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4234 Printer Maintenance Information Manual

SC31-3014-1

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| This major revision obsoletes SC31-3014-0 and TNL SN31-7689.
| Changes to the text and illustrations are indicated by a vertical line to
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Preface

This manual provides maintenance information for the service representative for use in repairing and maintaining the IBM 4234 Printer Models 1 and 2. The user should have completed an education course for the 4234 Printer.

Information in this manual includes:

1. How to remove, replace, and adjust the field replaceable units (FRUs) of the 4234 Printer
2. How to run the diagnostic tests
3. How the printer operates
4. Where the various parts of the printer are located.

This manual is to be used with the *IBM 4234 Maintenance Analysis Procedures*, SC31-3013. You should begin problem analysis in the *Maintenance Analysis Procedures* (MAPs) and use the *Maintenance Information Manual* (MIM) for supporting information when necessary. The MAPs will guide you to the first page of the appropriate section in this manual for removal and replacement procedures, service checks, and adjustment procedures.

You can find information in this manual by using the table of contents, the figures list, or by consulting the index.

How to Use This Manual

This manual is to be used with the MAPs. You should begin problem analysis in the Start pages of the MAPs. The MAPs determine the problem area and then send you to the first page of the appropriate section in this manual for removal and replacement procedures, as well as for service checks and adjustment procedures.

For instance, the MAPs might tell you to perform the Forms Feeding Service Check (MI 300). You would then turn to the first page of Section 300 and find that the procedure number, the procedure title (Forms Feeding Service Check), and the page number are given here. Keep this MIM in the binder next to the MAPs for future service information.

Maintenance Procedures

This manual describes the removal and replacement of FRUs, service checks, and adjustment procedures. However, not all FRUs have service checks and adjustments associated with them. The recommended actions for the procedures in this manual are:

- Service check (if provided)
- Adjustment (if provided)
- Removal/Replacement (sometimes followed by the adjustment again).

While doing the procedures, you may be referred to another section in the manual for information that is needed. After following the instructions in that section, you should then return to the original procedure and continue with the next instruction.

Testing Procedures

After you service the 4234, it is important to test the printer functions. The MAPs will direct you to the proper diagnostics according to the failure type. Section 700 describes all of the diagnostic tests available. The Test key tests (see "Test Key Tests" on page 700-4) provide the minimum amount of testing.

Related Publications

See the following publications if additional information is required:

- *IBM 4234 Printer Principles of Operation,* GC31-2553

  This book explains the operating characteristics of the 4234 Printer Models 1 and 2. It has operating information summarized as well as in-depth information about how the printer functions. Operator training information is found in this book.

- *IBM 4234 Printer Model 1 Operating Instructions, Volumes 1 and 2,* GC31-2556

- *IBM 4234 Printer Model 2 Operating Instructions, Volumes 1 and 2,* GC31-2557

  The operating instructions for each model printer has two parts that are contained in separate booklets. *Volume 1* describes the different operating states of the printer, explains how to set the Option Select switches, and explains how to change the ribbon, the dot band, and the forms. This booklet is attached to the printer top cover. *Volume 2* contains information about the lights, switches, and keys on the operator panel. Status codes and operator recovery actions are explained. *Volume 2* is attached to the operator panel.

- *IBM 4234 Printer Product and Programming Description,* GC31-2554

  This reference manual has planning information for the owner of the printer and contains a guide to the other related publications. It also contains all of the programming information for the 4234 Printer Models 1 and 2.

- *IBM 4234 Maintenance Analysis Procedures,* SC31-3013

  The service representative uses this manual to diagnose printer failures.

- *IBM 4234 Printer Parts Catalog,* SC31-3015.

  The service representative uses this information for ordering parts.

This product meets IBM safety standards.

The following information has been included in this publication for the use and safety of IBM personnel. For more information, see *Electrical Safety for IBM Service Representatives,* S229-8124, and *Safety/Health Guidelines for IBM Service Representatives,* S241-5493.

You are responsible for maintaining a safe working environment at all times. This section describes the rules that you should follow when working with electrical and mechanical equipment, how to administer first aid if an electrical accident occurs, and how to report an accident. You must use discretion and your own good judgment as to when and how to apply these procedures.

General Safety During Work

Use these rules to ensure general safety:

- Observe good housekeeping in the area of the machines during maintenance and after completing it.
- Use only field-supplied items (such as adhesives, cleaning fluids, lubricants, paints, and solvents) that have been approved by IBM, that is, are supplied under an IBM part number.
- When lifting any heavy object:
  1. Ensure that you can stand safely without slipping.
  2. Balance the weight of the object between your two feet.
  3. Use a slow lifting force. Never move suddenly or twist when you attempt to lift.
  4. Lift by standing or by pushing up with your leg muscles; this action removes the strain from the muscles in your back. Do not attempt to lift any objects that you think are too heavy for you.
- Do not perform any action that causes hazards to the customer or that makes the equipment unsafe.
- Put removed covers and other parts in a safe place, away from all personnel, while you are servicing the machine.
- Always keep your tool case away from walk areas so that other persons will not trip over it; for example, put it under a desk or table.
- Do not wear loose clothing that can be trapped in the moving parts of a machine. Ensure that your sleeves are fastened or are rolled up above the elbows. If your hair is long, fasten it.
- Do not wear jewelry, chains, metal-frame eyeglasses, or metal fasteners for your clothing.

  Remember: A metal object lets more current flow if you touch a live conductor.
- Insert the ends of your necktie or scarf inside other clothing or fasten the necktie or scarf with a clip, preferably nonconductive, approximately 8 centimeters (3 inches) from the ends.
- Wear safety glasses when you are:
  - Using a hammer to drive pins or similar parts
  - Drilling with a power hand-drill
  - Using spring hooks or attaching springs
  - Soldering parts
  - Cutting wire or removing steel bands
  - Cleaning parts with solvents, chemicals, or cleaning fluids
  - Working in any other conditions that might be hazardous to your eyes.
- Before you start the machine, ensure that other service representatives and the customer's personnel are not in a hazardous position.
- After maintenance, reinstall all safety devices such as, guards, labels, and ground wires. Exchange any safety device that is worn or defective for a new one.

Remember: Safety devices protect personnel from hazards. You destroy the purpose of the devices if you do not reinstall them before completing your service call.

- Reinstall all covers correctly before returning the machine to the customer.

Safety with Electricity

Observe these additional rules when working on equipment powered by electricity:

- Find the room emergency power-off (EPO) switch or disconnecting switch. If an electrical accident occurs, you can then operate the switch quickly.

- Do not work alone under hazardous conditions or near equipment that has hazardous voltages. Always inform your manager of any possible problem or if you must work alone.

- Disconnect all power:

  - Before removing or installing main units

  - Before working near power supplies

  - Before doing a mechanical inspection of power supplies

  - Before installing changes in machine circuits.

- Before you start to work on a machine, unplug the machine's power cable. If you cannot unplug the cable easily, ask the customer to switch off the wall box switch that supplies power to the machine, and either:

  - Lock the wall box switch in the off position, or

  - Attach a DO NOT OPERATE tag, Z229-0237, to the wall box switch.

    Note: A non-IBM attachment to an IBM machine can be powered from another source and controlled by a different disconnecting switch or circuit breaker. If you determine that this condition is present, ensure that you remove (eliminate) this hazard before you start work.

- If you need to work on a machine that has exposed electrical circuits, observe the following precautions:

  - Ensure that another person who is familiar with the power-off controls is near you.

    Remember: Another person must be there to switch off the power, if necessary.

  - CAUTION
    Some IBM hand tools have handles covered with a soft material that does not insulate you when working with live electrical circuits.

    Use only those tools and testers that are suitable for the job you are doing.

  - Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back.

    Remember: There must be a complete circuit to cause electrical shock. By observing this rule, you may prevent a current from passing through the vital parts of your body.

  - When using testers, set the controls correctly and use the IBM-approved probe leads and accessories intended for that tester.

  - CAUTION
    Many customers have rubber floor mats that contain small conductive fibers near their equipment to decrease electrostatic discharges. Do not use this type of mat to protect yourself from electric shock.

    Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.

- Observe special safety precautions when you work with very high voltages; these precautions can be found in IBM safety service memorandums (SMs) and the safety sections of maintenance information manuals. Use extreme care when measuring high voltages.

- Do not use tools or testers that have not been approved by IBM. Ensure that electrical hand tools, such as power drills and wire wrapping tools, are inspected regularly.
- Do not use worn or broken tools and testers.
- Never assume that power has been disconnected from a circuit. First, check that it has been switched off.
- Always look carefully for possible hazards in your work area. Examples of hazards are: moist floors, nongrounded power extension cables, power surges, and missing safety grounds.
- Do not touch live electrical circuits with the glass surface of a plastic dental mirror. The surface is conductive; such touching can cause personal injury and machine damage.
- Unless the maintenance information specifically instructs you to, do not service the following parts with power on them when they are removed from their normal operating places in the machine:

  Power supply units
  Pumps
  Blowers and fans
  Motor generators

  and similar units. (This rule ensures correct grounding of the units.)
- If an electrical accident occurs:
  - **Use caution; do not become a victim yourself.**
  - **Switch off power.**
  - **Send another person to get medical aid.**
  - **If the victim is not breathing, decide whether to give rescue breathing.**

  These actions are described below.

Emergency First Aid

When giving rescue breathing after an electrical accident:

- ***Use Caution.*** If the victim is still in contact with the electrical-current source, **remove the power.** To do this, you may need to use the room emergency power-off (EPO) switch or disconnecting switch.

  If you cannot find the switch, use a dry wooden rod or some other nonconductive object to move the victim away from contact with the electrical-current source.
- ***Work Quickly.*** If the victim is unconscious, he or she possibly needs rescue breathing. If the heart has stopped beating, the victim may also need external cardiac compression.

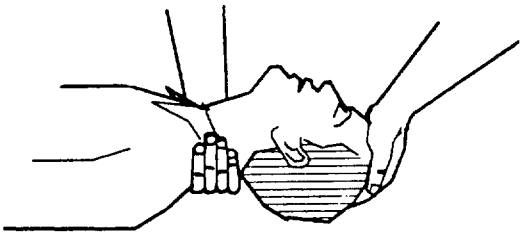
  Only a trained and certified person should perform external cardiac compressions. This training can be obtained from a locally authorized organization, such as the Red Cross.
- ***Get Medical Aid.*** Call a rescue group, an ambulance, or a hospital immediately.

Rescue Breathing Procedures

Determine if the victim needs rescue breathing:

1. Prepare the victim:
   a. Ensure that the victim's airway is open and not obstructed. Look in the victim's mouth for objects (such as chewing gum, food, dentures, or the tongue) that can obstruct the flow of air.
   b. Place the victim on his or her back, then put one hand under the victim's neck and the other hand on the victim's forehead.

c. Lift the neck with one hand and press the forehead backward with the other hand. See 1.



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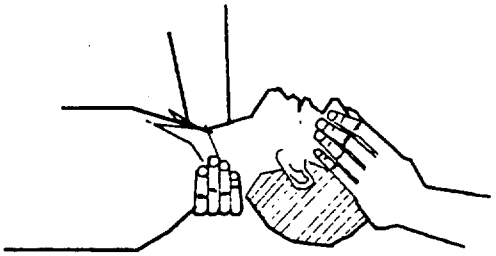
2. Look, listen, and feel to determine if the victim is breathing freely:

   a. Put your cheek near the victim's mouth and nose.

   b. Listen and feel for the breathing-out of air. At the same time, look at the victim's chest and upper abdomen to see if they move up and down.

If the victim is not breathing correctly and you decide that you want to give rescue breathing:

3. Continue to press on the victim's forehead with your hand and pinch together the victim's nostrils with your thumb and finger. See 2.



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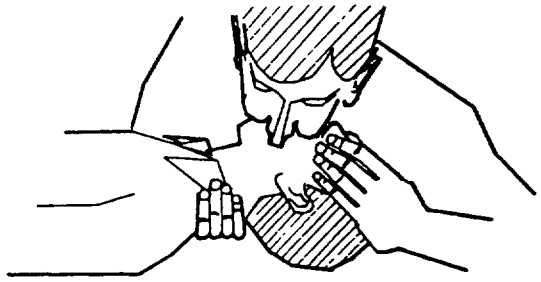
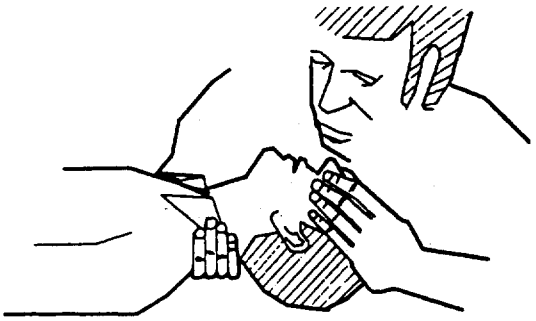
4. CAUTION
   Use extreme care when giving rescue breathing to a victim who possibly has breathed in toxic fumes. Do not breathe in air that the victim has breathed out.

   Open your mouth wide and take a deep breath. Make a tight seal with your mouth around the victim's mouth and blow into it. See 3. A rescue-breathing, face covering (mask) or similar unit can be used if you have been taught how to use it.



3

5. Remove your mouth and let the victim breathe out while you check to see that the victim's chest moves down. See 4.



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6. Repeat steps 4 and 5 once every 5 seconds until the victim breathes normally again or until medical aid comes.

Reporting Accidents

Report to your manager or to your IBM site all accidents, possible hazards, and accidents that nearly occurred.

Remember: An accident that nearly occurred can be caused by a design problem. Quick reporting ensures quick solving of the problem.

Also report each small electric shock, because the conditions that caused it need to differ only slightly to cause serious injury.

Handling Parts That Are Sensitive to Electrostatic Discharge

Electrostatic discharge (ESD) can damage certain cards and logic boards when you handle them. If current from such a discharge passes through these parts, damage can range from immediate failure to degraded performance (the parts wear out prematurely). Use the following to reduce the exposure to damage from ESD:

- Field ESD kit
- Wrist bands
- Protective card caddies.

Field ESD Kit

Generally, you should consider all logic cards and boards to be ESD sensitive, and when you handle them, you must use the Field ESD Kit (part number 6428316). This kit contains the following:

Part No.	Description
6428166	ESD cord
6428274	ESD mat, safe work surface
6428275	Conductive black plastic box
6428317	Label containing instructions (inside lid of box)
6428318	Label, outside identification

Before you use the tools, read the instructions that are supplied with the kit. The instructions contain SAFETY practices that you must follow and some general practices that will help you to use the kit correctly.

Wrist Bands

In addition to the kit, you need a wrist band for personal grounding. The following two sizes are available and must be ordered separately:

Part No.	Description
6428167	Wrist band, small (beige)
6428169	Wrist band, large (blue)

The small wrist band is for a wrist circumference that is less than 165 mm (6.5 inches). The large band is for a wrist circumference that is 165 mm (6.5 inches) or more.

All other wrist bands are obsoleted by the new wrist bands. A number of the obsoleted wrist bands were shipped with some machines. These bands are no longer approved for use and you should discard them.

Card Caddies

The following two new ESD protective card caddies have been released:

Part No.	Description
6428141	Conductive, soft-sided caddy (Full size = 36 4W x 3H cards)
6317023	Conductive, soft-sided caddy (Half size = 18 4W x 3H cards)

Both caddies have a snap fastener for attaching the ESD cord (part of the ESD kit). This permits the caddy to serve as a large ESD safe work surface.

Both caddies also have a carrying strap that is long enough to permit you to carry the caddy over your shoulder.

The new soft caddies are intended for logic cards, but sometimes can include small mechanical parts if the caddy is stocked to support a particular product. Do not carry large heavy parts in the new soft caddies. Use the old style caddies to carry mechanical parts and other items.

Safety Notices

There are three types of safety notices. They are printed here to show you what they look like and explain the purpose of each.

Danger Notices

DANGER
This type notice advises you of a condition that could present a potential hazard where loss of life or serious personal injury is possible unless care is used.

Caution notices

CAUTION
This type notice advises of a condition that could present a potential hazard where personal injury (other than life threatening) is possible unless care is used.

Warning notices

Warning: This type notice advises of a potential condition that could cause machine or program damage unless care is used.

Danger Notices

The following danger notices are in this book:

On page 000-7:
DANGER
With the covers removed from the printer, there is exposure to 120 or 220 volts ac. Set the printer power switch to the Off (O) position, and remove the power cord from the power source during all procedures except for the few procedures for which the power must be on.

On page 300-3:
DANGER
The dot band can run with the safety cover removed during tests initiated by the service representative. Keep hands away from band area when power is on and the band is exposed.

On page 700-17:
DANGER
These tests allow the band motor to run with the band cover removed. Keep hands away from band area while running these tests.

Safety Inspection Procedure for the 4234

The following safety inspection should be performed on any 4234 Printer that is being considered for an IBM maintenance agreement when there is any reason to question its safety. If the inspection indicates the level of safety is unacceptable, it must be brought up to an acceptable level before IBM service can be provided.

Getting Ready

Before doing the inspection procedures, ensure that the present conditions are safe, the printer is powered off and all electrical power is removed at the line cord.

Safety Conditions

If present conditions are not safe, you must determine if the condition is serious.

For example, the following conditions are not safe;

- Electrical: A frame that is not at ground potential in the primary power area.
- Mechanical: Missing band cover (see Figure 800-2 on page 800-3) and missing forms drive safety cover (see Figure 800-3 on page 800-4)
- Explosive: Defective band motor capacitor (see Figure 300-8 on page 300-11) and blower motor capacitor (see Figure 600-6 on page 600-10) that are expanded

You must correct any problem found in these areas before you continue with this inspection.

Safety Education

Before doing the inspection procedures, you must have completed the Electrical Safety Training Course for IBM service representatives.

Performing the Inspection

IBM machines are designed and assembled with safety items installed to protect owners, operators, and service personnel from injury. This inspection identifies areas of the machine that may not be safe. Use good judgement to identify other safety conditions not covered by this guide.

__ 1. Check the line cord for visible cracks, wear or damage.

__ 2. Ensure that the line cord has the correct power plug.

__ 3. Check for 0.1 ohm (or less) of resistance between the line cord ground and the ground pin on the power plug.

__ 4. Ensure that all the safety ground screws and wires are connected as shown in the safety ground schematic (see Figure 800-14 on page 800-15).

__ 5. Ensure that the safety cover is installed on the solid state state relay (see Figure 600-3 on page 600-5).

__ 6. Check the inside of the printer for foreign materials.

__ 7. Check all printer covers for loose or broken hinges and sharp edges.

__ 8. Ensure that the power supply rivets have not been tampered with.

__ 9. Plug in the line cord and turn the power switch to the On position and verify that the printer powers on.

__ 10. With the power switch in the On position, verify that the printer powers off when the switch is put in the Off position.

__ 11. With the power switch in the Off position, verify that the printer does not power on.

__ 12. Return the printer to the customer and inform the local branch office of the inspection results.

ABBREVIATIONS

AC	alternating current
APL	a programming language
BAT	basic assurance test
CA	communication adapter
COAX	coaxial cable
COMP	compensation
CU	control unit
COVR	cover
CPI	characters per inch
CPS	characters per second
CRC	cyclic redundancy check
CU	control unit
CEM	customer engineering memorandum
DP	data processing
EC	engineering change
EBCDIC	extended binary coded decimal interchange code
EMC	electromagnetic compatibility
EOF	end of forms
EPO	emergency power off
EPROM	erasable programmable read only memory
ESD	electrostatic discharge
FRU	field replaceable unit
GLP	general logic probe
GND	ground
ID	identification
IO	input/output
IOCR	input/output common register
ILP	integrated logic probe
LED	light emitting diode
LPI	lines per inch
LPM	lines per minute
MAP	maintenance analysis procedure
MCPC	Machine Check/Program Check
MI	maintenance information
MMIO	memory mapped input output
MPU	microprogram unit
NLQ	near letter quality
NPN	negative-positive-negative (transistor term for lower drive signal to the hammer coils)
PA1	program attention 1
PA2	program attention 2
PA KEY	Either PA1 or PA2 keys on the Operator Panel
PCIA	printer control information area
PLAT	platen
PMA	print mechanism adapter
P/N	part number
PNP	positive-negative-positive (transistor term for the upper drive signal to the hammer coils)
POR	power on reset
POS	position
RAM	random access memory
ROS	read only memory
SENS	emitter sensor
SC	status code
SD	status display
SW	switch
SYNC	synchronization
VSP	variable speed print
WT	World Trade

Contents

Figures

000. General Information

000 - Section Contents

Printer Description

The 4234 Printer (see Figure 1-1) is a line printer that uses a dot band technology. It is an "all-points-addressable" printer, meaning it can print in every matrix space available. The print pattern shown in Figure 1-2 on page 000-3 is an example of a dot pattern printed during testing. It can print characters of different fonts and quality by using different print densities. The printer uses a dot matrix character in a 7 dot-wide format. The dot band is a customer-replaceable steel band containing dot elements on chevrons. Forms are fed by a combination of reversible pin-feed tractors and drive rolls. Self-Contained internal diagnostics assist the customer in problem determination.

The Model 1 Printer can be attached by coaxial cable to devices such as follows:

- 327X Control Units
- System/370
- 43XX Systems.
- 3694

The Model 2 Printer can be attached by twinaxial cable to such devices as follows:

- 5294 Controller
- System/36.

The 4234 Models 1 and 2 have different keys, lights, and controls on the operator panel. Also, the communication circuits for the Models 1 and 2 are different. The Model 1 communication adapter circuits are part of the system card. A communications adapter card in the Model 2 Printer receives the data from the host and then sends the information to the system card.

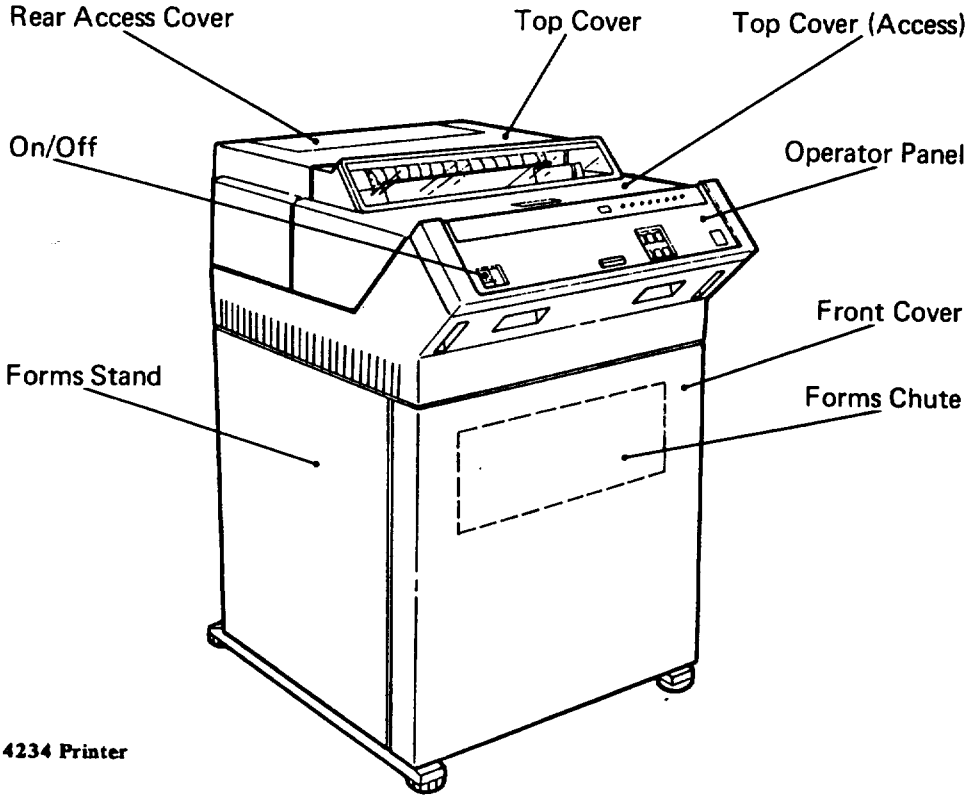


Figure 1-1. 4234 Printer

Configurations

Both models can serve as a printer for computer systems or display systems. Display system printers can be attached directly (locally) or attached through telecommunications (remotely) to the computer system.

Dot Band

The dot band is a continuous steel band that contains 120 flexible chevrons, with a single dot on each chevron (see Figure 1-2). Three types of bands are available to the customer. The medium dot-size band is shipped with the printer. The small and large dot-size band are optional. Each size dot band has a different colored stripe on the top edge for identification. The customer is responsible for periodic cleaning of the dot band and also for replacing it.

The 4234 prints by selecting dots from a single horizontal row of dots mounted on a revolving steel dot band. When a hammer "fires," a dot on a chevron is forced against the ribbon and a spot of ink is placed on the forms. The printer forms characters by selectively printing dots as the band moves across the form, and then moving the forms after each horizontal row of dots is printed. The number of dots per character depends on:

- The print quality selected
- The number of characters per inch (CPI) selected
- The number of lines per inch (LPI) selected
- The line width selected.

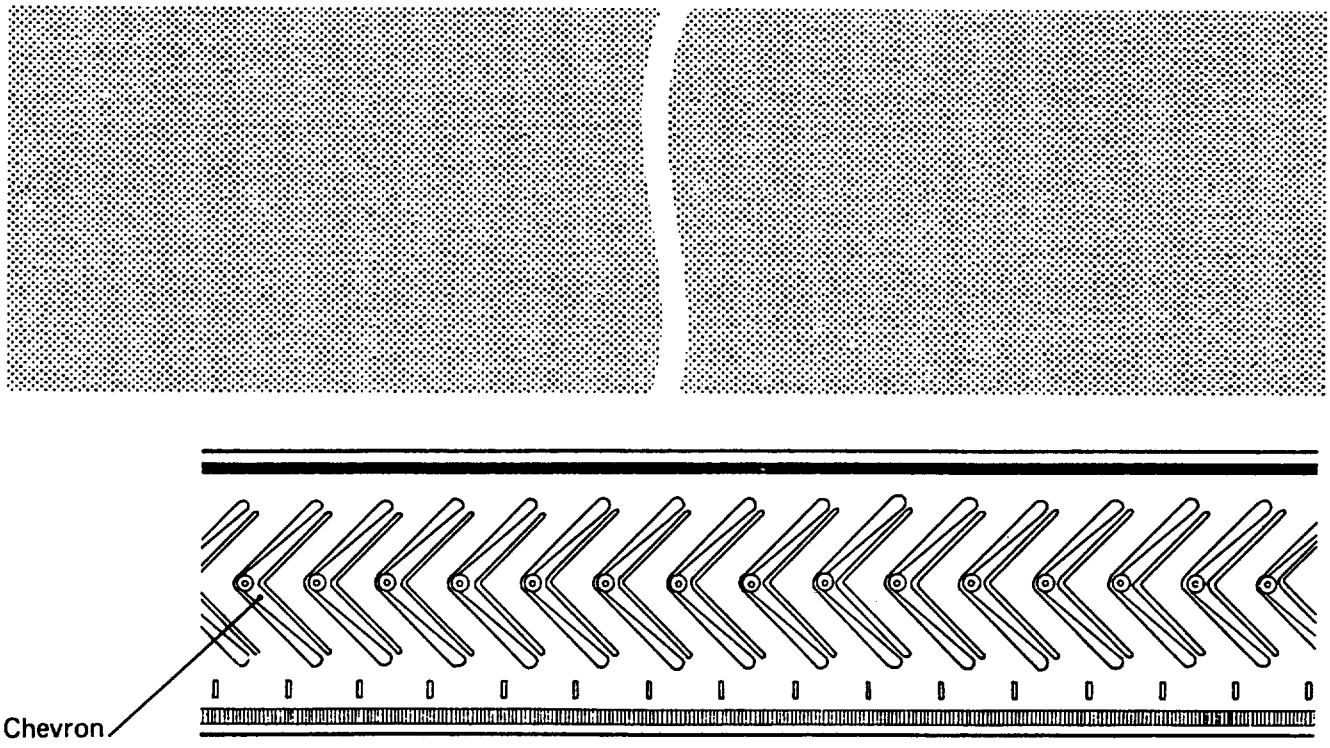


Figure 1-2. Dot Printout and Dot Chevrons

Print Modes

The 4234 has three levels of print quality available:

- Draft Mode - 5 high by 4 of 7 wide dot matrix
- Data Processing Mode (DP) - 8 high by 4 of 7 wide dot matrix
- Near-Letter-Quality Mode (NLQ) - 9 high by 7 at 6 LPI or 11 high by 7 at 8 LPI.

See the table below for printing speeds and dot size information. Each print selection changes the density of the printed character and the speed of the printer. Printing speed is reduced if higher density characters are used. The 4234 has 132 print positions at 10 CPI or 198 print positions at 15 CPI. It has vertical spacing options of 3, 4, 6, or 8 LPI, with single- or double-spacing between the lines. It has horizontal spacing options of 10 and 15 CPI.

The following chart is a recommended dot band to print type combination, however, the customer may choose combinations other than those recommended below:

Print Type	*Approximate Print Speed	IBM Part Number	Dot Size	Color Stripe
Near Letter Quality	120 LPM	6275527	0.30 mm (0.012 in.)	Red
Data Processing	300 LPM	6275528	0.41mm (0.016 in.)	Black
Draft	410 LPM	6275529	0.51mm (0.020 in.)	Green

Figure 1-3. Print

* The approximate speeds are based on 10 CPI and 6 LPI. Additional information about the factors that affect the print speed is in the *IBM 4234 Printer Principles of Operations.*

Forms

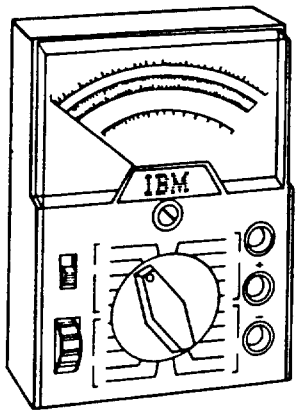
The IBM 4234 Printer uses variable width forms from 88.9 mm to 406.4 mm (3.5 in. to 16 in.) and can feed up to 6-part forms. Print quality for the fifth and sixth forms is left to the user's judgement. Additional information about forms specifications is in the *IBM 4234 Printer Product and Programming Description.*

To automatically load continuous forms into the printer, move the forms thickness lever fully to the rear, place the forms feed assembly in the autoload position (tractor assembly released and pushed to the rear), and insert the form into the forms chute (see Figure 1-1 on page 000-2). When the form is inserted into the guide, feed rolls grasp and feed the top of the form into view above the print mechanism. The forms may then be set into the tractors.

Tools and Test Equipment

Analog CSR Meter (P/N 1749231)

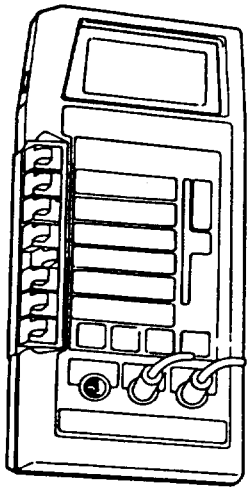
The analog CSR meter is used for measuring the ac and dc voltage and for performing continuity checks.



| Digital CSR Meter (P/N 1762916)

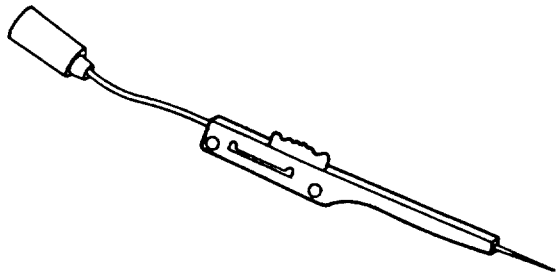
The digital CSR meter is used for measuring the ac and dc voltage and for performing continuity checks.

| Order meter leads (P/N 1762920 = red and P/N
| 1762921 = black) for use with this meter.



Miniprobe (P/N 453718)

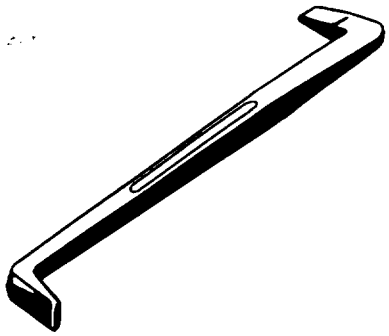
The miniprobe attaches to the test leads of the CSR meter and is used to probe connectors.



Metric Tool Supplement (P/N 1749235)

The metric tool supplement (not shown) contains the tools needed to repair metric machines.

| Offset Screwdriver (P/N 489136)



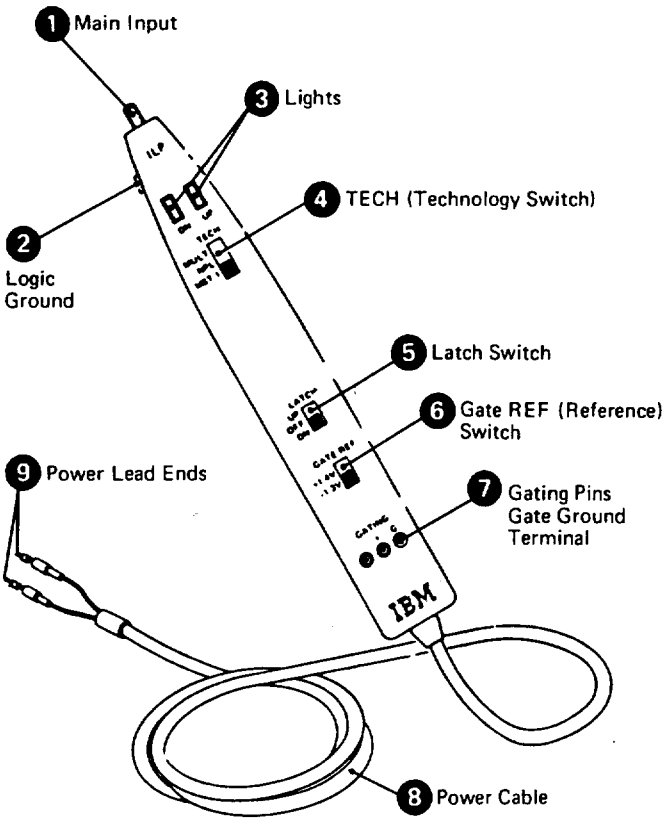
Integrated Logic Probe (P/N 453222)

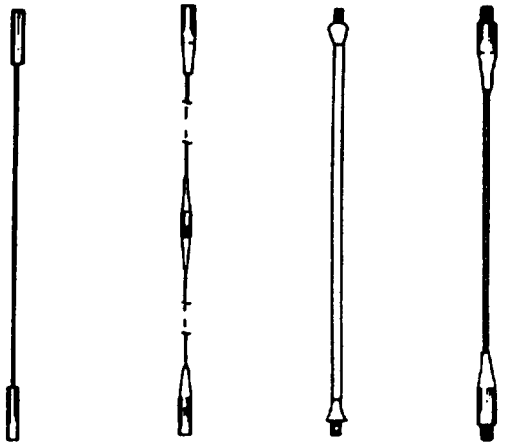
The IBM Integrated Logic Probe (IPLP), P/N 8550201, is a small hand-held device used to observe logic signals. The ILP kit (P/N 453222) includes:

- The IBM Integrated Logic Probe Unit
- Standard accessories
- *IBM Integrated Logic Probe Operator's Guide,* S226-3951.

For Integrated Logic Probe operating instructions, refer to the *IBM Integrated Logic Probe Operator's Guide,*S226-3951.

Pull-Up Resistor Adapter (P/N 2721947)*





P/N 2588263 Gate Jumper 300 mm (12-inch) (One)

P/N 8550208 Gate (10K) Resistor Jumper 300 mm (12-inch) (One)

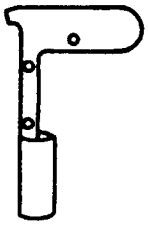
P/N 8565942 Ground Lead 300 mm (12-inch) (One)

P/N 5500900 Ground Lead 125 mm (5-inch) (One)

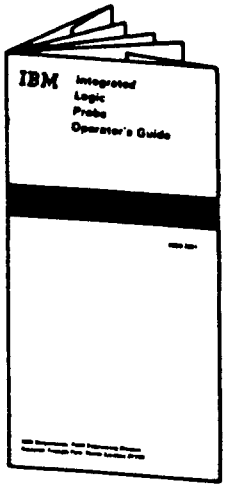
P/N 8550205 Straight Probe Tip Pin (One)

P/N 453167 SLT Probe Tip, Straight (Three)

P/N 461159 Alligator Clip (Three)



P/N 453826 SLT Probe Tip, Flag (One)



Integrated Logic Probe Operator's Guide, S226-3951 (One)

* This Resistor Adapter is not supplied with the Probe or the Accessories. It must be ordered separately.

Top Cover

DANGER

With the covers removed from the printer, there is exposure to 120 or 220 volts ac. Set the printer power switch to the Off (O) position, and remove the power cord from the power source during all procedures except for the few procedures for which the power must be on.

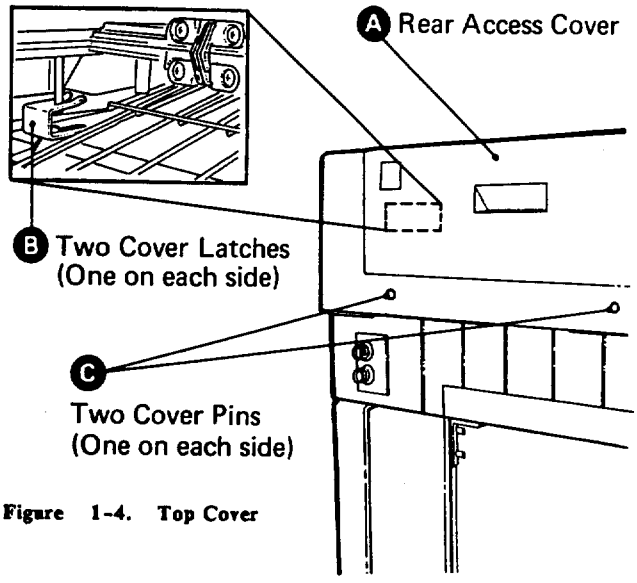
See Figure 1-4.

Removal

1. Remove the forms from the printer (refer to the *Operating Instructions, Volumn 1*, if necessary).
2. Set the printer power switch to O (Off) and disconnect the power cord from the back of the printer.
3. Disconnect the static grounding wire (D) located at the ground terminal strip that connects the upper wire paper guide to frame ground.
4. Open the rear access cover (A).
5. Press down on the top cover and pull the two cover latches (B) toward the rear of the printer until the studs on the top cover are released.
6. While slightly lifting the top cover, push (with a screwdriver) the two cover pins (C) located at the rear of the printer until the top cover is released.
7. Lift the cover from the printer.

Replacement

1. Place the cover on the printer.
2. Align the two cover pins (C) with the latches that hold them.
3. Push down on the cover until the cover pins (C) are in place.
4. Press down on the top cover and push the latches (B) forward into place.
5. Reconnect the static grounding wire (D).
6. Close the rear access cover (A) and connect the power cord.



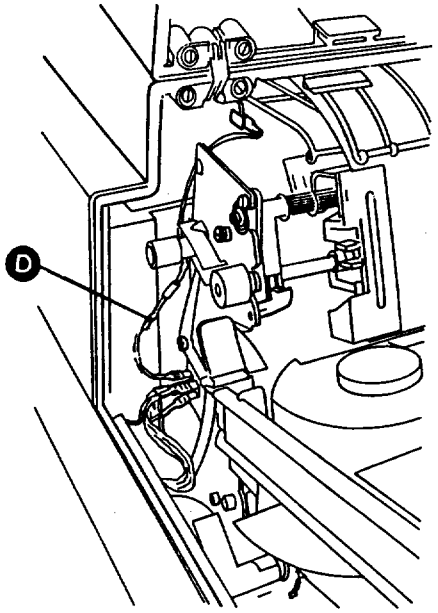


Figure 1-4. Top Cover

Power Cover

Note: The power cover has retainers that keep the power cover paper guide in place. A static eliminator is mounted on the power cover paper guide to discharge static electricity. Observe correct installation of these parts to ensure proper forms feeding operation.

See Figure 1-5.

Removal

1. Remove the forms from the printer (refer to the *Operating Instructions Volume 1*, if necessary).
2. Set the printer power switch to O (Off).
3. Remove the top cover (see "Top Cover" on page 000-7).
4. Remove the ground wire (B) at the ground terminal strip which connects the power cover paper guide to frame ground.
5. Remove four screws (A), two from each end of the cover, and lift the power cover from the printer.

Replacement

1. Lower the cover into place while inserting the front edge into the slots located in the base.

   Note: The cables to the logic gate should lie within the cut-out (C) on the power cover.

2. Tighten the cover with four screws (A).
3. Connect the static grounding wire (B).
4. Install the top cover (see "Top Cover" on page 000-7).

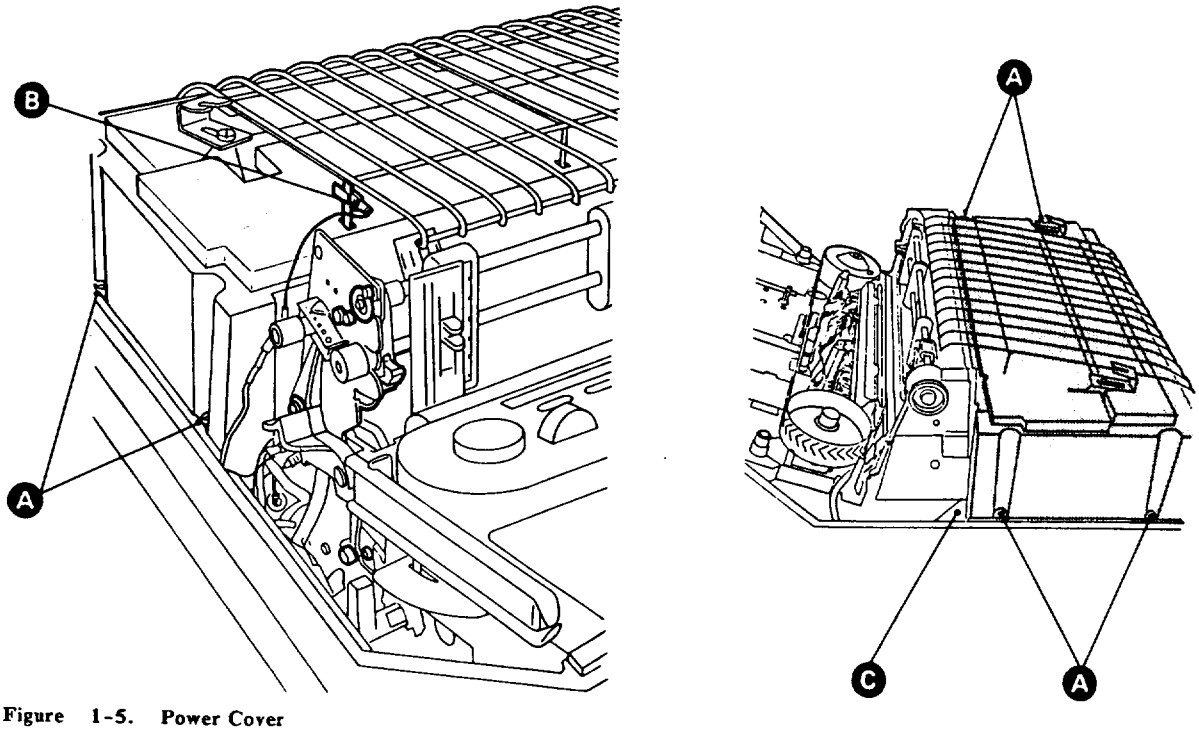


Figure 1-5. Power Cover

100. Test Log Printout

100 - Section Contents

Test Key Printout

Either you or the operator should obtain a Test Key printout after a printer failure has occurred. To obtain a Test Key printout, press and release the Test key.

You can use the Test Key printout to determine the number and type of errors that have occurred since the last power on. Refer to Figure 100-1 on page 100-3 for an example of the Test Key printout.

Description

The Test Key printout has four major parts:

The Log Printout: This is the first section of the printout. The first six lines of this printout have the most important information needed by the service representative: the error log. The other logs in this section may be used for problem determination under the guidance of the MAPs or your support structure.

The Basic Assurance Tests: This is an in-depth version of the BATs. No printing occurs.

The Pattern Printouts: These patterns are useful samples of print quality.

The Additional Log Printout: These two lines of data are printed only if an error occurred during the Test Key test and the printer is able to recover from the error and continue printing.

The first byte of information in the additional log printout is a hexadecimal **8X** where the **8** indicates valid error information has been logged, and the **X** indicates the number of bytes of information logged. The second byte is the diagnostic Status code (SC), followed by up to three more bytes that describe the error in more detail. Section 700 has a complete chart of the diagnostic error codes and additional error log bytes.

How to Interpret the Test Key Printout

1. Refer to the statistical error log (see Figure 100-1 on page 100-3), while examining the Test Key printout.
2. Scan the printout for "significant" error counts of the Status codes as shown in the sample printout in Figure 100-2 on page 100-4.
3. Refer to MAP 100 for possible causes of any significant SC errors.
4. Refer to the error sequence counters, located at 2BD0, 2BE0, and 2BF0 in the Test Key printout (see Figure 100-3 on page 100-5), to determine the most recent error.

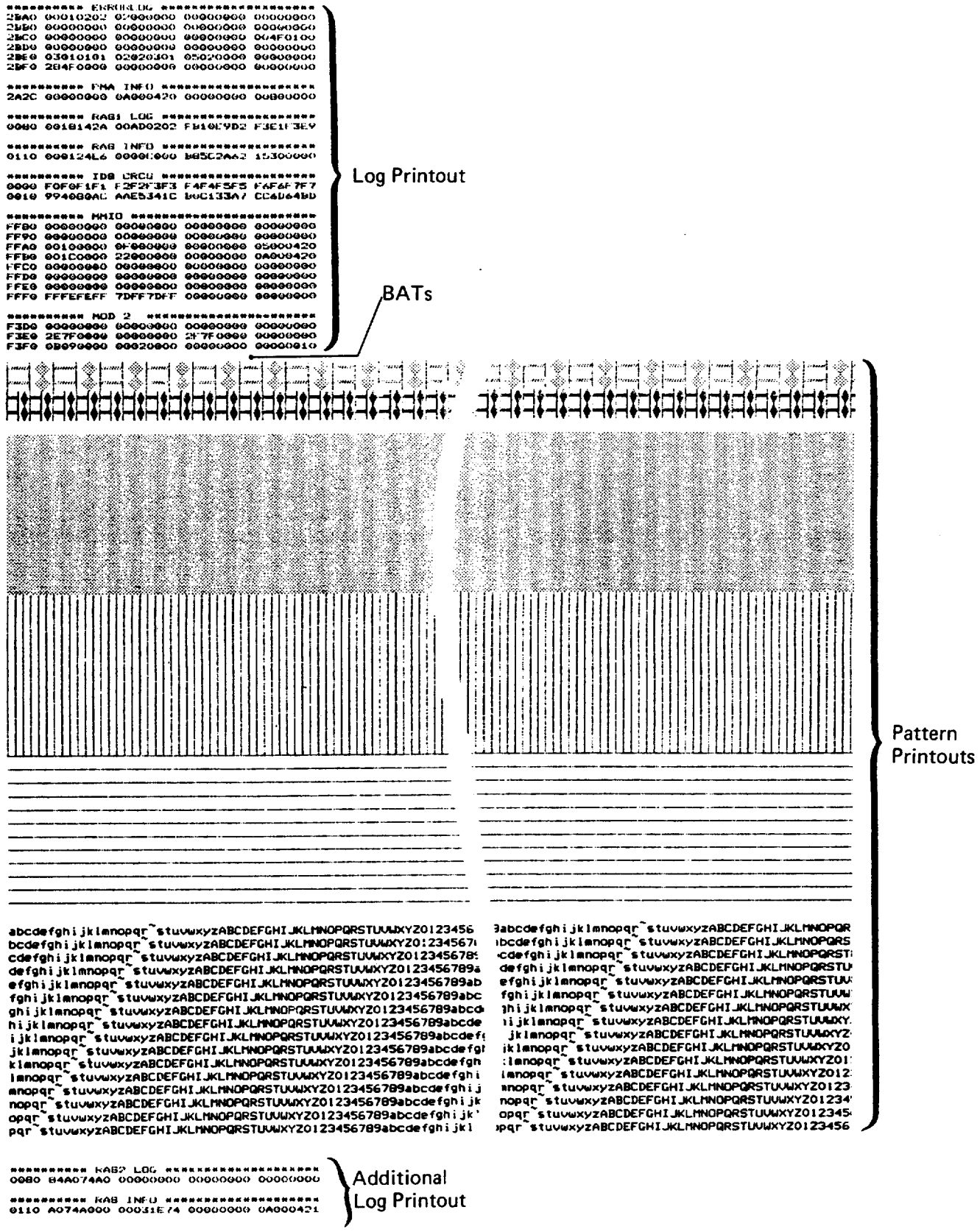


Figure 100-1. Test Key Printout

Statistical Error Log

Statistical error log data is useful as a starting point for troubleshooting customer-reported intermittent problems. Refer to Figure 100-2 and notice that certain counters log the number of times that an error occurred for a particular Status code.

The two-digit hexadecimal counters can reach a maximum count of hexadecimal FF (256 decimal). If the error count reaches FF, it stays at FF until the Test key is pressed or the printer power is turned off.

How to Interpret the Statistical Error Log

Examine any Test Key printouts available, and use Figure 100-2 below to determine the type and number of status code failures the printer has had.

- A 07 in position 2BC5 (SC=57 has occurred 7 times) indicates the printer detected seven emitter checks.
- A 04 in position 2BB0 (SC=36 has occurred 4 times) indicates the printer was unable to detect the emitter slots on the dot band four times and would be a significant error.
- 07 in position 2BA1 (SC=01 has occurred 7 times) could indicate the printer ran out of paper seven times and would probably not indicate a problem. However, the errors might be caused by a defective EOF switch (or lever). Therefore, further testing with Test 55 could help determine if there is problem.

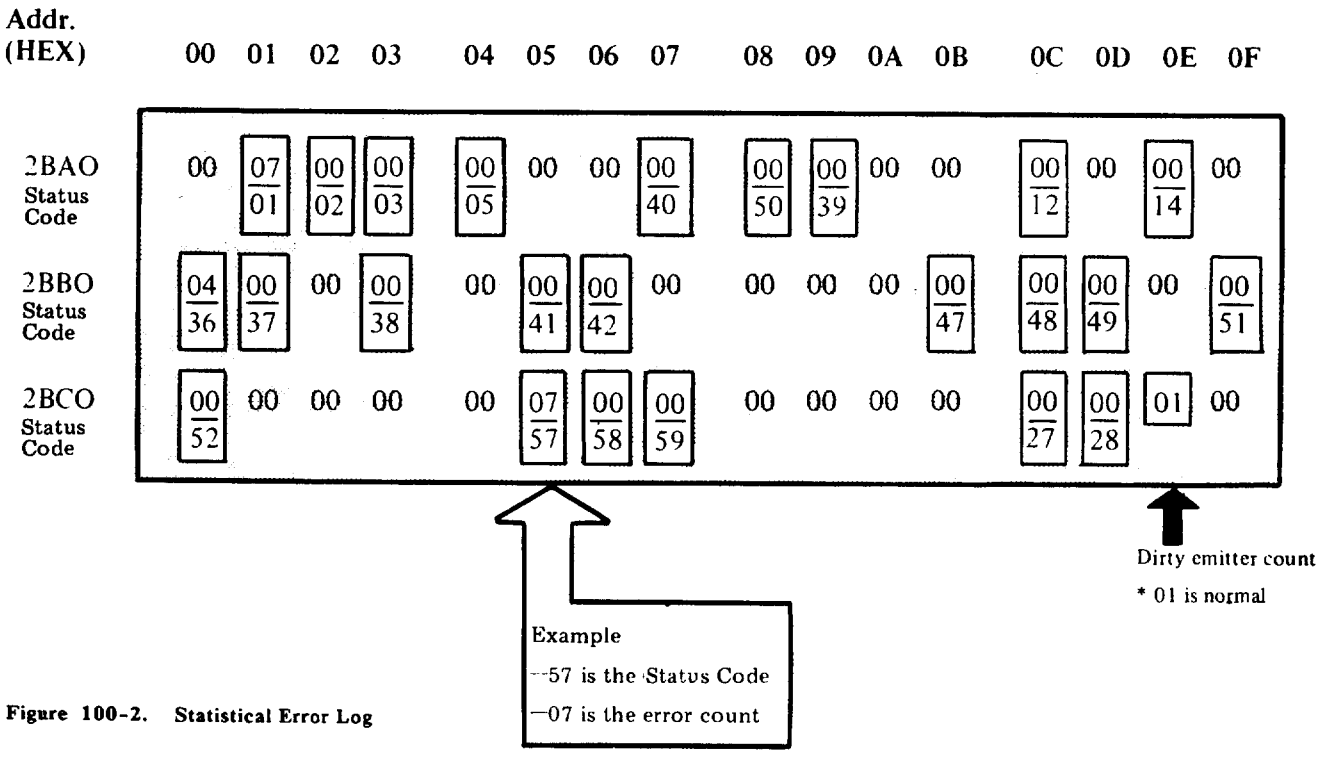


Figure 100-2. Statistical Error Log

Error Sequence Counters

Error sequence data identifies the latest machine check, printer error, or communication error. Machine check errors are shown in sequence from right to left. Printer and communication errors are shown in sequence from left to right with the most recent error in the first address position. The sequence counter holds the eight most recent errors. The first byte is the Status code and the second byte is the error count (the number of times the error occurred). Refer to Figure 100-3.

In the example below, a Status Code 28 was recorded and the error count is hex 80.

Information

See section 700 for a complete list of error codes.

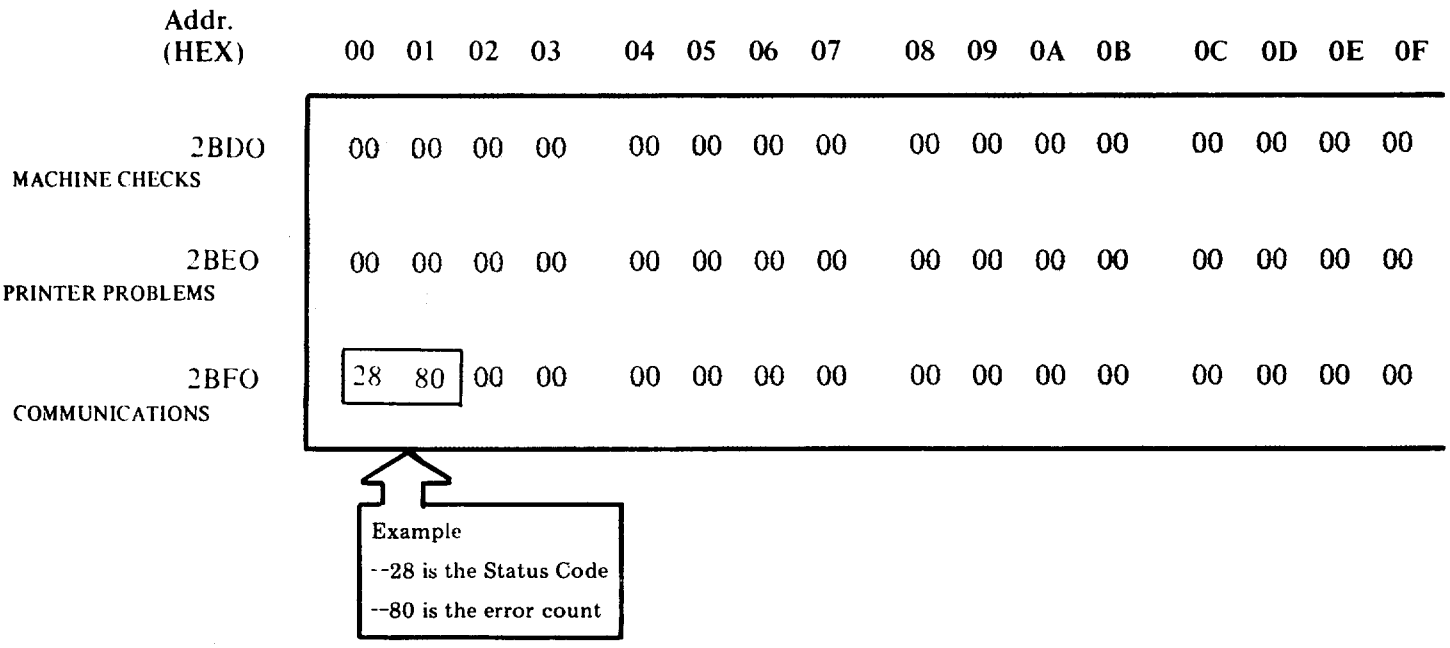


Figure 100-3. Error Sequence Counters

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300. Print Unit

300 - Section Contents

320 Dot Band

Theory of Operation

Three different size dots are available to the customer. The dot band has a color stripe at the top to show what size dot is mounted on it. See Figure 1-3 on page 000-4 for information about dot size, the related color stripe on the band, and the three types of print quality available. All dot bands are 48 inches long and have 120 dots mounted on spring chevrons along the band. The chevron returns the dot to the rest state after it has printed.

The emitter sensor generates output signals from the two sets of timing slots in the band. The sensor card receives this information and sends it to the printer logic, which uses this data to maintain synchronism with the band position. The dot band rests on three bearings located on each side of the print mechanism. These bearings establish the horizontal path of the dot band as it turns. The drive and idler wheels hold the band in place. The band motor provides drive to the drive wheel during a print operation and during certain diagnostics.

The band oiler lubricates the anvils mounted on the inside of the chevrons. The band brushes clean the band to reduce the amount of dirt on the emitter slots and to allow better application of the oil to the anvils.

The dot band is a customer-replaceable item. Handle the band carefully to prevent it from becoming damaged. The emitter slots must be on the bottom with the color stripe at the top and facing out. The chevrons closest to you point to the left when you are facing the printer. A band twisted inside-out has the emitter slots on the bottom, but the color stripe is on the inside of the band and the chevrons are pointing to the right. See Figure 300-1 for an example of dot band chevrons.

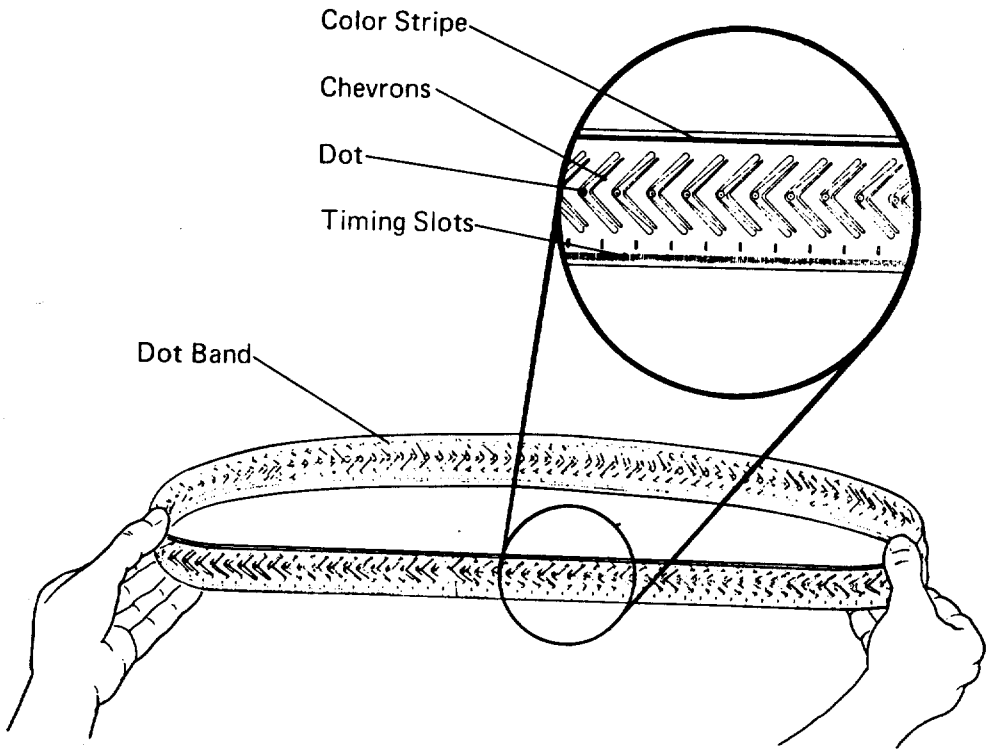


Figure 300-1. Dot Band

Dot Band Removal and Replacement

DANGER

The dot band can run with the safety cover removed during tests initiated by the service representative. Keep hands away from band area when power is on and the band is exposed.

Warning:

If you install the dot band incorrectly it will be damaged when power is restored and serious machine damage will result.

Note: For more detailed illustrations, see the *IBM 4234 Printer Operating Instructions* located inside the printer cover.

See Figure 300-2.

Removal

1. Set the printer power switch to O (Off).
2. Open the top cover.
3. Remove the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
4. Remove the dot band cover by pulling up on the curved handles of the cover.
5. Move the dot band release lever (B) toward the rear of the printer to remove tension from the dot band.
6. Carefully lift the band off the drive wheel (C), and remove it.
7. Pull the dot band away from the idler wheel (A), and lift it up over the flange.

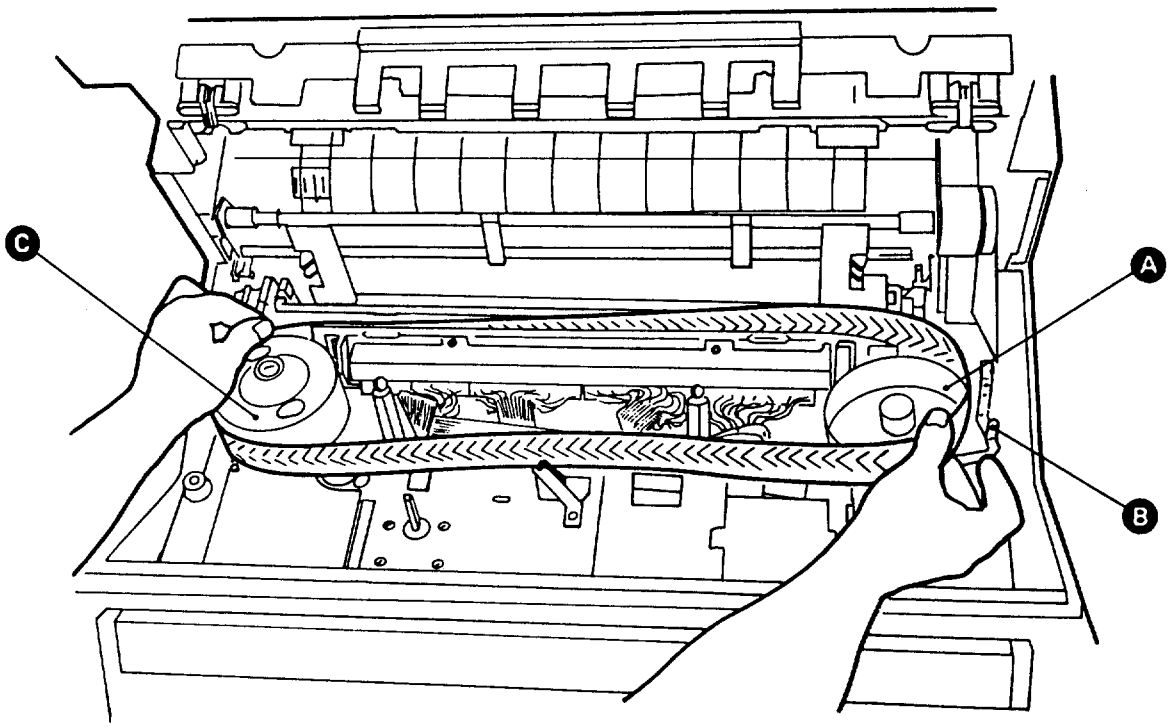


Figure 300-2. Dot Band Removal

Replacement

1. Hold the dot band with the vertical slots at the bottom, the color stripe at the top outside edge, and the chevrons nearest you pointing to the left.

   Warning: Do not install the dot band incorrectly or it will be immediately damaged when the printer power is turned on. Be sure the dot band is lined up correctly before putting it on the wheels.

2. Place the dot band around the right wheel. Be sure the top edge (stripe) of the dot band is under the flange at the top of the right wheel.

3. Guide the dot band through the sensor slot (A) by carefully rotating the band in the direction shown.

4. Carefully slip the dot band over the left wheel.

5. Be sure the band is between the band brushes (B) and in front of the oiler (D).

6. To restore tension to the dot band, move the dot band release lever (C) toward the front of the printer.

7. To ensure that the dot band is correctly seated, carefully rotate the left wheel (drive wheel) so that the band is under the flange at the top of the right (idler) wheel.

   Important

   Check to ensure that all three registration bearings turn when the band is rotating.

8. Install the dot band cover.

9. Install the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).

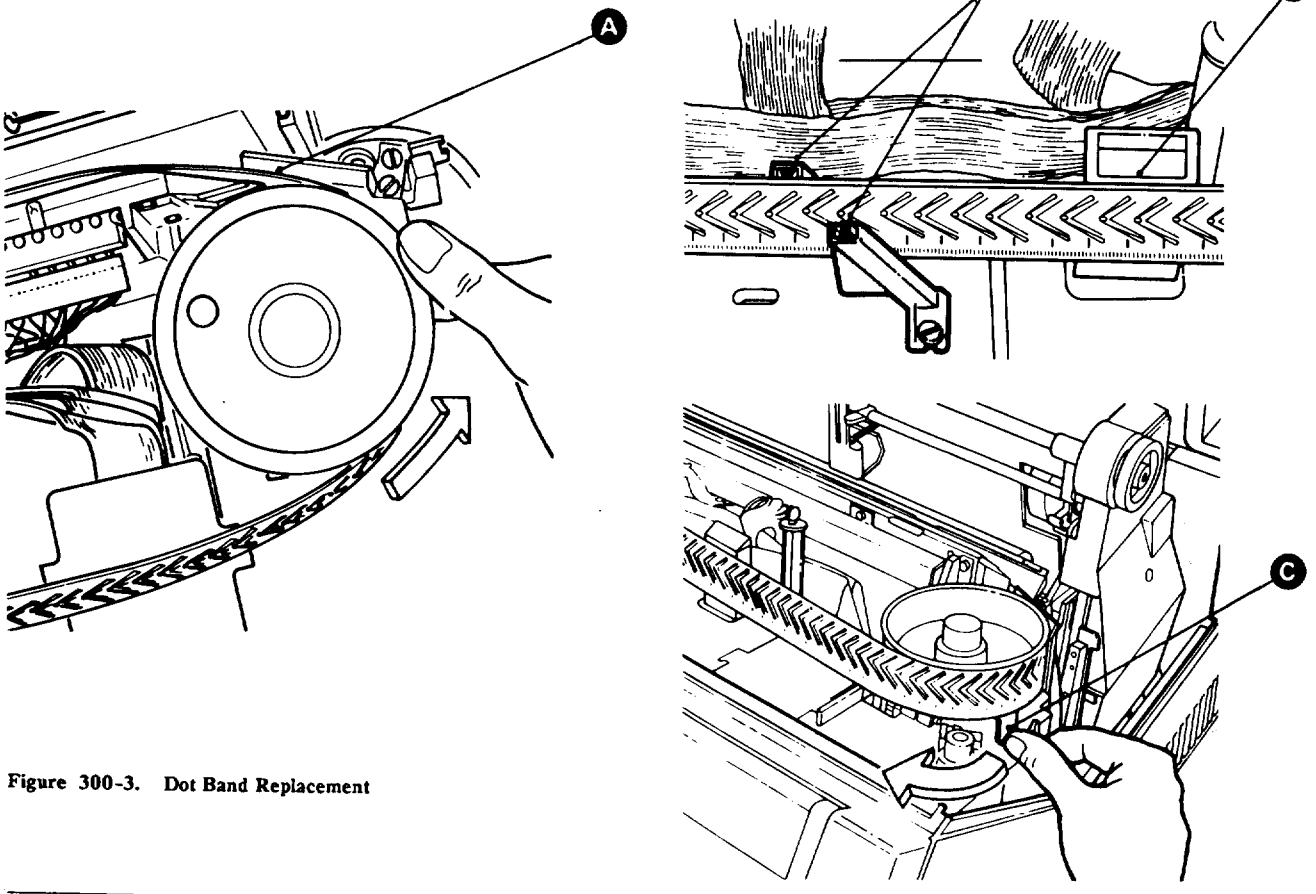


Figure 300-3. Dot Band Replacement

Band Oiler Assembly

See Figure 300-4.

Removal

1. Set the printer power switch to O (Off).
2. Remove the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
3. Remove the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
4. Loosen the two oiler assembly mounting screws (A).
5. Remove the oiler assembly (B) from the print mechanism.

Replacement

1. Install the oiler assembly on the print mechanism but do not tighten the two mounting screws (A).
2. Install the dot band, but do not install the dot band cover (MI "Dot Band Removal and Replacement" on page 300-3). Ensure that the band release lever is toward the front of the printer.
3. Ensure that the band oiler assembly is loose enough so that the magnets on the assembly will pull the assembly to the dot band.
4. Tighten the two oiler mounting screws without moving the position of the oiler assembly.
5. Install the band cover.
6. Install the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).

Adjustment

1. Set the printer power switch to O (Off).
2. Remove the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
3. Remove the dot band cover.
4. Loosen the two oiler assembly mounting screws (A).
5. Ensure that the band oiler assembly is loose enough so that the magnets on the assembly will pull the assembly to the dot band.
6. Tighten the two screws without moving the position of the oiler assembly.

   Note: The oiler assembly should not deflect dot band, but the chevrons should slightly deflect outward as they pass the pad on the oiler.

7. Install the band cover.
8. Install the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).

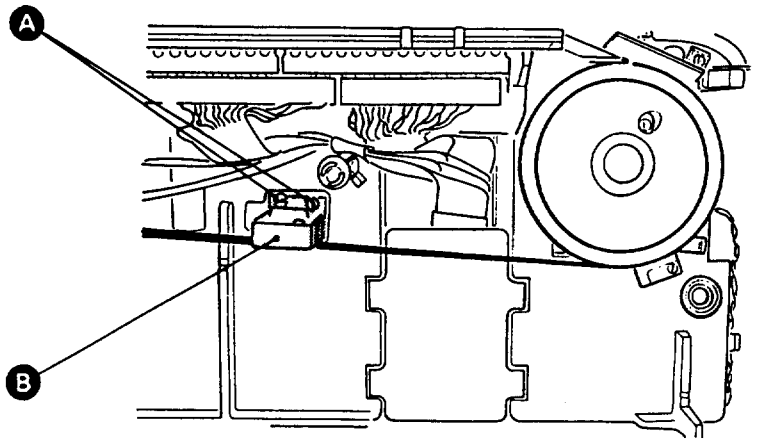


Figure 300-4. Band Oiler Assembly, Right Side View

Dot Band Brushes

See Figure 300-5.

Removal

1. Set the printer power switch to O (Off).
2. Remove the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
3. Remove the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
4. Loosen the brush assembly mounting screws (A), and remove the brush assemblies.

Replacement

1. Install the brush assemblies, but do not tighten the mounting screws (A).
2. Install the dot band (MI "Dot Band Removal and Replacement" on page 300-3) but not the band cover.
3. Move the brush assemblies toward the dot band until they just touch the band and tighten the mounting screws.

Adjustment

1. Set the printer power switch to O (Off).
2. Remove the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
3. Remove the dot band cover.
4. Loosen the brush assembly mounting screws (A).
5. Move the brush assemblies toward the dot band until they just touch the band and tighten the mounting screws.
6. Install the dot band cover.
7. Install the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).

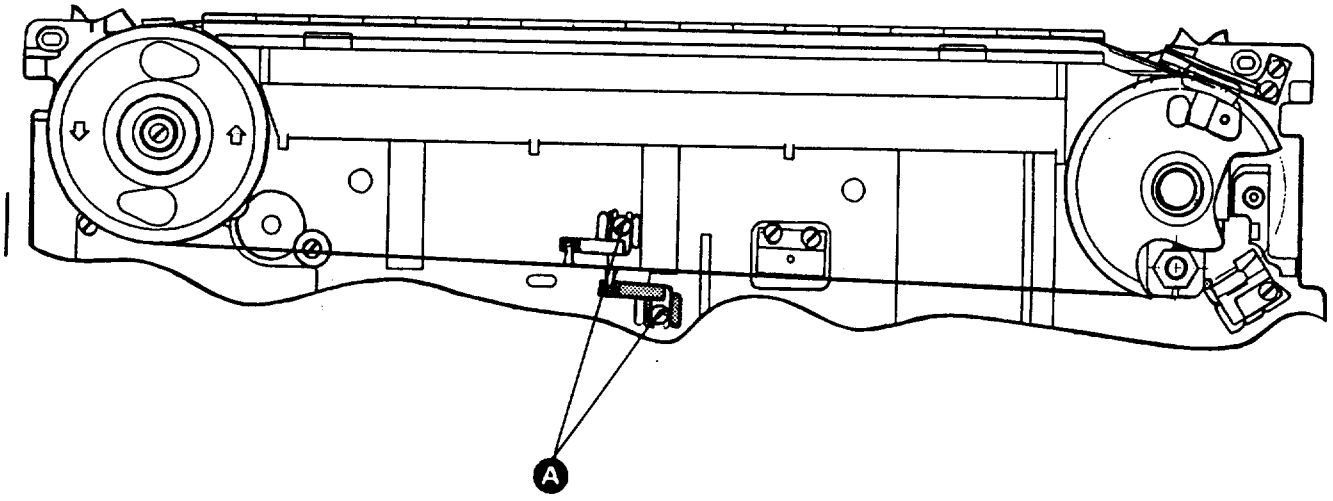


Figure 300-5. Dot Band Brushes, Top View

Band Cover Switch

See Figure 300-6.

Removal

1. Set the printer power switch to O (Off).
2. Place the print mechanism in the service position (MI "Print Mechanism (Service Position)" on page 300-48).
3. Remove the two switch bracket mounting screws (B).
4. Remove the two switch mounting screws (A).
5. Remove the cable from the clamps and disconnect the COVR switch connector.

Replacement

1. Connect the COVR switch connector.
2. Install the cable in the clamps.
3. Install the cover switch on the bracket with the two screws (A).
4. Install the two bracket mounting screws (B).
5. Install the band cover and ensure that the switch has 0.025 in. to 0.030 in. overthrow after it makes.
6. Install the print mechanism (MI "Print Mechanism (Service Position)" on page 300-48).

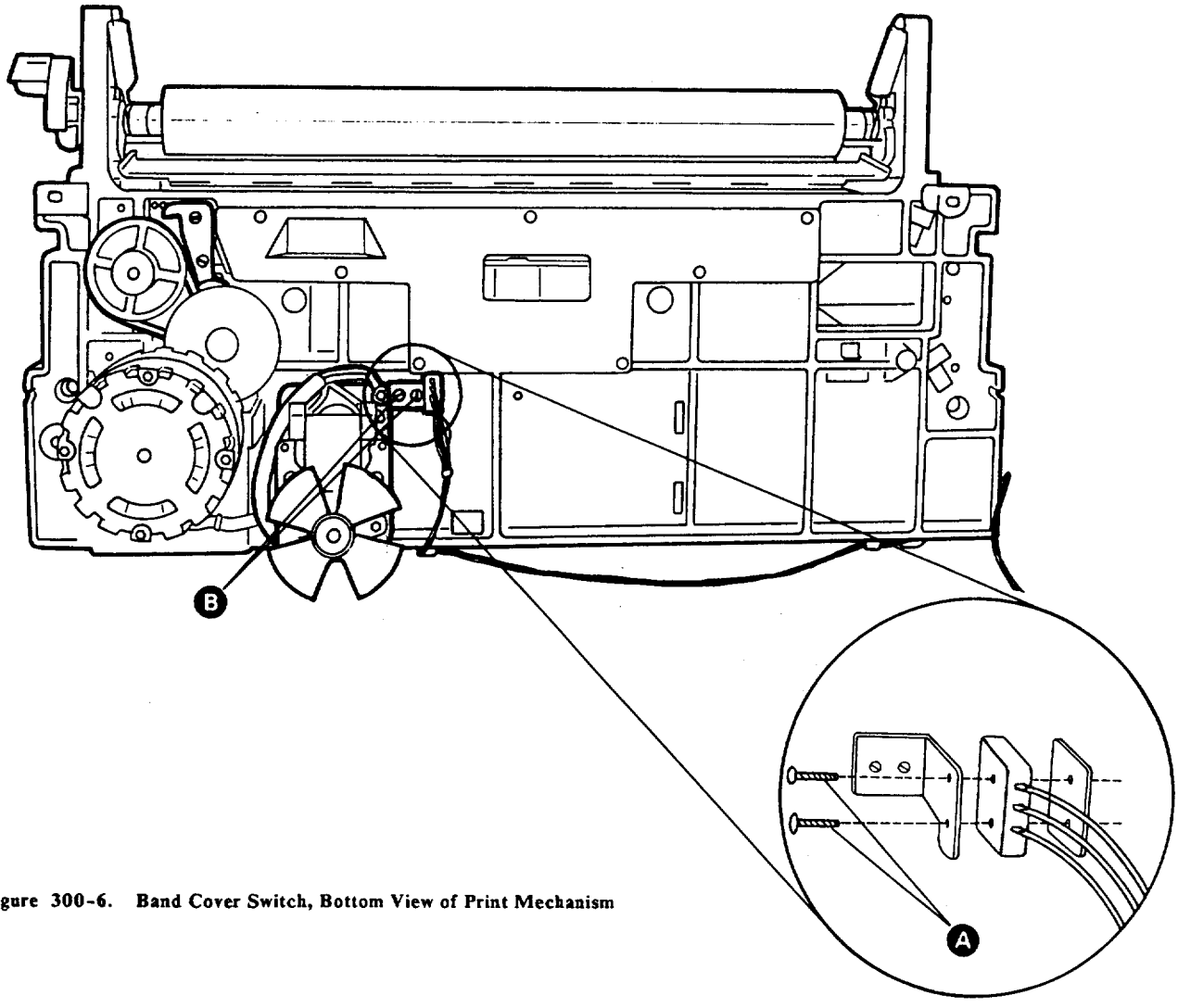


Figure 300-6. Band Cover Switch, Bottom View of Print Mechanism

Emitter Sensor

See Figure 300-7 on page 300-9.

Removal

1. Set the printer power switch to O (Off).
2. Remove the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
3. Remove the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
4. To remove the plastic band guide, remove its two mounting screws (A).
5. Remove the four band guide mounting screws (C) and remove the band guide assembly.
6. Align the access hole of the idler wheel to the emitter mounting screw (B) and remove the screw.
7. Disconnect the emitter connector marked SENS.
8. Lift the idler wheel (D) and remove the emitter.

Replacement

1. Install the emitter sensor, ensuring that the aligning lug is seated in its slot in the casting.
2. Move the emitter as far to the rear as possible, do not tighten the screw (B).
3. Install the band guide with the four mounting screws (C).
4. Adjust the emitter, so there is a 0.932 mm ± 0.06 mm (0.0367 in. ± 0.002 in.) gap between the band guide and the emitter sensor, as follows:
   a. Place a 0.950 mm (0.037 in.) feeler gauge vertically in the emitter sensor slot.
   b. Move the emitter sensor toward the band guide until a 0.950 mm (0.037 in.) gap is obtained between the rear wall of the emitter slot and the band guide then tighten the emitter mounting screw (B).
5. Install the plastic band guide with the two screws (A).
6. Connect the emitter sensor connector marked SENS.
7. Install the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
8. Install the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
9. Set the printer power switch to | (On).
10. Run Test 07 (Ripple Print) and the Test Key tests.

Adjustment

1. Set the printer power switch to O (Off).
2. Remove the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
3. Remove the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
4. Remove the two plastic guide mounting screws (A) and remove the guide.
5. Adjust the emitter, so there is a 0.932 mm ± 0.06 mm (0.0367 in. ± 0.002 in.) gap between the band guide and the emitter sensor, as follows:
   a. Place a 0.950 mm (0.037 in.) feeler gauge vertically in the emitter sensor slot.
   b. Move the emitter sensor toward the band guide until a 0.950 mm (0.037 in.) gap is obtained between the rear wall of the emitter slot and the band guide then tighten the emitter mounting screw (B).
6. Install the plastic guide with the two screws (A).
7. Install the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
8. Install the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
9. Set the printer power switch to | (On).
10. Run Test 07 (Ripple Print) and the Test Key tests.

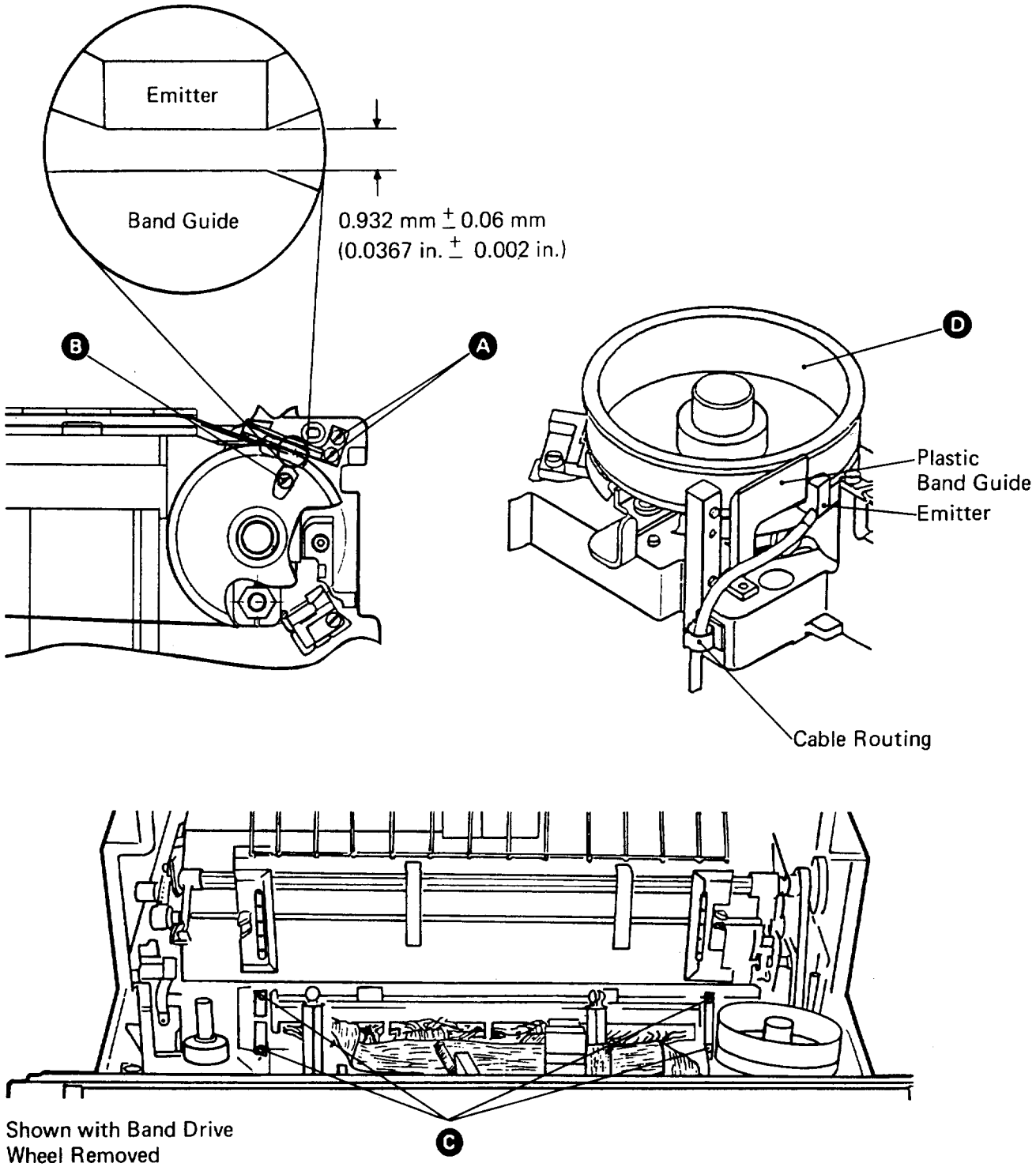


Figure 300-7. Emitter Sensor

Band Drive Mechanism

Band Drive Motor

Note: If either of the two band drive belts shows wear, replace them both at the same time that you replace the motor. Refer to MI "Band Drive Belts" on page 300-12.

See Figure 300-8 on page 300-11.

Removal

1. Set the printer power switch to O (Off) and disconnect the power cord from the back of the printer.
2. Remove the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
3. Remove the capacitor safety cover (B).

   Note: Line voltage is present when the power is on.
4. Remove the wires that go from the motor to the capacitor. Note the position of the wires and how they are routed.
5. Place the print mechanism in the service position (MI "Print Mechanism (Service Position)" on page 300-48).
6. Remove the three screws (A) that hold the motor.
7. Remove th band drive motor.
8. Remove the motor pulley from the motor by loosening the two setscrews.

Replacement

1. Install the motor to the casting with the three screws (A).
2. Route the cables to their relative position.
3. Install the pulley on the motor shaft and visually align the motor pulley with the idler pulley so that belts will track properly. Tighten the setscrews.
4. Thread the motor belt around the motor pulley.
5. Do the band motor belt adjustment (MI "Band Drive Belts" on page 300-12) and return here.

   Note: Line voltage is present when the power is on.
6. Install the wires on the capacitor.
7. Install the capacitor safety cover (B).
8. Install the print mechanism (MI "Print Mechanism (Service Position)" on page 300-48).
9. Connect the power cord to the back of the printer.

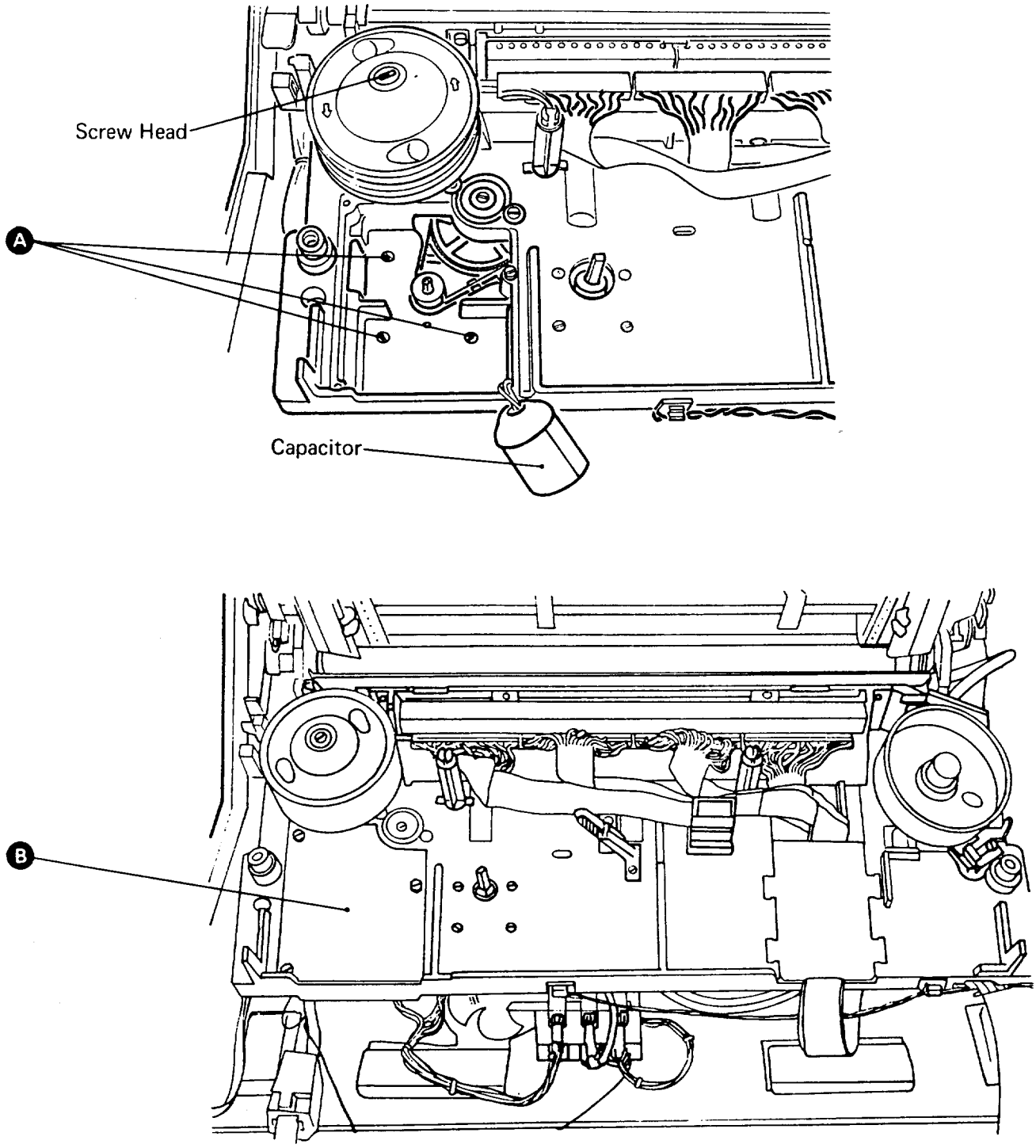


Figure 300-8. Band Drive Motor

Band Drive Belts

Note: Because of the difficulty in installing these belts, install both belts at the same time.

See Figure 300-10 on page 300-13.

Removal

1. Set the printer power switch to Off (O).
2. Remove the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
3. Remove the capacitor safety cover, (see Figure 300-8 on page 300-11) and position the capacitor out of the way.
4. Loosen the three band motor mounting screws (F) to release tension on the motor belt.
5. Place the print mechanism in the service position (MI "Print Mechanism (Service Position)" on page 300-48).
6. Loosen the two screws (A) and move the tension lever (B) to remove the belt tension.
7. Remove both belts.

Replacement

1. Install the drive pulley belt. (It is wider than the drive motor belt.)
2. Do the drive wheel belt adjustment (MI "Band Drive Belts") and return here.
3. Install the band motor belt around the idler pulley and the band motor pulley.
4. Do the band motor belt adjustment (MI "Band Drive Belts").
5. Install the print mechanism (MI "Print Mechanism (Service Position)" on page 300-48).
6. Install the capacitor safety cover, (see Figure 300-8 on page 300-11).
7. Install the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
8. Install the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).

Adjustment

Note: For each belt adjustment, form a paper clip as shown in Figure 300-9 and hook one end of it into the gram gauge. The other end of the paper clip should be held at midpoint at a 90 degree angle to the belt.

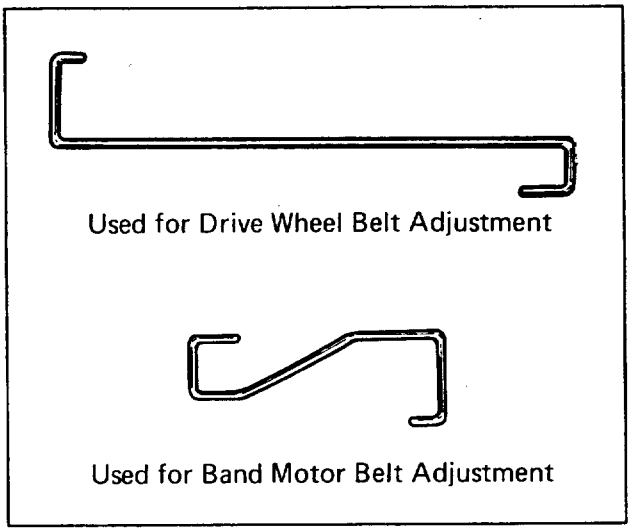
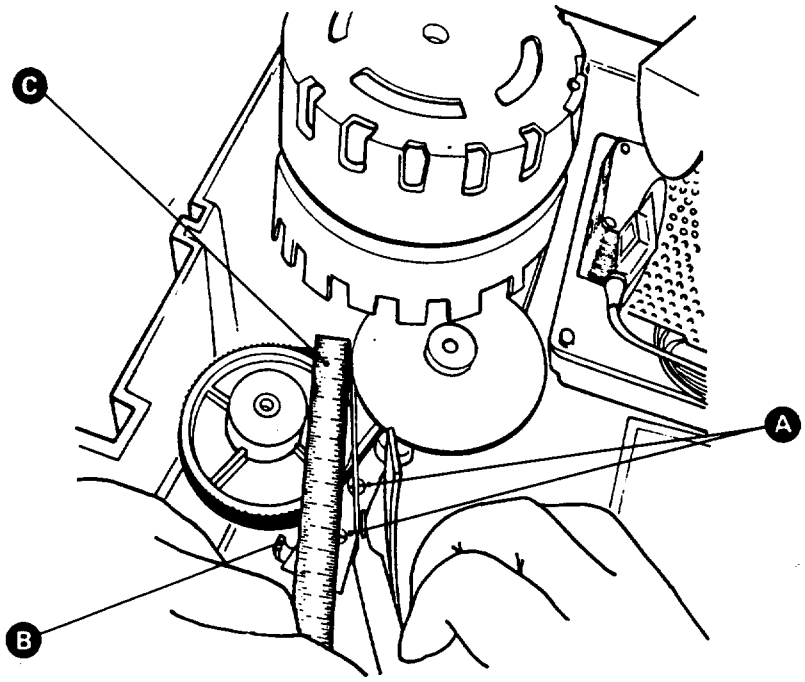
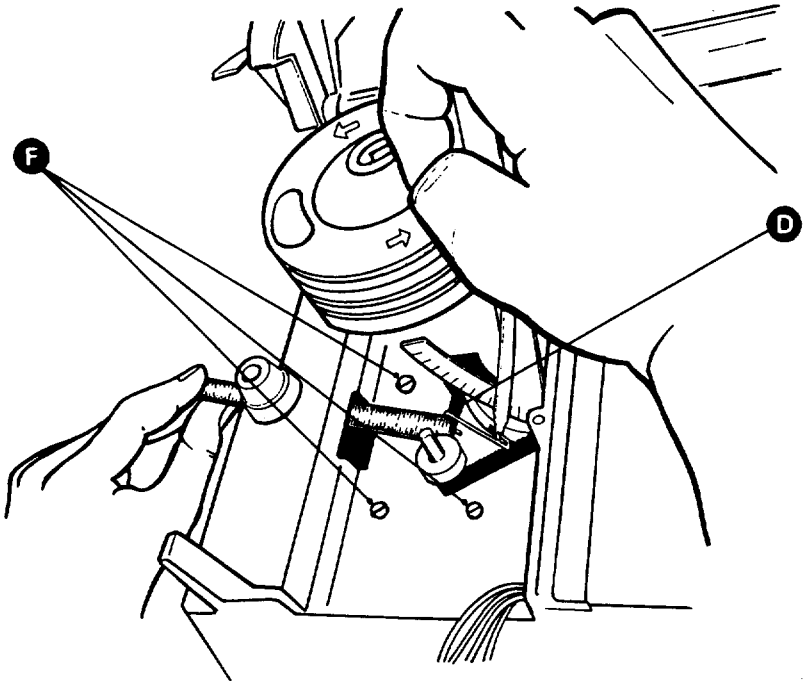


Figure 300-9. Paper Clips

1. Do steps 1 through 5 under "Band Drive Belts Removal."
2. **Drive Wheel Belt Adjustment**
   a. Loosen the two screws (A).
   b. Adjust the tension lever (B) so that the belt deflects 1.0 mm to 1.5 mm (0.039 in. to 0.059 in.) when a force of 80 grams is applied at point (C) (midpoint) and tighten both screws (A).
3. **Band Motor Belt**
   a. Position the motor in the motor mounting holes so that a a force of 80 grams applied at 90 degrees to the belt at point (D) (midpoint) deflects the belt 1.0 mm to 1.5 mm (0.039 in. to 0.059 in.).
   b. Tighten the band motor mounting screws (F) when the belt tension is correct.
   c. Do steps 5 through 8 under "Band Drive Belts Replacement."



Bottom View of Print Mechanism
(Band Wheel Belt Adjustment)



Band Motor Belt Adjustment

Figure 300-10. Band Drive Belts

Band Idler Wheel

See Figure 300-11 on page 300-15.

Removal

1. Set the printer power switch to O (Off).
2. Disconnect the power cord from the outlet.
3. Remove the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
4. Remove the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
5. Remove the operator panel support plate (MI "Operator Panel Support Plate" on page 500-5).
6. Move the band release lever to the "operating" position (toward the front of the casting).
7. Remove the upper C-clip (A) from the pivot shaft (B).
8. Push the pivot shaft out through the bottom of the casting and reach through the operator panel opening to remove it.
9. Rotate the arms (C) of the idler assembly 90 degrees clockwise and remove the tension spring (D).
10. Tilt the upper half of the assembly toward the center of the casting and lift the assembly out of the casting.

Note: If you are replacing the idler assembly, remove and save the pivot shaft (B) and the eccentric nut (G) to use for the new assembly. You do not have to adjust the eccentric nut.

Replacement

1. Position the idler assembly over the hole in the casting so that the arms (C) point toward the oiler assembly.
2. Insert the lower arm of the assembly through the hole and turn the assembly counterclockwise until the lug (E) on the idler assembly lines up with the lug (F) on the casting.
3. Install the spring (D).
4. Install the shaft (B) and the C-clip (A).
5. Install the operator panel support plate (MI "Operator Panel Support Plate" on page 500-5).
6. Install the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
7. Install the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).

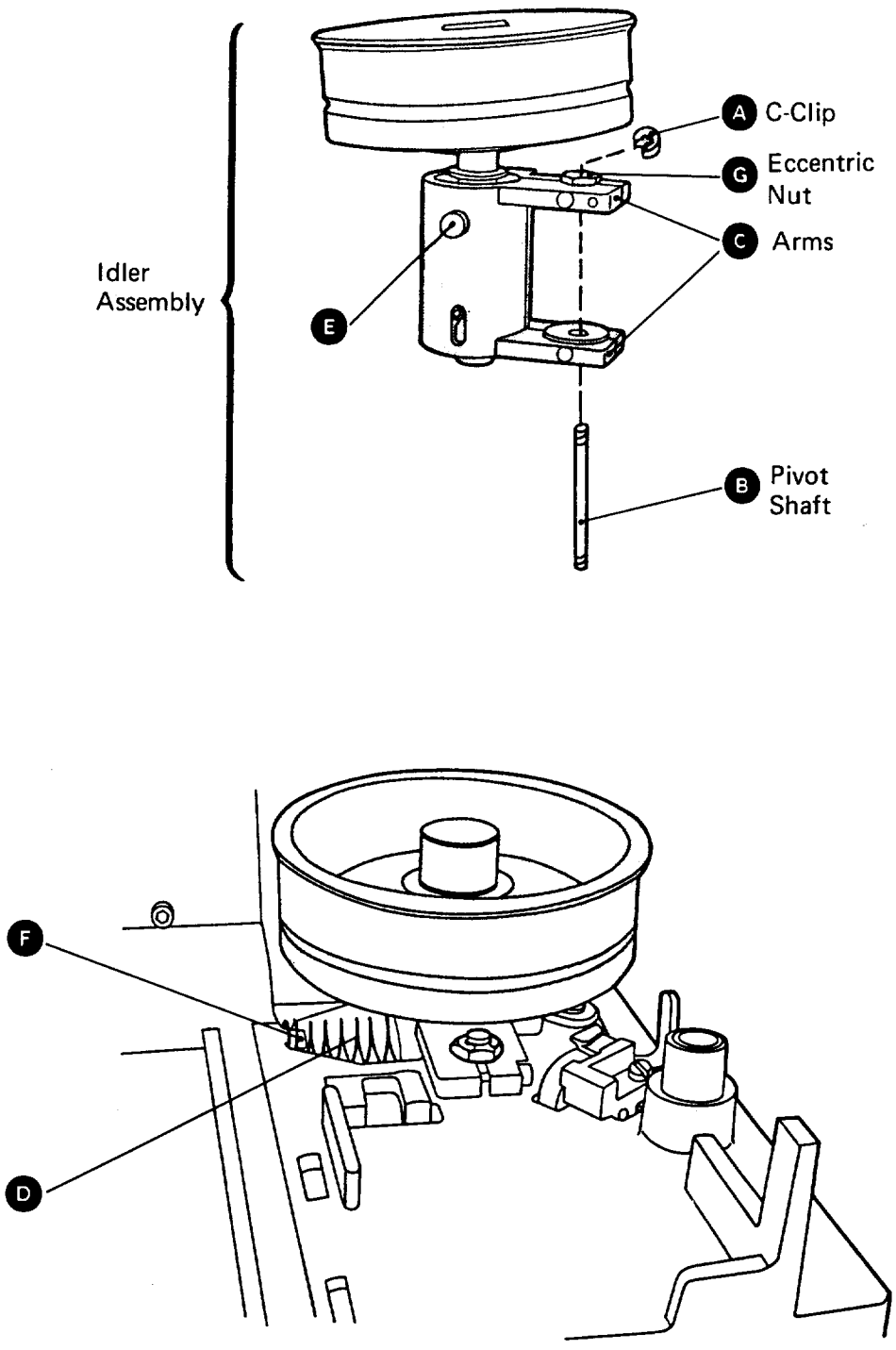


Figure 300-11. Band Idler Wheel

Band Drive Wheel Assembly

See Figure 300-12.

Removal

1. Set the printer power switch to O (Off).
2. Remove the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
3. Remove the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
4. Remove the screw (A) from the center of the drive wheel.
5. Pull the band drive wheel assembly (B) up and off the drive shaft.

Replacement

1. Install the band drive wheel assembly (B) onto the shaft and tighten screw (A).
2. Press down on the outer portion of the drive wheel assembly to fully seat the assembly. Ensure it moves up and down freely when you lift it.
3. Install the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
4. Install the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).

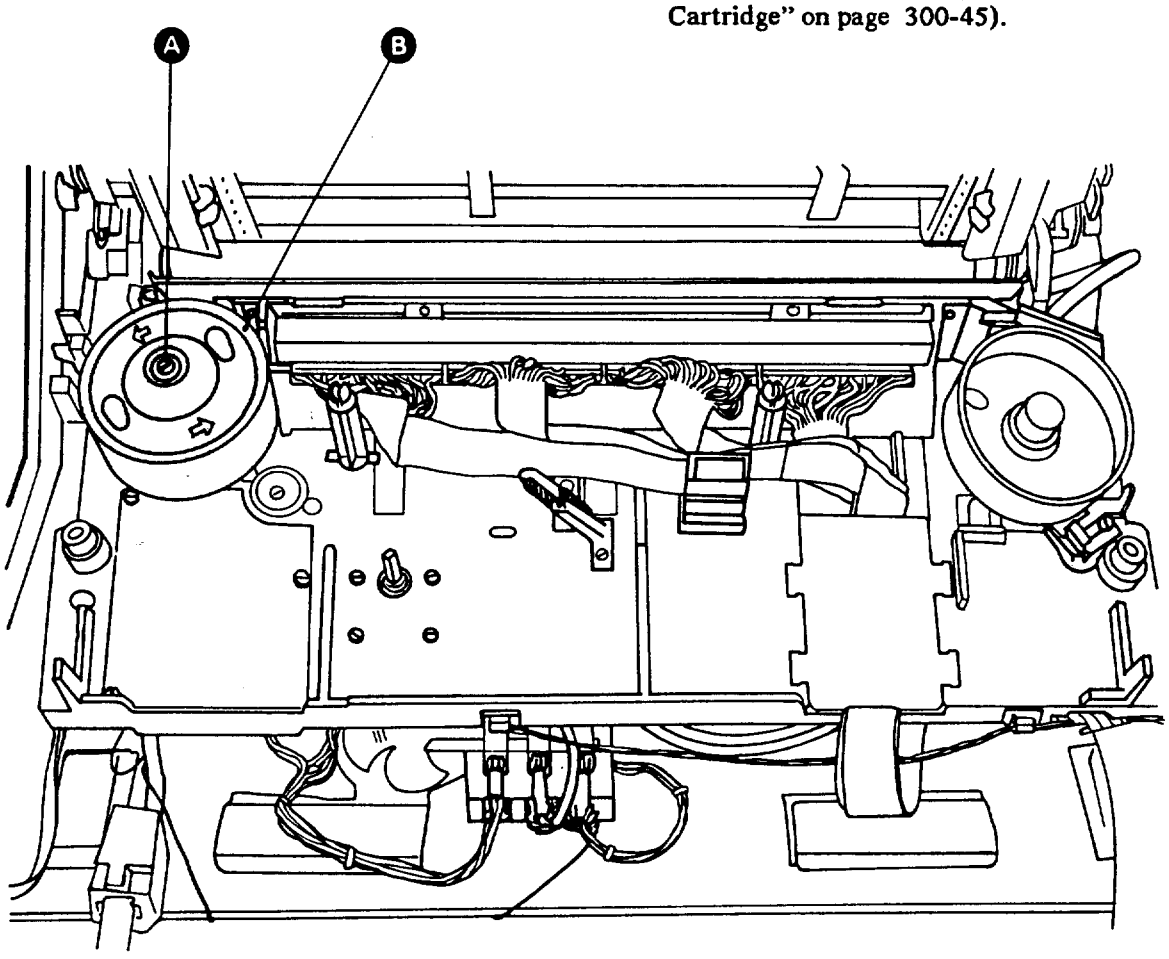


Figure 300-12. Band Drive Wheel Assembly. Top View

Band Drive Wheel Shaft

See Figure 300-13.

Removal

1. Set the printer power switch to O (Off).
2. Remove the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
3. Remove the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
4. Remove the band drive wheel (MI "Band Drive Wheel Assembly" on page 300-16).
5. Place the print mechanism in the service position (MI "Print Mechanism (Service Position)" on page 300-48).
6. Remove the band drive belt by loosening two screws on the lever (A).
7. Remove the band drive pulley (B) by loosening the two allen screws .
8. Push the shaft through the top of the casting and remove it.

Replacement

1. Install the shaft into the casting.
2. Install the band drive pulley (B) onto shaft and tighten the two screws. Ensure that the pulley is as far on the shaft as possible (touching the bearing).
3. Install the drive belt and make adjustment (MI "Band Drive Belts" on page 300-12), and return here.
4. Install the print mechanism (MI "Print Mechanism (Service Position)" on page 300-48).
5. Install the drive wheel (MI "Band Drive Wheel Assembly" on page 300-16).
6. Install the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
7. Install the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).

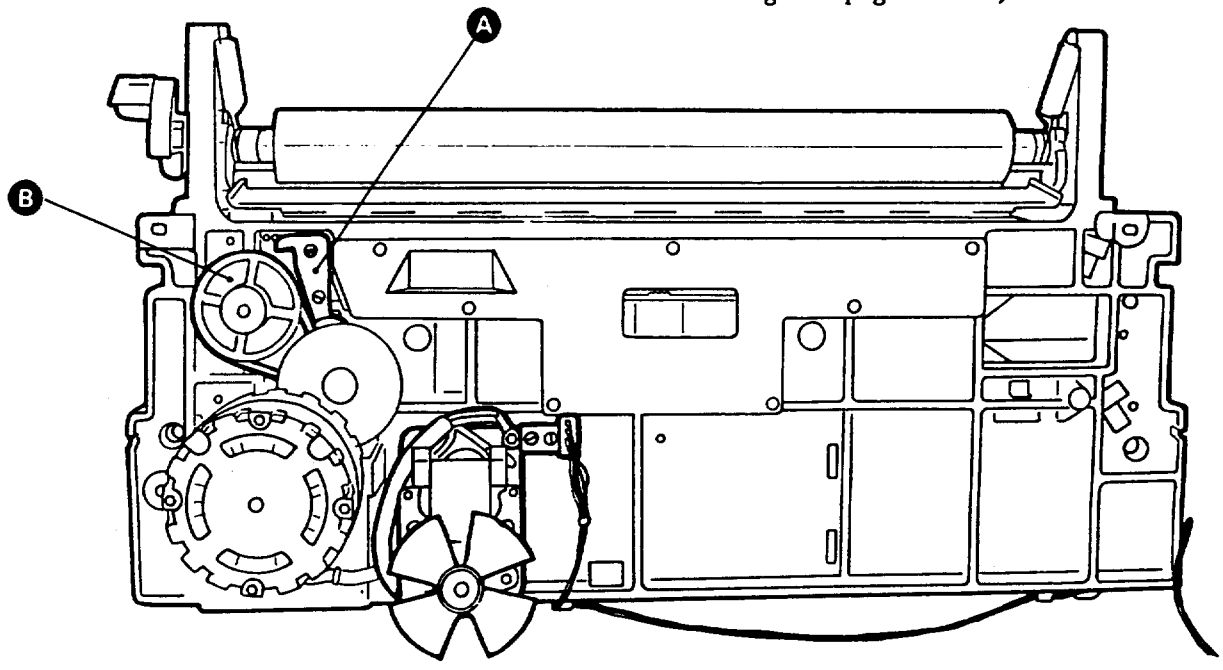


Figure 300-13. Band Drive Wheel Shaft Assembly

Right Front Registration Bearing

See Figure 300-14.

Removal

1. Set the printer power switch to O (Off).
2. Remove the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
3. Remove the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
4. Remove the screw (A) and the bearing assembly.
5. Remove the bearing from the bearing support block.

Replacement

1. Install the bearing on the bearing support block.
2. Install the bearing assembly to the print mechanism, but do not tighten the screw (A).
3. Install the dot band, but do not install the cover (MI "Dot Band Removal and Replacement" on page 300-3).
4. Move the bearing so that the band tracks in the center of the bearing ± 0.254 mm (± 0.010 in.).
5. Tighten the screw (A).
6. Install the dot band cover.
7. Install the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).

Adjustment

1. Set the printer power switch to O (Off).
2. Remove the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
3. Remove the dot band cover by lifting up on the curved handles.
4. Loosen the screw (A) and move the bearing so that the band tracks in the center of the bearing ± 0.254 mm (± 0.010 in.).

   Note: Ensure that the dot band does not touch the step of the support block.
5. Tighten the screw (A).
6. Install the dot band cover.
7. Install the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).

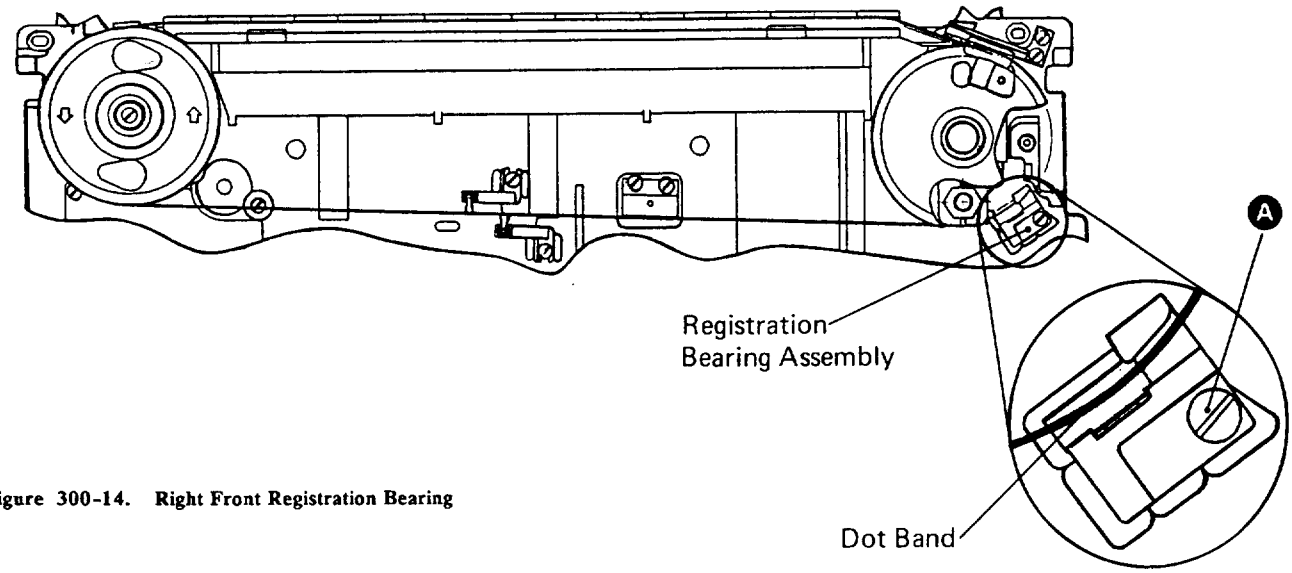


Figure 300-14. Right Front Registration Bearing

Right Rear Registration Bearing

See Figure 300-15.

Removal

1. Set the printer power switch to O (Off).
2. Remove the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
3. Remove the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
4. Remove the plastic guide (B).
5. Align the bearing access hole in idler wheel with the bearing support mounting screw (A), and remove the screw.
6. Lift the idler wheel and remove the bearing assembly.
7. Remove the bearing from the bearing support block.

Replacement

1. Install the bearing on the bearing support block.
2. Install the bearing assembly in the casting, but do not tighten screw (A).
3. Install the plastic guide (B).
4. Install the dot band. Ensure that the band tension lever is in the operating position (forward).
5. Move the bearing assembly (C) until the band just touches the wall of the bearing support, and tighten the screw (A).

> **Important**
>
> Ensure that the bearing assembly does not deflect the band.

6. Install the dot band cover.
7. Install the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).

Adjustment

1. Set the printer power switch to O (Off).
2. Remove the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
3. Remove the dot band cover.
4. Align the bearing access hole in the idler wheel with the screw (A), and loosen the screw.
5. Move the bearing assembly (C) until the band just touches the wall of the bearing support, then tighten the screw (A).

> **Important**
>
> Ensure that the bearing assembly does not deflect the band.

6. Install the dot band cover.
7. Install the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).

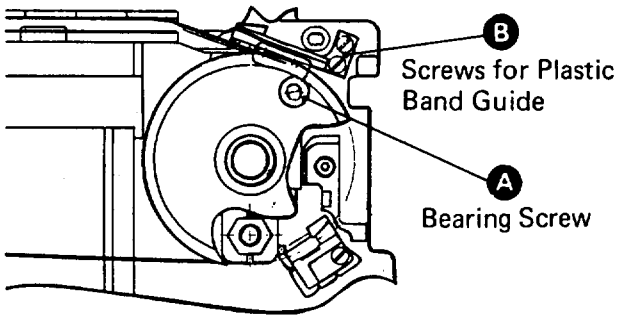
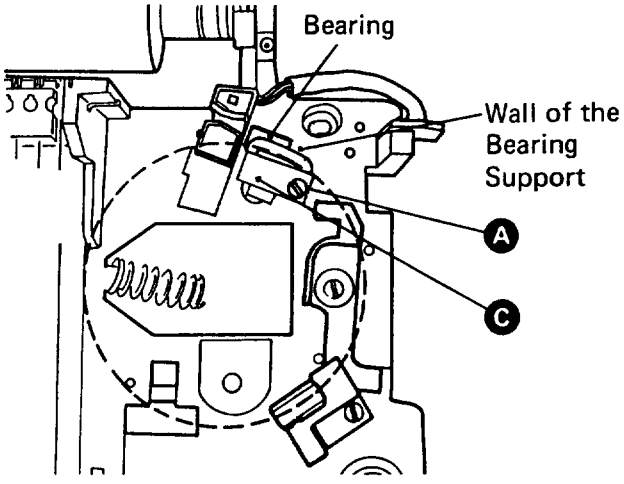


Figure 300-15. Right Rear Registration Bearing



Left Registration Bearing

See Figure 300-16 on page 300-21.

Removal

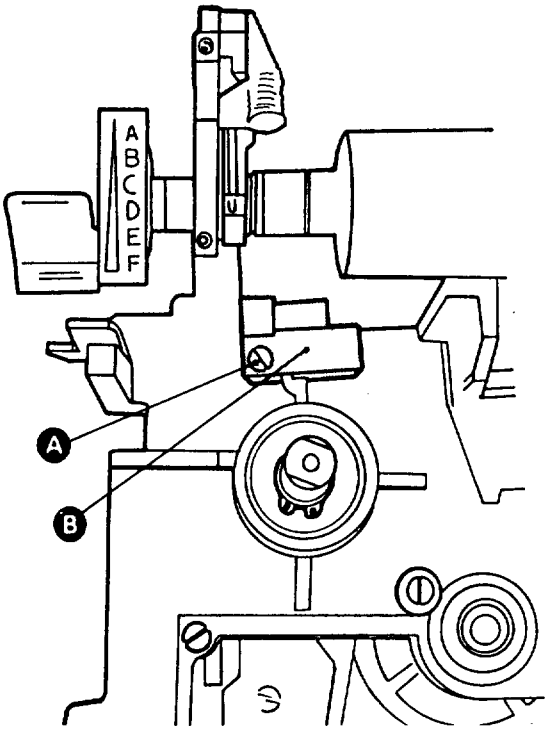
1. Set the printer power switch to O (Off).
2. Remove the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
3. Remove the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
4. Remove the band drive wheel (MI "Band Drive Wheel Assembly" on page 300-16).
5. Remove the screw (A) on the left registration bearing assembly.
6. Remove the bearing assembly (B).
7. Remove the bearing from the bearing support.

Replacement

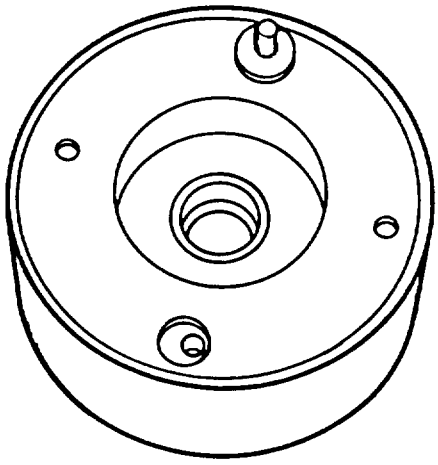
1. Install the bearing to the bearing support.
2. Install the bearing assembly (B) to the print mechanism but do not tighten the screw (A).
3. Do steps 2 through 9 in the adjustments.

Adjustment

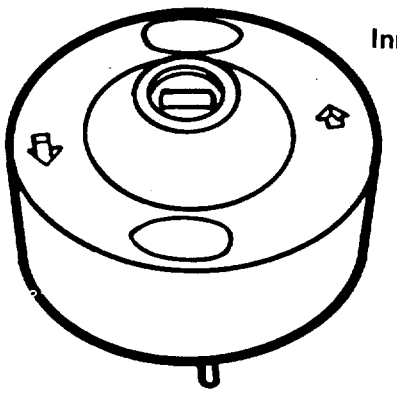
1. Remove the band drive wheel (MI "Band Drive Wheel Assembly" on page 300-16).
2. Separate the outer wheel from the inner wheel.
3. Install the outer wheel on the shaft.
4. Install the dot band and turn the outer wheel counterclockwise until the screw (A) can be seen through the access hole in the outer wheel.
5. Loosen the screw (A), and move the bearing assembly until the bearing protrudes 2 mm ± 0.25 mm (0.080 in. ± 0.010 in.) beyond the outside circumference of the band and tighten the screw (A).
6. Remove the dot band.
7. Re-Assemble the drive wheel, and install it on the drive shaft (press down on the outer wheel to ensure that it is fully seated).
8. Install the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
9. Install the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).



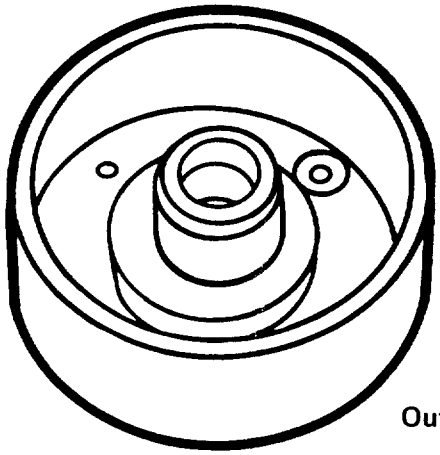
Left Side View
With Band Drive Wheel Removed



Bottom View



Inner Wheel



Outer Wheel

Figure 300-16. Left Registration Bearing

Band Drive Service Check

Warning: Do not install the dot band upside down (with the slots at the top and the color band on the bottom edge), or inside out (with the chevrons pointing to the right). If it is installed incorrectly, the dot band will be damaged when the printer power is restored. Be sure the dot band is lined up correctly before putting it on the band drive and idler wheels. Use only 70% (minimum) isopropyl alcohol when cleaning the dot band. **Do NOT use any other cleaner on the dot band.**

Read through the following checks. You may wish to change the order of some steps or do only certain ones, based on the Printer failure symptom. However, ensure that the band drive is working correctly before ending the service call.

1. Remove the dot band (MI "Dot Band Removal and Replacement" on page 300-3).

2. Inspect the lower edge of the band for cracks. Ensure that the band is not bent or rolled over at the bottom.

3. Inspect the following areas of the band drive mechanism. Ensure that all parts are clean (no paper dust, ink, or ribbon contamination).

   Note: It is the customer's responsibility to clean the dot band, sensor slot, wheels, band brushes, and oiler.

   The dot band:

   a. Place a clean, dry cloth in one hand and lay a section of the dot band on the cloth.
   b. Use 70% (minimum) isopropyl alcohol and the brush supplied with the printer to clean the dot band. Apply a few drops of the alcohol to the slots and brush them until clean.
   c. Rotate the dot band carefully and repeat the previous step until all slots are clean.
   d. Hold the dot band to a light source and inspect the slots. Be sure there is no dirt in any slots.
   e. When the entire band is clean, carefully remove any excess alcohol with a clean, dry cloth.

   The band oiler:

   a. Wash the cleaning brush with alcohol until it is free of ink and dirt, then dry it off.
   b. Use the brush to clean any ink and paper dust off the oiler.

   The paper shield:

   a. Fold a lint-free cloth and soak it with 70% (minimum) isopropyl alcohol.
   b. Wrap the cloth around the cleaning brush and wipe between the paper shield surface and the print hammers.

   The band brushes:

   a. Wash the cleaning brush with alcohol until it is free of ink and dirt, then dry it off.
   b. Use the cleaning brush to clean any ink and paper dust from the band brushes.
   c. Wipe the brushes with a clean, dry cloth.

   The band drive and band idler wheels:

   a. Wipe the wheels with a cloth dampened with isopropyl alcohol until all build-up is removed.
   b. Dry off the wheels with a clean, dry cloth.

The emitter:

a. Fold a clean, dry cloth and dampen with 70% (minimum) isopropyl alcohol.
b. Insert cloth into emitter sensor gap and move cloth backward and forward carefully to remove any ink, ribbon contamination, and paper dust.
c. Use a clean, dry cloth to remove any remaining dust.
d. Visually check the emitter to ensure that it is clean.

4. Check that the drive outer wheel is tight on the drive shaft and that the drive shaft is not worn.

5. Check that the bearing that holds the shaft is not worn. To do this, remove the drive wheel (MI "Band Drive Wheel Assembly" on page 300-16). Turn the drive shaft and ensure that there is no play in the shaft. Also, verify that the bearing the shaft turns within is not defective. The bearing should turn smoothly.

6. Check that the idler wheel floats freely on the shaft by lifting the wheel and releasing it. The idler wheel should return to its operating position. If it does not, replace the idler wheel assembly (MI "Band Idler Wheel" on page 300-14).

7. Tilt the idler wheel assembly in all directions and ensure that it moves freely. Replace the assembly if it does not.

8. Check that the drive wheel floats freely on the shaft by lifting the wheel and releasing it. If it does not, replace the drive wheel assembly.

9. With the band removed, check all three bearings to ensure that they turn freely. Replace any bearing that is defective.

10. Install the dot band (MI "Dot Band Removal and Replacement" on page 300-3), but not the band cover. Turn the drive wheel counterclockwise, and ensure that all three bearings turn as the band moves over them. Check for binds and then check the adjustment of any bearing that does not turn.

11. Check the band release lever to see that it is not binding. If this lever is binding, the amount of tension on the band decreases and the band will slip. Ensure that there is some lubrication present where the lever contacts the idler housing and the print casting.

12. Check that the paper shield closes and latches properly. If it does not, check the ribbon path for obstructions. Obstructions here can also bind the band.

13. Check the band oiler adjustment (MI "Band Oiler Assembly" on page 300-5). Turn the drive wheel counterclockwise and observe each dot as it passes the oiler assembly. As the chevrons move across the oiler assembly, each dot should slightly deflect outward. Worn anvils or a worn oiler wick could be the problem if no deflection occurs. Replace defective parts.

14. Excessive noise as the band passes the hammer unit or during printing of a heavy pattern indicates a lack of oil on the band. If this seems to be the problem, remove the oiler (MI "Band Oiler Assembly" on page 300-5). Remove the two screws from the back of the oiler, and inspect the wick. If it is extremely white, then it has dried out, and the oiler assembly should be replaced. Excessive noise may also be caused by a mechanically bad hammer dragging on the print band.

15. Check the two band drive belts beneath the print casting for wear or missing teeth. The belts are seen with the capacitor safety cover removed (MI Figure 300-10 on page 300-13). If either belt is defective, replace them both. If the belts are in good condition, check the tension adjustment for each belt (MI "Band Drive Belts" on page 300-12).

16. Ensure that the brushes wipe the band as it revolves. Adjust if necessary (MI "Dot Band Brushes" on page 300-6).

17. **If your problem remains after making these checks,** refer to MAP 300, which has information about specific print quality problems.

330 Forms Drive

Forms Drive Theory of Operation

Primary forms movement is provided by pin-feed tractors, located above the print line. A stepper motor drives the tractors by the forms drive belt. The rolls on the drive roll shaft and the pressure roll shaft apply a small amount of tension to the forms. Tension fingers that are adjustable also provide tension to the forms. The adjustment is made by loosening the tension control knob on the forms tension assembly and moving the pointer to the desired location. An autoload feature allows forms to be easily inserted and moved to a position above the print line.

Autoload Clutch Description

This clutch is mounted on the end of the forms drive roll shaft. It controls the autoloading of forms during a forms load operation.

Autoload Operation: Forms can be automatically loaded into the printer when the forms thickness lever is all the way to the rear and the pressure roll lever is to the rear. With the platen in this position (all the way to the rear), the upper end of the autoload lever activates the platen switch. The other end of the autoload lever pushes the autoload coupling against the autoload drive wheel. Now the autoload clutch is engaged.

Insertion of forms into the forms guide operates the EOF switch and starts the forms motor. The forms drive belt turns the autoload drive wheel that is engaged with the coupling. The coupling drives a screwpin that is screwed into the forms drive shaft. The rolls on the drive shaft move the forms upward until the top edge of the form is above the print line. The forms motor stops. The forms are ready to be loaded into the tractors. Once the forms thickness lever is brought forward to the print position, the autoload clutch disengages and forward forms movement is provided by the tractors.

Normal Printing: With the clutch in the normal printing (disengaged) position, the pin feed tractors drive the forms, and the forms turn the drive roll shaft. The autoload clutch is not operative, and does not affect the forms movement.

Reverse Forms Feeding: The forms drive motor is bi-directional. When it operates in the reverse direction, a one-way-clutch in the autoload drive wheel turns the drive roll shaft in the reverse direction. The drive rolls move the forms downward. Thus, the forms can be restored to the first print line after the last printed form is removed.

Autoload Clutch

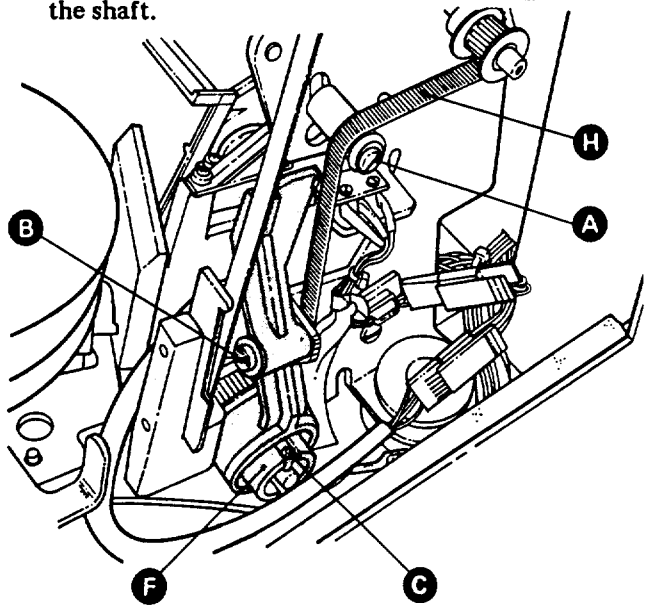
See Figure 300-17.

Removal

1. Set the printer power switch to O (Off).
2. Remove the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
3. Remove the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
4. Remove the forms drive safety cover (MI "Transport Assembly, Part 2" on page 800-5) from the right side of printer (remove the bottom screw only).
5. Loosen the idler assembly screw (A), and remove the drive belt (H).
6. Remove the clutch lever mounting screw (B) and the clutch lever.
7. Remove the screwpin (C) in the slot of the autoload coupling.
8. Remove the coupling (F) and the coil spring from the shaft.
9. Remove the C-clip (D) and the washer behind it. Slide the autoload drive wheel assembly (G) from the shaft.

Replacement

1. Install the drive wheel assembly (G) on the shaft and install the washer and the C-clip (D).
2. Install the coil spring and the coupling (F) on the shaft. Install the screwpin (C).
3. Install the clutch lever with the screw (B). Ensure that the top of the clutch lever is to the left of the platen switch actuating lever, as viewed from the front of the printer.
4. Install the belt and position the idler assembly to hold the belt in place.
5. Adjust the idler pulley up or down so that 450 grams of force deflects the center of the drive belt 6.0 to 6.5 mm (0.236 in. to 0.256 in.) as shown in "Forms Drive Belt" on page 300-32.
6. Turn the forms knob several times, then check the belt tension. Readjust if necessary.
7. Install the forms drive safety cover.
8. Install the dot band (see "Dot Band Removal and Replacement" on page 300-3).
9. Install the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).



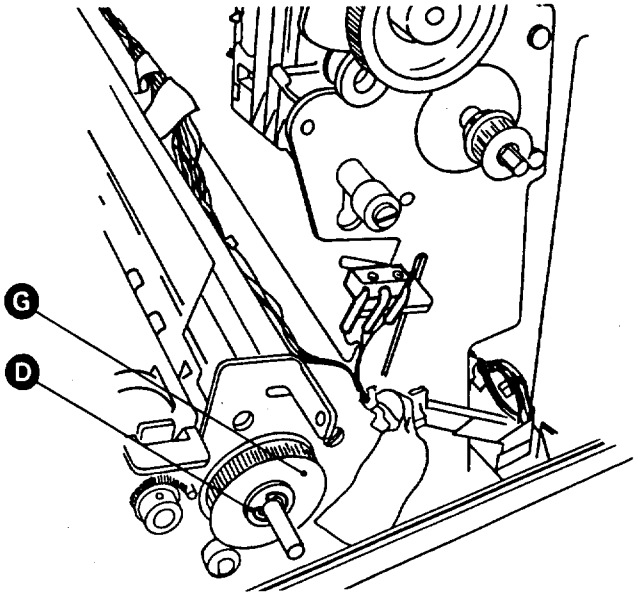


Figure 300-17. Autoload Clutch

Tractor Assembly

See Figure 300-18.

Removal

1. Remove forms from the tractor assembly.
2. Set the printer power switch to O (Off).
3. Press both latch levers (D) up and pivot the tractor assembly toward the front of the printer (Figure 300-18).
4. Remove the forms drive safety cover (G) ("Transport Assembly, Part 2" on page 800-5) from the right side of printer (remove the bottom screw only).
5. Loosen the idler assembly screw (A), and remove the forms drive belt.
6. Remove C-clip (B).
7. Move right latch assembly (E) to the left.
8. Remove two screws (C) from the left bearing plate.
9. Slide the tractor assembly to the right and remove it from the side-frame.

Note: If you are replacing the tractor assembly with a new assembly, remove the forms knob (F).

Replacement

Note: If you are not installing a new assembly, start with step 1. If you are installing a new tractor assembly, remove the right latch assembly C-clip (B) and move the assembly to the left. Also install the forms knob (F) to the tractor assembly.

1. Place the tractor assembly into the side-frame and install the bearing plate with the two screws (C).
2. Move the latch assembly (E) to the right and install C-clip (B).
3. Latch the tractor assembly in place.
4. Install the forms drive belt and adjust the idler pulley so that 450 grams of force deflects the center of the drive belt 6.0 to 6.5 mm (0.236 in. to 0.256 in.) as shown in "Forms Drive Belt" on page 300-32.
5. Turn the forms knob several times, then check the belt tension. Readjust if necessary.
6. Install the forms drive safety cover.

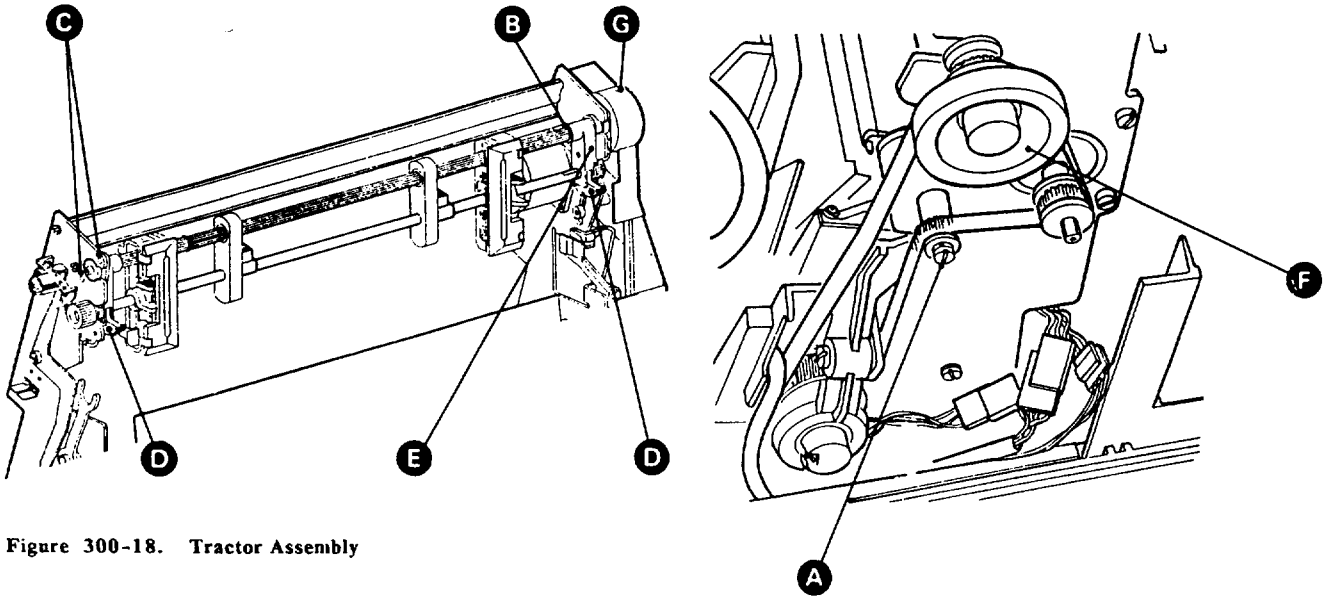


Figure 300-18. Tractor Assembly

Forms Tension Lever Assembly

See Figure 300-19.

Removal

1. Set the printer power switch to O (Off).
2. Remove the spring (C) from the bottom of the tension assembly.
3. Remove the lever mounting screw (A).
4. Remove the two screws (B) and remove the lever assembly.

Replacement

1. Install the lever assembly to printer with the two screws (B).
2. Install the screw (A) to the lever.
3. Install the spring (C) to the tension assembly.

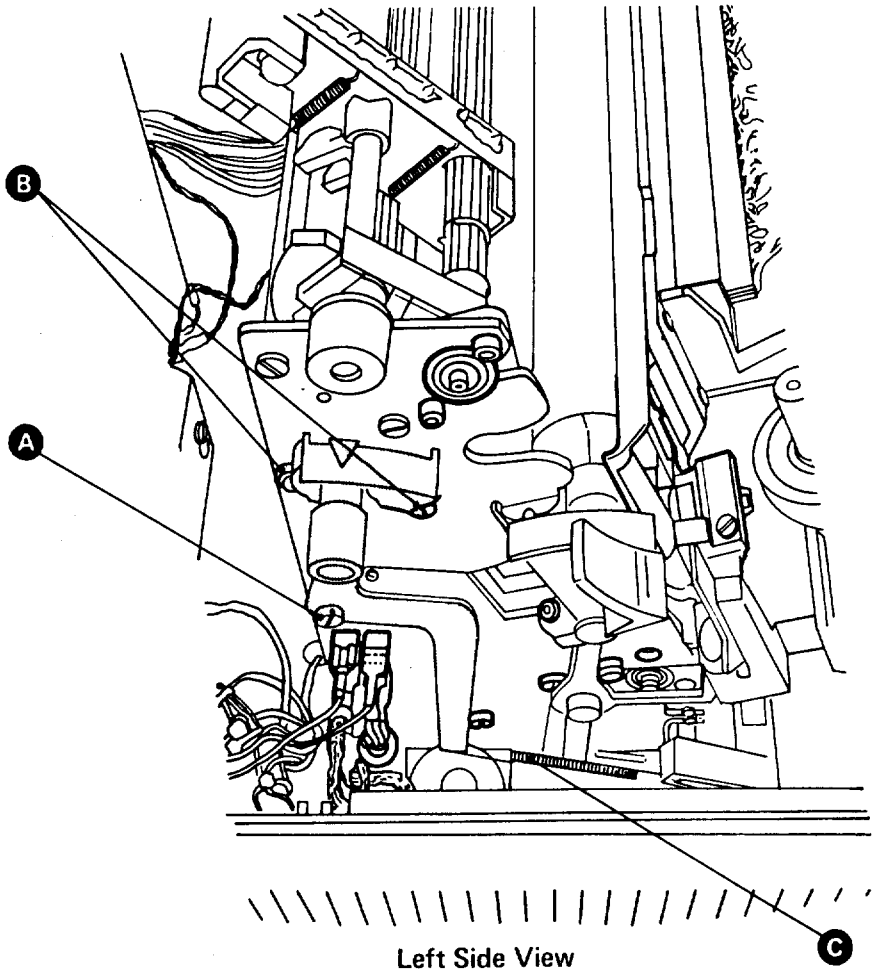


Figure 300-19. Forms Tension Lever Assembly

Forms Drive Roll Shaft

See Figure 300-20 on page 300-29.

Note: If you are replacing this shaft assembly because of drive roll wear, inspect the pressure rolls for wear, and also replace the pressure roll shaft assembly if necessary.

Removal

1. Remove the forms from the printer.
2. Set the printer power switch to O (Off).
3. Disconnect the power cord from the outlet.
4. Remove the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
5. Remove the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
6. Remove the top cover (MI "Top Cover" on page 000-7).
7. Remove the power cover (MI "Power Cover" on page 000-8).
8. Remove the dress panel (early printers only, MI "Transport Assembly, Part 2" on page 800-5) from behind the tractor assembly by pulling up and out of the transport assembly.
9. Place the print mechanism in the service position (MI "Print Mechanism (Service Position)" on page 300-48).
10. Remove the autoload clutch (MI "Autoload Clutch" on page 300-25).
11. Open the pressure feed rolls and remove the screw (A) which holds the bracket (E) to the tie bar.
12. Remove the bracket (E) and wheel (F) from the tie bar.
13. Remove the screw which holds the yoke (B) located at the left side-frame and remove the yoke.
14. Remove the bearing plate assembly mounting screws (C).
15. Slide the drive roll shaft to the right.
16. Remove the bearing plate assembly by removing the screw (D) on the end of the shaft.
17. Slide the shaft to the left and pull it out from the right.

Replacement

1. Insert the left end of the shaft through the left side-frame of the transport assembly.
2. Move the shaft to the right so that the right bearing goes through its hole in the side-frame.
3. Install the bearing plate assembly with the screw (D) on left end of the shaft. Ensure that the bearing is in the side-frame.
4. Slide the shaft to the left, place the bearing assembly into the left side-frame, and install the two mounting screws (C).
5. Install the yoke (B) with the mounting screw.
6. Install the bracket (E) and wheel (F) to the tie bar with the screw (A).
7. Install the autoload clutch (MI "Autoload Clutch" on page 300-25 through step 5).
8. Install the print mechanism (MI "Print Mechanism (Service Position)" on page 300-48).
9. Install the dress panel (early printers only).
10. Install the power cover (MI "Power Cover" on page 000-8).
11. Install the top cover (MI "Top Cover" on page 000-7).
12. Install the dot band (MI "Dot Band Removal and Replacement" on page 300-3).

13. Install the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).

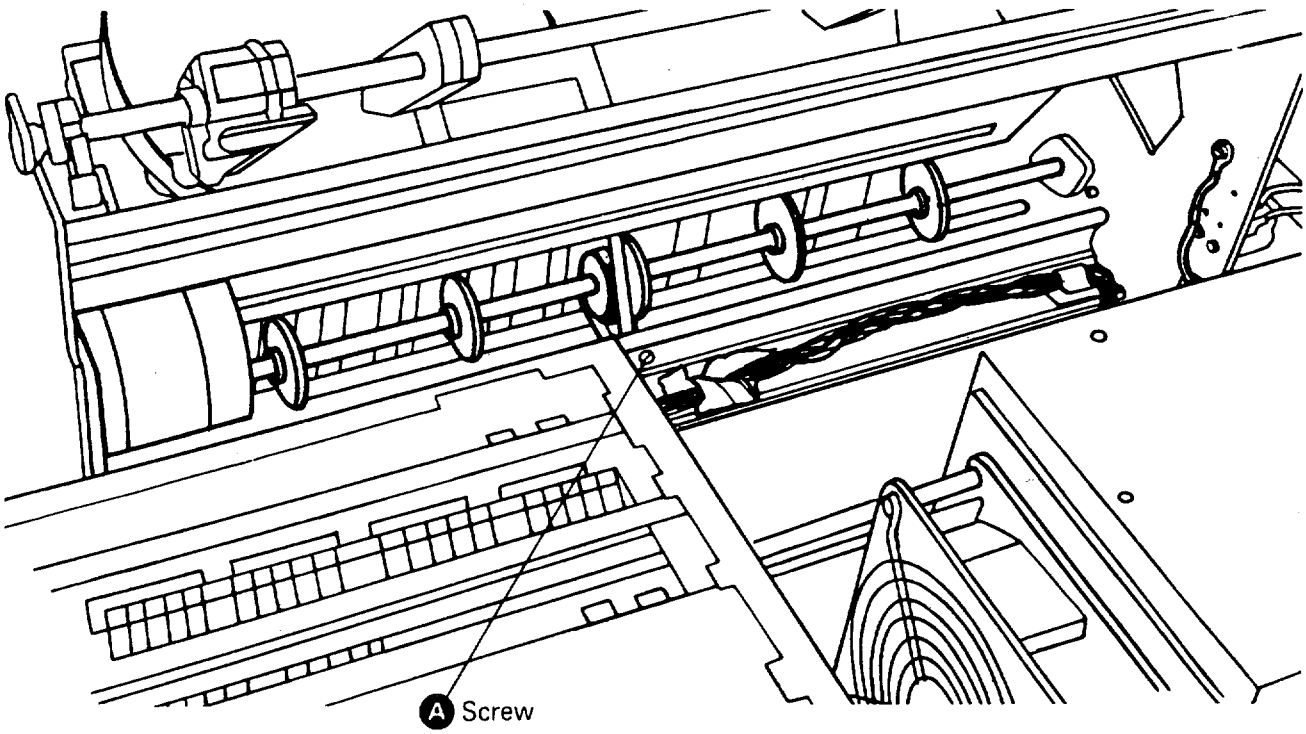


Figure 300-20. Forms Drive Roll Shaft

Forms Pressure Roll Shaft

See Figure 300-21 on page 300-31.

Removal

1. Remove the forms from the printer.
2. Set the printer power switch to O (Off).
3. Disconnect the power cord from the outlet.
4. Remove the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
5. Remove the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
6. Place the print mechanism in the service position (MI "Print Mechanism (Service Position)" on page 300-48).
7. Remove the EOF (D) and JAM (E) sensors by pulling them from their housings.

   Note: The sensors snap in and out of their housings.

8. Remove the springs (B) from both ends of the forms pressure roll shaft.
9. Remove the pressure roll handle screw (C), and remove the handle.
10. Loosen the setscrew and remove the collar from the right end of forms pressure roll shaft.
11. Remove the two cams (A) from the shaft.
12. Remove the two C-clips that position the roller on the far right and move the roller to the left.
13. Slide the shaft to the right and lift it from the printer.

Replacement

Note: If you are installing a new shaft, remove the two C-clips that position the roller on the far right and move the roller to the left.

1. Install the shaft into the side-frames.
2. Reposition the far-right roller and install the two C-clips.
3. Install the two cams (A).
4. Install the springs (B) around the cams on each end of the shaft.
5. Install the pressure roll handle to the shaft assembly.
6. Install collar on the right side of the shaft so there is 0.2 mm to 0.3 mm (0.008 in. to 0.012 in.) between the cam (A) and the side frame.
7. Install the EOF and JAM sensors in their housings.

   Note: The sensors snap in and out of their housings.

8. Install the print mechanism (MI "Print Mechanism (Service Position)" on page 300-48).
9. Install the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
10. Install the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).

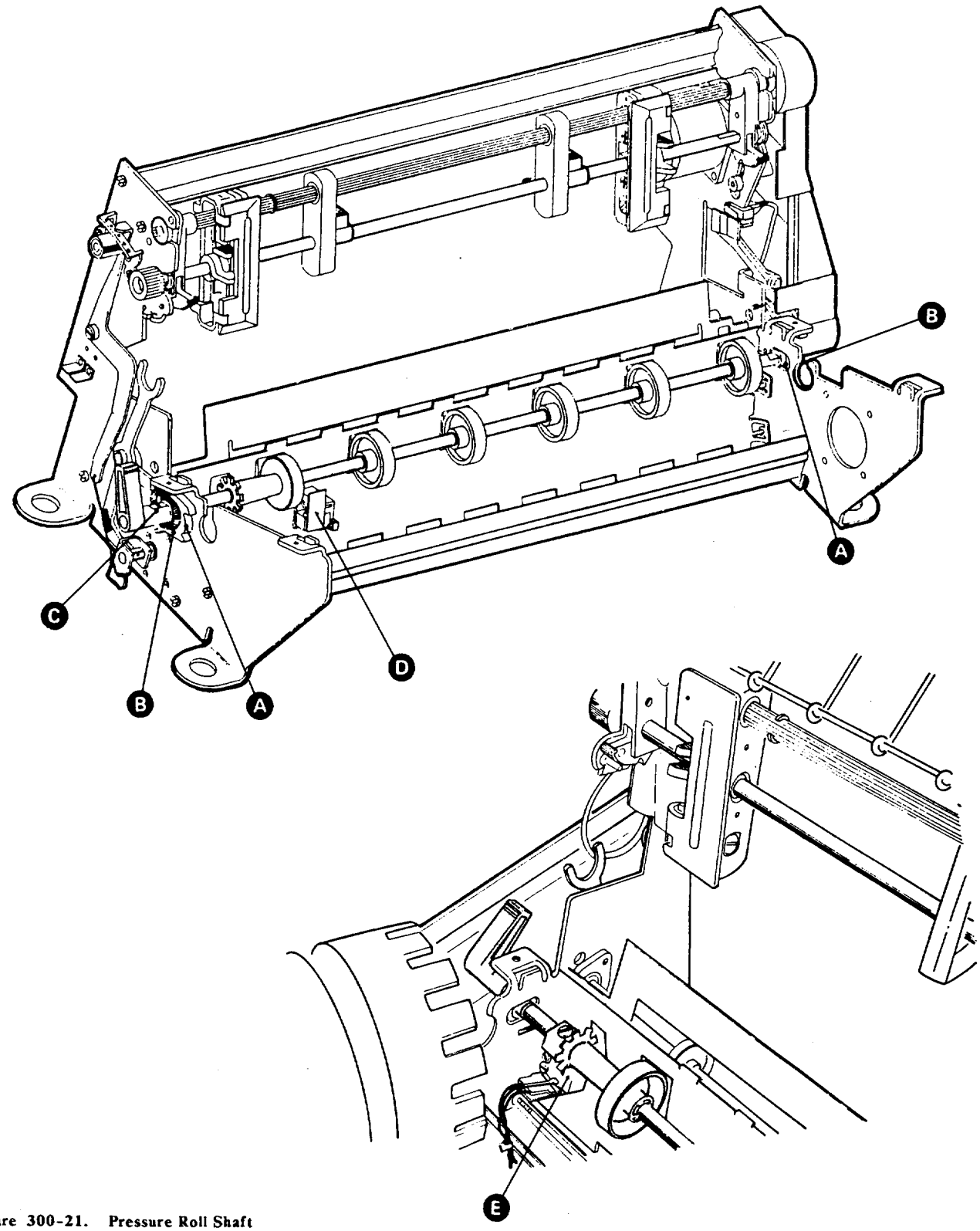


Figure 300-21. Pressure Roll Shaft

Forms Drive Belt

See Figure 300-22

Removal

1. Set the printer power switch to O (Off).
2. Open the top cover.
3. Remove the forms drive safety cover (MI "Transport Assembly, Part 2" on page 800-5) from the right side of printer (remove the bottom screw only).
4. Loosen the idler pulley screw (A) and remove the belt.

Replacement

1. Install the drive belt and adjust the idler pulley (A) so that 450 grams of force deflects the center of the drive belt 6.0 mm to 6.5 mm (0.236 in. to 0.256 in.) as shown in "Forms Drive Belt."
2. Turn the forms knob several times, then check the belt tension. Readjust if necessary.
3. Install the forms drive safety cover (MI "Transport Assembly, Part 2" on page 800-5).

Adjustment

1. Set the printer power switch to O (Off).
2. Open the top cover.
3. Remove the forms drive safety cover (MI "Transport Assembly, Part 2" on page 800-5). from the right side of printer (remove the bottom screw only).
4. Adjust the idler pulley (A) up or down so that 450 grams of force deflects the center of the drive belt 6.0 mm to 6.5 mm (0.236 in. to 0.256 in.) as shown in "Forms Drive Belt."
5. Turn the forms knob several times, then check the belt tension. Readjust if necessary.
6. Install the forms drive safety cover.

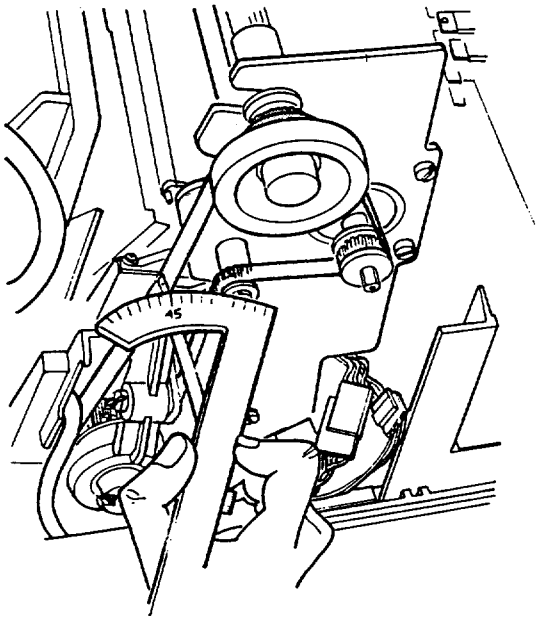
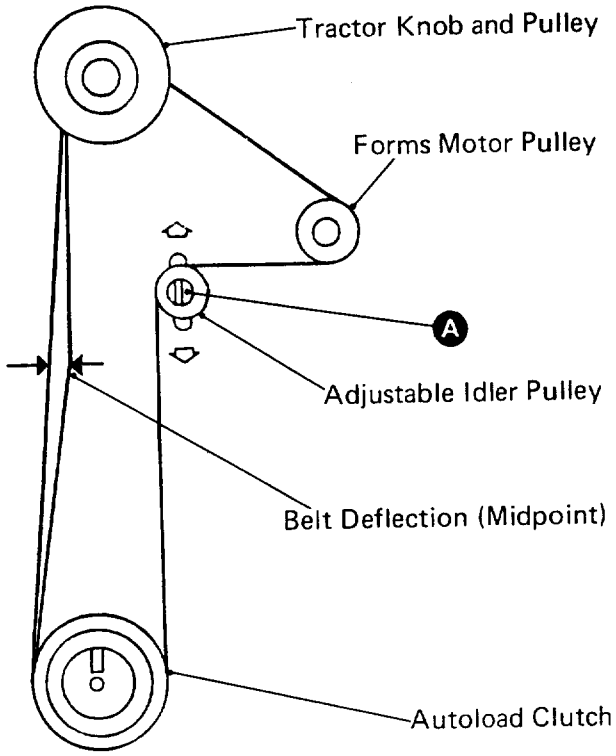


Figure 300-22. Forms Drive Belt



Forms Belt Adjustment

Frame Assembly

See Figure 300-23.

Removal

1. Set the printer power switch to O (Off), and disconnect the power cord from the back of the printer.
2. Remove the power cover (MI "Power Cover" on page 000-8).
3. Remove the print mechanism (MI "Print Mechanism (Removal)" on page 300-50).
4. Disconnect the PLAT connector.
5. Remove the dress panel (early printers only, MI "Transport Assembly, Part 2" on page 800-5).
6. Remove the PLAT, COVR, and SENS harnesses from the right side-frame.
7. Remove the forms drive motor (MI "Forms Drive Motor" on page 300-37).
8. Remove all ground straps from the left side-frame.
9. Disconnect the EOF and JAM sensors, and remove them from the cable clamp.
10. Remove the four frame assembly mounting screws and shock mounts, and remove the frame.
11. If necessary, remove the tractor assembly (see "Tractor Assembly" on page 300-26).

Replacement

1. Position the frame assembly in the bottom cover.
2. Install the four frame shock mounts and mounting screws.
3. Connect the EOF and SENS sensors to the forms pressure roll shaft and install the cables in the cable clamp.
4. Connect all ground straps to the left side-frame.
5. Install the forms drive motor.
6. Install the dress panel (early printers only, MI "Transport Assembly, Part 2" on page 800-5).
7. Connect the PLAT connector.
8. Install the print mechanism (MI "Print Mechanism (Removal)" on page 300-50).
9. Install the power cover (MI "Power Cover" on page 000-8).
10. Install the top cover (MI "Top Cover" on page 000-7).
11. Connect the power cord to the back of the printer.

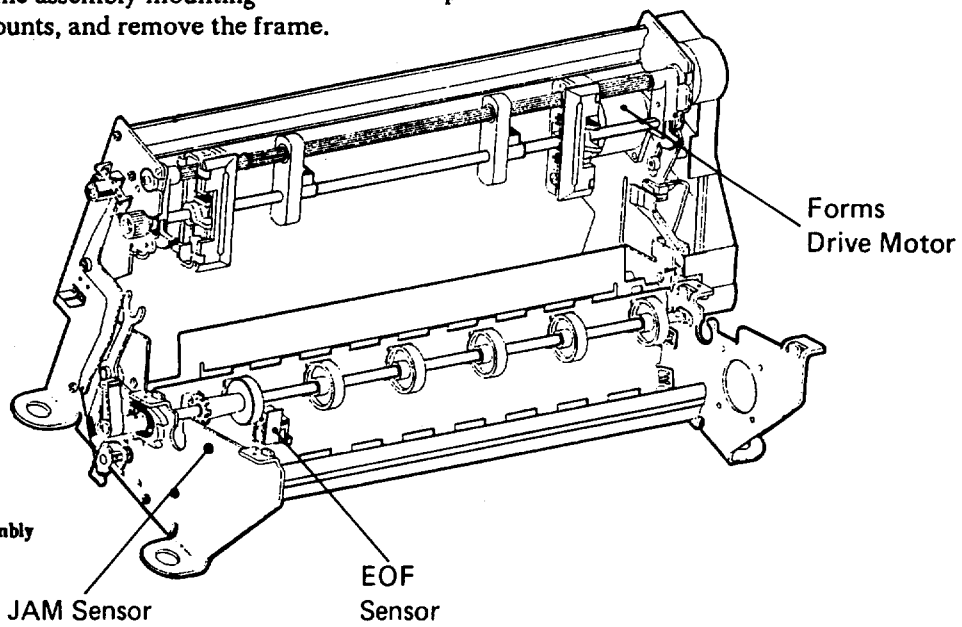


Figure 300-23. Frame Assembly

Forms Tension Assembly

See Figure 300-24.

Removal

1. Set the printer power switch to O (Off), and disconnect the power cord from the back of the printer.
2. Remove the frame assembly (MI "Frame Assembly" on page 300-33).
3. Remove the platen yoke (A).
4. Remove the forms tension lever spring (B).
5. Remove the tension assembly pivot lever (C) from the left end of the assembly.
6. Remove the tension assembly collar from the right end of the assembly.
7. Move the tension assembly (D) to the right so that the left end of the assembly clears the left side-frame.
8. Move the assembly down and to the left and remove it from the frame assembly (through the bottom).

Replacement

1. Install the forms tension assembly (D) in the right side-frame.
2. Put the left end of the assembly in the left side-frame.
3. Install the tension pivot lever (C) to the assembly.
4. Install the tension assembly collar to the right end of the assembly. Ensure that the assembly will pivot freely.
5. Install the tension lever spring (B).
6. Install the platen yoke (A).
7. Install the frame assembly (MI "Frame Assembly" on page 300-33).
8. Install the print mechanism (MI "Print Mechanism (Removal)" on page 300-50).
9. Connect the power cord to the back of the printer.

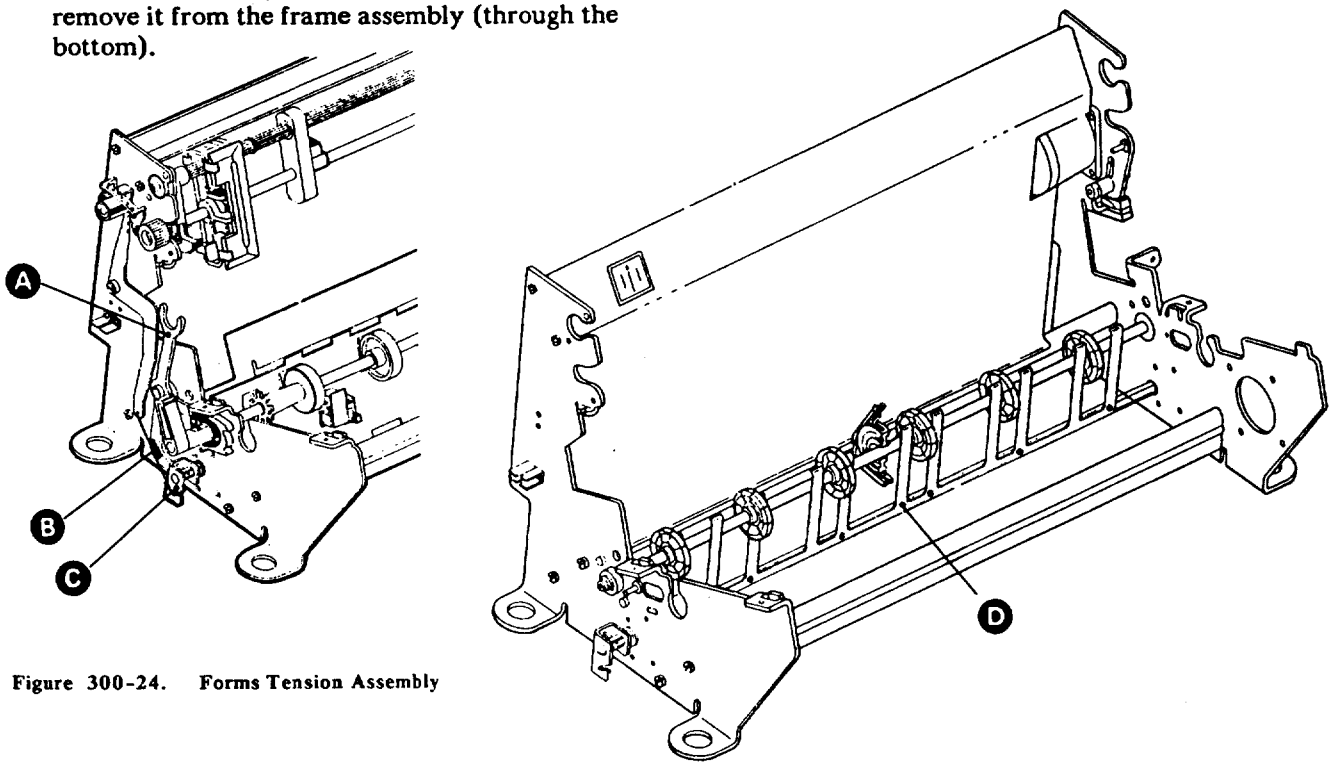


Figure 300-24. Forms Tension Assembly

Rear Forms Guide Plate

See Figure 300-25.

Removal

1. Set the printer power switch to O (Off), and disconnect the power cord from the back of the printer.
2. Remove the frame assembly (MI "Frame Assembly" on page 300-33).
3. Remove the forms tension assembly (MI "Forms Tension Assembly" on page 300-34).
4. Remove the four rear plate mounting screws.
5. Remove the plate (A) through the bottom of the frame.

Replacement

1. Position the forms guide plate (A) in the frame assembly.
2. Install the four guide plate mounting screws.
3. Install the forms tension assembly (MI "Forms Tension Assembly" on page 300-34).
4. Install the frame assembly (MI "Frame Assembly" on page 300-33).
5. Install the print mechanism (MI "Print Mechanism (Removal)" on page 300-50).
6. Connect the power cord to the back of the printer.

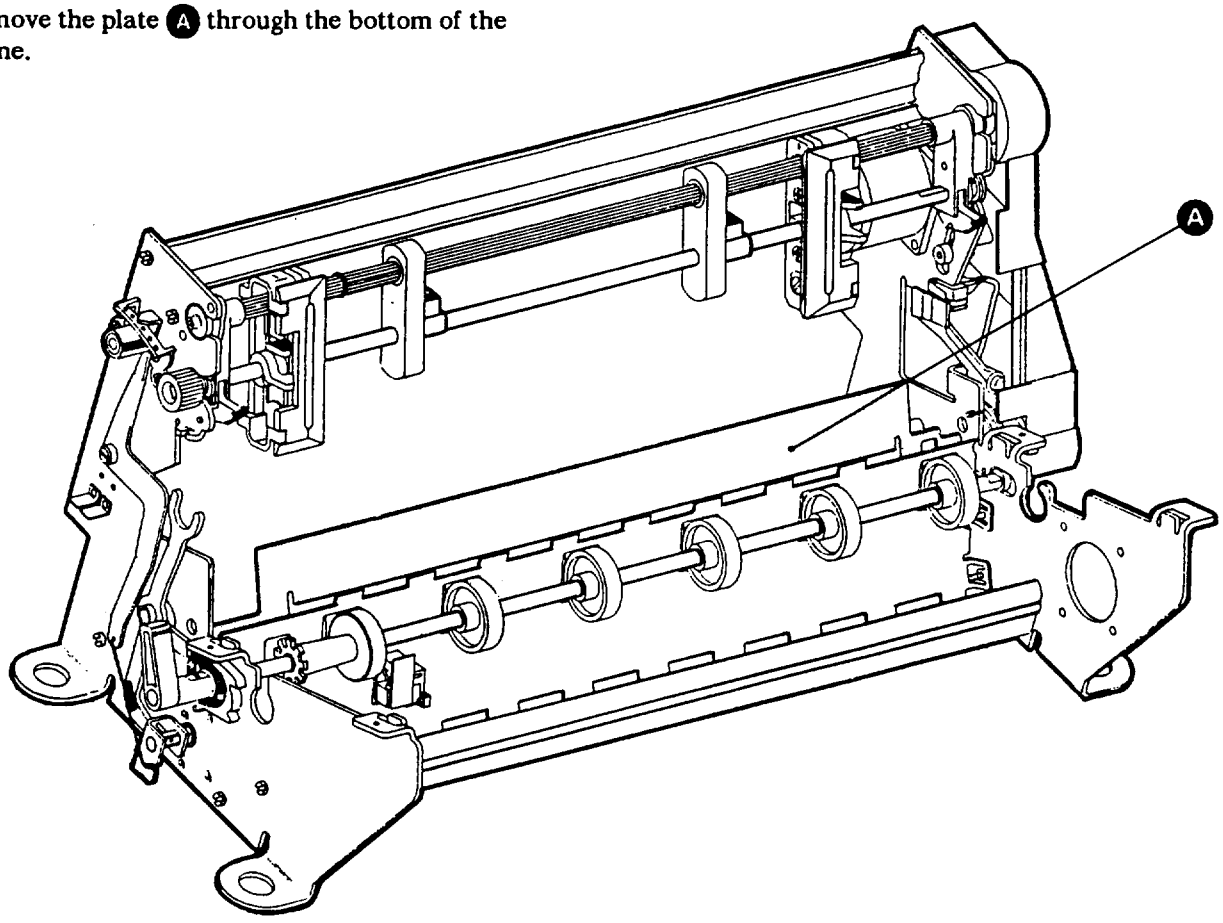


Figure 300-25. Rear Forms Guide Plate

] ·ont Forms Guide Plate

See Figure 300-26.

Removal

1. Set the printer power switch to O (Off), and disconnect the power cord from the back of the printer.
2. Remove the frame assembly (MI "Frame Assembly" on page 300-33).
3. Remove the forms tension assembly (MI "Forms Tension Assembly" on page 300-34).
4. Remove the four front plate mounting screws.
5. Remove the plate (A) through the bottom of the frame.

Replacement

1. Position the forms guide plate (A) in the frame assembly.
2. Install the four guide plate mounting screws.
3. Install the forms tension assembly (MI "Forms Tension Assembly" on page 300-34).
4. Install the frame assembly (MI "Frame Assembly" on page 300-33).
5. Install the print mechanism (MI "Print Mechanism (Removal)" on page 300-50).
6. Connect the power cord to the back of the printer.

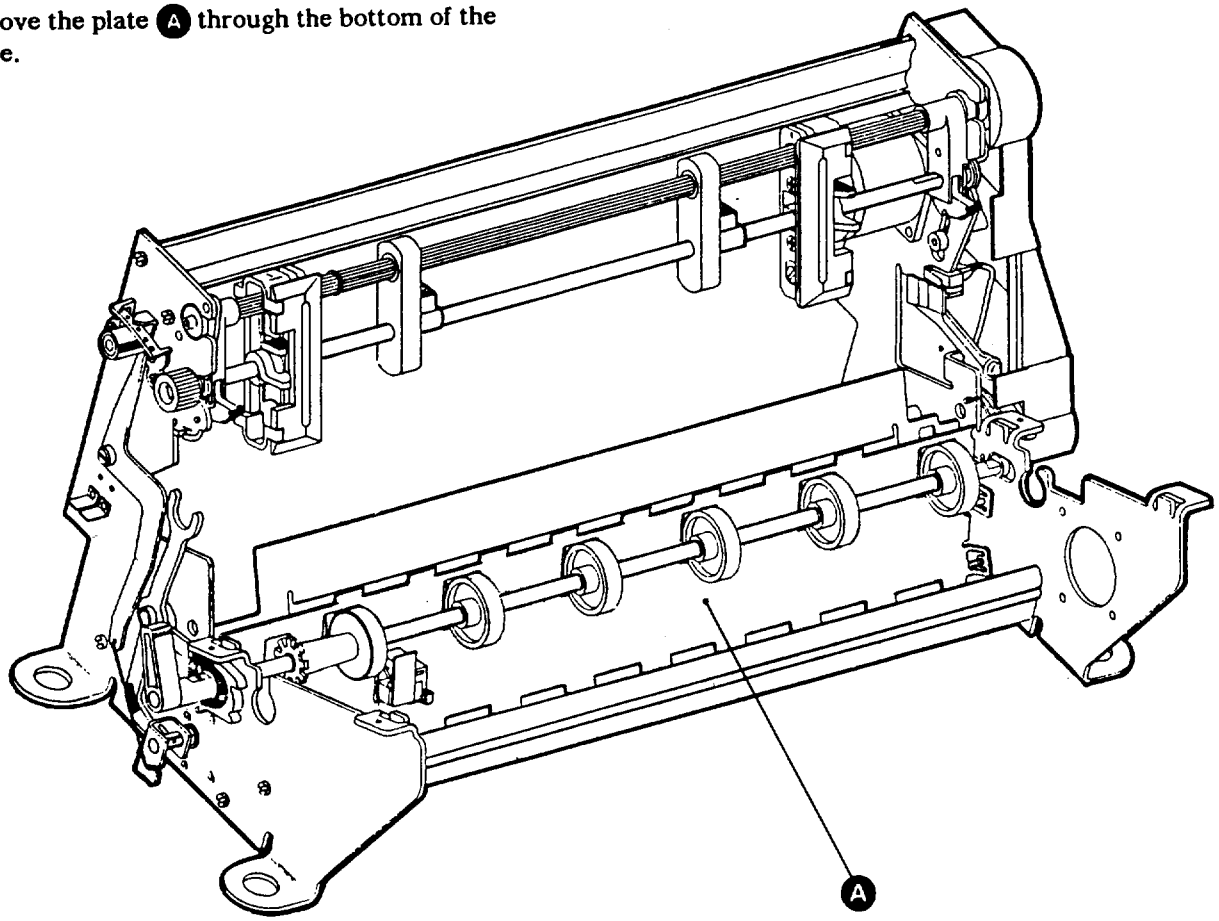


Figure 300-26. Front Forms Guide Plate

Forms Drive Motor

See Figure 300-27.

Removal

1. Set the printer power switch to O (Off).
2. Remove forms from the printer.
3. Remove the top cover (MI "Top Cover" on page 000-7).
4. Remove the power cover (MI "Power Cover" on page 000-8).
5. Remove the forms drive safety cover (MI "Transport Assembly, Part 2" on page 800-5) from the right side of printer (remove the bottom screw only).
6. Release the forms motor cable from all cable ties and clamps.
7. Pivot the logic gate and disconnect the motor connector (01A-A1G3) from the logic gate.
8. Release the tension on the forms drive belt by loosening the idler pulley screw (A), and move the idler pulley down.
9. Loosen the setscrew on motor pulley (C), and slide the pulley from the motor shaft.
10. Remove the forms motor mounting screws (B), and remove the motor.

Replacement

1. Mount the motor on the side-frame with the screws (B).
2. Install the motor pulley (C) onto the motor shaft.
3. Tighten the setscrew on the motor pulley.
4. Connect the motor connector (01A-A1G3) to the logic gate.
5. Install cable ties and clamps.
6. Install the drive belt and adjust the idler pulley (A) so that 450 grams of force deflects the center of the drive belt 6.0 mm to 6.5 mm (0.236 to 0.256 inches) as shown in "Forms Drive Belt" on page 300-32.
7. Turn the forms knob several times, then check the belt tension. Readjust if necessary.
8. Turn the forms advance knob several times to ensure that the belt tracks in the center of the pulley. If it does not, move the pulley left or right.
9. Install the forms drive safety cover.
10. Install the power cover (MI "Power Cover" on page 000-8).
11. Install the top cover (MI "Top Cover" on page 000-7).

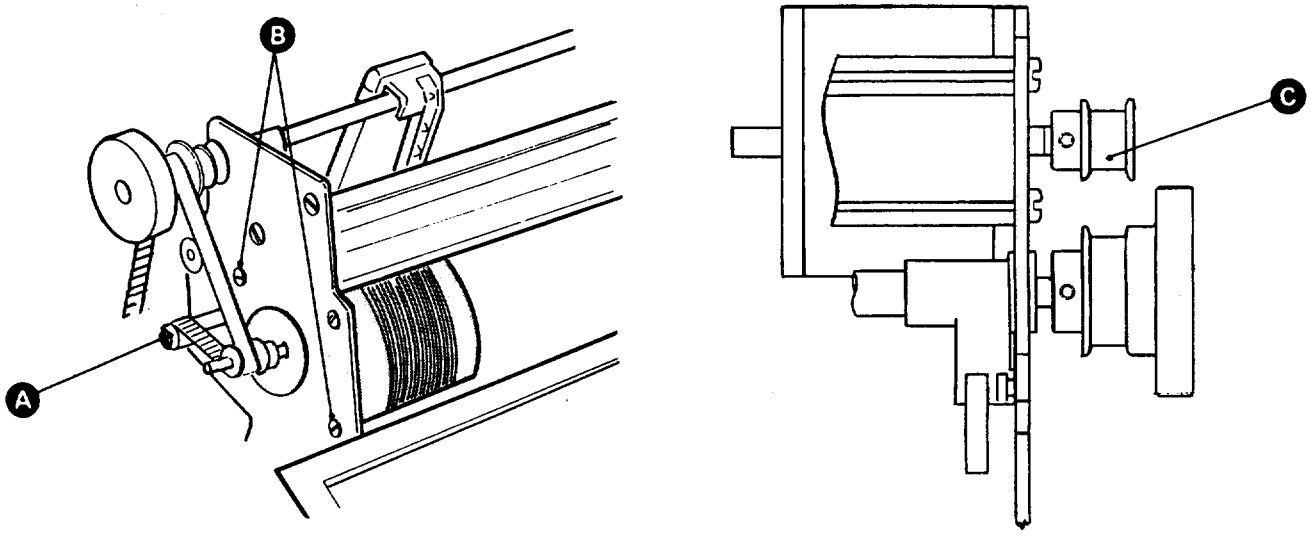


Figure 300-27. Forms Drive Motor

EOF Sensor

See Figure 300-28.

Removal

1. Set the printer power switch to O (Off).
2. Place the print mechanism in the service position (MI "Print Mechanism (Service Position)" on page 300-48).
3. Remove the EOF sensor by pulling it from its housing.

   Note: The sensor snaps in and out of the housing.
4. Disconnect the connector from the sensor.

Replacement

1. Connect the connector to the sensor.
2. Install the EOF sensor in its housings.

   Note: The sensor snaps in and out of the housing.
3. Install print mechanism (MI "Print Mechanism (Service Position)" on page 300-48).
4. Set the power switch to | (On), and test the printer.

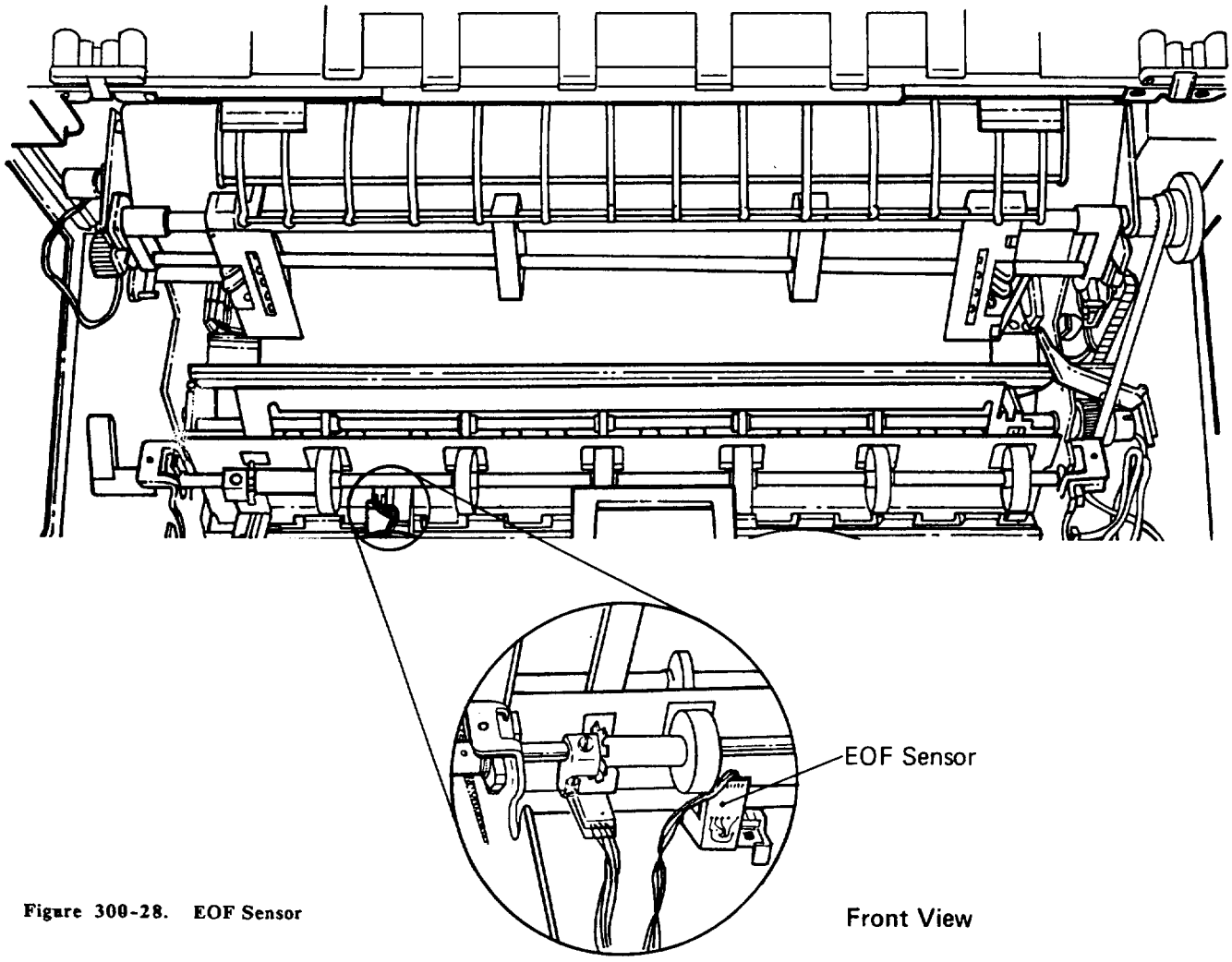


Figure 300-28. EOF Sensor

JAM Sensor

See Figure 300-29.

Removal

1. Set the printer power switch to O (Off).
2. Place the print mechanism in the service position (MI "Print Mechanism (Service Position)" on page 300-48).
3. Remove the JAM sensor by pulling it from its housing.

   Note: The sensor snaps in and out of the housing.

4. Disconnect the cable connector from the sensor assembly.

Replacement

1. Connect the cable connector to the sensor.
2. Install the JAM sensor in its housing.

   Note: The sensor snaps in and out of the housing.

3. Close the forms pressure roll shaft.
4. Install print mechanism (MI "Print Mechanism (Service Position)" on page 300-48).
5. Set the printer power switch to | (On), and test the printer.

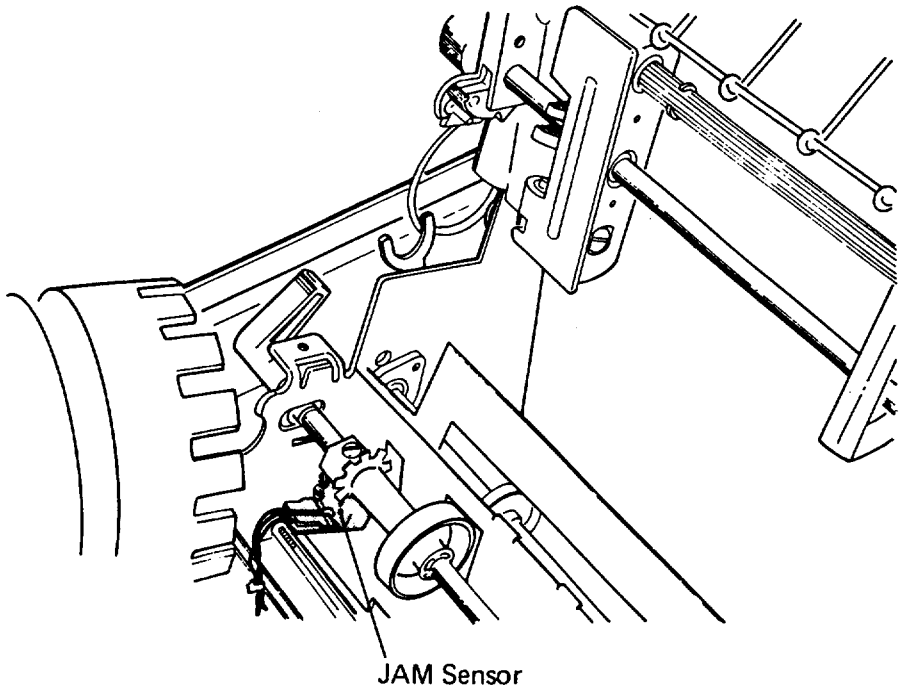


Figure 300-29. JAM Sensor

Forms Feeding Service Check

See Figure 300-30 on page 300-41.

The three possible areas of forms feeding problems in the printer are:

- Autoload mechanism
- Tractor assembly
- Stacker area.

Autoload Mechanism

If forms fail to load in an autoload operation, perform the following general checks:

1. With no forms loaded in the printer, set the printer power switch to O (Off), and turn the forms advance knob (A) several times. The knob should turn easily.
2. Visually check that there are no obstructions in the forms path by looking down between the forms guide and the platen.
3. With the forms thickness lever (B) toward the front of the printer (platen closed), power on, and allow the printer to complete the BAT test. The printer should detect an "end of forms" condition and the status code should be 01.
4. Move the forms thickness lever (B) all the way to the rear of the printer (platen open) and check that the form feed pressure rolls are closed and against the form drive rolls.
5. Insert the forms up into the forms chute to begin the autoload operation. Be sure the forms operate the EOF sensor lever.

Forms Motor Fails to Start: If the forms motor fails to start when you insert forms into the forms chute, check the following:

1. The forms operate the EOF lever (look down forms path below print area).
2. The forms thickness lever (B) is open (toward the rear of the printer), and the form pressure roll lever (C) is closed (toward the rear of the printer).
3. The platen switch adjustment (MI "Platen Switch" on page 300-53).

Forms Motor Starts: If the forms motor starts, but forms do not move up to the form tractor area, check the following:

1. The condition of the forms drive belt (E) (missing teeth, frayed or stretched belt) and the belt tension adjustment (MI "Forms Drive Belt" on page 300-32).
2. The forms motor pulley and the forms knob and pulley (A) are tight and aligned correctly (see Figure 300-27 on page 300-37).
3. The forms pressure rolls and feed rolls for wear and alignment, and that the tension springs (D) on either side of the pressure roll shaft hold the pressure rolls against the feed rolls when the pressure roll lever (C) is toward the rear of the printer.
4. The teeth on the autoload clutch coupling (G) engage with the teeth on the drive wheel ratchet.

5. The autoload clutch screwpin (F) is in place and is driving the coupling that is attached to the forms drive roll shaft. The form drive wheels should be turning at this time.

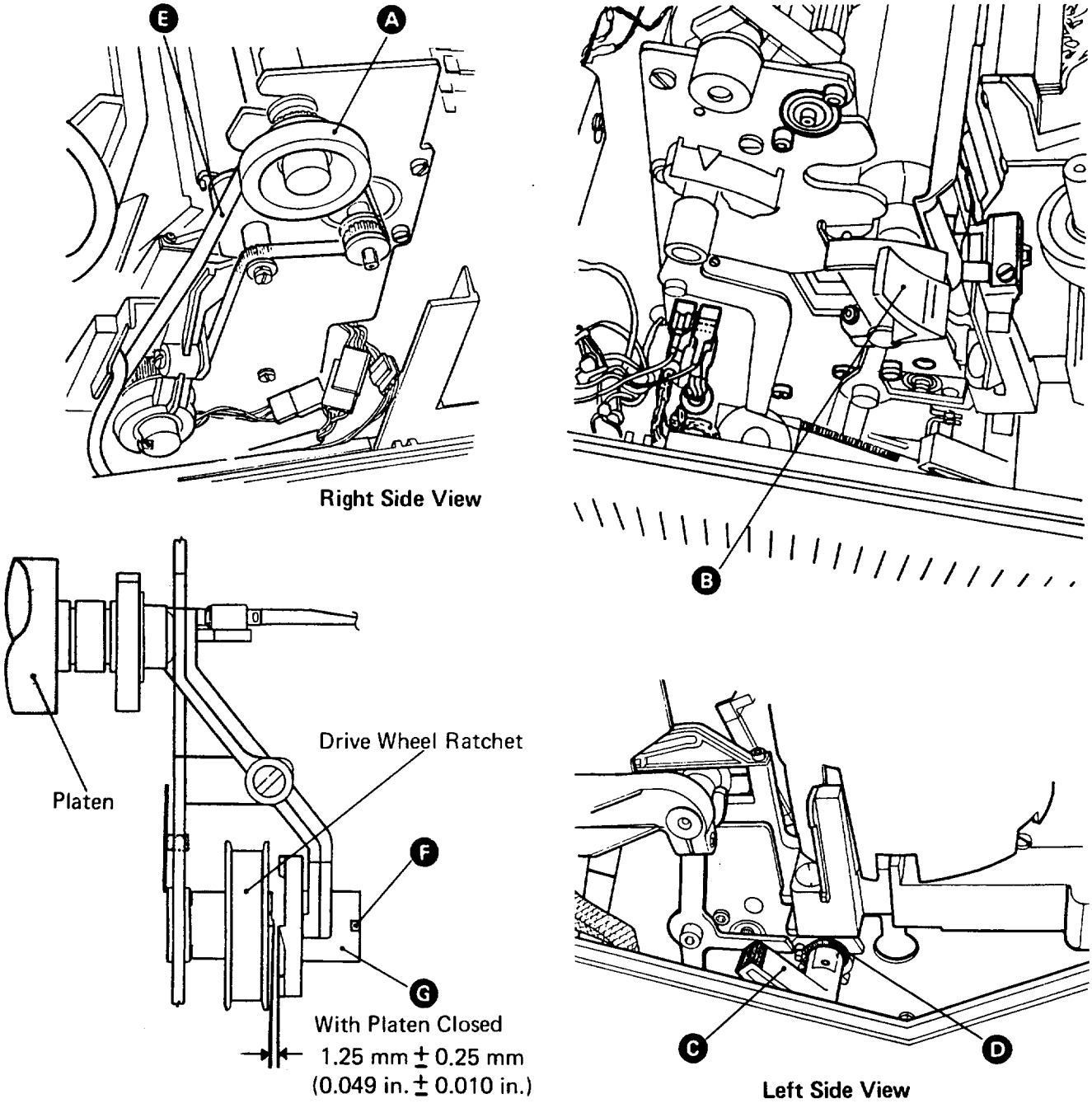


Figure 300-30. Forms Feeding Service Check - Autoload Assembly

Tractor Assembly

See Figure 300-31 on page 300-43.

For torn forms, misled forms, or form jams (SC=02, 32 or 82), perform the following checks:

1. Check that the forms thickness lever is set for the thickness of forms being used.
2. With forms loaded, set the power switch to O (Off), and turn the forms knob to ensure that the forms feed easily from the supply box and that the box is properly aligned.
3. Ensure that the forms motor pulley and the forms advance knob are tight on their shafts and that the form drive belt is properly adjusted.
4. Check that the forms are stacking properly behind the printer. Forms that do not stack properly can cause jams in the printing area and the stacker area.
5. Check that the tractor assembly (A) is correctly latched and positioned and that the form guides are properly positioned behind the forms.
6. Check both the tractor pins (B) and tractor doors (C) for horizontal alignment and for signs of wear. Check that the tractor doors (C) are held in position by spring tension and that the forms are held firmly against the tractor guides.
7. Check for proper clearance and for any obstructions between the wire form guides that are attached to the top and power covers.
8. Remove the black plastic panel, and check the form drive rolls and the form pressure rolls for alignment and wear.
9. Check to see if the autoload drive wheel has disengaged from the coupling when the forms thickness lever is brought forward (MI "Print Mechanism Setscrew Adjustment" on page 300-52).
10. If the above checks are OK, check the platen-to-hammer gap adjustment (MI "Platen Assembly Adjustments" on page 300-54).

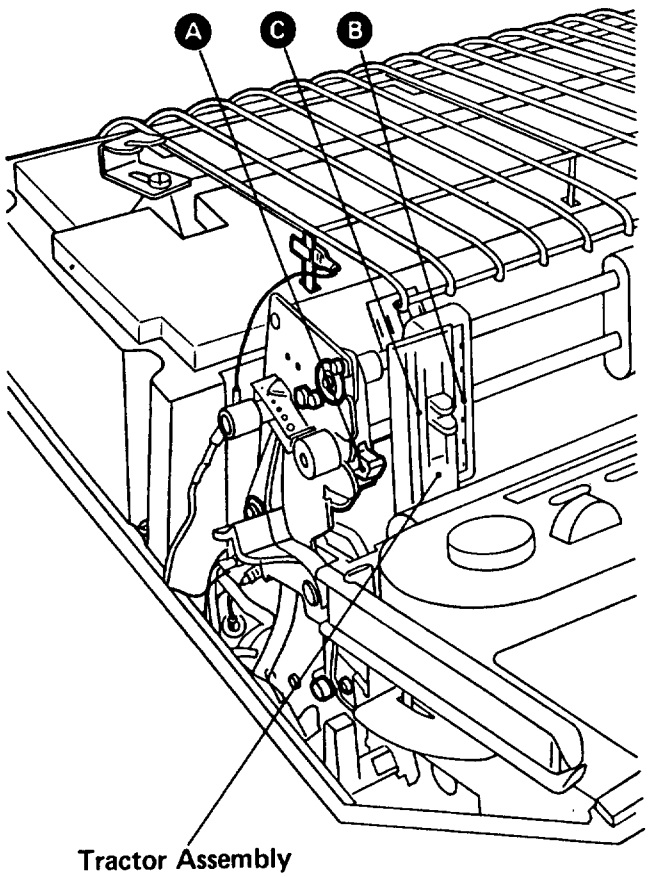
Stacker Assembly

Forms that do not stack properly can back up and jam in the wire paper guides. Check the following:

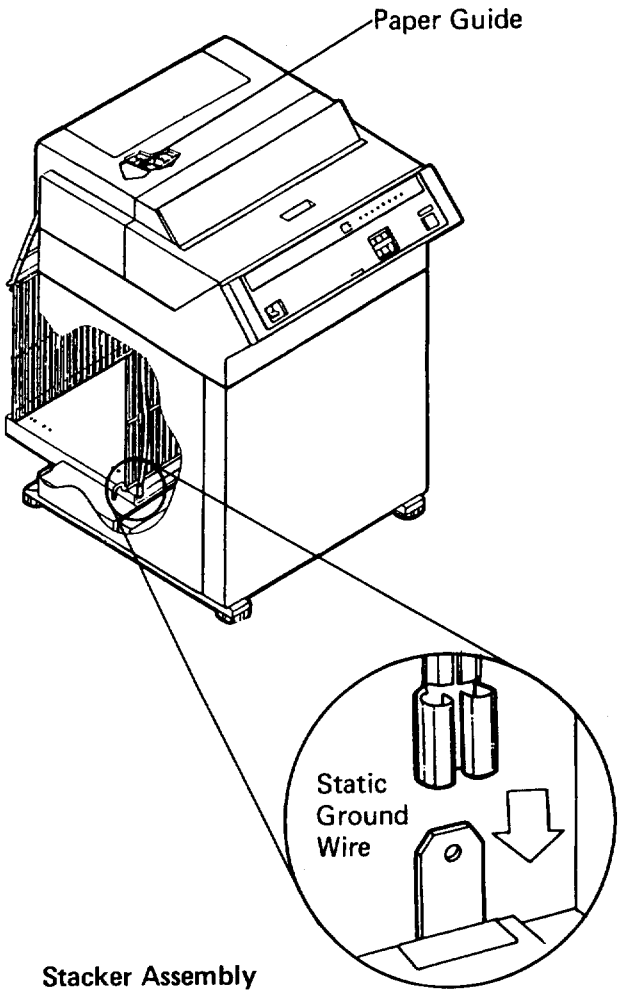
1. Check for proper stacker adjustment for the length and width forms you are using. Refer to the *IBM 4234 Printer Operating Instructions, Volume 1.*

2. Check that the wire guide on the power cover and on the top cover are properly positioned, and that there are no obstructions to the forms path in this area.

3. Check that the static ground wire is connected to the stacker plate, and that the static eliminator is in place and does not obstruct the forms path.



Tractor Assembly



Stacker Assembly

340 Ribbon Drive

Ribbon Drive Theory of Operation

The ribbon cartridge (see Figure 300-31) is a customer-replaceable item. The ribbon is driven at an angle to spread the print line over a larger area of ribbon. This helps to extend the life of the ribbon. An ac motor drives the ribbon in the same direction as the dot band. The system card controls the ribbon movement.

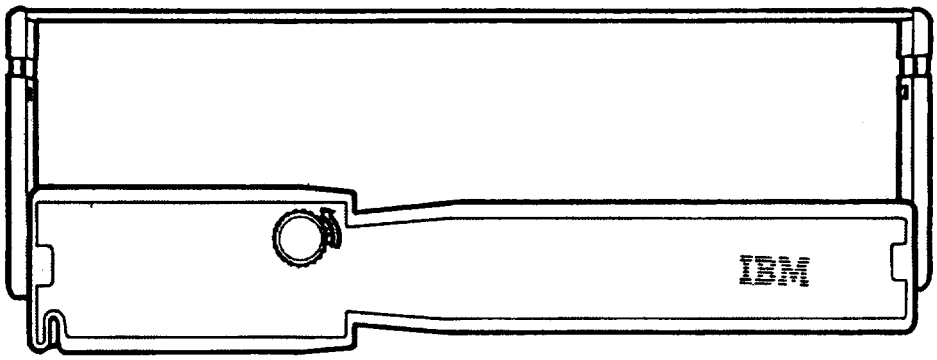


Figure 300-31. Ribbon Cartridge

Ribbon Cartridge

Note: For more detailed illustrations, see the *IBM 4234 Printer Operating Instructions* located inside the printer cover.

See Figure 300-32.

Removal

1. If power is on, press the **Hold Print** key.
2. Open the top cover.
3. Move the forms thickness lever (A) completely toward the rear of the printer.
4. Unlatch the forms feed assembly (B) and push the assembly away from you toward the rear of the printer.
5. Push the ends of the paper shield (C) toward the rear of the printer.
6. Pull the two ribbon cartridge arms (D) out slightly and lift them up.
7. Lift the ribbon cartridge out of the printer.

   Note: Use a small amount of force to unsnap the ribbon cartridge.

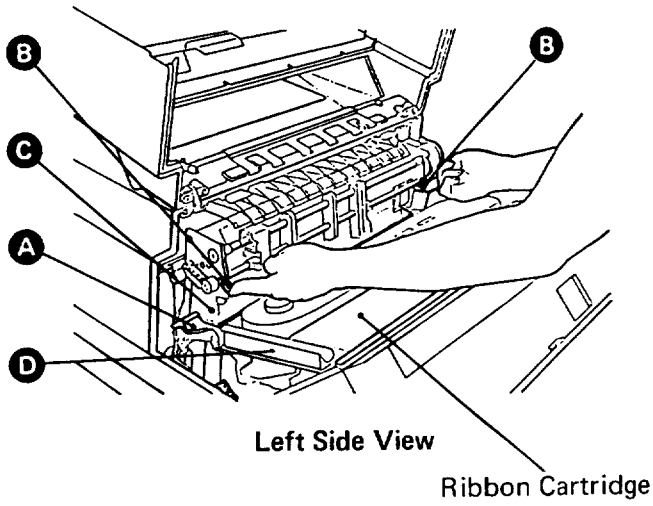


Figure 300-32. Ribbon Cartridge Removal

Replacement

1. Rotate the ribbon knob counterclockwise to remove any slack in the ribbon.
2. Line up the slot on the left of the ribbon cartridge with the rib on the base of the printer.
3. Place the cartridge against the rib on the right.
4. Press down on the ribbon cartridge and turn the ribbon knob counterclockwise until the cartridge snaps into place.
5. Pull the two ribbon cartridge arms (D) out and down over their locking slots. The ribbon arms latch in place at different heights.
6. Ensure the ribbon lies between the dot band and the paper shield.
7. Rotate the ribbon knob counterclockwise to remove any slack in the ribbon.
8. Pull the paper shield (C) forward until it snaps in place.
9. Pull the forms feed assembly (B) toward the front of the printer until it latches in place.
10. Move the forms thickness lever (A) toward the front of the printer.
11. Press the **Enable Print** key and test the printer.

Ribbon Motor

Warning:

The ribbon motor cable must not interfere with the motor fan blade. Observe the cable routing.

See Figure 300-33.

Removal

1. Set the printer power switch to O (Off).
2. Open the top cover.
3. Place the print mechanism in the service position (see "Print Mechanism (Service Position)" on page 300-48).
4. Remove the four ribbon motor mounting screws (A).
5. Disconnect the motor cable (M-2).
6. Remove the ribbon motor.

Replacement

1. Install the ribbon motor through the print casting and tighten the four screws (A).
2. Connect the motor cable (M-2).
3. Install the print mechanism (see "Print Mechanism (Service Position)" on page 300-48).

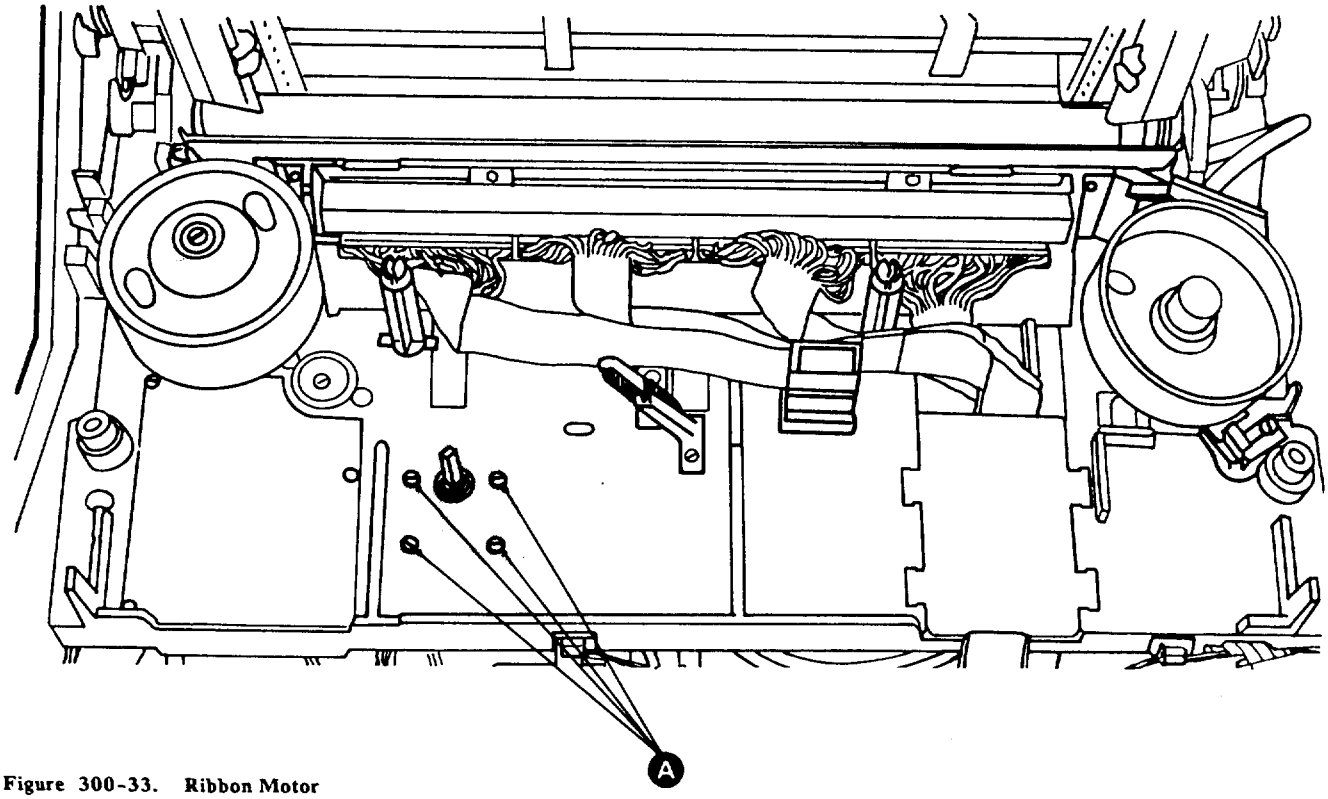


Figure 300-33. Ribbon Motor

Ribbon Service Check

If you are having print problems, check the following before replacing the ribbon.

See Figure 300-34.

With power off:

1. Check the setting of the forms thickness lever (B) for the thickness of forms being used.
2. Ensure that the ribbon is installed correctly and is seated on the ribbon motor drive shaft.
3. Check the condition of the ribbon for wear, the cartridge arms for proper position, and turn the ribbon knob counter-clockwise to determine that the ribbon feeds smoothly and easily.
4. Remove the dot band and inspect it for any damage (bent chevron) that could affect the condition of the ribbon.

With power on:

1. Install the dot band and set the printer power switch to | (On). After the BAT test completes, select Test 55 and press key D to start the ribbon drive motor.
2. Check that the paper shield (A) is closed and latched. If the shield does not close and latch, there may be an obstruction in the ribbon path.
3. With the ribbon motor running, check that the ribbon feeds smoothly and steadily.
4. Check the forms thickness lever (B) adjustment for the thickness of the forms being used. If the lever is set for single-part forms and you are using multiple-part forms, the ribbon may be binding or dragging.

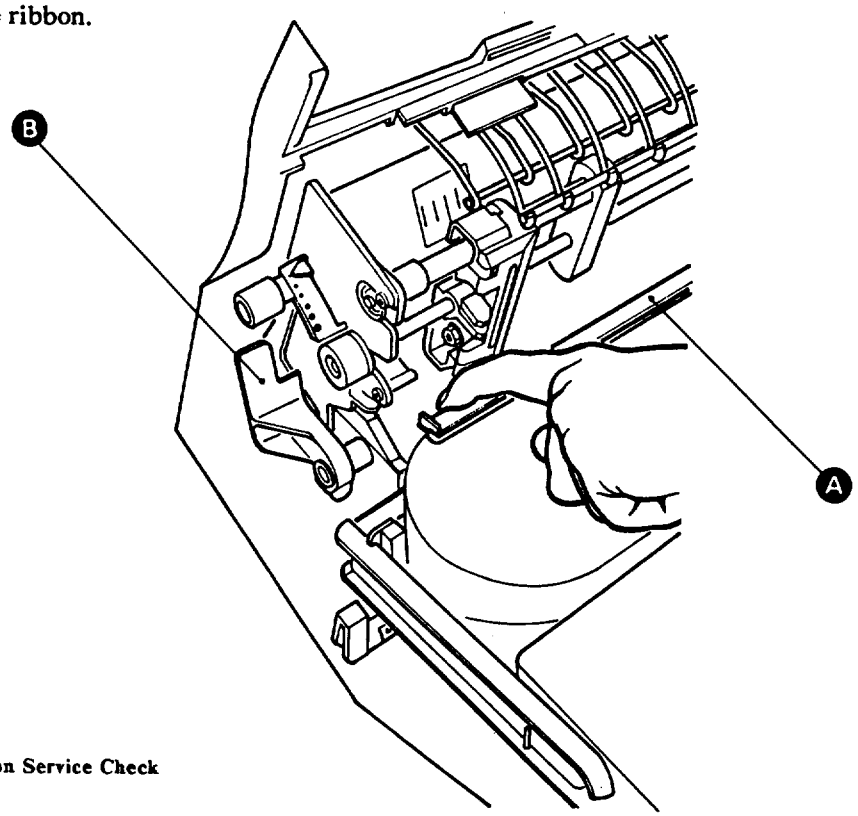


Figure 300-34. Ribbon Service Check

350 Print Quality

Print Mechanism (Service Position)

Note: This service procedure should be followed for all printers that have the projections (E) on the print mechanism. The complete print mechanism removal procedure (MI "Print Mechanism (Removal)" on page 300-50) should be followed for those printers which do not have the projections.

See Figure 300-35 on page 300-49.

Removal

1. Set the printer power switch to O (Off).
2. Remove the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
3. Remove the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
4. Remove the operator panel (MI "Operator Panel" on page 500-3).
5. Remove the operator panel support plate (MI "Operator Panel Support Plate" on page 500-5).
6. Disconnect M1 and M2 (B).
7. Remove the forms drive safety cover by removing the bottom screw only (MI "Transport Assembly, Part 2" on page 800-5).
8. Disconnect the SENS and COVR switch cable connectors (D).
9. Remove the three print mechanism mounting screws (A).
10. Lift the front of the print mechanism approximately 8 cm (3 in.), and move the mechanism toward you until the platen assembly clears the side plates.
11. Continue to lift and turn the platen end of the print mechanism toward you 90 degrees until the platen is pointing up.
12. Place the two projections (E) of the casting into the holes (C) of the side plates.

Replacement

1. To install the print mechanism, lift the casting so that the projections (E) clear the holes (C) in the side plate.
2. Rotate the mechanism away from you 90 degrees until the platen faces the rear of the printer.
3. Align the platen shaft (G) with the platen yoke (F) and ensure that the autoload clutch lever (J) is located to the left of the platen switch lever (K).
4. Insert the mechanism into the printer side plates and lower it into position on the mounting pads.
5. Move the mechanism as far to the right as possible and install the three screws (A). Ensure that the print mechanism casting touches the setcrew (MI "Print Mechanism Setscrew Adjustment" on page 300-52).
6. Check the print mechanism setscrew adjustment (MI "Print Mechanism Setscrew Adjustment" on page 300-52).

   Note: Ensure that the platen switch operates properly after the print mechanism has been installed.

7. Move the forms thickness lever as you observe the platen switch.
   - With the forms thickness lever (H) moved completely to the rear (platen open position), the platen switch should be closed.
   - With the forms thickness lever in one of the print positions, A through F, the platen switch should be open.
8. If necessary, adjust the platen switch (MI "Platen Switch" on page 300-53).
9. Install the forms drive safety cover (MI "Transport Assembly, Part 2" on page 800-5).
10. Connect the SENS and COVR cable connector (D).
11. Connect the M1 and M2 connectors (B).

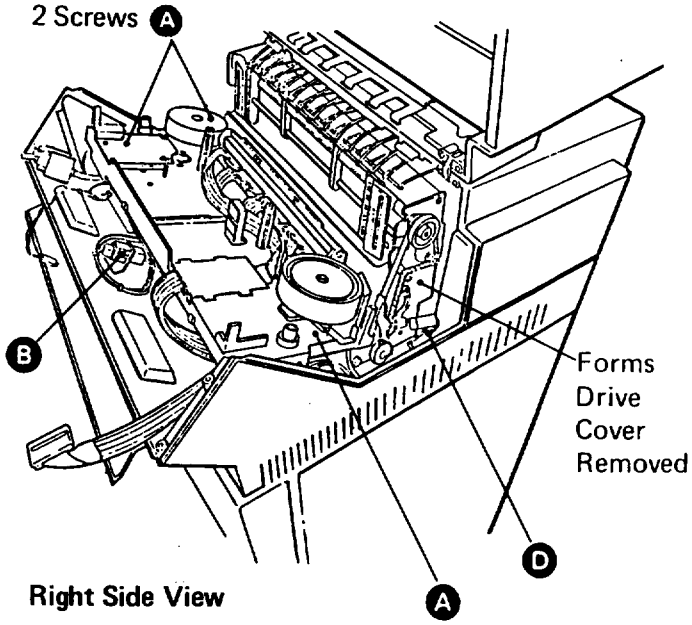
12. Install the operator panel support plate (MI "Operator Panel Support Plate" on page 500-5).

13. Install the operator panel (MI "Operator Panel" on page 500-3).

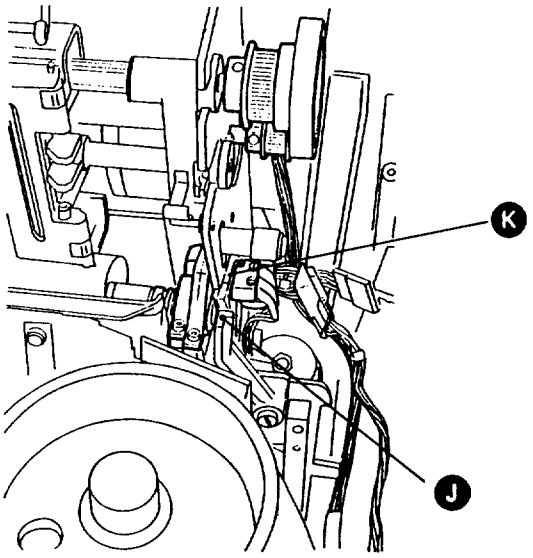
14. Install the dot band (MI "Dot Band Removal and Replacement" on page 300-3).

15. Install the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).

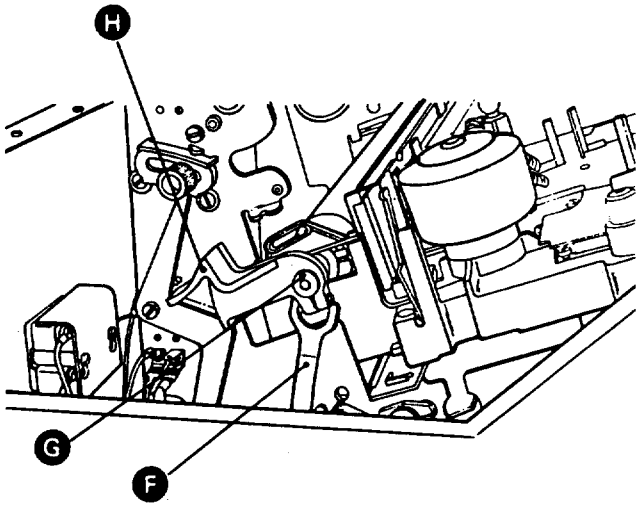
16. Set the printer power switch to | (On), and test the printer.



Right Side View



Right Side



Left Side View

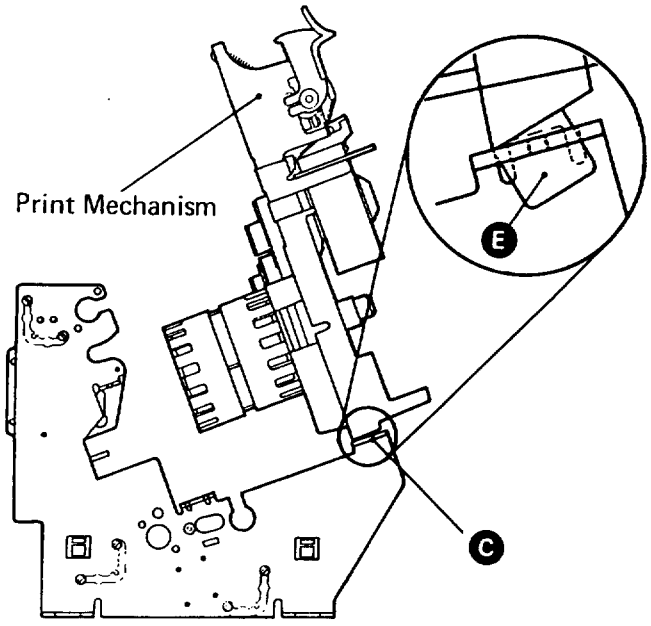


Figure 300-35. Print Mechanism Service Position

Print Mechanism (Removal)

See Figure 300-36 on page 300-51.

Removal

1. Remove the forms.
2. Set the printer power switch to Off (O), and disconnect the power cord from the back of the printer.
3. Remove the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
4. Remove the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
5. Remove the operator panel (MI "Operator Panel" on page 500-3).
6. Remove the operator panel support plate (MI "Operator Panel Support Plate" on page 500-5).
7. Disconnect M1 and M2 (B).
8. Remove the forms drive safety cover by removing the bottom screw only (MI "Transport Assembly, Part 2" on page 800-5).
9. Disconnect the SENS and COVR switch cable connectors (D).
10. Remove the metal plate (F) over the hammer cables.
11. Remove the hammer safety cover (H) located over the the hammer connectors.
12. Remove the capacitor safety cover (G) and remove the ground wire located in the casting.
13. Disconnect the eight hammer connectors and lay the cables over the front edge of the printer.
14. Remove the three print mechanism screws (A) and lift the print mechanism from the printer.

Replacement

1. Align the platen shaft (J) with the platen yoke (K) and ensure that the autoload clutch lever (L) is located to the left of the platen switch lever (M).
2. Insert the mechanism into the printer side plates and lower it into position on the mounting pads.
3. Move the mechanism as far to the right as possible and install the three screws (A). Ensure that the print mechanism casting touches the setscrew (MI "Print Mechanism Setscrew Adjustment" on page 300-52).
4. Check the print mechanism setscrew adjustment (MI "Print Mechanism Setscrew Adjustment" on page 300-52).

   Note: Ensure that the platen switch operates properly after the print mechanism has been installed.

5. Move the forms thickness lever as you observe the platen switch.

   - With the forms thickness lever (C) moved completely to the rear (platen open position), the platen switch should be closed.
   - With the forms thickness lever in one of the print positions, A through F, the platen switch should be open.

6. If necessary, adjust the platen switch (MI "Platen Switch" on page 300-53).

   Warning: When connecting the hammer cables, note that pins 45 on hammer block three are NOT used and should not have connectors attached.

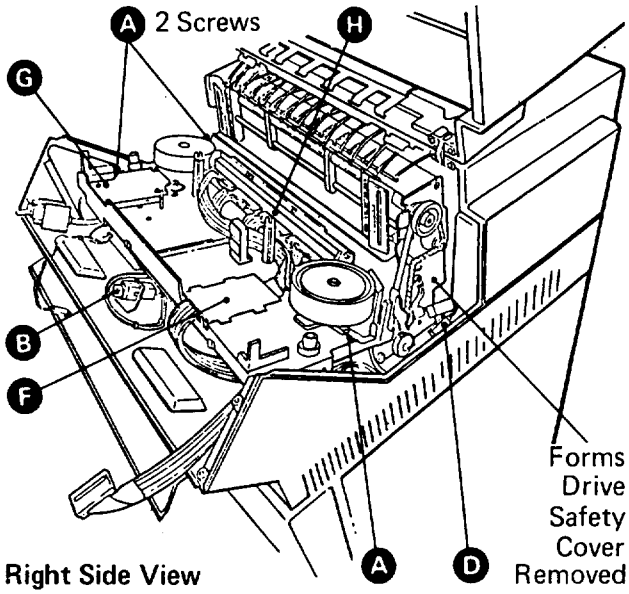
7. Connect the eight hammer connectors and install the hammer safety cover (H) over them.
8. Install the ground wire located in the capacitor cavity and install the capacitor safety cover (G).
9. Reconnect the SENS and COVR switch cable connectors (D).
10. Install the forms drive safety cover (MI "Transport Assembly, Part 2" on page 800-5).

11. Install the metal plate over the hammer cables.

12. Connect M1 and M2 (B).

13. Install the operator panel support plate (MI "Operator Panel Support Plate" on page 500-5).

14. Install the operator panel (MI "Operator Panel" on page 500-3).



Right Side View

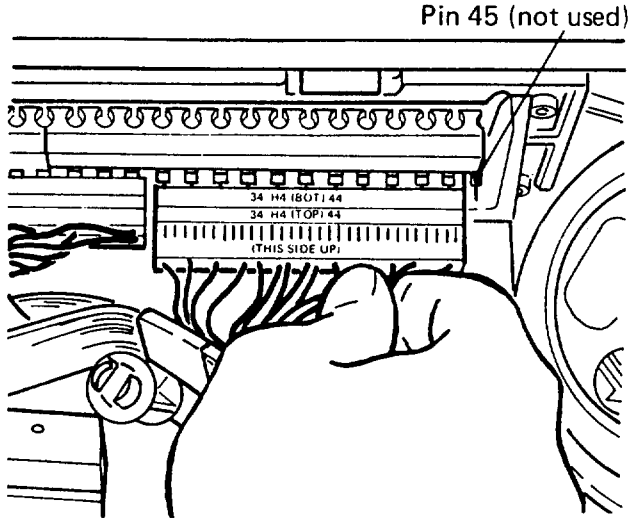
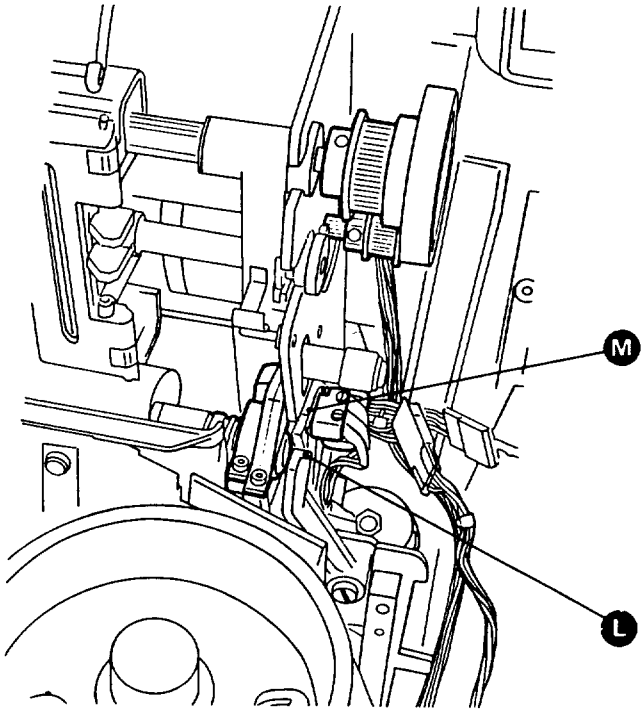


Figure 300-36. Print Mechanism

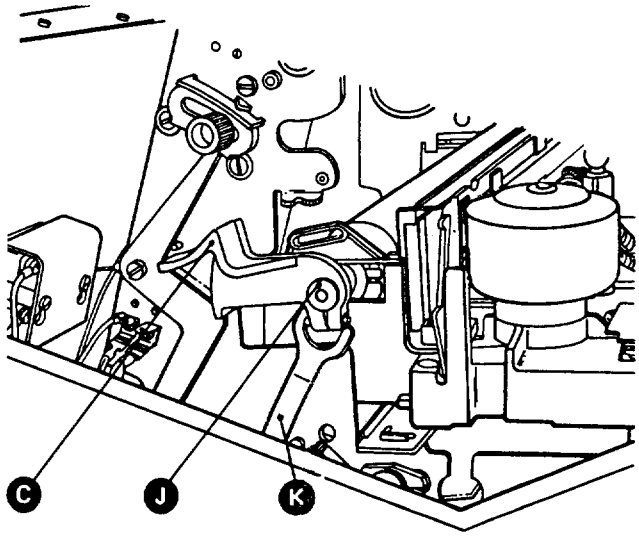
15. Install the dot band (MI "Dot Band Removal and Replacement" on page 300-3).

16. Install the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).

17. Connect the line cord to the back of the printer.



Right Side



Left Side View

Print Mechanism Setscrew Adjustment

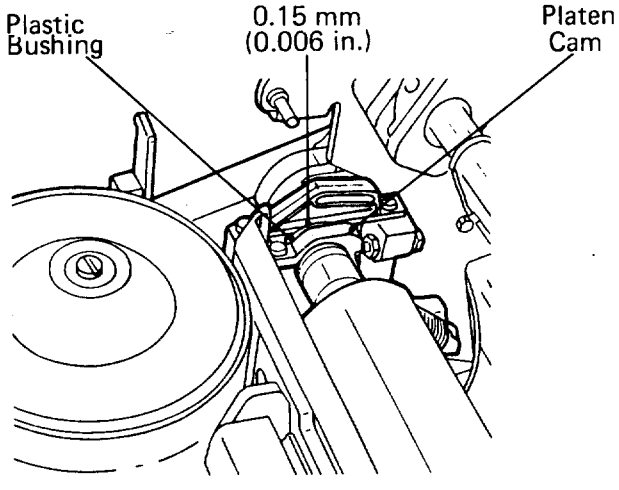
Note: This adjustment should only be made after a new print mechanism or platen is installed or rotated. If you change this adjustment, put a couple drops of Loctite[1] or an equivalent on the setscrew.

See Figure 300-37.

Adjustment

1. Set the printer power switch to O (Off).
2. Remove the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
3. Remove the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
4. Move the forms thickness lever forward to close the platen.
5. Remove the forms drive safety cover.
6. Loosen the three print mechanism mounting screws.
7. While pushing the print mechanism to the right, ensure that it is touching the setscrew (A). Adjust the gap between the tip of the autoload coupling ratchet and the tip of the forms drive wheel ratchet for 1.25 mm ± 0.25 mm (0.049 in. ± 0.010 in.).
   - Turn setscrew clockwise to increase the gap or counterclockwise to decrease the gap.

   Note: If you cannot obtain this gap, check the platen "end play." There should be a maximum of 0.15 mm (0.006 in.) gap between the print mechanism and the plastic bushing when the forms thickness lever is completely forward (see the figure below). Move the platen cam left or right to obtain this gap.
8. Tighten the three print mechanism mounting screws.
9. Check platen switch for proper operation (MI "Platen Switch" on page 300-53).
10. Install the forms drive safety cover.
11. Install the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
12. Install the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).



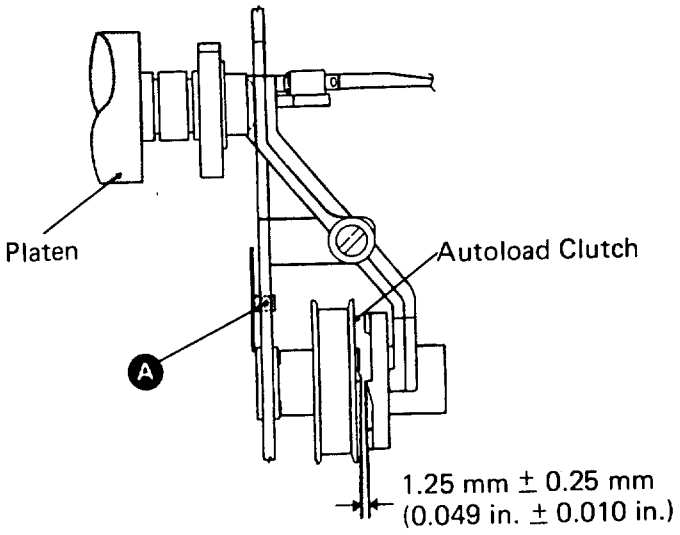


Figure 300-37. Print Mechanism Setscrew Adjustment

1 Trademark of the Loctite Corp.

Platen Switch

See Figure 300-38.

Removal

1. Set the printer power switch to O (Off).
2. Move the forms thickness lever toward the front of the printer.
3. Remove the forms drive safety cover (MI "Transport Assembly, Part 2" on page 800-5).
4. Remove any cable clamps or ties, and disconnect the platen switch connector PLAT.
5. Loosen the two platen switch mounting screws, and remove the switch assembly (A).

Replacement

1. Install the platen switch (A) on the side-frame.

   Note: Ensure that the switch actuator is to the right of the autoload clutch lever.

2. Install all cable clamps or ties, and connect the platen switch connector PLAT.

   Note: See adjustment below.

3. Install the forms drive safety cover.

Adjustment

1. Set the printer power switch to O (Off).
2. Remove the forms drive safety cover (MI "Transport Assembly, Part 2" on page 800-5).
3. Loosen the two platen switch mounting screws.
4. Move the forms thickness lever completely to the rear.
5. Adjust the switch so that the switch activates and has 0.51 mm to 0.76 mm (0.020 in. to 0.030 in.) overthrow. Tighten the two platen switch mounting screws.
6. Install the forms drive safety cover.
7. Move the forms thickness lever toward the front of the printer.

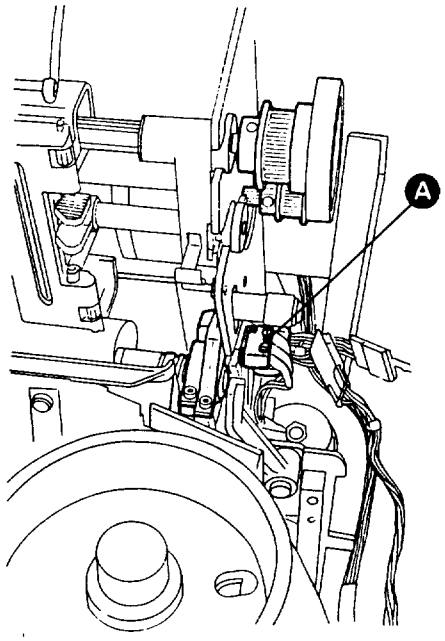


Figure 300-38. Platen Switch

Platen Assembly Adjustments

Note: Rotate the platen only if the surface of the platen where the hammers strike is worn or damaged. Then check the platen-to-hammer gap adjustment.

See Figure 300-39 on page 300-55.

Platen Rotation

1. Remove all forms from the printer.
2. Set the printer power switch to O (Off).
3. Remove the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
4. Remove the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
5. Remove the top cover (MI "Top Cover" on page 000-7).
6. Remove the power cover (MI "Power Cover" on page 000-8).
7. Remove the dress panel (early printers only, MI "Transport Assembly, Part 2" on page 800-5).
8. Release the tractor assembly latches, and raise the assembly to the service position.
9. Move the forms thickness lever to the rear.
10. Loosen the cam clamp screws (B).
11. Rotate the platen 3.0 to 6.0 mm (0.118 to 0.236 in.) toward the rear of the printer.
12. Tighten both cam clamp screws (B). Ensure that there is grease (IBM No. 23 grease) on the cam surfaces.
13. Move the forms thickness lever forward and loosen the lever screw (D).
14. Check the platen "end play." There should be a maximum of 0.15 mm (0.006 in.) gap between the print mechanism and the plastic bushing when the forms thickness lever is completely forward (MI "Print Mechanism Setscrew Adjustment" on page 300-52).
15. Center the "A" on the forms thickness lever with the notch on the side-frame and tighten the screw.
16. Do the following "Platen-to-Hammer Clearance" adjustment.

Platen-to-Hammer Clearance

1. Remove the top cover (MI "Top Cover" on page 000-7).
2. Remove the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
3. Remove the four screws holding the band guide assembly (A), and remove the assembly.
4. With the forms thickness lever in position "A" (closed), use a feeler gauge and adjust the platen for a gap of 2.11 mm ± 0.05 mm (0.083 in. ± 0.002 in.) between the platen surface and a hammer face at both ends of the platen as shown at (C). Do the adjustment by loosening the two nuts (E) and turning screws (F) until the gap is correct.
5. While preventing screws (F) from turning, tighten the nuts (E).
6. Install the band guide assembly (A).
7. Install the dress panel (early printers only, MI "Transport Assembly, Part 2" on page 800-5).
8. Install the power cover (MI "Power Cover" on page 000-8).
9. Install the top cover (MI "Top Cover" on page 000-7).
10. Install the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
11. Install the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
12. Pivot the tractor assembly to the operating position.

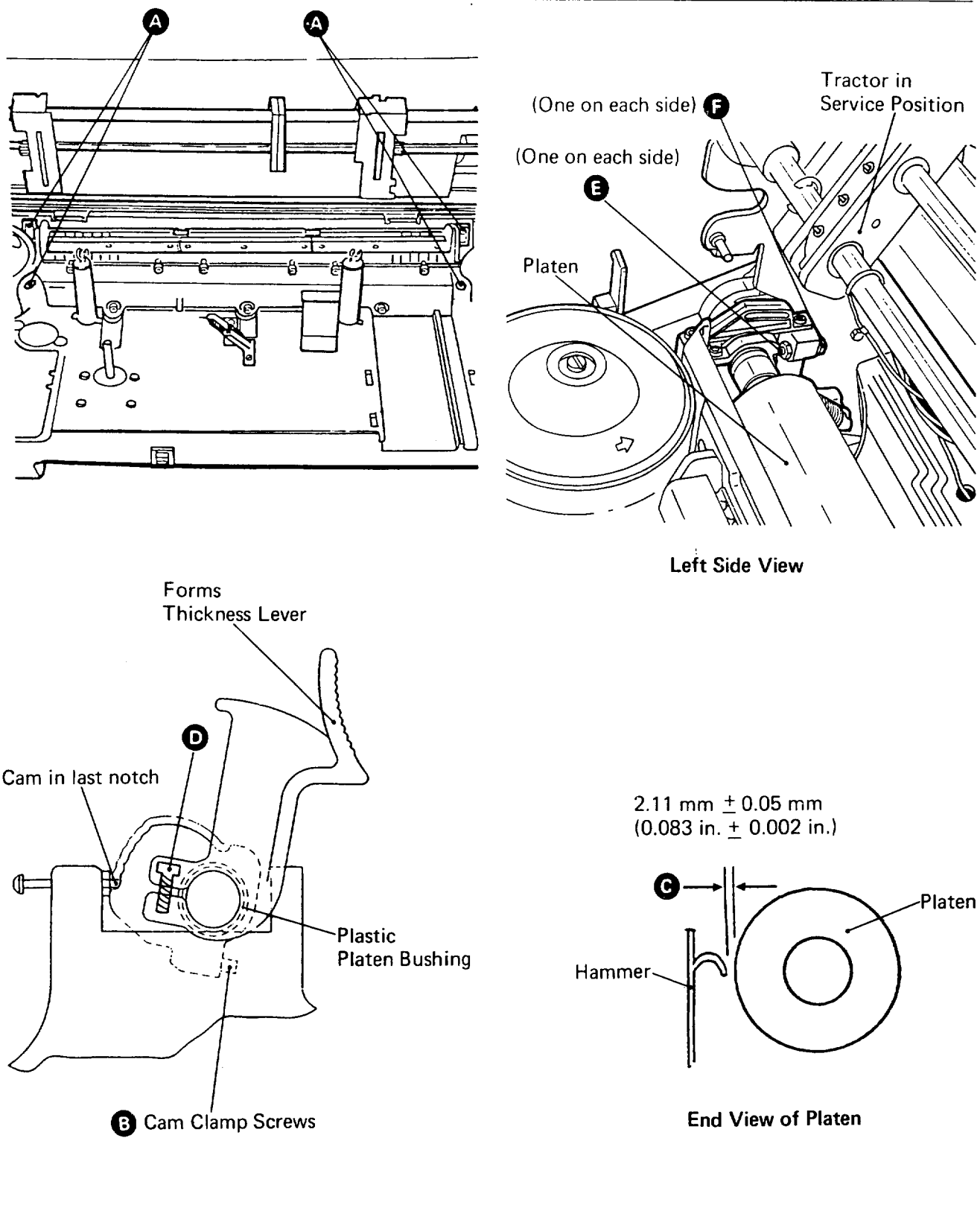


Figure 300-39. Platen Adjustments

Print Quality Service Check

General Checks

Set the printer power switch to | (On) and run Test 07 (Ripple Print).

1. Press and hold the Test key.
2. Press and release the 0 key.
3. Press and release the 7 key.
4. Release the Test key.

The test will print 16 lines. For continuous printing, press and release the 6 key as soon as printing begins. Press and release the Cancel Print key to stop the test.

Follow these procedures:

1. Do the ribbon service check (MI "Ribbon Service Check" on page 300-47) for smudged printing or ink smears.

2. Remove the dot band and check the chevrons for alignment and damage. A damaged chevron can cause missing dots and other print quality problems.

3. Do the forms feeding service check (MI "Forms Feeding Service Check" on page 300-40) when overprinting occurs on preceding or following lines, or if forms jam or tear while advancing.

4. If light printing occurs:

   a. Print on multiple forms to verify proper tension assembly adjustment.

   b. Do the ribbon service check (MI "Ribbon Service Check" on page 300-47).

   c. If no problem is found by the ribbon service check, check the platen-to-hammer adjustment (MI "Platen Assembly Adjustments" on page 300-54).

5. If 3 or more print positions are not printing, do the hammer coil service check (MI "Hammer Coil Service Check" on page 300-68).

Print Quality Check

Using DP print mode, visually check print quality by the following methods:

1. Run Test 87 to get a pattern printout.

   a. Load forms in the printer.
   b. Press and hold the Test key.
   c. Press and release the 8 key.
   d. Press and release the 7 key.
   e. Release the Test key.

2. Run Test 07 (Ripple Print) and examine the overall character print quality.

   a. Press and hold the Test key.
   b. Press and release the 0 key.
   c. Press and release the 7 key.
   d. Release the Test key.

   The test will print 16 lines. For continuous printing, press and release the 6 key as soon as printing begins. Press and release the Cancel Print key to stop the test.

3. Check both printouts for:

   - Consistent horizontal and vertical registration of characters across the complete print line
   - Dot consistency, missing dots, or light dot patterns
   - Light overall printing, or light and dark patterns on print lines
   - Light printing on part of a line or at either side of the print line
   - Ink smudging, smearing, or light print at all print positions
   - Partial or missing characters
   - Overprinting or incorrect spacing
   - Horizontal, vertical, or diagonal streaks on printouts.

If print quality problems are identified, perform MI "Forms Feeding Service Check" on page 300-40 and "Band Drive Service Check" on page 300-22 if necessary.

Print Registration Checks

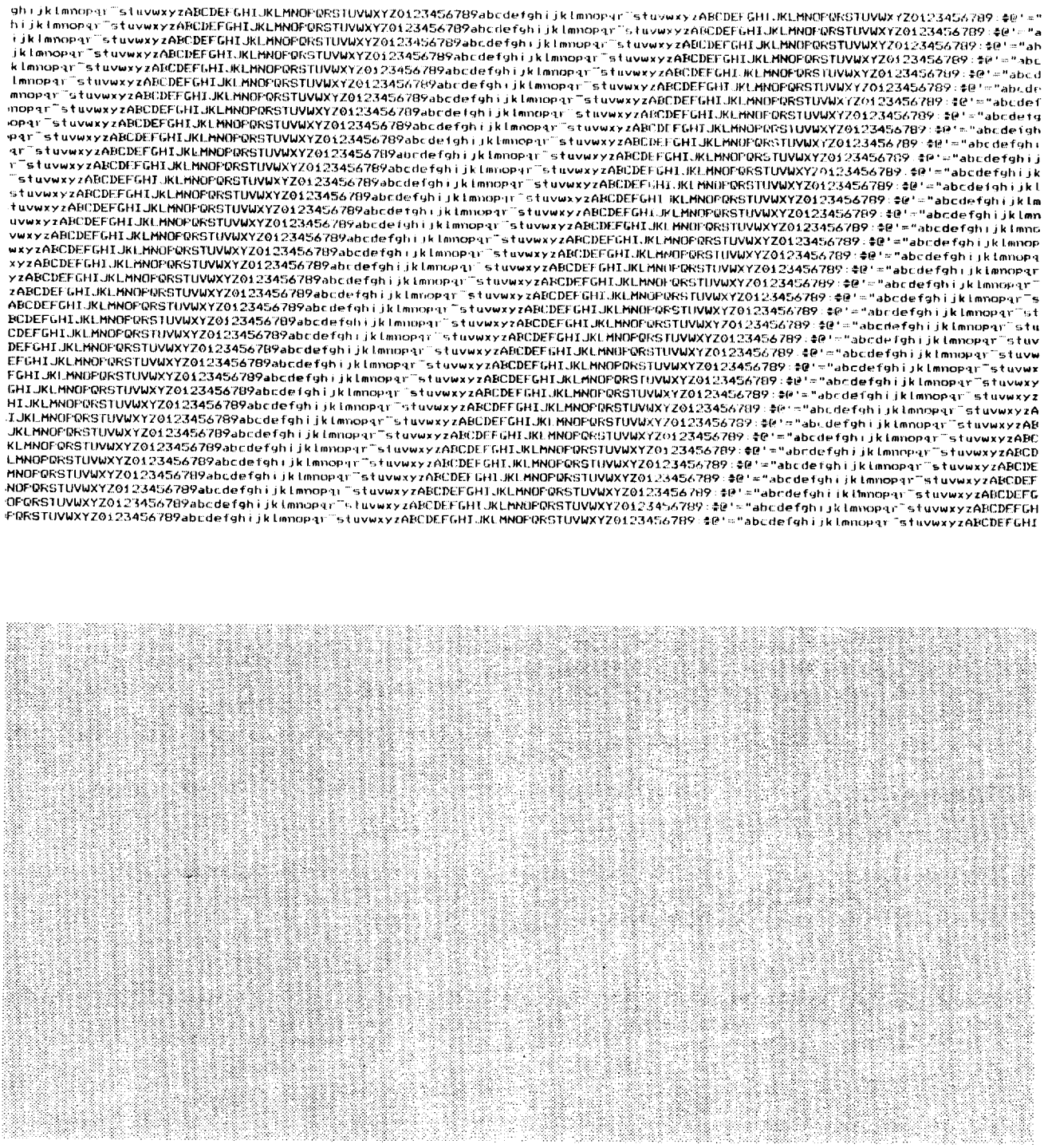
Vertical registration problems can be caused by:

- Forms motor driver card
- Damaged or binding drive or idler wheel
- Drive or idler wheel not floating freely on shaft
- Loose or damaged forms drive belt
- Forms motor
- Spring fingers not applying proper tension to the forms
- Bent chevron on the dot band
- Dot band not tracking properly on the registration bearings
- Loose tractor belts or worn tractor pins on the forms feed assembly
- Worn forms drive roll shaft
- Pressure roll shaft not engaging completely.

Horizontal registration problems can be caused by:

- Dot band not tracking properly
- Band drive mechanisms failing
  - Band drive motor
  - Loose drive or idler wheel
  - Improper belt tension (drive or idler belt)
  - Band installed incorrectly
  - Drive wheel surface dirty
- Dirty dot band
- Emitter that is defective or not adjusted properly
- Bent chevron on dot band.

Compare the examples that follow to the first example of print quality shown in Figure 300-40 on page 300-58.

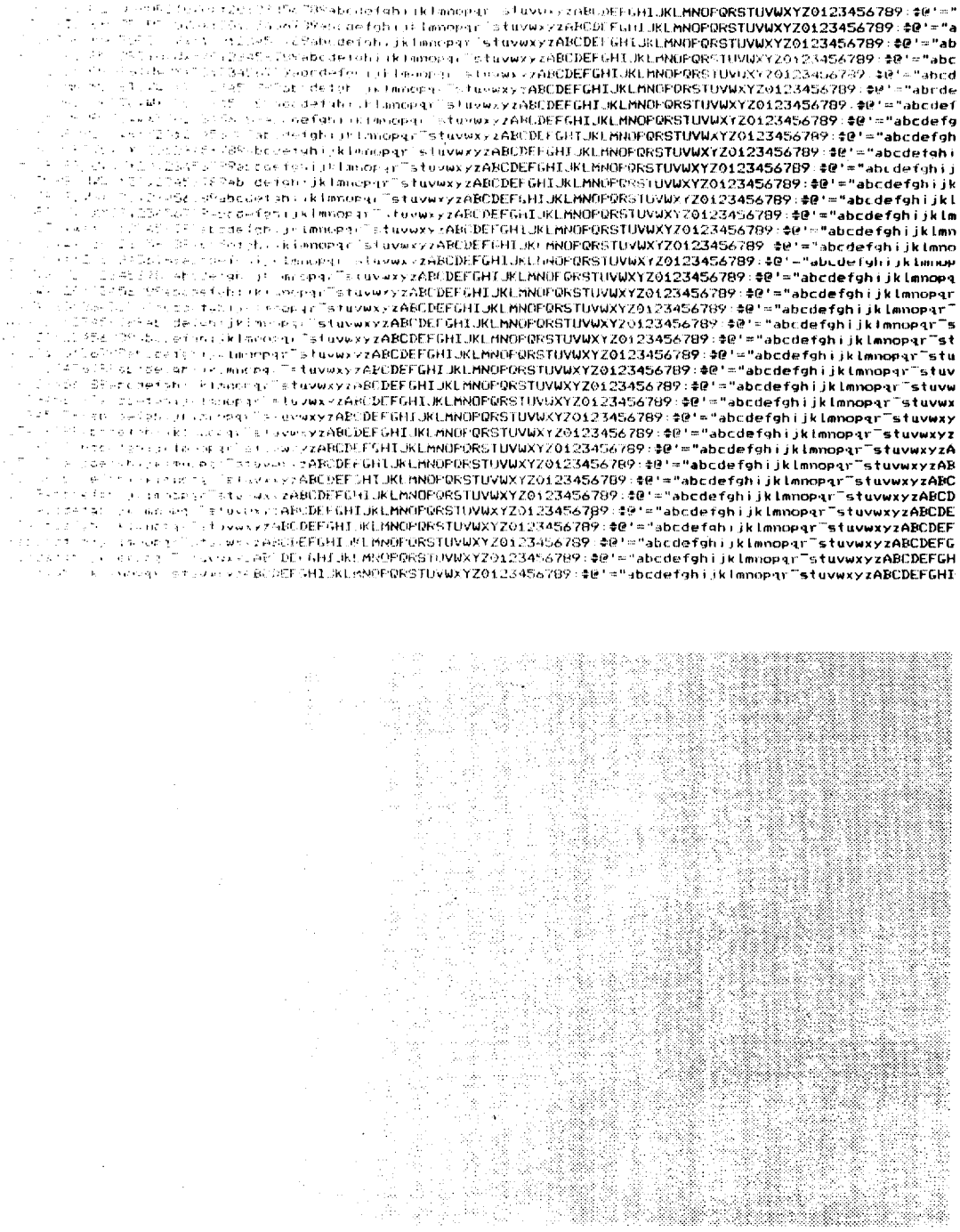


No Failure – Good Print Quality Examples

Figure 300-40. Print Quality Examples

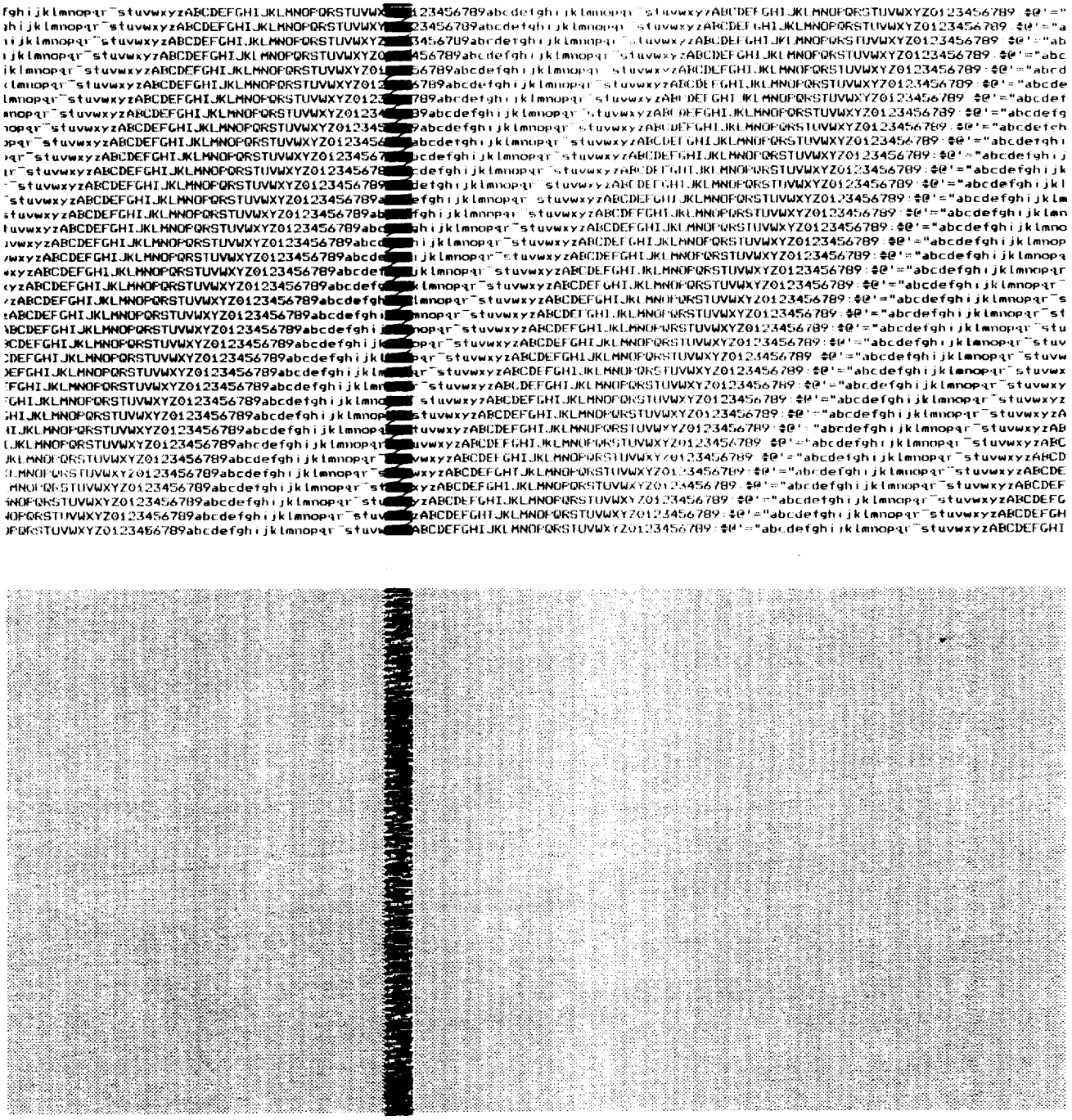
One Hammer Coil Open or Hammer Is Physically Held Retracted

Figure 300-41. Print Quality Examples



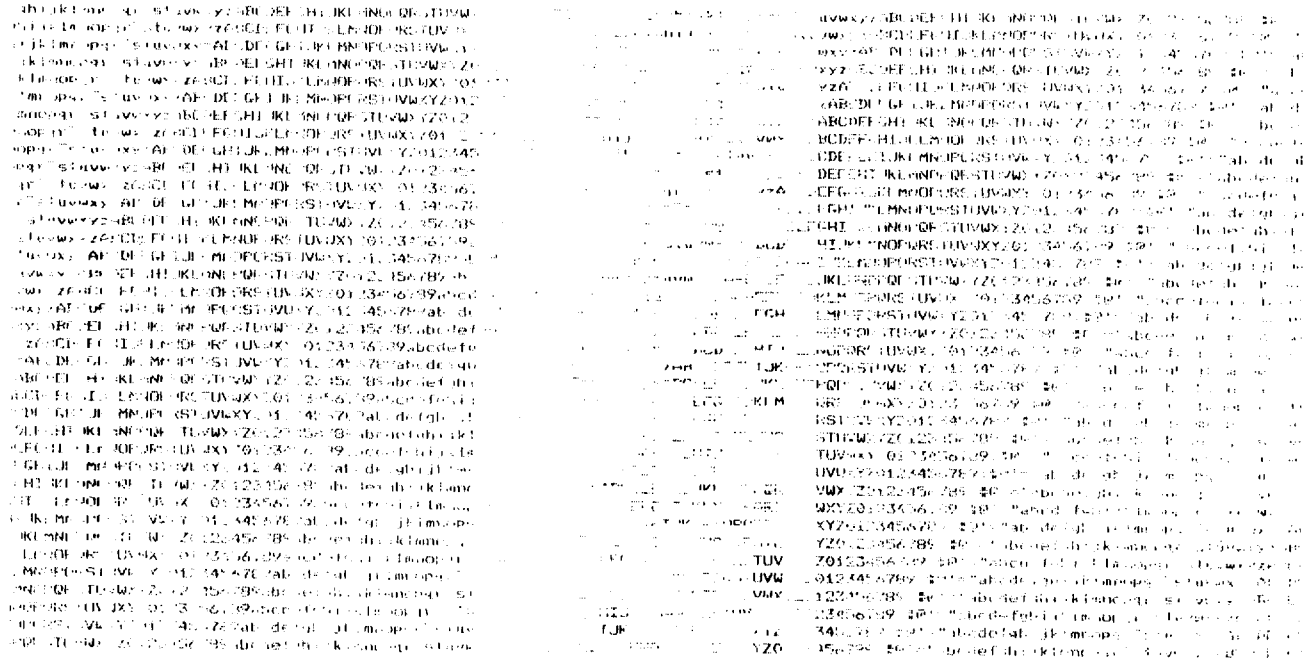
Platen Is Not Set Properly — Gap Is Too Wide or Ribbon Arm Not Properly Seated

Figure 300-42. Print Quality Examples



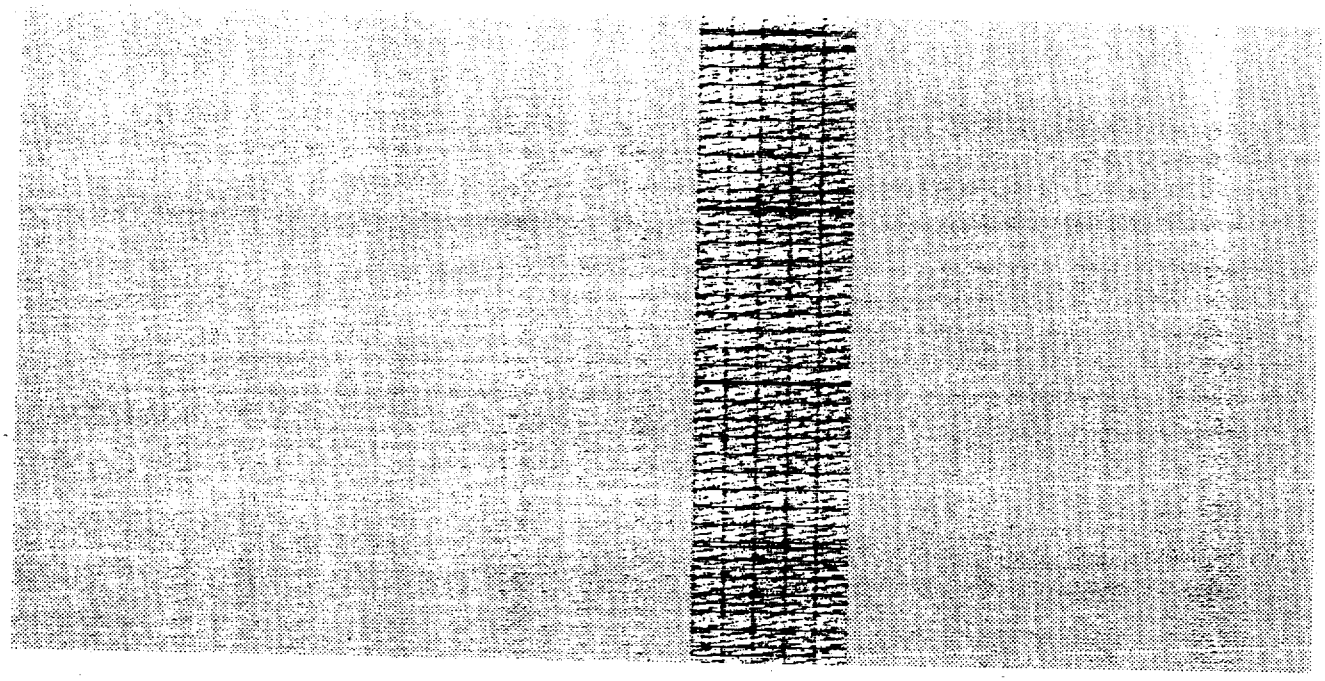
One Hammer Out of Position-Protruding

Figure 300-43. Print Quality Examples

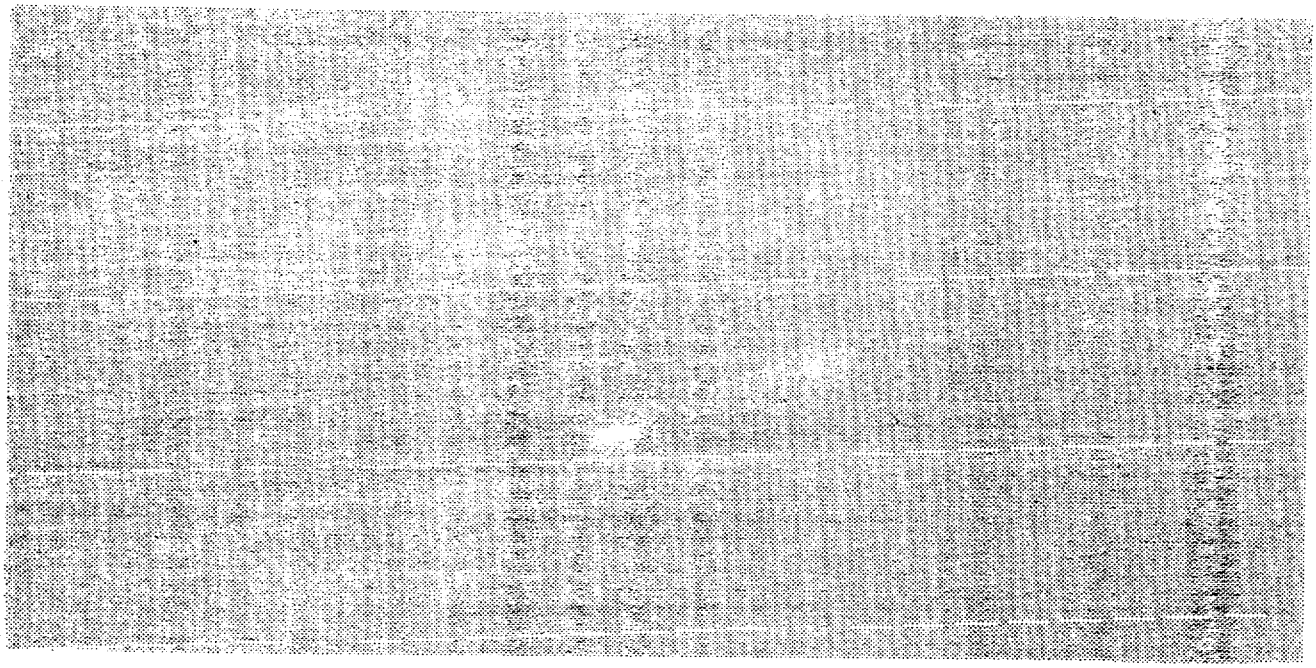


Defective Hammer Block and Platen Gap Not Adjusted Properly

Figure 300-44. Print Quality Examples



5 Hammer Positions Protruding Due to Loose Magnet. Also Shows One Dot Missing.



One Dot Missing

Figure 300-45. Print Quality Examples

```
********** ERRORLOG **********
2BA0 00050002 00000000 00000000 00000000
2BB0 00000000 00000000 00000000 00000000
2BC0 00000000 00000000 00000000 01DE0160
2BD0 00000000 00000000 00000000 00000000
2BE0 03620107 00000000 00000000 00000000
2BF0 28072701 28D70000 00000000 00000000

********** PHA INFO **********
2A2C 00000000 06000420 08000008 00800000

********** RAS1 LOC **********
0080 40181420 00AD2208 FB00E7D2 F3E1F3E9

********** RAS INFO **********
0110 001024E6 0000C000 B6742A62 15120000

********** IDS CRCS **********
0000 F0F0F1F1 F2F2F3F3 F4F4F5F5 F6F6F7F7
0010 9540800C AAE5341C 800C133A7 CC4D44BD

********** MMIO **********
FF80 00000000 00000000 00000000 00000000
FF90 00000000 00000000 00000000 00000000
FFA0 00100000 07000000 00000000 05000421
FFB0 00180000 1D000000 00000000 0A000421
FFC0 00000000 00000000 00000000 00000000
FFD0 00000000 00000000 00000000 00000000
FFE0 00000000 00000000 00000000 00000000
FFF0 FFFEFEFF 2EFF2EFF 00000000 00000000

********** MOD 2 **********
F3D0 00000000 00000000 00000000 00000000
F3E0 20007F00 00000000 21007F00 00000000
F3F0 0B0BF100 00000200 00000000 00000010
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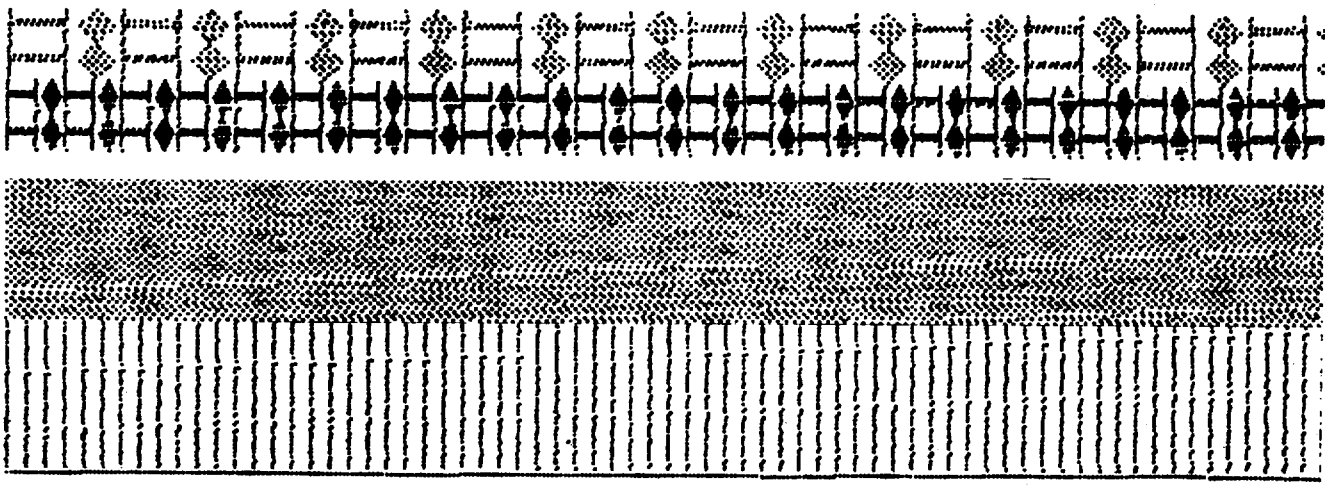

```
efghijklmnopqr~stuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789abcdefghijk
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ghijklmnopqr~stuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789abcdefghijklm
hijklmnopqr~stuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789abcdefghijklmn
```

Loose Dots on the Print Band (Partial Example)

Figure 300-46. Print Quality Examples

370 Hammers

Hammer Theory of Operation

The hammer bank contains three identical hammer blocks. Each block has six permanent magnets. Two permanent magnets are mounted behind five hammers. Each hammer consists of a steel spring beam that is held in a deflected position by the permanent magnets. When a pulse of current is applied to a coil located behind the spring, an opposing electromagnetic field allows the hammer to spring forward. The hammer blade strikes an anvil on the dot band and forces a dot against the ribbon. This forms a dot on the paper. The hammer is restored by the permanent magnet when the hammer driver current is turned off.

When the Basic Assurance Tests run, a soft hammer fire verifies the hammer fire circuits. The hammers are fired, but without the force required for printing.

The hammer fire circuit consists of:

- Two hammer driver cards
- The interface between the hammer driver cards and the printer electronics
- The interface between the hammer driver cards and the hammer coils.

The 4234 Printer has two hammer driver cards, each of which drives 22 print hammers. These hammer driver cards are the interface between the system card and the print hammers. The 45th hammer (hammer 15 of the third block) is not used.

Each hammer driver card consists of three parts:

- The serial-to-parallel conversion electronics
- The hammer drivers
- The error-checking circuits.

The error-checking circuits monitor the upper and lower drivers. They check for four conditions:

- Upper drivers shorted
- Upper drivers open
- Lower drivers shorted
- Lower drivers open.

Hammer Block

See Figure 300-47 on page 300-67.

Removal

1. Remove the forms from the printer.
2. Set the printer power switch to O (Off) and disconnect the power cord from the back of the printer.
3. Remove the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
4. Remove the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
5. Remove the band guide assembly by removing the four screws (D).
6. Remove the top and bottom hammer cables that are associated with the hammer block(s) to be removed.
7. Remove the metal shunt (A) between the block you are removing and adjacent block(s).
8. Remove the screw (B) and loosen two screws (C) of each hammer block to be removed.
9. Remove the hammer block(s).

Replacement

Note: Hammer blocks must be replaced in order from left to right and free of any foreign materials.

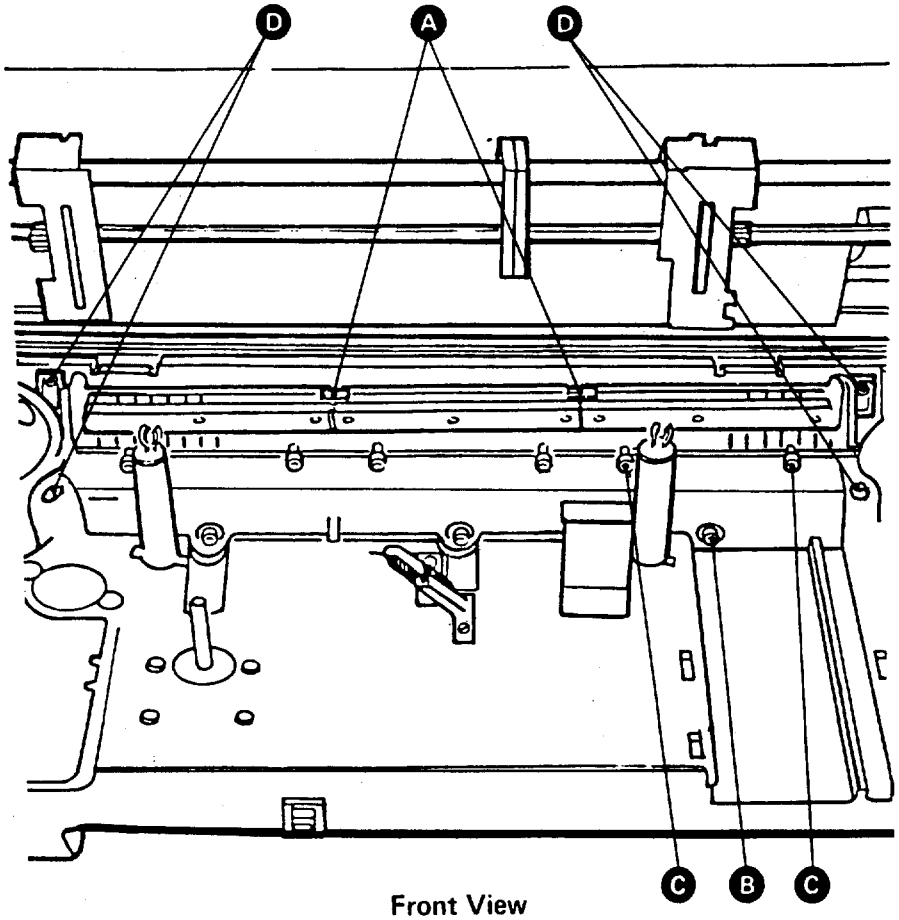
1. Loosen the hammer block(s) on the right side of the block being replaced.
2. Install the hammer block.
3. Starting with the leftmost block, press and hold each block down to seat it fully onto the casting and position it as far to the left as possible. Install and tighten screw (B) and the two screws (C).
4. Repeat the above step until all blocks are replaced.
5. Inspect the area between the lower edge of the hammer blocks and the machined pads on the print mechanism casting with a dental mirror (E). There should not be a gap.

   Note: Print quality problems will result if blocks are not seated properly. Be sure there is no gap between the removed block and adjacent blocks.

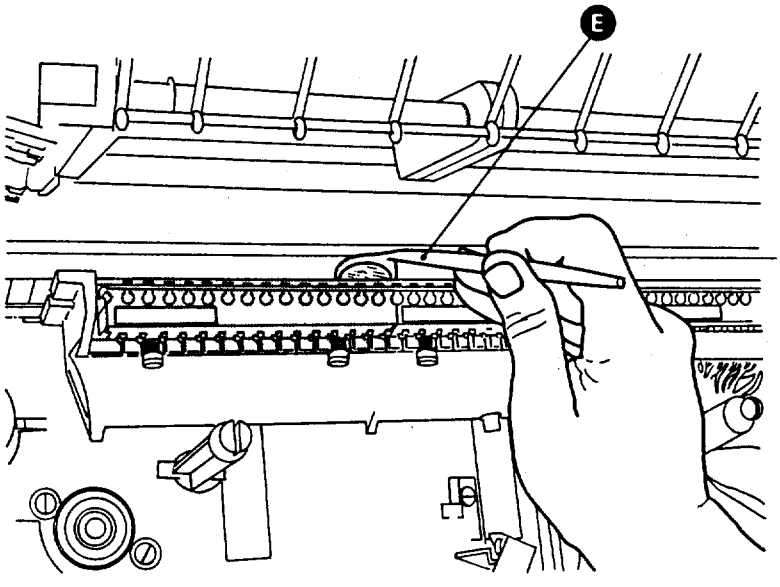
6. Install the metal shunt(s) (A) between blocks.
7. Check the platen-to-hammer gap for each block replaced (MI "Platen Assembly Adjustments" on page 300-54).

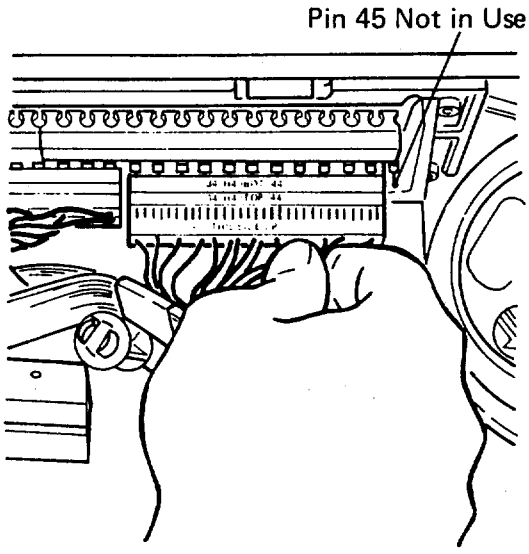
   Warning: When connecting the hammer cables, the pins for hammer 45 on hammer block 3 are NOT used and should not have connectors attached.

8. Install the cables removed from the hammer block(s).
9. Install the band guide assembly with four screws removed (D).
10. Install the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
11. Install the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
12. Connect the power cord to the back of the printer.



Front View





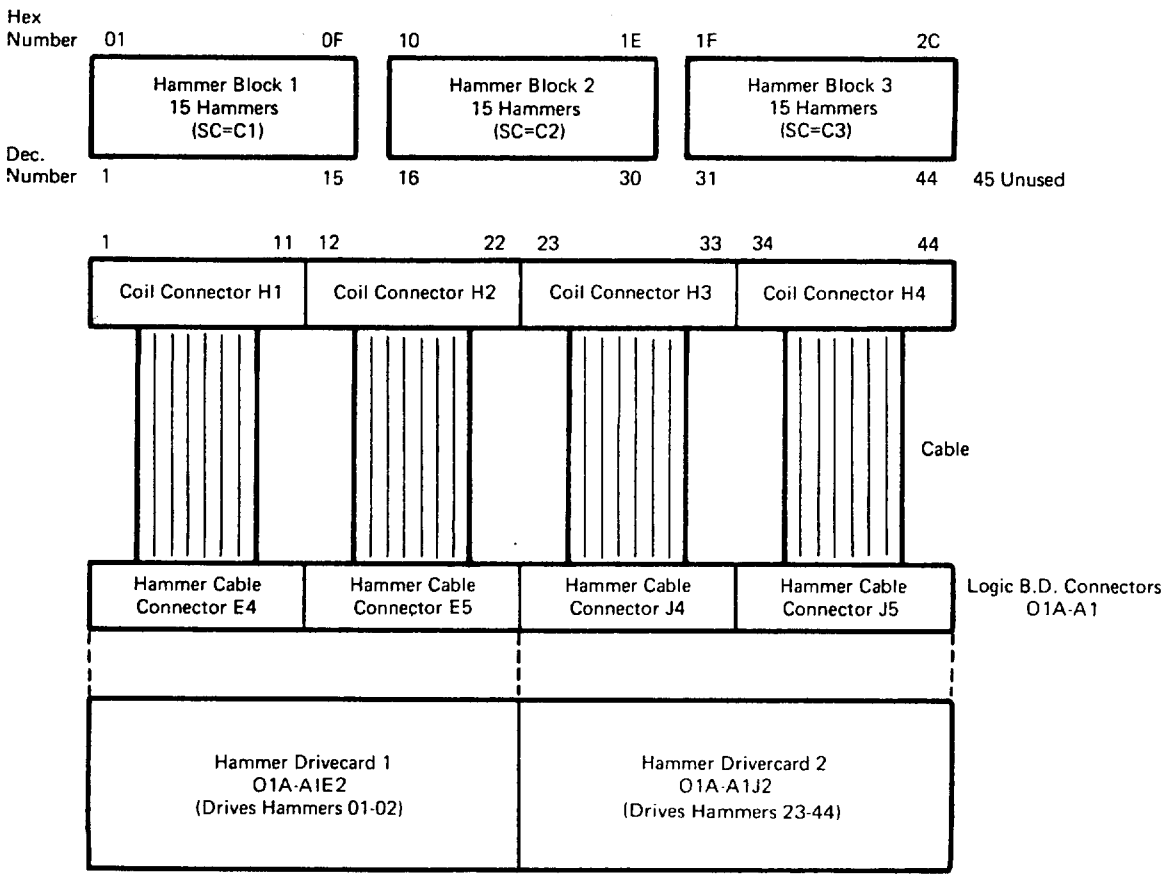
Pin 45 Not Connected

Figure 300-46. Hammer Block

Hammer Coil Service Check

Warning: When plugging the hammer cable connectors, note that pins 45 on hammer block 3 are not used and should not have connectors attached. See Figure 300-48 on page 300-71.

1. Set the printer power switch to O (Off).
2. Remove the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
3. Remove the dot band cover by pulling up on the curved handles on the cover.
4. Remove the hammer safety cover over the hammer blocks by removing the two screws.
5. Remove all connectors from the hammer block that contain the suspected failing coil.
6. Examine the coil pins for dirt, corrosion, or signs of electrical arcing. Using an ohmmeter set to the X1 scale, measure the resistance of the coil. The resistance should be 5.4 ohms ± 0.3 ohms.
7. Measure for shorts from both pins of the coil to frame ground (not to the aluminum casting). There should be no continuity to ground from either pin.
8. If the resistance is incorrect or the coil is shorted to ground, install the hammer block assembly (MI "Hammer Block" on page 300-66).
9. Check that the terminals in the hammer cable connector make good contact with the hammer coil pins.
10. Visually inspect all hammer cables for damaged or shorted wires. Reseat all hammer cable connectors at the logic board and at the hammer coil pins. Install the hammer cable assembly if defective or if an intermittent problem with the cable is suspected.



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Hammer Cable Assembly

See Figure 300-48 on page 300-71.

Removal

1. Set the printer power switch to O (Off) and disconnect the power cord from the rear of the printer.
2. Remove the top cover (MI "Top Cover" on page 000-7).
3. Remove the power cover (MI "Power Cover" on page 000-8).
4. Remove the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
5. Remove the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
6. Remove the metal plate (A) over the cable assembly.
7. Remove the hammer safety cover (C) over the hammer blocks (2 screws).
8. Release the cable from all cable ties and clamps.

   Note: Observe cable routing and the location of cable ties.

9. Remove the eight hammer block connectors (B) from the hammer coils.
10. Open the logic gate and disconnect hammer cable connectors 01A-A1E4, 01A-A1E5, 01A-A1J4, and 01A-A1J5.
11. Remove the hammer cable assembly.

Warning: When connecting the hammer cable connectors, note that pins 45 on hammer block 3 are NOT used and should not have connectors attached.

Replacement

1. Connect logic board connectors in the associated logic board locations 01A-A1E4, 01A-A1E5, 01A-A1J4, and 01A-A1J5.
2. Lower the logic gate to its normal position.
3. Route the cable in the same manner as the cable removed, and restore all cable clamps and ties to the cable.
4. Carefully connect the eight hammer block connectors (B) to the appropriate hammer coil pins, leaving pins 45 on hammer block 3 open.
5. Install the metal plate (A) over the hammer cables.
6. Install the hammer safety cover (C) over the hammer blocks.
7. Install the dot band (MI "Dot Band Removal and Replacement" on page 300-3).
8. Install the ribbon cartridge (MI "Ribbon Cartridge" on page 300-45).
9. Install the power cover (MI "Power Cover" on page 000-8).
10. Install the top cover (MI "Top Cover" on page 000-7).
11. Connect the power cord to the rear of the printer.
12. Set the printer power switch to | (On), and test the printer.

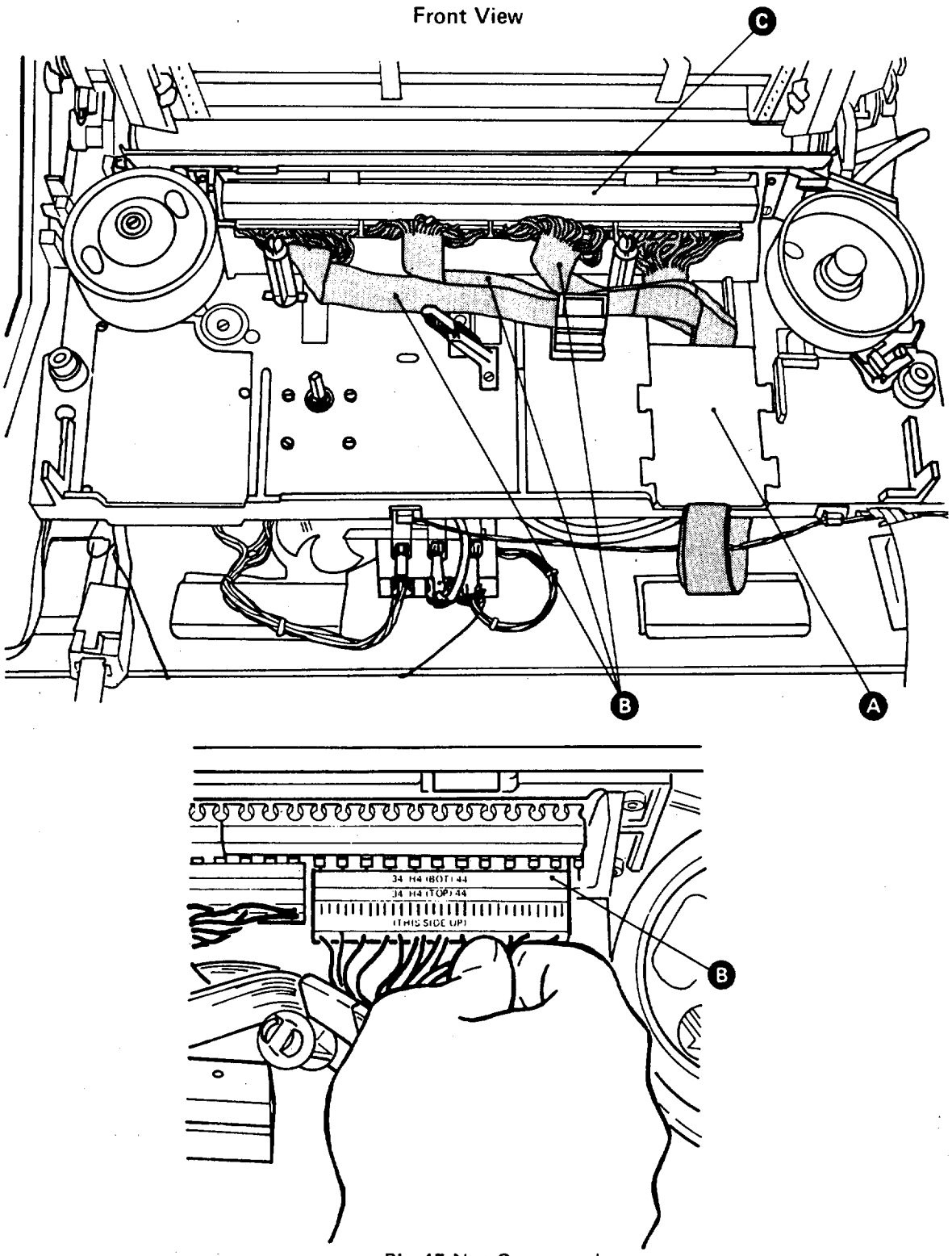

Figure 300-47. Hammer Cable Assembly

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400. Communications

400 - Section Contents

410 Communications -- Model 1

Theory of Operation

The Model 1 attachment adapter is the interface between a 327X controller or a 43XX processor and the printer. Communications with the host is accomplished via a 10 bit serialize/deserialize (SERDES) register with the appropriate drivers and receivers for encoding and decoding the pulses transmitted and received. This connection is made via a RG62AU coaxial cable up to 1.5 km (5000 ft) in length.

The printer communications adapter is located on the system card (01A-A1A2). The interface to the coaxial communication line is via a cable that plugs into the logic gate at 01A-A1A2 (wiring side). Communication problems can develop from intermittent connections in the cables or from a bad ground signal. The Model 1 Printer has one communication connector.

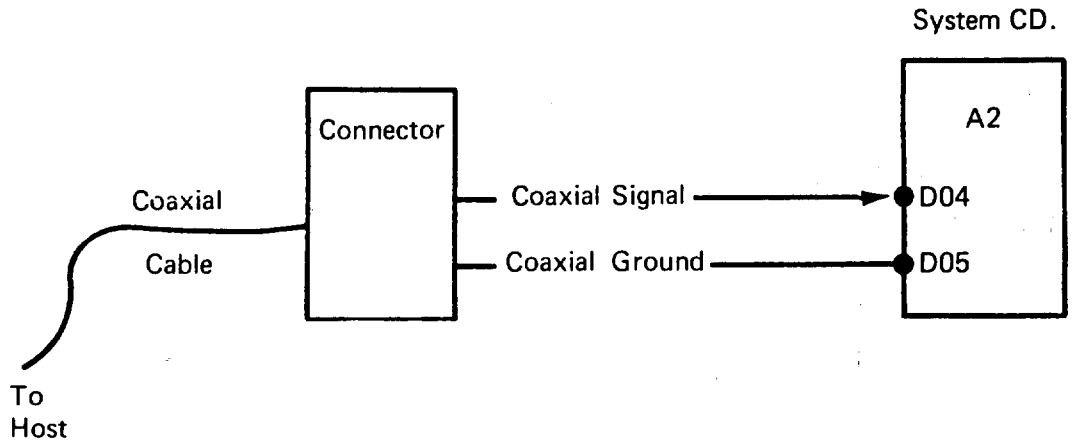


Figure 400-1. Model 1 Communication Data Flow

Model 1 Communication Connector Assembly

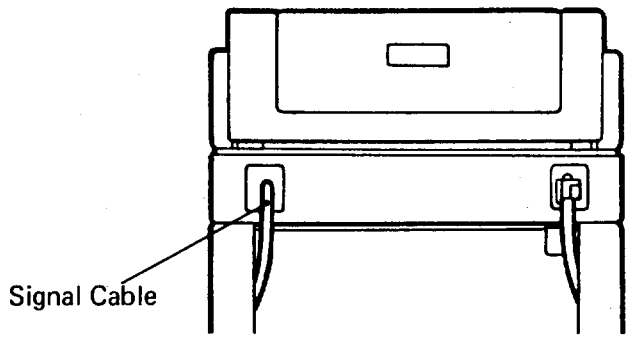
See Figure 400-2.

Removal

1. Set the printer power switch to O (Off).
2. Remove the top cover (MI "Top Cover" on page 000-7).
3. Remove the power cover (MI "Power Cover" on page 000-8).
4. Open the logic gate and disconnect connector 01A-A1A2 from the logic board.
5. Disconnect the braided ground strap from the power supply (it is connected to the communication connector).
6. Press the two tabs (A) on the communication connector housing and remove the communication connector assembly.

Replacement

1. Press the communication connector housing into the cover until the two tabs (A) snap into place.
2. Route the cables that go from the communication connector so that they do not interfere with opening and closing the logic gate.
3. Connect 01A-A1A2 connector to the logic board and close the logic gate.
4. Connect the braided ground strap to the power supply.
5. Install the power cover (MI "Power Cover" on page 000-8).
6. Install the top cover (MI "Top Cover" on page 000-7).



Model 1 Rear View

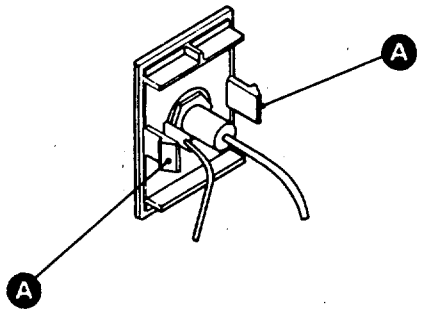


Figure 400-2. Communication Connector (Model 1)

Coaxial Cable Checks

Printer Internal Coaxial Cable Checks

1. Set the printer power switch to O (Off).
2. Disconnect the coaxial cable from the printer.
3. Using the ohmmeter, check for continuity at the coaxial connector on the rear of the printer.
   - Outer conductor to printer frame ground should be more than 1 megohm.
   - Outer conductor to inner conductor should be less than 2 ohms.
   - Outer connector to 01A-A2D05 and center pin of connector to 01A-A2D04 should read near 0 ohm.

Printer External Coaxial Cable to Controller Checks

1. Check the condition of the coaxial connector (male and female ends), the center pin, cable, and so on.
2. Check at the controller end for controller powered off, hung, or disabled.
3. Verify circuit is complete from the controller to the printer.

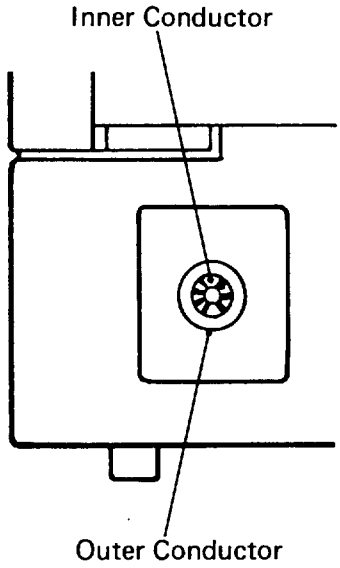


Figure 400-3. Coaxial Connector (Model 1)

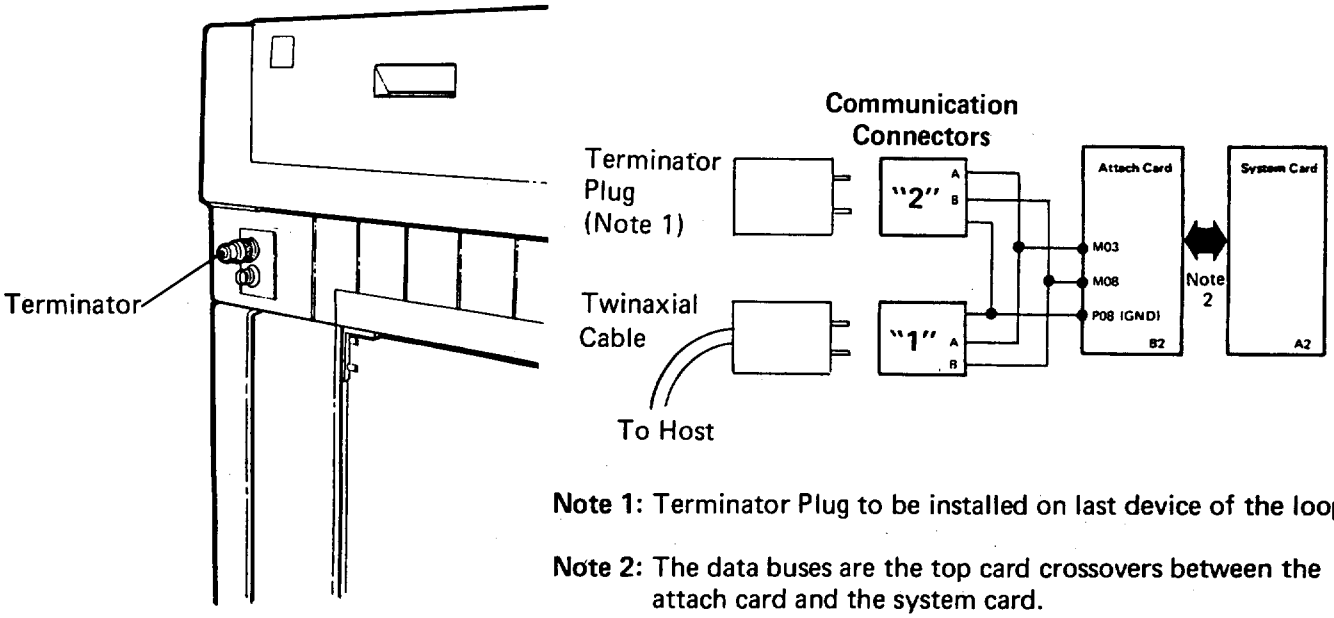
450 Communications -- Model 2

Theory of Operation

The Model 2 attachment adapter is the interface between an IBM 5294 controller or System/36 and the printer. The adapter establishes and maintains protocols and synchronization between the host and the printer. It attaches to the host via a twinaxial cable up to 1.5 km (5000 ft.) in length (cable not included with printer). Communications with the host is in a serial-by-bit format of 16 bits per frame at a bit rate of 1 bit per microsecond. The adapter provides two 256-byte data buffers to allow the printer to be reading from one while the other is being filled.

The communications adapter is located on the communications card (01 A-A1B2). This card interfaces to the system card (01A-A1A2) logic through crossover connectors. The interfaces to the twinaxial communication lines are via a small cable that connects 01A-A1B4 (wire side) on the logic board to the twinaxial connectors at the rear of the printer. Communication problems can be caused by intermittent signal connections in the cables or from a bad ground connection.

The Model 2 Printer has two communication connectors; a twinaxial cable is usually connected to each connector. If the 4234 Printer is the only device or the last device in a port configuration, it must have a terminator installed in the communication connector marked 2. The terminator has a T-connector configuration that acts as a load to the communication circuit.



Note 1: Terminator Plug to be installed on last device of the loop.

Note 2: The data buses are the top card crossovers between the attach card and the system card.

Figure 400-4. Model 2 Communication Data Flow

Model 2 Communication Connector Assembly

See Figure 400-5.

Removal

1. Set the printer power switch to O (Off).
2. Remove the top cover (MI "Top Cover" on page 000-7).
3. Remove the power cover (MI "Power Cover" on page 000-8).
4. Open the logic gate and disconnect connector 01A-A1B4 from the logic board.
5. Press the two tabs (A) on the communication connector housing and remove the communication connector assembly.

Replacement

1. Press the communication connector housing into the cover until the two tabs (A) snap into place.
2. Route the cables that go from the communication connector so that they do not interfere with opening and closing the logic gate.
3. Connect the 01A-A1B4 connector to the logic board and close the logic gate.
4. Install the power cover (MI "Power Cover" on page 000-8).
5. Install the top cover (MI "Top Cover" on page 000-7).

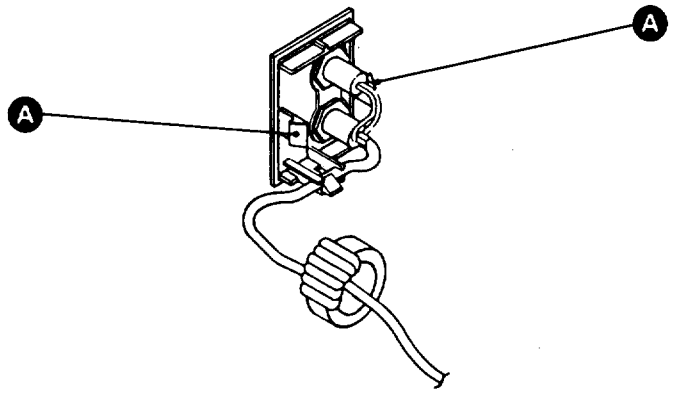


Figure 400-5. Twinaxial Connector (Model 2)

Twinaxial Cable Check

See Figure 400-8 on page 400-8.

The following chart shows the cable check for the twinaxial connectors. These checks should be made with the attachment card installed and the cable installed in 01A-A1B4.

With Terminator Installed

Between	Range
A and *B*	80-120 ohms
A and *ground shield*	40-60 ohms
B and *ground shield*	40-60 ohms

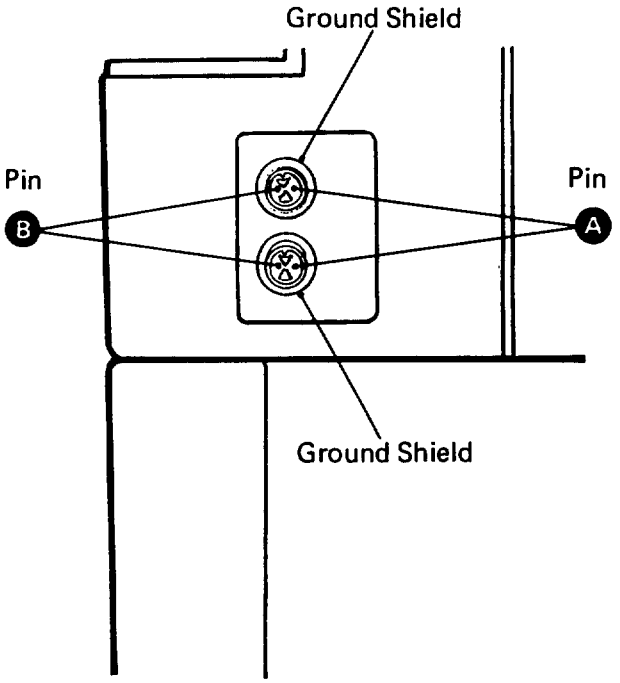
Figure 400-6. Printer Twinaxial Cable

Without Terminator Installed

Between	Range	
A and *B*	∞	
A and *ground shield*	1000-2000 ohms	Reverse Bias Diode ∞
B and *ground shield*	1000-2000 ohms	Reverse Bias Diode ∞

Figure 400-7. Printer Twinaxial Cable

Pin (A) for the twinaxial cables connects to 01A-A1B2M03. The twinaxial connection for pin (B) is to 01A-A1B2M08. The ground shield connects to 01A-A1B2P08.



Model 2 –Rear View

Figure 400-8. Twinaxial Connector (Model 2)

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500. Operator Panel/Logic

500 - Section Contents

Operator Panel

Operator Panel Theory of Operation

The operator panel has two functions. The operator uses the panel to input and display operator information. The service representative uses the panel for running diagnostics and viewing Status codes. In diagnostic mode the LEDs display a hexadecimal byte of information. The function keys provide input to the logic gate to start and control the running of diagnostics.

The panel has one printed circuit card with two connectors on it. One connector supplies +5 volts dc from the power supply. The J1 connector connects the printed circuit board to the operator panel cable. The other end of the operator panel cable is plugged into the logic gate at position 01A-A1A5.

The two figures below show the operator panels for both the Model 1 and the Model 2 Printers. Further information about operator panel functions and usage is provided in the *IBM 4234 Printer Principles of Operations.*

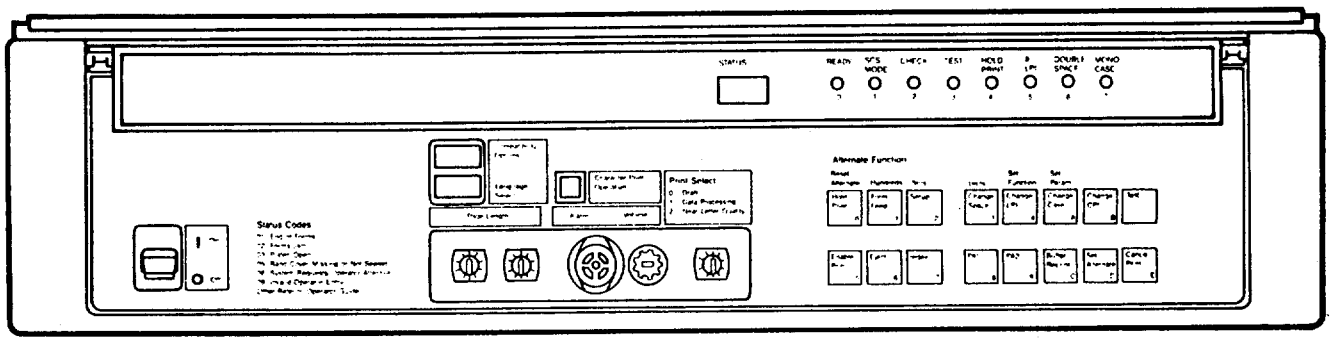

Figure 500-1. Operator Panel, Model 1

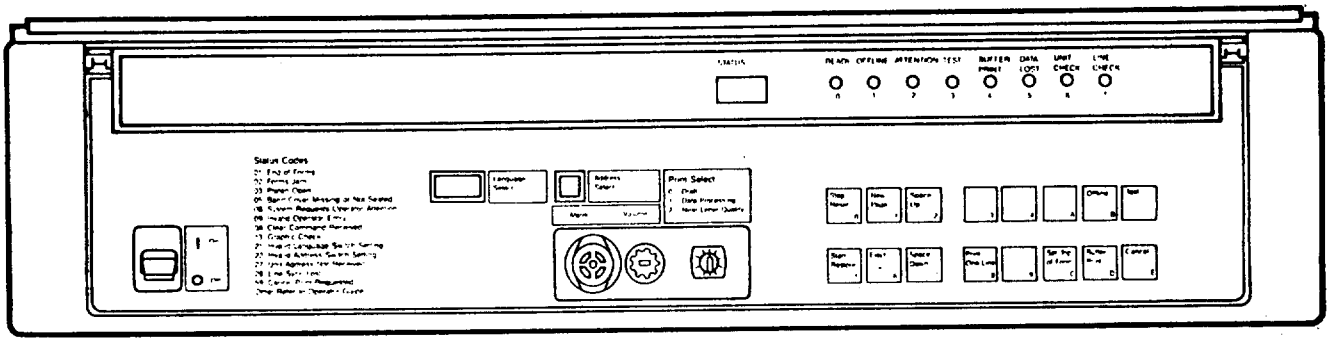

Figure 500-2. Operator Panel, Model 2

Operator Panel

Warning: Plastic clips on the operator panel are easily broken. Use caution when replacing the operator panel to the plate.

See Figure 500-3.

Removal

1. Set the printer power switch to O (Off), and disconnect the power cord from the outlet.
2. Pull the operator panel toward you at the same angle that it is mounted on the printer.
3. Disconnect the static ground strap (A) on the operator panel that runs between the panel and the support plate.
4. Note how the signal connector (J) retainer is positioned, and remove the retainer and the connector from the circuit board.
5. Squeeze the retainer on the +5 V dc connector (B) and remove the connector from the circuit board.

CAUTION

Be sure that the power switch handle extends through the panel. The ac power switch *MUST* be in the O (Off) position.

Replacement

1. Hold the panel close to the printer and connect the ground strap (A) to the operator panel.
2. Connect the two cable connectors (J) and (B) to the circuit board and install the signal cable retainer.
3. Carefully insert the four retainers on the operator panel into the holes in the support plate and press the panel into place.
4. Connect the power cord to the rear of the printer.
5. Set the printer power to | (On) and run the operator panel tests (MI "Operator Panel Tests" on page 700-8).

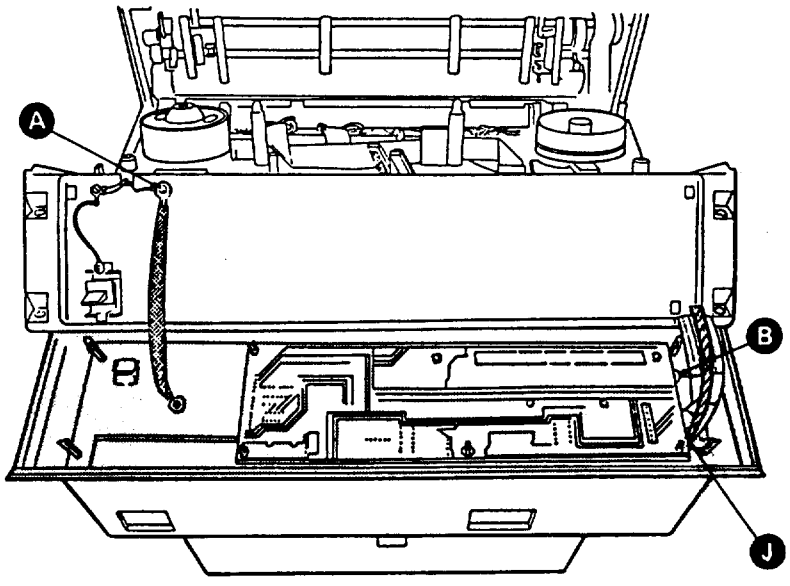

Figure 500-3. Operator Panel

Operator Panel Cable

See Figure 500-4.

Removal

1. Set the printer power switch to O (Off), and disconnect the power cord from the back of the printer.
2. Remove the top cover (MI "Top Cover" on page 000-7).
3. Remove the power cover (MI "Power Cover" on page 000-8).
4. Pull the operator panel straight out at the same angle it is mounted on the printer.
5. Note how the signal connector (J) retainer is positioned, and remove the retainer and the connector from the circuit board.
6. Squeeze the retainer on the + 5 V dc connector (B) and remove the connector from the circuit board.
7. Remove the four screws that secure the operator panel support plate.
8. Open the logic gate and remove the 01A-A1A5 connector.
9. Remove the cables' ground strap from the power supply and remove the cable.

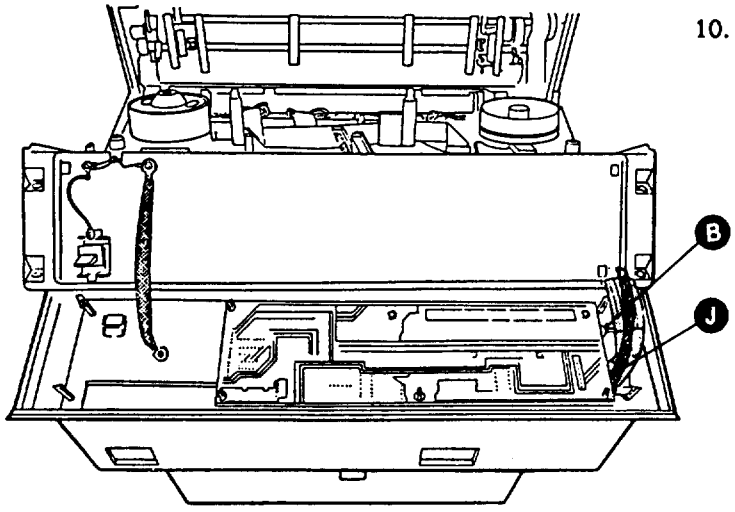

Figure 500-4. Operator Panel Cable

Replacement

1. Connect the 01A-A1A5 connector to the logic gate and close the gate.
2. Connect the ground strap to the power supply.
3. Route the cable to front of the printer.

> **Important**
>
> Ensure that the +5 V dc cable is on top of the signal cable and fits in the smaller notch of the support panel.

4. Install the operator panel support panel. Ensure that the signal and + 5 V dc cables are positioned in the notch of the support plate.
5. Connect the two cable connectors (J) and (B) to the circuit board, and install the signal cable retainer.
6. Carefully insert the four retainers on the operator panel into the holes in the support plate and press the panel into place.
7. Install the power cover (MI "Power Cover" on page 000-8).
8. Install the top cover (MI "Top Cover" on page 000-7).
9. Connect the power cord to the back of the printer.
10. Set the power switch to | (On), and run the operator panel tests (MI "Operator Panel Tests" on page 700-8).

Operator Panel Support Plate

See Figure 500-5.

Removal

1. Set the printer power switch to O (Off), and disconnect the power cord from the back of the printer.
2. Remove the operator panel (MI "Operator Panel" on page 500-3).
3. Remove the four support plate mounting screws (A).
4. Remove the ground wire to the power switch (B).
5. Release the tabs (D) on the power switch and remove switch from the plate.
6. Remove the remaining ground wires and remove the plate.

Replacement

1. Install the power switch to the support plate.
2. Connect ground wires.

> **Important**
>
> Place the cables to the operator panel under the notch (E) in the lower right corner of the support plate with the small cable (+5 V dc) routed on top of the signal connector.

3. Install the operator panel support plate with four screws (A).
4. Install the operator panel (MI "Operator Panel" on page 500-3).
5. Connect the power cord to the back of the printer.

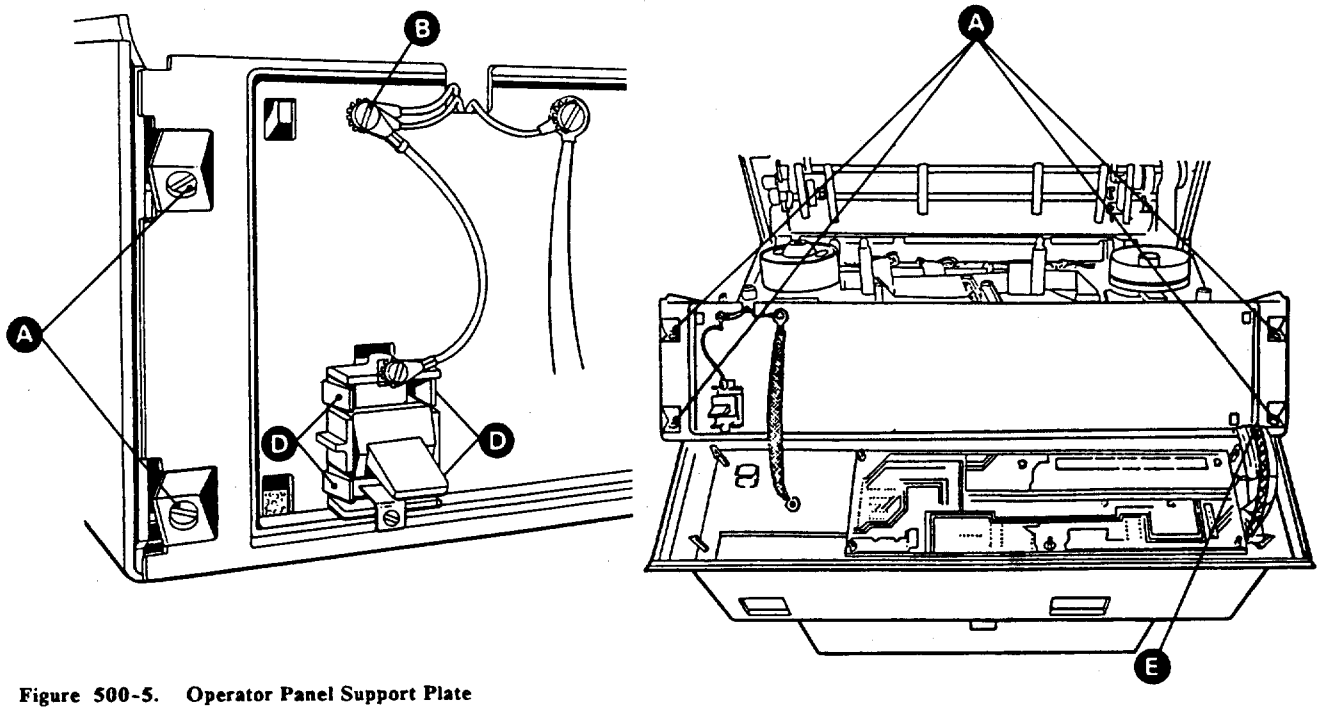

Figure 500-5. Operator Panel Support Plate

Circuit Board

See Figure 500-6.

Removal

1. Set the printer power switch to O (Off), and disconnect the power cord from the back of the printer.
2. Remove the operator panel (MI "Operator Panel" on page 500-3).
3. Note how the signal connector (J) retainer is positioned, and remove the retainer and the connector from the circuit board.
4. Squeeze the retainer on the 5 V dc connector (B) and remove the connector from the circuit board.
5. Remove the four circuit board mounting screws (A).

   Note: Once you have removed the board, do not turn the panel over; the keybuttons will fall out.
6. Squeeze the four retainers (C), and lift the board from the panel.

Replacement

1. Install the circuit board by pressing the board over four retainers (C).
2. Install the four screws (A) to the panel.
3. Connect the two cable connectors (J) and (B) to the circuit board and install the signal cable retainer.
4. Carefully insert the four retainers on the operator panel into the holes in the support plate and press the panel into place.
5. Connect the power cord to the back of the printer.
6. Set the printer power switch to | (On) and run the operator panel tests (MI "Operator Panel Tests" on page 700-8).

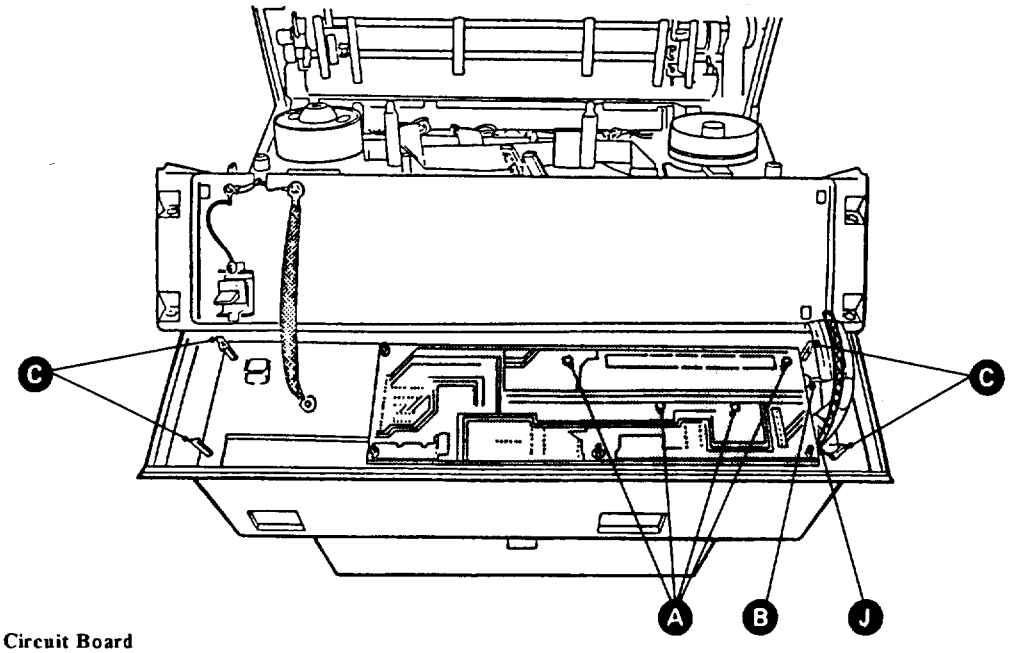

Figure 500-6. Circuit Board

550 Logic

EPROM Card

The printer's microcode is stored in EPROM modules. Some printers will have an EPROM card installed having eight sockets that hold either two 32K EPROM modules, for U.S. and World Trade (W.T.), or eight 8K EPROM modules (W.T. only). Later printers (U.S. and W.T.) have two 32K EPROM modules on the system card and do not have an EPROM card installed.

Important

Eight dip switches located on the card correspond to each socket and must be set to "| (On)" for each EPROM module installed.

Removal

1. Set the printer power switch to O (Off).
2. Remove the top cover (MI "Top Cover" on page 000-7).
3. Remove the power cover (MI "Power Cover" on page 000-8).
4. Remove the EPROM card from the logic gate:

Model	Location
• Model 1 (U.S.) = 1A-A1B2 or 1A-A1C2 • Model 1 (W.T.) = 1A-A1B2 • Model 2 (All) = 1A-A1C2.	

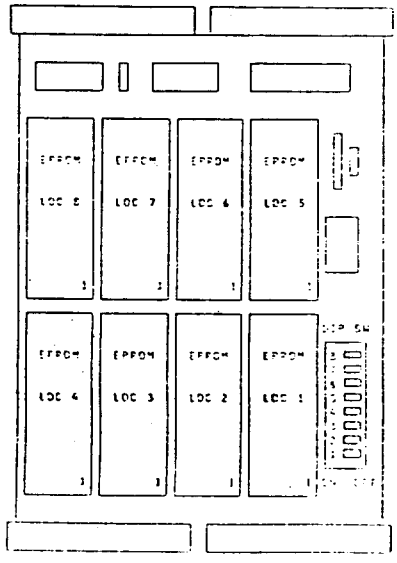

Figure 500-7. EPROM Card

Replacement

1. Install the EPROM card into the logic gate.

Model	Location
• Model 1 (U.S.) = 1A-A1B2 or 1A-A1C2 • Model 1 (W.T.) = 1A-A1B2 (MUST be in this location) • Model 2 (All) = 1A-A1C2.	

2. Install the power cover (MI "Power Cover" on page 000-8).
3. Install the top cover (MI "Top Cover" on page 000-7).
4. Set the printer power switch to | (On) and verify printer completes the BATs.

   Notes:

   a. EPROM module pin 1 is designated by the '1' in the lower right corner of the EPROM outlines.

   b. All switches should be set to the | (On) position.

Logic Board

See Figure 500-8 on page 500-9.

Removal

1. Set the printer power switch to O (Off) and disconnect the power cord from the back of the printer.
2. Remove the top cover (MI "Top Cover" on page 000-7).
3. Remove the power cover (MI "Power Cover" on page 000-8).
4. Remove the dress panel (early printers only, MI "Transport Assembly, Part 2" on page 800-5).
5. Remove the crossover connectors located on 01A-A1A2 and 01A-A1A3.
6. Remove all the logic cards from the gate.
7. Open the logic gate to the service position.
8. Press the tab on the stiffener bracket (A) to release it from the guide, and slide the bracket to the front of the printer until it is removed from the guide.

> **Important**
>
> Ensure that all connectors are marked before you remove them.

9. Remove all the cable connectors from the logic board.
10. Remove the board stiffener mounting screws (B).
11. Remove the logic board.

Replacement

1. Install the logic board to the gate.
2. Install the board stiffener to the logic board, with the eight screws (B).
3. Install the cable connectors to the logic board.
4. Install the stiffener bracket (A) and form the tab to secure it in the guide.
5. Close the logic gate, using caution not to pinch the cables.
6. Install the logic cards to the logic board (MI "Card Locations, Model 1 (Level 1)" on page 800-8 or "Card Locations, Model 2 (Level 1)" on page 800-10).
7. Install the crossover connectors to 01A-A1A2 and 01A-A1A3.
8. Install the dress panel (early printers only, MI "Transport Assembly, Part 2" on page 800-5).
9. Connect the power cord to the back of the printer.
10. Set the printer power switch to | (On) and verify that BATs run successfully.
11. Install the power cover (MI "Power Cover" on page 000-8).
12. Install the top cover (MI "Top Cover" on page 000-7).

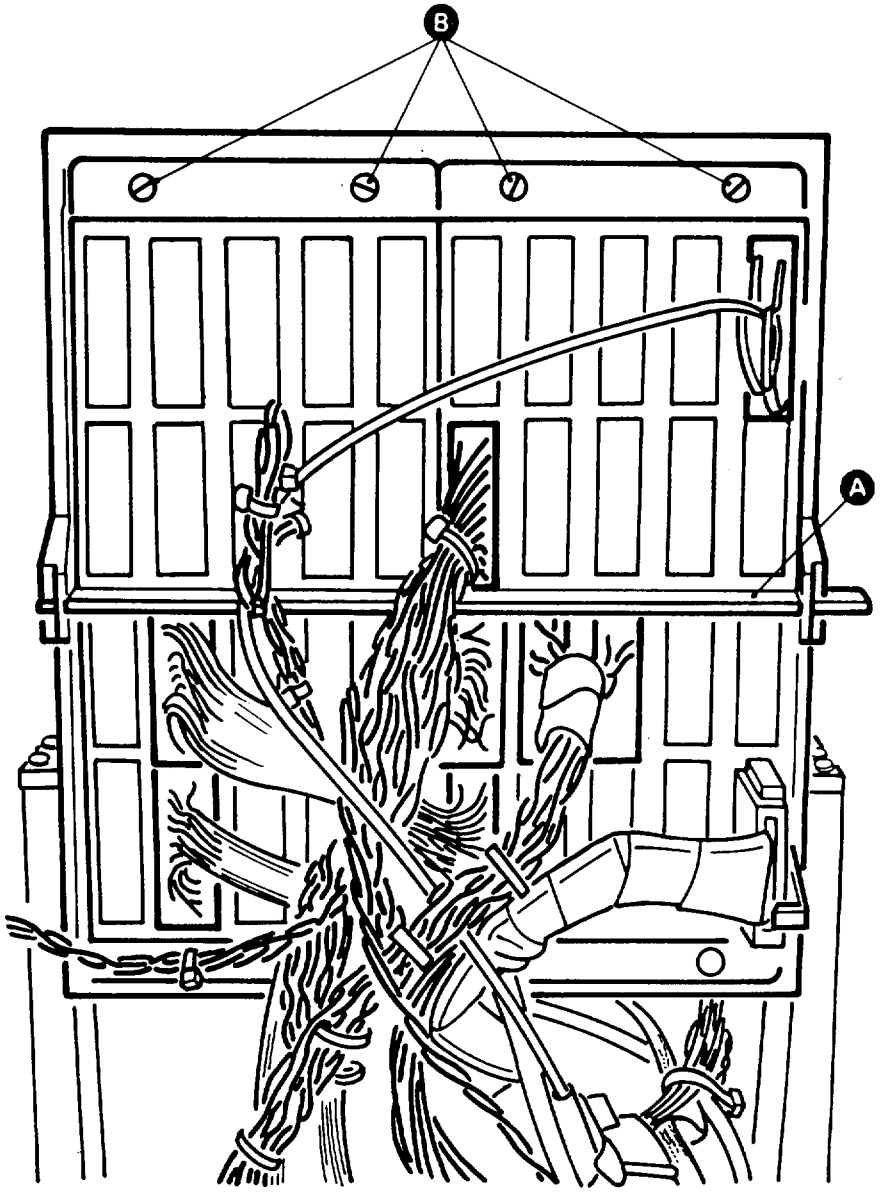

Figure 500-8. Logic Board

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600. Power

600 - Section Contents

Power Supply

Power Supply Theory of Operation

See Figure 600-1.

The power supply and fan are supplied as one field replaceable unit. Two power supplies are available; both supplies are single phase with different input voltage requirements of 100 to 127 and 200 to 240 volts. The power supply produces four direct current (dc) output voltages: −5, +5, +8.5, and +32 volts. All dc voltages have a tolerance of ±10% except the +5 volts, which has a tolerance of ±5%.

The power supply provides the four dc voltages to the logic gate via two cables that connect at 01A-A1E3 and 01A-A1D5. Connector J2 on the power supply provides the ac for the band, ribbon, and blower motor. It also supplies the alternating current (ac) input voltage to the power switch. Connector J4 supplies +5 volts dc to the operator panel from the power supply.

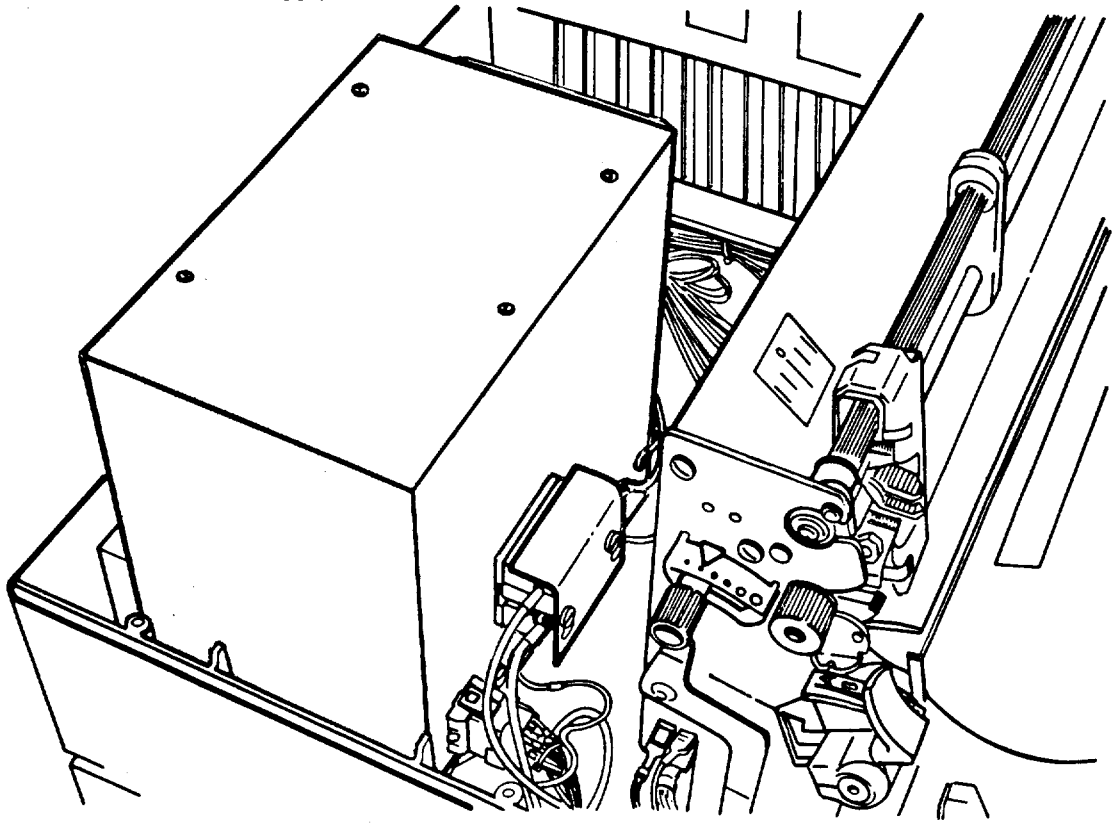

Figure 600-1. Top View of Power Supply

Relay (Solid State)

See Figure 600-2.

Removal

1. Set the printer power switch to O (Off), and disconnect the power cord from the back of the printer.
2. Remove the top cover (MI "Top Cover" on page 000-7).
3. Remove the power cover (MI "Power Cover" on page 000-8).
4. Remove the two screws that hold the safety cover (A).
5. Record the location of the four wires that connect to the relay terminals and remove the wires.
6. Remove the two studs (C) that attach the relay to the power supply (B).

Replacement

1. Install the relay to the power supply (B) with the two studs (C).
2. Install all wires to the relay terminals.
3. Install the safety cover (A).
4. Install the power cover (see "Power Cover" on page 000-8).
5. Install the top cover (see "Top Cover" on page 000-7).
6. Connect the power cord to the back of the printer.

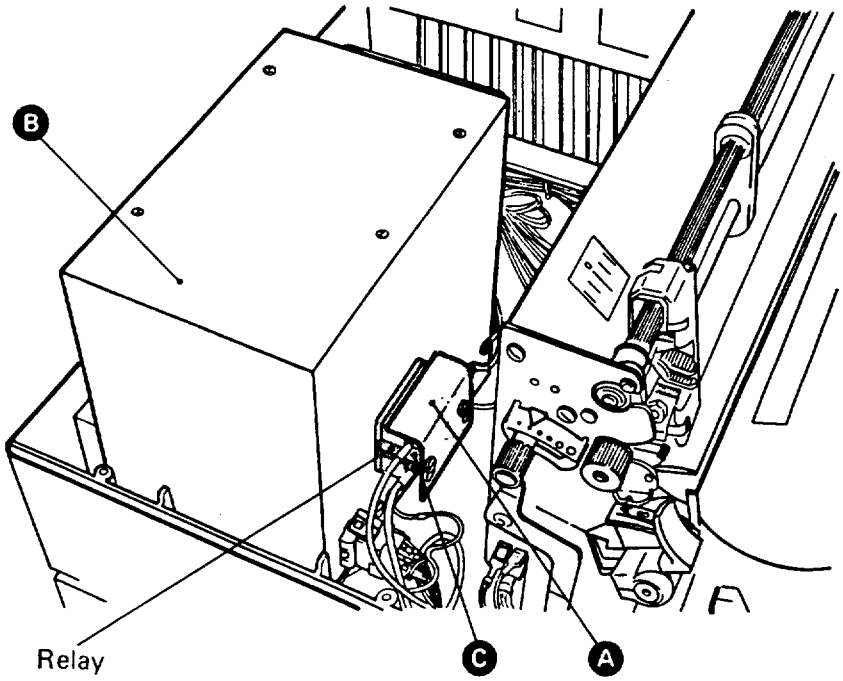

Figure 600-2. Relay

Power Supply

See Figure 600-3 on page 600-5.

Note: The power supply and fan are one FRU.

Removal

1. Set the printer power switch to O (Off), and disconnect the power cord from the back of the printer.
2. Remove the top cover (MI "Top Cover" on page 000-7).
3. Remove the power cover (MI "Power Cover" on page 000-8).
4. Remove the relay from the power supply, but do not remove the wires from the relay (MI "Relay (Solid State)" on page 600-3).
5. Disconnect the P2 connector (A) from the power supply.
6. Remove the ground wires (B) attached to the power supply.
7. Disconnect + 5 V dc cable at the J4/P4 connector and remove the cable-ties associated with the cable. If necessary, refer to Figure 800-11 on page 800-12 for the location of this connector.
8. Pivot the logic gate up and disconnect the two connectors (01A-A1D5 and 01A-A1E3), and remove the cable-ties and clamps associated with these cables.
9. Lift the power supply from the printer.

Replacement

1. Install the power supply on the four mounting studs in the base of the printer.
2. Connect the ground wires (B) to the power supply. Be sure that starwashers are beneath the terminals.
3. Connect the P2 connector (A) to the power supply.
4. Install the relay on the power supply (MI "Relay (Solid State)" on page 600-3).
5. Connect the P4 connector to the J4 connector and install the cable-ties.
6. Route the two cables that go to the logic board and connect the connectors 01A-A1D5 and 01A-A1E3.
7. Install all cable clamps and ties to the cables.
8. Close the logic gate.
9. Install the power cover (MI "Power Cover" on page 000-8).
10. Install the top cover (MI "Top Cover" on page 000-7).
11. Connect the power cord to the back of the printer.

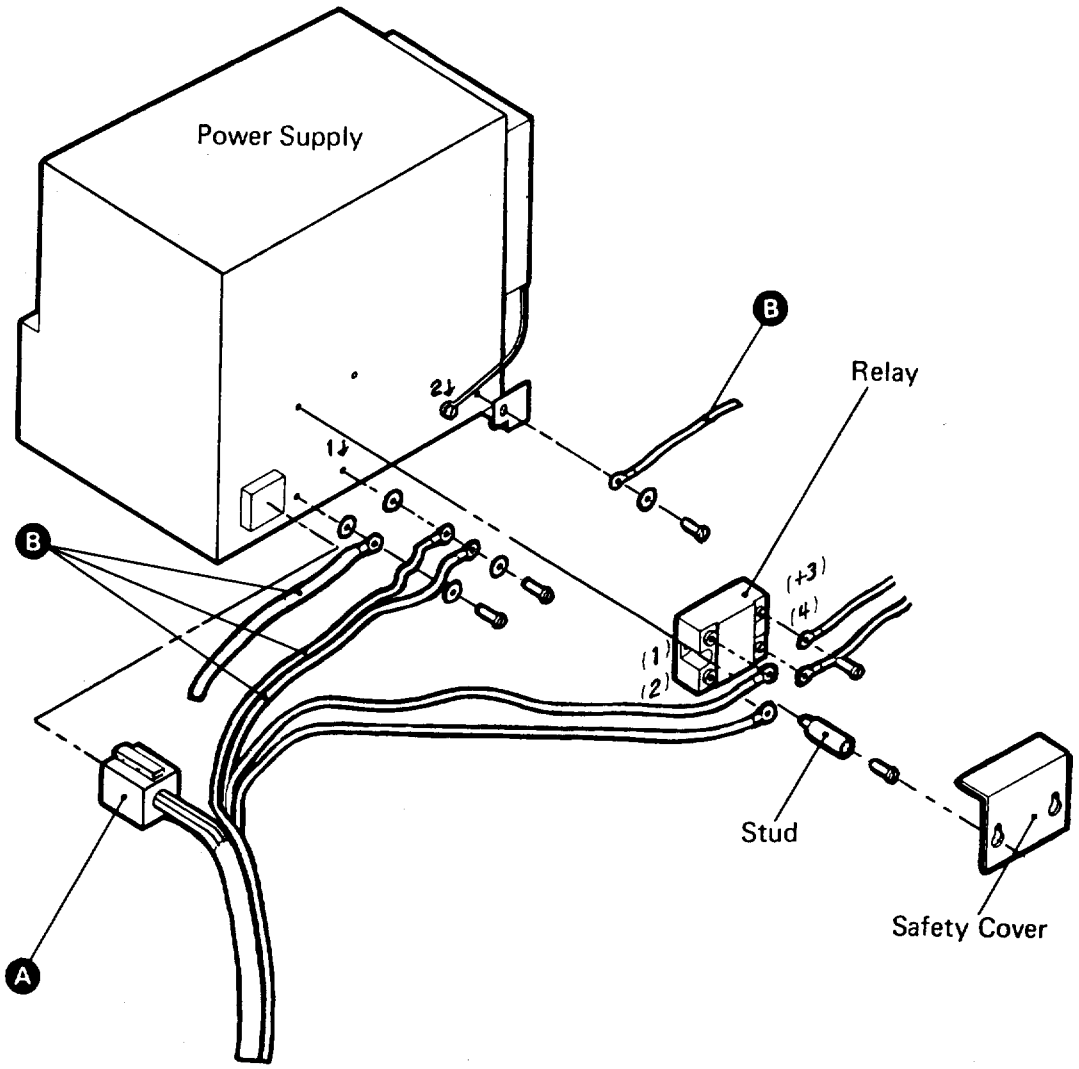

Figure 600-3. Power Supply

Cable

Power Switch and AC Cable

See Figure 600-4 on page 600-7.

Note: The power switch and cable are removed as one FRU. It is important that all starwashers removed during this procedure be replaced between the ground wiring terminals (braided straps and green/yellow wires) and the component to which they are attached.

Removal

1. Set the printer power switch to O (Off), and disconnect the power cord from the back of the printer.
2. Remove the top cover (MI "Top Cover" on page 000-7).
3. Remove the power cover (MI "Power Cover" on page 000-8).
4. Remove the operator panel support plate (MI "Operator Panel Support Plate" on page 500-5).
5. Remove the power switch from support plate.
6. Disconnect the three motor connectors (M1, M2, and M3).
7. Remove the M1, M2, and M3 connectors from the bracket mounted on the base of the printer.
8. Remove the capacitor safety cover (B).
9. Remove the ground wire in the capacitor area.
10. Remove the cable assembly from under the band drive motor.
11. Unplug the P2 connector (A) from the power supply.
12. Remove the relay safety cover (C).

    Note: Observe the wire number (or color) that attaches to terminals 1 and 2 of the relay for future reference.
13. Remove the wires from terminals 1 and 2.
14. Remove the ground wires that go from the ac cable to the power supply and the side-frame.
15. Remove the cable from all cable ties and clamps.
16. Remove the power switch and ac cable from the printer.

Replacement

1. Install the switch and cable assembly into the printer and connect the wires to the relay terminals 1 and 2.
2. Install the relay safety cover (C).
3. Connect the ground wires to the power supply and side-frame.
4. Connect the P2 connector (A) to the power supply.
5. Connect the ground wire in the capacitor area.
6. Install the capacitor cover (B).
7. Route the motor connector cable under the band drive motor.

> **Important**
>
> Ensure that the cable does not bind the ribbon motor fan.

8. Install all cable ties and clamps to the cable.
9. Install the M1, M2, and M3 connectors into the bracket in the base of the printer.
10. Connect the M1, M2, and M3 connectors.
11. Install the operator panel support plate (MI "Operator Panel Support Plate" on page 500-5).

12. Install the operator panel (MI "Operator Panel" on page 500-3).

13. Install the power cover (MI "Power Cover" on page 000-8).

14. Install the top cover (MI "Top Cover" on page 000-7).

15. Connect the power cord to the back of the printer.

16. Set the printer power switch to | (On) and verify correct printer operation.

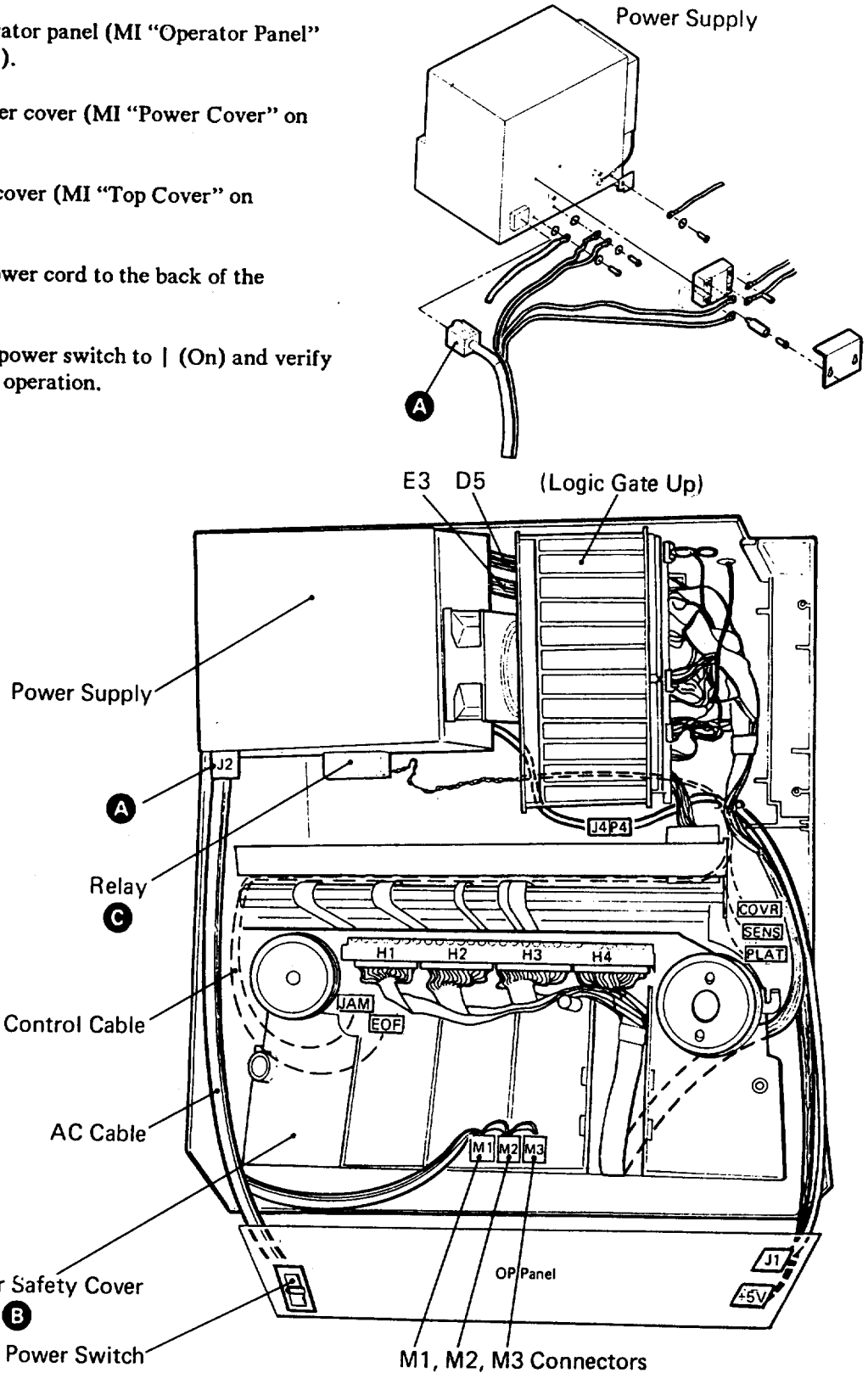

Figure 600-4. Power Switch and AC Cable

Control Cable

Note: Observe cable routing before removing the control cable.

See Figure 600-5 on page 600-9.

Removal

1. Set the printer power switch to O (Off), and disconnect the power cord from the back of the printer.
2. Remove the power cover (MI "Power Cover" on page 000-8).
3. Open the logic gate and disconnect connectors 01A-A1C4 and 01A-A1D4.
4. Remove the forms drive safety cover from the right side of printer (MI "Transport Assembly, Part 2" on page 800-5).
5. Disconnect the following connectors along the right side of the print mechanism:
   - Emitter sensor (marked SENS)
   - Platen switch (marked PLAT)
   - Band cover switch (marked COVR).
6. Place the print mechanism in the service position (MI "Print Mechanism (Service Position)" on page 300-48).
7. Disconnect the following connectors on the forms pressure roll assembly (MI "Forms Pressure Roll Shaft" on page 300-30):
   - EOF switch (marked EOF)
   - JAM sensor (marked JAM).
8. Remove the power supply relay safety cover and remove the wires from relay terminals three and four. Observe the wire location for replacement.
9. Remove all cable ties and clamps from the cable and remove the cable.

Replacement

1. Place the cable in the printer and connect the wires to the power supply relay terminals 3 and 4.
2. Install the relay safety cover.
3. Connect the following connectors to the forms pressure roll assembly (MI "Forms Pressure Roll Shaft" on page 300-30):
   - EOF switch (marked EOF)
   - JAM sensor (marked JAM).
4. Insert the cable into the clamp.
5. Install the print mechanism (MI "Print Mechanism (Service Position)" on page 300-48).
6. Connect the 01A-A1C4 and 01A-A1D4 connectors to the logic gate.
7. Close the logic gate.
8. Connect the following connectors along the right side of the print mechanism:
   - Emitter sensor (marked SENS)
   - Platen switch (marked PLAT)
   - Band cover switch (marked COVR).
9. Install all clamps and cable ties.
10. Install the forms drive safety cover.
11. Install the power cover (MI "Power Cover" on page 000-8).
12. Install the top cover (MI "Top Cover" on page 000-7).
13. Connect the power cord to the back of the printer.
14. Set the printer power switch to | (On), and verify correct printer operation.

MOD 1 Logic Gate Connectors

	K	J	H	G	F	E	D	C	B	A
2										System Attach Cable
3				Form Feed Cable		32V. Power Cable				
4		Hammer Cable				Hammer Cable	Logic Cable	Sensor Card Cable		
5		Hammer Cable				Hammer Cable	DC Power Cable			OP Panel Cable

MOD 2 Logic Gate Connectors

	K	J	H	G	F	E	D	C	B	A
2										
3				Form Feed Cable		32V. Power Cable				
4		Hammer Cable				Hammer Cable	Logic Cable	Sensor Card Cable	System Attach Cable	
5		Hammer Cable				Hammer Cable	DC Power Cable			OP Panel Cable

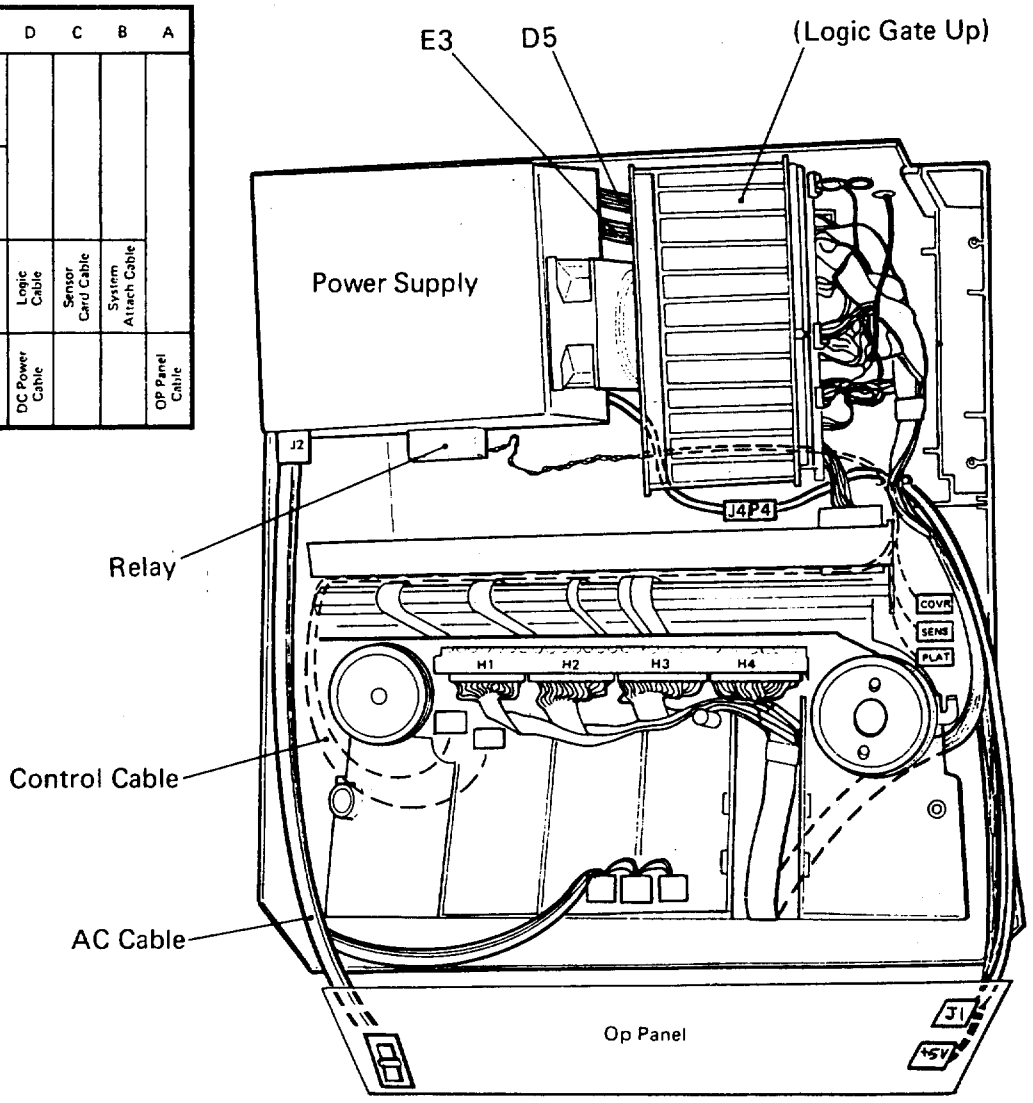

Figure 600-5. Control Cable

Blower

Blower Assembly

See Figure 600-6.

Removal

1. Set the printer power switch to O (Off), and disconnect the power cord from the back of the printer.
2. Remove the print mechanism (MI "Print Mechanism (Removal)" on page 300-50).
3. Remove two screws (A) securing the blower to the base.
4. Disconnect all ground wires to the blower assembly.

   Note: Record the location of ground wires.

5. Disconnect M3 cable connector (B).
6. Disconnect the wires to the capacitor (C).
7. Lift the blower from under the two left side tabs.
8. Remove the mounting hardware.

Replacement

1. Install the mounting hardware.
2. Place the blower under the two tabs and fasten it with two screws (A).
3. Connect the wires to the capacitor (C).
4. Connect the ground wires.

   Note: Be sure that the starwasher removed with the ground wire is reinstalled with the starwasher between the ground lead terminal and the capacitor clamp.

5. Connect M3 cable connector (B).
6. Install the print mechanism (MI "Print Mechanism (Removal)" on page 300-50).
7. Connect the power cord to the back of the printer.
8. Set the printer power switch to | (On) and verify proper operation of the hammer blower.

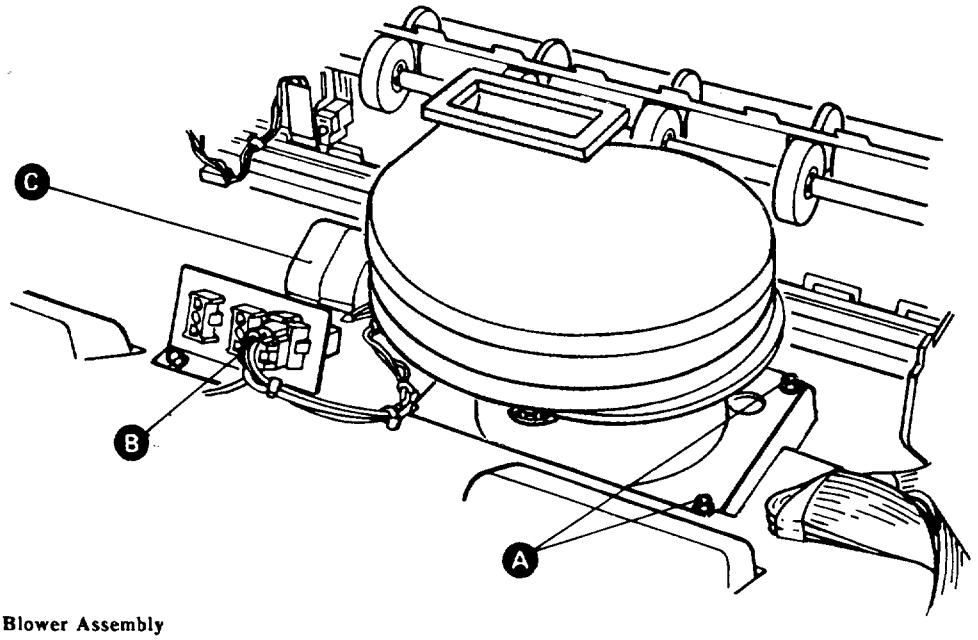

Figure 600-6. Blower Assembly

700. Diagnostic Procedures

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Diagnostic Test

List of Diagnostic Tests

The 4234 diagnostic tests are described in this section. The tests are:

- Test Key Tests
- Basic Assurance Tests (BATs)
- Operator Panel Test
- Test 01, Emitter and Dot Band
- Test 02, Hammer Alignment
- Test 03, RAM Print
- Test 04, Communications Data Print
- Test 06, Language Select Character Print
- Test 07, Ripple Print
- Test 51, ROS CRC and Parity Check
- Test 52, RAM Write/Read
- Test 55, Printer Exerciser
- Test 60, Communications Adapter Exerciser
- 70 Series of Tests, Printer Diagnostics
- 80 Series of Tests, Dot Patterns.

The most commonly used tests are:

- Test Key Tests
- Test 01 (Emitter and Dot Band)
- Test 07 (Ripple Print)
- Test 70 (Printer Diagnostics)
- Test 80 (Dot Patterns).

Hexadecimal Conversion Table

Hex	Decimal	Hex	Decimal
1	1	10	16
2	2	20	32
3	3	30	48
4	4	40	64
5	5	50	80
6	6	60	96
7	7	70	112
8	8	80	128
9	9	90	144
A	10	A0	160
B	11	B0	176
C	12	C0	192
D	13	D0	208
E	14	E0	224
F	15	F0	240
100	256	1000	4096
200	512	2000	8192
300	768	3000	12288
400	1024	4000	16384
500	1280	5000	20480
600	1536	6000	24576
700	1792	7000	28672
800	2048	8000	32768
900	2304	9000	36864
A00	2560	A000	40960
B00	2816	B000	45056
C00	3072	C000	49152
D00	3328	D000	53248
E00	3584	E000	57344
F00	3840	F000	61440

Selecting Tests

You can select all the tests with the operator panel keys. The progress of the selected test is displayed on the operator panel as it runs. Errors that occur during the test are displayed in the Status display.

To select a test, press and hold the Test key while you press the numbered operator panel keys for the test you want to run. While you press the numbered keys, the numbers selected are displayed in the Status display (SD) until you release the Test key.

For example, to start Test 51:

1. Press and hold the Test key.
2. Press and release the '5' key.
3. Press and release the '1' Key.
4. Release the Test key.

The ROS CRC and Parity Check test begins.

After you release the Test key, the status code is 00 and the eight LEDs (Light Emitting Diodes) numbered 0 through 7 are set to hex F0. After the selected test begins to run, the status code and LEDs change under the control of the selected test.

Test Looping Options

You can select two test looping options:

1. Loop Stop - Press the E key (Cancel Print) after selecting the test but before releasing the Test key. This causes the test to loop until an error occurs and then stops.
2. Loop Restart Run - Press the B key after selecting the test but before releasing the Test key. This causes the test to restart when an error occurs. The error is logged in the RAS Error log and the test continues.

To stop test looping, select another test or press the Test key.

Diagnostic Error (SC) Codes

These codes are displayed when an error occurs during diagnostic testing. Up to three additional bytes of error information are available for display. These status codes and error information are listed in "List of Diagnostic Status Codes and Additional Error Log Bytes" on page 700-21.

Test Key Tests

See Figure 700-2 on page 700-5.

Operation

To start the Test Key test, press and release the Test key. Forms must be loaded before running this test. The test normally takes about one minute to complete.

Test Description

There are four parts to the test:

Log Printout: This is information about printer errors and events that have occurred since the last power on. The log is printed first because the BATs destroy previously logged information.

Basic Assurance Tests (BATs): This part of the test is an in-depth version of the power-on BATs. The ROS, RAM, PMA, and the communications adapter receive more extensive testing at this time. No printing occurs during this part of the test.

Pattern Printouts: These patterns provide print samples for observing print quality.

Additional Log Printout: These two additional lines of the log are printed only if an error occurs while the Test Key test was running and the printer is still able to print.

Figure 700-2 on page 700-5 describes the correct operation of this test.

Error Indications

If an error occurs during the Test Key printout, and the printer cannot recover from the error, the BATs will continue to run and an error will be posted in the Status display. If an error occurs during the test, and the printer is capable, it will print the additional log printout. If one of the following status codes is displayed, intervention is required before the printer can print.

SC	Problem	Action
81	End of forms	Insert forms
82	Forms jam	Clear forms jam
83	Platen open	Close the platen
85	Band cover switch not activated	Install the band cover

Figure 700-1. Intervention Codes for Test Key Test

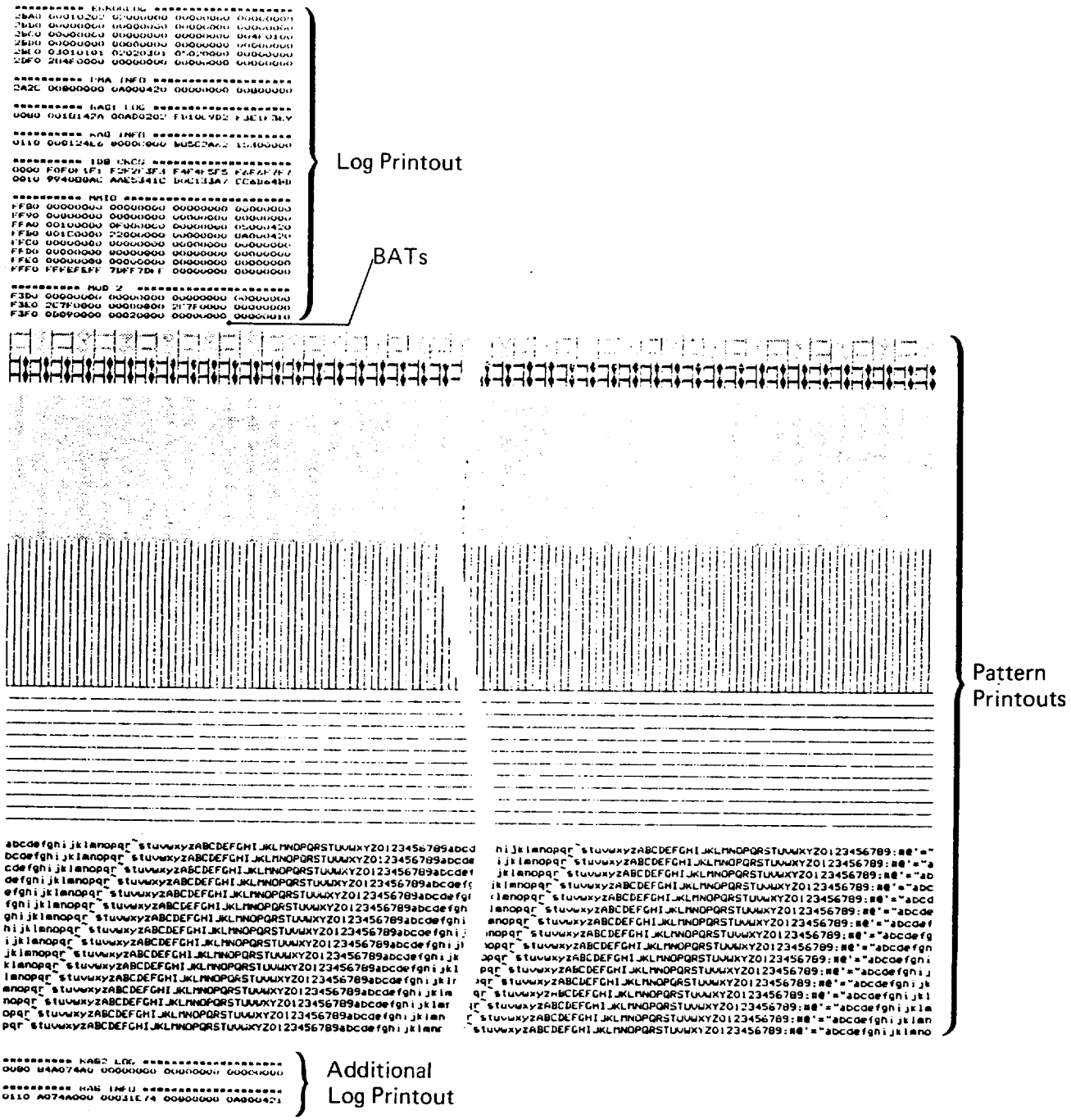

Figure 700-2. Sample of Test Key Printouts

Figure 700-3 describes the correct operation of this test.

SC	LEDs	Description
88	FF	This indicates that the Test key has been pressed.
--	30	The error log prints out. If a printer error occurs during the error log printout, or the printer has a solid error, the printout will not be complete. Following the error log printout, the in-depth BATs run.
FO	14	The dot band, ribbon, and blower motor run briefly, then stop.
--	91	The SC decimal point blinks while the CRC logic tests are running. This indicates that the tests are running.
--	92	Additional RAM logic tests are running.
--	93	The Communications test is running.
--	95	The SD is blank. Forms movement occurs after a brief delay. The forms stop moving, then the dot band, ribbon, and blower motor start. A soft hammer fire occurs (no printing). The dot band stops running.
--	96 99 9A 9B	The dot band starts running and a series of dot patterns print. The customer or service representative can check for overall print quality.
--	9F	The SD is blank. Diagnostic routine ends.
88	FF	All LEDs are on, the alarm sounds, and printer control is given back to the controller.

Figure 700-3. Test Key Test

Basic Assurance Tests (BATs)

Purpose: The BATs run automatically when power is applied to the printer. These are internal diagnostics that check the following areas and functions of the printer:

- PMA (print mechanism adapter)
- ROS (read-only storage)
- RAM (read/write storage)
- Communications adapter
- Operator panel
- Forms movement
- Ribbon movement
- Emitter
- Soft hammer fire (no printing occurs)
- Power supply voltage compensation.

Note: Normal completion time for the BATs is about 30 seconds. A status code of 01 during the BATs indicates forms should be loaded.

Description: The following events occur during correct operation of these tests:

SC	LEDs	Description
88	FF	Printer microcode is being initialized. All LEDs are on.
FO	14	The band, ribbon, and blower motor run briefly, then stop.
--	91	SD decimal point blinks while the CRC logic tests run. This shows that the printer test is running.
--	92	Additional RAM logic tests are running.
--	93	The Communications test is running.
--	95	The forms move up and then, after a brief delay, move down. Then the band, ribbon, and blower motor turn on. A soft hammer fire occurs (no printing is seen).
--	9F	Diagnostic routine ends.
88	FF	All LEDs are on and the alarm sounds. This is the ending sequence.
--	--	Status display is blank and all LEDs are off. BATs end.

Figure 700-4. BATs Test Description

Note: The decimal point on the left side of the SC blinks off and on during the printer tests. This indicates that tests are running.

Error Indications: An error code is displayed in the SD if an error is detected.

Operator Panel Tests

Purpose: This test determines whether the operator panel keys, switches, and LEDs are functioning properly. The test has two parts.

To start the test:

1. Power On the printer. All segments of the Status display and all LEDs come on briefly; then the BATs begin to run.
2. The alarm sounds for one second when the BATs end successfully.
3. Press and hold the Test key. All segments of the Status display and all the LEDs come on.
4. Press and release the 0 key. The status code changes to 00 and the LEDs change to F0.
5. Press and release the 1 key. The status code changes to 01 and the LEDs change to F1.
6. Continue to hold the Test key and press, one at a time, the remaining keys (2-9). The status code and LEDs continue to change as shown in the Figure 700-5.

KEY	SC	LEDs
0	00	F0
1	01	F1
2	12	F2
3	23	F3
4	34	F4
5	45	F5
6	56	F6
7	67	F7
8	78	F8
9	89	F9
A	89	FA
B	89	FB
C	89	FC
D	89	FD
E	89	FE

Figure 700-5. Operator Key Test

Address Switch Group Test

1. Press and hold the Test key.
2. Press and release the 5 key.
3. Press and release the 5 key again. The SC = 55 and the LEDs = F5.
4. Release the Test key. The SC = 00 and the LEDs = 0F (the LEDs are blinking).

   Note: Notice that the decimal point has come on in the SD for the first time.

5. Press and release the 3 key. The SC = 00 and the LEDs = F0 (the LEDs are blinking).

6. Press and hold the 0 key until the SC = F0.
7. Release the 0 key.
8. Press and hold the 1 key until the SC = FF.
9. Release the 1 key.
10. Press and hold the 2 key until the SC = 00.

    Note: Notice that the decimal point in the SD goes off.

11. Press and hold the 0 key until the SC = F0.
12. Release the 0 key.
13. Press and hold the 1 key until the SC = F2.
14. Release the 1 key.

    Note: You have set up storage address hex FFF2. First, the high-order address byte hex FF is shown in the Status display. Then the low-order byte hex F2 is shown.

15. Press and release the 4 key. The status code is F2 and the LEDs are not blinking.

The switches on the operator panel can now be tested. The SC indicates the low-order address of the group of switches to be tested. The LEDs show the value in hexadecimal that have been set into the switches.

After selecting a group of switches, you can change the settings of the switches. The value displayed in the LEDs will change accordingly. Press and release the 4 key to advance the low-order address to the next group of switches. See Figure 700-6.

SC	Model	Switch
F2	1 and 2	Language Select
F3	1	Compatibility Options
F4	1 2	Character Print Operation/Print Select Address Select
F5	1	Page Length

Figure 700-6. Address Switch Group Test

Test 01, Emitter and Dot Band

Purpose: This test checks the emitter and determines if the emitter slots in the print band are clogged.

Either you or the customer runs this test.

Operation: To start this test:

1. Press and hold the Test key.
2. Press and release the 0 key.
3. Press and release the 1 key.
4. Release the Test key.

Error Indications: SC = 12 is displayed when 12 or more emitter slots are clogged or dirty.

Test 02, Hammer Alignment

Purpose: This test prints all dots on the band by printing 12 lines of Test Pattern 87. You can visually check for missing dots on the band, hammer alignment, broken hammers, hammers not striking the form correctly, and emitter alignment.

Either you or the customer runs this test. It also runs as a part of the Test Key test.

Operation: To start this test:

1. Press and hold the Test key.
2. Press and release the 2 key.
3. Release the Test key.

Error Indications: Compare the results with the examples shown in "Print Quality" located in Section 300, page 300-58.

Test 03, RAM Print

Purpose: This test prints out all of the RAM (read/write storage) starting at storage address hex 0000.

You would run this test under direction of the Support Center.

Operation: To start this test:

1. Press and hold the Test key.
2. Press and release the 3 key.
3. Release the Test key.

To stop the printout, press the Cancel Print key.

Error Indications: If a parity check occurs while RAM is being printed, a C0 is printed for that position and a machine check is logged. If a printer error occurs, the error is displayed in the SD and printing stops.

Test 04, Communications Data Print

Purpose: This test prints data specific to the communications adapter installed. For a twinaxial connector, this data is in the MPU (microprogram unit) storage and addresses hex F000 through hex F3FF are printed. For the coaxial connector, this data is in the PCIA (printer control information area) and the extended PCIA of the adapter buffer (in MPU storage).

The contents of the register storage are printed following the communication printout.

Either you or the customer runs this test.

Operation: To start this test:

1. Press and hold the Test key.
2. Press and release the 4 key.
3. Release the Test key.

Test 06, Language Select Character Print

Purpose: This test prints the character set selected by the Language Select switches, and all APL characters, in 8 and 6 LPI (lines per inch) of DP and NLQ printing. It also prints the draft character set in both 8 and 6 LPI.

Either you or the customer runs this test.

Operation: To start this test:

1. Press and hold the Test key.
2. Press and release the 6 key.
3. Release the Test key.

Test 07, Ripple Print

Purpose: This test prints a ripple pattern of characters a through z, A through Z, 1 through 9, and selected special characters. The special characters are selected by the setting of the select switches. The test prints at the character density set in the Print Quality Select switch.

Either you or the customer runs this test.

Operation: To start this test:

1. Press and hold the Test key.
2. Press and release the 7 key.
3. Release the Test key.
4. The test will print 12 lines.

To run Ripple Print continuously:

1. Press and release the 6 key as soon as printing starts.

2. To stop continuous printing, press Cancel Print.

Test 51, ROS CRC and Parity Check

Purpose: This test checks ROS for correct parity and the values of CRC (cyclic redundancy check) characters for each 8K of ROS. Each module is checked for parity errors.

You may run this test. It also runs automatically as part of the Basic Assurance tests and the Test Key tests.

Operation: To start this test:

1. Press and hold the Test key.
2. Press and release the 5 key.
3. Press and release the 1 key.
4. Release the Test key.

Error Indications: Errors are displayed for each 8K of ROS. The Status display displays an error code and printing stops.

Test 52, RAM Write/Read

Purpose: This test writes various bit patterns into 16K/32K RAM and reads them back while checking for parity errors. Both odd and even parity are used during testing. A refresh test runs between the write and read operation of RAM. Additional testing occurs during the Test Key test to ensure that the RAM refresh is working.

During the testing of the RAM, the error log and customer operator panel data are saved in register storage. At the end of testing, this data is restored to the proper RAM locations.

You run this test, which also runs during the BATs and Test Key tests.

Operation: To start this test:

1. Press and hold the Test key.
2. Press and release the 5 key.
3. Press and release the 2 key.
4. Release the Test key.

Test 55, Printer Exerciser

Purpose: This test does the following:

- Displays data in any address in RAM or register storage.

  This data is used by the service representative to check logic line states, and to read FRU isolation data directly from RAM and register storage.

- Prints a hex character that has been entered into the SD at the selected CPI (characters per inch). The CPI is also entered into the SD. The default settings for other switches are used.

- Displays data at specific address. Keys A through E are used to display data at any address in the printer RAM or registers.

After selecting Test 55, press:

1. **The A key to display:**

   a. Band cover switch
   b. EOF switch condition
   c. Jam sensor condition.

2. **The B key to display:**

   a. Platen switch condition
   b. 32 volts condition (on or off).

3. **The D key to start the dot band and display:**

   a. Print emitter condition
   b. Home emitter condition.

Example 1: You use keys 0, 1, and 2 to set up storage address hex FFF2.

1. Start Test 55:
   a. Press and hold the Test key.
   b. Press and release the 5 key.
   c. Press and release the 5 key.
   d. Release the Test key.

   Note: The SC = 00 and the LEDs = 0F and are blinking. Notice that the decimal point in the Status display is on. Test 55 is loaded now.

2. Press and hold the 0 key until the SC = F0.
3. Press and hold the 1 key until the SC = FF.
4. Press and hold the 2 key until the SC = 00.

   Note: Notice that the decimal point in the Status display goes off.

5. Press and hold the 0 key until the SC = F0.
6. Press and hold the 1 key until the SC = F2.

   The high order address byte hex FF is displayed in the Status display first, and then the low order byte F2 is displayed.

Example 2: To display RAM or register space:

1. First, start Test 55:
   a. Press and hold the Test key.
   b. Press and release the 5 key.
   c. Press and release the 5 key.
   d. Release the Test key.

      Note: The SC = 00 and the LEDs = 0F are blinking.

2. Then press and release the 3 key to display the RAM or register. The SC = 00 and the LEDs = F0.

   To display data, use the following keys:

Key	Function
0	Increments the left (high-order) SC digit from 1X to 2X to 3X and so on.
1	Increments the right (low-order) SC digit from X1 to X2 to X3 and so on.
2	Selects the left or right byte of the two-byte address. If the Status display decimal point is on, the left address byte is displayed. If the Status display decimal place is off, the right byte is displayed. Each depression of the 2 key changes the byte selected from left (high-order) to right (low-order) or from right to left.
3	Selects either RAM or register address display. Each time you press the 3 key, the selection changes from RAM to register or from register to RAM. If the LEDs blink 0F, the registers can be displayed. If the LEDs blink F0, the RAM can be displayed.
4	Reads and displays data from a selected address. The SD shows the low-order address of the storage selected and the LEDs display the data. If you continue to press the 4 key, it increments the address in the Status display and displays that data in the LEDs.
5	Prints any character. Use keys 0, 1, and 2 to set the hex character to be displayed in the Status display high-order byte. Use these keys to set the attribute buffer character in the Status display low-order byte. The attribute buffer character is 00 for EBCDIC, 01 for APL, and 02 for a special character set. Press the 5 key to begin print.
6	Not used.
7	Not used.
8	Not used.

9 Not used.

A Display RAM address hex FFAF. The SC is AF. The LEDs display the following special information:

LED 5 - Current status of the band cover switch
LED 6 - Current status of the EOF (end-of-forms) sensor
LED 7 - Current status of the jam sensor.

The LEDs turn on and off as these sensors or switches are manually activated. Press the 4 key to increment the display. The contents of this address are printed during the Test Key tests in the section "MMIO."

B Turns on 32 volts power and displays RAM address hex FFA0. The SC is A0. The LEDs display the following special information:

LED 4 - Current status of the platen switch. Moving the forms thickness lever will turn this LED on and off.
LED 6 - Current status of the 32 volts power supply (LED on = supply off). At first, this LED should be on indicating the that power supply voltage is off. Then, as the 32-volt power supply comes on, the LED should go off.

Press the 4 key to increment the display. The contents of this register are printed in the Test Key tests in the section "MMIO."

C Not used.

D Starts the dot band and displays RAM address hex FFA1. The SC is A1. The LEDs display the following special information:

LED 4 - Current condition of the print emitter output from the sensor card
LED 5 - Current condition of the home emitter output from the sensor card.

Note: If you can turn the band drive pulley fast enough to turn LEDs 4 and 5 on and off, then the output of the sensor card can be verified. The band speed must approach print speed.

Press the 4 key to increment the display to the next address. The contents of this register are printed during the Test Key tests in the section "MMIO."

E Not used.

Test 60, Communications Adapter Exerciser

Purpose: This test exercises the hardware logic of the installed communications adapter. The test runs without manual intervention.

You may run this test. It also runs automatically during the BAT and Test Key tests.

Operation: To start this test:

1. Press and hold the Test key.
2. Press and release the 6 key.
3. Press and release the 0 key.
4. Release the Test key.

Test 70, Printer Diagnostics

DANGER
These tests allow the band motor to run with the band cover removed. Keep hands away from band area while running these tests.

Purpose: These tests exercise the hardware and the logic for the band drive, forms drive, and the hammer circuits.

You run these tests. They also run automatically during the BATs and Test Key tests.

Test 70 runs Tests 71 through 79, except for Test 78. No printing occurs during forms movement. Dots are printed so that they can be seen individually.

These tests include the following:

Test 70 All of the following tests except 78 run.

Test 71 Forms movement and timer.

Test 72 Reserved.

Test 73 15 millisecond timer.

Test 74 Shift register and soft hammer fire.

Test 75 Belt timing, emitter, and clogged slots.

Test 76 Scan counter and storage.

Test 77 Hammer fire (During the BATs, the hammers do not touch the form.)

Test 78 Diagnostic printout of alignment pattern. This prints during the Test Key tests or when it is started directly.

Test 79 Voltage compensation test.

Operation: To start these tests:

1. Press and hold the Test key.
2. Press and release the 7 key.
3. Press and release the 0 key.
4. Release the Test key.

You may run Tests 71 through 78 individually. To start the test:

1. Press and hold the Test key.
2. Press and release the 7 key.
3. Press and release the X key where X = 1 through 8.
4. Release the Test key.

Error Indications: If an error is detected in any part of these tests, an SC is displayed.

Tests 80-87, Dot Print Patterns

Purpose: These tests print various dot patterns and can be used to check print quality.

Operation: To start these tests:

1. Press and hold the Test key.
2. Press and release the 8 key.
3. Press and release the X key where X = 0 through 7.
4. Release the Test key.

Once printing begins:

- Press and hold the 5 key to continue printing even when errors are detected.
- Press and hold the 6 key to print more than 10 lines.

Status Display

Operator Status Codes (SC)

The following status codes may occur during operation of the printer. Some codes are normal indications.

SC	Condition
01	End of forms
02	Forms jam
03	Platen open
05	Band cover missing or installed incorrectly
06	System requests operator intervention (audible alarm sounds)
07	Invalid instruction from the controller
08	Ten-Minute timer expired in hold print mode
09	Invalid operator entry
12	Dirty dot band (emitter slots clogged)
13	Graphic check
14	Eject forms restore pending
21	Invalid Language Select switch status
22	Invalid Address switch status
27	Communication errors (unit address not received)
28	Communication errors (line sync lost)

Timeout Status Codes: When status codes 01 through 05 occur, a 60-second timer starts. If the operator (or you) presses the Hold Print key within that time, a 10-minute timer starts to allow more time to correct the cause of the status code. If this 10-minute timer expires, the following status codes are displayed:

SC	Condition
31	End-of-Forms timeout
32	Forms jam timeout
33	Platen-Open timeout

35	Band-Cover-Check timeout

Other Timeout Codes:

SC	Condition
36	Dot band timeout
37	Stepper motor control timeout
39	Slow-Print timeout

Operator Panel Error Codes:

SC	Condition
40	Microcode overrun (buffer is not finished loading)
41	Hammer driver check, driver card 1
42	Hammer driver check, driver card 2
47	Forms driver check
48	Hammer driver shorted
50	Coil open
51	Coil protect check, card 1
52	Coil protect check, card 2
57	Emitter check
58	Power supply failure (32 V dc)

Other Operator Panel Status Codes:

SC	Condition
59	Cancel key selected or active
60	Buffer print selected or active
61	PA 1 selected
62	PA 2 selected
63	System requests a PA key

List of Diagnostic Status Codes and Additional Error Log Bytes

If an error occurs while running printer diagnostics (including the Test key tests), a status code will display. The Cancel/Print key displays bytes 2, 3, and 4. These bytes may provide additional information relating to the error. In Figure 700-7, a blank space under bytes 2, 3, or 4 indicates that the data located in these bytes are not used for that particular status code.

Status Code	Byte 2	Byte 3	Byte 4	Description
81	1C 70			Out of forms Out of forms when printing
82	1E			Jam sensor
83	04 70			Platen opened when 32 volts turned on Platen open when printing
85	05			Cover opened when 32 volts turned on

Figure 700-7 (Part 1 of 5). Status Codes and Error Bytes

Status Code	Byte 2	Byte 3	Byte 4	Description
A0	14			Forms timer on when not active
	17			Forms timer did not come on when forms timer enabled
	18			No level 1 interrupt when form or ribbon timer ends
	19			Forms driver (bit on, drivers off) when drivers turned on
	1D			Forms timer
	1E			Form data did not change in motor sense after interrupt
	1F	07		Level 1 interrupt did not occur when timer value written to XX
	2A			Form timer value low
	2F			New form/ribbon phase not written after interrupt
	30			No level 3 interrupt forms timer
	31			Level 3 timer fails to come on
	32			Level 3 timer not reset by reading
	33			Cannot reset timer level 3 interrupt
	34			Level 3 timer fails to come on after clearing
	35			Level 3 timer greater than 16.6 ms.
	36			Level 3 timer less than 13.5 ms.
	40	A2	XX	Npn fire bit not on at latch load (see byte 3)
	40	A3	XX	Pnp fire bit not on at latch load (see byte 3)
	41			Npn fire bit off too soon (off at 230 usec., set to 240 usec.)
	42			Npn fire bit on at 260 usec. (should be off, set to 240 usec.)
	43			Pnp bit at 475 usec., set to 490 usec.
	44			Pnp bit not off at 510 usec., set to 490 usec.
	4F	AX	XX	Fire/parity bit not on, any hammer on (see bytes 3 and 4)
	61			Vsp on, should be off, wrote to 00 to printer
	62			Vsp on, too soon after writing to MIMIO
	63			Vsp did not come on after data written
	64			Scan count not correct when data read
	70			Form timer interrupt did not occur
	74			'Row complete' failed to come on while printing
	91			Pnp fire bit not on when latch loaded
	92			Npn fire bit not on when latch loaded
	94			Npn bit time short, less than 140 usec.
	95			Npn bit time long, more than 175 usec.
	96			Pnp bit time short, less than 200 usec.
	97			Pnp bit long, greater than 300 usec.
	98			15 ms. timer not active since beginning of test
	98	07	XX	Interrupt 3 bit not on (15 ms. timeout)

Figure 700-7 (Part 2 of 5). Status Codes and Error Bytes

Status Code	Byte 2	Byte 3	Byte 4	Description
A1	40	A3	X1	Pnp parity error detected, no hammer fired (see byte 3)
	48			Open coil, soft hammer fire
	4A	A2	X1	Npn parity error, no hammer fired (see byte 3)
	4A	A3	X1	Pnp parity error, no hammer fired (see byte 3)
	74			Hammer pedestal check
	75			Npn parity bit is on but not open coil or shorted driver
	90			Pedestal parity on too soon, 32 volts comp
	93			Volt comp fail, fails to respond by 100 usec.
	97			Parity bit not latched at end of pnp fire
A2	40	A3	X2	Pnp parity error detected, no hammer fired (see byte 3)
	48			Open coil, soft hammer fire
	49			Hammer check, shift register or coil shorted
	4A	A2	X2	Npn parity error, no hammer fired (see byte 3)
	4A	A3	X2	Pnp parity error, no hammer fired (see byte 3)
	74			Hammer pedestal check
	75			Npn parity bit is on but not open coil or shorted driver
	90			Pedestal parity on too soon, 32 volts comp
	97			Parity bit not latched at end of pnp fire
A7	01			Forms motor overcurrent when 32 volts is turned on
	11			Forms driver (bit) on when should be off
	12			Phase driver open (form)
	13			Overcurrent or pedestal open (form)
	15			Form driver/phase driver open
	16			Driver overcurrent or pedestal open in motor sense (form)
	1A			Form pedestal open or phase driver open when drivers are on
	1B			Form overcurrent when drivers are on
	1F			Overcurrent motor moving
	2F			Overcurrent when phase written to forms MMIO
	71			Forms status error when printing
	90			Pedestal parity on too soon, 32 volts comp
	93			Comp voltage failure, neither card responds at 100 usec.
A9	50			Home and emitter pulses on solid (1.25 seconds)
	53			Home OK - emitter not changing off solid (1.25 seconds)
	54			Home OK - emitter not changing on solid (1.25 seconds)
	60			Home emitters not changing
C1	45	H#	A1	No current drawn, hammer fired, npn bit on (see byte 3)
	46	H#	A1	'Any hammer on' when pos 48 fired, npn bit on
	48	H#	A1	Open coil, soft hammer fire (3 = hammer #, 4 = card)
	49	H#	A1	Shorted coil, soft hammer fire (3 = hammer #, 4 = card)
				Note: H# = hammer number in hexadecimal. A1 = Hammer driver card 1. A2 = Hammer driver card 2.

Figure 700-7 (Part 3 of 5). Status Codes and Error Bytes

Status Code	Byte 2	Byte 3	Byte 4	Description
C2	45	H#	A1	No current drawn, hammer fired, npn bit on (see byte 3)
	45	H#	A2	No current drawn, hammer fired, npn bit on, (see byte 3)
	46	H#	A1	'Any hammer on' when pos 48 fired, npn bit on
	46	H#	A2	'Any hammer on' when pos 48 fired, npn bit on
	48	H#	A1	Open coil, soft hammer fire (3 = hammer #, 4 = card)
	48	H#	A2	Open coil, soft hammer fire (3 = hammer #, 4 = card)
	49	H#	A1	Shorted coil, soft hammer fire (3 = hammer #, 4 = card)
	49	H#	A2	Shorted coil, soft hammer fire (3 = hammer #, 4 = card) Note: H# = hammer number in hexadecimal. A1 = Hammer driver card 1. A2 = Hammer driver card 2.
C3	45	H#	A2	No current drawn, hammer fired, npn bit on (see byte 3)
	46	H#	A2	'Any hammer on' when pos 48 fired, npn bit on
	48	H#	A2	Open coil, soft hammer fire (3 = hammer #, 4 = card)
	49	H#	A2	Shorted coil, soft hammer fire (3 = hammer #, 4 = card) Note: H# = hammer number in hexadecimal. A1 = Hammer driver card 1. A2 = Hammer driver card 2.
C4	75			Open coil check when printing, read A2 for hint, run test 74
	76			Open coil check when printing, no parity bits
C5	75			'Any hammer on' bit on after printing, run test 74
C6	75			'Any hammer on' bit on after printing, no parity bits
C7	11			Forms driver (bit) and pedestal error (motor or cable open)
C9	50			Emitter not changing (off)
	51			Emitter not changing (on)
	52			Emitter changing but one is off too long
	53			Emitter changing but one is on too long
	54			Emitter slot on band clogged, previous slots OK
	55			Home off too long
	56			Home on too long
	57			Home slot clogged
	60			Home emitters not changing
	73			Home and emitter pulses not on within 50 ms.
	74			Emitter check when printing

Figure 700-7 (Part 4 of 5). Status Codes and Error Bytes

Status Code	Byte 2	Byte 3	Byte 4	Description
CF	00			32 volts bad bit on, did not turn off when set off
	03			32 volts indicates 'not on' when first turned on
	10			32 volts not on for form/ribbon test
	11			Bits 1, 2, and 3 on (voltage apparently missing)
	1E			Any hammer on when forms moved
	40			'Any hammer on' (on) when no hammer fired (195 usec.)
	43			'Any hammer on' (on) between 195 usec. and 460 usec.
	46			Any hammer on when pos 48 fired, no associated parity errors
	74			Voltage error while printing
E0	E7			ROS module location wrong
F0	F7			ROS module CRC, MCPC

Figure 700-7 (Part 5 of 5). Status Codes and Error Bytes

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800. Locations and Wiring Diagrams

800 - Section Contents

Locations

Front and Rear Locations

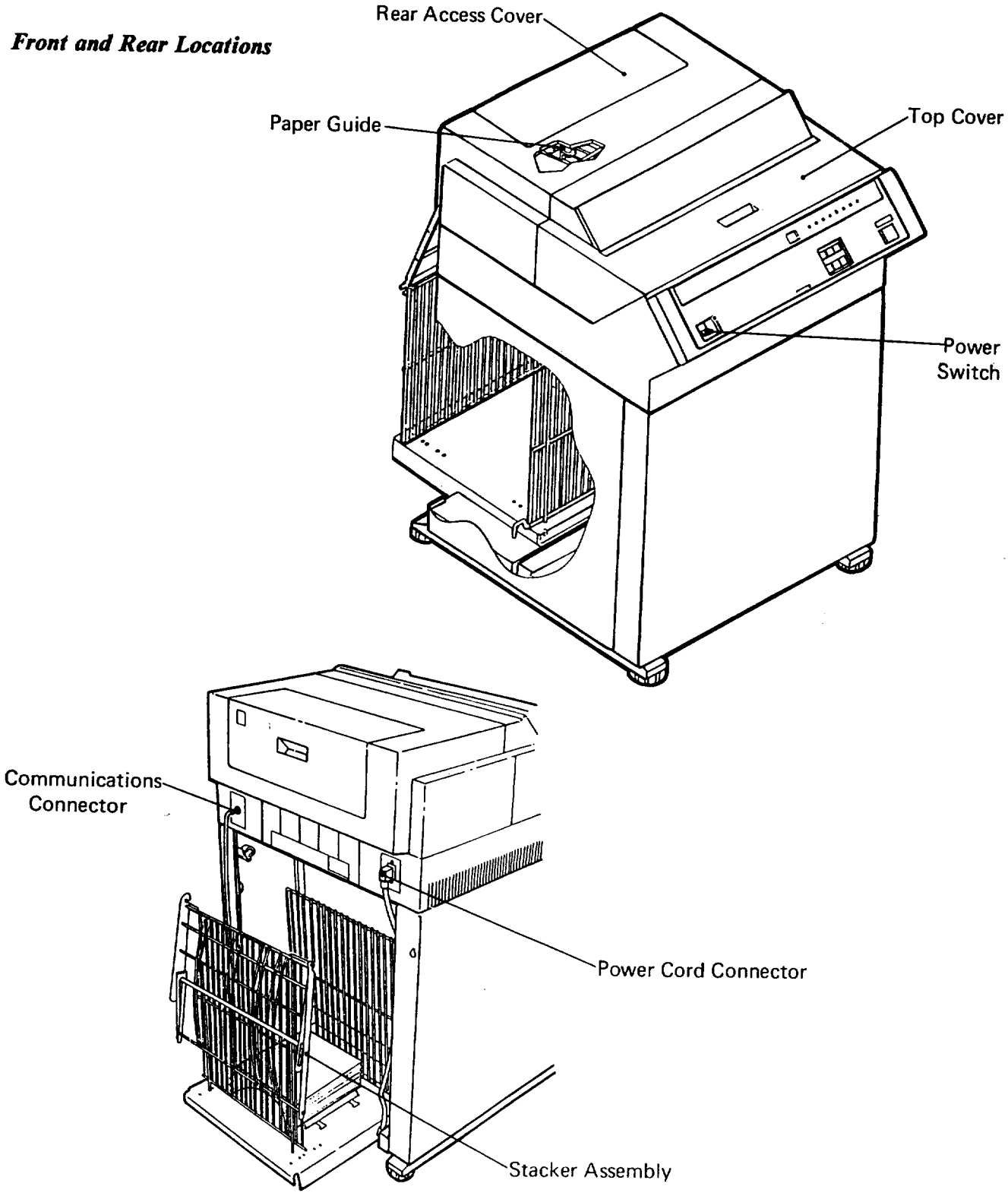
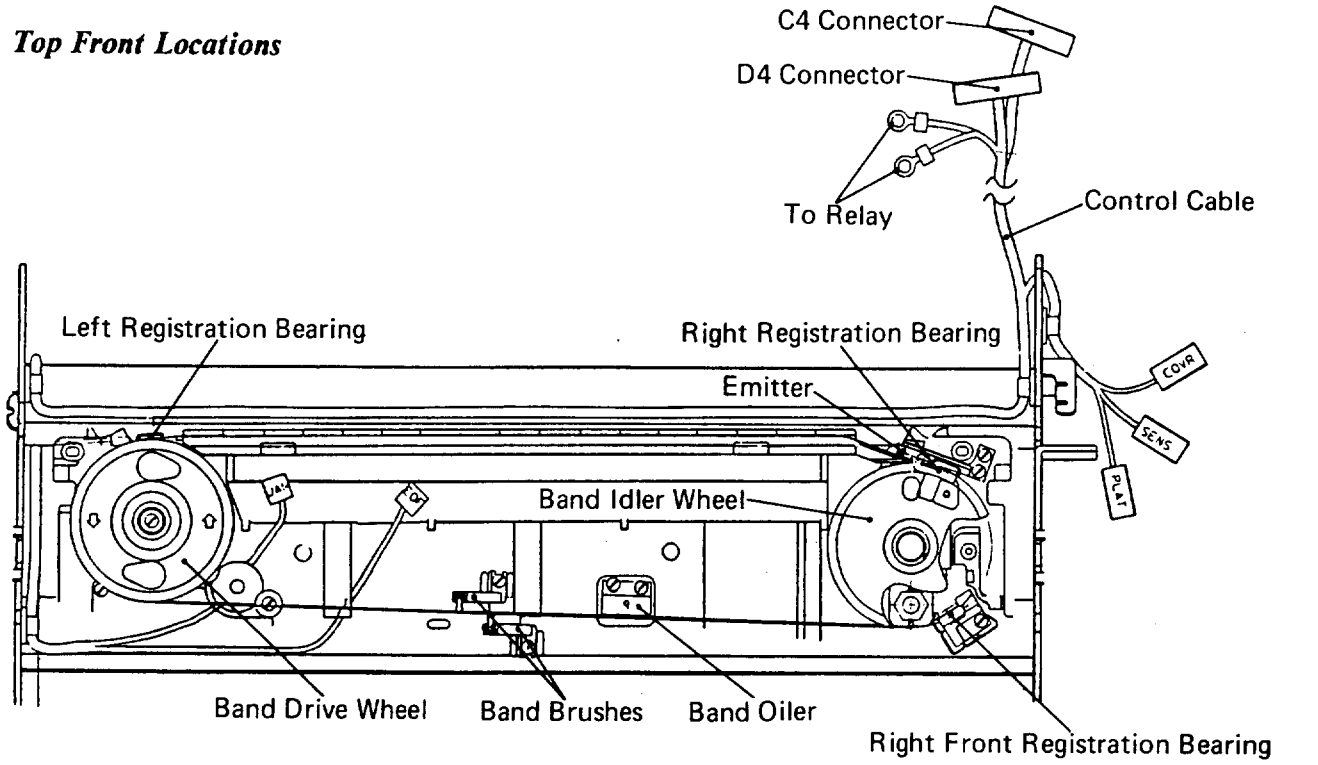


Figure 800-1. Locations, Front and Rear

Top Front Locations



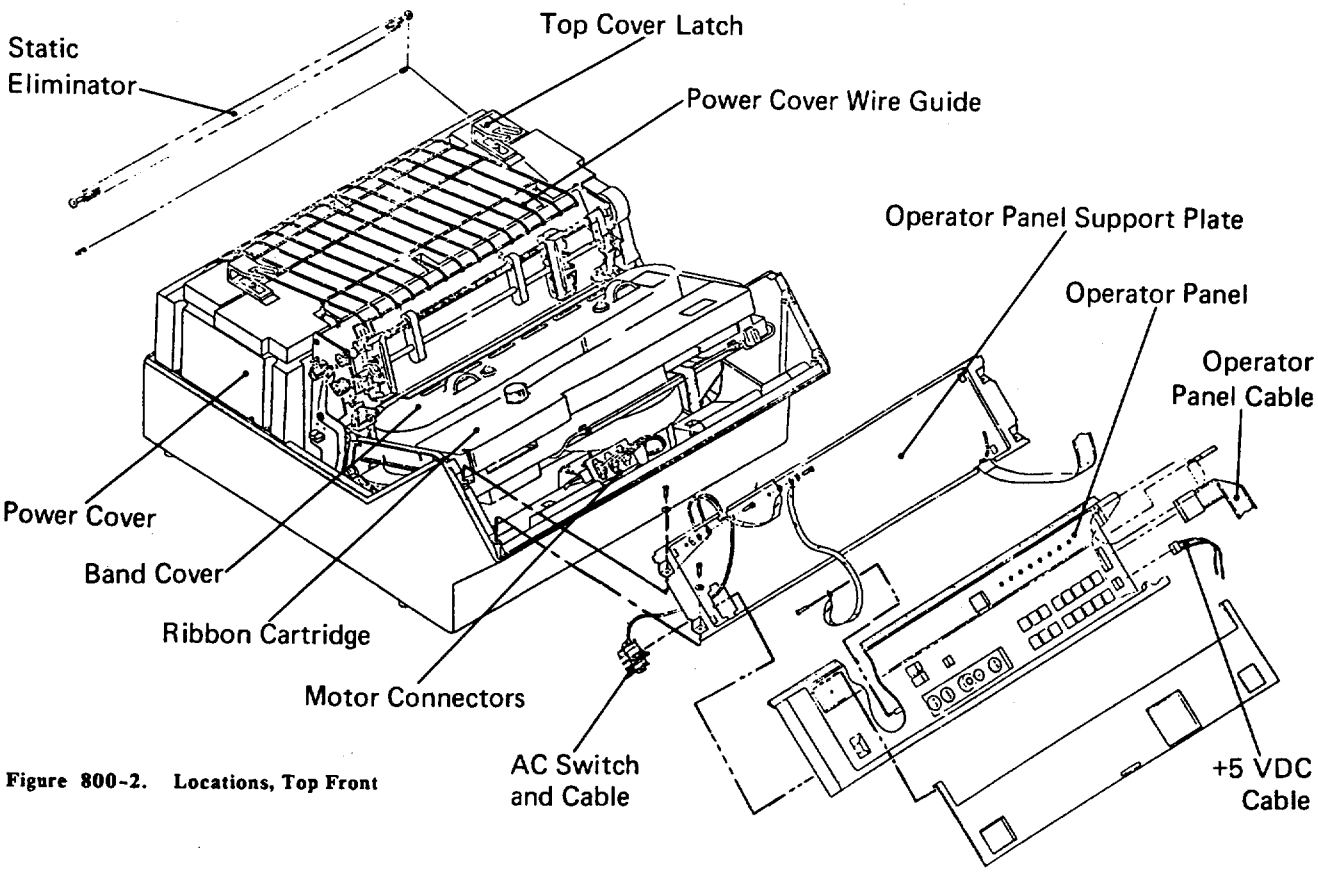


Figure 800-2. Locations, Top Front

Transport Assembly, Part 1

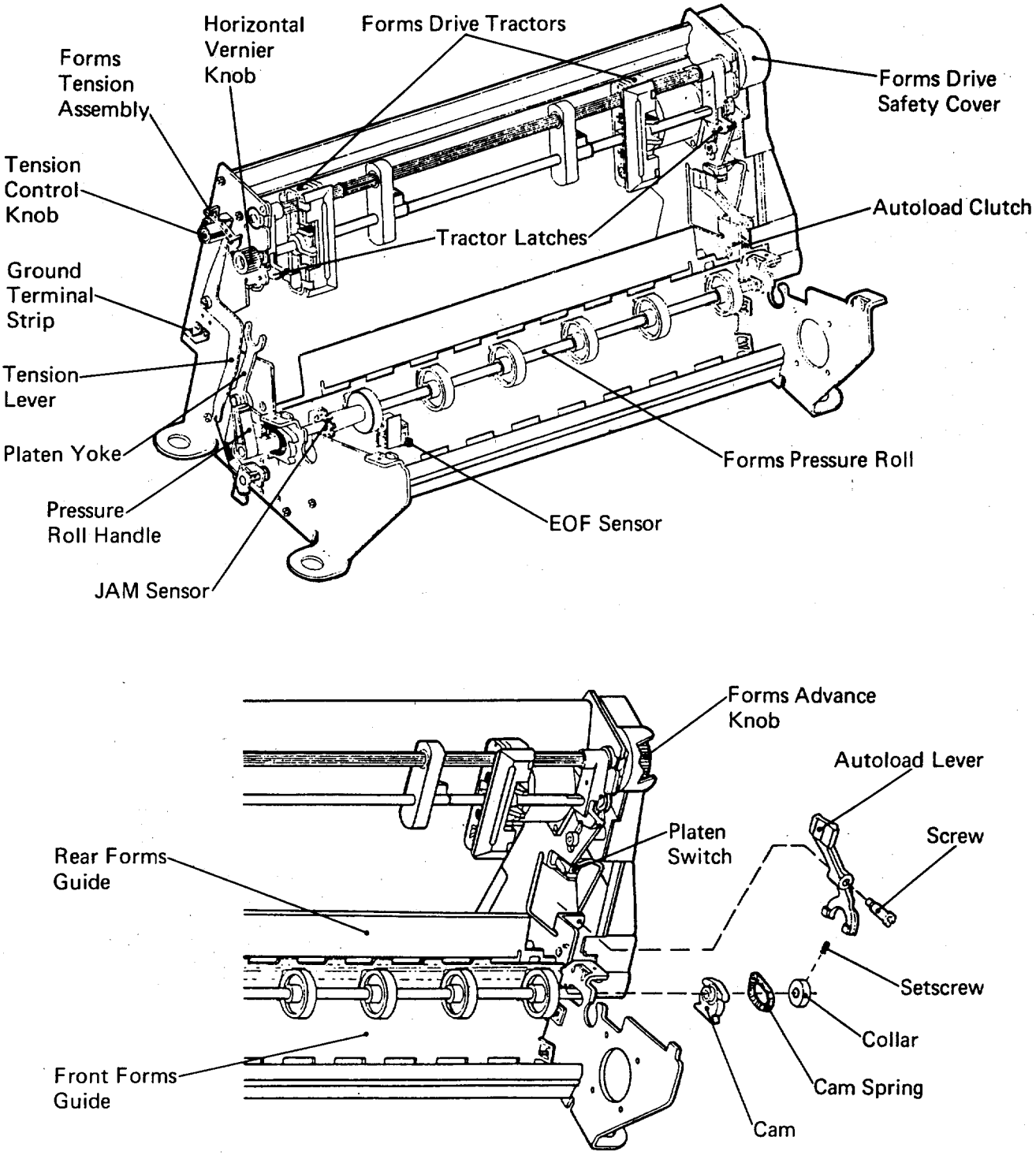


Figure 800-3. Locations, Transport Assembly, Part 1

Transport Assembly, Part 2

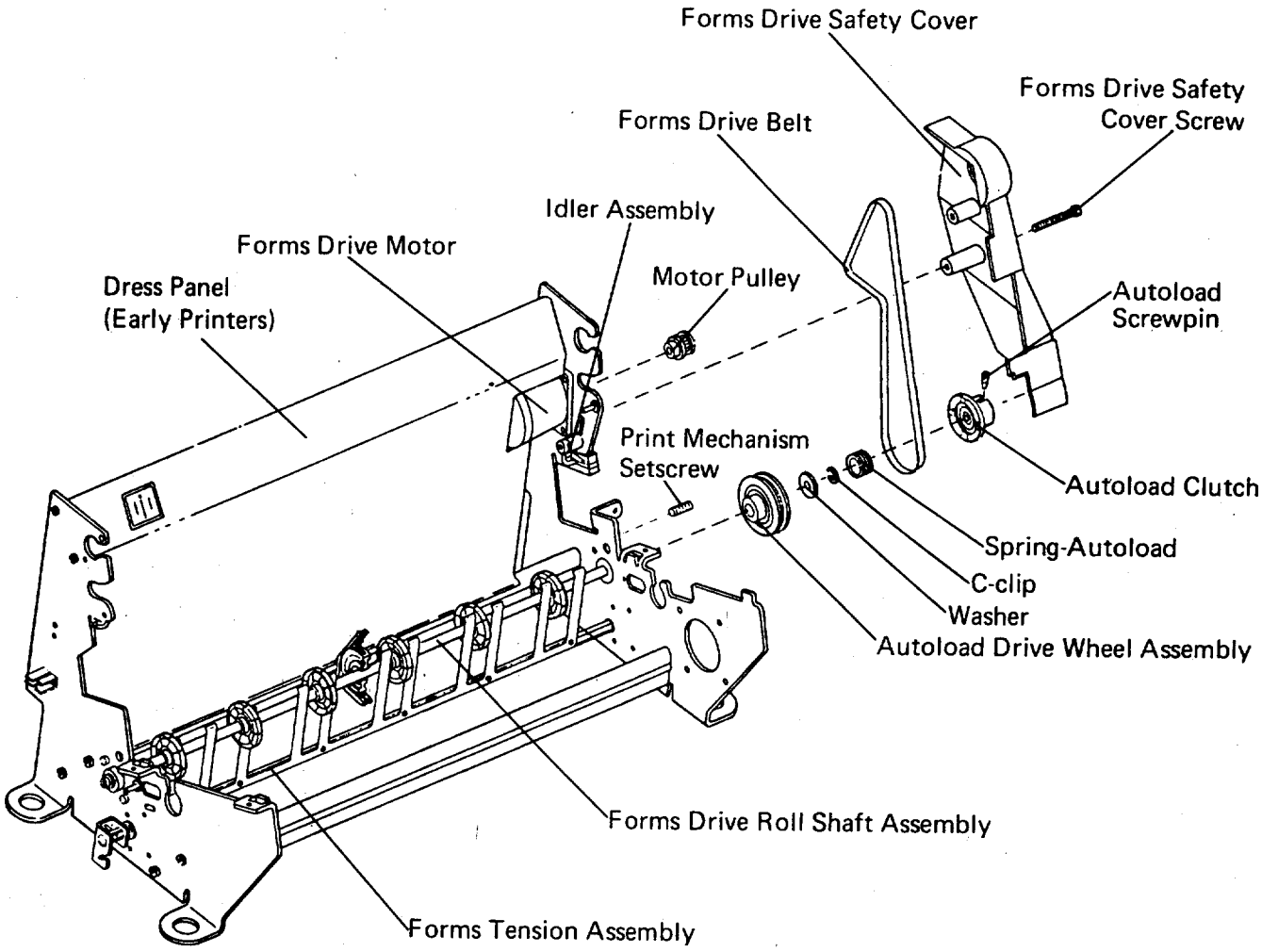


Figure 800-4. Transport Assembly, Part 2

Printer Mechanism

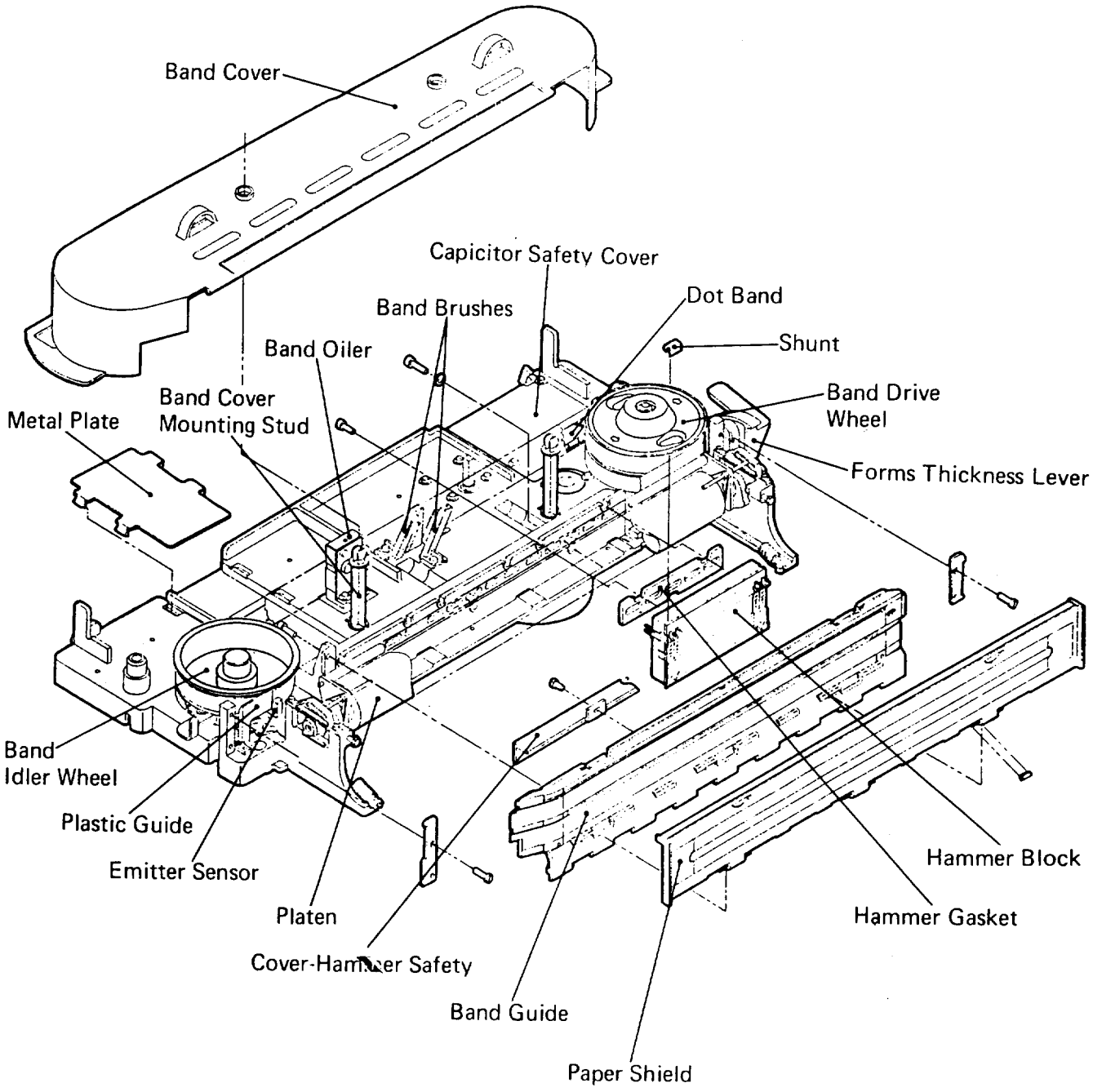


Figure 800-5. Printer Mechanism

Print Casting

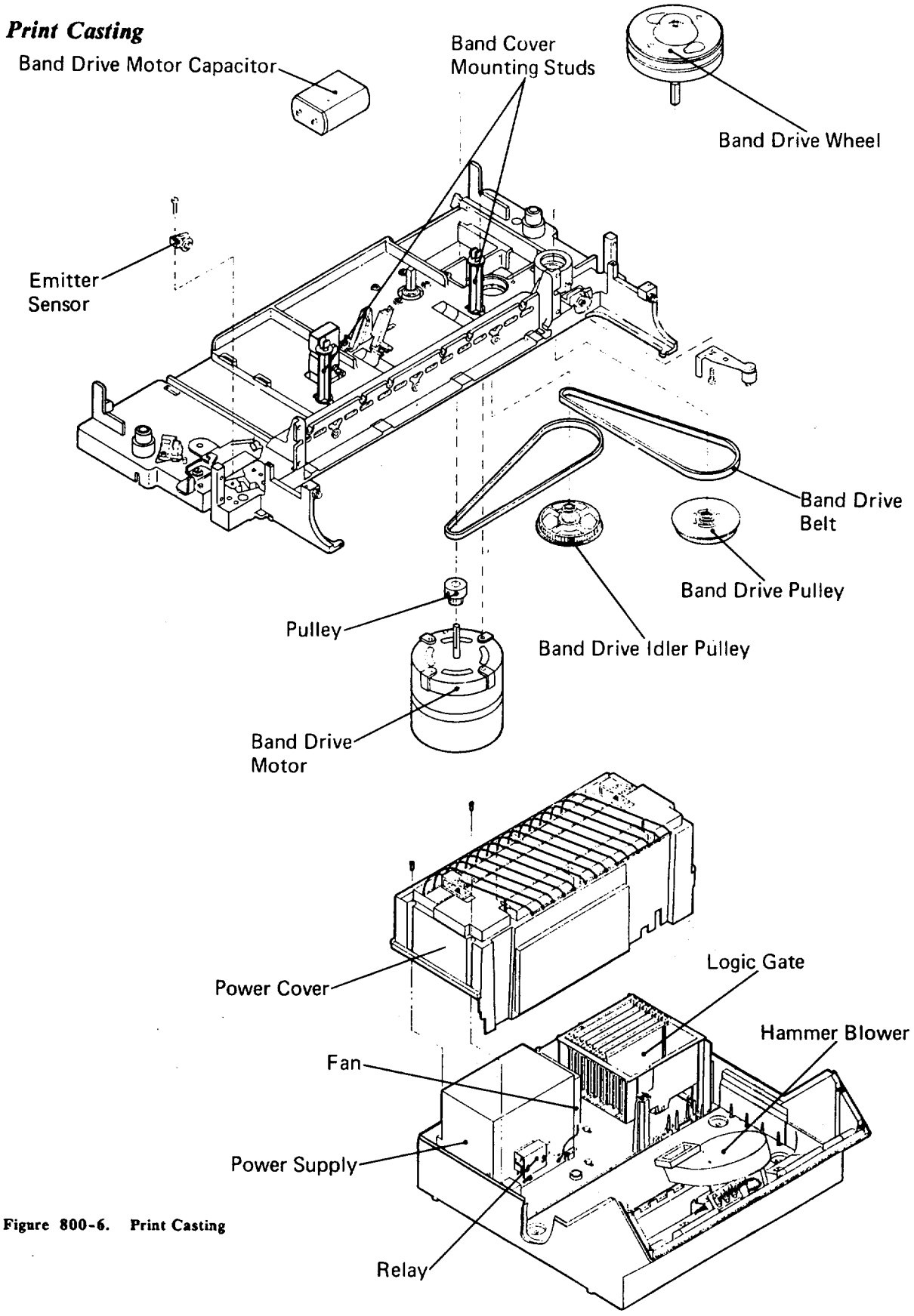
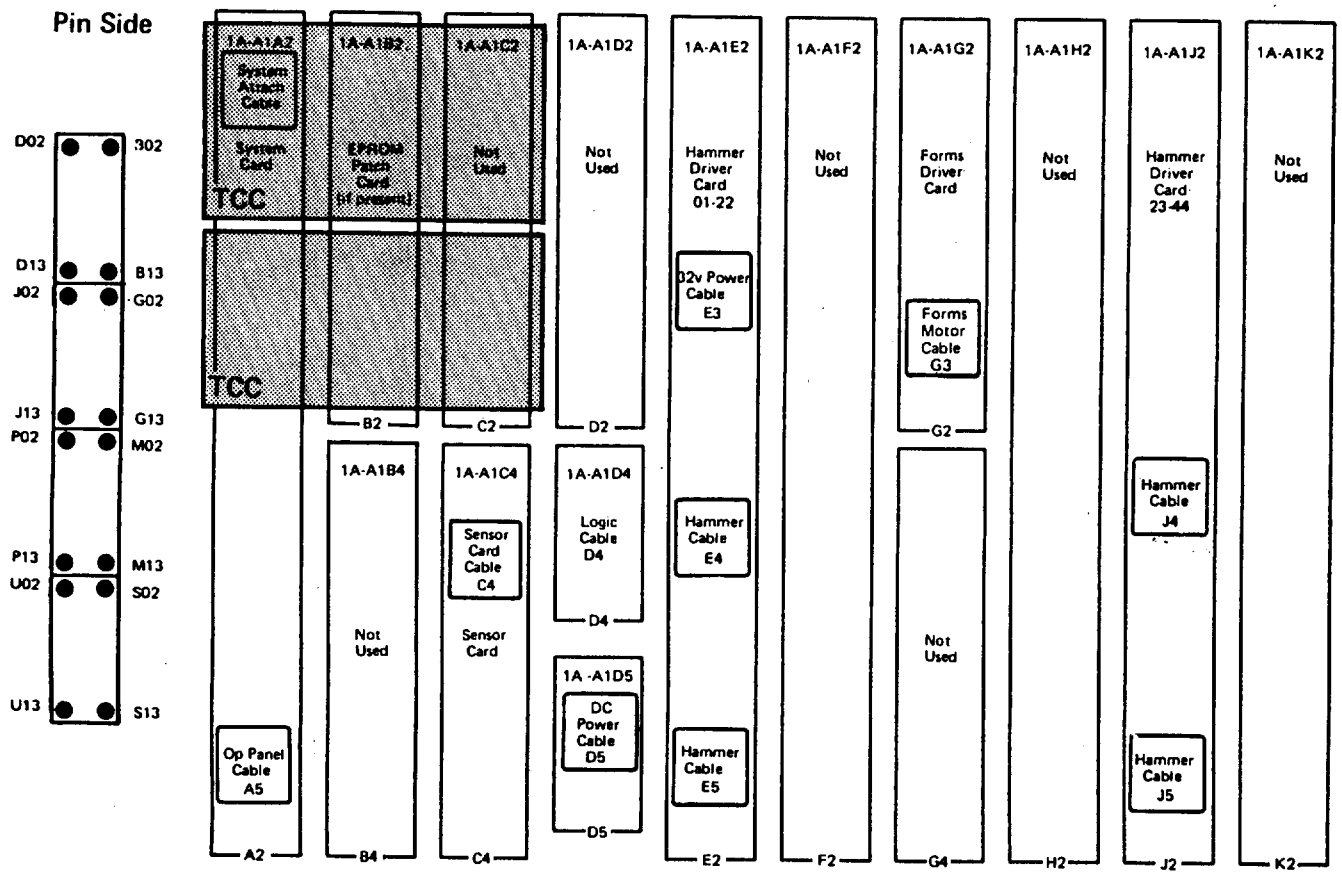


Figure 800-6. Print Casting

Card Locations, Model 1 (Level 1)



Note 1. ☐ indicates location of connector on pin side of logic board

Note 2. TCC TCC = top card crossover **Top View — Card Side**

Note 3. The EPROM card is located in 1A-A1C2 on some U.S. printers. EPROM card for World Trade printers MUST be installed in 1A-A1B2.

Figure 800-7. Card Locations, Logic Board Model 1

Card Locations, Model 1 (Level 2)

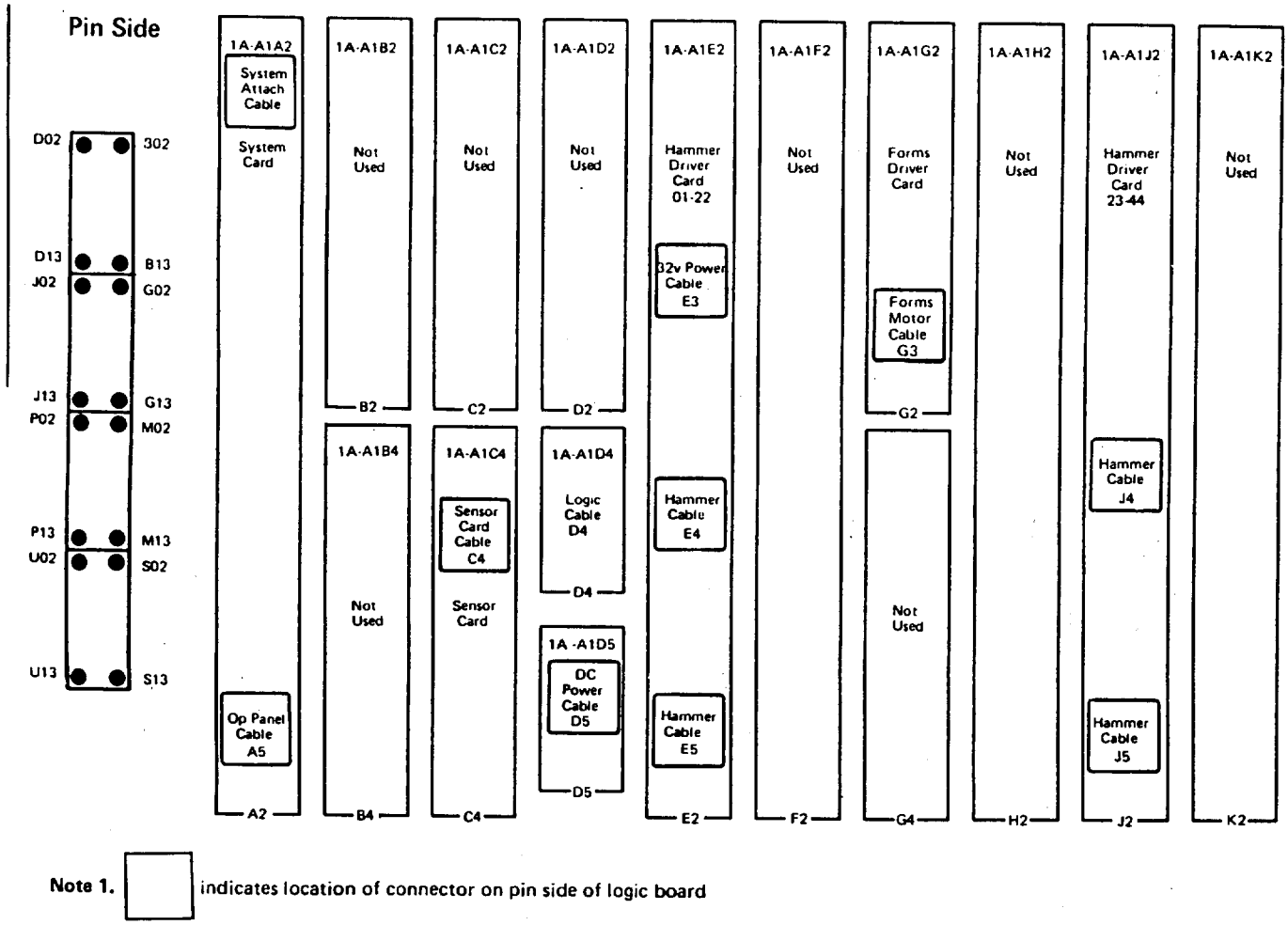


Figure 800-8. Card Locations, Logic Board Model 1

Card Locations, Model 2 (Level 1)

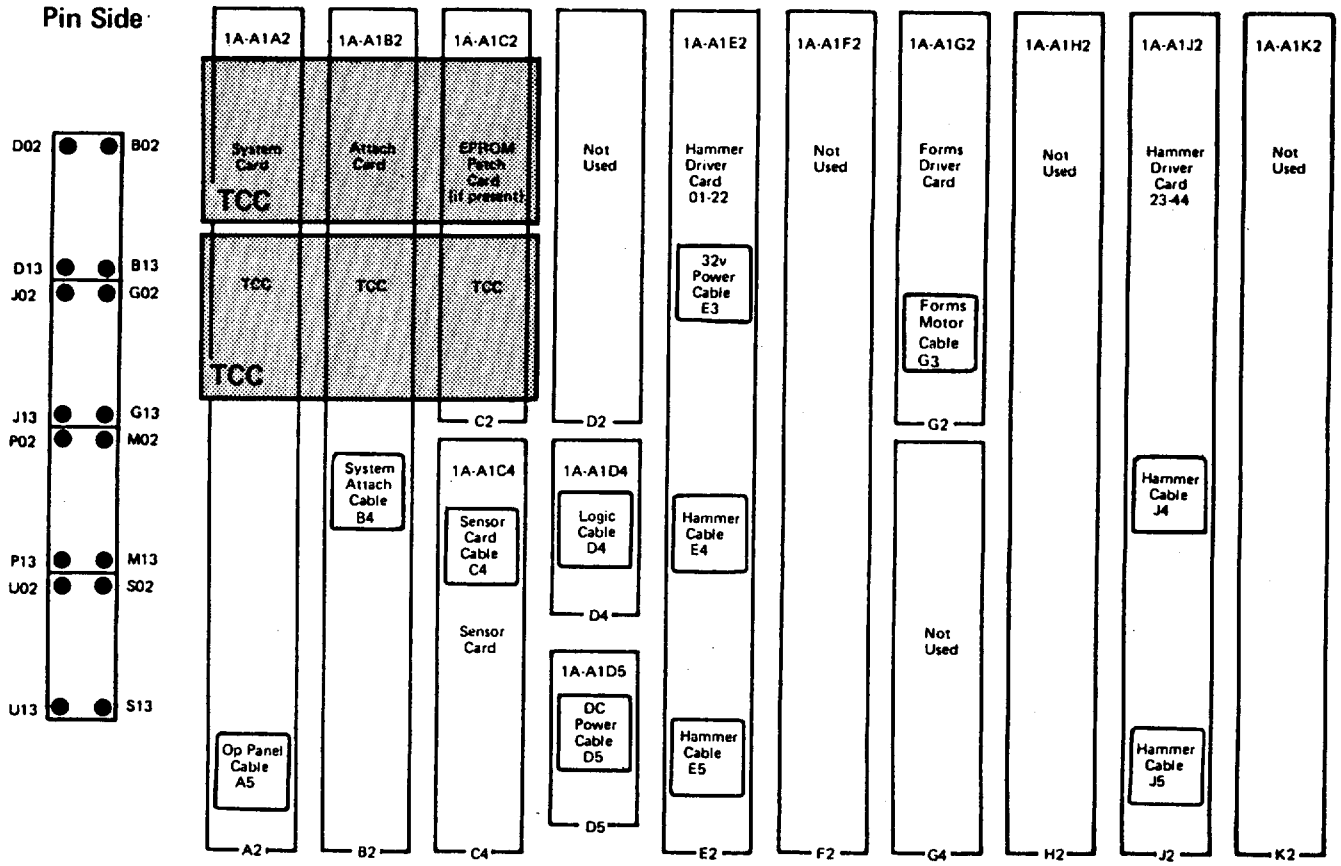
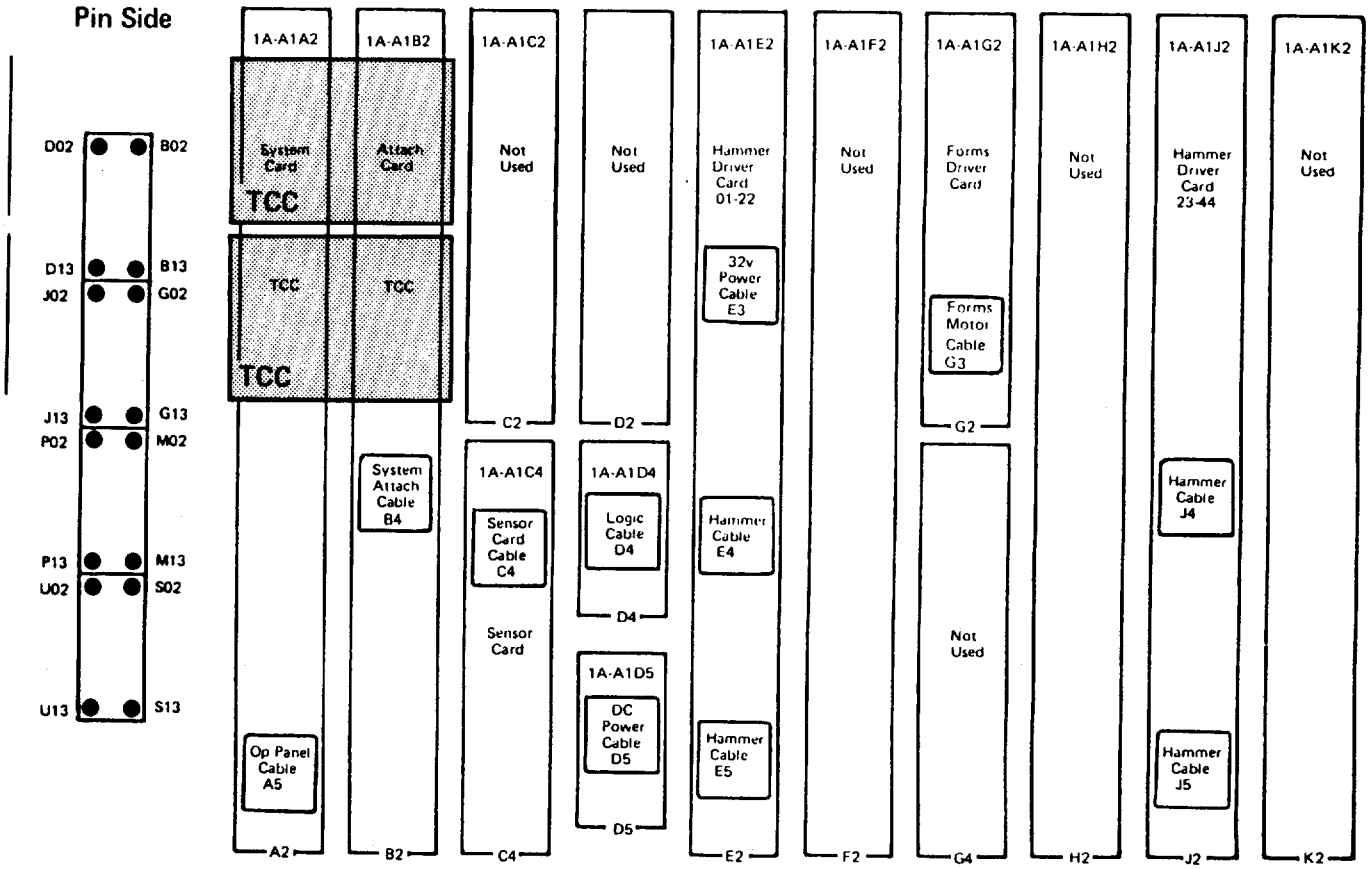


Figure 800-9. Card Locations, Logic Board Model 2

Card Locations, Model 2 (Level 2)



Note 1. indicates location of connector on pin side of logic board

Note 2. TCC = top card crossover

Top View – Card Side

Note 3. 3 wide crossover may be used instead of 2 wide crossover.

Figure 800-10. Card Locations, Logic Board Model 2

Wiring Diagrams

Ac Wiring Diagram

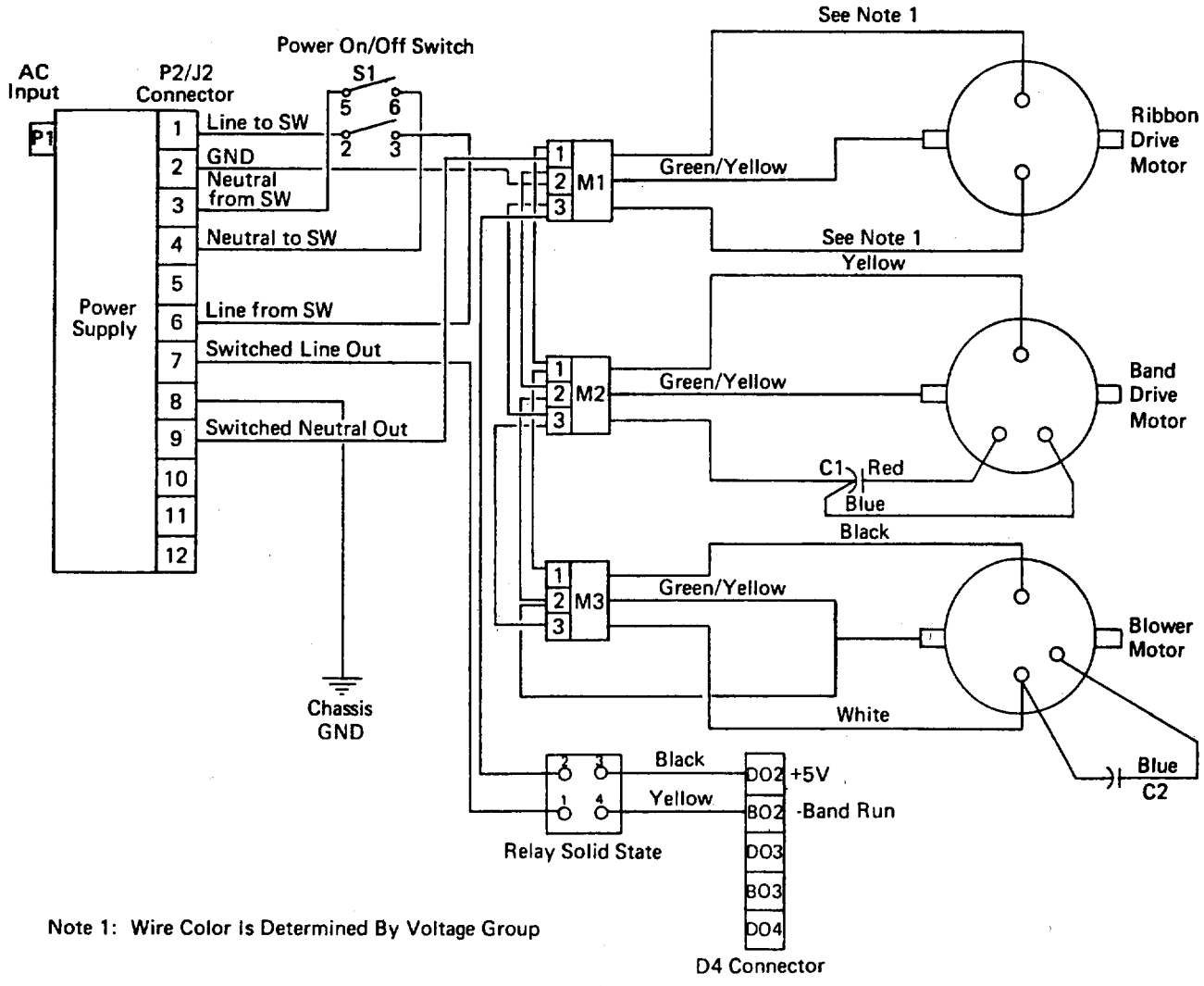
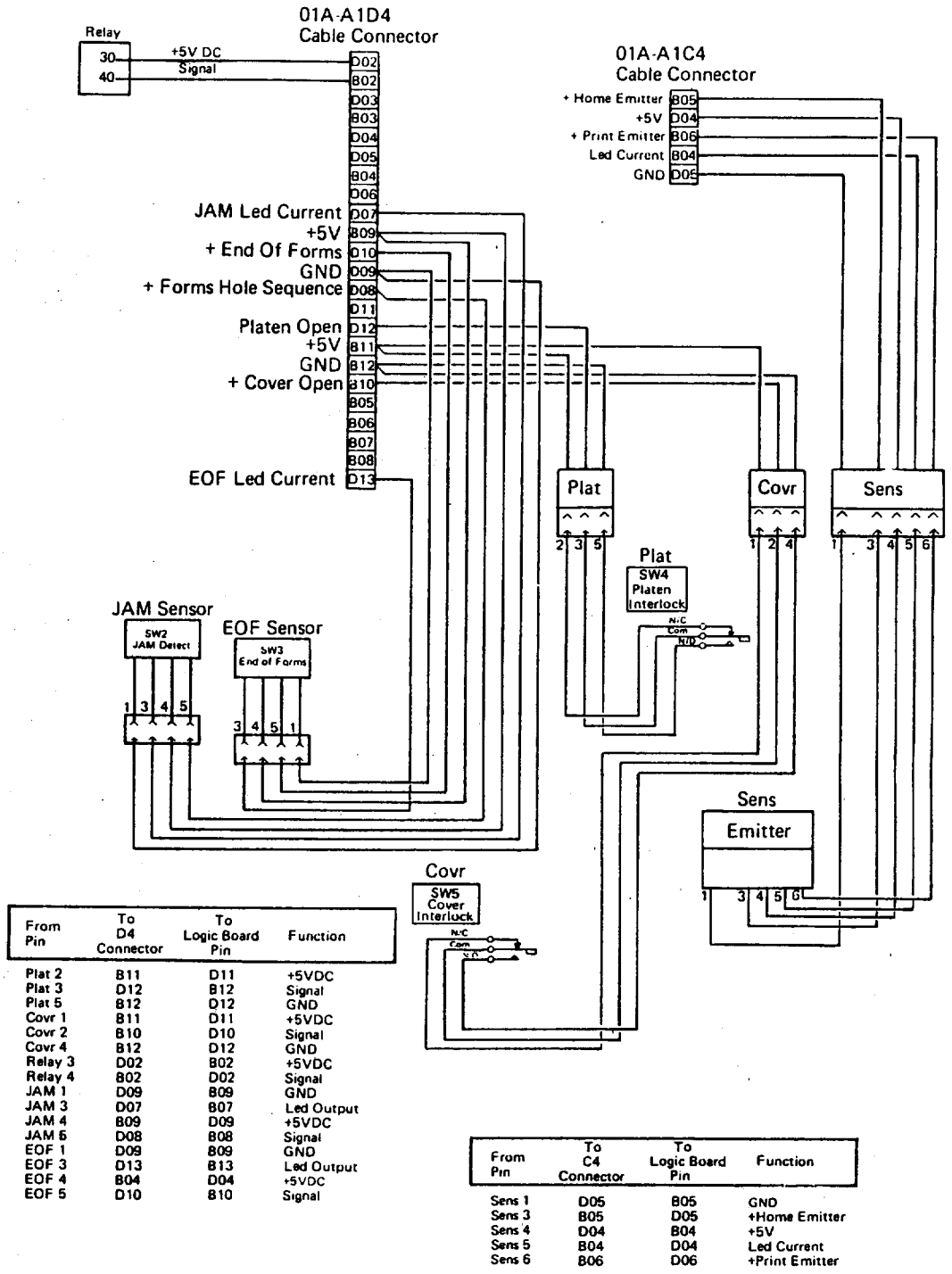


Figure 800-11. Wiring Diagram, AC, and AC Motors

Control Cable

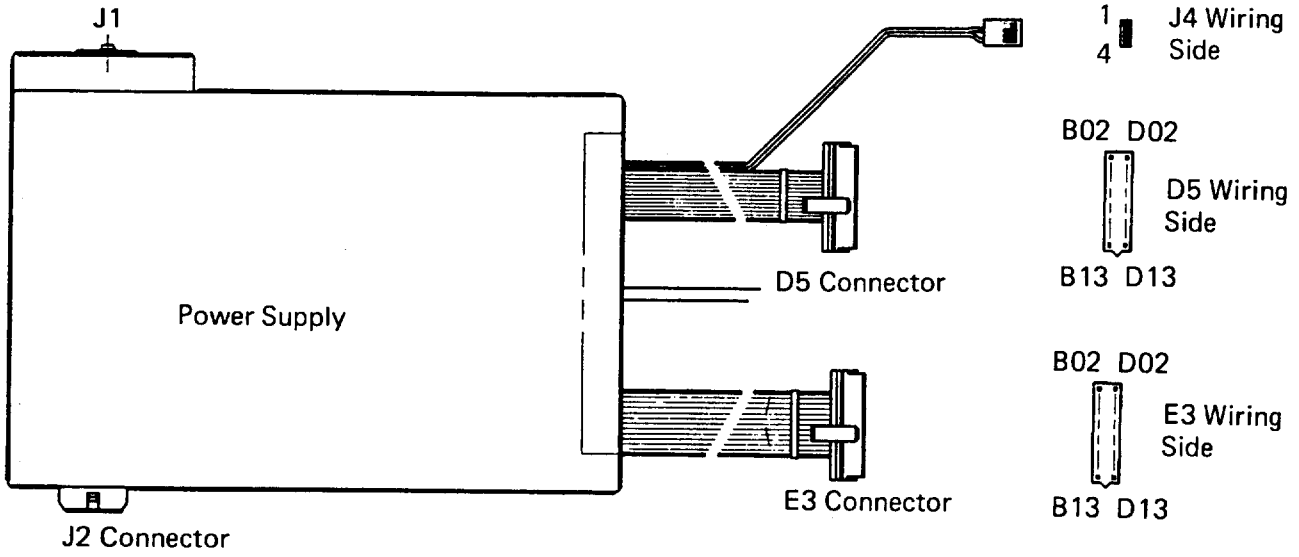


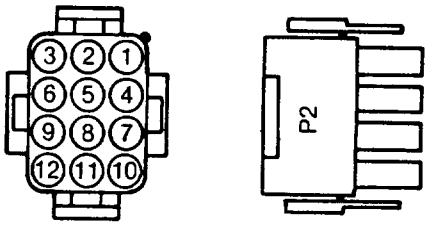
From Pin	To D4 Connector	To Logic Board Pin	Function
Plat 2	B11	D11	+5VDC
Plat 3	D12	B12	Signal
Plat 5	B12	D12	GND
Covr 1	B11	D11	+5VDC
Covr 2	B10	D10	Signal
Covr 4	B12	D12	GND
Relay 3	D02	B02	+5VDC
Relay 4	B02	D02	Signal
JAM 1	D09	B09	GND
JAM 3	D07	B07	Led Output
JAM 4	B09	D09	+5VDC
JAM 5	D08	B08	Signal
EOF 1	D09	B09	GND
EOF 3	D13	B13	Led Output
EOF 4	B04	D04	+5VDC
EOF 5	D10	B10	Signal

From Pin	To C4 Connector	To Logic Board Pin	Function
Sens 1	D05	B05	GND
Sens 3	B05	D05	+Home Emitter
Sens 4	D04	B04	+5V
Sens 5	B04	D04	Led Current
Sens 6	B06	D06	+Print Emitter

Figure 800-12. Control Cable, Switches, and Sensors

Power Supply Voltage Pins





Power Supply Connector

CONNECTOR	TO:	DESCRIPTION	PIN	FUNCTION
J1	POWER SUPPLY	RECEPTACLE.LOW	NONE	LINE CORD
J4	OPERATOR PANEL	HOUSING. 4 POS	1 2 4	 +5V +5V RETURN
J2/P2	1. ON/OFF SWT. 2. RELAY 3. M1. M2. M3	HOUSING. 12 POS	1 2 3 4 5 6 7 8 9 10 11 12	LINE-TO SW GND NEUTRAL-TO SW NEUTRAL-FROM SW LINE-FROM SW LINE-OUT GND-OUT NEUTRAL-OUT
J3		FAN CABLE	NONE	COOLING FAN(AC)
D5	LOGIC BOARD	HOUSING SHROUD	B02 D02 B03 D03 B04 D04 B05 D05 B06 D06 B07 D07 B08 D08 B09 D09 B10 D10 B11 D11 B12 D12 B13 D13	+5V +5V +5V +5V +5V +5V -5V GROUND -5V GROUND GROUND +ANY HAMMER ON +TURN OFF 32V -POR -GOOD 32V LEVEL +SLOW PRINT +8.5V GROUND +8.5V GROUND GROUND
E3	LOGIC BOARD	HOUSING SHROUD	B02 D02 B03 D03 B04 D04 B05 D05 B06 D06 B07 D07 B08 D08 B09 D09 B10 D10 B11 D11 B12 D12 B13 D13	+32V HAMMER +32V RETURN +32V RETURN +32V HAMMER +32V RETURN +32V HAMMER +32V RETURN +32V HAMMER +32V MOTOR +32V RETURN +32V RETURN +32V HAMMER +32V RETURN +32V HAMMER +32V RETURN +32V MOTOR +32V HAMMER +32V RETURN +32V HAMMER +32V RETURN

Figure 800-13. Power Supply, Connectors, and Pin Identification

Safety Grounding and ESD Wiring

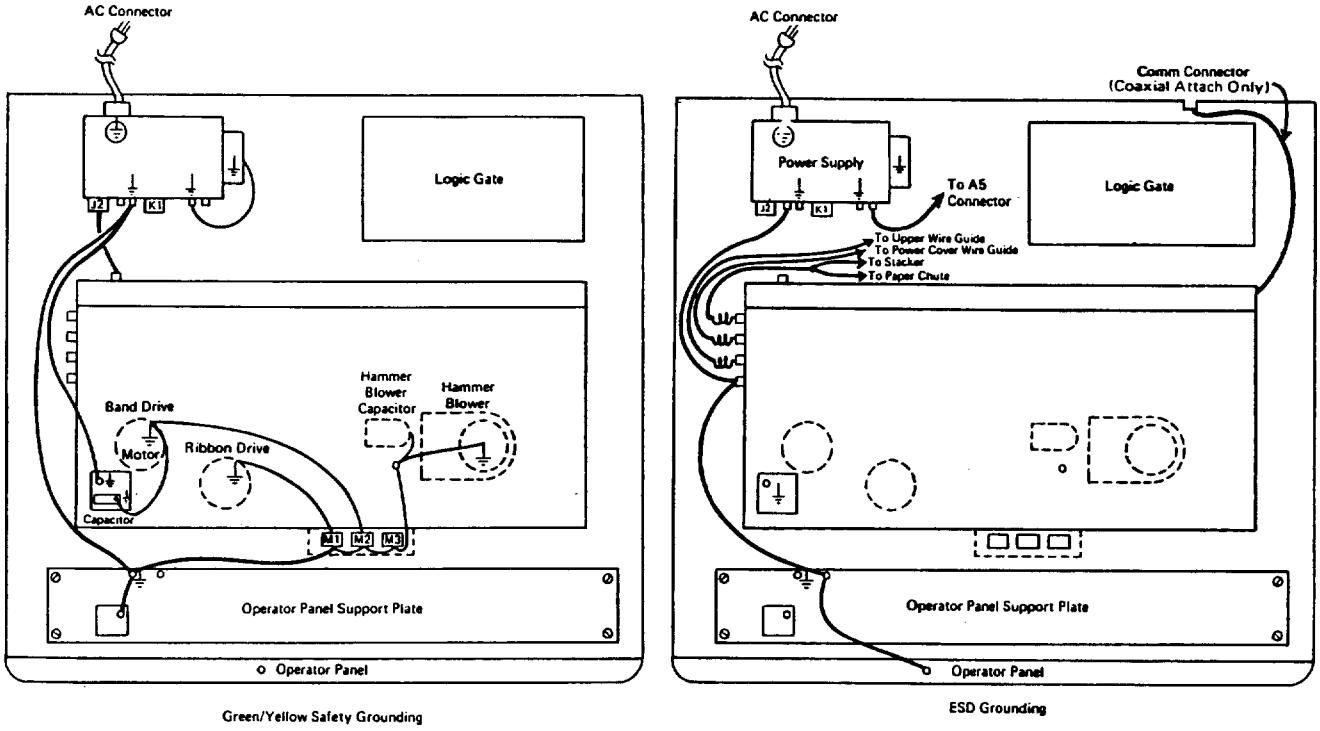


Figure 800-14. Safety Grounding and ESD Wiring

Cables and Connectors

Cable and Connector Locations

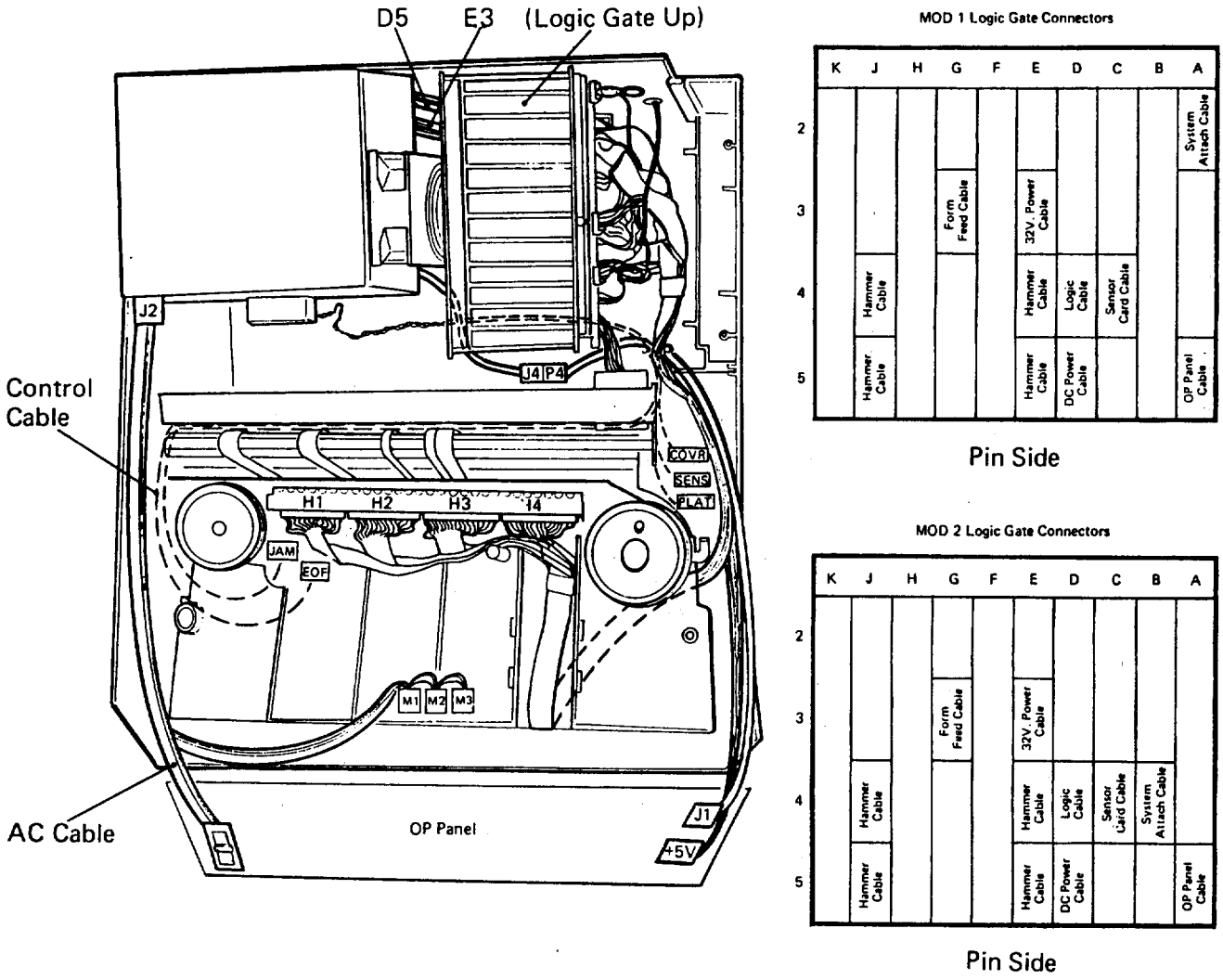
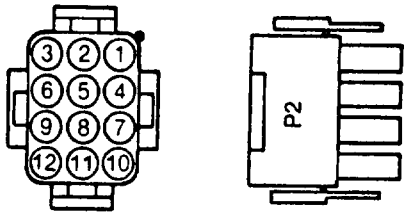
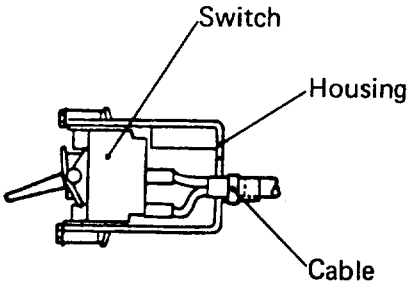


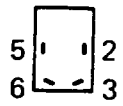
Figure 800-15. Cable and Connector Locations

Connector Pin Identification



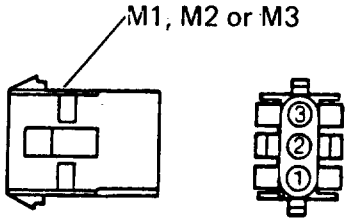
Power Supply Connector





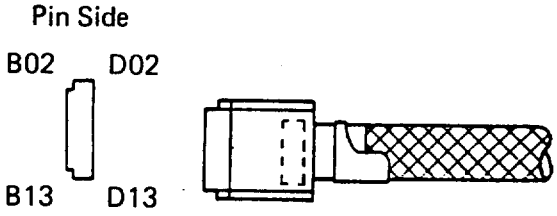
Wiring View of Switch

On/Off Switch

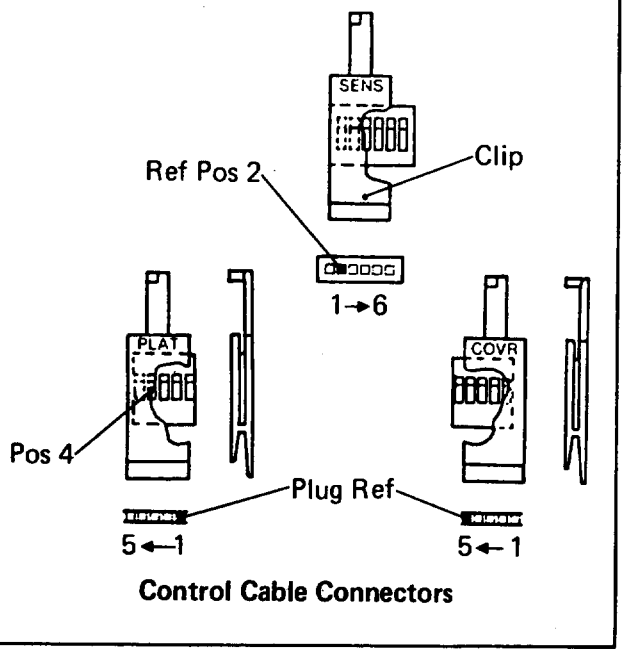


Motor Connectors

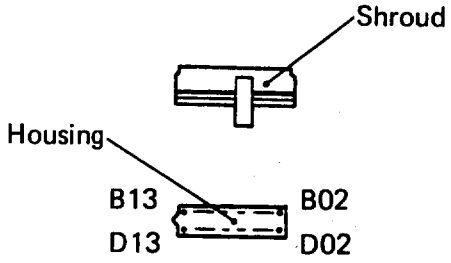
+5V Connector



Operator Panel Connectors



Control Cable Connectors

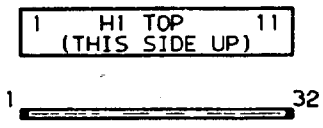


Logic Board Connectors

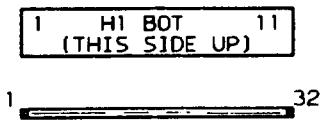
Figure 800-16. Connector Pin Identification

Hammer Cables

E4-H1 WIRING CHART					
LEAD NO	FROM CONN E4	TO CONN H1 TOP	TO CONN H1 BOT	FUNCTION	
1	B02		1	+ HAMMER	1
2	D02	1		-	1
3	B03		4	+	2
4	D03	4		-	2
5	B04		7	+	3
6	D04	7		-	3
7	B05		10	+	4
8	D05	10		-	4
9	B06		13	+	5
10	D06	13		-	5
11	B07		16	+	6
12	D07	16		-	6
13	B09		19	+	7
14	D09	19		-	7
15	B10		22	+	8
16	D10	22		-	8
17	B11		25	+	9
18	D11	25		-	9
19	B12		28	+	10
20	D12	28		-	10
21	B13		31	+	11
22	D13	31		- HAMMER	11

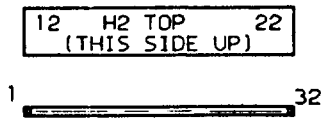


H1 TOP WIRING VIEW

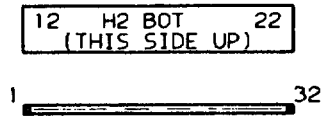


H1 BOTTOM WIRING VIEW

E5-H2 WIRING CHART					
LEAD NO	FROM CONN E5	TO CONN H2 TOP	TO CONN H2 BOT	FUNCTION	
1	B02		1	+ HAMMER	12
2	D02	1		-	12
3	B03		4	+	13
4	D03	4		-	13
5	B04		7	+	14
6	D04	7		-	14
7	B05		10	+	15
8	D05	10		-	15
9	B06		13	+	16
10	D06	13		-	16
11	B07		16	+	17
12	D07	16		-	17
13	B09		19	+	18
14	D09	19		-	18
15	B10		22	+	19
16	D10	22		-	19
17	B11		25	+	20
18	D11	25		-	20
19	B12		28	+	21
20	D12	28		-	21
21	B13		31	+	22
22	D13	31		- HAMMER	22



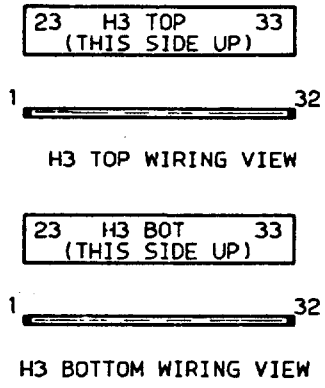
H2 TOP WIRING VIEW



H2 BOTTOM WIRING VIEW

Figure 800-17. H1 and H2 Hammer Cables

J4-H3 WIRING CHART					
LEAD NO	FROM CONN J4	TO CONN H3 TOP	TO CONN H3 BOT	FUNCTION	
1	B02		1	+ HAMMER	23
2	D02	1		-	23
3	B03		4	+	24
4	D03	4		-	24
5	B04		7	+	25
6	D04	7		-	25
7	B05		10	+	26
8	D05	10		-	26
9	B06		13	+	27
10	D06	13		-	27
11	B07		16	+	28
12	D07	16		-	28
13	B09		19	+	29
14	D09	19		-	29
15	B10		22	+	30
16	D10	22		-	30
17	B11		25	+	31
18	D11	25		-	31
19	B12		28	+	32
20	D12	28		-	32
21	B13		31	+	33
22	D13	31		- HAMMER	33



J5-H4 WIRING CHART					
LEAD NO	FROM CONN J5	TO CONN H4 TOP	TO CONN H4 BOT	FUNCTION	
1	B02		1	+ HAMMER	34
2	D02	1		-	34
3	B03		4	+	35
4	D03	4		-	35
5	B04		7	+	36
6	D04	7		-	36
7	B05		10	+	37
8	D05	10		-	37
9	B06		13	+	38
10	D06	13		-	38
11	B07		16	+	39
12	D07	16		-	39
13	B09		19	+	40
14	D09	19		-	40
15	B10		22	+	41
16	D10	22		-	41
17	B11		25	+	42
18	D11	25		-	42
19	B12		28	+	43
20	D12	28		-	43
21	B13		31	+	44
22	D13	31		- HAMMER	44

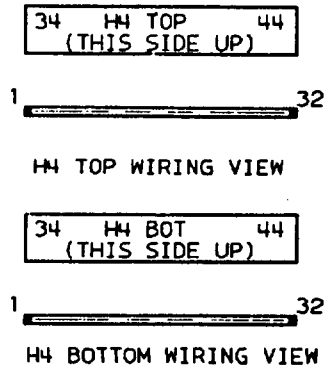


Figure 800-18. H3 and H4 Hammer Cables

Operator Panel Cable

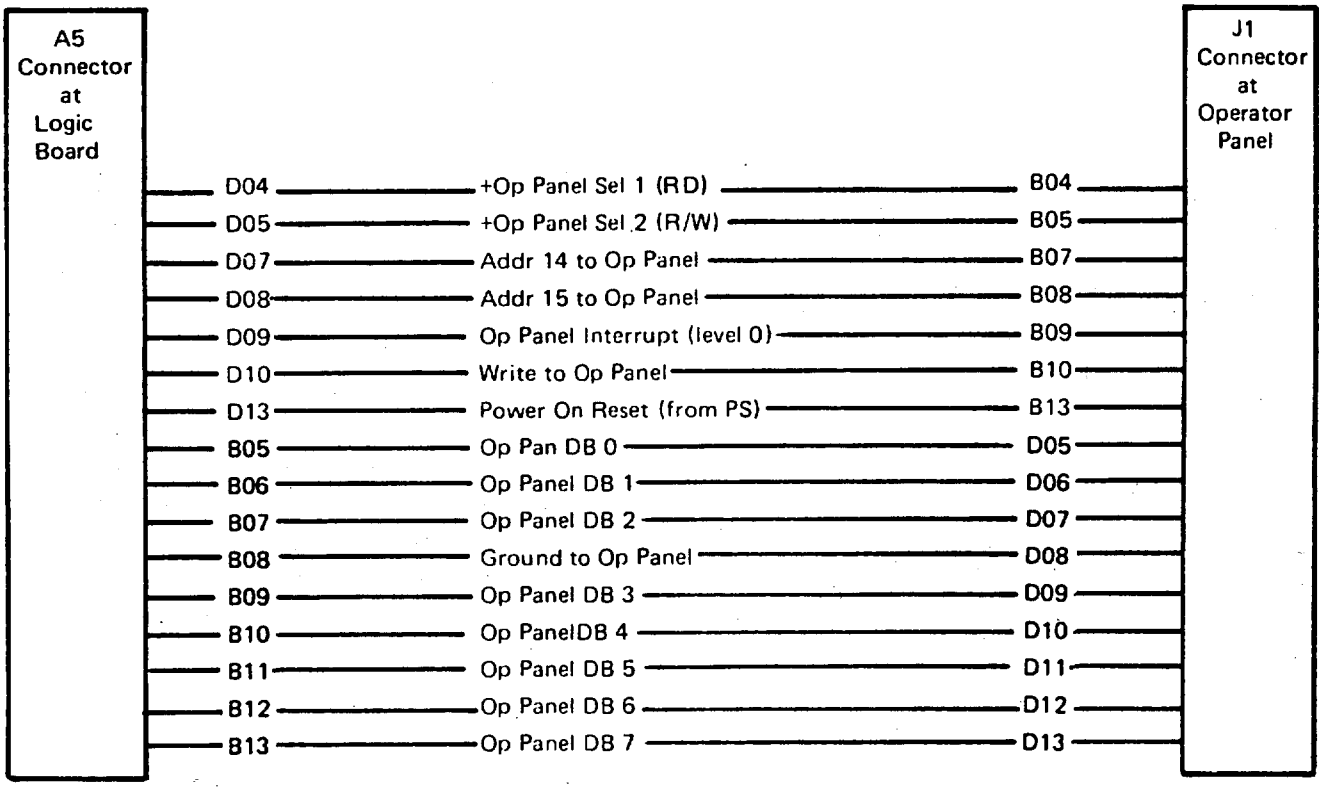


Figure 800-19. Operator Panel Cable

Logic Board Pin Identification

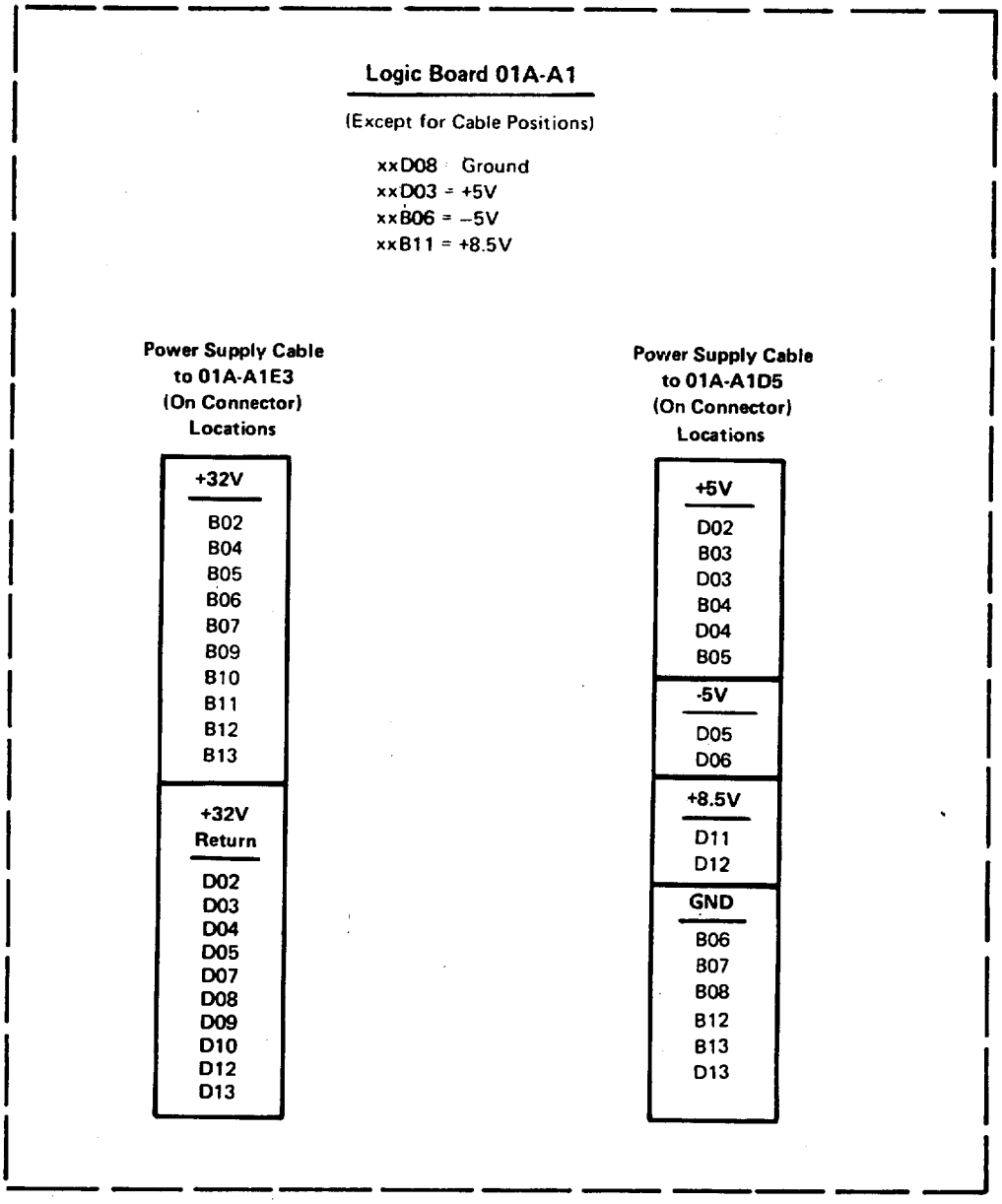


Figure 800-20. Logic Board Pin Identification

Data Flow Model 1

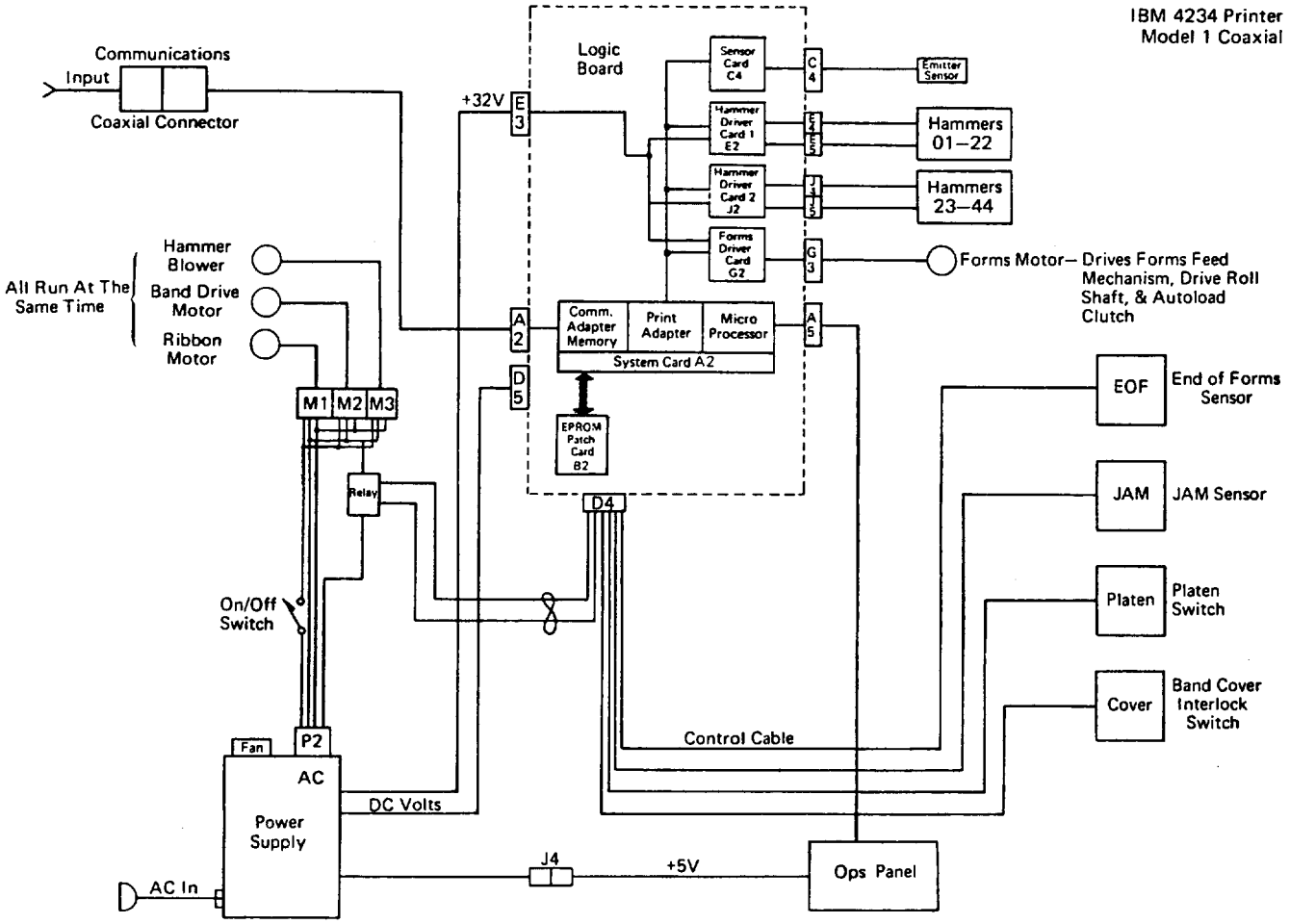


Figure 800-21. Data Flow Model 1

Data Flow Model 2

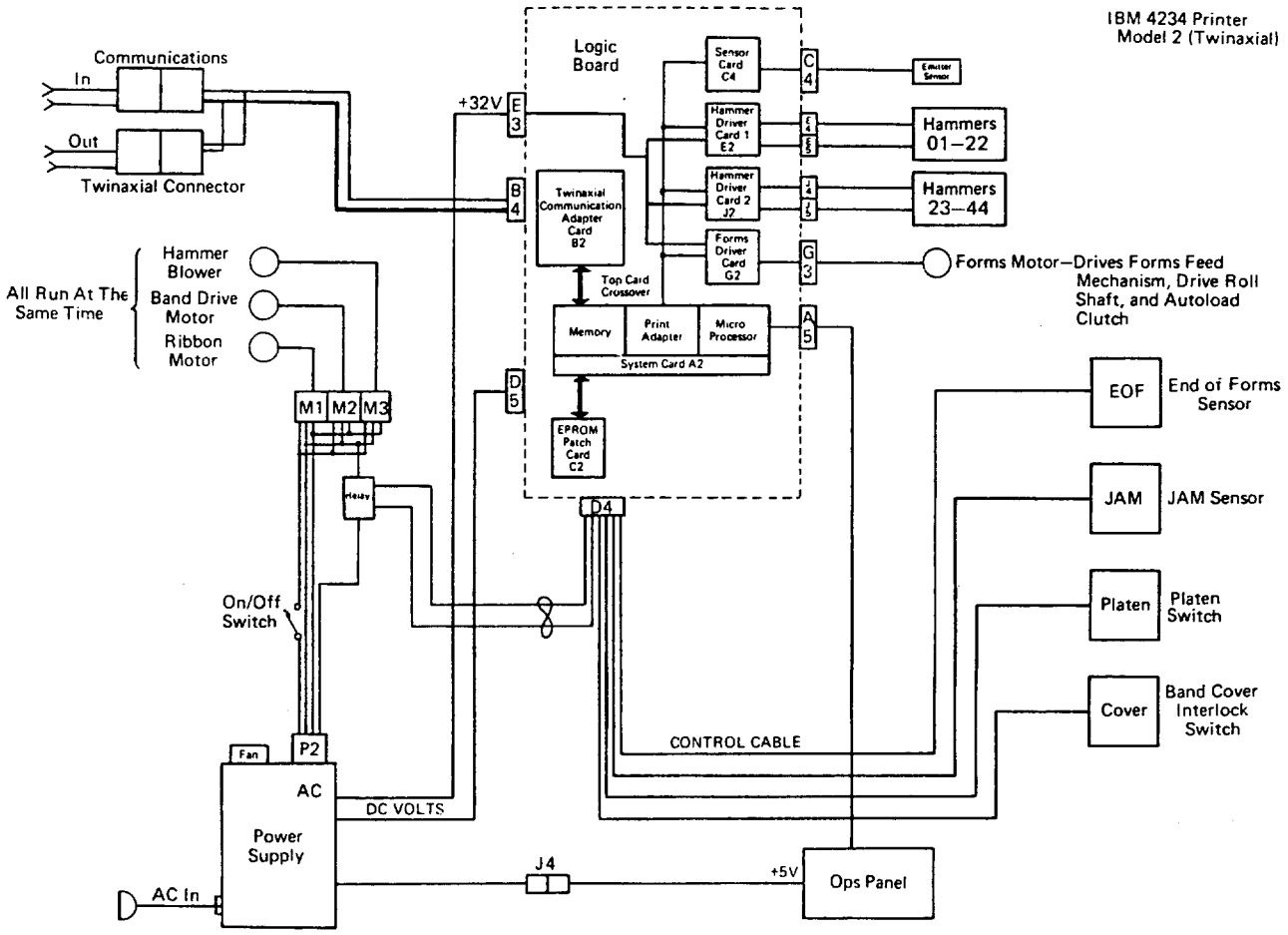


Figure 800-22. Data Flow Model 2

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