

**44689045**

**CENTRONICS®**  
data computer corp.  
LINE PRINTER DIVISION

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**E-SERIES BAND LINE PRINTER**  
**MODEL III**  
**CZ4A5-A/B/C/D**

**FAULT ISOLATION**  
**INSTALLATION AND CHECKOUT**  
**MAINTENANCE AIDS**  
**PREVENTIVE MAINTENANCE**  
**CORRECTIVE MAINTENANCE**  
**PARTS REPLACEMENT**  
**SPECIFICATIONS**

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**MAINTENANCE MANUAL**

# REVISION RECORD

REVISION	DESCRIPTION
01 FEB., 83	Pre-Release of the E- Series Band Line Printer Model III Maintenance Manual
02 JULY., 83	Revised to incorporate miscellaneous corrections
03 OCT., 83	Revised to incorporate C.E. corrections.
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**Revision Procedure:**

The revision record page is revised for each revision package to reflect the revision sequence: (Pre-Release) Rev. 01,02 etc. (Release) Rev. A, Rev. B, Rev. C, etc. The revision record page also provides a brief description of each change. A manual update revision package will be available for manuals after the Release revision of the manual. Each page revised in an update revision package will have the month and year printed in the lower right hand corner. This same date would appear in the revision column above, just below the revision identification. An Instruction Sheet cover is with each revision package, explaining page removal and insertion and reason for the change. The instruction sheets for revision packages are then to be placed at the back of the manual as a record of the change.

**IDENTIFICATION NO.**

# MANUAL TO EQUIPMENT LEVEL CORRELATION

This manual reflects the equipment configurations listed below.

EQUIPMENT TYPE	SERIES	TOP LEVEL ASSEMBLY	COMMENTS
CZ4A5-A	59829100	08-11	
CZ4A5-C	59829102	08-11	
CZ4A5-E	59829104	08-11	
CZ4A5-F	59829105	08-11	
CZ4A5-G	59829106	08-11	
CZ4A5-H	59829107	08-11	
CZ4A5-J	59829108	08-11	

## PREFACE

This publication contains hardware reference and maintenance information for the E-Series Model III Band Line Printer. This manual is directed toward the needs of Field Service Personnel (Customer Engineers) and provides only that information which is felt necessary to operate and maintain these printers in a safe and efficient manner.

The publications listed below are related publications and are not normally shipped with each printer.

Publication	Publication No.
E-Series Band Line Printer Model III Parts Identification Manual	44689041
E-Series Band Line Printer Model III Operators Manual	44689043
E-Series Band Line Printer Model III Technical Manual	44689047
Key to Logic Symbology	95390100

**WARNING:** This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A Peripheral computing device pursuant to Subpart J of Part 15 of the FCC Rules which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.



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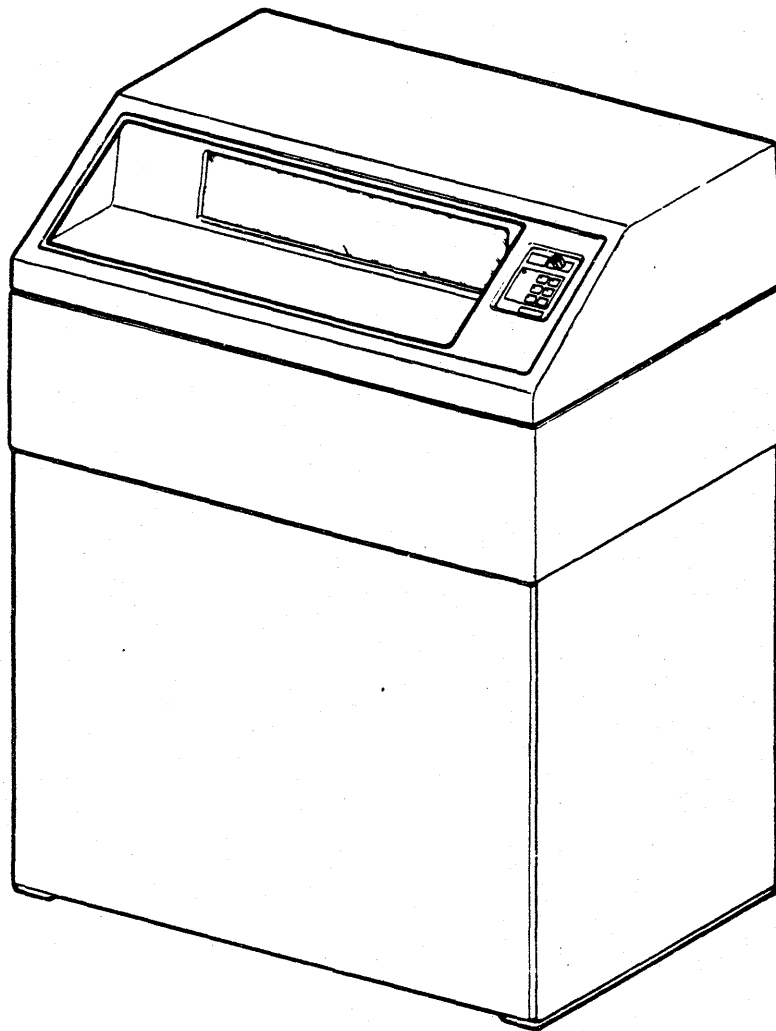
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E SERIES BAND LINE PRINTER  
MODEL III

# SECTION I FAULT ISOLATION

## INTRODUCTION

This section on fault isolation is intended to be used with the Corrective Maintenance and Parts Replacement Sections in this manual. For Principles Of Operation and Logic Diagrams on the printer see the Technical Manual.

This section contains the following subsections for fault isolation and repair.

Subsection	Title	Page
A	Easy Access Cabinet and Board Locator	1-2
B	Fault Guide	1-7
C	Procedure Index	1-17
D	Board Substitution Guide by Status Code	1-19
E	Status Display Guide	1-25
F	Fuses and Locations	1-38
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### Easy Access Cabinet and Board Locator

The cabinet is designed for easy access for maintenance. This subsection explains the maintenance access available and the location of boards and their installation methods.

### Fault Guide

The Fault Guide is a listing of possible problems. A fault identified in the guide will have the corrective action required listed. The corrective action will reference any corrective maintenance procedures along with any parts replacement procedures required.

### Procedure Index

This index assigns alphabetical listing to the procedures in Corrective Maintenance and Parts Replacement. The Fault Guide will reference these procedures by their alphabetical listing shown in this index.

### Board Substitution Guide by Status Code

This guide will list the status codes and provide a sequential listing of boards to replace for fault isolation. The board sequence indicates the most likely board first followed by the next likely. Boards should be replaced one at a time, testing the printer between changes. This guide should be used with the following subsection Status Display Guide.

### Status Display Guide

This guide lists the or status codes and provides a display meaning and sequence of events. When isolating faults this guide provides a probable cause and the corrective action required. This guide should be used with the Board Substitution Guide by Status Code which precedes this subsection.

### Fuses and Locations

This subsection identifies the fuse indicators and fuse locations available for fault isolation.

### Connector Pin Identification

This subsection identifies connector locations and the pin identification sequence on those connectors.

### AC/DC Diagrams and Flow Charts

This subsection shows overall printer wiring diagrams and fault isolation flow charts for a.c. power and d.c. power supplies.

### Test Points and Waveforms

This subsection provides test point waveforms on correctly operating equipment for judgement decisions on fault isolation.

### Isolating a Crobarred Printer

This subsection provides approaches to isolating a printer fault when the printer won't stay fully powered-ON for testing.

## SUBSECTION A-EASY ACCESS CABINET AND BOARD LOCATOR

### CABINET DESIGN

The printer cabinet is designed to allow quick and easy access to the printer's internal assemblies located under the printer's bonnet. Assemblies mounted in the front of the printer are accessed by opening the bonnet and gate, then removing or sliding open shrouds and covers. Assemblies mounted in the back of the printer are accessible by releasing the upper portion of the bonnet which raises. The paper guide can then be raised and the back panels opened, permitting complete access to the printer. Refer to Figures 1-1 and 1-2.

### FRONT INTERNAL PRINTER ACCESS

All internal access from the front of the printer is initiated by first opening the printer bonnet as shown in Figure 1-1 view "A".

#### Hammer Flight Time Access

Correction or adjustment of the odd column print hammer flight time to obtain maximum print quality is easy with aid of the rear sliding paper guide, which is over the top of the printer mechanism. Refer to Figure 1-1, view "A". Numbers 1 and 2 show the upward release of the two rear latches. Numbers 3 and 4 show the upward release of the front two latches. Number 5 shows the direction the paper guide is pushed to expose the top of the armature bank.

For even column print hammer flight timing the gate is opened and the inner throat plate (the covering around the print hammer bars) is removed by releasing two quarter turn fasteners. This provides access to the bottom portion of the armature bank.

#### Gate Arm Mechanism Access

The entire gate arm can be accessed by removing the left and right ribbon covers and swinging open the center ribbon cover. The left ribbon cover houses the upper and lower ribbon motors and is held in place by four screws; two on the top, one in the front and one in the back. The left ribbon cover is then removed by pivoting the bottom of the cover up, thereby clearing the gate latch handle. The right ribbon cover houses the skew arm motor and its cover. It is held in place by three screws; two on the top of the cover (the one in back taps into the gate casting, the other attaches into the skew arm motor cover), and one on the side of the cover. The center ribbon cover is designed to never be removed but it can be swung open by lifting on the gate latch handle while pulling on the center ribbon cover.

#### Internal Pedestal Access

The pedestal front cover, which is secured by two quarter turn fasteners may be removed as shown in Figure 1-1 view "B". This cover is removed to gain access to the blower assembly, power transformer, main circuit breaker, blower thermal fuse, skew relay board, line filter and the AC power connections.

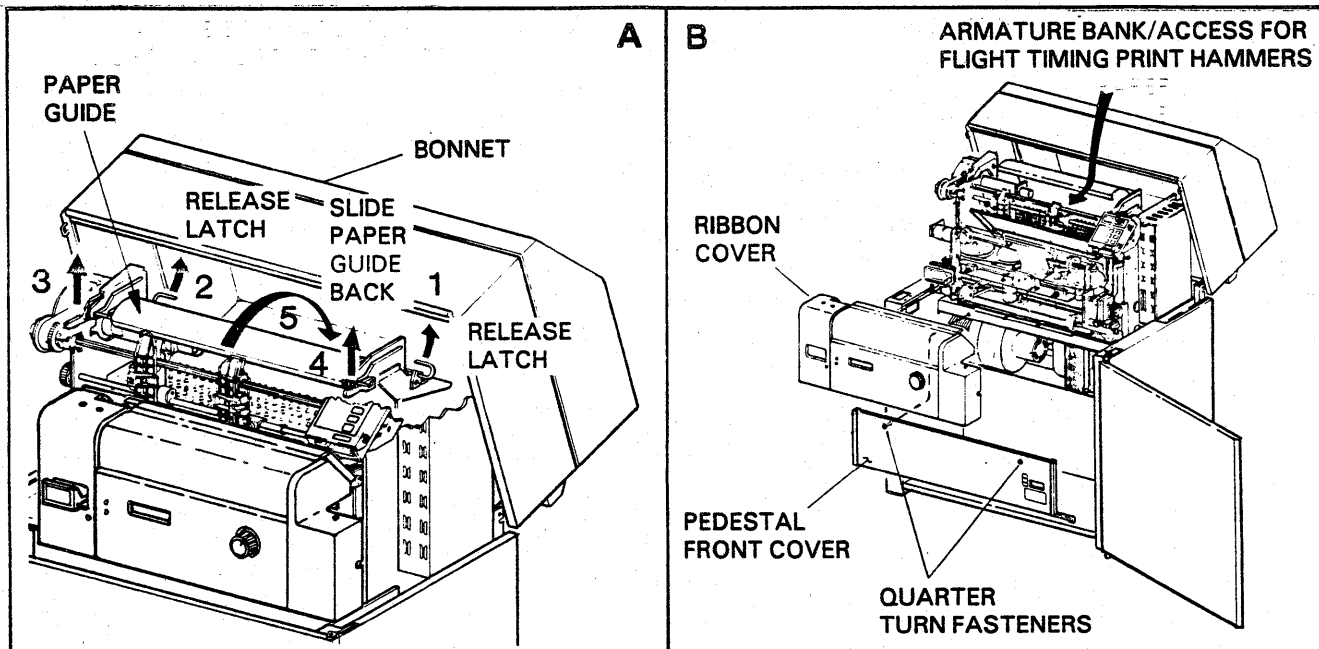


FIGURE 1-1. FRONT INTERNAL PRINTER ACCESS

## REAR INTERNAL PRINTER ACCESS

The upper bonnet and the paper guide are raised from the rear of the printer, and then the upper and lower back panels are swung out. Refer to Figure 1-2. The procedures for opening the printer from the rear are as follows:

### Upper Bonnet Release

The upper bonnet is released as shown in Figure 1-2, view "A". A half inch wrench is required to loosen the upper bonnet. The bolts are spring loaded to pop out when free. The upper bonnet is then free to be raised to the upper most position. The upper bonnet is retained in the up position by friction slides.

### Paper Guide Release (Rear)

The rear of the paper guide is held by a pop-in latch on either side. In Figure 1-2, view "B", steps 6 and 7 show the direction to release the latches. The paper guide can then be raised up from the rear to a position under the raised bonnet, refer to Figure 1-2, view "C", step 8.

### Upper Rear Panel Release

The upper rear panel can be swung out by turning a three quarter turn fastener CCW (step 9). The feature is located on the right side of the panel and once released, enables the panel to be swung from right to left. This will expose the hammer driver boards. Refer to Figure 1-2, view "C", step 10.

## Side Card Rack

With the bonnet open from the rear, the side card rack's cover can be released (quarter turn fastener) and raised up and back behind the printer, refer to Figure 1-2, view "C", step 11. The boards are then released by the two release levers and raised up and out of the card rack, refer to Figure 1-2, view "D", step 12. When inserting a board in the card rack make sure the release levers are down against the top edge of the board.

### Lower Access Panel Release

The lower access panel can be swung out by releasing the upper and lower fasteners located on the right side of the lower access panel. Once released, the panel can be swung from right to left and exposes the printer's logic boards. Refer to Figure 1-2, view "D", step 13.

### Swing Out Card Rack

Facing the back of the printer, the card rack swings out from the right. The card rack is held by one quarter turn fastener as shown in Figure 1-2, view "E". The logic boards can then be released and slide out the end of the card rack, refer to Figure 1-2, view "F" steps 16 and 17.

## LOGIC CARD LOCATIONS

The boards in the side card rack are referenced as location 2, the swing out card rack at the back is location 7. Behind the upper rear panel are the hammer driver boards which is location 5. Location 5 will have 4 boards; 5PC1 through 5PC4. Location 7 has three positions, the outer most being empty (7PC1). Refer to Figure 1-2, view "D" and "F" for board identification and location.

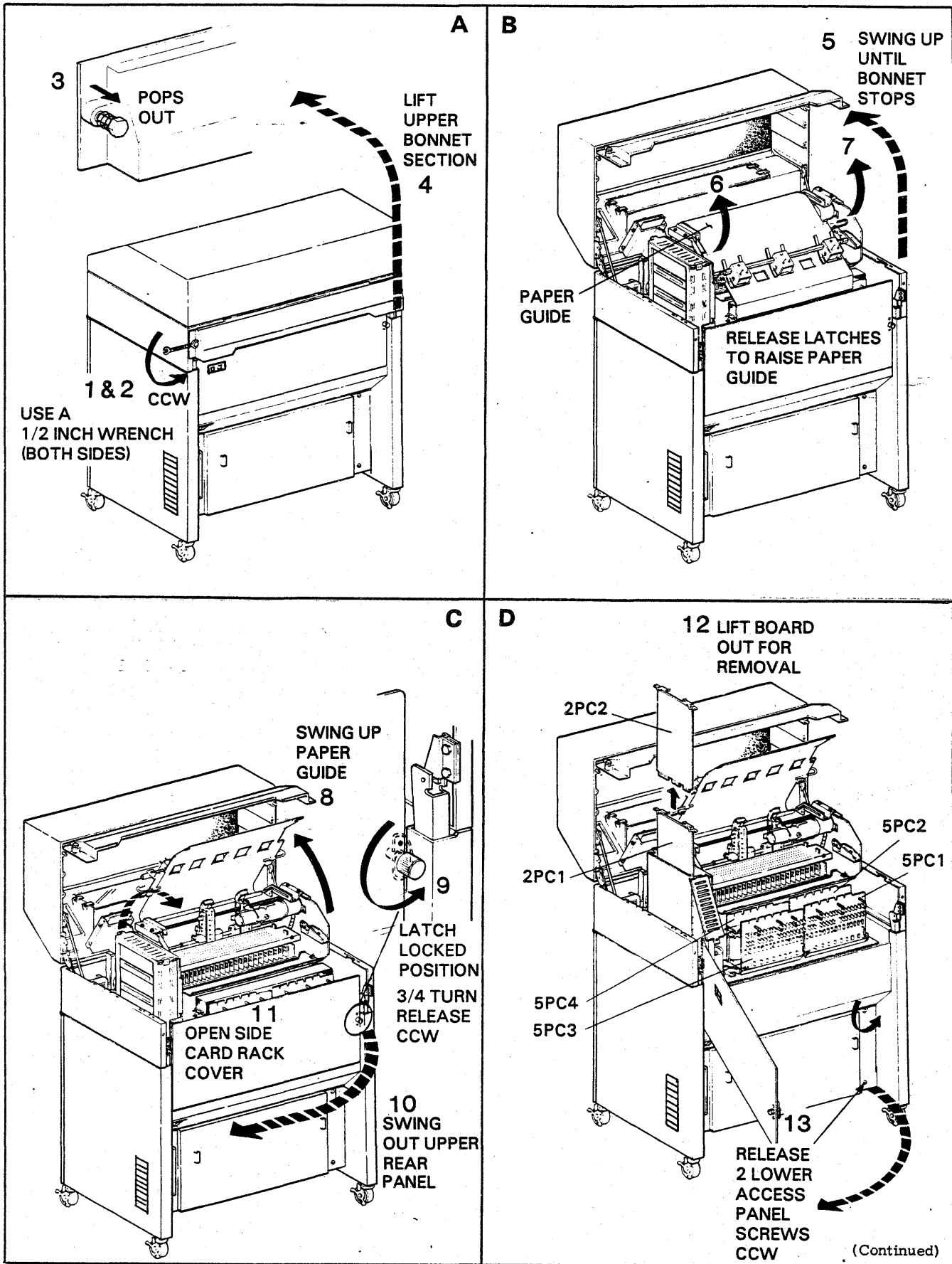


FIGURE 1-2. REAR INTERNAL PRINTER ACCESS (SHEET 1 OF 2)



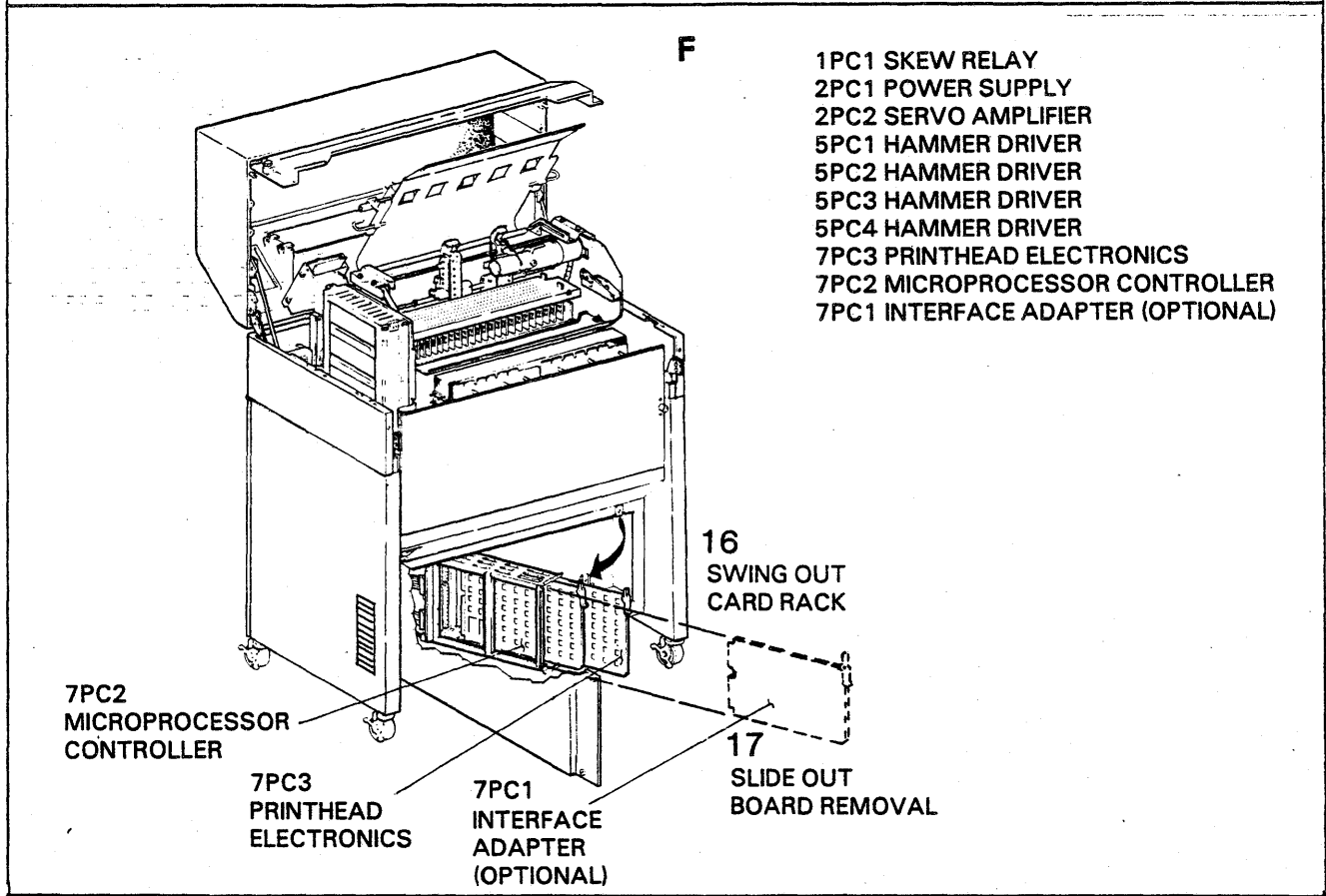
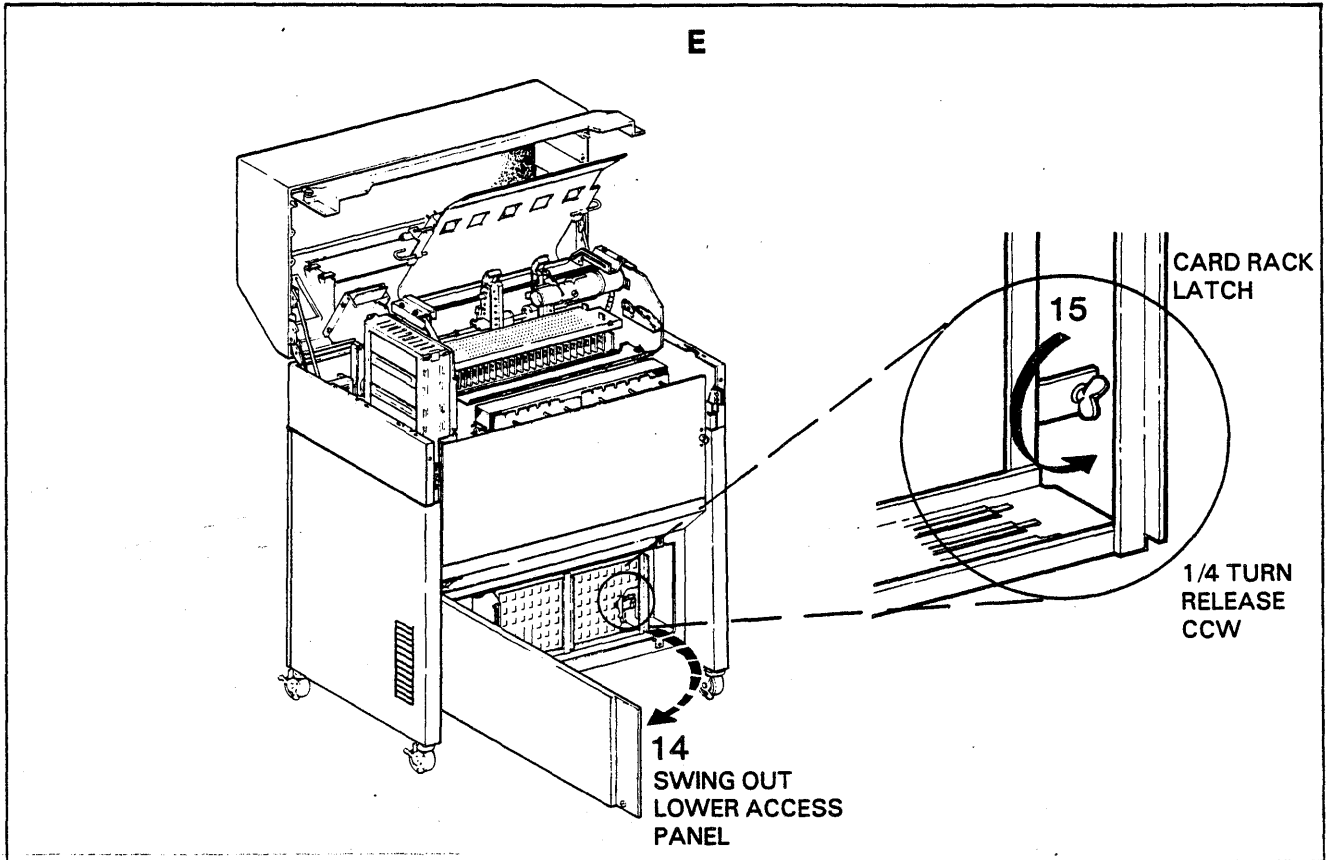


FIGURE 1-2. REAR INTERNAL PRINTER ACCESS (SHEET 2 OF 2)



## SUBSECTION B—FAULT GUIDE

### INTRODUCTION

During fault isolation refer to the Status Display Guide subsection "E" for all display codes indicated. This fault guide provides an index of possible problems in the form of five tables. The names of the Tables indicate a general type of problem. Within the Tables are more specific problem definitions to choose from in identifying a problem. Following the five Tables and in the same sequence is the diagnosis of each of the problems listed in the tables. The diagnosis of the problems will indicate the possible causes and make references to other Fault Isolation subsections along with any Corrective Maintenance procedures or Parts Replacement procedures required to correct the problem.

Corrective Maintenance procedures are in Section 5 and sequentially listed in alphabetical order using a double alphabetical designation like 5AA for the procedures. Five is the section number and the procedures progress as follows: 5AA 5AB, 5AC, and on into 5BA, 5BB, etc. Refer to Subsection C for the page numbers of the procedures covered in sections 5 and 6. The Parts Replacement is Section 6 and referenced by 6AA, 6AB, 6AC, etc. The tables of problem areas are as follows:

- TABLE 1-1. Print Problems.
- TABLE 1-2. Ribbon System Problems.
- TABLE 1-3. Paper Motion Problems.
- TABLE 1-4. Power Problems.
- TABLE 1-5. Random Printer Stopping.
- TABLE 1-6. Printer Noises.

TABLE 1-1. PRINT PROBLEMS

A. All or Most Characters Clipping: Left or right side of character missing.	<b>PROBLEMS ARE DEFINED IN MORE DETAIL ON PAGE 1-10.</b>
B. Characters Clipped on Top or Bottom at Left or Right side of Form: Forms Weight Knob mechanism loose.	
C. Smeared Characters: Ribbon ink getting on the forms.	
D. Prints Unrecognizable Data: Wrong data or characters being printed.	
E. Prints Bottom Half of Characters: Print band or mylar ribbon shield problem.	
F. Character Blocking on Multiple Part Forms: Last part copy shows block outline around characters.	
G. Horizontal Lines or Dashes Appearing on Forms: Print station problem.	
H. Line Spacing Errors: Mechanical or electrical problem.	
I. Missing Print Columns: Print hammer problem.	
J. Individual Print Hammer Columns Clipping: Check flight time adjustment.	
K. Density Uneven Across Page: Check with single and multiple part forms if possible.	
L. Vertical Character Positions Varying (Registration): Band tracking problem.	
M. Won't Print: Check dip switch settings on 7PC2, then replace 7PC2 or 7PC1 (optional board).	

TABLE 1-2. RIBBON SYSTEM PROBLEMS

- A. Ribbon Fails to Move:  
Vertical up or down drive.
- B. Ribbon Fails to Switch Direction:  
2PC2 board failed or ribbon installed over the outer throat plate.
- C. Ribbon Horizontal Tracking Problem:  
Skew system problem.

PROBLEMS ARE  
DEFINED IN MORE  
DETAIL ON PAGE  
1-13.

TABLE 1-3. PAPER MOTION PROBLEMS

- A. Forms Tearing:  
Paper clamp problem.
- B. Lines or Streaks on Back Copies of Multiple Part Forms:  
Paper clamp problem.
- C. Form Feed Holes Elongated:  
Print station problem.
- D. Vertical Character Positioning (Registration):  
Print station problem.
- E. Forms Jamming or Tearing:  
Printer exit roller problem if installed or stacking problem.

PROBLEMS ARE  
DEFINED IN MORE  
DETAIL ON PAGE  
1-14.

TABLE 1-4. POWER PROBLEMS

- A. ON/OFF Switch Trips When Reset:  
Breaker or short problem.
- B. AC Motors Not Running:  
Reset AC Circuit Breaker.
- C. Blower Not Running:  
Blower or circuit breaker problem.
- D. Loss of +5 Volts:  
Breaker up/Blower running/Stop lamp off/Display code off.

PROBLEMS ARE  
DEFINED IN MORE  
DETAIL ON PAGE  
1-15.

TABLE 1-5. RANDOM PRINTER STOPPING

<p>A. Low Humidity, Below Normal: Correct if possible.</p> <p>B. Static Discharge Faults: Check presence and positioning of static eliminators.</p> <p>C. Printer Prints and Stops, Prints and Stops at a High Rate of Speed. Data being sent slow or upper/lower ribbon reversing bars shorted.</p>	<p>PROBLEMS ARE DEFINED IN MORE DETAIL ON PAGE 1-16.</p>
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TABLE 1-6. PRINTER NOISES

<p>A. High Frequency Squeal-Vertical Tachometer: Check if the tachometer coupling is loose.</p> <p>B. Dragging Grind,Band Tracking: Replace the pulley at the gate hinge end.</p>	<p>PROBLEMS ARE DEFINED IN MORE DETAIL ON PAGE 1-16.</p>
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## PRINT PROBLEMS FROM TABLE 1-1

### A. ALL OR MOST CHARACTERS CLIPPING:

1. Adjust Control Panel Print Position knob to minimize or correct clipping (phasing).
2. If Print Position is fully rotated, center the control; adjust band character pickup block position; refer to 5AD.
3. Check the two position Residual Strip going between the actuators of the upper and lower actuator plate assembly; look for holes in the strip; move to second position if not previously used; replace strip; refer to 6AH.
4. Adjust if flight time for any individual columns still out of phase. For flight time adjustment, refer to 5AE. If problems occur refer to step J.
5. Check Actuator Plate Assemblies are seated and the hardware is secure. It should be all the way forward.
6. Check home character pulse centering.

### B. CHARACTERS CLIPPED ON TOP OR BOTTOM AT LEFT OR RIGHT.

1. Check the collar clamps on the platen adjustment screws. These two screws will have a Forms Weight mechanism attached by collar clamps. Refer to procedure 5AT.

### C. SMEARED CHARACTERS:

1. Check ribbon installation. Be sure it is not on the wrong side of the outer throat plate.
2. Check for excessive ink on ribbon, replace if excessive.
3. Clean mylar ribbon shield.
4. Check for proper positioning of ribbon shield.
5. Check mylar ribbon shield for damage; replace if in question; refer to 6AZ.

### D. PRINT UNRECOGNIZABLE DATA:

1. Insure proper band is installed, check Parts Manual for ROM's required.
2. Check 7PC2 for ROM's (E7 and F7); are ROM's enabled?; see next step.
3. Are ROM's enabled for number of band characters on band being used (48,64,96,128), 7PC2 SWN2-1 (128), -2(96), -3(64), -4(48). Does band being used require ROM's? (All non-ASCII bands do). Refer to 5AG.
4. Check Blank Code Selection 7PC2 SWN3 (normal 20 Hex/40 octal) SW8 "ON" other switches "OFF".
5. Check I/O cable installation.

### E. PRINTS BOTTOM HALF OF CHARACTER:

1. Check the position of the Forms Weight Knob for the correct position for the forms being used. Single forms, knob position should be to the right; Multiple forms, knob position should be to the left.
2. Check for proper band installation; refer to 5AG.
3. Check mylar ribbon shield positioning; refer to 6AZ.
4. Check band tracking and upper band edge guide (band guide upper) adjustment; refer to procedures 5AO, 5AP, 5AQ, 5AS.
5. Check In/Out of platen to hammers.

### F. CHARACTER BLOCKING ON MULTIPLE PART FORMS:

1. Adjust Forms Weight Knob.
2. Check mylar ribbon shield positioning, refer to 6AZ.
3. Check positioning of outer throat plate; refer to 5AU.
4. Check platen to pulley.

**G. HORIZONTAL AND VERTICAL LINES OR DASHES APPEARING ON FORMS:**

1. Check positioning of outer throat plate; refer to 5AU.
2. Check positioning of paper clamp; refer to 5AJ.
3. Check positioning of mylar ribbon shield; refer to 6AZ.
4. Check for Out of Paper switch positioning. It should not be too far forward.
5. Check positioning of the forms compressor blades; refer to 6AJ.

**H. LINE SPACING ERRORS:**

1. Check the unit on single and multiple part forms.
2. Check throat by checking the positioning of the outer throat plate; refer to 5AU.
3. Check positioning of paper clamp; refer to 5AJ.
4. Check vertical servo system set-up refer to 5AC.
5. Check the paper clamp fuse 7BP1-F1 and the clamp winding for continuity (8.3 ohms).
6. Replace vertical motion tachometer (3L01); refer to 6AB.
7. Replace vertical motion readers (3L02, 3L03) refer to 6AD.
8. Replace board 7PC3; refer to 5AA.
9. Replace board 2PC2; refer to 5AA.
10. Replace paper motion motor (3B01) refer to 6AE.
11. Check the vertical drive sprocket for damaged or cracked parts.

**With EVFU**

12. Check tape punching for proper line spacing mode 6/8 LPI. Tapes are punched using 6LPI tape marks because the reader only reads the 6LPI side of the tape. Tapes punched for 8 LPI must be punched counting the 6LPI marks on the tapes.
13. Check tape condition and replace if in question.

**I. MISSING PRINT COLUMNS:**

1. Check hammer pushrod, must align with tip of acuator, must not be missing a pushrod tip, must not be bent. Remove hammer module to check or realign, refer to 6AK and 6AJ. Also check hammer operation with hammer module removed.
2. Check for sticking hammers.
3. Replace hammer driver board (5PC1, 5PC2 5PC3 or 5PC4). Refer to 6AX.
4. Replace actuator; refer to 6AI.

**J. INDIVIDUAL PRINT HAMMER COLUMNS CLIPPING:**

1. Remove hammer module and check pushrod tips, hammer, pivot pin, spring/plunger, bent pushrod, refer to procedures; 6AK, 6AJ.
2. Check actuator plate assembly Residual Strips for a hole or damage; refer to 6AH.
3. Check for bent hammer face; refer to 6AJ.
4. Replace actuator; refer to 6AI.

**K. DENSITY UNEVEN ACROSS PAGE:**

1. Check the forms weight knob mechanism for loose crank arm clamps; refer to 5AT.
2. Check positioning of paper clamp; refer to 5AJ.

3. Replace ribbon and check on back copies of multiple part forms.

4. Check platen to hammer face by using print samples, but before making any adjustment to the gate itself, follow all the procedures listed to make sure all other adjustments are correct. Start checking print samples using Print Quality Adjustments and proceeding to Platen to Hammer Face Adjustment, refer to the following series of procedures; 5AI thru 5AT.

5. Check platen to pulley setup.

**L. VERTICAL CHARACTER POSITIONS VARYING (REGISTRATION):**

1. Check the paper clamp fuse 7BP1-F1 and the clamp winding for continuity (8.3 ohms).

2. Check registration on single and multiple part forms if possible.

3. Check for proper band tracking; refer to 5AQ and 5AS.

4. Check throat area by checking the positioning of the outer throat plate; refer to 5AU.

5. Check positioning of paper clamp; refer to 5AJ.

6. Check vertical servo system setup; refer to 5AC.

7. Check tractor belt tension; refer to 5AX.

8. Replace the 7PC3 board; refer to 5AA.

9. Check the vertical tachometer output, refer to Figure 1-17, TP-20.

**M. WON'T PRINT**

1. Start or On Line lamp will not light; replace 7PC2 followed by 7PC3; refer to 5AA.

2. Start or On Line lamp lit; check if system is ready to send data; replace 7PC2; refer to 5AA.

3. Double check 7PC2 dip switch settings. Replace the optional 7PC1 board if used in the printer.



## RIBBON SYSTEM PROBLEMS FROM TABLE 1-2

### A. RIBBON FAILS TO MOVE:

1. The printer must be able to print to have ribbon motion. Use the Test Print Feature, Ribbon Motion Test; remove paper remove ribbon, add paper loop to PMV tractor.
2. Ribbon motion has two directions, short both upper pair and lower pair of switching bars. If one direction works check connector of motor which fails to move. Replace 2PC2 board; refer to 5AA. Replace ribbon motor; refer to 6AS.
3. If both directions fail to operate; replace 2PC2 board; refer to 5AA. If still inoperative replace 7PC3; refer to 5AA.

### B. RIBBON FAILS TO SWITCH DIRECTION:

1. Use the Test Print Feature, Ribbon Motion Test as in preceding Step "A-1". Short upper pair and then lower pair of switching bars. If the motor switches, check ribbon shorting strips. If they don't switch replace 2PC2; refer to 5AA. Don't leave switching bars shorted.
2. Make sure ribbon is not installed over the top of the outer throat plate instead of under.
3. Check for broken wire on switching bars, and continuity check wires to 2PC2. Upper bars (4SW1) go to 2PC2, P1- (C) and P1-25. Lower bars (4SW2) go to 2PC2, P1-(B) and P1-24.

### C. RIBBON HORIZONTAL TRACKING PROBLEM:

1. Use the Test Print Feature, Ribbon Motion Test as in preceding Step "A-1". The skew system operates off the lower ribbon motor. If the upper ribbon motor is running; short the lower pair of ribbon

switching bars. With lower ribbon motor running the ribbon sense pawl should be going up and down, the top of the skew motor arm should be in toward the printer. Turning the sense pawl 90° and holding it should cause the top of the skew motor arm to turn out away from the printer.

2. If the skew system works in the test mode but not with a ribbon installed and moving from the lower spool to the upper spool, replace 7PC3; refer to 5AA. If still inoperative replace the skew relay board in the front of the lower printer frame on the a.c. selection panel.
3. If the skew arm is in the wrong position (out away from the printer) and moving the ribbon sense pawl 90° fails to cause the arm to skew out, check the sense pawl adjustment; refer to 5AV. Replace the 7PC3 board; refer to 5AA. Replace the skew relay board on the a.c. selection panel. Replace the skew motor; refer to 6AU.
4. If the skew is in the wrong position (out away from the printer) when not touching the sense pawl, and the skew arm can be manually moved without motor resistance, check the connectors that are connected to the skew board. Check for +5 volts and 117 VAC at the skew board. Make sure the motor is connected. Replace the skew board if 117 VAC is not going from board to motor. If 117 VAC is present at the motor disconnect the motor; continuity check the winding. If the motor has low resistance (approximately 33 ohms black/gray and yellow/black, and 65 ohms yellow/gray, normal ranges), replace the start capacitor for the motor; otherwise replace the motor.

## PAPER MOTION PROBLEMS FROM TABLE 1-3

### A. FORMS TEARING:

1. Check for excessive horizontal tractor tension or alignment which elongates paper feed holes.
2. Check tractor belt tension, refer to 5AX.
3. Check mylar ribbon shield position and for damaged edges, refer to 6AZ.
4. Check outer throat plate positioning; refer to 5AU.
5. Check paper clamp positioning; refer to 5AJ.
6. Check exit roller system tension (if installed) for tears above the tractors, disengaging one roller at a time.

### B. LINES OR STREAKS ON BACK COPIES OF MULTIPLE PART FORMS:

1. Check paper clamp positioning, refer to 5AJ.
2. Check edges of mylar ribbon shield; refer to 6AZ.
3. Check for unseated hammer module; reseal module.
4. Check out of paper switch bracket position is not out too far.
5. Check positioning of forms compressor blades; refer to 6AJ.

### C. FORM FEED HOLES ELONGATED:

1. Check outer throat plate positioning; refer to 5AU.
2. Check paper clamp positioning; refer to 5AJ.
3. Check tractors; refer to 5AX.
4. Replace 2PC2; refer to 5AA.

### D. VERTICAL CHARACTER POSITIONING (REGISTRATION)

1. Check paper clamp positioning; refer to 5AJ.
2. Check outer throat plate positioning; refer to 5AU.
3. Check mylar ribbon shield for damage; refer to 6AZ.
4. Vertical only, check band tracking; refer to 5AQ and 5AS.
5. Check the vertical tachometer signal output, refer to Figure 1-17 (TP-20). Also check the vertical servo settle time at TP-13, referring to Figure 1-17.

### E. FORMS JAMMING OR TEARING:

1. If using a stacker, check its rollers.
2. If paper jam is occurring at the stacker, check power plugs to stacker.

## POWER PROBLEMS FROM TABLE 1-4

### A. ON/OFF SWITCH TRIPS WHEN RESET:

1. Unplug the power cord, then check the a.c. voltage selection wiring first, then replace circuit breaker; refer to 5AF.
2. If a new breaker still trips, unplug the power cord and replace the resonant capacitor (1C01, 12uf) positioned on the transformer secondary connector located behind the blower.
3. If the breaker still trips, unplug the printer and replace the start capacitor (1C02, 4uf) for the blower motor; then the blower motor; then replace the power transformer. Test the printer after each replacement and then unplug the printer.
4. Breaker still trips; replace 2PC1 board; refer to 5AA.
5. Breaker still trips; disconnect 5C01 (73,000uf) which is the +5 volt filter; this is located behind the swing out card rack at its hinge.
6. Breaker still trips; remove 2PC2 and remove F-1 fuse for the +36 volts; install 2PC2 and test breaker. If the breaker doesn't trip check the capacitors in the capacitor bank for shorts or high leakage; refer to 6AY.

### B. AC MOTORS NOT RUNNING:

1. Push the reset switch at the back of the printer on the Stacker plug. This reset switch controls the following AC motors: Blower, Stacker, optional Exit Rollers, and optional EVFU reader.

### C. BLOWER NOT RUNNING:

1. Push AC Circuit Breaker reset switch.
2. Allow the printer to cool. Air flow sensor will reset after a few minutes. Make sure air intakes on side of pedestal are clear of obstructions.
3. Check for binding of the blower fan blade.
4. Check wiring from circuit breaker (1CB1) to blower.
5. Check or replace blower start capacitor (4uf) 1C02.
6. Check continuity or replace the blower motor.

### D. LOSS OF +5 VOLTS:

1. Breaker up; Blower running; Stop lamp off; Display code off: These indications imply the loss of +5 volts. It's possible to have a short or load to where the Stop lamp would be dim along with the digital display.
2. Check for +5 volts at the power distribution panel which is located on the frame next to the hammer driver boards 5PC2 and 5PC4.
3. If +5 volts is at the distribution panel, check the Control Panel. If +5 volts is not present at the distribution panel replace 2PC1 board; refer to 5AA.
4. If +5 volts is still not present, check for 9.5 VAC at the transformer connector 1J02 pins 9 to 8 and 7 to 8, pin 8 is the transformer center tap.
5. If 9.5 VAC is not present but other d.c. voltages are normal, replace the transformer; refer to 5AF.

## RANDOM PRINTER STOPPING FROM TABLE 1-5

### A. LOW HUMIDITY, BELOW NORMAL:

1. Correct cause, note problem with customer.
2. Check static eliminator position on paper guide over printer.
3. Check bonnet seating to base (grounding); refer to 5BB.

### B. STATIC DISCHARGE FAULTS:

1. Check static eliminator position on paper guide over printer. Add additional eliminators to paper guide and paper basket, if used.

2. Check to make sure all ground straps are connected.

3. Check bonnet seating to base for proper grounding; refer to 5BB.

### C. PRINTER PRINTS AND STOPS, PRINTS AND STOPS AT A HIGH RATE OF SPEED.

1. Is data available at a normal rate?

2. Are the upper or lower ribbon reversing bars shorted together?

## PRINTER NOISES FROM TABLE 1-6

### A. HIGH FREQUENCY SQUEAL, VERTICAL TACHOMETER:

1. Check the clamp collar at the vertical tachometer to make sure the clamp is tight and clamping the tachometer shaft to the vertical motor shaft.
2. Check Vertical Velocity; refer to procedure 5AC.

### B. DRAGGING GRIND, BAND TRACKING:

1. If this occurs on more than one band then the gate hinge pulley should be replaced and band tracking checked. Refer to procedures 6AU and 5AS.
2. If this occurs only with one band replace the band.

## SUBSECTION C-PROCEDURE INDEX

This following index list is for the sections (5 and 6), plus the alphabetical sequence of all the procedures referenced in the Fault Isolation section. Section 5 procedures are in Corrective Maintenance, Section 6 procedures are in Parts Replacement. Procedures are alphabetically listed with a two character identification; AA, AB, AD, thru AZ, BA, BB, etc. This index is provided to supply procedure page numbers for quick location.

TABLE 1-7. CORRECTIVE MAINTENANCE-SECTION 5

<u>SEQUENCE</u>	<u>TITLE</u>	<u>PAGE</u>
<b>ELECTRICAL ADJUSTMENTS</b>		
5AA	BOARD REPLACEMENT CHECKS AND ADJUSTMENTS .....	5-2
5AB	FIVE VOLT ADJUSTMENT .....	5-5
5AC	VERTICAL SERVO SYSTEM SET-UP .....	5-5
5AD	BAND PICKUPS POSITIONING AND ADJUSTMENT .....	5-5
5AE	FLIGHT TIME ADJUSTMENTS .....	5-8
5AF	AC VOLTAGE/FREQUENCY MODIFICATIONS .....	5-11
5AG	PRINT BAND INSTALLATIONS .....	5-14
5AH	LOGIC GROUND REFERENCE .....	5-16
<b>MECHANICAL ADJUSTMENTS</b>		
5AI	PRINT QUALITY ADJUSTMENT .....	5-17
5AJ	PAPER CLAMP ADJUSTMENT .....	5-18
5AK	INNER THROAT PLATE ADJUSTMENT .....	5-18
5AL	PAPER OUT SWITCH ADJUSTMENT .....	5-21
5AM	BAND MOTOR BELT TENSION ADJUSTMENT .....	5-22
5AN	GATE LATCH ADJUSTMENT .....	5-22
5AO	PLATEN TO BAND PULLEY ALIGNMENT .....	5-24
5AP	BAND PULLEY LOCATION ADJUSTMENT .....	5-25
5AQ	UPPER BAND EDGE GUIDE ADJUSTMENT .....	5-26
5AR	BAND LOCATOR ADJUSTMENT .....	5-27
5AS	BAND PULLEY AN TRACKING ADJUSTMENT .....	5-27
5AT	PLATEN TO HAMMER FACE ADJUSTMENT .....	5-31
5AU	OUTER THROAT PLATE ADJUSTMENT .....	5-34
5AV	RIBBON SENSE MECHANISM ADJUSTMENT .....	5-37
5AW	PAPER ADVANCE MOTOR BELT TENSION ADJUSTMENT .....	5-40
5AX	TRACTOR ASSEMBLY ADJUSTMENT .....	5-40
5AY	PAPER BAIL ADJUSTMENT .....	5-42
5AZ	PAPER EXIT MOTOR AND BELT ADJUSTMENT .....	5-44
5BA	FORMAT TAPE READER DRIVE SPROCKET ADJUSTMENT .....	5-45
5BB	CABINET AND PRINTER POSITIONING .....	5-46

ALSO SEE  
TABLE 1-8  
FOLLOWING

TABLE 1-8. PARTS REPLACEMENT-SECTION 6

<u>SEQUENCE</u>	<u>TITLE</u>	<u>PAGE</u>
6AA	FORMS MOTION COMPONENT REPLACEMENT .....	6-2
6AB	TACHOMETER REPLACEMENT .....	6-2
6AC	6/8 LINE MICRO-SWITCH REPLACEMENT .....	6-2
6AD	VERTICAL READERS (3L02/3) REPLACEMENT .....	6-2
6AE	SERVO MOTOR REPLACEMENT .....	6-3
6AF	ACTUATOR PLATE REMOVAL .....	6-4
6AG	ACTUATOR PLATE INSTALLATION .....	6-5
6AH	RESIDUAL STRIP REPLACEMENT .....	6-8
6AI	ACTUATOR REPLACEMENT .....	6-8
6AJ	PRINT HAMMER REPLACEMENT .....	6-10
6AK	PUSH ROD REPLACEMENT .....	6-11
6AL	FORMAT TAPE READER ASSEMBLY REPLACEMENT .....	6-11
6AM	CONTROL PANEL REPLACEMENT .....	6-12
6AN	TRACTOR REMOVAL AND REPLACEMENT .....	6-13
6AO	TRACTOR COMPONENTS REPLACEMENT .....	6-15
6AP	FLAP REPLACEMENT .....	6-15
6AQ	CHAD REMOVER PLASTIC STRIP REPLACEMENT .....	6-15
6AR	BAND DRIVE MOTOR REPLACEMENT .....	6-16
6AS	RIBBON MOTOR REPLACEMENT .....	6-16
6AT	SKEW ARM MOTOR REPLACEMENT .....	6-18
6AU	BAND PULLEY REPLACEMENT .....	6-19
6AV	AIR FLOW SENSOR REPLACEMENT .....	6-20
6AW	PAPER MOTION VERIFICATION SENSOR REPLACEMENT .....	6-22
6AX	HAMMER DRIVER BOARD REPLACEMENT .....	6-22
6AY	HAMMER BANK CAPACITOR REPLACEMENT .....	6-24
6AZ	MYLAR RIBBON SHIELD REPLACEMENT .....	6-27

## SUBSECTION D-BOARD SUBSTITUTION GUIDE BY STATUS CODE

### DISPLAY CODES

This subsection uses the display code on the Control Panel to isolate major components which may be at fault when the resulting display code appears. This subsection assumes a problem exists with the code shown. The major intent is to provide board substitution information for quick repair, however, other components have also been listed due to their impor-

tance in the area being monitored. Following is a component locator diagram which locates components called out in the following guide. At the back of this subsection is a Table 1-10 for cross reference from components designations to maintenance procedure. Some components on the printer are not visible in the views shown, most of these are behind the lower front panel by the circuit breaker. Those components not shown are as follows:

1B01 Blower  
 1CB1 Circuit Breaker  
 1CB2 Circuit Breaker  
 1C01 Resonant Capacitor  
 1PC1 Skew Relay

1XF1 Transformer  
 3B04 EVFU  
 3K01 Triac EVFU  
 9R03 Air Flow Sensor  
 1K01 TRIAC Switch

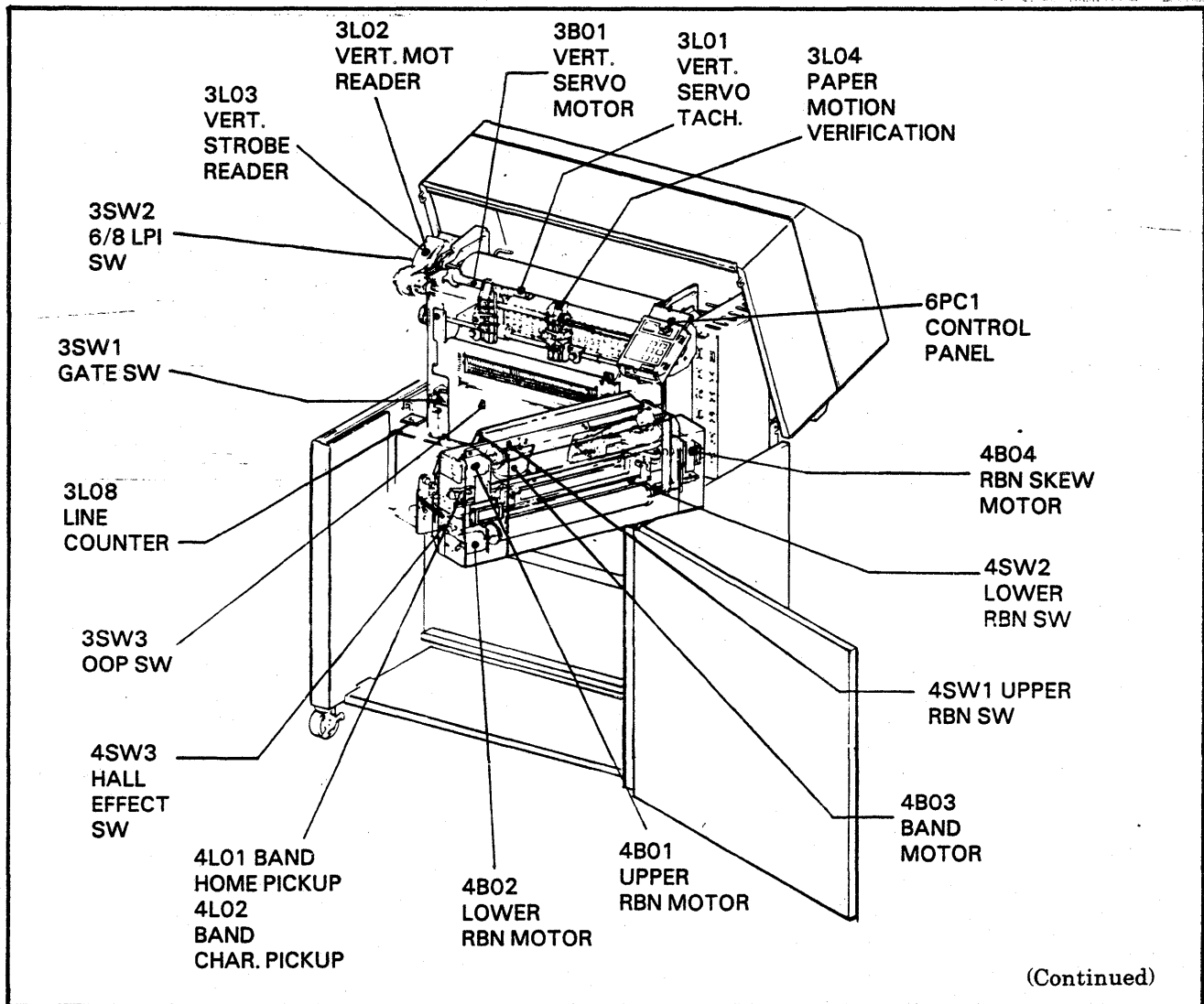


FIGURE 1-3. COMPONENT LOCATOR - FRONT VIEW





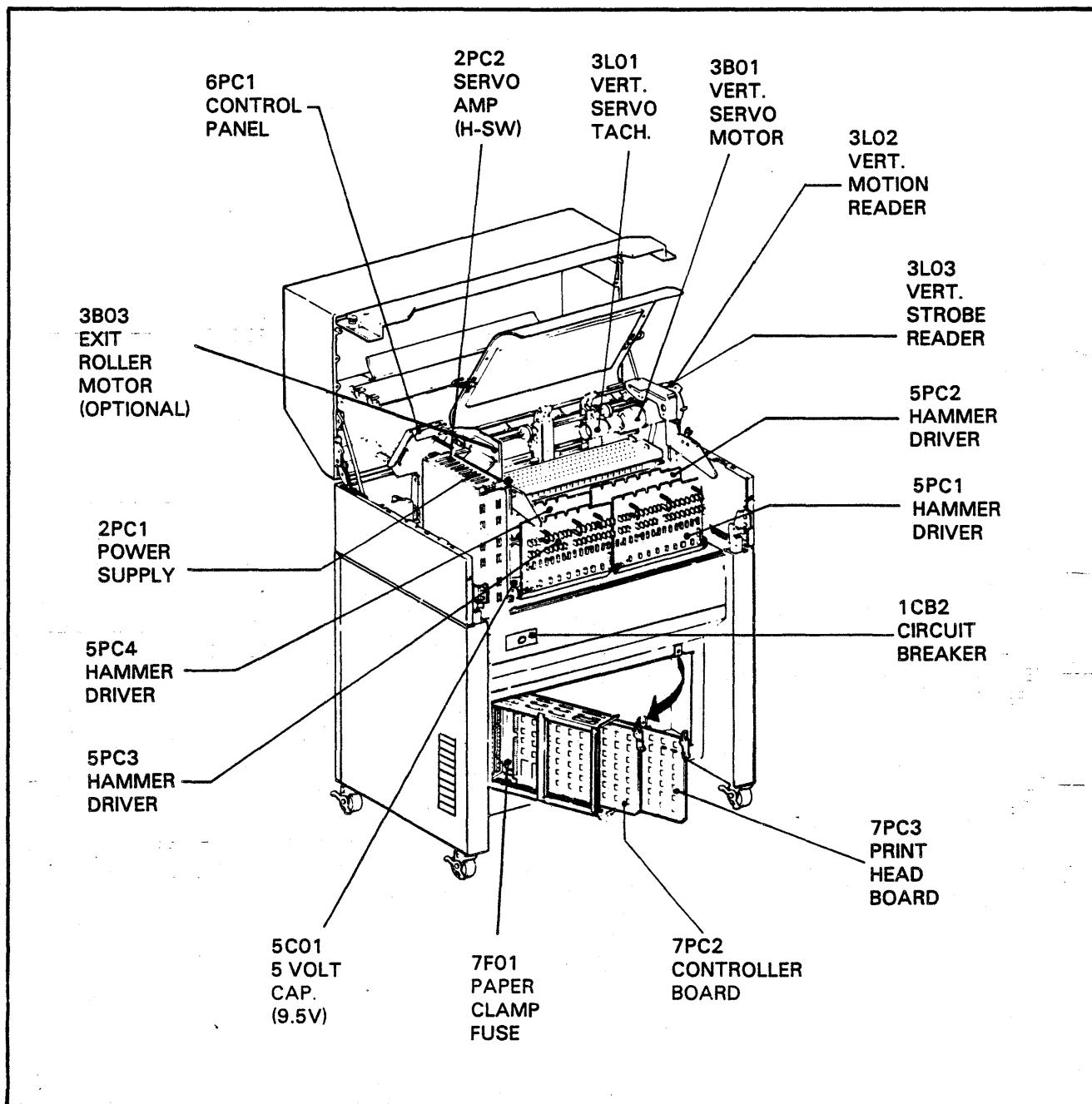


FIGURE 1-3. COMPONENT LOCATOR - REAR VIEW

TABLE 1-9. BOARD SUBSTITUTION GUIDE BY STATUS CODES

DISPLAY CODE	DESCRIPTION	LOGICAL SOLUTIONS IN SEQUENCE												
		1	2	3	4	5	6	7	8	9	10			
00	Fail to Initialize	PWR OFF/ON	Check +5 Volts	7PC2										
1	Gate Open	3SW1	7PC3	7PC2	6PC1									
2	Not Defined	N/A	7PC3	7PC2	6PC1									
3	Not Defined	7PC2	6PC1											
4	Paper Tear Tractor	3L04	7PC3	7PC2	6PC1									
5	Out Of Paper	3SW3	7PC2	6PC1	7PC3									
6	Stacker Not Ready	7PC2	6PC1											
7	Printer Not Ready	NO	Fault 7PC2	7PC3	6PC1									
8	Test Print Mode	Dip	Switch	7PC2	7PC2	7PC3								
9	Printer Ready													
	Awaiting Data	NO	Data	7PC2	7PC3	6PC1								
10	EVFU Not Loaded	Load	Tape	Reader	3B04	7PC2	6PC1							
11	EVFU Load Cycle	Tape	Reader	3B04	7PC2	6PC1								
12	No Tape in Reader	Tape	Reader	7PC2	6PC1									
13	Tape Reader Jam	Tape	Reader	7PC2	6PC1									
14	No Top of Form in Tape	Tape	Reader	7PC2	6PC1									
15	Tape Too Long	Tape	7PC2	Reader	6PC1									
16	Invalid Channel Selected	System	Tape 7PC2	6PC1										
17	EVFU Data Stop Code Error	System	7PC1	6PC1										
18	EVFU Data Transfer Too Long	System	7PC2	6PC1										
19	Unable to Read/Verify Tape	Tape	Reader	7PC2	6PC1									
20	Invalid Forms Length (000)	6PC1	7PC2											
21	Invalid Format Code	System	Dip	Switch	7PC2	7PC2	6PC1							
22	Master Clear On	System	7PC2	6PC1										
23	Band Improperly Installed	Band	7PC3	7PC2	4L01	4L02	2PC2	4B03	6PC1					
24	EVFU Parity Error	Load	(DAVFU)	EVFU	7PC2	6PC1								
25	Selected VFU Char Not Punched	Load	(DAVFU)	EVFU	System	7PC2	6PC1							
26	Reset Switch	7PC2	6PC1											
27	Band Image not Loaded	7PC2	6PC1											
28	Not Defined	7PC2	6PC1											
29	Not Defined	7PC2	6PC1											
30	Controller ROM Error	7PC2	6PC1											
31	EVFU ROM Error	7PC2	6PC1											
32	System RAM Error	7PC2	6PC1											
33	EVFU RAM Error	7PC2	6PC1											
34	Buffer RAM Error	7PC2	6PC1											
35	Illegal Character Register Error	7PC2	6PC1											
36	Image ROM Error	7PC2	6PC1											
37	No Image ROM Installed	7PC2	6PC1											
38	Image RAM Not Available	7PC2	6PC1											
39	Invalid Text ROM	7PC2	6PC1											
40	Band Motor Over Current Fault	Band	4B03	2PC2	7PC2	7PC3	6PC1							
41	Ribbon Motor Fault	RBN	4B01	4B02	7PC3	7PC2	6PC1							
42	12 Volt Fault	Fuse	2PC1	F2/F3	2PC2	7PC3	7PC2	3L02	3L03	3L06	1XF1			
43	Hammer Fault	Actuator Assy		(5PC1)	5PC2	5PC3	5PC4	7PC3	7PC2	6PC1				
44	Not Defined	7PC2	6PC1											
45	Home Fault	3L06	2PC2	7PC3	7PC2	6PC1								
46	Not Defined	7PC2	6PC1											
47	H-Switch Fault	2PC2	(3B01)	(3B02)	(3L01)	(3L05)	7PC3	7PC2	3L06	3L02	6PC1			
48	Fuse Fault (+36V)	2PC2	F1	2PC2	(F1/F2)	F3	1CB1	9F01	7PC3	7PC2	6PC1			
49	Paper Runaway Controller	7PC2	3L02	2PC2	7PC3	3B01								
50	Paper Runaway Servo Drive	2PC2	7PC3	3L01	7PC2	6PC1								

(Continued)

TABLE 1-9. BOARD SUBSTITUTION GUIDE BY STATUS CODES (Continued)

DISPLAY CODE	DESCRIPTION	LOGICAL SOLUTIONS IN SEQUENCE									
		1	2	3	4	5	6	7	8	9	10
51	Unidentifiable C.E. Fault	7PC3	7PC2	6PC1							
52	Line Space Error	3L03	7PC3	7PC2	6PC1						
53	Band Sync Error	(4L01	4L02)	F6/F7	band	7PC3	7PC2	6PC1			
54	CRC Error (Series 1 Interface Only)	7PC2	6PC1								
55	Printer Buffer Overflow	7PC2	6PC1								
56	I/O Parity Error	7PC2	6PC1								
57	No Default Image ROM	7PC2	6PC1								
58	Unable to Identify Band	7PC3	7PC2	4B03	4L01/2	6PC1					
59	Compare Fault	7PC2	6PC1								
60	Input Cycle	7PC2	System	6PC1							
61	Print Cycle	4L02	band	7PC3	7PC2	6PC1					
62	Not Defined	7PC2	6PC1								
63	Vert. Motion Cycle	2PC2	3L02	7PC3	7PC2	3B01	6PC1				
64	Band Not Identified	Band	7PC3	7PC2	4L02	4L01	6PC1				
65	Not Defined	7PC2	6PC1								
66	Not Defined	7PC2	6PC1								
67	Not Defined	7PC2	6PC1								
68	Not Defined	7PC2	6PC1								
69	Not Defined	7PC2	6PC1								
70	Image Word Count Error	7PC2	6PC1								
71	Invalid Image Start Code	7PC2	6PC1								
72	Print Attempt With No Image	7PC2	6PC1								
73	6/8 LPI Strobe Count Error	7PC2	6PC1								
74	Not Defined	7PC2	6PC1								
75	Not Defined	7PC2	6PC1								
76	Not Defined	7PC2	6PC1								
77	Not Defined	7PC2	6PC1								
78	Not Defined	7PC2	6PC1								
79	Not Defined	7PC2	6PC1								
80	Test Mode/Not Valid Test	7PC2	Dip	Switch	7PC2	6PC1					
81	Test Mode/Sliding Alphabet	7PC2	Dip	Switch	7PC2	6PC1					
82	Test Mode/Cycle No Print	7PC2	Dip	Switch	7PC2	6PC1					
83	Test Mode/Hor. Only	7PC2	Dip	Switch	7PC2	6PC1					
84	Test Mode/Vert. Only	7PC2	Dip	Switch	7PC2	6PC1					
85	Internal Test Print Mode Selected (Series 1 Interface Only)	7PC2	6PC1								
86	Test Mode/Text Mode	7PC2	Dip	Switch	7PC2	6PC1					
87	Not Defined	7PC2	6PC1								
88	Not Defined	7PC2	6PC1								
89	Not Defined	7PC2	6PC1								
90	Not Defined	7PC2	6PC1								
91	Not Defined	7PC2	6PC1								
92	Not Defined	7PC2	6PC1								
93	Not Defined	7PC2	6PC1								
94	Not Defined	7PC2	6PC1								
95	Not Defined	7PC2	6PC1								
96	Not Defined	7PC2	6PC1								
97	Not Defined	7PC2	6PC1								
98	Not Defined	7PC2	6PC1								
99	Not Defined	7PC2	6PC1								
FF	See 00 Code										

TABLE 1-10 COMPONENT MAINTENANCE PROCEDURES

DESIGNATION	COMPONENT	SPARED	PROCEDURE	PAGE
1XF1	Power Transformer	YES	5AF	5-11
2PC1	Power Supply Board	YES	5AA	5-2
2PC2	Servo Amplifier Board	YES	5AA	5-2
3B01	Vertical Servo Motor	YES	6AE,5AC	6-3,5-5
3B04	EVFU Reader Motor	YES	6AL,5BA	6-11,5-45
3L01	Vertical Servo Tachometer	YES	6AB,5AC	6-2,5-5
3L02/3	Vertical Motion/Strobe Reader	YES	6AD,5AC	6-2,5-5
3L04	Paper Motion Verification Sensor	YES	6AW	6-22
3L07	Paper Clamp	YES	5AJ	5-18
3SW1	Gate Switch	YES	5AN	5-22
3SW3	Out Of Paper Switch	YES	5AL	5-21
4B01	Upper Ribbon Motor	YES	6AS	6-16
4B02	Lower Ribbon Motor	YES	6AS,5AV	6-16,5-37
4B03	Band Motor	YES	6AR	6-16
4B04	Skew Motor	YES	6AT	6-18
4L01/2	Band Home/Character Pickup		5AD	5-5
4SW3	Ribbon Skew Sense			5-32
	(Skew Hall Effect Switch)	YES	5AV	5-37
5PC1-5PC4	Hammer Driver Board	YES	6AX,5AA	6-22,5-2
6PC1	Control Panel	YES	6AM	6-12
7PC2	Microprocessor Controller Board	YES	5AA	5-2
7PC3	Print Head Board	YES	5AA	5-2
9R03	Auto Reset Air Flow Sensor	NO	6AV	6-20

## SUBSECTION E-STATUS DISPLAY GUIDE

### DIGITAL STATUS DISPLAY

The Digital Status Display consists of a two digit L.E.D. (Light Emitting Diode) display. This digital display is located at the top left corner of the Control Panel and can be viewed with the bonnet in its open or closed position (Figure 1-4). The display shows the status of the printer in the form of numbers which represent both operator and Customer Engineer correctable status'.

Table 1-11 groups the status display numbers into two groups as follows:

- A. Status Numbers 1 Thru 29— Statuses that can normally be corrected by the operator.
- B. Status Numbers 30 Thru 99— Statuses that can normally be corrected only by the Customer Engineer.

Certain statuses (when the printer is On Line) will cause either the STOP or ALARM light to flash which means the +36 volt power supply is shut down and the printer is Off Line.

The Digital Status Display System sets priorities such that if more than one status exists, such as OUT OF PAPER and GATE OPEN, only the status deemed more appropriate will be displayed (Example: If OUT OF PAPER is displayed and the gate is opened to load paper, OUT OF PAPER will be removed, and GATE OPEN will be displayed).

As statuses are serviced by the Customer Engineer, the display may or may not change numbers, depending on the situation. If another correctable status exists when the operator tries to go from Off Line to On Line it will be displayed and the printer will not go On Line.

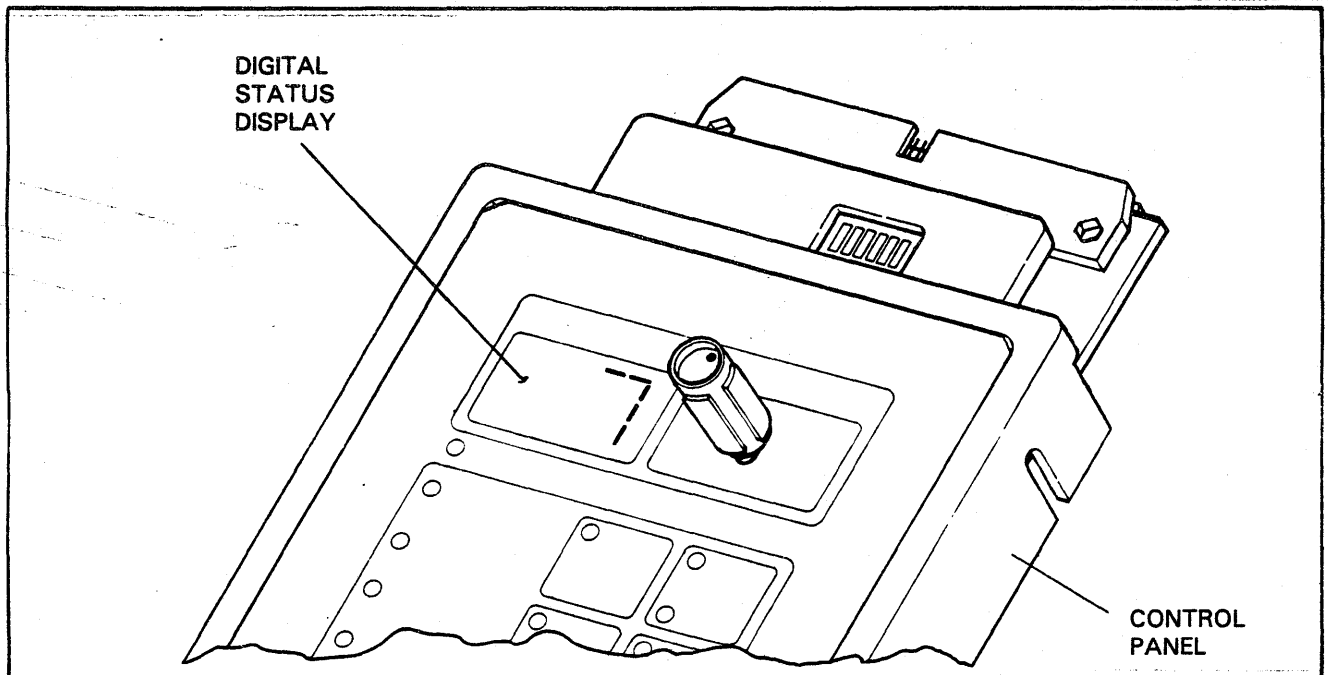


FIGURE 1-4. DIGITAL STATUS DISPLAY

TABLE 1-11. STATUS DISPLAY GUIDE

STATUS NUMBER DISPLAYED	DEFINITION AND/OR SYMPTOM	PROBABLE CAUSE AND/OR CORRECTIVE ACTION
00 or FF	Controller did not initialize.	<ol style="list-style-type: none"> <li>1. Power the printer OFF and back ON again.</li> <li>2. Check +5 volts.</li> <li>3. Replace 7PC2, refer to 5AA.</li> </ol>
1-	<p>GATE OPEN -</p> <ol style="list-style-type: none"> <li>1. STOP or ALARM light lit.</li> <li>2. Band motor will not run when printer is powered ON.</li> <li>3. If On Line, printer goes Off Line.</li> </ol>	<ol style="list-style-type: none"> <li>1. Print gate open or not latched properly.</li> <li>2. Gate latching mechanism out of adjustment.</li> <li>3. Gate Switch (3SW1) loose or out of adjustment.</li> <li>4. Gate Switch actuator arm deformed.</li> <li>5. Defective Gate Switch (3SW1), refer to 5AN.</li> <li>6. Replace 7PC3 then 7PC2 then 6PC1 (Refer to 5AA, 6AM).</li> </ol>
2	Not assigned or displayed.	None. Reserved for other printer models. If Status appears and cannot be cleared, replace 7PC3 then 7PC2 then 6PC1 (Refer to 5AA, 6AM).
3	Not assigned or displayed.	None. Reserved for future status assignments. Replace 7PC2 then 6PC1
4	<p>PAPER TEAR OR JAM AT TRACTORS (PAPER MOTION VERIFICATION (PMV) ERROR).</p> <ol style="list-style-type: none"> <li>1. If no paper is detected, or paper jam is detected by the sensor after 27 lines (3 1/2 inches) of vertical advance, the printer drops On Line and goes Off Line.</li> <li>2. PAGE EJECT/FORM FEED light may or may not be lit, depending on controller program.</li> <li>3. STOP or ALARM light lit once the gate is opened.</li> </ol>	<ol style="list-style-type: none"> <li>1. Paper tear or jam at right tractor.</li> <li>2. Possible dirty Photo-Electric Sensor (3LO4) on right tractor</li> <li>3. Possible defective Photo-Electric Sensor (3LO4) on right tractor, refer to 6AW.</li> <li>4. Replace 7PC3 then 7PC2 then 6PC1, refer to 5AA, 6AM.</li> </ol>
5	<p>OUT OF PAPER -</p> <ol style="list-style-type: none"> <li>1. STOP or ALARM light lit.</li> <li>2. Paper Out Switch (3SW3) on gate is loose or out of adjustment.</li> </ol>	<ol style="list-style-type: none"> <li>1. Printer out of paper or tear at perforation in supply stack.</li> <li>2. If On Line, printer goes Off Line.</li> <li>3. Paper Out Switch (3SW3) on gate is defective, refer to 5AL.</li> <li>4. Replace 7PC2 then 6PC1 then 7PC3, refer to 5AA, 6AM.</li> </ol>
6	STACKER NOT READY	<ol style="list-style-type: none"> <li>1. Replace 7PC2, refer to 5AA.</li> <li>2. Replace 6PC1, refer to 6AM.</li> <li>3. If the Stacker's power plugs are not seated you will not receive this code.</li> </ol>
7	<p>PRINTER NOT READY -</p> <ol style="list-style-type: none"> <li>1. STOP or READY light lit.</li> <li>2. No faults/errors exist in printer in Off Line mode (printer read to enter On Line mode).</li> </ol>	<ol style="list-style-type: none"> <li>1. Status only - No corrective action required. Printer ready to enter on Line mode.</li> <li>2. If printer won't go On Line, replace 7PC2 then 7PC3 then 6PC1, refer to 5AA, 6AM.</li> </ol>
8	<p>TEST PRINT MODE -</p> <ol style="list-style-type: none"> <li>1. STOP or READY light lit.</li> <li>2. TEST PRINT switch on 7PC2 board has been pressed or optional TEST PRINT switch on Control Panel has been pressed and is lit.</li> </ol>	<ol style="list-style-type: none"> <li>1. Status only - No corrective action required.</li> <li>2. Press START or ON LINE switch on Control Panel to start test printing (required on some printer configurations). Set DIP switches on 7PC2.</li> <li>3. Replace 7PC2 then 7PC3, refer to 5AA.</li> </ol>
9	<p>PRINTER READY AWAITING DATA -</p> <ol style="list-style-type: none"> <li>1. START or ON LINE lit.</li> <li>2. Printer is On Line with data source awaiting data.</li> </ol>	<ol style="list-style-type: none"> <li>1. Status only - No corrective action required.</li> <li>2. In no data, replace 7PC2 then 7PC3 then 6PC1, refer to 5AA, 6AM.</li> </ol>

(CONTINUED)

TABLE 1-11. STATUS DISPLAY GUIDE (Continued)

STATUS NUMBER DISPLAYED	DEFINITION AND/OR SYMPTOM	PROBABLE CAUSE AND/OR CORRECTIVE ACTION
10	<p><b>EVFU NOT LOADED -</b></p> <ol style="list-style-type: none"> <li>1. Vertical format information has not been loaded into the printer's Vertical Format Memory.</li> <li>2. Units with tape reader will not go On Line and STOP or ALARM light will be lit.</li> <li>3. START/STOP or READY/ON LINE light may be lit on units with DAVFU.</li> </ol>	<ol style="list-style-type: none"> <li>1. Load vertical format tape via printer's format reader or load vertical format data over data lines from data source if DAVFU. Replace 3B04 then 7PC2 then 6PC1, refer to 6AL, 5AA, 6AM.</li> </ol>
11	<p><b>EVFU LOAD CYCLE -</b></p> <ol style="list-style-type: none"> <li>1. Vertical format information is in the process of being loaded into the printer's Vertical Format Memory.</li> <li>2. STOP or READY light will be lit on units with tape reader.</li> <li>3. START or ON LINE light will be lit on units with DAVFU.</li> </ol>	<ol style="list-style-type: none"> <li>1. Status only - No corrective action required.</li> <li>2. Status number will be removed when vertical format information has been loaded and verified.</li> <li>3. If Status number is not removed, replace 3B04 then 7PC2 then 6PC1, refer to 6AL, 5AA, 6AM.</li> </ol>
12	<p><b>NO TAPE IN FORMAT READER -</b></p> <ol style="list-style-type: none"> <li>1. Attempted to load format tape information into printer's Vertical Format Memory without installing format tape in reader.</li> <li>2. STOP or READY light is lit.</li> </ol>	<ol style="list-style-type: none"> <li>1. No format tape installed in reader.</li> <li>2. Format tape broken, refer to 6AL.</li> <li>3. Install format tape in reader and press Tape Load Switch on format reader. Status number will be removed when load cycle starts.</li> <li>4. If Status number is not removed, replace 7PC2 then 6PC1, refer to 5AA, 6AM.</li> </ol>
13	<p><b>TAPE READER JAM -</b></p> <ol style="list-style-type: none"> <li>1. Format tape reader started to read tape, but never finished.</li> <li>2. STOP or READY light lit.</li> <li>3. Red light on EVFU reader lit.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check format reader for jam or improperly installed tape. Install tape and press Tape Load Switch. Status number will stay displayed until tape load cycle starts.</li> <li>2. Possible defective Drive Motor (3B04) or loose tape drive sprocket (refer to 5BA, 6AL).</li> <li>3. Possible defective Format Tape Reader, refer to 6AL.</li> <li>4. Possible defective Motor Relay (3K01)</li> <li>5. Replace 7PC2 then 6PC1, refer to 5AA, 6AM.</li> </ol>
14	<p><b>NO TOP OF FORM IN TAPE-</b></p> <ol style="list-style-type: none"> <li>1. No top of forms information received during Vertical Format Memory load cycle.</li> <li>2. On EVFU - No channel 1 or optional channel 8 (Top of Forms) punch detected on format tape during load cycle.</li> <li>3. On DAVFU - No channel 1 or optional channel 8 (Top of Forms) received from data source during load cycle.</li> <li>4. STOP or READY light lit.</li> </ol>	<ol style="list-style-type: none"> <li>1. Add top of forms information to format tape or to vertical format data from data source. Start of format load cycle will remove displayed number.</li> <li>2. Replace 7PC2 then 6PC1, refer to 5AA, 6AM.</li> </ol>
15	<p><b>TAPE TOO LONG -</b></p> <ol style="list-style-type: none"> <li>1. Vertical format tape is too long, or tape has an excess of lines between Top Of Forms punches.</li> <li>2. STOP or READY light lit.</li> </ol>	<ol style="list-style-type: none"> <li>1. Format tape exceeds maximum length of 30 inches.</li> <li>2. Tape has an excess of 180 lines between Top Of Form punches.</li> <li>3. Replaces 7PC2 then 6PC1, refer to 5AA, 6AM.</li> </ol>
16	<p><b>INVALID CHANNEL SELECTED -</b></p> <ol style="list-style-type: none"> <li>1. The data source has selected a format channel that is not valid for your format configuration.</li> <li>2. Data source has selected a channel other than 1 thru 12.</li> <li>3. Printer goes Off Line.</li> </ol>	<ol style="list-style-type: none"> <li>1. Correct vertical format software at data source so it agrees with the printer's valid format configuration.</li> <li>2. If correct, replace 7PC2 then 6PC1, refer to 5AA 6AM.</li> </ol>

(CONTINUED)

TABLE 1-11. STATUS DISPLAY GUIDE (Continued)

STATUS NUMBER DISPLAYED	DEFINITION AND/OR SYMPTOM	PROBABLE CAUSE AND/OR CORRECTIVE ACTION
17	<b>EVFU DATA STOP CODE ERROR –</b> 1. Vertical format load information from data source (DAVFU) is not correct. 2. An odd number of data bytes was transferred when a Stop code was received. Data transfer to vertical format memory was incomplete. 3. Printer goes Off Line.	1. Correct vertical format load information at data source. Status number displayed will be removed by start of data transfer 2. If correct, check 7PC1 then 6PC1.
18	<b>EVFU DATA TRANSFER TOO LONG –</b> 1. Vertical format data load transfer from data source exceeded 180 format lines. 2. Printer goes Off Line	1. Correct vertical format data load information at data source so it does not exceed maximum number of 180 lines. Displayed number will be cleared by start of load cycle. 2. Replace 7PC2 then 6PC1, refer to 5AA, 6AM.
19	<b>UNABLE TO READ/VERIFY TAPE –</b> 1. The format tape information read into the Format Tape Memory during the first pass (load cycle) is not the same as the information read into the Format Tape Memory on the second pass (verify cycle). 2. STOP or READY light lit.	1. Check format tape for improperly located or punched holes. 2. Additional lengths of form punched on a single format tape were not punched identically to the first length. EXAMPLE: On forms with a vertical length less than 11 inches the format tape will be too short to go around the tape reader. Therefore, it is necessary to repeat the format pattern two or more times on a single tape. 3. If correct, check 7PC2 then 6PC1.
20	<b>INVALID FORMS LENGTH –</b> 1. Optional Page Length Select switches on the top of the Control Panel is set at zero inches. 2. STOP or READY light lit.	1. Switches must be set between ½" and 3 1/2" in order to function. Displayed number will be cleared by making valid selection and moving paper. 2. Check 6PC1 then 7PC2, refer to 6AM, 5AA.
21	<b>INVALID FORMAT CODE –</b> 1. Format code from data source is not valid for this printer's configuration. 2. Data source has sent format code, but printer's Vertical Format memory was never loaded. 3. Printer goes Off Line.	1. Invalid format code has been sent by data source. 2. Printer's Vertical Format Memory is not loaded. 3. Printer's dip switches on controller board 7PC2 are not set properly for your printer's configuration. A. Dip switch set for no Vertical Format Memory and printer has tape reader or DAVFU. B. Dip switch set for Standard Interface and printer has optional interface. C. Dip switch set for optional interface and printer has standard interface. 4. Replace 7PC2 then 6PC1, refer to 5AA, 6AM.
22	<b>MASTER CLEAR ON –</b> 1. MASTER CLEAR from data source is on constantly and will not let printer function. 2. STOP /START or READY/ON LINE light may be lit.	1. MASTER CLEAR from data source is hung up and must be cleared. Removal of MASTER CLEAR will remove displayed number. 2. Replace 7PC2 then 6PC1, refer to 5AA, 6AM.

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TABLE 1-11. STATUS DISPLAY GUIDE (Continued)

STATUS NUMBER DISPLAYED	DEFINITION AND/OR SYMPTOM	PROBABLE CAUSE AND/OR CORRECTION ACTION
23	<b>BAND IMPROPERLY INSTALLED -</b> 1. Band motor was turned on, but Band Character Pickup 4L02 is not receiving character pulses from print band. 2. Band motor will turn off 30 seconds after number is displayed. 4. If On Line, printer goes Off Line.	1. No band installed. 2. Band installed upside down. 3. Broken band. 4. Band not tracking properly. 5. Band Tension Lever not engaged. 6. Band Character Pickup (4L02) misadjusted or defective, refer to 5AD. 7. Possible Defective 7PC3 board, refer to 5AA. 8. Possible bad band motor 4B03, refer to 6AR.
24	<b>EVFU PARITY ERROR -</b> 1. Vertical Format Memory data in printer controller has changed. 2. If On Line, printer goes Off Line.	1. Reload Vertical Format Data into Printer Memory. Displayed number will be removed with start or reload cycle. 2. If status number persists replace EVFU RAM's on Controller Board 7PC2, refer to 5AA.
25	<b>SELECTED VFU CHANNEL NOT PUNCHED -</b> 1. Vertical format channel selected by data source is not in Vertical Format Memory. 2. Printer goes Off Line.	1. Data source has selected an invalid format channel not in Vertical Format Memory. 2. Format channel selected by data source was never loaded into Vertical Format Memory.
26	<b>RESET SWITCH ON -</b> 1. Optional RESET (printer controller clear) switch on Control Panel is being pressed. 2. If printing, line is completed, line buffer is cleared, I/O hardware is cleared, printer goes Off Line. 3. If On Line, printer goes Off Line. 4. STOP/START or READY/ON LINE switch clears all the same faults as RESET switch, with the exception that STOP/START or READY/ON LINE does not clear the Line Buffer or I/O when faults are cleared.	1. Releasing RESET switch will remove displayed number.
27	<b>BAND IMAGE NOT LOADED</b> 1. Selected I/O Image Mode but Image has not been loaded.	Load the Image over the I/O. Check I/O assembly and cable. Replace 7PC2 then 6PC1. Refer to 5AA, 6AM
28	Not assigned or displayed.	None. Reserved for future status assignments.
29	Not assigned or displayed.	

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TABLE 1-11. STATUS DISPLAY GUIDE (Continued)

STATUS NUMBER DISPLAYED	DEFINITION AND/OR SYMPTOM	PROBABLE CAUSE AND/OR CORRECTIVE ACTION
30	<p><b>CONTROLLER ROM ERROR -</b></p> <p>1. During power ON initialization a controller ROM check routine has detected that information in the Controller Program ROM's on board 7PC2 has changed since they were programmed. ROM set may consist of 2 to 5 ROM's.</p>	<p>1. Power printer OFF to clear printer logic and fault.</p> <p>2. Check to assure that ROM's/RAMS's are seated properly.</p> <p>3. Power printer ON. If status number persists, replace defective ROM/RAM or replace 7PC2 board, refer to 5AA.</p>
31	<p><b>EVFU PROGRAM ROM ERROR -</b></p> <p>1. During power ON initialization a controller ROM check routine has detected that information in the EVFU Program ROM on board 7PC2 has changed since it was programmed. Consists of one ROM.</p>	
32	<p><b>SYSTEM RAM ERROR -</b></p> <p>1. During power ON initialization the controller has tested the System RAM Memory and has found it to be malfunctioning. May consist of 1 to 2 RAM's.</p>	
33	<p><b>EVFU RAM ERROR -</b></p> <p>1. During power ON initialization the controller has tested the EVFU RAM Memory and has found it to be malfunctioning. May consist of 1 to 2 RAM's.</p>	
34	<p><b>BUFFER RAM ERROR -</b></p> <p>1. During power ON initialization the controller has tested the Controller Buffer RAM Memory and has found it to be malfunctioning. Consists of two RAM's.</p>	
35	<p><b>ILLEGAL CHARACTER REGISTER ERROR -</b></p> <p>1. One or more of the chips on 7PC2 are bad or a foil is missing.</p>	<p>Replace 7PC2 then 6PC1. Refer to 5AA, 6AM.</p>
36	<p><b>IMAGE ROM ERROR -</b></p> <p>1. Bad Image ROM/s. Bits of data have been lost.</p>	<p>Replace Image ROM/s. Replace 7PC2 then 6PC1. Refer to 5AA, 6AM.</p>
37	<p><b>NO IMAGE ROM INSTALLED -</b></p>	<p>Install Image ROM's, replace 7PC2 then 6PC1. Refer to 5AA, 6AM.</p>
38	<p><b>IMAGE RAM NOT AVAILABLE</b></p> <p>1. Selected I/O Image RAM Mode but the RAM either wasn't installed or is defective.</p>	<p>Install or replace Image RAM. Replace 7PC2 then 6PC1. Refer to 5AA, 6AM.</p>
39	<p><b>INVALID TEXT ROM -</b></p> <p>1. Selected the C.E. Test Print feature "Text Mode" but ROM either wasn't installed or is defective.</p>	<p>Install or replace Text ROM to allow C.E. Test Print to occur. Replace 7PC2 then 6PC1. Refer to 5AA, 6AM.</p>
40	<p><b>BAND MOTOR OVERCURRENT FAULT -</b></p> <p>1. Band Motor Overcurrent Circuit on board 2PC2 has detected an overcurrent to the band motor.</p> <p>2. If On Line, printer goes Off Line.</p> <p>3. STOP or ALARM light will be flashing and +36V power supply will shut down via the 36 volt Crobar circuit on 2PC1 board.</p>	<p>1. Power printer OFF and ON to clear logic and fault. If problem and fault number persist, see below.</p> <p>2. Check for band jam or binding in bands' mechanical drive system.</p> <p>3. Replace Servo Power Amp Board 2PC2, refer to 5AA.</p> <p>4. Replace band motor 4B03, refer to 6AR.</p> <p>5. Refer to Subsection J-Isolating a Crobarred Printer.</p> <p>6. Replace 7PC2, refer to 5AA.</p> <p>7. Replace 7PC3, refer to 5AA.</p> <p>8. Replace 6PC1, refer to 6AM.</p>



(Continued)

TABLE 1-11. STATUS DISPLAY GUIDE (Continued)

STATUS NUMBER DISPLAYED	DEFINITION AND/OR SYMPTOM	PROBABLE CAUSE AND/OR CORRECTIVE ACTION
41	<p><b>RIBBON MOTOR OVERCURRENT FAULT.</b></p> <ol style="list-style-type: none"> <li>Ribbon Motor Overcurrent circuit on board 2PC2 has detected an overcurrent to the ribbon motors.</li> <li>If On Line, printer goes off Line.</li> <li>STOP or ALARM light will be flashing and +36V power supply will shut down via the 36 volt Crobar circuit on 2PC1 board.</li> </ol>	<ol style="list-style-type: none"> <li>Check for improperly installed ribbon spools, causing both motors to pull on ribbon at same time.</li> <li>Check for defective or missing ribbon switching foil near end of ribbon. Could cause motors not to reverse. Motor would be trying to pull end of ribbon off of empty spool.</li> <li>Check for ribbon jam. Jam is normally caused by a worn or torn ribbon that causes the ribbon to track improperly.</li> <li>Check for defective Servo Power Amp Board 2PC2 (refer to 5AA) or defective Ribbon Motors 4B01 and 4B02 (refer to 6AS). Disconnect ribbon motor power plugs under each motor. Power printer ON and attempt to move ribbon. If status number persists, replace Servo Power Amp Board 2PC2 (refer to 5AA). If status number is removed, power printer OFF and remove both ribbon spools from ribbon drive spools. Reconnect power plug to one of the ribbon motors. Power Printer ON and attempt to move ribbon. If motor does not turn, short that motor's ribbon switching bar with a screwdriver to start it driving. If status number persists, replace that motor. If status number is removed, power printer OFF and reconnect second motor. Power printer ON and attempt to move ribbon. Short motor ribbon switching bar with screwdriver to start motor driving. If status number persists, replace that motor.</li> <li>Ribbon motors must be checked to see if they are seized up.</li> <li>Check to see if the cam collars are occasionally slipping.</li> <li>Refer to Subsection J-Crobarred Printer.</li> <li>Replace 7PC3 then 7PC2 then 6PC1, refer to 5AA, 6AM.</li> </ol>
42	<p><b>12 VOLT FAULT –</b></p> <ol style="list-style-type: none"> <li>The 12 Volt Fault circuit on the 7PC3 board has detected a loss of +12 volts at 5TB1 or a loss of -12 volts at 5TB2 on the Power Distribution Board.</li> <li>If On Line, printer goes Off Line.</li> <li>STOP or Alarm light will be flashing and + 36V power supply will shut down via the 36V Crobar circuit on 2PC1 board.</li> </ol>	<ol style="list-style-type: none"> <li>Refer to Subsection F-Fuses and Locations and check the side card rack for lit fuse LEDs (2PC1, F4 and F5). Replace any blown fuse on 2PC2 and retest the printer; if fuse blows replace 2PC1, refer to 5AA.</li> <li>This fault can be caused by a short anyplace in the printers' <math>\pm 12</math> volt distribution network, from the input transformer to the using PC cards or components. This fault could also be caused by a faulty 12 volt fault circuit. See Figure 1-13 for D.C. Distribution Diagram that will aid in isolating this fault.</li> <li>Power printer OFF and ON. If status number persists, check for +12V at the power distribution board 5TB1 and -12 volts at 5TB2 to assure that 12 volts is lost and that the real problem is not with the 12 volt fault circuit on 7PC3 or 7PC2 board. If <math>\pm 12</math> volts is present replace 7PC3 board, refer to 5AA. If status number persists replace 7PC2 board, refer to 5AA.</li> <li>If <math>\pm 12</math> V is not present on the power distribution board 5TB1 and 5TB2 and fuses are not blown, remove the fuses F2 and F3 from 2PC1 and check for 16.5 VAC on the spare (50 or 60 Hz) transformer plugs. If 16.5 VAC is not present replace transformer 1XF1. If 16.5 VAC is present, replace 2PC1 board, refer to 5AA.</li> <li>If <math>\pm 12</math> V are present at the power distribution board 5TB1 and 5TB2, the short is on 2PC2, 7PC3, 3L02, 3L03, 3L06, 7PC1 or in one of the power distribution cables to these boards and readers. The shorted P.C. board or reader may be found by disconnecting the power distribution cable to each P.C. board or reader one at a time until the <math>\pm 12</math> volts return, and the short is isolated. Replace the defective board or reader. Refer to Subsection J-Crobarred Printer.</li> </ol>

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TABLE 1-11. STATUS DISPLAY GUIDE (Continued)

STATUS NUMBER DISPLAYED	DEFINITION AND/OR SYMPTOM	PROBABLE CAUSE AND/OR CORRECTIVE ACTION
43	<p><b>HAMMER FAULT -</b></p> <ol style="list-style-type: none"> <li>One of the Hammer Driver Fault Sense circuits on Hammer Driver Boards 5PC1 thru 5PC4 has detected that the drive current to a hammer armature coil has been on too long, is open, or is drawing excessive current.</li> <li>This fault lights an LED on the Hammer Driver board with the circuit malfunction.</li> <li>If On line, printer goes Off Line.</li> <li>STOP or ALARM light will be flashing and +36V power supply will shut down via the 36V Crobar circuit on 2PC1 board.</li> </ol>	<ol style="list-style-type: none"> <li>Replaced Hammer Driver Board that displays a lit L.E.D.</li> <li>Power printer OFF and ON and attempt to print. If problem persists, check for short or open coil on the Armature Striker Coils being driven by the Hammer Driver Board you replaced in step 1 above. A good coil should have approx. 6 Ohms of resistance across the coil.</li> <li>Refer to Subsection J-Isolating a Crobarred Printer.</li> <li>Replace 7PC3 then 7PC2 then 6PC1, refer to 5AA, 6AM.</li> </ol>
44	Not Assigned or Displayed	None. Reserved for other model printers.
45	Not Assigned or Displayed	None. Reserved for other model printers.
46	Not Assigned or Displayed	None. Reserved for other model printers.
47	<p><b>H SWITCH FAULT -</b></p> <ol style="list-style-type: none"> <li>The "H" Switch Fault sense circuit on 2PC2 board has detected an overcurrent in the vertical power amplifiers that drive the Vertical Servo Motor 3B01.</li> <li>If On Line, printer goes Off Line.</li> <li>STOP or ALARM light will be flashing and +36V power supply will shut down via the 36V crobar circuit on 2PC1 board.</li> </ol>	<ol style="list-style-type: none"> <li>Power printer OFF and ON and attempt to print. If (status number persists, move to step 2.</li> <li>Replace 2PC2 board, refer to 5AA.</li> <li>Possible defective Vertical Servo Motor 3B01, refer to 6AE.</li> <li>Replace 7PC3 board, refer to 5AA.</li> <li>Possible bad vert. servo Tach. 3L01, refer to 6AB, 5AC.</li> <li>Possible bad vert. Motion Reader 3L02, refer to 6AD, 5AC.</li> <li>Replace 7PC2 board, refer to 5AA.</li> <li>Refer to Subsection J-Isolating a Crobarred Printer.</li> <li>Replace 6PC1, refer to 6AM.</li> </ol>
48	<p><b>FUSE FAULT (+36V SENSE) -</b></p> <ol style="list-style-type: none"> <li>The +36 Volt Sense line that originates on 2PC2 board has detected a loss of +36V in the +36 volt system.</li> <li>If On Line, printer goes Off Line.</li> <li>STOP or ALARM light will be flashing and +36V power supply will shut down via the 36V Crobar circuit on 2PC1 board.</li> <li>A loss of any of the following fuses or circuit breakers will generate this fault (See Fuse Chart in this section).</li> </ol> <p>1CB1 POLE 3                  2PC1-F2-15A                  2PC1-F3-15A                  2PC1-F4-2A                  2PC1-F5-2A                  2PC1-F6-25A                  2PC1-F7-25A                  2PC1-F1-15A</p> 	<ol style="list-style-type: none"> <li>The loss of any of the fuses or circuit breakers shown in the following Subsection "F" Fuses and Locations Chart will generate a Fuse Fault. Check for blown fuses and replace as necessary (See Fuse Chart in Subsection "F").</li> <li>This fault can also be caused by a short anyplace in the +36V volt distribution network from the input transformer to the using PC boards or components. See Figure 1-13 for D.C Distribution Diagram which will aid in isolating a short in the +36V network. Also see A.C. and D.C. Voltage Check Flow Charts in Subsection "H". (Refer to page indexing on page 1-1).</li> <li>Replace 1CB1 then 9R03 then 7PC3 then 7PC2 then 6PC1, refer to 6AV, 5AA, 6AM.</li> </ol> <p>NOTE:</p> <ol style="list-style-type: none"> <li>Paper Clamp fuse (7BP1-F1) on the swing out card rack mother board (7BP1) is only monitored by an LED on the backplane mother board. This voltage (9.5 volts unregulated) comes from the 5 volt transformer windings.</li> <li> Servo Amp Board fuse fault LED will light for a blown fuse the first second after power ON or until the fuse fault is sensed and the printer crobarred.</li> </ol>

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TABLE 1-11. STATUS DISPLAY GUIDE (Continued)

STATUS NUMBER DISPLAYED	DEFINITION AND/OR SYMPTOM	PROBABLE CAUSE AND/OR CORRECTIVE ACTION
49	<p><b>PAPER RUNAWAY FAULT –</b></p> <ol style="list-style-type: none"> <li>1. The Paper Runaway Fault circuit on 7PC3 board has detected that the controller has turned Paper Advance on and has not turned it off within the max paper slew time of 2.5 seconds.</li> <li>2. Controller 7PC2 is not receiving the Vertical Strobe signals required to terminate paper advance.</li> <li>3. If On Line, printer goes Off Line.</li> <li>4. STOP or ALARM light will be flashing and the +36V power supply will shut down via the 36V Crobar circuit on 2PC1 board.</li> </ol> <p style="text-align: center;"><b>CAUTION</b></p> <p><b>MORE THAN THREE FORMS RUNAWAY IN A ROW MAY OVERHEAD TRACTORS AND DAMAGE BEARING SURFACE.</b></p>	<ol style="list-style-type: none"> <li>1. Power printer OFF and ON and attempt to move paper. If status number persists move to step 2.</li> <li>2. Was paper in motion when fault was detected? If no, move to step 3. If yes do the following.               <ol style="list-style-type: none"> <li>A. Check for defective Vertical Reader 3LO2. While pressing the Forms Release Switch on the Control Panel.</li> </ol> <p style="margin-left: 40px;">Check the output Voltage of Vertical Reader 3LO2 at TP13 on 7PC3 board. Use digital volt meter or oscilloscope. Rotate the Vertical Code Disk by turning The Course Position Control Knob and observe that the maximum output voltage is 5 volts or greater and the minimum output voltage is -5 volts or less. If not, reader is misaligned or defective, refer to 6AD, 5AC.</p> </li> <li>3. Do the following:               <ol style="list-style-type: none"> <li>A. Check for defective Vertical Servo Motor 3B01, refer to 6AE, 5AC.</li> <li>B. Replace 7PC3 then 2PC2 then 7PC2 refer to 5AA.</li> </ol> </li> </ol>
50	<p><b>PAPER RUNAWAY (HARDWARE FAILURE) FAULT -</b></p> <ol style="list-style-type: none"> <li>1. The controller is receiving Vertical Strobe signals during a time when Vertical Advance is off. The controller generates a Customer Engineer Fault</li> <li>2. If On Line, printer goes Off Line.</li> <li>3. STOP or ALARM light will be flashing and the +36V power supply will shut down via the 36V Crobar circuit on 2PC1 board.</li> </ol>	<ol style="list-style-type: none"> <li>1. Power printer OFF and ON and attempt to move paper. If problem (status number) persists, check for loose Vertical Code Disk or Vertical Shaft Drive Pulley.</li> <li>2. Replace 2PC2, then 7PC3 then 7PC2, refer to 5AA.</li> <li>3. Check the vertical tachometer signal (7PC3, TP-18 or TP-20) for loss of signal. Replace the tachometer if in question.</li> <li>4. Replace 6PC1, refer to 6AM.</li> </ol>
51	<p><b>UNIDENTIFIABLE C.E. FAULT –</b></p> <ol style="list-style-type: none"> <li>1. The 7PC3 board has raised its C.E. Fault line to the controller, but the controller has not received a specific fault.</li> <li>2. If On Line, printer goes Off Line.</li> <li>3. STOP or ALARM light will be flashing and the +36V power supply will shut down via the 36V Crobar circuit on 2PC1 board.</li> </ol>	<ol style="list-style-type: none"> <li>1. Power printer OFF and ON and attempt to print. If problem (status number) persists, replace 7PC3 board.</li> <li>2. Power printer OFF and ON and attempt to print. If problem persists, replace 7PC2 board, refer to 5AA.</li> <li>3. Check positioning of paper clamp; refer to 5AJ.</li> <li>4. Look at band pickups for excessive noise.</li> <li>5. Check for mis-seated PCB or Control Panel Cable.</li> </ol>
52	<p><b>LINE SPACE ERROR-</b></p> <ol style="list-style-type: none"> <li>1. Controller has gained or lost a Vertical Strobe signal.</li> <li>2. STOP or ALARM light lit.</li> <li>3. If On Line, printer goes Off Line.</li> </ol>	<ol style="list-style-type: none"> <li>1. Power printer OFF and ON and attempt to print. If problem (status number) persists move to step 2.</li> <li>2. Check for loose Code Disk.</li> <li>3. Check for defective Reader 3LO2, refer to 6AD, 5AC.</li> <li>4. Replace 7PC3 then 7PC2 then 6PC1. Refer to 5AA, 6AM.</li> </ol>


(CONTINUED)

TABLE 1-11. STATUS DISPLAY GUIDE (Continued)

STATUS NUMBER DISPLAYED	DEFINITION AND/OR SYMPTOM	PROBABLE CAUSE AND/OR CORRECTIVE ACTION
53	<p><b>BAND SYNC ERROR –</b></p> <ol style="list-style-type: none"> <li>1. The controller lost or gained a Character Pulse or Home Pulse signal.</li> <li>2. If On Line, printer goes Off Line.</li> <li>3. The print band is not up to speed.</li> </ol>	<ol style="list-style-type: none"> <li>1. This status number may be cleared by pressing STOP/START, or by pressing (optional) RESET switch and then START, or by pressing ALARM/CLEAR and then ON LINE, or by powering the printer OFF and ON and then pressing START or ON LINE switch.</li> <li>2. Clean the inside surface of the band motor drive belt with alcohol, then clear the fault and attempt to print. If status number persists, move to step 3.</li> <li>3. Check fuses F6 and F7 on 2PC1. If bad replace fuse/s.</li> <li>4. Check for misadjusted or defective Band Pickups 4L01 (Home Pulse Pickup) and 4L02 (Character Pickup), refer to 5AD.</li> <li>5. Check for nick or crimp in band that could have generated a false timing mark pulse.</li> <li>6. Replace 7PC3 then 7PC2 then 6PC1, refer to 5AA, 6AM.</li> </ol>
54	<p><b>CRC ERROR –</b></p> <ol style="list-style-type: none"> <li>1. The controller lost or gained CRC data bits (a form of parity check).</li> <li>2. Loss of data over the interface lines.</li> </ol>	<ol style="list-style-type: none"> <li>1. Possible problem in the Controller's internal counting. Replace 7PC2 board (See 5AA).</li> <li>2. Check for loose I/O connector or defective I/O cable.</li> <li>3. Probable loss of data over interface lines in the receiver chips. Replace 8PC1.</li> </ol>
55	<p><b>PRINTER BUFFER OVERFLOW –</b></p>	<p>Replace 7PC2 then 6PC1 refer to 5AA, 6AM.</p>
56	<p><b>I/O PARITY ERROR –</b></p> <ol style="list-style-type: none"> <li>1. A Parity error has been detected over the I/O lines.</li> </ol>	<p>Check program and resend data. Check I/O assembly and cable. Replace 7PC2 then 6PC1. Refer to 5AA, 6AM.</p>
57	<p><b>NO DEFAULT IMAGE ROM –</b></p> <ol style="list-style-type: none"> <li>1. Proper Image ROM not found and no ROM is installed in the default socket. ROM does not match the band installed.</li> </ol>	<p>Install proper ROM and/or band. Replace 7PC2 then 6PC1. Refer to 5AA, 6AM.</p>
58	<p><b>UNABLE TO IDENTIFY BAND –</b></p>	<ol style="list-style-type: none"> <li>1. Possible bad band.</li> <li>2. Replace 7PC3 then 7PC2, refer to 5AA.</li> <li>3. Possible bad band motor 4B03, refer to 6AR.</li> <li>4. Check position of 4L01 and 4L02, refer to 5AD.</li> <li>5. Replace 6PC1, refer to 6AM.</li> </ol>
59	<p><b>COMPARE FAULT –</b></p> <ol style="list-style-type: none"> <li>1. Trying to print a character which has not been loaded or does not appear in Image ROM.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace 7PC2.</li> </ol>
60	<p><b>INPUT CYCLE IN PROGRESS STATUS-</b></p> <ol style="list-style-type: none"> <li>1. Data source has started to load a line of data into the printers' Buffer Memory but total line was not completed.</li> <li>2. Data source has stopped sending data or printer will not accept data.</li> <li>3. Data source did not send a valid control code to terminate Load cycle.</li> <li>4. Printer will remain in START or ON LINE and status number will remain displayed until data line is terminated by data source or printer logic is cleared.</li> </ol>	<ol style="list-style-type: none"> <li>1. This status number may be cleared by pressing STOP/START, or by pressing (optional) RESET switch and then START switch, or by pressing ALARM CLEAR and the ON LINE, or by powering printer OFF and ON and then pressing START or ON LINE switch.</li> <li>2. Clear status and enter START or ON LINE. If problem (status number) persists, move to step 3.</li> <li>3. Check for loose I/O connector from data source or defective I/O cable.</li> <li>4. Check to assure that data source is sending proper printer control codes.</li> <li>5. If printer has interface adapter installed in board location 7PC1, replace board, refer to 5AA.</li> <li>6. Replace 7PC2 then 6PC1 board, refer to 5AA, 6AM.</li> </ol>


(CONTINUED)

TABLE 1-11. STATUS DISPLAY GUIDE (Continued)

STATUS NUMBER DISPLAYED	DEFINITION AND/OR SYMPTOM	PROBABLE CAUSE AND/OR CORRECTIVE ACTION
61	<p>PRINT CYCLE (WAITING FOR SCAN SYNC INTERRUPT STATUS—)</p> <p>1. The controller has stopped receiving Character Pulses from the band.</p>	<p>1. Power printer OFF and ON and attempt to print. If status number persists, move to step 2.</p> <p>2. Check for misadjusted or defective Band Pickup 4L02 (Character Pulse Pickup), refer to 5AD.</p> <p>3. Check for broken band or band not tracking properly.</p> <p>4. Replace 7PC3 then 7PC2 then 6PC1, refer to 5AA, 6AM.</p>
62	Not Assigned or Displayed	None. Reserved for other printer models.
63	<p>VERTICAL MOTION CYCLE STATUS —</p> <p>1. This status is generated whenever the controller sends a vertical motion command, but is normally not displayed because it is turned ON and OFF too quickly during normal paper motion cycle. Status will be displayed momentarily during Page Eject or Paper Run-away (2.5 seconds).</p> <p>2. If status remains displayed; the controller has sent a vertical motion signal, but motion has never happened.</p>	<p>1. When status remains displayed, power printer OFF and ON and attempt to print. If problem persists, move to step 2.</p> <p>2. Possible defective 2PC2 board, refer to 5AA.</p> <p>3. Possible defective Vertical Servo Motor 3B01, refer to 6AE. Test by grounding Vertical Advance on 7PC3, if motor runs check 7PC2, if motor fails to run check 7PC3.</p> <p>4. Replace 7PC3 then 7PC2, refer to 5AA.</p>
64	<p>BAND NOT IDENTIFIED STATUS—</p> <p>1. This status is generated by the controller during power ON initialization and will stay displayed until band is up to speed and identified (5 to 7 seconds).</p>	Status Only. No corrective action necessary.
65	Not assigned or displayed.	None. Reserved for future status assignments.
66		
67		
68		
69		<p>INCORRECT IMAGE ROM NUMBER —</p> <p>1. Image ROM does not match the band installed.</p>
70	<p>IMAGE WORD COUNT ERROR</p> <p>1. Attempted to load an improper number of characters into Image RAM.</p>	Check program and resend data. Check I/O assembly and cable. Replace 7PC2 then 6PC1, refer to 5AA, 6AM.
71	<p>INVALID IMAGE START CODE</p> <p>1. The start code which starts the load to the Image RAM is not correct.</p>	Start code should be 12 hex. Check program and resend data. Check I/O assembly and cable. Replace 7PC2 then 6PC1, refer to 5AA, 6AM.
72	<p>PRINT ATTEMPT WITH NO IMAGE —</p> <p>Tried to print with code "27" showing on Control Panel.</p>	Load image over the I/O. Repace 7PC2 then 6PC1, refer to 5AA, 6AM.

(CONTINUED)


TABLE 1-11. STATUS DISPLAY GUIDE (Continued)

STATUS NUMBER DISPLAYED	DEFINITION AND/OR SYMPTOM	PROBABLE CAUSE AND/OR CORRECTIVE ACTION
73	<p>6/8 LPI STROBE COUNT ERROR</p> <p>1. Loss of Top of Form position due to either the operator changing 6/8 LPI switch or a line spacing change over the the I/O. It takes 24 increments to move the paper one inch 3 increments = 1 line in 8 LPI mode, 4 increments = 1 line in 6 LPI mode. Top of Form (TOF) is checked one line before TOF position. 8 LPI should have 3 increments left, 6 LPI should have 4 increments left.</p>	<p>Reset and align Top of Form position and press Form Feed switch then Reset or Clear switch. 6/8 LPI switch should not be activated without resetting Top of Form Position. Replace 7PC2 then 6PC1, refer to 5AA, 6AM.</p>
74 75 76 77 78 79	<p>Not assigned or displayed</p>  <p>Not assigned or displayed.</p>	<p>None. Reserved for future status assignments.</p>
80	<p>C.E. TEST PRINT/NOT VALID TEST-</p> <p>1. An invalid C.E. Test Print pattern or action has been selected with the 8 position dip switch on Controller Board 7PC2. Printer will not function in Test Print until proper selection is made.</p>	<p>For detailed information on how to select and activate the following Test Print patterns or actions, see your Technical Manual. If okay, replace 7PC2 then 6PC1, refer to 5AA, 6AM.</p>
81	<p>C.E. TEST PRINT/SLIDING PATTERN -</p> <p>1. The Sliding C.E. Test Print Pattern has been selected on the controller's 8 position dip switch and is printing. Will be printing all characters in band order.</p>	<p>1. Check DIP switch settings on 7PC2. 2. Replace 7PC2 then 6PC1, refer to 5AA, 6AM.</p>
82	<p>C.E. TEST PRINT/CYCLE WITH NO PRINTING -</p> <p>1. The Cycle/No Print Test Print Action has been selected on the controller's 8 position dip switch and is functioning the printer without printing.</p>	<p>1. Check DIP switch settings on 7PC2. 2. Replace 7PC2 then 6PC1, refer to 5AA, 6AM.</p>
83	<p>Not Assigned or Displayed.</p>	<p>None. Reserved for other model printers.</p>
84	<p>C.E. TEST PRINT/VERTICAL ONLY -</p> <p>1. The Vertical Only, Test Print Action has been selected on the controller's 8 position dip switch and is functioning the printers' vertical motion system only.</p>	<p>1. Check DIP switch settings on 7PC2. 2. Replace 7PC2 then 6PC1, refer to 5AA, 6AM.</p>
85	<p>INTERNAL TEST PRINT MODE SELECTED</p> <p>1. The printer's internal Test Print feature is being used rather than the information transferring across the interface lines. The number appears as a status when the printer's internal Test Print feature is enabled.</p>	<p>1. If code 85 appears and is not wanted, it may be disabled by pressing the push button switch SW1 on 7PC2 board.</p>

(CONTINUED)



TABLE 1-11. STATUS DISPLAY GUIDE (Continued)


STATUS NUMBER DISPLAYED	DEFINITION AND/OR SYMPTOM	PROBABLE CAUSE AND/OR CORRECTIVE ACTION
86	C.E. TEST PRINT/TEXT MODE --	1. Check DIP switch settings on 7PC2. 2. Replace 7PC2, refer to 5AA. 3. Replace 6PC1, refer to 6AM.
87  88  89  90  91  92  93  94  95  96  97  98  99	Not Assigned or displayed.    Not assigned or displayed.	None. Reserved for future status/fault assignment.
FF	See 00 Code.	See 00 Code.

## SUBSECTION F - FUSES AND LOCATION

This subsection lists the fuses and their function in Table 1-12. The Power Supply board has the fuses for the transformer inputs and the voltage outputs. The Servo Amp. (H-Switch) board has one fuse for the +36 volts for the paper motor. The Power Supply board (2PC1) and the Servo Amp. (2PC2) are located in the side card rack which has cutouts in the front thru which the fuse fault LEDs show for the two boards. In some fault isolation of shorts, fuses may be removed to help isolate shorted components.

The paper clamp uses the voltage of the 5 volt supply before regulation which makes the voltage about 9.5 volts. The fuse for the paper clamp is on the swing out logic rack mother board (7BP1). The fuse is a 3 Amp and is not monitored by any fuse fault circuit but there is a fault LED. The first sign of a blown fuse may be vertical character registration in the printout.

TABLE 1-12. FUSE FUNCTIONS

DEVICE IDENT.	PROTECTS	LOCATION	AMPS	TYPE	PART NO.
F2/F3 (2PC1-F2/F3)	Transformer 1X01, Power Supply Board 2PC1, Print Head 7PC3 Controller 7PC2.	Right side of Print Head Structure, on Power Supply 2PC1	15A	MDL15 (Slow)	24521734
F4/F5 (2PC1-F4/F5)	Transformer 1X01, Power Supply Board 2PC1, Servo Power Amp Board 2PC2 and Print-head Electronics Board 7PC3.	On right side of Print Head Structure, on Power Supply Board 2PC1.	2A	MDL2 (Slow) or 3AG2 (Slow)	24521724
F6/F7 (2PC1-F6/F7)	Transformer 1X01, Circuit Breaker 1CB1	Right side of Print Head Structure on 2PC1	25A	MDL25 (Slow)	24521736
F1 (2PC2-F1) 	Motors 4B03, 4B02, 4B01, 3B01, 3B02.	Right side of Print Head Structure on Servo Power Amplifier Board 2PC2.	15A	GBB15 (Fast acting)	95342611
1CB1	Poles 1 and 2- Protects A.C. blower motor 1B01, transformer 1XF1 and Power Supply board 2PC1.  Pole 3-Protects +36V distribution bus and +36V capacitor storage bank.	Front right side of printer, under Print Head Structure	15A (Poles 1 & 2)  3A (Pole 3)	Air Pax (UAGH-311 5048-2)  Hieman (JA3-A8A 8B5-A)	44670333
F1 (7BP1-F1)	Paper clamp 3L07.	Swing Out Card Rack	3A	AGC3 (Fast Acting)	93418330

NOTE:  Fuse Fault LED only lights the first second after power-on or until the +36 volts is crobarred down.

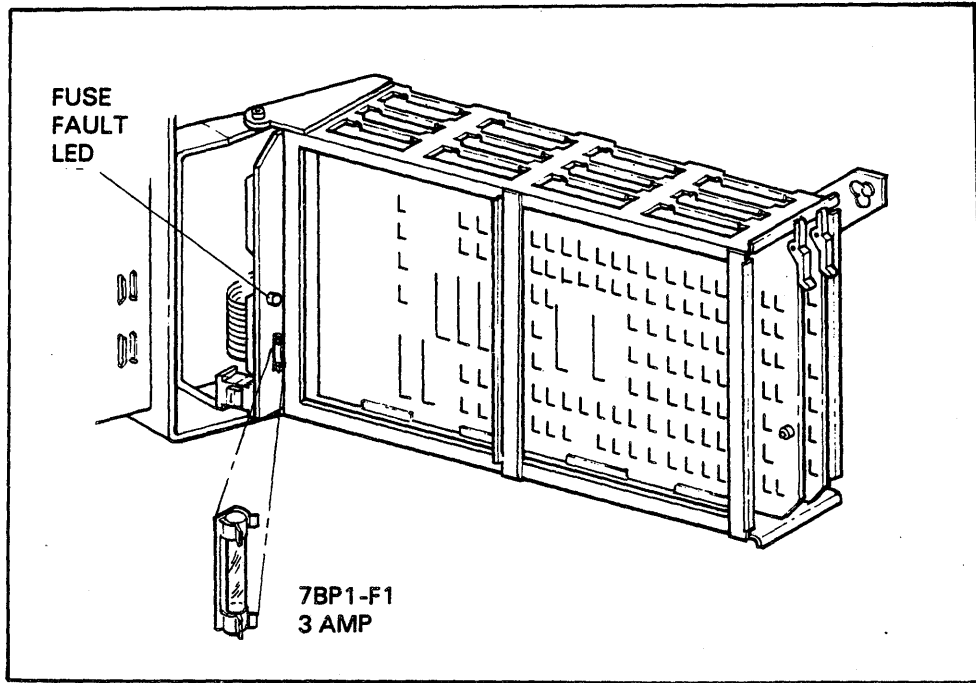


FIGURE 1-5. PAPER CLAMP FUSE

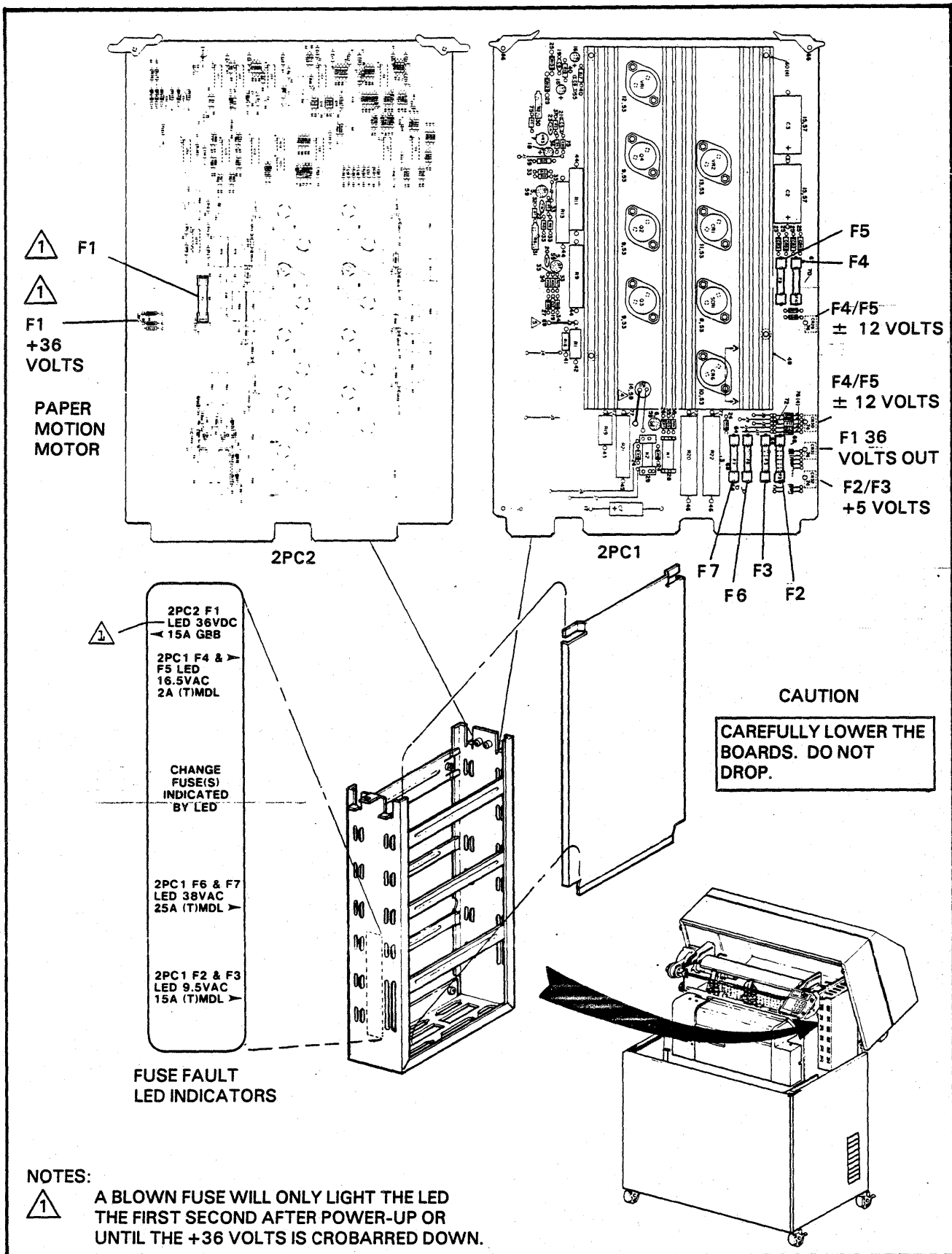


FIGURE 1-6. SIDE CARD RACK FUSES AND FUSE INDICATORS

## SUBSECTION G—CONNECTOR PIN IDENTIFICATION

This subsection presents the different types of connectors in the standard printer. The pin configuration is shown along with any pin keying or connector keying.

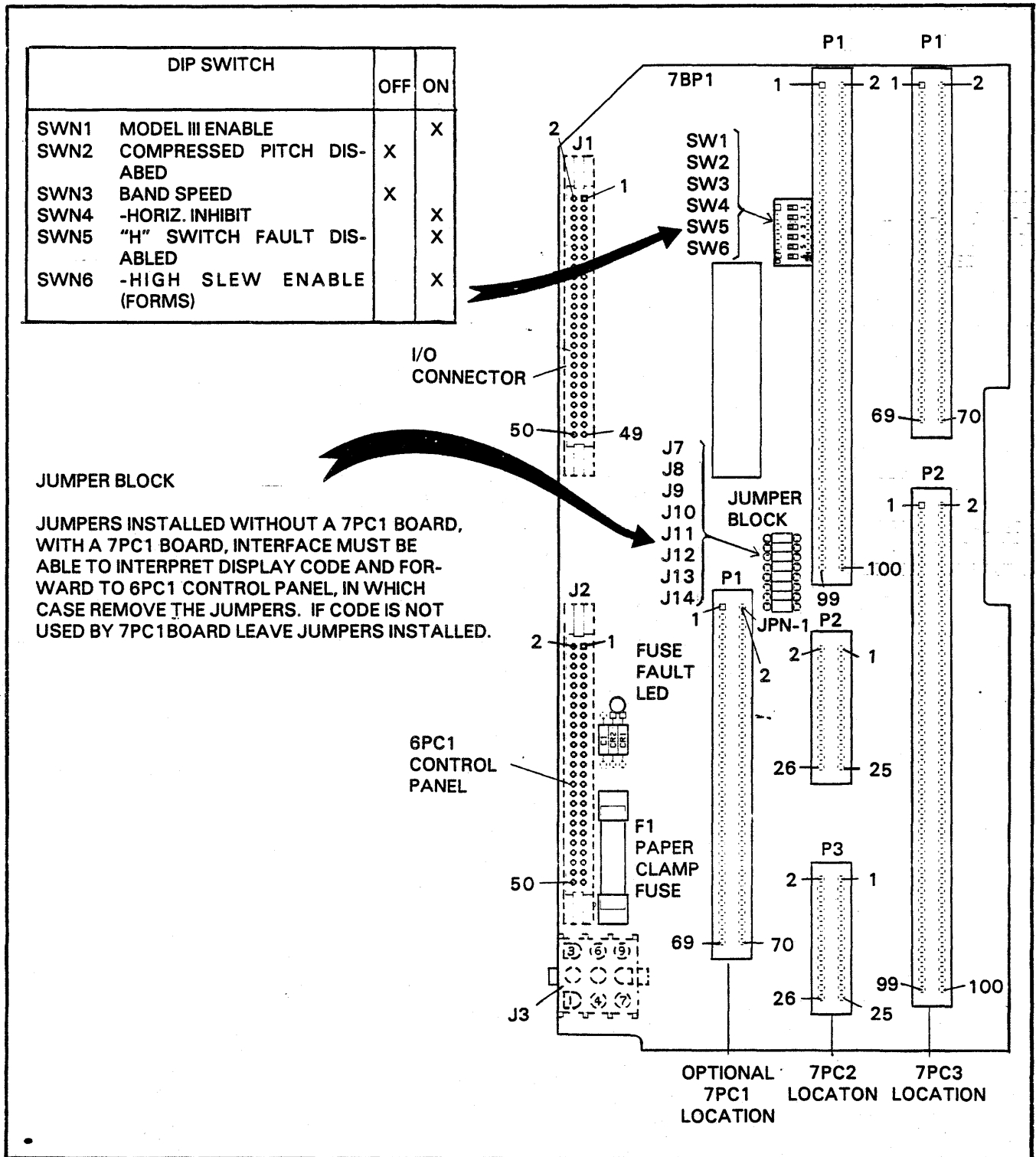


FIGURE 1-7 SWING OUT CARD RACK BACKPLANE

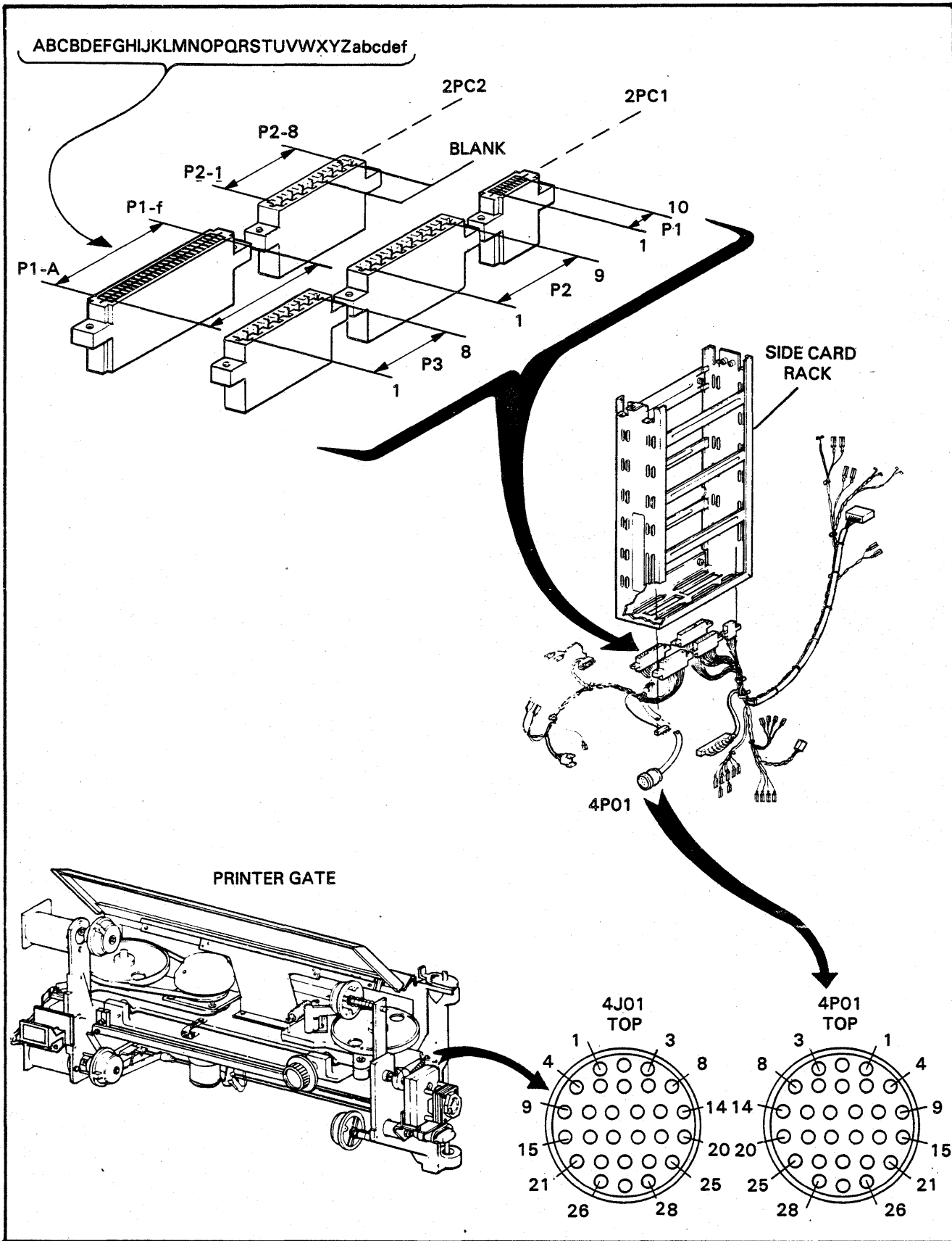


FIGURE 1-8. SIDE CARD RACK CONNECTORS

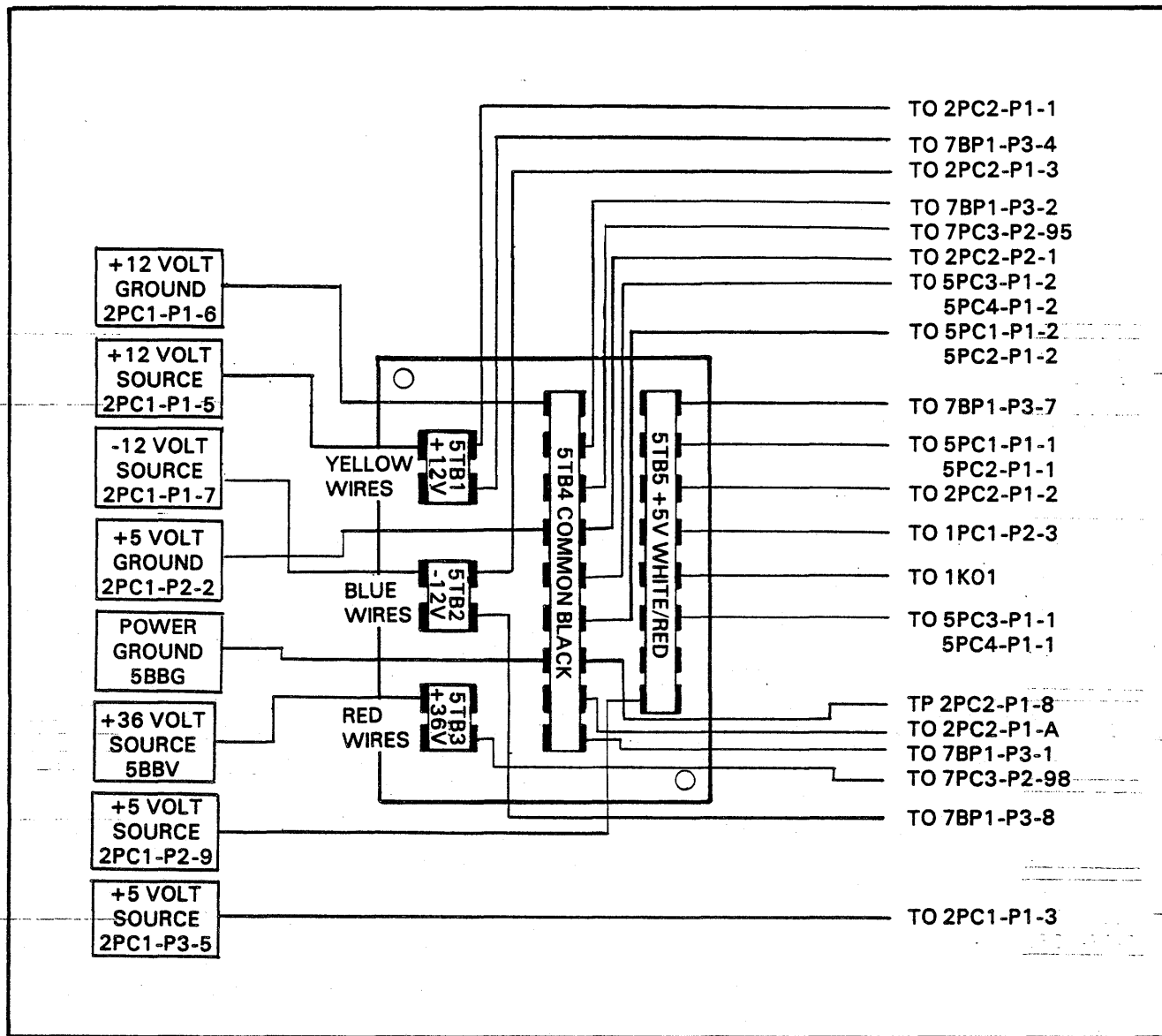


FIGURE 1-9. D.C. POWER DISTRIBUTION BOARD

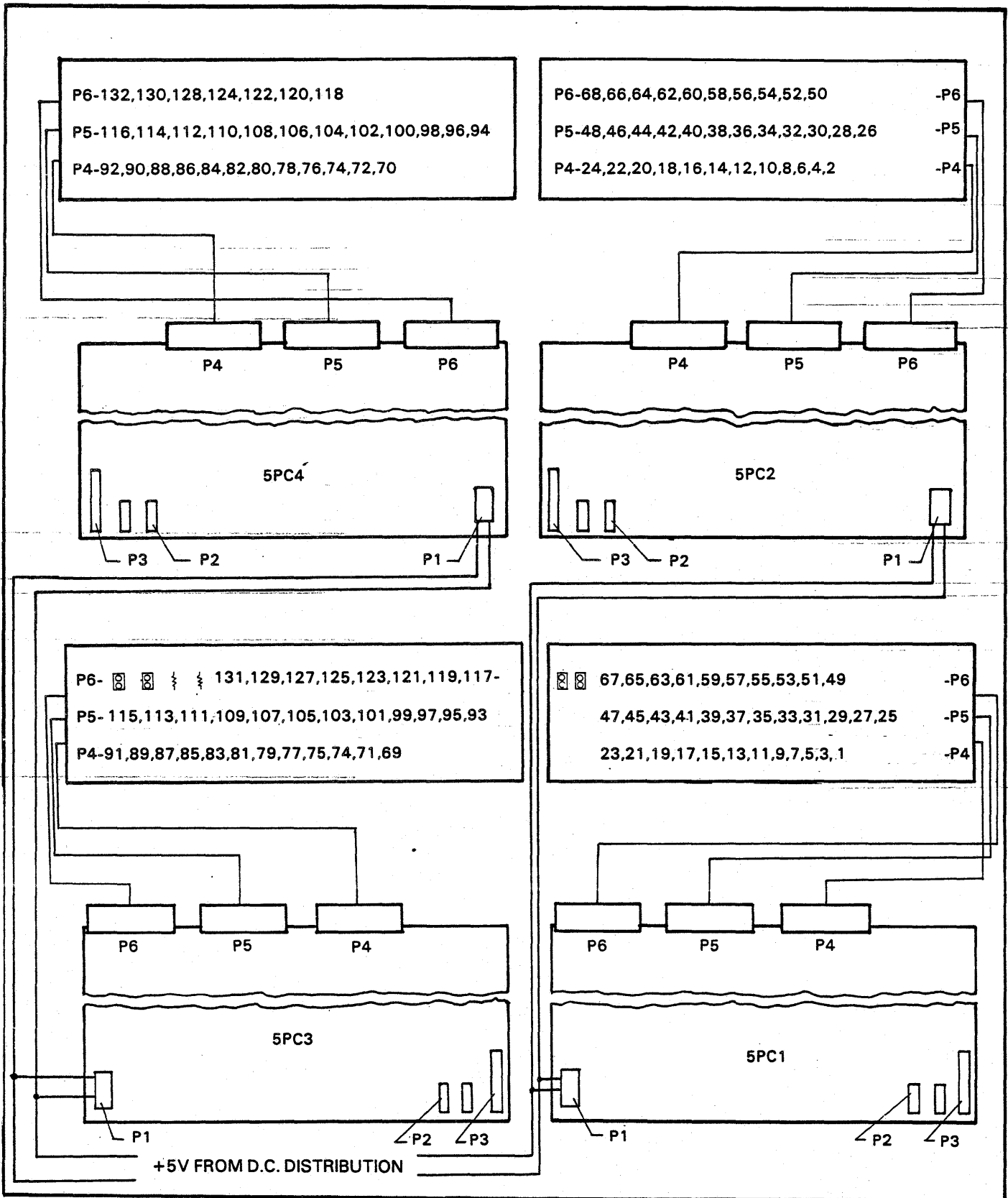


FIGURE 1-10. HAMMER DRIVER BOARD POWER DISTRIBUTION



## SUBSECTION H – AC/DC DIAGRAMS AND FLOW CHARTS

This subsection contains wiring diagrams for the printer's a.c. and d.c. wiring along with a functional drawing of the crobar circuit. The wires are color coded according to RETMA standards. Following the wiring diagrams are the flow charts for isolating a.c. and d.c. voltage problems. The flow charts take a step by step check sequence to the problem.

### FAULT ISLOATION FLOW CHARTS

Fault isolation flow charts are provided in this subsection to aid field service personnel in establishing the sequence of events required to isolate and repair the most common printer faults. These flow charts are intended to be used in conjunction with the Digital Status Display system and the A.C. and D.C. Distribution Diagrams found in this subsection.

### FLOW CHART SYMBOLS

Eight symbols are used in the flow charts which appear in this manual. These symbols are shown and are explained in the following text.

#### Normal Event Symbol

The normal event symbol is used to indicate an event which occurs at a definite time within the flow.

#### Special Event Symbol

This symbol is used to indicate that the event is of special significance to the user of the flow chart. It may indicate that the event occurs in a machine other than the one in which most of the events occur or as a result of a series of events which are charted or described elsewhere in the document. This symbol may also be used to designate an event which may happen at any time during a series of other events. Used in this manner the symbol usually indicates such unpredictable events as a parity error or an out of paper condition.

#### Check-For-Condition (Decision) Symbol

This symbol indicates a decision which occurs at a definite point in the flow and always determines the direction the flow takes subsequently.

#### Entry Symbol

The entry symbol is used at the beginning of a flow chart and at any point where information from another flow chart enters the subject flow chart.

#### Termination Symbol

The termination symbol is used at the end of a flow chart. Depending on how the sequence of operations being charted occurs, a flow chart may have one or several termination symbols.

#### Intraflow Exit and Entry Continuity Symbols

These symbols are used to show flow continuity within a particular flow chart. They may be used to represent an exit from one point of the flow and an entry into another point of the same flow or to show continuity where the flow extends for more than one page.

#### Interflow Continuity Symbol

This symbol indicates that the sequence of operations described in one flow chart leads directly to a sequence described in another flow chart. When this symbol is used a letter will appear inside of the symbol and the same letter will appear inside the entry symbol on the subsequent flow chart.

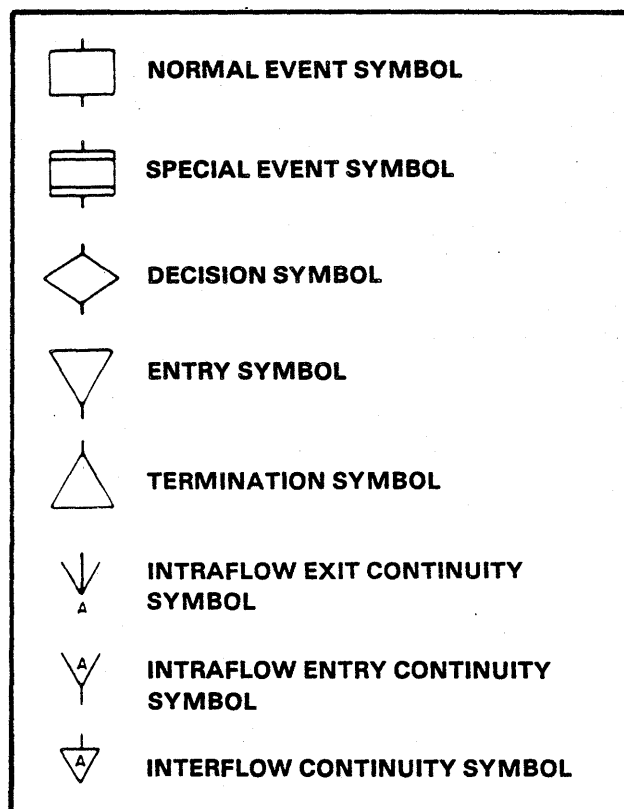


FIGURE 1-11. FLOW CHART SYMBOLS



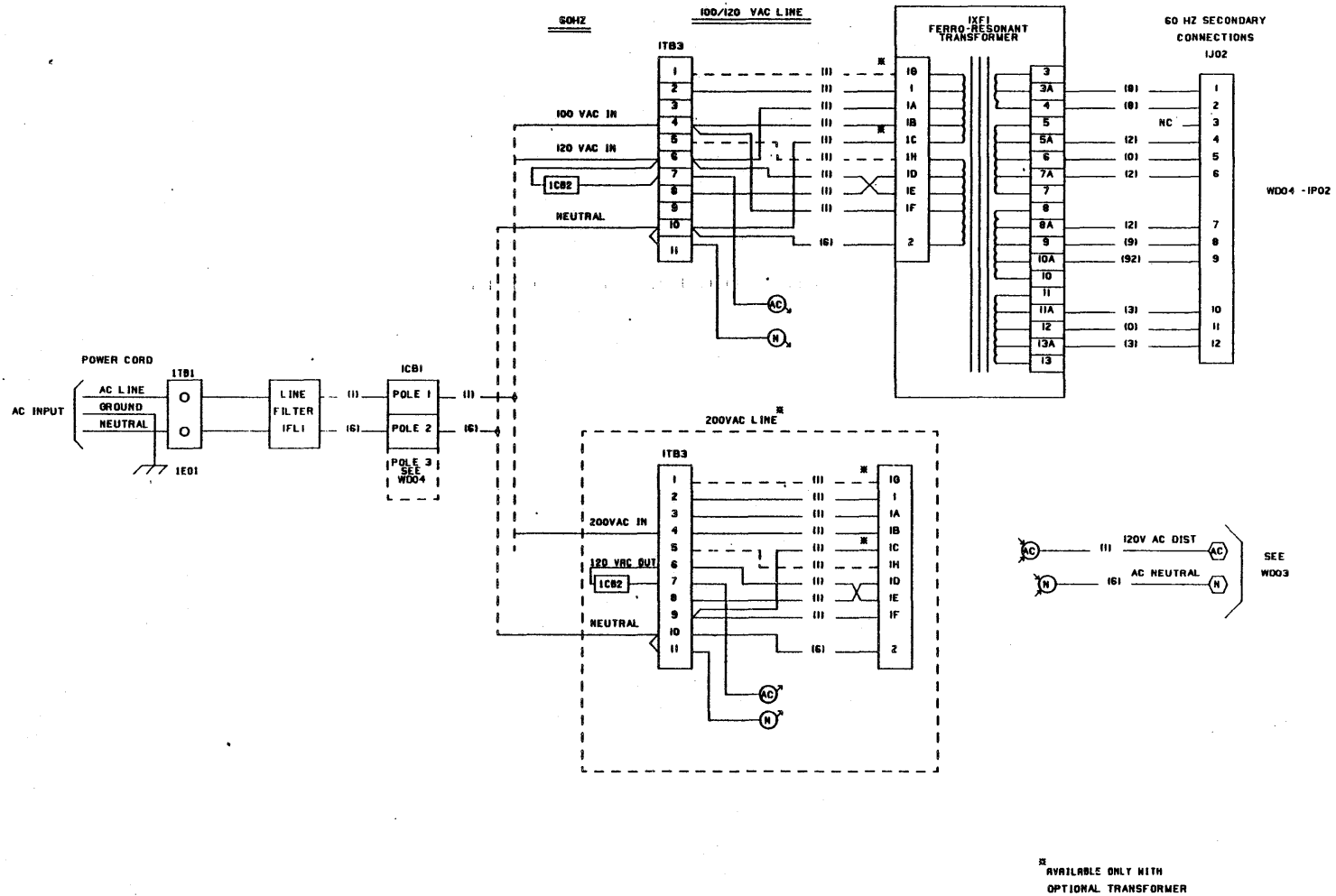
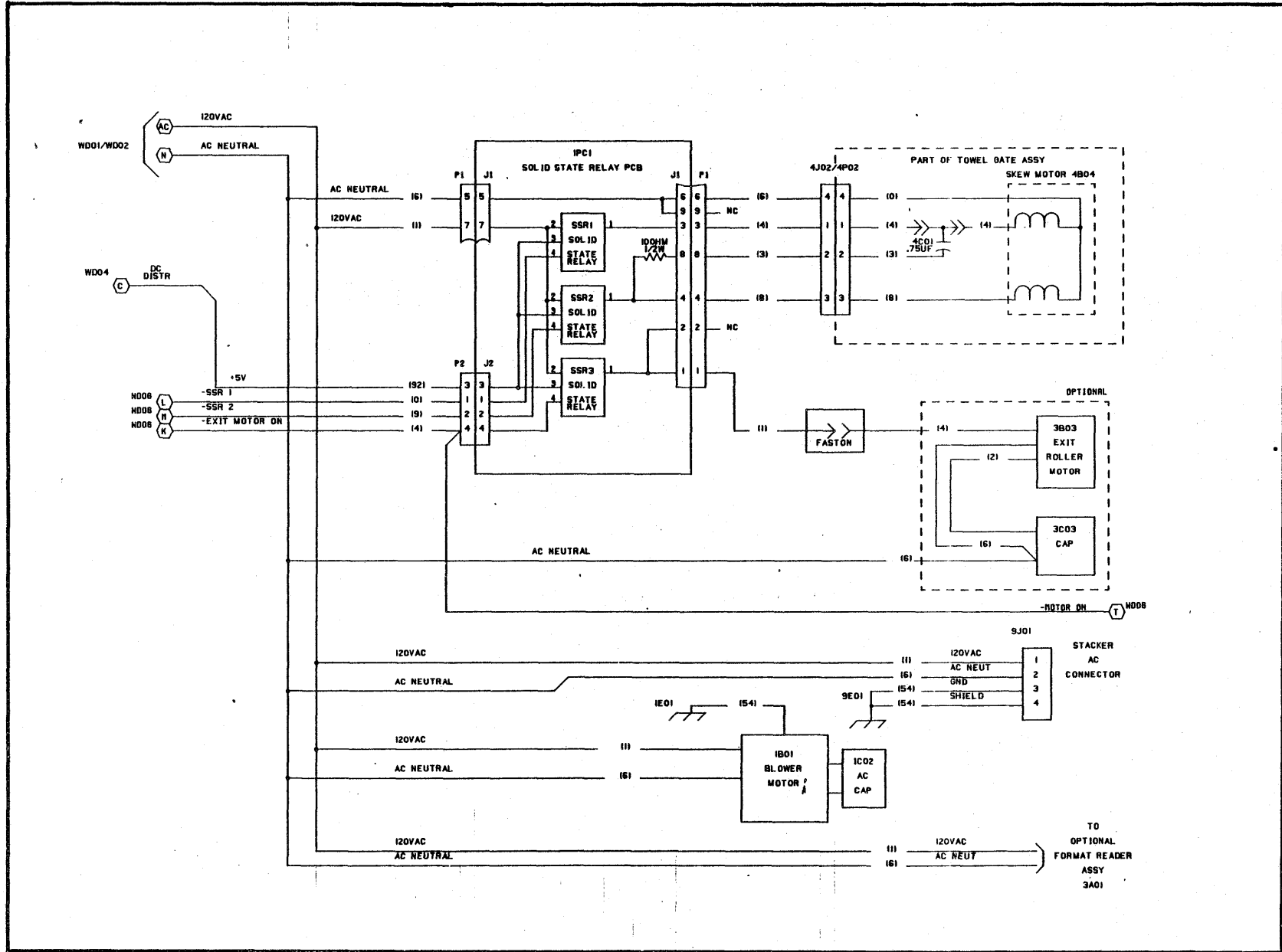


FIGURE 1-12. 60 HZ AC INPUT WIRING (2 of 3)

FIGURE I-12. AC INPUT WIRING (3 of 3)



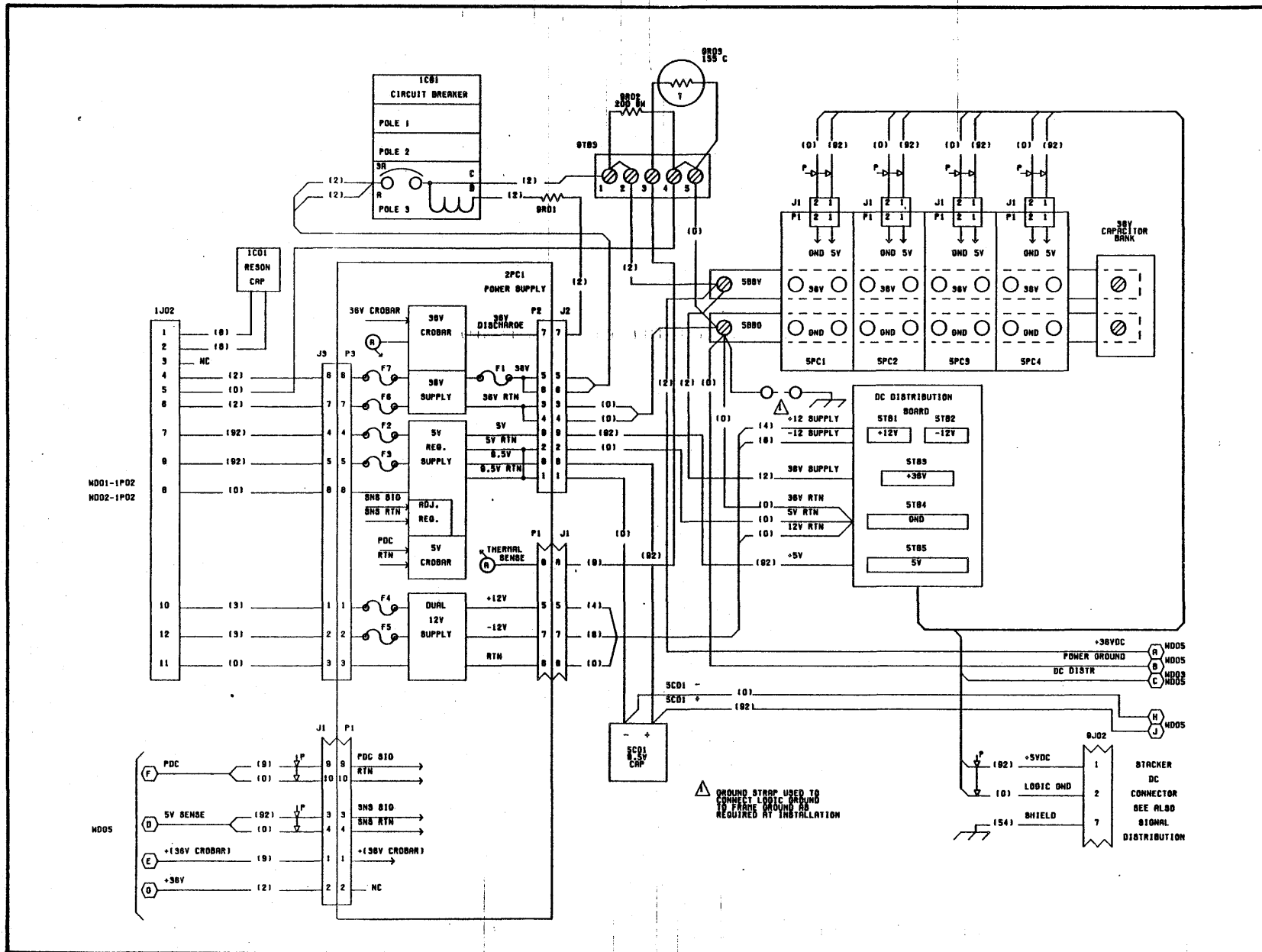
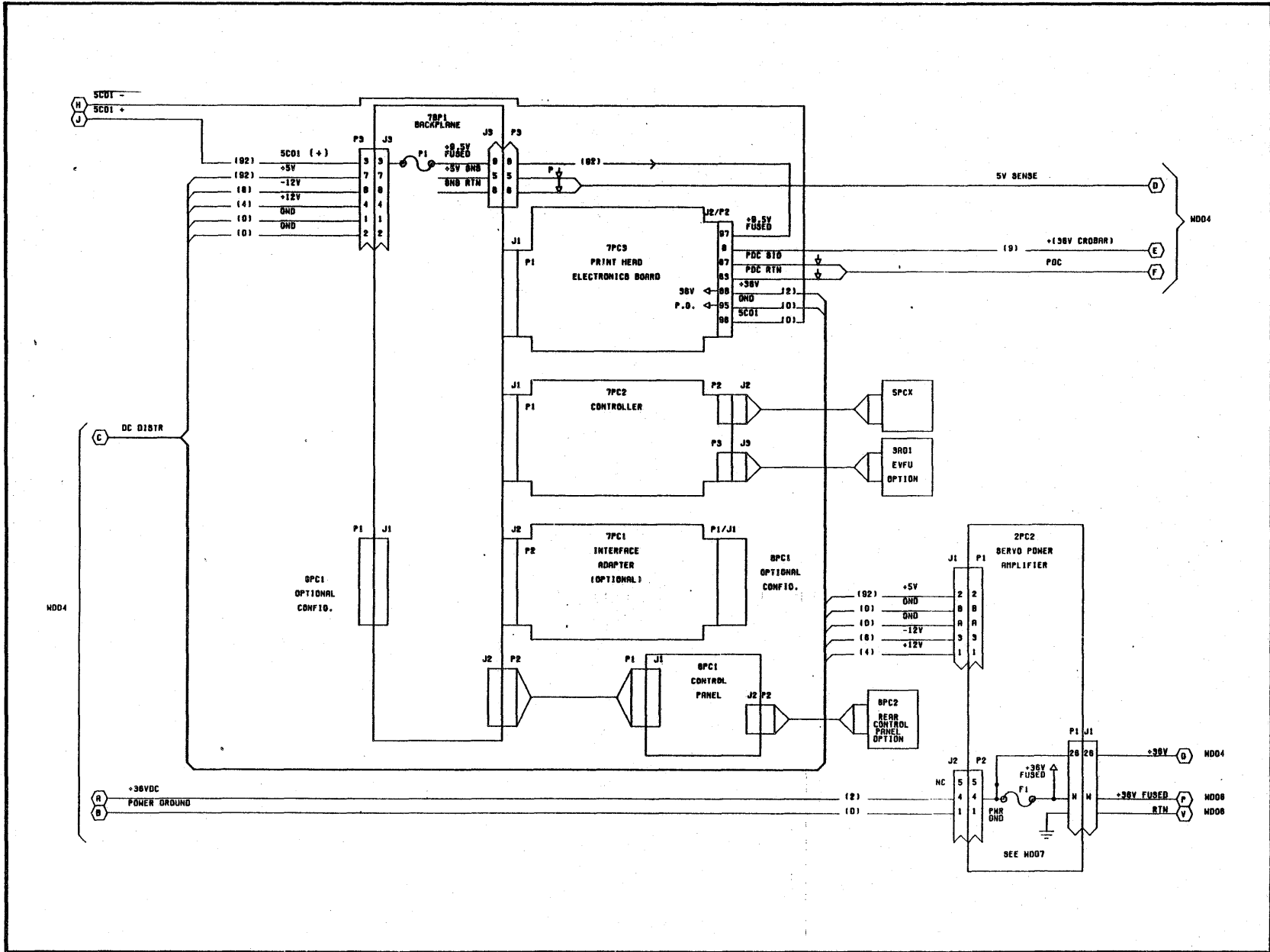
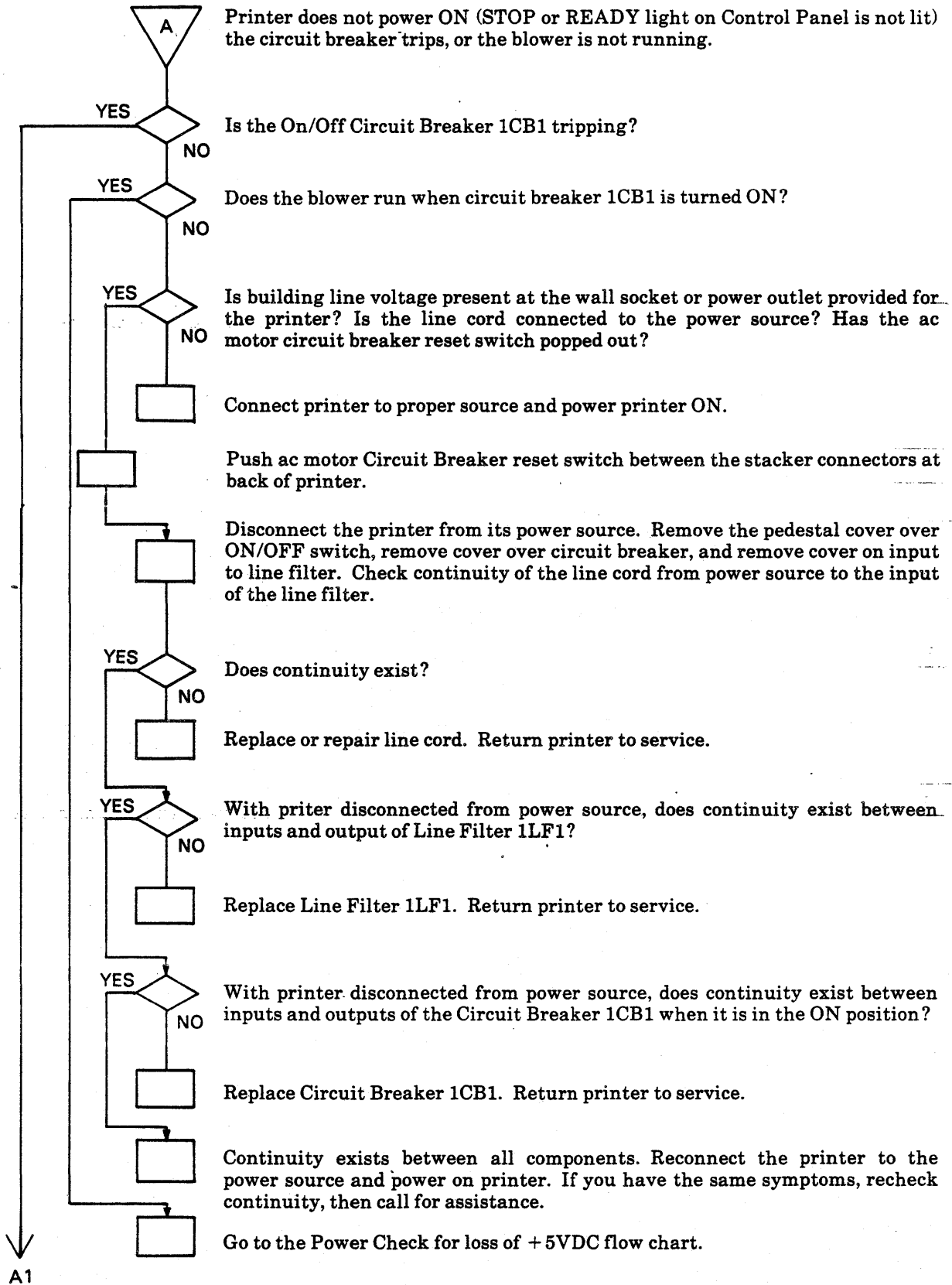


FIGURE 1-13. DC DISTRIBUTION (1 of 2)

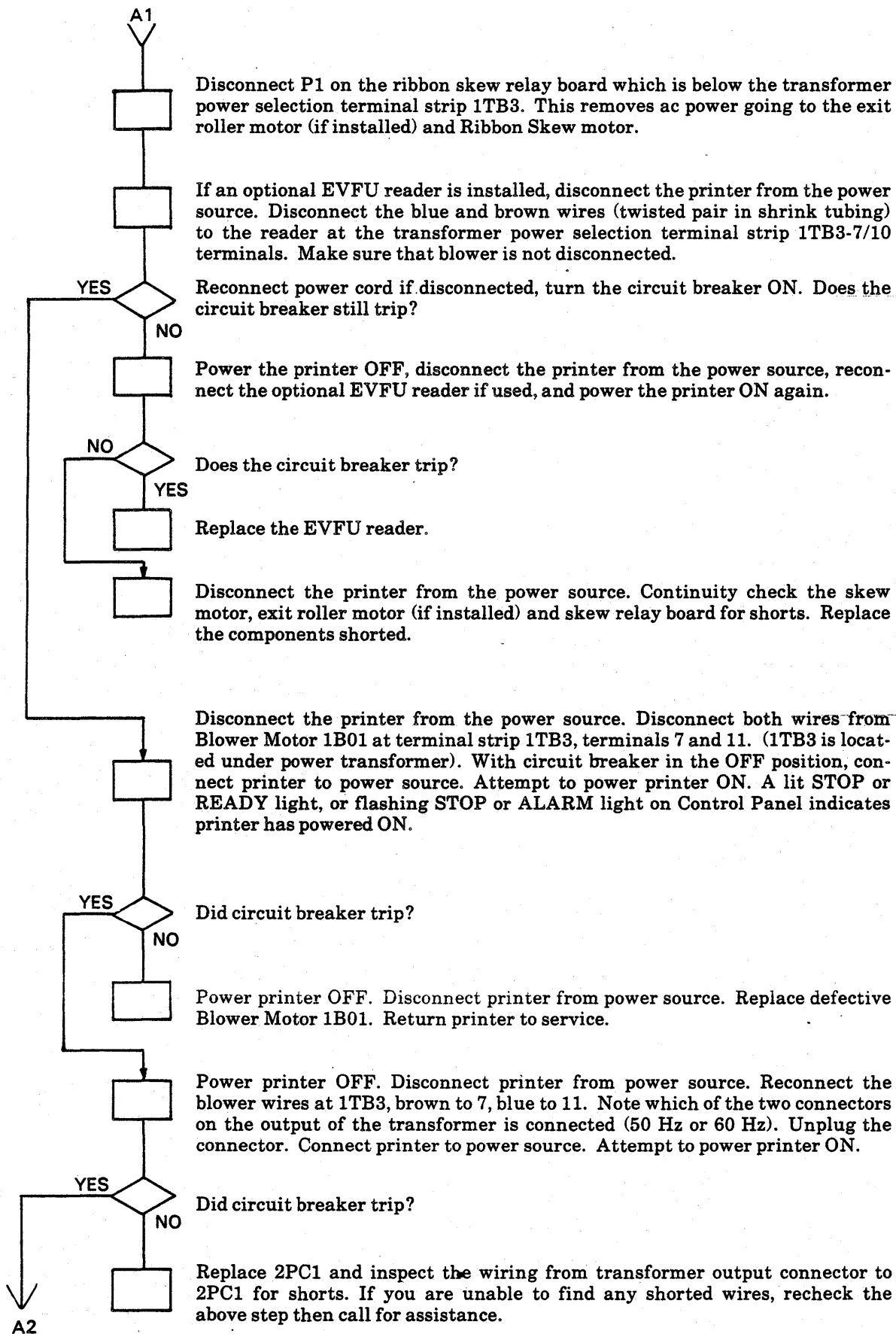
FIGURE 1-13. DC DISTRIBUTION (2 of 2)



## AC POWER CHECK

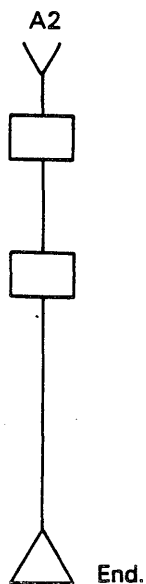


AC POWER CHECK (Continued)





AC POWER CHECK (Continued)



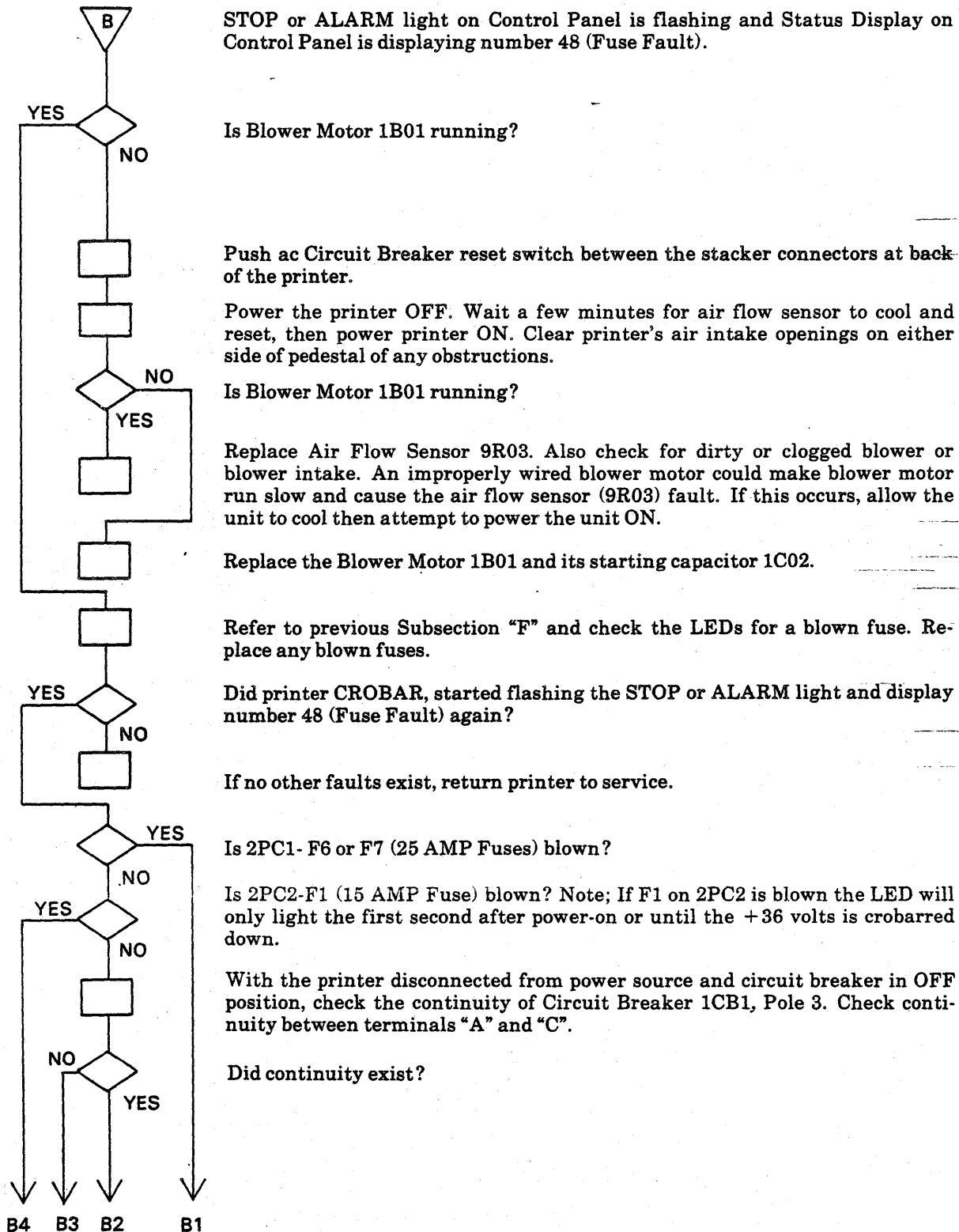
Power the printer OFF. Disconnect printer from power source. Replace defective Transformer 1XF1 and its Resonant Capacitor 1C01.

Reconnect transformer output connector to the 50 Hz or 60 Hz plug to which it was connected. Reconnect printer to power source. Power printer ON. The STOP or READY light should be lit, the STOP or ALARM light should be flashing and blower motor should be running.

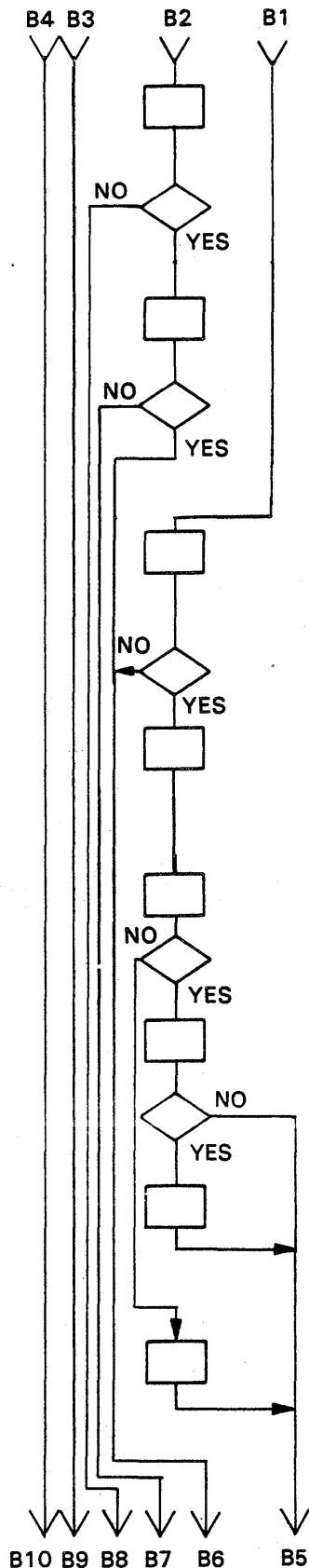
**CAUTION:** Defective Transformer could have been caused by a defective Power supply Board 2PC1. Check for defective Power Supply Board 2PC1 before returning printer to service.

## POWER CHECK FOR LOSS OF +36 VDC

**NOTE:** To assist you in following this flow chart, see A.C. and D.C. Distribution Diagrams in this subsection.



POWER CHECK FOR LOSS OF +36 VDC (Continued)



With printer disconnected from power source and Circuit Breaker 1CB1 in OFF position, check continuity of the Air Flow Sensor (9R03). Check continuity between the right circuit breaker section, terminal "C" and the +36 volt bus 5TB3.

Did continuity exist?

Power the printer OFF. Check for 36 VAC by removing fuses F6 and F7 from 2PC1. With the board (2PC1) in place, power the printer ON and check for >40 VAC at the output of the transformer.

Did > 40 VAC exist?

Power printer OFF. Replace blown fuse. Disconnect the faston wire from the right section of the circuit breaker (1CB1); the three terminal one; remove terminal "C". With printer connected to power source, power printer ON. Check for +36 VDC at terminal "C" of the right circuit breaker section.

Did +36 VDC exist?

Power printer OFF, reconnect circuit breaker lead.

Remove the fuse 2PC2-F1 and power printer ON.

Does 2PC1-F6 or F7 blow?

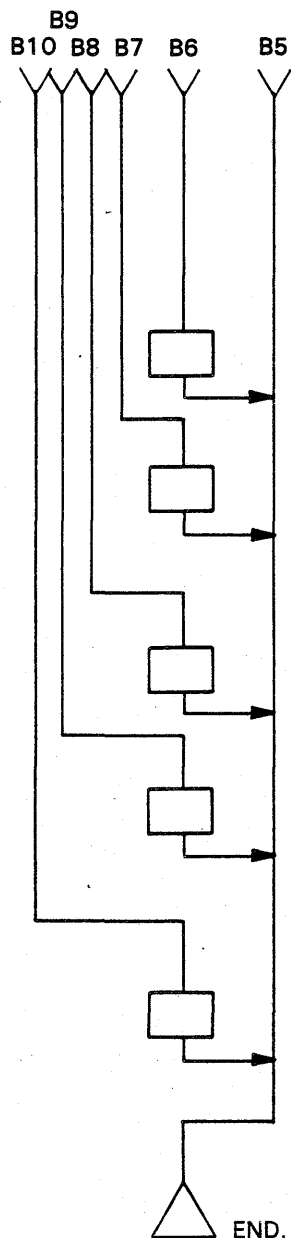
Replace the fuse 2PC2-F1 and remove the following boards, replace the boards one at a time, retesting the printer each time; 5PC1, 5PC2, 5PC3, 5PC4 and 7PC3.

Does 2PC1-F6 or F7 fuses still blow?

Disconnect the capacitor bank and check for leaky or shorted filter capacitors, also swap 2PC1 board. Test for shorts in the system. If no problem is found replace the transformer.

Power OFF, replace fuse 2PC2-F1. Disconnect the leads on the paper motion motor, and upper and lower ribbon motors and band motor. NOW: Retest the printer and reconnect one component between each test until the component blowing the fuse is found.

POWER CHECK FOR LOSS OF +36 VDC (Continued)



Disconnect printer from power source, check the fuses and then replace 2PC1 board. Monitor the printer in case something else caused the failure.

Disconnect printer from power source. Replace defective Transformer 1XF1 and its Resonant Capacitor 1C01. Replace fuses on 2PC1- F6 and F7 which were removed, then return printer to service.

Replace Air Flow Sensor (9R03) and check for defective Blower Motor 1B01. Also check for dirty or clogged blower or blower intake. An improperly wired blower motor could make blower motor run slow and overheat 9R03. The auto reset air flow sensor 9R03 should reset when cooled, but the blower may be causing a overheating problem.

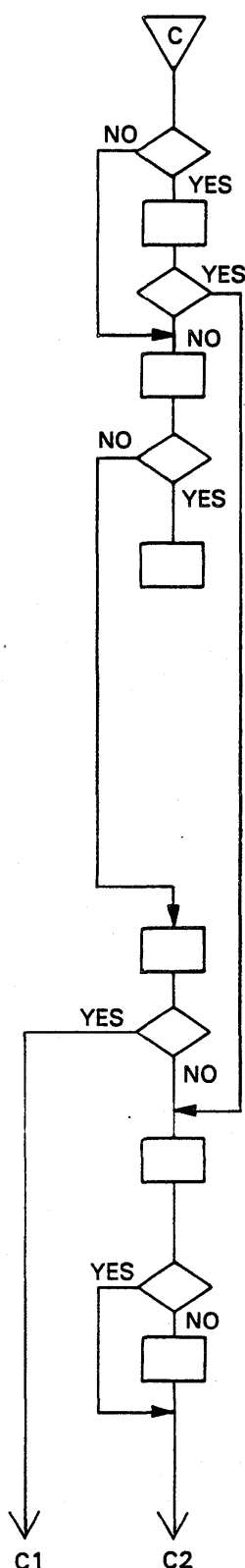
Replace Circuit Breaker 1CB1 and return printer to service.

The 2PC2-F1 (15 AMP Fuse) protects Vertical Servo Motor 3B01, Band Motor 4B03, Lower Ribbon Motor 4B02, Upper Ribbon Motor 4B01, and all the drive circuits for these components on Servo Power Amp Board 2PC2. A short or overcurrent on any of these components or in the drive circuits for these components could cause this fuse to blow. Replace Servo Power Amp Board 2PC2. If fuse still blows then isolate defective motor by disconnecting all the motors, connecting one at a time until the fuse blows again, the last motor connected is the defective component. Replace defective component and return printer to service.

NOTE: Replace any fuses remove, and connect disconnected components.

## POWER CHECK FOR LOSS OF +5 VDC

**NOTE:** To assist you in following this flow chart, see A.C. and D.C. distribution diagrams in this subsection.



Circuit Breaker 1CB1 is ON and blower motor is running. None of the Control Panel lights are lit or if they are lit, they are flashing erratically. Nothing seems to be working. If printer is functioning it is functioning erratically.

Is fuse LEDs lit for 2PC1 F2 or F3?

Replace the fuse indicated.

Does the fuse blow again?

With printer powered ON, check for +5 VDC on the distribution board at 5TB5 referenced to 5TB4 (ground).

Is +5 VDC present?

The +5 VDC has been lost (is open) someplace in the printer's +5 VDC distribution network, from 5TB5 on the Power Distribution Board to the using P.C. card or components. Check for the following:

- A. Possible loose connector or open +5 VDC wire in power distribution cable to boards 7PC2, 7PC3, 2PC2, 5PC1, 5PC2, 5PC3 and 5PC4.
- B. Possible loose connector or open +5 VDC wire in ribbon cables connecting control panel to controller board 7PC2, or to optional Interface Adapter Board 7PC1. Power OFF, remove and reinsert boards.
- C. Possible open +5 VDC conductor on one of the using P.C. boards. Power OFF and swap board with a spare.

Isolate problem, replace defective P.C. board or cable and return printer to service.

Check for 9.5 VDC at the paper clamp fuse (7BP1-F1) on the swing out logic gate, backplane board.

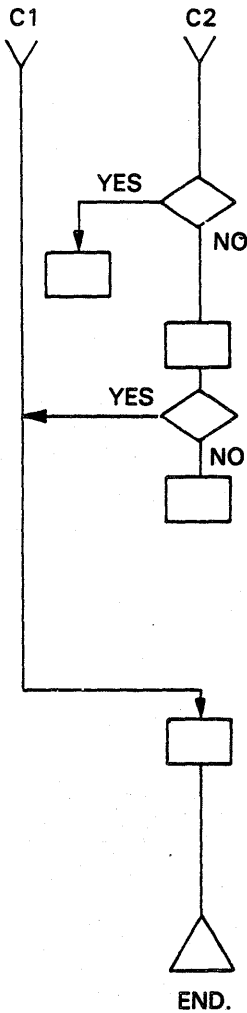
Is 9.5 VDC present?

With printer disconnected from power source, disconnect wire to the 5 volt Filter Capacitor 5C01. Be sure there is no voltage on the capacitor. Check the continuity of the capacitor looking for leakage or a short. Note: You are checking a 73,000 uf capacitor.

Does charging continuity exist through Capacitor 5C01?

Replace 5volt Filter Capacitor 5C01.

POWER CHECK FOR LOSS OF +5 VDC (Continued)



Is 5 volts present at 5TB5?

Return printer to service.

Replace 2PC2 board.

Is 9.5 VDC present at fuse 7BP1-F1?

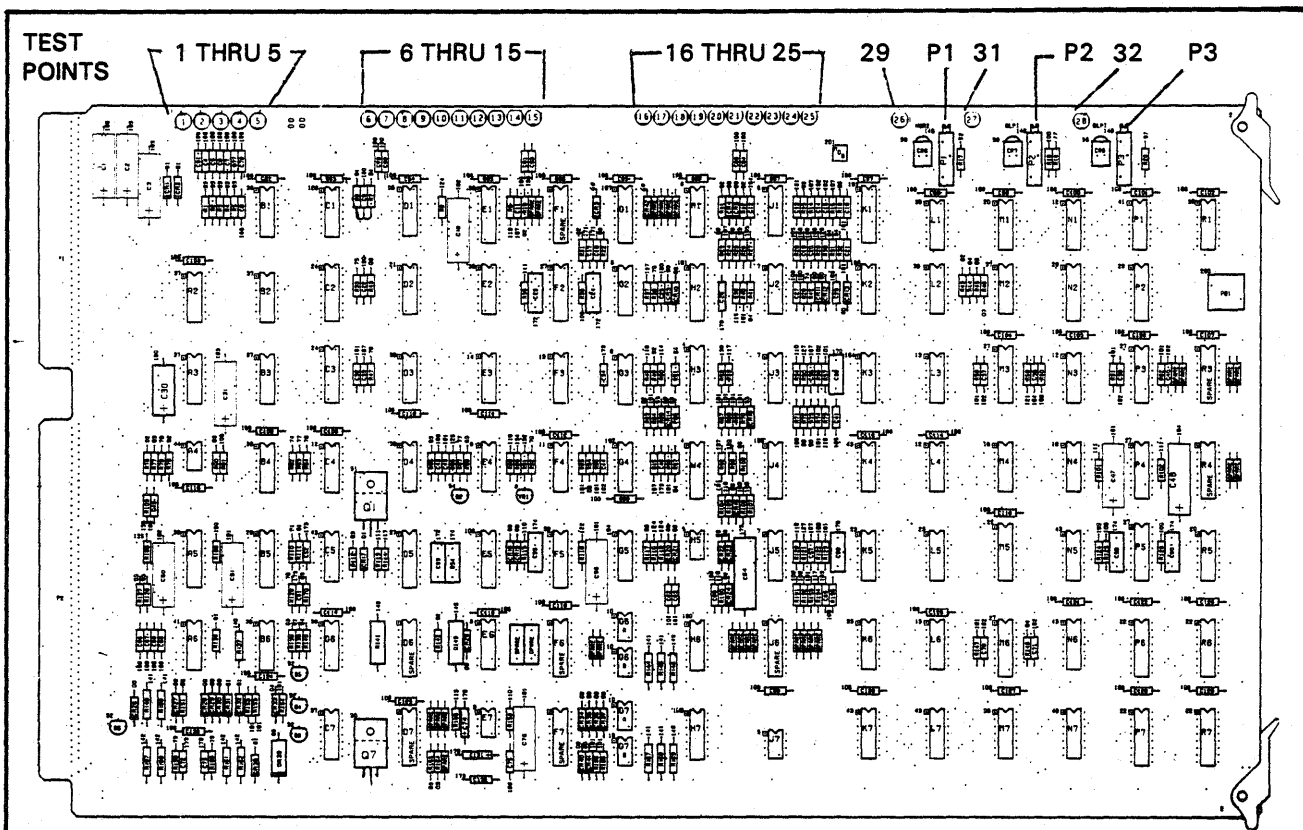
Check the fuses F2 and F3 on 2PC1 and if good replace power transformer 1XF1.

Your problem is overcurrent fold back in the 2PC1 boards current fold back circuit. This is caused by a short or overcurrent someplace in the printers' +5VDC distribution network (from the output of 2PC1 to the using P.C. boards and components). Disconnect the P1 connector on the hammer driver board 5PC1 at 5TB5. If +5 VDC returns, replace the P.C. card you disconnected. If +5 VDC is still not present, reconnect that card and repeat check on the other three hammer driver boards. If the +5 volts is still not present, power the printer OFF, install a spare board for only one of the following boards at a time; 2PC1, 7PC3, 7PC2 and optional 7PC1 if used. Repeat this until all cards have been checked or until a defective card has been found. Also, check for shorts in +5 VDC distribution cables to each of the P.C. cards. Replace the defective P.C. card or cable and return printer to service.

END.

## **SUBSECTION I – TEST POINTS AND WAVEFORMS**

This subsection shows the boards with test points, listing the test points. Following the test points are the waveforms present at those test points. Any adjustments or checks are also shown in relation to the test points.



**TEST POINT**

**DESCRIPTIONS**

- 1 GROUND (LOGIC)
- 2 BAND CHARACTER PULSE (BCP)
- 3 HORIZONTAL ADVANCE (NOT APPLICABLE)
- 4 VERTICAL ADVANCE
- 5 GATE SWITCH
- 6 HORIZONTAL CURRENT SENSE (NOT APPLICABLE)
- 7 MOTOR ON
- 8 10 KHZ OSCILLATOR
- 9 HORIZONTAL VELOCITY FEEDBACK (NOT APPLICABLE)
- 10 HORIZONTAL TACH SIGNAL (NOT APPLICABLE)
- 11 BAND MOTOR CONTROL FEEDBACK (BMC FDBK)
- 12 VERTICAL CHECK STROBE
- 13 VERTICAL MOTION READER
- 14 HORIZONTAL POSITION READER (NOT APPLICABLE)
- 15 HORIZONTAL HOME READER (NOT APPLICABLE)
- 16 VERTICAL CURRENT SENSE
- 17 HORIZONTAL ERROR (NOT APPLICABLE)
- 18 VERTICAL TACH.
- 19 PAPER MOTION VERIFICATION READER
- 20 VERTICAL TACH. OUTPUT
- 21 VERTICAL RAMP GENERATOR
- 22
- 23
- 24 VERTICAL STROBE
- 25 BAND HOME PULSE (BMP)
- 29 SUBSCAN PULSE (SSP)
- 31 HORIZONTAL VELOCITY CONTROL ADJ. (NOT APPLICABLE)
- 32 VERTICAL VELOCITY COMMAND

- P1 HORIZONTAL VELOCITY CONTROL } NOT USED
- P2 VERTICAL VELOCITY CONTROL (6 LPI)
- P3 VERTICAL VELOCITY CONTROL (8 LPI)

FIGURE 1-14. PRINT HEAD ELECTRONICS (7PC3) TEST POINTS AND POTS



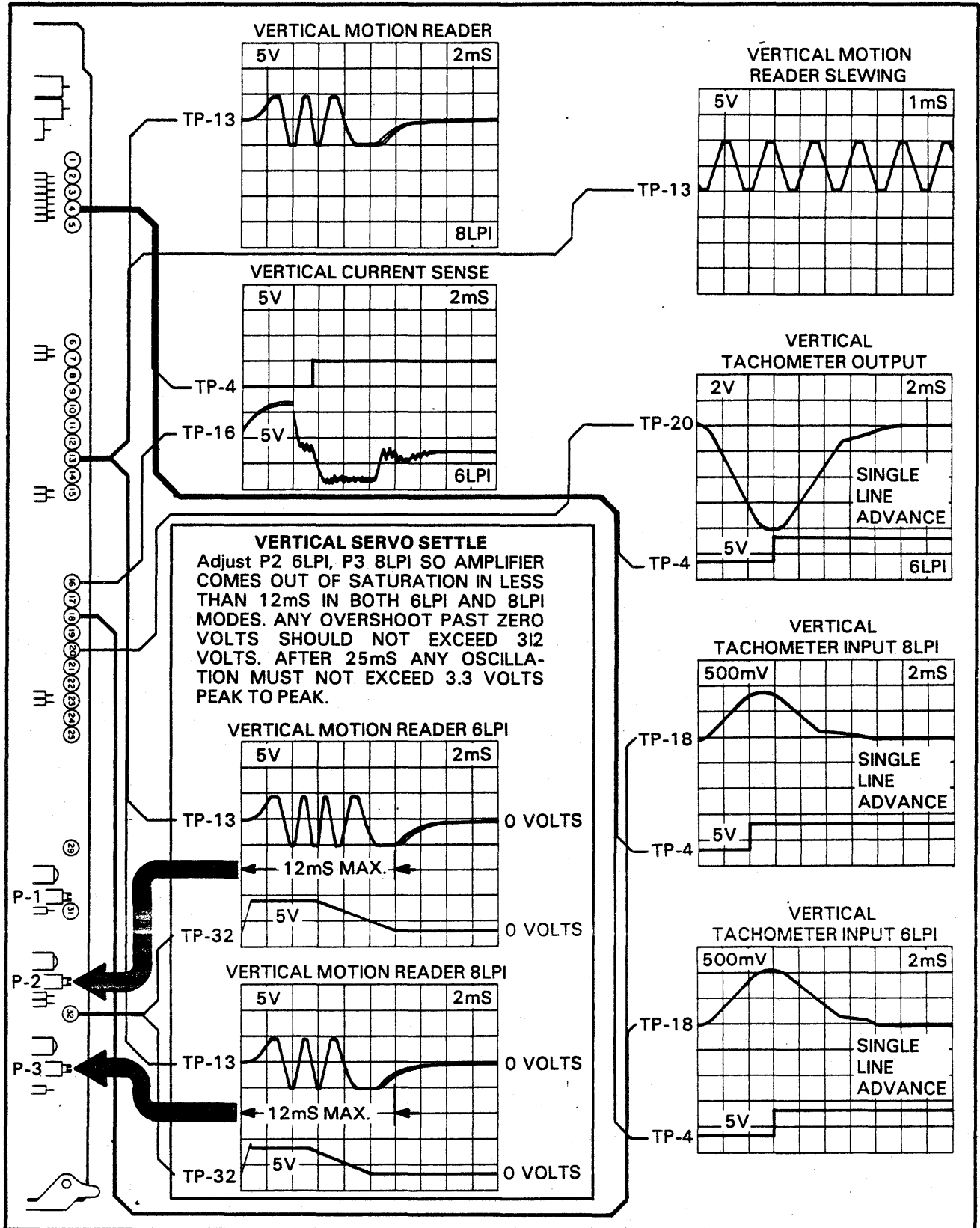


FIGURE 1-15. VERTICAL SET - UP AND TEST POINT WAVEFORMS

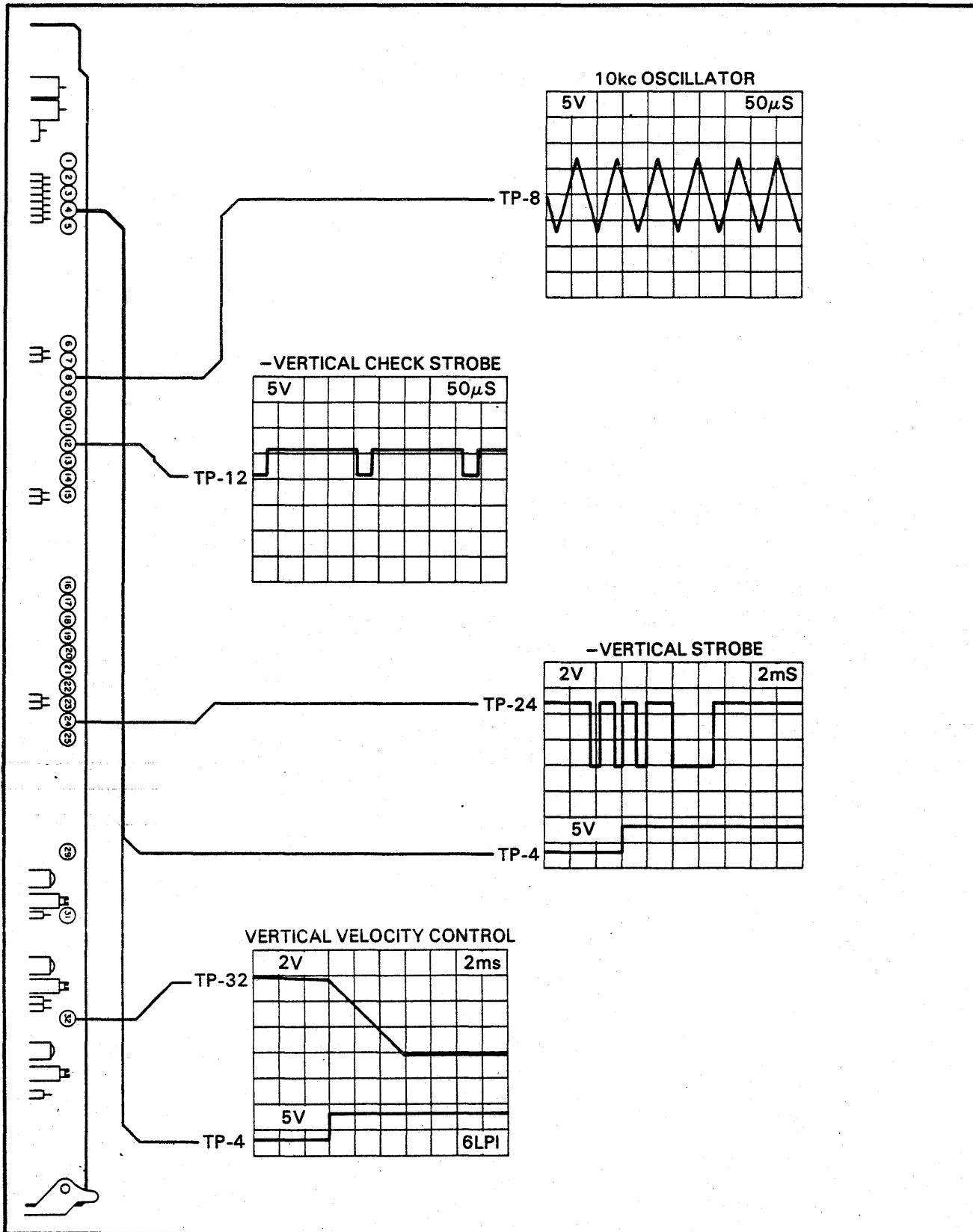


FIGURE 1-16. VERTICAL TEST POINTS

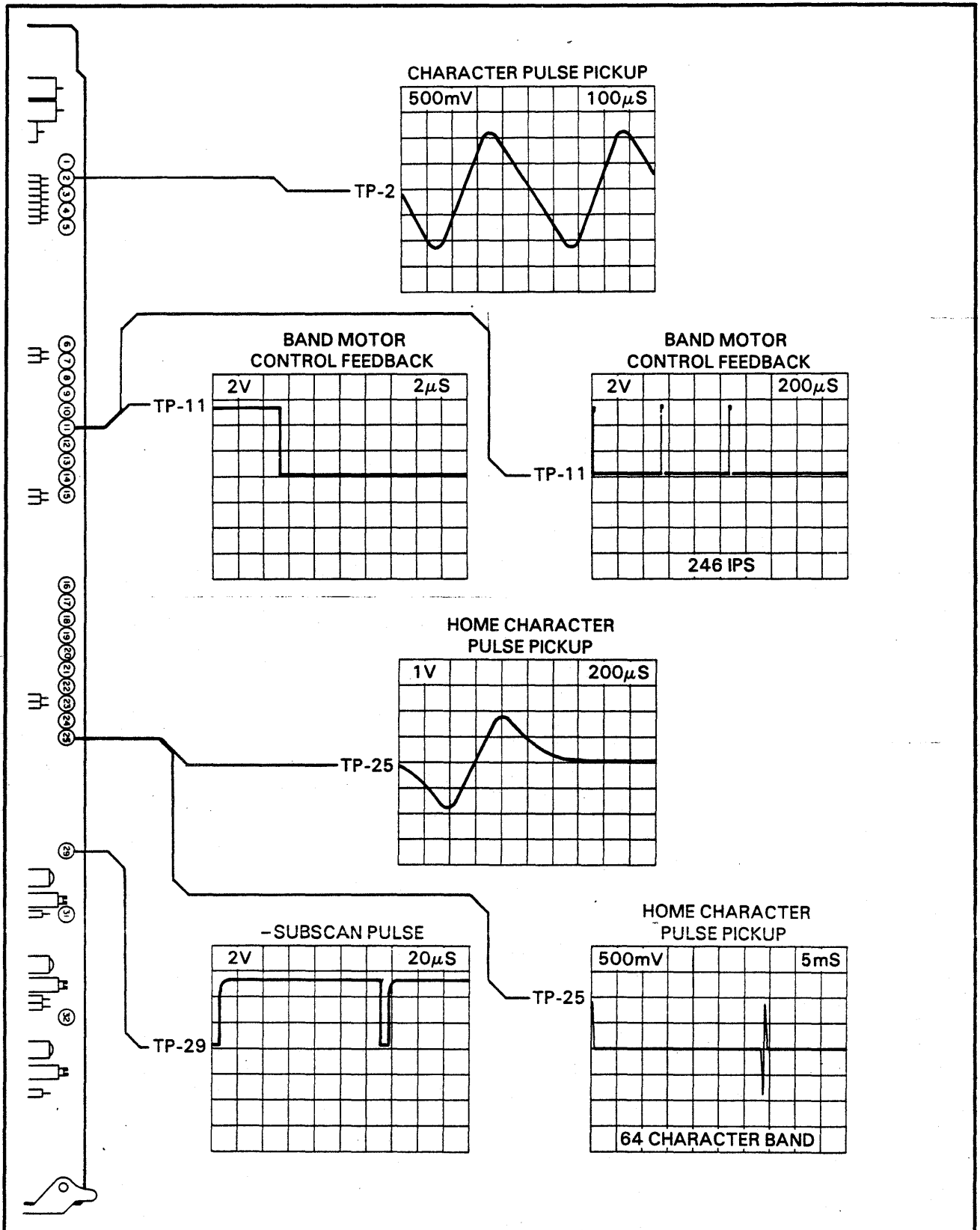


FIGURE 1-17. BAND CHARACTER TEST POINTS



## SUBSECTION J – ISOLATING A CROBARRED PRINTER DO NOT POWER THE PRINTER OFF

This subsection assumes the printer is crobarred. Static discharges can cause the printer to crobar in which case the Control Panel Display will not show a display. In most cases the status code on the Control Panel will give a clue to the cause of the fault. The following list of display codes result when a printer crobars.

Display Code	Fault Description	Procedure
40	Band Motor Overcurrent	C
41	Ribbon Drive Motors, Overcurrent	D
42	12 Volt Fault	E
43	Hammer Fault	B
44	N/A	F
45	N/A	G
46	N/A	H
47	H-Switch Fault	I
48	Fuse Fault (+ 36 volt sense)	J
49	Paper Runaway Fault (Controller)	K
50	Paper Runaway Fault (Printer)	L
51	Unidentified C.E. Fault	M

### INITIAL SYMPTOMS

Go through the following checks to isolate the printer subsystem which crobarred the printer's +36 volts. These faults are printer malfunctions which may cause damage to the mechanism or loss of data and are called C.E. faults. A C.E. Fault will generate a crobar signal which turns on an SCR on the Power Supply Board (2PC1); a fault signal is also sent to the Controller (7PC2) which samples the status register on the Print Head Electronics Board (7PC3). The status register determines the display code sent to the Control Panel. The crobar circuit is used to bleed the 36 volts on the capacitor bank and in doing so it trips the 36 volt d.c. section of the power ON circuit breaker. Once a crobar takes place, the power ON circuit breaker must be turned OFF for 15 seconds (cooling) and then back ON; this action resets the d.c. section of the circuit breaker, and the SCR device. Refer to Figure 1-19 for illustration of Crobar circuit. See the Technical Manual for more information.

Go through the alphabetical items following to find the observed symptoms. Then go through the checks until the fault is identified.

### NOTE

**DO NOT POWER THE PRINTER OFF WHEN CROBARRED**

#### A. Observe no lights on Control Panel (Cooling Blower Not Running.)

1st Check; Loss of source a.c. power.

2nd Check; Power-On circuit breaker malfunction.

#### B. Observe Display Code 43: (Do Not Power the Printer Off.)

1st Check; Is a hammer fault LED lit on the hammer driver board (s)? If so, replace the board. If the printer has been powered-off the fault may not occur again for sometime.

2nd Check; Is the 5 volt connector (P1) connected on the hammer driver board (s)? Look for loss of 5 volts, refer to Figure 1-18. Loss of 5 volts will not light the hammer driver LED's.

3rd Check; Are any armature striker assemblies damaged? After replacing a hammer driver board always observe the printer's operation. If another hammer fault occurs lighting the same hammer driver board LED, or if one hammers printed columns have density variations, then check that half of the boards strikers. Refer to Figure 1-18 and identify the hammer drive connector with the column in question (P4, P5 or P6). Check for shorts to ground, open coils, or shorted coils. Approximate coil resistance is 6 Ohms.

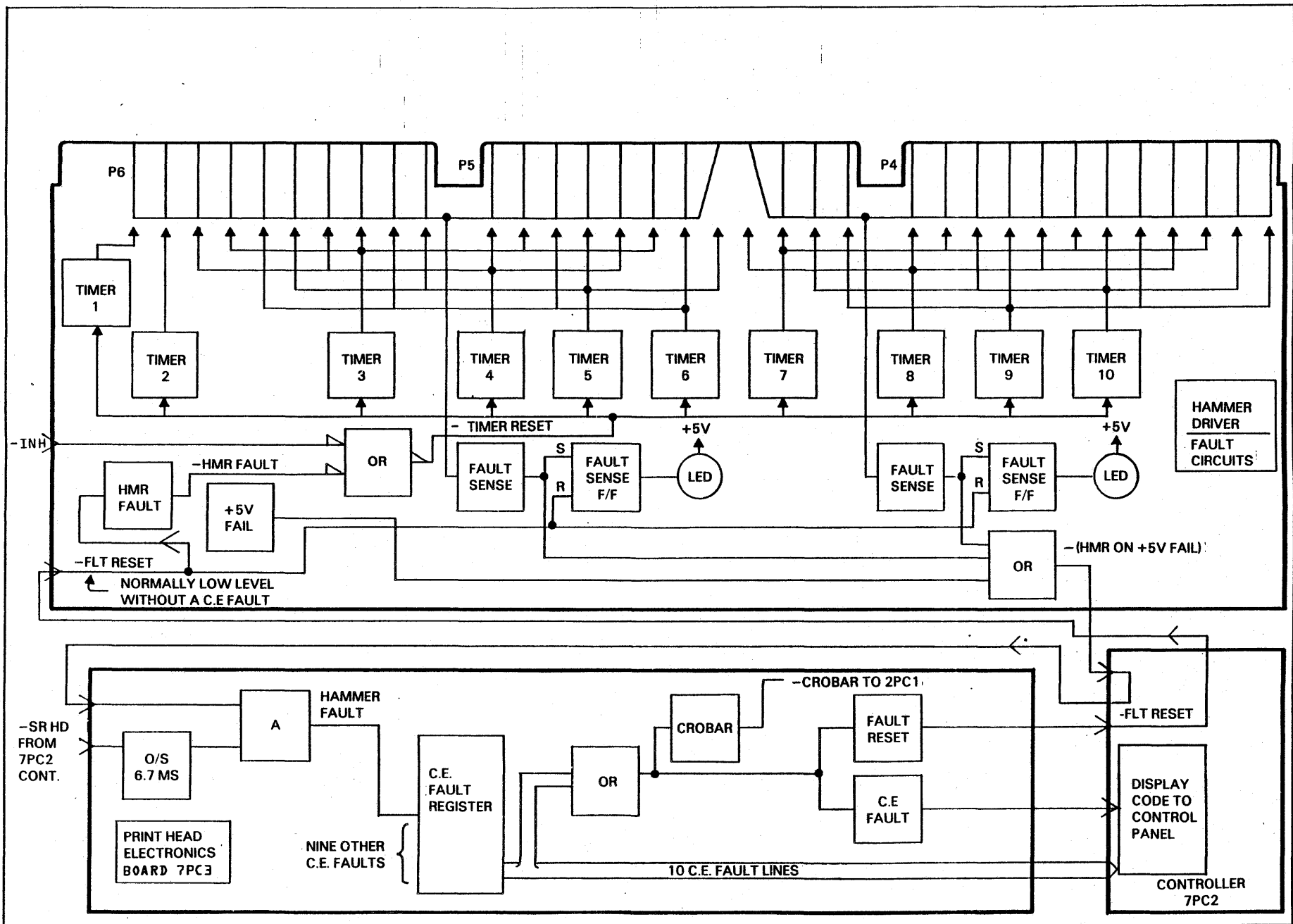


FIGURE 1-18. HAMMER DRIVER FAULT CIRCUITS

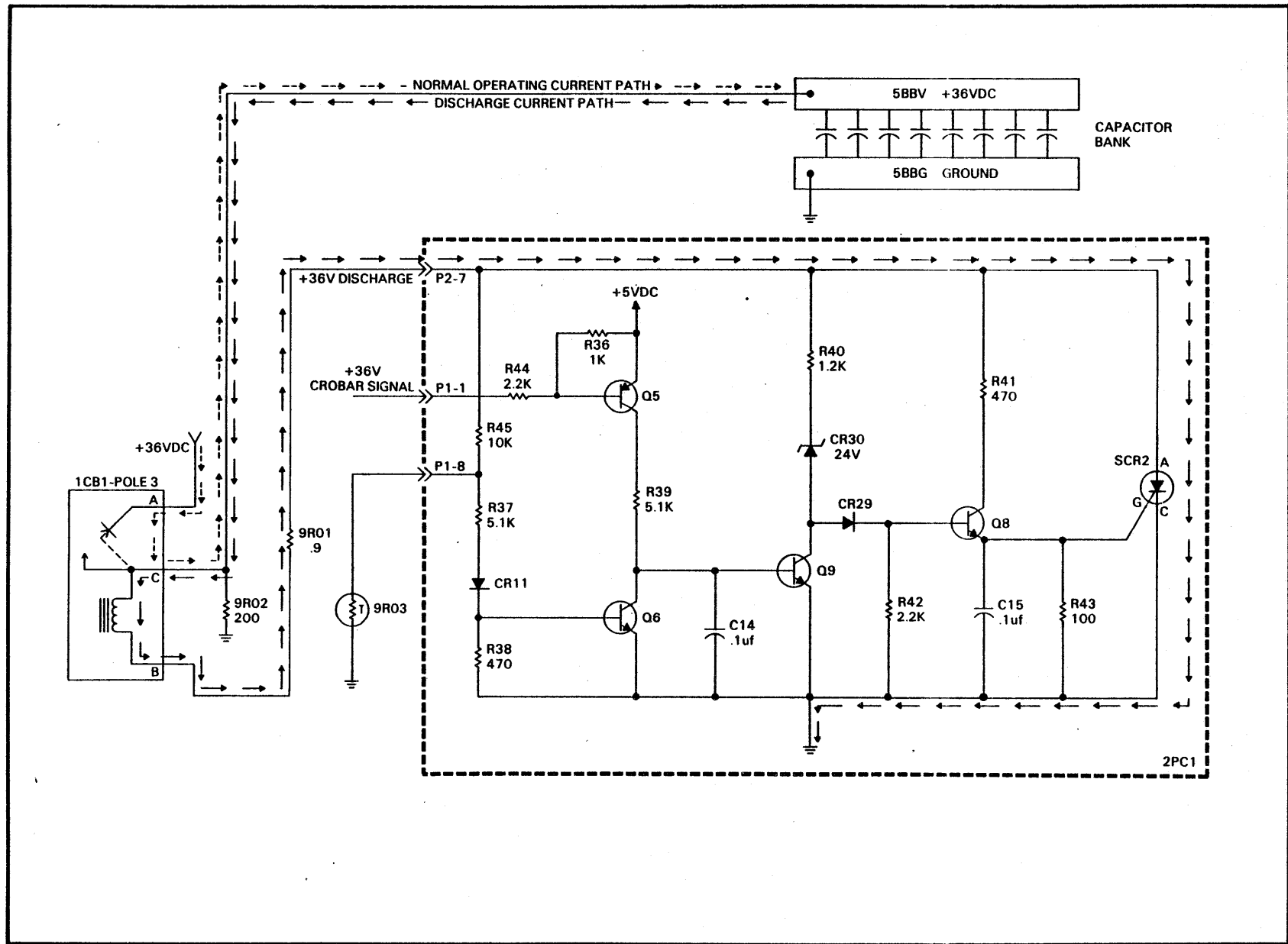


FIGURE 1-19. +36VDC CROBAR CIRCUIT

**C. Observe Display Code 40:**

- 1st Check; Is the band tracking correctly around the pulleys and against the top edge guide at the platen? If tracking is in question, perform the following procedures in Section 5: 5AO, 5AP, 5AQ and 5AS.
- 2nd Check; Is the band up side down? Install correctly.
- 3rd Check; Does the band system rotate smoothly without binding? If binding is encountered, remove the band to identify if it is the pulleys or the motor. Refer to the following procedures for repair; 6AR or 6AU.
- 4th Check; Replace the following boards one at a time and test the printer between each replacement; 2PC2, 7PC3.
- 5th Check; Replace the band motor (4B03) and refer to the Parts Replacement procedure 6AR.

**D. Observe Display Code 41:**

- 1st Check; Is the ribbon jammed, installed over the outer throat plate, or did it just fail to reverse? Correctly install a new ribbon with the outer throat plate open, and check for reversing foil by running and correctly reversing at both ends.
- 2nd Check; Is the ribbon failing to reverse in one or both directions? Short the switching bars with a jumper to eliminate the ribbon's foil being at fault. Are the wires to the bars loose? Replace the 2PC2 board.
- 3rd Check; Does the fault always occur in the same direction of ribbon motion? Replace the 2PC2 board. If the fault still occurs replace the other motor for the spool to which the ribbon is going (winding onto). Refer to procedure 6AS. If the fault still occurs replace the other motor.

- 4th Check; Is the ribbon jamming because the skew system is not operating? Make sure the skew system will operate by manually turning the ribbon sense pawl weight 90 degrees with the ribbon system operating. If the system will skew one way holding the pawl 90 degrees and back when released, then perform procedure 5AV. If the system fails to skew, first replace the 7PC3 board, then replace the skew relay board in the front of the cabinet by the power transformer, located on the a.c. selection plate. Replace the skew motor if voltage is getting to its plug. Refer to procedure 6AT.

**E. Observe Display Code 42:**

- 1st Check; Is the 12 volt fuse fault LED (F4/F5) lit on the side card rack (double check the fuses on the board)? Replace any bad fuses and test run the printer.
- 2nd Check; If a fuse still blows disconnect the vertical reader at the back upper corner of the chassis. Replace the fuse again, if it still blows replace board 2PC2. Replace the fuse if it still blows replace board 2PC1, followed by board 7PC3. Replace the Vertical Reader and refer to procedure 6AD (Vert. Pos, and Vert. Ck. Strobe).

**I. Observe Display Code 47:**

- 1st Check; Excessive current is indicated by the vertical drive electronic circuits. Power the printer OFF and back ON to reset the crobar circuit. If the printer crobars before the following vertical test can be run, go to the next check. Stop the printer and select the vertical only test, SWN4 switches 6,7 and 8 to ON and switch 5 to OFF. If the fault can be duplicated to to the next check. If the fault can't be duplicated then temperature, binding, or recessive drag may be at fault. Try to repeat the initial fault conditions. Hold onto the vertical position knob, which will increase system drag. Once the vertical system is determined, look for binding or excessive drag in the system.



2nd Check; Power OFF and replace the 2PC2 board. Disconnect the vertical motor leads. Power the printer ON. If the printer crobars look for shorts in the cables or wiring of the +36 volts in the system. If the printer doesn't crobar then power OFF and connect the leads on the system. Power the printer ON and if it crobars replace the motor. If the printer doesn't crobar power the printer OFF and check the other system for a bad motor. The vertical motor should read about 5 ohms stopped and about 10 ohms when slowly rotated (varying with speed of rotation). If the system looks correct, then reconnect the system and power the printer ON. If the printer doesn't crobar then 2PC2 board had failed. If the printer does crobar, replace the motor.

3rd Check; Once a faulty system is found it may be necessary to replace the 2PC2 board again due to damage in testing. Check the printer operation. It is also possible the control circuits on the 7PC3 board could cause uncontrolled operation causing current faults; tachometers and readers should also be checked using procedures K and L.

#### J. Observe Display Code 48:

1st Check; Are any of the fuse fault LED's lit on the 2PC1 board for fuses F6, F7 and is the blower running? Power the printer OFF if fuses are blown or not. Replace the fuse for any LED lit. Power the printer ON and observe the fuse fault LED for F1 on the 2PC2 board during the first second of power ON. If the 2PC2 F1 fuse LED is lit during the first second the fault should be either the 2PC2 board, Vertical motor, band motor, or one of the two vertical drive ribbon motors, proceed to the 3rd Check if F6 or F7 was blown. Did the fuse blow again when checking 2PC2 F1? If so proceed to 2nd Check. If the blower was not running at the start, replace the blower or its start capacitor.

If no fuses were blown and the printer crobars, turn power OFF, remove the 6 thumb screws on the hammer driver board(s). Move the hammer driver board(s) off the +36 volt buss studs, let the board(s) rest on the chassis with something under them to insulate them from the chassis. If the printer still crobars check the capacitors in the storage bank and/or replace the circuit breaker (or both). If the printer doesn't crobar replace the hammer driver boards one at a time with new boards; see procedure 6AX.

2nd Check; If F6 or F7 fuses on the 2PC1 board are blowing, power the printer OFF and replace the 2PC1 board making sure the fuses are good. If the fuse still blows and crobars the printer, power OFF and replace the fuse and them check the wiring from the transformer; also the wiring to the d.c. section of the circuit breaker.

3rd Check; If the fuse 2PC2-F1 is blowing, power the printer OFF and replace the fuse, then disconnect the faston leads to the paper motion motor (3B01). Unplug the connectors to the vertical drive ribbon motors (4B01 and 4B02) and the band motor (4B03). Power the printer ON if F1 blows again, replace 2PC2 board. If F1 doesn't blow, power the printer OFF and connect one disconnected component at a time until F1 blows again. Then check and replace the last component connected.

#### K. Observe Display Code 49:

1st Check; If the printer goes into an uncontrolled slew of forms when powered ON replace the controller board 7PC2 first; set up the DIP switches and swap any band translators to the new board if any are installed. If a power ON slew still occurs replace the printhead electronics board 7PC3; set the pot P2 and P3 to mid-range, which would get the board operating. For final board setups, refer to procedure 5AA.

2nd Check; If the printer crobars with a 49 display but the forms did not actually slew after the 1st line of print, then check for a broken belt or very loose belt tension due to the vertical motion assembly being loose. If the belt drive is okay, replace the 2PC2 board first. If the fault still occurs replace the 7PC3 board, setting pot P2 and P3 to midrange for an initial check. If the fault still occurs replace the 7PC2 board, swapping any band translator ROM's to the new board, and positioning the DIP switches like the old board. Refer to procedure 5AA for final board setup.

3rd Check; If the printer crobars because of a forms runaway, refer to Figure 1-15 and monitor TP-13, TP-18, and TP-20 while repeating the test (power OFF and then ON before attempting to print). If any signal fails to have an output or is in question, check that component (tachometer or reader), the tachometer signal is only shown for a single line advance in Figure 1-15. With the printer crobarred, check the tachometer and then the reader as follows. Monitor TP-18 and operate the manual forms advance control rapidly which should produce about a 1.0 volt signal. Replace the vertical tachometer if in question. For the reader make sure the code disc is not rubbing on the reader. Monitor TP-13 and use the manual forms advance control to advance the forms. The TP-13 voltage level should go from zero to positive or about 5 to 6 volts then drop through zero to minus 5 to 6 volts and back to zero as each cutout in the code disc passes. If the tachometer and reader functions. Replace the 7PC3 board, setting P2 and P3 in midrange. If the fault still occurs replace the 2PC2 board. For replacement of the tachometer or reader refer to either procedure 6AB or 6AD.

#### L. Observe Display Code 50:

1st Check; Replace the 2PC2 board. Power OFF and replace the board and power back ON. If the fault still occurs replace the 7PC3 board after powering OFF. Set the pot P2 and P3 to mid-range on the new 7PC3 board which should make it operate. Refer to procedure 5AA for final board setup.

2nd Check; If the fault still occurs leave the printer crobarred and check the tachometer and reader outputs. Check the tachometer by monitoring TP-18 and operating the manual vertical forms advance control rapidly observing a signal of about 1.0 volt varying with speed of rotation. Check the reader by monitoring TP-13 while rotating the manual vertical forms advance control. The reader output should be zero between cutouts on the code disk, as a cutout approaches the voltage should go positive to about 5 or 6 volts, then drop through zero to negative 5 or 6 volts, then drop through zero to negative 5 or 6 volts. For replacement of the tachometer or reader refer to either procedure 6AB or 6AD.

3rd Check; If the fault still occurs replace the 7PC2 board referring to procedure 5AA.

#### M. Observe Display Code 51:

1st Check; This fault should indicate the failure of the fault system to identify the crobarring fault. The fault monitoring system is located on two boards, 7PC2 and 7PC3. Replace one board at a time and test the printer between board changes. Refer to procedure 5AA when replacing boards. Fixing the fault system may correct the other fault. The display code may be in error if the display code readout is malfunctioning, which may require replacing the Control Panel.

## **SECTION II INSTALLATION AND CHECKOUT**

---

### **WARNING**

INSTALLATION AND CHECKOUT OF THESE PRINTERS REQUIRES THE REMOVAL OF PROTECTIVE COVERS PROVIDED TO PROTECT THE CUSTOMER AND FIELD SERVICE REPAIRMAN FROM HAZARDOUS VOLTAGES AND MECHANISMS. INSTALLATION AND CHECKOUT MUST ONLY BE PERFORMED BY FIELD SERVICE REPAIRMEN WHO HAVE BEEN TRAINED TO WORK ON THESE PRINTERS WITH THE PROTECTIVE COVERS REMOVED.

### **SITE PLANNING**

Factors to be considered when choosing a location for the printer include the access space necessary for operating and servicing, availability of electrical power and the environmental requirements of the printer.

### **Space and Floor Loading Requirements**

Adequate space must be provided for operating and servicing the printer. Refer to Section 7, Figure 7-1 for physical dimensions and space requirements. The floor structure must be able to hold 200 pounds (91kg) per loading point. If there is any possibility of floor instability, the printer should be positioned on a metal plate to prevent any frame flex.

### **Environmental And Electrical Requirements**

Refer to the specifications provided in Section 7 of this manual for environmental and electrical requirements.

### **PRINTER UNPACKAGING**

Unpackage printer by following Steps 1 through 24 in Figure 2-1.

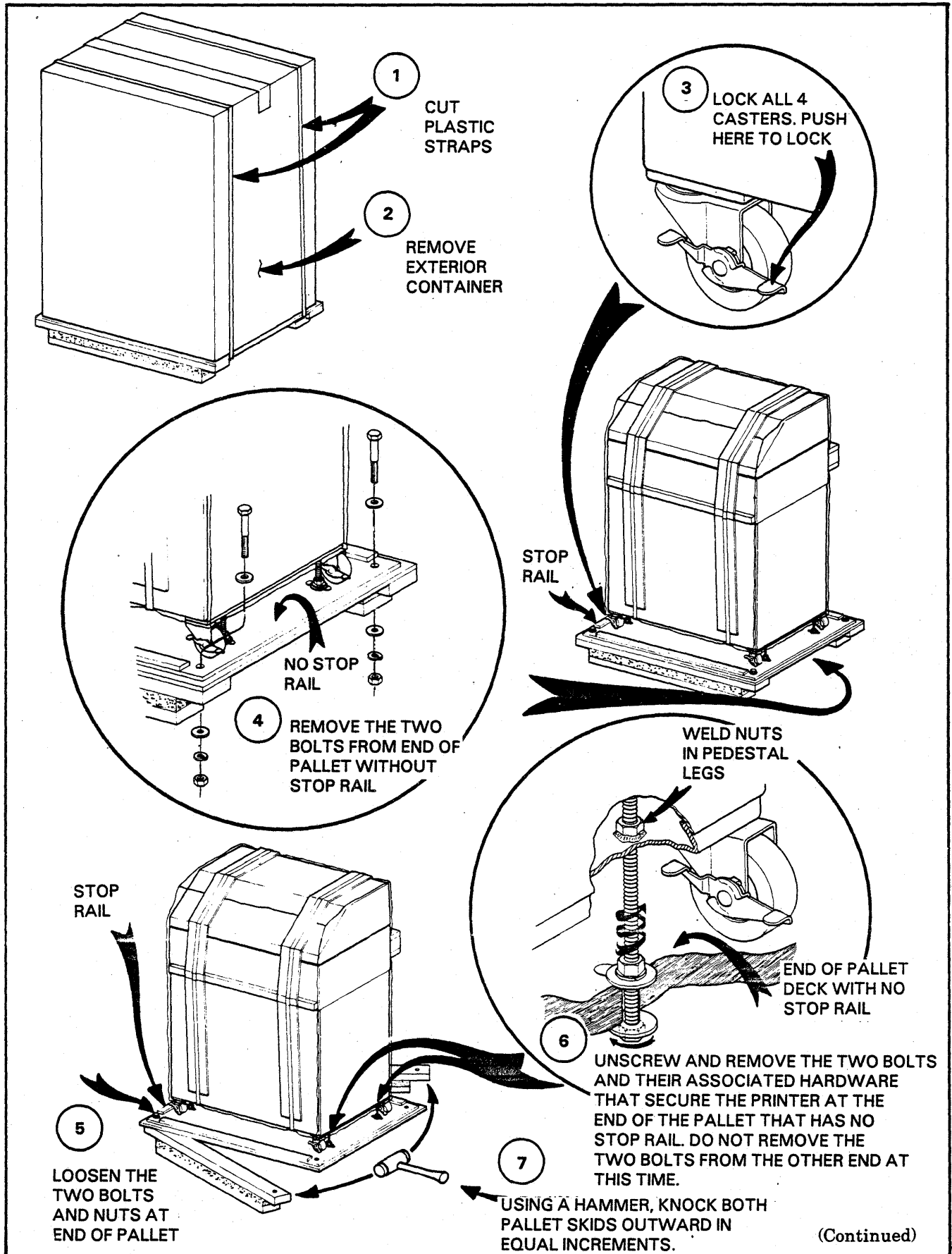


FIGURE 2-1. PRINTER UNPACKAGING

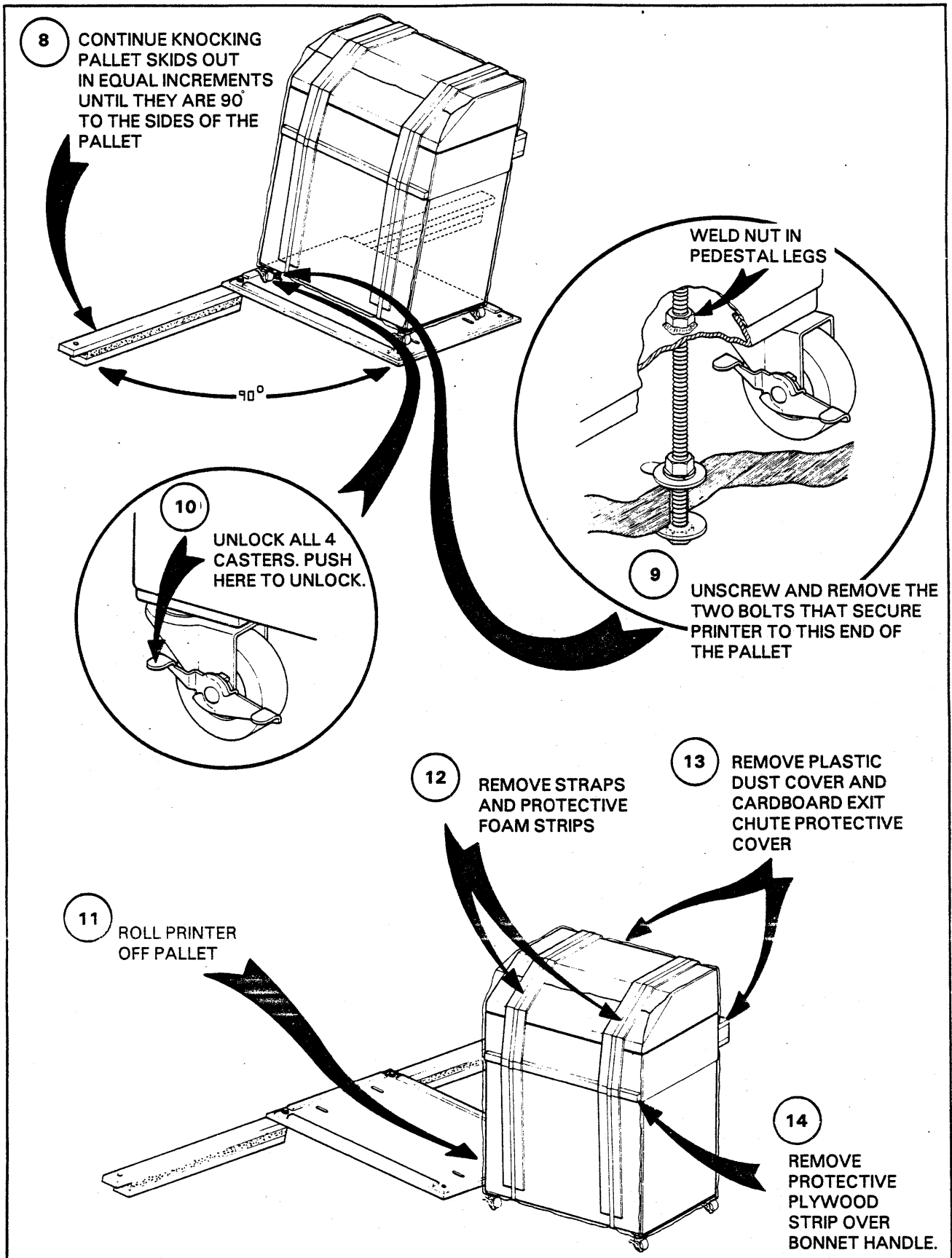


FIGURE 2-1. PRINTER UNPACKAGING (CONTINUED)

(Continued)

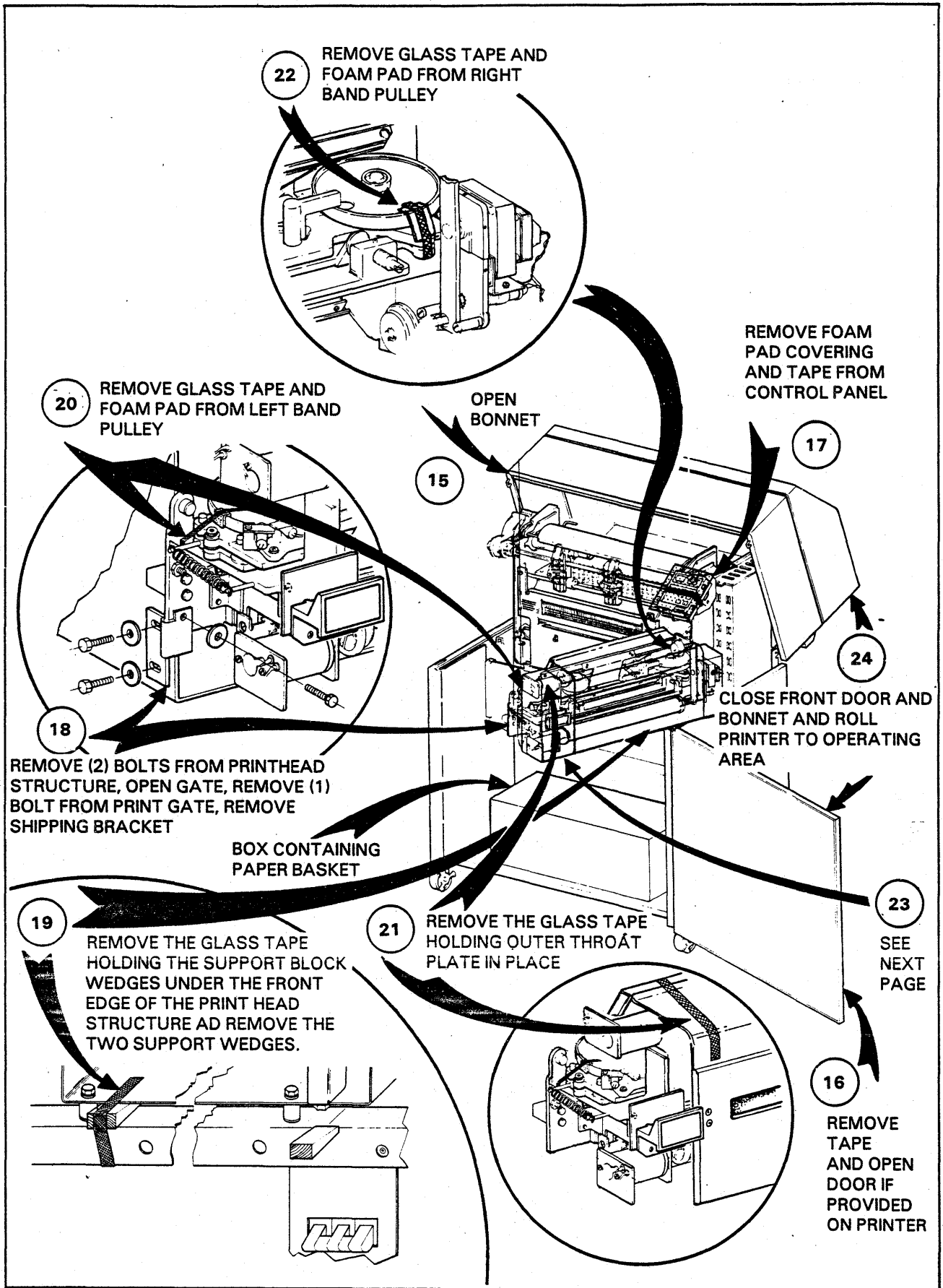


FIGURE 2-1. PRINTER UNPACKAGING (CONTINUED)

(Continued)

### LEFT RIBBON COVER INSTALLATION

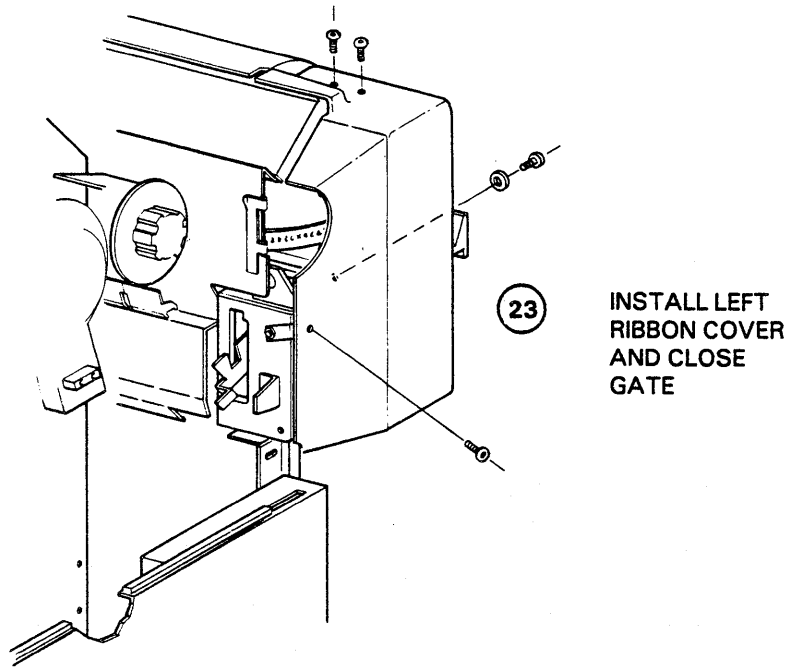


FIGURE 2-1. PRINTER UNPACKAGING (CONTINUED)

NOTE

PRINTER PACKAGING

Package printer by following Steps 1 through 24 in Figures 2-2. Follow steps 1 through 21 when packaging printer for van shipment. Follow Steps 1 through 24 when packaging printer for air shipment.

TO ORDER PACKAGING MATERIALS, WRITE TO SHIPPING DEPARTMENT, CENTRONICS, 1480 NORTH ROCHESTER RD, ROCHESTER MICH 48063. INDICATE IF MATERIALS ARE NEEDED FOR VAN OR AIR SHIPMENT. INCLUDE EQUIPMENT MODEL NUMBER.

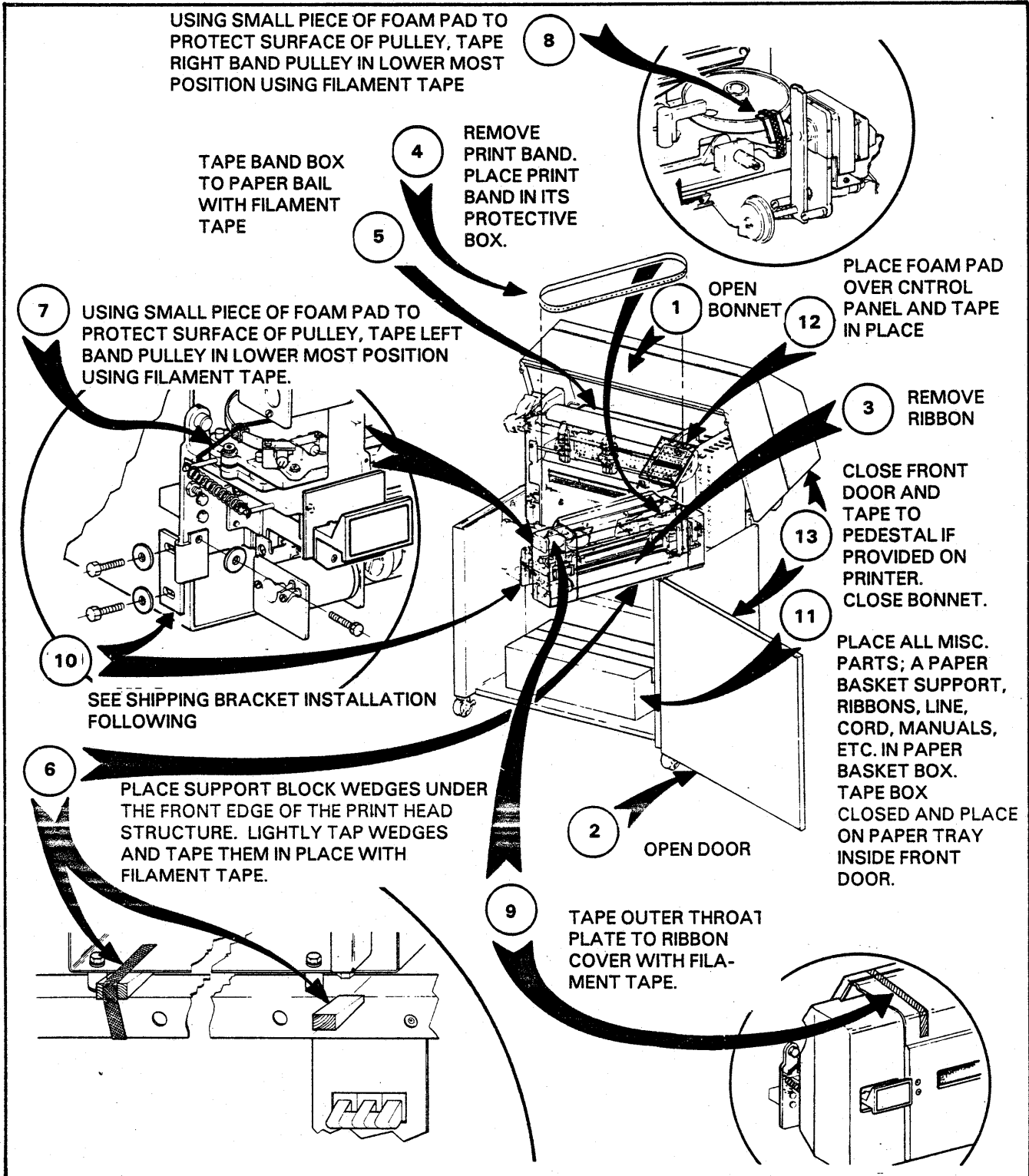


FIGURE 2-3. PRINTER PACKAGING

(Continued)



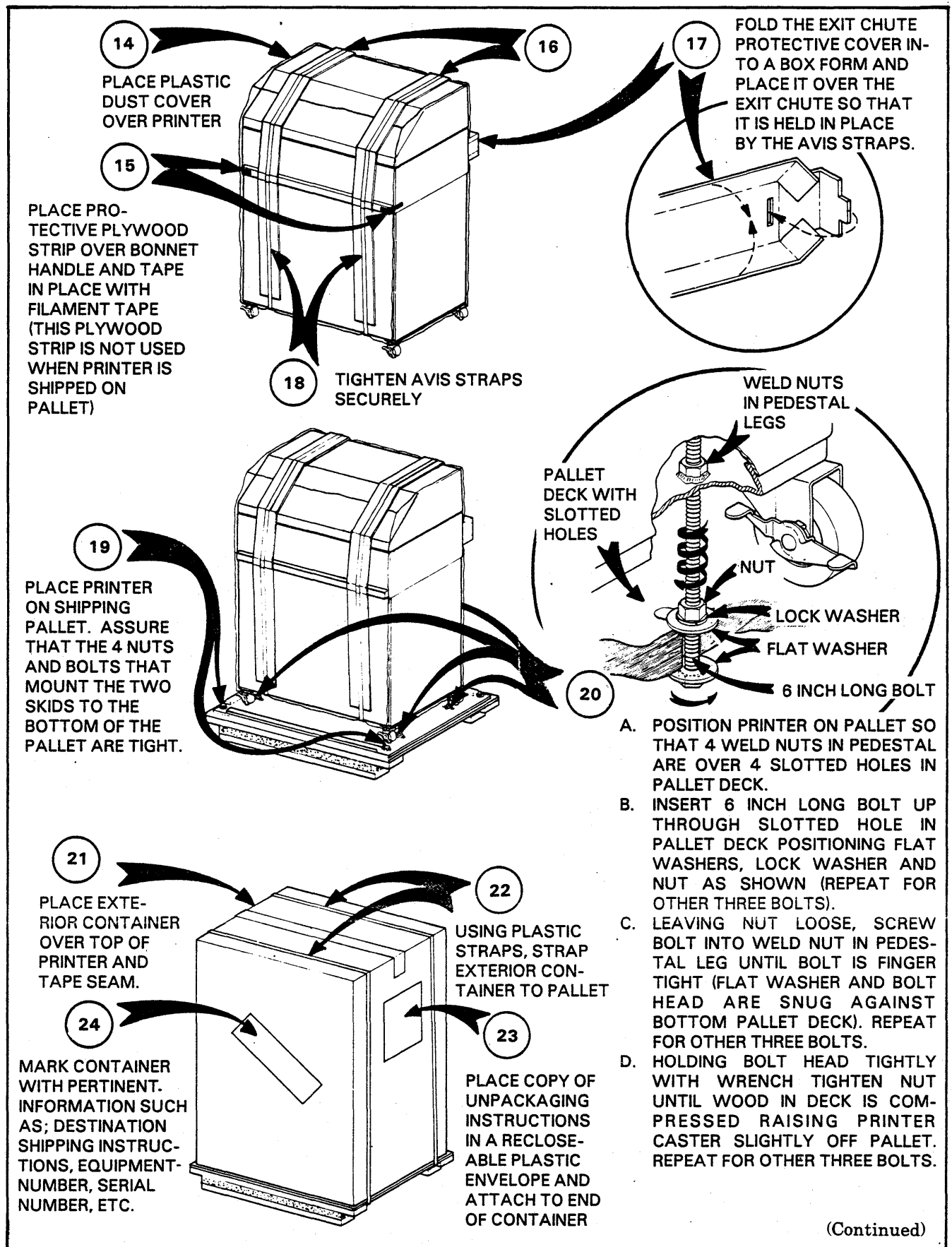


FIGURE 2-2. PRINTER PACKAGING (CONTINUED)

## SHIPPING BRACKET INSTALLATION

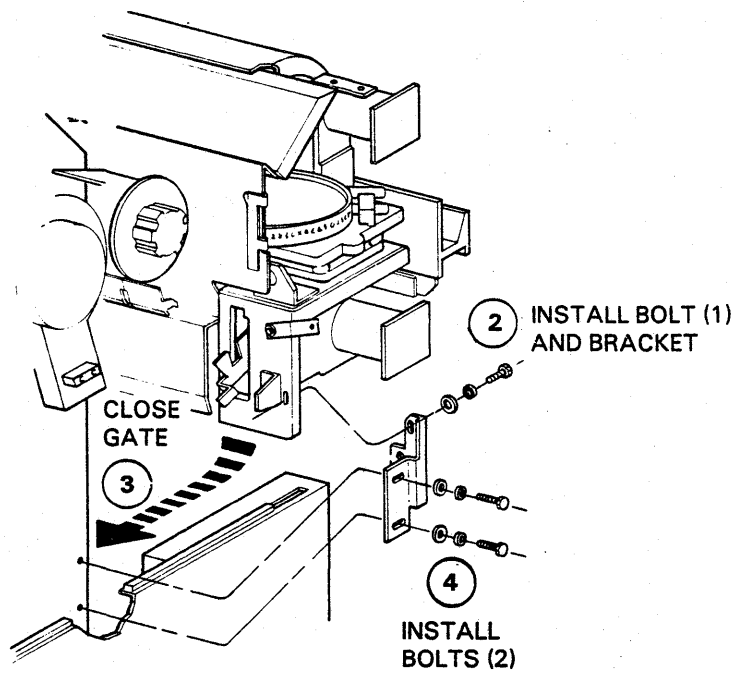
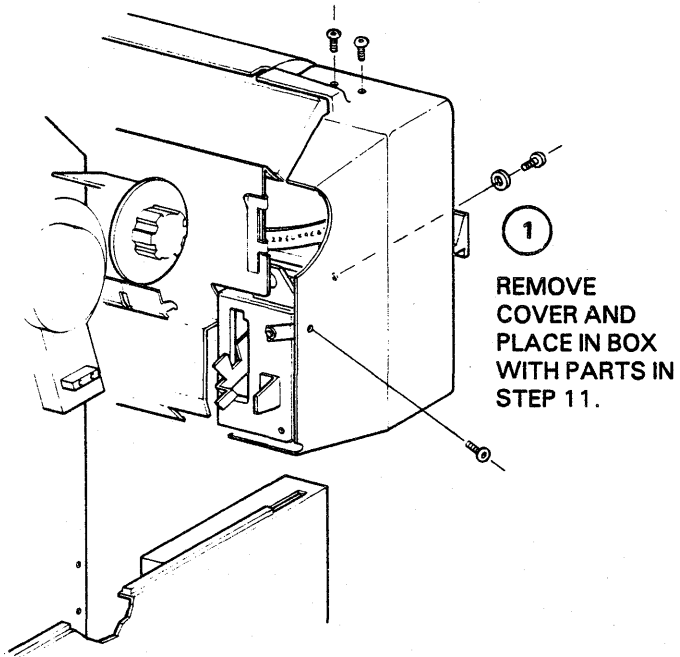


FIGURE 2-2. PRINTER PACKAGING (CONTINUED)

## PRINTER INSTALLATION PROCEDURE

This installation procedure requires the installer to be familiar with removing covers to gain access to the printer's internal assemblies. If not familiar with cabinet access, see Subsection "A" in Section I of this manual prior to starting installation.

### Procedure

1. Unlock the casters and slowly roll the unpackaged printer to the operating area.
2. During transit the printhead structure may have shifted forward on the pedestal and could cause the tractor flaps (in their open position) to interfere with the bonnet when it is opened or closed. With the tractor flaps in their open position, slowly open and close bonnet. If bonnet hits tractor flaps, perform Cabinet And Printer Positioning Procedure 5BB which is located in Section 5 of this manual.
3. For proper static discharge immunity, the static seal on the top right and left sides of the printer pedestal should make contact with at least 50% of the bonnet's lower edge when the bonnet is closed. This can be checked by opening the printer's front door if installed, and looking for lights appearing between the bonnet's lower edge and top of the static seal on the top right and left sides of the pedestal. If adjustment is required perform Cabinet And Printer Positioning Procedure 5BB which is located in Section 5 of this manual.
4. With a volt meter, check the line voltage at the wall socket or power outlet provided for the printer.
5. Ensure that the voltage and frequency labeled on the rear of the printer corresponds with the power provided for the printer. If power differences exist, rewire the unit per procedure 5AF (AC Voltage/Frequency Modifications) located in Section 5 of this manual.
6. The standard printer power cord is terminated with a non locking 3 prong plug, for use with 60 Hz outlets. The cord may also be fitted with plugs for use with 50 Hz outlets. If the plug supplied with the printer does not meet the local safety or electrical requirements, the plug should be removed and replaced with a plug that does.
7. The Controller Board in card location 7PC2 has several blocks of dip switches that must be set to provide those features and functions required for your printer. These switches may or may not have been pre-set at the factory for your printer's configuration. See the Technical Manual for dip switch settings.
8. Special Interface Kits are provided with some printers. If an Interface Kit is supplied with your printer, install it in board location 7PC1 at this time. For installation instructions, see the Installation and Checkout Section of the manual supplied with the kit.
9. Set dip switch SWN1 on Backplane Board 7BP1 as shown in Figure 2-3.
10. A jumper block JPN-1 is provided on Backplane Board 7BP1. Read the jumper block note provided in Figure 2-4 and remove jumpers J7 thru J14 if applicable to your printer.
11. Some system applications require that the printer's logic and frame ground be connected together. If the connection of logic and frame ground is a requirement of your system, perform Logic Ground Procedures 5AH which is located in Section 5 of this manual.
12. With the printer disconnected from its power source connect the interface cable, (cable from data source) to the printer. The printer's I/O connector is located in the lower right front corner of the pedestal.
13. Install the band on the printer following the installation instructions in the Operator's Manual. Refer to procedure 5AG if translator ROMs must be installed or if general information is required.
14. Install the printer ribbon per the installation procedure found in the Operator's Manual.
15. The printer is now ready for checkout.

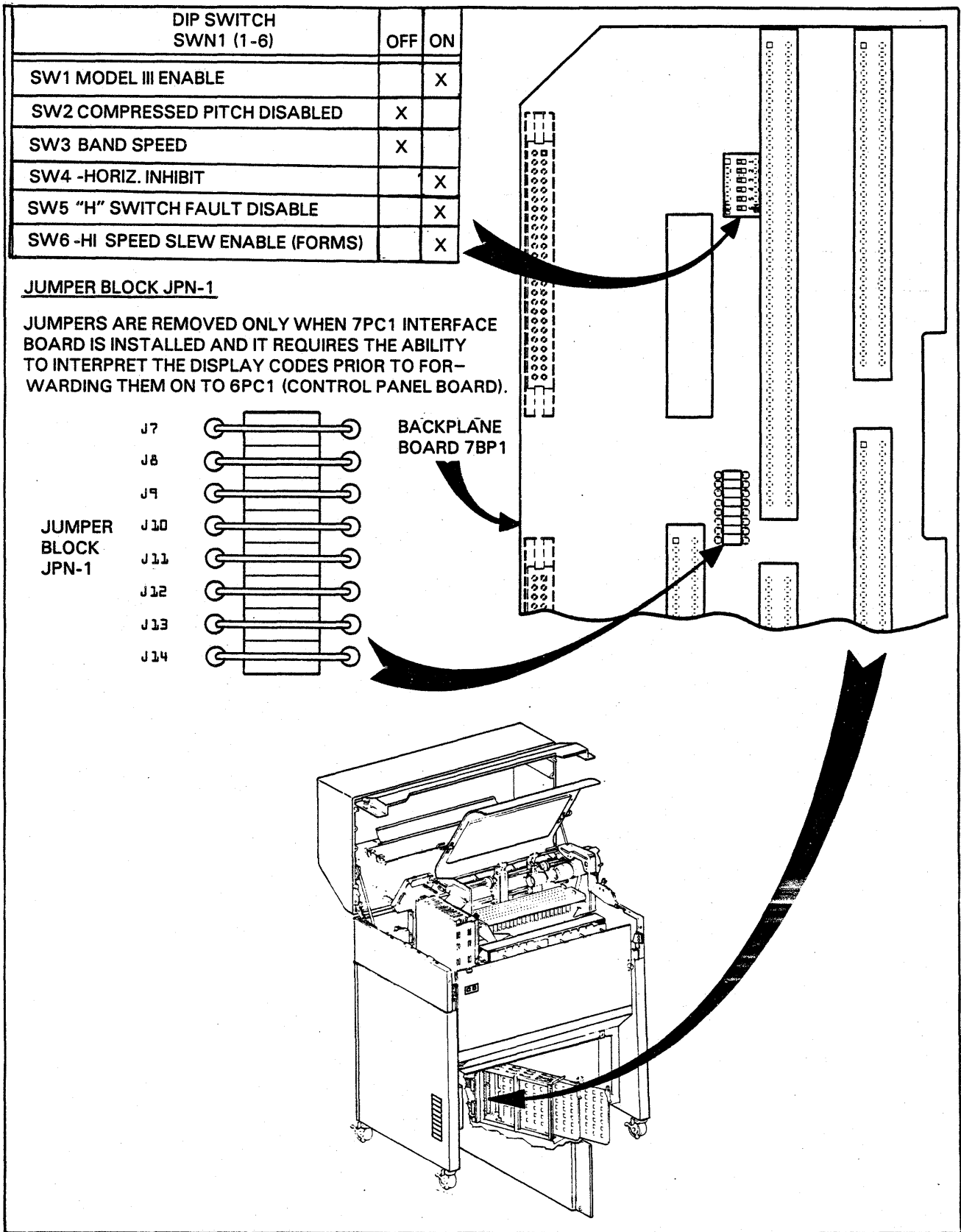


FIGURE 2-3. JUMPER BLOCK AND DIP SWITCHES ON BACKPLANE BOARD

## PRINTER CHECKOUT PROCEDURE

The checkout of these printers should only be performed by trained field service personnel. The printer should be installed per the Installation Procedure in this section of the manual before attempting to perform the following printer checkout procedures.

### Procedure

1. Do not connect the printer's power cord to its ac power source at this time.
2. Inspect and trace all interconnecting ribbon cables. Insure that all ribbon cable connectors are connected and seated properly.
3. Inspect all printed circuit cards and insure that all chips and ROM's are seated properly.
4. Locate and inspect all major assemblies for damaged or loose parts.
5. Put the printer's ON/OFF switch in the OFF position and connect the printer to its ac power source.
6. If the printer is equipped with an Electronic Vertical Format Unit (EVFU), mount the format tape in the reader. The printer will initialize to 6 LPI. If 8 LPI is desired, power ON, when Not Ready switch to 8 LPI.
7. With the gate closed and band installed, turn the ON/OFF switch to the ON position and check for the following:
  - A. The band motor should begin turning.
  - B. Blower should start running.
  - C. A breaking action should be felt when attempting to turn the vertical coarse positioning control knob.
  - D. The Exit Rollers if installed should run for 30 seconds.
  - E. The STOP or READY indicator on the Control Panel should be lit.
  - F. On units with EVFU option, install the format tape. It will be automatically read into the controller's EVFU memory.
  - G. After 30 seconds the band motor and exit rollers will turn off.
8. Install the forms per the Paper Installation Procedure provided in the Operator's Manual.
9. Close the gate and pause for the band Up-To Speed delay to time out (approx. 5 to 10 seconds). Press the START or ON LINE switch. The START or ON LINE lamp should illuminate and the STOP or READY lamp should turn OFF. If the STOP or ALARM lamp is lit, check the status number displayed on the Control Panel digital status indicator. If a flashing ALARM lamp occurs, this indicates that the +36 volt power supply has shut down. Power printer OFF and ON (use printer ON/OFF switch) to clear printer logic and to recover the +36 volt supply. For definition and corrective action for the status displayed, see the Status Display Guide in Section 1.
10. With the printer Off Line, remove the forms from the right tractor and press the FORM FEED switch. The forms should advance approximately 3 inches and the printer should stop moving paper. To clear the fault, reinstall the forms and press the START or ON LINE switch.
11. With the printer On Line, activate the print gate latch without opening the gate. The printer should go Off Line and the STOP or ALARM light should be lit.
12. With the printer Off Line, enter the TEST PRINT mode and print several lines. This is accomplished by pressing the TEST PRINT switch on the Controller Board in card location 7PC2. On some printers TEST PRINT may also be entered by pressing the optional TEST PRINT switch on the Control Panel. Some controller Test Print configurations require that the START/STOP or READY/ON LINE switch on the Control Panel also be pressed before the printer will start or stop printing. An 8 position dip switch located on Controller Board 7PC2 selects the test pattern or action that will result when TEST PRINT mode is enabled. For detailed information on the controller's Test Print feature, see your Technical Manual. After printing several lines, remove the printer from the TEST PRINT mode.
13. An optional Variable Form Length switch that is installed at the top of the Control Panel, set the miniature switches for the length of form being used. Enter the printer into the TEST PRINT mode. The printer should skip three lines between printed forms if the length of forms is set correctly and if the Perf Skip feature on Controller Board 7PC2 is enabled. Remove the printer from the TEST PRINT mode. If the Electronic Vertical Format Unit option is installed, the vertical form length switch is disabled.

14. With the printer in the TEST PRINT mode and printing, sever the forms at the form stack in the front of the printer. The printer should go Off Line before the severed edge of the form reaches the print station, indicating an OUT OF PAPER condition.
15. With the printer in the TEST PRINT mode and printing, check for the following:
  - A. Check ribbon tracking at different times to make sure the ribbon skew mechanism is functioning properly. If adjustment is required, perform Procedure 5AV.
  - B. Check the printout quality for the following:
    - Density
    - Vertical registration
    - Horizontal registrationRefer to Procedure 5AI if adjustment is needed.
16. Pressing the TEST PRINT switch a second time will remove the printer from the TEST PRINT mode.
17. Press the START or ON LINE switch and initiate a data transfer from the processor (data source). If your printer is using the DAVFU (Direct Access Vertical Format Unit) feature, load VFU data over the interface data lines into the printer controller EVFU memory at this time (CPU loaded). The DAVFU feature requires that format data be loaded into the printer prior to sending character data. The printer's status display will display status number 10 (EVFU Not Loaded) until the data source loads the VFU format buffer.
18. Check to be sure the correct data is being printed. If data being printed is incorrect turn to the Fault Guide in Subsection "B" in Section 1.
19. Replace all panels and covers removed during installation and checkout.
20. If an optional forms basket or a powered forms stacker is provided with the printer, install it at this time. The basket mounts into two blocks on the lower rear panel of the printer. For forms basket or powered forms stacker operation see the Paper Installation Procedure in the Operator's Manual. If the stacker is being used, the printer's exit rollers of installed should be disengaged. If using a forms basket, the printer's optional exit rollers must be positioned over the forms and engaged.

## SECTION III MAINTENANCE AIDS

### INTRODUCTION

This section contains information on standard maintenance tools, special maintenance tools, maintenance materials and built in printer features that are intended to aid service personnel in performing maintenance on these printers. This section also contains general maintenance notes and warnings.

TABLE 3-1. STANDARD MAINTENANCE TOOLS

OSCILLOSCOPE: Dual trace, d.c. to 10 mHz minimum, calibrated triggered sweep.

DIGITAL VOLTMETER: Three and a half digit.

SCREWDRIVER ASSORTMENT: Flat blade and phillips.

SOLDERING IRON: 6 or 15 watt recommended

VACUUM CLEANER (PORTABLE)

WRENCH ASSORTMENT: Open end American sizes through 9/16".

HEX KEY WRENCH SET: .050 through 3/16 inch.

RULER: 6" or metric equivalent.

SQUARE: Small right angle.

THICKNESS GAUGE SET: Thickness in millimeters or 1000ths of an inch.

TORQUE WRENCH: 0-50 in. lbs. (Optional)

### TOOLS AND MAINTENANCE

Tools and materials required for maintaining the printer are listed in three groups; Standard Maintenance Tools, Special Maintenance Tools are items normally used by field service personnel (Table 3-1). Special Maintenance Tools are items of special design or items not considered a part of a standard set of field maintenance tools (Table 3-3). Maintenance Materials are basic supplies ordinarily used during maintenance (Table 3-2).

TABLE 3-2. MAINTENANCE MATERIALS

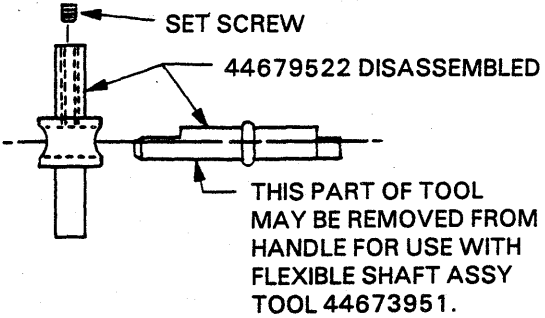
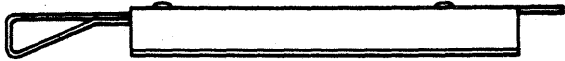
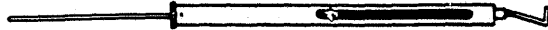
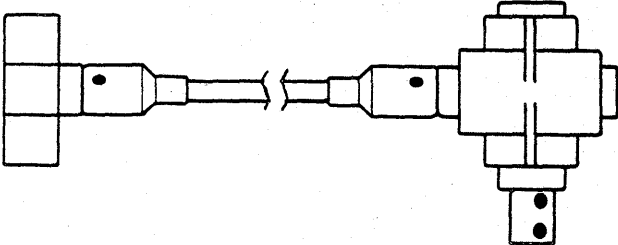
ALCOHOL: For general cleaning.

SILICON GREASE: For print gate pivot and latch pin.

RUBBER CEMENT SOLVENT: Gate adhesive removal.

95130200 GREASE: For band pulley bearing. (MIL G-3278)

TABLE 3-3. SPECIAL MAINTENANCE TOOLS

<p>44679522 FLIGHT TIME TOOL</p> <p>This tool is required to adjust the upper printer hammer flight time.</p>	
<p>94806776 CONNECTOR PIN EXTRACTOR (AMP 457241-1)</p> <p>Used for removing pins from the Hammer Striker harness connectors which plug into the Hammer Driver circuit boards.</p>	
<p>12210947 SPRING SCALE</p> <p>For adjusting belt tension, band tension. Push/Pull gauge to 20 lbs or 9 kilograms.</p>	
<p>44673951 FLEXIBLE SHAFT ASSEMBLY</p> <p>This tool is used with the Band Tracking/Flight Time tool (less handle) to adjust the lower print hammer actuators for proper print hammer flight time.</p>	

**TEST PRINT FEATURE**

A Test Print feature is provided as standard equipment on all printers. The Test Print feature is activated by a pushbutton switch on the Controller Board in card location 7PC2. Some printers may have an optional Test Print switch on the Control Panel that will also activate the Test Print feature. The TEST PRINT mode may only be entered when the printer is in the STOP or READY condition. Some controller Test Print configurations require that the START/STOP or ON LINE switch on the Control Panel also be pressed before the printer will start or stop printing. An 8 position dip switch located on Controller Board 7PC2 selects the test pattern or action that will result when the Test Print switch is activated. For detailed information on how to select and activate the following types of test patterns or actions, see your Technical Manual.

**All One Character Test**

A dip switch selected test pattern of all one character printed line after line.

**No Printing Test**

A dip switch selected test that will cause the printer to act as if it were in the All One Character Test, but hammers will not fire. While in this test, faults such as Out Of Paper, Paper Tear, Line Space Error and Sync Error will not be displayed or cause the printer to stop. The paper motion system will function without forms or ribbon installed.

**Vertical Motion Only Test**

A dip switch selected test that will cause the printer's vertical motion system to perform single line advances at a maximum rate with no other printer activity.



## SYSTEMS SAFETY

### Hazardous Voltages and Mechanisms

Maintenance of these printers requires the removal of protective covers provided to protect the customer and field service repairman from hazardous voltages and mechanisms. Maintenance on these printers shall only be performed by trained field service repairman who have been trained to work on these printers with the protective covers removed. Whenever possible during maintenance operations, disconnect the printer power cord from its external power source or switch OFF the printer's circuit breaker. When power is applied to the printer during maintenance operations, care must be taken to avoid contact with hazardous voltages such as mains circuits and the high voltage section of power supplies.

On low voltage circuits, an additional hazard exists due to the high short circuit current/energy (often hundreds of amps) which can flow into a circuit and cause damage. Great care must be taken to avoid the short circuiting of these circuits by tools or personal metallic adornments such as rings or watchbands.

### Handling of MOS Components:

MOS (Metal Oxide Silicon) components are present on the printed circuit boards in your printer. MOS components may be damaged by static electrical charges which are commonly generated by human movement such as walking over carpeted floors or by friction between clothing and chair seats or desk tops. Damage to MOS components may be minimized or eliminated if the following component and board handling precautions are observed.

#### *MOS Component Handling:*

1. Before handling MOS components, personnel should ground themselves via earth ground to the printer frame or other earthed metalwork.
2. MOS components should never be removed or installed on boards when printer power is ON.

3. MOS components should be stored in conductive trays (metal or foil lined containers) or have their pins joined by conductive foam.
4. High static materials should be excluded from the working area.

#### *Handling of Printed Circuit Boards With MOS Component Installed:*

1. The PCB must always be transported in the container provided.
2. There is no easy way of recognizing a MOS component, so if in doubt, assume that one is fitted to the PCB you are handling.
3. PCB's should never be installed or removed from the printer when the printer is powered ON.
4. When a replacement board is to be installed in a printer, the installer must first touch bare earthed metal frame to discharge any static electric charge he is carrying. Having done so, he should avoid taking any more steps on the floor prior to installing the PCB into the printer. He should then remove the PCB from its container, handling it in a way which avoids any contact with any conducting part of the PCB. He should then remove any protective clip, if fitted to the MOS device and insert the PCB.
5. Prior to removing a PCB, the person removing the PCB must again touch a bare earthed metal frame, avoid taking any further steps on the floor, remove the PCB from the printer, handling it as described above, fit protective clips where appropriate, and place the PCB in the container provided for the purpose.

### Reconnecting Ground Straps After Servicing

All covers and major assemblies are grounded to the printer frame (earth ground) with ground straps. These ground straps are used to provide the printer with Electro Static Discharge and Safety Ground. Assure that all ground straps are reconnected to frame ground after servicing.



## SECTION IV PREVENTIVE MAINTENANCE

### INTRODUCTION

This section contains the information and instructions needed for performing preventive maintenance. Preventive Maintenance is divided into two levels. The Level 1 operations require approximately one hour to perform. Level 2 operations required an additional half hour to perform. This maintenance should be performed by months or printed lines whichever occurs first (Table 4-1).

### TOOLS AND MATERIALS

Tools and materials required for maintaining the printer are listed in three groups; maintenance tools, special maintenance tools and maintenance materials. Maintenance tools are items normally used by field engineers. Special maintenance tools are items of special design or items not considered a part of a standard set of field maintenance tools. Maintenance materials are basic supplies ordinarily used during maintenance. Refer to the Maintenance Aids section of this manual for a complete listing of tools and materials required for maintaining the printer.

### CAUTION

THESE MAINTENANCE PROCEDURES SHOULD BE PERFORMED BY TRAINED SERVICE PERSONNEL ONLY. PROTECTIVE COVERS AND PANELS MUST BE REMOVED; THEREFORE, THE OPERATION SHOULD BE PERFORMED USING EXTREME CARE TO PREVENT INJURY OR DAMAGE. OPERATOR MAINTENANCE IS OUTLINED IN THE OPERATORS MANUAL.

### WARNING

NOISE LEVEL UNDER BONNET WHILE PRINTING MAY CAUSE HEARING IMPAIRMENT. THE WEARING OF EAR PROTECTION DEVICES IS RECOMMENDED. KEEP EXPOSURE TIME TO A MINIMUM.

TABLE 4-1. PREVENTIVE MAINTENANCE SCHEDULE

LEVEL	MONTHS	PRINTED LINES (MILLIONS)
LEVEL 1	6	36.0
LEVEL 2	12	72.0

TABLE 4-2. PREVENTIVE MAINTENANCE TOOLS AND MATERIALS

LEVEL	DESCRIPTION	P.M TOOLS AND MATERIALS								
		VACUUM	ALCOHOL	CLEANSER	ALLEN WRENCHES	SPRING SCALE	RULE	FLIGHT TIME TOOL	SILICONE GREASE	
1.1	PRINTER CLEANING	X	X	X						
1.2	RESIDUAL STRIP				X					
1.3	FLIGHT TIME				X			X		
2.1	DRIVE BELT					X	X			
2.2	PRINTER LUBRICATION								X	

**LEVEL 1 MAINTENANCE**

**1.1 PRINTER CLEANING**

**CHECK/Conditions**

1. Power the printer OFF and open the print gate. Remove print band. Perform cleaning actions steps 1 thru 4.
2. With all cabinetry in place, perform cleaning actions step 5 and 6.

**Actions**

1. Vacuum hammer modules.
2. Clean lint from platen and top guide.
3. Wipe band pulley surfaces with alcohol.
4. Wipe the inside surface of the band drive belt with alcohol while slowly rotating the band motor flywheel by hand. Dirt build-up can cause sync errors.
5. Clean ribbon residue from ribbon switching bars.
6. Remove all surface dirt using a non-abrasive commercial cleaner.

**1.2 RESIDUAL STRIP ADJUSTMENT OR REPLACEMENT PROCEDURE 6AH**

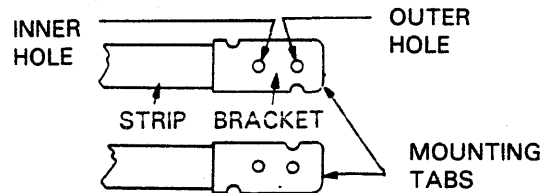
**CHECK/Conditions**

1. Power the printer OFF.
2. Gain access to the armature bar from the rear of the printer (See Figure 1-2 in this manual for access).
3. Remove 3 allen screws securing armature bar.
4. Unplug hammer driver cables.
5. Lift out armature bar.
6. CHECK: If residual strip has not been shifted before as evidenced by wear in only one position, then perform action step 1. If strip has been shifted, perform action step 2.

**Action**

The residual strip has two possible mounting positions to permit maximum use of the strip.

1. If strip indicates wear in only on position, move the mounting tabs to the other (unused) holes.
2. If strip has been used in both positions, it must be replaced. Position the mounting tabs so that on one side of the armature bar the inner hole (closest to strip) is positioned over locating pin. On the opposite side of the armature bar, the mounting tab must be positioned over locating pin. On the opposite side of the armature bar, the mounting tab must be positioned over the pin using the outer hole.



**1.3 HAMMER FLIGHT TIME ADJUSTMENT PROCEDURE 5AE**

**CHECK/Conditions**

1. Print all one character pattern of M's or H's.
2. CHECK: Are all characters printed equally on both sides/ Remember odd print columns are printed by the upper hammer actuators and even print columns are printed by the lower hammer actuators.

**Action**

1. Perform Flight Time Adjustment procedure 5AE.

## LEVEL 2 MAINTENANCE

### 2.1 DRIVE BELT INSPECTION

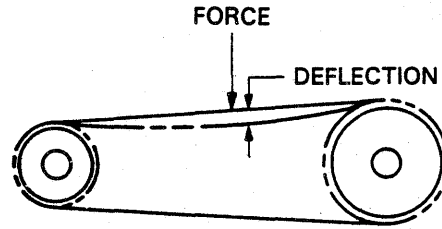
**CHECK/Conditions**

1. Power the printer OFF.
2. CHECK: Inspect the drive belts for signs of wear and check their tension.

**Action**

1. Replace worn belts.
2. Perform the belt tension adjustments specified in the Corrective Maintenance section procedures:

5AM Band Motor  
 5AW Paper Advance Motor  
 5AX Tractor Assembly  
 5AZ Paper Exit Motor Belt Tension and Tracking Adjustments



BELTS	FORCE		DEFLECTION
	MIN.	MAX.	
Band Motor	16oz (4.45N)	24oz (6.67N)	0.150 in (3.8mm)
Paper Advance	32oz (8.90N)	40oz (11.12N)	0.150 in (3.8mm)
Tractor	32oz (8.90N)	Pull	0.240 to 0.260in (6.1 to 6.6mm)
Exit Motor (if installed)	7 lbs. (31.0N)	9 lbs. (40.0N)	Pull on front motor standoff

### 2.2 PRINTER LUBRICATION

**CHECK/Conditions**

1. Power the printer OFF and open the print gate.

**Actions**

1. Apply G.E. silicone grease to gate pivot pin and latch pin.

## SECTION V CORRECTIVE MAINTENANCE

The following contents list is for section 5, plus the alphabetical sequence of all procedures referenced in the Fault Isolation section. Procedures are alphabetically listed with a two character identification; AA, AB, AC, thru AZ, BA, BB, etc. This index is provided to supply procedure page numbers for quick location.

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5AC	VERTICAL SERVO SYSTEM SET-UP.....	5-5
5AD	BAND PICKUPS POSITIONING AND ADJUSTMENT.....	5-5
5AE	FLIGHT TIME ADJUSTMENTS.....	5-8
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5AZ	PAPER EXIT MOTOR AND BELT ADJUSTMENTS.....	5-44
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5BB	CABINET AND PRINTER POSITIONING.....	5-46

## ELECTRICAL ADJUSTMENTS

### 5AA

#### BOARD REPLACEMENT CHECKS AND ADJUSTMENTS

When printed circuit boards are replaced or swapped in the printer, other electrical adjustments or physical components on the boards must be checked or swapped to the new board. Refer to Table 5-1 and the reference notes indicated for the board being replaced.

#### BACKPLANE BOARD 7BP1

DIP SWITCH SWN1 (1-6)		OFF	ON
SWN1 MODEL III ENABLE			X
SWN2 COMPRESSED PITCH DISABLED	X		
SWN3 BAND SPEED	X		
SWN4 -HORIZ INHIBIT			X
SWN5 "H" SWITCH FAULT DISABLE			X
SWN6 -HIGH SLEW ENABLE (FORMS)			X



TABLE 5-1 BOARD REPLACEMENT CHECKS AND ADJUSTMENTS

**HOW TO USE TABLE**

WHEN REPLACING BOARDS MAKE THE INDICATED CHECKS IN NUMERICAL SEQUENCE STARTING WITH ONE (1).

SPARED BOARDS BELOW

	CHECK +5 VOLTS	6	CHECK ±12 VOLTS (FIG 1-9, 5TB1/5TB2, 11.3 to 12.6 VOLTS)	CHECK +36 VOLTS (SEE FIGURE 1-9, 5TB3, +36 ±3 VOLTS)	CHECK BOARD DIP SWITCH POSITIONS	1	CHECK BOARD JUMPERS INSTALLED	CHECK FOR CORRECT JUMPER BLOCK TERMINATORS	3	CHECK IF BAND CODE TRANSLATOR ROMS REQ'D	2	CHECK IF FLIGHT TIME ADJUSTMENT IS REQ'D	CHECK VERTICAL SERVO SYSTEM SET-UP	4	CHECK FOR CORRECT PROCESSOR ROM'S INSTALLED	5
2PC1 POWER SUPPLY BOARD	1	2	3													
2PC2 SERVO POWER AMPLIFIER BD		1	2													
5PC1 THRU 5PC4 HAMMER DRIVER BD								1		2						
7PC2 CONTROLLER BOARD					1					2						3
7PC3 PRINT HEAD ELECTRONICS BD	1												2			
7PC1 INTERFACE ADAPTOR BD (OPT)					1	2										

NOTES:

- 1 For dip switch locations and settings see old board or dip switch set-up procedures in your separate Technical Manual.
- 2 Special bands may require that translator ROM's or DIL jumper chips be installed on the 7PC2 board. For locations and part numbers of these ROM's or DIL jumper chips see the old board and Parts Manual (normally locations E7 and F7).
- 3 Each Hammer Driver Board locations requires a different jumper terminator chip to be installed in chip location 5PC1-P2 (lower right corner of board). This terminator chip identifies the boards locations in the printer (5PC1 thru 5PC4). Remove terminator chip from board being replaced and install it on new board.
- 4 See procedure 5AC for Vertical set-up procedure in this section of the manual.
- 5 For the locations and part numbers of the Controller ROM set, EVFU RAMs, Buffer RAMs and System RAMs, see old board and/or Parts manual. New boards may have updated ROMs and should not be swapped for those on the old board.
- 6 The +5 volts is always measured and adjusted to a reference point on the 7PC2 board. Refer to the next procedure 5AB and perform the +5 volts adjustment procedure.

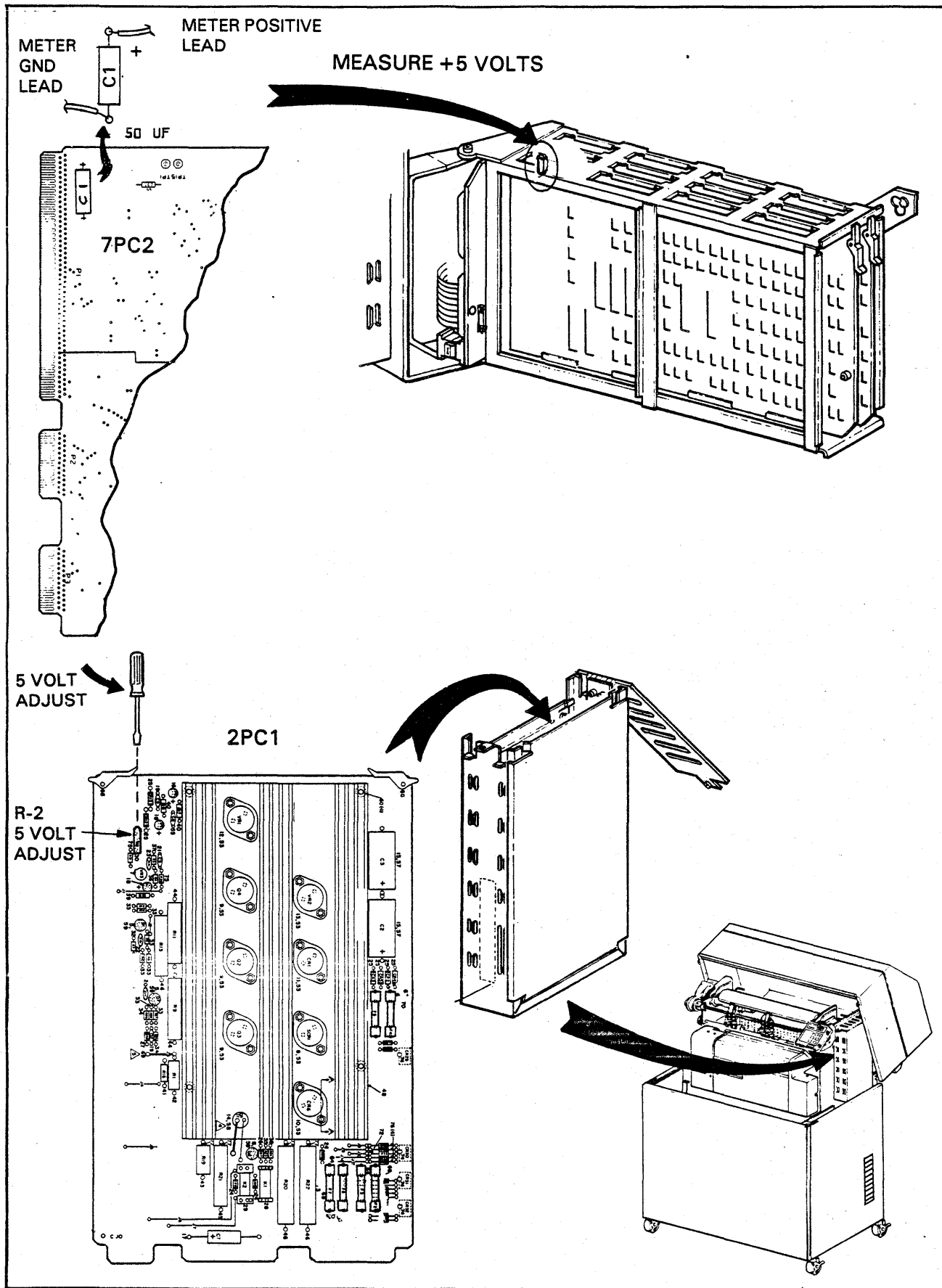


FIGURE 5-1 FIVE VOLT ADJUSTMENT

## 5AB

### FIVE VOLT ADJUSTMENT

The 5 volt regulator for the power supply is adjusted on the power supply board 2PC1; the voltage is measured on the controller board 7PC2. Refer to Figure 5-1 for location of adjustment and monitor test point.

1. Power the printer ON and adjust the 5 volts for 5.00, plus or minus one count on the last digit or within  $\pm 0.01$  volts.
2. Test the printer's operation. A misadjusted 5 volts may affect the Vertical motion system if these setups were made while the five volts was misadjusted. If the Vertical system requires adjustment refer to procedure 5AC.
3. Recheck the 5 volt adjustment before leaving the printer.

## 5AC

### VERTICAL SERVO SYSTEM SET-UP

1. Open the print gate.
2. Power the printer ON (Vertical forms advance motor will not be running). Be sure the printer is in the 6 LPI mode.
3. Enter the printer into the No Printing Test: This is the same as the All One Character Test but the hammers do not fire and the ribbon does not move. This test is entered by setting switches on the controller board 7PC2 SWN4 (switch network 4) and by pressing the controller board's Test Print switch (7PC2-SW1). If switch setup information is necessary perform steps a thru c.
  - a. Set SWN4, switches 1 thru 4 either ON or OFF; they are not used.
  - b. Set SWN4, switches 5, 6 and 8 ON.
  - c. Set SWN4, switch 7, OFF.
4. The 6 LPI LED should be lit on the Print Head Electronics board 7PC3. Adjust pot P2 (the 6 LPI pot) ten (10) turns clockwise and press SW1 on 7PC3.
5. Adjust this pot clockwise if the LED is not lit or counterclockwise if the LED is lit until the LED flashes as the machine cycles.

6. Change the vertical mode from 6 LPI to 8 LPI. The 8 LPI LED on 7PC3 should light. Adjust pot P3 (the 8 LPI pot) ten (10) turns clockwise and press SW1 on 7PC3.
7. Adjust this pot clockwise if the LED is not lit or counter clockwise if the LED is lit until the LED flashes as the machine cycles.
8. After this pot is adjusted, release SW1 on 7PC3 and rotate the 8 LPI pot (P3) counter clockwise  $1\frac{1}{2}$  turns.

## 5AD

### BAND PICKUPS POSITIONING AND ADJUSTMENT

This procedure can be used to position the character and home pickups laterally as a unit and to adjust each pickup individually for pickup-to-band clearance. A pickup replacement procedure is not provided in this manual since replacement is quite easy. The pickups are mounted on a bracket which can be moved laterally after loosening its mounting screw. The mounting bracket slides in and is controlled by two guide pins underneath the bracket. Tolerances are such that, during lateral positioning, the pickup mounting bracket can be moved while the band is running. Do not exert inward pressure toward the band while the mount is loosened and check that a 0.005 inch minimum clearance is maintained between the band timing marks and the pickup pole pieces. Pickup-to-band clearance is adjusted by loosening the pickup mounting clamp and sliding the pickup back and forth in the mounting bracket.

The pickup can be replaced by loosening the clamp and unplugging its connector. Lateral adjustment of the pickup mounting bracket will cause printing to advance to the next character on the band.

#### Procedure

1. Make sure the band is tracking properly by performing the Band Pulley Alignment and Band Tracking procedure 5AS. Clean the inside surface of the band motor drive belt with alcohol.
2. Set the Phasing Control on the Control Panel to its midrange position.
3. If the mounting bracket is being replaced, scribe a reference mark on the bracket mounting surface along the left side of the bracket to mark its location. (See Figure 5-2). Locate the



new bracket on this reference mark. If the mounting bracket was removed without marking its location, set the mounting bracket in the middle of its travel and tighten the mounting screws.

4. Pickup-to-band clearance is adjusted with the band installed and the high point of the pulley circumference adjacent to the pickup. The pulley high point is usually marked by a blue spot. Set the pickup clearance by loosening the single screw at the top of the mounting bracket which clamps the pickup in place. (See Figure 5-3). With the pickup pole piece vertical (white dot on top), position the pickup 0.005 (0.127mm) minimum from the band timing mark. Tighten the clamp screw.
5. Install multiple part forms in the printer to prevent damage to the band while adjusting the pickups. Six part forms are recommended, but if not available other multiple part or very heavy (even card stock) forms can be used.
6. Position the Forms Weight Knob and the Print Position Knob to their mid range position.
7. Make sure the correct band speed is being checked by 7BP1 backplane switch SW3 being in the proper position: It should be open.
8. Turn the printer's power on and select an all one character printout in all columns. The character "M" is generally used, however, any wide character like "H" or "W" can be used to check for side clipping called phasing. If the one character pattern is sent from a processor system and the interface codes are not ASCII, then translators on the controller board are used to convert the codes to the internally used ASCII codes. If the printer's Test Print function is used, the character printed is selected by ASCII code on the controller board dip switches, this code may differ from the system's character code on non-ASCII code systems. Refer to the Technical Manual for switch set-up.
9. Start printing momentarily and check the printout. The selected character may be printing with either the left or right side missing or clipped. The wrong character to the left or right of the selected character may be printed, or a random pattern of one or the other of two characters may be printed. However, it is possible to be more than one character off from the selected character.
10. Loosen the bracket mounting screw enough to slide the bracket laterally until the selected character is printing in all columns. Mark the frame against the bracket with a felt pen.
  - Move the bracket in both directions until an adjacent character is printed, then center the

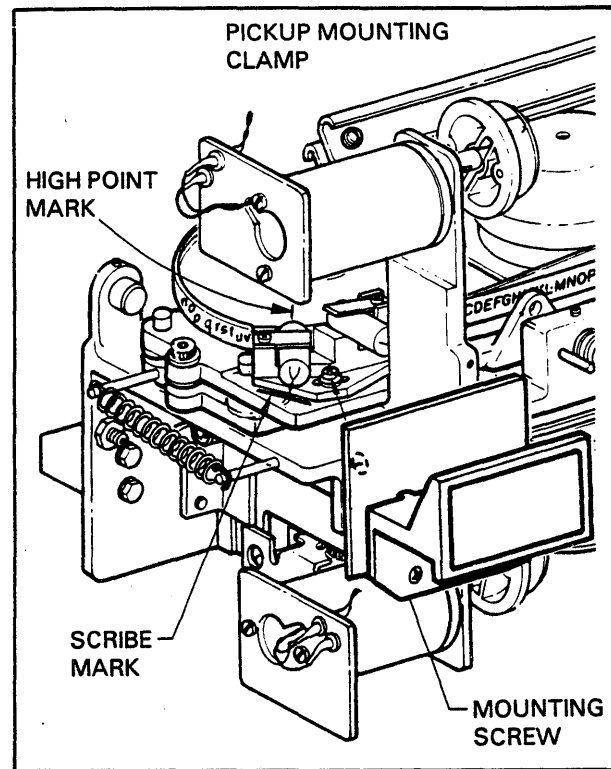


FIGURE 5-2. PICKUP MOUNTING BRACKET

bracket between these two points. Tighten the mounting screw.

**CAUTION**

**ALWAYS CHECK THE PICKUP TO BAND CLEARANCE BEFORE RESTARTING THE BAND.**

11. The pickups are properly adjusted when the selected character is printed across the page without any clipping of the sides of the characters. However, individual hammers may have incorrect flight time adjustments. Refer to 5AE if flight timing is necessary.
12. Check the polarity of the pickup wires and the pickup output amplitude by observing the waveform on a scope. Start the band running and connect the scope first to the Character pickup and then the Home pickup. Character pickup is monitored at 7PC3 TP-2. Home pickup is monitored at 7PC3 TP-25, ground reference at 7PC3 TP-1. The null or dwell crossing zero volts must be on the negative slope which means the lead polarity is correct. The negative excursion peak voltage must be as shown in Figure 5-4. If the waveform appears with rounder peaks, check the vertical alignment of the tip of the pickup.

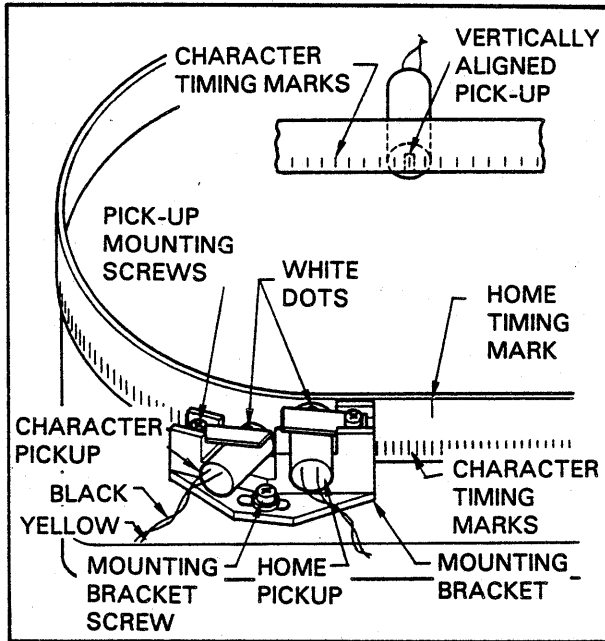


FIGURE 5-3. CHARACTER AND HOME PULSE ADJUSTMENTS

## 5AE

### FLIGHT TIME ADJUSTMENT

This procedure should be performed anytime there is evidence of horizontal clipping of print characters by individual hammers. Odd print columns are printed by the upper hammer actuators and even print columns are printed by the lower hammer actuators. If the wrong character is being printed, refer to Band Pickups Positioning and Adjustment, 5AD.

### Procedure for Upper Actuators (See Figures 5-5 and 5-6)

1. Open the bonnet.
2. Release and slide back the paper guide.
3. Check the horizontal position of the actuator plate assembly to be sure the pushrod tips are centered on the actuator ends across entire length of the bank. Loosen the three bolts holding the actuator plate assembly if centering is required and then recheck printout.
4. Initiate an all one character printout of "M"s. Adjust the Control Panel Phasing Control for best overall phasing of all hammers. Those hammers still clipping or with density variation will require adjustments.

### WARNING

NOISE LEVEL UNDER BONNET WHILE PRINTING MAY BE HAZARDOUS TO HEARING. KEEP EXPOSURE TO A MINIMUM.

5. For adjustment of a hammer column, slightly loosen the two screws holding the upper actuator in place.
6. Insert the flight time tool into the adjusting slot.
7. Move the actuator with the flight time tool until there is no evidence of horizontal clipping.

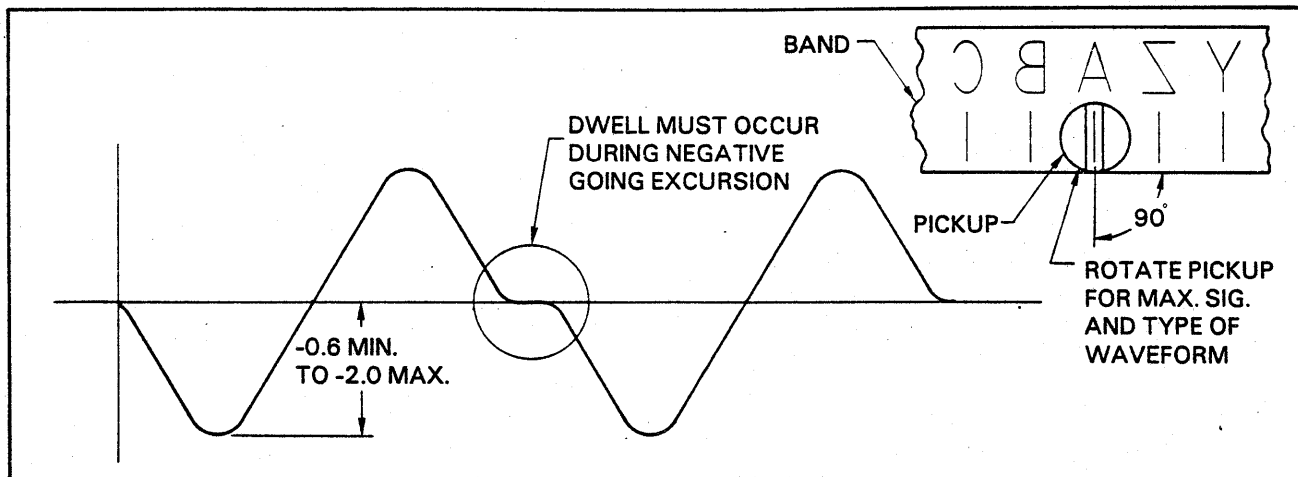


FIGURE 5-4. CHARACTER AND HOME PULSE WAVESHAPES

8. Rotate the Control Panel's Phasing Control to center the character so no clipping occurs.
9. While holding the upper actuator in its new position, torque the two screws to 20 in. lbs. (23 cm/kg).
10. Slide the paper guide back into position and latch.

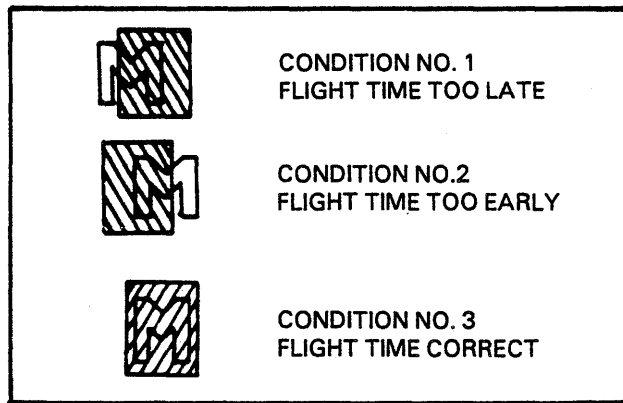


FIGURE 5-5. FLIGHT TIME CHECK

**Procedure for Lower Actuators (See Figures 5-5 and 5-6)**

1. Open the bonnet.
2. Release and slide back the paper guide.
3. Open the print gate and remove the inner throat plate.
4. Check the horizontal position of the actuator plate assembly to be sure the pushrod tips are centered on the actuator ends across the length of the bank. Loosen the three bolts holding the actuator plate assembly if centering is required and then recheck printout.
5. Tape the out of paper switch (which normally extends through the inner throat plate) closed.
6. Attach the flexible shaft assembly to the flight time adjusting tool.
7. Slightly loosen the two screws holding the lower actuator in place.
8. Insert the flight time tool into the actuator plate adjusting slot so that the tool is held in place by the grommet.

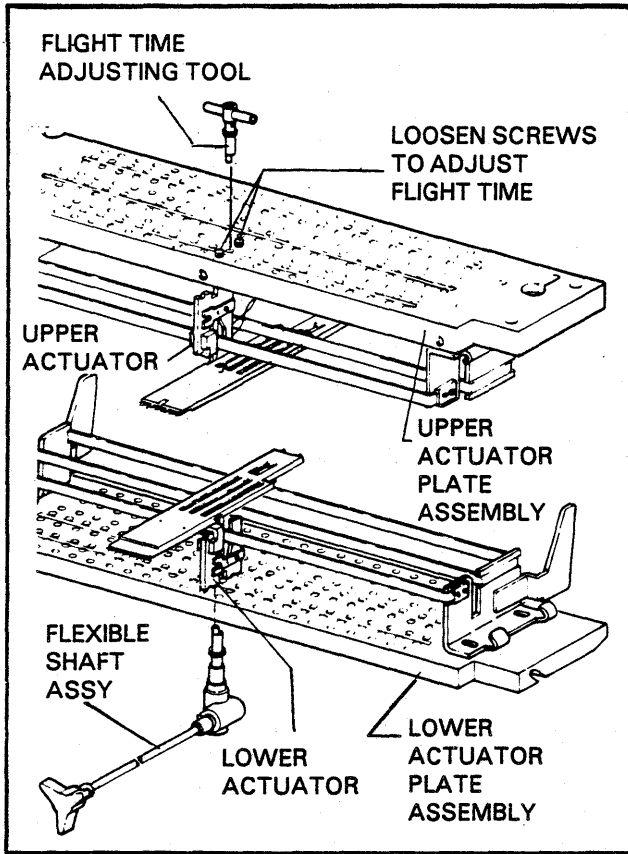


FIGURE 5-6. FLIGHT TIME ADJUSTMENTS

9. Close the print gate while holding the flexible shaft through the opening at the bottom of the gate.

10. Initiate and all one character printout of all H's or M's and adjust the Phasing Control for all columns.
11. Move the lower actuator (front or back) by rotating the flexible shaft until there is not evidence of horizontal clipping.
12. Rotate the Control Panel's Phasing Control to center the character so no clipping occurs.
13. While holding the lower actuator in its new position, torque the two screws to 20 in. lbs. (23 cm/kg).
14. Remove the tool and remove the tape from the out of paper switch.
15. Install the inner throat plate and return the paper guide back to its original position and latch it in place.
16. Return the printer to service.

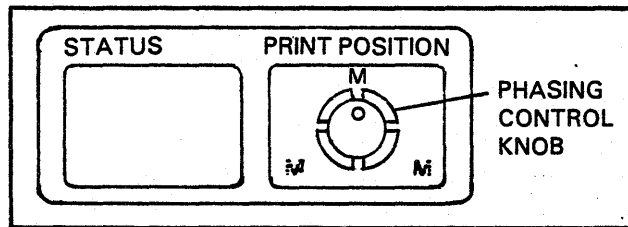


FIGURE 5-7. PHASING CONTROL ADJUSTMENT



## 5AF

### AC VOLTAGE/FREQUENCY MODIFICATIONS

The operating a.c. voltage and frequency can be modified by changing a frequency plug, reconnecting the transformer input/output wires, and selecting a voltage tap.

1. Determine the power source frequency and voltage. The source voltage must be single phase, two wire with the neutral ground. If the voltage varies the lowest value should be used when selecting a voltage tap.
2. Determine what the printer should be wired for from the tag on the back of the printer. Always verify the printer is still wired to match the tag by comparing the wiring to Figures 5-9 and 5-10. If the wiring appears to be different, determine by comparison to which configuration it is wired.

**60 Hz**  
100 or 120 vac - Figure 5-9

**50 Hz**  
220,240 vac-Figure 5-10

3. If a.c. power modifications are necessary make sure the power cord is unplugged or source power cable disconnected.
4. Make sure the frequency plug at the transformer is connected to the correct frequency jack.
5. Identify the wires coming from the transformer and connect them to the correct terminal on 1TB3 in the figure being used.

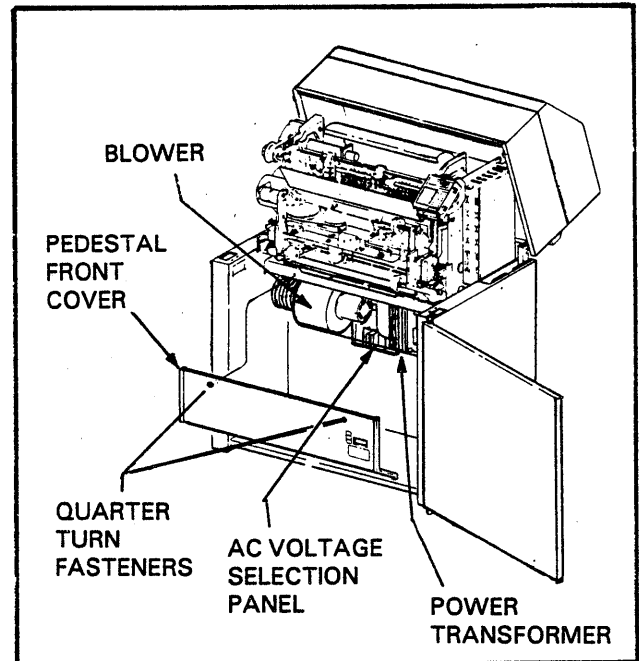


FIGURE 5-8. VOLTAGE SELECTION PANEL

6. Connect the brown (1) wire coming from the circuit breaker to the correct voltage tap on 1TB3 in the figure being used.
7. Recheck the connections. If correct, connect the power cable to the a.c. power source.
8. Apply power to the printer with the front circuit breaker.
9. Refer to Five Volt Adjustment procedure 5AB and adjust the +5 volts if necessary.

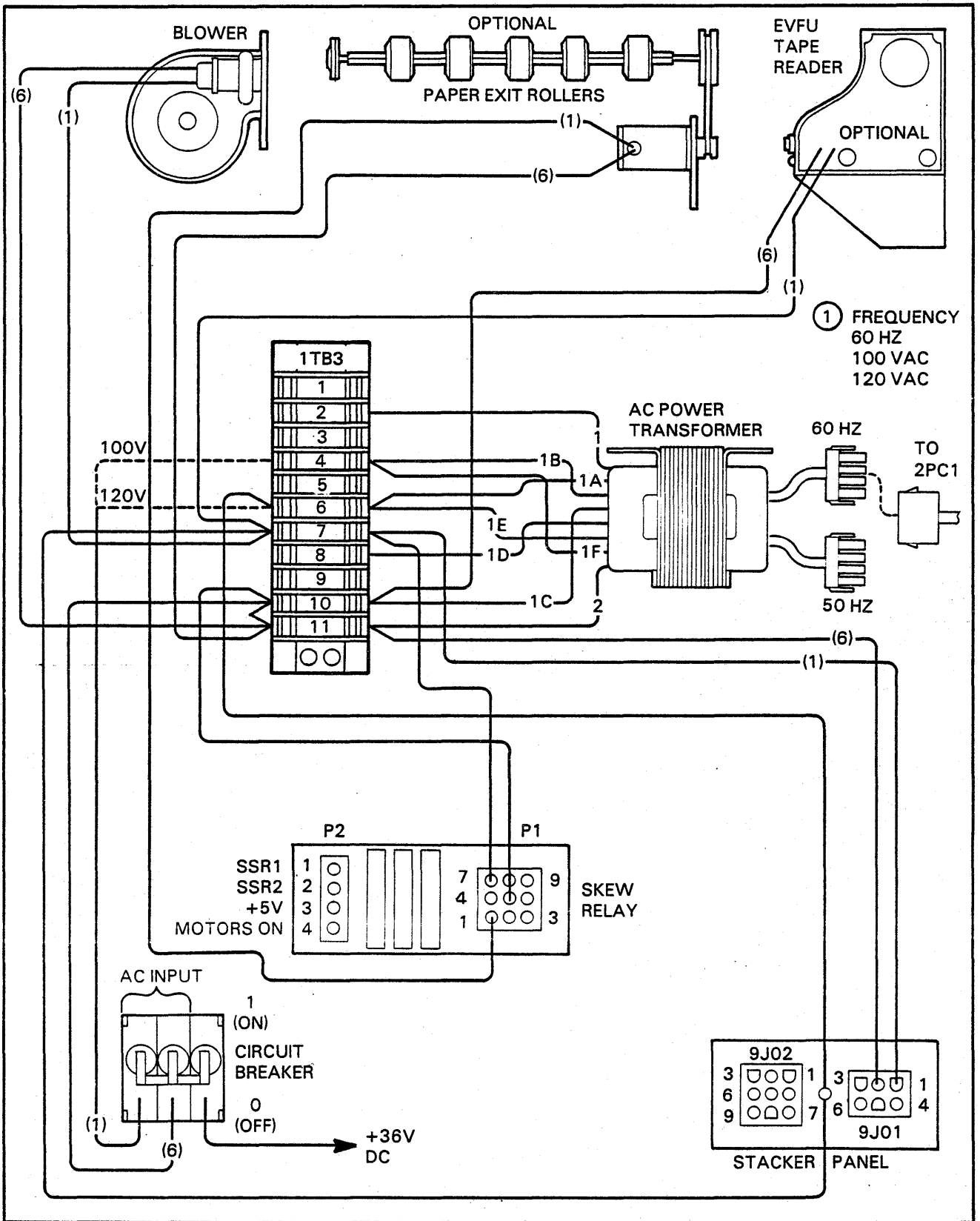


FIGURE 5-9. FREQUENCY 60 HZ - 100 OR 120 VAC

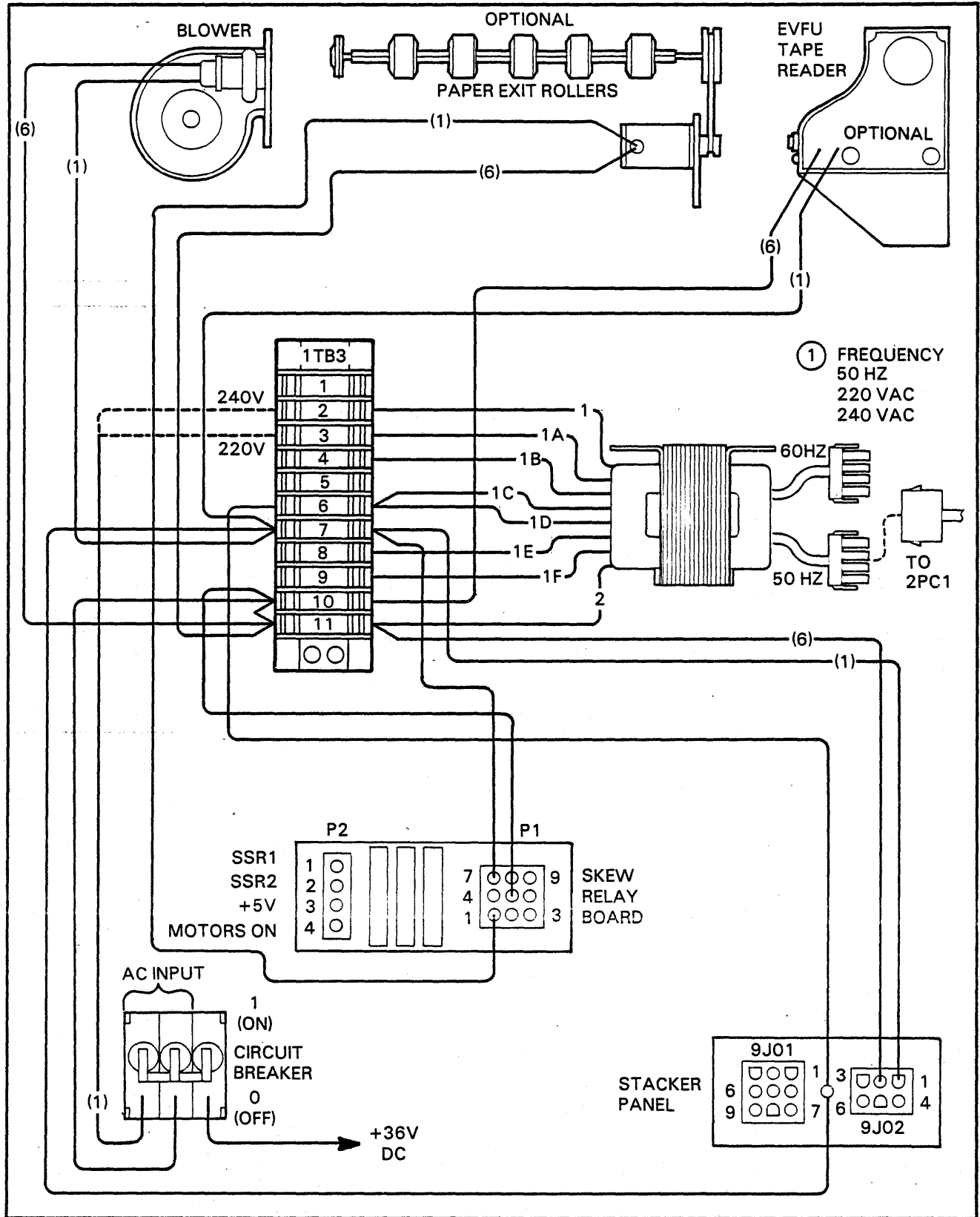


FIGURE 5-10. FREQUENCY 50 HZ - 220, 240 VAC

# 5AG

## ROM SET INSTALLATION FOR BAND TRANSLATION

The printer can accept standard print bands or non standard print bands. Print bands come in groups of 48, 64, 96, and 128 character sets. The band can be identified by counting the number of characters on the band between home pulses. Home pulses signify the beginning of a character set and appear as raised lines above the first character of that character set. There is one home pulse at the beginning of every character set on the band. Compressed pitch print bands have two home pulses at the beginning of every character set on the band. 48 character set bands have 8 sets of characters, 64 character set bands have 6 sets of characters, 96 character set bands have 4 sets of characters and 128 character set bands have 3 sets of characters.

Standard print bands are ASCII 64 or 96 character set bands. These bands do not require translation and no printer modification is necessary. Non standard print bands are all non ASCII bands. These bands require translation and are shipped with translator ROM's. These ROM's must be installed in the controller board 7PC2. When installing the ROM set, it is necessary to remove 7PC2. Before removing this board be sure the printer is powered OFF.

The controller board 7PC2 is accessed by opening the lower rear access panel and swinging out the lower card rack. Once the card rack is opened, remove 7PC2 printed circuit board and install the ROM set in locations E7 and F7: Location E7 for the lower four bits and location F7 for the upper four bits, see Figure 5-12. Once the translator ROM's are installed, select switch segments 1 thru 4 of SWN2 on 7PC2 to one of the following configurations, see Figure 5-11. These switches, when set, translate the character code on the band into standard ASCII character codes.

Enable the translation ROM set as indicated below:

SWN2 - Segments 1 thru 4

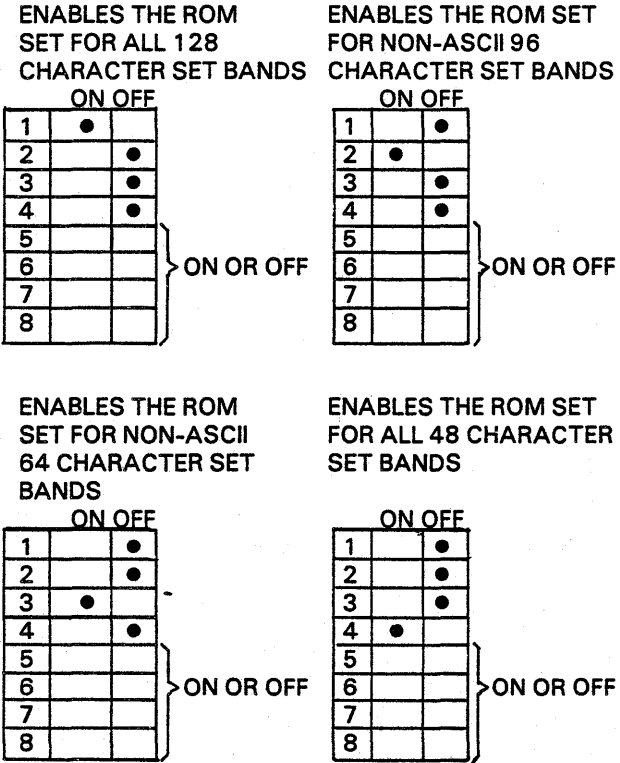


FIGURE 5-11. DIP SWITCH SETTINGS

If a print band is installed in the printer which requires translation, and a band which does not require translation is to be installed, it is not necessary to remove the translator ROM's. It is necessary, however, to turn OFF switch segments 1 thru 4 on SWN2. The ROM set is exclusive for one band only. For example, two different 128 character set bands require different ROM's to be installed on the 7PC2 board.

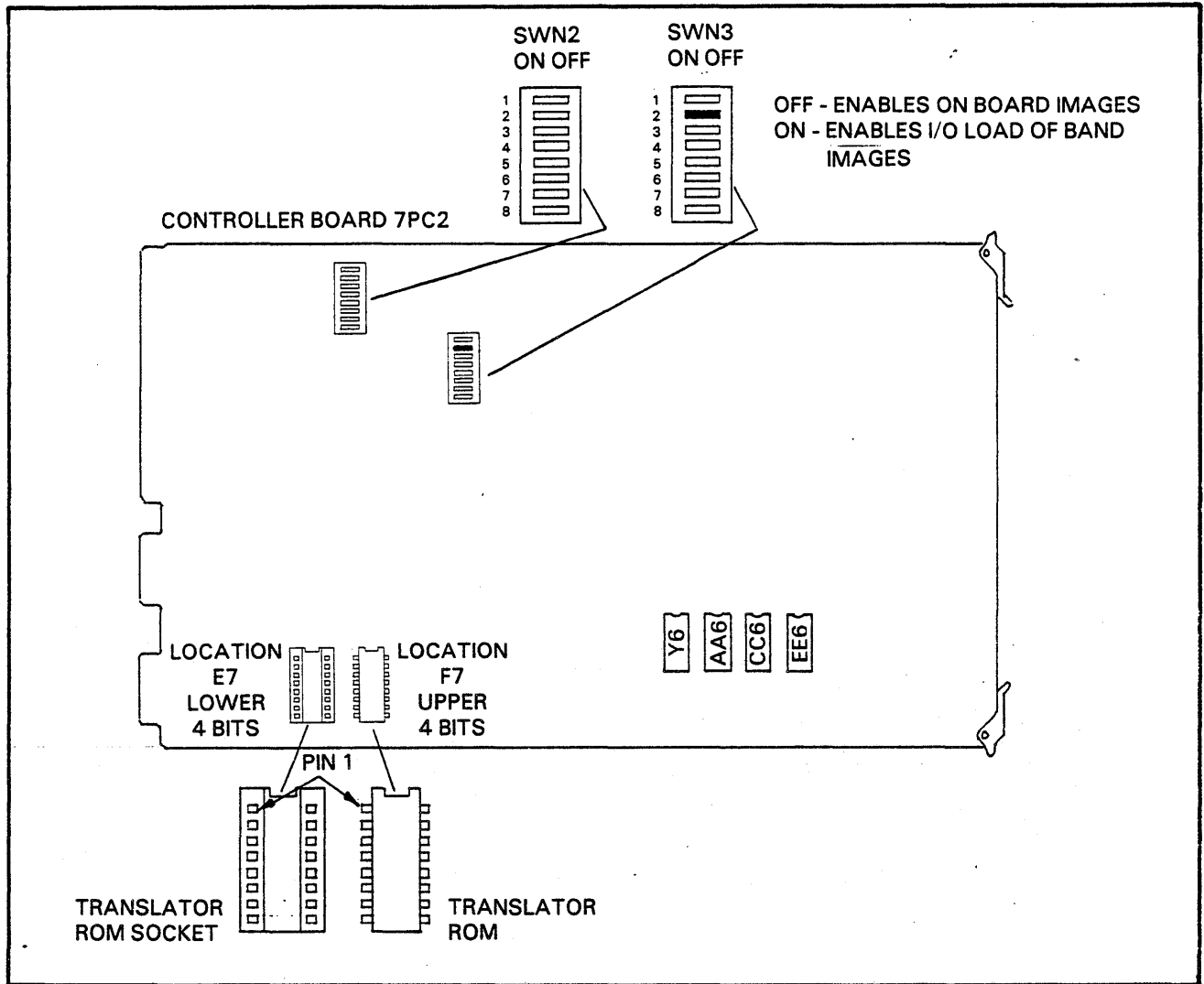


FIGURE 5-12. TRANSLATOR ROM SET AND BAND TRANSLATION SWITCH LOCATION

### Image ROM's (See Figure 5-12)

There are chip sockets available on the 7PC2 board that allow flexibility in the type of unique band or bands which can be used. Chips can then be installed in the sockets which provide the band image. The band image is defined as the band's character code set, its character sequence, and the band image identification number. During the printer's power-up sequence, the band image is sensed and ROM is scanned looking for that band's image.

The band image can also be loaded over the I/O into RAM (chip location AA6 on 7PC2) after SWN3-2 is turned ON. When SWN3-2 is turned OFF, it allows the image or images to be read from ROM. The RAM is volatile memory, the ROM is non volatile memory.

If the band being installed has one or two home pulse marks at the beginning of every font on the band, its corresponding ROM (if one is supplied with the band) is installed in location Y6 on 7PC2. If the band has a group of three or more home pulse marks anywhere on the band the band's ROM or ROM's are installed in either location CC6 or EE6 on 7PC2. SWN3-2 must be turned OFF to allow access to the ROM.

## 5AH

### LOGIC GROUND REFERENCE

The printer is shipped from the factory with logic ground isolated from frame ground. This may require changing if the system connects both logic and frame ground together. A system can also have ground currents set up by the grounding method used, called ground loops. It may sometimes be necessary to change the printer's logic and frame ground to be compatible with the system ground loops.

### Procedure (See Figure 5-13)

1. Release the upper bonnet latches.
2. Open the bonnet from the rear of the printer.
3. Release and lift the paper bail assembly.
4. Swing open the upper rear panel.
5. Remove and save the top nut and lock washers mounting the ground strap to the isolated ground stud next to the hammer driver boards.
6. Remount the ground strap to the frame grounding stud which is located directly below the isolated ground stud.

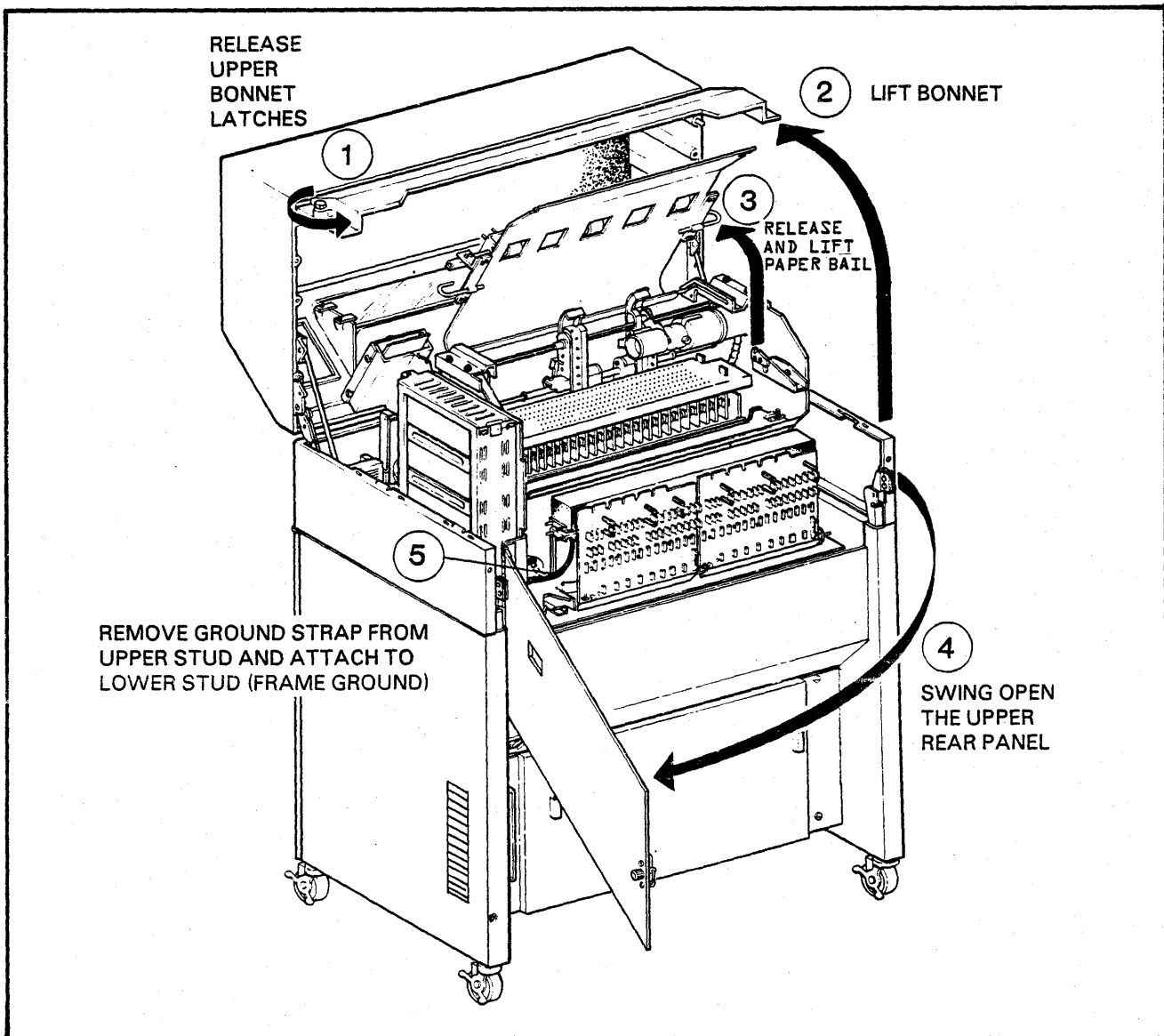


FIGURE 5-13. LOGIC GND TO FRAME GND REFERENCE

## MECHANICAL ADJUSTMENTS

### 5A1

#### PRINT QUALITY ADJUSTMENT

The object of the following procedure is to lead a customer engineer up the adjustment of the platen to the hammer faces (5AW), using print quality as a measurement of proper adjustment for the printer.

Before attempting adjustment of the platen adjust assembly, all other adjustments affecting print quality must be checked. If the printer's print quality is poor and any individual hammer flight time has been corrected, then the following procedures should lead a customer engineer to the point of adjusting the platen adjust assembly (Refer to Figure 5-24).

#### General Adjustment Overview

The following sequence is intended to provide a relationship of adjustment procedures. A complete set of these adjustment procedures follows in this section.

- A. The inner throat plate is set up to the hammer module mounting bar.
- B. The platen and band drive pulleys are set up to one another.
- C. The upper band guide (top edge guide) is set up to the platen's forms compression bar (lower band guide).
- D. The band pulley casting is adjusted to provide proper band tracking.
- E. The platen is set up to the hammer faces using print quality as a measuring device.
- F. The outer throat plate is set up to the platen.

#### Precautions:

1. Adjustment screws and nuts that have a colored substance applied at the factory should not be adjusted unless the adjustment is out of its specified tolerance.
2. Check the upper and lower actuator plate's residual strips for damage when print quality is a problem, refer to procedure 6AH.
3. Inspect the ribbon shield. A worn out or misaligned ribbon shield may cause form smudging, ribbon binding, paper jamming and degraded printing. See procedure 6AZ for proper ribbon shield installation. Paper jams that occur when the perforation catches on the lower edge of the shield may be eliminated by rubbing that edge smooth with very fine emery paper. If the lower ribbon shield has vertical lines or holes, or if there are vertical lines or fuzzy characters appearing on multi-part paper, check the positioning of the forms compressor blades; refer to 6AJ.

#### Adjustment Procedure Sequence:

The following procedure should be performed in sequence.

1. Perform the Paper Clamp Adjustment procedure 5AJ.
2. Perform the inner Throat Plate Adjustment procedure 5AK.
3. Perform Band Motor Belt Tension Adjustment procedure 5AM.
4. Perform Gate Latch Adjustment procedure 5AN.
5. Perform Platen To Band Pulley Alignment procedure 5AO.

6. Perform Band Pulley Location Adjustment procedure 5AP.
7. Perform Upper Band Guide Adjustment procedure 5AQ.
8. Perform Band Pulley and Tracking Adjustment procedure 5AS.
9. Perform Platen To Hammer Face Adjustment procedure 5AT.
10. Perform Outer Throat Plate Adjustment procedure 5AU.

## 5AJ

### PAPER CLAMP ADJUSTMENT

The clamp must be adjusted whenever it has been replaced or when misalignment occurs which may cause a waviness in the printed line or may tear the forms.

Procedure (See Figure 5-14)

1. Remove the inner throat plate.
2. Loosen the two adjusting screws that mount the magnetic paper clamp assembly to the inner throat plate. Loosen screws just enough so that the paper clamp assembly will slide in its adjusting slots, but does not wobble.
3. Place a straight edge against the two front surfaces of the clamp assembly.
4. Measure the distance from the inside edge of the straight edge to the upper front surface of the inner throat plate. Measurement should be taken at both ends of paper clamp assembly, just outside of the first and last module assembly.
5. Adjust the paper clamp assembly forward or backward to obtain a measurement of 0.005 to 0.015 in. (0.13 to 0.38mm) at both ends of clamp assembly.
6. Tighten magnetic paper clamp assembly mounting screws.
8. Check the paper out switch adjustment procedure 5AL.

## 5AK

### INNER THROAT PLATE ADJUSTMENT

The inner throat plate has been factory aligned and should not require realignment unless one or more of its locating brackets is knocked out of position.

Procedure (See Figure 5-15)

1. Open the bonnet from the front.
2. Open the print gate.
3. Remove the inner throat plate.
4. Place a straight edge along the front surface of upper and lower hammer module mounting bars. There are only two areas where this can be accomplished; one is before the first hammer module the other is after the last hammer module.
5. The measurement between the front of the hammer module mounting bars (the straight edge) and the outside of the lower locating bracket should be  $.304 \pm .005$  in ( $7.72 \pm .013$ ). This measurement should be obtained on both sides of the lower locating bracket.

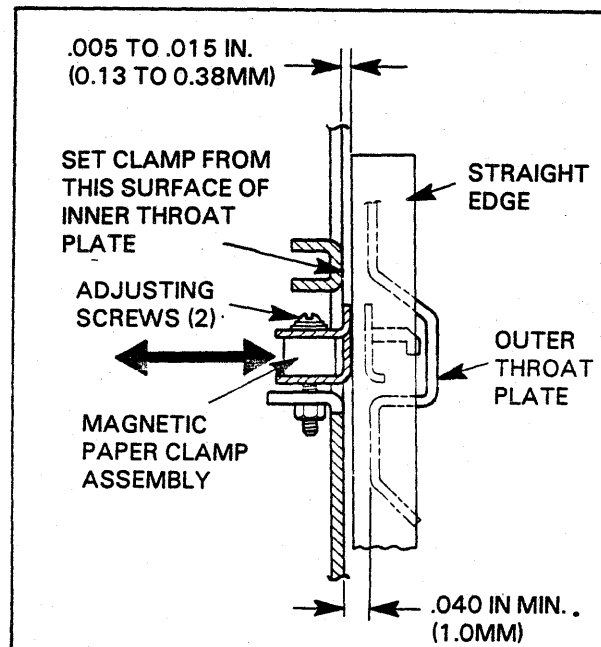


FIGURE 5-14. PAPER CLAMP ADJUSTMENT



6. If adjustment is necessary, loosen the two allen screws on both ends of the lower locating bracket and adjust both sides (in or out) until the measurement between the front of the hammer module mounting bars and the outside of the lower locating bracket is  $.304 \pm .005$  in. ( $7.72 \pm .013$  mm). This measurement should be taken as close as possible to the base of the inner throat plate. Retighten the two allen screws.
7. Reinstall the inner throat plate.
8. Check to make sure the upper portion of the inner throat plate is properly seated (flush) against the four stop surfaces located above and below the hammer bank (both sides). If it is not, adjustment is necessary.
9. With the inner throat plate locked into position, loosen the two adjusting bracket allen screws (four total) attached to the left and right hammer bank structure side frames.
10. Push the inner throat plate until it makes contact with the stop brackets.
11. Retighten the four allen screws in their new position.
12. Perform the Paper Out Switch Adjustment procedure 5AL.

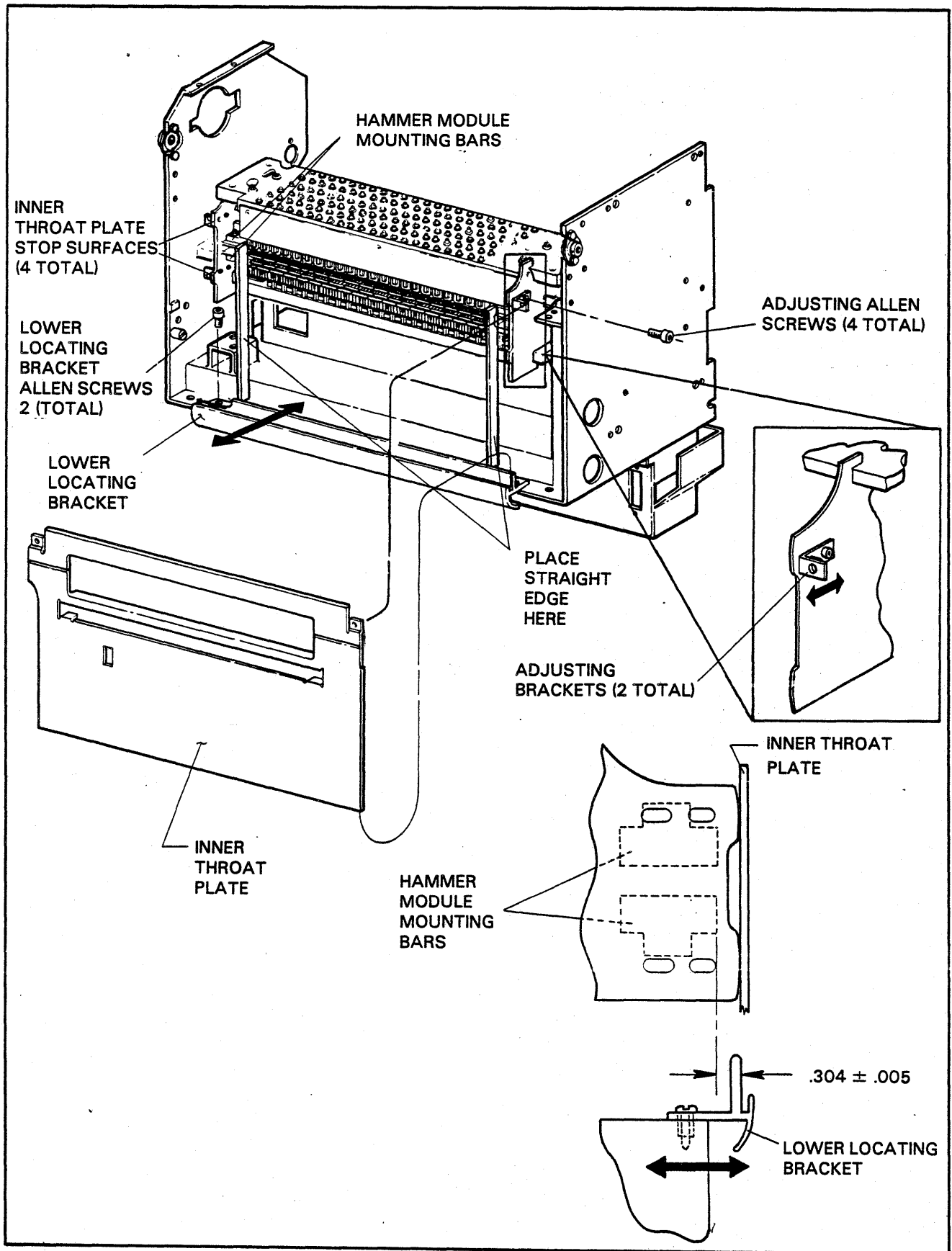


FIGURE 5-15. INNER THROAT PLATE ADJUSTMENTS

## 5AL

### PAPER OUT SWITCH ADJUSTMENT

The paper out switch must be adjusted whenever the inner throat plate is readjusted.

#### Procedure (See Figure 5-16)

1. Open the front door of the printer.
2. With the gate closed, insert feeler gauges up between the inner and outer throat plate below the area of the paper out switch, take a measurement and record.
3. Open the print gate and measure the distance from the tip of the switch plate assembly to the front surface of the inner throat plate. If the tip of the switch plate is set inside the front surface of the inner throat plate, add that distance to the measurement performed in step 2. If the tip of the switch plate is set outside the front surface of the inner throat plate subtract that distance from the measurement performed in step 2.
4. If the measurement obtained in step 3 is .040 in. minimum (1.02mm), no adjustment of the paper out switch is necessary.
5. If adjustment is necessary, remove the inner throat plate by releasing the two quarter turn fasteners. Loosen the two switch plate mounting screws and slide the switch plate assembly in or out until the distance between the tip of the switch plate assembly and the outside front surface of the inner throat plate added to or subtracted from the measurement taken in step 2 (the total measurement) is .040 in. (1.02mm) minimum.
6. Reinstall the inner throat plate.
7. Close the gate and recheck the adjustment.
8. Run a functional test using single and multi-part forms to make sure the switch is operating properly. If not, repeat procedure.

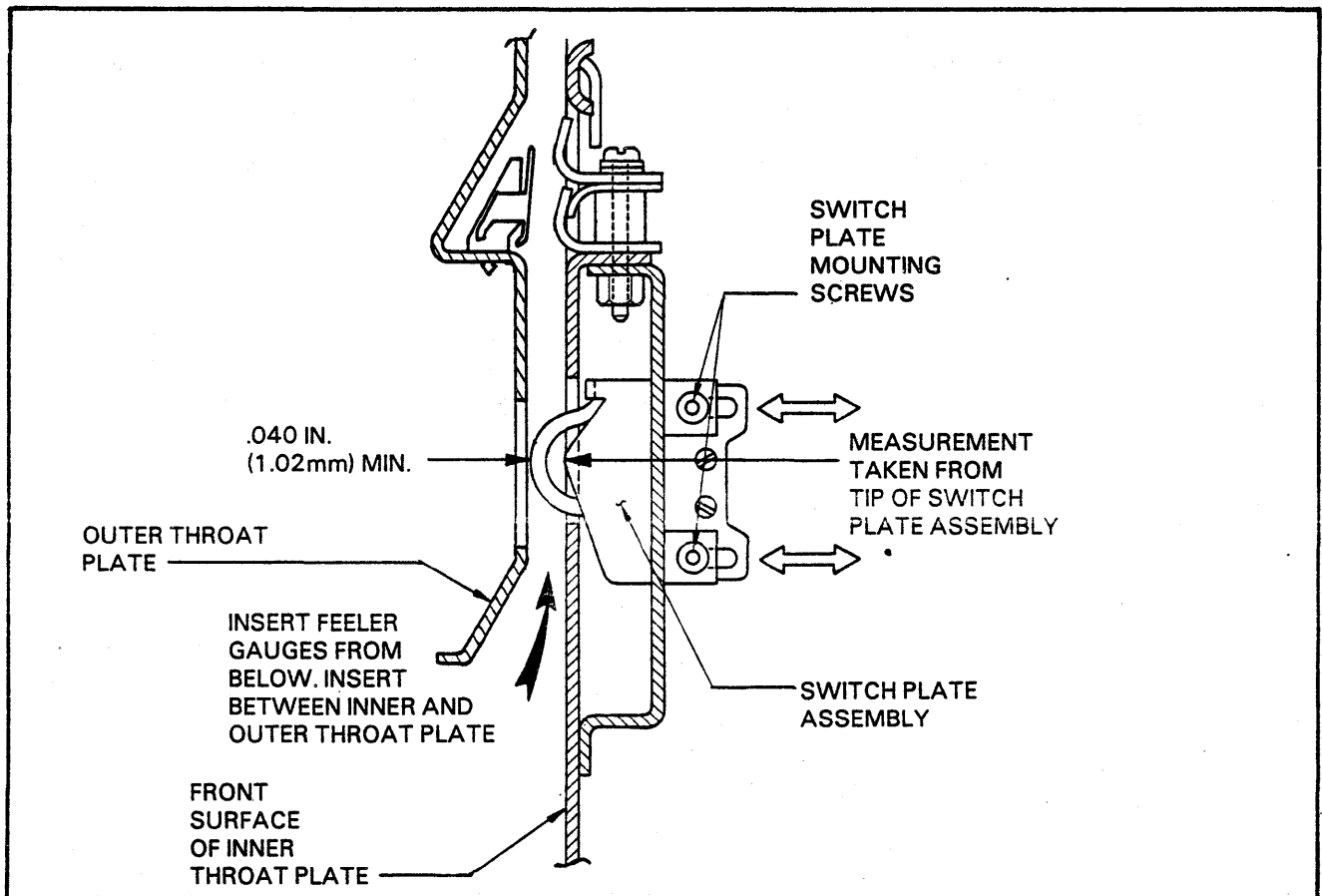


FIGURE 5-16. PAPER OUT SWITCH ADJUSTMENTS

## 5AM

### BAND MOTOR BELT TENSION ADJUSTMENT

The band motor belt tension must be adjusted whenever the belt is replaced or the motor mounting plate is moved. Tension should be checked whenever the band timing seems unstable or when the belt shows excessive wear. The spring scale shown in Table 3-3 is used in this adjustment.

#### Procedure (See Figure 5-17)

1. Open the print gate.
2. Remove the ribbon and band.
3. Make a mark on the spring scale shaft 0.15 in. (3.8mm) from the tip of the shaft.
4. Lay a straight edge on the outer surface of the band pulleys where the band contacts both pulleys.
5. At a point midway between the pulleys, depress the belt with the end of the spring scale until the mark on the shaft is aligned with the inside edge of the straight edge (0.15 inch. belt deflection).
6. From the spring scale, read the force necessary to achieve this deflection.
7. If the force is not between 1.0 and 1.5 pounds (0.454 to 0.680 kg.), loosen the four motor mounting plate mounting screws and move the motor mounting plate to obtain the proper tension. Make sure there is some clearance left between belt and platen.
8. Tighten the four mounting screws.
9. Replace the band and ribbon.

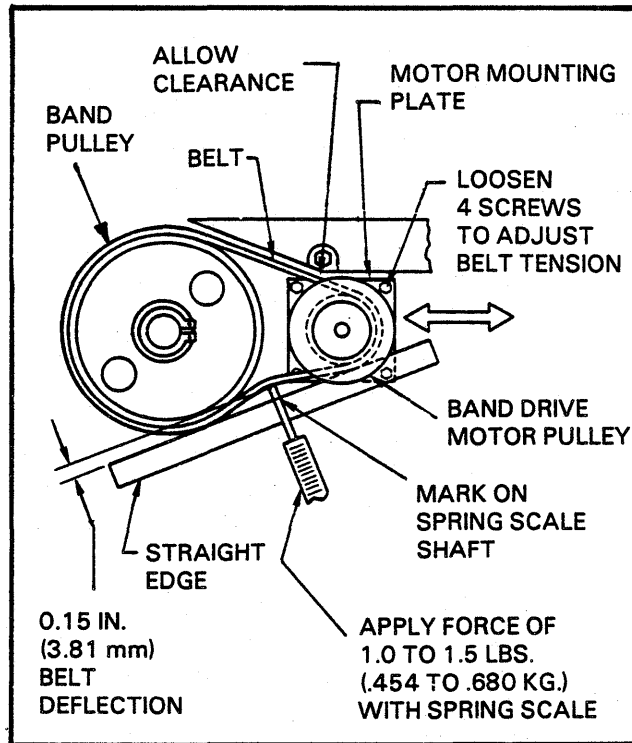


FIGURE 5-17. BAND MOTOR BELT TENSION

## 5AN

### GATE LATCH ADJUSTMENTS

The gate latch must be set so the gate is held securely against the gate stop. If it isn't, print quality will be affected and the gate will not open or close properly. Also, the print gate switch must be properly adjusted to prevent loss of Ready mode or damage to the switch.

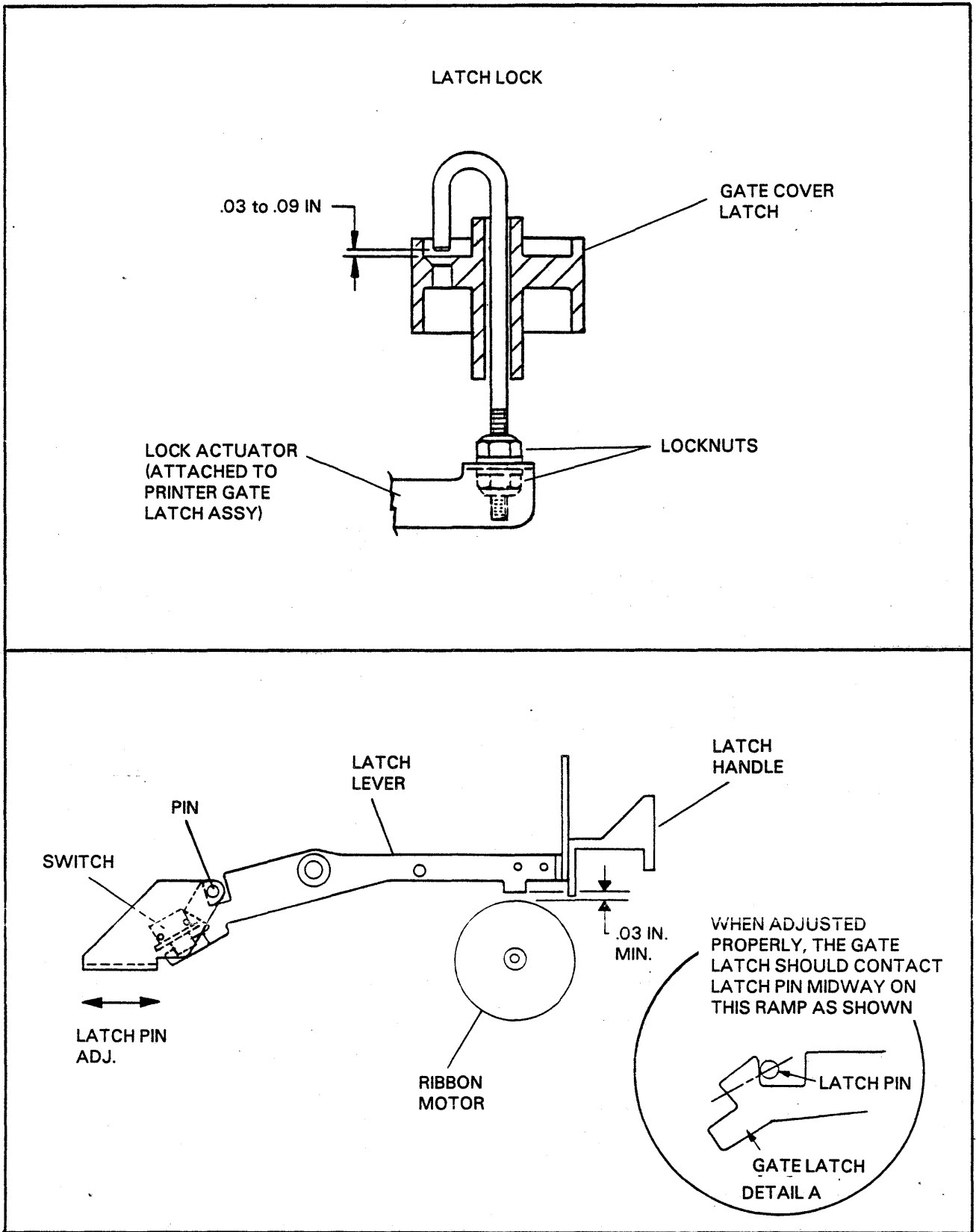


FIGURE 5-18. GATE LATCH AND SWITCH ADJUSTMENTS

### Gate Latch Adjustment (See Figure 5-18)

1. Open the print gate.
2. Remove the inner throat plate.
3. Loosen the latch pin bracket mounting screws enough to allow adjustment by tapping.
4. Lift the gate latch handle to lower the gate latch enough so that when the gate is closed, the gate latch will clear the latch pin. Close the gate and release the gate latch handle so the latch is hooked over the latch pin.
5. Repeating step 4, adjust the latch pin bracket until the gate latch and latch pin are aligned as shown in detail "A" of Figure 5-18. When the gate is adjusted properly, there should be no play between the gate stop and the gate stop screw (See detail "A" of Figure 5-18) and the gate latch should be contacting the latch pin midway on the latch ramp. After the gate is closed, a 1.030 min. gap should be maintained between the lever latch and ribbon motor.
6. Tighten the latch pin bracket mounting screws.
7. The print gate switch must be adjusted so that when the gate is in the closed position, the latch actuates the switch but does not bottom it out. Adjust the switch plate assembly if necessary by loosening its two mounting screws.
8. Open the center ribbon cover by pulling up on the gate latch while pulling on the ribbon cover.

9. Using the two locknuts located on the threaded end of the latch lock, adjust the height of the latch lock such that with the printer's gate latch handle in the raised position, the rounded end of the latch lock is positioned .03 to .09 inch above the hole in the gate cover latch, but is not above the end of the rim. Allow a slight clearance (.03 in. max) between the two locknuts and the lock actuator to avoid binding.
10. Reinstall the inner throat plate.

## 5A0

### PLATEN TO BAND PULLEY ALIGNMENT

This procedure must be performed if either of the band pulleys are replaced or if the platen is replaced. This adjustment affects the tracking of the band across the platen surface and may affect print quality.

#### Procedure (See Figure 5-19)

1. Open the gate and outer throat plate.
2. Open the center ribbon cover.
3. Remove the ribbon and band.
4. Turn the band tension lever counter clockwise to take tension off the band and rotate the band pulleys so that the high point of each pulley (marked with ink on the top surface of each pulley) is located as shown. Release the band lever and rotate the band to assure that it is seated properly.

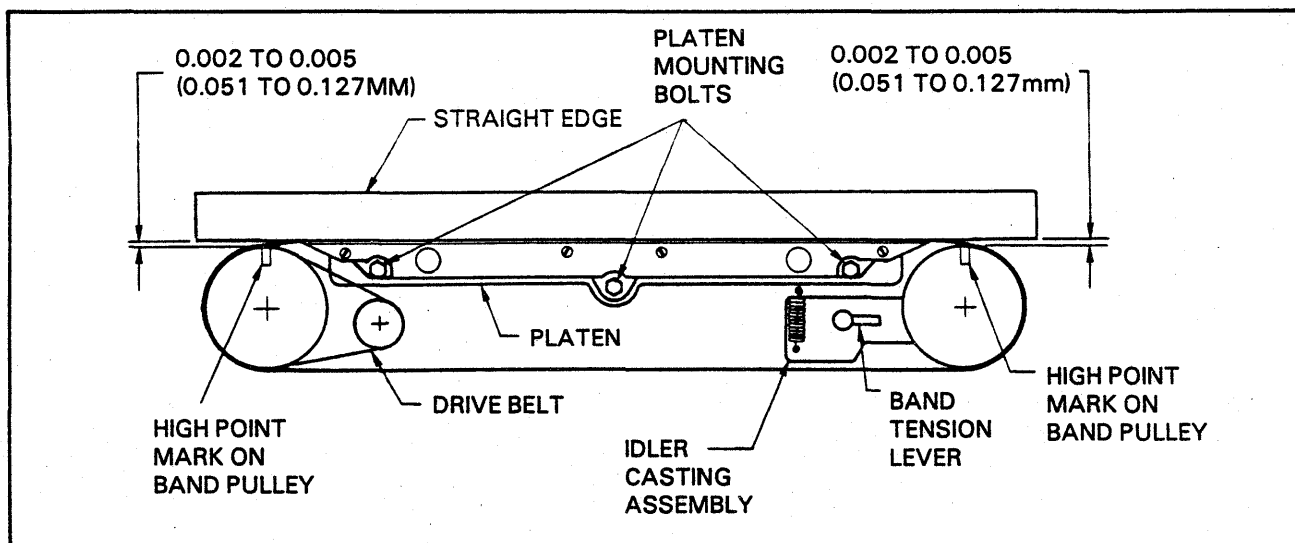


FIGURE 5-19. PLATEN TO BAND PULLEY ALIGNMENT

5. Rotate the band so that both of the high point marks on the band pulleys are located as shown.
  6. Tighten the latch pin bracket mounting screws.
  7. The print gate switch must be adjusted so that when the gate is in the closed position, the latch actuates the switch but does not bottom it out. Adjust the switch plate assembly if necessary by loosening its two mounting screws.
  8. Open the center ribbon cover by pulling up on the gate latch while pulling on the ribbon cover.
  9. Loosen the three platen mounting bolts and move the platen in or out as required.
  10. Tighten the three mounting bolts and repeat Steps 4 through 10 until the clearance specified in Step 7 is obtained.
  11. Perform the Band Pulley Location Adjustment procedure 5AP.
3. Hold a 0.04 in. (1.02mm) feeler gauge against the bottom surface of the upper band edge guide so that it overhangs the floating band pulley.
  4. Move the snap ring vertically on its shaft so that the top of the band pulley flange is flush with the bottom surface of the feeler gauge. The clearance between the bottom of the upper band edge guide and the top of the band pulley should be  $0.04 \pm 0.02$  in ( $1.02 \pm 0.51$ mm).
  5. Repeat the adjustment procedure on the other pulley.
  6. Perform the Upper Band Edge Guide Adjustment procedure if necessary.

## 5AP

### BAND PULLEY LOCATION ADJUSTMENT

The band pulley location (height) must be adjusted whenever one of the pulleys is replaced. If this adjustment is not within the desired range, the vertical registration of the print characters may be affected.

#### Procedure (See Figure 5-20)

1. Remove the print band.
2. Remove the band drive belt by rotating band pulley and working belt off pulley.

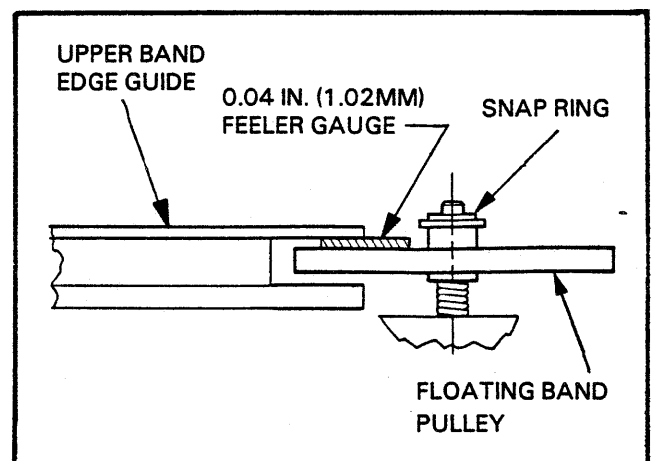


FIGURE 5-20. BAND PULLEY LOCATION ADJUSTMENT

## 5AQ

### UPPER BAND EDGE GUIDE ADJUSTMENT

This procedure must be performed whenever the upper band edge guide is replaced, removed, or if the platen is replaced.

#### Procedure (See Figure 5-21)

1. Open the print gate and outer throat plate.
2. Open the center ribbon cover.
3. Loosen the four screws that hold the upper band edge guide to the top of the platen and slide the band edge guide toward the front of the printer.
4. Hold an 0.011 in. (0.279mm) feeler gauge against the surface of the plastic strip on the face of the platen. Press a straight edge against the lower band edge guide and the feeler gauge.
5. Move the front surface of the upper band edge guide so that it is in contact with the straight edge.
6. Repeat Steps 4 and 5 at the opposite end of the platen.
7. Tighten the four band edge guide mounting screws. Tighten screws to 14 to 18 in. lb. torque.
8. Replace the band.
9. Close the outer throat plate and print gate.

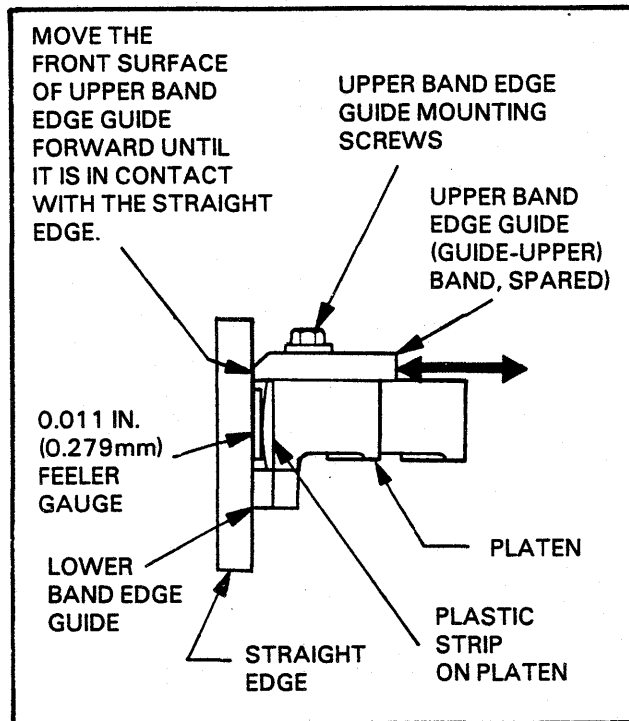
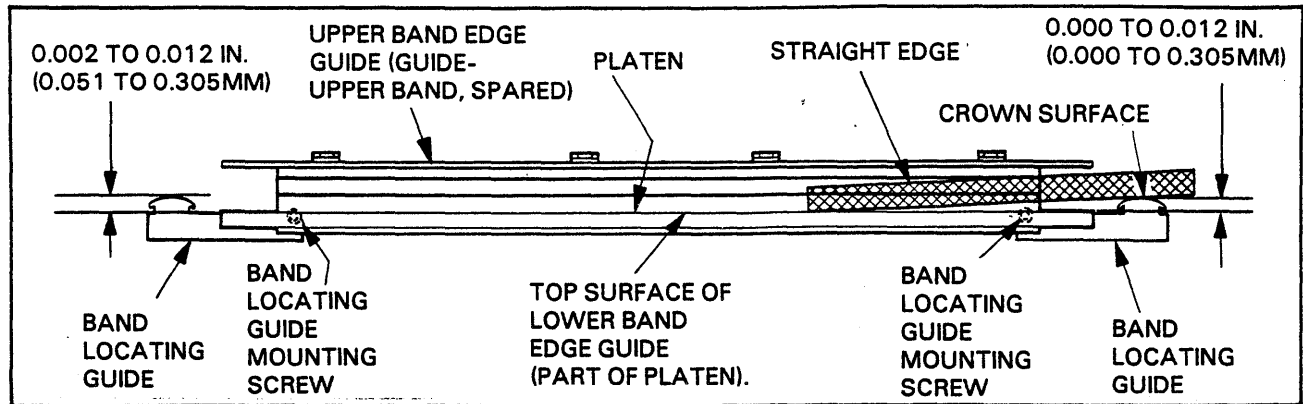


FIGURE 5-21. UPPER BAND EDGE GUIDE ADJUSTMENT





## 5AR

### BAND LOCATOR ADJUSTMENT

The band locators prevent damage to the band during band loading. If they are adjusted too high or too low the band could catch on the upper or lower band edge guides.

#### Procedure (See Figure 5-22)

1. Open the print gate and outer throat plate.
2. Open the center ribbon cover and remove the ribbon and the band.
3. Lay a straight edge on the top surface of the lower band edge guide section of the platen. Slide it along this surface until it contacts the crowned surface of the band locator.
4. Adjust the crowned surface of the band locating guides so that they are 0.002 to 0.012 in. (0.051 to 0.305mm) above the top surface of the lower band edge guide as shown in Figure 5-22.
5. Adjustment of the band locating guides is accomplished by loosening the band locating guide mounting screws on the back of the platen and moving the guides up or down as required.
6. Tighten the band locating guide mounting screws after adjustment.
7. Replace the band and ribbon.

## 5AS

### BAND PULLEY AND TRACKING ADJUSTMENT

This procedure should be performed anytime band tracking is in question or parts have been replaced, like a band pulley or pulley bearing. This procedure will maintain band interchangeability and determine a band with poor trackability due to damage or change in characteristics due to age.

When more than one band is available for use, they should be checked for tracking. The first requirement is that all bands track across the front of the platen, riding with their upper edge against the upper band edge guide which is bolted to the top of the platen. Bands are not required to touch the upper band edge guide across its full length across the platen, but must contact the upper guide within two inches at both ends. If certain bands fail to track they should be set aside for the purpose of this test as possible bad bands. If all or a great majority of the bands fail to track then its safe to say the printer's tracking requires adjustment.

#### Tracking Check Procedure

1. Open the print gate, remove the ribbon and band covers. Clean the inside surface of the band drive belt with alcohol.
2. Install a band for a tracking check. If this is not the band on the printer, make a note of the band installed so it can be replaced after testing.

3. Perform the Band Pickups Positioning and Adjustment procedure 5AD in this section to ensure that the band does not hit the reluctance pick-ups.
4. Rotate the band motor pulley counter clockwise until the band is in contact with the bottom surface of the upper band edge guide. The band may not contact the upper band edge guide the full length of the platen. The band must, however, contact the bottom of the upper band edge guide within two inches of both ends of the upper band edge guide. Any clearance between the upper band edge guide and the top of the print band in other areas must not exceed 0.007 in. (0.173mm) across the platen.

Refer to the side view of the platen shown in Figure 5-23, Tracking Check. If contact at both ends of the upper band edge guide cannot be obtained by rotating the band, install another band. If more than 0.007 in. (0.173mm) is found between the top of the band and the upper band edge guide, install another band. If all bands exhibit the above problems then band tracking is misadjusted or the upper band edge guide may require replacement.

5. Power the printer on and run the band for 30 seconds to allow the floating band pulleys to position themselves within the print band. Power printer off. If the tracking is so bad the band jumps off the upper band edge guide proceed to the Belt Tracking procedure following.
6. Power the printer OFF and wait for band to stop.
7. Without touching the band or pulleys, check to see if the upper edge of the band is touching the platen within two inches of both ends. If the band does not track against the upper band edge guide then another trackable band should be tested if possible.

If band tracking appears marginal and not the fault of the bands, then proceed with belt tracking and pulley tracking procedures following.

### Belt Tracking Procedure

Drive belt tracking affects band tracking. If bands fail to track, band motor belt tension must be checked using the preceding procedure 5AM. Belt tension will side load the pulley and the band motor shaft causing some variation in belt tracking. When belt tension is correct belt tracking can be checked as follows:

1. Remove the ribbon. Open the gate and outer throat plate.
2. Run the band for 30 seconds as in the Tracking Check using the gate switch. If band tracking is so bad the band jumps off, perform the following procedures before adjusting tracking; 5AO, 5AP and 5AQ. Also check to see that the pulley can float up and down without binding on its shaft, if it binds replace the pulley. If after performing the procedures the band still jumps off, use the band tracking adjustment screws shown in Figure 5-23 to lower the band if its jumping off the top of the pulleys. If the band is riding too low, raise the band tracking. Turning the screws CW will cause the band to ride down lower, and CCW will raise the band.
3. If the band can be tracked against the upper band edge guide, which may require the adjustment of the band tracking adjustment screws as described in the previous step, then check the belt tracking. If band tracking cannot be obtained continue through step 4 and then repeat steps 2 thru 4. The belt tracking is correct when centered on the band pulley, however, tracking is acceptable if the belt racks up to 0.010 inches above or below the pulley edge as shown at the top of Figure 5-23. This check can be made without removing the band by checking between the band pulley and the motor flywheel, where the band and belt separate on the pulley.
4. Correcting belt tracking is performed by adding, removing or swapping the position of shims between the casting and the plate to which the motor is mounted. Refer to the Parts Manual for the Assy. Platen Adjust view. The shims used are part numbers 446843992 (0.005), 44684993 (0.010).

### Pulley Tracking Procedure

This procedure assumes the printer has bend tracking problems or that bands cannot be interchanged without adjusting the tracking screws. Always remember that bands can be skewed so as not to track properly. Tracking should not normally be adjusted so one band will track perfectly. Band tracking is a mid-ranging adjustment so all bands without a tolerance range will track when bands are interchanged.

This adjustment is based on setting a mean band dimension within a tolerance range of a calculated center reading. The calculated center reading is provided in the steps below along with the tolerance. The mean reading is calculated from a

band installed right side up and then upside down. The two measurements of the two band positions are then subtracted from each other, divided by two, and the number is then added to the smallest measurement to obtain a mean dimension. The mean dimension is then compared to the center reading. If the mean reading is within the tolerance given, band tracking is acceptable. If unacceptable the band tracking screws are adjusted to bring the mean reading within tolerance of the center reading.

The tracking is calculated at both pulleys using the best band available, which is the one with the closest two readings of right side up and upside down. Measurements taken are only valid if the band is tracking against the upper band edge guide at the time of measurement. If the band tracks one way and does not track when flipped over, tracking must be adjusted until the band tracks in both positions.

1. Run the band for 30 seconds as performed in Belt Tracking before making the following measurements. When the band stops make sure it is tracking against the upper band edge guide.
2. Gently place a ruler on the top flange of the band pulley, behind the band, and in an area where the band is in contact with the pulley surface. Refer to Figure 5-23. Note the distance from the top flange edge on the band pulley to the top edge of the band. Record the measurement as one of the numbers for calculating the mean dimension. Perform the same measurement on the other pulley labeling the reading left and right pulley.
3. Remove the band, turn it upside down and reinstall on the printer. Run the band for 30 seconds, check tracking, and make a second set of readings for the left and right pulleys.
4. Subtract the two left readings and then the two right readings. Divide both results by two. Refer to example. Add the results to the lowest band position readings (see note). The answers are the mean reading for the two pulleys. The mean readings are now compared to the calculated center reading with its tolerance, which is the band tracking range.

### EXAMPLE

	LEFT PULLEY	RIGHT PULLEY
BAND RIGHT SIDE UP	0.165	0.170
BAND UPSIDE DOWN	0.190	0.185
SUBTRACTED DIFFERENCE	0.025	0.015
DIFFERENCE DIVIDED BY 2	0.0125	0.0075
LOWEST READING	0.165	0.170
ADDED	0.1775	0.1775
MEAN READING RESULT	←	→

CENTER READING 0.125 Tolerance  $\pm 0.015$  inches  
(METRIC) 3.175mm  $\pm 0.381$ mm  
TRACKING RANGE 0.140 to 0.110 inches  
(METRIC) 3.556 to 2.794 mm

### NOTE

If the lowest reading on one pulley is the high reading at the other pulley, then the high reading is subtracted with the "Difference Reading Divided By 2" in the example to get the mean reading.

5. The readings in the example show the tracking of the band is too low on the pulley. Use the band tracking adjusting screws shown in Figure 5-23 to adjust the mean reading within the band tracking range. Turning the adjustment screw clockwise will cause the band to ride down on the band pulley. Turning the adjustment screw counter clockwise will cause the band to ride up on the band pulley.
6. Repeat steps 1-5 until both mean readings are within the tracking range.
7. Replace the original band and ribbon.

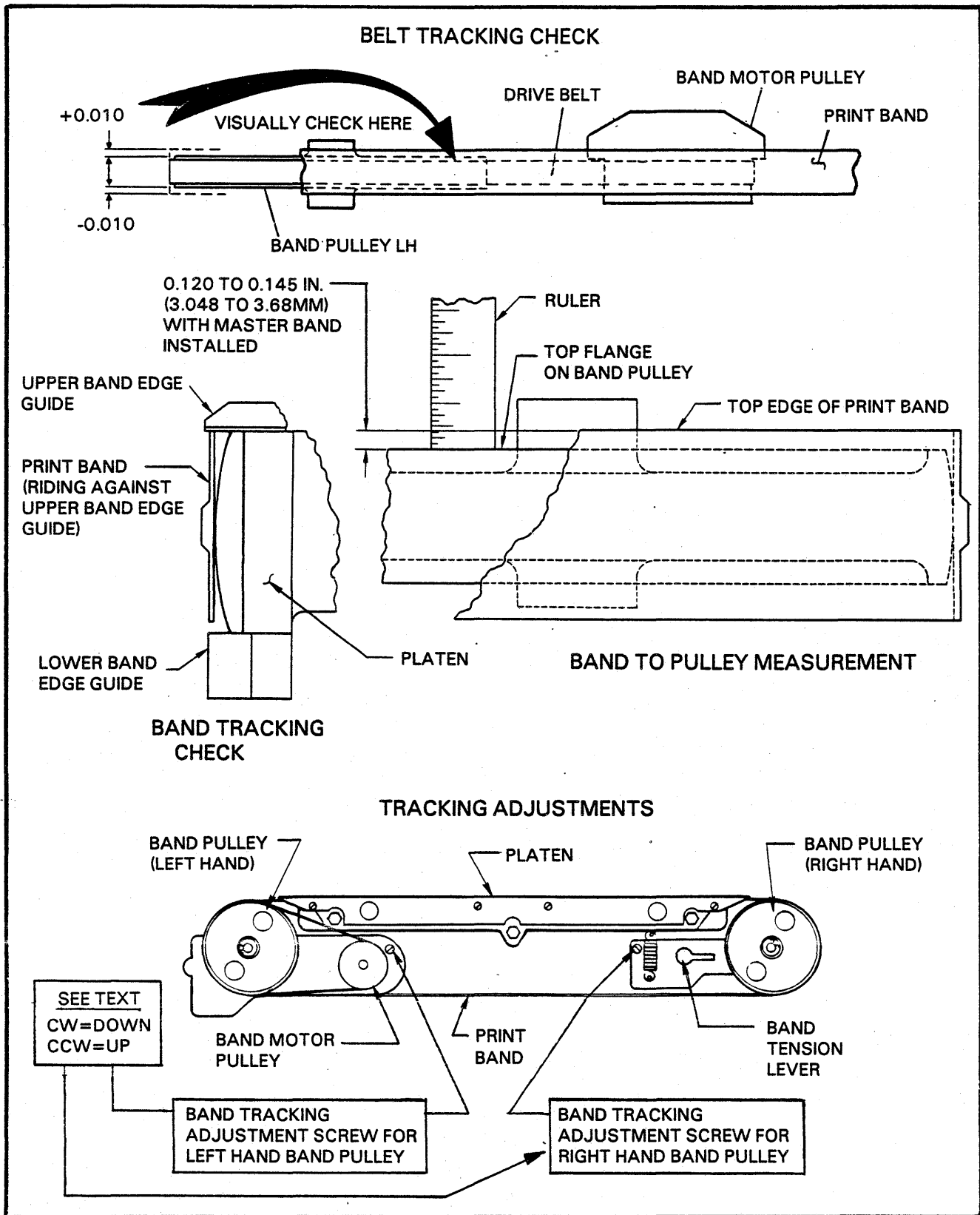


FIGURE 5-23. BAND PULLEY AND TRACKING ADJUSTMENT

## 5AT

### PLATEN TO HAMMER FACE ADJUSTMENT

Since these adjustments cannot be done mechanically in the field without special gauges and fixture, a method using output print quality as the criterion for proper registration is used instead. Two adjustments must be made, one is a vertical adjustment and the other is a horizontal adjustment. The horizontal adjustment must be done first.

#### Horizontal Adjustment (See Figure 5-24)

The distance between the print band and the hammers affects top and bottom character density. If the platen and band are too far from the hammers the character printout will be light on top. If the platen and band are too close to the hammers, character printout will be light on the bottom. Paper jams may occur on printers that have the platen and band too close to the hammers.

The Horizontal adjustment of the platen to the hammer faces is made by turning the two throat adjusting screws mounted on the front of the gate support assembly. These two adjusting screws move the spring loaded platen adjust assembly in and out on the gate support assembly.

1. Power the printer OFF and open the center ribbon cover.
2. Loosen the crank arm clamp screw on both crank arms (behind the forms weight knob) so that the crank arms are loose on the throat adjusting screws.
3. Back off the platen by turning the two throat adjusting screws one full turn (360°) counter clockwise. NOTE: One full turn of these screws will move the platen about 0.090 in. (2.29mm).
4. Holding two six part forms (12 sheets with carbons in the paper path (between inner throat plate and outer throat plate), close the print gate. The forms should be able to be pulled through the throat with ease (little or no drag). Excessive drag would indicate that the inner or outer throat plates are not adjusted properly. Check inner and outer throat plate adjustments. A space of 0.040 in. (1.016mm) minimum gap must be maintained between the two throat plates.

5. Turn both throat adjusting screws clockwise in equal increments until the forms can be pulled through the forms throat with difficulty.
6. Open the print gate and remove one of the six part forms (six sheets). Close the print gate and manually pull the remaining six part forms through the forms throat. The forms should move through the throat easily. If forms do not move easily, back off both throat adjusting screws and equal amount until forms do move easily.
7. Open the print gate and remove the six part forms and load them into the tractors for printing. Close the print gate.
8. Power the printer ON and place it in the test print mode. Print entire lines of the character "E".

#### CAUTION

You will be making the final band to hammer face adjustments with the printer printing. Care should be taken to only adjust the throat adjusting screws in small 1° (one degree) increments. Turning the throat adjusting screws in too far or in large increments could damage the hammer modules or print band.

9. Turn the left crank on the left throat adjusting screw counter clockwise until it is flush against the crank arm stop as shown. Tighten the crank arm clamp screws on both the left and right crank arms.
10. Turn the left throat adjusting screw clockwise until the left crank arm is flush against the crank arm stop.
11. With six part forms installed, adjust the throat adjusting screws in small increments until the character "E" is printing heavy at the top and light but legible on the bottom. This condition must be obtained for the full length of the print line.
12. Power the printer OFF and replace the six part forms with single part forms. Power the printer ON and print the character "E".
13. With single part form installed, adjust the throat adjusting screws until the character "E" is printing heavy at the bottom and light but legible at the top. This condition must be obtained for the full length of the print line.

14. If equal density along the length of the print lines does not exist, loosen the crank arm clamp screw on the throat adjusting screw closest to the end of the print line that is printing with less density. Turn that throat adjusting screw clockwise until the entire line is printing with equal density. Care should be taken to assure that the position of the crank arms and the other throat adjusting screw is maintained during this adjustment. Tighten the crank arm clamp screw that was loosened.
15. Run four part forms and check print quality. The print density should be even over the whole character. If not, repeat Steps "11" through "15".
16. Power the printer OFF and tighten the set screws that lock the two throat adjusting screws in place.
17. Close the center ribbon cover.
18. Perform the vertical adjustment if the print gate was removed from the printer. If gate was not removed, perform the Outer Throat Plate Adjustment procedure 5AU.

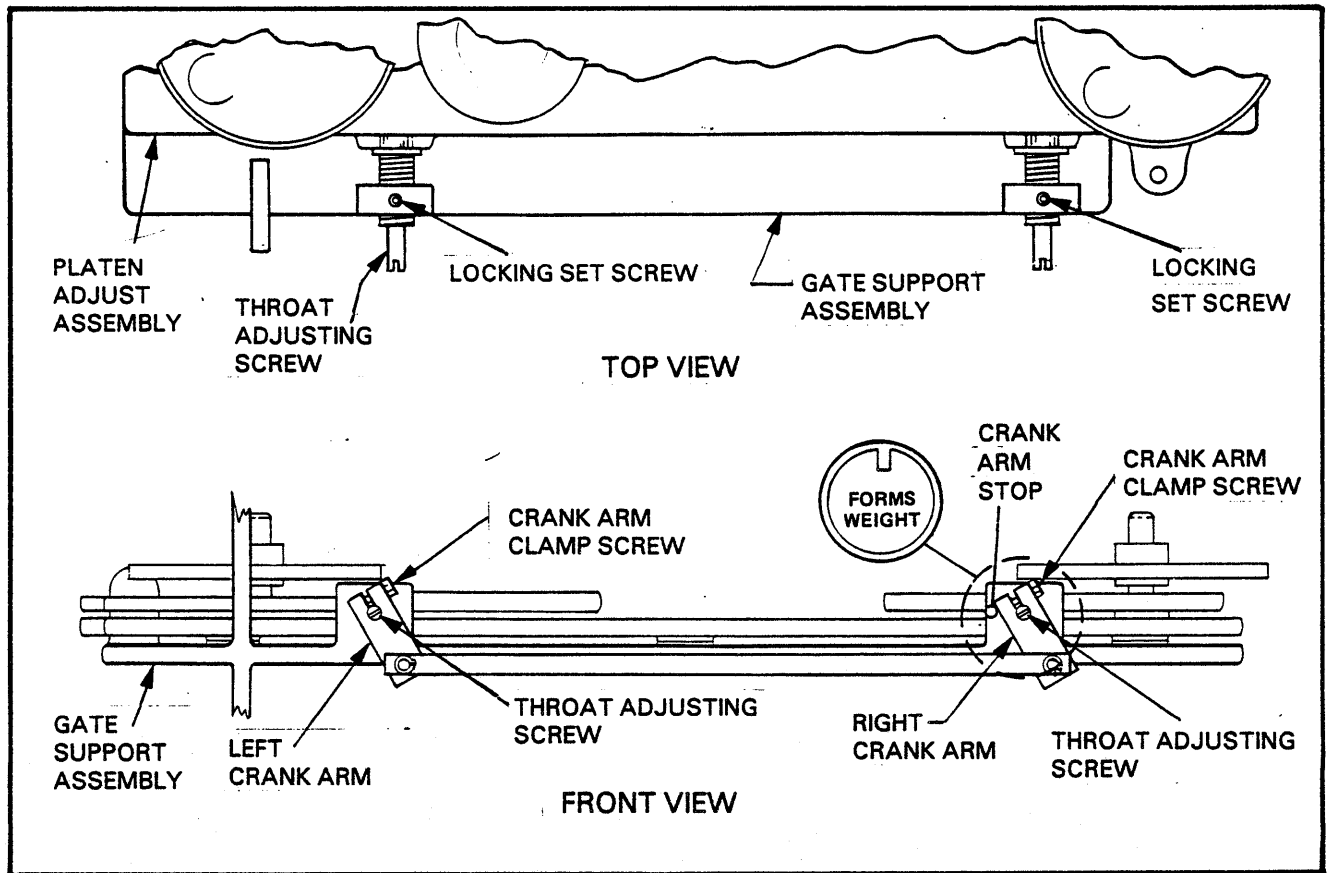


FIGURE 5-24. PLATEN TO HAMMER FACE ADJUSTMENT

### Vertical Adjustment

The vertical adjustment of the platen to the hammer faces is fixed at the factory and under normal conditions should never require adjustment. The latch side of the print gate is permanently located at the factory and cannot be vertically adjusted in the field. The hinge side of the print gate has been factory set, but can be vertically adjusted in the field by inserting or removing shims at the bottom of the gate hinge.

This adjustment is required only when the print gate is removed from the printer and shims get lost or damaged.

1. Momentarily print the character "E" without forms installed in the printer and the paper out switch taped down.
2. Observe the "E" image on the hammer faces. If the character is not vertically centered, the gate should be raised if the character is low, and lowered if the character is high. Horizontal misalignment would indicate the Control

Panel phasing is incorrect. Evaluate the character position observing all the hammers. Any left to right side of the bank variance of a print line may indicate incorrect gate latch adjustment or the previous horizontal adjustment is incorrect.

3. To raise the gate, washer type shim stock (91866818 0.005 in.) is notched out with a pair of side-cutters and added at the lower part of the hinge. The notch should be cut to leave the center opening smaller than the hinge shaft diameter. The gate can be raised by lifting near the hinge to allow the shim (s) to be inserted using pliers.
4. To lower the gate, lift near the hinge and use pliers to remove one shim at a time. There will be 0.010 in. and 0.005 in. shims. Always remove one 0.005 in. shim at a time and recheck gate height.
5. Perform the Outer Throat Plate Adjustment procedure 5AU.

## 5AU

### OUTER THROAT PLATE ADJUSTMENT

The position of the outer throat plate assembly will affect paper motion and print quality. If it is too far from the platen, the paper will tear as it passes through the print station. If the outer throat plate is too close to the platen, the ribbon will bind or will smudge the forms. If the assembly is misaligned vertically, the shield may interfere with the hammer impact area, causing a reduction in shield life and degraded print quality.

**Procedure (See Figures 5-25 and 5-26)**

1. Open the print gate, center ribbon cover and remove the ribbon.
2. Check to insure that the upper and lower ribbon shields are installed properly on the scribed marks on the back of the outer throat plate. Refer to procedure 6AZ.
3. Adjust the outer throat plate assembly so that the upper edge of the lower ribbon shield is parallel to the bottom of the characters on the print band as follows:
  - a. Loosen the outer throat plate support block mounting screw on the latch side of the print gate (Figure 5-25). Slide the block down so it is not supporting the outer throat plate.
  - b. Loosen the lower adjusting slide mounting screw that is located under the throat plate at the gate hinge pin.
  - c. Move the unsupported end of the throat plate (end opposite hinge) up or down until the upper edge of the lower ribbon shield is parallel to the bottom of the characters on the print band. Tighten the lower adjusting slide mounting screw.
4. Vertically adjust the outer throat plate assembly so that the characters on the print band are centered between the edges of the upper and lower ribbon shields as follows:
  - a. Loosen the collar clamp mounting screw that is located under the throat plate at the gate hinge pin.
  - b. Position the throat plate vertically by moving it up or down on the hinge pin, until the characters on the print band are centered between the edges of the upper and lower ribbon shields.

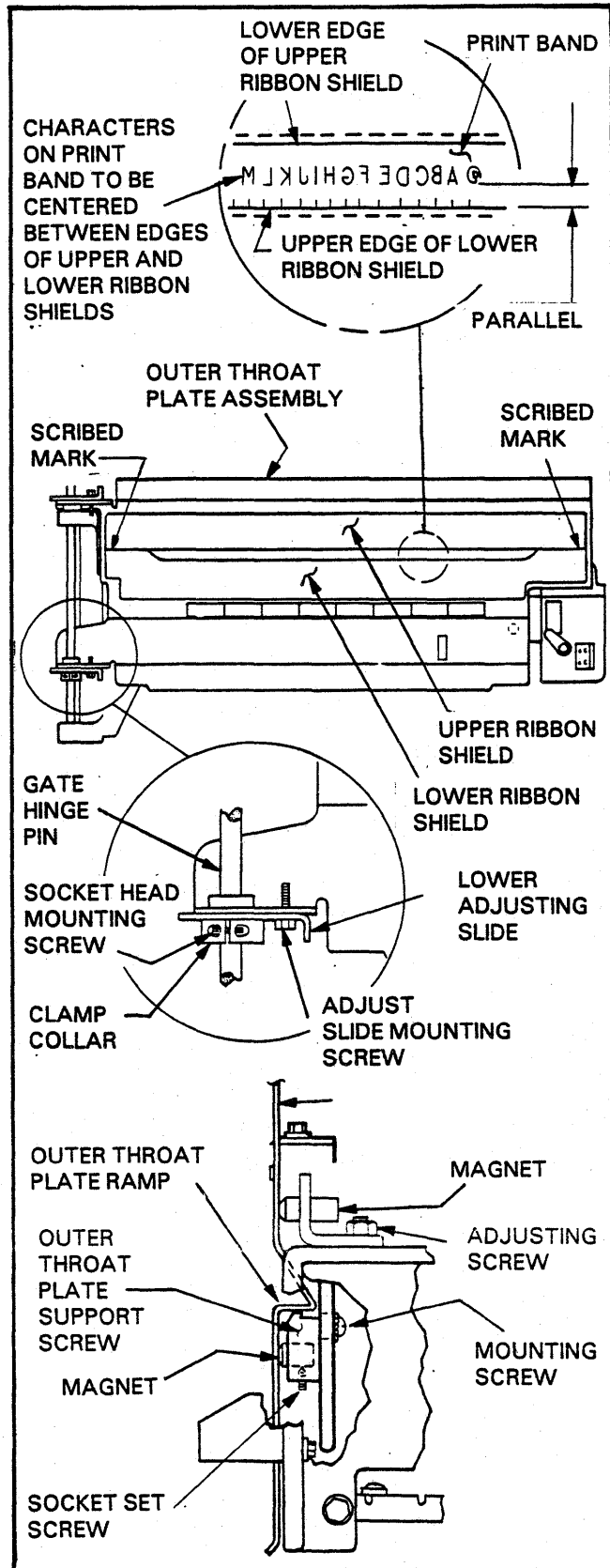


FIGURE 5-25. VERTICAL ADJUSTMENT OF OUTER THROAT PLATE



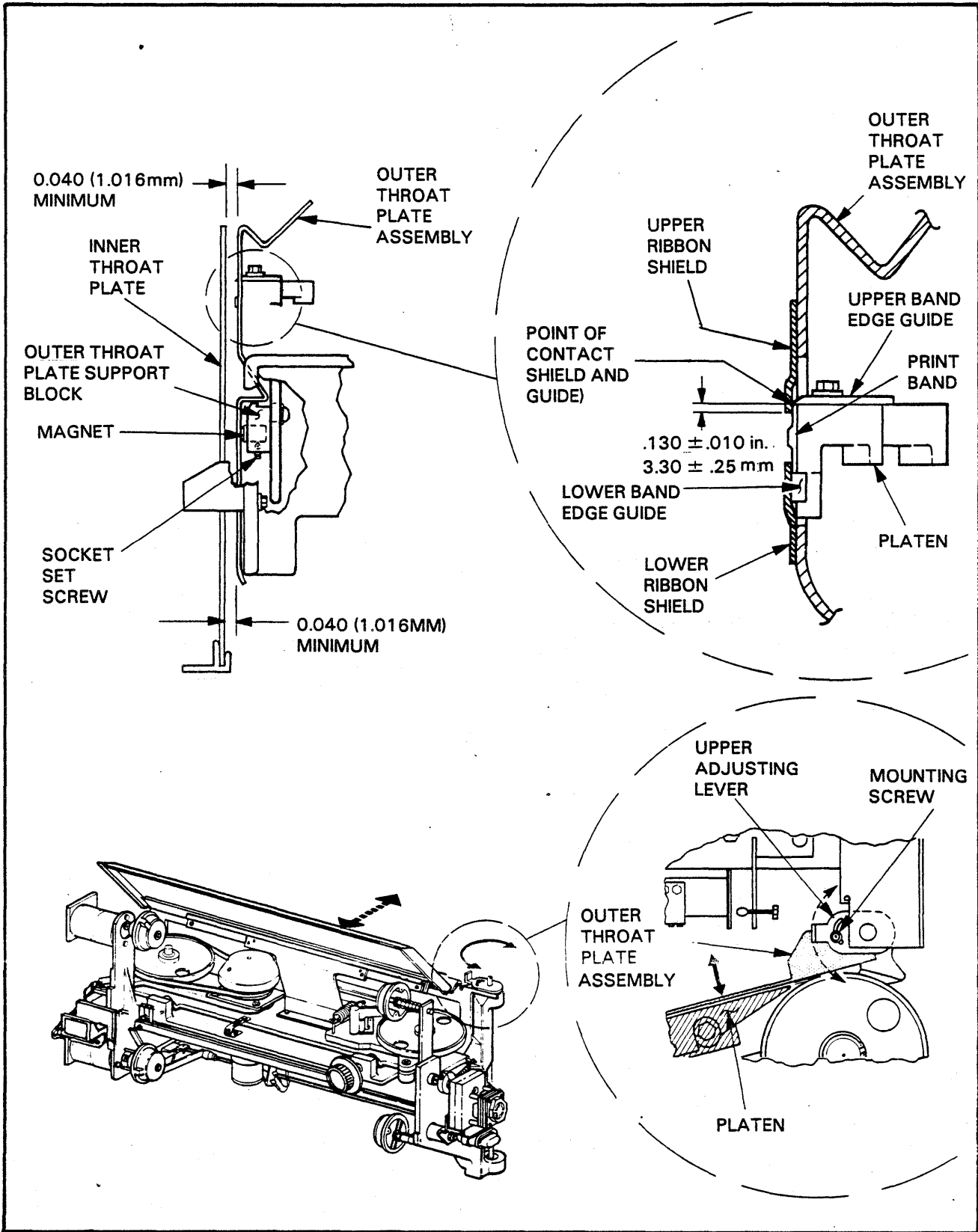


FIGURE 5-26. HORIZONTAL ADJUSTMENT OF OUTER THROAT PLATE

- c. Move the clamp collar on the hinge pin until it contacts the bottom of the throat plate. Tighten the clamp collar.
  - d. Move the outer throat plate support block up until it is in contact with the ramp on the throat plate. Tighten the support block mounting screw.
5. Turn the forms weight knob to obtain maximum forms thickness setting.
6. Position the outer throat plate so that the upper ribbon shield just touches the upper band edge guide. Due to the probable out-of-flat condition of the outer throat plate and upper band edge guide, judgement must be used to ensure maximum contact between the shield and guide. If adjustment is necessary.
  - a. Loosen the upper adjusting lever mounting screw that is located on top of the outer throat plate assembly at the gate hinge pin.
  - b. Adjust the top of the outer throat plate horizontally by moving the upper adjusting lever. When the lever is moved toward the front of the printer the top of the throat plate moves toward the front of the printer. When the lever is moved toward the rear of the printer, the throat plate moves toward the rear of the printer.
  - c. Loosen the screws that mount the magnets to the left side of the gate casting. Adjust the magnets so that they are flush to .005 in. to the edge of the outer throat plate.
  - d. Tighten the magnet mounting screws and close the print gate.
7. With a 0.040 in (1.016mm) feeler gauge, measure the clearance between the inner and outer throat plates. Clearance must be a minimum of 0.040 in. (1.016mm) throughout the paper feed area. If clearance does not exist, repeat Step 6.
8. Replace the ribbon.

# 5AV

## RIBBON SENSE MECHANISM ADJUSTMENT

This assembly senses the lateral position of the ribbon and reverses the ribbon's lateral skew mechanism as required. The ribbon sense assembly is located below the gate latch mechanism on the print gate.

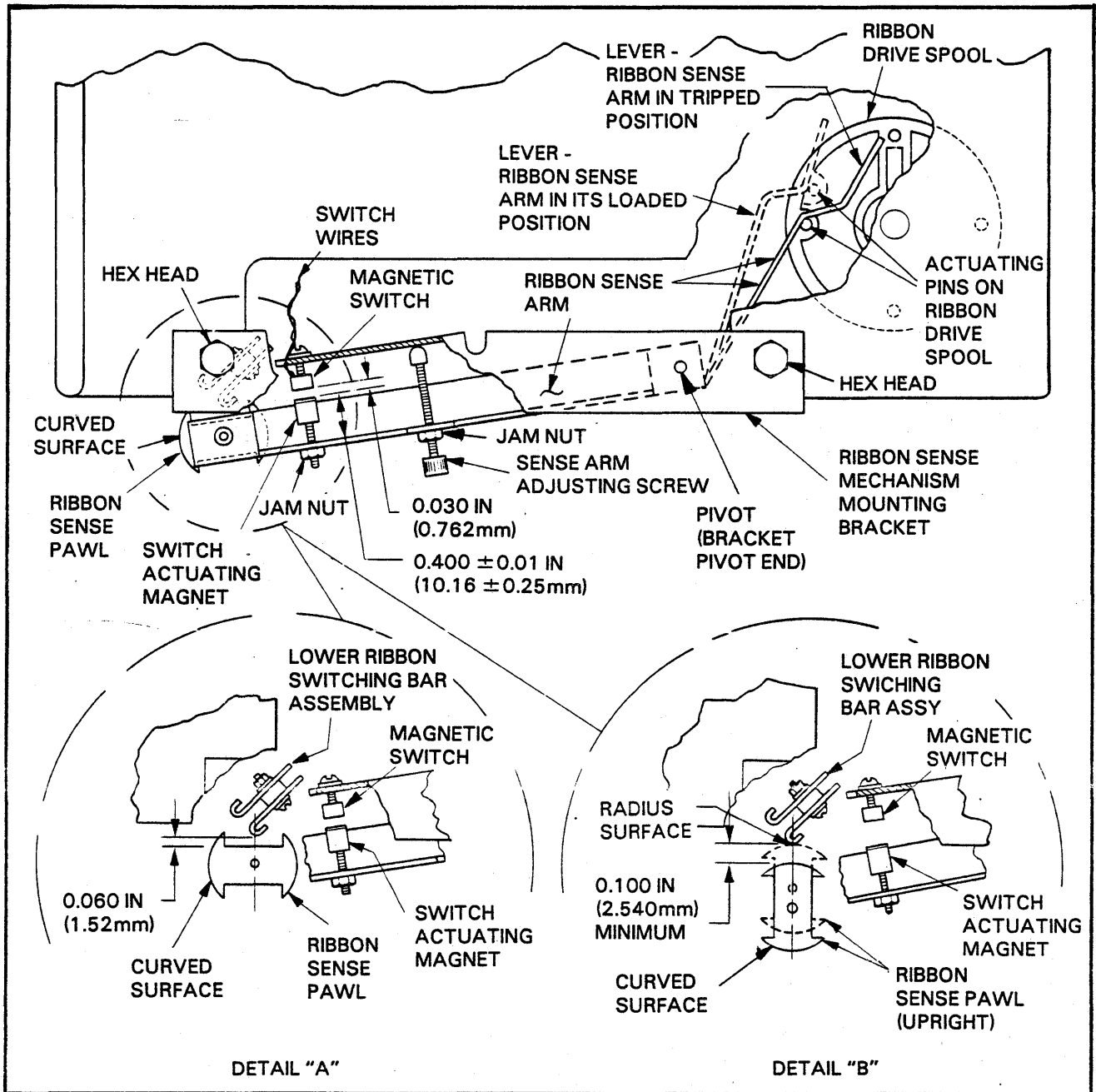


FIGURE 5-27. RIBBON SENSE MECHANISM ADJUSTMENT

### Switch Adjustment Procedure (See Figure 5-27)

1. Open the print gate and swing the outer throat plate assembly away from the gate.
2. Loosen the jam nut on the switch actuating magnet and adjust the top of the magnet  $0.40 \pm 0.01$  in. ( $10.16 \pm 0.25$ mm) from to the ribbon sense arm and tighten the jam nut.
3. Loosen the jam nut and turn the sense arm adjusting screw until the gap between the switch actuating magnet and the magnetic switch is 0.030 in. (0.762mm). Tighten the jam nut.
4. Rotate the ribbon drive spool until the lever on the end of the ribbon sense arm is in the tripped position.
5. Slide the ribbon sense mechanism bracket horizontally on its loose screws so that the curved surface of the sense pawl is against, and centered on, the radius surface of the lower bar on the lower ribbon switching bar assembly. For position, see dashed picture of ribbon sense pawl as shown in Detail "B".
6. Rotate the sense pawl to the tripped position, as shown in Detail "A". Slide the ribbon sense mechanism mounting bracket vertically until there is a clearance of 0.060 in. (1.524mm) between the flat on the sense pawl and the ribbon switching bar assembly.
7. Snug up the mechanism mounting bracket screw closest to the sense pawl after performing Steps 5 and 6.
8. Rotate the ribbon drive spool until the lever on the end of the ribbon sense arm is in its loaded position.
9. Position the pivot end of the sense mechanism mounting bracket vertically so when the ribbon sense arm is in its loaded position, there is a 0.100 in. (2.540mm) minimum clearance between the curved surface of the ribbon sense pawl and the lower bar on the ribbon switching bar assembly. For position, see Detail "B".
10. Tighten both of the ribbon sense mechanism's mounting screws.
11. Rotate the ribbon drive spool until the lever on the end of the ribbon sense arm is in the tripped position. The curved surface of the ribbon sense pawl should be resetting on the lower ribbon switching bar. Make sure the sense pawl does not contact the upper bar of the lower ribbon switching bar assembly when the sense pawl is slowly tripped. Trip the pawl by hand slowly letting the ribbon sense arm raise the pawl. If the pawl contacts the upper bar repeat the procedure moving the ribbon sense mechanism mounting bracket to the right a little.
12. In order to provide adequate operational margin, the magnet adjustment of 0.40 in. (10.16mm) made in Step 3, may have to be altered to meet the following conditions.
13. Power the printer OFF. Connect a voltmeter to the 7PC3 board as shown in Figure 5-28, at chip A5 pin 5. Connect ground at TP-1. Power the printer ON.
14. With sense pawl upright and resting on the switching bar as shown in Detail "B", a voltage of at least 4 volts must be present. If not the gap between the magnet and switch must be increased, by lowering the magnet until 4 volts are obtained.
15. Manually hold the sense pawl and assembly while turning the sense pawl  $90^\circ$  so you can slowly close the switch gap. The magnet must move .03 in. (0.76mm) minimum toward the switch before the switch changes state (voltage drops to .4 volts or lower between chip A5, pin 5 and ground). If not, the gap between the magnet and switch must be increased by lowering the magnet to allow this condition to be met.  
  
The magnet must then move an additional .03 in. (0.76mm) minimum toward the switch before the adjustable stop screw bottoms out, but must stop at least .03 in. (0.76mm) away from the switch (.03 in. minimum gap).

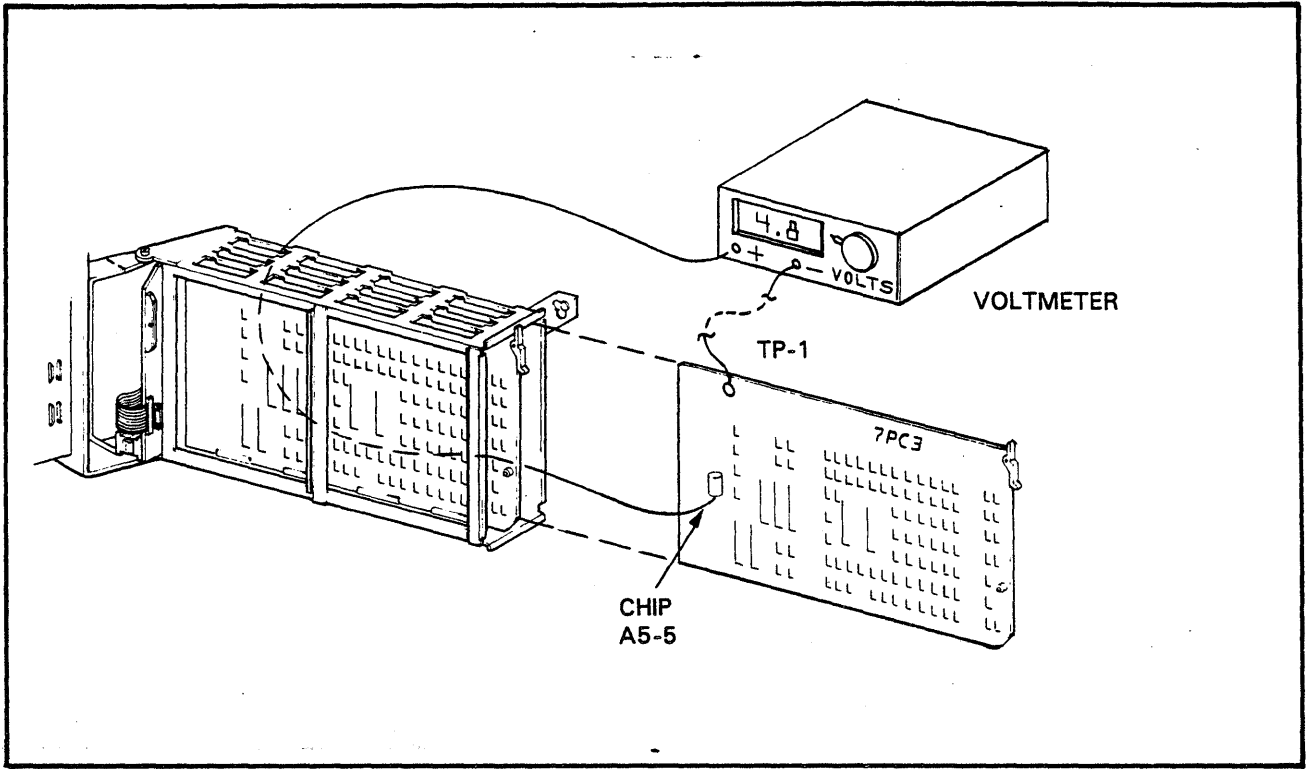


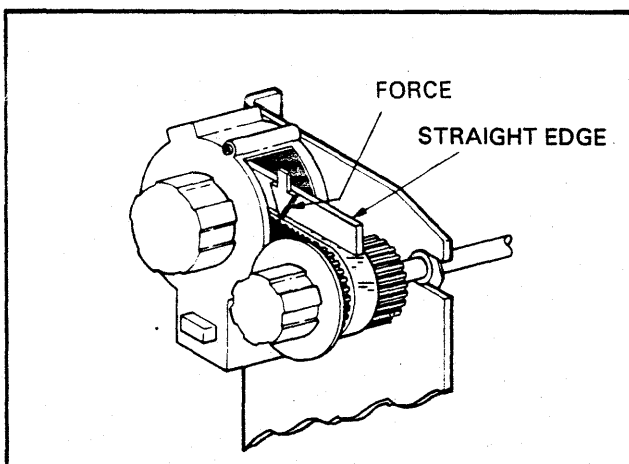
FIGURE 5-28. HALL EFFECT SWITCH OUTPUT

## 5AW

### PAPER ADVANCE MOTOR BELT TENSION ADJUSTMENT

This procedure should be performed anytime the belt is changed or the advance motor mounting plate is moved. It should also be performed when there is evidence of vertical line spacing problems or excessive belt wear. The spring scale shown in Table 3-3 is used in this procedure.

1. Make a mark on the spring scale shaft 0.15 in (3.8mm) from the tip of the shaft.
2. Place a straight edge on the upper edge of both pulleys.
3. At a point midway between the pulleys, depress the belt with the spring scale until the mark on the shaft is aligned with the bottom of the straight edge (0.15 inch or .38mm belt deflection).
4. From the spring scale, read the force necessary to achieve this deflection.
5. If the force required is not between 2.0 and 2.5 pounds (2.30 and 2.88 cm/kg), open the bonnet from the back and raise the paper guide.
6. Loosen the three nuts that hold the paper motion mounting plate to the side casting and move the paper motion assembly to obtain the proper tension.
7. Lower the paper guide and close the rear bonnet top, securing the two bolts



## 5AX

### TRACTOR ASSEMBLY ADJUSTMENTS

There are three adjustments associated with the tractor assembly; belt tension, tractor flap clearance and tractor body alignment. If the belt is too tight, it can cause the tractor assembly to bind. Too loose a belt can affect line spacing. If there is too little clearance between the tractor flap and the tractor body, the forms may tear as they pass through the tractor. If the flap clearance is too great or tractor body alignment is incorrect, the forms will have a tendency to jump off the tractor drive pins.

#### Tractor Belt Tension procedure (See Figure 5-30)

1. Open the bonnet from the rear along with the paper guide.
2. Remove the plastic (chad remover) strip over the tractor belt teeth (cogs) by pulling it apart at its junction.

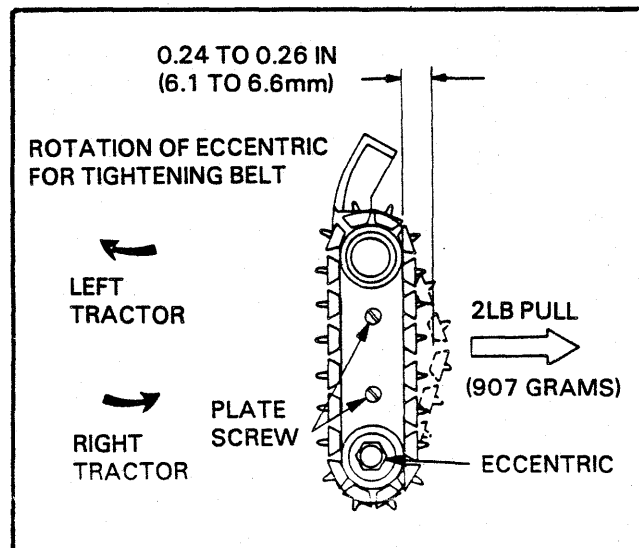


FIGURE 5-30. TRACTOR BELT TENSION

3. From the rear of the tractor hook the spring scale (shown in Table 3-3) under the belt between the teeth, as close to the center of the tractor body as possible.
4. Exert a force of 2.0 pounds (908 grams) on the belt toward the rear of the printer.

5. Using the scale measure the gap between the tractor guide surface and the belt (between the links).
6. If the gap is not between 0.24 to 0.26 in. (6.1 to 6.6mm), loosen the screws above the eccentric that holds the metal plate to the tractor housing.
7. To tighten the belt, the left tractor eccentric should be rotated clockwise and the right tractor eccentric should be rotated counterclockwise.

**CAUTION**

**DO NO TURN THE ECCENTRICS IN  
THE WRONG DIRECTION.**

8. Recheck the gap before tightening the metal plate mounting screws.
9. When the tension is correct, tighten the metal plate mounting screws.
10. Replace the plastic strip (chad remover) over the belt teeth (clogs).
11. Lower the paper guide into position and close the rear bonnet top.

### Tractor Flap Clearance Procedure (See Figure 5-31)

1. Open the print gate.
2. Insert a 0.02 in (0.5mm) feeler gauge between the tractor flap and the tractor body. Pass the gauge through Zone A of the tractor flap.
3. If the feeler gauge does not fit easily in the gap throughout Zone A, turn the adjusting set screw clockwise until it does.
4. Insert a 0.030 in (0.8mm) feeler gauge between the tractor flap the the tractor body. Pass the gauge through Zone A of the tractor flap.
5. The feeler gauge must make contact in at least one point of Zone A. If it does not, turn the adjusting set screw counterclockwise until the gauge makes contact.
6. Recheck steps 3 and 4.

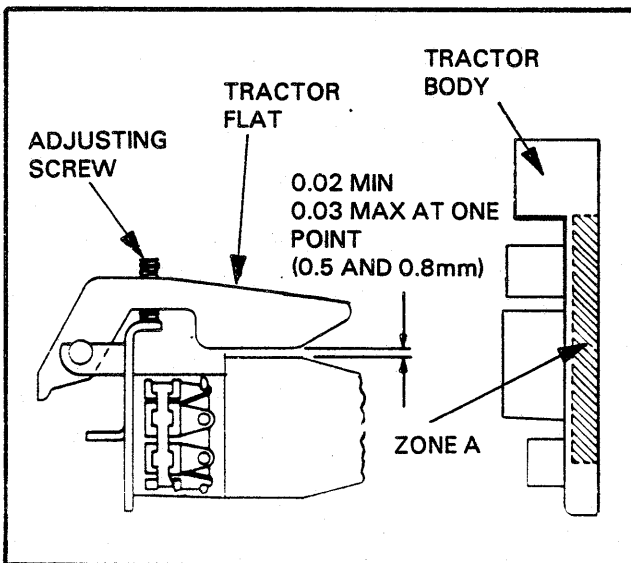


FIGURE 5-31. TRACTOR FLAP ADJUSTMENT

## 5AY

### PAPER BAIL ADJUSTMENT

This adjustment should be performed anytime the paper bail is replaced or paper jams occur at the exit roller system (if installed). If the paper bail is not properly adjusted, paper exit problems could occur.

#### Procedure (see Figure 5-32)

1. Power the printer OFF.
2. Open the bonnet from the front.
3. To adjust the gap between the paper bail, slightly loosen the two hex head screws on both the left and right black plastic bail support brackets, and clip the back of the paper bail into the bail support brackets by pushing downward. Make sure the paper bail remains seated during adjustment of the tractor/paper bail.
4. Loosen the two screws on the right and left ball mount brackets. Adjust the paper bail (front or back) so that the gap between the paper bail and the tractor body must be .030 to .120 inches (0.762 to 3.048mm). Use feeler gauges to check this gap.
5. Once the proper gap is achieved, tighten first the screws on the right and left bail mount brackets, then the screws on the black plastic bail support brackets.
6. To adjust the exit roller (if installed) to paper bail gap, loosen the two hex head screws on the left and right bail ramp brackets. Move the bail ramps up or down until the proper gap is obtained. The proper gap between the top of the exit rollers and the paper bail should be .020 to .060 inches (0.5 to 2.1mm). Once this gap is achieved, tighten the screws on the left and right bail ramp baskets. Use feeler gauges for this adjustment.
7. Close the bonnet and return the unit to service.



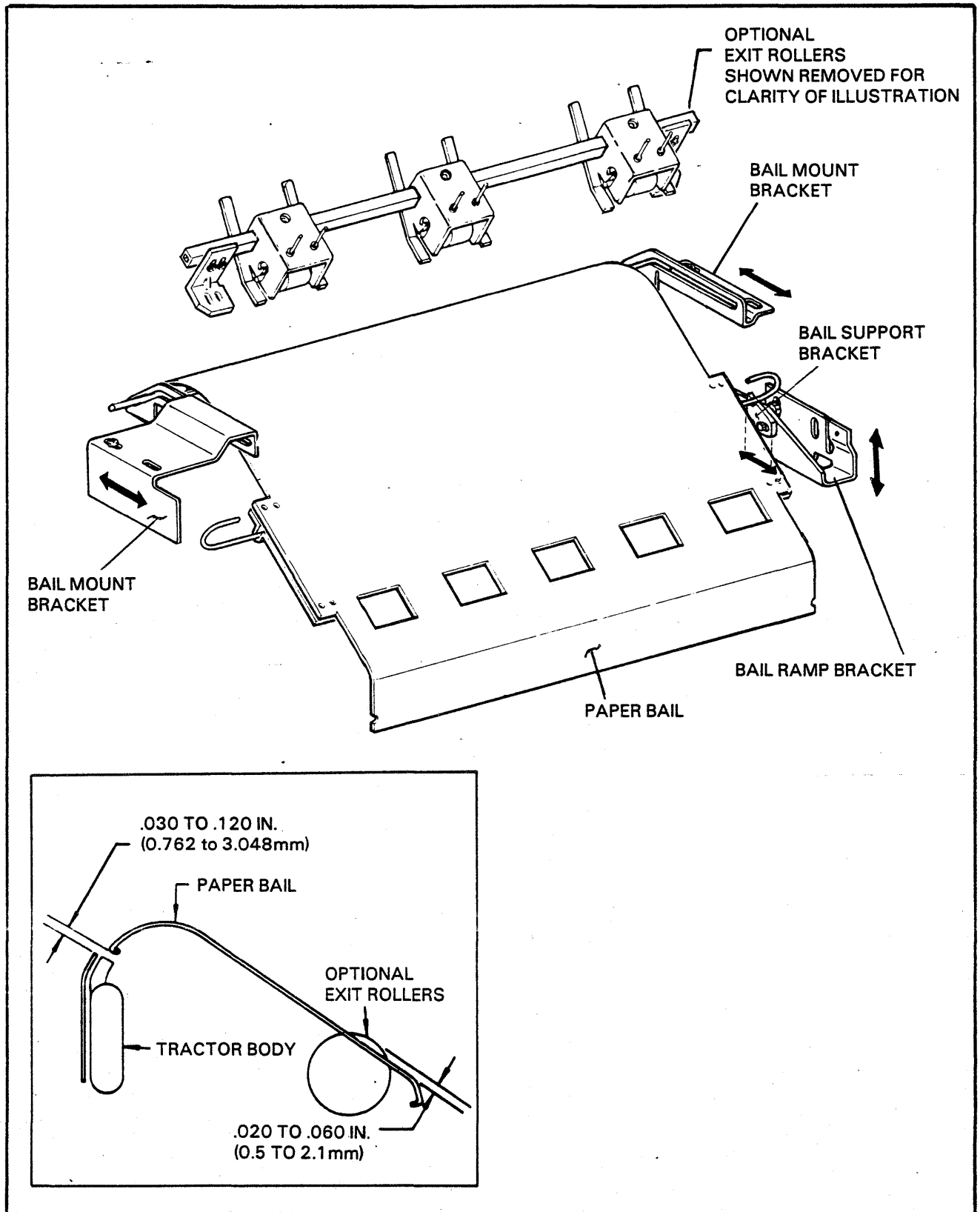


FIGURE 5-32. PAPER BAIL ADJUSTMENT

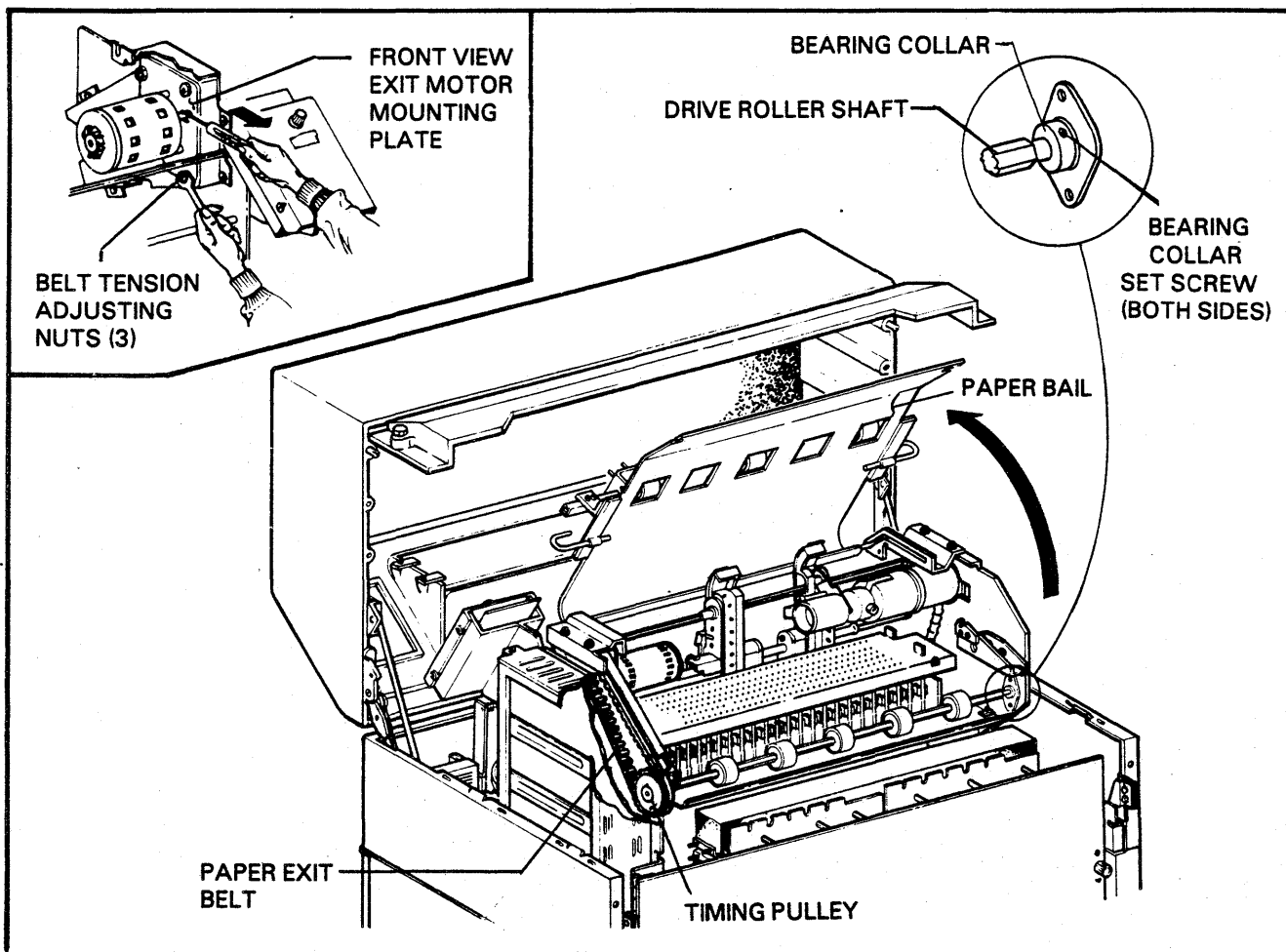


FIGURE 5-33. OPTIONAL PAPER EXIT MOTOR BELT TENSION AND TRACKING ADJUSTMENT

## 5AZ

### PAPER EXIT MOTOR BELT TENSION AND TRACKING ADJUSTMENTS (OPTIONAL)

These adjustments must be performed any time the belt as been removed or replaced. The spring scale shown in the Maintenance Aids section (Section 3) is used for this procedure.

#### Procedure (See Figure 5-33)

1. Power the printer OFF.
2. Raise the bonnet from the front.
3. Adjust the belt tension by loosening the nuts which secure the exit motor mounting plate to the print head structure.
4. Attach a spring scale to the upper front motor standoff and apply 7 to 9 lb. pull on the motor standoff while retightening the three motor mounting plates securing nuts.
5. Close the bonnet.
6. Open the bonnet from the rear.
7. Power the printer ON and check that the paper exit belt is tracking in the center of the timing pulley.
8. If adjustment is needed, power the printer OFF and raise the paper bail from the rear. To center the belt loosen the set screws in the bearing collars on both ends of the drive roller shaft. Move the shaft in the same direction the belt is displaced.
9. Power the printer ON and check again for proper belt tracking. Repeat step 7 and 8 if necessary.
10. Once proper belt tracking is achieved, power the printer OFF, close the paper bail and lock it into position and close the bonnet.

## 5BA

### FORMAT TAPE READER DRIVE SPROCKET ADJUSTMENT

The E.V.F.U. uses a format tape to load its memory. This tape is driven by a sprocket and motor assembly. If the sprocket is not properly set, loading problems will occur.

#### NOTE

A DEFECTIVE FORMAT TAPE CAN CAUSE LOADING PROBLEMS. INSPECT THE TAPE FOR DEFECTS BEFORE ATTEMPTING THIS ADJUSTMENT.

#### Procedure (Figure 5-34)

1. Power the printer OFF.
2. Open the bonnet.
3. Remove the format tape reader cover from the side of the assembly.
4. Open the format tape spring guide by pushing down on the knurled shaft and turning it counterclockwise.
5. A properly adjusted drive sprocket will allow the format tape to just ride against the guide ramp during the entire load cycle. A sprocket positioned too far onto the motor shaft will cause the format tape to fold over and prevent the tape reader from reading the tape. A sprocket positioned too far out (toward the end of the motor shaft) will also prevent reading of the tape by the tape reader.
6. Loosen the screw holding the drive sprocket on the motor shaft.
7. Install a format tape.
8. Move the sprocket in or out as required so that the format tape will just ride against the guide ramp (located beneath the paper tape reader). Tighten the sprocket retaining screw. See Figure 5-34.
9. Turn the knurled shaft clockwise to position the spring guide over the format tape.
10. Power the printer ON and check for loading of the format tape.
11. Repeat steps 6 through 10 if necessary until the tape will load into EVFU Memory.

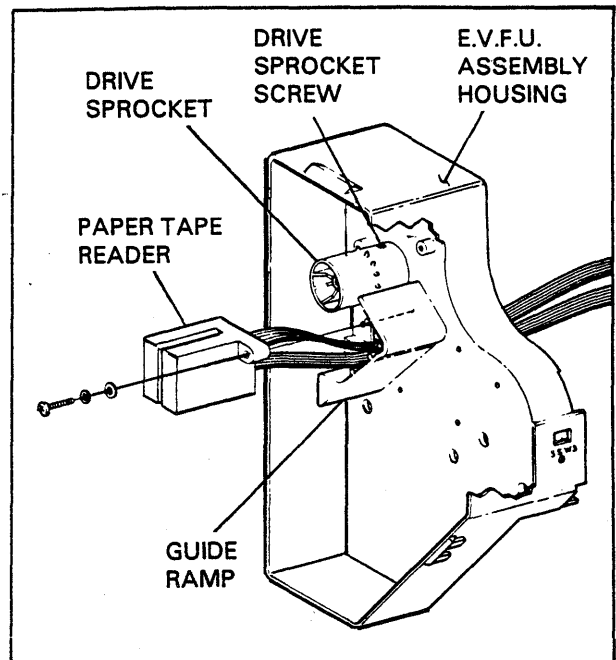


FIGURE 5-34. DRIVE SPROCKET ADJUSTMENT

## 5BB

### CABINET AND PRINTER POSITIONING (Figure 5-35)

In the following procedures the position of the chassis is checked to make sure an open tractor flap does not hit the bonnet during bonnet closing. The castors or leveling legs are adjusted so the bonnet sits flush with the pedestal for maximum static discharge immunity. The upper bonnet top, friction slides, are checked or adjusted to retain the rear bonnet opening in its maximum position when open.

#### Open Tractor Flap Interference

1. Check to see when closing the bonnet with the tractor flaps open, if the bonnet comes in contact with the tip of the flaps. Move the tractors horizontally through their range rechecking for interference. If the bonnet hits the flaps the printer chassis must be moved back on the lower cabinet.
2. Loosen the three nuts that secure the print head structure and shockmounts to the printer pedestal. Shove the print head structure toward the rear of the pedestal as far as it will go. Tighten the three nuts down until they make contact with the flat washers under the nuts and so the flat washers can no longer be turned by hand. These nuts should never be tightened to the point where they cause the shock mounts to be compressed.

#### Printer Leveling

Leveling the base cabinet for correct bonnet mating provides static discharge immunity for the electronics. Once the printer is in its operating position, open the front door, if installed, and check for light appearing between the bonnet's lower edge and the top of the cabinet base. A card or other gauging device can also be used to slip between the bonnet and the cabinet base. It may be necessary to loosen the catch assemblies in the cabinet (view "B") to allow bonnet movement when checking leveling. The static seal on the top edge of the cabinet base should make contact with at least 50% of the bonnet's lower edge when the bonnet is closed.

If adjustment is required use a long board as a lever to slightly raise the cabinet to adjust the castor or leveling pad height. The lever may also be used in determining which of the castors or leveling pads should be adjusted by raising different cabinet cor-

ners while checking bonnet fit. Lock the wheels during adjustment of the castors. Use an 11/16 inch wrench to loosen the lock nut. Use large pliers or channel lock pliers to rotate the flange on the castor, above its bearing. If the bonnet cannot be seated against the cabinet seal by leveling, then perform the bonnet adjustment following.

When the front door is in the closed position, the bonnet should not raise off the static seal. Check the door hinges for damage, or loose bolts before readjusting castors.

#### Bonnet Adjustment

Always level the printer as previously explained, checking the bonnet and front door fit before adjusting the bonnet itself.

1. If the bonnet sits high off the cabinet seal at the back near the counterbalance, slightly loosen the nuts holding the counterbalance to the bonnet. Tap the counterbalance slightly upwards. (view "C"). The bonnet can be removed for better access to the counterbalance by fully opening the bonnet and screwing in the two locking screws (at the back of the bonnet) until seated. Raise the bonnet straight upward at the back of the printer and carefully set aside.
2. If the bonnet sits high off the seal at the front of the printer, loosen the catch assembly (vertical adjustment screws). If the bonnet still sits high at the front repeat step "1" only tap the counterbalance downward. If the "U" bolts are still hitting the loose catch assembly, loosen the nuts and raise the "U" bolts higher into the bonnet. Repeat the adjustment of the counterbalance until the bonnet seats flush on the seal. (view "C").
3. Horizontally adjust the catch assembly so the "U" bolts fall straight into the catch assembly when closing the bonnet. Position the vertical position on the catch assembly in the center of its range. (view "B")
4. Roughly adjust the height of the "U" bolts so the bonnet closes tightly in the catch assembly without raising the bonnet off the cabinet seal. (view "B").
5. Vertically adjust the catch assembly for maximum cabinet seal contact. (view "B").

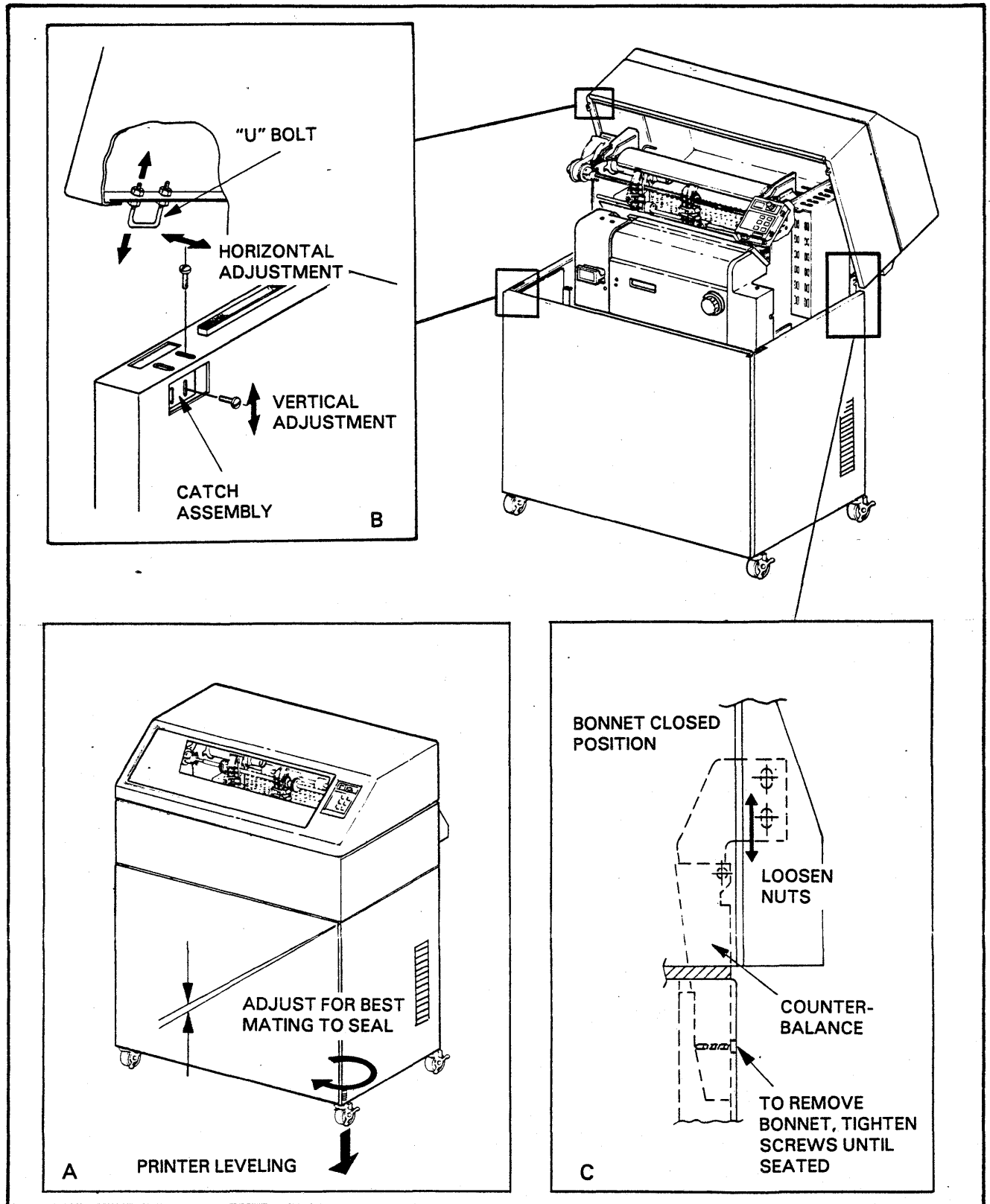


FIGURE 5-25. CABINET POSITIONING

### Bonnet Friction Slides (Figure 5-36)

When the bonnet is raised from the rear, it is held in the up position by friction slides. The resistance to movement is determined by a plastic clamp on the slide. The clamp is housed in a bracket welded to the bonnet base.

1. Make sure as the bonnet is closed that the left and right sides go straight down into the bonnet base and do not bind by angular motion. Adjust the upper slide bracket horizontally to correct any binding of the slides.

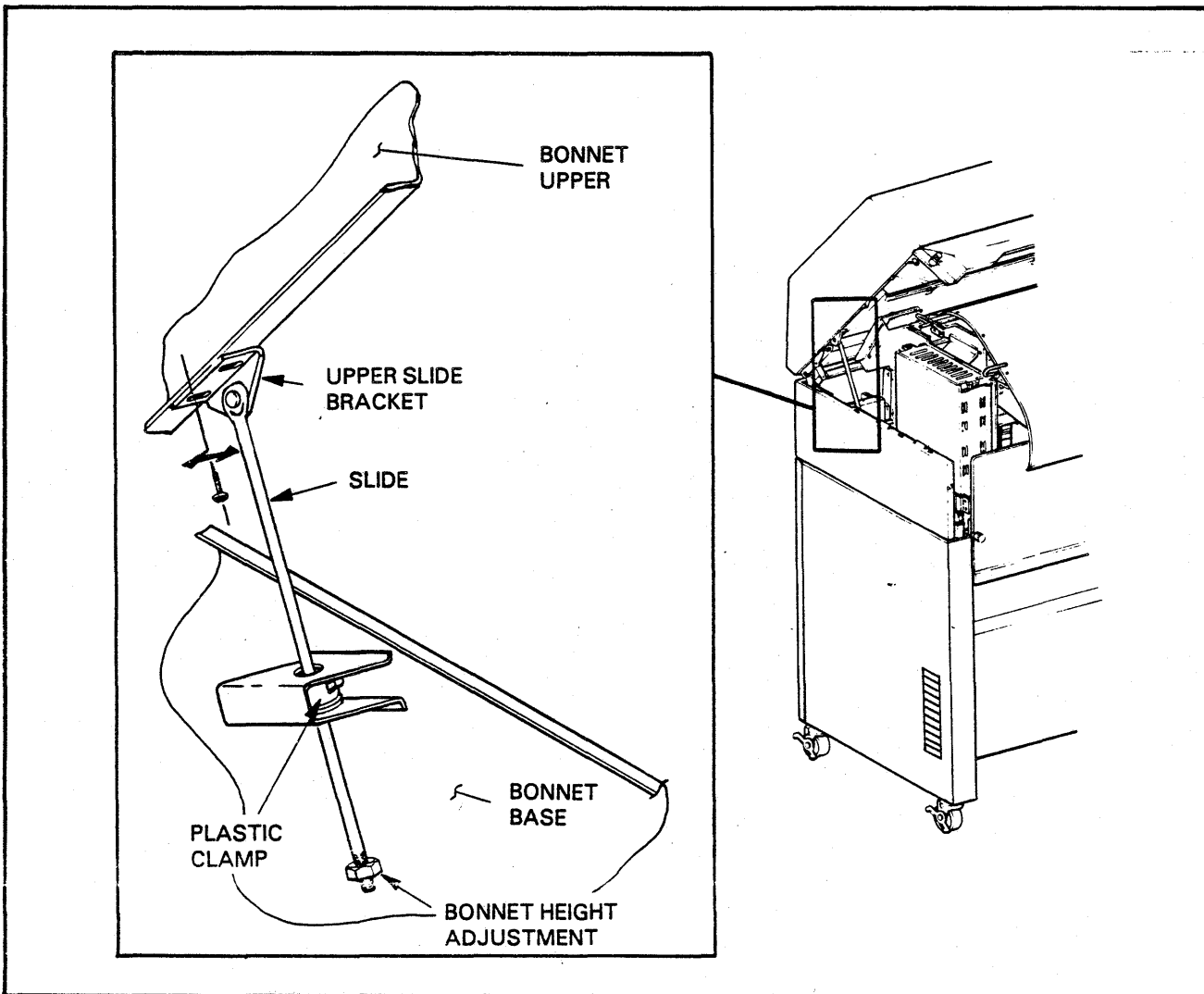


FIGURE 5-36. BONNET FRICTION SLIDE ADJUSTMENT

## SECTION VI PARTS REPLACEMENT

### INTRODUCTION

This section includes disassembly and assembly procedures required for parts replacement in the field. This section should be used with the printer's Parts Manual and the Corrective Maintenance section in this manual. The following contents list is

for section 6, plus the alphabetical sequence of all the procedures referenced in the Fault Isolation section. Procedures are alphabetically listed with a two character identification; AA, AB, AC, thru AZ, BA, BB, etc. This index is provided to supply procedure page numbers for quick location.

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## 6AA

### FORMS MOTION COMPONENT REPLACEMENT

The Forms Motion system consists of the following components: Tachometer, 6/8 Line Switch, two Vertical Readers and a Servo Motor. This procedure comprises the following other procedures; 5AC, 5AD, 5AE, 5AF, and 5AG.

## 6AB

### Tachometer Replacement (Figure 6-1)

1. Power the printer OFF.
2. Open the bonnet and paper guide from the rear of the printer.
3. Disconnect the return spring from the tachometer assembly.
4. Noting polarity, disconnect the tachometer leads.
5. Loosen the locking collar holding the tachometer to the servo motor and slide the tachometer out of the motor shaft.
6. Remove the spring plate from the old tachometer and mount it on the new tachometer.
7. Slide the new tachometer into the motor shaft and secure it with the locking collar.
8. Reconnect the two leads to the tachometer; red to terminal with red dot.
9. Connect the return spring to the tab on the tachometer spring plate.
10. Perform the Vertical Servo System Set-Up procedure 5AC.

## 6AC

### 6/8 Line Micro-switch Replacement (Figure 6-1)

1. Power the printer OFF.
2. Raise the bonnet from the rear.

3. Remove the five screws that hold the position reader cover in place and remove the cover.
4. Remove the two screws that hold the micro-switch in place and remove the switch.
5. Position the new switch in the reader and secure with the same mounting screws.
6. Replace the reader cover and check continuity at the switch terminals. Check to see the N.O. and N.C. contacts function when the switch is moved between 6/8 LPI.

## 6AD

### Vertical Readers (3L02/3) Replacement (Figure 6-1)

1. Perform steps 1 through 4 of the 6/8 Line Microswitch replacement procedure 6AC.
2. Cut all the ty-raps between the reader and the plug that secure the reader cable.
3. Slide the position reader down and out of the assembly.
4. Remove the paper motion protective belt cover (see Figure 6-8).
5. Loosen the locking collar that holds the forms positioning knob to the tractor shaft and slide the knob off the tractor shaft (see Figure 6-8).
6. Remove the forms drive belt.
7. Loosen the locking collar that holds the code disk assembly to the drive shaft.
8. Remove the two screws securing the check strobe reader and slide the reader and the code disk assembly out of the reader assembly.
9. Remove the old readers and position the new readers for installation.
10. Place the code disk assembly in the new strobe reader slot and slide the code disk and reader back onto the drive shaft.
11. Secure the reader in place using the same two mounting screws and tighten the code disk locking collar. Position the code disk in the center of the reader.



12. Slide the position reader into the assembly.
13. Position the micro-switch beneath the reader and secure with the mounting bolts.
14. Place the drive belt on the drive pulley.
15. Loop the drive belt around the drive pulley and reposition the knob on the tractor shaft. Tighten the locking collar (see Figure 6-8).
16. Perform the Belt Tension Adjustment procedure 5AW.
17. Replace the ty-raps that were cut off in step 2.
18. Replace the reader cover.

## 6AE

### Servo Motor Replacement (Figure 6-1)

1. Power the printer OFF.
2. Open the bonnet from the rear.
3. Raise the paper guide from the rear.
4. Disconnect the return spring from the tachometer assembly.
5. Loosen the locking collar holding the tachometer to the motor and slide the tachometer out of the motor shaft.
6. Remove the two screws that hold the spring plate to the servo motor and remove the plate.
7. Cut the ty-raps around the motor.
8. Unplug the leads from the motor.
9. Remove the five screws that hold the position reader cover in place and remove the cover.

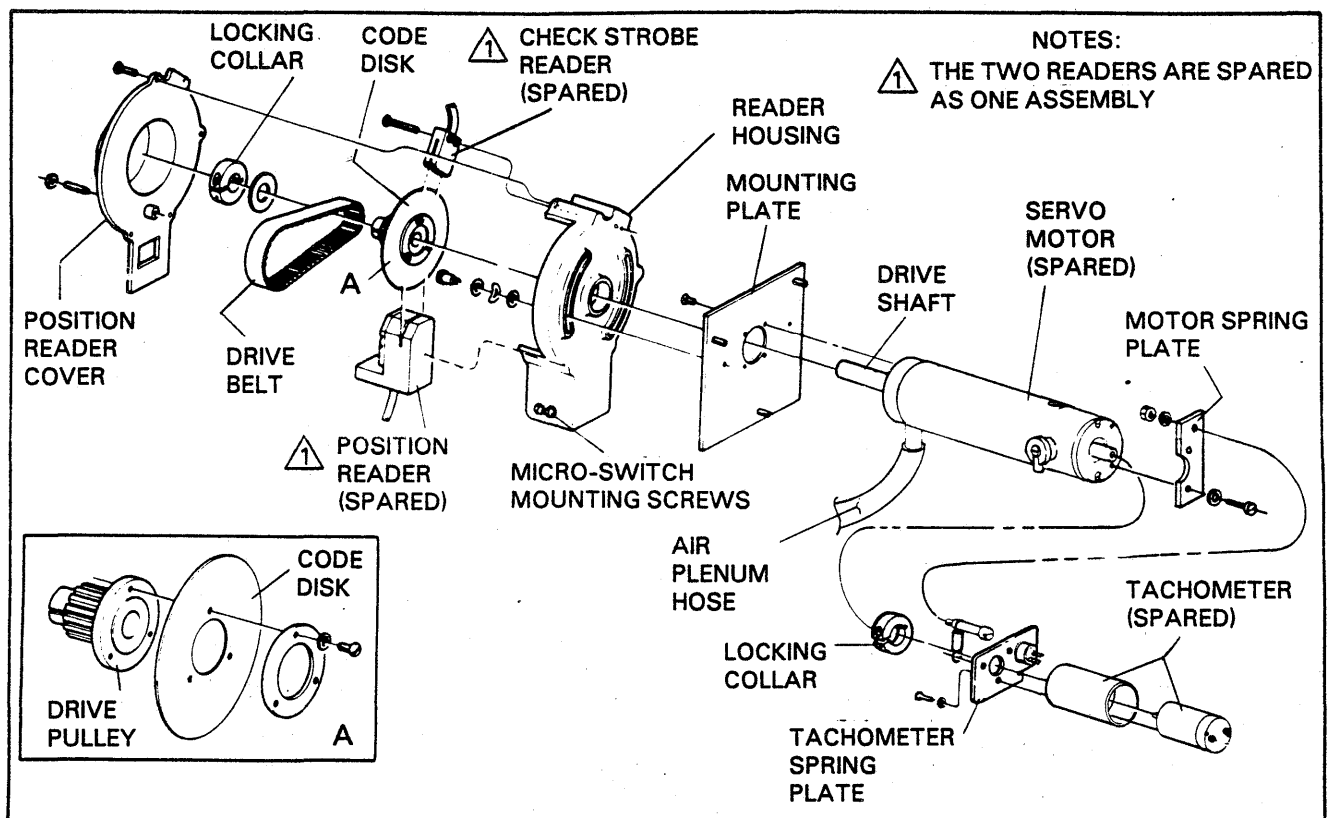


FIGURE 6-1. FORMS MOTION COMPONENT REPLACEMENT

10. Remove the two screws that hold the micro-switch in place and remove the switch.
11. Slide the position reader down and out of the assembly.
12. Remove the protective belt cover (see Figure 6-8).
13. Loosen the locking collar that holds the forms positioning knob to the tractor shaft and slide the knob off the tractor shaft (see Figure 6-8).
14. Remove the forms drive belt.
15. Loosen the locking collar that holds the code disk assembly to the motor shaft.
16. Remove the two screws securing the check strobe reader and slide the reader and code disk assembly out of the reader assembly.
17. Remove the two shoulder screws that secure the reader housing to the motor mounting plate and remove the housing.
18. Unplug the air plenum hose from the servo motor.
19. Remove the four screws that hold the motor to the mounting plate and remove the motor.
20. Position the new motor against the mounting plate and secure with the same four screws.
21. Reconnect the air plenum hose to the motor.
22. Mount the reader housing on the mounting plate with the two shoulder screws and their spacers.
23. Slide the check strobe reader and the code disk assembly back into the reader assembly.
24. Secure the check strobe reader with the two mounting screws.
25. Position the code disk in the center of the reader. Tighten the code disk assembly locking collar.
26. Slide the position reader into the assembly.
27. Position the micro-switch beneath the reader and secure with the two mounting screws.
28. Place the drive belt on the drive pulley.
29. Loop the drive belt around the forms positioning knob and reposition the knob on the tractor shaft. Tighten the locking collar.
30. Replace the reader cover. Replace the protective belt cover.
31. Plug the two leads into the new motor. Red lead to the terminal with the red dot.
32. Secure the spring plate to the motor using the two mounting screws.
33. Slide the tachometer into the motor shaft and secure it with the locking collar.
34. Connect the return spring to the tab on the tachometer spring plate.
35. Ty-rap the tachometer leads to the body of the motor.
36. Perform the Belt Tension Adjustment procedure 5AW.
37. Perform Vertical Servo System procedure 5AC.

## **6AF**

### **ACTUATOR PLATE REMOVAL (Figure 6-2)**

#### **Procedure for Upper Actuator Plate Removal**

1. Open the bonnet from the rear.
2. Swing up the paper bail assembly from the rear.
3. Remove the hammer driver cable cover.
4. Unplug the outer six hammer driver board connectors.
5. Remove the ground strap and the three allen screws.
6. Pull the upper actuator plate assembly toward the back of the printer and lift the assembly out.

#### **Procedure for Lower Actuator Plate Removal**

1. Open the bonnet from the rear.
2. Swing up the paper bail assembly from the rear.

3. Remove the hammer driver cable cover.
4. Unplug the inner two hammer driver board connectors (six total).
5. Close the paper bail assembly.
6. Close and lock the bonnet.
7. Open the bonnet from the front.
8. Open the gate.
9. Remove the inner throat plate by turning the two quarter turn fasteners counter clockwise.
10. Remove the paper clamp assembly from the side plates of the hammer bank structure.
11. Reaching up under the lower actuator plate assembly, remove the three allen screws which hold the lower actuator in place by using an "L" shaped allen wrench.
6. Tighten the three actuator plate allen screws using an "L" shaped allen wrench.
7. Reattach the ground strap.
8. Plug in the outer six hammer driver board connectors into their original positions.
9. Reinstall the hammer driver cable cover.
10. Close the paper bail assembly.
11. Close and lock the bonnet.
12. Check Flight Time Adjustment (procedure 5AE).

**CAUTION**

THE LOWER ACTUATOR PLATE IS VERY HEAVY. USE CARE WHEN REMOVING.

12. Push the lower actuator plate toward the rear of the printer and remove the lower actuator plate from the printer.

**6AG**

**ACTUATOR PLATE INSTALLATION (Figure 6-2)**

**Procedure for Upper Actuator Plate Installation**

1. Open the bonnet from the rear.
2. Swing up the paper bail assembly from the rear.
3. If the hammer driver cable cover is installed, remove it.
4. Place the upper actuator plate back in the printer and start the three mounting allen screws. Be careful not to cross thread the special nuts which secure the actuator plate.
5. Align the actuator plate horizontally to center the push rod tips on the actuator ends.

**Procedure for Lower Actuator Plate Installation**

1. Open the bonnet from the front.
2. Remove the inner throat plate by turning the two quarter turn fasteners counter clockwise.
3. Place the lower actuator plate assembly back into the printer and start the three allen screws. Be careful not to cross thread the special nuts which secure the actuator plate.
4. Align the actuator plate horizontally to center the push rod tips and the actuator ends.
5. Tighten the three actuator plate allen screws using an "L" shaped allen wrench.
6. Reinstall the inner throat plate.
7. Close the bonnet.
8. Open the bonnet from the rear.
9. Swing up the paper bail assembly from the rear.
10. If the hammer driver cable cover is installed, remove it.
11. Plug in the inner six hammer driver board connectors into their original position.
12. Reinstall the hammer driver cable cover.
13. Close the paper bail assembly.
14. Close and lock the bonnet.
15. Check Flight Time Adjustment (procedure 5AE).

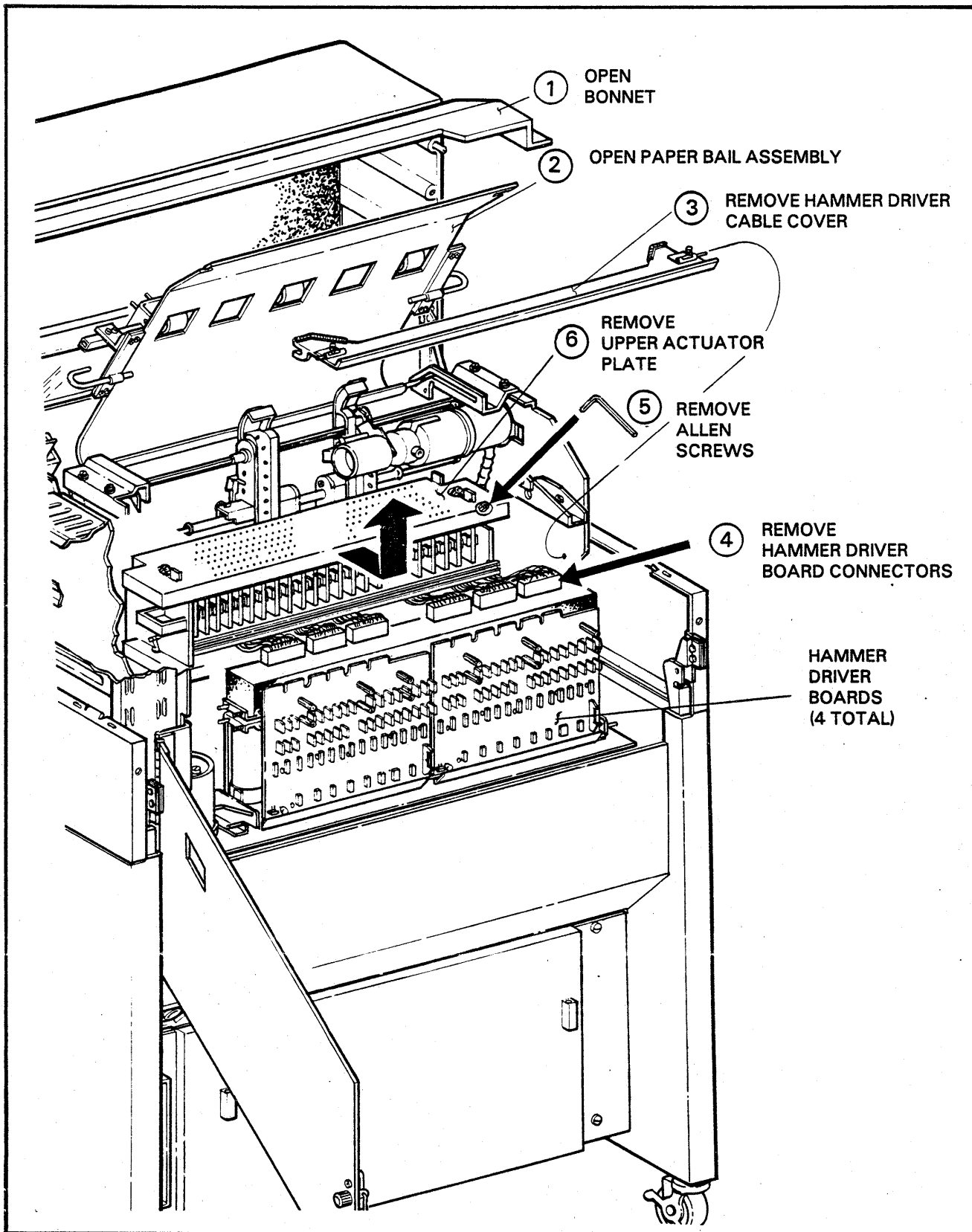


FIGURE 6-2. UPPER ACTUATOR PLATE REMOVAL AND INSTALLATION (SHEET 1 OF 2)

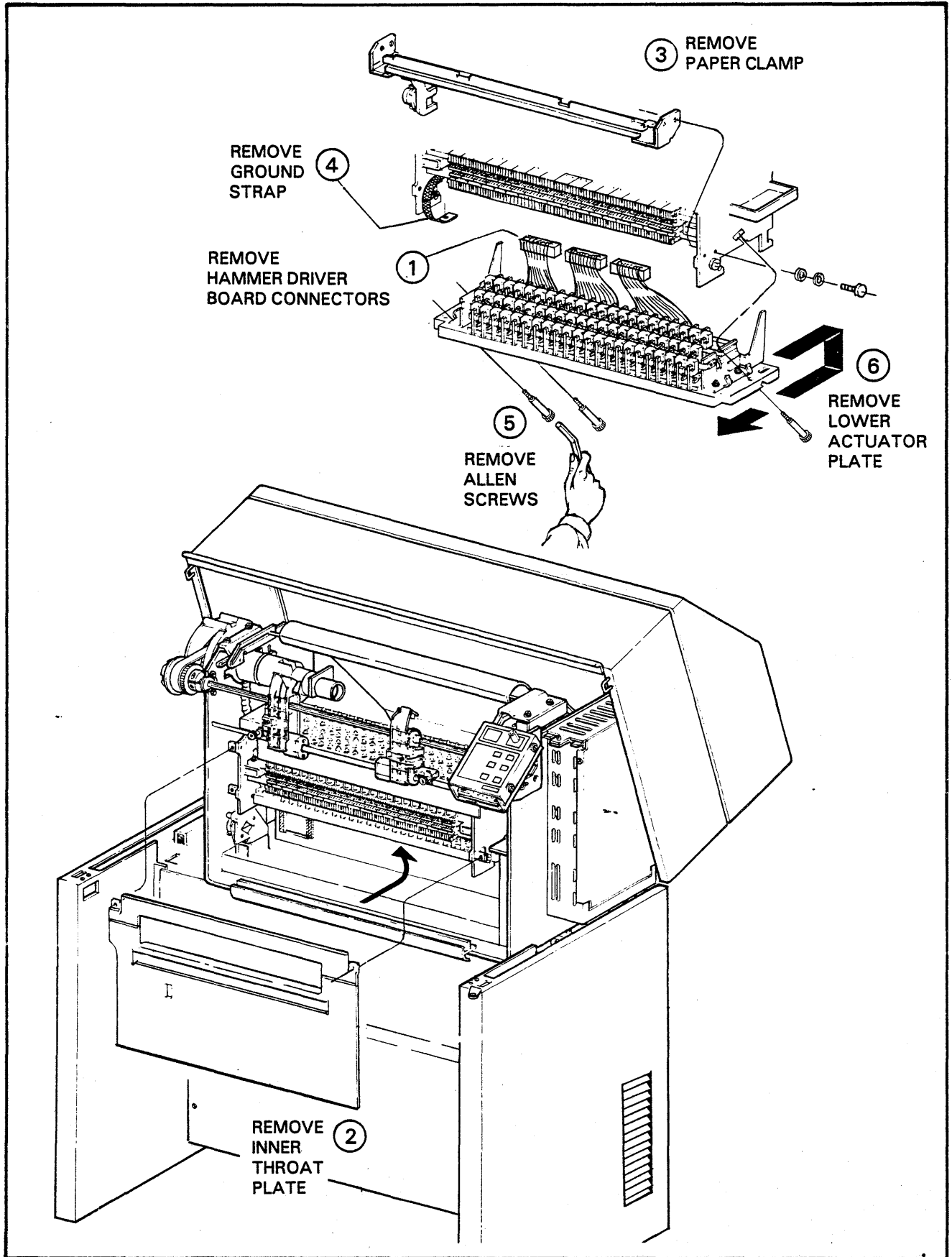


FIGURE 6-2. LOWER ACTUATOR PLATE REMOVAL AND INSTALLATION (SHEET 2 OF 2)

## 6AH

### Residual Strip Replacement (Upper and Lower)

1. Perform Actuator Plate Removal procedure 6AF.
2. The residual strip has two possible mounting positions to permit maximum use of the strip. If the strip indicates wear in only one position, move the mounting tabs to the other (unused) holes and proceed to step 5. A strip that has been used in both positions must be replaced as per steps 3 and 4.
3. Position the strip's mounting tabs so that on one side of the actuator plate assembly the inner hole (closest to the strip) is positioned over the locating pin. On the opposite side of the actuator plate assembly, the mounting tab must be positioned over the pin using the outer hole. (Refer to Figure 6-3).
4. Check that the strip is not twisted or folded over in its routing through the actuators.
5. Perform Actuator Plate Installation procedure 6AG.

## 6AI

### ACTUATOR REPLACEMENT (Upper and Lower)

1. Power the printer OFF.
2. Perform Actuator Plate Removal procedure 6AF.

#### NOTE

IF AN ODD COLUMN ACTUATOR NEEDS REPLACEMENT, REMOVE THE UPPER ACTUATOR PLATE. IF AN EVEN COLUMN ACTUATOR NEEDS REPLACEMENT, REMOVE THE LOWER ACTUATOR PLATE.

3. Unclip the residual strip and remove it.
4. Remove the two mounting screws of the defective actuator and remove the actuator.
5. Using the pin extractor tool, remove the actuator leads from the plug.
6. Plug in the two leads of the new actuator.
7. Position the new actuator in the actuator plate and secure it with the mounting screws.
8. Reinstall the residual strip. Refer to procedure 6AH if necessary.
9. Perform Actuator Plate Installation procedure 6AG.
10. Perform the Flight Time Adjustment procedure 5AE.

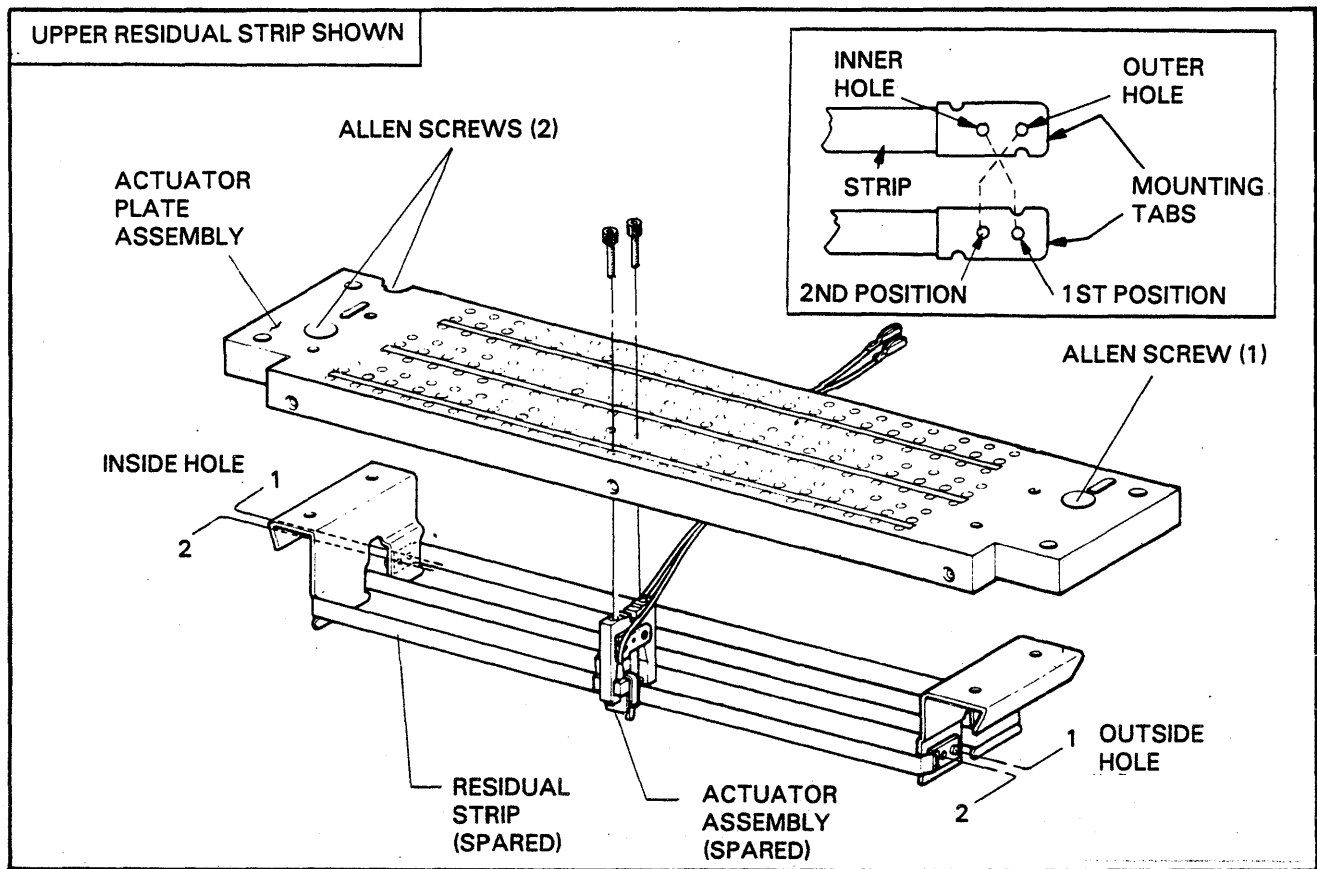


FIGURE 6-3. RESIDUAL STRIP POSITIONING

## 6AJ

### PRINT HAMMER REPLACEMENT

1. Power the printer OFF.
2. Remove the inner throat plate.
3. Locate the module containing the defective hammer. Hammer modules are spared with all four hammers. The hammer module can be disassembled for individual parts or installed as a whole module.

#### CAUTION

TO MINIMIZE POSSIBLE HORIZONTAL MISALIGNMENT OF THE PRINT HAMMERS, ONLY REMOVE ONE HAMMER MODULE AT A TIME.

4. Remove the two module mounting screws and slide the module off the hammer bar. (See Figure 6-4).

#### CAUTION

THE HAMMERS AND PLUNGERS ARE SPRING LOADED AND WILL SHOOT OUT UNLESS THEY ARE RELEASED SLOWLY.

5. Slide the pivot pin out of the module until the defective hammer can be reached.
6. Place the new hammer in the module and slide the pivot pin back into the module. Make sure the forms compressor is in place and measures .406 in. to .408 in. beyond the vertical locating face of the hammer module. If adjustment is necessary, rotate the set screw (located in the rear of the module). This moves the forms compressor blade in or out until the proper measurement is achieved.
7. Mount the module back on the hammer bar.
8. Replace the inner throat plate.
9. Perform the Flight Time Adjustment procedure 5AE if necessary.

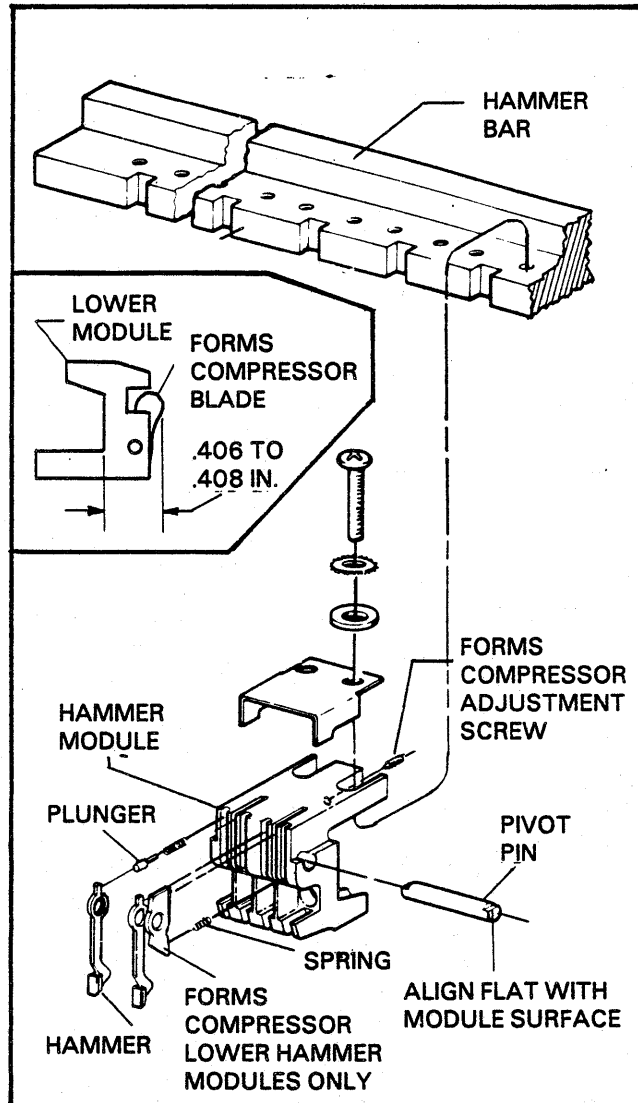


FIGURE 6-4. PRINT HAMMER REPLACEMENT



## 6AK

### PUSH ROD REPLACEMENT

This procedure may be performed to replace a bad push rod retainer assembly. Indication of failure appears as columns dropping out on the printout. Flight time adjustment may sometimes appear to correct this problem, but is usually only temporary. Check both ends of push rods on the affected columns for missing tips (glass like, clear shiny tips) or bent rods at the rod ends. See Figure 6-5.

1. Power the printer OFF.
2. Open the bonnet from the rear.
3. Raise the paper guide from the rear of the printer.
4. Perform Actuator Plate Removal procedure 6AF.

#### NOTE

IF AN ODD COLUMN PUSH ROD RETAINER NEEDS REPLACEMENT, REMOVE THE UPPER ACTUATOR PLATE. IF AN EVEN COLUMN PUSH ROD RETAINER IS TO BE REPLACED, REMOVE THE LOWER ACTUATOR PLATE.

5. The push rod retainer assemblies are held in place by two screws for each assembly. These mounting screws are on the top back sloping surface of the module mounting bar. If more than one assembly is removed, note each assembly's position because push rod lengths vary. Remove the two mounting screws holding the push rod retainer assembly and remove the assembly.
6. Examine the push rods for missing or bent tips.
7. Install a new push rod retainer assembly if damaged by inserting from the back of the module mounting bar. Align the front locking tab of the retainer into the slot on the bottom of the mounting bar. All push rods must be inserted into the hammer bar behind the correct hammer.

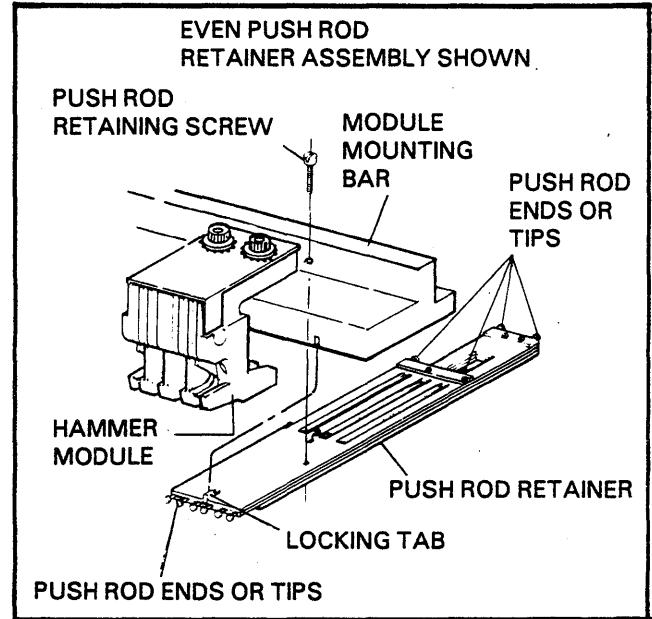


FIGURE 6-5. PUSH ROD REPLACEMENT

8. Perform Actuator Plate Installation procedure 6AG.
9. Perform Flight Time Adjustment procedure 5AE for only those hammers which are driven by the push rod retainer assembly replaced.

## 6AL

### FORMAT TAPE READER ASSEMBLY REPLACEMENT

If the reader assembly is being removed to check internal circuits, or to gain access to other components, then perform only step "6".

1. Disconnect printer from its power source.
2. Open the bonnet and paper guide from the rear of the printer.
3. Remove the 7PC2 Controller board from the card rack.
4. Remove the hardware holding P3 to the back-plane board 7BP1. Rotate the connector and feed it through the board. Pull the connector and ribbon cable toward the EVFU from behind the hammer driver boards.

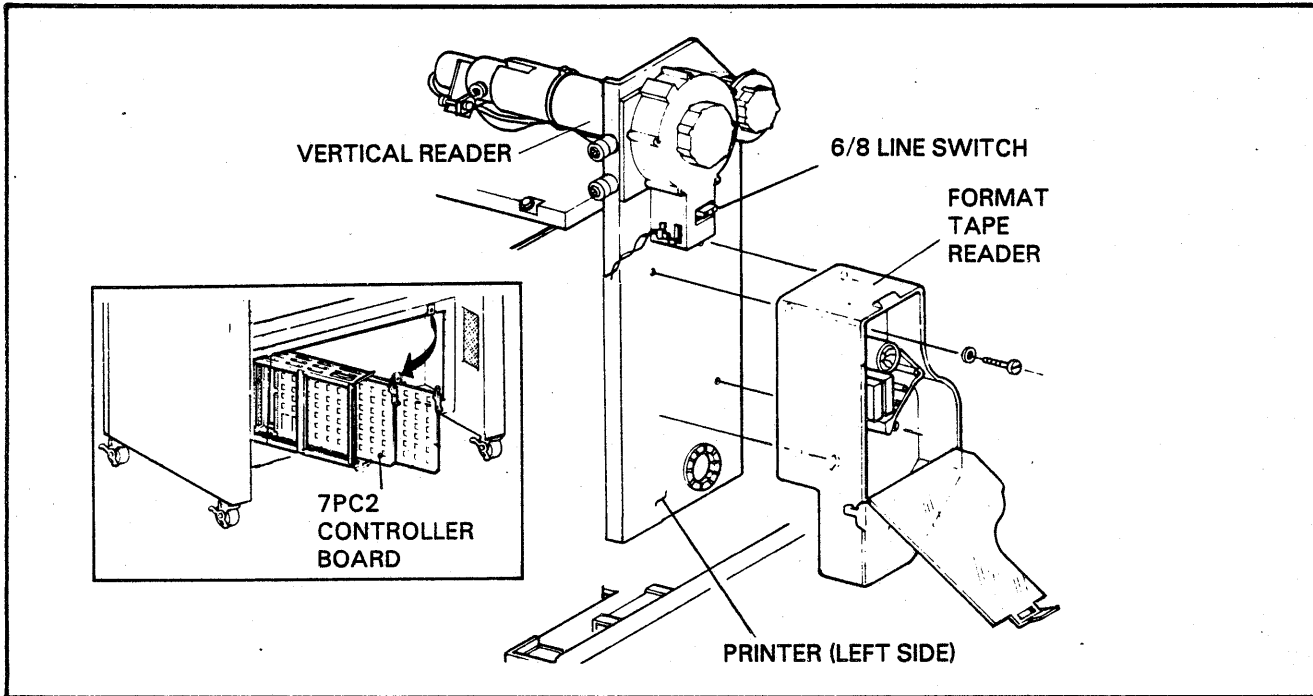


FIGURE 6-6. FORMAT TAPE READER ASSEMBLY REPLACEMENT

5. Disconnect the reader's brown and blue ac power leads at terminal strip 1TB3. Terminal strip 1TB3 is located under a plastic cover at the left of the circuit breaker box. Trace the reader's ac cable to terminal strip 1TB3 and note the two terminals that the wires are connected (7/10). (See Figures 5-8 through 5-10).
6. Open the reader cover. Remove the four corner mounting screws at the back inside surface of the reader (refer to Figure 6-6). Remove the reader assembly.
7. Install a new reader with the four screws removed in step "6".
8. Route the two a.c. wires down to 1TB3 and connect as removed in step "5".
9. Route the ribbon cable behind the hammer driver boards to the backplane board 7BP1. Install the connector at P3 on the 7PC2 board location which is the bottom connector on 7PC2. (Refer to Figure 1-7).
10. Install the controller board 7PC2. If this is a new installation, check the 7PC2 board for EVFU ROM's and new dip switch settings (Refer to the Technical Manual).

## 6AM

### CONTROL PANEL REPLACEMENT

1. Power the printer OFF and raise the bonnet.
2. Disconnect the ribbon cable at the top of the panel.
3. Scribe a line around the base of the Control Panel on the mounting bracket.
4. Loosen the four screws and raise to remove the Control Panel assembly.

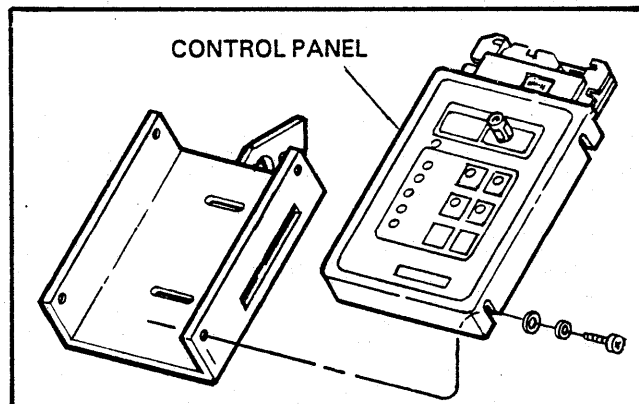


FIGURE 6-7: CONTROL PANEL REPLACEMENT

5. Position a new panel down over the screws on the mounting bracket.
6. Align the bottom edge of the panel with the scribe line and tighten the four screws.
7. Slowly close the bonnet, being careful in case the Control Panel is too high. The top surface of the panel must contact the seal around the bonnet opening. The panel must not raise the bonnet off the seal on the lower cabinet base. Check for an opening with a card.
8. If the panel raises the bonnet from the cabinet base, loosen the screws just enough so closing the bonnet will push the panel into place. Then tighten the four screws again.
9. If the panel is too low raise the panel slightly and just barely snug up the screws, so lowering the bonnet will position the panel. Then tighten the four screws.
10. Replace the ribbon cable connection at the top of the Control Panel.
3. Unscrew the fine horizontal paper positioning knob counter clockwise while holding the shaft so it does not rotate.
4. Loosen the tractor locking knobs.
5. Remove the lower tractor shaft from the Control Panel side.
6. Remove the protective cover positioned over the belt for the tractor drive system (Figure 6-8).
7. Remove the paper motion verification (PMV) sensor from the right tractor if replacing the right tractor (Figure 6-9).
8. Loosen the collar clamp and remove the coarse paper positioning knob and belt from the upper shaft (Figure 6-9). Check the knob for cracks. Replace if cracked.
9. Loosen the set screws which hold the left and right shaft bearings on the upper shaft.
10. Slide the upper shaft to the left until the right end clears the bearing and the chassis structure.

## 6AN

### TRACTOR REMOVAL AND REPLACEMENT

1. Power the printer OFF.
2. Open the bonnet and slide the paper guide to the rear of the printer.
11. Swing the upper shaft toward the front of the printer, and slide the tractors off the right end of the shaft.
12. Remove the tube from the tractors.

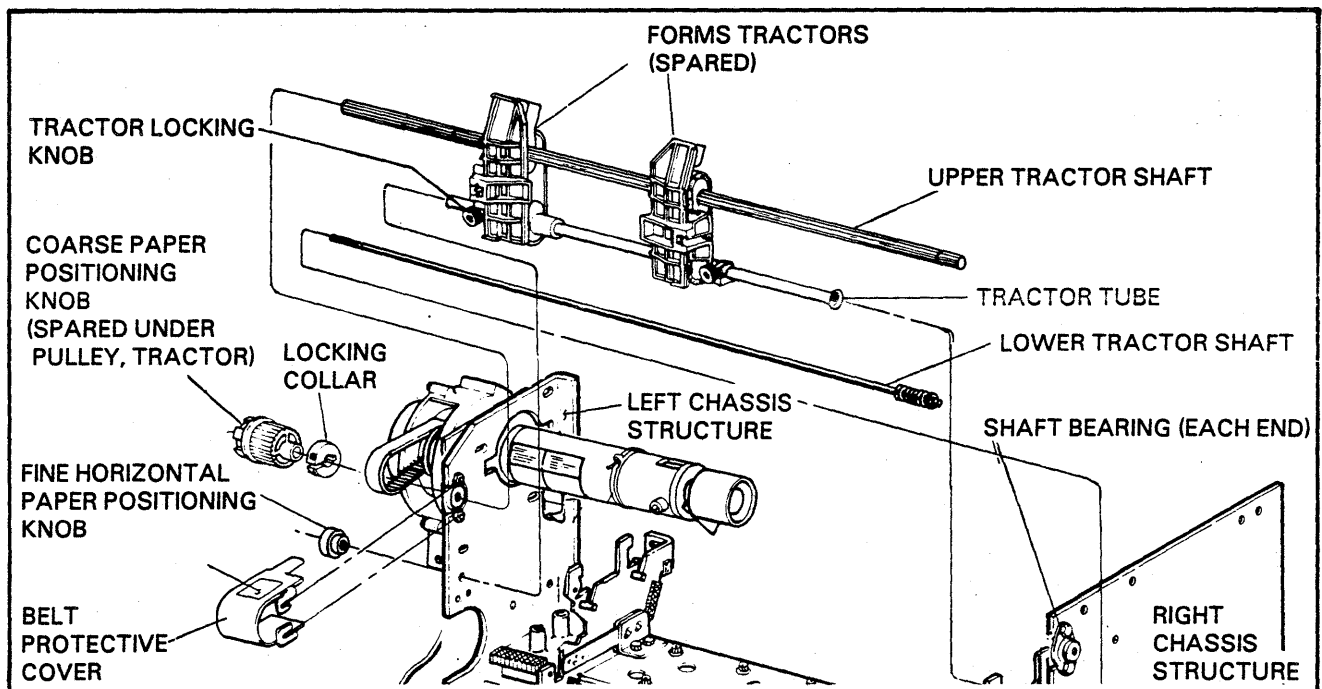


FIGURE 6-8. TRACTOR REMOVAL AND REPLACEMENT

13. The ends of the upper tractor shaft are different, so before replacing the tractors onto the upper tractor shaft, make sure the shaft is positioned correctly. The left side of the shaft has a taper approximately 3 inches from the left side. The right side has a taper approximately  $\frac{3}{4}$  of an inch from the right side. These tapers ensure proper seating in the bearings.
14. Replace the tractors as required. Slide the new tractor/s on from the right side and position them around the upper shaft and lower tractor tube.
15. Align the upper shaft with the holes in the bearing and left side chassis. Slide the shaft to the left until the right side of the shaft clears the right chassis structure and insert it into the right chassis structure bearing. Push the shaft all the way to the right and tighten the set screw in the right shaft bearing. Tighten the left shaft bearing screw.
16. Install the lower shaft through the right side chassis structure, into the lower tractor tube and out the left side chassis structure.
17. Re-install the coarse paper positioning knob and drive belt.
18. Tighten the left and right tractor locking knobs.
19. Screw on the fine horizontal paper positioning knob clockwise while holding the shaft so it does not rotate. Tighten the knob until it stops turning.
20. Perform the Belt Tension Adjustment Procedure 5AW.
21. Perform the Tractor Assembly Adjustment Procedure 5AX.

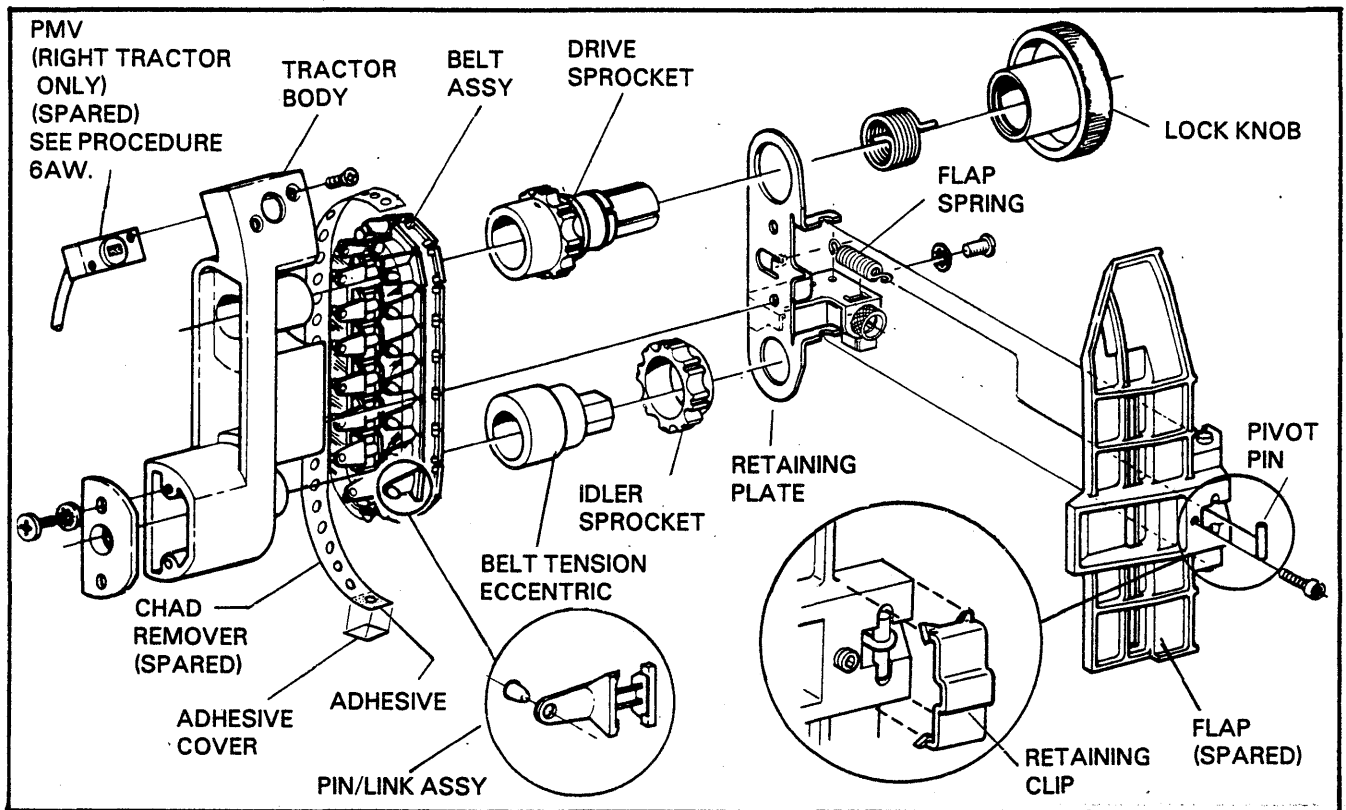


FIGURE 6-9. TRACTOR COMPONENTS LOCATOR

**6AO**

**TRACTOR COMPONENTS REPLACEMENT**

This procedure includes those procedures required for major tractor repair. These procedures include 6AP and 6AQ.

**NOTE**

THE TRACTOR FLAP AND PIN/LINK ASSEMBLY COMPONENTS MAY BE REPLACED WITHOUT TAKING THE TRACTOR ASSEMBLY OFF THE PRINTER.

**6AP**

**TRACTOR FLAP REPLACEMENT (FIGURE 6-10)**

1. Power the printer OFF.
2. Open the print gate.
3. Remove the retaining clip and flap spring from around the pin making sure that the pivot pin does not fall into the other printer components.

4. Remove the flap.
5. Replace the flap and re-install the pivot pin, spring and the retaining clip.
6. Perform the Tractor Flap Clearance Procedure which is part of Tractor Assembly Adjustments 5AX.

**6AQ**

**CHAD REMOVER PLASTIC STRIP REPLACEMENT (FIGURE 6-9)**

1. Power the printer OFF.
2. Open the bonnet and slide the paper guide to the rear of the printer.
3. Cut off the old chad remover plastic strip.
4. Insert a new chad remover over the cogs on the tractor belt. Remove the adhesive cover on one end against the belt and lay the other down onto the adhesive.

## 6AR

### BAND DRIVE MOTOR REPLACEMENT

1. Power the printer OFF.
2. Open the gate and center ribbon cover.
3. Remove the ribbon and print band.
4. Rotate band pulley and work the drive belt off pulley.
5. Remove one hex. socket set screw then loosen the second hex. socket set screw in motor pulley and remove pulley. (See Figure 6-10).
6. Cut ty-rap and unplug in-line connector which has black and red wires soldered to feed-thru capacitor plate.
7. Remove four motor mounting screws, flat washers, and lockwashers and remove motor assembly from motor mounting plate.
8. Disconnect red and black wires from motor terminals.
9. Remove feed-thru capacitor plate from motor by first removing two screws, lockwashers, and flat washers.
10. Install feed-thru capacitor plate on new band drive motor using same hardware removed from old motor.
11. Connect red and black wires to new motor. The red wire goes to the motor terminal with the red dot.
12. Install motor on motor mounting plate using the hardware removed in step 7.
13. Install motor pulley on motor shaft and tighten set screw (28 to 32 in. lbs.) Allow about 0.030-inch clearance under pulley. Install the second locking set screw to the pulley.
14. Connect the in-line connector and tie the harness wires with a ty-rap.
15. Clean the inside surface of the band drive belt with alcohol.
16. Install band drive belt over motor pulley and band pulley. Rotate pulley until belt tracks in the center of pulley.
17. Perform the Bank Motor Belt Tension Adjustment procedure 5AM.
18. Perform the Band Pulley and Tracking Adjustment procedure 5AS.
19. Install the correct band, ribbon and ribbon cover.

## 6AS

### RIBBON MOTOR REPLACEMENT

1. Power the printer OFF and open the bonnet.
2. Open the center ribbon cover, remove the left ribbon cover and ribbon.
3. Cut ty-rap and unplug in-line connector which has yellow and black wires soldered to feed-thru capacitor mounting plate. (Refer to Figure 6-11).
4. Loosen hex socket screw in motor shaft clamp collar and separate motor, collar, and ribbon spool.
5. Remove two hex head mounting screws and lockwashers and remove motor assembly from gate arm.
6. Do not remove the feed-thru capacitor plate located on the bottom of the motor.
7. Install the new motor on gate arm with two hex head screws and lockwashers.
8. Assemble ribbon spool to motor shaft using the clamp collar. Tighten hex socket set screw in collar.
9. Plug in-line connector into mating connector and secure to wire bundle using a ty-rap.
10. Replace the left ribbon cover, ribbon and close the center ribbon cover.

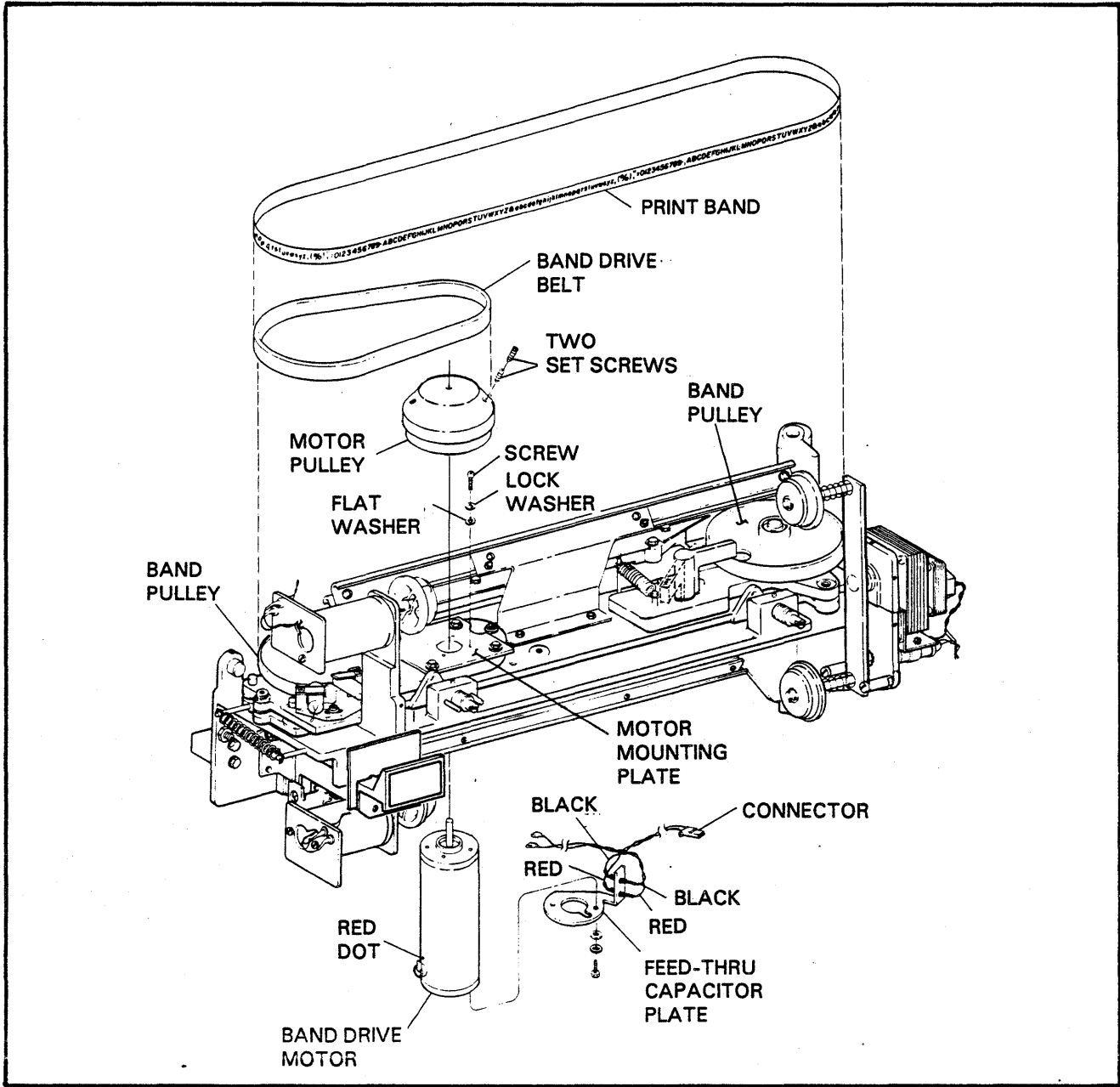


FIGURE 6-10. BAND DRIVE MOTOR REPLACEMENT

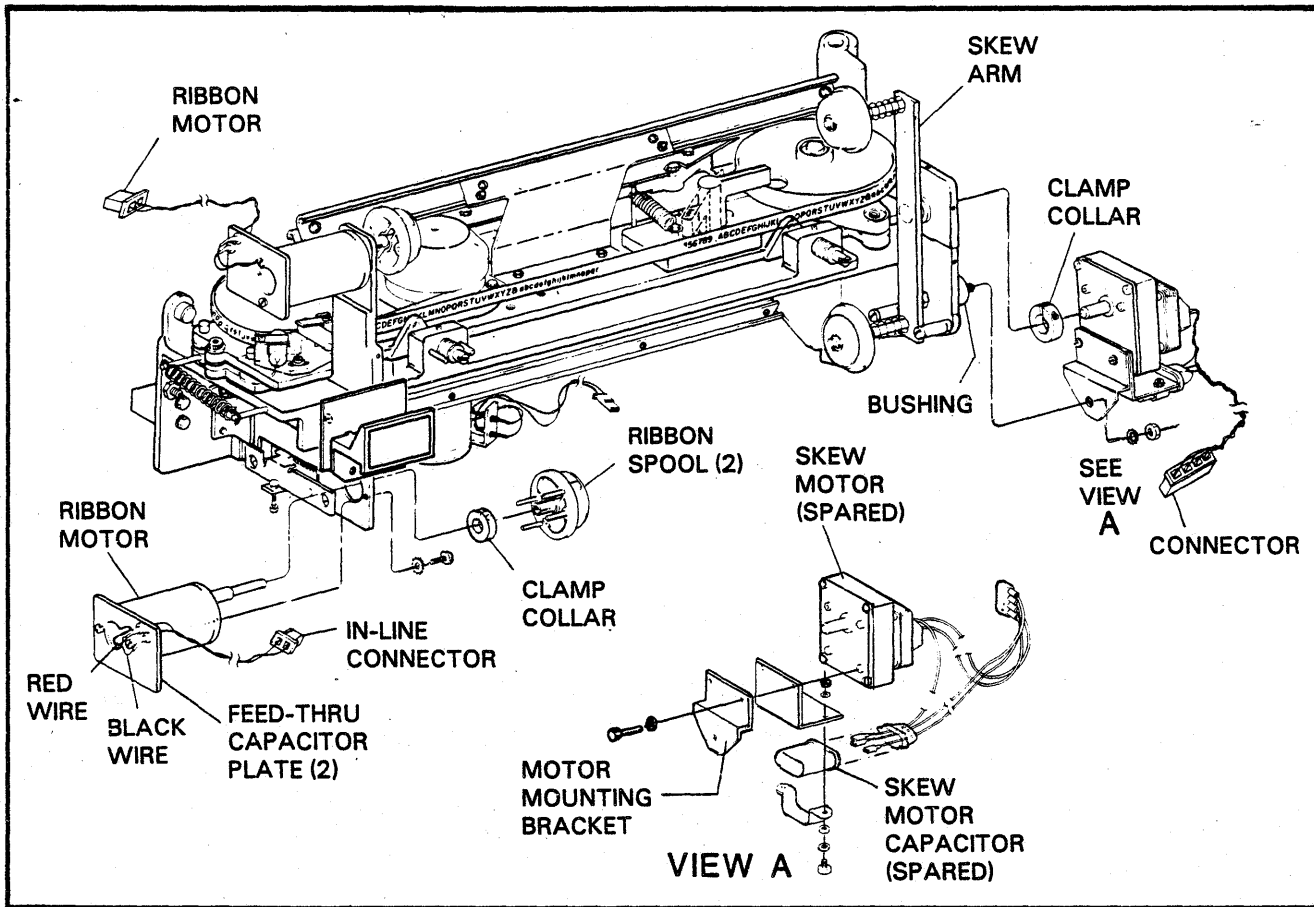


FIGURE 6-11. RIBBON MOTOR AND SKEW ARM MOTOR REPLACEMENT

## 6AT

### SKEW ARM MOTOR REPLACEMENT

1. Power the printer OFF, open the bonnet and center ribbon cover.
2. Remove the right ribbon cover.
3. Unplug the cable to the skew motor connector.
4. Use a screwdriver to dislodge the connector from connector bracket.
5. Loosen hex socket screw in clamp collar.
6. Remove nut and lockwasher at bottom of motor mounting bracket and separate motor assembly from skew arm.
7. Pull the boot off the capacitor, note and mark the wire locations on the capacitor.
8. Separate motor from capacitor bracket and motor mounting bracket by removing two screws, lockwashers, and flat washers.
9. Assemble replacement motor to motor mounting bracket and capacitor bracket with two screws, lockwashers, and flat washers.
10. Insert the wires through the boot and connect to the capacitor. Install the boot on the capacitor.
11. Insert the connector back in the bracket.
12. Plug the cable back on the connector.
13. Install motor assembly on skew arm making sure clamp collar is in place on skew arm shaft and motor mounting bracket is in place on bolt and against rubber bushing. Secure motor assembly using nut and lockwasher.



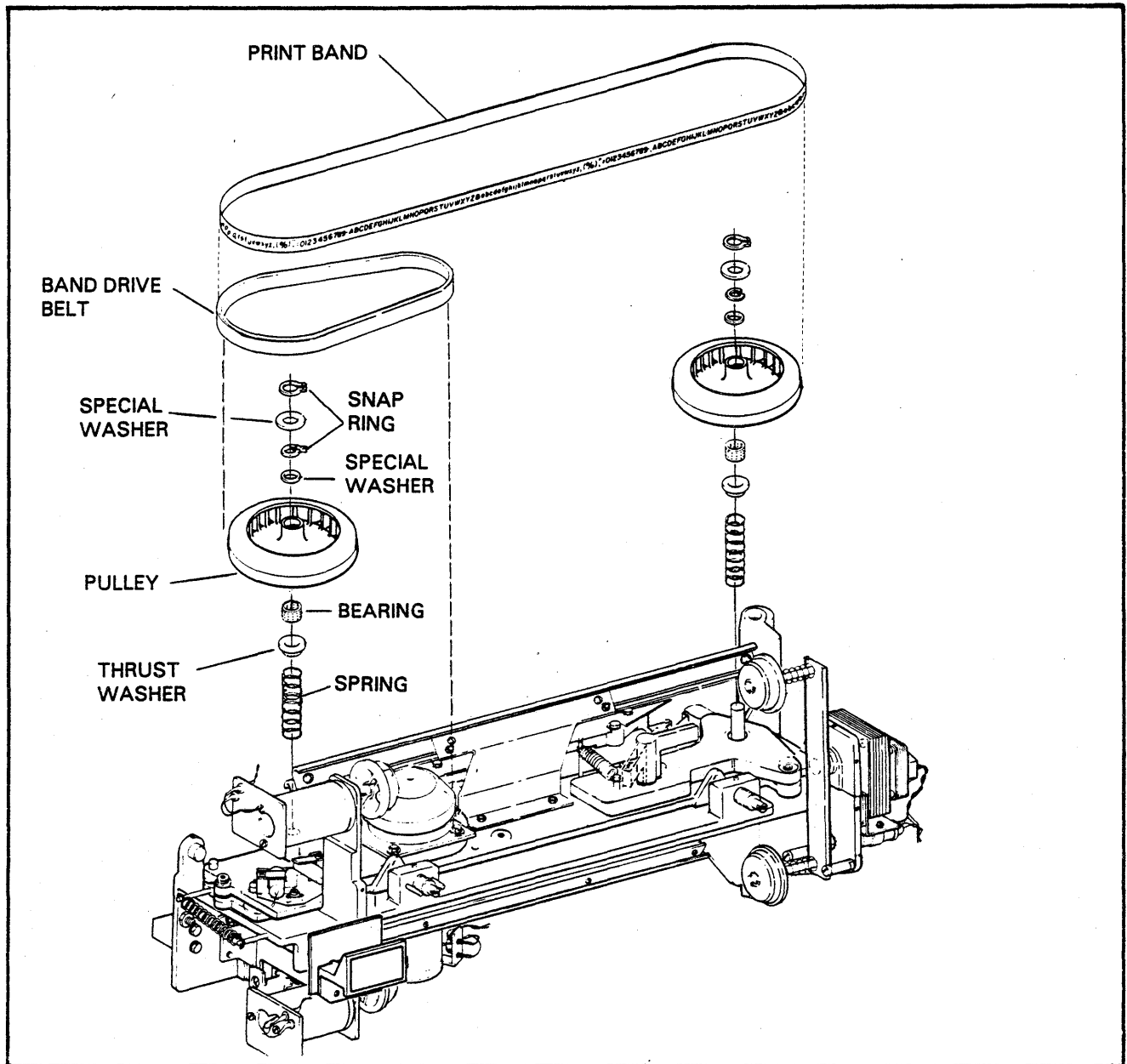


FIGURE 6-12. BAND PULLEY REPLACEMENT

14. Visually align motor vertically and tighten hex socket screw in clamp collar.
15. Plug motor connector into connector on gate arm bracket.
16. Replace the right ribbon cover.

## 6AU

### BAND PULLEY REPLACEMENT

1. Power the printer OFF, open the bonnet and the gate.
2. Open the center ribbon cover and outer throat plate.

3. Remove the ribbon and print band.
4. Rotate band pulley and work the drive belt off pulley.
5. Using a snap ring spanner wrench, remove the large snap ring on top of pulley shaft. (See Figure 6-12).
6. Remove special plastic washer, then remove pulley.
7. Remove smaller snap ring and special washer from inside pulley.
8. Inspect parts underneath pulley; the bearing, thrust washer, and spring. Replace or clean if necessary. Wipe pulley shaft clean. If bearing is being replaced, coat with grease, part number 95130200.
9. Make sure spring, thrust washer and bearing are installed on pulley shaft in the proper order.
10. Install special washer and snap ring inside top of pulley.
11. Install pulley on shaft.
12. Make sure pulley rotates freely with no binding or noise, then install large special washer and snap ring.
13. Clean the inside surface of the band motor drive belt with alcohol and install the band drive belt over motor pulley and band pulley. Rotate pulley until belt tracks in center of pulley.
14. Perform the Band Pulley Location Procedure and Band Pulley and Tracking procedures 5AP and 5AS.
15. Install print band, ribbon and close the center ribbon cover.

## 6AV

### BLOWER AIR FLOW SENSOR REPLACEMENT

#### WARNING

REMOVE POWER BY DISCONNECTING THE A-C POWER CORD FROM THE VOLTAGE SOURCE.

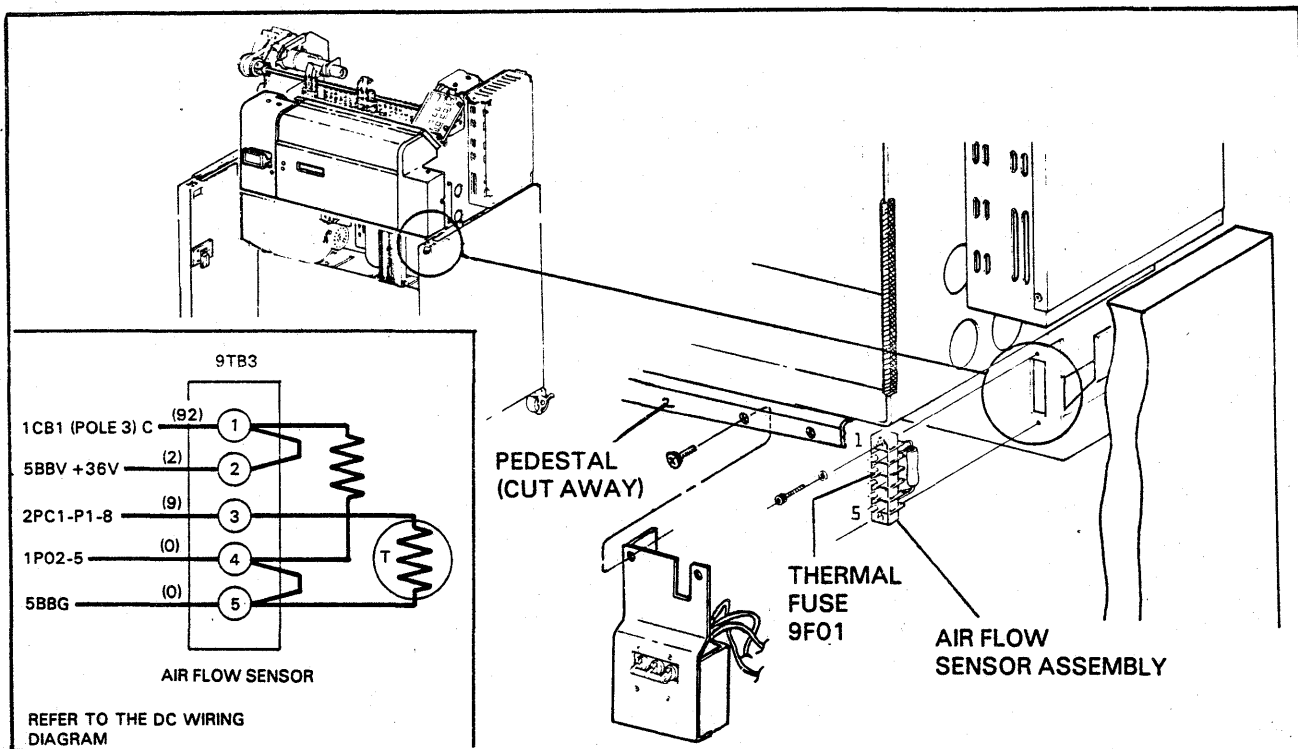


FIGURE 6-13. BLOWER AIR FLOW SENSOR REPLACEMENT

The Air Flow Sensor assembly uses a thermistor which automatically resets when cooled. If the blower's air flow is reduced or stopped during printer operation the Air Flow Sensor will crobar the printer's +36 volts but will reset itself when the printer is cooled.

1. Remove the front cabinet cover over the circuit breaker. Remove two screws at top of the circuit breaker mounting bracket and lower the circuit breaker assembly to the extent allowed by the length of the wires attached (see Figure 6-13).
2. Locate air flow sensor terminal block (9TB3) mounted on the chassis behind the circuit breaker assembly.
3. Make note of the wire colors and position on the terminal block, then remove the wires.
4. Remove the air flow sensor assembly by removing two socket-head screws securing the terminal block to panel. Observe the wiring arrangement of the 8-watt resistor and thermal cutoff (within the resistor) for correct orientation of new part (see Figure 6-13).
5. Install new air flow sensor assembly with screws removed in step 4.
6. Connect wires to terminal block in the order noted in step 3.
7. Mount the circuit breaker assembly with the two screws removed in step 1, but do not tighten screws. The circuit breaker assembly should be adjusted so that its front surface just contacts the inner surface of the front cabinet cover when it is installed. Make the necessary adjustments and tighten the circuit breaker assembly in place.
8. Replace the front cabinet cover.

## 6AW

### PAPER MOTION VERIFICATION SENSOR REPLACEMENT

1. Power the printer OFF.
2. Remove PMV sensor by removing two screws securing sensor to right-hand tractor (refer to Figure 6-9).
3. Withdraw sensor cable from wire retaining clip and disconnect in-line sensor cable connector.
4. Install new PMV sensor with the photocell (a bright spot as seen through the sensor window) to the left. Use screws removed in step 2.
5. Connect in-line cable connector and push sensor cable into wire retaining clip.

## 6AX

### HAMMER DRIVER BOARD REPLACEMENT

Procedure (See Figure 6-14 and 6-15)

1. Power the printer OFF.
2. Open the bonnet from the rear.
3. Raise the paper bail from the rear.
4. Swing open the upper back panel.
5. Remove the hammer driver cable cover over the hammer driver board assembly. Then slide the assembly toward the rear of the printer.

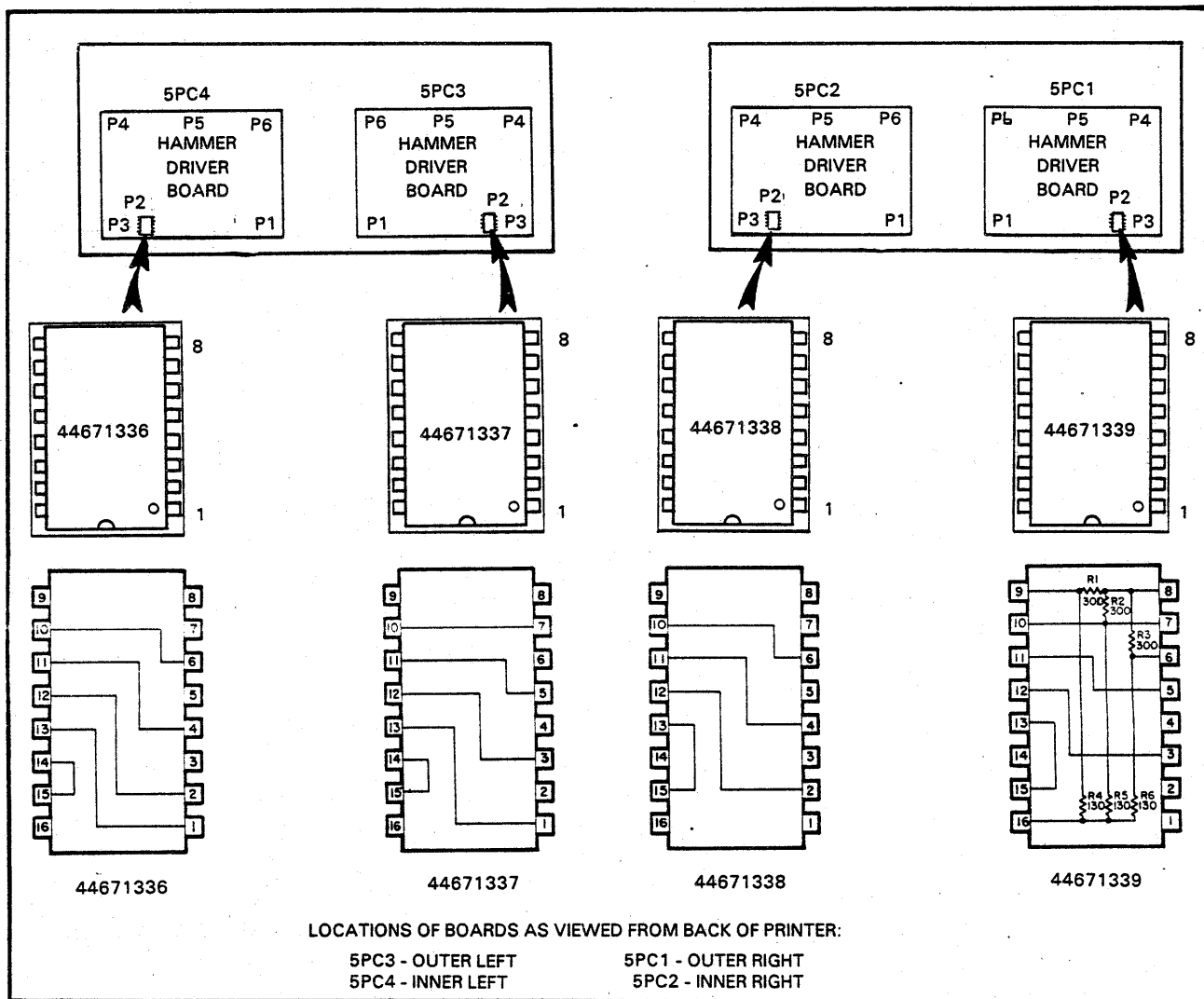


FIGURE 6-14. HAMMER DRIVER BOARD TERMINATOR POSITION

6. Unplug power cable connector P1 and ribbon cable connector P3 from the board to be replaced. Also remove the three top edge connectors P4, P5 and P6.
7. Remove the protective cover which extends across two boards by first removing four plastic retaining screws.
8. Using a 1/4 in. nut driver, remove six threaded hexagon standoffs which hold the board against the buss bars. Remove the board and remove the terminator plug from the board.
9. Plug the terminator into the jumper socket on a new board. Figure 6-14 identifies the terminators for the four hammer driver boards.

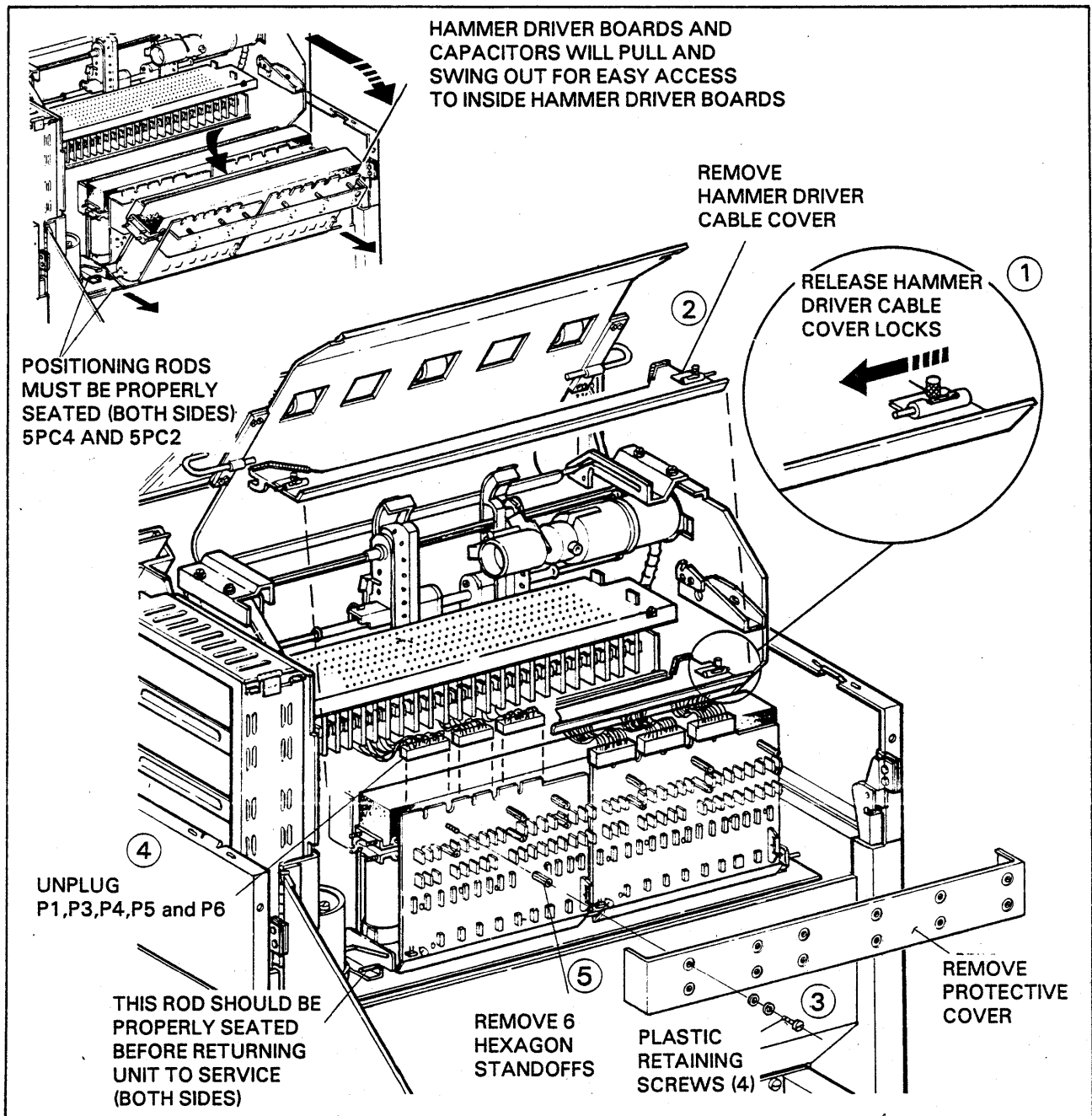


FIGURE 6-15. HAMMER DRIVER BOARD REPLACEMENT

10. Place a new board in position against the buss bars and secure with the six hexagon standoffs.
11. Replace the three top edge connectors, power connector and ribbon connector on the hammer driver board.
12. Install the protective cover across two boards with four plastic screws.
13. Slide the hammer driver board assembly back into position with the rod all the way into the slot at the bottom of the assembly.
14. Reinstall the hammer driver cable cover covering the hammer driver boards.
15. Close the upper back panel.
16. Close and lock the paper bail.
17. Close the bonnet.
9. Use a large screwdriver to ground the buss bars together on the top of the capacitors, making sure the capacitors are discharged.
10. Loosen the 2 clamps which hold the capacitors to the frame.
11. Carefully move the buss bar and capacitor assembly out the back of the printer until the top of the buss bar clears the frame. Mark the location of any wires which are too short, which must be disconnected.
12. Peel back the gray insulating material on top of the buss bar over the capacitor being replaced and remove both screws from the top of the capacitors to be replaced.
13. The capacitor is now free from the buss bar assembly and can be removed by sliding it out the bottom of the assembly.
14. Install a new capacitor observing the polarity signs on the capacitor and buss bar.
15. Secure the capacitor to the buss bar assembly with the two screws removed in step 12. Cover the screws with gray insulating material that was peeled back earlier.
16. Carefully push the buss bar and capacitor assembly back into the frame and fasten the two capacitor clamps to the frame.
17. Reinstall the hammer driver boards and secure in place with six threaded standoffs for each board.
18. Replace the top edge connectors on the hammer driver boards in the following left to right order, as viewed from the rear of the printer: P6, P5, and P4 for outer boards 5PC3 and 5PC1 and P4, P5, and P6 for inner boards 5PC4 and 5PC2.
19. Replace the ribbon cable and power cable connectors on the hammer driver boards and any other wires which were removed to gain access to the assembly.

## 6AY

### HAMMER BANK CAPACITOR REPLACEMENT

1. Power the printer OFF.
2. Open the bonnet from the rear of the printer.
3. Raise the paper guide from the rear.
4. Release and swing out the upper back panel of the printer.
5. Remove the ribbon cable connector (P3) and power cable connector (P1) from hammer driver boards, board locations 5PC1, 5PC2, 5PC3 and 5PC4. It may be necessary to swing the hammer driver board and capacitor assembly out toward the back of the printer when working on inner most boards 5PC2 and 5PC4. (See Figure 6-16).
6. Remove three top edge connectors from each of the hammer driver boards (P4, P5 and P6).
7. Remove the four plastic screws which attach the hammer driver board cover to the outside hammer driver boards 5PC3 and 5PC1 and remove the cover.
8. Remove six threaded standoffs using a 1/2 in. nut driver from 5PC1 and 5PC3 hammer driver boards and remove the boards.

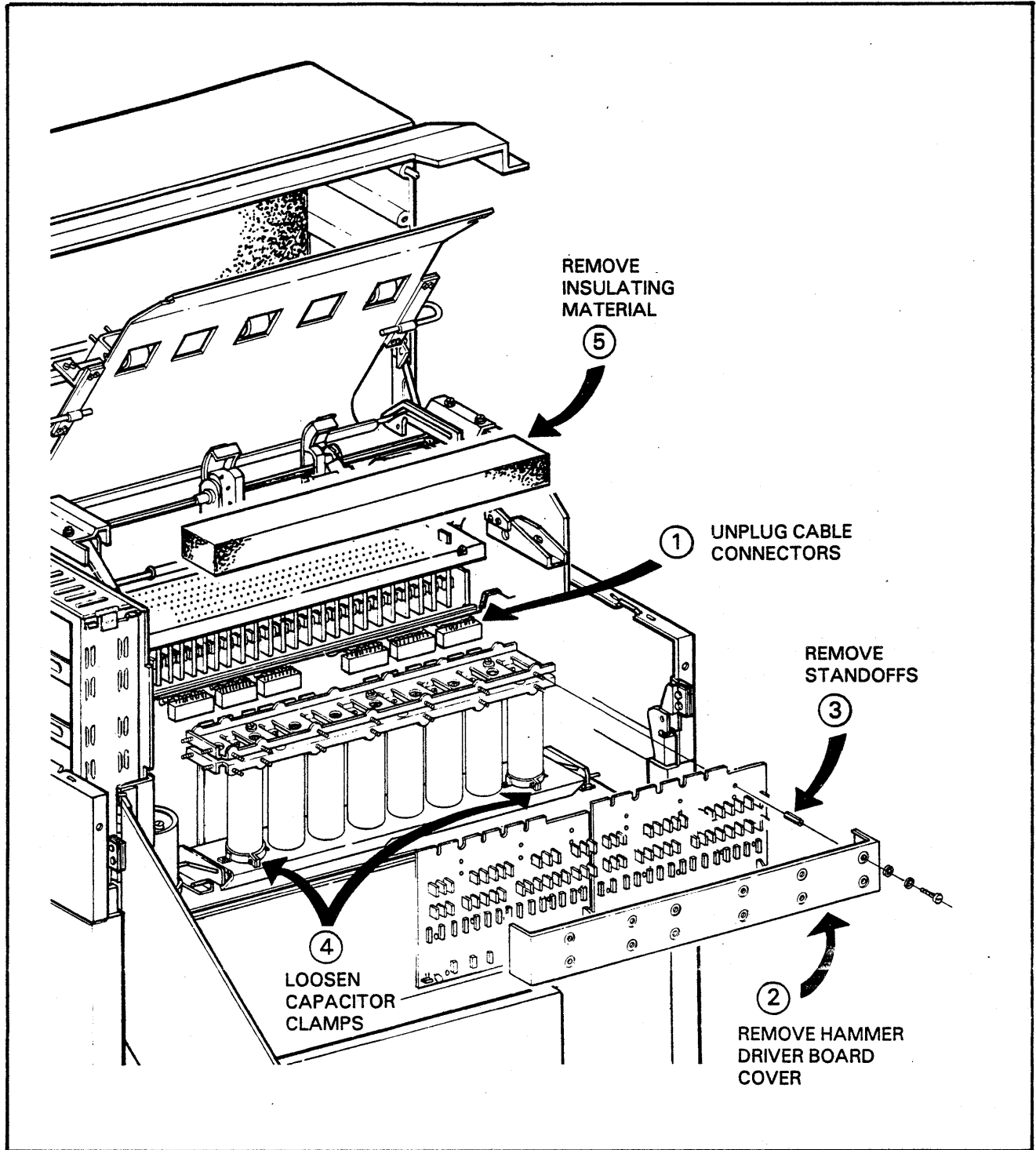


FIGURE 6-16. HAMMER BANK CAPACITOR REPLACEMENT (SHEET 1 OF 2)

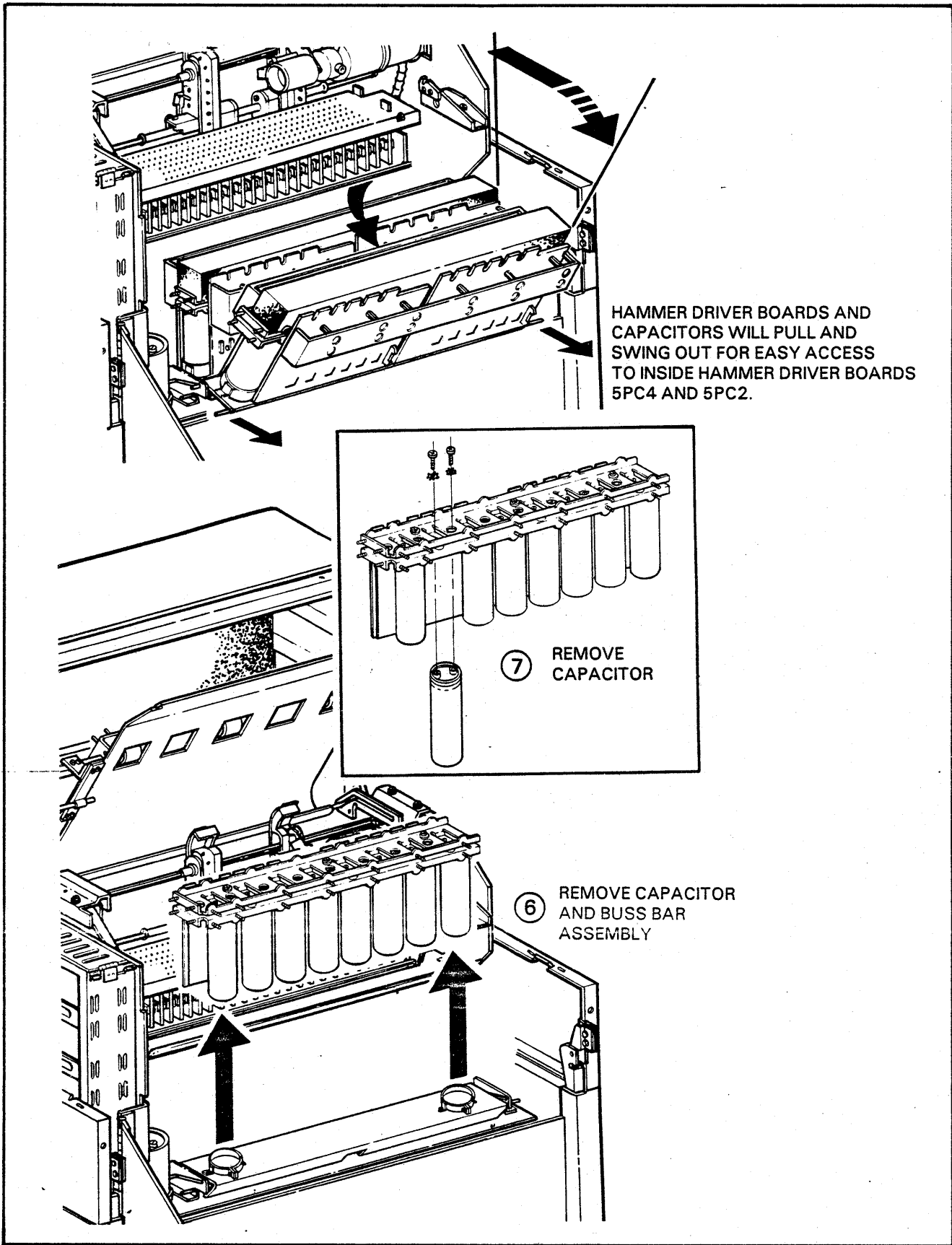


FIGURE 6-16. HAMMER BANK CAPACITOR REPLACEMENT (SHEET 2 OF 2)



## 6AZ

### MYLAR RIBBON SHIELD REPLACEMENT

#### Tools and Material Required:

- a. Soft rags.
- b. Rubber cement solvent; Bestine, Ross or equivalent.
- c. One upper ribbon shield and one lower ribbon shield.
- d. Single edge razor blade, exacto knife or equivalent.

#### REMOVAL

Ribbon shield replacement is an operator responsibility and is necessary every 6 million lines. A worn out or misaligned ribbon shield may cause smudging on the paper, ribbon binding, paper jamming or degraded printed output.

1. Read and become familiar with this entire removal and installation procedure before attempting ribbon shield replacement.
2. Power printer OFF and open bonnet.
3. Open the gate by pulling up on the gate latch handle.
4. Locate the upper and lower ribbon shields. They are located on the outside surface of the outer throat plate assembly.
5. Grasp the grounding clip and pivot it out and up as shown in the illustration.
6. With a single edge razor blade, lift one edge of the shield. Remove the upper and lower ribbon shields. Slow removal will leave less adhesive residue on the outer throat plate. Any residue or plastic remaining on the surface can be removed with the razor blade.
7. Clean all the adhesive, ink and oil residue from the outer throat plate assembly using a soft rag and rubber cement solvent. Residue is removed by soaking the rag with solvent and rubbing rigorously. Repeat as necessary using a clean area on the rag for each application of solvent. Once the area is clean, allow to air dry for several minutes.

#### NOTE

IT IS VERY IMPORTANT THAT ALL RIBBON SHIELD MOUNTING SURFACES BE CLEANED THOROUGHLY AND THAT ALL OLD ADHESIVE RESIDUE BE REMOVED BEFORE INSTALLING NEW RIBBON SHIELDS.

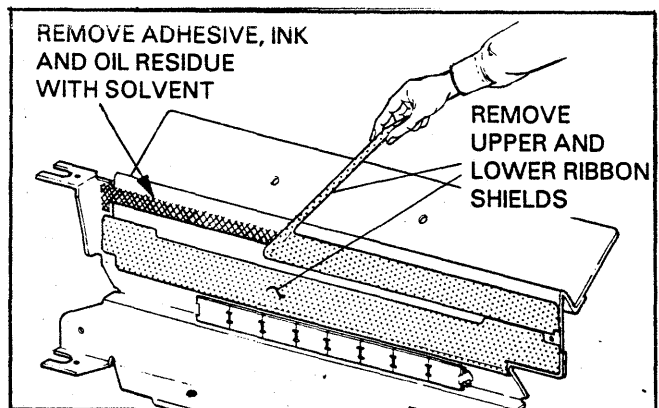
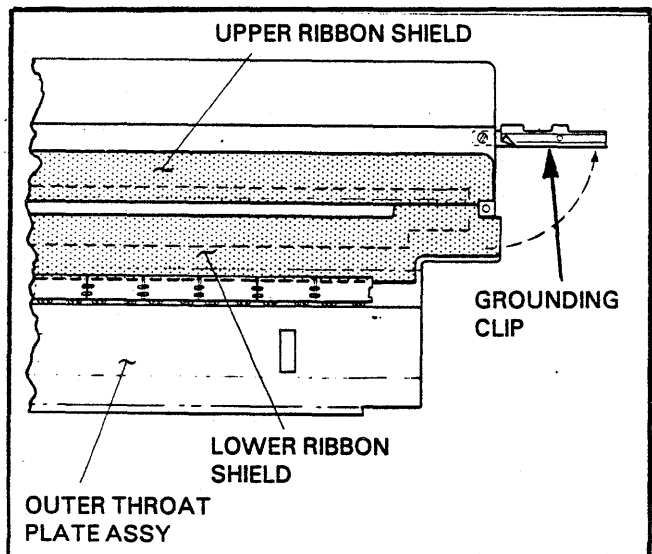
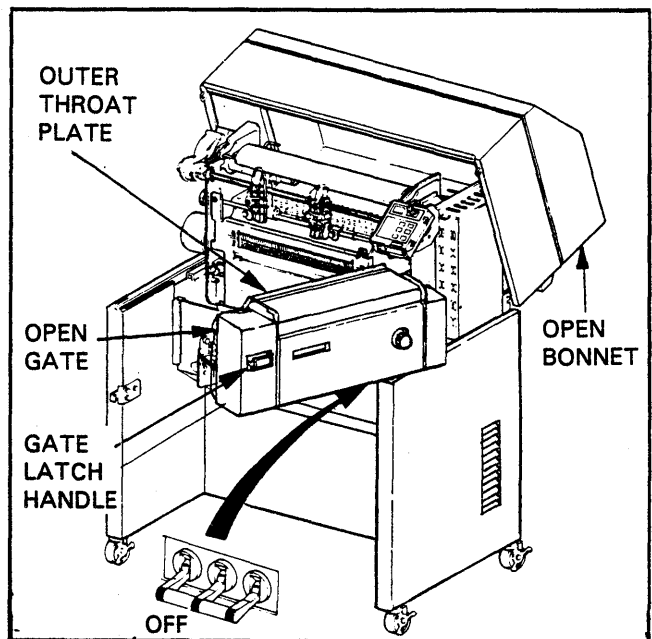


FIGURE 6-17. SHIELD REMOVAL

## INSTALLATION

### NOTE

PROPER ALIGNMENT OF RIBBON SHIELDS IS IMPORTANT TO ASSURE GOOD PRINT QUALITY.

8. Remove non-stick paper backing from adhesive areas on back of new upper ribbon shield.
9. Align upper ribbon shield surface "A" with scribe lines "B" on outer throat plate. Also align the right edge of the ribbon shield with the right edge of the throat plate. Assure that the entire surface of the ribbon shield is not bowed or creased before pressing ribbon shield firmly to throat plate.
10. Remove non-stick paper backing from adhesive on back of new lower ribbon shield.
11. Align lower ribbon shield edge "C" on or slightly below the same scribe lines. Also align the right edge of the lower ribbon shield with the right edge of the upper ribbon shield. Assure that the entire surface of the ribbon shield is not bowed or creased before pressing ribbon shield firmly to throat plate. Tuck the lower edge of the lower ribbon shield behind the paper clamp plates.
12. Grasp the grounding clip and pivot it down and to the left until it clips over the edge of the throat plate and is flush with its edge.
13. Close gate and bonnet.
14. Power printer ON and return it to service.

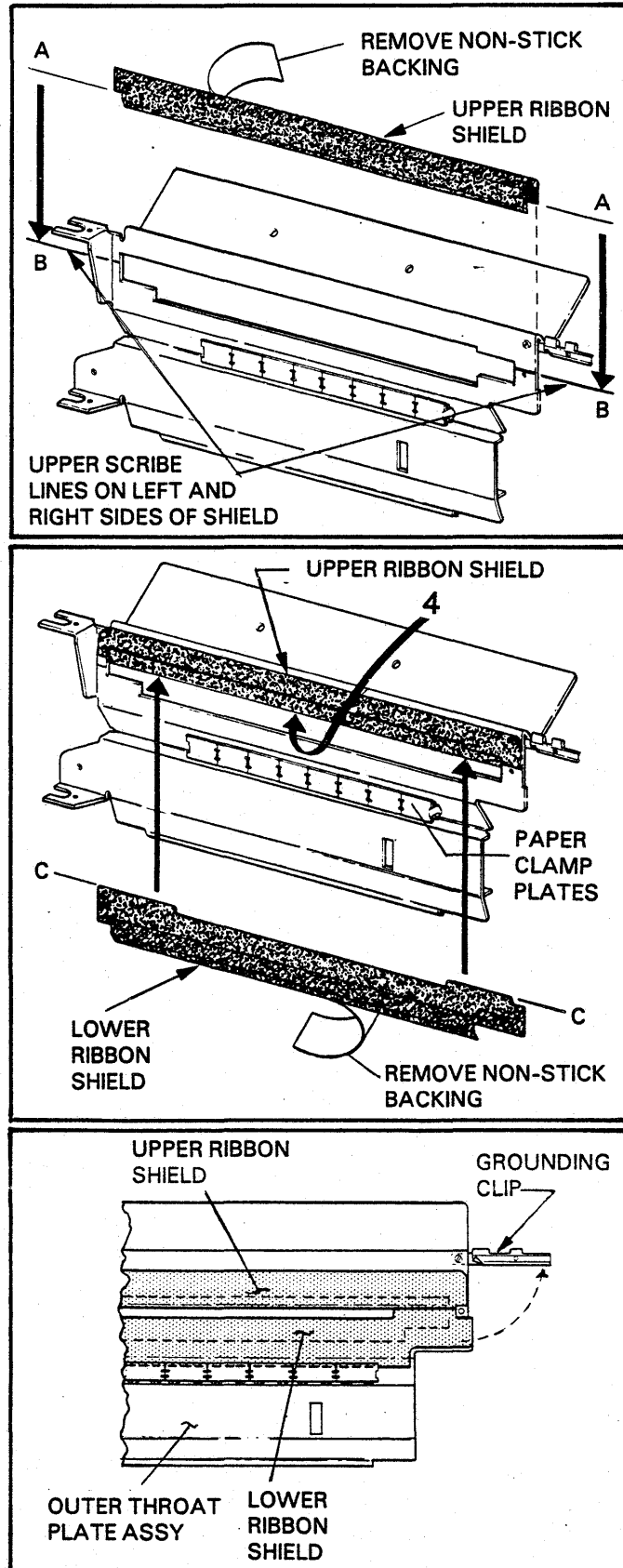


FIGURE 6-18. SHIELD INSTALLATION

## SECTION VII SPECIFICATIONS

### GENERAL DESCRIPTION

These printers, with Large Scale Integrated (LSI) microprocessor controller electronics, use a metal band (character font) and back impact printing pro-

cess to produce one line at a time printout. These free-standing peripherals are capable of communicating with an external data source, storing data, printing, and moving paper by employing the following major subsystems.

TABLE 7-1. PRINTER SUBSYSTEMS

SUBSYSTEM	DESCRIPTION
Power Distribution	Power supply board(s), cables and associated components which supply both ac and dc power to the electrical and mechanical systems.
Cooling System	Cooling protection to various areas of the printer, employs an ac blower to supply air to the various parts of the printer. Air flow sensor removes dc power to the subsystems if cooling becomes insufficient and is automatically reset.
Control Panel	The Control Panel consists of membrane type, touch-switches, with LED (light emitting diode) indicators, and includes a two digit (LED) status display system.
Print Gate	Swing out device housing the print band and ribbon transport system, outer paper guide and column scale. Allows operator complete access to areas used in forms (paper), ribbon, band installation, and printer maintenance.
Print Hammer System	Hammers, mounting bars, and necessary drive components which perform the print function by compressing the forms and ribbon against the rotating character print band. Consists of a column width capacity of up to 136.

(Continued)

TABLE 7-1. PRINTER SUBSYSTEMS (CONTINUED)

SUBSYSTEM	DESCRIPTION
Vertical Forms (Paper) Motion	Moves forms (paper) from the initial stack to the final printout by incorporating a drive motor and controls, drive tractors, and related components. Motor speed monitoring capability and paper motion verification sensor (located on right tractor) are included.
Forms Motion Inhibitors	Enhance print quality by providing a constant hold on forms as (Paper Clamp System) printing occurs.
Logic Chassis	Housing for the printer electronics; includes controller board, hammer driver boards, print head board and any optional interface boards.
Printhead Structure	Basic frame component for print system.
Cabinet	Protective outer panels and bonnet.

**SPECIFICATIONS**

**Print Speed**

**TABLE 7-2. PRINT SPEED**

CHARACTERS IN SET				
	48	64	96	128
SETS/BAND	8	6	4	3
LINES/MINUTE	1600	1300	950	750

**Physical Characteristics**

**Outside Dimensions**

See Figure 7-1 for dimensions.

**Weight**

Shipping - 600 LBS (272 kg).  
 Installed - 550 LBS (249 kg.)

Locking Casters: Installed on all models.

**Electrical Requirements**

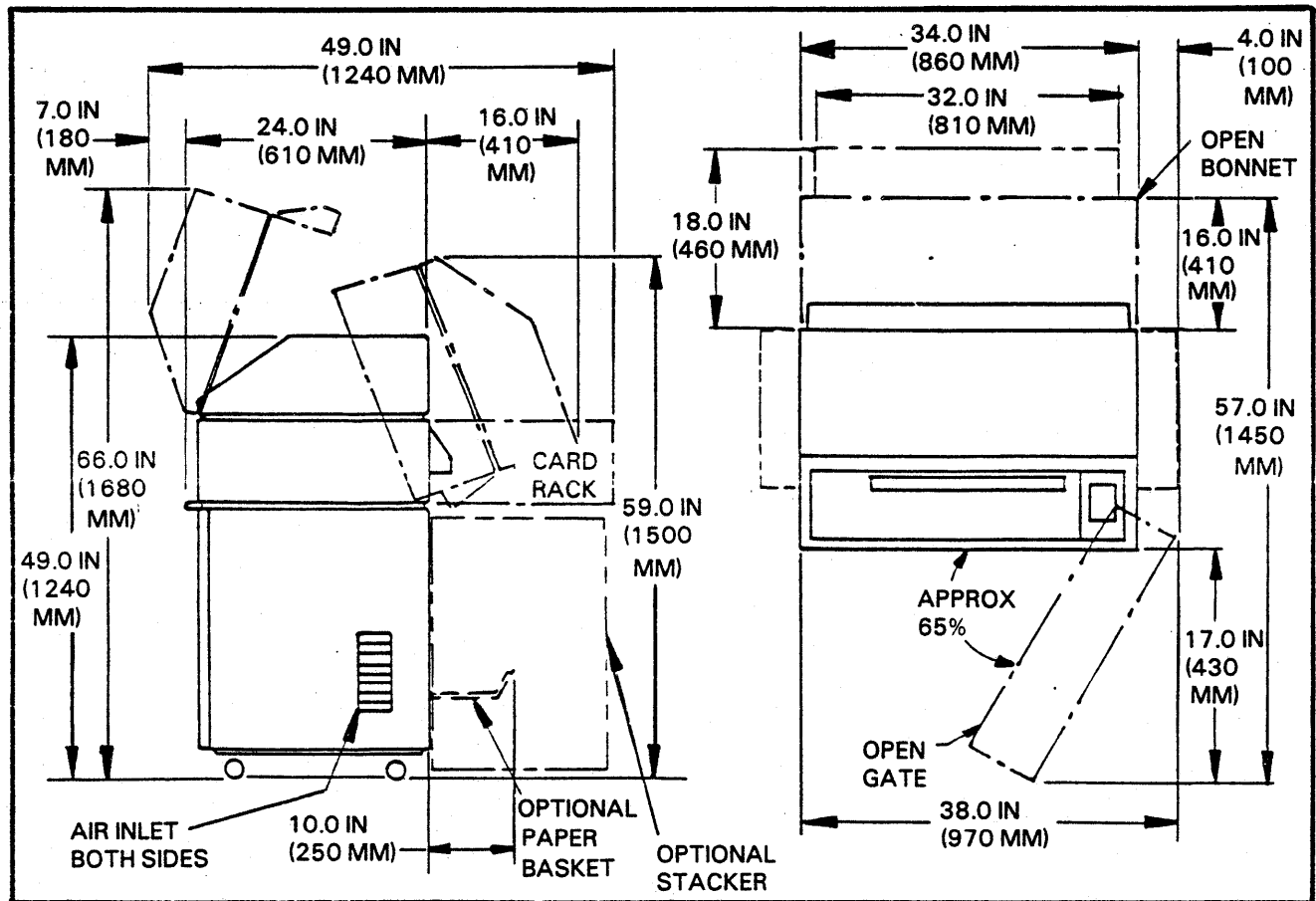
**Power Cord:** The standard printer is provided with a three wire (hot, neutral and earth ground) detachable power cord that is 7.5 feet (2.28 meters) long. The standard power cord is terminated with a non-locking 3 prong plug for use with 60 Hz outlets. The cord may also be fitted with plugs for use with 50 Hz outlets.

**Frequency:** The printer may be operated from a 50 or 60 Hz (single phase) power source within the following frequency ranges:

Nominal Frequency	Tolerance Range
50 Hz	49.0 to 50.5 Hz
60 Hz	59.0 to 60.6 Hz

**Voltage Requirements:** Due to the difference in nominal voltage inputs between countries the printer is equipped with a multi-tap input transformer. Voltage ranges can be tap selected by changing field accessible input power terminal block connections. For wiring diagrams on how to convert the printer to any of the following voltage ranges, see procedure 5AF.

Nominal (VAC)	Voltage Range
100 (60 HZ, 50 HZ)	90 to 107
120 (60 HZ)	104 to 127
220 (50 HZ)	198 to 235
240 (50 HZ)	216 to 257



**FIGURE 7-1. MODEL III PHYSICAL DIMENSIONS.**

**Current:** The current requirements are as follows:

**60 HZ**

Nominal Voltage	Printer and Stacker Max. Current (Amps)		
	Min. V	Nom. V	Max. V
100	17.8A	16.0A	15.0A
120	15.4A	13.3A	11.6A

**50 HZ**

Nominal Voltage	Printer and Stacker Max. Current (Amps)		
	Min. V	Nom. V	Max. V
100	17.8A	16.0A	15.0A
220	8.1A	7.3A	6.8A
240	7.4A	6.7A	6.2A

KVA: 1.6 Max.

**Input Power Protection:** Two poles of a 3 pole, dual purpose circuit breaker and ON/OFF switch (located under the print gate) provides input power protection to the printer and is rated as follows:

Full Load = 20 Amps Rms  
Trip = 25 Amps Rms

**Environmental Requirements**

**Operating Temperature and Humidity**

The printer has been designed to operate or be stored within the following ambient conditions:

**Temperature - Dry Bulb**

50 to 95 F ( 10 to 35 C) - Operating  
14 to 122 F (-10 to 50 C) - Storage

**Relative Humidity**

20 to 80% Non Condensing - Operating  
10 to 90% Non Condensing - Storage

**Forms (Paper)**

**Type:** Paper and card stock; perforated along the margins; fan-fold type.

**Width:** 4.00 to 16.75 in. (101 to 425 mm)

**Length:** 8.0 to 14.0 in. (200 to 355 mm)

**NOTE**

USE OF FORMS LONGER THAN 12 INCHES WOULD REQUIRE THE CABINET DOOR TO BE OPEN AND ACOUSTIC SPECIFICATIONS WILL NOT BE MET.

**Sprocket Drive Holes**

0.151 to 0.161 in. (3.840 to 4.090 mm) diameter;

0.247 to 0.253 in. (6.270 to 6.430 mm) from edge;

0.495 to 0.505 in. (12.57 to 12.84 mm) non-accumulative between hole centers

**Maximum Thickness of Multi Part Forms**

0.020 in. (0.508 mm) maximum in the print area

0.030 in. (0.762 mm) maximum across crimp fastenings.

**NOTE**

REFER TO SUPPLIES SECTION OF OPERATOR'S MANUAL FOR RECOMMENDED FORMS.

**Print Bands**

**Type:** Continuous loop, engraved steel; operator installable, standard and optional compressed pitch.

**Characters:** 384 total; grouped into various sets; home and character pulse lines above and below characters respectively.

**Column Width**

132 Standard  
136 Optional

## OPTIONAL FEATURES

The following optional features are available on these printers. These optional features may be factory installed as part of the original equipment configuration or, in some cases, field installed as optional feature kits. Refer to the Operator's Manual for other pertinent information about these features.

### Forms (Paper) Basket

A removable forms collector basket may be positioned at the lower back of the printer to stack printout. The basket increases stackability and decreases some static problems.

### Input/Output I/O Connector

A standard interface connector and cable is available as a kit for installation on the back of the printer. Special processor interface adapter kits may include special I/O connectors along with the electronic package.

### Interface Adapter

Special processor interface adapter boards are available for different processing systems. Interface adapter boards may be factory installed or exchanged in the field. These kits can be identified by unique I/O connectors or by the interface electronics located in the printed circuit board rack at the back of the printer (location 7PC1). In some cases the interface logic is combined with the controller logic on a single board in location 7PC2.

### Print Bands

A standard 64 or 96 character ASCII band is available in a number of different character designs. Optional bands are available in 48 and 128 character sets and 64 and 96 non-ASCII. Character sets of 48, 128, or with non-ASCII unique characters will be supplied with Programmed Read Only Memories (PROM's) which the Customer Engineer must install on the Controller board (7PC2). Some unique interfaces are setup to use a group of bands from 48 to 128 characters without PROM's and use Dual-In-Line (DIL) jumper chips in place of PROM's for unique bands. A PROM set installed for a 48 character, or a set installed for a 128 character set, will still allow any standard 64 or 96 character ASCII band to be used.

## Variable Form Length

This option consists of a six section dip switch that is located at the top of the Control Panel. This switch allows the operator to enter the length (in inches) that will be monitored between form perforations or top of forms. A switch on the controller board 7PC2 will allow an automatic three line perforation skip. This counter is disabled if an Electronic Vertical Format Unit (EVFU) is installed.

### Electronic Vertical Format Unit (EVFU)

The Electronic Vertical Format Unit (EVFU) may be installed as an option to the standard paper motion system. The EVFU consists of a light emitting diode (LED) format tape reader and a special EVFU circuit on the printer controller board.

The primary function of the EVFU is to read a punched format tape and load it into a format tape memory on the controller board. The EVFU can be configured to operate in either the tape reader mode or direct access vertical format unit (DAVFU) mode (See DAVFU option below). The EVFU has 12 channels and the format tape buffer size is 180 lines or 360 bytes. When the printer is powered ON in the EVFU mode, the format tape is automatically loaded into the format tape buffer and verified. Further loads required due to changing of the format tapes are accomplished via a push-button switch on the reader assembly.

### Direct Access Vertical Format Unit (DAVFU)

The Direct Access Vertical Format Unit (DAVFU) may be installed as an option to the standard paper motion system. The DAVFU consists of a special EVFU circuit on the controller board and is activated by a DIP switch in this circuit. Unlike the EVFU, the DAVFU does not require a format tape reader to load the controller's format tape memory. The DAVFU mode lets the data source load formatting information directly into the printer controller format tape buffer over the interface data lines.

