IBM Technical Newsletter

This Newsletter No.	SN31-0147
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Base Publication No.	SY27-2315-3 SY27-2316-2 SY27-2317-2
Previous Newsletters	SN31-0051 (for SY27-2316-2) SN31-0052 (for SY27-2317-2)

IBM Maintenance Library:
3284/3286 Printer Models 1 and 2 Troubleshooting Guide
3284 Printer Model 3 Troubleshooting Guide
3286 Printer Model 3 Troubleshooting Guide

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This Technical Newsletter provides replacement pages for the three subject publications. With one exception (as noted below), all pages listed on this cover letter are replacement pages for any of the three subject publications.

Pages to be replaced are:

5-5, 5-6 Replace *ONLY* in SY27-2316-2 and SY27-2317-2.
or
5-7, 5-8 Replace *ONLY* in SY27-2315-3.
7-1 through 7-6
7-9, 7-10
9-5, 9-6

Summary of Amendments

This TNL incorporates maintenance information about newly released fuses for the 3284 and 3286 printers.

Note: *Please file this cover letter at the back of the manual for reference.*

IBM Corporation, Product Publications, Dept. 52L, Neighborhood Road, Kingston, N.Y. 12401

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6.8 PRINT SWITCHES

6.8.1 Test Switches

The IBM 3284/86 Printers, Models 1 and 2, have four manual controls which are accessible for user or CE operation: Power switch, CE switch, MODE switch, and START PRINT switch. No indicators are provided in the printers.

Power Switch

This switch controls the application of dc power to the printer logic circuits and printer motor. It has two positions:

1. ON – Supplies dc power to activate the printer.
2. OFF – Removes all dc power to deactivate printer.

CE Switch

This switch has three positions:

1. ONLINE – Enables normal operation. Disables the MODE and START PRINT switches.
2. PRINT BUFFER – Enables offline operation while still retaining the data loaded in the message buffer during online operation.
3. PRINT PATTERN – Enables offline operation. Allows an alphameric fixed-program pattern to be loaded in the message buffer or an "All H's" test pattern to be generated by printer logic.

MODE Switch

The MODE switch has two positions:

1. MODE 1
   a. In conjunction with PRINT BUFFER enables online data printout in an 80-character-per-line format.
   b. In conjunction with PRINT PATTERN enables alphameric test printout in an 80-character-per-line printout.
2. MODE 2
   a. In conjunction with PRINT BUFFER enables online data printout in a default format.
   b. In conjunction with PRINT PATTERN enables "All H's" printout in an 80-character-per-line format.

START PRINT Switch

The START PRINT switch is a momentary-action, slide switch. It causes the 3284/86 Mod 1 and Mod 2 Printers to produce a test printout in accordance with settings made at the CE and MODE switches.

6.8.2 Control Switches

Carriage Drive-Motor Switch

Controls the 110 volts to the carriage drive motor.

End-of-Forms Switch

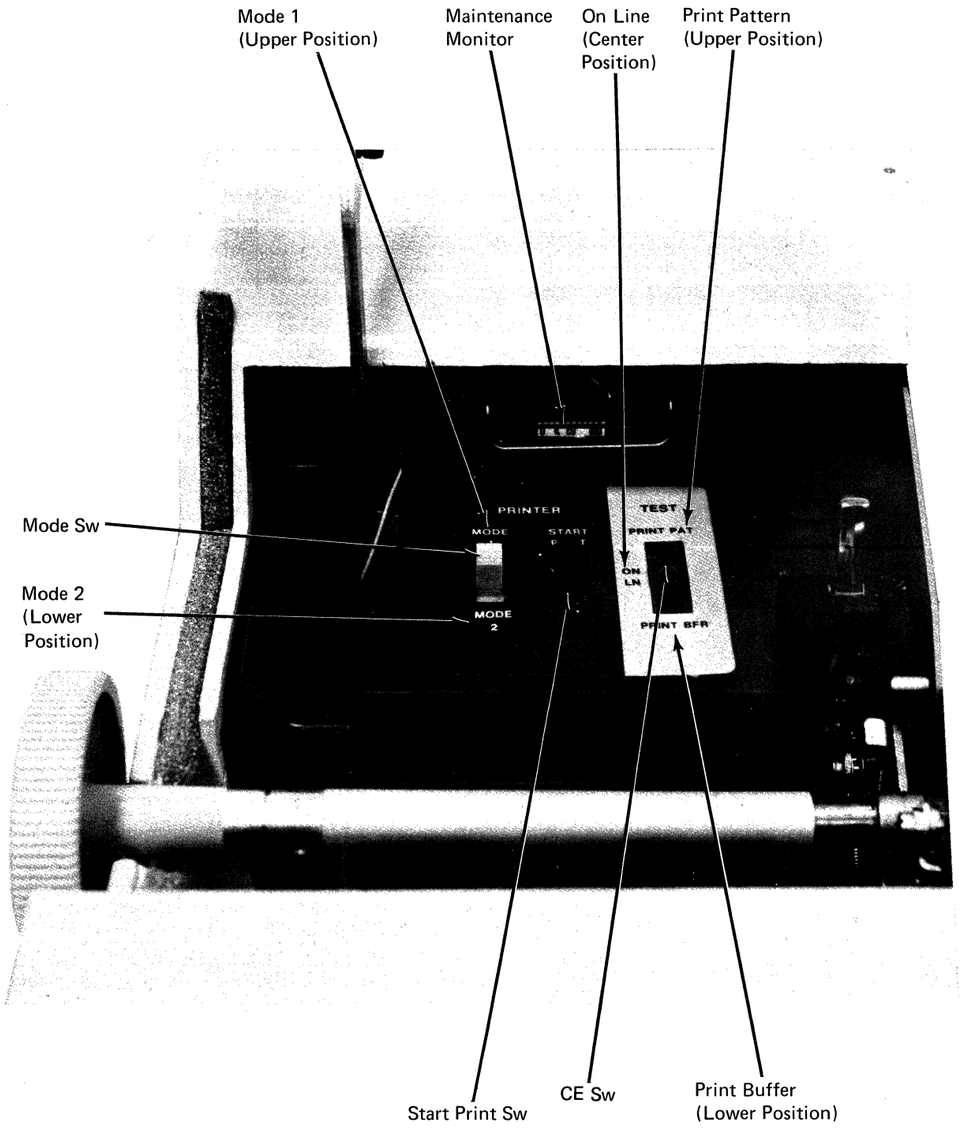
Signals the adapter when an end-of-forms is reached.

Cover Interlock Switch

Signals the adapter when the printer cover is open.

Forms-Moving Switch

Signals the system that forms are moving and that printing cannot take place.



6.9 PRINTER CIRCUIT BOARD DESCRIPTION

6.9.1 Driver Cards

The 2.2-ampere driver provides drive for print magnets, stepper motor (combination of four drivers), and carriage clutch solenoid.

The illustration shows a driver card in a print-magnet application. With the input at an UP level (driving block turned off), T1 and T2 are cut off and the output maintains an UP level. Bias resistor R2 and diode D1 maintain a reverse bias for T1. T2 is reversed-biased by R4 and D2. When the driving block is turned on, T1 is turned on with its base current limited by R1. T1 then provides base drive to T2 through R3. T2 saturates for a peak current up to 2.2 amperes. With a "100% ON" duty cycle, this current must be limited to 1.66 amperes.

C1 delays the turn-off transition of T2 to minimize the shift on the ground distribution system. C2 prevents oscillation in the output circuit if transistor T2 has a high gain and a broad frequency response. An additional function of D2 is to provide a clamp for the voltage that develops from current through C1 when a negative shift occurs on the collector of T2 after T2 has turned off.

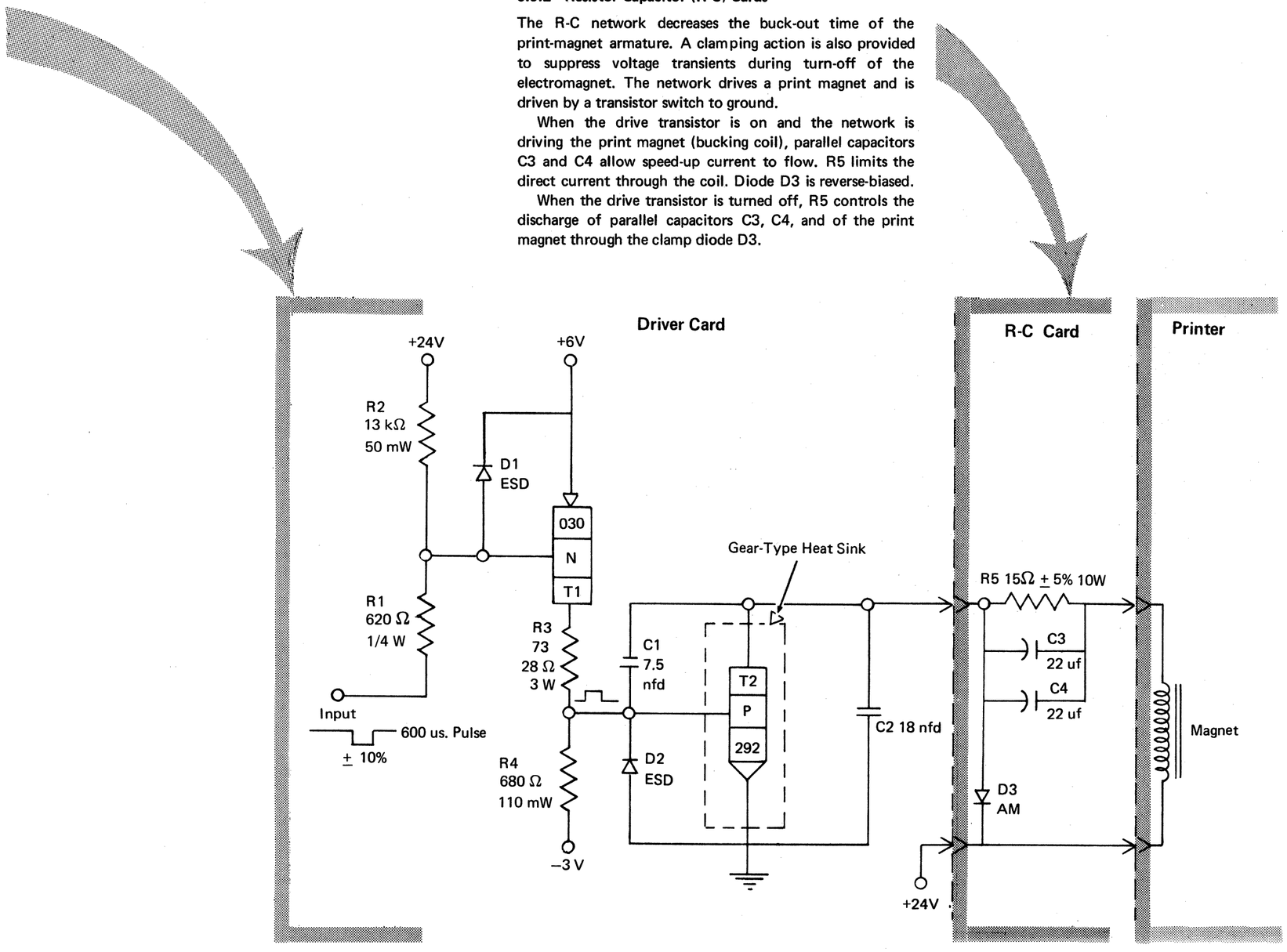
kΩ = 1000Ω
mW = milliwatts
nfd = nanofarads
uf = microfarads

6.9.2 Resistor-Capacitor (R-C) Cards

The R-C network decreases the buck-out time of the print-magnet armature. A clamping action is also provided to suppress voltage transients during turn-off of the electromagnet. The network drives a print magnet and is driven by a transistor switch to ground.

When the drive transistor is on and the network is driving the print magnet (bucking coil), parallel capacitors C3 and C4 allow speed-up current to flow. R5 limits the direct current through the coil. Diode D3 is reverse-biased.

When the drive transistor is turned off, R5 controls the discharge of parallel capacitors C3, C4, and of the print magnet through the clamp diode D3.



6.10 COVERS

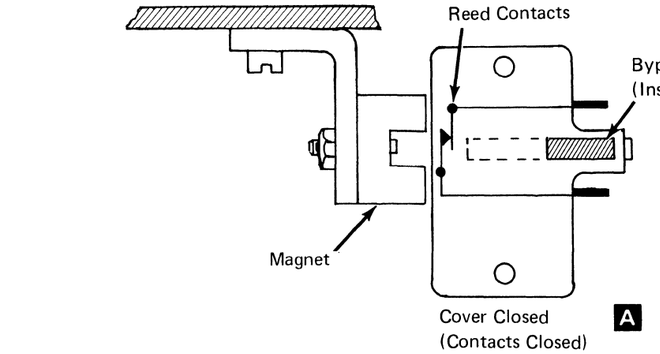
6.10.1 Cover Interlock Switch Adjustment

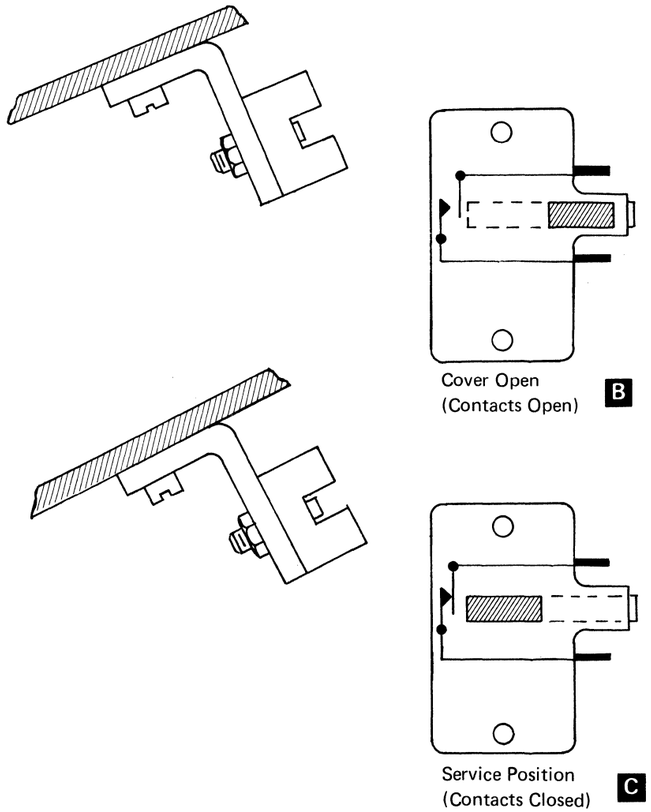
The cover interlock switch is a safety device to prevent printer operation when the cover is open.

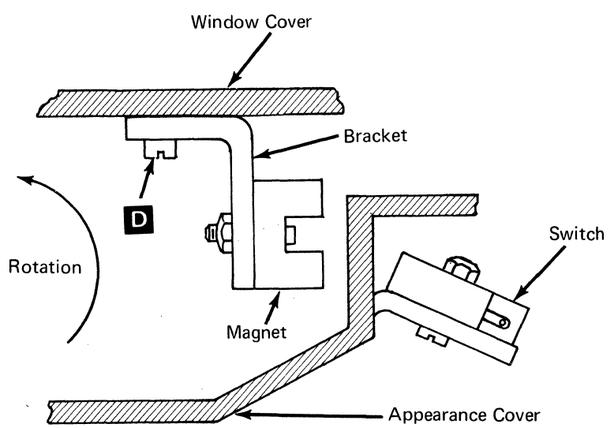
1. With the cover closed **A** , an operating magnet attached to the cover closes the reed contacts and, at the same time, repels the bypass magnet to the end of its guide tube.
2. With the cover open **B** the reed contacts open under their own spring tension.
3. In the service position **C** , the bypass magnet is moved close to the reed contacts to close them. Do this (instead of shorting the contact leads) by sliding a screwdriver or other magnetic object along the top of the switch toward the rear of the printer. The bypass magnet follows inside its guide tube, and remains until repelled by the cover operating magnet or drawn back by a reverse movement of the screwdriver.

   Note: If the operating magnet is removed, replace it with one of the same polarity in order to repel the bypass magnet.

4. Loosen the screw **D** holding the magnet bracket on the top cover and position the magnet so that the reed switch closes when the cover is closed. Tighten the screw. To check the switch, connect logic probe to pin F2S04 of the logic board. When switch contacts are closed **A** , the probe will indicate GREEN. If a CE meter is used, turn power off and connect meter between F2S04 and dc ground (D08).







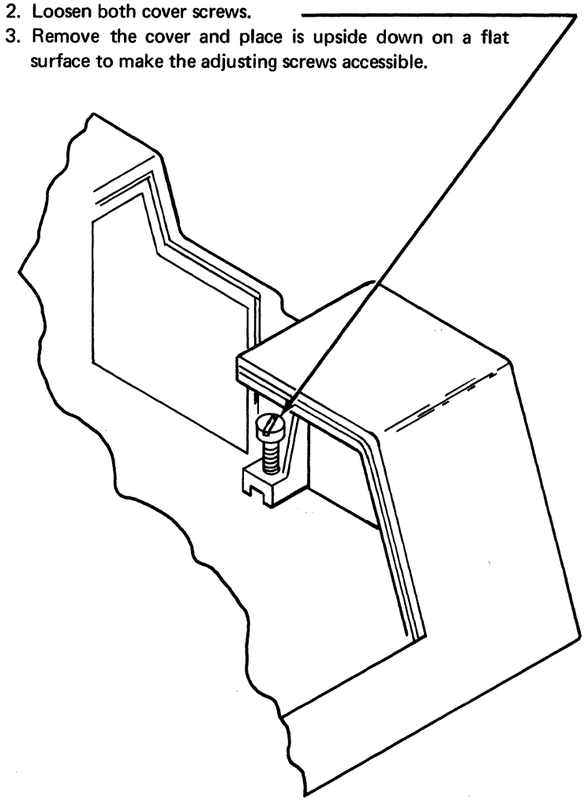
6.10.2 Cover Adjustments

Objective:

To position correctly the hinged cover with the main cover and provide a proper seal when covers are closed.

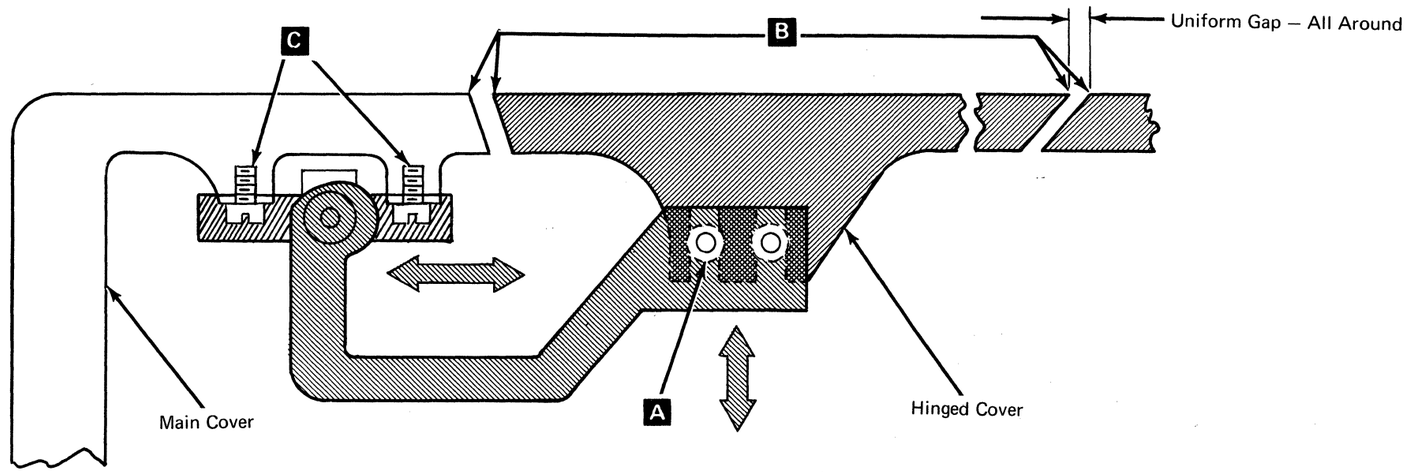
The main cover it self locating and is fastened to the frame by a screw on each side of the cover. To remove the cover:

1. Open the hinged cover and remove the platen.
2. Loosen both cover screws.
3. Remove the cover and place is upside down on a flat surface to make the adjusting screws accessible.



Adjustment

1. Loosen the screws **A** and shift the hinged cover until it is flush with the main cover **B** . Tighten the screws.
2. Loosen the screws **C** and adjust the hinge assembly so that the gap between the covers is uniform.



Side View

6.10.3 Internal Covers Removals and Replacements

Five internal covers protect the components beneath the forms carriage and ensure proper air flow around the circuit components. The printer should not be operated for extended periods with these covers removed.

Removals

1. With the print head to the right, remove the center vertical cover **A** . This cover has two bottom tabs that slip over the carriage frame. Disengage the two formed tabs that grip the tie rod shaft (being careful not to break off the tabs), and lift out the cover.
2. Remove the small horizontal cover over the driver cards **B** . This cover slides into two slots molded into the larger horizontal cover and has two formed tabs that grip the tie rod shaft. First disengage the two formed tabs from the tie rod shaft, and then pull the small cover out of the slots in the larger cover.
3. Remove the vertical cover **C** with the sponge pad that holds in the two driver cards. This cover slips over the carriage frame at the bottom, and has two formed tabs at the top that grip the shaft.

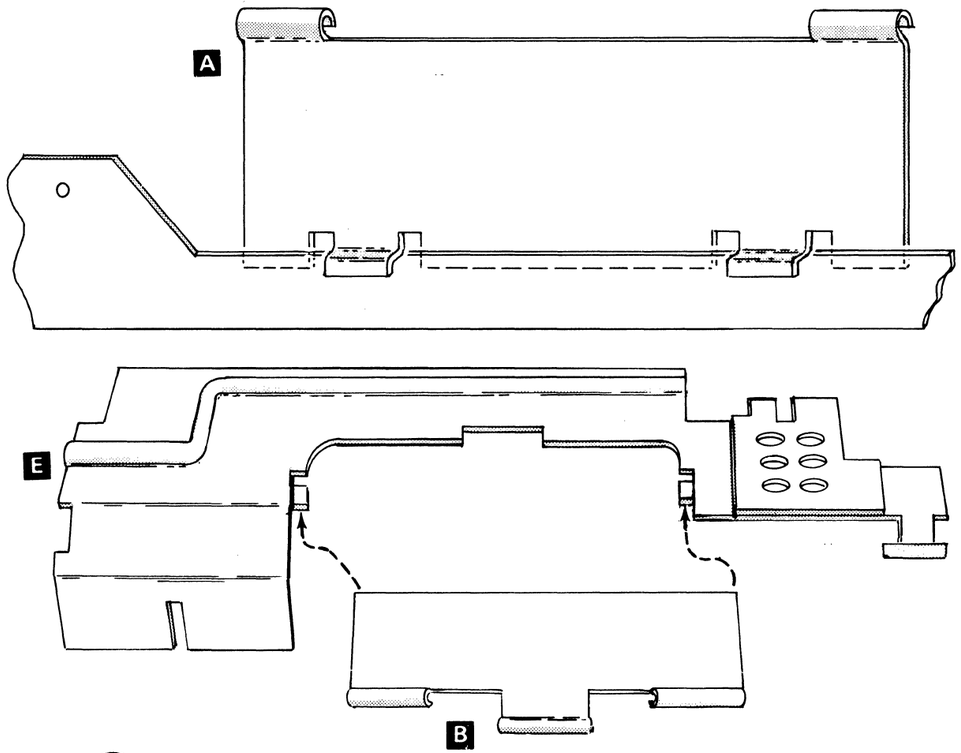
   Note: Driver cards can now be extracted from their sockets and readily replaced. If servicing other components, remove platen and machine outer cover before continuing.

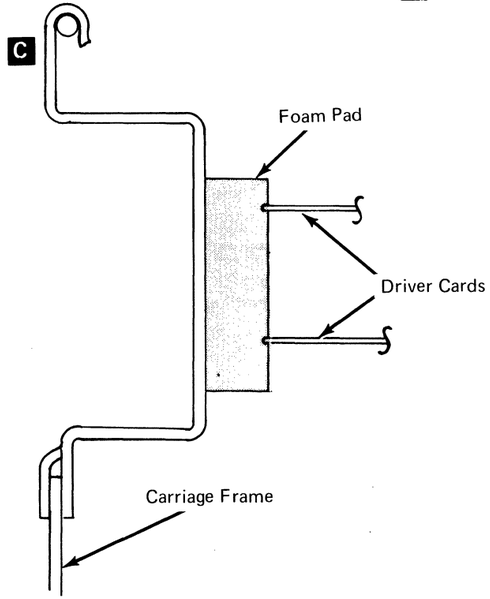
4. With the print head to the left, remove the vertical cover **D** over the carriage drive motor. Loosen the clamping screw in the slot in the front of this cover. Insert a screwdriver under the closed hinged cover, leadscrew, and support shaft. Disengage the two formed tabs from the tie-rod shaft. Be careful not to break off the tabs.
5. With the print head to the right, loosen the 2 screws that clamp the large horizontal cover **E** . Disengage the single formed tab from the tie rod. Lift the cover up, forward, and out.

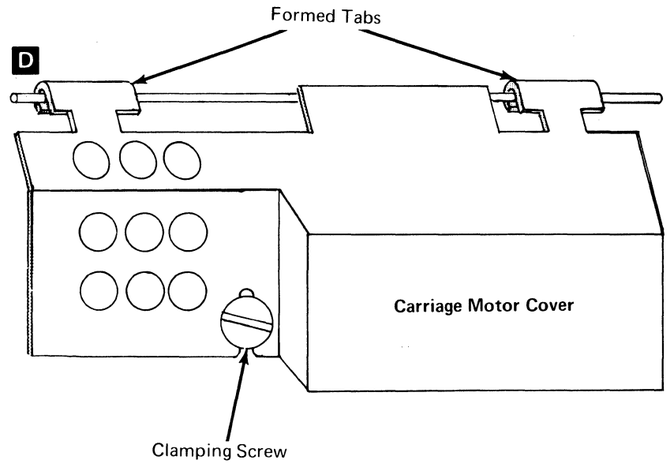
Replacements

Replace the covers by following the removal steps in reverse order.

1. Slide the screw slot in the carriage motor cover over the clamping screws and tighten the screws.
2. Slip the two tabs at the bottom of vertical covers over the carriage base frame.
3. Slip the tabs that were removed from the tie rod shaft over that shaft.





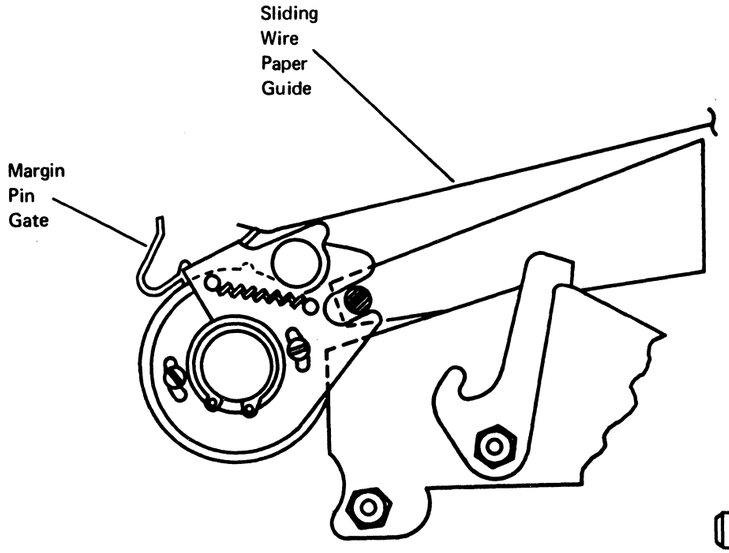


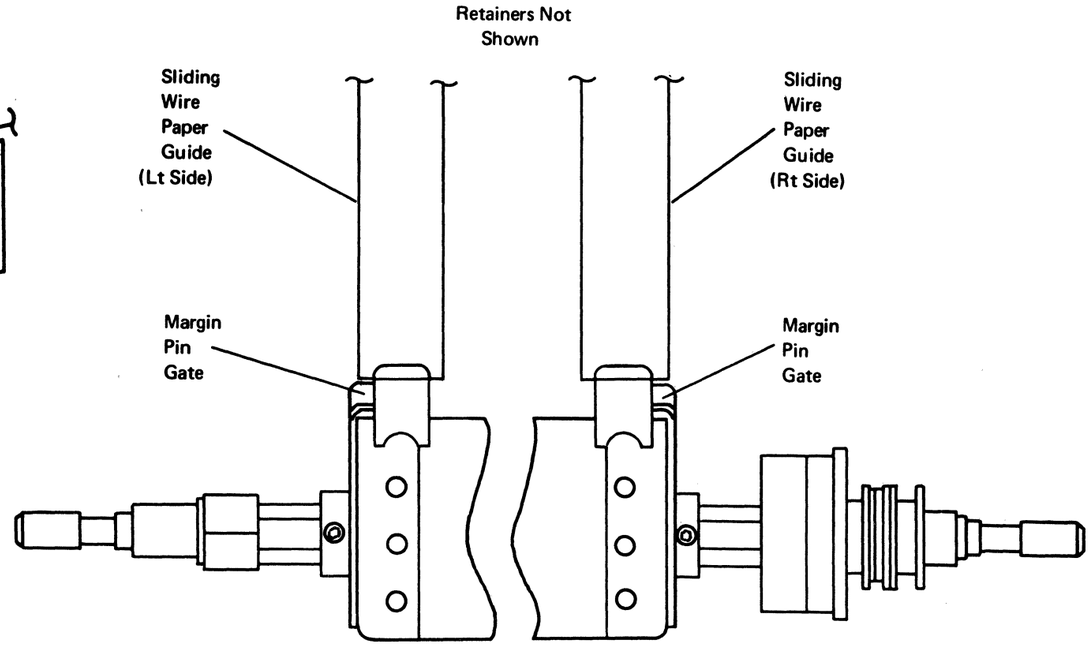
6.10.4 Sliding Wire Paper Guide Adjustment

OLD STYLE

This guide prevents the paper forms from adhering to the window in the top cover of the printer as they feed through the machine. Two guides are used, one on either end of the window. The guides are adjusted by loosening the screw in the retainer mounted on the inside of the cover, and positioning the tip of the wire guide over the upper tip of the gate which closes over the margin pins on the platen.

Note: In general, only the sliding wire paper guide mounted on the right side of the platen should ever require adjusting, which will occur as a function of platen size.



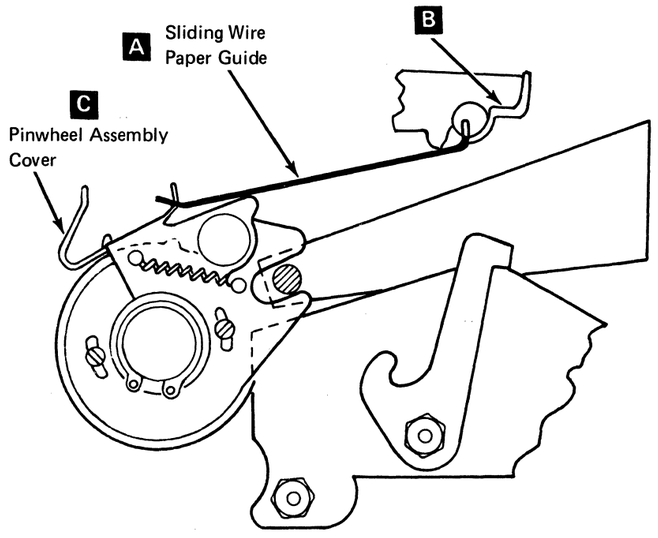


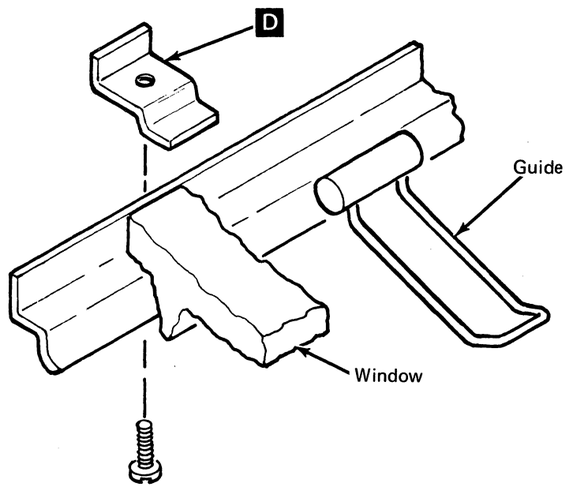
NEW STYLE

The sliding wire paper guide **A** prevents paper forms from adhering to the window in the top cover window of the printer as they feed through the machine.

By opening the cover and sliding the guides left or right on the bracket **B** , the two guides can be adjusted to accommodate any platen size. Line up each guide with the pinwheel assembly cover **C** . When the cover is closed, the tip of the guides should rest on the upper tips of the pinwheel assembly covers.

The paper guides can be removed by removing the three window retainer clamps **D** and lifting the guides out.

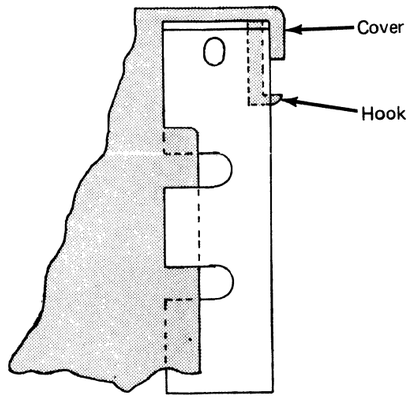




6.10.5 Stepper-Motor Resistor Cover Removal and Replacement

Removal

1. Remove the platen and main cover.
2. Remove the molding assembly that houses the maintenance monitor and test switches (3 screws).
3. Pull out paddle card EC-3.
4. While gently lifting on the resistor cover, insert a screwdriver in each of the 3 holes in the metal bracket and release the plastic hooks. (2 on rear and 1 in front.)



Replacement

1. Slide the resistor cover over the metal bracket. Be sure all three plastic hooks protrude through the holes.
2. Replace the paddle card and molding assembly.
3. Replace the main cover. Tighten the captive screws on each end of the cover.
4. Install the platen.

Section 7. Power Supply Checks and Adjustments

This section contains all checks, adjustments, and removal procedures necessary to maintain the printer power supply. It also contains procedures to determine if adjustments are required and to verify the accuracy of any adjustments implemented.

7.1 VOLTAGE CHECKS

Tabulated below are the dc voltages used in the printer power supply:

Voltage	*Current Rating (a)*	*Tolerance*	*Fuse No.*
+5	5.5	-10%	F4-AMB
+24	3.5	-12%	F5-ASB
-12	0.65	-4%	AF2 ASB

These voltages are provided by a ferro-resonant transformer (see 7.4 through 7.6) with an ac primary input and multiple secondary output taps. The transformer is protected by a fuse (2A) in series with its primary winding. Refer to the troubleshooting charts if a voltage is missing or of incorrect value. Measure the low dc voltages and the land pattern side of the power printed circuit (PC) board. Observe the polarity of the terminals and connect the test leads properly to prevent damage to the meter while measuring voltages at the PC board. All three dc voltages can be measured at the PC board.

7.2 -12V REGULATOR CARD ADJUSTMENT

This adjustment should be performed when the -12V regulator card is replaced or when a check of the operating voltages shows that the -12V is not at its nominal value:

1. **Set the selection switch of the CE volt/ohmmeter to a position that will accurately measure 12V dc.**
2. **Attach the meter plus (+) lead to the RET terminal on the power PC board (7.7).**
3. **Attach the meter minus (-) lead to the -12V terminal on the power PC board.**
4. **Adjust the potentiometer on the -12V regulator card. Use a small screwdriver. Set the potentiometer so the reading on the voltmeter shows -12V.**
5. **Remove the meter leads from the power PC board.**

7.3 REMOVAL PROCEDURES

The following paragraphs describe the removal and replacement procedures for printer field replacement units (FRUs). All removal and replacement procedures assume the desired unit has been made accessible by the removal of necessary covers.

7.3.1 Cover

Removal of the front cover exposes the front of the power supply and the logic gate. The logic gate swings out to provide access to I/O cabling.

7.3.2 Power Supply

DANGER
All power component removal and replacement procedures must be performed with the power turned off and the power cord removed from the wall socket.

The entire power supply can be removed from the machine by taking out three screws, disconnecting the wire nuts from leads of fuses F4 and F5, unplugging the dc output from the supply, and unplugging the motor cable and line cord.

CAUTION
To prevent accidental dislodging of the power supply from its fixed vertical position, be sure to reinsert and tighten the three mounting screws when replacing or returning the power supply to its fixed position.

The total weight of the power supply does not exceed 20 pounds. Within the power supply are the following FRUs: ferroresonant transformer assembly, PC board assembly, -12V regulator card, and fuses.

The power supply can be rotated to a horizontal position without unplugging it or removing it from the unit for access to fuses and regulator card adjustment. FRUs can be easily removed if the power supply is removed from the machine.

Prime Power Box

Service access to the prime power box (A3 in 7.4) may be obtained by removing 4 screws (2 top, 2 bottom) and both side panels. Contained within this box are the Main Line switch, line filter caps, and fuse 1.

Transformer Assembly

The transformer assembly is removed by taking out four 8–32 nuts, disconnecting the transformer primary wires, and unplugging the transformer secondary connector.

DANGER
Check for proper rewiring when reassembling transformer assembly.

PC Board Assembly

The PC board assembly is removed by unplugging both input and output connectors, disconnecting ring tongue terminals from the plus (+) side of capacitors C1 and C2, and removing 12 self-tapping screws.

-12V Regulator Card

The -12V regulator card is simply unplugged from its socket.

Fuses

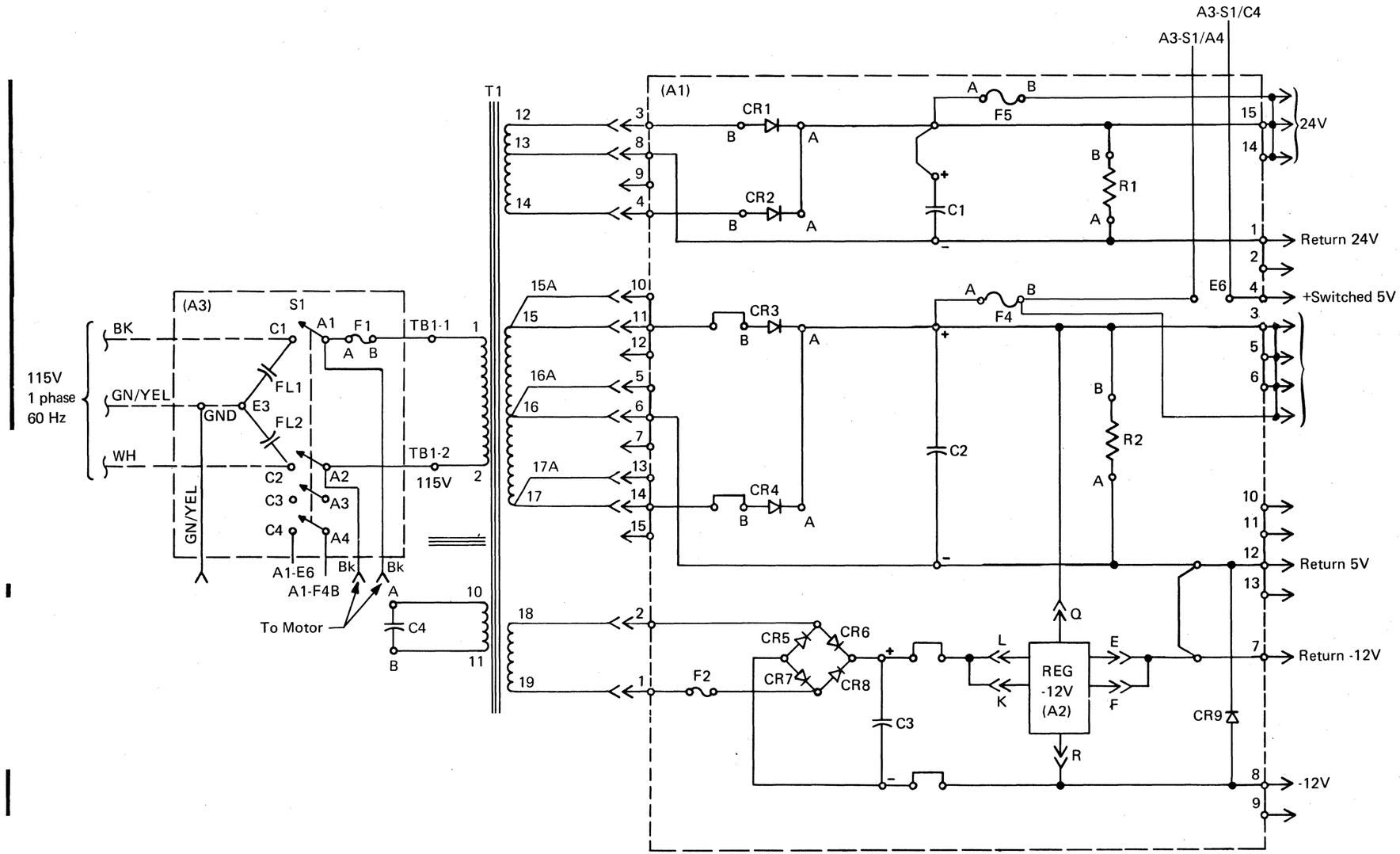
The primary fuse(s) are removed from the front of the prime power box assembly. The secondary fuses are removed from the component side and the land pattern side of the PC board.

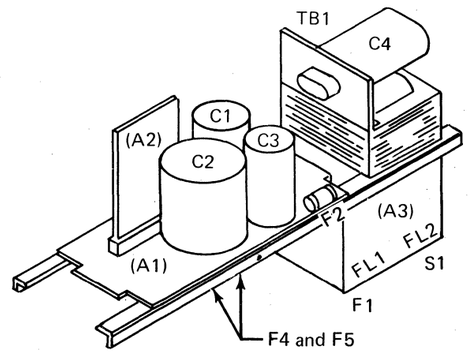
DANGER
When reconnecting the special 5V lines to the PC board, make certain that the correct line is connected to the proper terminal.

Board Voltage Wiring

A diagram illustrating the wiring scheme of the board for all voltages used in the printer is presented in Appendix B.

7.4 PRINTER LOW-VOLTAGE (60 Hz) POWER SUPPLY

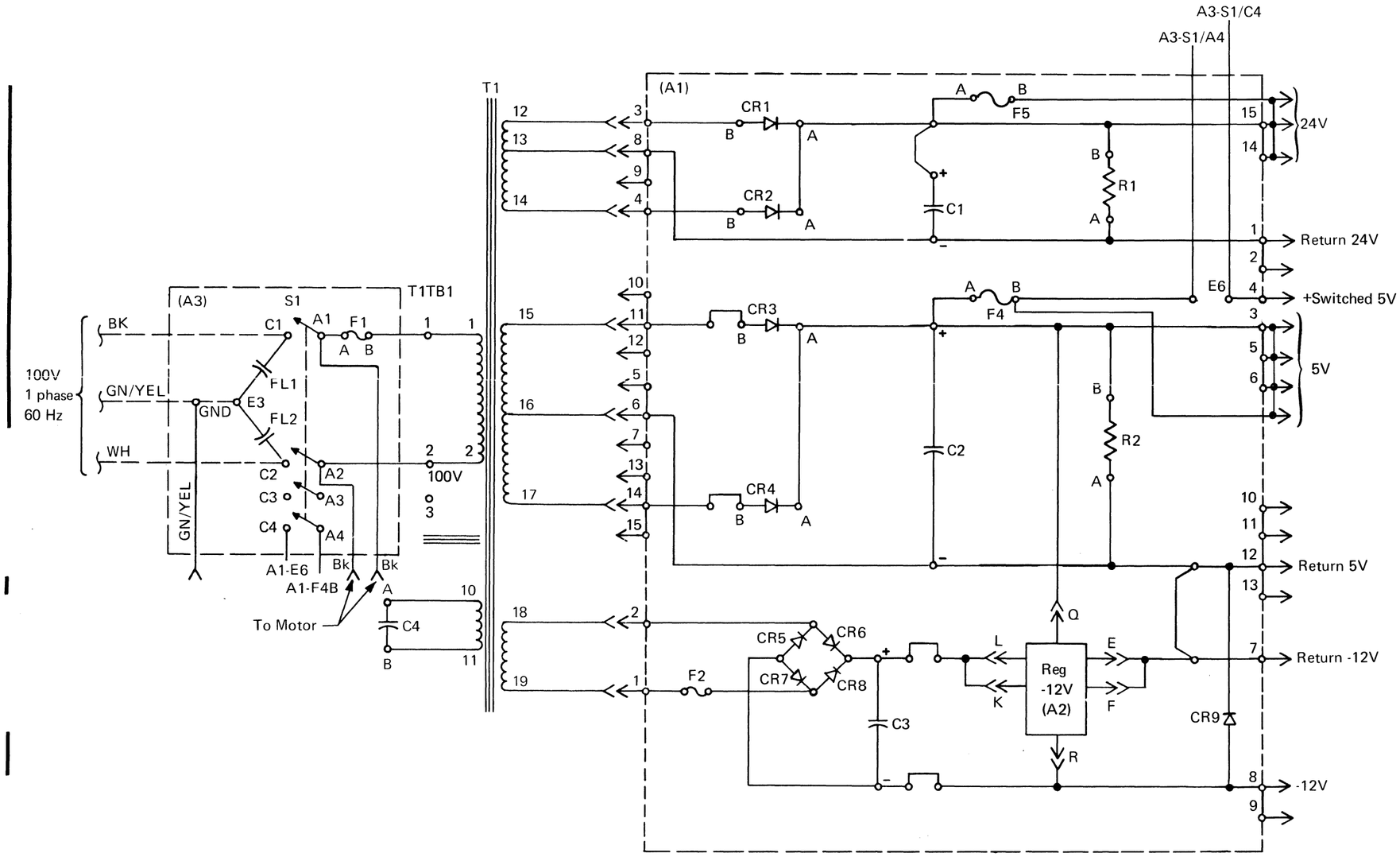


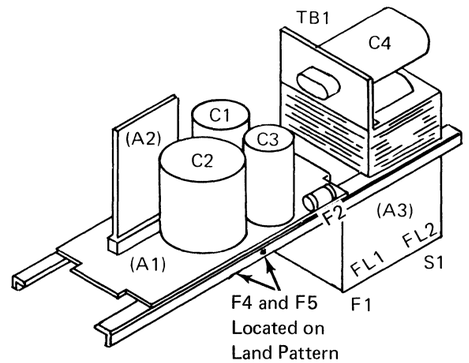


F4 and F5
Located on
Land Pattern
Side of PC Board.

CODE	DESCRIPTION
A1	PC Board Asm
A2	Regulator Card -12V
A3	Prime Pwr Box
C1	Capacitor 24K uf 30V
C2	Capacitor 240K uf 7.5V
C3	Capacitor 3.1K uf 25V
FL1 & FL2	Capacitor, Filter.01uf
C4	Capacitor, AC 4 uf 600V
CR1 & CR2	Diode 3 Amp 100V
CR3 & CR4	Diode 10 Amp 150V
CR5 - CR9	Diode 1 Amp 180V
F1	Fuse 2.5 Amp SB 125V
F2	Fuse 1 Amp SB
F4	Fuse 6 Amp MB 250V
F5	Fuse 5 Amp SB 125V
S1	Switch 15 Amp
T1	Ferro, 60 Hz
R1	Resistor 40 Ω 25W 5%
R2	Resistor 5 Ω 25W 10%

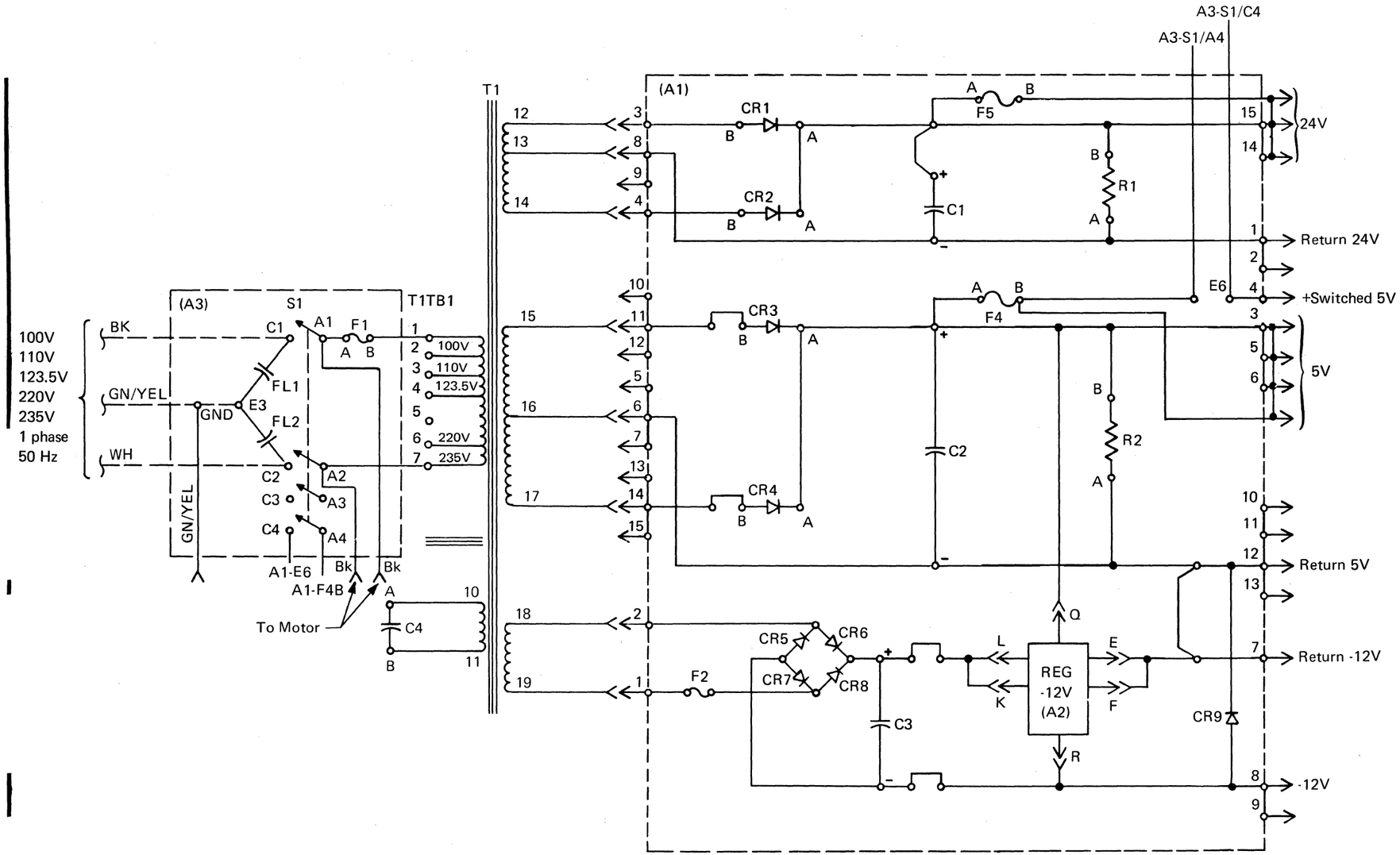
7.5 WTC PRINTER LOW-VOLTAGE (60 Hz) POWER SUPPLY

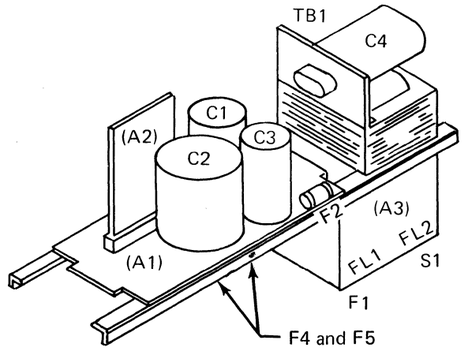




CODE	DESCRIPTION
A1	PC Board Asm
A2	Regulator Card -12V
A3	Prime Pwr Box
C1	Capacitor 24K uf 30V
C2	Capacitor 240K uf 7.5V
C3	Capacitor 3.1K uf 25V
FL1 & FL2	Capacitor, Filter .01 uf
C4	Capacitor, AC 4 uf 660V
CR1 & CR2	Diode 3 Amp 100V
CR3 & CR4	Diode 10 Amp 150V
CR5 - CR9	Diode 1 Amp 180V
F1	Fuse 2.5 Amp SB 125V
F2	Fuse 1 Amp SB 250V
F4	Fuse 6 Amp MB 250V
F5	Fuse 5 Amp SB 125V
S1	Switch 15 Amp
T1	Ferro, 60 Hz
R1	Resistor 40 Ω 25W 5%
R2	Resistor 5 Ω 25W 10%

7.6 WTC PRINTER LOW-VOLTAGE (50 Hz) POWER SUPPLY





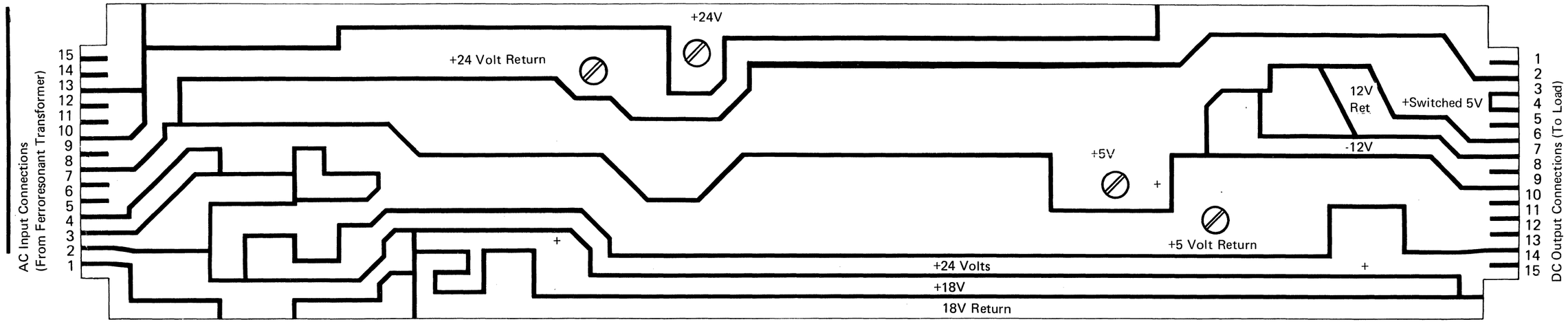
F4 and F5 Located on Land Pattern Side of PC Board.

CODE	DESCRIPTION
A1	PC Board Asm
A2	Regulator Card -12V
A3	Prime Pwr Box
C1	Capacitor 24K uf 30V
C2	Capacitor 240K uf 7.5V
C3	Capacitor 3.1K uf 25V
FL1 & FL2	Capacitor, Filter .01 uf
C4	Capacitor, AC 4 uf 600V
CR1 & CR2	Diode 3 Amp 100V
CR3 & CR4	Diode 10 Amp 150V
CR5 - CR9	Diode 1 Amp 180V
F1	Fuse 1.5 Amp SB 250V Note 1
	Fuse 2.5 Amp SB 125V Note 2
F2	Fuse 1 Amp SB 250V
F4	Fuse 6 Amp MB 250V
F5	Fuse 5 Amp SB 125V
S1	Switch 15 Amp
T1	Ferro, 50 Hz
R1	Resistor 40 Ω 25W 5%
R2	Resistor 5 Ω 25W 10%

Notes:

1. Fuse 1176668 is required when the unit is wired for 220V or 235V.
2. Fuse 361755 is required when the unit is wired for 100V, 110V, or 123.5V.

7.7 LOW-VOLTAGE PC BOARD



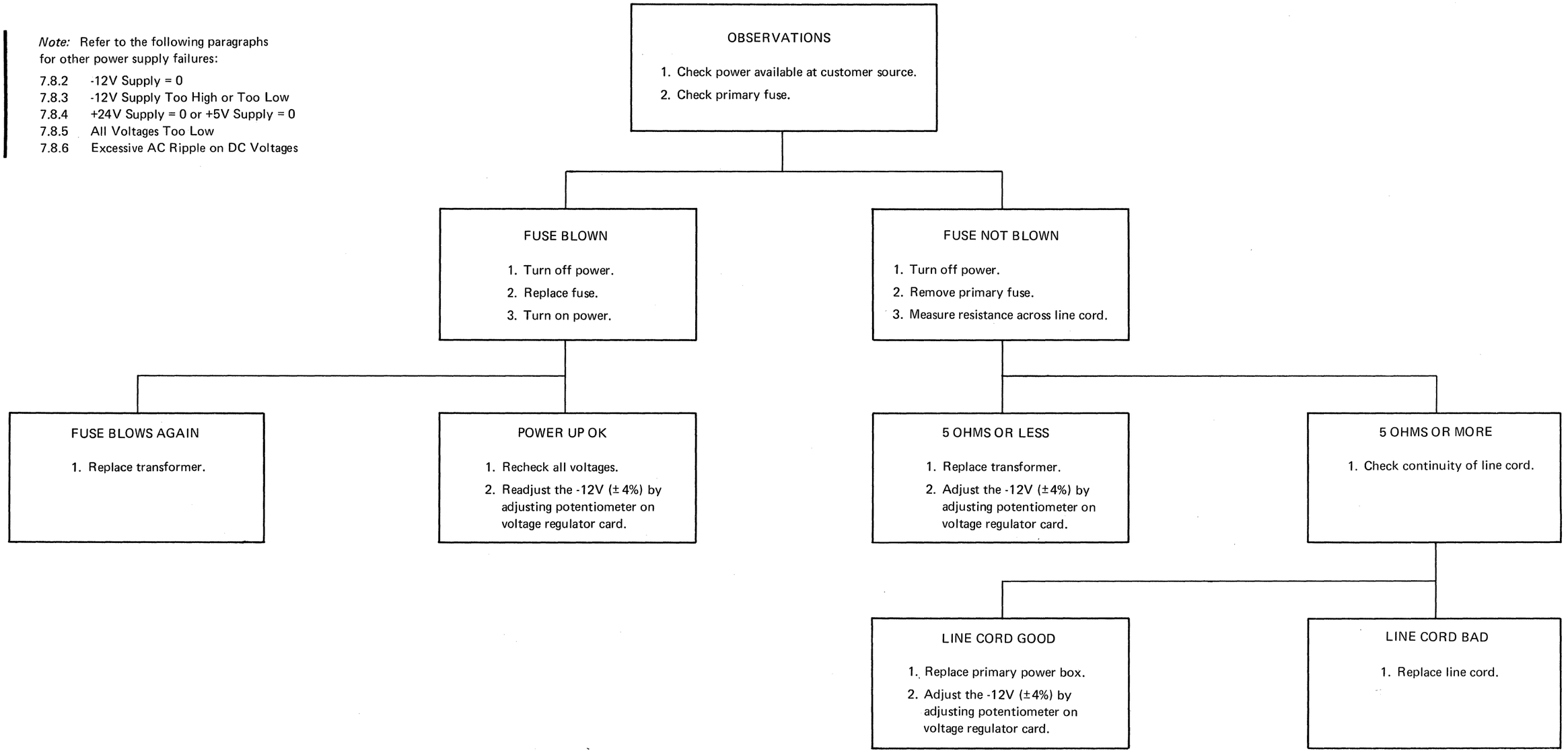
Land Pattern Side

7.8 POWER SUPPLY FAILURES

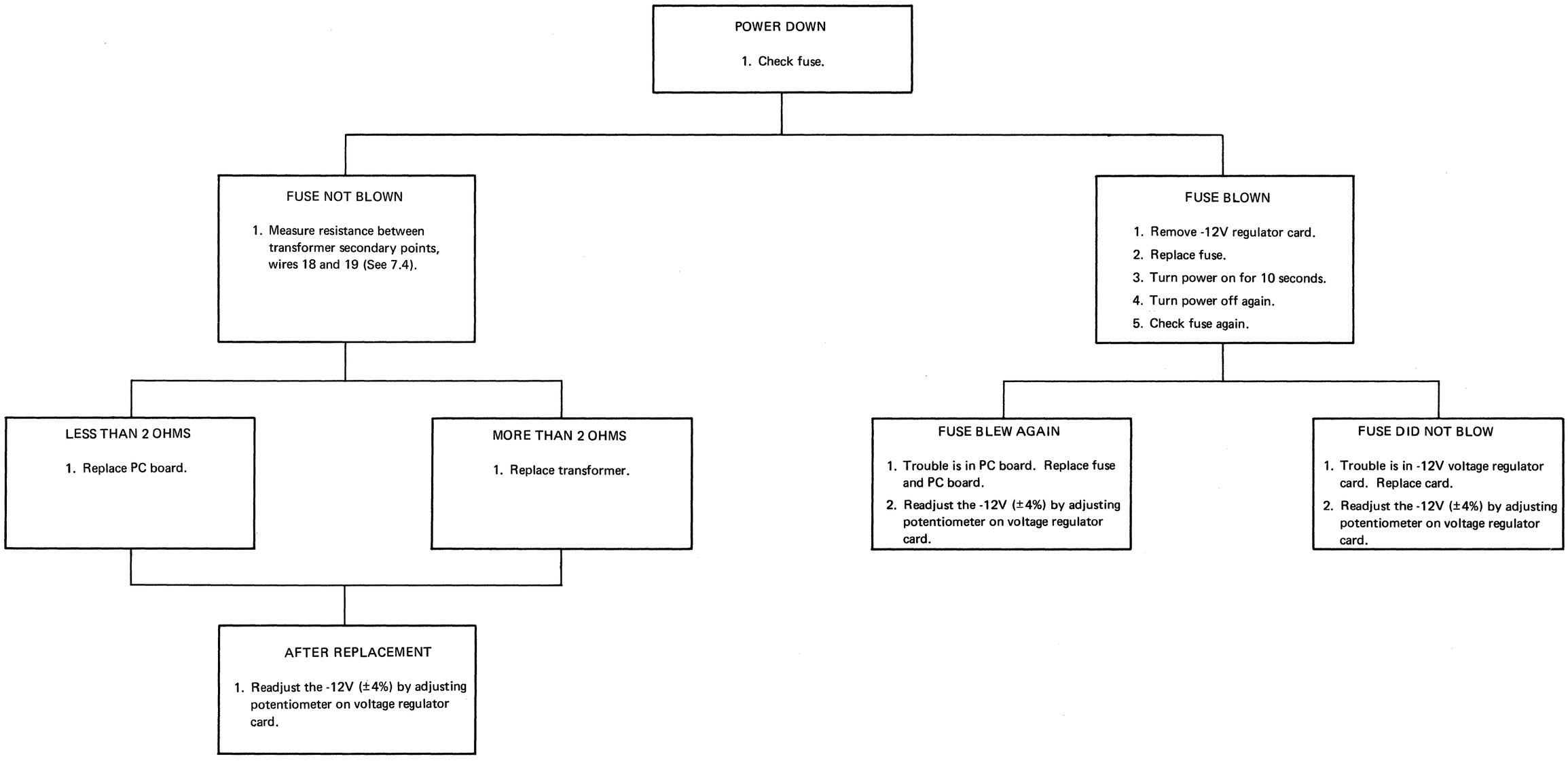
7.8.1 All Voltages = 0

Note: Refer to the following paragraphs for other power supply failures:

7.8.2 -12V Supply = 0
7.8.3 -12V Supply Too High or Too Low
7.8.4 +24V Supply = 0 or +5V Supply = 0
7.8.5 All Voltages Too Low
7.8.6 Excessive AC Ripple on DC Voltages



7.8.2 -12V Supply = 0



7.8.3 -12V Supply Too High or Too Low

CORRECTIVE ACTION

1. Adjust the -12V supply (±4%) by adjusting potentiometer on voltage regulator card.

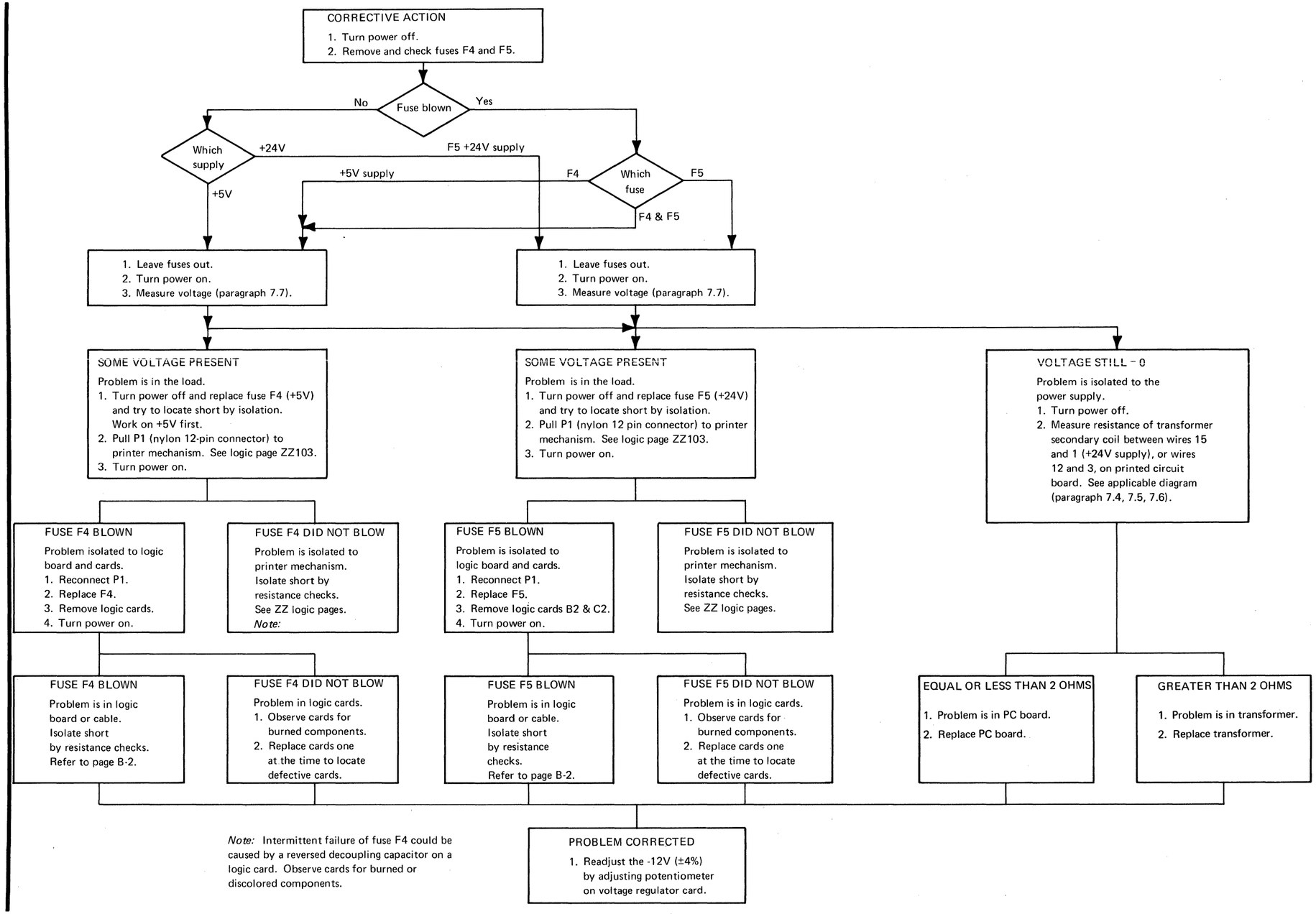
PROBLEM STILL EXISTS

1. Trouble is in voltage regulator card or in PC board.
2. Replace voltage regulator card first. No good. - - Replace the PC board.

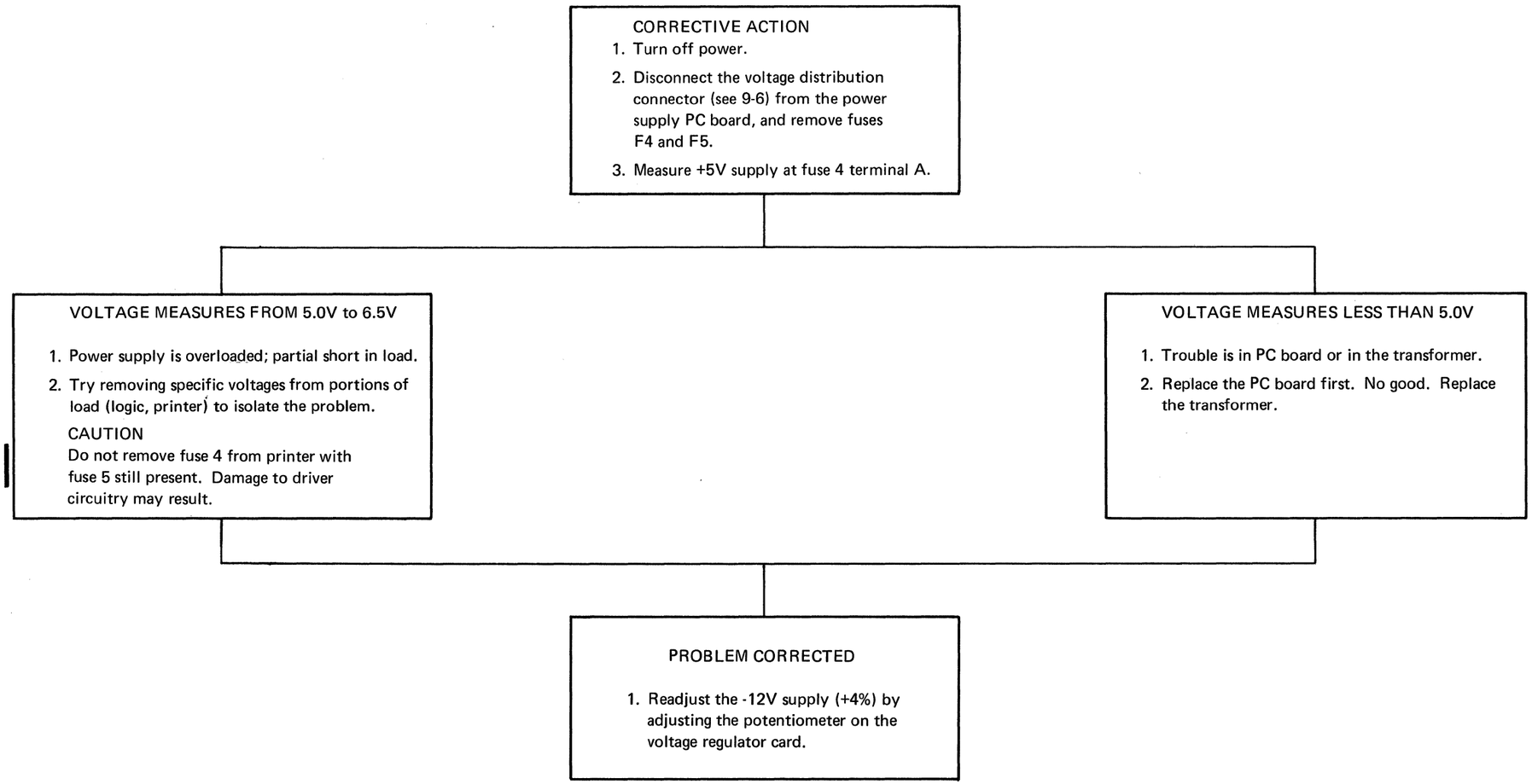
PROBLEM CORRECTED

1. Readjust the -12V supply (±4%) by adjusting potentiometer on voltage regulator card.

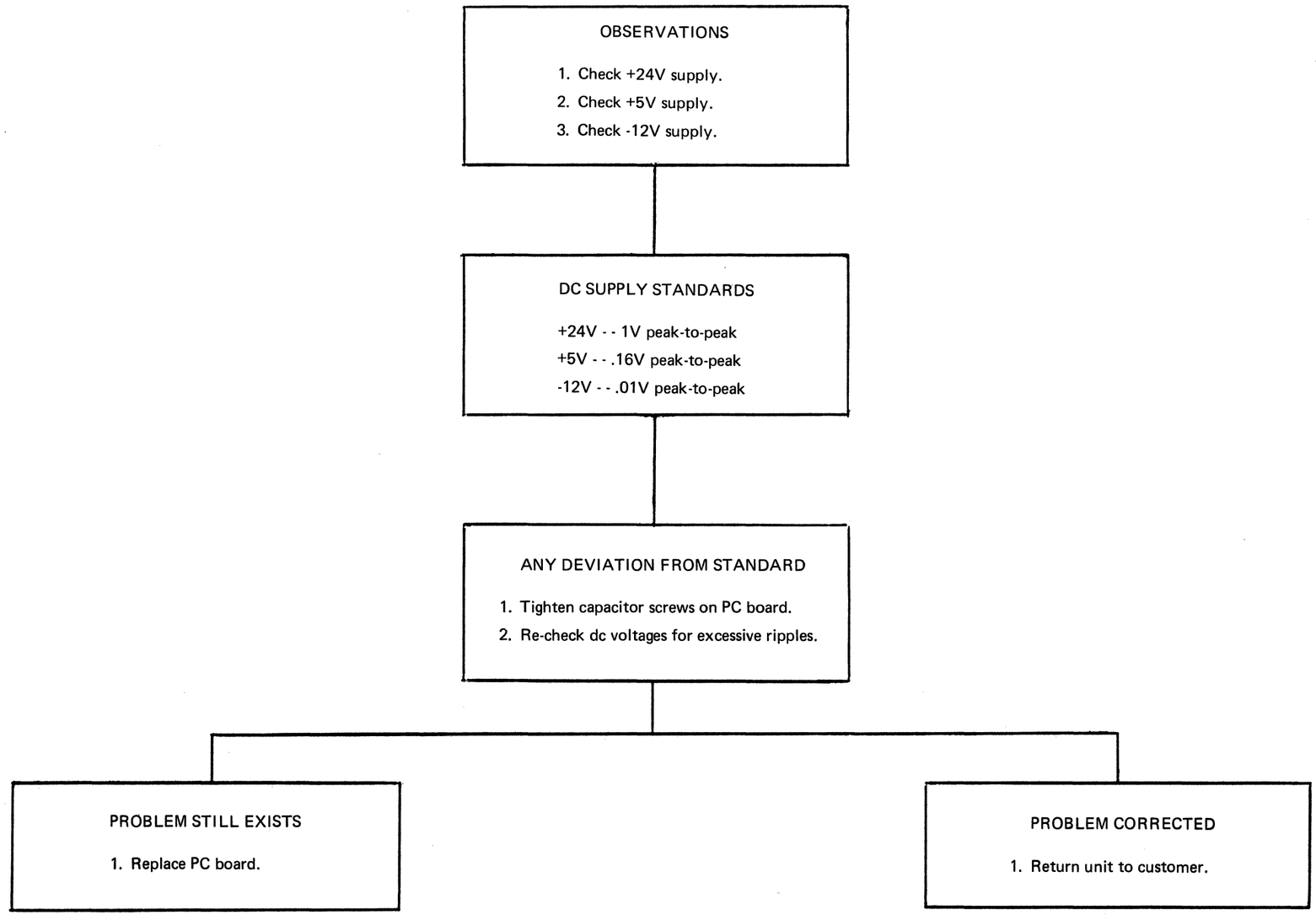
7.8.4 +24V Supply = 0 or +5V Supply = 0



7.8.5 All Voltages Too Low



7.8.6 Excessive AC Ripple on DC Voltages (60-Hz Supplies Only)



Note: Information on this page does *not* apply to print-magnet assemblies with black sealant on the allen screws.

8.1 MAINTENANCE MONITOR DESCRIPTION

The maintenance monitor indicates actual machine usage. The readings determine scheduling for preventive maintenance. The monitor is wired to a selected print magnet. Each time that magnet is fired, the electrolyte gap moves to the right.

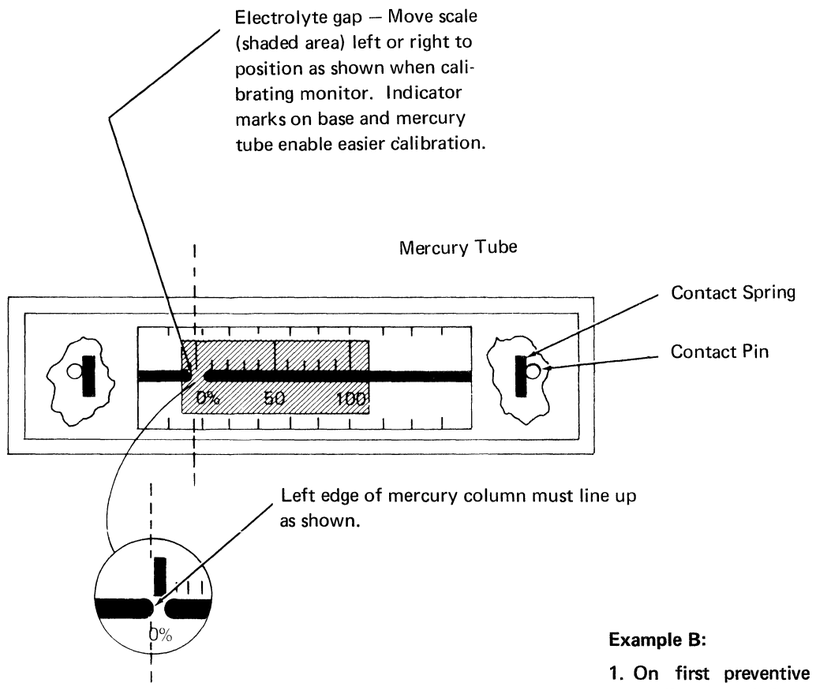
CAUTION
The monitor becomes permanently damaged if the electrolyte gap reaches the extreme end of tube. If the gap reaches the end of the tube, replace the mercury tube and housing (part 1149674) and recalibrate. Be careful when handling the monitor. A sharp impact may displace the electrolyte gap.

8.2 PREVENTIVE MAINTENANCE FREQUENCY PROCEDURE

Usage must be recorded on a label (part 2526585) located on the inside of the printer cover. The vertical column indicates percent of use. The horizontal column indicates elapsed time in months. At the installation of a new machine or new print head, adjust the monitor calibration to zero.

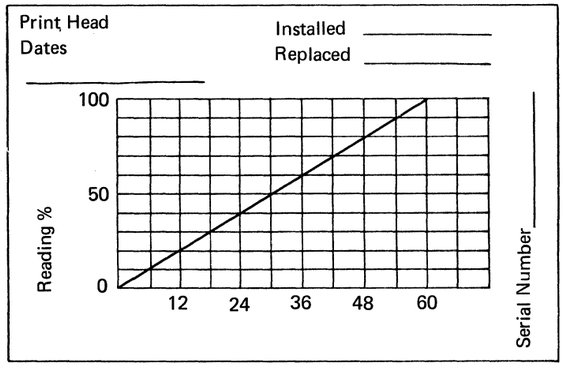
On the first preventive maintenance call (PM Unit 3), read the monitor scale, plot the point on the label, and draw a straight line from zero to the point plotted.

Record this estimate in the 'Change PM Frequency to' block on the incident report. Check for proper estimate by reading the scale on every PM Unit 3 call to determine the validity of PM frequency. The algorithm for calculating PM frequency is: Projected 100% Month X .25 = frequency for units 1 and 3.



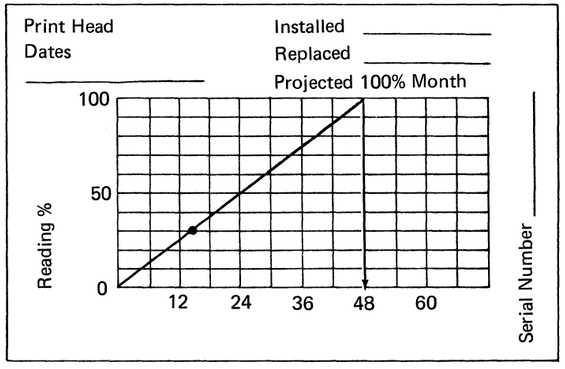
Example A:

This label represents average use (per PM chart Page 8-2) whereby 25% = 15 months, 50% = 30 months, and 100% = 60 months.



Example B:

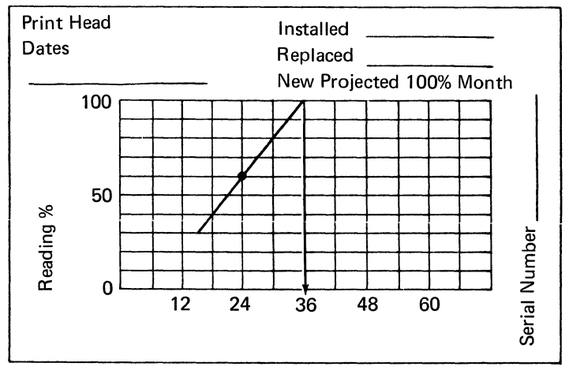
1. On first preventive maintenance call (PM Unit 3), reading on scale is approximately 30%.
2. Place a dot on the scale where the 30% and 15-month time period intersect and draw a line from 0 through the dot and to the 100% line.
3. This line across the month scale indicates that units 1 and 3 should be changed to 12 months and unit 4 to 24 months.



Example C:

1. On the next PM Unit call (9 months later), the monitor reads 60%. Place a dot where 60 and 24 months intersect and draw a line from the previous dot through the last dot plotted.
2. Where the line crosses the 100% scale indicates that the PM frequency for units 1 and 3 should be changed to 9 months and for unit 4 to 18 months.

Note: PM Units 1 and 3 are now past due (past 50%). Do PM Units 1, 3, and 4 now.



Monitor Recalibration

When the gap reaches the 100% mark, remove the top cover housing the mercury tube, turn the tube 180 degrees, and recalibrate the tube.

1. With a pointed instrument, move the scale in the base assembly left or right until the 0% mark on the scale aligns with the electrolyte gap in the tube.
2. Perform PM Units 1, 3, and 4 and continue as previously with a new usage label attached adjacent to the original label.

CAUTION
A print head used beyond its indicated PM Unit 4 period may result in less than normal ribbon life.

8.3 PREVENTIVE MAINTENANCE, PRINTER

- Check operation of the blower fan.
- Inspect the printer output for signs of print-density variations due to print-wire wear.
- Clean ink accumulation from the ribbon guide.
- Remove debris from the wire-guide tip and clean the side grooves in the wire-guide tip.
- Clean the carrier support shaft with a cloth dampened with IBM #6.
- Clean the leadscrew with cloth lightly dampened with IBM #6.
- Saturate felt in oil reservoir with IBM #6.

PM Routine

Code U	Code R	Location Operation	Frequency	Clean	Lubricate	Observe
0		Blower				Check operation each service call.
1		Pin-Feed Carriage	12 mo. or 25% change in MM scale		IBM # 23 on: Feed roll release mechanism Feed roll release cam Platen motion escapement Index link Index pawl Index pawl carrier stud Index cam and follower	
3		Leadscrew and Support Shaft	12 mo. or 25% change in MM scale	Clean with cloth lightly dampened with IBM # 6.		
4		Print Head	24 mo. or 50% change in MM scale for print heads with red or white color-coded allen screws.	See "Print-Head Cleaning, Stoning and Lubrication Procedure."	Saturate felt in oil reservoir with IBM # 6.	All Color-Coded Print Heads Check for lubrication of wire guide and core oiler. Make sure wicks are properly installed in oil reservoir. Brush debris lightly from wire guide tip. Red or White Color-Coded Print Heads Only Calculate MM change since last PM Unit 4. If 50%, perform PM Unit 4. Update the PM Freq. Maint. Monitor usage label. Refer to "Preventive Maintenance Frequency Procedure." Examine customer ribbon for shredding and/or excess wear. Check wire guide for accumulation of ribbon fibers and binding/sticking print wires. Correct these conditions by performing the print-head cleaning, stoning, and lubrication procedure. Recalibrate MM scale when MM reads 100% (every other stoning operation). Refer to "Maintenance Monitor."
			DANGER Do not stone print heads with black sealant on allen screws of each print-magnet assembly. Print wires are brittle and can shatter if overstressed.			
			24 mo. for black color-coded allen screws on print magnets.	Brush debris from wire tip and wick groove. After reinstalling wick, saturate wick with IBM # 6.		

8.4 PRINT-HEAD CLEANING, STONING, AND LUBRICATION

Perform print-head maintenance when 50% change is registered on the maintenance monitor.

DANGER
Do not stone print heads with black sealant on allen screws of each print-magnet assembly. Print wires are brittle and can shatter if overstressed.

Note: Black color-coded print-magnet assemblies must not be stoned or interchanged with red or white color-coded assemblies.

Stoning Tools

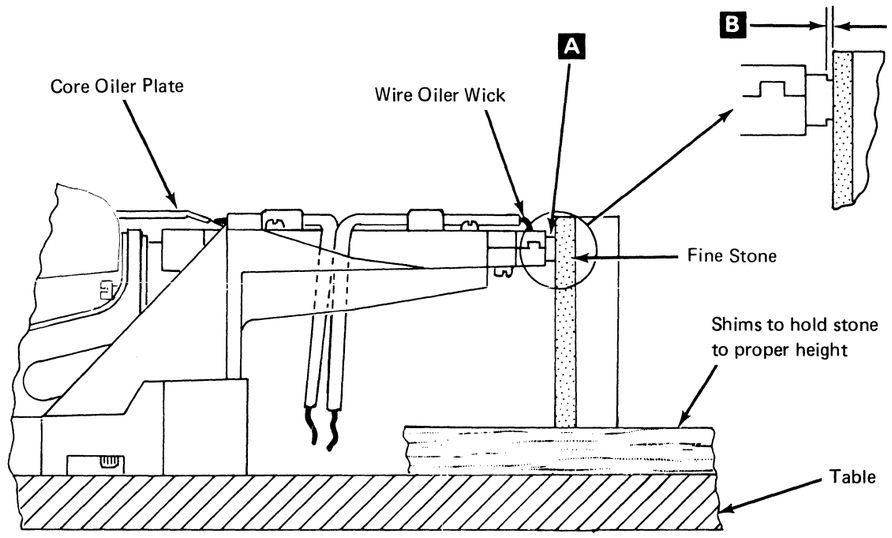
1. IBM #6.
2. Stoning tool (part 18463) — free of gouges.

Stoning Procedure

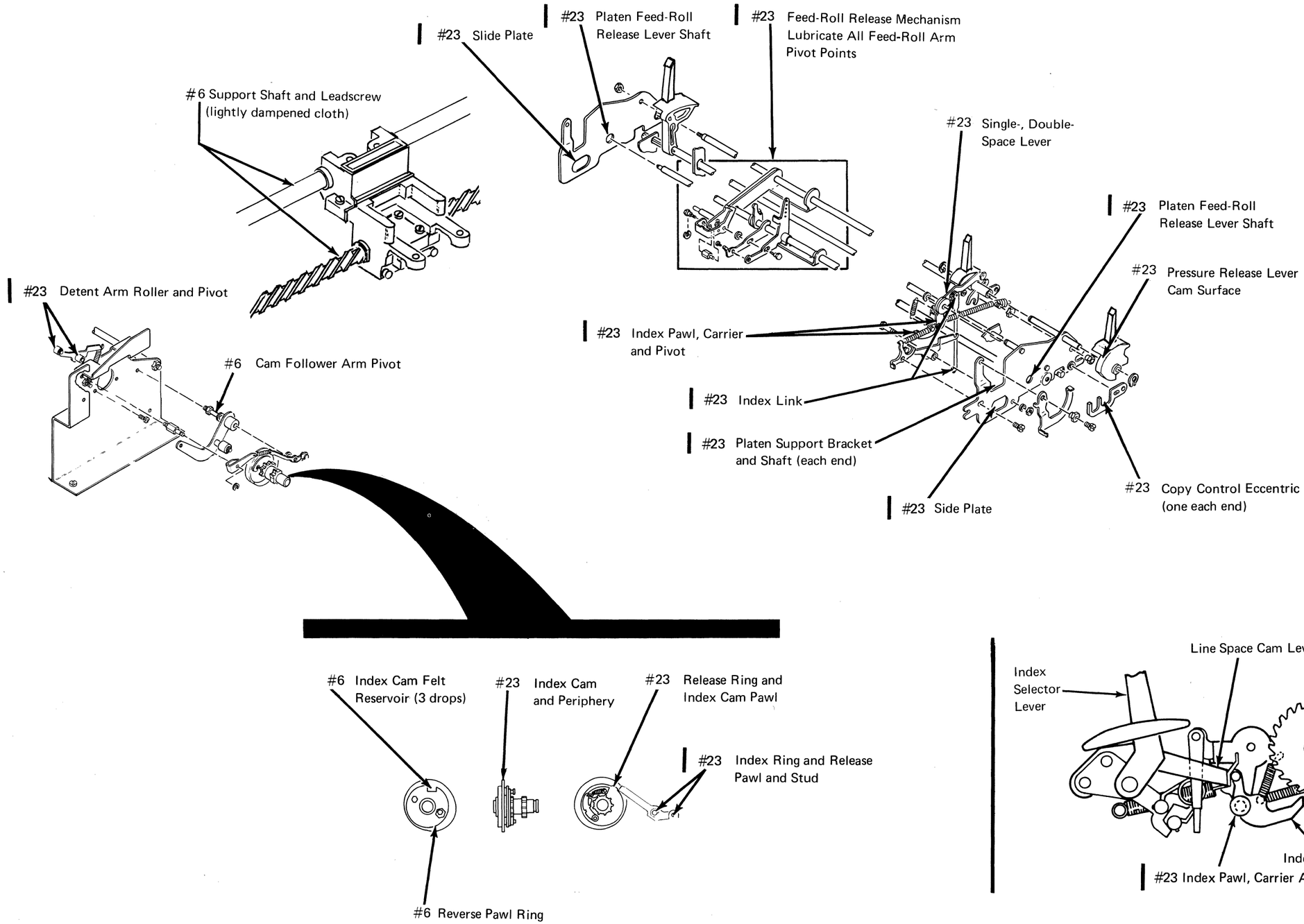
1. Remove the print head. (See 6.4.4.)
2. Remove the core oiler plate and wick assembly (2 screws) and tighten the screws to prevent them from falling out when stoning. Lift the oiler wick out of the wire guide tip.
3. Brush debris from around wire guide and ribbon guide. Check for sticking or binding wires by carefully extending the armatures forward and slowly releasing them. Ensure that the armatures return to their fully restored position. If a print magnet armature does not restore properly, remove the magnet assembly (see 6.4.5) and clean the wire guide hole with straightening tool (part 2617969). Replace the print magnet assembly and recheck for binds.
4. Thoroughly wet both sides of the stone with IBM #6.
5. Be sure that the end of the print head is square with the stone A . Gently slide the print head back and forth on the coarse side of the stone until the print wire tips are flat and flush with the wire guide. Removing a minimum amount of material 0.005 in.; 0,13 mm) is usually sufficient.

   Note: A ledge B 0.010 in. (0,25 mm) from the tip of the wire guide provides a reference in maintaining squareness of the tip and a limit to avoid removing too much material.

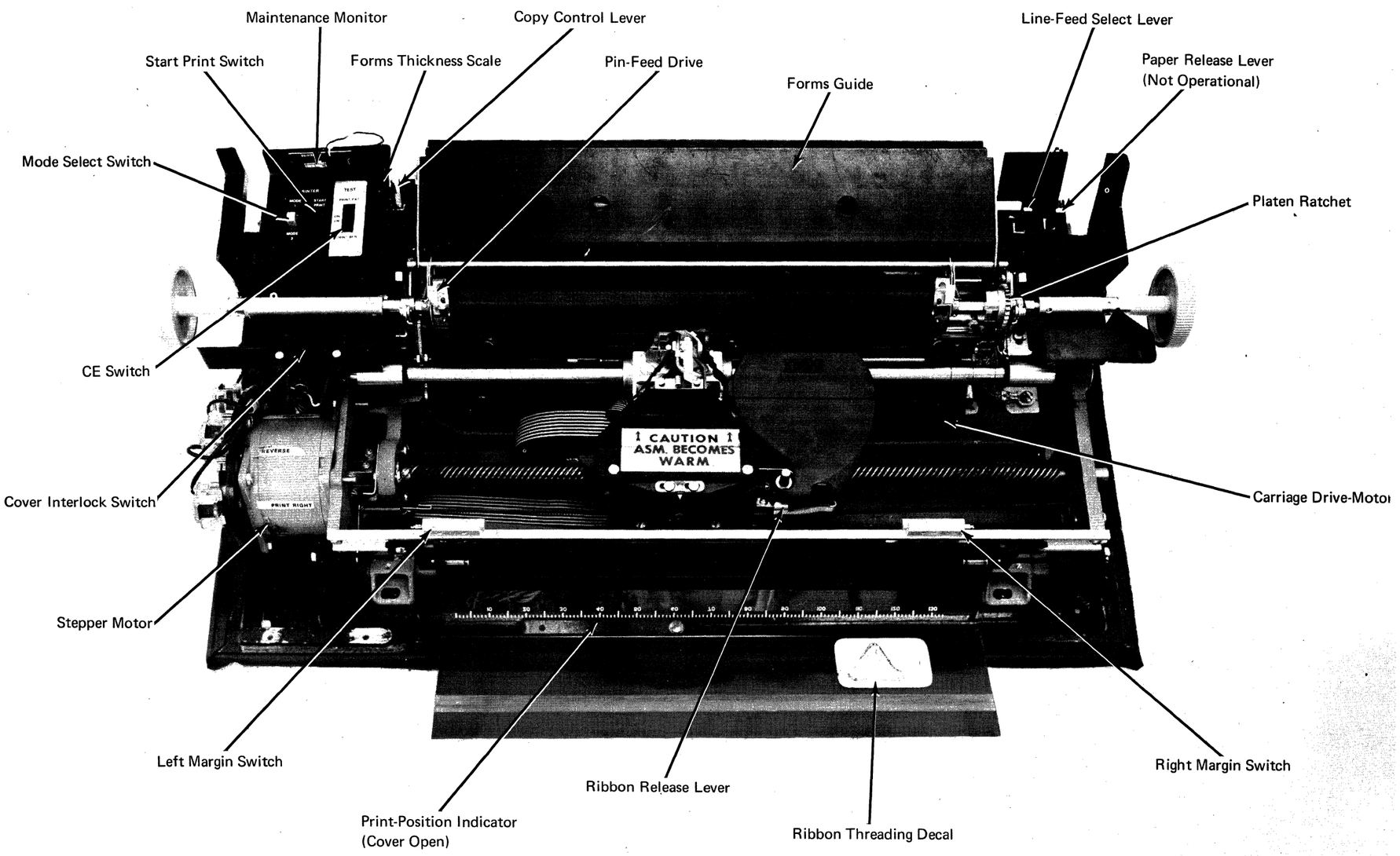
6. When the wire tips appear flat and flush with the wire guide, turn the stone over and polish the tips with the fine side of the stone until the tips appear shiny.
7. Carefully clean the wire guide tip with a brush. Lift each armature from the core (thumbnail can be used), and brush the debris from each wire tip.
8. Saturate core oiler pad and install core oiler plate so that the back of the oiler pad rests on top of the magnet cores.
9. Slide the wick tube forward and, using the wire cleaning and straightening tool (part 2617969), carefully insert the wick alongside the print wires so that the wick extends below the bottom of the wire guide.
10. Install the print head. See 6.4.4.



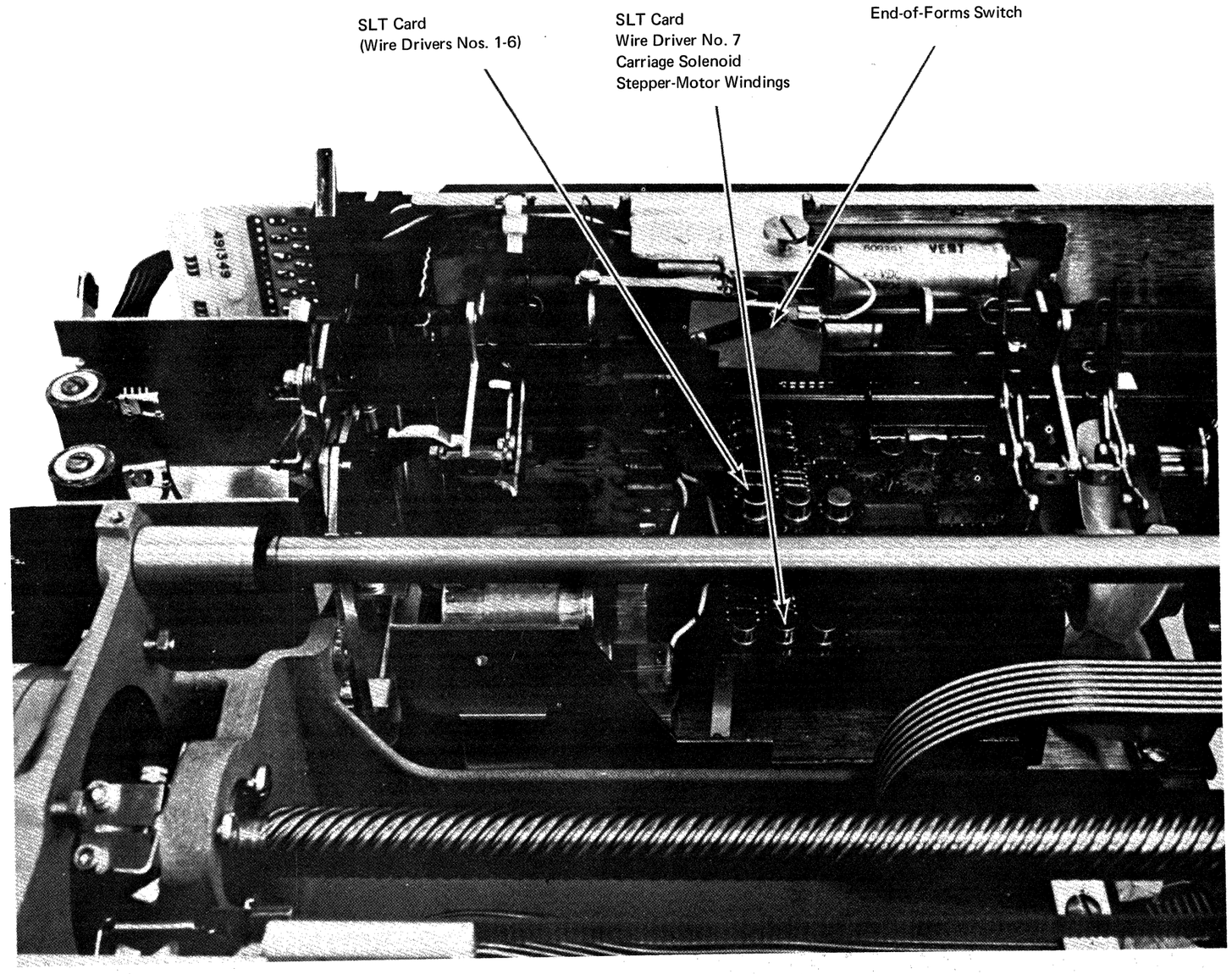
8.5 LUBRICATION POINTS



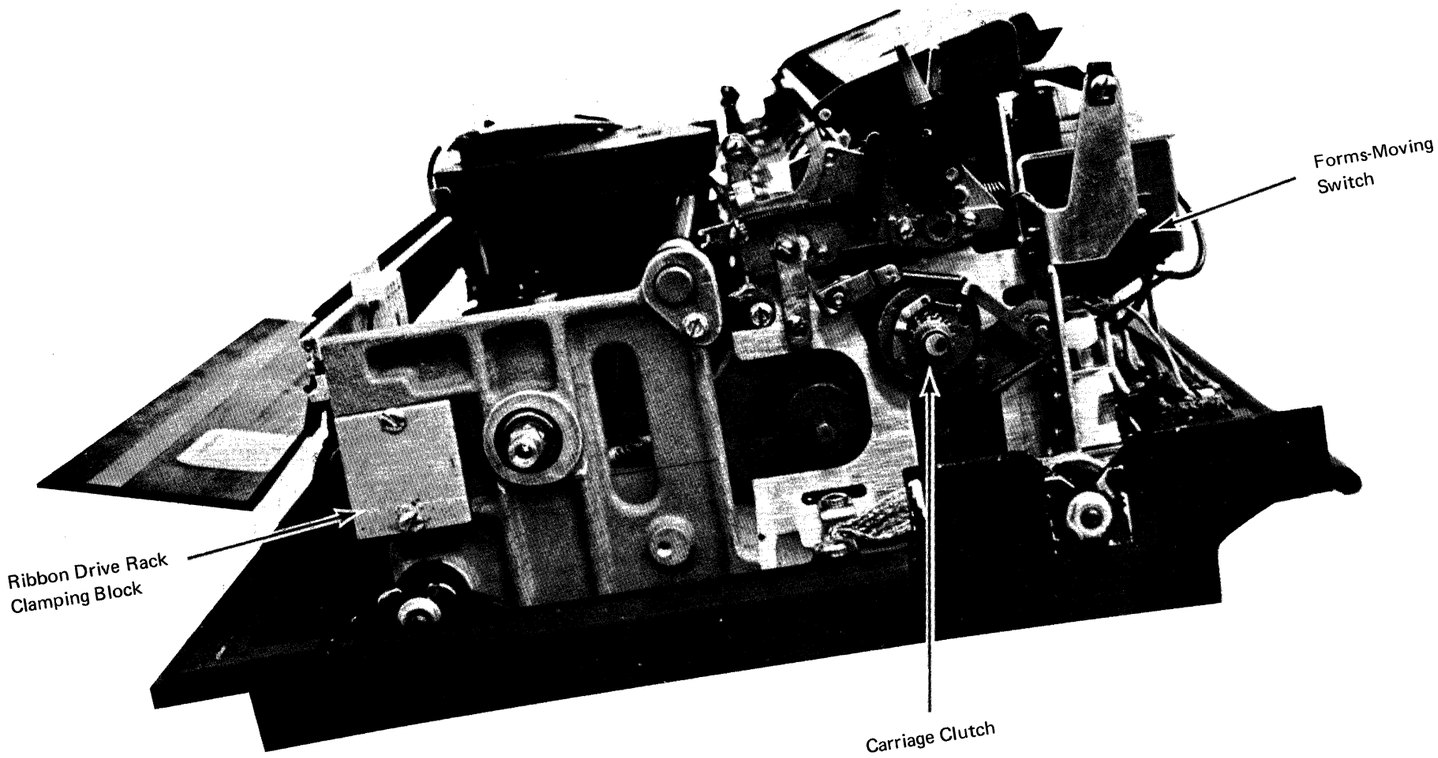
Section 9. Locations



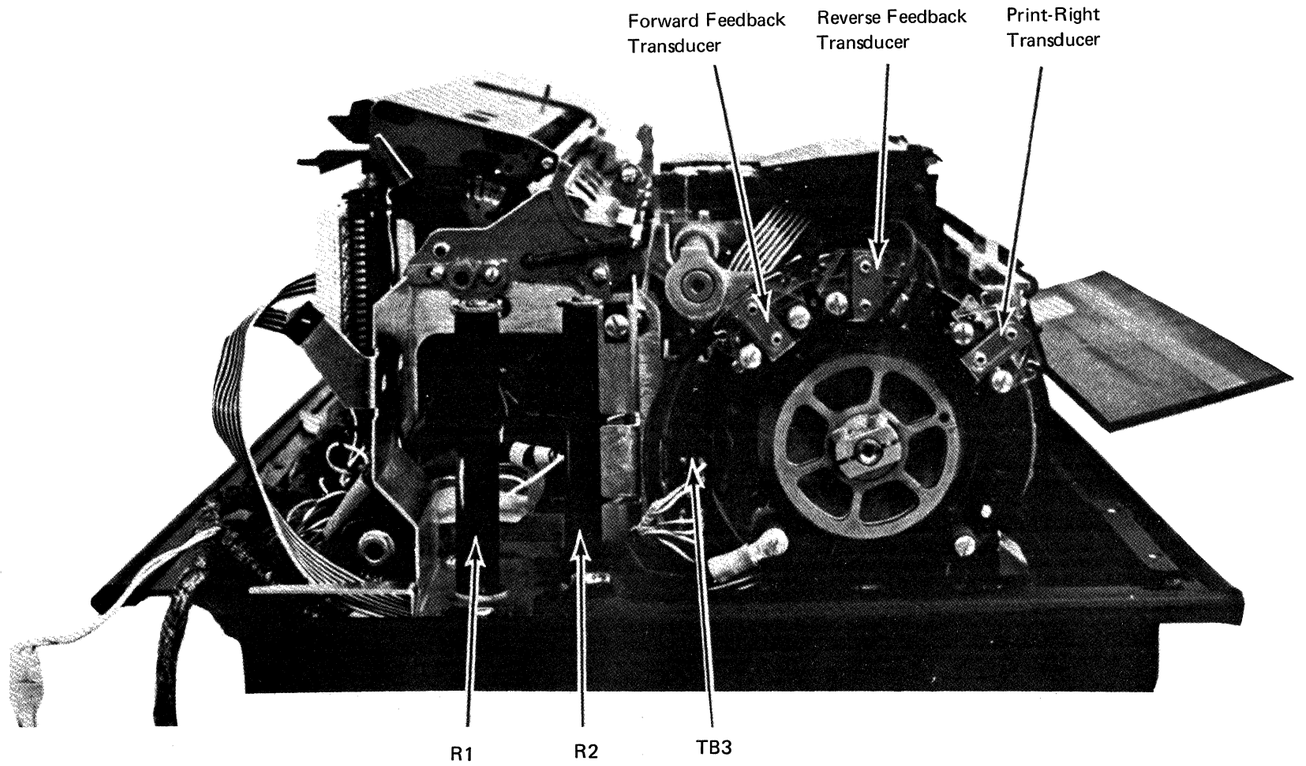
Printer, Top Front View



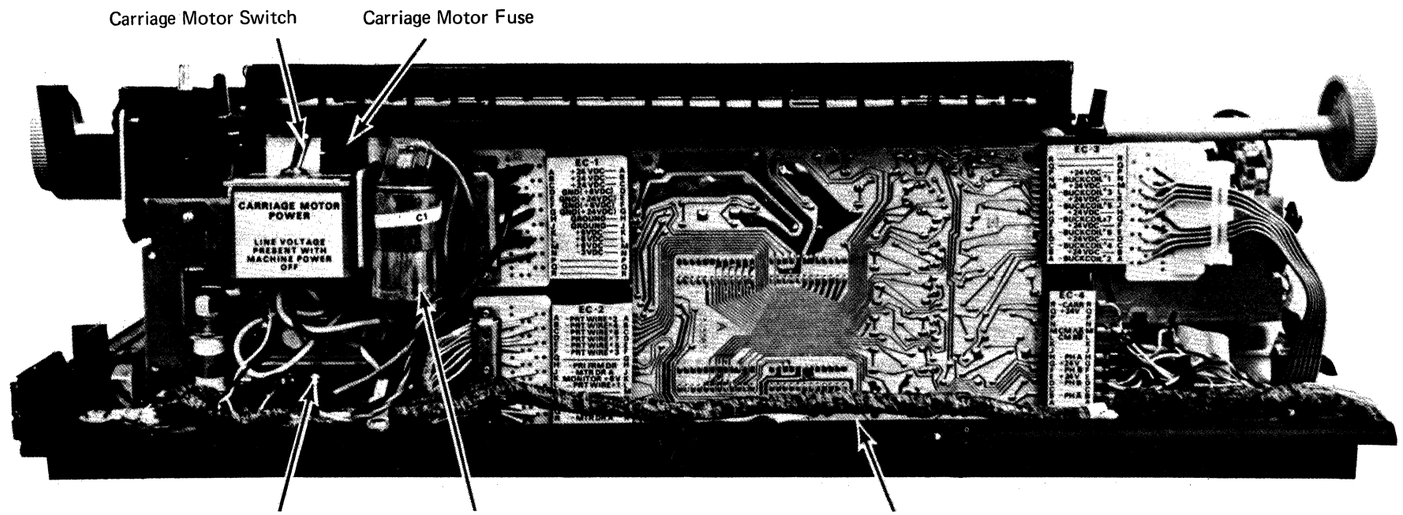
Printer, Top Left Front View



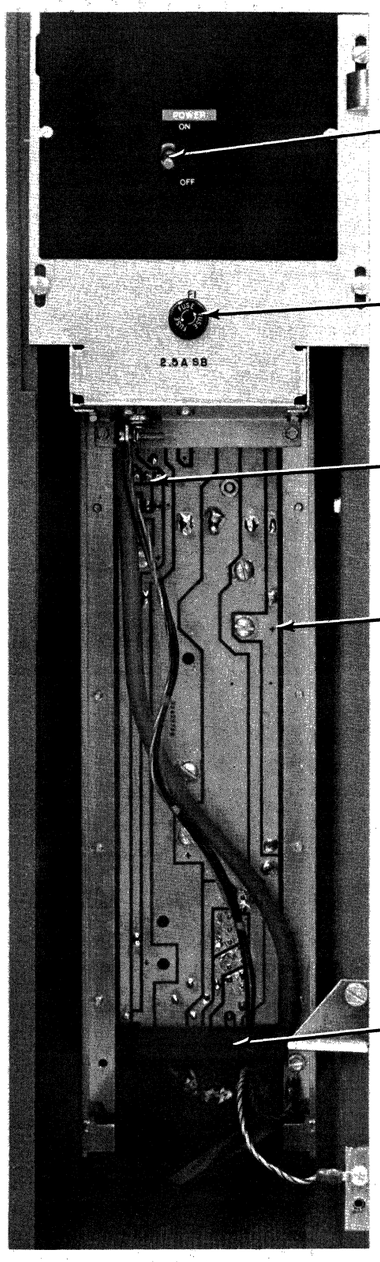
Printer, Right Side View



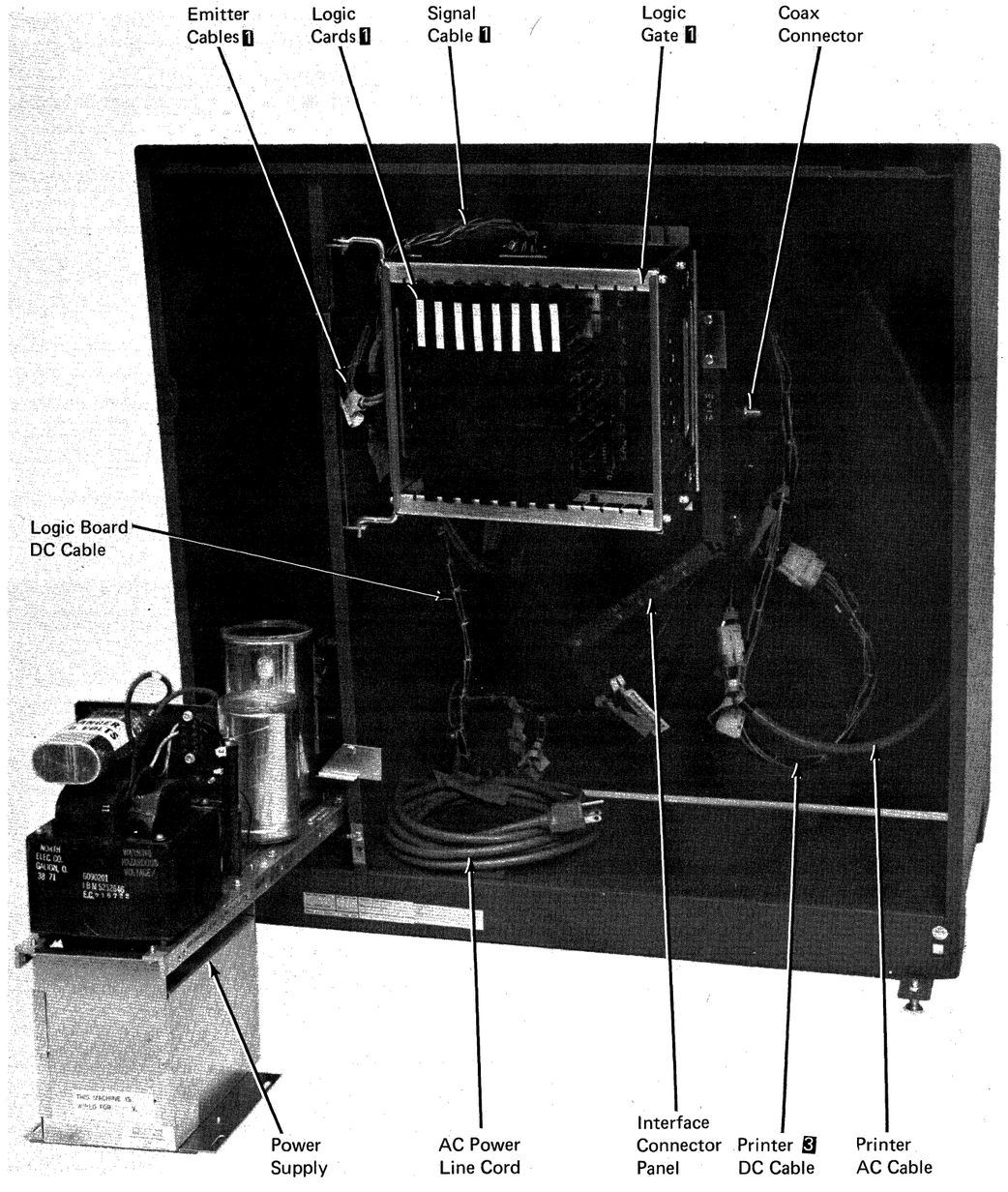
Printer, Left Side View



Printer, Rear View



Power Supply



Power and Signal Cable Distribution

Appendix A. Program Pin Jumper Connections, Counter and Compare Card (H2), and Motor Control Card (G2)

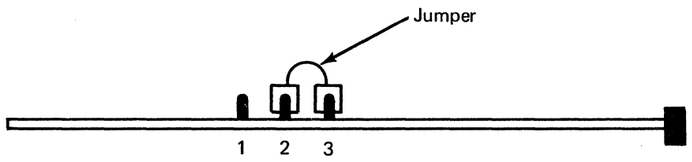
CAUTION
Jumper pins can bend or break, or jumpers can be pulled off pins. Exercise care when inserting or removing jumpered cards or cards next to jumpered cards.

A.1 CORRECT ORIENTATION OF PROGRAM PIN JUMPER ON COUNTER AND COMPARE CARD (H2)

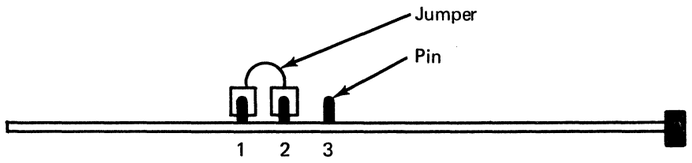
The counter and compare card mounted in logic gate location H2 requires a programmable pin-jumper. The manner in which the pin-jumper is mounted on the card, (shown in the diagrams below) is dependent upon the printer model in use.

Note: Whenever card H2 is replaced, the pin-jumper connection must be checked to ensure that it is properly mounted for the printer model in use.

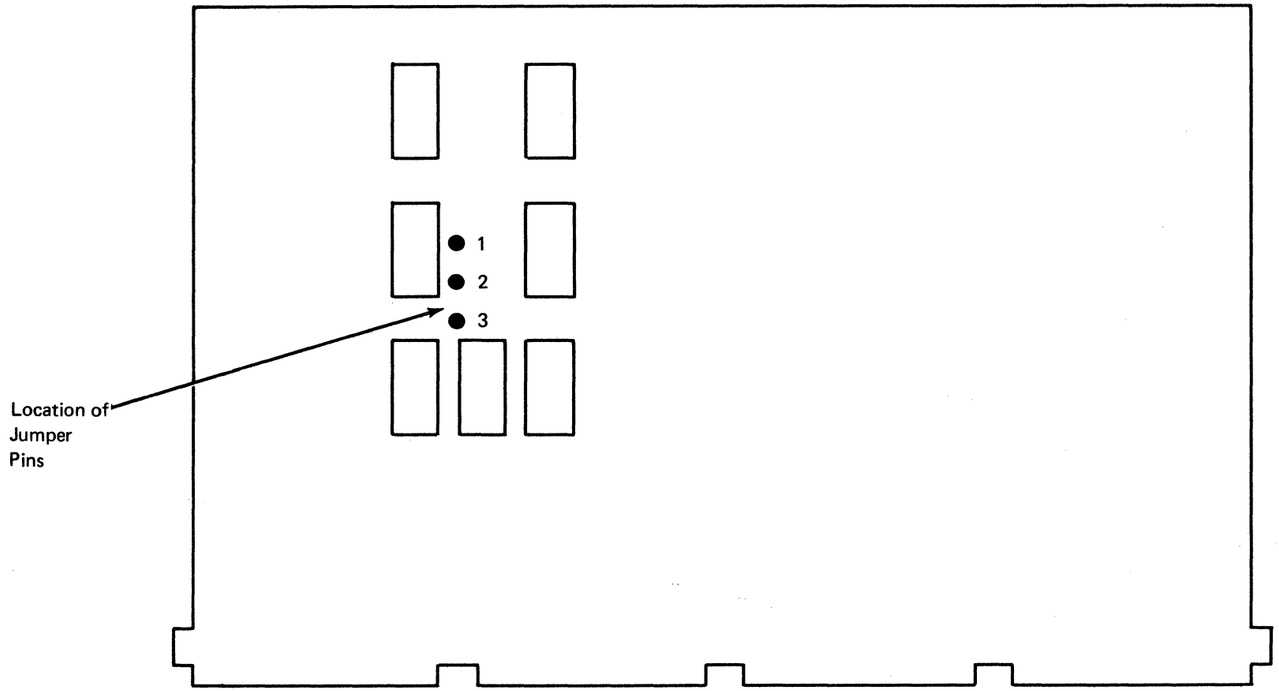
For IBM 3284/86 Printers, Models 1



For IBM 3284/86 Printers, Models 2



COUNTER AND COMPARE CARD (H2)
(Module Side)

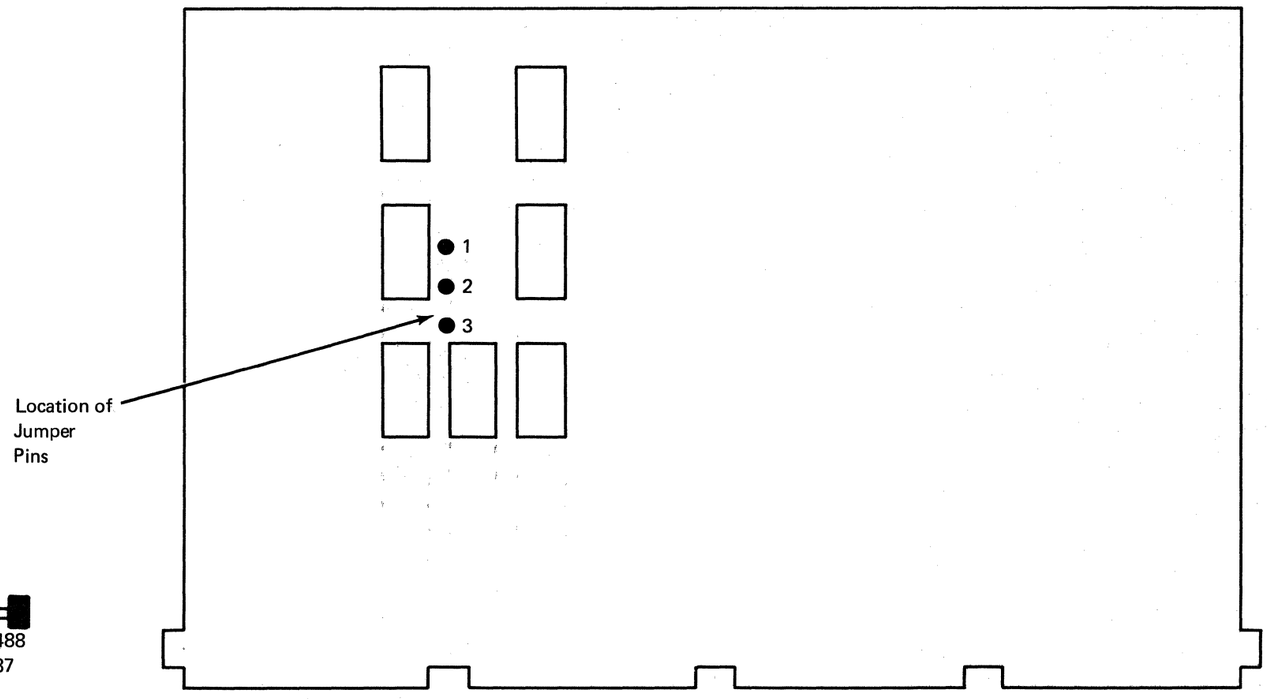


CAUTION
Jumper pins can bend or break, or jumpers can be pulled off pins. Exercise care when inserting or removing jumpered cards or cards next to jumpered cards.

A.2 CORRECT ORIENTATION OF PROGRAM PIN JUMPER ON MOTOR CONTROL CARD (G2)

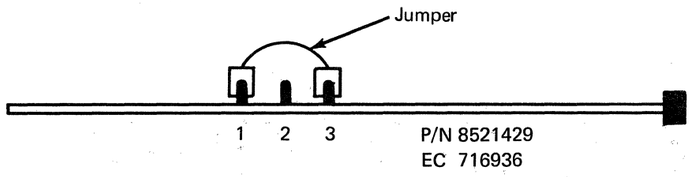
The motor control card (G2) contains most of the logic for the control of the dc stepper motor which drives the screw to run the print-head carrier in forward and reverse directions. Since the motor control card is used in both the 3284 and the 3286 printers, there is a programmable pin jumper on the card which determines whether the card will function as a 3284 stepper motor control or a 3286 stepper motor control. The proper programming is shown below.

MOTOR CONTROL CARD (G2)
(Module Side)

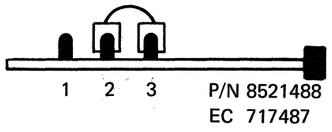


For IBM 3284 Printer, Models 1 and 2

The outer pins must be jumpered together:



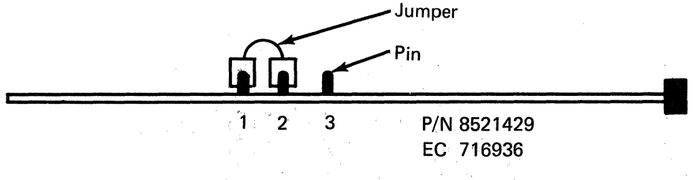
P/N 8521429
EC 716936



P/N 8521488
EC 717487

For IBM 3286 Printer, Models 1 and 2

The center pin must be jumpered to the pin (1) farthest from the plug side of the card:



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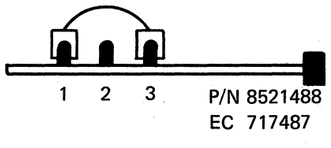

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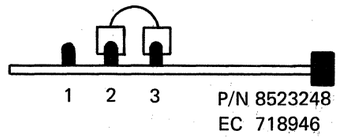
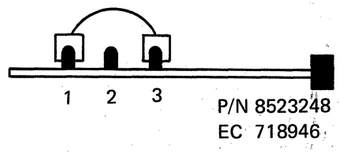
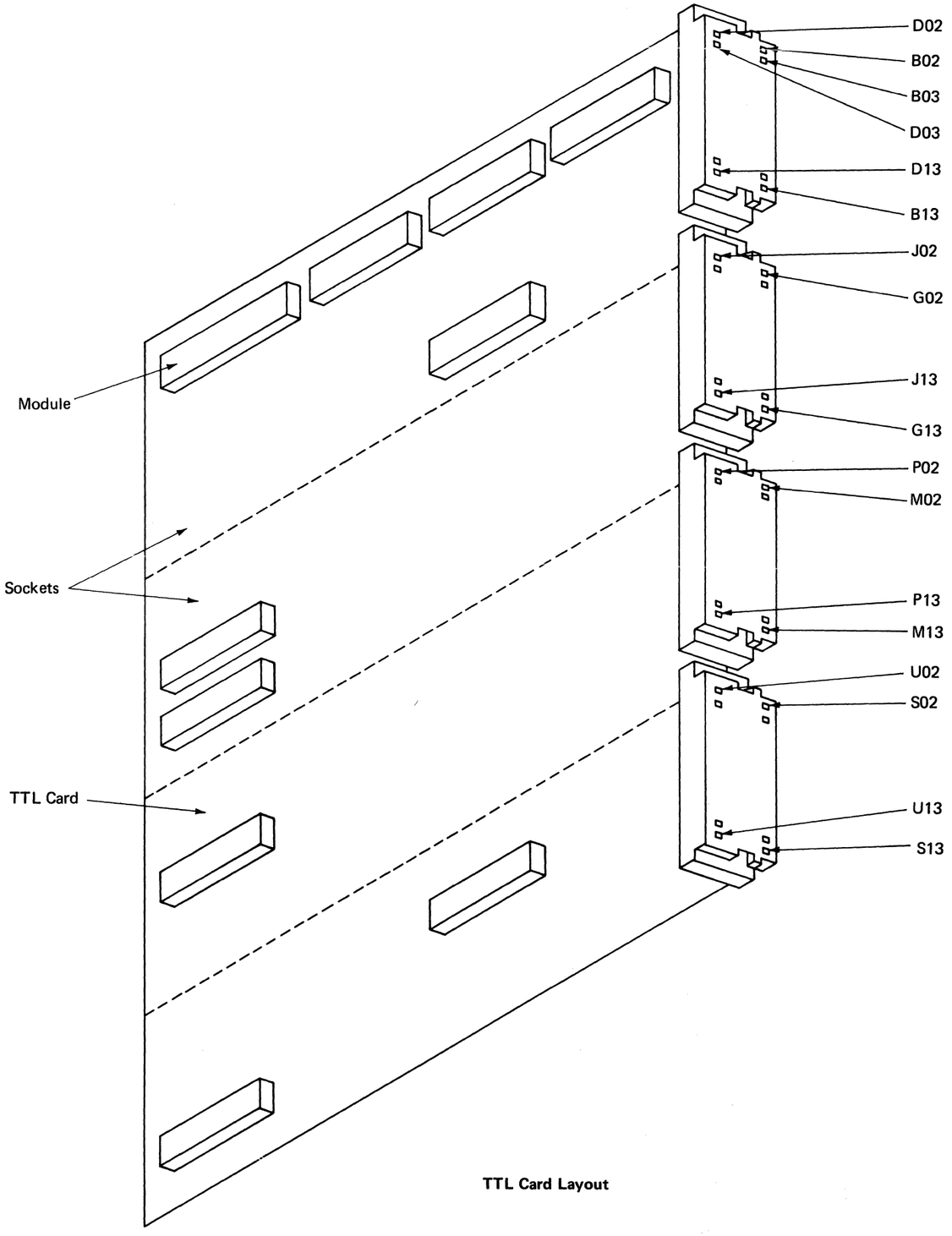


P/N 8523248
EC 718946

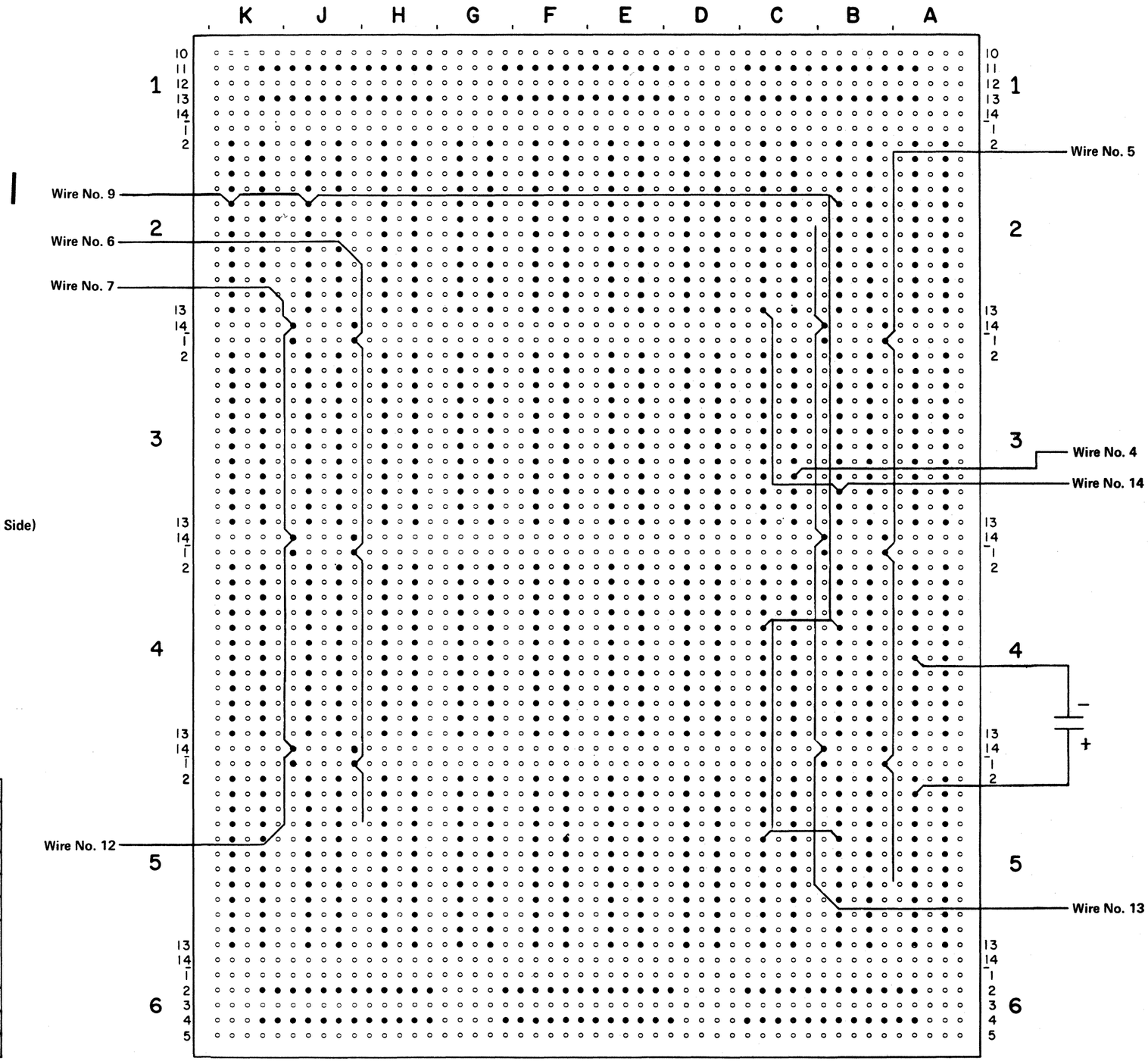


P/N 8523248
EC 718946

Appendix B. Card and Board Layouts

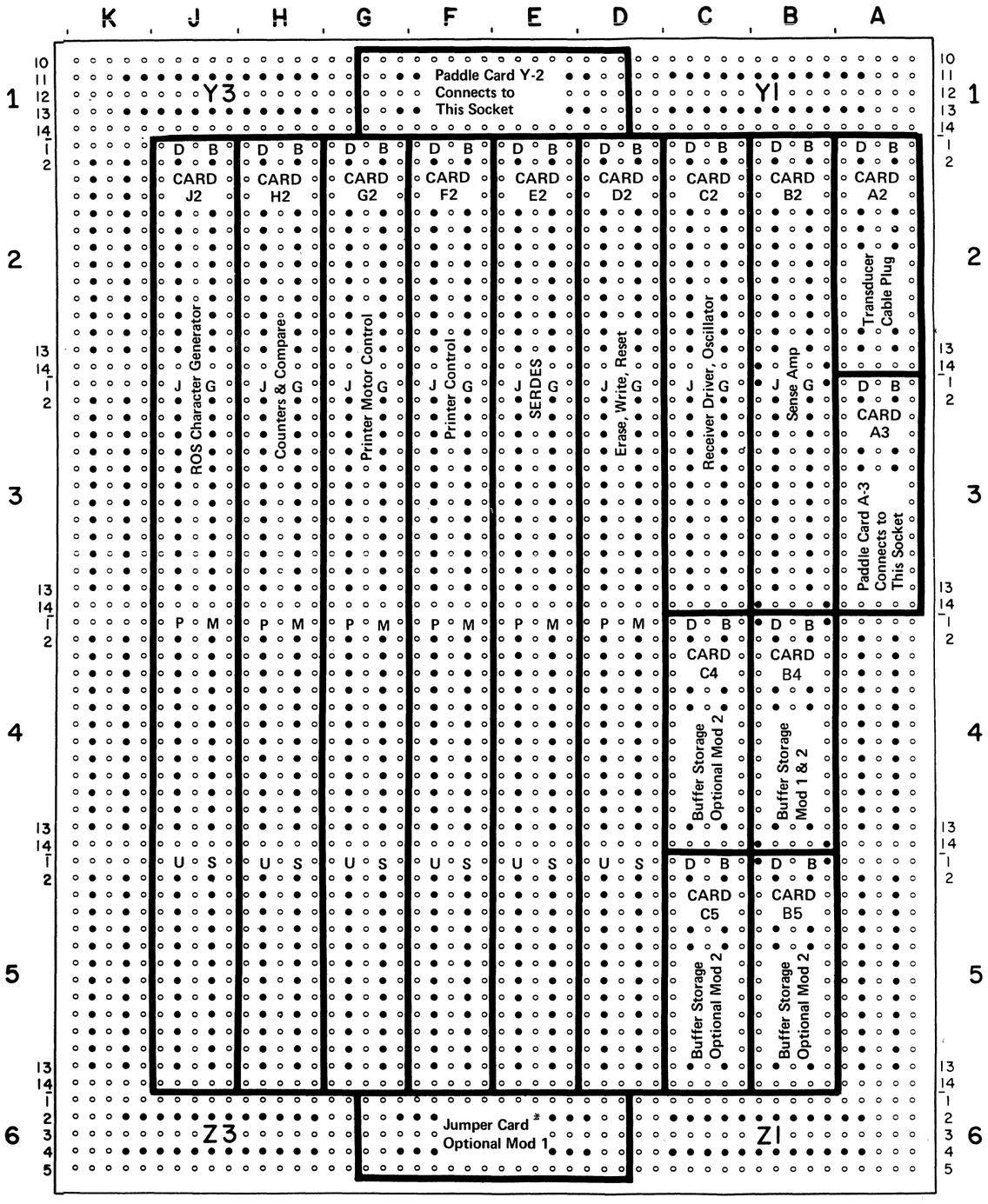


TTL Card Layout



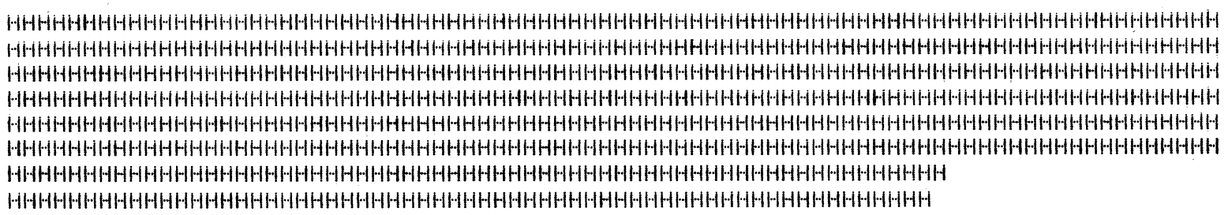
1/2 Board Voltage Wiring Diagram (Pin Side)

3284-1, 2 & 3286-1, 2		
Board Location	Wire No.	Voltage
C3–B10	4	+5 Special
Voltage Bus	5	+5
Voltage Bus	6	+5
Ground Bus	7	Ret
J2–D06, B2–D06, B4–D06, C4–D06, B5–D06, C5--D06	9	-12
Ground Bus	12	Ret
Ground Bus	13	Ret
B3--D11, C2--D13	14	+24

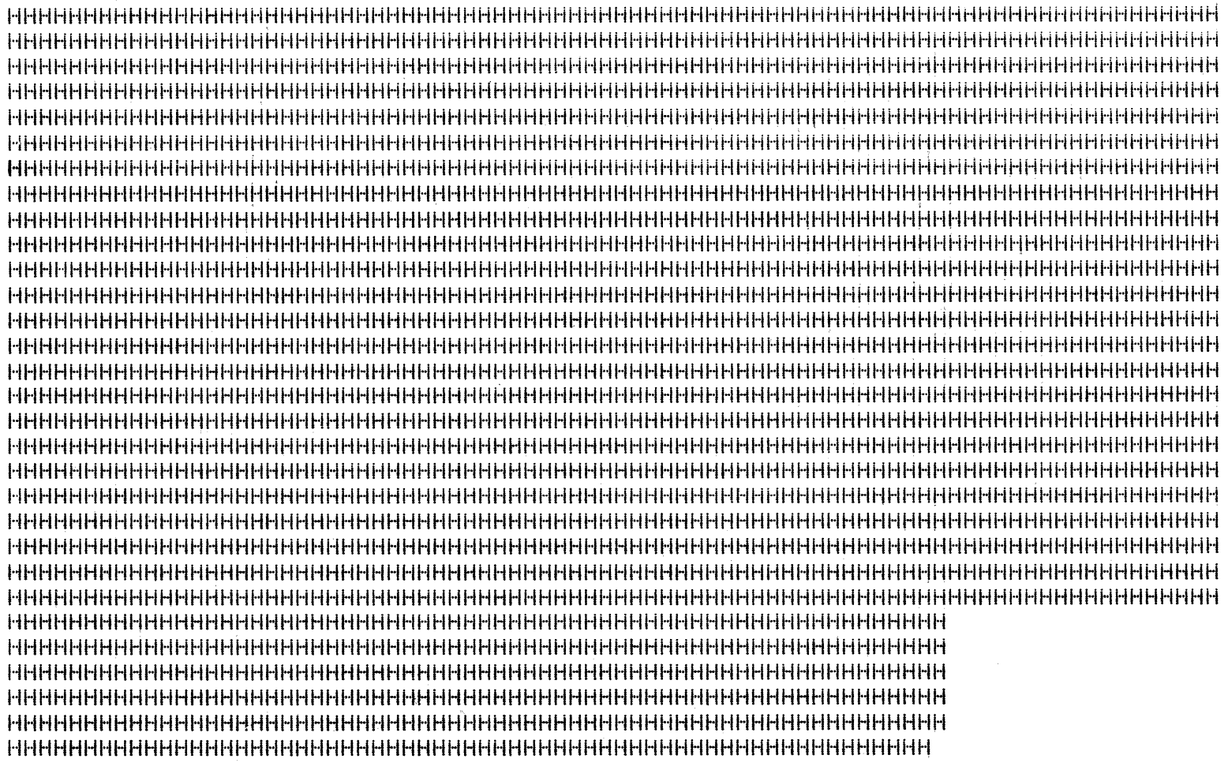


1/2 Board Card Layout (Pin Side)

*Jumper Card requires no external wiring.



IBM 3284/86 Printers, Model 1, "All H" Pattern Printout



IBM 3284/86 Printers, Model 2, "All H" Pattern Printout

```
 B D F H ¢ <     K M O Q ! *     S U W Y   %     2 4 6 8 : @     B D F   B D F
XXCXEFXXI¢X<XX‖XJKXMXXPQXX$X);XX/SXUXXXYXX,X_)X0XX3X56XX9:X@XX" XXCXEFX XXCXEFX
ABCDEFGHI¢.<(+‖&JKLMNOPQR!$*);¬-/STUVWXYZ ,%_)?0123456789:#@'=" ABCDEFG ABCDEFG
ABCDEFGHI¢.<(+‖&JKLMNOPQR!$*);¬-/STUVWXYZ ,%_)?0123456789:#@'=" ABCDEFG ABCDEFG
 B D F H ¢ <     K M O Q ! *     S U W Y   %     2 4 6 8 : @     B D F   B D F
XXCXEFXXI¢X<XX‖XJKXMXXPQXX$X);XX/SXUXXXYXX,X_)X0XX3X56XX9:X@XX" XXCXEFX XXCXEFX
X
                              S U W Y   %     2 4 6 8 : @
                              S U W Y   %     2 4 6 8 : @
```

1st Part of Printout

2nd Part of Printout

IBM 3284/86 Printers, Model 1, Alphameric Pattern Printout

```
 B D F H ¢ <     K M O Q ! *     S U W Y   %     2 4 6 8 : @     B D F   B D F
XXCXEFXXI¢X<XX‖XJKXMXXPQXX$X);XX/SXUXXXYXX,X_)X0XX3X56XX9:X@XX" XXCXEFX XXCXEFX
ABCDEFGHI¢.<(+‖&JKLMNOPQR!$*);¬-/STUVWXYZ ,%_)?0123456789:#@'=" ABCDEFG ABCDEFG
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 B D F H ¢ <     K M O Q ! *     S U W Y   %     2 4 6 8 : @     B D F   B D F
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 B D F H ¢ <     K M O Q ! *     S U W Y   %     2 4 6 8 : @     B D F   B D F
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X
                              S U W Y   %     2 4 6 8 : @
                              S U W Y   %     2 4 6 8 : @
                              S U W Y   %     2 4 6 8 : @
                              S U W Y   %     2 4 6 8 : @
                              S U W Y   %     2 4 6 8 : @
                              S U W Y   %     2 4 6 8 : @
```

1st Part of Printout

2nd Part of Printout

IBM 3284/86 Printers, Model 2, Alphameric Pattern Printout

Appendix D. Preferred Alternate Transducer Adjustment - Complete Procedure

This complete procedure can be used whenever a transducer problem is encountered, and is offered as an alternate to the separate procedures, 6.5.2, 6.5.3, and 6.5.5, found in Section 6 of this manual. An oscilloscope is required to perform this procedure.

D.1 EMITTERS AND TRANSDUCERS ADJUSTMENTS

Objective: To align the emitter wheels with transducer tips, and to obtain the proper air gap on all transducers.

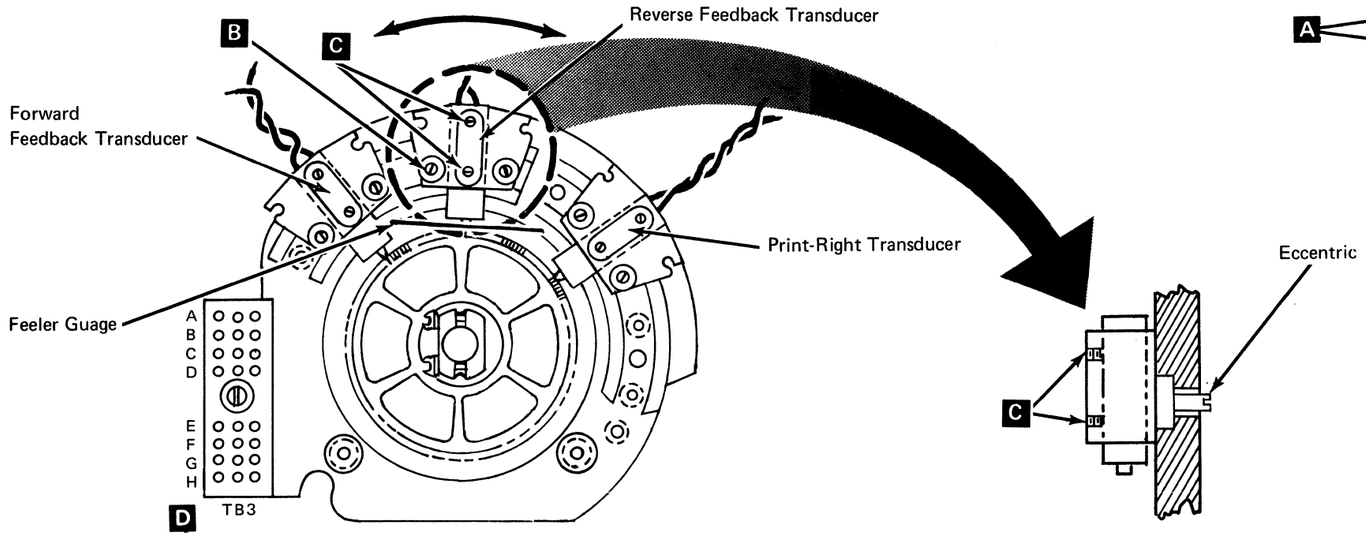
Adjustment

1. Remove dc power (6.4.2). Remove emitter cover (2 screws). Loosen the emitter wheel screws A and position the assembly so that the emitter wheels align with the transducer tips. Tighten the screws.

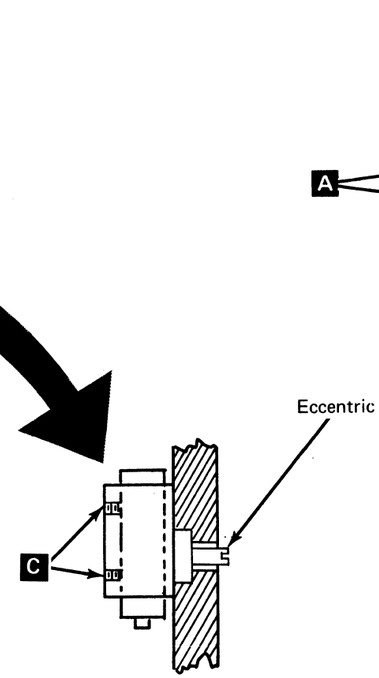
   Note: The wheel may not be centered under the transducer; however, the alignment should be the same on both wheels.

2. Loosen the transducer block clamping screws B and adjust the eccentrics to position each transducer block in the center of the mounting screw slots. MAINTAIN DOWNWARD PRESSURE ON THE TRANSDUCER BLOCK AND TIGHTEN THE SCREWS.
3. Loosen the transducer clamp screws C , and insert a 0.002-in. (0,06 mm) feeler gauge between the transducer tip and the tooth of the emitter wheel. MAINTAIN DOWNWARD PRESSURE ON THE TRANSDUCER AND TIGHTEN THE SCREWS.
4. Check for 0.001-in. (0,03 mm) clearance by inserting the 0.001-in. feeler gauge (PN 2525953) between the transducer tips and the emitter wheel. When the emitter wheel is rotated, there should not be any drag on the gauge.

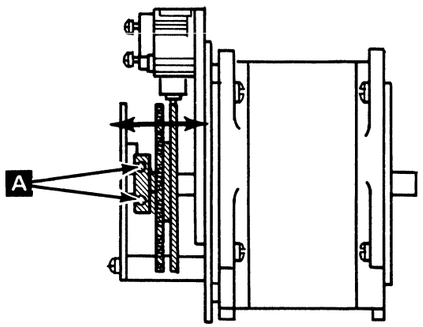
   Note: Check several points on wheel with gauge to prevent possible damage to the emitters and transducers when power is turned on.



Left Side View



Front View



Front View

Note: To ensure correct wiring of transducers, use an ohmmeter to check for continuity between the following points:

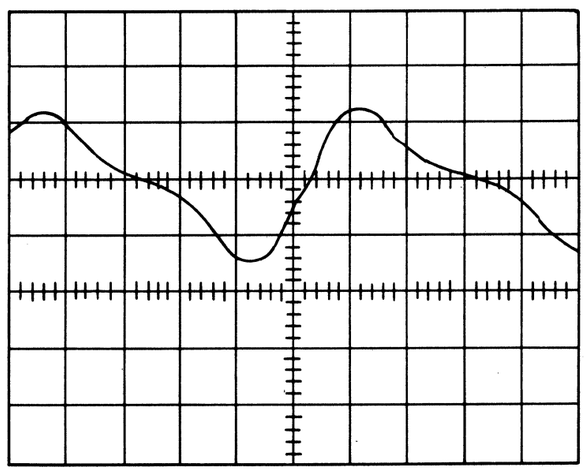
D TB3H to A1A2B10 (Print-Right Transducer)
TB3E to A1A2B04 (Forward Feedback Transducer)
TB3C to A1A2B07 (Reverse Feedback Transducer)

5. With an oscilloscope, check both feedback transducers and print-right transducer for minimum output of 750 millivolts. (Typical output is about 2 volts.) See Waveshape E . If output does not meet requirements, recheck 0.001-in. (0,03-mm) air gap (6.5.2).

   Note: Check outputs on brown wires at TB3 positions C, E, and H in printer assembly D .

6. Proceed to D.2, Stepper-Motor Speed Adjustments.

E Typical Transducer Output at TB3



Time/Division: 0.5 ms
Volts/Division: 1V
Mode Channel: 1
Sync: Internal Coupling DC, Slope Plus
Source: Internal Channel 1 only.

D.2 STEPPER-MOTOR SPEED ADJUSTMENTS

CAUTION

- Do not make transducer adjustments while printing. Print wire damage may result.
- The speed of the printer will vary greatly with only a small change in the position of the adjusting eccentric.
- Stepper-motor advance pulses that vary more than 150 usec may be due to binds in leadscrew, excessive drag on ribbon, stepper-motor circuit failures, or other failures. Eliminate binds before making motor-speed adjustments (6.5.1).
- This adjustment must be made with print carrier returning at low speed.
- Adjust forward transducer with the head moving to the right.
- Adjust reverse transducer with the head moving to the left.

D.2.1 Forward Speed Adjustment

1. a. Set CE switch to PRINT PATTERN position.
   b. Install the ribbon cassette.
   c. To make carriage move without printing, perform power-on reset operation.
2. Sync on and look at the output of the forward transducer at point A1B2-J12.
3. Loosen two mounting screws on forward feedback transducer mounting plate and adjust eccentric for proper trace **A** . Press mounting plate toward emitter wheel and tighten mounting screws.

D.2.2 Reverse Speed Adjustment

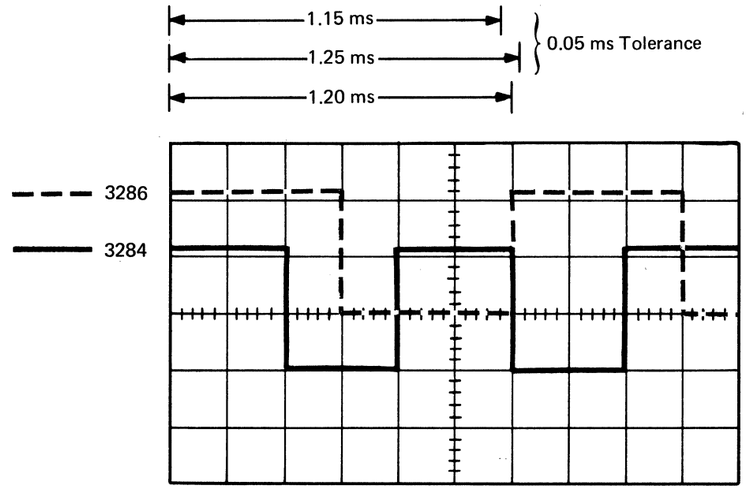
Note: Disable high-speed return by jumpering the slow-down margin switch (A1E2-B06 to E2-D08).

1. Sync on and look at the output of the reverse transducer at point A1B2-D12.
2. Loosen two mounting screws on the reverse feedback transducer mounting plate and adjust eccentric to obtain proper trace **A** as the carriage moves in a reverse direction. Press mounting plate toward emitter wheel and tighten mounting screws.
3. Remove the jumper used to disable high-speed return, and check that the carrier returns at high speed.
4. Proceed to D.3, Print Carrier and Print Emitter Adjustment.

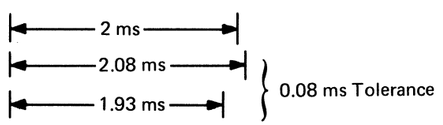
A Typical Speed Adjustment Trace

3286

Time/Division: 0.2 Millisecond
Volts/Division: 2 Volts
Mode Channel: 1
Sync: Internal Coupling DC, Slope Plus
Source: Internal Channel 1 Only



3284



Time/Division: 0.5 ms
Volts/Division: 2V
Mode Channel: 1
Sync: Internal Coupling DC, Slope Plus
Source: Internal Channel 1 only

D.3 PRINT CARRIER AND PRINT EMITTER ADJUSTMENT

Objectives

1. To position the left end of the carrier support shaft flush with the side casting and then to align the edge of the print carrier with the milled ring on the carrier support shaft.
2. To align the middle scribed line on the print emitter wheel to the print-right transducer tip.
3. To position the print poistion pointer to indicate print position 1.

Note: If the following adjustment is required, recheck the stepper-motor speed adjustments (D.2).

Service Check

Return the carrier to print position 1 and check that:

1. Left edge of carrier aligns with milled ring **A** on left end of carrier support shaft.
2. Print-right transducer tip **D** aligns to center scribed line on print emitter wheel.
3. Print position indicator indicates print position 1.

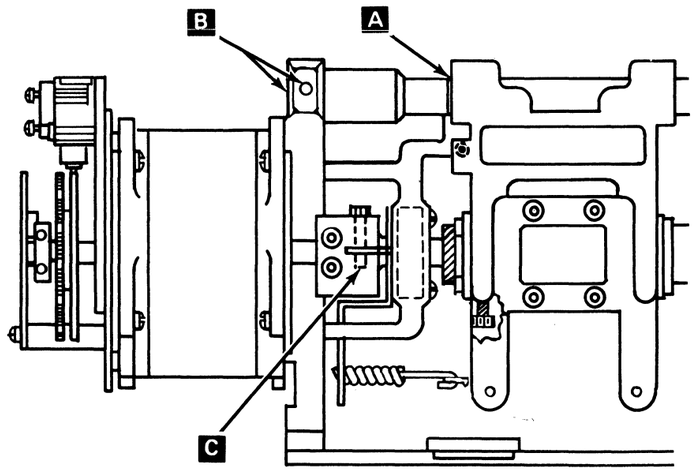
If the carrier is off the scribed line **A** one print position (0.100 in.) (2.54 mm), adjust the left margin switch. If the carrier is off the scribed line less than one print position (0.100 in.), make the following adjustment.

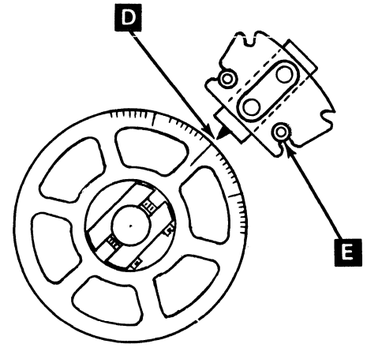
Adjustment

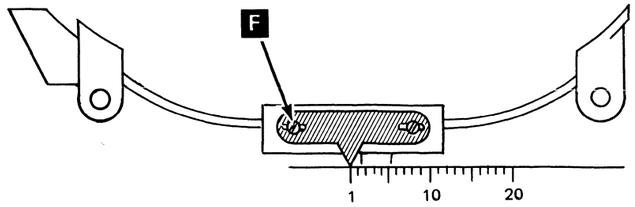
1. Place machine in offline status.
2. Loosen the setscrew and position the left end of the carrier support shaft flush with the side casting **B** . Tighten the setscrew (may be on right side of carrier support shaft).
3. Loosen the 2 coupling screws **C** to disconnect the leadscrew from the stepper motor.
4. Turn power *off,* then *on,* to perform a POR. The stepper motor will start. Move the head manually to the right margin. The stepper motor will reverse. Now move the head back to the left margin. The stepper motor will stop in the detented position ($\overline{A}$ $\overline{B}$) if the margin switch works correctly.
5. Turn the leadscrew until the left edge of the print carrier aligns with the milled ring **A** on the carrier support shaft. Ensure that the coupling flange is against the bearing and tighten the coupling screws.
6. Loosen the two print-position pointer screws **F** and move the pointer left or right to indicate print position, and tighten the screws.

Note: The following adjustment is made after the 3284/86 Model 1 or 2 printer is running and up to its proper speed.

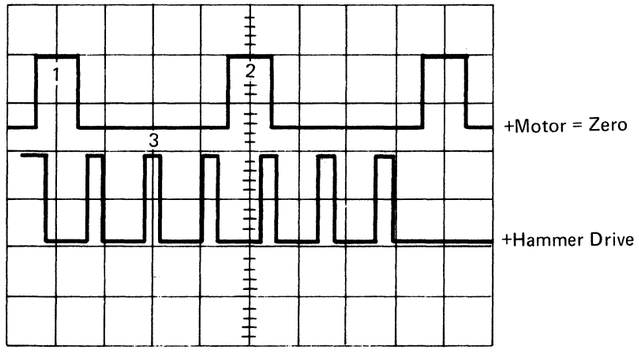
7. Jumper pin A1G2B06 to A1G2D08 (–Slow down switch).
8. Connect pin A1J3B02 to the "External Trigger Output" plug of the scope.
9. Sync the scope on a negative-going signal.
10. Look at the "+Motor is Equal to Zero" signal at pin A1G3D05 with scope channel number 1.
11. Look at the "+Hammer Drive" pulses at pin A1J5B07 with scope channel number 2.
12. Loosen the two mounting screws on the Print Right Transducer and adjust the eccentric so that the third "Hammer Drive" pulse is centered between the first two "Motor Equal to Zero" pulses **G** .
13. Replace the emitter cover (2 screws).
14. Check margin switch adjustment (6.5.4).





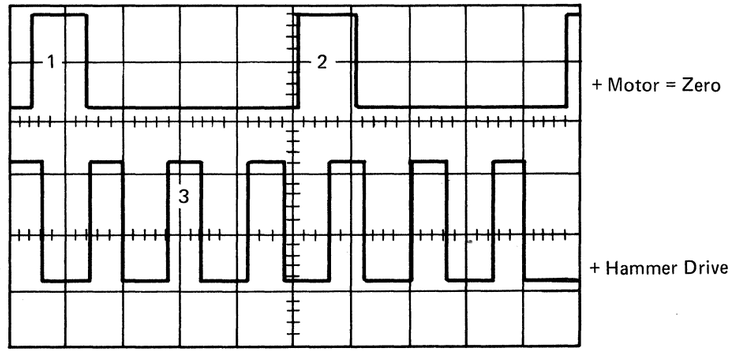


G 3284



Time/Division: 2.0 ms
Volts/Division: 2V
Mode Channel: Alternate
Sync: External Trigger
Negative Slope

G 3286



Time/Division: 1.0 ms
Volts/Division: 2V
Mode Channel: Alternate
Sync: External Trigger, Negative Slope

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