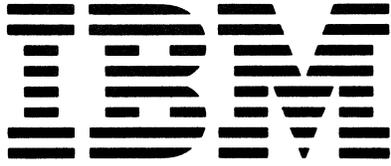


SY34-0060-1

IBM 5225 Printer
Models 1, 2, 3, and 4
Maintenance Information



SY34-0060-1

IBM 5225 Printer
Models 1, 2, 3, and 4
Maintenance Information

Federal Communications Commission (FCC) Notice

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

Second Edition (April 1982)

This is a major revision of, and obsoletes, SY34-0060-0. Because the changes and additions are extensive, this manual should be reviewed in its entirety.

Use this publication only for the purpose stated in the Preface.

Changes are periodically made to the information herein; any such changes will be reported in subsequent revisions or Technical Newsletters.

It is possible that this material may contain reference to, or information about, IBM products (machines and programs), programming, or services that are not announced in your country. Such references or information must not be construed to mean that IBM intends to announce such IBM products, programming, or services in your country.

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Preface

This publication is for IBM Customer Engineers and customer service personnel who maintain the IBM 5225 Printer. The user of this publication should have basic mechanical/electrical and electronic experience, and should have completed the IBM service course for the 5225 Printer.

This publication was written using the IBM CE Limited Vocabulary.

The following information is included in this publication:

- Introduction to the printer
- Overview of maintenance strategy
- Description of testing procedures
- Operation description of functional unit operation
- Service checks
- Adjustment procedures
- Removal and replacement procedures
- Reference information

This publication is intended for use with the Maintenance Analysis Procedures (MAPs) for the 5225 Printer.

Related Publications

Related publications that are useful to service personnel are:

- For machine setup, *IBM 5225 Printer Setup Manual*, GA34-0085
- For machine operation, *IBM 5225 Printer Operator Guide*, GA34-0054
- For parts information, *IBM 5225 Printer Parts Catalog*, S134-0032

Warning, Danger, and Caution Notices

WARNING notices alert you to conditions that could damage the machine.

DANGER and CAUTION notices alert you to conditions that could cause personal injury.

DANGER

Do not attempt to service the printer subassemblies after you have removed them from the machine if the cables are attached and the power is on.

Note: The following pages of the Maintenance Information Manual (MIM) have DANGER, CAUTION, and WARNING notices. If desired, translate those notices and write your own words on the blank lines provided on these pages.

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Grounding ac Outlet

The 5225 Printer must be connected to a properly grounded ac outlet. Refer to the System Planning and Site Preparation Guide for your system.

Using the IBM 5225 Maintenance Information Manual

The information in this manual is to be used as reference material when diagnosing machine failures. The contents include maintenance procedures, diagnostic aids, and theory. This maintenance information manual will be revised as needed to contain the latest material relating to the IBM 5225 Printer.

The format for page numbering is X-YYY.Z. X is the chapter number, YYY is the page number, and Z (although not normally used) is for expansion when giving new numbers to all pages is not practical.

Reference Methods

Reference methods used in the manual are:

- MAP 4-digit reference numbers
- Page number references
- On-page references

MAP 4-digit reference numbers are assigned to location drawings and maintenance procedures to reference from the MAPs and from other procedures within this manual. For example, 3104 is the forms drive motor and encoder adjustment procedure.

Page references in a section are to the specific page containing the information, for example, see 3-20.

On-page references are: *this page, see below*, etc. For figures with named or numbered parts, the reference is to the specific number or name of the part.

When multiple procedures are required to perform a specific removal or adjustment, the referenced procedure will be indicated as follows.

X. Open the left end cover (1005).

1005 is the procedure for opening and removing the left end cover.

Content Summary

Chapter 1. Introduction

This chapter contains the specifications for the IBM 5225 Printer, and a brief description of the major functional units.

Chapter 2. Maintenance Summary

This chapter contains:

- A description of the tools necessary to service the printer.
- An identification of preventive maintenance requirements.
- A description of each of the test routines contained in the Printer Control Unit.
- A description of the actuator carrier drive motor, and the forms drive motor adjustment procedures.

Chapter 3. Maintenance Procedures

This chapter contains location drawings and maintenance procedures for repairing or installing Field Replaceable Units (FRUs) that the MAPs call out. The location drawings are of 2 types: reference drawings showing the major functional units, and detail location drawings showing the FRUs in a functional unit. Maintenance procedures are service checks, removals, replacements, reinstalls, and adjustments. All procedures have 4-digit reference numbers assigned to reference from the MAPs.

Chapter 4. Reference Information

This chapter contains:

1. Reference drawing showing the major functional units.
2. Detailed drawings showing the FRUs in a functional unit.
3. Command Summary
4. Environmental considerations
5. Status and error information.

Chapter 5. 5225 Preventive Maintenance

This chapter contains maintenance procedures and lubrication points.

Glossary of Terms and Abbreviations

This section contains definitions of terms and abbreviations that are not common, but are used in the MIM and MAPs.

Maintenance

Sequence-Affected Adjustments

The following adjustment procedures must be performed in the sequence listed, and all adjustments must be performed.

3104 Forms Feed Electronic Adjustments

1. Forms Symmetry A
2. Forms Symmetry B
3. Forms quadrature
4. Forms speed
5. Forms busy

3105 Actuator Carrier Assembly Electronic Adjustments

1. Carrier speed at 10 cpi
2. Carrier speed at 15 cpi
3. Carrier turnaround

3303 Linear Encoder and Amplifier Assemblies

1. Encoder glass to LED assembly space adjustment
2. LED assembly vertical and skew adjustment
3. LED assembly left and right adjustment
4. Character alignment

3306 Actuator Carrier

1. Vertical bearing adjustment
2. Thrust track to carrier shaft alignment
3. Thrust bearing adjustment

3402 Forms Feed Assembly

1. Left to right play adjustment
2. End plate to print assembly adjustment
3. Platen to print actuator adjustment
4. Forms drag assembly

Safety

CE Safety Practices

All Customer Engineers are expected to take every safety precaution possible and to observe the following safety practices while maintaining IBM equipment:

1. You *should* not work alone under hazardous conditions or around equipment with dangerous voltage. Always advise your manager if you **MUST** work alone.
2. Remove all power, ac and dc, when removing or assembling major components, working in immediate areas of power supplies, performing mechanical inspection of power supplies, or installing changes in machine circuitry.
3. After turning off the wall box power switch, lock it in the Off position or tag it with a "Do Not Operate" tag, Form 229-1266. Disconnect the ac power supply cord whenever possible.
4. When working on equipment having exposed operating mechanical parts or exposed live electrical circuitry anywhere in the machine, it is absolutely necessary to observe the following precautions:
 - a. Another person familiar with power off controls must be in immediate vicinity.
 - b. Do not wear rings, wrist watches, chains, bracelets, or metal cuff links.
 - c. Use only insulated pliers and screwdrivers.
 - d. Keep one hand in your pocket.
 - e. When using test instruments, be certain that the controls are set correctly and that insulated probes of the proper capacity are used.
 - f. Avoid contacting ground potential (metal floor strips, machine frames, etc.). Use suitable rubber mats, purchased locally if necessary.
5. Wear safety glasses when:
 - a. Using a hammer to drive pins, riveting, etc.
 - b. Power or hand drilling, reaming, grinding, etc.
 - c. Using spring hooks, attaching springs.
 - d. Soldering, wire cutting, removing steel bands.
 - e. Cleaning parts with solvents, sprays, cleaners, chemicals, etc.
 - f. Performing any other work that may be hazardous to your eyes.**REMEMBER—THEY ARE YOUR EYES.**

6. Follow special safety instructions when performing specialized tasks, such as handling cathode ray tubes and extremely high voltages. These instructions are outlined in CEMs and in the safety portion of the maintenance manuals.
7. Do not use solvents, chemicals, greases, or oils that have not been approved by IBM.
8. Avoid using tools or test equipment that have not been approved by IBM.
9. Replace worn or broken tools and test equipment.
10. Lift heavy equipment or parts by standing or pushing up with stronger leg muscles—this takes strain off back muscles. Do not lift any equipment or parts weighing over 60 pounds.
11. After maintenance, restore all safety devices such as guards, shields, signs, and grounding wires.
12. Each Customer Engineer must be certain that no action on his part renders products unsafe or exposes customer personnel to hazards.
13. Place removed machine covers in a safe out-of-the-way place where no one can trip over them.
14. Ensure that all machine covers are in place before returning machine to customer.
15. Always place your CE tool kit away from walk areas so no one can trip over it, such as, under a desk or table.
16. Avoid touching moving mechanical parts when lubricating, checking for play, adjusting, etc.
17. When using stroboscopes, do not touch ANYTHING—that may be moving.
18. Avoid wearing loose clothing that may be caught in machinery. Shirt sleeves must be left buttoned or rolled above the elbow.
19. Ties must be tucked inside your shirt or have a tie clasp (preferably nonconductive) approximately 3 inches from the end. Tie chains are not recommended.
20. Before starting any equipment, make certain fellow CEs and customer personnel are not in a hazardous position.
21. Maintain good housekeeping in the area of the machine while performing and after completing maintenance.

Knowing safety rules is not enough. An unsafe act will inevitably lead to an accident. Use good judgment—eliminate unsafe acts.

Artificial Respiration

General Considerations

1. **Start Immediately—Seconds Count**
Do not move the victim unless absolutely necessary in order to remove them from danger. Do not wait, look for help, stop to loosen clothing, warm the victim, or apply stimulants.
2. **Check Mouth for Obstructions**
Remove foreign objects and pull tongue forward.
3. **Loosen Clothing—Keep Victim Warm**
Take care of these items after the victim is breathing by himself or when help is available.
4. **Remain in Position**
After the victim revives, be ready to resume respiration if necessary.
5. **Call a Doctor**
Have someone summon medical aid.
6. **Don't Give Up**
Continue without interruption until victim is breathing without help or is certainly dead.

Rescue Breathing for Adults

1. Place victim on his back immediately.
2. Clear throat of water, food, or foreign matter.
3. Tilt head back to open air passage.
4. Lift jaw up to keep tongue out of air passage.
5. Pinch nostrils to prevent air leakage when you blow.
6. Blow until you see chest rise.
7. Remove your lips and allow lungs to empty.
8. Listen for snoring and gurglings, or signs of throat obstruction.
9. Repeat mouth to mouth breathing 10–20 times a minute. Continue rescue breathing until victim breathes for himself.



Thumb and
finger positions



Final mouth-to-
mouth position

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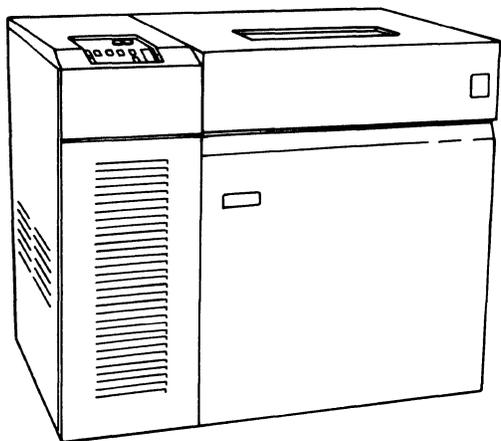
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Chapter 1. Introduction

The IBM 5225 Printer can be used for various printing needs in data processing, data collection, data entry, and communications systems. It can be used as a system printer or a work station printer.



Printer Description

- Available in four models, with printing speeds from 90 to 560 lines per minute (lpm). Model, character density, and line length determine printing speed.
- Prints characters by a series of dots contained in an eight high by nine wide matrix.
- Vertical spacing of six, eight, or nine lines per inch (lpi), selected by the operator or by program control, and special spacing of 0.352 mm (0.01388 in) under program control.
- Horizontal spacing of 10 or 15 characters per inch (cpi), selected by the operator or by program control.
- Can use one to six part continuous forms.
- Special graphics under control of the host system.
- The printer control unit (pcu) contains test routines for use by the operator and maintenance

personnel for problem determination and to verify repairs.

- Sixteen character sets are available in storage, selected by program control.

Printing Specifications

Maximum print line width—335.3 mm (13.2 in)

Maximum print positions for 10 cpi—132

Maximum print positions for 15 cpi—198

Adjustable forms width—76.2 to 450 mm (3.0 to 17.7 in)

Forms length—76.2 to 304.8 mm (3.0 to 12.0 in)

Printing Speeds

<i>Model</i>	<i>10 character per inch</i>	<i>15 character per inch</i>
1	130-280 lpm	90-195 lpm
2	205-400 lpm	145-290 lpm
3	330-490 lpm	235-355 lpm
4	520-560 lpm	365-420 lpm

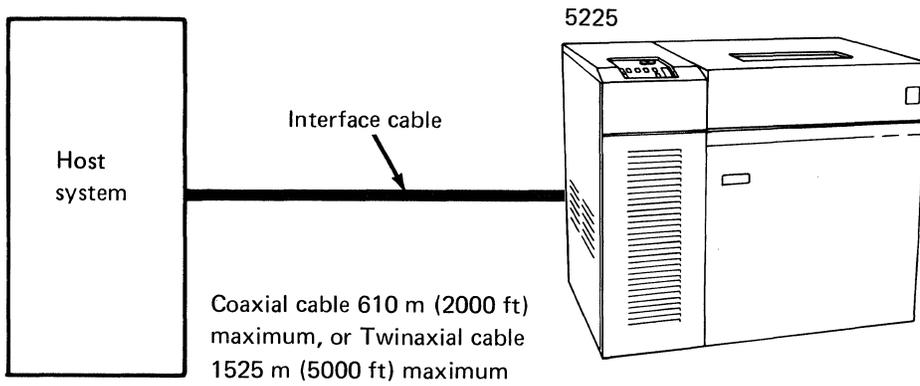
Note: The printing speed and throughput rates are determined by line density and line length, and not by the character set used.

Model Differences

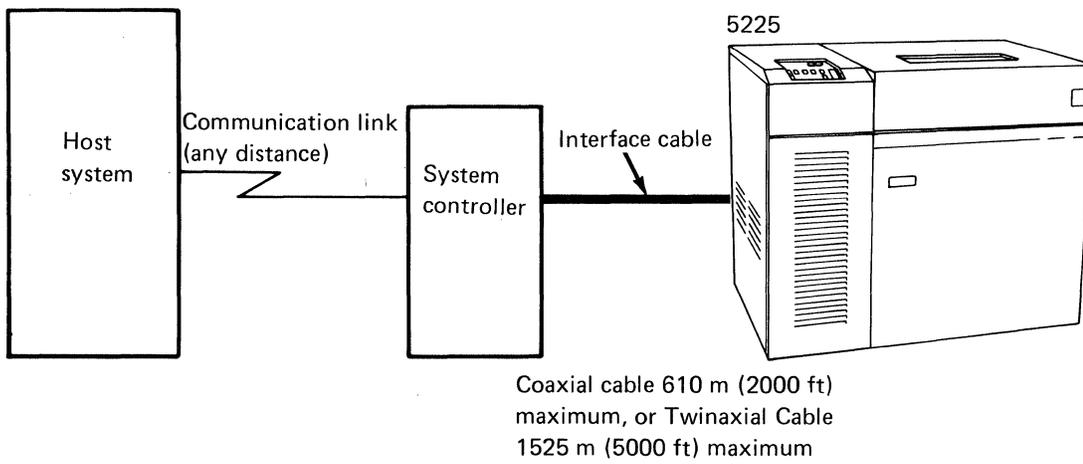
<i>Model</i>	<i>Print groups</i>	<i>Print actuators</i>
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3	6	48
4	8	64

Typical Applications

System Printer Application

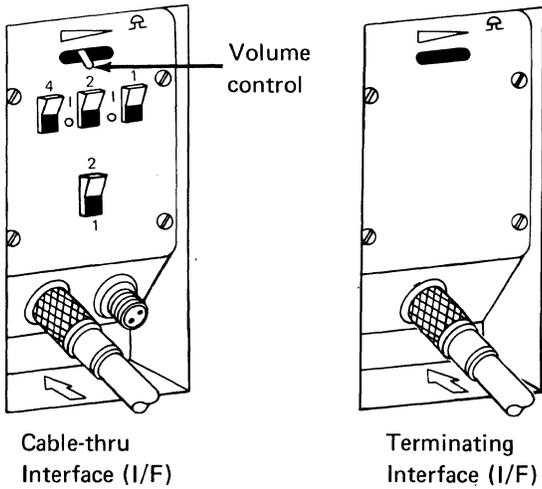


Work Station Printer Application



Customer Access Panel

With only one device on the cable, the customer access panel can be either of the following:



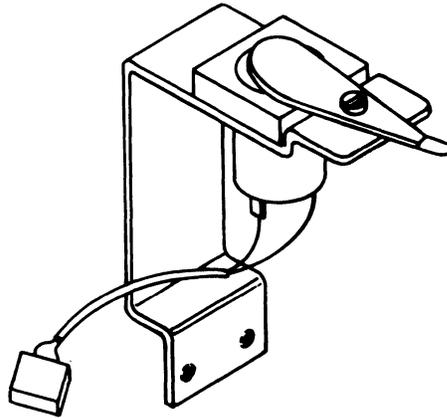
If the Cable-thru panel is installed, the switches can be set to any valid address, and the terminating switch is set to 1.

The terminating panel without switches has internal wiring for address zero and termination.

If the Cable-thru panel is installed and the printer is not the last one on the interface cable, the address switches can be set to any valid address and the terminator switch is set to 2.

Optional Features

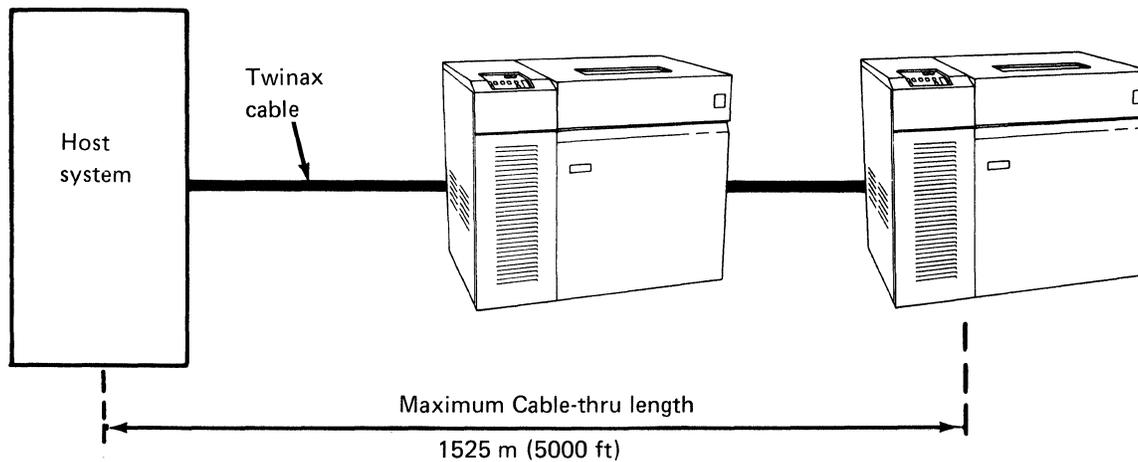
Audible Alarm Feature



The Audible Alarm Feature, which has an adjustable sound level, provides a warning to the operator of error conditions that occur during online operation.

The Audible Alarm Feature can be installed on the Cable-thru or terminating customer access panel.

Cable-thru Feature

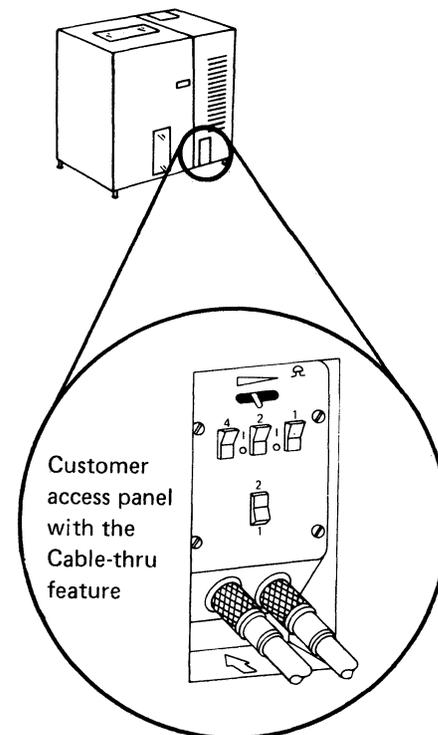


The Cable-thru Feature connects more than one printer or other work station units on the same cable to the system or controller.

Units supplied with the Cable-thru Feature have address setting switches, a terminating switch, and an additional cable connector. The customer assigns a different address to each unit on the cable and sets the address switches and terminating switch at installation time. The last printer on the cable must have the terminator switch set to 1. All other units on the cable must have the terminator switch set to 2. The Cable-thru Feature is not needed on the last unit on the line.

With the Cable-thru Feature, the maximum cable length restriction is measured from the controlling device to the last unit on the line. Up to seven devices can be installed on the line if twinax cable is used. The maximum cable-thru length is 1525m (5000 ft.).

No more than two devices can be installed if coaxial cable is used between the controlling system and the first device. The maximum cable length for coaxial cable is 610m (2000 ft). The maximum cable-thru length (coaxial+twinax) is 640m (2100 ft.).

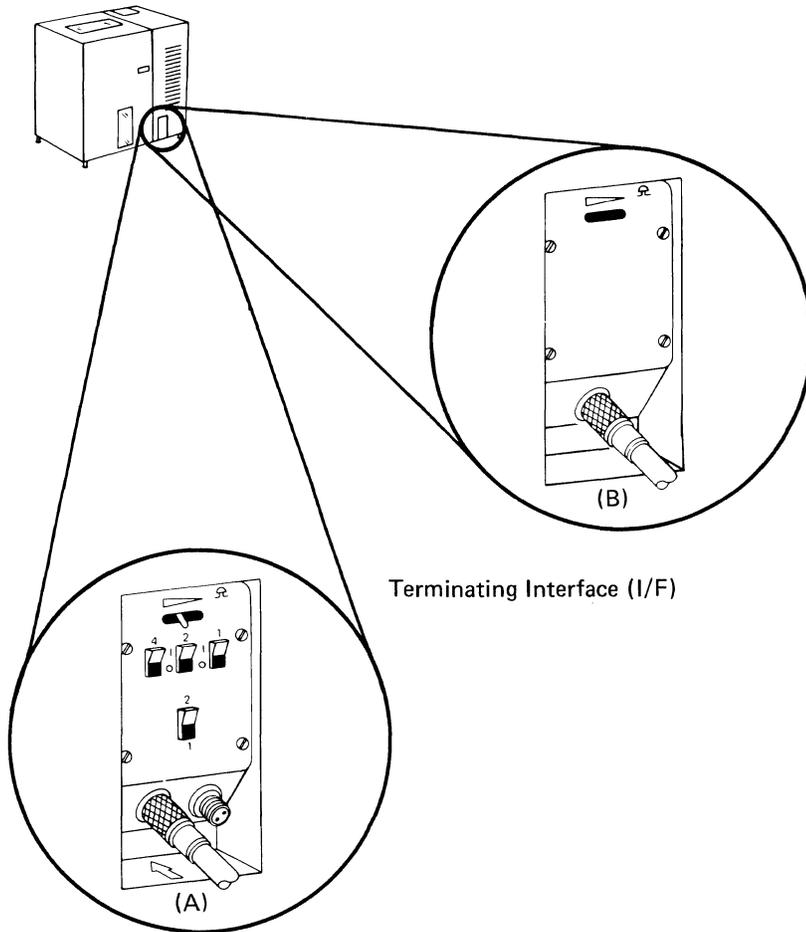


A terminating switch is supplied with this feature to terminate the line of the last unit on the cable.

The last printer on the cable must have the terminating switch set to 1, no cable from the out socket, and the address switches set to any valid address (A).

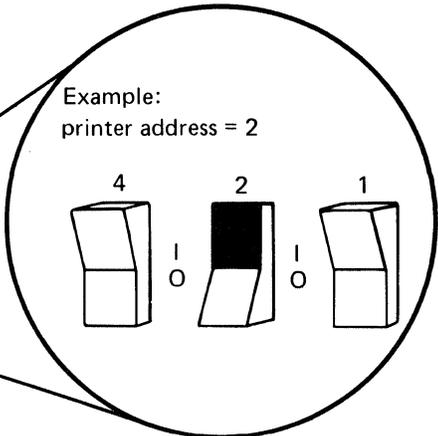
If the last printer has an interface panel with no switches (B), the panel is wired to address 000 and terminated internally.

The positioning of the three address switches determines the printer address. The address switch setting can be changed by the customer.



Printer address	Printer address switches
	4 2 1
0	
1	
2	
3	
4	
5	
6	
7	

Invalid



Functional Units

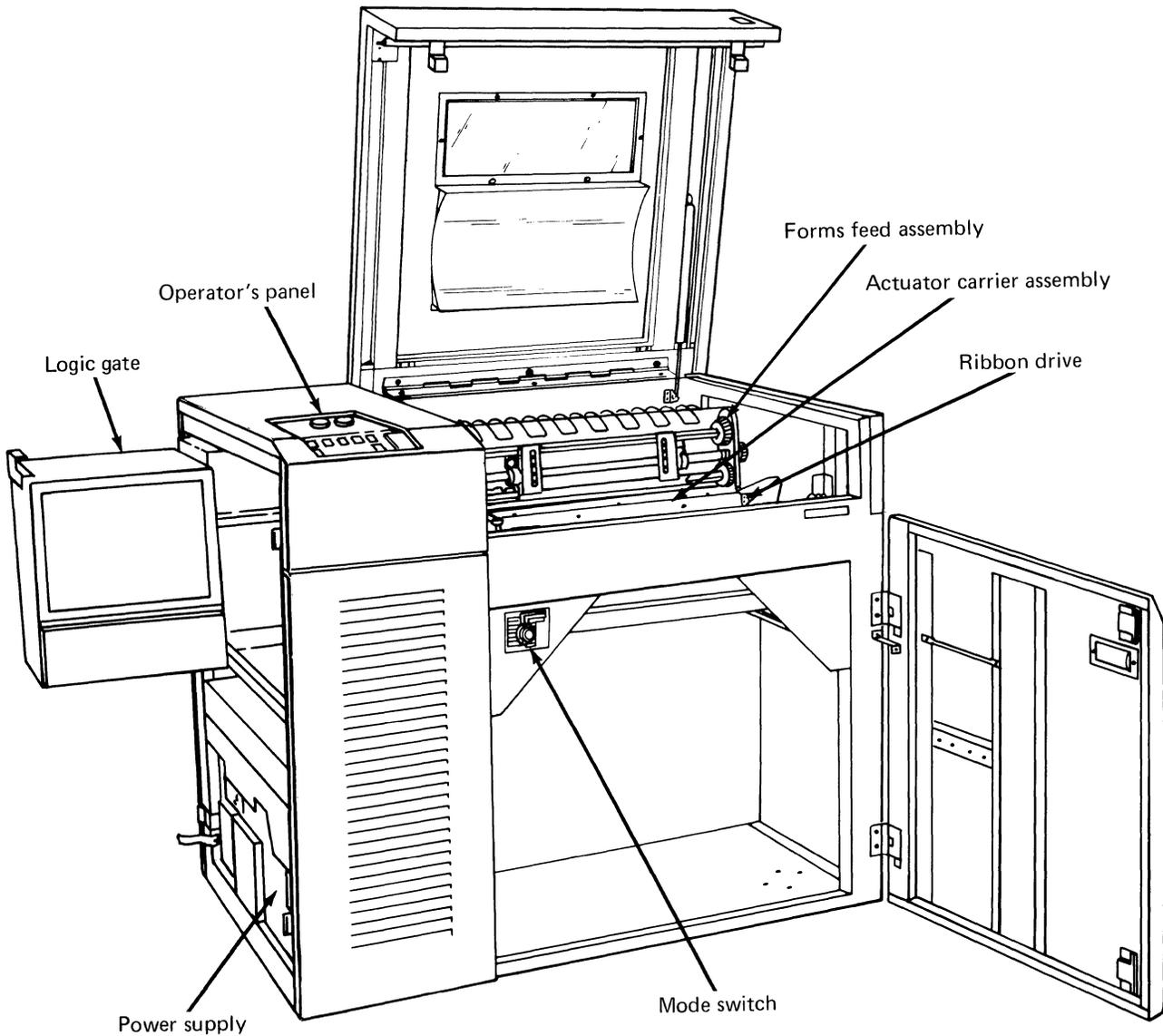


Figure 1-1. Functional units

Operator's Panel

The 5225 operator's panel has six keys (pushbuttons), two indicator lights, the power on/off switch, and a single position LED display. By using various combinations of the keys, the operator can:

- Start or stop printing
- Set print density
- Move forms one line or one page at a time
- Start or stop the offline test routines selected by the mode switch
- Display error codes

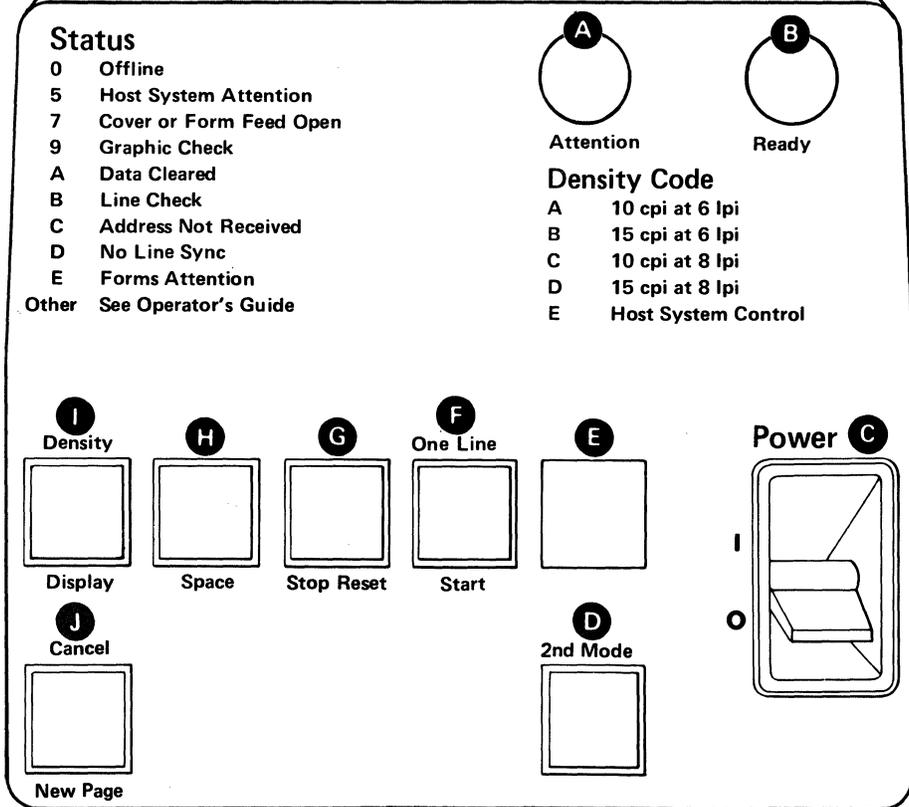
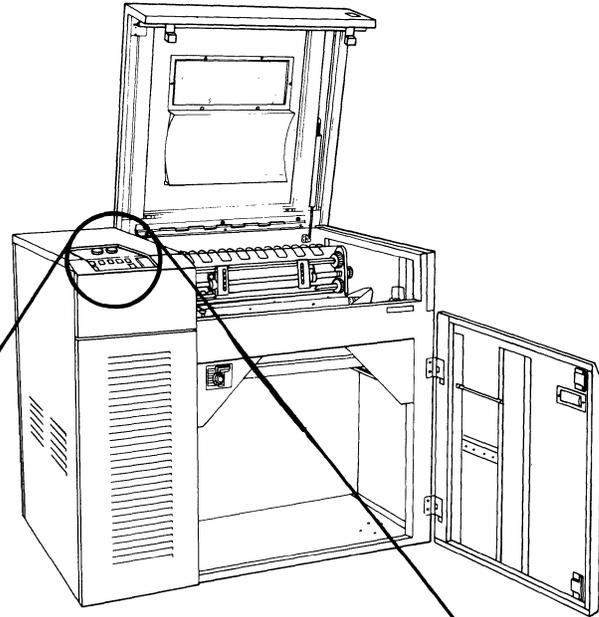


Figure 1-2. Operator's panel

The indicator lights and the operator's panel display indicate to the operator or maintenance personnel:

- That the printer is ready to print data from the using system
- That the printer needs attention
- That errors have been observed
- The results of the offline test routines
- The setting of the print density

See the *IBM 5225 Printer Operator's Guide*, GA34-0054 for complete operating information.

Operator's Panel Functions

The following summary of the operator panel functions is keyed to Figure 2 on page 1-8.

Power Switch

C This switch controls primary power to the printer. A series of power-on tests are run each time the ac power is switched on. These tests check the interface, forms movement, microprocessor storage, actuator carrier movement, and ribbon drive. The printer status is then displayed.

Start Key

F This key samples the hardware error sense and turns on the ready indicator if no errors are seen. In the offline mode, it starts the test selected by the mode switch.

The start key is also used in combination with the 2nd Mode key.

Stop/Reset Key

G This key stops the printer at the end of forms movement or at the end of the line being printed. The ready indicator is turned off, attention is turned on, and the actuator carrier assembly is moved to the home position.

Pressing the stop key when ready is off, generates an error reset.

Space Key

H This key moves the forms one print line each time it is pressed. The space key will not operate if the ready

indicator is on. After the form is spaced, the current line value will be increased by one to keep the forms in step with the logical page length.

Display Key

I Pressing this key (with ready off and no error displayed), causes the current print density to be displayed in the LED. Density codes are displayed as alphabetic characters A through E.

The display key is also used in combination with the 2nd Mode key.

New Page Key

J Pressing this key (with ready off and no error displayed), will cause the forms to move to the logical first print line of the next form. This is a program function that assumes the host has sent the printer the command to set the logical form length equal to the physical form length. If the printer is offline, or if the logical page length has not been set, the printer will default to one line space for each depression of the new page key.

With the top cover and forms feed assembly open, ready off and no error displayed, the forms may be vertically aligned to a line on the forms drag mechanism. The line on the forms drag mechanism is 38.1mm (1.5 in.) below the bottom of the print line on the platen.

Pressing the new page key *before* closing the forms feed assembly will cause the forms to be moved up 38.1mm (1.5 in.) when the forms feed assembly and the top cover are closed.

The new page key is also used in combination with the 2nd Mode key.

2nd Mode Key

D Pressing the 2nd mode key in combination with another key will cause a change to the second function as follows:

Pressing 2nd mode and display causes a density change.

Pressing 2nd mode and new page causes a cancel.

Pressing 2nd mode and start causes one line of print.

- Pressing display (with the 2nd mode key held down) will change the print density to the next combination. The new density will be displayed by the characters A through E. Power on always sets the density to A.
- Pressing start (with the 2nd mode key held down) will print one line. Terminating commands and error conditions will be recognized in this mode.

Note: During this function, both keys must be held down until the print line is complete.

- Pressing new page (with the 2nd mode key held down and ready on), sets the cancel request status bit, which is sent to the host. The host will respond with a clear command that stops the printing and clears the input buffers.

A second function of the new page key is used when the mode switch is returned from offline to one of the online positions. The printer will remain in an offline status until the cancel function is requested, which will force the power-on tests to run. After the tests are completed, the printer is ready for online operation. This cancel function will not be sent to the host.

Display

E This is a single character LED indicator that displays status information and conditions that may need operator action. In the offline mode, it is used with the MAPs to display error codes and to adjust motor speed for the forms and actuator assembly.

In addition to the status codes printed on the operator's panel, the following online error conditions are also displayed:

- F = Communications processing unit error
- 5 = Bell command received
- 4 = Forms drive error
- 3 = Actuator carrier assembly drive error
- 2 = Cable adapter error
- 1 = Printer controller error

Attention Light

A The Attention indicator lights to let the operator know when the printer needs attention. The light is on when:

- The mode switch is in any offline position
- Any error condition is present
- Ready light is off

Ready Light

B The Ready indicator light is turned on when the start key is pressed and no error conditions are present. It is turned off by pressing the stop key, or by the printer logic detecting an error.

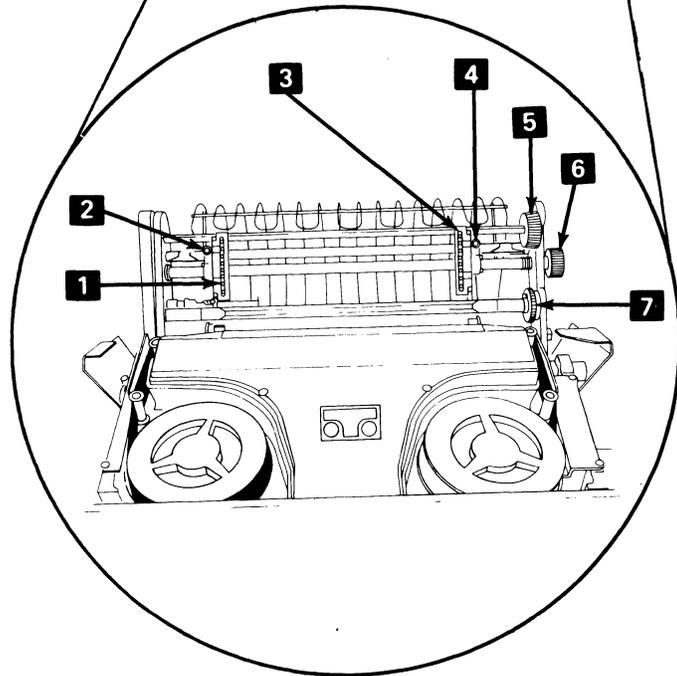
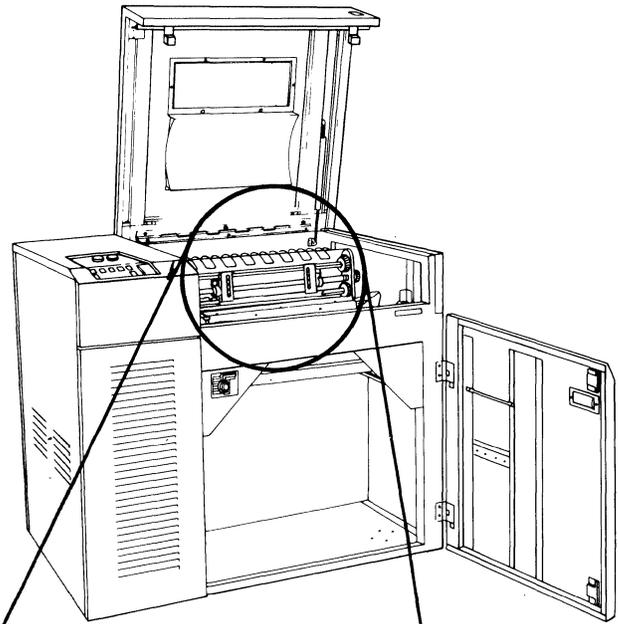
The mode switch, and all operator's panel keys except stop and cancel are disabled when ready is on.

Forms Feed Assembly

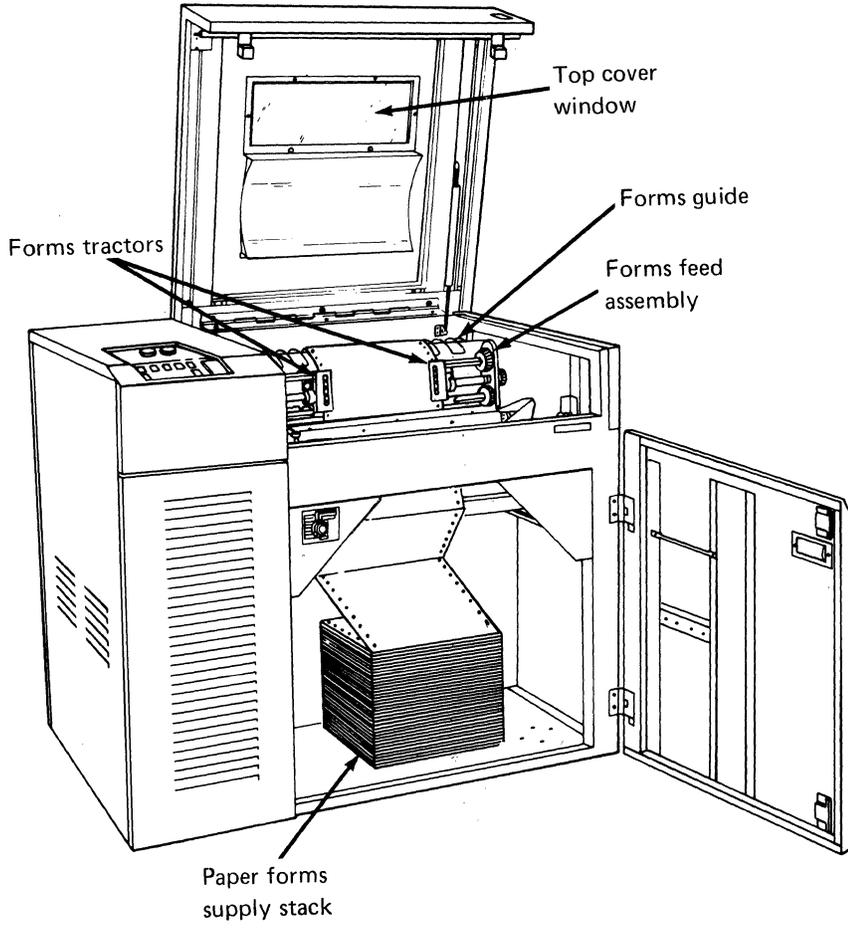
Forms are moved by two tractors **1** and **3**. The tractor release knobs **2** and **4** permit the forms to be moved right and left for horizontal alignment. The horizontal adjustment knob **6** permits small adjustments, left or right, for print registration.

The vertical adjustment knob **5** moves forms up and down.

The forms thickness cam **7** moves the forms feed assembly away from the print actuators when thicker than single-part forms are used.

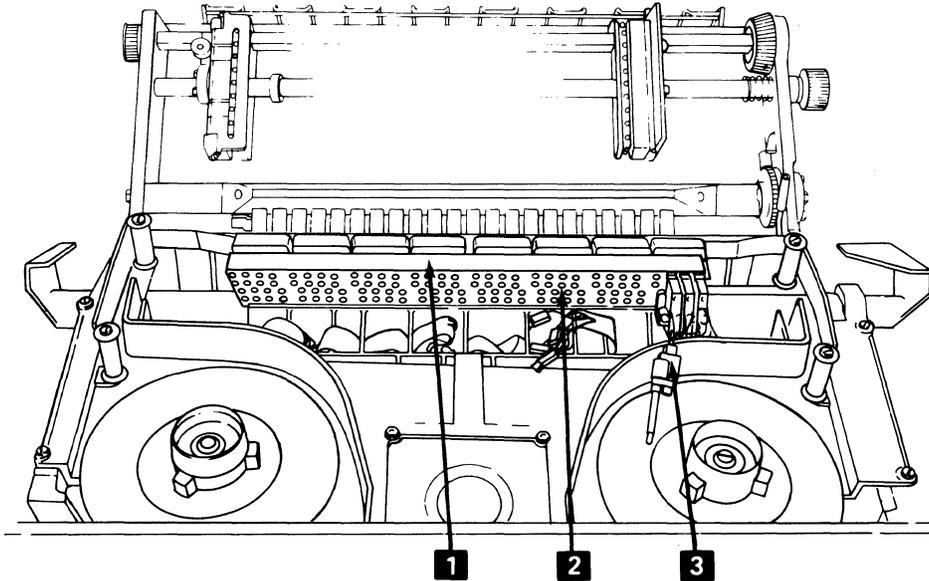


The forms path is from the supply stack inside the front cover, under the paper drag mechanism, through the tractors, over the forms guide, and down to be stacked inside the rear cover.



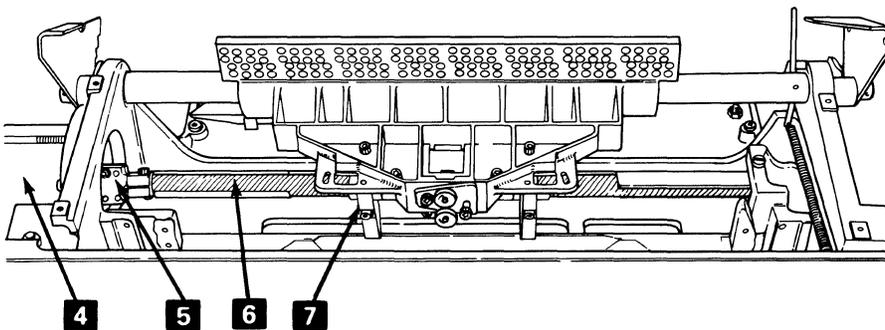
Actuator Carrier Assembly

The print wire actuators **3** are installed in the actuator carrier assembly **1** in groups of eight **2**. This figure shows a model 4, with eight actuator groups.



The actuator carrier assembly is installed on a support **4** that is moved by a leadscrew **3**. The leadscrew is connected to the shaft of a dc motor **1** by a split-block coupler **2**. The motor contains a tachometer that is used to control speed.

When printing is stopped, the actuator assembly moves to the left to the 'home' or 'ramp' position.



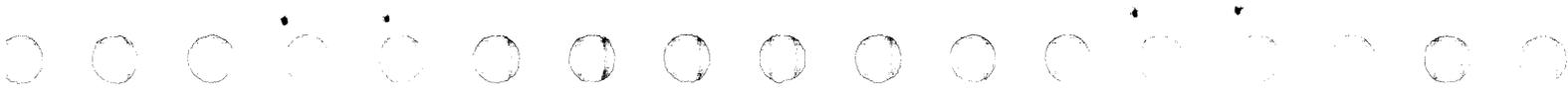
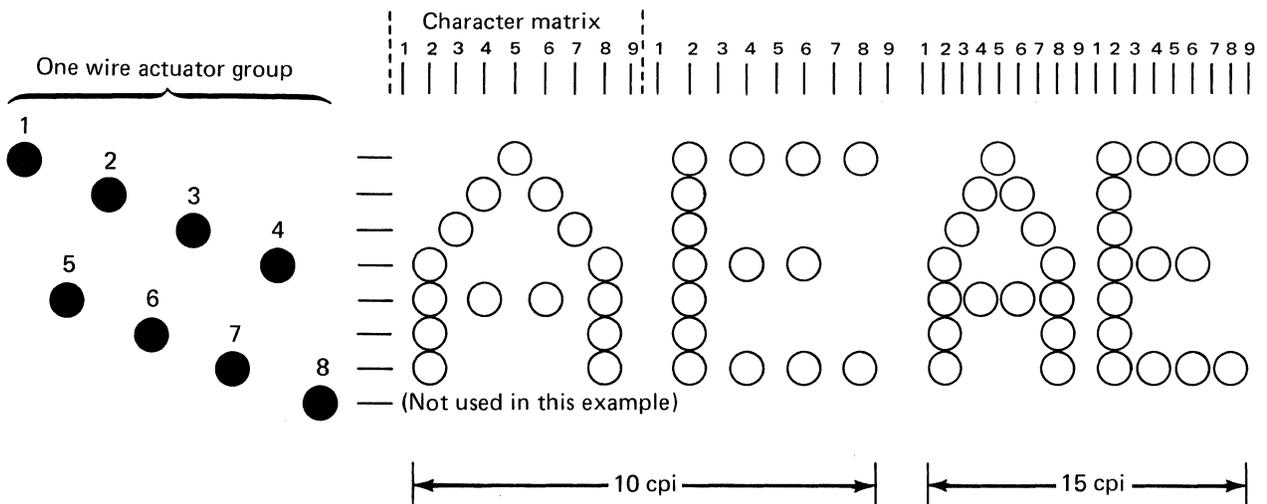
Note: In the 'home' position, print wire group one is left of the left margin, and the form feed assembly is moved away from the ribbon approximately 10 mm (.40 in) to prevent ribbon marks on the paper.

Character Formation

The printer control unit formats data received from the host into print lines, using formatting commands that are imbedded in the data stream. Operational commands, also included in the data stream, inform the printer of the function to be performed. The characters to be printed are placed into one of two print space line format buffers until printing time.

Characters are formed in an eight high by nine wide matrix, with the first and ninth horizontal positions blank to permit character spacing. Vertical position eight is used to line under characters, for lower case characters, and for special functions only.

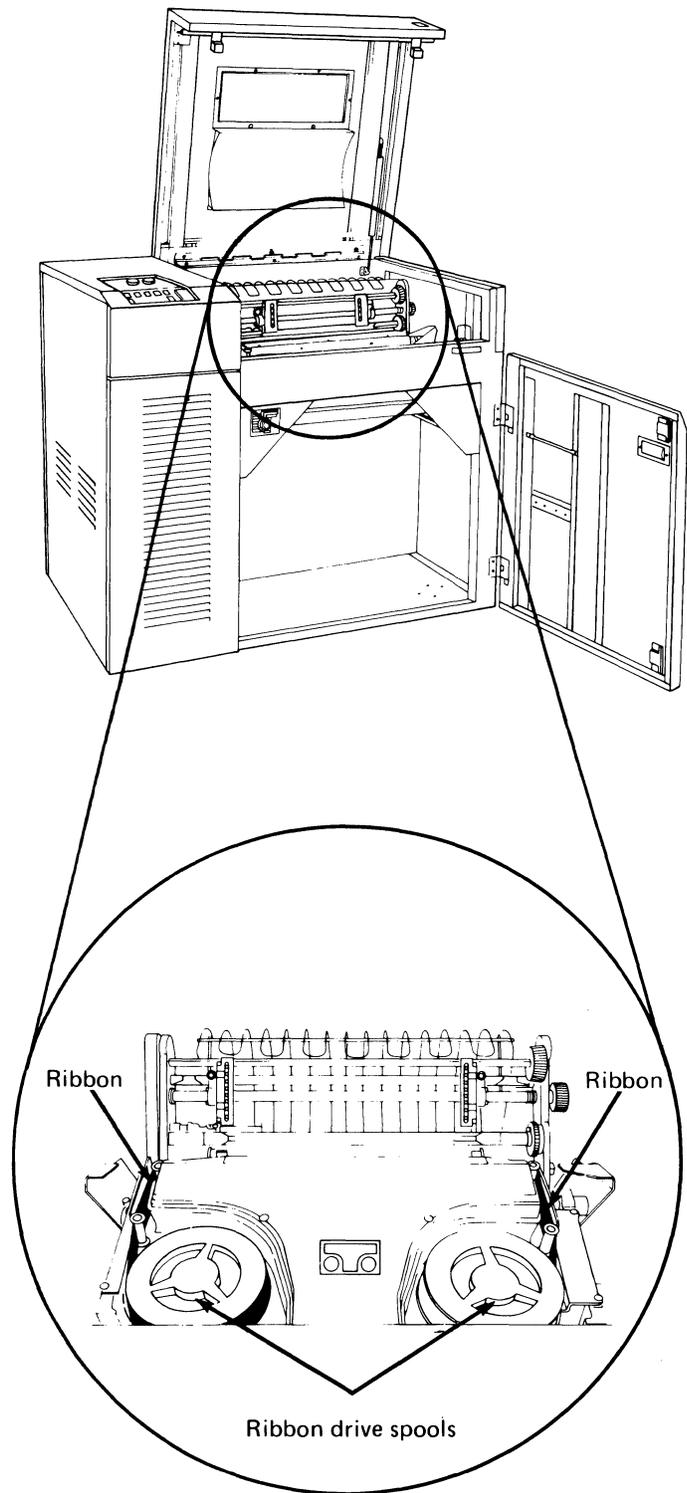
The 10 cpi character matrix is formed by dividing one character width of 2.54 mm (0.1 in) into nine equal parts. A wire firing option is generated for each part with the restriction that the wire actuators can only be fired every other option. Parts one and nine are not fired when printing characters. In printing graphics, a wire firing option can be generated for all nine parts.



Ribbon Drive

The 5225 Printer ribbon is driven in either direction by a motor with reduction gears on each spool shaft. While one motor is driven (take-up), the other motor (supply) functions as an emitter. The emitter output is checked to sense ribbon jams. When the supply spool fails to move, the motor direction is reversed. Two ribbon direction changes that occur in 9.144 m (30 ft.) of ribbon movement will be interpreted as a ribbon jam. This action will turn off the ready light, turn on the attention light, and set an error condition.

The ribbon is 38.1 mm (1.5 in) wide, 137.6 m (450 ft.) long. New spools are included with each replacement ribbon.

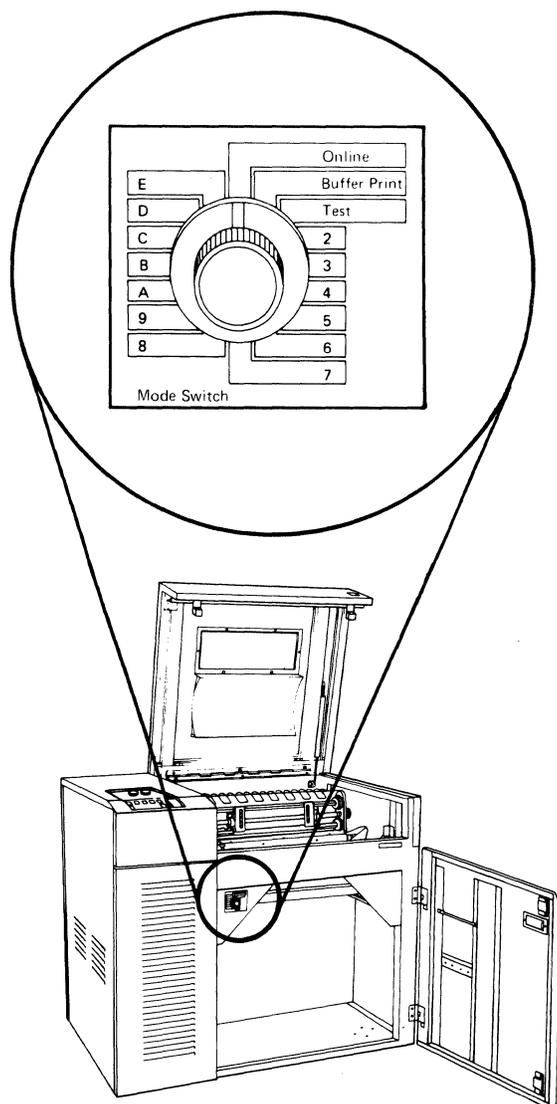


Mode Switch

The mode switch is a 16-position switch, located behind the front cover, that selects the function the printer is to perform.

The positions 'Online' and 'Buffer Print' permit communication between the printer and the host. The remaining positions select test routines that are stored in the printer control unit (pcu). Selection of any test routine places the printer in the offline mode.

The operator will use 'Online', 'Buffer Print', and 'Test'. All of the switch positions are to be used by maintenance personnel.



Switch Positions—Online

Online

Normal operating position when communicating with the host or control unit.

Buffer Print

This position is used for problem determination and for finding program errors. When the mode switch is in the buffer print position, all data (characters and commands) are printed in hexadecimal code with the character representing the code printed below. Control commands are not executed, but are printed as data.

Switch Positions—Offline

In the switch positions 'Test' through 'E', the following sequence will permit the tests to run:

- Press stop (a 0 will be displayed if the mode switch is in any offline position).
- Set the mode switch to the desired test position
- Press start. Attention on, ready on, and any character 0 through F displayed indicates the test is running. The offline tests check all printer functions up to the input cable connections.

When the selected test is completed, turning the mode switch to online and pressing the cancel function will run the power-on tests before returning the printer to online status.

See "Offline Tests" in "Chapter 2. Maintenance Summary" on page 2-1 for detailed information and print samples from each test.

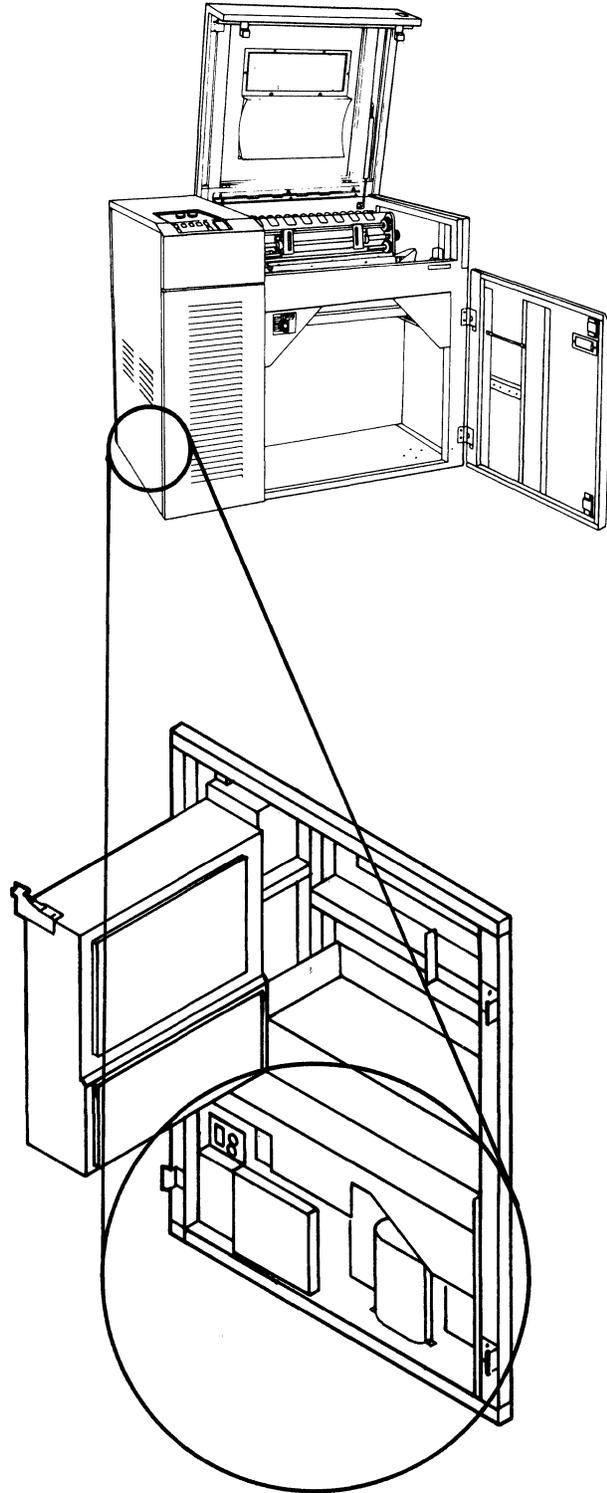
Power Supply

A transformer supply converts the ac line voltage to the following dc levels:

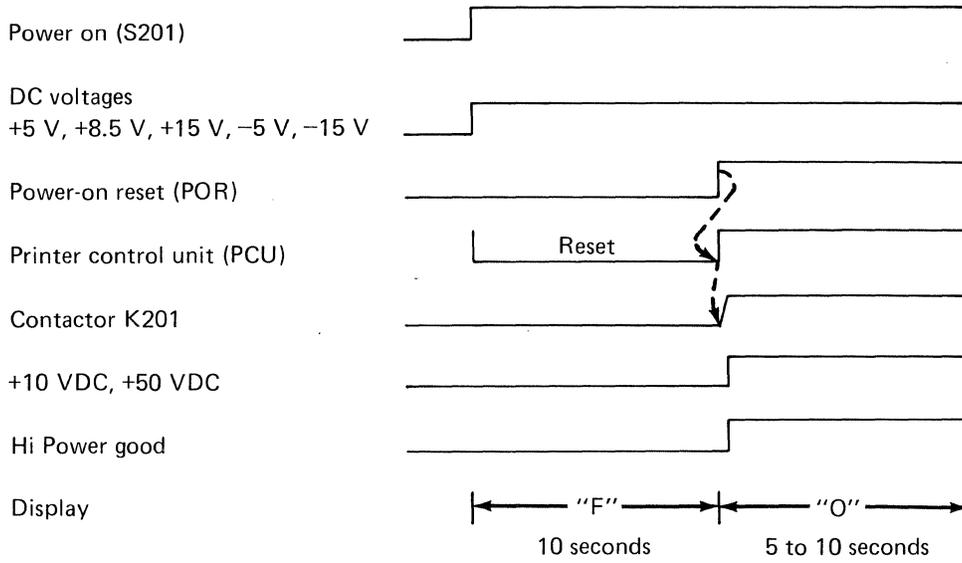
+50, +15, +10, +8.5, +5, -5, -15

Primary power needs of the transformer are listed on YA000.

The power supply is protected by a circuit breaker. Transformers in the supply are protected by fuses. An interlock switch operated by the top cover removes primary power from the high power (+10, +50 volt) transformer when the cover is open. Forced air is used to keep the supply cool.



Printer Power-On Sequence



Printer Logic Gate

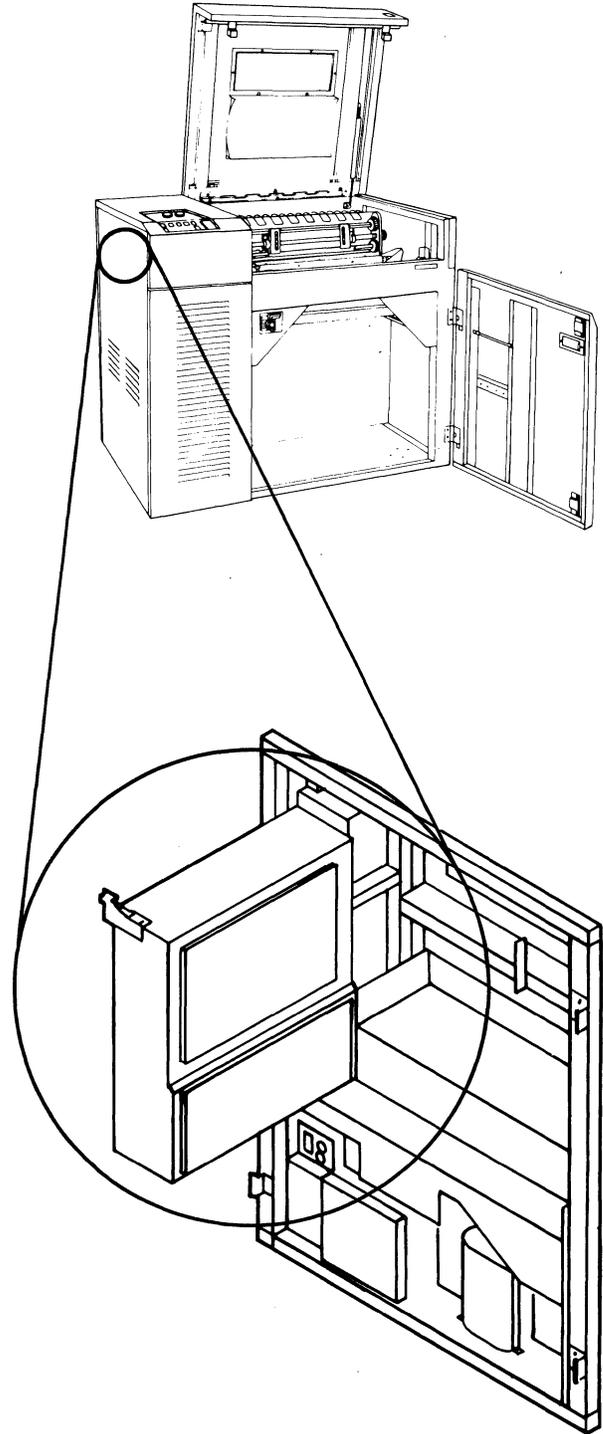
The logic gate contains the printer control unit (PCU) and the printer electronics, and is commonly known as the controller.

Printer Control Unit

The PCU is a small processing unit that connects the printer to the cable from the system controller. This processing unit controls the flow of data to and from the printer, as well as all internal printer functions. In addition, the PCU contains test routines that check all internal printer functions and error logging while power is on.

Printer Electronics

The printer electronic execute the controller commands to operate the actuator carrier assembly, forms drive, ribbon drive, and activate the actuators.



Printer Logic

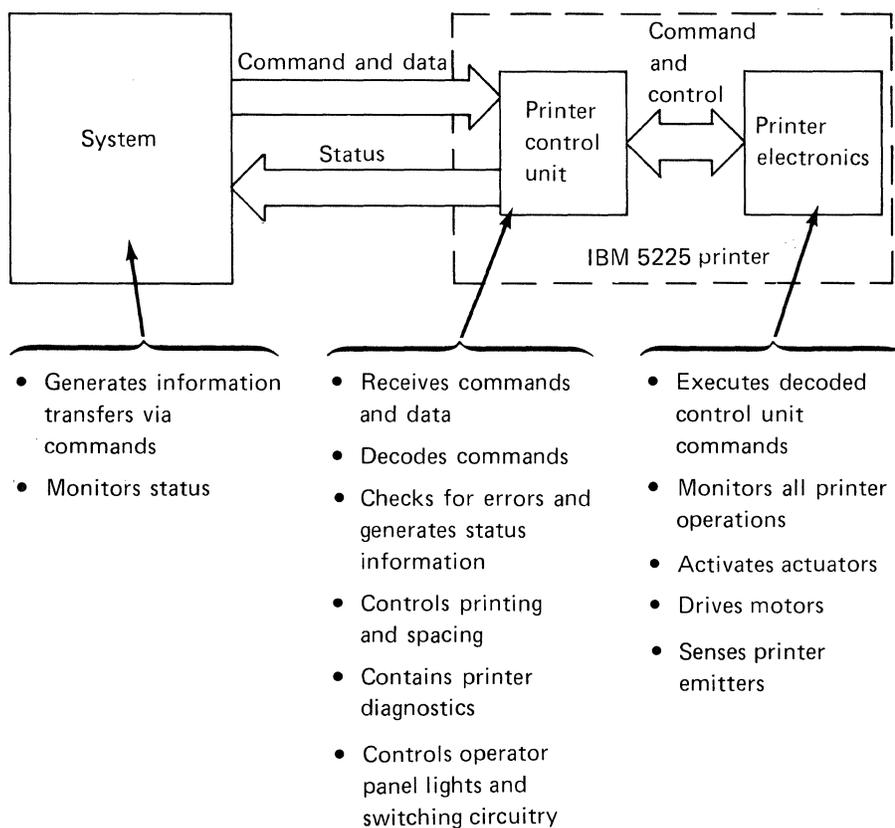
The printer logic is divided into two functions:

Printer Control Unit (PCU)

The PCU decodes incoming commands, checks for errors and generates status information, controls printing and forms movement, and controls operator panel lights and switches. The test routines are also part of the PCU.

Printer Electronic Circuits

The printer electronic circuits execute the controller commands to operate the actuator carrier assembly, forms drive, ribbon drive, and activate the actuators.



Chapter 2. Maintenance Summary

Introduction

The IBM 5225 Printer maintenance procedure permits the customer to perform a primary problem determination when failures occur. This information is then available for later use by maintenance personnel.

When an error condition is sensed by the printer control unit, normal operation is stopped and test routines are automatically run to isolate the problem. The results of these tests are shown to the operator on the operator's panel display, and are also stored in the read status byte.

Only service personnel will exchange parts, make adjustments, or remove covers that open areas of the machine that are not used for normal operation.

Preventive maintenance (PM) will be performed at 30-month intervals during a service call. See Chapter 5 for a list of the PM points. During normal service calls, the maintenance analysis procedures (MAPs) will give directions for the adjustment of parts and the replacement of Field Replaceable Units (FRUs).

Diagnosis, repair, adjustment, service checks, and repair verifying will be done offline using the test routines contained in the printer logic.

Customer Problem Determination Procedures

Information on the customer problem determination procedures is contained in: *IBM 5225 Printer Operator Guide*, GA34-0054, under 'Solving Printer Problems'. A list of the error codes is located in this book in "Chapter 4, Reference Information" on page 4-32.

Maintenance Tools

Customer Engineer Tool Case

The basic CE tool case, with the metric tool supplement (B/M 1749235), the IBM multimeter, and the IBM General Logic Probe II are used for all diagnostic and repair procedures. An oscilloscope is not needed for servicing the 5225 printer.

Thickness Gauge Conversion

The CE tool case contains two thickness gauge sets, one in metric and the other in inches. The following is

a conversion from millimeters to inches, and inches to millimeters for those gauges.

<i>mm</i>	<i>inch</i>
1.0	.040
0.9	.036
0.8	.032
0.7	.028
0.6	.024
0.5	.020
0.4	.016
0.3	.012
0.2	.008
0.15	.006
0.1	.004
0.05	.002

<i>inch</i>	<i>mm</i>
.030	0.8
.025	0.65
.020	0.5
.015	0.4
.014	0.35
.012	0.3
.0105	0.27
.010	0.25
.0095	0.24
.008	0.2
.005	0.13
.003	0.08
.002	0.05
.001	0.025

IBM General Logic Probe II

The General Logic Probe (GLP) II is a hand held unit used to sense logic signals for several preceding technologies.

The General Logic Probe II kit (part 453212) includes:

- The IBM General Logic Probe II unit
- Standard accessories
- *IBM General Logic Probe II manual*, SY34-0127

Each of these parts may be ordered separately. The general logic probe manual describes the features of the probe and the functions and restrictions of each feature. See that manual for detailed information.

Note: Set the Technology switch on the probe to the Multi position when troubleshooting the 5225 Printer.

Shipped Tools

The jumper supplied with the ship group must be used to reset the printer when operating in the offline mode. The location for installing this jumper is given in the MAPs.

Test Routines

The following is a general description of the test routines and adjustment procedures that are available by using the 16-position mode switch.

Power-on Tests

Power-on tests are run each time the power is switched on, when the mode switch is returned to an online position and cancel request is pressed, when the mode switch is set to position 2 and start is pressed, or when a reset command is received from the host system.

Before returning the printer to ready status, the power-on tests:

- Verify the communications adapter and storage operation
- Verify the control adapter and storage operation
- Test for valid printer address
- Verify the image generator and wire latch cards operation
- Test high voltage
- Test cover and platen closed switches
- Verify forms movement by spacing one line
- Check ribbon drive motor movement
- Verify actuator carrier movement at 10 cpi and 15 cpi

At the start of the power-on tests an "F" is shown in the display and attention is turned on. At the midpoint of the test a "1" is placed in the display. When the test ends, the display is changed to blank.

Note: If the host system does not poll I/O devices, a "D" is displayed at the end of the power-on tests when the printer is in the online mode.

Status and Error Information

Status/Error Codes

During normal operation and while running test routines, a four digit code is used by the host system to identify the unit and symptom when an error or reported status condition occurs. The first two digits of this code identify the unit (these two digits will not be the same for all using systems). The second two digits identify the condition, and are divided into functional areas as follows:

- 0X Line/interface
- 1X Printer control unit errors
- 2X Command/function
- 3X Actuator carrier drive errors
- 4X Forms drive and forms thickness errors
- 5X Normal routine conditions, EOF
- 8X Ribbon drive and print check errors, and power supply over/under voltage conditions
- 9X Time-out conditions

Status/error codes are sent to the host with a read response frame, and error codes are also stored in the printer error log. This error log will store a maximum of 16 entries. When full, any additional entries will cause the contents to shift and the oldest entry will be lost.

The contents of the printer error log can be printed by turning the mode switch to "D" and pressing start. Sixteen two digit groups print, with current error at the start of the line. If less than 16 errors are in the log the remaining positions will print 00. If the printer will not print, the last error sensed will be available in the display.

The printer error log is always cleared by a power-on reset.

Mode Switch

The mode switch operation is as follows:

- When moving the mode switch from 'Online' or 'Buffer Print' to any other position, press stop then start. The printer will then operate in the selected mode.
- When moving from any of the offline positions to 'Online' or 'Buffer Print', press stop then cancel request. The printer will run the power-on tests; then, press start. The printer will be in the selected mode.
- When moving from "Buffer Print" to "Online" press stop then start, the printer will return to Online mode.

Buffer Print

The Buffer Print test position is used for problem determination and to correct application programs.

When operating in this mode, all data (characters and formatting control codes) is printed in hexadecimal code with the character represented by the code printed below. To aid counting and identification, a hexadecimal count is printed above every 16th character and a vertical bar above every 8th character, starting with the 2nd character on the left. The 2nd digit in the left column indicates the print buffer used. One line of data prints as 4 lines. Formatting control codes are not executed, but are printed as data. The default character is printed below the hexadecimal code for the formatting control codes and for not valid characters.

A sample buffer print printout is as follows:

Buffer number	8th Character	16th Character
00		
CC1C4CC2CCCCDDDD0D		
1253045567891234D5		
AB | C | DE | FGHIJKLM | N		
	Line feed	Carrier return
	Space character	
New line		

In normal mode, with the control characters executed, the above would print as:

```
AB
C DE
N FGHIJKLM
```

Offline Tests

All error sensing circuits function when running the offline tests selected by the mode switch.

Note: All offline tests that print require the use of full width paper (378mm-14 7/8 in.)

Switch position	Function
Online	Normal operating position
Buffer Print	Prints control characters, used for program correction
Test	Runs the tests associated with positions 5, 6, 7, 8
2	Power-on tests
3	Used with A (* Test 10 cpi)
4	Ribbon movement (* Test 15 cpi)
5	Print actuator (* Carrier turnaround)
6	Ripple print
7	Vertical alignment
8	Forms high speed
9	Operator panel
A*	Adjustments (* Forms Symmetry A)
B	Emitter glass (* Forms Symmetry B)
C	Used with A (* Forms Quadrature)
D	Error log (* Forms speed)
E	Used with A

*Used for all forms drive motor and actuator carrier assembly drive motor adjustments.

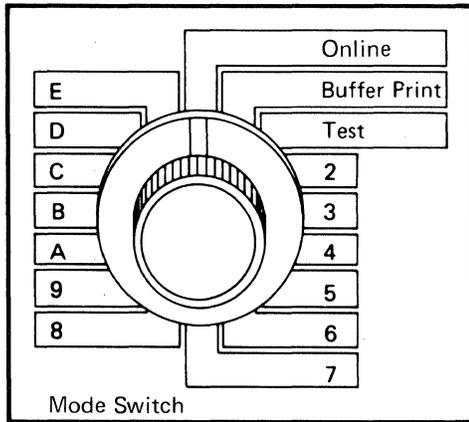


Figure 2-1. Mode switch

Test Position

Test

Note: Use single part, full width paper when running in 'Test' mode. If multiple part forms are used, or the forms thickness cam is set for four to six part forms, a '47' is displayed and the printer stops. This is not an error condition; see mode switch position 8, 'Forms High Speed'.

The test position displays a '1' while running. This position runs tests 5, 6, 7, and 8. Each test is run one time and the routine stops at the end of test 8.

The first line of the test printout contains the error log of a printer with a three-card controller. The error log should be all zeros after a power-on reset. A printer with a 7-card controller does not generate an error log printout from the test position. Refer to Mode switch position "D" for more information.

Position 2

Power on: Position 2 displays 'F' while running. This test is used to isolate to each card in the printer control unit. If no errors are found, a '0' is displayed. Error displays are as follows:

- 'F' = Communications adapter card
- 'E' = Communication storage or Interface card
- 'D' = Communication storage card
- '2' = Interface card
- '1' = Printer Processing Unit Error

Note: Refer to sections 3100 and 3100A for the card locations.

Any other display would be the same as those used for the power-on tests.

Position 4

Ribbon Test

A '4' is displayed while the test is running. Any ribbon movement error will stop the test and display an '8'.

Position 5

Print Actuator

This test prints two lines with each wire actuator group. An actuator failure could be seen in the following printout.

Note: This test requires a minimum paper width of 375 mm (14.8 in.).

Example

11	21	31	41	51	61	71	81
11	21	31	41	51	61	71	81
12	22	32	42	52	62	72	82
12	22	32	42	52	62	72	82
13	23	33	43	53	63	73	83
13	23	33	43	53	63	73	83
14	24	34	44	54	64	74	84
14	24	34	44	54	64	74	84
15	25	35	45	55	65	75	85
15	25	35	45	55	65	75	85
16	26	36	46	56	66	76	86
16	26	36	46	56	66	76	86
17	27	37	47	57	67	77	87
17	27	37	47	57	67	77	87
18	28	38	48	58	68	78	88
18	28	38	48	58	68	78	88

Note: This test requires a minimum paper width of 375 mm (14.8 in).

Example



Position 8

Forms High Speed

This test ensures that the forms drive motor will go into high speed. If high speed is not operating, 48 is displayed.

A second function tests the forms thickness switch. With the forms thickness cam set at 15 or higher, a '47' indicates that the forms thickness switch is operating correctly.

Position 9

Operator Panel

This routine tests the keys, display, and alarm. When each key is pressed, the following characters are displayed.

<i>Key</i>	<i>Display</i>
Start	6
Stop	7
Space	4
Display	5 (alarm sounds if installed)
New Page	3
*2nd mode	8

*2nd mode plus any other key displays the hexadecimal value of that combination.

Position A

See "Forms Adjustment Routines."

Position B

Linear Encoder Glass

This routine counts the number of emitter pulses to ensure that no scratch marks are on the encoder glass.

Position D

Error Log

When an error is sensed in either the online or offline mode, printing is stopped and a test is run to sense the status of the error in the failing functional unit (actuator carrier assembly, forms, ribbon, pcu). The results of this test are sent to the host system in the read status byte if the printer is online. In both the online and

offline mode, the read status byte is stored in the printer.

Select mode switch position D and press start to print the errors that have been stored in the log since the last power-on tests were run. If the printer will not print, the most current error is displayed on the operator's panel.

The 7-card controller (card in position U2) prints one 16 byte table in hex. Each time a different error is sensed, that type of error is logged. Consecutive errors of the same type are not logged.

Example:

Two 45 errors, followed by five 34 errors, one 88 error, and one 45 error.

The current failure is logged in byte 1.

```
45 88 34 45 00 00 00 00 ----- 00 00
```

The 3-card controller (no card in position U2) prints two 16 byte tables in hex. The first table logs the type of error. The second table records the number of times this error has occurred since the last power-on tests were run.

Example:

Two 45 errors, followed by five 34 errors, one 88 error, and one 45 error.

Table 1

```
88 34 45 00 00 00 00 00 ----- 00 00
```

Table 2

```
01 05 03 00 00 00 00 00 ----- 00 00
```

Mode Switch Test

With the 2nd mode key and the stop key pressed, the mode switch positions are displayed. The test position displays a '1.' Positions 2 through E display those characters. The buffer print position has a blank display, and turns out the attention light.

Actuator Carrier and Forms Adjustment Routines

Position A

Note: The temperature of the controller may cause a slight variation in the display. It is recommended that these adjustments be made after the printer has had power on for 15 minutes.

Adjustment

Several of the mode switch positions have a second test function when used with this switch position. These tests are used to adjust the forms drive motor and the actuator assembly drive motor.

When the mode switch is set to A and the start key is pressed, an 'A' is displayed. No routine starts, but the 'A' flashes on and off. Now, move the mode switch to the position indicated by the second character (AB, AC, A4, etc.) and press start again. The selected routine starts running.

This routine runs until the stop key is pressed. Pressing the stop key once returns the flashing 'A' to the display and permits the selection of another adjustment routine. Pressing the stop key two times resets the flashing 'A' and permits selection of a different test routine, or returns the printer to online status.

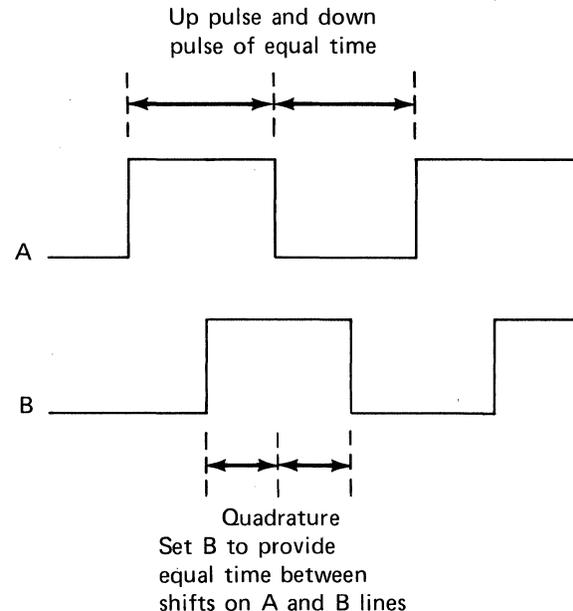
For a description of, and the complete adjustment procedure for each of the adjustment routines, see Chapter 3, "Map Support." The actuator carrier adjustments are in "3105 Actuator Carrier Electronic Adjustments." The forms feed adjustments are in "3104 Forms Feed Electronic Adjustments."

Forms Adjustments

The forms drive motor has a two track encoder and photocell assembly inside the motor housing. The encoder is installed on the motor shaft and each encoder pulse is 1/2 degree of shaft rotation. When printing six lines to the inch, each line space is 48 encoder pulses.

The first three adjustment routines are used to set the forms encoder pulses.

The symmetry A and B adjustments are made on the forms amplifier card located in the logic gate. The quadrature adjustment is mechanical, and is located on the forms drive motor housing.



Position AA

Forms Symmetry A

The forms tractor moves and '0' is displayed if the adjustment is correct. A wrong adjustment in one direction displays "F" through "A," with A being the maximum out of adjustment point. In the opposite direction, the display will be "1" through "6," with 6 being maximum.

Position AB

Forms Symmetry B

Same as forms symmetry A adjustment.

Position AC

Forms Quadrature

Same as the two symmetry adjustments.

Position AD

Forms Speed Adjustment

The forms tractor moves and "0" is displayed if the adjustment is correct. A wrong adjustment displays "1" through "6" or "F" through "A." The adjustment potentiometer is located on the servo amplifier card in the logic gate.

Position AE

Forms Busy

This procedure is the same as test AD.

Note: The preceding five adjustments must be made in the sequence AA through AE when the forms amplifier card, or the servo amplifier card are changed.

Actuator Carrier Speed Adjustments

Note: The following steps must be done in sequence (A3, A4, then A5).

Position A3

Actuator Carrier Speed Test at 10 cpi

Note: During head speed adjustments, the actuator carrier may move too far at turn around and cause a noise. This noise is not a problem and does *not* occur in normal operation. Set the forms thickness cam to "25" to avoid this noise during head speed adjustments. Return the forms thickness cam to "0" after the adjustments.

The actuator carrier runs at 10 cpi speed and a "0" is displayed if the speed is correct. If the motor is running at too high a speed, "1" through "6" are displayed; "F" through "A" are displayed if the motor is running at too low a speed. The adjusting potentiometer is located on the servo amplifier card.

Position A4

Actuator Carrier Speed Test at 15 cpi

The actuator carrier runs at the 15 cpi speed. The characters displayed are the same as test A3.

Position A5

Actuator Carrier Turnaround Adjustment

This procedure adjusts the amount of time needed to stop the actuator carrier, reverse the direction of movement, and return to normal speed. The characters displayed are the same as test A3.



Chapter 3. Maintenance Procedures

1000 Covers

In the following procedures, all left and right directions assume you are facing the printer as shown in each specific drawing.

The right front, right rear, and right top covers are customer access areas. These three covers have hinges to permit easy access. Magnets are attached to the covers to hold them closed. The left end cover (CE access) is also hinged, but is bolted to the frame at the bottom. The remaining covers are fastened to the frame with machine screws.

Note: Store removed covers in a safe location.

1001 Right Front Cover

Removal

1. To remove the front cover **2**, pull out on the handle **3**. The latch is magnetic.
2. Open and move the cover to the right 90°, and remove the nut that fastens the ground wire **4** to the cover; then, lift the cover up to clear the hinge pins **1**.

End of procedure.

Reinstall

1. Place both the top and bottom hinge pin brackets over the hinge pins.
2. Fasten the ground wire to the cover.
3. Move the cover to the left until the magnets on the cover make contact with the frame.

End of procedure.

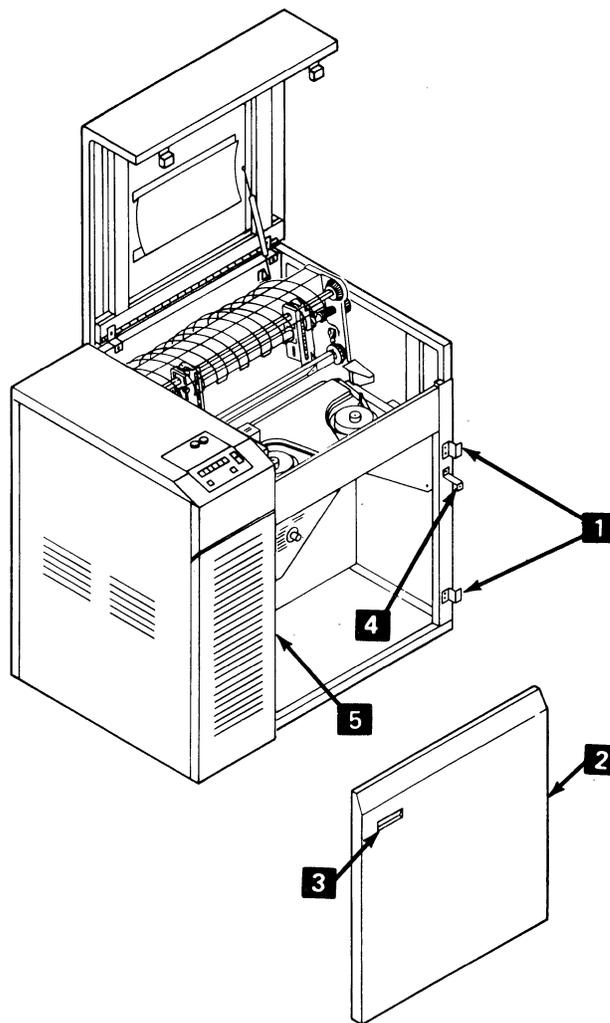
Adjustment

1. Adjust the cover hinges **1** by loosening the holding screws and moving the hinges left or right to

square the cover with the frame.

2. Set the front cover with a 3–8 mm (0.12 to 0.32 in) space between the two front covers at **5**. The width of the space between the covers should be uniform, and within 2.5 mm (0.10 in).

End of procedure.

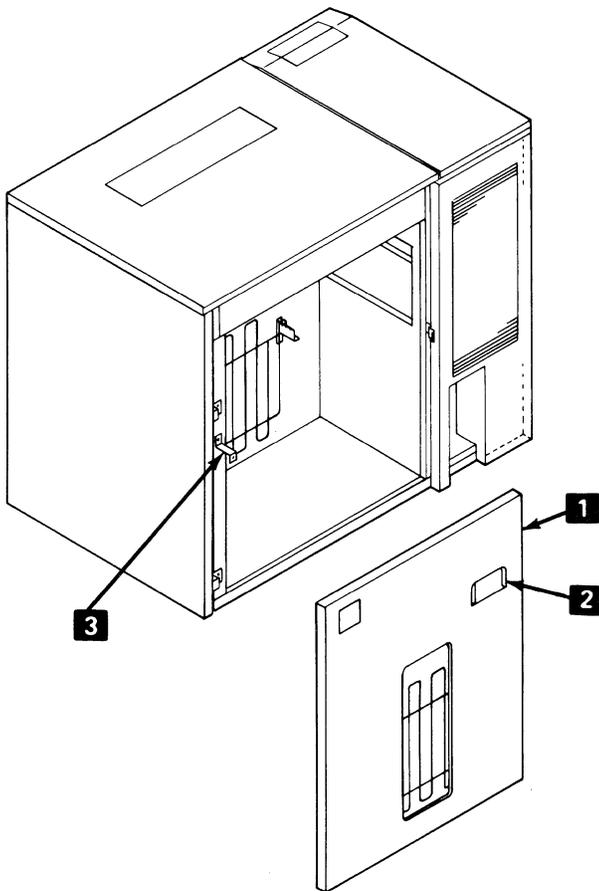


1002 Right Rear Cover

Removal

1. From the rear of the machine, remove the cover **1** by pulling the handle **2** to free the magnets from the frame; then move the cover to the left 90°, remove the nut that fastens the ground wire **3** to the cover, and lift the cover up to clear the hinge pins.

End of procedure.



Reinstall

1. Place both the top and bottom hinge pin brackets over the hinge pins, fasten the ground wire to the cover, and move the cover to the left until the magnets on the cover make contact with the frame.

End of procedure.

Adjustment

1. Adjust the cover hinges **1** by loosening the holding screws and moving the hinges left or right to square the cover with the frame. Set the rear cover with a 3–8 mm (0.12 to 0.32 in) space between the two rear covers at **5**. The width of the space between the covers should be uniform, and within 2.5 mm (0.10 in).

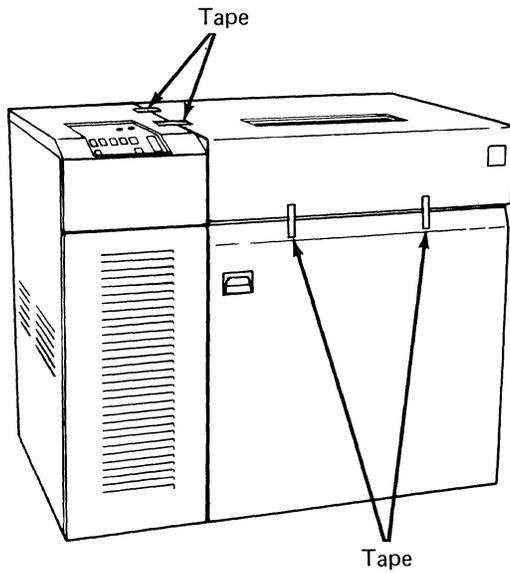
End of procedure.

1003 Top Right Cover

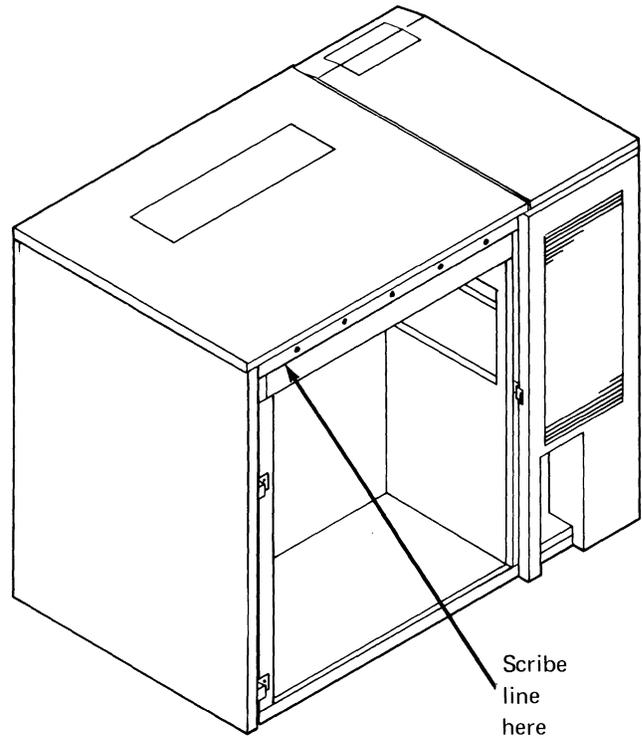
Removal

Note: Before performing the removal procedure, mark the cover in the following way to aid you during reinstallation.

Use any tape that will not leave adhesive on the cover when it is removed. Place the tape across the gap between the covers; then cut it at the gap.



With the right rear cover open, use a pencil to scribe a line, as indicated below, on the frame along the bottom of the top cover hinge. You can now start the removal procedure.

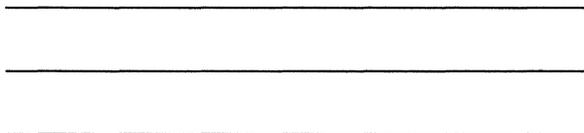


1003 Top Right Cover (Continued)

1. Open the top cover **1**.

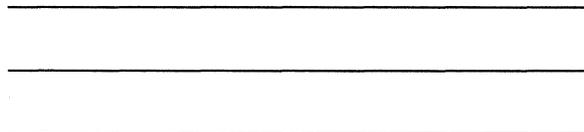
CAUTION

You must hold the cover open when the gas spring is disconnected in the following step.



2. Remove the nut that fastens the ground wire **6** to the cover.
3. Remove the brass safety spring that is inserted in the hole in the bottom end of the gas spring piston at **5**, and clips over the piston shaft.
4. With the safety spring removed, pull the piston free of the ball stud, then carefully lower the cover until it is fully closed.

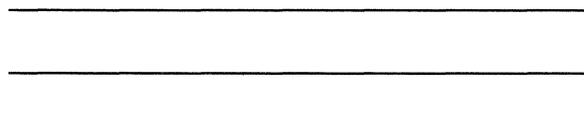
Warning: Do not permit the gas spring **2** to jam on the forms drive assembly when lowering the cover.



5. From the rear of the machine, remove the four screws that fasten the cover hinge **3** to the frame.

CAUTION

The top cover weighs 13.5 kg (30 lb).



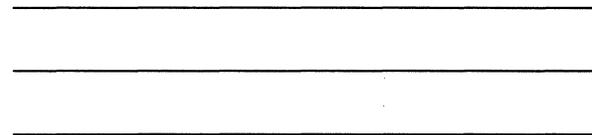
6. Remove the cover.

End of procedure.

Reinstall

CAUTION

The top cover weighs 13.5 kg (30 lb).



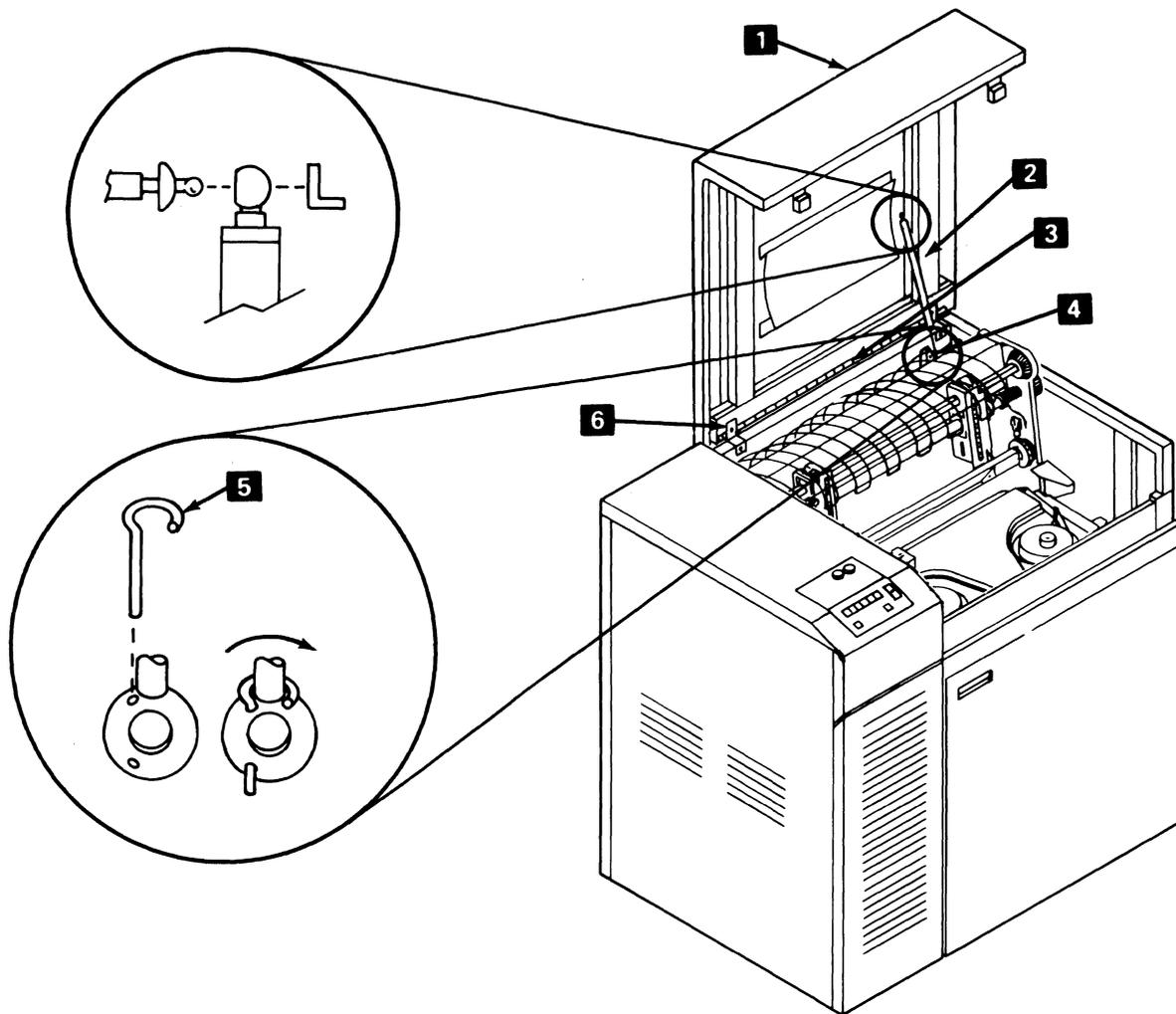
1. When placing the cover on the frame, remember the caution about the gas spring.
2. Reinstall the four screws that fasten the cover hinge **3** to the frame. Use the scribed line and the tape to correctly align the cover.
3. Open the cover and hold with one hand while pushing the lower end of the gas spring piston over the ball stud on the mounting bracket **4**.
4. Insert the safety spring in the hole in the socket, and snap the clip over the piston.
5. Fasten the ground wire **6** to the cover.
6. Make sure the top cover is latched on both sides. Adjust the cover if necessary.

Note: Refer to Section 1009 for the cover interlock switch service check.

End of procedure.



1003 Top Right Cover (Continued)



Adjustment

1. Make sure the top cover is aligned with the other covers. The gap between the top left cover and the top right cover should be greater at the front of the printer than at the rear. This is caused by the clockwise twist imposed on the cover by the gas spring.
2. If the cover must be adjusted, open the cover and loosen the screws that attach the cover hinge to the cover.
3. Close the cover and adjust as required.
4. Open the right rear cover for access to the cover screws.
5. Tighten the screws with the cover in the closed position.

6. Open the top cover and make sure all of the screws are tight.
7. Make sure all of the cover seals are in contact with the frame.

Gas Spring Cover Support

Note: If the gas spring does not hold the cover in the fully open position, or if the cover closes too fast, replace the gas spring.

Removal

1. Switch off the power.
2. Open the top cover.

1003 Top Right Cover (Continued)**CAUTION**

The top cover weighs 13.5 kg (30 lb).

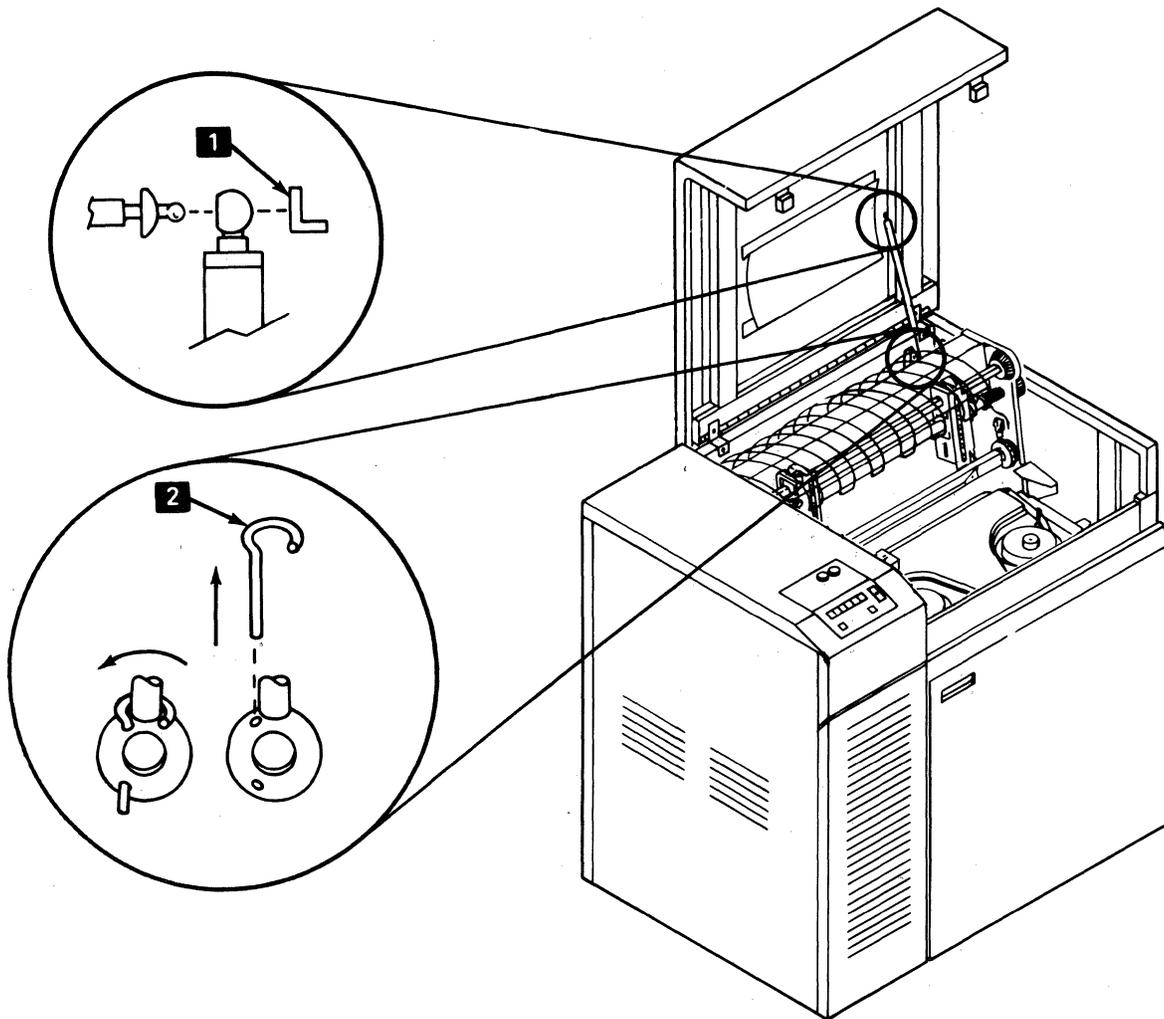
-
-
-
3. Remove the safety springs **1** and **2**.
 4. Hold the top cover with one hand and pull the socket free of the ball stud connected to the frame mounting bracket.

5. Pull the top of the gas spring free of the ball stud mounted on the cover bracket, and remove the gas spring from the machine.
6. Lower the top cover to the closed position.

End of procedure.

Note: The gas spring should hold the cover at any point between "X," approximately 150 mm (6.0 in) from the fully open position, and fully open. If the gas spring permits the cover to fall when it is stopped between these two points, or if the cover closes too fast, the gas spring should be replaced.

7. See "1009 Cover Interlock Switch," in this chapter, for the switch adjustment procedure.



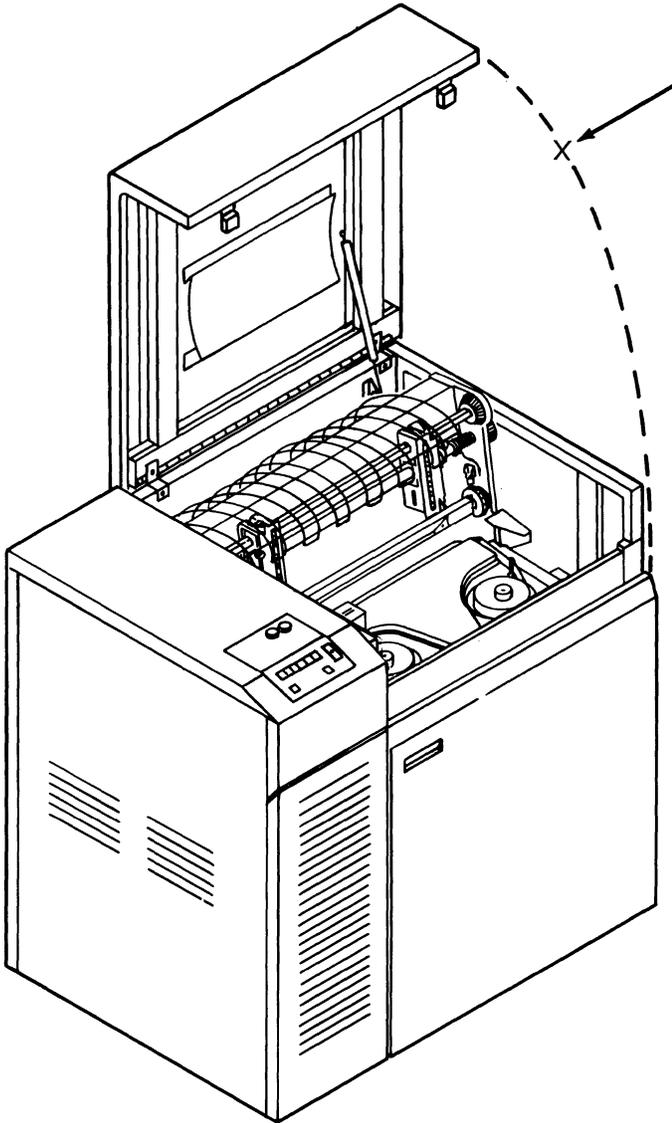
1003 Top Right Cover (Continued)

Reinstall

1. Open the top cover and support it with one hand.
2. Push the cylinder end of the gas spring **1** on the ball stud mounted on the cover bracket until the gas spring snaps into place.
3. Push the piston end of the gas spring **2** over the ball stud mounted on the frame bracket.

4. Insert the safety springs into the holes in each end of the gas spring assembly to hold the socket in place over the ball stud; then turn the safety springs until they clip over the shaft.
5. Close the top cover.

End of procedure.



1004 Right End Cover

Removal

1. Open the top cover.
2. From the inside of the frame, remove the two screws that fasten the right end cover **1** to the frame. The screws are located at the top of the cover **2**.
3. With the screws removed, move the top of the cover away from the frame. Lift straight up until the locating pins are free of the brackets **3** installed on the bottom frame rail.

End of procedure.

Reinstall

1. Seat both locating pins in the brackets **3** on the bottom rail. Then, fasten the top of the cover to the frame.

End of procedure.

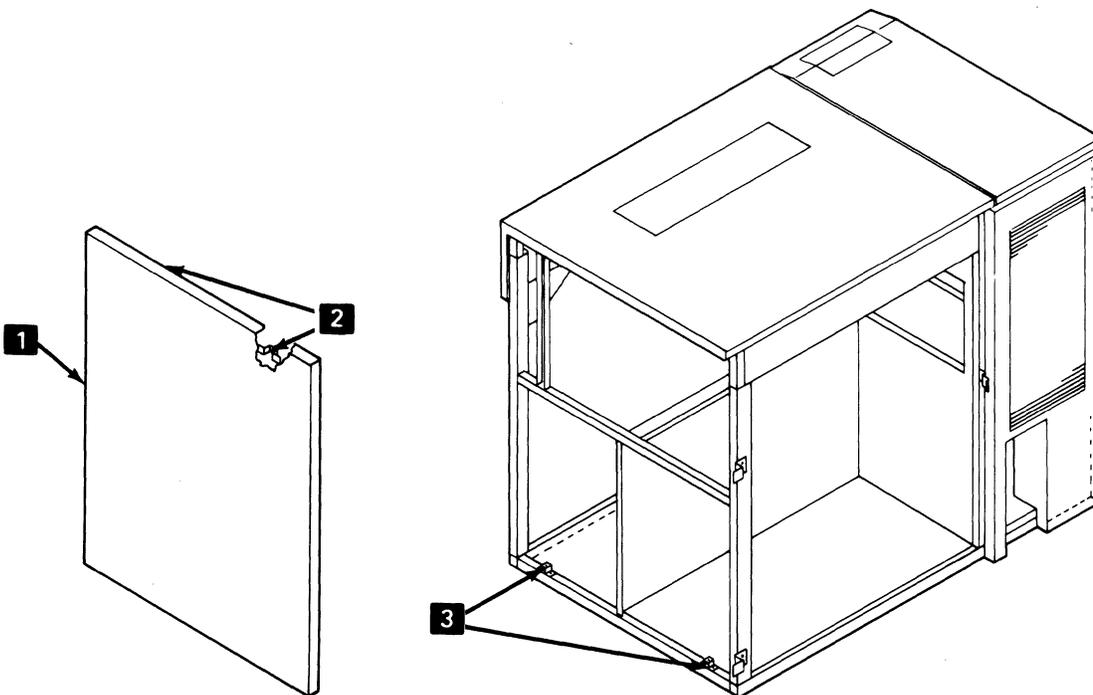
Adjustment

1. Loosen the two screws at the top of the cover **2** and the two screws that hold the lower front

bracket **3** to the frame.

2. Adjust the cover to obtain equal gap on each side.
3. Tighten the two screws that hold the lower front bracket to the frame.
4. Raise the cover as required to decrease the gap at the top of the cover. (Contact between the cover and the lower brackets is not necessary as long as the locating pins remain in contact with the brackets.)
5. Loosen the four screws that hold the upper brackets to the frame.
6. Loosen the four screws that hold the lower brackets to the frame.
7. Move the cover in or out for correct alignment or seal contact.
8. Tighten the screws that were loosened in steps 5 and 6.

End of procedure.



1005 Left End Cover

Logic Gate Access

1. Use an 8 mm hex-drive wrench to loosen the screw on the bottom side of the frame at **5**.

Note: The screw **5** must be replaced to prevent access to the power compartment by untrained personnel.

2. With the screw removed, pull the cover **1** away from the magnet **4**.

Removal

1. Complete the preceding steps for logic gate access.

Note: You may find it easier to lift the end cover clear of the hinge pins if the fastening screws on the operator's panel cover **3** are loosened, and the rear edge of the cover **3** is raised approximately 15 mm (.6 in). See "1008 Operator Panel Cover" for the procedure to loosen the mounting screws.

2. Move the cover **1** to the left 90°, and remove the nut that fastens the ground wire **6** to the cover; then, lift the cover up to clear the hinges **2**.

End of procedure.

Reinstall

1. Raise the rear of the operator panel cover; then place both brackets over the pins on the hinge **2**, fasten the ground wire to the cover, and close the cover.
2. Install and tighten the mounting screws for the operator panel cover.
3. With the cover latched to the top magnet **4**, reinstall the screw on the bottom side of the frame at **5**.

Note: The screw **5** must be replaced to prevent access to the power compartment by untrained personnel.

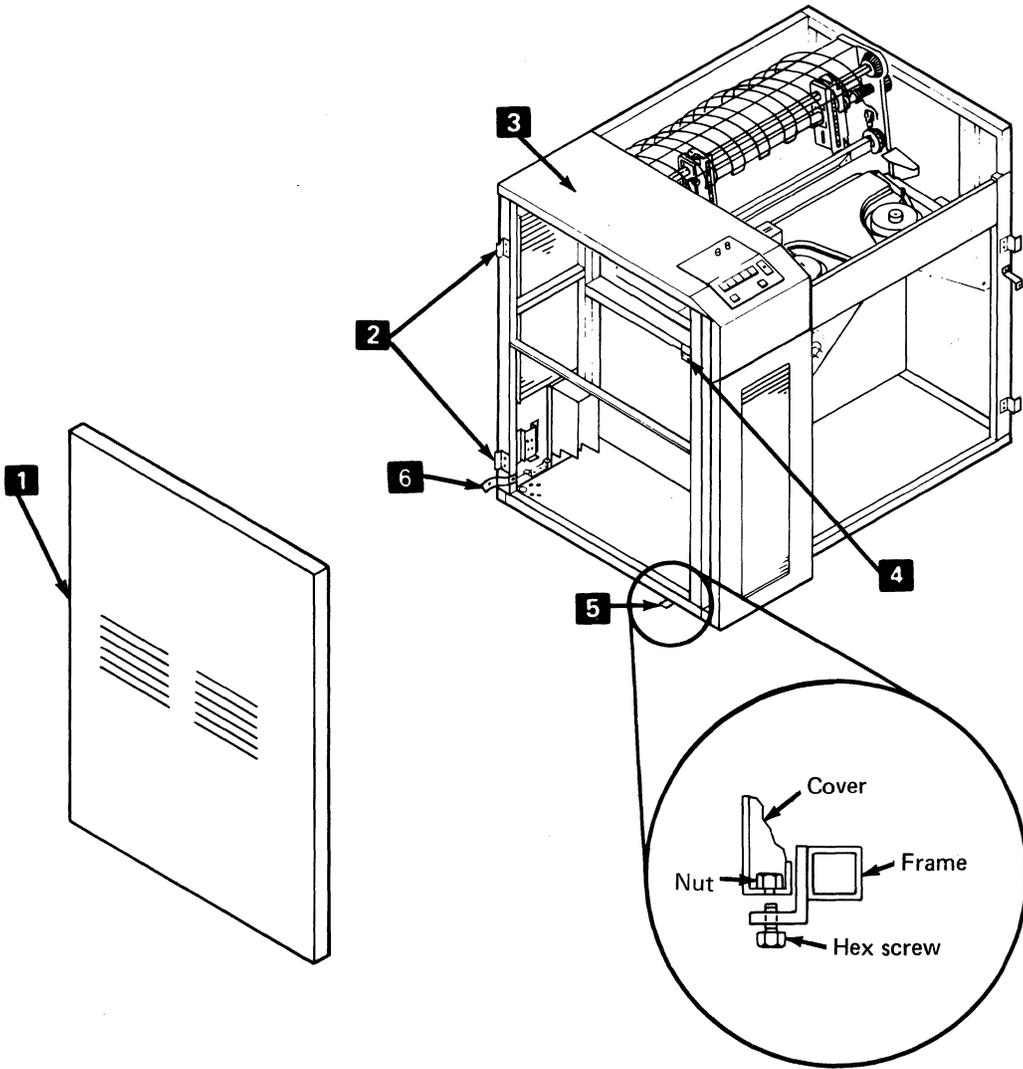
End of procedure.

Adjustment

1. Loosen the holding screws for the hinges **2**, and move the hinges as required to obtain an equal gap between the top and sides of the cover and adjacent cover.

End of procedure.

1005 Left End Cover (Continued)



1006 Left Front Cover

Removal

1. Use an 8 mm hex-drive wrench to loosen the screw on the bottom of the left end cover for logic gate access (1005).

Note: This screw must be replaced to prevent access to the power compartment by untrained personnel.

2. With the screw removed, pull the cover **1** away from the magnet **4**.

Note: The logic gate, not shown, must be opened to permit access to the fastening screws for this cover. Depress the latch spring on the right end of the gate, and pivot the gate to the left 90°.

3. With the logic gate open, remove the screw that fastens the cover **3** to the mounting bracket **1**.
4. Move the top of the cover away from the frame, and lift the cover until the locating pins on the bottom of the cover clear the mounting brackets **2**.

End of procedure.

Reinstall

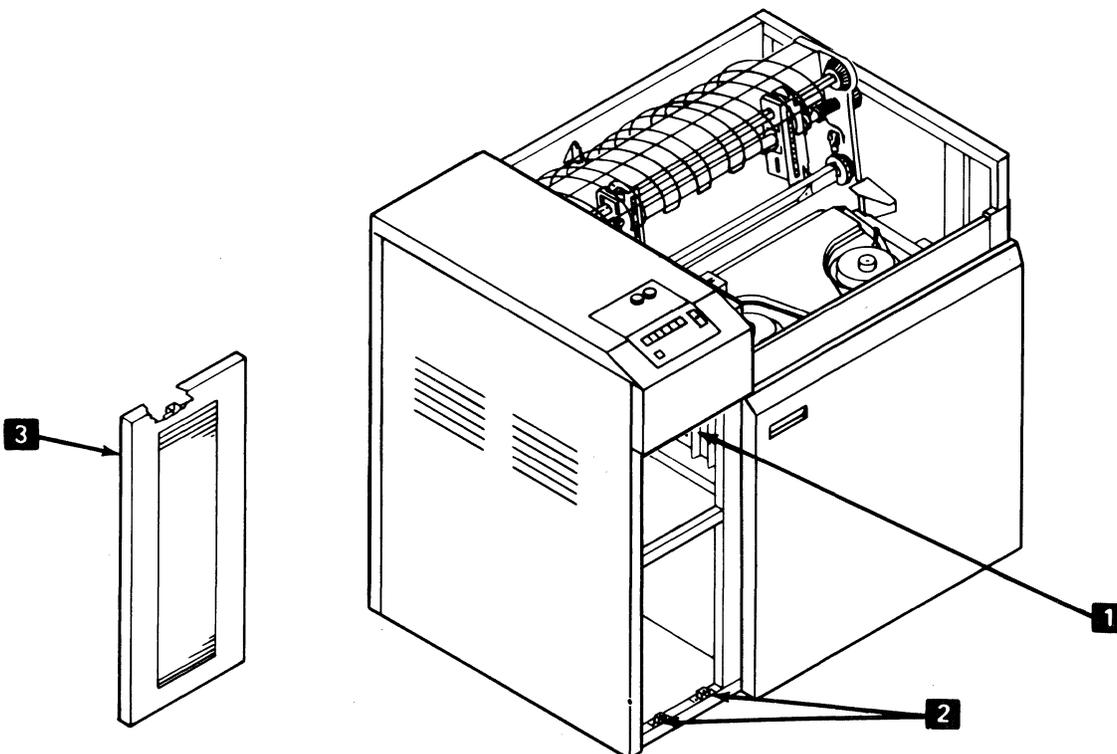
1. Seat the locating pins in the brackets **2**; then, push the cover closed and fasten it to the frame **1**.
2. Close the logic gate.
3. Close the left end cover and tighten the locking nut.

End of procedure.

Adjustment

The mounting bracket at the top of the cover **3** and the bracket on the frame at **1**, as well as the bottom brackets **2**, have long holes to allow the cover to be squared with the frame, and with the top left cover and the right front cover. Adjust as required to obtain an equal gap between covers.

End of procedure.



1007 Left Rear Cover

Removal

1. Use an 8 mm hex-drive wrench to loosen the screw on the bottom of the left end cover for logic gate access (1005).

Note: This screw must be replaced to prevent access to the power compartment by untrained personnel.

Note: The logic gate (not shown) must be opened to permit access to the fastening screws for this cover. Press the spring latch on the right end of the gate, and pivot the gate to the left 90°.

2. With the logic gate open, remove the screws that fasten the two cover mounting brackets **3** to the frame brackets.
3. Move the top of the cover **2** away from the frame, and lift it straight up until the locating pins are clear of the bracket **1** on the lower frame rail.

End of procedure.

Reinstall

1. Place the locating pins in the bracket **1**, push the cover closed, and fasten the mounting brackets **3** to the frame.

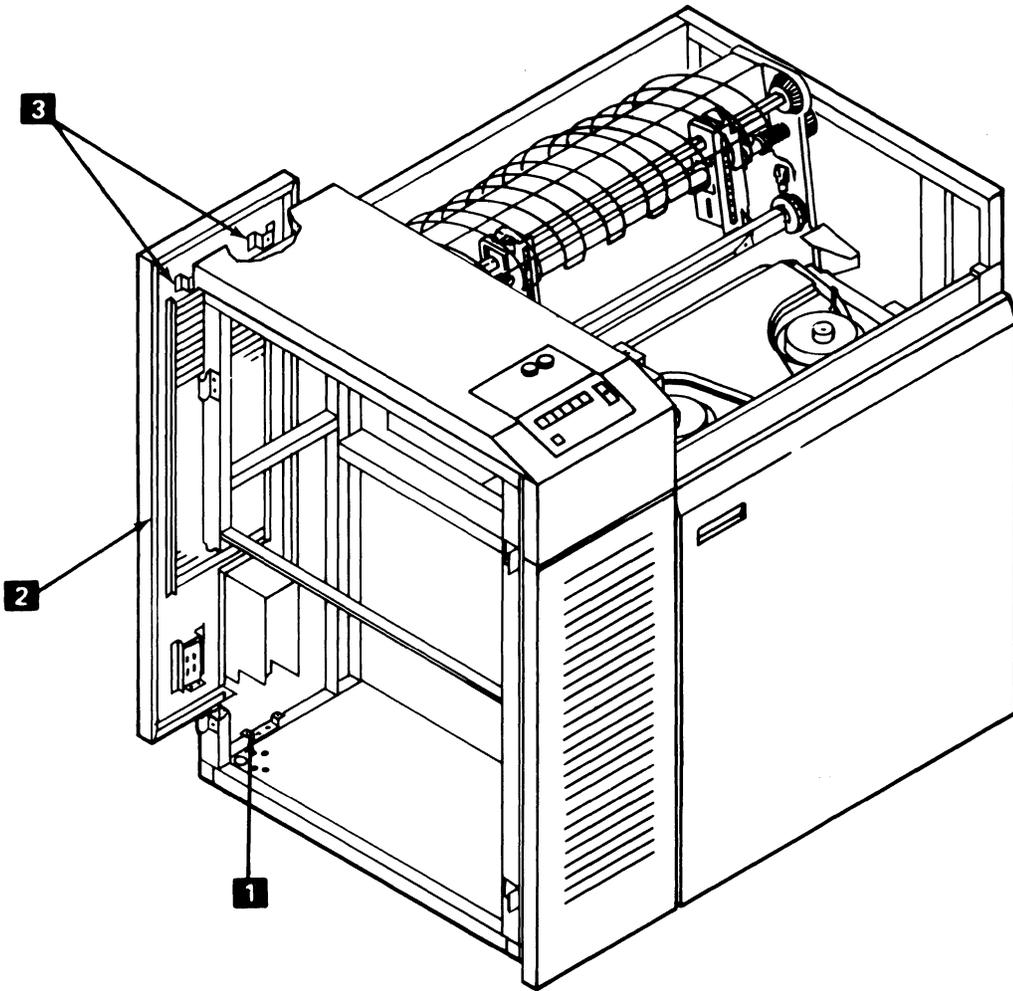
End of procedure.

Adjustment

The top frame brackets and the lower frame bracket have long holes to allow the cover to be squared with the frame, and with adjacent covers. Adjust as required to obtain an equal gaps between covers.

End of procedure.

1007 Left Rear Cover (Continued)



1008 Operator's Panel Cover

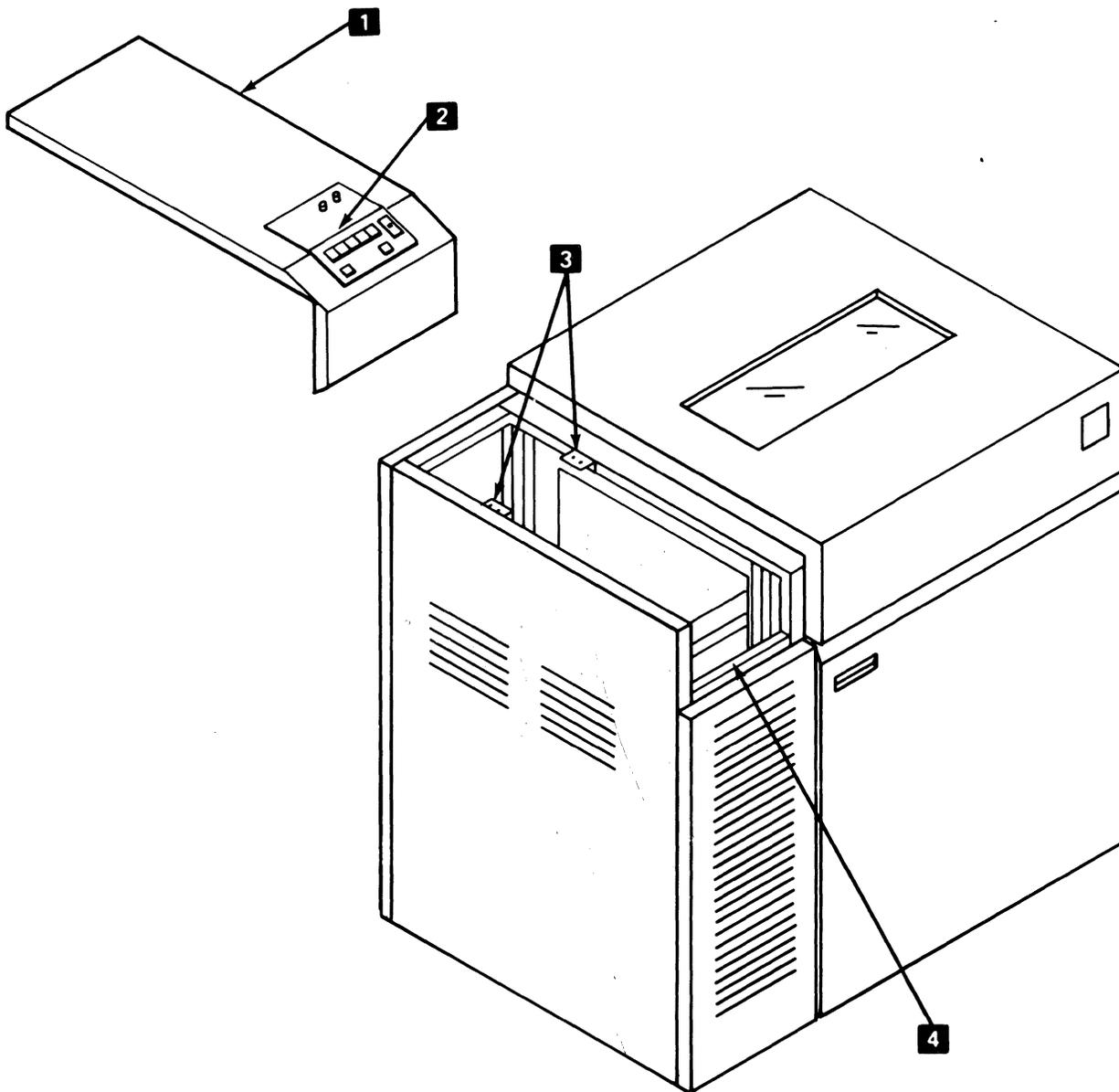
Removal

1. Use an 8 mm hex-drive wrench to loosen the screw on the bottom of the left end cover (1005).

Note: This screw must be replaced to prevent access to the power compartment by untrained personnel.

Note: The logic gate, not shown, must be opened to permit access to the fastening screws for this cover. Depress the spring latch on the right end of the gate, and pivot the gate to the left 90°.

2. Switch off the power.
3. Switch off the ac circuit breaker located on the power supply (3603).
4. Work from inside the frame, with the logic gate open.
5. Loosen the screws that fasten the mounting brackets **3** to the frame, and the screw in the front bracket that fastens the cover to the frame at **4**. The brackets at **3** and **4** remain attached to the cover **1**. Then disconnect the cable **8** (next page) from the operator's panel **2**.



1008 Operator's Panel Cover (Continued)

6. Lift the cover **1** straight up and turn it 90° to place on the frame as shown below.
7. Remove the two screws **7** from the power switch cover.
8. Remove the two fastening screws **6**, and remove the switch **5** from the operator's panel.
9. The operator's panel cover can now be lifted from the frame.

End of procedure.

Reinstall

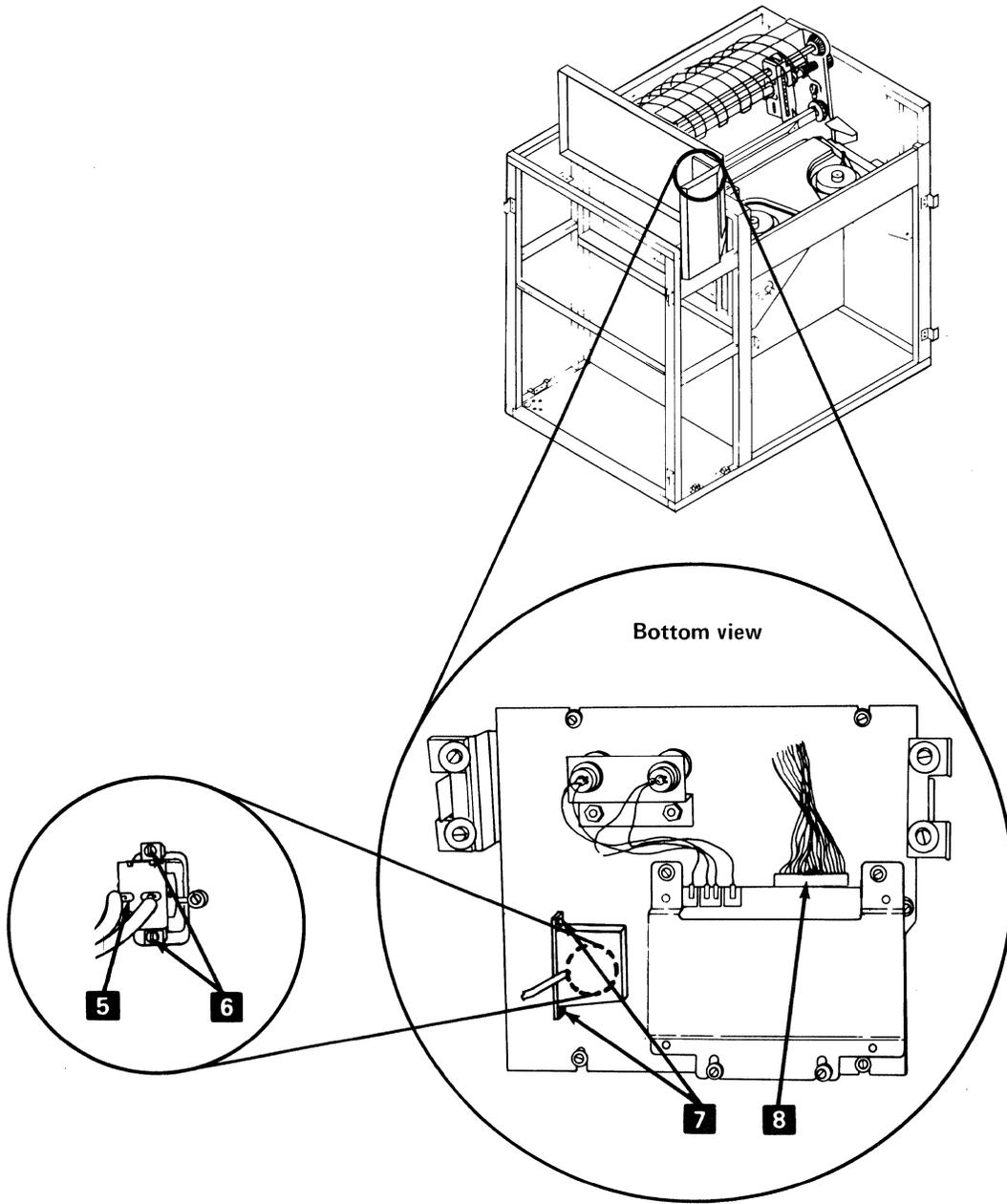
1. Facing the left end of the machine, place the cover on its side on the top frame rail. The inside of the operator panel should be facing you.
2. Reinstall the power switch **5** and the screws in the power switch cover **7**.
3. Place the front edge of the cover on the front guide rail, and lower the rear edge of the cover until it is fully closed.
4. Fasten the mounting brackets **3** and **4** to the frame.
5. Connect the cable **8** to the operator panel.
6. Switch on the ac circuit breaker.
7. Run verify MAP 2000 to ensure correct operation.

End of procedure.

Adjustment

1. The rear and side edges of the cover, and the top and front surfaces, should be flush with the surfaces of the other covers.
2. If the cover is too low, loosen the two screws that fasten the rear mounting brackets **3** to the frame, and raise the cover until the top surface is flush with the right hand cover. This is the only adjustment that should be required if the mounting brackets **3** and **4** have not been moved on the cover.
3. If more adjustment is necessary, loosen the two screws in each of the brackets **3** that attach the brackets to the cover. Also, loosen the two screws that attach the bracket **4** to the front of the cover.
4. The cover can now be moved relative to the frame, and adjusted to the desired position.
5. When the cover has been properly aligned, tighten all of the screws that fasten the brackets to the frame.

1008 Operator's Panel Cover (Continued)



1009 Cover Interlock Switch

The cover interlock switch protects the user from mechanical hazards due to actuator carrier or forms feed movement. Do not override this switch unless it is necessary for service.

Service Check

1. Switch off the power.
2. Connect the leads of the CE multimeter to terminals 2 and 3 on the left side of the switch. Set the meter to the R1 scale.
3. Close the top cover slowly and observe the meter needle deflection. The switch contacts should close when the cover is approximately 13 mm (.5 in) from being closed.

Removal

1. Switch off the power.
2. Open the left end cover (1005).
3. Switch off the ac breaker on the power supply (3603).
4. Open the top cover.
5. Remove the two screws that mount the cover interlock switch to the bracket, and remove the switch **1**.
6. Label and remove the wires. You have enough extra cable to permit removing the switch without opening the logic gate.

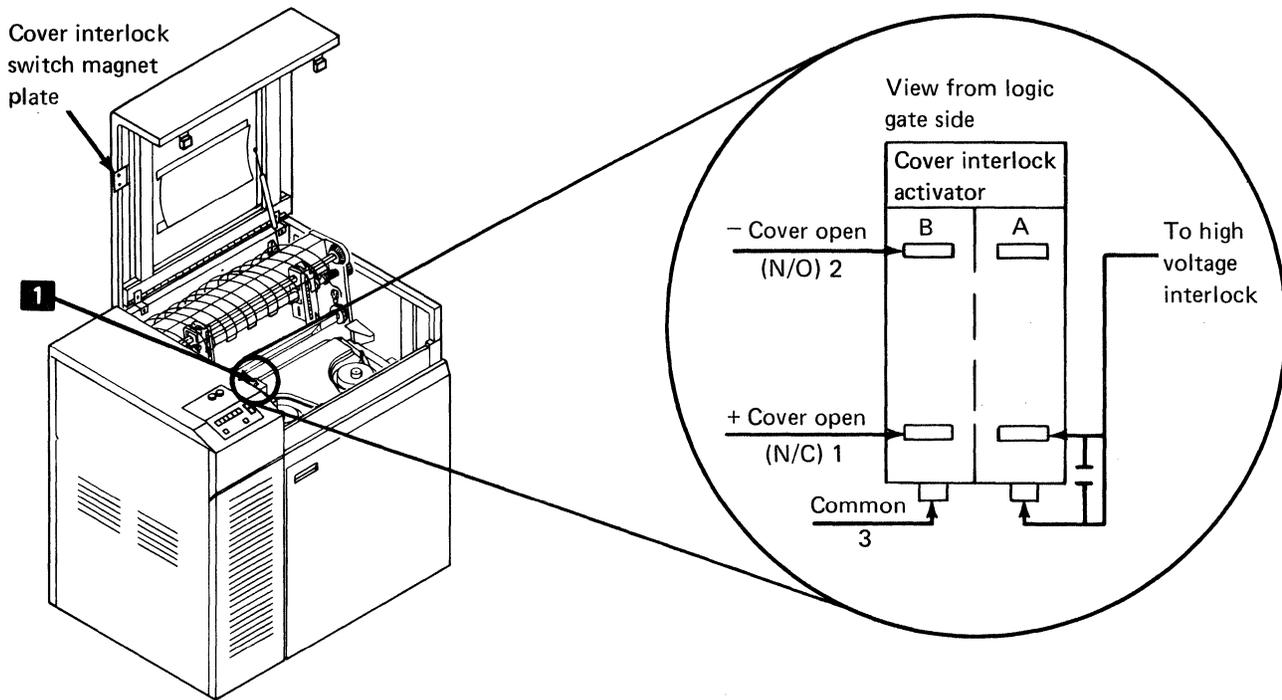
Note: Do not remove the mounting bracket from the frame. Only remove the screws that fasten the switch to the bracket. This will allow the switch to be reinstalled without needing realignment.

End of procedure.

Reinstall

1. Reconnect the wires to the switch.
2. Fasten the switch **1** to the bracket with the two mounting screws.
3. If the mounting bracket screws are loose, the drawing on the following page shows where to place the switch to align it to the magnet plate.
4. Open the left end cover (1005) and the logic gate.
5. Connect the leads of the CE multimeter to terminals 2 and 3 on the left side of the switch. Set the meter to the R1 scale.
6. Close the top cover slowly and observe the meter needle deflection. The switch contacts should close when the cover is approximately 13 mm (.5 in) from being closed.
7. If the contacts do not close, open the cover and shift the position of either the switch or the magnet plate until the specifications in step 5 above are met.

1009 Cover Interlock Switch (Continued)



1009 Cover Interlock Switch (Continued)

8. With the contacts closed and the cover fully seated, use your hand to hit the top cover directly over the switch while observing the needle on the multimeter. The contacts should not open because of vibration. If the contacts open, adjust the switch or magnet plate and repeat this step.
9. Close the logic gate.
10. Switch on the ac circuit breaker on the power supply (3603).
11. Close the left cover.

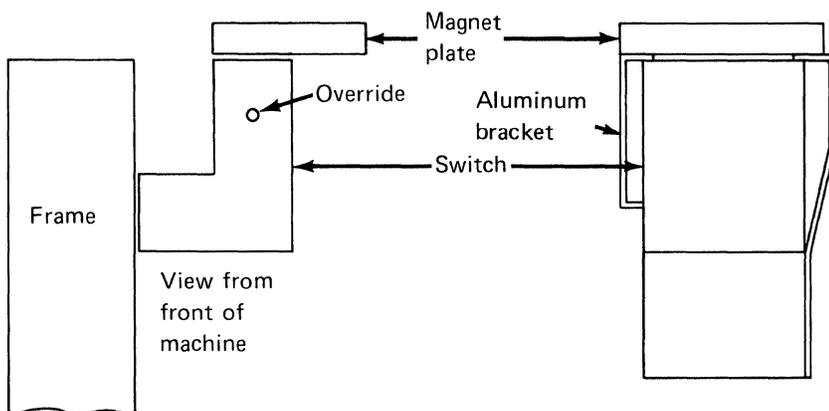
Cover Switch Override

CAUTION

Keep hands, tools, and loose clothing away from the printer mechanism when the printer is online. Unexpected operation may occur when the printer is is online mode.

When running the printer with the top cover open is necessary, insert a 2.5 mm (0.10 in) allen wrench through the indicated hole in the switch body, and turn the wrench clockwise until the tab is fully out of the switch; then, remove the wrench. Closing the top cover will reset the switch.

End of procedure.



1010 Customer Access Panel

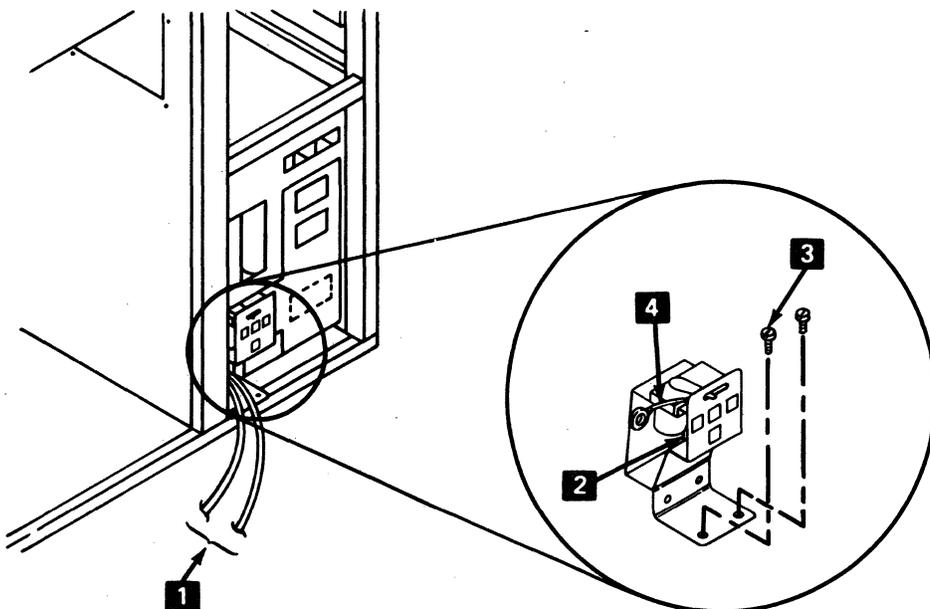
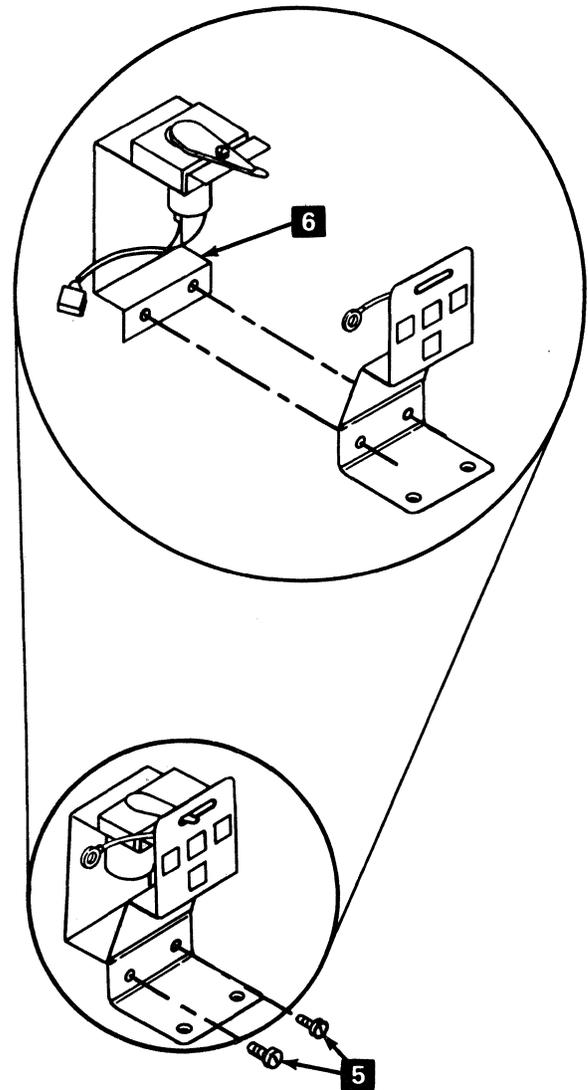
Note: If the MAPs directed you to this procedure in order to probe the card on the access panel, remove the assembly. However, do not disconnect any cables unless directed by the MAPs.

Removal

1. Switch off the power.

Note: If your machine has cable-thru, ensure that no other device on the loop is operating before disconnecting the input/output cables.

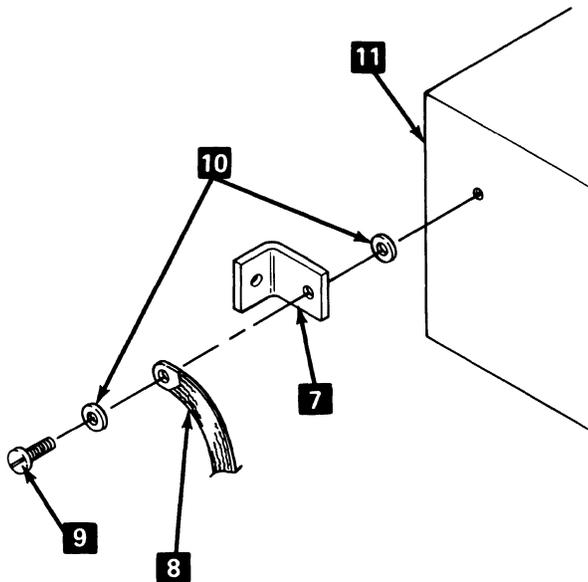
2. Remove the left rear cover (1007).
3. Remove the braided ground strap **4** where it attaches to the power supply bracket.
4. Disconnect the customer cables **1**.
5. Remove the two mounting screws **3**, and move the assembly out enough to disconnect the cable plug on the back of the card **2**.



1010 Customer Access Panel (Continued)

6. With the assembly out of the machine, remove the screws **5** and the audible alarm **6**.
7. The customer access panel can be either of the two types shown below.

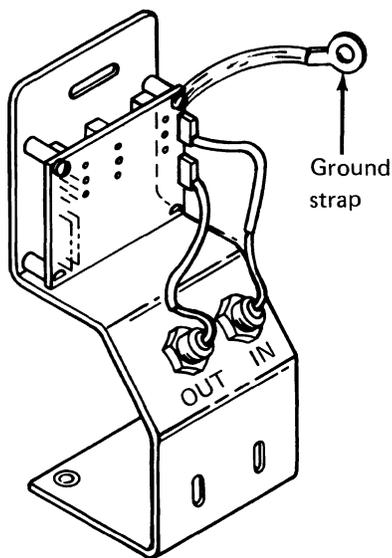
End of procedure.



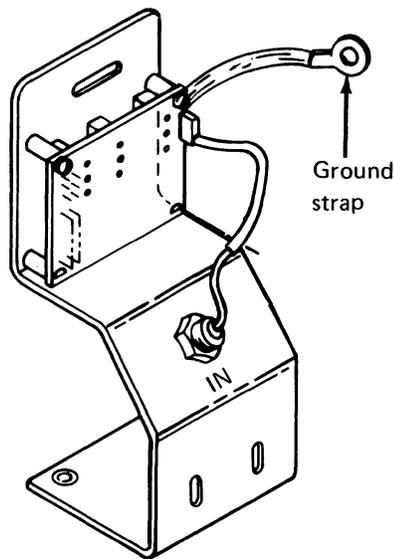
Reinstall

1. Fasten the alarm **6** to the access panel with the screws **5**.
2. Connect all plugs to the amplifier card **2** (customer cable, alarm).
3. Connect the cable plug to the back of the card **2**; then, fasten the assembly to the frame with the two screws **3**.
4. Connect the braided ground strap **8** terminal with the screw **9**, washers **10**, and bracket **7** to the frame **11**.
5. Install the left rear cover (1007).
6. Connect the customer cables **1**.
7. Switch on the power.

End of procedure.



Cable-thru feature panel



Single device or terminating device panel

1011 Audible Alarm

Removal

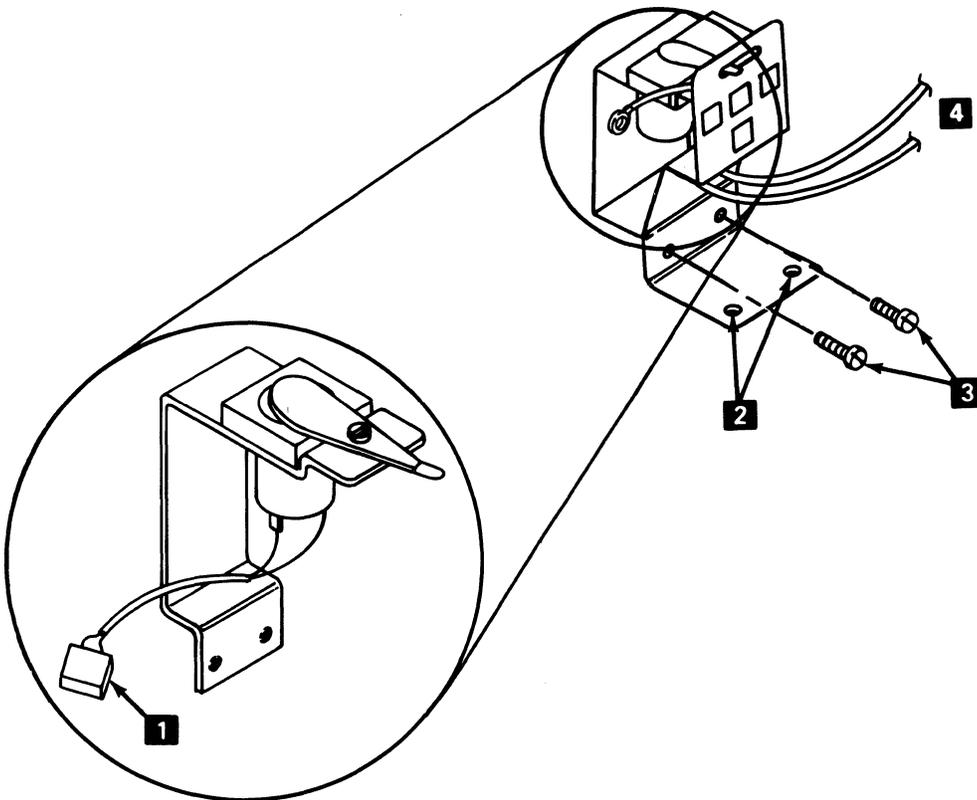
1. Switch off the power.
2. Remove the customer access panel assembly from the frame (1010).
3. Remove the two screws **3** that fasten the audible alarm to the access panel.
4. Disconnect the plug **1** from the access panel card.

End of procedure.

Reinstall

1. Fasten the alarm to the access panel with the two screws **3**.
2. Connect the cable **1** to the access panel card.
3. Connect the customer access assembly to the frame (1010).

End of procedure.



1012 Power Switch

Removal

Note: This switch is part of the cable assembly.

1. Switch off the power.
2. Disconnect the power cable from the ac outlet.
3. Open the left end cover for logic gate access (1005).
4. Switch off the ac circuit breaker.
5. Open the logic gate.

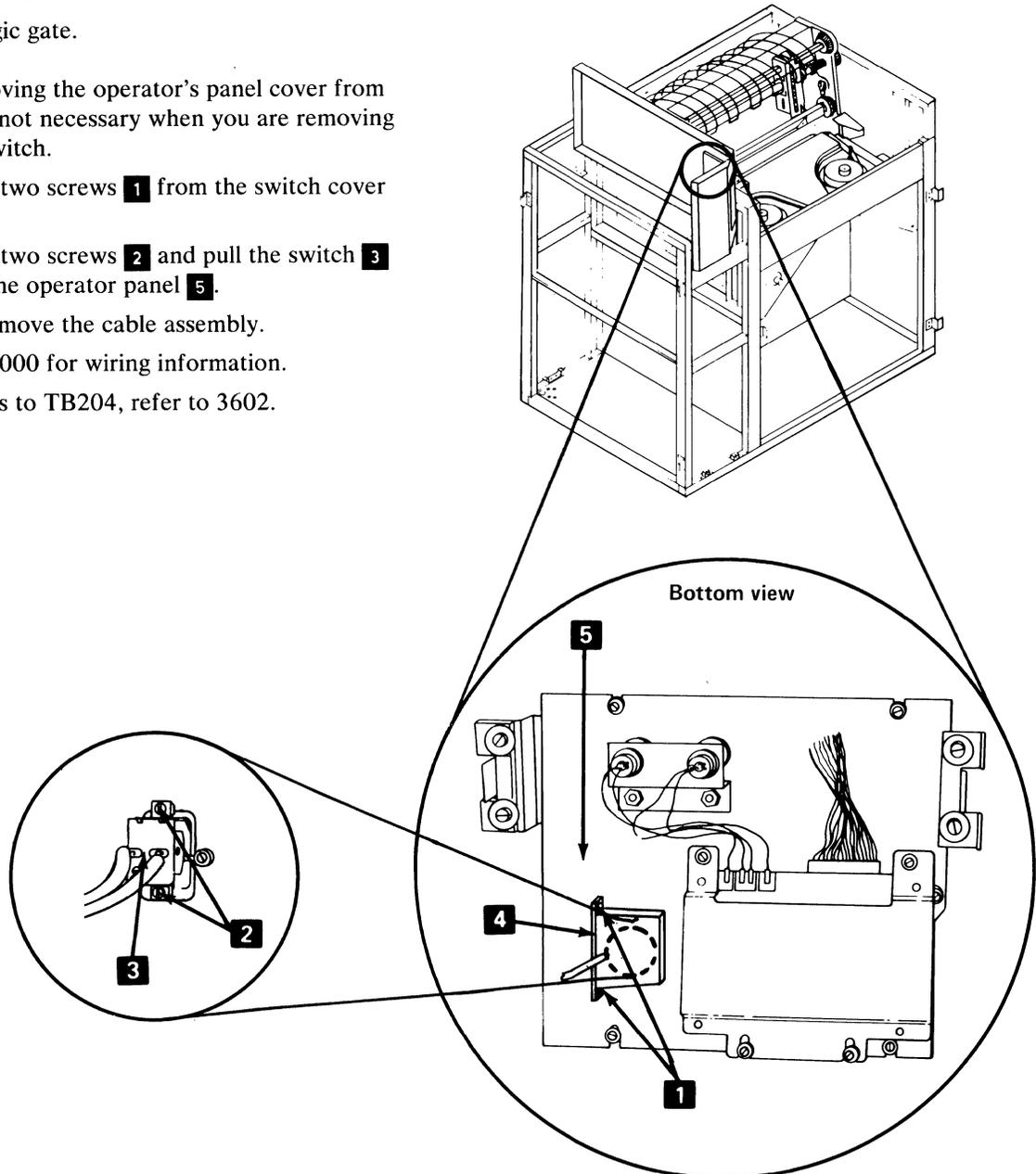
Note: Removing the operator's panel cover from the frame is not necessary when you are removing the power switch.

6. Remove the two screws **1** from the switch cover **4**.
7. Remove the two screws **2** and pull the switch **3** away from the operator panel **5**.
8. Mark and remove the cable assembly.
9. Refer to YA000 for wiring information.
10. To get access to TB204, refer to 3602.

End of Procedure

Reinstall

1. Fasten the switch **3** to the operator panel **5** with the two screws **2**.
2. Connect and secure the cable assembly.
3. Position the switch cover **4** over the switch and fasten with the two screws **1**.
4. Close the logic gate.
5. Switch on the ac circuit breaker.



1012 Power Switch (Continued)

6. Close and fasten the left end cover (1005).
7. Connect the power cable to the ac outlet.
8. Switch on the power.
9. Set the mode switch to "test" and press start to verify operation.

End of procedure.

1013 Operator's Panel Card

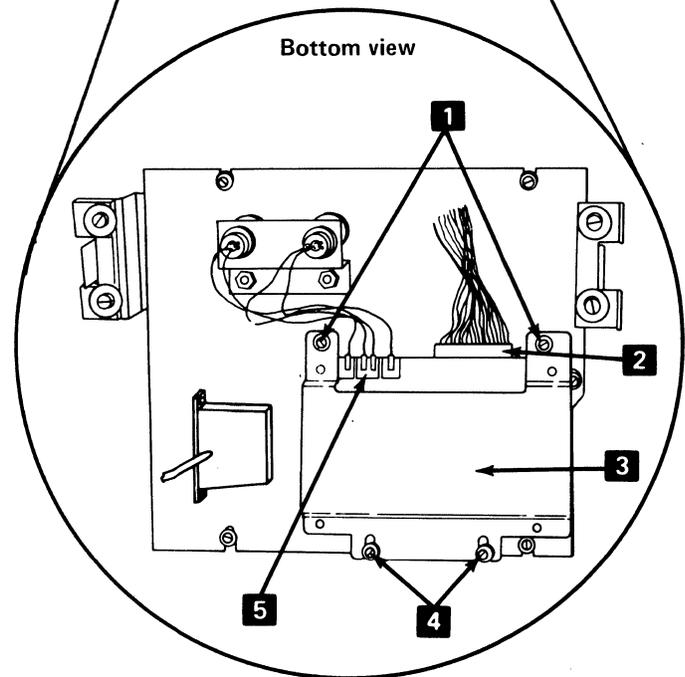
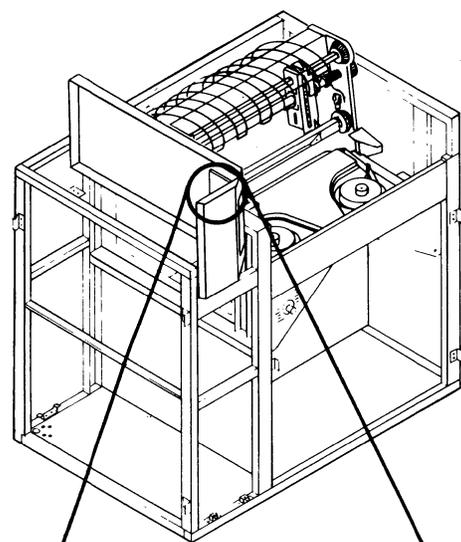
Removal

1. Switch off the power.
2. Open the left end cover (1005).
3. Switch off the ac circuit breaker.
4. Disconnect the power cable from the ac outlet.
5. Open the logic gate.

Note: Removing the operator's panel cover from the machine is not necessary.

6. Disconnect the cable **2**.
7. Disconnect the four indicator lamp wires **5**.
8. Remove the two screws **1**.
9. Loosen the two screws **4**, slide the bracket from under the screw heads, and remove the card **3** from the machine.

End of procedure.



1013 Operator's Panel Card (Continued)***Reinstall***

1. Insert the card **3**.
2. Connect the cable **2**.
3. Slide the bracket under the screw heads **4**; then install and tighten the screws **1**.
4. Tighten the screws **4** that fasten the bracket to the cover.
5. Connect the indicator lamp wires **5**.
6. Connect the power cable to the ac outlet.
7. Switch on the ac circuit breaker.
8. Switch on the power.
9. Set the mode switch to position 9, and perform the operator's panel test. Refer to "Test Routines," in "Chapter 2. Maintenance Summary" on page 2-1.
10. Close and fasten the left end cover (1005).

End of procedure.

2004 Vertical Alignment

The following print problem could be caused by:

- Paper not tight enough
- Forms feed assembly loose at pivots
- Side setscrews out of adjustment
- Loose or missing C clip on horizontal alignment knob



2005 Actuator Failure

Print wire actuator #1 of print group 7 is failing to print. This example is from a model 4.

11	21	31	41	51	61	71	81
11	21	31	41	51	61	71	81
12	22	32	42	52	62	72	82
12	22	32	42	52	62	72	82
13	23	33	43	53	63	73	83
13	23	33	43	53	63	73	83
14	24	34	44	54	64	74	84
14	24	34	44	54	64	74	84
15	25	35	45	55	65	75	85
15	25	35	45	55	65	75	85
16	26	36	46	56	66	76	86
16	26	36	46	56	66	76	86
17	27	37	47	57	67	77	87
17	27	37	47	57	67	77	87
18	28	38	48	58	68	78	88
18	28	38	48	58	68	78	88

2006 Actuator Failure

Print wire actuator #2 of print group 7 is always failing, on a model 4.

11	21	31	41	51	61	71	81
11	21	31	41	51	61	71	81
12	22	32	42	52	62	72	82
12	22	32	42	52	62	72	82
13	23	33	43	53	63	73	83
13	23	33	43	53	63	73	83
14	24	34	44	54	64	74	84
14	24	34	44	54	64	74	84
15	25	35	45	55	65	75	85
15	25	35	45	55	65	75	85
16	26	36	46	56	66	76	86
16	26	36	46	56	66	76	86
17	27	37	47	57	67	77	87
17	27	37	47	57	67	77	87
18	28	38	48	58	68	78	88
18	28	38	48	58	68	78	88

Print wire actuator #1 of group 2 is failing to print on a model 1.

11	21
11	21
12	22
12	22
13	23
13	23
14	24
14	24
15	25
15	25
16	26
16	26
17	27
17	27
18	28
18	28

2007 Actuator Connectors

Actuator connectors swapped as described in MAP
3500. Actuator driver 72 is good. Probably bad actua-
tor 72. This example is from a model 4.

11	21	31	41	51	61	71	81
11	21	31	41	51	61	71	81
12	22	32	42	52	62	72	82
12	22	32	42	52	62	72	82
13	23	33	43	53	63	73	83
13	23	33	43	53	63	73	83
14	24	34	44	54	64	74	84
14	24	34	44	54	64	74	84
15	25	35	45	55	65	75	85
15	25	35	45	55	65	75	85
16	26	36	46	56	66	76	86
16	26	36	46	56	66	76	86
17	27	37	47	57	67	77	87
17	27	37	47	57	67	77	87
18	28	38	48	58	68	78	88
18	28	38	48	58	68	78	88

This is the result of a bad card in a Model 4.

11	21	31	41	51	61	71	81
11	21	31	41	51	61	71	81
12	22	32	42	52	62	72	82
12	22	32	42	52	62	72	82
13	23	33	43	53	63	73	83
13	23	33	43	53	63	73	83
14	24	34	44	54	64	74	84
14	24	34	44	54	64	74	84
15	25	35	45	55	65	75	85
15	25	35	45	55	65	75	85
16	26	36	46	56	66	76	86
16	26	36	46	56	66	76	86
17	27	37	47	57	67	77	87
17	27	37	47	57	67	77	87
18	28	38	48	58	68	78	88
18	28	38	48	58	68	78	88

2008 Actuator Driver Card Failure

Model 1.

11	.....	21
11	.....	21
12	.....	22
12	.....	22
13	.....	23
13	.....	23
14	.....	24
14	.....	24
15	.....	25
15	.....	25
16	.....	26
16	.....	26
17	.....	27
17	.....	27
18	.....	28
18	.....	28

How To Find A Failing Actuator

The following procedure helps you identify which actuator is intermittently smearing or dropping dots.

- Place the Mode switch to position 5 and press the Start key. Check the printout for a bad actuator and replace it (2005). If no problem can be found on the printout, go to step 2.
- Obtain a copy of the failing printout.
- Fold the paper so that the failing line is at top of the page.
- Align print position 1 of the failing printout to position 1 on the 15 cpi scale on the actuator cover.
- Locate the failing column(s) on the 15 cpi scale (use the 15 cpi scale even if the printout is 10 cpi).
- Determine the failing dot row of the character.
- Select the actuator firing chart for the printer model to determine the location of the failing actuator.
- Replace the failing actuator (3308).

2008 Actuator Driver Card Failure (Continued)

Note: * Row 8 is used for putting a line under a character and some lower case letters.

Use the following table for the Model 1.

	Dot row Number	Failing Columns	Group/ Actuator	Failing Columns	Group/ Actuator
.	1	1-44	1/1	45-198	2/1
. .	2	1-50	1/2	51-198	2/2
. . .	3	1-56	1/3	57-198	2/3
. . . .	4	1-62	1/4	63-198	2/4
.	5	1-47	1/5	48-198	2/5
.	6	1-53	1/6	54-198	2/6
.	7	1-59	1/7	60-198	2/7
.	8*	1-65	1/8	66-198	2/8

Use the following two tables for the Model 2.

Note: * Row 8 is used for putting a line under a character and some lower case letters.

	Dot row Number	Failing Columns	Group/ Actuator	Failing Columns	Group/ Actuator
.	1	1-20	1/1	21-62	2/1
. .	2	1-26	1/2	27-68	2/2
. . .	3	1-32	1/3	33-74	2/3
. . . .	4	1-38	1/4	39-80	2/4
.	5	1-23	1/5	24-65	2/5
.	6	1-29	1/6	30-71	2/6
.	7	1-35	1/7	36-77	2/7
.	8*	1-41	1/8	42-83	2/8

	Dot row Number	Failing Columns	Group/ Actuator	Failing Columns	Group/ Actuator
.	1	63-104	3/1	105-198	4/1
. .	2	69-110	3/2	111-198	4/2
. . .	3	75-116	3/3	117-198	4/3
. . . .	4	81-122	3/4	123-198	4/4
.	5	66-107	3/5	108-198	4/5
.	6	72-113	3/6	114-198	4/6
.	7	78-119	3/7	120-198	4/7
.	8*	84-125	3/8	126-198	4/8

2008 Actuator Driver Card Failure (Continued)

Note: * Row 8 is used for putting a line under a character and some lower case letters.

Use the following three tables for the Model 3.

	Dot row Number	Failing Columns	Group/ Actuator	Failing Columns	Group/ Actuator
.	1	1-11	1/1	12-44	2/1
. .	2	1-17	1/2	18-50	2/2
. . .	3	1-23	1/3	24-56	2/3
. . . .	4	1-29	1/4	30-62	2/4
.	5	1-14	1/5	15-47	2/5
.	6	1-20	1/6	21-53	2/6
.	7	1-26	1/7	27-59	2/7
.	8*	1-32	1/8	33-65	2/8

	Dot row Number	Failing Columns	Group/ Actuator	Failing Columns	Group/ Actuator
. .	1	45-77	3/1	78-110	4/1
. . .	2	51-83	3/2	84-116	4/2
. . . .	3	57-89	3/3	90-122	4/3
.	4	63-95	3/4	96-128	4/4
.	5	48-80	3/5	81-113	4/5
.	6	54-86	3/6	87-119	4/6
.	7	60-92	3/7	93-125	4/7
.	8*	66-98	3/8	99-131	4/8

	Dot row Number	Failing Columns	Group/ Actuator	Failing Columns	Group/ Actuator
. . .	1	111-143	5/1	144-198	6/1
. . . .	2	117-149	5/2	150-198	6/2
.	3	123-155	5/3	156-198	6/3
.	4	129-161	5/4	162-198	6/4
.	5	114-146	5/5	147-198	6/5
.	6	120-152	5/6	153-198	6/6
.	7	126-158	5/7	159-198	6/7
.	8*	132-164	5/8	165-198	6/8

2008 Actuator Driver Card Failure (Continued)

Note: * Row 8 is used for putting a line under a character and some lower case letters.

Use the following four tables for the Model 4.

	Dot row Number	Failing Columns	Group/ Actuator	Failing Columns	Group/ Actuator
.	1	1-5	1/1	6-32	2/1
. .	2	1-11	1/2	12-38	2/2
. . .	3	1-17	1/3	18-44	2/3
. . . .	4	1-23	1/4	24-50	2/4
.	5	1-8	1/5	9-35	2/5
.	6	1-14	1/6	15-41	2/6
.	7	1-20	1/7	21-47	2/7
.	8*	1-26	1/8	27-53	2/8

	Dot row Number	Failing Columns	Group/ Actuator	Failing Columns	Group/ Actuator
.	1	33-59	3/1	60-86	4/1
. .	2	39-65	3/2	66-92	4/2
. . .	3	45-71	3/3	72-98	4/3
. . . .	4	51-77	3/4	78-104	4/4
.	5	36-62	3/5	63-89	4/5
.	6	42-68	3/6	69-95	4/6
.	7	48-74	3/7	75-101	4/7
.	8*	54-80	3/8	81-107	4/8

	Dot row Number	Failing Columns	Group/ Actuator	Failing Columns	Group/ Actuator
.	1	87-113	5/1	114-140	6/1
. .	2	93-119	5/2	120-146	6/2
. . .	3	99-125	5/3	126-152	6/3
. . . .	4	105-131	5/4	132-158	6/4
.	5	90-116	5/5	117-143	6/5
.	6	96-122	5/6	123-149	6/6
.	7	102-128	5/7	129-155	6/7
.	8*	108-134	5/8	135-161	6/8

	Dot row Number	Failing Columns	Group/ Actuator	Failing Columns	Group/ Actuator
.	1	141-167	7/1	168-198	8/1
. .	2	147-173	7/2	174-198	8/2
. . .	3	153-179	7/3	180-198	8/3
. . . .	4	159-185	7/4	186-198	8/4
.	5	144-170	7/5	171-198	8/5
.	6	150-176	7/6	177-198	8/6
.	7	156-182	7/7	183-198	8/7
.	8*	162-188	7/8	189-198	8/8

2009 Online Verification Test (Continued)

ABCDEFGHIJKLMNPQRSTUWXYZ	0123456789	アィウヱカキクケコ	エ.((+|&|%)?~/-,X_)?-100?"丁(1)\$	ABCDEFGHIJKLMNPQRSTUWXYZ	0123456789	アィウヱカキクケコ
BCDEFGHIJKLMNPQRSTUWXYZ	0123456789	アィウヱカキクケコ	エ.((+|&|%)?~/-,X_)?-100?"丁(1)\$	ABCDEFGHIJKLMNPQRSTUWXYZ	0123456789	アィウヱカキクケコ
CDEFGHIJKLMNPQRSTUWXYZ	0123456789	アィウヱカキクケコ	エ.((+|&|%)?~/-,X_)?-100?"丁(1)\$	ABCDEFGHIJKLMNPQRSTUWXYZ	0123456789	アィウヱカキクケコ
DEFGHIJKLMNPQRSTUWXYZ	0123456789	アィウヱカキクケコ	エ.((+|&|%)?~/-,X_)?-100?"丁(1)\$	ABCDEFGHIJKLMNPQRSTUWXYZ	0123456789	アィウヱカキクケコ
EFGHIJKLMNPQRSTUWXYZ	0123456789	アィウヱカキクケコ	エ.((+|&|%)?~/-,X_)?-100?"丁(1)\$	ABCDEFGHIJKLMNPQRSTUWXYZ	0123456789	アィウヱカキクケコ
FGHIJKLMNPQRSTUWXYZ	0123456789	アィウヱカキクケコ	エ.((+|&|%)?~/-,X_)?-100?"丁(1)\$	ABCDEFGHIJKLMNPQRSTUWXYZ	0123456789	アィウヱカキクケコ
GHIJKLMNPQRSTUWXYZ	0123456789	アィウヱカキクケコ	エ.((+|&|%)?~/-,X_)?-100?"丁(1)\$	ABCDEFGHIJKLMNPQRSTUWXYZ	0123456789	アィウヱカキクケコ
HJKLMNPQRSTUWXYZ	0123456789	アィウヱカキクケコ	エ.((+|&|%)?~/-,X_)?-100?"丁(1)\$	ABCDEFGHIJKLMNPQRSTUWXYZ	0123456789	アィウヱカキクケコ
IJKLMNPQRSTUWXYZ	0123456789	アィウヱカキクケコ	エ.((+|&|%)?~/-,X_)?-100?"丁(1)\$	ABCDEFGHIJKLMNPQRSTUWXYZ	0123456789	アィウヱカキクケコ

JKLMNPQRSTUWXYZ	0123456789	abcdefghijklmnopqrstuvwxyz	[(+|&|%)?~/-,X_)?-100?"丁(1)\$	ABCDEFGHIJKLMNPQRSTUWXYZ	0123456789	abcdefghijklmnopqrstuvwxyz
KLNPQRSTUWXYZ	0123456789	abcdefghijklmnopqrstuvwxyz	[(+|&|%)?~/-,X_)?-100?"丁(1)\$	ABCDEFGHIJKLMNPQRSTUWXYZ	0123456789	abcdefghijklmnopqrstuvwxyz
LNPQRSTUWXYZ	0123456789	abcdefghijklmnopqrstuvwxyz	[(+|&|%)?~/-,X_)?-100?"丁(1)\$	ABCDEFGHIJKLMNPQRSTUWXYZ	0123456789	abcdefghijklmnopqrstuvwxyz
NPQRSTUWXYZ	0123456789	abcdefghijklmnopqrstuvwxyz	[(+|&|%)?~/-,X_)?-100?"丁(1)\$	ABCDEFGHIJKLMNPQRSTUWXYZ	0123456789	abcdefghijklmnopqrstuvwxyz
QRSTUWXYZ	0123456789	abcdefghijklmnopqrstuvwxyz	[(+|&|%)?~/-,X_)?-100?"丁(1)\$	ABCDEFGHIJKLMNPQRSTUWXYZ	0123456789	abcdefghijklmnopqrstuvwxyz
RSTUWXYZ	0123456789	abcdefghijklmnopqrstuvwxyz	[(+|&|%)?~/-,X_)?-100?"丁(1)\$	ABCDEFGHIJKLMNPQRSTUWXYZ	0123456789	abcdefghijklmnopqrstuvwxyz

Line	Explanation		
1	Absolute vertical position = 6.	40	Select multinational character set; set 8 lpi; set 15 cpi; horizontal format = 198; absolute vertical position = line 48.
1	Set line density to 1 point per line (plot mode); set horizontal format = 132; set vertical format = 90; set horizontal print position = 1.	48	Set horizontal print position to 1.
1	132 underscores (6D) in separate 1-byte buffers to test turnaround emitters; auto line feed. (See note below.)	48-55	Ripple pattern using multinational character set with auto line feed.
2-4	3 lines of underscores (6D), 132 bytes in length using auto line feed.	56	Absolute vertical position to line 56; set horizontal print position to 1; print last line of ripple pattern; form feed.
5	13 new lines for forms adjustment.		
17	Set character density to 15 cpi; set line density to 6 lpi; set horizontal format = 198; select Katakana character set; set horizontal print position = 1.		At this point the paper should be in position to reprint the verification test; it should be in the same relative position as it was when the test began.
17-25	Ripple pattern using Katakana character set and auto line feed.		Note: In order for turnaround emitters to be tested properly, the printer must be run in execute mode. Running the test in quiesce mode will not test this function. However, all other functions will operate normally. In execute mode, commands are executed as they are received. In quiesce mode, the current command must be completed before the next command is sent.
25	Load alternate characters using various SCS commands as hex codes. 1st character = dash using wire 1, 2nd character using wire 2, etc. Relative vertical skip of 7. Set character density to 10; set line density to 9 lpi.		
32-39	Set transparent mode and print one line of each of the alternate characters.		

2100 Print Quality Symptom List

service check and/or repair action as required for one or more failures.

Note: The print quality symptom list should be used to isolate a print quality failure. Perform

Quality Symptom List

- A. Vertical dot alignment
- B. Horizontal dot alignment
- C. Extra dots
- D. Smudging
- E. Large dots
- F. Dropping dots
- G. Character registration
- H. Light and dark printing
- I. Partial or full line missing
- J. Poor carbon copies
- K. Double pass bar code (RPQ)

A. Vertical Dot Alignment

- | | |
|--|--------------------------------------|
| 1. Forms tension | See operator's guide (forms loading) |
| 2. Tractor loose | See MIM 3407 |
| 3. Horizontal adjustment rod loose | See MIM 3406 |
| 4. Forms box not aligned | See operator's guide (forms loading) |
| 5. Insufficient forms drag | See MIM 3402 |
| 6. Forms assembly pivot bolts | See MIM 3402 |
| 7. Forms assembly, side thrust screws | See MIM 3402 |
| 8. Forms feed assembly loose (side plate screws loose) | See MIM 3402 |
| 9. Thrust bearings | See MIM 3306 |
| 10. Vertical bearings anti-rotation | See MIM 3306 |
| 11. Leadscrew bearings | See MIM 3309 |
| 12. Leadscrew nuts and bushings | See MIM 3309 |
| 13. Nose guide | See MIM 3308 |
| 14. Actuator (alignment) | See MIM 3308 |
| 15. Linear encoder (LEM) | See MIM 3303 |

B. Horizontal Dot Alignment (Small and Large Characters)

- | | |
|--|--------------------|
| 1. Binds | |
| a. Forms drag tension | See MIM 3402 |
| b. EOF (end of forms) jammed | See MIM 3409 |
| 2. Check electronic adjustment of actuator carrier and forms | See MIM 3104, 3105 |
| 3. Pulley cover rubbing | See MIM 3403 |
| 4. Tractor | See MIM 3405 |
| 5. Belt tension | See MIM 3403 |
| 6. Pulley loose | See MIM 3403 |
| 7. Pulley alignment | See MIM 3403 |
| 8. Encoder wheel loose | See MIM 3404 |
| 9. Guide (nose piece) | See MIM 3308 |
| 10. Actuator (single) | See MIM 3308 |
| 11. A1L2 or A1K2 card bad | See MIM 3103A |
| 12. Forms motor bad | See MIM 3403 |

2100 Print Quality Symptom List (Continued)

C. Extra Dots (other than optioned)

- | | |
|-------------------------------------|--------------|
| 1. Actuator (bad) | See MIM 3308 |
| 2. Actuator/platen adjustment tight | See MIM 3402 |

D. Smudging (smear)

- | | |
|--|--------------|
| 1. Forms thickness cam setting not correct | See MIM 3410 |
| 2. Ribbon shield missing, damaged, too much ink | |
| 3. Actuator has foreign material on tip | |
| 4. Forms hole punches (chad) collected in printer | |
| 5. Ribbon defective (worn) | |
| 6. Actuator (wire out) | |
| 7. Ribbon snag | See MIM 3402 |
| 8. Multipass printing (verify forms thickness cam setting) | See MIM 3410 |
| 9. Insufficient forms drag | See MIM 3402 |
| 10. Platen gap adjustment | See MIM 3402 |
| 11. Ribbon drive position | See MIM 3804 |

E. Large Dots

- | | |
|--|--------------|
| 1. Endplate to print assembly adjustment | See MIM 3402 |
| 2. Closing forms feed assembly when actuator carrier not on ramp | |

F. Dropping Dots

- | | |
|---|--------------|
| 1. Forms thickness cam setting | See MIM 3410 |
| 2. Platen gap adjustment | See MIM 3402 |
| 3. Front oiler (dry), rear oiler (too much oil) | See MIM 3307 |
| 4. Rear oiler (interference) | See MIM 3307 |
| 5. Actuator screw broken or loose | See MIM 3308 |
| 6. Connector (electrical) loose | |
| 7. Actuator defective (broken mechanical wire) | See MIM 3308 |
| 8. Actuator carrier thrust bearing | See MIM 3306 |

G. Character Registration (line to line)

Vertical

- | | |
|--|----------------------|
| 1. Print too close to out fold | See operator's guide |
| 2. Opening cover while printing | |
| 3. Customer tearing off forms while printing | |
| 4. Forms not feeding straight | See operator's guide |
| 5. Forms drag | See MIM 3402 |
| 6. Forms pulley loose or rubbing cover | See MIM 3403 |
| 7. Forms encoder loose | See MIM 3404 |
| 8. Forms tractor binding | See MIM 3407 |
| 9. Program problem (forms spacing) | |

2100 Print Quality Symptom List (Continued)**Horizontal**

- | | |
|--|--------------|
| 1. Actuator carrier linear encoder (LEM) | See MIM 3303 |
| 2. Horizontal adjustment rod (vernier) loose | See MIM 3406 |
| 3. Horizontal forms tension (tractor or tractor setting) | See MIM 3407 |
| 4. Forms thickness cam setting | See MIM 3410 |

H. Light and Dark Printing

- | | |
|--|--------------------|
| 1. Ribbon wearing out | |
| 2. Forms thickness setting not correct or cam follower binding | See MIM 3302, 3406 |
| 3. Platen out of adjustment | See MIM 3402 |
| 4. Ribbon folded | |

I. Partial or Full Line Missing

- | | |
|--|--------------|
| 1. Forms thickness cam follower is binding and not closing fast enough | See MIM 3402 |
| 2. Forms feed assembly pivot bolts too tight | See MIM 3402 |
| 3. Forms feed assembly side thrust screws too tight | See MIM 3402 |
| 4. Ribbon drive binds against main shaft | See MIM 3804 |
| 5. End plate to print assembly adjustment | See MIM 3402 |
| 6. Cam follower spring defective | See MIM 3306 |
| 7. Actuator main shaft end adjustment | See MIM 3402 |
| 8. Latch binding | See MIM 3306 |
| 9. Actuator carrier bearings bad | See MIM 3310 |
| 10. Ribbon lifted | |
| 11. Ribbon folded or worn | |
| 12. Ribbon shield not installed correctly | See MIM 3807 |
| 13. Platen gap adjustment | See MIM 3402 |

J. Poor Carbon Copies

- | | |
|--|--------------|
| 1. Forms thickness setting not correct | See MIM 3410 |
| 2. Forms thickness not operating correctly | See MIM 3410 |
| 3. Forms slipping | See MIM 3403 |
| 4. Forms specifications | |

K. Double Pass Bar Code (RPQ) Smudging

- | | |
|--|----------------------------|
| 1. Forms thickness cam setting not correct | See MIM 3410 |
| 2. Vertical misplaced dot | See vertical dot alignment |

2100 Print Quality Symptom List (Continued)

3. Forms drag tension

See MIM 3402

4. Horizontal registration

See horizontal dot alignment

.....

3100 Logic Gate

Three different configurations of logic cards are used in the controller. One type uses 7 cards, while the others use 3 or 4 cards. (Model 1 uses 3 cards, Models 2, 3, and 4 use 4 cards. In this book, we will refer to the 3 and 4 card controllers as 3-card controllers, and the 7-card controller as the other.) Both types perform the same operations. The 3-card controller uses a greater density circuit design.

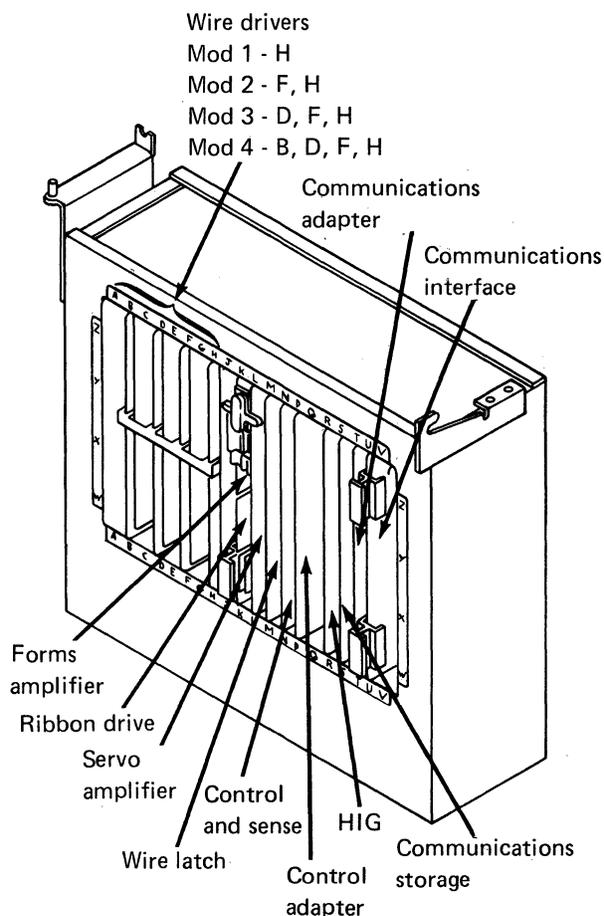
To determine which type is installed in your controller, inspect the U2 position of the logic gate. If a card is installed in the U2 position, your controller has 7 cards. The absence of a card in the U2 position indicates a 3-card controller. A description of the 3-card controller follows the description of the 7-card controller.

3101 Description - 7-card controller

The logic gate contains the printer control unit (PCU) and the printer electronics. The logic gate is cooled by a fan mounted under the gate.

The PCU contains the interface with the host. The PCU receives and stores the data, decodes commands, tests for and sends error conditions to the operator and the host controller, and determines the characters to be printed.

The printer electronics move the forms, the ribbon, and control the print actuators.



3102 Logic Gate (card side)

The cards in locations M through U are the PCU cards.
 The remainder are the printer electronic controls.

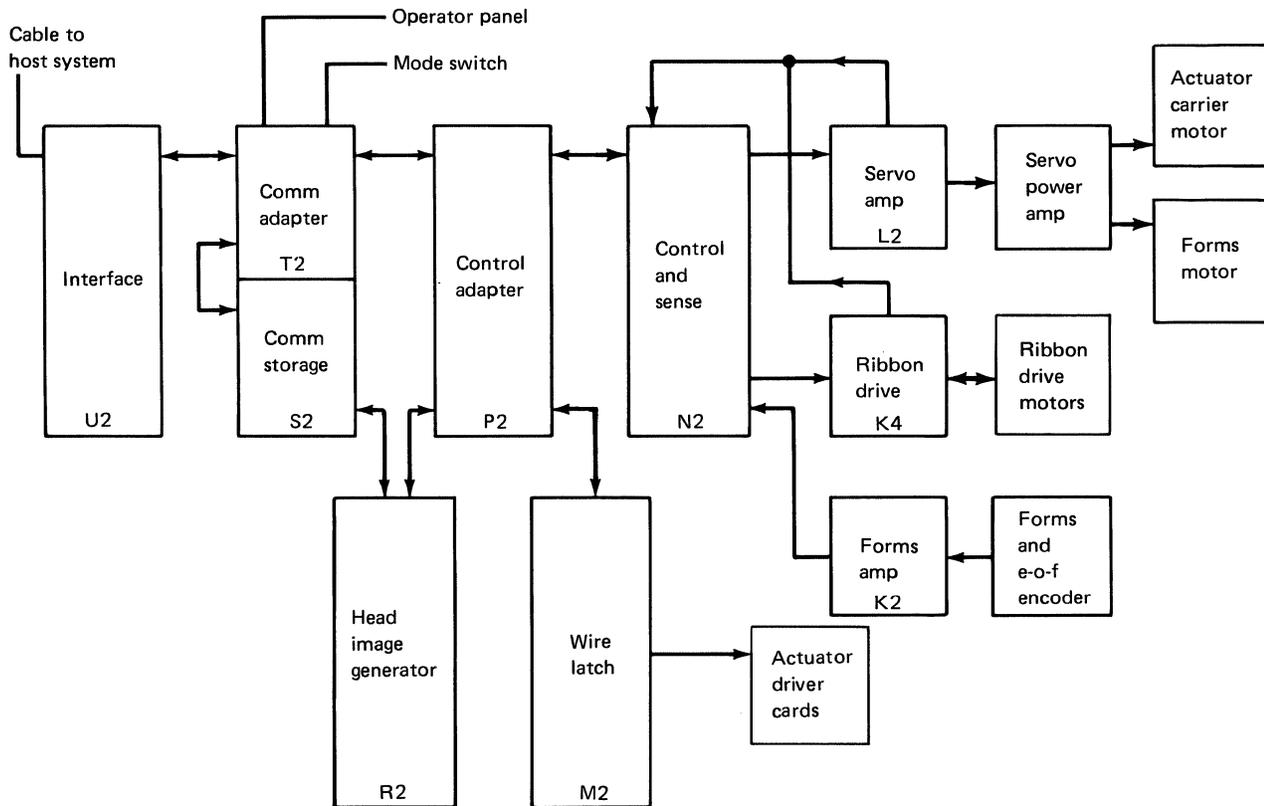
Y1			Y2				Emitters Y3			Op Panel Y4			Mode Switch Y5			I/F Cable Y6			
A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V
Actuator Driver Groups 7 and 8			Actuator Driver Groups 5 and 6		Actuator Driver Groups 3 and 4		Actuator Driver Groups 1 and 2		<ul style="list-style-type: none"> •A •B Forms Amplifier Ribbon Driver	<ul style="list-style-type: none"> •TA •10 •5/15 •Busy Servo Amplifier Fms Speed	Wire Latch	Control and Sense	Control Adapter		H I G	Comm Storage	Comm Adapter	Comm Interface	
Z1			Z2				Z3			Z4			Z5			Z6			

The cards in locations K2 and L2 contain the potentiometers that are used for adjusting the actuator carrier drive motor and the forms drive motor.

Card Functions

The following figure shows the flow of data through the logic gate.

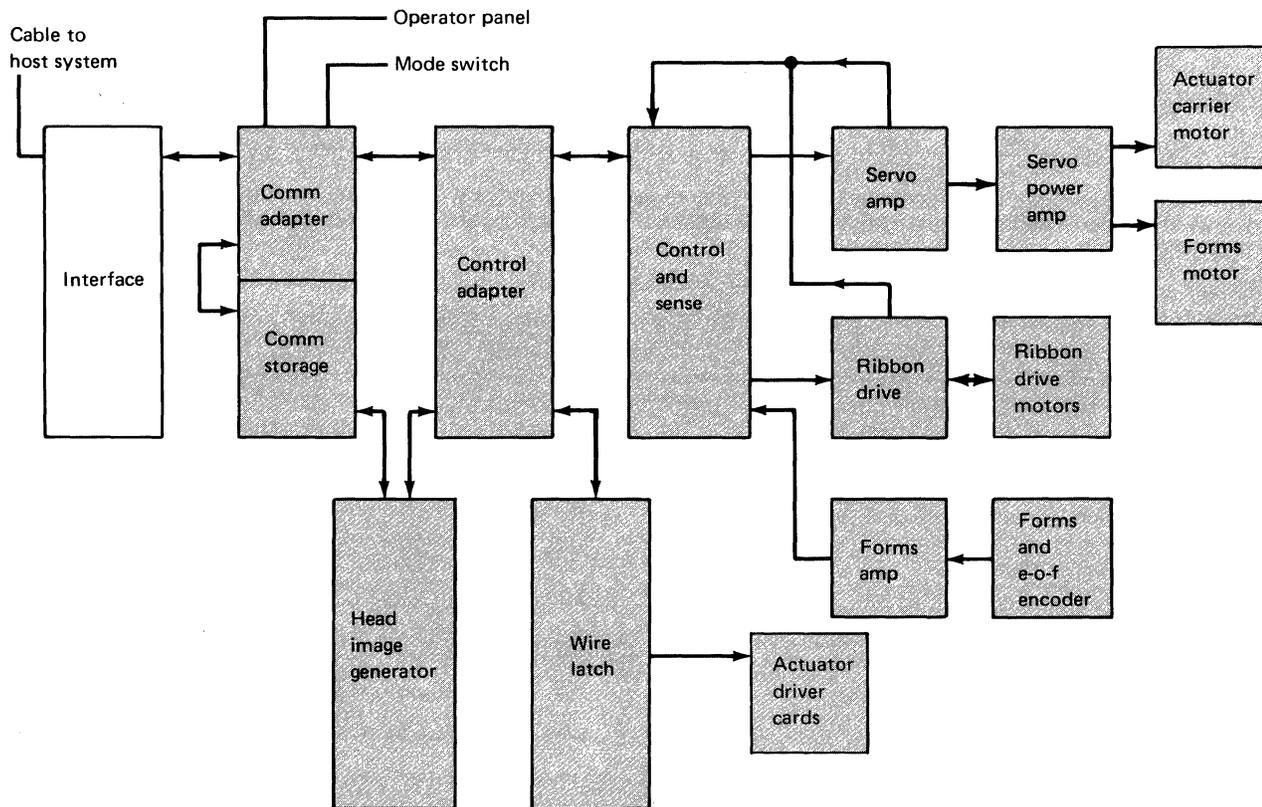
A description of the basic function of each of the cards in the logic gate follows.



Interface Card—(I/F) A1U2

The interface card communicates with the host over the twinax cable connection. The basic functions of the I/F card are to:

- Respond to poll commands with machine status
- Check parity on incoming data
- Generate parity for outgoing data
- Maintain line sync pulses
- Pass all data and control commands

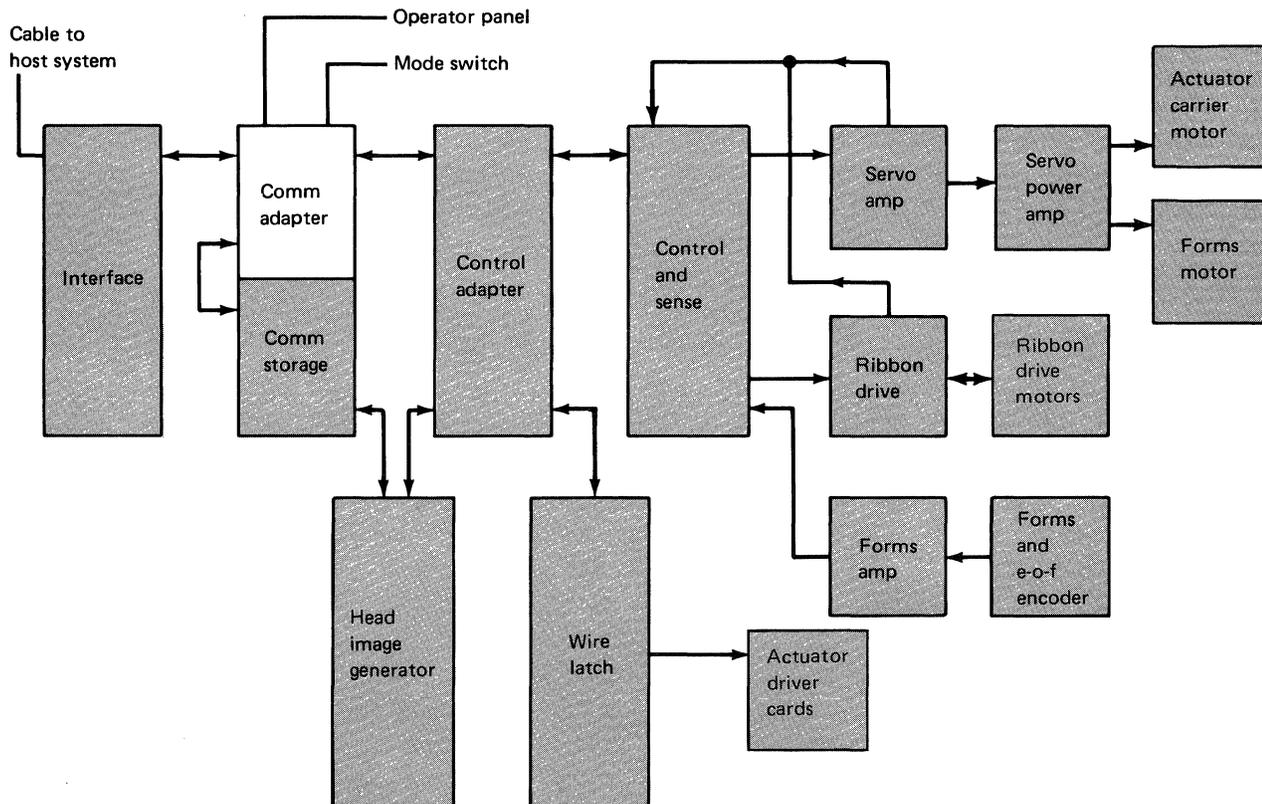


Communications Module Adapter—(CMA) A1T2

This card has a microprocessor that communicates with the interface card, the control adapter card, the operator panel, and the mode switch.

The basic functions of CMA are to:

- Decode the commands received from the interface card and determine if the commands are valid
- Instruct the control adapter of the functions to be performed as determined by the commands received
- Pass test data to the control adapter when the mode switch is moved to a test position
- Pass display characters to the operator panel
- Pass error data to the host on request
- Respond to operator panel commands
- Select the proper language group as determined by the card jumpers

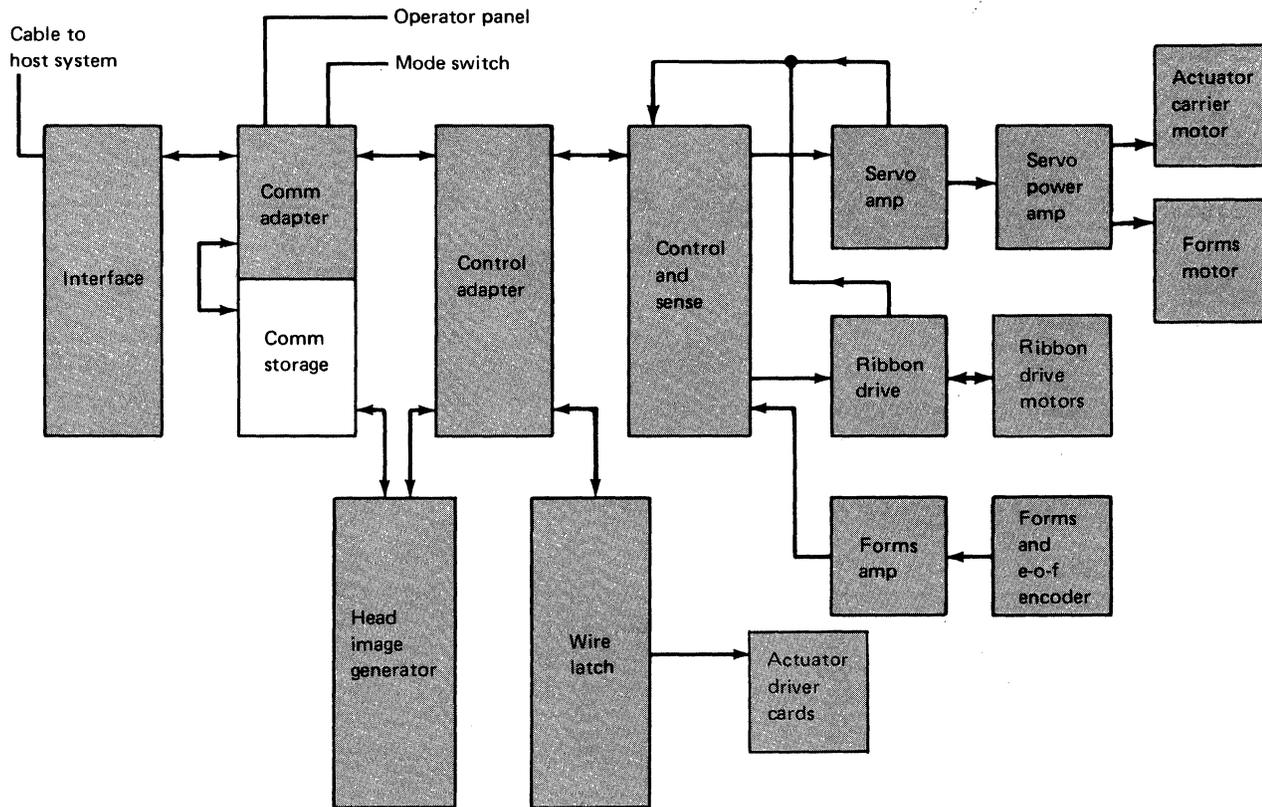


Communications Storage—(CMS) AIS2

The communications storage card passes data from the CMA card to the CTA.

The basic functions of the CMS are to:

- Supply extended program storage for the CMA.
- Also contains a text buffer and a wire image module.

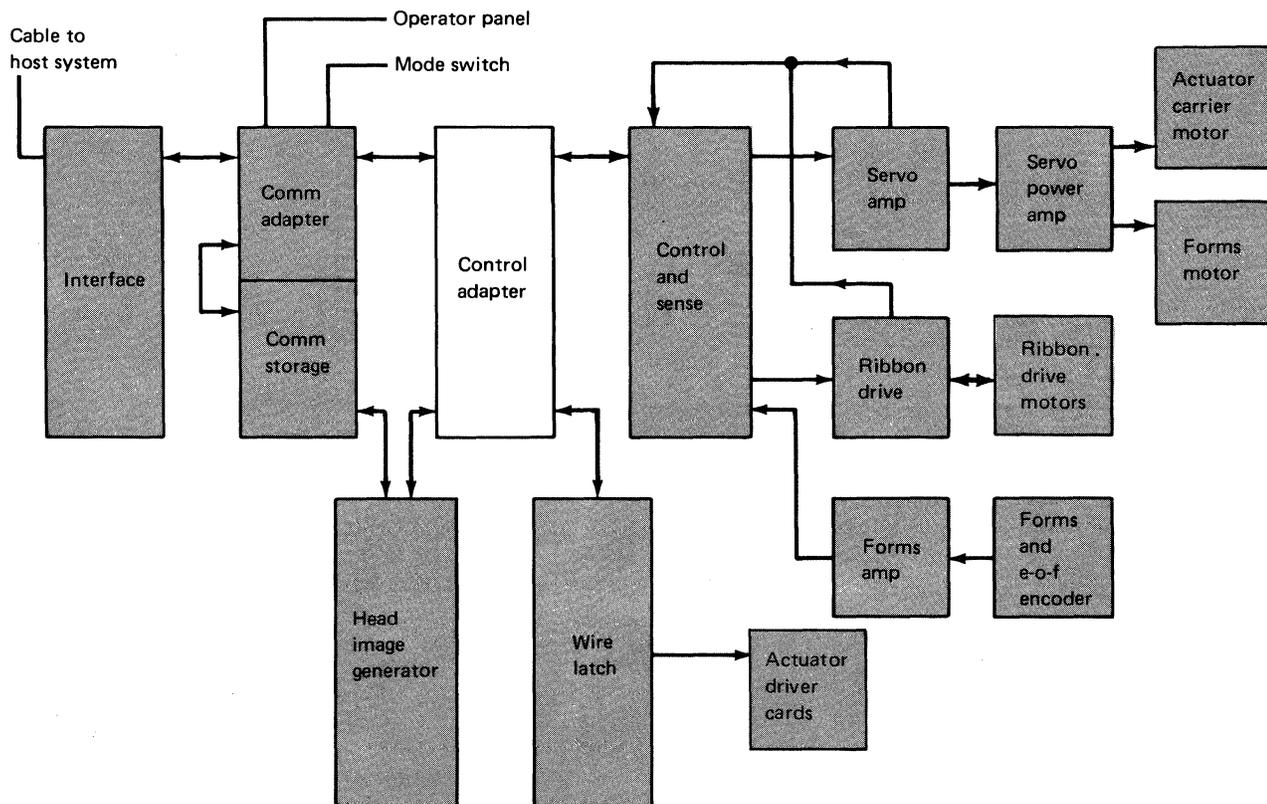


Control Adapter—(CTA) A1P2

This card also has a microprocessor that communicates with the communications adapter, the head image generator, the wire latch card, and the control and sense card.

The basic functions of CTA are to:

- Instruct the control and sense card to move the forms and actuator assembly.
- Determine if the forms motor will run in high speed, low speed, or detent speed, depending on how far the forms are to be moved.
- Collect error data from the control and sense card and pass it to the communications adapter.

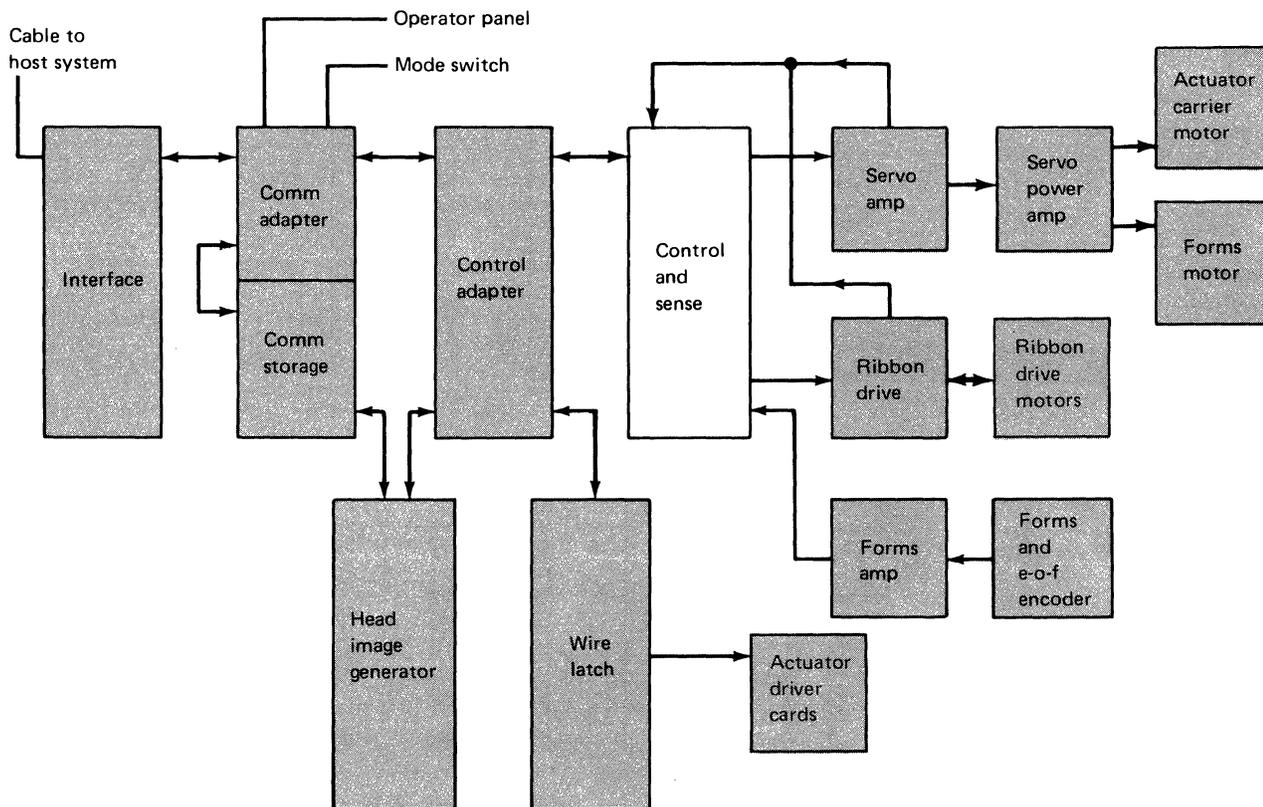


Control and Sense Card—(CS) A1N2

This card receives information from the control adapter that is sent on to the printer electronics.

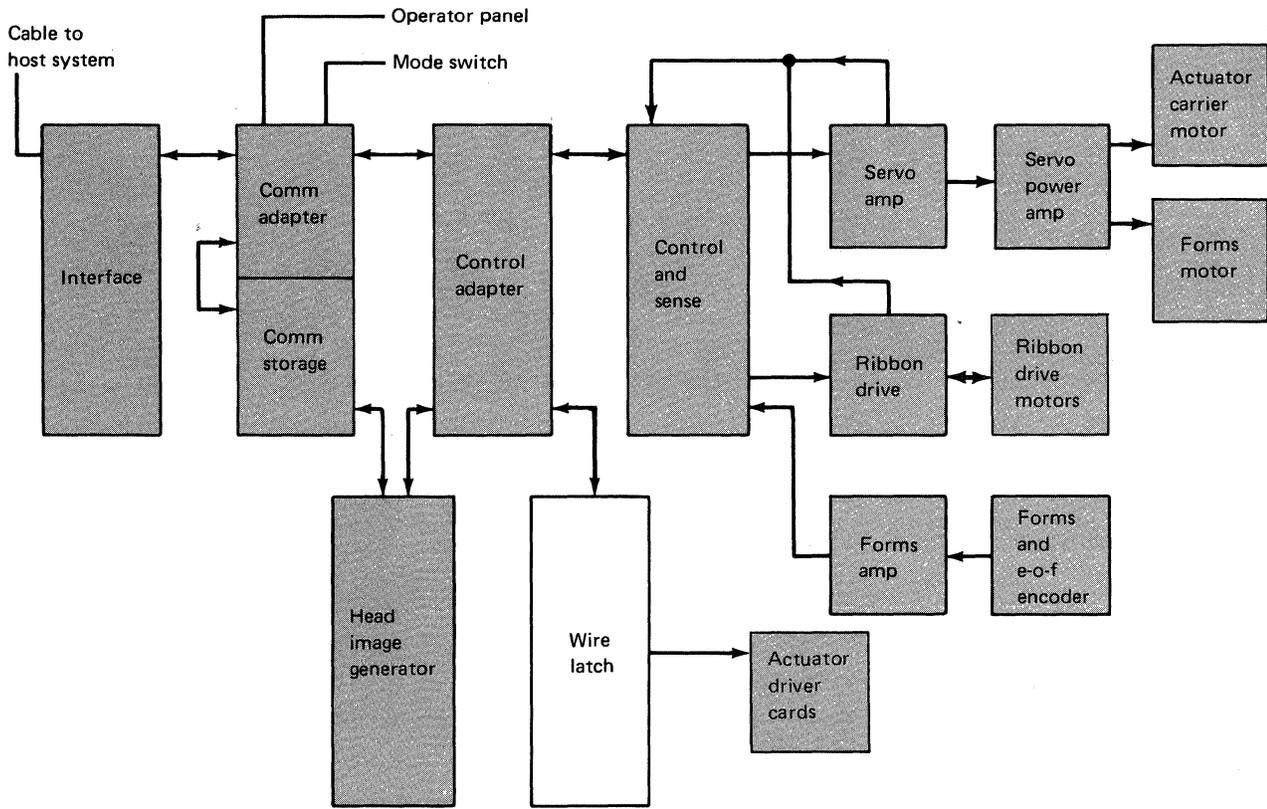
The basic functions of CS are to:

- Instruct the forms servo to move at high, normal, or detent speed.
- Instruct the head servo to move at 10 cpi or 15 cpi, and in which direction to move.
- Instruct the ribbon to move.
- Pass emitter pulses from the head and forms servo motors back to the control adapter for analysis.
- Pass ribbon jam sense and direction change signals back to the control adapter. Contain the model number jumper



Wire Latch Card—(WL) AIM2

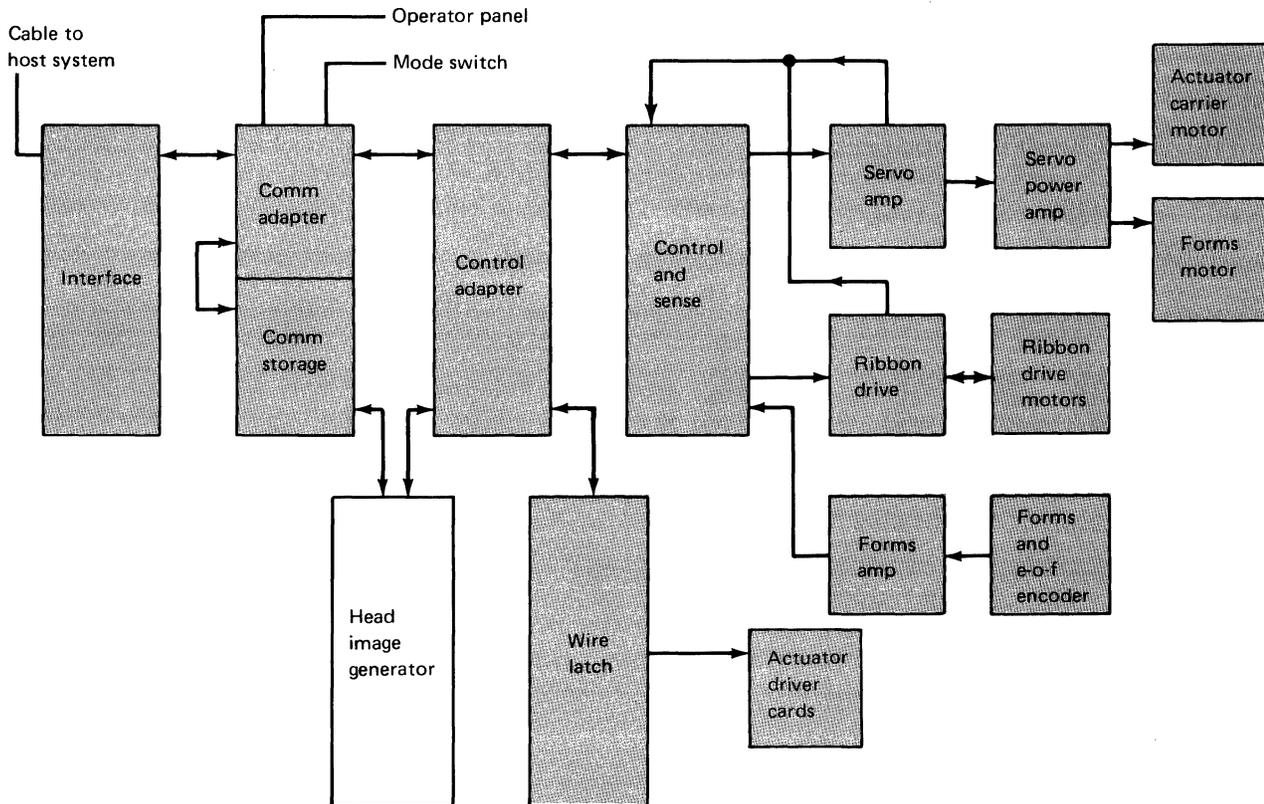
As each print wire is selected, the control adapter sends data to the wire latch card, which sets a bit for each selected wire. At the end of each print scan, the wire latch card will direct the actuator drive cards to fire the selected print wires.



Head Image Generator—(HIG) AIR2

The basic functions of the HIG are to:

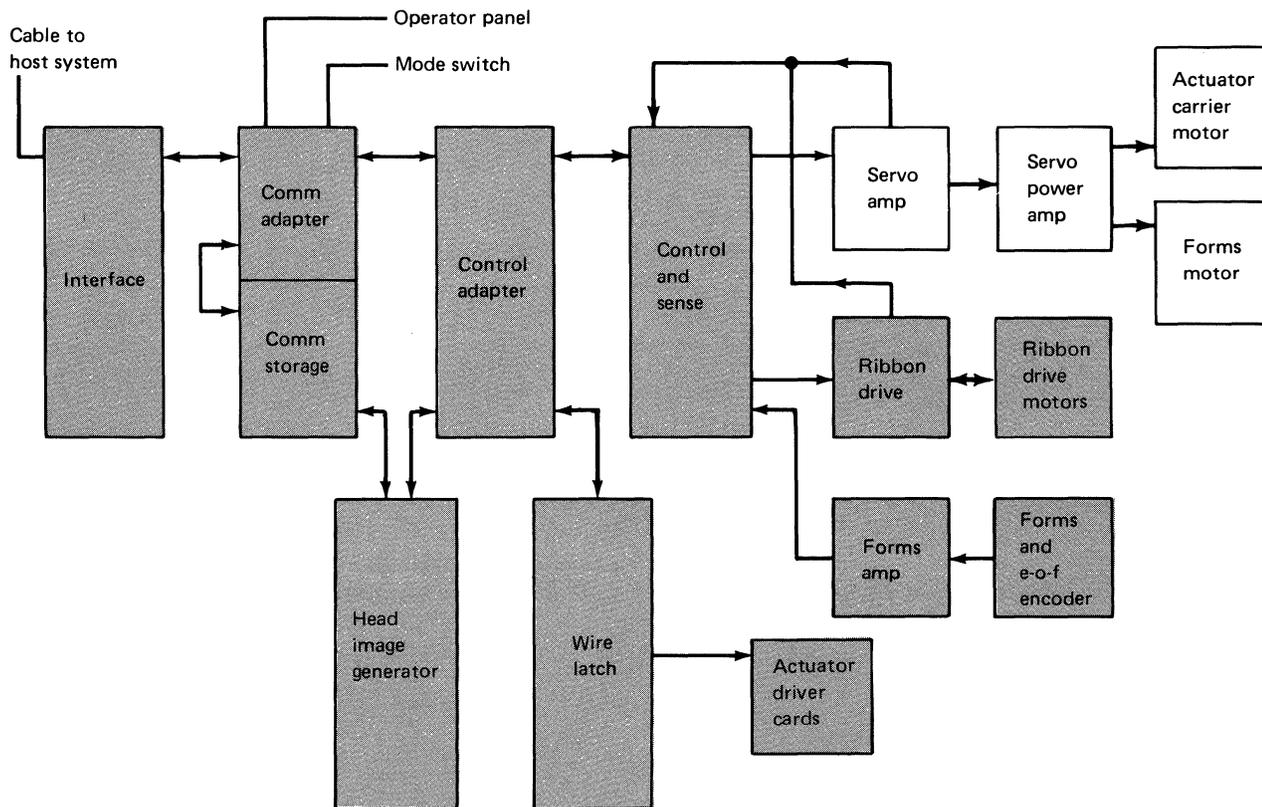
- Analyze the print characters to determine which wires to print, and passes this information to the control adapter.
- Contain the jumpers for model and characters-per-inch selection.
- Determine the actuator firing order with information from the print option table. This information is base on the printer model.



Servo Amplifier (AIL2)

The basic functions of the Servo Amplifier are to:

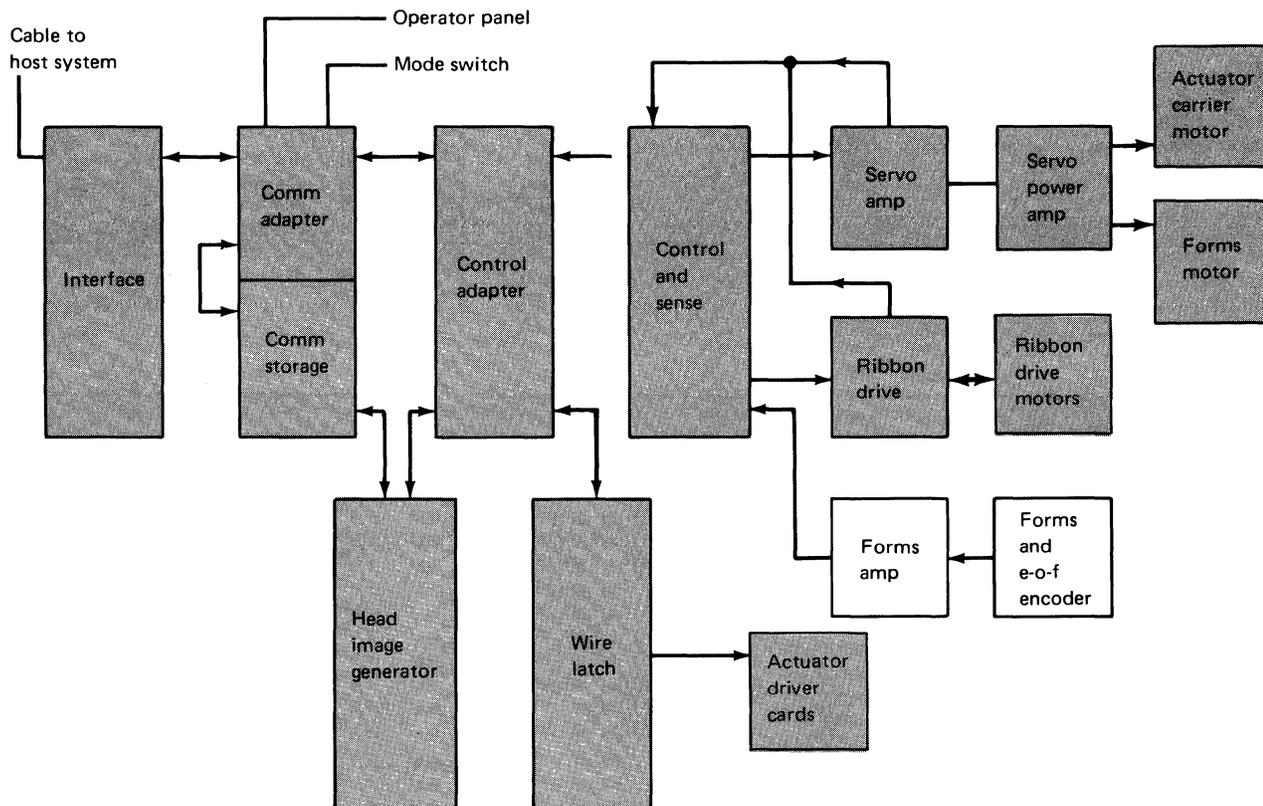
- Control actuator carrier servo motor speed and turnaround in response to input signals from the Control and Sense card (Selects 10 cpi, 5 cpi, and ramp speeds, as well as direction).
- Control forms servo motor speed and position in response to input signals from the Control and Sense card.
- Sense actuator carrier or forms overcurrent conditions and sends an error signal to Control and Sense card.
- Output actuator carrier and forms drive signals for power amplification by the Servo Power AMP card (located in the power supply).



Forms AMP Card (A1K2)

The basic functions of the Forms AMP Card are to:

- Send pulses from the form position encoder and end-of-forms sensor to the Control and Sense card
- Provide +8V, -8V, and a regulated 5V to the logic gate



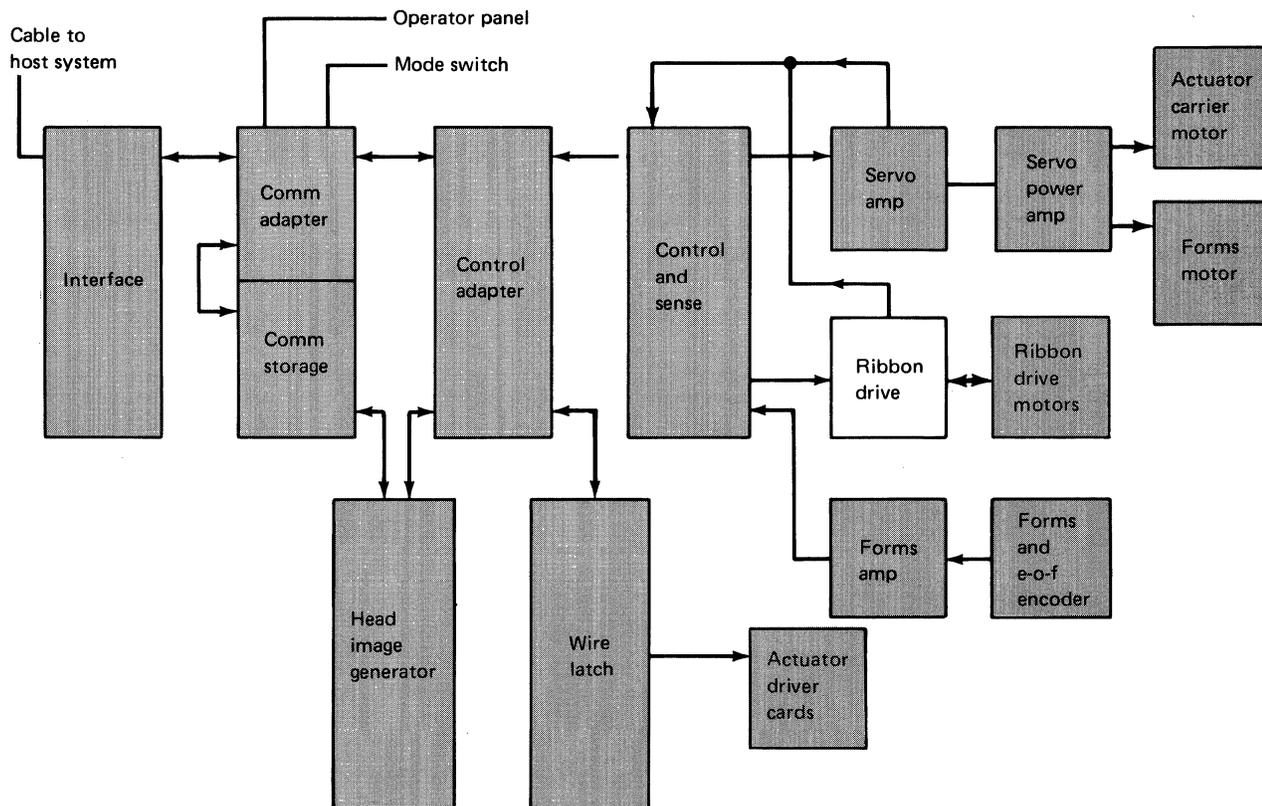
Ribbon Drive Card (A1K4)

This card contains a microprocessor. It receives input from the control and sense card, and supplies the drive line to the ribbon drive motors. The basic functions of the Ribbon Drive are to:

- Supply the drive line to the ribbon drive motors
- Keep track of ribbon direction
- Observe end-of-ribbon signals to sense ribbon jams

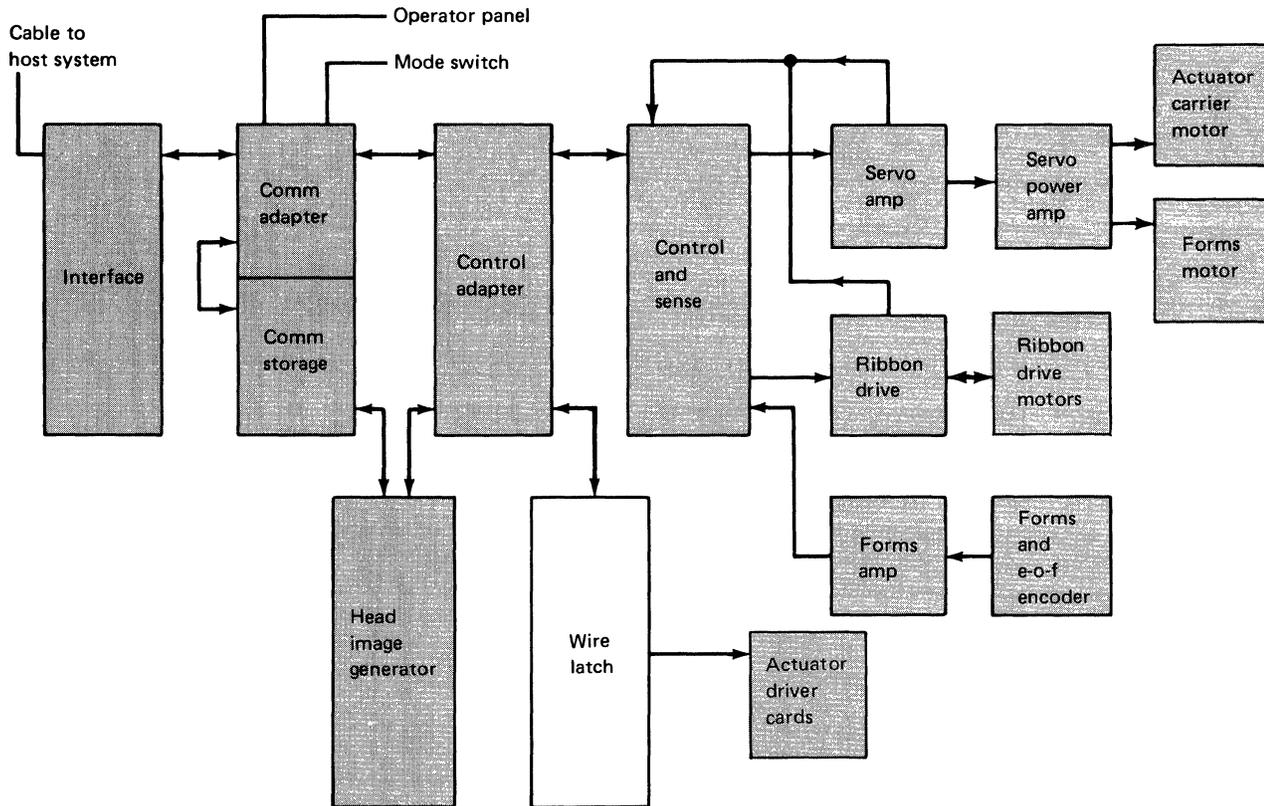
Note: Two end-of-ribbon signals inside 9 meters (30 feet) is interpreted as a jam condition.

This information is sent back to the control adapter through the control and sense card.



Actuator Driver Cards (A1H2, F2, D2, B2)

On signal from the wire latch card, the actuator driver cards supply the drive line to fire the selected print wires.



3103-Card Identification (Adjustments and Jumpers)

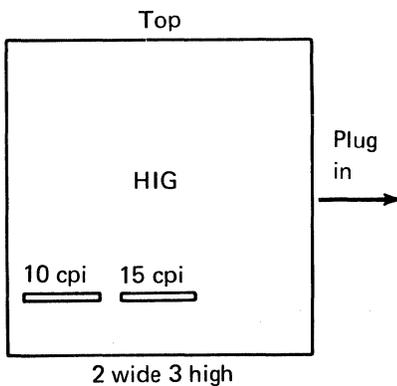
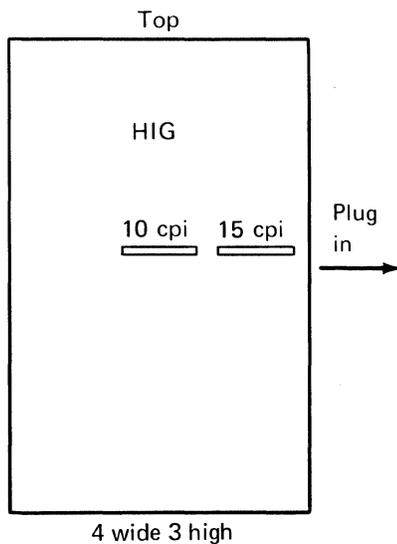
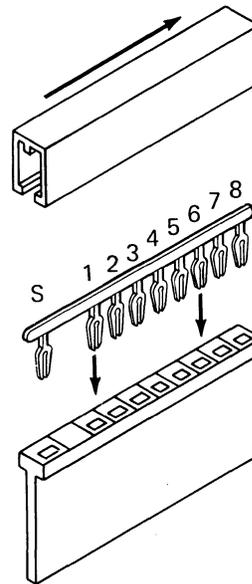
The following cards contain adjusting potentiometers for head and forms drive adjustments, or jumpers that identify the number of print wire groups. In addition, a jumper is used to select the graphic set that is loaded on power up. 16 sets are available.

Head Image Generator Card—HIG (A1R2)

The HIG can be in either of the following configurations. The cards are pin-to-pin compatible.

The jumpers are plugged on the parts side and can be moved to a new card if necessary to change the HIG card.

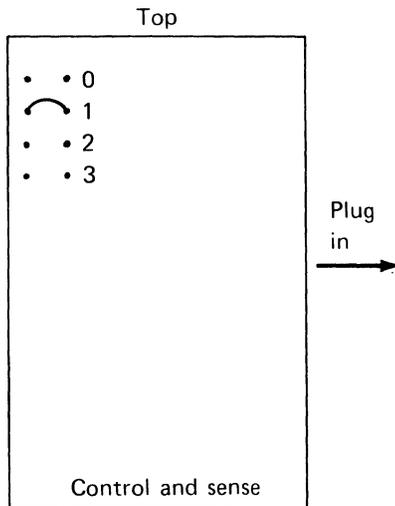
When making a new jumper, take the jumper block apart and remove the pins that are not needed. The chart show the jumper configuration for all models of the printer, for 10 cpi and 15 cpi.



		Model			
10 cpi		1	2	3	4
Source		⌞	⌞	⌞	⌞
Blank		X	X	X	X
1		⌞	⌞	⌞	⌞
2		⌞	⌞	⌞	⌞
3		X	⌞	⌞	⌞
4		X	X	⌞	⌞
5		⌞	⌞	X	⌞
6		X	X	⌞	⌞
7		X	X	X	X
8		X	X	X	X
		Model			
15 cpi		1	2	3	4
Source		⌞	⌞	⌞	⌞
Blank		X	X	X	X
1		⌞	⌞	⌞	⌞
2		X	⌞	⌞	⌞
3		⌞	X	⌞	⌞
4		X	⌞	X	⌞
5		⌞	⌞	⌞	⌞
6		⌞	⌞	⌞	X
7		X	X	⌞	⌞
8		X	X	X	X

Control and Sense Card—CS (A1N2)

These jumpers slide on to the connectors on the parts side of the card. Connect the jumpers to identify the number of print wire groups as shown on this chart.



- Model jumpers
- Model 4 = 3
 - Model 3 = 2 and 1
 - Model 2 = 2
 - Model 1 = 1

Control and sense jumper

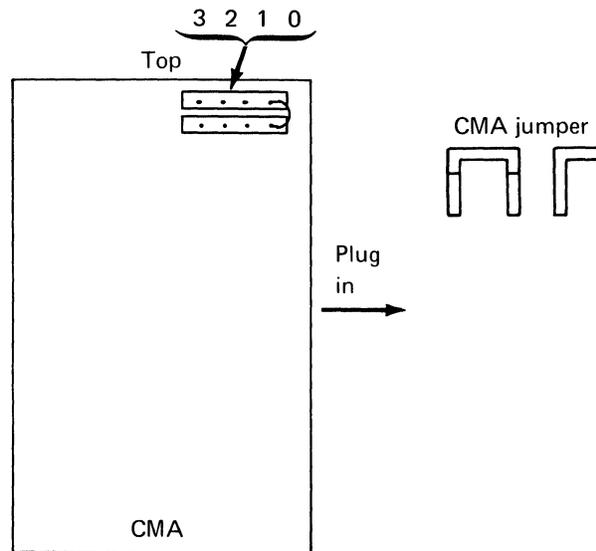


Communications Module Adapter—CMA (A1T2)

The 5225 printer contains 16 distinct character sets in ROS modules. On power up, the set selected by the customer as the primary set will be loaded into a working storage area. After the power-on sequence is complete, any of the character sets can be selected by the host system to replace the primary set in working storage.

The jumpers on this card are used to select the character set that has been selected as the primary set. The chart below identifies the jumpers needed to select any of the 16 character sets. The “X” on the chart indicates the jumpers needed. Jumpers are connected as shown on the drawing.

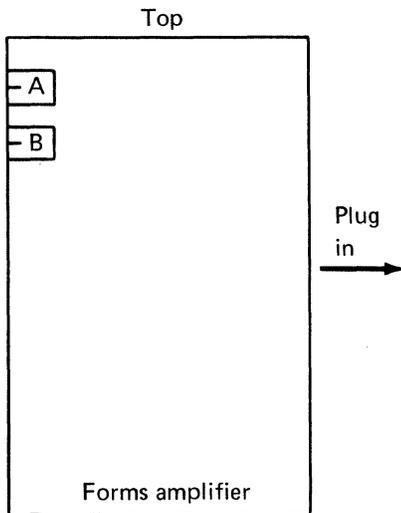
Note: The CMA card jumper positions are reversed from the jumper columns in the table.



Jumper pin number				Decimal	Character set
0	1	2	3		
				0	Multinational
			X	1	US and Canada
		X		2	Austria and Germany
		X	X	3	Belgium
X				4	Brazil
X		X		5	Canada (French)
X	X			6	Denmark and Norway
X	X	X		7	Finland and Sweden
X				8	France
X			X	9	Italy
X	X			10	Japan (English)
X		X	X	11	Katakana
X	X			12	Portugal
X	X		X	13	Spain
X	X	X		14	Spanish speaking
X	X	X	X	15	United Kingdom

Forms Amplifier Card A1K2

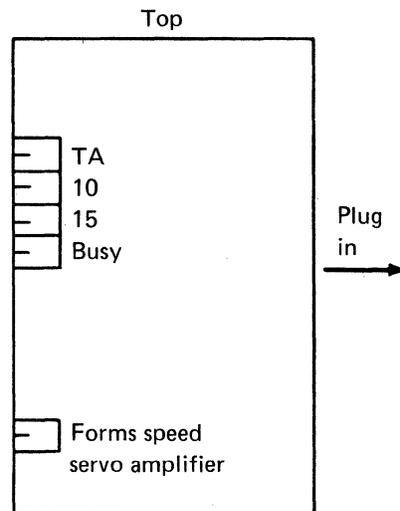
The adjusting potentiometers are used to set the forms symmetry A and B pulses. The complete forms adjustment procedure is located in this chapter at 3104.



Servo Amplifier Card A1L2

This card has five adjusting potentiometers. Two are used for forms adjustment, and the other three are used to adjust the speed of the actuator carrier and the turn-around time. The complete actuator carrier adjustment procedure is located in this chapter at 3105.

Note: If this card is replaced, *all* forms adjustment routines (3104) and *all* actuator carrier adjustment routines (3105) must be performed.



3101A Description - 3-Card Controller

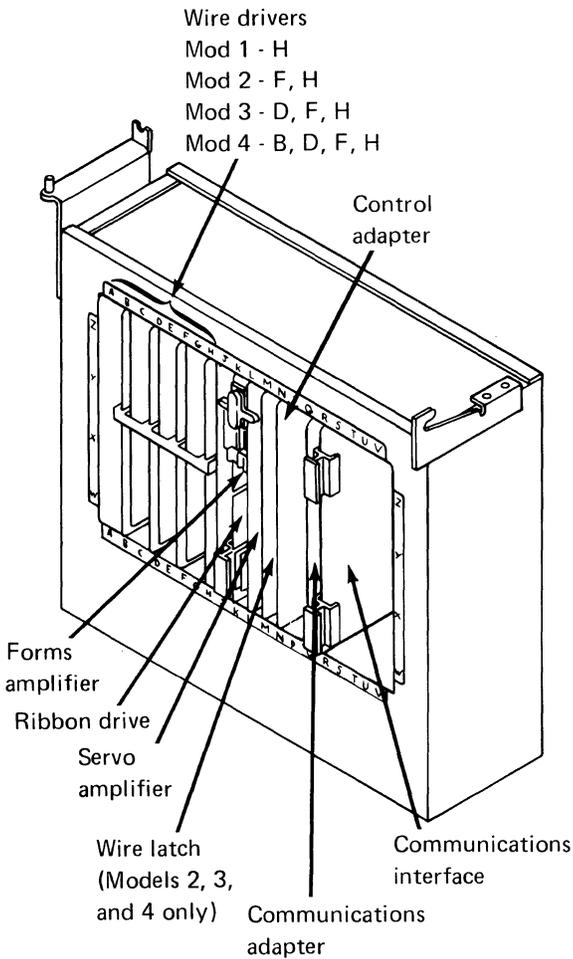
The logic gate contains the printer control unit (PCU) and the printer electronic controls. The logic gate is cooled by a fan mounted under the logic gate.

The PCU contains the interface with the host. It receives and stores the data, decodes commands, tests for and sends error conditions to the operator and the host controller, and determines the characters to be printed.

The printer electronic controls move the forms and the ribbon, and control the print actuators.

Three different configurations of logic cards are used in the controller. One type uses 7 cards, while the others use 3 or 4 cards. (Model 1 uses 3 cards, Models 2, 3, and 4 use 4 cards. In this book, we will refer to the 3 and 4 card controllers as 3-card controllers, and the 7-card controller as the other.) Both types perform the same operations. The 3-card controller uses a greater density circuit design.

To determine which type is installed in your controller, inspect the U2 position of the logic gate. If a card is installed in the U2 position, your controller has 7 cards. The absence of a card in the U2 position indicates a 3-card controller. A description of the 3-card controller follows.



102A Logic Gate (card side)

The cards in locations M through R are the PCU cards. The remaining cards control the printer electronics.

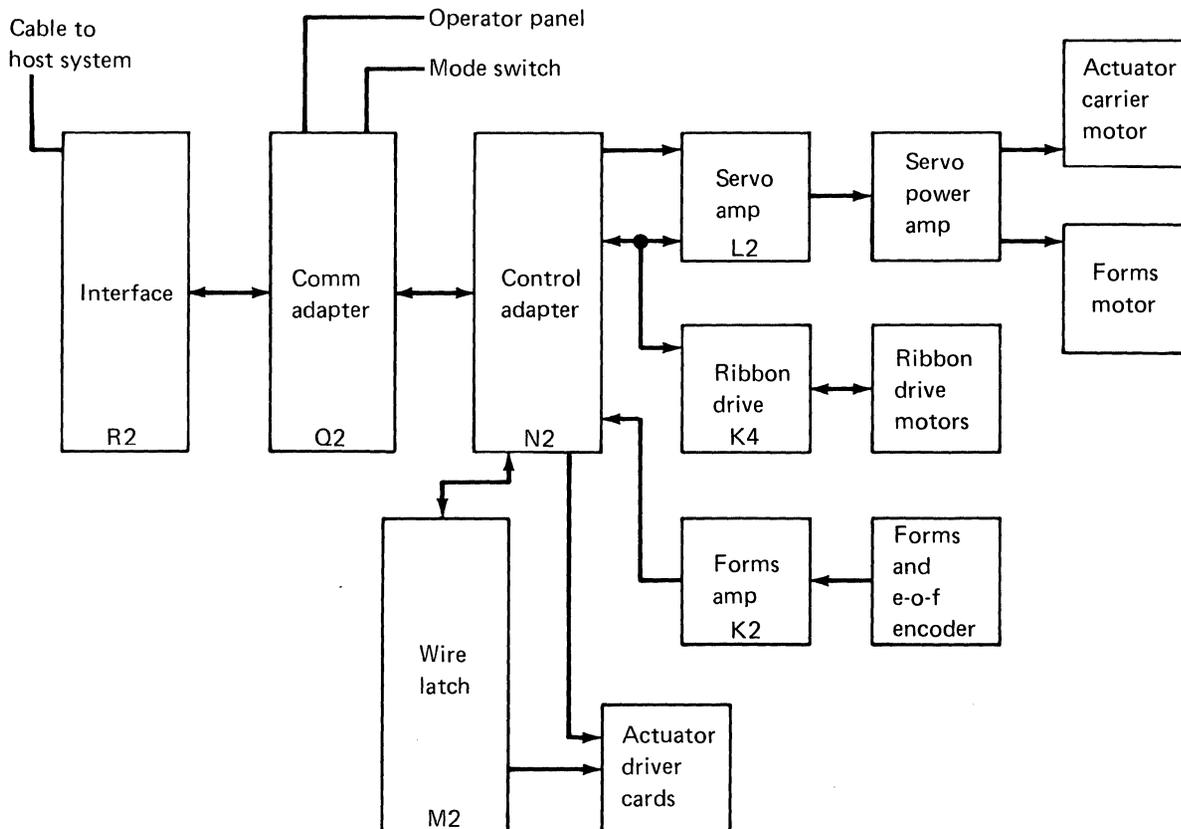
The cards in locations K2 and L2 contain the potentiometers that are used for adjusting the actuator carrier drive motor and the forms drive motor.

Y1			Y2			Emitters Y3			Op Panel Y4			Mode Switch Y5			I/F Cable Y6					
A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	
Actuator Driver Groups 7 and 8			Actuator Driver Groups 5 and 6			Actuator Driver Groups 3 and 4			Actuator Driver Groups 1 and 2	<ul style="list-style-type: none"> •A •B Forms Amplifier	<ul style="list-style-type: none"> •TA •10 •5/15 •Busy Servo Amplifier	Wire Latch Mods 2 3 4	Control Adapter		Comm Adapter	Comm Interface				
Z1			Z2			Z3			Z4			Z5			Z6					

Card Functions

The following figure shows the flow of data through the logic gate.

A description of the basic function of each of the cards in the logic gate follows.

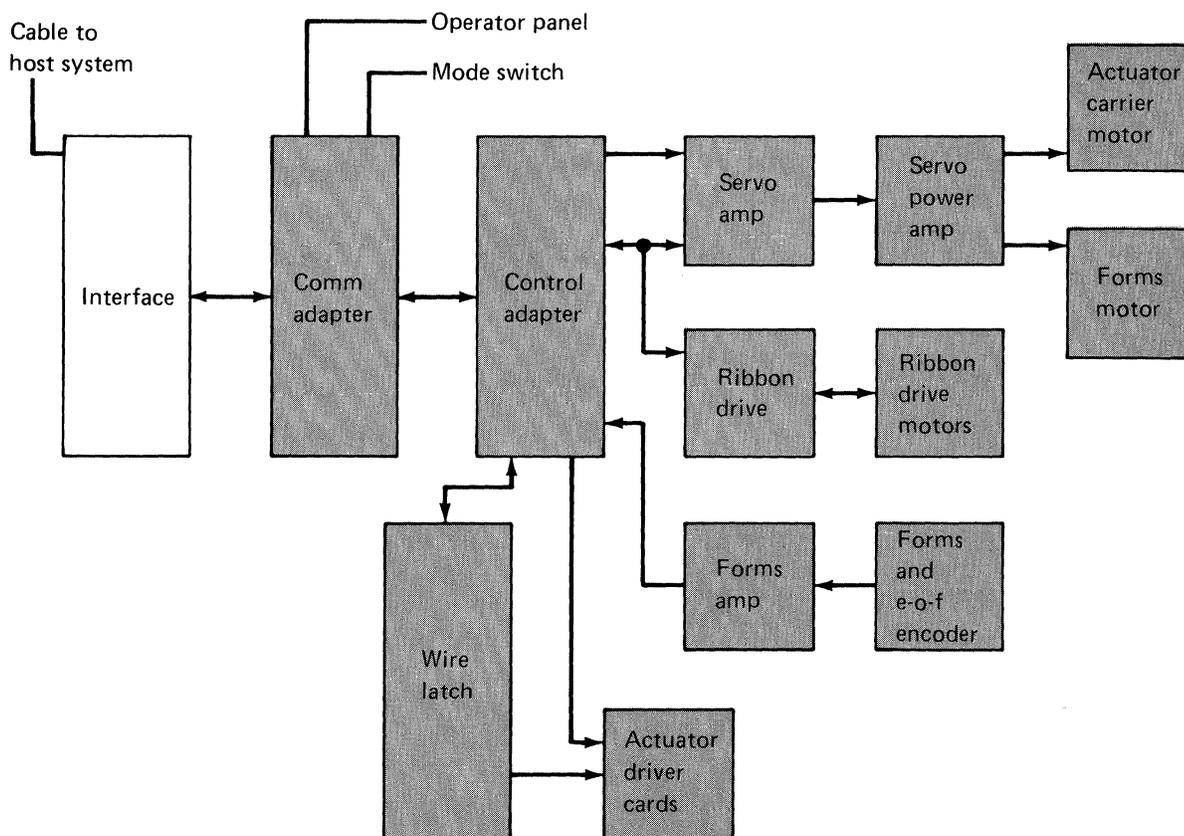


Interface Card—(I/F) A1R2

The interface card communicates with the host over the twinax cable connection.

The basic functions of the I/F are to:

- Respond to poll commands with machine status
- Check parity on incoming data
- Generate parity for outgoing data
- Maintain line sync pulses
- Pass all data and control commands to the communications module adapter

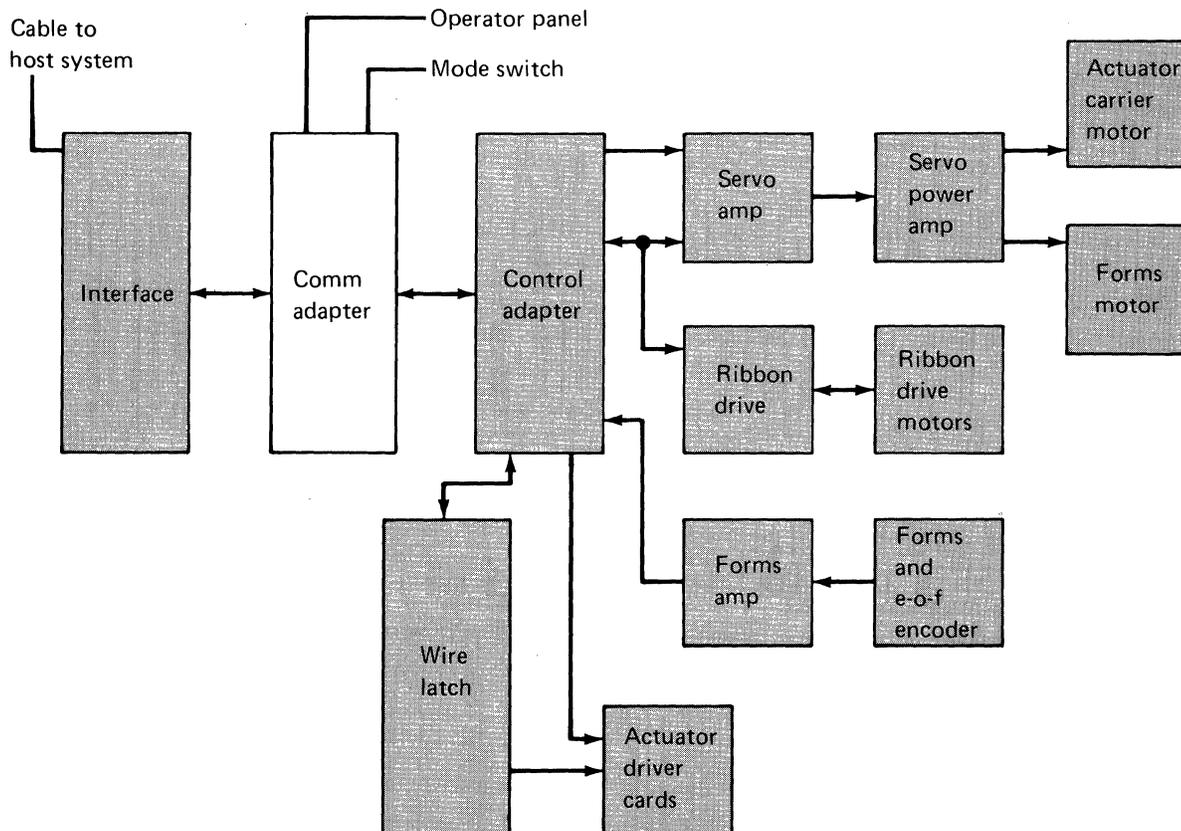


**Communications Module Adapter—(CMA)
A1Q2**

This card has a microprocessor that communicates with the interface card, the control adapter card, the operator's panel, and the mode switch.

The basic functions of CMA are to:

- Decode the commands received from the interface card and determine if the commands are valid
- Instruct the control adapter of the functions to be performed determined by the commands received
- Pass test data to the control adapter when the mode switch is moved to a test position
- Store characters to be printed until selected by the control adapter
- Pass display characters to the operator's panel
- Pass error data to the host on request
- Respond to operator's panel commands

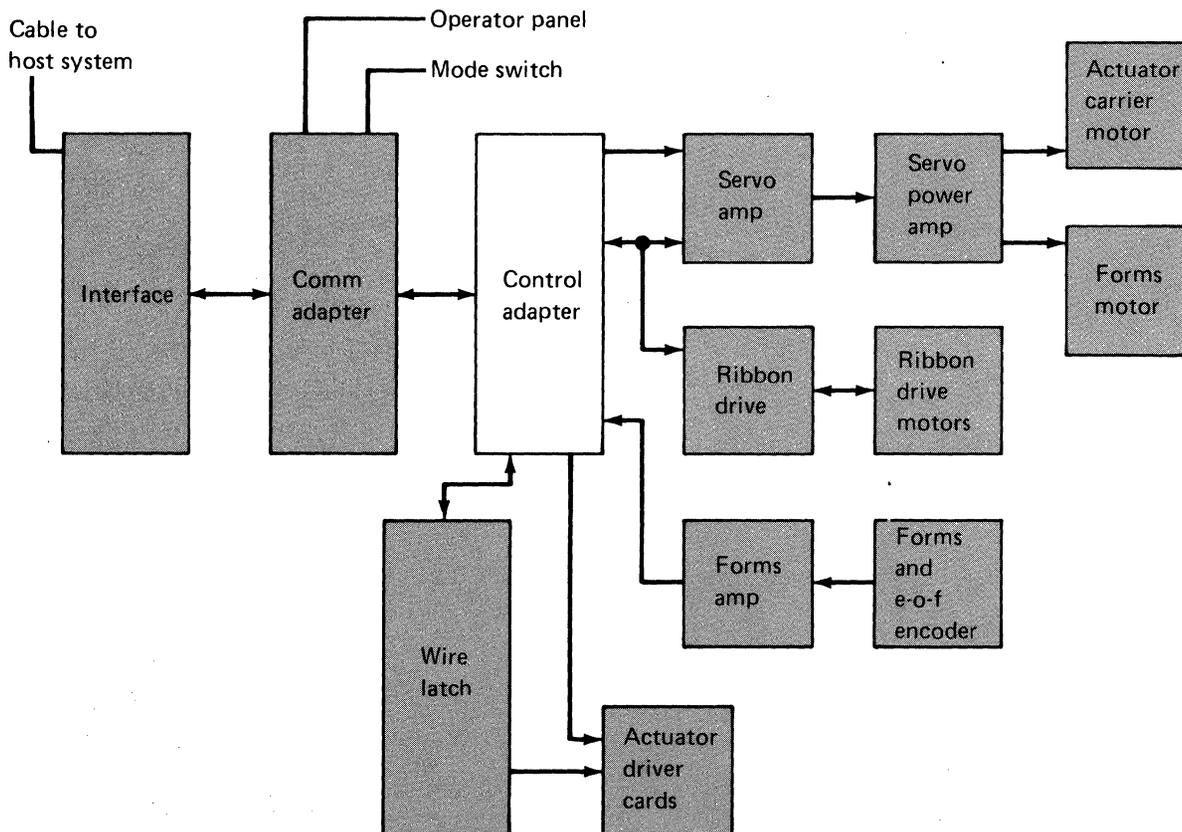


Control Adapter—(CTA) AIN2

This card has a microprocessor that communicates with the communications adapter, the wire latch card, the servo amplifier, the ribbon drive, the forms amplifier, and the actuator driver.

The basic functions of CTA are to:

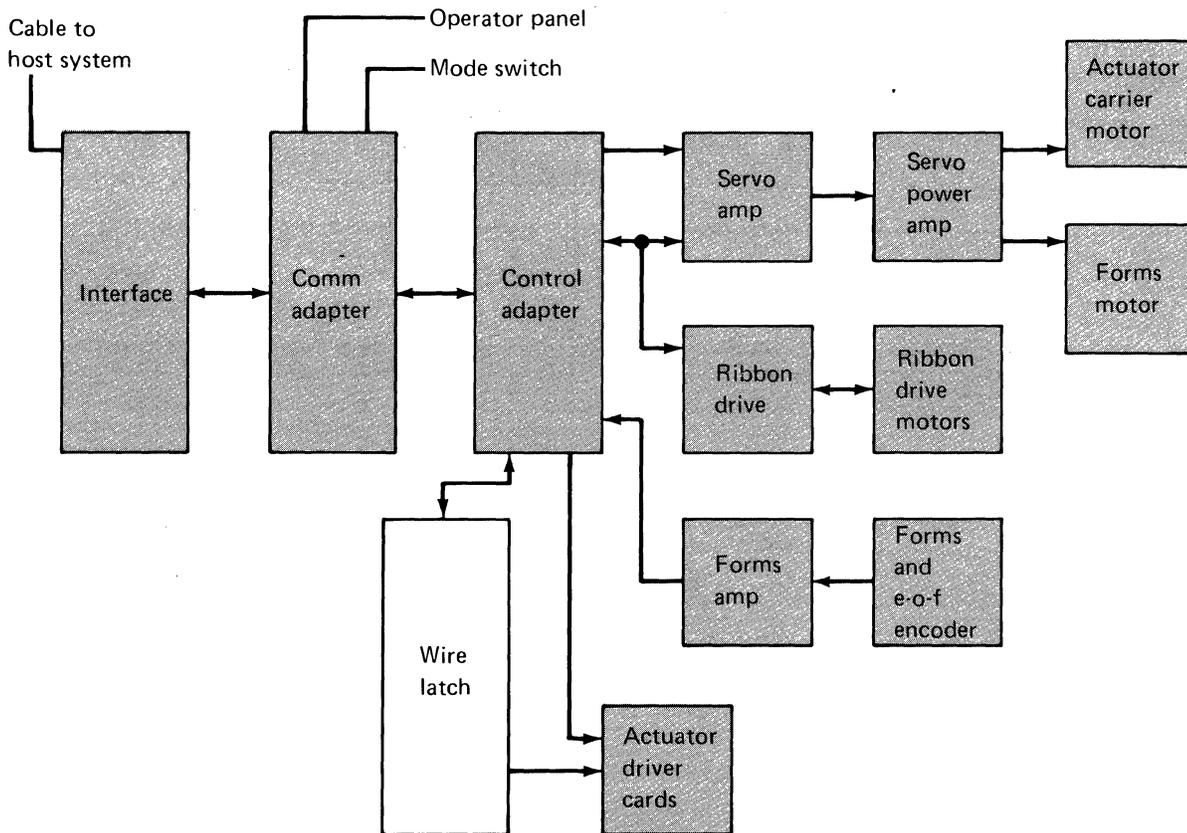
- Determine when the forms motor runs at high speed, low speed, or detent speed, depending on how far the forms are to be moved
- Collect error data and pass it to the communications adapter
- Instruct the head servo to move in either direction at 10 cpi or 15 cpi
- Determine ribbon movement and sense ribbon jams
- Analyze the print characters to determine which wires to print
- Direct the actuator drive card to select print wires for the first and second actuator groups.



Wire Latch Card—(WL) A1M2

This card is not used on the Model 1. The circuitry of the wire latch card is added to the control adapter card.

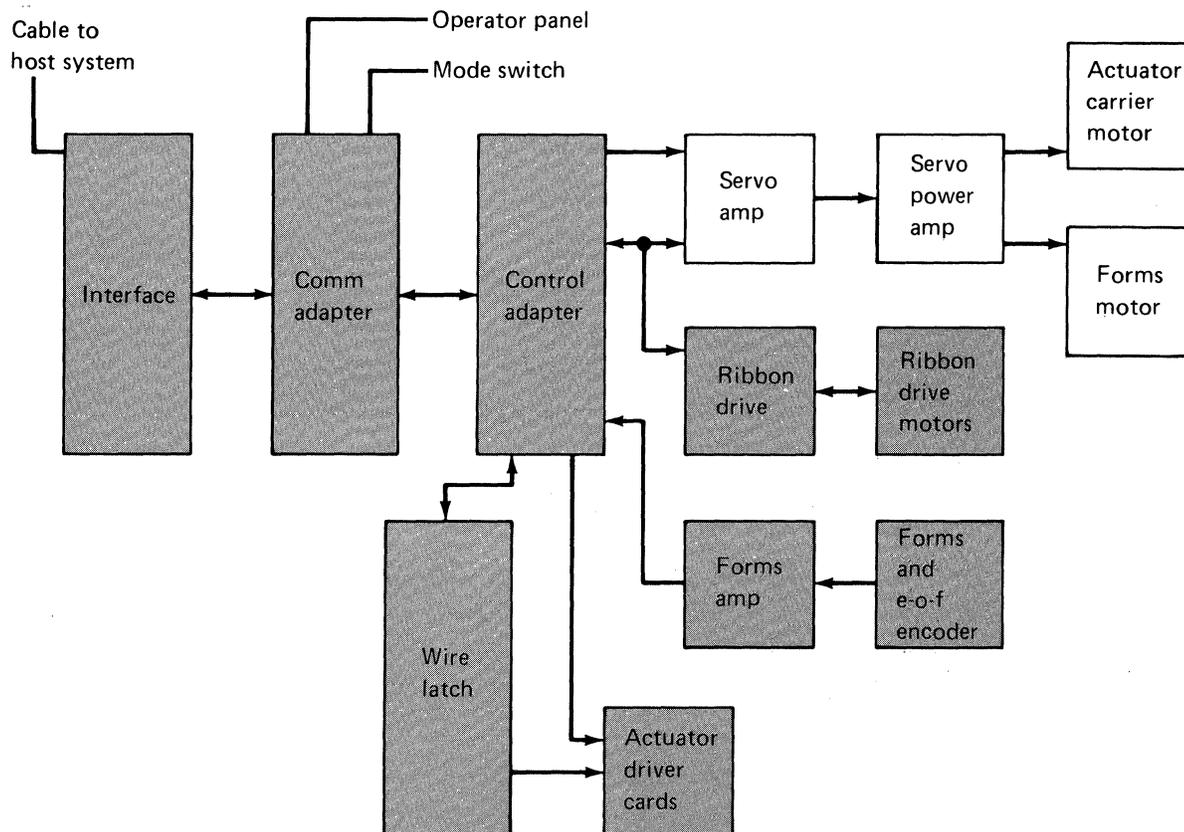
As each print wire is selected, the control adapter sends data to the wire latch card, which sets a bit for each selected wire. At the end of each print scan, the wire latch card will direct the actuator drive cards to fire the selected print wires for the third through the eighth actuator groups.



Servo Amplifier (A1L2)

The basic functions of the Servo Amplifier are to:

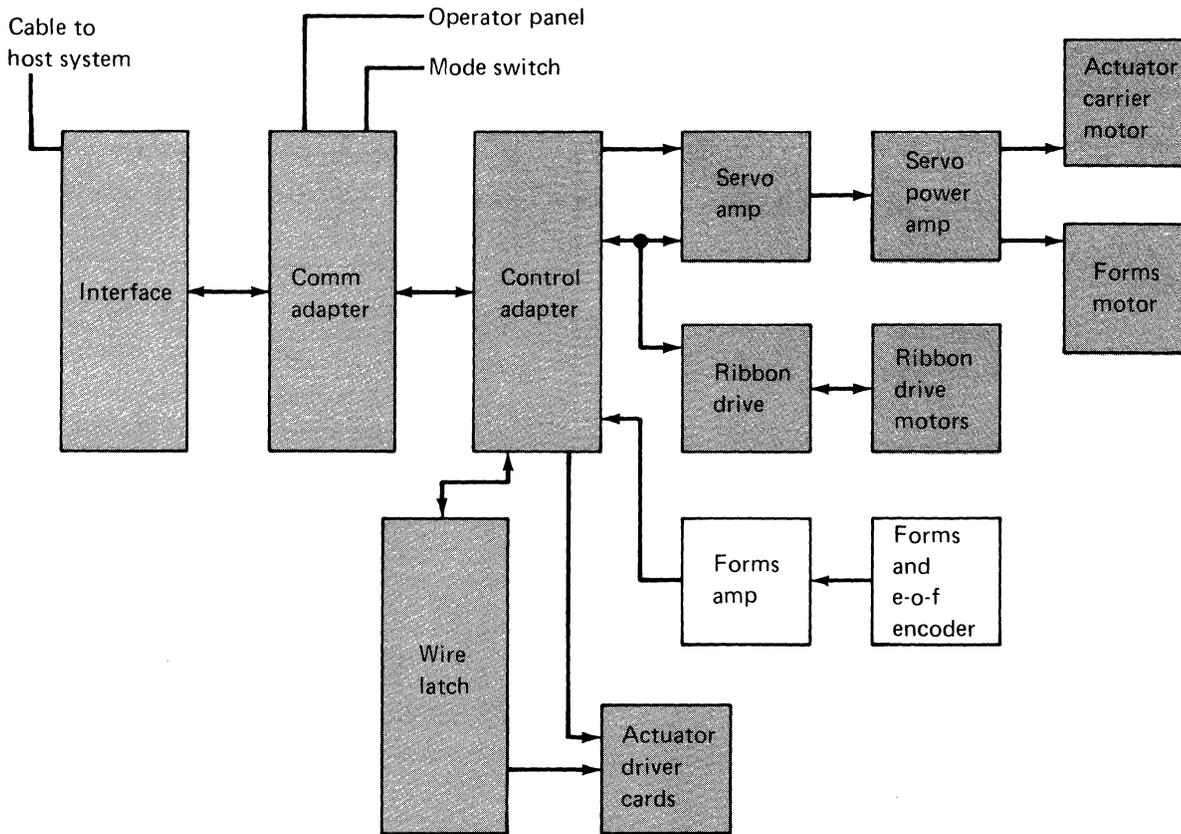
- Control the actuator carrier servo motor speed and turnaround in response to input signals from the Control Adapter card (Selects 10 cpi, 15 cpi, and ramp speeds, as well as direction)
- Control the forms servo motor speed and position in response to input signals from the Control Adapter card
- Sense actuator carrier or forms overcurrent conditions, and sends an error signal to Control Adapter card
- Output actuator carrier and forms drive signals for power amplification by the Servo Power AMP card (located in the power supply)



Forms AMP Card (A1K2)

The basic functions of the Forms AMP Card are to:

- Send pulses from the form position encoder and end-of-forms sensor to the Control Adapter card
- Provide +8V, -8V, and a regulated 5V to the logic gate



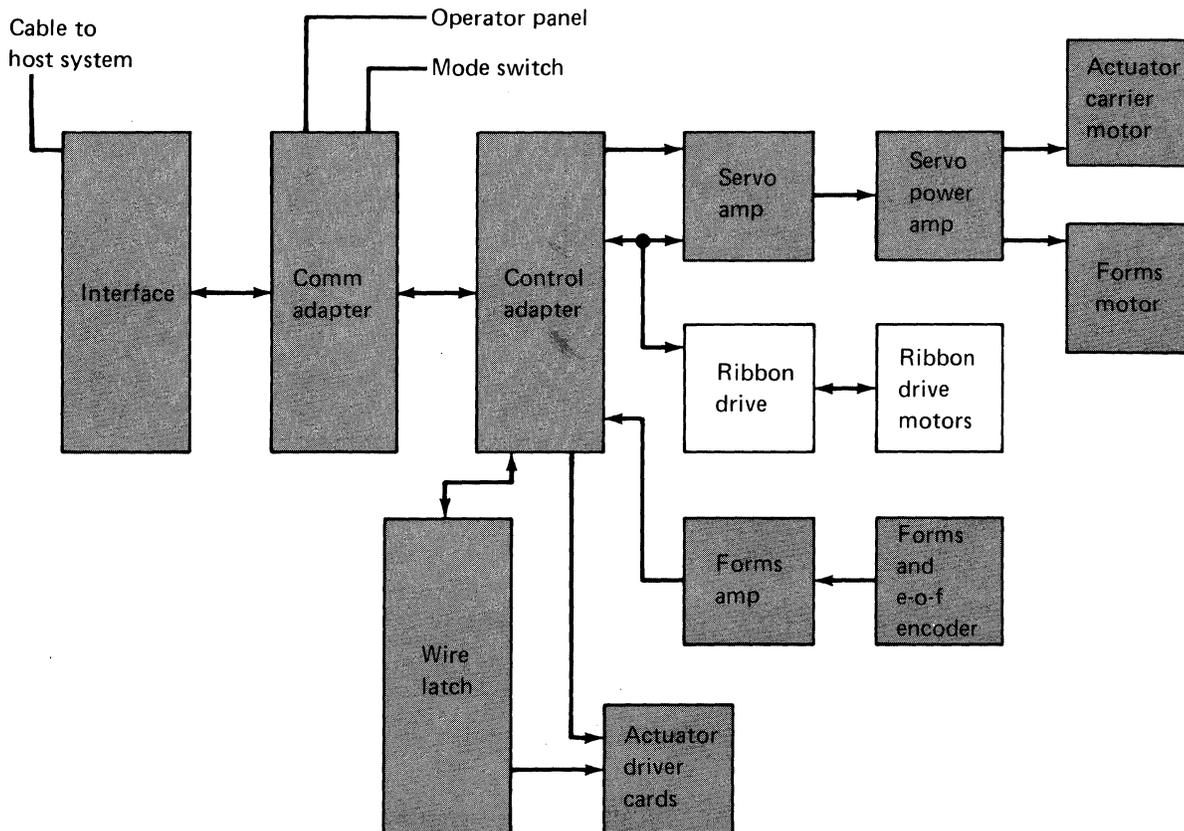
Ribbon Drive Card (A1K4)

This card has a microprocessor. It receives input from the Control Adapter card, and supplies the drive line to the ribbon drive motors. The basic functions of the Ribbon Drive Card are to:

- Supply the drive line to the ribbon drive motors
- Keep track of ribbon direction
- Observe end-of-ribbon signals to sense ribbon jams

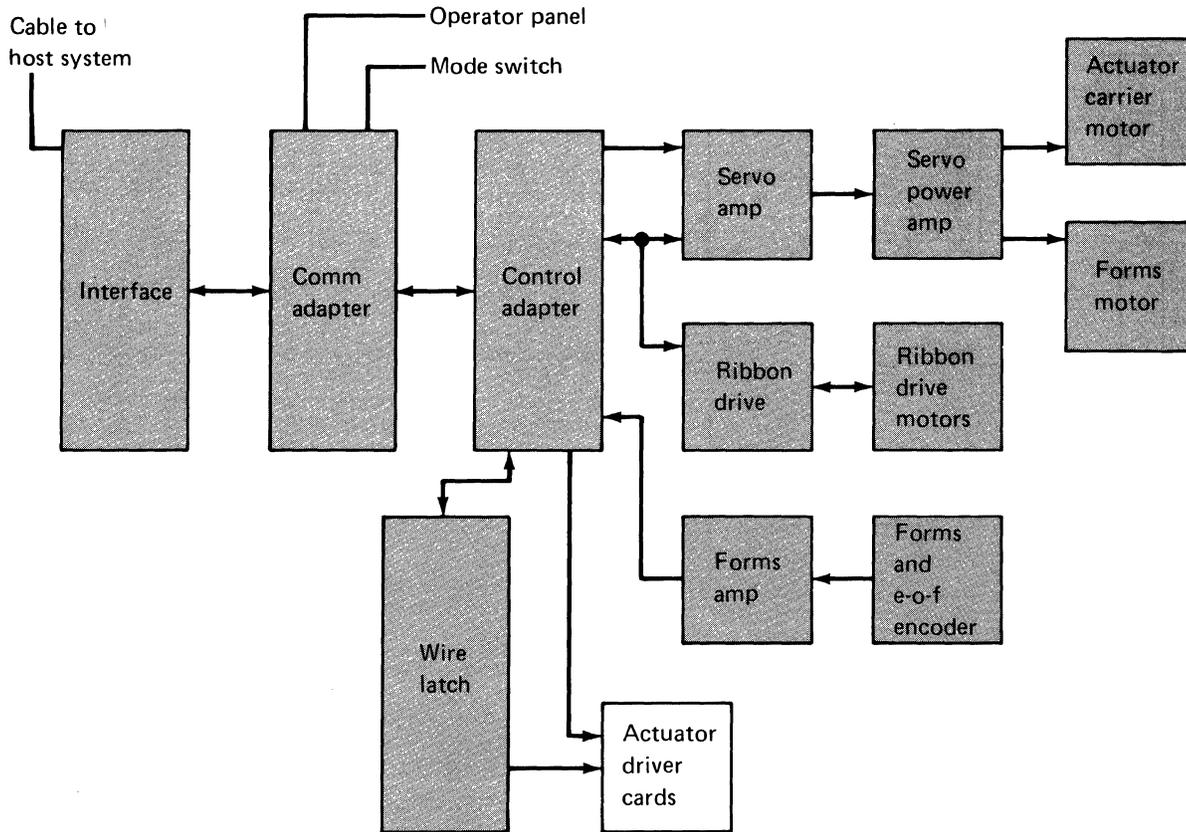
This information is sent back to the control adapter.

Note: Two end-of-ribbon signals inside 9 meters (30 feet) is interpreted as a jam condition.



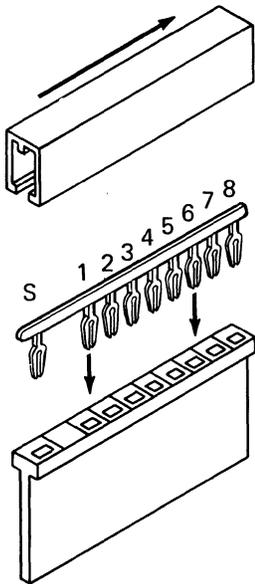
Actuator Driver Cards (A1H2, F2, D2, B2)

On signal from the wire latch card (Models 2, 3, and 4 only), the actuator driver cards supply the drive line to fire the selected actuators.



3103A Card Identification (Adjustments and Jumpers)

The following cards contain adjusting potentiometers for head and forms drive adjustments, or jumpers that identify the number of print wire groups.



In addition, a jumper is used to select the graphic set that is loaded on power up. 16 sets are available.

Control Adapter Card (CTA) (A1N2)

The CTA card uses both types of jumpers, as described below.

Wire Groups Spacing Jumpers

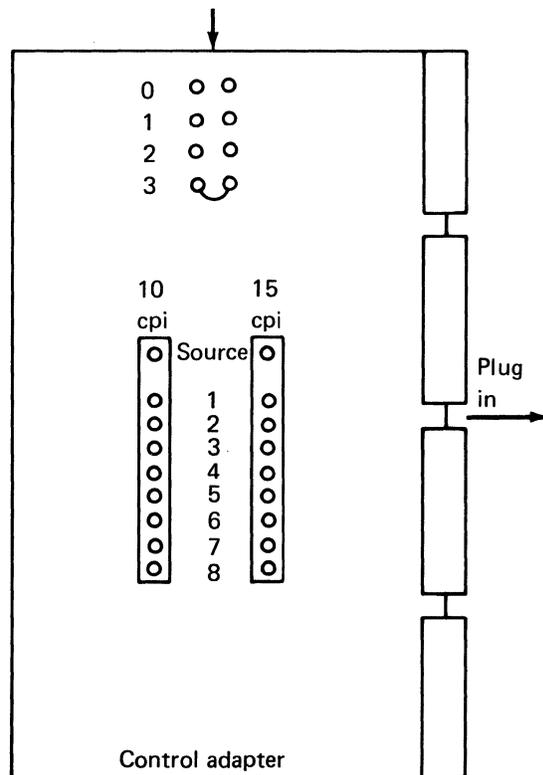
The jumpers are plugged on the parts side and can be moved to a new card if necessary to change the CTA card.

When making a new jumper is necessary, take the jumper block apart and remove the pins that are not needed. The chart shows the jumper configuration for all models of the printer, for both 10 and 15 cpi.

These jumpers slide on to the connectors on the parts side of the card. Connect the jumpers to identify the number of print wire groups as shown on this chart.

Model	Jumper
1	1
2	2
3	1 and 2
4	3

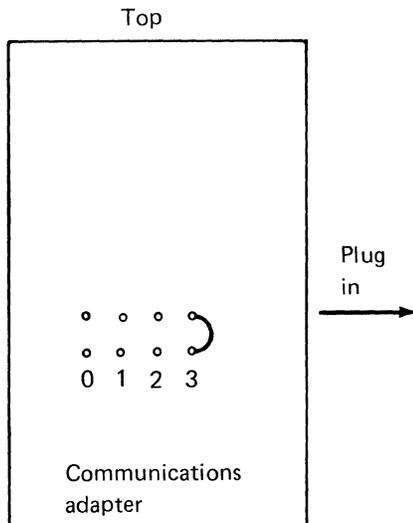
		Model			
10 cpi		1	2	3	4
Source		↔	↔	↔	↔
Blank		X	X	X	X
1		↔	↔	↔	↔
2		↔	↔	↔	↔
3		X	↔	↔	↔
4		X	X	↔	↔
5		↔	↔	X	↔
6		X	X	↔	↔
7		X	X	X	X
8		X	X	X	X
		Model			
15 cpi		1	2	3	4
Source		↔	↔	↔	↔
Blank		X	X	X	X
1		↔	↔	↔	↔
2		X	↔	↔	↔
3		↔	X	↔	↔
4		X	↔	X	↔
5		↔	↔	↔	↔
6		↔	↔	↔	X
7		X	X	↔	↔
8		X	X	X	X



Communications Module Adapter—CMA (A1Q2)

The 5225 printer contains 16 distinct character sets in ROS modules. On power up, the set selected by the customer as the primary set is loaded into a working storage area. After the power-on sequence is complete, any of the character sets can be selected by the host system to replace the primary set in working storage.

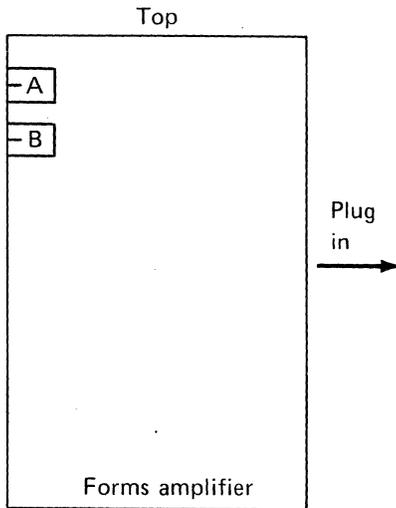
Use the jumpers on this card to select the character set that has been selected as the primary set. The chart identifies the jumpers needed to select any of the 16 character sets. The "X" on the chart indicates the jumpers needed. Jumpers are connected as shown on the drawing of the communications adapter card.



Jumper pin number				Decimal	Character set
0	1	2	3		
				0	Multinational
			X	1	US and Canada
		X		2	Austria and Germany
		X	X	3	Belgium
X				4	Brazil
X		X		5	Canada (French)
X	X			6	Denmark and Norway
X	X	X		7	Finland and Sweden
X				8	France
X		X		9	Italy
X	X			10	Japan (English)
X	X	X		11	Katakana
X	X			12	Portugal
X	X		X	13	Spain
X	X	X		14	Spanish speaking
X	X	X	X	15	United Kingdom

Forms Amplifier Card A1K2

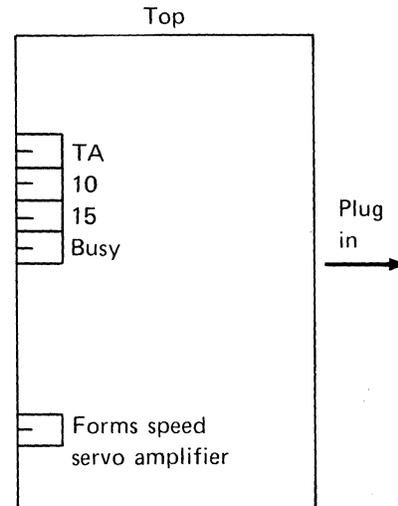
Use the adjusting potentiometers to set the forms symmetry A and B pulses. The complete forms adjustment procedure is located in this chapter at 3104.



Servo Amplifier Card A1L2

This card has five adjusting potentiometers. Two are used for forms adjustment, and the other three are used to adjust the speed of the actuator carrier and the turn-around time. The complete actuator carrier adjustment procedure is located in this chapter at 3105.

Note: If this card is replaced, *all* forms adjustment routines (3104) and *all* actuator carrier adjustment routines (3105) must be performed.



3104 Forms Feed Electronic Adjustments

Note: Before starting the adjustment procedure, remove the forms from the tractors.

The five forms feed adjustments must be made in the following sequence when the forms amplifier card or the servo amplifier card are changed.

Note: If an adjustment is made in section 3104, complete all adjustments in section 3105.

Note: This adjustment sequence uses the 7-card controller board as an example. The 3-card controller does not have cards in positions S, T, and U. The adjustments are the same for all controllers.

When an adjustment is correct, a "1" through "F" will be on the display. If an "A" through "E" is displayed, turn the adjusting screw clockwise. If a "1" through "6" is displayed, turn the adjusting screw counterclockwise. The correct setting is at the centerpoint between "F" and "1."

Note: A "1" or an "F" in the display does not cause an error, but adjust the potentiometer to indicate a "0." For example, as soon as the display changes from "E" to "F," start counting the number of turns

needed to change the display from "1" to "2." If two turns were needed, turn counterclockwise one turn.

Note: If a new forms amplifier card, a forms motor, or forms emitter are installed and a 46 error occurs while running the AA or AB test, turn the forms symmetry adjustments several turns in either direction to correct the error.

- To adjust Forms Symmetry A, set the mode switch on position A and press start. An "A" should flash on and off in the display. Now press start a second time. The forms drive should now move. Adjust the A potentiometer on the forms amplifier card at K2, using the method described above.

When the adjustment is correct, press the stop key *one* time. An "A" should now flash on and off in the display.

Note: As each adjustment is completed and the stop key is pressed *one* time, the display should have an "A" flashing on and off. If the "A" is not flashing, the stop key was pressed *twice* and you are out of the adjustment routine. Return the mode switch to position A, and press the start key *one* time to return the flashing "A" to the display before moving on to the next adjustment procedure.

Forms symmetry A

Y1			Y2			Emitters Y3			Op Panel Y4			Modg Switch Y5			I/F Cable Y6				
A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V
Actuator			Actuator				Actuator		Forms Amplifier	TA 10 5/15 Busy	Wire	Control and Sense	Control Adapter		H I G	Comm Storage	Comm Adapter	Comm Interface	
Driver			Driver				Driver		Ribbon Driver	Servo Amplifier	Lat ch								
Groups 7 and 8			Groups 5 and 6				Groups 3 and 4			Fms Speed									

3104 Forms Feed Electronic Adjustments (Continued)

- To adjust Forms Symmetry B, move the mode switch to position B and press start. Adjust the B

potentiometer on the forms amplifier card. When the adjustment is correct, press the stop key *one* time.

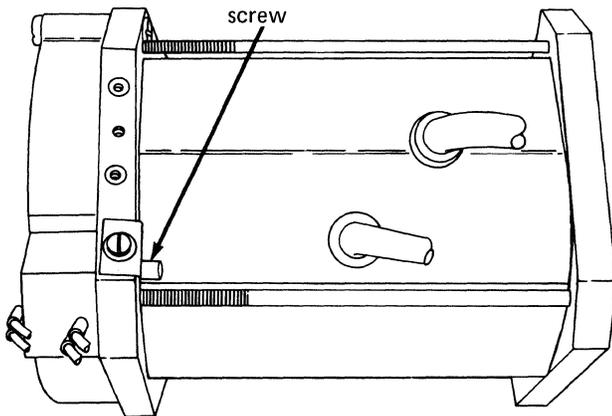
Forms symmetry B

Y1			Y2				Emitters Y3		Op Panel Y4			Mode Switch Y5			I/F Cable Y6				
A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V
Actuator Driver Groups 7 and 8			Actuator Driver Groups 5 and 6				Actuator Driver Groups 1 and 2		<ul style="list-style-type: none"> •TA •10 •5/15 •Busy Forms Amplifier Ribbon Driver	<ul style="list-style-type: none"> •TA •10 •5/15 •Busy Servo Amplifier Fms Speed	Wire Latch	Control and Sense	Control Adapter		H I G	Comm Storage	Comm Adapter	Comm Interface	

- To adjust Forms Quadrature, set the mode switch to position C and press start.

This adjustment is made by turning the eccentric adjusting screw on the forms drive motor. When the adjustment is correct, press the stop key *one* time.

Eccentric adjusting screw



These three adjustments set the time of the A and B pulses from the forms drive emitter, and place them so all pulses have the same time interval between them.

3104 Forms Feed Electronic Adjustments (Continued)

- To adjust Forms Speed, move the mode switch to position D and press start.

Adjust the forms speed potentiometer on the servo amplifier card located at L2. This adjustment controls the input to the forms drive motor to supply a constant speed. When the adjustment is correct, press stop *one* time.

- To adjust Forms Busy, move the mode switch to position E and press start.

Note: Forms Busy adjusts the starting and stopping rate of the forms.

Y1			Y2				Emitters Y3			Op Panel Y4			Mode Switch Y5			I/F Cable Y6			
A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V
Actuator	Actuator	Actuator	Actuator	Actuator	Actuator	Actuator	Actuator	Actuator	•A •B Forms Amplifier	•TA •10 •5/15 •Busy Servo Amplifier	Wire Latch	Control and Sense	Control Adapter		H I G	Comm Storage	Comm Adapter	Comm Interface	
Driver	Driver	Driver	Driver	Driver	Driver	Driver	Driver	Driver	Ribbon Driver	Fms Speed									
Groups 7 and 8	Groups 5 and 6	Groups 3 and 4	Groups 1 and 2																
Z1			Z2				Z3			Z4			Z5			Z6			

Forms speed

3105 Actuator Carrier Assembly Electronic Adjustments

The next three adjustments must be made in the following sequence when the servo amplifier card is exchanged with a new card.

Note: A "1" or "F" in the display does not cause an error, but adjust the potentiometer to indicate "0."

When an adjustment is correct, a "1" through "F" is on the display. If an "A" through "E" is displayed, turn the adjusting screw clockwise. If a "1" through "6" is displayed, turn the adjusting screw counterclockwise. The correct setting would be centered between "F" and "1.." For example, as soon as the display changes from "F" to "0," start counting the number of turns needed to change the display from "0" to "1.." Turn counterclockwise half of the total turns.

Note: During head speed adjustments, the actuator carrier may move too far at turn around and cause a noise. This noise is not a problem and does *not* occur in normal operation. Set the forms thickness cam to "25" to avoid this noise during head speed adjustments. Return the forms thickness cam to "0" after the adjustments.

- To adjust carrier speed at 10 cpi, set the mode switch to position A and press start. An "A" should be flashing on and off in the display. Move the mode switch to position 3 and press start again. The actuator carrier should now be moving at 10 character per inch (cpi) speed.

Adjust the 10 cpi potentiometer on the servo amplifier card located at L2 using the method described above.

Note: As each adjustment is completed, and the stop key is pressed *one* time, the display will have an "A" flashing on and off. If the "A" is not flashing, the stop key was pressed *twice* and you are out of the adjustment routine. Return the mode switch to position A, and press the start key *one* time to return the flashing "A" to the display before moving to the next adjustment routine.

10 CPI

Y1			Y2				Emitters Y3			Op Panel Y4			Mode Switch Y5			I/F Cable Y6			
A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V
Actuator			Actuator				Actuator		•A •B	TA 10 •5/15 •Busy	Wire	Control	Control		HIG	Comm	Comm	Comm	
Driver			Driver				Driver		Forms	Servo	Latch	and	Adapter			Storage	Adapter	Interface	
Groups			Groups				Groups		Ribbon	Amplifier		Sense							
7			5				1		Driver	Fms									
and			and				and			Speed									
8			6				2												

3105 Actuator Carrier Assembly Electronic Adjustments
(Continued)

- To adjust carrier speed at 15 cpi, set the mode switch to position 4 and press start. The actuator carrier will now be moving at 15 cpi speed.

15 CPI

Y1			Y2				Emitters Y3			Op Panel Y4			Mode Switch Y5			I/F Cable Y6			
A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V
Actuator Driver Groups 7 and 8			Actuator Driver Groups 5 and 6				Actuator Driver Groups 1 and 2		<ul style="list-style-type: none"> •A •B Forms Amplifier Ribbon Driver	<ul style="list-style-type: none"> •TA •10 •5/15 •Busy Servo Amplifier Fms Speed	Wire Latch	Control and Sense	Control Adapter		H I G	Comm Storage	Comm Adapter	Comm Interface	

Adjust the 15 potentiometer on the servo amplifier card located at L2.

- To adjust carrier turnaround, move the mode switch to position 5 and press start.

When the adjustment is correct, press stop *one* time.

Actuator carrier turnaround

Y1			Y2				Emitters Y3			Op Panel Y4			Mode Switch Y5			I/F Cable Y6			
A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V
Actuator Driver Groups 7 and 8			Actuator Driver Groups 5 and 6				Actuator Driver Groups 1 and 2		<ul style="list-style-type: none"> •A •B Forms Amplifier Ribbon Driver	<ul style="list-style-type: none"> •TA •10 •5/15 •Busy Servo Amplifier Fms Speed	Wire Latch	Control and Sense	Control Adapter		H I G	Comm Storage	Comm Adapter	Comm Interface	

**3105 Actuator Carrier Assembly Electronic
Adjustments (Continued)**

Adjust the TA potentiometer on the servo amplifier card located at L2. This adjustment ensures that the actuator carrier has enough time to stop, reverse direction, and reach the proper speed before the first print encoder pulse is sensed.

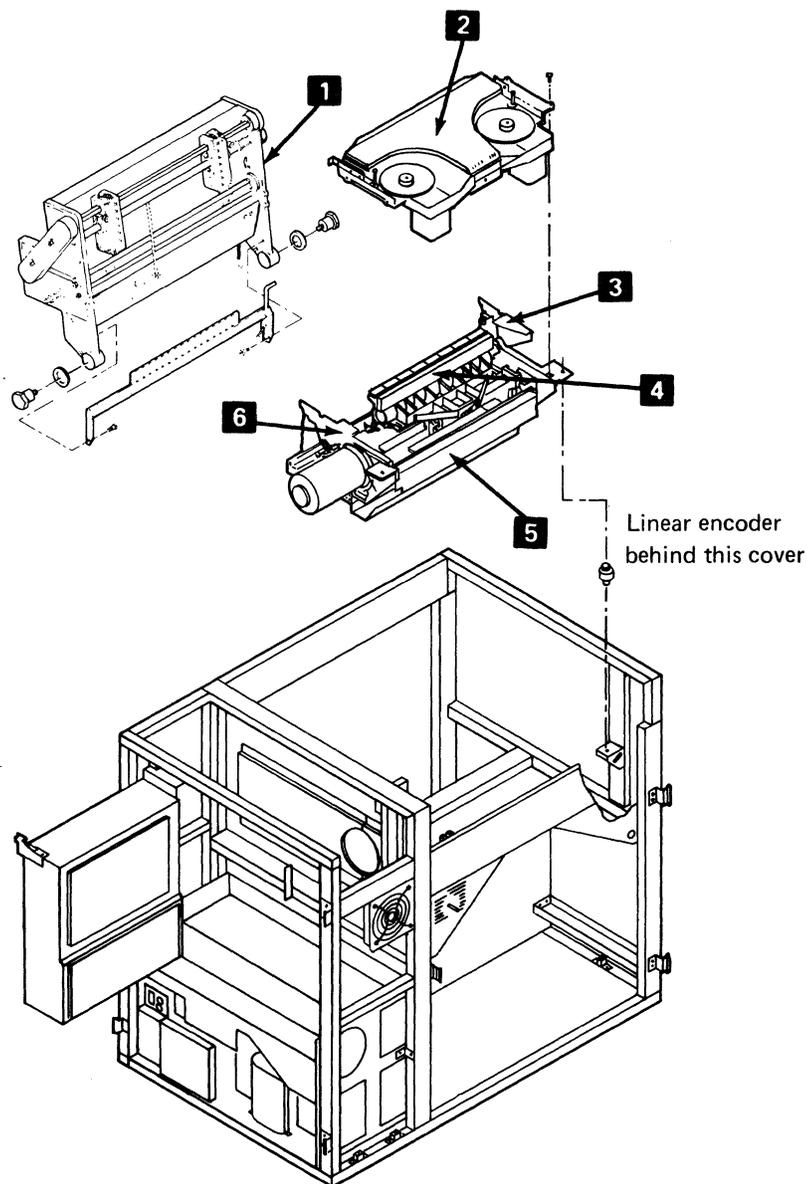
If a "A through E" is displayed, turn the adjusting screw counterclockwise. If a "1 through 9" is displayed, turn the adjusting screw clockwise.

When the adjustment is correct, press the stop key *two* times. The mode switch can now be moved to any other test position, online, or as instructed by the MAPs. Repeat the 10 cpi, 15 cpi, and TA adjustments once.

End of procedure.

Printer Mechanism

The printer mechanism includes the actuator carrier assembly and drive motor **4**, the linear encoder **5**, the forms mechanism latches **3** and **6**, and supplies the base for the ribbon drive assembly **2** and the forms feed assembly **1**. The linear encoder safety shield **5** is also part of the printer mechanism.



3300 Actuator Carrier Assembly

3301 Description

The actuator carrier assembly is the mounting for the print wire actuators. The assembly is driven left and right by a leadscrew that is connected to the shaft of a dc servo motor. Attached to the same shaft, but inside the motor housing, is a dc generator that generates a signal that is equal to the motor speed. The printer electronic circuits use this signal to control motor speed.

Note: When not printing, the actuator carrier is moved left to the "home" or "ramp" position. In this position, print wire group one is left of the left margin, and the forms feed assembly is moved away from the ribbon approximately 10 mm (.40 in) to prevent ribbon marks on the paper.

3302 Drive Motor

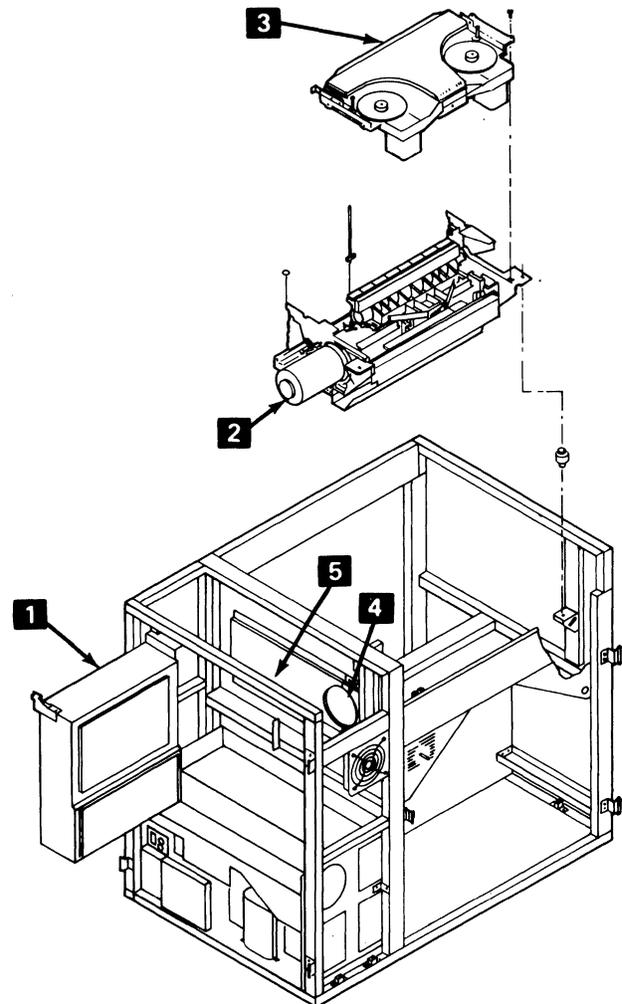
Removal

1. Switch off the power.
2. Open the left end cover (1005).
3. Switch off the ac circuit breaker located on the power supply (3603).
4. Open the top cover.
5. Remove the ribbon and ribbon drive assembly **3** (3802 and 3804).
6. Open the logic gate **1**.
7. Remove access panels **4** and **5**.
8. Use the hand wheel **2** on the drive motor to move the actuator carrier out of the home position.
9. Disconnect the drive motor cables **14** from the gate side of the frame.
10. Loosen the two screws **8** on the leadscrew side of the coupler **12**. Use the tip of the large screwdriver to open the coupler enough to free the leadscrew.

Note: Be careful not to damage the leadscrew.

11. Hold the motor **6** and remove the four mounting screws from the motor flange **13**. Take the motor out from the gate side. The leadscrew **9** does not have to be removed. Keep the coupler **12** for reinstallation.

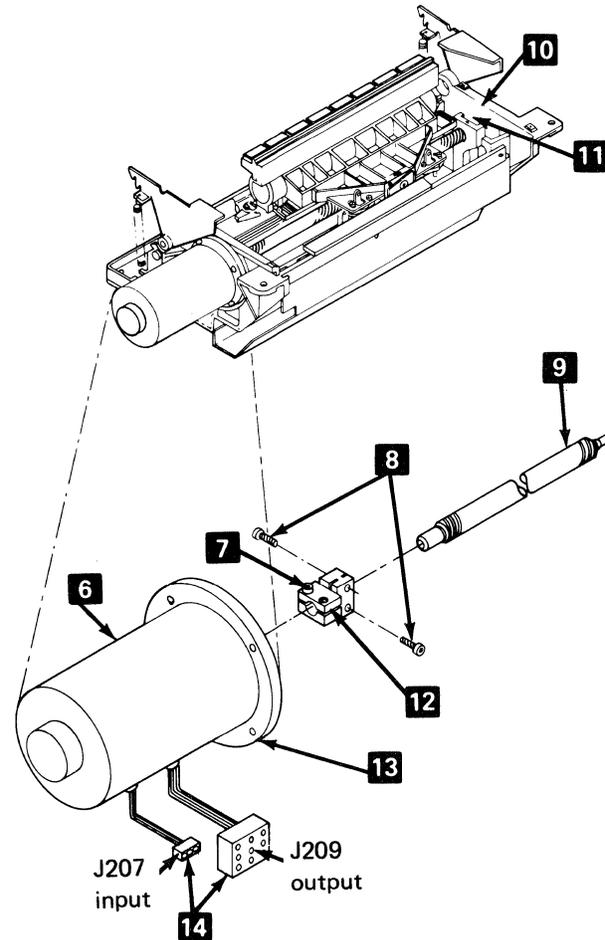
End of procedure.



3302 Drive Motor (Continued)**Reinstall**

1. Install the coupler **12** on the motor shaft. Slide the coupler toward the motor until the space between the motor housing **13** and the coupler is 1 mm (.004 in).
2. Tighten the screws **7** in the coupler. Do not tighten the screws **8**.
3. Tighten the screws in the coupler **9**.
4. Install the motor **6** and coupler **12** onto the lead-screw **9** from the gate side of the printer.
5. Install the 4 screws into the motor flange **13** and hand tighten.
6. Loosen screw **11** and tighten the four screws in the **13** motor flange.
7. Place a hammer handle between the frame **10** and the **9** leadscrew.
8. Press the leadscrew into the coupler **12** until the leadscrew shaft and the motor shaft touch, or the beginning of the leadscrew thread touches the coupler.
9. Tighten the screws **8** in the **12** coupler.
10. Tighten the **11** screw.
11. Connect the motor cables **11**.
12. Reinstall the access panels **4** and **5**.
13. Complete the platen-to-actuator service check described in section 3402.
14. Reinstall the ribbon and ribbon drive unit (3802 and 3804).
15. Close the logic gate.
16. Switch on the ac circuit breaker.
17. Close and fasten the left end cover (1005).
18. Close the top cover.
19. Switch on the power. The actuator carrier will return to the "home" position on power up.
20. Complete the electronic adjustments (3105).
21. Set the mode switch to the "Test" position and run the test routines to ensure correct operation.

End of procedure.



3303 Linear Encoder and Amplifier Assemblies

CAUTION

The Linear Encoder glass is easily broken and can cause physical injury.

Four adjustment procedures must be performed when the linear encoder or the LEM assembly are moved or exchanged.

These adjustments must be performed in the following sequence:

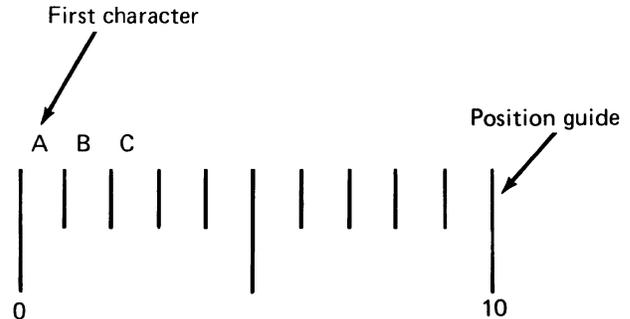
1. Encoder glass to LEM assembly space adjustment
2. LEM assembly vertical and skew adjustment
3. LEM assembly left and right adjustment
4. Character alignment

Service Checks

Warning: When working on the linear encoder, always hold the glass on the edge. Do Not allow fingerprints on the glass.

1. Switch off the power.
2. Remove the **3** safety cover.
3. Use a small mirror to ensure that the linear encoder is not touching the LEM assembly (Step 9 in the following procedure).
4. Move the actuator carrier across the full print line, using the handwheel, to ensure that the bottom of the LEM assembly is parallel with the bottom line on the linear encoder across the full width of the encoder (Step 20 in the following procedure).

5. Switch on the power, set the mode switch to the 'Test' position, and press start. Verify that the first printed character in the third line printed is in alignment with print position 1 on the print position guide (Step 29 in the following procedure). The print position guide is on the ribbon drive cover.

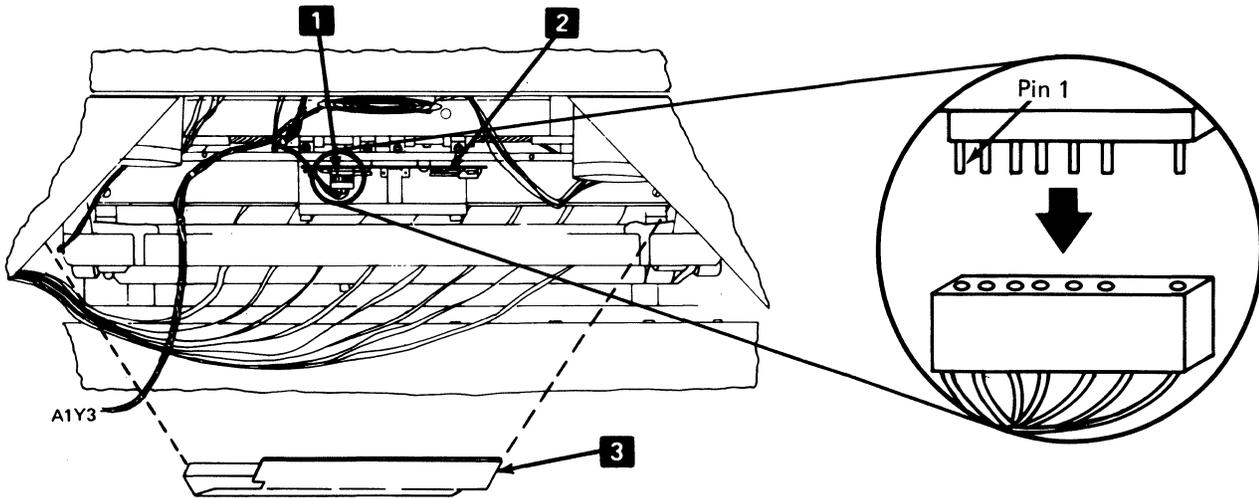


6. Set the mode switch to 'B' and press start. This routine will check for scratches or dirt on the linear encoder. After approximately 10 seconds of running time, press the stop key. If no problems occur, replace the **3** safety cover.

A. Encoder Glass to LEM Assembly Space Adjustment

1. Switch off the power.
2. Open the left end cover (1005) and switch off the ac circuit breaker.
3. Open the front cover.
4. Open the top cover.
5. Remove the safety cover **3** from the linear encoder and LEM assembly.
6. Disconnect the cable **1** from the amplifier board **2**.

3303 Linear Encoder and Amplifier Assemblies (Continued)

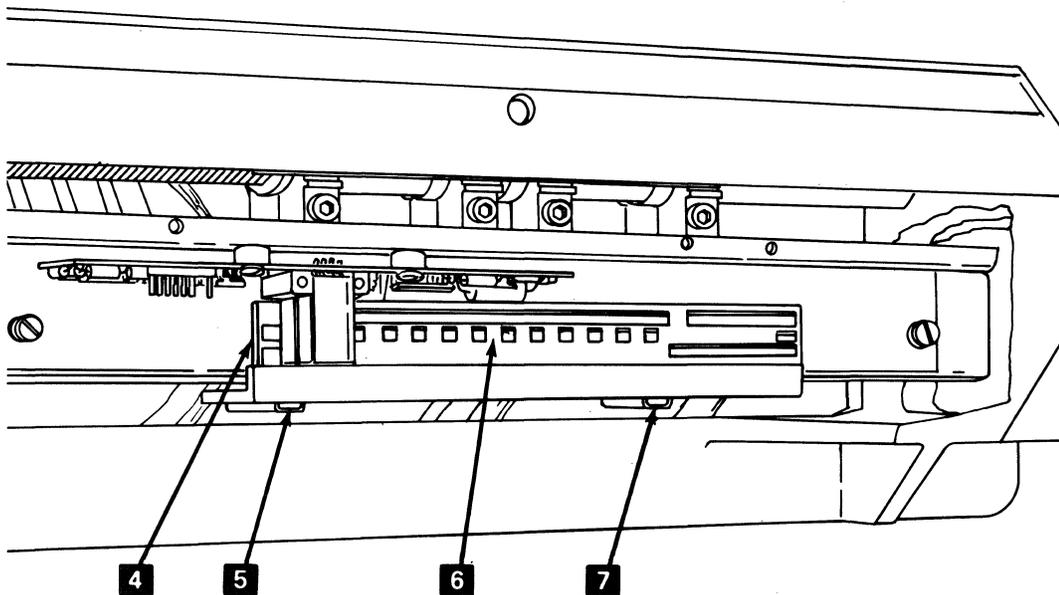


- 7. Move the actuator carrier to the right limit of movement.
- 8. Loosen screws **5** and **7** that fasten the linear encoder **6** to the actuator carrier.
- 9. Hold a small mirror at the left end of the linear encoder at **4** and look down the length of the encoder glass.

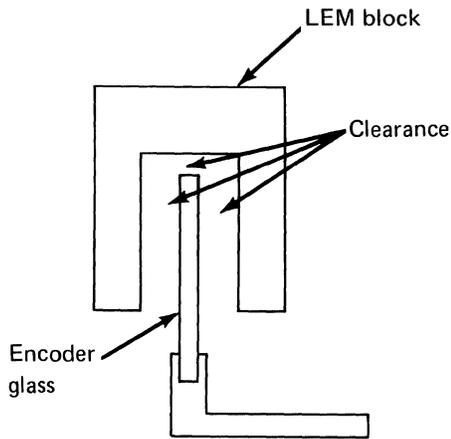
The linear encoder should be centered in the opening in the LEM assembly, and must not touch the assembly on the top or on either side.

- 10. Align the encoder to meet the conditions of the preceding step, and tighten the left end screw **5** that fastens the linear encoder to the actuator carrier.

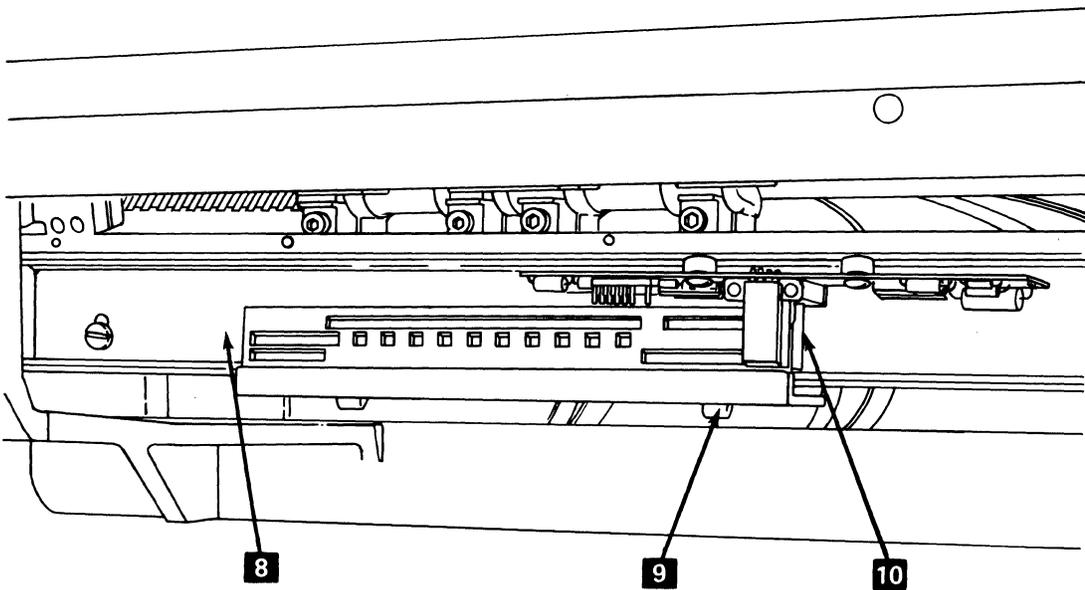
Note: White paper held at the right end of the encoder will aid you in seeing the space between the encoder and the LEM assembly.



3303 Linear Encoder and Amplifier Assemblies (Continued)

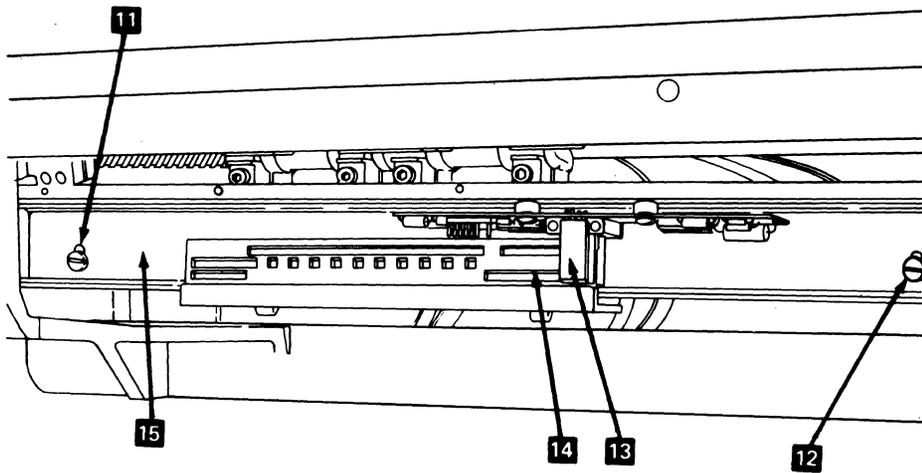


11. Move the actuator carrier to the "home" position by hand, and repeat the centering procedure from step 9 by holding the mirror at **10** and the white paper at **8**.
12. When the alignment condition in step 9 is correct at the right end of the encoder, tighten the fastening screw **9**.
13. Use the handwheel to move the actuator carrier to the right limit of movement, and check the encoder to LEM assembly space on the left end of the encoder.
14. Use the handwheel to move the actuator carrier to the 'home' position.



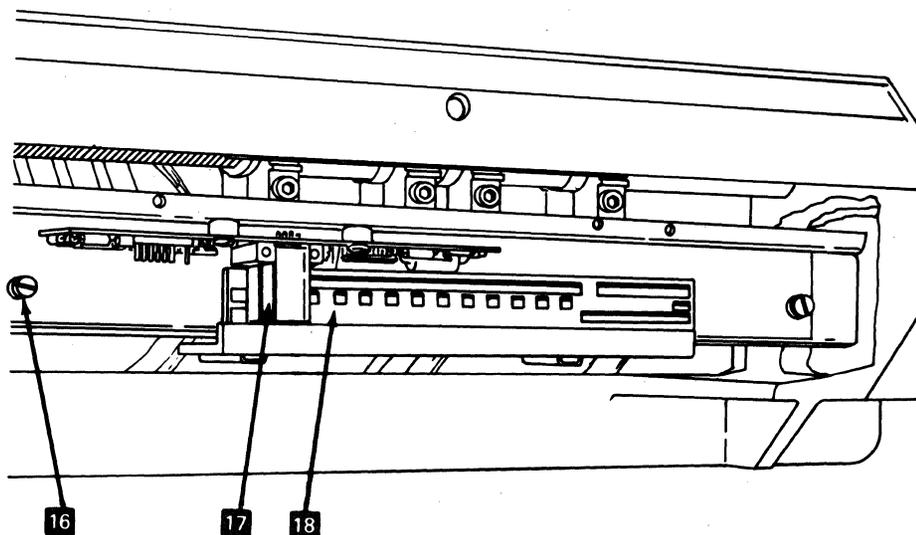
3303 Linear Encoder and Amplifier Assemblies (Continued)

B. LEM Assembly Vertical and Skew Adjustment



15. With the actuator carrier in the 'home' position, loosen fastening screws **11** and **12** at both ends of the channel **15**.
16. Move the channel vertically until the bottom of the LEM assembly **13** is aligned with the bottom line on the linear encoder **14**.
17. Tighten the fastening screw **12** on the right end of the channel.
18. Move the actuator carrier to the right limit of movement.
19. Move the channel vertically to align the bottom of the LEM assembly **17** with the bottom line **18** on the linear encoder; then, tighten the screw **16**.
20. Verify that the LEM assembly and bottom line on the linear encoder are parallel along the full length of the encoder as the actuator carrier is moved to the 'home' position.

Note: If the bottom line on the linear encoder is not parallel with the bottom of the LEM assembly along the full length of the encoder, the encoder is not correctly attached to the actuator carrier, or the encoder may be defective and may have to be replaced.



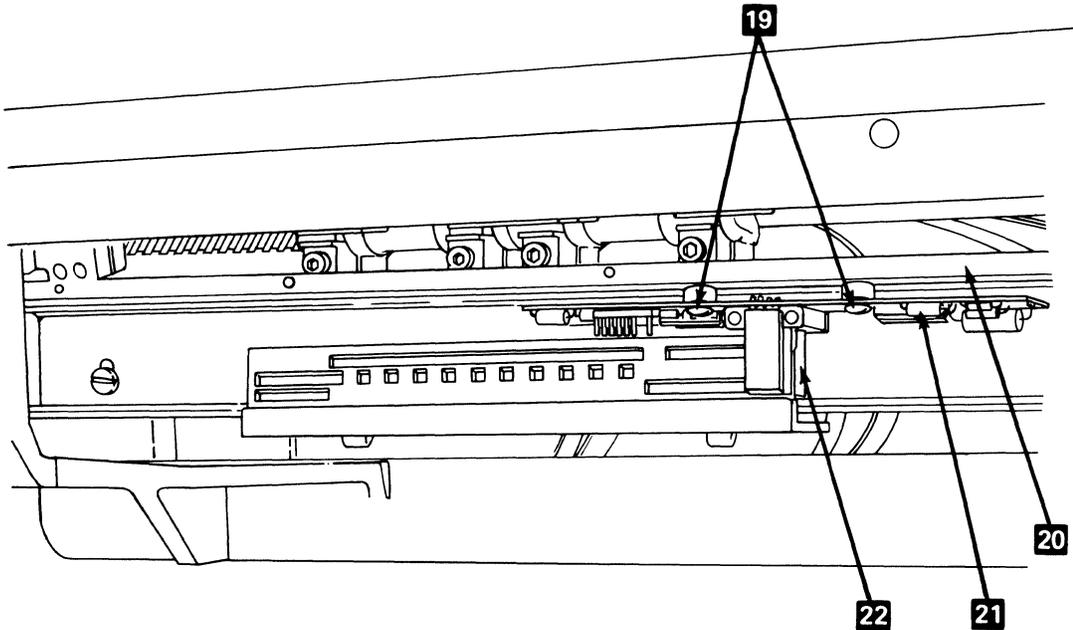
3303 Linear Encoder And Amplifier Assemblies (Continued)

C. LEM Assembly Left and Right Adjustment

21. Loosen the screws **19** holding the LEM assembly amplifier board **21** to the channel **20**.
22. Ensure that the actuator carrier is in the 'home' position; then, move the LEM assembly board left

or right until the right end of the linear encoder is aligned with the right edge of the LEM **22**. This is a first adjustment and may have to be changed later.

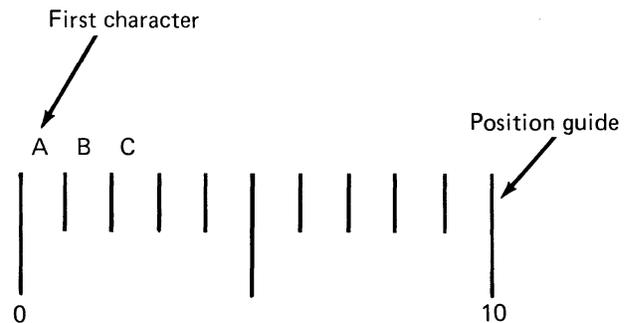
23. Tighten the fastening screws **19**.



Warning: Before performing the next adjustment, ensure that the LEM assembly to encoder glass clearance is correct (steps 9 and 11 in this procedure). This clearance must always be checked whenever the LEM assembly amplifier board is moved.

D. Character Alignment

24. Connect the cable to the amplifier board.
25. Switch on the ac circuit breaker.
26. Override the cover interlock switch (1009).
27. Switch on the power.
28. Turn the mode switch to position 6 and press the start key. Press the stop key after four or five lines have been printed.



29. Verify that the character printed in position 1 is aligned in the space indicated on the print position guide. If the character is not printing in the correct position, the LEM assembly amplifier board must be adjusted again.
30. Switch off the power.

3303 Linear Encoder And Amplifier Assemblies (Continued)

31. Switch off the ac circuit breaker.
32. Loosen the LEM assembly amplifier board fastening screws (step 22) and move the board in the direction the character must move. This is the same distance the character must move to be in correct alignment with the print position guide.

Warning: Moving the amplifier board too far could cause the actuator carrier to strike the casting, ribbon guide posts, or the leadscrew stops. Move the amplifier board a small amount at a time.

33. Verify the adjustment specified in steps 9 and 11 in procedure A before the power is switched on.
34. Repeat steps 29 through 32, as needed, until the character is in correct alignment; then, switch the power off.
35. Reinstall the safety cover over the linear encoder and LEM assembly.
36. Close and fasten the left end cover.
37. Close the top cover.
38. Switch on the power.
39. Set the mode switch to position B and press start. This routine will check the linear encoder glass to ensure no scratch marks.
40. Set the mode switch to Test and press start to ensure correct printer operation.
41. Set the mode switch to Online.
42. Close the front cover.

End of procedure.

Removal (Linear Encoder and Amplifier)

1. Switch off the power.
2. Open the front cover.

3. Remove the linear encoder safety cover, held by two screws.
4. Disconnect the encoder cable **2**.

Warning: The glass encoder is easily scratched and broken.

5. Remove the two mounting screws **5** that fasten the encoder **1** to the support. Place the glass encoder in a safe place to prevent breaking it.
6. Remove the two mounting screws **3** that fasten the amplifier board **4** to the frame. Remove the board.

End of procedure.

Reinstall

1. Fasten the amplifier board **4** to the frame with the two mounting screws.
2. Reinstall the linear encoder **1** but do not tighten the mounting screws at this time.

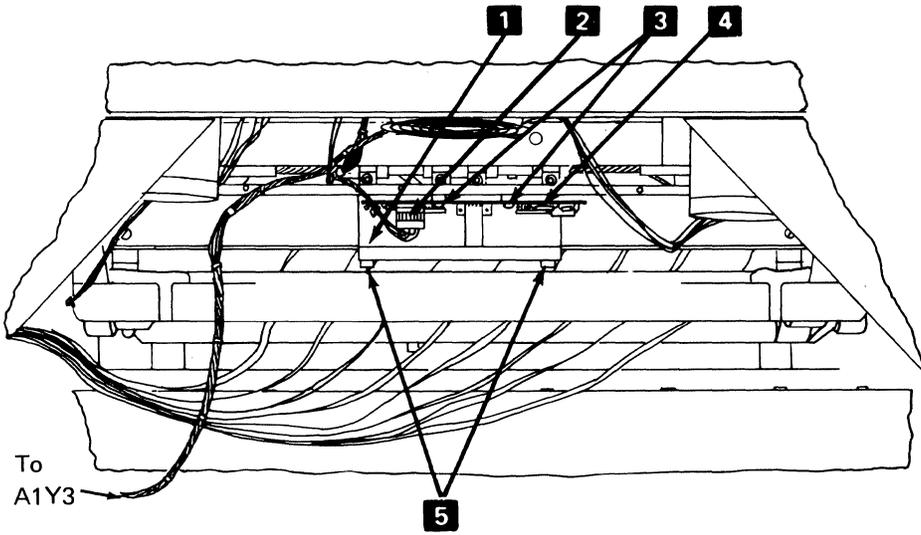
Warning: Ensure the encoder glass does not touch the LEM assembly.

3. Perform the complete adjustment procedure for the linear encoder and LEM assembly. The adjustment procedure is located in front of this removal and reinstall procedure (3303 Linear Encoder and Amplifier).

End of procedure.



3303 Linear Encoder And Amplifier Assemblies (Continued)



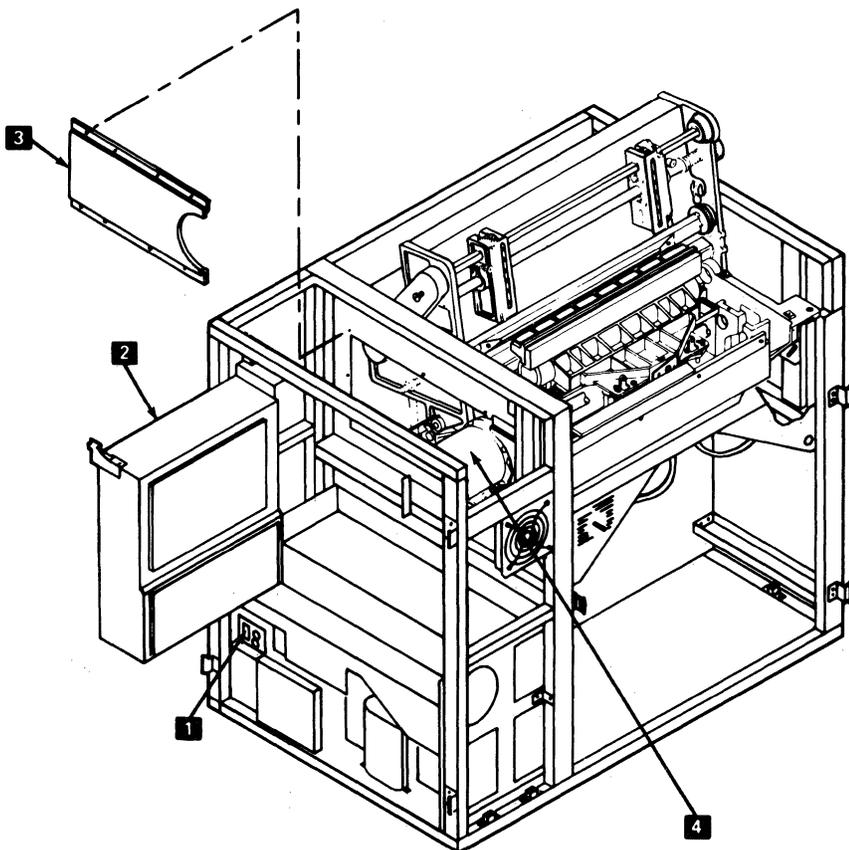
3304 Leadscrew

Service Checks

1. Make sure the leadscrew is clean and free of contamination.
2. Make sure the leadscrew turns freely.
3. Inspect the leadshaft bearing for wear. The bearing should not turn.
4. Make sure the screws **10** in the coupler **11** are tight.
5. Move the actuator carrier to the right against the stop. While holding the actuator carrier against the stop, make sure the leadscrew does not turn in either direction.

Removal

1. Switch off the power.
2. Open the left end cover (1005).
3. Switch off the ac circuit breaker **1** located on the power supply.
4. Perform the first five steps of the linear encoder removal procedure (3303). Removing the amplifier assembly is not necessary.
5. Open the top cover.
6. Open the forms feed assembly.
7. Remove the ribbon and ribbon drive assembly (3802 and 3804).
8. Open the logic gate **2**.
9. Remove the access panel **3**.
10. Use the handwheel on the drive motor **4** to move the actuator carrier away from the 'home' position.
11. Disconnect the drive motor cables **8** from the logic gate side.
12. Remove the two plastic stops **7** from the leadscrew (Models 2, 3, and 4 only).
13. Loosen the screw **5** that holds the bearing in the casting.



3304 Leadscrew (Continued)

14. Remove the nut and washer **6** from the right end of the leadscrew.
15. Remove the four mounting screws **9** from the drive motor.

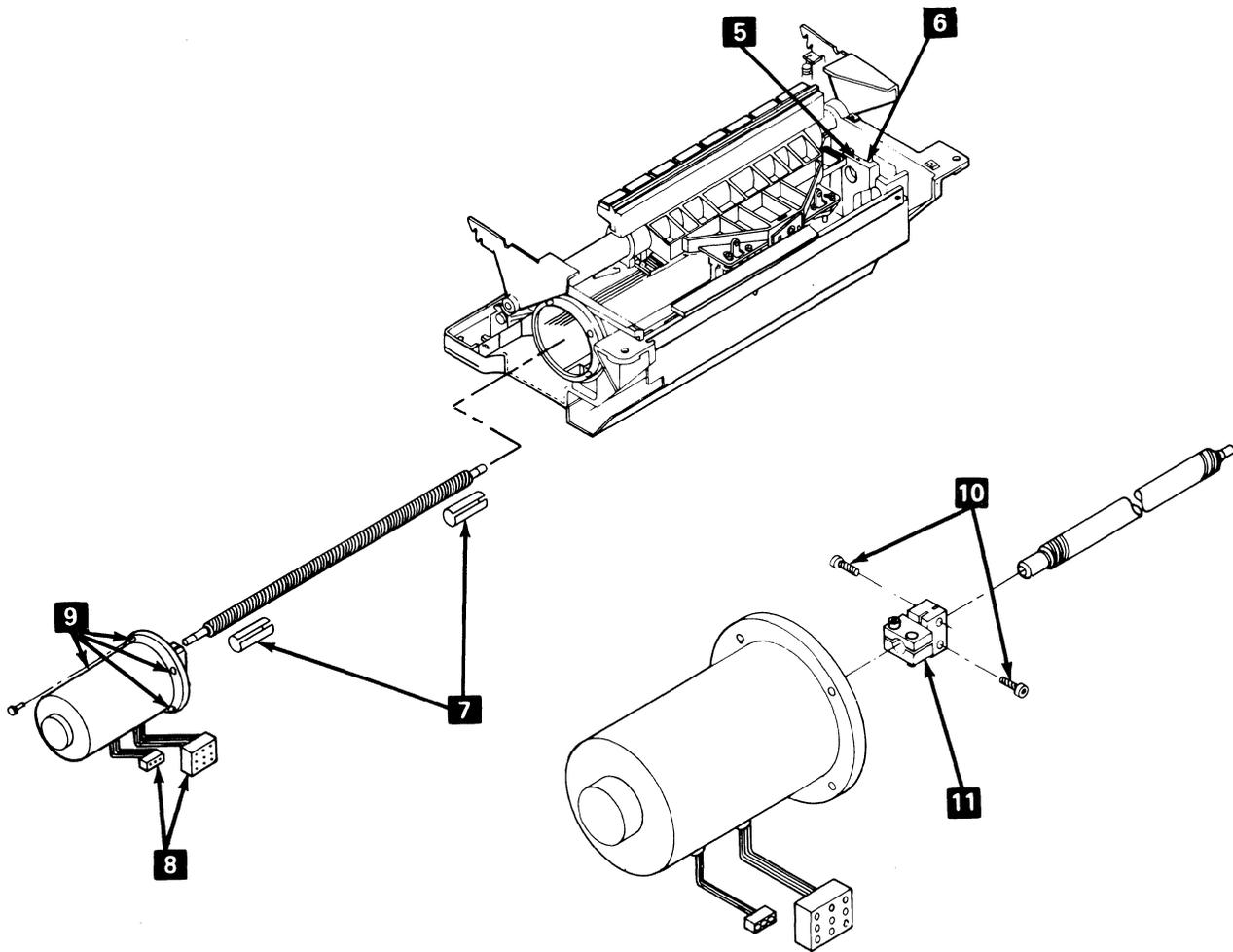
Note: If the bearing comes out of the casting with the leadscrew, remove it before the leadscrew is pulled through the actuator carrier support.

16. Pull the motor and leadscrew out through the left end of the machine by turning the leadscrew in a clockwise direction.

17. With the motor and leadscrew assembly on a suitable work surface, loosen the screws **10** in the coupler **11**; then pull the leadscrew out of the coupler.

Note: Using the tip of the large screwdriver to enlarge the opening in the coupler may be necessary in order to free the leadscrew.

End of procedure.



3304 Leadscrew (Continued)

Reinstall

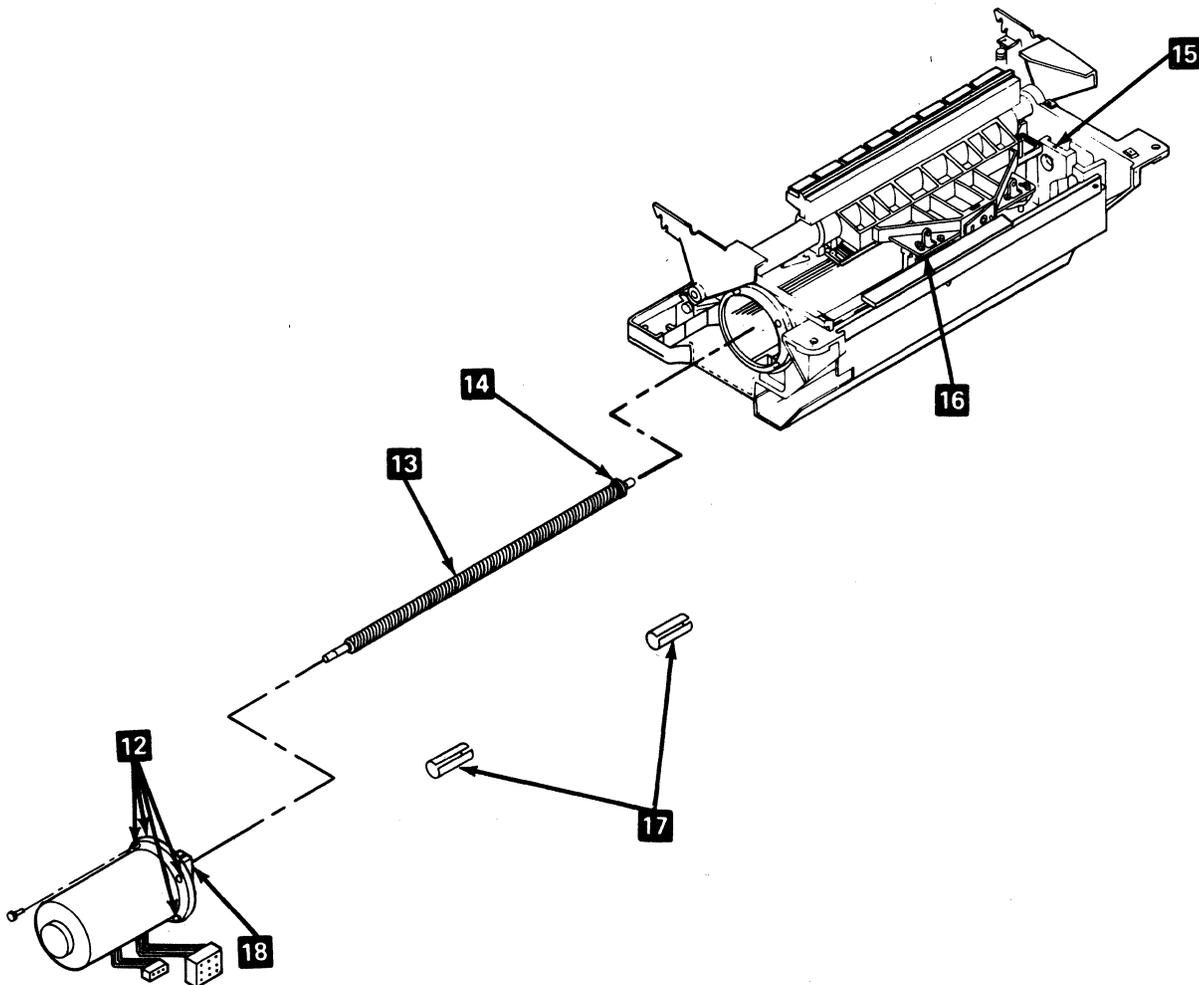
Note: Reseating the leadscrew bushings may be necessary when inserting the leadscrew through the carrier.

1. Slide the leadscrew through the actuator carrier support **16**, install the bearing **14** on the end of the leadscrew, and guide the bearing into the casting at **15**.
2. Make sure the coupler **11** is fastened to the motor shaft before proceeding.
3. Install the motor and coupler into the base casting.
4. Install the four motor mounting screws **12**.

Note: The end of the motor shaft and the end of the leadscrew must touch inside the coupler.

5. Carefully insert the leadscrew into the coupler.
6. Using a hammer handle wedged between the frame and the leadscrew, press the leadscrew into the coupler.
7. Tighten the two screws **10**.
8. Install the two plastic stops **17** on either side of the actuator carrier support **16** (Models 2, 3, and 4 only).

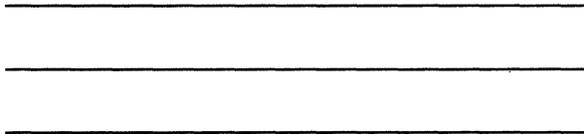
Note: The motor shaft should only be inserted halfway into the **11** coupler.



3304 Leadscrew (Continued)

9. Install the washer and nut on the end of the leadscrew at **13**.

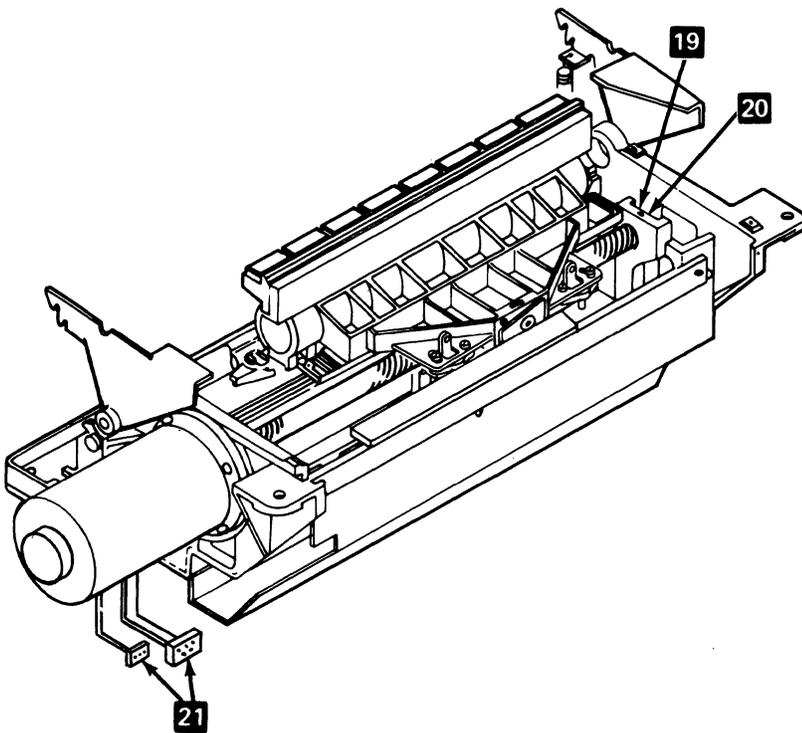
Warning: In the next step the bearing holding screw should be tight enough to hold the bearing, but should not change the shape of the plastic covering that protects the bearing.



10. Tighten the bearing holding screw **19**.
11. Lubricate the leadscrew with #6 oil.
12. Connect the drive motor cables **21**.
13. Install the access panel that fits around the drive motor.

14. Install the ribbon drive assembly and the ribbon (3802 and 3804).
15. Close the forms feed assembly.
16. See "3303 Linear Encoder and Amplifier Assemblies" and perform the reinstall procedure starting with step 2.
17. Complete the platen-to-printer actuator adjustment service check described in section 3402.
18. Switch on the ac circuit breaker.
19. Close and fasten the left end cover.
20. Close the top cover.
21. Switch on the power.
22. Set the mode switch to the "Test" position, and run the test routines to ensure correct operation.

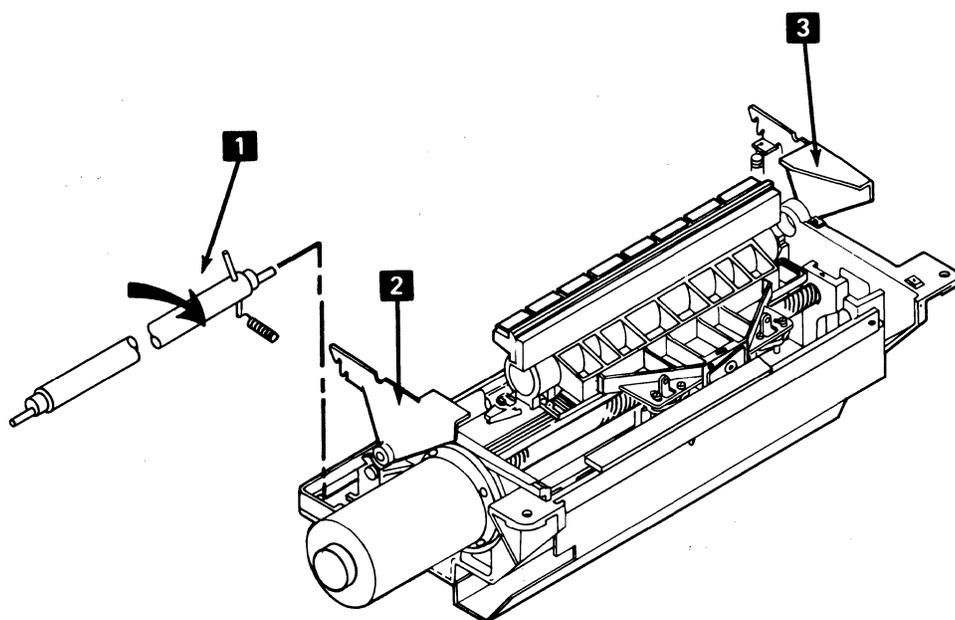
End of procedure.



3306 Actuator Carrier

Service Checks

1. Switch on the power.
2. Open the top cover.
3. Open the forms feed assembly.
4. Remove the ribbon drive assembly (3804).
5. The upper and lower vertical bearings **4** and the thrust bearings **7** and **10** should not turn freely. All four bearings should have a light to moderate drag.
6. Move the actuator carrier to the ramp position.
7. Check the ramp for wear and lubrication (#23 grease).
8. Open the forms feed assembly. Ensure the free return of the latches **2** and **3** when they are released. The latches should return to the latch position under spring tension with no binds.
9. Pull the cam follower **1** against the spring tension in the direction indicated, and allow it to slowly return. The motion should be smooth with no binds in the shaft. Make sure the spring is connected to the right end of the shaft.



Adjustment

The actuator carrier and track have three separate adjustments. When adjusting or replacing the track, all three adjustments must be performed in the following sequence:

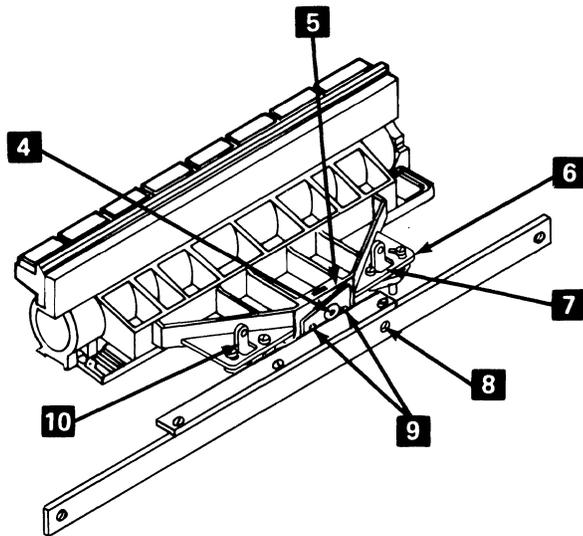
- A. Vertical Bearing Adjustment.
- B. Thrust Track to Carrier Shaft Alignment.
- C. Thrust Bearing Adjustment (Models 2, 3, and 4 only).
- D. Forms Feed Release Latches.

A. Vertical Bearing Adjustment

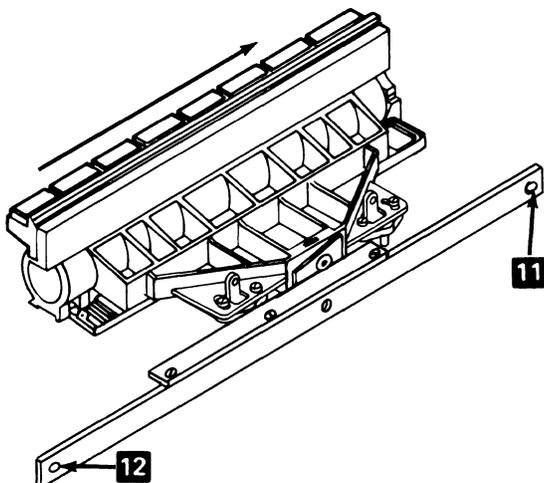
1. Switch off the power.
 2. Open the left end cover (1005) and switch off the ac circuit breaker.
 3. Open the top cover.
 4. Remove the ribbon and ribbon drive assembly (3802 and 3804).
- Note:** Move the actuator carrier to the left and right limits and become familiar with the normal carrier drag.
5. Move the actuator carrier to the center of the track.
- Note:** Access to the lower screw in the vertical bearing plate is through the hole in the track **6**.

3306 Actuator Carrier (Continued)

- Loosen the screws **9** that fasten in the vertical bearing plate **4** and the screws that fasten the thrust bearings **6** and **10**.



- Use downward pressure at **5** and tighten the screws **9**. To check the adjustment turn the bearing **4** with finger pressure. If the bearing turns freely or with slight drag, loosen the vertical bearing plate and use more downward pressure. If the bearing is binding on the track, you have too much pressure. The bearing should rotate with moderate pressure.



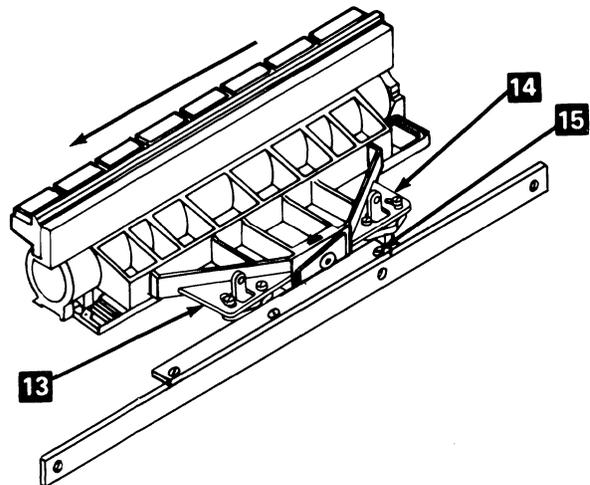
- Loosen the fastening screws **11** and **12**; then push the actuator carrier to its rightmost limit. Tighten screw **11**; then turn the screw counterclockwise 180°.
- Move the carrier to the leftmost position (but not into the home position) and tighten screw **12**. Now move the carrier back to the right and tighten screw **11**. The adjustment is correct if you have no space between the top and bottom rollers and the track, and no binds along the complete length of the track.

B. Thrust Track to Carrier Shaft Alignment

- Move the actuator carrier almost all the way to the left, but not on the ramp.

Note: The model 1 does not have thrust bearings.

- Move the right thrust bearing **14**, away from the track **15**, and then tighten the fastening screws.



- Using the .25 mm (.010 in) and .30 mm (.012 in) thickness gauges, set the left thrust bearing so that the .25 mm gauge will move between the bearing and the track without turning the bearing. The .30 mm gauge should cause the bearing to turn when moved between the bearing and the track.

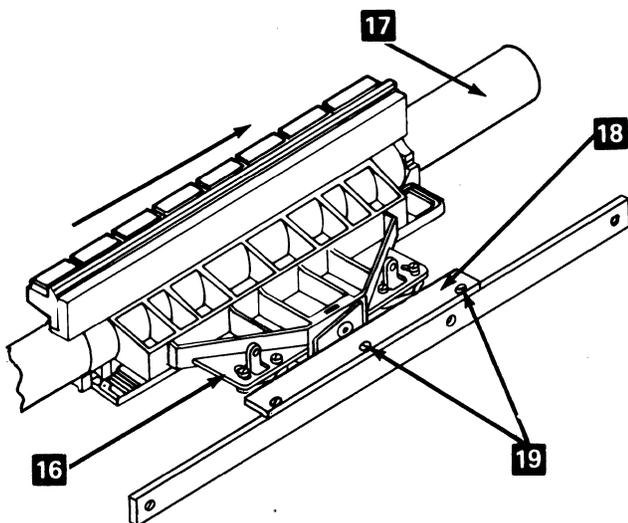
Note: The thickness gauge must be held flat against the face of the track to ensure that the gauge thickness is the only variable.

3306 Actuator Carrier (Continued)

13. Tighten the fastening screws on the left bearing **13**.
14. Move the actuator carrier all the way to the right, and check the adjustments performed in step 12 on the same bearing **13**. If the adjustment cannot meet these specifications, with the bearing in this position, DO NOT loosen the left thrust bearing. Go to the next step and perform the thrust track adjustment.

If the thrust track adjustment is correct, go to "C. Thrust Bearing Adjustment."

15. With the actuator carrier to the right limit of movement, loosen the center and right fasteners **19** on the thrust track **18**, and move the track in or out to obtain the correct space between the thrust bearing and the track. When the adjustment is correct, tighten the fasteners on the thrust track.



Now, move the actuator carrier back to the left and ensure that the adjustment is still correct on both ends of travel.

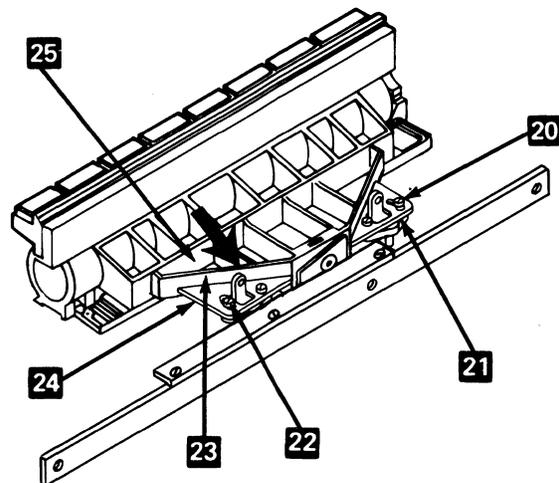
Note: Steps 12 through 15 may have to be repeated several times to obtain the correct adjustment between the thrust track **18** and the carrier shaft **17**.

C. Thrust Bearing Adjustment

16. Position the actuator carrier almost all the way to the left, but not into the ramp position.

Note: The model 1 does not have thrust bearings.

17. Loosen the fastening screws on the left thrust bearing **21**.
18. Press on the thrust bearing **21** in the direction of **24** with your finger. Press in the opposite direction against the actuator carrier **22** with your thumb. Tighten the screws on the thrust bearing.



19. With the actuator carrier still at the left end, loosen the fastening screws on the right thrust bearing **20**.
20. Perform step 19 on the right bearing, with force at screw **20**.
21. With the carrier at the left end, check the thrust bearings **21** and **24** for too much drag. If the bearings are binding on the track, there is too much pressure. If the bearings turn freely or with a slight drag, loosen the thrust bearing plate and use more pressure.
22. Move the carrier to the right limit. Check the bearing pressure as in step 22, but DO NOT adjust the bearings (the track may not be parallel). Perform the thrust track to carrier shaft alignment adjustment (step 15).

3306 Actuator Carrier (Continued)

23. Move the actuator carrier back and forth several times and observe the movement of the thrust bearings. They must be tight against the track but not binding. The bearings may skip at two or three places along the track, as long as the bearings are tight against the track at both ends of travel.

Note: If the bearings are still loose or bind when moving the actuator carrier from one end of the track to the other, the thrust track is out of adjustment or worn. Adjust the thrust track; then, perform the thrust bearing adjustment again.

24. Complete the platen-to-printer actuator adjustment service check described in section 3402.
25. Reinstall the ribbon drive assembly and ribbon (3802 and 3804).
26. Switch on the ac circuit breaker.
27. Close and fasten the left end cover (1005).
28. Close the top cover.
29. Switch on the power.
30. Set the mode switch to the "Test" position and press start to verify the print quality.

End of procedure.

D. Forms Feed Latch Adjustment

1. Adjust the nut **29** until the latch **30** is tight but not binding against the bearing **31**. Tighten the second nut to lock the first nut in place.
2. Adjust the nut **42** until the latch **41** is tight but not binding against the bearing **43**. Tighten the second nut to lock the first nut in place. Do not bind the shaft.
3. Make sure the shaft **33** has no horizontal movement and is free to rotate.

End of procedure.

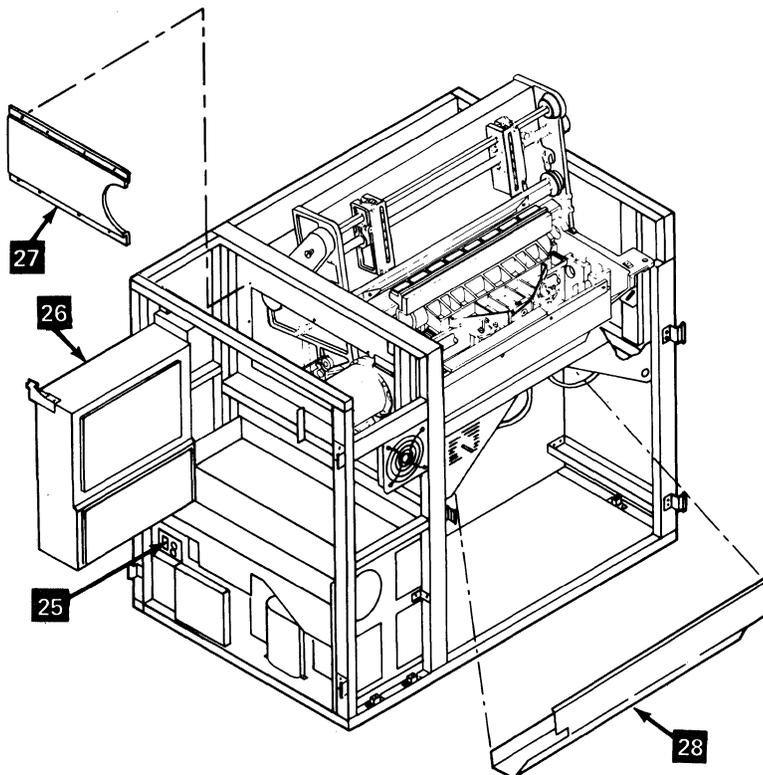
3306 Actuator Carrier (Continued)**Removal**

1. Switch off the power.
2. Open the left end cover (1005).
3. Switch off the ac circuit breaker **25** located on the power supply.
4. Open the front cover.
5. Open the top cover.
6. Open the forms feed assembly and remove the forms.
7. Remove the ribbon and ribbon drive assembly (3802 and 3804).
8. From the front of the machine, remove the cover that protects the linear encoder and amplifier assemblies **28**.
9. Open the logic gate **26**.
10. Remove the access panel **27**.

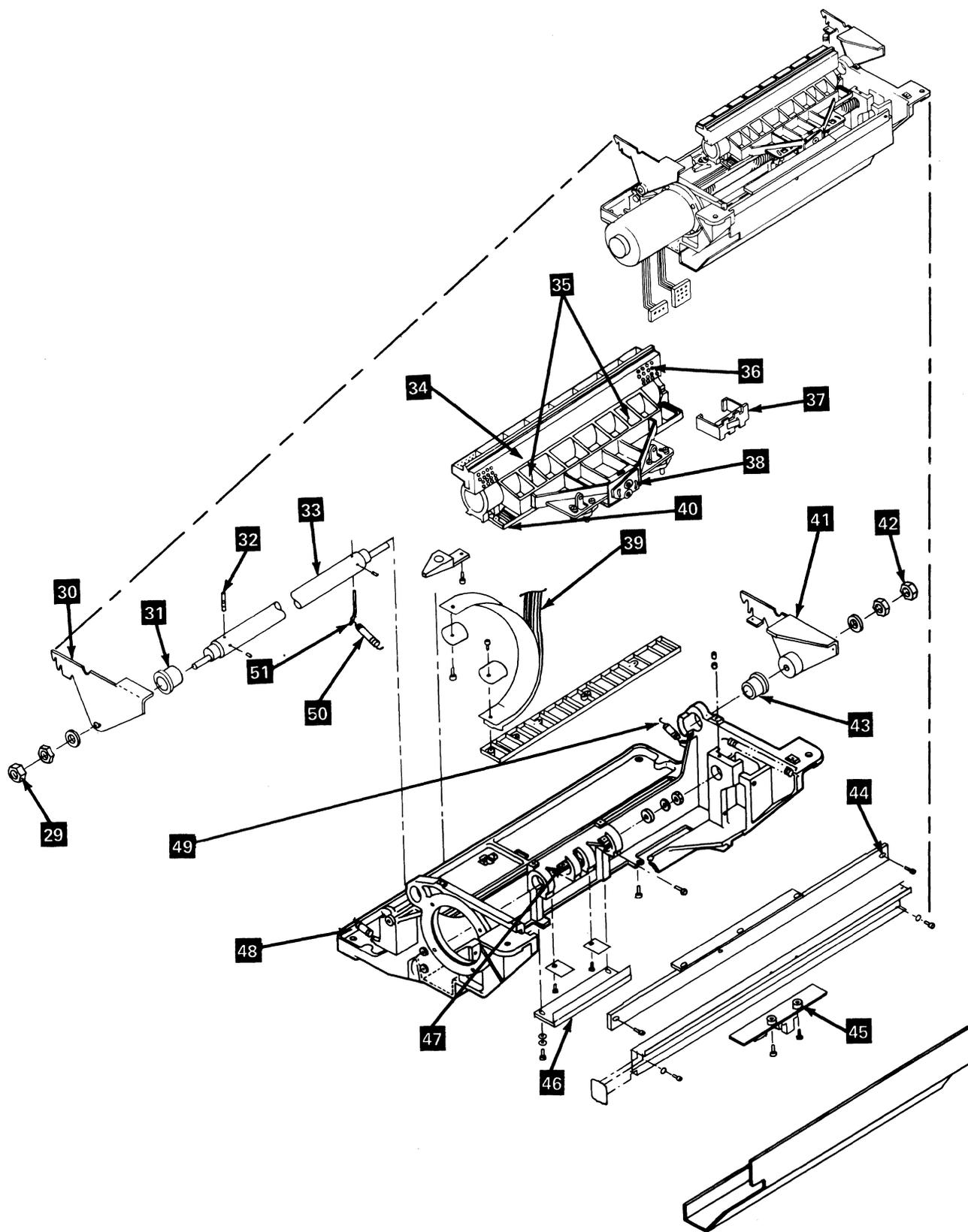
CAUTION

The glass encoder is easily broken, and can cause physical injury.

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11. Disconnect the encoder cable, remove the two mounting screws that fasten the linear encoder **46** to the base, and slide the encoder free of the amplifier assembly **45** (3303).



3306 Actuator Carrier (Continued)



3306 Actuator Carrier (Continued)

CAUTION

The Linear Encoder glass is easily broken and can cause physical injury.

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12. Remove the springs 48 and 49 from the latches 30 and 41.
 13. Remove the two nuts and washer 29, push the shaft to the right, and remove the latch 30.
 14. Remove the nuts and washer 42 and the latch 41.
 15. Loosen, but do not remove, the holding screws for the vertical bearings 38.
 16. Remove the rear oiler housings 37 from all of the actuator groups.
 17. Disconnect the cables 39 from all of the actuators installed in the assembly 36. Note the method used for placing the cable to ensure correct assembly.

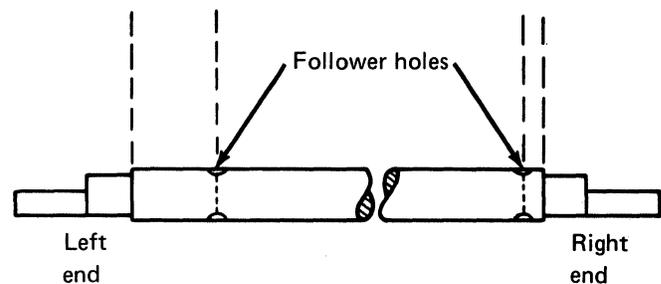
Note: Removing two or three actuators may be necessary to reach the mounting screws in the next step.

18. Remove the two mounting screws 35 that fasten the cable divider 40 to the actuator carrier assembly.
19. Remove the track 44.
20. Remove the cam follower spring 50.
21. Loosen the setscrews and remove the followers 32 and 51.
22. Remove the four mounting screws that fasten the actuator carrier 34 to the support 47.
23. Hold the actuator carrier 34 with one hand while pulling the shaft 33 out the left side of the assembly.
24. Remove the bearings 31 and 43.
25. Lift the actuator carrier 34 clear of the support and the cables and remove it from the machine.
26. If you must replace the actuator carrier, you must now remove all of the actuators.

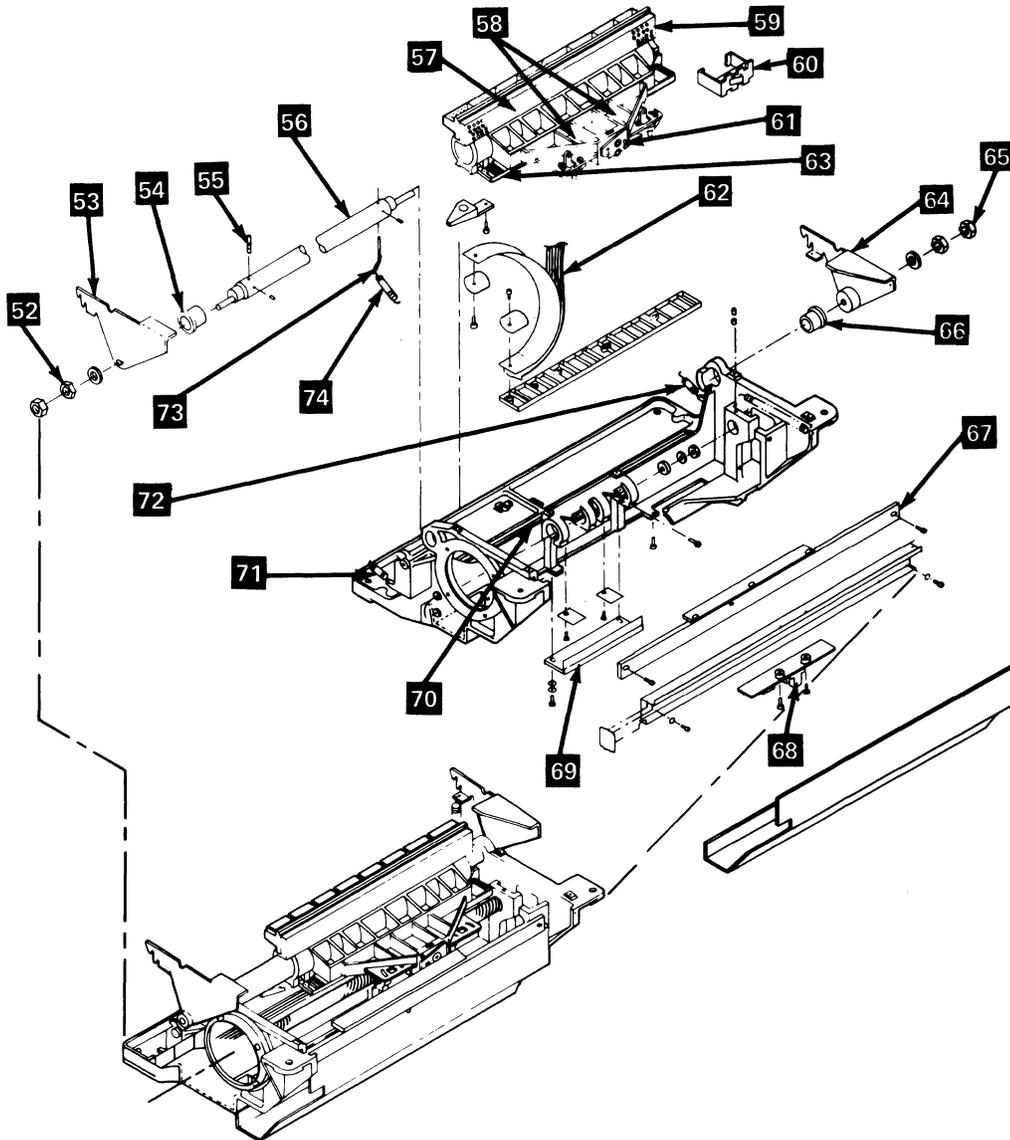
End of procedure.

Reinstall

1. Place the bearing 54 on the left end of the actuator carrier shaft 56.
- Note:** Ensure that the correct end of the shaft is on the right. The follower hole in the right end of the carrier shaft is closer to the shoulder than the hole in the left end.
2. Hold the actuator carrier 57 in place in the base casting and insert the shaft 56 through the carrier. Turn the shaft so that the eccentric ends are at the bottom.
 3. Place the bearing 66 on the right end of the shaft. Install the latch 64 and the washer and one nut 65. Temporarily tighten the nut enough to hold the latch and bearing on the shaft.
 4. Place the bearing 54, the latch 53, the washer and one nut 52 on the left end of the shaft. Tighten the nut until the shaft is tight against the bearing, but not binding. Place the second nut on the shaft and tighten it to lock the first nut in place.
 5. Test the shaft 56 to ensure no horizontal movement.



3306 Actuator Carrier (Continued)



6. Tighten the nut **65** until the latch **64** is tight against the bearing **66**, but do not bind the shaft. Tighten the second nut to hold the first nut in place.
7. Lubricate the shaft with IBM #23.
8. Thread the cables **62** up through the openings in the actuator carrier. Ensure that the cables are inserted through the correct openings.
9. Fasten the cable divider **63** to the carrier assembly **57** with the two mounting screws **58**.
10. Fasten the actuator carrier **57** to the support **70** with the four mounting screws.
11. Insert the two followers **55** and **73**, and tighten the setscrews. These followers must be installed as shown in the drawing.

- Note:** Ensure the flat spot on the follower **73** lines up with the hole for the setscrew.
12. Connect the follower spring **74**.
 13. Connect the springs **74** and **72** between the casting and the latches **53** and **64**.
 14. Install the track **67**. The track should be between the guide rollers **61**. Tighten the track mounting screws finger tight.
 15. See "3306 Actuator Carrier Assembly" for the track adjustment procedure.

3306 Actuator Carrier (Continued)

16. Install print actuators (3308), but do not verify print quality.

Warning: Ensure that the linear encoder glass does not touch the LEM **68**.

17. Install the linear encoder assembly **69**.
18. Reinstall the forms and close the forms feed assembly.
19. See "3303 Linear Encoder and Amplifier Assemblies" for the adjustment procedure for the encoder. Perform the complete adjustment procedure.

20. Reinstall the safety cover over the encoder/amplifier assemblies.
21. Reinstall the access panel behind the logic gate.
22. Complete the platen-to-printer actuator adjustment service check described in section 3402, including print quality verification.
23. Reinstall the ribbon and ribbon drive assembly (3802 and 3804).
24. Switch on the ac circuit breaker.
25. Close and fasten the left end cover.

End of procedure.

3307 Wick Assembly and Housing

Service Checks

Front oiler (printing end) felt pads should be saturated with IBM #6 oil.

The rear oilers (electrical connector end) are factory oiled and no oil should be added.

Warning: Adding oil to the rear oilers may degrade actuator performance.

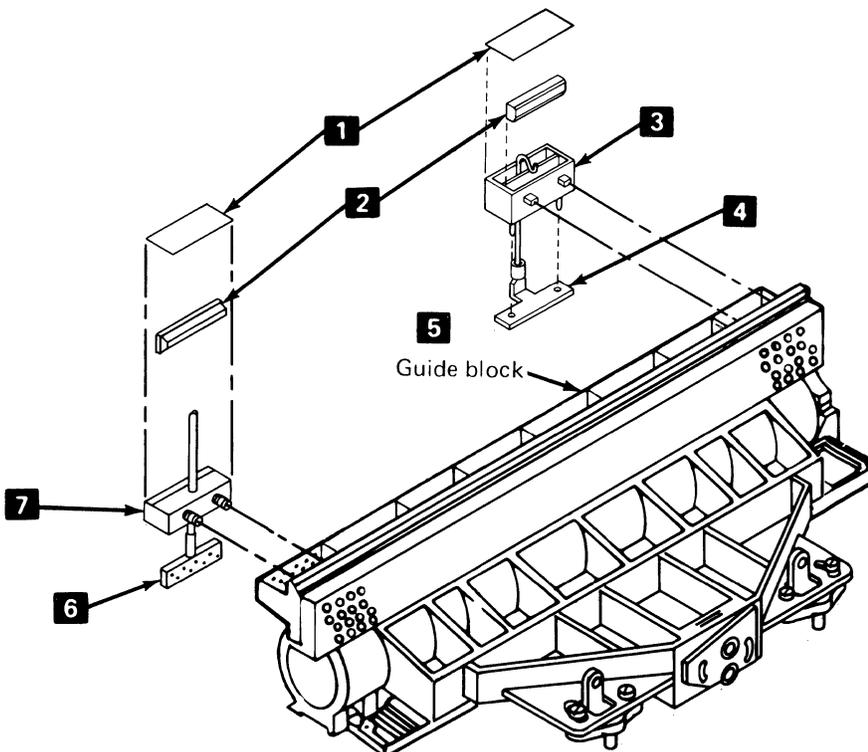
Removal

1. Switch off the power.
2. Open the top cover.
3. Open the forms feed assembly.
4. Remove the actuator fan cover from the ribbon drive assembly (3803).

5. Insert a small screw driver under housing 1 or 8 and carefully lift up until the tabs underneath are clear. Lift the housing slowly to prevent the cord portion of the feed-through type wick from breaking. If the housing 3 is completely free of the actuator carrier assembly, the printer has the universal wick and the removal is complete. If the housing 7 is still attached by the wick, the printer has the feed-through type wick (continue with step 6).
6. Remove the top 1 with your fingers. Using a small screwdriver or springhook, lift the cord end of the wick 6 out of the housing 7.

CAUTION

Do not break the cord. Ensure the metal crimp on the wick is not jammed in the housing.



3307 Wick Assembly And Housing (Continued)

7. Move the housing **7** toward the platen and lift up until the wick cord has been pulled out of the bottom of the housing. The felt pad **2** will remain in the housing.
8. In order to remove the wick assembly **6**, first remove the eight actuators (3308).

End of procedure.

Reinstall

1. If the printer has the feed-through type wick, complete steps 2 through 8. If the printer has the universal type wick, go to step 9.
2. Position the wick **6** in the actuator carriers.

Note: Ensure that the rows of holes in the wick angle down to the right when observed from the front of the machine.
3. Install the actuators (3308).
4. Soak the wick with IBM #6 oil.
5. Turn the housing **7** bottom side up, and insert the cord end of wick through the opening in the housing.
6. Turn the housing up and pull the wick cord until the metal crimp is in the opening in the housing.
7. Tilt the housing and insert the tabs into the opening in the actuator carrier; then, bend the housing by pressing on the sides, and push down to insert the lower tabs into the actuator assembly.

CAUTION

Ensure that the metal crimp on the wick cord does not block the tabs.

8. Push the cord end of the wick **6** down between the felt pad **2** and the housing **7**. Go to step 13.
9. If the printer has the universal type wicks, the actuators have been installed.
10. Make sure the two pegs on the bottom of the housing **3** are inserted into the holes in the wick **4**. The wick must be pulled over the tab on the housing to contact the chamois washer on actuator 2 when installed.
11. Tilt the housing and insert the tabs on the side into the slots on the guide block **5**. Press on the side near the platen until the tab on the bottom catch in the recess. Press down lightly on the top of the housing.
12. Remove the housing top **1**.
13. Soak the pad with IBM #6 oil.
14. Install the top **1**.
15. Check the platen to actuator space and verify print quality when actuators have been removed or replaced. See section 3402.

End of procedure.



3308 Print Actuator

Service Check

Actuator

Remove the cover from the oil box at the print end of the actuator. If the felt is dry, remove it from the box and add IBM #6 oil to within 3 mm of the overflow level. Carefully insert the felt into the oil and reinstall the lid.

CAUTION

Do not put oil on the end of the actuators where the electrical connection is made.

Removal

1. Switch off the power.
2. Open the top cover.
3. Open the forms feed assembly.
4. Remove the ribbon and the actuator fan cover (3802 and 3803).
5. If the actuator you are removing is on the top, take off the front oil housing (3307). Release the rear oil housing from the actuator and let it remain attached to the cable.
6. If the actuator you are removing is on the bottom, unplug the electrical connectors from the upper actuators in that head. Open the cable clip on the rear oiler and remove the rear oiler and felt pad.
7. Remove the electrical connector from the actuator you are removing. Remove the mounting screw **1**, and pull the actuator out of the actuator carrier.

Note: Keep the chamois washer **2** to use when reinstalling the actuator.

8. If you are removing all the actuators, the part of the actuator carrier containing the holes for the actuators must be supported when the last screw is removed. This portion is separate and could be dropped or damaged.

9. If the printer is a Model 4 and the ribbon drive assembly is in place, and actuator 8-8 (lower right actuator) is to be removed, actuator 8-4 (upper right actuator) must be removed first. Remove the screw for actuator 8-8, turn the actuator upside down and remove it.
10. If the ribbon drive assembly is on the printer, move the carrier from side-to-side to remove the actuators.

End of procedure.

Reinstall

1. If the actuator is being replaced, compare the chamois washer **2** on the old actuator with that on the new actuator. If the old washer is larger in diameter than the new one, use the old washer on the new actuator.
2. If this printer has the type of wick that the actuators must pass through, place the wick in position (3307). If only a few actuators were removed, make sure the holes in the wick are correctly positioned.
3. If all of the actuators were removed, install actuator #5 in the head at each end of the carrier assembly to hold it together. Keep the separate portion of the actuator assembly properly positioned when installing the actuator screws. This portion should be centered from side-to-side, and pressed down on the carrier.
4. Insert each actuator and install the actuator screw. If all of the actuators were removed, start at the lower left actuator position, connect the actuator cable, and proceed with the next actuator to the right.
Note: It may be necessary to loosen the next actuator to the one you are installing to engage the screw. Do not hold the actuator when the screw is being tightened the last turn.
5. After the lower actuators are installed and connected to the cable, install the upper actuators but do not connect the cable.
6. If the rear oiler is dry, replace the rear oiler with a new preoiled part.

3308 Print Actuator (Continued)**CAUTION**

Do not oil the rear oiler. It is oiled at the factory, and additional oil may degrade actuator performance.

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7. Install the rear oilers and connect the cable to the upper actuators.
 8. Install the fastening screw.

Note: Loosening the actuators on either side to engage the screw may be necessary. But, do not touch the actuators when retightening the screws.
 9. Close the clip on the rear oiler over the upper actuator cables.
 10. Move the actuator carrier assembly back and forth to ensure that the actuator cables do not touch the ribbon drive assembly.

11. Install the front oil housing (3307).
12. Check the platen to actuator space and verify print quality (3402).

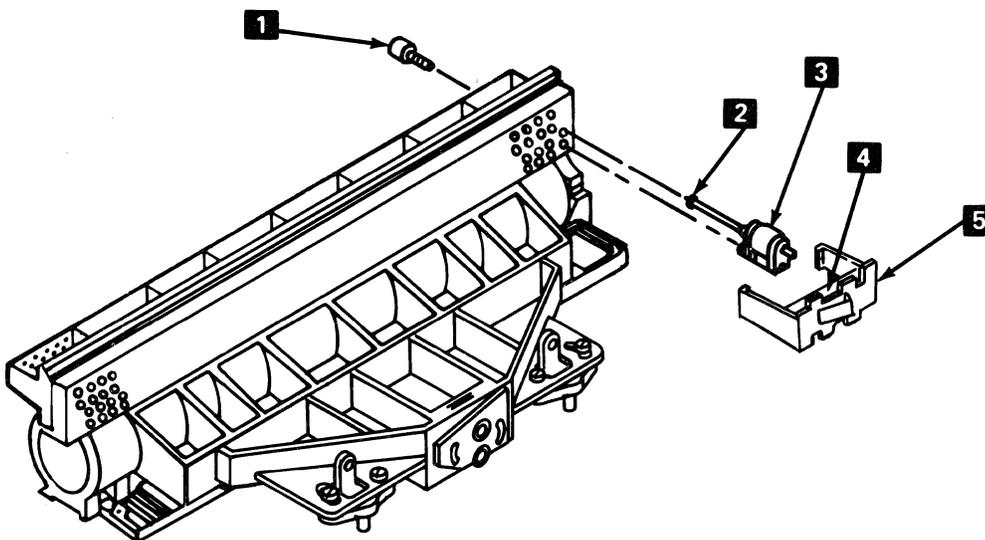
End of procedure.

Service Check**Guide Block**

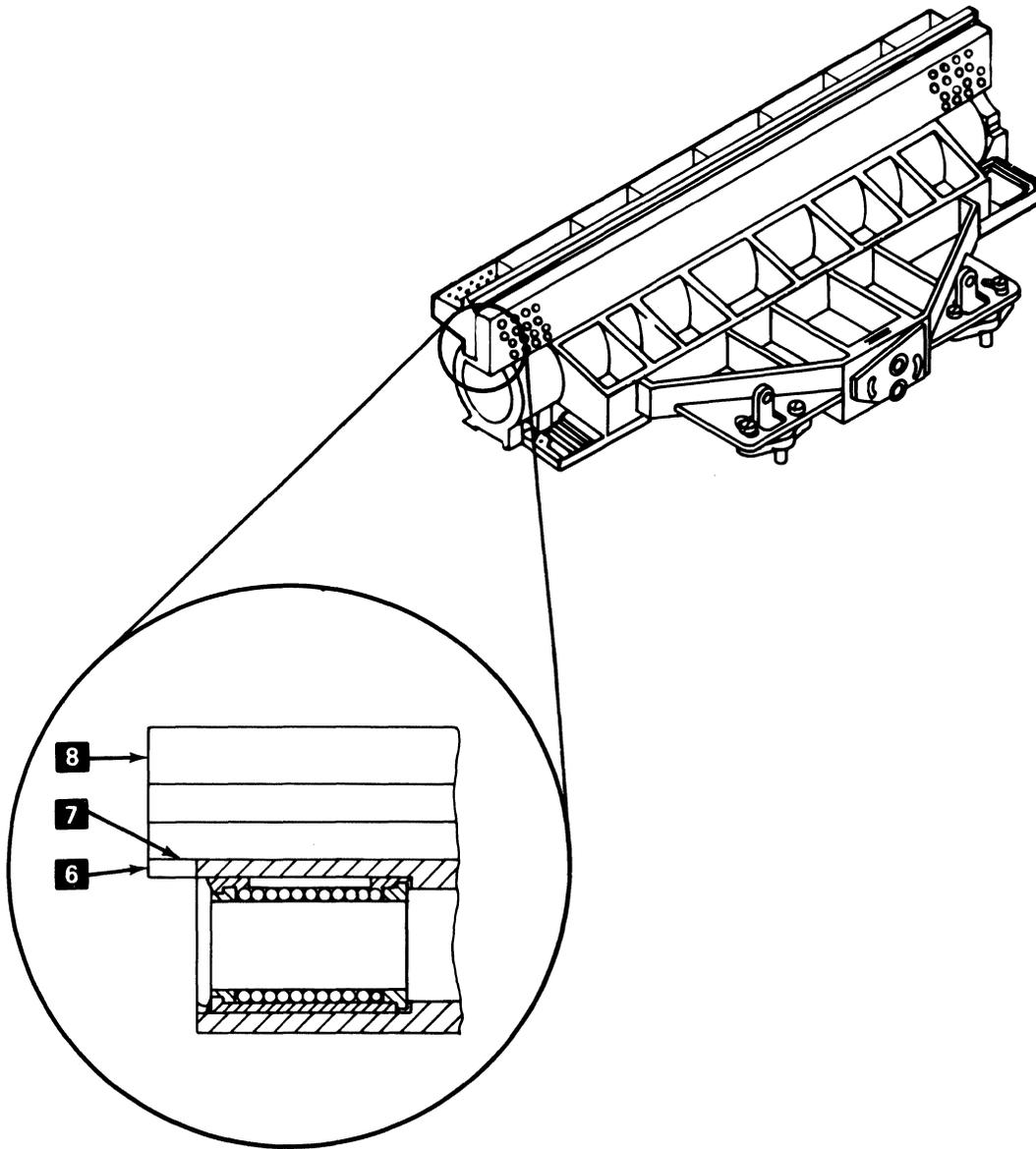
Make sure you have no clearance between the guide and the carrier.

Guide Block Adjustment

1. Loosen all of the actuator screws, but do not remove the actuators.
2. Remove any foreign material between the guide **8** and the carrier **6**.
3. Reseat the guide and make sure the clearance **7** does not exceed .030 mm (.001 in).
4. Tighten the actuators (3308).



3308 Print Actuator (Continued)



3309 Leadscrew Bushing

Service Checks

1. Switch off the power.
2. With the actuator carrier **14** out of the "home" position, left to right movement should not occur in the carrier. The leadscrew must be held in position when checking for carrier movement.
3. Turn the leadscrew to check for binds.

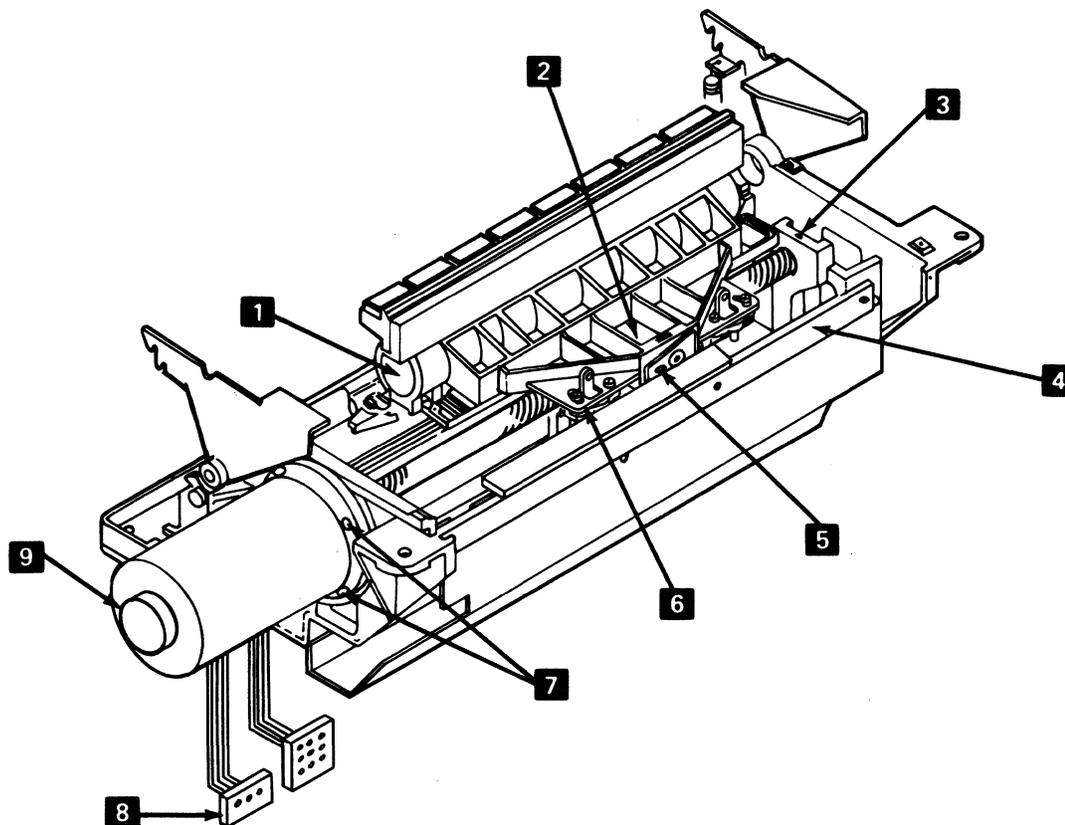
Removal

1. Switch off the power.
2. Open the left end cover (1005).
3. Switch off the ac circuit breaker.
4. Open the top cover.
5. Remove the left end cover, if necessary.
6. Open the forms feed assembly and remove the forms.
7. Remove the ribbon and ribbon drive unit (3802 and 3804).
8. Remove the linear encoder (3303). Removing the LEM amplifier assembly is not necessary.

9. Open the logic gate and disconnect the drive motor cables **8**.
10. Remove the large access panel that fits around the actuator carrier drive motor.
11. Turn the hand wheel **9** to move the actuator carrier away from the home position.

Warning: Ensure that the linear encoder has been removed.

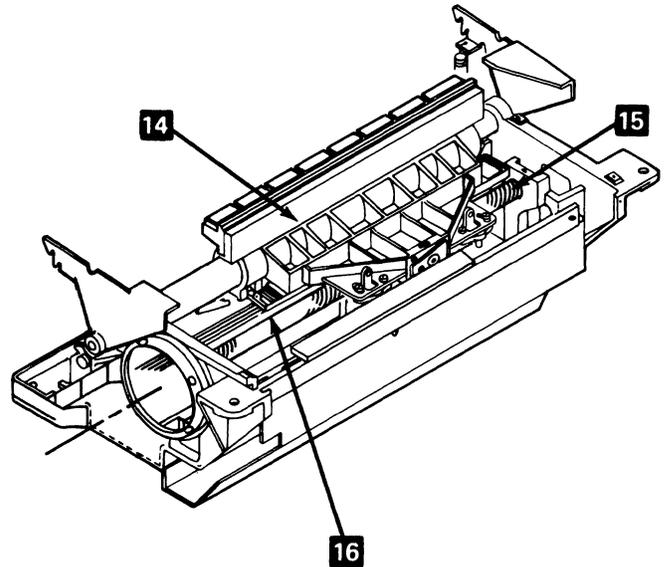
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12. Remove the four mounting screws that fasten the actuator carrier **2** to the support **6**.
 13. Loosen the mounting screws for the vertical bearing assembly **5**.
 14. Remove the track **4**. The actuator carrier will now pivot around the shaft **1** and can be lifted up from the rear to permit enough space to remove the leadscrew and support.



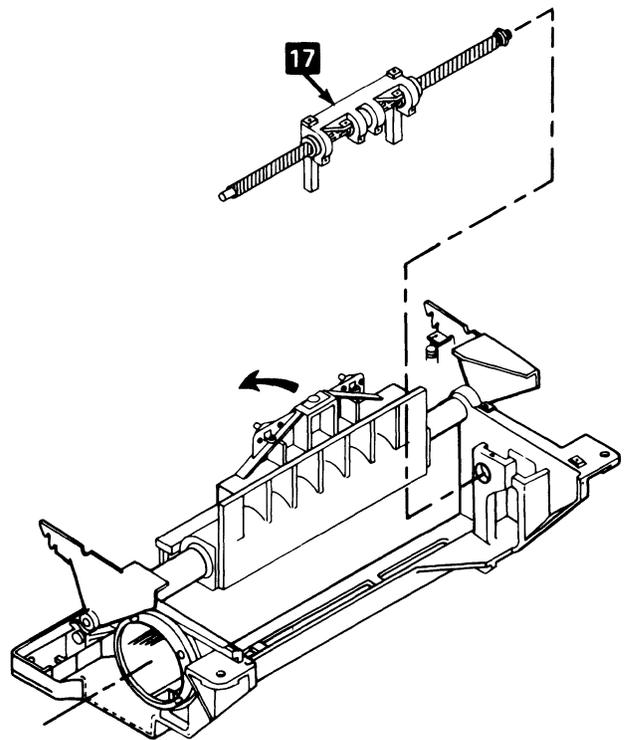
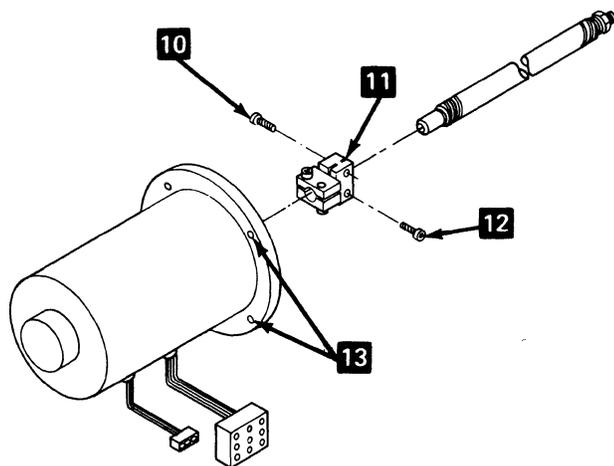
3309 Leadscrew Bushing (Continued)

15. Loosen the screw **12**.
16. Remove the screws **10** and **12** from the leadscrew side of the coupler. Insert the tip of the large screwdriver at **11** and open the coupler slightly to free the leadscrew.

Warning: When the leadscrew and motor are separated in the next step, you must support the leadscrew while removing the motor. If the leadscrew is permitted to drop, it could damage the bearing on the right end or bend the leadscrew.



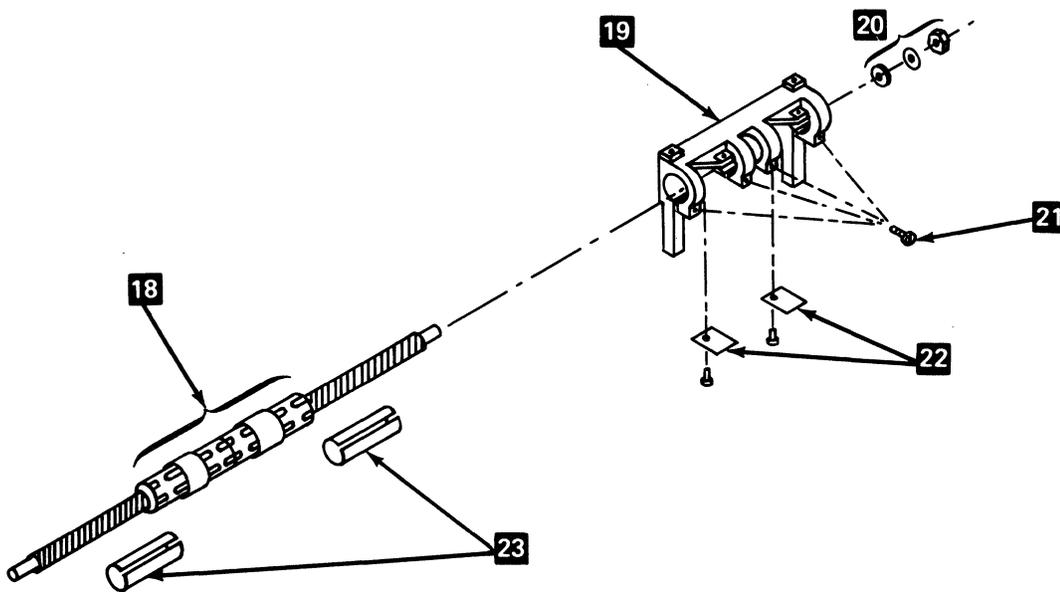
17. Remove the four mounting screws **13** that fasten the motor to the casting. Pull the motor and coupler free of the leadscrew and remove the motor and coupler.
18. Tilt the actuator carrier **14** forward, and pull the leadscrew and support **16** to the left until the bearing on the right end is clear of the casting at **15**.
19. Lift the leadscrew and support **17** up and to the right to clear the actuator carrier.



3309 Leadscrew Bushing (Continued)

20. Remove the plastic stops **23** (Models 2, 3, and 4 only).
21. Remove the nut, washer, and bearing **20**.
22. Remove the four clamp screws **21**.
23. Remove the two bushing springs **22**.
24. Slide the support **19** off the right end of the leadscrew.
25. Remove the four nuts and two bushings **18** by twisting the leadscrew.

End of procedure.



3309 Leadscrew Bushing (Continued)

Reinstall

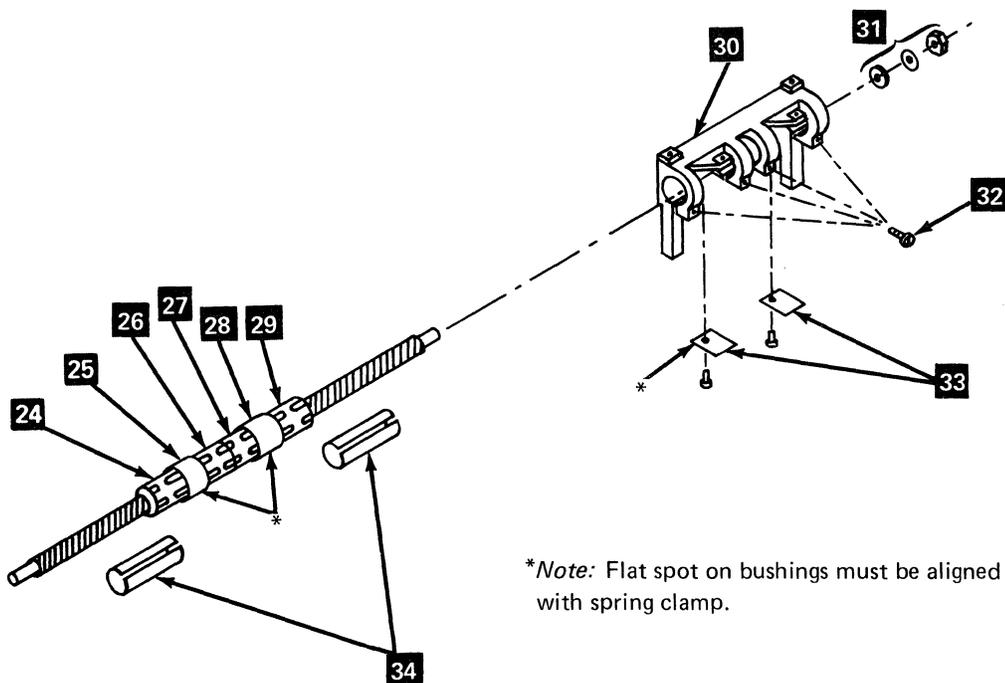
1. Thread the four nuts **24**, **26**, **27**, **29** and two bushings **25** and **28** on the leadscrew as shown. Position them near the center of the leadscrew.
2. Using hand pressure only, tighten the two center nuts **26** and **27** against each other by twisting them in opposite directions.
3. Tighten nuts **24** and **29** in a similar way to hold the bushings **25** and **28** tight between the nuts.
4. Slide the support **30** in place, and position it so that the springs **33** will be square on the flat spot on the bushings **25** and **28**.
5. Insert the clamp screws **32**, and the spring screws **34**. Tighten all six screws finger tight.

6. Check the nuts and bushings to ensure that they are still tight. You should not have any horizontal movement of the bushings. Now tighten the clamp screws **32** and the spring screws **34**.

Note: The nuts permit the use of a wrench for tightening. However, if the nuts are too tight the actuator carrier will bind on the leadscrew. The support should move the length of the leadscrew with no binds.

7. Reinstall the plastic stops **35** (Models 2, 3, and 4 only).
8. Install the bearing, washer, and nut **31** on the leadscrew.

3309 Leadscrew Bushing (Continued)



9. Tilt the actuator carrier up and install the leadscrew and support. The bearing will seat in the casting **39** without force if it is aligned correctly.
10. Guide the left end of the leadscrew **36** into the coupler on the drive motor **43**, and fasten the motor to the casting with the four mounting screws.

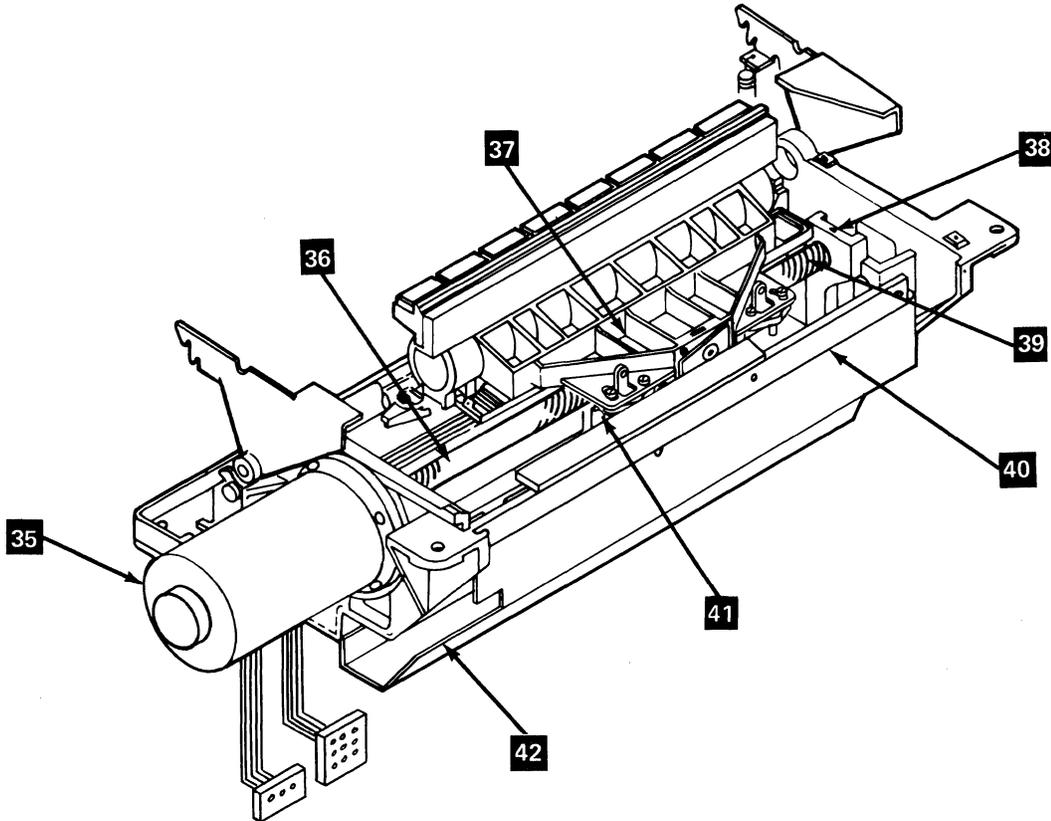
Note: The end of the leadscrew must touch the end of the motor shaft inside the coupler.
11. Tighten the screws in the coupler. All four screws must be tight to prevent the leadscrew from slipping.
12. Tighten the screw **38**, but do not distort the bearing's outer ring.
13. Install the four mounting screws that fasten the actuator carrier **37** to the support **41**. Push the actuator carrier toward the forms; then tighten the four mounting screws.
14. Put a light covering of IBM #6 oil on the leadscrew and move the carrier back and forth several times to ensure correct lubrication, and to check for binding of the leadscrew. If you detect any binds return to step 6 and readjust.
15. Install and adjust the track **40**.
16. Complete all of the actuator carrier adjustments (3306).
17. Reinstall and adjust the linear encoder (3303).
18. Reinstall the safety cover over the encoder/amplifier assemblies **42**.
19. Reinstall the access panel.
20. Plug in the drive motor cables.
21. Reinstall the ribbon and ribbon drive assembly (3802 and 3804).
22. Complete the platen-to-printer actuator adjustment service check described in section 3402.

3309 Leadscrew Bushing (Continued)

- 23. Load the forms and close the forms feed assembly.
- 24. Close the logic gate.
- 25. Switch on the ac circuit breaker.
- 26. Close and fasten the left end cover (1005).

- 27. Switch on the power.
- 28. Close the front and top covers.
- 29. Set the mode switch to the "Test" position, and run the test routines to verify correct operation.

End of procedure.



3310 Actuator Carrier Bushing

Removal

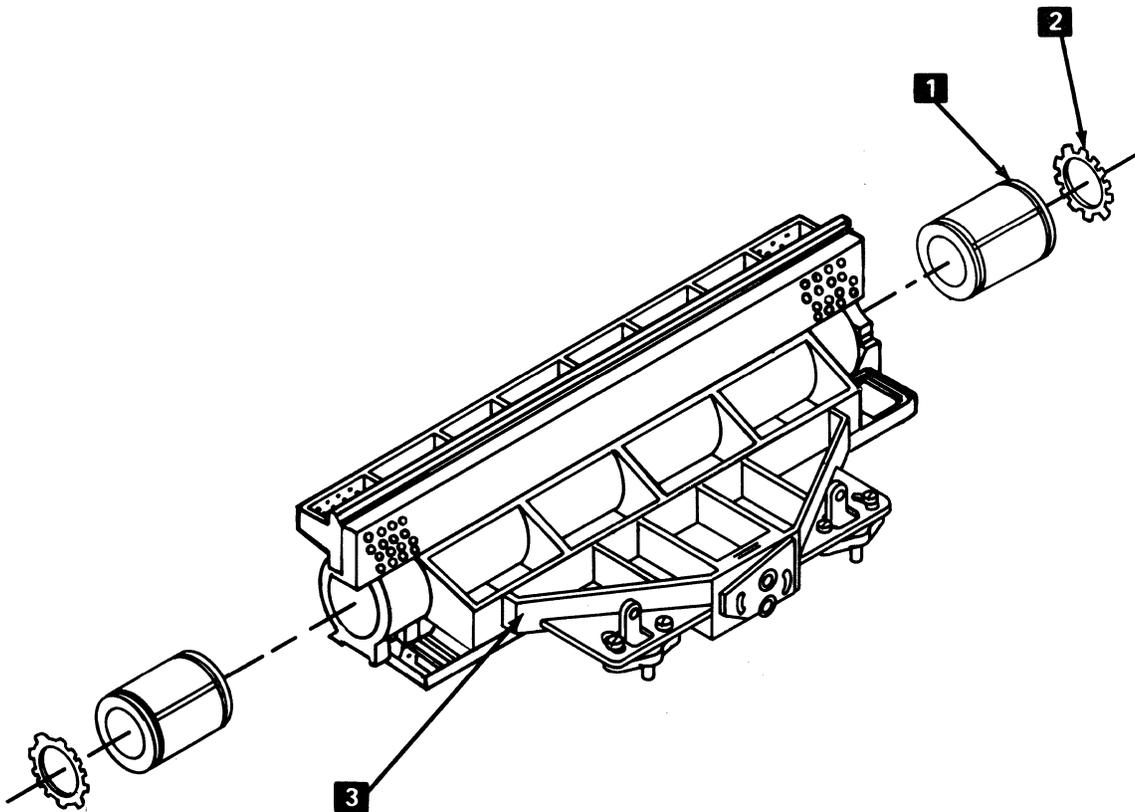
Note: These bushings are not replaceable on the Model 1.

1. See "3306 Actuator Carrier" and perform the complete removal procedure.
2. Use a small screwdriver to release the ring keepers **2** from the actuator carrier **3**.
3. Slide the bushings **1** out of the actuator carrier.

End of procedure.

Reinstall

1. Slide the bushings **1** into the actuator carrier as far as they will go.
2. If new bushings are installed, new keepers must be used. Insert the ring keepers **2** into the actuator carrier **3** as far as they will go.
3. See "3306 Actuator Carrier" and perform the reinstall procedure.



3400 Forms Mechanism

3401 Description

Forms are moved by two pinfeed tractors **3** and **5** located above the print line. Loosening the clamping screws **2** and **6** on the tractor permits separate tractor adjustment to take forms widths from 76.2 mm (3.0 in) to 450 mm (17.7 in). Left tractor movement is limited by the clip **4**. A horizontal vernier knob **8** supplies the fine adjustment left or right. The range of the vernier adjustment is approximately 12.7 mm (0.50 in.).

The vertical adjustment knob **7** positions the forms for first print line.

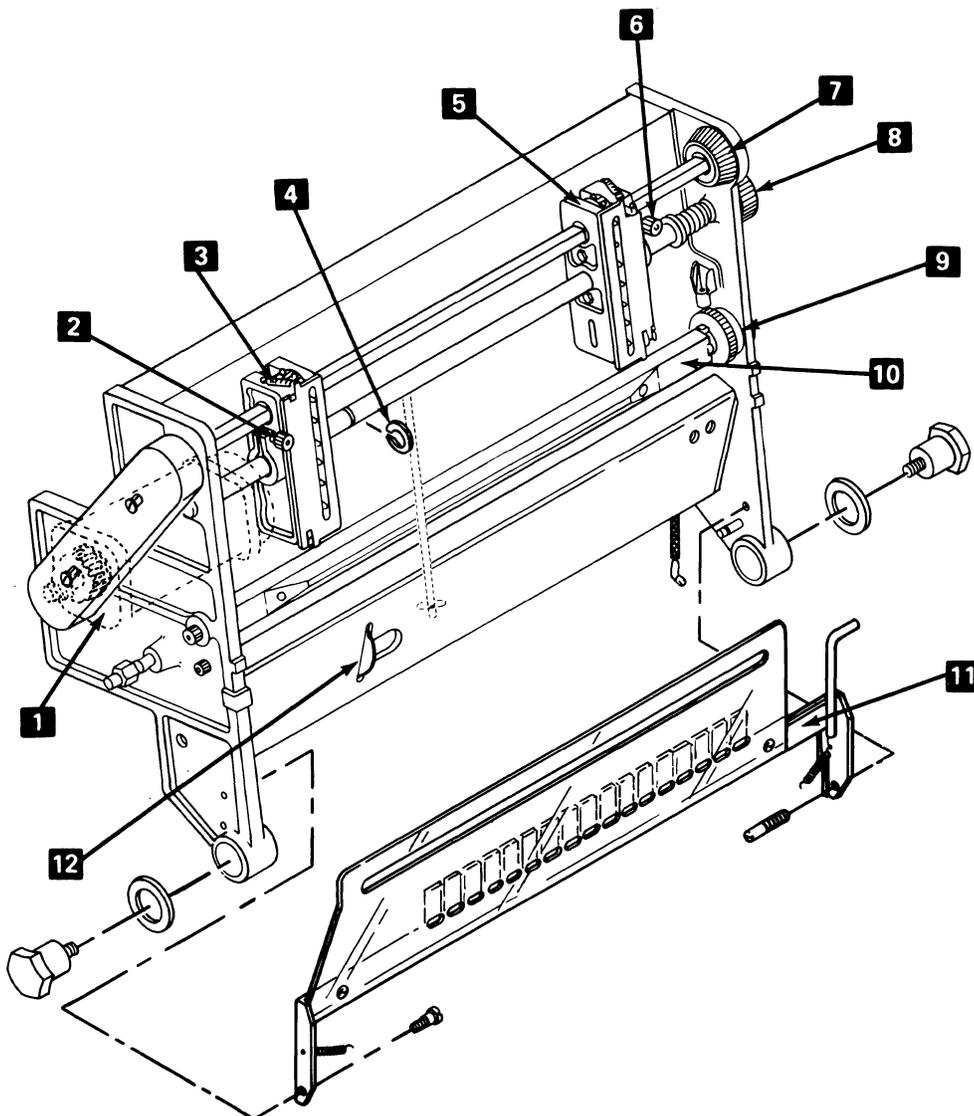
The forms thickness cam **9** changes the distance between the platen **10** and the print actuators to permit using multipart forms. Each notch on this cam changes the distance by approximately 0.0254 mm (0.001 in).

Note: The forms thickness switch (not shown) is located behind the lower support and is operated by the cam **9**. See MAP 4000 for information on the operation of the switch.

The drag assembly **11** is spring loaded and holds the forms against the bottom support to maintain print quality.

The forms drive motor **1** has a two track optical encoder attached to the motor shaft inside the housing. This encoder permits forms movement in half degree steps. Forms spacing of 0.176 mm (0.0069 in) steps is under host control. One line space at 6 lines per inch is 48 emitter steps.

The end-of-forms (EOF) emitter **12** will stop printing on EOF or forms jam.



3402 Forms Feed Assembly

The forms feed assembly has four service checks and adjustment procedures. All four procedures must be performed in the sequence listed whenever the forms feed assembly is adjusted:

- A. Left to right play adjustment
- B. Endplate to print assembly adjustment
- C. Platen to print actuator adjustment
- D. Forms drag assembly

Service checks for the forms feed assembly are located at the start of the controlling adjustment procedure.

A. Left to Right Play Adjustment

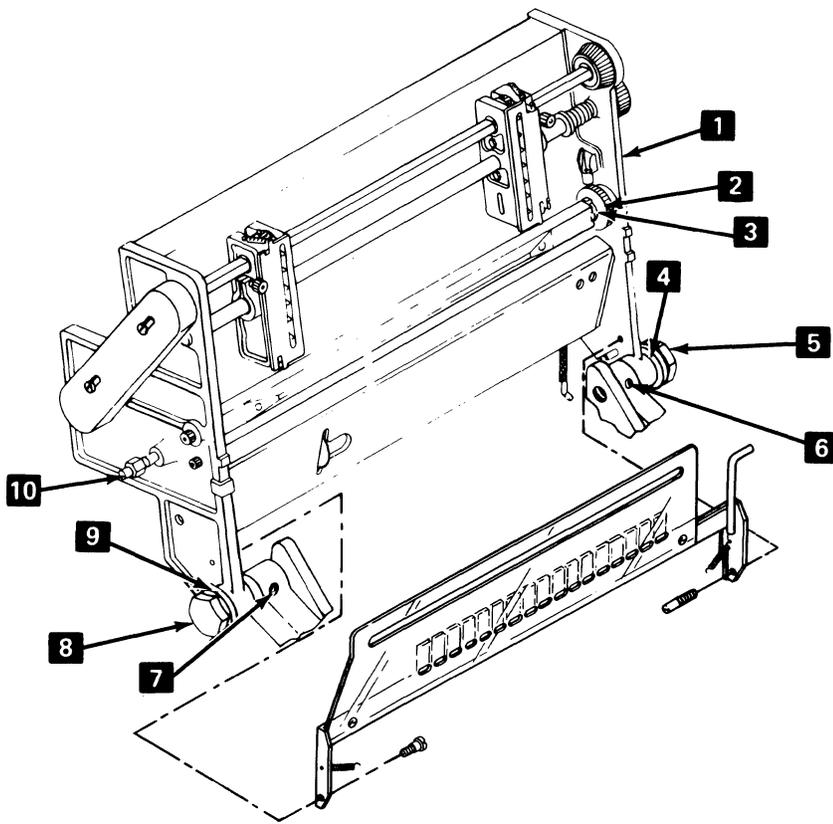
Service Checks

1. With the actuator carrier off the ramp, turn the forms thickness cam **2** from 25 to 0 and ensure that the pivot bolts are not binding. The cam follower spring should hold the follower tight against the cam **3** through the total cam rotation, from 25 to 0.
2. Ensure that both forms feed latches do not bind on the pivot, and are fully seated behind the eccentrics **1** and **10** when fastened. If the check is not successful, complete the 3306 service check.
3. Open the forms feed assembly.
4. Make sure that you do not have any left to right movement in the forms feed assembly caused by loose pivot bolts **5** and **10**. If the check is not successful, complete the 3306 service checks.
5. Release both latches and verify that the side play setscrews **6** and **7** in the print assembly casting, are not binding the forms feed assembly as it pivots to the rear.

Adjustment Procedure

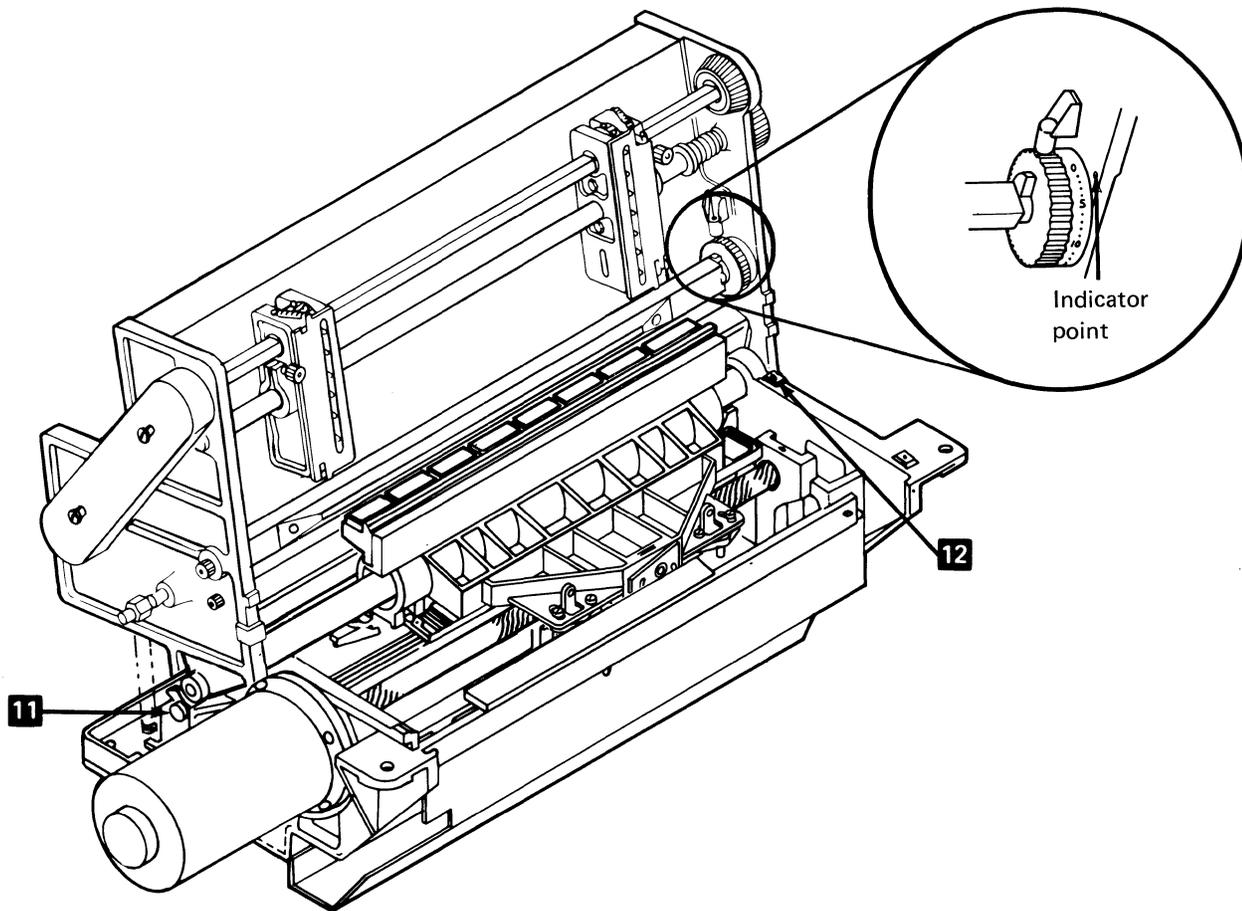
1. Switch off the power.
2. Open the top cover.
3. Open the forms feed assembly.
4. Loosen the side play setscrews **11** and **12** that hold pivot bolts **5** and **8**.
5. Turn the right pivot bolt **5** counterclockwise 180°.
6. Turn the left pivot bolt **8** clockwise until the washer **9** cannot be turned with your fingers. Now, turn the pivot bolt counterclockwise just enough to permit the washer to be turned with finger pressure.
7. Repeat step 6 on the right pivot bolt **5**.
8. Tighten the side play setscrews **11** and **12** on both bolts.

3402 Forms Feed Assembly (continued)



9. Check the adjustment as follows:
 - a. Make sure that you do not have any movement right to left in the assembly.
 - b. Close and latch the assembly.
 - c. Turn the knob on the actuator carrier drive motor to move the actuator carrier out of the "home" position.
 - d. Turn the forms thickness adjustment cam **2** to 25.
 - e. Turn the forms thickness cam back to 0. You should not have any space between the cam **3** and the cam follower at any point in the turning of the cam (from minimum to maximum form thickness adjustment).
 - f. If the follower does not follow the cam freely, the assembly is binding. Return to the service checks in this section.
 10. Adjust the side play setscrews **11** and **12** to just touch the forms feed assembly endplates. The setscrews should not bind the forms feed assembly when the latches are released.
 11. Perform the service checks in this section if any adjustments were made.
 12. Install the forms.
 13. Close and latch the forms feed assembly.
 14. Close the top cover.
 15. Switch on the power to return the actuator carrier to the "home" position.
 16. Set the mode switch to position 7 and press start to verify vertical alignment.
- End of procedure.

3402 Forms Feed Assembly (continued)

**B. Endplate To Print Assembly Adjustment**

Note: Adjustments A, B, and C must be completed in sequence.

Service Check

Make sure 3402A service check has been completed before doing the 3402B service check.

See the figure on the next page.

Set the forms thickness cam **3** to 0 and move the actuator carrier to the right of center. Use a thickness gauge to check the space at **16** and **19**. The acceptable space is 0.05 mm (.002 in) to 0.1 mm (.004 in).

Adjustment Procedure

1. Switch off the power.
2. Open the top cover.
3. Open the forms feed assembly.

4. Remove the ribbon (3802).
5. Turn the knob on the actuator carrier drive motor to move the carrier out of the "home" position.
6. Set the forms thickness cam **15** to 0.
7. Close and latch the assembly.

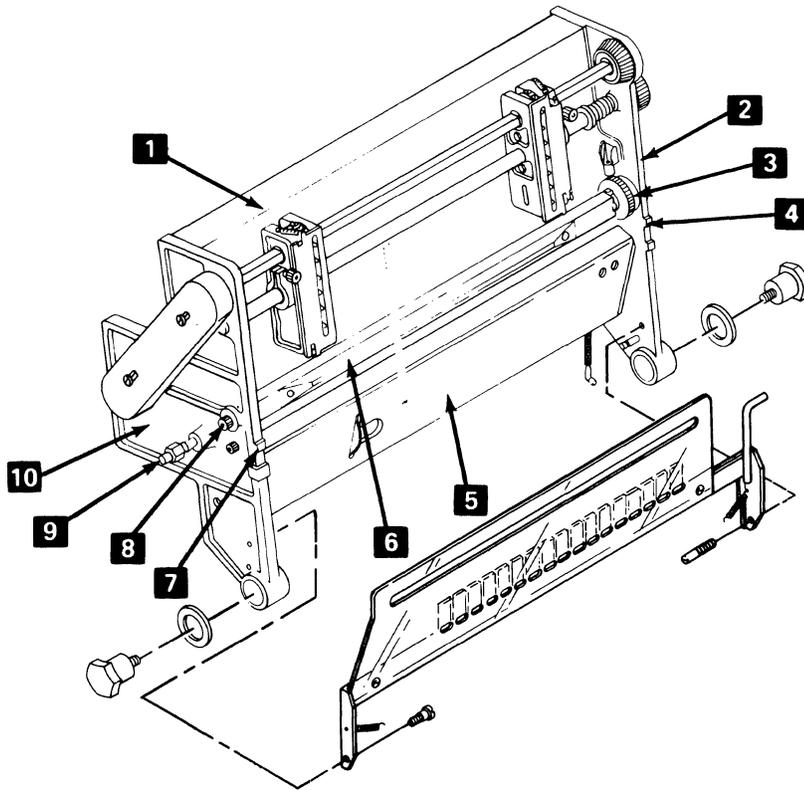
Note: Do not loosen the locking nut on the eccentric when performing the adjustment in the next two steps.

8. Turn the eccentric **21** until you have a light drag on a 0.1 mm (.004 in) thickness gauge inserted between the endplate and the printer assembly at **19**. Tighten the locking nut, if necessary. The acceptable adjustment range is 0.05 mm (.002 in) to 0.1 mm (.004 in).

Note: If you cannot obtain the correct adjustment in steps 8 and 9, perform steps 10 through 23. If the adjustment made in steps 8 and 9 is correct, *do not* perform steps 10 through 23.



3402 Forms Feed Assembly (continued)



9. Repeat the preceding step on the right endplate. Adjust the eccentric and measure the space at **18**. Tighten the locking nut, if necessary.
10. Open the forms feed assembly.
11. Disconnect one end of the forms feed assembly latch return springs on both the right and left latches.
12. Tape the latches open so that they cannot contact the eccentrics when the forms feed assembly is closed in step 17.
13. Ensure that the forms thickness cam is set at 0.
14. On the right endplate **14** loosen the five screws that fasten the top support **13**.
15. Loosen the screw that goes through the endplate, forms thickness cam, and into the right end of the platen **14**.
16. Loosen the two screws in the right endplate that fasten the bottom support **17**.
17. Open and close the forms feed assembly, and then hold it closed by hand with **16** and **19** seated against the printer casting.
18. Tighten the screws in the endplate for the upper support **13** and the lower support **17**.
19. Open the forms feed assembly.
20. Remove the tape from the latches.
21. Connect the return springs to both latches.
22. Close the forms feed assembly.
23. Check the space at **16** and **19**. If necessary, repeat steps 8 and 9 to obtain the correct space.

Note: Always check to ensure the cam follower on the forms thickness cam **3** is not binding.

3402 Forms Feed Assembly (Continued)

24. See the following procedure, "Platen to Print Actuator Space (3402C)" for the platen adjustment.

End of procedure.

C. Platen To Print Actuator Adjustment

Note: Adjustments A, B, and C must be completed in sequence.

Service Check

Make sure 3402A and 3402B have been completed before starting 3402C.

1. Switch off the power.
2. Remove the forms and the ribbon.
3. Remove the ribbon shield (3807).
4. Remove the actuator fan cover.
5. Close the forms feed assembly.
6. Move the actuator carrier to the right until the left end of the actuator carrier is 76 ± 2 mm from the inside surface of the forms feed assembly left side frame. Mark the platen with a pencil for future reference.

Note: Ensure that the forms thickness cam is set to 0.

7. A .30 mm (.011 in.) thickness gauge should easily pass between the tip of each actuator and the platen.

Note: The closer the adjustment is to .30 mm (.011 in.), the better the ribbon life will be.

8. Check the space with a .40 mm (.016 in.) gauge. You should have less than .40 mm (.016 in.) space between each actuator tip and the platen.
9. Move the actuator carrier to the right until the right end of the carrier is 110 ± 2 mm from the inside surface of the forms feed assembly right side frame.

10. Perform service check steps 7 and 8 on this end of the platen.
11. If the space is correct, reinstall the fan cover, the ribbon shield, the ribbon, and the forms.

Adjustment

1. Switch off the power.
2. Open the top cover.
3. Open the forms feed assembly.
4. Remove the ribbon (3802).
5. Remove the ribbon shield.

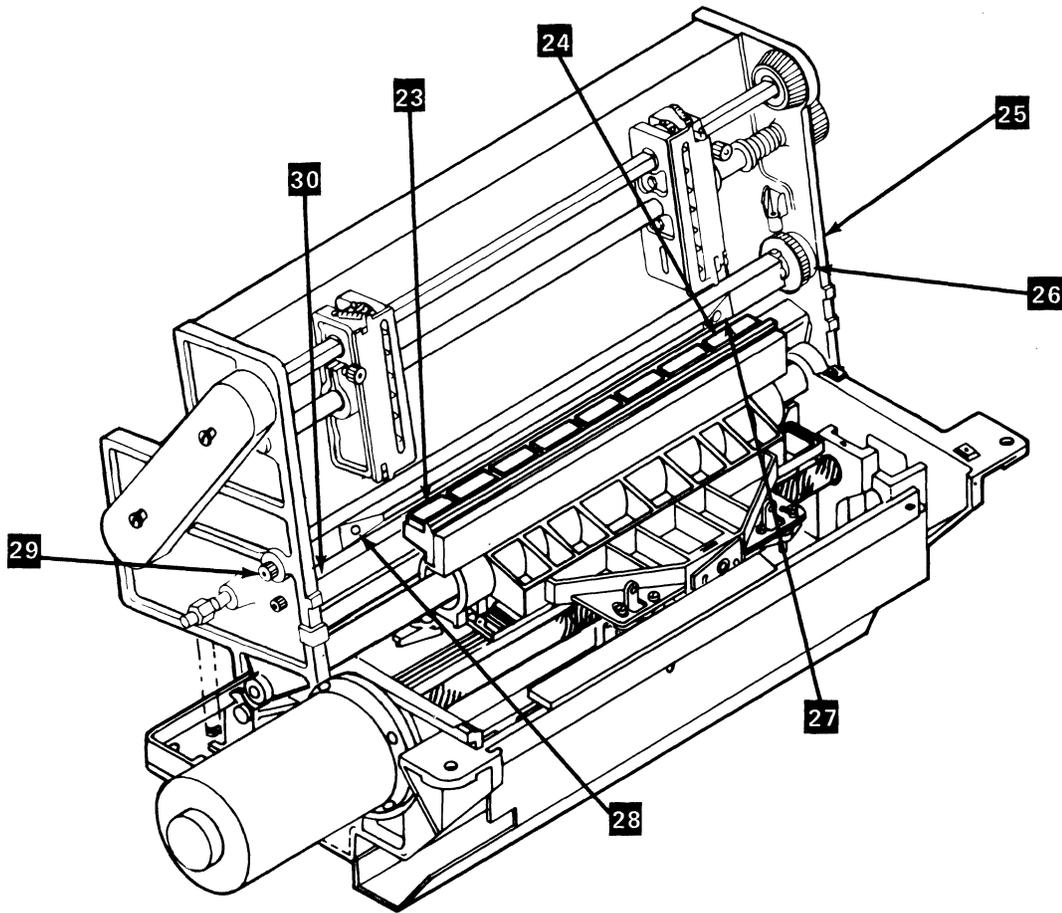
Note: The ribbon shield is taped to the drag assembly and the entire drag assembly must be removed.

6. Disconnect the springs from the drag assembly, and remove the left mounting screw. Move the left end of the drag assembly away from the end plate, and slide the assembly free of the right mounting stud.
7. Remove the fan cover.
8. Loosen the platen left mounting screw **29** about three turns.
9. Check the gap between the left end of the platen and the left side frame **30**. If the gap is greater than 0.2 mm (0.008 in), the platen must be shimmed, below 0.2 mm (0.008 in) no shims are required. Order shims, part 4468601 for 0.18 mm (0.007 in) and part 4468602 for 0.35 mm (0.014 in), as necessary.

Remove the left mounting screw **29**. Place as many shims as will go easily into the gap **30**. Reinstall the left mounting screw **29**, leaving it loose as in step 8 above.

10. Loosen the platen right mounting screw **25**.
11. Close and latch the forms feed assembly.

3402 Forms Feed Assembly (Continued)



12. Set the forms thickness cam **26** to 0.

Warning: The platen adjusting screws should be turned alternately and equally to prevent parts damage.

Note: Ensure that the forms thickness cam follower is against the cam before making the following adjustments.

13. Move the actuator carrier to the right until the left end of the carrier is 76 ± 2 mm from the inside surface of the forms feed assembly left side frame. Mark the platen with a pencil for future reference.

14. Place a .30 mm (.012 in) thickness gauge at **23**, between the first two print actuators on the left end of the carrier and the platen. Move the platen toward the actuators by turning the allen head adjusting screw **28** counterclockwise until you have a light drag on the thickness gauge; then tighten the screw **29** to hold the platen in place.
15. Move the actuator carrier to the right, by hand, until the right end of the carrier is 110 ± 2 mm from the inside surface of the forms feed assembly right side frame. Mark the platen with a pencil for future reference.
16. Repeat step 16 between the print actuators and the platen at **24**. Fully tighten the screw at **25**.
17. Move the actuator carrier to the left end position described in step 14, and check the space at **23** to ensure it is still correct; then fully tighten the screw **29**.

3402 Forms Feed Assembly (Continued)

18. Check the platen to print wire space by moving a .25 mm (.010 in.) thickness gauge down the length of the platen between the platen and the print wires. If the .25 mm gauge will clear the wires, use a .40 mm (.016 in) gauge and check at each actuator to ensure a gap of less than .40 mm. The adjustment is correct if the .25 mm will fit, and the .40 mm does not fit. If the adjustment is correct, skip to step 29. If the adjustment is incorrect, reset the platen or adjust each actuator as described in the following steps, 19 through 27.
19. If any actuators do not meet the gap requirements of step 18, each actuator may be adjusted instead of resetting the platen. Determine which actuators should be adjusted, and if they should be closer or farther from the platen.

Note: The closer the actuators are to the platen, the better ribbon life will be; but they must not be closer than .25 mm (.010 in.).
20. Open the forms feed assembly.
21. If the top actuators must be adjusted, remove the front oil housing (3307).
22. Loosen the actuator mounting screw.
23. To move an actuator closer to the platen, apply vertical pressure to the back of the actuator (downward for a top actuator, upward for a bottom actuator) while tightening the mounting screw.

Note: Unhooking the rear oiler and moving it back slightly to adjust the actuator may be necessary. After tightening the mounting screw, push the rear oiler to its locked on position.
24. To move an actuator farther from the platen, use light vertical pressure to the back of the actuator (upward for a top actuator, downward for a bottom actuator) while tightening the mounting screw.
25. If any of the front oilers were removed, reinstall them (3307).
26. Close the forms feed assembly.
27. Check the gap of the adjusted actuators (step 20).
28. Reinstall the ribbon shield or drag assembly.
29. Reinstall the fan cover.

30. Reinstall the ribbon (3802) and single part forms.
31. Close the top cover.
32. Switch on the power to return the actuator carrier to the "home" position.
33. Set the mode switch to the "Test" position and press start to verify print quality.

End of procedure.

Dynamic Check

In addition to the service checks outlined in this section (3402), the following service check will help you determine whether this area requires more attention.

1. Place the print mode selector switch in position 6 for ripple print.
2. Load single-part paper and set the forms thickness cam to position 0.
3. Bypass the cover interlock. Refer to "1009 Cover Switch Override."
4. Start the test. While the printer is running, carefully move the forms thickness cam to a higher number, one click at a time, until the print is no longer visible.

Stop the printer. The visible print should fade out evenly across the page and be completely gone by forms cam setting 10.

If the printing fades on one side of the print paper before the other, the platen is not parallel to the actuators and should be readjusted using the procedure in this section (3402). These adjustments are sequence sensitive and must be done in their entirety.

Removal (Forms Feed)

1. Switch off the power.
2. Open the left end cover (1005), and switch off the ac circuit breaker.
3. Open the back cover.
4. Open the top cover.
5. Release the latches that fit over the eccentrics **32** and **46**, and open the forms feed assembly.

3402 Forms Feed Assembly (Continued)

6. With the assembly open, the rod **31** will extend up through the support. Insert a small allen wrench through the hole in the rod that is now above the support.

Note: In this step do not use the same allen wrench that you will need in step 13 of this procedure.

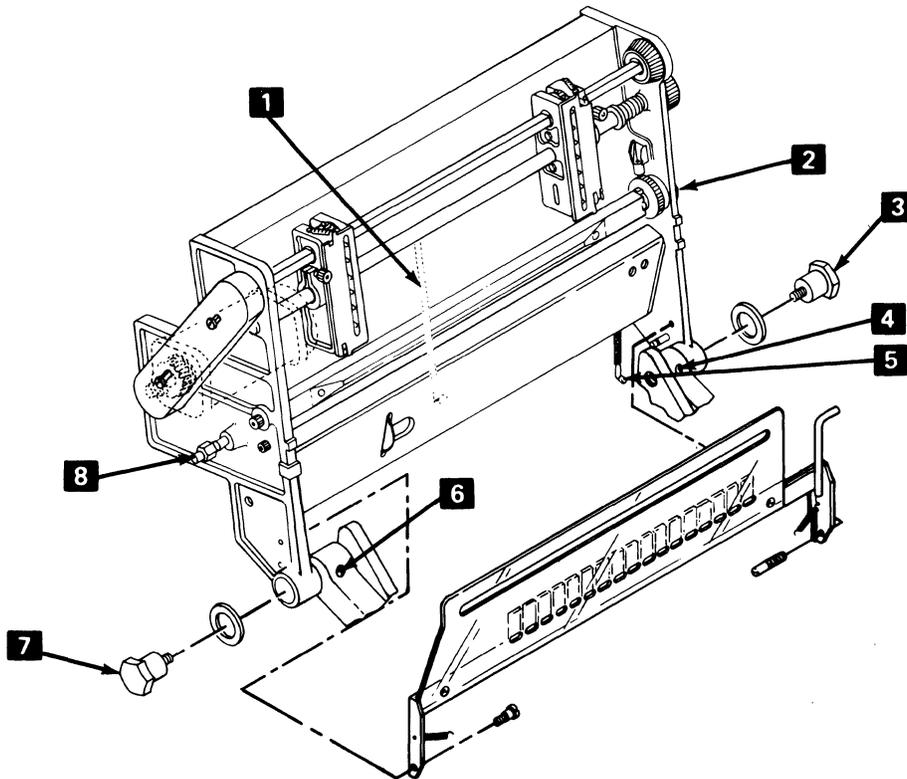
7. Close and latch the assembly. The bottom end of the rod will now be out of the hole in the casting.
8. Pull the bottom of the rod out until it is clear of the machine casting. Removing the rod and spring from the assembly is not necessary.
9. Guide the cable for the forms drive motor through the hole in the access panel and disconnect the plug.
10. Disconnect the forms encoder cable at the motor.
11. Disconnect the ground strap **37** from the frame.
12. Disconnect the end-of-forms sensor cable.
13. Facing the front of the machine, loosen the setscrews that hold the pivot bolts **35** and **44** in

position. The setscrews are located in the base of the casting at **36** and **41**.

Warning: When opening the forms feed assembly in the next step, support the assembly with one hand when the latches are released. Without the rod and spring in position for counterbalance, the forms feed assembly can hit the casting.

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14. Open the forms feed assembly and place it back on the casting; then unscrew and remove the pivot bolts **35** and **45**.
 15. Lift the forms feed assembly clear of the printer.

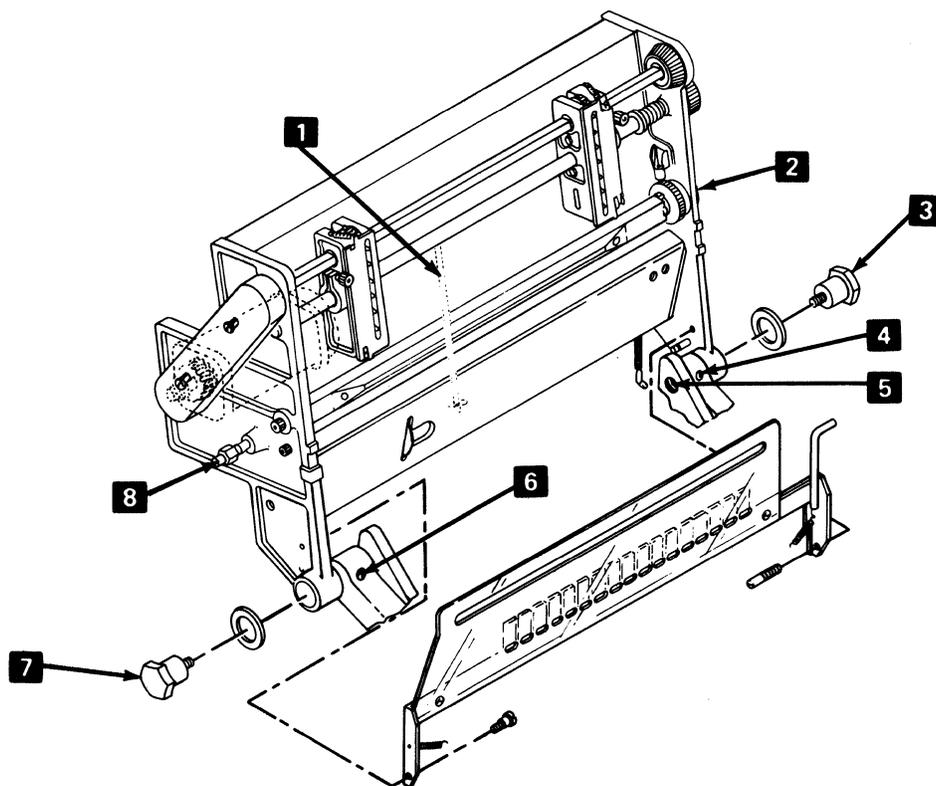
End of procedure.



3402 Forms Feed Assembly (Continued)**Reinstall**

1. Place the forms feed assembly on the casting and insert the pivot bolts **49** and **53** and the washers.
2. Turn the left pivot bolt **53** clockwise until the washer cannot be turned by hand; then, turn the pivot bolt counterclockwise enough to permit the washer to be turned using finger pressure only. Tighten the setscrew **52**.
3. Repeat step 2 on the right pivot bolt **49**, and tighten the setscrew **50**.
4. Close the assembly far enough to insert the bottom of the rod **47** into the hole in the casting. Now, open the assembly all the way and remove the allen wrench from the hole in the top of the rod.
5. Close and latch the forms feed assembly.
6. Connect the forms encoder cable to the forms motor.
7. Connect the EOF cable.
8. Connect the motor cable and guide the plug connection back through the hole in the access panel.
9. Connect the ground wire **51** to the frame.
10. Complete the service checks (3402).
11. Close the back cover.
12. Switch on the ac circuit breaker; then close and fasten the left end cover (1005).
13. Close the top cover.
14. Switch on the power.
15. Set the mode switch to the "Test" position and press start to verify print quality.

End of procedure.



3402 Forms Feed Assembly (Continued)

D. Forms Drag Assembly

Service Checks

1. Switch off the power.
2. Remove the forms.
3. Open the forms feed assembly.
4. Remove springs **57** and **63**, and make sure the drag assembly **60** is not binding on the pivots **58** and **62**.
5. Move the drag assembly **56** forward until it touches the forms feed assembly.
6. Make sure the drag assembly is parallel to the forms feed assembly.
7. All of the fingers should touch the forms feed assembly. Straighten any bent fingers.
8. Make sure the mounting screws **58** and **62** are tight and not worn.
9. Connect springs **57** and **63**.
10. Install single-part forms.
11. Make sure the ribbon shield **55** is installed.
12. Close the forms feed assembly.
13. With the actuator carrier off the ramp position, move the forms thickness setting to 0.
14. Turn the forms vertical adjustment knob to move 2 or 3 pages through the forms feed assembly. The forms tractor holes should not be damaged. If the holes are damaged, too much drag has been put to the forms.

3403 Forms Drive Motor

Service Checks

1. The drive shaft **6** and the pulley **4** should be tight against both sides of the bushing **5**.
2. The drive belt should have approximately 6 mm (.25 in) deflection (630 grams) at the center point between the pulleys. The belt and pulleys should not be worn or have broken or missing teeth.
3. Place the pulley on the drive motor shaft so that the full width of the belt contacts the upper pulley.
4. Turn the forms vertical adjustment knob **7** and check for any free movement.

Adjustments

1. Switch off the power.
2. Open the top cover.
3. Open the forms feed assembly.

Note: The drive belt cover can be removed without removing the holding screws.

4. Remove the drive belt cover **2**.

5. Loosen the two mounting bolts **1**.

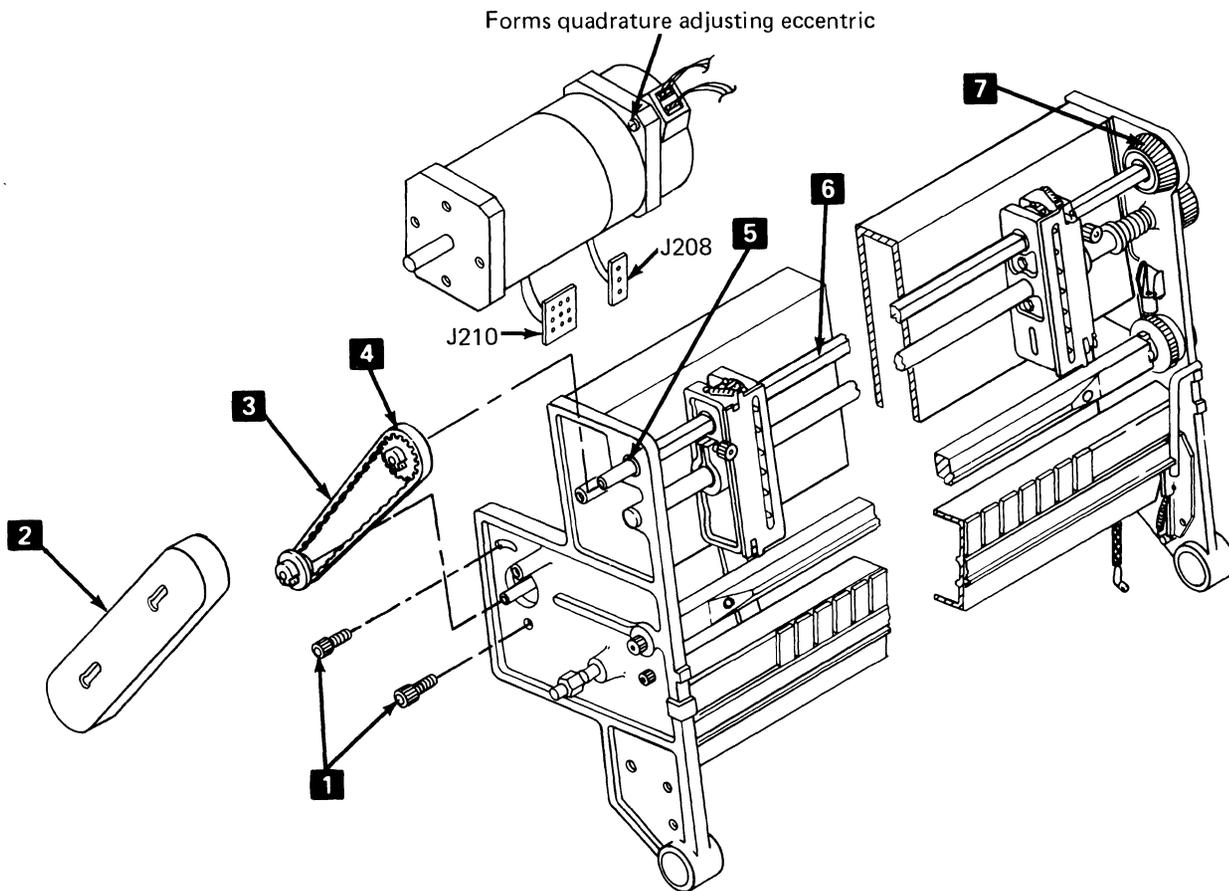
CAUTION

Do not over tighten the drive belt.

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6. Move the motor in the desired direction to obtain 6 mm (.25 in) belt deflection at **3** (center of belt) with 630 grams of force.
 7. Tighten the mounting bolts.
 8. Complete the 3104 adjustments.
 9. Reinstall the drive belt cover.
 10. Close the forms feed assembly.
 11. Close the top cover.

End of procedure.

3403 Forms Drive Motor (Continued)



Removal

1. Switch off the power.
2. Open the rear cover.
3. From the rear of the machine, disconnect the cable assemblies for the drive motor, the forms encoder, and the EOF emitter.
4. Open the forms feed assembly.
5. Remove the drive belt cover **8**.
6. Loosen the two mounting bolts **14** and remove the drive belt **9** and the pulley **15**.
7. While holding the motor with one hand, remove the mounting bolts **14** and the motor **11** from the assembly.

End of procedure.

Reinstall

Note: Ensure that the motor is correctly positioned. The forms quadrature eccentric should be on top. Make sure the smaller pulley is on the drive motor.

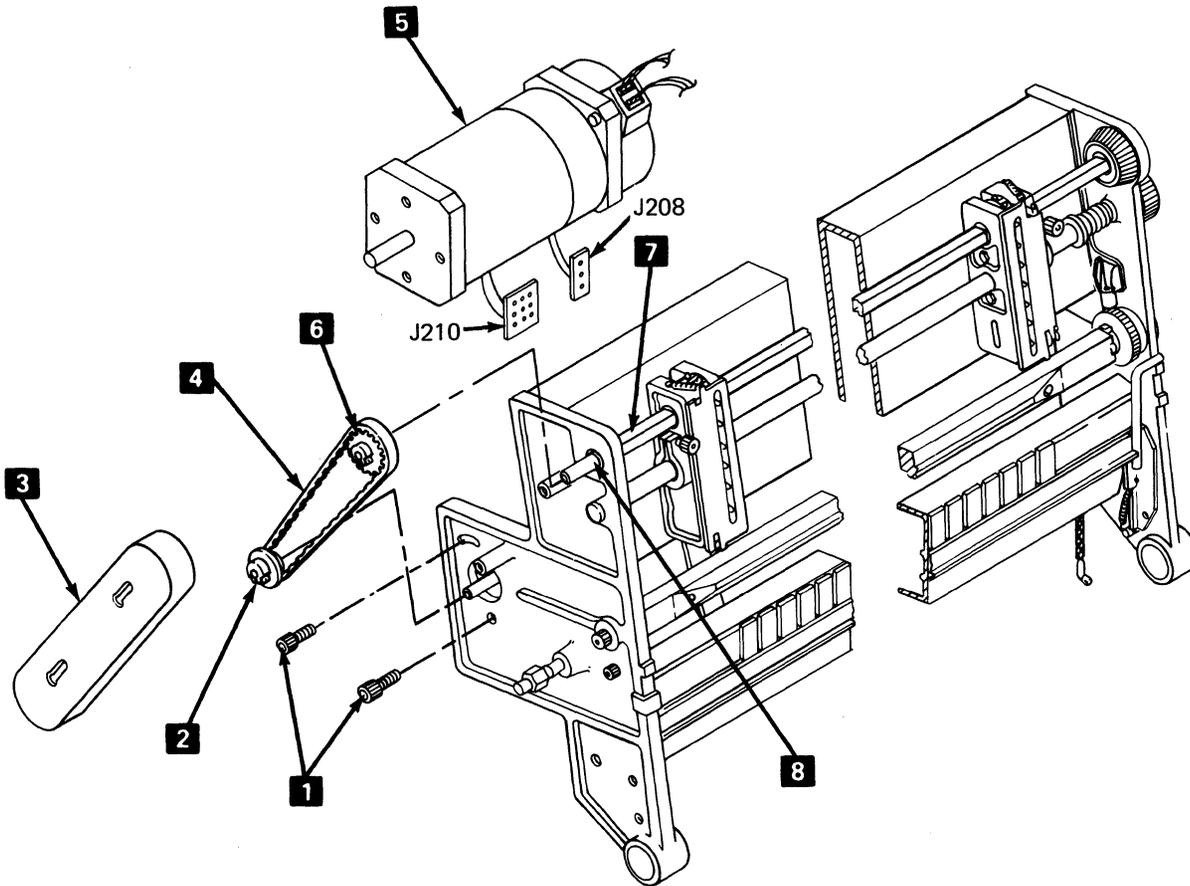
1. Hold the drive motor **11** in place, insert the two mounting bolts **14**, and tighten them finger tight.
2. Reinstall the drive pulley **15** and the belt **9**, but do not tighten the pulley.
3. Move the drive motor until the drive belt has 6 mm (.25 in) deflection in the center, with 630 grams of force.
4. Tighten the mounting bolts.

Note: Ensure that the shaft **12** and the pulley **10** are tight against the bearing **13** before performing step 5.

3403 Forms Drive Motor (Continued)

5. Position the pulley **15** so that the drive belt **9** is engaged along its full width on the upper pulley **10**. Check by turning the drive shaft **12** in an upward direction; then tighten the pulley.
6. Reinstall the belt cover **8**.
7. Close and latch the forms feed assembly.
8. See "3104 Forms Feed Electronic Adjustments" in this chapter, and perform all adjustments.
9. Close the rear cover.

End of procedure.



3404 Forms Drive Encoder Assembly

Service Checks

1. Check if the encoder is loose.
2. Look for dust or dirt on the encoder.
3. Make sure the LED is not rubbing on the transducer assembly.

Removal

1. Switch off the power.
2. Open the rear cover.
3. Disconnect the two cables on the transducer assembly **6**.
4. Remove the three screws and the cover **1**. The dust seal **7** will remain in the cover.

CAUTION

The glass encoder wheel can easily be broken when removing the transducer assembly, and can cause serious injury.

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5. Remove the mounting screw **8** from the transducer assembly.
 6. Pivot the transducer assembly around the eccentric and remove it from the machine.
 7. Loosen the clamping screw in the collar **2**.
 8. Remove the collar **2** and the encoder disk **3** from the motor shaft.

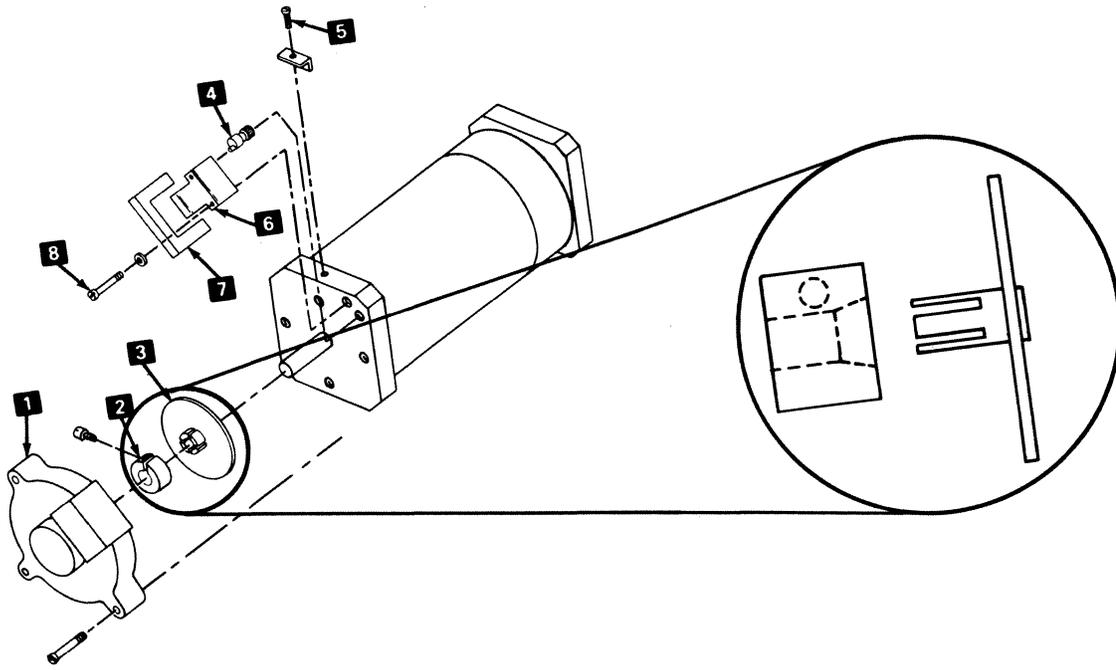
End of procedure.

Reinstall

1. Place the encoder disk **3** and the collar **2** on the motor shaft.
2. Place the transducer assembly **6** on the eccentric **4**.
3. Position the encoder disk on the motor shaft so the transducer assembly can be pivoted clockwise, and the encoder disk will be centered in the slot in the transducer assembly.
4. Secure the transducer assembly with the mounting screw **8**.
5. Rotate the encoder disk to ensure the disk does not touch the transducer assembly on either side; then tighten the clamping screw in the collar **2**.
6. Reinstall the cover and dust collar **1**.
7. Connect the cables to the transducer assembly.
8. See "3104 Forms Feed Electronic Adjustments" in this chapter, and perform all adjustments.

End of procedure.

3404 Forms Drive Encoder Assembly (Continued)



3405 Forms Tractor Drive Shaft

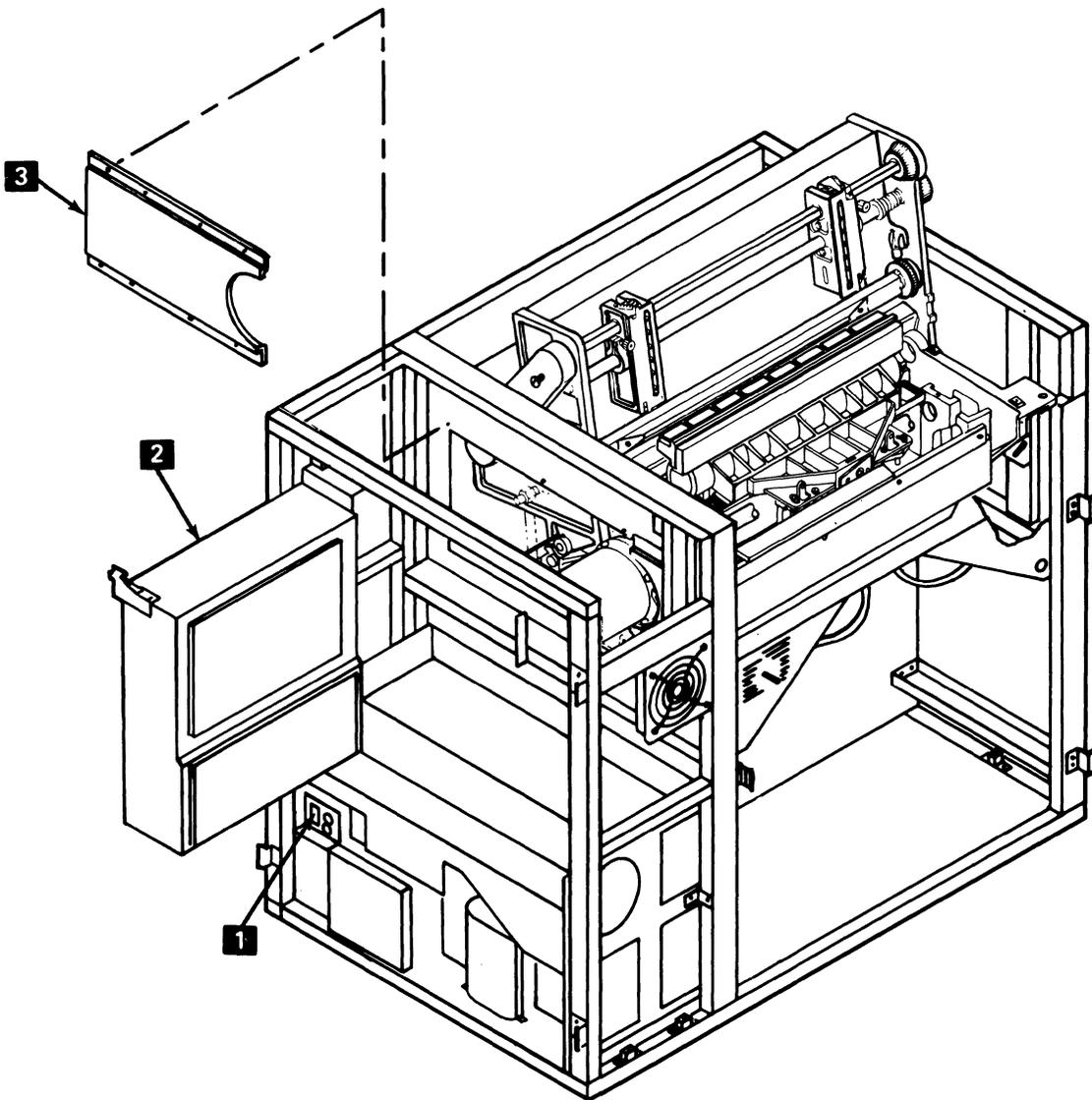
Note: The following procedure is for removal of the rod through the left endplate. However, if the right end of the printer is clear, removing the right end cover and then removing the rod through the right endplate is easier.

Service Checks

1. Turn the thumbwheel **14** and make sure it is not binding.
2. Make sure the two springs are connected to the tractor covers.

Removal

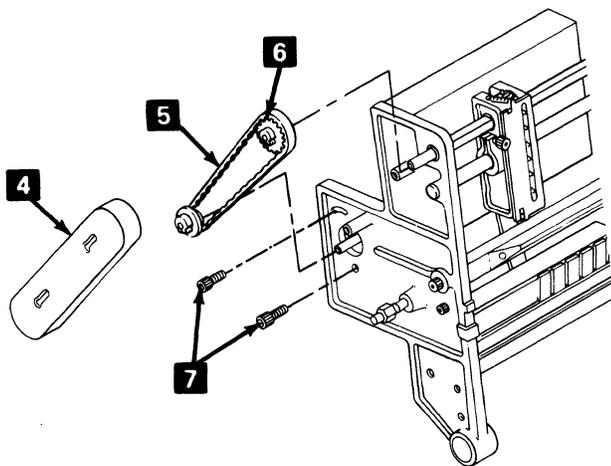
1. Switch off the power.
2. Open the left end cover (1005).
3. Switch off the ac circuit breaker **1**.
4. Open the logic gate **2**.
5. Remove the access panel **3**.
6. Open the forms feed assembly.



3405 Forms Tractor Drive Shaft (Continued)

1. Remove the belt cover **4**.
2. Loosen the mounting bolts **7** and remove the drive belt **5**.
3. Remove the pulley **6** from the drive shaft.
4. Remove the bearing holding screw **8**.
5. Loosen the clamping screws **11** and **13**.
6. Remove the clip **12**.
7. Move the tractors to the right side of the assembly.
8. Slide the shaft **10** to the left until the right end is clear of the endplate **15**; then remove the knob **14**.
9. Remove the shaft through the left endplate **9**.

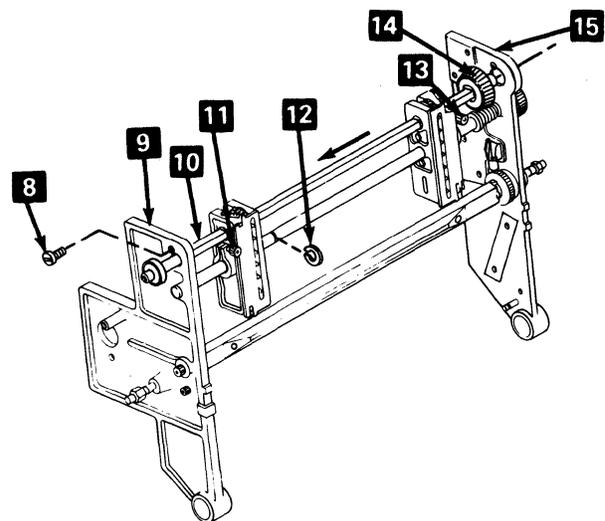
End of procedure.

**Reinstall**

1. Insert the drive shaft **19** through the left endplate **17** and the two tractor assemblies **20**.
2. Slide the knob **21** on to the shaft, and insert the shaft into the bearing in the right endplate **22**. Carefully slide the bearing **18** into the left endplate **17**, and ensure that it is fully seated before performing the next step. The bearings on both ends of the shaft should touch the square part of the shaft.
3. Insert and tighten the holding screw **16**.
4. Slide the left tractor to the left, and install the clip **23**.
5. Slide the pulley **26** on the shaft; then pull the shaft to the left against the bearing, push the pulley hard against the other side of the bearing and tighten the clamp screw.
6. Reinstall the drive belt **25**.

Note: If both pulleys have been removed, be sure you install the smallest pulley on the drive motor shaft.

7. Move the motor to obtain a belt deflection of 6 mm (.25 in) in the center of the belt; then tighten the motor mounting screws **27**.

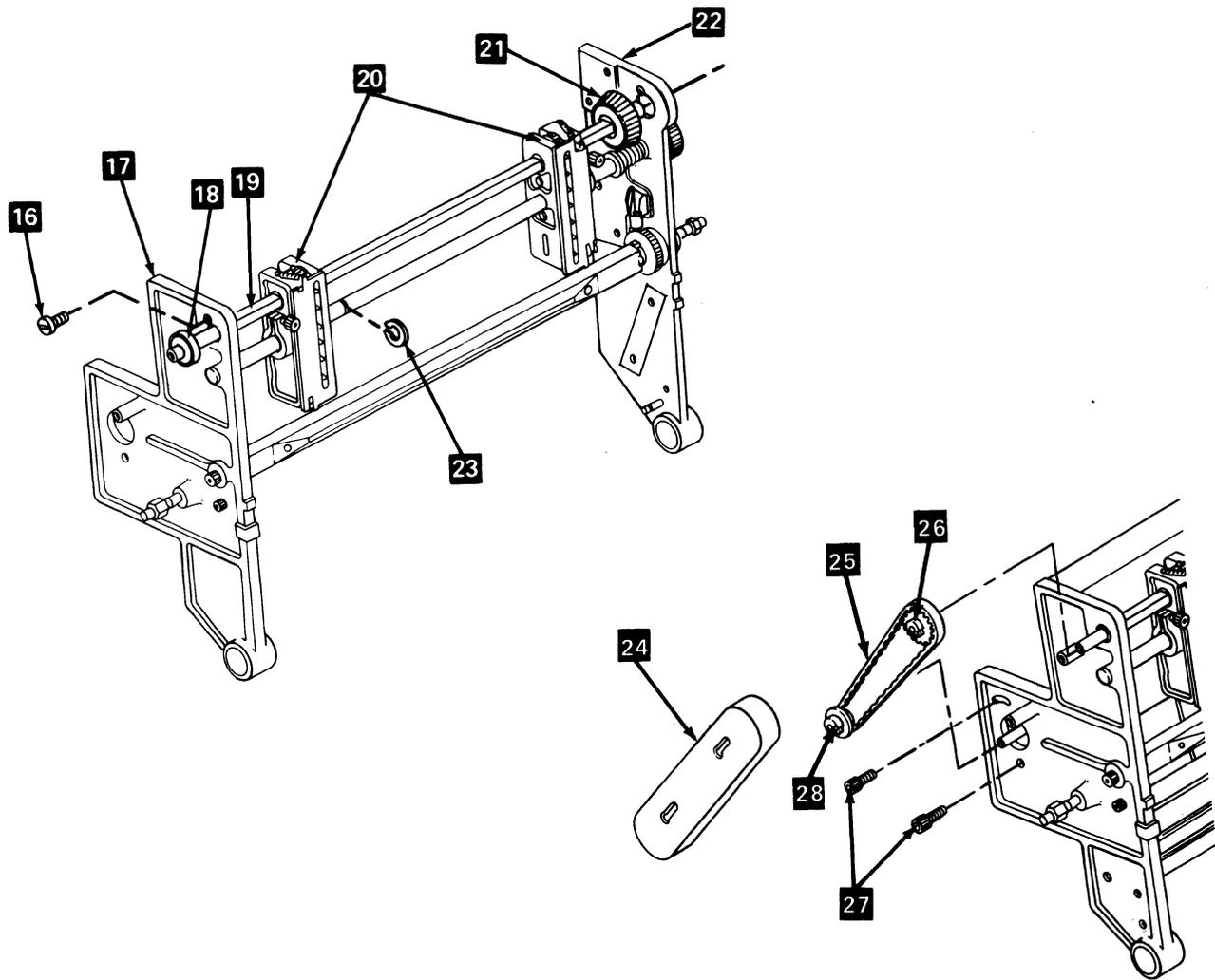


3405 Forms Tractor Drive Shaft (Continued)

8. Position the pulley **28** so that the drive belt **25** is engaged for its full width on the upper pulley **26**. Check by turning the upper drive shaft **19** in an upward direction for several turns; then tighten the pulley **28**.
9. Reinstall the drive belt cover **24**.
10. Reinstall the access cover.
11. Complete the platen-to-printer actuator adjustment service check described in section 3402.

12. Close the logic gate.
13. Complete the electronic adjustments (3104).
14. Switch on the ac circuit breaker.
15. Reinstall the end cover.
16. Close the forms feed assembly.

End of procedure.



3406 Horizontal Adjustment Rod

Service Checks

1. Make sure clips **6** and **8** are installed.
2. Make sure spring **7** is not broken.
3. Make sure rod **9** rotates when knob **5** is turned.
4. The spring **7** should be compressed half way when the rod is properly adjusted.

Note: The following procedure is for removal of the rod through the left endplate. However, if the right end of the printer is clear, removing the right end cover and then removing the rod through the right endplate is easier.

Removal

1. See "3405 Forms Tractor Drive Shaft" and perform the first eight steps of the removal procedure.
2. Loosen the clamping screws **2** and **4**.
3. Remove the clips **3** and **8**.
4. Turn the knob **5** clockwise until the clip **6** can be removed.
5. Remove the knob **5** by turning it counterclockwise.
6. Remove the spring **7** when the rod **9** is pulled out of the right endplate.
7. Pull the rod through the two tractor assemblies **10** and **11**, and out through the left endplate **12**.

End of procedure.

Reinstall

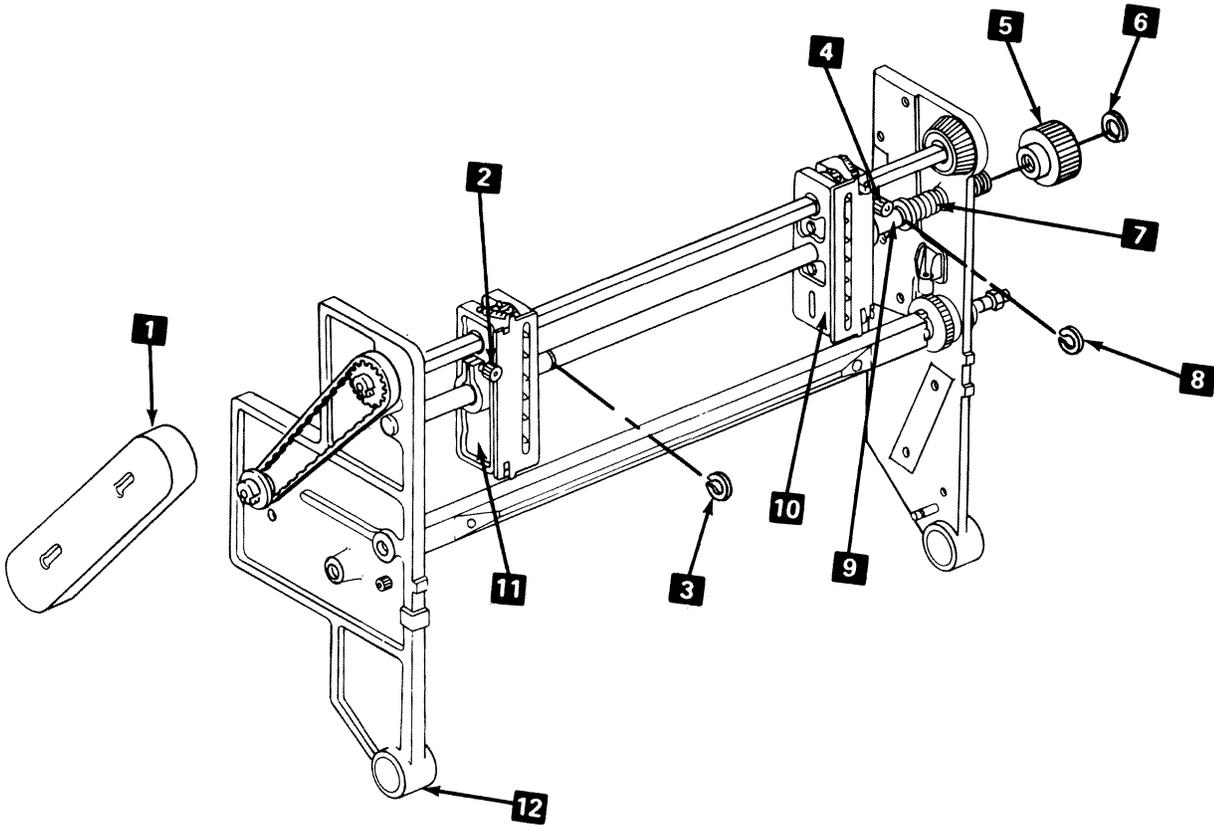
1. Guide the rod through the left endplate **12** and through the two tractor assemblies **10** and **11**.
2. Place the clip **8** and the spring **7** on the rod; then guide the rod through the right endplate.
3. Reinstall the knob **5** and the clip **6**.

Note: The spring **7** should be compressed half way when the rod is properly adjusted.

4. Push the tractor assembly **11** to the left and reinstall the clip **3**.
5. Reinstall the belt cover **1**.
6. See "3405 Forms Tractor Drive Shaft" and perform steps 7 through 14 of the replacement procedure.

End of procedure.

3406 Horizontal Adjustment Rod (Continued)



3407 Forms Tractor Assembly

Service Checks

1. Make sure both springs are connected to the tractor covers.
2. Make sure the tractor covers are seated properly.
3. Make sure there are no teeth missing from the tractor belt.
4. Make sure the tractor assembly is firmly held by the clamping screws.
5. Make sure the tractor assembly screws are tight.
6. Make sure the tractor assembly does not cause the paper to skew.

Note: The following procedure is for removal of the rod through the left endplate. However, if the right end of the printer is clear, removing the right end cover and then removing the rod through the right endplate is easier.

Removal

1. See "3405 Forms Tractor Drive Shaft" and perform steps 1 through 13 in the removal procedure.
2. See "3406 Horizontal Adjustment Rod" and perform steps 3 through 6 of the removal procedure.
3. Slide the tractor assemblies **12** and **14** to the right end plate **6**.
4. Pull the drive shaft **5** and the horizontal rod **13** far enough to the left to remove the tractor assemblies.

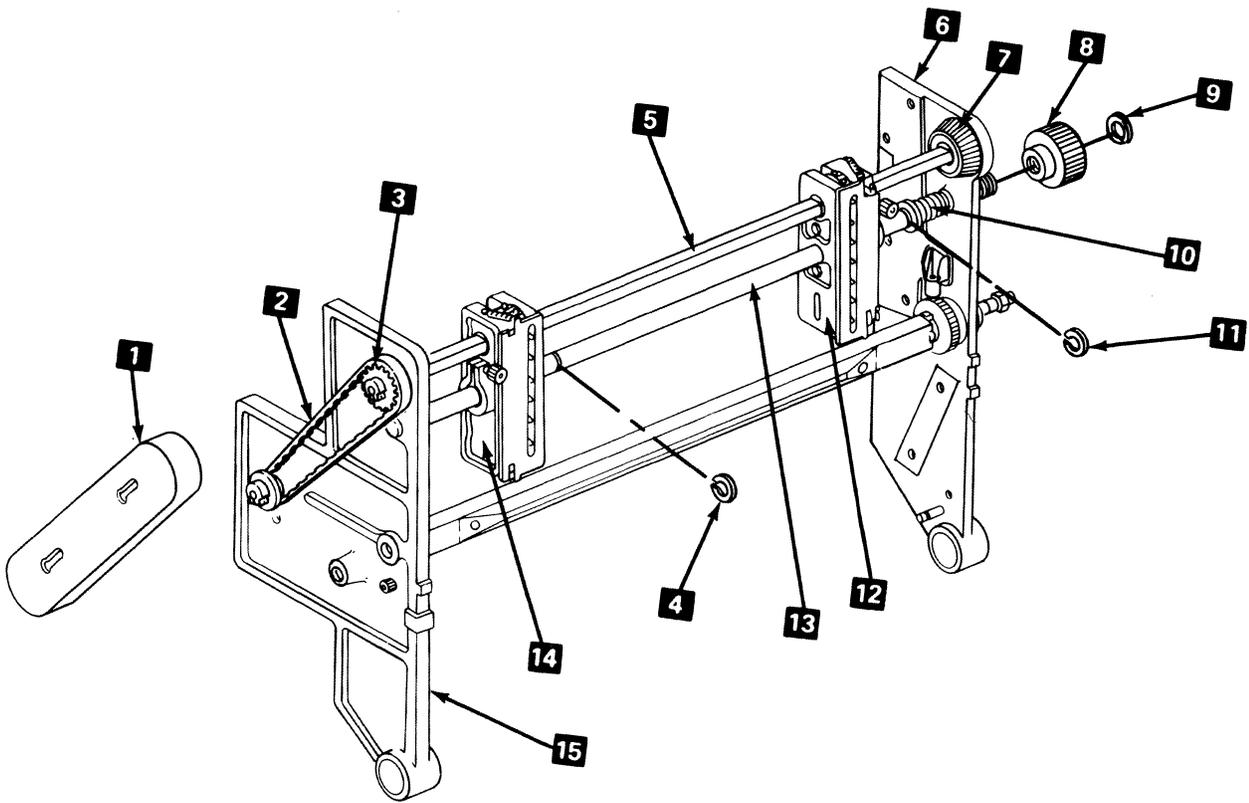
End of procedure.

Reinstall

1. Install the left tractor assembly **14** and the right tractor assembly **12** on the drive shaft **5** and the horizontal rod **13**. Slide both assemblies to the left.
2. Install the knob **7** on the drive shaft **5**; then move the drive shaft to the right inserting it into the bearing in the end casting **6**.
3. Install the clip **11** and the spring **10** on the horizontal rod **13**; then move the rod to the right into the end casting.
4. Install the knob **8** on the rod **13** by turning it clockwise.
5. Install the clip **9** on the end of the rod.
6. Install the clip **4** on the horizontal rod. Ensure that the left tractor assembly is to the left of the clip **4**.
7. Push the drive shaft all the way to the right to seat the bearing in the left endplate **15**; then install the bearing holding screw.
8. Slide the pulley **3** on the drive shaft, pull the shaft to the left against the bearing, and push the pulley to the right against the other side of the bearing; then tighten the clamp screw.
9. Reinstall the drive belt **2**.
10. Move the motor to obtain a belt deflection of 6 mm (.25 in) with 630 grams of force in the center, and tighten the motor mounting screws.
11. See "3405 Forms Tractor Drive Shaft" and perform steps 8 through 14 of the reinstall procedure.

End of procedure.

3407 Forms Tractor Assembly (Continued)

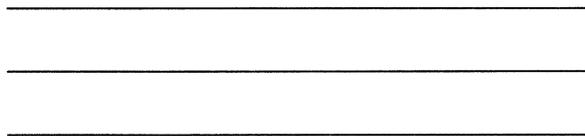


3408 Platen

Removal

1. Switch off the power.
2. Open the forms feed assembly.

Warning: Turning only one of the platen adjusting screws too many turns, without turning the other screw an equal amount, can damage several parts in the assembly.



Note: One or two shims **2** may be installed between the platen and the left end plate. When the platen is removed, keep the shims to use when the platen is reinstalled.

3. Remove the platen holding screws **1** and **6**.
4. Turn the left adjusting screw **3** counterclockwise two to three turns; then, turn the right adjusting screw **4** on equal number or turns in the same direction. Repeat, alternating from the left screw to the right screw, until both screws are free of the upper support panel. Then, pull the platen and shims (if any) out of the assembly.

End of procedure.

Reinstall

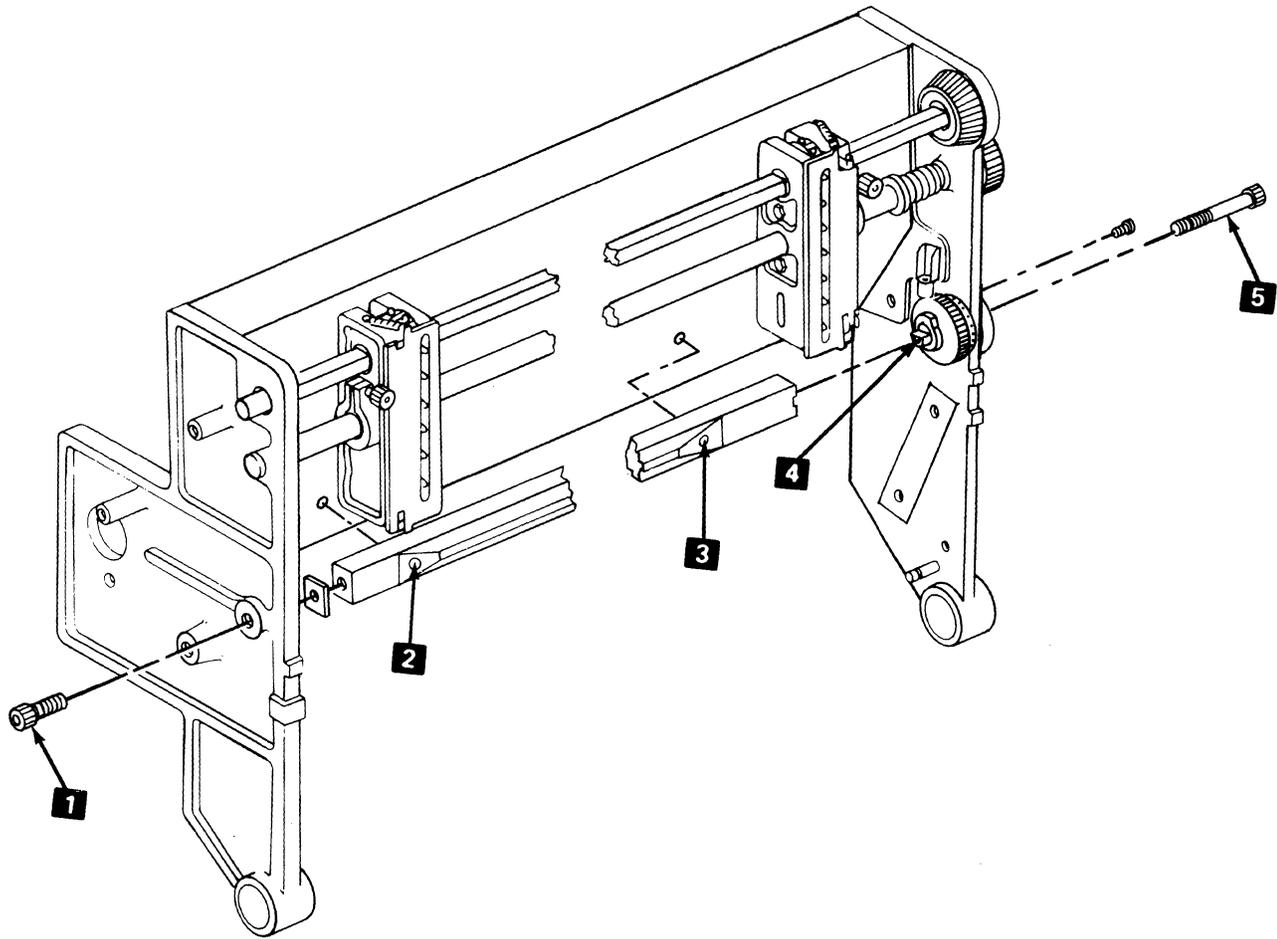
Reverse the removal procedure, making sure that any shims are reinstalled on the left end of the platen. Then, perform the platen-to-print actuator adjustment (3402C).

If a new platen is installed, the platen may have to be reshimmed.

1. Install the new platen.
2. Install and tighten the right holding screw **6**.
3. The shims come in two sizes:
 - a. .007 in., part 4468601
 - b. .014 in., part 4468602
4. Use both the original and new shims as needed that easily fit into the gap between the left end of the platen and the left endplate.
5. Install the left holding screw **1**.
6. Loosen the right holding screw **6**.
7. Complete the 3402 service checks A, B, and C.



3408 Platen (Continued)



3409 End of Forms Emitter

Service Checks

1. Rotate the wheel slowly and check for binds.
2. The head should be free to move under the heads of the screws.
3. Make sure that the wheel does not touch the opening.
4. Make sure there is a bend of 90° at **5**. A bend of more or less than 90° will cause end-of-forms problems, or too much drag on the forms.

Removal

1. Switch off the power.
2. Open the rear cover.
3. Disconnect the emitter cable **4**. (Do not pull the connector **3** off the bracket.)
4. Remove the screws **1** and **2**; then lift the assembly out of the machine.

End of procedure.

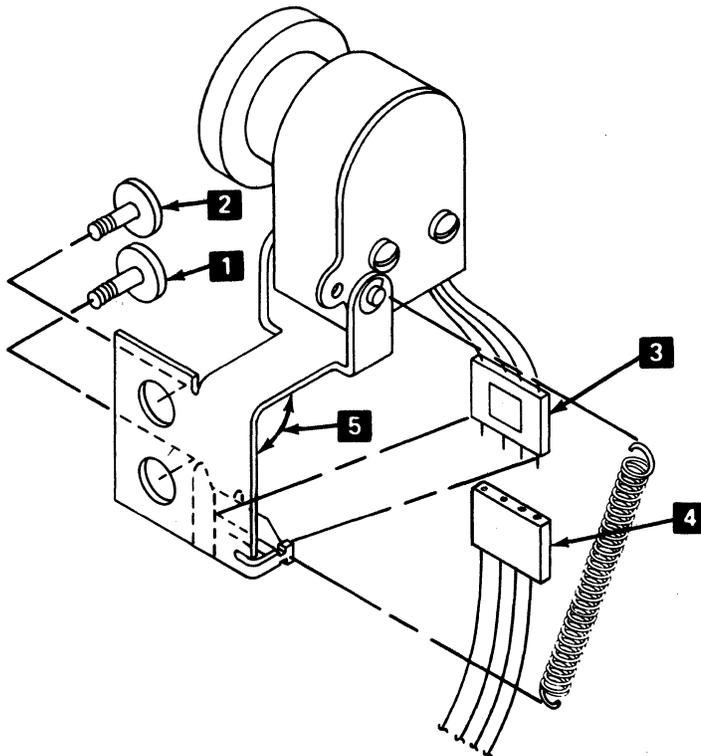
Reinstall

1. Hold the assembly in place and insert the two screws **1** and **2**.

Note: Do not over tighten the screws. The bracket should be free to move under the heads of the screws when the screws are tight. This movement is necessary to permit the emitter wheel to freely track the forms movement.

2. Connect the emitter cable **4**.
3. Close the rear cover.

End of procedure



3410 Forms Thickness Cam and Switch

Service Check

1. The cam **7** should turn easily using light finger pressure.
2. Loosen the fastening screw in the detent **1** and adjust up or down until the cam turns easily using light finger pressure. Ensure that the detent does not bind the cam.
3. Complete steps 4 through 11 of the forms thickness switch reinstall section

Remove (forms thickness cam)

1. Switch the power off.
2. Open the forms feed assembly and remove the forms.

Warning: Turn the platen adjusting screws alternately and equally to avoid parts damage.

-
-
-
3. Remove screws **3** and **13**.

Warning: When removing and reinstalling the cam **7**, do not bend the arm on the forms thickness switch **8**.

-
-
-
- Note:** One or two shims may be installed between the platen and the left end plate. When the platen is removed, keep the shims to use when the platen is reinstalled.
4. Turn the platen adjusting screws **9** and **11** counterclockwise until they are out of the upper support. Then, remove the platen **10**.
 5. Remove the cam **7** and the washer **6**.
 6. Remove the screws **2** and **4** from the support **5**. The screw **2** is longer than screw **4**. This supplies the stop for cam **7**.

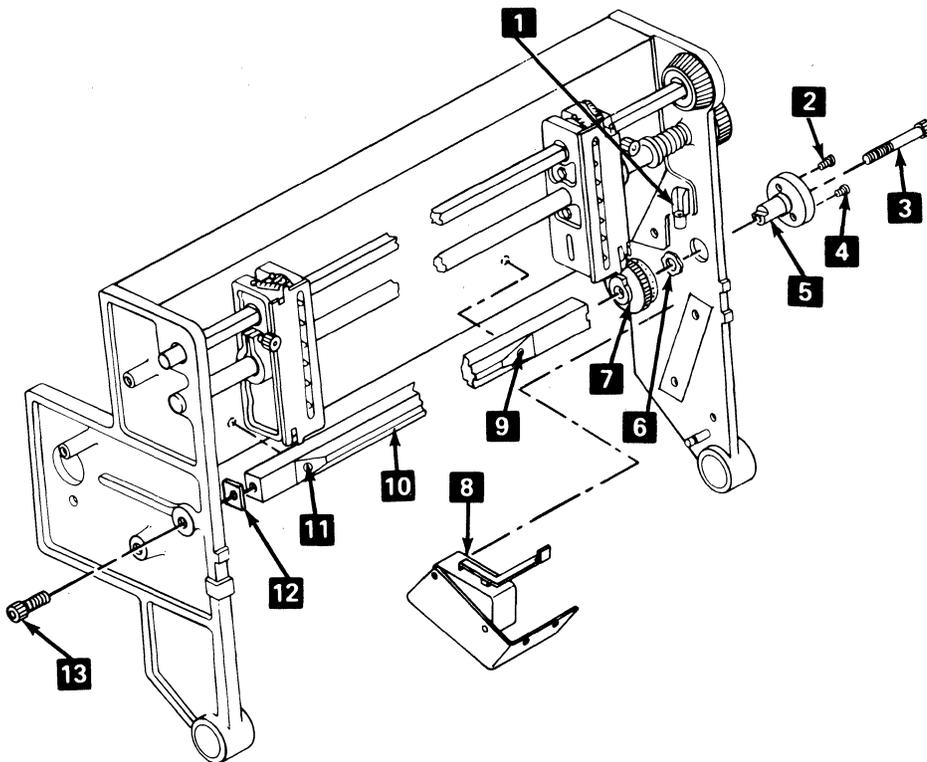
End of procedure.

Reinstall

1. Fasten the support **5** to the endplate with the two screws. The longest screw goes in the top hole.
2. Place the washer **6** and the cam **7** over the support.
3. Slide the platen **10** and shims (if any) **12** into position. The platen has a very close fit and will bind if even pressure is not used on both ends when locating it.
4. Insert the screws **9** and **11** in the holes in the upper support.
5. Insert the platen holding screws **3** and **13**, but do not tighten them at this time.
6. Load forms and close the forms feed assembly.
7. See "3402 Forms Feed Assembly" for the platen-to-print actuator adjustment procedure, and perform the entire procedure.

End of procedure.

3410 Forms Thickness Cam and Switch (Continued)

**Removal (forms thickness switch)**

1. Switch off the power.
2. Open for forms feed assembly and remove the forms.
3. Move the forms drag assembly away from the platen.
4. Remove the two screws that fasten the switch **8** to the lower support. The switch is mounted directly under the forms thickness cam.
5. Disconnect the cable leads and remove the switch.

End of procedure.

Reinstall

1. Fasten the switch **8** to the lower support with the two mounting screws.
2. Connect the cable leads to the switch.
3. Close the forms feed assembly with no forms loaded.
4. Switch on the power.
5. Override the cover switch interlock (1009).

6. Set the forms thickness cam to 10.
7. Set the mode switch to 8.
8. Press start. You should not stop with any error indications.
9. After approximately 5 seconds, press stop.
10. Set the forms thickness cam to 15.
11. Press start. The printer should stop with a 47 on the display. If the printer does not stop with a 47, the switch is out of adjustment.

Note: In the next step, when the switch transfers at a setting of 15, the actuator firing time is increased. Adjust the switch to transfer between 11 and 15 on the forms thickness cam.

12. Repeat steps 6 through 11 until the switch adjustment is within the specified limits.
13. Load single part forms and set the forms thickness cam to 0.
14. Set the mode switch to "Test" and press start to verify correct operation.

End of procedure.

3411 Forms Feed Interlock Switch (Platen Switch)

Service Check

With the forms feed assembly closed and the actuator carrier in the 'home' position, the actuator rod on the switch **5** should be fully depressed without compressing the spring **4**. (Refer to the figure on the next page.)

Removal

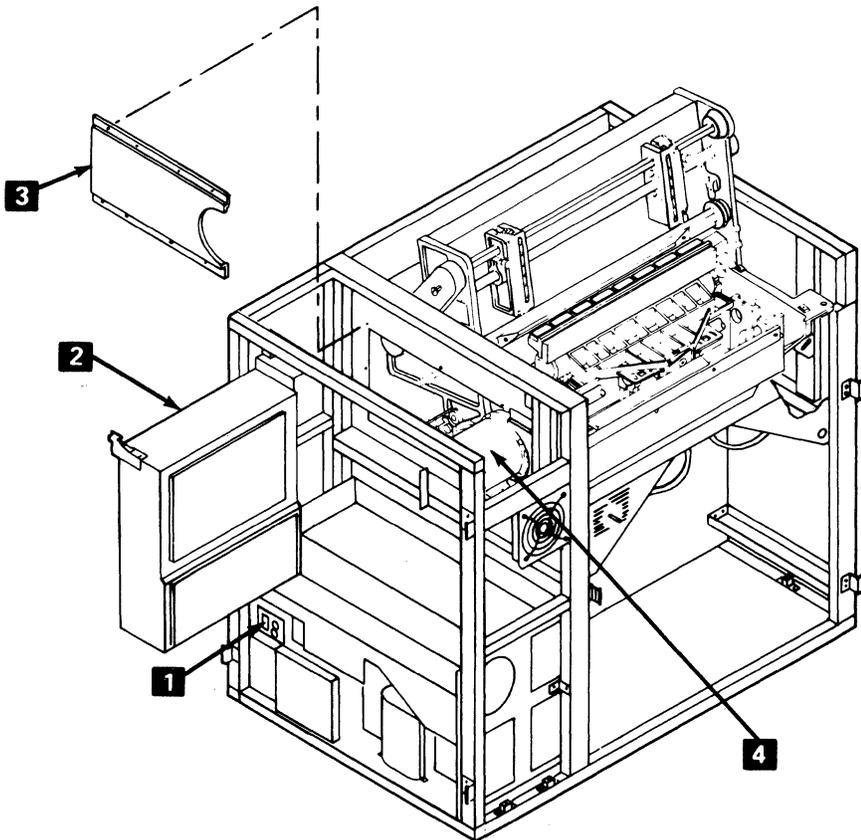
1. Switch off the power.
2. Open the left end cover (1005).
3. Switch off the ac circuit breaker **1**.
4. Open the logic gate **2**.
5. Remove the access panel **3**.
6. Open the top cover.
7. Open the forms feed assembly.
8. Remove the two screws holding the switch **5** on the casting.

9. Label and disconnect the three wires **6**, and remove the switch.
10. The spring **4** is fastened to the forms feed assembly with one screw.

End of procedure.

Reinstall

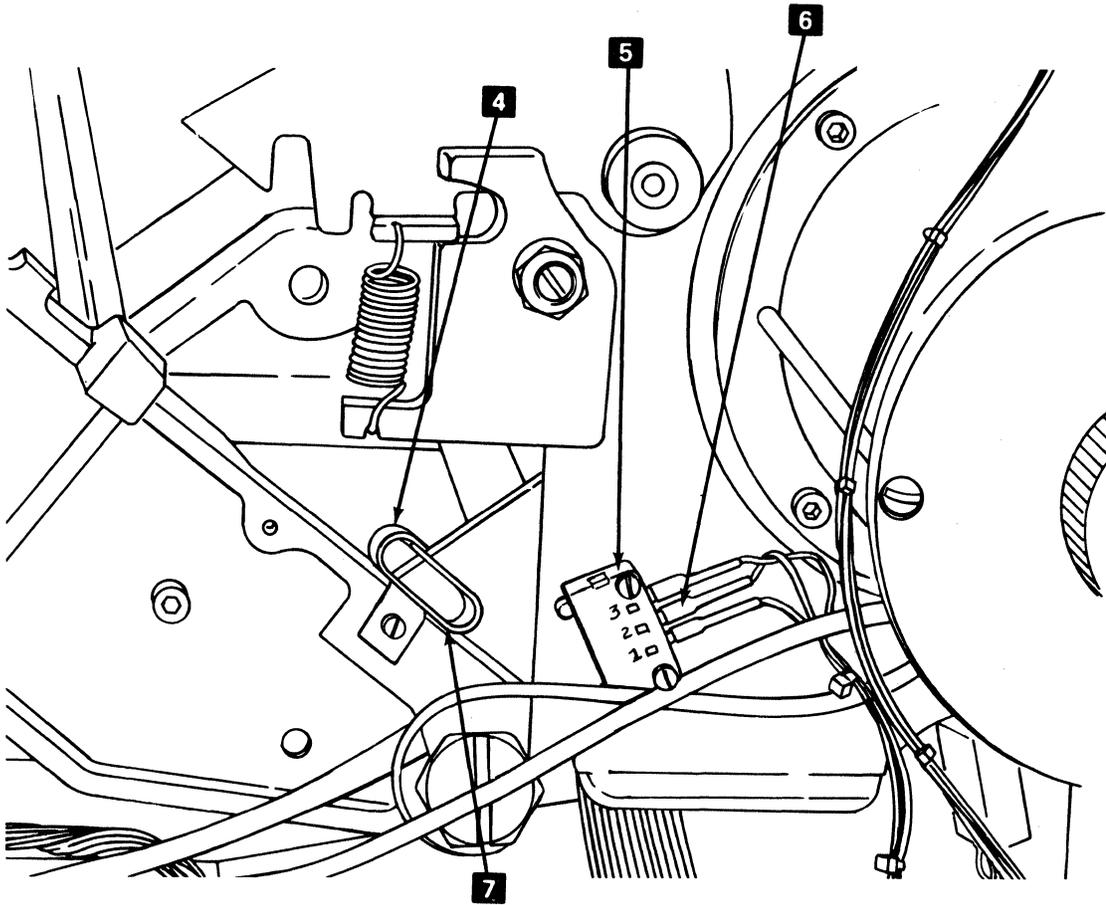
1. Connect the three wires **6** to the switch according to labels attached to them.
2. Secure the switch **5** to the casting with the two mounting screws.
3. If the spring **4** has been removed, reinstall it, but do not tighten the holding screw.
4. Close the forms feed assembly, and ensure that the actuator carrier is in the "home" position.
5. Position the spring **4** to fully depress the actuator rod on the switch without bending the spring.



3411 Forms Feed Interlock Switch (Platen Switch)

6. Use the handwheel to move the actuator carrier out of the "home" position while observing the spring. The spring should bend as the forms feed assembly moves into printing position, but it should not bend far enough to touch the mounting tab **7**.
7. If the spring bends too far, repeat steps 5 and 6.
8. Replace the access panel **3**.
9. Close the logic gate **2**.
10. Switch on the ac circuit breaker.
11. Close and fasten the left end cover (1005).
12. Close the top cover.
13. Switch on the power. The actuator carrier will return to "home" on power up.

End of procedure.



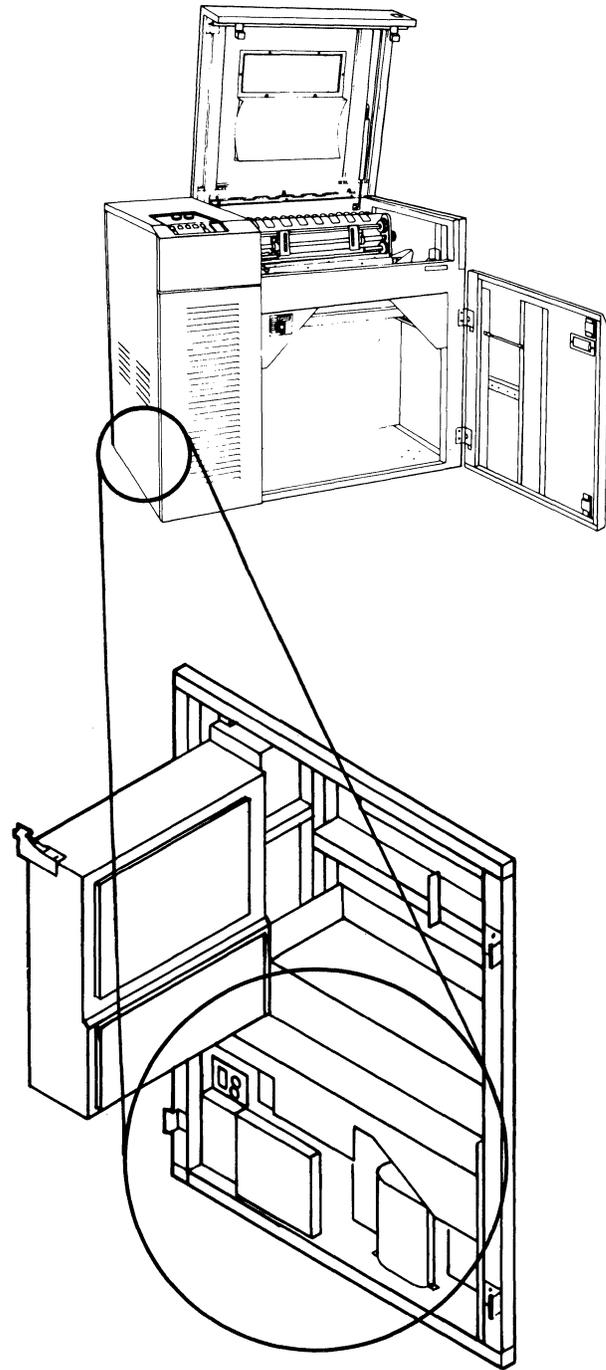
3600 Power Supply

3601 Description

The power supply provides dc voltages for the printer mechanics and electronics. An interlock switch removes primary power from the actuator transformer (high power transformer) through contactor K201 when the top cover of the machine is opened.

The forms feed assembly also contains an interlock switch. Power is removed from the forms motor when the forms feed assembly is opened.

The power supply has two versions, 50 Hz and 60 Hz. Use reference drawing YA000 for wiring information.



3602 AC Power Box

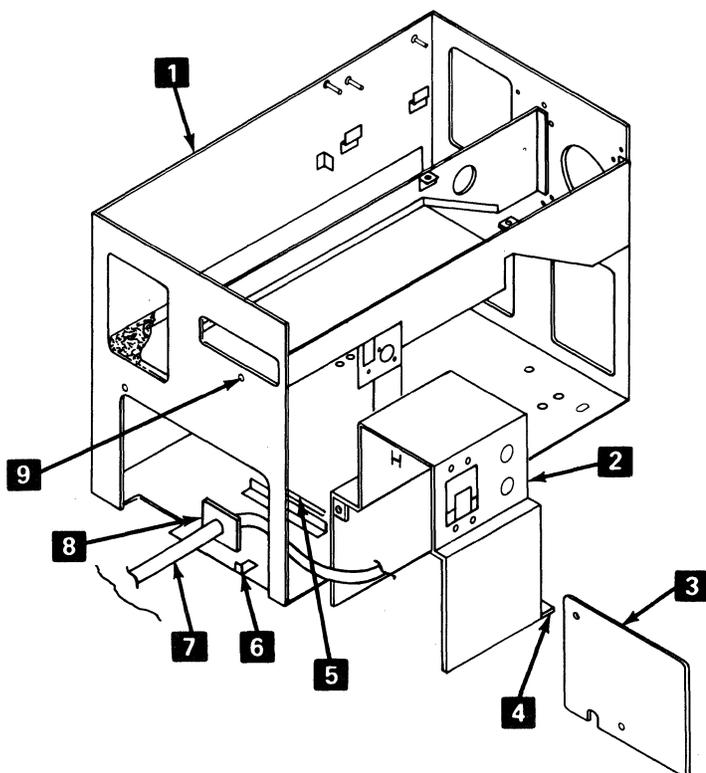
Removal

CAUTION

When working in the power supply area:

- Always disconnect the power cable from the customer's ac outlet.
- Do not connect the power cable to the ac outlet and switch on the power, when the supply is out of the frame.

1. Switch off the power.
2. Remove the left end cover (1005).



3. Switch off the ac circuit breaker.
4. Disconnect the power cable from the customer's outlet.
5. Remove the left rear cover (1007).
6. Remove the one screw **9** from the left side of the ac power box. Remove the cover **3** between the power supply frame **1** and the ac power box **2** by sliding it out of the frame. Tilt the cover **3** over the power cable **5** and remove the cover.
7. Remove the screws from the strain relief bracket **6**. Do not remove this bracket from the power cable. Label and remove the power cable leads from the ac box.

Note: Do not lose the lockwashers that are installed between the connector (on the yellow/green wires) and the chassis.

8. Locate, label, and remove all the wires on TB204 that exit the ac box through grommets holes. Remove these wires from the ac box.
9. Remove the cover bracket **4**.
10. Slide the ac power box out of the power supply frame.

End of procedure.

3602 AC Power Box (Continued)

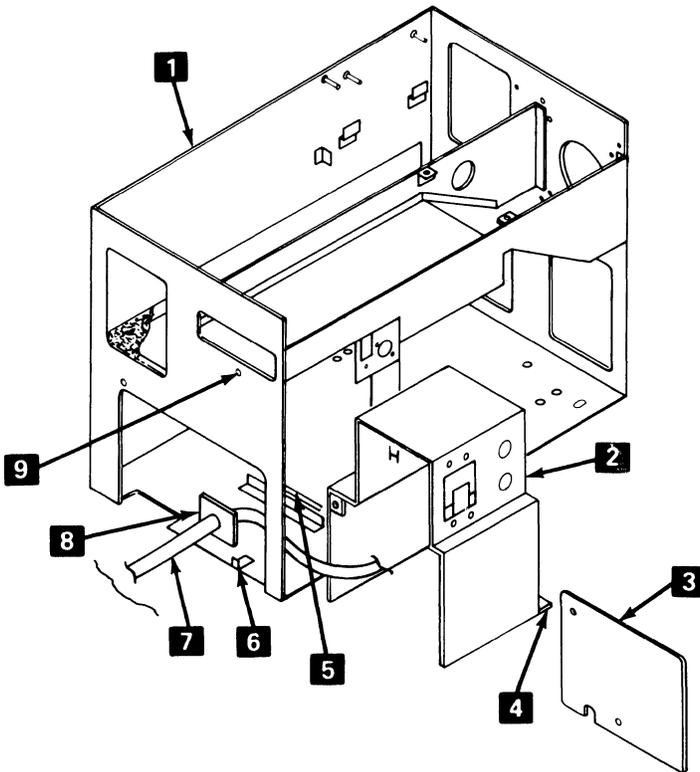
Reinstall

1. Slide the ac power box into the power supply frame. The edge **7** should be under the support **8**.
2. Reinstall the cover bracket **4**.
3. Reinstall the labeled wires through the grommets holes, and then connect to TB204.
4. Reinstall the strain relief bracket **6** with the power cable attached. When installing the yellow/green jumper (one end is terminated to the left side of the ac box), place the lockwasher between the connector and the bracket.
5. Reconnect the three leads of the power cable.

Note: Remember to place the lockwasher between the chassis and the connector of the yellow/green wire.

6. Reinstall the cover **3** between the ac power box and the frame. Tilt the ac power box cover to align the power cable with the hole on the ac box cover. Use reference drawing YA000 for wiring information. Fasten the cover at **4**.
7. Reinstall screw **9**.
8. Reinstall the left rear cover (1007).
9. Connect the ac power cable to the outlet.
10. Switch on the circuit breaker (CB201) on the ac power box.
11. Reinstall and fasten the left end cover of the machine (1005).
12. Switch on the power.
13. Set the mode switch to "Test" and press start to verify operation.

End of procedure.



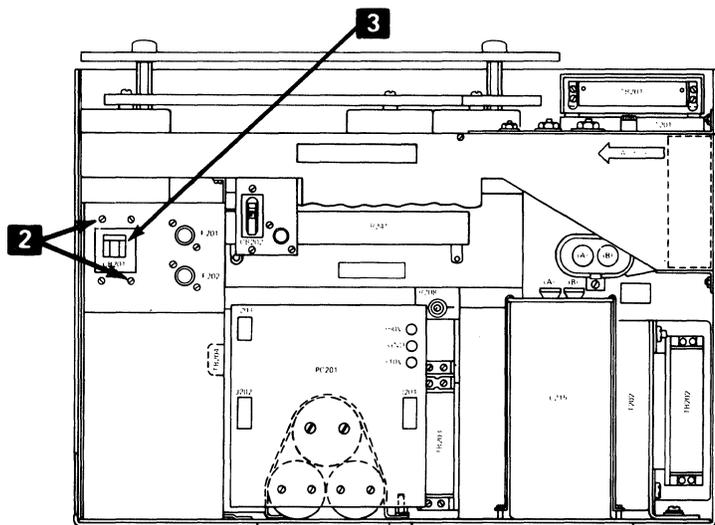
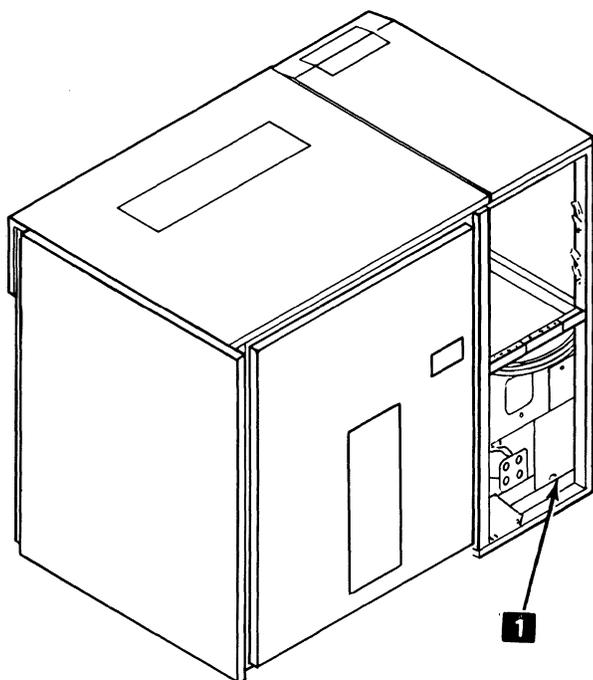
3603 Circuit Breaker, AC Box

Removal

1. Switch off the power.
2. Remove the left end cover (1005).
3. Switch off the ac circuit breaker.
4. Disconnect the power cable from the customer's outlet.
5. Remove the left rear cover from the machine (1007).

6. Remove the two screws **1** from the ac power box cover. Slide the cover from between the ac box and the power supply frame.
7. Remove the four screws **2** that hold the circuit breaker (CB201) in the ac power box.
8. Push the circuit breaker back into the ac power box. Label and remove the connectors **3** through **6** from the breaker (Refer to YA000).

End of procedure.

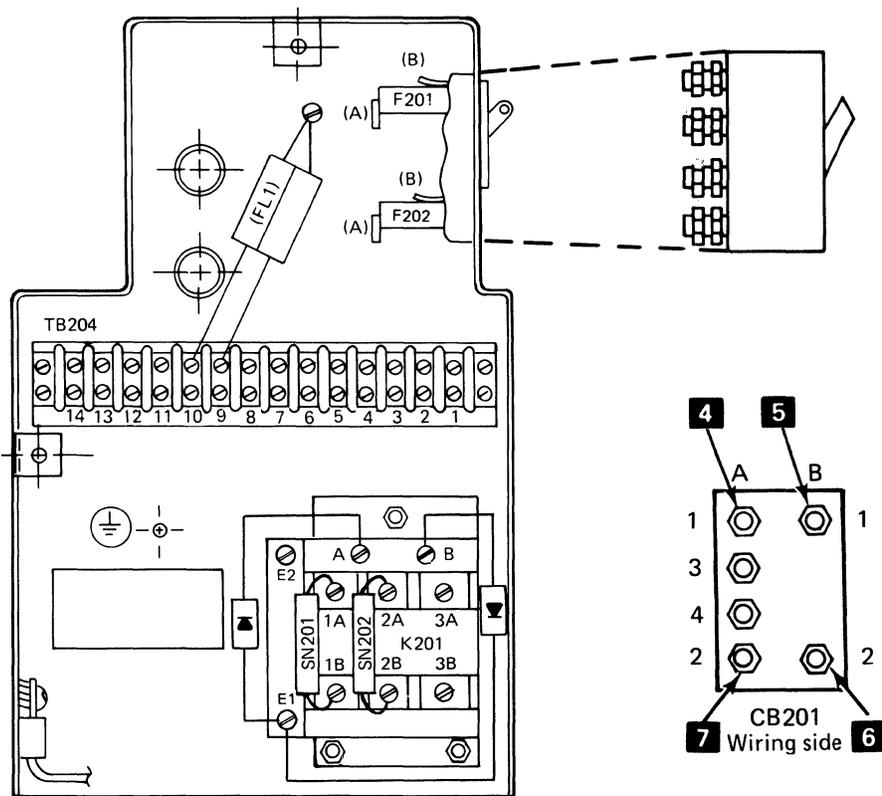


3603 Circuit Breaker, AC Box (Continued)

Reinstall

1. Reinstall the connectors to the circuit breaker (refer to YA000).
2. Align the circuit breaker with the hole in the ac power box.
3. Fasten the circuit breaker to the ac power box with four screws **2**.
4. Reinstall the cover between the ac power box and the frame. Tilt the ac power box cover to get the power cable aligned with the hole on the ac box cover. Fasten the cover with screws at **1**.
5. Reinstall the left rear cover (1007).
6. Connect the ac power cable to the customer's outlet.
7. Switch on the ac circuit breaker.
8. Reinstall the left end cover of the machine (1005).
9. Switch on the power.
10. Set the mode switch to "Test" and press start to verify operation.

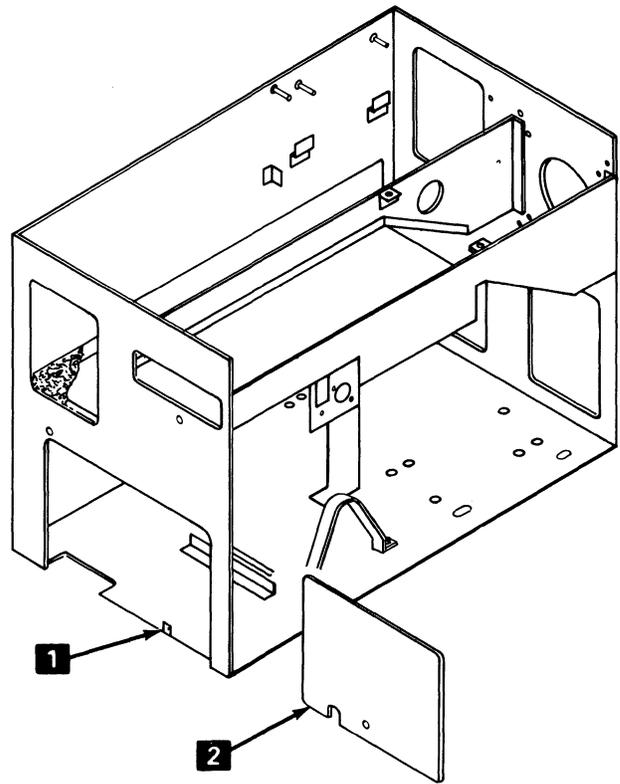
End of procedure.



3604 Contactor K201, AC Power Box

Removal

1. Switch off the power.
2. Remove the left end cover (1005).
3. Switch off the ac circuit breaker.
4. Disconnect the power cable from the customer's outlet.
5. Remove the left rear cover (1007).
6. Remove the screw **1** from the left side of the ac power box. Remove the cover **2** between the power supply frame and the ac power box by sliding the cover out of the frame. Tilt the cover over the power cable.
7. Label and remove the connectors (K201—1A, and 2A) **4** and (K201—1B, and 2B) **5** (refer to YA000).
8. Label the polarity and remove the diode connections to A and B.
9. Label and remove the snubbers from the contactor.
10. Remove the three screws **3** that hold the contactor to the ac power box.



End of procedure.

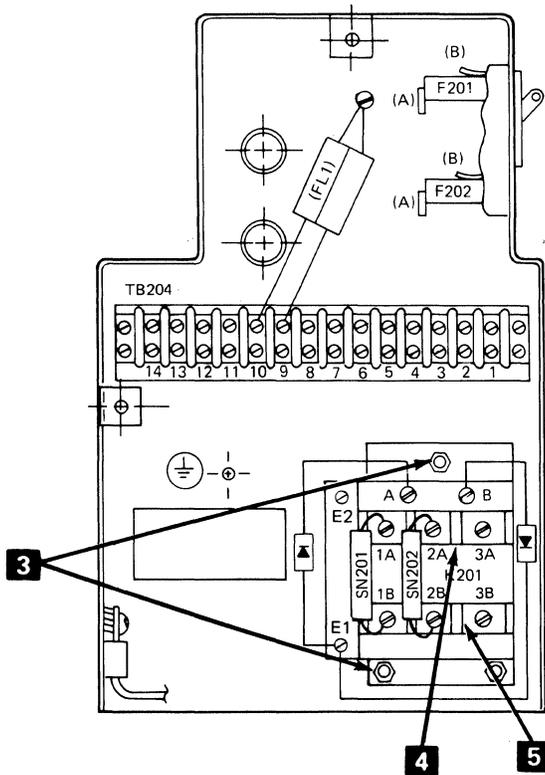
3604 Contactor K201, AC Power Box (Continued)

Reinstall

1. Reinstall the three screws **3** to fasten the contactor to the ac power box.
2. Reinstall the connections K201—1A and 2A **4**, and K201—1B and 2B **5**.
3. Install the snubbers.
4. Connect the leads of the diodes (CR221) to K201 A and B, and E1. Observe polarity and make sure the connections are tight.
5. Reinstall the cover **2** between the ac power box and the frame. Tilt the cover to align the power cable with the hole on the ac box cover. Fasten the cover at **1**.

6. Reinstall the left rear cover of the machine (1007).
7. Connect the power cable to the customer's outlet.
8. Switch on the ac circuit breaker.
9. Reinstall the left end cover of the machine (1005).
10. Switch on the power.
11. Set the mode switch to "Test" and press start to verify operation.

End of procedure.

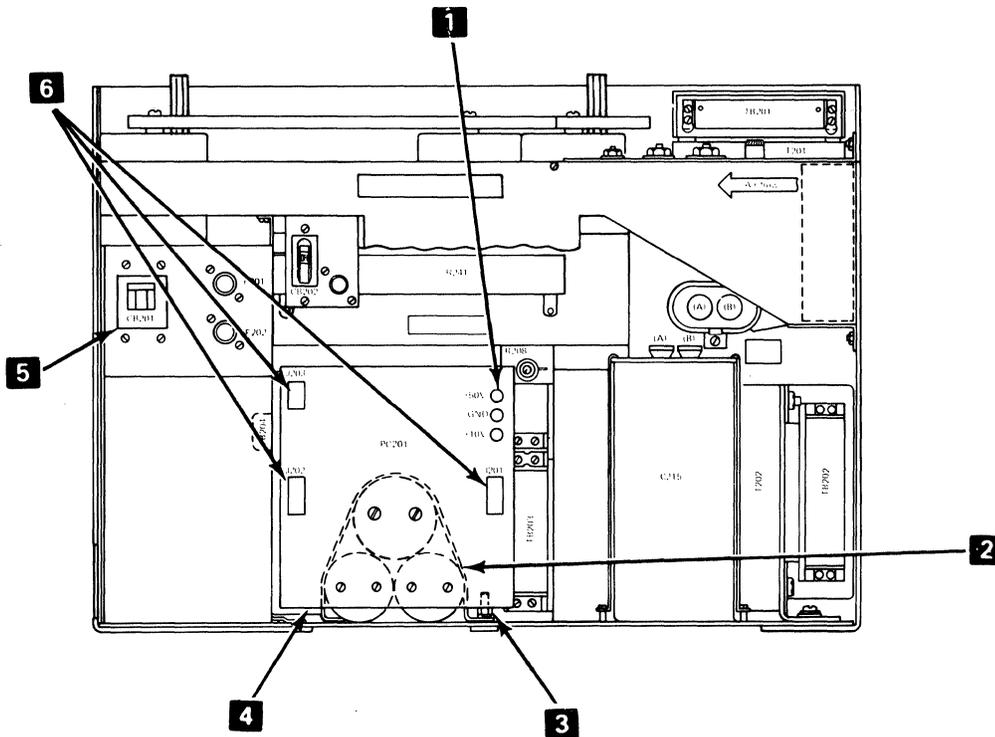


3605 Sequence Card

Removal

1. Switch off the power.
2. Open the left end cover (1005).
3. Switch off the ac circuit breaker **5**.
4. Disconnect the power cable from the customer's outlet.
5. Remove the sequence card cover.
6. Loosen the nut **3** until the sequence card **4** is loose enough to be pulled out of the bracket **2**.
7. Label and remove the three connectors (+50, Ground, and +10) **1** from the front of the sequence card.
8. Disconnect the three connectors (J201, J202, and J203) **6** from the back of the sequence card.
9. Pull the sequence card from under the bracket.

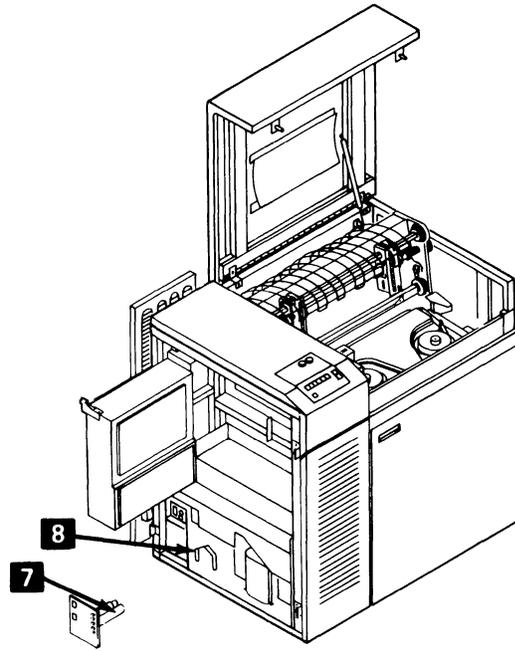
End of procedure.



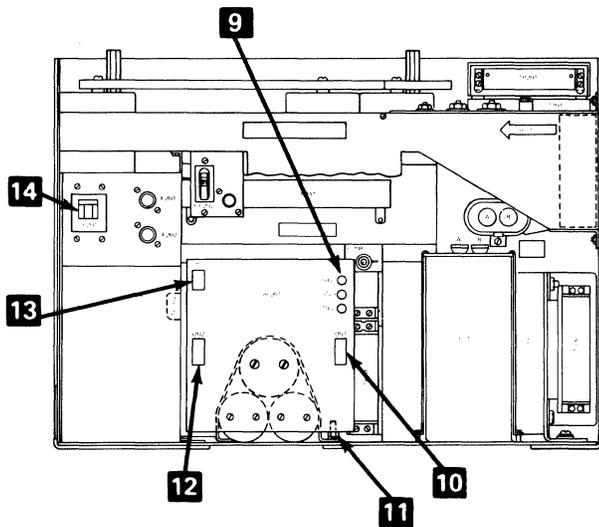
3605 Sequence Card (Continued)

Reinstall

1. Slide the capacitors **7** under the bracket **8** on the power supply frame.
2. Plug in the three connectors to the back of the sequence card:
 - J201 **10**
 - J202 **12**
 - J203 **13**
3. Reinstall the three connectors (+50v, Ground, and +10v) **9** to the front of the sequence card.
4. Make sure that the sequence card is in place; then tighten the nut **11** to hold the sequence card.
5. Reinstall the card cover.
6. Connect the power cable to the customer's outlet.
7. Switch on the ac circuit breaker **14**.
8. Close the left end cover (1005).
9. Switch on the power.



End of procedure.



3606 Capacitor C215 (High-Power Transformer)

Removal

1. Open the left end cover (1005).
2. Switch off the ac circuit breaker **1**.
3. Disconnect the power cable from the customer's outlet.
4. Remove the safety covers **2** from the capacitor then remove the push on connectors.

CAUTION

Always discharge capacitors by placing a screwdriver between each terminal and ground.

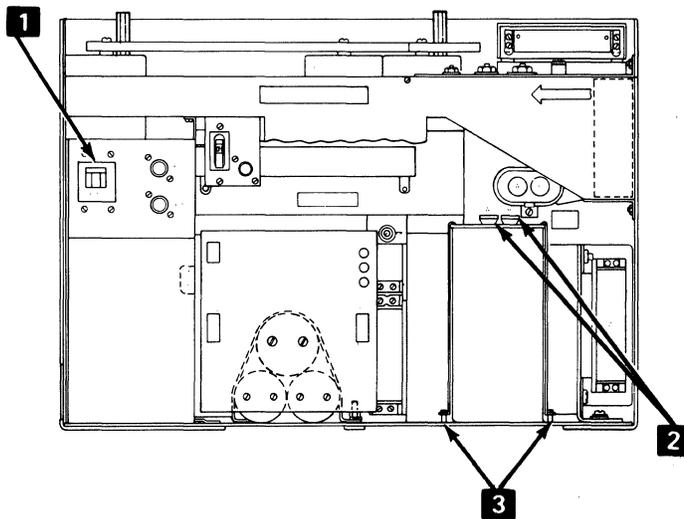
Reinstall

1. Place the capacitor between the brackets on the power supply frame, then place the brackets over the edge of the capacitor. Fasten the nut **3**.
2. Reinstall the push-on connectors to the capacitor; then place the safety covers on the capacitor **2**.
3. Connect the power cable to the customer's outlet.
4. Switch on the ac circuit breaker **1**.
5. Close and fasten the left end cover (1005).
6. Switch on the power.
7. Set the mode switch to "Test" and press start to verify operation.

End of procedure.

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5. Loosen the nut **3** on the bracket that holds the capacitor. Remove the capacitor.

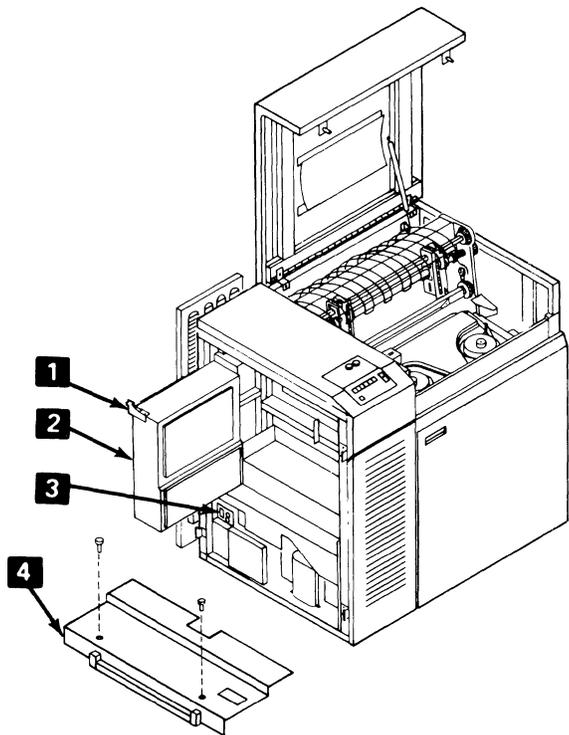
End of procedure.



3607 Capacitor C206 (5-volt Transformer)

Removal

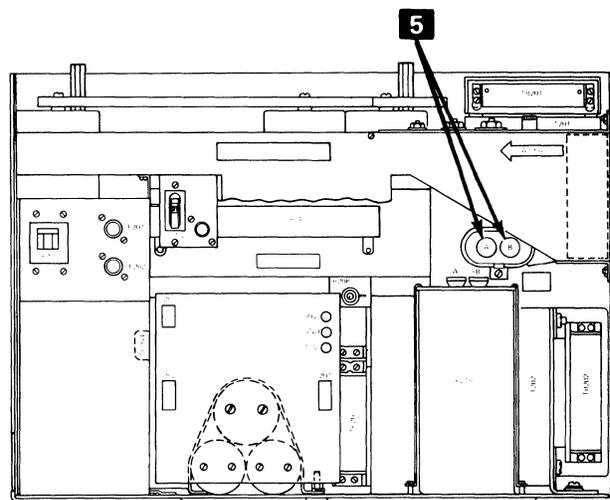
1. Switch off the power.
2. Open the left end cover (1005).
3. Switch off the ac circuit breaker **3**.
4. Disconnect the power cable from the customer's outlet.
5. Open the logic gate **2**. The gate swings open as shown, the latch **1** is a spring latch.
6. Remove the power supply cover **4**.



CAUTION

Always discharge capacitors by placing a screwdriver from each terminal to ground.

7. Remove the safety covers **5** from the capacitor (C206); **6**; then remove the push on connectors.



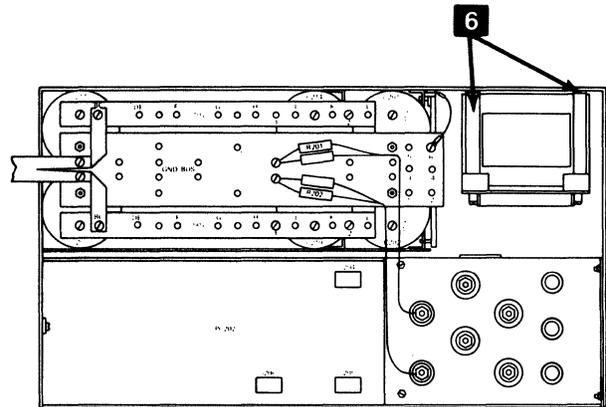
3607 Capacitor C206 (5-volt Transformer) (Continued)

8. Remove the nut and washer from **6**. Lift the transformer away from the screws and out of the power supply frame supports.

Note: Move the transformer (to get to the capacitor) without disturbing the transformer cables.

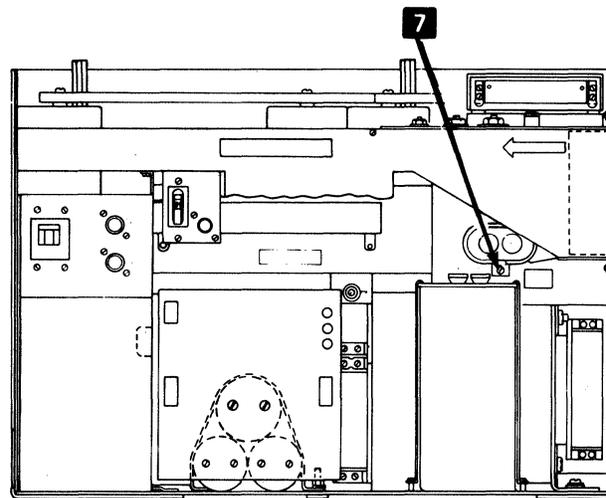
CAUTION

Always discharge capacitors by placing a screwdriver from each terminal to ground.



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9. Loosen the nut and washer **7** on the brackets that hold the capacitor; then remove the capacitor.

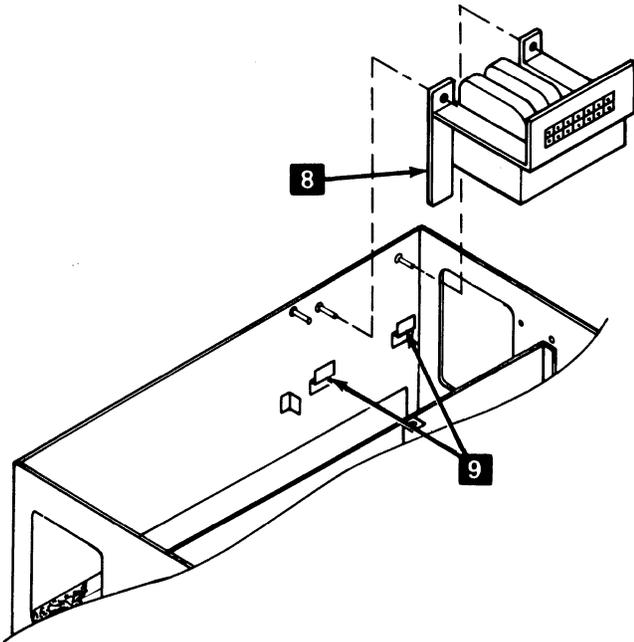
End of procedure.



3607 Capacitor C206 (5-volt Transformer) (Continued)

Reinstall

1. Place the brackets on the capacitor and fasten the nuts.
2. Place the transformer brackets **8** in the supports **9** on the power supply frame. Push the top mounting brackets over the screws on the power supply frame. Fasten with a nut and washer.



3. Reinstall the push on connectors (red wires) and safety covers on the capacitor **5**.
4. Reinstall the power supply cover **4**.
5. Close and latch the logic gate **2**.
6. Connect the power cable to the customer's outlet.
7. Switch on the ac circuit breaker **3**.
8. Close and fasten the left end cover (1005).
9. Switch on the power.
10. Set the mode switch to "Test" and press start to verify operation.

End of procedure.

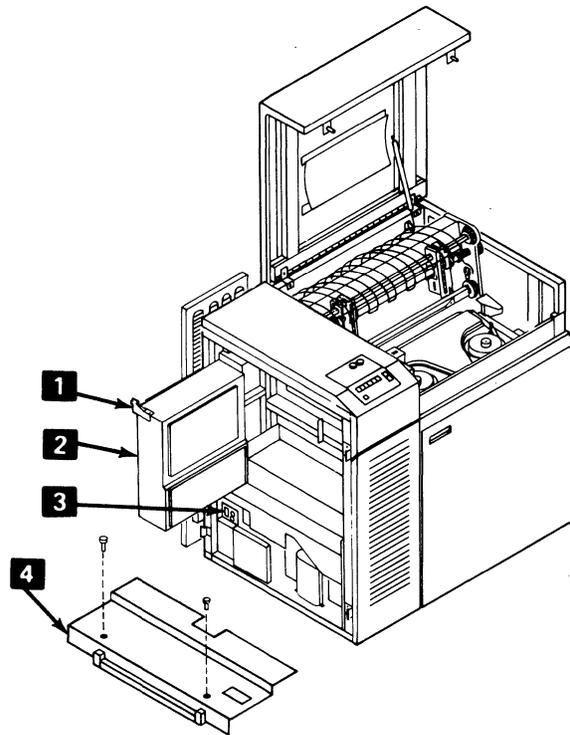
3608 Transformer T201 (5-volt)

Removal

1. Switch off the power.
2. Open the left end cover (1005).
3. Switch off the ac circuit breaker **3**.
4. Disconnect the power cable from the customer's outlet.
5. Open the logic gate **2**. The gate swings open as shown, the latch **1** is a spring latch.
6. Remove the power supply cover **4**.
7. Remove the safety covers **5** from the capacitor (C206), then remove the push on connectors from the capacitor.

CAUTION

Always discharge the capacitors by placing a screwdriver from each terminal to ground.

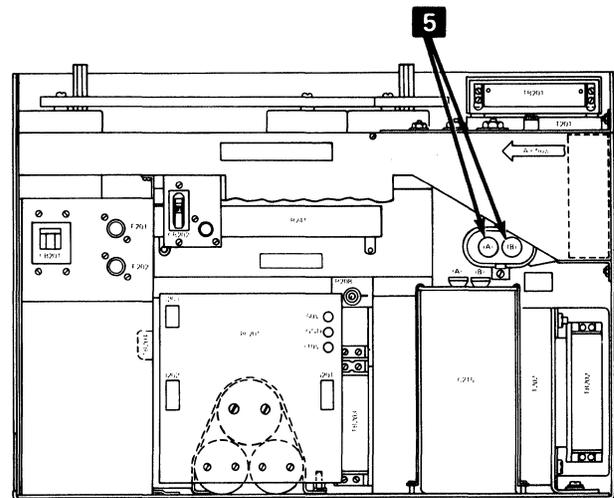


8. Refer to YA000 and YA010. Label and remove the connections from T201.

Note: After disconnecting the cable, from the transformer to J202, pull it back to the transformer side of the power supply.

9. Remove the nuts and washers from **6**, and lift the transformer out of the power supply frame.

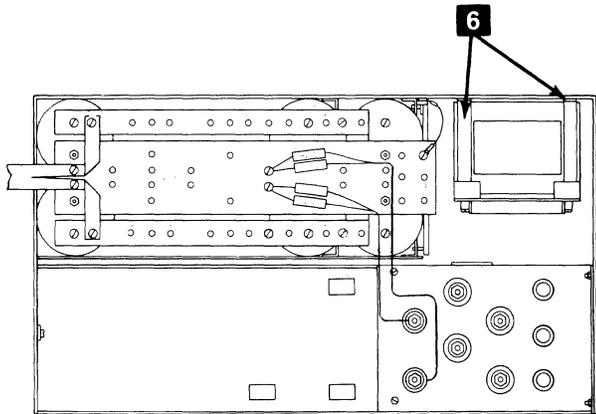
End of procedure.



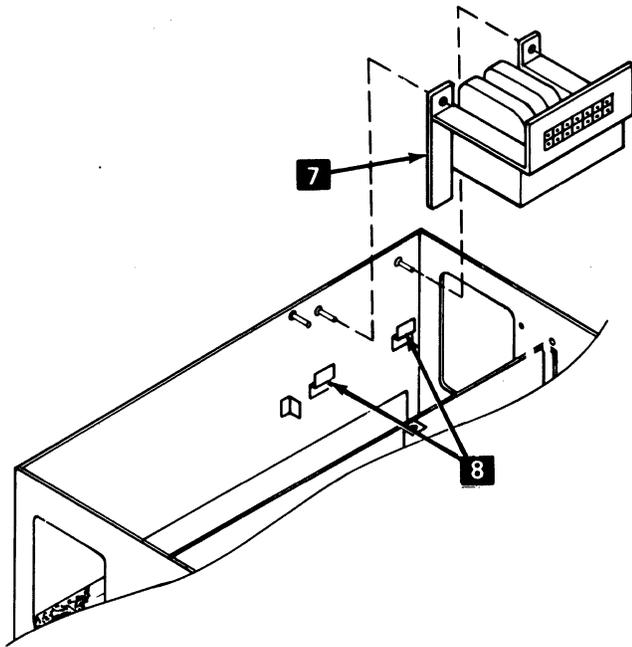
3608 Transformer T201 (5-volt) (Continued)

Reinstall

1. Place the transformer brackets **7** in the supports **8** on the power supply frame. Push the top mounting brackets over the screws on the power supply frame. Fasten the transformer with a nut and washer over the screws.
 2. Refer to YA000 and YA010, and reinstall the connectors to T201.
 3. Reinstall the push on connectors (red wires) and safety covers on the capacitor **5**.
 4. Reinstall the power supply cover **4**.
 5. Close and latch the logic gate **2**.
 6. Connect the power cable to the outlet.
 7. Switch on the ac circuit breaker **3**.
 8. Close and fasten the left end cover (1005).
 9. Switch on the power.
 10. Set the mode switch to "Test" and press start to verify operation.
- End of procedure.



3608 Transformer T201 (5-volt) (Continued)

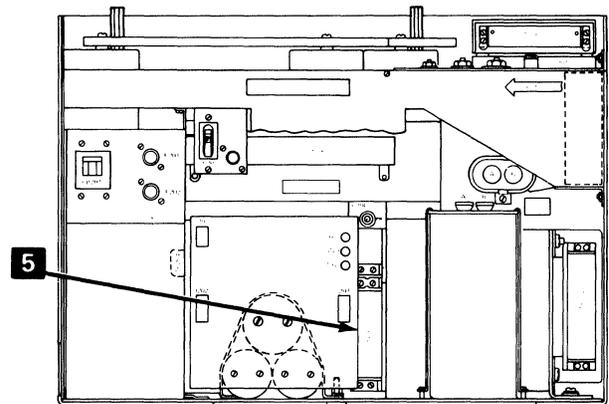
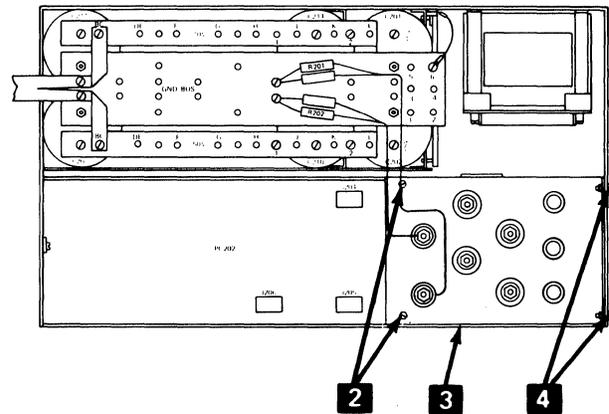
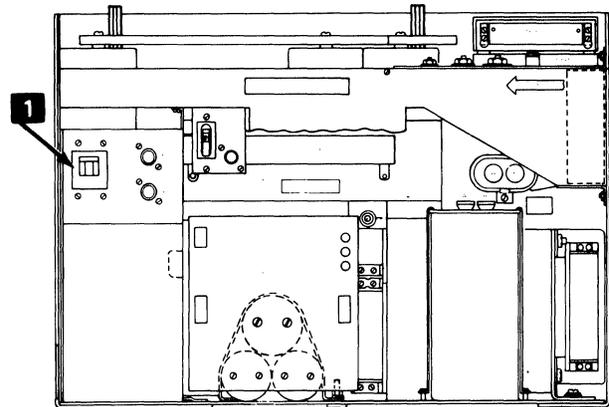


3609 Diode ASM

Removal

1. Switch off the power.
2. Open the left end cover (1005).
3. Switch off the ac circuit breaker **1**.
4. Disconnect the power cable from the customer's outlet.
5. Remove the power supply cover.
6. Remove the safety cover and screws at **2** and **4**. The screws **4** are fastened with a nut and washer.
7. Remove the safety cover from the terminal board **5**.
8. Label and remove the connections from the right side of the terminal board and bus bars. Refer to YA000.
9. Lift the diode assembly **3** from the power supply frame. Pull the cable through the hole **8** in the frame.

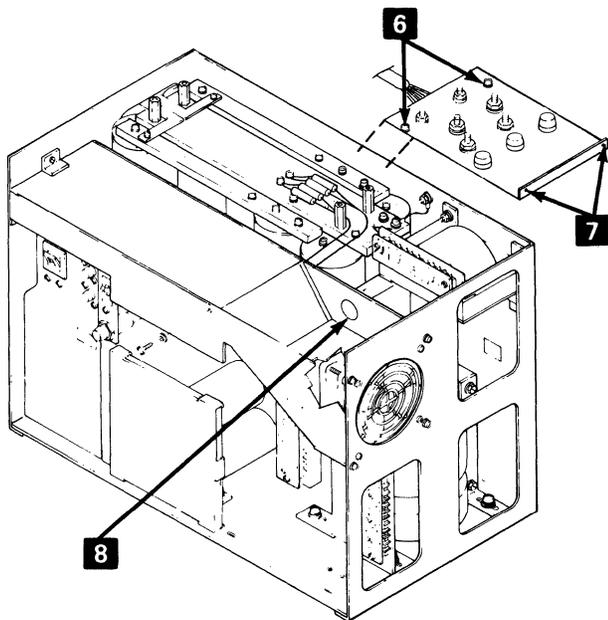
End of procedure.



3609 Diode ASM (Continued)***Reinstall***

1. Push the cable on the diode board through the hole **8** in the frame.
2. Refer to YA000 and connect the cable to the terminal board.
3. Reinstall the safety cover on the terminal board **5**.
4. Reinstall the standoff studs at **6**.
5. Reinstall the screws, washers, and nuts at **7**.
6. Reinstall the plastic safety cover.
7. Install the power supply cover.
8. Connect the power cable to the customer's outlet.
9. Switch on the ac circuit breaker.
10. Close and fasten the left end cover (1005).
11. Switch on the power.
12. Set the mode switch to "test" and press start to verify operation.

End of procedure.

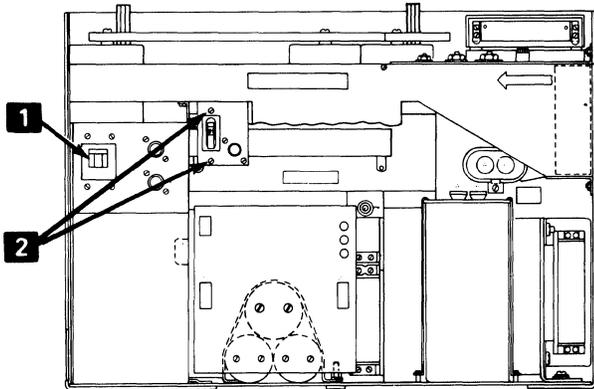


3610 Circuit Breaker (CB202 5-volt)

Removal

1. Switch off the power.
2. Open the left end cover (1005).
3. Switch off the ac circuit breaker **1**.
4. Switch off the 5-volt circuit breaker.
5. Disconnect the power cable from the customer's outlet.
6. Remove the two screws **2** on the 5-volt circuit breaker. Push the circuit breaker behind the support to remove the connections on the back of the circuit breaker.
7. Remove the nut from the back side of the circuit breaker to remove the line connector **4** and load connector **5**.

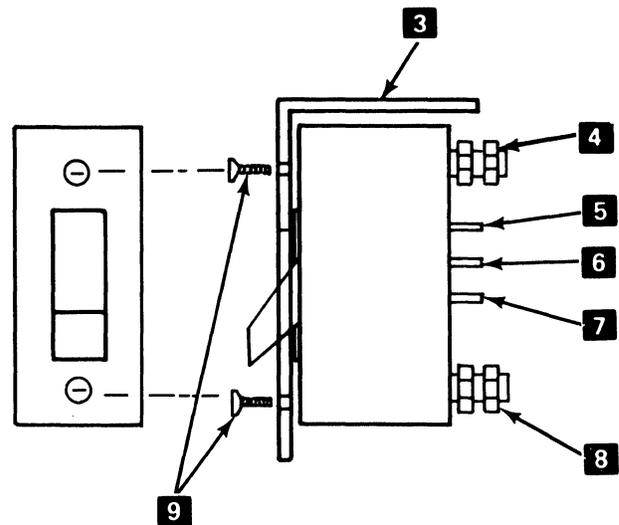
End of procedure.



Reinstall

1. Fasten the line connector **4** and the load connector **5** with nuts.
2. Fasten the breaker with screws at **6**.
3. Connect the ac power cable to the outlet.
4. Switch on the ac circuit breaker (CB201).
5. Switch on the 5-volt circuit breaker (CB202).
6. Close and fasten the left end cover (1005).
7. Switch on the power.
8. Set the mode switch to "Test" and press start to verify operation.

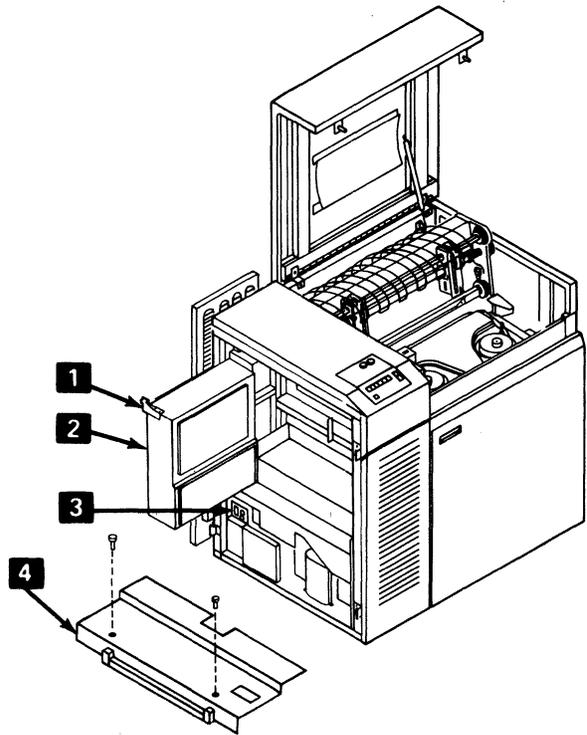
End of procedure.



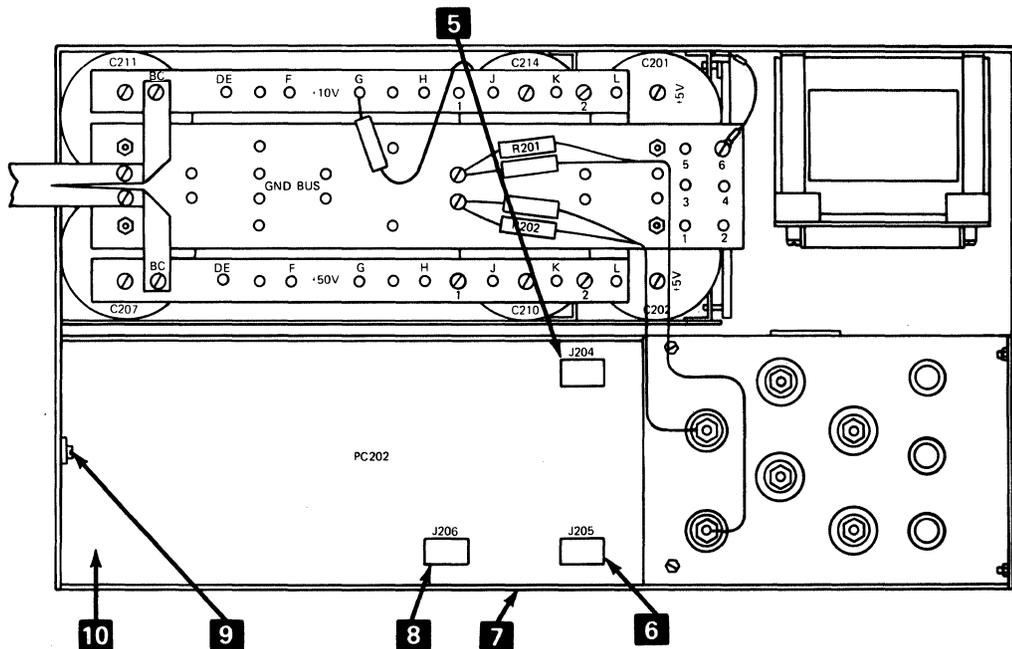
3611 Servo Power AMP Card

Removal

1. Switch off the power.
2. Open the left end cover (1005).
3. Switch off the ac circuit breaker **3**.
4. Disconnect the power cable from the outlet.
5. Open the logic gate **2**. The gate swings open as shown; the latch **1** is a spring latch.
6. Remove the power supply cover **4**.
7. Remove connectors at J204 **5**, J205 **6**, and J206 **8**.
8. Remove the screw at **7**. The screw is through the side of the power supply frame.
9. Remove the screw at **9** that fastens the left end of the card to the chassis.
10. Lift the left end of the servo power AMP card **10** to remove it from the machine.



End of procedure.

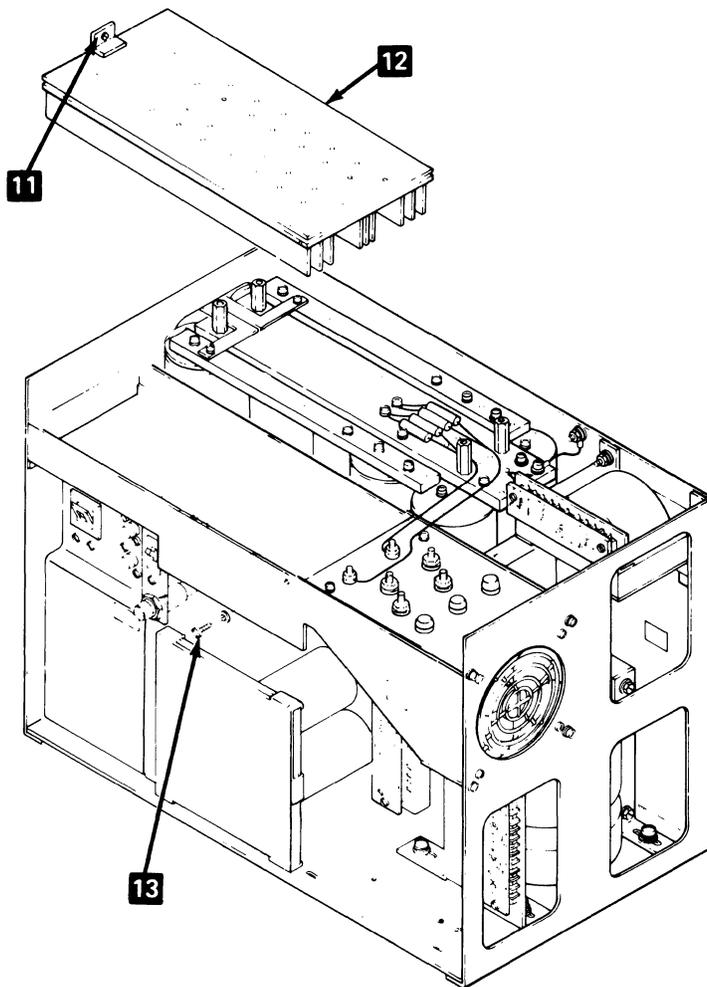


3611 Servo Power AMP Card (Continued)

Reinstall

1. Place the servo power AMP card **10** in position, and install the screws **7** and **9**.
2. Reinstall connectors at J204 **5**, J205 **6**, and J206 **8**.
3. Reinstall the power supply cover **4**.
4. Close and fasten the logic gate **1**.
5. Connect the power cable to the outlet.
6. Switch on the ac circuit breaker **3**.
7. Close and fasten the left end cover (1005).
8. Switch on the power.
9. Set the mode switch to "Test" and press start to verify operation.
10. See "3104 Forms Feed Electronic Adjustments" in this chapter, and complete all adjustments.

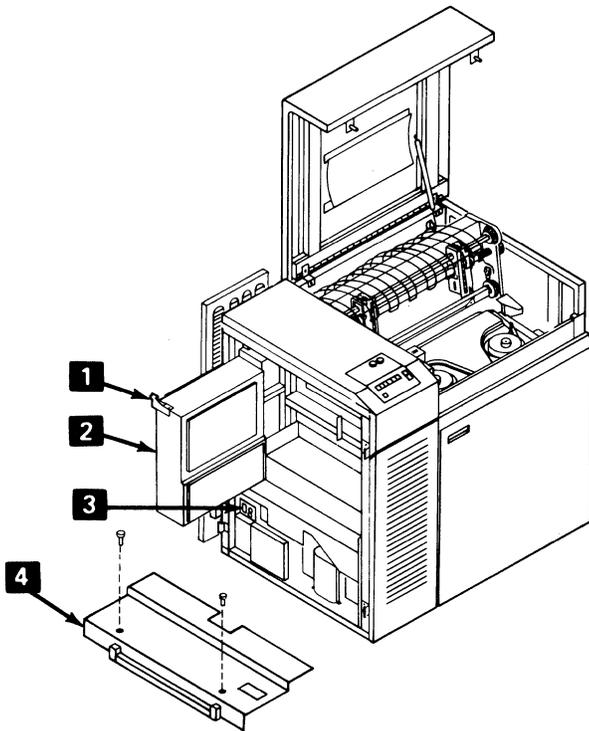
End of procedure.



3612 Transformer T202 (50-volt)

Removal

1. Switch off the power.
2. Open the left end cover (1005).
3. Switch off the ac circuit breaker **3**.
4. Disconnect the power cable from the customer's outlet.
5. Open the logic gate **2**. The gate swings open as shown; the latch **1** is a spring latch.
6. Remove the power supply cover **4**.



7. Remove the safety covers and the connectors **5** from the capacitor (C215).

CAUTION

Always discharge the capacitors by placing a screwdriver between each terminal and ground.

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8. Remove the screws **7** on the brackets that hold the capacitor. Remove the capacitor and brackets **6**.
 9. Label and remove the connections from T202. Refer to YA000.
 10. Remove the four screws **8** at the base of the transformer (T202).

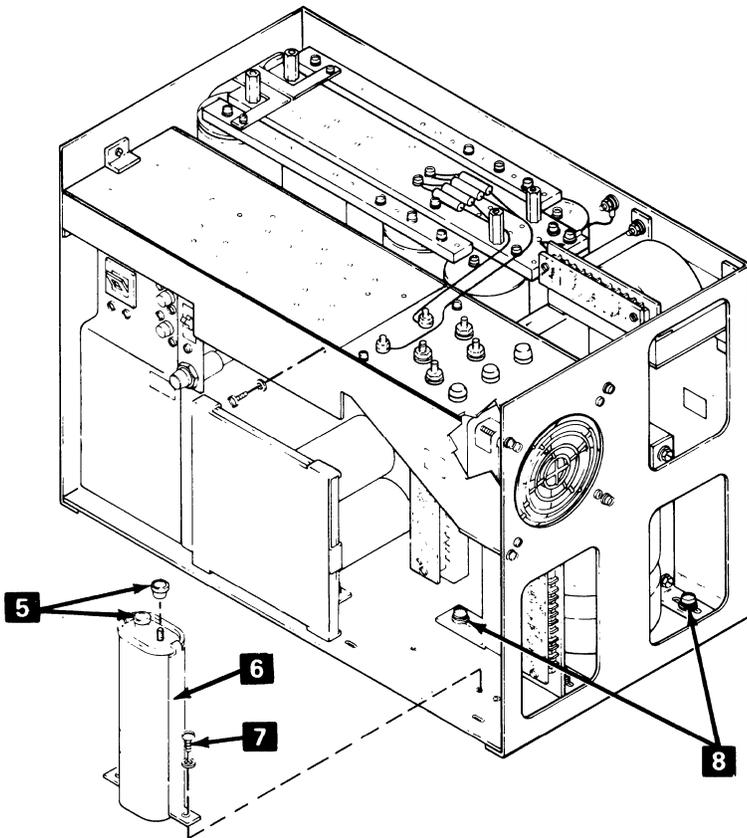
End of procedure.

3612 Transformer T202 (50-volt) (Continued)

Reinstall

1. Fasten the transformer with the four screws at **8**.
2. Install the connections to T202.
3. Reinstall the brackets **6** and install capacitor C215. Place the capacitor between the brackets, then fasten the screws **7** to hold the capacitor.
4. Install the connections **5** and the safety covers on the capacitor.
5. Reinstall the power supply cover **4**.
6. Close and latch the logic gate **2**.
7. Connect the power cable to the outlet.
8. Switch on the ac circuit breaker **3**.
9. Close and fasten the left end cover (1005).
10. Switch on the power.
11. Set the mode switch to "Test" and press start to verify operation.

End of procedure.

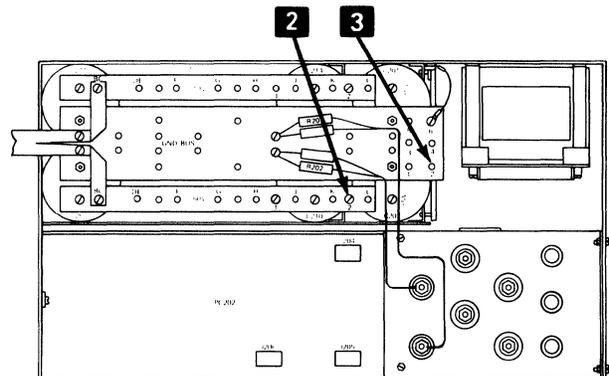
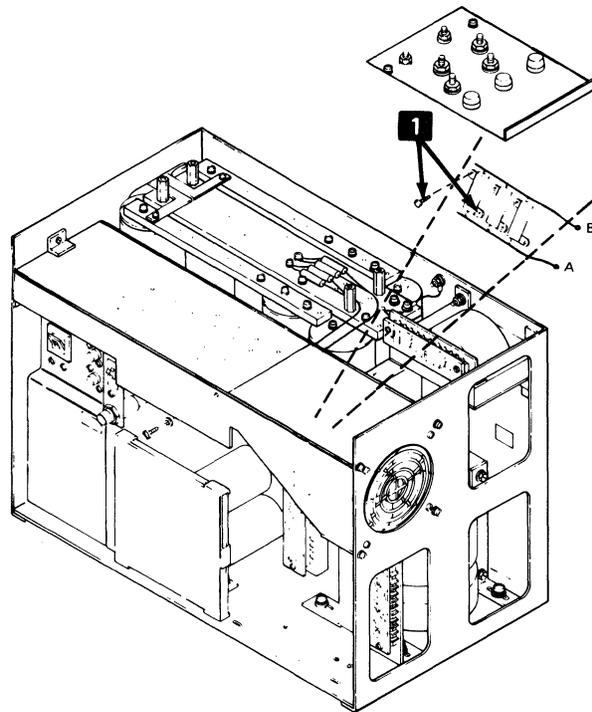


3613 Resistor Assembly (R205, R206, R207)

Removal

1. Switch off the power.
2. Perform steps 2 through 6 of the diode assembly removal (3609).
3. Remove the two screws **1** from the resistors (R205, R206, R207).
4. Label and remove the connections from the capacitor and bar assembly. Refer to YA000.

End of procedure.

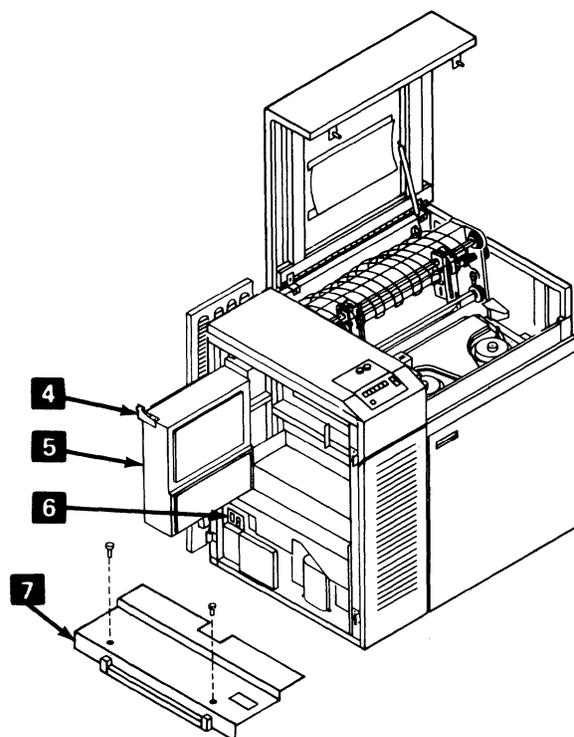


3613 Resistor Assembly (R205, R206, R207) (Continued)

Reinstall

1. Fasten the resistor assembly to the power supply frame with the two screws **1** in each resistor (R205, R206, R207).
2. Reinstall the connections to the capacitor and bar assembly. Refer to YA000.
3. Reinstall the diode assembly in the power supply frame (3609).
4. Reinstall the power supply cover **7**.
5. Close and latch the logic gate **5**.
6. Connect the power cable to the customer's outlet.
7. Switch on the ac circuit breaker **6**.
8. Close and fasten the left end cover of the (1005).
9. Switch on the power.
10. Set the mode switch to "Test" and press start to verify operation.

End of procedure.



3614 Resistor R241, Cable P206, and Fuse F209

Removal

1. Switch off the power.
2. Open the left end cover (1005).
3. Switch off the ac circuit breaker **3**.
4. Disconnect the power cable from the customer's outlet.
5. Open the logic gate **2**.
6. Remove the power supply cover **4**.
7. Disconnect the cable connector (P206) **5** from the Servo Power Driver Card.
8. Remove the connection **6** from the +10 V Bus (I) to the cable connector (P206).

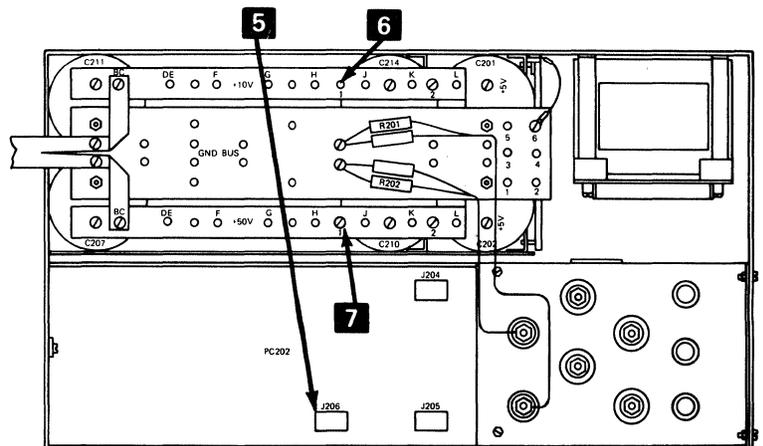
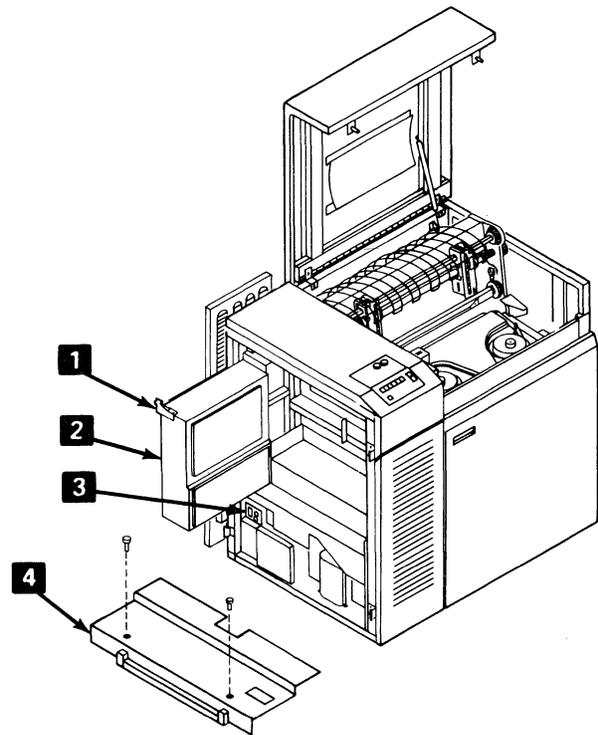
Note: You have more than one connection at this point, so make sure that you remove the wire from the P206 connector only.

9. Remove fuse holder and fuse F209 **10**.
10. Remove the connection **7** from the 50 V bus (I) to the fuse holder F209A.

Note: Make sure you only remove the wire from F209A.

11. Remove the two screws **11** from the resistor (R241).

End of procedure.

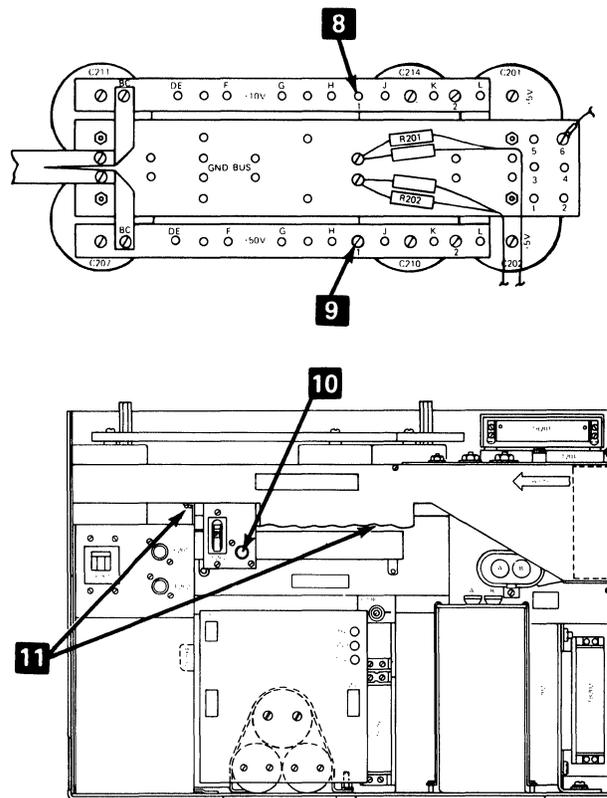


3614 Resistor R241, Cable P206, and Fuse F209 (Continued)

Reinstall

1. Fasten the resistor to the power supply frame with two screws **11**.
2. Connect the terminal from F209A to the 50 V bus (I) **7**.
3. Install fuse holder F209 **10** and insert the fuse.
4. Connect the terminal from P206-3 to the 10 V bus (I) **6**.
5. Install the cable connector (P206) to the Servo Power Driver Card at J206 **5**.
6. Reinstall the power supply cover **4**.
7. Close and latch the logic gate **2**.
8. Connect the power cable to the outlet.
9. Switch on the ac circuit breaker **3**.
10. Close and fasten the left end cover (1005).
11. Switch on the power.
12. Set the mode switch to "Test" and press start to verify operation.

End of procedure.

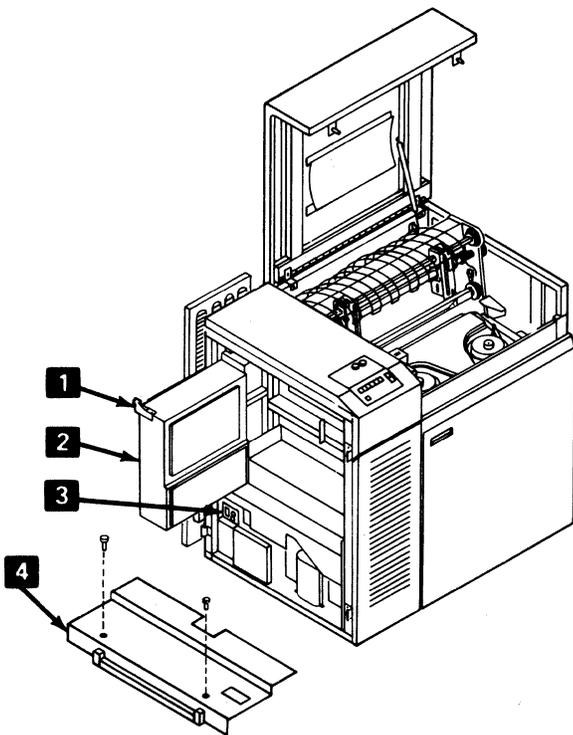


3615 Fan, Servo Power AMP

Removal

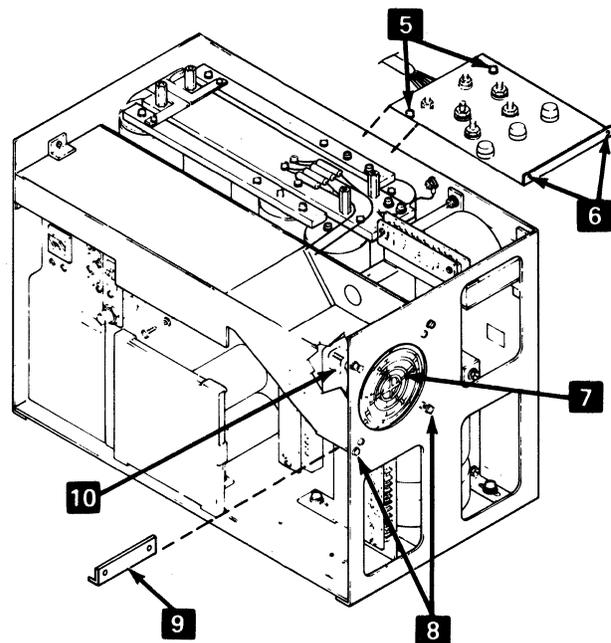
1. Switch off the power.
2. Open the left end cover (1005).
3. Switch off the ac circuit breaker **3**.
4. Disconnect the power cable from the customer's outlet.
5. Open the logic gate **2**. The gate swings open as shown, the latch **1** is a spring latch.
6. Remove the power supply cover **4**.
7. Remove the screws and safety cover at **5** and **6**. The screws **6** are fastened with a nut and washer.
8. Lift the diode assembly from the power supply frame and carefully set it to the side.
9. Remove the two screws **8** that fasten the bracket **9** to the power supply frame.
10. Remove the fan **10** and the fan guard **7**.
11. Remove the power connections on the bottom of the fan. The fan has a two-connector cable.

End of procedure.



Reinstall

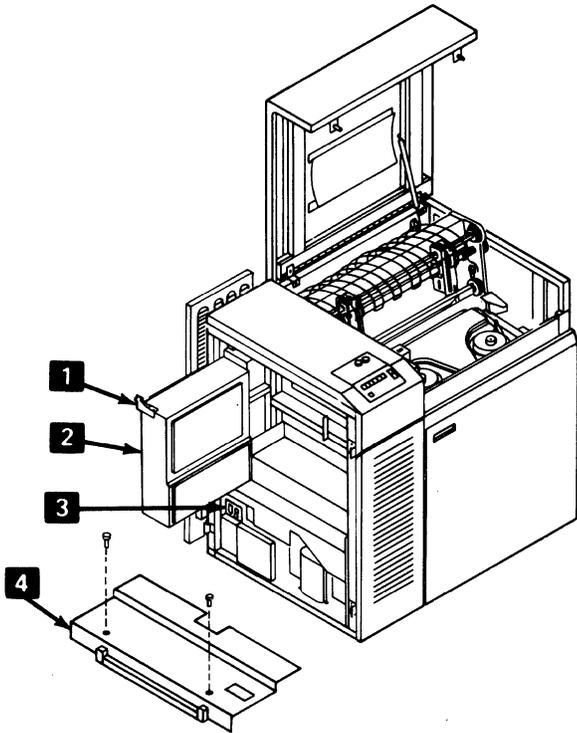
1. Install the power connections to the bottom of the fan.
- Note:** Install the fan with the air flow directed into the machine.
2. Install the fan **10** and fan guard **7** in the power supply frame with a screw, washer, spacer, and nut as shown.
 3. Reinstall the bracket **9** to the power supply frame. Fasten the bracket with the two screws **8** as shown.
 4. Perform steps 4 through 10 of the Diode Assembly reinstallation (3609).



3616 Resistor R208

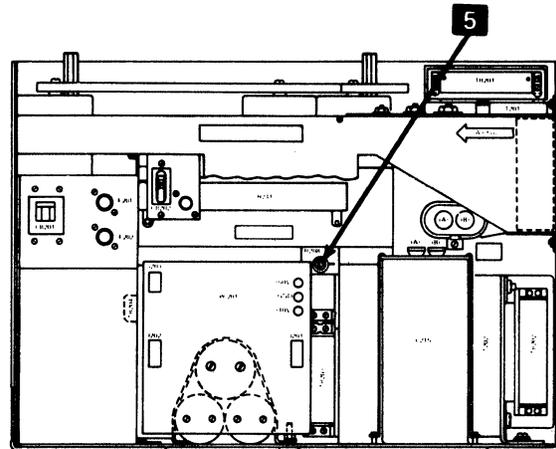
Removal

1. Switch off the power.
2. Open the left end cover (1005).
3. Switch off the ac circuit breaker **3**.
4. Disconnect the power cable from the customer's outlet.
5. Open the logic gate **2**. The gate swings open as shown, the latch **1** is a spring latch.
6. Remove the power supply cover **4**.



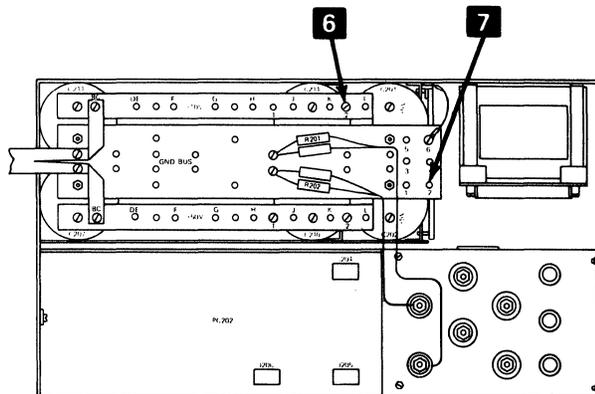
7. Remove the screw **5** that fastens the resistor (R208) to the power supply frame, then, label and remove the connections from the capacitor and bar assembly. Refer to YA000 for the wiring information.

End of procedure.

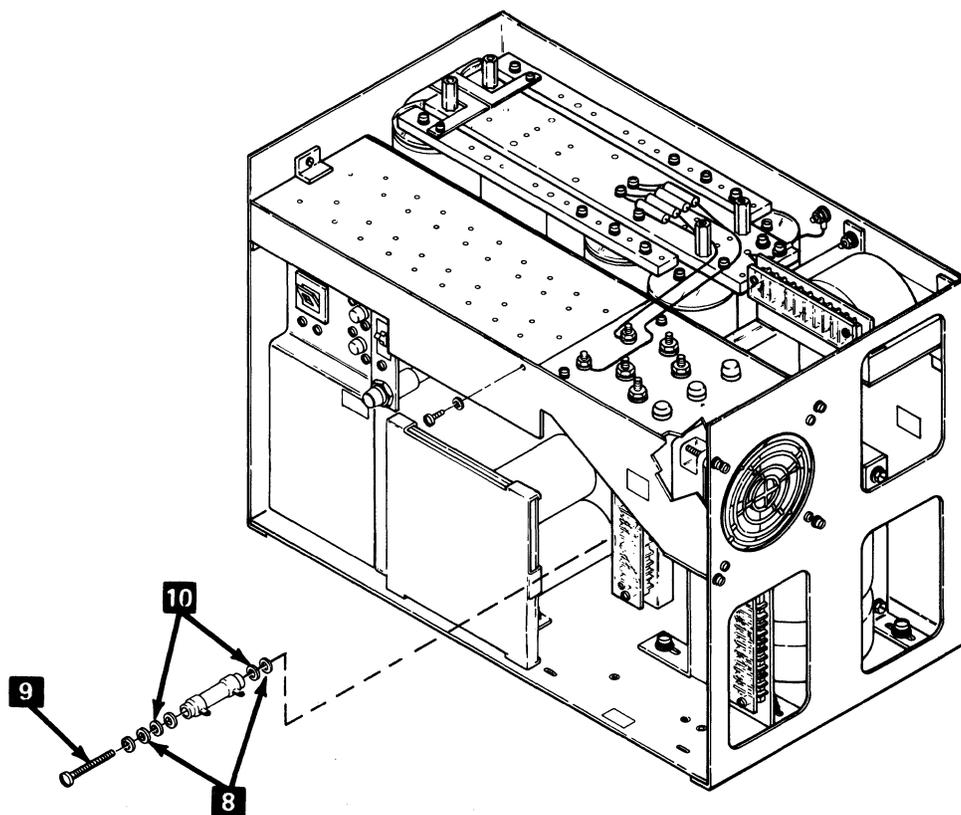


3616 Resistor R208 (Continued)**Reinstall**

1. Fasten the connections from the resistor (R208) to the capacitor and bar assembly. Refer to YA000 for wiring information.
2. Fasten the resistor (R208) to the power supply frame. Assemble as shown with washers **8**, insulators **10**, and screw **9**.
3. Reinstall the power supply cover **4**.
4. Close and latch the logic gate **2**.
5. Connect the power cable to the customer's outlet.
6. Switch on the ac circuit breaker **3**.
7. Close and fasten the left end cover (1005).
8. Switch on the power.
9. Set the mode switch to "Test" and press start to verify operation.



End of procedure.



3617 Capacitor and Bar Assembly

Removal

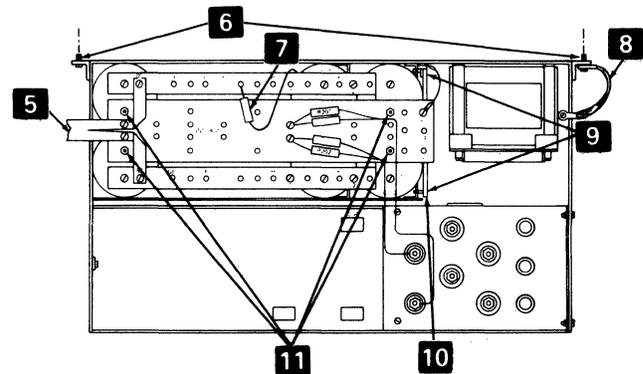
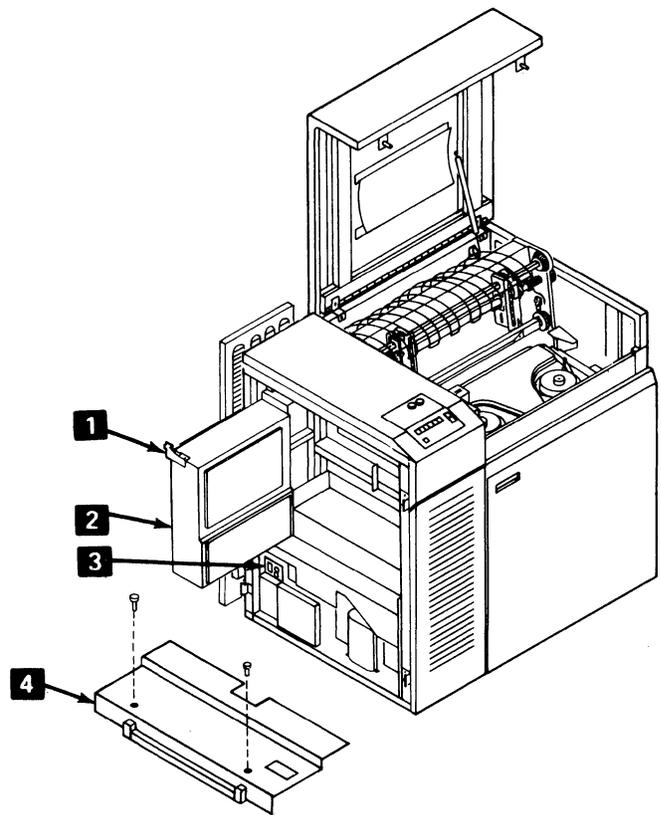
1. Switch off the power.
2. Remove the left cover (1005).
3. Switch off the ac circuit breaker.
4. Disconnect the power cable from the customer's outlet.
5. Open the logic gate **2** by releasing latch **1**.
6. Remove the left rear cover (1007).
7. Remove the left front cover (1006).
8. Remove the power supply cover **4**.
9. Remove the two screws that fasten the customer access panel to the frame. You do not have to disconnect any cables.
10. Remove the two screws **6** that fasten the power supply to the machine frame.
11. Remove the ground wire (yellow/green) **8** from the frame.
12. Remove the four screws **11** and remove the safety shield on the capacitor and bar assembly.
13. Remove the FDS cables **5** from the capacitor and bar assembly.
14. Remove the resistor **7** (to ribbon drive motors) from the 10 V bus (G).

CAUTION

The power supply weighs 68 Kg (150 lbs).

15. Pull the power supply 10 cm (4 in) out of the machine frame.
16. Loosen the two screws **9** from the bracket **10**

Note: Do not remove the screws. Loosen the screws by inserting a screwdriver below the transformer (T201).



3617 Capacitor and Bar Assembly (Continued)

CAUTION

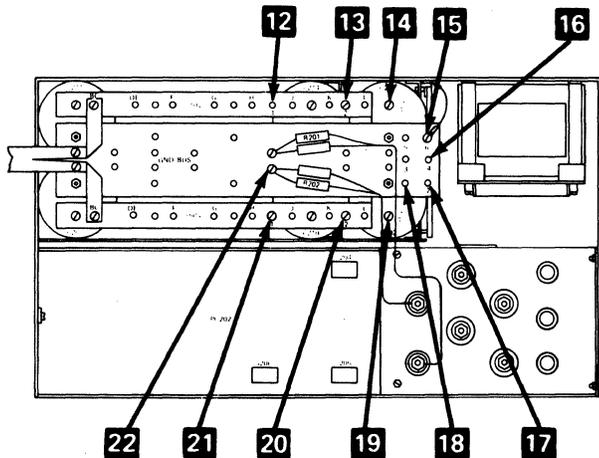
Always discharge the capacitors, by placing a screwdriver from each terminal to ground, before removing the connections in the following steps.

Note: Label and tie the following connections to make reinstallation easier.

17. Remove the connections:

Gnd bus 22
 +50V Bus - 1 21
 +50V bus - 2 20
 C202 19
 Gnd bus - 1 18
 Gnd bus - 2 17
 Gnd bus - 4 16
 Gnd bus - 6 15
 (green stripe)
 C201 14
 +10V bus - 2 13
 +10V bus - 1 12

18. Lift the capacitor and bar assembly out of the power supply chassis.

**Reinstall**

1. Place the assembly in the power supply chassis.
2. Reinstall the connections:

Gnd bus 22
 +50V Bus - 1 21
 +50V bus - 2 20
 C202 19
 Gnd bus - 1 18
 Gnd bus - 2 17
 Gnd bus - 4 16
 Gnd bus - 6 15
 (green stripe)
 C201 14
 +10V bus - 2 13
 +10V bus - 1 12

3. Tighten the two screws 9 on the bracket 10.
4. Position the power supply in the machine frame.
5. Fasten the power supply to the frame with the two screws 6.
6. Reinstall the frame ground wire 8 to the frame.
7. Reinstall the resistor 7 to the 10 V bus (G).
8. Reinstall the FDS cables 5.
9. Reinstall the safety shield with four screws 11.
10. Reinstall the power supply cover 4 screws.
11. Reinstall the left front cover (1006).
12. Reinstall the customer access panel.
13. Reinstall the left rear cover (1007).
14. Reinstall the left end cover (1005); do not close the cover.
15. Close and latch the logic gate 2.
16. Connect the power cable to the outlet.
17. Switch on the ac circuit breaker CB201 3.
18. Close and latch the left end cover (1005).
19. Switch on the power.
20. Set the mode switch to "Test" and press start to verify operation.

End of procedure.

3618 Power Supply Cover

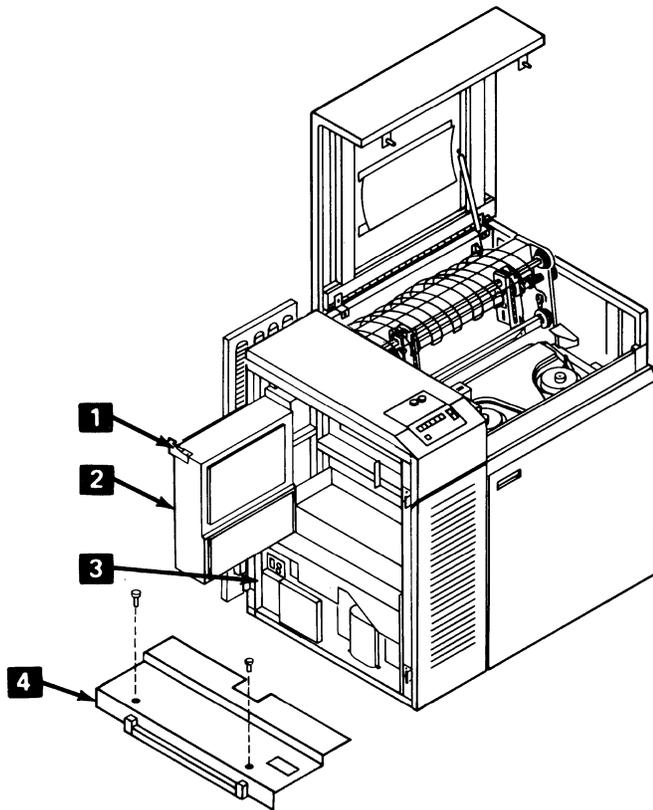
Removal

1. Switch off the power.
2. Open the left end cover (1005).
3. Switch off the ac circuit breaker **3**.
4. Open the logic gate **2**. The gate swings open as shown; the latch **1** is a spring latch.
5. Remove the two screws and slide the cover **4** out of the frame.

End of procedure.

Reinstall

Reverse the removal sequence.



3800 Ribbon Drive Assembly

3801 Description

Two stepping motors are used for ribbon drive and control. When one motor is driven (take-up spool), the other motor (supply spool) sends emitter pulses back to the printer control unit. The emitter pulses are sensed for ribbon jam or for end-of-ribbon conditions.

When the supply spool fails to move, the operation of the motors is reversed. Two ribbon direction changes inside approximately 9 meters (30 feet) is interpreted as a ribbon jam. This sets an error condition and stops the printer.

The fan for the print actuators is also located in the ribbon drive assembly.

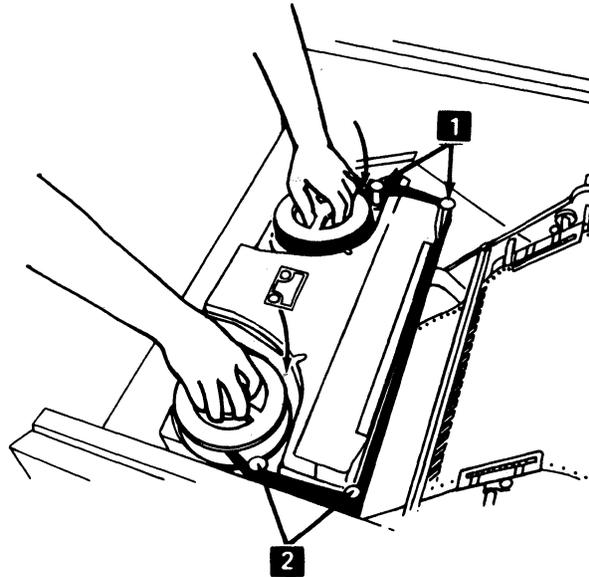
3802 Ribbon

Removal

1. Open the top cover.
2. Open the forms feed assembly.
3. Lift both ribbon reels and remove the ribbon from the guideposts **1** and **2**.
4. Wind the loose ribbon on either reel.

Reinstall

1. Unwind enough ribbon from either reel to fit around the guideposts, and place the reels on the drive spindles. The ribbon should unwind from the outside.
2. Wind the loose ribbon on either reel.
3. Close the forms feed assembly.
4. Close the top cover.



3803 Actuator Fan Cover

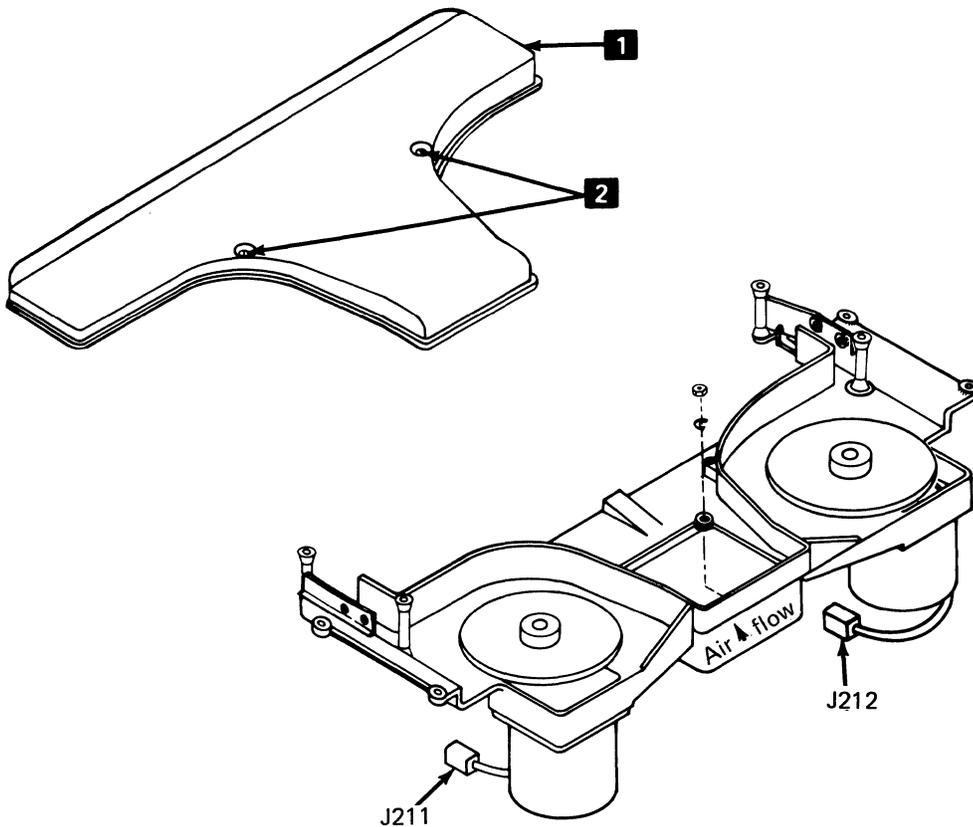
Warning: As a safety precaution, and to prevent damage to the print actuators, do not operate the printer with the fan cover removed.

Removal

1. Switch off the power.
2. Remove the ribbon (3802).
3. Remove the screws **2**.
4. Remove the cover **1**.

Reinstall

1. Place the cover **1** on the ribbon drive assembly.
2. Insert and tighten the screw **2**.
3. Install the ribbon (3802).



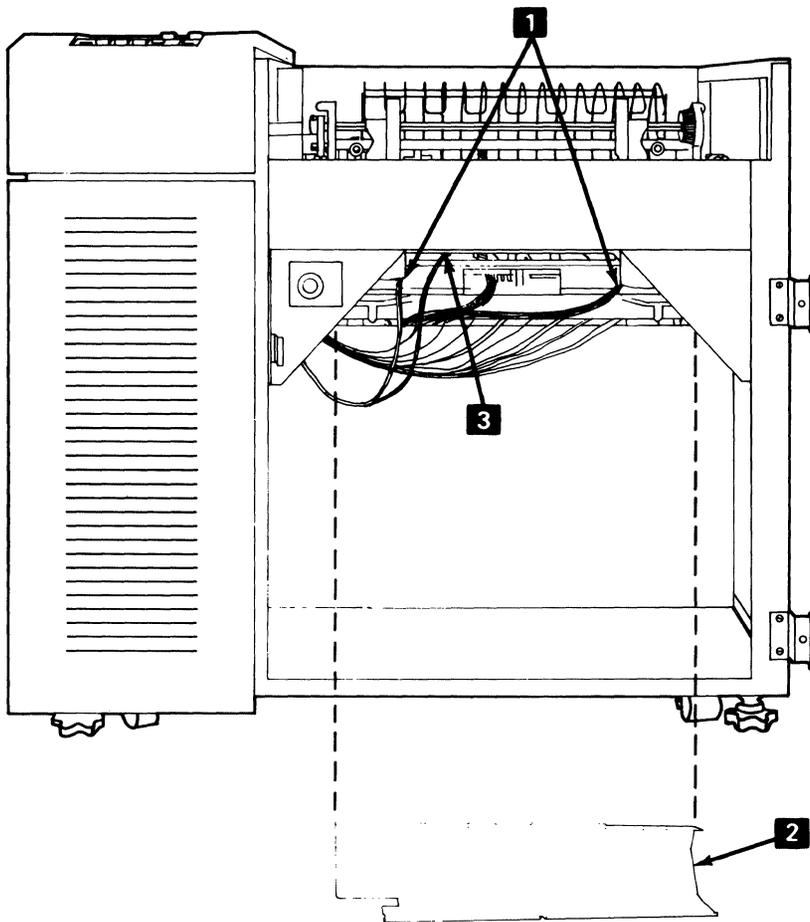
3804 Ribbon Drive

Service Checks

1. Make sure the ribbon drive is free to turn.
2. Check the play in the flanged gear drive (gear wear).
3. Check that the posts are tight and not bent.
4. Check the clearance between the tab on the ribbon drive casting **7**, and the shaft **6** on both sides of the ribbon drive assembly.

Removal

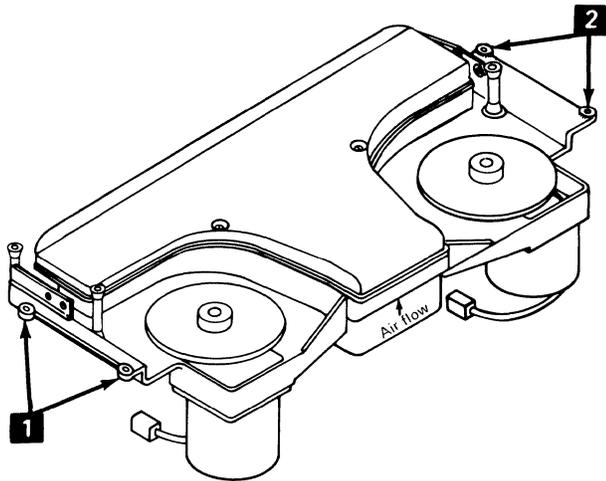
1. Switch off the power.
2. Open the top cover.
3. Open the forms feed assembly.
4. Open the front cover.
5. Remove the safety cover **2**, located under the ribbon drive unit, that protects the linear encoder and amplifier assemblies.
6. Disconnect the cable plugs **1** and **3**.



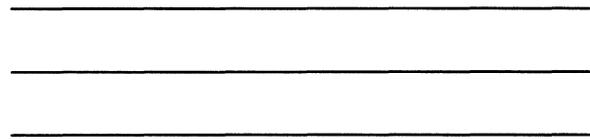
3804 Ribbon Drive (Continued)

7. Remove the ribbon (3802).
8. Remove the four mounting screws **4** and **5**.
9. Holding the ribbon assembly by both ends, lift it straight up until it clears the machine.

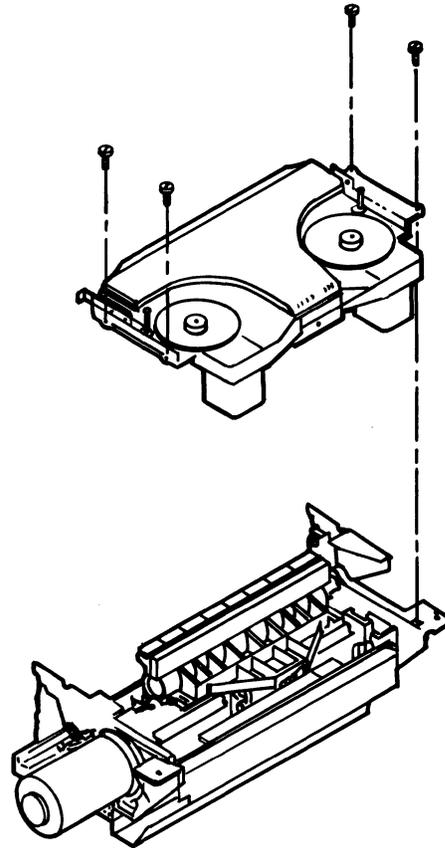
End of procedure.



Warning: Check to see if the fan is running. The actuators may be damaged if the printer is operated when the fan is not running.

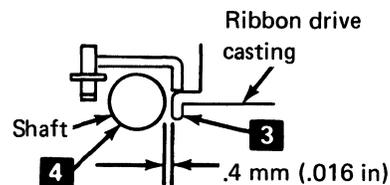


End of procedure.



Reinstall

1. Place the ribbon assembly on the casting as far left as possible. Ensure that the three motor cables are hanging freely below the assembly; then insert the four mounting screws **4** and **5**, but do not tighten them.
2. Set the clearance between the tab on the ribbon drive casting **7**, and the shaft **6** on both sides of the ribbon drive assembly; then tighten the four mounting screws.
3. Install the ribbon (3802).
4. Connect the cable plugs to the two ribbon drive motors and the fan motor.
5. Reinstall the safety cover over the linear encoder and cables.
6. Close the front cover.
7. Close the forms feed assembly.
8. Close the top cover.
9. Switch on the power. The power-on tests will check the ribbon drive assembly.



3805 Ribbon Drive Motor/Drive Gear

Service Checks

1. Make sure the ribbon drive is free to turn.
2. Check the play in the flanged gear drive (gear wear).
3. Check that the posts are tight and not bent.
4. Check the clearance between the tab on the ribbon drive casting, and the shaft on both sides of the ribbon drive assembly. (Refer to 3804.)

Removal

Note: The ribbon drive motors and fan can be removed without removing the ribbon drive assembly from the machine. However, working on the unit is easier if the ribbon drive assembly is removed from the machine.

1. Remove the ribbon drive unit (3804).
2. With a small screwdriver, remove the clip **2**, and lift the flange gear **1** straight up until it clears the shaft.

Note: The flange gear shaft **3** does not have to be removed to remove the drive motor. If you do not need to remove it, skip step 3.

3. Remove the flange gear shaft **3** by unscrewing the shaft.

Note: If you are replacing the motor **5**, do not remove the drive gear **4**. The new motor will have the drive gear attached to the shaft. Skip step 4.

If you are replacing the drive gear, complete step 4 and skip step 5.

4. A clamp holds the ribbon drive gear **4** to the motor shaft. Loosen the clamp and remove the gear.
5. Remove the ribbon drive motor **5** from under the casting **6**. The motor is held by four bolts.

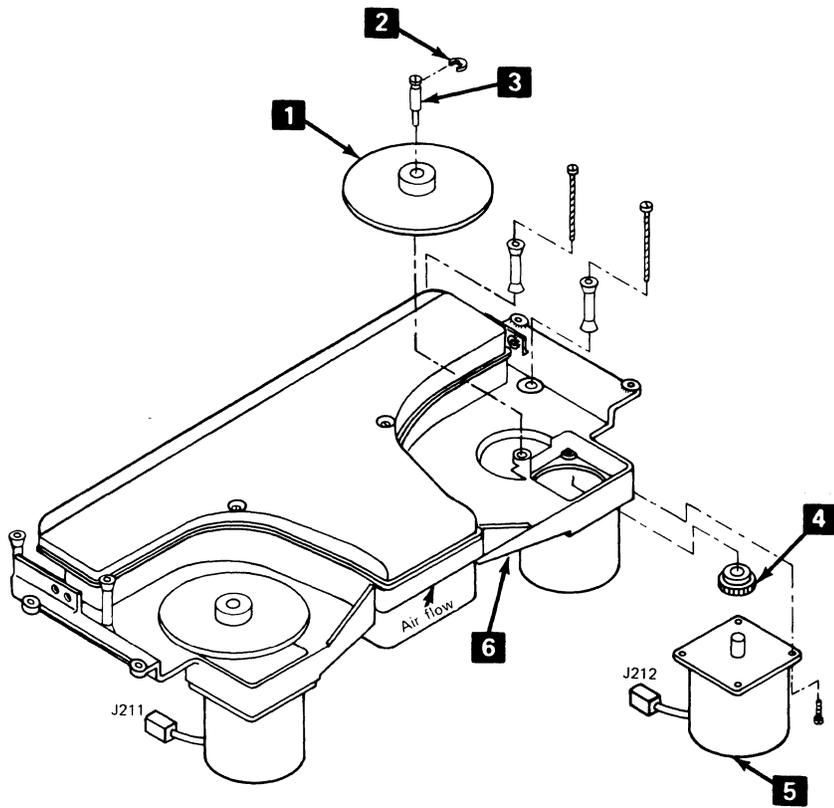
End of procedure.

Reinstall

1. Install the drive gear **4** flush with the end of the motor shaft.
2. Place the motor **5** on the casting **6**, with the cable plug on the left side. Tighten the four mounting bolts. Reinstalling the motor requires no adjustment.
3. Install the flange gear shaft **3**, if removed.
4. Place the flange gear **1** on the shaft. Turning the flange gear slightly, in either direction, may be necessary to ensure a correct fit with the drive gear on the motor shaft.
5. Press the clip **2** on the shaft **3** until it locks into place.
6. See "3804 Ribbon Drive" for the reinstall and adjustment procedure.

End of procedure.

3805 Ribbon Drive Motor/Drive Gear (Continued)



3806 Print Actuator Fan

Removal

1. Switch off the power.
2. Open the left end cover (1005).
3. Switch off the ac circuit breaker.
4. Open the front cover.
5. Remove the safety cover over the linear encoder and amplifier assemblies.
6. Disconnect the fan cable **5**.
7. Remove the cover **1**.
8. Remove the four mounting screws **2**, and take the fan **4** and guard **3** out from the bottom of the assembly.
9. Lift the guard **6** off the assembly.

End of procedure.

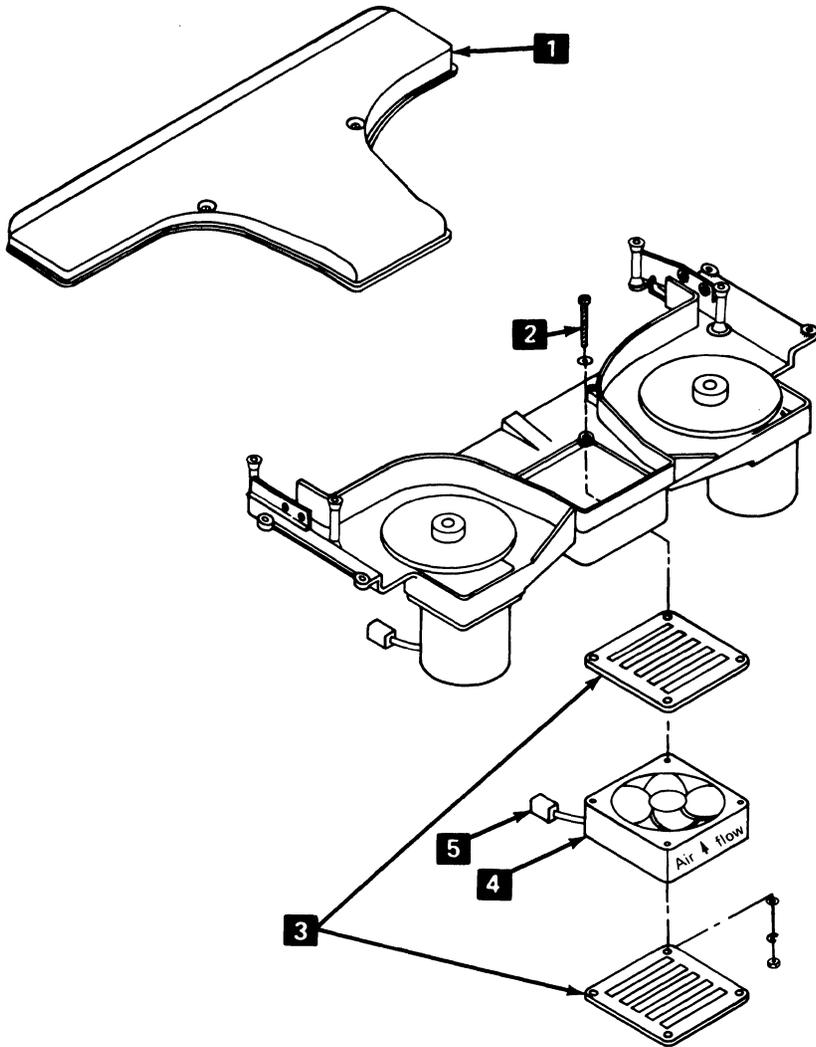
Reinstall

Warning: When installing the fan, ensure that the flow of air is up into the ribbon drive assembly.

-
-
-
1. Install the fan **4**. Place the guard **6** on the top of the assembly; then place the guard **3** on the fan before installing it on the assembly.
 2. Plug in the fan cable **5**.
 3. Reinstall the cover over the emitter and cables.
 4. Reinstall the fan cover **1**. Fully seat the cover before tightening the holding screws.
 5. Close the front cover.
 6. Switch on the ac circuit breaker.
 7. Close and fasten the left end cover.
 8. Switch on the power to verify fan operation.

End of procedure.

3806 Print Actuator Fan (Continued)



3807 Ribbon Shield

Service Checks

1. Check for any physical damage to the ribbon shield.
2. Make sure the ribbon shield is parallel with the lower flange of the drag assembly.
3. Make sure the ribbon shield has been properly installed.

Removal

1. Open the top cover.
2. Open the forms feed assembly.

Note: The ribbon shield may be held to the drag assembly by tape, or by mounting studs and tape.

3. Hold the drag assembly **6** and lift the ribbon shield to remove the shield from the drag assembly.

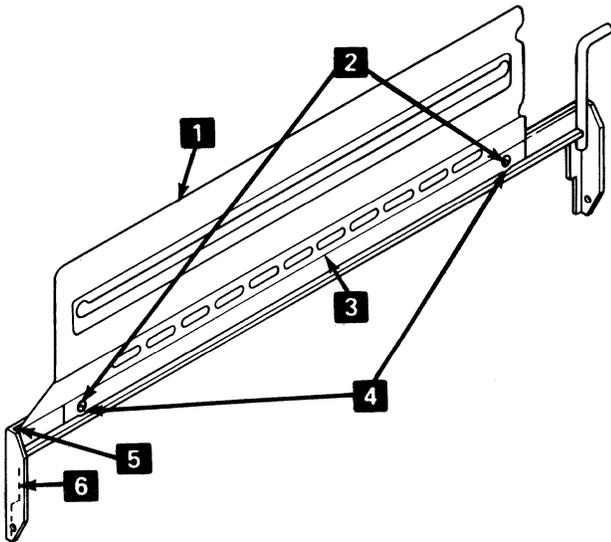
Reinstall (Without Mounting Studs)

1. Clean the drag assembly surface **3** where the ribbon shield tape will be placed.
2. Remove the paper strip from the tape at the lower edge of the ribbon shield **1**.

3. Place the lower left end of the ribbon shield **1** against the left end **5** of the drag assembly.
4. Make sure the ribbon shield is parallel with the lower flange of the drag assembly.
5. Use firm finger pressure to the taped area to fasten the ribbon shield to the drag assembly.
6. Close the forms feed assembly.
7. Close the top cover.

Reinstall (With Mounting Studs)

1. Remove the paper strip from the tape at the lower edge of the ribbon shield.
2. Clean the drag assembly surface **3** where the ribbon shield tape will be placed.
3. Place the lower left end of the ribbon shield **1** against the left end **5** of the drag assembly.
4. Place the ribbon shield on the mounting studs **2**.
5. Use firm finger pressure to the taped area to fasten the ribbon shield to the drag assembly.
6. Close the forms feed assembly.
7. Close the top cover.

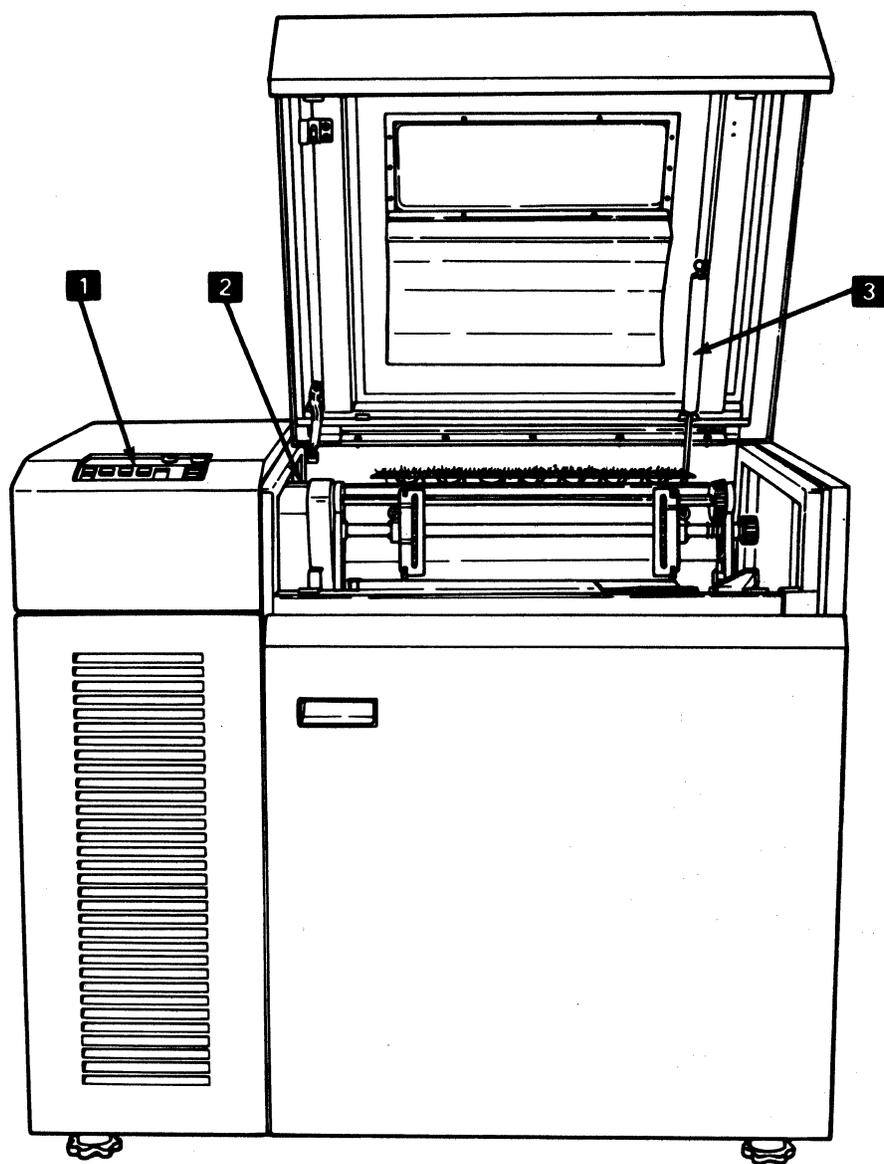


Chapter 4. Reference Information

Location Drawings and Diagrams

This chapter contains the following information:

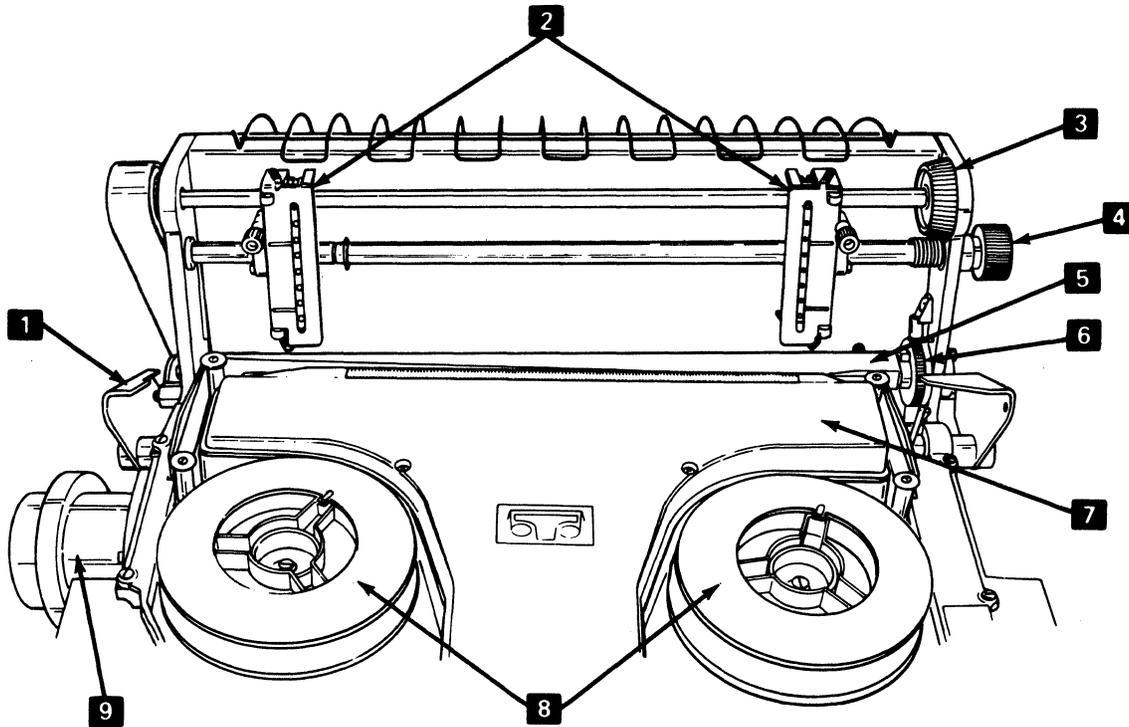
- Component location drawings and diagrams
- Power supply component locations
- Fuse locations
- Formatting command summary
- Formatting command descriptions
- Environmental considerations
- Printer error codes



- 1** Operator panel
- 2** Cover interlock switch
- 3** Gas spring cover support

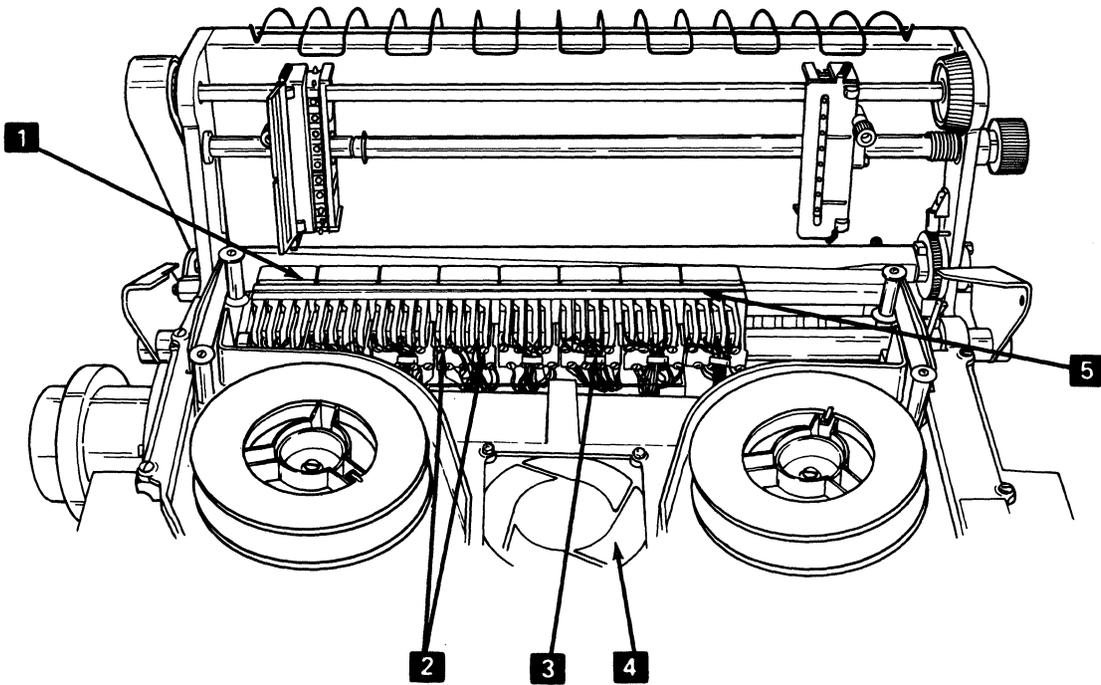
Figure 4-1. Front view





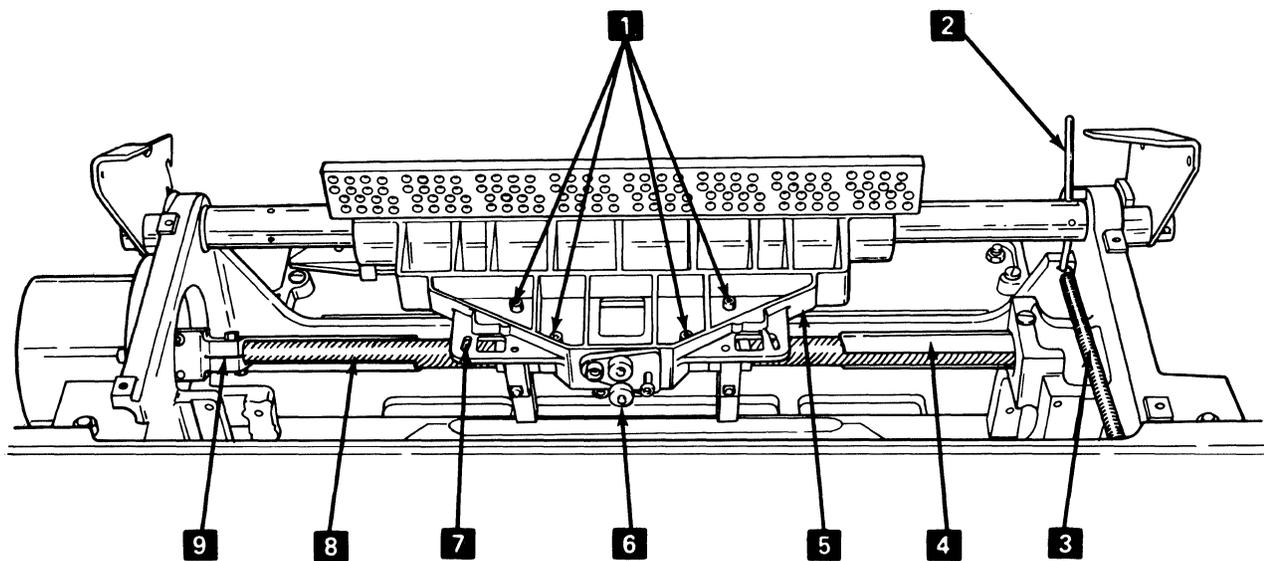
- | | | | |
|----------|-----------------------------------|----------|--------------------------------|
| 1 | Forms feed assembly release latch | 6 | Forms thickness adjustment cam |
| 2 | Forms feed tractors | 7 | Actuator cooling fan cover |
| 3 | Forms vertical adjustment knob | 8 | Ribbon spools |
| 4 | Forms horizontal adjustment knob | 9 | Carrier drive motor |
| 5 | Platen | | |

Figure 4-2. Front view (covers removed)



- 1** Print actuator front oiler
- 2** Print actuator group four
- 3** Print actuator rear oiler
- 4** Actuator assembly cooling fan
- 5** Actuator carrier

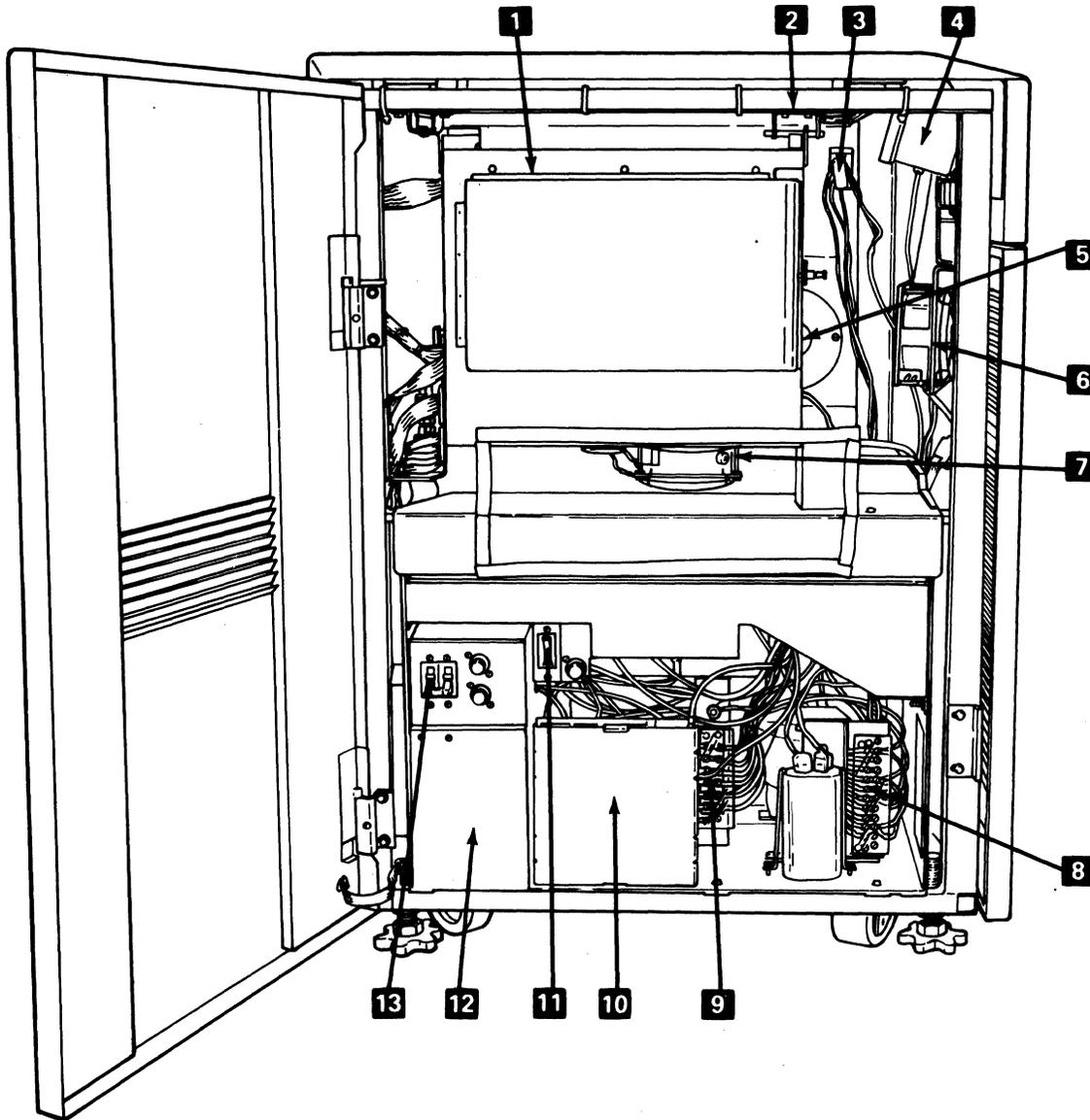
Figure 4-3. Top view



- | | |
|--|---|
| 1 Actuator carrier mounting screws | 6 Actuator carrier vertical thrust bearings |
| 2 Forms thickness cam follower | 7 Actuator carrier horizontal thrust bearing mount |
| 3 Cam follower return spring | 8 Lead screw |
| 4 Actuator carrier stops (both sides on Models 2, 3, and 4) | 9 Split-block coupler |
| 5 Actuator carrier assembly | |

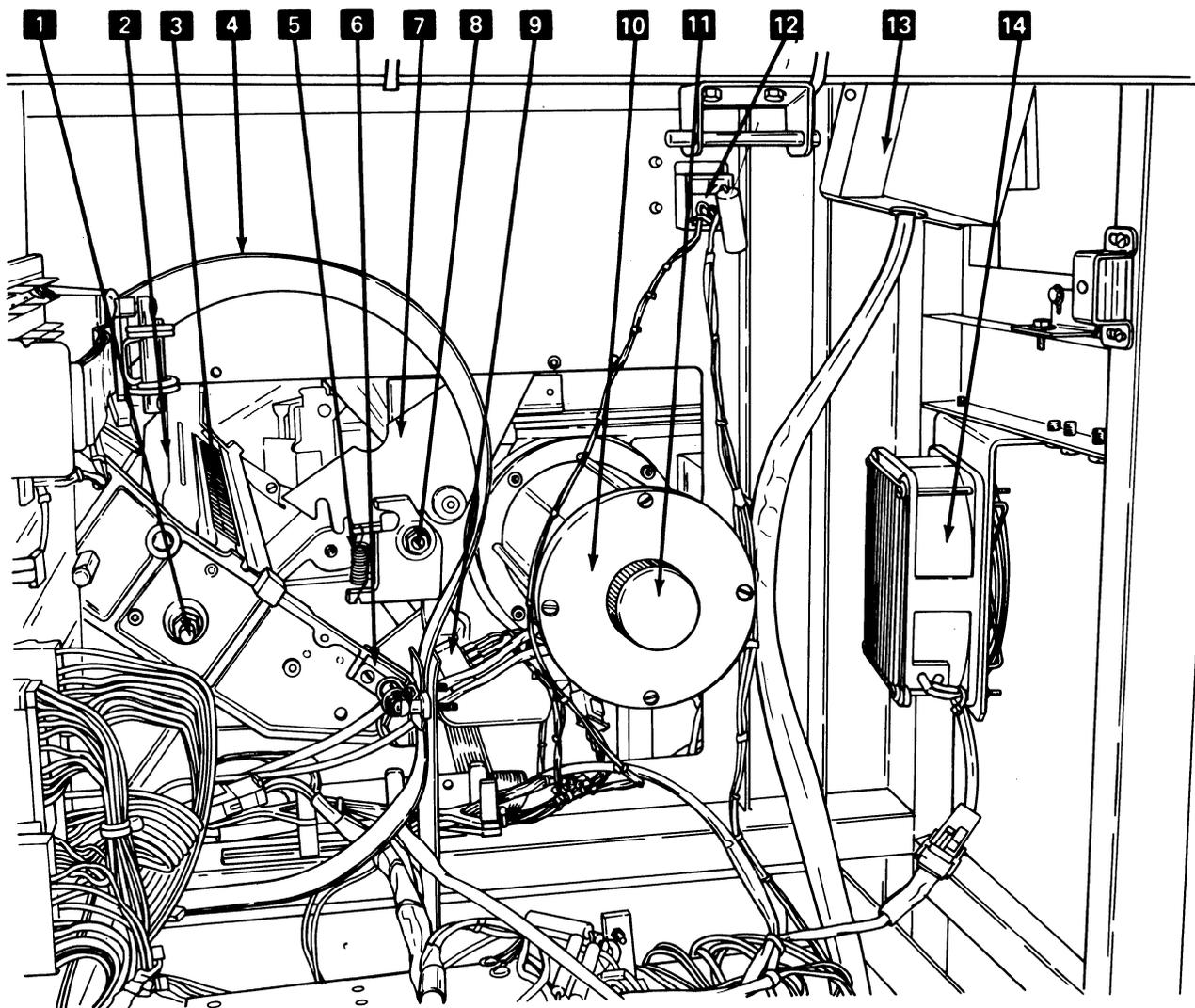
Thrust bar not shown, see '3306 Actuator Carrier'

Figure 4-4. Top view (actuator carrier assembly)



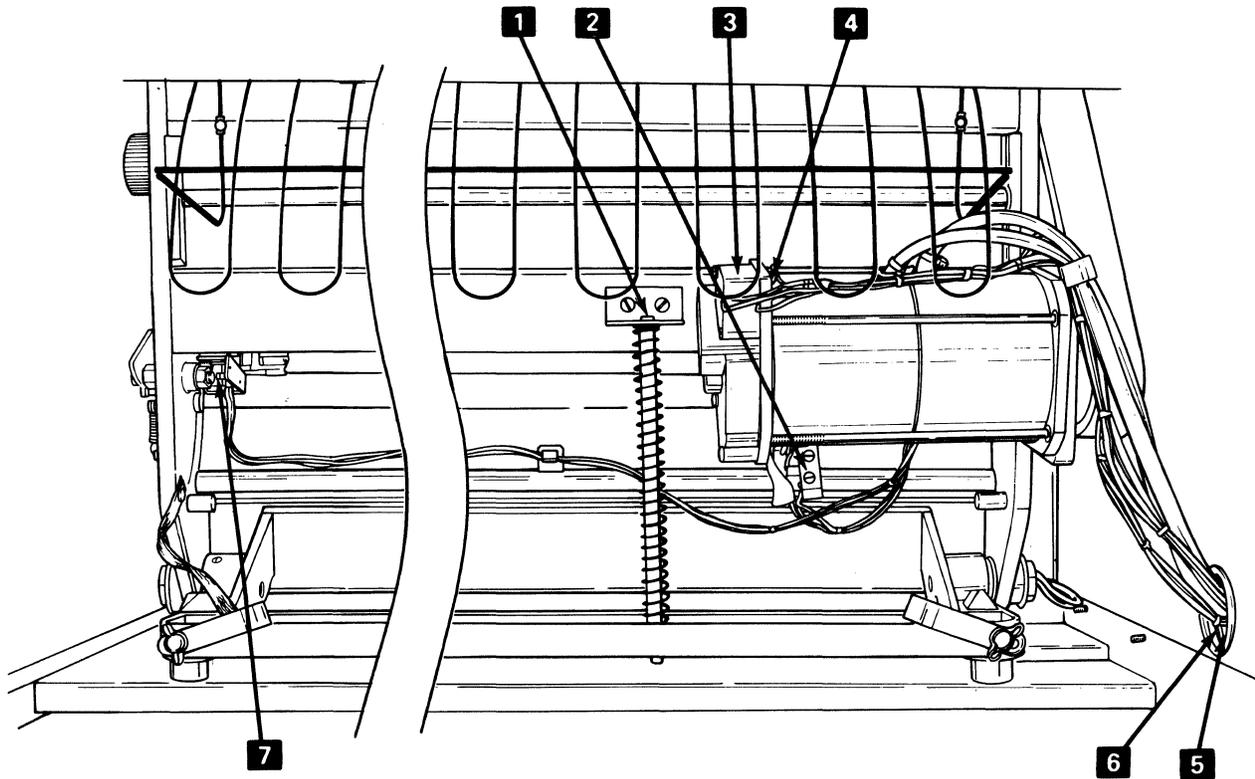
- | | | | |
|----------|---|-----------|------------------------------------|
| 1 | Logic gate | 8 | TB202 |
| 2 | Logic gate latch | 9 | TB203 |
| 3 | Cover interlock switch | 10 | Power sequence card (behind cover) |
| 4 | Power switch | 11 | 5-volt circuit breaker |
| 5 | Actuator carrier drive motor handwheel (knob) | 12 | Power box (K201 behind cover) |
| 6 | Drive motor cooling fan | 13 | Main (ac) circuit breaker (CB201) |
| 7 | Gate cooling fan | | |

Figure 4-5. Left end view



- | | |
|--|---|
| 1 Forms feed assembly eccentric stud | 8 Forms feed assembly endplay adjusting screw |
| 2 Platen | 9 Forms feed assembly interlock switch (platen switch) |
| 3 Forms drag assembly | 10 Actuator carrier drive motor |
| 4 Flat distribution system cables | 11 Actuator carrier drive motor handwheel (knob) |
| 5 Latch spring | 12 Cover interlock switch |
| 6 Forms feed assembly interlock switch (platen switch) operating spring | 13 Power switch safety cover |
| 7 Forms feed assembly release latch (left) | 14 Drive motor cooling fan |

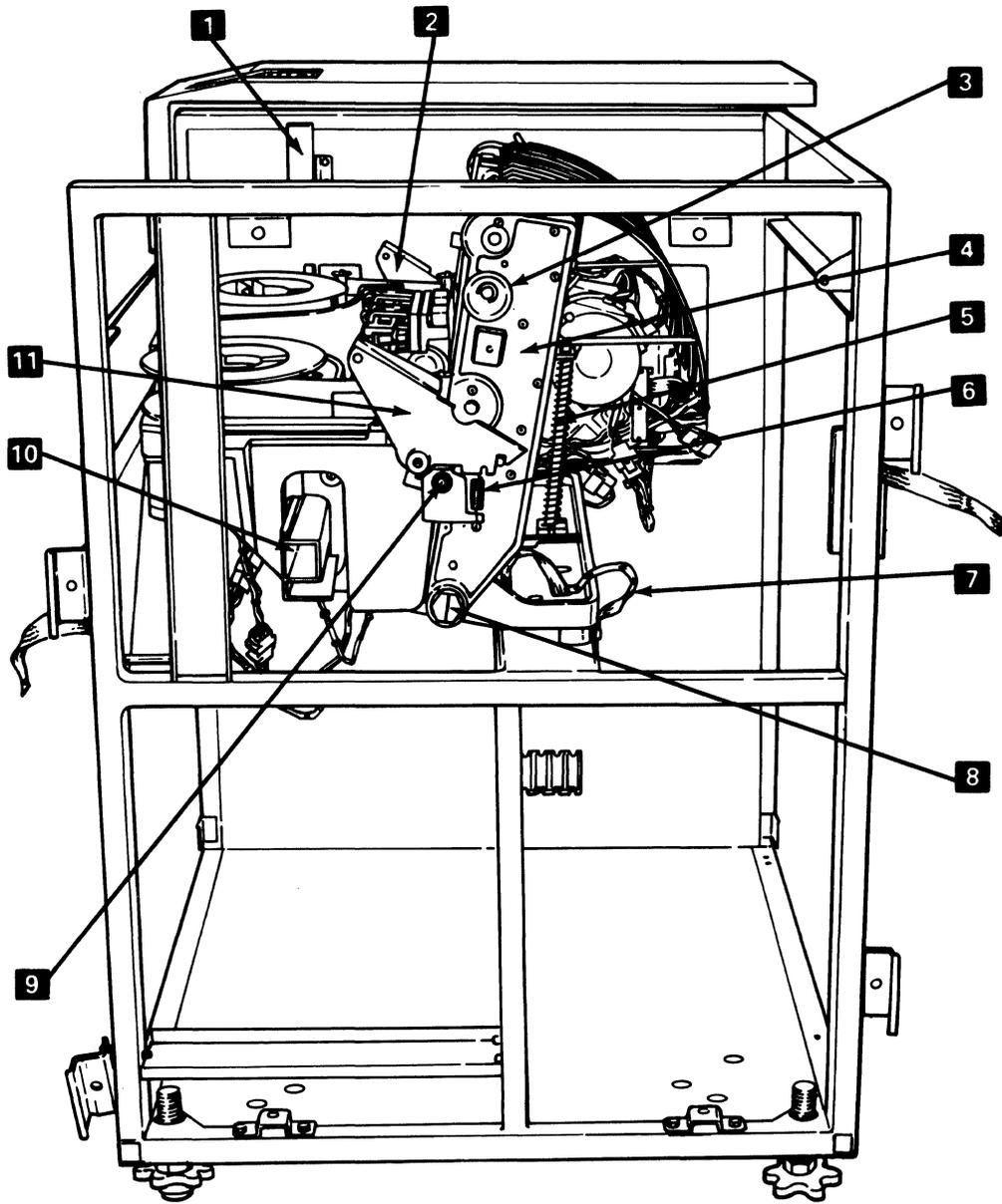
Figure 4-6. Left end (top)



- | | |
|---|--|
| 1 Counterbalance rod and spring | 5 Forms drive motor connectors (J208, P208) |
| 2 End-of-forms sensor | 6 Forms encoder connectors (J210, P210) |
| 3 Forms drive encoder LED assembly | 7 Forms thickness switch |
| 4 Forms quadrature adjusting eccentric | |

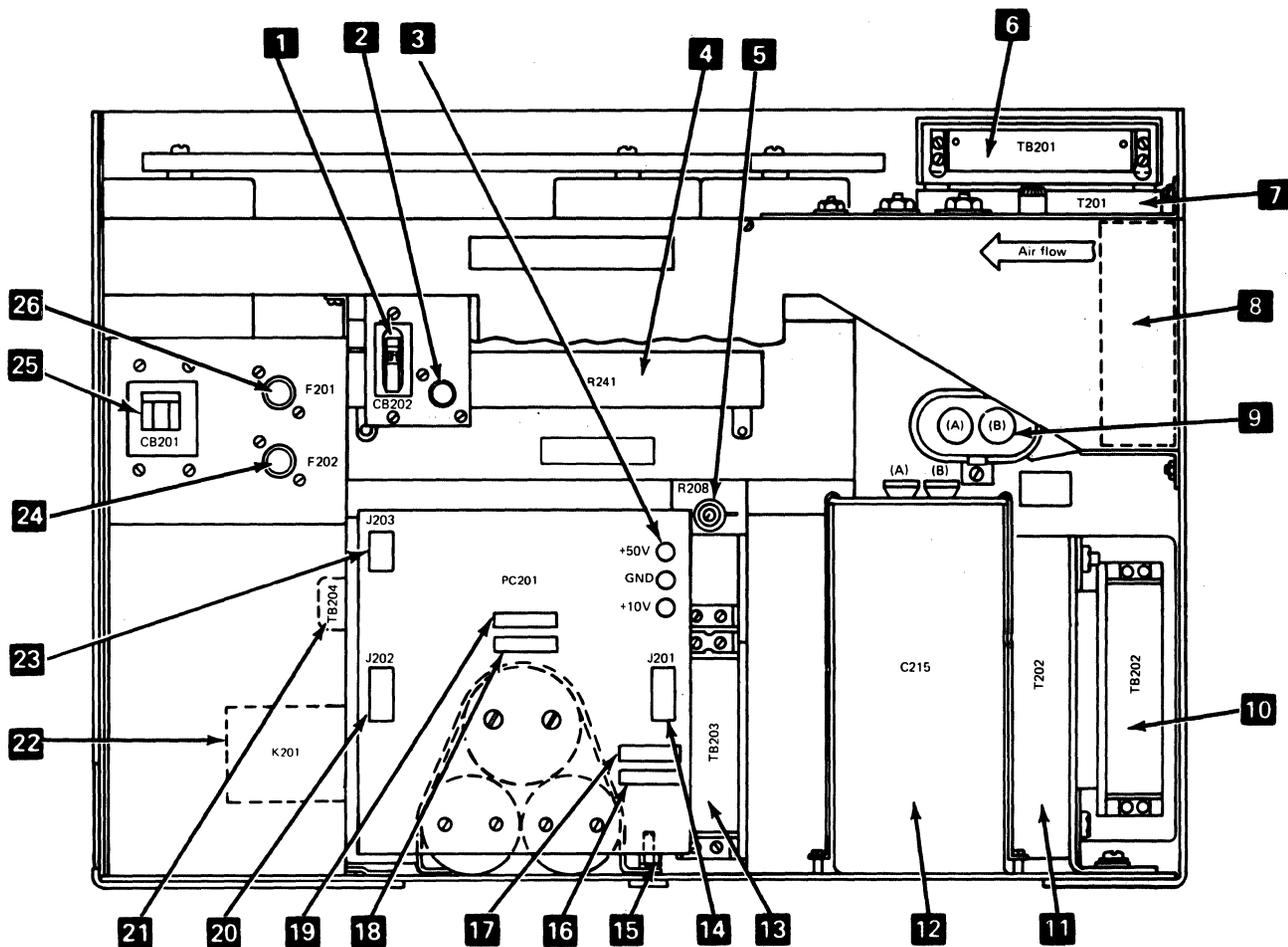
Note: The plugs and jacks for **5** and **6** are located on the other side of the frame.

Figure 4-7. Rear view (forms feed assembly)



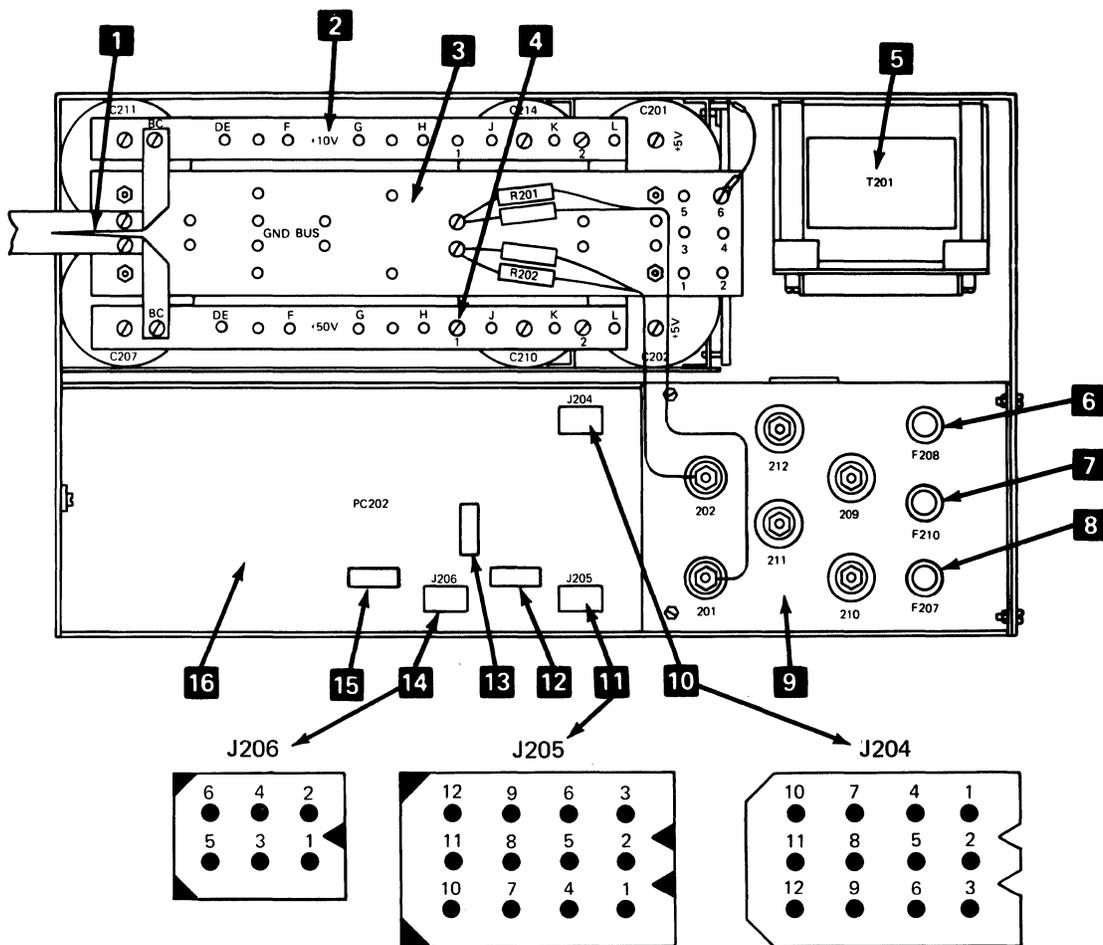
- | | |
|---|--|
| 1 Cover interlock switch | 7 Forms feed assembly groundwire |
| 2 Forms feed assembly release latch (left) | 8 Pivot bolt |
| 3 Forms horizontal adjustment knob | 9 Forms feed assembly endplay adjusting screw |
| 4 Forms feed assembly endplate | 10 Linear encoder channel |
| 5 Counterbalance rod and spring | 11 Forms feed assembly release latch (right) |
| 6 Latch spring | |

Figure 4-8. Right end view



- | | | | |
|-----------|--|-----------|--------------------------------|
| 1 | 5-Volt circuit breaker (CB202) | 14 | J201 |
| 2 | F209 | 15 | Sequence card mounting bracket |
| 3 | Sequence card connectors (test points) | 16 | F206 |
| 4 | R241 | 17 | F205 |
| 5 | R208 | 18 | F204 |
| 6 | TB201 | 19 | F203 |
| 7 | T201 | 20 | J202 |
| 8 | Fan, servo power amp (3615) | 21 | TB204 (In ac power box) |
| 9 | C206 | 22 | K201 |
| 10 | TB202 | 23 | J203 |
| 11 | T202 | 24 | F202 |
| 12 | C215 | 25 | Main circuit breaker (CB201) |
| 13 | TB203 | 26 | F201 |

Figure 4-9. Power supply locations



Top views

- | | |
|--|--------------------------------|
| 1 Flat distribution system (FDS) cables | 9 Diode assembly |
| 2 +10 volt bus | 10 J204 |
| 3 Ground bus | 11 J205 |
| 4 +50 volt bus | 12 F1 |
| 5 T201 | 13 F2 |
| 6 F208 | 14 J206 |
| 7 F210 | 15 F3 |
| 8 F207 | 16 Servo power amp card |

Figure 4-10. Power supply locations (top view)

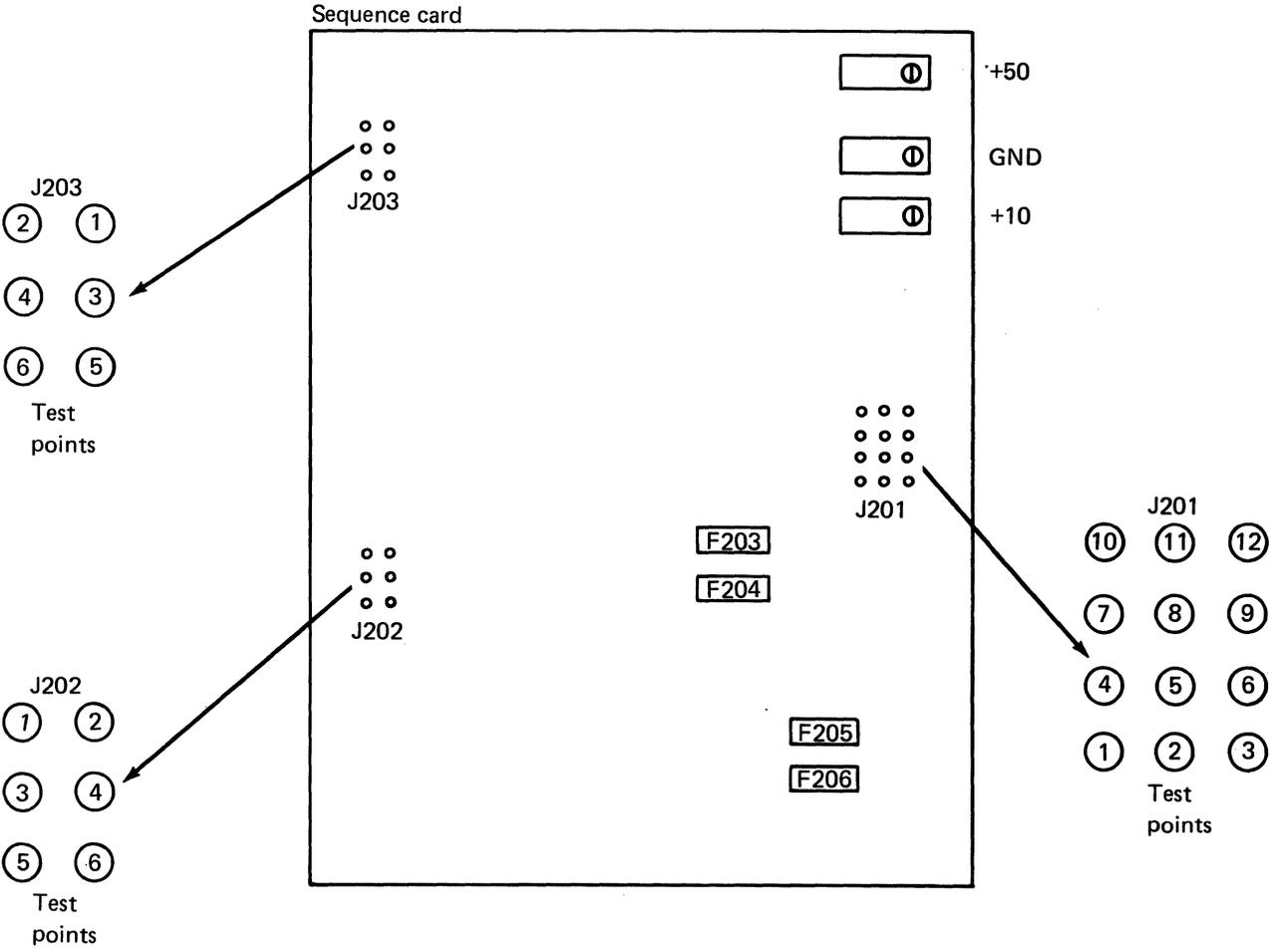


Figure 4-11. Sequence card locations

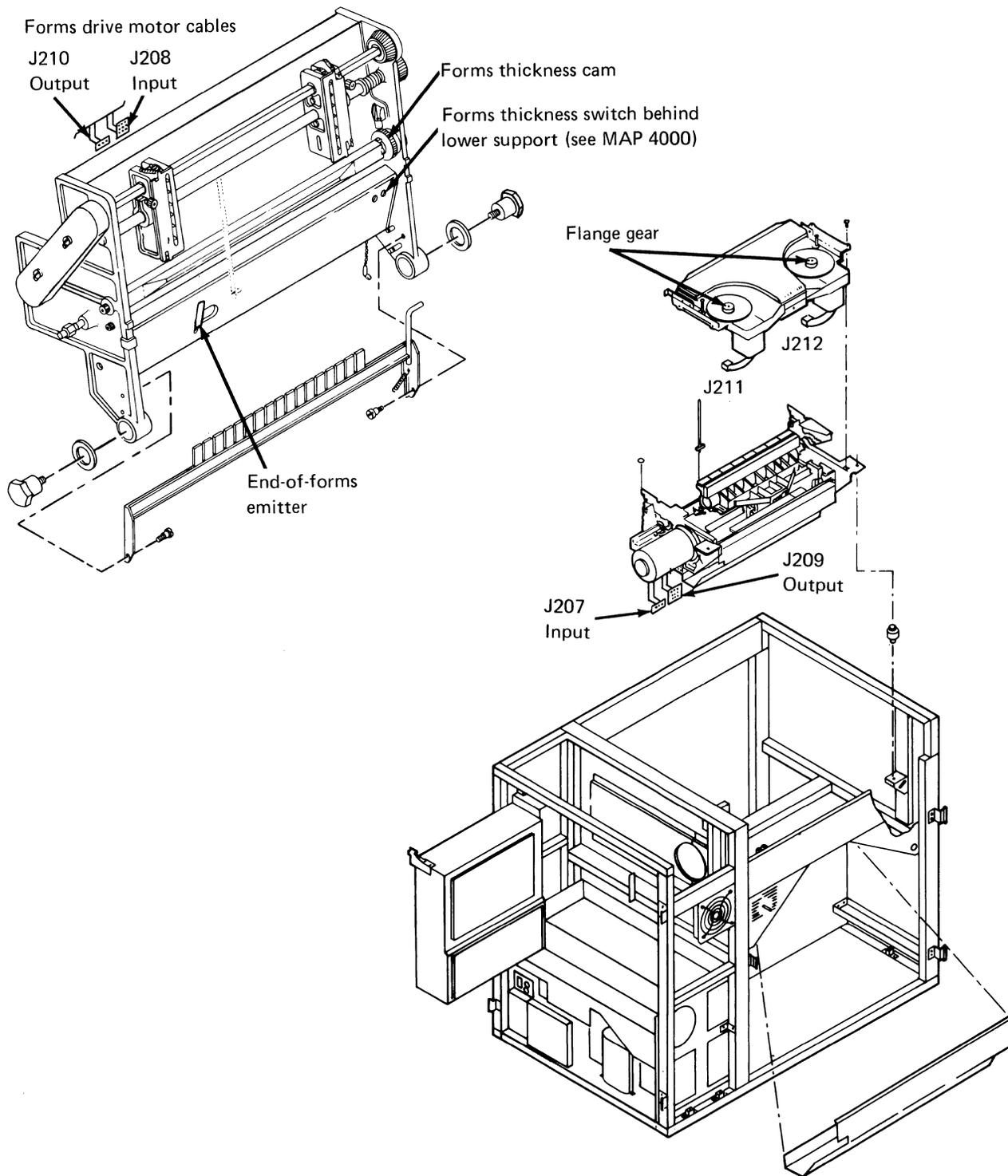
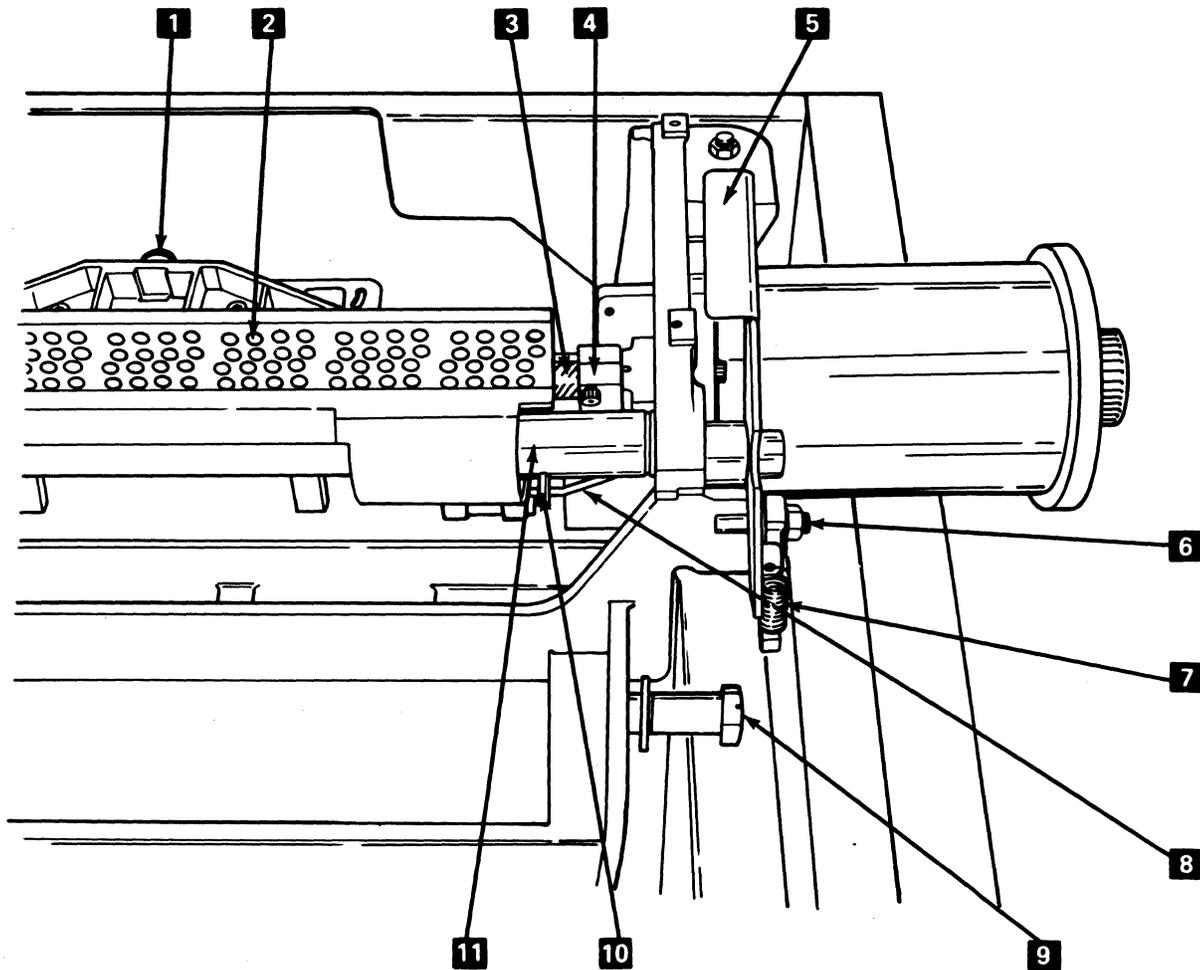
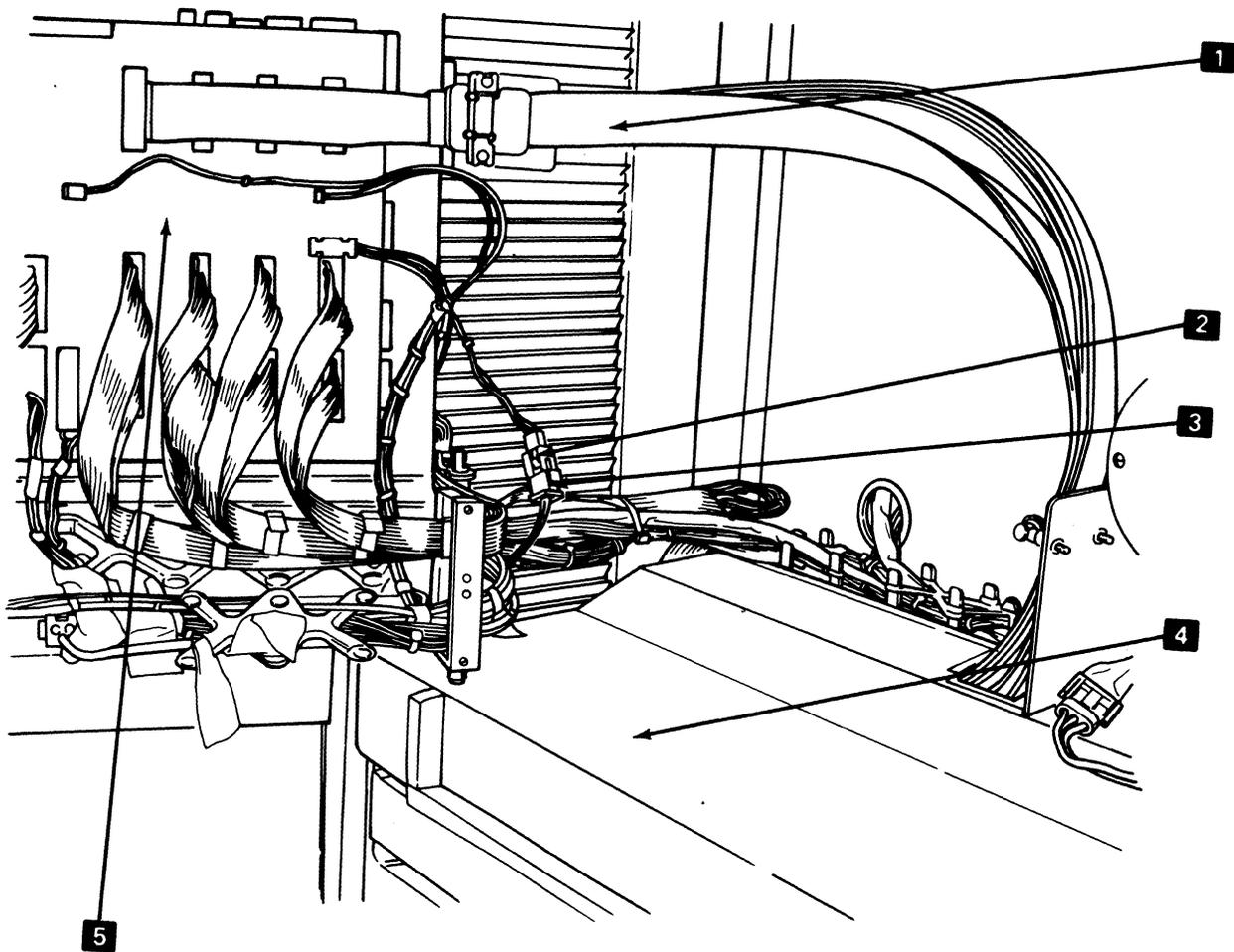


Figure 4-12. Component locations



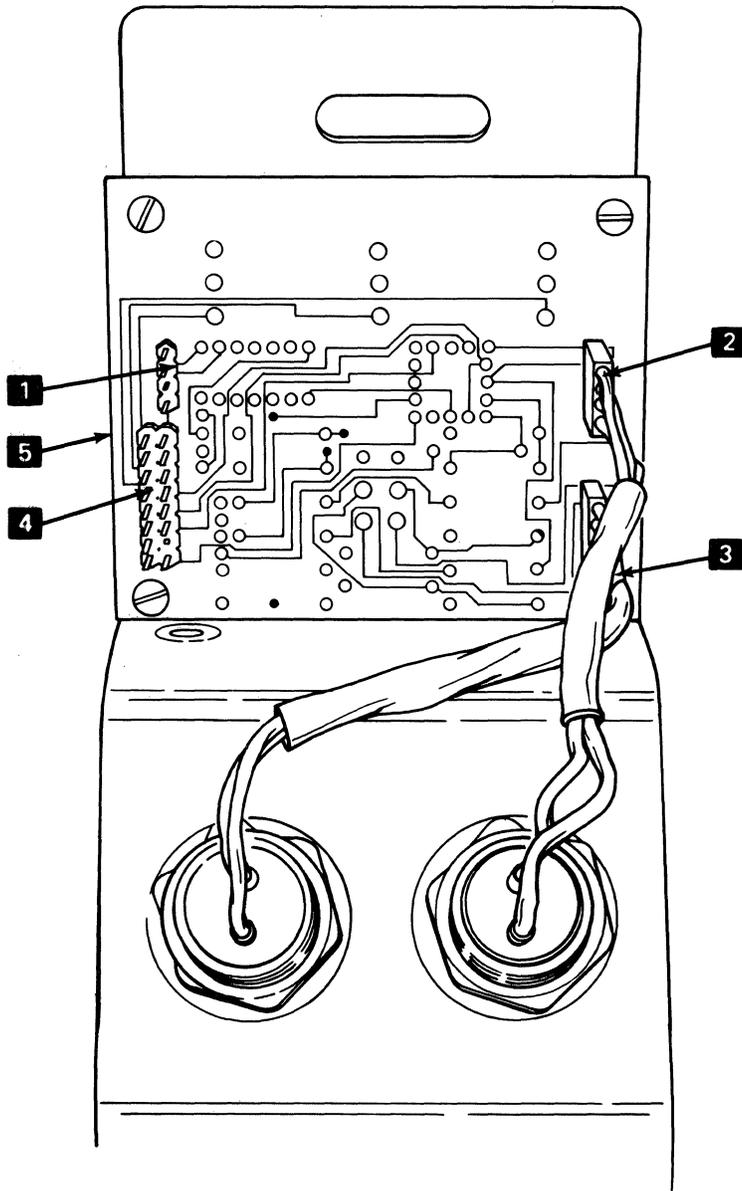
- | | | | |
|----------|---|-----------|-------------------|
| 1 | Actuator carrier vertical thrust bearing | 7 | Latch spring |
| 2 | Actuator carrier assembly | 8 | Home cam (ramp) |
| 3 | Leadscrew | 9 | Pivot bolt |
| 4 | Split-block coupler | 10 | Home cam follower |
| 5 | Forms feed assembly release latch (left) | 11 | Horizontal shaft |
| 6 | Forms feed assembly endplay adjusting screw | | |

Figure 4-13. Printer mechanism (rear view—left end)



- 1** Flat distribution system cables
- 2** J213
- 3** P213
- 4** Power supply cover
- 5** Logic gate

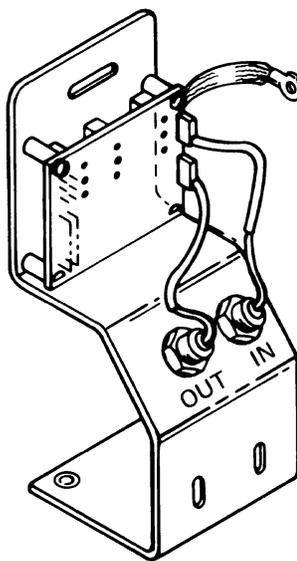
Figure 4-14. Logic gate cables



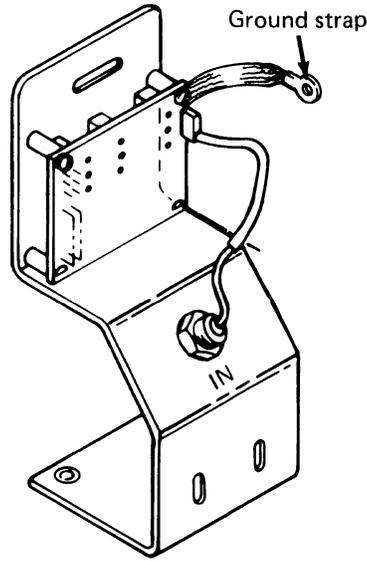
- 1** Alarm features socket pins
- 2** Cable input pins
- 3** Cable thru (feature) pins
- 4** Interface cable pins
- 5** Printed circuit card

Figure 4-15 (Part 1 of 2). Customer access panel PC card (cable-thru feature)

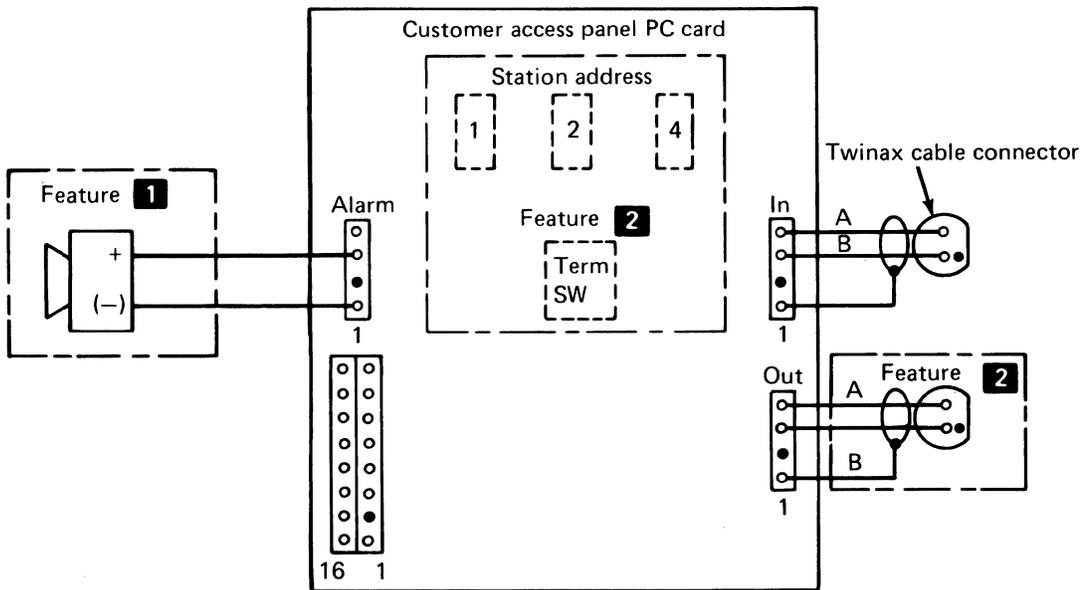




Cable-thru feature panel



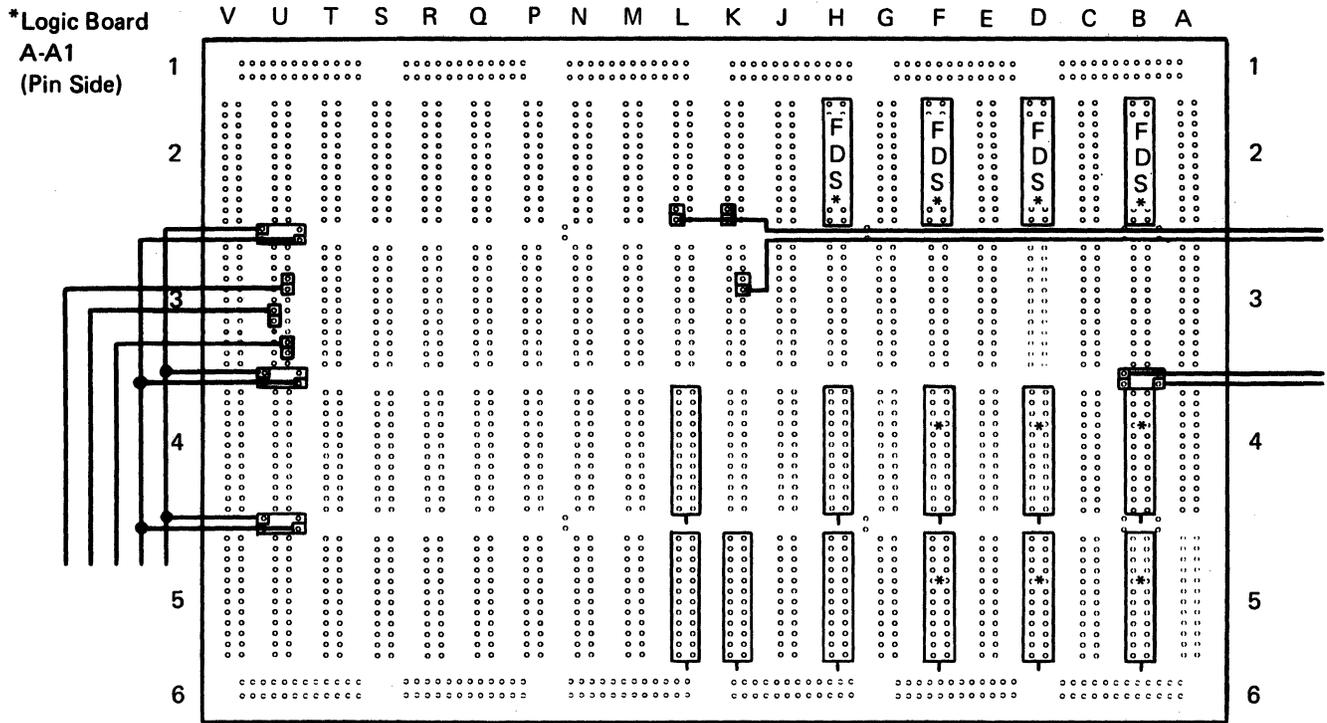
Single device or terminating device panel



Note: Card viewed from front of machine (cover removed).

- 1** Alarm feature
- 2** Cable-thru feature

Figure 4-15 (Part 2 of 2). Customer access panel PC card layout

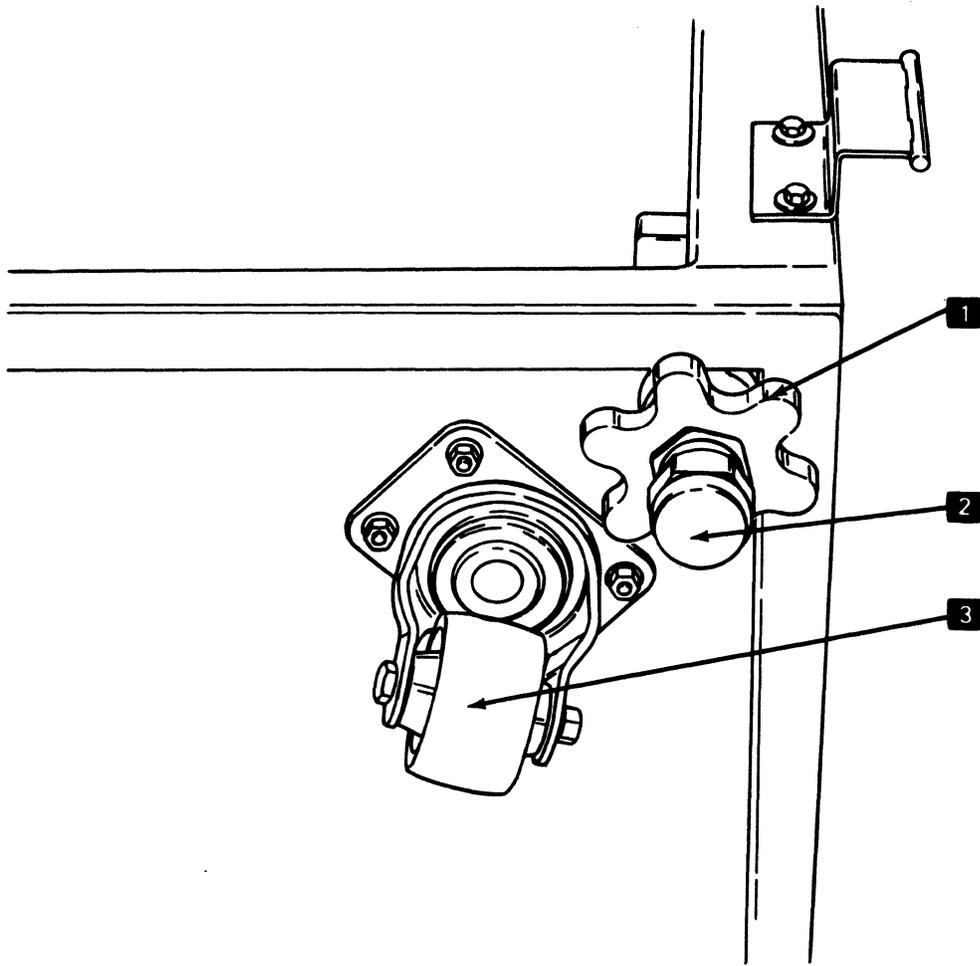


FDS = Flat Distribution System Cable Connectors

*The number of pin side plug connectors required will vary, depending on the model of printer.

Note: The actuator driver cables have black wires on the B row, and yellow wires on the D row.

Figure 4-16. Logic board pin side connectors



- 1 Starwheel
- 2 Pad
- 3 Caster

Figure 4-17. Caster, starwheel, and leveling pad

Formatting Command Summary

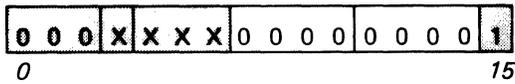
Command Name and abbreviation	Frame sequence (Hex code/parameter)						Description
	1	2	3	4	5	6	
Null (NUL)	00						No operation performed.
Carriage Return (CR)	0D						Moves the print position to the first position of the current line.
New Line (NL)	15						Moves the print position to the first position of the next line.
Interchange Record Separator (IRS)	1E						Same as New Line.
Line Feed (LF)	25						Moves the print position to the same horizontal position of the next line.
Form Feed (FF)	0C						Moves the print position to the first position of the next page.
Bell (BEL)	2F						Turns off Ready, turns on Attention and the audible alarm, and stops printing.
Presentation Position (PP)	34						Initiates a multiple-frame command sequence to move the horizontal or vertical print position.
Absolute Horizontal Print Position (AH)	34*	C0	NN				Moves the print position to the horizontal position specified in the NN parameter frame.
Absolute Vertical Print Position (AV)	34*	C4	NN				Moves the print position to the vertical position specified in the NN parameter frame.
Relative Horizontal Print Position (RH)	34*	C8	NN				Moves the print position horizontally towards the end of the line from the current print position the number of columns specified in the NN parameter frame.
Relative Vertical Print Position (RV)	34*	4C	NN				Moves the print position vertically towards the bottom of the page from the current print position the number of lines specified in the NN parameter frame.
Set Character Distance (SCD)	2B	D2	04	29	00	P2	Sets the character density to 10 or 15 cpi as specified in the P1 and P2 parameter frames.
Set CGCS through Local ID (SCL)	2B	D1	03	81	P1		Loads 1 of 16 graphic character set specified in the P1 parameter frame.
Set Horizontal Format (SHF)	2B	C1	NN	HH			Sets the print line length to the value specified in the HH parameter frame.
Set Vertical Format (SVF)	2B	C2	NN	VV			Sets the page length to the value specified in the VV parameter frame.
Set Graphic Error Action (SGEA)	2B	C8	NN	GG	UU		Defines the printer's response to a character code that is not part of the character set in use (unprintable character option and default graphic).
Transparent (TRN)	35	NN					Permits the codes normally used for formatting commands (00 to 3F), to be used as printable characters.
Load Alternate Characters (LAC)*	2B	FE	NN	MM	P1	Pn	Allows customer designed fonts or characters to be loaded for printing.
Set Line Density (SLD)	2B	C6	NN	LD			Selects a vertical line distance of: $\frac{LD}{72}$

*The first frame of this multiple-frame command sequence must be a Presentation Position (hex 34).

Figure 4-18. Formatting command summary

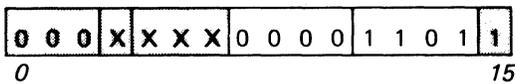
Formatting Command Descriptions

Null (00)



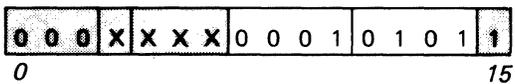
No characters are printed and no operation is performed in the printer as the result of a Null command.

Carriage Return (0D)



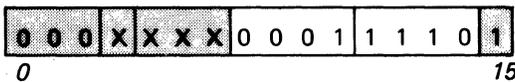
This command moves the print position to the first print position of the same line. If the current print position equals the first print position, no operation is performed.

New Line (15)



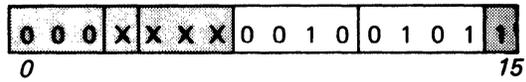
New Line moves the print position to the first print position of the next line. If the current position is on the last line of a page, the new position is the first print position of the first line of the next page.

Interchange Record Separator (1E)



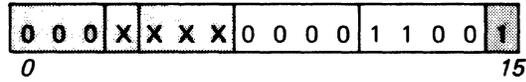
Interchange Record Separator moves the print position to the first print position of the next line. If the current position is on the last line of a page, the new position is the first print position of the first line of the next page.

Line Feed (25)



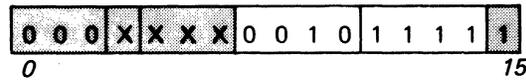
A Line Feed command moves the print position vertically to the next line. If the current position is on the last line of a page, the new position is the first line of the next page.

Form Feed (0C)



Form Feed moves the print position to the first print position, first line of the next page. If page length has not been set by a Set Vertical Format command, the default page length is one line.

Bell (2F)



Upon receiving a Bell command, the printer completes all printing and control operations currently in process. Printing and formatting is stopped, the Ready indicator is turned off, the Attention indicator is turned on, the audible alarm sounds, a '5' is displayed and Unit Not Available status is returned in the poll response (see "Status and Error Information." The Bell condition is cleared by pressing the Stop switch.

Presentation Position

Presentation Position is a multiple-frame command sequence that moves the horizontal or vertical print position. Three frames of data are necessary to accomplish this:

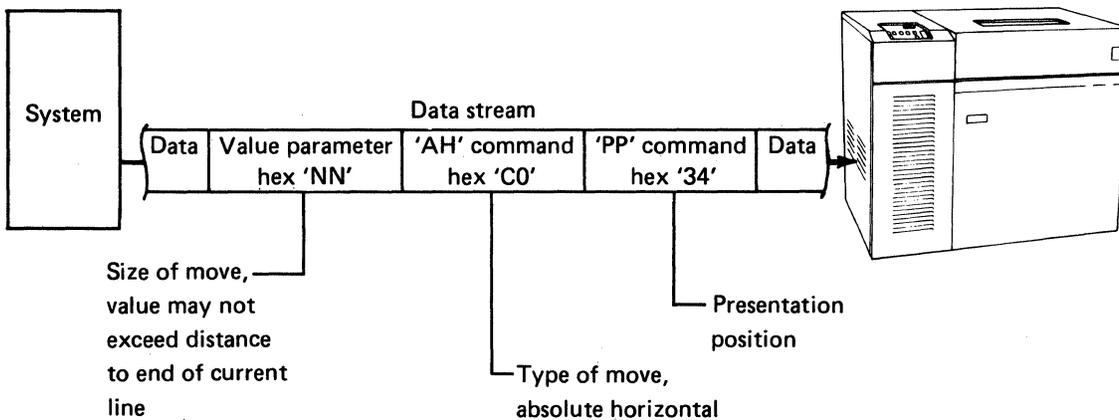
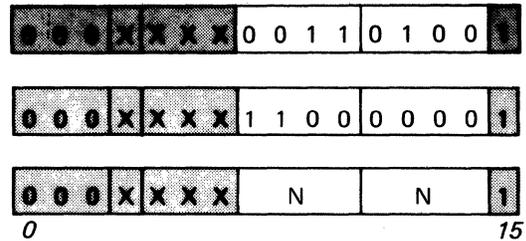
- Frame one defines Presentation Position.
- Frame two defines the direction and type of move.
- Frame three defines how far to move the print position.

The functions available are an absolute or relative move in either the horizontal or vertical direction.

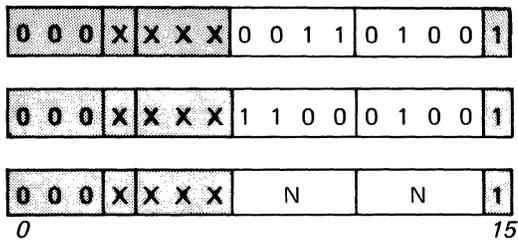
Presentation Position is used with and precedes the Absolute Horizontal Print Position, Absolute Vertical Print Position, Relative Horizontal Print Position or the Relative Vertical Print Position frames.

Absolute Horizontal Print Position (34C0NN)

This command sequence moves the horizontal print position to the position specified in the NN value parameter frame, regardless of the current print position. If the value parameter specifies a position beyond the end of the print line, an invalid SCS parameter error occurs (see "Status and Error Information").

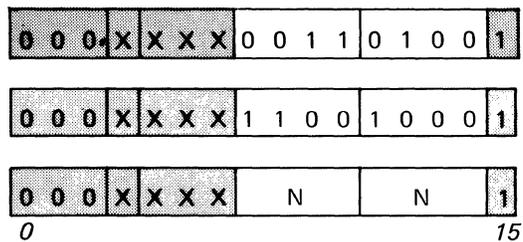


Absolute Vertical Print Position (34C4NN)



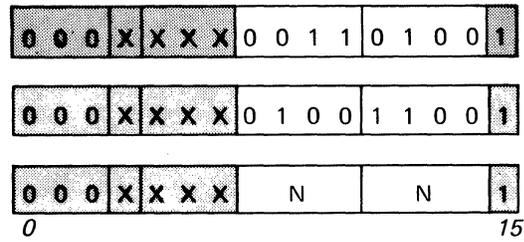
This command sequence moves the print position vertically to the line specified in the NN value parameter frame. If the line number specified in the value parameter frame is less than the current line number, the printer advances the forms to the requested line number on the next page. If the specified line number is greater than the last line number on a page, an invalid SCS parameter error occurs (see "Status and Error Information").

Relative Horizontal Print Position (34C8NN)



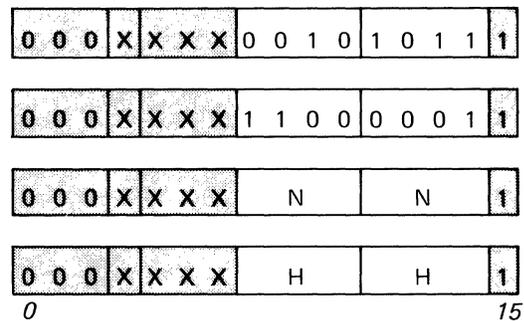
This command sequence moves the print position horizontally towards the end of the line the number of columns specified in the NN value parameter frame. If the number of columns specified plus the value of the current print position exceeds the end of the print line plus 1, an invalid SCS parameter error occurs (see "Status and Error Information").

Relative Vertical Print Position (344CNN)



This command sequence moves the print position vertically from the current print position towards the bottom of the page the number of lines specified in the NN value parameter frame. If the number of lines specified plus the current print line exceeds the length of a page, an invalid SCS parameter error occurs (see "Status and Error Information").

Set Horizontal Format (2BC1NNHH)



Set Horizontal Format is a multiple-frame sequence that sets the maximum print position. The NN is a count frame that defines the total number of frames following and including the count frame. Only values of 01 or 02 are valid for the count frame. Any other value results in an invalid SCS parameter error.

HH is a parameter frame that defines the maximum print position (print line length). This value is used in place of the actual physical line length. Therefore, the print line length must be equal to or less than the physical line length.

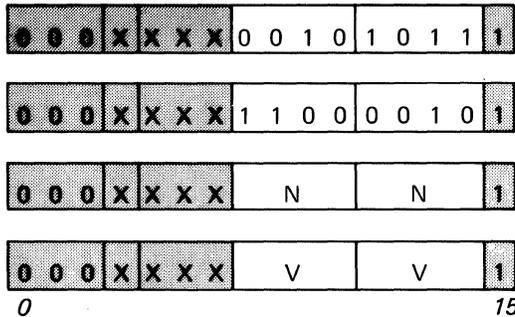
Maximum line length for 15 cpi mode is 198 (condensed print). The HH frame may have a value of hex 01 to hex C6 (1 to 198).

A value of zero results in a default value of hex 84 (132). A value greater than hex C6 (198) results in an invalid SCS parameter error.

Maximum line length for 10 cpi mode is 132. The HH frame may have a value of hex 01 to hex 84 (1 to 132). A value greater than hex 84 (132) results in an invalid SCS parameter error. See "Status and Error Information."

Formatting Command Descriptions (continued)

Set Vertical Format (2BC2NNVV)

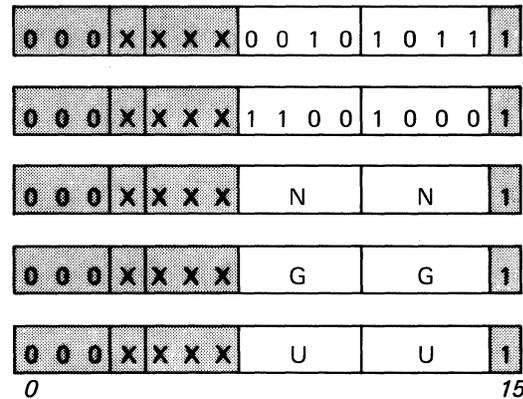


Set Vertical Format is a multiple-frame sequence that sets the maximum print line (logical page length). NN is a count frame that defines the total number of frames following and including the count frame. The value of the count frame must be either 01 or 02. Any other value results in an invalid SCS parameter status.

VV is a parameter frame that defines the maximum number of print lines on a page. Maximum page length in print lines is 255. A value of zero in this frame results in a default value of hex 01 (one line).

The combination of maximum print line parameter (VV), and the line density parameter (LD), should not exceed 1.62 meters (63.75 in.) or an invalid SCS parameter error will occur. (See status and error information)

Set Graphic Error Action (2BC8NNGGUU)



Set Graphic Error Action is a multiple-frame command sequence that defines the printer's response to a character code that is not part of the character set in use. NN is a count frame that indicates the total number of frames following and including the count frame. This count must be 01, 02, or 03. Any other value results in invalid SCS parameter status.

The GG frame defines the graphic to be printed in place of the unprintable character. This substitute character can be any printable character and is printed using options specified in the UU frame. If the substitute character selected is unprintable or if no character is selected, the default character is a hyphen (-).

The UU frame determines the error and status options resulting from an unprintable character. Valid values for this frame are:

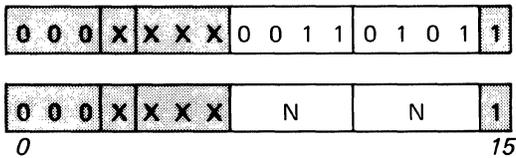
- Hex 01** No stop, no status
- Hex 00 or hex 02** Default to hex 01
- Hex 03** Stop, hard error status
- Hex 04** Default to hex 03

All other UU values result in invalid SCS parameter status.

If Set Graphic Error Action has not been sent, the default is:

- Hex 01 (no stop/no status)
- The hyphen is printed in place of the unprintable character

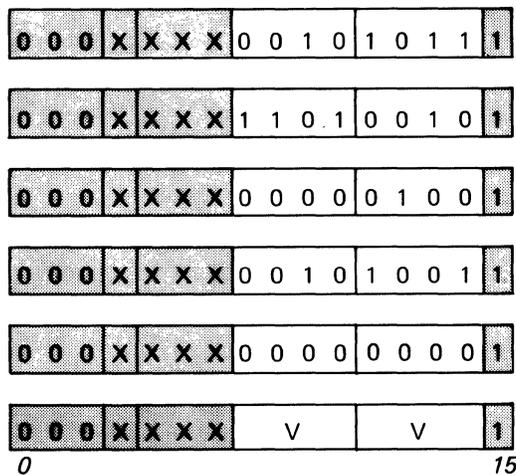
Transparent (35NN)



Transparent is a multiple-frame command sequence that permits the codes normally used for formatting commands (hex 01 through hex 3F) to be used as printable characters. NN is a count frame that defines the number of frames of transparent data to follow, not including the count frame. The count may be any value from 01 to 255. A value of 00 results in no-operation and all data following is treated as normal, non-transparent data.

Use of the codes hex 01 through hex 3F requires print images for those values to have previously been loaded into the print buffers by the using system. If no image for a given code has been loaded, graphic error action is taken by the printer. Hex 00 always prints as a blank.

Set Character Distance (2BD2042900VV)



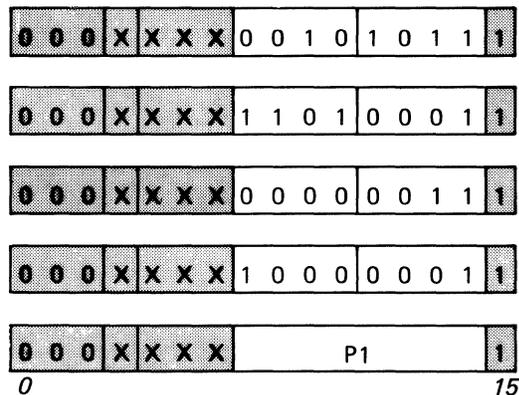
Set Character Distance is a multiple-frame command sequence that defines the number of characters-per-inch to be printed.

Frame six (VV) defines the desired character density. Valid values for VV are hex 0A (10 cpi), hex 0F (15 cpi), hex 00 (no operation), and hex FF (default to 10 cpi). All other values are invalid and result in invalid SCS parameter status. Character density continues as set by this command until a new Set Character

Distance command is issued or until changed by the operator. Power on/off sequencing or a Reset command results in a default to 10 cpi mode.

Maximum line length for 10 cpi mode is 132. For horizontal format greater than 132, a VV value of hex 0A resets line length to 132. For horizontal format less than 132, a VV value of 0A does not change the line length.

Set CGCS Through Local ID (2BD10381P1)



Set Coded Graphic Character Set (CGCS) through Local ID is a multiple-frame command sequence that selects 1 of 16 pre-determined character sets the printer uses to print data. The fifth frame (P1) designates a character set that the printer loads into the print image buffer. All print data uses this character set until it is changed by another Set CGCS through Local ID command, a Load Alternate Characters command, or a power-on reset which loads the default character set.

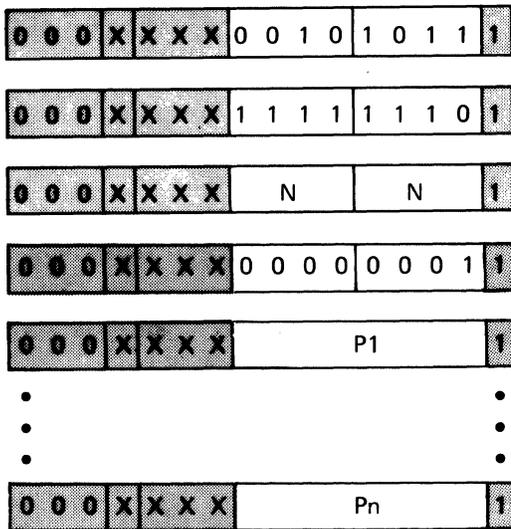
P1 values for available character sets are:

- FF Default (set by jumper)
- 00 Multinational
- 01 United States (English)
- 02 Austria/Germany
- 03 Belgium
- 04 Brazil
- 05 Canadian French
- 06 Denmark/Norway
- 07 Finland/Sweden
- 08 France
- 09 Italy
- 0A Japan—English
- 0B Japan—Katakana

- 0C Portugal
- 0D Spain
- 0E Spanish Speaking
- 0F United Kingdom

All other values of P1 result in the loading of the default language set (selected by jumpers on the CMA card).

**Load Alternate Character(s)
(2BFENNMMP1-Pn)**



Load Alternate Character(s) is a multiple-frame command sequence that allows the user to load from 1 to 25 alternate character images into the print image buffer.

NN is the count frame value that defines the number of frames required to load the alternate character images. The value of the count frame must be in multiples of ten (plus 1 for the count frame). The maximum count value can not exceed 251 frames (250 character parameter frames and 1 count frame).

Frames P1 through Pn define the character image. Each character image requires 10 parameter frames. The first parameter frame (P1) defines the buffer address of the character (hex 00 through FE). The next nine frames (P2 through P10) define the dot matrix of the alternate character image.

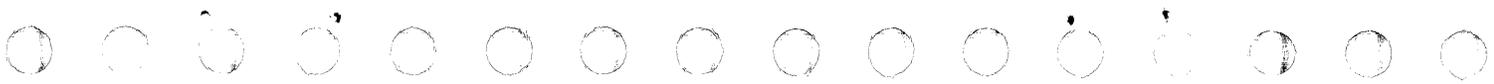
For each character image, frames P2 through P10 select specific print wires in the 8 X 9 character matrix. One character frame is required for each of the nine matrix columns. Each half of the parameter hex value is associated with four of the eight print wires in a matrix column. Thus, as shown in the example below, hex 01 selects no print wires from the top half of the column—but does select a print wire in the bottom half of a column.

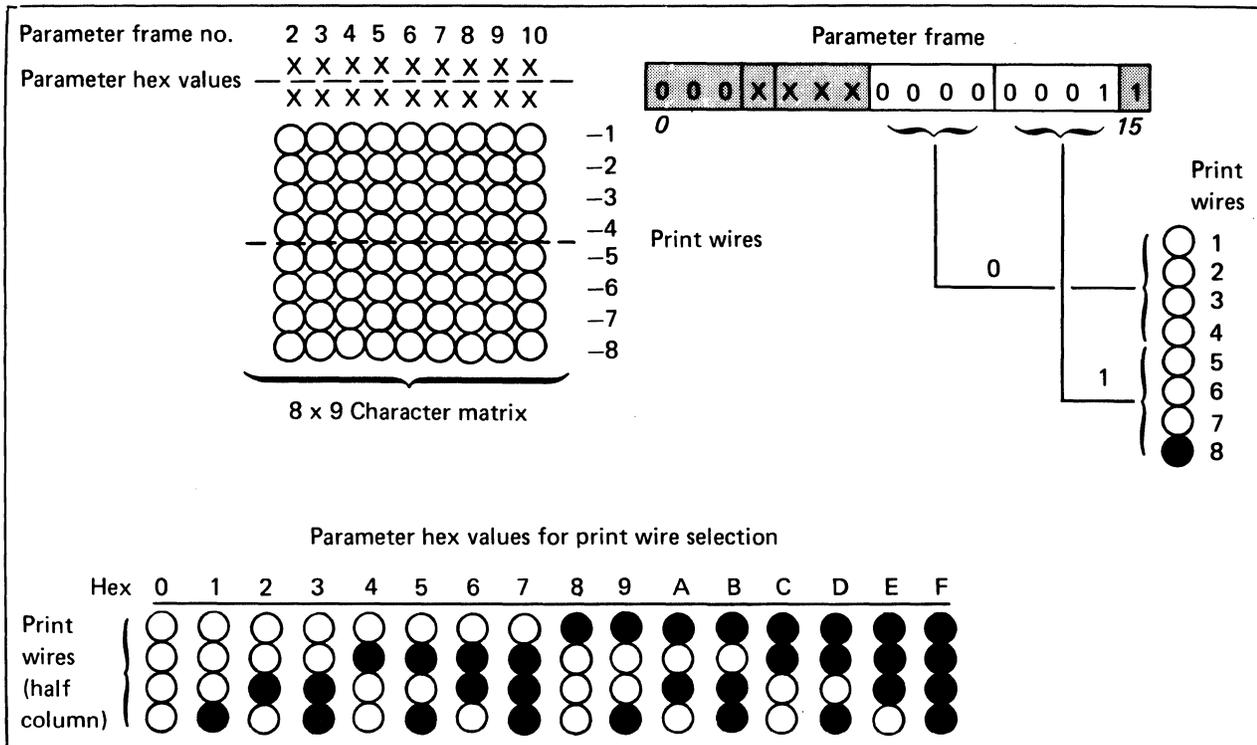
Parameter hex values for the various combinations of print wires in character matrix columns are shown below.

Programming considerations: If the count frame (NN) equals hex 00, no-operation results. If the count frame is a value that is not a multiple of 10 plus 1 for the count frame, zeros (or blanks) are filled in for the right most columns to the next higher multiple of 10. If the count frame is higher than 251, data in excess of 251 is disregarded and invalid SCS parameter status is reported.

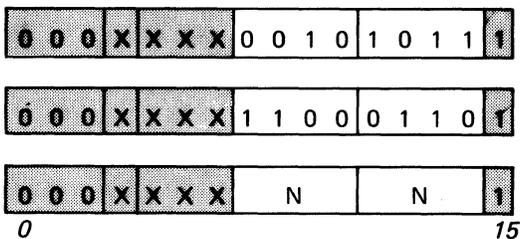
If the value of frame one in the ten frame character image is hex FF, the next nine frames are disregarded and not loaded in the print image buffer. An invalid SCS parameter status is reported.

In horizontal rows, adjacent dots must not be planned for a character image. Horizontal adjacent dots provide inconsistent results because, depending upon the direction of the print mechanism movement, the left or right adjacent dot is disregarded. This also applies to dot positions in columns that are normally spaces between characters (vertical columns one and nine).





Set Line Density (2BC6NNLD)



Set Line Density is a multiple-frame command sequence that sets the number of lines to be printed per inch of paper. The fourth frame is a parameter frame that defines the line density in increments of .353 mm (1/72 in). Any value from 01 to 255 is valid, but

normally, the line space is set at 6, 8, or 9 lines-per-inch (lpi). A value of 00 results in no operation performed. The normal values in frame four are:

- Hex 0C = 6 lpi 4.233 mm (12/72 in)
- Hex 09 = 8 lpi 3.175 mm (9/72 in)
- Hex 08 = 9 lpi 2.822 mm (8/72 in)

Nine lpi is used for plotting or other printer functions where characters on successive lines are desired to touch vertically.

Line spacing continues as set by this command until changed by the operator or a new Set Line Density command. The power-on condition is always 6 lpi.

Status and Error Information

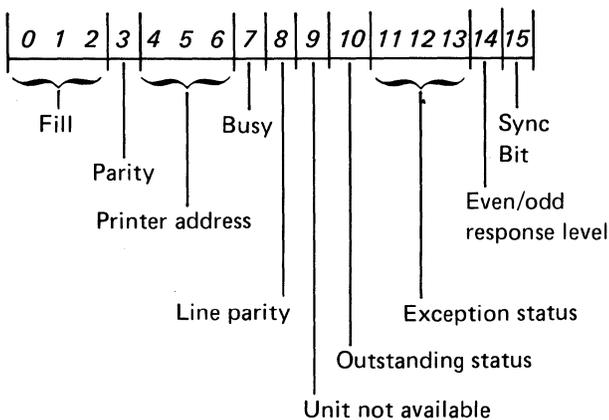
Poll Response Frames

Following a power-on reset, the printer responds to controller polling with a single status frame. The printer continues to respond to controller polling with a single status frame until the printer receives a Set Mode command.

After receiving a Set Mode command, the printer responds to polling with two status frames.

Status information described in frame 1 is the same in either case.

Poll status frame 1



Bits 0, 1, 2—Fill.

These bits are always set to 000 and are used for timing control.

Bit 3—Parity.

This bit is used to maintain an even bit count (even parity).

Bits 4, 5, 6—Printer address.

These bits are used for selecting a specific printer attached to the interface. Up to seven printers can be addressed by the combinations (000 through 110). A bit combination of 111 indicates an end-of-message.

Bit 7—Busy.

0 = Not busy (operational command queue is empty). 1 = Busy (operational command queue is not empty or an Activate command is received).

Bit 8—Line parity

0 = No line parity error is detected in a received frame. 1 = Line parity error is detected in a received frame.

Bit 9—Unit not available.

0 = Unit available (the Ready light is on). 1 = Unit not available (the Ready light is off).

Bit 10—Outstanding status.

0 = No outstanding status. 1 = Outstanding status (available by using the Read Status command).

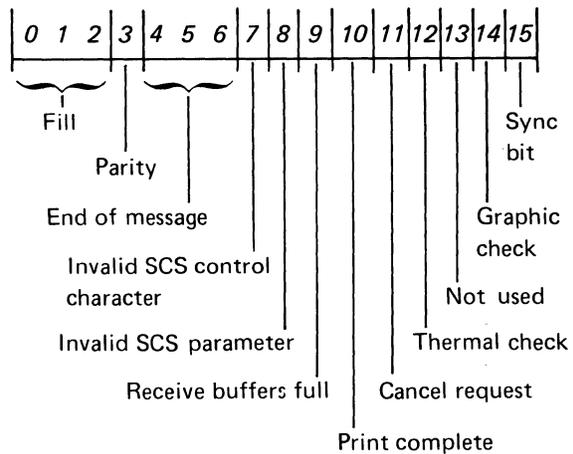
Bits 11, 12, and 13 indicate exception status. Until the exception status is reset, only Poll, Set Mode, and Reset commands are processed. The Write Control Data command (if the exception status is not power-on transition) is also processed. The power-on transition exception status is reset by the Set Mode command. The exception status conditions are reset by the Write Control Data command (see "Write Control Data").

Bit 11	12	13	Meaning
0	0	0	No exception status exists.
0	0	1	Activate lost—caused by a line parity error following a Write Data, Read Status, or Read Device ID.
0	1	0	Invalid activate command—caused when an Activate Write follows a Read Status or Read Device ID or, an Activate Read following a Write Data.
0	1	1	Reserved.
1	0	0	Invalid command—caused when a command is outside the operational command set or more than 240 microsecond interframe interval has been specified.
1	0	1	Input queue or input buffer overrun—caused when more than 16 commands and associated data frames or more than 256 data frames have been sent.
1	1	0	Reserved.
1	1	1	Power-on transition—causes only status frame 1 to be sent in response to a Poll command.

Poll Response Frame 2

Frame 2 contains the following information:

Poll status frame 2



Bit 0 through 6—Same as Poll status frame 1.

Bit 7—Invalid SCS (Standard Character String) control.

0 = No Invalid SCS Control Code is detected. 1 = Invalid SCS Control Code is detected. Reset by a Reset or Clear command.

Bit 14—Even/Odd response level.

When bit 14 goes from 0 to 1 or 1 to 0, the using system determines that the response frame is current status. When bit 14 is unchanged from the previous response, the using system determines that the response frame is previous status. (See "Poll" command in this chapter.) Any change in the response frame changes bit 14 from its previous state. Bit 14 is set to 0 after power-on.

Bit 15—Sync.

A synchronization bit that is always set to 1.

Bit 8—Invalid SCS (Standard Character String) parameter.

0 = No Invalid SCS parameter is detected. 1 = Invalid SCS parameter is detected. Reset by a Reset or Clear command.

Bit 9—Receive buffers full.

Used by the using system to determine when data can be sent to the printer.
 0 = Receive buffers are not full.
 1 = Receive buffers are full.

Bit 10—Print complete.

The print complete bit is set to 0 when the printer detects an Activate Write command. The print complete bit is set to 1 by Power-On reset, a Clear command, a Reset command, or when all input data is printed.
 0 = Printing is in progress.
 1 = Printing is completed.

Bit 11—Cancel Request.

The Cancel request bit is set to 1 when the operator presses the Cancel key on the Operator Panel. This bit is reset by the next Poll command (with Acknowledge bit 9 set to 1), a Reset or Power-On reset.
 0 = No cancel request.
 1 = Cancel request.

Bit 12—Not Used.

Bit 13—End of Forms.

This bit on indicates an end-of-forms conditions has been detected by the hardware, and turns the attention light on.

The EOF bit is reset by pressing the stop key, a received reset command, or a power-on reset condition.

0 = No end of forms condition detected
 1 = End of forms

Bit 14—Graphic check.

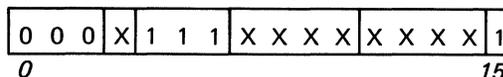
This bit set to 1 indicates that an undefined character has been detected in the data stream. (See Set Graphic Error Action in this chapter.) This bit is reset by the next Poll command (with Acknowledge bit set to 1), a Reset or Power-On reset.

0 = No graphic error is detected.
 1 = Graphic error is detected.

Bit 15—Sync.

A synchronization bit that is always set to 1.

Read Status Response Frame



One response frame is sent for every Read Status command. The response frame, sent only after the Activate Read command is received, contains a hex code that defines the outstanding status condition within the printer. The hex code corresponds to the last two digits of the error code that may be available as a system error message (depending on the using system). The first digits of these hex codes are also automatically displayed on the operator panel when the error occurs. Refer to "Write Control Data," in this chapter, for resetting outstanding status. The defined outstanding status conditions are:

<i>Hex Code</i>	<i>Error Condition</i>
00	No response, timeout
01	Transmit activity check
03	Receive parity check
04	Line parity check
06	Receive length check
07	Wrong station responded
08	Power-on transition
09	Activate command failure
11	Control adaptor
12	Cable adaptor (host interface)
20	Invalid command or device
22	Invalid queue or storage over-run
24	Invalid activate
26	Graphic check
28	Invalid SCS control character
29	Invalid SCS parameter
31	Control and Sense card
32	Actuator carrier servo card
34	Driver/servo card/motor
35	Overcurrent
36	Print emitter
37	Reserved
38	Actuator carrier speed
<i>Hex code</i>	<i>Error Condition</i>
39	Undetermined
41	Control and sense card
42	Forms servo card
43	Driver/servo card/motor
45	Overcurrent
46	Emitter
47	Forms thickness cam setting
48	Forms speed check
49	Undefined sense data
50	End of forms
51	Not ready (unit not available)
81	High voltage check

82	Control and sense card	87	Timers
83	Dot image generator	88	Ribbon Jam
84	Wire latch card	89	Ribbon card
85	Pedestal	90	Even/odd status time-out
86	Actuator group jumpers		

Operating environment

Temperature	10° C to 40° C (50° F to 105° F)
Relative humidity	8% to 80%
Maximum wet bulb	27° C (80° F)

Non-operating environment:

Temperature	10° C to 52° C (50° F to 125° F)
Relative humidity	8% to 80%
Maximum wet bulb	27° C (80° F)

Storage environment:

Temperature	0° C to 60° C (32° F to 140° F)
Relative humidity	5% to 80%
Wet bulb	0° C to 30° C (32° F to 86° F)

Shipping environment:

Temperature	-40° C to 60° C (-40° F to 140° F)
Relative humidity	5% to 100% (including condensations, excluding rain)
Wet bulb	0° C to 30° C (32° F to 86° F)

You should know the humidity limits of the supplies. Humidity limits may differ for various supplies, such as forms for the printer. If working and storage areas cannot be kept at the same relative humidity, allow enough time for the supplies to acquire the same humidity levels as that in the working area before you use the supplies.

The ideal environment for the 5225 is 22.2° C to 25.6° C (72° F to 78° F) and 40% to 50% relative humidity. Acceptable ranges (upper and lower limits) of temperature and humidity are given in the above specification chart.

Figure 4-19. Environmental considerations

Printer Error Codes*Display*

00

11

22

31-39

41-46,48

47

55

77

81

Condition

Printer not online

Machine check

Invalid address (7)

Print checks

Forms check

Forms thickness switch check

Bell Command received

Cover or platen interlock
open

Machine check (high power)

82-87

88

89

99

AA

BB

CC

DD

EE

FF

Machine check

Ribbon jam

Ribbon check

Graphic check (unprintable
character)

Data cleared

Line check

Printer address not received

No line activity

Forms jam or end-of-forms

Machine check

Figure 4-20. Error codes

Chapter 5. 5225 Preventive Maintenance

Preventive maintenance for the 5225 should be performed during a service call approximately every 30 months. This frequency may vary slightly dependent upon customer usage. Refer to the figures in this chapter for printer lubrication.

Main Frame of Machine

- Check for loose or missing cover hardware.
- Check power cord for wear.
- General cleaning (paper path, around actuators, around linear encoder, etc.).

Forms Feed Assembly

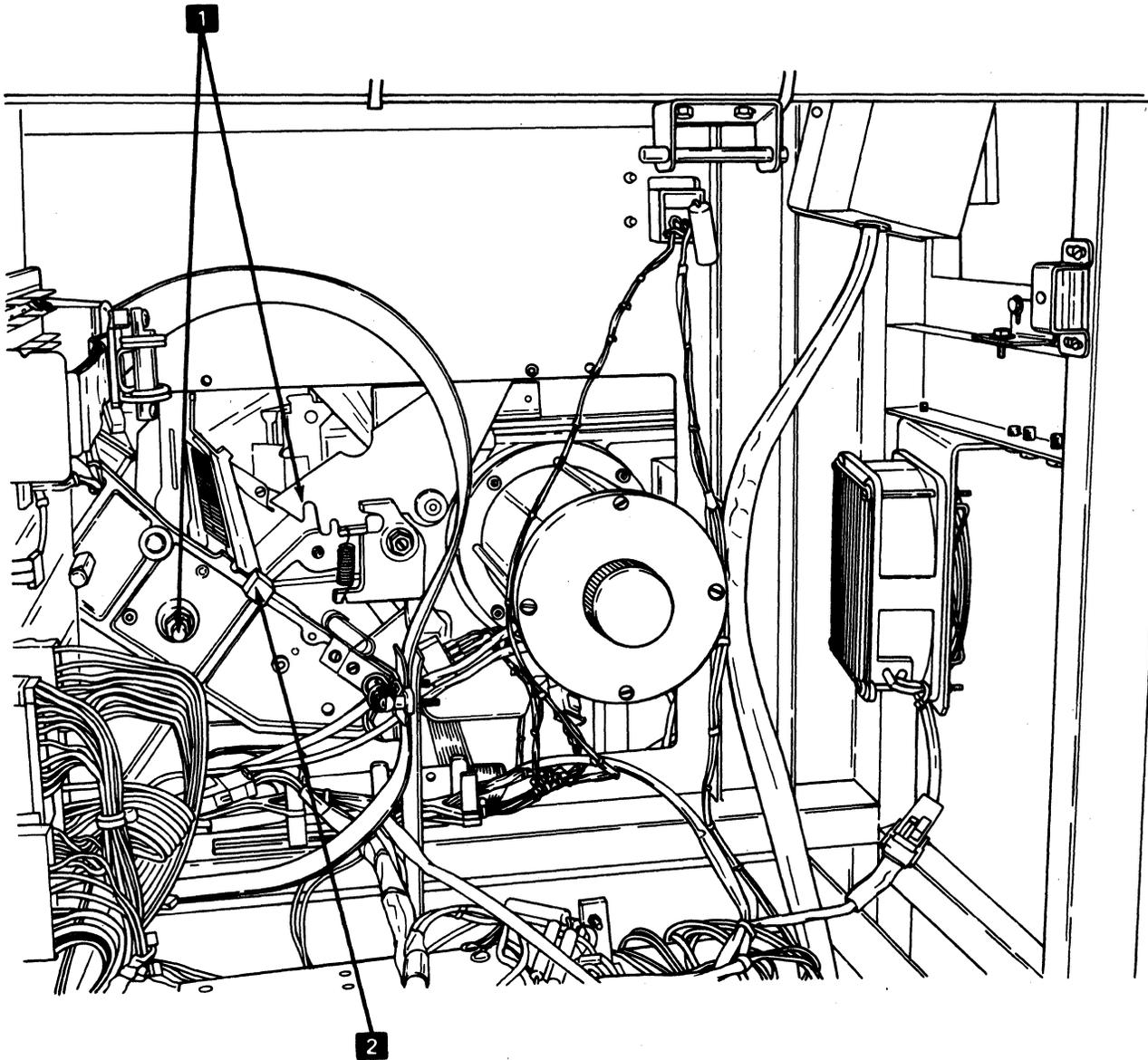
- Check adjustment of horizontal control studs for snug fit on 0.05 mm gage.
- Check for loose or broken springs (2) on forms drag unit.
- Check for worn or cracked forms feed drive belt.
- Check for binds and wear in End of Forms emitter.
- Check for worn or damaged tractor belts (2).

Fans

Check the following fans:

- power supply (servo power amp)
- actuator unit
- gate
- actuator drive motor

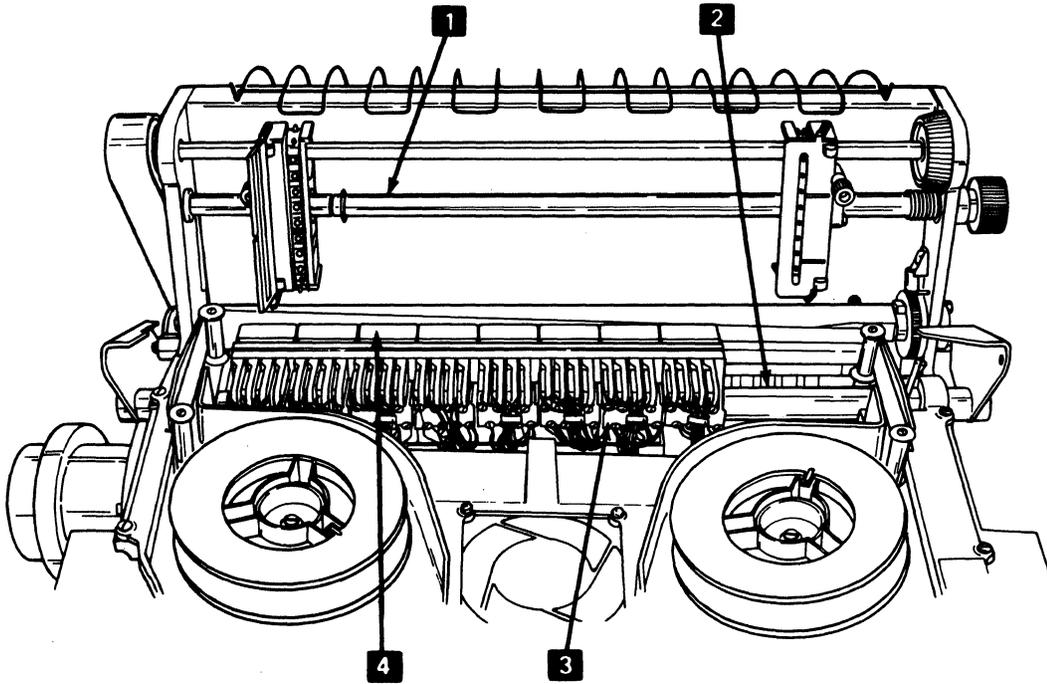
Note: This preventative maintenance procedure assumes that the verify map 2000 was run as part of the service call.



- 1** Forms feed release latch and eccentric belt IBM #23
- 2** Endplate at contact point with adjusting screw IBM #23

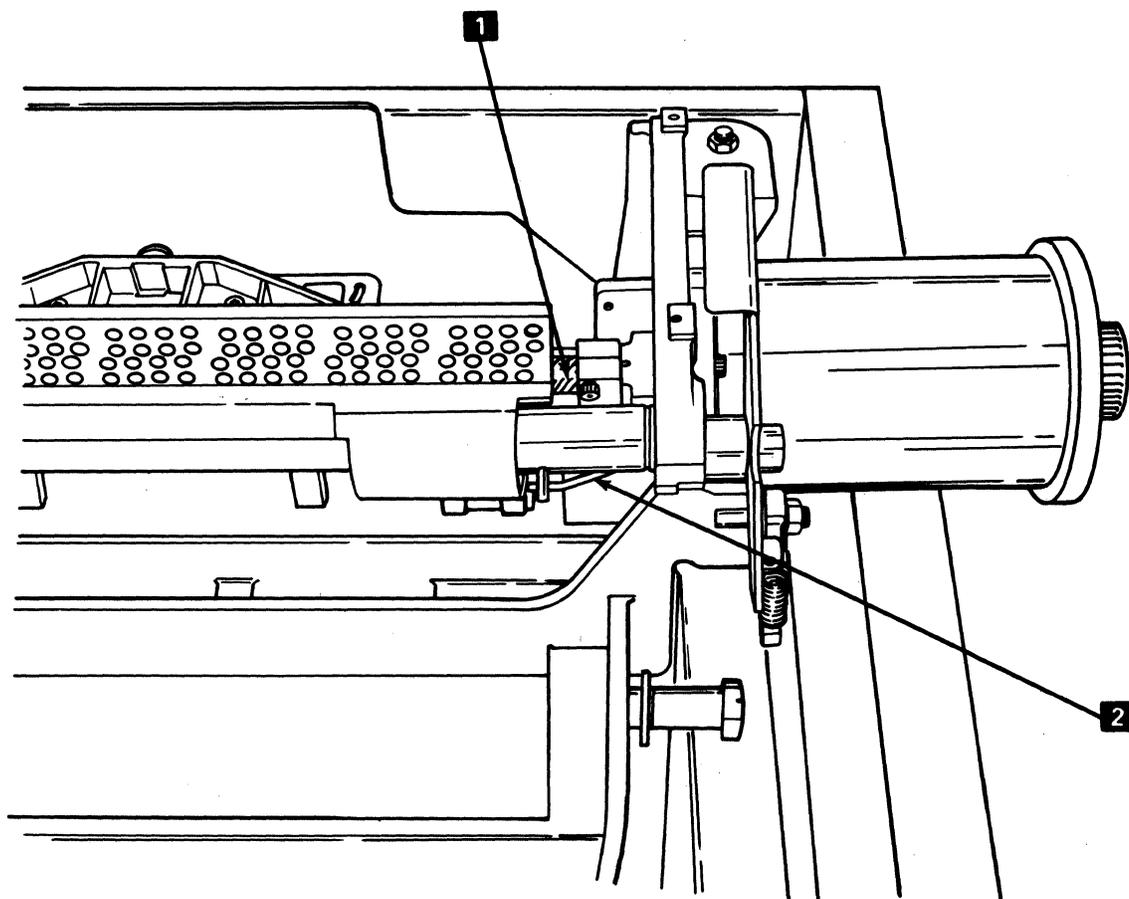
Lubricate the above points on both the left and right endplates

Figure 5-1. Lubrication points (forms feed assembly)



- 1** Tractor slides IBM # 6
- 2** Horizontal shaft IBM # 23
- 3** Actuator rear oilers (do not oil)
- 4** Actuator front oilers (fill) IBM # 6

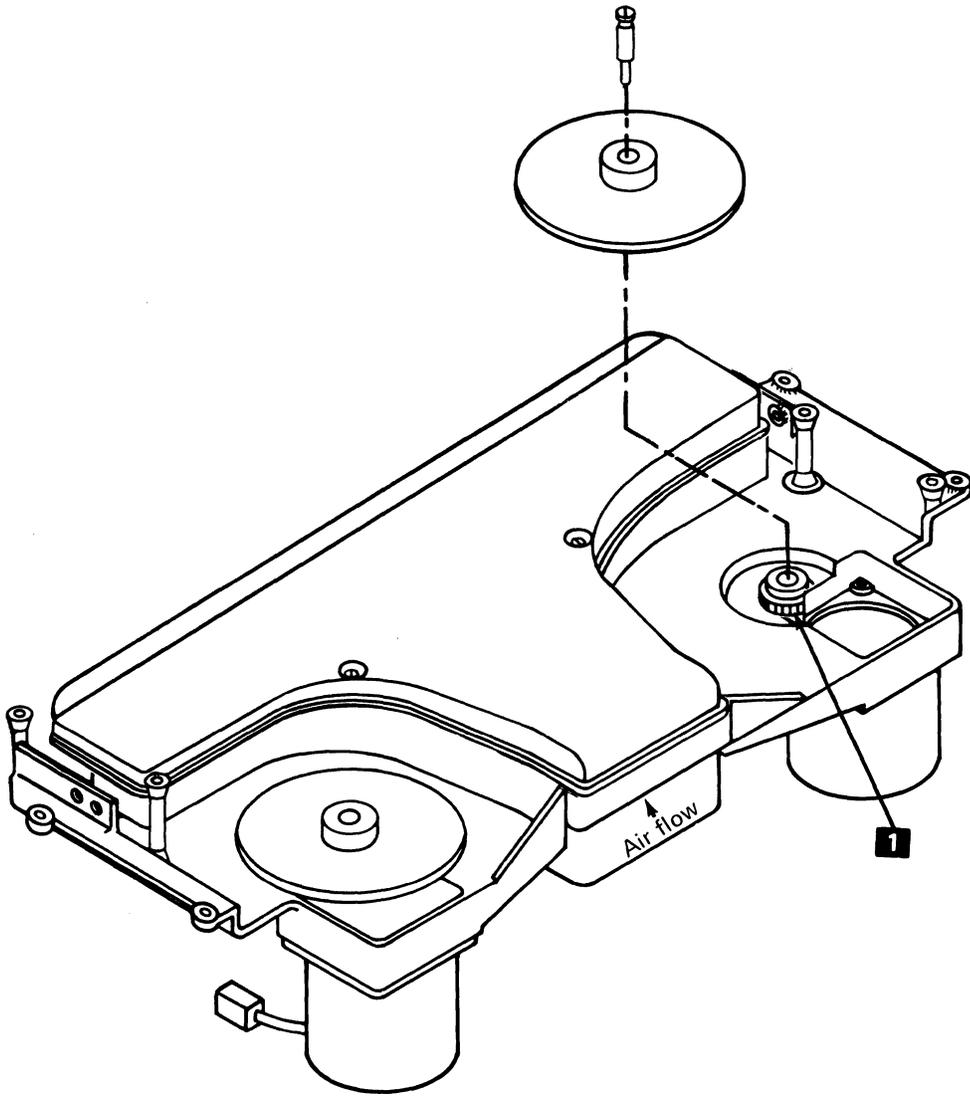
Figure 5-2. Lubrication points (forms feed and actuator assembly)



1 Leadscrew IBM # 6

2 Home cam and cam follower IBM # 23

Figure 5-3. Lubrication points (leadscrew and home cam)



1 Drive gear IBM #23

Figure 5-4. Lubrication points (ribbon drive motors)



Glossary of Terms and Abbreviations

This list includes words and abbreviations used in the MAPs as well as those used in this manual.

Actuator: Individual print wires used to form the printed characters.

Actuator Carrier: Mounting assembly that moves the actuators across the print line.

Actuator Driver: Logic card that supplies drive current to the actuators at print time.

amplifier: A device used to increase the size of the signal.

BEL: A command from the controller that activates the audible alarm feature.

buffer: A small special storage device.

C: capacitor

Cable-thru: A feature that allows the connection of more than one printer or work station on a single cable from the using system or controller.

CE: Customer Engineer

chamois: A soft leather material used in the actuator oil reservoir.

CMA: Communications Adapter.

CMS: Communications Storage.

coaxial cable: A cable consisting of two conductors, individually insulated.

Counterbalance: A mechanical device to balance the weight of the forms feed assembly.

cpi: Characters per inch.

CTA: Control Adapter.

Detent: Slow forms speed.

Drawing(s): Figure, an illustration.

EC: Engineering change.

Encoder: A device for changing an analog quantity (shaft position, voltage amplitude) into a digital signal.

Endplate: Vertical supports on the forms feed assembly.

EOF: End of forms.

FET: Field Effect Transistor.

FDS: Flat distribution system cables.

FRU: Field Replaceable Unit.

GLP: General Logic Probe.

gnd: ground

Group: 8 actuators in one local area.

Handwheel: The knob mounted on the actuator carrier drive motor that allows the carrier to be moved by hand.

Home: Location of the actuator carrier assembly when not printing. Left limit of movement for the carrier. Also called Ramp position.

I/F: Interface.

Leadscrew: A mechanical device used to move the actuator carrier across the print line.

LED: Light Emitting Diode.

LEM: Linear Emitter.

Linear Encoder: A device used to define the motion and position of the actuator carrier assembly. It consists of an encoder glass assembly and emitter block assembly.

Logical page length: The length of the printed page specified by the using system.

lpi: Lines per inch.

lpm: Lines per minute.

MAPs: Maintenance Analysis Procedures.

Microprocessor: An electronic device that processes digital data.

MIM: Maintenance Information Manual.

MLM: Maintenance Logic Manual.

mm: millimetre.

Mode: A method of operation.

MST: Monolithic System Technology.

N/C: Normally closed point of a switch.

N/O: Normally open point of a switch.

Oil Reservoir: Container for oil used to lubricate actuators.

Option: Pertaining to a choice.

PCU: Printer Control Unit.

poll, polled, polling: To question a station to determine if it is ready to receive data.

POR: Power on reset.

quadrature: The alignment of two line signals to produce four equally spaced pulses in a specified period of time.

Ramp: See Home.

Raster Scan: A printing pattern of vertical lines to verify vertical forms registration.

Reference Drawings: Functional diagrams used by the MAPs for failure isolation.

Replace: Swap a new part for an old part.

Ribbon Guideposts: Hardware that guides the ribbon through a particular path.

Ripple print: A printing pattern that shifts the characters one position to the left for each print line.

ROS: Read only storage.

SCS: SNA character string.

Slack: Loose.

SNA: System Network Architecture

Snubber: RC (resistor-capacitor) pack, used across a contactor's n/c or n/o point.

Split-block: A mechanical device that connects the leadscrew to the drive motor shaft.

Symmetry: Up and down time for a given signal are equal.

Tachometer: A device for measuring velocity.

Take-up reel: The ribbon reel that is pulling the ribbon through the print path.

Terminating I/F: Customer access panel on the last device on the cable.

Thrust bearings: Support bearings for the actuator carrier assembly.

Turnaround time: The time required to stop the actuator carrier assembly, reverse direction of travel, and return it to normal speed.

Twinax: See Twinaxial

Twinaxial: A cable made of two twisted wires inside a shield.

Vac: Volts alternating current.

Vdc: Volts direct current.

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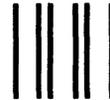
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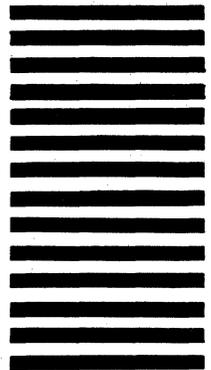
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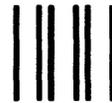
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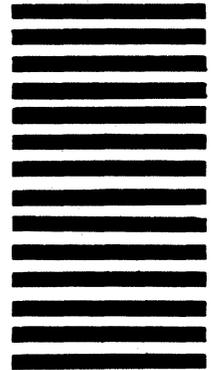
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