DPP-25 and DPP-45 Series Printers
User's Guide

DPP-25 and DPP-45 Series Printers
User's Guide

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Preface

This document describes the features and operation of the DPP-25 and DPP-45 Series printers.

The manual is intended for users responsible for setting up, installing, and operating these printers.

The *DPP-25 and DPP-45 Series User's Guide* is organized as follows:

- Chapter 1 provides an overview of the features, specifications, and dimensions of the DPP-25 and DPP-45 Series printers.
- Chapter 2 describes how to set up the printers.
- Chapter 3 describes how to operate the printers.
- Chapter 4 describes how to change the configuration of the printers.

An index completes this manual.

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1

Overview

This chapter describes the features, general specifications, and dimensions of the DPP-25 and DPP-45 Series printers.

Features

The DPP-25 and DPP-45 Series printers provide the following standard features:

- 5 VDC input power operation.
- 6912 Character input buffer.
- Paper feed/reset/self-test input.
- Normal or inverted print.
- Underlined text.
- Double-wide, double-high, or double-wide AND double-high characters. You can mix normal and double-wide characters on any line.
- Bit image graphics mode using the EPSON line printer, ESC K protocol.
- Fast paper feed through the Paper Feed switch or through the "immediate feed command" (ESC J +n).
- Serial RS-232 interface, available on the DPP-25xxS and DPP-45xxS printers.

- Centronics interface, available on the DPP-25xxC and DPP-45xxC printers.
- Parallel interface, available on the DPP-25xxP and DPP-45xxP printers.

The following features are optional:

- 12 VDC power input (includes a linear regulator), available on the DPP-2512x and DPP-4512x printers.
- 120 VAC power input (includes the linear regulator and a 14 VAC, 20 VA wall mount transformer), available on the DPP-25ACx and DPP-AC12x printers.

The interface type and the power input used are indicated in the model number for the printer, as shown in Figure 1-1.

For example, a DPP-25 Series printer with the 12 VDC power input and the RS-232 serial interface is model number DPP-2512S. A DPP-45 Series printer with the 5 VDC power input and the parallel interface is model number DPP-4505P.

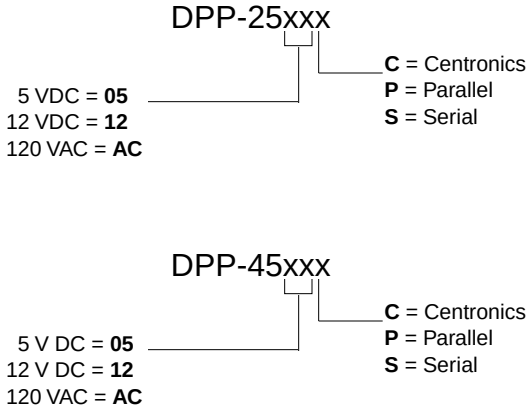

Figure 1-1. Printer Model Numbers

Specifications

Table 1-1 lists the general specifications of the DPP-25 and DPP-45 Series printers.

Table 1-1. General Specifications

Feature	DPP-25 Series Specifications	DPP-45 Series Specifications
Paper Width	57.5 mm 2.25 inches	57.5 mm 2.25 inches
Dots per line	166	252
Characters per line	24	42
Lines per second	1.7	1.0

Dimensions

Figure 1-2 shows the dimensions of the printers from the front with the front cover removed. Figure 1-3 shows the dimensions of the printers from the rear with the rear cover installed. Figure 1-4 shows the dimensions of the printers from the side with the rear cover removed. Figure 1-5 shows the dimensions of the printers from the side with the rear cover installed.

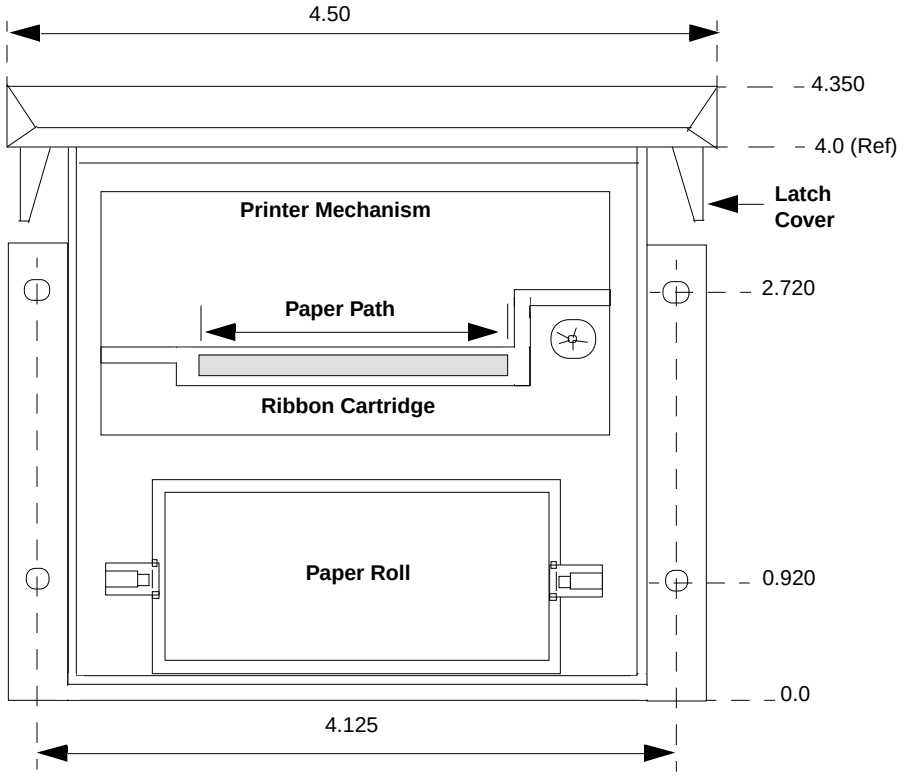

Figure 1-2. Printer Dimensions (Front View without Front Cover)

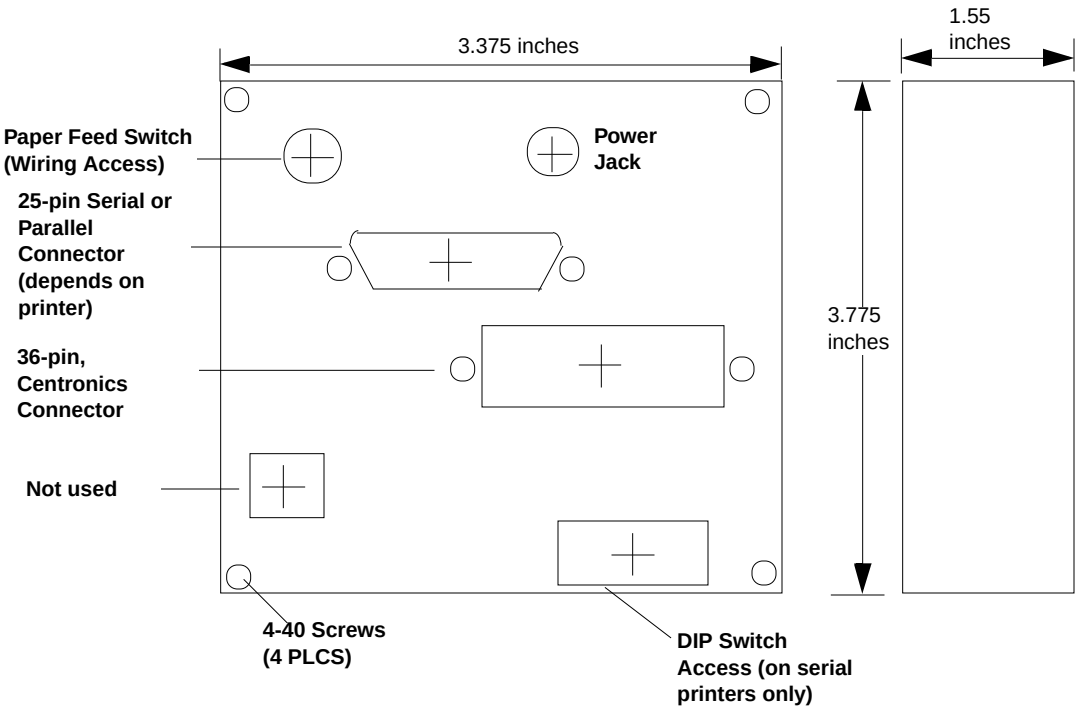

Figure 1-3. Printer Dimensions (Rear View with Cover)

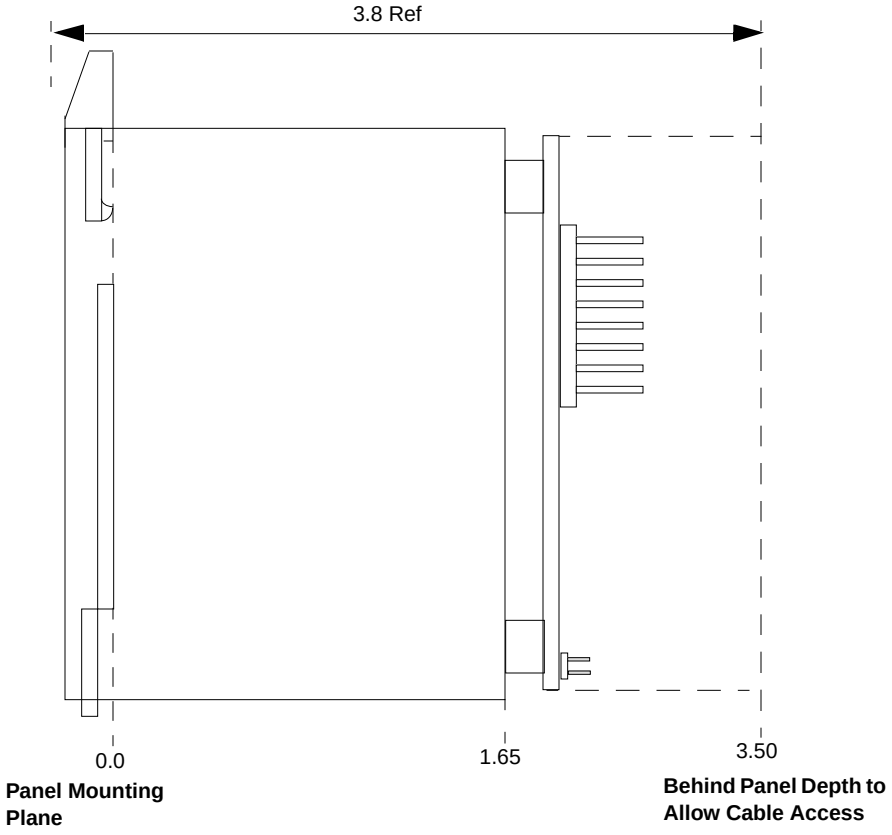

Figure 1-4. Printer Dimensions (Side View without Rear Cover)

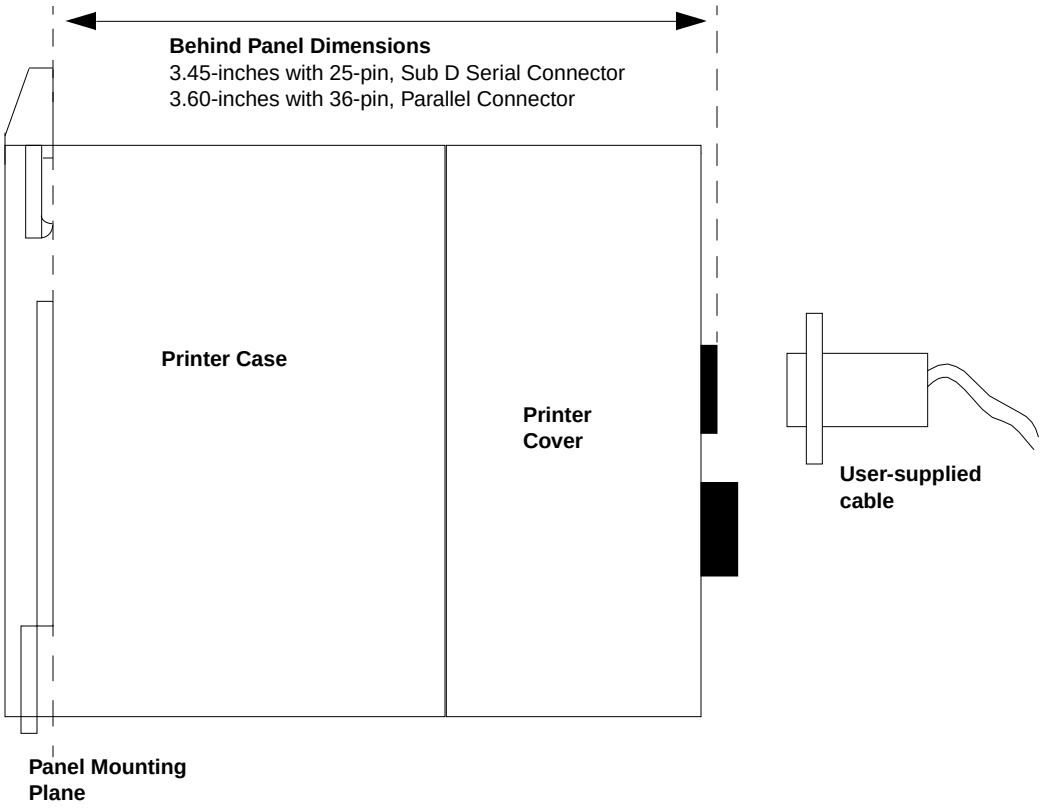

Figure 1-5. Printer Dimensions (Side View with Rear Cover)

2

Setting up the Printer

This chapter describes how to set up the printer, including how to

- Connect an I/O device to the printer
- Connect power to the printer
- Load or change the paper roll
- Change the ribbon cartridge
- Mount the printer in a panel

Refer to Chapter 3 for information on how to operate the printer; refer to Chapter 4 for information on how to change the printer configuration.

Connecting I/O Devices to the Printer

Refer to Figure 2-1 for the location of the I/O connectors on the printer.

If you are using a serial printer, connect the 25-pin, male connector end of the serial cable to the I/O connector on the rear panel of the printer; connect the other end to the I/O device.

If you are using a Centronics printer, connect the 36-pin, male connector end of the cable to the I/O connector on the rear panel of the printer; connect the other end to the I/O device.

If you are using a parallel printer, connect the 25-pin, female connector end of the cable to the I/O connector on the rear panel of the printer; connect the other end to the I/O device.

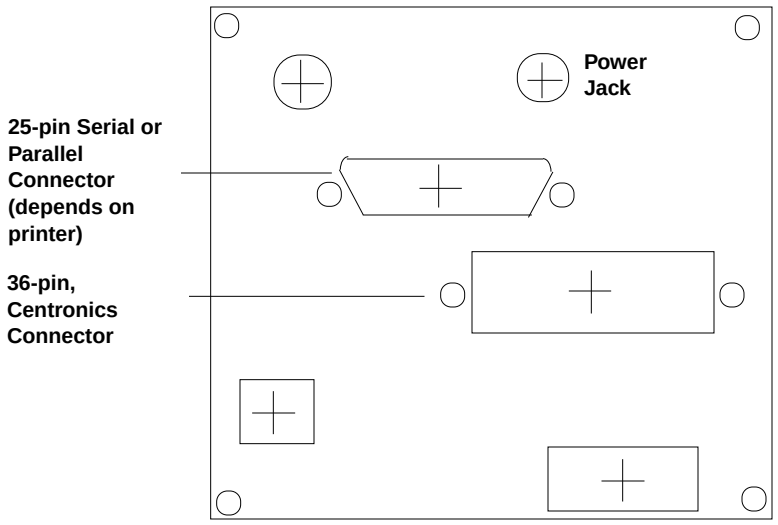

Figure 2-1. Connecting to the Printer

Connecting Power to the Printer

1. Attach the red and black wires of the supplied power cord to the corresponding terminals of the appropriate power supply:
   - 5 VDC power supply for printer models DPP-2505x and DPP-4505x
   - 12 VDC power supply for printer models DPP-2512x and DPP-4512x
   - 120 VAC power supply for printer models DPP-25ACx and DPP-45ACx
2. Insert the other end of the power cord into the power jack on the rear panel of the printer, as shown in Figure 2-1.

Loading or Changing the Paper Roll

To load or change the paper roll, perform the following steps:

1. Slide the front cover down as far as it will go (about 1/2 inch), as shown in Figure 2-2, and lift it off.

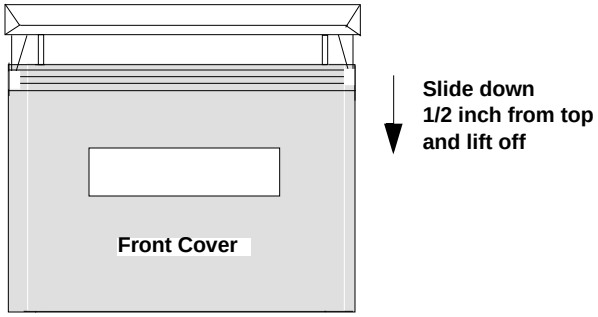

Figure 2-2. Removing the Front Cover

2. Locating the paper roll, use a rotating motion to lift first the left then the right end of the paper spindle, as shown in Figure 2-3.

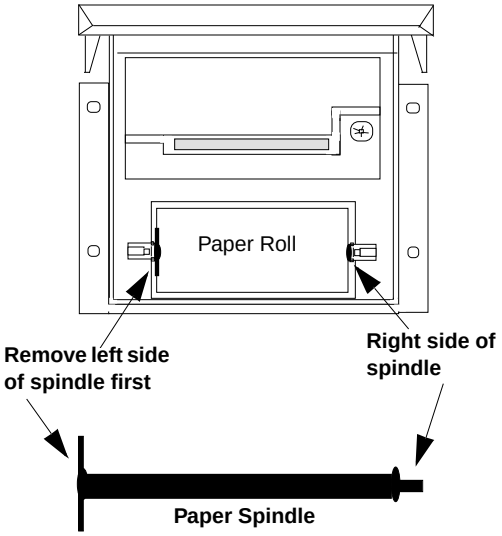

Figure 2-3. Removing the Paper Spindle

3. Insert the end of the new roll of paper into the paper slot of the printer mechanism with the paper coming off the roll at the bottom, as shown in Figure 2-4.

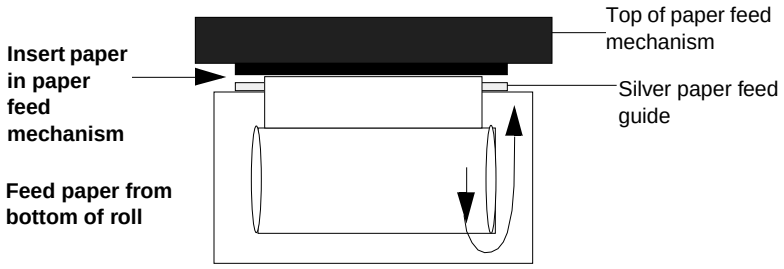

Figure 2-4. Loading the Paper into the Paper Feed Mechanism

4. With power supplied to the printer, press the Paper Feed switch until at least 3 inches of paper extend above the printer, as shown in Figure 2-5.

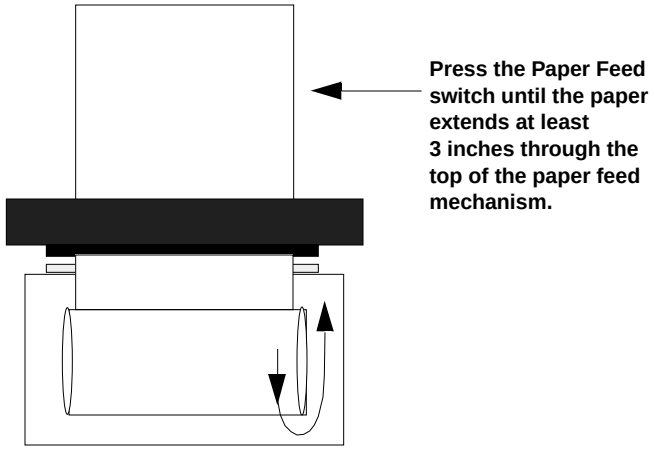

Figure 2-5. Feeding the Paper through the Paper Feed Mechanism

5. Slide the spindle into the new paper roll, being sure that the end with two shafts is on the left.

6. Place the spindle into its holder by inserting the right side first, followed by the left side, as shown in Figure 2-6.

   Ensure that the left side snaps into place.

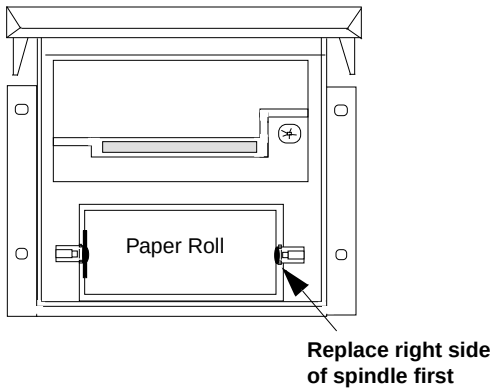

Figure 2-6. Replacing the Spindle

7. Feed the loose end of paper through the paper slot of the front cover and rest the cover flush on the base, 1/2 inch from the top, as shown in Figure 2-7.

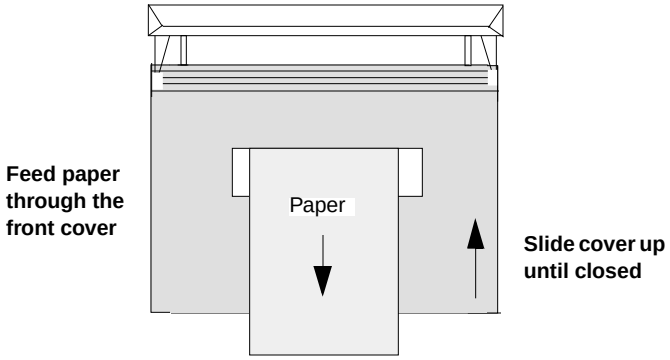

Figure 2-7. Feeding Paper through the Front Cover

8. Slide the front cover up and snap it into position.

Changing the Ribbon Cartridge

Note: Ignore this section unless your ribbon cartridge needs to be replaced.

To change the ribbon cartridge, perform the following steps:

1. Remove the front cover, as shown in Figure 2-2 on page 2-3.
2. With at least 3 inches of paper extending from the printer, press down on the left end of the ribbon cartridge to eject it, as shown in Figure 2-8.

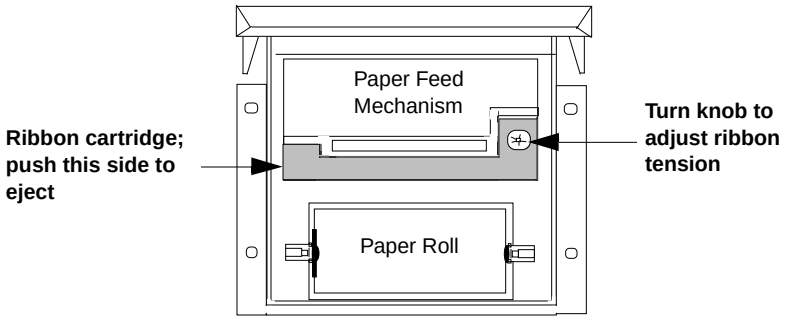

Figure 2-8. Ejecting the Ribbon Cartridge

3. Lift both ends of the ribbon cartridge to remove it.
4. Lower the new ribbon cartridge over the extended paper, turning the knob on the right end of the ribbon cartridge, as needed, to keep the ribbon tight.
5. Snap the new ribbon cartridge in place.
6. Replace the front cover as shown in Figure 2-5 on page 2-4.

Mounting the Printer

If you want to mount the printer into a panel, ensure that you choose a convenient location on the front panel for the Paper Feed switch. Figure 2-9 shows the dimensions required to mount the printer.

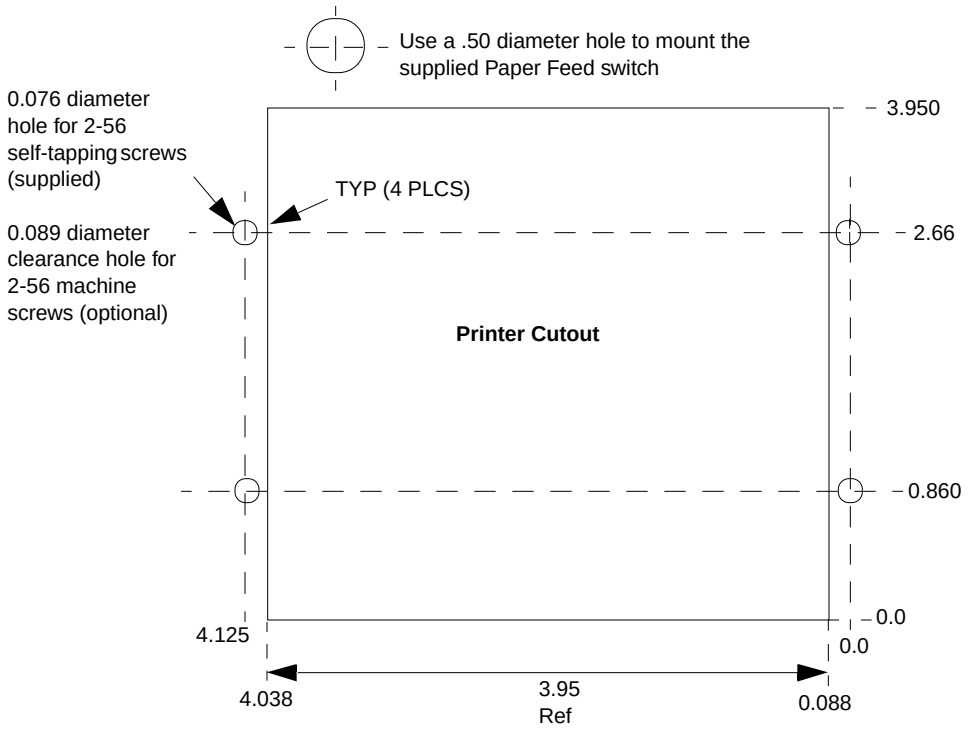

Figure 2-9. Mounting the Printer

3

Operating the Printer

This chapter describes how to operate the printer, including how to

- Perform a self test
- Use control codes
- Use escape sequences
- Use binary image graphics mode

Performing a Self Test

The self-test feature prints the version of the software installed, the model of the printer connected, various setup parameters (such as the interface type and communication parameters), followed by the entire alphabet.

To perform the self test, press the Paper Feed switch when turning on power or use the ESC T command, described on page 3-3.

Using Control Codes

Table 3-1 describes the codes you can use to control the DPP-25 and DPP-45 Series printers.

Table 3-1. Control Codes

Hexadecimal Value	Decimal Value	Name	Description
0A	10	LF	Prints the contents of the printer buffer without moving the column pointer, and clears double-high mode.
0D	13	CR	Prints the contents of the printer buffer, moves the column pointer to the left margin, and clears double-high mode.
0E	14	SO	Sets double-wide[1] print mode for text. Single-wide and double-wide print can be intermixed on any print line. Double-wide stays in effect until the clear double-wide command is received.
0F	15	SI	Sets double-high[2] print mode for text and/or bit image graphics (see page 3-4). Double-high printing is on a line-by-line basis. The line is single-high or double-high depending on the mode when a line is printed. Double-high print mode is cleared when the clear double-high command is received or whenever a line is printed. The print can be due to any of the print commands or to a line length overflow.
14	20	DC4	Clears double-wide print mode.
15	21	NAK	Clears double-high print mode.
1B	27	ESC	Escapes header. See the next section for more information.

Notes
[1] You can mix double-wide and normal-wide characters on any line.
[2] Double-high print mode causes the entire line to be double high.

Using Escape Sequences

An escape sequence is the ESC character immediately followed by the appropriate byte(s) to complete the sequence, where *+n* refers to another byte and *+s* refers to more than 1 byte to complete the command sequence. Abbreviations used are as follows:

- NC = Number Of Characters per line
- ND = Number Of Dots per line
- DL = Dot Line
- CL = Character Line
- LM = Left Margin (default = 1)
- RM = Right Margin (default = NC)
- BI = Bit Image graphics

The escape sequences supported by the DPP-25 and DPP-45 Series printers are described in Table 3-2.

Table 3-2. Escape Sequences

Hexadecimal Value	Decimal Value	Name	Description
+n 20	32	(sp)	Tabs to character position *n*. Range = 1 to RM. This command is ignored if *n* is out of range. *n* is for single-wide character positions even if double-wide mode is selected at the time.
+n 24	36	$	Tabs to dot position *n*. Range = 1 to RM*6. This command is ignored if *n* is out of range.[1]
+n 2D	45	-	Selects underline mode. OFF is *n*=0 , ON is *n*=1.
30	48	0	Sets line spacing to 9 DL/CL (default).
31	49	1	Sets line spacing to 8 DL/CL (no BI space).
32	50	2	Sets line spacing to 12 DL/CL.
40	64	@	Initializes printer.

Table 3-2. Escape Sequences (cont.)

Hexadecimal Value	Decimal Value	Name	Description
+n 41	65	A	Sets line spacing to *n* DL/CL. *n* = 0 to 8 is treated as *n* = 8. *n* = 9 to 127 is treated as *n*. *n* > 127 is treated as (*n* – 128).
+n 43	67	C	Causes a pause while the controller tries to activate an autocutter. These printers have no provision for driving an autocutter.
+n 4A	74	J	Prints, if needed, then fast feeds paper *n* DL. The column counter is not changed.
+s 4B	75	K	Selects bit image mode. See “Using Bit Image Graphics Mode” on page 3-4 for more information.
54	84	T	Runs a self test. See “Performing a Self Test” on page 3-1 for more information.
+s 58		X	Sets margins. +s = two more bytes (*n*1 and *n*2), which defines the leftmost and rightmost character positions to use for printing. Range = 1 to NC. This command is ignored if either *n*1 or *n*2 = 0, or if *n*1 = *n*2 and both are in range. One byte greater than NC is treated as *n* = NC. If both bytes are greater than N, the right margin is set to NC and the left margin is set to NC – 1.

Notes

[1] If the margins are changed with the ESC X +s command, either tab command can still tab back to position 1, but RM sets the right limit of printing.

Using Bit Image Graphics Mode

Bit image (BI) graphics mode uses the ESC K protocol. This protocol is similar to EPSON line printers; however, because DPP-25 and DPP-45 Series printers have a fixed number of dot positions (ND), limitations exist.

If more data is specified than the printer is capable of printing, the first ND (left part) is printed and the remaining columns of data are ignored (truncated to ND). If you change the margins with the ESC X +s command, then the effective ND is also changed.

The protocol is as follows:

```
ESC K n1 n2 (n2*256 + n1 bytes of data) PRINT
```

For example, the following line prints 272 columns of bit image graphics (truncated at ND columns):

```
1Bhex K 16dec 1dec (272 bytes of data) 0Dhex
```

If the number of bytes = N, the values of *n*1 and *n*2 are as follows:

- *n*1 (LSB) is the remainder of dividing N by 256 (N MOD 256).

  The range is 0 (decimal) to 255 (decimal) but any number larger than the number of dots per line is truncated.

- *n*2 (MSB) is the integer quotient of dividing N by 256 (INT(N/256)).

  Any data for *n*2 > 0 (decimal) is truncated.

The character line spacing remains in effect; therefore, if you want to print the graphics on adjacent character lines with no blank dot lines in between, set the line spacing by sending ESC 1 (8 DL/CL).

The first byte of data is printed in the current dot position as a vertical group of 8 dots, defined by the data byte. The most significant bit of the byte is printed at the top of the group of dots; the least significant bit is printed at the bottom of the group of dots. (If the appropriate bit is a logical 1, a dot is printed. If the bit is 0, nothing is printed at that position).

The second byte is printed in the next dot position and so on, until byte *n*1 + (*n*2 x 256) is printed. Printing does not occur until a print command is received or until more than ND bytes of data are received.

Graphics data and ASCII text data can be printed on the same line by printing only when all the required data is in the printer's input buffer. Printing occurs if a print command is received or if the ND counter is greater than the ND for the printer.

Paper is automatically advanced one dot line as each dot line is printed. The printer’s motor is turned off anytime the next line of data is not ready to be printed or when the printer completes the previous character line. Before any printing can be done, the motor must be turned on for one shuttle to synchronize the printer; this causes the paper to feed one dot line.

Note: To avoid blank dot lines from occurring between each 8 dot lines of bit image graphic data, the data must be sent at a rate fast enough to stay ahead of the printer.

An IBM PC/XT (8088 at 4.8 MHz) running a BASICA program does not send data fast enough, even to the parallel port. Sending a few print commands before a routine to print bit image graphic data can keep the printer busy long enough for the computer to send several lines of data to the printer's buffer.

4

Changing the Printer Configuration

This chapter describes how to change the configuration of the printer for various operations.

Locating the Components

Figure 4-1 shows the rear view of the serial printers with the rear cover removed.

Figure 4-2 shows the rear view of the Centronics and parallel printers with the rear cover removed.

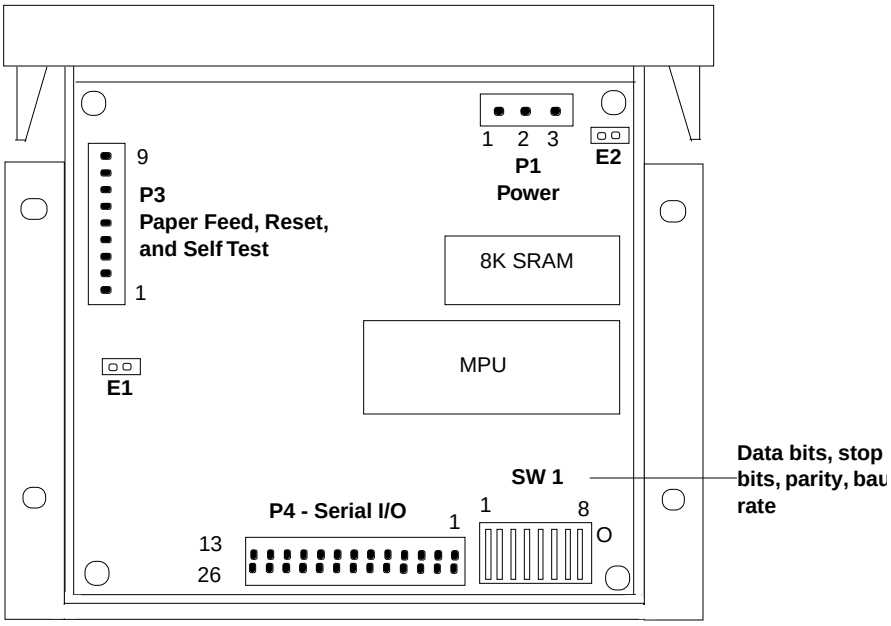

Figure 4-1. Rear View of Serial Printers

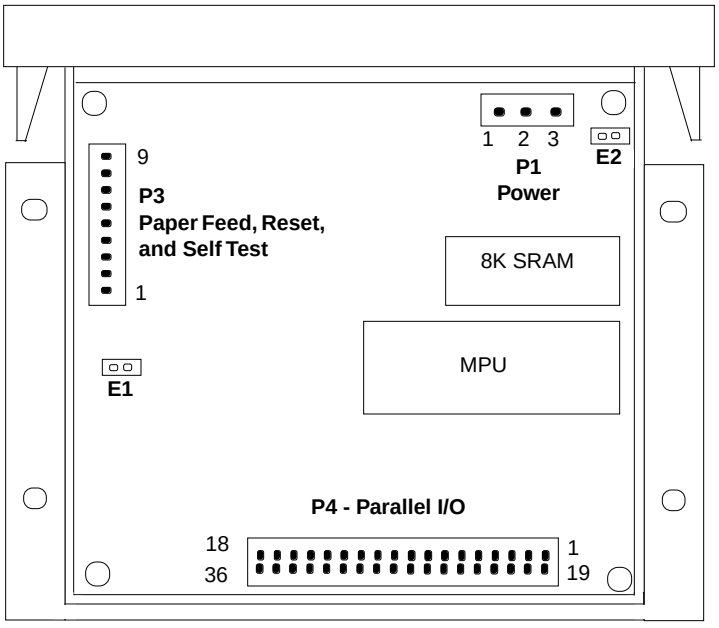

Figure 4-2. Rear View of the Centronics and Parallel Printers

Notes: For the serial printers, the 26-pin serial connector (P4) mates to a DB25, 25-pin connector on the rear cover.

For the Centronics printers, the 36-pin connector (P4) mates to a 36-pin Centronics connector on the rear cover.

For the parallel printers, the 36-pin connector (P4) mates to a 25-pin parallel connector on the rear cover.

The following subsections describe how to adjust the printer settings using the components shown.

Connecting Power - P1

Power is available through the P1 power connector. The pin assignments of connector P1 are described in Table 4-1.

Table 4-1. P1 - Power Connector Pin Assignments

Pin	Name	I/O	Description
1	GND	Input	Common
2	5	Input	+5 V
3	+V	Input	Strapped through E2 to +5 V. E2 can be cut and +V can be applied at this pin, if desired, to power the mechanism separately from the +5 V logic supply.

The power requirement is regulated +5 VDC voltage.

The current requirements are as follows:

- Standby, which means ON but not printing, requires 25 mA typical (CMOS logic).
- With DPP-25xxx series printers, printing typical ASCII text requires 4.5 A peak and 1.0 A average.

Average current varies depending on the density of dots printed.

Note: The P1 connector is available from Molex as part# 09-74-103. The posts of the connector are 1 x 3, 0.045-inch square, L/R.

Feeding the Paper, Resetting the Printer, or Performing a Self Test - P3

The paper feed, reset, and self-test functions are available through connector P3. The pin assignments of connector P3 are described in Table 4-2.

Table 4-2. P3 - Paper Feed and Reset Connector Pin Assignments

Pin[1]	Name	I/O	Description
9[2]	/PF	Input	Low = paper feed; Low at power on = self test (see page 3-1).
7	-	Input	No connection.
6	/RST	Input	Low pulse yields reset.
4	PE	Input	Normally connected to ground by a strap at E1. If the strap is cut, a high input at this pin means the printer is out of paper.
1	IS	Output	Current source for PE LED.

Notes
[1] Pins 2, 3, 5, and 8 are grounds.
[2] By default, this pin is connected to the Paper Feed switch, described on page 4-5.

No paper-out sensor is furnished. If you add a paper-out sensor, you must cut the etch between the two pads at jumper pad E1. This allows you to use pin 4 of connector P3 as a paper-out input signal from the paper-out sensor you supply.

A 12-inch cable assembly, which includes the mating connector for P3 and a push button Paper Feed switch, is furnished with all printers. The Paper Feed switch is required to load paper.

Note: Connector P3 is available from Molex as part# 22-03-2091. The posts of the connector are 1 x 9 0.025-inch square.

Changing the Communication Parameters - SW1 (Serial Printers Only)

DIP switch SW1 is provided for serial printers only. Use DIP switch SW1 to change the communication parameters for the DPP-25xxS and DPP-45xxS printers. Table 4-3 describes the DIP switch settings.

Table 4-3. DIP Switch Settings (Serial Printers Only)

Position	ON =	OFF =
8	Normal (default)	Inverted print
7	–	DPP-25 or DPP-45 Series printer (default)
6	7 data bits	8 data bits (default)
5	odd parity	even parity (default)[1]
4	enable parity	disable parity (default)
3	BR3[2] on	BR3 off (default)
2	BR2[2] on	BR2 off (default)
1	BR1[2] on (default)	BR1 off

Notes
[1] This setting is ignored by default since the default setting disables parity.
[2] See Table 4-4 on page 4-6. The default baud rate is 9600.

Note: 7 data bits, no parity, and 1 stop bit is NOT a valid combination to send to the printer.

Table 4-4 describes the available baud rate settings that you can set using DIP switch SW1.

Table 4-4. Baud Rate Settings

Baud Rate	BR3 Setting	BR2 Setting	BR1 Setting
150	on	on	on
300	on	on	off
600	on	off	on
1200	on	off	off
2400	off	on	on
4800	off	on	off
9600 (default)	off	off	on
19200	off	off	off

Connecting I/O - P4

Connector P4 provides the I/O interface to your printer, but uses different hardware and has different functionality depending on the printer you are using.

The following subsections describes the implementation of the P4 connector and the timing for each I/O interface.

RS-232 Serial Interface

For the DPP-25xxS and DPP-45xxS printers, connector P4 provides an RS-232 serial interface. Table 4-5 describes the pin assignments of connector P4 for these printers.

Table 4-5. P4 Connector, RS-232 Interface Pin Assignments

Pin	Name	I/O	Description
2	XD	output	RS-232 transmitted data (no function)
3	RD	input	RS-232 received data
7	GND	-	Logic ground
20	DTR	output	Hardware handshake line

The serial timing of the RS-232 interface is shown in Figure 4-3.

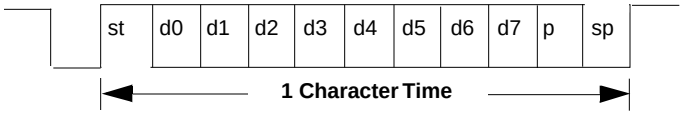

Figure 4-3. Serial Timing

The definitions of these bits is as follows:

- st = start bit
- sp = stop bit
- p = parity bit (optional)
- d0 to d7 = data bits. d7 is optional unless needed for graphics. The width of each bit depends on the baud rate.

The length of the data byte must be 10 bits minimum. 7 data bits, no parity, and 1 stop bit is not a valid combination to send to the printer. The polarity shown (start bit high and stop bit low) is for RS-232 voltage levels of serial data stream.

Note: For serial printers, connector P4 uses 2 x 13, 0.025-inch square posts.

Centronics and Parallel Interfaces

For the DPP-25xxC and DPP-45xxC printers, connector P4 provides a Centronics interface; for the DPP-25xxP and DPP-45xxP printers, connector P4 provides a parallel interface. Table 4-6 describes the pin assignments of connector P4 for these printers.

Table 4-6. P4 Connector, Centronics and Parallel Interfaces

Pin[1,2]	Name	I/O	Description
1	/STB	input	Active low pulse to send data to printer
2	D0	input	ASCII data bit 0 (LSB)
3	D1	input	ASCII data bit 1
4	D2	input	ASCII data bit 2
5	D3	input	ASCII data bit 3
6	D4	input	ASCII data bit 4
7	D5	input	ASCII data bit 5
8	D6	input	ASCII data bit 6
9	D7	input	ASCII data bit 7 (MSB)
10	/ACK	output	Active low pulse when data is accepted
11	BUSY	output	High level when printer cannot accept data
12	PE	output	High level when printer is out of paper (no paper out sensor is furnished)
31	/INIT	input	Low pulse resets the printer
32	/ERROR	output	Normally high, low = error condition

Notes

[1] For the Centronics interface, pins 13 and 35 are pulled up to +5 V; pins 16, 17, 19 to 30, and 33 are grounds; pins 14, 15, 18, 34, and 36 are not connected.

[2] For the parallel interface, pins 13 and 15 are pulled up to +5 V; pins 18 to 25 are grounds; pins 14, 16, and 17 are not connected.

The timing used for the Centronics and parallel printers is shown in Figure 4-4.

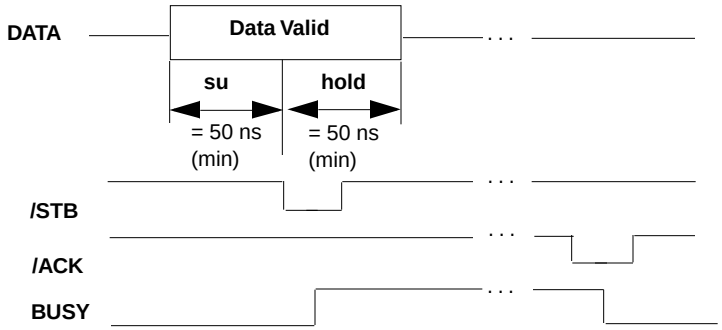

Figure 4-4. Centronics and Parallel Timing

The terms used in Figure 4-4 are described as follows:

- su = setup time

  DATA VALID to /STB LOW = 50 ns (min)
- hold = hold time

  /STB LOW to DATA can change = 50 ns (min)
- /STB width = 20 ns (min)
- /ACK width = 0.5 μs (typical)
- /STB LOW to BUSY high = 40 ns (typical)

Note: For the Centronics printers, connector P4 uses 2 x 18, 0.025-inch square posts.

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