4080B THERMAL PRINTER

OPERATION AND MAINTENANCE INSTRUCTIONS

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RECORD OF CHANGES

Date	Revision	Description of Change
040325	–	INITIAL RELEASE

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SAFETY SUMMARY

INTRODUCTION

Only qualified personnel will be permitted to perform maintenance tasks associated with the printer. All personnel should be instructed in the safety precautions identified in station safety manuals. Knowledge and training in handling equipment and materials and adherence to safety regulations will prevent injury to personnel and possible damage to equipment. Untrained personnel must not operate electronic equipment. This safety summary describes precautions to be followed to avoid hazards involved in the operation and maintenance of the printer.

GENERAL PRECAUTIONS

Maintenance personnel are expected to use good shop practice at all times when handling components, tools, and equipment. Although equipment is constructed to withstand normal handling and usage, proper care can reduce failures and potential safety hazards. Because good shop practice is assumed to be understood, procedures do not always provide cautionary notes concerning the following:

a. Equipment, tools, or procedures cannot be altered or modified without proper written authorization.

b. Electronic or delicate mechanical assemblies must not be dropped or subjected to abnormal abuse (dropped units must be retested).

c. Cable assemblies must not be pulled, twisted, or subjected to undue physical stress.

d. Work areas and materials must be kept clean and orderly.

e. Protective equipment for components and materials must remain installed until it is necessary to remove them during equipment maintenance.

f. Tools must be used only in the manner intended.

g. Tools should not be allowed to become so dirty or worn that usefulness is impaired.

h. Personnel should notify their immediate supervisor if unsure of any instructions or if equipment functions in an abnormal manner.

Should situations arise that are not covered in the general or specified safety precautions, the commanding officer or other authority will issue orders as deemed necessary to cover the situation.

TOOLING

Common workshop tools specified in procedural steps are those considered best to accomplish the task. However, personal preference may be taken into consideration. For example, if a ratchet is called for and personnel accomplishing the task prefer a speeder handle, then this tool may be used in place of the ratchet. Where special tools or fixtures are required and supplied, deviations are not permitted.

SAFEGUARDS

Certain precautions must be taken to protect personnel from harm and equipment from damage. Where applicable, these precautions are mentioned in warning or cautionary notes in the appropriate job sheets.

WARNING NOTES: Electrical shock hazards that can cause personnel injury are indicated in notes headed by the word WARNING. Hazardous voltages are present within the printer. Operating personnel are expected to use good judgment to avoid electrical shock hazards.

CAUTION NOTES: Conditions that can cause damage to equipment are indicated in notes headed by the word CAUTION. Operating personnel are expected to observe all cautions to ensure the effectiveness of the equipment is not impaired.

ELECTRONICS SAFETY

Safety regulations must be observed at all times when electronic equipment is serviced. Rings and watches must be removed to avoid accidental shock during servicing of electronic equipment. Power must be turned off when equipment is adjusted. Electronic equipment must be deactivated before servicing. Dangerous potentials may exist in circuits, even with power supplies set to off, due to charges retained by capacitors. Capacitors and ground circuits must be discarded before being touched. Personnel should avoid reaching inside equipment with both hands when power cannot be turned off during maintenance.

Under no circumstance should any person adjust equipment alone. A second person capable of rendering first aid should always be present.

Personnel working with or near high voltages must be familiar with the methods of artificial respiration.

CHAPTER 1
INTRODUCTION

1.1. CONTENTS OF MANUAL

This technical manual contains an introduction (Chapter 1), preparation for use and installation instructions (Chapter 2), a general theory of operation (Chapter 3), operating instructions (Chapter 4), preventive maintenance and testing (Chapter 5), corrective maintenance (Chapter 6), programming interface requirements (Chapter 7), preparation for reshipment (Chapter 8), and a parts list (Chapter 9) to provide printer operation maintenance instructions for the Datametrics Corporation (DmC) Model 4080B high-speed printer.

1.2. GENERAL DESCRIPTION

The DmC 4080B high-speed printer is a dry-process, 4-1/4-inch-wide, thermal paper, 40 column, half-page printer of modular construction. As an option, the printer is capable of 80-column font side writing. The modular construction allows easy access for repairs and replacement of parts and assemblies.

Accessible on the front of the printer are the door assembly, control panel door latches, and a circuit breaker (see Figure 1-1).

1.2.1. Door Assembly

The door assembly consists of the film, paper spool, drive roller, idler roller, gear, and paper guide. The motor is a stepper motor that advances the paper one dot row each time it is pulsed. It has four control voltage lines and two return lines. The paper drive roller is driven by a positive drive gear for control of the paper in relation to the printhead surface. The door assembly also contains a 4-1/4-inch-wide by 100-foot roll of thermal paper.

1.2.2. Control Panel

The control panel assembly is discussed in Chapter 4.

1.3. EQUIPMENT CHARACTERISTICS, SPECIFICATIONS AND CAPABILITIES

See Table 1-1.

1.4. EQUIPMENT SUPPLIED

See Table 1-2.

1.5. EQUIPMENT REQUIRED BUT NOT SUPPLIED

See Table 1-3.

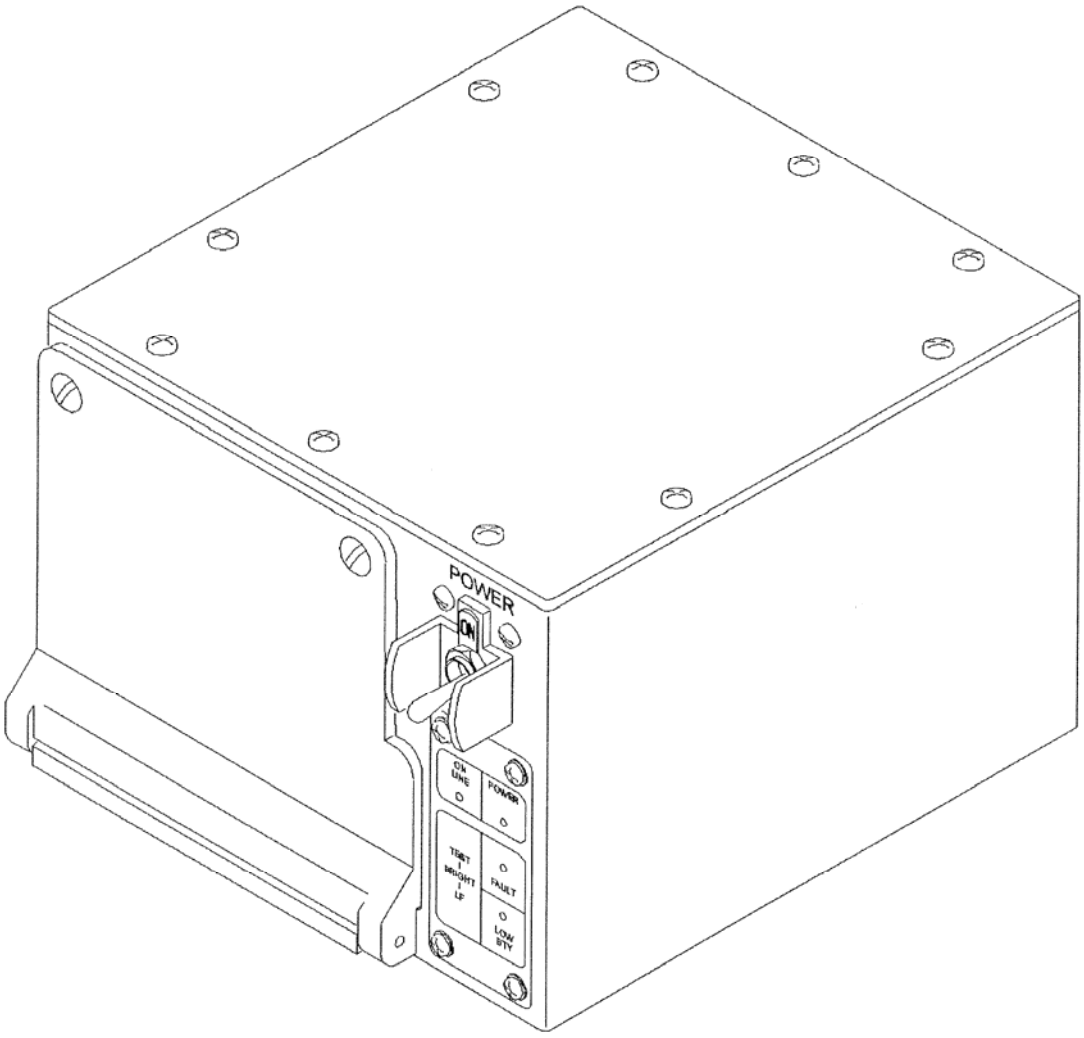


Figure 1-1. DmC 4080B Printer

Table 1-1. Equipment Characteristics, Specifications, and Capabilities

Characteristics, Specifications, and Capabilities	Data/Units
Sand, dust, and fungus protection	Thermal
Printing speed	100 to 400 lines per minute
Characters/inch	40-column font (80-column font, optional)
Paper type/size	Thermal sensitive/roll, 4.25 inches wide x 100 +10,-0 feet
Built-in test (BIT)	To line replaceable unit (LRU)
Graphics	Bit-mapped (optional)
Shades of gray	8 (16, optional)
Interface	Serial, RS-232-C, 150 to 19,200 baud rate
Printer size and weight: Height Width Depth Weight	 5.0 inches 7.0 inches 7.0 inches (8.5 inches with TEMPEST, optional) 9 pounds maximum (without paper); 12 pounds maximum with TEMPEST, optional (without paper)
Handle	Optional
Power requirements	23 Vdc, 10 to 50 watts (24 Vdc battery, 10 to 50 watts, optional)
EMI/EMC protection	Yes
TEMPEST (option)	NACSIM 5100A
Mean Time Between Failures (MTBF)	2,981 hours
Mean Time to Repair (MTTR)	5.4 minutes (intermediate level)
Temperature (Full MIL-SPEC): Operating Storage	 -40°C to +50°C -40°C to +71°C
Humidity (operating)	0 to 95 percent, noncondensing
Shock	Yes (ruggedized)
Vibration	Yes (ruggedized)
Altitude (operating)	-30 to 4,750 meters
Sand, dust, and fungus protection	Yes

Table 1-2. Equipment Supplied

Quantity	Description	Part Number	Manufacturer
1	High-speed 4080B printer (DC) full MIL-SPEC		DmC (19059)
1	Carrying case		SBC Case
1	Roll, thermal paper		DmC (19059)

Table 1-3. Equipment Required But Not Supplied

Quantity	Description	Part Number	Use
As required	Roll, thermal paper		Hard-copy printout
As required	Lint-free, cotton cloth		General and roller cleaning
As required	Cotton swabs		Printhead cleaning
As required	Isopropyl alcohol		Printhead, general, and roller cleaning

CHAPTER 2
PREPARATION FOR USE AND INSTALLATION INSTRUCTIONS

2.1. GENERAL

This chapter provides preparation for use and installation instructions for the DmC 4080B high-speed printer, DmC part number 115700-105. Included in these instructions are printer unpacking and handling, inspection, installation requirements with dimensions, and cabling data.

2.2. UNPACKING AND HANDLING

The printer is wrapped in plastic, cushioned on six sides, and packed in cardboard cartons. Unpack the printer using the following procedural steps:

CAUTION

When opening the shipping carton, use care not to cut deeper than the thickness of the cardboard.

a. Use Figure 2-1. Cut through tape that seals cardboard carton.
b. Open four flaps of cardboard carton.
c. Lift out plastic cushioned top.
d. Lift printer out of cardboard carton.
e. Remove plastic from printer.
f. Save cardboard carton and packaging materials.

NOTE

When packing, the printer must be cushioned on all six sides by foam, or the equivalent. Bubble pack may be used instead of the plastic wrapping.

2.3. INSPECTION

Visually inspect the equipment supplied to ensure that all assemblies have arrived (reference Chapter 1, Table 1-2) and are free of damage incurred during shipping. This inspection will reveal only obvious damage or shipping errors, and is not intended as a performance verification (Chapter 6). As part of the inspection, and in most repair procedures, it is necessary to open the printer door (2, Figure 2-2) and remove cover (7). Open printer door, remove printer cover and perform the inspection as described in the following steps:

CAUTION

Avoid contact with printhead assembly when opening door as damage may result.

Step 1. Loosen two captive screws (1) securing printer door (2). Pull door completely open.

Step 2. Remove ten screws (7) securing cover (6) to printer and remove cover.

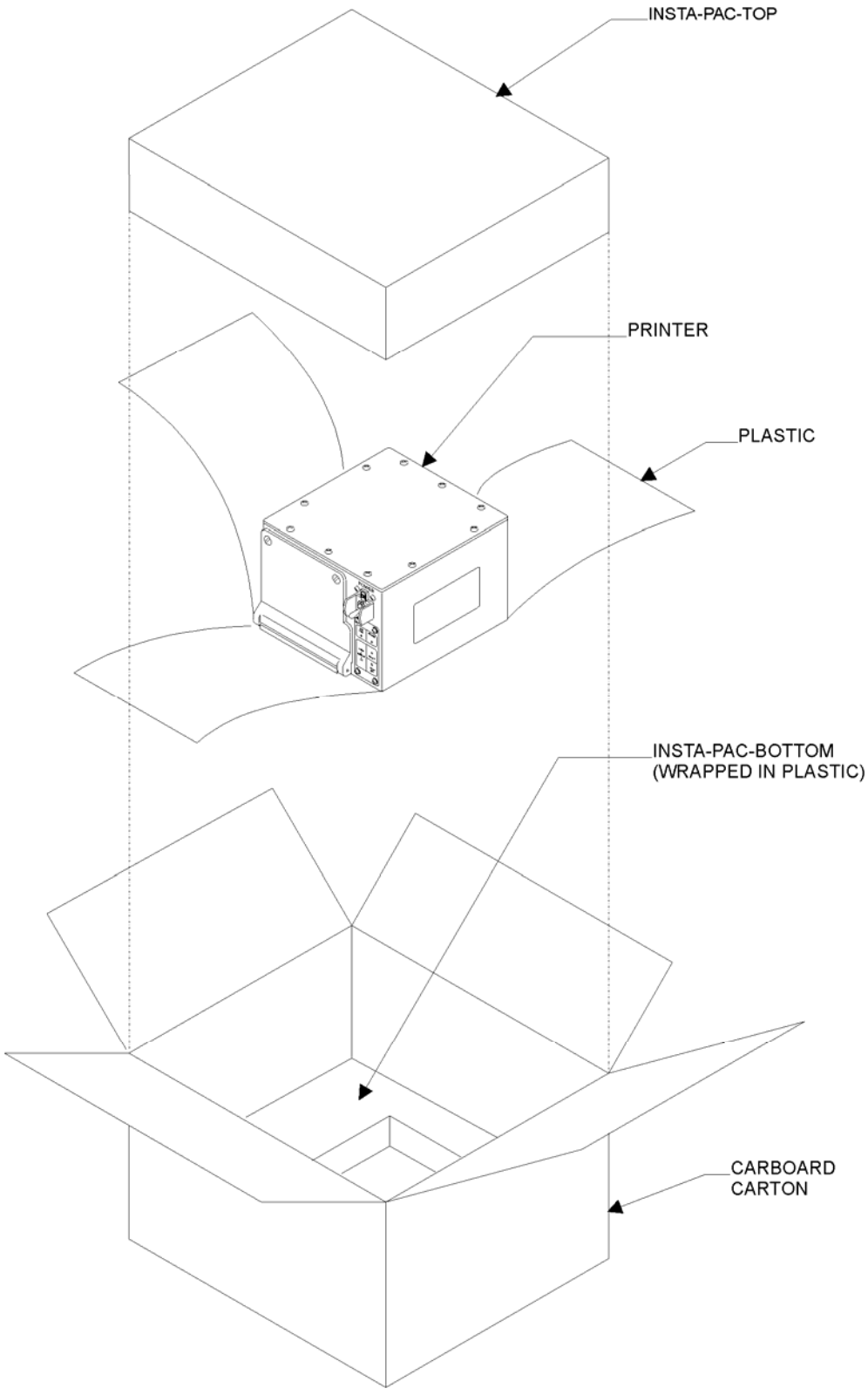


Figure 2-1. Printer Packaging

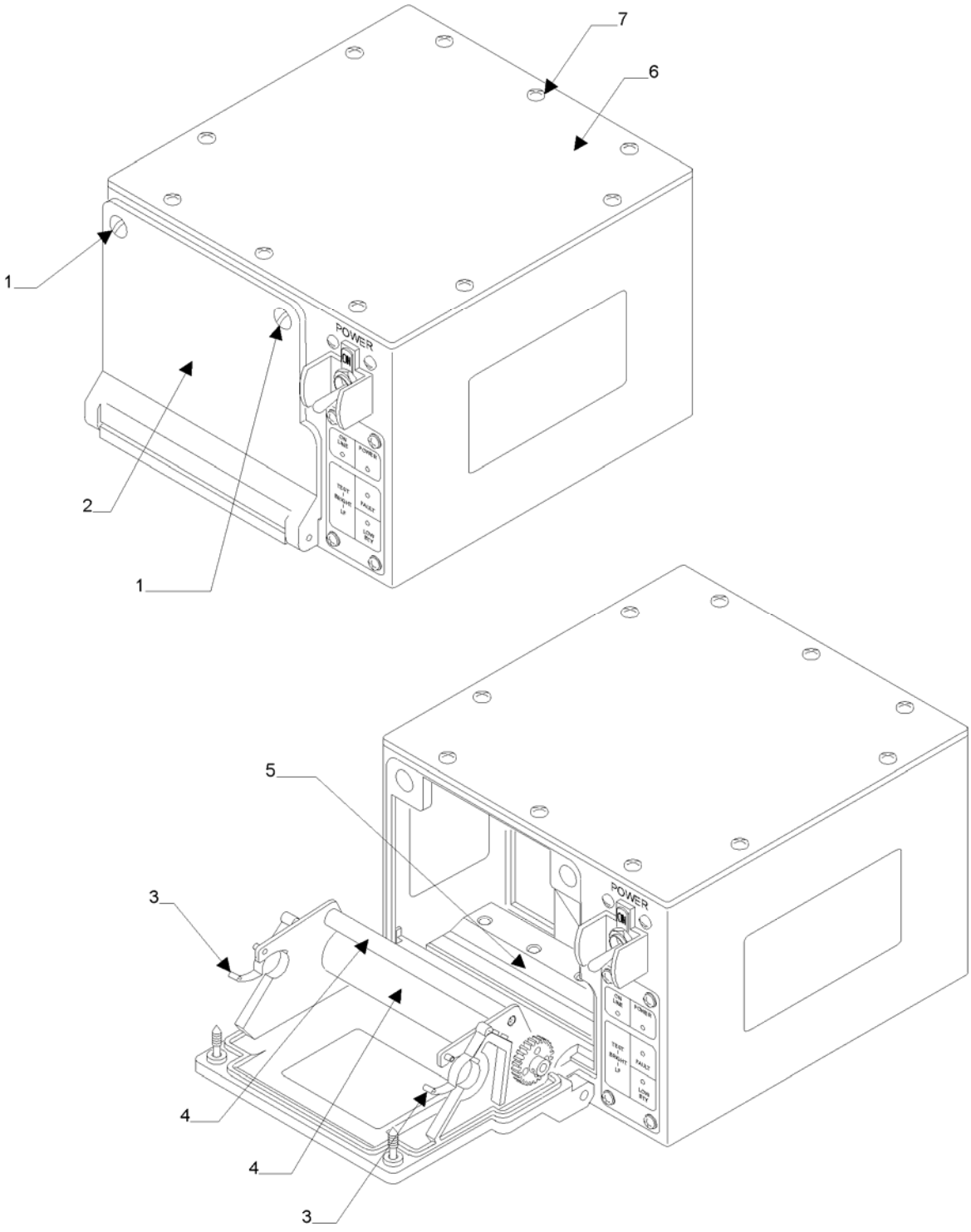


Figure 2-2. Printer Inspection

Step 3. Inspect printhead assembly (5) for damage, dust, or loose wire connections.
Step 4. Inspect roller assemblies (4) in door (2) for freedom of movement.

Step 5. Inspect spring clips (3) for damage and operation.

Step 6. Inspect the interior of printer for any signs of loose wiring or damage.

Step 7. Close printer door (2), tighten screws (1).

Step 8. Install cover (6) on printer and secure with ten screws (7).

2.4. INSTALLATION REQUIREMENTS

The dimensions required for printer installation are provided in Chapter 1, Table 1-1. Input power, input data, and baud rate switch settings are referenced in Tables 2-1 through 2-3.

2.4.1. Removal of Printer

It is necessary to remove the printer from any mount (if so installed) in order to replace printer, make repairs to the unit, and/or for shipping.

NOTE

Power, grounding strap, and data connections at the J1, El, and J2 locations are disconnected from rear of printer.

Step 1. Disconnect input power cable from input power receptacle J1 and data cable from data receptacle J2.

Step 2. Disconnect grounding strap El.

Step 3. Remove mounting screws, lock washers, and flat washers securing printer to mount (when installed) and remove printer.

2.4.2. Installation of Printer

It is necessary to remove the printer from any mount (if so installed) in order to replace printer, make repairs to the unit, and/or for shipping.

Step 1. Place printer on mount and secure with mounting screws, lock washers, and flat washers (when used).

Table 2-1. Input Power Receptacle J1 Pin Assignments

Receptacle Pin	Signal Name
A	24 Vdc
B	24 Vdc RTN
C	+ sense
D	– sense
E	N/C

Table 2-2. Data Input Receptacle J2 Pin Assignments

Pin	Signal Name
A	Receive data
B	Ground
C	Clear to send
D	Ground
E	Transmit data
F	Ground

Table 2-3. Baud Rate Switch Selection

SW1	SW2	SW3	SW4	Mode
Closed	Closed	Closed	Closed	Serial (150 baud)
Open	Closed	Closed	Closed	Serial (300 baud)
Closed	Open	Closed	Closed	Serial (600 baud)
Open	Open	Closed	Closed	Serial (1200 baud)
Closed	Closed	Open	Closed	Serial (2400 baud)
Open	Closed	Open	Closed	Serial (4800 baud)
Closed	Open	Open	Closed	Serial (9600 baud)
Open	Open	Open	Closed	Serial (19,200 baud)
NOTE: Printer data transmittal is preset at a 9600 baud rate				

NOTE

Power, grounding strap, and data connections at the J1, E1, and J2 locations are connected to rear of printer.

Step 2. Connect ground strap El.

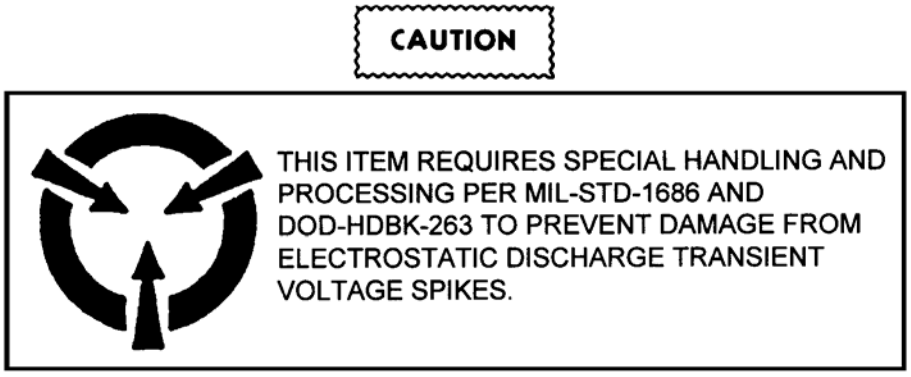
Step 3. Connect input power cable to input power receptacle J1 and data cable to data receptacle J2 (refer to paragraph 2-5).

Step 4. The mount (if used) is used to secure the printer assembly and allows printer assembly removal for cleaning and repairing.

2.5. CABLING DATA

Two cables are necessary for on-line printer operation. The input power cable is installed on the rear of the printer into input power receptacle J1. Pin assignments for input power receptacle J1 are listed in Table 2-1. The data cable is installed on the rear of the printer into data receptacle J2. The maximum data cable length allowed is 50 feet. Pin assignments for data 1, receptacle J2 and signal names for each interface are listed in Table 2-2.

After the two cables (power and data) have been installed, the printer is ready for operating instructions (Chapter 4). Data are transmitted through the data cable between the printer and host computer using an RS-232C serial interface configuration. Printer data transmit baud rate (Table 2-3) is set before operation of the printer. Each interface shall recognize and print a 64-symbol subset of ASCII (Table 2-4).



To set printer data transmit baud rate, open the printer door, locate control circuit card assembly and press numbered side of DIP switch (U4) for closed, or press OPEN side for open in accordance with Table 2-3 for baud rate selection.

Table 2-4. ASCII 64-Symbol Printing Subset

Column				0	1	2	3	4	5	6	7	
b7				0	0	0	0	1	1	1	1	ROW
	b6			0	0	1	1	0	0	1	1	
		b5		0	1	0	1	0	1	0	1	
b4	b3	b2	b1	Nonprinting		Printing						
0	0	0	0		DLE	SP	0	@	P	@	P	0
0	0	0	1		DC1	:	1	A	Q	A	Q	1
0	0	1	0		DC2	*	2	B	R	B	R	2
0	0	1	1		DC3	#	3	C	S	C	S	3
0	1	0	0		DC4	$	4	D	T	D	T	4
0	1	0	1	ENQ	NAK	%	5	E	U	E	U	5
0	1	1	0	ACK		&	6	F	V	F	V	6
0	1	1	1			‘ (apos)	7	G	W	G	W	7
1	0	0	0			(	8	H	X	H	X	8
1	0	0	1			)	9	I	Y	I	Y	9
1	0	1	0	LF		*	:	J	Z	J	Z	10
1	0	1	1			+	;	K	[	K	[	11
1	1	0	0	FF		,	<	L	\	L	\	12
1	1	0	1	CR	GS	–	=	M	]	M	]	13
1	1	1	0	SO		.	>	N	^	N	^	14
1	1	1	1	SI		/	?	O	_	O	_	15

CHAPTER 3
GENERAL THEORY OF OPERATION

3.1. INTRODUCTION

This chapter contains a general theory of operation for the DmC 4080B high-speed printer. An overall functional description of operation and a description of the three functional sections of the printer and associated block diagrams are provided in this chapter.

3.2. OVERALL FUNCTIONAL DESCRIPTION

The function of the printer is to convert received information from a host computer into printable data and provide a half-page hard-copy output of that data. Printable data can be either alphanumeric or, as an option, graphics data. In the alphanumeric mode, data are interpreted as text characters in a 40-column font, with an 80-column font as an option. The overall operation of the printer is shown in Figure 3-1 with the location of three functional sections.

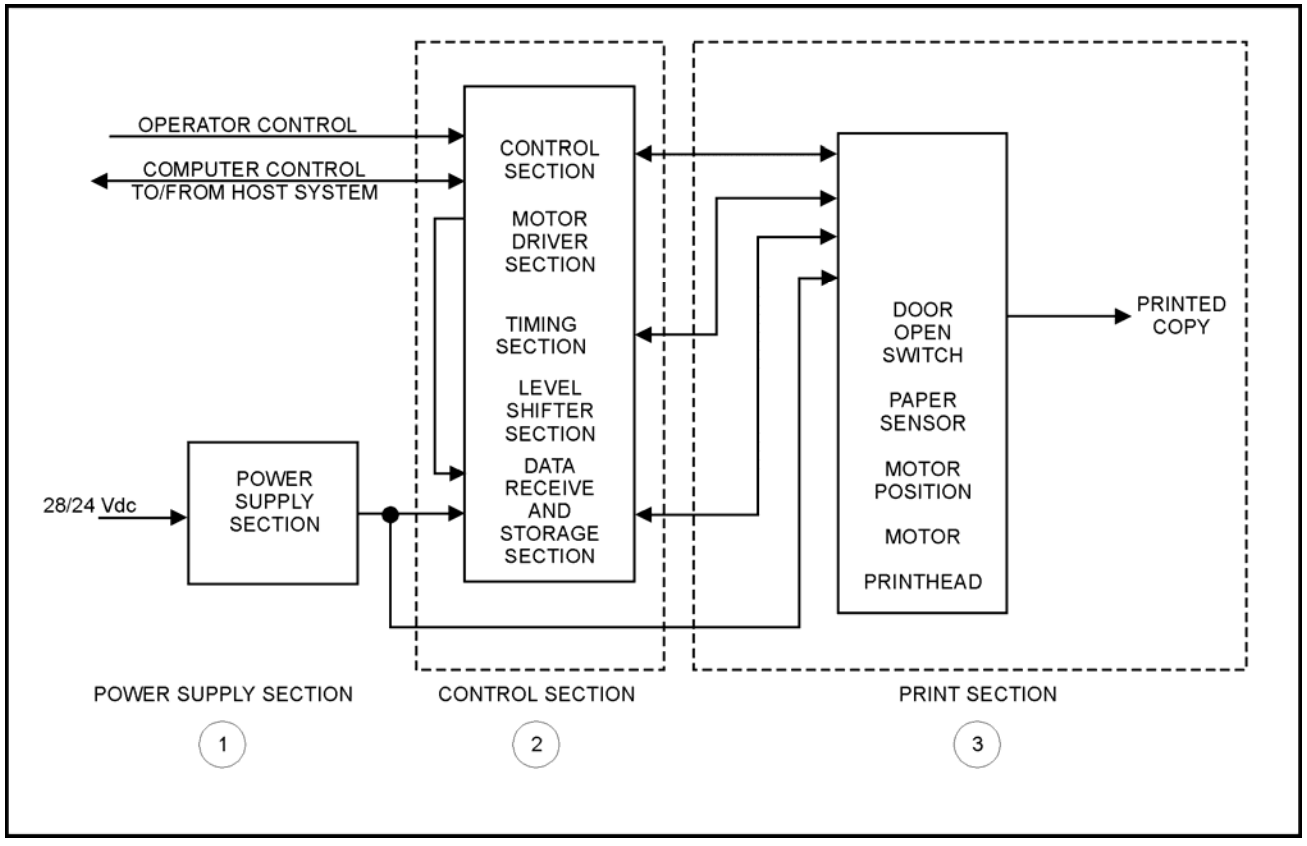


Figure 3-1. Printer Overall Functional Operation, Block Diagram

3.3. PRINTER FUNCTIONAL SECTIONS

The printer operates through three functional sections: power supply, logic, and print. Each of the three functional sections are defined in the following paragraphs, which are keyed to Figure 3-1. Interface diagrams with signals and voltages are provided in Chapter 7.

3.3.1. Power Supply Section (1)

This section receives input power from a dc external source and supply power for the printer and the power driving circuits for the printhead and drive motor. The input contains a circuit breaker mounted on the control panel. The power supply section supplies all printer dc power from a switching regulator.

3.3.2. Control Section (2)

This section receives and transmits data in an ASCII format, serial asynchronous RS-232-C type interface. In the serial interface mode, data transfer baud rates of 150, 300, 600, 1200, 2400, 4800, 9600, or 19.2K are selected (Chapter 2, paragraph 2-5 and Table 2-3) on the control CCA prior to applying printer power.

3.3.3. Print Section (3)

This section contains the printhead with its internal circuitry. This circuitry can store a dot line of data and thermally excite the printhead thermal element to print. This section also contains the drive motor and associated mechanics (rollers and gears) needed to move paper over the printhead and out of the printer door. The sensor assembly also is located in this section and is monitored by the control port section with signals going to the logic assembly in a polling sequence. The sensor assembly detects the presence or absence of paper (paper sensing function).

CHAPTER 4
OPERATING INSTRUCTIONS

4.1. INTRODUCTION

Operating instructions for the DmC 4080B high-speed printer in this chapter contain a description of operating controls and indicators, and operating procedures. Operating procedures include the following: power turn on, paper removal and reloading, self tests, on-line operation, and power turn off.

4.2. OPERATIONAL SWITCH-LIGHTS, INDICATORS, AND SWITCHES

4.2.1. Operator Controlled Switch-Lights

All the switch/lights required for printer operation are on the control panel (Figure 4-1). Switch/ lights are pressed to activate, and light to indicate activation. The switch-lights are SELF TEST and LINE FEED (LF). Table 4-1 describes the switch/indicators.

4.2.2. Indicators

Four indicators are located on the control panel. The POWER indicator illuminates to indicate power circuit breaker (CB1) is set to ON with printer connected to a power source. The FAULT indicator illuminates to indicate a fault. The ON LINE indicator when the printer is ready to receive data from the host computer. LOW BTY indicator illuminates to indicate that the battery is low.

4.2.3. Nonoperator-Controlled Switch

One nonoperator-controlled switch is contained in the printer (Figure 4-1). The nonoperator-controlled function of circuit breaker CB1 (switch) is to automatically deactivate input voltage to protect against power overloads. The switch is manually set to ON position to apply power to the printer. Refer to Table 4-1.

4.3. PREOPERATING PROCEDURES

The following paragraphs describe preoperating procedures of the printer. Preoperating procedures consist of paper loading, and power and data cable connections.

4.3.1. Paper Loading

Load printer with roll paper (1, Figure 4-2) in accordance with the following steps:

Step 1. Unscrew two captive screws (6) securing door (7) to printer and place door in full open position.

Step 2. Place roll paper shaft (2) into core of roll paper (1).

Step 3. Pull approximately six inches of paper from the roll, then place roll with roll paper shaft (2) into both retainer slots of spring clips (9), one side at a time.

Step 4. Thread end of paper through slot (5) in printer door (7), making sure that paper rolls freely over idler roller (3) and drive roller (4).

Step 5. Pull paper out through slot (5).

Step 6. Close door (7) and secure each side to printer by tightening two captive screws (6).

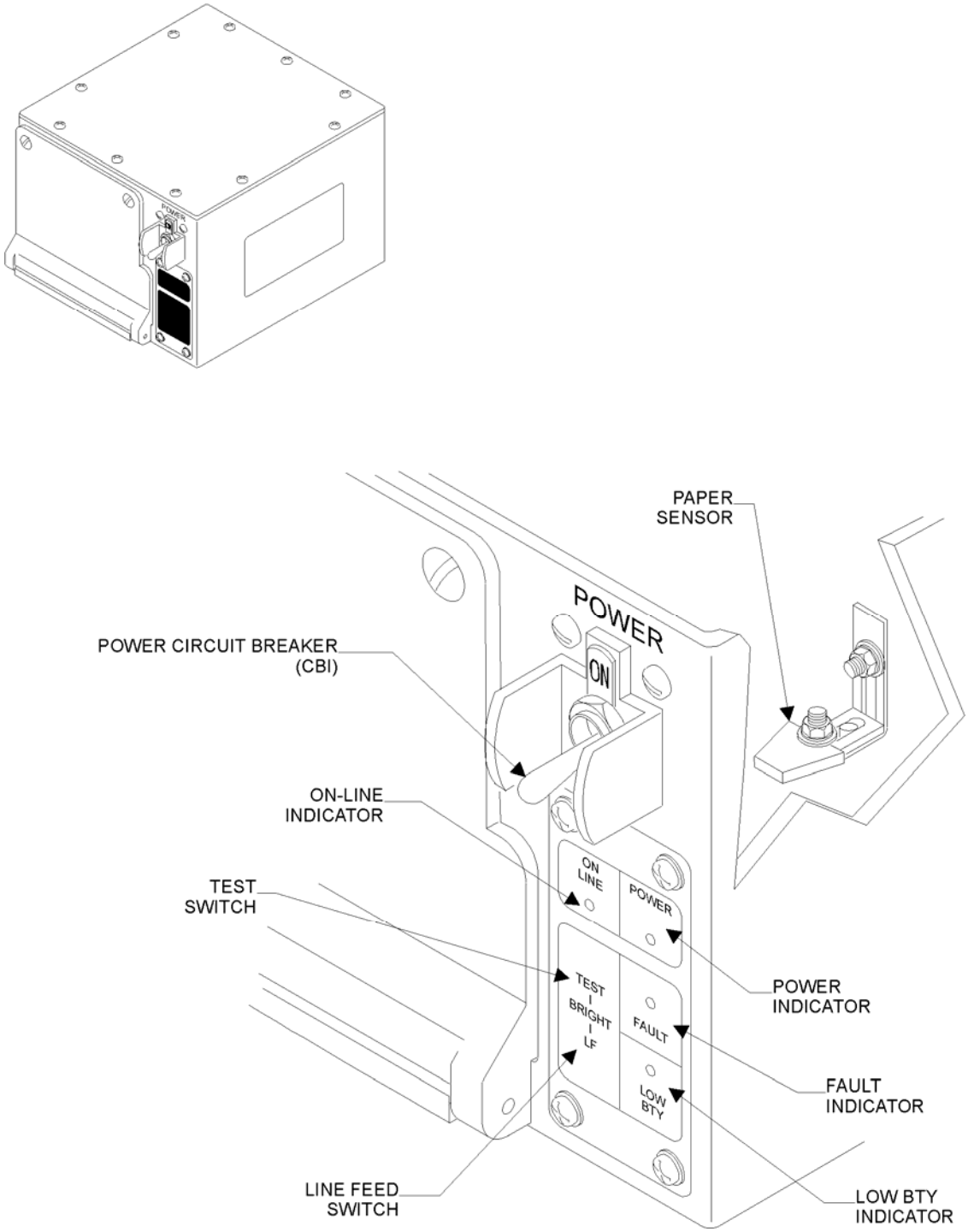


Figure 4-1. Controls and Indicators

Table 4-1. Control and Indicator Functions

Control/Indicator	Function
POWER circuit breaker (CB1)	Applies 24 Vdc power to the printer in the ON position, provides overload protection, and removes power in OFF position.
POWER indicator	Green indicator lamp. Illuminates when power is applied to printer and CB1 is set to ON.
ON LINE indicator	Green indicator lamp. Illuminates when printer is ready to receive data from host system or control panel.
FAULT indicator	Red indicator lamp. Illuminates when a fault is detected in the power supply, control CCA, printhead, or motor. Flashes when printer is out of paper or door is open.
TEST switch	Performs a switch indicator lamp test by illuminating each lamp twice. Initiates built-in test (BIT) which validates the printer internal operation and prints a 40-column self-test pattern.
LOW BTY indicator	Amber indicator lamp. Illuminates when the battery senses a low battery condition.
LINE FEED (LF) switch	Advances printer paper until switch is released.
Paper sensor	Senses paper out condition then flashes FAULT indicator on and off.

4.3.2. Paper Removal

Remove paper supply from printer door (2, Figure 4-3) in accordance with the following steps:

Step 1. Unscrew two captive screws (1) securing door (2) to printer.

Step 2. Place door (2) in full open position.

Step 3. Press upward on both spring clips (3) to remove roll paper shaft (4) from retainer grooves in each side of door (2).

Step 4. Pull roll paper and roll paper shaft (4) from door (2). Retain roll paper shaft for use with replacement roll paper.

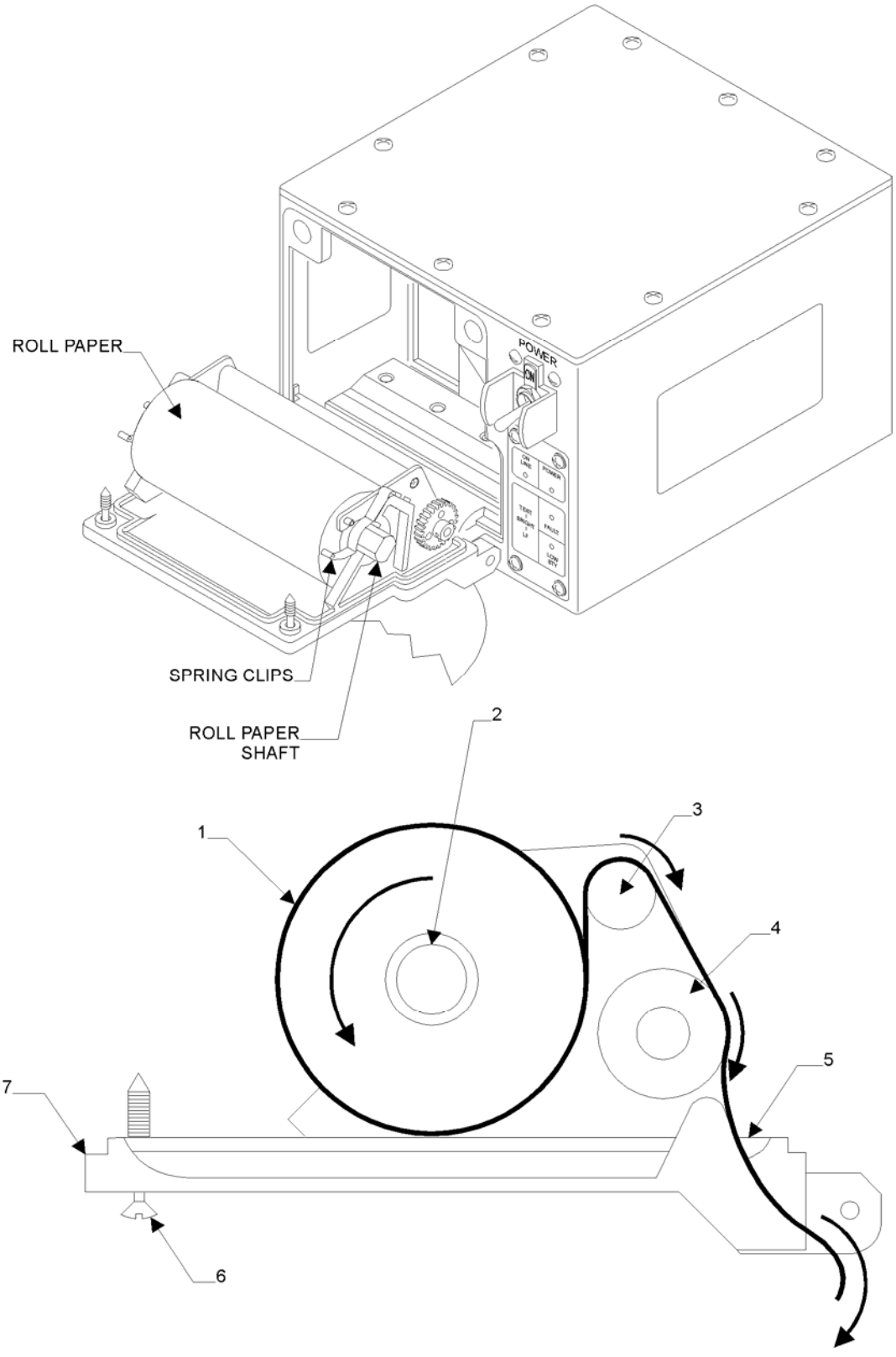


Figure 4-2. Paper Loading (Side View, Door Open)

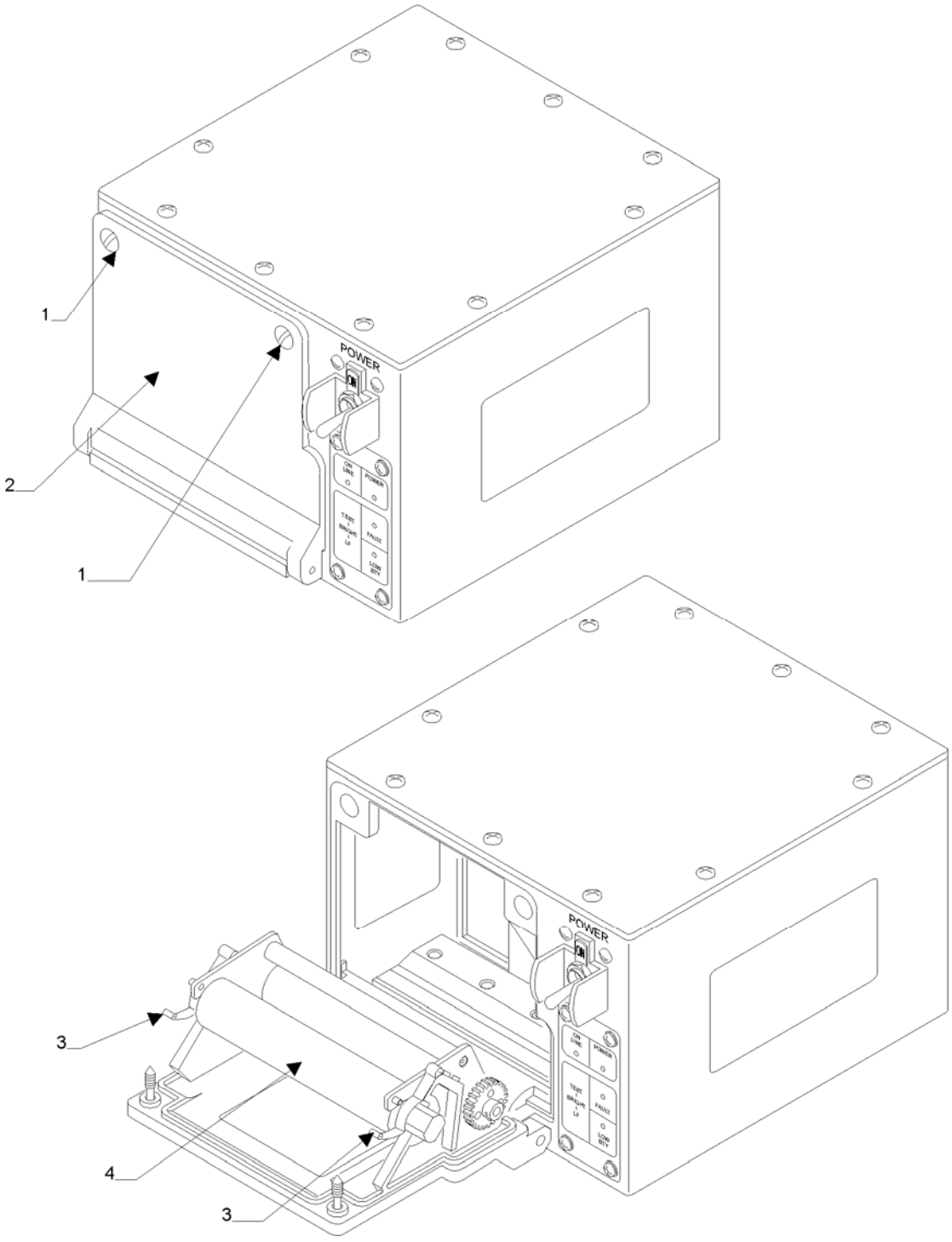


Figure 4-3. Paper Unloading

4.3.3. Power and Data Cable Connections

Two cables and a ground strap are necessary for on-line printer operation. The input power cable is installed on the rear of the printer into input power connector J1 (Figure 4-4). Pin assignments for input power connector J1 are listed in Chapter 2, Table 2-1. The data cable is installed on the rear of the printer into data connector J2. Pin assignments for data connector J2 and signal names are listed in Chapter 2, Table 2-2. The ground strap is installed on the rear of the printer to ground lug El (1).

After the two cables and ground (one power, one data, and one ground strap) have been installed, the printer is ready for operating procedures (paragraph 4-4). Data are transmitted through the data cable between the printer and host at a baud rate selected from Chapter 2, Table 2-3.

4.3.4. Field Power Distribution Unit

The field power distribution unit (FPDU) is a dc-to-dc converter. The FPDU consists of two connectors, J1 and J2 (see Figure 4-5). J1 is connected to a 28 Vdc source (vehicle power). J2 is connected to the printer through the 24 Vdc power cable.

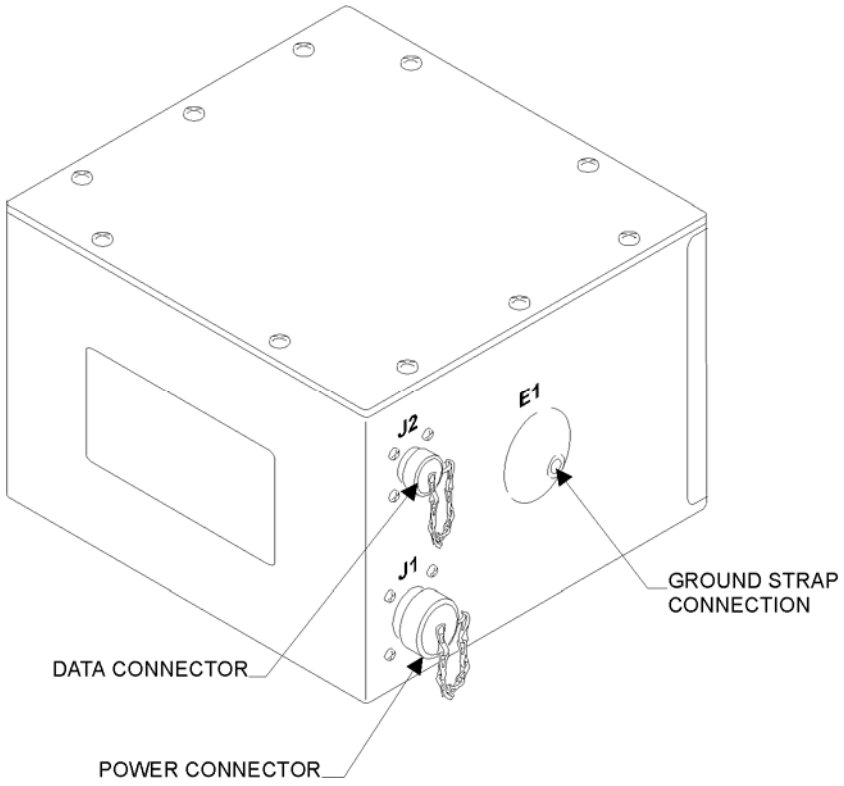


Figure 4-4. Power, Data, and Ground Strap Connections

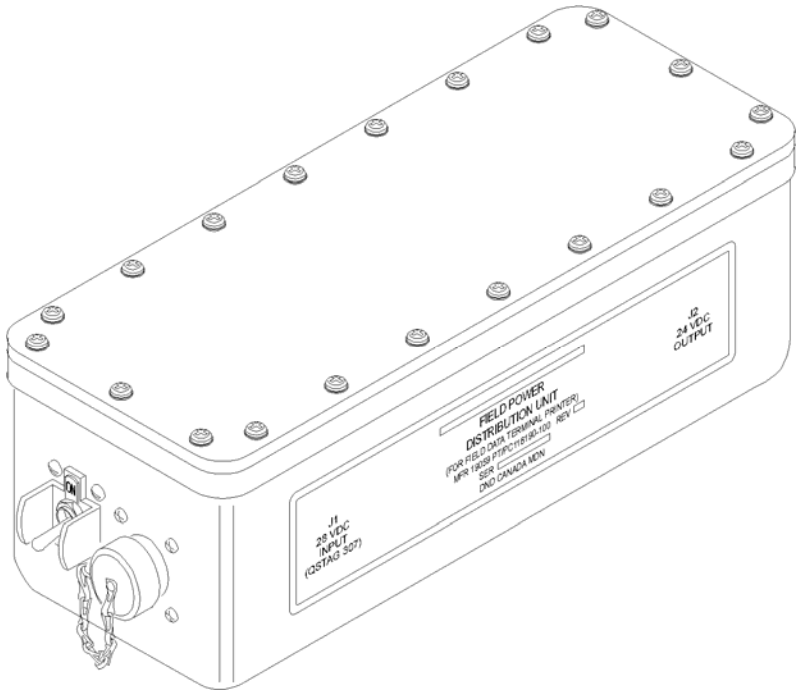


Figure 4-5. Field Power Distribution Unit (FPDU)

4.4. OPERATING PROCEDURES

The following paragraphs describe operating procedures for the printer. Operating procedures consist of power turn on, control panel functional checks, self tests, normal operation, and power turn off. A combination of operating procedures provides printer performance verification (Chapter 6, paragraph 6-18).

4.4.1. Power Turn On

After power, data, and ground strap connections are made to the printer (paragraph 4-3.3), turn printer power on in accordance with the following steps:

Step 1. Steps b. and c. will not be required if power has previously been turn on.

Step 2. Set circuit breaker CB1 (Figure 4-1) to ON position.

Step 3. Observe that POWER indicator (Figure 4-1) illuminates and printer performs built-in test (BIT) (approximately 1 minute). The printer will perform the following sequence of events:

1. ON LINE indicator off.
2. Printer not ready signal sent to host.
3. RAM test.
4. EPROM test.
5. Logic function test.
6. Printhead loop test.

7. Paper transport (motor) test.
8. Printer ready signal sent to host.
9. ON LINE indicator on.

NOTE

If FAULT indicator illuminates red after BIT, proceed to paragraph 4-4.3.b.

Step 4. To remove power, set CB1 to OFF (down position).

4.4.2. Annunciator Panel Functional Checks

The POWER, ON LINE/FAULT, SELF TEST, and LINE FEED (LF) indicators/switch-lights are checked in accordance with the following steps:

Step 1. Press LINE FEED (LF) switch-light (Figure 4-1) with power turned on (paragraph 4-4.1) and printer loaded with paper (paragraph 4-3.1).

Step 2. Paper will advance continuously until LINE FEED (LF) switch-light is released.

Step 3. FAULT indicator will illuminate (red) when a fault is detected during printer self test, and flash on and off when printer is out of paper or door is opened.

Step 4. ON LINE indicator will illuminate (green) when the printer is ready to accept input data from the host, or receive control panel input.

Step 5. POWER indicator will illuminate (green) when CB1 is set to ON.

4.4.3. Self Tests

Three types of printer self tests are provided. The first type is the power on BIT; the second type is the operator-invoked self-test diagnostic; and the third type is the host-requested background diagnostics.

a. Power on BIT. Each time printer POWER is set to ON, a diagnostic BIT resident in memory is performed. The BIT is completed in less than 1 minute and performs the following tests of the printer:

NOTE

This diagnostic BIT also can be initiated by the host sending an ENQ control code to the printer.

1. A checksum of the read only memory (ROM) software program, and each address location in random access memory (RAM), is tested to correctly store digits 1 and 0 on the control CCA. A failure causes the FAULT indicator and to illuminate and printer to remain off line.

2. A printhead internal shifting loop test is performed to verify printhead data interface. A failure causes the FAULT indicators to illuminate and printer to remain off line.

3. Power supply voltage status signals are sampled against stored values for faults and voltage to the drive motor. This occurs for approximately 5 seconds to allow a motor run status signal check. A failure causes the FAULT indicator to illuminate and printer to remain off line.

    (a) At completion of power-on BIT with no faults detected, printer sends ACK code notifying host that printer is ready and illuminates ON LINE indicator.

    (b) If BIT fails, the FAULT indicator will illuminate, an NAK code and status byte is sent to the host, and the printer will remain off line waiting. Troubleshoot by referring to chapter 6.

b. Operator-Invoked Self-Test Diagnostic. A self test invoked by the operator pressing TEST switch-light performs the following tests of the printer:

NOTE

The operator-invoked self-test diagnostics also can be initiated by the host sending a DC2 control code to the printer.

1. Printer sends off-line signal to host and extinguishes ON LINE indicator.

2. Performs a lamp test of each indicator and switch-light, twice in a clockwise direction from POWER, ending with POWER indicator illuminated.

3. Advances paper several lines.

4. Performs power-on BIT.

5. Prints a shifting pattern of host selected 40- or 80-column alphanumeric text (Figures 4-6 or 4-7).

6. Advances paper several lines.

7. Sends ACK code notifying host that printer is ready.

8. Illuminates ON LINE indicator.

9. Compare printout from step 5. to Figures 4-6 or 4-7. If not similar to or better than self-test pattern, refer to troubleshooting (Chapter 6).

    (a) At completion of power-on BIT with no faults detected, printer sends ACK code notifying host that printer is ready and illuminates ON LINE indicator.

    (b) If BIT fails, the FAULT indicator will illuminate, an NAK code and status byte is sent to the host, and the printer will remain off line waiting troubleshooting (Chapter 6).

Figure 4-6. 40-Column Self-Test Printout

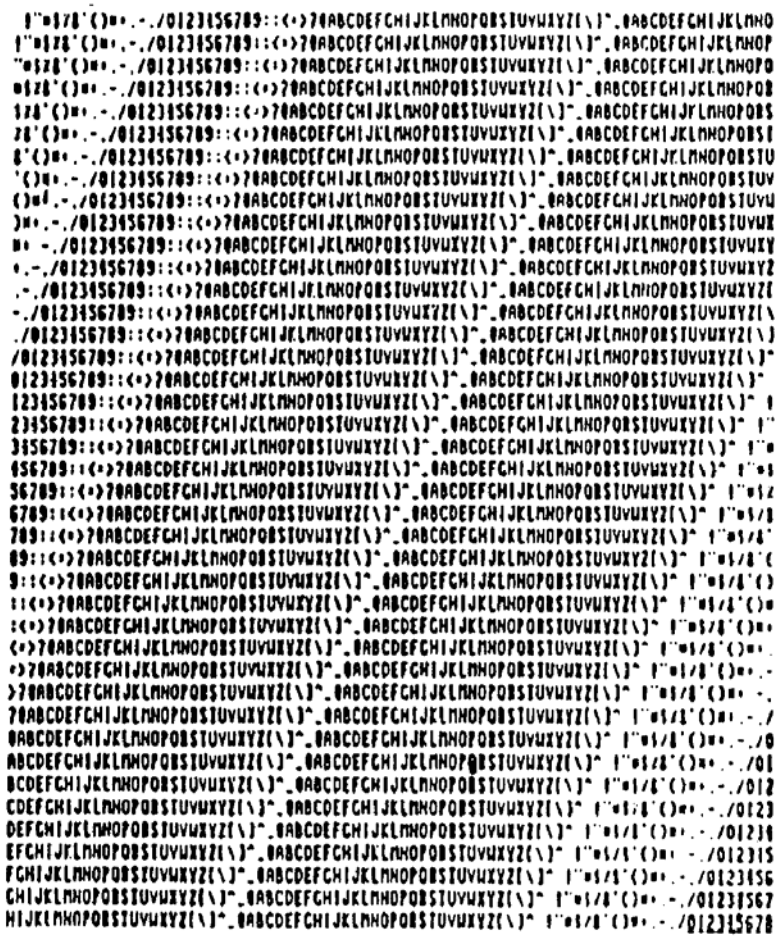


Figure 4-7. 80-Column Test Printout

c. Background Diagnostics. During operation, the printer samples all internal functions with the internal buffer. The host can receive the printer status by sending a DC4 control code to the printer. The printer sends its operational status in an 8-bit status byte format (Table 4-2) to the host.

d. Printer Font Selection. When or 80-column optional font has been installed in the printer, a host generated SO 0EH (shift out code) signal switches the printer from 40-column font to the 80-column font (see programming requirements, Chapter 7, paragraphs 7-2.1.e. and 7-2.1.f.). The test pattern (Figures 4-6 or 4-7) will be printed in the font selected by the host.

If a FAULT is sensed, the LRU that has failed is identified to the user by the blinking FAULT LED according to Table 4-3.

4.4.4. Normal Operation

For normal operation of the printer, perform the following procedure:

a. Check printer paper supply and replenish as needed in accordance with paragraph 4-3.1.
b. Connect power and data cables in accordance with paragraph 4-3.3.
c. Apply power to printer and allow power-on BIT (paragraph 4-4.3.a) completion.
d. Perform operator-invoked self-test diagnostics (paragraph 4-4.3.b).
e. When tests are completed without fault, printer is ready for use.

4.4.5. Power Turn Off

Remove printer power by setting POWER switch to OFF position.

Table 4-2. 8-Bit Status Byte Format

Bit	Printer Byte/Status
0	Set to 0: Prevents host recognition as XON or XOFF code
1	Set to 1: Door open condition.
2	Set to 1: Fault in power supply, control CCA, printhead, or motor
3	Set to 1: Ready to accept data Set to 0: Fault condition, paper out, door open, printing, line feed (F), self test
4	Set to 1: Paper out
5	Set to 0: Parity error, always set to 0 (not used)
6	Set to 1: Prevents host recognition as ACK or NAK code.
7	Set to 1: Test in progress

Table 4-3. LED Fault Indicators

FAULT LED Blinks	Fault
Once with a pause	Indeterminate: 1 of X SRUs
Twice with a pause	Control CCA
Three times with a pause	Power Supply CCA
Four times with a pause	Printhead
ON steady (not blinking)	Out of paper or door open

CHAPTER 5
PREVENTIVE MAINTENANCE AND TESTING

5.1. INTRODUCTION

Preventive maintenance instructions for the DmC 4080B high-speed printer in this chapter contain cleaning, inspection, and testing to help prevent the necessity of future corrective maintenance. Refer to Chapter 6 for printer corrective maintenance.

5.2. PREVENTIVE MAINTENANCE

Perform preventive maintenance on the printer in accordance with procedures contained in paragraphs 5-2.2 through 5-2.3.

5.2.1. Materials

Materials required to perform preventive maintenance are listed in Table 5-1.

5.2.2. Inspection

The following tasks are to be performed as listed in the following paragraphs.

5.2.2.1. Operator Inspection. The following inspection tasks are not scheduled, but should be carried out prior to operating the printer.

a. Printer Carrying Case. Inspect the straps and clips of the carrying case for rips or tears that will prevent that carrying case from safely transporting the printer and it's associated ancillaries. If the printer carrying case proves to be unserviceable replace it with a serviceable assembly.

b. Printer:

1. Inspect the printer assembly for physical damage as listed below:

   (a) Control Panel
   (b) Door assembly operation
   (c) Circuit breaker switch
   (d) Power Connector J1
   (e) Data Connector J2
   (f) The actual print operation

2. If the printer will does not operate correctly perform the following:

   (a) Make sure that the power LED located on the control panel assembly is illuminated with the circuit breaker switch is in the ON position and power is applied to J1 on the rear of the printer assembly.

   (b) Make sure that printer is properly loaded with clean, dry, thermal paper and the front door assembly is closed.

Table 5-1. Preventive Maintenance Materials

Materials	Description	Use
1. Isopropyl alcohol	MIL-A-10428, Grade A or commercial equivalent	General, printhead surface, and roller cleaning
2. Cotton swabs	Commercial	Printhead cleaning
3. Cleaning cloth, lint-free light-colored	Commercial	General and printhead cleaning

(c) Make sure that a serviceable NiCad or Lithium battery is properly installed in the printer.

(d) Make sure that a serviceable data cable is properly connected between J2 on the printer and the serial RS-232 port on the host computer.

(e) Perform a BIT self test from the host computer, refer to paragraph 4-4.3.

3. If any of the above steps result in a failure replace the printer with a serviceable assembly.

5.2.2.2. First Level Inspection. The following inspection tasks are to be performed annually:

a. Printer Inspection:

1. Make sure that power is removed from the printer. Remove the printer from it's carrying case
2. Inspect that the door assembly
3. Inspect the captive screws on the door assembly for damage
4. Inspect the battery door and securing screws and springs. Replace hardware and or door as applicable
5. Remove the protective metal caps from both J1 and J2 on the rear of the printer assembly. Make sure that J1 and J2 connectors on the rear of the printer assembly are clean, contacts are clean and connector is free from physical damage
6. Make sure that the circuit breaker power switch can toggle to the OFF and ON positions and is not corroded or damaged
7. Open the front door of the printer assembly
8. Make sure that the interior of the printer is free from dirt or corrosion

If any of the above steps result in a failure replace the printer with a serviceable assembly.

b. Printer Carrying Case. Inspect the straps and clips of the carrying case for rips or tears that will prevent that carrying case from safely transporting the printer along with it's associated ancillaries. If the printer carrying proves to be unserviceable replace it with a serviceable assembly.

5.2.3. First Level Cleaning

General cleaning of the printer should be performed every three months, or more frequently if required by environmental conditions. Perform first level cleaning of the printer in accordance with the following steps:

NOTE

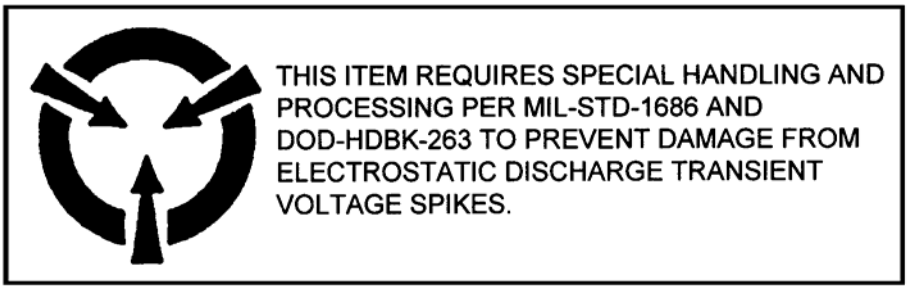
The printer does not require lubrication.

Step 1. Make sure that the circuit breaker toggle switch is in the OFF position.

Step 2. Open the printer door (1, Figure 5-1) and remove any installed paper (Chapter 4, paragraph 4-3.2).

CAUTION

To prevent printhead damage, avoid striking printhead during cleaning procedure.



Step 3. Wipe all debris from printer interior, rollers, and exterior using lint-free cleaning cloth.

WARNING

Isopropyl alcohol is a toxic and flammable liquid. Keep isopropyl alcohol, and cleaning cloths wet with isopropyl alcohol, away from ignition sources, and use only in a well ventilated area.

NOTE

Use lint-free cleaning cloth to dry isopropyl alcohol from surfaces.

Step 4. Clean rollers (2) with isopropyl alcohol and a clean, lint-free cloth.

Step 5. Clean printer interior and exterior with isopropyl alcohol and a clean, lint-free cloth.

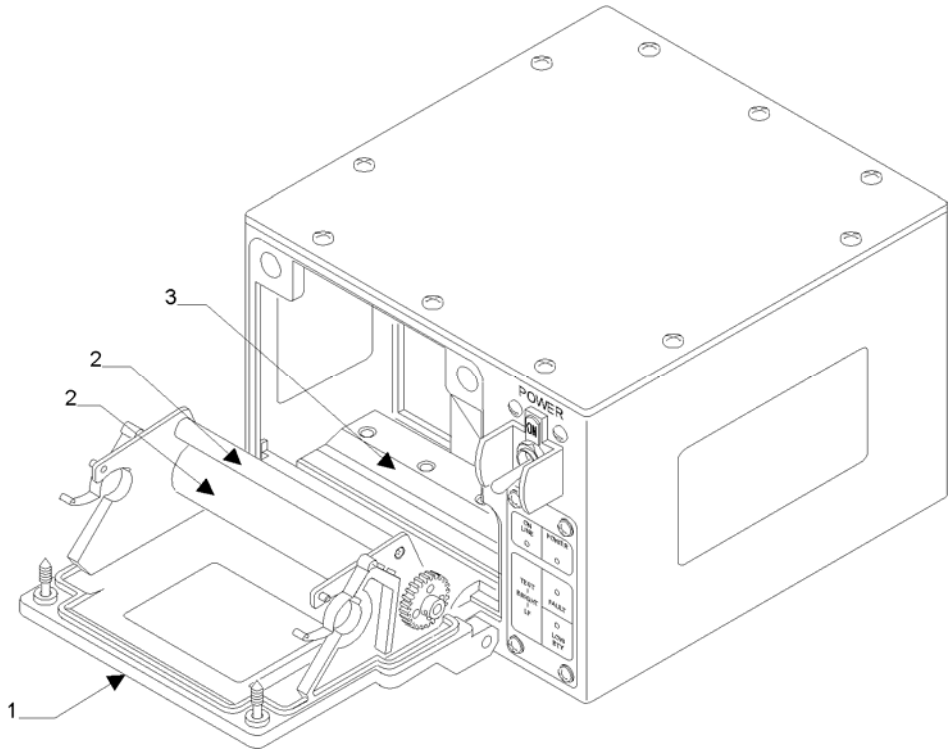


Figure 5-1. Printer Cleaning

Step 6. Load printer with roll paper (Chapter 4, paragraph 4-3.1).

Step 7. Close and secure printer door.

Step 8. Perform printer performance verification in accordance with Chapter 6, paragraph 6 18).

CAUTION

To prevent printhead damage, avoid striking printhead during cleaning procedure.

5.2.4. Printhead Cleaning

Step 1. Open the printer door (l, Figure 5-1) and remove paper supply (Chapter 4, paragraph 4-3.2).

WARNING

Isopropyl alcohol is a toxic and flammable liquid. Keep isopropyl alcohol, and cleaning cloths wet with isopropyl alcohol, away from ignition sources, and use only in a well ventilated area.

Step 2. Using cotton swabs dampened with isopropyl alcohol, clean printhead (3) printing surface and surrounding area until all foreign material is completely removed.

Step 3. Remove any isopropyl alcohol from printhead (3) and surrounding area with a dry, lint-free cleaning cloth.

Step 4. Load printer with roll paper (Chapter 4, paragraph 4-3.1).

Step 5. Close and secure printer door.

Step 6. Perform printer performance verification, refer to Chapter 6, paragraph 6-18.

5.3. TESTING

Perform first or second level testing by referring to the procedures listed below.

5.3.1. First Level Testing

Perform the procedures list below prior second level testing. Table 5-2 lists the test equipment required.

5.3.2. Test Setup

Make sure that clean, dry paper is properly loaded in the printer and that the printhead is clean, dry and properly aligned.

5.3.3. Testing

Perform the procedures listed below:

Step 1. Toggle the circuit breaker switch to the ON position. Verify that power up that the power LED illuminates and all other LEDs illuminate momentarily. Paper also must advance approximately 1 inch from the paper slot. After initial power up, make sure that only the power LED and on-line LED remain illuminated.

Step 2. Press the LF switch on the control panel. Verify paper advances from the printer.

Step 3. Press the LF switch three times simultaneously on the control panel. Verify that the POWER and ON LINE LEDs vary in brightness.

Step 4. Press the TEST switch on the control panel. Verify that the printer prints rotating ASCII characters. Refer to Chapter 4, Figure 4-6.

Table 5-2. First Level Test Equipment

Equipment	Description	Use
28 Vdc power supply	DC power supply able to supply 28 Vdc	To simulate vehicle 28 Vdc to FPDU
Host computer	Computer 286 or better with DOS 5.0 or higher	To send/receive required codes to printer

Step 5. Loosen the two captive screws on the front door assembly and open the front door. Verify that the FAULT LED on the control panel begins to flash.

Step 6. Press the LINE FEED (LF) and TEST switches simultaneously. Verify that paper does not advance from the printer.

Step 7. Close the printer door and secure with the two captive screws. Verify that the FAULT LED extinguishes.

Step 8. Initiate a BIT test from the host computer by sending the control code DC2 through the serial communication data line. Verify the following:

1. A not ready signal is sent from the printer to the host computer
2. All LEDs on the printer momentarily illuminate
3. The printer prints rotating ASCII characters. Refer to Chapter 4, Figure 4-6
4. Paper advances
5. ACK code is sent from the printer to the host computer
6. The ON LINE LED on the printer's control panel illuminates.

Step 9. Toggle the circuit breaker switch on the printer to the OFF position.

Step 10. Toggle the power switch on the FPDU to the OFF position.

Step 11. Remove the 24 Vdc cable from J1 on the rear of the printer assembly.

Step 12. Make sure a serviceable battery is properly installed in the printer.

Step 13. Toggle the circuit breaker on the printer to the ON position.

Verify that upon powering up that the power LED illuminates that all other LEDs illuminate momentarily and that paper also must advance approximately one inch from the paper slot. After initial power up, make sure that only the power LED and ON LINE LED remain illuminated.

5.3.4. Second Level Testing

Perform the procedures list below prior second level testing. Refer to Table 5-2 for required test equipment required. If a failure occurs through the implementation of the procedures below, perform fault isolation refer to chapter 6.

5.3.5. Test Setup

Make sure that clean, dry paper is properly loaded in the printer and that the print head is clean, dry and properly aligned.

5.3.6. Testing

Perform the procedures listed below:

Step 1. Toggle the circuit breaker switch to the ON position. Verify that upon powering up that the power LED illuminates and all other LEDs illuminate momentarily. The paper

must also advance approximately one inch from the paper slot. After initial power up, make sure that only the power LED and on-line LED remain illuminated.

Step 2. Press the LF switch on the control panel. Verify paper advances from the printer.

Step 3. Press the LF switch three times simultaneously on the control panel. Verify that the Power and ON LINE LED vary in brightness.

Step 4. Press the TEST switch on the control panel. Verify that the printer prints rotating ASCII. Refer to figure 4-6.

Step 5. Loosen the two captive screws on the front door assembly. Completely open the front door. Verify that the FAULT LED on the control panel begins to flash.

Step 6. Press the LF and TEST switches simultaneously. Verify that paper does not advances from the printer.

Step 7. Close the printer door and secure with the two captive screws. Verify that the FAULT LED extinguishes.

Step 8. Initiate a BIT test from the host computer by sending the control code DC2 through the serial communication data line and verify the following:

1. A not ready signal is sent from the printer to the host computer
2. All LEDs on the printer momentarily illuminate
3. The printer prints rotating ASCII. Refer to Chapter 4, Figure 4-6
4. Paper advances
5. ACK code is sent from the printer to the host computer
6. The ON LINE LED on the printer's control panel illuminates

Step 9. Toggle the circuit breaker switch on the printer to the OFF position.

Step 10. Toggle the power switch on the FPDU to the OFF position.

Step 11. Remove the 24 Vdc cable from J1 on the rear of the printer assembly.

Step 12. Make sure that a serviceable battery is properly installed in the printer.

Step 13. Toggle the circuit breaker power switch to the ON position.

Verify that upon powering up that the power LED illuminates and all other LEDs illuminate momentarily. Paper also must advance approximately 1 inch from the paper slot. After initial power up, make sure that only the power LED and on-line LED remain illuminated.

CHAPTER 6
CORRECTIVE MAINTENANCE

6.1. GENERAL

Corrective maintenance instructions for the DmC 4080B high-speed printer in this chapter contain troubleshooting procedures, alignment/adjustment procedures, replacement procedures, and when applicable, a performance verification procedure for the printer. Equipment/material used for corrective maintenance are listed in Table 6-1.

6.2. TROUBLESHOOTING

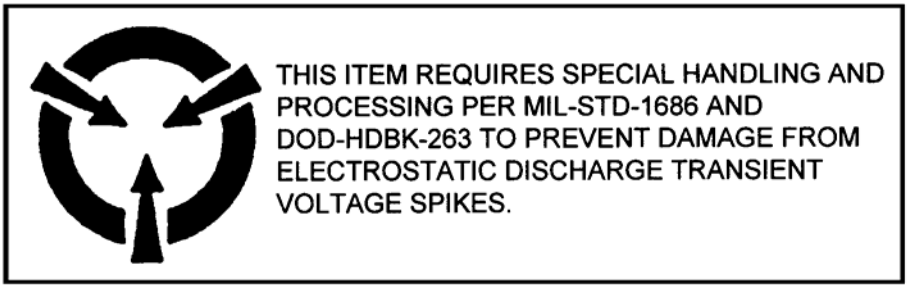
Printer troubleshooting is accomplished using control panel indicators and self-test information. Refer to Figure 6-1 and Table 6-2 for fault isolation procedures for printer assemblies. Cable troubleshooting is accomplished using a digital multimeter to check continuity/voltage as required, to isolate a fault (refer to Figure 6-2). Enter Fault Isolation (Table 6-2) with failure symptom from control panel indication(s), and/or self-test results.

Search column 1 for failure description which matches failure symptom. Perform procedures in sequence, listed in column 2. Test printer after each component change in accordance with second line maintenance testing (Chapter 5, paragraph 5-3.4).

6.2.1. Second Level Fault Isolation

Perform the appropriate fault isolation procedure as shown in Table 6-2.

CAUTION



6.3. CORRECTIVE MAINTENANCE REPAIR

Printer repairs are accomplished by performing replacement instructions, including any required adjustments of the assembly containing a fault, isolated in Table 6-2. A parts list is provided in Chapter 9, including mounting hardware and some related parts. Removal/installation of printer assemblies is simplified if printer is in an open area. Remove printer from a space restrictive area, if so installed, prior to performing corrective maintenance repair.

Table 6-1. Corrective Maintenance Equipment and Materials

Equipment or Materials	Description	Use
1. Thermal compound	MIL-C-47009 or equivalent	Applied to bottom of printhead and power supply for heat transfer
2. Common hand tools	Commercial screwdriver, Phillips head no. 1, no. 2, no. 3 (two no. 1's required) Screwdriver, flat head, 1/4-in. blade, 8-inch long shaft Screwdriver set Screwdriver set, jeweler's Allen wrench set Calipers, 0-5 in., 0.001-in. increments Needle nose pliers, 4 in. Tweezers, 6 in. Flashlight	Removal, replacement, and adjustment functions
3. Flexible, numbered wire markers	Commercial	Wire identification
4. Tie wrap	MS3367-5-9 or equivalent	Secures cable assemblies
5. Digital multimeter	AN/USM486 or equivalent	Continuity/voltage check of cables

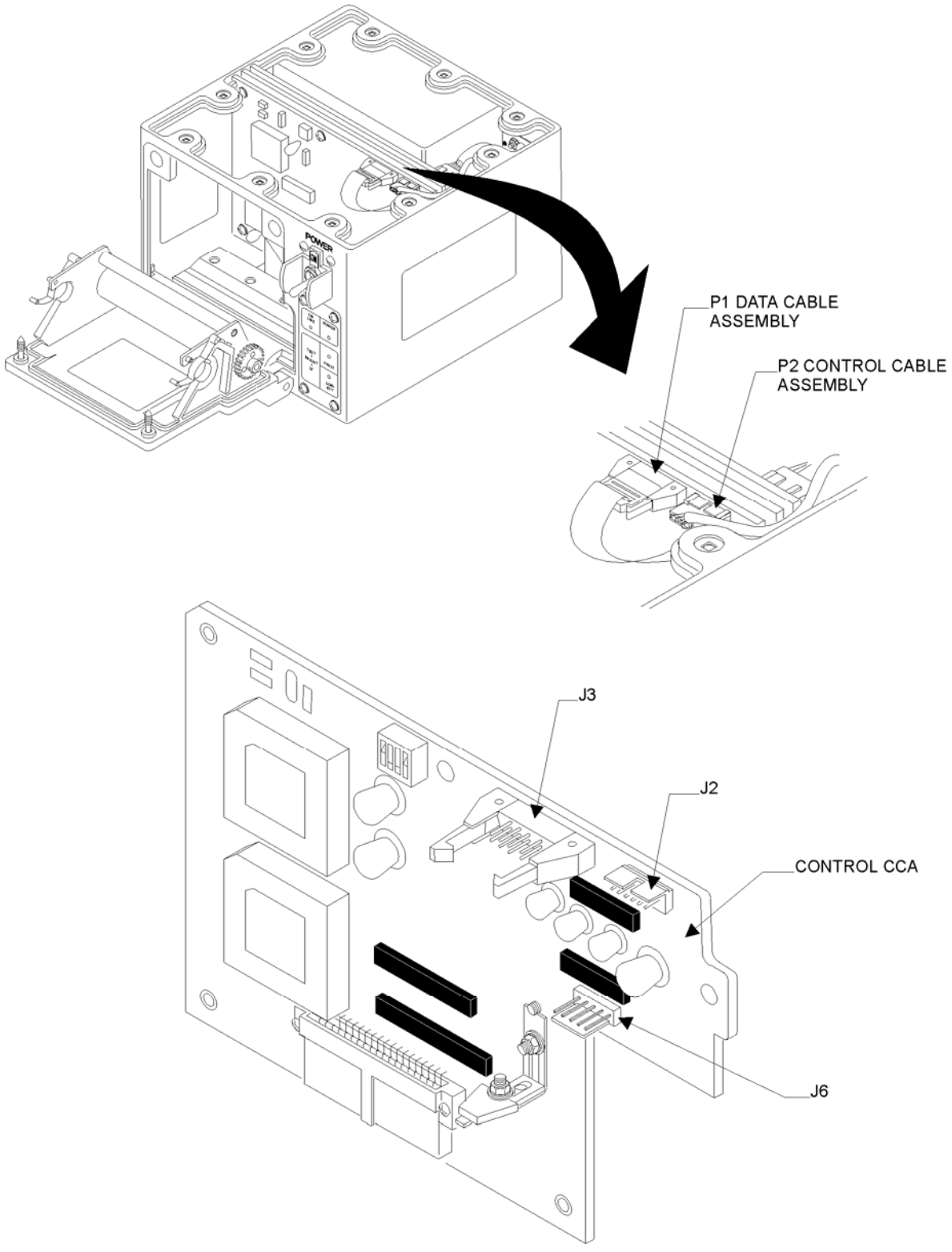


Figure 6-1. Fault Isolation

Table 6-2. Fault Isolation

Fault	Corrective Action
Unable to transmit/receive information to/from the host computer	1. Send an ASCII control code (LF 0AH) from the host computer to initiate a line feed command. 2. Initiate a BIT diagnostic by sending the ASCII control code (DC2 12H) to the printer via the host computer. If steps 1 or 2 result in a failure replace the Controller CCA. 3. Open the printer door by loosening two captive screws that secure the printer door. Completely open the printer door. Refer to Figure 6-1 for the following steps. 4. Inspect J3 on the Controller CCA for physical damage such as damaged pins. Replace the Controller CCA, if necessary. 5. Inspect P2 on the controller cable assembly for physical damage such as damaged pins. Replace if necessary. 6. Make sure that the connection between J3 on the Controller CCA and control panel cable assembly is secure. If the problem cannot be resolved, replace the control panel (refer to paragraph 6-8).
Unable to transmit/receive information to/from the host computer	1. Initiate a BIT from the control panel. If the BIT indicates a failure, replace the Controller CCA. 2. Remove the RS-232 cable from J2 on the rear of the printer (refer to Figure 6-2). 3. Inspect the data cable connector J2 for damaged pins. Replace data cable, if necessary. 4. Remove the printer top cover. 5. Remove the data cable from J2 on the Controller CCA (refer to Figure 6-1). 6. Inspect the data cable connector P1 for damaged pins (Figure 6-1).

Table 6-2. Fault Isolation (Continued)

Fault	Corrective Action
	Replace the data cable, if necessary. 7. Perform a continuity check on the data cable using a multimeter. 8. Ensure that there is no short circuit between each pin on the data cable. If steps 7 or 8 result in a failure, replace the data cable assembly. If the problem cannot be resolved, replace the Controller CCA (refer to paragraph 6-9).
Printer motor does not operate	1. Initiate a BIT from the control panel. If the BIT indicates a failure, replace the Controller CCA or Power Supply CCA as identified by the flashing LED pattern (refer to Chapter 4, Table 4-3). 2. Remove the printer top cover. 3. Remove the motor cable assembly from J6 on the Controller CCA (Figure 6-1). 4. Perform a continuity check on the motor's windings using a digital multimeter. If step 4 results in a failure, replace the motor assembly (refer to paragraph 6-7. 5. Inspect the motor cable assembly connector P1 for damaged pins. Replace motor cable assembly if necessary (refer to paragraph 6-7). 6. Inspect the Controller CCA assembly connector J6 for damaged pins. Replace the Controller CCA, if necessary (refer to paragraph 6-9).

Table 6-2. Fault Isolation (Continued)

Fault	Corrective Action
Vertical lines/distortion on printout	1. Open the printer door by loosening two captive screws. Completely open the printer door. 2. Make sure the paper is clean, dry, and properly installed. Reinstall or replace the paper as applicable. 3. Initiate BIT from the control panel. If the BIT indicates a failure, replace the Controller CCA (refer to paragraph 6-9) or Power Supply CCA (refer to paragraph 6-10) as identified by the flashing LED pattern (refer to Chapter 4, Table 4-3). 4. Clean the thermal printhead (refer to paragraph 5-2.3). If the problem has not been resolved, replace the motor assembly (refer to paragraph 6-7).
Self-test printout continuously missing one or more diagonal characters or lines	1. Initiate BIT from the control panel. If BIT results in a Controller CCA assembly failure, replace the Controller CCA (refer to paragraph 6-9). If BIT results in a printhead assembly failure, perform the following: a. Remove the printhead cable assembly from the Controller CCA (refer to paragraph 6-6.1, steps 1 through 3. b. Remove the printhead cable assembly from the printhead. c. Perform a continuity check on the printhead cable assembly using a multimeter. d. Inspect both ends of the printhead cable assembly for damaged pins. If steps c. or d. result in a failure, replace the printhead cable assembly (refer to paragraph 6-6). If the problem cannot be resolved replace the printhead assembly (refer to paragraph 6-5).

Table 6-2. Fault Isolation (Continued)

Fault	Corrective Action
Self-test printout contains vertical white streaks	1. Open the printer door by loosening the two captive screws. Completely open the printer door. 2. Make sure the paper is clean, dry, and properly installed. Reinstall or replace the paper as applicable. 3. Initiate BIT from the control panel. If the BIT indicates a failure, replace the Controller CCA (refer to paragraph 6-9) or printhead assembly (refer to paragraph 6-10) as identified by the flashing LED pattern (refer to Chapter 4, Table 4-3). 4. Clean the thermal printhead (refer to paragraph 5-2.3). If the problem has not been resolved, replace the printhead (refer to paragraph 6-5).
Self-test prints only on half of each page	1. Open the printer door by loosening the two captive screws. Completely open the printer door. 2. Make sure the paper is clean, dry, and properly installed. Reinstall or replace the paper as applicable. 3. Initiate BIT from the control panel. If the BIT indicates a failure, replace the Controller CCA (refer to paragraph 6-9) or Power Supply CCA (refer to paragraph 6-10) as identified by the flashing LED pattern (refer to Chapter 4, Table 4-3).
Printer operates properly, but the control panel does not illuminate	1. Change the control panel LED intensity by simultaneously pressing the TEST and LF buttons on the control panel. 2. Inspect P2 on the control panel cable assembly for physical damage such as damaged pins. Replace the control panel cable assembly, if necessary (refer to Figure 6-1). 3. Inspect J3 on the Controller CCA for physical damage such as damaged pins. Replace the Controller CCA, if necessary (refer to paragraph 6-9). 4. Make sure the connection between J3 on the Controller CCA and control panel cable assembly is secure. If the problem cannot be isolated, replace the control panel (refer to paragraph 6-8).

Table 6-2. Fault Isolation (Continued)

Fault	Corrective Action
Printer will not operate on battery power	1. Replace the battery (refer to paragraph 6-14). 2. Initiate BIT from the control panel. If BIT indicates a failure, replace the Controller CCA or Power Supply CCA, as identified by the flashing LED pattern (refer to Chapter 4, Table 4-3). 3. Remove the printer top cover. 4. Remove the circuit breaker cable assembly from J4 on the Power Supply CCA (refer to Figure 6-3). 5. With the circuit breaker OFF, verify an open circuit between pins P1-1 and P1-2 and between P1-3 and P1-4 on the circuit breaker cable assembly. 6. With the circuit breaker ON, verify an open circuit between pins P1-3 and P1-4 and between pins P1-1 and P1-2 on the circuit breaker cable assembly. If step 5 or 6 result in an error, replace the circuit breaker cable assembly (refer to paragraph 6-15). 7. Remove the battery cable assembly from J3 on the Power Supply CCA. 8. Remove the battery cable assembly from the battery. 9. Perform a continuity check on the battery cable assembly. Replace the battery cable assembly if step 9 resulted in a failure. If the problem cannot be isolated, replace the Power Supply CCA (refer to paragraph 6-10).

Table 6-2. Fault Isolation (Continued)

Fault	Corrective Action
Battery low indication illuminates while running on vehicle power	1. Replace the battery (refer to paragraph 6-14). 2. Initiate BIT from the control panel. If BIT indicates a failure, replace the Controller CCA (refer to paragraph 6-9) or Power Supply CCA (refer to paragraph 6-10) as identified by the flashing LED pattern (refer to Chapter 4, Table 4-3). 3. Remove the printer top cover. 4. Remove the circuit breaker cable assembly from J4 on the Power Supply CCA (refer to Figure 6-3). 5. With the circuit breaker OFF, verify an open circuit between pins P1-1 and P1-2 and between P1-3 and P1-4 on the circuit breaker cable assembly. 6. With the circuit breaker ON, verify an open circuit between pins P1-3 and P1-4 and between pins P1-1 and P1-2 on the circuit breaker cable assembly. If step 5 or 6 result in an error, replace the circuit breaker cable assembly (refer to paragraph 6-15). 7. Reconnect the circuit breaker cable assembly to J4 on the Power Supply CCA. 8. Toggle the power OFF on the FPDU and disconnect 24 Vdc cable connected to J2 on the FPDU. 9. Toggle the power switch on the FPDU to ON. 10. Make sure there is 24 Vdc potential between J2-A and J2-B on the FPDU (refer to Figure 6-4). If step 10 results in a failure, replace the FPDU (refer to paragraph 6-17). 11. Toggle the power OFF on the FPDU. 12. Reconnect the 24 Vdc cable to J2 on the FPDU. 13. Remove the dc power cable assembly from J1 on the Power Supply CCA.

Table 6-2. Fault Isolation (Continued)

Fault	Corrective Action
	14. Toggle the power switch on the FPDU to ON. 15. Make sure that 24 Vdc is present between pins P1-1 and P1-2 on the dc power supply cable assembly. If step 15 results in an error, replace the dc power supply cable assembly (refer to paragraph 6-12). If the problem was not isolated in the above steps, replace the Power Supply CCA (refer to paragraph 6-10).
Power up BIT detects a fault	1. Open the printer door by loosening the two captive screws. Completely open the printer door. 2. Make sure that the paper is properly installed. Reinstall or replace the paper as applicable. 3. Initiate BIT from the control panel. If BIT indicates a failure, replace the Controller CCA or Power Supply CCA as indicated by the flashing LED pattern (refer to Chapter 4, Table 4-3). If BIT results in a printhead assembly failure, perform the following: a. Remove the printhead cable assembly from the Controller CCA (refer to paragraph 6-6.1, steps 1 through 3). b. Remove the printhead cable assembly from the printhead. c. Perform a continuity check on the printhead cable assembly using a multimeter. d. Inspect both ends of the printhead cable assembly for damaged pins. If steps c. or d. result in a failure, replace the printhead cable assembly (refer to paragraph 6-6). If the problem cannot be resolved, replace the printhead assembly (refer to paragraph 6-5.

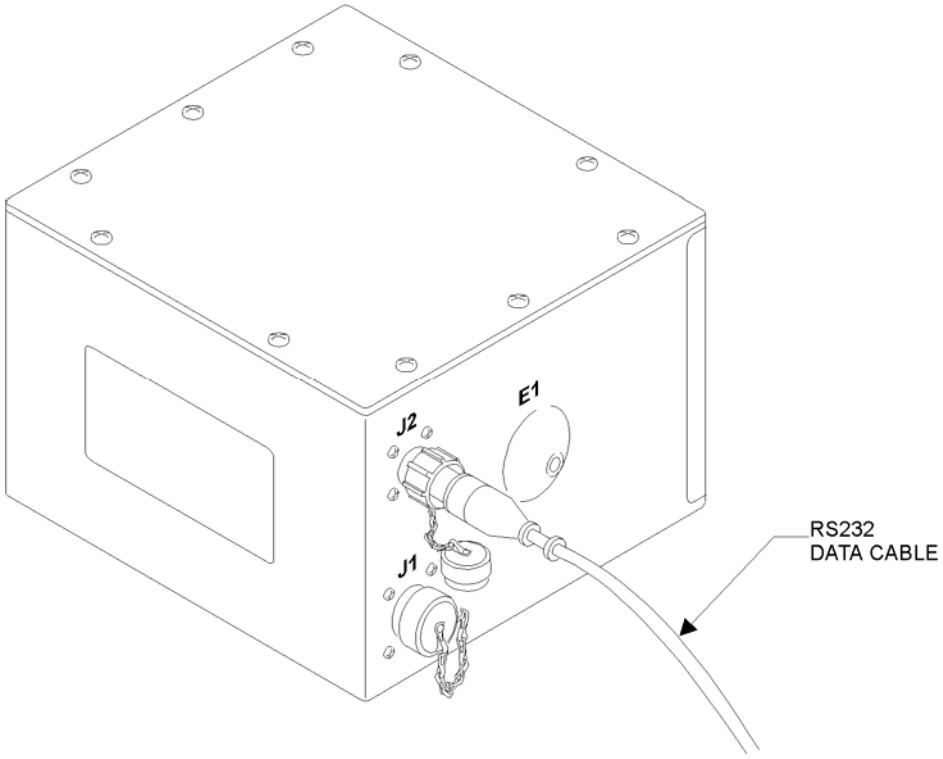


Figure 6-2. RS-232 Data Cabling

Figure 6-3. Circuit Breaker Cable Assembly Replacement

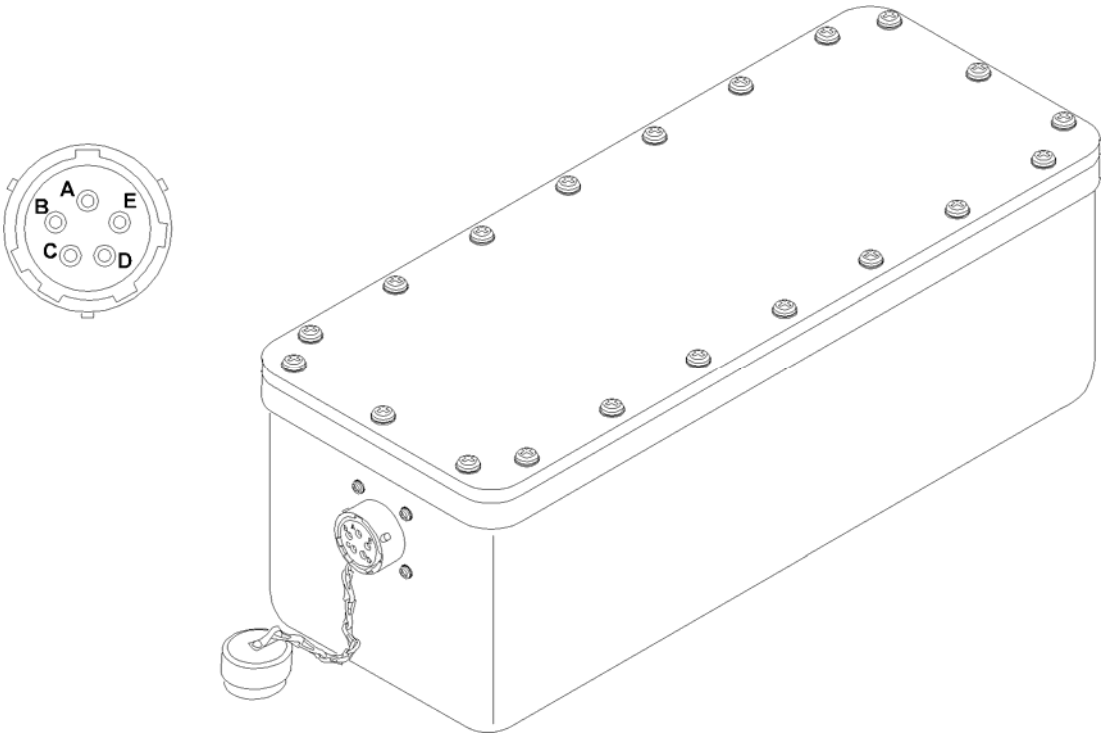


Figure 6-4. Field Power Distribution Unit (FPDU)

WARNING

To avoid electrical shock, verify power source is disconnected before starting any removal or assembly procedure. Do not begin procedure for 1 minute after power is removed.

CAUTION

THIS ITEM REQUIRES SPECIAL HANDLING AND PROCESSING PER MIL-STD-1686 AND DOD-HDBK-263 TO PREVENT DAMAGE FROM ELECTROSTATIC DISCHARGE TRANSIENT VOLTAGE SPIKES.

6.3.1. Operator Remove and Replace Procedures

The operator remove and replacement consists of removing and replacing either the carrying case or printer with a serviceable assembly.

6.3.1.1. Printer Removal. Perform the following steps to remove printer:

Step 1. Toggle the circuit breaker switch to OFF on the printer. Make sure the power LED on the front panel is not illuminated.

Step 2. Remove any cabling that may be connected to J1 or J2 from either the host computer or vehicle power. Make sure to toggle the FPDU power switch to OFF prior to removing the 24 Vdc cable from J1 on the rear of the printer assembly.

Step 3. Remove battery from the carrying case.

Step 4. Slide the printer out of the carrying case with the data and power connectors still connected to the printer.

Step 5. Remove any cabling that may be connected to J1 or J2 on the rear of the printer assembly. Make sure to toggle the FPDU power switch to OFF prior to removing the 24 Vdc cable from J1 on the rear of the printer assembly.

Step 6. Connect the protective metal caps to J1 and J2 on the rear of the printer.

6.3.1.2. Printer Replacement. Perform the following steps to replace the printer with a serviceable assembly:

Step 1. Replace the defective printer assembly with a serviceable assembly.

Step 2. Remove the protective metal caps and attach the appropriate cables to J1 and J2.

Step 3. Slide the printer into the carrying case so the front door faces outward. Make sure the power and data cable connectors attached are routed towards the front of the printer.

Step 4. Place all ancillaries back into the carrying case next to the printer.

6.3.1.3. Carrying Case Removal. Perform the following steps to remove the carrying case:

Step 1. Toggle the circuit breaker switch to OFF on the printer. Make sure the power LED on the front panel is not illuminated.

Step 2. Remove cabling connected to J1 or J2 from either the host computer or vehicle power. Toggle the FPDU power switch to OFF prior to removing the 24 Vdc cable from J1 on the rear of the printer assembly.

Step 3. Remove the battery from the carrying case.

Step 4. Slide the printer out of the carrying case with the data and power connectors still connected to the printer.

6.3.1.4. Carrying Case Replacement. Perform the following steps to replace the carrying case with a serviceable assembly:

Step 1. Replace the defective carrying case with a serviceable assembly.

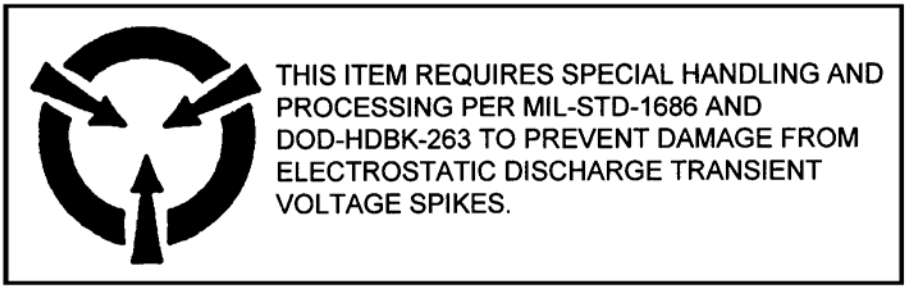
Step 2. Slide the printer into the carrying case so the front door faces outward. Make sure the power and data cable connectors attached are routed towards the front of the printer.

Step 3. Place all ancillaries back into the carrying case next to the printer.

6.4. SECOND LEVEL REMOVAL AND REPLACEMENT

Remove and replace assemblies indicated by the fault isolation procedures by following the appropriate procedures outlined in paragraph 6-6 through to and including 6-18.

CAUTION



6.5. PRINTHEAD ASSEMBLY (A3) REPLACEMENT

CAUTION

To avoid printhead damage, do not strike printhead surface during removal.

6.5.1. Printhead Assembly Removal

Remove the printhead assembly (refer to Figure 6-5) in accordance with the following steps:

Step 1. Open the printer door (2), loosen the two captive screws (1) that secure the printer door. Completely open the printer door.

Step 2. Remove the ten screws (7) that secure the top cover. Remove the top cover from the printer assembly.

Step 3. Disconnect the printhead cable connector (8) from the printhead assembly.

Step 4. Remove two screws (3) and two flat washers (4) securing printhead assembly (6) to printer housing.

Step 5. Remove printhead assembly from printer.

Figure 6-5. Printhead and Cable Assembly Replacement

6.5.2. Printhead Assembly Installation

Install the printhead referencing Figure 6-5 in accordance with the following steps:

Step 1. Connect the printhead cable assembly connector (8) to the printhead assembly.

Step 2. Insert the printhead assembly to the bottom of the printer housing assembly using two screws (3) and two flat washers (4). Do not tighten screws (3).

Step 3. Adjust the printhead assembly until it is parallel and nearly touching the front of the printer door assembly. Secure the printhead into place by tightening the two screws (3).

Step 4. Install the printer cover using ten screws (7) and tighten the screws.

Step 5. Load printer with paper (Chapter 4, paragraph 4-3.1).

Step 6. Close printer door and tighten the two captive screws (1).

Step 7. Perform second line maintenance testing as described in Chapter 5, paragraph 5-3.4.

6.6. PRINTHEAD CABLE ASSEMBLY (W4) REPLACEMENT

6.6.1. Printhead Cable Assembly Removal

Remove printhead cable assembly in accordance with the following steps referencing Figure 6-5.

Step 1. Open the printer door (2), loosen the two captive screws(1) that secure the printer door. Completely open the printer door.

Step 2. Remove the ten screws (7) that secure the top cover. Remove the top cover from the printer assembly.

Step 3. Disconnect the printhead cable P2 from the Controller CCA by pulling upwards on the controller and power supply assemblies until the connector is released.

Step 4. With the controller and power supply CCA slightly extracted from the housing assembly remove two screws (9) that secure the printhead cable assembly P2 to the bottom of the printer housing.

Step 5. Disconnect the printhead cable connector P1 from the printhead assembly.

Step 6. Remove the printhead cable assembly from the printer housing assembly.

6.6.2. Printhead Power Cable Assembly Installation

Install the printhead power cable assembly in accordance with the following steps:

Step 1. Connect the printhead cable assembly connector P1 to the printhead assembly.

Step 2. Using two screws (9) secure the printhead cable assembly connector to the bottom of the printer housing assembly.

Step 3. Connect the controller and power supply CCAs with the printhead cable assembly connector (P2) by carefully sliding them down until they are firmly seated in the connector.

Step 4. Install the printer cover using ten screws (7) and tighten the screws.

Step 5. Load printer with paper (Chapter 4, paragraph 4-3.1).

Step 6. Close printer door and tighten the two captive screws (1).

Step 7. Perform second line maintenance testing as described in Chapter 5, paragraph 5-3.4.

6.7. MOTOR ASSEMBLY (B1) REPLACEMENT

6.7.1. Motor Assembly Removal

Remove motor assembly from printer (refer to Figure 6-6) in accordance with the following steps:

Step 1. Open the printer door (2), loosen the two captive screws (1) that secure the printer door. Completely open the printer door (refer to Figure 6-5).

Step 2. Remove the ten screws (7) that secure the top cover. Remove the top cover from the printer assembly (refer to Figure 6-5).

Step 3. Disconnect the circuit breaker cable connector P1 from the power supply by pressing on the locking latch and extracting from the power supply socket (refer to Figure 6-3).

Step 4. Remove lug nut (1) and washer (2) that secure the circuit breaker switch (3) to the front of the printer (refer to Figure 6-6).

Step 5. Remove the two screws (4) that secure the circuit breaker (3) to the front of the printer.

Step 6. Remove the circuit breaker cable through the top cover of the printer housing.

Step 7. Remove the two screws (5) and flat washers (6) that secure the motor to the bottom of the printer housing assembly.

Step 8. Remove two nuts (7), flat washers (8), and lock washers (9) that secure the motor bracket (10) to the side of the printer housing.

Step 9. Remove connector W6 P1 from J6 on the Controller CCA.

Step 10. Remove the motor and bracket (10) through the top cover of the printer housing.

Step 11. Remove two screws (11), flat washers (12), and lock washers (13) that secure the motor bracket (10) to the motor.

Step 12. Replace the motor assembly with a serviceable assembly.

6.7.2. Motor Assembly Installation

Install the motor assembly (refer to Figure 6-6) in accordance with the following steps:

Step 1. Secure the two screws (11), flat washers (12), and lock washers (13) that secure the motor bracket (10) to the motor.

Step 2. Install the motor assembly with the bracket to the studs (15) on the most right interior corner of the printer housing assembly.

Step 3. Fasten two nuts (7), flat washers (9), and lock washers (8) to secure the motor bracket (10) to the side of the printer housing. Make sure the two holes on the bottom of the printer are aligned with the holes on the printer. Torque the nuts to 4 ± 1 in/lbs.

Figure 6-6. Motor Assembly Replacement

Step 4. Secure motor assembly to bottom of the printer with two screws (5), two washers (6), and tighten.

Step 5. Connector W6P1 to connector J6 on the Controller CCA.

Step 6. Place circuit breaker switch (3) through hole marked POWER, on the printer housing. Secure the circuit breaker to the printer housing assembly using two screws (4) and lock-tight and tighten. Fit the switch guard (14) over the power switch and secure to the printer housing assembly using washer (2), lug nut (1) and tighten.

Step 7. Connect the circuit breaker cable assembly P1 to J4 on the power supply assembly (refer to Figure 6-3).

Step 8. Install the printer cover using ten screws (7) and tighten the screws (refer to Figure 6-5).

Step 9. Load printer with paper (Chapter 4, paragraph 4-3.1).

Step 10. Close printer door and tighten the two captive screws (1) (refer to Figure 6-5).

Step 11. Perform second line maintenance testing as described in Chapter 5, paragraph 5-3.4.

6.8. CONTROL PANEL ASSEMBLY REPLACEMENT

6.8.1. Control Panel Assembly Removal

Remove the control panel assembly (refer to Figure 6-7) in accordance with the following steps:

Step 1. Partially open the printer door (2) and loosen the two captive screws(1) that secure the printer door. Open the printer door.

Step 2. Remove the ten screws (7) that secure the top cover. Remove the top cover from the printer assembly.

Step 3. Disconnect the control panel cable from the Controller CCA connector J3.

Step 4. Remove four screws (3) and washers (4) that secure the control panel to the housing assembly.

Step 5. Gently push on the control panel from inside the printer housing assembly and remove the control panel from the printer housing.

Step 6. Carefully pull control panel, along with control panel cable out of control panel opening.

Step 7. Inspect the control panel's gasket for rips or tears and replace if necessary.

6.8.2. Control Panel Assembly Installation

Install the control panel (refer to Figure 6-7) in accordance with the following steps:

Step 1. Insert the control panel and cable assembly through the control panel opening.

Step 2. Secure control panel to the printer housing assembly with four screws (3) and four flat washers (4). Torque the screws to 4 ± 1 in/lbs.

Step 3. Connect the control panel cable to the Controller CCA connector J3.

Figure 6-7. Control Panel Assembly Replacement

Step 4. Install the printer cover using ten screws (7) and tighten the screws.

Step 5. Load printer with paper (Chapter 4, paragraph 4-3.1).

Step 6. Close printer door and tighten the two captive screws (1).

Step 7. Perform second line maintenance testing as described in Chapter 5, paragraph 5-3.4.

6.9. CONTROLLER CIRCUIT CARD ASSEMBLY (CCA) REPLACEMENT

6.9.1. Controller CCA Removal

Remove the Controller CCA (refer to Figure 6-8) from the printer in accordance with the following steps:

Step 1. Partially open the printer door (2), loosen two captive screws(1) that secure the printer door. Open the printer door.

Step 2. Remove the ten screws (7) that secure the top cover. Remove the top cover from the printer assembly.

Step 3. Disconnect the following cables from the corresponding connectors on the Controller CCA:

1. Control panel cable assembly from J3 on the Controller CCA.
2. Data cable assembly from J2 on the Controller CCA.
3. Motor cable assembly from J6 on the Controller CCA.

Step 4. Disconnect the following cables from the corresponding connectors on the power supply CCA (refer to Figure 6-3):

1. Battery cable assembly from J3 on the power supply CCA.
2. DC power cable assembly from J1 on the power supply CCA.
3. Circuit breaker cable assembly from J4 on the power supply CCA.

Step 5. Remove the power supply and Controller CCA assemblies from the printer by pulling the assembly in a vertical direction out of the printer.

Step 6. Remove the six screws (3), washers (4), and lock washers (5) that secure the Controller CCA to the standoffs (6).

Step 7. Remove the Controller CCA.

6.9.2. Controller CCA Installation

Install the Controller CCA (Figure 6-8) in accordance with the following steps:

Step 1. Secure the Controller CCA to standoffs (6) with six screws (3), six lock washers (4), and six flat washers (5). Torque screws (3) to 4 ± 1 in/lbs.

Step 2. Install the controller and power supply CCA into the printer ensuring that J7 on the Controller CCA mates securely with the printhead connector (8).

Figure 6-8. Controller CCA Replacement

Step 3. Connect the following cables to the corresponding connectors on the Controller CCA:

1. Control panel cable assembly to J3 on the Controller CCA.
2. Data cable assembly to J2 on the Controller CCA.
3. Motor cable assembly to J6 on the Controller CCA.

Step 4. Connect the following cables to the corresponding connectors on the power supply CCA (refer to Figure 6-3):

1. Battery cable assembly to J3 on the power supply CCA.
2. DC power cable assembly to J1 on the power supply CCA.
3. Circuit breaker cable assembly to J4 on the power supply CCA.

Step 5. Install the printer cover using ten screws (7) and tighten the screws.

Step 6. Load printer with paper (Chapter 4, paragraph 4-3.1).

Step 7. Close printer door and tighten the two captive screws (1).

Step 8. Perform second line maintenance testing as described in Chapter 5, paragraph 5-3.4.

6.10. POWER SUPPLY CIRCUIT CARD ASSEMBLY (CCA) REPLACEMENT

6.10.1 Power Supply CCA Removal

Remove the Power Supply CCA (refer to Figure 6-3) in accordance with the following steps:

Step 1. Open the printer door (2), loosen the two captive screws (1) that secure the printer door. Completely open the printer door (refer to Figure 6-5).

Step 2. Remove the ten screws (7) that secure the top cover. Remove the top cover from the printer assembly (Figure 6-8).

Step 3. Disconnect the following cables from the corresponding connectors on the Controller CCA (see Figure 6-8):

1. Control panel cable assembly from J3 on the Controller CCA.
2. Data cable assembly from J2 on the Controller CCA.
3. Motor cable assembly from J6 on the Controller CCA.

Step 4. Disconnect the following cables from the corresponding connectors on the Power Supply CCA (see Figure 6-3):

1. Battery cable assembly from J3 on the Power Supply CCA.
2. DC power cable assembly from J1 on the Power Supply CCA.
3. Circuit breaker cable assembly from J4 on the Power Supply CCA.

Step 5. Remove the Power Supply and Controller CCA assemblies from the printer by pulling the assembly in a vertical direction out of the printer (refer to Figure 6-3).

Step 6. Remove the six screws (3), washers (4), and lock washers (5) that secure the Power Supply CCA to the standoffs (6).

Step 7. Remove the Power Supply CCA.

6.10.2. Power Supply CCA Installation

Install the Power Supply CCA (refer to Figure 6-8) in accordance with the following steps:

Step 1. Secure the Power Supply CCA to standoffs (6) with six screws (3), six lock washers (4), and six flat washers (5). Torque screws (3) to 4 ± 1 in/lbs.

Step 2. Install the control and Power Supply CCA into the printer ensuring that J7 on the Controller CCA mates securely with the printhead connector (8).

Step 3. Connect the following cables to the corresponding connectors on the Controller CCA:

1. Control panel cable assembly to J3 on the Controller CCA.
2. Data cable assembly to J2 on the Controller CCA.
3. Motor cable assembly to J6 on the Controller CCA.

Step 4. Connect the following cables to the corresponding connectors on the Power Supply CCA (refer to Figure 6-3):

1. Battery cable assembly to J3 on the Power Supply CCA.
2. DC power cable assembly to J1 on the Power Supply CCA.
3. Circuit breaker cable assembly to J4 on the Power Supply CCA.

Step 5. Install the printer cover using ten screws (7) and tighten the screws (refer to Figure 6-5).

Step 6. Load printer with paper (Chapter 4, paragraph 4-3.1).

Step 7 Close printer door and tighten the two captive screws (1).

Step 8. Perform second line maintenance testing as described in Chapter 5, paragraph 5-3.4.

CAUTION

To avoid possible electrical shock, verify power source is disconnected before starting removal procedure.

6.11. DATA CABLE ASSEMBLY REPLACEMENT

6.11.1. Data Cable Assembly Removal

Remove the data cable (refer to Figure 6-9) in accordance with the following steps:

Step 1. Partially open the printer door (2), loosen the two captive screws (1) that secure the printer door. Open the printer door.

Step 2. Remove the ten screws (7) that secure the top cover. Remove the top cover from the printer assembly.

Step 3. Disconnect the data cable (P2) from connector J2 on the Controller CCA.

Step 4. Remove the protective cap from J2 on the rear of the printer.

Step 5. Remove four countersunk screws (3) that secure J2 to the printer housing assembly.

Figure 6-9. Data Cable Assembly Replacement

Step 6. Remove two hex nuts (4) and flat washers (5) that secure the chassis ground connection (6) to the housing assembly

Step 7. Remove the data cable assembly from the printer housing assembly.

Step 8. Inspect the data cable gasket (8) for rips or tears and replace as required.

6.11.2. Data Cable Assembly Installation

Install the data cable assembly (refer to Figure 6-9) in accordance with the following steps:

Step 1. Route the data cable assembly connector P2 through the printer housing assembly.

Step 2. Secure the gasket (8), mounting plate (9), protective cap chain, and J2 connector to the housing assembly using four screws (3). Torque screws (3) to 4 ± 1 in/lbs.

Step 3. Secure ground lug (6) to the connector mounting plate (9) using hex nut (4) and washers (5).

Step 4. Connect the data cable to connector J2 on the Controller CCA.

Step 5. Install the printer cover using ten screws (7) and tighten the screws.

Step 6. Load printer with paper (Chapter 4, paragraph 4-3.1).

Step 7. Close printer door and tighten the two captive screws (1).

Step 8. Perform second line maintenance testing as described in Chapter 5, paragraph 5-3.4.

6.12. DC POWER CABLE ASSEMBLY REPLACEMENT

6.12.1. DC Power Cable Assembly Removal

Remove the dc power cable assembly (refer to Figure 6-10) in accordance with the following steps:

Step 1. Remove the 24 Vdc cable assembly or protective metal cap from J1 on the printer by rotating the connector ring counterclockwise until loose. Pull the 24 Vdc cable connector or protective metal cab straight out and disconnect it from the printer connector J1.

Step 2. Partially open the printer door (2), loosen the two captive screws (1) that secure the printer door. Open the printer door.

Step 3. Remove the ten screws (7) that secure the top cover. Remove the top cover from the printer assembly.

Step 4. Disconnect the dc power supply cable from connector J1 on the power supply CCA.

Step 5. Remove four screws (3) that secure J1 to printer housing assembly.

Step 6. Remove hex nut (4) and flat washers (5) that secure the chassis ground connection to the housing assembly.

Step 7. Remove the dc power cable assembly from the printer housing assembly.

Step 8. Inspect the dc power cable gasket (8) for any rips or tears and replace as required.

Figure 6-10. DC Power Cable Assembly Replacement

6.12.2. DC Power Cable Installation

Install the DC power cable assembly (refer to Figure 6-10) in accordance with the following steps:

Step 1. Secure the gasket (8), mounting plate (9), protective cap chain and J1 connector to the housing assembly using four screws (3). Torque screws (3) to 4 ± 1 in/lbs.

Step 2. Secure ground lug (6) to the connector mounting plate (9) using hex nut (4) and flat washers (5).

Step 3. Connect the dc power supply cable to connector J1 on the dc power supply CCA (refer to Figure 6-3).

Step 4. Install the printer cover using ten screws (7) and tighten the screws.

Step 5. Load the printer with paper (Chapter 4, paragraph 4-3.1).

Step 6. Close the printer door and tighten the two captive screws (1).

Step 7. Perform second line maintenance testing as described in Chapter 5, paragraph 5-3.4.

6.13. 24 VDC CABLE ASSEMBLY REPLACEMENT

6.13.1. 24 Vdc Cable Assembly Removal

Remove the 24 Vdc cable assembly (refer to Figure 6-11) in accordance with the following steps:

Step 1. Remove the 24 Vdc cable assembly from J1 on the rear of the printer assembly by rotating the connector counter-clockwise until loose and pull out of J1.

Step 2. Rotate the connector attached to P2 on the FPDU clockwise until it is loose. Pull connector straight out and remove the 24 Vdc cable from the FPDU.

Step 3. Replace the unserviceable 24 Vdc cable assembly with a serviceable assembly.

6.13.2. 24 Vdc Cable Installation

Install the 24 Vdc cable assembly (refer to Figure 6-11) in accordance with the following steps:

Step 1. Connect the serviceable 24 Vdc cable assembly to J1 on the rear of the printer assembly. Rotate the connector clockwise to secure it to J1 on the printer.

Step 2. Connect the opposite connector on the 24 Vdc cable assembly to P2 on the FPDU. Rotate the connector clockwise to secure it to P2 on the FPDU.

Step 3. Perform second line maintenance testing as described in Chapter 5, paragraph 5-3.4.

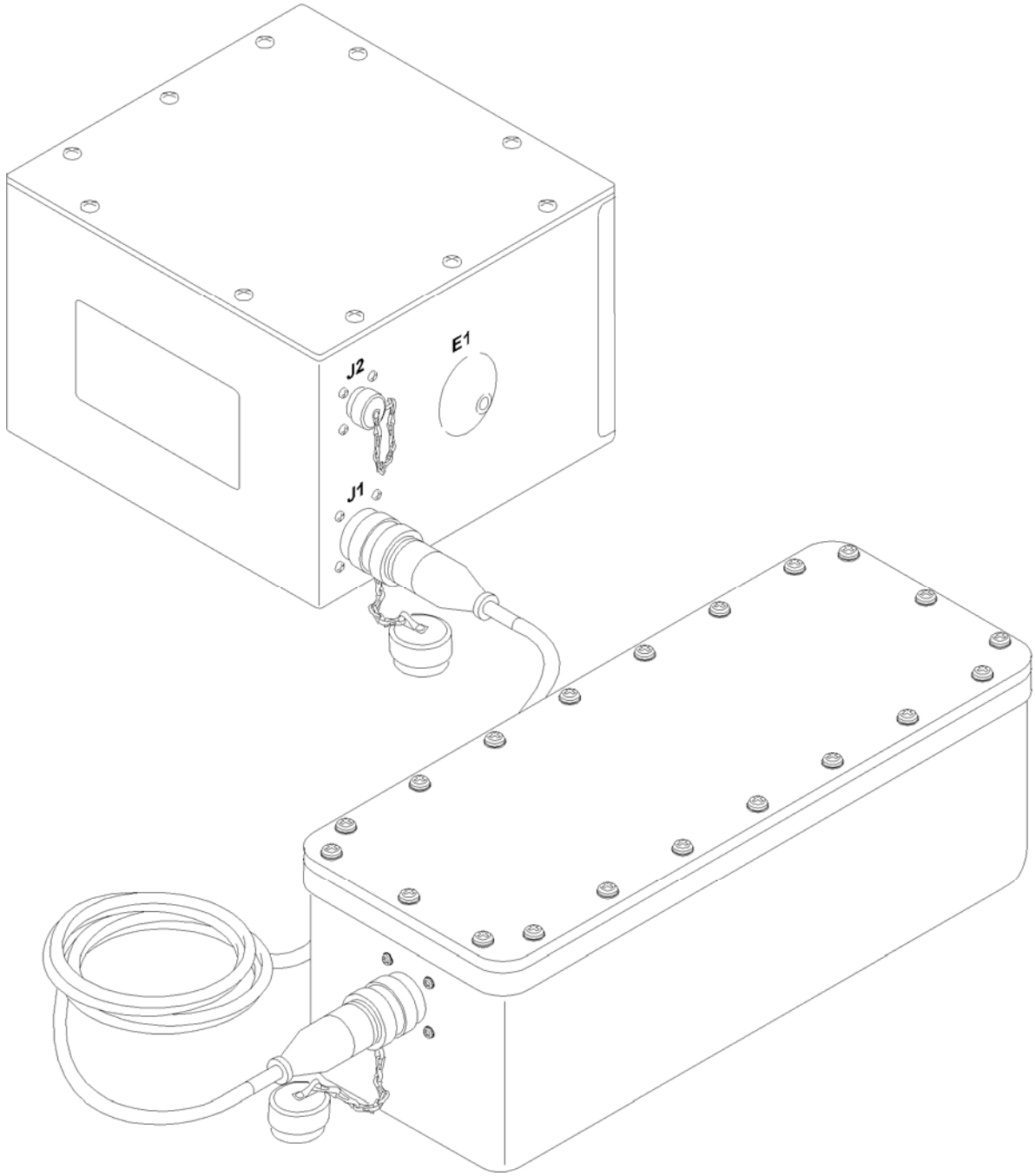


Figure 6-11. 24 Vdc Cable Assembly Replacement

6.14. NiCAD BATTERY ASSEMBLY REPLACEMENT

WARNING

NiCad batteries are potentially hazardous if misused or tampered with before or after discharge. The following precautions must be followed to prevent injury or equipment damage:

1. Do not heat, incinerate, crush, puncture, or disassemble the batteries.
2. Do not short circuit the battery or bypass the internal circuit breaker.
3. Do not store batteries in the printer for longer than 30 days.

If battery becomes hot to touch, turn printer OFF immediately. Remove battery when their temperature has dropped.

6.14.1. NiCad Battery Assembly Removal

Remove the battery (refer to Figure 6-12) in accordance with the following steps:

Step 1. Remove the printer cover by removing the ten screws (3) that secure it in place.

Step 2. Loosen the two screws that secure the battery door to the printer housing assembly.

Step 3. Slide battery cover (2) to the rear of the printer housing assembly.

Step 4. Disconnect J3 on the battery cable assembly.

Step 5. Remove the unserviceable battery from the printer assembly.

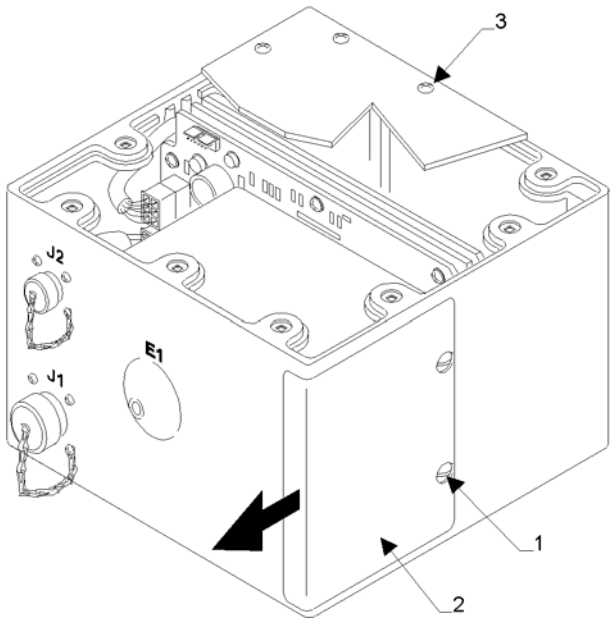


Figure 6-12. NiCad Battery Assembly Replacement

6.14.2. NiCad Battery Assembly Installation

Install the battery assembly (refer to Figure 6-12) in accordance with the following steps:

Step 1. Position battery into the battery compartment, making sure to insert the connector end first.

Step 2. Connect J3 on the battery cable assembly to the battery.

Step 3. Slide the battery cover (2) into the slots on the left side of the printer assembly.

Step 4. Rotate screws (1) clockwise until they are tight.

Step 5. Install the printer cover using ten screws (3) and tighten the screws.

Step 6. Perform second line maintenance testing as described in Chapter 5, paragraph 5-3.4.

6.15. CIRCUIT BREAKER CABLE ASSEMBLY REPLACEMENT

6.15.1. Circuit Breaker Cable Assembly Removal

Remove the circuit breaker cable assembly from the printer (refer to Figure 6-6) in accordance with the following steps:

Step 1. Partially open the printer door, loosen the two captive screws that secure the printer door. Open the printer door.

Step 2. Remove the ten screws (1) that secure the top cover. Remove the top cover from the printer assembly (refer to Figure 6-3).

Step 3. Disconnect the circuit breaker cable connector P1 from the power supply J4 by pressing the locking latch and extracting the connector from the power supply socket (refer to Figure 6-3).

Step 4. Remove lug nut and washer (1 and 2) that secure the circuit breaker switch to the front of the printer (refer to Figure 6-6).

Step 5. Remove the two screws (4) that secure the circuit breaker to the front of the printer.

Step 6. Remove the circuit breaker cable through the top cover of the printer housing.

Step 7. Replace the Circuit Breaker Cable assembly with a serviceable assembly.

6.15.2. Circuit Breaker Cable Assembly Installation

Install the circuit breaker cable assembly (refer to Figure 6-6) in accordance with the following steps:

Step 1. Insert circuit breaker switch (3) through hole marked POWER on the printer housing. Apply Loctite to the threads of two screws (4). Secure the circuit breaker to the printer housing assembly using two screws (4). Fit the switch guard (14) over the power switch and secure to the printer housing assembly using washer (2), lug nut (1) and tighten.

Step 2. Connect the circuit breaker cable assembly to J4 on the power supply assembly (refer to Figure 6-3).

Step 3. Install the printer cover using ten screws (1) and tighten the screws (refer to Figure 6-3).

Step 4. Load printer with paper (Chapter 4, paragraph 4-3.1).

Step 5. Close printer door and tighten the two captive screws.

Step 6. Perform second line maintenance testing as described in Chapter 5, paragraph 5-3.4.

6.16. BATTERY CABLE ASSEMBLY REPLACEMENT

6.16.1. Battery Cable Assembly Removal

Remove battery cable assembly from the printer in accordance with the following steps:

Step 1. Partially open the printer door (2) and loosen the two captive screws (1) that secure the printer door. Open the printer door (refer to Figure 6-10).

Step 2. Remove the ten screws (7) that secure the top cover. Remove the top cover from the printer assembly (refer to Figure 6-10).

Step 3. Remove the battery assembly from the printer, as described in paragraph 6-3.9.

Step 4. Disconnect the battery cable from J3 on the power supply (refer to Figure 6-3).

Step 5. Remove the unserviceable battery cable assembly through the top of the printer.

6.16.2. Battery Cable Assembly Installation

Install the battery cable assembly in accordance with the following steps:

Step 1. Connect the battery cable assembly to J3 on the power supply assembly (refer to Figure 6-3).

Step 2. Install the battery assembly in the printer as described in paragraph 6-14.2.

Step 3. Install the printer cover using ten screws (7) and tighten the screws (refer to Figure 6-3).

Step 4. Close the printer door and tighten the two captive screws (1) (refer to Figure 6-10).

Step 5. Perform second line maintenance testing as described in Chapter 5, paragraph 5-3.4.

6.17. FPDU ASSEMBLY REPLACEMENT

Make sure that the 28 Vdc power source is OFF and the 28 Vdc cable is disconnected from J1 on the FPDU prior to the implementation of the following steps.

6.17.1. FPDU Assembly Removal

Remove the Field Power Distribution Unit (FPDU) assembly (refer to Figure 6-11) in accordance with the following steps:

Step 1. Remove the 24 Vdc cable assembly from J2 on the FPDU by rotating the connector counter-clockwise until the connector is loose. Pull the 24 Vdc connector free from J2 on the FPDU.

Step 2. Replace the FPDU with a serviceable assembly.

6.17.2. FPDU Installation

Install the FPDU assembly (refer to Figure 6-11) in accordance with the following steps:

Step 1. Connect the 24 Vdc cable assembly to J2 on the FDPU by inserting and rotating the connector clockwise until the connector is secure and locked in place.

Step 2. Insert and rotate clockwise the opposite end of the 24 Vdc cable assembly into the J1 connector located on the rear of the printer housing assembly and rotate the 24 Vdc cable connector clockwise until the connector is secure and locked in place.

Step 3. Perform second line maintenance testing as described in Chapter 5, paragraph 5-3.4.

6.18. PERFORMANCE VERIFICATION

Performance verification ensures that the printer is operating properly. The printer performance verification should be performed periodically and always after repairs have been made to the printer. Perform printer performance verification in accordance with the following steps:

Step 1. If required, load printer with paper (Chapter 4, paragraph 4-3.1).

WARNING

The power source must be off before installing power cable. To prevent injury, do not touch electrical terminals.

Step 2. If required, connect power or data cables onto rear connector mounting plate connectors (Chapter 4 paragraph 4-3 3).

Step 3. Reinstall all removed assemblies then perform steps 4 through 8.

Step 4. Perform power turn on (Chapter 4, paragraph 4-4.1).

Step 5. Perform control panel functional checks (Chapter 4, paragraph 4-4.2).

Step 6. Perform power on BIT (Chapter 4, paragraph 4-4.3.a.).

Step 7. Perform operator-invoked self test (Chapter 4, paragraph 4-4.3.b.).

Step 8. Use troubleshooting guide (Table 6-2) to isolate faults when printer performance or self tests indicate a malfunction.

CHAPTER 7
PROGRAMMING/INTERFACE REQUIREMENTS

7.1. INTRODUCTION

The DmC 4080B high-speed printer programming and interface requirements in this chapter contain host-provided control codes to the printer with printer actions; control codes sent to the host with printer actions; printer interface electrical characteristics with transmission format for RS-232-C serial; interconnection diagram with signals and voltages (Figure 7-1).

7.2. PROGRAMMING REQUIREMENTS

7.2.1. Host-Provided Printer Control Codes

Printer programming by the host is performed by generating control codes received by the printer. The printer will recognize and respond to ASCII control codes sent in accordance with the following codes:

a. Host-generated ENQ, 05H (inquiry) code. The printer terminates its ready status (ON LINE light turned off) and performs a built-in test (BIT). The printer transmits an ACK character to the host and returns to ready status (ON LINE light turned on) if BIT passes. If BIT fails, the printer transmits an NAK character to the host and remains not ready (ON LINE light off).

b. Host-generated LF, 0AH (line feed) code. The printer prints current contents of line buffer, advances to the next character line, and inserts the next character received into the first position of the line buffer.

c. Host-generated FF, 0CH (form feed) code. The printer prints current contents of line buffer, then advances paper until printed text is positioned above paper tear-off bar. The next character received is inserted into the first position of the line buffer.

d. Host-generated CR, 0DH (carriage return) code. The printer prints current contents of line buffer, advances to the next character line, and inserts the next character into the first position of the line buffer.

e. Host-generated SI, 0FH (shift in) code. The printer prints current contents of line buffer, then switches to optional character font, if installed. If no optional character font is installed, font switch command is not active.

f. Host-generated SO, 0EH (shift out) code. The printer prints current contents of line buffer, then switches to standard 40-column character font.

g. Host-generated DLE, 10H (data link escape) code. The printer switches to optional graphics mode and prints received bytes as graphic data, followed by a dot line, then returns to ASCII text mode.

h. Host-generated DC, 12H (device command 2) code. The printer terminates its ready status (ON LINE light turned off), performs a BIT, then prints a test pattern. The printer transmits an ACK character to the host and returns to ready status (ON LINE light turned on) if BIT passes. If BIT fails, the printer transmits an NAK character to the host and remains not ready (ON LINE light off).

i. Host-generated DC4, 14H (device command 4) code. The printer transmits current status byte to the host.

All control codes not identified in a. through i. will not be recognized by the printer.

Figure 7-1. Interconnection Diagram

7.2.2. Provided Printer Control Codes

In response to host-generated control codes, the printer will generate ASCII operational control codes to the host in accordance with the following codes:

a. Printer-generated ACK, 06H (acknowledge) code. The printer transmits the ACK code to the host when the printer passes a host-generated BIT or self test.

b. Printer-generated NAK, 1SH (no acknowledge) code. The printer transmits the NAK code to the host when the printer fails a host-generated BIT or self test.

c. Printer-generated DC3 or XOFF, 13H (device command 3) code (optional). The printer transmits the XOFF code to the host when the printer is ready to accept data from the host.

d. Printer-generated DC3 or XOFF, 13H (device command 3) code (optional). The printer transmits the XOFF code to the host when the printer is not ready to accept data from the host under the following conditions:

1. BIT/self test in progress
2. LINE FEED (LF) in progress
3. Character or graphics data printing in progress
4. Out of paper or door open
5. Printer detects internal fault condition

7.3. INTERFACE REQUIREMENTS

7.3.1. RS-232C Interface Electrical Characteristics

The RS-232C interface electrical characteristics required by the printer are provided by the signal type and levels, printer driver and receiver voltage with rise/fall rate, and host receiver connection load requirement.

7.3.1.1. Signal Type. Data or control signals, unbalanced, provide serial data transfer between printer and host. Each interface signal is transferred over a single-ended one conductor connection to the host (Figure 7-2).

7.3.1.2. Signal Levels. The serial interface signals are produced by a driver and received by a receiver on the control board in the printer. The voltage level of a signal is measured between drive output/ receiver input (A) and signal ground (C). When printer interface signal data condition indicates spacing (D), the interface signal control condition is on with the voltage level between (A) and (C) from +3 Vdc to +l5 Vdc. When printer interface signal data condition indicates marking (1), the interface signal control condition is off with the voltage level between (A) and (C) from -3 Vdc to -l5 Vdc.

7.3.1.3. Printer Driver. The required voltage absolute value of the driver output voltage is from 3 Vdc to 15 Vdc into a 3K ohms to 7K ohms load at the host. Open circuit voltage shall not exceed 25 Vdc. The maximum voltage difference between signal levels is 1 volt (+3 Vdc plus in volts -3 Vdc minus in volt equals 1 volt difference). Voltage is measured between (A) and (C) (Figure 7-3).

7.3.1.4. Printer Receiver. The printer receiver operates in the correct polarity from +3 Vdc differential voltage between (A) and (C) (Figure 7-3) up to the maximum ±12 Vdc as described in paragraph 7-3.1.2. The printer receiver provides protection against printing spurious characters when the host is disconnected due to power failure or damaged cables.

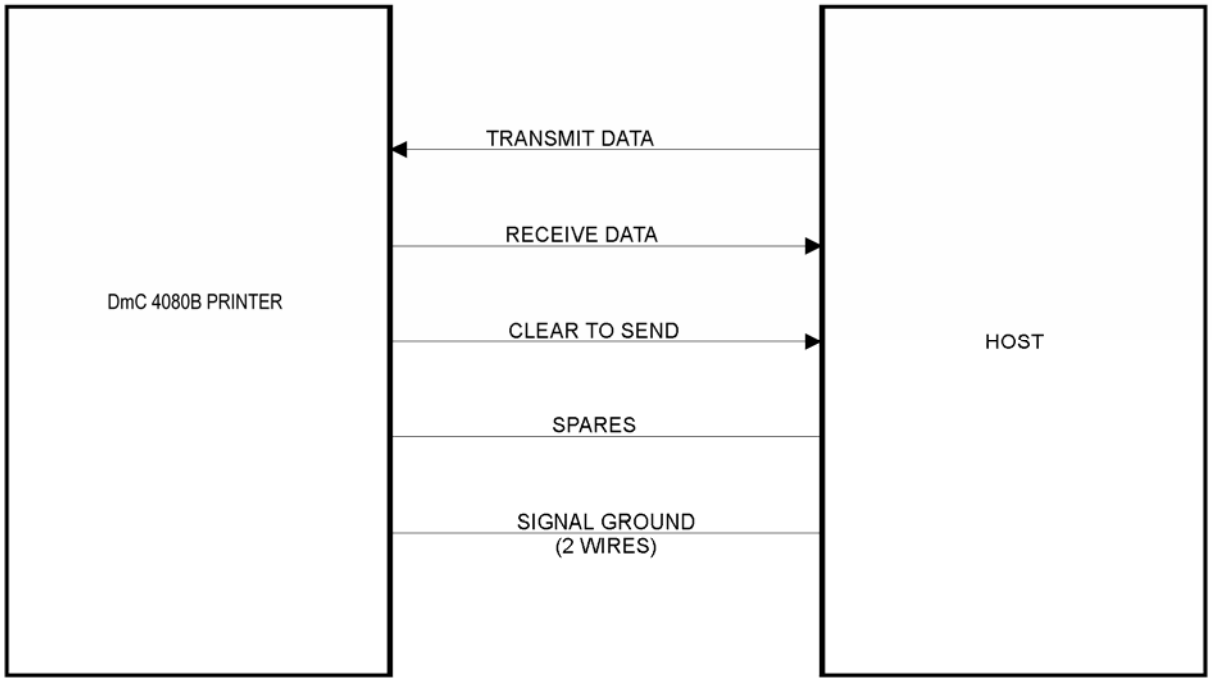


Figure 7-2. RS-232C Interface Diagram

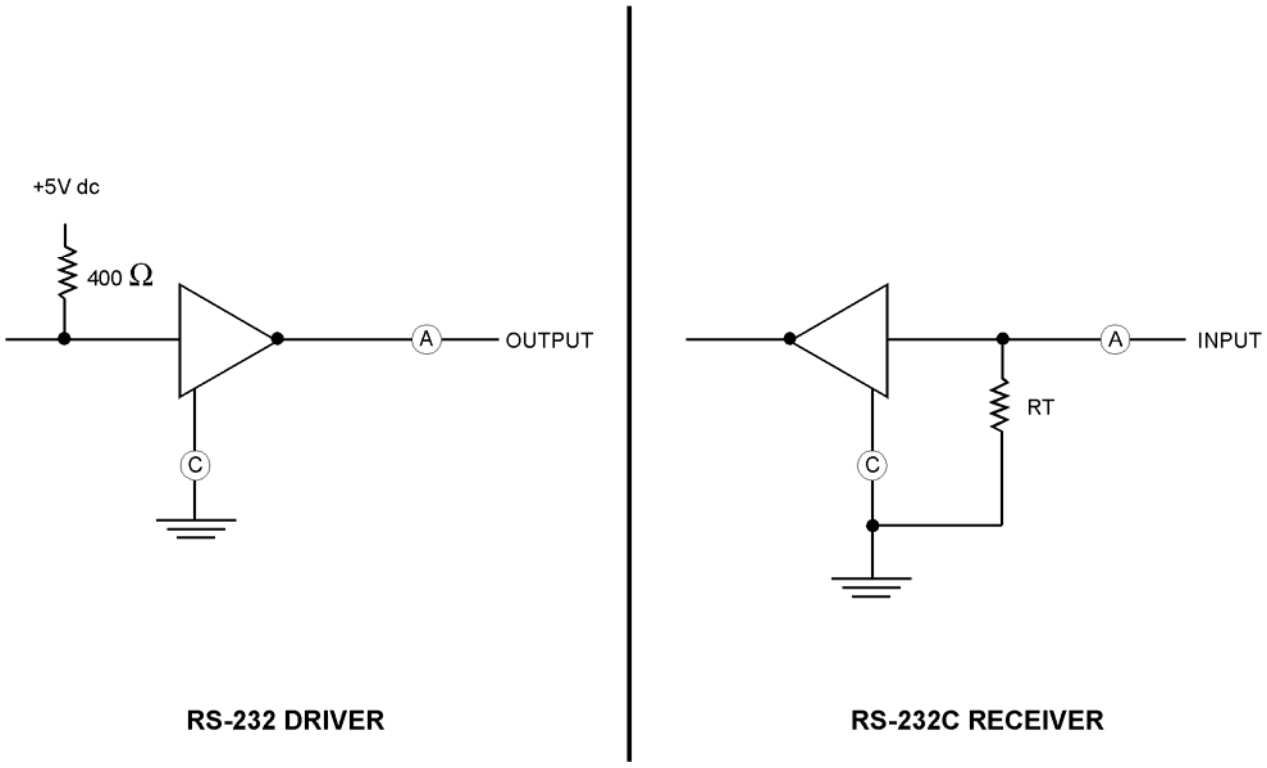


Figure 7-3. RS-232C Driver/Receiver Interface

7.3.1.5. **Driver/Receiver Signal Voltage**. Steady-state voltage measured between (A) and (C) (Figure 7-3) is used as a base to check rise and fall rates of driver/receiver signal voltage. The following signal voltages indicate correct operating rise and fall rates for the printer.

a. Data signal rise and fall rate shall be 31.2 volts per microsecond maximum during 10 to 90 percent of the steady-state voltage.

b. Control signal rise and fall rate shall be 10.4 volts per millisecond maximum during 10 to 90 percent of the steady-state voltage.

7.3.1.6. **Host Receiver Load**. The host receiver load to the printer driver shall be 3K ohms to 7K ohms (see paragraph 7-3.1.3).

7.3.1.7. **RS-232C Transmission Format**. The RS-232-C interface sends/receives ASCII characters in sequence as shown in Figure 7-4 and Table 7-1. Ensure power is off, then see Chapter 2, Table 2-3 for baud rate selection; see Chapter 4, Table 4-2 for 8-bit status byte format. The RS-232-C transmission format control codes are the same as those listed in paragraph 7-2.1 and 7-2.2.

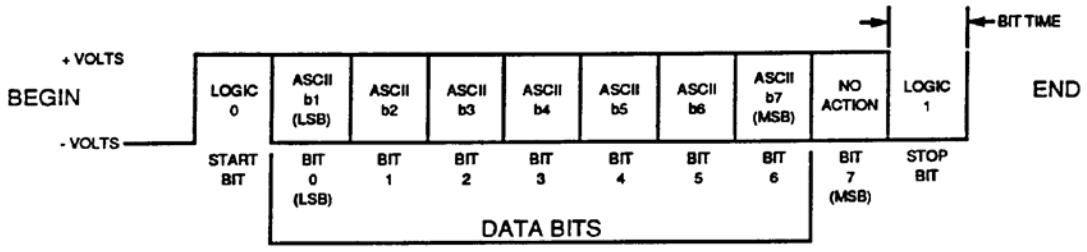


Figure 7-4. RS-232C ASCII Sequence

Table 7-1. RS-232C Serial Interface

Baud Rate	BIT Time (μsec)
150	6656
300	3328
600	1664
1200	832
2400	416
4800	208
9600	104
19,200	52

CHAPTER 8
PREPARATION FOR RESHIPMENT

8.1. GENERAL

This chapter contains information for the DmC 4080B high-speed printer reshipment. Preparation for reshipment and storage are basically the same (refer to Chapter 1, Table 1-1 for printer environmental limits).

8.2. PREPARATION FOR RESHIPMENT

Prepare the printer for reshipment or storage in accordance with the following steps:

Step 1. Open the printer door (Chapter 2, paragraph 2-3.a.).

Step 2. Remove paper from printer (Chapter 4, paragraph 4-3.2).

Step 3. Perform general cleaning of the printer (Chapter 5, paragraph 5-2.3).

Step 4. Remove paper from printer (Chapter 4, paragraph 4-3.2) and place in protective wrap for storage in cardboard carton (Figure 8-1).

Step 5. Close printer door (Chapter 2, paragraph 2-3.g.).

Step 6. Place printer in protective plastic wrap retained during unpacking and handling (Chapter 2, paragraph 2-2).

Step 7. Place printer with plastic wrap into cardboard carton, cushioned on all sides with foam packing or bubble pak (Figure 8-1).

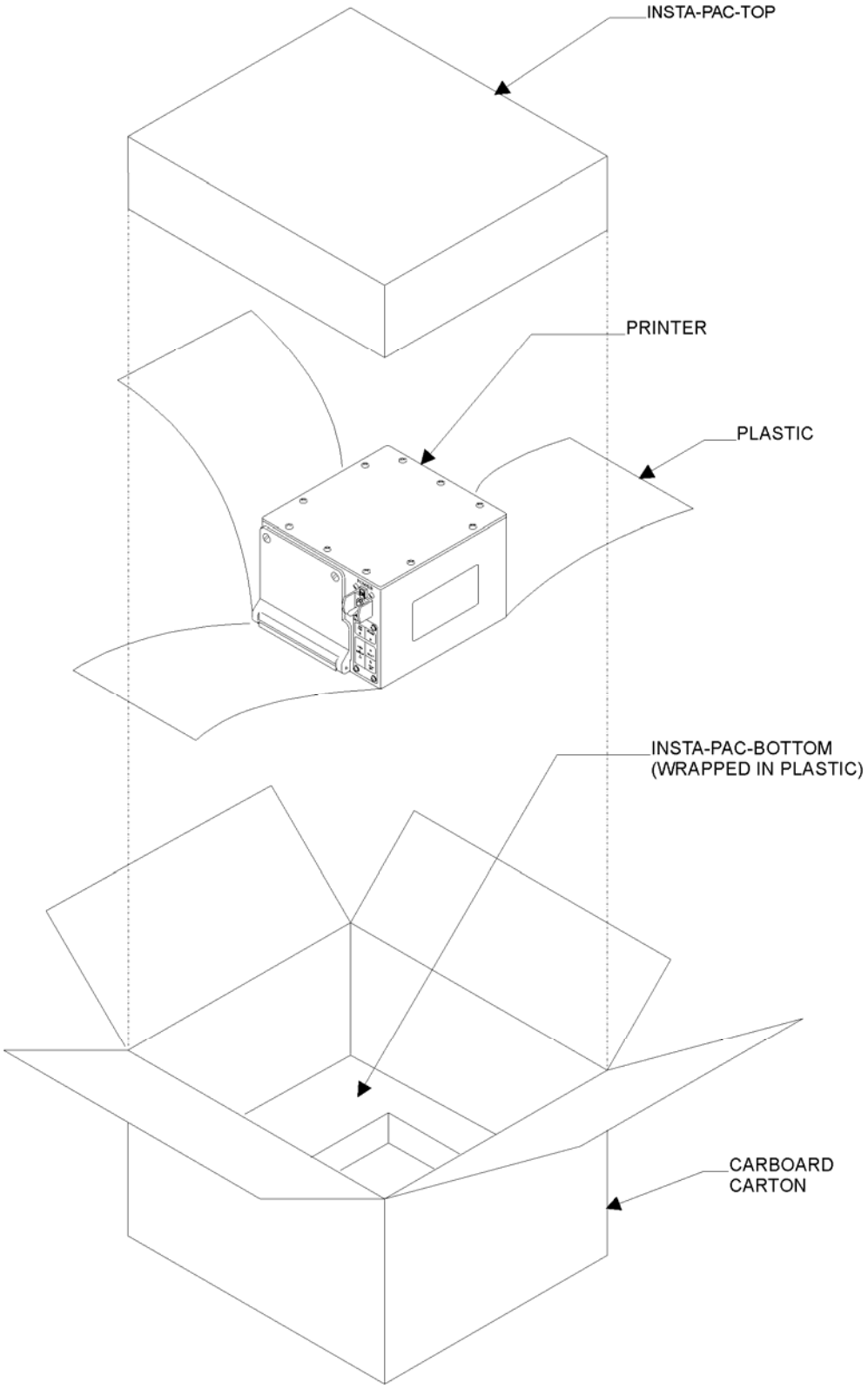


Figure 8-1. Packaging Printer for Reshipment