Model 2000 Series
Ruggedized Dot Matrix Printer

Operation and Maintenance Manual

DataMetrics™

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1. CONFIGURATION

1.1. Introduction

This chapter defines the configuration of a specific Model 2x00 printer. Information is provided concerning system configuration (Table 1-1), field-replaceable units (Table 1-2), external cabling (Table 1-3), and external connector signal assignments (Table 1-4).

Table 1-1. System Configuration

Characteristic	Description
Top Assembly Part No.	202000-001
Paper-Feed Configuration	External Feed
Installation Configuration	Tabletop

Table 1-2. Field Replaceable Units

Description	Part No.
Print Engine Assembly	200014-001
Control Panel Interface	200094-001
Power Supply Assembly	200179-002
Circuit Breaker Assembly	200220-002
Ribbon Cassette	302000-095 (1)
Controller Board	302000-098
Line Filter	600011-001
Control Panel	700002-001

(1) Equivalent to Panasonic order number KX-P160.

Table 1-3. External Cables

Description	Part No.
AC Power Cable	200199-003

Table 1-4. External Connector Signal Assignments

Connector	Function	Pin	Signal
J1	Prime Power	1	HOT
		2	NEUTRAL
		3	CHASSIS GROUND
J2	Parallel Data	1	DATA STROBE*
		2	DATA BIT 1
		3	DATA BIT 2
		4	DATA BIT 3
		5	DATA BIT 4
		6	DATA BIT 5
		7	DATA BIT 6
		8	DATA BIT 7
		9	DATA BIT 8
		10	ACKNOWLEDGE*
		11	BUSY
		12	PAPER OUT
		13	SELECT
		14	AUTO FEED XT*
		15	Not used
		16	SIGNAL GROUND
		17	CHASSIS GROUND
		18	+5V
		19	DATA STROBE RETURN
		20	DATA BIT 1 RETURN
		21	DATA BIT 2 RETURN
		22	DATA BIT 3 RETURN
		23	DATA BIT 4 RETURN
		24	DATA BIT 5 RETURN
		25	DATA BIT 6 RETURN
		26	DATA BIT 7 RETURN
		27	DATA BIT 8 RETURN
		28	ACKNOWLEDGE RETURN
		29	BUSY RETURN
		30	PRIME RETURN*
		31	PRIME*
		32	ERROR*
		33	SIGNAL GROUND
		34	Not used
		35	Not used
		36	SELECT IN*

2. GENERAL INFORMATION

2.1. Introduction

This manual provides information and instructions required for the operation and maintenance of the Model 2000 dot matrix printer manufactured by Peripheral Equipment Corporation.

2.2. Applicable Documents

Military Standards

MIL-STD-461C	Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference
MIL-STD-810E	Environmental Test Methods

2.3. Printer Description

The Model 2x00 printer is a ruggedized, general-purpose dot matrix printer that is configured in a single enclosure. The equipment is packaged using environmental management techniques that protect internal components from shock, vibration, temperature extremes, and EMI/RFI. The Model 2000 printer (Figure 2-1) is provided in a tabletop configuration. The Model 2100 (Figure 2-2) is a rack-mount configuration. The tabletop configuration operates with externally fed paper. The rack-mount configuration utilizes paper fed from an internal roll. The printer includes the following primary functional elements:

- Power subsystem
- Printing subsystem
- Control panel
- External interfaces

2.3.1. Power Subsystem

The printer operates with either 115 Vac or 230 Vac input power. The power subsystem includes a line filter, power switch/circuit breaker, and power supply.

2.3.2. Printing Subsystem

The printer incorporates a Panasonic Model KX-P2130 dot matrix print engine that provides letter quality (30 x 24 dpi) resolution with a minimum print speed of 56 cps. Print speeds up to 250 cps are supported in draft mode. The printer controller includes a 14 Kbyte buffer that is expandable to 46 Kbyte. The printer may be operated with any host computer that supports Windows or DOS operating environments. The printer supports Epson LQ-860 and IBM Proprinter X24E emulation with a variety of fonts and character sets. Printing is accomplished in bidirectional mode. Printed paper exits the chassis through an aperture in the top cover of the unit. The Model 2000 printer supports page widths of 4 to 11.7 inches and lengths of 5 to 14.3 inches. The Model 2100 printer supports A and A4 size page widths and lengths of 5 to 14.3 inches.

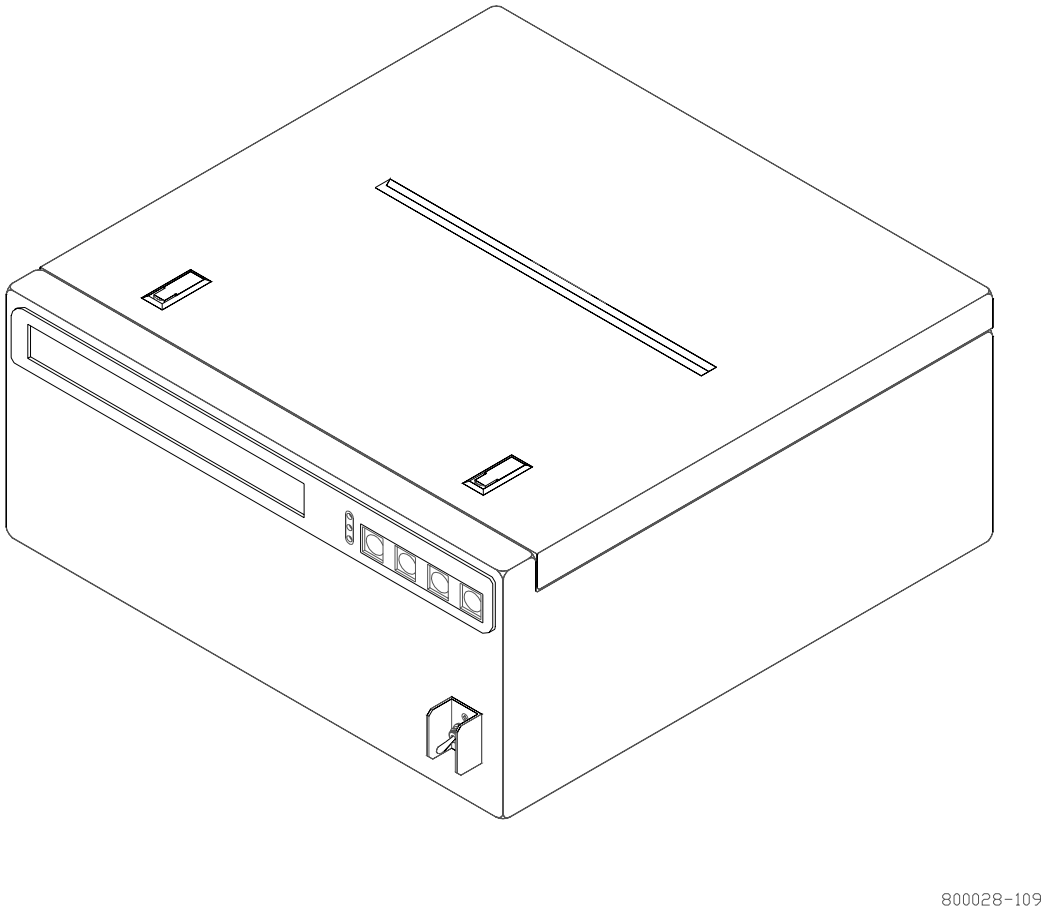

Figure 2-1. Tabletop/External Paper Feed Configuration

2.3.3. Control Panel

The control panel is located at the printer front panel. This panel is the operator interface for print operations other than those controlled from the host computer. Controls and indicators are described in Chapter 4.

2.3.4. External Interfaces

The rear panel of the printer includes connectors for prime power and the host computer data interface. A chassis ground lug is located on the rear panel adjacent to the power connector. The printer incorporates a Centronics parallel data interface. External connector assignments are identified in Chapter 1.

2.4. Specifications

Equipment specifications for the Model 2x00 printer are defined in Tables 2-1 through 2-4.

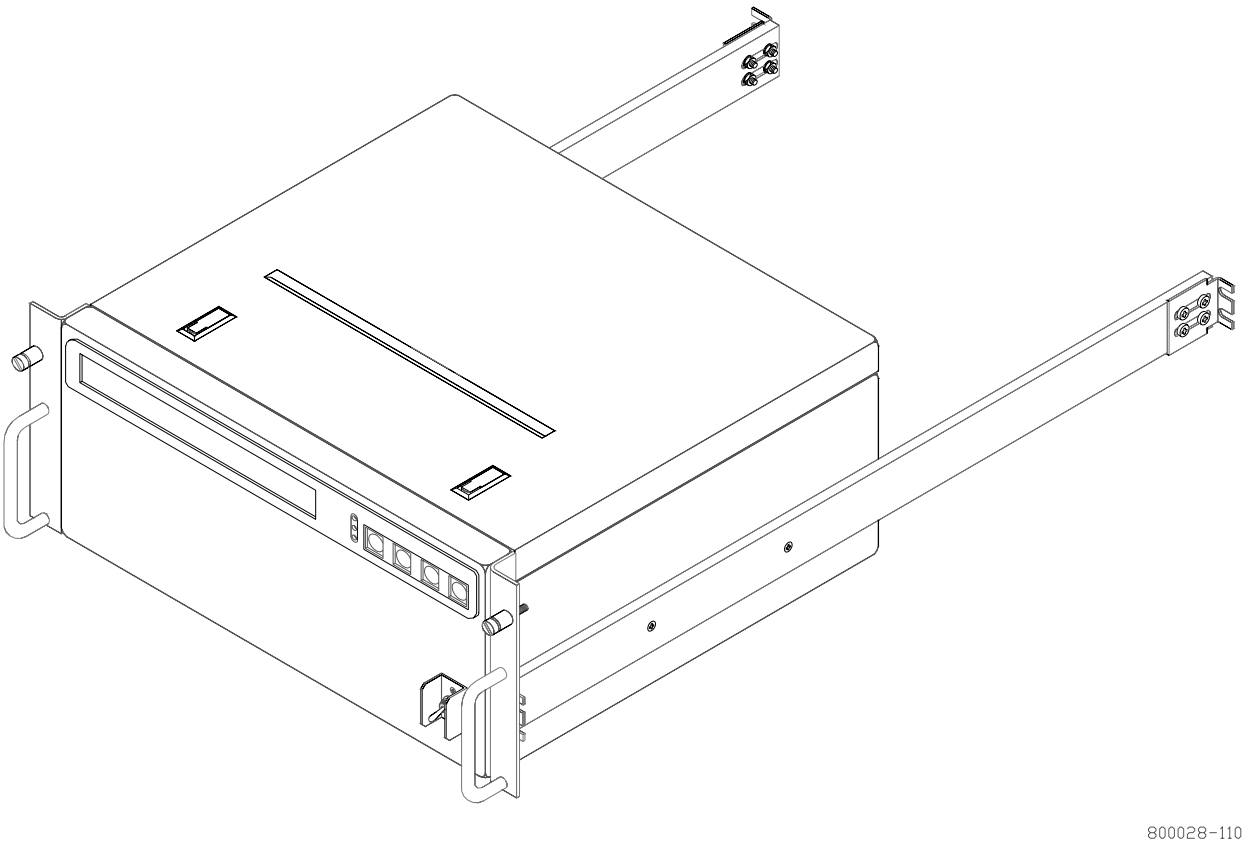

Figure 2-2. Rack Mount/Internal Paper Feed Configuration

Table 2-1. Physical Specifications

Characteristic	Description
Dimensions	
Tabletop configuration	16.9” wide x 7.25” high x 16.5” deep
Rack-mount configuration	19” wide x 7.25” high x 15.5” deep (1)
Weight	
Tabletop configuration	22 lb.
Rack-mount configuration	25 lb.

(1) Excluding handles.

Table 2-2. Electrical Specifications

Characteristic	Description
Input Voltage (1)	92 to 132 Vac 184 to 265 Vac
Input Frequency	47 to 440 Hz
Output Current	
5 Vdc	2 A
39 Vdc	6 A
Power Consumption	37/60 W (2)

(1) Auto-selecting for 115 Vac or 230 Vac source.
(2) Idle/active printing mode.

Table 2-3. Environmental Specifications

Characteristic	Description
Temperature	
Operating	-25 to 55°C
Nonoperating	-40 to 70°C
Relative humidity (noncondensing)	10 to 90%
Altitude	
Operating	15,000 feet
Nonoperating	50,000 feet
Vibration	MIL-STD-810E, Method 514.4, Procedure I.
Shock	MIL-STD-810E, Method 516.4, Procedure VI.
Inclination	Up to 45° off-level on any axis
EMI/EMC	MIL-STD-461C, Methods CE01, CE03, CS01, CS02, CS06, RE02, RS02, and RS03.
Fungus	MIL-STD-810E, Method 508.4.

Table 2-4. Printer Performance Specifications

Characteristic	Description
Fonts	
Draft	Pica, Elite, and Micron.
Letter quality	Roman, Sans Serif, Courier, Prestige, Script, OCR-B, and Bold PS.
Character sets	96 regular and italic ASCII characters
	33 international characters (14 countries and Legal set)
	158 IBM-PC special characters
	38 multilingual characters
Dot configuration	
Diameter	0.2 mm
Matrix	9 x 24 (draft) and 30 x 24 (letter quality)
Pitch	Draft: 0.21 (horizontal) x 0.14 mm (vertical)
	Letter quality: 0.07 (horizontal) x 0.14 mm (vertical)
Characters per inch (cpi)/ per line (cpl)	Pica: 10 cpi/80 cpl
	Elite: 12 cpi/96 cpl
	Micron: 15 cpi/120 cpl
	Compressed: 17 cpi/137 cpl
	Elite compressed: 20 cpi/160 cpl
	Pica elongated: 5 cpi/40 cpl
	Elite elongated: 6 cpi/48 cpl
	Micron elongated: 7.5 cpi/60 cpl
	Compressed elongated: 8.5 cpi/68 cpl
	Elite compressed elongated: 10 cpi/80 cpl
Printing speed {characters per second (cps)}	
Micron	250 cps (draft) and 83 cps (letter quality)
Elite	200 cps (draft) and 67 cps (letter quality)
Pica	167 cps (draft) and 56 cps (letter quality)
Service life	
Printhead	200 million strokes for black ribbon in draft mode
Ribbon	3 million characters for black ribbon in draft mode

2.5. Options

The Model 2x00 printer may be configured with the optional features listed in the following paragraphs.

2.5.1. Memory Buffer

The standard memory buffer (14 Kbyte) may be increased to 46 Kbyte by incorporation of a 32 K expansion buffer chip.

2.5.2. RS-232 Interface

The printer may be configured with a parallel-to-serial converter that allows the unit to operate with an RS-232 data interface.

2.5.3. Ethernet Interface

The printer may be configured with an Ethernet print server that allows the unit to operate with a 10Base2 or 10Base-T data interface.

2.5.4. 28 Vdc Input Power

The printer may be configured with a dc power supply that allows the unit to operate with 28-volt input power.

3. INSTALLATION

3.1. Introduction

This chapter provides information and instructions required for installation of the Model 2x00 printer. Information is included concerning unpacking, ribbon and paper installation, connection of external cabling, software installation, setup utilities, and storage.

3.2. Chassis Installation Configuration

Model 2100 (rack mount) chassis outline dimensions are identified in Figure 3-1.
Model 2000 (tabletop) dimensions are identified in Figure 3-2. The mounting footprint for the tabletop configuration is shown in Figure 3-3.

3.3. Unpacking

Follow the steps listed below to unpack the printer and prepare the unit for installation. Packing materials should be retained for future use.

a. Carefully remove the printer from the shipping container. Inspect the unit for any evidence of damage.

b. Open the top cover of the printer and remove the plastic retainer from the printhead carriage guide bar.

3.4. Ribbon Installation

Follow the procedure defined below to install a ribbon cassette in the printer. Refer to Figures 3-4 and 3-5.

a. Open the top cover of the printer and power up the unit to center the ribbon carriage.

b. Adjust the head gap lever to the “6” position.

c. Rotate the knob on the ribbon cassette clockwise to remove any slack.

d. Position the ribbon cassette over the printhead. Angle the ribbon cartridge down and position it under the retaining bracket. Ensure that the ribbon is located between the printhead nose and the ribbon mask. Gently press down on the cassette until it snaps into place.

e. Adjust the head gap lever for the thickness of paper used {1 (thin) to 6 (thick)}. A head gap setting of 2 or greater is recommended for normal operation.

f. Close the top cover of the printer and power down the unit (if required).

3.5. Paper Installation

Follow the procedure defined below to install paper in the printer. Refer to Figures 3-4 and 3-5.

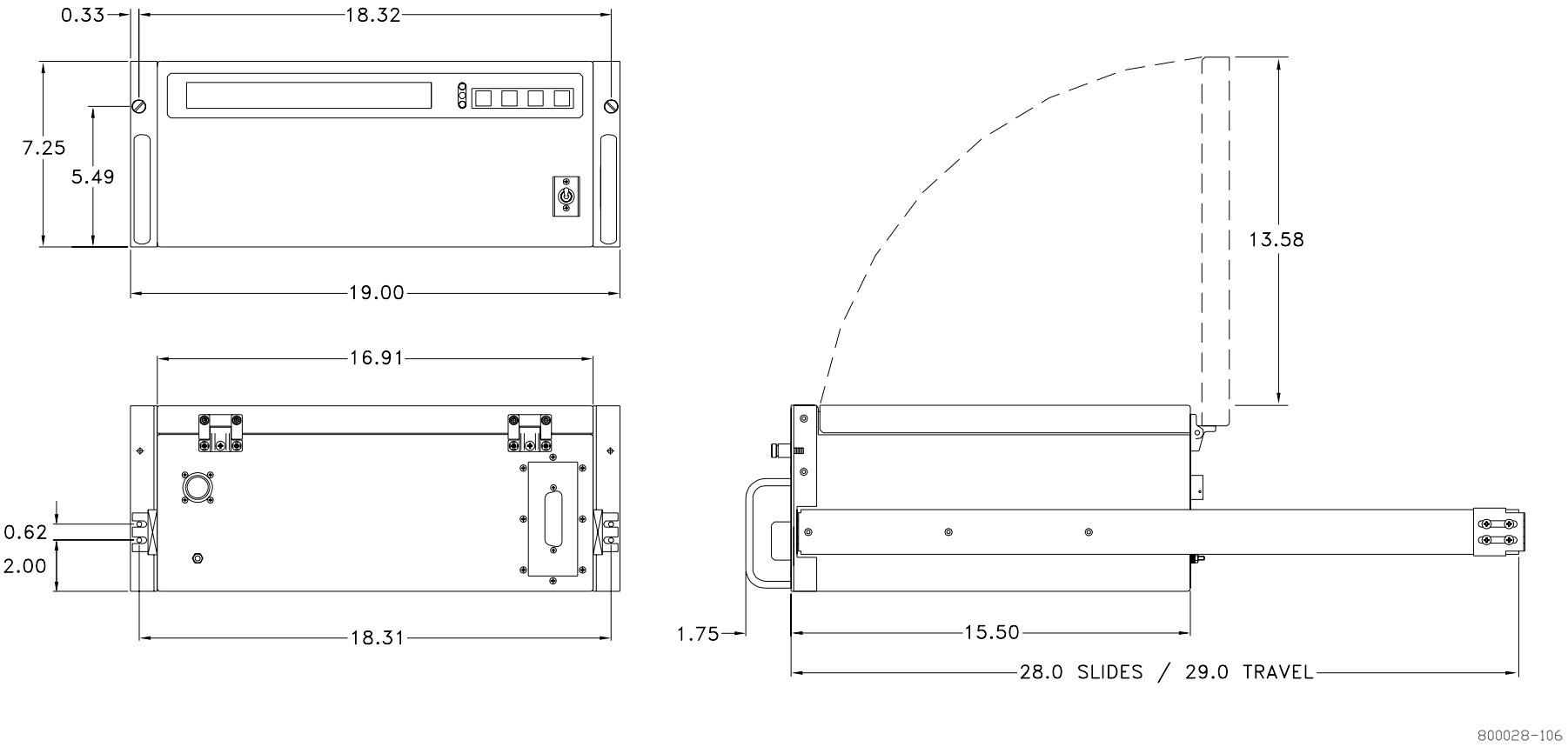

Figure 3-1. Rack Mount/Internal Paper Feed Configuration Installation Dimensions

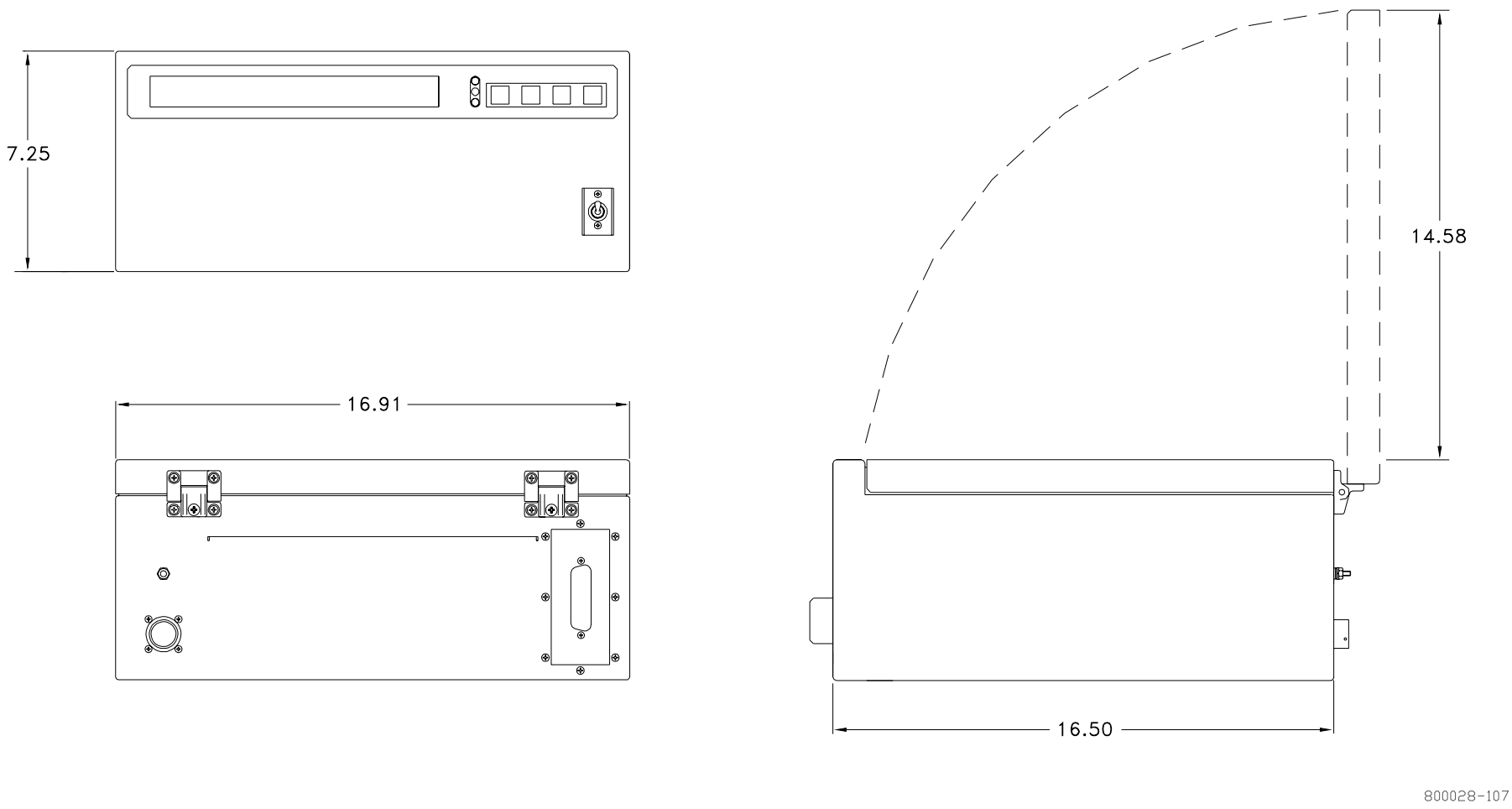

Figure 3-2. Tabletop/External Paper Feed Configuration Installation Dimensions

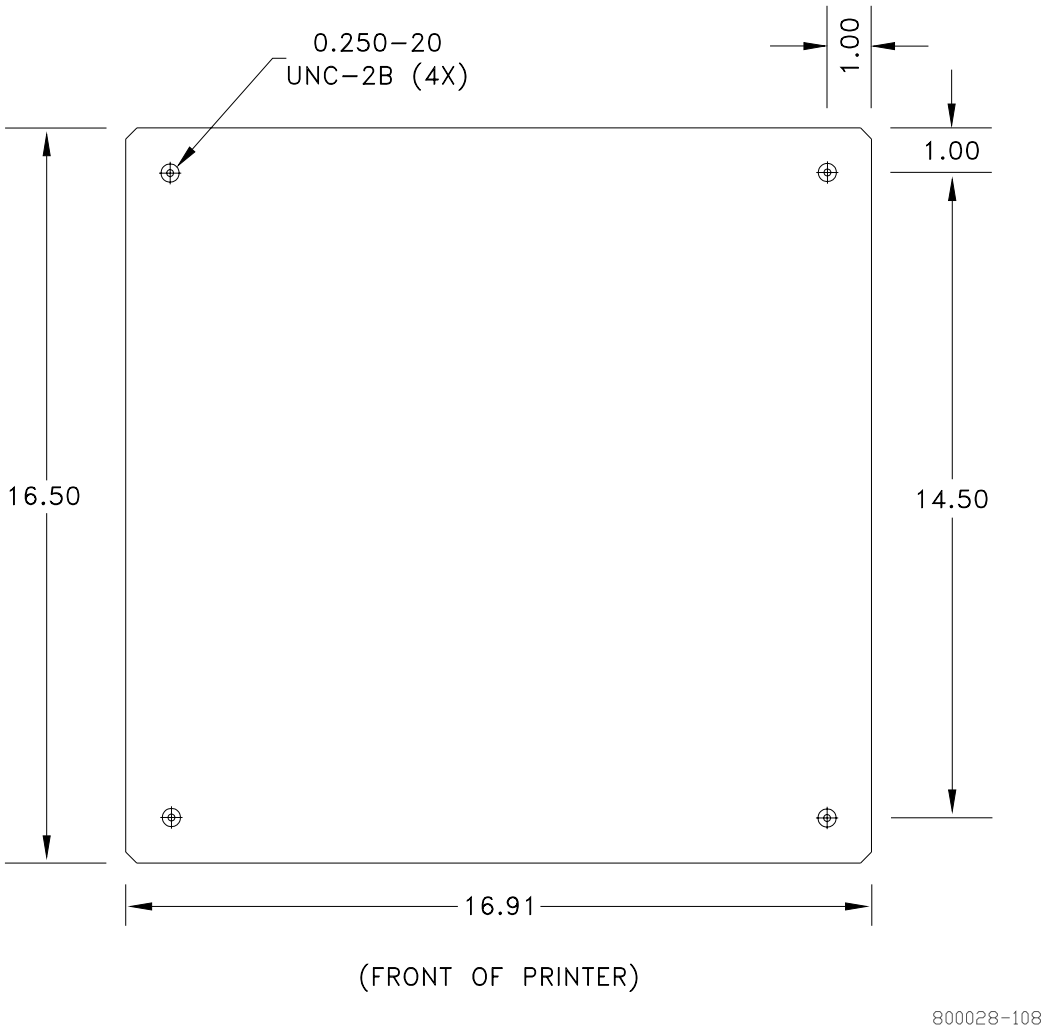

Figure 3-3. Tabletop Configuration Mounting Footprint

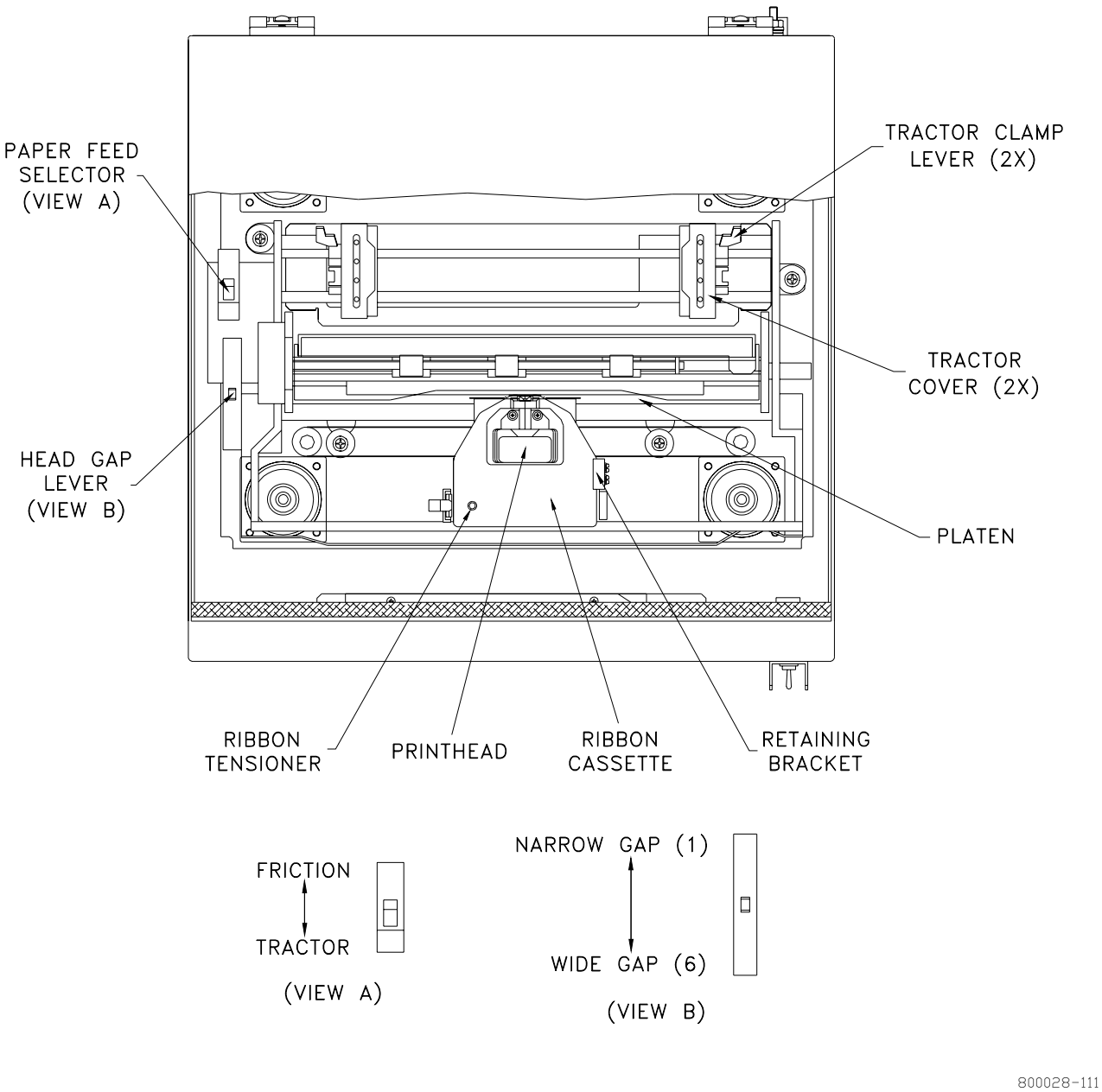

Figure 3-4. External Feed Configuration Ribbon and Paper Installation

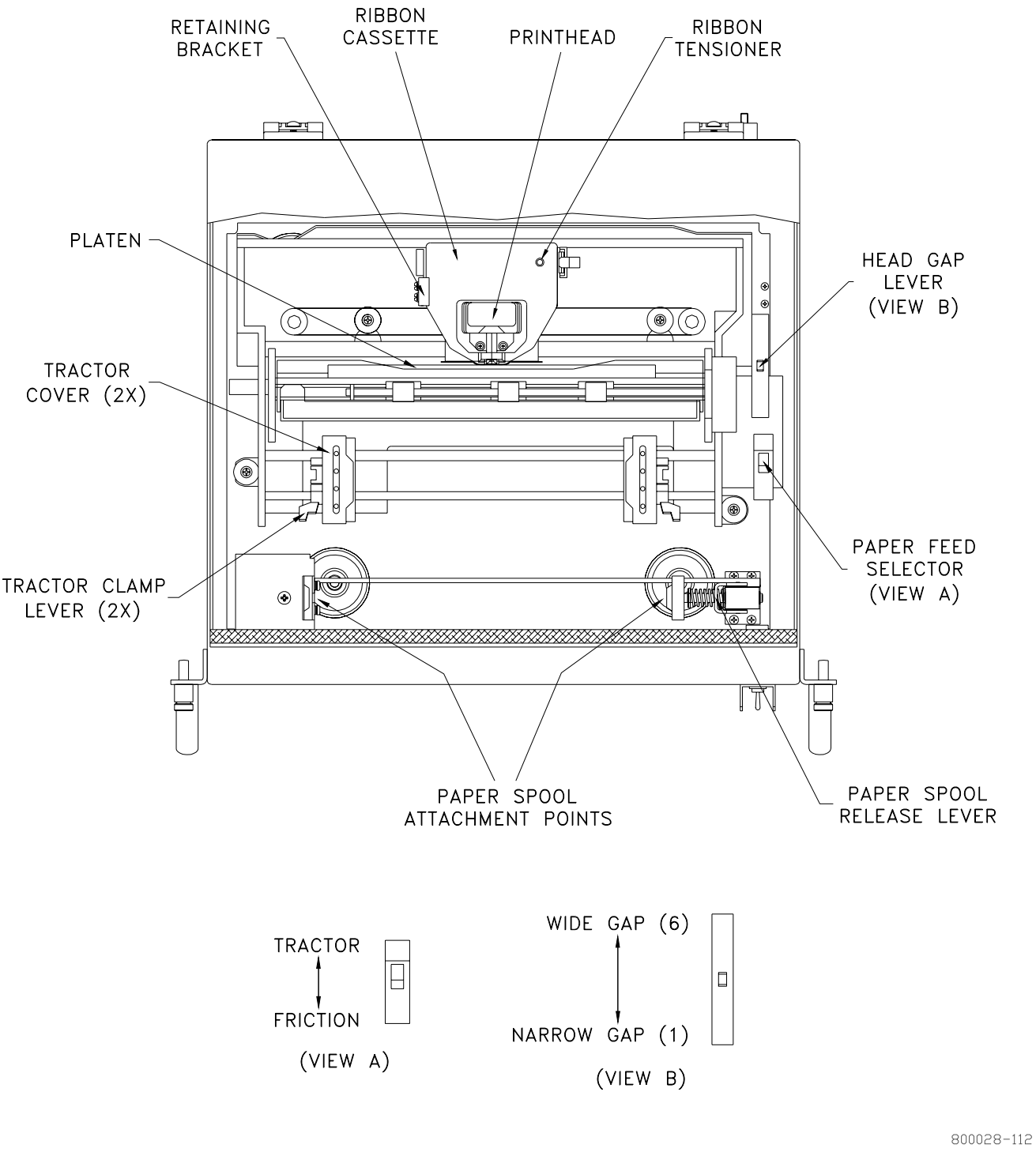

Figure 3-5. Internal Feed Configuration Ribbon and Paper Installation

3.5.1. External Paper Feed

a. Open the top cover of the printer.

b. Adjust the head gap lever for the thickness of paper to be used {1 (thin) to 6 (thick)}. A head gap setting of 2 or greater is recommended for normal operation.

c. Place the paper feed selector in the “tractor” position.

d. Unlock the tractors by pulling the clamping levers forward.

e. Slide the tractors to positions that match the paper width.

f. Open the tractor covers.

g. Insert the leading edge of the paper stack through the slot in the rear panel and route the paper over the tractors.

h. Position the leading edge of the paper at the bottom of the platen.

i. Align the paper sprocket holes on the tractor pins and close the tractor covers.

j. Verify that the tractors are aligned so that the paper does not exhibit slack or tension.

k. Lock the tractors by pushing the clamping levers back.

l. Power up the printer and press LOAD/PARK to advance the paper to the first print line. Close the top cover of the printer. Press and hold LF/FF to advance the paper through the paper egress slot in the top cover.

3.5.2. Internal Paper Feed

a. Open the top cover of the printer.

b. Adjust the head gap lever for the thickness of paper to be used {1 (thin) to 6 (thick)}. A head gap setting of 2 or greater is recommended for normal operation.

c. Place the paper feed selector in the “tractor” position.

d. Unlock the tractors by pushing the clamping levers back.

e. Slide the tractors to positions that match the paper width.

f. Open the tractor covers.

g. Insert the paper roll in the spool carriage and route the paper over the tractors.

h. Position the leading edge of the paper at the bottom of the platen.

i. Align the paper sprocket holes on the tractor pins and close the tractor covers.

j. Verify that the tractors are aligned so that the paper does not exhibit slack or tension.

k. Lock the tractors by pulling the clamping levers forward.

l. Power up the printer and press LOAD/PARK to advance the paper to the first print line. Close the top cover of the printer. Press and hold LF/FF to advance the paper through the paper egress slot in the top cover.

3.6. External Cable Installation

All external interfaces for the printer are located at the rear panel (Figure 3-6). External connector signal assignments are defined in Table 1-4. Perform the following steps to connect external cabling.

a. Verify that the front panel circuit breaker is in the “off” position.

b. Connect the system ground cable to the ground stud on the rear panel.

c. Install the data interface cable.

d. Connect the power cable to the input connector on the rear panel.

CAUTION

VERIFY THAT THE POWER SOURCE CONFORMS
TO THE LIMITS DEFINED IN TABLE 2-2.

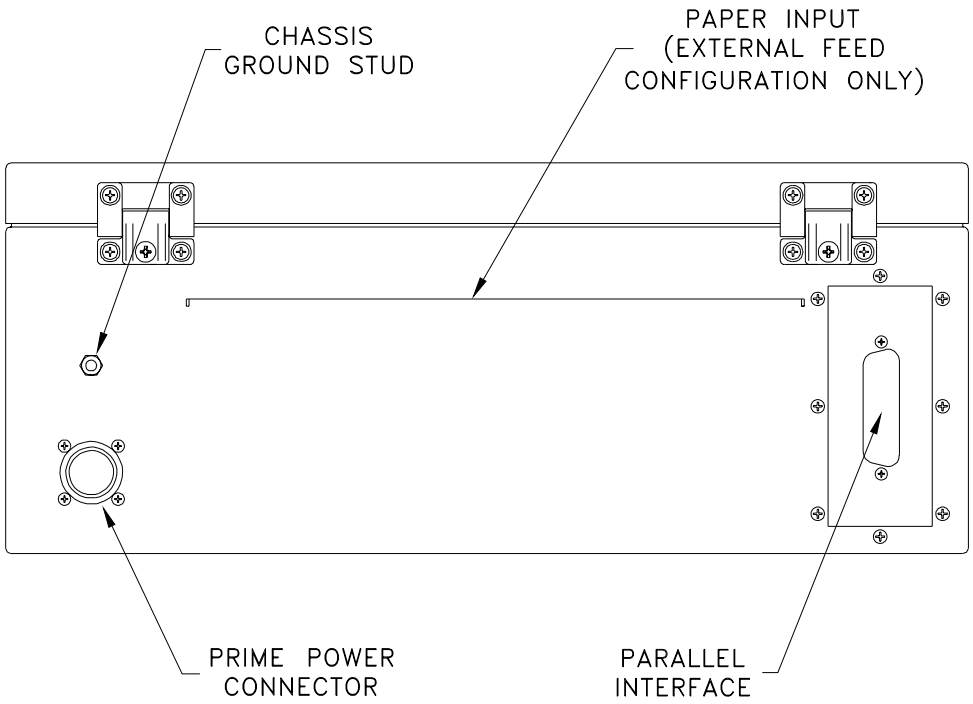

Figure 3-6. Rear Panel

3.7. Software Installation

The Model 2x00 printer will operate with any Windows-based (3.x/95/98) computer. The software installation procedures defined in the following paragraphs are tailored for Windows 95/98 installation.

NOTE

PRINTER SOFTWARE IS PROVIDED ON 1.44 MB DISKETTES. IF THE HOST COMPUTER DOES NOT INCLUDE A DISKETTE DRIVE, THE SOFTWARE MUST BE TRANSFERRED TO THE HOST STORAGE MEDIA USING SUPPORT EQUIPMENT THAT INCLUDES A DISKETTE DRIVE.

Follow the steps defined below to install the printer driver.

a. Verify that the printer is connected to a Windows-based computer that is powered up and configured for normal operation.
b. Verify that the printer is powered up and on line.
c. At the Windows main screen of the host computer, select **Start** – **Settings** - **Printers**.
d. Select **Add Printer** and then **Next**.
e. In the Manufacturer column, select “Panasonic”.
f. In the Printers column, select “Panasonic KX-P2130”.
g. Insert the Panasonic Setup disk in the diskette drive and select **Have Disk**.
h. Enter the directory path where the software resides and select **Ok** twice.
i. Verify that “Panasonic KX-P2130” appears in the dialog box and select **Next**.
j. Chose the port to be used (default LPT1:) and select **Next**.
k. Enter a printer name (arbitrary designation).
l. Chose a printer use designation (default/non-default) and select **Next**.
m. Chose if a test page is desired and select **Finish**.

3.8. Setup Utility

Follow the steps defined below to configure operational parameters for the printer using the Setup Utility.

a. Verify that a parallel interface cable is installed between a Windows-based host computer and the parallel port of the printer.
b. Power up the host computer and printer. Verify that the printer is on line.
c. At the Windows main screen of the host computer, select **Start** – **Run**.
d. Insert the Setup disk in the diskette drive.
e. Enter the directory path where the software resides and select **Ok**.

f. Press the <RETURN> key or left mouse button at the setup introduction page.

g. The Setup Utility includes the menus, submenus, and individual settings identified in Table 3-1. Function keys are identified in Table 3-2. Menu items and settings can be selected using the arrow keys or mouse. A selected item can be enabled using the <RETURN> key or left mouse button. Configure the printer with the required operational parameters using the Setup Utility.

h. After all required setup parameters have been established, the current settings should be saved to a disk other than the original distribution media. Setup parameters are saved using the F3 function key.

i. Power down the printer and host computer (if required).

Table 3-1. Setup Utility Menus

Menu	Submenu	Settings
Print Style	Font	Draft, Roman, Sans Serif, Courier, Prestige, Script, OCR-B, and Bold PS.
	Pitch	5, 6, 7.5, 8.5, 10, 12, 15, 17, 20 cpi, and Proportional.
Emulation	Epson	
	IBM	
Page Format	Lines per Inch	1, 1.5, 2, 2.5, 3, 4, 4.5, 5, 6, 7.5, 8, 9, 10, and 12 lpi.
	Page Length	5.5, 8, 8.5, 11, 11.66, 12, and 14 inches.
	Top Margin	0 to 2.5 inches.
	Bottom Margin	0 to 5.0 inches.
	Left Margin	0 to 78 columns (1)
	Right Margin	2 to 80 columns (1)
	Center Printhead	Column 10 to 45.
Print Mode	Graphic Direction	Bidirectional or Unidirectional.
	Text Direction	Bidirectional or Unidirectional.
Text Enhancement	Bold	Off/On
	Double Height	Off/On
	Double Strike	Off/On
	Double Wide	Off/On

(1) Setting of one margin affects the available parameters for the opposite margin.

Table 3-1. Setup Utility Menus

Menu	Submenu	Settings
Text Enhancement	Italics	Off/On
	Outline	Off/On
	Shadow	Off/On
	Zero Font	Normal, Point, or Slash.
Character Set	Country	U.S.A, France, Germany, U.K, Denmark1, Sweden, Italy, Spain1, Japan, Norway, Denmark2, Spain2, Latin America, Korea, and Legal.
	Character Set	Italic, Graphic1, and Graphic2.
	Code Page	U.S.A, Multilingual, Portugal, French Canadian, Norway, Turkey, BRASCII, and ABICOMP.
Install	AGM/IBM	Off/On
	Auto CR/IBM	Off/On
	Auto LF	Off/On
	Auto Loading	Off/On
	Paper Out Detect	Off/On
	Super Quiet Mode	Off/On
	Tear Off	Manual/Auto
	CSF Mode	Off/On
	Download	Off/On
	Color [(2)]	Black, Magenta, Cyan, Violet, Yellow, Orange, and Green.
	Auto On Line	Off/On
	Data Length	8 Bits/7 Bits
TOF Setting	Tractor	0 to 5 inches.
	Friction	0 to 5 inches.
	Cut Sheet Feeder	0 to 5 inches.

[(2)] The Model 2x00 printer supports only monochrome printing.

Table 3-2. Setup Utility Function Keys

Key	Description	Function
F1	Help	Provides an explanation of each menu selection.
F2	Factory Setting	Restores all menu settings to the factory default.
F3	Save to Disk	Saves current menu settings to the specified path and filename.
F4	Load from Disk	Loads menu settings that were previously saved to disk.
F5	Print Setting	Prints a list of the current menu settings.
F6	List	Displays the current menu settings.
F10	Send to Printer	Downloads the current menu settings to the printer.
ESC	Exit	Exit the Setup Utility.

3.9. Limited Operation, Storage, and Transportation

If the printer is not operated for an extended period of time, the paper and ribbon should be removed and stored in a humidity-controlled environment. This provision is particularly important when the equipment is used in a high-humidity environment. If the printer is to be stored or transported, the unit should be packaged as originally shipped with the retainer installed on the printhead carriage guide bar (Figure 6-1). The printer can be stored or transported in any manner that is consistent with the environmental conditions identified in Table 2-3.

4. OPERATION

4.1. Introduction

This chapter provides information concerning printer controls and indicators, test printing, normal operation, error conditions, and shutdown. Before the unit is powered up for the first time, verify that the installation procedures defined in Chapter 3 have been performed.

4.2. Controls and Indicators

All controls and indicators required for operation of the printer are located at the front panel of the unit (Figure 4-1). Controls and indicators are described in Table 4-1.

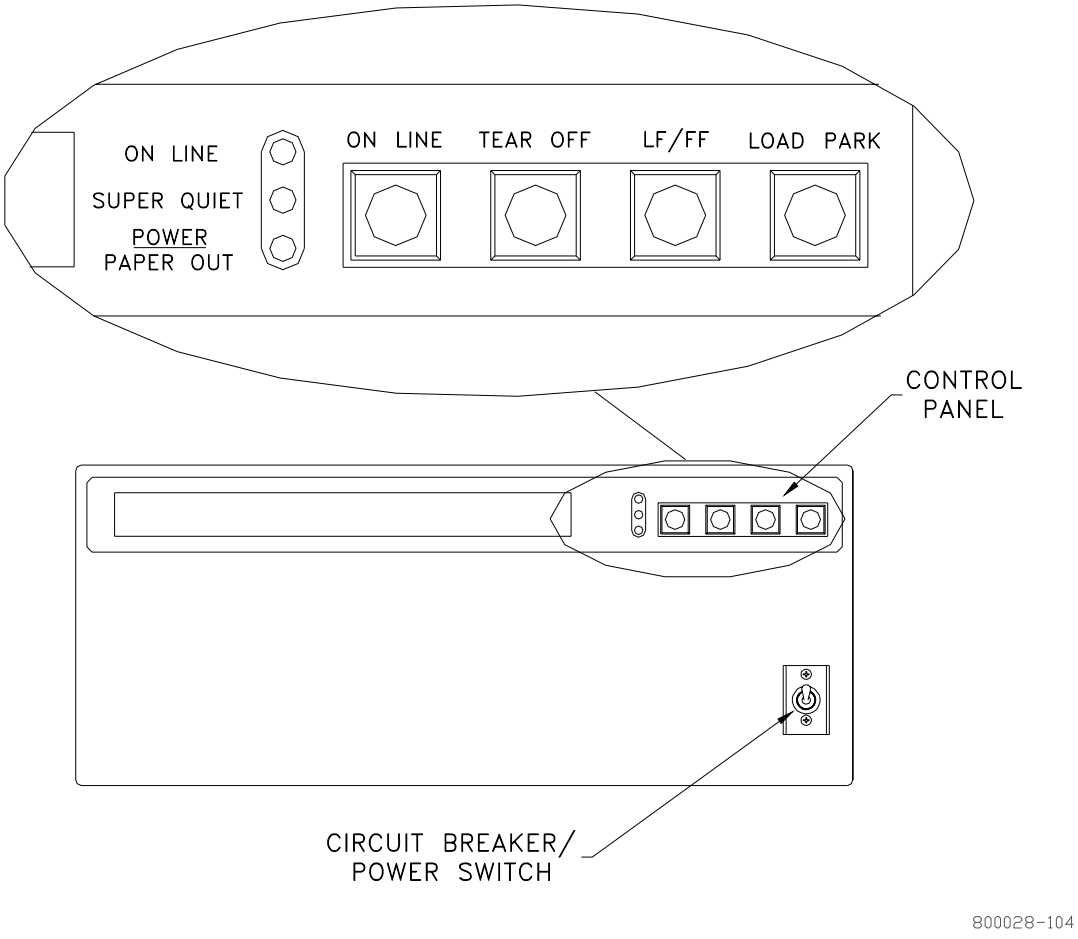

Figure 4-1. Front Panel

Table 4-1. Controls and Indicators

Identification	Description	Function
	Circuit breaker switch	When placed in the “on” position, prime power is applied to the printer.
ON LINE	Indicator	Illuminates when the printer is in the on-line state.
SUPER QUIET	Indicator	Illuminates when the Super Quiet mode is enabled. Super Quiet mode is enabled/disabled by simultaneously pressing the ON LINE and TEAR OFF switches.
POWER PAPER OUT	Indicator	Illuminates steadily when prime power is applied; indicator blinks when the paper supply is exhausted. Note that when a paper-out condition occurs while a page is being printed, press ON LINE repetitively to continue printing to the end of the page.
ON LINE	Momentary pushbutton switch	When pressed, the printer toggles to the on line/off line state.
TEAR OFF	Momentary pushbutton switch	When pressed, paper is advanced to the “tear” position. When the switch is pressed a second time, paper advances to the first print line. Note that this function is usable only when the top cover of the printer is open.
LF/FF	Momentary pushbutton switch	When pressed once, the paper advances one line. When held in the depressed position, the printhead is centered and the paper is advanced to the top of the next page. When pressed in conjunction with the ON LINE switch, paper advances one micro line (1/180”). When pressed in conjunction with the LOAD PARK switch, paper reverses one micro line (1/180”). When LF/FF and ON LINE/LOAD PARK are held in the depressed position, the paper will continuing advancing/reversing until the switches are released. If released within 5 inches of the top of the page, the position will be stored as the “top of form”.
LOAD PARK	Momentary pushbutton switch	When pressed the first time after the unit is powered up, paper advances to the first print line. When pressed a second time, the paper reverses to the “park” position.

4.3. Self Test

The self test function will print 5 lines of each resident font and then print the draft font for approximately 20 minutes. The self test function is initiated by activating the prime power switch while pressing the LF/FF switch. The test sequence can be terminated prior to completion by powering down the printer.

4.4. Normal Operation

Follow the instructions defined below to operate the printer under normal conditions.

a. Power-up the host computer.

b. Place the printer power switch in the “on” position and verify that the control panel POWER indicator is illuminated.

c. The printer can be configured to enter the on-line state manually or automatically using the Setup Utility (Table 3-1). Once the printer has achieved an on-line state, no manual intervention is required to conduct routine print tasks. Operational parameters are not affected by normal power on/off cycles.

4.4.1. Stopping a Print Job

A print job can be terminated from the host computer or at the printer control panel. Place the printer off line to stop a print job from the control panel. Unprinted data in the buffer can be cleared by cycling printer power. If power is not cycled, the print job will continue when the printer is returned to the on-line state.

4.5. Error Conditions

Refer to Chapter 6 for information concerning printer troubleshooting and corrective action.

4.6. Shutdown

It is not necessary to power down the printer when the unit is not used for limited periods. When the printer is to be taken out of service, perform the following shutdown sequence:

a. Ensure that the printer is not receiving data from the host computer.

b. Place the printer power switch in the “off” position.

5. FUNCTIONAL DESCRIPTION

5.1. Introduction

This chapter describes the major functional elements of the Model 2x00 printer. Information is provided concerning power distribution, the printing subsystem, control panel, and heaters. Chassis interconnections are identified in Figure 5-1.

The printer provides dot matrix hardcopy output of data received from a host computer. The printer communicates with a host computer through a parallel data interface. The mechanical and electrical subsystems of the printer are described in the following paragraphs.

5.1.1. Power Distribution

Prime power (115/230 Vac) enters the chassis at the rear panel J1 connector. A line filter provides attenuation of interference related to input voltage and output current. Prime power exits the filter and is routed to a 5-ampere circuit breaker/power switch at the front panel. The load side of the circuit breaker provides ac power to the power supply input connector. The power supply converts 115/230 Vac input to outputs of +5 V at 2 A and 39 V at 6 A. Power supply outputs are provided to the controller board. A chassis ground stud is located on the rear panel of the unit.

5.1.2. Printing Subsystem

The Model 2x00 incorporates the printing architecture of the Panasonic Model KX-P2130 printer. The printing subsystem consists of a controller board and print engine mechanics. The controller board receives +5 V and +39 V from the power supply. Power and data signals are provided by the controller board to the print engine mechanics, control panel interface, and parallel data interface.

5.1.3. Control Panel

All controls and indicators required for printer operation are located at the front panel of the unit. The switch/indicator panel communicates with the printer controller through a control panel interface board. The circuit breaker/power switch interfaces with the line filter and power supply. Printer controls and indicators are described in Chapter 4.

5.1.4. Heaters

The printer incorporates a heating capability to facilitate operation at low temperature. A controlled heat source is provided for the two print engine drive motors. The heat source consists of a 50-watt resistor mounted under each motor. A thermal switch is used to apply power to the resistors at $\leq$ -15°C and remove power at $\geq$ 0°C.

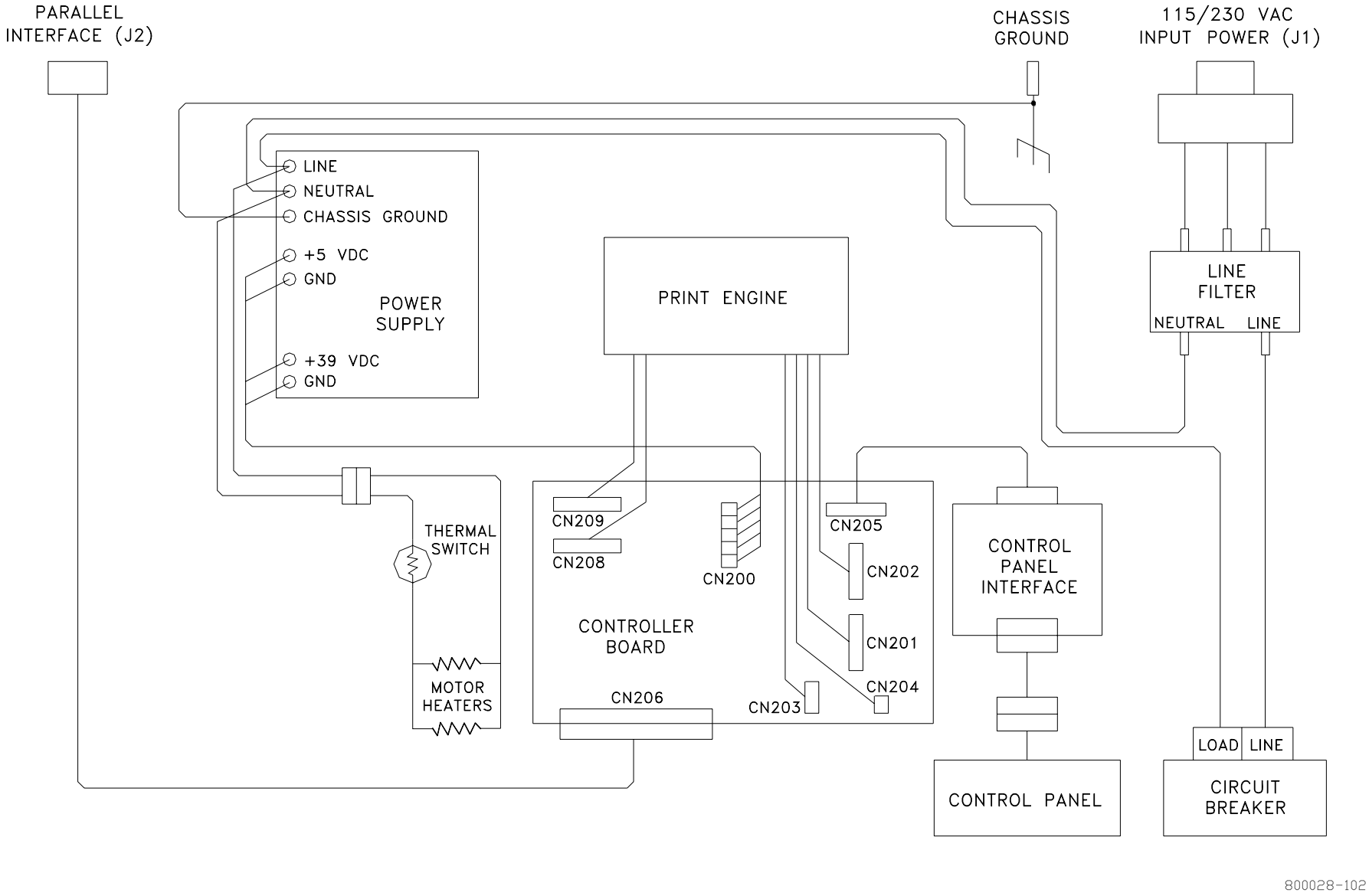

Figure 5-1. Chassis Interconnections

6. MAINTENANCE

6.1. Introduction

This chapter provides information and instructions concerning Model 2x00 printer tools and test equipment, periodic maintenance, fault isolation, and the removal and installation of replaceable components and subassemblies.

6.2. Tools and Test Equipment

The following tools and test equipment are required to maintain the printer:

- Common hand tools
- Digital multimeter
- Host computer with Centronics parallel interface

6.3. Periodic Maintenance

6.3.1. Cleaning and Lubrication

The recommended frequency for cleaning and lubrication is dependent on the usage profile and installation environment. As a minimum, the following actions should be performed whenever the ribbon cassette is replaced.

- Wipe the printer interior with a soft cloth and mild commercial cleaner. The platen (Figure 6-1) should only be cleaned with denatured alcohol.
- Vacuum dust and paper particles from the chassis interior.
- Apply a small amount of very light oil to the carriage guide bar (Figure 6-1).

6.3.2. Ribbon Cassette Re-Inking

A black ribbon supports the printing of approximately 3 million characters in draft mode. When the print image begins to fade, the ribbon can be re-inked. Re-inking is accomplished by removing the cassette and gently pushing the ribbon counter spring (Figure 6-1) with a ball-point pen or similar object. Reinstall the ribbon cassette and print a few test pages. If image quality does return to normal after a few pages are printed, the ribbon cassette should be replaced. The ribbon should not be re-inked unless the print image is fading.

6.4. Fault Isolation

If the printer exhibits an error condition or degraded performance, refer to the troubleshooting information provided in Table 6-1.

6.5. Replaceable Components and Subassemblies

The following paragraphs include information concerning the replaceable components and subassemblies identified in Table 1-2. Item locations are shown in Figures 6-2 and 6-3.

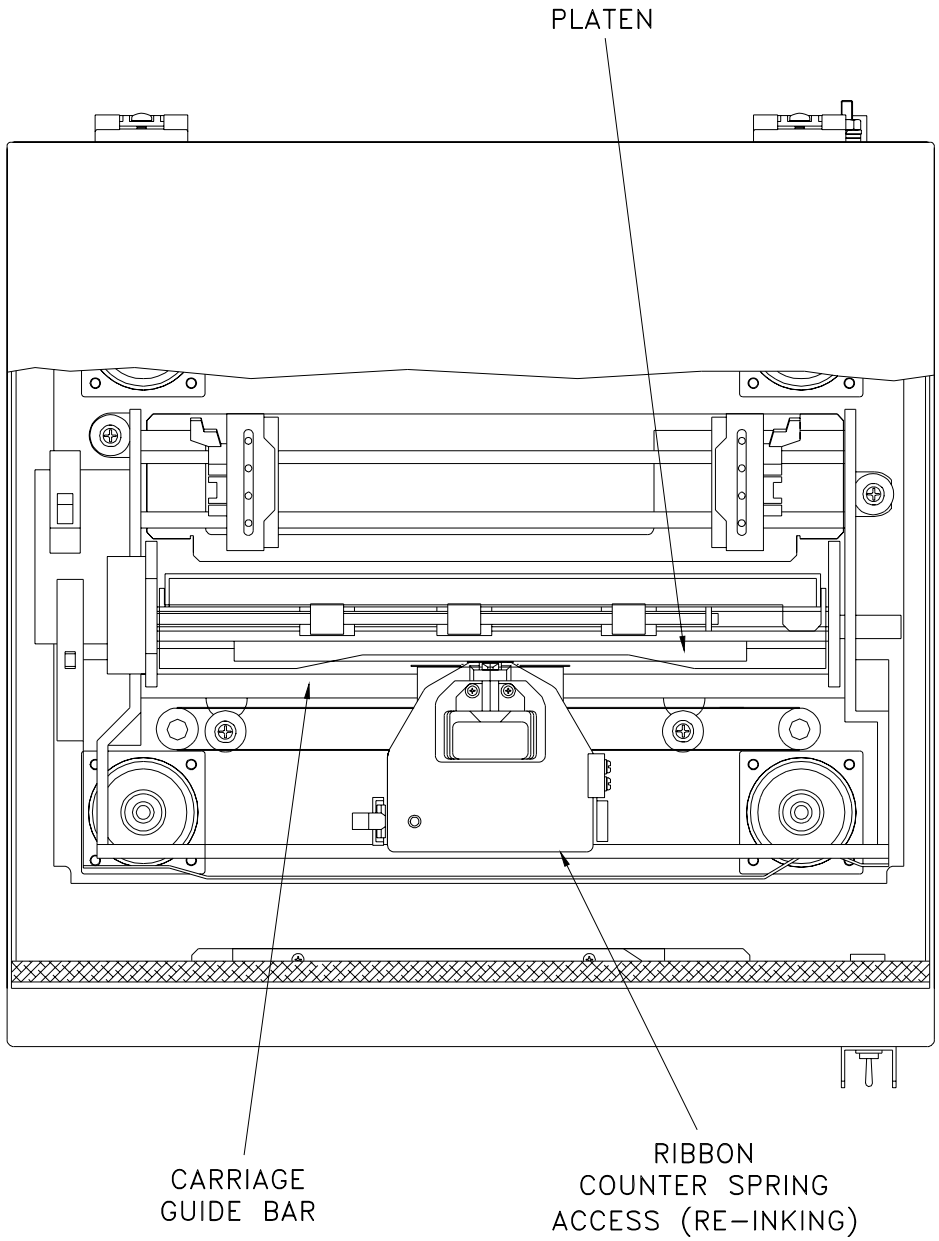

Figure 6-1. Periodic Maintenance Locations

Table 6-1. Fault Isolation

Fault Condition	Recommended Action
Ink smears or printout is faint.	Adjust head gap lever (Figure 3-4/5).
Printhead moves but does not print.	Verify that ribbon is installed correctly. Adjust head gap lever (Figure 3-4/5).
POWER indicator is illuminated but unit will not print.	Verify that printhead path is not blocked. If lengthy print operations were being performed, allow the unit to cool down.
Unexpected characters appear in printing.	Verify that emulation mode is correct (Table 3-1).
Printout is double spaced.	Disable Auto LF setting (Table 3-1).
The same line is repetitively printed.	Enable Auto LF setting (Table 3-1).
Incorrect character set prints.	Select the required character set per Table 3-1.
All ASCII characters cannot be printed.	Select the correct data length setting (Table 3-1).
Paper out indicator (PO) does not illuminate when paper supply is exhausted.	Enable Paper Out Detect setting (Table 3-1).
Printer will not power up.	Verify that input power is within the limits defined in Table 2-2. If input power is correct, verify that supply voltage is present at the line filter output terminals. If voltage is not correct, replace line filter. With power cable disconnected and the circuit breaker closed, verify continuity across circuit breaker terminals. Replace the switch assembly if continuity is not present. Verify that voltage (5 V/39 V) is present at power supply output terminals. Replace power supply if voltage is not correct. If previous verifications are conducted successfully, replace the controller board.
Printer powers up but will not execute print operations.	Replace controller board. If problem remains, replace print engine assembly.
Control panel is inoperative.	Perform a sequential replacement of the control panel, control panel interface, and controller board.

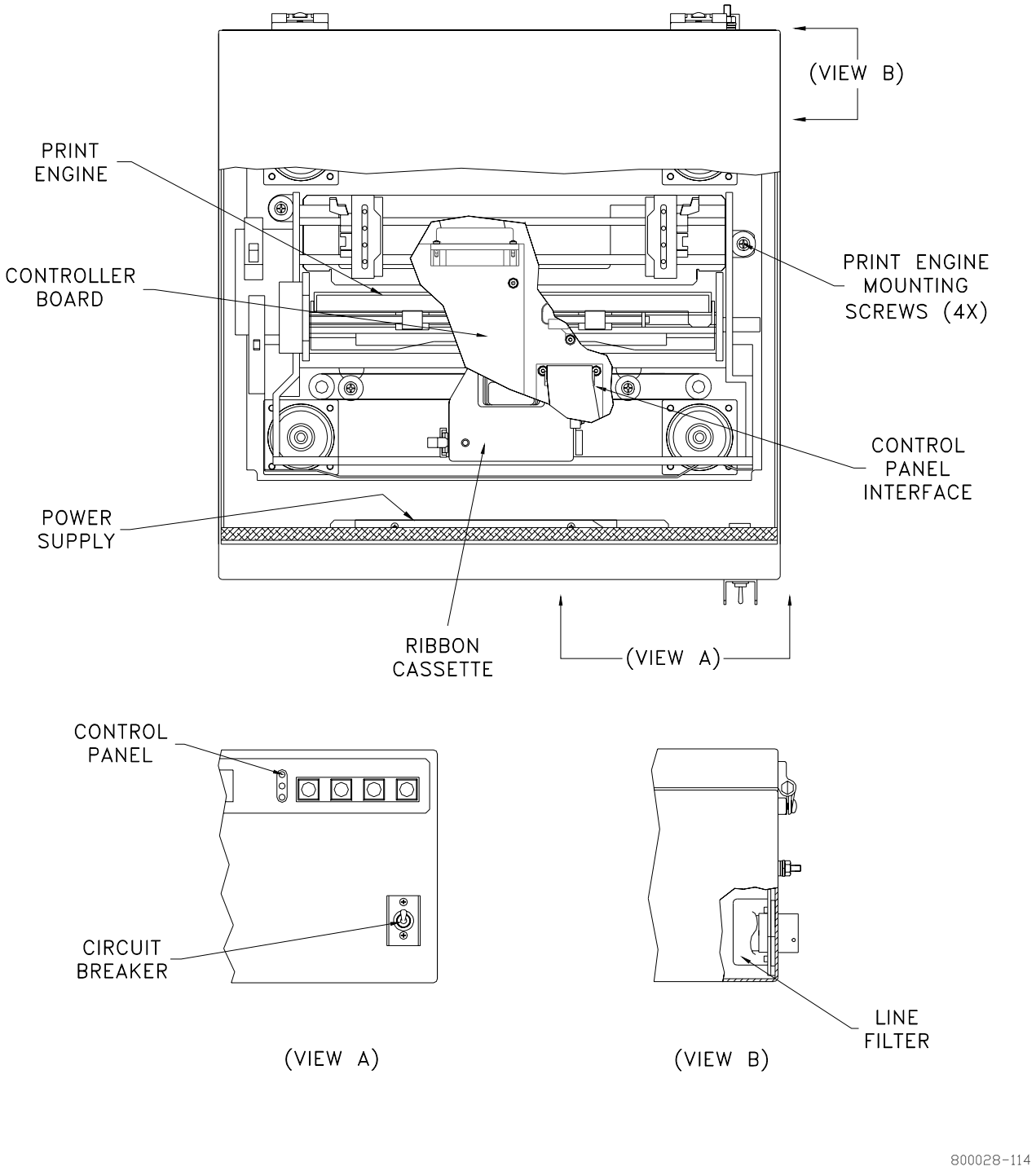

Figure 6-2. External Feed Configuration Replaceable Unit Locations

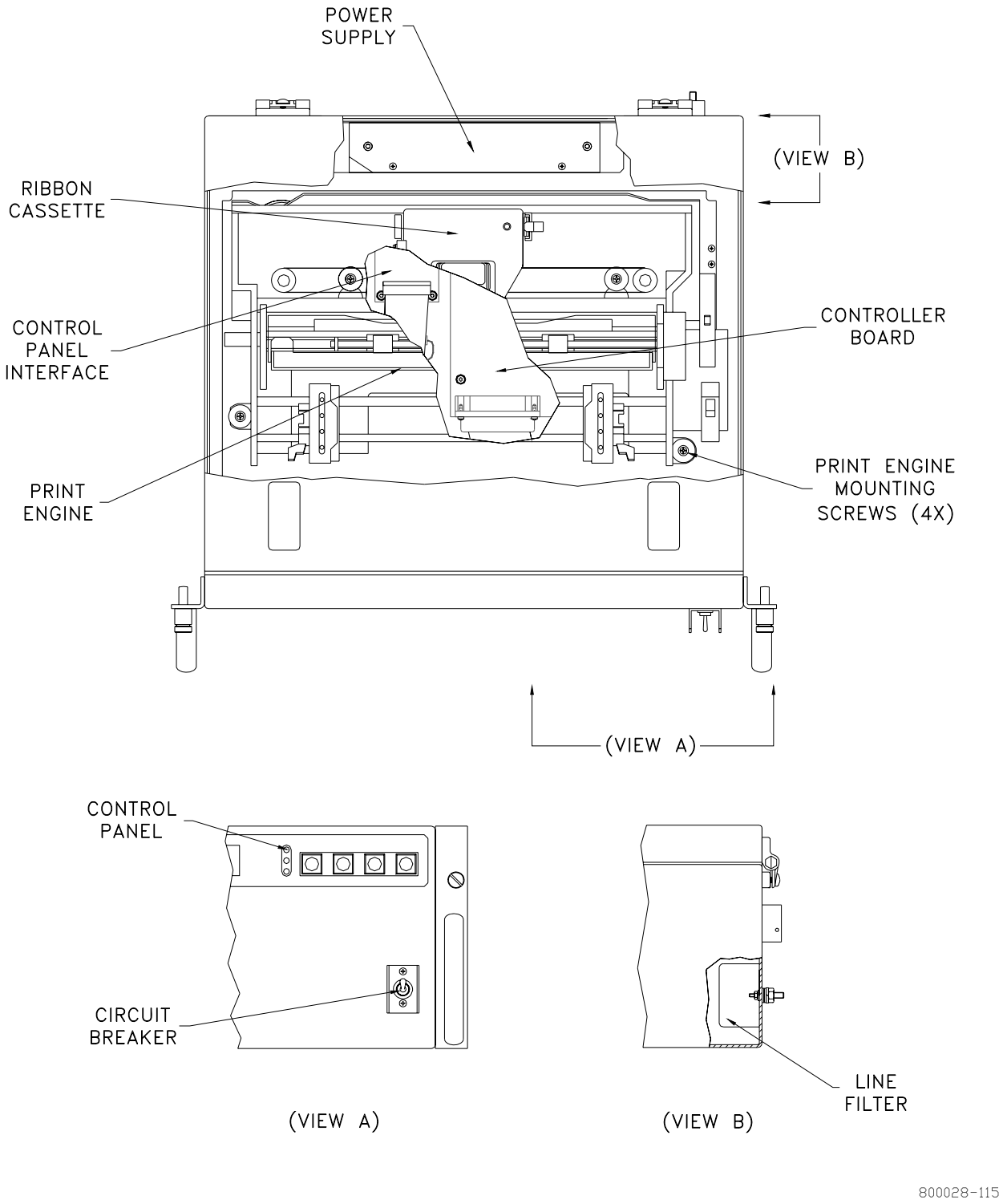

Figure 6-3. Internal Feed Configuration Replaceable Unit Locations

CAUTION

THE PRINTHEAD CAN BECOME VERY HOT AFTER PERIODS OF CONTINUOUS OPERATION. AVOID CONTACT WITH THE PRINTHEAD DURING MAINTENANCE PROCEDURES.

NOTE

OBSERVE PRECAUTIONS RELATING TO ELECTROSTATIC DISCHARGE (ESD) WHEN HANDLING COMPONENTS THAT INCLUDE INTEGRATED CIRCUITRY.

6.5.1. Ribbon Cassette

Removal:

a. Open the top cover of the printer and power up the unit to center the ribbon carriage.

b. Move the head gap lever to the “6” position (Figure 3-4/5).

c. Depress the tab on the side of the ribbon cassette and remove the ribbon from the printer.

Installation:

a. Rotate the knob on the new ribbon cassette clockwise to remove any slack.

b. Position the ribbon cassette over the printhead. Angle the ribbon cartridge down and position it under the retaining bracket. Ensure that the ribbon is located between the printhead nose and the ribbon mask. Gently press down on the cassette until it snaps into place.

c. Adjust the head gap lever for the thickness of paper used {1 (thin) to 6 (thick)}. A head gap setting of 2 or greater is recommended for normal operation.

d. Close the top cover of the printer and power down the unit (if required).

6.5.2. Print Engine

Removal:

a. Open the top cover of the printer.

b. Remove the four screws that secure the print engine assembly to the engine base plate.

c. Lift the print engine assembly up far enough to disconnect the interface cables from the controller board. Remove the engine assembly from the chassis.

Installation:

a. Lower the print engine assembly into the chassis and connect the interface cabling to the controller board.

b. Position the engine assembly on the base plate mounting blocks and install the hardware that secures the print engine.

c. Close the top cover of the printer.

6.5.3. Power Supply

Removal:

a. Open the top cover of the printer.
b. Remove the AC LINE, AC NEUTRAL, and CHASSIS GROUND connections from the power supply terminal block.
c. Disconnect the power supply interface cable connectors for the controller board and heater harness.
d. Remove the hardware that secures the power supply mounting plate to the chassis. Remove the power supply assembly from the chassis.

Installation:

a. Position the power supply assembly in the chassis and install the hardware that secures the assembly.
b. Connect the power supply interface cable connectors for the controller board and heater harness.
c. Install the AC LINE, AC NEUTRAL, and CHASSIS GROUND connections on the power supply terminal block.
d. Close the top cover of the printer.

6.5.4. Circuit Breaker Assembly

Removal:

a. Open the top cover of the printer.
b. Remove the hardware that secures the line filter cover to the chassis. Remove the cover from the chassis.
c. Remove the hardware that secures the line filter to the chassis.
d. Remove the AC LINE and AC NEUTRAL terminals of the circuit breaker harness from the line filter output (bottom) connections.
e. Remove the CHASSIS GROUND terminal of the circuit breaker harness from the inside of the rear panel.
f. Remove the AC LINE, AC NEUTRAL, and CHASSIS GROUND terminals of the circuit breaker harness from the power supply terminal block.
g. *External paper feed configuration only:* Remove the hardware that secures the circuit breaker cover to the inside of the front panel. Remove the cover from the chassis.
h. Remove the hardware that secures the circuit breaker to the front panel of the printer. Remove the circuit breaker assembly from the chassis.

Installation:

a. Position the circuit breaker switch on the front panel and install the hardware that secures the switch.

b. *External paper feed configuration only:* Position the circuit breaker cover on the inside of the front panel. Install the hardware that secures the cover.

c. Install the AC LINE, AC NEUTRAL, and CHASSIS GROUND terminals of the circuit breaker harness on the power supply terminal block.

d. Connect the CHASSIS GROUND terminal of the circuit breaker harness to the inside of the rear panel.

e. Install the AC LINE and AC NEUTRAL terminals of the circuit breaker harness on the line filter output (bottom) connections.

f. Position the line filter on the chassis and install the hardware that secures the filter.

g. Install the line filter cover on the chassis.

h. Close the top cover of the printer.

6.5.5. Line Filter

Removal:

a. Open the top cover of the printer.

b. Remove the hardware that secures the line filter cover to the chassis. Remove the cover from the chassis.

c. Remove the hardware that secures the line filter to the chassis.

d. Remove the input, output, and ground harness terminals from the line filter. Remove the line filter from the chassis.

Installation:

a. Install the AC LINE, AC NEUTRAL, AND CHASSIS GROUND terminals of the power input harness on the line filter input (top) connections.

b. Install the AC LINE and AC NEUTRAL terminals of the circuit breaker harness on the line filter output (bottom) connections.

c. Position the line filter on the chassis and install the hardware that secures the filter.

d. Install the line filter cover on the chassis.

e. Close the top cover of the printer.

6.5.6. Controller Board

Removal:

a. Remove the print engine assembly per 6.5.2.

b. Remove the power supply, control panel, and parallel interface cables from the controller board.

c. Remove the hardware that secures the controller board to the print engine base plate. Remove the controller board from the chassis.

Installation:

a. Position the controller board on the print engine base plate and install the hardware that secures the module.

b. Install the power supply, control panel, and parallel interface cables on the controller board.

c. Install the print engine assembly per 6.5.2.

6.5.7. Control Panel Interface

Removal:

a. Remove the print engine assembly per 6.5.2.

b. Remove the interface cables from the control panel interface board.

c. Remove the hardware that secures the control panel interface board to the print engine base plate. Remove the interface board from the chassis.

Installation:

a. Position the control panel interface board on the print engine base plate and install the hardware that secures the module.

b. Install the control panel interface board cables.

c. Install the print engine assembly per 6.5.2.

6.5.8. Control Panel

Removal:

a. Open the top cover of the printer.

b. Disconnect the control panel interface cable.

c. Remove the hardware that secures the control panel to the back of the front panel. Remove the control panel from the chassis.

Installation:

a. Position the control panel on the faceplate mounting studs at the back of the front panel.

b. Install the hardware that secures the control panel.

c. Connect the control panel interface cable.

d. Close the top cover of the printer.