LP37 Line Printer
Service Manual

EK-OLP37-SV .002

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Line Printer
Service Manual

EK-OLP37-SV.002

Prepared by Educational Services
of
Digital Equipment Corporation

Contents

2 INTERFACE FUNCTIONAL DESCRIPTION

3 TROUBLESHOOTING

4 ADJUSTMENTS AND PREVENTIVE MAINTENANCE

5 REMOVAL/REPLACEMENT OF FIELD REPLACEABLE UNITS

Index

Figures

Tables

About This Manual

INTRODUCTION

This manual contains information necessary for interfacing, adjusting, troubleshooting, maintaining, and repairing the LP37 Line Printer. This includes both the old style printer and the new style printer. The old style printer has nonremovable cabinet side panels, and the new style printer has removable cabinet side panels.

The information in this manual addresses the needs of the Customer Services engineer in servicing the LP37 Line Printer.

- Chapter 1 provides general information and describes the physical characteristics and specifications of the printer.
- Chapter 2 provides information on control codes and the printer interface.
- Chapter 3 provides information helpful in troubleshooting printer malfunctions.
- Chapter 4 provides adjustment information that may be required if components are replaced or tolerances drift.
- Chapter 5 contains information on replacing printer field replaceable units (FRUs).
- Appendix A contains information for troubleshooting the areas in the new style printer that are different from the old style printer.
- Appendix B contains the removal/replacement procedures for the FRUs in the new style printer for which the procedure differs from the old style printer.

DIFFERENTIATING THE OLD STYLE PRINTER FROM THE NEW

The easiest way to differentiate between the old and new style printers is to look at the circuit breakers/power switch. Figure 1 shows the difference between the circuit breakers for the two printers.

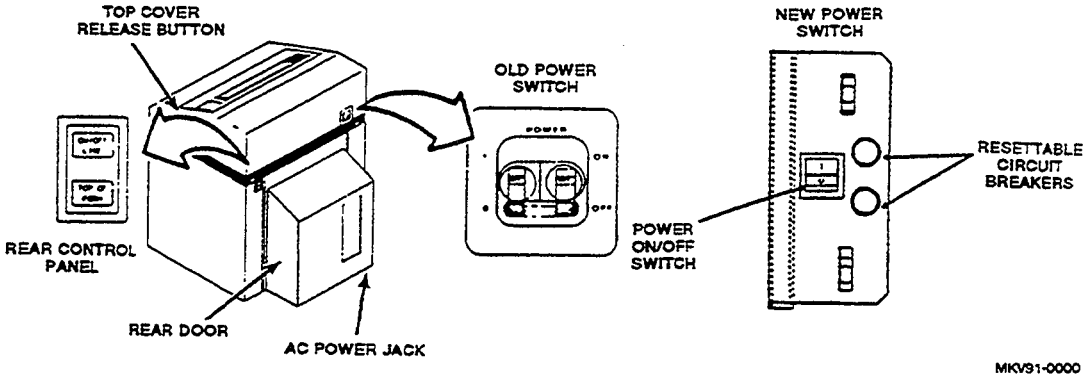


Figure 1 Differentiating Between the Old and New Style Printers

RELATED DOCUMENTATION

Other publications that support the LP37 Line Printer are shown in Table 1 and Table 2.

Table 1 LP37 Related Documents

Title	Digital Part Number
LP37 User's Videotape (VHS English)	EC-V0001-56
LP37 Line Printer User's Guide	EK-OLP37-UG
LP37 Line Printer Installation Guide	EK-OLP37-IG
LP37 Quick Reference	EK-OLP37-QR
LP11/LPV11 Controller Installation Manual	EK-LP11V-IN
LB-1515 Illustrated Parts List/DEC LP37 IPL Addendum (Field Service Internal Use Only)	ER-OLP37-IP
LP37 DEC I/O Interface Schematics (Field Service Internal Use Only)	ER-OLP37-MP

Table 2 Dataproducts Related Documents

Title	Vendor Part Number
LB-300/600 Maintenance Guide	267895-001
LB-1015 Maintenance Guide	292505-001
LB-1515 Maintenance Guide	289583-001
LB-300/600 Operator Guide	267884-001
LB-1015/1515 Operator Guide	293869-001
LB-300/600 Illustrated Parts List	289558-001
LB-1515 Illustrated Parts List	289584-001
DEC LP37 IPL Addendum	293943-001

1
GENERAL DESCRIPTION

1.1 INTRODUCTION

The LP37 Line Printer is a high-speed, general-purpose line printer designed to print fully formed characters, using various ASCII character bands. The LP37 Printer is a 132/136-column, impact band printer that produces printed copies on 1- to 6-part perforated forms at 10 characters per inch. Line spacing is selectable between 6 or 8 lines per inch.

The LP37 Line Printer is designed to operate in a heavy-duty cycle environment and is housed in a steel cabinet. The electronic circuits are enclosed in a steel case within the cabinet to provide excellent soundproofing (55 dBa) and EMI shielding.

1.2 PRINT MECHANISM

The print mechanism consists of six major components:

- Paper feed system
- Ribbon system
- Meter package
- Band system
- Hammerbank system
- Cooling system

1.2.1 Paper Feed System

The paper feed system (Figure 1–1) consists of four individually adjustable pin-feed tractors. Each tractor has a lock lever, and the tractors can be adjusted to accept paper width from 3 inches to 16 inches. The tractors are mounted on a drive shaft connected by a toothed timing belt, which is mounted to a stepper servomotor. Under microprocessor control, the closed-loop stepper servomotor advances the paper at single or multiple line rates.

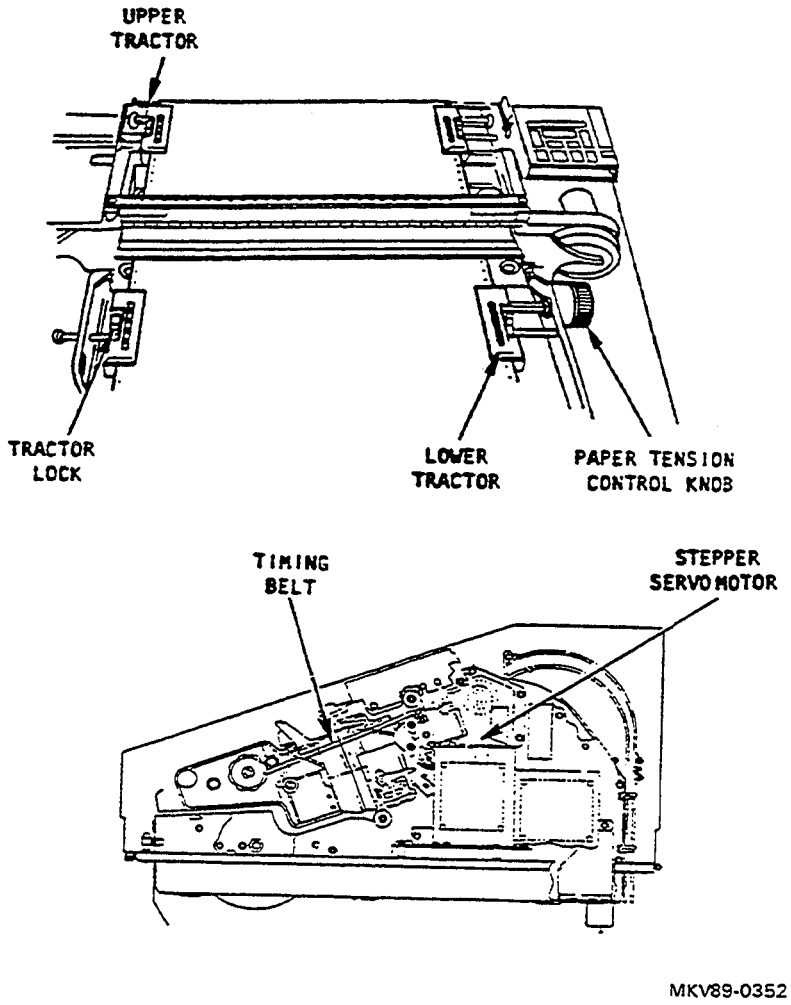


Figure 1–1 Paper Feed System

1.2.1.1 Paper Loading

As shown in Figure 1–2, paper is loaded from the bottom of the cabinet over the two lower tractors, through the fixed opening between the ribbon/band/platen and the hammerbank, and over the two upper tractors. Vertical paper tension across the print station is adjusted by a control knob on the right end of the lower tractor shaft.

Horizontal paper tension is adjusted by properly positioning each of the four tractor assemblies and locking them in place using the tractor lock knobs.

1.2.1.2 Paper Operation

Paper operation (Figure 1–2) is monitored by an optical paper low sensor located 14 inches below the print station and by a paper motion sensor on the upper left tractor. If the printer is out of paper or the paper stops moving, the printer goes OFF LINE and a fault message is indicated on the control panel LCD (liquid crystal display).

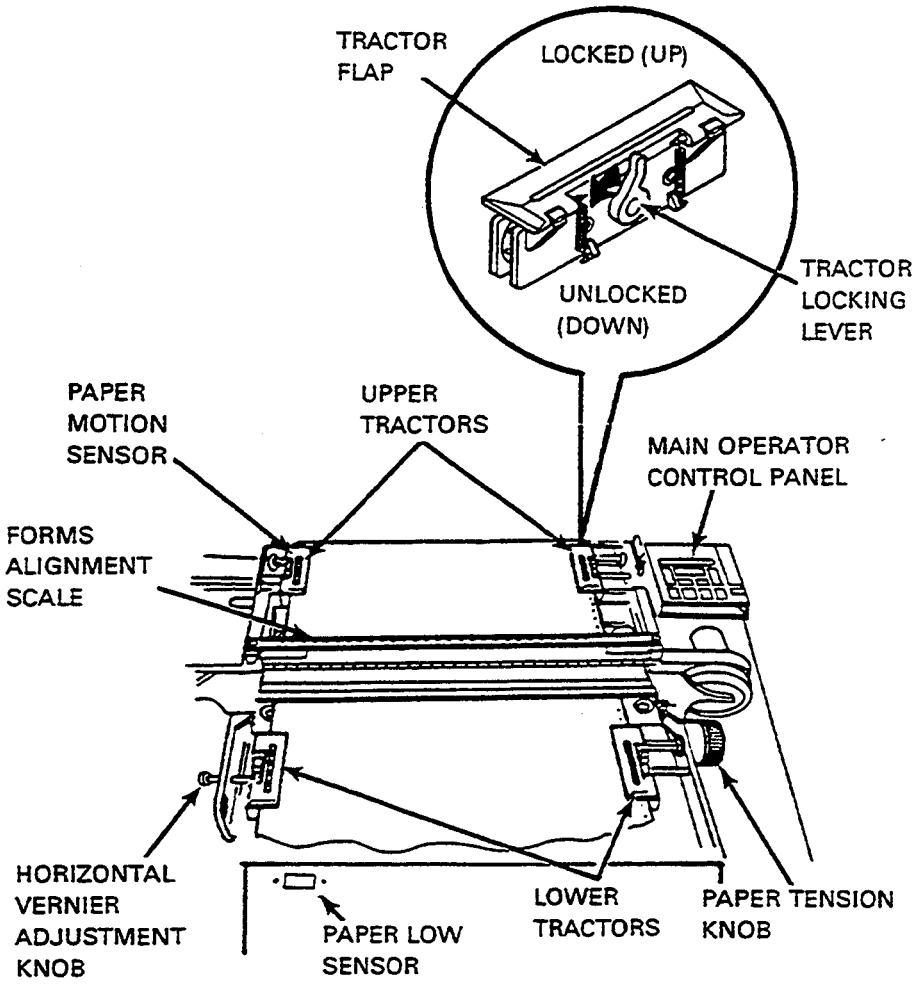


Figure 1–2 Paper Operation

1.2.1.3 Paper Puller and Powered Paper Stacker

The paper feed system contains a paper puller and a powered paper stacker that is mounted inside the printer cabinet. The paper stacker is designed to stack a full box of 11 x 14-inch, single-ply paper with two or fewer operator interventions.

1.2.2 Ribbon System

The ribbon system (Figure 1–3) consists of a supply reel and a take-up reel mounted on each side of the print mechanism. The ribbon system is gear-driven and powered by two dc motors (one for each reel). The ribbon is a tight-weave nylon ribbon that contains a shorting foil for end-of-ribbon detection. The shorting foil activates the reversing mechanism to change the direction of the ribbon. Ribbon motion is sensed by the circuitry that monitors the rotation of the supply reel.

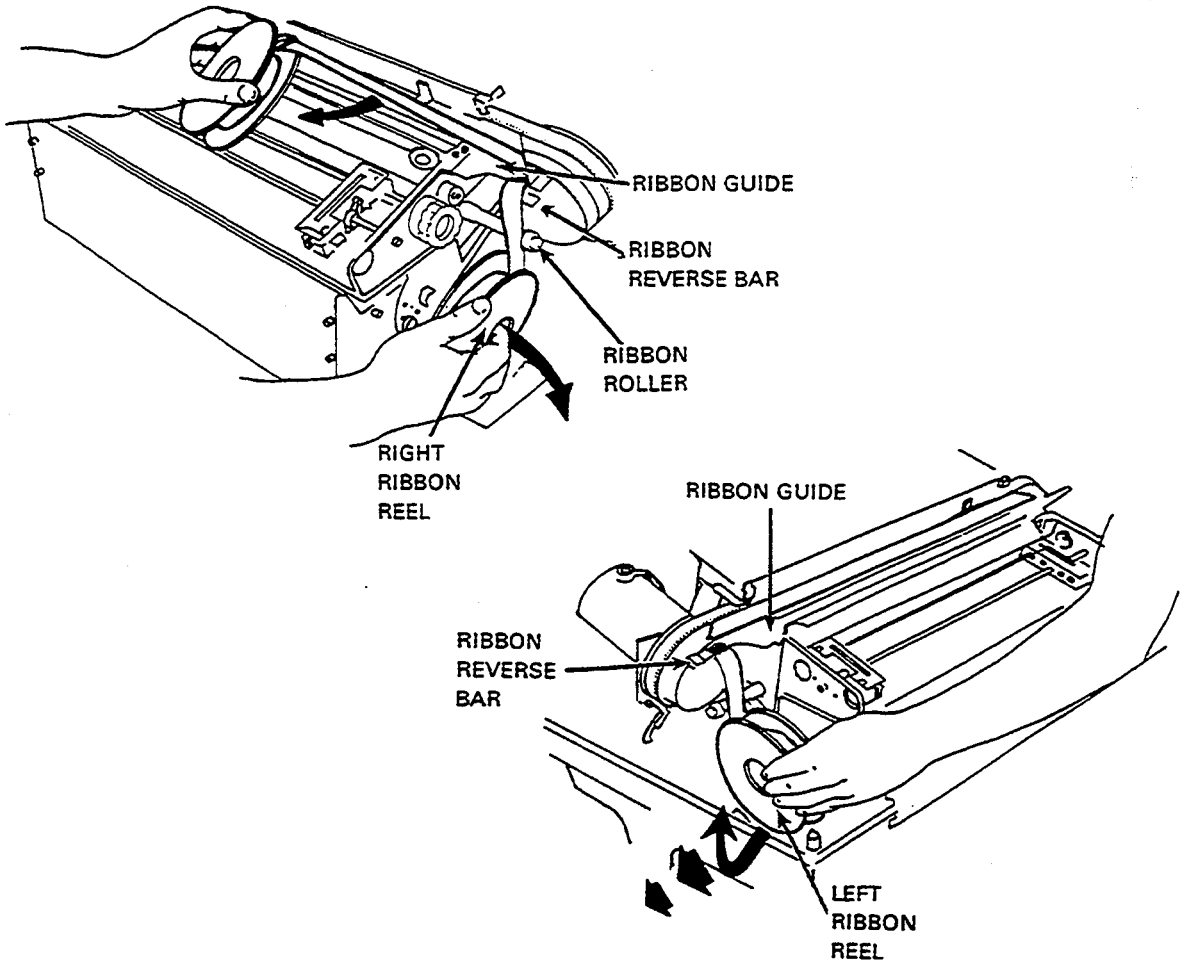


Figure 1–3 Ribbon System

1.2.3 Meter Package

The meter package (Figure 1–4) provides historical information about the operation of the printer. This information is available through a 16-digit alphanumeric display. The meter package consists of:

- A power-on and print-time meter to record power-on time and print-time in hours.
- A line counter to record the number of lines printed in 1000-line increments.
- A ribbon counter to monitor the number of lines printed on a ribbon. This counter can be preset to a particular number of lines. When the count reaches the preset number, the printer stops and the RIBBON EXHAUSTED message is displayed.

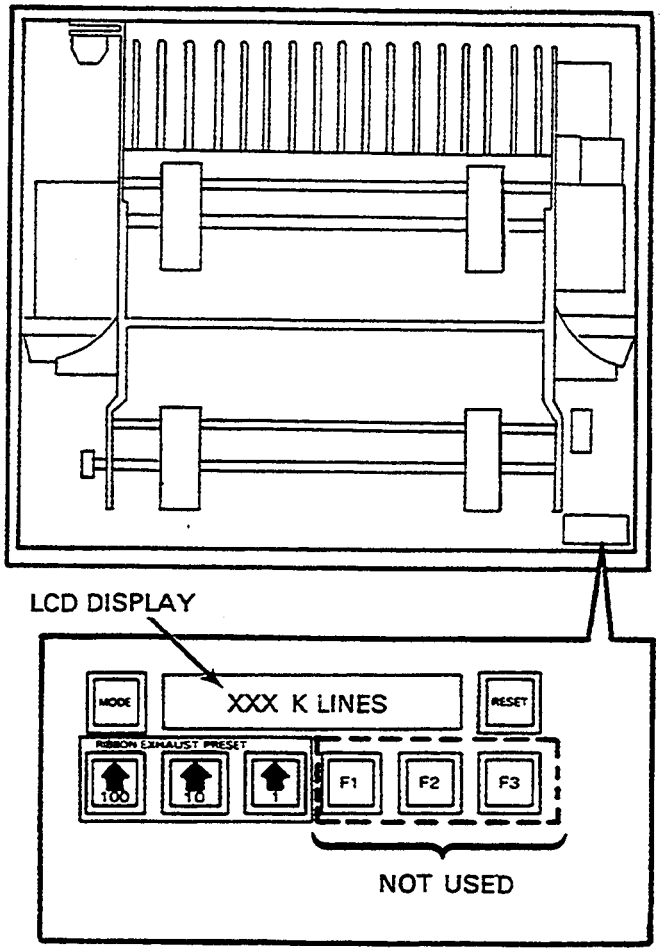


Figure 1–4 Meter Package

1.2.4 Band System

The band system (Figure 1–5) consists of a character band, a dc servomotor, a drive pulley, and an idler pulley. The dc servomotor is coupled directly to the drive pulley, which rotates the band in a counterclockwise direction around the hammerbank. Motor cooling is provided by a blower motor located behind the idler pulley. The character band is mounted over tapered pulleys and is biased against a flange on each pulley. The band rotates only during printing.

The font carrier is a continuous steel print band that can be changed by the operator. It is 15.2 mm (0.6 inches) wide and has 528 centered and raised characters etched into the band. Each of these characters is rated for 30 million impacts when printing typical print patterns on 15 lb (minimum) paper and using the specified ribbon. Character spacing is 2.9 mm to allow every eighth hammer to align with every seventh character. A lever on the idler pulley allows the operator to release tension on the band for band replacement.

The band has perforations below each character to serve as timing marks. These timing marks are sensed by an electromagnetic transducer positioned directly over the band and are used to synchronize hammer firing.

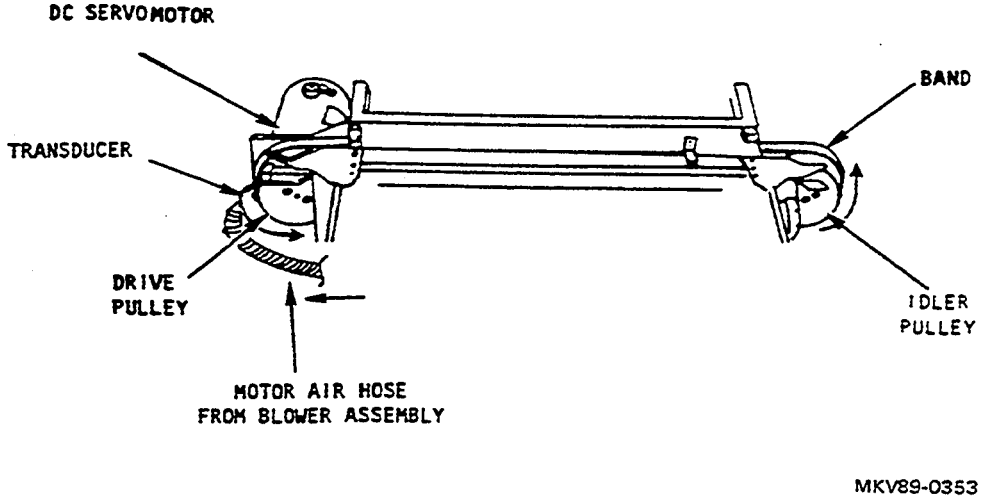


Figure 1–5 Band System

1.2.5 Hammerbank System

The printer hammerbank (Figure 1–6) consists of 136 moving coil hammers arranged in modules of four, mounted between rare earth magnets that are attached to the base frame. Shock absorbing backstop screws are used to settle the hammer to a stable position after impact. The backstop screws can be adjusted to achieve horizontal print registration. A built-in flight time meter allows individual adjustment of the hammer backstop screws to ensure that the flight time of every hammer is within specification.

The hammerbank is divided into an upper and lower bank, each having 68 hammers. The two banks are joined together with the hammers aligned horizontally for even/odd print column registration. The upper bank contains the hammers for the even-numbered print columns and the lower bank contains the hammers for the odd-numbered print columns.

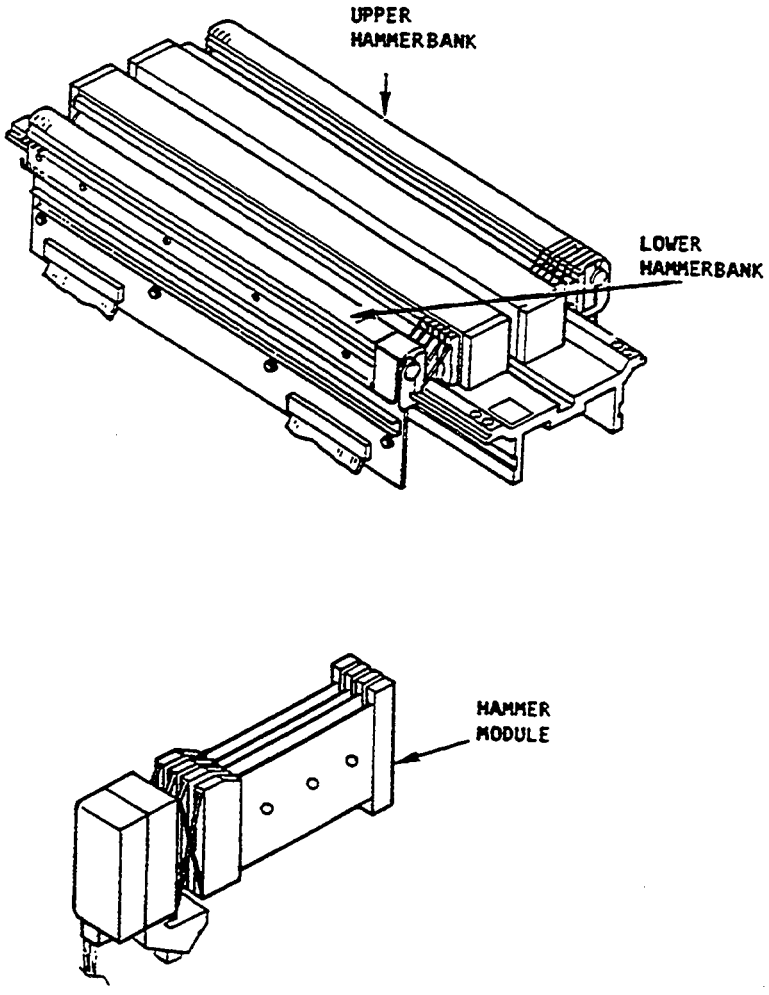


Figure 1–6 Hammerbank

1.2.6 Cooling System

Printer cooling is provided by a blower assembly mounted on the base of the cabinet. The blower draws cool air across the power supply and the electronic circuits. An air plenum directs air to the hammerbank assembly and an air hose directs air to the band motor. An airflow sensor mounted in the air duct causes the printer to shut down if airflow is inadequate. Figure 1–7 shows the location of the cooling system's components.

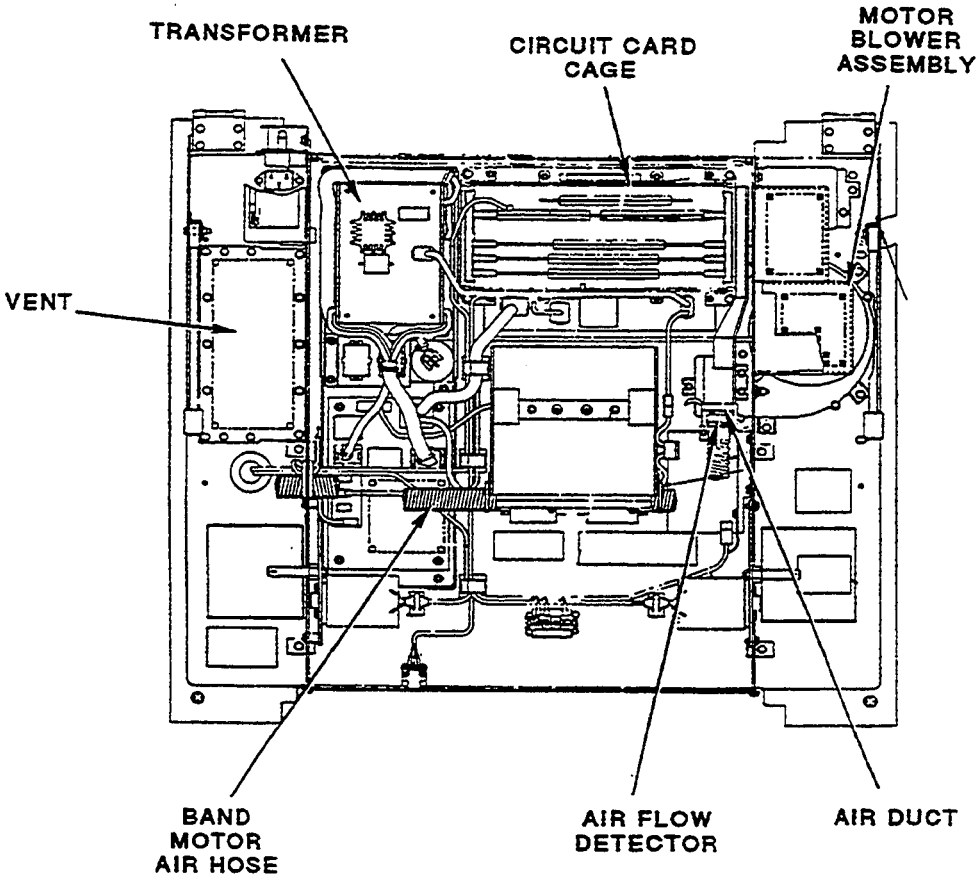


Figure 1–7 Cooling System

1.3 PRINTER SPECIFICATIONS

The physical and performance specifications of the LP37 Line Printer are summarized in Table 1–1.

Table 1–1 LP37 Printer Specifications

Parameter	Specification
Dimensions:	
Width	78 cm (31 inches)
Depth	89 cm (35 inches)
Height	110 cm (44 inches)
Weight	138 kg (300 lbs)
Input Power:	
Low range	90 to 140 Vac
High range	200 to 264 Vac
Frequency	50 or 60 Hz ± 1.0 Hz, single-phase
Power Consumption	400 watts (maximum standby) 850 watts (maximum printing)
Power Supply	Universal power supply
Print Speed:	
64 character	980 to 1200 lpm
96 character	550 to 900 lpm
Print Technology	Impact; steel character band
Lines Per Inch	6 or 8
Print Density	10 characters per inch
Print Columns	132/136 - Operator control panel selectable
Paper Width	3 to 16 inches
Paper Length	3 to 14 inches
Paper Thickness	15 lb bond minimum to 125 lb card stock up to .020 inch thick
Copies	1 to 6 parts

1.4 PRINTER ELECTRONICS

Figure 1–8 is a block diagram of the printer's electronic circuits. It shows the interaction of the circuits and the devices they control or monitor. Section 1.4.1 through Section 1.7 provide a brief discussion of the elements of the block diagram.

The printer electronics is packaged on six circuit boards. Five of these circuit boards plug into a motherboard that functions as a common bus for signal transfers between the circuit boards. Each of the five circuit boards contain specific circuits:

- Interface
- Processor
- Motor control
- Hammer driver (upper hammerbank)
- Hammer driver (lower hammerbank)

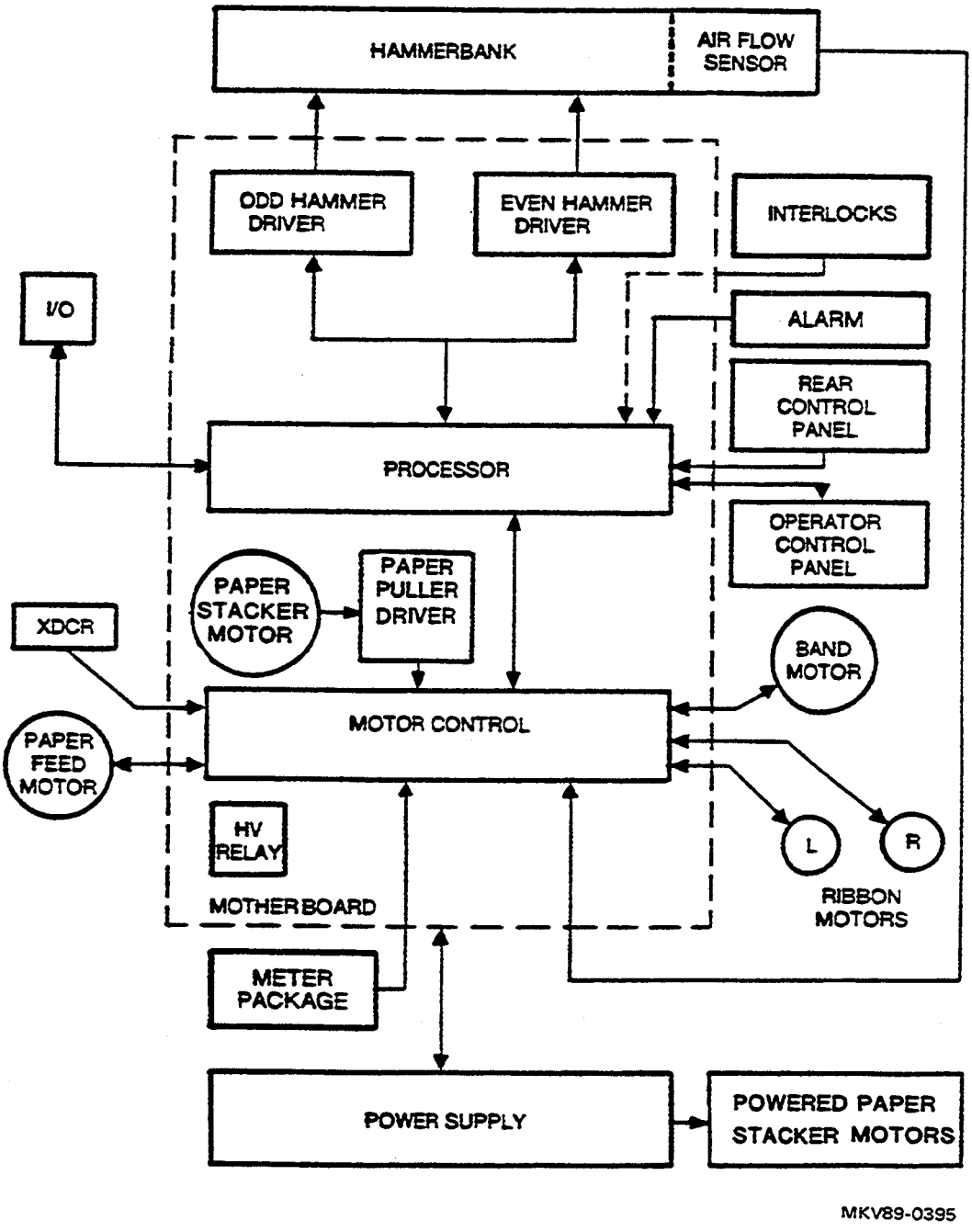


Figure 1–8 Printer Block Diagram

The motherboard and the five circuit boards (Figure 1–9) are keyed so that each type of circuit board has a dedicated slot and can be plugged into only that slot. The two hammer driver boards are identical, however, and can be interchanged.

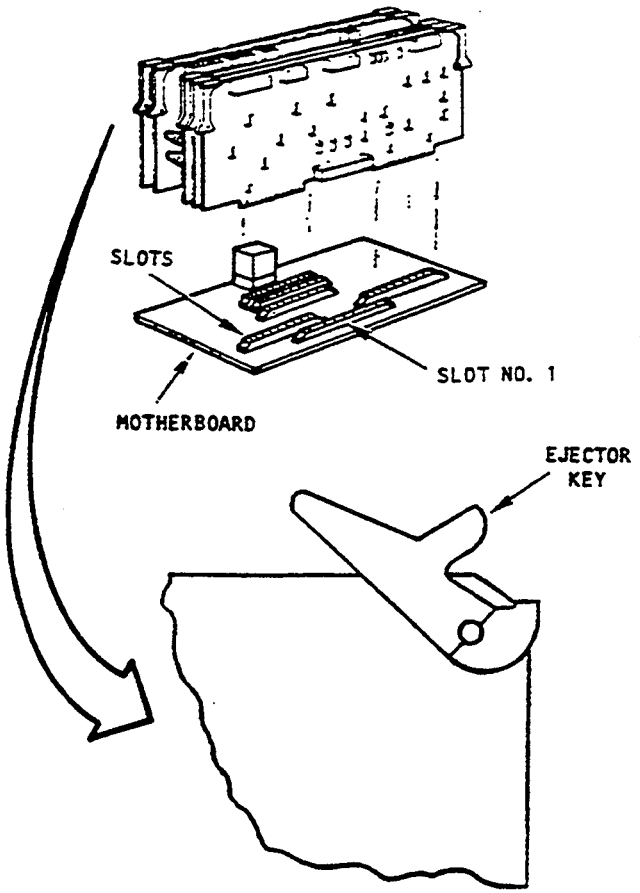


Figure 1–9 Printer Electronics

The sixth circuit board is located under the print mechanism and controls the paper puller/stacker stepper motor in an open-loop mode.

1.4.1 Interface Board

The interface board contains the logic necessary to communicate with the controller. Included in this circuitry is all the interface logic as well as the electronic vertical format unit (EVFU) and band decoding/synchronizing circuitry.

1.4.2 Processor Board

The processor board contains a master control processor that is made up of:

- Five single-chip microprocessors (one for each phase of the clock and master controller)
- Interface controller
- One code conversion/mapping PROM
- VFU RAM
- Interface drivers and receivers

The ROM code mapping receives character band position from the interface board and passes this information to the print buffer under microprocessor control. No band image PROMs are required.

The processor interfaces with the hammer driver board to provide print data that is latched into the hammer driver circuit and is decoded, enabling selected hammers to fire.

1.4.3 Motor Control Board

The motor control board functions as an interface between the processor and the paper feed drive system, and between the hammer drive system and the band drive system. The motor control board provides regulated voltages to the printer's analog and digital circuits. By monitoring all voltages, it protects against overloading the voltage and current circuits. The motor control board contains all the wave-shaping circuits for the transducer, phasing, and copies controls, and it has a print inhibit switch. The print inhibit switch allows the printer to go through all print motions without actually printing.

1.4.4 Hammer Driver Boards

There are two hammer driver boards: one for the upper hammerbank and one for the lower hammerbank. Each board drives 68 hammers by means of 17 quad hammer drivers and four hammer timing circuits. The hammer driver boards interface with the processor and the hammerbank, and contain the circuitry for firing the hammers and detecting hammer misfire. The hammer driver boards are identical and interchangeable.

1.5 FAULT MONITORING

All functions of the printer are monitored by the processor, and two categories of errors are detected and recorded:

- Soft errors
- Hard errors

When either soft or hard errors occur, a fault or error message appears on the control panel LCD.

1.5.1 Soft Errors

Soft errors are ones that can be cleared from the control panel and no data loss occurs.

1.5.2 Hard Errors

Hard errors are ones that result from a hardware malfunction. Hard errors cause the hammer supply voltage to be removed and the printer to be not ready.

To easily locate the cause of a hard error, second level diagnostic messages are provided to isolate the most likely cause of the problem. The messages are displayed in the order in which they are most likely to cause the particular problem. For more detailed information on isolating the causes of hard errors, refer to Chapter 3, "Troubleshooting."

1.6 UNIVERSAL POWER SUPPLY ASSEMBLY

NOTE

Information on the Universal Power Supply Assembly for the new style printer is found in Section B.5.

The universal power supply assembly (Figure 1–10) is designed to operate with 115 or 230 Vac and 50 or 60 Hz. Input voltage selection is provided through a power interconnect board located on the power supply assembly. This interconnect board contains double sets of plugs and jacks to provide four combinations of input voltage and frequency as shown in Table 1–2.

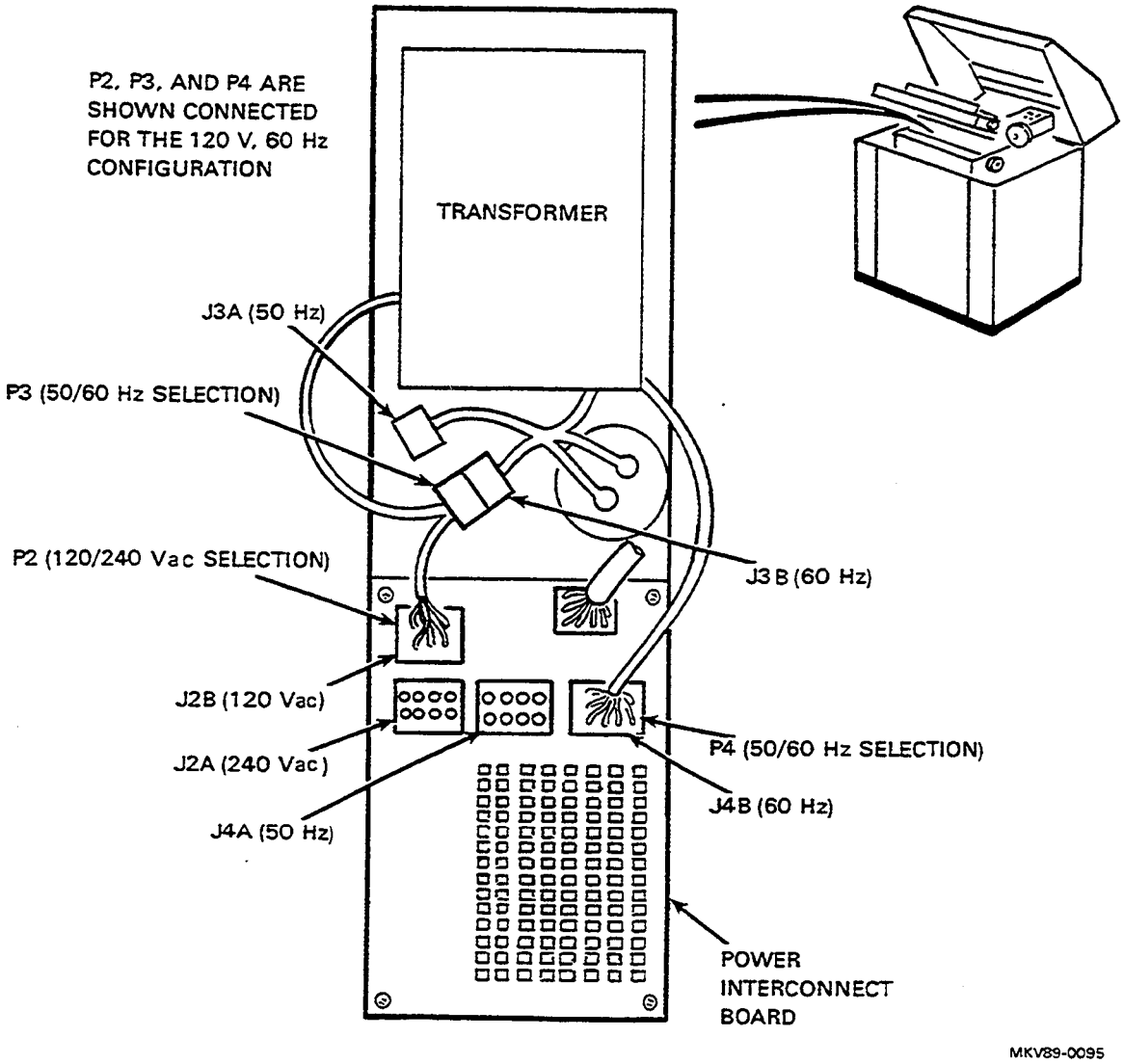


Figure 1–10 Universal Power Supply Assembly

Table 1–2 Input Power Selection

Input Voltage/ Frequency	Connections
120 V, 50 Hz	P2 to J2B, P3 to J3A, and P4 to J4A
120 V, 60 Hz	P2 to J2B, P3 to J3B, and P4 to J4B
240 V, 50 Hz	P2 to J2A, P3 to J3A, and P4 to J4A
240 V, 60 Hz	P2 to J2A, P3 to J3B, and P4 to J4B

The power supply consists of:

- A constant voltage transformer
- A resonant capacitor
- A 48 volt preloaded resistor
- An ac power switch/circuit breaker
- A universal +5 volt regulator circuit with a 48 volt regulator
- A capacitor bank assembly

The distribution and specifications of dc output voltages are shown in Table 1–3.

Table 1–3 Voltage Distribution/Specifications

Supply Voltage	Used For	Regulation	Current (Amps)	Protection
+48 Vdc	Hammers and motors	-3 V to +4 V	14	Circuit breaker, relay, fuses
+5 Vdc	Logic circuits	±5%	9	Fuse, overvoltage and short circuit protected

1.7 MAIN OPERATOR CONTROL PANEL

The printer has a main operator control panel (Figure 1–11) with a 16-character alphanumeric display and a nonvolatile memory to store the printer set-up parameters. There are 16 tactile-feel membrane switches and 6 dedicated LED indicators that monitor major printer functions. The keys on the control panel function in one of two modes, depending on the position of the mode switch. The mode switch is located on the control panel and can be set to mode 0 or mode 1. When the mode switch is set to mode 0, the printer is in normal operation and the keys are in direct operator control mode. When the mode switch is set to mode 1, the printer is in configuration set-up mode and activates the second function of the keys (the numbered keys 0 through 9 and "next").

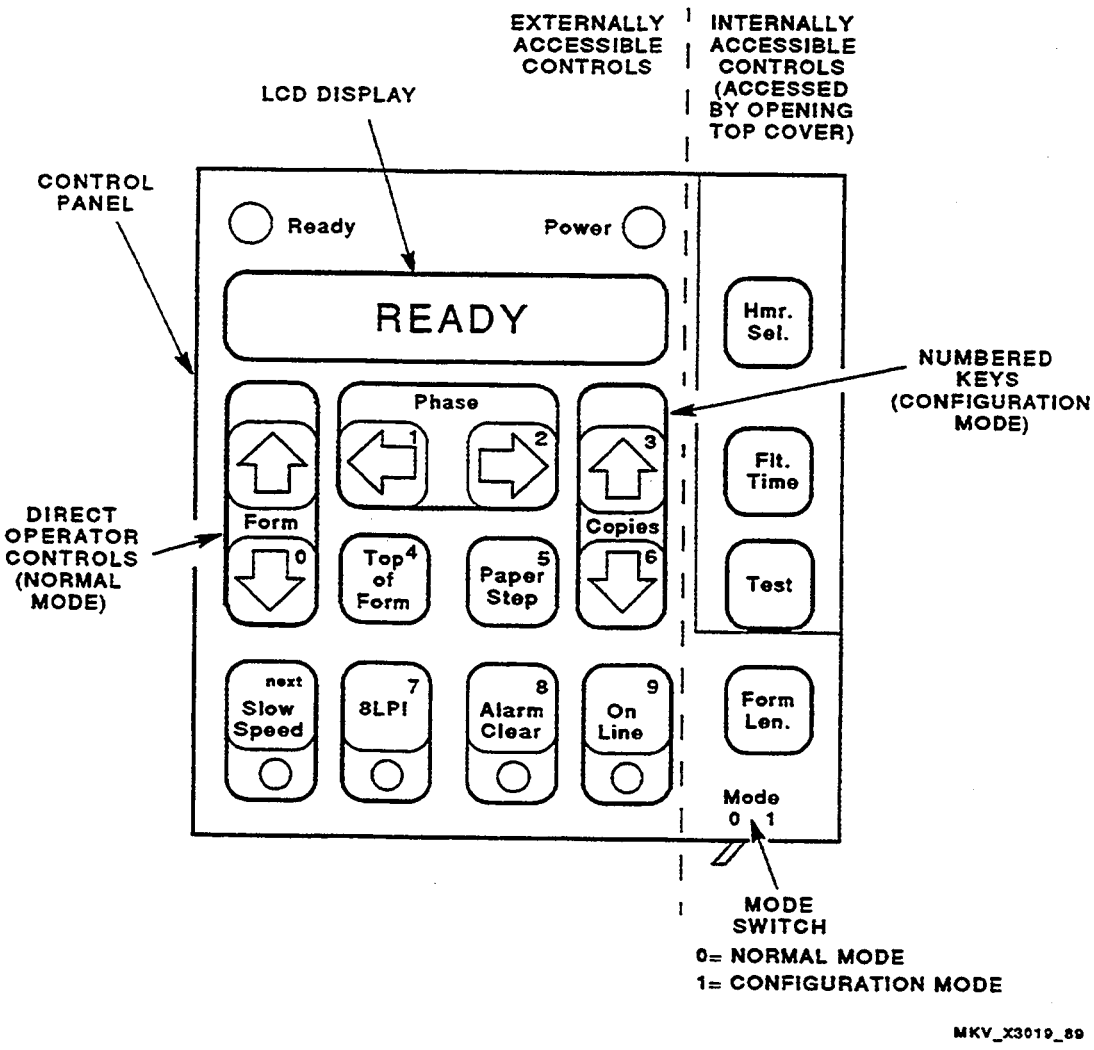


Figure 1–11 Main Operator Control Panel

1.8 REAR CONTROL PANEL

The rear control panel (Figure 1-12) contains two membrane keys: the TOP OF FORM key and the ON/OFF LINE key. These keys perform the same functions as the corresponding keys on the main operator control panel, and are for operator convenience when removing hard copy from the stacker area.

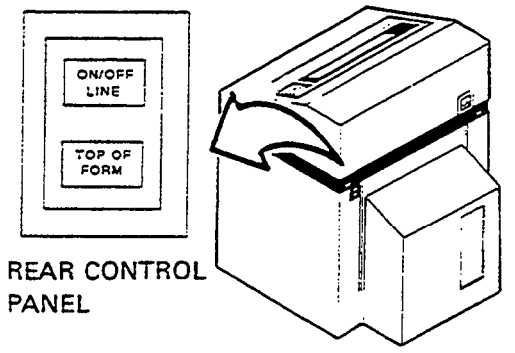


Figure 1–12 Rear Control Panel

2
INTERFACE FUNCTIONAL DESCRIPTION

2.1 INTRODUCTION

This chapter contains information on the operation of the printer's interface circuitry. The interface consists of parallel interface circuitry on a separate parallel interface board, referred to as the DEC I/O interface. Part of the interface circuit is a 12-channel electronic vertical format unit (EVFU) for controlling the vertical format of the printed information. The EVFU is located on the processor board, and is used instead of the conventional paper tape format unit. It stores up to 144 lines of formatting information. Formatting information is loaded into the VFU memory from the user system under control of VFU control codes.

2.2 INTERFACE OPERATION

The purpose of the interface circuitry is to handle the transfer of data, control signals, and escape sequence codes between the printer and the user system. The types of non-data information handled by the interface circuitry are:

- Standard interface signals
- ASCII format control codes
- VFU control codes

Standard interface signals are assigned to specific lines in the 50-pin D-subminiature connector as shown in Table 2–1.

The ASCII format control codes are sent over the data lines, and are used to terminate the line of data and specify the line spacing. The ASCII codes that are recognized by the printer are:

- Line feed
- Form feed
- Carriage return
- Vertical tab
- Vertical pitch

The VFU control codes are sent over the data lines under control of the VFU control codes, and are used to load the VFU memory with format information.

2.3 INTERFACE SIGNAL DEFINITIONS

Signal definitions for each of the interface signals are provided in Table 2–1.

Table 2–1 Interface Signal Definitions

Signal	Origin	Meaning (Asserted)	Meaning (Nonasserted)
READY	Printer	Signifies: 1. Power and dc voltages are present 2. No printer fault exists 3. Paper has been loaded and ALARM CLEAR is asserted 4. The ALARM light is OFF 5. The printer is ready (if on-line) to print	A fault exists and is reported to the control panel. If DEMAND is asserted, the user system can read the status conditions on the data lines.
ON LINE	Printer	Signifies that the operator has placed the printer in the run position and that the user system can send data. Can only be asserted if READY is asserted	Printer is off-line.
DEMAND	Printer	Synchronizes data transfers between the printer and the user system. DEMAND requests a character from the user system. READY must be asserted. If READY is not asserted, the data lines contain printer status information	No data is being received and no status information is being sent.
DATA STROBE	User system	Identifies that the user system has placed a new character on the data lines. Generated in response to DEMAND	No data is available from the user system.
DATA	User	These 7 or 8 lines carry print data codes and format control codes. Data is accepted by the printer when DATA STROBE is asserted	No data is being sent by the user system.
INTFC CON VER	Interface connector	Verifies that the interface connector is plugged into the printer	Interface connector is not plugged into the printer.
PARITY	User	Indicates that odd or even parity is checked on 7 or 8 lines of data	Parity is not checked.
PARITY ERROR	Printer	A character with a parity error has been detected. PARITY remains asserted until the end of line control code or BUFFER CLEAR is received. A parity error results in printing a question mark	No parity error exists.
BUFFER CLEAR	User	Clears the print buffer and allows a new line of data to be loaded	Print buffer is not cleared.
VFU RDY	Printer	VFU buffer is loaded and available for use	VFU buffer is not loaded.

2.4 I/O CONNECTOR PIN ASSIGNMENTS

Table 2–2 lists the signal names and the pin assignments for the interface 50-pin D-type subminiature connector.

Table 2–2 I/O Connector Pin Assignments

Signal Pin	Return Pin	Signal Name
19	03	DATA BIT 1
20	04	DATA BIT 2
01	02	DATA BIT 3
41	40	DATA BIT 4
34	18	DATA BIT 5
43	42	DATA BIT 6
36	35	DATA BIT 7
28	44	DATA BIT 8
30	14	PI
29	13	PARITY
38	37	DATA STROBE
31	15	BUFFER CLEAR
21	05	ON LINE
22	06	READY
23	07	DEMAND
27	11	PARITY ERROR
26	10	VFU READY
46	45	INTFC CONN VER
08,09,12,16	N/A	NC
17,24,25,32	N/A	NC
33,39,47,48	N/A	NC
49,50	N/A	NC

NC = Not connected.

2.5 INTERFACE SIGNAL CIRCUITS

Signals between the user system and the printer are transmitted over twisted-pair cables that can be up to 30 ft in length. These signals require driver and receiver circuits to maintain proper signal levels across the cable. Figure 2–1 shows the driver circuit for sending all signals except data to the user system. The driver circuit for the DEMAND signal contains two 7406 drivers wired in parallel. Figure 2–2 shows the receiver circuit for receiving all signals except data from the user system. Figure 2–3 shows the circuit used for sending and receiving all data signals to and from the user system.

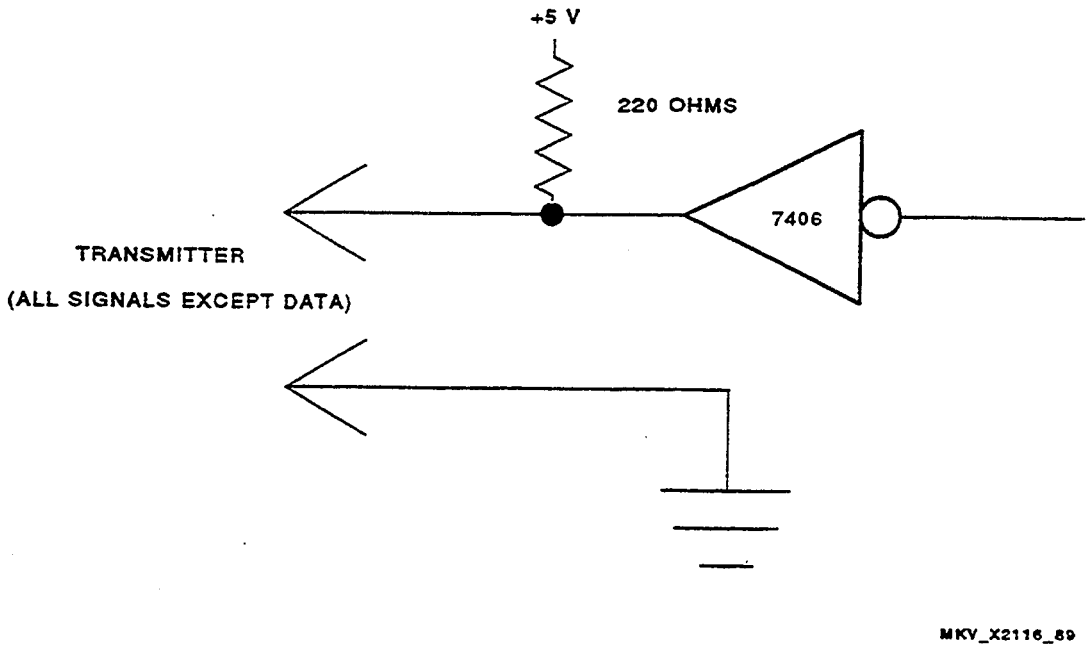


Figure 2–1 Driver Circuit for All Signals Except Data

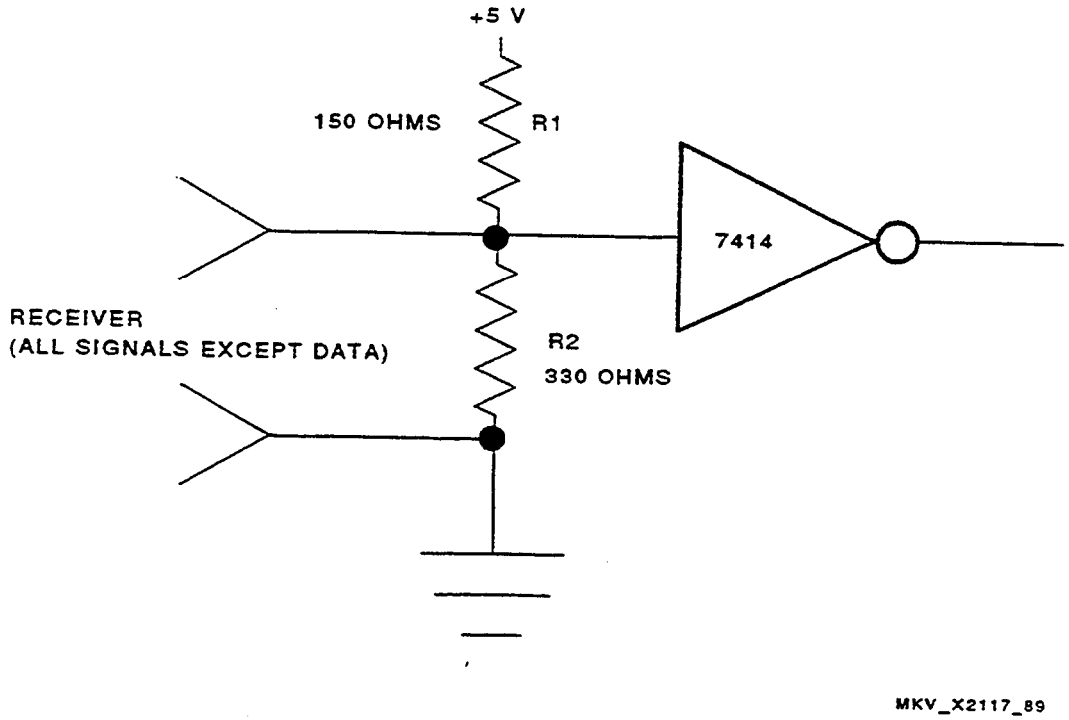


Figure 2–2 Receiver Circuit for All Signals Except Data

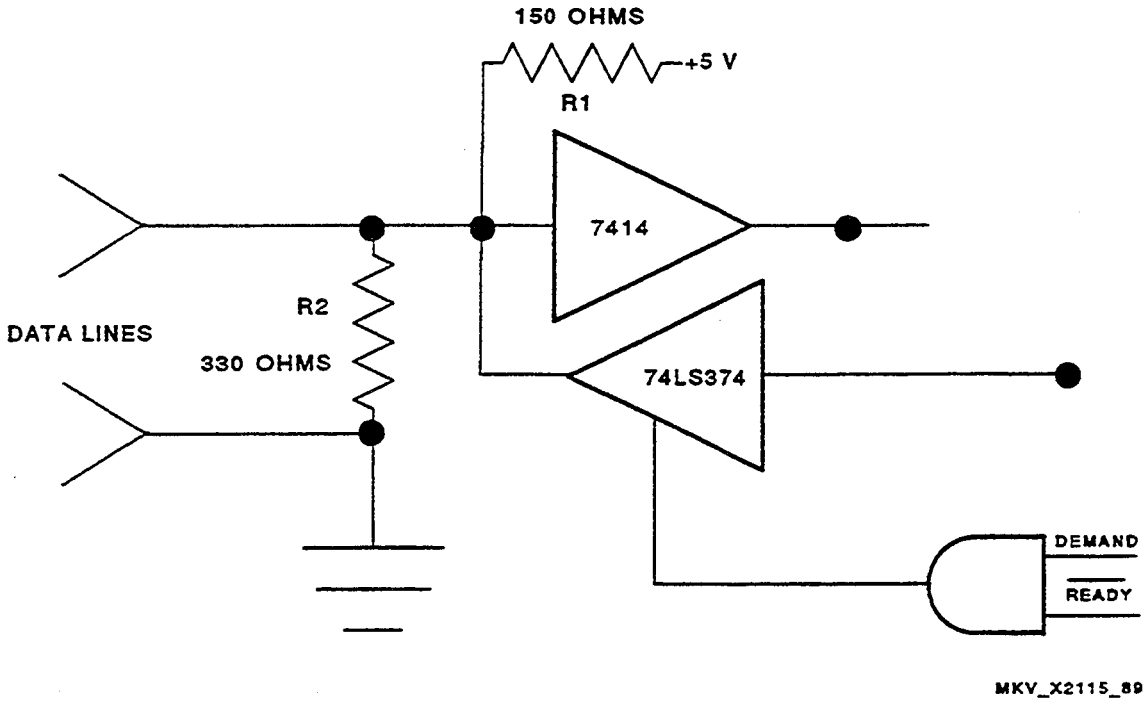


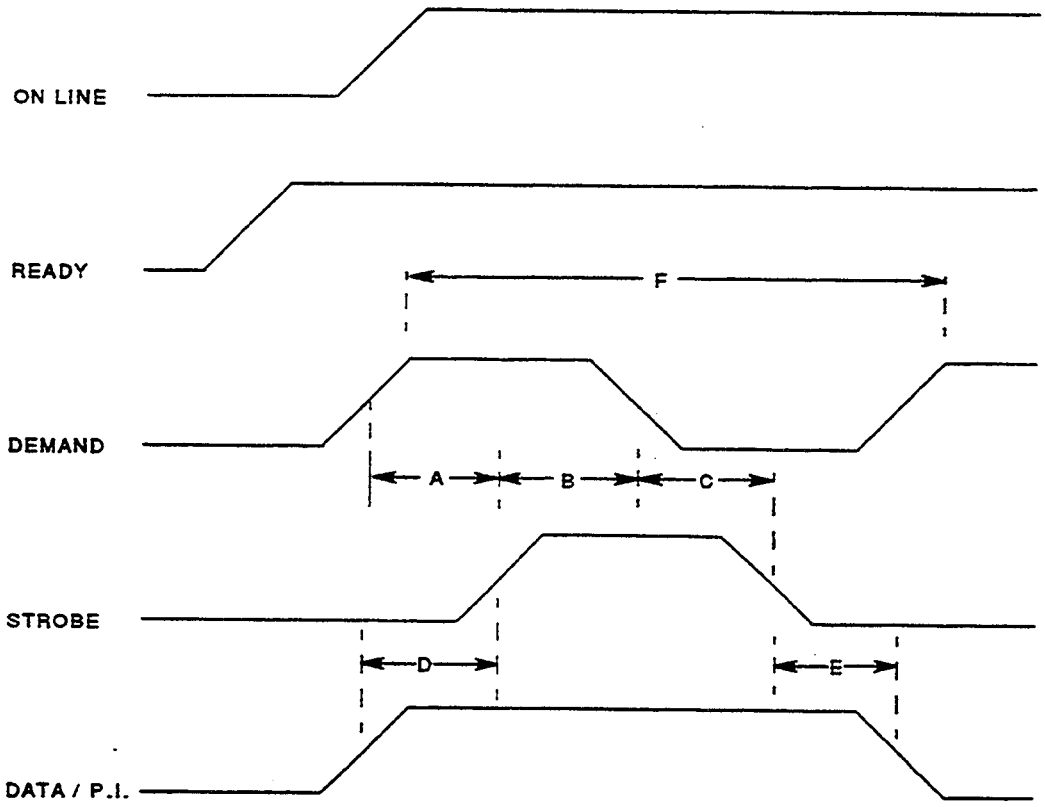
Figure 2–3 Driver/Receiver Circuit for Data

2.6 HANDSHAKING

The handshaking takes place in the interlocked mode using DATA STROBE and DEMAND interface signals. The sequence for handshaking is as follows:

1. The printer is placed on-line to activate the ON LINE signal.
2. DEMAND is asserted by the printer to notify the printer controller that the printer is ready to accept data transfers.
3. The printer controller transmits DATA STROBE to the printer along with valid data.
4. The printer removes DEMAND in response to DATA STROBE.
5. The printer controller removes DATA STROBE in response to DEMAND being removed.
6. The printer responds to the inactivated DATA STROBE by processing the data.
7. When data processing is complete and no faults exist, DEMAND is asserted again.

Timing diagrams for the handshaking are shown in Figure 2–4 through Figure 2–6.



	MAX	MIN
A = STROBE PRESENT AFTER DEMAND PRESENT	250 ns	50 ns
B = DEMAND REMOVED AFTER STROBE PRESENT	143 ns	N/A
C = STROBE REMOVED AFTER DEMAND REMOVED	800 ns	50 ns
D = SETTLING TIME	N/A	50 ns
E = DATA HOLD TIME	N/A	50 ns
F = CHARACTER TRANSFER	N/A	1.95 µs

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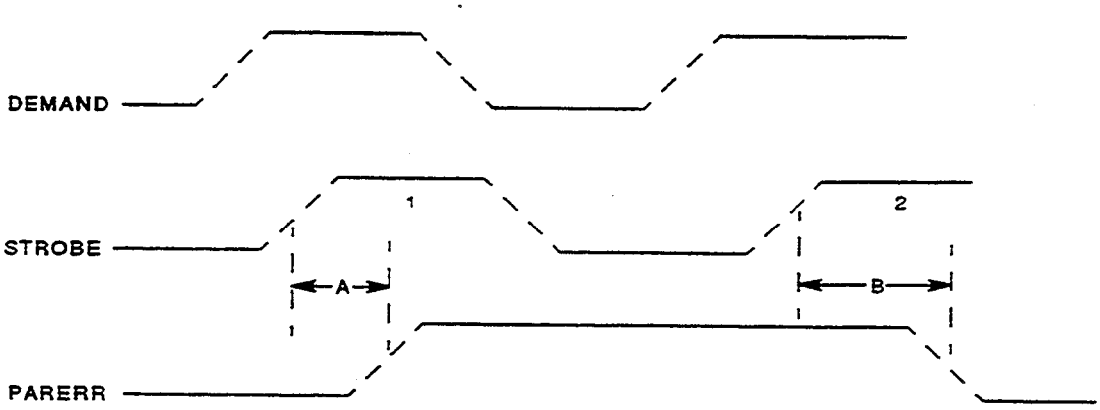
Figure 2–4 Timing Diagram for Normal Data Transfer



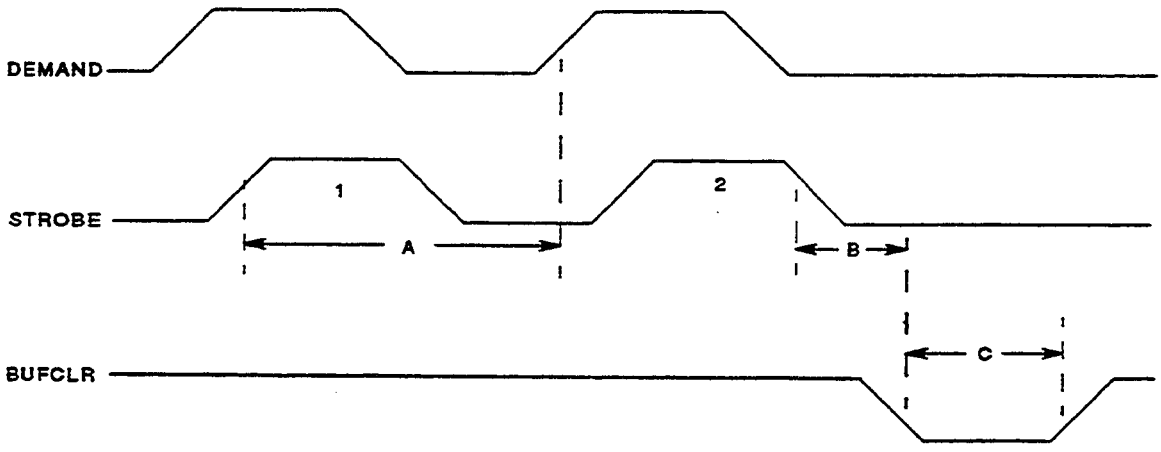
A = STROBE TRUE TO PARERR TRUE: 100 ns MAX
B = STROBE TRUE TO PARERR FALSE: 100 ns MAX

1 = DATA CHARACTER WITH BAD PARITY.
2 = DATA CHARACTER WITH GOOD PARITY.

NOTE: IF MULTIPLE DATA CHARACTERS RECEIVED WITH BAD PARITY, PARERR REMAINS TRUE UNTIL THE FIRST DATA CHARACTER WITH GOOD PARITY IS RECEIVED.

MKV_X2113_89

Figure 2–5 Timing Diagram for Data Load with Parity Error



A = BUFCLR IS ILLEGAL AT THIS TIME.
B = 500 ns MINIMUM.
C = 4 µs MINIMUM.

1 = DATA IS CONTROL CODE.
2 = DATA IS CHARACTER CODE.

NOTE: STROBE IS ILLEGAL DURING BUFCLR.

MKV_X2114_89

Figure 2–6 Timing Diagram for BUFFER CLEAR

3
TROUBLESHOOTING

3.1 INTRODUCTION

This chapter contains information to help isolate the causes of problems that may occur while operating the printer. The chapter is divided into two main sections. The first section discusses LCD error message procedures, and the second section discusses inoperative printer procedures. To assist in troubleshooting, various diagrams are included at the end of the LCD error message procedures (Figure 3–2 through Figure 3–16). These diagrams include:

- A system interconnect diagram
- System wiring diagrams
- Board layout diagrams
- A power supply diagram
- Block diagrams
- A hammer driver functional schematic

To aid in troubleshooting, there is a print inhibit switch on the motor control board. This switch overrides the paper low and paper motion sensors.

CAUTION

DO NOT TOGGLE the print inhibit switch while the printer is printing. Relay damage may occur. Set the printer to the Off-Line state before setting the switch to the On state.

3.2 LCD ERROR/FAULT MESSAGES

The LCD on the operator's control panel displays messages that indicate the status of the printer. Included in the status are messages identifying printer diagnosed faults. When a fault occurs, the main fault message is displayed to indicate the general area of the problem. More specific information is provided in the second level diagnostics discussed in Section 3.2.1.

3.2.1 Second Level Diagnostics

To assist in isolating the cause of a problem, second level diagnostic messages are provided. These messages indicate probable related causes in order of their probability. Each message has its own diagnostic tree, which can be stepped through by pressing the "next" key while in the second level diagnostics.

The procedure for using the second level diagnostics is as follows:

1. At the first level error message, open the top cover and set the Mode toggle switch to 1.
2. Close the top cover and press the "next" key. The display shows the next probable cause of the fault.
3. Press the "next" key again to view the next message.
4. If a message with a question is displayed, press 1 to answer YES or 0 to answer NO.
5. Press the "next" key for additional messages related to the question.

The example below uses the second level diagnostics to diagnose an airflow fault. The sequence (diagnostic tree) for this fault is shown in Figure 3–1.

1. At the main fault message, open the top cover and set the MODE switch to mode 1.
2. Close the top cover and press the "next" key. The RECYCLE POWER message appears.
3. Set the MODE switch to 0 and turn power OFF and back ON.
4. Open the top cover and press TEST.
5. Close the top cover and press ON LINE to start the test.
6. If the error message is displayed, open the top cover and set the MODE switch to 1.
7. Close the top cover and press the "next" key twice. This will bypass the RECYCLE POWER message and show the BLOWER WORKING? display.
8. Since this is a question, it must be answered by pressing 1 for YES or 0 for NO.
9. Press the "next" key for additional instructions related to the problem.

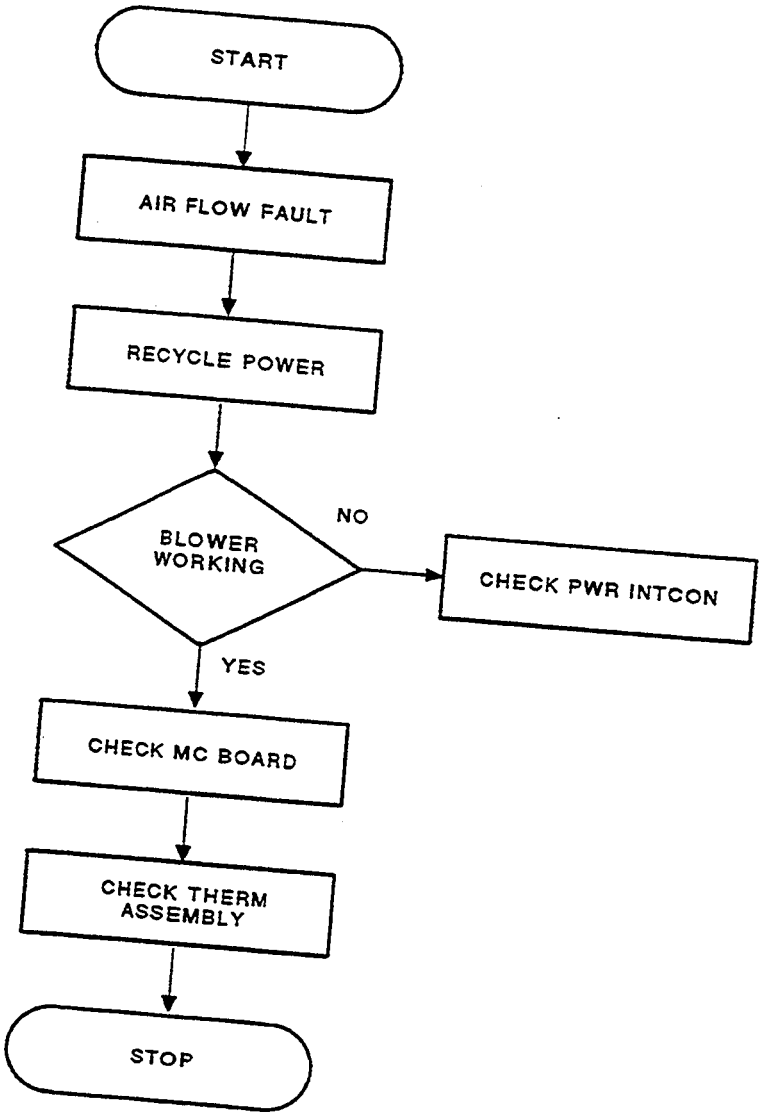


Figure 3–1 Airflow Fault Diagnostic Tree

3.2.2 Diagnostic Messages

This section discusses in detail the second level diagnostic procedures, and provides step-by-step troubleshooting procedures for each diagnostic message.

WARNING

Before performing any maintenance on the printer, power OFF the printer, wait 15 seconds, then disconnect the power cord.

3.2.2.1 AIR FLOW FAULT

When the AIR FLOW FAULT message appears, it indicates lack of airflow or excessive temperature of airflow in the hammerbank plenum. The airflow sensing is accomplished by an airflow sensor and circuit board in the air plenum duct. This sensor circuit feeds the detection circuitry on the motor control board. To determine the cause of the fault, a quick check can be made by stepping through the second level diagnostics as explained in Section 3.2.1. When using the second level diagnostics, follow the instructions at each step before going on to the next step. A more detailed procedure is listed below. The steps in this procedure are ordered according to the most probable cause.

1. Power OFF the printer.
2. Check for excessive room ambient temperature.
3. Check the printer blower inlet area (underneath the printer on the right side) for obstruction.
4. Power ON the printer.
5. Determine if the blower is operating by listening and checking for airflow.
6. If the blower is not operating, power OFF the printer and check in order:
   a. The blower plug P8/J8 on the power interconnect board
   b. The power interconnect board (replace)
   c. The blower motor assembly

   For replacement procedures, see Section 5.16.
7. If the blower motor is operating, check in order:

   NOTE

   The airflow fault circuit is active only while the printer is printing.

   a. P4/J4 on the motor control board.
   b. Motor control board (reseat).
   c. While printing, measure from P4-1 to P4-2 (gnd) and from P4-3 to P4-2. If P4-3 is greater than P4-1, replace the motor control board. If P4-1 is greater than P4-3, replace the airflow detector board.
8. Replace the airflow detector board.

3.2.2.2 BAND MOTOR FAULT

The BAND MOTOR FAULT message indicates that an overcurrent condition exists in the band motor circuit. To determine the cause of the fault, a quick check can be made by stepping through the second level diagnostics as explained in Section 3.2.1. When using the second level diagnostics, follow the instructions at each step before going on to the next step. A more detailed procedure is listed below. Steps in this procedure are ordered according to the most probable cause.

1. Cycle the printer power OFF then ON in an attempt to clear the fault.
2. If the fault still exists, continue with the next step.
3. Power OFF the printer and open the top cover.
4. Remove the paper and ribbon.

5. Remove the band and clean the band, the band pulleys, the pulley brushes, and the ribbon path.
6. Replace the band.
7. Replace the ribbon and paper.
8. Power ON the printer and allow the printer diagnostic check to complete.
9. If the problem still exists, power OFF the printer and check the band pulley for drag (Section 4.4.4).
10. Power ON the printer and allow the printer diagnostic check to complete.
11. If the problem still exists, check P3/J3 on the motor control board (Figure 3–9).
12. If the problem still exists, replace the motor control board.
13. If the problem still exists, replace the band drive motor assembly (Section 5.13).

3.2.2.3 BAND OV SPD FAULT

The Band Over Speed fault message indicates that the band is operating too fast. To determine the cause of the fault, a quick check can be made by stepping through the second level diagnostics as explained in Section 3.2.1. When using the second level diagnostics, follow the instructions at each step before going on to the next step. A more detailed procedure is listed below. Steps in this procedure are ordered according to the most probable cause.

1. Power OFF the printer.
2. Ensure that the band is installed properly, and the band release lever is in the locked (down) position.
3. Power ON the printer and allow the diagnostic check to complete.
4. If the fault still exists, power OFF the printer and check the transducer gap adjustment (Section 4.4.3).
5. Rotate the band pulleys and ensure that the band is seated against the flange on each pulley (Section 4.4.4).
6. Power ON the printer and allow the diagnostic check to complete.
7. If the fault still exists, power OFF the printer and check and reseat the motor control board and cables.
8. Power ON the printer and allow the diagnostic check to complete.
9. If the fault still exists, power OFF the printer and replace the motor control board.
10. Power ON the printer and allow the diagnostic check to complete.
11. If the fault still exists, power OFF the printer and reseat the processor and cables.
12. Power ON the printer and allow the diagnostic check to complete.
13. If the fault still exists, replace the processor board.

3.2.2.4 BAND UN SPD FAULT

The Band Under Speed fault message indicates that the band is operating too slowly. To determine the cause of the fault, a quick check can be made by stepping through the second level diagnostics as explained in Section 3.2.1. When using the second level diagnostics, follow the instructions at each step before going on to the next step. The steps for troubleshooting this condition are the same as those for the band over speed condition.

3.2.2.5 CHANNEL NOT FD

The Channel Not Found message indicates that the VFU is loaded; however, a GO TO CHANNEL command was received for a channel in which nothing is loaded. To determine the cause of the fault, a quick check can be made by stepping through the second level diagnostics as explained in Section 3.2.1. When using the second level diagnostics, follow the instructions at each step before going on to the next step. Details of this procedure are as follows:

1. Check that the VFU channel format is correct for the print job interface being printed.
2. Reload the VFU.
3. Verify VFU format by running the diagnostic check.
4. If the problem still exists, verify that all print data is correct. If the print data is not correct, check the interface board and I/O cable connection to the printer.
5. If the problem still exists, reseat or replace the processor board.

3.2.2.6 CHECK PAPER

The CHECK PAPER message indicates that paper motion has not been detected after paper movement commands to move a total of one inch of paper were issued. To determine the cause of the fault, a quick check can be made by stepping through the second level diagnostics as explained in Section 3.2.1. When using the second level diagnostics, follow the instructions at each step before going on to the next step. Details of this procedure are as follows:

1. Ensure that there are no paper jams.
2. Clean the paper motion sensor on the upper left tractor.

NOTE

The back of the paper must be white or light in color to reflect the light from the paper motion sensor.

3. Ensure that the back of the paper being printed is white.
4. If the paper is moving, perform the steps below in order.
   a. Check the paper motion sensor cable plug J2/A19 (Figure 3–2).
   b. Check plug P9/J9 on the motherboard (Figure 3–12).
   c. Reseat or replace the processor board.
   d. Test and/or replace the paper motion sensor. See Section 3.4.4.1 for testing and Section 5.22 for replacing the paper motion sensor.

5. If the paper is not moving, perform the steps below in order.
   a. Check the condition of the paper feed belt.
   b. Check the condition of the paper feed belt pulleys.
   c. With the power OFF, rotate the forms adjust knob and verify that all tractors and shafts rotate as the knob is rotated.

3.2.2.7 CHECK RIBBON

The CHECK RIBBON message indicates that ribbon motion has not been detected after ribbon motors were enabled. To determine the cause of the fault, a quick check can be made by stepping through the second level diagnostics as explained in Section 3.2.1. When using the second level diagnostics, follow the instructions at each step before going on to the next step. Details of this procedure for troubleshooting a ribbon motion problem are listed below.

1. Check the following:
   a. The ribbon is installed correctly.
   b. The ribbon is not jammed.
   c. The ribbon is not broken.
   d. The ribbon spools are secured properly.
2. If the ribbon is at the end of the spool:
   a. Ensure that the ribbon reversing foil is on the ribbon.
   b. Clean the ribbon reversing bars.
   c. Power OFF the printer and check the ribbon reversing bar connectors P5/J5 on the motor control board (Figure 3–2).
3. Power ON the printer and test ribbon motion.
4. If the problem still exists, replace the motor control board.
5. Power ON the printer and rotate the ribbon spool to release ribbon tension. If the ribbon tension is not restored, replace the ribbon drive motor assembly (Section 5.10).
6. If the problem still exists, replace the motor control board.

3.2.2.8 CHECK TOP COVER

The CHECK TOP COVER message indicates that the early warning top cover switch is open. To determine the cause of the fault, a quick check can be made by stepping through the second level diagnostics as explained in Section 3.2.1. When using the second level diagnostics, follow the instructions at each step before going on to the next step. Details of this procedure for troubleshooting a top-cover-open problem are as follows:

1. Verify that the top cover is closed and press Alarm Clear.
2. If the problem still exists, open the top cover and verify that the upper top cover switch is operational (Section 5.19).
3. Ensure that the upper top cover actuator inserts into the switch when the cover is closed.
4. Pull the switch plunger out to the interlock defeated position and with the top cover open, verify that the check top cover message does not appear after placing the printer on-line.

5. If the problem still exists, power OFF the printer and check the top cover switch plug P9/J9 on the motherboard (Figure 3–2).
6. Power ON the printer and allow the diagnostic check to complete.
7. If the problem still exists, power OFF the printer and replace the top cover switch assembly (Section 5.19).
8. Power ON the printer and allow the diagnostic check to complete.
9. If the problem still exists, reseat/replace the processor board.

3.2.2.9 DAVFU LOAD ERROR

The DAVFU LOAD ERROR message indicates that incorrect VFU channel format is loaded into the RAM. To determine the cause of the fault, a quick check can be made by stepping through the second level diagnostics as explained in Section 3.2.1. When using the second level diagnostics, follow the instructions at each step before going on to the next step. Details of this procedure for troubleshooting a DAVFU load error are as follows:

1. Reload the VFU.
2. Verify that top-of-form is defined by channel 1 in the VFU load data.
3. Verify that an even number of VFU data bytes are loaded.
4. Verify that no more than 144 data words are loaded.
5. Verify that the I/O cable is connected to the printer.
6. If the problem still exists, reseat/replace the processor board.

3.2.2.10 DIAGNOSTIC CHECK

NOTE

DIAGNOSTIC CHECK is a normal display that occurs for approximately 15 seconds after the printer is powered ON.

The DIAGNOSTIC CHECK message indicates that the printer is not set to an initialized state while performing internal self-test. There are no second level diagnostics for the DIAGNOSTIC CHECK condition. The procedures for troubleshooting a diagnostic check error are as follows:

1. Power OFF the printer, then ON.
2. If the problem still exists, power OFF the printer and reseat all connectors on the motor control, processor, and control panel boards (Figure 3–2).
3. Power ON the printer and allow the diagnostic check to complete.
4. If the problem still exists, power OFF the printer and reseat/replace the processor board.
5. Power ON the printer and allow the diagnostic check to complete.
6. If the problem still exists, power OFF the printer and replace the control panel board (Section 5.24).
7. Power ON the printer and allow the diagnostic check to complete.
8. Check the transducer gap (Section 4.4.3).
9. If the problem still exists, refer to Section 3.3.

3.2.2.11 EXCESS CRS

The EXCESS CRS message indicates that more than 8 (or 140)† print lines were received that terminated with a carriage return or VFU line skip = 0. To troubleshoot this problem:

1. Check the format code issued to the printer.
2. Verify that the print data is correct.
3. Enable the AUTO LF ON CR via the printer control panel (refer to the user's guide). The printer performs a line feed for each carriage return received.
4. If the problem still exists, power OFF the printer and replace the processor board.
5. If the problem still exists, check the interface board and I/O cable connection to the printer.

3.2.2.12 HAMMER FAULT

The HAMMER FAULT message indicates that a hammer driver circuit is shorted, or that the +48 volts is not present at the relay output. This is a hard fault and requires the printer to be powered off to clear the fault. To determine the cause of the fault, a quick check can be made by stepping through the second level diagnostics as explained in Section 3.2.1. When using the second level diagnostics, follow the instructions at each step before going on to the next step. Details of this procedure for troubleshooting a hammer fault are as follows:

1. Check the last line printed for abnormal print data and record the column number of any abnormal printing.
2. Power OFF the printer and unplug the hammer driver boards in slots 4 and 5 of the card cage.
3. Power ON the printer and allow the diagnostic check to complete.
4. If the message is now HAMMER DRIVER FAULT, power OFF the printer and replace the appropriate hammer driver board.

NOTE

The hammer driver board in slot 4 contains the circuitry for the odd numbered print columns, and the hammer driver board in slot 5 contains the circuitry for the even numbered columns.

5. If the message is still HAMMER FAULT, power OFF the printer and replace the processor board.
6. If the HAMMER FAULT message occurs after placing the printer on-line, replace the +48 volt relay or the capacitor bank assembly (Section 5.26).

† Number of print lines can be set to either 8 or 140.

3.2.2.13 HAMMER DRIVER FAULT

The HAMMER DRIVER FAULT message indicates that a hammer driver circuit is open. This message is a soft fault and can be cleared with the Alarm Clear key. To troubleshoot this fault:

1. Check the last line printed for abnormal print data and record the column number of any abnormal printing.
2. Press Alarm Clear and put the printer in self-test mode.
3. Observe which columns do not print.
4. Power OFF the printer and replace the appropriate hammer driver board.

NOTE

The hammer driver board in slot 4 contains the circuitry for the odd numbered print columns, and the hammer driver board in slot 5 contains the circuitry for the even numbered print columns.

5. If all print columns print normally, power OFF the printer and replace the motor control board.
6. If the HAMMER DRIVER FAULT cannot be cleared with the Alarm Clear key, replace the processor board.

3.2.2.14 HV 1 FAULT

The High Voltage 1 (HV1) Fault message indicates that a fault was detected in the motor +48 V circuits. HV1 controls the printer band, paper feed, and ribbon circuits. To determine the cause of the fault:

1. Power OFF the printer, then ON.
2. If the problem still exists, check the voltage/frequency plugs on the power interconnect board for the correct configuration (Table 3–1).
3. If the problem still exists, check all motor cables, print band, paper feed, and ribbon motors.
4. If they are functioning normally, replace the power interconnect board.
5. If the problem still exists, replace the transducer assembly (Section 5.11).

Table 3–1 Input Power Selection

Input Voltage/Frequency	Connections
120 V, 50 Hz	P2 to J2B, P3 to J3A, and P4 to J4A
120 V, 60 Hz	P2 to J2B, P3 to J3B, and P4 to J4B
240 V, 50 Hz	P2 to J2A, P3 to J3A, and P4 to J4A
240 V, 60 Hz	P2 to J2A, P3 to J3B, and P4 to J4B

3.2.2.15 HV 2 FAULT

The High Voltage 2 (HV2) Fault message indicates that a fault was detected in the hammer +48 V circuits. HV2 controls the hammer +48 volts. To determine the cause of the fault:

1. Power ON the printer, then OFF.
2. If the problem still exists, check the voltage/frequency plugs on the power interconnect board for correct configuration (Table 3–1).
3. If the problem still exists, check fuse F1 on the power interconnect board (Figure 3–7).
4. If the fuse is good, check hammer interconnect cables from the hammer driver boards to the hammers, and from the power interconnect board to the motherboard.
5. If the interconnect cables are good, measure the +48 volts from TP-C to ground on the motherboard.
6. If the test point does not measure +48 volts, replace the power interconnect board.
7. If the test point does measure +48 volts, replace the motor control board.

3.2.2.16 I/O DIAGNOSTIC FAULT

The Interface Diagnostic Fault message indicates that the interface is not communicating properly. To determine the cause of the fault, a quick check can be made by stepping through the second level diagnostics as explained in Section 3.2.1. When using the second level diagnostics, follow the instructions at each step before going on to the next step. Details of this procedure for troubleshooting an interface diagnostic fault are as follows:

1. Power OFF the printer then back ON, and allow the diagnostic check to complete.
2. If the problem still exists, power OFF the printer and ensure that the interface board and processor board are seated.
3. Power ON the printer and allow the diagnostic check to complete.
4. If the problem still exists, power OFF the printer and verify that the PROMs are correctly oriented in the sockets on the processor board and the interface board.
5. Power ON the printer and allow the diagnostic check to complete.
6. If the problem still exists, power OFF the printer and replace the interface board or PROM in socket U5, or the processor board or PROM in socket U8.

Table 3–2 Processor Board Switch Settings

Switch Position	Default Setting	Definition
SW1	OFF	VFU Ready
SW2	OFF	Paper Motion
SW3	ON	VFU Ready
SW4	ON	Paper Motion
SW5	ON (Disabled)	Paper Empty
SW6	OFF (Enabled)	Stacker Fault
SW7	ON (Disabled)	Parity Error

3.2.2.17 MC PROC FAULT

The Motor Control Processor Fault message indicates that there is a problem with the firmware for the motor control board. To troubleshoot this fault:

1. Power OFF the printer then back ON, and allow the diagnostic check to complete.
2. If the problem still exists, power OFF the printer and replace the motor control board.
3. Power ON the printer and allow the diagnostic check to complete.
4. If the problem still exists, replace the firmware PROM in socket U25 on the motor control board.

3.2.2.18 OPEN HAMMER

The OPEN HAMMER fault message indicates that a hammer is open or will not fire. To troubleshoot this condition:

1. Power OFF the printer then back ON, and allow the diagnostic check to complete.
2. If the condition still exists, press Alarm Clear and run the Auto Flight Time test. Note which hammer is not firing.

3. Power OFF the printer and swap the odd bank hammer driver board with the even bank hammer driver board.
4. Power ON the printer and run the Auto Flight Time test.
5. If the open hammer moves to another column, the hammer driver is defective. Power OFF the printer and replace the hammer driver board.
6. If the open hammer stays in the same column, power OFF the printer and replace the defective hammer module (Section 5.25).

3.2.2.19 PAPER FEED MOTOR

The PAPER FEED MOTOR message indicates that there is an overcurrent condition in the paper feed motor circuits. To troubleshoot this condition:

1. Ensure that the paper tension between tractors is adjusted properly.
2. Ensure that the belt tension is adjusted properly (Section 5.21).
3. Ensure that the tension pulleys rotate freely and that the belt is seated on the pulleys properly (Section 5.21).
4. Ensure that all tractor assembly pins rotate freely (Section 5.22).
5. Power OFF the printer and turn the vertical adjust knob. Replace the step motor assembly if friction is excessive (Section 5.21).
6. Power ON the printer. If the paper moved, power OFF the printer and reseat/replace the motor control board.
7. If the paper did not move but the condition still exists, power OFF the printer and reseat/replace the processor board.
8. Power ON the printer and allow the diagnostic check to complete.
9. If the condition still exists, power OFF the printer and check the step motor cable plug P6/J6 and/or replace the motor control board.
10. Power ON the printer and allow the diagnostic check to complete. If the condition still exists, power OFF the printer and replace the paper step motor assembly (Section 5.21).

3.2.2.20 PF MOTOR STALL

The Paper Feed Motor Stall message indicates a loss of paper motor phase. To troubleshoot this condition, a quick check can be made by stepping through the second level diagnostics as explained in Section 3.2.1. When using the second level diagnostics, follow the instructions at each step before going on to the next step. Details of this procedure for troubleshooting a paper feed motor stall condition are as follows:

1. Ensure that there is no paper obstruction.
2. Ensure that the paper belt is engaged with the pulleys and forms adjustment knob.
3. Ensure that the paper belt pulleys rotate freely and that the belt is seated on the pulleys correctly.
4. Check each tractor assembly for proper operation.
5. Check the 3.3 ohm ballast resistor mounted underneath the hammerbank blower cage on the right side of the printer.
6. Check paper motion. If stalled, power OFF the printer and check the paper feed motor plug P6/J6 on the motor control board (Figure 3–2).

7. Power ON the printer and allow the diagnostic check to complete.
8. If the problem still exists, power OFF the printer and replace the motor control board.
9. Power ON the printer and allow the diagnostic check to complete.
10. If the problem still exists, power OFF the printer and replace the processor board.
11. Power ON the printer and allow the diagnostic check to complete.
12. If the problem still exists, power OFF the printer and check the resistance of the paper step motor (Section 3.4.2.2).
13. If the motor resistance is not correct, power OFF the printer and replace the paper step motor assembly (Section 5.21).

3.2.2.21 ADD PAPER

The ADD PAPER message indicates that paper is not loaded, the paper supply is exhausted, or there is a malfunction in the paper sensing circuitry. To troubleshoot this condition:

1. Ensure that paper is loaded and the supply is not exhausted.
2. Verify that DIP switch S1-5 on the processor board is in the OFF position.
3. Check the paper out sensor located below the lower left tractor assembly for loose connections.
4. Power OFF the printer and check sensor plug J1B/P1 (Figure 3–2).
5. Clean the paper out sensor switch.
6. If the problem still exists, power OFF the printer and replace the paper out sensor switch (Section 5.20).
7. Power ON the printer and allow the diagnostic check to complete.
8. If the problem still exists, power OFF the printer and replace the processor board.

3.2.2.22 PRINT PROC FAULT

The Print Processor Fault message indicates that there is a firmware problem on the processor board. To troubleshoot this fault:

1. Power OFF the printer, then back ON, and allow the diagnostic check to complete.
2. If the problem still exists, power OFF the printer and replace the processor board and/or PROMs in sockets U32, U33, U45, U46, U47, U48, U59, and U60.

3.2.2.23 RIBBON EXHAUSTED

The RIBBON EXHAUSTED message indicates that either the print line counter has reached its preset threshold value set on the meter unit, or there is a problem with the meter unit or the processor board. To troubleshoot this condition:

1. Press the RESET key on the meter package to reset the meter package.
2. Press Alarm Clear on the control panel to reset the printer.
3. If the condition still exists, power OFF the printer and check P2/J2 on the motor control board.
4. If P2/J2 is OK, replace the motor control board.
5. Power ON the printer and allow the diagnostic check to complete.

6. If the problem still exists, power OFF the printer and replace the meter package (Section 5.34).

3.2.2.24 STACKER FAULT

The STACKER FAULT message indicates that there is a paper jam or misstack condition in the paper stacker in the rear of the cabinet. To troubleshoot this error condition, a quick check can be made by stepping through the second level diagnostics as explained in Section 3.2.1. When using the second level diagnostics, follow the instructions at each step before going on to the next step. Details of this procedure for troubleshooting a stacker fault are as follows:

1. Ensure that the paper stack is not full or misstacked.
2. Ensure that the misstack switch cable plug is connected to P4/J4 on the processor board.
3. Check the misstack switch actuator to ensure that the switch actuator is not stuck, and that it functions properly.
4. Verify that the puller assembly on the stacker is functioning correctly by pressing the Up/Down switch, and by actuating the stack sensing switch.
5. Power ON the printer and allow the diagnostic check to complete.
6. If the problem still exists, power OFF the printer and reseat/replace the processor board.

3.2.2.25 SYSTEM FAULT

The SYSTEM FAULT message indicates that an unidentified hardware fault has been detected. To troubleshoot this fault:

1. Power OFF the printer, then back ON.
2. If the fault is still present, power OFF the printer and reseat/replace the processor board.
3. Power ON the printer and allow the diagnostic check to complete.
4. If the fault is still present, power OFF the printer and replace the motor control board.

3.2.2.26 TRANSDUCER FAULT

NOTE

A TRANSDUCER FAULT could be due to the early warning switch being open while the top cover interlock switch is closed.

The TRANSDUCER FAULT message indicates that the print band transducer is unable to read the band index. To troubleshoot this fault:

1. Verify that the band is installed correctly with the timing marks at the bottom of the band.
2. Ensure that the band release lever is in the "down" position.
3. If the band rotated, power OFF the printer and check the transducer gap adjustment.
4. If the band did not rotate, power OFF the printer and check the band motor cables.
5. If the band motor cables are OK, reseat/replace the motor control board.

3.2.2.27 VCL FAULT

The Voltage Clamp Fault message indicates that a fault was detected on the VCL voltage level. The VCL voltage controls the amount of current that flows through the print hammers. The VCL voltage is varied through the Copies control on the control panel. To troubleshoot this fault:

1. Power OFF the printer, then back ON.
2. If the fault remains, power OFF the printer and replace the motor control board.
3. Power ON the printer and allow the diagnostic check to complete.
4. If the fault remains, power OFF the printer and replace the control panel board.
5. Power ON the printer and allow the diagnostic check to complete.
6. If the fault remains, power OFF the printer and replace the hammer driver boards.

3.2.2.28 VFU NOT LOADED

The VFU NOT LOADED message indicates that a GO TO CHANNEL command was received with no data in the VFU memory. To troubleshoot this problem, use the second level diagnostics as explained in Section 3.2.1. Follow the instructions at each step before going on to the next step. Detailed procedures for troubleshooting a VFU not loaded condition are as follows:

1. Reload the VFU, and verify the load by running the diagnostic check.
2. If the condition still exists, power OFF the printer and reseat/replace the processor board.

3.2.2.29 12 VOLT FAULT

The 12 VOLT FAULT message indicates that there is a malfunction of the plus or minus 12 volt circuit. To troubleshoot this fault:

1. Power OFF the printer, then back ON.
2. If the fault remains, measure the voltage at TP-F on the motherboard for -26 volts.
3. If -26 V is not present, check fuses F3 and F4 on the power interconnect board.
4. If the fuses are good, replace the power interconnect board.
5. If TP-F measures -26 volts and the 12 volt fault still exists, replace the motor control board.
6. If the problem still exists, check TP-B on the motherboard for +5 volts. If TP-B measures fewer than 4.75 volts, replace the +5 volt regulator board.

NOTE

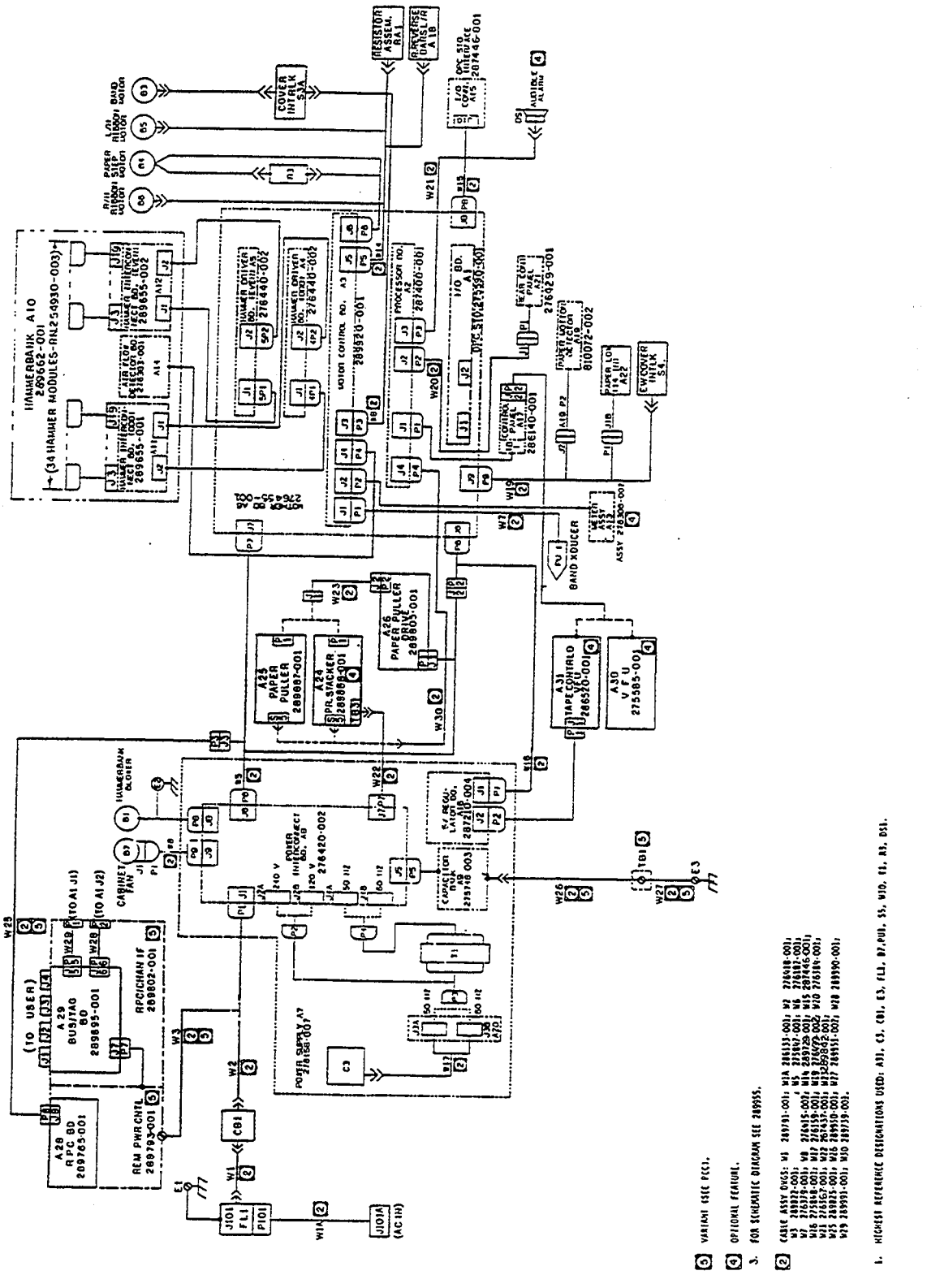
The new style printer does not have a separate +5 volt regulator board. If you have a new style printer, refer to Section B.7.8 for information on replacing the power supply board.

3.2.3 Printer Diagrams

This section contains the following diagrams:

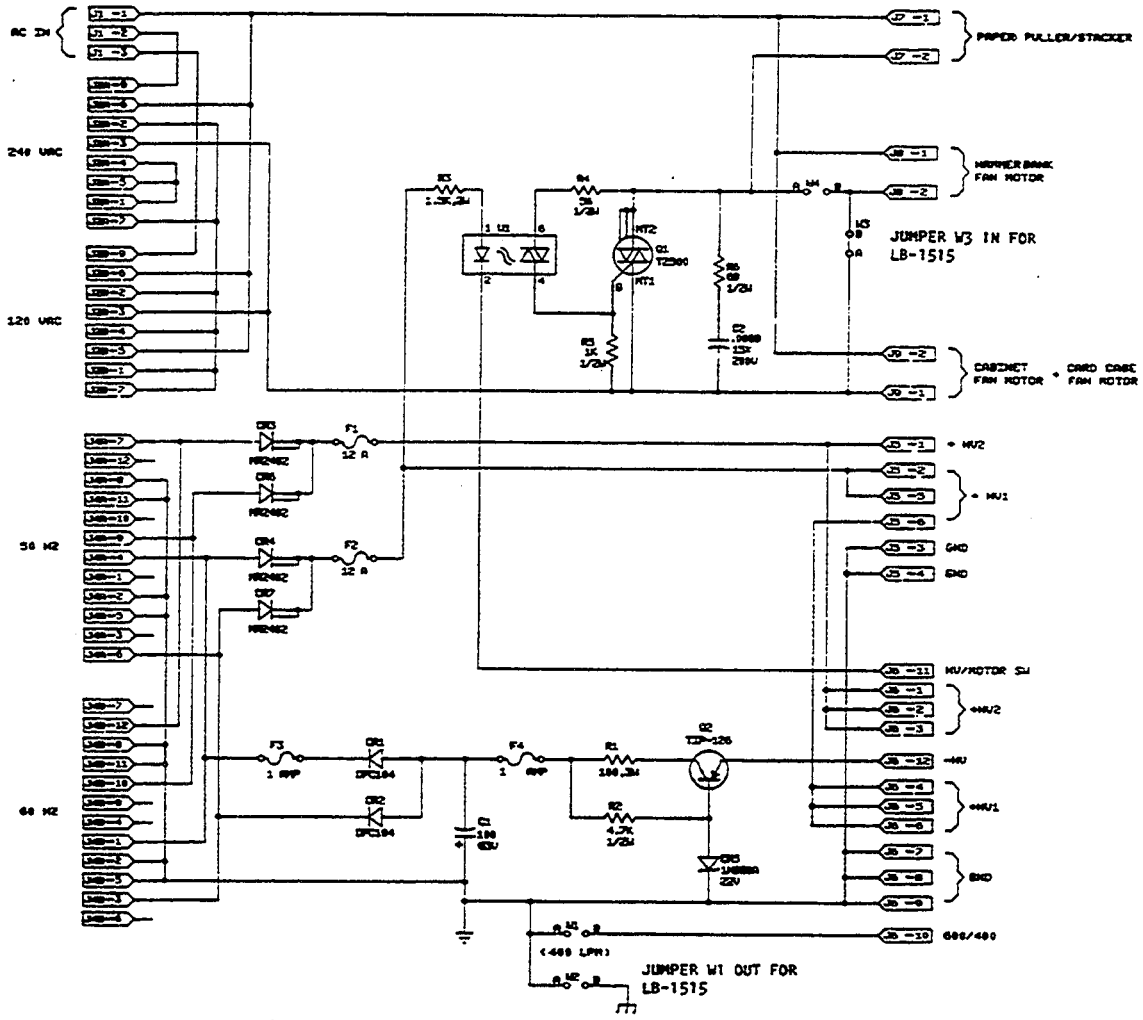
- System interconnect †
- System wiring †
- Printed circuit boards
- Power supply
- Block diagrams
- Hammer driver functional schematic

† These diagrams are different for the new style printer. See Section A.2.



MKV09-0429

Figure 3–2 System Interconnect Diagram (For the new style printer see Figure A–2)



MKV89-0431

Figure 3–3 System Wiring Diagram #1 (This diagram is the same for both style printers)

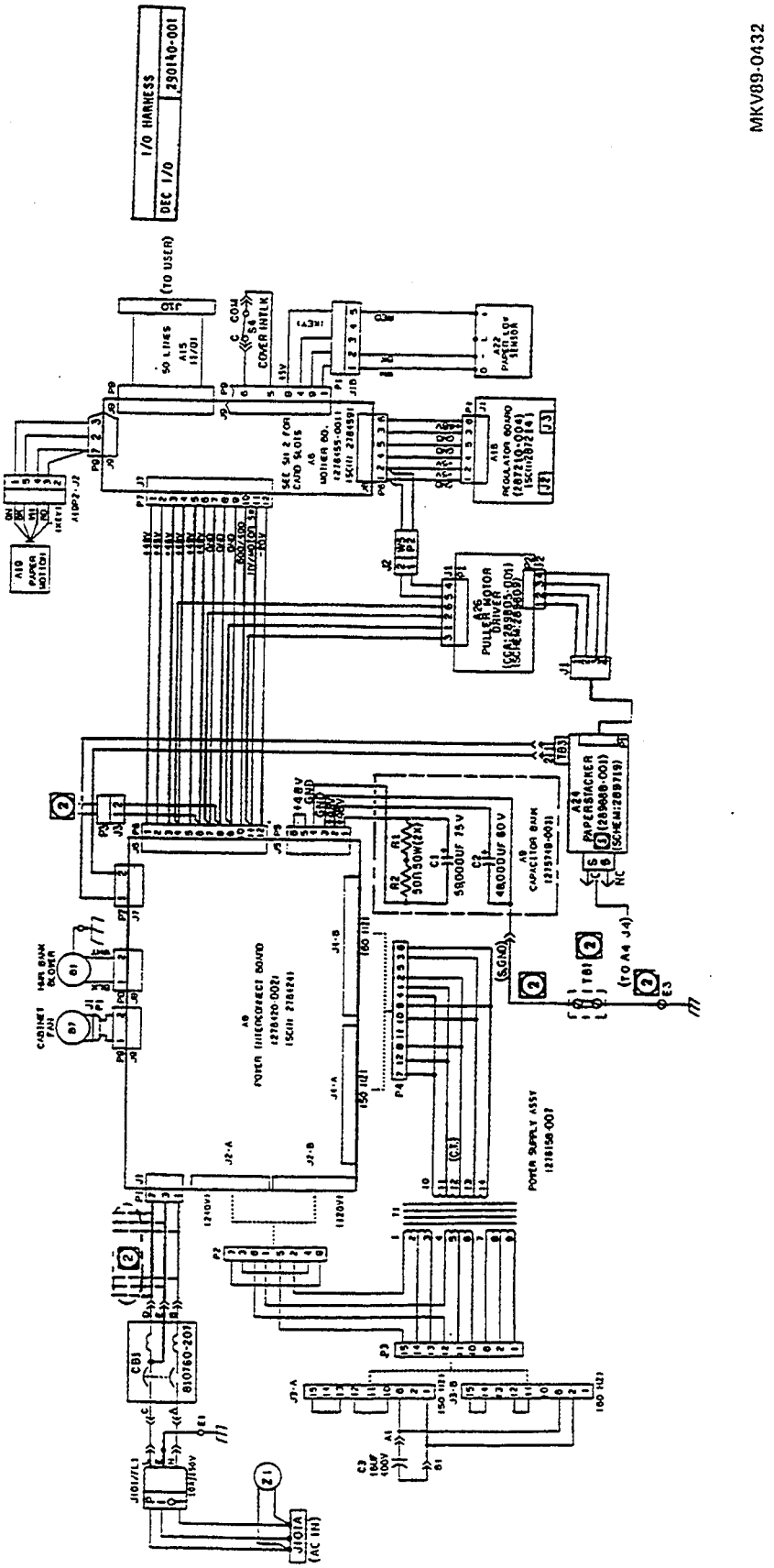
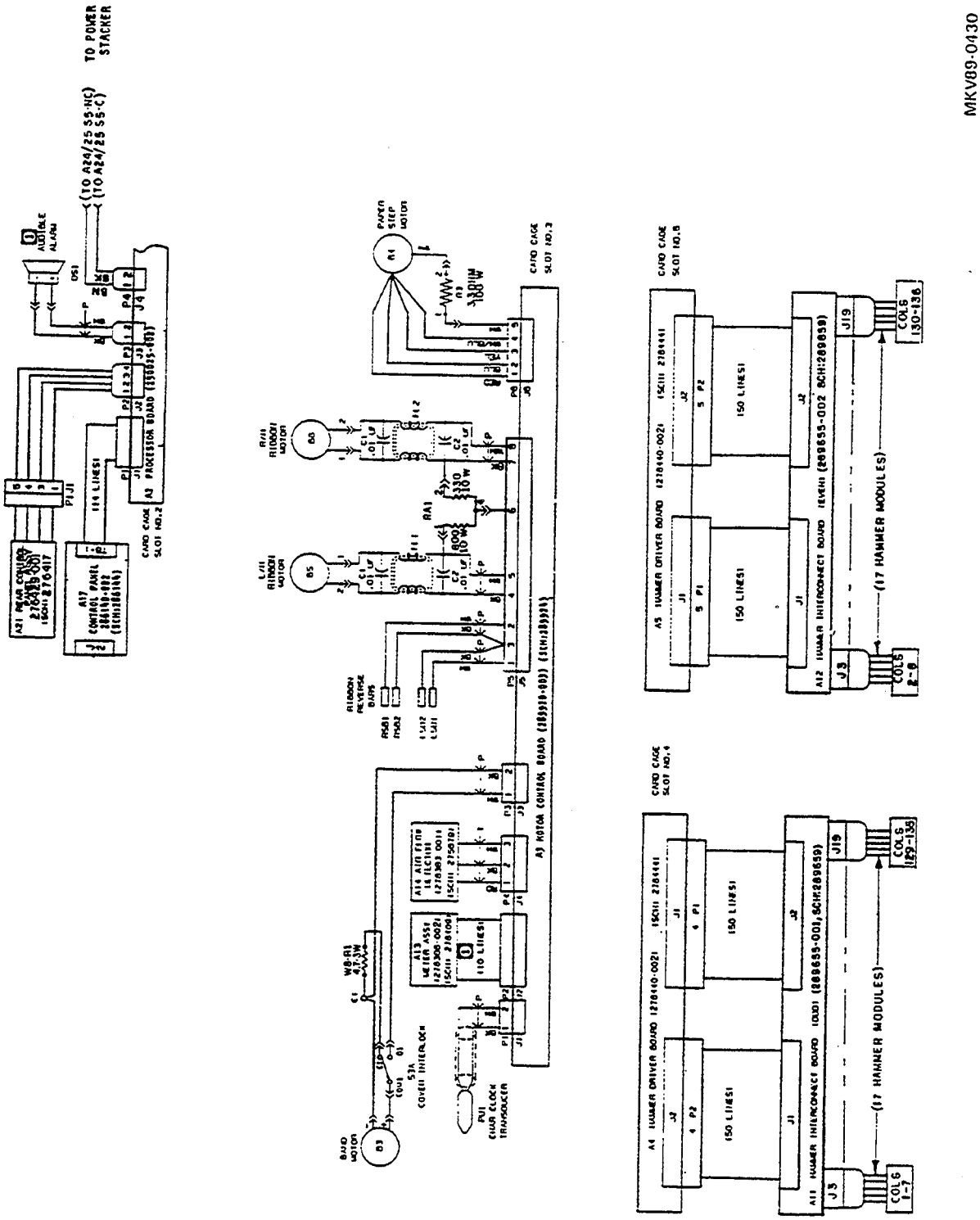


Figure 3–4 System Wiring Diagram #2 (For the new style printer see Figure A–3)



MKV89-0430

Figure 3–5 System Wiring Diagram #3 (For the new style printer see Figure A–4)

NOTE

There is no +5 volt regulator board for the new style printer.

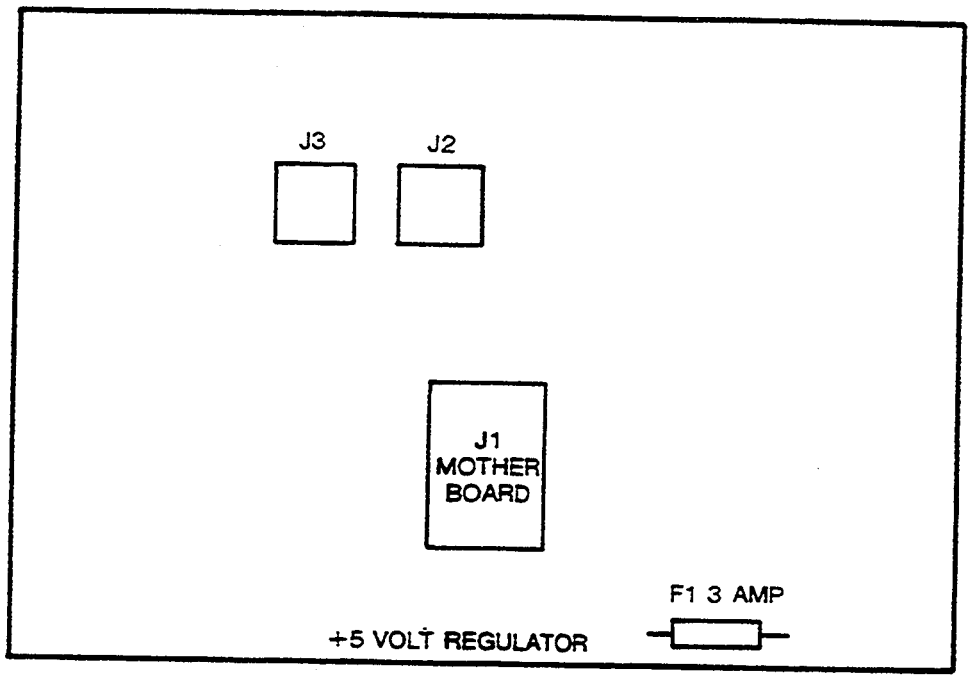


Figure 3–6 +5 V Regulator Board

NOTE

Power interconnections and fuse locations for the new style printer, are shown in Table A–1 and Figure A–5.

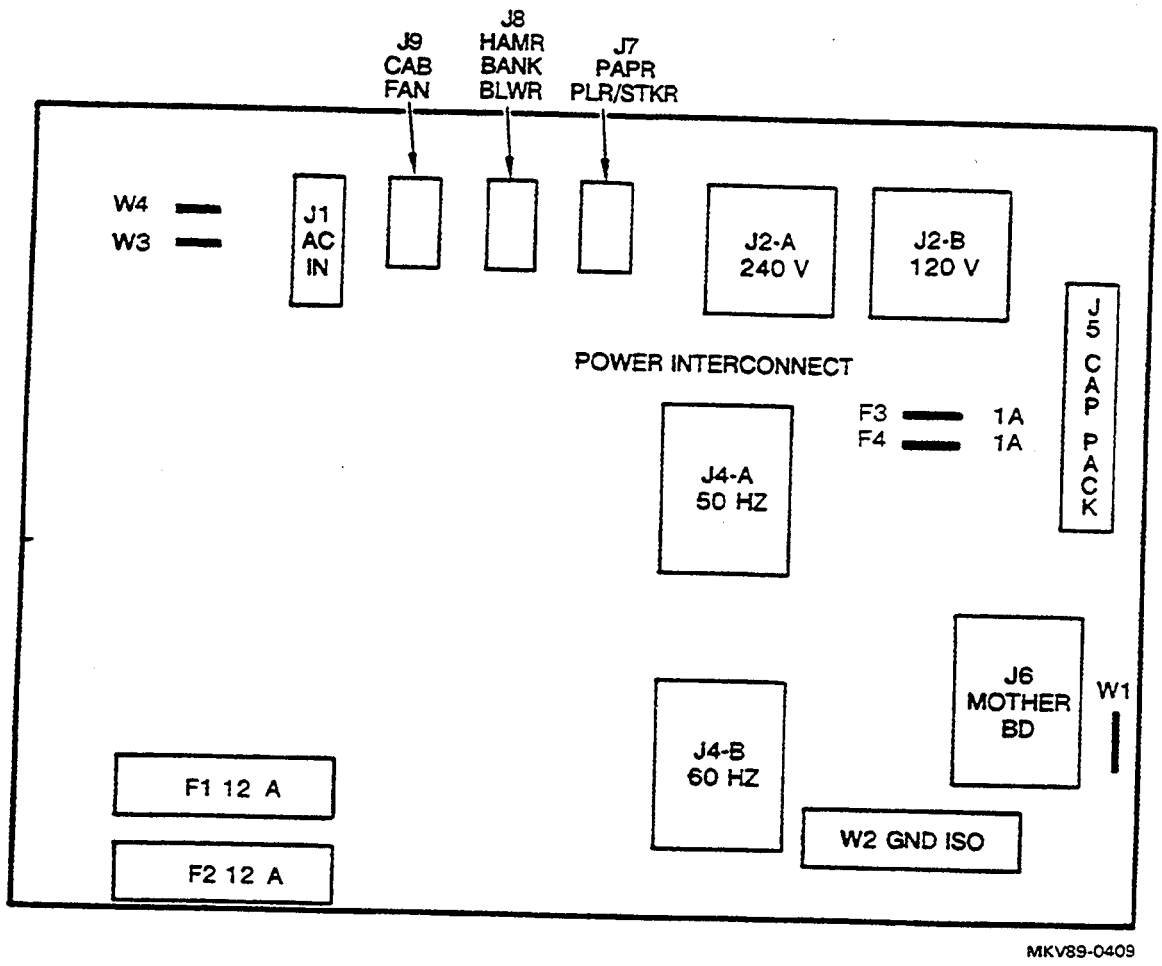


Figure 3–7 Power Interconnect Board (For the new style printer see Figure A–5)

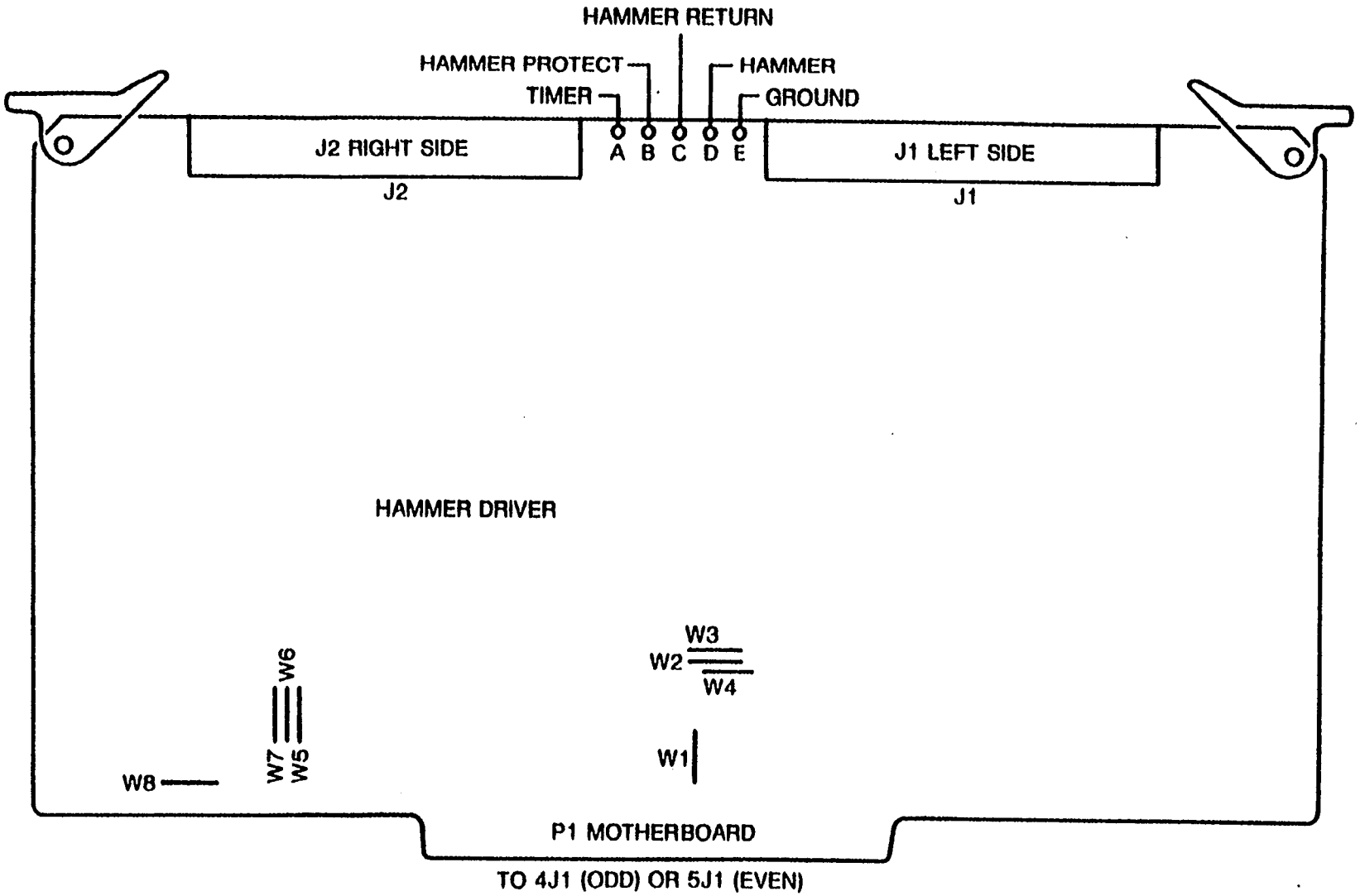


Figure 3–8 Hammer Driver Board

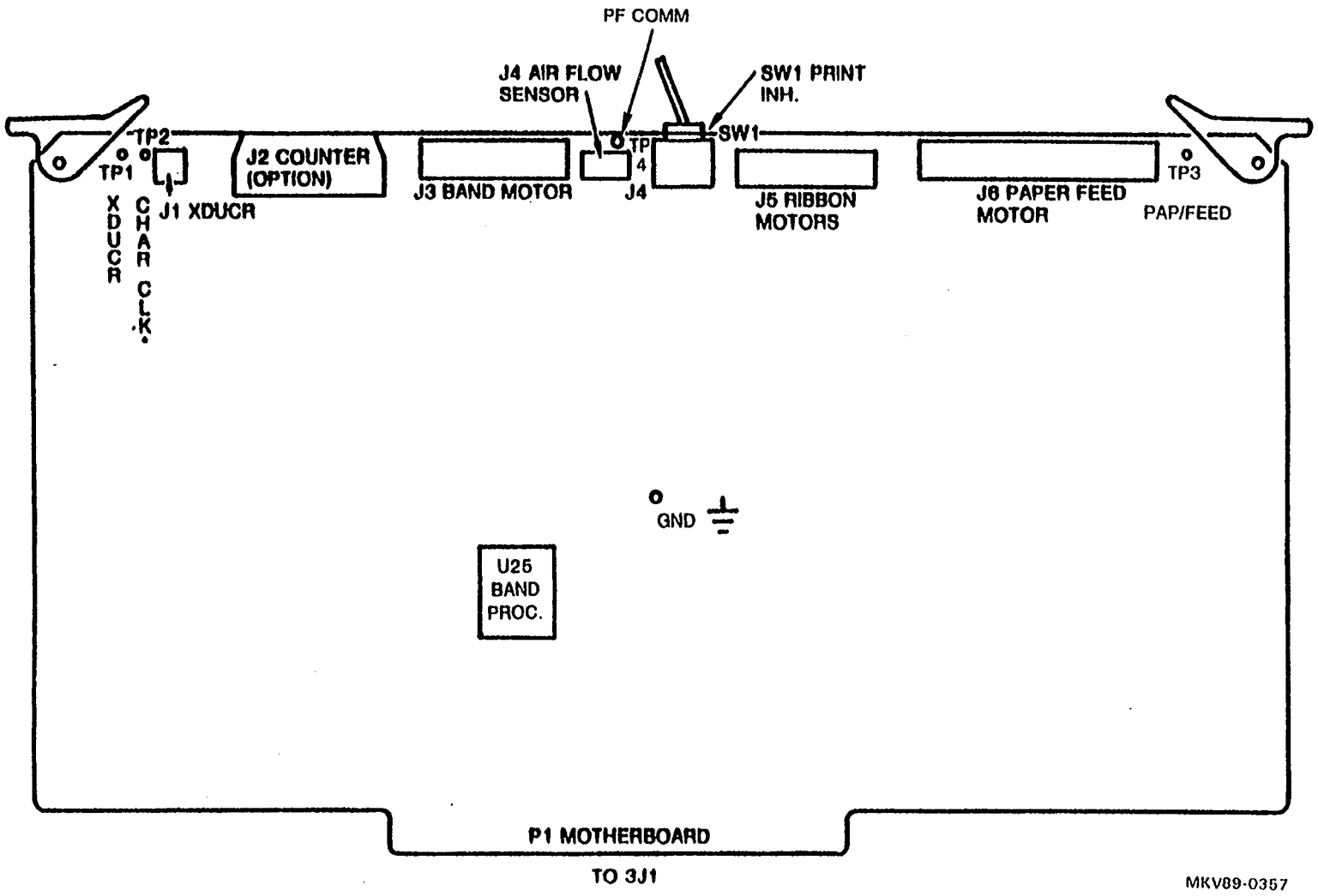


Figure 3–9 Motor Control Board

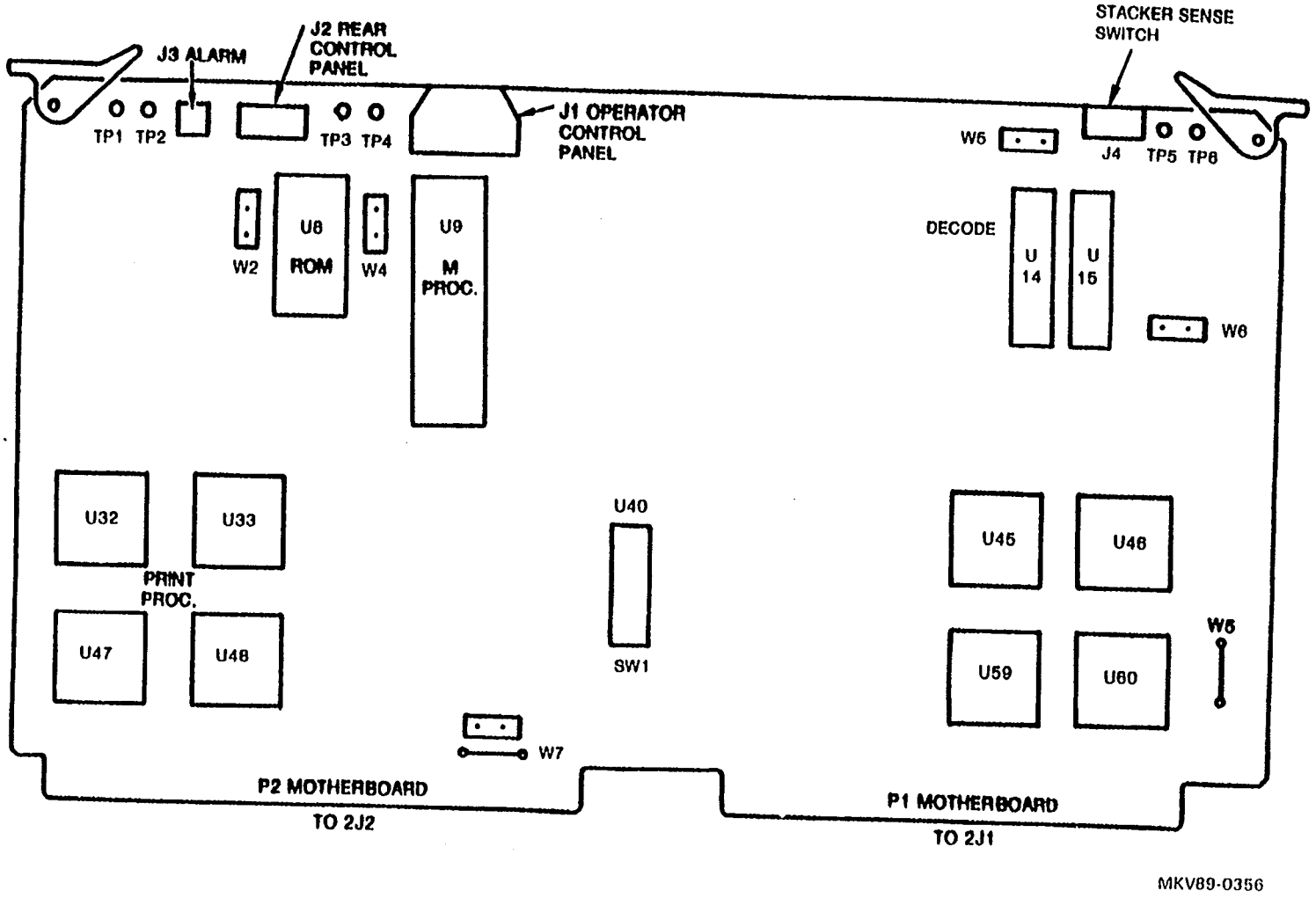


Figure 3–10 Processor Board Layout

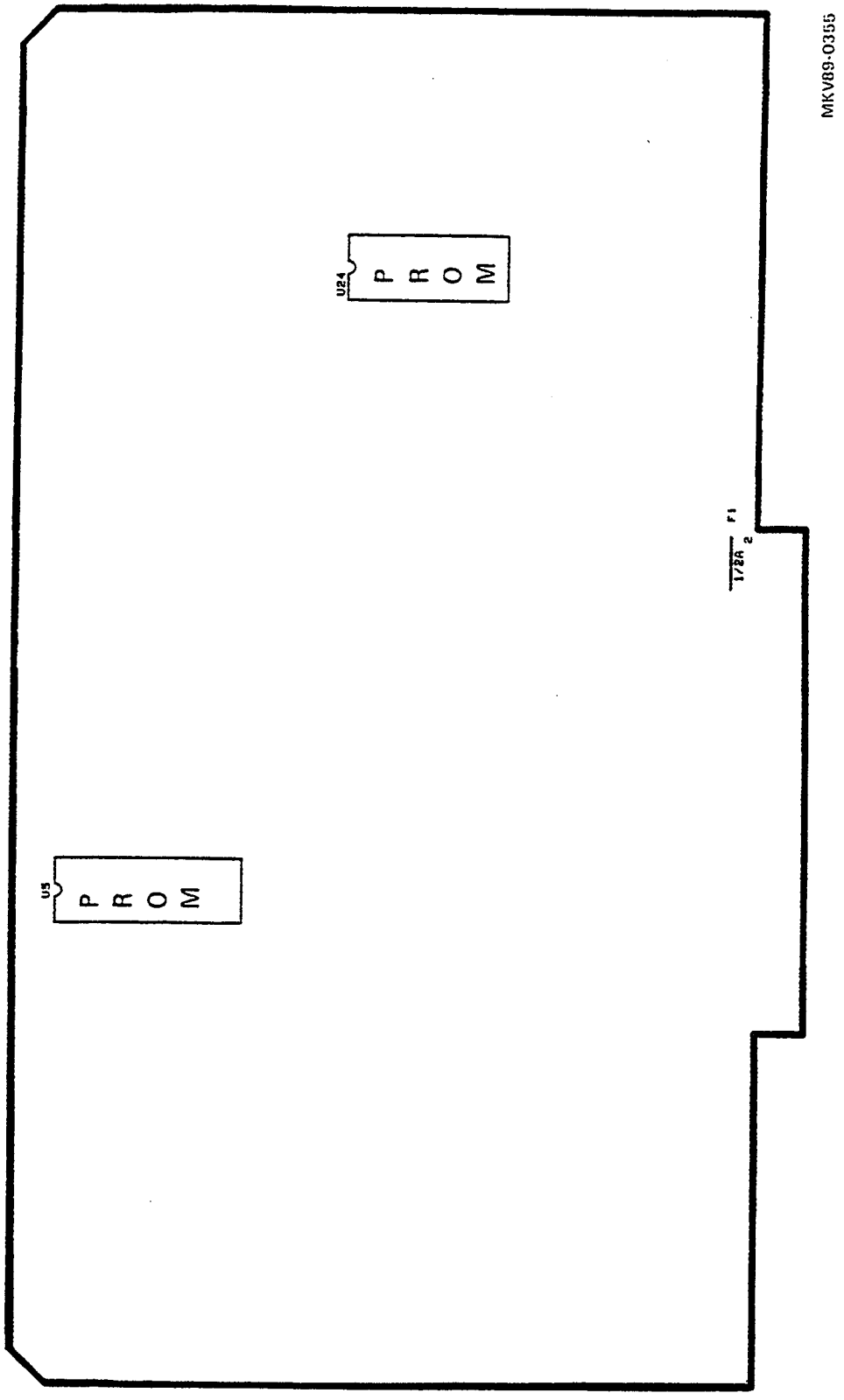


Figure 3–11 Interface Board Layout

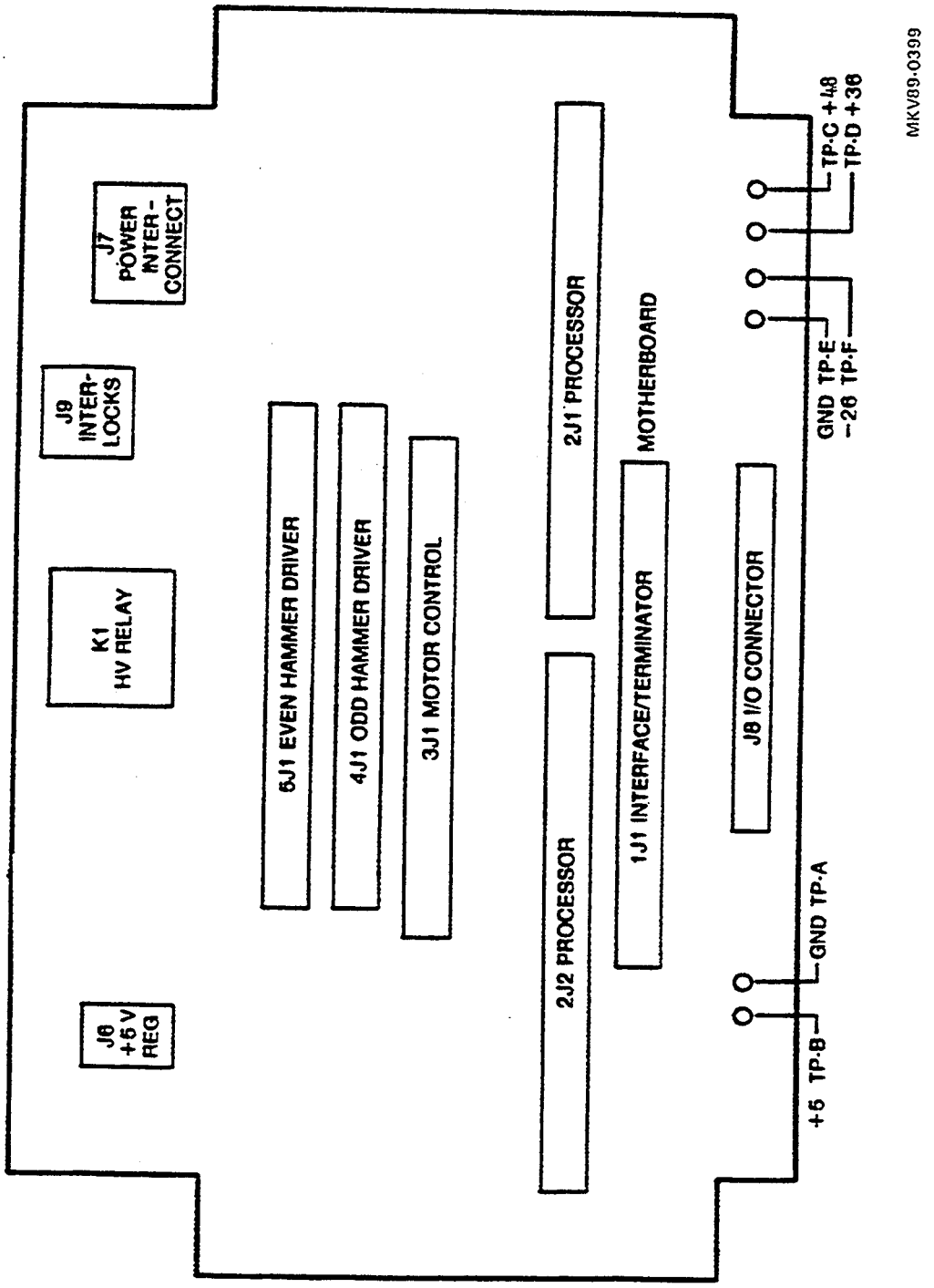


Figure 3–12 Motherboard Layout (There is no +5 V regulator board on the new style printer)

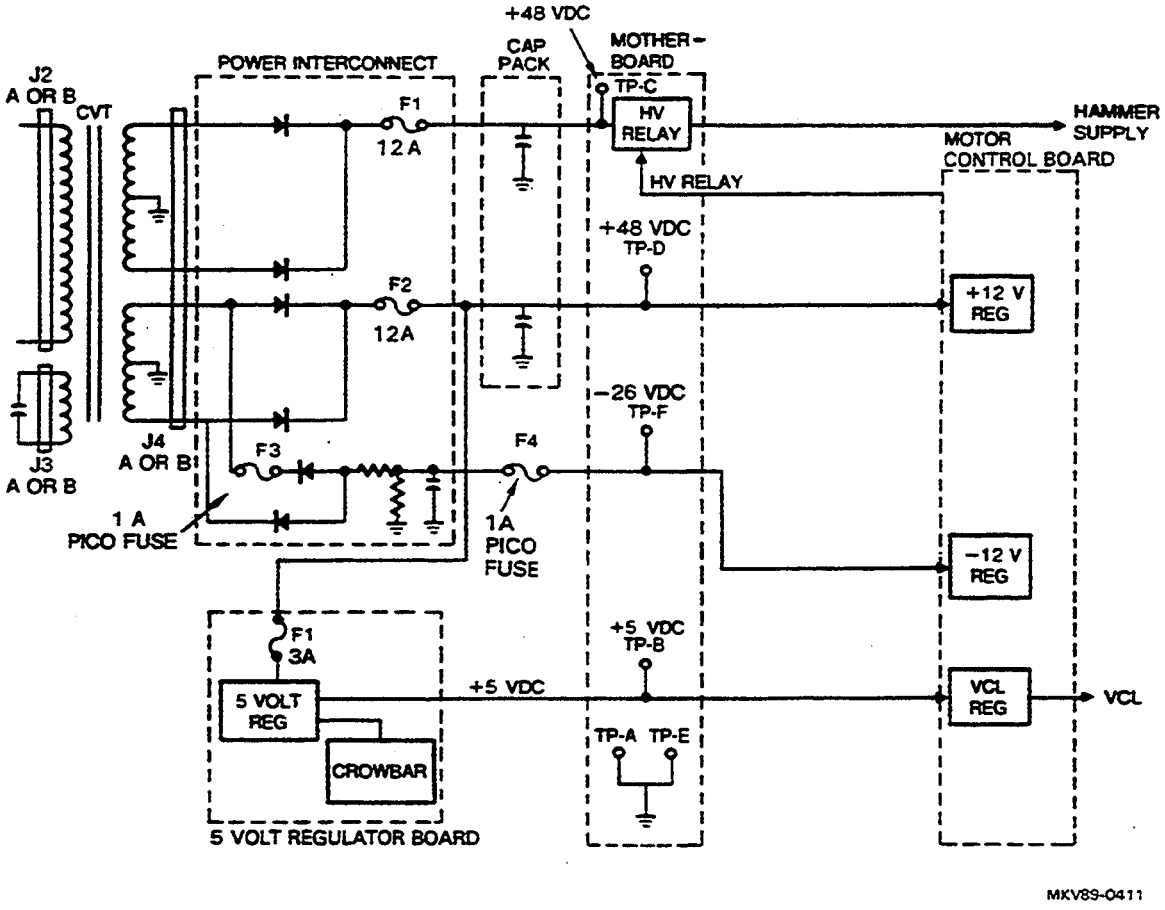


Figure 3–13 AC and DC Power Supply (There is no +5 V regulator board on the new style printer)

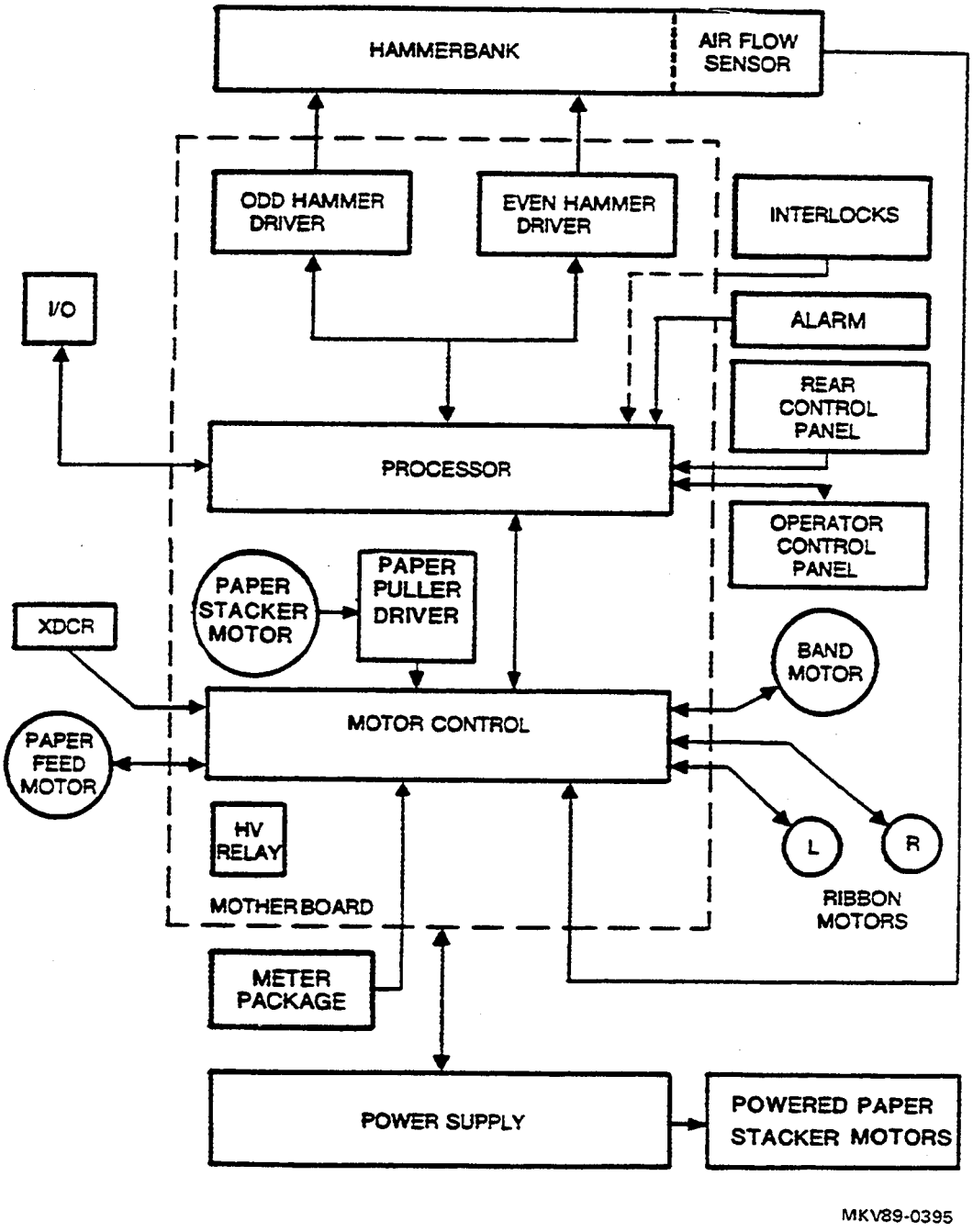
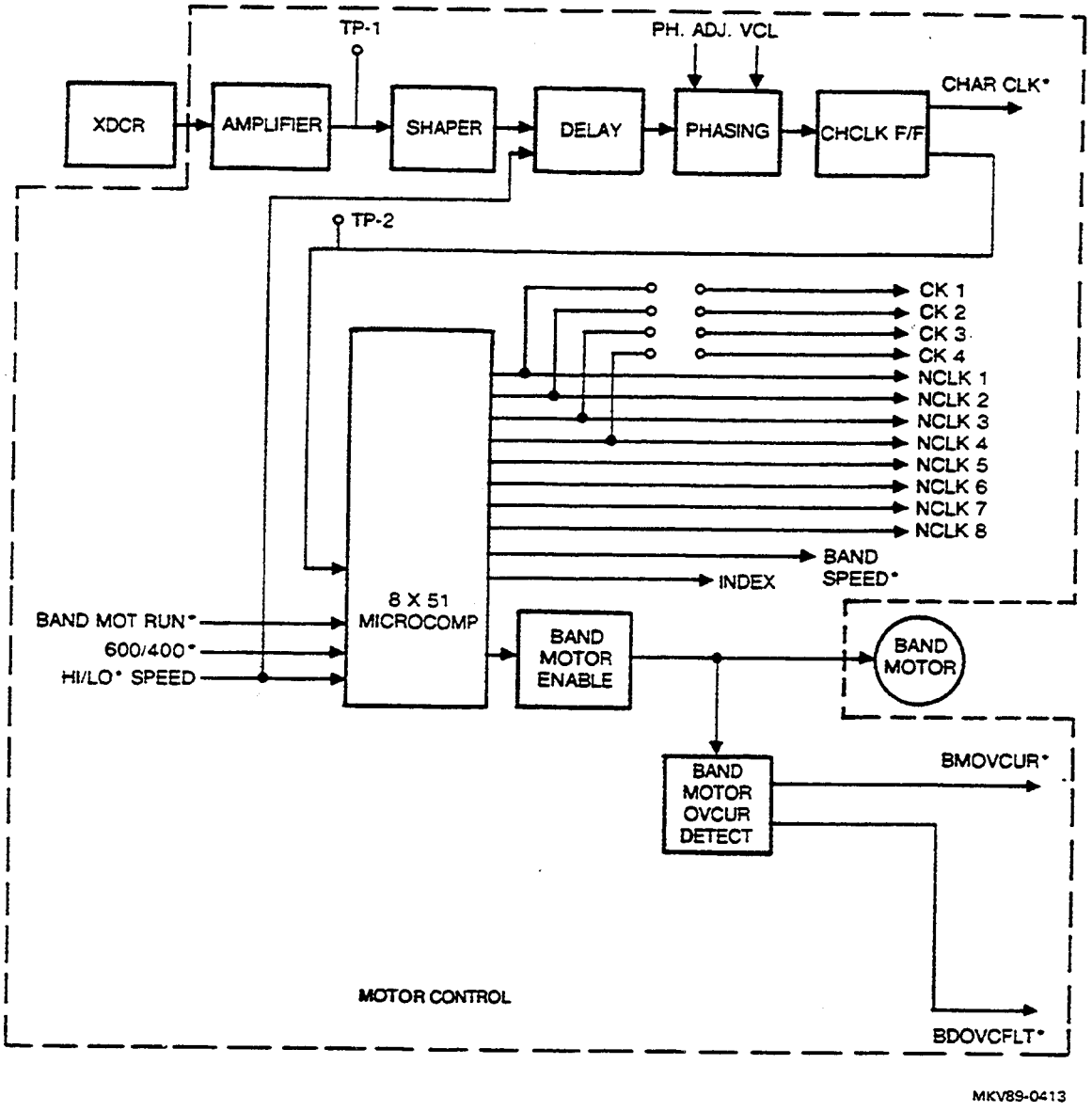
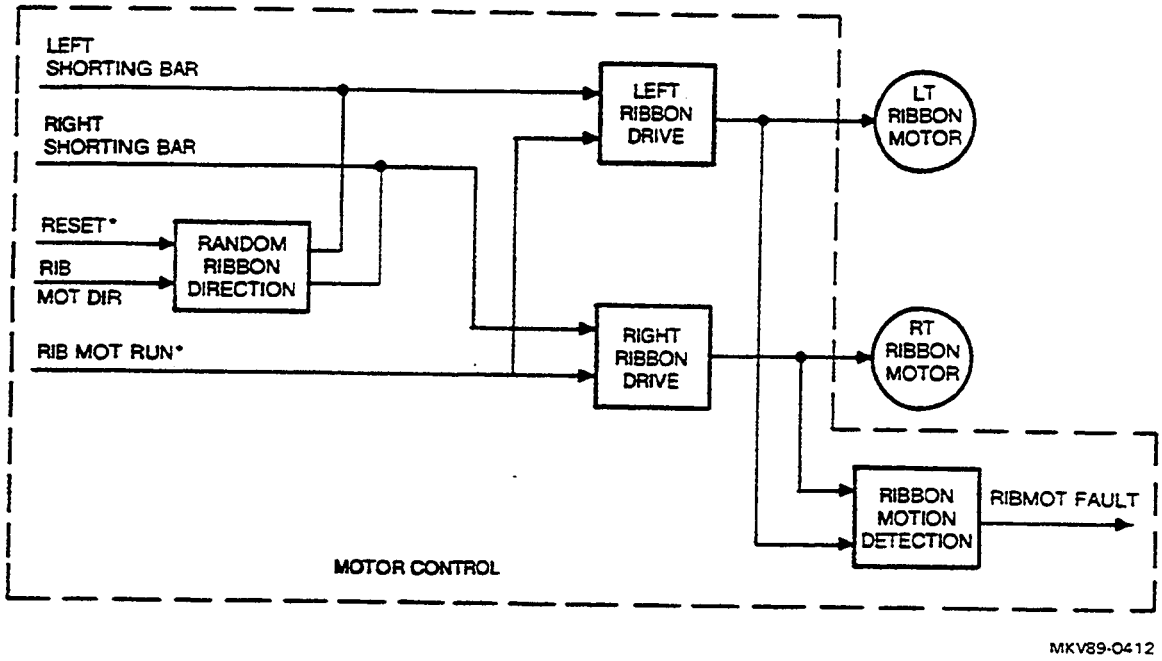


Figure 3–14 System Block Diagram



* = NOT FUNCTION

Figure 3–15 Band Drive Block Diagram



* = NOT FUNCTION

Figure 3–16 Ribbon Drive Block Diagram

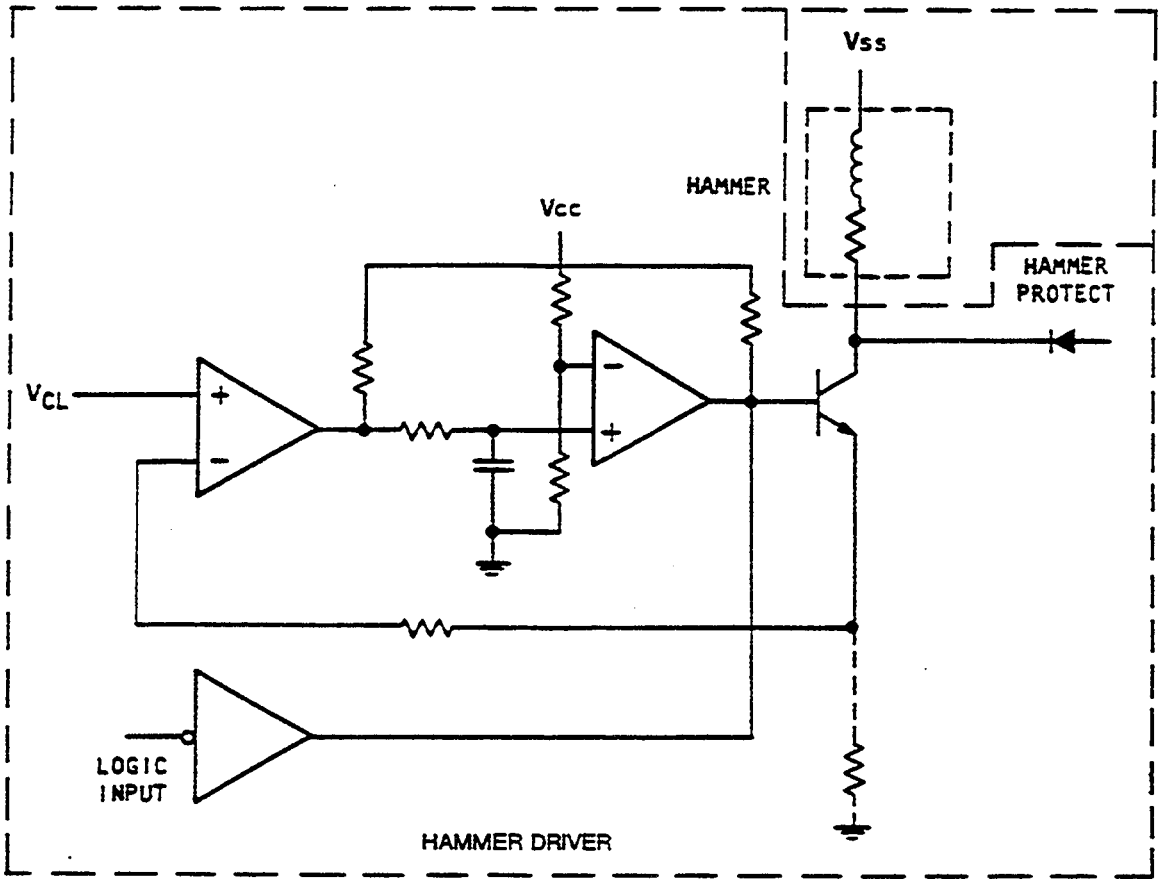
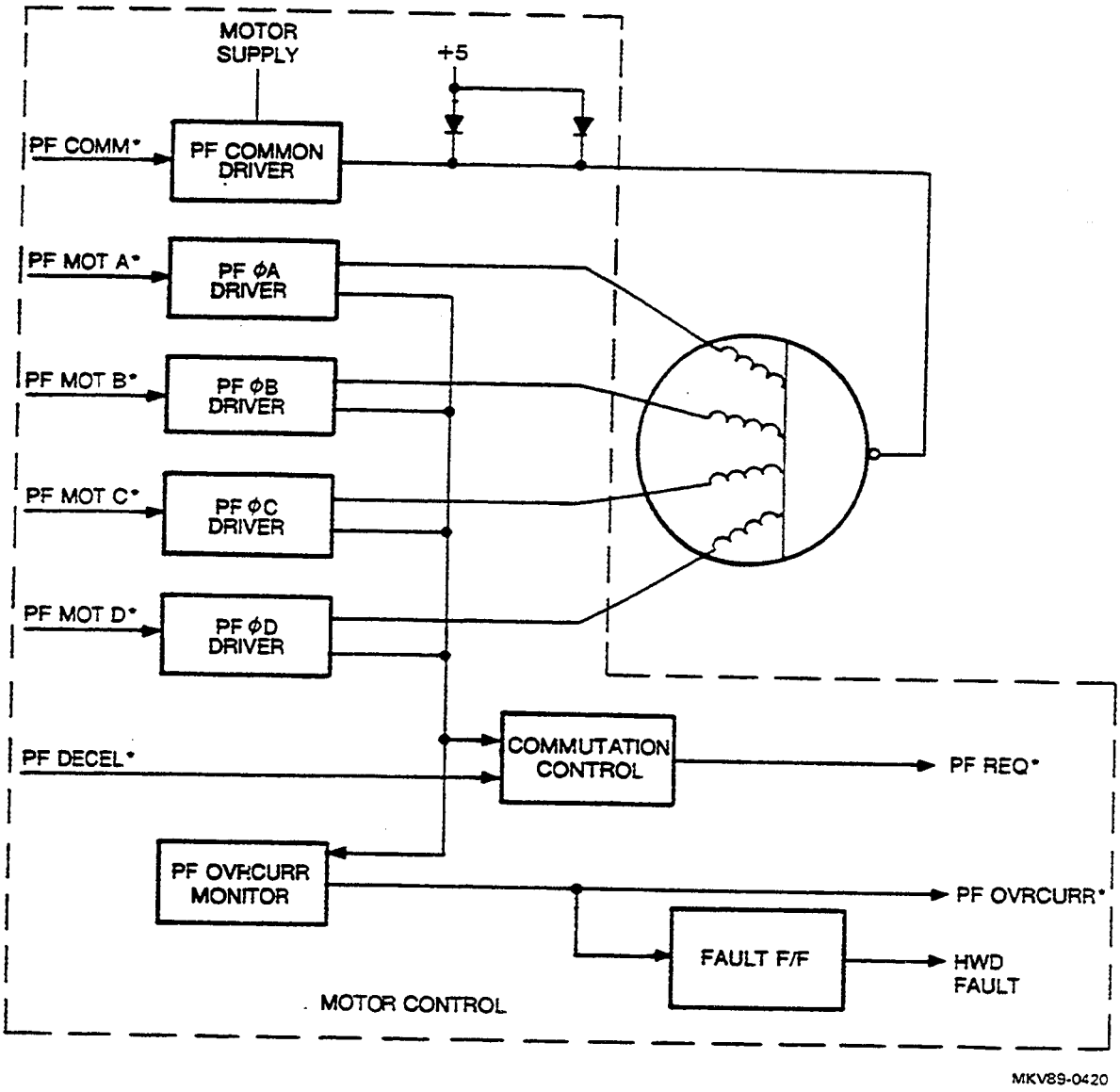


Figure 3–17 Quad Hammer Driver Functional Schematic



* = NOT FUNCTION

Figure 3–18 Paper Feed Hardware Block Diagram

3.3 INOPERATIVE PRINTER PROCEDURES

An inoperative printer is defined as either having no display on the control panel or the display is garbled. An inoperative printer may also mean that the paper puller, puller stacker, or meter package is inoperative. When any of these conditions exists, use the troubleshooting flowcharts (Figure 3–19 through Figure 3–22 or Figure A–6 through Figure A–9 for the new style printer.) to determine the cause of the problem. When resistance checks or voltage measurements are required, use the resistance check and voltage measurement procedures in Section 3.4 to ensure that measurements are made properly.

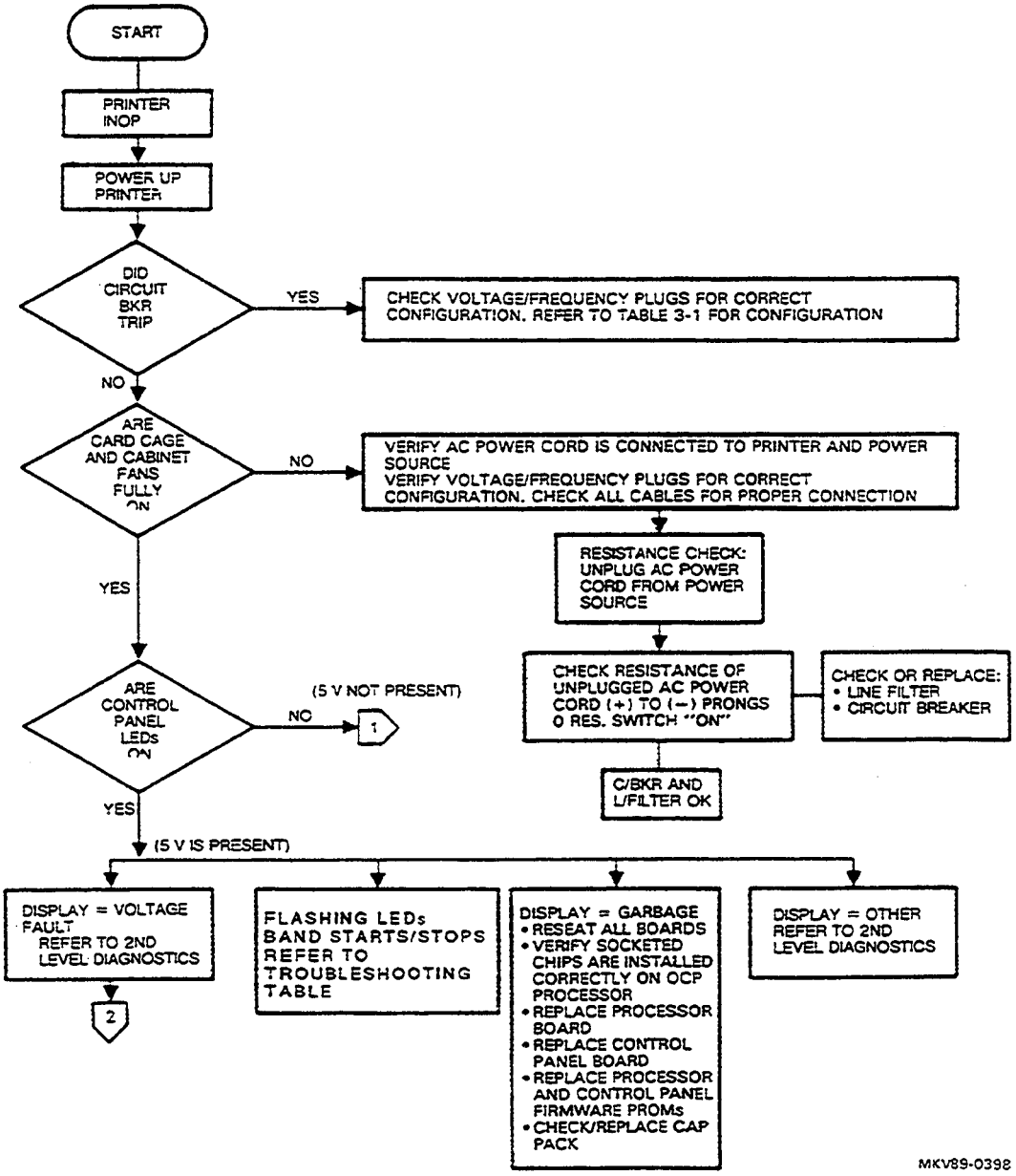


Figure 3–19 (Cont.) Inoperative Printer Troubleshooting Flowchart (For the new style printer see Figure A–6)

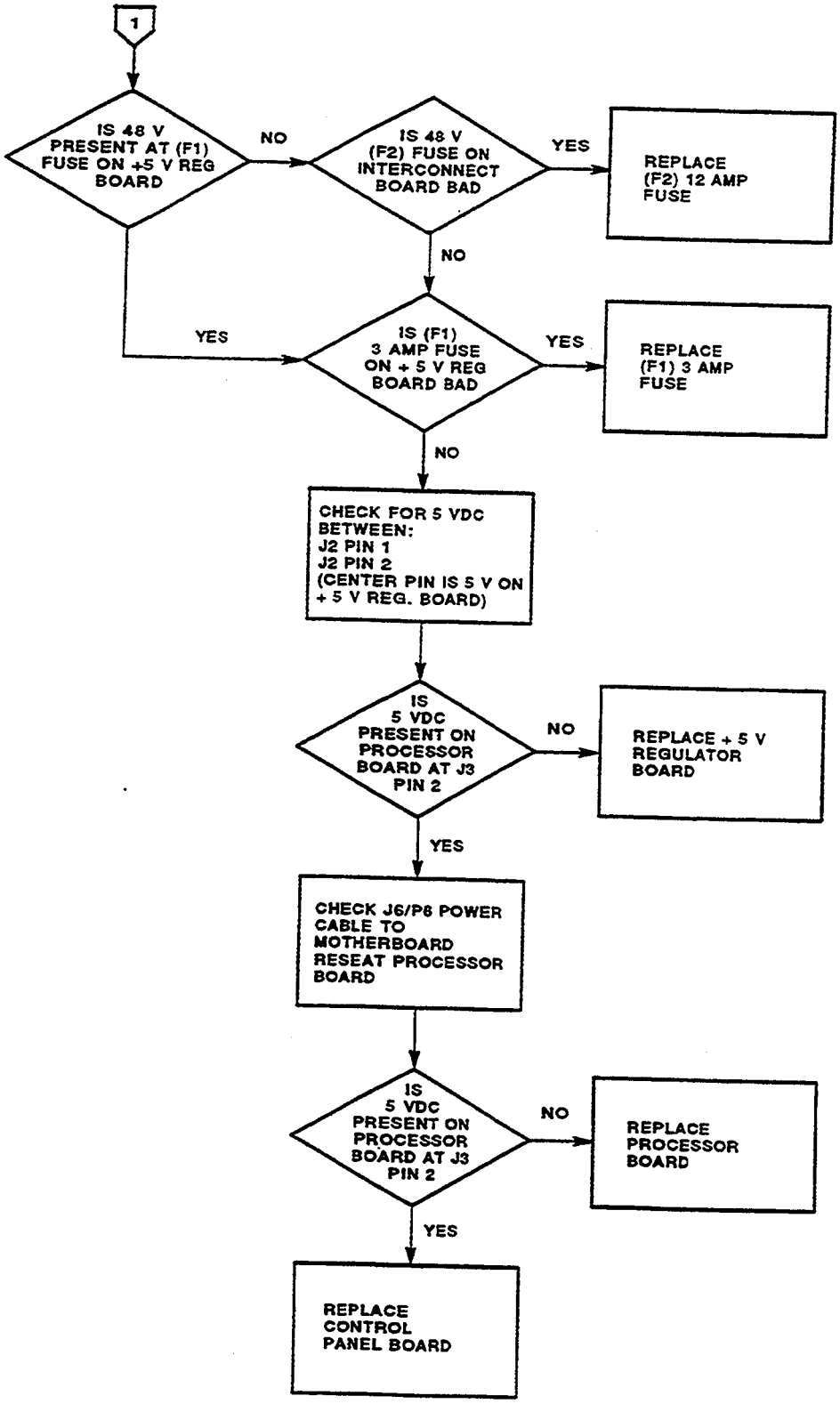


Figure 3–19 (Cont.) Inoperative Printer Troubleshooting Flowchart (For the new style printer see Figure A–6)

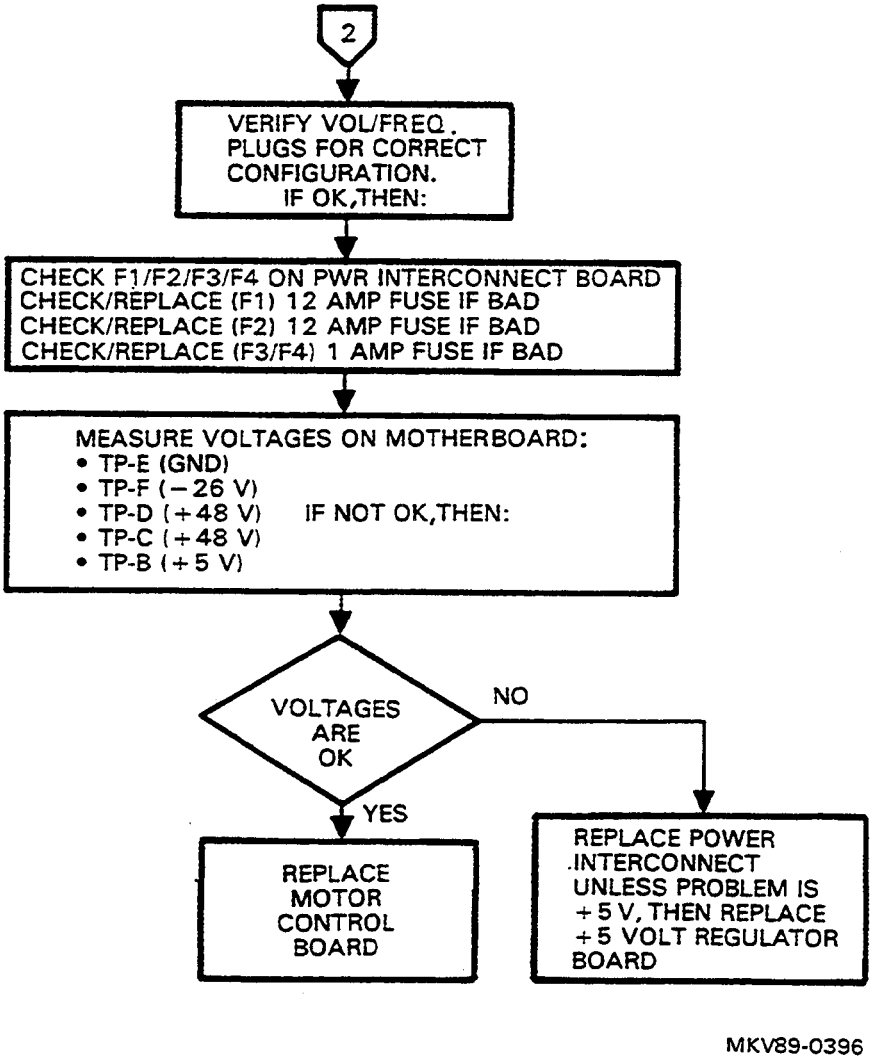


Figure 3–19 Inoperative Printer Troubleshooting Flowchart (For the new style printer see Figure A–6)

Table 3–3 Troubleshooting Chart

Symptom	Cause
Display shows 8 blocks. Power On and Alarm/Clear LEDs ON.	Pin 25 on control panel EPROM not connected
No display. Power On and Alarm/Clear LEDs ON.	Pin 23 on control panel EPROM not connected
Band starts and stops. Display shows 8 blocks. Power On and Alarm/Clear LEDs ON.	Any of the following pins on EPROM not connected: Pins 3 through 18, 20, 21, 24, 27, 28
Display = Diagnostic check. Ready and Alarm/Clear LEDs flashing. Band starts and stops.	Pin 2 on EPROM not connected

3.3.1 Inoperative Paper Puller

When the paper puller is inoperative, use the paper puller troubleshooting flowchart (Figure 3–20) to determine the cause of the problem.

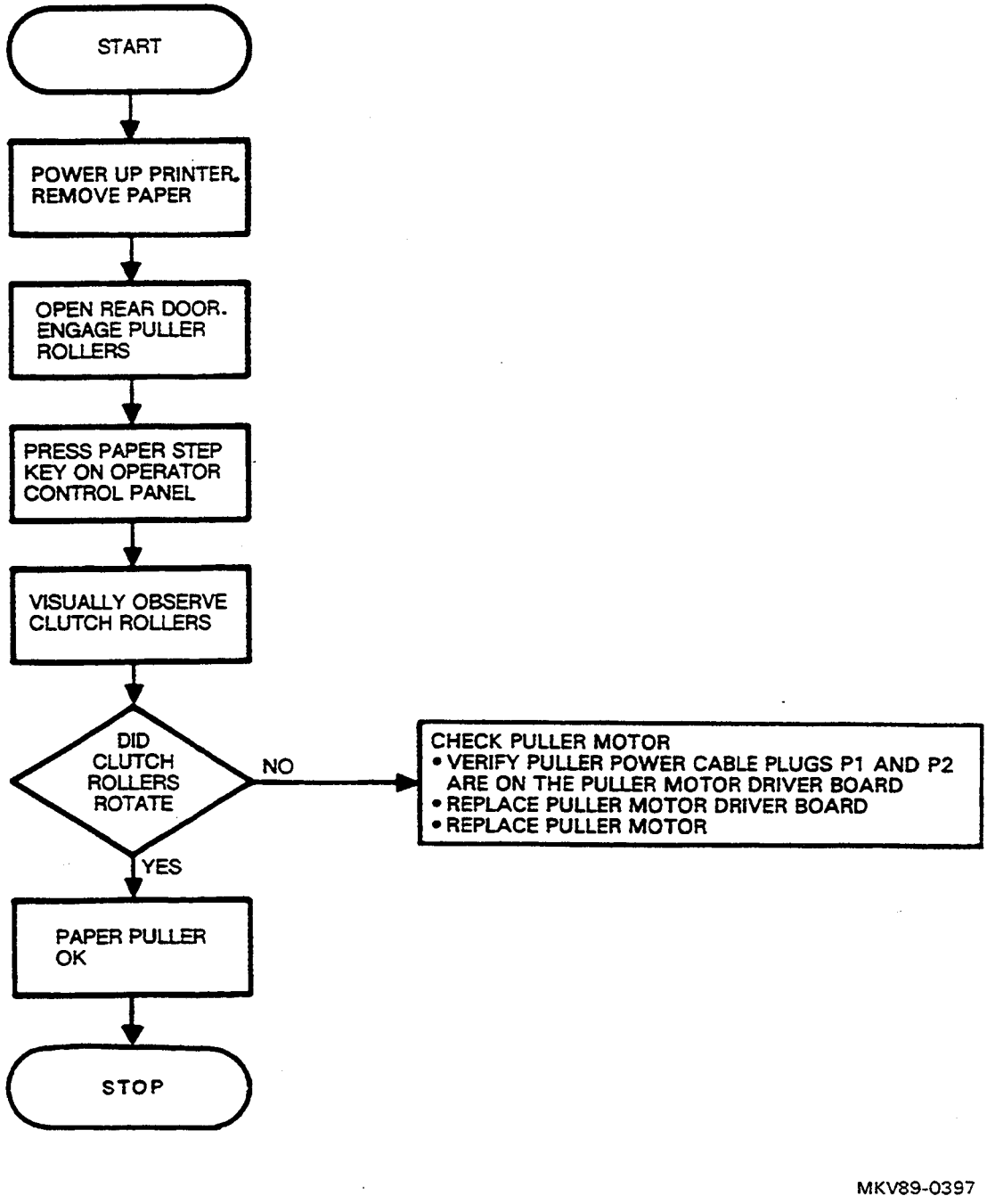


Figure 3–20 Inoperative Paper Puller Troubleshooting Flowchart (For the new style printer see Figure A–7)

3.3.2 Inoperative Puller Stacker

When the puller stacker is inoperative, use the puller stacker troubleshooting flowchart (Figure 3–21) to determine the cause of the problem.

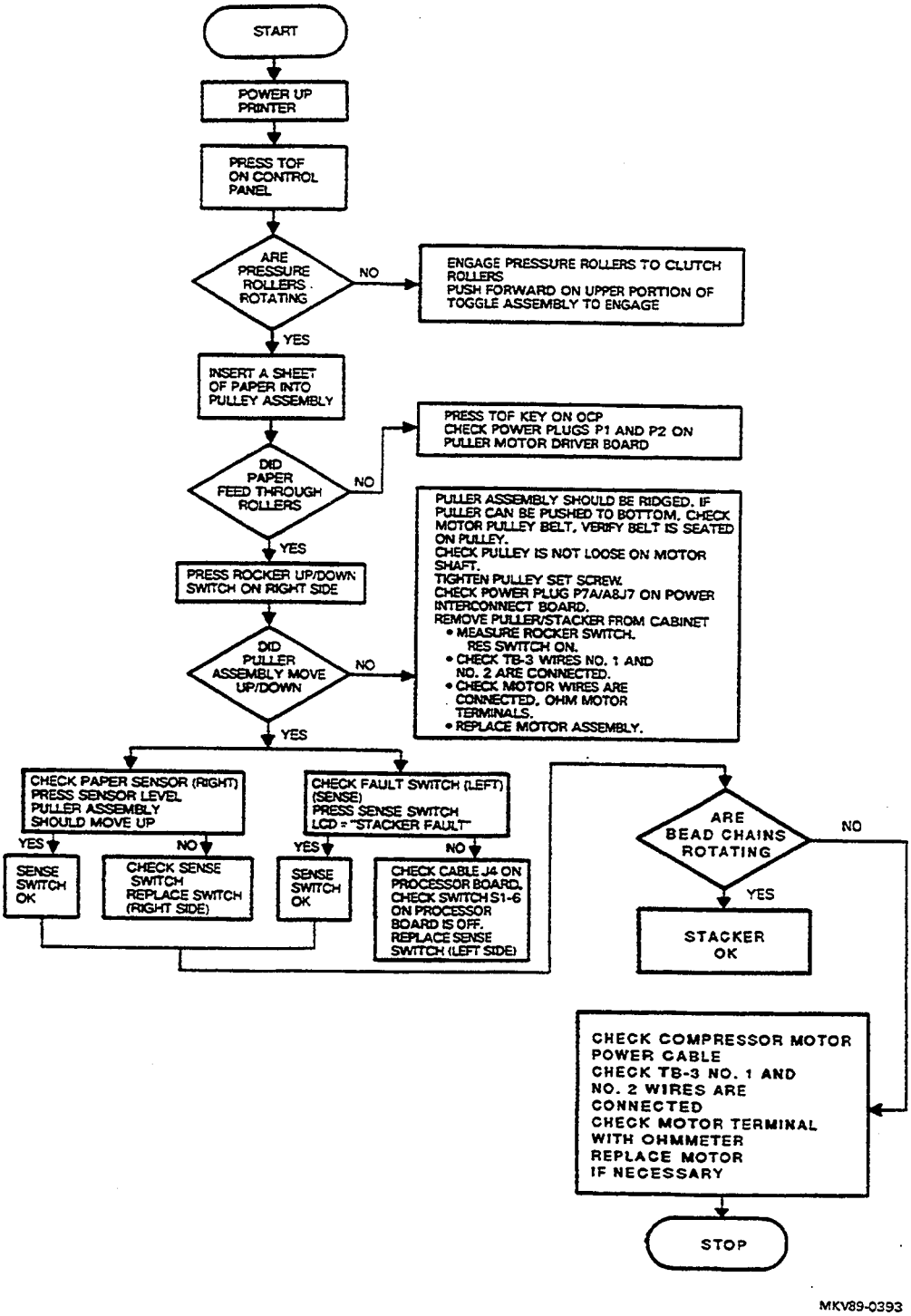


Figure 3–21 Inoperative Puller Stacker Troubleshooting Flowchart (For the new style printer see Figure A–8)

3.3.3 Inoperative Meter Package

When the meter package is inoperative, use the meter package troubleshooting flowchart (Figure 3–22) to determine the cause of the problem.

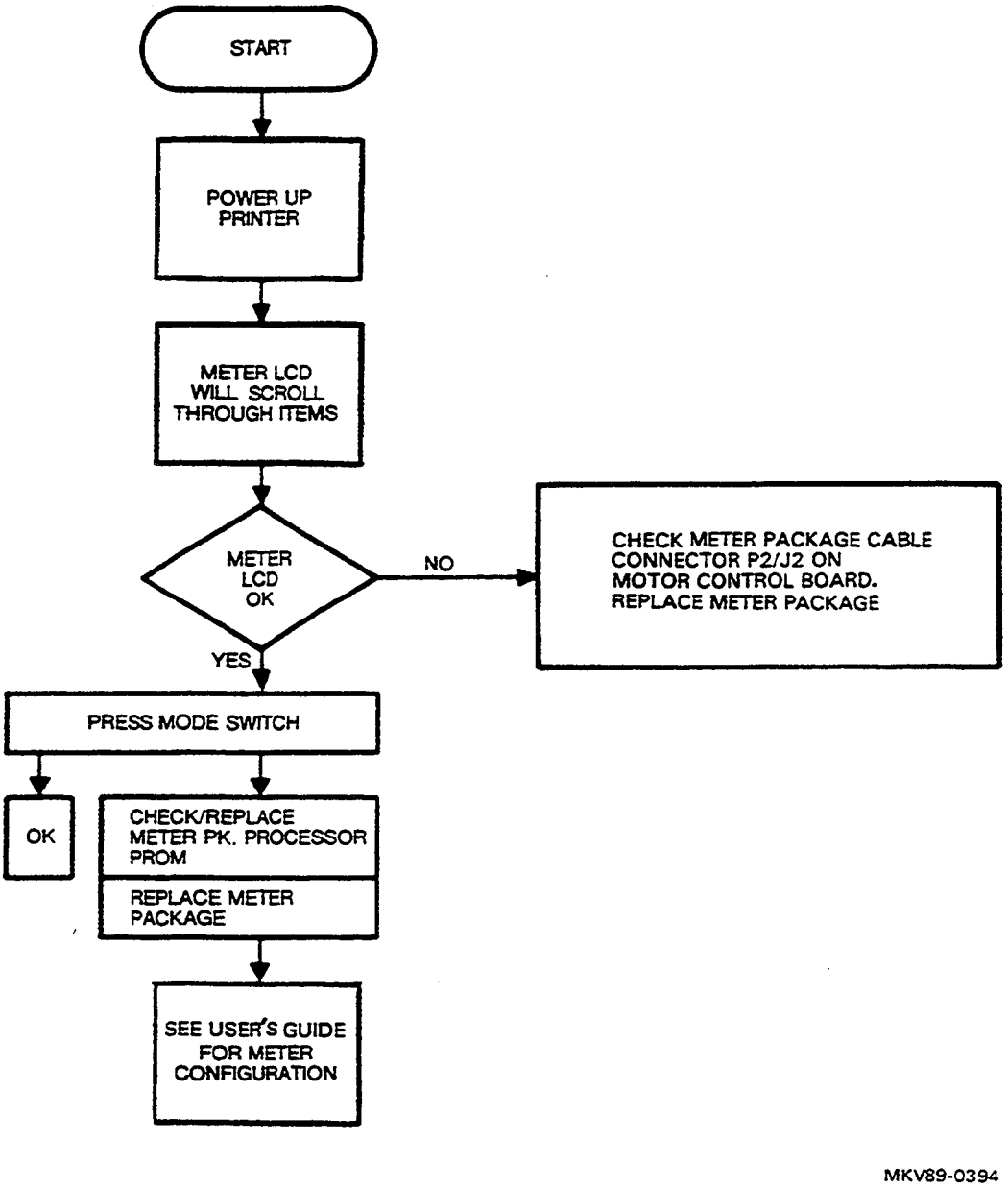


Figure 3–22 Inoperative Meter Package Troubleshooting Flowchart (For the new style printer see Figure A–9)

3.4 RESISTANCE CHECK AND VOLTAGE MEASUREMENT

This section provides procedures for checking the resistance and measuring the voltage of certain components of the printer.

3.4.1 Resistance Checks

As an aid to troubleshooting, resistance checks can be made in the following areas:

- Motors
- Switches/sensors

3.4.2 Motor Resistance Checks

3.4.2.1 Band Drive Motor

Check the resistance of the band drive motor as follows:

1. Unplug connector P3 from the motor control board.
2. Measure the resistance between P3-1 and P3-2 for approximately 2 ohms.
3. Reconnect P3 to the motor control board.

3.4.2.2 Paper Feed Motor

Check the resistance of the paper feed motor as follows:

1. Unplug connector P6 from the motor control board.
2. Unplug connector R3 from resistor R3 on the printer chassis (Figure 3–2).
3. Measure the resistance between P6-1 and R3-2 for approximately 0.6 ohms.
4. Measure the resistance between P6-2 and R3-2 for approximately 0.6 ohms.

3.4.2.3 Ribbon Motor

To measure the resistance of the ribbon motor, disconnect the motor leads and check the motor terminals from + to - for approximately 15 ohms.

3.4.2.4 Blower Assembly

Measure the resistance of the blower assembly, disconnect P8 from the interconnect board and measure between P8-1 and P8-2 for approximately 74 ohms.

3.4.3 Switches/Sensors Resistance Checks

3.4.3.1 Circuit Breaker Power Switch

Measure the resistance of the circuit breaker as follows:

1. Power OFF the printer and unplug the ac power cord from the wall outlet.
2. Turn the circuit breaker to ON.
3. Measure between prong 1 and prong 2 for 0 ohms.
4. Turn the circuit breaker to OFF.
5. Measure between prong 1 and prong 2 for infinite resistance.

3.4.3.2 Top Cover Interlock Switch

Measure the resistance of the top cover interlock switch as follows:

1. Power OFF the printer and unplug the ac power cord from the wall outlet.
2. Open the top cover.
3. Remove the circuit breaker cover.
4. Disconnect the 5 connectors from the top cover interlock switch.
5. Press the top cover interlock to the cover-open position.
6. Measure between C1 and COM1 for 0 ohms.
7. Measure between O1 and COM1 for infinite resistance.
8. Measure between C2 and COM2 for 0 ohms.
9. Measure between O2 and COM2 for infinite resistance.
10. Press the top cover interlock to the cover-closed position.
11. Measure between C1 and COM1 for infinite resistance.
12. Measure between O1 and COM1 for 0 ohms.
13. Measure between C2 and COM2 for infinite resistance.
14. Measure between O2 and COM2 for 0 ohms.

3.4.3.3 Early Warning Top Cover Switch

Measure the resistance of the early warning top cover interlock switch as follows:

1. Power OFF the printer and unplug the ac power cord from the wall outlet.
2. Remove the circuit breaker cover.
3. Disconnect the wires from the early warning switch (located above the main power switch).
4. Pull the plunger out to the interlock defeated position.
5. Measure between COM and C for infinite resistance.
6. Push the plunger to the released position.
7. Measure between COM and C for 0 ohms.

3.4.3.4 Misstack Switch

Measure the resistance of the misstack switch as follows:

1. Unplug P4 from the processor board.
2. With the misstack switch in the normal (down) position, measure between pin 1 and pin 2 on plug 4 for 0 ohms.
3. Place the misstack switch in the "up" position and measure between pin 1 and pin 4 on plug 4 for infinite resistance.

3.4.3.5 Stack Height Switch

The stack height switch is located in the stacker area to the right of the misstack switch. Measure the resistance of the stack height switch as follows:

1. Remove the switch cover.
2. With the switch in the normal (down) position, measure between terminals 1 and 2 for infinite resistance.
3. With the switch in the "up" position, measure between terminals 1 and 2 for 0 ohms.

3.4.4 Voltage Measurements

3.4.4.1 Paper Motion Sensor

1. Power ON the printer.
2. Remove the paper.
3. Remove the paper forms guide and card cage cover.
4. Set the digital volt multimeter to the dc voltage scale.
5. Locate the paper motion sensor attached to the left rear tractor.
6. Follow the wires from the paper motion sensor to find the connector A19P2/J2.
7. Cover the sensor with white paper.
8. Measure between pin 5 of the connector and ground (pin 1) for approximately 4.3 volts.
9. Uncover the sensor.
10. Measure between pin 5 of the connector and ground for approximately 3.8 volts.
11. Measure between pin 3 of the connector and ground for +5 volts.
12. Measure between pin 4 of the connector and ground for +5 volts.

3.4.4.2 Paper Out Sensor

1. Power ON the printer.
2. Remove the paper.
3. Remove the paper forms guide and card cage cover.
4. Locate the paper out sensor at the left front of the printer.
5. Follow the wire from the sensor to connector A22P1/J1.
6. Cover the sensor with white paper.
7. Measure between pin 3 of the connector and ground for approximately 0 volts.
8. Uncover the sensor.
9. Measure between pin 3 and ground for approximately 5 volts.

4
ADJUSTMENTS AND PREVENTIVE MAINTENANCE

4.1 INTRODUCTION

Periodic adjustments and preventive maintenance routines are necessary for optimal performance. These adjustments or checks may be required because of shifts in the electrical or mechanical characteristics of components due to aging, or because a component has been replaced.

This chapter provides periodic maintenance checks and adjustment procedures for the electrical functions and mechanical components that may require periodic adjustment.

4.2 SPECIAL TOOLS

Special tools are required when performing some of the adjustment procedures in this chapter. These tools are listed in Table 4–1.

Table 4–1 Special Tools

Digital Part Number	Vendor Part Number	Description
29-27740-01	293474-001	Band Tracking Adjust Tool Kit
29-27530-01	289721-001	Hammer Alignment Tool

The hammer alignment tool is stored inside the electronics housing, and should be returned to its storage place after being used.

A PROM removal tool (PN 29-27831-01) is recommended for extracting the 44-pin PROMs found on some of the circuit boards.

4.3 PREVENTIVE MAINTENANCE

There is no set schedule for performing periodic maintenance checks; however, the following checks should be made whenever there is a question about the printer's performance or print quality, or whenever a service call is made.

1. Check the paper feed belt for wear. Replace the belt if it is worn or is more than 12 months old.
2. Check all sensors for correct operation: paper motion, optical paper out, and paper low.

3. Check ribbon tracking.
4. Check the operator controls:
   a. Paper tension adjust knob
   b. Tractor lock knobs
   c. Horizontal vernier adjust knob
5. Check the control panel switches/lamp for correct operation.
6. For print quality, check:
   a. Hammer flight time
   b. Print phasing
7. Check operation of the top cover latch and the cabinet doors.
8. If there is a buildup of dust or paper chad on the platen and ribbon mask area, remove the platen/ribbon mask assembly (Section 5.7) and clean the assembly with isopropyl alcohol.
9. If the band pulley brushes are dirty with paper chad or dust, clean them. If the brushes are contaminated with ink, either remove and clean them with isopropyl alcohol, or replace them.
10. Remove any ribbon lint/dust underneath the printer mechanism.
11. Check for loose hardware.
12. Verify that the following are operating correctly:
    a. Rear control panel
    b. Meter package
    c. Powered paper stacker
    d. Paper puller
13. Check the print quality for the problems listed below.
    a. Smeared characters - look for the following:
       1. Excessive ink on the ribbon
       2. Dirty character band
       3. Poor quality paper
       4. Dirty ribbon reversing bar
    b. Light printing - look for the following:
       1. Worn ribbon
       2. Improperly adjusted Copies control
       3. Debris under the ribbon mask
       4. Improperly tensioned ribbon mask
       5. Loose platen
    c. Missing right or left portions of characters - look for the following:
       1. Improperly adjusted Phase control

2. Improperly adjusted transducer phasing

d. Ribbon smear - look for the following:

1. Folded ribbon
2. Ribbon mask improperly attached to the platen - edge of the mask should butt against the platen surface

e. Variations in print density - look for the following:

1. Worn ribbon
2. Loose platen

f. Line skew - look for the following:

1. Loose pulley screws
2. Improper band tracking

g. Print column displaced - indicates that the hammer backstop screw needs to be adjusted (Section 4.4.1).

4.4 ADJUSTMENTS

The areas that may require adjustment are:

- Hammer flight time
- Transducer phasing
- Transducer gap
- Band tracking

4.4.1 Hammer Flight Time Checks and Adjustment

The hammer flight time adjustment may be required after:

- Replacing a print hammer
- Replacing the hammer driver board
- About 12 months of use

When individual print columns are not correctly registered, a flight time adjustment may be required. The need for a hammer flight time adjustment is determined by visually examining of a printed sample of the letter H. To make this examination, refer to (Section 4.4.1.1).

4.4.1.1 Hammer Flight Time Checks

1. Ensure that 15 to 20 lb single-part paper is installed.
2. Select the Fixed Pattern self-test mode.
3. Close the top cover.
4. Set the Copies block to the lowest (left) setting (1 block).
5. Set the Phase to the mid-range position (phasing block 8 or 9).
6. Press On Line to start the test.

7. Observe the printout for any columns that are not correctly registered. These columns may require flight time adjustment.

NOTE

If necessary, adjust the Phase control to achieve correct phasing. Correct phasing is achieved when both vertical bars of the H have the same density. If correct phasing cannot be achieved, the transducer phasing adjustment may be required (Section 4.4.2).

4.4.1.2 Auto Flight Time Test

The overall flight time settings for all hammers may be checked by running the Auto Flight Time test. This test generates a 2-form printout of the current hammer flight time values. The printout shows a sliding H pattern, the hammer number, and the flight time variation from the nominal flight time for each hammer.

Flight time variations are measured in microseconds and the nominal flight time is 1.80 milliseconds. Each hammer is fired one time and the measured flight time variation is calculated and printed. Repetitions of this test will show slightly different values, and values measured on individual hammers will be slightly different, also. If the test is run on the printer when it is cold, different values will be obtained from those obtained if the test is run on the printer when it is warm.

Run the Auto Flight Time test as follows:

1. Open the top cover.
2. Ensure that 15 or 20 lb single-part paper is installed.

NOTE

If the Copies control is not set to one block, all printout data is invalid.

3. Set the Copies control to one block.
4. Press Test once. Fixed Pattern is displayed.
5. Press Flt Time. Auto Flight Time is displayed.
6. Close the top cover.
7. Press On Line to start the test.
8. Press On Line again to stop the test.
9. Open the top cover.
10. Press Test to exit the Auto Flight Time mode.
11. When an individual hammer needs adjustment, use the printout to determine the average flight time variation value (Section 4.4.1.3).

NOTE

Hammer flight times are set correctly if they fall within a range of -111 to +112 microseconds from the nominal setting of 1.80 milliseconds. If the H printout looks good and the Auto Flight Time values fall within this range, no flight time adjustment is needed.

4.4.1.3 Hammer Flight Time Adjustment

If it is necessary to adjust the flight time of one or more hammers, proceed as follows:

1. Set the circuit breaker switch to OFF.
2. Open the top cover.
3. Unload paper or tear the paper at perforations just above the upper tractors.
4. Remove the paper forms guide and card cage cover (Section 5.4).
5. Set the circuit breaker switch to ON.
6. Ensure that paper is loaded properly in the tractors but allows free access to the backstop hammer screws.
7. When the display shows READY - OFFLINE, press the Flt Time key. The left side of the display (Figure 4–1) shows the hammer number of the selected key, and the right side of the display shows the hammer flight time when printing.

NOTE

This flight time value is "rounded" to the next lower increment of 16, and will not match the Auto Flight Time printout.

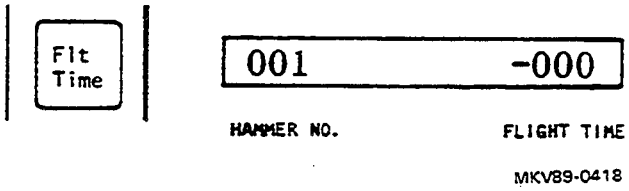


Figure 4–1 Hammer Flight Time Display

8. Select the hammer to be adjusted by pressing the Hmr Sel key (Figure 4–2). The Hmr Sel key may be pressed and held to scroll through the hammers, or it may be pressed and released to increment one at a time.

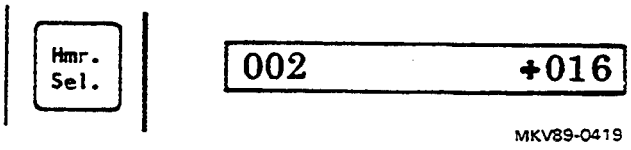


Figure 4–2 Hammer Selection

NOTE

The Form key (⇑ and ⇓) allows movement forward or backward through the hammers.

9. When the desired hammer is selected, close the top cover and press the On Line key to start the Hammer Print test. An H is printed for the selected hammer and the flight time is displayed. Refer to the Auto Flight Time printout to determine the average flight time variation value.
10. Press the On Line key to stop the print test.

11. Open the top cover, and remove the flexible adjustment tool from its storage place inside the electronics housing.

NOTE

Return the adjustment tool to its storage place after all hammer flight time adjustments are made. This ensures that the tool is available the next time it is needed.

12. Insert the flexible adjustment tool into the backstop hammer screw for the hammer under test (Figure 4–3).

CAUTION

Take care when inserting the adjustment tool to avoid shorting or otherwise damaging the electrical components in the electronics housing.

NOTE

The adjustment tool must be inserted all the way into the backstop hammer screw slot.

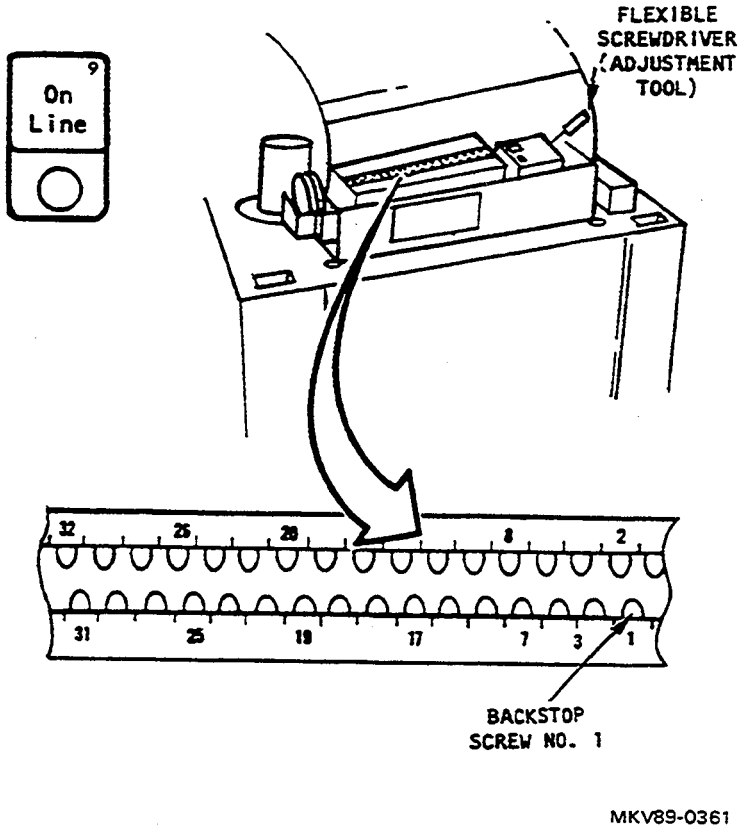


Figure 4–3 Adjusting Hammer Flight Time

13. Turn the adjustment tool slightly counterclockwise to increase the flight time or clockwise to decrease the flight time. The flight time variation should be adjusted towards the average flight time variations of the other hammers. The final setting, however, is obtained by reviewing the Fixed Pattern H printout (Section 4.4.1.1).

14. Close the top cover and press the On Line key to continue the print test. The display shows the new flight time.

NOTE

It may be necessary to repeat steps 9 through 13 until the flight time is adjusted properly.

15. Repeat steps 8 through 15 for each hammer that needs to be adjusted.
16. Perform the visual hammer flight time check to ensure that all columns are correctly registered. Repeat the hammer flight time adjustment, if needed.
17. Check the transducer phasing (Section 4.4.2) and adjust, if necessary.
18. When all adjustments are made, press the Alarm Clear key to return to the printer READY - OFFLINE mode.
19. Return the flexible adjustment tool to its storage place inside the electronics housing.
20. Set the printer power switch to OFF.
21. Install the card cage cover and paper forms guide (Section 5.4).
22. Ensure that the paper is properly installed.
23. Close the top cover.

4.4.2 Transducer Phasing Adjustment

NOTE

Before adjusting the transducer phasing, ensure that all hammer flight time variations are within the acceptable value range. This can be done by running the Auto Flight Time test (Section 4.4.1.2, step 8).

The transducer phasing adjustment procedure checks character print registration. If the transducer has been replaced, hammer flight time adjustments have been made, or proper phasing cannot be achieved, a transducer phasing adjustment should be performed followed by a transducer gap adjustment (Section 4.4.3). The transducer gap adjustment is necessary because when the transducer bracket is loosened, the spacing between the transducer and the belt is disturbed. To adjust transducer phasing, follow the steps below. The transducer is located on the mounting bracket for the band drive motor.

1. Open the top cover.
2. Ensure that the band, ribbon, and 15 to 20 lb single-part paper are loaded.
3. Press the Test key to select Fixed Pattern.
4. Use the Copies key to set the Copies block to the left (minimum).
5. Close the top cover and press On Line to start the print test.
6. Press the Phase key to move the block fully left.

7. Observe the H characters. The left vertical bar should be more dense than the right vertical bar (Figure 4–4).

Figure 4–4 H Character Phased Left

8. Press the Phase key to move the block fully right.
9. Observe the H characters. The right vertical bar should be more dense than the left vertical bar (Figure 4–5).

Figure 4–5 H Character Phased Right

10. Press the Phase key to move the block to the center (Figure 4–6).

Figure 4–6 Properly Phased H

11. Press the On Line key to stop the print test.
12. If correct results were achieved in steps 7 through 11, no adjustment is necessary. Go to step 22.
13. Ensure that the printer is OFF LINE.
14. Ensure that the Phase block is centered.
15. Open the top cover.
16. Loosen the transducer bracket screw(s) just enough to allow the bracket to be moved.

NOTE

Moving the transducer bracket up darkens the left side of the H, and moving the transducer down darkens the right side of the H.

17. Move the transducer up or down slightly, and tighten the bracket screws.
18. Close the top cover and press the On Line key to start the Fixed Pattern test.
19. If the H is not correct, repeat steps 14 through 17 until the proper phasing is achieved.
20. When proper phasing is achieved, press On Line to stop the test.
21. Press Test twice. This will set the printer READY - OFF LINE.
22. Ensure that paper is properly loaded and then press On Line.
23. Perform the transducer gap adjustment (Section 4.4.3).

4.4.3 Transducer Gap Adjustment

The transducer gap is the spacing between the transducer and the character band. If this spacing is not correct, synchronizing the characters with the hammer drivers might be incorrect, resulting in wrong or missing characters.

The transducer gap must be adjusted if the transducer has been replaced or transducer phasing has been adjusted.

NOTE

The output of the transducer is approximately 2 V peak-to-peak. This signal feeds the amplifier circuit on the motor control board where it is amplified to approximately 11 volts peak-to-peak. This 11-volt signal can be measured at TP-1 on the motor control board (Figure 3–15).

To adjust the transducer gap, perform the following steps:

1. Set the circuit breaker switch to OFF and unplug the power cord.
2. Open the top cover.
3. Ensure that the band release lever (Figure 4–7) is in the down (locked) position and that the band is in its normal position.

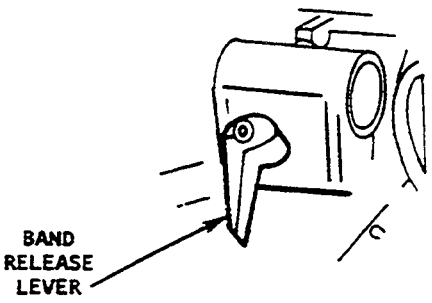


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Figure 4–7 Band Release Lever in the Locked Position

4. Try to insert a 0.010-inch feeler gauge between the band surface and the transducer (Figure 4–8). If the 0.010-inch feeler gauge cannot be inserted, a gap adjustment is needed.

5. Try to insert a 0.012-inch feeler gauge between the band surface and the transducer. If the 0.012 inch feeler gauge can be inserted, a gap adjustment is needed.

NOTE

The transducer gap is correctly adjusted if the 0.010-inch feeler gauge fits in the gap but the 0.012-inch feeler gauge does not.

6. If the gap is correctly adjusted, go to step 11.

IMPORTANT

Ensure that the transducer gap requires adjusting before proceeding.

7. Loosen the transducer assembly mounting screw.

8. Insert a .010-inch feeler gauge between the surface of the band and the transducer.

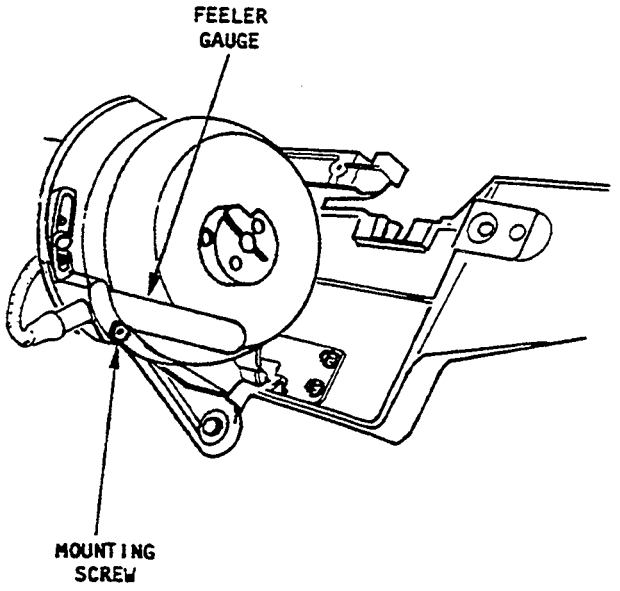

Figure 4–8 Inserting the Feeler Gauge

9. Press the transducer against the feeler gauge and tighten the mounting screws.

10. Go to step 4.

11. Close the top cover.

12. Repeat the transducer phasing adjustment procedure.

4.4.4 Band Tracking Adjustment

Band tracking adjustments may be required after replacing the band drive motor or the idler pulley. The need for a band tracking adjustment can be determined by visual examinations as outlined in Section 4.4.5. Make these visual examinations before attempting any of the band tracking adjustment procedures.

4.4.5 Band Drive System Visual Examinations

The character band is driven by the band drive motor on a set of pulleys so that it rotates around the hammerbank assembly. The pulleys are biased at a slight angle, which causes the band to ride against the flange at the rear of the pulley. This angle is referred to as the "tilt" of the pulley. In addition to the tilt, the pulley is adjusted in two planes. The position of the pulley on its respective shaft determines the relationship of the character band to the print hammers, and the mounting position of the band drive motor or idler assembly on the side casting determines the relationship of the character band to the platen. The position of the pulley on the shaft is referred to as the pulley height, and the position of the band drive motor or idler assembly with respect to the platen is referred to as the motor or idler height. The six adjustments that may be required are:

- Band drive motor pulley height adjustment
- Idler pulley height adjustment
- Band drive motor height adjustment
- Idler assembly height adjustment
- Band drive motor pulley tilt adjustment
- Idler pulley tilt adjustment

4.4.5.1 Checking the Tilt Adjustment

The tilt adjustment check is done in two parts:

- Band drive side
- Idler assembly side

Band Drive Side - Perform the following:

1. Spin the band manually counterclockwise while observing the edge of the band at the pulley flange. The band should be seated against the pulley flange.
2. Rotate the right side band pulley approximately two (2) inches clockwise, then counterclockwise in a rocking motion. While rocking the pulley, observe the band closely to ensure that the band does not bow or buckle on the flange.
3. Ensure that the ribbon is installed.
4. Perform the self-test in SHIFT/REPEAT mode and print several pages.
5. Verify that the band remains seated against the pulley flange.

Idler Assembly Side - Perform the following:

1. Spin the band manually counterclockwise while observing the edge of the band at the pulley flange. The band should be seated against the pulley flange.
2. Rotate the left side band pulley approximately two (2) inches clockwise, then counterclockwise in a rocking motion. While rocking the pulley, observe the band closely to ensure that the band does not bow or buckle on the flange.
3. Ensure that the ribbon is installed.
4. Perform the self-test in SHIFT/REPEAT mode and print several pages.
5. Verify that the band remains seated against the pulley flange.

4.4.6 Checking the Pulley Height Adjustment

To check the pulley height adjustment on both the band drive side and the idler side, do the following:

1. Perform the printer self-test in SHIFT/REPEAT mode and print several pages.
2. Visually inspect the print sample, paying close attention to the top and bottom of each character printed in each column.
3. Ensure that:
   a. No characters are "clipped" at either the top or bottom.
   b. The characters are printed in a straight line across the page.
4. Check the underline character in the print sample very carefully for the following:
   a. Correct position relative to the hammer face
   b. Same line thickness in all columns
   c. No evidence of hammer face blocking in any column

If top or bottom clipping or hammer face blocking is present, pulley height adjustment is required. The pulley on the side where the clipping or blocking occurs is the one that requires adjustment.

4.4.7 Checking the Band Motor or Idler Assembly Height Adjustment

The band motor and idler assembly height adjustments will probably never be required. The factory settings for these adjustments allow the motor or idler assembly to be replaced without the need for these adjustments. If there is a question about the necessity of these adjustments, perform the procedures outlined in Section 4.4.5 through Section 4.4.6 and then look for the following:

- Random light printing of individual characters
- Character band rubbing on the ribbon guide assemblies
- Band pulley rubbing on the ribbon guide assemblies
- Abnormal wear of ribbon mask or platen
- Band motor fault occurring due to overcurrent conditions

NOTE

Before starting any adjustments:

1. **Set the circuit breaker switch to OFF.**
2. **Open the top cover.**
3. **Remove the paper, ribbon reels, and band from the printer.**

4.4.7.1 Band Drive Motor Pulley Height Adjustment

The purpose of this adjustment is to position the band drive motor pulley on the motor shaft so that the characters on the print band are centered on the print hammer faces. Generally, this adjustment is necessary when the band drive motor pulley has been replaced.

To adjust the band drive motor pulley height, perform the following steps:

1. Remove the paper, band, and ribbon from the printer.
2. Grasp the band drive motor pulley to prevent it from slipping, and loosen the two pulley mounting screws and the clamp screw (Figure 4–9).

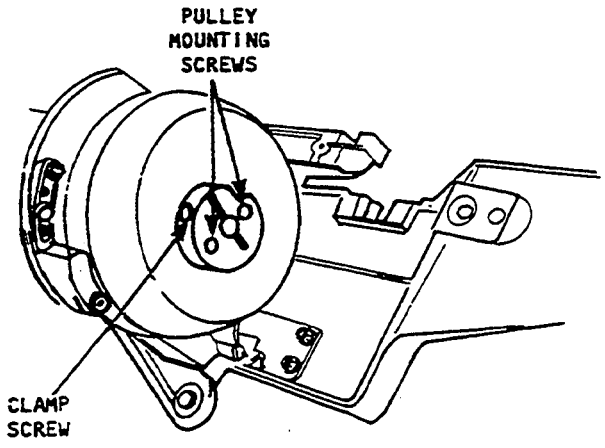

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Figure 4–9 Loosening the Band Drive Motor Pulley

3. Remove the two screws securing the platen, and remove the platen/ribbon mask from the printer (Section 5.7).
4. Install the character band.
5. Thread one of the pulley adjustment tools (PN 100348-101) partway into the left side platen screw hole (Figure 4–10).
6. Place the other pulley adjustment tool (PN 100348-102) on top of the band and underneath the first adjustment tool.
7. Continue threading the first adjustment tool, making sure that it enters the hole in the second tool. Tighten the first tool until it is firmly seated.
8. Adjust the position of the pulley as necessary so that the edges of the band are flush with the edges of the -102 tool (Figure 4–10).
9. Tighten the pulley set screw first, then tighten the two collar screws on the band drive motor pulley.
10. Remove the pulley adjustment tool.
11. Check the band drive motor pulley and idler pulley height adjustment (Section 4.4.6).
12. Remove the character band.
13. Install the platen/ribbon mask and tighten the two screws that secure the platen.
14. Install the band, ribbon, and paper.
15. Perform the band drive system visual examinations (Section 4.4.5).

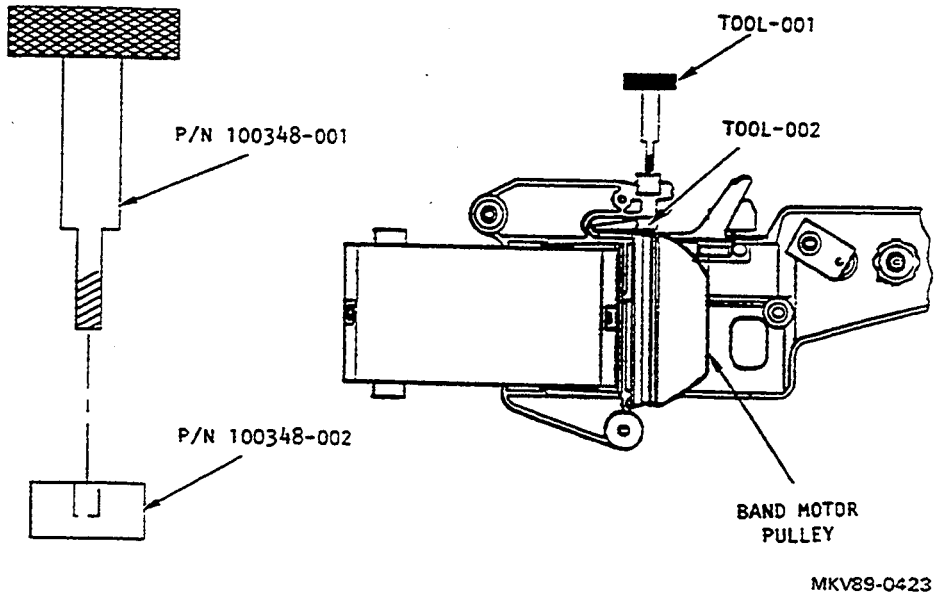

Figure 4–10 Adjusting the Band Drive Motor Pulley Height

4.4.7.2 Idler Pulley Height Adjustment

This adjustment is usually necessary when the band idler pulley has been replaced. The purpose of this adjustment is to position the band idler pulley on the idler assembly shaft so that the character band characters will be centered on the print hammer faces.

1. Remove the paper, ribbon, and band from the printer.
2. Grasp the idler pulley and loosen the two pulley collar screws (Figure 4–11).

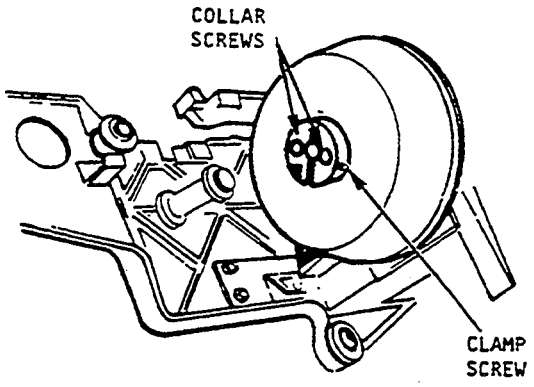

Figure 4–11 Loosening the Band Idler Pulley

3. Remove the two screws that secure the platen, and remove the platen/ribbon mask assembly from the printer (Section 5.7).
4. Install the character band.

5. Thread one of the pulley adjustment tools (PN 100348-101) partway into the right side platen screw hole (Figure 4–12).
6. Place the other pulley adjustment tool (PN 100348-102) on top of the band and under the first adjustment tool.
7. Continue threading the first tool, making sure that it enters the hole in the second tool. Tighten the tool until it is firmly seated.
8. Adjust the position of the pulley as necessary so that the edges of the band are flush with the edges of the -102 tool.

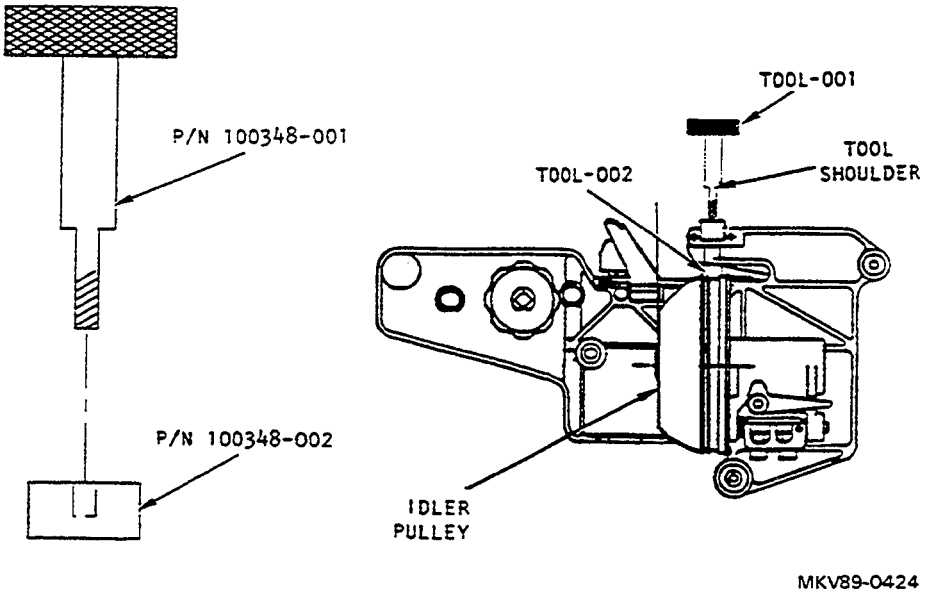

Figure 4–12 Adjusting the Band Idler Pulley

9. Tighten the two collar screws on the idler pulley.
10. Remove the pulley adjustment tool.
11. Check the band drive motor pulley and idler pulley height adjustments (Section 4.4.6).
12. Remove the character band.
13. Install the platen/ribbon mask and tighten the two screws that secure the platen.
14. Install the band, ribbon, and paper.
15. Perform the band drive system visual examinations (Section 4.4.5).

4.4.7.3 Band Drive Motor Pulley Tilt Adjustment

The purpose of this adjustment is to set the angle (tilt) of the band motor pulley so that the print band is driven against the flange on the back side of the pulley. If the band drive motor or pulley has been replaced, the tilt adjustment should be verified and/or adjusted to ensure that the band rides correctly on the pulleys.

NOTE

Check and/or adjust the band pulley height before starting this procedure.

Verify and/or adjust the band drive motor pulley tilt as follows:

1. Remove the band, ribbon, and paper from the printer.
2. Remove the two screws securing the platen, and remove the platen/ribbon mask assembly from the printer.
3. Reinstall the band.
4. Lock the band in place by pressing the release lever down.

NOTE

Tightening the tilt screw moves the band closer to the flange, and loosening the tilt screw moves the band away from the flange.

5. Tighten or loosen the tilt screw until the band is seated against the pulley flange.
6. Rotate the band drive motor pulley counterclockwise while observing the band edges. The band should lightly touch the pulley flange but should not bow or fold over.
7. If a light, intermittent scraping sound is not heard while the band is rotated, adjust the tilt band motor screw again.
8. Remove the print band.
9. Install the platen/ribbon mask.
10. Install the band, ribbon, and paper.
11. Perform the band drive system checks to ensure proper setup of the band drive system.

4.4.7.4 Idler Pulley Tilt Adjustment

The purpose of this adjustment is to set the angle (tilt) of the idler pulley so that the print band is driven against the flange on the back side of the pulley. If the idler pulley has been replaced, the idler pulley tilt adjustment should be verified and/or adjusted to ensure that the band rides correctly on the pulleys.

NOTE

Check and/or adjust the idler pulley height before starting this procedure.

Verify and adjust the idler pulley tilt as follows:

1. Remove the band, ribbon, and paper from the printer.
2. Remove the two screws securing the platen, and remove the platen/ribbon mask assembly from the printer.
3. Ensure that the band is installed in the normal operating position.
4. Loosen slightly the two 5 mm Allen screws that secure the clamp plate (Figure 4–13).

NOTE

The clamp plate should remain fairly tight against the pivot bar in order to better control the range of pivot bar movement when adjusting the cone set screw.

NOTE

Tightening the set screw moves the band closer to the flange, and loosening the set screw moves the band away from the flange. It may be necessary to pull the idler assembly toward the set screw when loosening the screw to ensure that the pivot bar is seated against the screw.

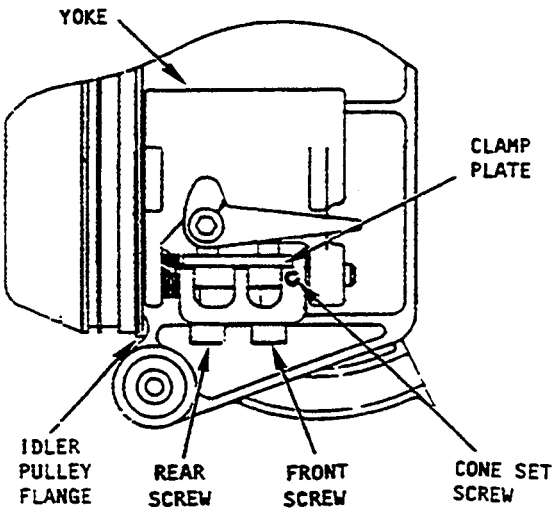

Figure 4–13 Adjusting the Idler Pulley Tilt

5. Tighten or loosen the 2 mm Allen tilt adjustment set screw until the band is seated against the pulley flange.
6. Rotate the idler pulley counterclockwise while observing the band edges. The band should lightly touch the pulley flange but should not bow or fold over.
7. If a light, intermittent scraping sound is not heard while the band is rotated, adjust the tilt again.
8. Tighten the two screws that secure the clamp plate.
9. Remove the print band.
10. Install the platen/ribbon mask.
11. Install the band, ribbon, and paper.
12. Perform the band drive system checks to ensure proper setup of the band drive system.

4.4.7.5 Band Drive Motor Height Adjustment

This adjustment probably will not be required unless the band drive motor has been replaced. Perform the checks indicated in Section 4.4.7 before attempting this adjustment. If the adjustment is required, perform the following steps:

1. Remove the paper, band, and ribbon from the printer.
2. Remove the two screws securing the platen, and remove the platen/ribbon mask assembly from the printer (Section 5.7).
3. Install the character band.
4. Thread the pulley adjustement tool (PN 100348-001) into the left side casting platen mounting hole until the end of the tool just makes contact with the band or until the shoulder on the tool bottoms out in the casting hole (Figure 4–14).

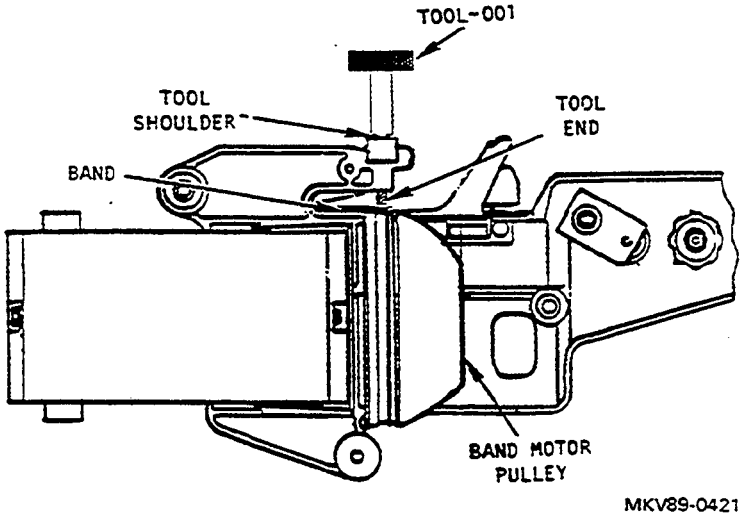

Figure 4–14 Adjusting the Band Drive Motor Height

5. Check the clearance between the bottom of the adjustment tool and the band.
   a. If there is a gap between the tool and the band, try to fit a small piece of single-part paper (or a .003 inch feeler gauge) between the tool and the band. If it fits snugly, the setting is acceptable. If there is still a gap, the band drive motor needs to be adjusted upward.
   b. If the tool end touches the band before it is fully seated on the shoulder stop, mark the position of the adjustment tool knob. Turn the knob until the shoulder bottoms out in the casting hole. If the knob turns less than 1/8 turn, the setting is acceptable. If the knob turns more than 1/8 turn, the setting is acceptable. If the knob turns 1/8, the band drive motor needs to be adjusted downward.
6. If no adjustment is required, go to step 9.
7. If adjustment is required, loosen the jam nut that secures the 3 mm Allen pivot screw (Figure 4–15), and turn the pivot screw clockwise to raise the band motor or counterclockwise to lower the band drive motor.
8. Tighten the jam nut to secure the Allen pivot screw.

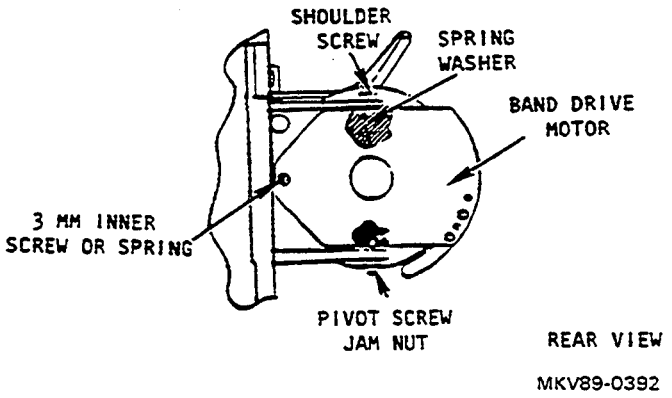

Figure 4–15 Adjusting the Band Drive Motor Jam Nut

9. Remove the adjustment tool and character band.
10. Install the platen/ribbon mask assembly and tighten the two screws that secure the platen.
11. Install the band, ribbon, and paper.
12. Power ON the printer and allow the diagnostic tests to complete.

4.4.7.6 Idler Assembly Height Adjustment

This adjustment probably will not be required unless the idler assembly has been replaced. Before attempting this adjustment, perform the checks outlined in Section 4.4.7. If adjustment is needed, perform the following steps:

1. Remove the paper, ribbon, and band from the printer.
2. Remove the two screws securing the platen, and remove the platen/ribbon mask from the printer.
3. Install the character band.

4. Thread the pulley adjustment tool (PN 100348-001) into the right side casting platen mounting hole until the end of the tool just makes contact with the band or until the shoulder on the tool bottoms out in the casting hole (Figure 4–16).

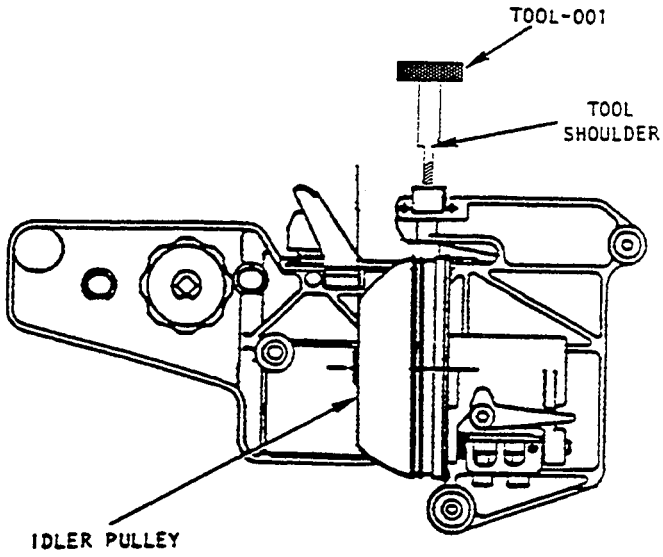

Figure 4–16 Checking the Idler Assembly Height

5. Check the clearance between the bottom of the tool and the band.
   a. If there is a gap between the tool and the band, try to fit a small piece of single-part paper (or a .003 inch feeler gauge) between the tool and the band. If it fits snugly, the setting is acceptable. If there is still a gap, the band drive motor needs to be adjusted upward.
   b. If the tool end touches the band before it is fully seated on the shoulder stop, mark the position of the adjustment tool knob. Turn the knob until the shoulder bottoms out in the casting hole. If the knob turns less than 1/8 turn, the band drive motor needs to be adjusted downward.
6. If no adjustment is required, go to step 9.
7. If adjustment is required, determine approximately how much adjustment is needed and in which direction. This can be done with feeler gauges or by threading the adjustment tool. Each 1/8 turn of the tool equals about .003 inch.

8. Remove the idler assembly and use the chart below to determine the size of shim that is installed under the pivot bar (Figure 4–17).

Shim PN	Thickness
276212-001	.020 inch
276212-002	.024 inch
276212-003	.028 inch
276212-004	.016 inch
276212-005	.012 inch

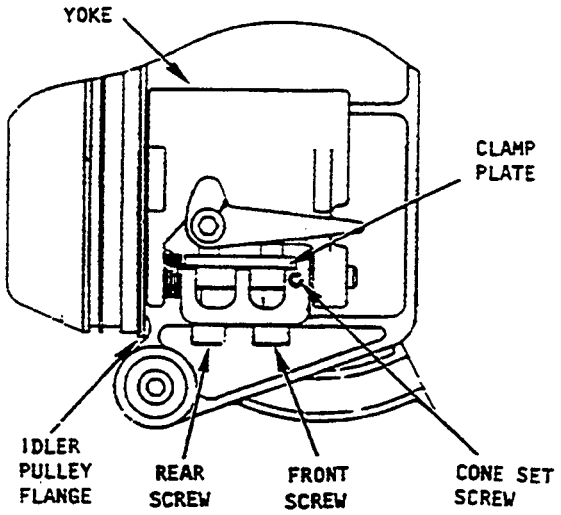

Figure 4–17 Shim Location

9. Select the next appropriate size shim as determined in step 7. A smaller size shim will lower the idler assembly, and a larger size shim will raise the idler assembly.
10. Reinstall the idler assembly by using the shim selected in step 9.
11. Repeat this procedure beginning with step 4 until the correct idler assembly height is achieved.
12. Remove the adjustment tool and character band.
13. Install the platen/ribbon mask assembly and tighten the two screws that secure the platen.
14. Install the band, ribbon, and paper.
15. Power ON the printer and allow the diagnostic tests to complete.

4.4.7.7 Band Tracking Final Procedures

After all the band tracking adjustments have been made or verified, perform the following steps to test the printer and restore it to operation:

1. Turn the circuit breaker switch ON and press the Test key to select the SHIFT/REPEAT pattern.
2. Close the top cover.
3. Press On Line to start the test.
4. After the pattern has printed once, press the On Line key to stop the test.
5. Verify that all characters are printed correctly. Ensure that:
   a. Characters are not clipped on the top. (If characters are clipped, both pulleys are positioned too far in along the pulley shaft, and both pulleys need to be adjusted.)
   b. Characters are not clipped on the bottom. (If characters are clipped, both pulleys are positioned too far out along the pulley shaft, and both pulleys need to be adjusted.)
   c. The row of characters is horizontal. If not, one of the pulleys is not aligned correctly. Verify the band drive system adjustments (Section 4.4.5).

   NOTE

   If characters are not printed correctly, the band drive system adjustments should be verified again.
6. After all adjustments are made, perform the self-test and print registration adjustment as described in the user's guide.
7. If a horizontal alignment problem exists, check the transducer phasing and adjust the transducer accordingly (Section 4.4.2).

5
REMOVAL/REPLACEMENT OF FIELD REPLACEABLE UNITS

5.1 OVERVIEW

This chapter describes how to remove and install the field replaceable units (FRUs) of the printer. A qualified service person must perform all procedures in this chapter. The FRUs identified for the printer are listed below, and a complete list of spare parts with part numbers is provided in Section 5.36.

- Top cover
- Paper forms guide/card cage cover
- Printed circuit boards
- Platen/ribbon mask assembly
- Hammer mask assembly
- Ribbon guide/ribbon end sensor assembly
- Ribbon drive motor assembly
- Transducer assembly
- Transducer bracket assembly
- Band drive motor assembly
- Band cleaning brush assembly
- Band idler pulley
- Blower motor assembly
- Airflow detector board
- I/O harness assembly
- Circuit breaker, early warning, and top cover interlock switches
- Paper out sensor
- Paper step motor assembly
- Upper tractor assemblies and paper motion sensor
- Vernier adjust knob, belt, and lower tractors
- Front control panel assembly

- Hammer module
- Power supply components
  - — Capacitor bank assembly
  - — Power interconnect board
  - — +5 volt regulator board
  - — Transducer assembly
  - — Card cage assembly
  - — Motherboard
  - — 44-pin PROM
- Paper puller
- Paper puller/stacker assembly
- Meter package
- Rear control panel

5.2 SPECIAL TOOLS

A PROM removal tool (PN 29-27831-01) is recommended for extracting the 44-pin PROMs found on some of the circuit boards.

5.3 REMOVING/REPLACING THE TOP COVER

To remove the top cover (Figure 5–1):

1. Raise the top cover.
2. While supporting the top cover, use a flat-blade screwdriver to pry each gas spring socket off its mating ball.
3. Rest the gas springs on the printer base.

WARNING
The top cover is heavy and will drop off the hinges when rotated back.

4. From the rear of the printer, support the top cover with both hands. Tilt the top cover back and lift it off the hinges.
5. Set the top cover out of the way.

To replace the top cover:

1. Support the top cover with both hands and place it on the hinges at the rear of the printer.
2. Tip the top cover forward so that it is supported by the hinges.
3. Hold the top cover at a 45° angle and insert the gas spring sockets over the mating balls.
4. Tilt the top cover slightly forward and press in each gas spring clip.

The top cover is now installed and should operate properly.

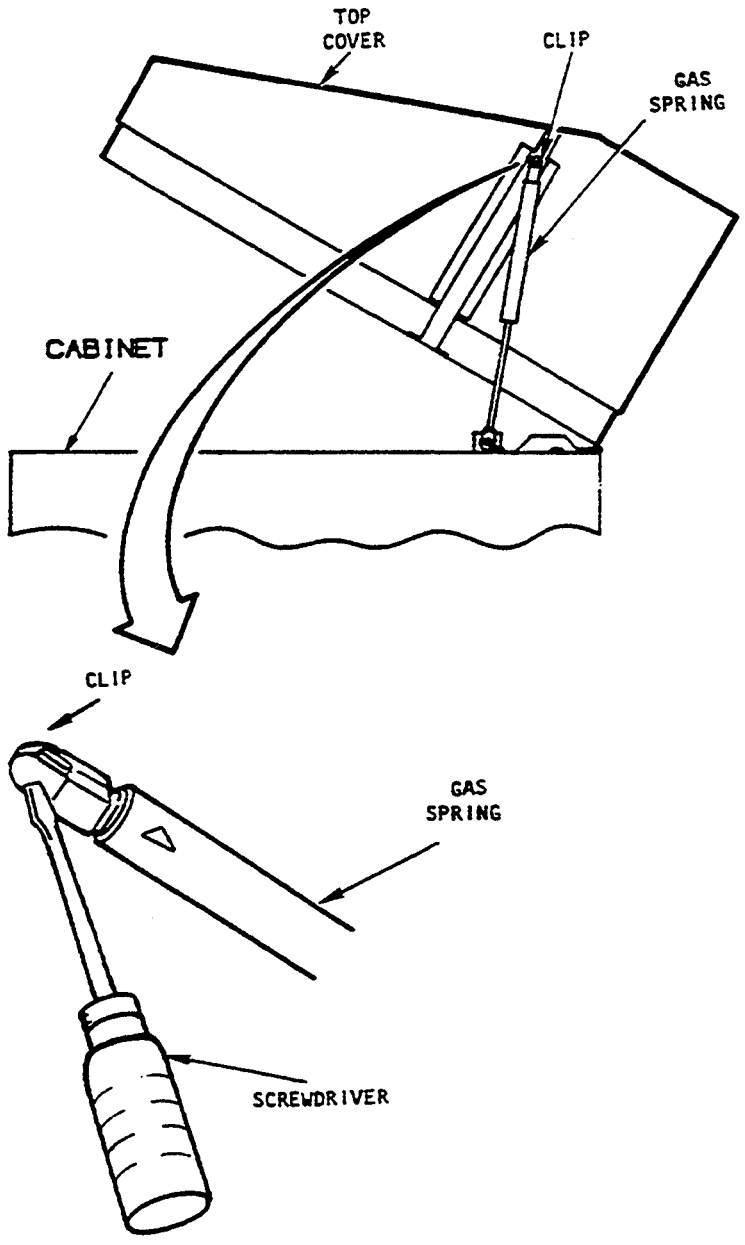

Figure 5–1 Removing the Top Cover

5.4 REMOVING/REPLACING THE PAPER FORMS GUIDE/CARD CAGE COVER

To remove the paper forms guide/card cage cover (Figure 5–2):

1. Power OFF the printer, and disconnect the power cord from the wall outlet.
2. Open the top cover.
3. Using a flat-blade screwdriver, loosen the retaining screw on the card cage cover.
4. Lift the paper forms guide/card cage cover vertically from the side support and remove it from the printer.

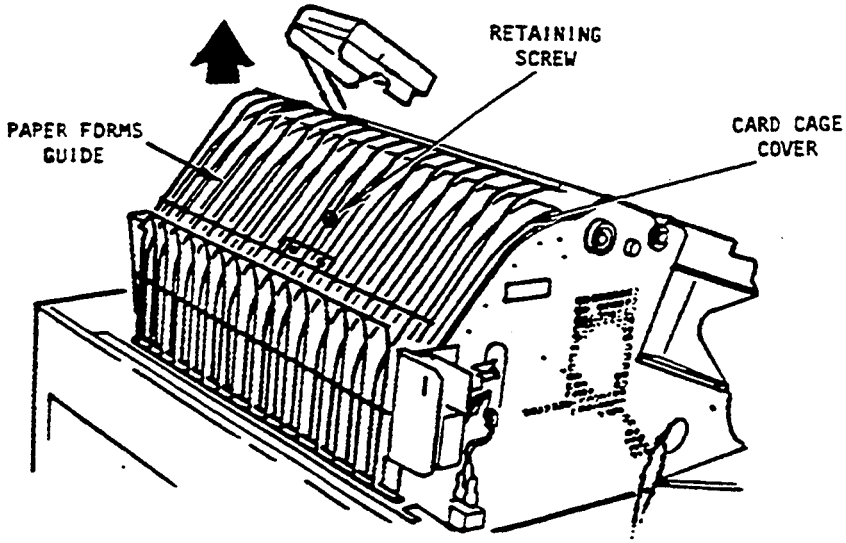

Figure 5–2 Removing the Paper Forms Guide/Card Cage Cover

To replace the paper forms guide/card cage cover:

1. Lower the paper forms guide/card cage cover into position and ensure that it mates properly with the fingerstock gasketing.
2. Tighten the retaining screw.

5.5 REMOVING/REPLACING PRINTED CIRCUIT BOARDS

To remove a printed circuit board housed in the card cage:

1. Remove the paper forms guide and card cage cover (Section 5.4).
2. Disconnect all cable connections from the board to be removed.
3. Pull up the ejector keys of the board to be removed (Figure 5–3).
4. Lift the board from the card cage.

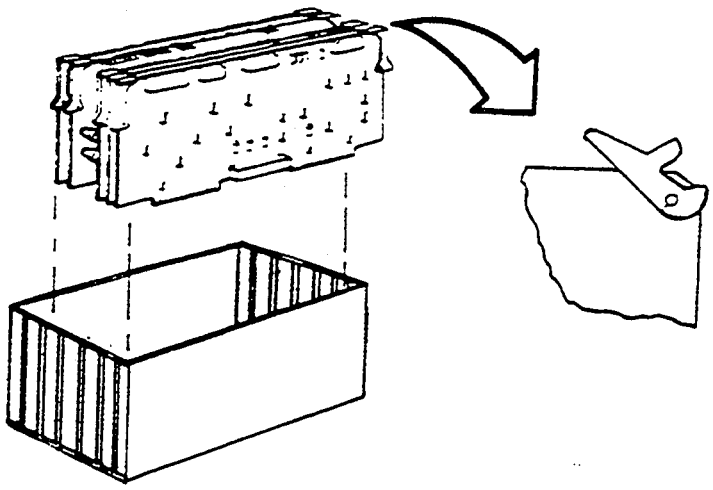

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Figure 5–3 Removing Printed Circuit Boards from the Card Cage

To replace a printed circuit board into the card cage:

1. Slide the board into the card cage (Figure 3–10).
2. Press the ejector keys down to seat the board properly.
3. Connect all cable plugs to their associated connectors on the board.
4. Replace the paper forms guide and card cage cover (Section 5.4).

5.6 RAISING AND LOWERING THE PRINTER MECHANISM

To raise the printer mechanism:

1. Power OFF the printer, unplug the power cord, and open the top cover.
2. Loosen the left side support screw of the printer mechanism (Figure 5–4).

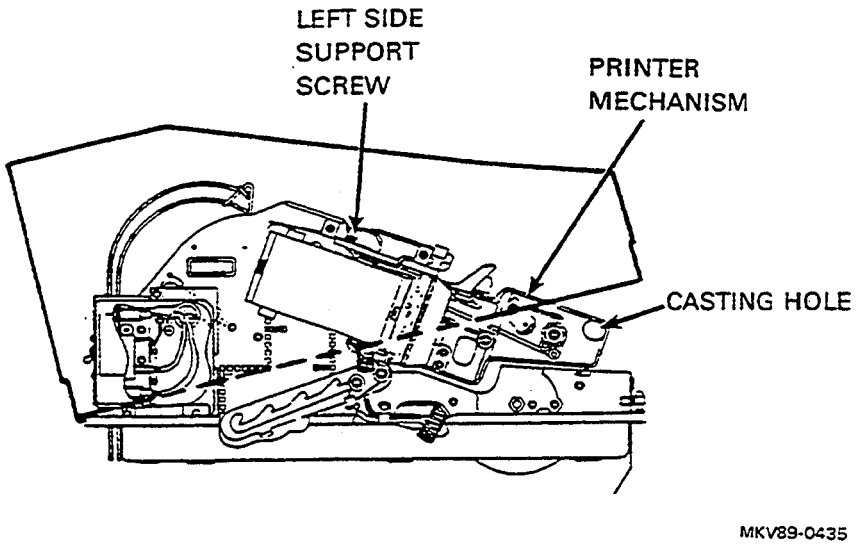

Figure 5–4 Raising the Printer Mechanism (Left Side)

3. Loosen the two right side support screws of the printer mechanism (Figure 5–5).

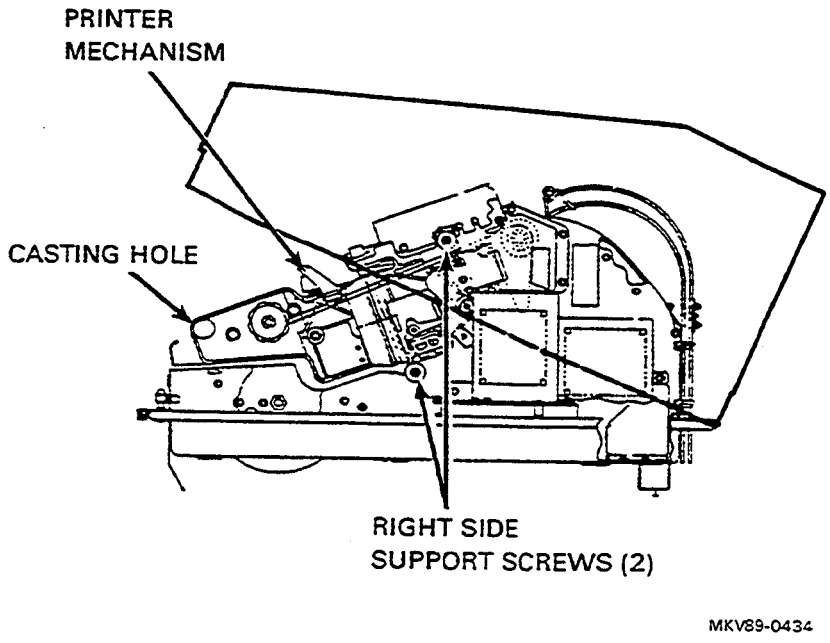

Figure 5–5 Raising the Printer Mechanism (Right Side)

4. Grasp the printer mechanism by the casting holes on both sides of the mechanism, and gently raise it until the latch arm locking slot slides over the support bushing to hold the mechanism in place (Figure 5–6).

WARNING

Ensure that the latch arm locking slot is securely latched over the support bushing before reaching under the printer mechanism.

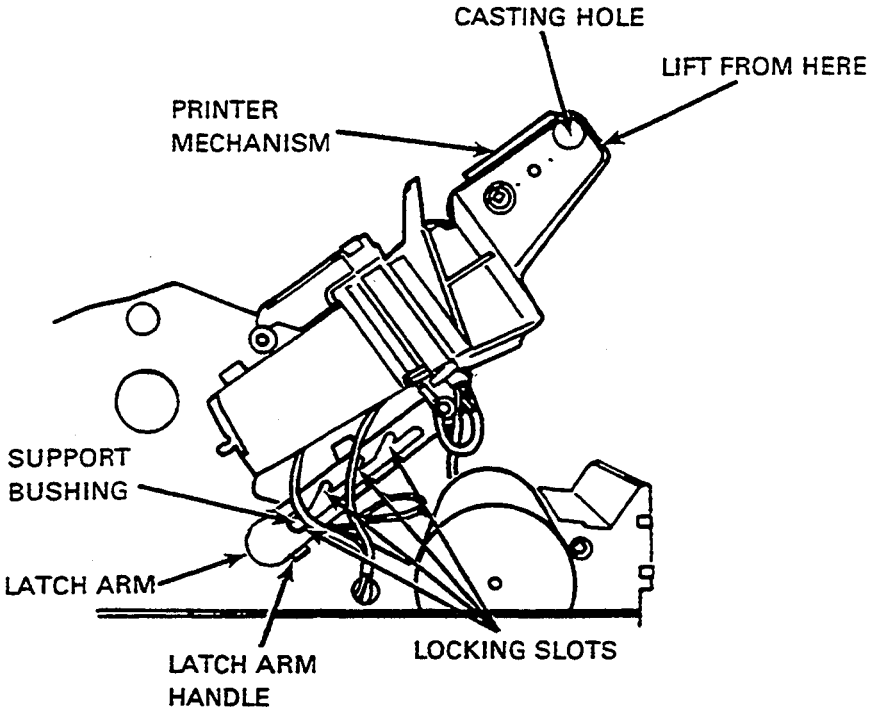

Figure 5–6 Printer Mechanism in Raised Position

To lower the printer mechanism:

1. Grasp the printer mechanism by the casting holes.
2. Lift the blue handle on the latch arm to disengage the locking slot from the support bushing.
3. Lower the printer mechanism.
4. Tighten the three support screws (two on the right side and one on the left side of the mechanism).
5. Lower the top cover.

5.7 REMOVING/REPLACING THE PLATEN/RIBBON MASK ASSEMBLY

To remove the platen and ribbon mask assembly (Figure 5–7):

1. Power OFF the printer, unplug the power cord, and raise the top cover.
2. Remove the paper, ribbon, and print band.
3. Remove the two platen screws.

CAUTION

Be careful not to damage the outside edge of the ribbon mask when removing it from the printer.

4. Carefully lift the platen and ribbon mask off the printer.

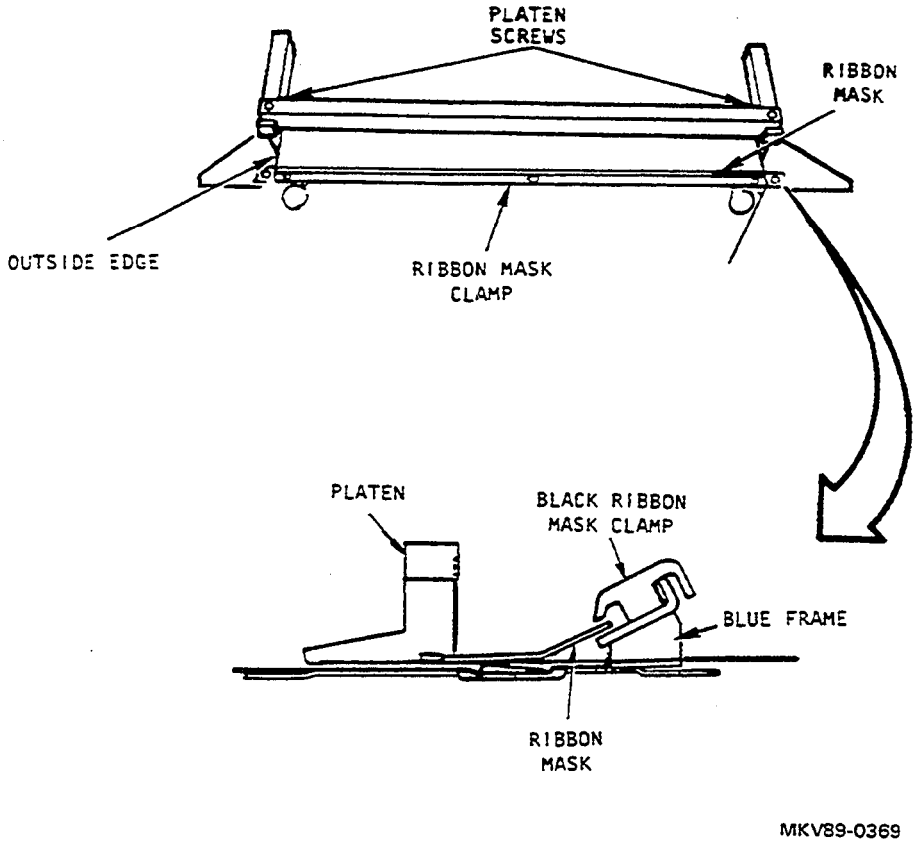

Figure 5–7 Removing the Platen and Ribbon Mask Assembly

To replace the platen and ribbon mask assembly:

1. Position the platen and ribbon mask assembly onto the side castings, ensuring that the front edge of the ribbon mask is positioned between the blue ribbon mask frame and the black ribbon mask clamp.
2. Install and tighten the two platen screws.
3. Install the ribbon, print band, and paper.

5.8 REMOVING/REPLACING THE HAMMER MASK ASSEMBLY

To remove the hammer mask assembly (Figure 5–8):

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Remove the paper, ribbon, and print band.
3. Remove the platen and ribbon mask assembly (Section 5.7).
4. Remove the two ribbon mask frame Allen screws from the printer and remove the frame/clamp assembly from the printer.
5. Remove the hammer mask from the printer (held by hammerbank magnets only).

To replace the hammer mask assembly:

1. Position the hammer mask over the hammerbank so that the fingerstock gasketing on the upper paper tray presses against the hammer mask, and the fingerstock gasketing on the hammer mask presses against the lip on the lower paper tray.
2. Install the platen and ribbon mask assembly (Section 5.7).
3. Install the print band, ribbon, and paper.

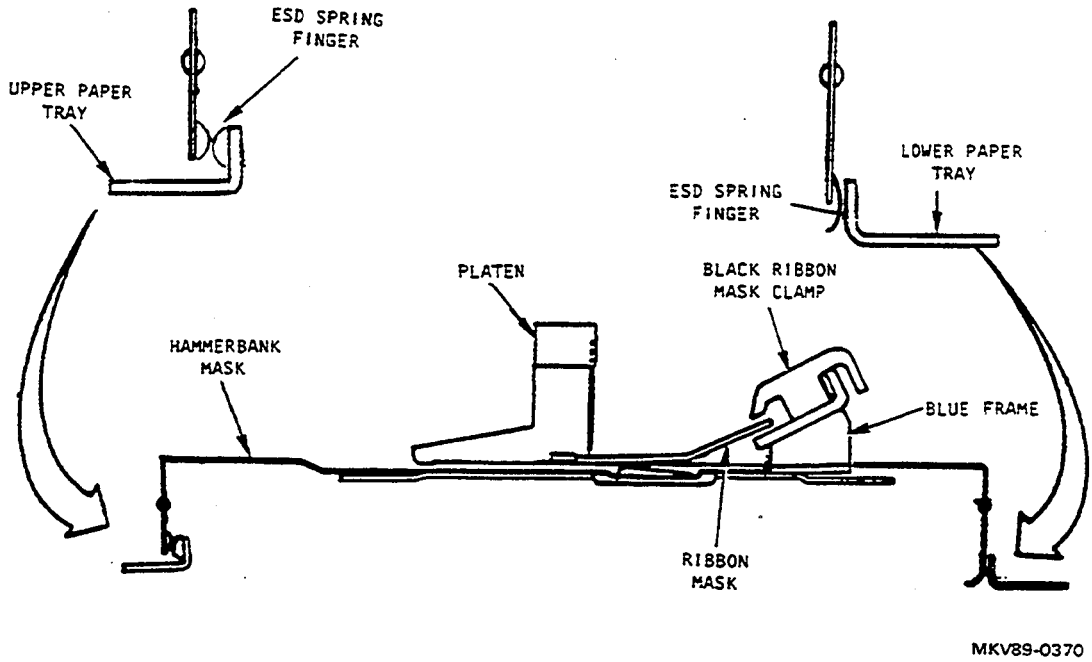

Figure 5–8 Installing the Hammer Mask

5.9 REMOVING/REPLACING THE RIBBON GUIDE/RIBBON END SENSOR ASSEMBLY

To remove the ribbon guide and ribbon sensor assemblies (Figure 5–9):

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Remove the paper, ribbon, and print band.
3. Remove the ribbon mask frame Allen screws.
4. Remove the retaining Allen screws from both ribbon guide brackets.

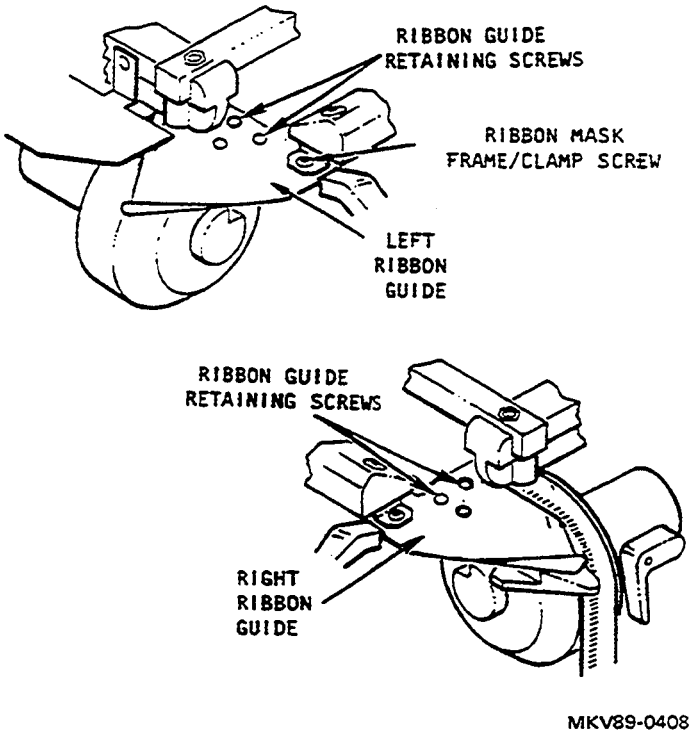

Figure 5–9 Removing the Ribbon Guide and Ribbon End Sensor

5. Slide both ribbon guide brackets out of their slots.
6. Disconnect the terminal wire plugs from the two prongs on each ribbon guide bracket.
7. Remove the ribbon guide assembly.

NOTE

If it is necessary to remove a ribbon end sensor, continue with steps 8 and 9.

8. Remove the sensor screws from the ribbon end sensor (Figure 5–10).
9. Remove the ribbon end sensor assembly from the ribbon guide brackets.

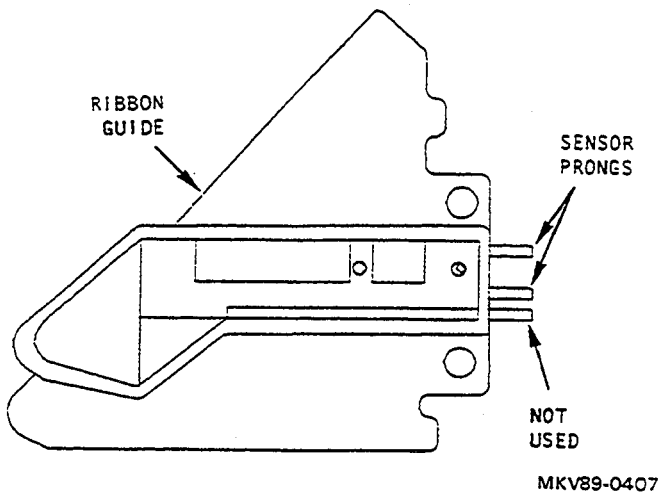

Figure 5–10 Ribbon Guide

To replace the ribbon end sensor and ribbon guide assembly:

1. If the ribbon end sensor was removed, attach the ribbon end sensor assembly to the ribbon guide assembly with the sensor screw.
2. Connect both terminal wire plugs on the left to the left ribbon end sensor assembly.
3. Connect both terminal wire plugs on the right to the right ribbon end sensor assembly.
4. Place the ribbon guide assemblies in position against the printer frame.
5. Install the retaining Allen screws into both ribbon guide assemblies.
6. Install the ribbon mask Allen screws.
7. Install the print band, ribbon, and paper.

5.10 REMOVING/REPLACING THE RIBBON DRIVE MOTOR ASSEMBLY

To remove the ribbon drive motor assembly:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Raise the top cover.
3. Remove the ribbon spools.
4. Raise the printer mechanism (Section 5.6, steps 2 through 4).

WARNING

Ensure that the latch arm locking slot is securely latched over the support bushing before reaching under the printer mechanism.

NOTE
Label the wires before disconnecting them.

5. Disconnect the two terminal wires from the left ribbon drive motor assembly. Note the polarity of the wires (Figure 5–11).
6. Remove the four hex screws (Figure 5–11) that secure the motor to the motor bracket, and remove the left ribbon drive motor assembly from the printer.
7. Disconnect the two terminal wires from the right ribbon drive motor assembly. Note the polarity of the wires.
8. Remove the four screws that secure the motor to the motor bracket, and remove the motor assembly from the printer.

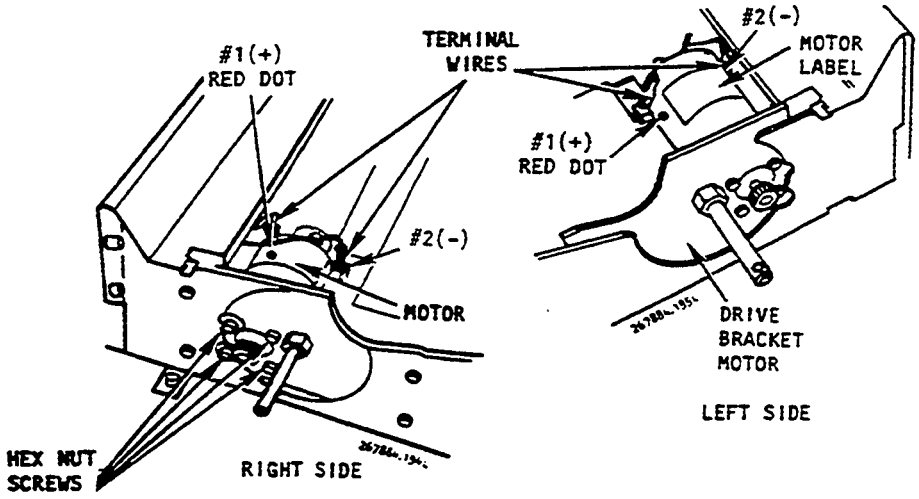

Figure 5–11 Removing the Ribbon Drive Motor

To replace the left and right ribbon drive motor assemblies:

1. Place the ribbon drive motor assembly in position against the drive motor bracket with the motor's label on top.
2. Install and tighten the four screws to secure the motor to the bracket.
3. Connect the #1 (+) terminal wire to the + connector on the motor.
4. Connect the #2 (-) terminal wire to the - connector on the motor.
5. Lower the print mechanism.
6. Tighten the three support screws (two on the right side and one on the left side of the mechanism).
7. Replace the ribbon spools.
8. Lower the top cover.

5.11 REMOVING/REPLACING THE TRANSDUCER ASSEMBLY

To remove the transducer assembly (Figure 5–12):

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Raise the top cover.
3. Remove the paper.
4. Remove the paper forms guide and card cage cover (Section 5.4).
5. Raise the printer mechanism (Section 5.6).

WARNING

Ensure that the latch arm locking slot is securely latched over the support bushing before reaching under the printer mechanism.

6. Cut the cable tie securing the transducer cable to the cable clamp bracket (Figure 5–12).
7. Mark the transducer assembly position (if it is to be reinstalled).
8. Loosen the transducer mounting screw on the transducer bracket.

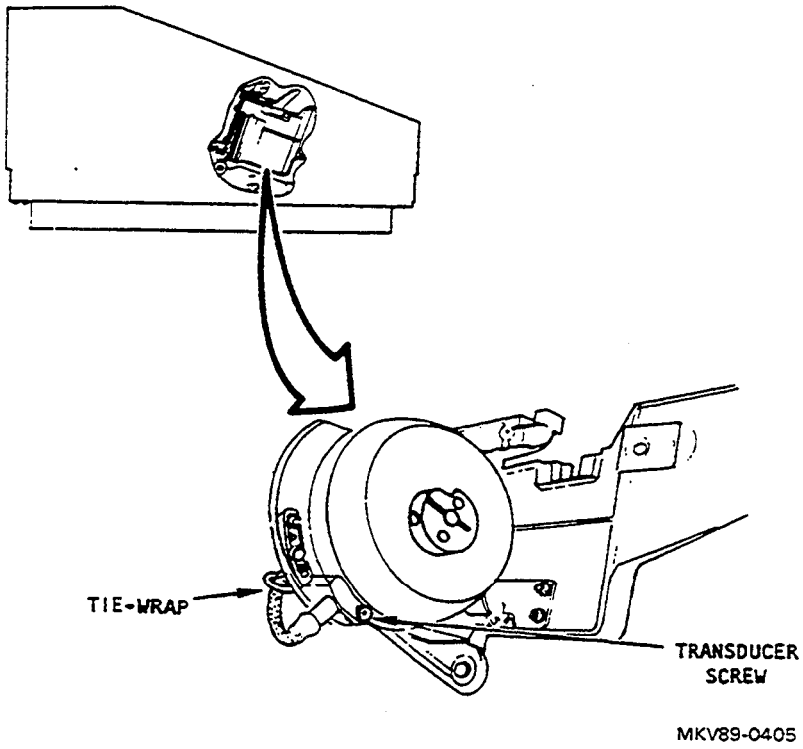

Figure 5–12 Transducer Assembly

9. Slide the transducer assembly out of the bracket.
10. Disconnect cable plug P1 from the motor control board connector J1 (Figure 5–13).
11. Pull the cable through the access hole and remove the transducer assembly from the printer.

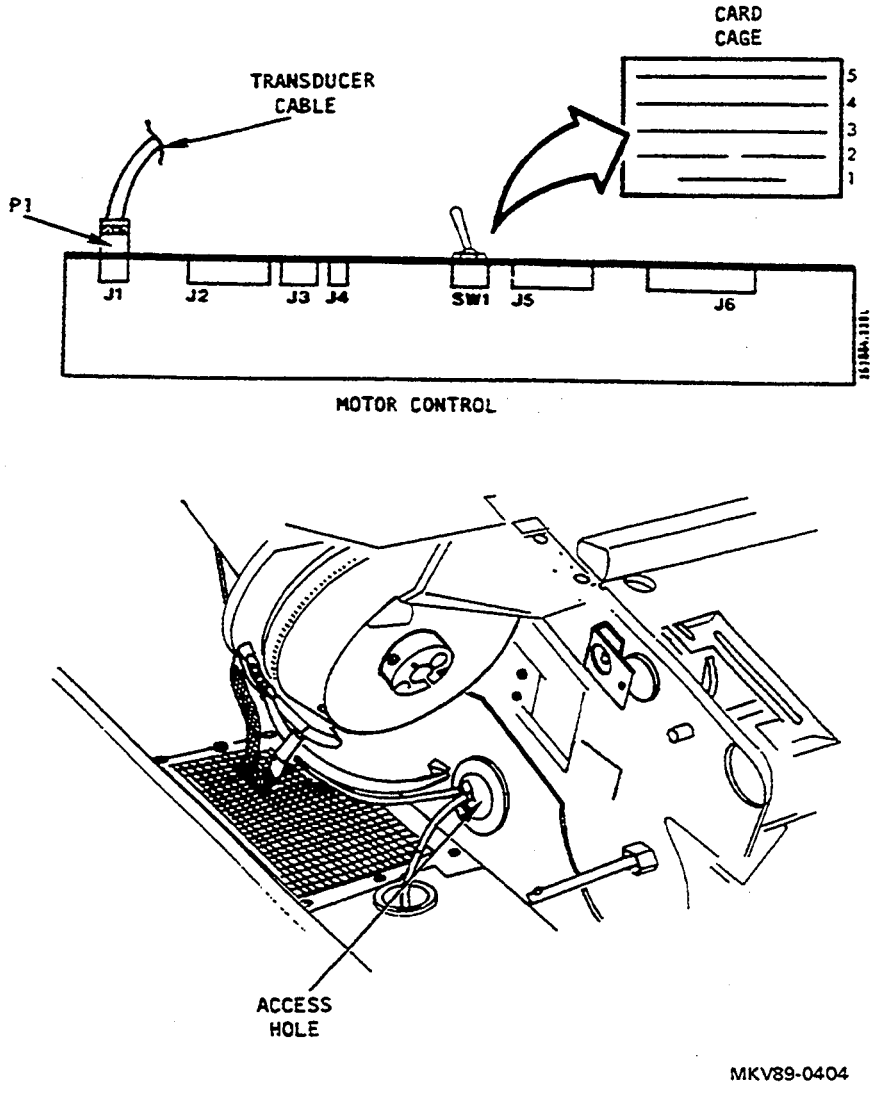

Figure 5–13 Removing the Transducer Assembly

To replace the transducer assembly:

1. Insert the transducer assembly into the bracket at the marked position.
2. Do not let the transducer touch the print band.
3. Tighten the mounting screw on the transducer bracket (Figure 5–14).
4. Use a cable tie to secure the transducer cable to the cable clamp bracket.

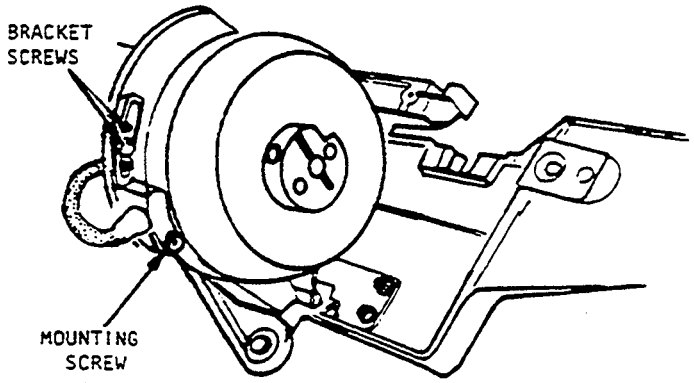

Figure 5–14 Installing the Transducer Assembly

5. Insert the transducer cable through the side access hole.
6. Connect plug P1 to the motor control board connector J1.
7. Lower the printer mechanism.
8. Tighten the screws on the printer mechanism.
9. Install the card cage cover and paper forms guide (Section 5.4).
10. Replace the ribbon and paper.
11. Connect the power cord and power ON the printer.
12. Perform the transducer gap adjustment (Section 4.4.3).
13. Perform the transducer phasing adjustment (Section 4.4.2).

5.12 REMOVING/REPLACING THE TRANSDUCER BRACKET ASSEMBLY

To remove the transducer bracket assembly (Figure 5–15):

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Raise the top cover.
3. Mark the transducer where it enters the transducer bracket (Figure 5–15).
4. Loosen the transducer mounting screw and remove the transducer from the bracket.
5. Remove the two screws that secure the transducer bracket to the printer and remove the bracket.

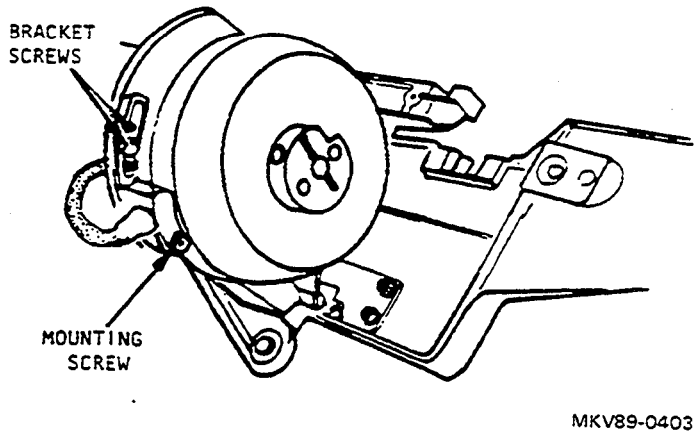

Figure 5–15 Removing the Transducer Bracket

To replace the transducer bracket assembly:

1. Place the bracket in place against the band motor mount.
2. Install and tighten the two bracket mounting screws.
3. Insert the transducer assembly into the bracket until the mark on the transducer lines up with the bracket.
4. Tighten the transducer mounting screw.
5. Lower the top cover, and connect the power cord to the wall outlet.
6. Perform the transducer phasing adjustment (Section 4.4.2).

5.13 REMOVING/REPLACING THE BAND DRIVE MOTOR ASSEMBLY

To remove the band drive motor assembly:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Raise the top cover.
3. Remove the paper, ribbon, and print band.
4. Remove the two screws from the left ribbon guide.
5. Lift up the ribbon guide and obtain enough wire slack to rest the ribbon guide inside the printer frame.
6. Remove the transducer bracket screws and remove the bracket with the transducer attached (Figure 5–16) from the band motor assembly.

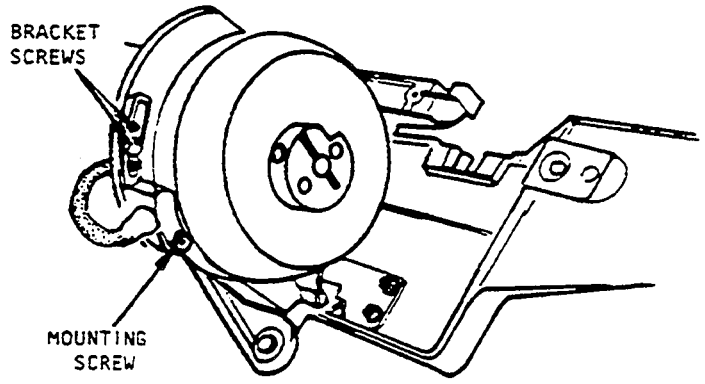

Figure 5–16 Transducer Bracket

7. Remove the hex head and Allen head screws from the flip chart bracket, and remove the bracket from the printer (Figure 5–17).

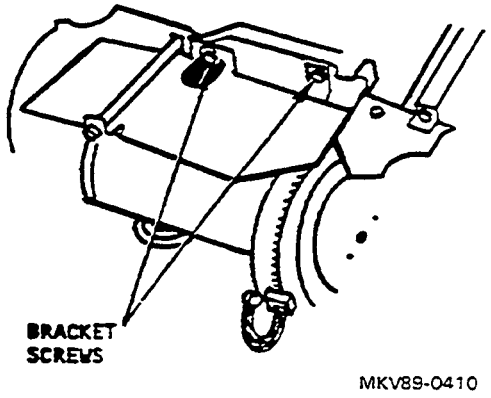

Figure 5–17 Removing the Flip Chart Bracket

8. While supporting the band motor pulley, loosen the two pulley mounting screws and the clamp screw (Figure 5–18).
9. Remove the ribbon roller.
10. Remove the pulley from the motor shaft.

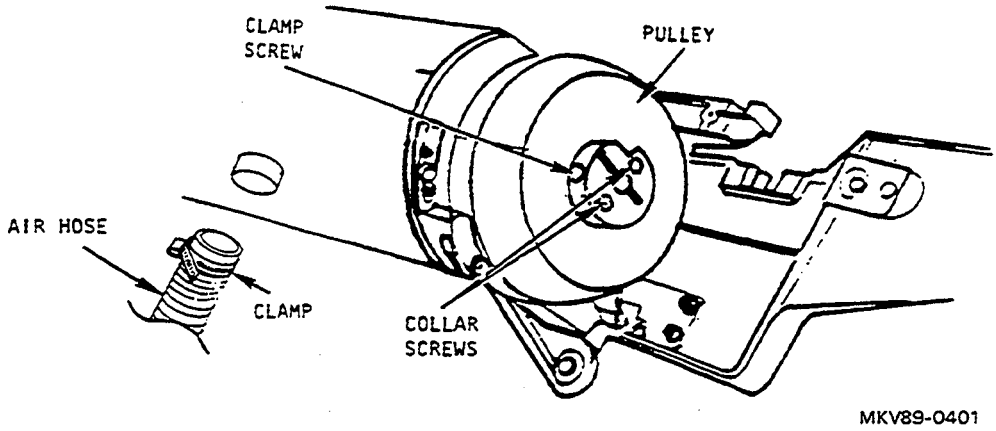

Figure 5–18 Removing the Band Motor Pulley

11. Loosen the screw securing the clamp on the motor air hose.
12. Slide the air hose off the motor assembly (Figure 5–18).
13. Note the polarity, and disconnect the upper and lower wire connectors from the rear of the band motor (Figure 5–19).

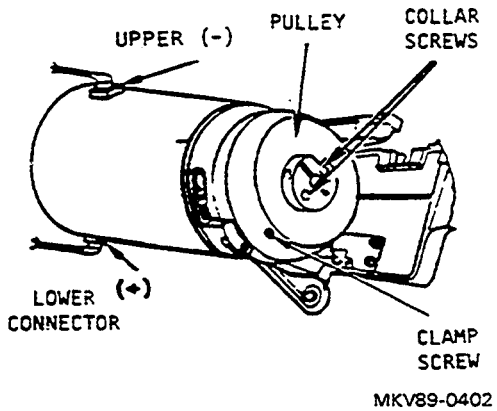

Figure 5–19 Disconnecting the Upper and Lower Wire Connectors from the Band Drive Motor

14. Remove the top pivot screw and spring washer from the motor assembly.
15. Using a hex driver with an extension, remove the inner hex screw from the motor bracket (Figure 5–20).

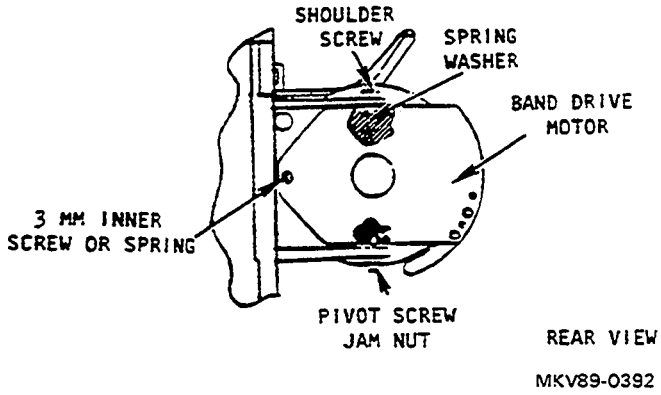

Figure 5–20 Removing the Inner Screw from the Band Pulley Motor

16. Tilt the motor back and remove the inner spring.

NOTE

To avoid having to adjust the band motor height, DO NOT loosen the lower mounting bolt.

17. Lift the motor up and off the lower mounting bolt.

To replace the band drive motor assembly:

1. Insert the inner spring into the motor bracket recess.
2. Position the motor over the lower mounting bolt.
3. Insert the spring washer under the bracket aligned with the top pivot screw.
4. Install and tighten the top pivot screw.
5. Install but DO NOT tighten the inner screw.
6. Connect the (+) terminal wire to the lower connector on the rear of the motor next to the red dot decal (Figure 5–21).
7. Connect the (-) terminal wire to the upper connector on the rear of the motor.

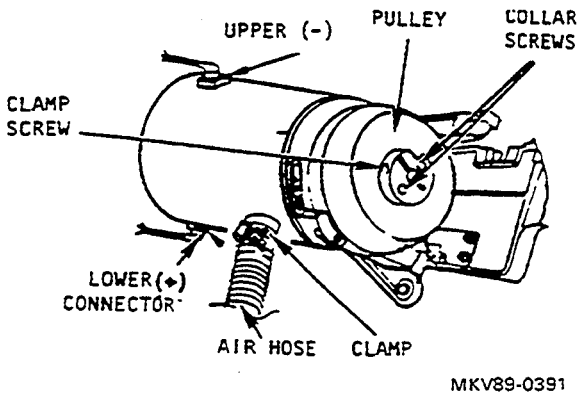

Figure 5–21 Installing the Band Drive Motor

8. Mount the band motor pulley onto the motor shaft but DO NOT tighten the two pulley mounting screws and clamp screws.
9. Position the air hose clamp over the end of the hose and slide the motor air hose onto the motor assembly.
10. Tighten the air hose clamp.
11. Place the flip chart bracket in position, and install the hex head and Allen head screws.
12. Install the ribbon roller.
13. Place the transducer bracket in position against the band motor assembly and secure with the two bracket screws.
14. Seat the left ribbon guide in position against the printer frame, making sure that the wires do not get caught under the ribbon guide.
15. Install and tighten the two Allen head screws to secure the ribbon guide.
16. Install the print band, ribbon, and paper.
17. Perform the following adjustment procedures (Chapter 4).
    a. Band motor pulley height
    b. Band motor pulley tilt
    c. Transducer phasing
    d. Transducer gap

5.14 REMOVING/REPLACING THE BAND CLEANING BRUSH ASSEMBLY

To remove the band cleaning brush assembly:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Remove the two screws that secure the brush assembly to the printer.
3. Remove the brush assembly and inspect the brushes.
4. If the brushes are worn badly, replace the brush assembly; otherwise, clean the brushes and reinstall the brush assembly.

5.15 REMOVING/REPLACING THE BAND IDLER PULLEY

To remove the band idler pulley:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Raise the top cover.
3. Remove the paper, ribbon, and print band.
4. Remove the two screws from the right ribbon guide.
5. Lift the ribbon guide and ensure that there is enough slack to rest the guide on the printer frame.
6. While supporting the band idler pulley, loosen the two pulley mounting screws and the clamp screw (Figure 5–22).
7. Remove the ribbon roller.
8. Remove the pulley from the shaft.

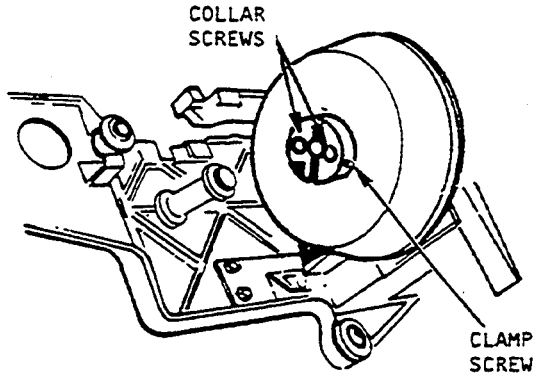

Figure 5–22 Removing the Band Idler Pulley

To replace the band idler pulley:

1. Mount the band idler pulley onto the pulley shaft but DO NOT tighten the pulley mounting screws and the clamp screw.
2. Seat the right ribbon guide, making sure that the sensor wires do not get caught under the guide.
3. Install and tighten the two ribbon guide mounting screws.
4. Install the ribbon roller.
5. Install the ribbon, band, and paper.
6. Connect the power cord and power ON the printer.
7. Perform the following adjustments (Chapter 4):
   a. Idler pulley height
   b. Idler pulley tilt

5.16 REMOVING/REPLACING THE BLOWER MOTOR ASSEMBLY

NOTE

To replace the blower motor in the new style printer, refer to Section B.7.4.

To remove the blower motor assembly:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Raise the top cover.
3. Remove the paper.
4. Remove the paper forms guide and card cage cover (Section 5.4).
5. Raise the printer mechanism (Section 5.6, steps 2 through 4).

WARNING

Ensure that the latch arm locking slot is securely latched over the support bushing before reaching under the printer mechanism.

6. Remove the two screws from the blower motor cover and remove the cover (Figure 5–23).

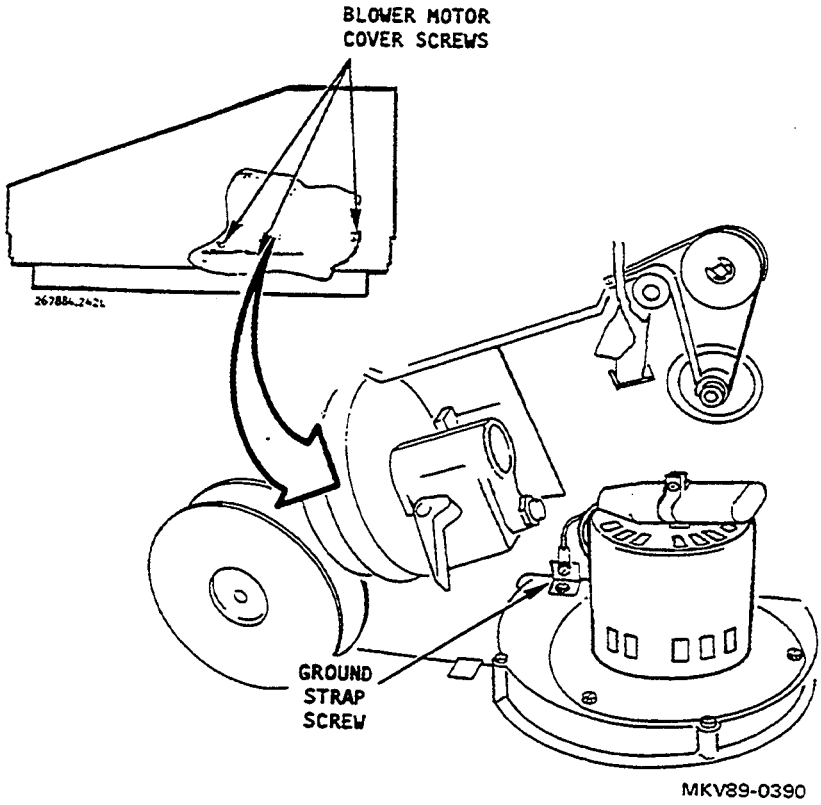

Figure 5–23 Removing the Blower Motor Assembly

7. Disconnect the blower motor cable plug P8 from connector J8 on the power interconnect board (Figure 5–24).

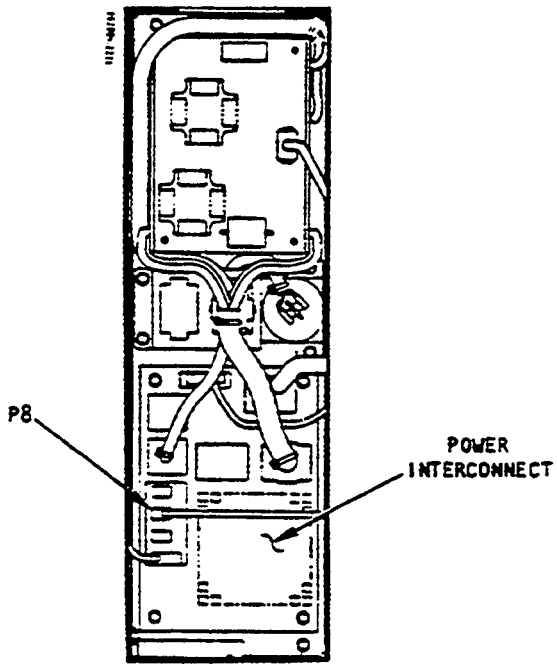

Figure 5–24 Disconnecting the Blower Motor Cable from the Power Interconnect Board

8. Remove the three screws from the blower motor assembly base (Figure 5–25).

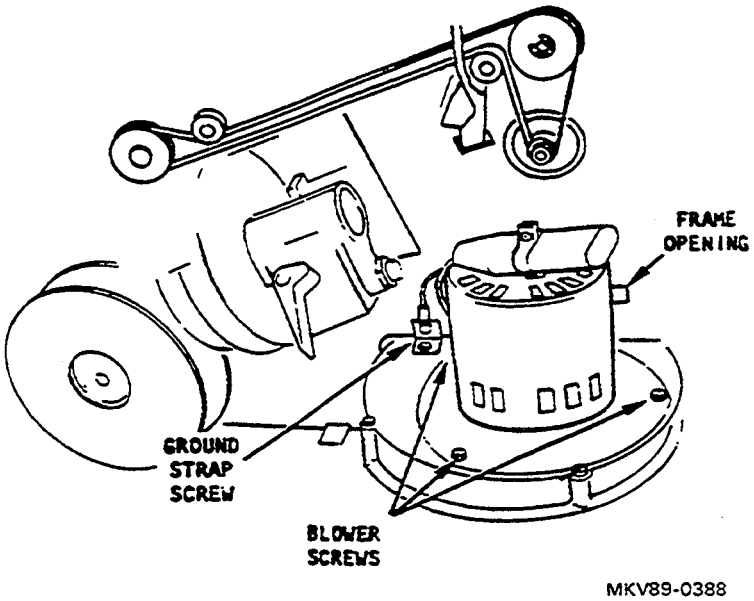

Figure 5–25 Removing Screws from the Blower Motor Base

9. Carefully guide the cable through the opening while removing the blower motor from the printer.

To replace the blower motor assembly:

1. Feed the blower motor cable through the access hole and connect cable plug J8 to connector P8 on the power interconnect board.
2. Mount the blower motor on its base and secure it with the three screws.
3. Place the blower motor cover over the motor and secure it with two screws.
4. Lower the printer mechanism and tighten the three screws to secure it in place.
5. Replace the card cage cover and paper forms guide.
6. Relace the paper and power ON the printer.
7. Ensure that the blower motor is operating properly.

5.17 REMOVING/REPLACING THE AIRFLOW DETECTOR BOARD

To remove the airflow detector board:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Open the top cover and remove the paper, ribbon, and print band.
3. Remove the paper forms guide and card cage cover (Section 5.4).
4. Raise the printer mechanism (Section 5.6, steps 2 through 4).

WARNING

Ensure that the latch arm locking slot is securely latched over the support bushing before reaching under the printer mechanism.

5. Disconnect airflow detector plug J4 from connector P4 on the motor control board.
6. Cut the cable ties from the airflow detector cable.
7. Remove the two Allen head screws on the left side of the air duct.
8. Remove the nut plate securing the airflow detector board to the opening of the air duct (Figure 5–26).
9. With a utility knife, carefully slit the gasket so that the cable can be removed from the gasket.
10. Carefully guide the board and cable between the air duct opening and gasket. Remove the airflow detector board from the printer (Figure 5–26).

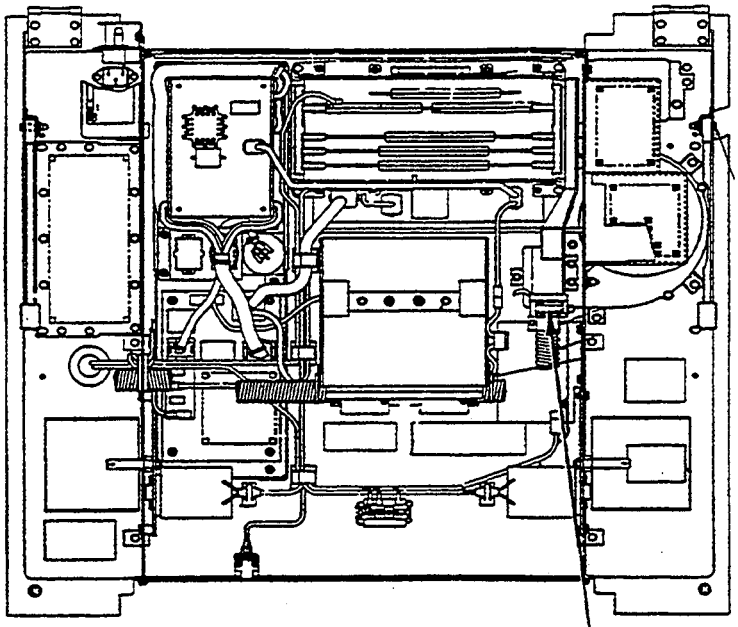

Figure 5–26 Removing the Airflow Detector Board

To replace the airflow detector board:

1. Feed the airflow detector cable through the entrance of the air duct and connect cable plug J4 to connector P4 on the motor control board.
2. Mount the airflow detector board to the inside surface of the air duct, and secure it with the two Allen head screws and nut plate.
3. Lower the printer mechanism.
4. Tighten the three screws on the printer mechanism.
5. Install the paper forms guide and card cage cover.
6. Install the band, ribbon, and paper.
7. Connect the power cord and power ON the printer.
8. Test the printer.

5.18 REMOVING/REPLACING THE I/O HARNESS ASSEMBLY

NOTE

To replace the I/O harness assembly in the new style printer, refer to Section B.7.5.

To remove the I/O harness assembly:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Open the top cover and remove the paper.

3. Remove the paper forms guide and card cage cover (Section 5.4).
4. Open the rear cabinet door.
5. Remove the three screws from the blower motor cover and remove the cover (Figure 5–27).
6. Remove the two remaining screws from the I/O harness bracket cover and remove the cover.
7. Remove the rear plate from the card cage.

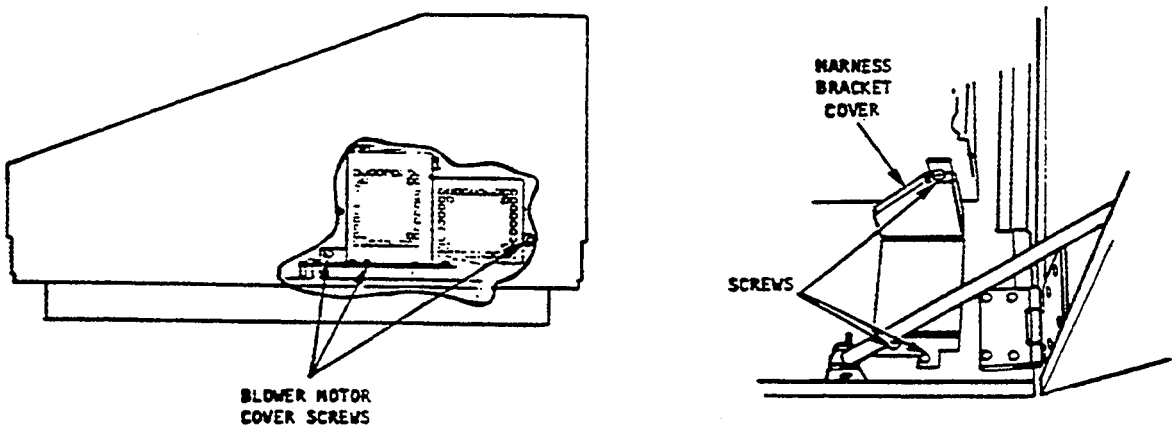

Figure 5–27 Removing the I/O Harness Assembly

8. Disconnect the I/O ribbon cable plug from the motherboard (Figure 5–28).
9. Remove the three screws securing the I/O harness bracket (Figure 5–27). The screws are on the top side of the printer base but the bracket is underneath the printer base.

10. Position the ribbon connector vertically and gently push it through the side access hole and down through the lower access hole (Figure 5–28).
11. Remove the I/O harness assembly from the printer.

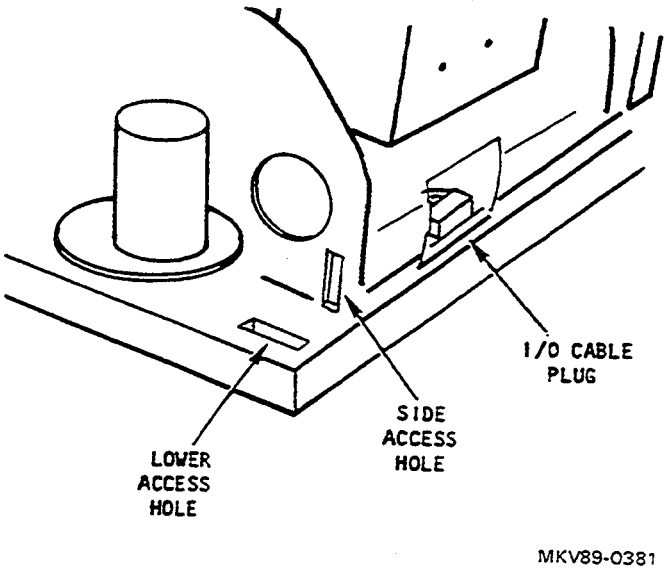

Figure 5–28 I/O Harness Access Holes

To replace the I/O harness assembly:

1. Push the ribbon connector up through the lower access hole into the side access hole (Figure 5–28).
2. Place the back of the I/O harness bracket against the underside of the printer base and secure it with the two screws.
3. Connect the I/O ribbon cable plug to the motherboard.
4. Install the rear plate to the card cage.
5. Mount the I/O harness bracket cover and install the two lower screws (Figure 5–29).

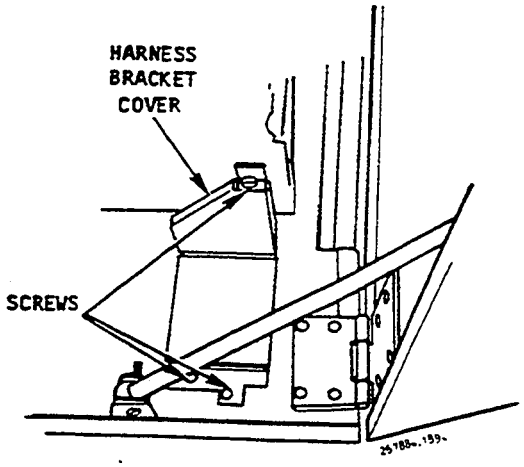

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Figure 5–29 Mounting the I/O Harness Bracket

6. Place the blower motor cover over the motor and install the three screws.
7. Close the rear cabinet door.
8. Install the card cage cover and paper forms guide.
9. Add paper.
10. Test the printer.

5.19 REMOVING/REPLACING THE CIRCUIT BREAKER, EARLY WARNING, AND TOP COVER INTERLOCK SWITCHES

NOTE

To replace the power ON/OFF switch or circuit breaker in the new style printer, refer to Section B.7.6 and Section B.7.7.

To remove the circuit breaker, early warning, and top cover interlock switches:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Open the top cover.

3. Remove the two screws from the circuit breaker switch cover, and remove the cover from the printer (Figure 5–30).

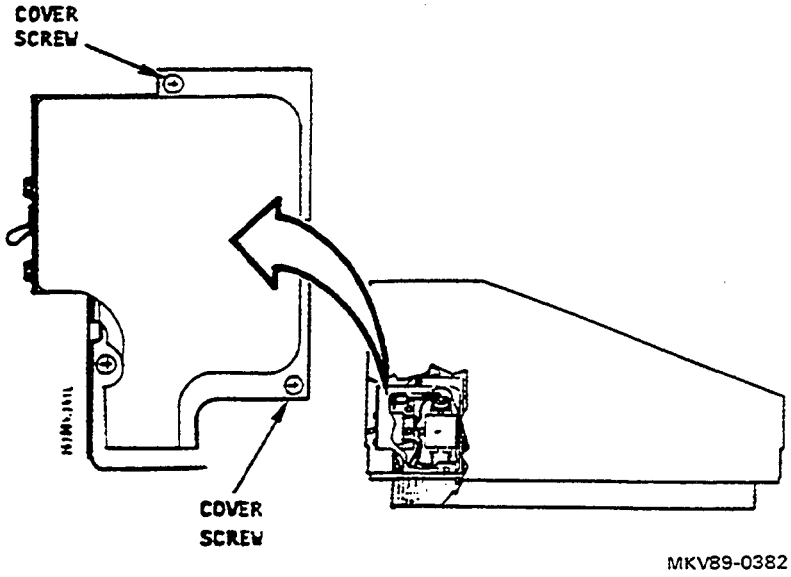

Figure 5–30 Removing the Circuit Breaker Switch Cover

4. Remove the three bracket screws and carefully remove the bracket and interlock switches from the side frame (Figure 5–31).

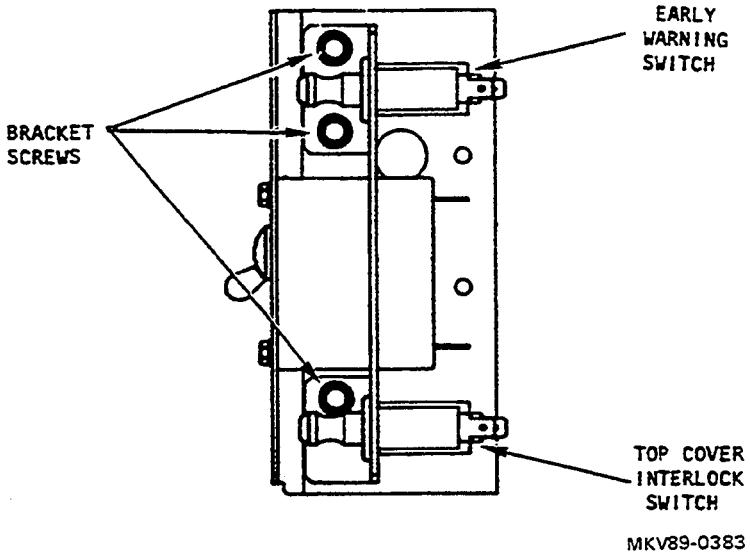

Figure 5–31 Removing the Switch Bracket

5. Mark and remove all the wires from the switch to be removed (Figure 5–32).

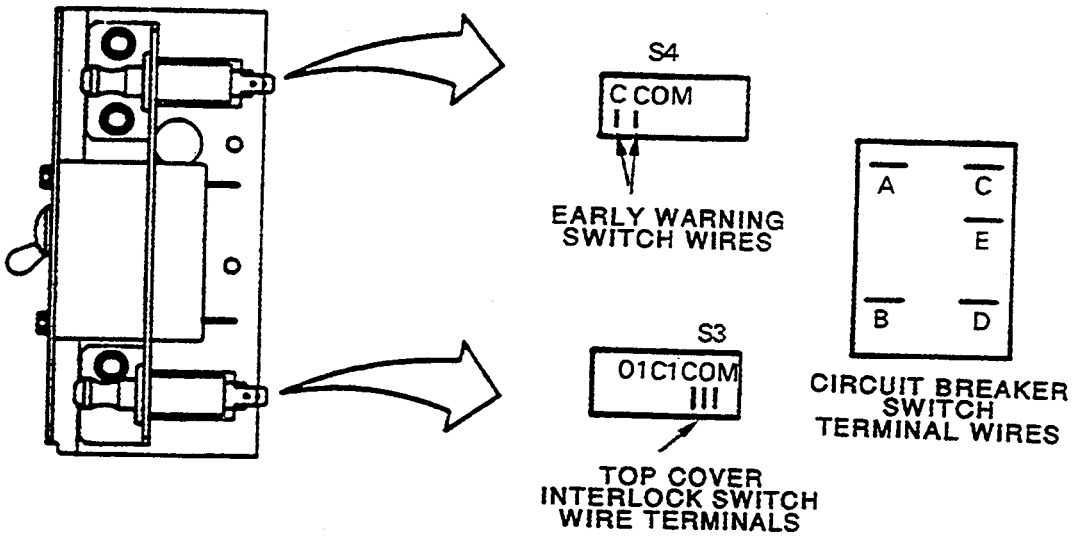

Figure 5–32 Removing Wires from the Switches

6. If one of the interlock switches is being removed, press in the sides of the switch to be removed and slide the switch through the bracket (Figure 5–33).

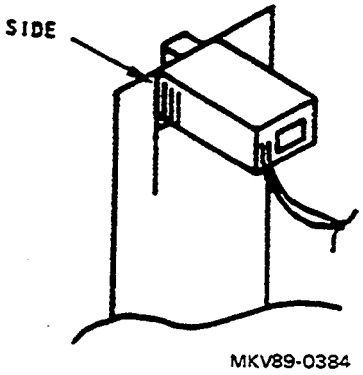

Figure 5–33 Removing Interlock Switches

7. If the circuit breaker switch is to be removed, remove the four mounting screws from the circuit breaker switch and remove the switch from the bracket (Figure 5–34).

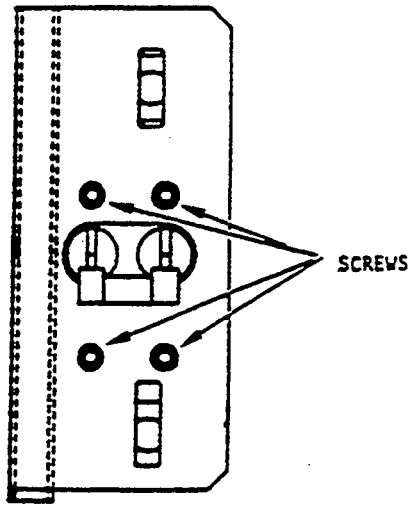

Figure 5–34 Removing the Circuit Breaker Switch

To replace the circuit breaker, early warning, or top cover interlock switches:

1. If the circuit breaker switch is to be installed, mount it onto the switch bracket and secure it with the four mounting screws (Figure 5–35).
2. Connect the five wires to the circuit breaker switch terminals according to their markings.

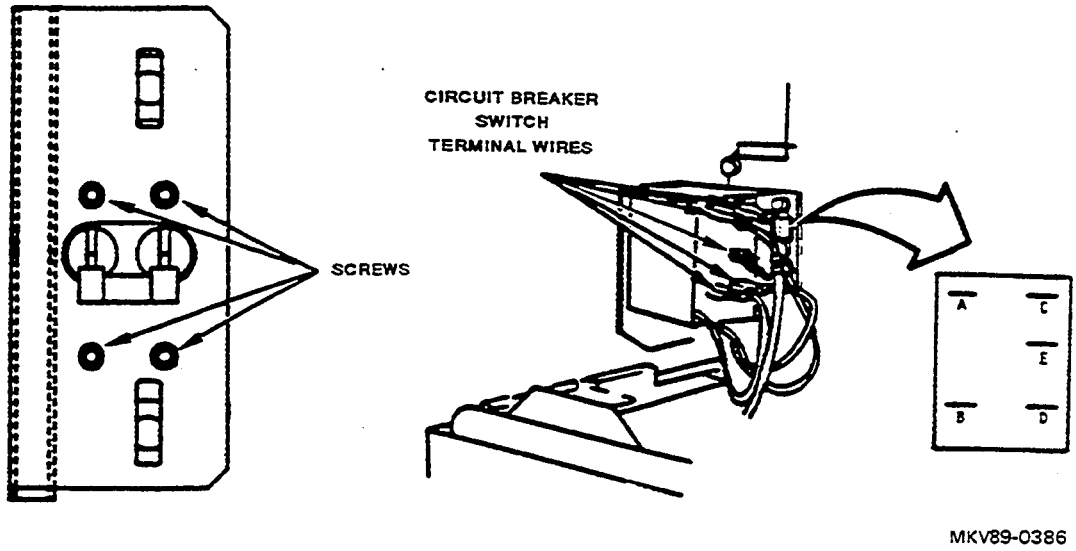

Figure 5–35 Installing the Circuit Breaker Switch

3. Go to step 7.
4. If the early warning or top cover interlock switches are to be installed, mount the switch to the bracket.
5. Place the bracket in position on the side frame and secure it with the three bracket screws (Figure 5–36).

6. Connect the wires to the switch terminal according to their markings.

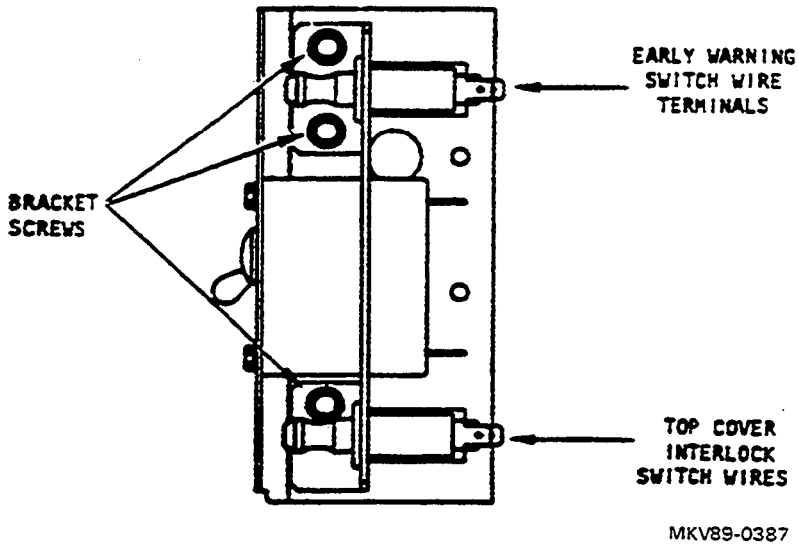

Figure 5–36 Installing the Interlock Switches

7. Mount the circuit breaker switch cover over the switches and secure it with the two cover screws (Figure 5–37).

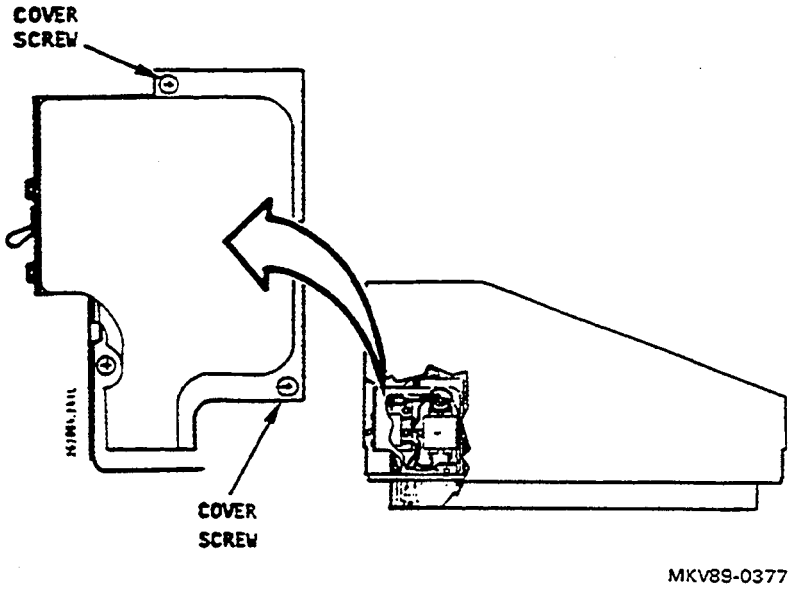

Figure 5–37 Installing the Switch Cover

5.20 REMOVING/REPLACING THE PAPER OUT SENSOR

To remove the paper out sensor:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Open the top cover.
3. Remove the paper.

4. Remove the paper forms guide and card cage cover.
5. Release the sensor cable from the cable ties and disconnect connector A22J1B from W19P1 (Figure 5–38).
6. Raise the printer mechanism (Section 5.6, steps 2 through 4).

WARNING

Ensure that the latch arm locking slot is securely latched over the support bushing before reaching under the printer mechanism.

7. Remove the two screws that secure the front paper deflector and remove the deflector.
8. Remove the two screws securing the sensor to the pan and remove the sensor from the printer.

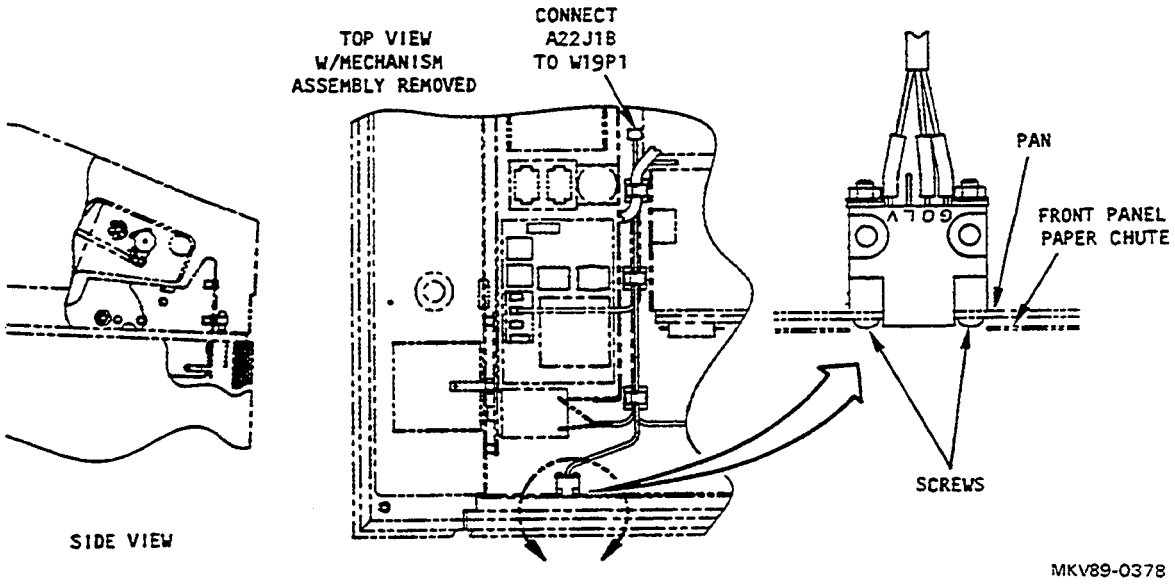

Figure 5–38 Removing the Paper Out Sensor

To replace the paper out sensor:

1. Route the sensor cable through the cable ties.
2. Connect the sensor cable plug A22J1B to W19P1.
3. Position the sensor inside the pan and secure it with the two screws.
4. Install the front paper deflector and secure it with the two screws.
5. Lower the printer mechanism.
6. Tighten all the printer mechanism screws.
7. Add paper and connect the power cord to the wall outlet.
8. Install the paper forms guide and card cage cover.
9. Power ON and test the printer.

5.21 REMOVING/REPLACING THE PAPER STEP MOTOR ASSEMBLY

To remove the paper step motor assembly:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Remove the paper.
3. Remove the paper forms guide and card cage cover.
4. Remove the screws securing the paper step motor cover, and remove the cover (Figure 5–39).

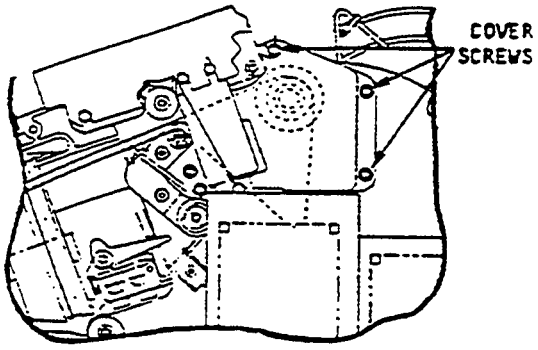

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Figure 5–39 Removing the Paper Step Motor Cover

5. Press down on the tension spring to relieve the timing belt tension, and slide the timing belt off the top motor pulley (Figure 5–40).

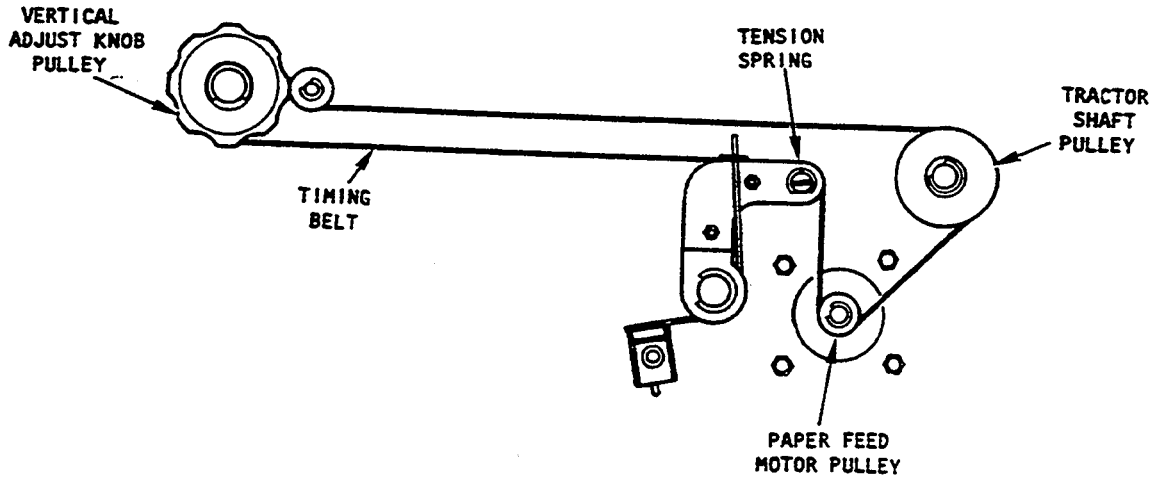

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Figure 5–40 Removing the Timing Belt

6. Remove the three blower motor cover screws and remove the cover (Figure 5–41).
7. Disconnect the two terminal wires from the 3.3 ohm resistor ballast.
8. Disconnect motor cable plug P6 from motor control board connector J6.
9. Remove the four mounting screws from the motor and remove the paper step motor assembly from the printer.

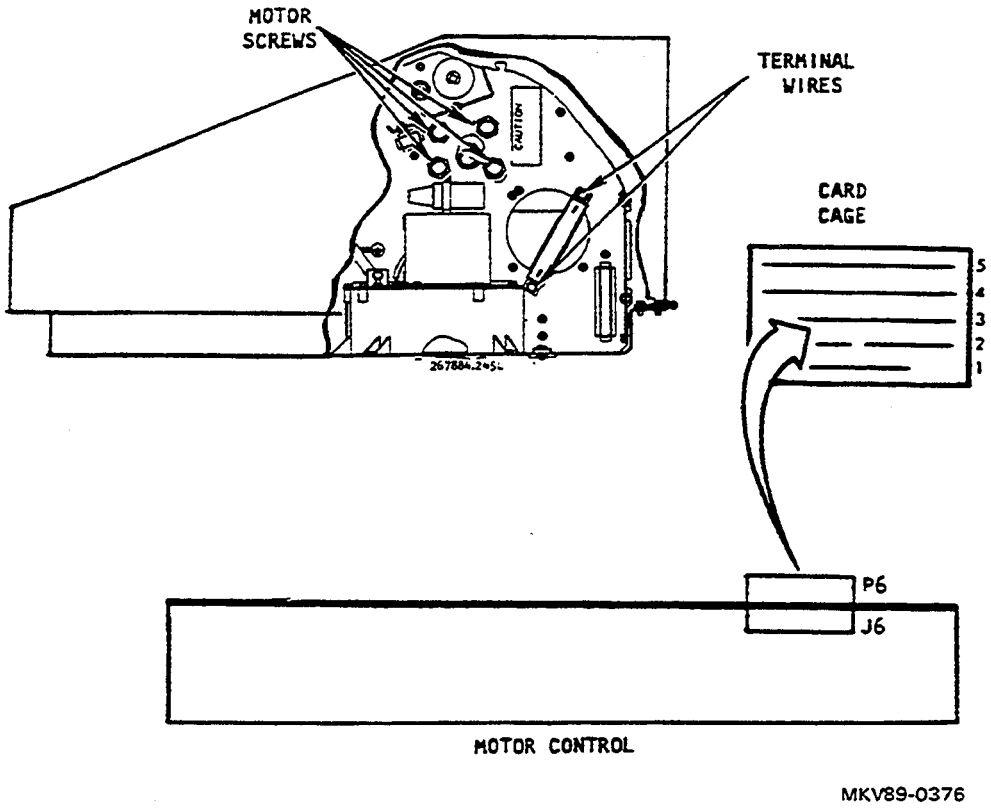

Figure 5–41 Removing the Paper Step Motor Assembly

To replace the paper step motor assembly:

1. Place the paper step motor into position and secure it with the four mounting screws (Figure 5–42).
2. Connect motor cable plug P6 to motor control board connector J6.
3. Connect the two terminal wires to the 3.3 ohm resistor ballast. There is no specific wiring order.
4. Position the timing belt on all pulleys. Then, press down on the tension spring.
5. Slide the belt onto the top pulley. Then, release the tension spring.

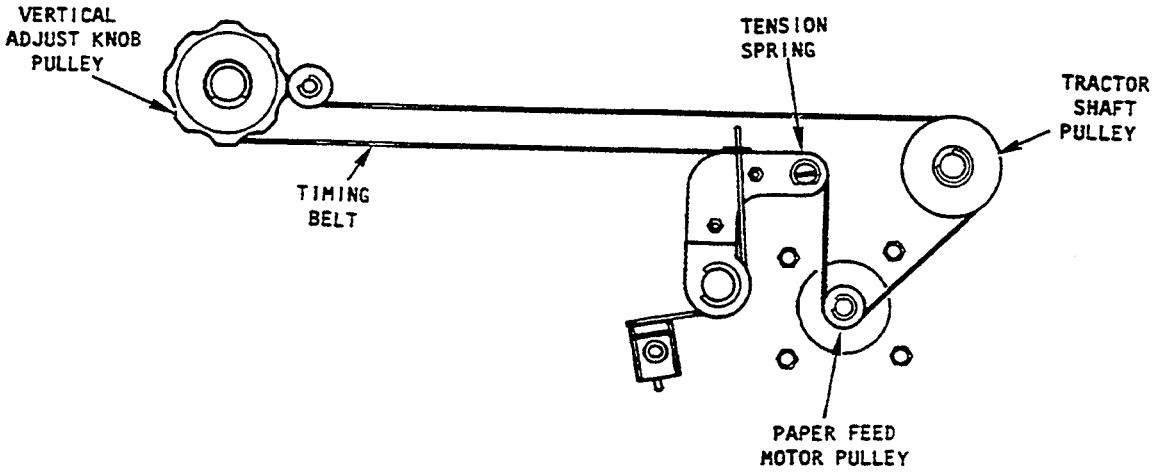

Figure 5–42 Installing the Timing Belt

6. Mount the paper step motor cover on the motor and secure it with the three cover screws.
7. Place the blower motor cover over the blower motor and secure the cover with the three screws.
8. Install the paper forms guide and card cage cover.
9. Turn the forms adjust knob to ensure that the tractor shafts turn freely and that the timing belt is mounted correctly.
10. Add paper and connect the power cord to the wall outlet.
11. Power ON the printer and test the printer.

5.22 REMOVING/REPLACING THE UPPER TRACTOR ASSEMBLIES AND PAPER MOTION SENSOR

To remove the upper tractor assemblies and paper motion sensor:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Open the top cover and remove the paper.
3. Unlock the upper tractors.
4. Remove the paper forms guide and card cage cover (Section 5.4).
5. On the left side (facing the front of the printer), remove the flip chart bracket.
6. Push the lower pulley upward and slip the vernier adjust belt off the top pulley (Figure 5–43).

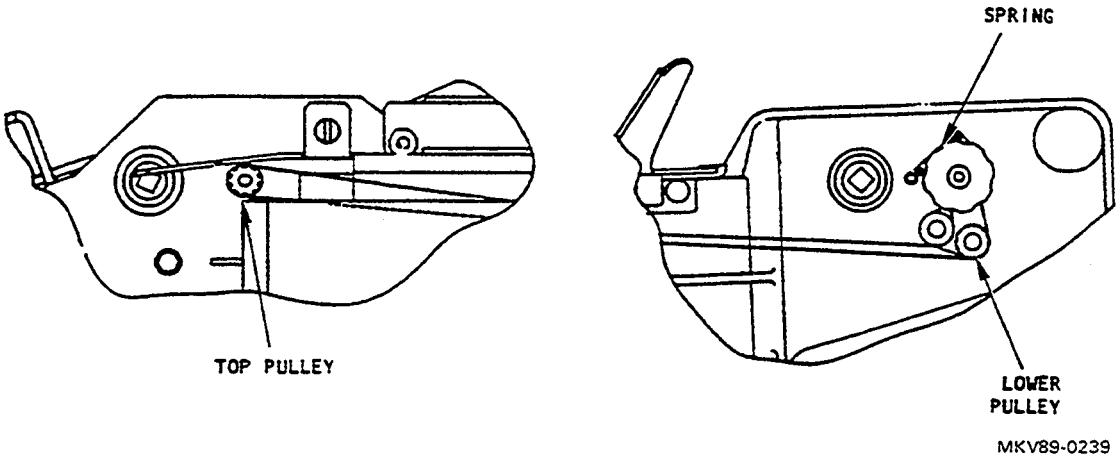

Figure 5–43 Removing the Vernier Adjust Belt

7. On the right side (facing the front of the printer), remove the screws from the paper step motor cover and remove the cover from the printer.
8. Push down on the tension spring pulley and slide the timing belt off the top pulleys (Figure 5–44).

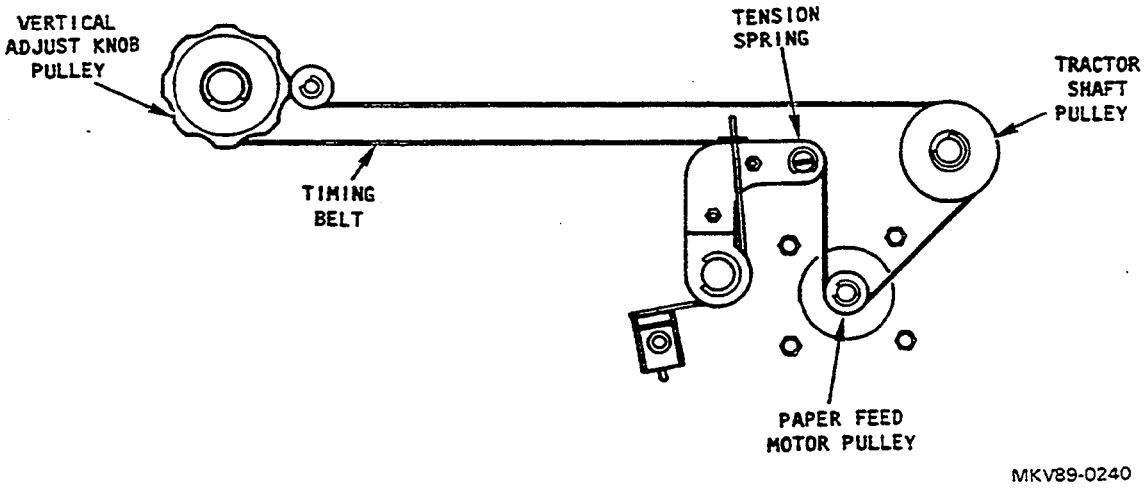

Figure 5–44 Removing the Timing Belt from Tractor Shaft Pulley

9. Remove the three C-rings from the upper shaft (Figure 5–45).
10. Remove the one C-ring from the right end of the lower shaft.
11. Slide the top shaft to the right and out of the right frame molding.

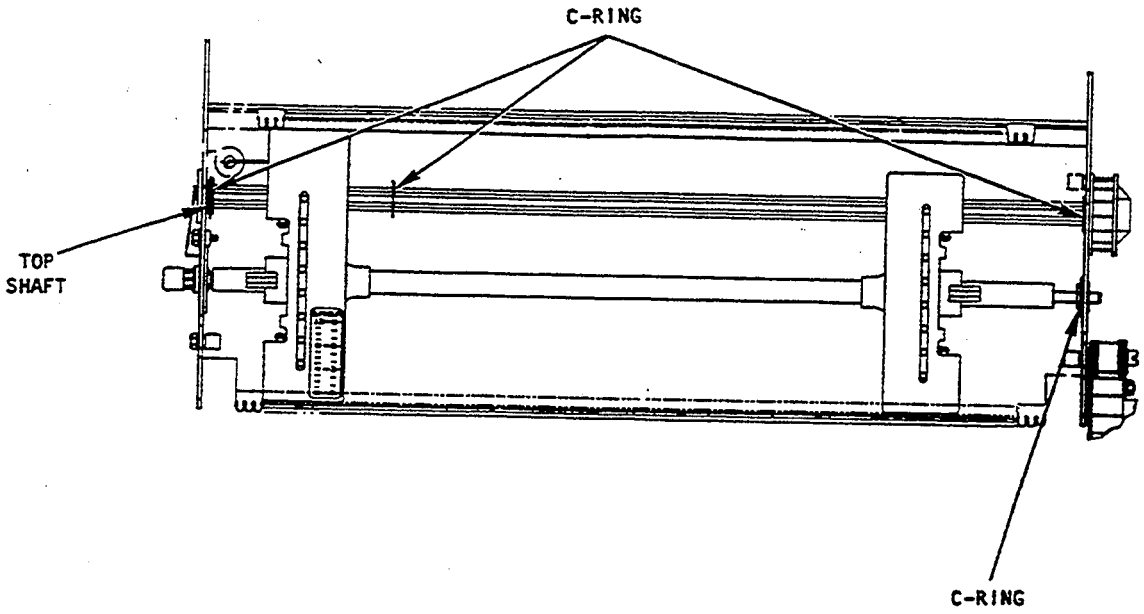

Figure 5–45 Removing C-Rings

12. Turn the top vernier adjust belt pulley counterclockwise until the pulley is separated from the lower shaft (Figure 5–46).

NOTE

This may require pushing down on the tension spring pulley to allow the shaft to clear the tension spring assembly.

13. Disconnect paper motion cable plug P2/J2 from the cable connected to J9/P9 on the motherboard.
14. Slide the paper motion sensor tractor off the shaft.
15. Remove the rubber grommet and guide the cable plug through the access hole.

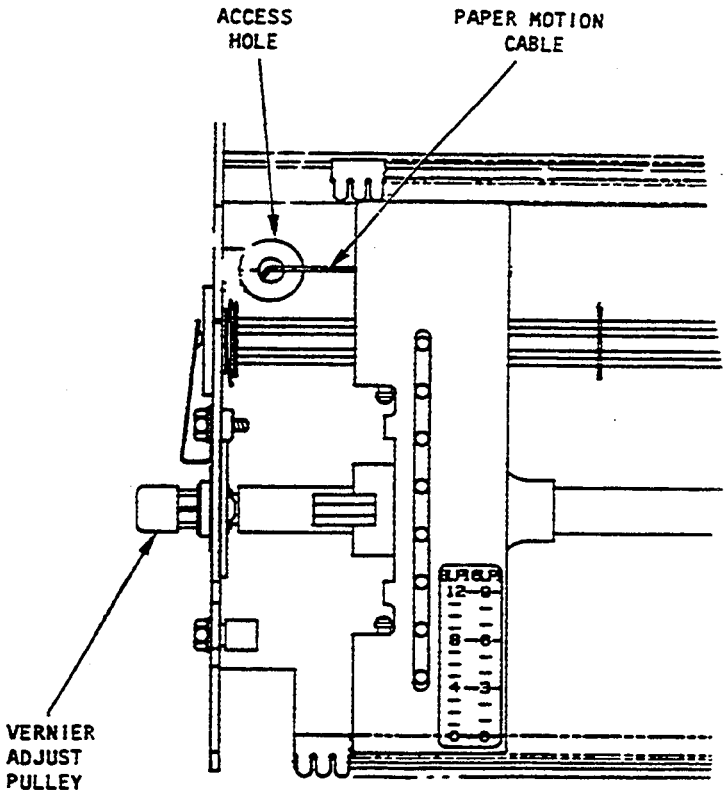

Figure 5–46 Removing the Upper Tractor Assembly

16. To remove the paper motion sensor from the upper tractor, remove the screw as shown in Figure 5–47.

17. If the right tractor assembly is to be replaced, slide it off the shaft.

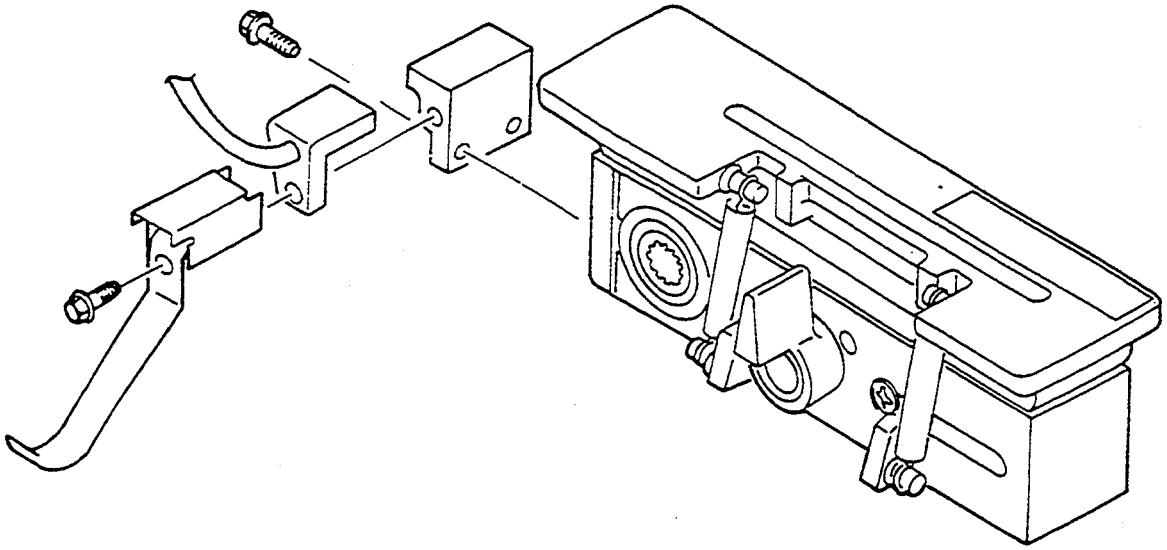

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Figure 5–47 Removing the Paper Motion Sensor from the Tractor

To replace the upper tractor assemblies and paper motion sensor:

1. Install a new paper motion sensor onto the upper tractor, if needed.
2. If replacing the right tractor assembly, slide the new assembly onto the shaft and position it to the right side of the shaft.
3. Note the position of the white phasing dot on each tractor assembly, and slide the paper sensor tractor assembly onto the shaft so that the phasing dots on both upper tractors are located on the same spline of the shaft.
4. Route the sensor cable through the grommet and through the access hole.
5. Connect sensor cable plug P2/J2 to the cable connected to plug J9/P9 on the motherboard.
6. Install the lower shaft keyed insert onto the shaft and into the right side frame molding, and secure in place with the inner C-ring. .
7. Insert the lower shaft thread into the vernier adjust top pulley.
8. Turn the pulley clockwise until the shaft is against the left side frame, then turn the pulley counterclockwise three full turns.
9. Turn the vernier adjust knob clockwise to move the lower tractor's shaft against the left side frame.
10. Slide the vernier adjust belt onto the pulleys as shown in Figure 5–48.
11. Slide the top spline shaft to the left, ensure that both bearings are in the side panels, and install the C-rings on both shafts.

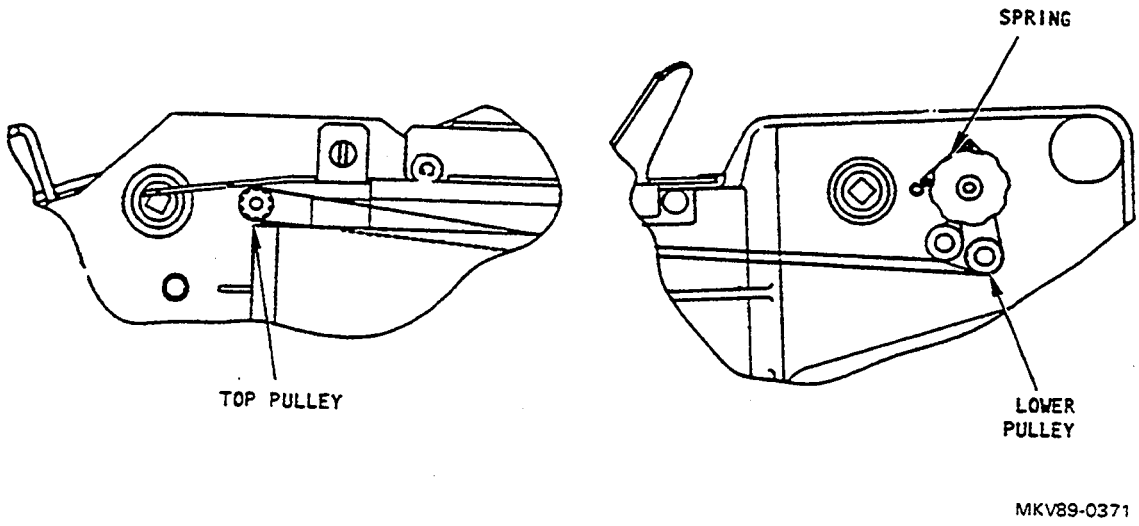

Figure 5–48 Installing the Vernier Adjust Belt

12. Install the paper feed timing belt.
13. Install the paper step motor cover and secure with the three screws.
14. Install the flip chart bracket.
15. Add paper and position tractors correctly.
16. Connect the power cord to the wall outlet.
17. Power ON and test the printer.

5.23 REMOVING/REPLACING THE VERNIER ADJUST KNOB, BELT, AND LOWER TRACTORS

To remove the vernier adjust knob, belt, and lower tractors:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Open the top cover and remove the paper.
3. Unlock the lower tractors.
4. Remove the flip chart bracket.
5. Push the lower pulley upward and release the belt from the top pulley (Figure 5–49).
6. If only this belt is being replaced, go to step 9 of the replacement procedures.
7. Remove the vernier adjust spring from the printer frame.

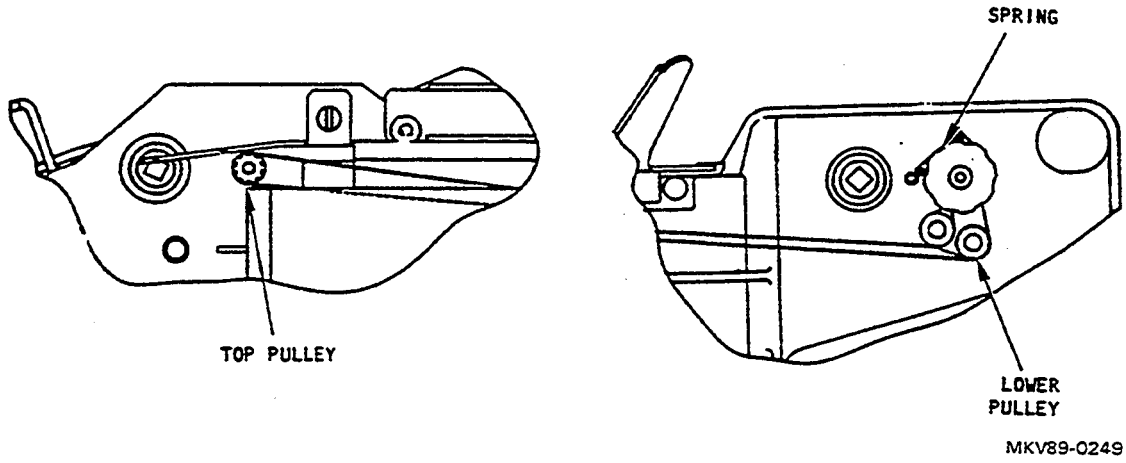

Figure 5–49 Removing the Vernier Adjust Spring

8. Remove the three C-rings from the upper tractor shaft and the one C-ring from the lower tractor shaft (Figure 5–50).

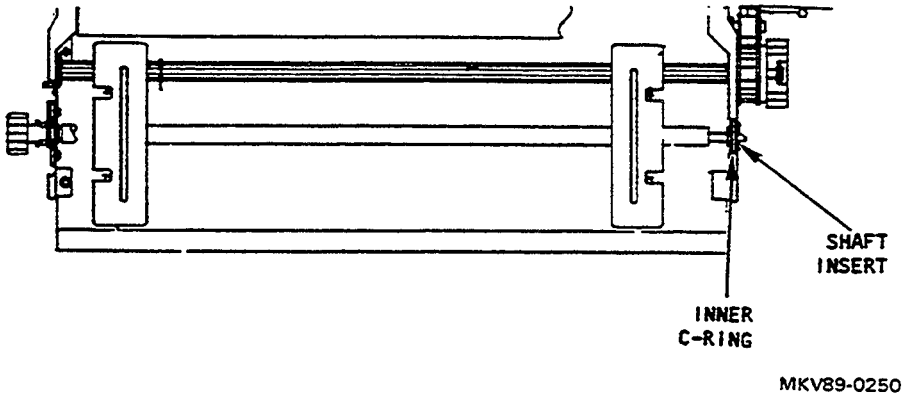

Figure 5–50 Removing C-Rings from Lower Shafts

9. To remove the vernier adjust knob, remove the inner C-ring from the lower shaft (Figure 5–51).
10. Turn the knob counterclockwise until the knob is separated from the lower shaft.
11. Remove the bracket and inside washers from the printer.

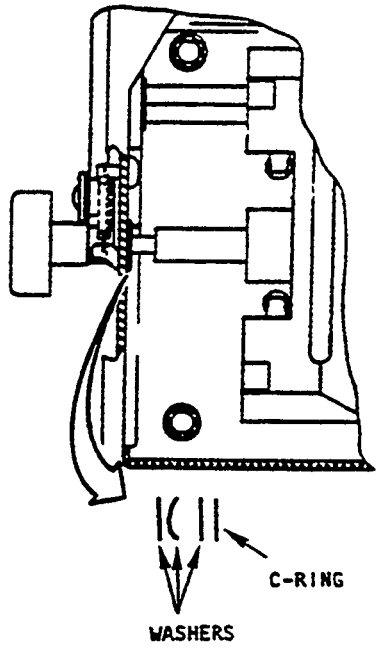

Figure 5–51 Separating the Shaft from the Vernier Adjust Knob

12. If the vernier adjust knob is the only item being replaced, go to step 5 of the installation procedures.
13. Remove the shaft insert from the right side of the lower shaft (Figure 5–52).

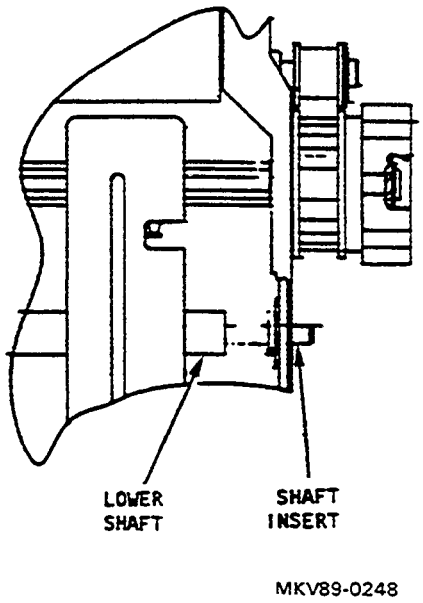

Figure 5–52 Removing the Shaft Insert

14. Slip the paper feed timing belt off the vertical adjust knob pulley by pushing back on the tension spring pulley and sliding the belt off the pulley (Figure 5–53).

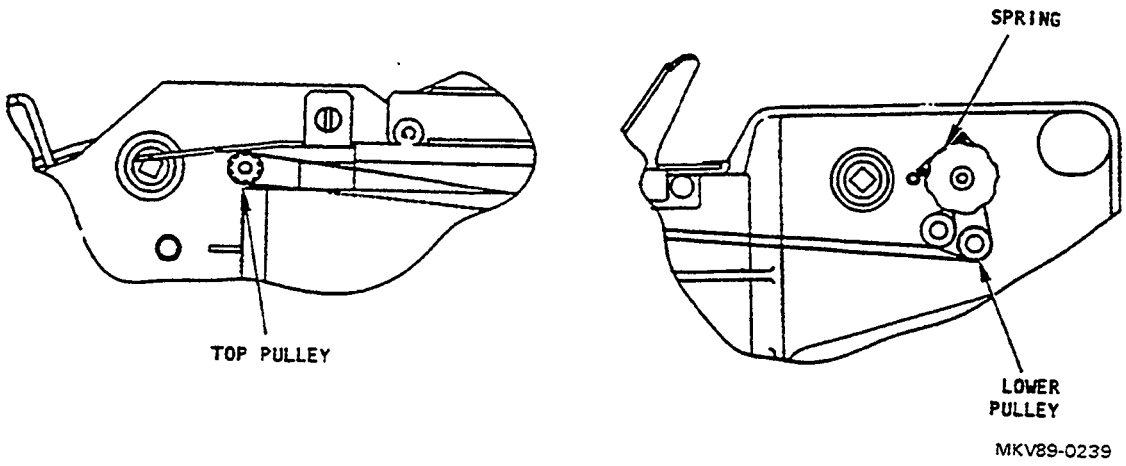

Figure 5–53 Removing the Timing Belt from the Lower Shaft Pulley

15. Remove the outer C-rings from the lower shaft.
16. Slide the shafts to the right and out of the frame molding enough to slide the tractors off the shafts.
17. Slide the tractors off the shafts.

To replace the vernier adjust knob, belt, and lower tractors:

1. Slide the right side tractor onto the shafts and position it to the right.
2. Note the position of the white phasing dot on each tractor assembly, and slide the left tractor assembly onto the shaft so that the phasing dots on both lower tractors are located on the same spline of the shaft.
3. Install the lower shaft keyed insert onto the shaft and into the right side frame molding.
4. Install the three C-rings (Figure 5–54).
5. Position the vernier adjust knob assembly (bracket, outside washer, and inner washers) onto the lower shaft.
6. Install the two inner C-rings onto the lower shaft.

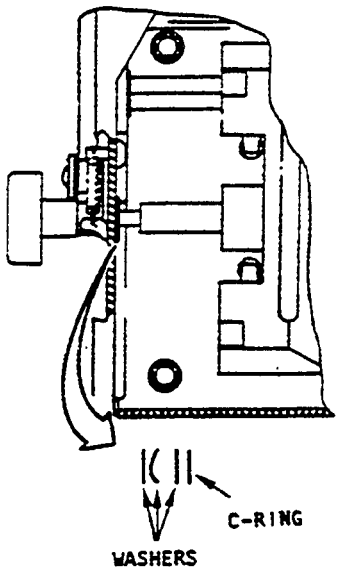

Figure 5–54 Installing the Lower Shafts

7. Install the vernier adjust spring onto the frame.
8. Insert the lower shaft thread into the vernier adjust knob and turn the knob clockwise until the shaft is against the left side frame.
9. Press up on the lower pulley and slide the vernier adjust belt onto the pulleys (Figure 5–55).

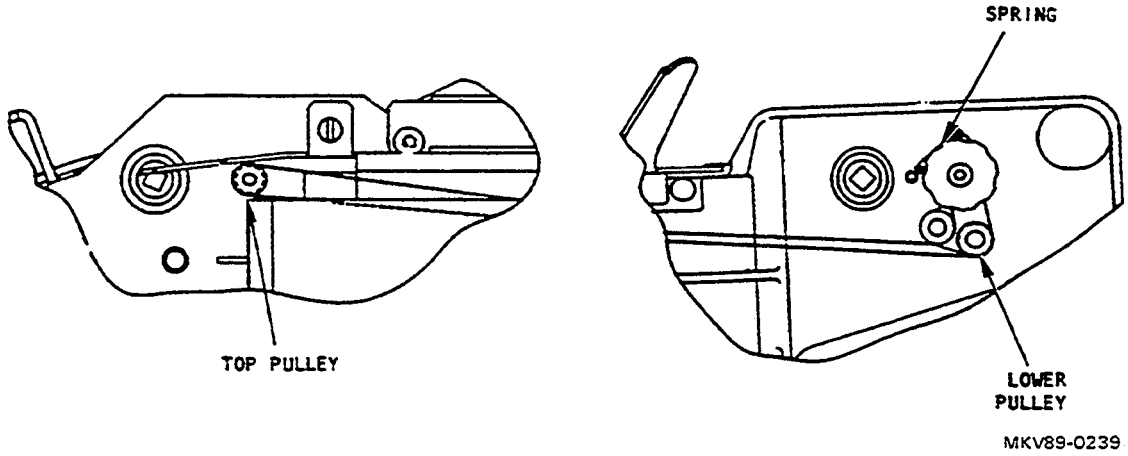

Figure 5–55 Installing the Vernier Adjust Spring and Belt

10. Turn the pulley for the upper set of tractors vernier adjust belt clockwise until the shaft is against the left side frame, then turn the pulley three full turns counterclockwise.
11. Install the paper feed timing belt by pressing down on the tension spring and sliding the belt onto the pulleys (Figure 5–56).

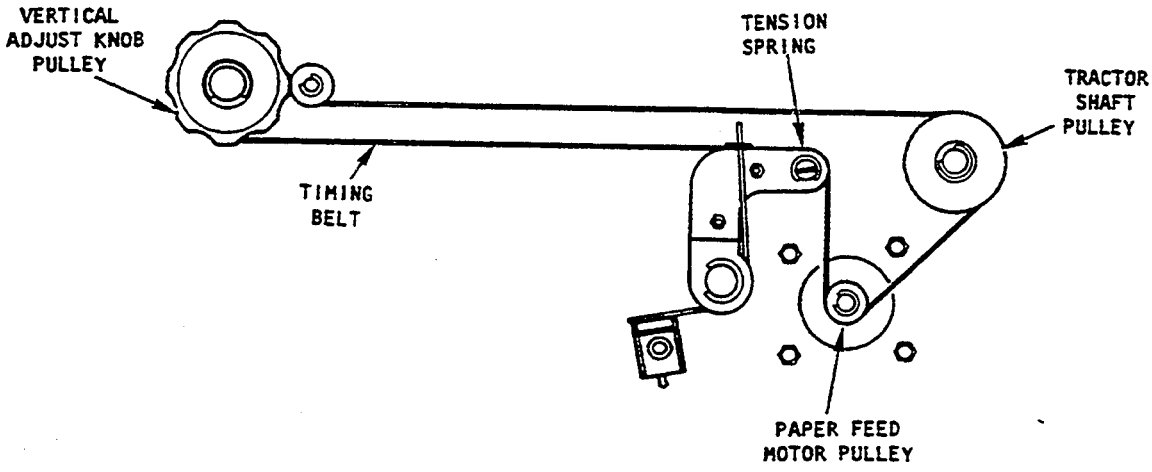

Figure 5–56 Installing Timing Belt on Lower Shaft Pulley

12. Install the paper step motor cover and secure it with the cover screws.
13. Install the flip chart bracket.
14. Add paper, position the tractors, and lock them in place.
15. Connect the power cord to the wall outlet and power ON the printer.
16. Test the printer.

5.24 REMOVING/REPLACING THE MAIN OPERATOR CONTROL PANEL BOARD

To remove the main operator control panel board:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Open the top cover and remove the paper.
3. Remove the paper forms guide and card cage cover (Section 5.4).
4. Remove the screws securing the paper step motor cover and remove the cover.
5. Loosen the two outer screws securing the control panel bracket.
6. Remove the inner control panel bracket screw and keyed washer.

CAUTION
DO NOT allow the washers to fall into the printer mechanism.

7. Carefully lift the control panel and disconnect the control panel plug from the board connector (Figure 5–57).

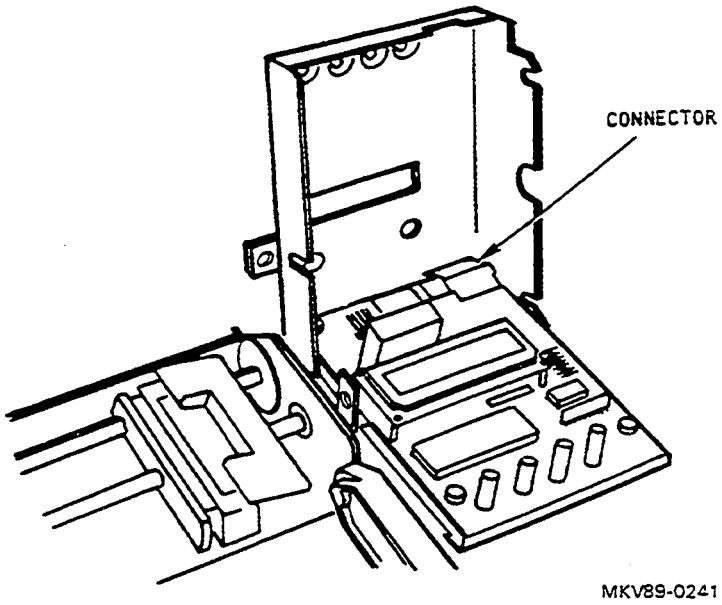

Figure 5–57 Removing the Main Operator Control Panel Cover

8. Disconnect ribbon cable connector P1 from processor board connector J1.
9. Unsnap the bracket cable support cover and remove the cover (Figure 5–58).

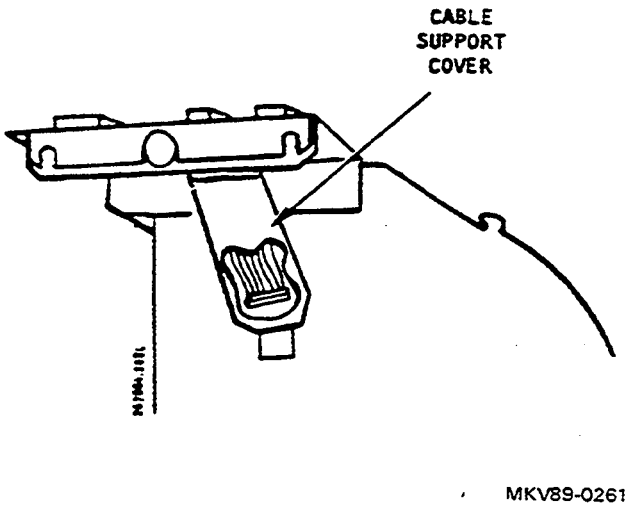

Figure 5–58 Removing the Bracket Cable Support Cover

10. Remove the four screws securing the control panel board (Figure 5–59).

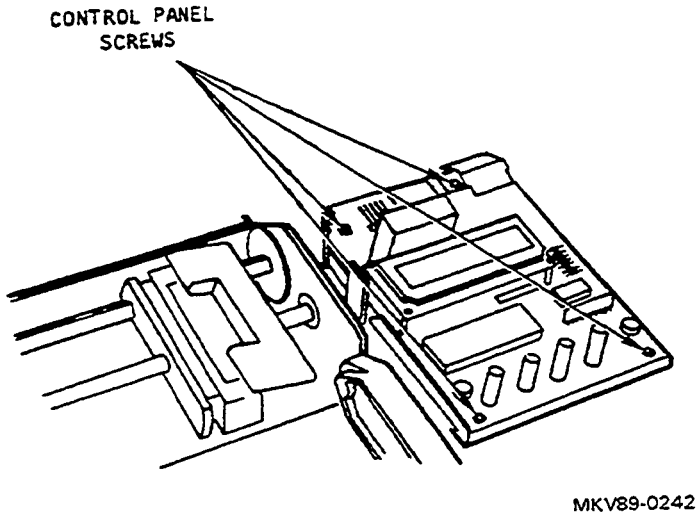

Figure 5–59 Removing the Main Operator Control Panel Board

11. Guide the ribbon cable through the access hole and remove the control panel assembly from the bracket (Figure 5–60).

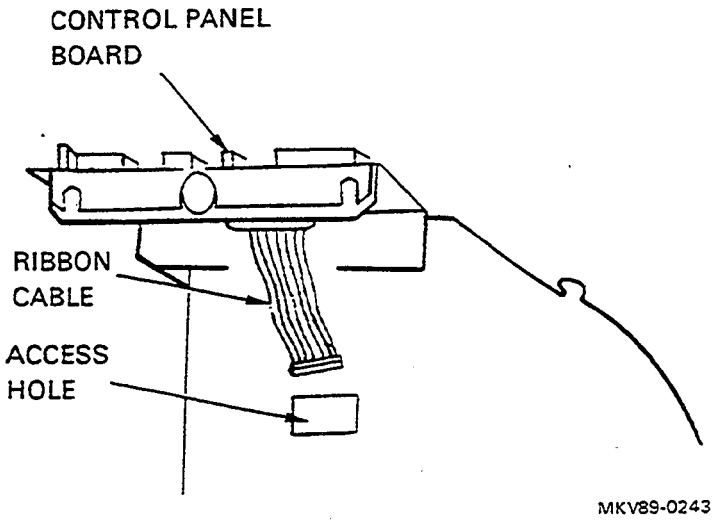

Figure 5–60 Main Operator Control Panel Ribbon Cable

To replace the control panel board:

1. Feed the ribbon cable through the access hole and position the control panel assembly onto the bracket.
2. Install and tighten the four mounting screws.
3. Connect ribbon cable plug P1 to processor board connector J1.
4. Snap the bracket cable support cover over the cable.
5. Carefully connect the control panel ribbon connector to the board connector.
6. Place the control panel over the board.
7. Install and tighten the inner control panel bracket screw and keyed washer.
8. Tighten the two outer control panel bracket screws.
9. Place the paper step motor cover on the step motor and secure it with the cover screws.
10. Install the paper forms guide and card cage cover.
11. Add paper.
12. Connect the power cord to the wall outlet and power ON the printer.
13. Test the printer.

5.25 REMOVING/REPLACING A HAMMER MODULE

To remove a hammer module:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Open the top cover and remove the paper, ribbon, and print band.
3. Remove the platen/ribbon mask assembly and hammerbank mask (Section 5.7).
4. Raise the printer mechanism to its highest position (Section 5.6, steps 2 through 4).

WARNING

Ensure that the latch arm locking slot is securely latched over the support bushing before reaching under the printer mechanism.

5. Remove the four screws securing the air plenum assembly, and remove the air plenum assembly from the hammerbank assembly. The screws are located in the four corners of the plenum. The right front screw is located under the hammerbank mask (Figure 5–61).

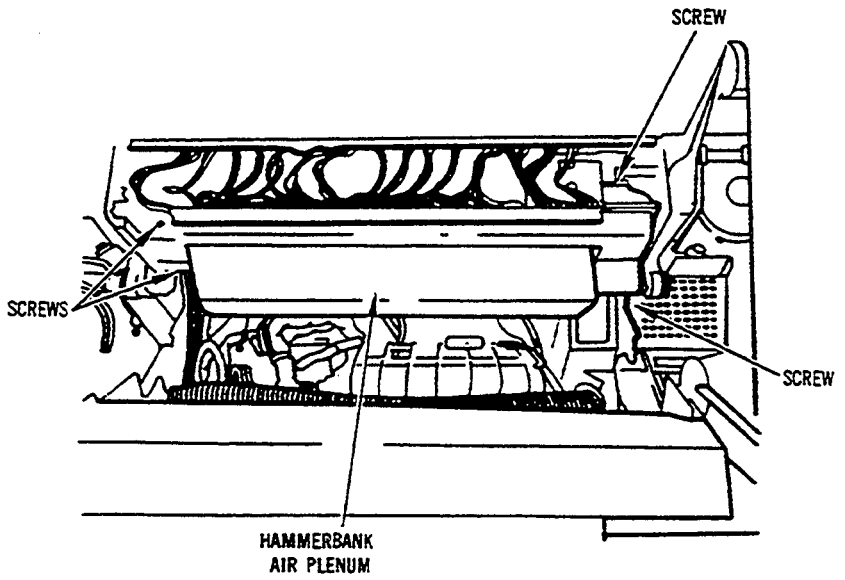

Figure 5–61 Removing the Air Plenum

6. Locate the module to be replaced. Each module contains four hammers as shown in Figure 5–62.

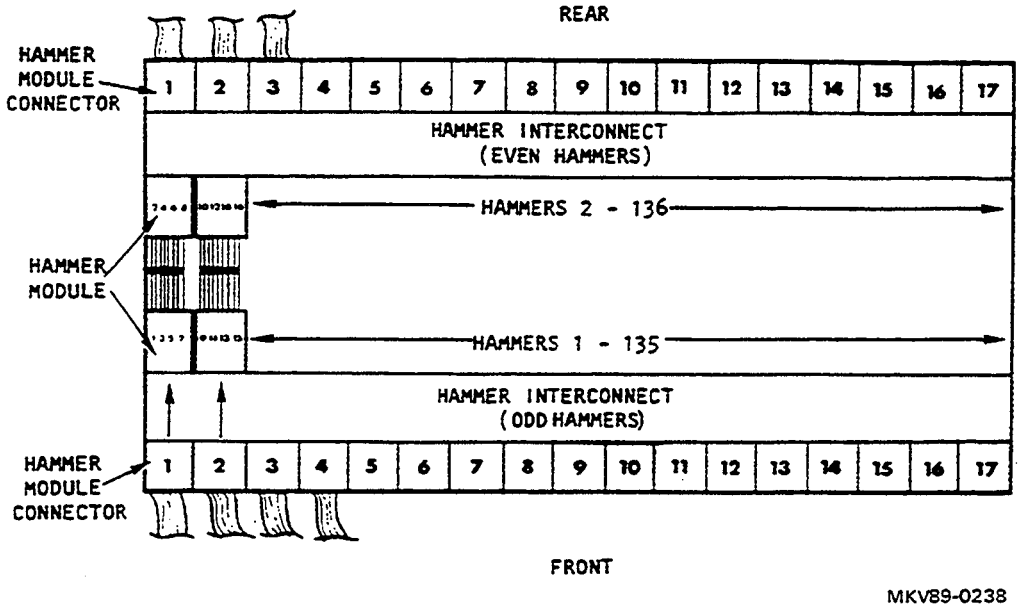

Figure 5–62 Hammer Module Locations

7. Using a hex screwdriver, remove the outside hammer module screw.

NOTE

DO NOT loosen the inside hammer magnet screw.

8. Unplug the associated hammer module connector from the hammer interconnect board.
9. Carefully pull the hammer module and connector up and out of the hammerbank assembly.

To replace a hammer module:

1. Carefully insert the hammer module and connector into the hammerbank assembly.
2. Plug the connector into the correct position on the hammer interconnect board.
3. Using a torque screwdriver, install and tighten the hammer module screws to 4.8 to 5 inch-pounds.
4. Mount the air plenum onto the lower edge of the hammerbank assembly and secure it with the four mounting screws.
5. Place the hammerbank mask on the hammerbank.
6. Lower the printer mechanism and tighten the screws.
7. Install the platen/ribbon mask assembly.
8. Install the band, ribbon, and paper.
9. Connect the power cord and power ON the printer.
10. After the diagnostic check completes, check the hammer flight time and adjust as necessary (Chapter 4).

5.26 REMOVING/REPLACING THE CAPACITOR BANK ASSEMBLY

NOTE

To replace the capacitor bank assembly in the new style printer, refer to Section B.7.9.

To remove the capacitor bank assembly:

1. Power OFF the printer, wait at least 15 seconds for the capacitor charge to bleed off, then disconnect the power cord from the wall outlet.
2. Remove the paper, ribbon, and band from the printer.
3. Raise the printer mechanism (Section 5.6, steps 2 through 4).

WARNING

Ensure that the latch arm locking slot is securely latched over the support bushing before reaching under the printer mechanism.

4. Disconnect capacitor bank assembly cable plug P5 from the power interconnect board connector J5 (Figure 5–63).

NOTE

There is an unused wire at the capacitor bank assembly. This wire is for the paper tape VFU, which is not used on the LP37 Printer.

5. Remove the two outer nuts from the capacitor bank enclosure.

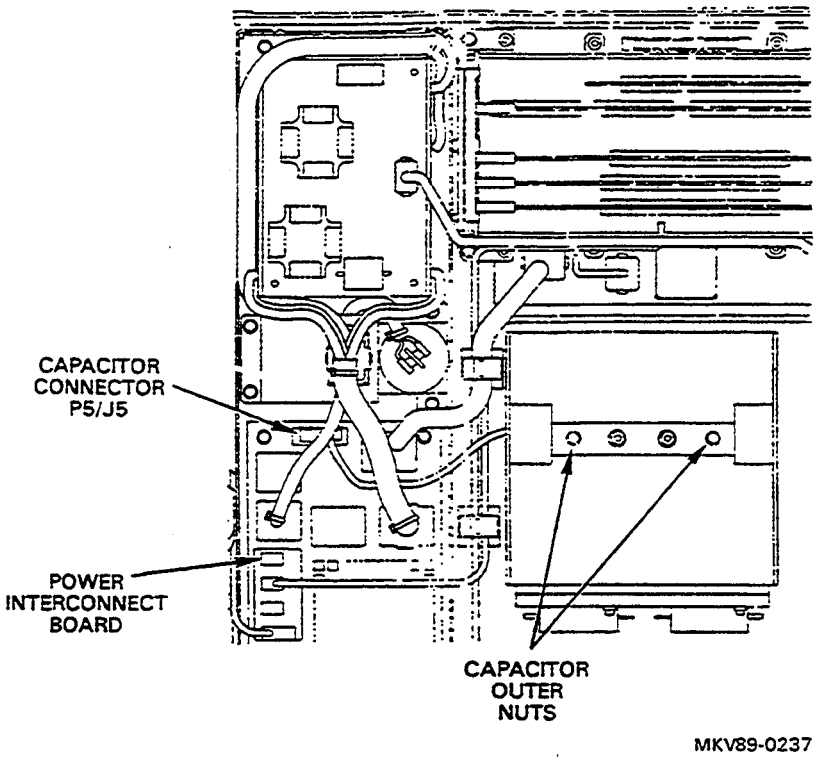

Figure 5–63 Removing the Capacitor Bank Assembly

6. Lift the capacitor bank assembly from its mating studs.

To replace the capacitor bank assembly:

1. Mate the upper and lower capacitor bank enclosure halves and secure them with the two inner nuts.
2. Mount the capacitor bank assembly onto its mating studs and secure it with the two outer nuts.
3. Connect capacitor bank assembly plug P5 to the power interconnect board connector J5.
4. Lower the printer mechanism and tighten the screws.
5. Replace the band, ribbon, and paper.
6. Connect the power cord to the wall outlet and power ON the printer.
7. Test the printer.

5.27 REMOVING/REPLACING THE POWER INTERCONNECT BOARD

NOTE

For the new style printer, power interconnection is part of the power supply board. Refer to Section A.4. To replace the new style printer power supply board refer to Section B.7.8.

To remove the power interconnect board:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Remove the paper, ribbon, and band from the printer.
3. Raise the printer mechanism (Section 5.6, steps 2 through 4).

WARNING

Ensure that the latch arm slot is securely latched over the support bushing before reaching under the printer mechanism.

4. Disconnect the six connector plugs from the power interconnect board (Figure 5–64).

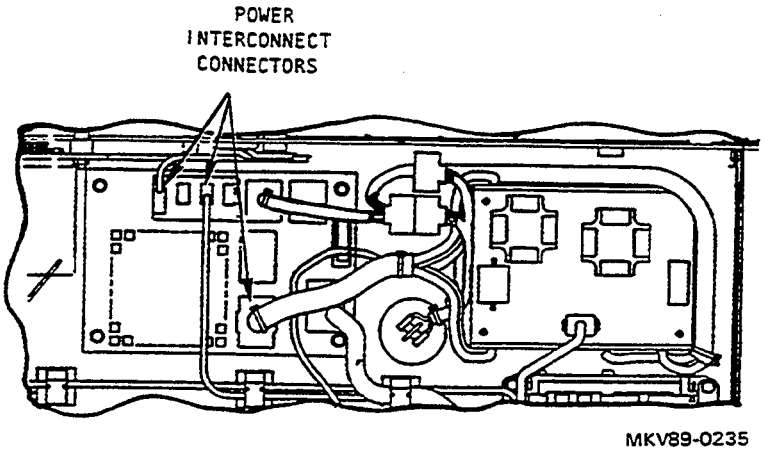

Figure 5–64 Disconnecting the Power Interconnect Board

5. Remove the four nuts from the power interconnect board.
6. Remove the plastic cover from the power interconnect board.
7. Remove the four standoffs and remove the power interconnect board (Figure 5–65).

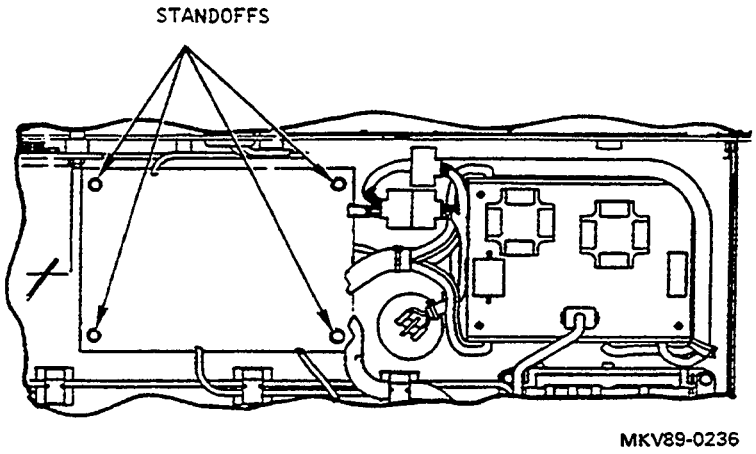

Figure 5–65 Removing the Power Interconnect Board

To replace the power interconnect board:

1. Place the power interconnect board in position and install the four standoffs.
2. Install the plastic cover on the power interconnect board.
3. Install the four nuts onto the standoffs.
4. Connect the six connector plugs to the power interconnect board (Figure 5–66).

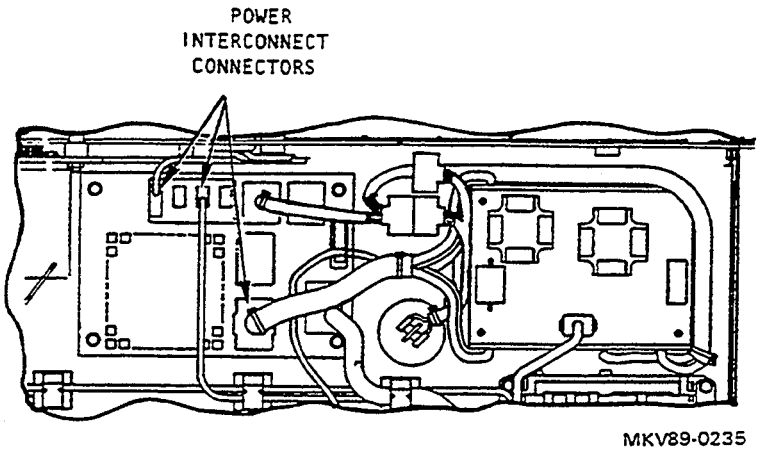

Figure 5–66 Connecting the Power Interconnect Board

5. Lower the printer mechanism and tighten all the screws.
6. Replace the band, ribbon, and paper.
7. Connect the power cord to the wall outlet and power ON the printer.
8. Test the printer.

5.28 REMOVING/REPLACING THE +5 VOLT REGULATOR

NOTE

On the new style printer the +5 V regulator is part of the power supply board. Refer to Section A.4.

To remove the +5 volt regulator:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Remove the paper, ribbon, and band from the printer.
3. Remove the paper forms guide and card cage cover (Section 5.4).
4. Raise the printer mechanism (Section 5.6, steps 2 through 4).

WARNING

Ensure that the latch arm locking slot is securely latched over the support bushing before reaching under the printer mechanism.

5. Disconnect connector P1/J1 from the +5 volt regulator board.

6. Unsnap the +5 volt regulator board from its standoffs and remove it from the transformer assembly (Figure 5–67).

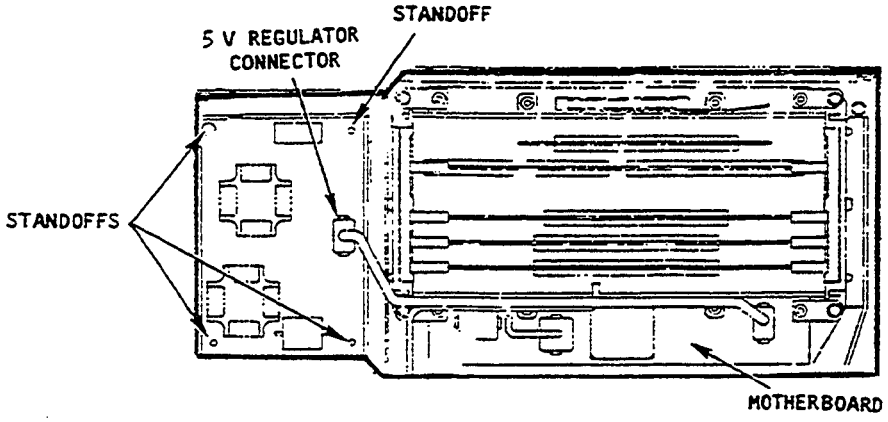

Figure 5–67 Removing the +5 Volt Regulator

To replace the +5 volt regulator:

1. Place the +5 volt regulator board in position on the transformer assembly and snap it onto its standoffs.
2. Connect P1/J1 to the +5 volt regulator board.
3. Lower the printer mechanism.
4. Install the paper forms guide and card cage cover.
5. Connect the power cord to the wall outlet and power ON the printer.
6. Install the band, ribbon, and paper.
7. Test the printer.

5.29 REMOVING/REPLACING THE TRANSFORMER ASSEMBLY

To remove the transformer assembly:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Remove the paper, ribbon, and band from the printer.
3. Remove the top cover (Section 5.3).
4. Remove the paper forms guide and card cage cover (Section 5.4).
5. Raise the printer mechanism (Section 5.6, steps 2 through 4).

WARNING

Ensure that the latch arm locking slot is securely latched over the support bushing before reaching under the printer mechanism.

6. Remove the flexible screwdriver from inside the card cage.
7. Disconnect the plugs from the interconnect board and the +5 volt regulator board.
8. Remove the screws from the power switch cover and remove the cover (Figure 5–68).

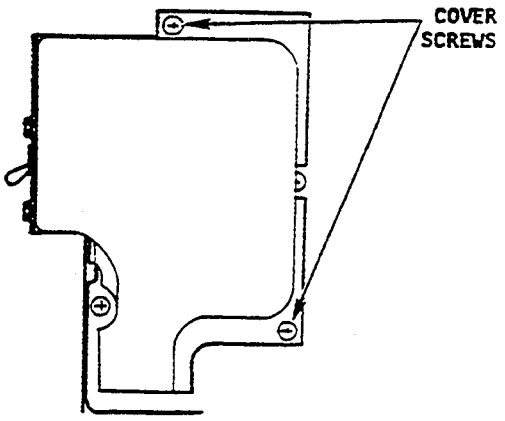

Figure 5–68 Removing the Circuit Breaker Switch Cover

9. Remove the four screws from the blue edge fasteners on the rear support plate and remove the plate (Figure 5–69).

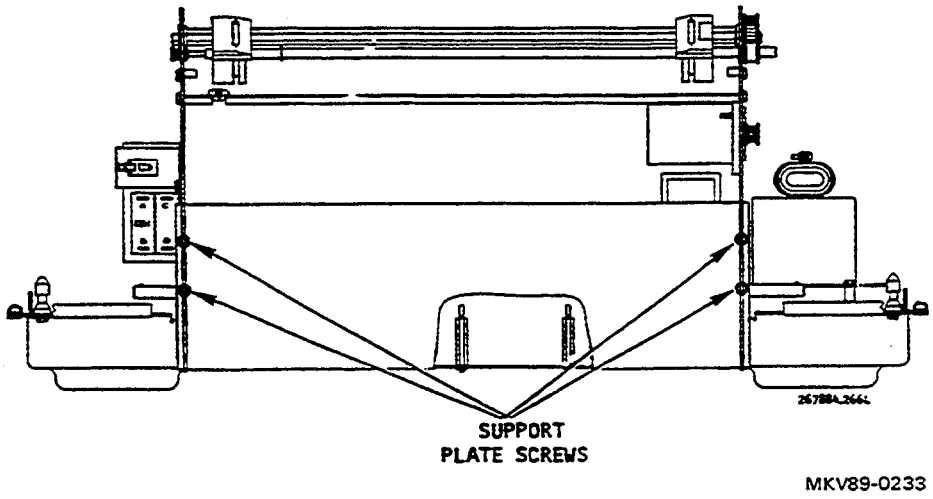

Figure 5–69 Removing the Rear Support Plate

10. Remove the four screws securing the transformer assembly to the printer base.
11. Grasp the transformer assembly, lift it up, and guide it out of the printer.

To replace the transformer assembly:

1. Lower the transformer assembly into the base of the printer.
2. Install and tighten the four mounting screws.

3. Connect all the plugs to the interconnect board and the +5 volt regulator board.
4. Mount the rear support plate onto its side hooks and secure it with the four screws.
5. Mount the circuit breaker switch cover on the circuit breaker switch assembly and secure it with the cover screws.
6. Replace the flexible screwdriver.
7. Replace the paper forms guide and card cage cover.
8. Lower the printer mechanism and tighten the screws.
9. Replace the top cover (Section 5.3).
10. Replace the band, ribbon, and paper.
11. Connect the power cord and power ON the printer.
12. Test the printer.

5.30 REMOVING/REPLACING THE CARD CAGE ASSEMBLY

To remove the card cage assembly:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Remove the top cover (Section 5.3).
3. Remove the paper forms guide and card cage cover (Section 5.4).
4. Remove the rear support plate from the printer base (Figure 5–70).

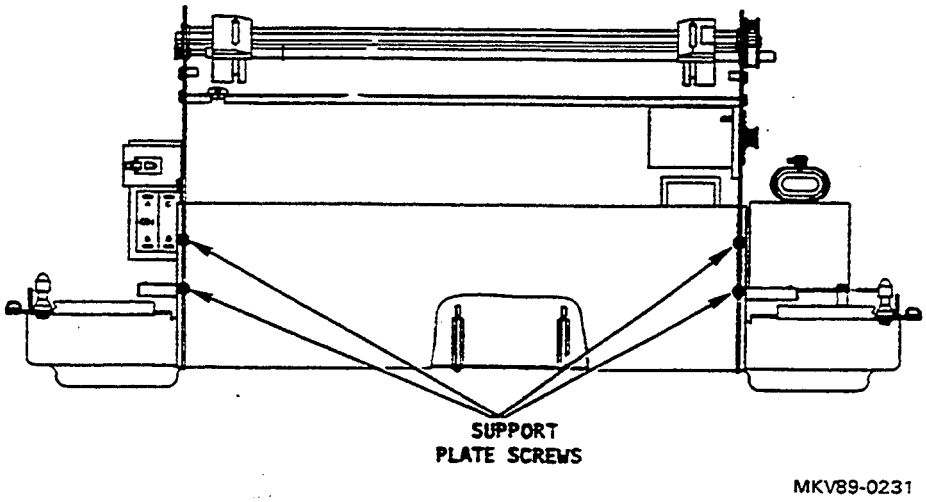

Figure 5–70 Removing the Rear Support Base

5. Raise the printer mechanism (Section 5.6, steps 2 through 4).

WARNING

Ensure that the latch arm locking slot is securely latched over the support bushing before reaching under the printer mechanism.

6. Disconnect all connectors from the boards in the card cage and from the motherboard.
7. Pull up on the ejector keys to remove all circuit boards from the motherboard.

8. Remove the four screws securing the card cage (Figure 5–71).

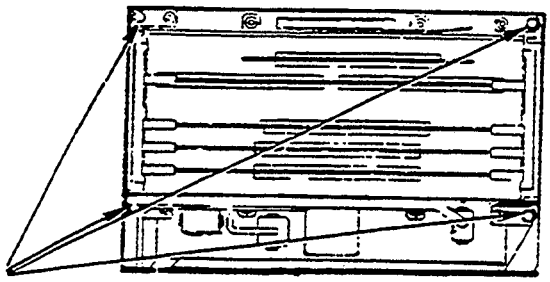

Figure 5–71 Removing Screws from the Card Cage

9. Lift the card cage assembly from the base and out of the printer (Figure 5–72).

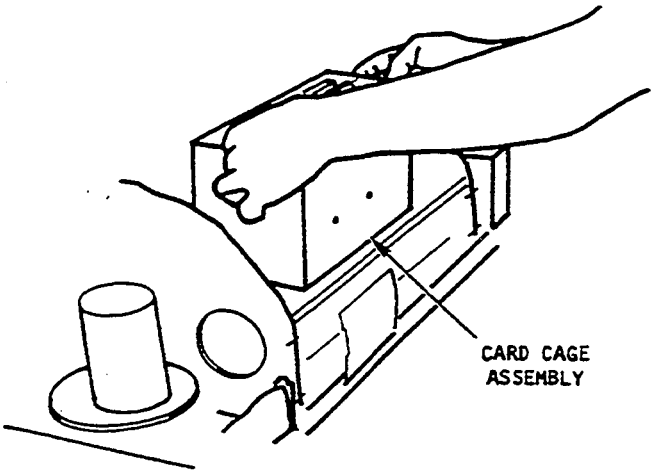

Figure 5–72 Removing the Card Cage

To replace the card cage assembly:

1. Lower the card cage assembly into the base of the printer.
2. Install and tighten the four mounting screws to secure the card cage.
3. Install the circuit boards into the motherboard slots.
4. Connect all connector plugs to the motherboard.
5. Connect all connector plugs to each circuit board.

5.31 REMOVING/REPLACING THE MOTHERBOARD

NOTE

To replace the motherboard in the new style printer, refer to Section B.7.10.

To remove the motherboard:

1. Remove the card cage assembly (Section 5.30).
2. Place the card cage upside down on a flat surface (Figure 5–73).

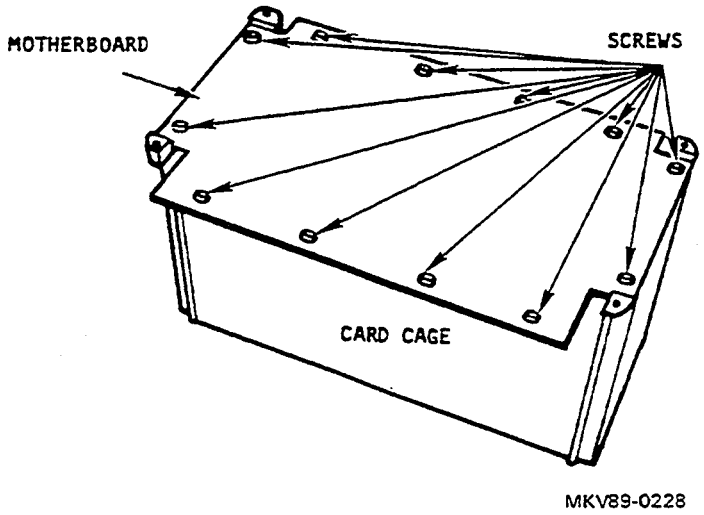

Figure 5–73 Removing the Motherboard

3. Remove the twelve screws securing the motherboard to the card cage and remove the motherboard.

To replace the motherboard on the card cage:

1. Place the motherboard in position over the bottom of the card cage assembly.
2. Install and tighten the twelve mounting screws.
3. Replace the card cage assembly (Section 5.30).
4. Replace the paper forms guide and card cage cover.
5. Lower the printer mechanism and tighten all screws.
6. Replace the top cover (Section 5.3).
7. Connect the power cord to the wall outlet and power ON the printer.
8. Add paper and test the printer.

5.32 REMOVING/REPLACING 44-PIN PROMS

Both the processor board and the motor control board contain 44-pin PROMs that may require replacing. The procedure requires an AMP IC extraction tool (PN 821591-1) and is outlined as follows:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Open the top cover.

3. Remove the paper from the printer.
4. Remove the paper forms guide and card cage cover (Section 5.4).
5. Disconnect all connectors from the board that contains the PROM to be replaced.
6. Pull upward on the board ejector keys and remove the board.
7. Place the board (component side up) on a flat surface.
8. Insert the IC extraction tool into the PROM socket.
9. Pull the PROM upward and remove it from its socket.
10. Install the replacement PROM with its notch oriented correctly with the notch on the socket as shown in Figure 5–74.

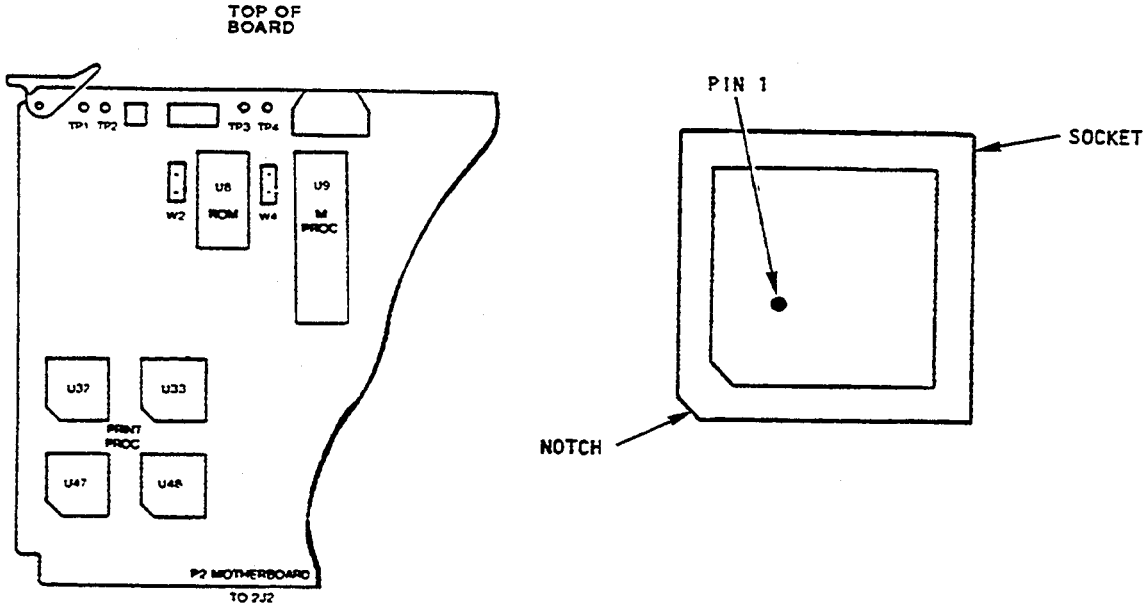

Figure 5–74 Installing a 44-Pin PROM

11. Ensure that all PROM pins are inserted into the socket, then press firmly on the center of the PROM to seat it into the socket.
12. Ensure that all pins are seated correctly and none are broken or bent.
13. Install the board into the motherboard slot.
14. Connect all connectors.
15. Replace the paper forms guide and card cage cover.
16. Add paper.
17. Connect the power cord to the wall outlet and power ON the printer.
18. Test the printer.

5.33 REMOVING/REPLACING THE PAPER PULLER/STACKER ASSEMBLY

NOTE

To remove the paper puller/stacker assembly in the new style printer, refer to Section B.7.11.

To remove the paper puller assembly:

1. Open the top cover.
2. Open and remove the rear printer door by lifting it off the hinge pins.
3. Position the paper puller near the top (not all the way up).
4. Power OFF the printer and disconnect the power cord from the wall outlet.
5. Raise the printer mechanism (Section 5.6, steps 2 through 4).

WARNING

Ensure that the latch arm locking slot is securely latched over the support bushing before reaching under the printer mechanism.

6. Remove the two screws securing the paper shelf to the cabinet floor and remove the shelf (Figure 5–75).

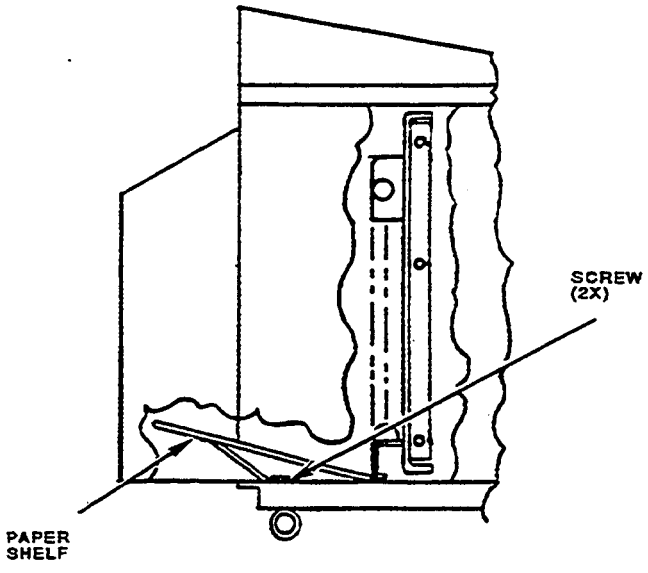

Figure 5–75 Removing the Rear Paper Shelf

7. Remove the three screws securing the safety panel screen and remove the screen from the cabinet (Figure 5–76).

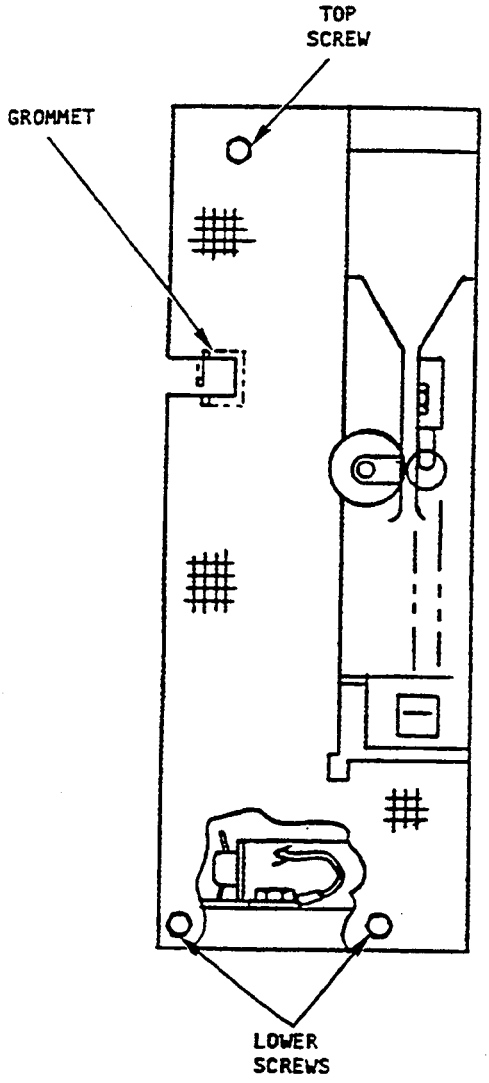

Figure 5–76 Removing the Safety Screen

8. Remove the screws securing the power switch cover and remove the cover.
9. Disconnect the power cord connectors from the power switch.
10. Disconnect the ground wire from the chassis.
11. Slip the power cord down through the access hole.
12. Disconnect the compressor cable push-on terminals from terminal block TB-3 (Figure 5–77).
13. Disconnect the green ground wire at floor of the cabinet.

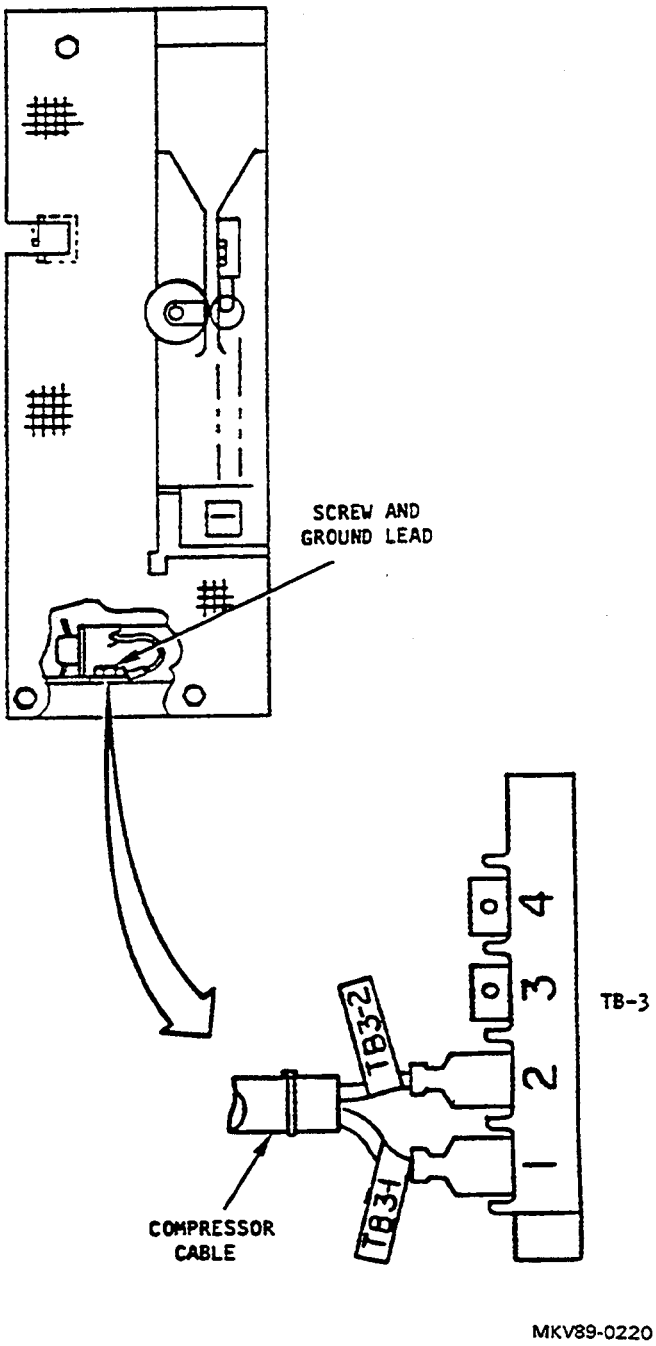

Figure 5–77 Disconnecting the Paper Puller

14. Remove the six screws securing the compressor assembly, and remove the assembly from the printer.
15. Disconnect misstack sensor cable P4 from the processor board.
16. Disconnect paper puller motor cable J2 from the paper puller board and remove the ground wire screw and terminal. The paper puller board is located under the printer mechanism and to the right of the printer base.

17. Disconnect stacker ac cable connector P7A from A8J7 on the power interconnect board (Figure 5–78).

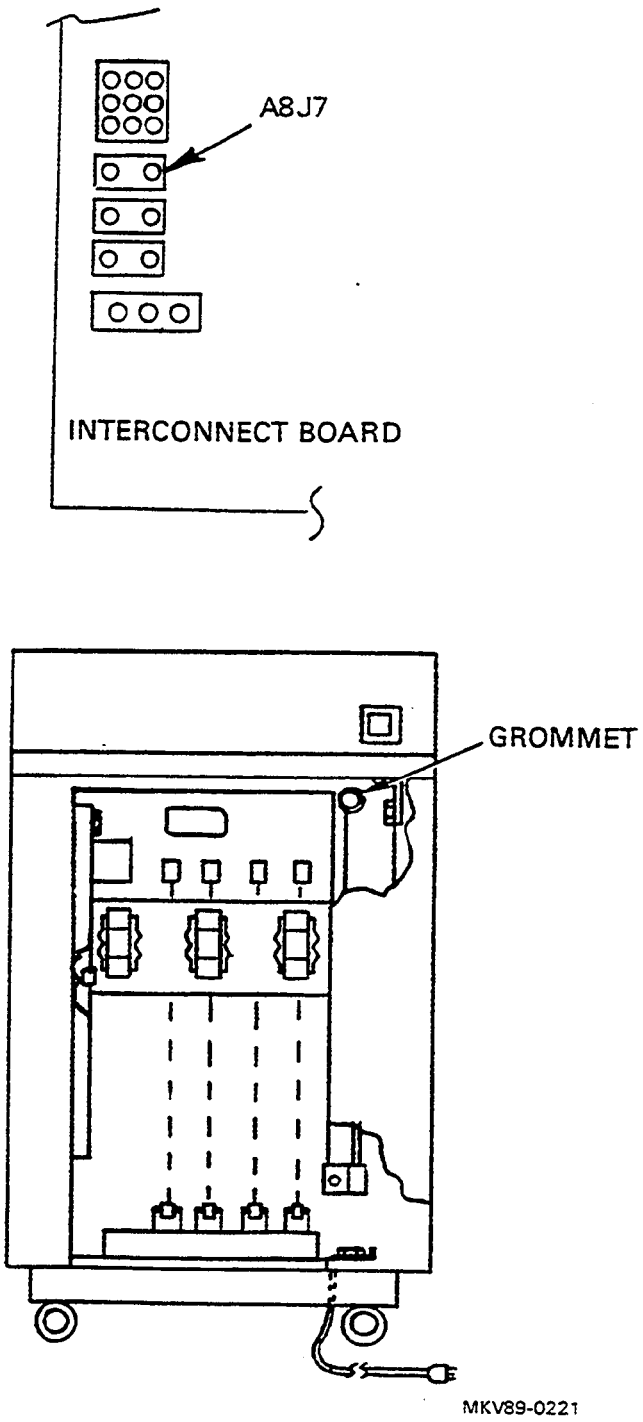

Figure 5–78 Disconnecting the Stacker

18. Remove the two screws securing the paper puller track and remove the track from the printer (Figure 5–79).

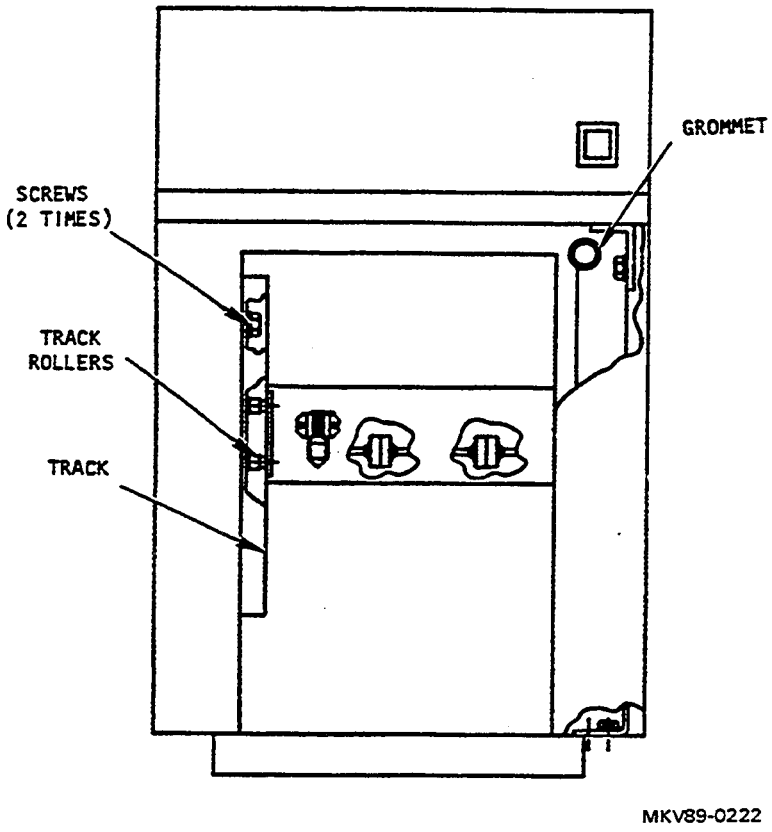

Figure 5–79 Removing the Paper Puller Track

19. Remove the four screws securing the support assembly, and remove the paper puller assembly from the printer.

To replace the paper puller/stacker:

1. Hold the support assembly upright and position it on the right side of the cabinet.
2. Lift the assembly into the cabinet at an angle, left side first.
3. Tilt the top of the assembly to the right and lift it into the right side cabinet opening.
4. Ensure that the insulation paper is not folded back and remains under the push-on terminals of TB-3.
5. Straighten the assembly, and install and tighten the top support screw.

6. Install and tighten the three bottom screws.
7. Install the paper puller track on the left side by sliding it over the rollers from the top down. Install and tighten the two Allen head screws.
8. From inside the cabinet, route the stacker ac power cable, misstack sensor cable, and paper puller motor cable through the rear grommet hole. Then, route them up through the base pan grommet and into the printer side frame grommet (Figure 5–80).

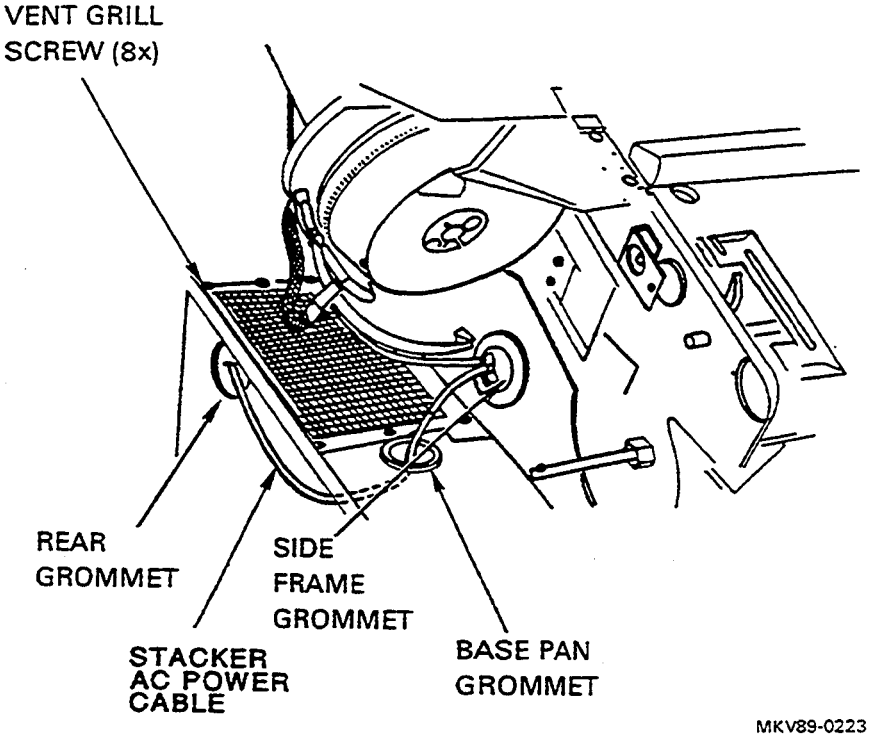

Figure 5–80 Installing the Paper Puller

9. Connect misstack cable connector P4 to J4 on the processor board.
10. Connect stacker ac power cable connector P7A into A8J7 on the power interconnect board (Figure 5–81).

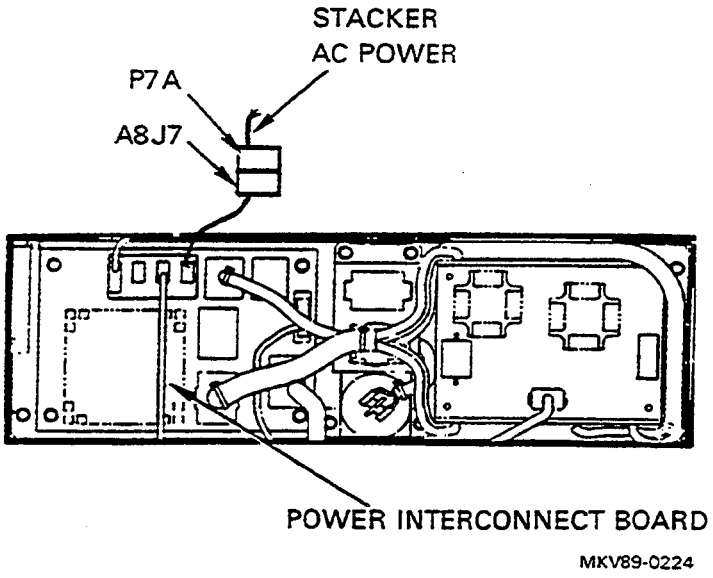

Figure 5–81 Connecting the Paper Puller

11. Connect paper puller cable connector J2 to P2 on the paper puller board and connect the ground wire to the bracket.
12. Install the blower grill and secure it with eight screws (Figure 5–82).
13. Connect the two ac power cable female push-on fasteners to the circuit breaker male spades as marked.
14. Secure the green wire ground terminal to the frame with the ground screw.

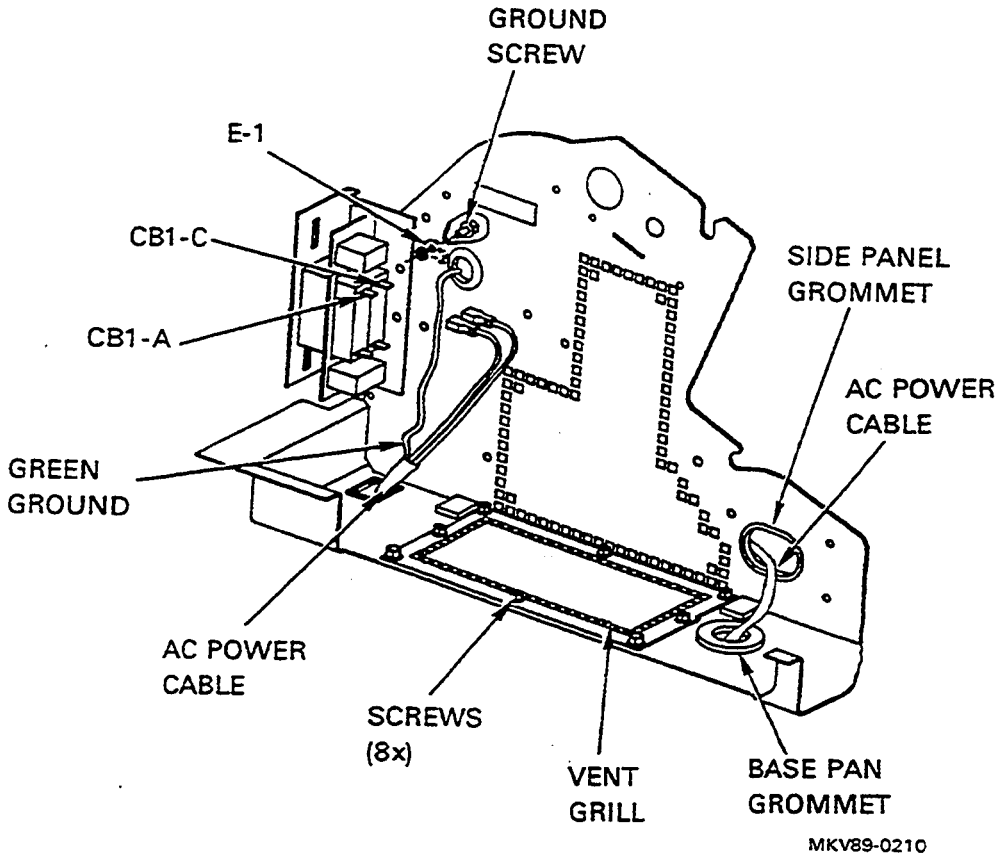

Figure 5–82 Connecting the AC Power Cord to the Power Switch

15. Install the circuit breaker cover and secure it with the two cover screws.
16. Lower the printer mechanism and tighten the three screws.
17. Position the compressor assembly so that the rectangular opening in the panel is in the top position and the bead chains are facing the rear.
18. Insert the compressor assembly into the printer at an angle, right side first.
19. Align the panel with the six threaded cabinet inserts and secure it with the screws that were removed earlier.
20. Install the compressor cable and push-on terminals 1 and 2 onto the terminal block.
21. Attach the green ground to the base with one of the screws that holds the support assembly.
22. Secure the ac power cord and stacker cables to the inside of the cabinet in two places with the cable clamps.
23. Slide the safety panel up and behind the puller, and position it over the rocker switch.
24. Secure the safety panel with the three screws removed earlier.
25. Position the paper shelf over the two threaded inserts in the cabinet base and secure it with the two mounting screws.
26. Install the rear door.

27. Add paper.
28. Connect the power cord to the wall outlet and power ON the printer.
29. Test the printer.

5.34 REMOVING/REPLACING THE METER PACKAGE

To remove the meter package:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Open the top cover.
3. Remove paper and the ribbon.
4. Raise the printer mechanism (Section 5.6, steps 2 through 4).

WARNING

Ensure that the latch arm locking slot is securely latched over the support bushing before reaching under the printer mechanism.

5. Remove the paper forms guide and card cage cover (Section 5.4).
6. Remove cable connector P2 from the motor control board (Figure 5–83).

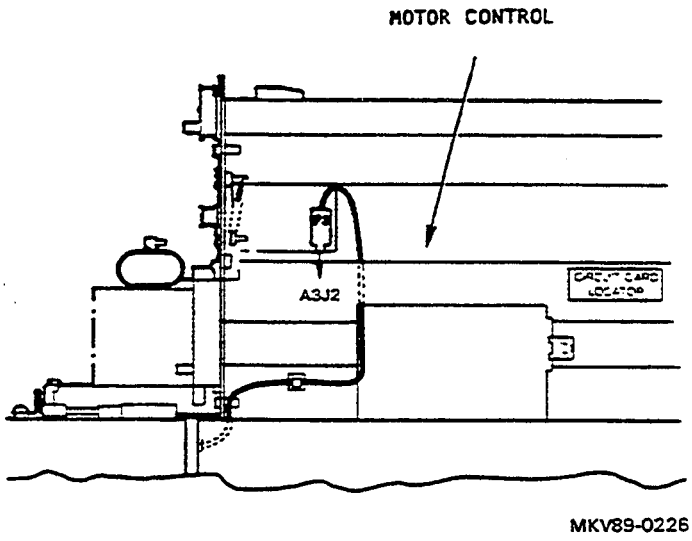

Figure 5–83 Removing the Cable from the Meter Package

7. Remove the two screws securing the meter package and remove the meter package from the printer (Figure 5–84).

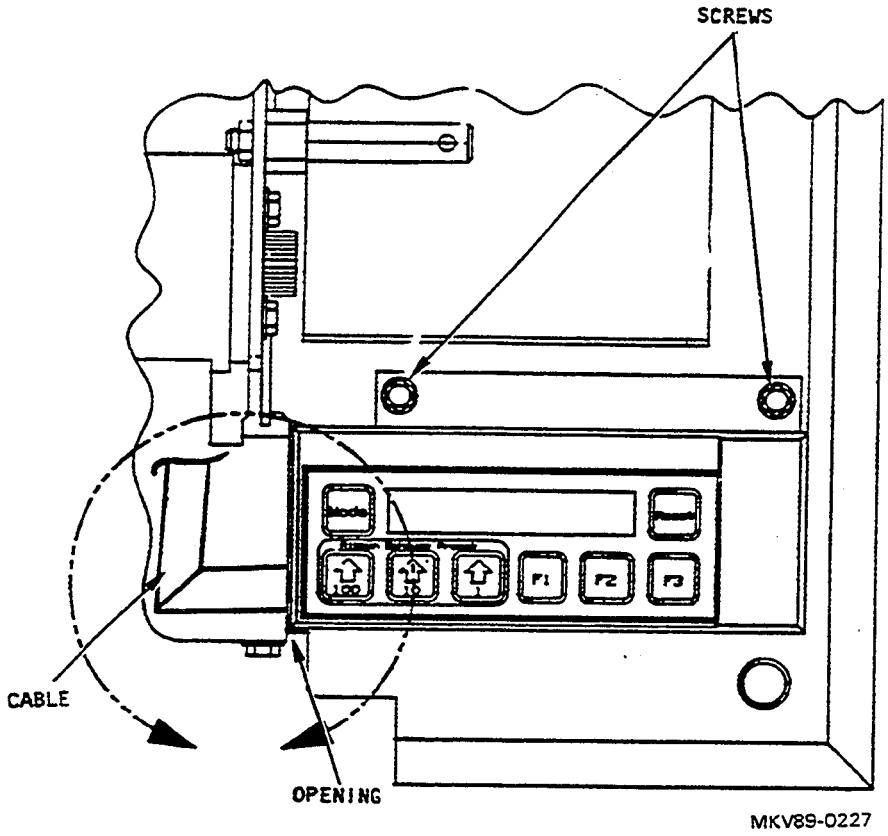

Figure 5–84 Removing the Meter Package

To replace the meter package:

1. Position the meter package against the right front vertical sides of the pan as shown in Figure 5–85.

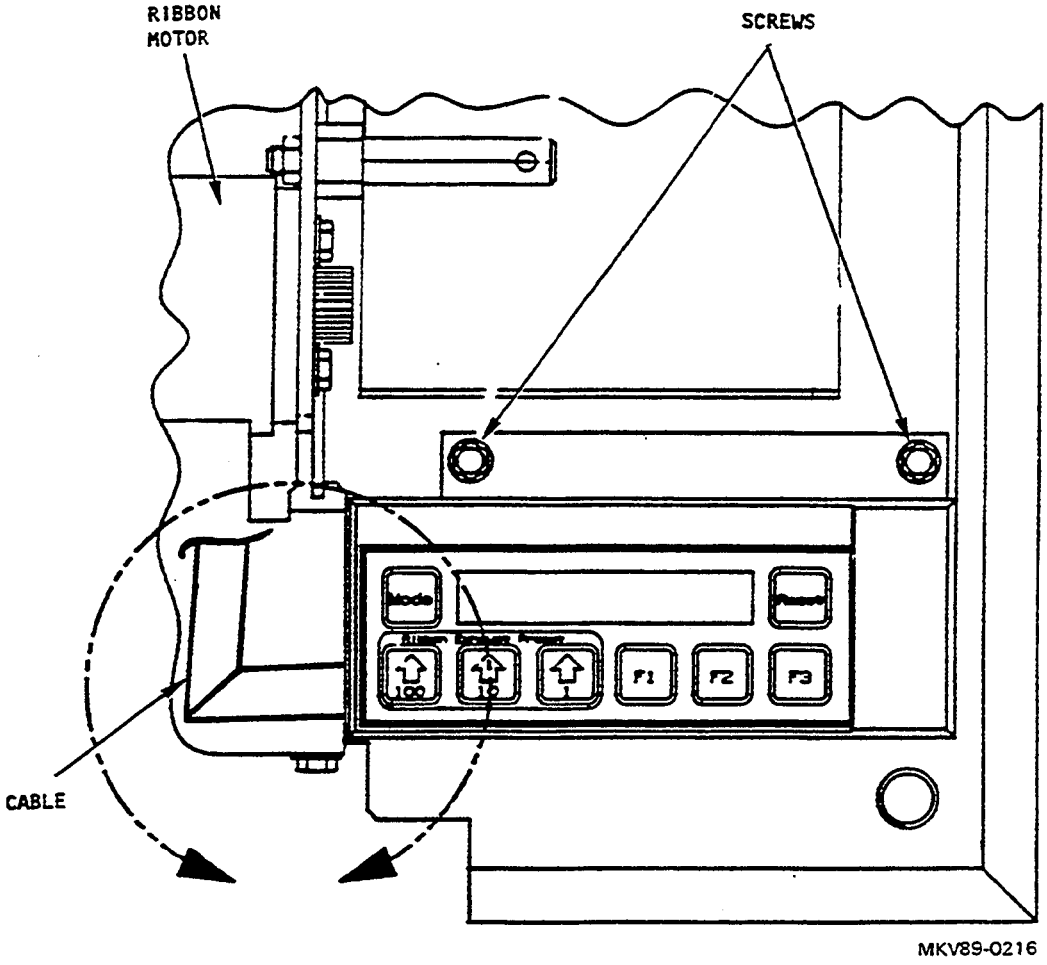

Figure 5–85 Installing the Meter Package

2. Route the cable through the opening next to the right ribbon motor.
3. Secure the meter package with the two mounting screws.
4. Route the cable through the printer mechanism and connect the plug to J2 on the motor control board.
5. Lower the printer mechanism and tighten the three screws.
6. Replace the paper forms guide and card cage cover, and tighten the retaining screw.
7. Add paper and the ribbon, and close the top cover.
8. Connect the power cord to the wall outlet and power ON the printer.
9. Test the printer.

5.35 REMOVING/REPLACING THE REAR CONTROL PANEL

To remove the rear control panel:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Open the top cover.
3. Remove the screws securing the rear control panel.
4. Disconnect cable connector P1 from J1 on the rear of the panel and remove the panel.

To replace the rear control panel:

1. Remove the tape backing on the rear control panel.
2. Connect P1 to J1 on the rear control panel.
3. Position the rear control panel on the pan.
4. Press the control panel against the side panel using even pressure over the contact area.
5. Install and tighten the ground screw through the switch tab.
6. Remove the backing from the gasket and attach it to the top of the rear control panel.
7. Install the paper forms guide and card cage cover.

5.36 SPARE PARTS LIST

Table 5–1 and Table 5–2 list the spare parts with their part numbers.

Table 5–1 Spare Parts

Digital Part Number	Vendor Part Number	Description
FD-10341-00	276383-001	Airflow Detector Assembly
29-23610-00	270759-001	Backstop Screw Assembly (5)
29-27893-01	286695-001	Band Brush Assembly, Idler Side
29-27894-01	287143-001	Band Brush Assembly, Motor Side
FD-13261-01	275861-001	Band Release Lever
29-27500-01	286594-001	Bead Chain, Stacker
29-27501-01	286681-001	Bearing, Rubber Tire, Stacker
29-27522-01	811241-002	Bearing, Tractor Shaft
29-27502-01	811870-001	Belt, Horizontal Vernier
29-27523-01	801669-010	Belt, Paper Feed Timing
29-27524-01	811901-001	Belt, Timing, Stacker
29-27834-01	293163-001	Bracket, Operator's Guide
29-27525-01	275748-003	Capacitor Pack Assembly†
29-27526-01	810760-207	Circuit Breaker†
29-27527-01	289685-001	Clutch Assembly, Paper Feed

†Parts used on old style LP37 only.

Table 5–1 (Cont.) Spare Parts

Digital Part Number	Vendor Part Number	Description
FD-10345-00	800131-002	Fan, Full-Length Cabinet
29-28492-01	290067-001	Filter/Receptacle, AC Line†
29-24305-00	800316-030	Fuse, 3AG, 3A (1)
90-08290-01	801672-120	Fuse, Slo-Blo 12A (1)
12-10929-02	801702-006	Fuse, Sub-Min 1A (1)
29-27528-01	810496-010	Gas Spring
29-27529-01	292373-001	Guide, Left/Right Ribbon Spool
29-27531-01	251704-024	Hammer Module, Spare
29-27532-01	289675-001	Hammerbank Mask Assembly
29-27558-01	294982-001	Harness Assembly, DEC I/O†
FD-13508-01	276386-002	Meter Package Assembly
29-27533-01	276376-002	Motor Assembly, Blower
29-27534-01	289716-001	Motor Assembly, Paper Step
29-27515-01	811803-001	Motor, Band Drive
29-27516-01	287149-001	Motor, Compressor, Stacker
29-27517-01	287150-001	Motor, Control Drive, Stacker
29-27518-01	289841-001	Motor, Paper Puller/Stacker
FD-10333-00	811020-002	Motor, Ribbon Drive
29-27519-01	287210-004	PCB, +5V Regulator†
29-27511-01	295025-001	PCB, DEC I/O Interface (A1)
FD-12796-01	276440-002	PCB, Hammer Driver (A4, A5)
29-27512-01	289920-003	PCB, Motor Control No PROM (A3)
29-27514-01	286140-002	PCB, OCP, No PROM
29-27520-01	276420-002	PCB, Power Interconnect†
29-27507-01	290025-002	PCB, Processor, No PROM (A2)
29-27513-01	289805-002	PCB, Puller, Motor Driver
29-27508-01	290072-004	PROM, Band Decode 1 to 1 (A1U14)
29-27509-01	289962-001	PROM, Control Decode, Processor (A2U28)
29-27510-01	290148-010	PROM, Control Decode, Interface (A1U24)
29-27539-01	290138-010	PROM, Interface (A1U5)
29-27535-01	290137-010	PROM, Master, Processor (A2U8)
29-27536-01	289723-016	PROM, Motor Control, Processor (A3U25)
29-27537-01	290136-010	PROM, OCP Processor (U10)
29-27538-01	289733-013	PROM, Print, Processor (8 Ea. on A2)
29-27503-01	289845-001	Platen Assembly

†Parts used on old style LP37 only.

Table 5–1 (Cont.) Spare Parts

Digital Part Number	Vendor Part Number	Description
29-27504-01	289667-001	Pulley, P/F Idler
29-27521-01	811026-002	Relay, Motherboard
29-27505-01	293217-001	Ribbon Guide, Left
29-27506-01	293218-001	Ribbon Guide, Right
29-27540-01	293216-001	Ribbon Mask Assembly
29-27541-01	289871-001	Sensor Assembly, Misstack
FD-13277-01	810072-002	Sensor, Paper Motion
29-27542-01	291166-001	Sensor, Switch Assembly, Stacker
29-27543-01	290004-003	Shaft Assembly, Paper Puller
29-27544-01	251341-001	Sleeve, Roller, Stacker
29-27545-01	800328-056	Spring, Extension, Stacker
29-23972-01	810447-001	Static Eliminator Tinsel
29-27546-01	293404-001	Switch Assembly, Rear Control Panel
FD-10343-00	810582-004	Switch, Cover Lower Interlock
29-27548-01	810582-005	Switch, Cover Upper Early Warning
29-27547-01	810582-001	Switch, Limit, Stacker
29-27549-01	291168-002	Switch, Up/Down, Stacker
29-27530-01	289721-001	Tool, Hammer Alignment
29-27831-01	821591-1	Tool, PROM Removal (AMP)
29-27740-01	293474-001	Tool Kit, Band Tracking Adjustment
29-27550-01	276104-004	Touch Panel Assembly, English
29-27551-01	276104-005	Touch Panel Assembly, French
29-27552-01	276104-006	Touch Panel Assembly, German
29-27553-01	276104-007	Touch Panel Assembly, Spanish
29-27555-01	811842-002	Tractor, Lower Left
29-27554-01	811842-003	Tractor, Lower or Upper Right
29-27556-01	811842-001	Tractor, Upper Left/No Sensor
29-27557-01	289717-001	Tractor + Sensor, Upper Left
FD-10309-00	276379-001	Transducer Assembly

Table 5–2 Spare Parts (New Cabinet Models Only)

Digital Part Number	Vendor Part Number	Description
12-34269-01	801732-005	Circuit Breaker 5A, CB2
12-34270-01	801732-007	Circuit Breaker 12A, CB1
29-28487-01	293190-003	PCB, Power Supply
29-28488-01	293226-003	Capacitor Bank Assembly
29-28489-01	293297-001	AC Line Filter
29-28490-01	817275-004	Switch Power ON/OFF
29-28491-01	295003-001	Harness Assembly, DEC I/O

The following parts can be ordered from Dataproducts Corp.

Part	Old Cabinet	New Cabinet
Top Cover	293425-002†	293253-002†
Paper Door	276016-001†	Same as old cabinet
Rear Door	286607-001†	Same as old cabinet
Left Side	None	293442-001†
Right Side	None	293442-002†

†Must specify "DEC colors" when ordering.

A

TROUBLESHOOTING THE LP37 WITH REMOVABLE CABINET SIDE PANELS

A.1 INTRODUCTION

This appendix includes troubleshooting information for the assemblies in the new style LP37 Line Printer that are affected by the new cabinet and power supply circuit board assembly. The new style printer is easily identified by the circuit breakers/power switch as shown in Figure A–1. Troubleshooting procedures for all other assemblies are provided in Chapter 3.

The information contained in this appendix includes:

- System Interconnect/Wiring Diagrams
- Fuse Identification
- Power Supply Board (Interconnect) Drawing
- Inoperative Printer Troubleshooting Flowchart
- Inoperative Paper Puller Troubleshooting Flowchart
- Inoperative Puller Stacker Troubleshooting Flowchart
- Inoperative Meter Package Troubleshooting Flowchart

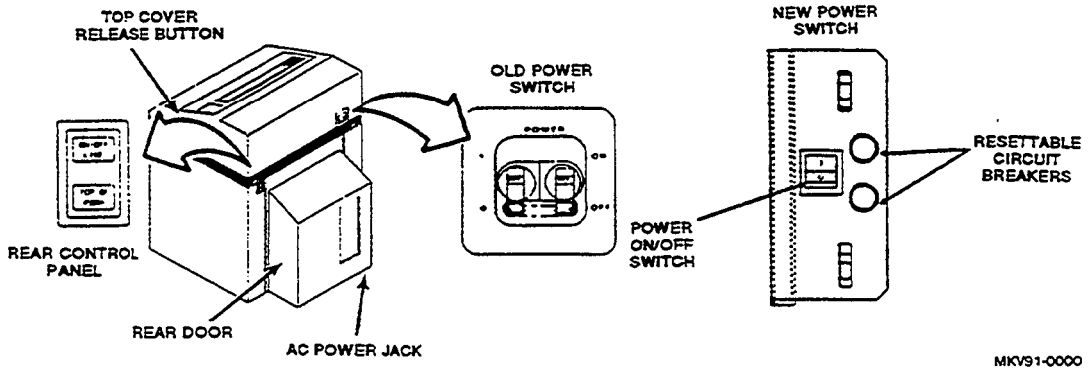

Figure A–1 Identifying the New Style Printer

A.2 SYSTEM INTERCONNECT/WIRING DIAGRAMS

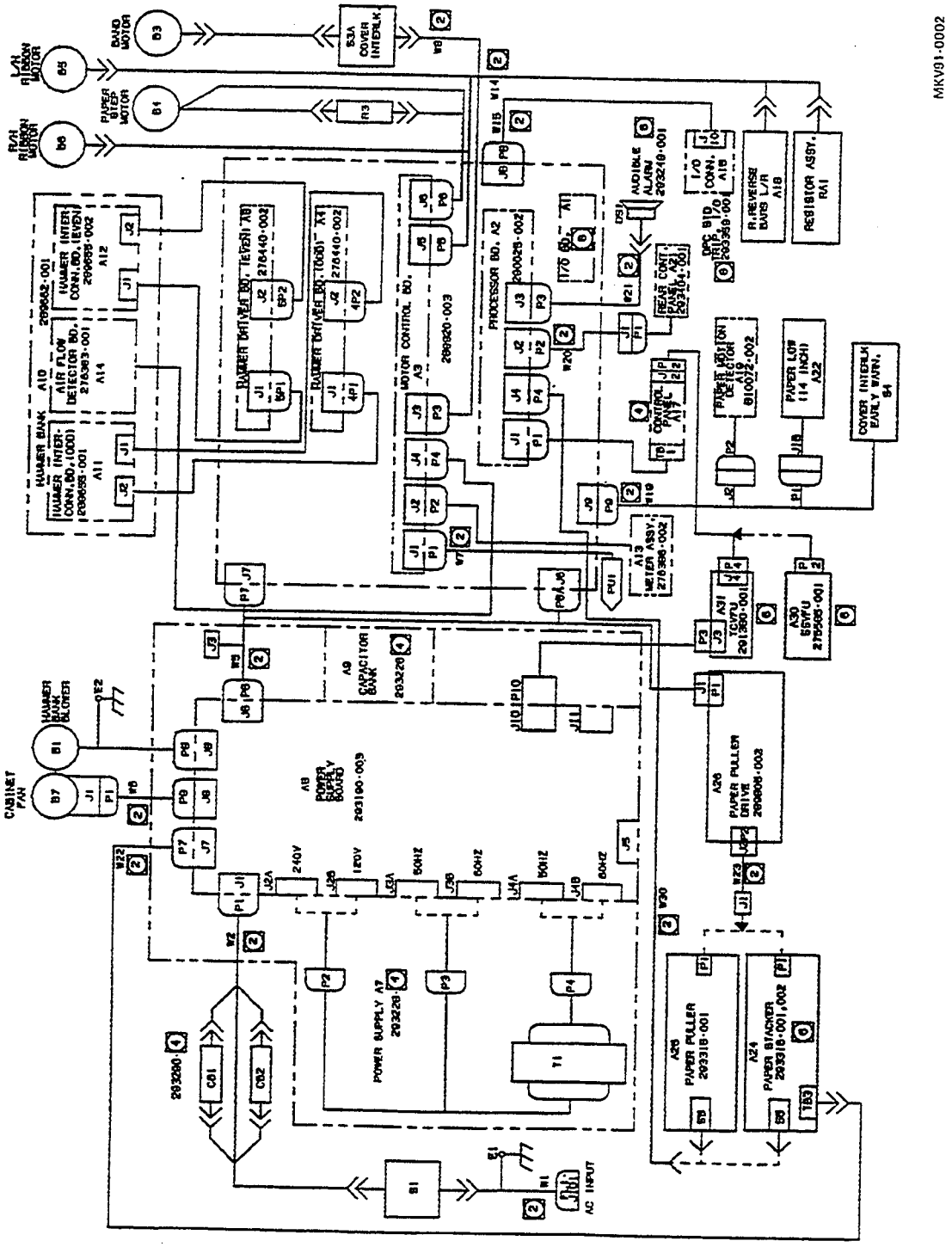

Figure A–2 System Interconnect Diagram

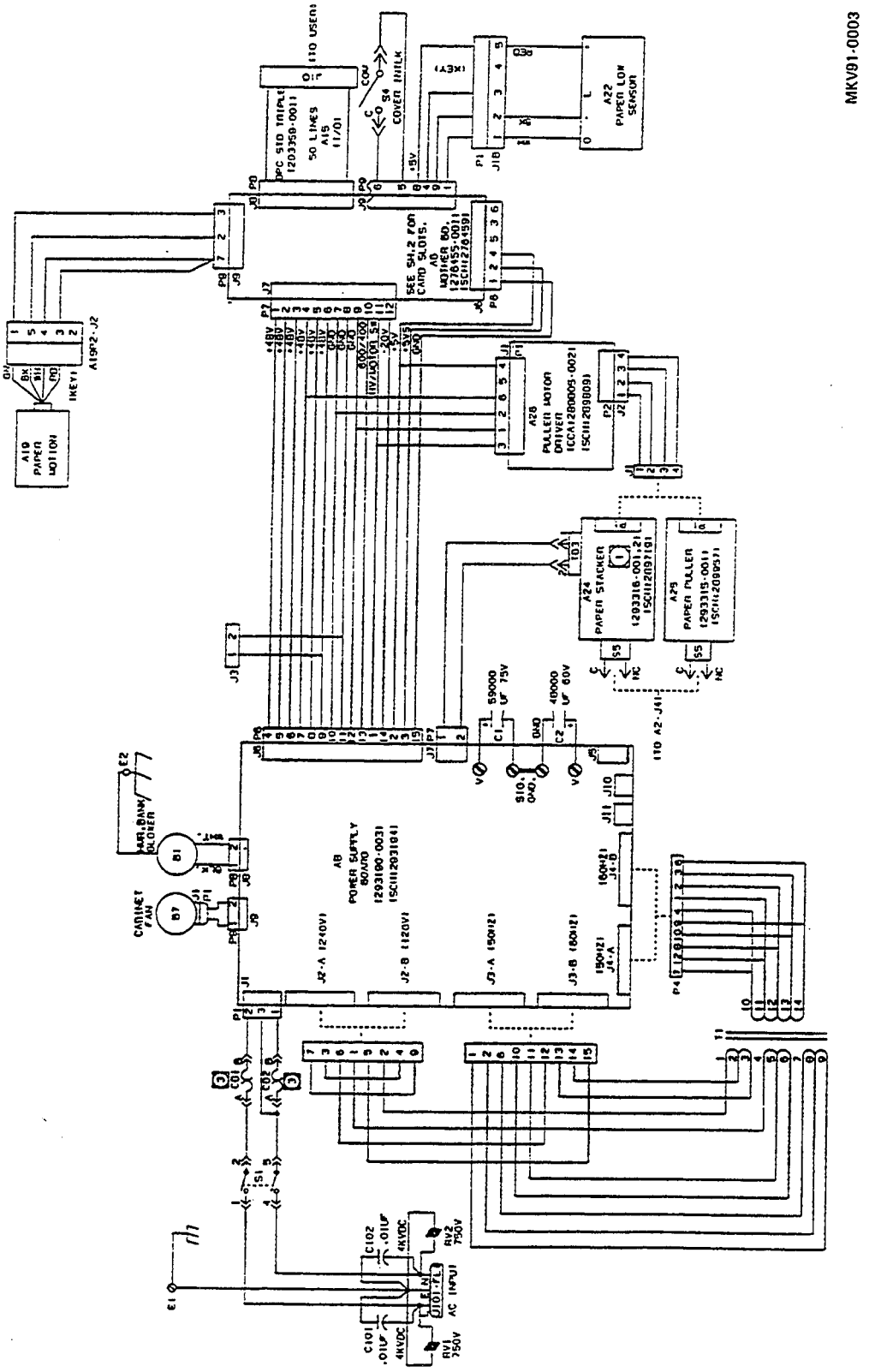

Figure A–3 System Wiring Diagram #1

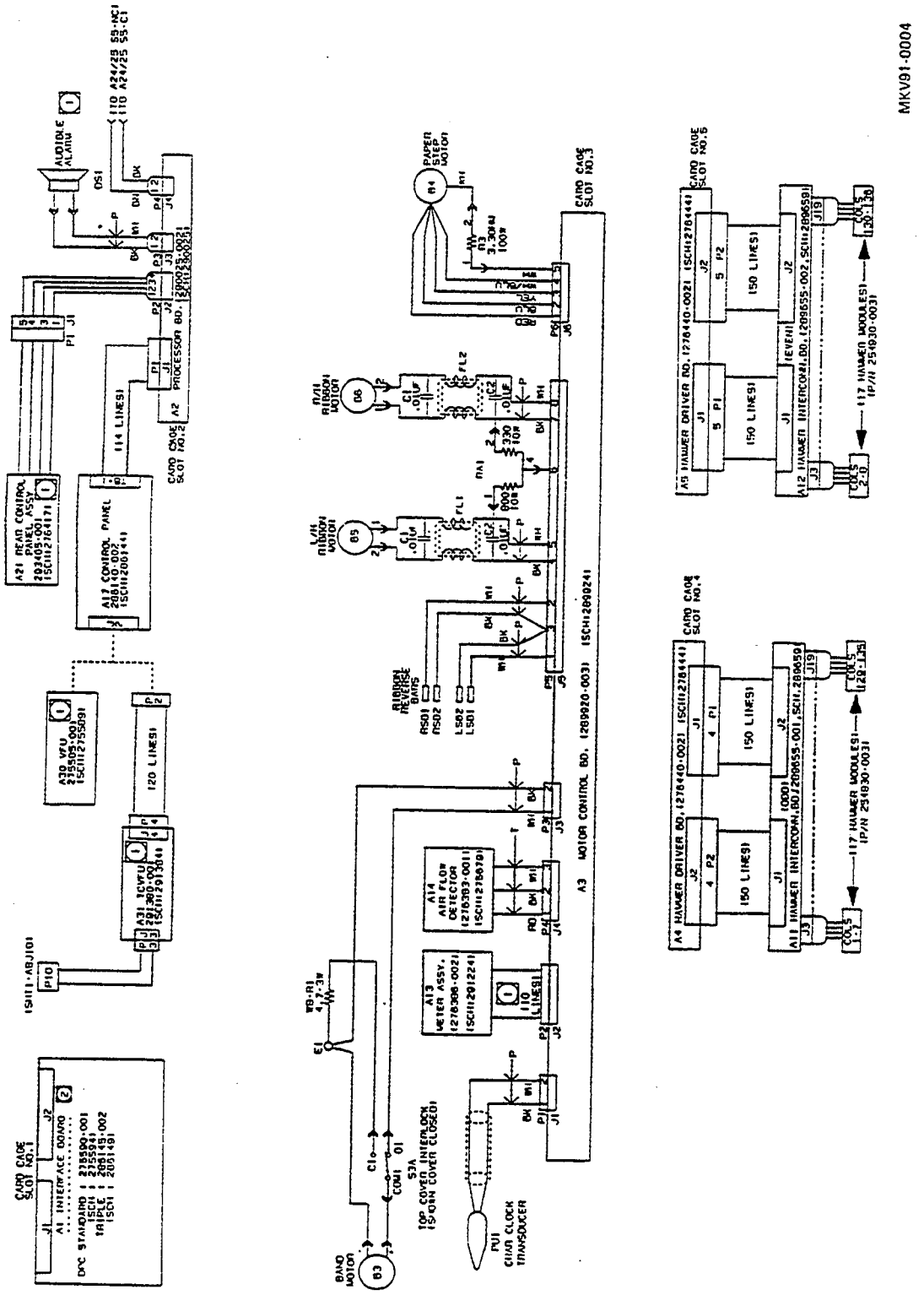

Figure A–4 System Wiring Diagram #2

A.3 FUSE IDENTIFICATION

Table A–1 lists the fuses, their ratings, their locations, and the circuits they protect.

Table A–1 Fuse Identification

Fuse	Rating	Location	Protects
F1	12 Amp	Power Supply Board	+48 Vdc (Hammers)
F2	12 Amp	Power Supply Board	+48 Vdc (Motors)
F3	1 Amp	Power Supply Board	-20 Vdc (Logic)
F4	3 Amp	Power Supply Board	+5 Vdc
F1	0.5 Amp	Interface Board	+5 Vdc

A.4 POWER SUPPLY BOARD

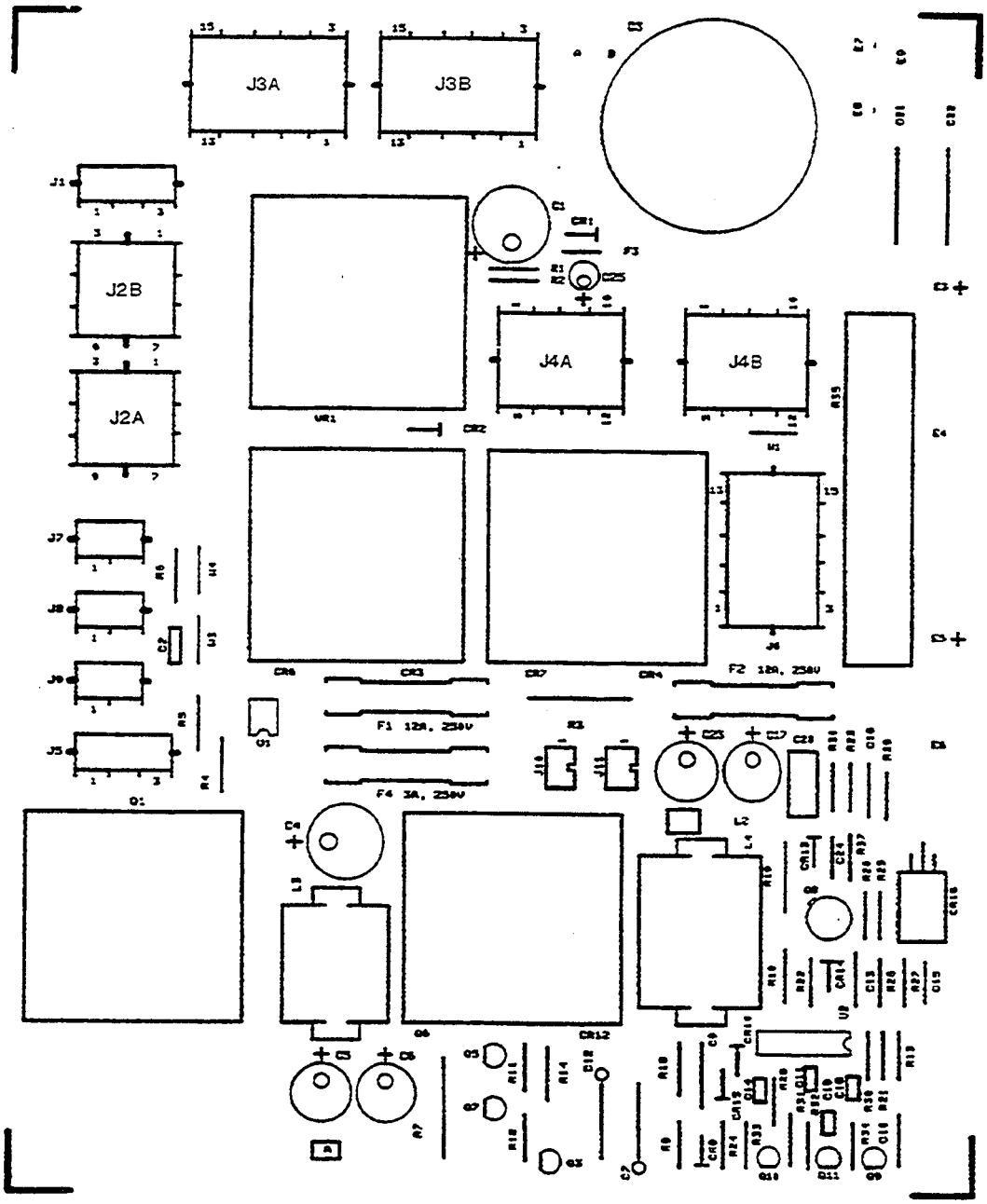

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Figure A–5 Power Supply Board (Interconnect) Drawing

A.5 TROUBLESHOOTING FLOWCHARTS

A.5.1 Inoperative Printer Troubleshooting Flowchart

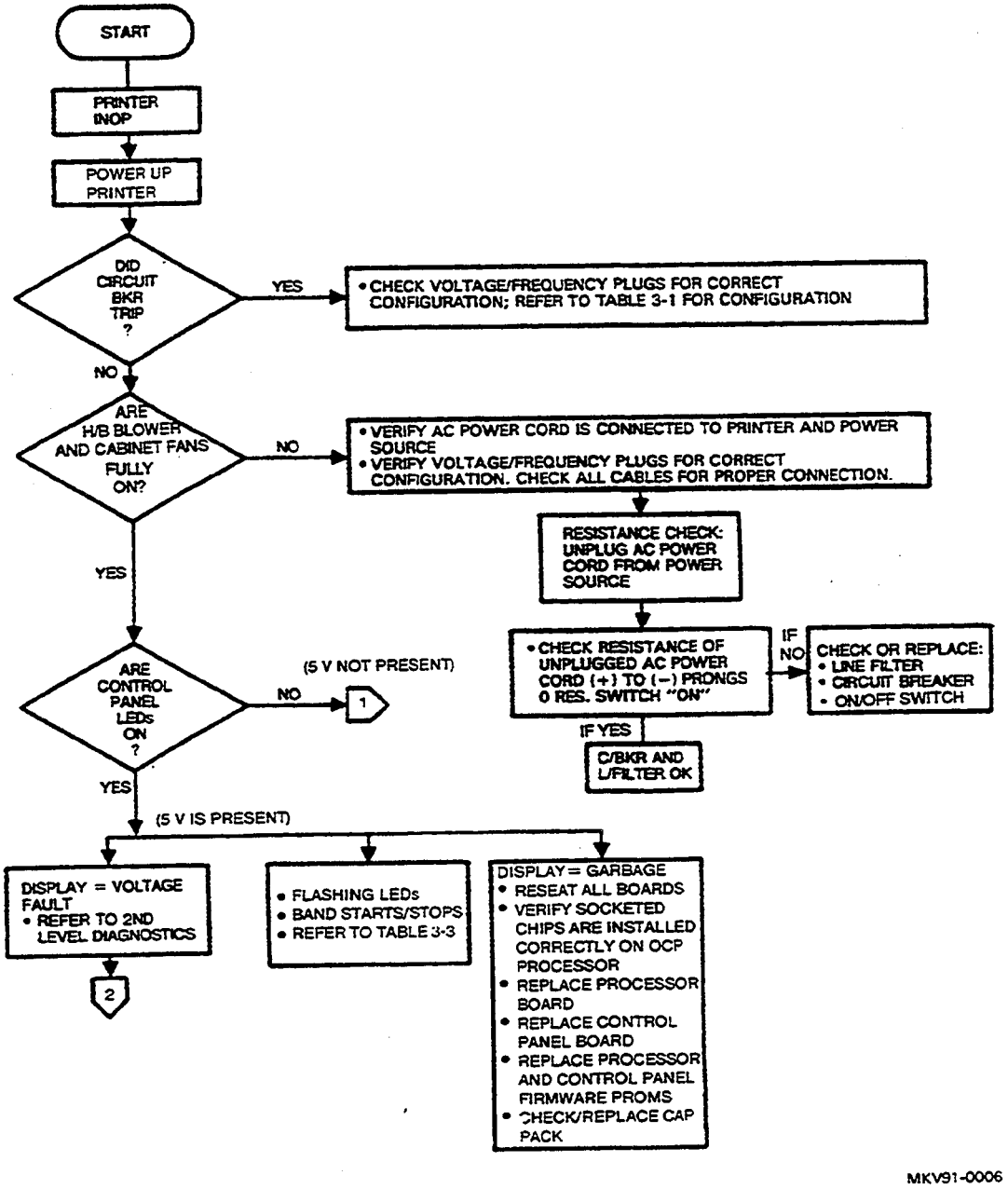


Figure A–6 (Cont.) Inoperative Printer Troubleshooting Flowchart

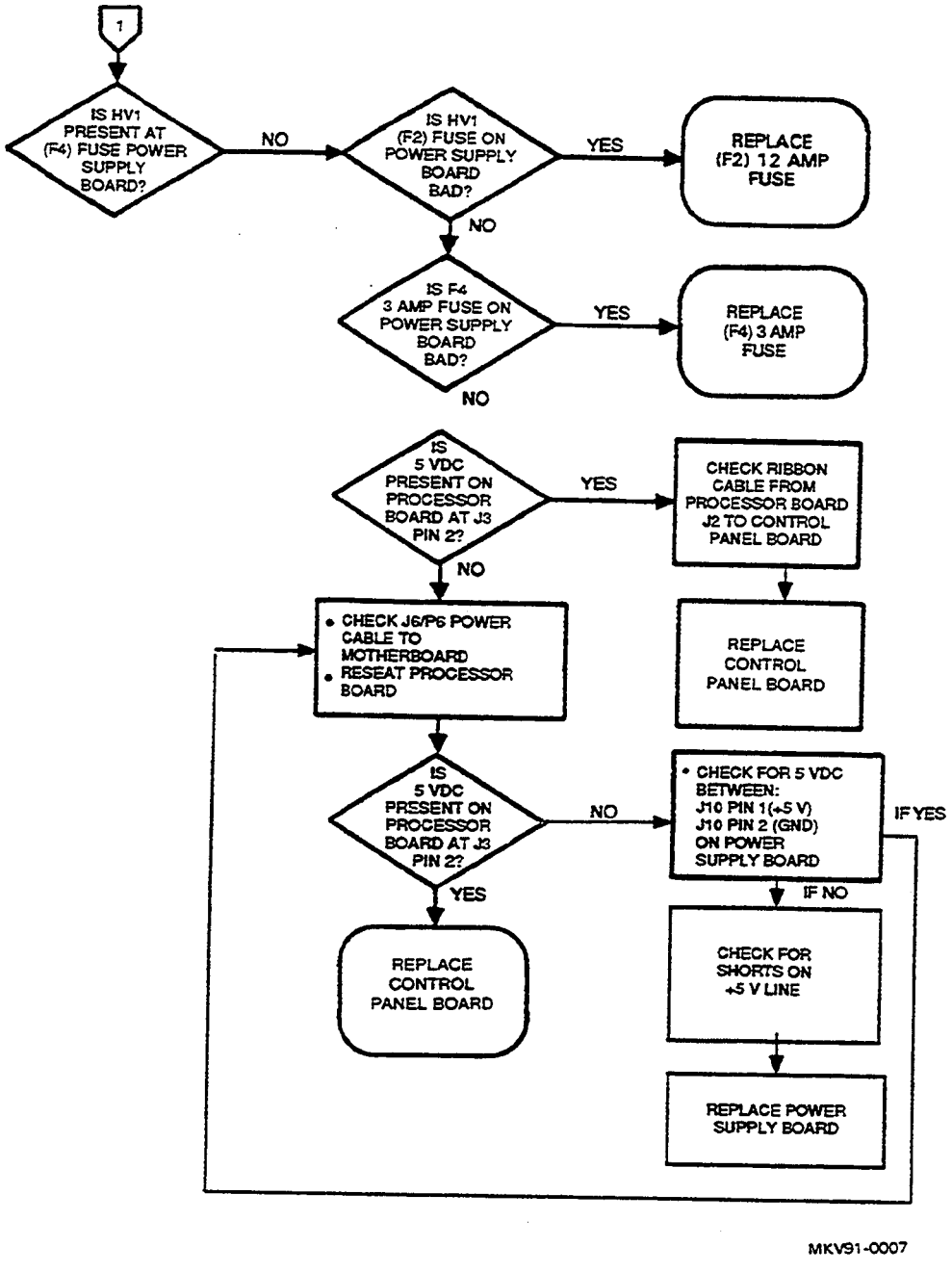
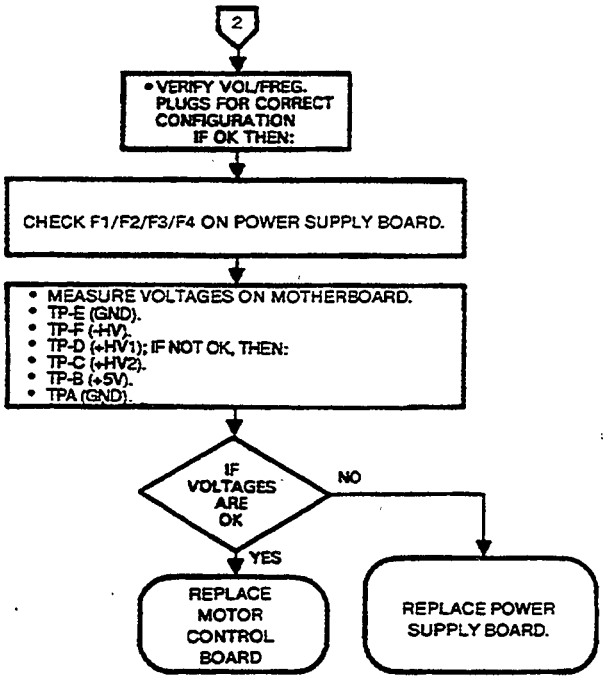


Figure A–6 (Cont.) Inoperative Printer Troubleshooting Flowchart



MODEL	+HV1	+HV2	-HV
LP37	48V	48V	–20V

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Figure A–6 Inoperative Printer Troubleshooting Flowchart

A.5.2 Inoperative Paper Puller Troubleshooting Flowchart

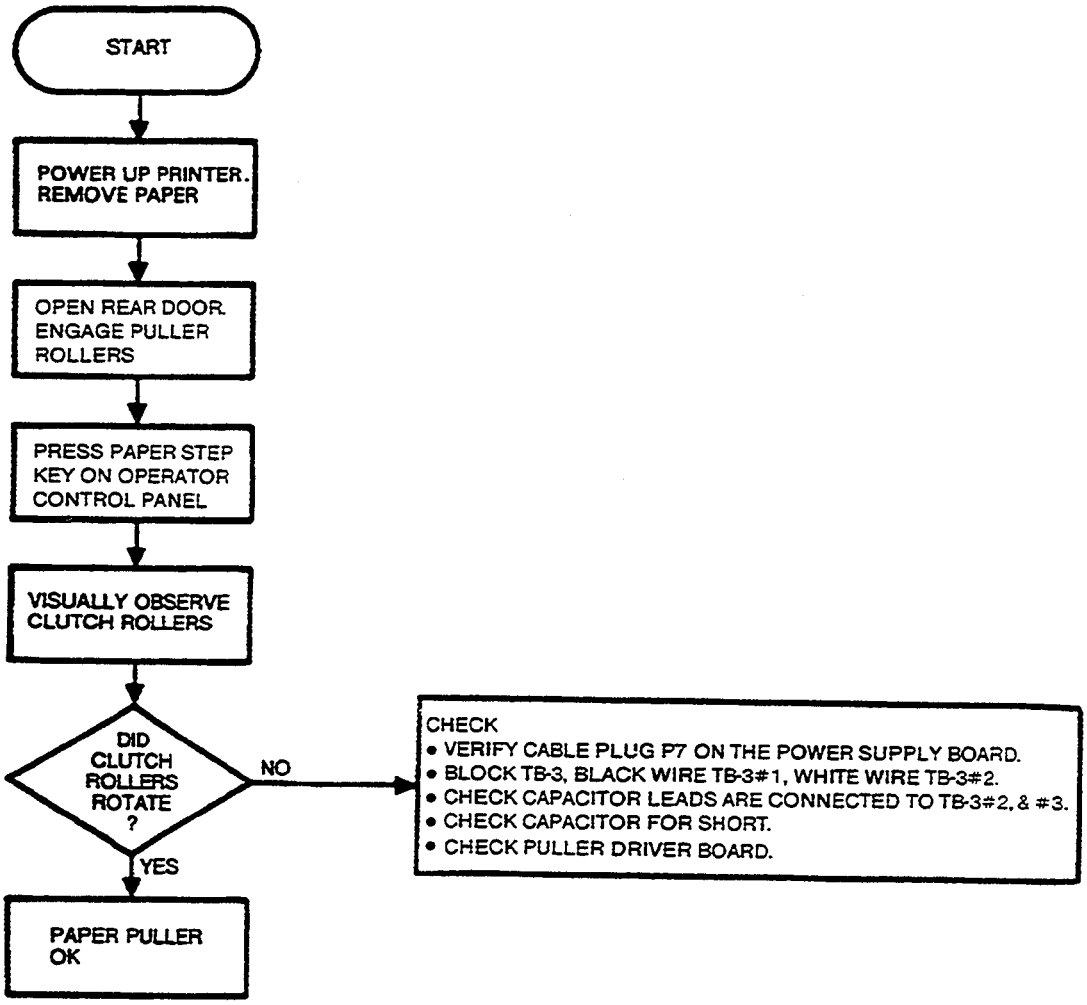

Figure A–7 Inoperative Paper Puller Troubleshooting Flowchart

A.5.3 Inoperative Puller Stacker Troubleshooting Flowchart

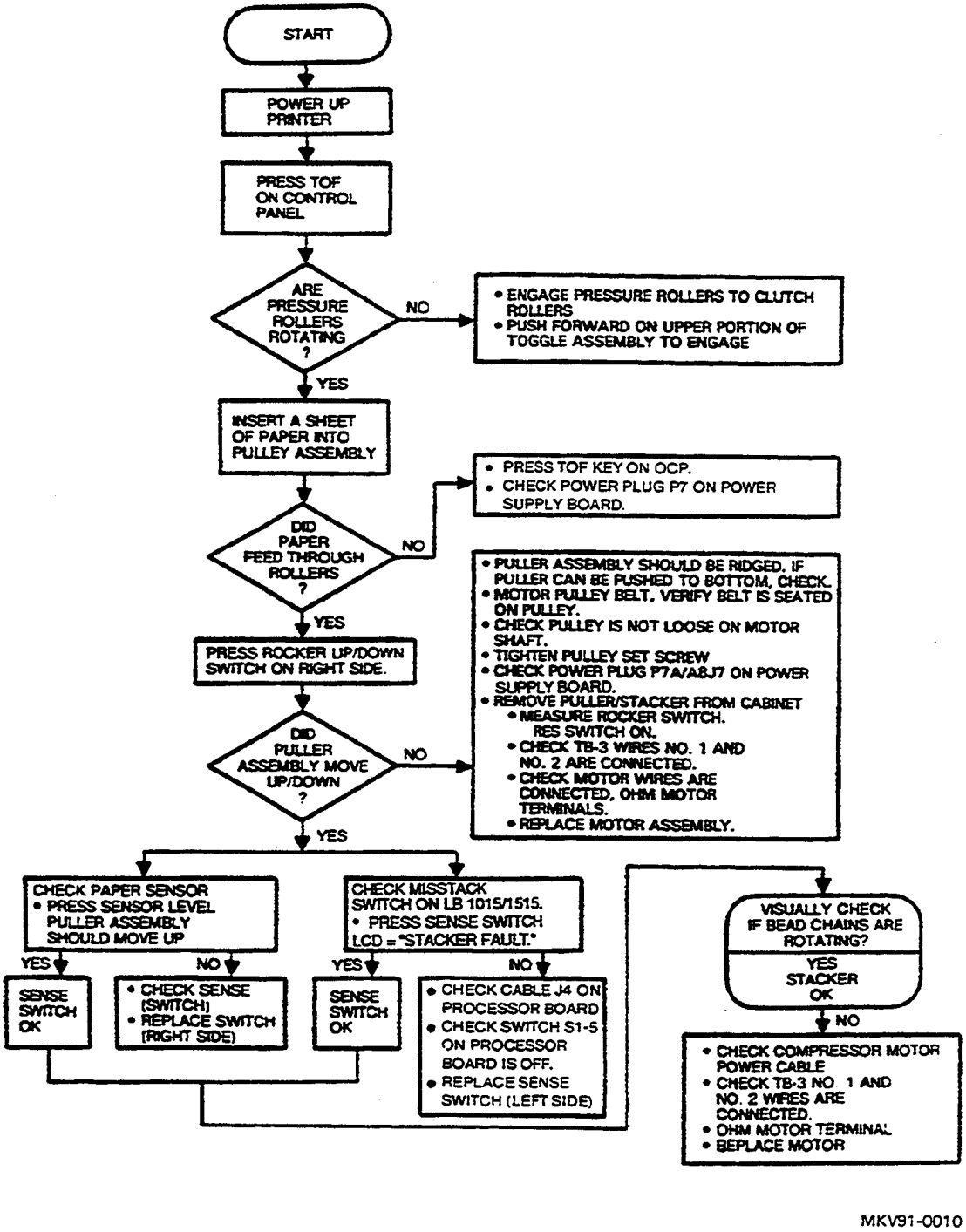

Figure A–8 Inoperative Puller Stacker Troubleshooting Flowchart

A.5.4 Inoperative Meter Package Troubleshooting Flowchart

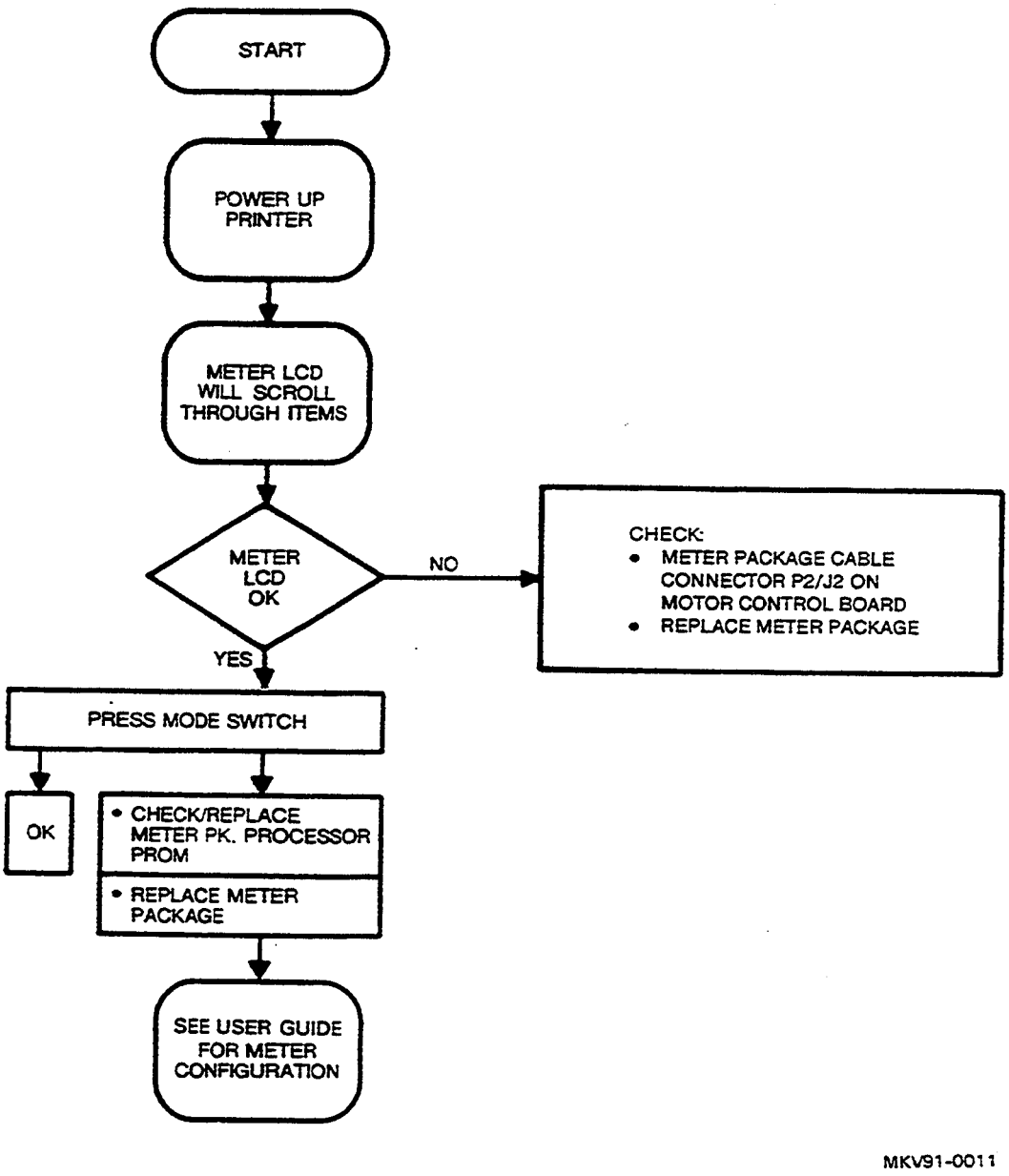

Figure A–9 Inoperative Meter Package Troubleshooting Flowchart

B

REMOVAL/REPLACEMENT PROCEDURES FOR THE LP37 WITH REMOVABLE SIDE PANELS

B.1 INTRODUCTION

Changes have been made to improve the manufacturing and servicing of the LP37 Line Printer. These changes and their benefits are summarized in Table B–1. The new style printer is easily identified by the circuit breakers/power switch as shown in Figure B–1.

Table B–1 Summary of Printer Improvements

Change	Benefit
New cabinet with removable side panels.	Allows easier access to difficult service areas (the power stacker can now be replaced more easily and damaged side panels can be replaced).
New power board that combines the 5 volt regulator with the power interconnect board.	Reduces the number of boards, simplifies troubleshooting, and reduces cabling and assembly.
New power ON/OFF switch assembly that separates the switch from the circuit breaker.	Provides a visible indication of a problem by providing two visible and resettable circuit breakers adjacent to the switch.

B.2 PURPOSE

Use the information in this appendix to supplement and/or replace information in the removal/replacement chapter of this manual.

B.3 ORGANIZATION

The information in this appendix is organized as follows:

- New Printer Cabinet Description—Section B.4
- Universal Power Supply Description—Section B.5
- Power and Frequency Plug Locations—Section B.6
- Revised and New Removal/Replacement Procedures—Section B.7
- Revised Recommended Spares—Section B.8

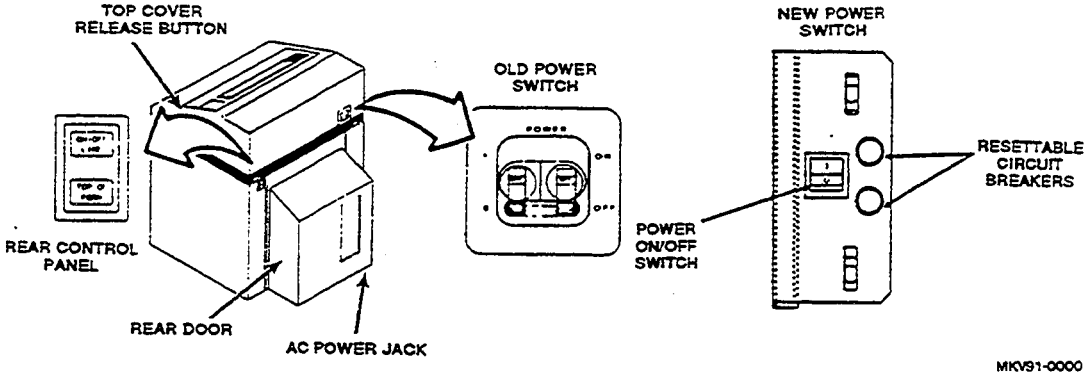

Figure B–1 Identifying the New Style Printer

B.4 NEW PRINTER CABINET DESCRIPTION

The printer cabinet side panels (Figure B–2) can be removed to allow access to the paper puller and power paper stacker assembly, I/O interface bracket, and other components. Refer to Section B.7 for cabinet side panel removal and installation procedures.

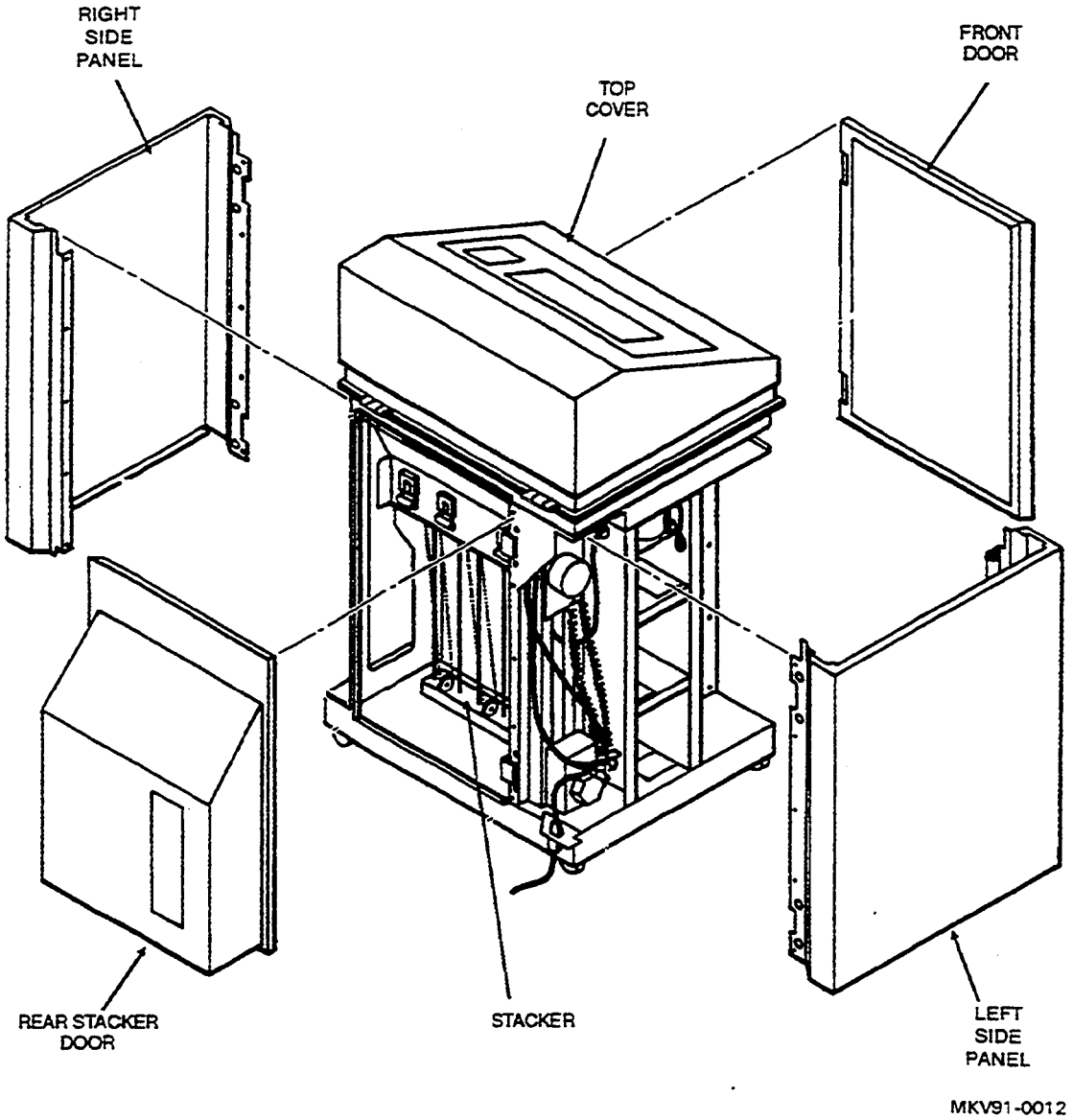

Figure B–2 Printer Cabinet Removable Side Panels

B.5 UNIVERSAL POWER SUPPLY DESCRIPTION

The universal power supply assembly (Figure B–3) is designed to operate with power inputs of 120 Vac or 240 Vac at 60 or 50 Hz. The assembly consists of a constant voltage transformer, ac circuit breakers, power supply circuit board assembly, and capacitor pack assembly. Power configuration plugs on the power supply board can select domestic or foreign input configuration requirements.

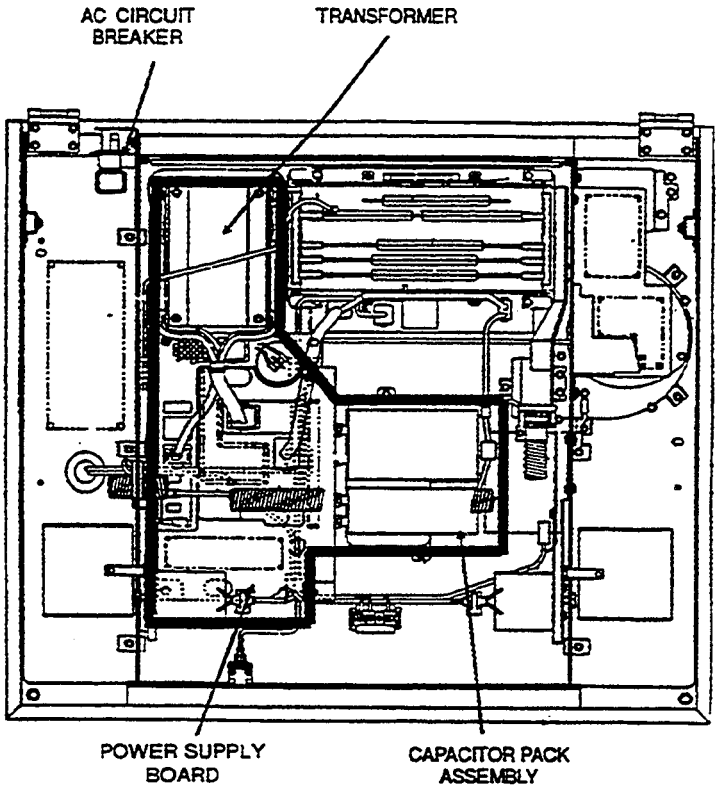

Figure B–3 Universal Power Supply Assembly

B.6 POWER AND FREQUENCY PLUG LOCATIONS

Figure B–4 shows the power and frequency plug locations. Table B–2 shows how to configure the correct input power and frequency plugs for the input voltage and frequency at the operating site.

If the voltage decal does not match the input voltage at the operating site, the plugs on the power supply must be changed to match the correct input voltage as shown in Table B–2.

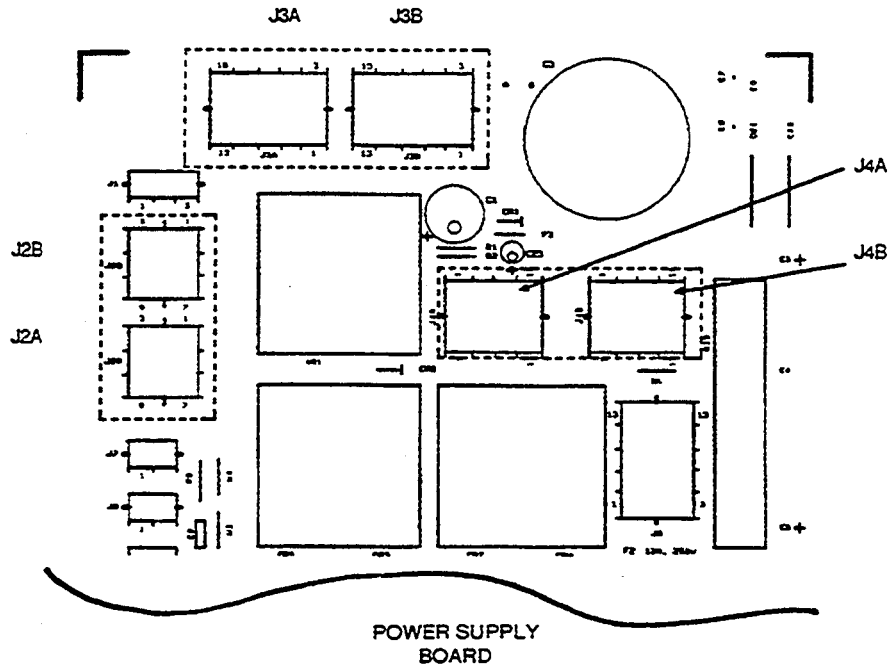

Figure B–4 Power Supply Voltage Selection Plug Locations

Table B–2 Voltage Configurations

Input Voltage/ Frequency	Connections
120 V, 50 Hz	P2 to J2B, P3 to J3A, and P4 to J4A
120 V, 60 Hz	P2 to J2B, P3 to J3B, and P4 to J4B
240 V, 50 Hz	P2 to J2A, P3 to J3A, and P4 to J4A
240 V, 60 Hz	P2 to J2A, P3 to J3B, and P4 to J4B

B.7 REVISED AND NEW REMOVAL/REPLACEMENT PROCEDURES

The removal and replacement procedures in this appendix are either new or are intended to replace the corresponding procedure in Chapter 5 for the new printer with removable skins. The removal/replacement procedures in this appendix include:

- Right Side Cabinet Panel
- Left Side Cabinet Panel
- Cabinet Fan
- Blower Motor Assembly
- I/O Harness Assembly
- Power ON/OFF Switch and Circuit Breakers
- Power Supply Board
- Capacitor Pack Assembly
- Motherboard
- Power Paper Stacker Assembly

B.7.1 Right Side Cabinet Panel Removal/Replacement

To Remove the Right Side Cabinet Panel:

1. Remove the top cover (Section 5.3) and place it aside.
2. Remove the front door by opening it and lifting it off the hinge pins. Set the door aside.
3. Open the rear door.
4. Remove the two screws from the wire paper rack and remove the rack from the cabinet floor.
5. Use the UP/DOWN switch to position the paper puller support assembly to the middle of the puller guide rail.
6. Remove the two Allen screws from the support guide rail.
7. Remove the three remaining hex head screws from the right side panel.
8. From the front of the printer, remove the five screws securing the right side panel to the front right corner of the cabinet.
9. Remove the right side panel and set it aside.

NOTE

The rear of the panel must be moved around to clear the screws in the cabinet.

To Replace the Right Side Cabinet Panel:

1. Position the panel onto the right side of the cabinet.
2. From the front of the printer, install and tighten the five panel screws into the front right corner of the cabinet.
3. Install and tighten the two guide rail Allen screws at the rear of the cabinet.
4. Install and tighten the three panel hex head screws at the rear of the cabinet.
5. From the rear of the printer, install the wire paper rack and secure with the two screws removed earlier.
6. With the front door in the open position, mount the door hinges onto the cabinet hinge pins; inserting the lower hinge pin first.
7. Replace the top cover (Section 5.3).

B.7.2 Left Side Cabinet Panel Removal/Replacement

To Remove the Left Side Cabinet Panel:

1. Remove the top cover (Section 5.3) and set it aside.
2. Remove the rear door by opening it and lifting it off the hinge pins. Set the door aside.
3. From the rear of the printer, remove the two screws from the wire paper rack and remove the rack from the cabinet floor.
4. Using a hex driver, remove the five left side panel screws from the rear left corner of the cabinet.
5. Open the front door and remove the five screws securing the left side panel to the front left corner of the cabinet.
6. Remove the left side panel and set it aside.

NOTE

The rear of the panel must be moved around to clear the screws in the cabinet.

To Replace the Left Side Cabinet Panel:

1. Position the panel onto the left side of the cabinet.
2. From the front of the printer, install and tighten the five panel screws into the front left corner of the cabinet.
3. Install and tighten the five rear panel screws into the rear left corner of the cabinet.
4. With the rear door in the open position, mount the door hinges onto the cabinet hinge pins; inserting the lower hinge pin first.
5. Install the paper wire rack onto the rear cabinet floor and secure with the two screws removed earlier.
6. Replace the top cover (Section 5.3).

B.7.3 Cabinet Fan Removal/Replacement

To Remove the Cabinet Fan:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Remove the left side cabinet panel (Section B.7.2).
3. Disconnect the fan power cable plug from the fan ac terminals (Figure B–5).
4. Using a hex driver, remove the four nuts securing the fan to its bracket.
5. Lower the fan away from the mounting screws and remove it from the printer.

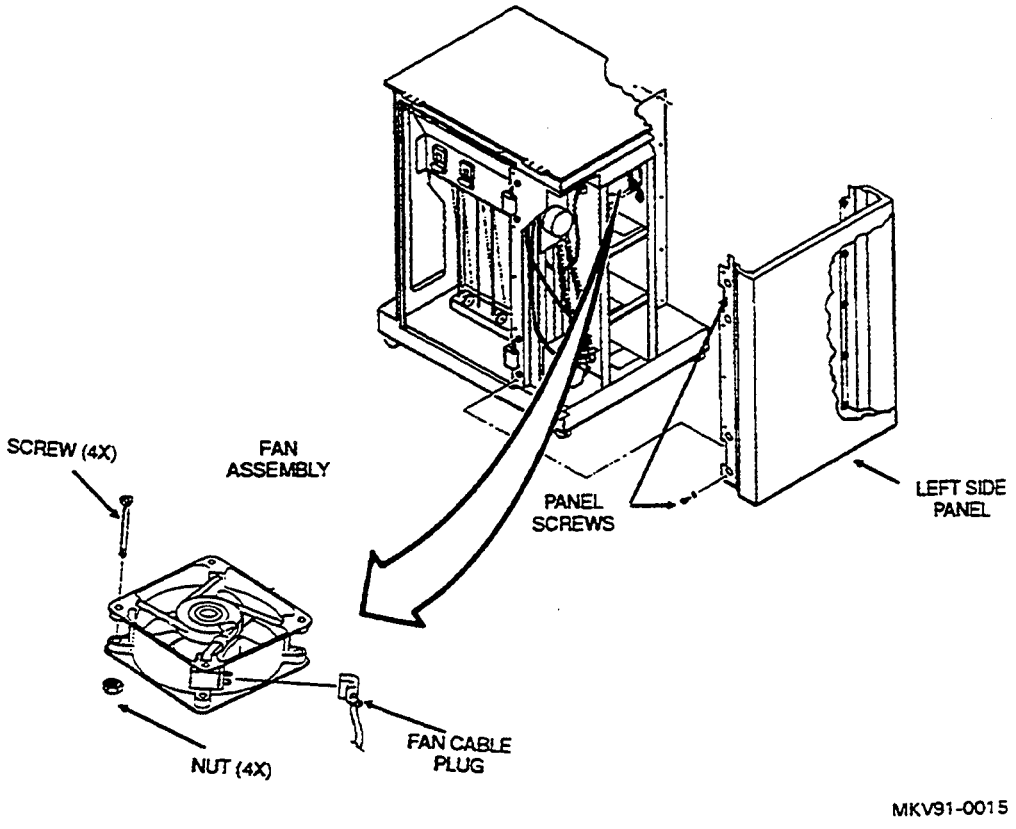

Figure B–5 Removing the Cabinet Fan

To Replace the Cabinet Fan:

1. With the airflow direction arrow (Figure B–6) pointing down, mount the fan onto the four bracket mounting screws and secure it with the four fan assembly nuts.
2. Connect the fan power cable plug to the fan ac terminals.
3. Install the left side cabinet panel (Section B.7.2).

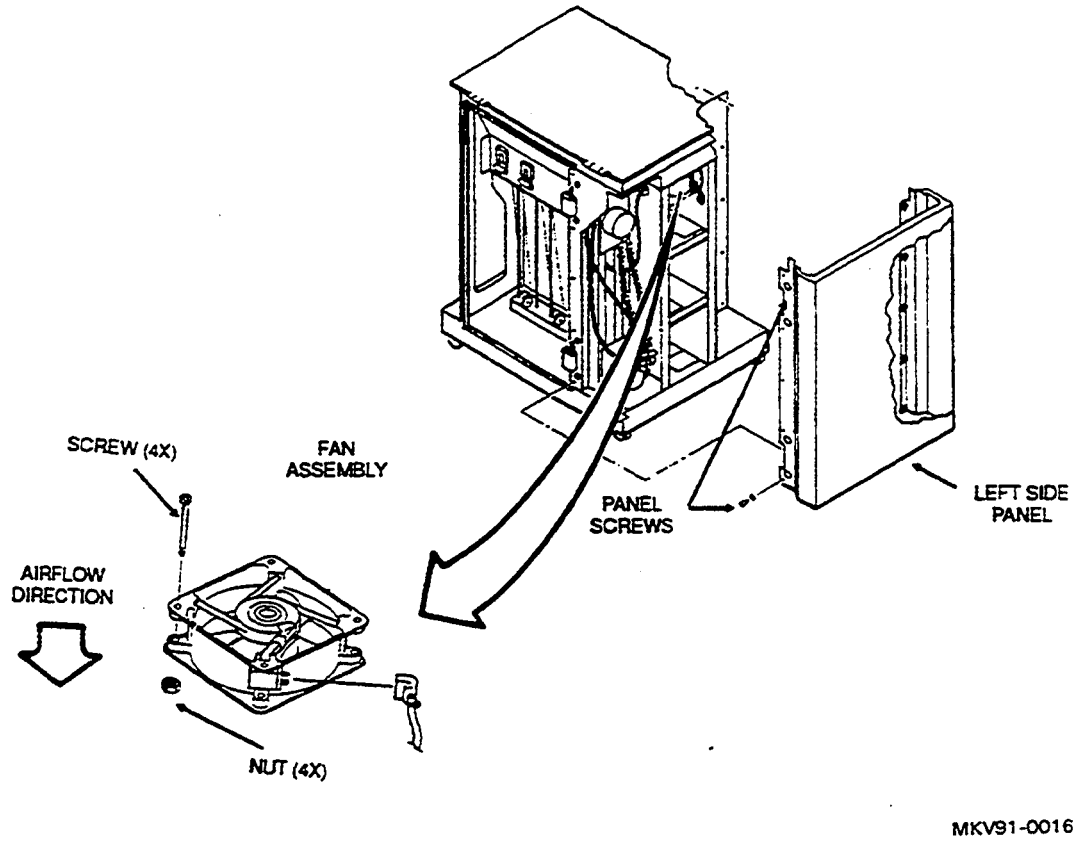

Figure B–6 Replacing the Cabinet Fan

B.7.4 Blower Motor Removal/Replacement

To Remove the Blower Motor:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Raise the printer mechanism (Section 5.6).
3. Remove the two screws securing the blower cover (Figure B–7) and remove the cover.

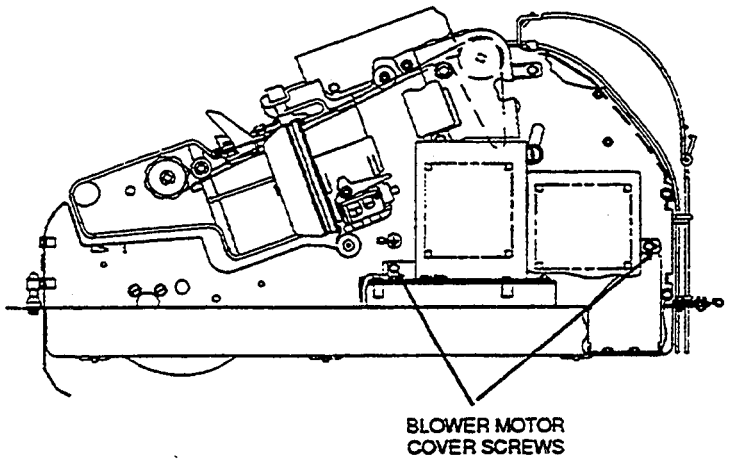

Figure B–7 Removing the Blower Motor Cover

4. Disconnect the blower motor cable plug P8 (Figure B–8) on the power supply board.
5. From under the printer mechanism, cut the tie wraps securing the blower motor cable and release the cable.

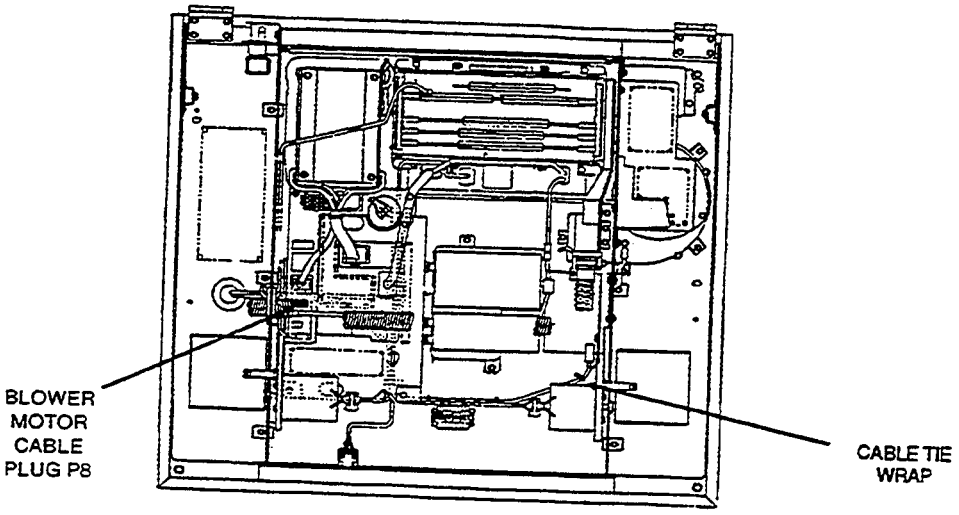

Figure B–8 Preparing to Remove the Blower Motor

6. Remove the three blower motor screws from the blower motor assembly (Figure B–9).
7. From above the raised printer mechanism, using an extension driver, loosen the two right side screws of the air duct (Figure B–9).
8. Remove the left side screw from the air duct assembly.
9. Lift up and hold the loosened air duct assembly.
10. Lift the blower motor assembly and carefully pull the blower motor cable from under the air duct and through the side frame opening.
11. Remove the blower motor assembly.

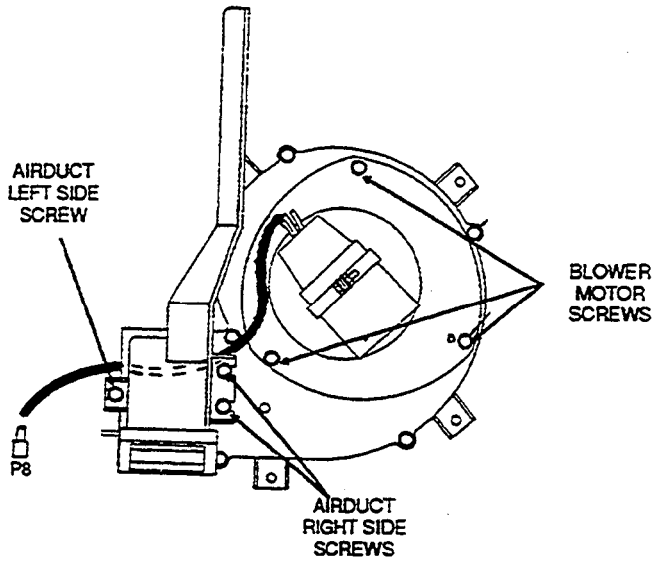

Figure B–9 Removing the Blower Motor

To Replace the Blower Motor Assembly:

1. Route the blower motor cable through the side frame opening, under the air duct assembly, across the printer base, and connect it to J8 on the power supply board.
2. Mount the blower motor assembly on the blower housing and secure it with the three blower motor screws (Figure B–10).

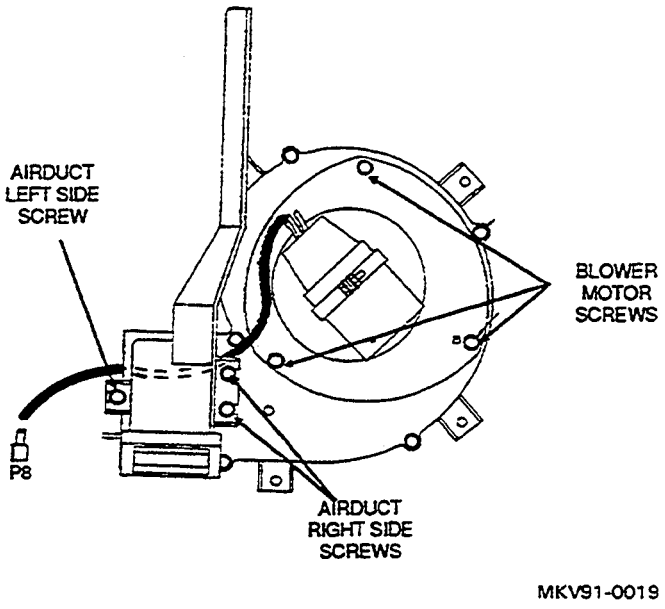

Figure B–10 Replacing the Blower Motor Assembly

3. From under the printer mechanism, install and tighten the left side screw and the two right side screws on the air duct assembly (Figure B–11).
4. Mount the blower motor cover over the motor and secure it with the two cover screws.
5. Secure the blower motor cable with cable ties (Figure B–11).
6. Lower the printer mechanism (Section 5.6).

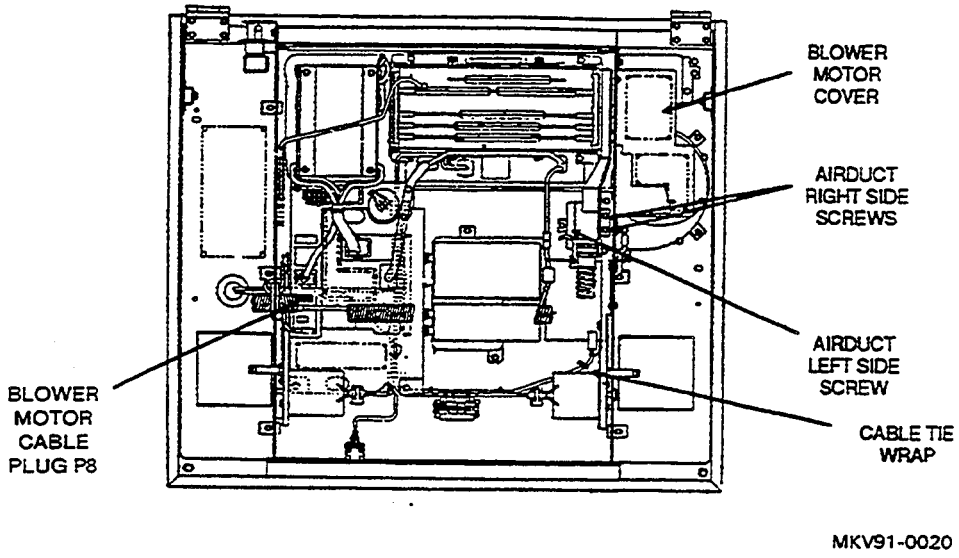

Figure B–11 Completing the Blower Motor Replacement

B.7.5 I/O Harness Assembly Removal/Replacement

To Remove the I/O Harness Assembly:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Remove the right side cabinet panel (Section B.7.1).
3. Remove the paper forms guide/card cage cover (Section 5.4).
4. Remove the two screws from the blower motor cover (Figure B–12) and remove the cover.

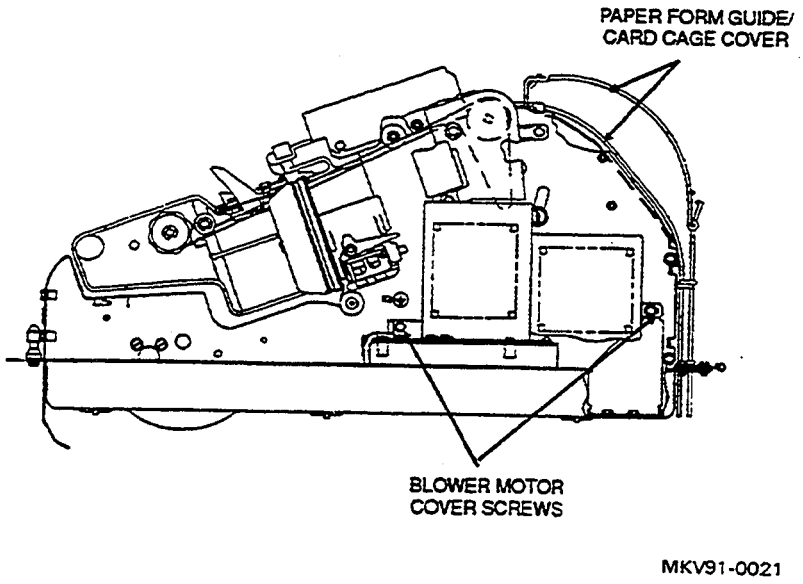

Figure B–12 Removing the Blower Motor Cover

5. Remove the remaining screw securing the I/O harness cover and remove the harness cover (Figure B–13).

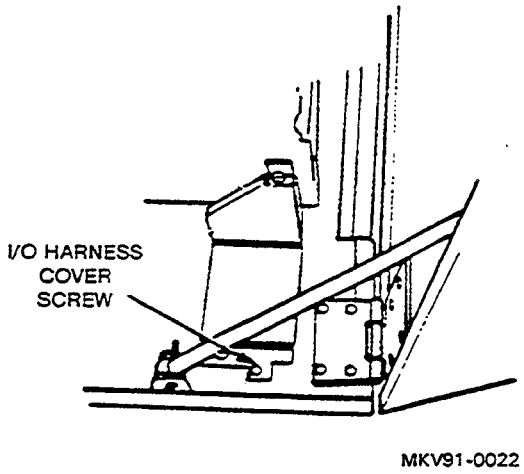

Figure B–13 Removing the I/O Harness Cover

6. Remove the two screws from the card cage rear plate and remove the plate.
7. From underneath the base pan, remove the three screws securing the I/O harness assembly.
8. Disconnect the I/O ribbon cable from J8 on the motherboard.
9. Position the ribbon connector(s) horizontally and gently push them through the side access hole (Figure B–14).
10. Remove the I/O harness assembly from the printer.

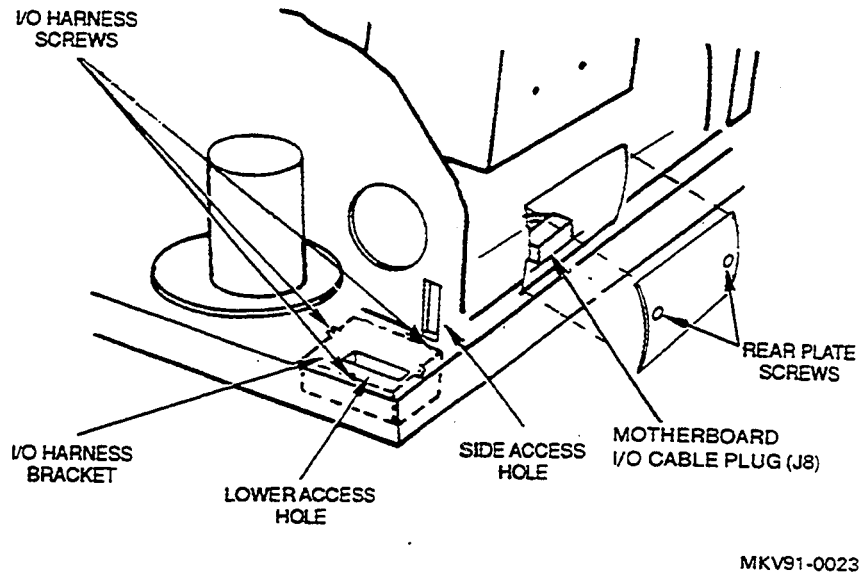

Figure B–14 Removing the I/O Harness Assembly

To Replace the I/O Harness Assembly:

1. Push the I/O harness ribbon connector(s) horizontally up through the lower access hole, and through the side access hole (Figure B–15).
2. Mount the back of the I/O harness assembly against the underside of the printer base.
3. Install and tighten the three screws to secure the I/O harness assembly.
4. Guide the cable through the side access hole.
5. Connect the cable to J8 of the motherboard.
6. Install the rear plate and secure it with the two screws.
7. Mount the I/O harness bracket cover and install and tighten the outer mounting screw.

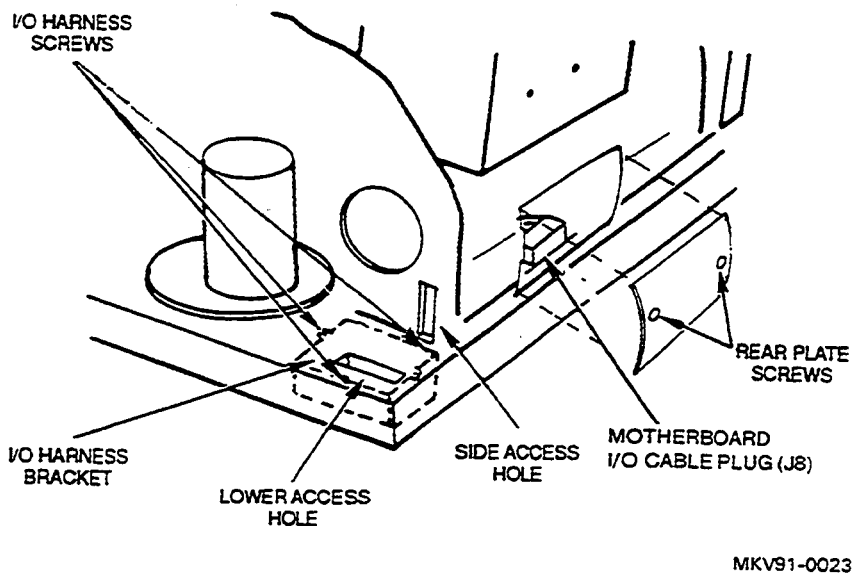

Figure B–15 Replacing the I/O Harness Assembly

8. Place the blower motor cover over the motor and secure it with two screws (Figure B–16).
9. Install the paper forms guide/card cage cover (Section 5.4).
10. Replace the right side cabinet panel (Section B.7.1).

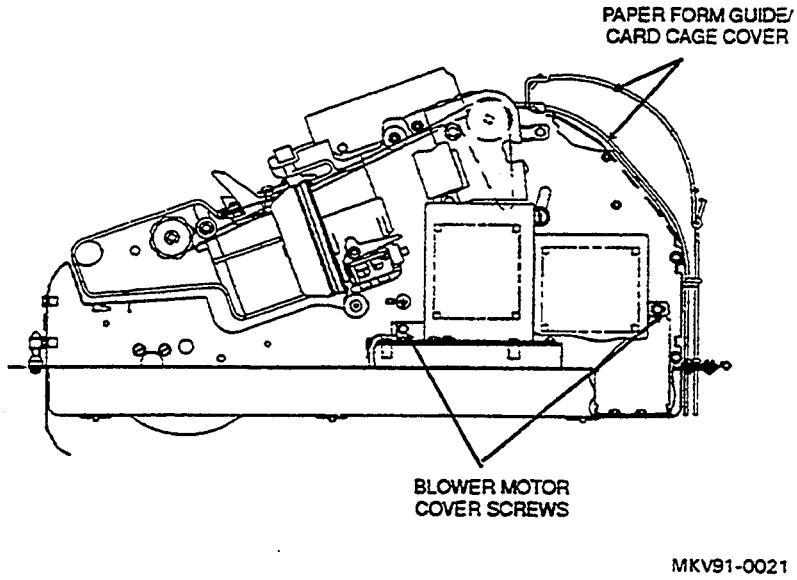

Figure B–16 Replacing the Blower Motor Cover and Card Cage Cover

B.7.6 Power ON/OFF Switch Removal/Replacement

To Remove the Power ON/OFF Switch:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Open the top cover.
3. Remove the two screws securing the power switch safety cover and remove the cover (Figure B–17).

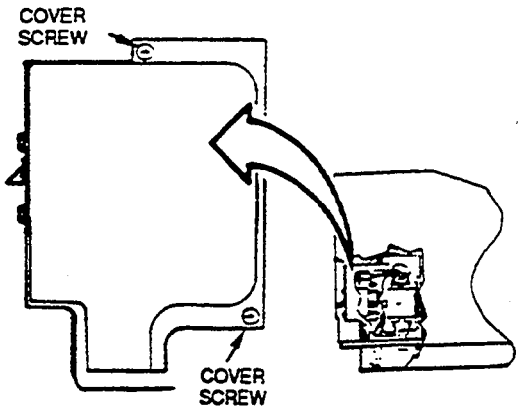

Figure B–17 Removing the Power Switch Safety Cover

4. Remove the three screws from the safety interlock switch bracket (Figure B–18) and move the bracket and switch aside to allow access to the power switch.

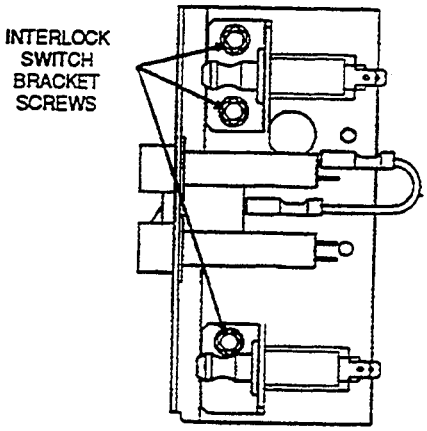

Figure B–18 Moving the Upper Interlock Switch Bracket

5. Note the wire positions and disconnect the four terminal wires from the power switch.
6. Squeeze the switch locking tabs and push the switch through the front of the bracket.

To Replace the Power ON/OFF Switch:

1. Orient the power switch so that the 0 is positioned at the bottom.
2. Push the switch into the bracket hole.
3. Noting the specific wiring order as removed, connect the four terminal wires to the switch connectors.
4. Pull out the interlock switch actuators and mount the switches against the circuit breaker bracket.
5. Ensure that the end of each actuator is positioned against the backside of the circuit breaker bracket (Figure B–19).
6. Install and tighten the three interlock switch bracket mounting screws.

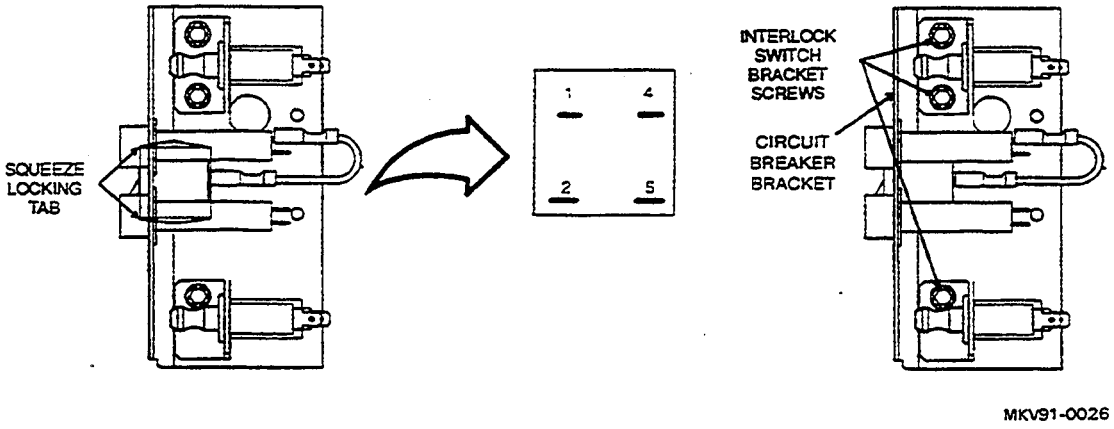

Figure B–19 Replacing the Power ON/OFF Switch

B.7.7 Circuit Breaker Removal/Replacement

To Remove the Circuit Breaker:

1. Perform steps 1 through 3 of Section B.7.6.
2. Disconnect the terminal wires from the circuit breaker.
3. Using a small flat-blade screwdriver, pry the retaining ring (Figure B–20) back and slide it off the circuit breaker.
4. Push the circuit breaker through the bracket and remove it.

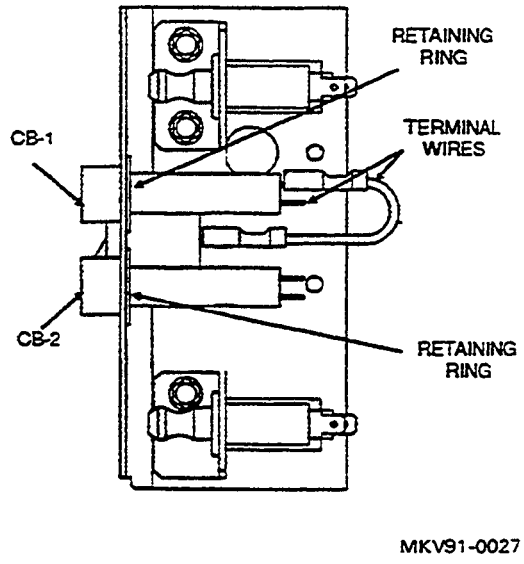

Figure B–20 Removing the Circuit Breaker

To Replace the Circuit Breaker:

1. Insert the circuit breaker into the bracket hole from the front.
2. Slide the retaining ring (Figure B–21) onto the circuit breaker from the back of the circuit breaker.
3. Push the retaining ring flush against the inside of the bracket to secure the circuit breaker in place.
4. Connect the two terminal wires to the circuit breaker connectors as labeled.

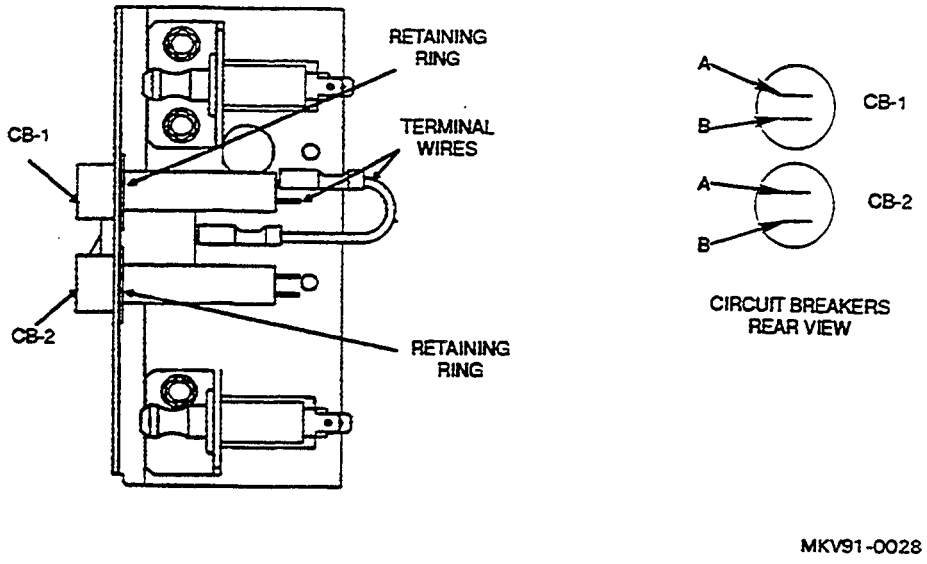

Figure B–21 Replacing the Circuit Breaker

5. Install the power switch cover and secure it with two screws (Figure B–22).

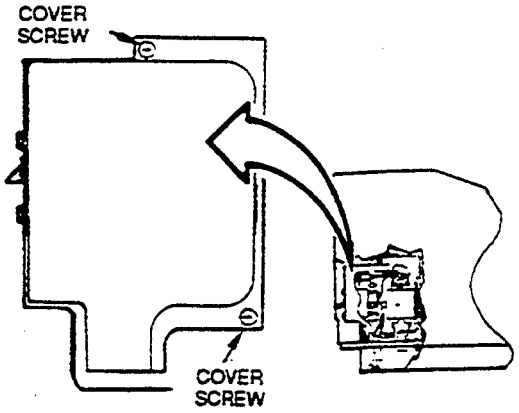

Figure B–22 Replacing the Power Switch Cover

B.7.8 Power Supply Board Removal/Replacement

To Remove the Power Supply Board:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Open the top cover.
3. Raise the printer mechanism (Section 5.6).
4. Disconnect all plugs from the power supply board.
5. Loosen the hose clamp screw (Figure B–23) and release the hose from the air duct assembly.
6. Move the hose aside to allow access to the power supply board.

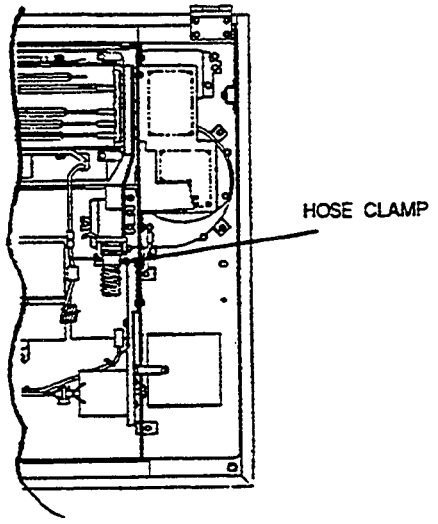

Figure B–23 Removing the Hose

7. Remove the three screws from the power supply cover (Figure B–24) and remove the cover.

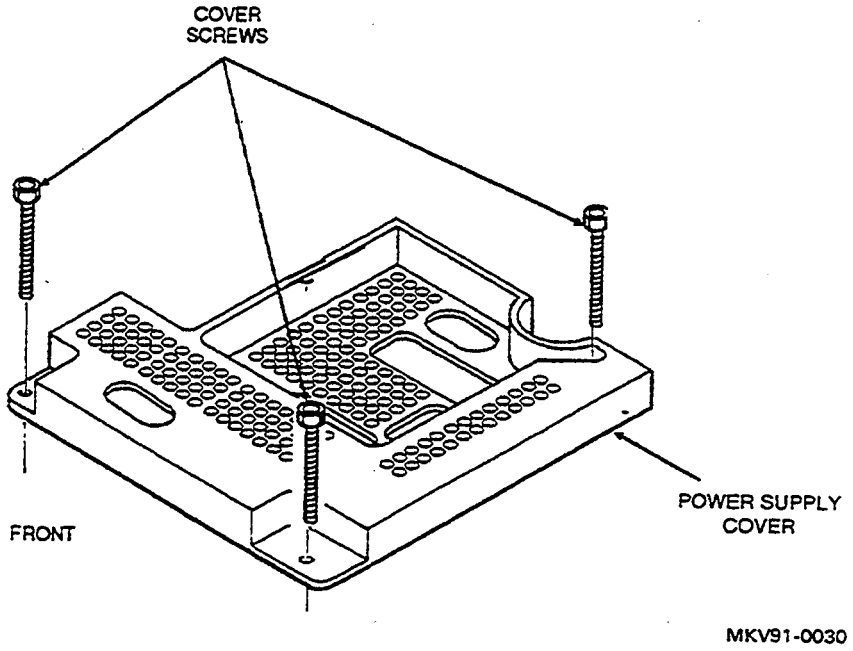

Figure B–24 Removing the Power Supply Board Cover

8. Remove the screw from each of the four L-shaped brackets securing the ac capacitor packs to the power supply board.
9. Remove the two rear nuts (Figure B–25) securing the power supply board to the base pan.

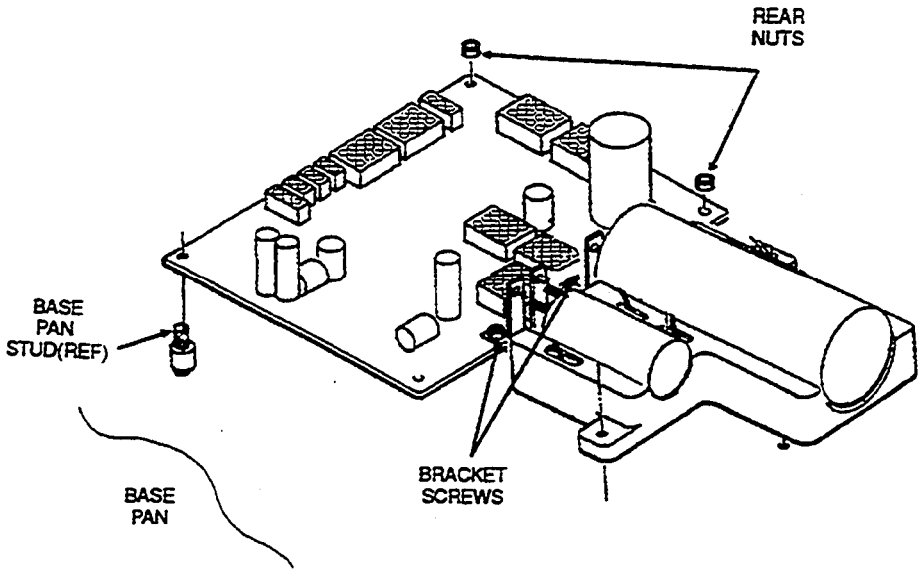

Figure B–25 Removing the Power Supply Rear Nuts

10. Remove the two front cover standoffs (Figure B–26) from the power supply board. Leave the plastic standoffs on the pan studs.
11. Remove the power supply board from the printer.

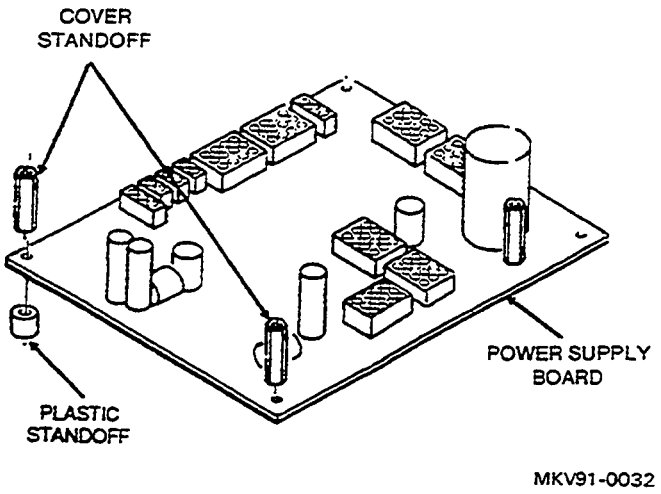

Figure B–26 Removing the Power Supply Board

To Replace the Power Supply Board:

1. Position the power supply board onto the base pan plastic standoffs.
2. Install and tighten the two rear nuts (Figure B–27) to secure the power supply board.
3. Install and tighten the two front cover standoffs.

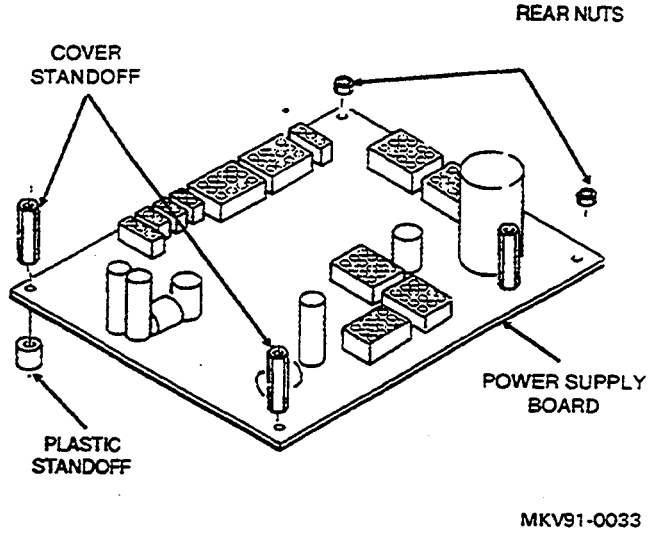

Figure B–27 Replacing the Power Supply Board

4. Install and tighten the four bracket screws (Figure B–28) to secure the L-shaped capacitor brackets to the power supply board.

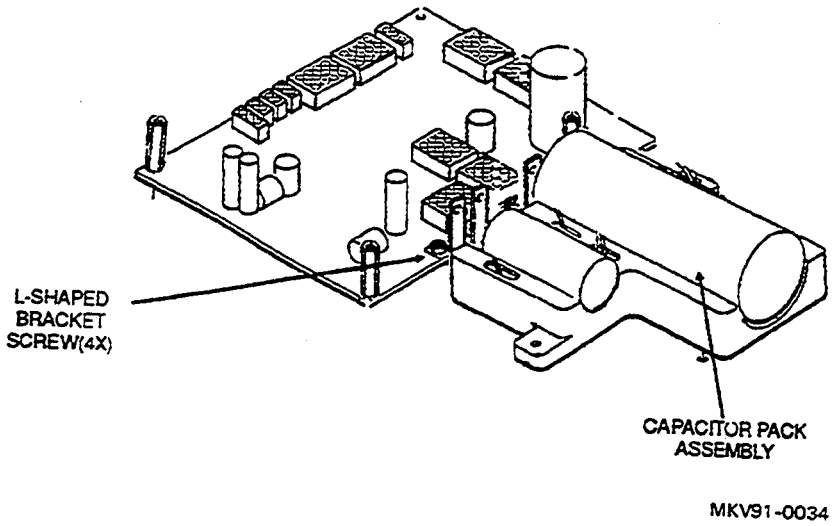

Figure B–28 Replacing the L-Shaped Capacitor Brackets

5. Install plugs P1, P7, and P8 into the power supply board.
6. Refer to Figure B–29 and Table B–3 and install plugs P2 and P3 for the correct voltage configuration.

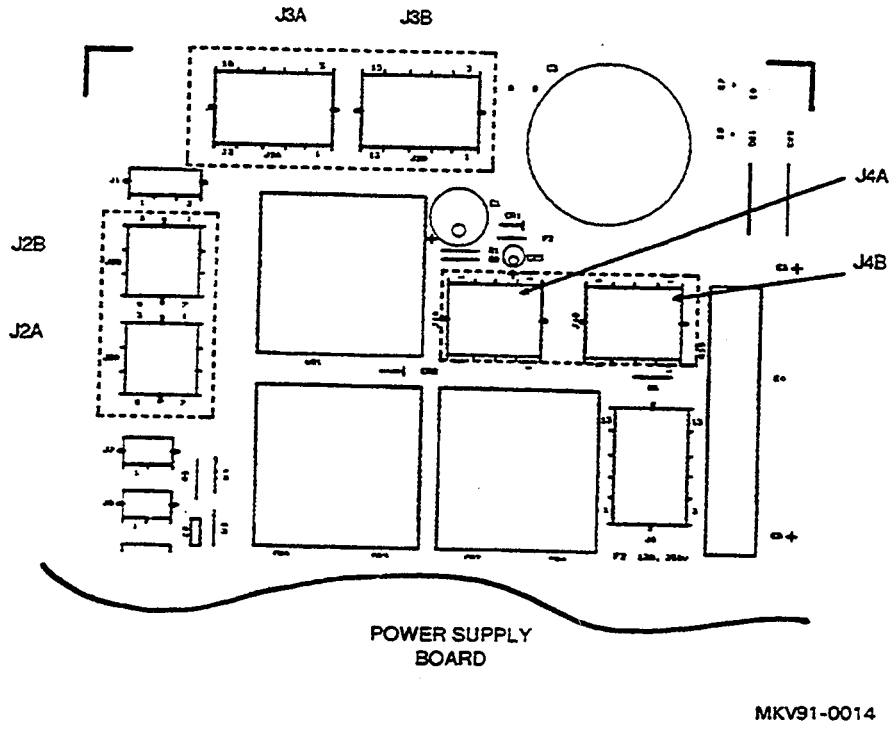

Figure B–29 Configuring the Voltage

Table B–3 Voltage Configurations

Input Voltage/ Frequency	Connections
120 V, 50 Hz	P2 to J2B, P3 to J3A, and P4 to J4A
120 V, 60 Hz	P2 to J2B, P3 to J3B, and P4 to J4B
240 V, 50 Hz	P2 to J2A, P3 to J3A, and P4 to J4A
240 V, 60 Hz	P2 to J2A, P3 to J3B, and P4 to J4B

7. Position the power supply board cover onto the three standoffs and secure the cover with the screws previously removed (Figure B–30).

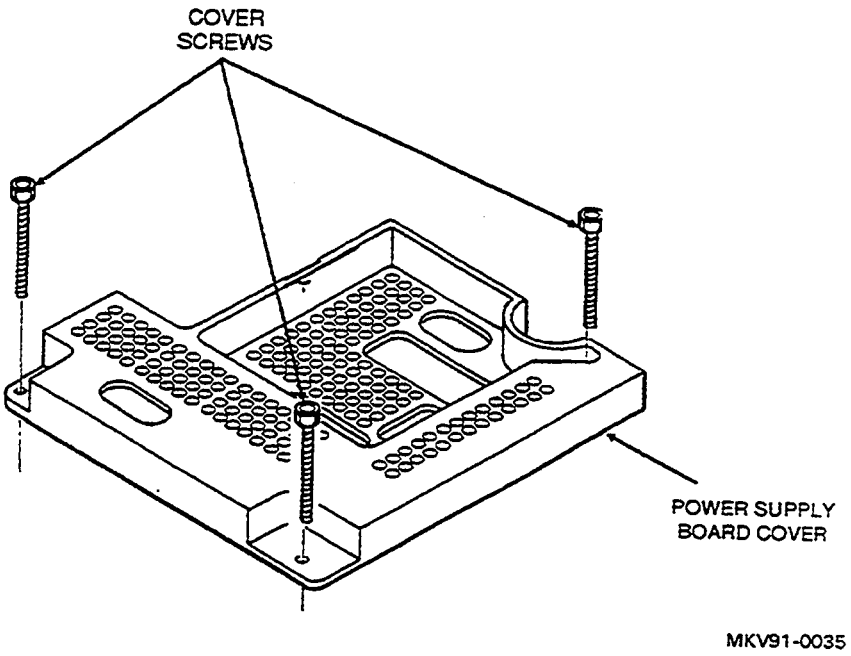

Figure B–30 Replacing the Power Supply Board Cover

8. Using Figure B–29 and Table B–3 connect P4 and P6 to the power supply board.
9. Connect the hose to the air duct assembly and tighten the clamp screw.
10. Using tie wraps, secure the air hose to the power supply board in two places.
11. Lower the printer mechanism (Section 5.6).
12. Close the top cover.

B.7.9 Capacitor Pack Assembly Removal/Replacement

To Remove the AC Capacitor Pack:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Open the top cover.
3. Raise the printer mechanism (Section 5.6).
4. Remove plugs P4 and P6 from the power supply board (Figure B–31).

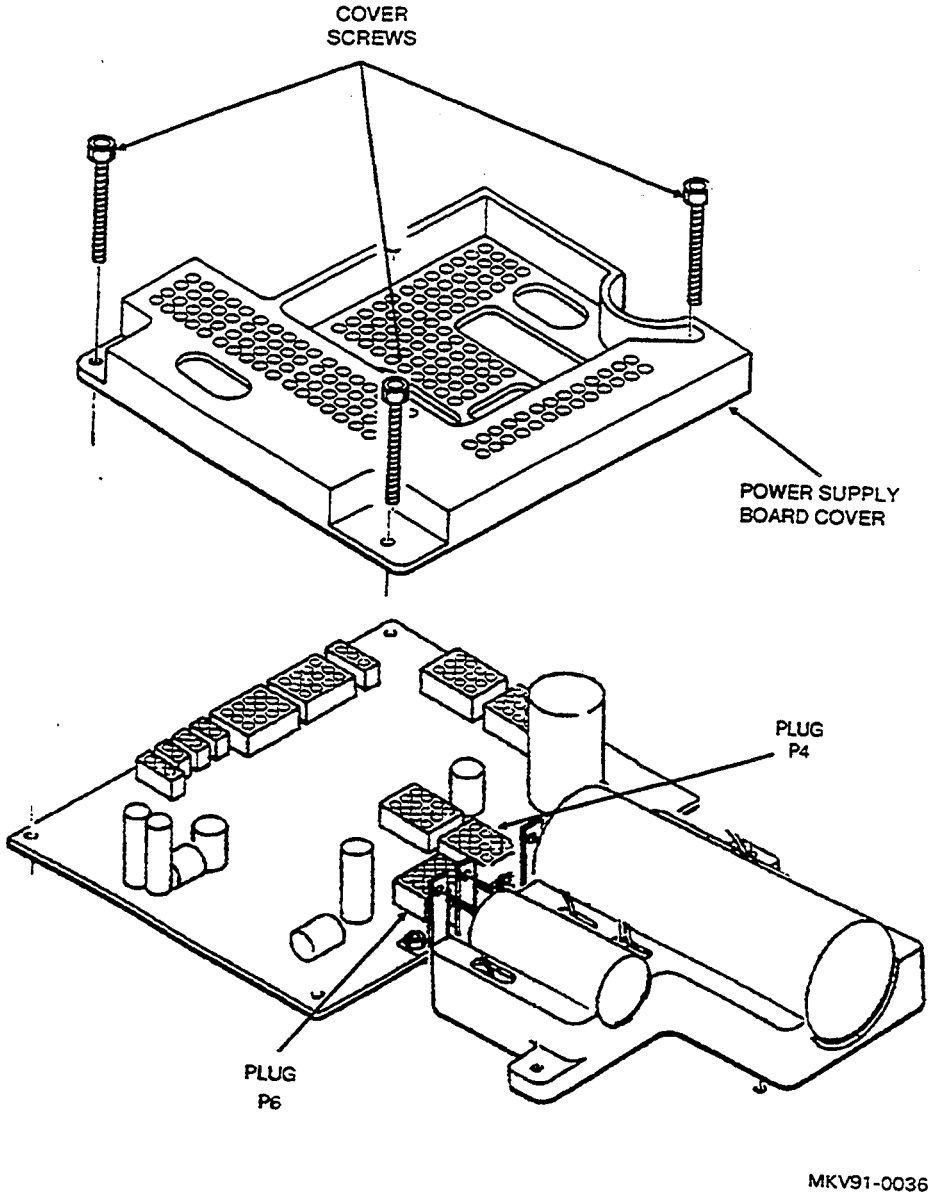

Figure B–31 Removing the Power Supply Board Cover

5. Remove the three power supply cover screws and remove the cover.
6. Remove the four screws securing the capacitor to the L-shaped brackets.

NOTE

Be careful not to bend the tall capacitors on the circuit board.

7. Remove the two screws from the capacitor pack mounting base (Figure B–32).
8. Remove the capacitor pack and mounting base from the printer.

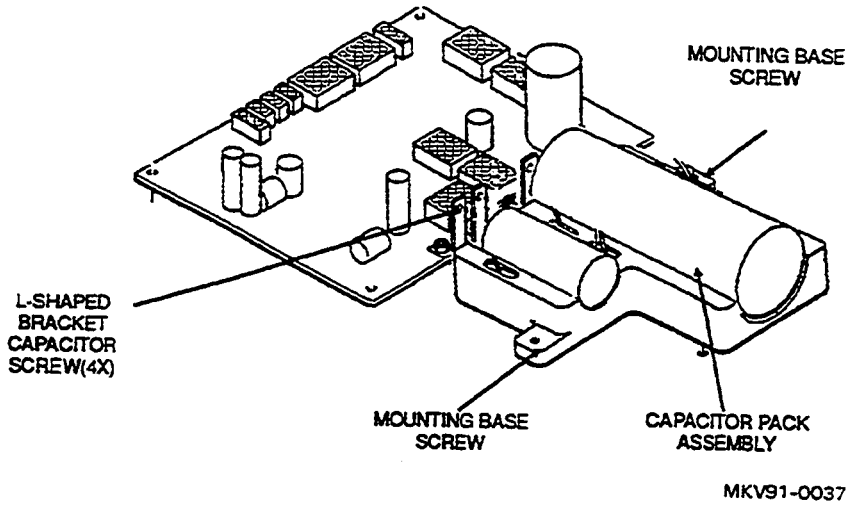

Figure B–32 Removing the Capacitor Pack Mounting Base

To Replace the AC Capacitor Pack:

NOTE

If the new capacitor pack has brackets attached, remove the brackets.

1. Set the mounting base, with capacitors, onto the printer base.
2. Align and insert each capacitor terminal into the L-shaped brackets.
3. Secure the capacitors with the bracket screws (Figure B–33).

NOTE

Be careful not to bend the tall capacitors on the circuit board.

4. Ensure that the capacitors are correctly oriented onto the mounting base.

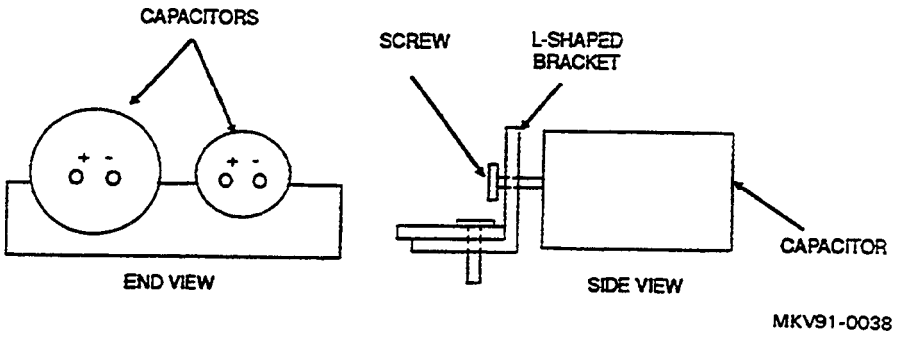

Figure B–33 Replacing the Capacitor Pack Assembly

5. Install and tighten the two mounting base screws (Figure B–34).
6. Install the power supply cover and secure with the three screws previously removed.
7. Refer to Figure B–29 and Table B–3 and connect plugs P4 and P6 to the power supply board.
8. Lower the printer mechanism (Section 5.6).
9. Close the top cover.

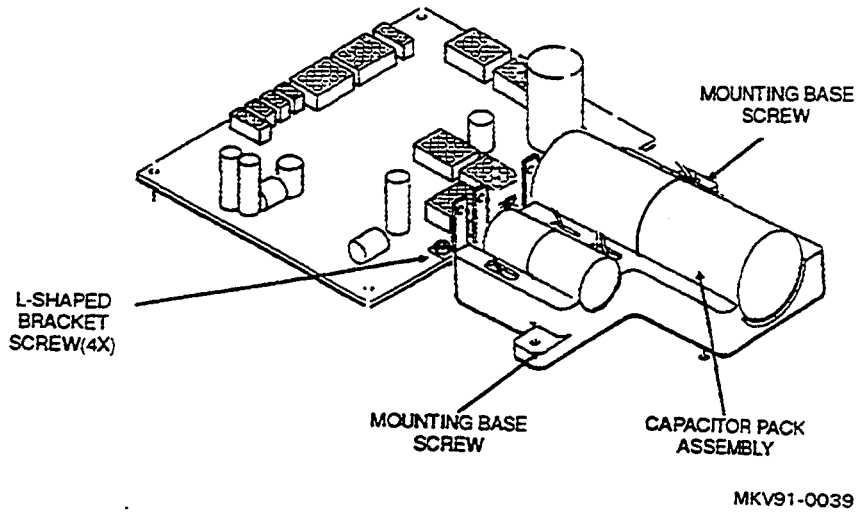

Figure B–34 Replacing the Mounting Base Screws

B.7.10 Motherboard Removal/Replacement

To Remove the Motherboard:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Remove the top cover (Section 5.3).
3. Remove the paper forms guide/card cage cover (Section 5.4).
4. Raise the printer mechanism (Section 5.6).
5. Disconnect all cable plugs from the circuit boards on the card cage assembly.
6. Remove the power switch safety cover and the rear enclosure panel.
7. Remove the four screws that secure the motherboard to the base pan (Figure 5–73).
8. Remove the motherboard and card cage assembly from the printer.
9. Remove the circuit boards from the card cage assembly.
10. Unsnap the card cage assembly by lifting the metal panels to release the motherboard.

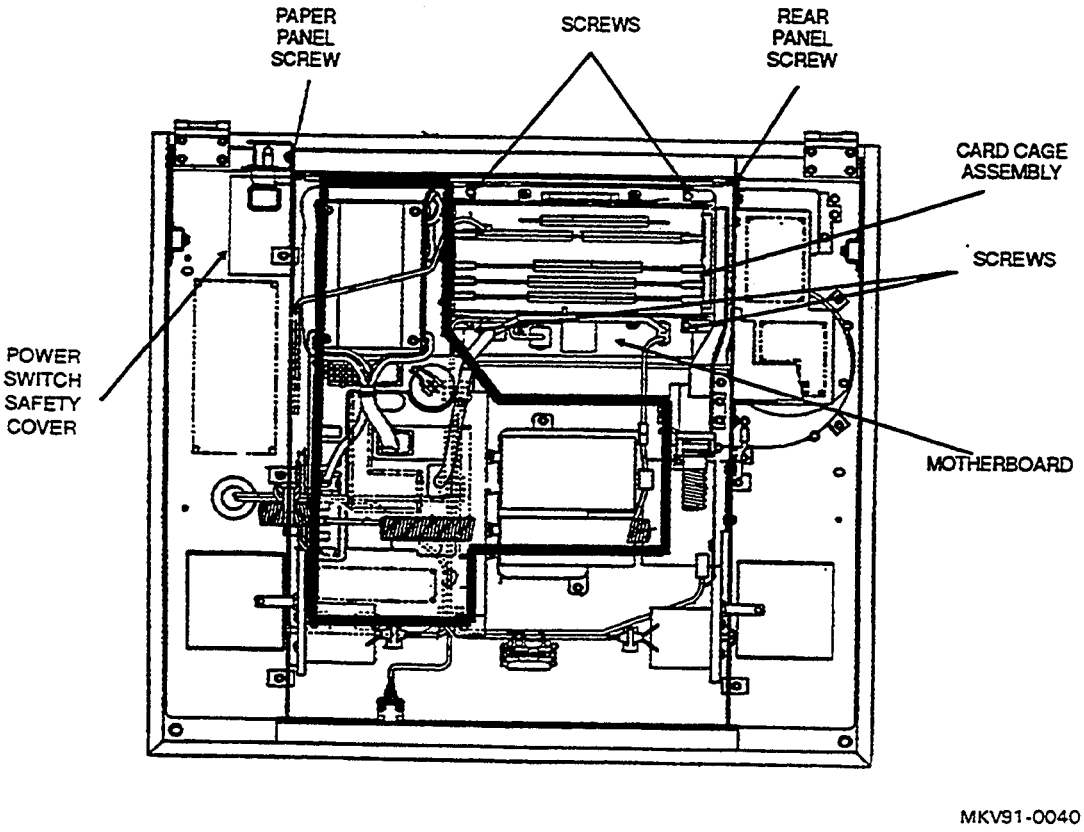

Figure B–35 Removing the Motherboard

To Replace the Motherboard:

1. Snap the card cage assembly together to secure it to the motherboard.
2. Position the motherboard and card cage assembly on the base pan over the mounting holes.
3. Install and tighten the four screws that secure the motherboard to the base pan (Figure 5–73).
4. Install the circuit boards in the card cage assembly and reconnect the cable plugs to the circuit boards.
5. Install the rear enclosure panel and the power switch safety cover.
6. Lower the printer mechanism (Section 5.6).
7. Install the paper forms guide/card cage cover (Section 5.4).
8. Replace the top cover (Section 5.3).

B.7.11 Power Paper Stacker Assembly Removal/Replacement

The power paper stacker assembly consists of two major assemblies: compressor assembly and puller support assembly.

B.7.11.1 Compressor Assembly Removal/Replacement

To Remove the Compressor Assembly:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Remove the left side cabinet panel (Section B.7.2).
3. Remove the two screws that secure the paper wire rack inside the bottom rear of the cabinet, and remove the paper wire rack from the printer.
4. Remove the three hex head screws that secure the safety panel (Figure B–36) and remove the safety panel.

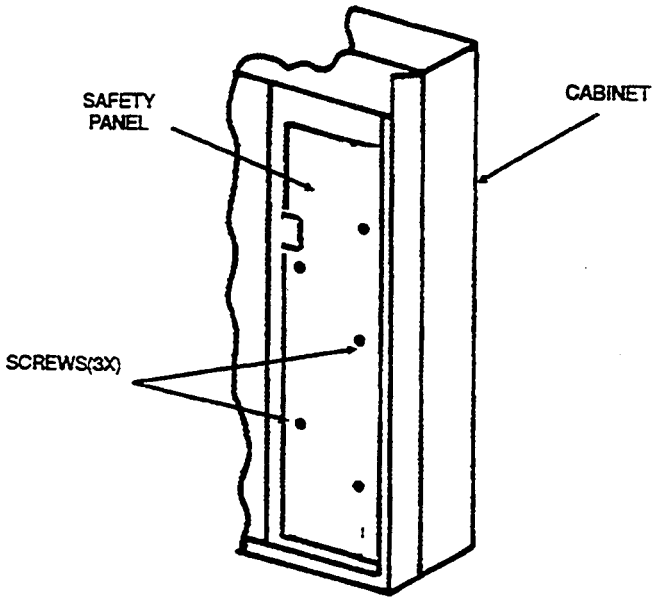

Figure B–36 Removing the Safety Panel

5. Disconnect the compressor motor ac cable from terminals 1 and 2 of terminal block TB-3 (Figure B–37).
6. Cut the tie wraps securing the compressor motor cable and release the cable.
7. Remove the compressor motor ground lead screw from the base of the cabinet (Figure B–37) and release the ground lead.

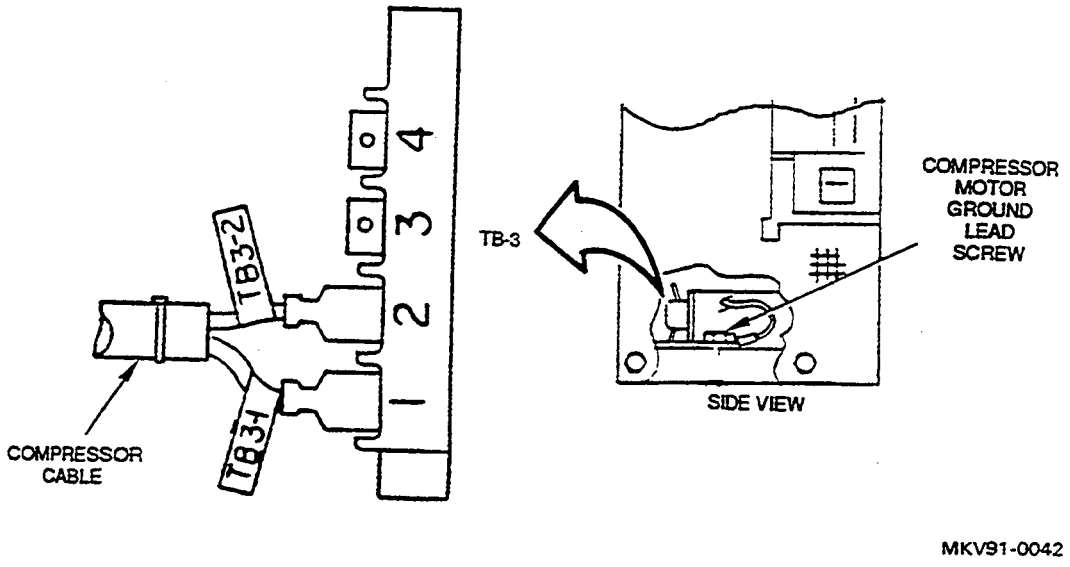

Figure B–37 Removing the Compressor Motor Cable and Ground Lead

8. From the front of the printer, remove the six screws that secure the compressor assembly to the cabinet (Figure B–38).
9. Remove the left side of the compressor assembly first, at an angle, to allow clearance for the compressor motor.

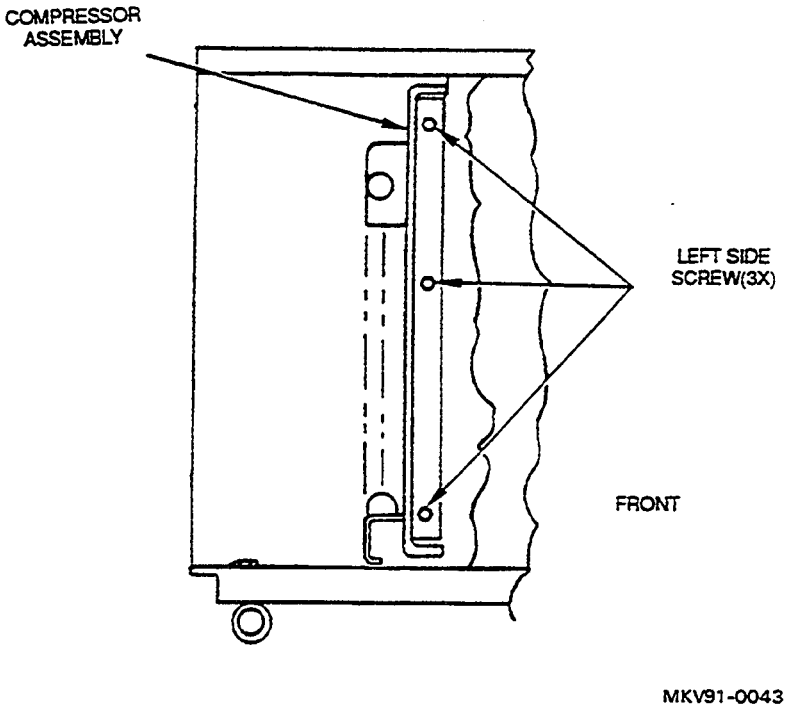

Figure B–38 Removing the Compressor Assembly Screws

To Replace the Compressor Assembly:

1. Install the compressor assembly from the front of the cabinet with the bead chains facing the rear.
2. Position the compressor assembly into the cabinet right side first, at an angle.
3. Align the compressor assembly with the six mounting holes and install and tighten the six screws that secure the compressor assembly to the cabinet (Figure B–38).
4. Connect the compressor motor ac cable to terminals 1 and 2 of terminal block TB-3 (Figure B–37).
5. Secure the compressor motor ground lead to the base of the cabinet with the ground lead screw (Figure B–37).
6. Install the safety panel and secure it with the three hex head screws (Figure B–36).
7. Install the paper wire rack inside the bottom rear of the cabinet and secure it with the two screws.
8. Install the left side cabinet panel (Section B.7.2).

B.7.11.2 Puller Support Assembly Removal/Replacement

To Remove the Puller Support Assembly:

1. Power OFF the printer and disconnect the power cord from the wall outlet.
2. Remove the left side cabinet panel (Section B.7.2).
3. Remove the two screws that secure the paper wire rack inside the bottom rear of the cabinet, and remove the paper wire rack from the printer.
4. Remove the three hex head screws that secure the safety panel (Figure B–36) and remove the safety panel.
5. Disconnect the two misstack sensor terminal wires from the misstack sensor and cut the tie wraps that secure the misstack sensor cable to the support assembly (Figure B–39).
6. Disconnect the puller motor plug (W23) (Figure B–39).

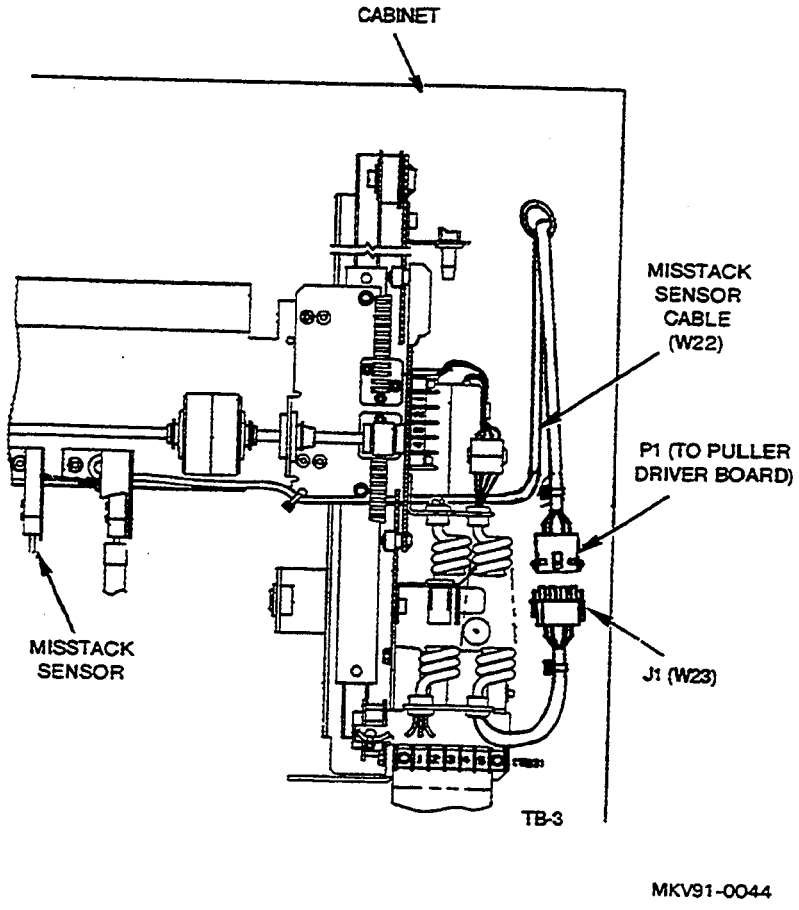

Figure B–39 Removing the Misstack Sensor and Puller Motor Cables

7. Disconnect the support assembly ac cable terminal wires from terminals 1 and 2 of terminal block TB-3.
8. Remove the two screws from the ac power filter bracket (Figure B–40) and set the ac power filter aside.

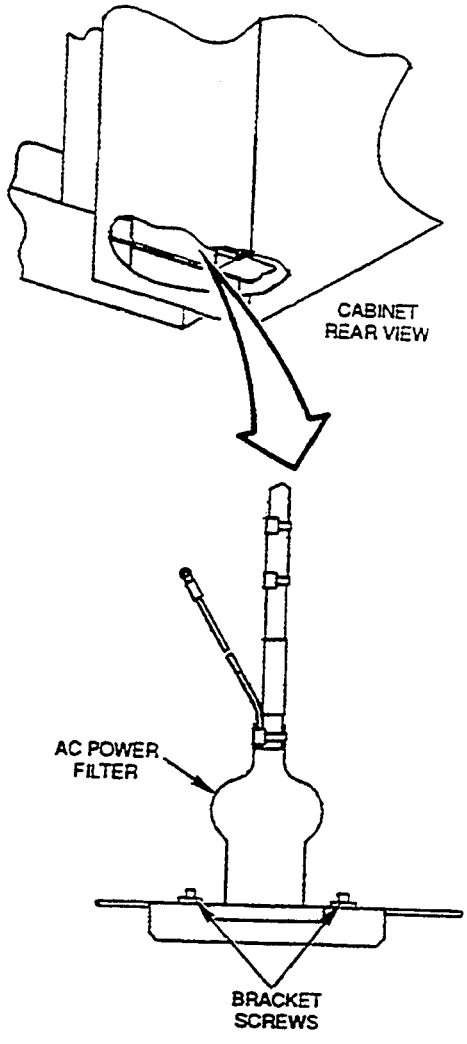

Figure B–40 Removing the AC Power Filter

9. Disconnect the compressor motor ac cable terminal wires from terminals 1 and 2 of terminal block TB-3 (Figure B–37).
10. Remove the compressor motor ground lead screw from the base of the cabinet (Figure B–41) and release the ground lead.
11. Remove the two lower screws that secure the puller support assembly to the cabinet base and the two upper screws from the puller support assembly bracket (Figure B–41).
12. Slide the puller support assembly out through the left side of the cabinet.
13. Leave the spacer in place on the cabinet base (Figure B–41).

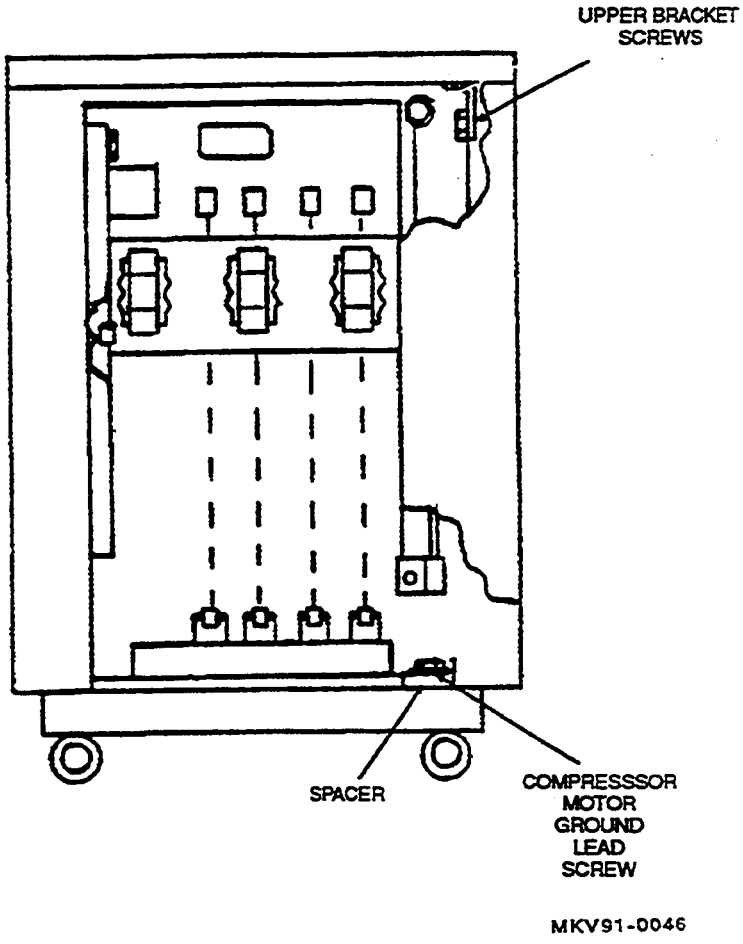

Figure B–41 Removing the Puller Support Assembly

To Replace the Puller Support Assembly:

1. Ensure that the spacer is in position on the cabinet base (Figure B–41).
2. Position the puller support assembly through the left side interior panel of the cabinet, ensuring that the support roller slides into the puller support assembly rail.
3. Align the spacer screw holes with the cabinet screw holes, making sure that the terminal block (TB-3) insulation paper remains under the push-on terminals.
4. Move the puller support assembly toward the front of the cabinet until it is positioned at the end of the slotted screw holes on the bottom of the cabinet.
5. Install and tighten the two lower screws that secure the puller support assembly to the cabinet base.
6. Align the upper puller support assembly bracket screw holes and install and tighten the two upper screws (Figure B–41).
7. Secure the compressor motor ground lead to the base of the cabinet with the ground lead screw (Figure B–37).
8. Connect the two misstack sensor terminal wires to the misstack sensor, and use tie wraps to secure the misstack sensor cable to the support assembly (Figure B–39).
9. Connect the puller motor plug (W23) (Figure B–39).
10. Connect the support assembly ac cable terminal wires to terminals 1 and 2 of terminal block TB-3.
11. Connect the compressor motor ac cable terminal wires to terminals 1 and 2 of terminal block TB-3 (Figure B–37).
12. Install the ac power filter and secure it to the ac power filter bracket with the two screws (Figure B–40).
13. Install the safety panel and secure it with the three hex head screws (Figure B–36).
14. Install the paper wire rack inside the bottom rear of the cabinet and secure it with the two screws.
15. Install the left side cabinet panel (Section B.7.2).

B.8 REVISED RECOMMENDED SPARES

Table B–4 Spare Parts

Digital Part Number	Vendor Part Number	Description
FD-10341-00	276383-001	Airflow Detector Assembly
29-23610-00	270759-001	Backstop Screw Assembly (5)
29-27893-01	286695-001	Band Brush Assembly, Idler Side
29-27894-01	287143-001	Band Brush Assembly, Motor Side
FD-13261-01	275861-001	Band Release Lever
29-27500-01	286594-001	Bead Chain, Stacker
29-27501-01	286681-001	Bearing, Rubber Tire, Stacker
29-27522-01	811241-002	Bearing, Tractor Shaft
29-27502-01	811870-001	Belt, Horizontal Vernier
29-27523-01	801669-010	Belt, Paper Feed Timing
29-27524-01	811901-001	Belt, Timing, Stacker
29-27834-01	293163-001	Bracket, Operator's Guide
29-27525-01	275748-003	Capacitor Pack Assembly†
29-27526-01	810760-207	Circuit Breaker†
29-27527-01	289685-001	Clutch Assembly, Paper Feed
FD-10345-00	800131-002	Fan, Full-Length Cabinet
29-28492-01	290067-001	Filter/Receptacle, AC Line†
29-24305-00	800316-030	Fuse, 3AG, 3A (1)
90-08290-01	801672-120	Fuse, Slo-Blo 12A (1)
12-10929-02	801702-006	Fuse, Sub-Min 1A (1)
29-27528-01	810496-010	Gas Spring
29-27529-01	292373-001	Guide, Left/Right Ribbon Spool
29-27531-01	251704-024	Hammer Module, Spare
29-27532-01	289675-001	Hammerbank Mask Assembly
29-27558-01	294982-001	Harness Assembly, DEC I/O†
FD-13508-01	276386-002	Meter Package Assembly
29-27533-01	276376-002	Motor Assembly, Blower
29-27534-01	289716-001	Motor Assembly, Paper Step
29-27515-01	811803-001	Motor, Band Drive
29-27516-01	287149-001	Motor, Compressor, Stacker
29-27517-01	287150-001	Motor, Control Drive, Stacker
29-27518-01	289841-001	Motor, Paper Puller/Stacker

†Parts used on old style LP37 only.

Table B–4 (Cont.) Spare Parts

Digital Part Number	Vendor Part Number	Description
FD-10333-00	811020-002	Motor, Ribbon Drive
29-27519-01	287210-004	PCB, +5V Regulator†
29-27511-01	295025-001	PCB, DEC I/O Interface (A1)
FD-12796-01	276440-002	PCB, Hammer Driver (A4, A5)
29-27512-01	289920-003	PCB, Motor Control No PROM (A3)
29-27514-01	286140-002	PCB, OCP, No PROM
29-27520-01	276420-002	PCB, Power Interconnect†
29-27507-01	290025-002	PCB, Processor, No PROM (A2)
29-27513-01	289805-002	PCB, Puller, Motor Driver
29-27508-01	290072-004	PROM, Band Decode 1 to 1 (A1U14)
29-27509-01	289962-001	PROM, Control Decode, Processor (A2U28)
29-27510-01	290148-010	PROM, Control Decode, Interface (A1U24)
29-27539-01	290138-010	PROM, Interface (A1U5)
29-27535-01	290137-010	PROM, Master, Processor (A2U8)
29-27536-01	289723-016	PROM, Motor Control, Processor (A3U25)
29-27537-01	290136-010	PROM, OCP Processor (U10)
29-27538-01	289733-013	PROM, Print, Processor (8 Ea. on A2)
29-27503-01	289845-001	Platen Assembly
29-27504-01	289667-001	Pulley, P/F Idler
29-27521-01	811026-002	Relay, Motherboard
29-27505-01	293217-001	Ribbon Guide, Left
29-27506-01	293218-001	Ribbon Guide, Right
29-27540-01	293216-001	Ribbon Mask Assembly
29-27541-01	289871-001	Sensor Assembly, Misstack
FD-13277-01	810072-002	Sensor, Paper Motion
29-27542-01	291166-001	Sensor, Switch Assembly, Stacker
29-27543-01	290004-003	Shaft Assembly, Paper Puller
29-27544-01	251341-001	Sleeve, Roller, Stacker
29-27545-01	800328-056	Spring, Extension, Stacker
29-23972-01	810447-001	Static Eliminator Tinsel
29-27546-01	293404-001	Switch Assembly, Rear Control Panel
FD-10343-00	810582-004	Switch, Cover Lower Interlock
29-27548-01	810582-005	Switch, Cover Upper Early Warning
29-27547-01	810582-001	Switch, Limit, Stacker
29-27549-01	291168-002	Switch, Up/Down, Stacker

†Parts used on old style LP37 only.

Table B–4 (Cont.) Spare Parts

Digital Part Number	Vendor Part Number	Description
29-27530-01	289721-001	Tool, Hammer Alignment
29-27831-01	821591-1	Tool, PROM Removal (AMP)
29-27740-01	293474-001	Tool Kit, Band Tracking Adjustment
29-27550-01	276104-004	Touch Panel Assembly, English
29-27551-01	276104-005	Touch Panel Assembly, French
29-27552-01	276104-006	Touch Panel Assembly, German
29-27553-01	276104-007	Touch Panel Assembly, Spanish
29-27555-01	811842-002	Tractor, Lower Left
29-27554-01	811842-003	Tractor, Lower or Upper Right
29-27556-01	811842-001	Tractor, Upper Left/No Sensor
29-27557-01	289717-001	Tractor + Sensor, Upper Left
FD-10309-00	276379-001	Transducer Assembly

Table B–5 Spare Parts (New Cabinet Models Only)

Digital Part Number	Vendor Part Number	Description
12-34269-01	801732-005	Circuit Breaker 5A, CB2
12-34270-01	801732-007	Circuit Breaker 12A, CB1
29-28487-01	293190-003	PCB, Power Supply
29-28488-01	293226-003	Capacitor Bank Assembly
29-28489-01	293297-001	AC Line Filter
29-28490-01	817275-004	Switch Power ON/OFF
29-28491-01	295003-001	Harness Assembly, DEC I/O

The following parts can be ordered from Dataproducts Corp.

Part	Old Cabinet	New Cabinet
Top Cover	293425-002†	293253-002†
Paper Door	276016-001†	Same as old cabinet
Rear Door	286607-001†	Same as old cabinet
Left Side	None	293442-001†
Right Side	None	293442-002†

†Must specify "DEC colors" when ordering.

Index

E

F

H

I

R

S

T

U

V

W