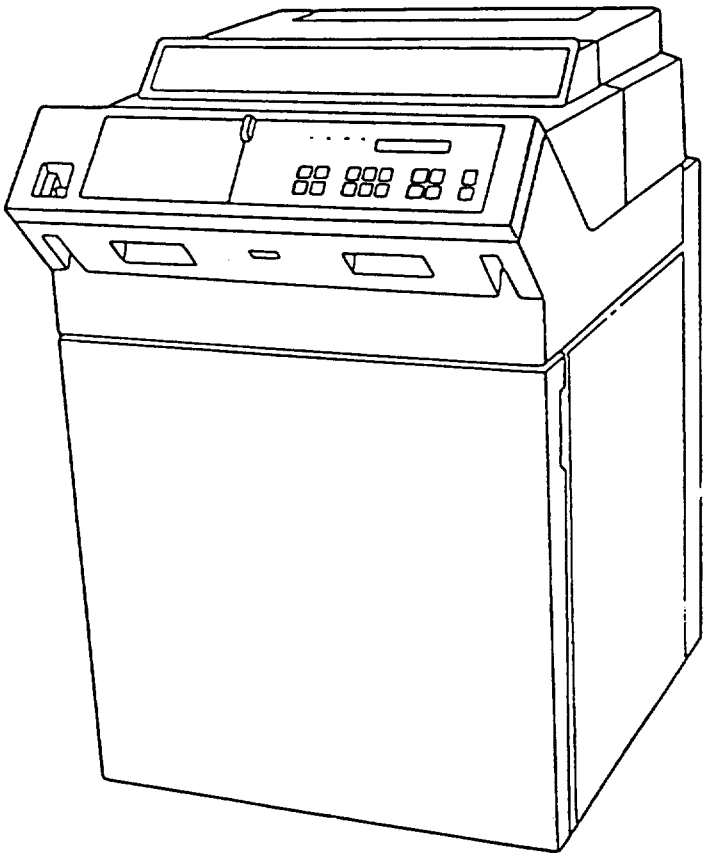
SC31-3738-3

IBM 4234 Printer
Models 007, 008, 009, 011, 012, and 013
Maintenance Information Manual



About This Book

The information in this book applies equally to the Models 011, 012, 013, and the Models 007, 008, and 009 of the 4234 Printer.

Any reference in this book to the Model 011 also applies to the Model 007.
Any reference in this book to the Model 012 also applies to the Model 008.
Any reference in this book to the Model 013 also applies to the Model 009.

Third Edition (September 1990)

This edition is a major revision of, and obsoletes, SC31-3738-2. Changes to the text and illustrations are indicated by a vertical line to the left of the change.

IBM has prepared this maintenance manual for the use of IBM service representatives in the installation, maintenance, or repair of the specific machines indicated. IBM makes no representations that it is suitable for any other purpose.

Information contained in this manual is subject to change from time to time. Any such change will be reported in subsequent revisions or Technical Newsletters.

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| This catalog was prepared by IBM Corporation, Serviceability Engineering, Department R53, P.O. Box 6
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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 011, 012, and 013. 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 Printer Models 011, 012, and 013 Maintenance Analysis Procedures*, SC31-3740. You should begin problem analysis in the *Maintenance Analysis Procedures* (MAPs) and use the *Maintenance Information Manual* (MI) 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 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 MI in the binder next to the MAPs for future service information.

Maintenance Procedures

This manual describes service checks, adjustment procedures, and the removal and replacement of FRUs. 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 700-6) provide the minimum amount of testing.

Related Publications

See the following publications if additional information is required:

- *IBM 4234 Printer Models 011, 012, and 013 Principles of Operation*, GC31-3878
  This book explains the operating characteristics of the 4234 Printer Models 011, 012, and 013. 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 011 Operating Instructions*, GC31-3736

- *IBM 4234 Printer Model 012 Operating Instructions*, GC31-3737

- *IBM 4234 Printer Model 013 Operating Instructions*, GC31-3861
  The *Operating Instructions* for each model printer describes the different operating states of the printer, how to select various printer options, and how to change the ribbon, the dot band, and the forms. This book is attached to the operator panel. It also contains information about the lights and keys on the operator panel and describes the status codes and operator recovery actions.

- *IBM 4234 Printer Models 011 and 012 Product and Programming Description*, GC31-3879
  This reference manual describes the programming that controls the 4234 Printer Models 011 and 012.

- *IBM 4234 Printer Model 013 Product and Programming Description*, GC31-3880
  This reference manual describes the programming that controls the 4234 Printer Model 13.

- *IBM 4234 Printer Planning and Site Preparation Guide*, GC31-2555
  This guide has information pertaining to electrical, space, environmental, and cabling requirements for your 4234 Printer. It also contains information on supplies used by the 4234 printer.

- *IBM 4234 Printer Models 011, 012, and 013 Customer Set Up Instructions*, GC31-3735
  This guide contains set-up information for the 4234 Printer.

- *IBM 4234 Printer Models 011, 012, and 013 Maintenance Analysis Procedures*, SC31-3740
  The service representative uses this manual to diagnose printer failures.

- *IBM 4234 Printer Models 011, 012, and 013 Parts Catalog*, SC31-3739
  The service representative uses this information for ordering parts.

- *IBM 4234 Printer Models 011, 012, and 013 Maintenance Safety Notices*, SC31-3884 (World Trade only)
  This booklet compiles and lists all Warning, Caution, and Danger information in the printer maintenance manuals.

- *IBM 4234 Printer Models 011, 012, and 013 User Safety Notices*, GA34-2112 (World Trade only)
  This booklet compiles and lists all Warning and Caution information in the printer user manuals.

Safety

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
- *Safety/Health Guidelines for IBM Service Representatives*, S241-5493

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-supply 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 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 shields, 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 the 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 possibly 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 the above 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, near their equipment, rubber floor mats that contain small conductive fibers to decrease electrostatic discharges. Do not use this wrong 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 the special safety precautions when you work with very high voltages; these instructions are given in IBM safety service memorandums (SMs) and the safety sections of maintenance information. 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-Wrap[1] 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 these 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 lets you, do not service the following parts *with power on them* when they are removed from their normal operating places in a 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.**

Emergency First Aid

When giving first aid 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 pull or push 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.

[1] Trademark of the Gardner-Denver Co.

Only a trained and certified person[2] should perform external cardiac compressions.

- *Get Medical Aid.* Call a rescue group, an ambulance, or a hospital immediately.

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.

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

[2] If you want to be trained in giving this aid, ask a suitable organization (such as the Red Cross) in your area.

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

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:
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: 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:

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.

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.

Safety Inspection Procedure for the 4234 Printer

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 that 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, that the printer is powered off, and that all electrical power is removed at the power 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 78 on page 800-4) and missing forms drive safety cover (see Figure 79 on page 800-5).

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

Systems Card: The systems card contains a small lithium battery. There is a risk of fire, explosion, or burns if you disassemble, incinerate, or expose the card to heat above 100°C (212°F).

You may dispose of up to 50 cards using your normal disposal procedures. To dispose of greater quantities, you must make special arrangements with the manufacturer or a qualified refuse disposal agency.

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 power cord for visible cracks, wear, or damage.

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

__ 3. Check for 0.1 ohm (or less) of resistance between the power 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 97 on page 800-23).

__ 5. Ensure that the safety cover is installed on the solid state relay (see Figure 73 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 power cord and set 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.

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Printer Description

The 4234 Printer Model 011, 012, or 013 (see Figure 1 on page 000-4) 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 2 on page 000-5 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 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 aid the customer in problem determination.

The Model 011 Printer can be attached by coaxial cable to devices such as:

- IBM 3174/3274 Control Units
- IBM 4321/4331/4361 Display Printer Adapters
- IBM 4361 Workstation Adapter
- IBM ENTERPRISE SYSTEM/9370[3] (ES/9370[4] Workstation Controller).

The Model 012 Printer can be attached by twinaxial cable to such devices as:

- IBM 5294 Remote Control Unit
- IBM 5394 Remote Control Unit
- IBM System/36
- IBM System/38
- IBM AS/400[5] System.

The Model 013 Printer can be attached by serial/parallel cable to such devices as follows:

- IBM AS/400 System
- IBM RT system processors.

The 4234 Printer Models 011, 012, and 013 have different keys, lights, and controls on the operator panel. Also, the communication circuits for the Models 011, 012, and 013 are different. Each model communicates with the data processing system by an attachment card that is unique for each model.

[3] Trademark of IBM

[4] Trademark of IBM

[5] Trademark of IBM

Printer Description (continued)

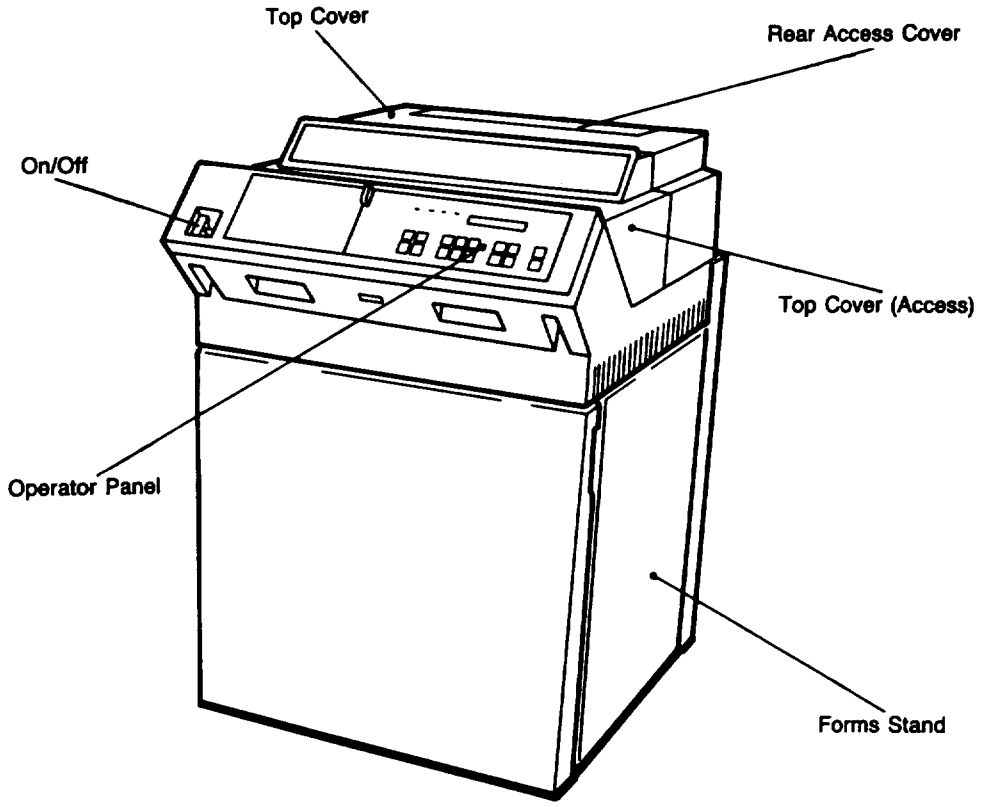


Figure 1. 4234 Printer Models 011, 012, and 013

Configurations

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

Dot Band

The dot band is a continuous steel band that contains 144 flexible chevrons, with a single print element on each chevron (see Figure 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 Printer 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 mode selected
- The number of characters per inch (CPI) selected
- The number of lines per inch (LPI) selected
- The line width selected.

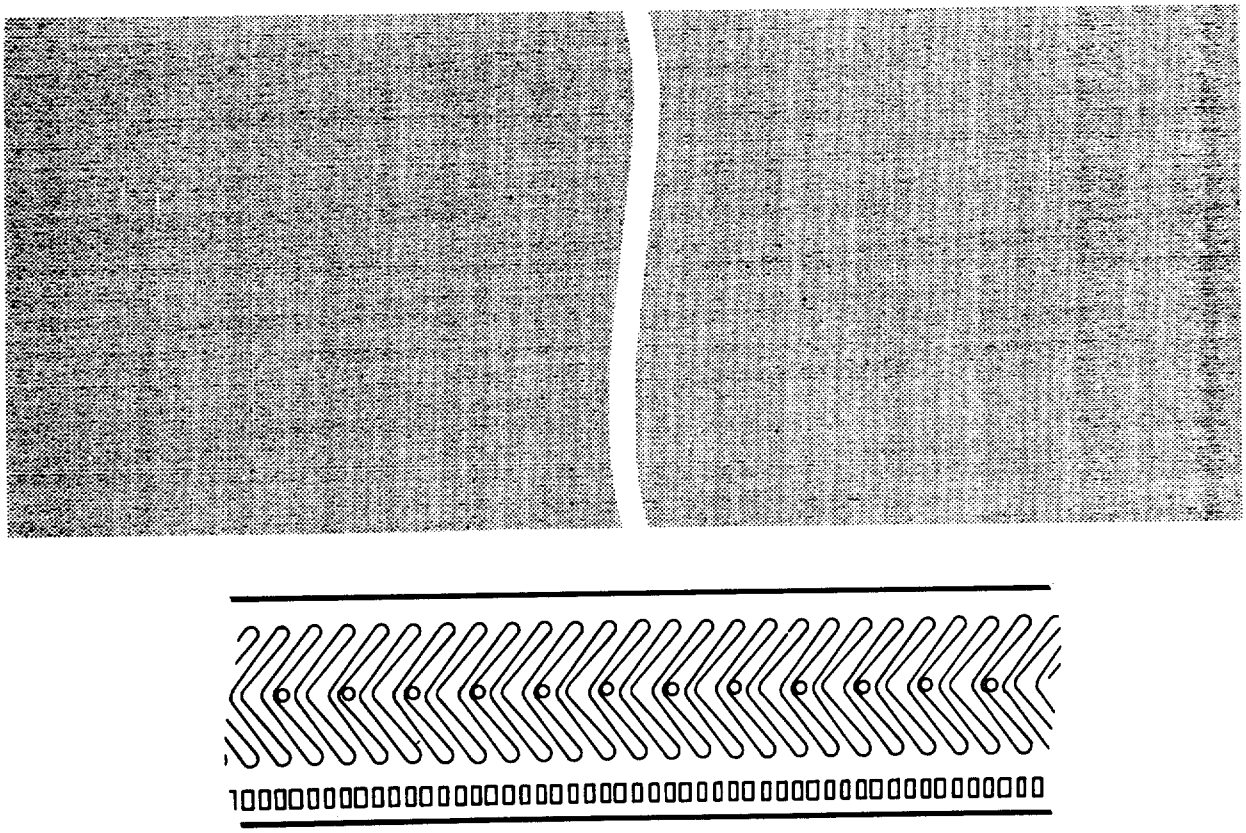


Figure 2. Dot Printout and Dot Chevrons

Print Modes

The 4234 Printer has three print modes (dot densities):

- Draft Mode
- Data Processing Mode (DP)
- Near-Letter-Quality Mode (NLQ).

Recommended Dot Band for Print Quality

The size of the print dot element in the dot band affects the density of characters printed. Table 1, Table 2 and Table 3 show the dot band size recommended for the print type quality you select for printing. However, the customer may select combinations other than those recommended:

Table 1. Recommended Dot Band Size for 10 to 13.3 Characters per Inch (CPI)

Print Type Quality	Standard Font	Compressed Font
Draft	0.51 mm (0.020 inch) Green	0.41 mm (0.016 inch) Black
Data Processing (DP)	0.41 mm (0.016 inch) Black	0.30 mm (0.012 inch) Red
Near-Letter Quality (NLQ)	0.41 mm (0.016 inch) Black	0.30 mm (0.012 inch) Red

Table 2. Recommended Dot Band Size for 15 to 18 Characters per Inch (CPI)

Print Type Quality	Standard Font and Compressed Font
Draft	0.41 mm (0.016 inch) Black
Data Processing (DP)	0.30 mm (0.012 inch) Red
Near-Letter Quality (NLQ)	0.30 mm (0.012 inch) Red

Table 3. Recommended Dot Band Size for Graphics Printing

Print Type	Dot Band Size
Bar Code	0.30 mm (0.012 inch)* Red stripe
Graphics	0.41 mm (0.016 inch)** Black stripe

* Recommended for most applications. Your application should be tested for best readability.

** When you print heavily shaded graphics such as bars in a bar graph, some ink smudging may occur.

Throughput

Throughput for the 4234 Printer 011, 012, and 013 will vary depending on the parameters associated with the printed data and the communication environment. These parameters are:

- Line length
- Lines per inch (LPI) of the printed data
- Characters per inch (CPI) of the printed data
- Character height
- Print mode
- Page length
- Condition of the dot band
- Communication overhead.

Each print mode changes the density of the printed character and the speed of the printer. Throughput is decreased if higher density characters are used. Table 4 and Table 5 on page 000-8 show the throughputs for all CPI and print modes at 6 and 8 LPI, respectively. Additional information on the factors that affect the print speed is in the *IBM 4234 Printer Models 011, 012, and 013 Principles of Operation*.

Note: Throughput is measured in lines per minute (LPM).

6 LPI Throughput

Table 4. Maximum Throughput at 6 Lines per Inch

CPI	Draft Mode Throughput	DP Mode Throughput	NLQ Mode Throughput
10	800	600	200
12	650	480	175
13.3	650	480	200
15	540	385	140
16.7	540	385	160
18	475	340	140
PSF	N/A	N/A	200

Legend: CPI = Characters per inch
N/A = Not applicable
PSF = Proportional Spaced Font

Throughput (continued)

8 LPI Throughput

Table 5. Maximum Throughput at 8 Lines per Inch			
CPI	**Draft Mode Throughput**	**DP Mode Throughput**	**NLQ Mode Throughput**
10	800	600	170
12	650	480	140
13.3	650	480	170
15	540	385	115
16.7	540	385	130
18	475	340	115
PSF*	N/A	N/A	170

Legend: CPI = Characters per inch
N/A = Not applicable
PSF = Proportional Spaced Font

Spacing

Vertical line spacing for the 4234 Printer is 3, 4, 6, or 8 lines per inch (LPI) or is selected by the host system.

The printer has maximum print positions (MPP) ranging from 132 print positions at 10 characters per inch (CPI) to 237 MPP at 18 CPI. Table 6 shows the different CPI and MPP with the maximum print line length (MPL) being 13.2 inches.

Table 6. Maximum Print Positions

CPI	MPL	MPP
10	13.2	132
12	13.2	158
13.3	13.2	175
15	13.2	198
16.7	13.2	220
18	13.2	237

Note: Proportional spaced font (PSF) is also available.

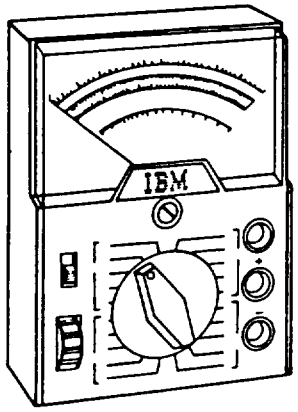
Forms

The IBM 4234 Printer Models 011, 012, and 013 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 on forms specifications is in the *IBM 4234 Printer Models 011 and 012 Product and Programming Description* or the *IBM 4234 Printer Model 013 Product and Programming Description*.

Tools and Test Equipment

Analog CSR Meter (P/N 1749231)

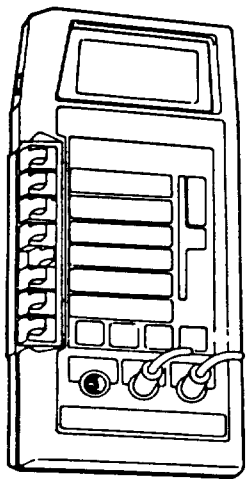
The analog CSR meter is used for measuring the ac and dc voltage and for performing continuity checks.



Digital CSR Meter (P/N 1762916)

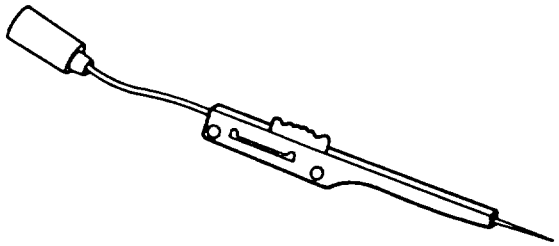
The digital CSR meter is used for measuring the ac and dc voltage and for performing continuity checks.

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



Miniprobe (P/N 453718)

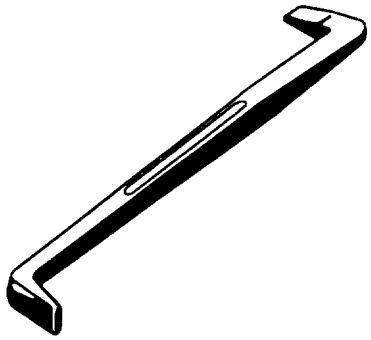
The miniprobe attaches to the test leads of the CSR meter and is used to probe connectors.



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)



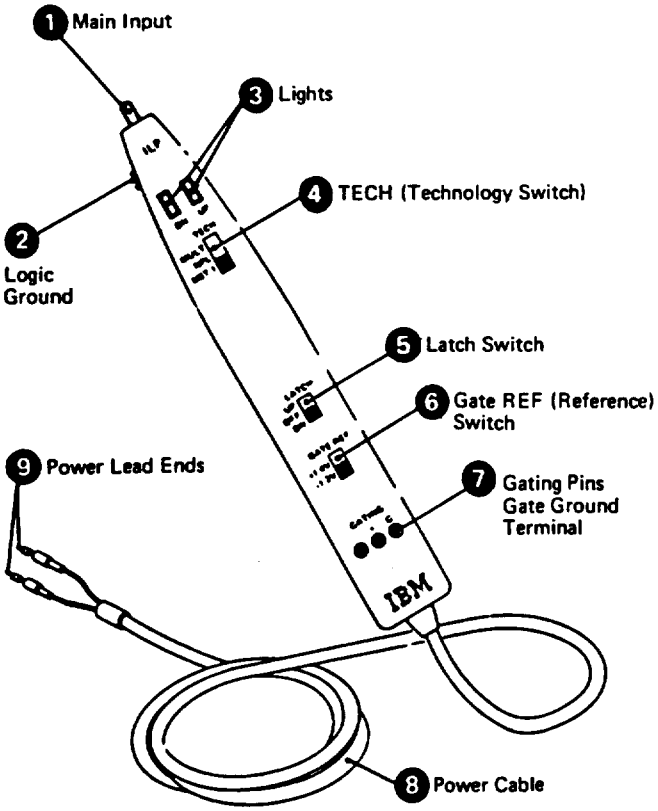
Integrated Logic Probe (P/N 453222)

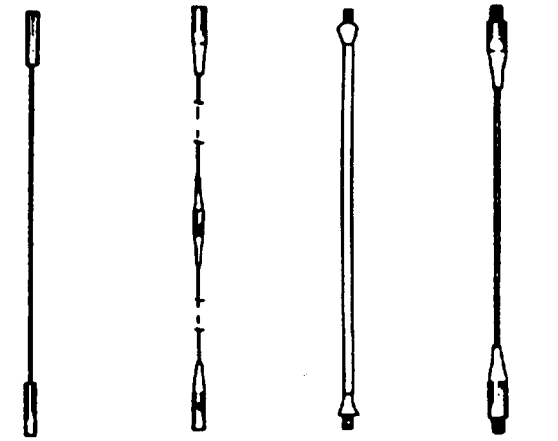
The IBM Integrated Logic Probe (ILP), P/N 8550201, is a small hand-held device used to observe logic signals. The ILP kit (P/N 453222) includes:

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

For Integrated Logic Probe operating instructions, see 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)

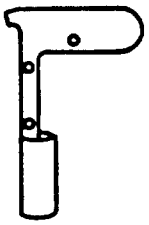
P/N 8565942 Ground Lead 300 mm (12-inch) (One)

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

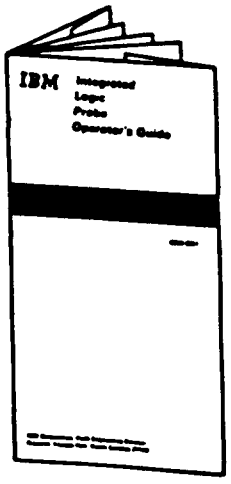
P/N 8550205 Straight Probe Tip Pin (One)

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.

100 Test Key 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 the five latest errors that have occurred. The error log also recommend field replaceable units (FRUs) to repair some printer problems. The operator can use the Test key printout to verify optional select settings. See Figure 3 on page 100-4, Figure 4 on page 100-5, and Figure 5 on page 100-6 for an example of the Test Key printout.

Description

The Test Key printout has four major parts:

Printer ID: The first part of the printout consists of copyright, chip identification, and cyclic redundancy check information. This information is used by the systems engineer to resolve application and software problems.

Condensed Error Log: This printout has important information needed by the service representative. The first row contains information on the latest error. The second column of the error log has the status code. The third and fourth columns contain the FRU that is the more probably repair for the problem. See "Field Replaceable Units (FRUs)" on page 700-19 for a list of FRUs. You should attempt the FRU in the third column first. The fifth column is the number of times the error occurred. The last column is the procedure identification. This is the ID of the procedure that was executing when the error occurred.

Printer Options: This section of the printout consists of the present printer settings. The first line (0-8) is the setting for the primary menu options. The second and third lines (9-27) are the settings for the secondary menu options. The fourth line (28-34) consists of compatibility options.

The Pattern Printouts: The last section of the printout consists of six patterns. These patterns are useful samples of print quality.

How to Interpret the Test Key Printout (Customer Setup)

1. See the condensed error log while reviewing the Test Key printout (see Figure 3 on page 100-4).
2. Scan the printout for "significant" error counts of the status codes (SC).
3. See the suggested FRU or to MAP 100 for possible causes of any significant SC errors.
4. Run Test 08 to run the complete error log.

To run the Test key printout:

- Ensure that the printer has 409 mm (16 inches) paper installed.
- Ensure that a good ribbon is installed.
- Press the **Hold Print** or **Stop/Reset** key to put the printer in the offline condition.
- Press and release the **Test** key.
- Wait approximately one minute for the internal tests to run and the printout to complete printing.

Operating Notice

You may lose some data if you run the test while the printer is in the operating condition.

Test Key Printout - Model 011

```
A600 8213C9C0 IBM COPYRIGHT 1988
A60E 539A462D IBM COPYRIGHT 1988
B600 COFFE2F6 IBM COPYRIGHT 1988

      00  05  D2  A0  02  01
      01  03  FF  FF  04  11
      02  02  FF  FF  01  11
      03  03  FF  FF  04  FF
      04  05  FF  FF  02  FF
```

	Alarm	Keyboard	Print Quality	CPI	LPI	MPP	MPL	Case	Space		
	0	1	2	3	4	5	6	7	8		
	2	2	1	10	6	132	66	1	1		
Display	Printed Language	Memory Default	Font	Graphics Bar Code	Not Used	Screen Size	Not Used	Orientation	Not Used	Not Used	Not Used
9	10	11	12	13	14	15	16	17	18	19	20
1	1	A	1	3		1920		1			

	CR	NL	FF	AS	Null Suppress	FF Location	Auto Skip
	21	22	23	24	25	26	27
	1	1	0	1	0	1	0

Auto FF	Suppress Timeout	Not Used	Extension Attribute	EPC	Not Used	Not Used
28	29	30	31	32	33	34
0	0	0	0	0	0	0

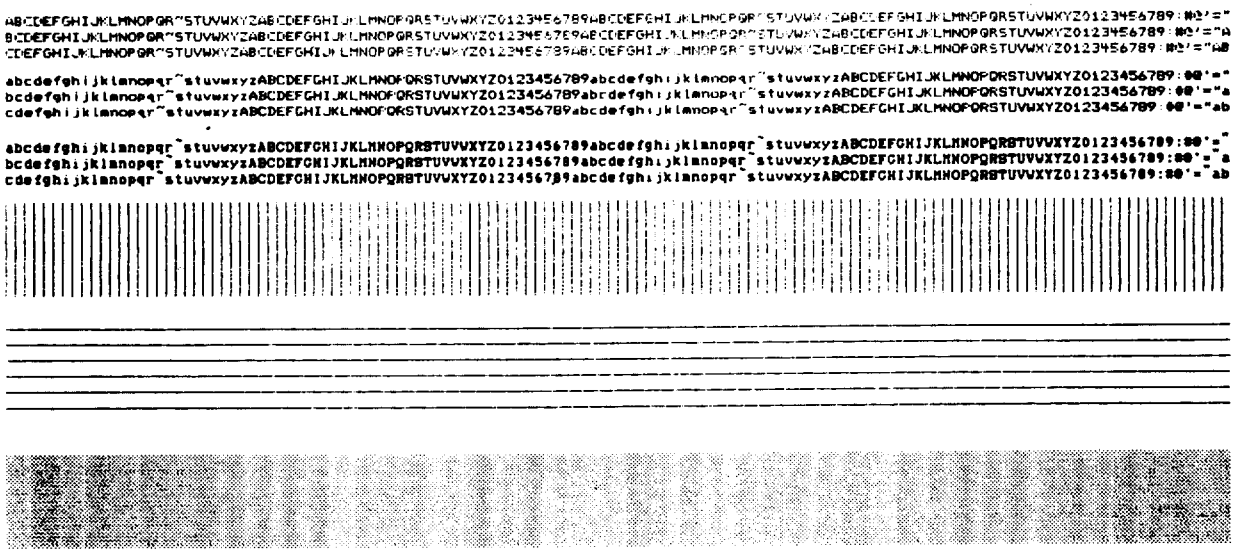


Figure 3. Test Key Printout - Model 011

Test Key Printout - Model 012

```
A600 8213C9C0 IBM COPYRIGHT 1988
A60E 539A462D IBM COPYRIGHT 1988
B600 C0FFE2F6 IBM COPYRIGHT 1988

00  03  FF  FF  07  11
01  03  FF  FF  07  FF
02  03  FF  FF  07  11
03  03  FF  FF  07  11
04  02  FF  FF  03  11
```

	Alarm	Keyboard	Print Quality	CPI	LPI	MPP	MPL	Not Used	Not Used		
	0	1	2	3	4	5	6	7	8		
	2	2	1	10	6	132	66				
Display	Printed Language	Memory Default	Font	Graphics Bar Code	Address	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
9	10	11	12	13	14	15	16	17	18	19	20
1	0	A	1	3	1						

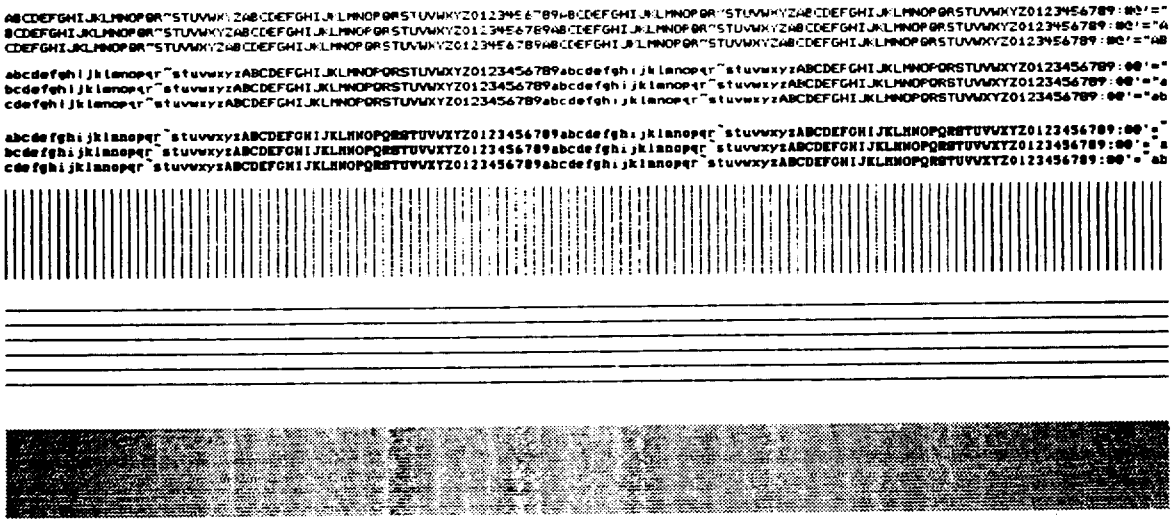


Figure 4. Test Key Printout - Model 012

Test Key Printout - Model 013

```
A600 8213C9C0 IBM COPYRIGHT 1988
A60E 539A462D IBM COPYRIGHT 1988
B600 4737EBBC IBM COPYRIGHT 1988

00  03  FF  FF  09  11
01  03  FF  FF  09  11
02  03  FF  FF  09  11
03  03  FF  FF  09  11
04  03  FF  FF  09  11
```

	Alarm	Keyboard	Print Quality	CPI	LPI	MPP	MPL	Not Used	Not Used		
	0	1	2	3	4	5	6	7	8		
	2	2	2	10	6	132	66				
Display	Printed Language	Memory Default	Font	Not Used	Not Used	Not Used	Not Used	Not Used	Baud Rate	Parity	Char Encoding
9	10	11	12	13	14	15	16	17	18	19	20
1	1	0	1						19200	2	8

	FF	LF	CR	CPI	Serial Break	Link Error	Serial Interface
	21	22	23	24	25	26	27
	0	0	0	0	0	0	0

Font	Serial Pacing	Stop Bit	Interface Type	PC Char Set	Not Used	Not Used
28	29	30	31	32	33	34
0	0	0	1	0	0	0

```
ABCDEFGHIJKLMNOPQR^STUVWXYZABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789ABCDEFGHIJKLMNOPQR^STUVWXYZABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789:#@'=^
#CDEFGHIJKLMNOPQR^STUVWXYZABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789ABCDEFGHIJKLMNOPQR^STUVWXYZABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789:#@'=^A
CDEFGHIJKLMNOPQR^STUVWXYZABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789ABCDEFGHIJKLMNOPQR^STUVWXYZABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789:#@'=^AB

abcdefghijklmnopqr^stuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789abcdefghijklmnopqr^stuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789:@@'=^
bcdefghijklmnopqr^stuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789abcdefghijklmnopqr^stuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789:@@'=^a
cdefghijklmnopqr^stuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789abcdefghijklmnopqr^stuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789:@@'=^ab

abcdefghijklmnopqr^stuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789abcdefghijklmnopqr^stuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789:@@'=^
bcdefghijklmnopqr^stuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789abcdefghijklmnopqr^stuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789:@@'=^a
cdefghijklmnopqr^stuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789abcdefghijklmnopqr^stuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789:@@'=^ab
```

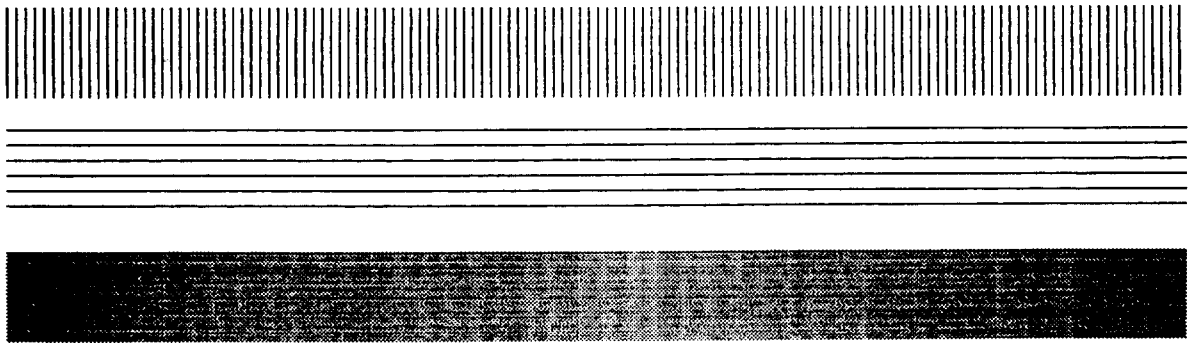


Figure 5. Test Key Printout - Model 013

300 Print Unit

300 - Section Contents

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 6.

Removal

1. Open the rear door.
2. Remove the forms from the printer (see the *Operating Instructions*, if necessary).
3. Set the printer power switch to O (Off) and disconnect the power cord from the electrical outlet.
4. Open the top access cover.
5. Disconnect the static grounding wire **D** located at the ground terminal strip that connects the upper forms guide to frame ground.
6. Close the top access cover.
7. Open the rear access cover **A**.
8. 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.
9. 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.
10. Lift the top cover from the printer.

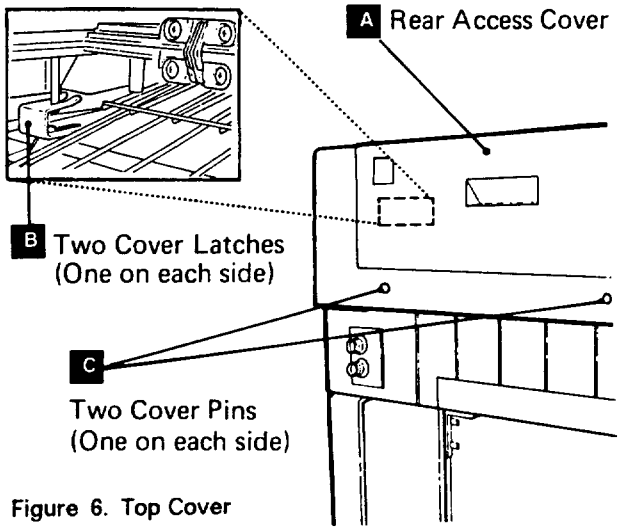
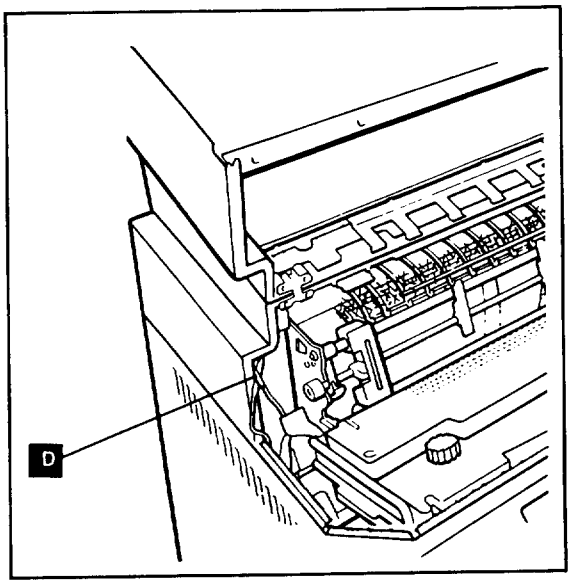


Figure 6. Top Cover

Installation

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. Open the rear access cover.
5. Press down on the top cover and push the latches **B** forward into place.
6. Close the rear access cover.
7. Open the top access cover.
8. Reconnect the static grounding wire **D**.
9. Close the top access cover **A** and connect the power cord.
10. Close the rear door.



Power 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.

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

See Figure 7.

Removal

1. Remove the forms from the printer (refer to the *Operating Instructions*, if necessary).
2. Set the printer power switch to O (Off).
3. Remove the top cover (see "Top Cover" on page 300-3).
4. Remove the static grounding wire **B** at the ground terminal strip that 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.

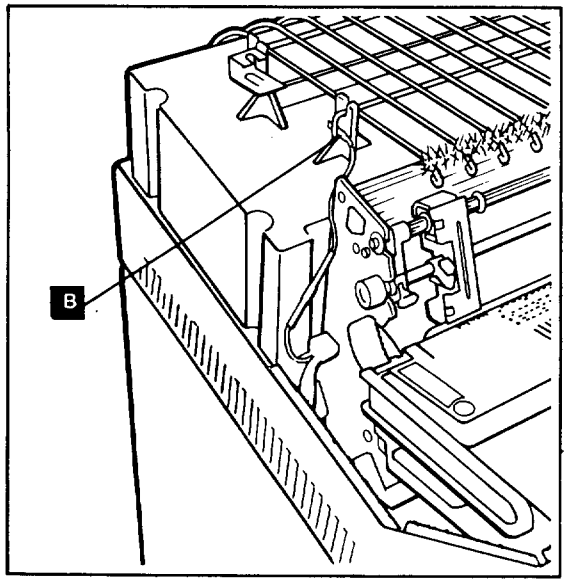


Figure 7. Power Cover

Installation

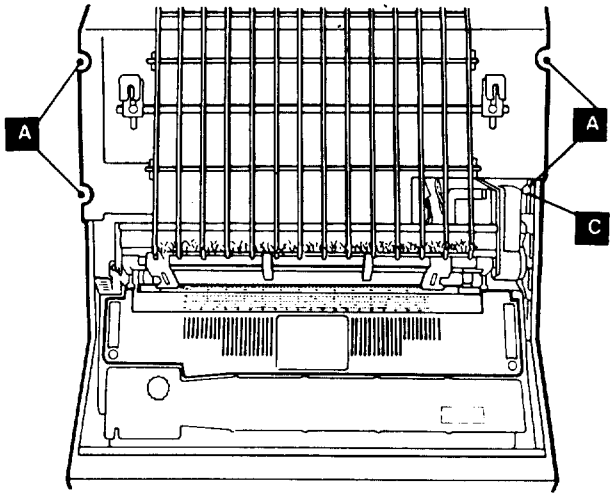
1. Lower the cover into place while inserting the front edge into the grooves located in the base.

Important

Ensure that the power cover is correctly seated in grooves of the base cover.

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**. (Start with right side.)
3. Connect the static grounding wire **B**.
4. Install the top cover (see "Top Cover" on page 300-3).



Top View

320 Dot Band

Theory of Operation

Three different dot bands are available to the customer. Each band has dots of a unique size. The dot band has a color stripe at the top to show what size dot is mounted on it. See Table 1 on page 000-6 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 144 dots mounted on spring chevrons along the band. The chevron returns the dot to the rest state after it has printed.

The dot band sensor generates output signals from the timing slots in the band. The system card electronics and microcode receives this information and uses this data to maintain synchronism with the band position. The drive and idler rotors hold the band in place. The band motor provides drive to the drive rotor during a print operation and during certain diagnostics. The band oiler lubricates the anvils mounted on the inside of the chevrons.

The dot band is a customer-replaceable item. Handle the band carefully to prevent it from becoming damaged. The timing 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 timing 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 8 for an example of dot band chevrons.

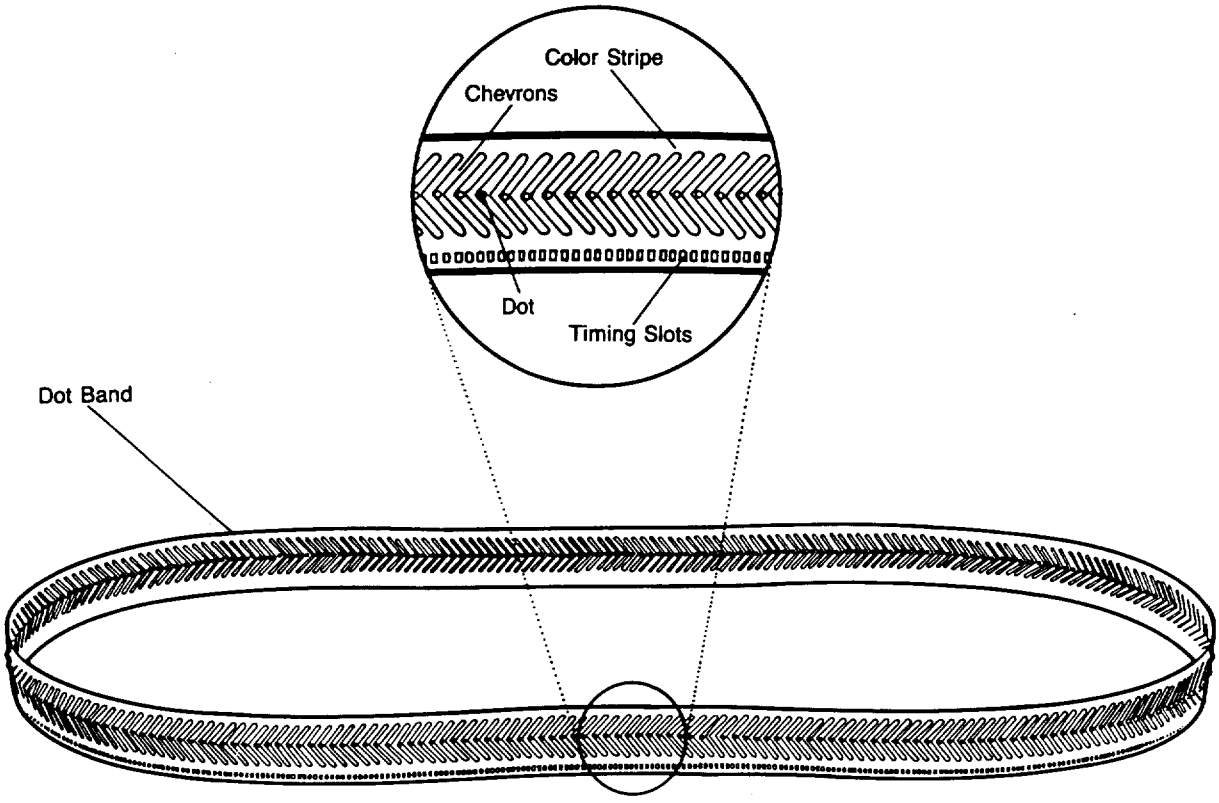


Figure 8. Dot Band

Dot Band Removal and Installation

DANGER

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

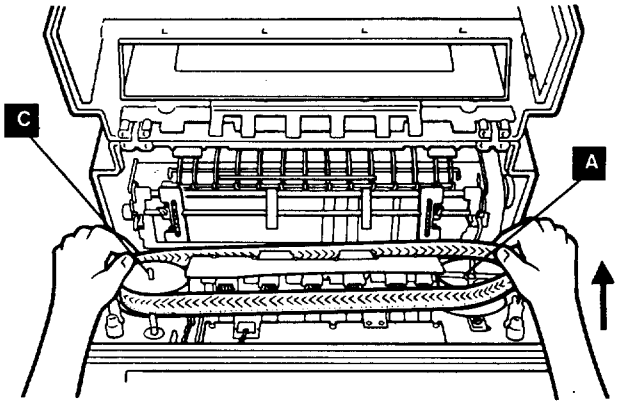
Warning: If you install the dot band incorrectly, it will be damaged when power is restored and serious machine damage will result.

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

See Figure 9.

Removal

1. Set the printer power switch to O (Off).
2. Open the top access cover.
3. Remove the ribbon cartridge (MIM "Ribbon Cartridge" on page 300-41).
4. Grasp the dot band cover on both ends and lift and remove it.
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 rotor **C**, and remove it.
7. Pull the dot band away from the idler rotor **A**, and lift it off the rotor.



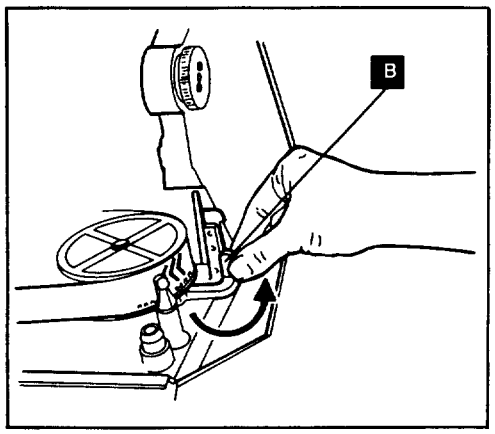


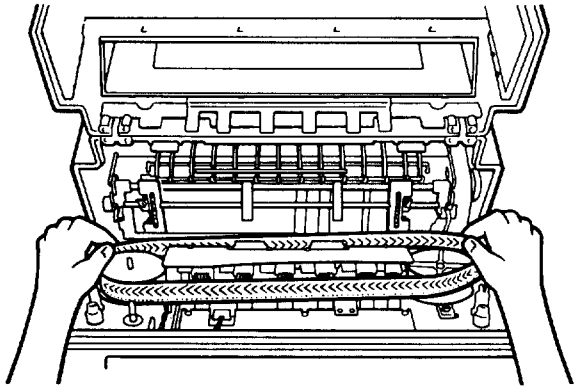
Figure 9. Dot Band Removal

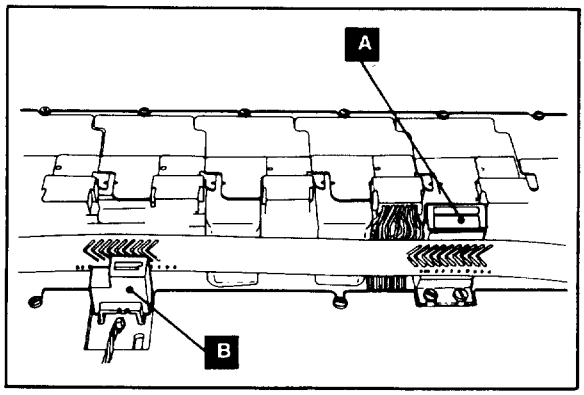
Installation

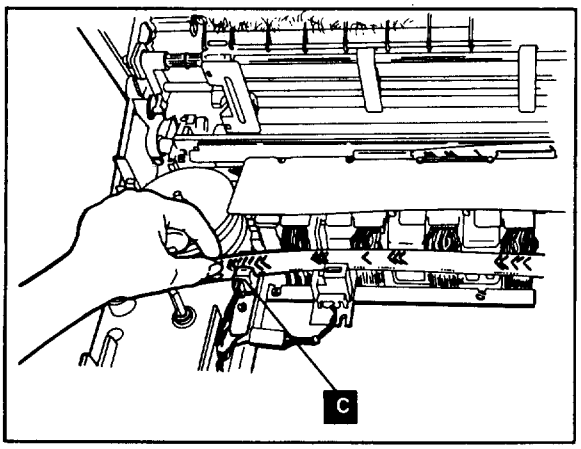
1. Hold the dot band with the timing slots at the bottom, the color stripe at the top outside edge, and the chevrons nearest you pointing to the left.

   Warning: Do not install the dot band incorrectly or it will be **immediately damaged** when the printer power switch is set to On. Ensure that the dot band is aligned correctly before putting it on the rotors.

2. Place the **dot band** around the right rotor. Ensure that the bottom edge (timing slots) of the dot band is resting on the flange at the bottom of the right rotor.
3. Guide the dot band in front of the dot band oiler **A** and behind the band cover switch **B**.
4. Carefully slip the **dot band** over the left rotor.
5. Ensure that the band is between the slot of the band sensor **C**.
6. Move the **dot band release lever** **D** toward the front of the printer to restore tension to the dot band.
7. Install the dot band cover.
8. Install the ribbon cartridge (MIM "Ribbon Cartridge" on page 300-41).







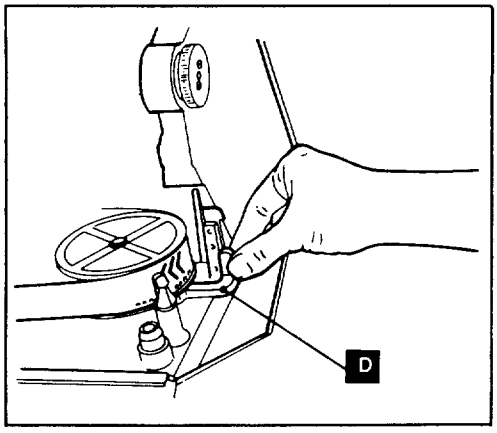


Figure 10. Dot Band Installation

Band Oiler Assembly

See Figure 11.

Removal

1. Set the printer power switch to O (Off).
2. Remove the ribbon cartridge (MIM "Ribbon Cartridge" on page 300-41).
3. Remove the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
4. Loosen the two oiler assembly mounting screws **A**.
5. Remove the oiler assembly **B** from the print mechanism.

Installation

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 (MIM "Dot Band Removal and Installation" on page 300-6). 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 (MIM "Ribbon Cartridge" on page 300-41).

Adjustment

1. Set the printer power switch to O (Off).
2. Remove the ribbon cartridge (MIM "Ribbon Cartridge" on page 300-41).
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 the 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 (MIM "Ribbon Cartridge" on page 300-41).

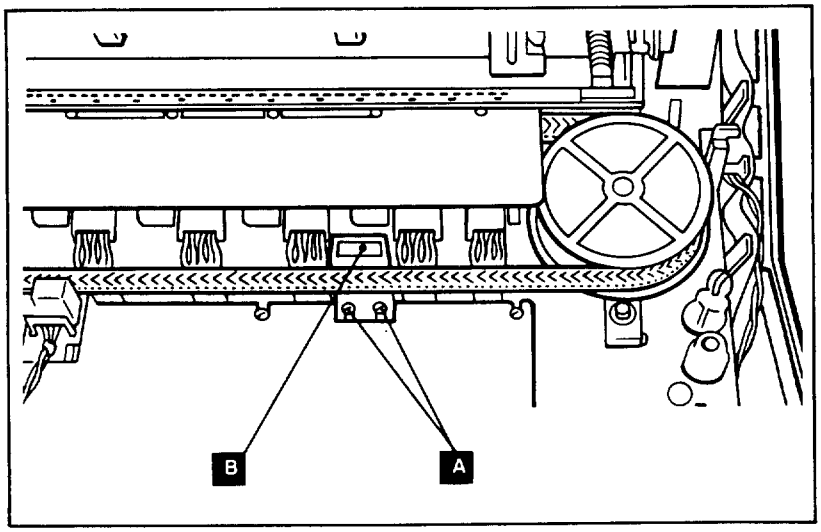


Figure 11. Band Oiler Assembly, Right Side View

Band Cover Switch

See Figure 12.

Removal

1. Set the printer power switch to O (Off).
2. Remove the ribbon cartridge (MIM "Ribbon Cartridge" on page 300-41).
3. Grasp the dot band cover on both ends and lift and remove it.
4. Remove the cable from the clamp **A** and disconnect the COVR switch connector **B**.
5. Remove the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
6. Firmly grasp the switch then lift and remove it from the print casting.

Installation

1. Install the switch in the print casting.
2. Connect the COVR switch connector **B**.
3. Install the cable in the clamp **A**.
4. Install the cover switch.
5. Install the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
6. Install the ribbon cartridge (MIM "Ribbon Cartridge" on page 300-41).

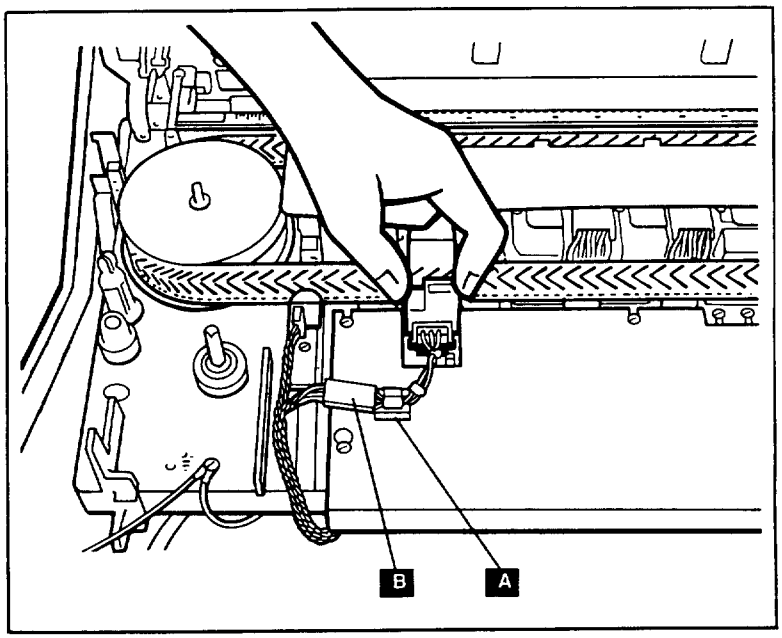


Figure 12. Band Cover Switch

Band Drive Motor Filter (Early Models Only)

See Figure 13.

Note: If the motor filter is bad, the motor assembly (without filter) **must** be replaced.

Removal

1. Set the printer power switch to O (Off) and disconnect the power cord from the electrical outlet.
2. Place the print mechanism in the service position (MIM "Print Mechanism (Service Position)" on page 300-49).
3. Disconnect the filter cable **A**.
4. Disconnect the two motor wires **B**.
5. Remove the band motor filter mounting screw **C** and remove the filter **D**.

Installation

1. Install the filter onto the band drive motor.
2. Connect the filter cable connector **A**.
3. Connect the two motor wires **B**.

   Note: The red lead **must** be connected to the red terminal and the blue lead is connected to the black terminal. Damage to the motor assembly will occur if the leads are connected incorrectly.
4. Install the print mechanism (MIM "Print Mechanism (Service Position)" on page 300-49).
5. Connect the power cord to the electrical outlet.

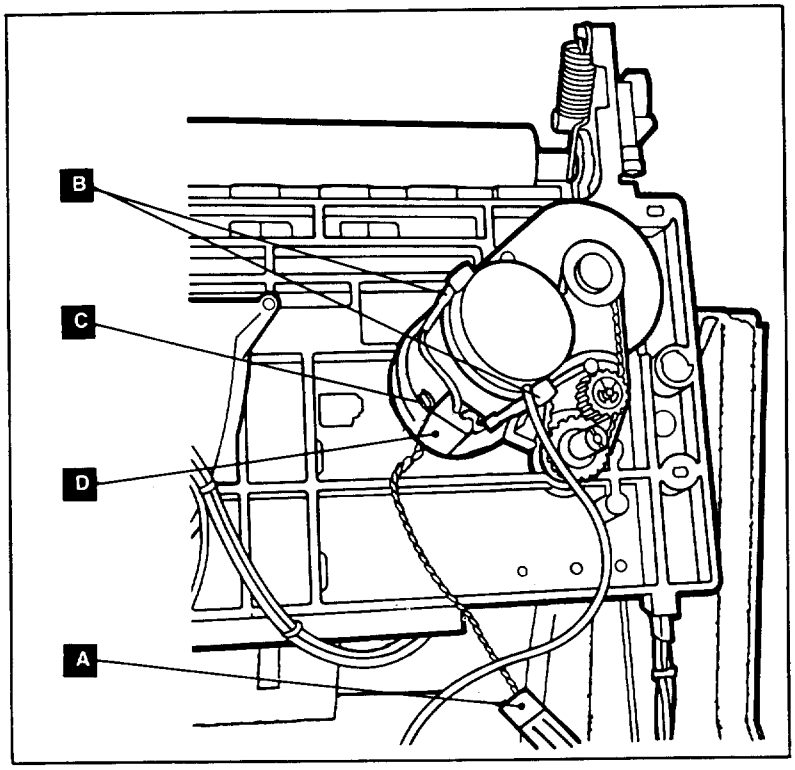


Figure 13. Band Drive Motor Filter

Band Drive Motor

See Figure 14.

Removal

1. Set the printer power switch to O (Off) and disconnect the power cord from the electrical outlet.
2. Place the print mechanism in the service position (MIM "Print Mechanism (Service Position)" on page 300-48).
3. Remove the ribbon drive idler assembly mounting screws **A** and remove the assembly and the drive belt **E**.
4. Remove the ribbon drive pulley **B**.
5. Disconnect the encoder cable connector **C**.
6. Remove the motor filter - early models only (MIM "Band Drive Motor Filter (Early Models Only)" on page 300-10).
7. Remove the band drive motor mounting screws **D** and remove the motor assembly.

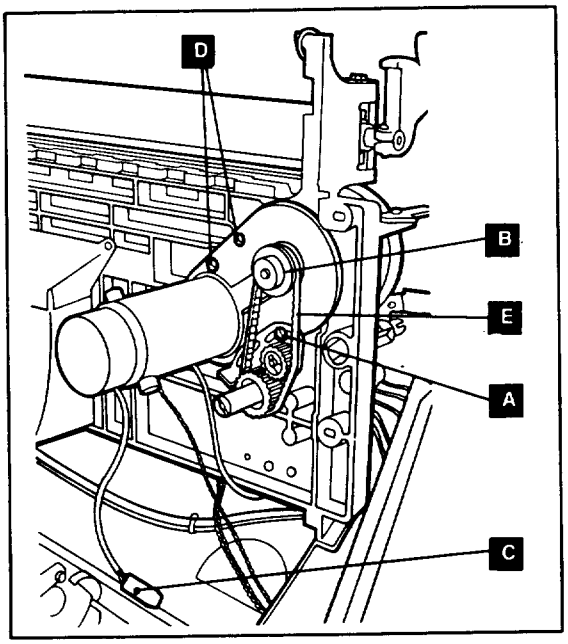


Figure 14. Band Drive Motor

Installation

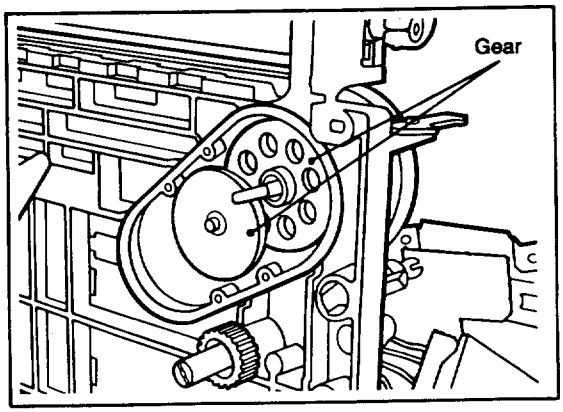
Important

If the gear assembly shows considerable wear or use, replace **all** of the gears. Lubricate the gears with **IBM PN 29F0362** lubricant. If you replace all of the gears, use the entire contents of the lubricant evenly on all gear teeth and working surfaces.

1. Install the band drive motor assembly (screws **D** only).
2. Install the ribbon drive pulley **B**.
3. Install the ribbon drive idler assembly and the drive belt.
4. Install the motor filter - early models only (MIM "Band Drive Motor Filter (Early Models Only)" on page 300-10).
5. Connect the encoder cable connector **C**. Ensure that the red wire (+60 V) is connected to the red terminal on the motor encoder. If the encoder is connected incorrectly, the motor will run backward.

Adjustment

1. Ensure that the idler screws **A** are loose and apply 570 grams (1.25 pounds) of pressure to the lever of the assembly and tighten the screws.
2. Install the print mechanism (MIM "Print Mechanism (Service Position)" on page 300-48).
3. Connect the power cord to the electrical outlet.



Pivot/Idler Rotor Assembly

See Figure 15.

Removal

1. Set the printer power switch to O (Off) and disconnect the power cord from the electrical outlet.
2. Remove the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
3. Place the print mechanism in the service position (MIM "Print Mechanism (Service Position)" on page 300-48).
4. Remove the C-clip **A** and remove the idler rotor.

To Remove the Pivot Assembly

1. Move the band release lever to the "operating" position (toward the front of the casting).
2. Remove the upper C-clip **B** from the pivot shaft **C**.
3. Push the pivot shaft out of the pivot.
4. Remove the tension spring **D**.
5. Rotate the assembly 90° counterclockwise and remove it from the casting.

Note: If you are **replacing** the pivot assembly, remove and save the pivot shaft **C** to use with the new assembly.

Installation

1. Install the pivot assembly onto the casting and turn the assembly until the lug **E** on the idler assembly aligns with the lug on the casting.
2. Install the shaft **C** and the C-clip **B**.
3. Install the spring **D**.
4. Install the idler rotor and the C-clip **A**.

   Note: Ensure that the C-clip is installed as shown below.
5. Check "Band Idler Rotor Assembly Adjustment" on page 300-14.
6. Install the print mechanism (MIM "Print Mechanism (Service Position)" on page 300-48).

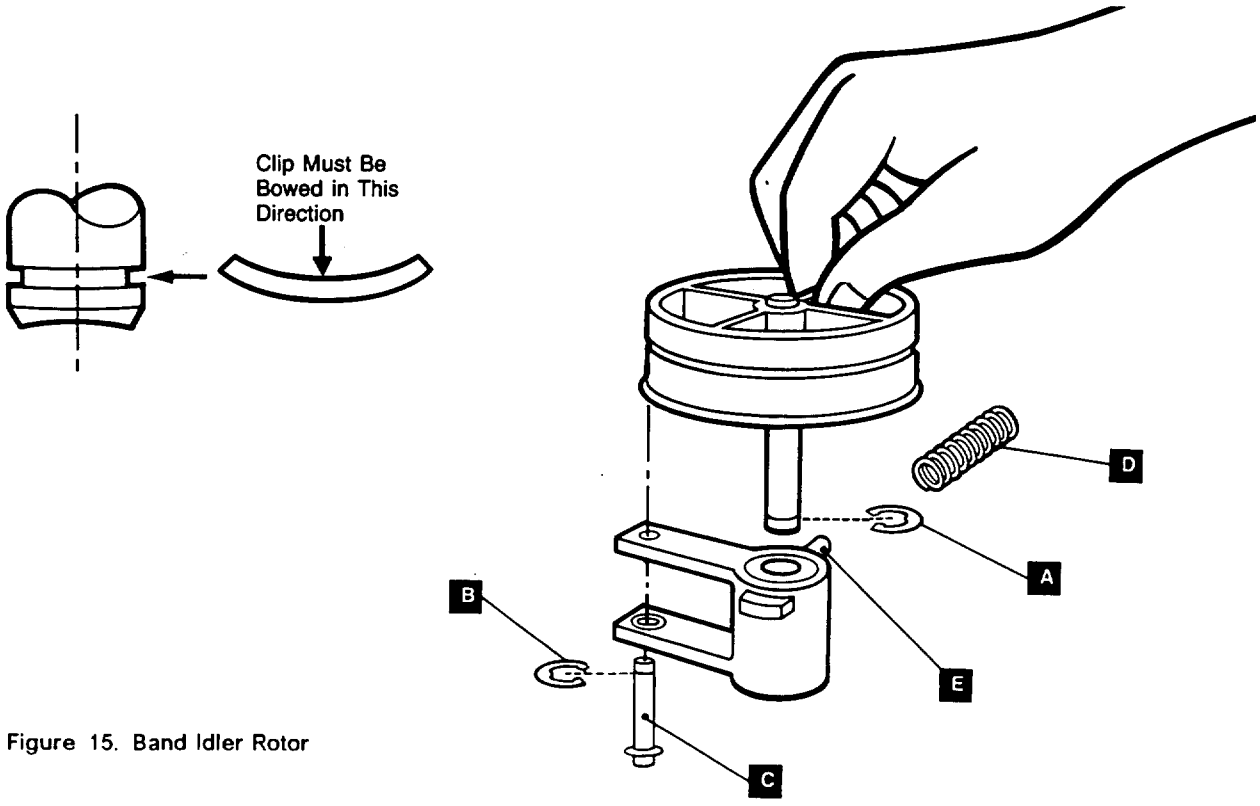


Figure 15. Band Idler Rotor

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Band Tracking Adjustments

See Figure 16 on page 300-15.

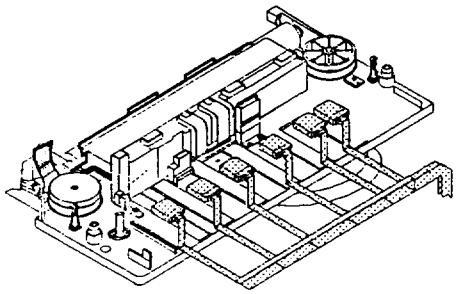
Band Idler Rotor Assembly/Band Support Adjustment

Adjustment

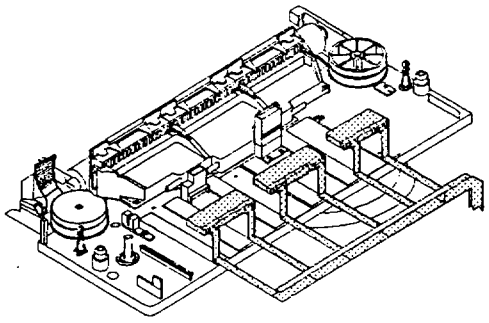
1. Set the printer power switch to O (Off) and disconnect the power cord from the electrical outlet.
2. Place the print mechanism in the service position (MIM "Print Mechanism (Service Position)" on page 300-48).
3. Determine if you have a Linac hammer unit or Clicking hammer unit. See diagram below.
4. Ensure that the band cover and ribbon sensors are connected.
5. Loosen the seven band support screws **A** and move the band support to its lowest position (Linac hammer only).
6. Install the operator panel and print band.
7. Connect the power cord to the electrical outlet and set the printer power switch to | (On).
8. Loosen the eccentric nut screw **B**.
9. Run Test 91. **CAUTION: Keep hands away from the band when running TEST 91.**

   To run Test 91, press and hold the Test key; then press and release the '9' key and then the '1' key. Release the Test key. Press the '0' key to set the 60 volts to on and then press '2' key to run the band motor.

   Press the Quit key when you want to stop the test.
10. With the band running, adjust the eccentric nut **C** counter clockwise until the band rises from the idler rotor flange.
11. Slowly adjust the eccentric nut clockwise until the band is just touching the flange. Note the position of the mark on the eccentric nut and move the nut 30 degrees or 1/12 turn clockwise.
12. With the band still running, (Linac hammer only) move the band support up until the center third of the support is touching the bottom of the band. Tighten the seven screws starting in the middle, alternating from side to side.
13. Run Test 83 to check the adjustment. The top line should be straight, lines following the top line may be slightly uneven.
14. Restore the printer to normal operating condition.



Linac (Early Level) Hammer Unit



Clicking (Late Level) Hammer Unit

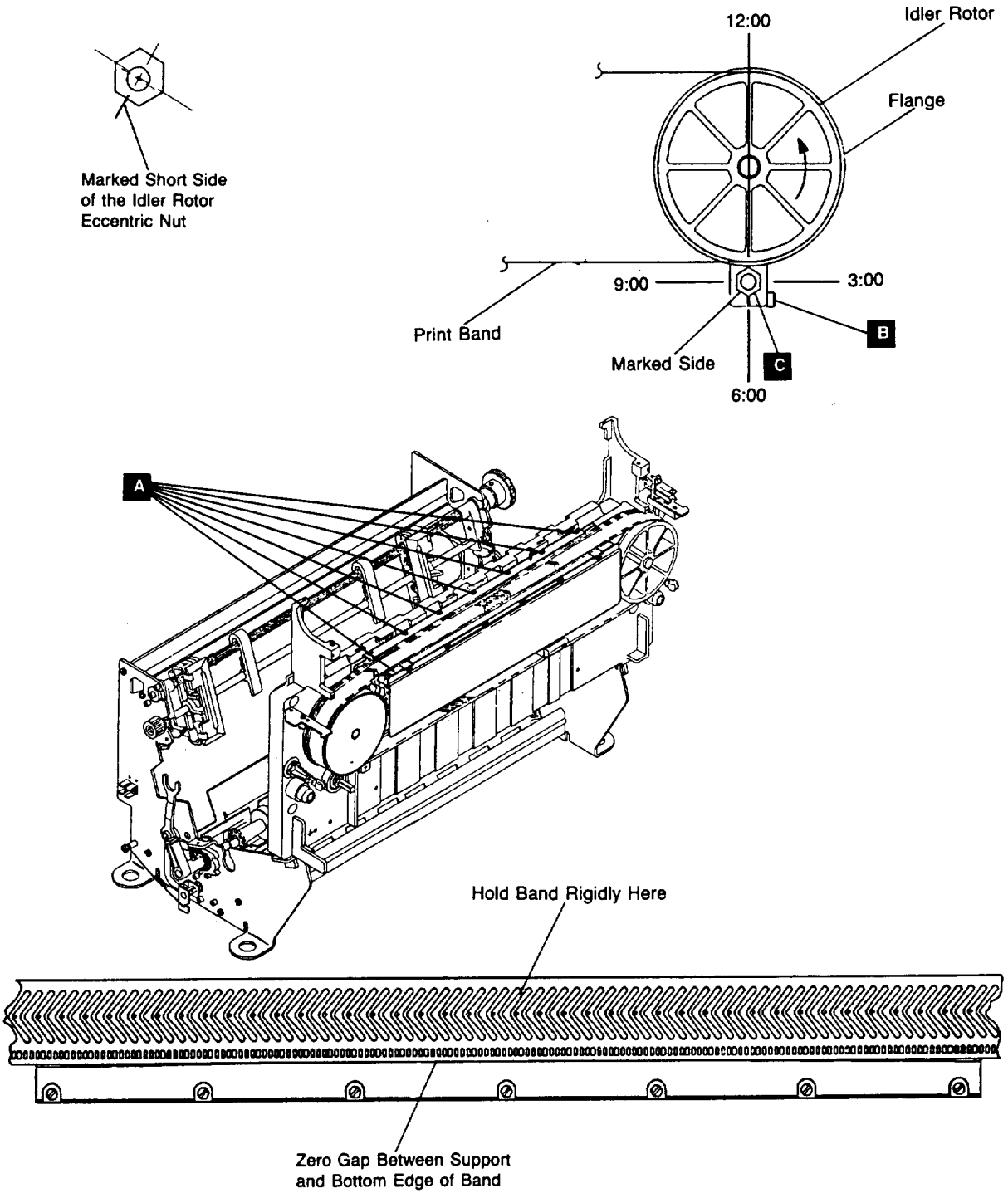


Figure 16. Band Tracking Adjustment

Dot Band Sensor

See Figure 17.

Removal

1. Set the printer power switch to O (Off) and disconnect the power cord from the electrical outlet.
2. Remove the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
3. Disconnect the band sensor connector **A**.
4. Remove the band sensor mounting screw and remove the band sensor **B**.

Installation

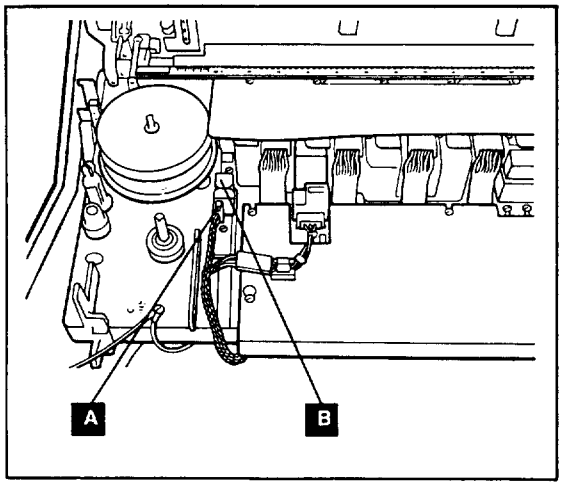
1. Install the dot band sensor **B** to the print casting.
2. Connect the band sensor connector **A**.
3. Install the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
4. Connect the power cord to the electrical outlet.

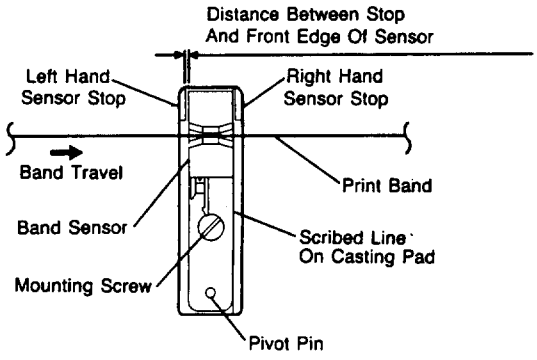
Adjustment

Band tracking **must** be correct.

1. Loosen the sensor mounting screw and place the sensor so that the right edge of the sensor is parallel to the scribed line on the casting mounting pad and tighten the screw.
2. Install ribbon and paper and set the forms thickness lever to "B."
3. Run Test 86; if the two dot columns are not of uniform print density as shown below, pivot the sensor in small increments.

Note: If none of the three patterns appear, move the sensor around until one of the patterns appear and go to step 3.





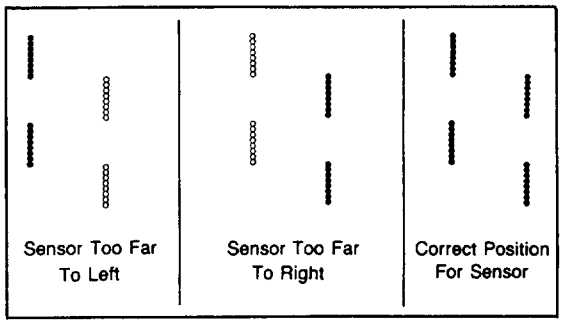


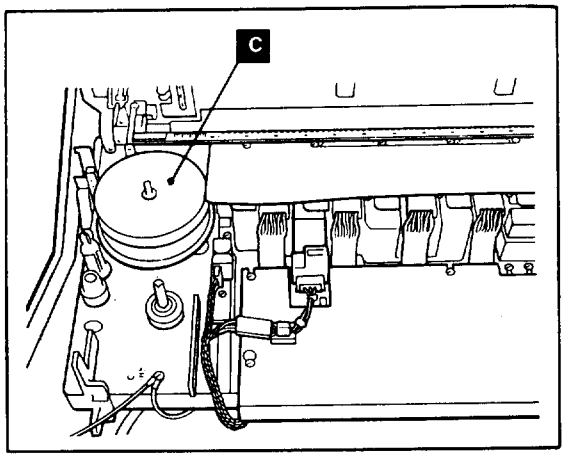
Figure 17. Dot Band Sensor

Band Drive Rotor Assembly

See Figure 18.

Removal

1. Set the printer power switch to O (Off) and disconnect the power cord from the electrical outlet.
2. Remove the band drive motor (MIM "Band Drive Motor" on page 300-11). Do not remove the motor filter - early models only.
3. Loosen the drive rotor gear **A**.
4. Remove the key **D** from the shaft.
5. Remove the drive rotor **C**.



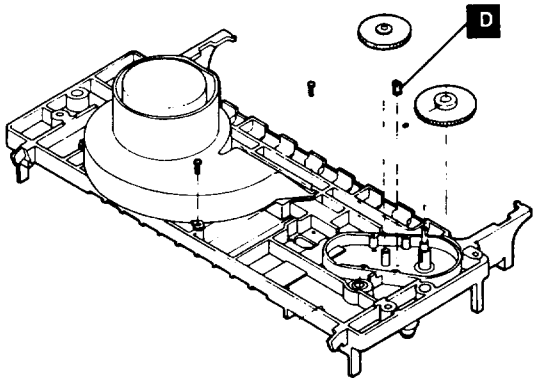


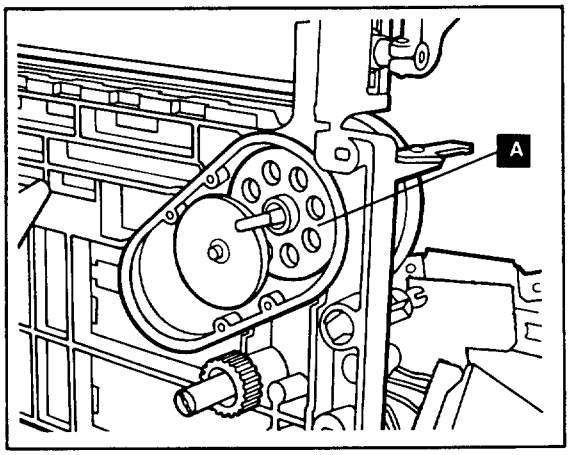
Figure 18. Band Drive Rotor Assembly

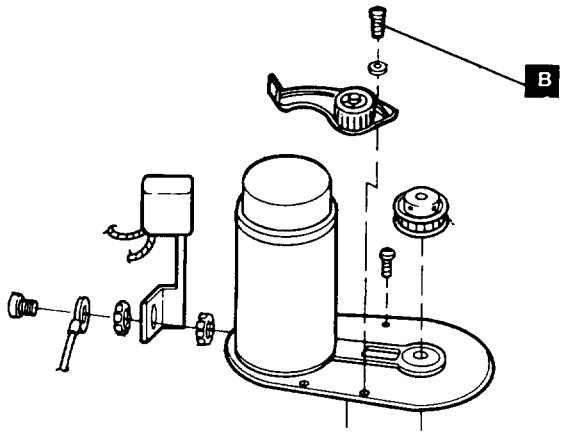
Installation

1. Install the band drive rotor **C** onto the casting.
2. Install the key **D** onto the drive rotor shaft.
3. Install the drive rotor gear **A**. There should be no end play in the band drive shaft.
4. Install the band drive motor (MIM "Band Drive Motor" on page 300-11).

Adjustment

1. Ensure that the ribbon drive idler screws **B** are loose and apply 570 grams (1.25 pounds) of pressure to the lever of the assembly and tighten the screws.
2. Check MIM "Band Tracking Adjustments" on page 300-14 and "Adjustment" on page 300-16.
3. Install the print mechanism (MIM "Print Mechanism (Service Position)" on page 300-48).





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. Ensure that the dot band is aligned correctly before putting it on the band drive and idler rotors. 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 want to change the order of some steps or to do only specific 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 (MIM "Dot Band Removal and Installation" on page 300-6).
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, rotors, 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. Put a few drops of the alcohol to the slots and brush them until clean.
   c. Rotate the dot band carefully and repeat the preceding step until all slots are clean.
   d. Hold the dot band to a light source and inspect the slots. Ensure that 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 shield:

   a. Clean the shield with alcohol until it is free of ink and dirt; then dry it off.

   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 clean between the paper shield surface and the print hammers.

   The band drive and band idler rotors:

   a. Clean the rotors with a cloth moistened with **isopropyl alcohol** until all build-up is removed.
   b. Dry off the rotors with a clean, dry cloth.

   The dot band sensor:

   a. Fold a clean, dry cloth and dampen with **70% (minimum) isopropyl alcohol**.
   b. Insert cloth into dot band 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 sensor to ensure that it is clean.

4. Check that the bearing that holds the shaft is not worn. To do this, remove the drive rotor (MIM "Band Drive Rotor Assembly" on page 300-17). Turn the drive shaft and ensure that there is no play in the shaft. Also, verify that the bearing within which the shaft turns is not defective. The bearing should turn smoothly.

5. Check that the idler rotor rotates freely on the shaft. If it does not, replace the pivot/idler rotor assembly (MIM "Pivot/Idler Rotor Assembly" on page 300-12).
6. Check that the drive rotor rotates without binds. If it does not, replace the drive rotor assembly.
7. Install the dot band (MIM "Dot Band Removal and Installation" on page 300-6), but not the band cover.
8. 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.
9. Check that the paper shield closes and latches correctly. If it does not, check the ribbon path for obstructions. Obstructions here can also bind the band.
10. Check the band oiler adjustment (MIM "Band Oiler Assembly" on page 300-8). Turn the drive rotor 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.
11. 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 (MIM "Band Oiler Assembly" on page 300-8). 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 dot band.
12. Check the ribbon drive belt under the print casting for wear or missing teeth. If the belt is defective, replace it. If the belt is in good condition, check the tension adjustment (MIM "Ribbon Drive Belt" on page 300-42).
13. **If your problem remains after making these checks**, see MAP 300, which has information about specific print quality problems.

330 Forms Drive

Forms Drive Theory of Operation

Primary forms movement is supplied 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. An autoload feature lets 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 forms loading during an autoload 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 rotor. 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 rotor 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 moved forward to the print position, the autoload clutch disengages and forward forms movement is supplied 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 rotor turns the drive roll shaft in the reverse direction. The drive rolls move the forms downward. Therefore, the forms can be restored to the first print line after the last printed form is removed.

Autoload Clutch

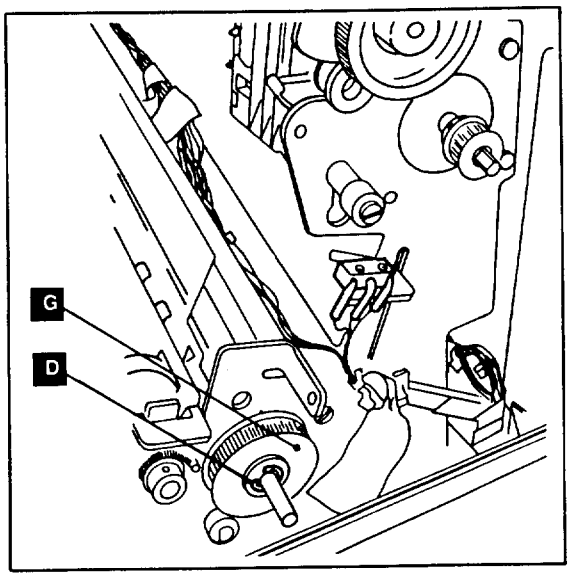
See Figure 19.

Removal

1. Set the printer power switch to O (Off).
2. Remove the ribbon cartridge (MIM "Ribbon Cartridge" on page 300-42).
3. Remove the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
4. Remove the forms drive safety cover (MIM "Transport Assembly, Part 1" on page 800-5) from the right side of printer.
5. Loosen the idler assembly screw **A**, and remove the autoload clutch 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 rotor assembly **G** from the shaft.

Installation

1. Install the drive rotor 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 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 204 grams of force deflects the center of the drive belt 2.0 to 2.5 mm (0.079 in. to 0.098 in.) as shown in "Autoload Clutch and Forms Drive Belts" on page 300-28.
6. Turn the forms knob several times; then check the belt tension. Adjust if necessary.
7. Install the forms drive safety cover.
8. Install the dot band (see "Dot Band Removal and Installation" on page 300-6).
9. Install the ribbon cartridge (MIM "Ribbon Cartridge" on page 300-42).



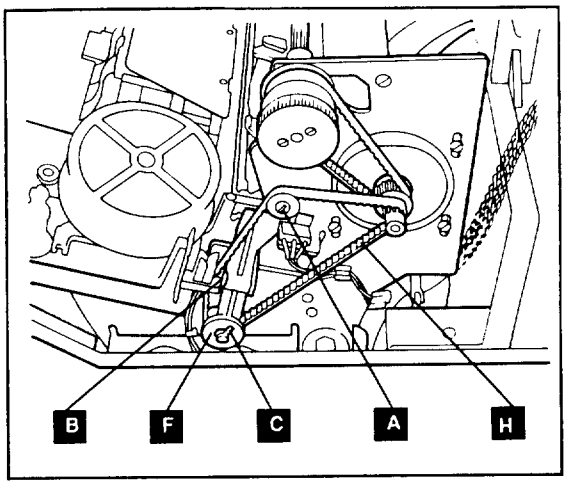


Figure 19. Autoload Clutch

Tractor Assembly

See Figure 20.

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 20).
4. Remove the forms drive safety cover **G** ("Transport Assembly, Part 1" on page 800-5) from the right side of printer.
5. Loosen the idler assembly screw **A**, and remove the autoload clutch drive belt.
6. Loosen the forms drive motor mounting screws and remove the forms drive belt.
7. Remove C-clip **B**.
8. Move right latch assembly **E** to the left.
9. Remove two screws **C** from the left bearing plate.
10. 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**.

Installation

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 and autoload clutch drive belts.
5. Adjust the forms drive motor up or down so that 408 grams of force deflects the center of the forms drive belt 2.0 to 2.5 mm (0.079 in. to 0.098 in.).
6. Adjust the idler pulley **A** so that 204 grams of force deflects the center of the autoload clutch belt 2.0 to 2.5 mm (0.079 in. to 0.098 in.).
7. Turn the forms knob several times; then check the belt tension. Readjust if necessary.
8. Install the forms drive safety cover.

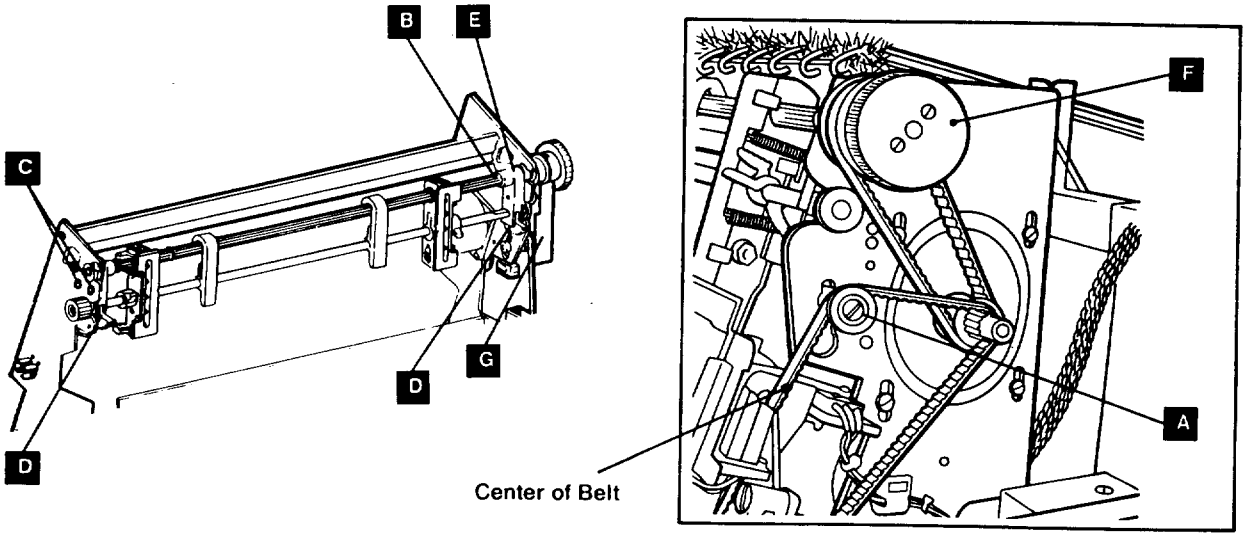


Figure 20. Tractor Assembly

Tractor

See Figure 21.

Removal

1. Set the printer power switch to O (Off).
2. Remove the guides K by unsnapping them from the support shaft.
3. Remove the four C-clips A.
4. Remove the spline head screw, washer, and lock-washer B.
5. Remove the horizontal knob screw, washer, and lock-washer J.
6. Press both latch levers D up and pivot the tractor assembly toward the front of the printer (Figure 21).
7. Remove the horizontal knob by turning it counterclockwise until it is free from the support shaft.
8. Pull the forms knob F to the right just enough so that the left end of the spline shaft clears the bearing plate M.

   Note: The blue portion of the latch assembly D is spring loaded and will come apart when performing the next step. Securing the latch to the housing with tape will help when re-assembling the tractor assembly.
9. Carefully hold and slide the latch assembly C off the shafts.
10. Slide the tractors (G and H) off the shafts.

Installation

1. Align the timing mark on the tractor drive gear with the mark on the tractor housing (both tractors).

   Note: The timing mark on both tractor drive gears **must** line up on the same groove of the spline shaft.
2. Install the tractor(s) onto the spline and support shafts.
3. Install the latch assembly C and horizontal knob J onto the spline and support shafts. (Install the horizontal knob onto the support shaft by turning it clockwise.)
4. Install the horizontal knob screw, washer, and lock-washer.
5. Install the left end of the spline shaft into the bearing M. (Ensure that the right bearing is correctly seated in the side-frame.)
6. Install the spline head screw, washer, and lock-washer B.
7. Ensure that the tractors are positioned as shown.
8. Install the four C-clips A.
9. Install the paper guides K onto the spline and support shafts by snapping them in place.

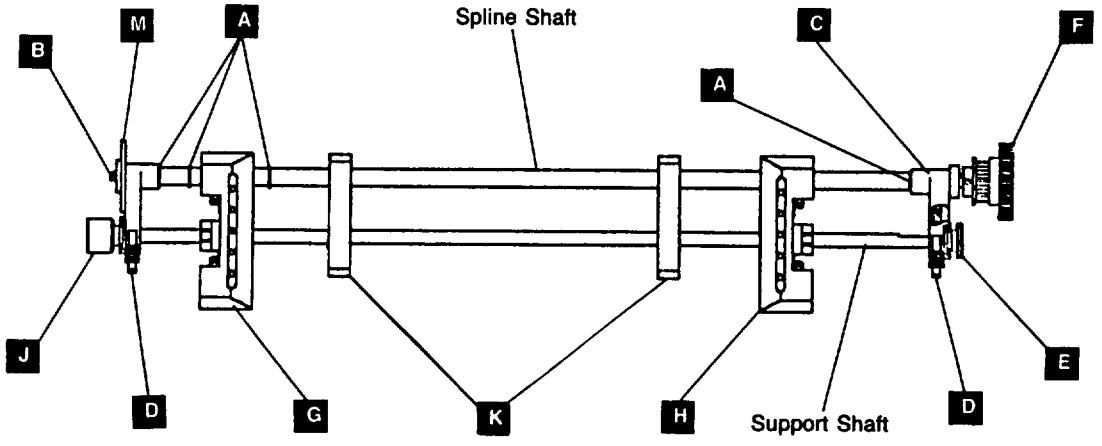


Figure 21. Tractor

Forms Drive Roll Shaft

See Figure 22 on page 300-25.

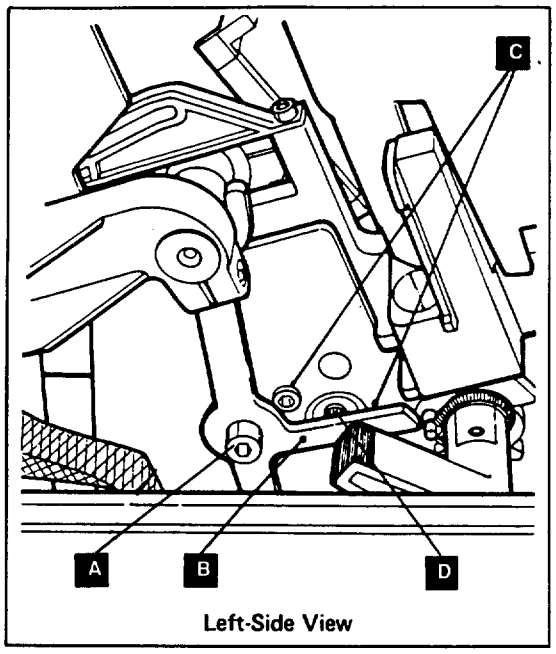
Note: If you are replacing this shaft assembly because of drive roll wear, inspect the pressure rolls for wear, and also replace the pressure roll shaft assembly if necessary.

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 (MIM "Ribbon Cartridge" on page 300-41).
5. Remove the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
6. Remove the top cover (MIM "Top Cover" on page 300-3).
7. Remove the power cover (MIM "Power Cover" on page 300-4).
8. Place the print mechanism in the service position (MIM "Print Mechanism (Service Position)" on page 300-48).
9. Remove the autoload clutch (MIM "Autoload Clutch" on page 300-21).
10. Remove the screw **A** which holds the yoke **B** located at the left side-frame and remove the yoke.
11. Remove the bearing plate assembly mounting screws **C**.
12. Slide the drive roll shaft to the right.
13. Remove the bearing plate assembly by removing the screw **D** and washers from the end of the shaft.
14. Slide the shaft to the left so that right end of the shaft clears the side-frame; then pull it out from the right.

Installation

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 screw **D** and washers on the 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 autoload clutch (MIM "Autoload Clutch" on page 300-21 through step 5).
7. Install the print mechanism (MIM "Print Mechanism (Service Position)" on page 300-48).
8. Install the power cover (MIM "Power Cover" on page 300-4).
9. Install the top cover (MIM "Top Cover" on page 300-3).
10. Install the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
11. Install the ribbon cartridge (MIM "Ribbon Cartridge" on page 300-41).



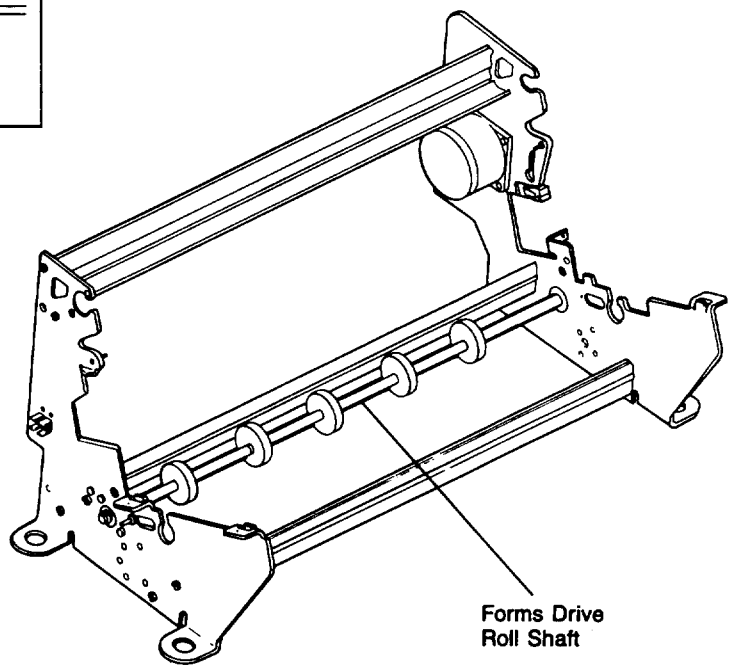


Figure 22. Forms Drive Roll Shaft

Forms Pressure Roll Shaft

See Figure 23 on page 300-27.

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 (MIM "Ribbon Cartridge" on page 300-41).
5. Remove the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
6. Place the print mechanism in the service position (MIM "Print Mechanism (Service Position)" on page 300-48).
7. Remove the autoload clutch (MIM "Autoload Clutch" on page 300-21).
8. Loosen the setscrew **B** and remove the JAM sensor **C**.
9. Remove the pressure roll handle screw **D**, 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.

    Note: The cams are not the same. The cam with the leg is on the left.
12. Slide the shaft to the right and lift it from the printer.

Installation

1. Install the shaft into the side-frames.

   Note: Ensure that the springs **E** are on the front side of the shaft.
2. Install the two cams **A**.
3. Install the pressure roll handle to the shaft assembly.
4. 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.
5. Install the JAM sensor **C** on the front guide plate.

   Note: Adjust the sensor so that the rotor is centered in the sensor slot and the rotor turns freely. Ensure that the springs are correctly positioned.
6. Install the autoload clutch (MIM "Autoload Clutch" on page 300-21).
7. Install the print mechanism (MIM "Print Mechanism (Service Position)" on page 300-48).
8. Install the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
9. Install the ribbon cartridge (MIM "Ribbon Cartridge" on page 300-41).

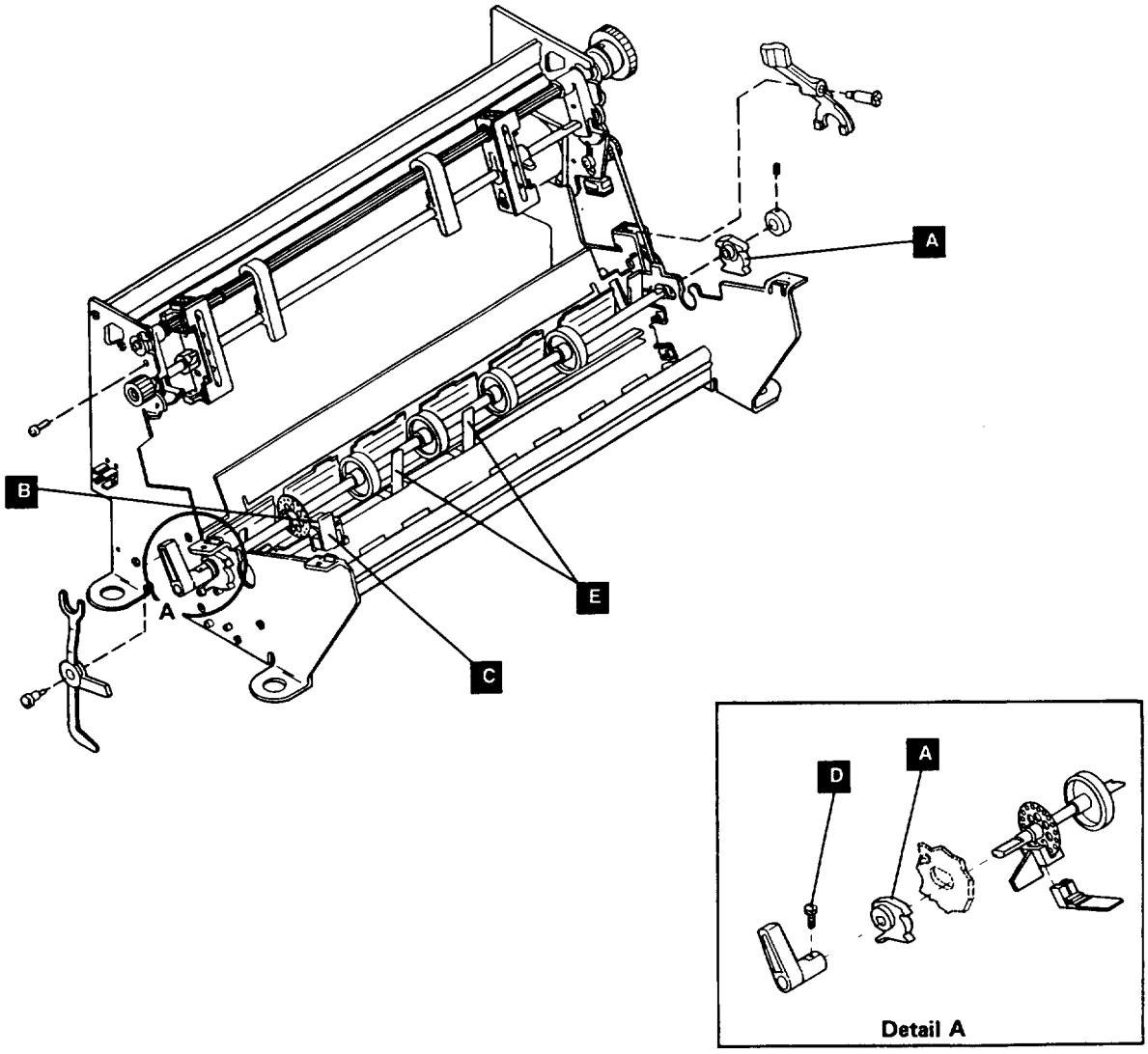


Figure 23. Pressure Roll Shaft

Autoload Clutch and Forms Drive Belts

See Figure 24.

Removal

1. Set the printer power switch to O (Off).
2. Open the top access cover.
3. Remove the forms drive safety cover (MIM "Transport Assembly, Part 1" on page 800-5) from the right side of printer.
4. Loosen the idler pulley screw **A** and remove the autoload clutch drive belt.
5. ***If you want to remove the forms drive belt***, loosen the forms drive motor mounting screws and remove the forms drive belt.

Installation

1. Install the forms and autoload clutch drive belts.
2. Adjust the forms drive motor up or down so that 408 grams of force deflects the center of the forms drive belt 2.0 to 2.5 mm (0.079 in. to 0.098 in.).
3. Adjust the idler pulley **A** so that 204 grams of force deflects the center of the autoload clutch belt 2.0 to 2.5 mm (0.079 in. to 0.098 in.).
4. Turn the forms knob several times; then check the belt tension. Adjust if necessary.
5. Install the forms drive safety cover (MIM "Transport Assembly, Part 1" on page 800-5).

Adjustment

1. Set the printer power switch to O (Off).
2. Open the access cover.
3. Remove the forms drive safety cover (MIM "Transport Assembly, Part 1" on page 800-5) from the right side of printer (remove the bottom screw only).
4. Adjust the forms drive motor up or down so that 408 grams of force deflects the center of the forms drive belt 2.0 to 2.5 mm (0.079 in. to 0.098 in.).
5. Adjust the idler pulley **A** so that 204 grams of force deflects the center of the autoload clutch belt 2.0 to 2.5 mm (0.079 in. to 0.098 in.).

   Note: Adjust the forms drive belt first.
6. Turn the forms knob several times; then check the belt tension. Adjust if necessary.
7. Install the forms drive safety cover.

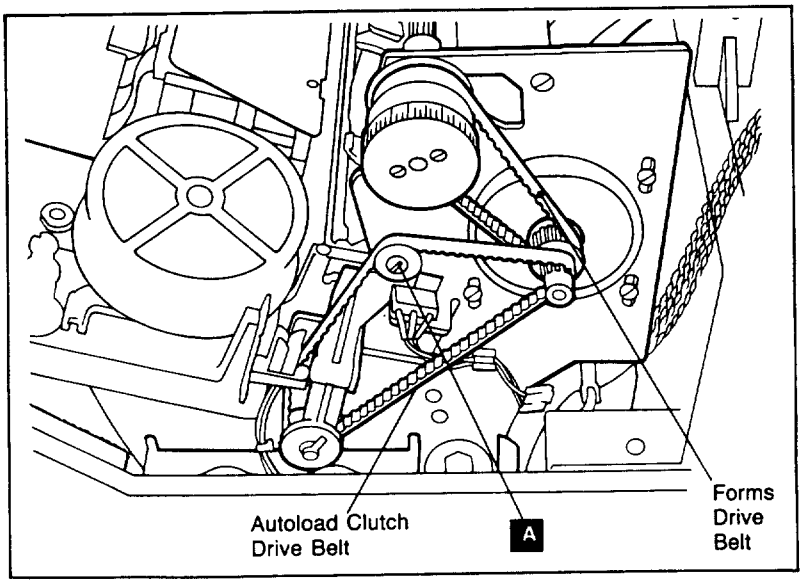


Figure 24. Forms Drive Belt

Frame Assembly

See Figure 25.

Removal

1. Set the printer power switch to O (Off), and disconnect the power cord from the electrical outlet.
2. Remove the power cover (MIM "Power Cover" on page 300-4).
3. Remove the print mechanism (MIM "Print Mechanism (Removal)" on page 300-50).
4. Disconnect the PLAT cable connector located on the right side of the frame.
5. Disconnect the forms drive motor cable and ground wire from the right side of the side-frame.
6. If necessary, remove the forms drive motor (MIM "Forms Drive Motor" on page 300-32).
7. Remove all ground straps from the left side-frame.
8. Disconnect the EOF and JAM sensors and remove them from the cable clamp.
9. Remove the four frame assembly mounting screws and the shock mounts and remove the frame.
10. If necessary, remove the tractor assembly (see "Tractor Assembly" on page 300-22).

Installation

1. Position the frame assembly in the bottom cover.
2. Install the four frame shock mounts and the mounting screws.
3. Connect the EOF and SENS sensors 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. Connect the forms drive motor cable.
7. Install the ground wire to the right side of the side-frame.
8. Connect the PLAT and RIB cable connectors located on the right side of the frame.
9. Install the print mechanism (MIM "Print Mechanism (Removal)" on page 300-50).
10. Install the power cover (MIM "Power Cover" on page 300-4).
11. Install the top cover (MIM "Top Cover" on page 300-3).
12. Connect the power cord to the back of the printer.

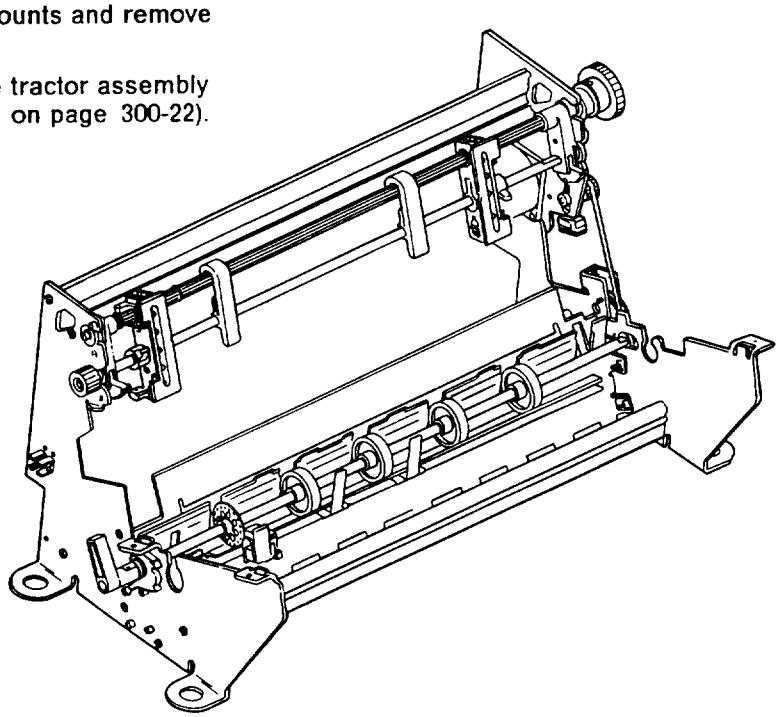


Figure 25. Frame Assembly

Rear Forms Guide Plate

See Figure 26.

Removal

1. Set the printer power switch to O (Off), and disconnect the power cord from the electrical outlet.
2. Remove the frame assembly (MIM "Frame Assembly" on page 300-29).
3. Remove the forms drive roll shaft (MIM "Forms Drive Roll Shaft" on page 300-24).
4. Remove the four rear forms guide plate mounting screws.
5. Remove the plate **A** through the bottom of the frame.

Installation

1. Position the forms guide plate **A** in the frame assembly.
2. Install the four guide plate mounting screws.
3. Install the forms drive roll shaft (MIM "Forms Drive Roll Shaft" on page 300-24).
4. Install the frame assembly (MIM "Frame Assembly" on page 300-29).
5. Install the print mechanism (MIM "Print Mechanism (Removal)" on page 300-51).
6. Connect the power cord to the back of the printer.

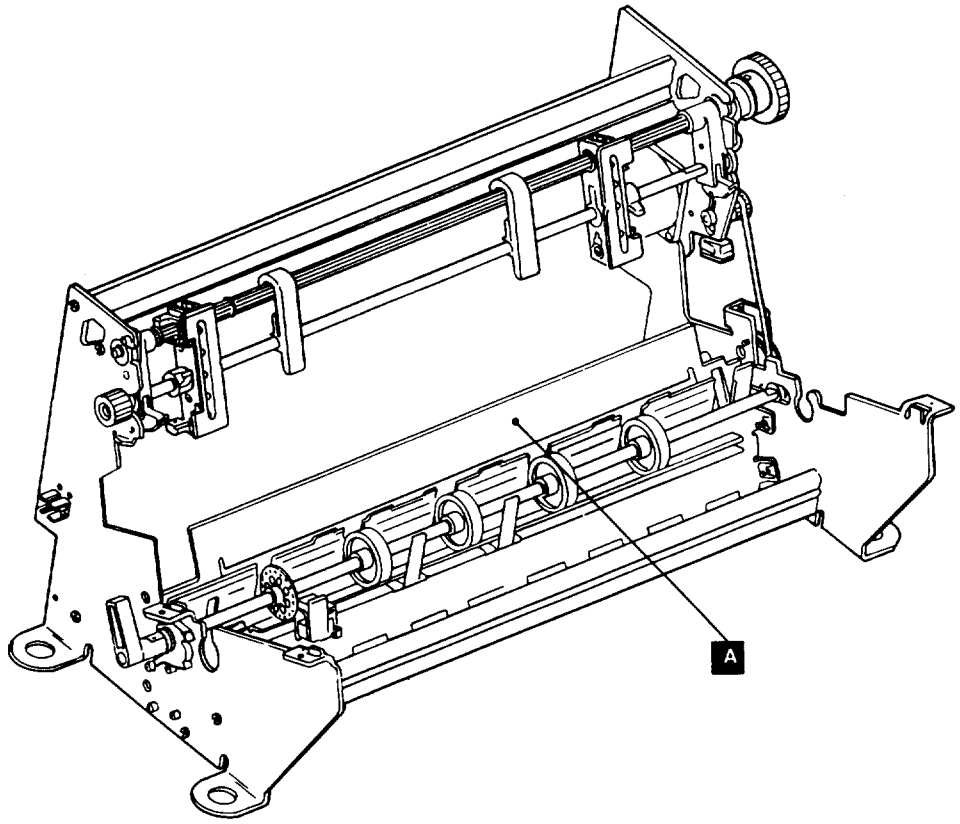


Figure 26. Rear Forms Guide Plate

Front Forms Guide Plate

See Figure 27.

Removal

1. Set the printer power switch to O (Off), and disconnect the power cord from the electrical outlet.
2. Remove the frame assembly (MIM "Frame Assembly" on page 300-29).
3. Remove the forms pressure roll shaft ("Forms Pressure Roll Shaft" on page 300-26).
4. Remove the four front plate mounting screws.
5. Remove the plate **A** through the bottom of the frame.

Installation

1. Position the forms guide plate **A** in the frame assembly.
2. Install the four guide plate mounting screws.
3. Install the forms pressure roll shaft ("Forms Pressure Roll Shaft" on page 300-26).

   Note: Ensure that the Pressure roll shaft springs are positioned correctly.
4. Install the frame assembly (MIM "Frame Assembly" on page 300-29).
5. Install the print mechanism (MIM "Print Mechanism (Removal)" on page 300-50).
6. Connect the power cord to the back of the printer.

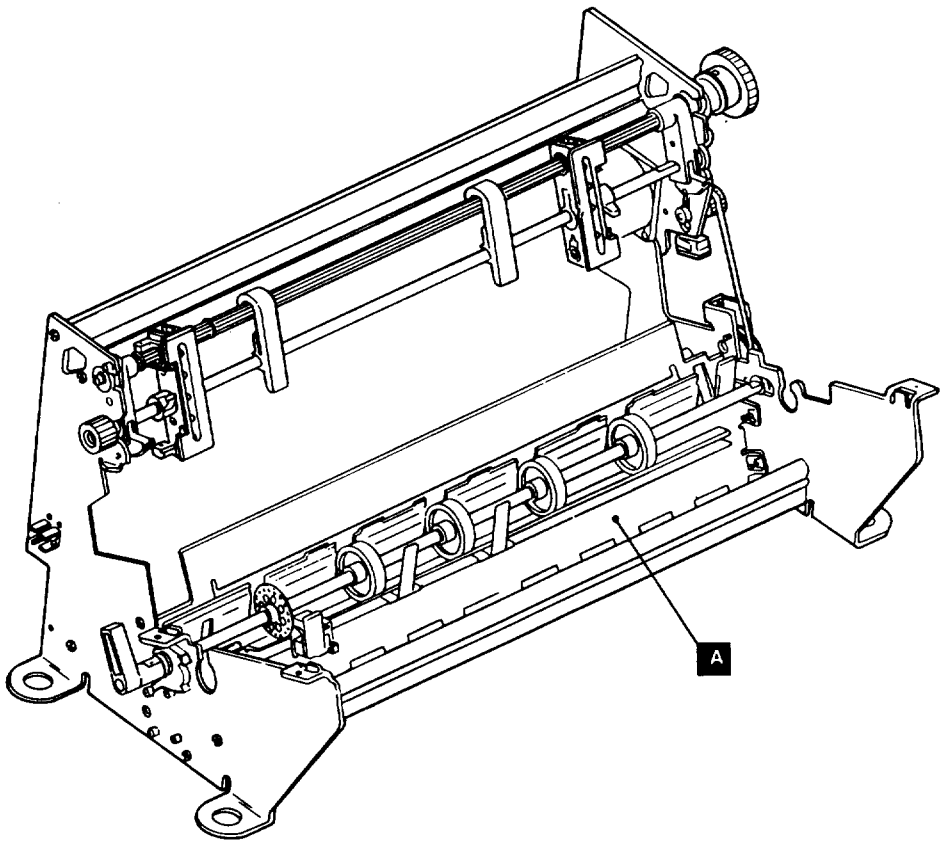


Figure 27. Front Forms Guide Plate

Forms Drive Motor

See Figure 28.

Removal

1. Set the printer power switch to O (Off).
2. Remove forms from the printer.
3. Remove the top cover (MIM "Top Cover" on page 300-3).
4. Remove the power cover (MIM "Power Cover" on page 300-4).
5. Remove the forms drive safety cover (MIM "Transport Assembly, Part 1" on page 800-5) from the right side of printer.
6. Disconnect the forms motor cable connector.
7. Remove the autoload and forms drive belts (MIM "Autoload Clutch and Forms Drive Belts" on page 300-28).
8. Loosen the setscrew on motor pulley **A**, and slide the pulley from the motor shaft.
9. Remove the forms motor mounting screws **B**, and remove the motor.

Installation

1. Install the motor on the side-frame with the screws **B** (do not tighten).
2. Install motor pulley **A** onto the motor shaft.
3. Tighten the setscrew on the motor pulley.
4. Connect the motor cable connector.
5. Install and adjust the autoload clutch and forms drive belts (MIM "Autoload Clutch and Forms Drive Belts" on page 300-28).
6. Turn the forms knob several times; then check the belt tension. Adjust if necessary.
7. 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.
8. Install the forms drive safety cover.
9. Install the power cover (MIM "Power Cover" on page 300-4).
10. Install the top cover (MIM "Top Cover" on page 300-3).

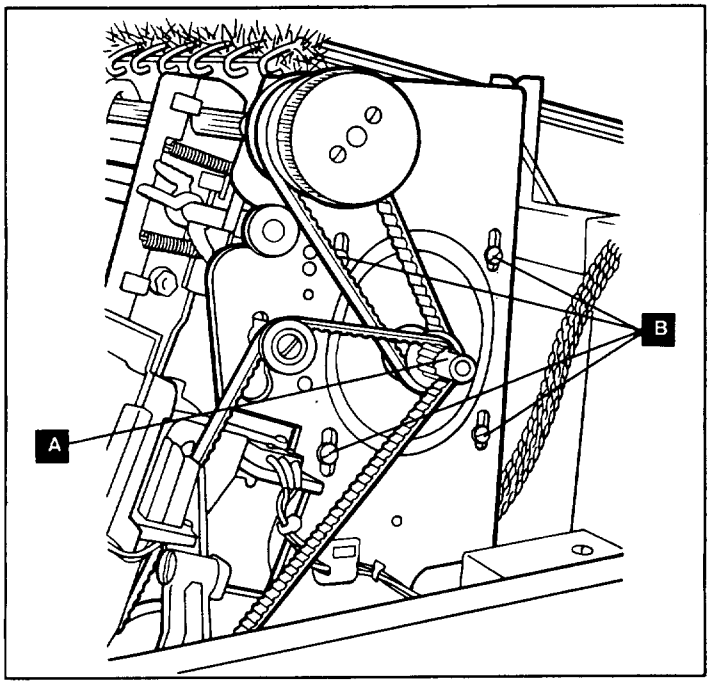


Figure 28. Forms Drive Motor

EOF Sensor

See Figure 29.

Removal

1. Set the printer power switch to O (Off).
2. Place the print mechanism in the service position (MIM "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.

Installation

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 (MIM "Print Mechanism (Service Position)" on page 300-48).
4. Set the power switch to | (On), and test the printer.

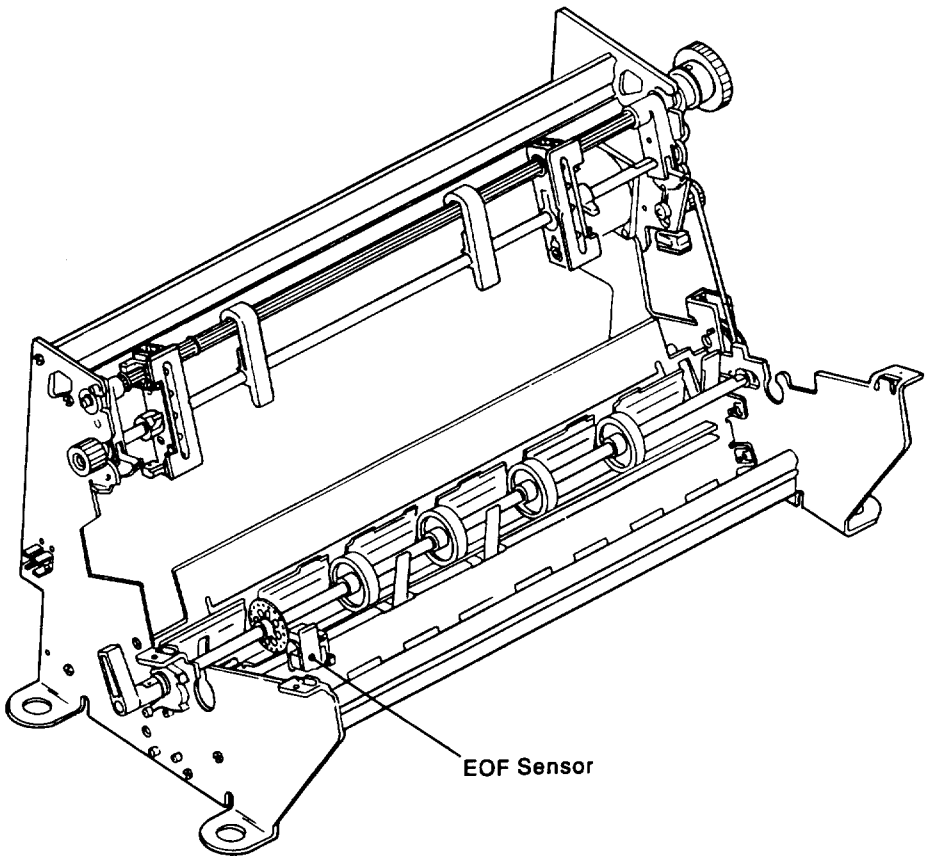


Figure 29. EOF Sensor

Jam Sensor

See Figure 30.

Removal

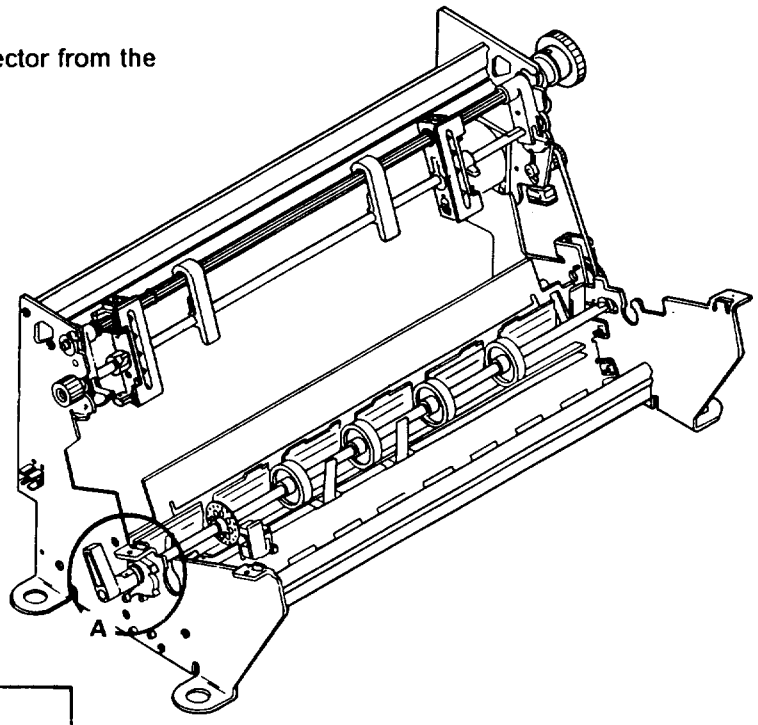
1. Set the printer power switch to O (Off).
2. Place the print mechanism in the service position (MIM "Print Mechanism (Service Position)" on page 300-48).
3. Remove the JAM sensor by pushing down on the sensor (not the housing).

   Note: The sensor snaps in and out of the housing. To remove the housing, loosen the mounting setscrew and remove it from the front guide plate.
4. Disconnect the cable connector from the sensor assembly.

Installation

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 (MIM "Print Mechanism (Service Position)" on page 300-48).
5. Set the printer power switch to | (On), and test the printer.



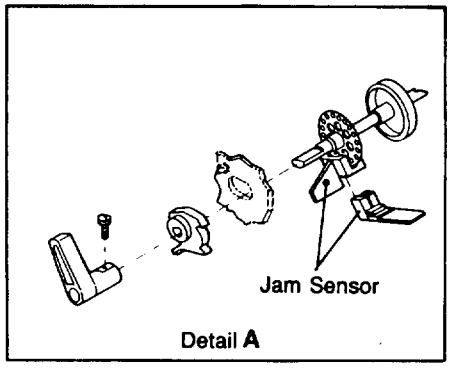


Figure 30. Jam Sensor

Upper Forms Guide

See Figure 31.

Removal

1. Set the printer power switch to O (Off).
2. Remove the top cover (MIM "Top Cover" on page 300-3).
3. Remove the forms guide mounting screws A.
4. Remove the guide.

Installation

1. Install the guide on the top cover with screws A.
2. Ensure that the support B on the rear of the guide is flush with the rear edge C of the top cover.
3. Install the top cover on the printer
4. Check for correct clearance D, and for any obstructions between the forms guides that are attached to the top and power covers.

Note: If the clearance is not correct, replace the upper forms guide. It may be necessary to replace both guides.

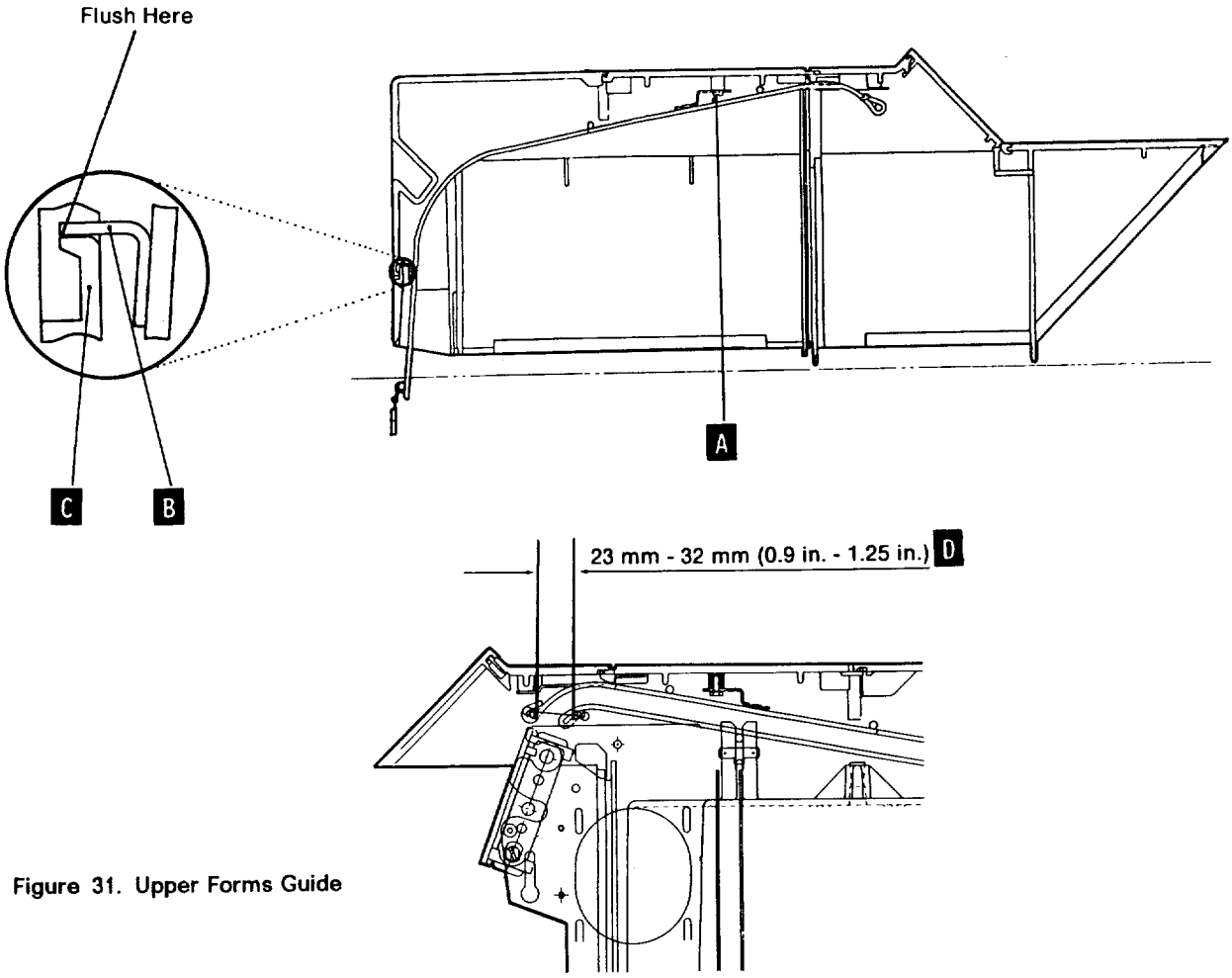


Figure 31. Upper Forms Guide

Forms Feeding Service Check

See Figure 32 on page 300-37.

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. Visually check the condition of the autoload clutch belt belt **H** (missing teeth, frayed or stretched belt) and the belt tension adjustment (MIM "Autoload Clutch and Forms Drive Belts" on page 300-28).
4. With the forms thickness lever **B** toward the front of the printer (platen closed), power on, and let the printer to complete the POST. The printer should detect an "end of forms" condition and the status code should be 01.
5. 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.
6. Insert the forms up into the forms chute to start the autoload operation. Ensure that 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 the forms path below the 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 is correct (MIM "Platen Switch" on page 300-58).

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 (MIM "Autoload Clutch and Forms Drive Belts" on page 300-28).
2. That the forms motor pulley and the forms knob and pulley **A** are tight and aligned correctly (see Figure 28 on page 300-32).
3. The forms pressure rolls and feed rolls for wear and alignment. Check 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. That the teeth on the autoload clutch coupling **G** engage with the teeth on the drive rotor ratchet. Also see "Print Mechanism Setscrew Adjustment" on page 300-52.
5. That 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 rotors should be turning at this time.

Forms Feeding Service Check (Continued)

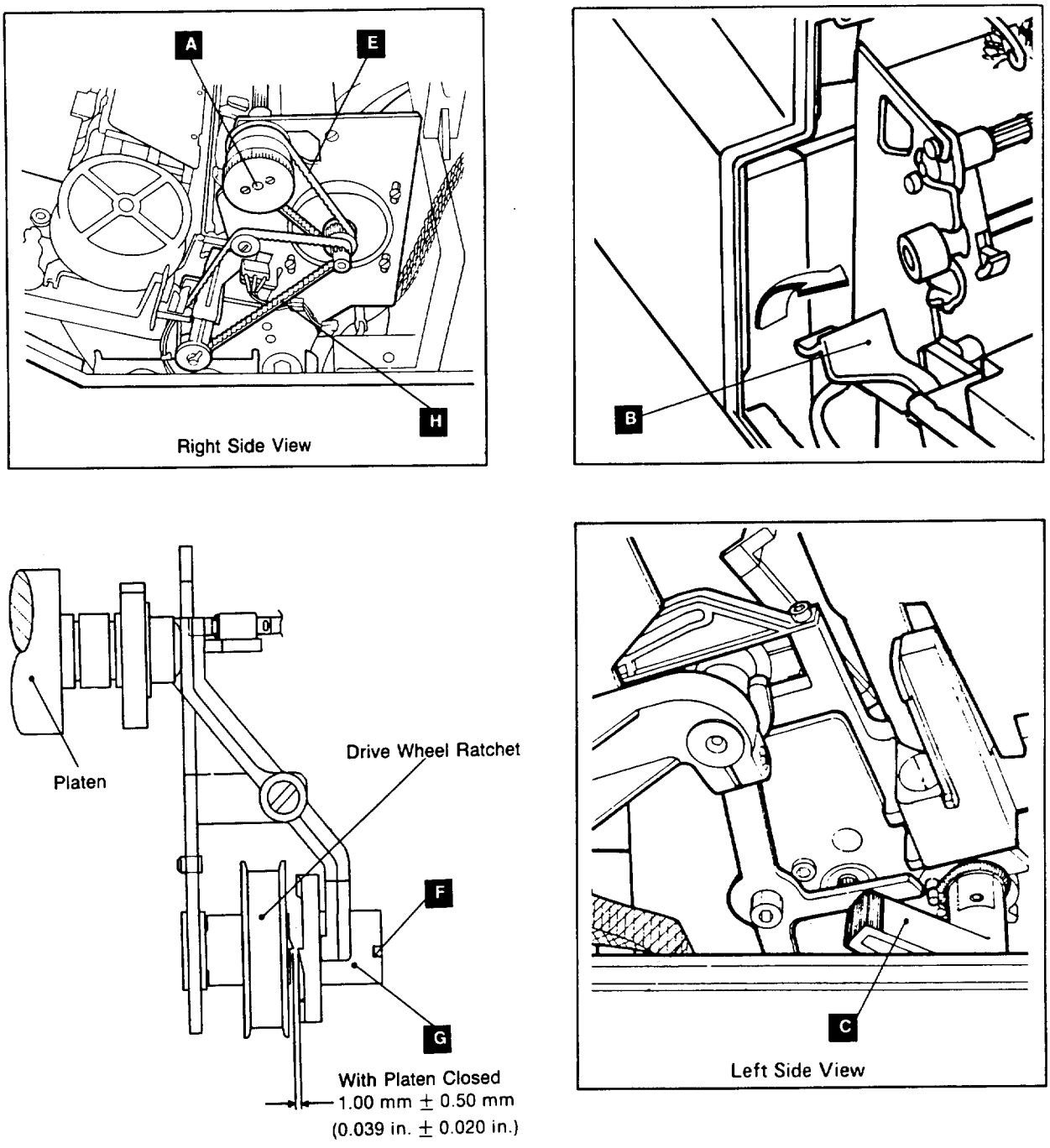


Figure 32. Forms Feeding Service Check - Autoload Assembly

Forms Feeding Service Check (Continued)

See Figure 33.

Tractor Assembly

For torn forms, misled forms, or forms jams (SC=02 or 32), 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 correctly 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 correctly adjusted.
4. Check that the forms are stacking correctly behind the printer. Forms that do not stack correctly 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 correctly 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 place by spring tension and that the forms are held firmly against the tractor guides.
7. Check for correct clearance (MIM "Upper Forms Guide" on page 300-35) and for any obstructions between the forms guides that are attached to the top and power covers.
8. Ensure that the tinsel is installed correctly.
9. Ensure that the power cover is in the groove and that all four mounting screws are tightened.
10. Check the form drive rolls and the form pressure rolls for alignment and wear.
11. Check to see if the autoload drive rotor has disengaged from the coupling when the forms thickness lever is moved forward (MIM "Print Mechanism Setscrew Adjustment" on page 300-52).
12. If the above checks are OK, check the platen to hammer gap adjustment (MIM "Platen Assembly Adjustments" on page 300-56).

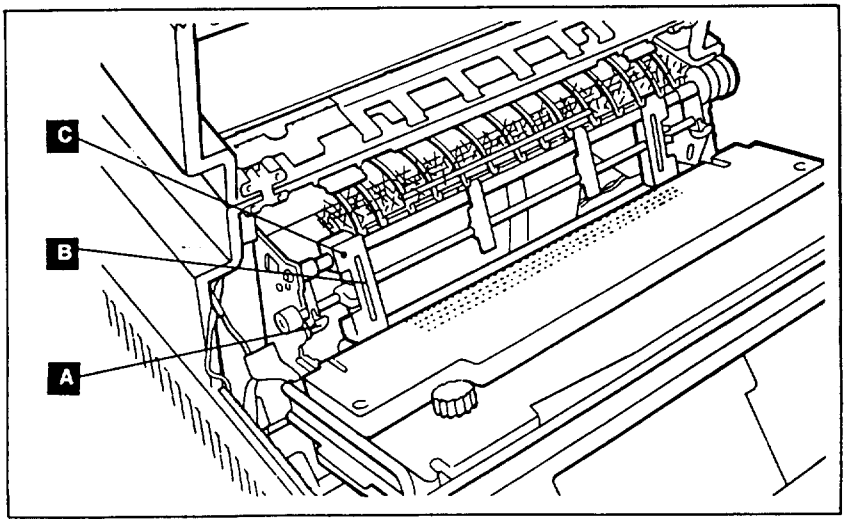


Figure 33. Forms Feed and Tractor Assembly

Forms Feeding Service Check (Continued)

Stacker Assembly

See Figure 34.

Forms that do not stack correctly can back up and jam in the forms guides. Check the following:

1. Check that the tinsel is in place and installed correctly.
2. Check for proper stacker adjustment for the length and width forms you are using. See the *IBM 4234 Printer Operating Instructions*.
3. Check that the forms guide on the power cover and on the top cover are correctly positioned and that there are no obstructions to the forms path in this area.
4. Check that the static ground wire is connected to the stacker tray and that the static eliminator is in place and does not obstruct the forms path.

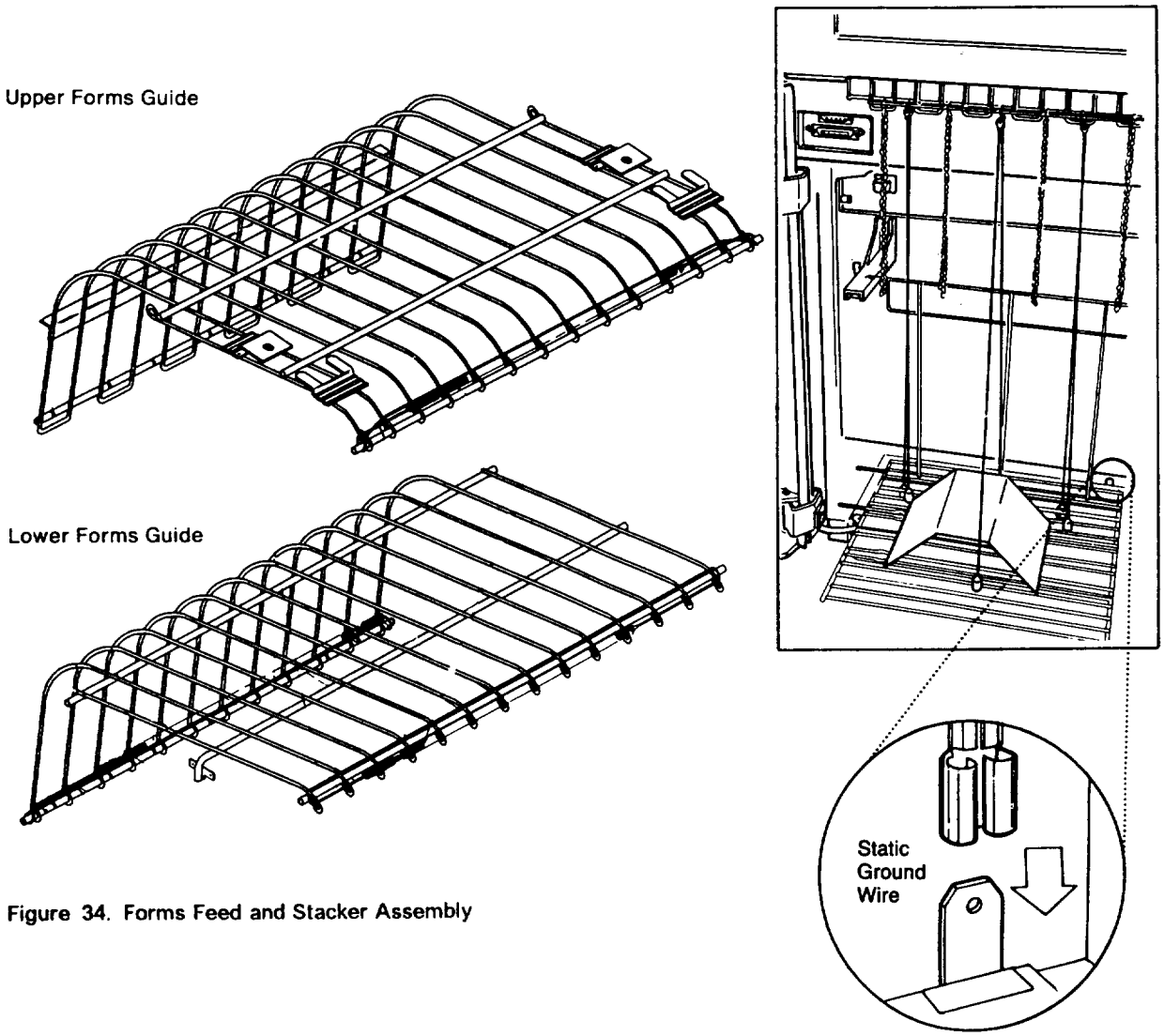


Figure 34. Forms Feed and Stacker Assembly

340 Ribbon Drive

Ribbon Drive Theory of Operation

The ribbon cartridge (see Figure 35) 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. The band motor controls the ribbon movement.

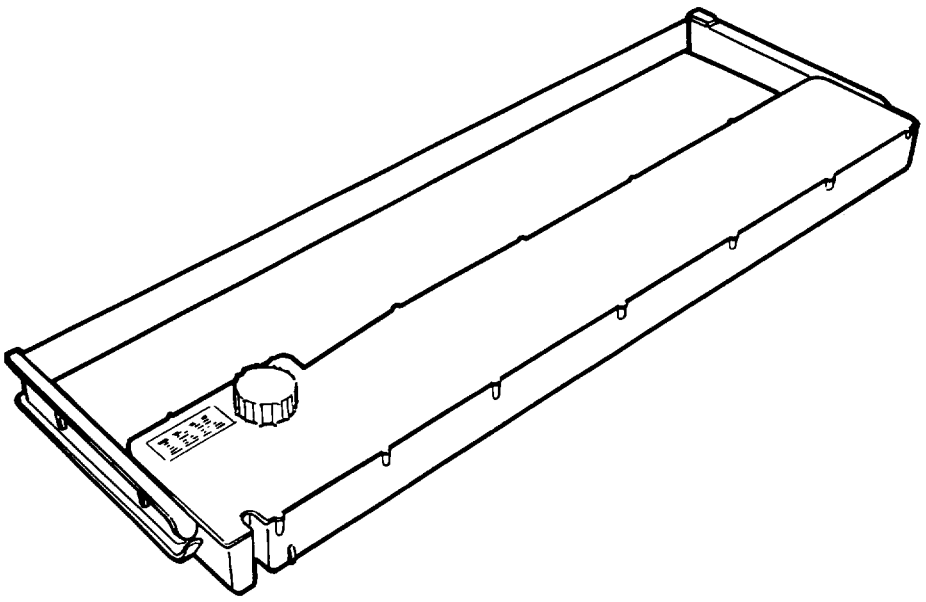


Figure 35. Ribbon Cartridge

Ribbon Cartridge

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

See Figure 36.

Removal

1. If the power switch is set to | (On), press the **Hold Print** or **Stop** key.
2. Open the top access 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.

Installation

1. Rotate the ribbon knob counterclockwise to remove any slack in the ribbon.
2. Align the inside edge of the ribbon cartridge with the notched edge on the dot band cover to fit into the printer.
3. Press down on the ribbon cartridge and turn the ribbon knob counterclockwise until the cartridge snaps into place.
4. Pull the two ribbon cartridge arms **D** out and down over their locking slots. The ribbon arms latch in place at different heights.
5. Ensure that the ribbon lies between the dot band and the paper shield and passes through the slot in the ribbon sensor.
6. Rotate the ribbon knob counterclockwise to remove any slack in the ribbon.
7. Pull the paper shield **C** forward until it snaps in place.
8. Pull the forms feed assembly **B** toward the front of the printer until it latches in place.
9. Move the forms thickness lever **A** toward the front of the printer.
10. Close the front access cover.
11. Press the **Enable Print** or **Start** key and test the printer.

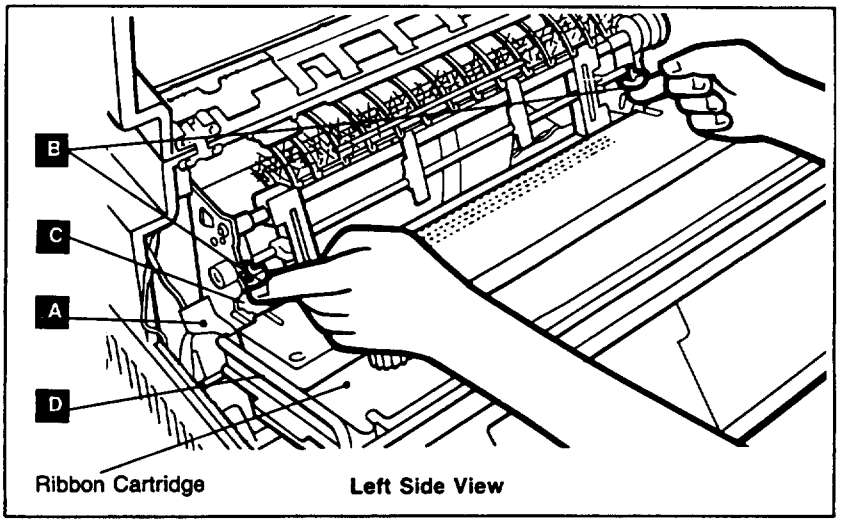


Figure 36. Ribbon Cartridge Removal

Ribbon Drive Belt

See Figure 37.

Removal

1. Set the printer power switch to O (Off) and disconnect the power cord from the electrical outlet.
2. Place the print mechanism in the service position (MIM "Print Mechanism (Service Position)" on page 300-48).
3. Loosen the ribbon drive idler assembly mounting screws A and remove the drive belt.

Installation

1. Install the drive belt.
2. Ensure that the idler screws A are loose; apply two pounds of pressure to the lever of the assembly and tighten the screws. (The ribbon drive shaft should turn smoothly in one direction without the ribbon installed.)
3. Install the print mechanism (MIM "Print Mechanism (Service Position)" on page 300-48).

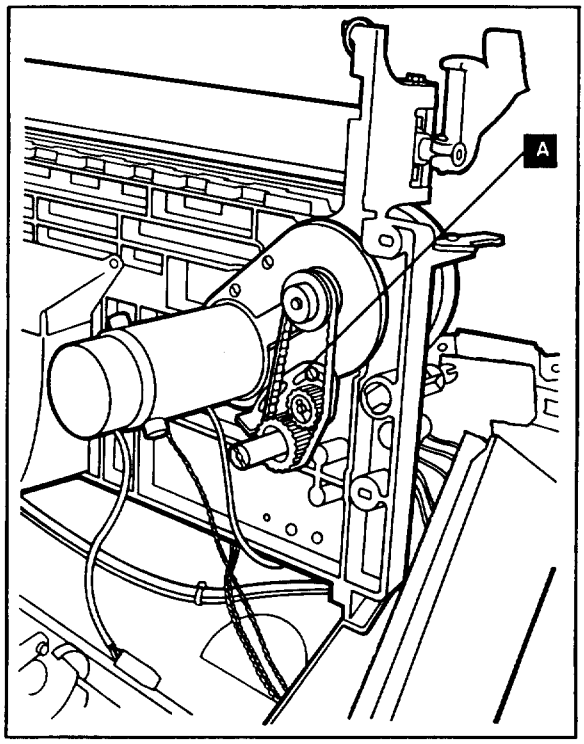


Figure 37. Ribbon Drive Belt

Ribbon Drive Shaft

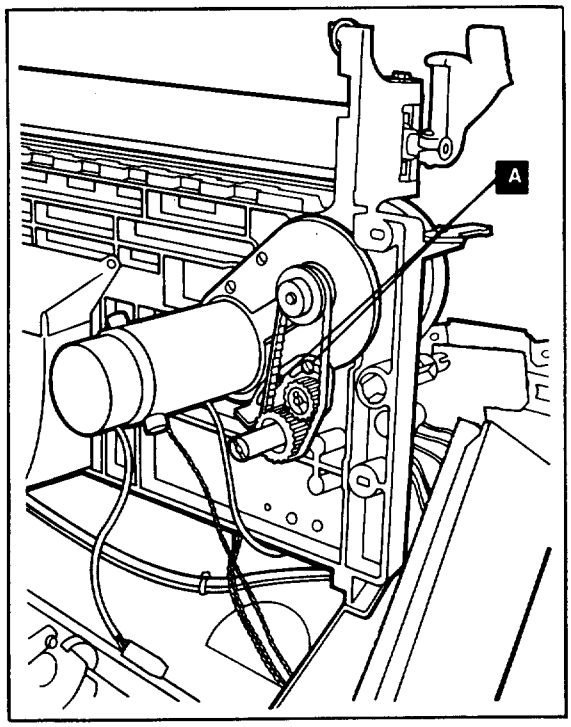
See Figure 38.

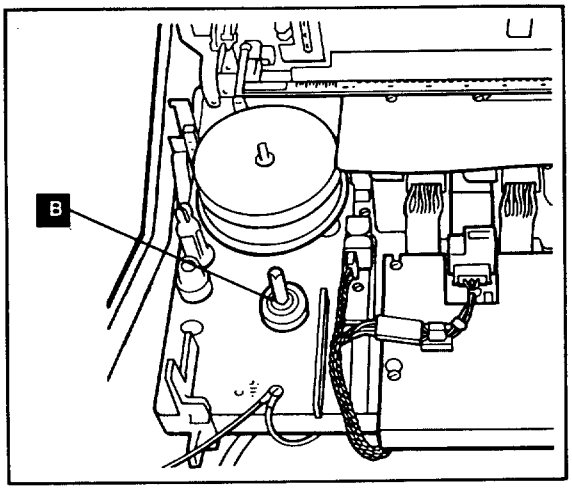
Removal

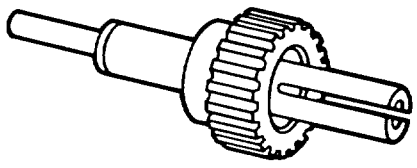
1. Set the printer power switch to O (Off) and disconnect the power cord from the electrical outlet.
2. Place the print mechanism in the service position (MIM "Print Mechanism (Service Position)" on page 300-48).
3. Loosen the ribbon drive idler assembly mounting screws **A** and remove the drive belt.
4. Remove the drive shaft C-clip **B** and remove the shaft and pulley.

Installation

1. Install the drive shaft and pulley onto the print casting and secure it with the C-clip **B**.
2. Install the drive belt.
3. Ensure that the idler screws **A** are loose; apply 570 grams (1.25 pounds) of pressure to the lever of the assembly and tighten the screws. (The ribbon drive shaft should turn smoothly in one direction without the ribbon installed.)
4. Install the print mechanism (MIM "Print Mechanism (Service Position)" on page 300-48).







Shaft Assembly

Figure 38. Ribbon Drive Shaft Assembly

Ribbon Weld Sensor

See Figure 39.

Removal

1. Set the printer power switch to O (Off) and disconnect the power cord from the electrical outlet.
2. Remove the ribbon cartridge (MIM "Ribbon Cartridge" on page 300-41).
3. Remove the forms drive safety cover ("Transport Assembly, Part 1" on page 800-5).
4. Disconnect the ribbon weld sensor cable **A**.
5. Remove the two sensor mounting screws **B**.
6. Remove the sensor from the casting.

Installation

1. Install the sensor onto the casting with the two mounting screws.
2. Connect the ribbon weld sensor cable **A**.
3. Install the forms drive safety cover ("Transport Assembly, Part 1" on page 800-5).
4. Install the ribbon cartridge (MIM "Ribbon Cartridge" on page 300-41).
5. Set the printer power switch to | (On) and connect the power cord to the electrical outlet.

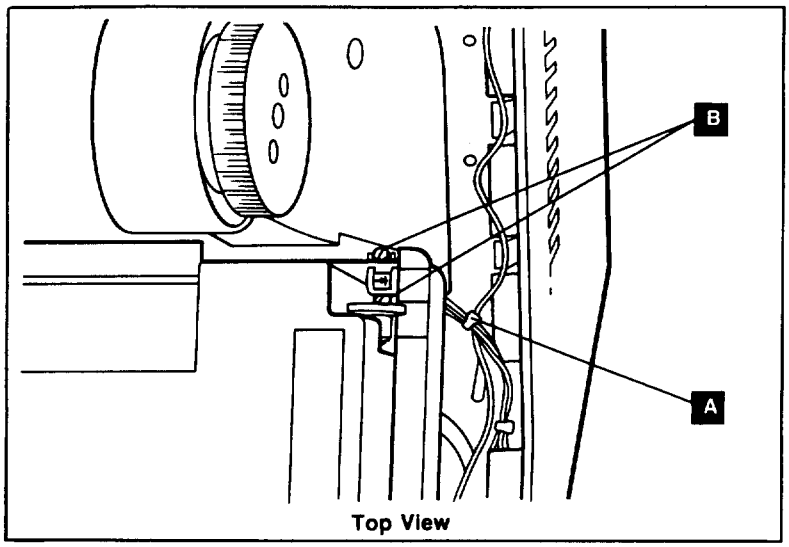


Figure 39. Ribbon Weld Sensor

Ribbon Service Check

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

See Figure 40.

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 drive shaft.
3. Check the condition of the ribbon for wear and the cartridge arms for proper position. Turn the ribbon knob counterclockwise 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 POST completes:

2. Disconnect the signal cable.
3. 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.
4. Ensure that the band cover shield is installed correctly and not damaged.
5. 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.

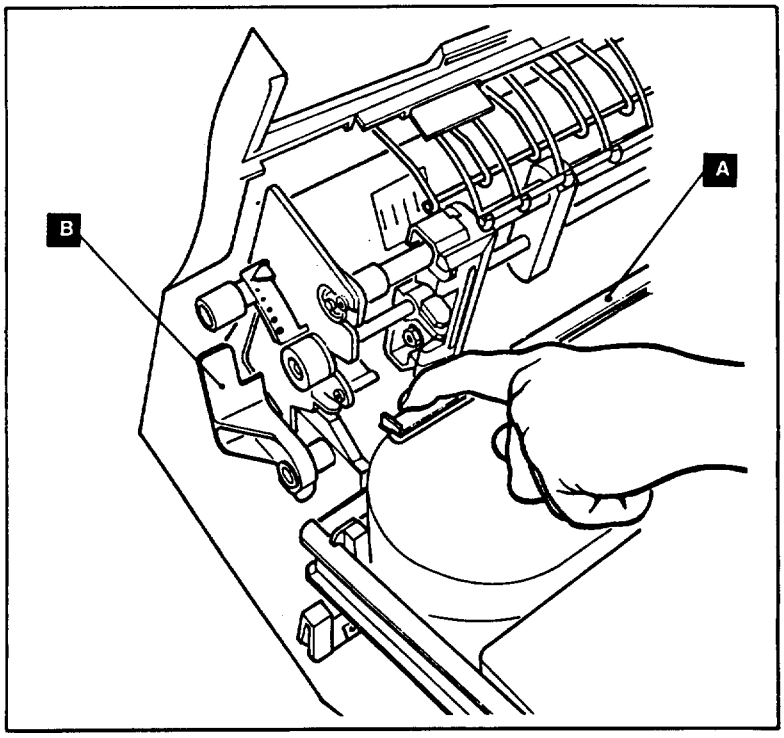


Figure 40. Ribbon Service Check

350 Print Quality

Paper Shield

See Figure 41.

Removal

1. Remove all forms from the printer.
2. Set the printer power switch to O (Off).
3. Remove the top cover (MIM "Top Cover" on page 300-3).
4. Remove the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
5. Place the print mechanism in the service position (MIM "Print Mechanism (Service Position)" on page 300-48).
6. Ensure that the forms thickness lever is in the open position.
7. Remove the paper shield spacer **A**.
8. Slide the paper shield **B** to the right and remove it.

Installation

1. Install the paper shield **B** and slide it to the left.
2. Install the paper shield spacer **A**.
3. Install the print mechanism (MIM "Print Mechanism (Service Position)" on page 300-48).
4. Install the power cover (MIM "Power Cover" on page 300-4).
5. Install the top cover (MIM "Top Cover" on page 300-3).
6. Install the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
7. Install the ribbon cartridge (MIM "Ribbon Cartridge" on page 300-41).
8. Pivot the tractor assembly to the operating position.

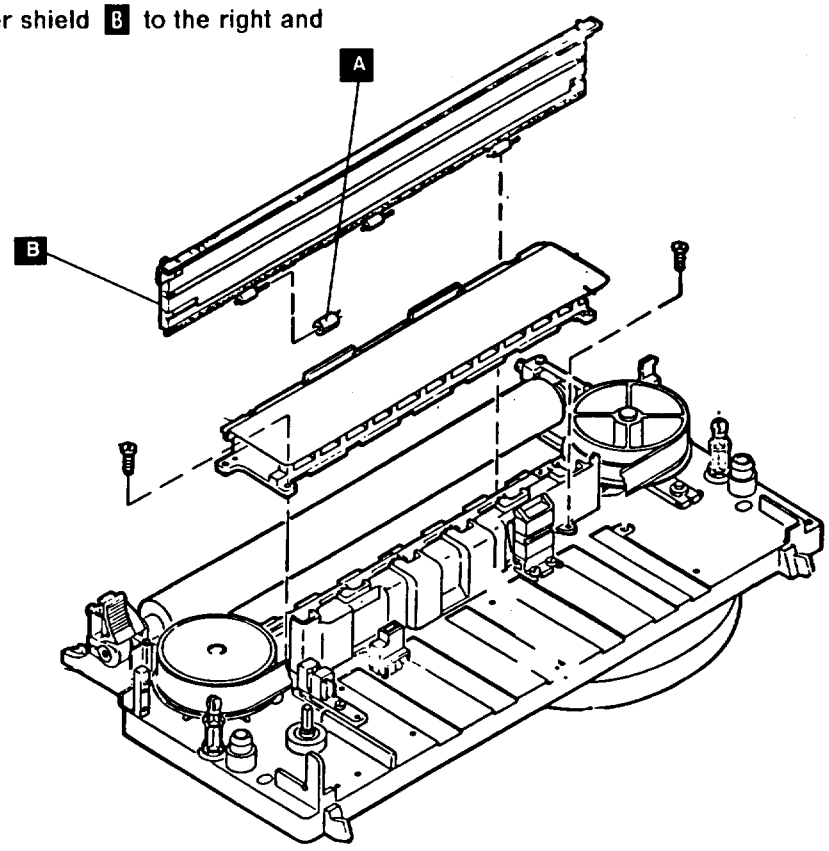


Figure 41. Paper Shield

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Print Mechanism (Service Position)

See Figure 42 on page 300-49.

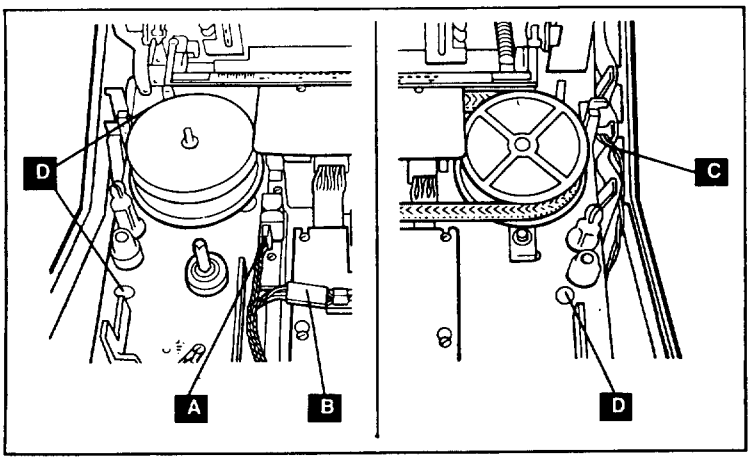
Removal

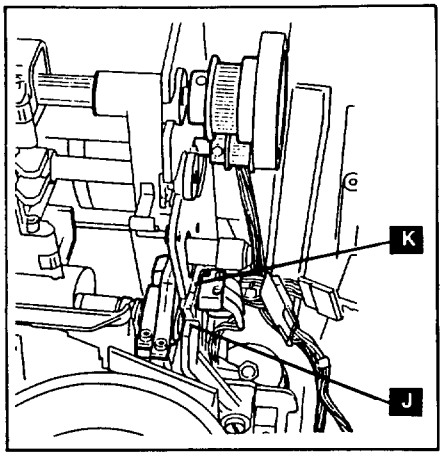
1. Set the printer power switch to O (Off).
2. Remove the ribbon cartridge (MIM "Ribbon Cartridge" on page 300-41).
3. Remove the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
4. Remove the operator panel (MIM "Operator Panel" on page 500-4).
5. Remove the operator panel support plate (MIM "Operator Panel Support Plate" on page 500-7).
6. Remove the forms drive safety cover (MIM "Transport Assembly, Part 1" on page 800-5).
7. Disconnect the BAND and COVR switch cable connectors A and B.
8. Disconnect the ribbon sensor cable connector C.
9. Remove the three print mechanism mounting screws D.
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 G of the side plates.

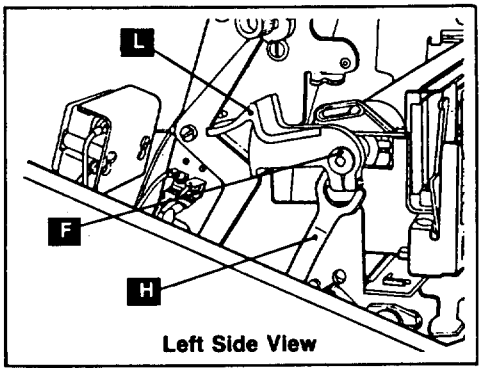
Installation

1. To install the print mechanism, lift the casting so that the projections E clear the holes G 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 F with the platen yoke H 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 D. Ensure that the print mechanism casting touches the setscrew (MIM "Print Mechanism Setscrew Adjustment" on page 300-52).
6. Check the print mechanism setscrew adjustment (MIM "Print Mechanism Setscrew Adjustment" on page 300-52).

   Note: Ensure that the platen switch operates correctly after the print mechanism has been installed.
7. Move the forms thickness lever as you observe the platen switch.
   - With the forms thickness lever L 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 (MIM "Platen Switch" on page 300-58).
9. Connect the ribbon sensor cable connector C.
10. Install the forms drive safety cover (MIM "Transport Assembly, Part 1" on page 800-5).
11. Connect the BAND and COV sensor cable connectors A and B.
12. Install the operator panel support plate (MIM "Operator Panel Support Plate" on page 500-7).
13. Install the operator panel (MIM "Operator Panel" on page 500-4).
14. Install the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
15. Install the ribbon cartridge (MIM "Ribbon Cartridge" on page 300-41).
16. Set the printer power switch to | (On), and test the printer.







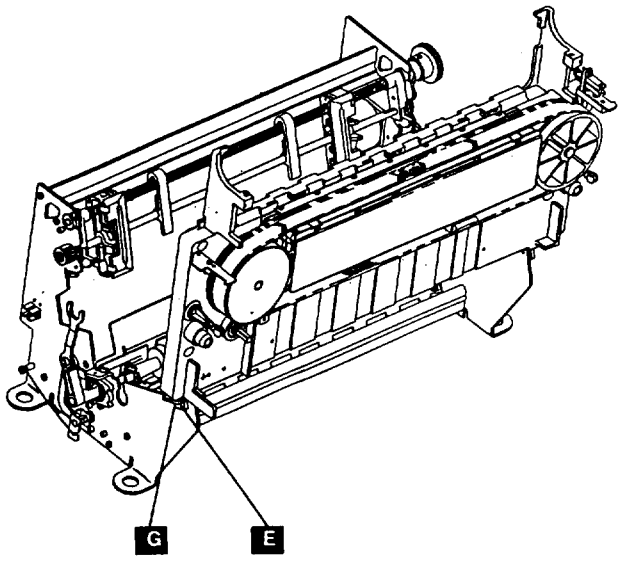


Figure 42. Print Mechanism Service Position

Print Mechanism (Removal)

See Figure 43 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 electrical outlet.
3. Remove the ribbon cartridge (MIM "Ribbon Cartridge" on page 300-41).
4. Remove the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
5. Remove the operator panel support plate (MIM "Operator Panel Support Plate" on page 500-7).
6. Remove the forms drive safety cover (MIM "Transport Assembly, Part 1" on page 800-5).
7. Disconnect the BAND and COVR switch cable connectors A and B.
8. Remove the metal plate P over the hammer cables.
9. Disconnect the six hammer connectors and put the cables over the front edge of the printer.
10. Remove all ground wires attached to the print casting.
11. Disconnect the ribbon sensor cable connector C.
12. Remove the three print mechanism mounting screws D.
13. 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.
14. Continue to lift and turn the platen end of the print mechanism toward you 90 degrees until the platen is pointing up.
15. Place the two projections E of the casting into the holes G of the side plates.
16. Disconnect the blower cable connector (M1) H.
17. Disconnect the encoder cable connector R and the band drive motor connector S.
18. Lift the print mechanism from the printer.

Installation

1. Place the two projections E of the casting into the holes G of the side plates.
2. Connect the blower cable connector (M1) H.
3. Connect the encoder cable connector R and the band drive motor connector S.
4. Align the platen shaft F with the platen yoke H and ensure that the autoload clutch lever J is located to the left of the platen switch lever K.
5. Insert the mechanism into the printer side plates and lower it into position on the mounting pads.
6. Move the mechanism as far to the right as possible and install the three screws D. Ensure that the print mechanism casting touches the setscrew (MIM "Print Mechanism Setscrew Adjustment" on page 300-52).
7. Check the print mechanism setscrew adjustment (MIM "Print Mechanism Setscrew Adjustment" on page 300-52).

   Note: Ensure that the platen switch operates correctly after the print mechanism has been installed.
8. Move the forms thickness lever as you observe the platen switch.
   - With the forms thickness lever L 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.
9. If necessary, adjust the platen switch (MIM "Platen Switch" on page 300-58).
10. Connect the six hammer connectors and install the metal plate P over the hammer cables.
11. Connect the ribbon sensor cable connector C.
12. Install the forms drive safety cover (MIM "Transport Assembly, Part 1" on page 800-5).
13. Connect the BAND and COV sensor cable connectors A and B.
14. Install the operator panel support plate (MIM "Operator Panel Support Plate" on page 500-7).
15. Install all grounds that were attached to the print casting.

16. Install the operator panel (MIM "Operator Panel" on page 500-4).
17. Install the dot band (MIM "Dot Band Removal and Installation" on page 300-6) and band cover.
18. Install the ribbon cartridge (MIM "Ribbon Cartridge" on page 300-41).
19. Connect the power cord to the electrical outlet.

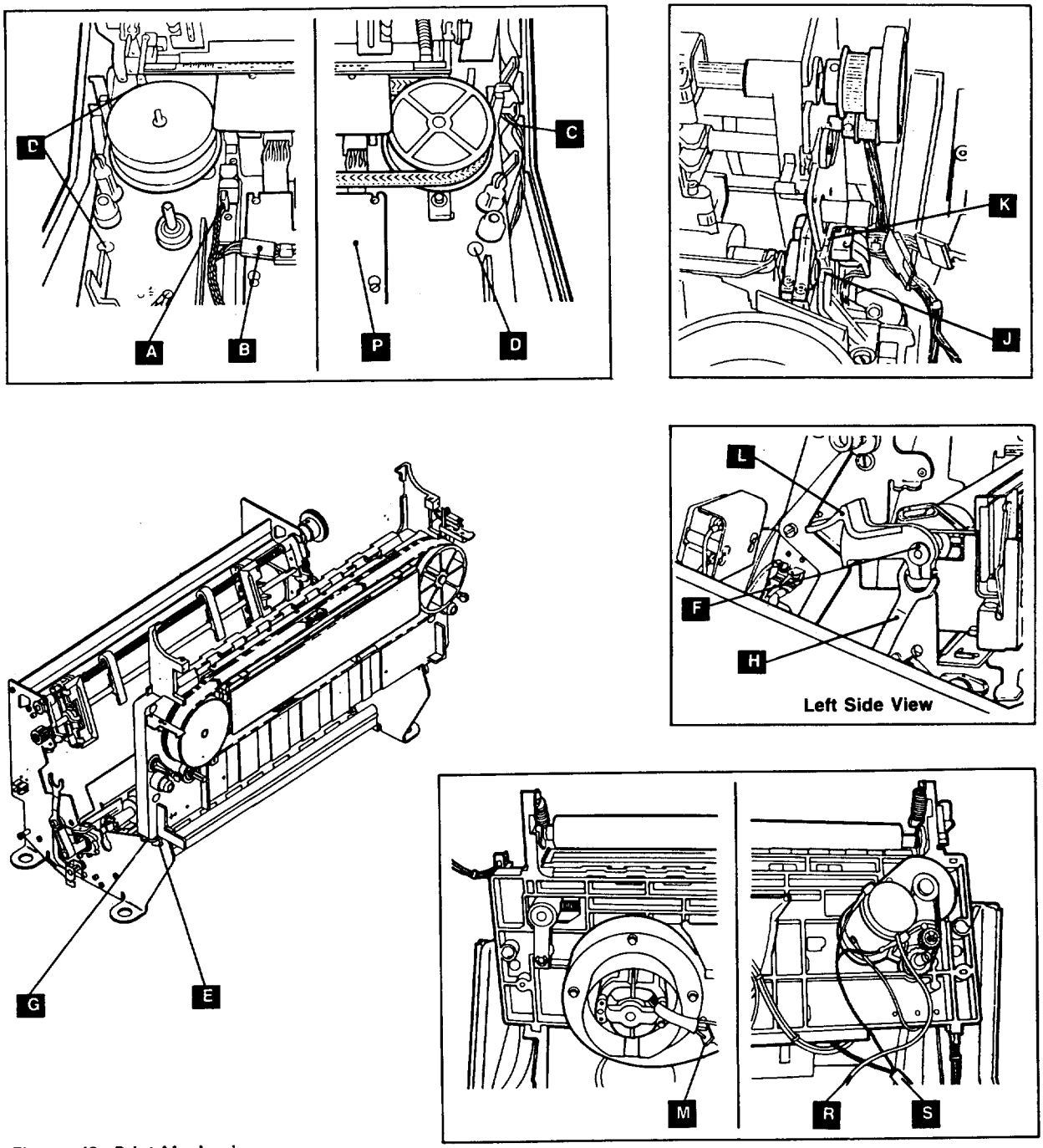


Figure 43. Print Mechanism

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[6] or an equivalent on the setscrew.

See Figure 44.

Adjustment

1. Set the printer power switch to O (Off).
2. Remove the ribbon cartridge (MIM "Ribbon Cartridge" on page 300-41).
3. Remove the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
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 1.00 mm ± 0.50 mm (0.039 in. ± 0.020 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 correct operation (MIM "Platen Switch" on page 300-58).
10. Install the forms drive safety cover.
11. Install the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
12. Install the ribbon cartridge (MIM "Ribbon Cartridge" on page 300-41).

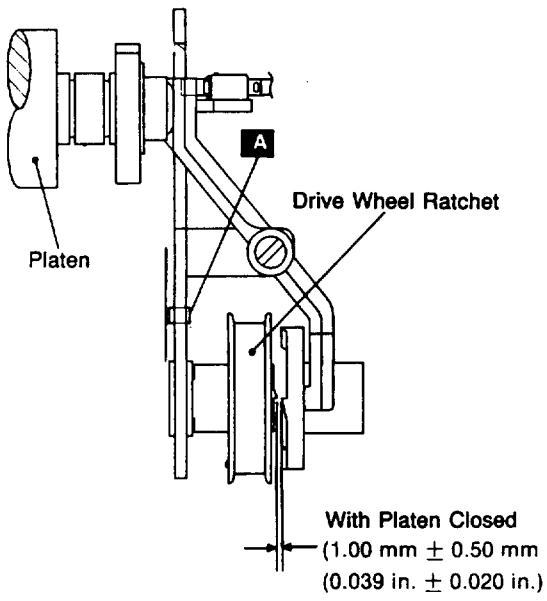


Figure 44. Print Mechanism Setscrew Adjustment

[6] Trademark of the Loctite Corp.

Platen Drag Adjustment

See Figure 45.

Adjustment

1. Ensure that the friction pad **A** and the adjusting screw **B** are free of dust, oil, grease, and other lubricants.
2. Loosen the locknut.
3. Turn screw **B** clockwise until the tip touches the friction pad, then turn the screw an additional 1/4 of a turn.
4. Tighten the locknut.
5. Record the present settings of the following printer options:
   - Print Type Quality
   - Characters per Inch (CPI)
   - Maximum Print Position (MPP).
6. Set the printer options to the following:
   - Print Type Quality - NLQ
   - Characters per Inch (CPI) - 12
   - Maximum Print Position (MPP) - 158.
7. Set the forms thickness lever to position **B**.
8. Run test 95, 700-17, using character C8. Print a full page.
9. If the forms thickness lever does not move, the adjustment is complete. If the forms thickness lever moves, turn the adjusting screw in increments of 1/8 turn (clockwise) until the lever stays at position **B** when a full page prints.

Important

Set the printer options to the settings that you recorded earlier.

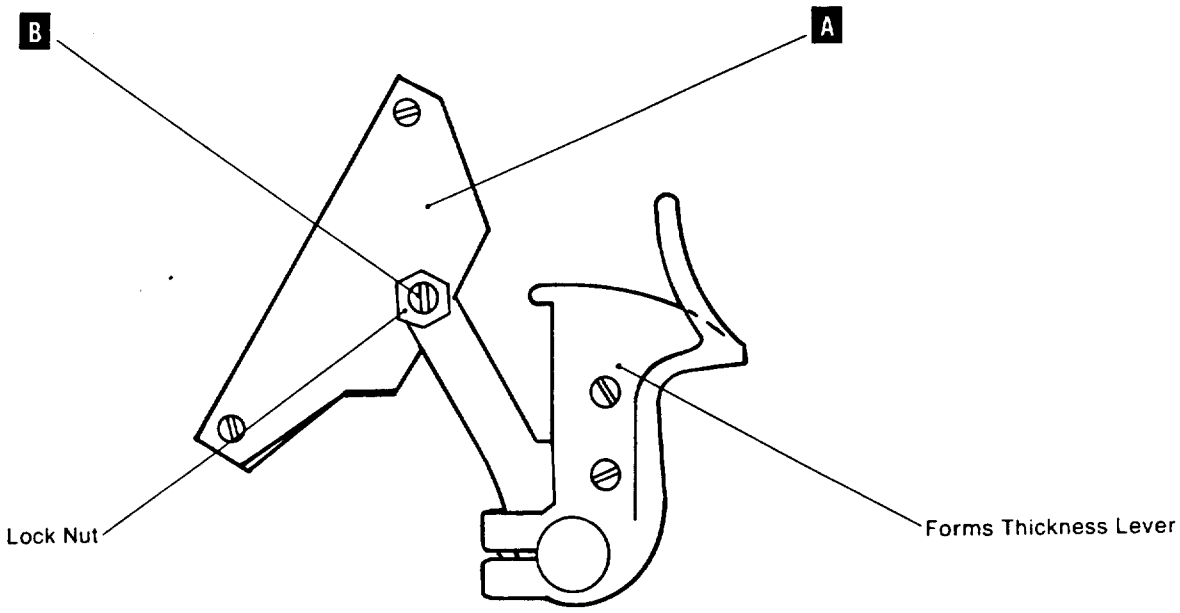


Figure 45. Platen Drag Adjustment

Platen

See Figure 46 on page 300-55.

Removal

1. Set the printer power switch to O (Off).
2. Remove the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
3. Remove the top cover (MIM "Top Cover" on page 300-3).
4. Place the forms feed assembly in the service position.
5. Remove the two platen mounting straps **E**.
6. Remove the two platen springs **B**.
7. Remove the platen **C**.

If you are replacing the platen:

a. Remove the forms thickness lever **D**.

b. Remove the bushings **A** and cams from the platen.

Installation

If you are replacing the platen:

a. Install the cams and bushings on the platen; do not tighten the cams.

b. Install the platen on the print casting. Ensure that the end of the platen fits in the yoke.

c. Rotate the platen toward the rear of the printer (counterclockwise) until the bottom of both cams touch the platen adjusting screws **G**. Tighten the cam screws **F**.

d. Rotate the platen toward the rear of the until the cam stop touches the platen adjusting screws.

e. Install the forms thickness lever on the platen.

1. Install the two platen springs **B**.
2. Install the two platen mounting straps **E**.
3. Place the forms feed assembly in the operating position.
4. Install the top cover (MIM "Top Cover" on page 300-3).
5. Install the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
6. Set the printer power switch to | (On).
7. Ensure that the forms thickness lever is adjusted so that the indicator on the side-frame aligns with the top line above the 'A' on the lever when the platen is completely closed.

Note: If you are replacing the platen, see "Platen-to-Hammer Clearance" on page 300-56.

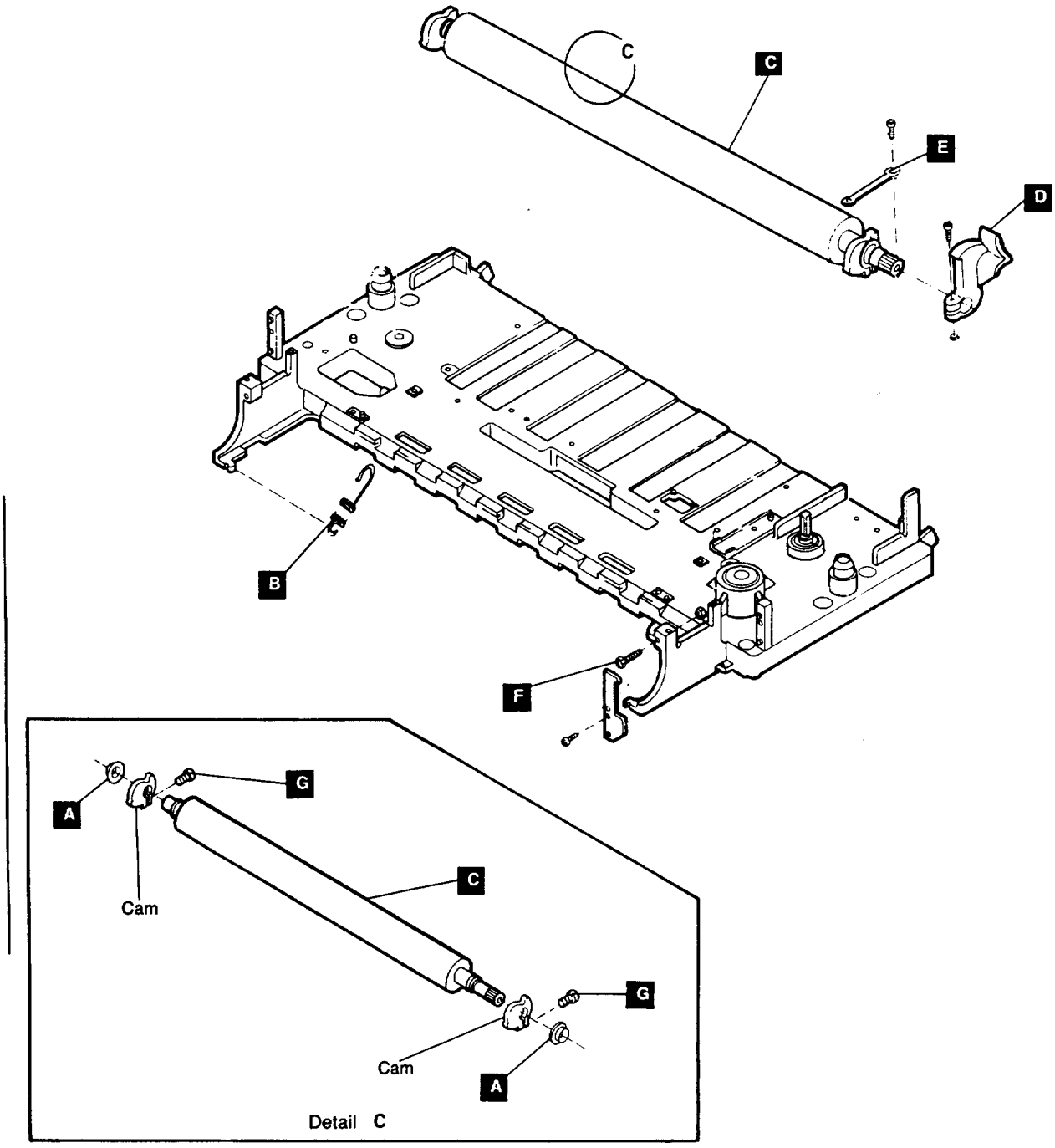


Figure 46. Platen Assembly

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 47 on page 300-57.

Platen Rotation

1. Remove all forms from the printer, and set the printer power switch to O (Off).
2. Remove the ribbon cartridge (MIM "Ribbon Cartridge" on page 300-41) and remove the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
3. Remove the top cover (MIM "Top Cover" on page 300-3).
4. Release the tractor assembly latches, and raise the assembly to the service position.
5. Move the forms thickness lever to the rear.
6. Loosen (but leave snug) the cam screws **A**.
7. Rotate the platen **B** 3.0 mm to 6.0 mm (0.118 in. to 0.236 in.) toward the rear of the printer (counterclockwise).
8. Tighten both cam screws **A**. Ensure that there is grease (IBM No. 23 grease) on the cam surfaces.
9. Move the forms thickness lever forward and loosen the lever screw **C**.
10. Ensure that the forms thickness lever is adjusted so that the indicator on the side-frame aligns with the top line above the 'A' on the lever when the platen is completely closed.
11. If necessary, do the following "Platen-to-Hammer Clearance" adjustment.

Platen-to-Hammer Clearance

1. Remove all forms from the printer, set the printer power switch to O (Off) and remove the power cord from the electrical outlet.
2. Remove the top cover (MIM "Top Cover" on page 300-3).
3. Remove the dot band, and place the print mechanism in the service position (MIM "Print Mechanism (Service Position)" on page 300-48).
4. Remove the paper shield (MIM "Paper Shield" on page 300-46).
5. Remove the upper plastic guide **J** (Clicking hammer unit only).
6. Ensure that the platen is completely closed. Check this by observing that the stop of the cam contacts the cam follower as shown at **D**.
7. Use a feeler gauge and adjust the platen for a gap of 2.18 mm $\pm$ 0.025 mm (0.086 in. $\pm$ 0.001 in.) for the Linac hammer unit or 2.25 mm $\pm$ 0.05 mm (0.089 in $\pm$ 0.002 in) for the Clicking hammer unit. Measure between the platen surface and a hammer face at both ends of the platen as shown at **E** (Linac) or **K** (Clicking). To adjust, loosen the two nuts **F** and turn the cam follower screws **G** until the gap is correct.
8. While preventing screws **G** from turning, tighten the nuts **F**.
9. Install the paper shield (MIM "Paper Shield" on page 300-46).
10. Install the print mechanism (MIM "Print Mechanism (Service Position)" on page 300-48).
11. Move the forms thickness lever forward and loosen the lever screw **C**.
12. Ensure that the forms thickness lever is adjusted so that the indicator on the side-frame aligns with the top line above the 'A' on the lever when the platen is completely closed.
13. Install the power cover (MIM "Power Cover" on page 300-4).
14. Install the top cover (MIM "Top Cover" on page 300-3).
15. Install the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
16. Install the ribbon cartridge (MIM "Ribbon Cartridge" on page 300-41).
17. Pivot the tractor assembly to the operating position.
18. Close the top cover and connect the power cord to the electrical outlet.

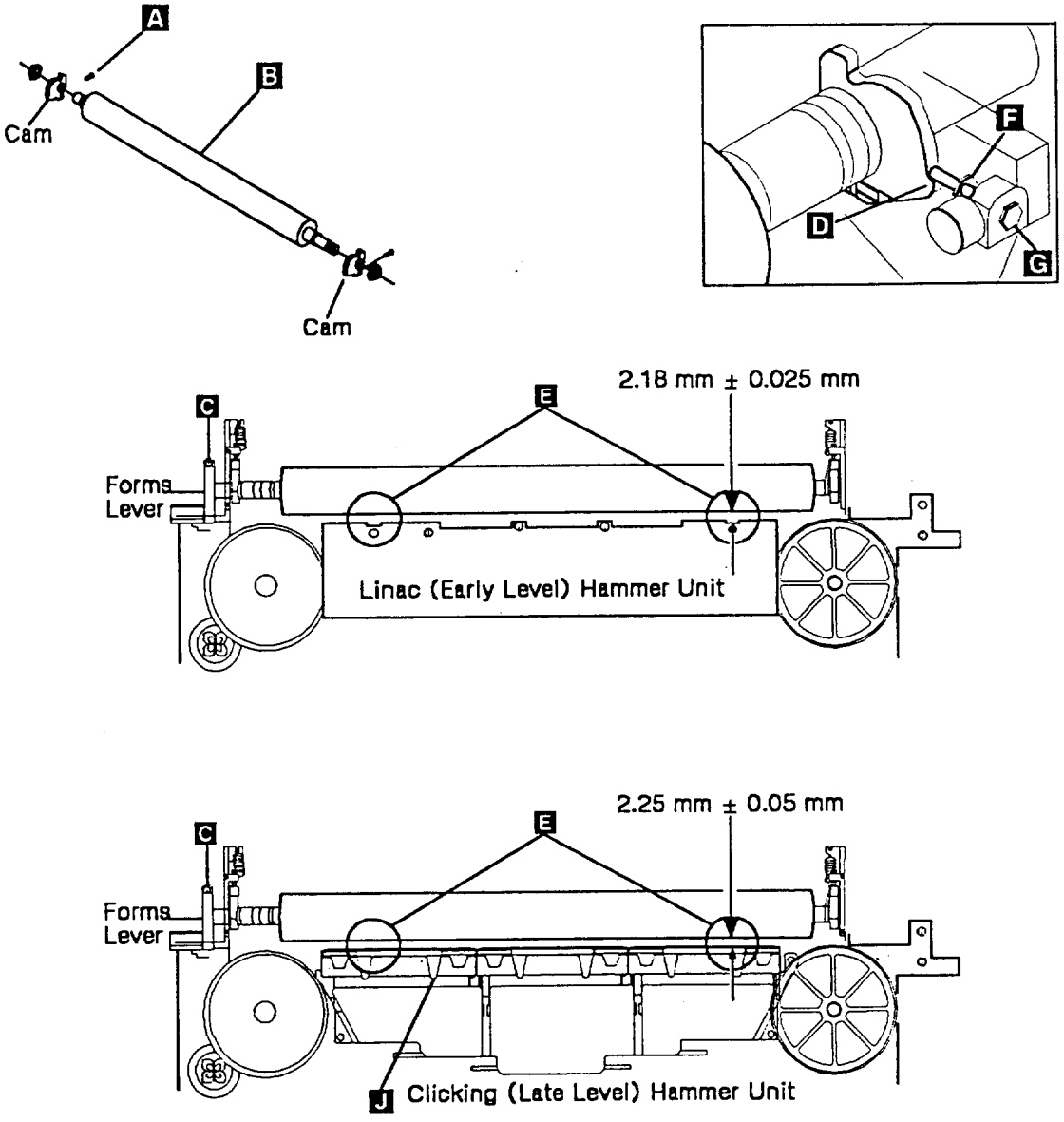


Figure 47. Platen Adjustments

Platen Switch

See Figure 48.

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 (MIM "Transport Assembly, Part 1" 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**.

Installation

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 (MIM "Transport Assembly, Part 1" 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.

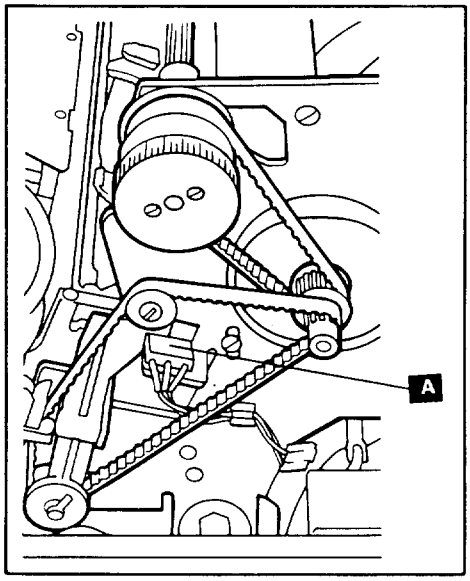


Figure 48. Platen Switch

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 continuously until the Test key is pressed. POST is activated when you press the Test key and the printer will print the Test key printout.

Follow these procedures:

1. Do the ribbon service check (MIM "Ribbon Service Check" on page 300-45) for smeared 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 (MIM "Forms Feeding Service Check" on page 300-36) when overprinting occurs on preceding or following lines or if forms jam or tear while advancing.
4. If light printing occurs:
   a. Do the ribbon service check (MIM "Ribbon Service Check" on page 300-45).
   b. If no problem is found by the ribbon service check, check the platen-to-hammer adjustment (MIM "Platen Assembly Adjustments" on page 300-56).

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 **general** 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 continuously until the Test key is pressed. POST is activated when you press the Test key and the printer will print 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
   - Generally light 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 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 MIM "Forms Feeding Service Check" on page 300-36 and "Band Drive Service Check" on page 300-18 if necessary.

Print Registration Checks

Vertical registration problems can be caused by:

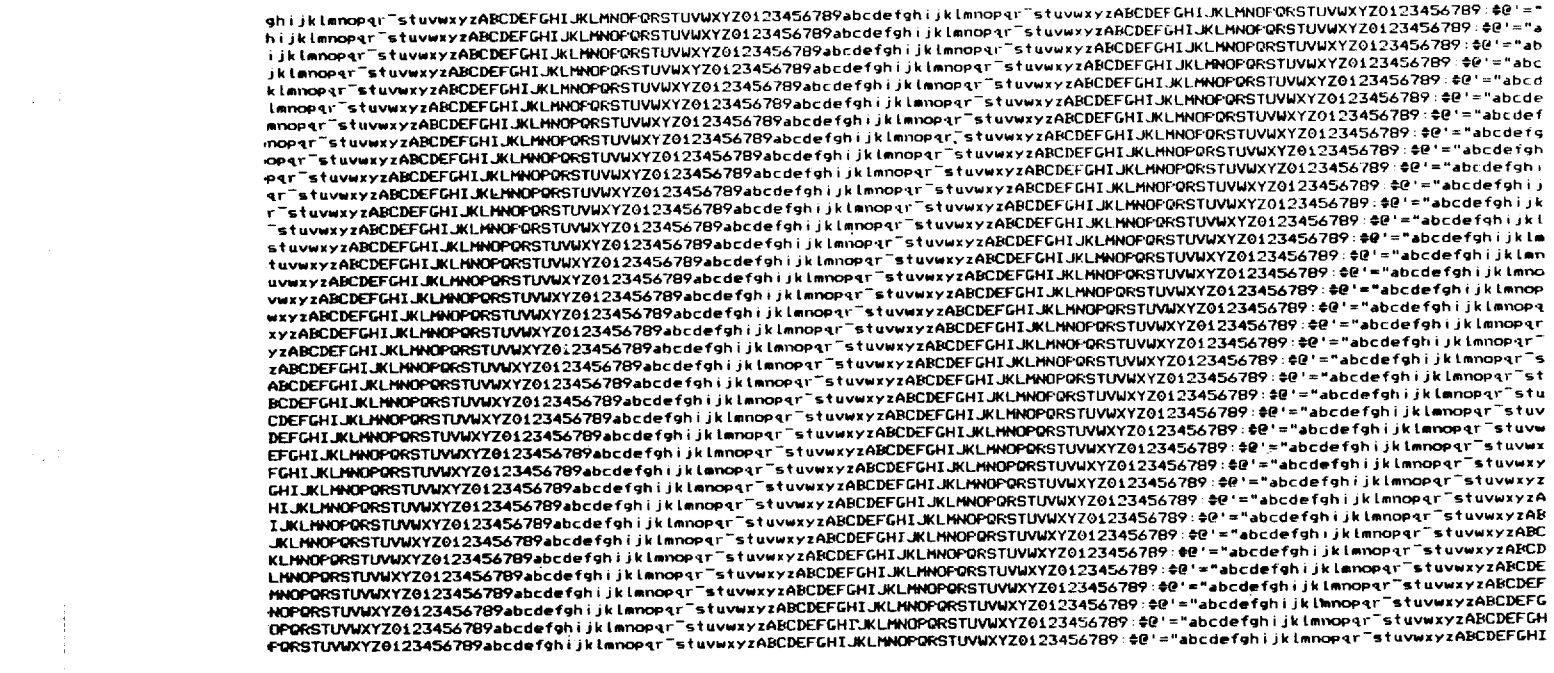
- Forms motor driver card
- Damaged or binding drive or idler wheel
- Drive or idler wheel not rotating freely
- Loose or damaged forms drive belt
- Forms motor
- Bent chevron on the dot band
- Dot band not tracking correctly
- Loose tractor belts or worn tractor pins on the forms feed assembly
- Worn forms drive roll shaft
- Pressure roll shaft not engaging completely.

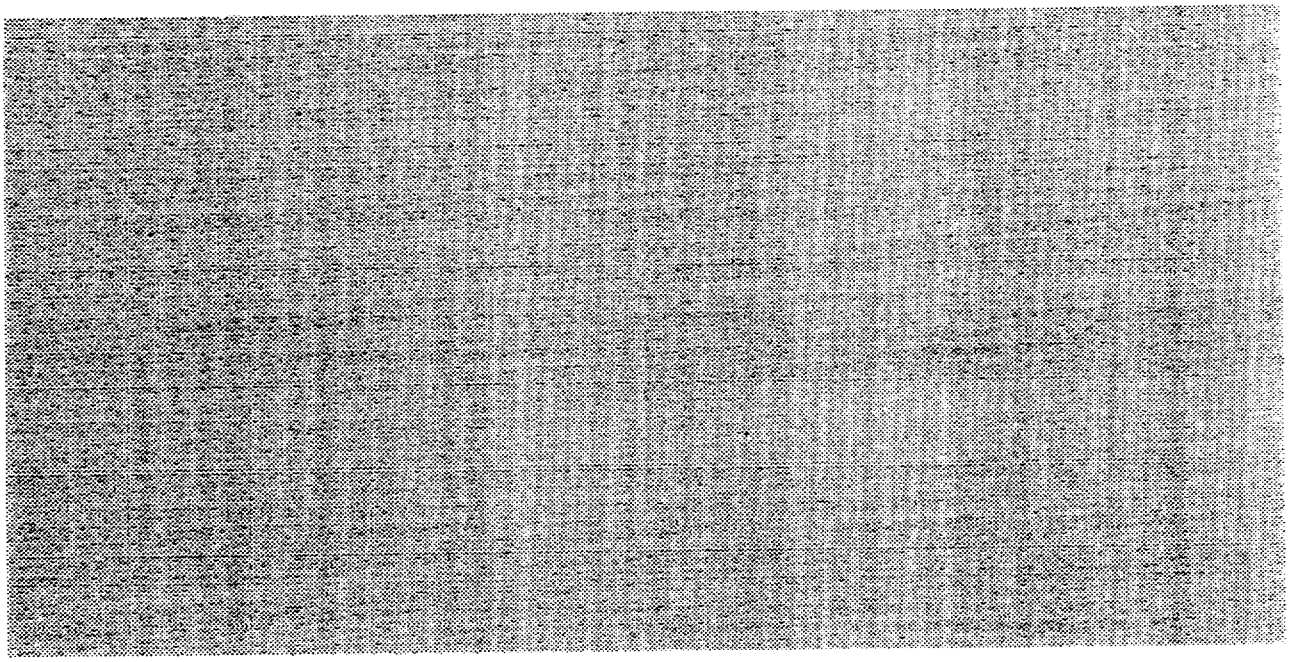
Horizontal registration problems can be caused by:

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

Compare the examples that follow to the first example of print quality shown in Figure 49 on page 300-61.

Print Quality Examples

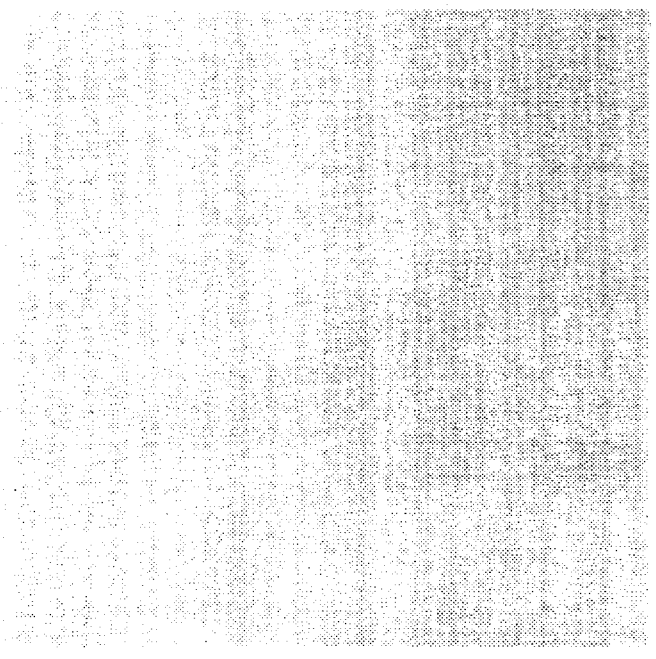




No Failure — Good Print Quality Examples

Figure 49. Print Quality Examples

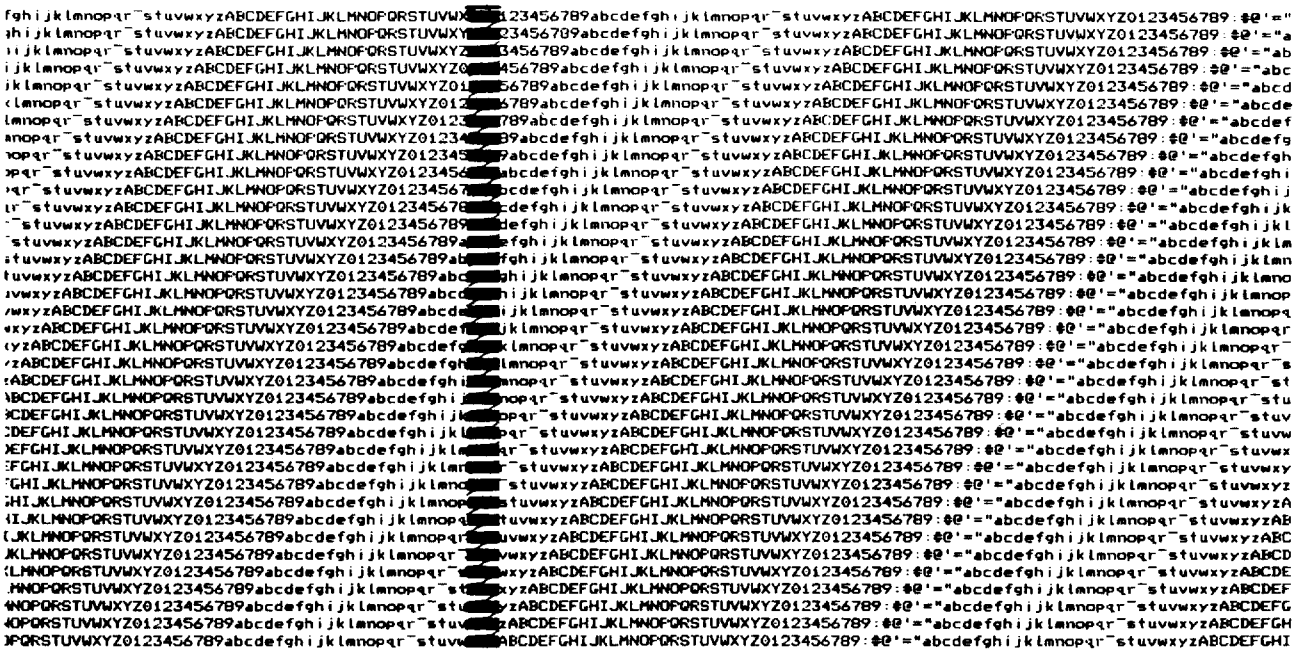
Print Quality Examples



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

Figure 50. Print Quality Examples

Print Quality Examples



One Hammer Out of Position-Protruding

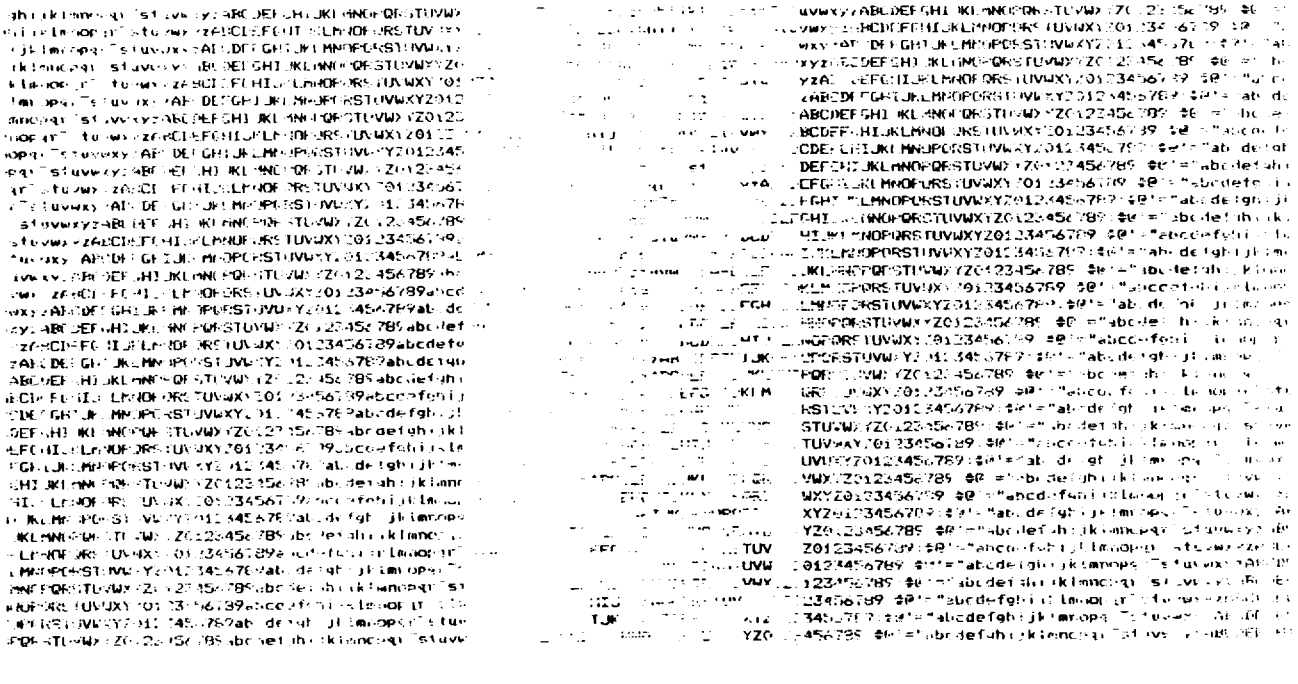
Figure 51. Print Quality Examples

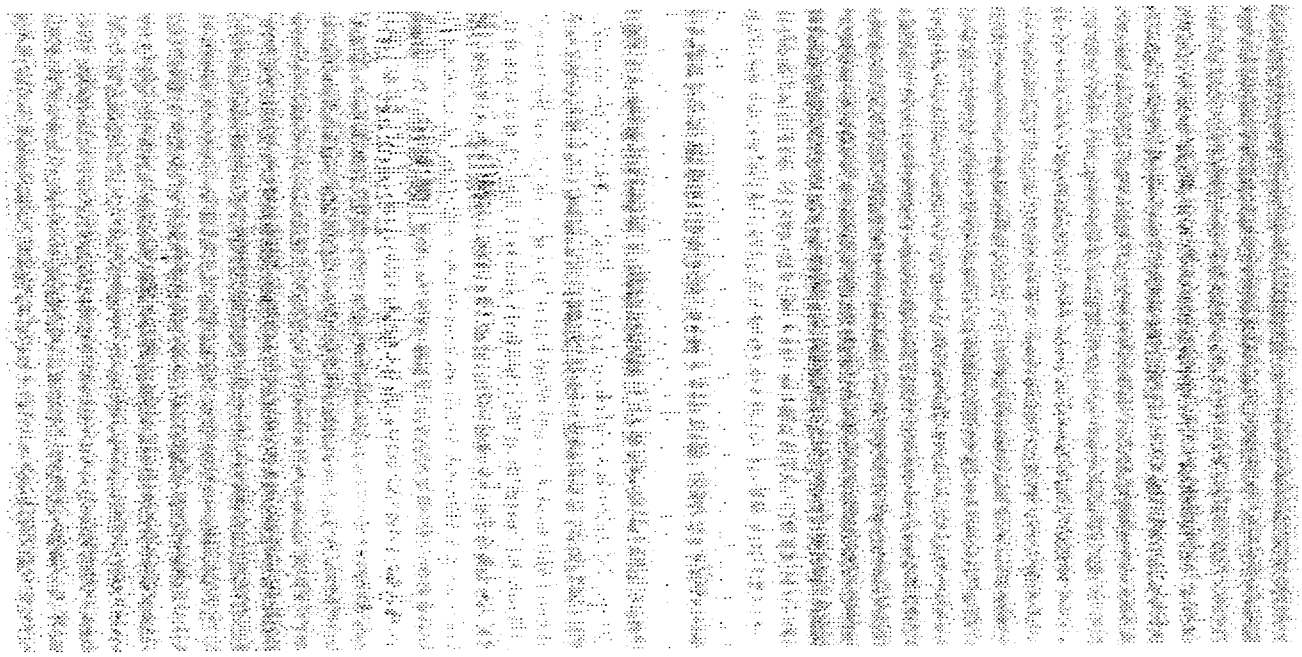
Print Quality Examples

One Hammer Coil Open or Hammer Is Physically Held Retracted

Figure 52. Print Quality Examples

Print Quality Examples

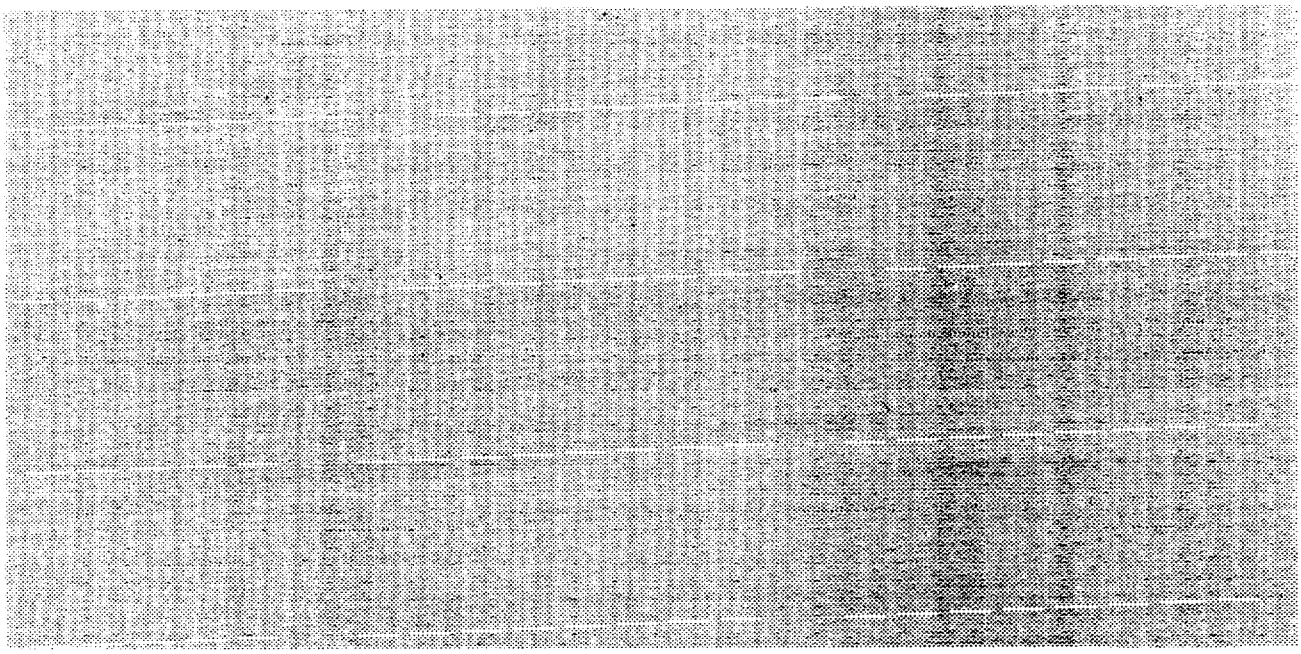




Defective Hammer Block and Platen Gap Not Adjusted Properly

Figure 53. Print Quality Examples

Print Quality Examples



One Dot Missing

Figure 54. Print Quality Examples

370 Hammers

Hammer Theory of Operation

There are two different hammer designs used in the 4234 Models 7,8 and 9 and 11,12 and 13. The Linac (early level) hammer unit has been replaced by the Clicking (late level) hammer unit. This manual includes the differences in adjustments and procedures used in servicing both units.

The hammer bank is a Field Replaceable Unit (FRU). The linear actuators (Linac hammers) consist of a slider, a spacer, two housings, two stators ("E" shaped cores of magnetic material), a coil wound around the center leg of each of the stator cores, and a spring return/damper assembly. The hammer face is attached to one end of the slider. The slider is positioned between the two "E" cores. The hammer coils are energized to develop a magnetic force between the cores and iron bars in the slider. This force accelerates the slider and drives it against an anvil on the dot band. This forces the print element into the ribbon, paper, and platen to make a printed dot. The return spring positions the slider for subsequent firing.

The hammer bank is a Field Replaceable Unit (FRU). It is possible to replace a single hammer block. The clicking hammer unit consists of hammer blocks, magnets, beams, posts, and coils. There are two unused hammers in the hammer bank. The hammer face is attached on top of the beam. A hammer coil is energized to develop a magnetic field which overcomes the permanent magnetic field and the beam will move by its own spring force to hit the anvil on the dot band. This forces the print element into the ribbon, paper and platen to make a printed dot. The beam returns by the permanent magnetic force when the coil current is cut off.

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

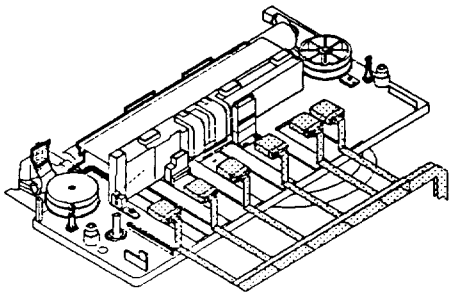
The hammer fire circuit consists of:

- One hammer driver card
- The interface between the hammer driver card and the printer electronics
- The interface between the hammer driver card and the hammer coils.

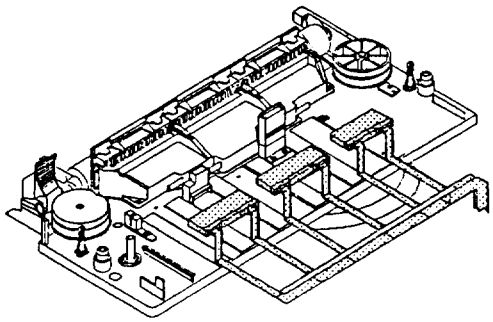
The hammer driver card consists of three parts:

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

The error-checking circuits monitor the drivers. They check for short circuits and open conditions.



Linac (Early Level) Hammer Unit



Clicking (Late Level) Hammer Unit

Hammer Bank

See Figure 55.

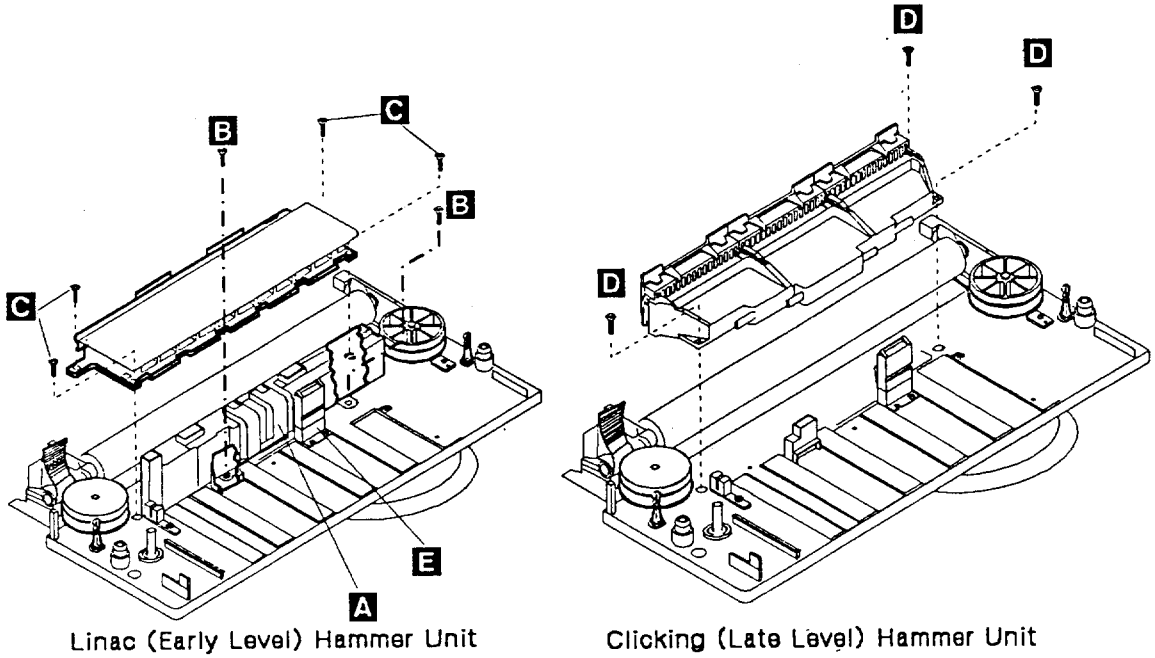
Removal

1. Remove the forms from the printer.
2. Set the printer power switch to O (Off) and disconnect the power cord from the electrical outlet.
3. Remove the ribbon cartridge (MIM "Ribbon Cartridge" on page 300-41).
4. Remove the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
5. Remove the dot band oiler **E** (2 screws) (Linac hammer unit only).
6. Remove the hammer cables (MIM "Hammer Cable Assembly" on page 300-73).
7. Remove the two air baffle screws **B** (Linac hammer unit).
8. Remove the air baffle **A** (Linac hammer unit).
9. Remove the hammer bank mounting screws **C** (Linac hammer unit) or **D** (Clicking hammer unit) and remove the bank.

Installation

1. Install the hammer bank by pushing forward and to the left against the locating pins.
2. Install the air baffle on the print casting with mounting screws **B** (Linac hammer unit only).
3. Install the hammer bank cables.
4. Install the dot band oiler **E** (Linac hammer unit only).
5. Check the platen adjustment (MIM "Platen Assembly Adjustments" on page 300-56).
6. Install the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
7. Install the ribbon cartridge (MIM "Ribbon Cartridge" on page 300-41).
8. Connect the power cord to the electrical outlet.

Note: If you are replacing the hammer bank, go to "Band Tracking Adjustments" on page 300-14.



Linac (Early Level) Hammer Unit

Clicking (Late Level) Hammer Unit

Figure 55. Hammer Bank

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Hammer Block (Clicking Hammer Unit Only)

See Figure 56 on page 300-71.

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

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 (MIM "Ribbon Cartridge" on page 300-41).
4. Remove the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
5. Remove the hammer bank (MIM "Hammer Bank" on page 300-68).
6. Remove hammer cables from the blocks (MIM "Hammer Cable Assembly" on page 300-72).
7. Remove the upper band guide clip(s) **A** between the block you are removing and adjacent block(s).
8. Remove the magnetic clip(s) **C**
9. Remove the screw **B** from the block to be replaced and that of any to the left of the block to be replaced.
10. Remove the hammer block(s).

Replacement

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 on to the casting and position it as far to the left as possible.
4. Install and tighten screw **B**.
5. Repeat the above step until all blocks are replaced.
6. Inspect the area between the lower edge of the hammer blocks and the machined pads on the print mechanism casting with a dental mirror. There should not be a gap.

   Note: Print quality problems will result if blocks are not seated correctly. Be sure there is no gap between the removed block and adjacent blocks.
7. Install the magnetic clip(s) **C**.
8. Install the upper band guide clip(s) **A** between blocks.
9. Install the hammer bank. See (MIM "Hammer Bank" on page 300-68).
10. Check the platen-to-hammer gap for each block replaced (MIM "Platen Assembly Adjustments" on page 300-56).

    Warning: When connecting the hammer cables, the pins for hammer 45 on hammer block 3 are NOT used and should not have connectors attached.
11. Install the hammer cable(s).
12. Install the dot band (MIM "Dot Band Removal and Installation" on page 300-6).
13. Install the ribbon cartridge (MIM "Ribbon Cartridge" on page 300-41).
14. Connect the power cord to the back of the printer.

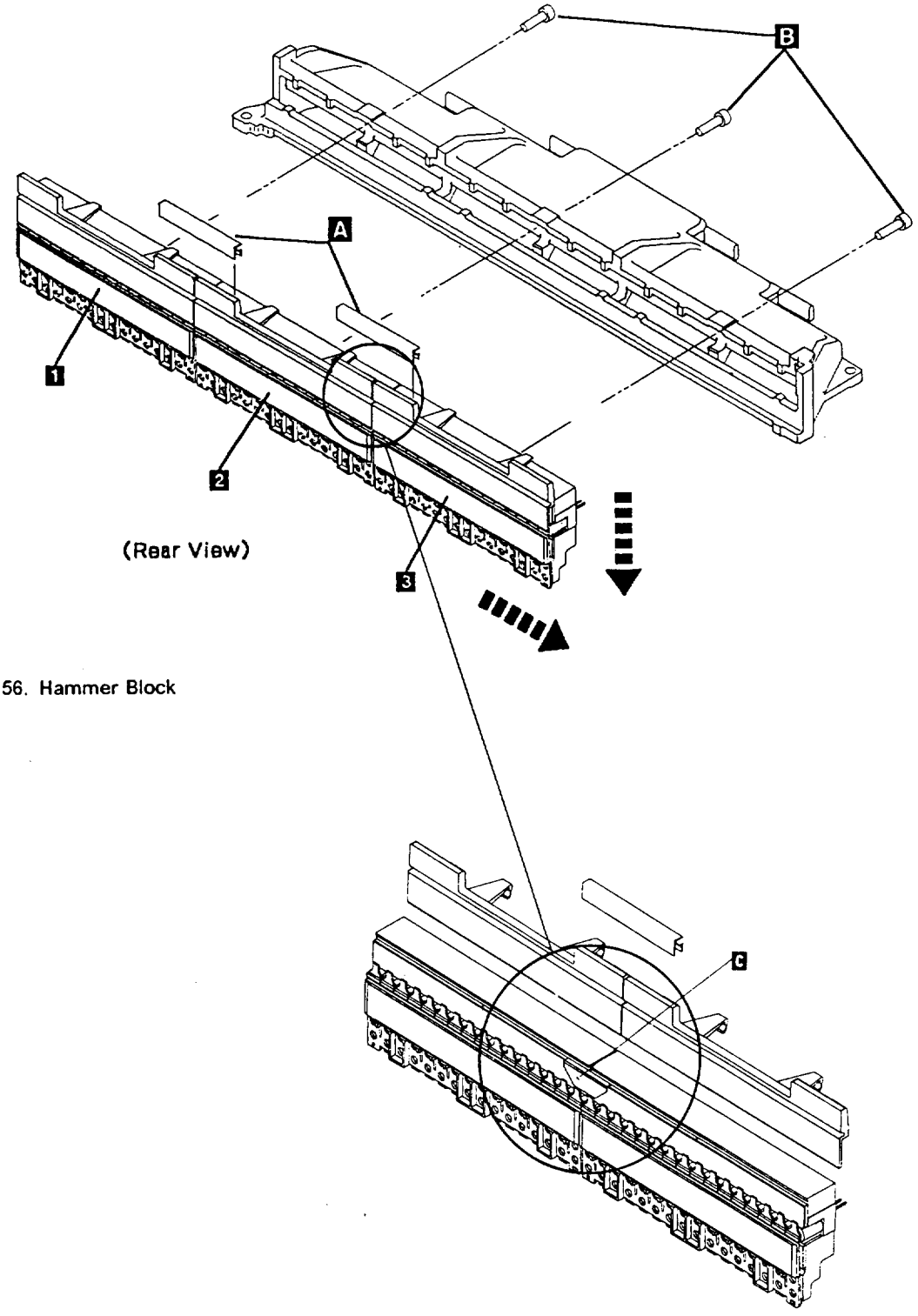
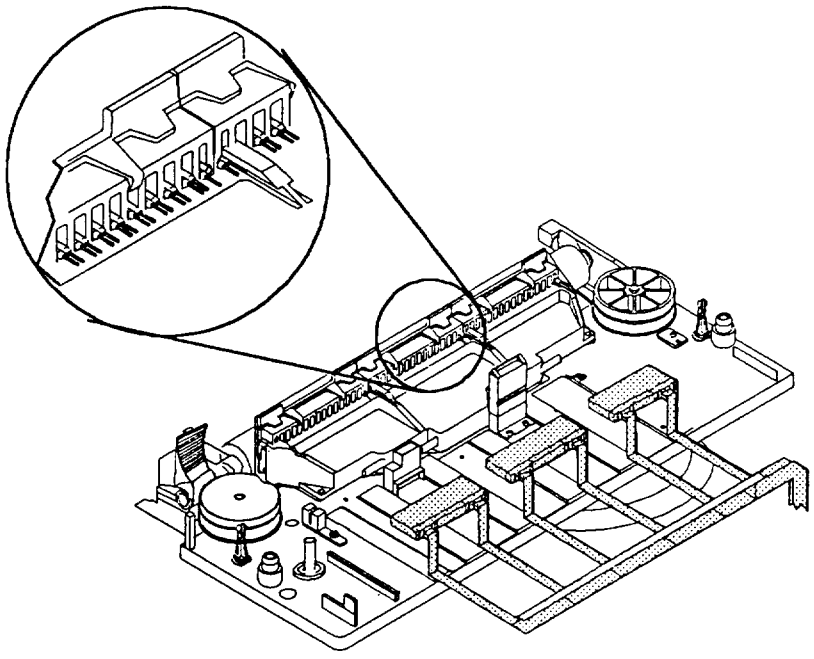


Figure 56. Hammer Block

Hammer Coil Service Check

See Figure 57.

1. Set the printer power switch to O (Off).
2. Remove the ribbon cartridge (MIM "Ribbon Cartridge" on page 300-41).
3. Remove the dot band cover.
4. Remove all connectors from the hammer bank that contains the suspected failing coil.
5. 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 2.3 ohms to 2.7 ohms.
6. Measure for short circuits from both pins of the coil to frame ground (not to the **aluminum** casting). There should be **no** continuity to ground from either pin.
7. If the resistance is incorrect or the coil is shorted to ground, replace the hammer bank assembly (MIM "Hammer Bank" on page 300-68).
8. Check that the terminals in the hammer cable connector make good contact with the hammer coil flex circuit.
9. 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. Replace the hammer cable assembly if it is defective or if an intermittent problem with the cable is suspected.



Clicking (Late Level) Hammer Unit

Figure 57. Hammer Coils

400 Communications

400 - Section Contents

410 Communications -- Model 011

Theory of Operation

The Model 011 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 plugs into the interconnect board. Communication problems can develop from intermittent connections in the cables or from a bad ground signal.

450 Communications -- Model 012

Theory of Operation

The Model 012 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 by 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 has two 256-byte data buffers to let the printer read from one while the other is being filled.

The communications adapter plugs into the interconnect board. Communication problems can be caused by intermittent signal connections in the cables or from a bad ground connection.

470 Communications -- Model 013

Theory of Operation

The 4234 Model 013 can be attached to a variety of host systems. It operates as a part of data processing systems that use serial/parallel attachment architectures. Print and control commands from the data processing system are received by the serial/parallel attachment, translated to printer tasks, and sent to the printer controller. The 4234 Model 013 can be attached to the following systems:

- The IBM AS/400 System
- The IBM RT PERSONAL COMPUTER®.

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 4234 Printer uses a liquid crystal display (LCD) that may display decimal, hexadecimal, or English messages. The function keys supply input to the logic gate to start and control the running of diagnostics. The panel has a keypad and one printed circuit card with two connectors on it.

The three figures below show the operator panels for the Model 011, the Model 012, and the Model 013 Printers. More information about operator panel functions and usage is in the *IBM 4234 Printer Model 011, 012, and 013 Principles of Operations.*

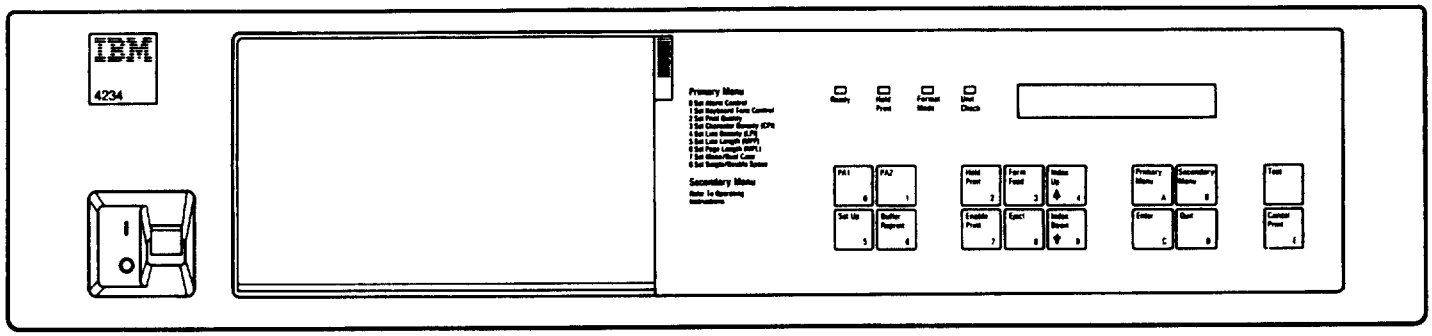


Figure 58. Operator Panel, Model 011

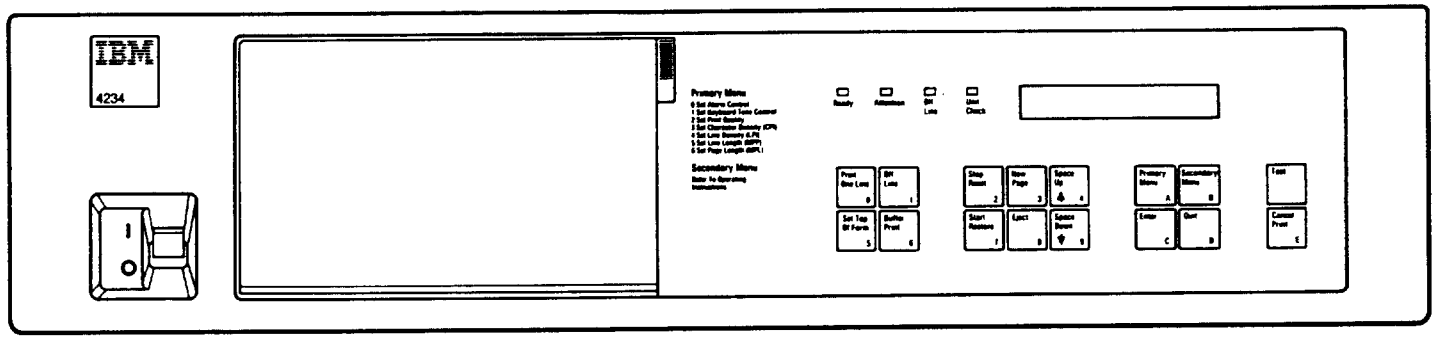


Figure 59. Operator Panel, Models 012

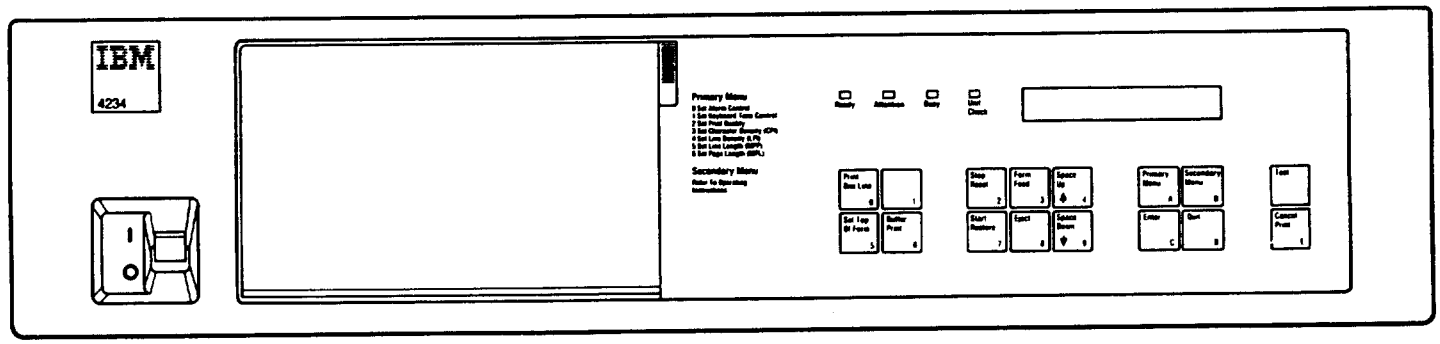


Figure 60. Operator Panel, Model 013

Operator Panel

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

See Figure 61.

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. Disconnect the operator panel cable **B**.

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

Installation

1. Hold the panel close to the printer and connect the ground strap **A** to the operator panel.
2. Connect the operator panel cable **B** to the circuit board.
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 (MIM "Test 57, Operator Panel LED/LCD Test" on page 700-11).

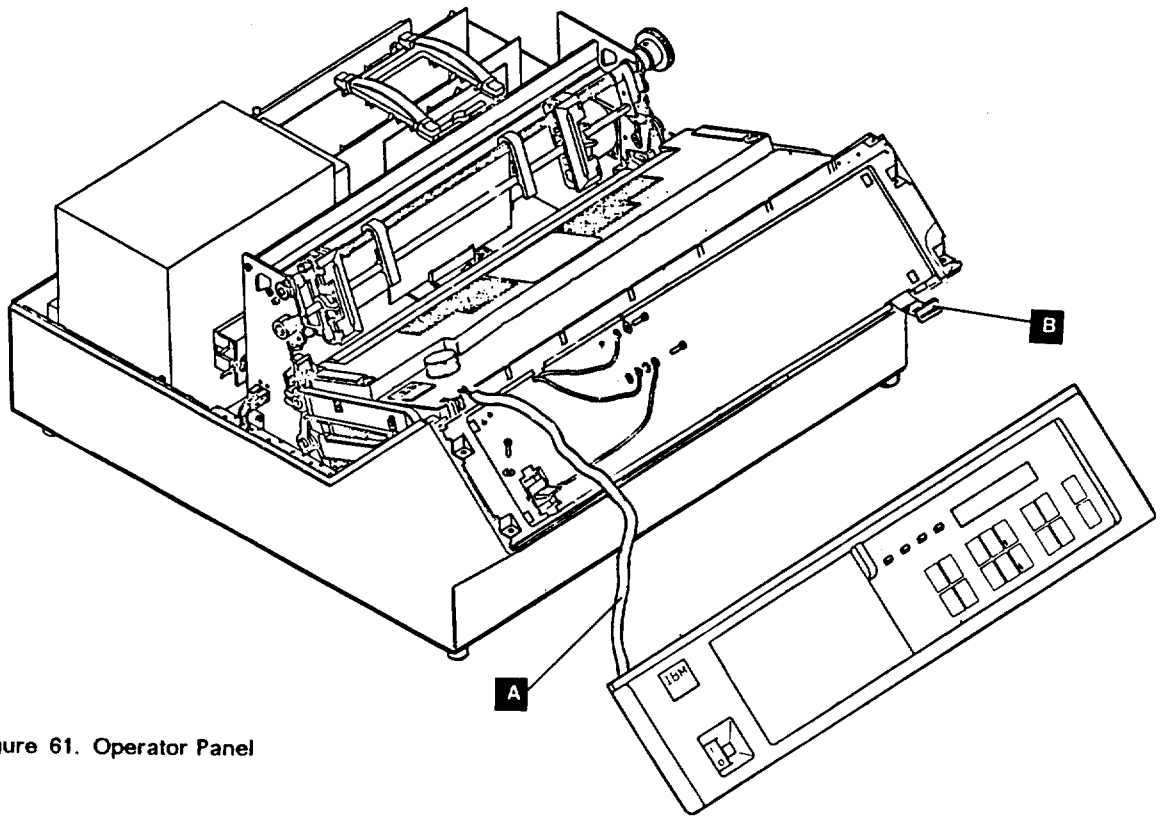


Figure 61. Operator Panel

Operator Panel Keypad

See Figure 62.

Removal

1. Set the printer power switch to O (Off), and disconnect the power cord from the electrical outlet.
2. Open the top cover.
3. Remove the operator panel overlay.
4. Pull the operator panel straight out at the same angle it is mounted on the printer.
5. Disconnect the cable connector **A** from the operator panel card **B**.
6. Remove the keypad ground screw **C**.
7. Remove the keypad **E** by peeling it from the operator panel.

Installation

Note: Ensure that the operator panel is clean and free of old adhesives.

1. Peel the backing from the new keypad, and attach it to the operator panel. (Press firmly.)
2. Route the keypad connector and the ground strap to the bottom of the operator panel.
3. Connect the keypad cable connector **A** to the operator panel card **B**.
4. Install the ground strap on the operator panel.
5. Install the operator panel.
6. Install the operator panel overlay.
7. Close the top cover.
8. Connect the power cord to the electrical outlet.

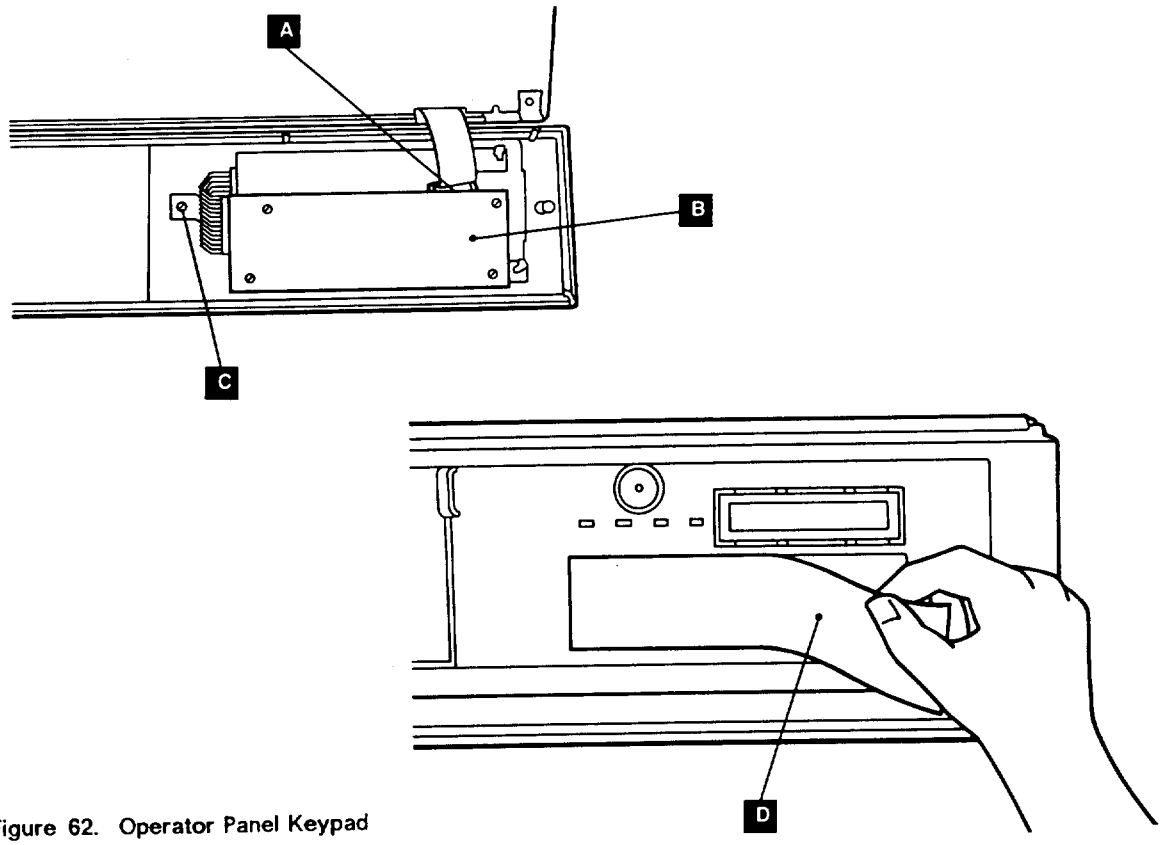


Figure 62. Operator Panel Keypad

Operator Panel Cable

See Figure 63.

Removal

1. Set the printer power switch to O (Off), and disconnect the power cord from the electrical outlet.
2. Remove the top cover (MIM "Top Cover" on page 300-3).
3. Remove the power cover (MIM "Power Cover" on page 300-4).
4. Pull the operator panel straight out at the same angle it is mounted on the printer.
5. Disconnect the cable connector from the operator panel card.
6. Remove the four screws that secure the operator panel support plate.
7. Disconnect the cable connector from the system card and remove the cable.

Installation

1. Connect the cable to the system card.
2. Route the cable to the front of the printer.
3. Install the operator panel support plate.

Important

Ensure that the cable fits in the notch of the support panel.

4. Connect the cable connector to the operator panel card.
5. Carefully insert the four retainers on the operator panel into the holes in the support plate and press the panel into place.
6. Install the power cover (MIM "Power Cover" on page 300-4).
7. Install the top cover (MIM "Top Cover" on page 300-3).
8. Connect the power cord to the electrical outlet.
9. Set the power switch to | (On), and run the operator panel tests (MIM "Test 57, Operator Panel LED/LCD Test" on page 700-11).

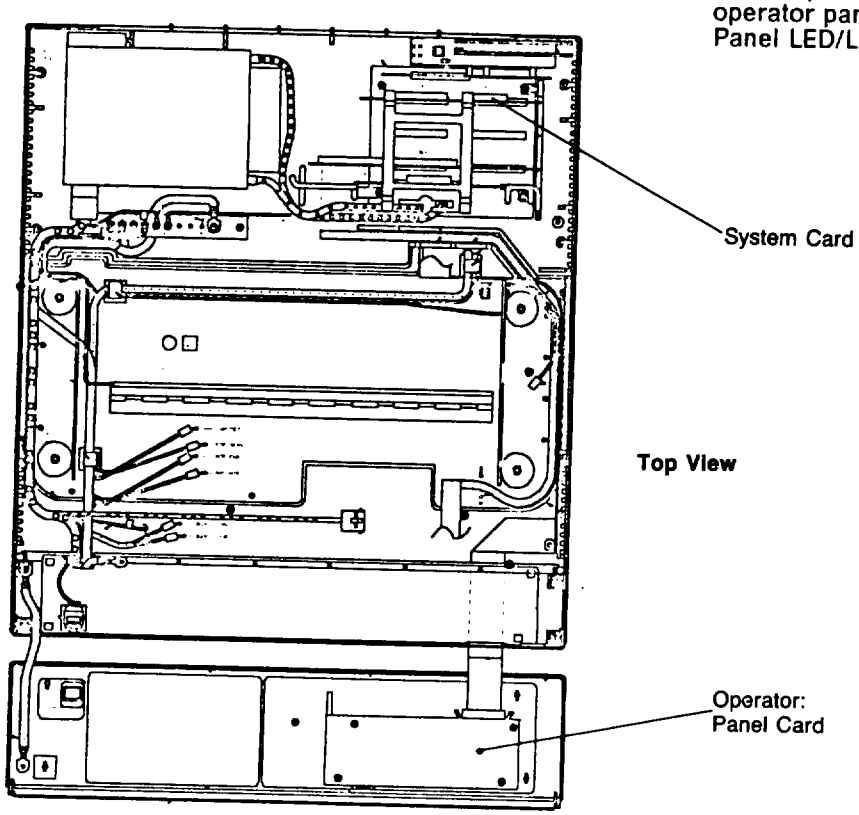


Figure 63. Operator Panel Cable

Operator Panel Support Plate

See Figure 64.

Removal

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

Installation

1. Install the power switch to the support plate.
2. Connect ground wires. Ensure that the star washer is between the ring terminal and the mounting surface.

> **Important**
>
> Place the cable to the operator panel under the notch C in the lower right corner of the support plate.

3. Install the operator panel support plate with four screws A.

   Note: Ensure that the ground lead is connected between the plate and the casting.
4. Install the operator panel (MIM "Operator Panel" on page 500-4).
5. Connect the power cord to the electrical outlet.

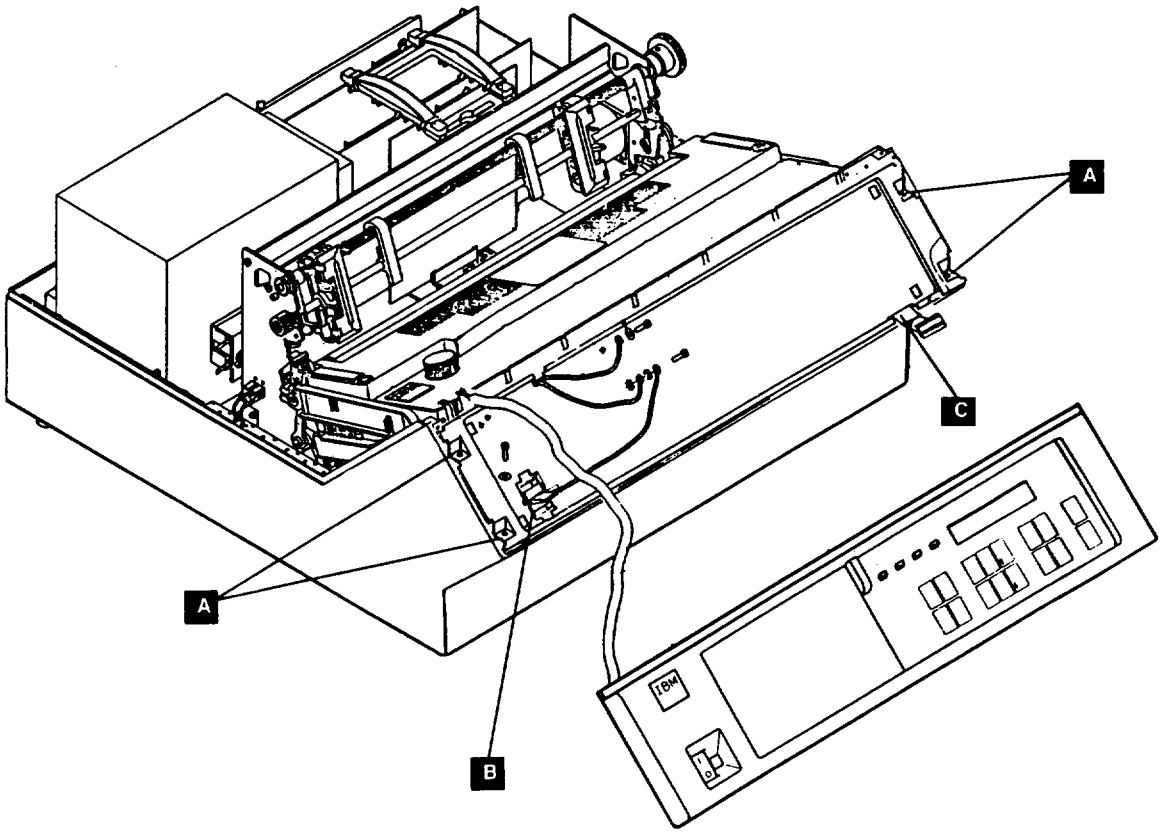


Figure 64. Operator Panel Support Plate

Operator Panel Card

See Figure 65.

Removal

1. Set the printer power switch to O (Off), and disconnect the power cord from the electrical outlet.
2. Remove the operator panel (MIM "Operator Panel" on page 500-4).
3. Disconnect the cable connector **A** from the operator panel card.
4. Disconnect the keypad cable connector **B** from the operator panel card.
5. Remove the four card mounting screws **C**, and lift the card from the panel.

Installation

1. Install the card on the operator panel with the four mounting screws **C**.
2. Connect the keypad cable connector **B** from the operator panel card.
3. Connect the cable connector **A** from the operator panel card.
4. Connect the ground strap to the panel.
5. Carefully insert the four retainers on the operator panel into the holes in the support plate and press the panel into place.
6. Connect the power cord to the electrical outlet.
7. Set the printer power switch to | (On) and run the operator panel tests (MIM "Test 57, Operator Panel LED/LCD Test" on page 700-11).

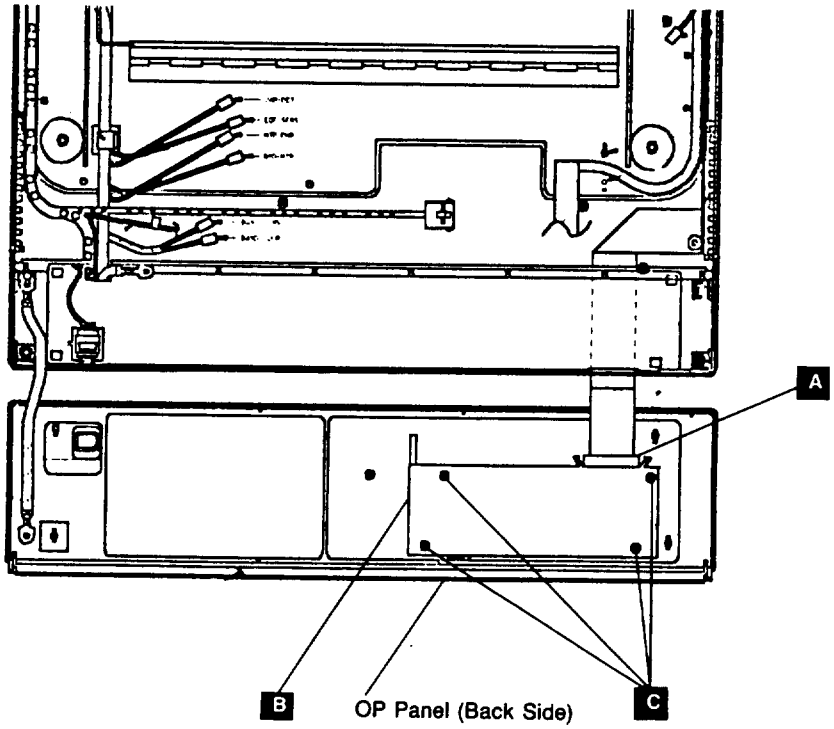


Figure 65. Operator Panel Card

Model (All) Attachment Card

See Figure 66.

Removal

1. Set the printer power switch to O (Off).
2. Remove the top cover (MIM "Top Cover" on page 300-3).
3. Remove the power cover (MIM "Power Cover" on page 300-4).
4. Disconnect the signal interface cable from the attachment card **A**.
5. Unlatch the card retainer by pulling up on the tab.
6. Remove the card by pulling it up.

Installation

1. Install the attachment card onto the interconnect board **B**.
2. Latch the card retainer.
3. Connect the cable to the attachment card **A**.
4. Install the power cover (MIM "Power Cover" on page 300-4).
5. Install the top cover (MIM "Top Cover" on page 300-3).

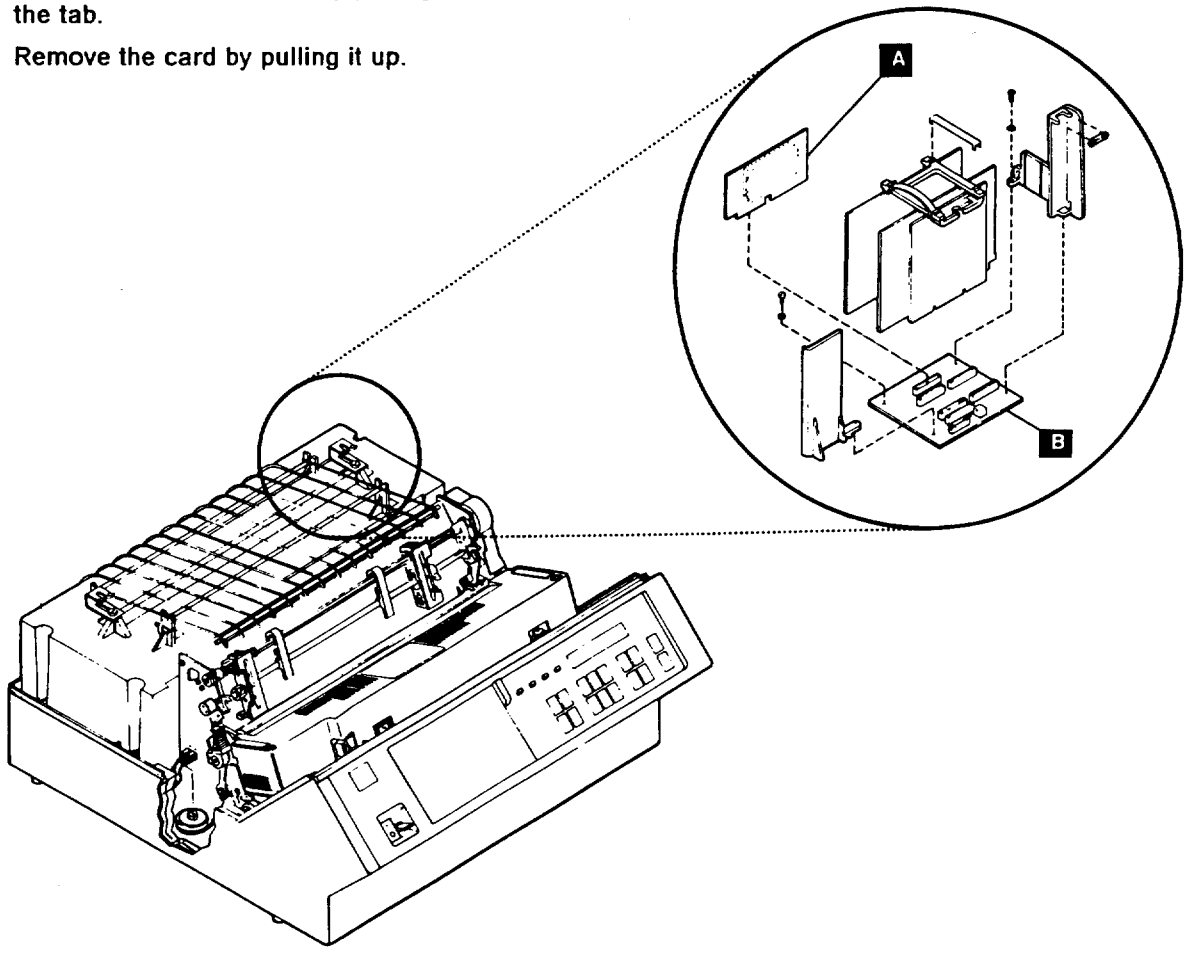


Figure 66. Attachment card (All models)

System Card

CAUTION:

The systems card contains a small lithium battery. There is a risk of fire, explosion, or burns if you disassemble, incinerate, or expose the card to heat above 100°C (212°F).

You may dispose of up to 50 cards using your normal disposal procedures. To dispose of greater quantities, you must make special arrangements with the manufacturer or a qualified refuse disposal agency.

See Figure 67.

Removal

1. Set the printer power switch to O (Off) and disconnect the power cord from the electrical outlet.
2. Remove the top cover (MIM "Top Cover" on page 300-3).
3. Remove the power cover (MIM "Power Cover" on page 300-4).
4. Disconnect the two systems card cables connectors.
5. Remove the card retainer A.
6. Remove the systems card B by pulling it up.

Installation

1. Install the systems card onto the interconnect board C.
2. Connect the two systems card cables connectors.
3. Install the card retainer A.
4. Install the power cover (MIM "Power Cover" on page 300-4).
5. Install the top cover (MIM "Top Cover" on page 300-3).

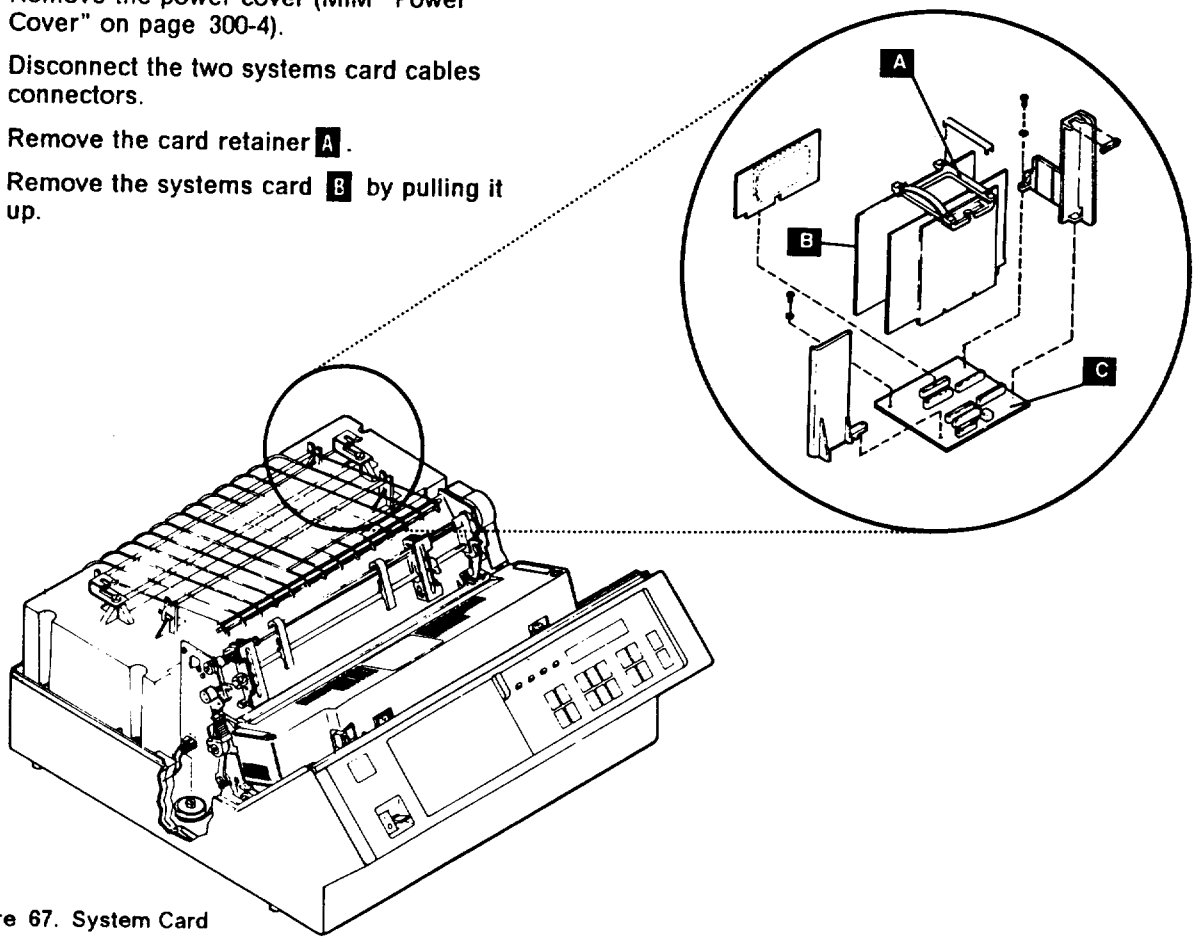


Figure 67. System Card

Hammer Driver Card

See Figure 68.

Removal

1. Set the printer power switch to O (Off) and disconnect the power cord from the electrical outlet.
2. Remove the top cover (MIM "Top Cover" on page 300-3).
3. Remove the power cover (MIM "Power Cover" on page 300-4).
4. Disconnect the two systems card cables connectors.
5. Disconnect the two hammer driver card cable connectors.
6. Remove the card retainer **A**.
7. Remove the hammer driver card **B** by pulling it up.

Installation

1. Install the hammer driver card onto the interconnect board **C**.
2. Connect the two hammer driver card cable connectors.
3. Connect the two systems card cables connectors.
4. Install the card retainer **A**.
5. Install the power cover (MIM "Power Cover" on page 300-4).
6. Install the top cover (MIM "Top Cover" on page 300-3).

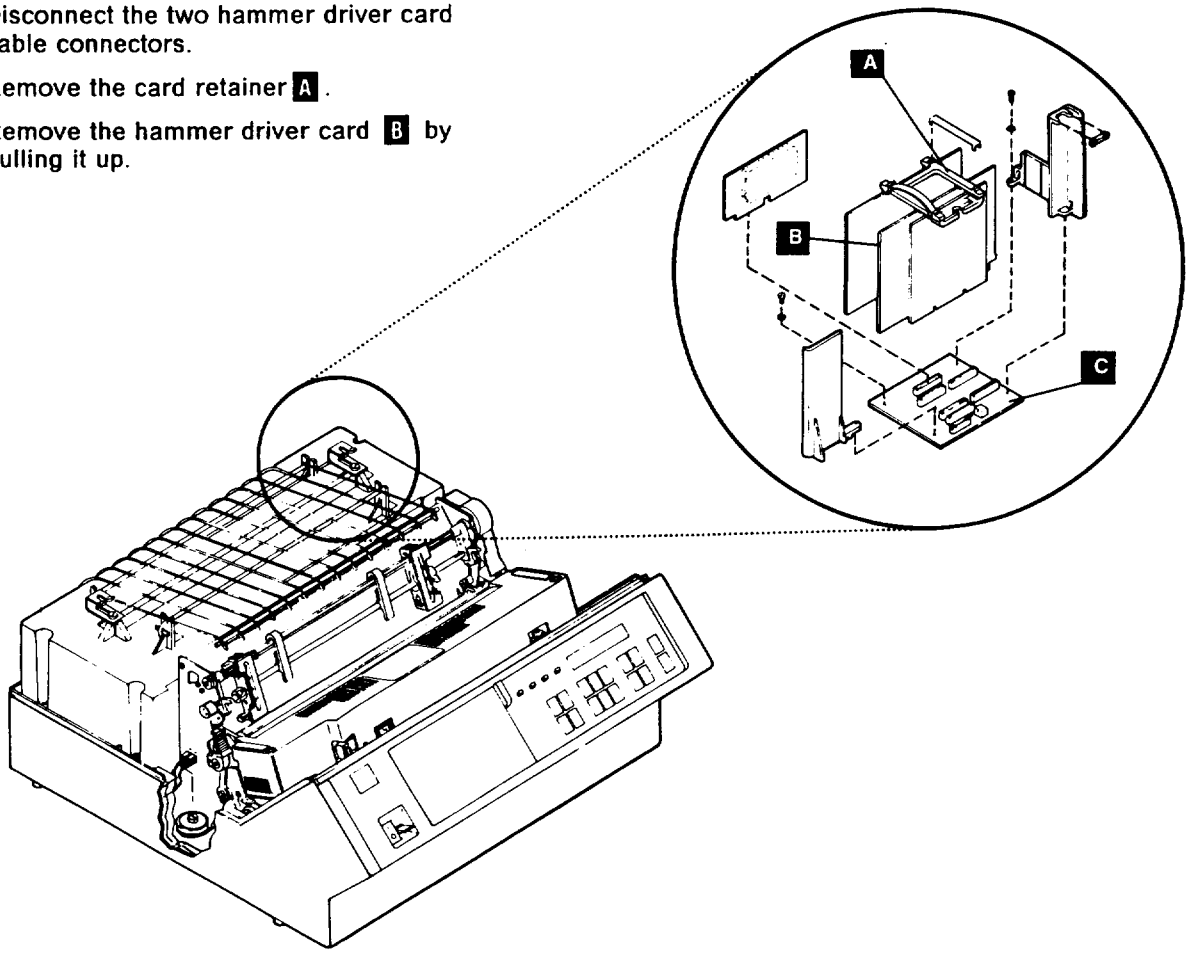


Figure 68. Hammer Driver Card

Motor Driver Card

See Figure 69.

Removal

1. Set the printer power switch to O (Off) and disconnect the power cord from the electrical outlet.
2. Remove the top cover (MIM "Top Cover" on page 300-3).
3. Remove the power cover (MIM "Power Cover" on page 300-4).
4. Disconnect the two systems card cables connectors.
5. Disconnect the two hammer driver card cable connectors.
6. Disconnect the motor driver card cable connector.
7. Remove the card retainer **A**.
8. Remove the motor driver card **B** by pulling it up.

Installation

1. Install the motor driver card onto the interconnect board **C**.
2. Connect the motor driver card cable connector.
3. Connect the two hammer driver card cable connectors.
4. Connect the two systems card cables connectors.
5. Install the card retainer **A**.
6. Install the power cover (MIM "Power Cover" on page 300-4).
7. Install the top cover (MIM "Top Cover" on page 300-3).

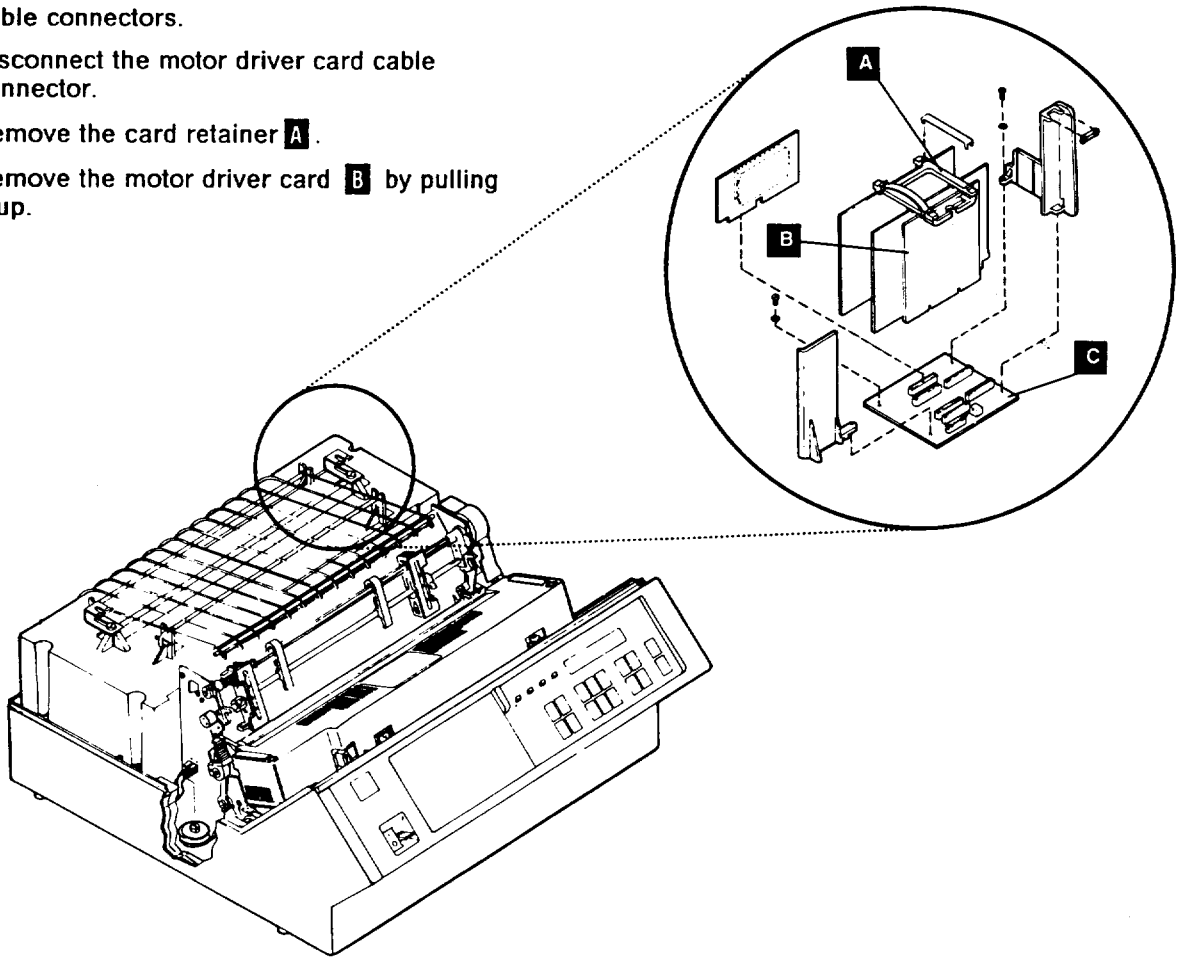


Figure 69. Motor Driver Card

Interconnect Board

See Figure 70.

Removal

1. Set the printer power switch to O (Off) and disconnect the power cord from the electrical outlet.
2. Remove the top cover (MIM "Top Cover" on page 300-3).
3. Remove the power cover (MIM "Power Cover" on page 300-4).
4. Disconnect the two system card cable connectors.
5. Disconnect the two hammer driver card cable connectors.
6. Disconnect the motor driver card cable connector.
7. Remove the card retainer **A**.
8. Remove the motor driver card **B** by pulling it up.
9. Remove the hammer driver card **C** by pulling it up.
10. Remove the system card **D** by pulling it up.
11. Remove the air baffle (not shown) from the interconnect board.
12. Unlatch the card retainer.
13. Remove the attachment card **E** by pulling it up.
14. Remove P1 and P2 from the board.
15. Remove the four board mounting screws.
16. Remove the board.

Installation

1. Install the interconnect board with the four board mounting screws. (Ensure that the baffles are in place.)
2. Connect the P1 and P2 connectors to the board.
3. Install the motor driver card onto the interconnect board **F**.
4. Install the hammer driver card **C**.
5. Install the air baffle onto the interconnect board (between the system and hammer driver card).
6. Install the system card **D**.
7. Install the attachment card **E**.
8. Connect the motor driver card cable connector.
9. Connect the two hammer driver card cable connectors.
10. Connect the two system card cable connectors.
11. Install the card retainer **A**.
12. Install the power cover (MIM "Power Cover" on page 300-4).
13. Install the top cover (MIM "Top Cover" on page 300-3).

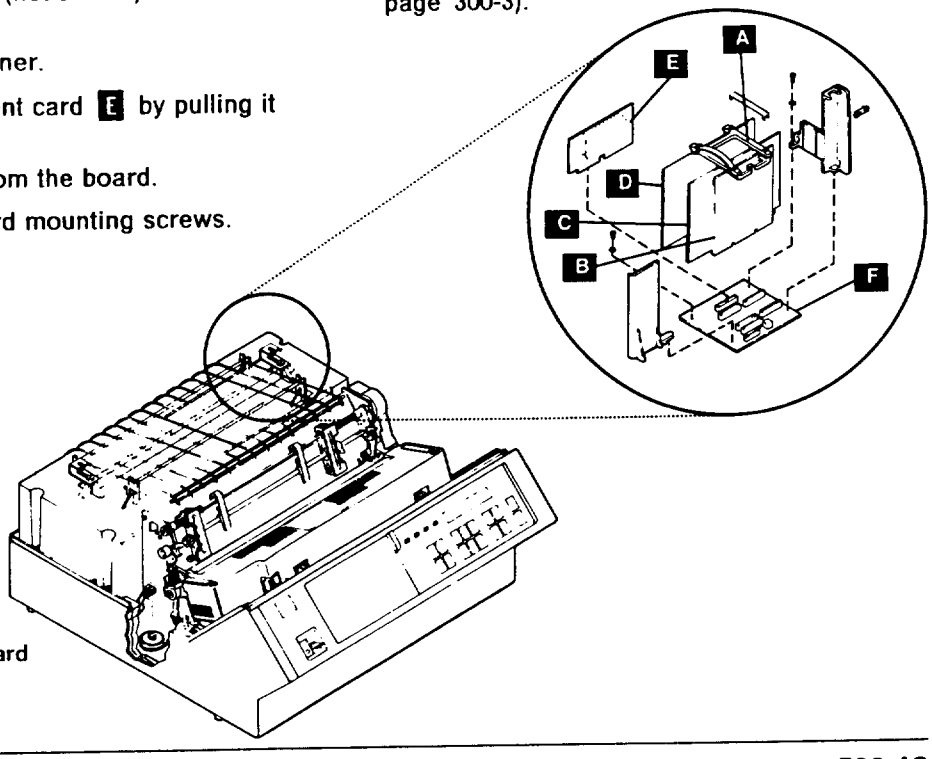


Figure 70. Interconnect Board

600 Power

600 - Section Contents

Power Supply

Power Supply Theory of Operation

See Figure 71.

The power supply and fan are supplied as one field replaceable unit. The power supply is single phase with different input voltage requirements of 100 to 127 or 200 to 240 volts. A switch on the side of the power supply is used to match the input voltage. The power supply generates four direct current (dc) output voltages: +5, ±12, and +60 volts. The tolerance for the +5 volts is −4 to +5%; ±12 volts is ±10%; and +60 volts is −5 to +10%.

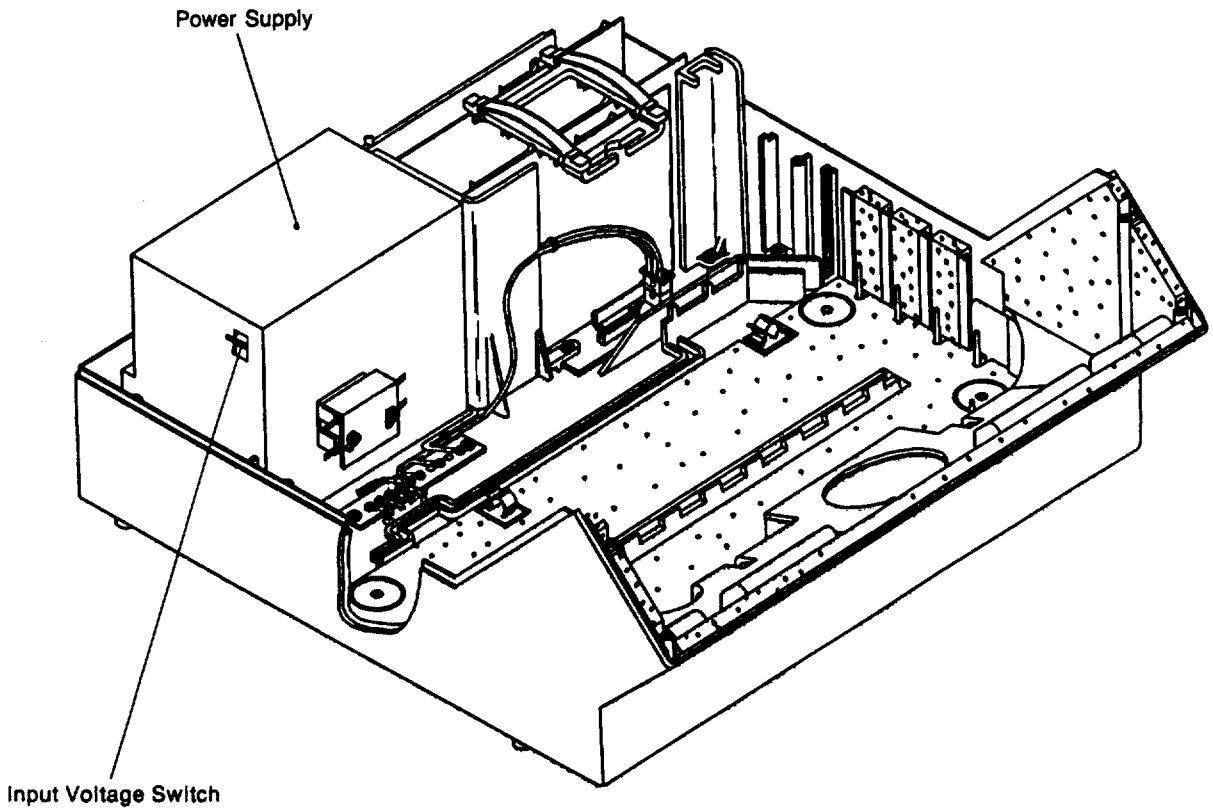


Figure 71. Top View of Power Supply

Relay (Solid State)

See Figure 72.

Removal

1. Set the printer power switch to O (Off), and disconnect the power cord from the electrical outlet.
2. Remove the top cover (MIM "Top Cover" on page 300-3).
3. Remove the power cover (MIM "Power Cover" on page 300-4).
4. Remove the two screws that hold the safety cover **A**.
5. Record the location of the five 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**.

Installation

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 300-4).
5. Install the top cover (see "Top Cover" on page 300-3).
6. Connect the power cord to the electrical outlet.

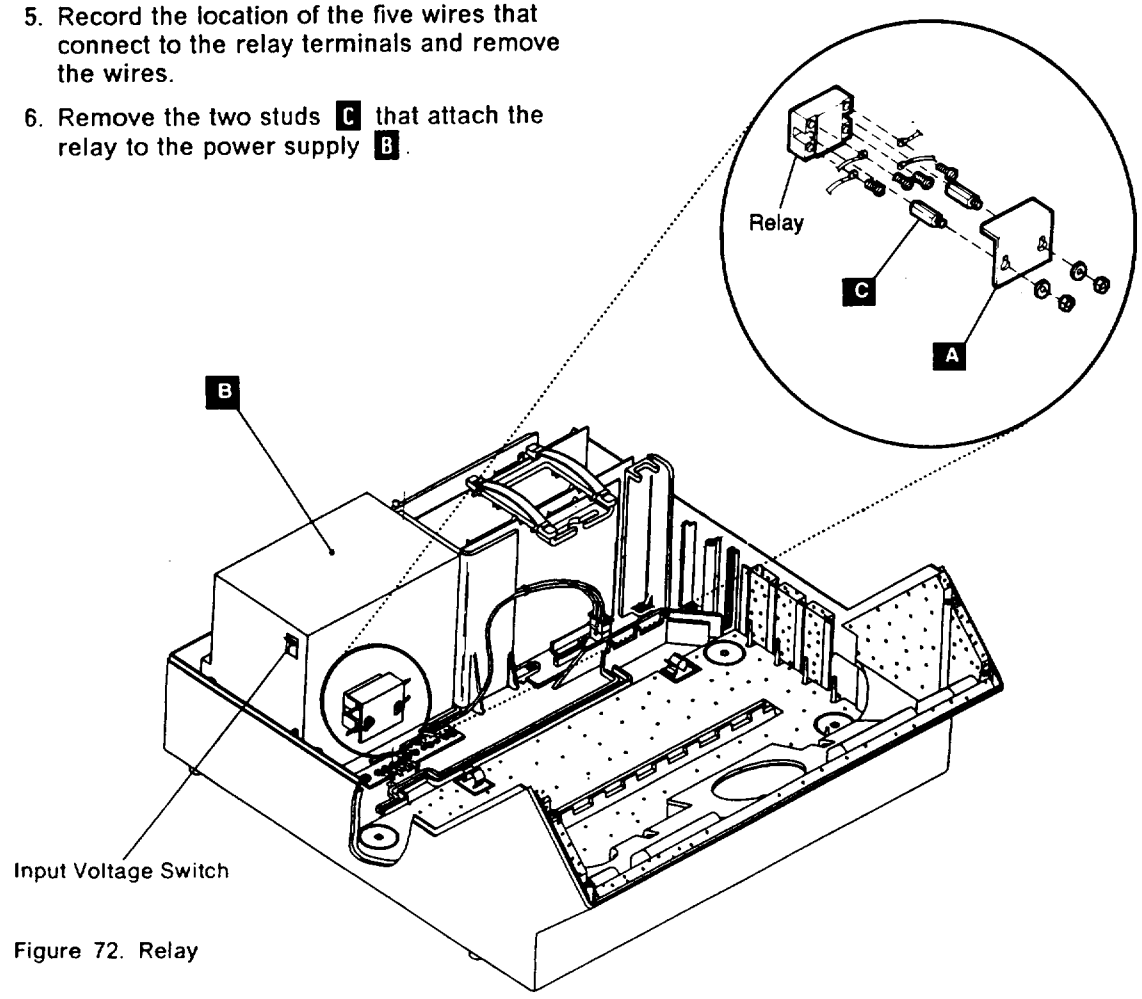


Figure 72. Relay

Power Supply

See Figure 73.

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 electrical outlet.
2. Remove the top cover (MIM "Top Cover" on page 300-3).
3. Remove the power cover (MIM "Power Cover" on page 300-4).
4. Remove the relay from the power supply, but do not remove the wires from the relay (MIM "Relay (Solid State)" on page 600-4).
5. Disconnect the P1 connector **A** from the power supply.
6. Disconnect the P2 connector **B** from the power supply.
7. Disconnect the P3 connector **C** from the power supply.
8. Remove the ground straps (one on each end of the power supply).
9. Lift the power supply from the printer.

Installation

1. Install the power supply on the four mounting studs in the base of the printer.
2. Install the ground straps (one on each end of the power supply).
3. Connect the P3 connector **C** to the power supply.
4. Connect the P2 connector **B** to the power supply.
5. Connect the P1 connector **A** to the power supply.
6. Install the relay on the power supply (MIM "Relay (Solid State)" on page 600-4).
7. Ensure that switch **D** is set to the correct input voltage.
8. Install the power cover (MIM "Power Cover" on page 300-4).
9. Install the top cover (MIM "Top Cover" on page 300-3).
10. Connect the power cord to the electrical outlet.

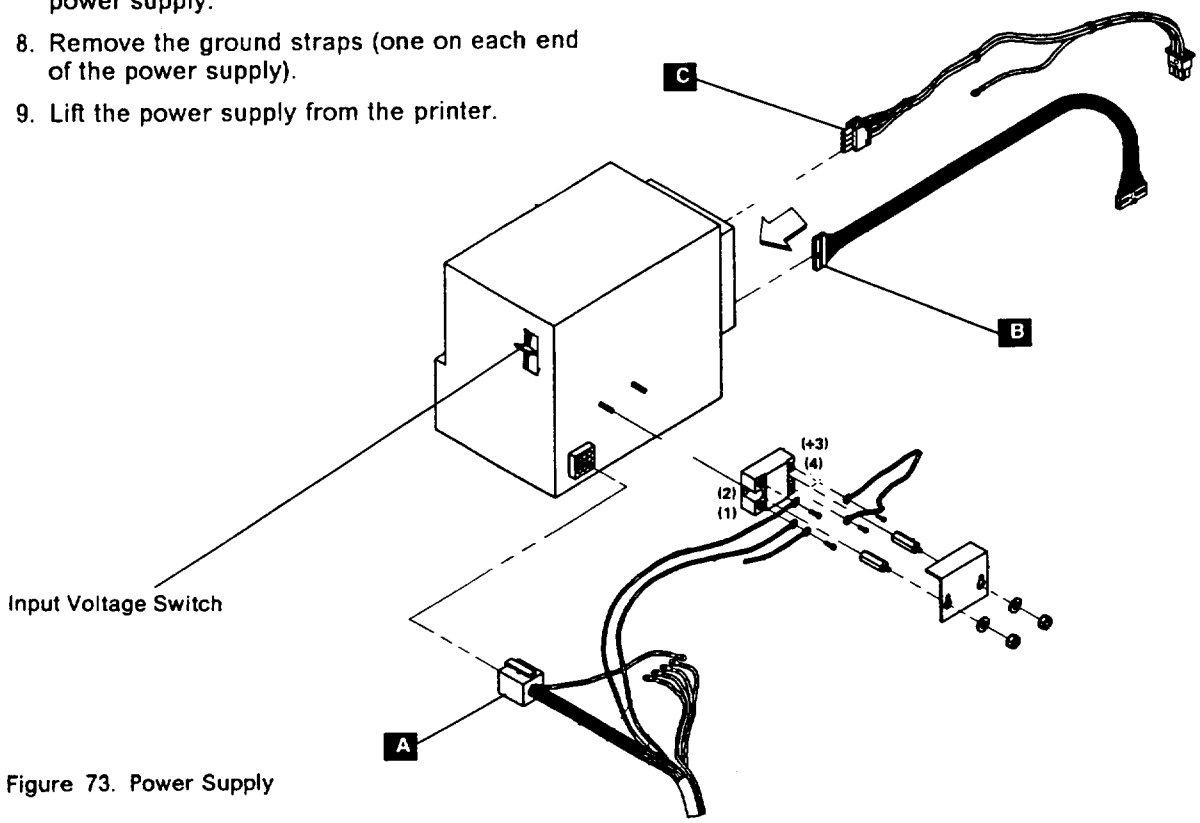


Figure 73. Power Supply

ac Cable

Power Switch and ac Cable

See Figure 74 on page 600-7.

Note: The power switch and cable are removed as one FRU. It is important that all star washers 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 electrical outlet.
2. Remove the top cover (MIM "Top Cover" on page 300-3).
3. Remove the power cover (MIM "Power Cover" on page 300-4).
4. Remove the operator panel support plate (MIM "Operator Panel Support Plate" on page 500-7).
5. Remove the power switch from the support plate.
6. Remove the ground wires from the print mechanism.
7. Disconnect the hammer blower connector.
8. Unplug the P1 connector **A** from the power supply.
9. Remove the relay safety cover **B**.

   Note: For future reference, observe the wire number (or color) that attaches to terminals 1 and 2 of the relay.
10. Remove the wires from terminals 1 and 2.
11. Remove the ground wires that go from the ac cable to the copper ground bar.
12. Remove the cable from all cable ties and clamps.
13. Remove the power switch and ac cable from the printer.

Installation

Ensure that you have the correct cable assembly for your input voltage.

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 **B**.
3. Connect the ground wires to the copper ground bar.
4. Connect the P1 connector **A** to the power supply.

   Important

   Install all cable ties and clamps to the cable.
5. Connect the hammer blower connector.
6. Install the ground wires on the print mechanism.
7. Install the operator panel support plate (MIM "Operator Panel Support Plate" on page 500-7).
8. Install the operator panel (MIM "Operator Panel" on page 500-4).
9. Install the power cover (MIM "Power Cover" on page 300-4).
10. Install the top cover (MIM "Top Cover" on page 300-3).
11. Connect the power cord to the electrical outlet.
12. Set the printer power switch to | (On) and verify correct printer operation.

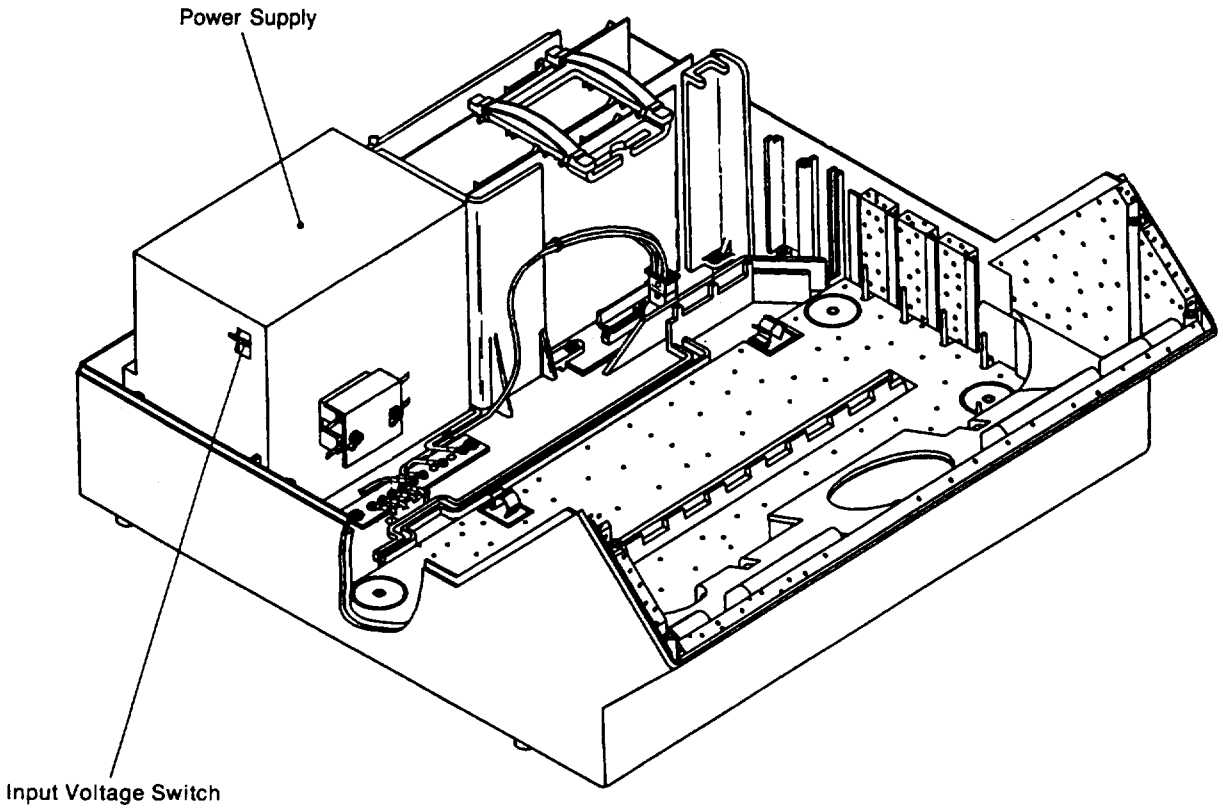


Figure 74. Power Switch and ac Cable

Blower

Blower Assembly

See Figure 75.

Removal

1. Set the printer power switch to O (Off), and disconnect the power cord from the electrical outlet.
2. Place the print mechanism in the service position (MIM "Print Mechanism (Service Position)" on page 300-48).
3. Disconnect the blower assembly ground wire.
4. Disconnect M1 cable connector **B**.
5. Remove four screws **A** securing the blower to the print casting.

Installation

1. Place the blower on the print casting and install the four mounting screws **A**.
2. Connect the ground wire. Be sure to install the star washer.
3. Connect M1 cable connector **B**.
4. Install the print mechanism (MIM "Print Mechanism (Removal)" on page 300-50).
5. Connect the power cord to the electrical outlet.
6. Set the printer power switch to | (On) and verify proper operation of the hammer blower.

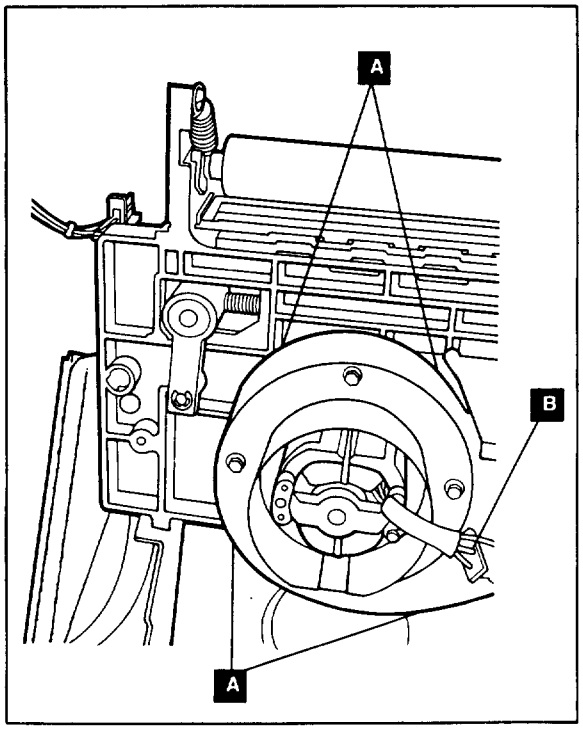


Figure 75. Blower Assembly

700 Diagnostic Procedures

700 - Section Contents

Hexadecimal Conversion

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

Figure 76. Hexadecimal Conversion Chart

Diagnostic Tests

List of Diagnostic Tests

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

- Test Key Tests
- Power On Self Test (POST)
- Operator Panel Test
- Test 01, Dot Band
- Test 06, Customer Setup Printout
- Test 07, Ripple Print
- Test 08, Print Error Log
- Test 09, Communication (Attachment) Card Combined Printout
- Test 50, BAT for the 80186
- Test 53, Displays the Error Log
- Test 57, Op Panel LED/LCD Test
- Test 60, Communications (Attachment) Card Test
- Test 61, Attachment Card Communications Wrap Test
- Test 71, Forms Driver Test
- Test 74, SRAM Arbitration Test
- Test 75, Band Test
- Test 76, DMA/Serializer/Soft Hammer Fire Test
- Test 80, Print MPU Memory
- Test 82, Print Vertical Bars
- Test 83, Print Horizontal Bars
- Test 84, Registration Pattern
- Test 85, Hammer Life Pattern
- Test 86, Emitter Alignment Pattern
- Test 87, Print Diamond Grid Pattern
- Test 89, Print H Pattern
- Test 90, Display Memory
- Test 91, Display Sensors
- Test 92, Loop on Selected Test
- Test 93, Clear CMOS
- Test 94, Clear Error Log
- Test 95, Print Op Panel Selected Character
- Test 99, Manufacturing Set Up Test.

Selecting Tests

You can select all the tests with the operator panel keys. Errors that occur during the test are shown in the message 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 you select are shown in the display until you release the Test key.

For example, to start Test 89:

1. Press and hold the Test key.
2. Press and release the '8' key.
3. Press and release the '9' key.
4. Release the Test key.

The test begins.

To stop any test without printing the Customer Setup test, set the printer power switch to O (Off) then to | (On) or

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.

Diagnostic Errors

When an error occurs during diagnostic testing, these codes are displayed in the message display. These status codes and error information are listed in "Status Codes" on page 700-18.

Test Key Tests

See Figure 3 on page 100-4.

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 approximately one minute to complete.

Test Description

The Power On Self Test (POST): A number of offline diagnostic routines are exercised during this test to ensure the basic function of the printer. If an error occurs, the execution stops and the correct error message appears in the LCD display. No printing occurs during this test.

The Test Key printout has four major parts:

Printer ID: The first part of the printout consists of copyright, chip identification, and cyclic redundancy check information. This information is used by the systems engineer to resolve application and software problems.

Condensed Error Log: This printout has important information needed by the service representative. The first column has the latest error. The second column of the error log has the status code. The third and fourth columns contain the FRU that is the more probable repair for the problem. See "Field Replaceable Units (FRUs)" on page 700-19 for a list of FRUs. You should attempt the FRU in the third column first. The fifth column shows the number of times the error occurred. The last column shows the procedure identification. This is the ID of the procedure that was executing when the error occurred.

Printer Options: This section of the printout consists of the present printer settings. The first line (0-8) is the setting for the primary menu options. The second and third lines (9-34) are the settings for the secondary menu options. The third line (21-34) consists of compatibility options. These are also secondary menu options.

The Pattern Printouts: The last section of the printout consists of four patterns. These patterns are useful samples of print quality.

Error Indications

If an error occurs during the Test Key printout and the printer cannot recover from the error, the POST will stop executing and an error will be posted in the message display. Once an error occurs, testing stops. If the error code is less than **40** and can be cleared, pressing the **Stop** key will place the printer in the **Not Ready** condition.

Power On Self Test (POST)

Purpose: The POST runs automatically when power is put to the printer. An enhanced version of this test can be done by pressing and releasing the Test key.

As a Basic Assurance Test, this procedure performs the following:

- Resets all hardware
- Executes the Engine test (part 1)
- Executes the ROS test
- Executes the RAM test
- Sets up the stack (for calls/returns)
- Calls the CMOS RAM test
- Calls the Engine test (part 2)
- Calls the Internal Timers test
- Calls the DMA test
- Calls the Task Interface test
- Calls the Timer test
- Calls the SRAM test
- Clears RAM
- Gets the status of the 8096
- Calls the Forms Driver test (Test 71)
- Calls the DMA/Serializer/Hammer Fire test (Test 76)
- Calls the SRAM arbitration test (Test 74)
- Calls the Band test (Test 01 or 75)
- Calls the Op Panel LED/LCD test (Test 57)
- Calls the Communication Adapter's test (Test 60)
- Calls the CSU print sample test (Test 06).

Note: Normal completion time for the POST is approximately one minute. A status code of 01 during the POST indicates forms should be loaded.

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 the service representative or the customer runs this test.

Operation: To start this test, see "Selecting Tests" on page 700-5.

Error Indications: The message display shows '12 DOT BAND CLOGGED' when 12 or more emitter slots are clogged or dirty. Other error indications that may occur are 05 (band cover open), 5E (60 volts failure), 60 (band driver overcurrent), 61 (band speed error), and C0 (processor check).

Test 06, Customer Setup Printout

Purpose: This test causes the print sample portion of the Customer Setup test to be executed. This test consists of five blocks of information. See "Test Key Printout" on page 100-3. Either the service representative or the customer runs this test.

Operation: To start this test, see "Selecting Tests" on page 700-5.

Error Indications: Normal printing errors.

Test 07, Ripple Print

Purpose: This test prints a continuous ripple pattern consisting of characters a-z, A-Z, 0-9, and selected special characters. You can select the print quality, LPI, and CPI at the operator panel.

Operation: To start this test, see "Selecting Tests" on page 700-5.

To stop the printout, press the Test key or Test 60.

Error Indications: Normal printing errors.

Test 08, Print Error Log

Purpose: Prints the errors that have occurred and indicates how many times each error occurred since the error log was cleared. See "Test Key Printout" on page 100-3. Either the service representative or the customer runs this test.

Operation: To start this test, see "Selecting Tests" on page 700-5.

Error Indications: Normal printing errors.

```
- *******  ERRORLOG  *******
  #     SC  FRU1 FRU2  CNT  PID
  00    03   FF   FF   02   11
  01    03   FF   FF   02   11
  02    02   FF   FF   01   FF
  03    00   00   00   00   00
  04    00   00   00   00   00

     *****  ERROR COUNT  ******

 #     0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F
00    00 00 01 02 00 00 00 00 00 00 00 00 00 00 00 00
10    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
20    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
30    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
40    00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

Test 09, Attachment (Communication) Card Combined Printout

Purpose: This test prints data specific to the communications adapter installed. For a twinaxial (Model 012) connector, this data is in the MPU (microprogram unit) storage and addresses hex F000 through hex F3FF are printed. For the coaxial (Model 011) 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.

Operation: To start this test, see "Selecting Tests" on page 700-5.

Error Indications: Normal printing errors.

```
                    ATTACHMENT ERROR LOG
0014 00000000 00000000 00000102 30002001 ................

                    ATTACHMENT ROS ID 0
0000 ED16F7F0 E7F0F8F3 F7D5D3E2 F5F0F4F8 ..70X0837NLS5048
0010 C3D6D7E8 D9C9C7C8 E340C9C2 D440C3D6 COPYRIGHT IBM CO
0020 D9D740F1 F9F8F56B F1F9F8F8 40C1D3D3 RF 1985,1988 ALL
0030 40D9C9C7 C8E3E240 D9C5E2C5 D9E5C5C4  RIGHTS RESERVED

                  NDS COMMUNICATION BUFFER
4000 00040000 00000000 00009770 D5101C00 ..........P.N...
4010 00000000 00000000 00000000 00000000 ................
4020 00000000 00000000 00000000 00000000 ................
4030 00000000 00000000 00000000 00000000 ................
4040 00000000 00000000 00000000 00000000 ................
```

Test 50, 80186 BAT Test

Purpose: This test runs BATs for the system card. The service representative runs this test. This test is incorporated in the POST and the Test Key test.

Operation: To start this test, see "Selecting Tests" on page 700-5.

Error Indications: Errors that may occur are B5 (80186 processor check), B8 (task interface check), and BA (80186 SRAM check).

Test 53, Error Log Display

Purpose: This test displays the error log in the message display. The latest error is displayed first. Scrolling through the log is accomplished by using the Index Up or Index Down keys. To view the status code count, press the Secondary Menu key. Pressing the Secondary Menu key again will display the last error logged. Press the Primary Menu to return to the status code display. To end this test, press Quit or Cancel. The service representative runs this test.

Operation: To start this test, see "Selecting Tests" on page 700-5.

```
 # SC FRU1 FRU2 CNT PID
02 74  A3   A0   17  FF
```

# = Error log entry number ('1'= latest error)
SC = Status Code
FRU1 = Most probable cause of the error
FRU2 = Second most probable cause of the error
CNT = Number of times this error occurred.
PID = Procedure identification.

```
 # SC      MAP CNT PID
02 5E     0010  17  FF
```

# = Error log entry number ('1'= latest error)
SC = Status Code
MAP = MAP entry point
CNT = Number of times this error occurred
PID = Procedure identification.

```
 SC 00 0000120C00000000
HEX 08 00000000000000FF
```

This screen lets you to scroll through each status code. It displays the number of times (in hexadecimal) an error has occurred in each status code. The screen above shows that:

SC 02 = 12
SC 03 = 0C
SC 0F = FF

Test 57, Operator Panel LED/LCD Test

Purpose: This test determines whether the operator panel keys, switches, and LEDs are operating correctly. The service representative runs this test. This test is incorporated in the POST and the Test Key test.

Operation: The test has two parts. To start the test:

1. Press and **hold** the Test key.
2. Press and release the 5 key.
3. Press and release the 7 key.
4. Release the Test key.

During this test the Op Panel is reset, data is written to and read from the LCD, the LEDs are turned on and off, and the following three patterns are displayed on the LCD (message display): all dots on, all dots off, and upper- and lowercase A through X.

To test the keypad:

1. Press and **hold** the Test Key.
2. Press and release the desired keys.
   The message display shows the key that is pressed.

Error Indications: BC (operator panel check).

Test 60, Attachment Card Test

Purpose: This test causes the communication adapter to execute its internal diagnostics. The service representative runs this test. This test is incorporated in the POST and the Test Key test.

Operation: To start this test, see "Selecting Tests" on page 700-5.

Error Indications: 74 (AC timeout AC---> PC).

Test 61, Communications Adapter Wrap Test

Purpose: This test executes an internal Communications Adapter wrap test. The test will continue until an error occurs or a key is pressed. The service representative runs this test.

Operation: To start this test, see "Selecting Tests" on page 700-5.

Error Indications: 74 (AC timeout AC---> PC).

Test 71, Forms Driver Test

Purpose: This test verifies the correct operation of the forms driver (up and down movement). The service representative runs this test. This test is incorporated in the POST and the Test Key test.

Operation: To start this test, see "Selecting Tests" on page 700-5.

Error Indications: 40 through 4D and 5E.

Test 74, SRAM Arbitration Test

Purpose: During this test, both the 80186 and the DMA serializer perform a large number of accesses to SRAM to verify that the arbitration circuit is working. The service representative runs this test. This test is incorporated in the POST and the Test Key test.

Operation: To start this test, see "Selecting Tests" on page 700-5.

Error Indications: BA (SRAM check).

Test 75, Band Test

Purpose: This test is the same as test 01.

Operation: To start this test, see "Selecting Tests" on page 700-5.

Test 76, DMA/Serializer/Soft Hammer Fire Test

Purpose: This test verifies correct operation of the DMA/Serializer circuitry, hammer driver cards, power supply, hammer banks, and cabling. The service representative runs this test. This test is incorporated in the POST and the Test Key test.

Operation: To start this test, see "Selecting Tests" on page 700-5.

Error Indications: 51 through 5E.

Test 80, Print MPU Memory

Purpose: This test places the correct commands into the task interface to print MMIMO, CMOS, part of SRAM, and the first 64K of RAM.

Operation: To start this test, see "Selecting Tests" on page 700-5.

Error Indications: Normal printing errors.

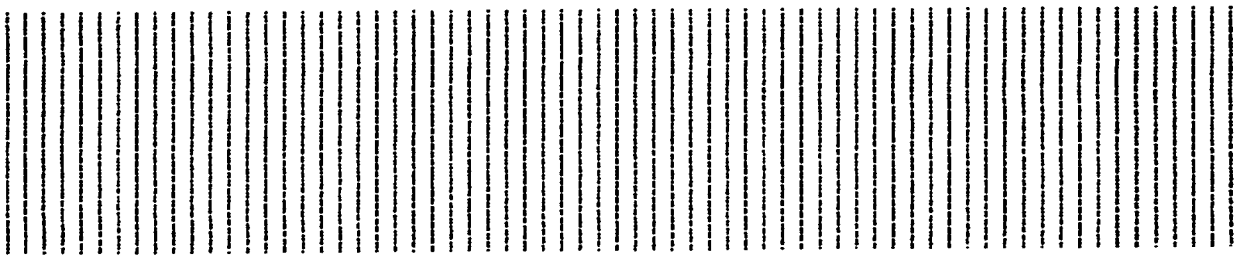
```
    MMIO DATA AREA
SEG :OFFSET     0 1 2 3 4 5 6 7 8 9 A B C D E F 0 1 2 3 4 5 6 7 8 9 A
2000:FC80       03FC00FC26FC01FC05FC00FC00FC00FC00FC00FC00FC00FC1FFC0
2000:FCA0       F3FC0BFC12FC1CFC00FC00FC00FC00FCF4FC1FFCF4FC1FFC00FC0
2000:FCC0       00FC00FC00FC00FC00FC00FC00FC00FC00FC00FC00FC00FC00FC0
2000:FCE0       00FC00FC00FC00FC00FC00FC00FC00FC00FB00FF0000
```

Test 82, Print Vertical Bars

Purpose: Prints a pattern of vertical bars to check vertical registration. The service representative runs this test. This test is incorporated in the test 08 and the Test Key test.

Operation: To start this test, see "Selecting Tests" on page 700-5.

Error Indications: Normal printing errors.



Test 83, Print Horizontal Bars

Purpose: Prints a pattern of horizontal bars to check horizontal registration. The service representative runs this test. This test is incorporated in the test 08 and the Test Key test.

Operation: To start this test, see "Selecting Tests" on page 700-5.

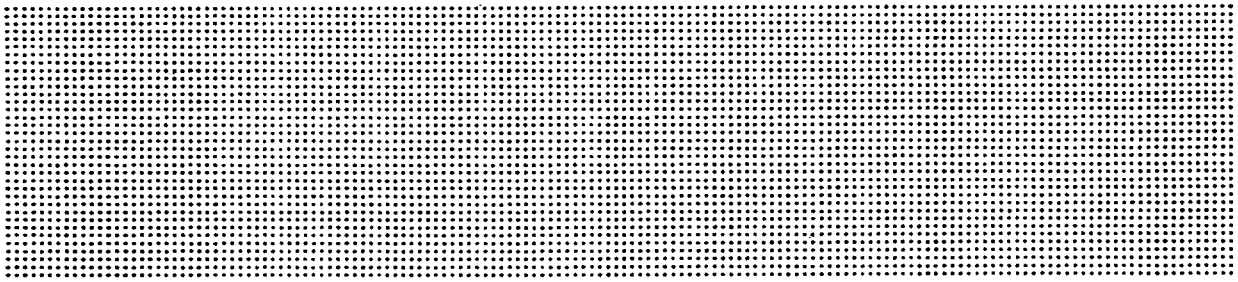
Error Indications: Normal printing errors.

Test 84, Print Registration

Purpose: Prints a print registration pattern to check print density, hammer bank, and horizontal and vertical registration. The service representative runs this test.

Operation: To start this test, see "Selecting Tests" on page 700-5.

Error Indications: Normal printing errors.



Test 85, Hammer Life

Purpose: Used by IBM manufacturing.

Test 86, Emitter Alignment Pattern

Purpose: This test uses hammer number 21 to print a modified dot column near each edge of the hammer. This test is used to align the dot band sensor. The service representative runs this test.

Operation: To start this test, see "Selecting Tests" on page 700-5.

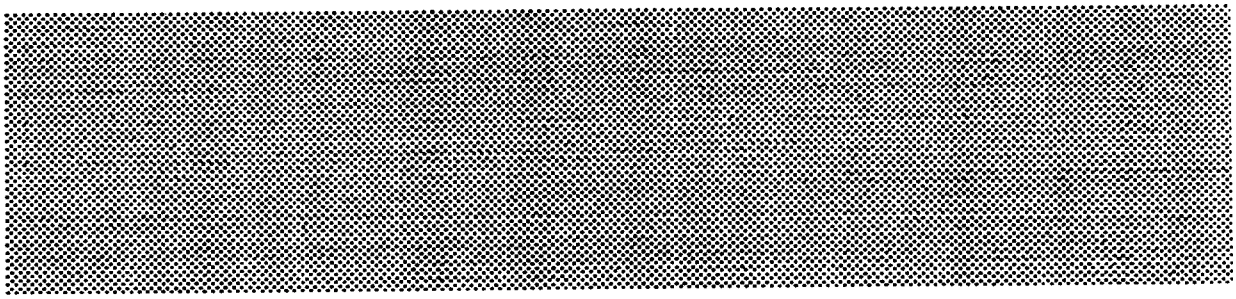
Error Indications: Normal printing errors.

Test 87, Diamond Grid Pattern

Purpose: Prints a diamond grid pattern. It is also a check to find bent chevrons and missing elements. The service representative runs this test. This test is incorporated in the test 08 and the Test Key test.

Operation: To start this test, see "Selecting Tests" on page 700-5.

Error Indications: Normal printing errors.

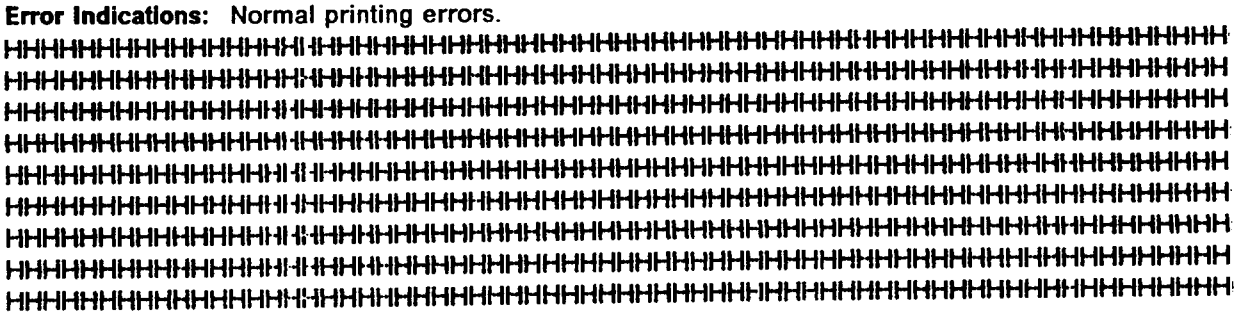


Test 89, Print H Pattern

Purpose: Prints several rows of Hs for print registration in DP quality at 10 CPI and 6 LPI. The service representative runs this test.

Operation: To start this test, see "Selecting Tests" on page 700-5.

Error Indications: Normal printing errors.



Test 90, Display Memory

Purpose: Displays a selected block of memory on the LCD. The Index Up and Index Down keys increment and decrement the digit selected by the cursor. The cursor can be moved (horizontally) to another digit by pressing the Primary Menu key (10x) or the Secondary Menu key (0.1x). To end this test, press the Cancel or Quit key. If no action is taken within 10 minutes, the test will end on its own. Memory and its address is displayed in hexadecimal. The service representative runs this test.

Operation: To start this test, see "Selecting Tests" on page 700-5.

Test 91, Display Sensors

Purpose: Displays the status of all sensors dynamically. The LED's display the present status of the following sensors (left to right): Band (sensor), Jam, End of Forms, and Platen. The LCD displays a message when the status of the band motor, fan, band cover, or ribbon sense is changed. To set On the:

- 60v press key 0
- FAN press key 1
- BAND press key 2.

The status of the ribbon weld sensor and the band cover switch is shown in the message display. The service representative runs this test.

Operation: To start this test, see "Selecting Tests" on page 700-5; to exit the test, press Quit or Cancel Print.

Test 92, Loop on Selected Tests

Purpose: This test lets you loop on selected test. The service representative runs this test.

Operation: To start this test:

1. Press and hold the Test key.
2. Press and release the '9' key.
3. Press and release the '2' key.
4. Release the Test key.
5. Enter the tests that you would like to loop. (Press Enter between each test entry.)
6. Press the Quit key.
7. Enter the number of times you want the tests to loop.
8. Press the Enter key.

To stop this test, set the power switch to O (Off) then to | (On).

Test 93, Clear CMOS

Purpose: This test clears CMOS. The service representative runs this test.

Operation: To start this test:

1. Press and **hold** the Test key.
2. Press and release the 9 key.
3. Press and release the 3 key.
4. Release the Test key.

Note: You will always get an error code "1F" when you run this test. Press the "2" then the "7" to clear the error.

Test 94, Clear Error Log

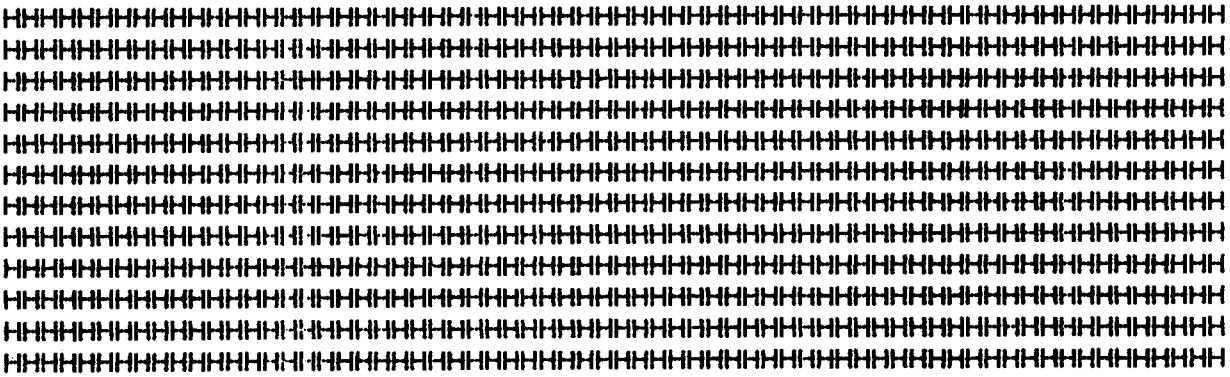
Purpose: Running this test clears the error log. The service representative runs this test.

Operation: To start this test, see "Selecting Tests" on page 700-5.

Test 95, Print Selected Characters

Purpose: This test prints selected characters. The Index Up and Index Down keys increment and decrement the digit selected by the cursor. The cursor can be moved (horizontally) to another digit by pressing the Primary Menu key or the Secondary Menu key. This is a hexadecimal value and the print is an EBCDIC character. Press the Quit key to do this test. To end this test, press the Test key. The service representative runs this test.

Operation: To start this test, see "Selecting Tests" on page 700-5.



Test 99, Set Up for Manufacturing

Purpose: This test is used by IBM manufacturing and is cleared when the test key is pressed.

Status Codes

00 - 40 Operator Messages

01 - End of Forms
02 - Paper jam
03 - Platen open
04 - Ribbon check
05 - Band Cover open
06 - Bell command received (Models 011 and 013)
07 - Incorrect print order (Model 011)
08 - Hold print timeout - 10 minutes (Model 011)
09 - Invalid operator key entry
0A - Clear command received (Models 012 and 013)
12 - Print band clogged
13 - Graphic check (Model 012)
14 - Restore function pending
1F - CMOS checksum
23 - Transmit buffer overrun (Model 013)
24 - Line parity error (Model 013)
25 - Line Framing error (Model 013)
26 - Buffer parity error (Model 011)
Line parity error (Model 012)
Receive buffer overrun (Model 013)
27 - Subsystem not ready (Model 011)
Unit address not received (Model 012)
Interface pacing protocol mismatch (Model 013)
28 - Poll check (Model 011)
Line synchronization lost (Model 012)
Link not established (RS-232-C) (Model 013)
2F - Data lost (Model 012)

Model 011

31 - Status code 01 with IR timeout
32 - Status code 02 with IR timeout
33 - Status code 03 with IR timeout
34 - Status code 04 with IR timeout
35 - Status code 05 with IR timeout
3A - Cancel print
3B - Buffer reprint active (Model 011)
Buffer print mode (Models 012 - 013)
3C - PA1 selected (Model 011)
3D - PA2 selected (Model 011)
3E - Printer in send state (Model 011)

40 - 7F Machine Check Messages

40 - FF driver overcurrent
41 - FF chop A error
42 - FF chop B error
43 - FF current sense A failure
44 - FF current sense B failure
45 - FF phase A error
46 - FF phase B error
47 - FF timeout
48 - Forms check
49 - Autofeed failure
4A - FF phase read error
4B - FF MMIMO error
4C - FF Interrupt error
4D - FF Pedestal error
* **FF=form feed**

Hammer Checks

51 - Hammer driver PNP open
53 - Hammer driver NPN open
55 - Hammer coil bank open
57 - Hammer driver PNP short
59 - Hammer driver NPN short
5B - Hammer coil bank short
5D - Hammer protection failure
5E - 60 volts failure

Emitter/Band Checks

60 - Band driver PNP open
61 - Band speed error
62 - Band motor drive (excess emitters)
63 - High duty cycle
65 - Emitter check
6B - PLL tracking
6C - PLL sync check

Software Checks

70 - PC command check
71 - MC command check
72 - IB control block check
73 - IB sequence check
74 - AC timeout
75 - PC timeout
76 - MC timeout
77 - MS timeout
7C - Attachment software check
7D - PC/RAS software check
7E - MC software check
7F - MS software check

Host Application Check Messages

80 - Cyclical include overlay
81 - Font does not exist
84 - Incompatible font
85 - Invalid CPI
86 - Insufficient storage
87 - Incompatible cell height
88 - Incompatible cell width
89 - Font loading error (Codepoint X'00')
8A - Font loading error (Too much data)
8B - Font loading error (Codepoint X'FF')
8C - Invalid page depth
8D - Invalid page width
8E - Image load error (Excess data)
8F - Image load error (Insufficient data)
90 - Invalid task ID
91 - Reverse forms move
92 - Overlay does not exist
93 - Invalid task length
95 - Logical page overflow
96 - Logical page overflow (Text)
97 - Barcode/Text graphic error
98 - Overstrike character left overflow
99 - Overstrike character right overflow
9A - New top of forms-data loss
9B - Invalid overlay ID
9C - Barcode codepoint invalid
9D - Barcode check digit error

Machine Check Messages

A0 - DMA failure
A1 - DMA overrun
A2 - DMA 0 timeout
A3 - DMA 1 timeout
A4 - Print timeout
A5 - 80186 Bus error
A6 - 80186 DRAM parity error
A7 - 80186 Acknowledge timeout
A8 - 8096 Ready timeout
A9 - Task Interface DRAM parity error
AA - 80186 CMOS checksum error
AB - 80186 CMOS read/write failure
AC - 80186 DRAM read/write failure
AD - 80186 SRAM read/write failure
AE - 80186 Timer failure

80186 RAS Check

B0 - 80186 Processor check
B1 - 80186 Processor check
B2 - ROS check (CRC)
B3 - DRAM check (Read/Write/Parity)
B4 - CMOS check
B5 - 80186 Processor check
B6 - 80186 Processor check
B7 - DMA check
B8 - Task Interface check
B9 - Timer check (80186)
BA - SRAM check (80186)
BB - Forms drive check
BC - Op panel check
BF - Attachment card not installed

8096 RAS Check

C0 - Processor check
C1 - Timer check
C2 - DMA/Serializer check
C4 - Shift register check
C5 - HSO check
C6 - Band check
C7 - SRAM check
C8 - SRAM arbitration check

Host Application Check Messages

F0 - Invalid mode (Graphics)
F2 - Invalid image format (Graphics)
F4 - Invalid axis angle (Graphics)
F5 - Invalid map request (Graphics)
F6 - Local PG mapping error (Graphics)

Field Replaceable Units (FRUs)

A0 - System card
A3 - Attachment card
A5 - Forms driver card
A7 - Op panel card set
AB - Hammer driver card
B0 - Band motor
B1 - Dot band
B2 - Band sensor
B3 - Power supply
B5 - Forms motor
BA to BF - Hammer bank 1 to 6
C1 - Op panel cable
C2 - Sensor cable
C3 - Power logic cable

C4 - Band drive/Forms drive cable
C5 - Hammer cable
C6 - Hammer cable
C7 - Power cable

800 Locations and Wiring Diagrams

800 - Section Contents

Locations

Front and Rear Locations

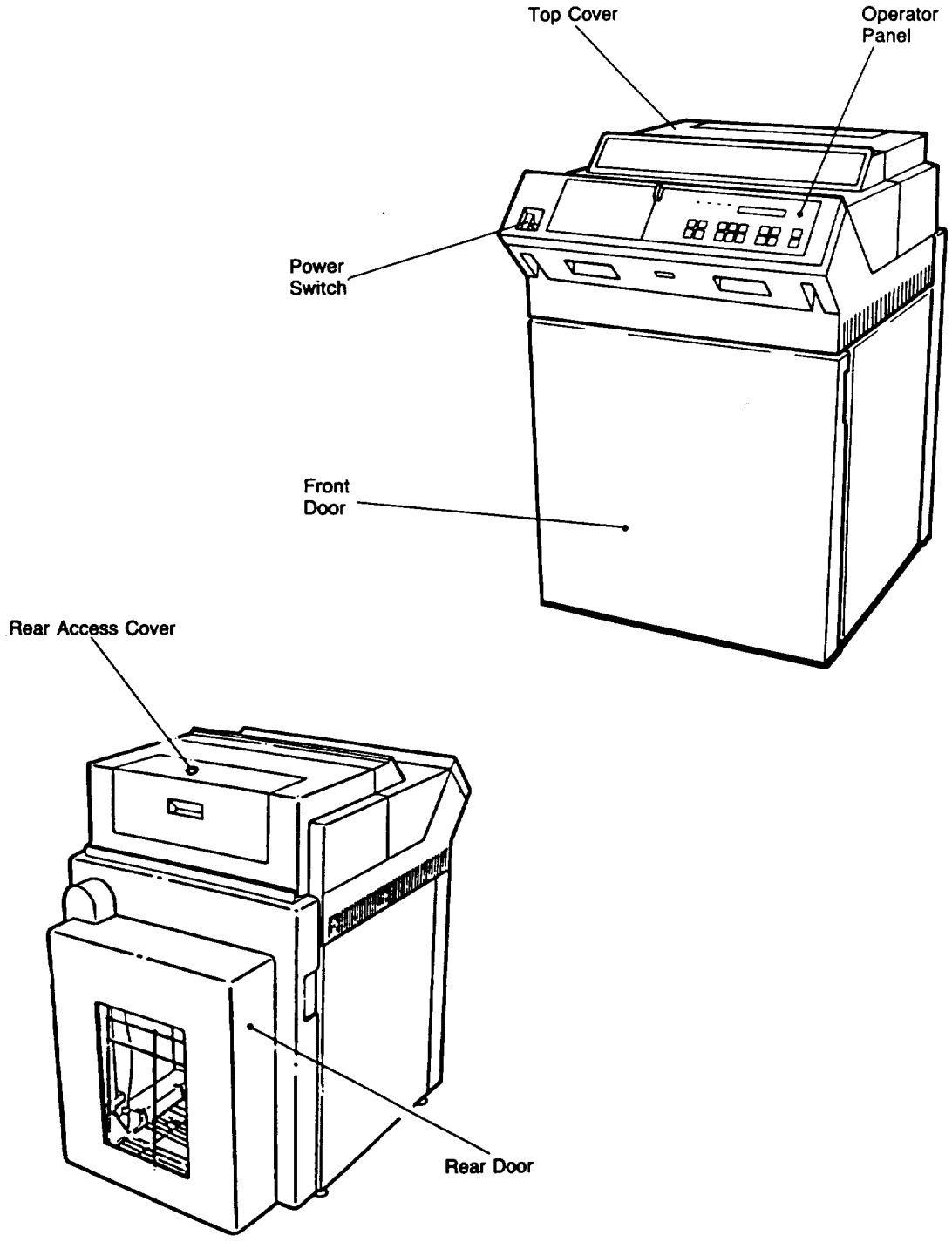


Figure 77. Locations, Front and Rear

Top Front Locations

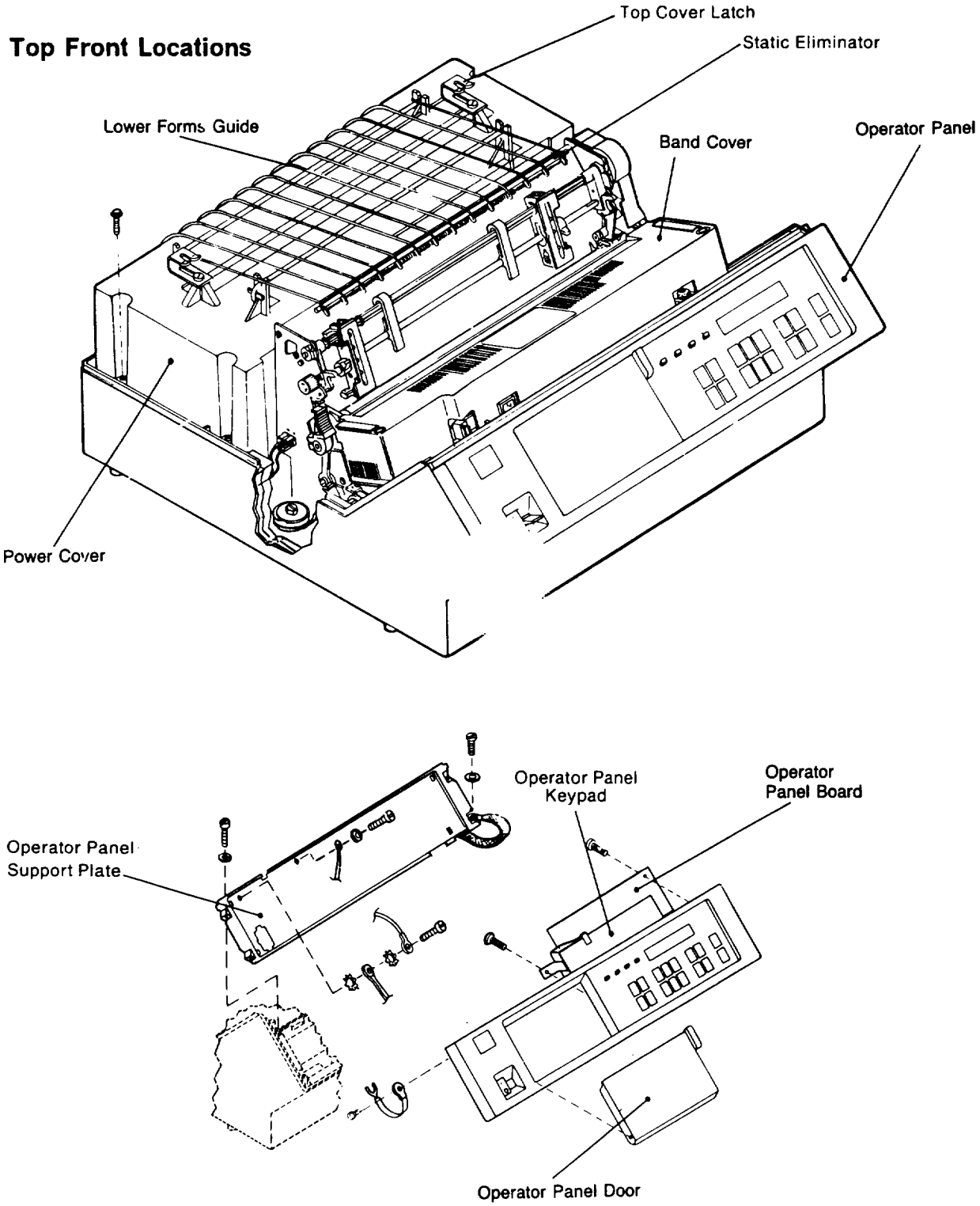


Figure 78. Locations, Top Front

Transport Assembly, Part 1

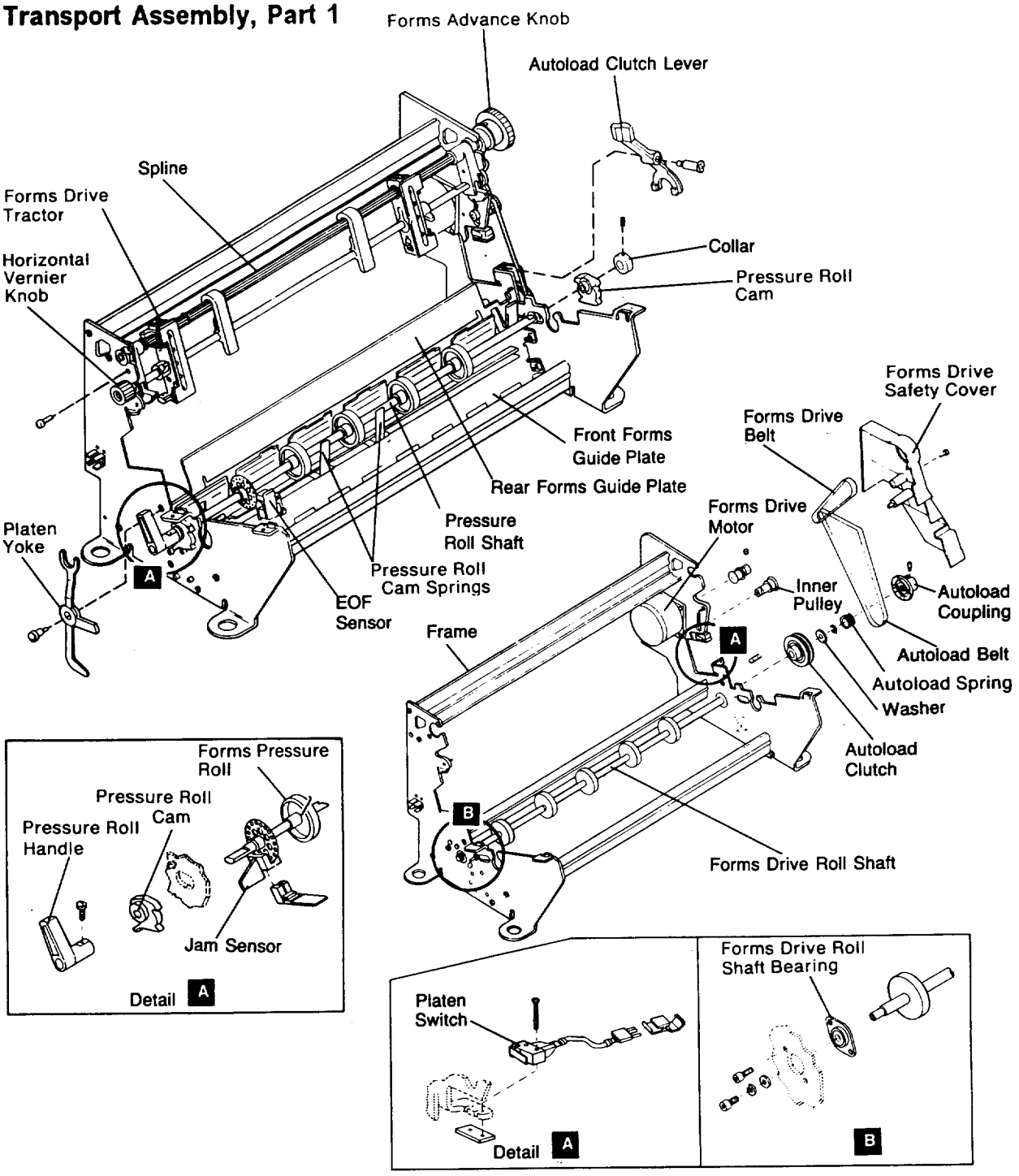


Figure 79. Locations, Transport Assembly, Part 1

Transport Assembly, Part 2

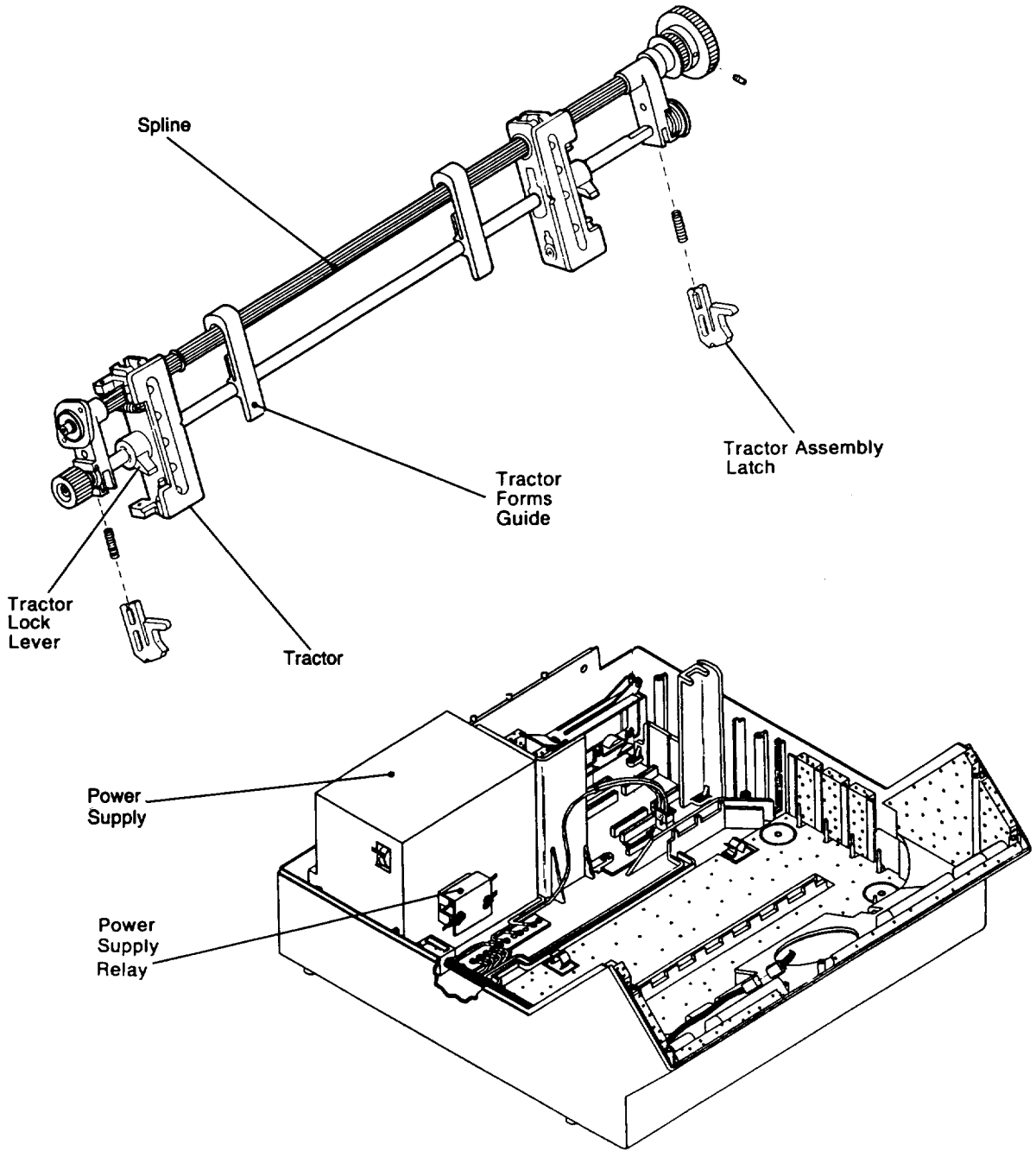


Figure 80. Transport Assembly, Part 2

Printer Mechanism

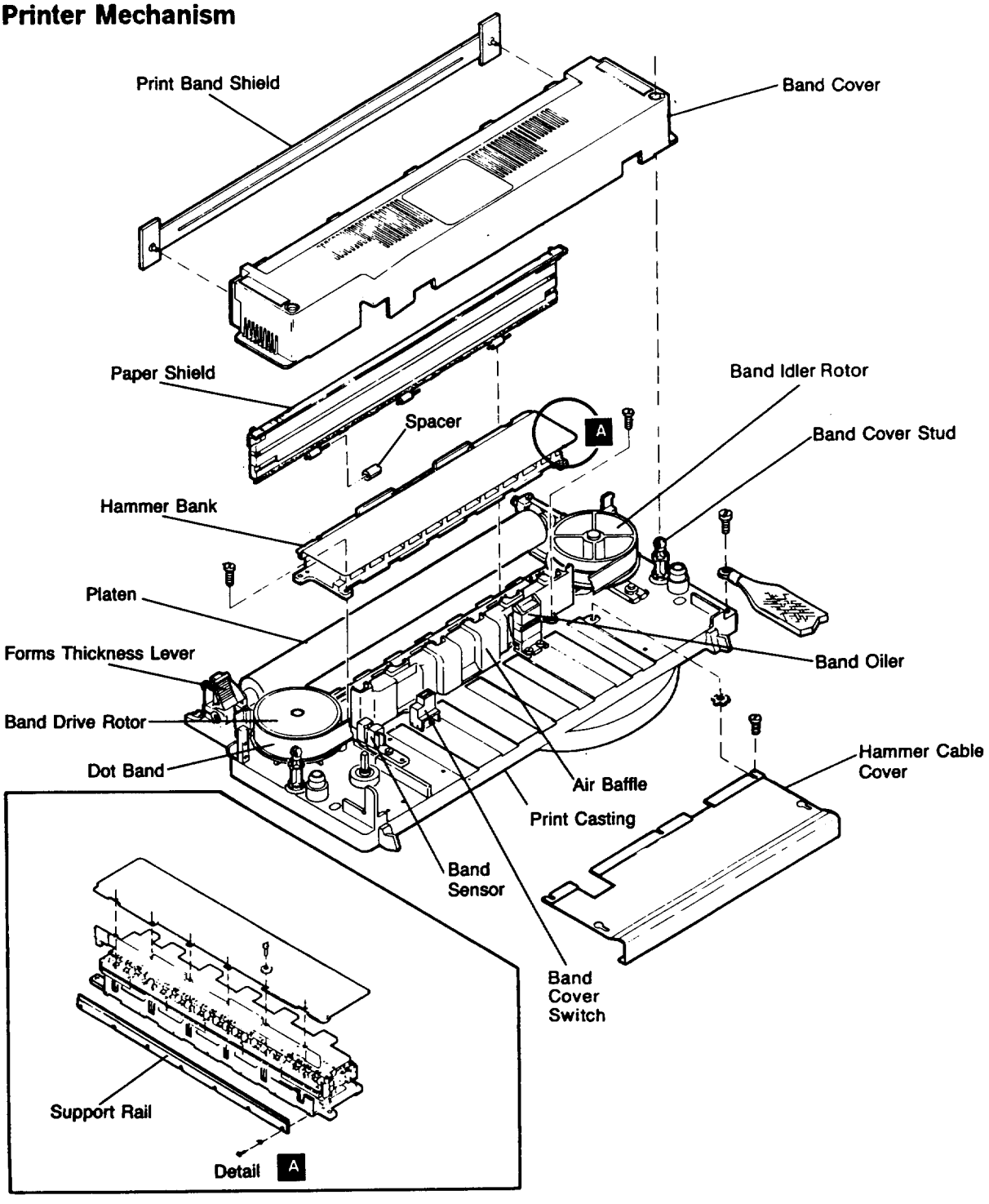


Figure 81. Printer Mechanism

Print Casting

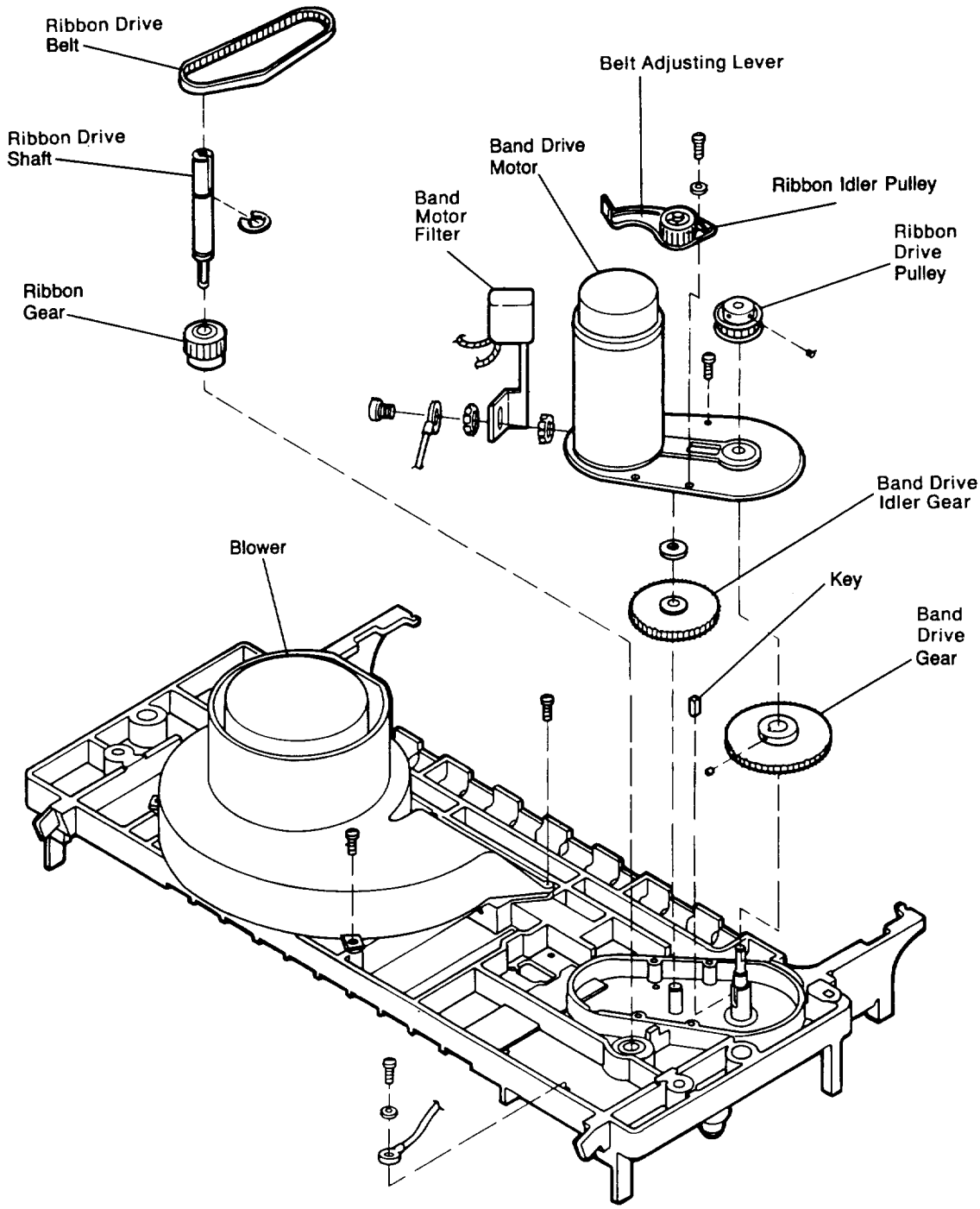


Figure 82. Print Casting

Card and Cable Connections

Interconnect Board

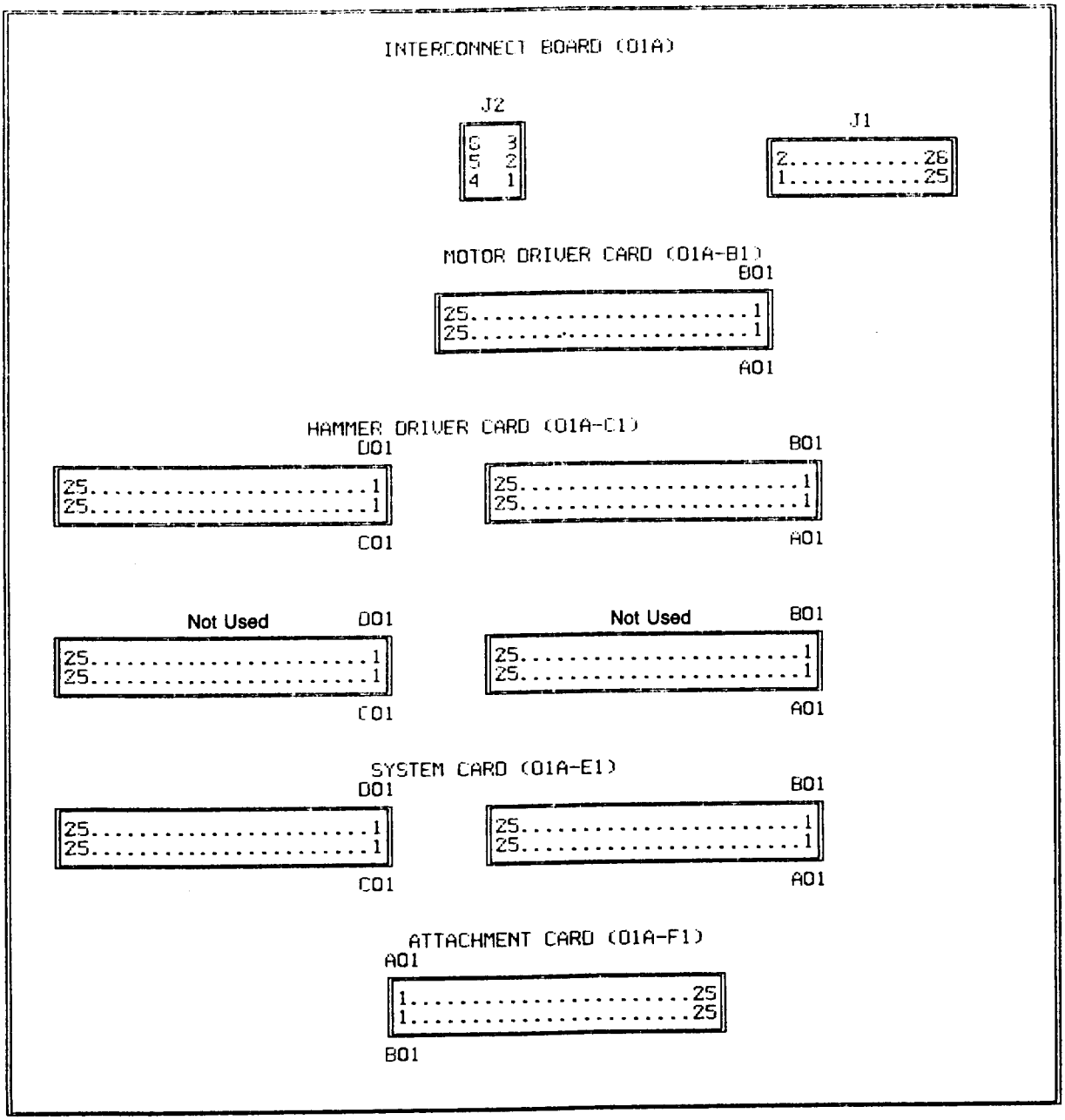


Figure 83. Interconnect Board

Attachment Card Connections

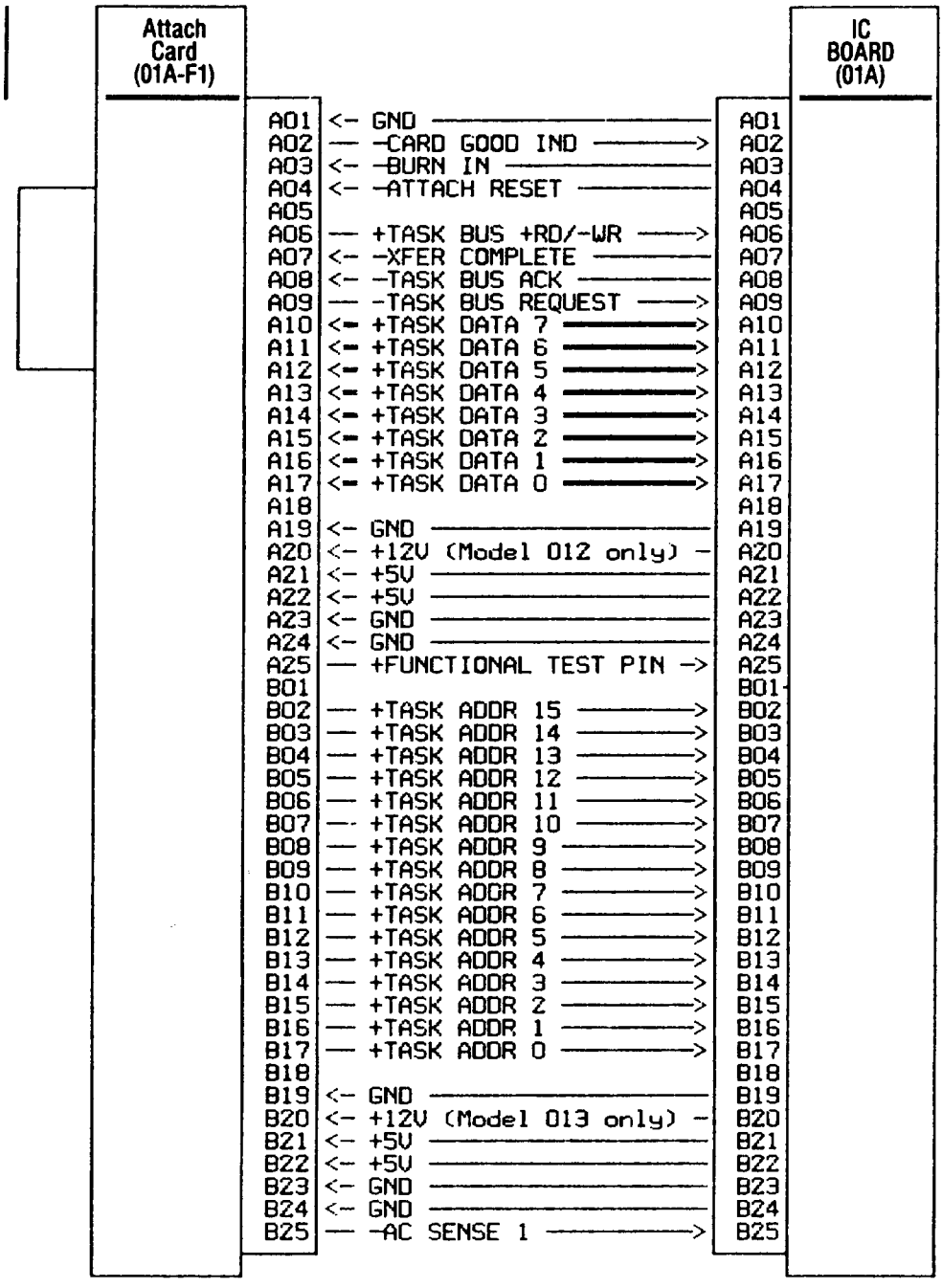


Figure 84. Attachment Card Connections

Motor Driver Card and Cable Connections

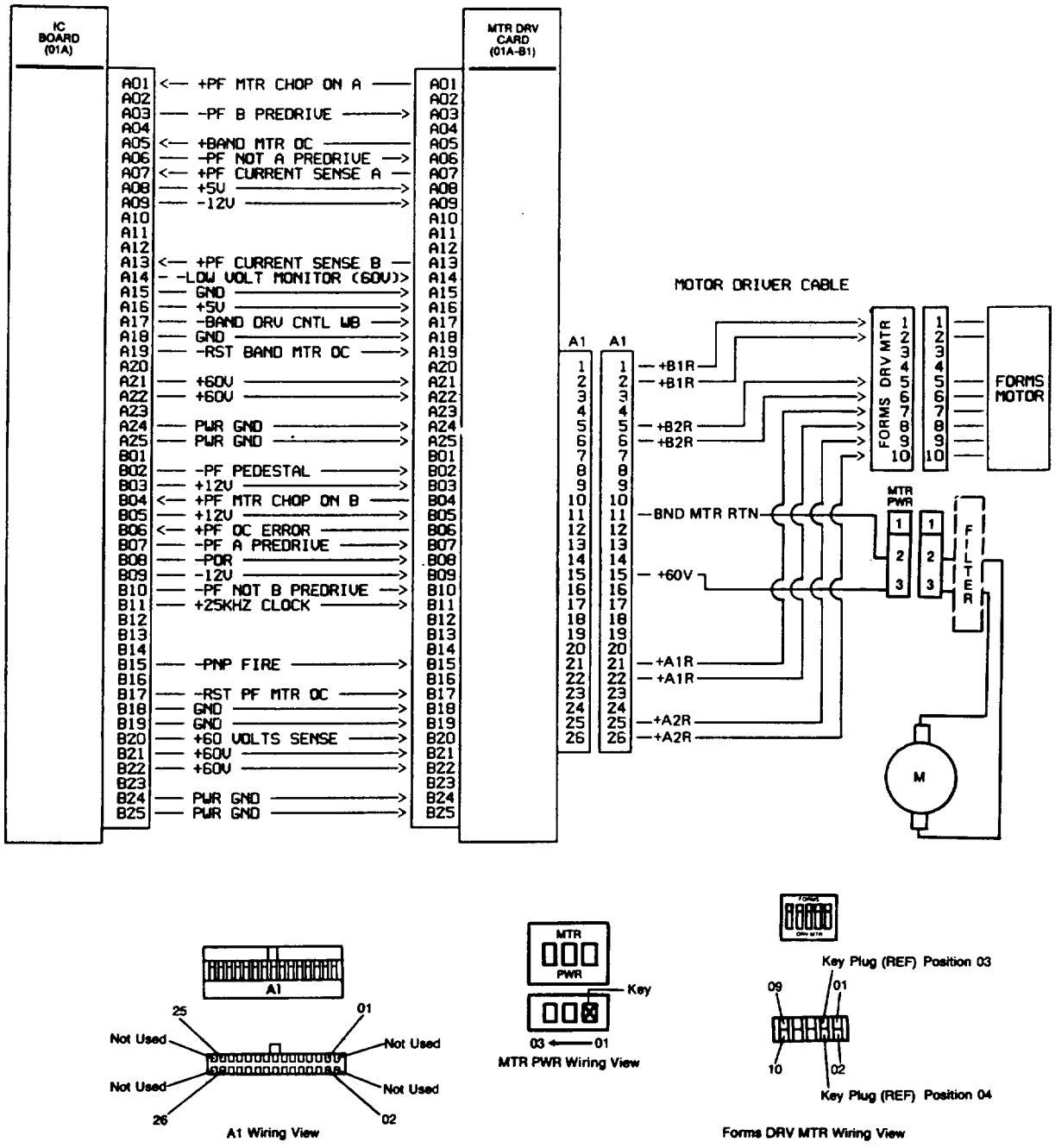


Figure 85. Motor Driver Card and Cable Connections

Operator Panel and Sensor Cable Connections

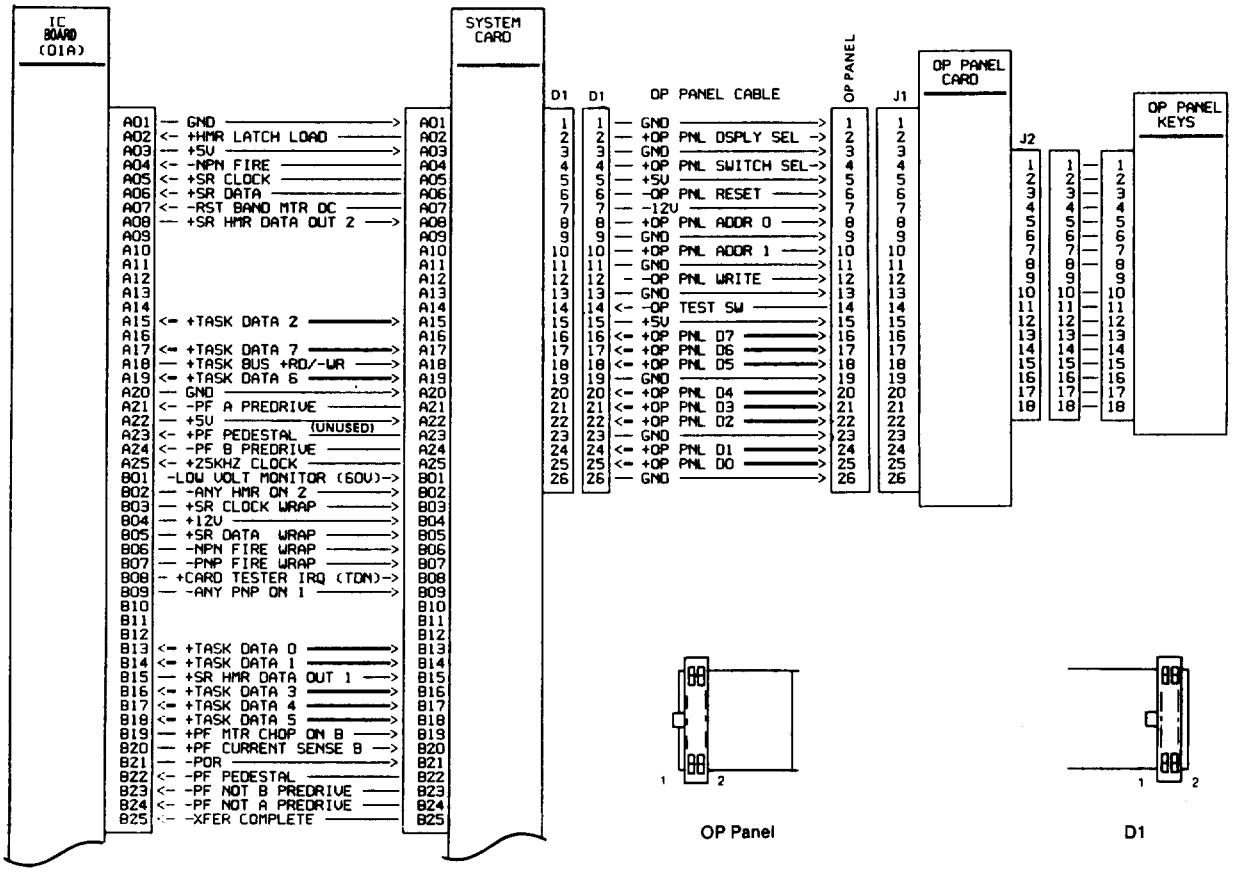


Figure 86. Operator Panel and Sensor Cable Connections

Operator Panel and Sensor Cable Connections (continued)

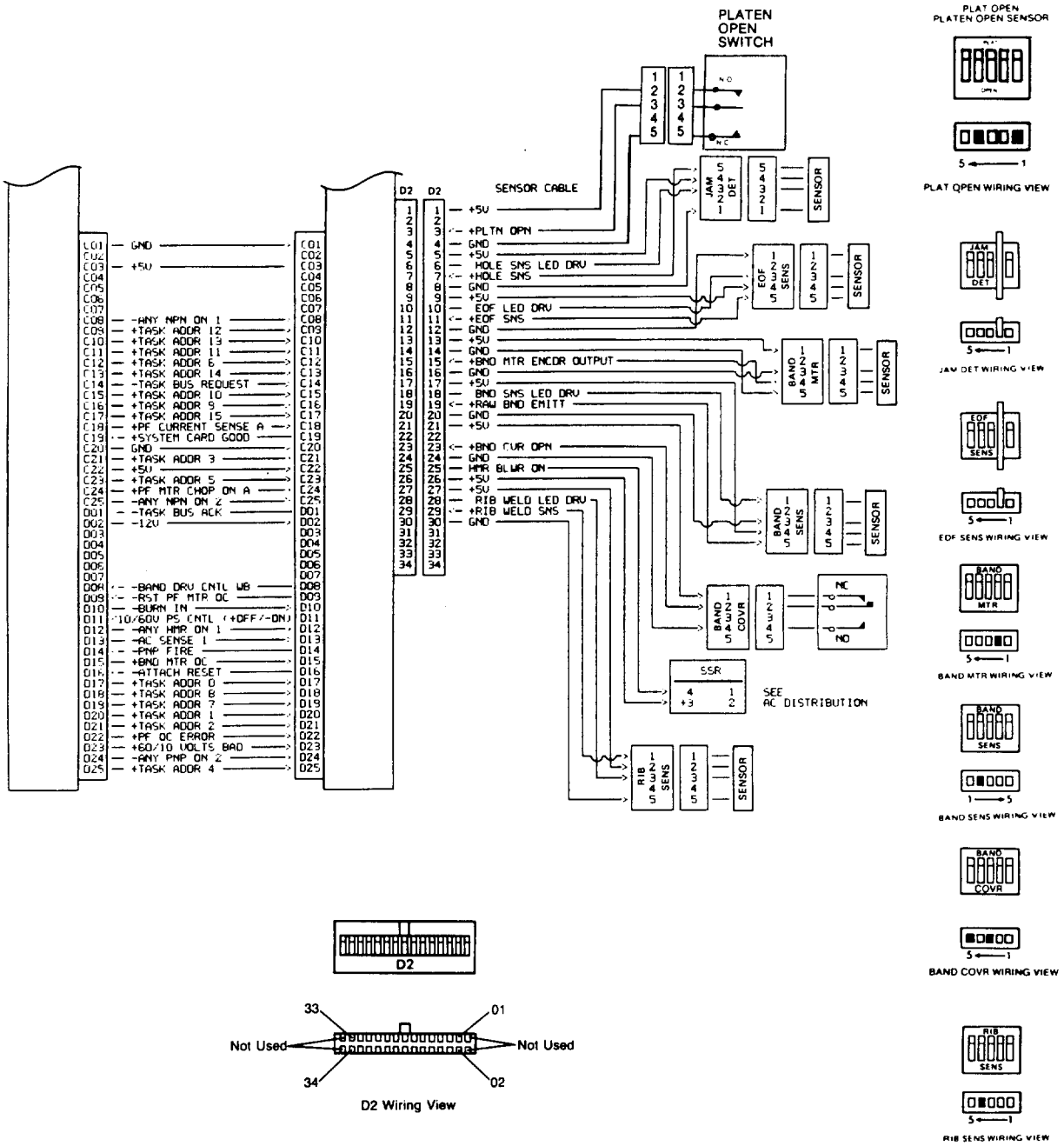


Figure 87. Operator Panel and Sensor Cable Connections

Hammer Bank Cable Connections

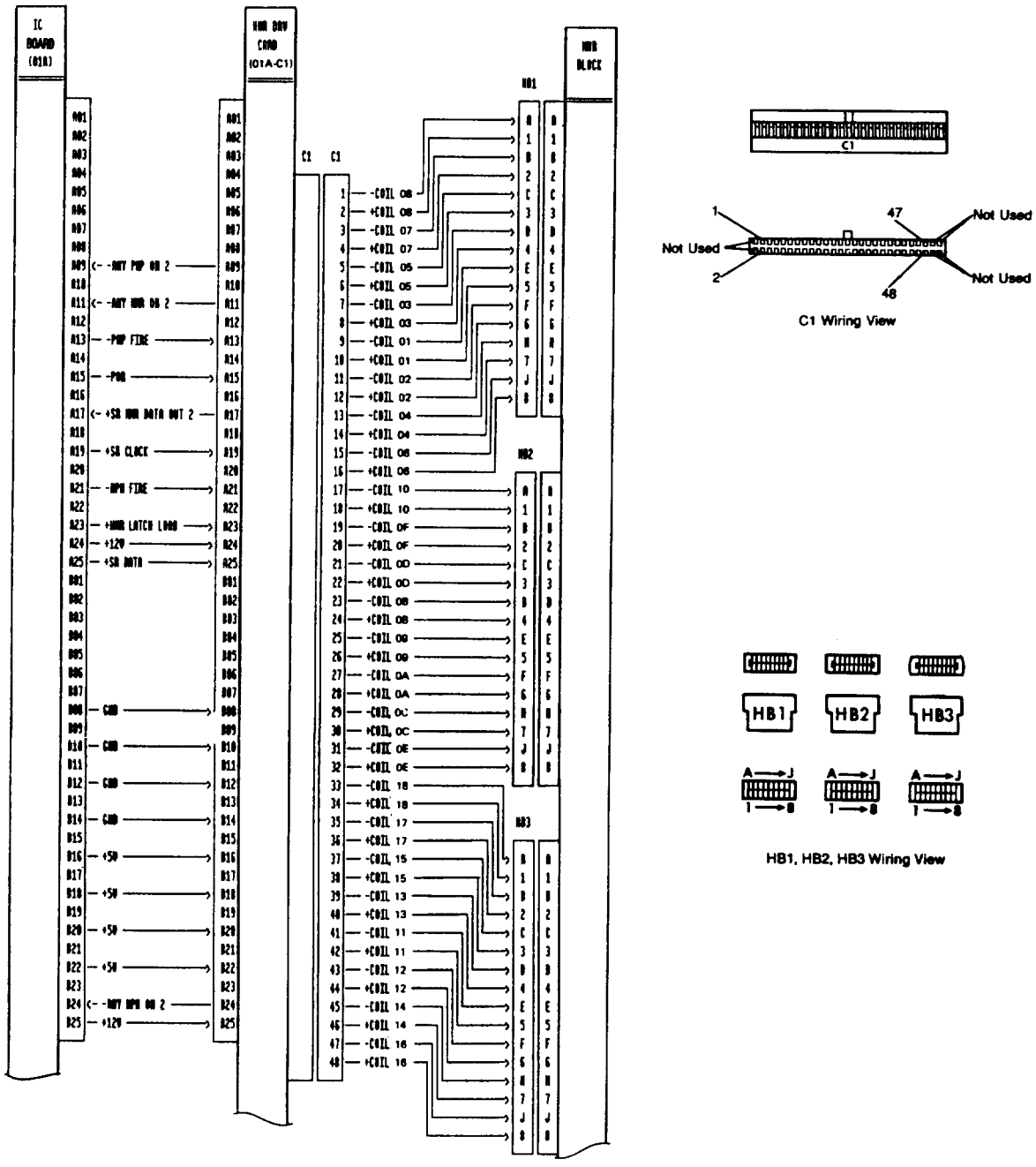
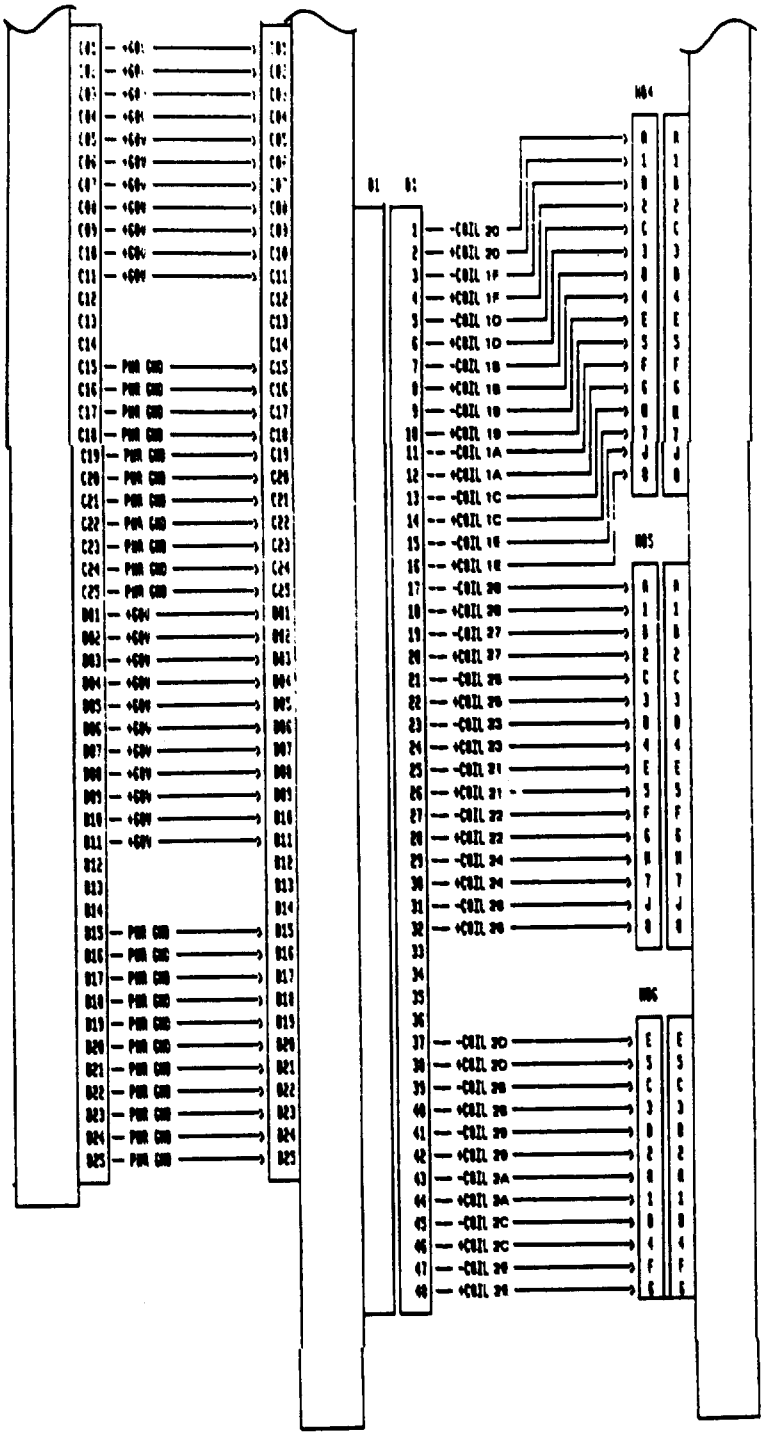
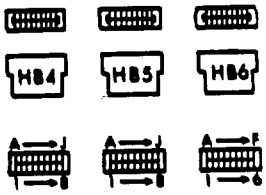


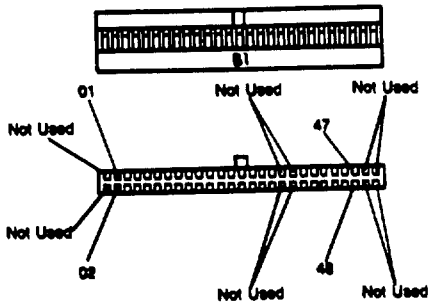
Figure 88. Hammer Bank Cable Connections

Hammer Bank Cable Connections (continued)





HB4, HB5, HB6 Wiring View



B1 Wiring View

Figure 90. Hammer Bank Cable Connections

Power Distribution

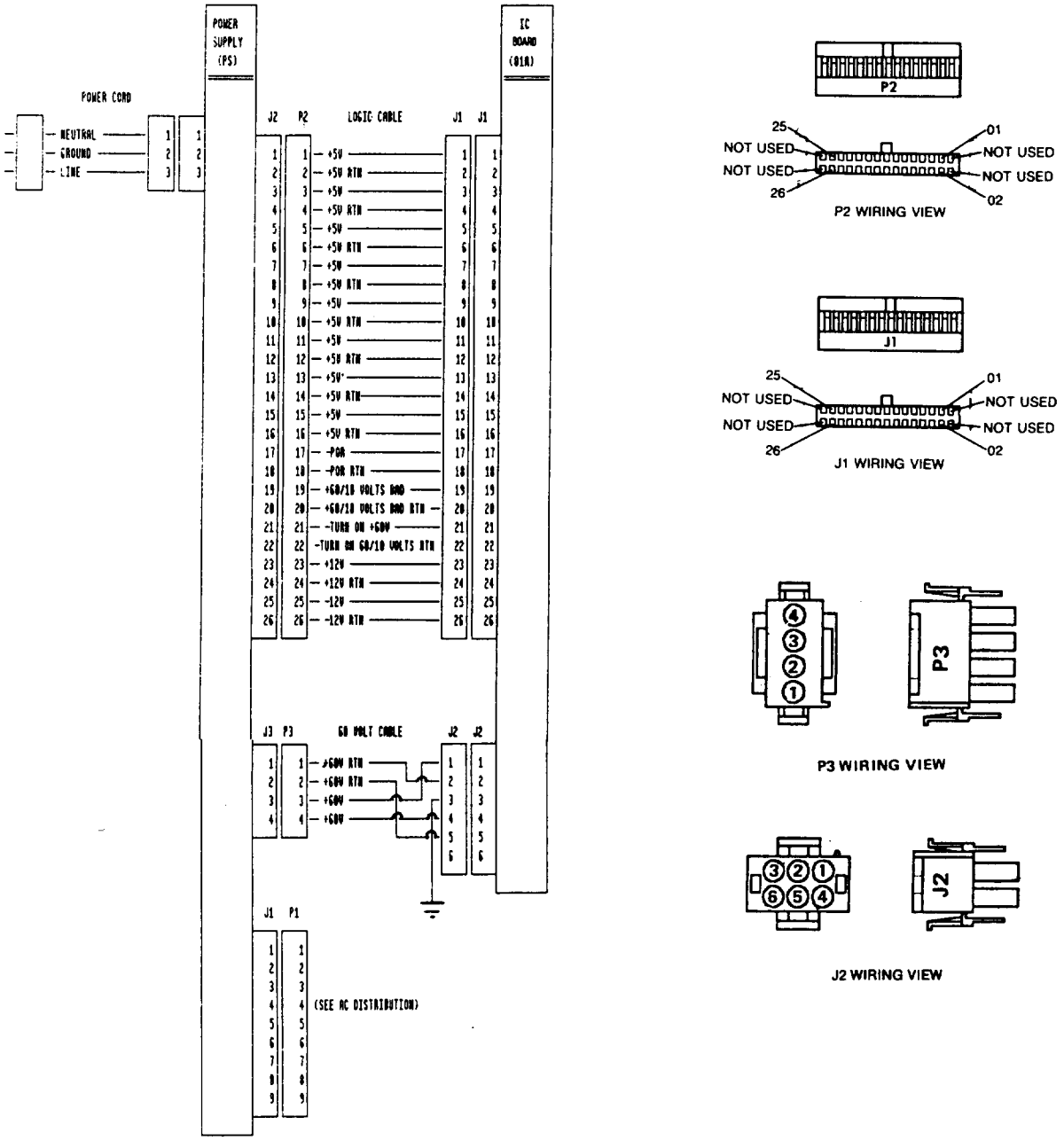


Figure 90. Power Supply, Connectors, and Pin Identification

+5 Volt Power Distribution

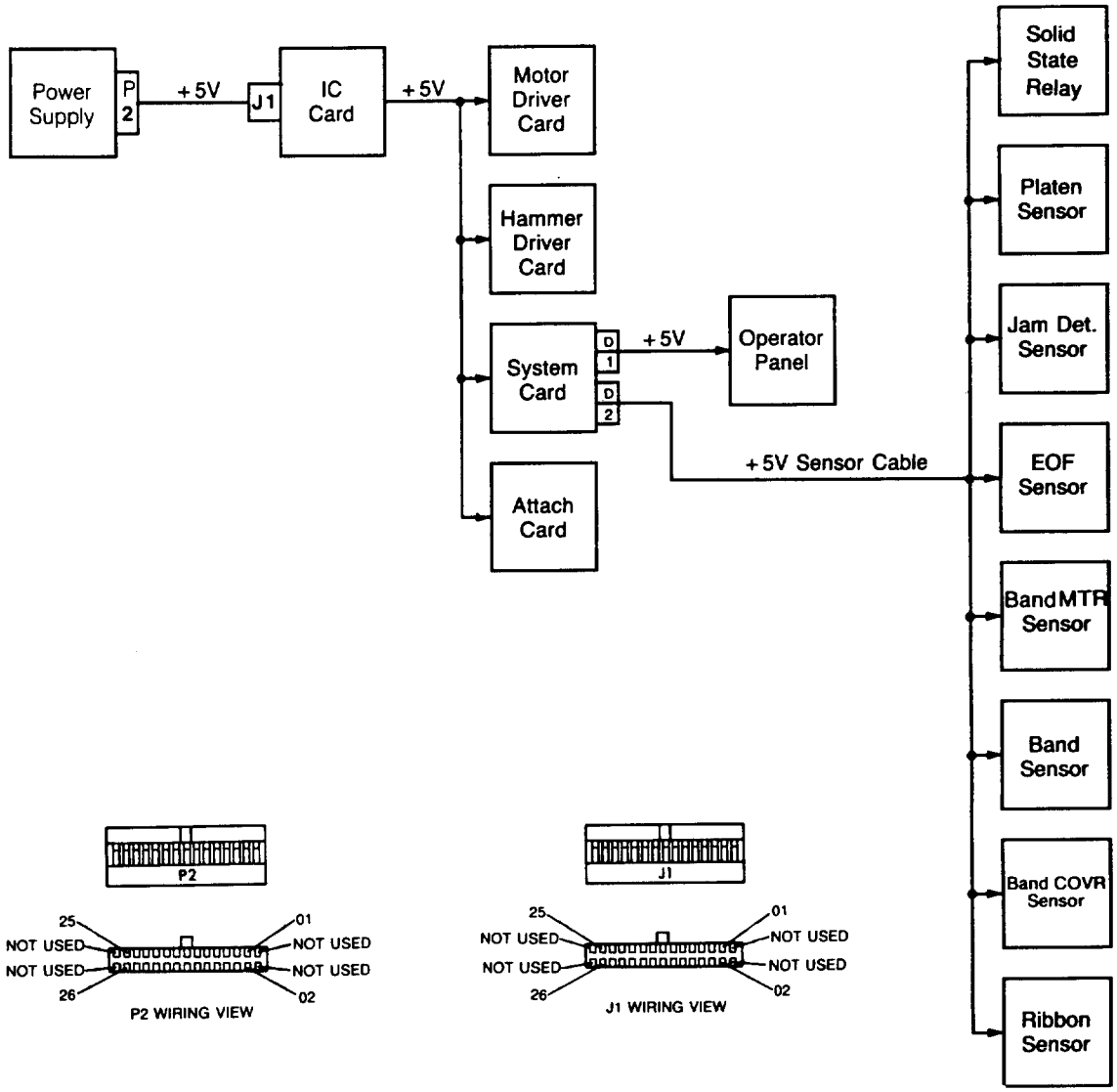
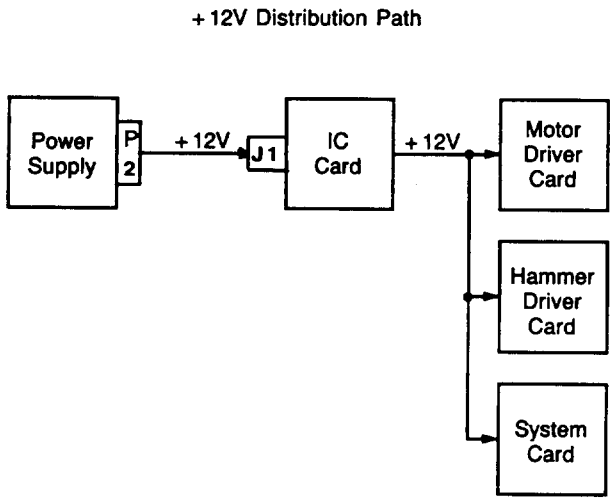


Figure 91. Power Distribution (+5 volt)

+12 Volt Power Distribution



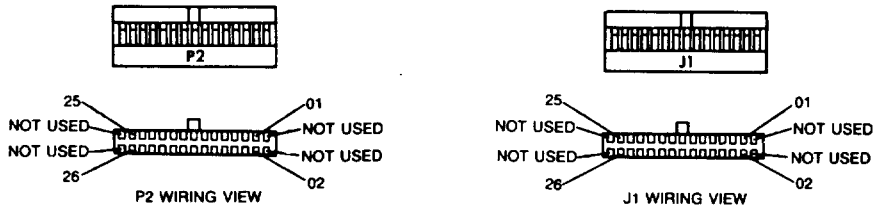


Figure 92. Power Distribution (+12 volt)

-12 Volt Power Distribution

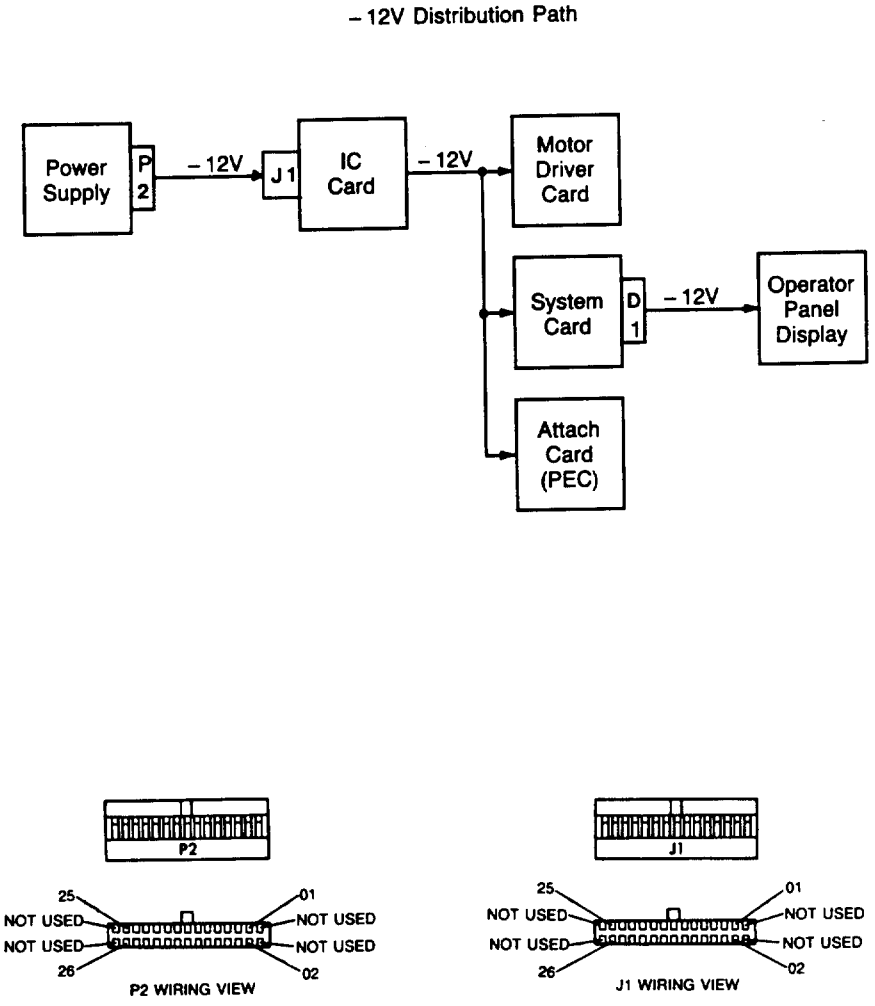
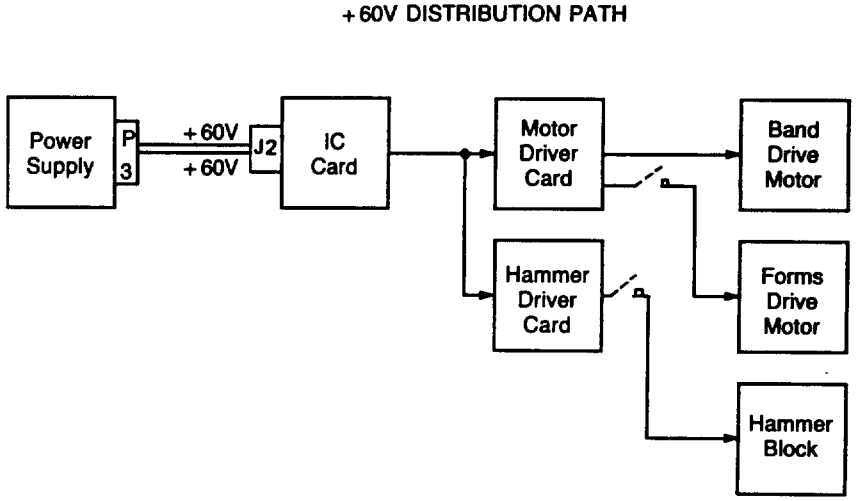
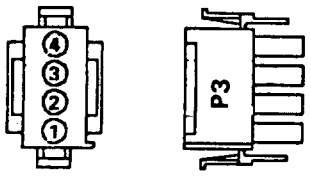


Figure 93. Power Distribution (-12 volt)

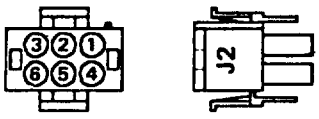
+60 Volt Power Distribution



NOTE: +60V dc does not go directly to the forms drive motor or to the hammer block, but is switched to them by their respective drive cards.



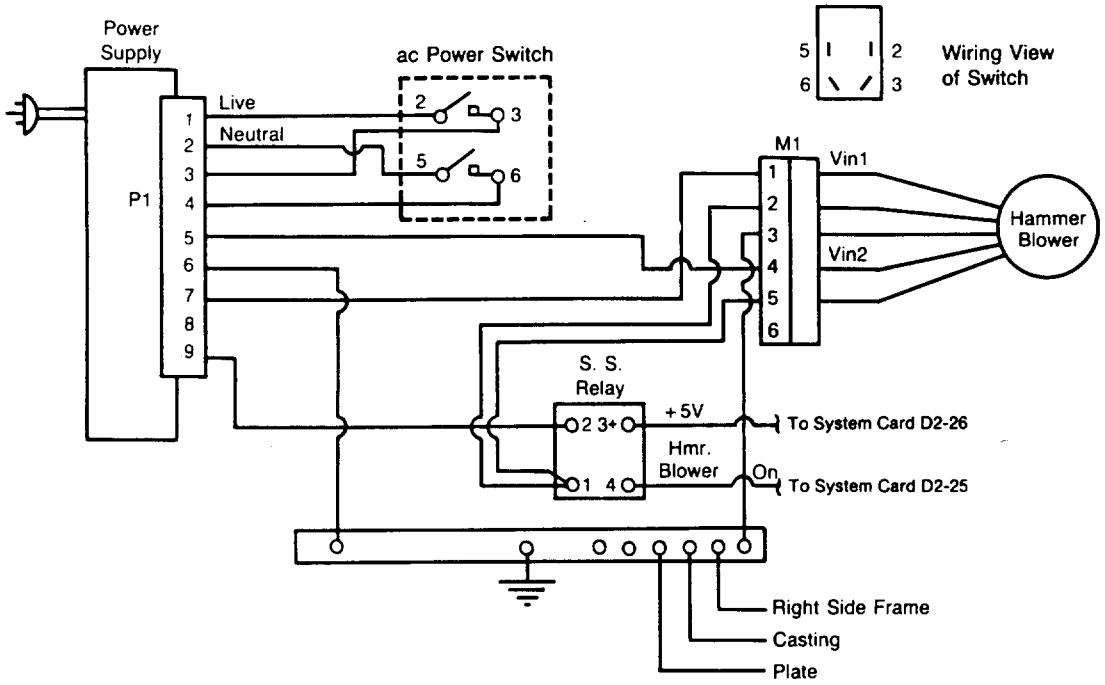
P3 WIRING VIEW

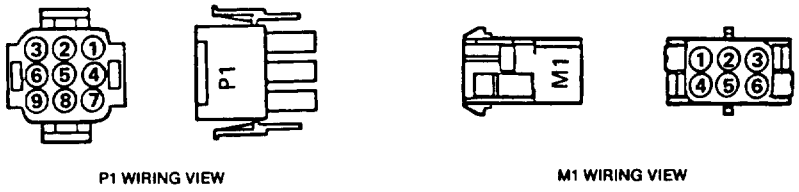


J2 WIRING VIEW

Figure 94. Power Distribution (+60 volt)

ac (Low) Power Distribution



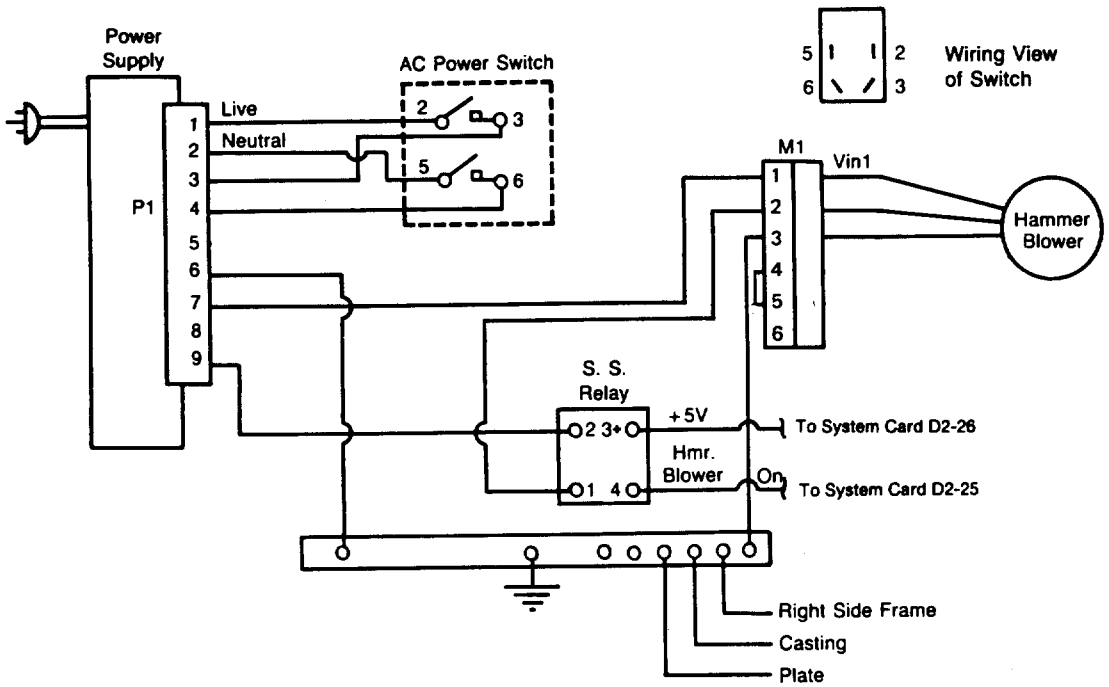


P1 WIRING VIEW

M1 WIRING VIEW

Figure 95. Power Distribution - ac (Low)

ac (High) Power Distribution



P1 WIRING VIEW

M1 WIRING VIEW

Figure 96. Power Distribution - ac (High)

Safety Grounding and ESD Wiring

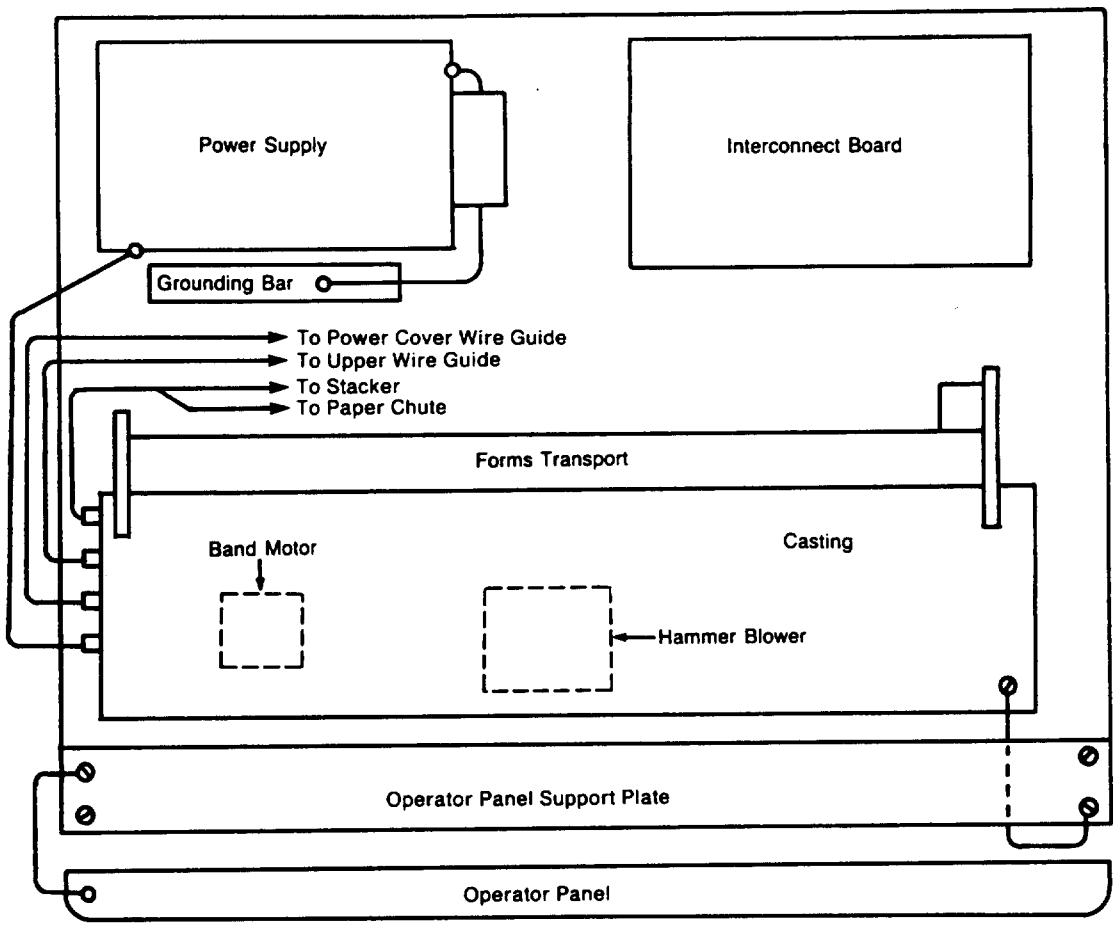
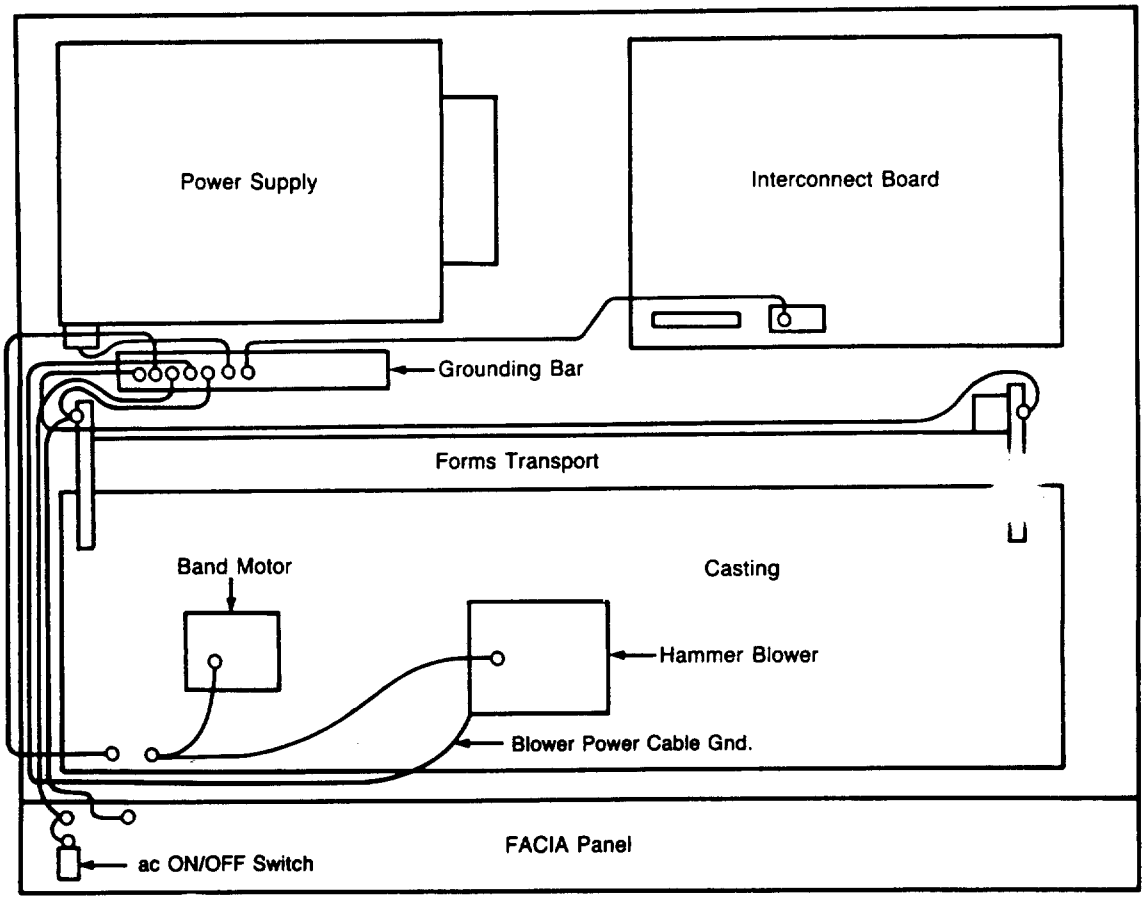


Figure 97. **(Part 1 of 2)** Safety Grounding and ESD Wiring

Safety Grounding and ESD Wiring



SAFETY GROUNDING

Figure 97. **(Part 2 of 2)** Safety Grounding and ESD Wiring

Abbreviations

AC	alternating current
APL	a programming language
BAT	basic assurance test
CA	communication adapter
CEM	customer engineering memorandum
CMOS	complementary metal-oxide semiconductor
COAX	coaxial cable
COMP	compensation
COVR	cover
CPI	characters per inch
CPS	characters per second
CRC	cyclic redundancy check
CSR	customer service representative
CSU	customer setup
CU	control unit
DC	direct current
DMA	direct memory access
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
LCD	liquid crystal display
LED	light emitting diode
LPI	lines per inch
LPM	lines per minute
MAP	maintenance analysis procedure
MC	mechanism controller
MCPC	Machine Check/Program Check
MS	mechanism slave
MIM	maintenance information
MMIMO	memory mapped input output
MPL	maximum page length or maximum print line **length**
MPP	maximum print position
MPU	microprogram unit
N/A	not applicable
NLQ	near letter quality
NPN	negative-positive-negative (transistor term for lower drive signal to the hammer coils)
OCR	optical character recognition
PA1	program attention 1
PA2	program attention 2
PA KEY	Either PA1 or PA2 keys on the Operator Panel
PC	printer controller
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
POST	power on self test
PSF	proportional spaced font
RAM	random access memory
RAS	reliability, availability, and serviceability
ROS	read only storage
SC	status code
SD	status display
SENS	emitter sensor
SRAM	shared random access memory
SW	switch
SYNC	synchronization
VSP	variable speed print
WT	World Trade

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Numerics

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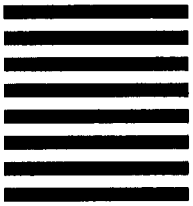

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