IBM Maintenance Library

Selectric® I/O-II Console Printer-Keyboard Theory-Maintenance

SY27-0078-1

IBM Maintenance Library

Selectric® I/O-II Console Printer-Keyboard Theory-Maintenance

SY27-0078-1

Preface

This manual combines theory of operation and maintenance information for the IBM Selectric® I/O-II Console Printer-Keyboard. Parts information is contained in the *IBM Selectric® I/O-II Console Printer Parts Catalog,* S131-0024. The functional units of the following I/O Printers are described in this manual:

- IBM 5471 Console Printer-Keyboard.
- IBM 3210 Models 1 and 2 Console Printer-Keyboard.

Topics in this manual are presented as follows:

- A major topic is introduced by a 
- A page with more than one topic has blocks with sequential letters A, B.
- In text, numbers or letters in circles or blocks identify corresponding areas in illustrations.
- Blocks or circles containing numbers indicate a required reading order.
- Blocks or circles containing letters indicate a preferred reading order.
- The "operator side" of the printer-keyboard is defined as the "front" of the printer-keyboard.

This manual is intended primarily for IBM customer engineers and can be used a a teaching aid and as a reference for servicing the printer-keyboard. A previous knowledge of Selectric® I/O printers would be helpful, but it is not a prerequisite for using this manual.

Organization of the manual and chapter locators are shown on the opposite page, under "How to Use This Manual". The chapter locator tabs are aligned with tabs on the first page of that chapter, to expedite locating the chapter. Chapters 2 and 4 have a detailed chapter contents listed on the first page of the chapter, in addition to the contents given in the front of the manual.

A detailed index at the back of this publication will assist the reader in locating any particular subject or illustration. Since the index also provides a much faster means of locating a specific illustration, there is no numerical listing of the illustrations in this publication.

Second Edition (October 1972)

This is a major revision of, and obsoletes, SY27-0078-0. Maintenance flowcharts have been added to "Chapter 3. Reference Data" for easier servicing.

A change, addition, or deletion to the text or an illustration is indicated by a vertical line to the left of the change.

Changes are periodically made to the information herein; any such changes will be reported in subsequent revisions or Technical Newsletters. Before using this publication in connection with the operation of IBM systems or equipment, refer to the latest edition that is applicable and current.

This manual has been prepared by the IBM Systems Development Division, Publications Center, Dept E01, P.O. Box 12195, Research Triangle Park, North Carolina 27709. A form for readers' comments is provided at the back of this publication. If the form has been removed, comments may be sent to the above address.

© Copyright International Business Machines Corporation 1970, 1972

HOW TO USE THIS MANUAL

For an Introduction to the Selectric® I/O-II Printer-Keyboard	CHAPTER 1. INTRODUCTION • Highlights, features, and electrical interface
For Learning Printer-Keyboard Operations **For Adjusting**	CHAPTER 2. OPERATIONS AND ADJUSTMENTS • Printer-keyboard functional mechanisms • Printer-keyboard adjustment checks
For Reference Data	CHAPTER 3. REFERENCE DATA • Supporting reference data (locations, code chart, timing charts, and diagnostics)
For Removing and Replacing Mechanisms	CHAPTER 4. REMOVALS AND REPLACEMENTS
For Scheduled Preventive Maintenance	CHAPTER 5. PREVENTIVE MAINTENANCE • Preventive maintenance procedures and lubrication chart
For Locating a Particular Subject or Illustration	INDEX • Detailed listing and location of subjects

USE THE INDEX

Contents

DANGER
When the Selectric® I/O-II Console Printer-Keyboard is operating, keep hair, fingers, and objects such as bracelets, necklaces, etc. away from the open part of the printer, to avoid personal injury.

CE SAFETY PRACTICES

All Customer Engineers are expected to take every safety precaution possible and 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 area of power supplies, performing mechanical inspection of power supplies and installing changes in machine circuitry.
3. Wall box power switch when turned off should be locked or tagged in off position. "Do not Operate" tags, form 229-1266, affixed when applicable. Pull power supply cord whenever possible.
4. When it is absolutely necessary to work on equipment having exposed operating mechanical parts or exposed live electrical circuitry anywhere in the machine, the following precautions must be followed:
   a. Another person familiar with power off controls must be in immediate vicinity.
   b. Rings, wrist watches, chains, bracelets, metal cuff links, shall not be worn.
   c. Only insulated pliers and screwdrivers shall be used.
   d. Keep one hand in pocket.
   e. When using test instruments be certain controls are set correctly and proper capacity, insulated probes are used.
   f. Avoid contacting ground potential (metal floor strips, machine frames, etc. — use suitable rubber mats purchased locally if necessary).
5. Safety Glasses must be worn when:
   a. Using a hammer to drive pins, riveting, staking, etc.
   b. Power hand drilling, reaming, grinding, etc.
   c. Using spring hooks, attaching springs.
   d. Soldering, wire cutting, removing steel bands.
   e. Parts cleaning, using solvents, sprays, cleaners, chemicals, etc.
   f. All other conditions that may be hazardous to your eyes. REMEMBER, THEY ARE **YOUR** EYES.
6. Special safety instructions such as handling Cathode Ray Tubes and extreme high voltages, must be followed as outlined in CEM's and Safety Section 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 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. All safety devices such as guards, shields, signs, ground wires, etc. shall be restored after maintenance.
12. Each Customer Engineer is responsible to be certain that no action on his part renders product unsafe or exposes hazards to customer personnel.
13. Place removed machine covers in a safe out-of-the-way place where no one can trip over them.
14. All machine covers must be in place before machine is returned to customer.
15. Always place CE tool kit away from walk areas where no one can trip over it (i.e., under desk or table).
16. Avoid touching mechanical moving parts (i.e., when lubricating, checking for play, etc.).
17. When using stroboscope — do not touch ANYTHING — it 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 in shirt or have a tie clasp (preferably nonconductive) approximately 3 inches from end. Tie chains are not recommended.
20. Before starting equipment, make certain fellow CE's and customer personnel are not in a hazardous position.
21. Maintain good housekeeping in area of machines 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

229-1264-1

Artificial Respiration

GENERAL CONSIDERATIONS

1. **Start Immediately, Seconds Count**
   Do not move victim unless absolutely necessary to remove from danger. Do not wait or look for help or stop to loosen clothing, warm the victim or apply stimulants.
2. **Check Mouth for Obstructions**
   Remove foreign objects — Pull tongue forward.
3. **Loosen Clothing — Keep Warm**
   Take care of these items after victim is breathing by himself or when help is available.
4. **Remain in Position**
   After 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.

Reprint Courtesy Mine Safety Appliances Co.

Rescue Breathing for Adults Victim on His Back Immediately

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

Continue rescue breathing until he breathes for himself.

Thumb and finger positions

PRINTER-KEYBOARD HIGHLIGHTS

A Printer

- Printer and keyboard operate independently of each other and are considered as separate units. (Both units must go through an electrical interface to operate as a typewriter.)
- Printer Functions:

  PRINT - 88 characters
  SPACE - advances the carrier one space to the right
  SHIFT - selects either the 44 lowercase characters or the 44 uppercase characters on the typehead
  CARRIER RETURN/INDEX - powers the carrier to the left margin and simultaneously advances the platen one space vertically.

- Printer operational speeds are 15.5 characters per second for space and print and approximately 15 inches per second for carrier return.
- Platen accommodates a maximum of an original and five carbon copies of pin-feed forms.
- Uses the cartridge fabric ribbon mechanism used in the IBM Selectric® typewriter.
- Separate cables for the printer, keyboard, and control lights and switches connect the printer and keyboard to the control unit.

Selectric ®I/O-II Console Printer-Keyboard with Basic Covers

B Keyboard

- Contains 44 character keys, along with Shift, Space, and Carrier Return keys. (Typamatic keys are not available.)
- Accepts entries at a nominal rate of 15.5 characters per second.
- Transmits a six-bit code plus a check bit for parity.
- Both functions and characters are assigned discrete codes and are transmitted through a single keyboard transmit contact assembly, to provide interlocking between functions and characters.

OPERATOR CONTROLS

Copy Control Lever

- Compensates for thickness of multiple forms.
- Moving the lever to the rear moves the platen farther from the typehead.

Impression Control Lever

- Five-position lever, located just to the right of the typehead.
- Allows the operator to vary print impression for different typing applications.
- Push the lever to the right and pull forward for increased print impression.

Forms Load Lever

- The lever should be pulled forward when forms are being loaded
- The lever must be in the rear position when the printer is operating.

Selectric ® I/O-II Console Printer-Keyboard with Basic Covers

System Control Switches

- Vary with using systems.

System Indicator Lamps

- Vary with using systems.

Platen Variable Control

- When the knob is pressed in, the platen can be rotated freely, to locate a line of print.

PRINTER OPERATING MODE

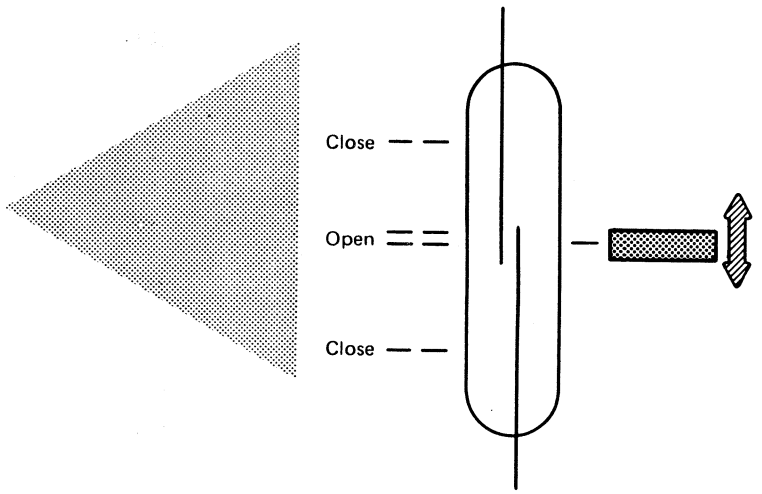
The printer operates in a "closed loop" mode. In closed loop mode, information from the control unit is released to the printer only when the printer is ready to receive it. Information is terminated when the printer feedback contacts (reed switches) close, and new information may be accepted when the feedback contacts are open. The feedback contacts are timed to allow initiation of the next printer cycle prior to the end of the current cycle. This provides maximum safe throughput time for the printer.

A Reed Switch Actuation

- All contact assemblies used in the printer and keyboard for data input and control are permanent magnet-operated reed-switch contacts.
- The two methods of actuating these reed switches are shown in 1 and 2

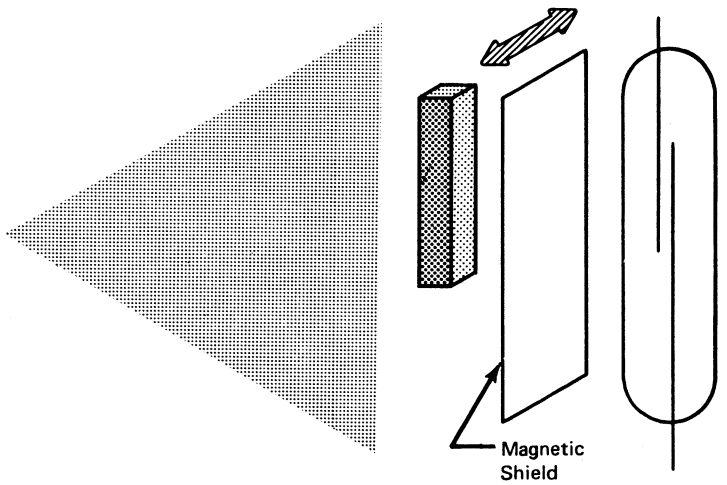
1 Parallel Actuation, Magnet Perpendicular To Switch Axis

This arrangement results in two reed-switch closures as the magnet is moved along the entire length of the reed-switch capsule.

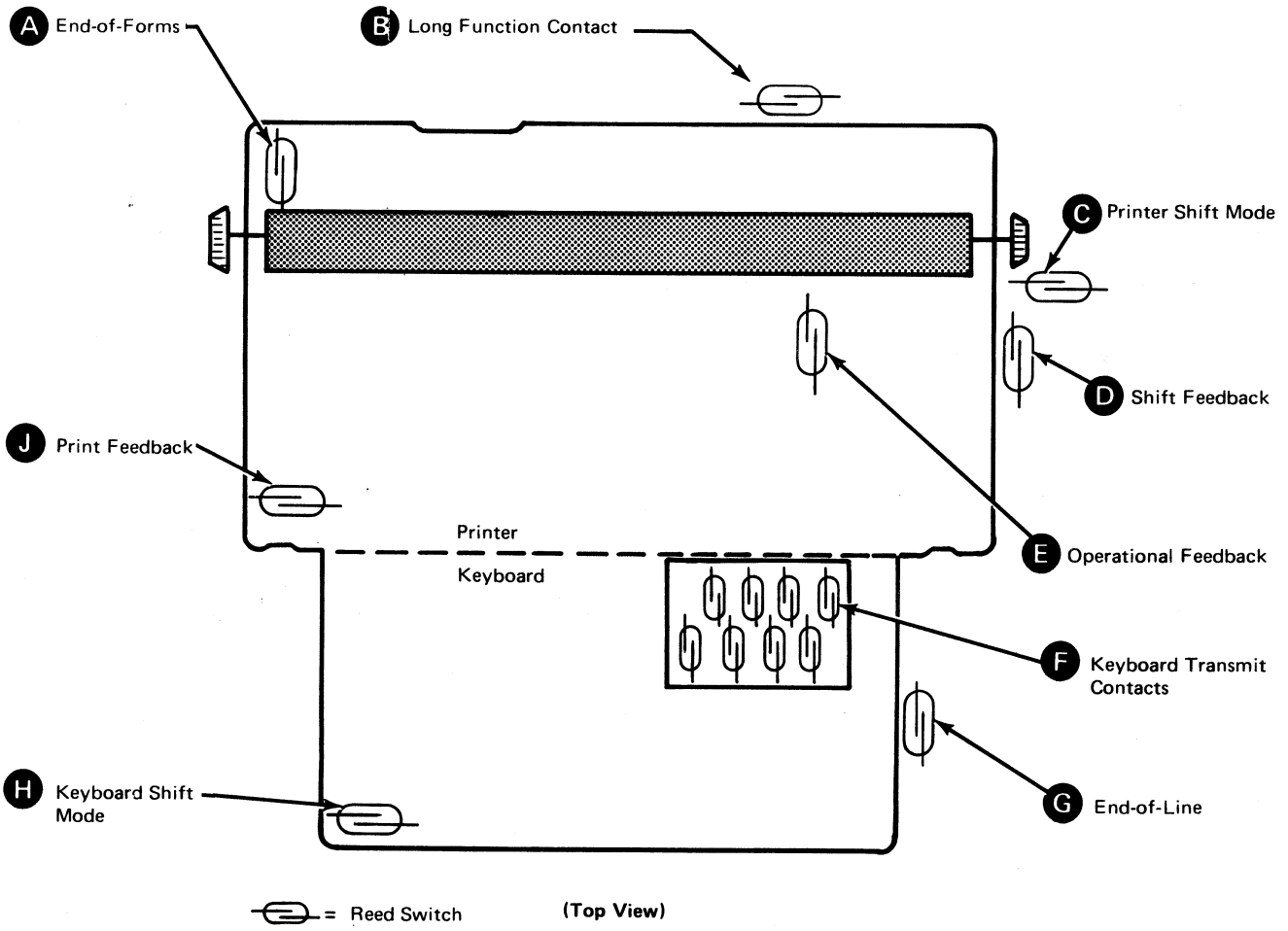


2 Shunt Actuation

With this arrangement, the reed switch is controlled by the use of a magnetic shield inserted between the reed-switch capsule and magnet to shunt the magnetic flux field.



REED SWITCH FUNCTIONS



A End-of-Forms - Closes when the printer is out of paper forms and when the forms load lever is in the forward position.

B Long Function Contact - Closes during a Carrier return/index operation and remains closed for the duration of the carrier return. Because the switch closes when the carrier moves in either direction, it may close during a print or space cycle.

C Printer Shift Mode - Signals the printer case mode (uppercase or lowercase). Closes for uppercase shift and opens for lowercase shift.

D Shift Feedback - Closes during uppercase and lowercase shift cycles.

E Operational Feedback - Closes when the platen is being indexed (advanced one line space) during a carrier return/index operation.

F Keyboard Transmit Contacts - Seven data contacts and a strobe contact. The strobe contact closes with every data contact and is the last contact to close. Strobe contact closure is the signal to the control unit that data is available at the keyboard.

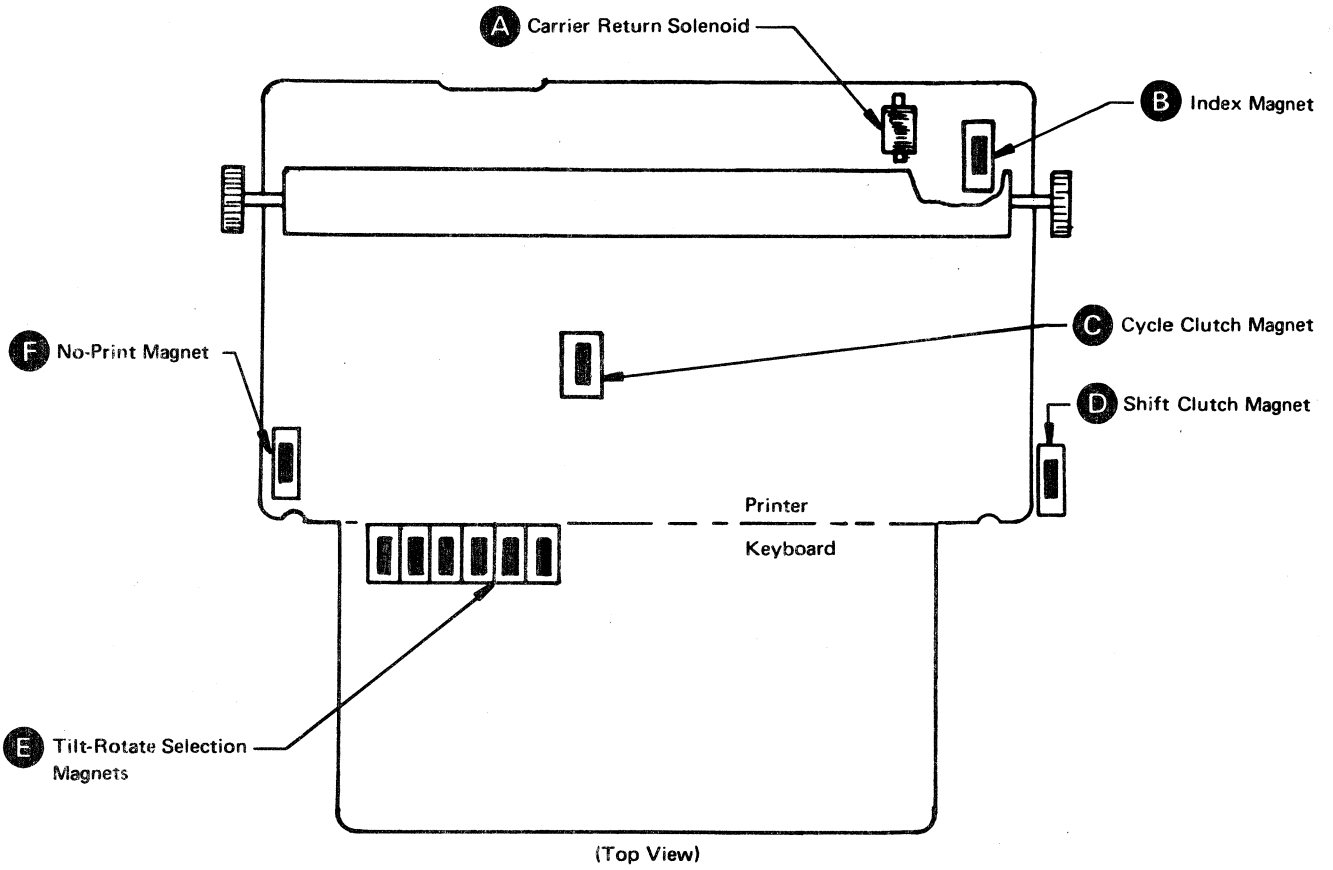
G End-of-Line - Closes 5 ± 1 spaces prior to the right margin setting to signal the end of the writing line.

H Keyboard Shift Mode - Actuated by the shift keylever. Signals the mode (uppercase or lowercase) of the keyboard for printing from the keyboard.

J Print Feedback - Closes during a print or a space cycle.

MAGNET AND SOLENOID FUNCTIONS

- Printer magnets and solenoids control all printer functions.



A Carrier Return Solenoid—Pulsed simultaneously with the index magnet, for a carrier return/index operation. Initiates carrier movement to the left margin.

B Index Magnet—Pulsed from the INDEX key and also pulsed simultaneously with the carrier return solenoid. Allows the platen to be indexed (advanced one line space).

C Cycle Clutch Magnet—Controls cycle shaft movement. Pulsed on every print or space cycle.

D Shift Clutch Magnet—A single magnet, pulsed for either a shift to uppercase or a shift to lowercase.

E Tilt-Rotate Selection Magnets—Combinations of these six magnets determine the proper typehead position for a print cycle or a space ("no-print" character) cycle.

F No-Print Magnet—Pulsed simultaneously with low velocity, cycle clutch, and certain tilt-rotate selection magnets, for a space ("no-print" character) cycle.

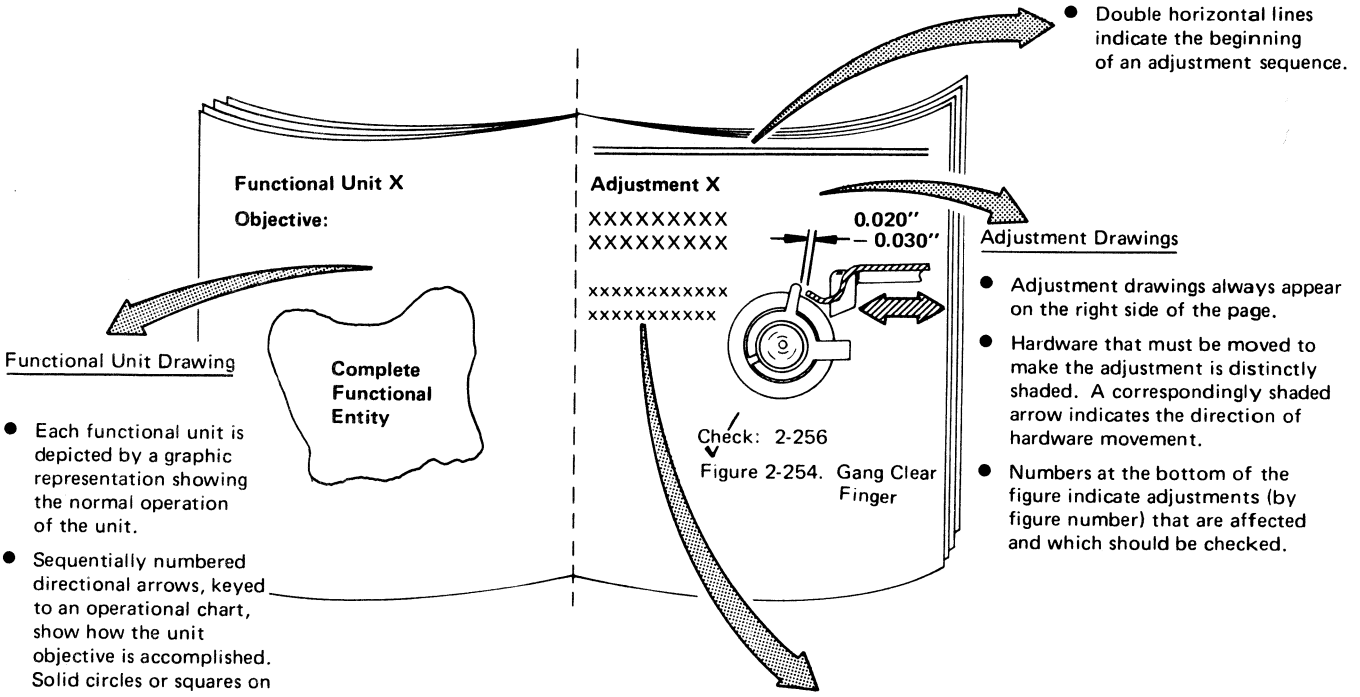
Chapter 2. Operation and Adjustments

Contents

How to Use Chapter 2

A Functional Unit Operation

B Functional Unit Adjustments



- Each functional unit is depicted by a graphic representation showing the normal operation of the unit.
- Sequentially numbered directional arrows, keyed to an operational chart, show how the unit objective is accomplished. Solid circles or squares on an operational chart represent sequential events not keyed from the drawing.

- Double horizontal lines indicate the beginning of an adjustment sequence.

Adjustment Drawings

- Adjustment drawings always appear on the right side of the page.
- Hardware that must be moved to make the adjustment is distinctly shaded. A correspondingly shaded arrow indicates the direction of hardware movement.
- Numbers at the bottom of the figure indicate adjustments (by figure number) that are affected and which should be checked.

Adjustment Text

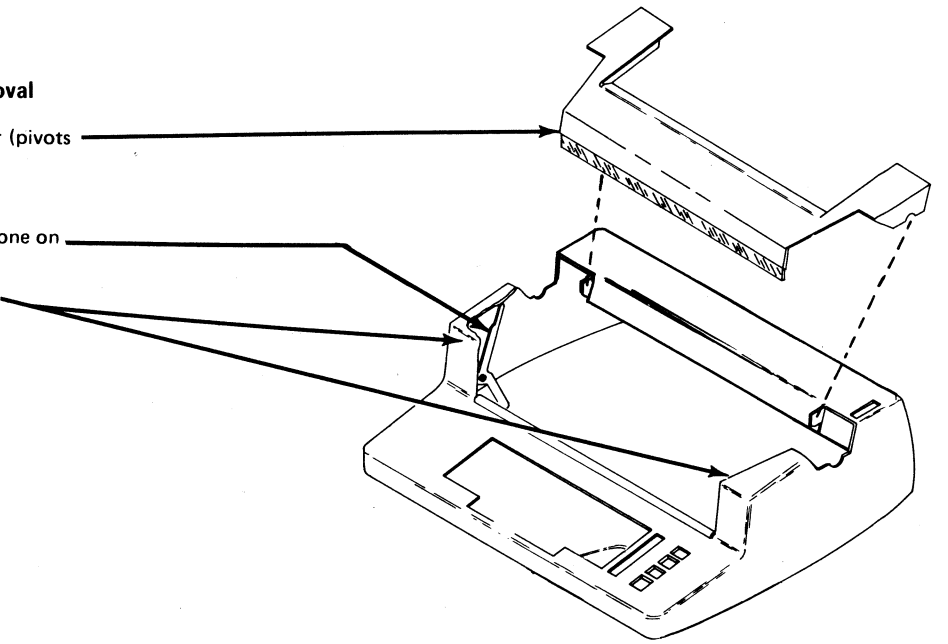
- The basic adjustment check is printed in bold type for emphasis, followed by any instructions needed to support the drawing.

PRINTER COVERS (Basic Covers Only)

- Covers may vary with using systems.

A Top and Center Cover Removal

1. Lift up on front of top cover (pivots rearward).
2. Remove platen.
3. Pull forward on latch levers (one on each side of center cover).
4. Lift straight up on the cover.

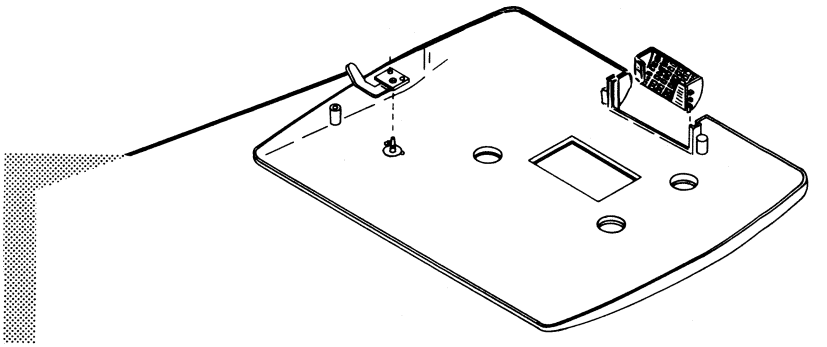


B Bottom Cover

- Provides base for the printer.

Printer Latch Lever

- Mounted on keyboard powerframe.
- Locks printer to bottom cover.
- Pushing the latch lever to the rear allows the printer to be lifted slightly, pulled forward, and tilted up for servicing.



PRINTER COVERS ADJUSTMENT CHECKS (BASIC COVERS ONLY)

Printer Rear Mounting Brackets

A **With the top cover closed, the contour of the top cover should match the contour of the center cover. The platen knob should be vertically centered in the platen hole in the top and center covers.**

B **The operating levers should be centered in their exit holes.**

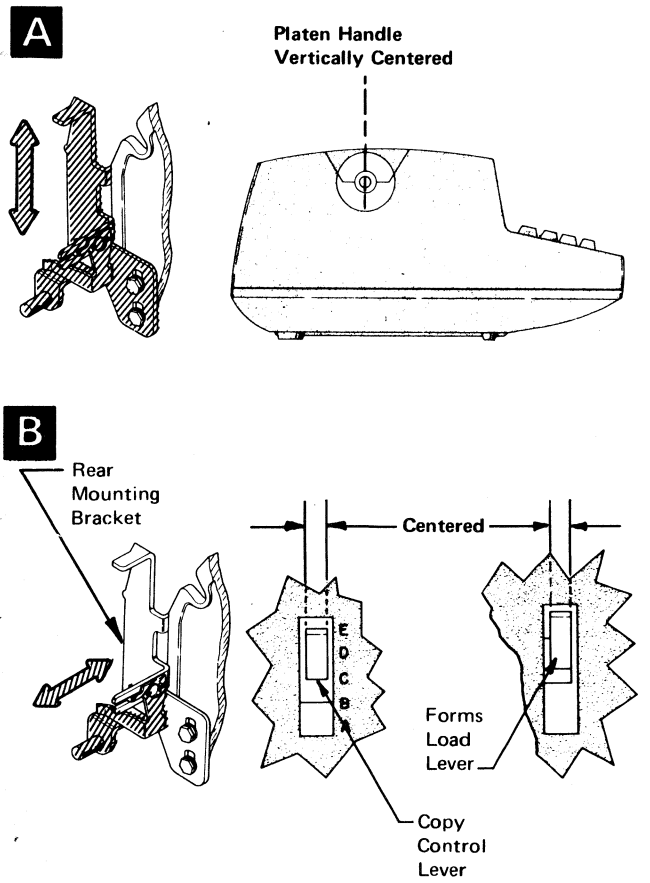


Figure 2-1. Printer Rear Mounting Brackets

Printer Front Mounting Bracket

A **The bottom of the keyboard keybuttons should be 1/16" below the top of the center cover.**

B **All keybuttons should be centered in their openings in the printer cover.**

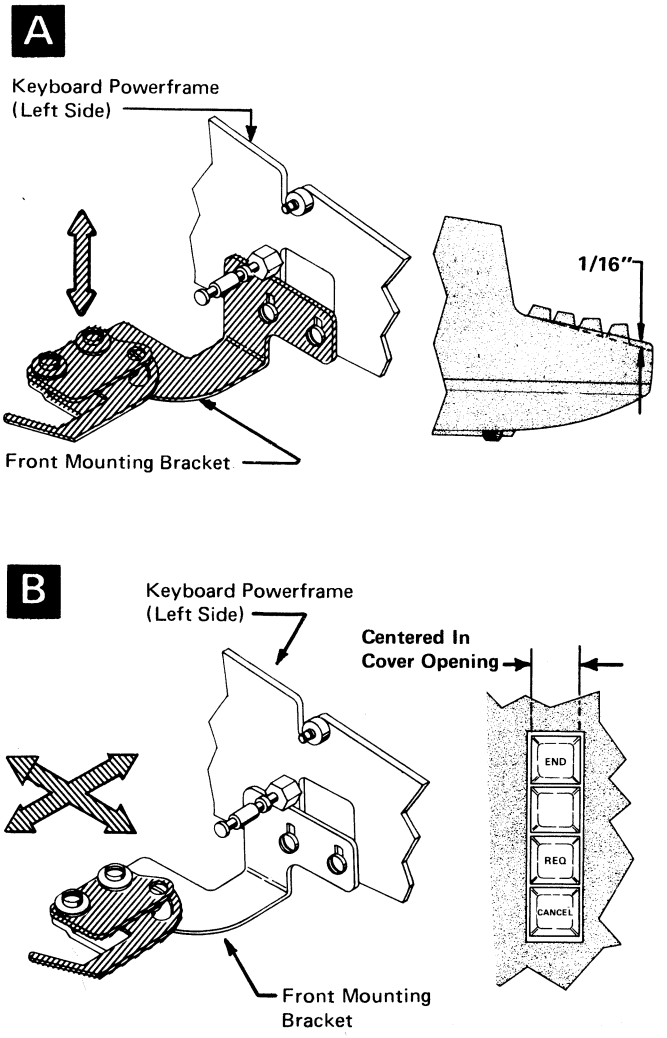


Figure 2-2. Printer Front Mounting Brackets

Figure numbers 2-3 through 2-8 have been purposely omitted, to allow for possible future additional adjustments.

PRINTER MOTOR

Objective: To provide positive drive to the printer drive mechanism via the drive belt and cycle clutch pulley.

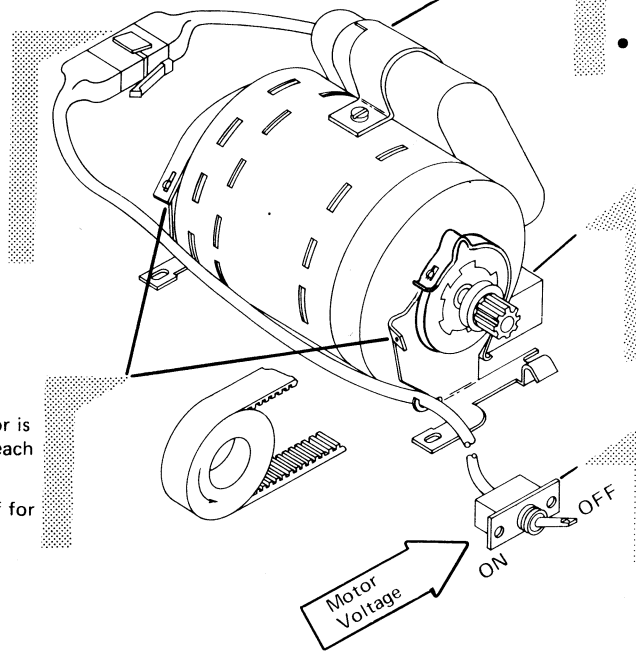
A Motor Features

CE Service Connector

- Located at left rear of printer.
- Removes line voltage from motor.
- In series, electrically, with CE service switch.

Motor Mounts

- Operating force of motor is against mounts (one at each end of motor).
- Spring retainers snap off for motor removal.



Motor Capacitor

- Provides starting torque for the motor and controls direction of motor rotation.
- Grounded to motor through mounting screws.

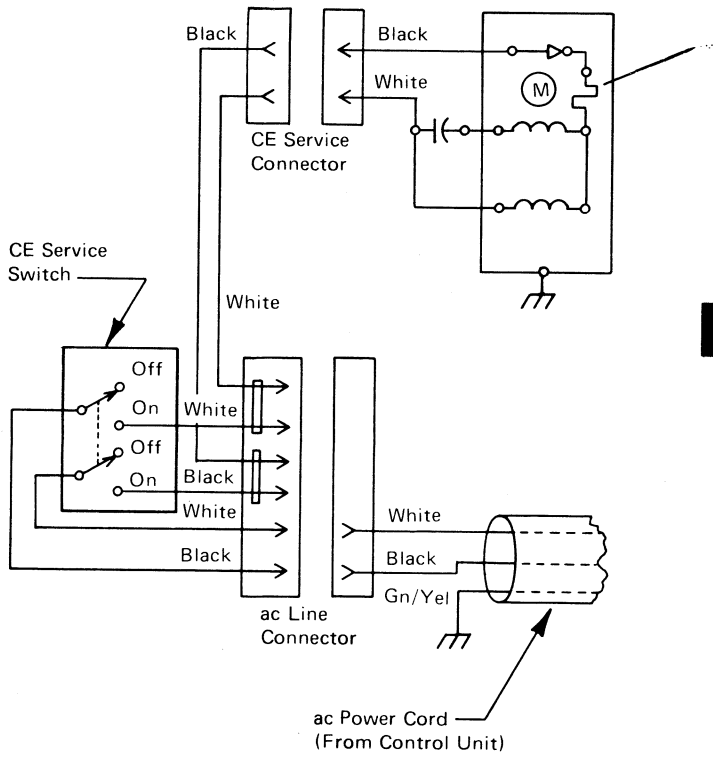
Air Duct

- Discharge air pulled through the motor by the cooling system.
- Air is pulled through the left end and over the field coils by a fan attached to the right end of the rotor.

CE Service Switch

- Located on right side of keyboard powerframe.
- Removes line voltage from motor.

B Wiring Diagram



Thermal Circuit Breaker

- Opens only if motor remains stalled for a period of time.
- Closes after motor regains normal temperature.
- Continues to open and close as long as motor is stalled and motor voltage is present.

C Motor Specifications

	Domestic	World Trade
Voltage	115V ac ± 10%	220V ac ± 10%
hertz	60	50
Operating Current	1.0 ampere	0.5 ampere
Operating Speed	1625 rpm	1325 rpm
Rated Horsepower	1/20	1/20

MOTOR ADJUSTMENT CHECKS

Motor Pulley

Check for a slight clearance between the drive belt and the flange, on both the motor pulley and the cycle clutch pulley.

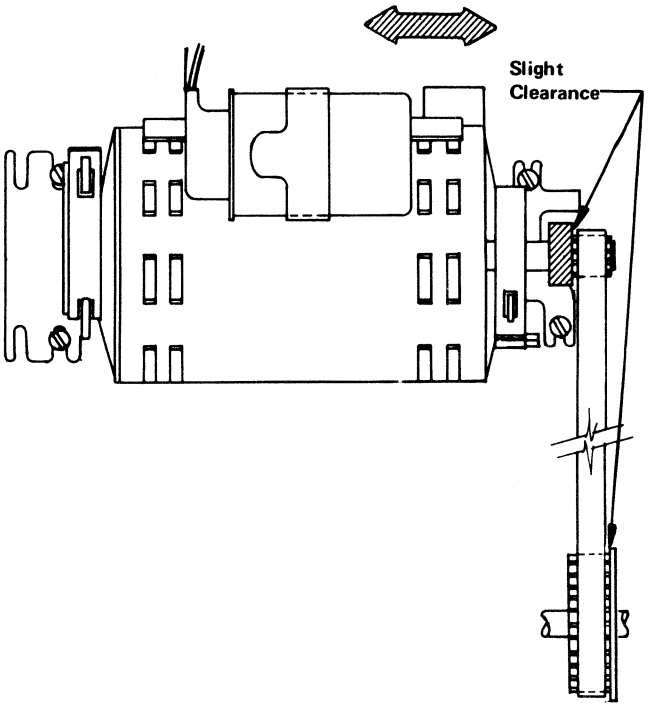


Figure 2-9. Motor Pulley Clearance

Belt Tension

Drive belt tension should be adjusted to produce a minimum amount of noise.

NOTE The belt must be tight enough to keep it from jumping the cogs on the motor pulley. Both ends of the motor must have the same adjustments, to maintain the motor shaft perpendicular to the drive belt.

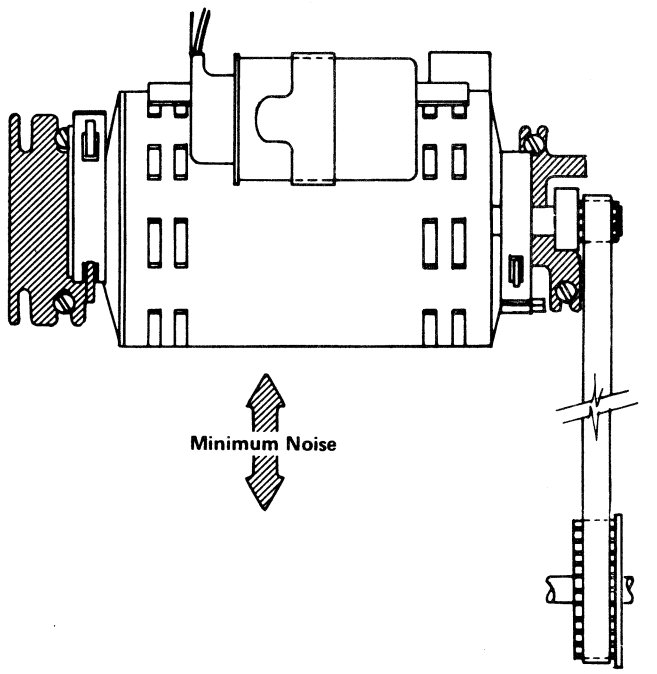
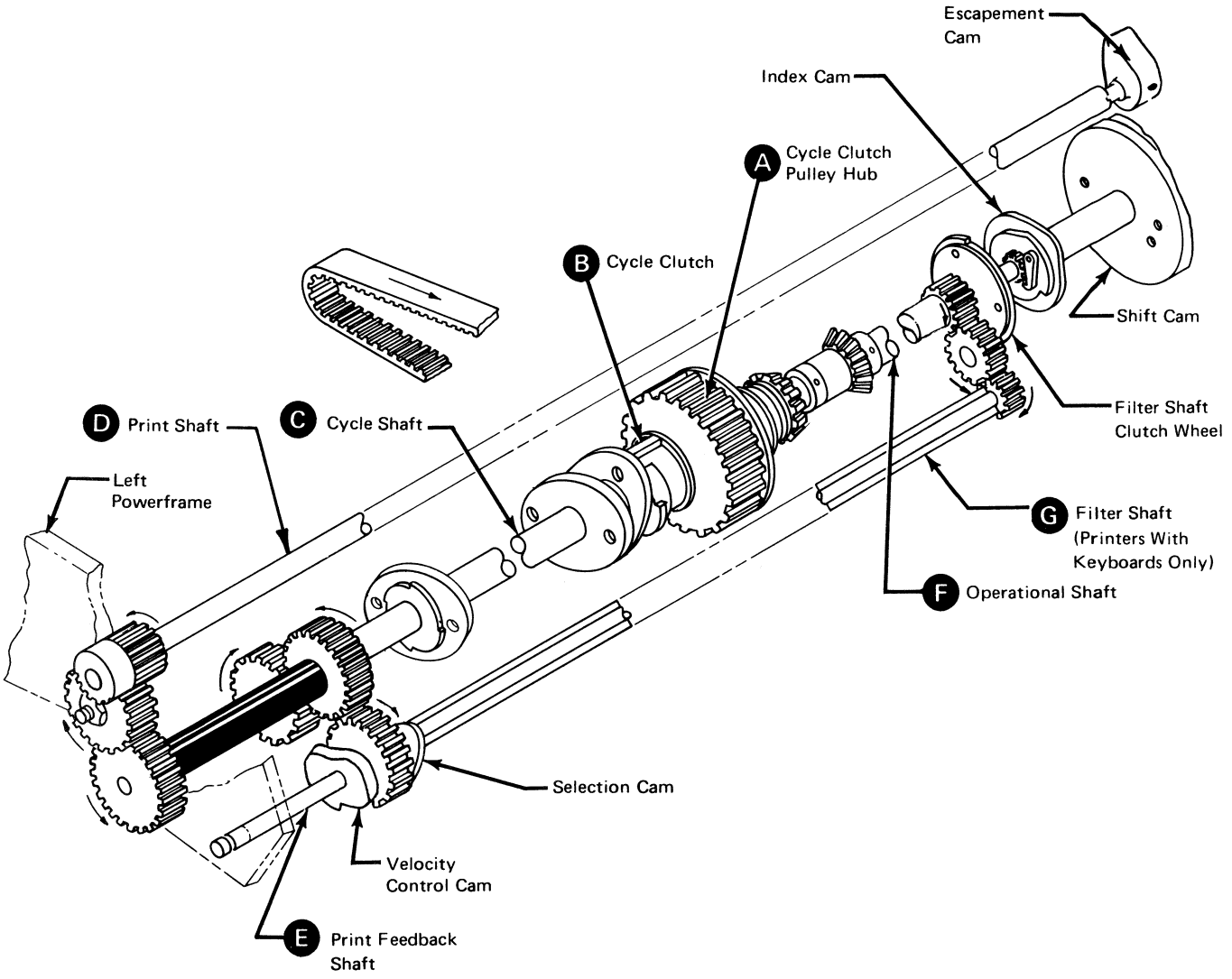


Figure 2-10. Motor Belt Tension

PRINTER DRIVE MECHANISM

Objective: To power all printer operations.



A Cycle Clutch Pulley Hub - Driven by the motor drive belt. Rotates continously when the motor is operating. Driving member for the cycle shaft and the operational shaft.

B Cycle Clutch - Driving connection between the cycle clutch pulley hub and the cycle shaft. Drives the cycle shaft 180° for each print cycle.

C Cycle Shaft - Driven by the cycle clutch via the cycle clutch pulley. Operates the print feedback shaft and the print shaft and, directly or indirectly, powers all other print operations.

D Print Shaft - Driven by the cycle shaft. Rotates 360° during each print cycle, to operate the print mechanisms in the carrier and to allow the carrier to escape one space to the right after each print operation.

E Print Feedback Shaft - Driven by the cycle shaft. Provides print feedback timing, and drives the velocity control cam and the selection cam.

F Operational Shaft - Continuously driven by the cycle clutch pulley when the motor is operating. Powers the carrier return/index and shift functions. Also powers the filter shaft (printers with keyboards only).

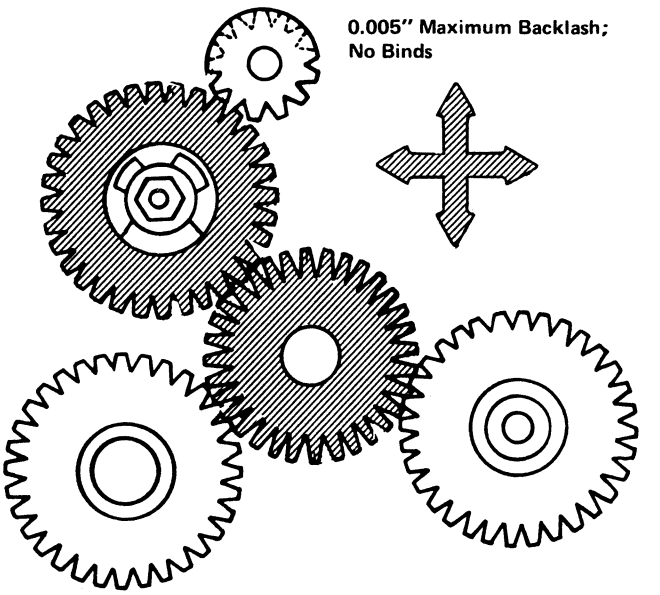
G Filter Shaft - Operates (drives) selection interposers to generate six-bit keyboard code. Restores keyboard mechanisms after each keyboard cycle.

PRINTER DRIVE ADJUSTMENT CHECKS

Idler Gears

Check for a 0.005" maximum backlash between mating gears Gears must not bind.

This adjustment prevents erratic drive train operation and ensures minimum overthrow of the driven shafts.

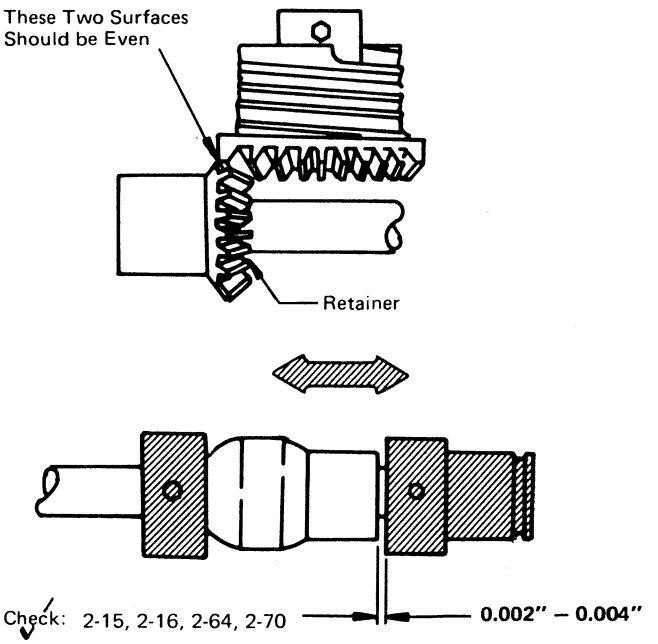


Check: 2-35, 2-60, 2-104, 2-150

Figure 2-11. Idler Gears

Operational Shaft End Play

With the carrier return pinion pushed to the right against the retainer, check for 0.002" – 0.004" end play in the operational shaft. The outer surfaces of the carrier return pinion and the escapement cord drum gear teeth should be even.



Check: 2-15, 2-16, 2-64, 2-70

Figure 2-12. Operational Shaft End Play

Operational Shaft Support

The operational shaft should operate freely and without binding in the operational shaft support.

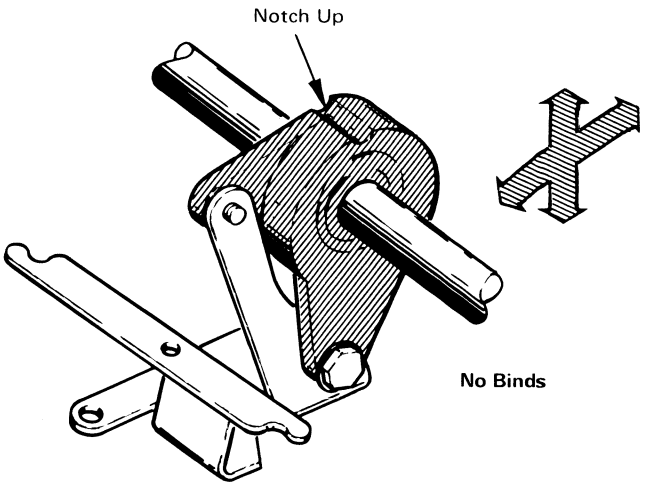


Figure 2-13. Operational Shaft Support

Torque Limiter Arbor End Play

Check for 0.002" – 0.006" clearance between the carrier return clutch arbor and the carrier return pinion.

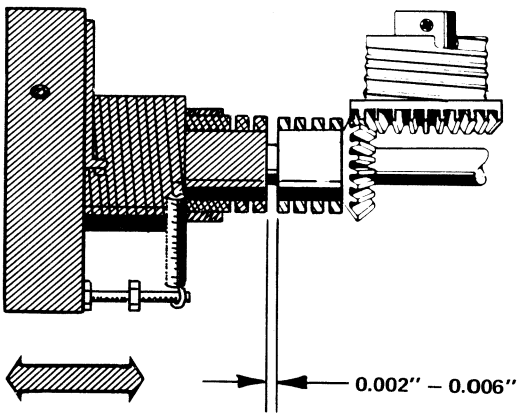
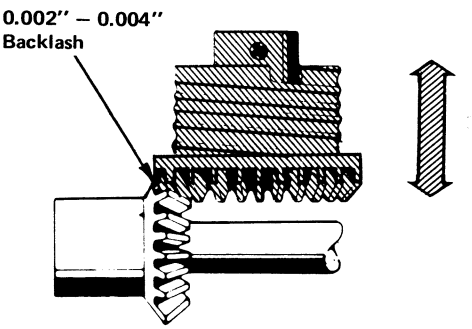


Figure 2-14. Torque Limiter Arbor End Play

Escapement Cord Drum Gear

CAUTION The mainspring tension should be *relaxed* before the escapement cord drum gear is loosened. The cord tension should also be relaxed by removing the cord from the pulley on the tension arm.

Check for 0.002" – 0.004" backlash at the tightest point, between the escapement cord drum gear and the carrier return pinion.



Check: 2-16

Figure 2-15. Escapement Cord Drum Gear

Tab Pinion

Check for 0.002" – 0.004" backlash between the escapement cord drum and the tab governor pinion. **A**

Check for 0.002" – 0.004" clearance between the tab governor pinion and collar. **B**

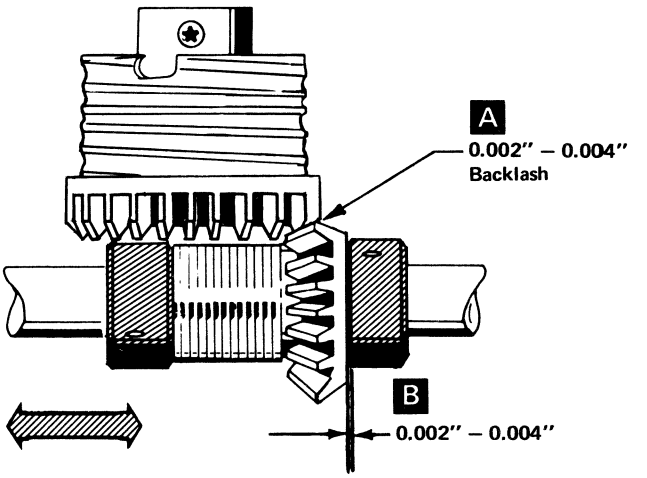


Figure 16. Tab Pinion

Torque Limiter

With the carrier nearing the left margin during a carrier return operation, check for 1 - 2 pounds pull on the carrier, generated by the torque limiter. (Check by holding the push end of a spring scale against the carrier.)

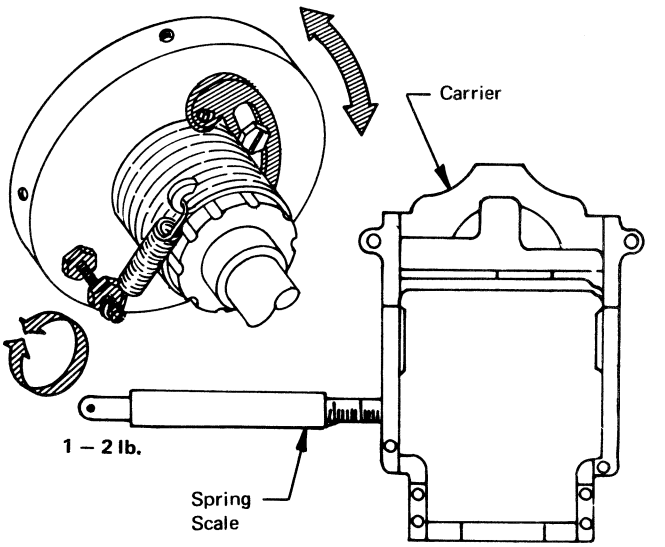


Figure 17. Torque Limiter

Index Cam

The index cam should be visually centered between the index magnet armature and the check pawl.

NOTE All other "Printer Drive Adjustments" are included in the functional unit areas they affect.

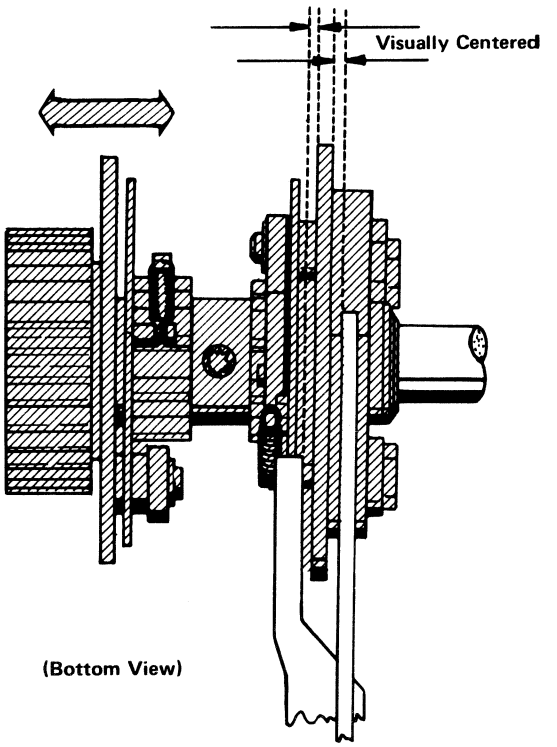


Figure 2-18. Index Cam

CYCLE CLUTCH (Part 2 of 2)

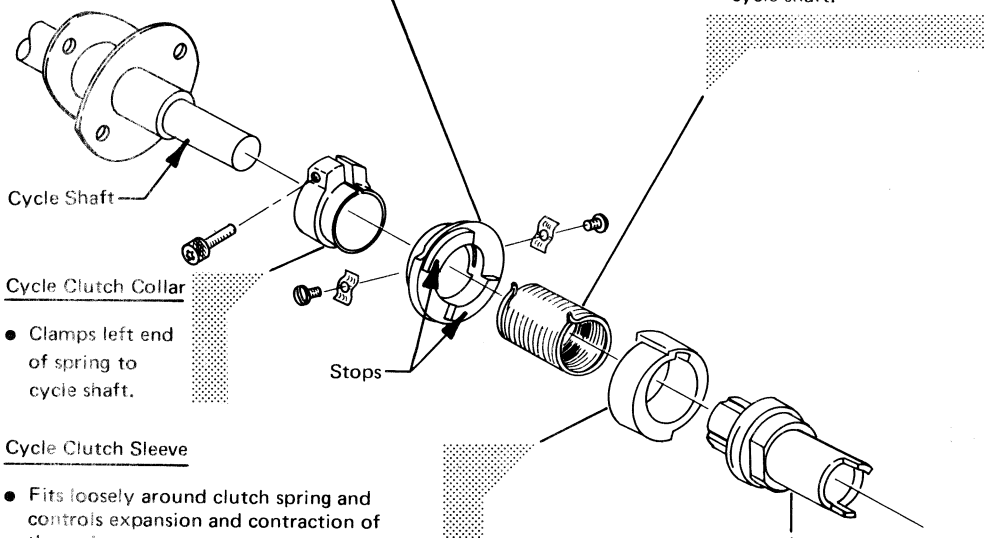
C Cycle Clutch Assembly

Cycle Clutch Restoring Cam

- Forces clutch latch into position to engage one of the two steps on the clutch sleeve, after 180° cycle shaft rotation.
- Stops on cam contact lugs on clutch sleeve and prevent cycle shaft from overthrowing past its rest position when the sleeve is stopped by the clutch latch.

Clutch Spring

- Driving connection between cycle clutch pulley and cycle shaft.
- Left end of spring is clamped to the cycle shaft by the cycle shaft collar.
- Right end of spring fits over pulley hub, and turned-up ear fits into slot in clutch sleeve.
- Holding left end of spring stationary and turning right end clockwise enlarges the inside diameter of spring and allows the hub to rotate freely within spring. When right end of spring is released, it contracts, engages the pulley hub, and drives the cycle shaft.



Cycle Clutch Collar

- Clamps left end of spring to cycle shaft.

Cycle Clutch Sleeve

- Fits loosely around clutch spring and controls expansion and contraction of the spring.
- Contains two steps (180° apart) which can be engaged by clutch latch. In the rest position, sleeve is engaged by clutch latch, and spring is held in an expanded condition. Clutch sleeve must be unlatched to allow cycle clutch to operate.

Cycle Clutch Pulley Hub

- Driving member for cycle shaft.

D Cycle Clutch Latching and Unlatching

- With the cycle clutch in the rest position, a step on the cycle clutch magnet armature holds the clutch latch under one of the steps on the clutch sleeve (latched position of clutch).
- When the magnet is energized, the latch releases (unlatches) the clutch sleeve, allowing the clutch spring to contract and drive the cycle shaft.
- When the restoring cam reaches the high dwell, the cam follower forces the clutch latch into position to engage the next step on the clutch sleeve. When the sleeve is stopped by the latch, a momentum built up by the cycle shaft expands the clutch spring until it no longer drives the shaft.
- Stopping the cycle shaft at the end of a print cycle results in a tendency of the shaft to rebound (turn backward). If the shaft is permitted to turn backward, the clutch spring will contract and reengage the pulley hub, resulting in clutch "chatter". To prevent this, the check pawl drops into a tooth on the check ratchet just as the clutch sleeve is latched (engaged) by the clutch latch.
- Both the overthrow stop and the check pawl ensure that the cycle shaft will return exactly to its rest position (positive cams almost on their low dwells and the check ratchet latched by the check pawl) at the completion of each print cycle.

CYCLE CLUTCH ADJUSTMENT CHECKS

Cycle Shaft End Play

Check for 0.001" – 0.006" cycle shaft end play.

This clearance is maintained by placing shims between the left bearing and the check ratchet. Shims are available in various thicknesses and are described in the *IBM Selectric ® I/O – II Console Printer/Keyboard Illustrated Parts Catalog,* S131-0024.

The cycle clutch sleeve and spring should be removed to prevent interference and ensure a correct end-play adjustment.

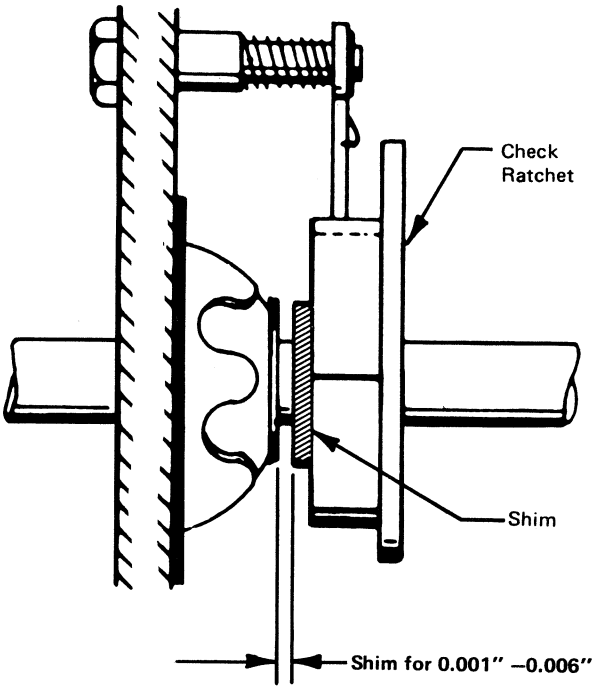


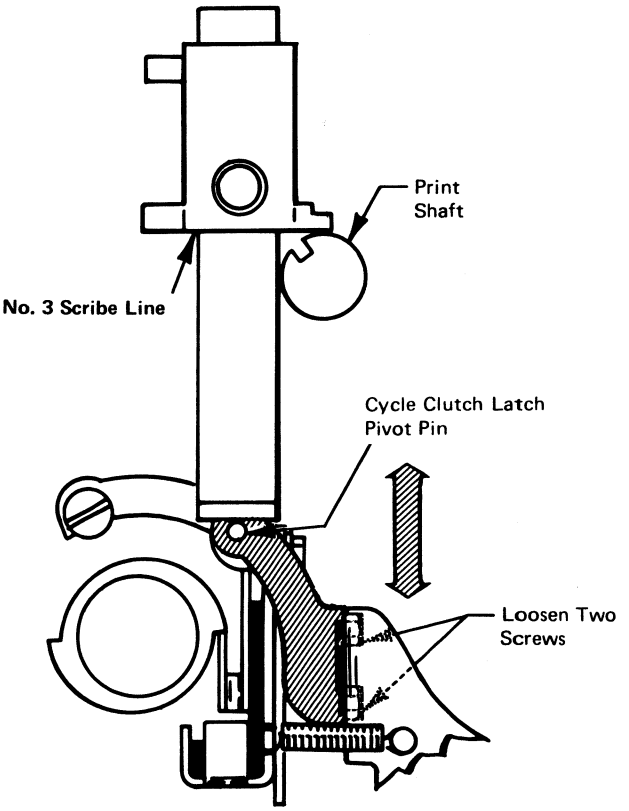
Figure 2-19. Cycle Shaft End Play

Cycle Clutch Latch Height

With the head of the Hooverometer set at the No. 3 scribe line, the head should rest on top of the print shaft, with the handle touching the cycle clutch latch pivot pin.

This adjustment ensures that the steps of the cycle clutch sleeve meet the cycle clutch latch squarely. To ensure that the latch is parallel to the step on the sleeve: raise the latch to the top of the elongated slot, trip the cycle clutch, and hand-cycle until the sleeve forces the latch down to the correct height.

If the bracket is adjusted too low, the latch will have difficulty releasing the clutch sleeve. With the bracket too high, the force of stopping the cycle shaft will tend to cam the latch forward, resulting in a repeat cycle.



Check: 2-15, 2-26, 2-28, 2-29

Figure 2-20. Cycle Clutch Latch Height

Cycle Clutch Armature Pivot Plate

With the armature manually attracted, the armature should just touch the armature pivot plate.

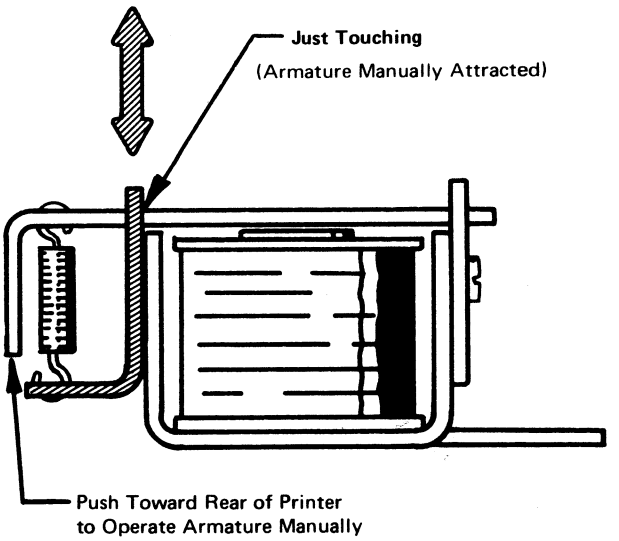
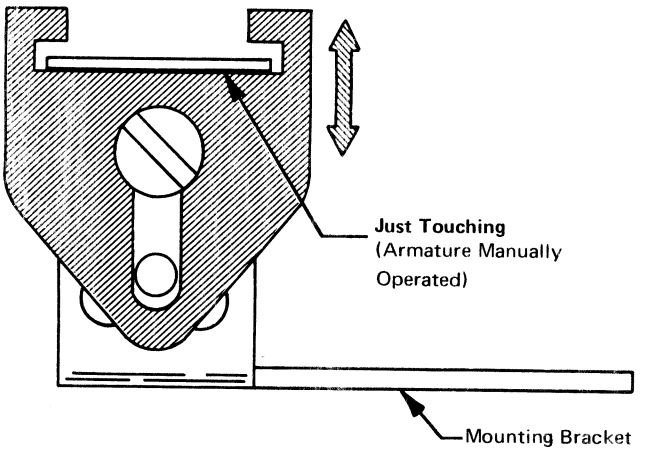


Figure 2-21. Cycle Clutch Magnet Armature Pivot Plate.

Cycle Clutch Armature Upstop

With the armature manually attracted, the armature should just touch the armature upstop.



Check: 2-23

Figure 2-22. Cycle Clutch Magnet Armature Upstop

Cycle Clutch Armature Latch

With the armature against the upstop, the 'armature' latch should just touch the armature.

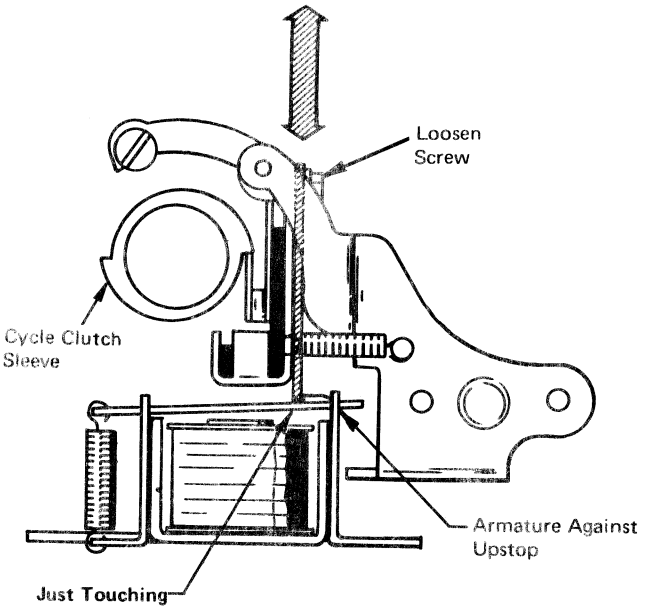
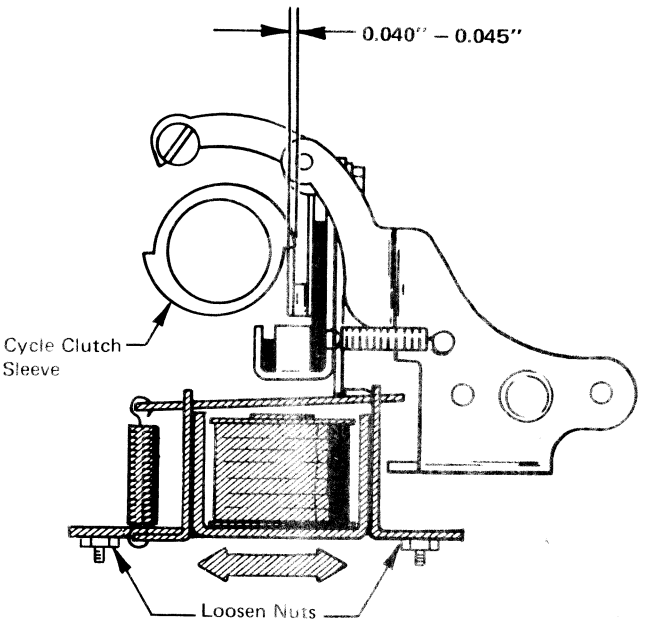


Figure 2-23. Cycle Clutch Armature Latch

Cycle Clutch Latch Bite

With the cycle clutch latched, the clutch should engage a step on the clutch sleeve by 0.040" – 0.045".

NOTE The thickness of latch is approximately 0.040".



Check: 2-26

Figure 2-24. Cycle Clutch Latch Bite

Cycle Clutch Latch Overthrow

With the restoring cam follower roller on the high dwell of the restoring cam, the cam follower should overthrow the cycle clutch armature lug by 0.015" – 0.025".

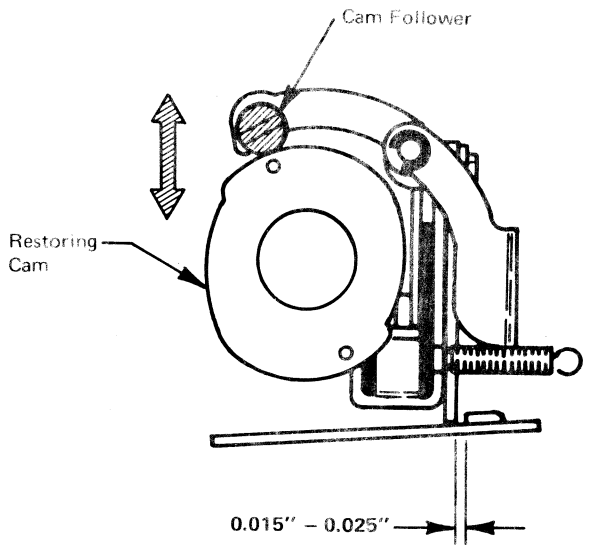


Figure 2-25. Cycle Clutch Latch Overthrow

Cycle Clutch Restoring Cam Follower Clearance

The restoring cam follower should be 0.00" – 0.015" from the left-hand edge of the restoring cam.

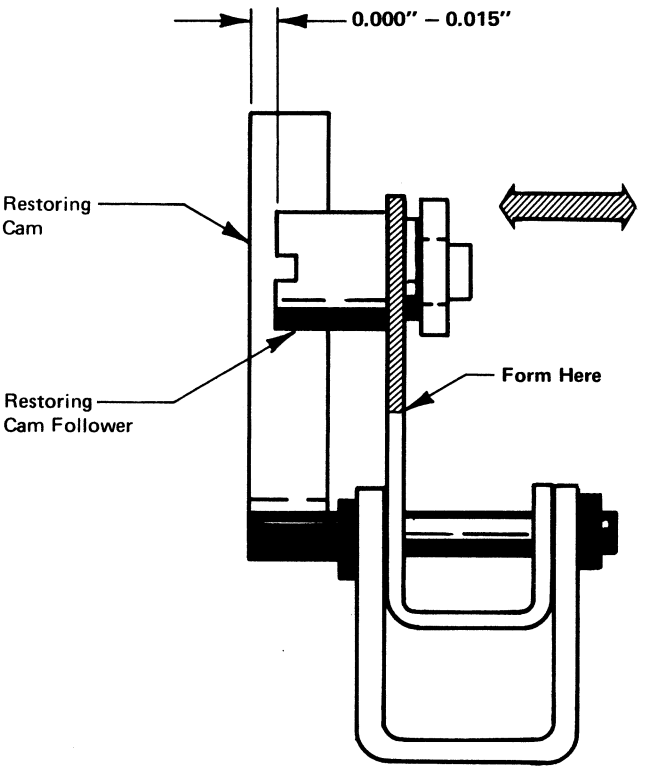


Figure 2-26. Cycle Clutch Restoring Cam Follower

Cycle Clutch Spring (Lateral)

The cycle clutch spring must be positioned laterally against the negative five cam.

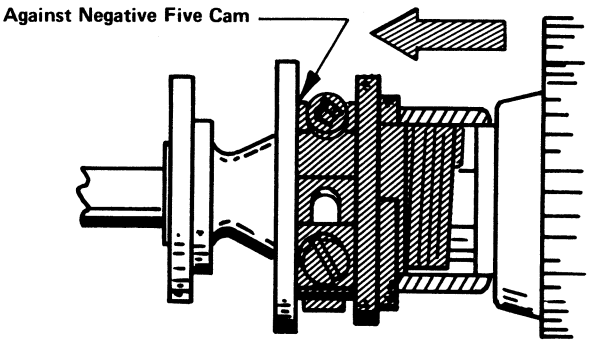
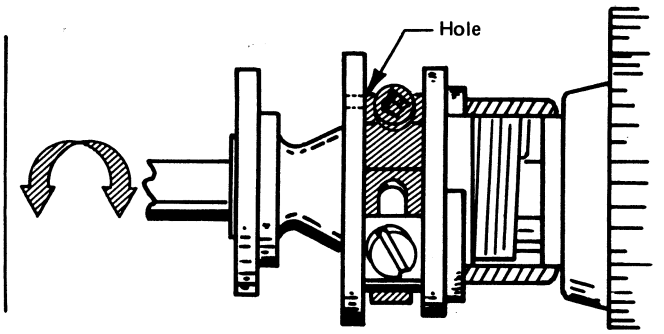


Figure 2-27. Cycle Clutch Spring (Lateral)

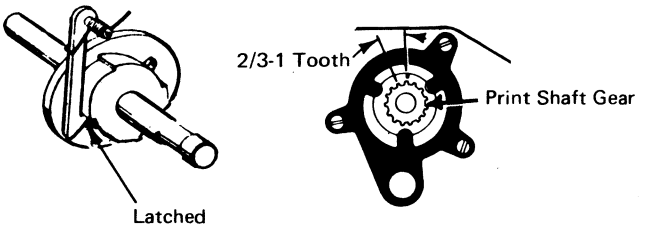
Cycle Clutch Spring (Rotational)

During a hand-cycled zero-tilt, minus-five rotate character, the clutch spring should cease driving the cycle shaft two-thirds to one print shaft gear tooth before the cycle shaft is latched by the check pawl.

NOTE A preliminary setting is to align the head of the screw in the cycle clutch collar with the hole in the minus-five cam.



Print Shaft Gear Slips 2/3 – 1 Tooth Before the Check Pawl Latches the Cycle Shaft when a 0 Tilt – 5 Rotate Character is Hand-Cycled



Check: 2-29

Figure 2-28. Cycle Clutch Spring (Rotational)

Cycle Clutch Overthrow Stop

With the cycle clutch latched by the check pawl, the cycle shaft should overthrow its latched position 0.007" – 0.015".

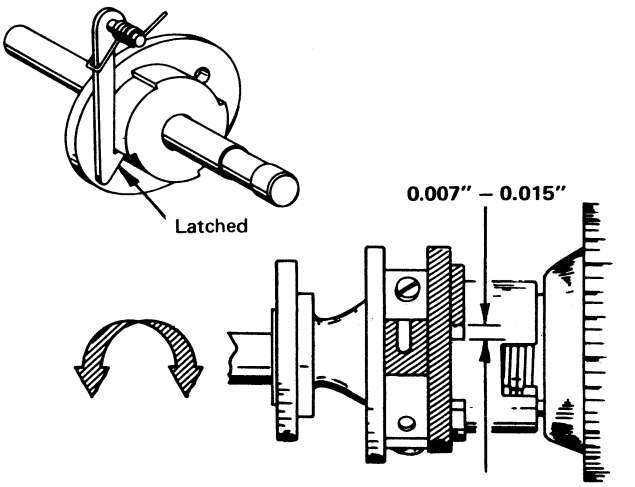


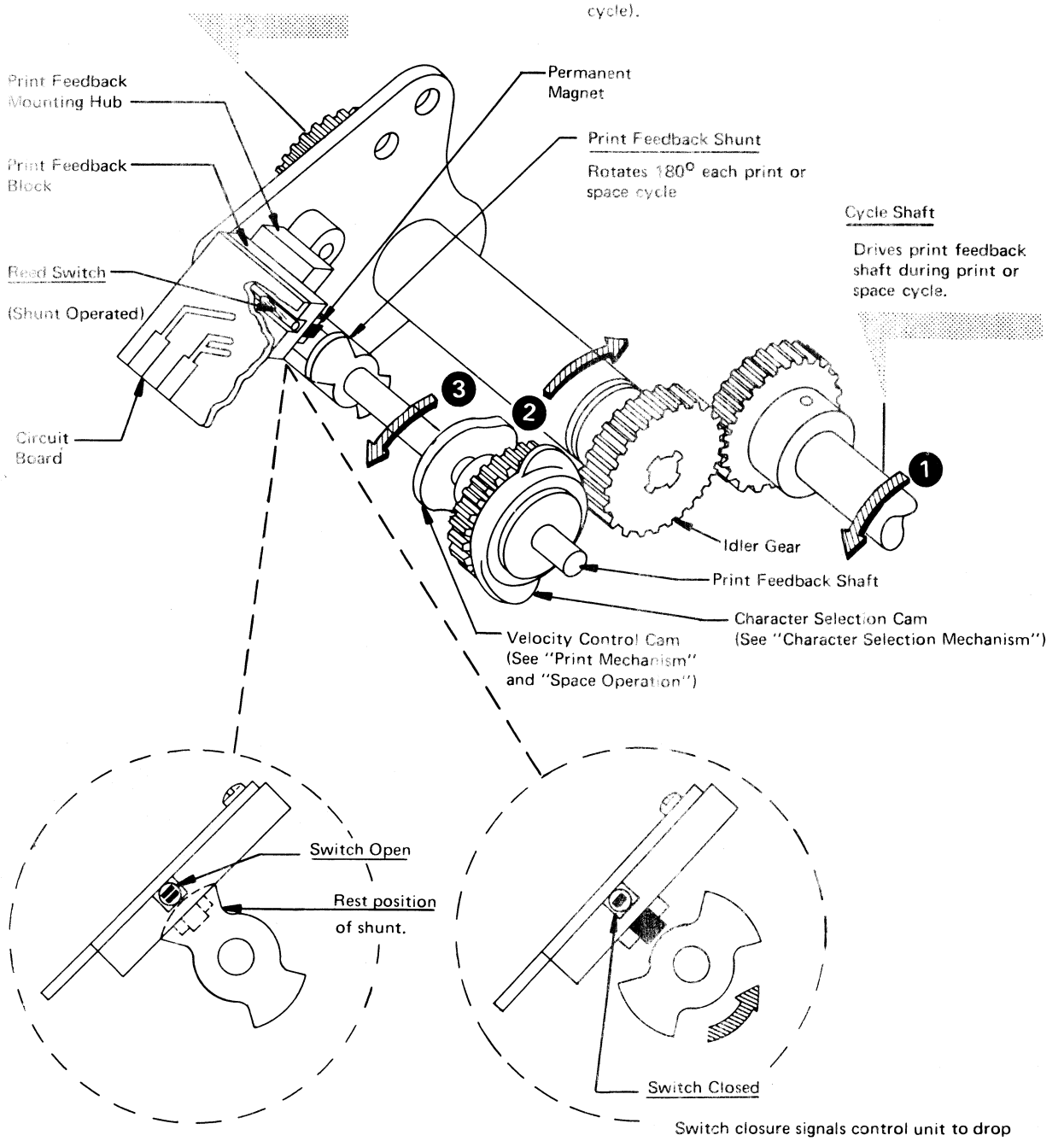
Figure 2-29. Cycle Clutch Overthrow Stop

Figure numbers 2-30 through 2-33 have been purposely omitted, to allow for possible future additional adjustments.

PRINT FEEDBACK SWITCH

- Shunt-operated reed switch. Closes during a print or space cycle and inhibits another printer cycle until the current cycle is completed.

- Switch closure signals control unit to drop the cycle clutch magnet and the character selection magnets. Also drops the no-print magnet during a space cycle.
- Print feedback shunt is operated by the print feedback shaft which is gear-driven by the cycle shaft. The shunt is rotated 180° during a print or space (no-print character cycle).

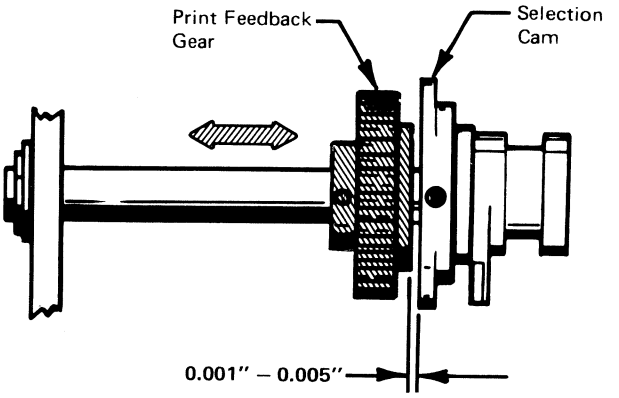


Switch closure signals control unit to drop the cycle clutch magnet and the character selection magnets. Also drops the no-print magnet during a space cycle.

PRINT FEEDBACK ADJUSTMENT CHECKS

Print Feedback Gear

Check for a clearance of 0.001" – 0.005" between the print feedback gear and the selection cam.

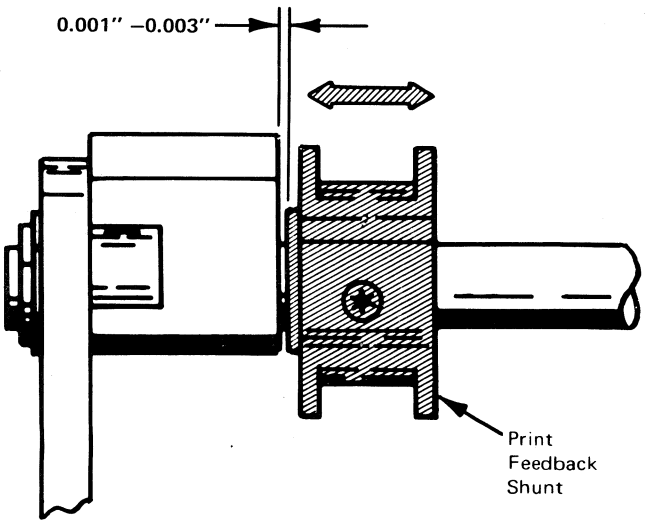


Check: 2-37, 2-60, 2-150

Figure 2-34. Print Feedback Gear

Print Feedback Shunt

Check for 0.001" – 0.003" clearance between the shunt and the print feedback mounting block.



Check: 2-36

Figure 2-35. Print Feedback Shunt

Print Feedback Block

Check for a clearance of 0.025" – 0.030" between the permanent magnet and the core of the print feedback shunt. Add or remove a 0.020" Mylar* shim between the mounting hub and the print feedback block to obtain the proper clearance.

NOTE Insufficent clearance can result in the permanent magnet being shunted for 180° rotation of the print feedback shaft.

The permanent magnet should be centerd between the side shunts of the print feedback shunt.

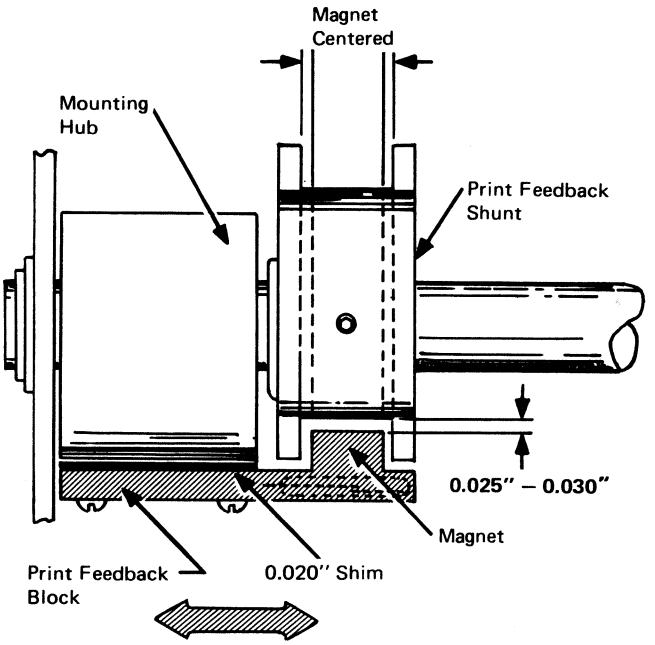


Figure 2-36. Print Feedback Block

*Trademark E.I. duPont de Nemours & Co. (Inc.)

Print Feedback Timing

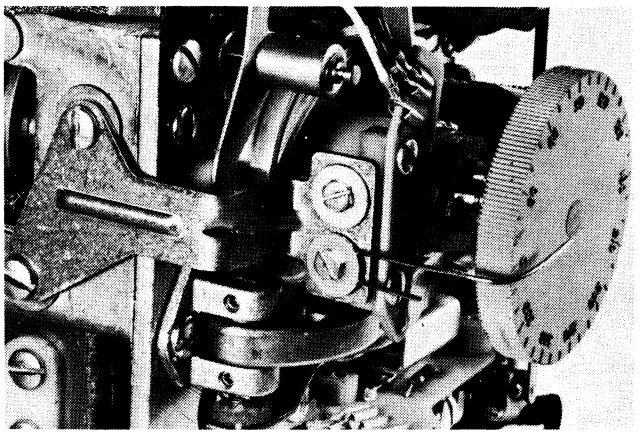
CAUTION DO NOT use timing lights across reed switches.

The print feedback switch should open when the print feedback shaft is rotated to 122° – 130°.

NOTE When the shunt is timed to open the feedback switch between 122° – 130° and the switch does not close between 17° – 37° replacement of the print feedback magnet or reed switch may be necessary.

To check this adjustment:

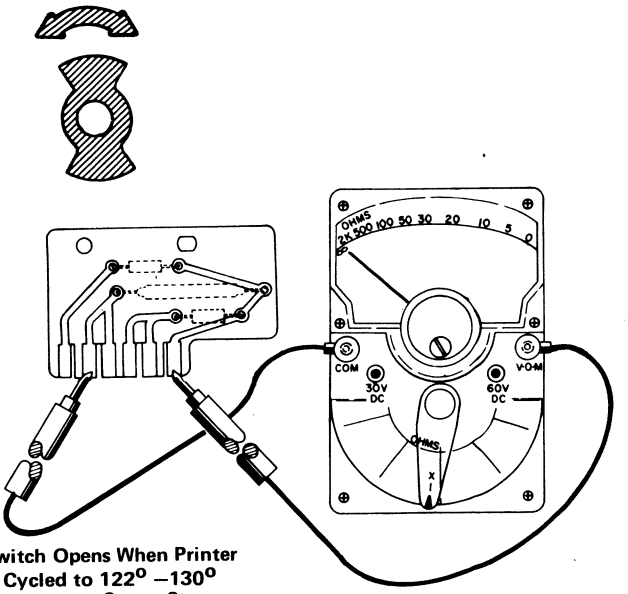
1. Attach a paper clip to the shift feedback bracket, as shown.



(Printer Tilted Up)

2. Turn the hand-cycle wheel until zero degrees is close to the paper clip pointer.
3. Trip the cycle clutch and turn the hand-cycle wheel until the print feedback shaft just begins to turn (see note).
4. Set the paper clip pointer on zero degrees on the hand-cycle wheel and proceed to check the adjustment.

NOTE Step 3 varies when this method is used to check other timings.



Switch Opens When Printer is Cycled to 122° –130° (Closes at 17° – 37°)

Figure 2-37. Print Feedback Timing

PRINT ESCAPEMENT MECHANISM (Part 1 of 2)

Objective: To move the carrier one space to the right, after a character has been printed, to avoid printing over the previous character.

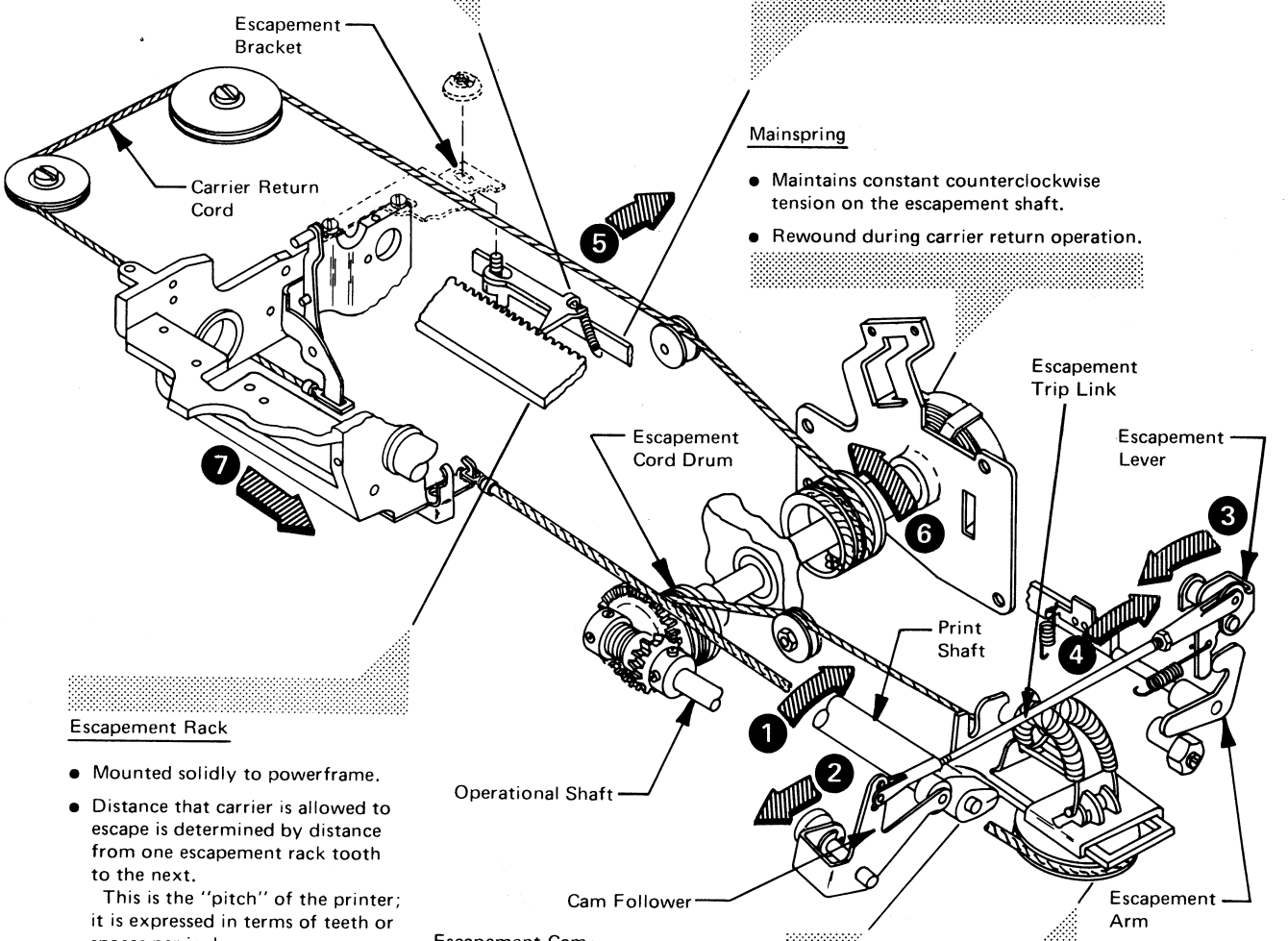
A Print Escapement Functional Principles

Escapement Pawl

- Attached to escapement bracket by eccentric mounting stud.
- Turned-down ear hooks over escapement torque bar.
- Elongated mounting hole permits pawl movement while carrier is not moving. See C

Escapement Torque Bar

- Pivots between sides of the powerframe to trip escapement pawl out of escapement rack.
- Eccentric head on escapement mounting stud extends down in front of torque bar. Torque bar pries against pawl stud to offset tendency to bow toward the front when tripping the pawl from its rack. Bowing tendency is greatest at the middle of the torque bar and this could result in escapement trip failure.



Mainspring

- Maintains constant counterclockwise tension on the escapement shaft.
- Rewound during carrier return operation.

Escapement Rack

- Mounted solidly to powerframe.
- Distance that carrier is allowed to escape is determined by distance from one escapement rack tooth to the next.
  This is the "pitch" of the printer; it is expressed in terms of teeth or spaces per inch.

Escapement Cam

- Rotates 360° each print cycle.
- Timed so escapement trip occurs just after typehead leaves the platen to return to rest position. Prevents carrier from moving before character is printed.

Cord Tension Arm

- Maintains constant pressure toward the right to keep slack out of the escapement and carrier return cords.

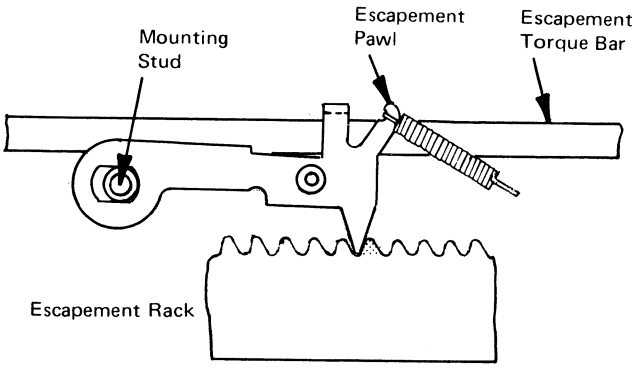
PRINT ESCAPEMENT MECHANISM (Part 2 of 2)

B Print Escapement Operational Sequence

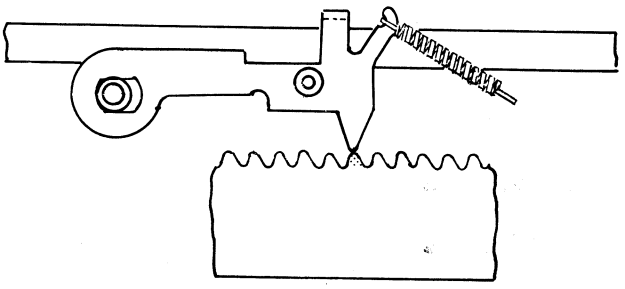
- Any character prints.
1. Print shaft rotates until the high dwell of the escapement cam is under the escapement cam follower roller.
2. Cam follower pulls escapement trip link forward.
3. Escapement lever is pivoted forward by the escapement trip link.
4. Top of escapement torque bar is pivoted rearward by escapement lever.
5. Escapement torque bar pulls escapement pawl out of the escapement rack.
- Spring tension pulls pawl to the right and restores it in the next escapement rack tooth, before the carrier begins to move.
6. Escapement shaft is rotated counterclockwise by mainspring tension.
7. Carrier is pulled to the right as escapement cord is wound on escapement cord drum. Carrier is stopped by escapement pawl after escaping one space to the right.

C Escapement Pawl Operation

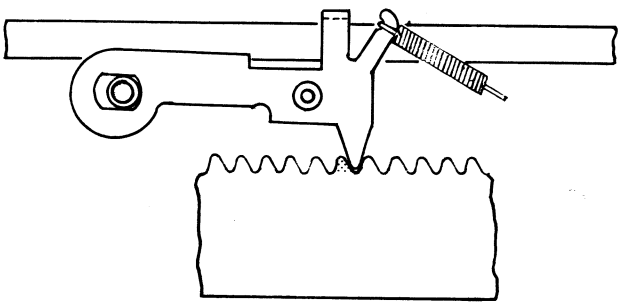
1 Pawl at rest.



2 Pawl is pulled out of rack. Spring tension pulls pawl to the right before carrier moves.



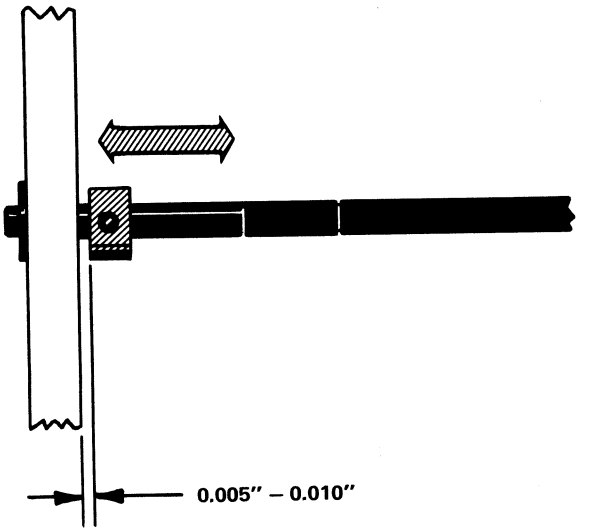
3 Pawl engages next tooth. Carrier moves to the right and is stopped by the pawl after escaping one space.



ESCAPEMENT MECHANISM ADJUSTMENT CHECKS

Escapement Torque Bar End Play

Check for 0.005" – 0.010" clearance between the torque bar collar and the powerframe.



Check: 2-43

Figure 2-38. Escapement Torque Bar End Play

Escapement Torque Bar Backstop

Check for 0.001" – 0.005" clearance between the torque bar backstop and the back of the escapement torque bar.

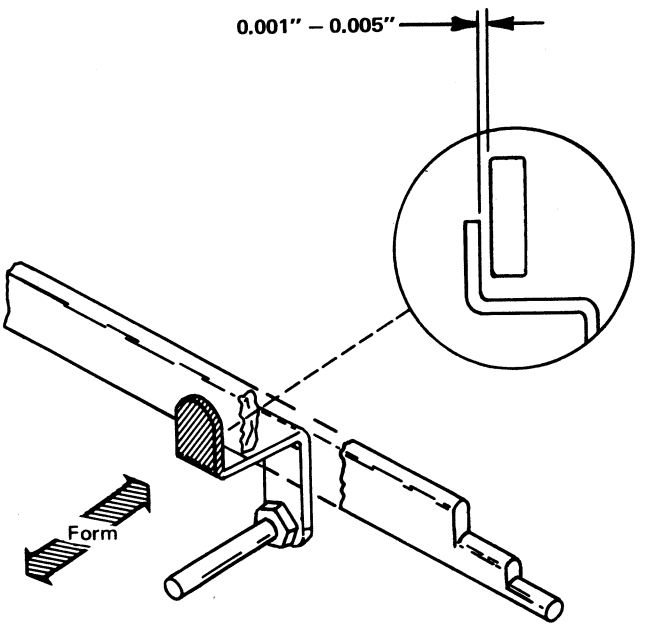
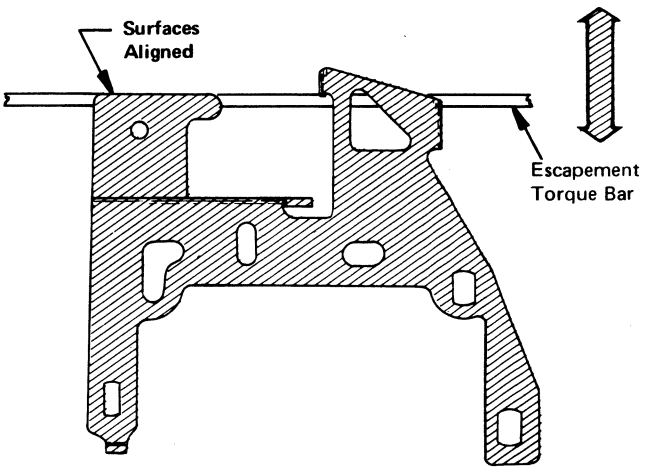


Figure 2-39. Escapement Torque Bar Backstop

Escapement Bracket

Align the left rear surface of escapement bracket with the back of the escapement torque bar. Check entire length of writing line for possible wraped torque bar.



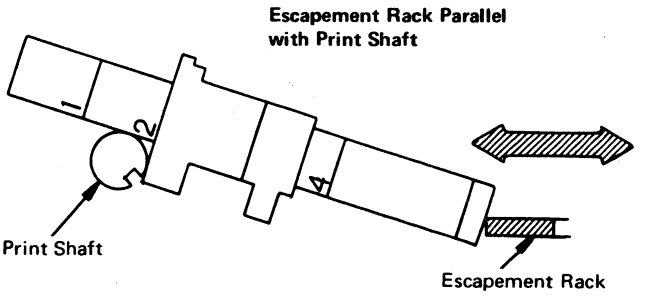
Check: 2-45, 2-46, 2-47

Figure 2-40. Escapement Bracket

Escapement Rack

NOTE Because several adjustment relationships are affected by this adjustment, do not attempt to adjust the escapement rack unless it is absolutely necessary.

With the Hooverometer set at the No. 2 scribe line and placed between the print shaft and the escapement rack, the midpoint of the base of the Hooverometer handle should rest lightly against the front edge of the escapement rack. Check this adjustment at both ends and in the middle of the escapement rack.



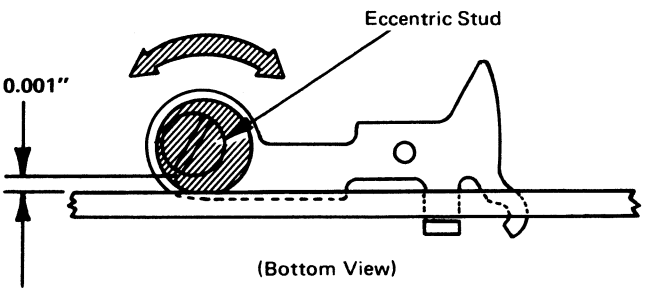
Check: 2-44, 2-45, 2-46,

Figure 2-41. Escapement Rack

Escapement Pawl Mounting Stud

Check for 0.001" clearance between the escapement pawl mounting stud and the escapement torque bar at the closest point along the writing line.

NOTE The high point of the eccentric must be to the left to prevent repeated escapement torque bar operations from loosening the mounting stud.



Check: 2-44

Figure 2-42. Escapement Pawl Mounting Stud

Escapement Arm

The outside surface of the escapement arm should be 0.000" – 0.010" from the outside surface of the escapement lever.

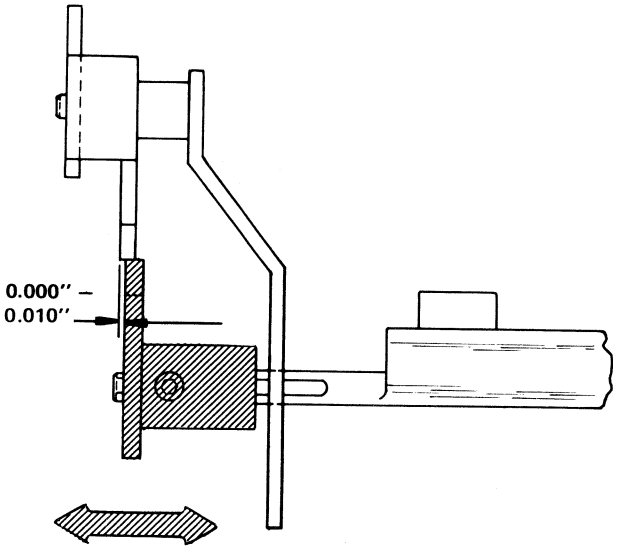
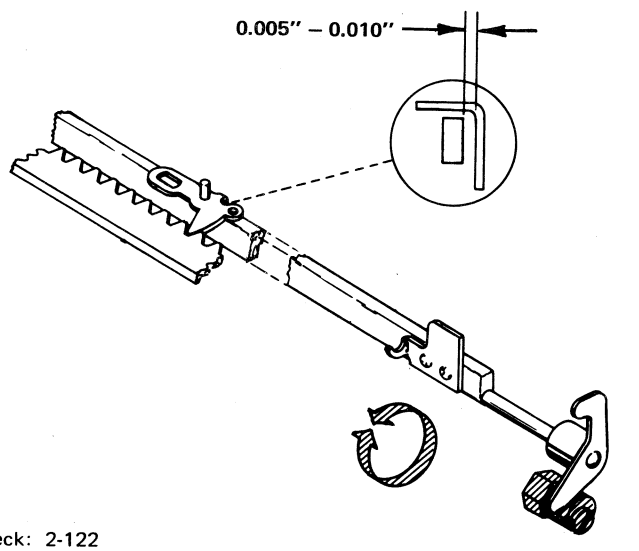


Figure 2-43. Escapement Arm

Escapement Torque Bar Eccentric

With the escapement torque bar in the rest position, check for a 0.005" – 0.010" clearance between the torque bar and the escapement pawl lug. Check at the left margin, center, and right-hand side of the printer.

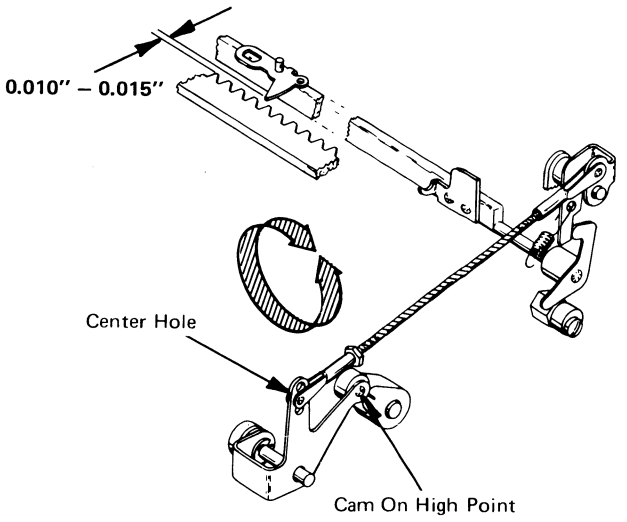


Check: 2-122

Figure 2-44. Escapement Torque Bar Eccentric

Escapement Link (Preliminary)

With the escapement link clevis in the center hole of the escapement cam follower arm, and the cam follower on the high dwell of the escapement cam, check for 0.010" – 0.015" clearance between the escapement pawl and the escapement rack.



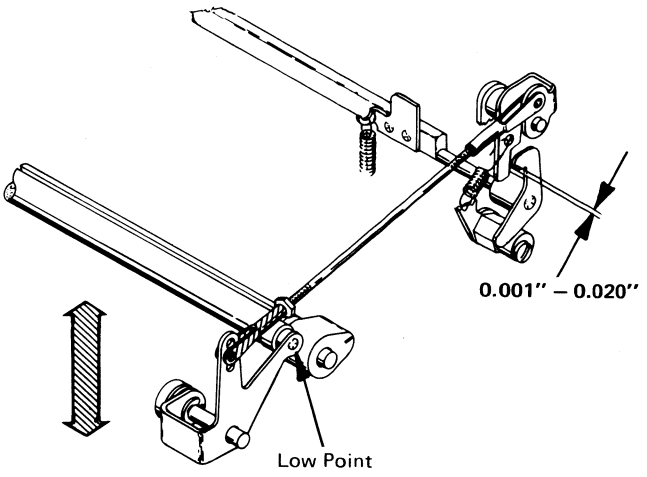
Check: 2-46

Figure 2-45. Escapement Link (Preliminary)

Escapement Link Clevis

With the cam follower on the low dwell of the cam, check for 0.001" – 0.020" clearance between the escapement arm and the escapement lever.

Place Clevis In Top Hole If Clearance Is Too Close.
Place Clevis In Bottom Hole If Clearance Is Too Wide.

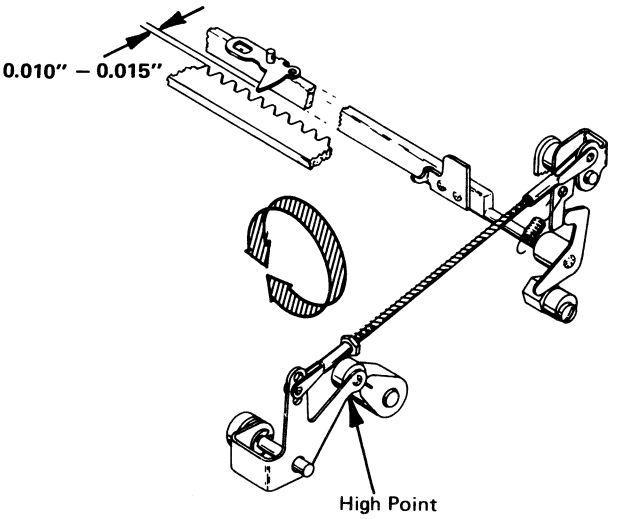


Check: 2-47

Figure 2-46. Escapement Link Clevis

Escapement Link (Final)

With the escapement link clevis in either one of the three holes in the escapement cam follower arm and the cam follower on the high dwell of the escapement cam, check for 0.010" – 0.015" clearance between the escapement pawl and the escapement rack. mounting stud.

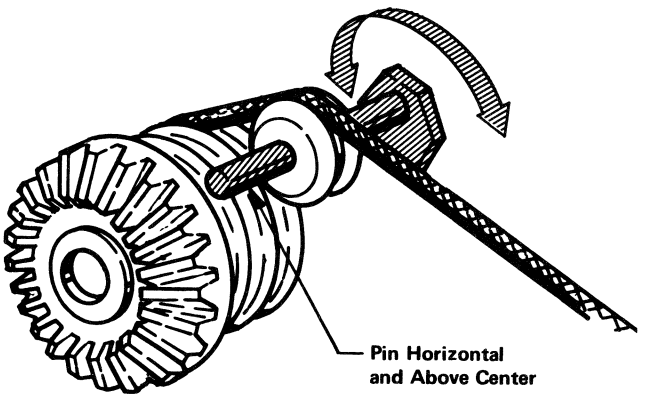


Check: 2-46

Figure 2-47. Escapement Link (Final)

Escapement Cord Idler Pulley Eccentric

The eccentric should be horizontal and above center of the mounting stud.



Check: 2-50

Figure 2-48. Escapement Cord Idler Pulley Eccentric

Mainspring

CAUTION Handle the mainspring carefully so that it will not slip when the tension is increased or decreased.

Preliminary

With the carrier at the extreme right margin, check for 4-2/3 to 5-1/3 turns of the mainspring within the mainspring cage (Figure 2-49).

Final

Initiate a tab operation. Check for 1/2 – 3/4 pounds of force, with a spring scale, as the carrier nears the right margin.

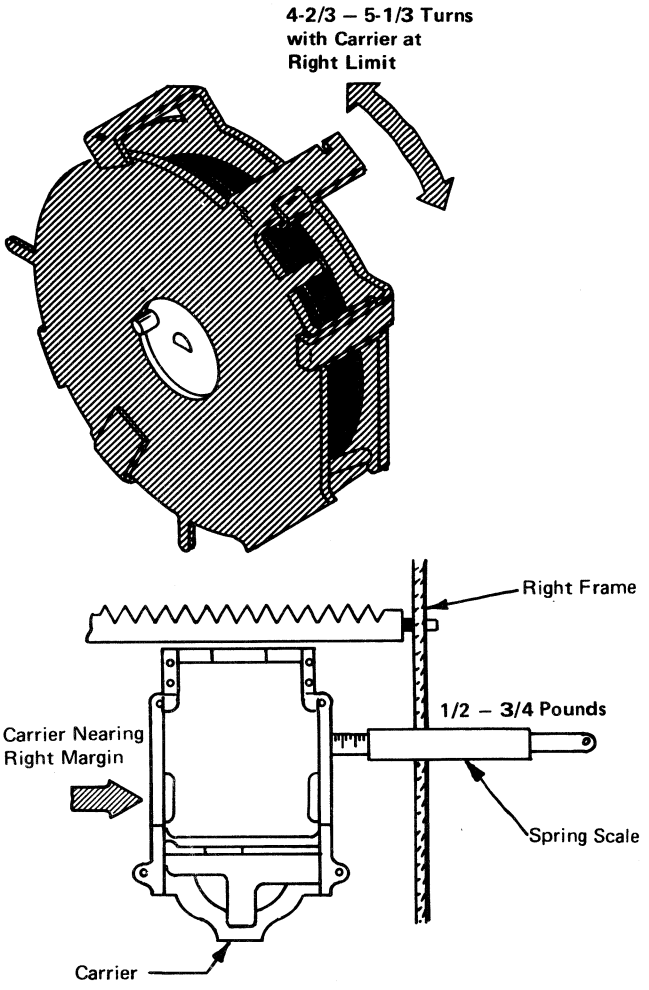


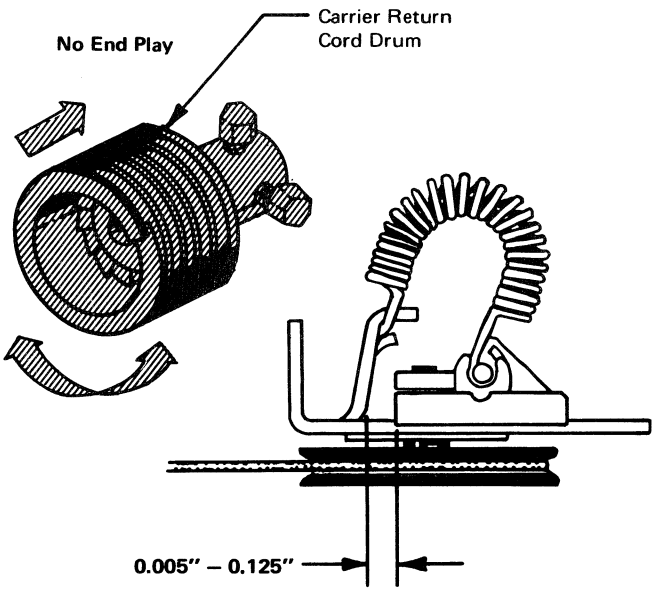
Figure 2-49. Mainspring

Escapement Cord Tension

Check for 0.005" – 0.125" clearance between the nut on the right-hand transport pulley screw and the pulley bracket

The escapement cord should track in the center of the pulley, throughout the full length of carrier travel.

NOTE Remove end play by holding the escapement shaft forward and pushing the carrier return cord drum against the rear bearing, before tightening the drum.



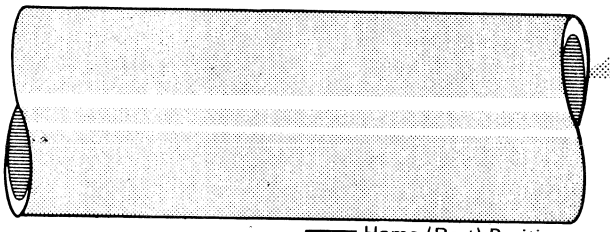
Check: 2-16

Figure 2-50. Escapement Cord Tension

Figure numbers 2-51 through 2-53 have been purposely omitted, to allow for possible future additional adjustments.

TYPEHEAD (Print Element)

Objective: To tilt upward and/or rotate clockwise or counterclockwise from its rest position and emboss the paper (print) with any one of the 88 typehead characters.

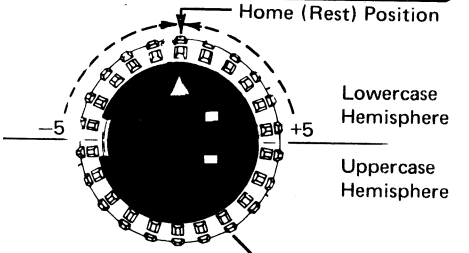


Platen

- Feeds the paper vertically.
- Provides a solid backing for the paper forms during a print operation.

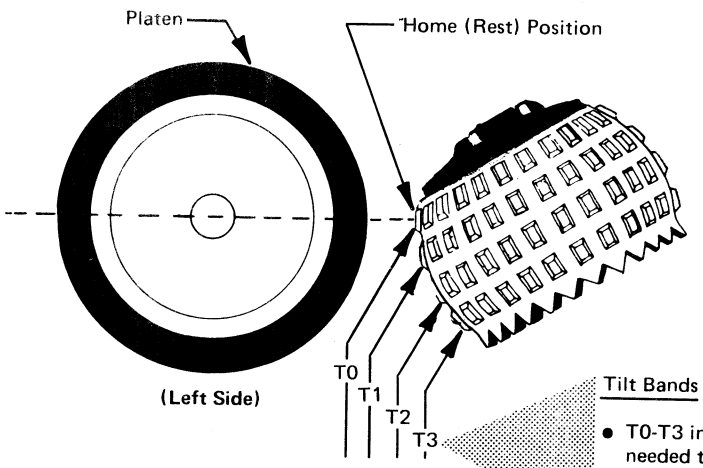
A Typehead Characteristics

- Made of a plastic material covered by a thin metallic film.
- Contains 88 characters.
- Triangle embossed on typehead cap designates lowercase hemisphere.
- Rotates back to the home position after a character has been printed.



(Top View)

- To print uppercase characters, the typehead must be rotated (shifted) 180° counterclockwise from the lowercase home position (see "Shift Mechanism").
- When the typehead is shifted, the center row of characters in the uppercase hemisphere is known as the uppercase home position.



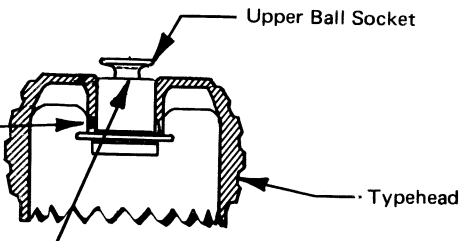
(Left Side)

Tilt Bands

- T0-T3 indicates the increments of tilt motion needed to print a character in that band.
- 22 character in each tilt band--11 uppercase and 11 lowercase characters.

B Typehead Mounting

- Lever on typehead must be raised when removing or installing typehead.
- Locating pin allows typehead to be installed in one position only on the upper ball socket.
- A spring clip, controlled by the lever on the typehead, locks the typehead into position on the upper ball socket.



(Cutaway View)

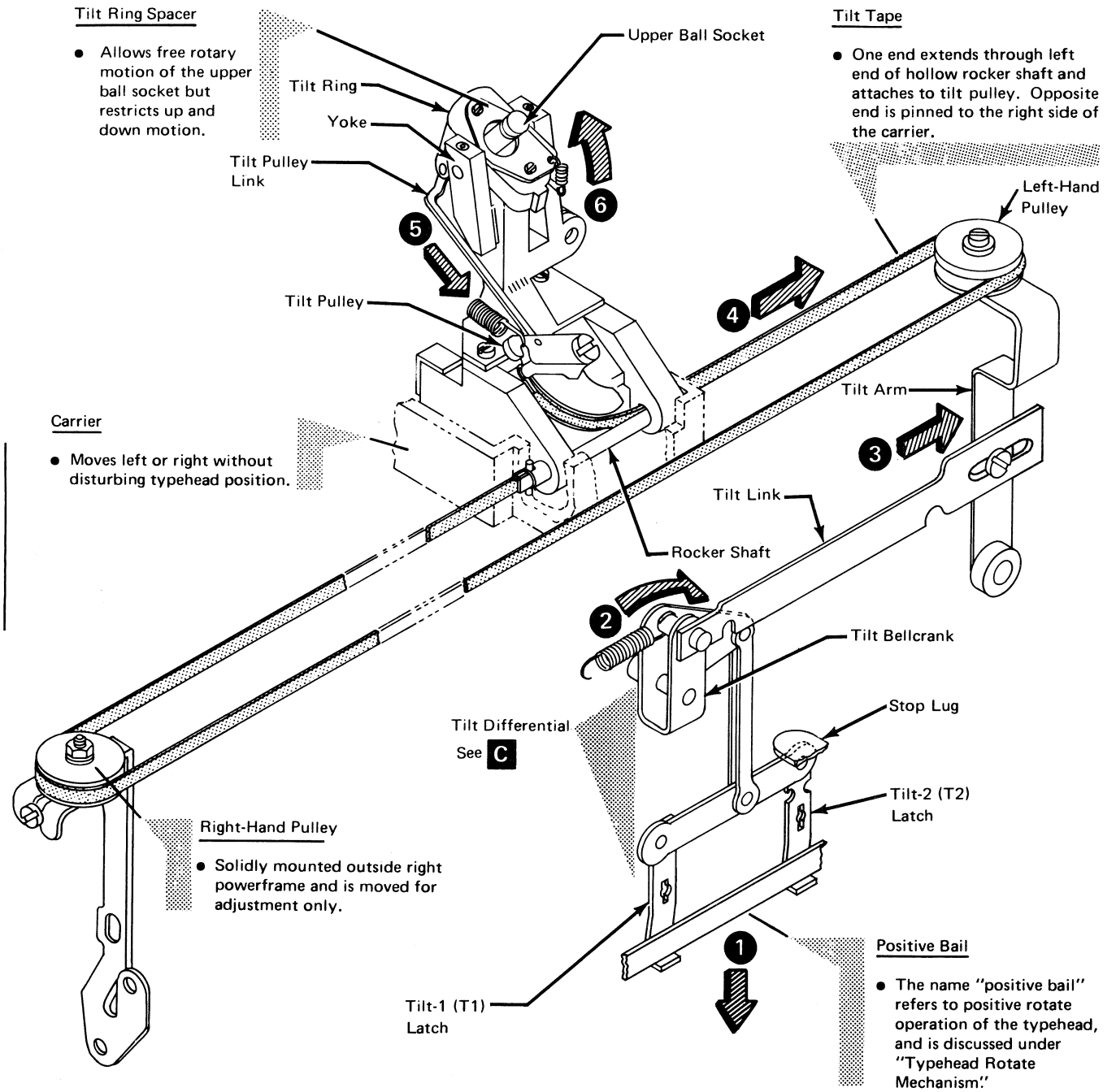
(This page has been left blank intentionally, so that the text and illustrations on the following two pages will be opposite each other.)

TYPEHEAD TILT MECHANISM (Part 1 of 2)

Objective: To tilt the typehead upward one to three tilt bands from its rest position to the desired tilt band for printing a character in that band.

A Tilt Mechanism Functional Principles

- The tilt mechanism selects the desired amount of tilt motion, transmits this motion via the tilt tape to the tilt components in the rocker, and tilts the typehead to the proper character band.
- Because the typehead rests with the upper band (tilt 0) in the print position, all tilt operations are upward from the rest position.
- The name given to each tilt band is actually the number of increments of tilt needed to position that band for printing.



(Rear View)

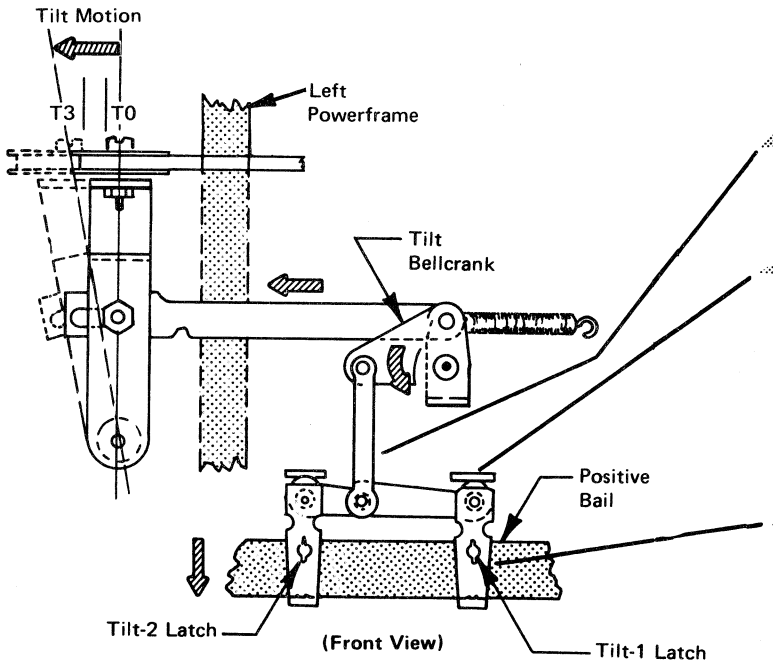
TYPEHEAD TILT MECHANISM (Part 2 of 2)

B Tilt Mechanism Operating Sequence

● Unwanted tilt latches pulled from under the bail. See "Character Selection Mechanism."

1. Positive bail pulls (operates) any latches downward that are left under the bail. Operated latches impart corresponding motion to the typehead.
2. Tilt bellcrank pivots and imparts motion to the tilt arm.
3. Tilt link forces tilt arm to the left (away from the left powerframe) and exerts a pull on the tilt tape.
4. Tilt tape exerts corresponding pull on the tilt pulley. Because the opposite end of the tape is pinned to the carrier, any tilt tape movement is imparted to the tilt pulley.
5. Tilt pulley pulls on the tilt link, which in turn pulls on the front of the tilt ring.
6. Rear of tilt ring pivots upward from its rest position 1-3 tilt increments to position the desired character band for a print operation. No tilt motion required for tilt 0 character band (rest position of typehead). Because the tilt ring is the component that actually tilts the typehead, tilt ring and typehead tilt motion are considered the same.

C Tilt Differential



Tilt Selection Latch Lever

- Pivot point is closest to the tilt-2 latch. This allows the tilt-2 latch to develop more leverage and a correspondingly greater amount of tilt motion than the tilt-1 latch.

Stop Lugs

- Selection latch lever spring-loaded against stop lugs when at rest.
- Provide clearence between the latches and the postive bail when the bail is at rest. This permits free movement of the latches for tilt selection.
- Act as pivot stops on tilt-1 and tilt-2 operations.

Tilt Latches

- Spring-loaded to the rear, and at rest under the positive bail.
- Attached to the tilt selection latch lever by ball-shouldered rivets, which allow the latches to pivot in all directions.

Typehead Tilt Motion	Latches Operated*	
	T1	T2
Tilt-0 (T0)		
Tilt-1 (T1)	X	
Tilt-2 (T2)		X
Tilt-3 (T3)	X	X

* X indicates latches operated downward for corresponding typehead motion.

- Latches controlling desired tilt motion are left under the bail and are driven down (cperated) by the bail.
- Latches controlling unwanted tilt motion must be removed from under the bail (selected) before the bail starts down.

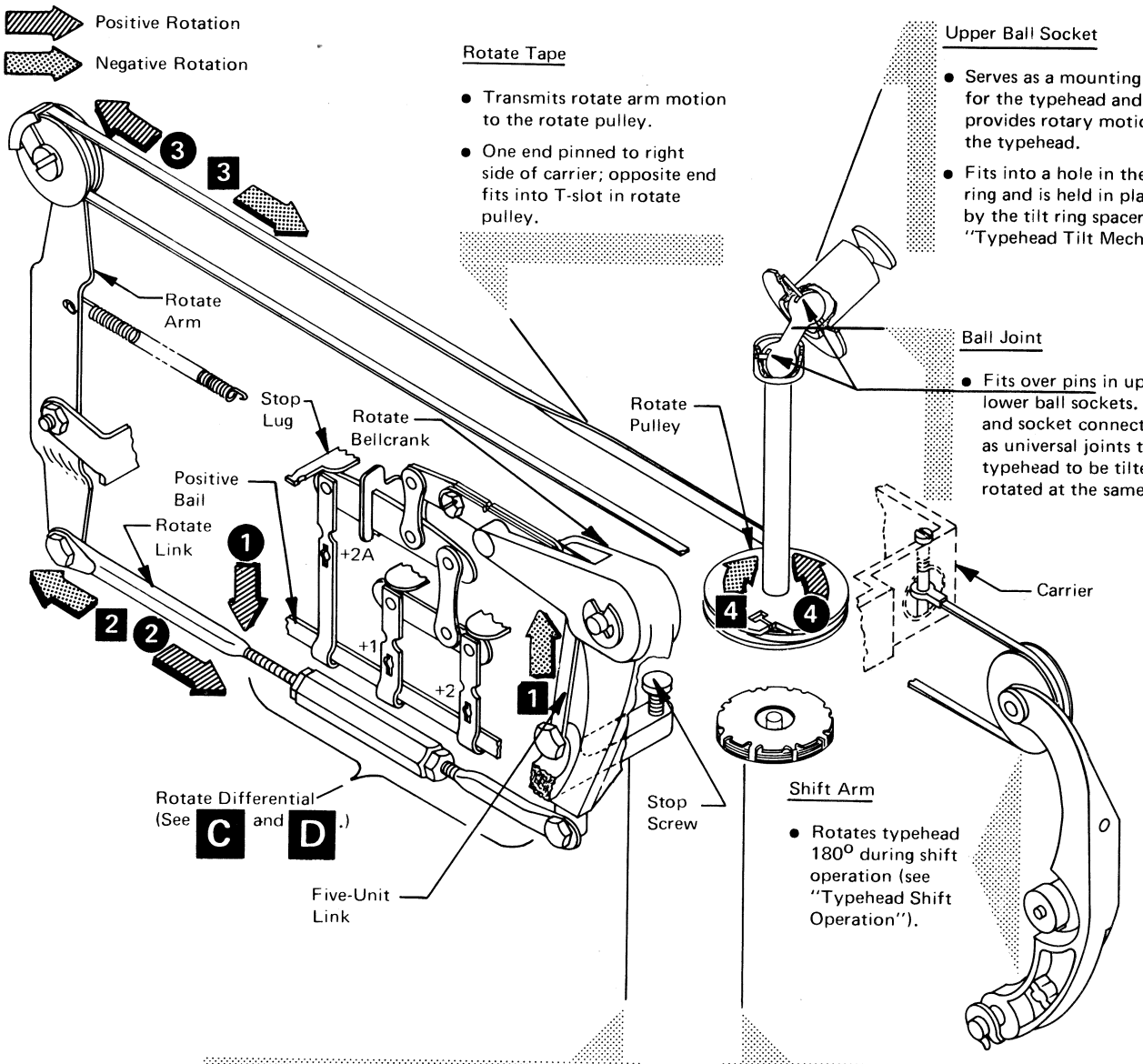
NOTE Latch selection and positive bail operation are discussed under "Character Selection."

TYPEHEAD ROTATE MECHANISM (Part 1 of 4)

Objective: To rotate the typehead to print any character in a typehead tilt band.

A Rotate Mechanism Functional Principles

- The rotate mechanism must rotate the typehead up to five increments in a positive (counterclockwise) direction or a negative (clockwise) direction from the rest position of the typehead.
- The rotate differential determines amount of negative or positive typehead rotation needed to print a specific character and imparts this motion to the typehead via the rotate tape system.



Rotate Tape

- Transmits rotate arm motion to the rotate pulley.
- One end pinned to right side of carrier; opposite end fits into T-slot in rotate pulley.

Upper Ball Socket

- Serves as a mounting post for the typehead and also provides rotary motion to the typehead.
- Fits into a hole in the tilt ring and is held in place by the tilt ring spacer (see "Typehead Tilt Mechanism").

Ball Joint

- Fits over pins in upper and lower ball sockets. Ball and socket connections act as universal joints to permit typehead to be tilted and rotated at the same time.

Shift Arm

- Rotates typehead 180° during shift operation (see "Typehead Shift Operation").

Five-Unit Bail

- During a positive rotate or a no-rotate cycle, the five-unit bail rises slightly before being restricted by the five-unit latch. This upward movement allows a slight clockwise rotation of the typehead from the rest position to a position known as the "latched home" position. All positive and negative rotations begin from the latched home position.

Rotate Spring

- Mainspring enclosed in a stationary cage with outer end of spring attached to cage.
- Inner end of spring is attached to rotate pulley and applies constant clockwise tension to the pulley.
- Turns rotate pulley clockwise when rotate arm moves toward sideframe.

TYPEHEAD ROTATE MECHANISM (Part 2 of 4)

B Rotate Mechanism Operating Sequence

POSITIVE ROTATION

- Unwanted positive rotate latches pulled from under the bail (see "Character Selection Mechanism").
- 1 Positive bail pulls (operates) any positive latches downward that are left under the bail. Operated latches impart a corresponding motion to the rotate bellcrank.
- 2 Rotate bellcrank pivots and imparts motion to rotate arm.
- 3 Rotate arm moves away from sideframe and exerts a pull on the rotate tape.
- 4 Rotate tape forces rotate pulley to rotate counter-clockwise against rotate spring tension.
- Rotate pulley rotates the ball socket assemblies and typehead (typehead mounted on upper ball socket) 1 to 5 rotate increments, to align the desired character for printing.

NEGATIVE ROTATION

- Five-unit latch pulled forward from over the head of the stop screw.
- 1 Five-unit bail operates upward to impart its motion to the rotate bellcrank.
- 2 Rotate bellcrank pivots and imparts motion to rotate arm.
- 3 Rotate arm moves toward sideframe.
- 4 Relaxing pull on rotate tape allows rotate pulley to turn clockwise under rotate spring tension.
- Rotate pulley rotates the ball socket assemblies and typehead (typehead mounted on upper ball socket) 1 to 5 rotate increments, to align the desired character for printing.

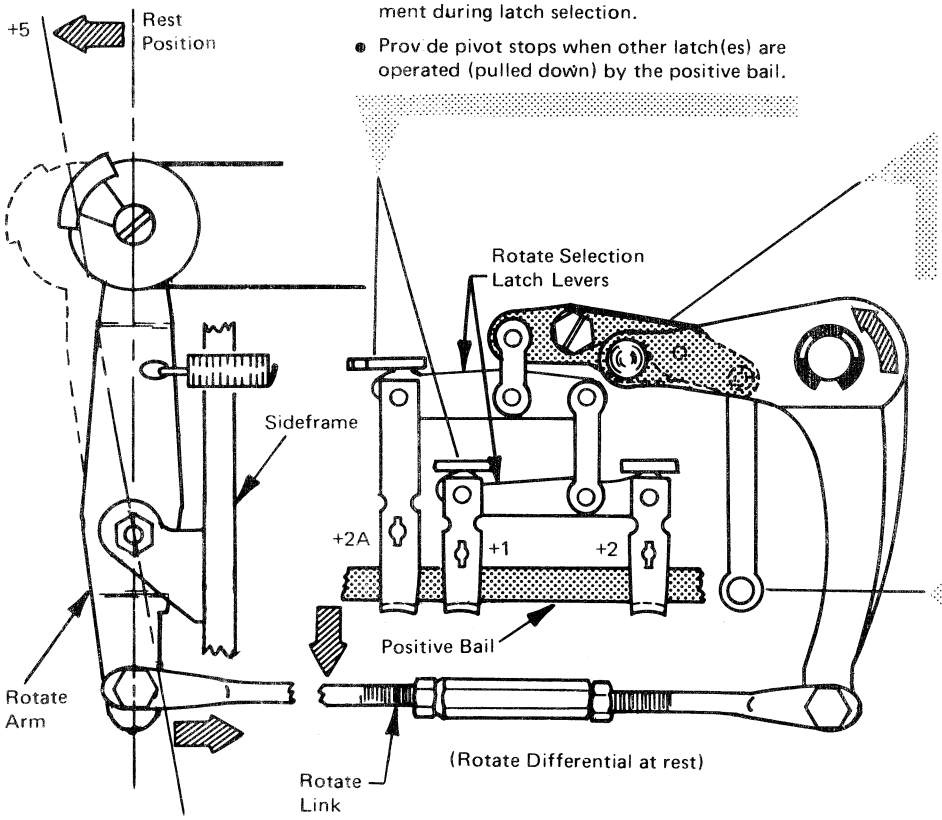
TYPEHEAD ROTATE MECHANISM (Part 3 of 4)

C Positive Typehead Rotation

- Positive rotate differential determines amount of positive (counterclockwise) increments of rotation needed to reach a specific character in any of the four tilt bands.
- Latch names (+1, +2, +2A) are actually the number of rotate increments each provides.
- At rest, latches are spring-loaded to the rear, under the positive bail.
- Ball-shouldered rivets allow latches to pivot in all directions.
- Latches left under the bail are operated downward and impart a corresponding rotate motion to the typehead.
- Latches are operated independently or in combinations for different increments of rotation (+2A latch is not operated individually by the positive bail).

Stop Lugs

- At rest, rotate selection latch levers held against stops; this provides clearance between positive bail and latches for free latch movement during latch selection.
- Provide pivot stops when other latch(es) are operated (pulled down) by the positive bail.



Balance Lever

- Balances amount of motion between positive and negative typehead rotation

Five-Unit (-5) Link

- Prevented from rising by five-unit latch and holds right end of balance lever stationary during positive rotate operations.

NOTE

Latch selection and positive bail operation are discussed under "Character Selection Mechanism."

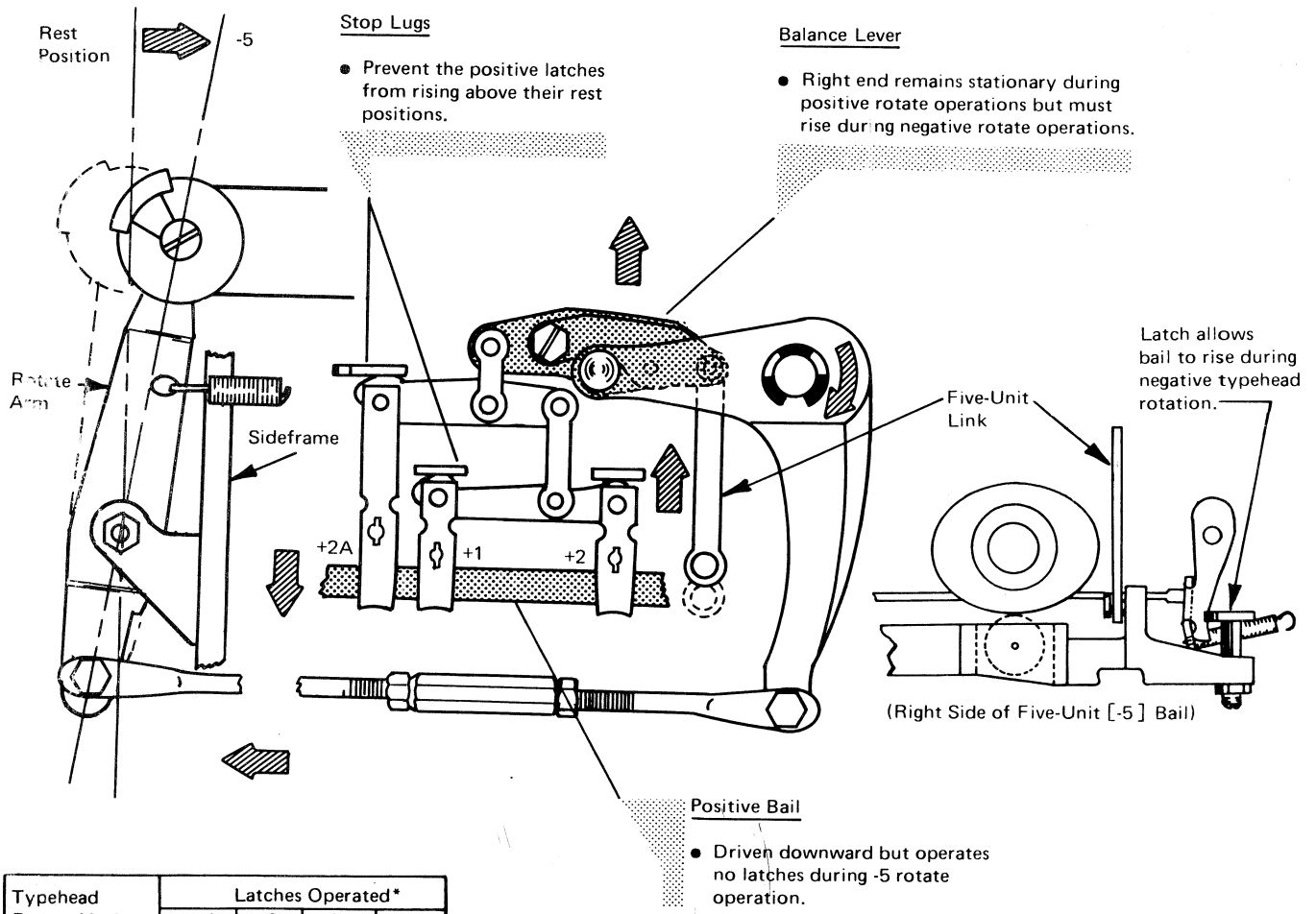
Typehead Rotate Motion	Latches Operated*			
	+1	+2	+2A	-5
+1	X			Not operated for positive rotations.
+2		X		
+3	X	X		
+4		X	X	
+5	X	X	X	
"I/O Home"				X

* X indicates latches operated downward for corresponding typehead motion (except -5 which moves upward to transfer its motion). See D

TYPEHEAD ROTATE MECHANISM (Part 4 of 4)

D Negative Typehead Rotation

- Rotate bellcrank must be operated clockwise to move the top of the rotate arm toward the sideframe and relax the pul on the rotate tape. Rotate pulley spring tension then rotates the typehead in a negative (clockwise) direction.
- To operate the bellcrank clockwise, the center pivot o the balance lever must be raised. The left end of the lever cannot rise because of the positive latch stop lugs; therefore, the right end of the lever must rise.
- The rotate pulley spring and rotate arm spring apply constant clockwise force on the rotate bellcrank, which, in turn, attempts to raise the right end of the balance lever. The five-unit link (attached to the right end of the balance lever and the five-unit bail) is prevented from rising by the five-unit latch. When the latch is pulled forward, the link and balance lever are allowed to rise under spring tension.
- If fewer than five units of negative rotation are desired, it s necessary to pull down on the left end of he balance lever as the right end goes up. Operating one or more positive latches in conjunction with allowing the five-unit bail to rise reduces the amount of clockwise movement of the bellcrank and corresponding typehead rotation.



Typehead Rotate Motion	Latches Operated*			
	+1	+2	+2A	-5
-1		X	X	X
-2	X	X		X
-3		X		X
-4	X			X
-5				X
"I/O Home"				X

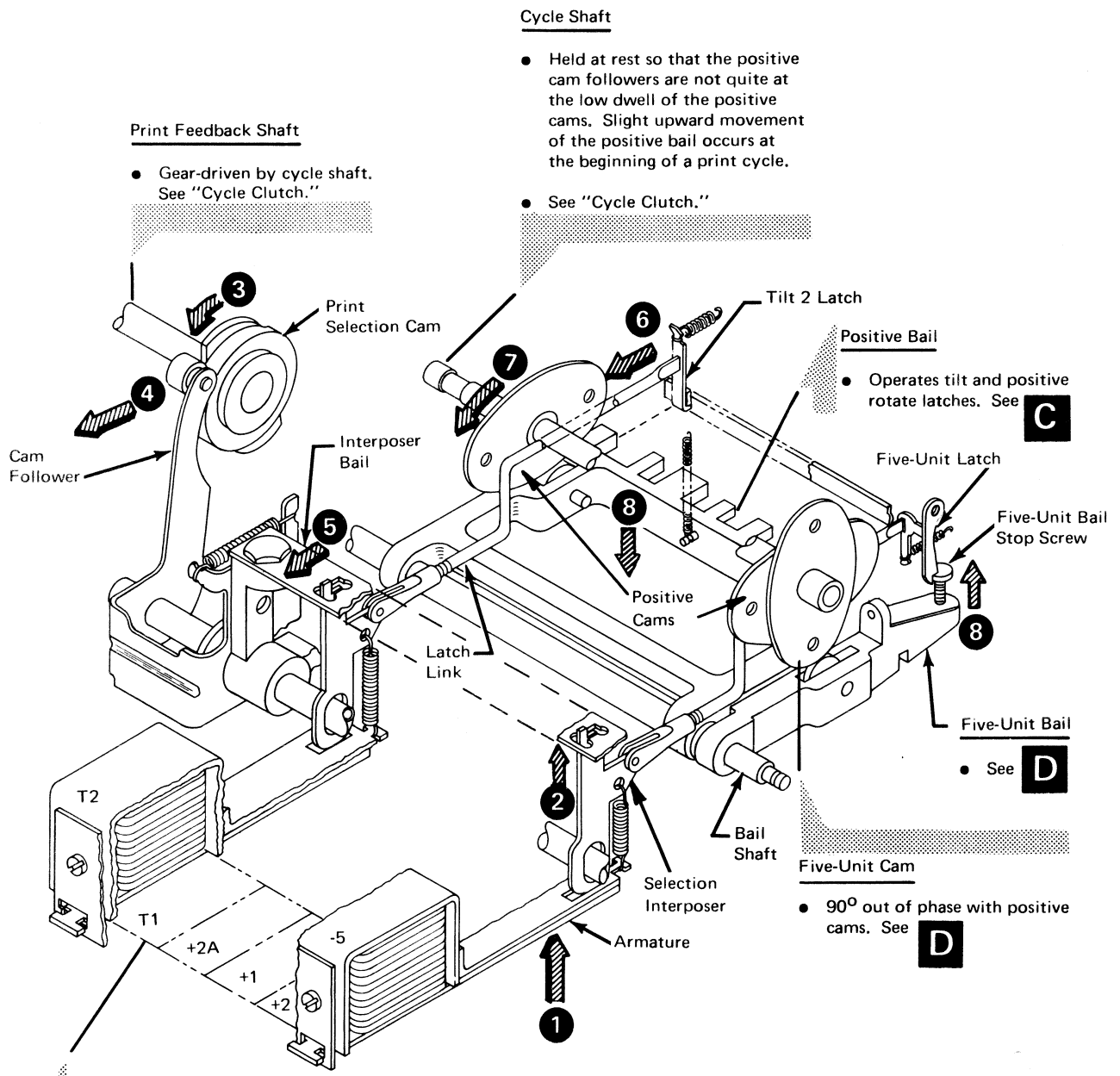
* X indicates operated latches. Positive latches are pulled downward; -5 latch moves upward.

NOTE For typehead rotate mechanism adjustment checks, see "Typehead Alignment Adjustment Checks", following in this chapter.

CHARACTER SELECTION MECHANISM (Part 1 of 2)

Objective: To determine which tilt and rotate latches are to impart their motion to the typehead for a desired character and then impart this motion via the tilt and rotate differentials.

A Selection Mechanism Functional Principles



(Top, Right View)

CHARACTER SELECTION MECHANISM (Part 2 of 2)

B Selection Mechanism Operating Sequence

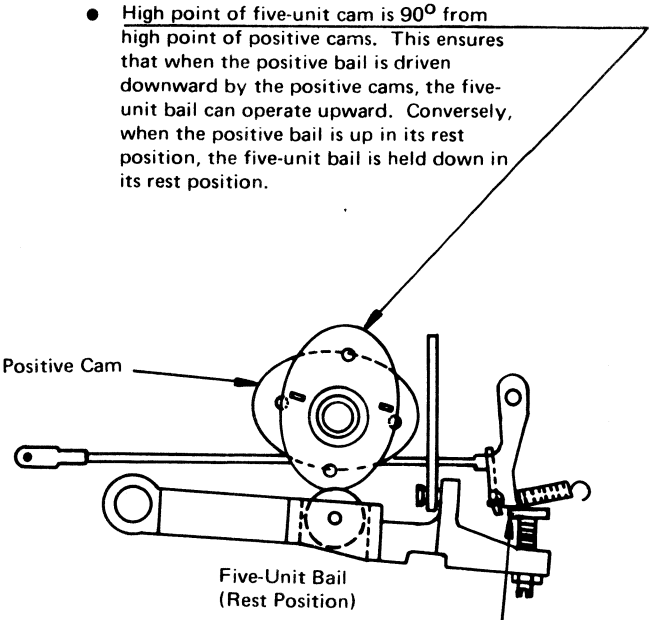
1. Desired selection magnet(s) energized.
2. Selection interposer(s) forced up into interposer bail by corresponding energized magnet armature(s).
3. Print selection cam rotates to high point (rotates 180° for each print cycle).
4. Cam follower drives interposer bail forward.
5. Interposer bail pulls selection interposer(s) forward.
6. Tilt latches and positive rotate latches SELECTED (pulled from under positive bail). Five-unit (-5) latch SELECTED (pulled from over top of five-unit bail stop screw).
7. Cycle shaft rotates positive cams to high point and five-unit cam to low point (90° out of phase with positive cams).
8. Any latches left under the positive bail are OPERATED (pulled downward) when the bail is driven downward by positive cams. Conversely, the five-unit bail is OPERATED (pulled upward) when the five-unit bail is SELECTED (See D).

C Positive Bail Operation

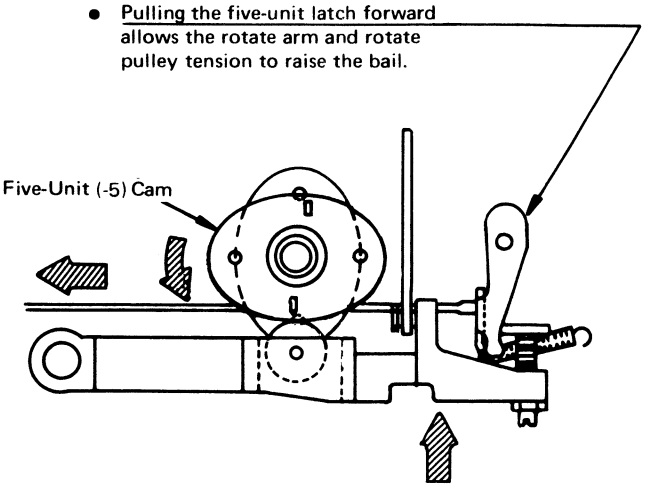
- Located just beneath the cycle shaft, and pivots at the front on a shaft mounted to the powerframe.
- Rear of bail is recessed at five points, to accommodate the tilt and positive rotate latches.
- Cam followers located on each side of the bail assembly are constantly in contact with associated double-lobed positive cams on the cycle shaft. Bail is spring-loaded at the rear to hold cam followers against the cams.
- Each time the cycle shaft rotates 180°, the bail is forced to pivot downward about the bail shaft and is then spring-loaded back to its rest position.

D Five-Unit Bail (-5) Operation

- Separate bail required because it must rise to transfer its motion to the type-head.
- High point of five-unit cam is 90° from high point of positive cams. This ensures that when the positive bail is driven downward by the positive cams, the five-unit bail can operate upward. Conversely, when the positive bail is up in its rest position, the five-unit bail is held down in its rest position.



- In the rest position, the five-unit cam prevents the rear of the bail from rising. This provides a clearance between the five-unit latch and the stop screw to ensure that the latch is free to be selected and then relatched at the completion of a print cycle. Pulling the latch forward allows rotate arm and rotate pulley tension to raise the bail.
- Pulling the five-unit latch forward allows the rotate arm and rotate pulley tension to raise the bail.



CHARACTER SELECTION ADJUSTMENT CHECKS

Selection Magnets Pivot Plate

With the two outside armatures manually attracted, they should just touch the magnet pivot plate.

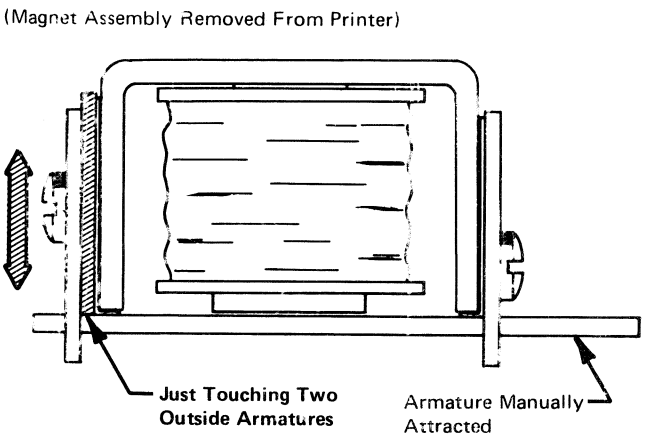


Figure 2-54. Selection Magnets Pivot Plate

Selection Magnets Retainer Plate

When the armatures are manually attracted, they should just touch the bottom of the slots in the retaining plate.

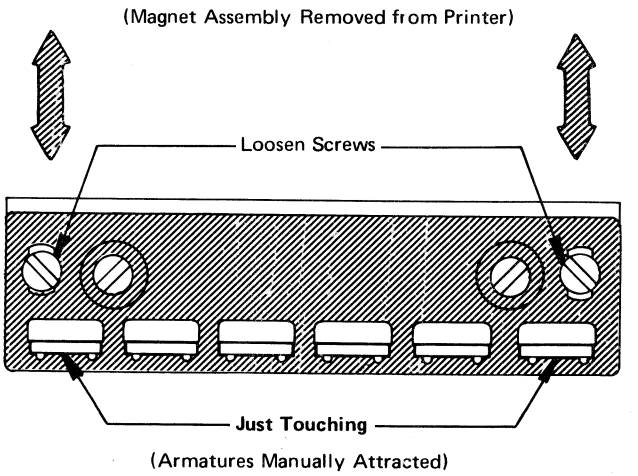
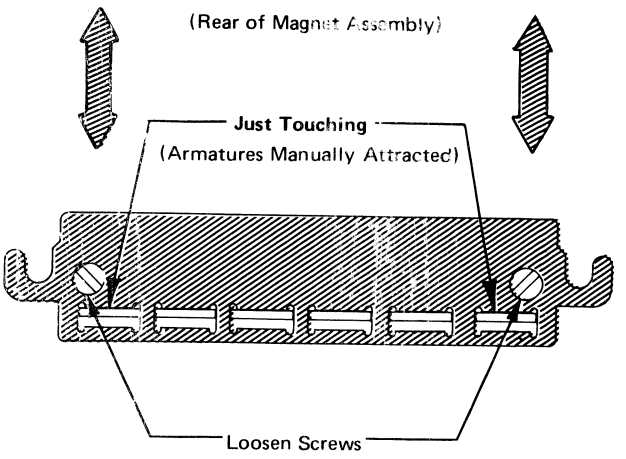


Figure 2-55. Selection Magnets Retainer Plate (Front View)

Selection Magnet Armature Upstop

When the armatures are manually attracted, they should just touch the top of the slots in the armature upstop



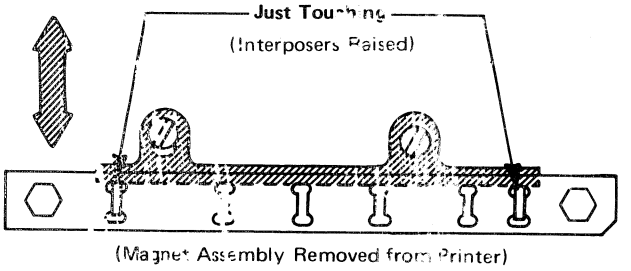
(Magnet Assembly Removed from Printer and Interposer Selection Bracket Removed)

Check: 2-57

Figure 2-56. Selection Magnets Armature Upstop

Selection Interposer Stop Bracket

With the armatures manually attracted the selection interposers should just touch the interposer stop bracket.



Check. 2-61, 2-62

Figure 2-57. Selection Interposer Stop Bracket (Top View)

Selection Cam

With the print feedback shaft pushed to the right against the C-clip, the print feedback cam should just touch the filter shaft bearing.

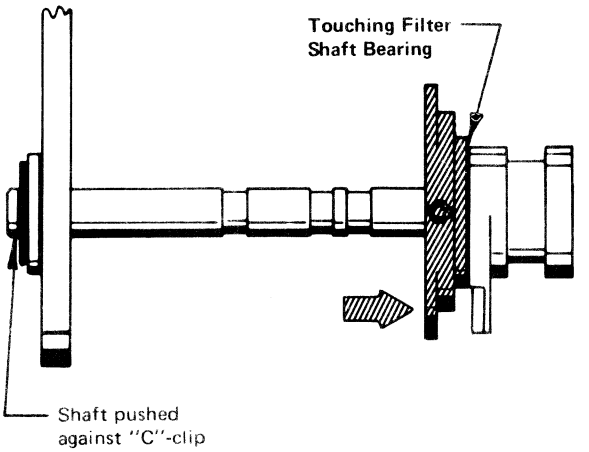


Figure 2-58. Selection Cam

Selection Magnet Armature/Interposer Clearance

With the selection magnets at rest, check for 0.001" – 0.003" clearance between the two outside armatures and interposers.

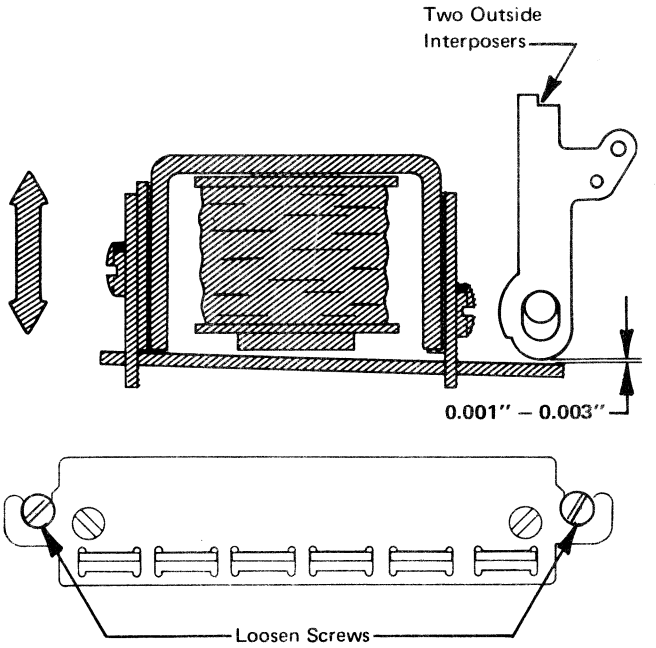


Figure 2-59. Selection Magnet Armature/Interposer Clearance

Selection Cam Timing

A **Level 1**

With the print feedback shaft cycled to 31° – 33°, the print feedback cam follower roller should fit into the timing mark in the cam. The timing mark appears on alternate cycles.

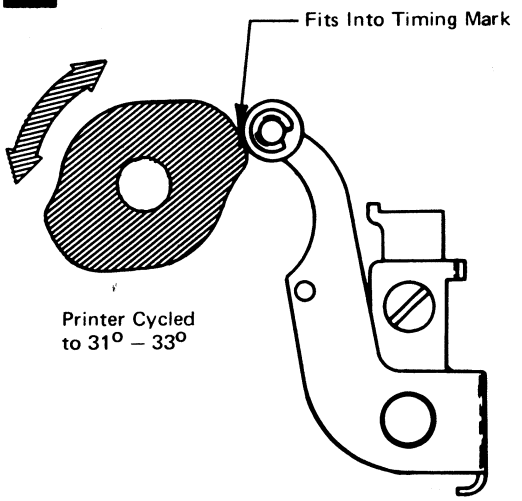
NOTE Zero degrees is the point where the print feedback begins to turn.

To check this adjustment: Refer to procedure accompanying Figure 2-37.

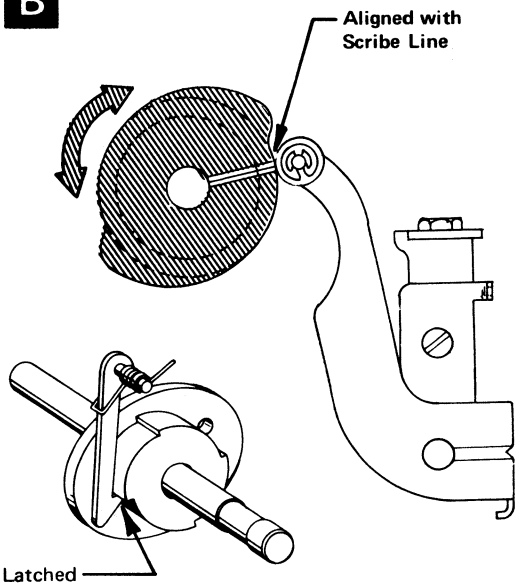
B **Level 2**

With the cycle shaft latched by the check pawl and all gear train backlash removed, the print feedback cam follower should be aligned with the scribe line on the print feedback cam The scribe line appears on alternate cycles.

A **Level 1**



B **Level 2**



Check: 2-34, 2-35, 2-37, 2-61, 2-62

Figure 2-60. Selection Cam Timing

Selection Interposer Bail

A **Level 1**

With the cam follower roller on the low dwell of the timing slot side of the print feedback cam, check for 0.010" – 0.015" clearance between the working edge of the selection interposers and the corresponding edge of the slots in the selection latch trip bail.

B **Level 2**

With the print cam follower roller aligned with the scribe line on the print feedback cam, check for 0.010" – 0.015" clearance between the working edge of the selection interposers and the corresponding edge of the slots in the selection latch trip bail.

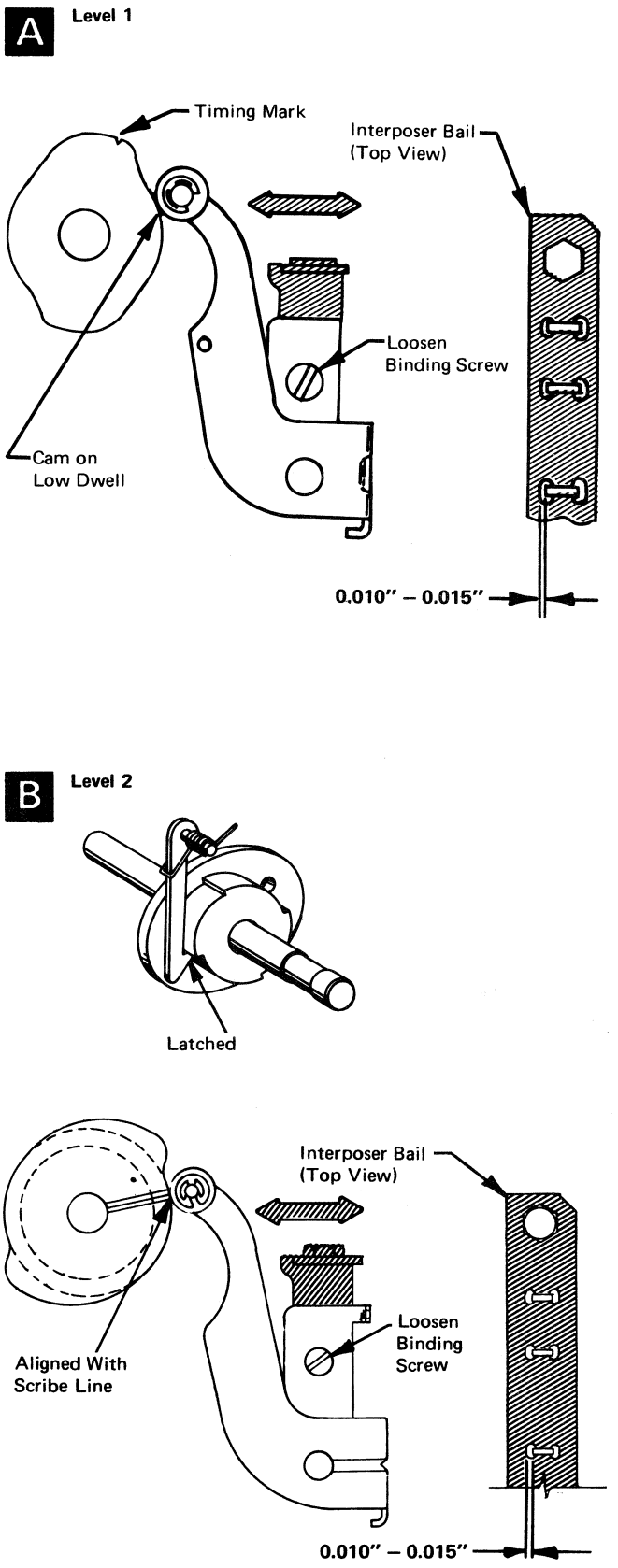


Figure 2-61. Selection Interposer Bail

Selection Latch Links

A **With the printer at rest, all positive rotate and tilt selection latches should overhang the positive selection bail by 0.004" – 0.018".**

B **With the printer at rest, the minus-five latch should overlap the stop screw head by 0.052" – 0.062".**

NOTE Adjusting a link too short can result in erroneous selection because the latch will not have a secure bite on the latch bail plate (or minus-five stop screw). The force of operation could cause the latch to slip off part way through a cycle and cause a noisy operation as well as an erroneous selection.

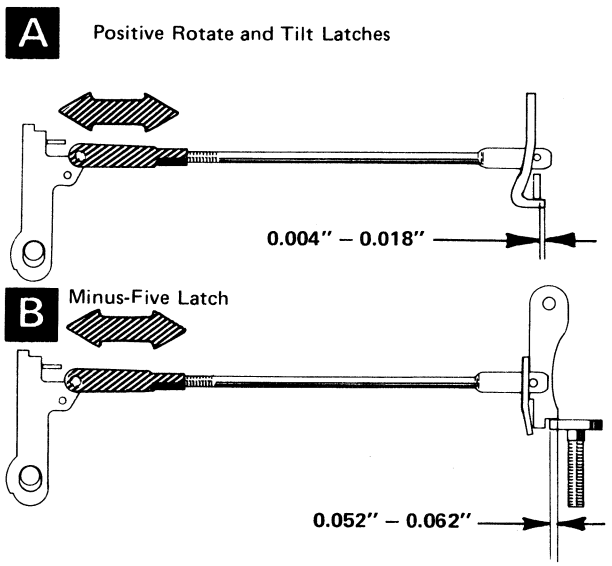
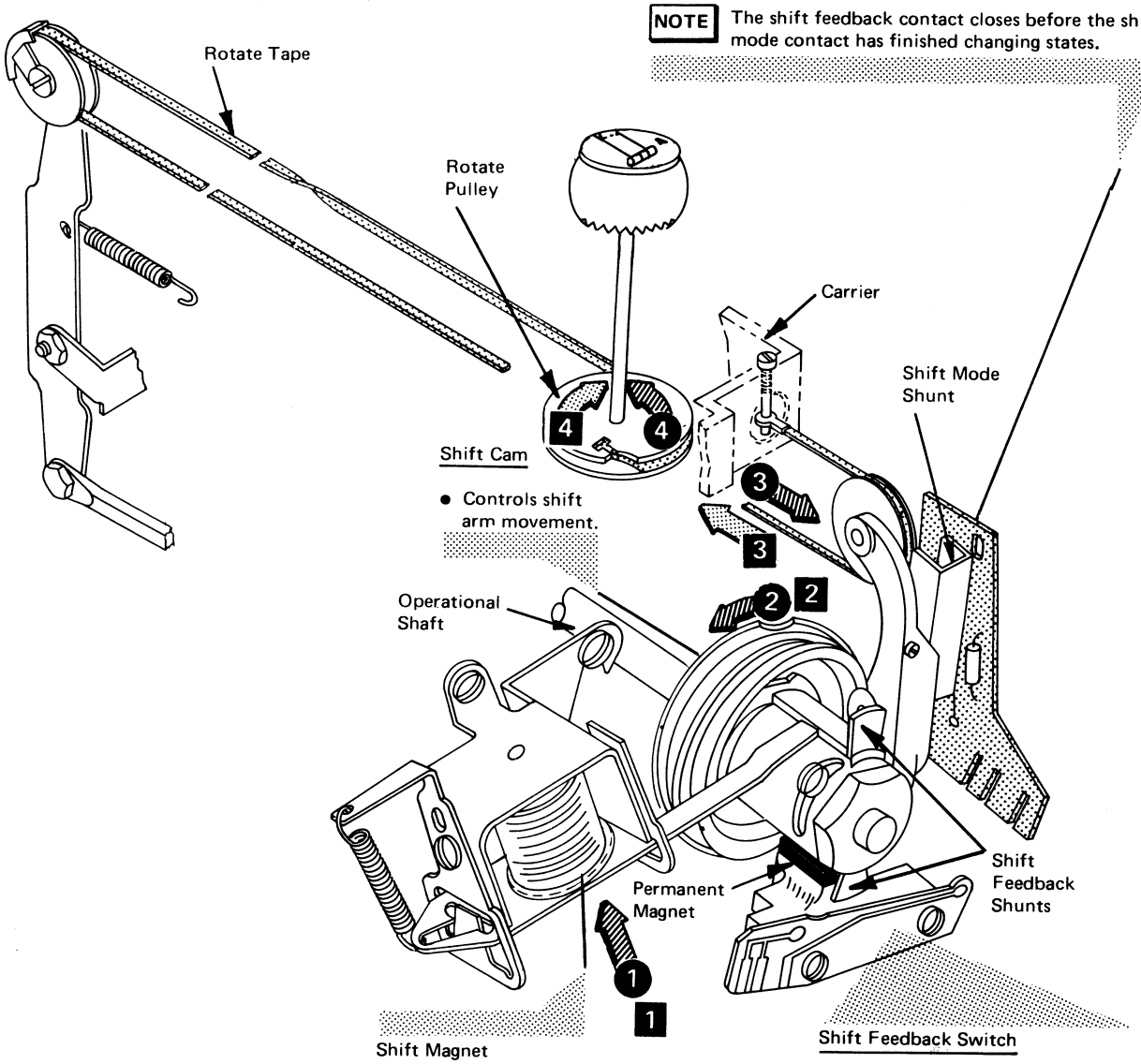


Figure 2-62. Selection Latch Links

TYPEHEAD SHIFT MECHANISM (Part 1 of 4)

Objective: To rotate typehead 180° and allow characters to be printed from either the uppercase or lowercase hemisphere.

A Shift Mechanism Functional Principles



Shift Mode Contact

- Shunt-operated reed switch.
- Actuated by movement of shift arm.
- Switch is open in lowercase mode.
- Switch closes during a shift to uppercase and remains closed as long as the printer remains in uppercase mode.

NOTE The shift feedback contact closes before the shift mode contact has finished changing states.

Shift Cam

- Controls shift arm movement.

Shift Magnet

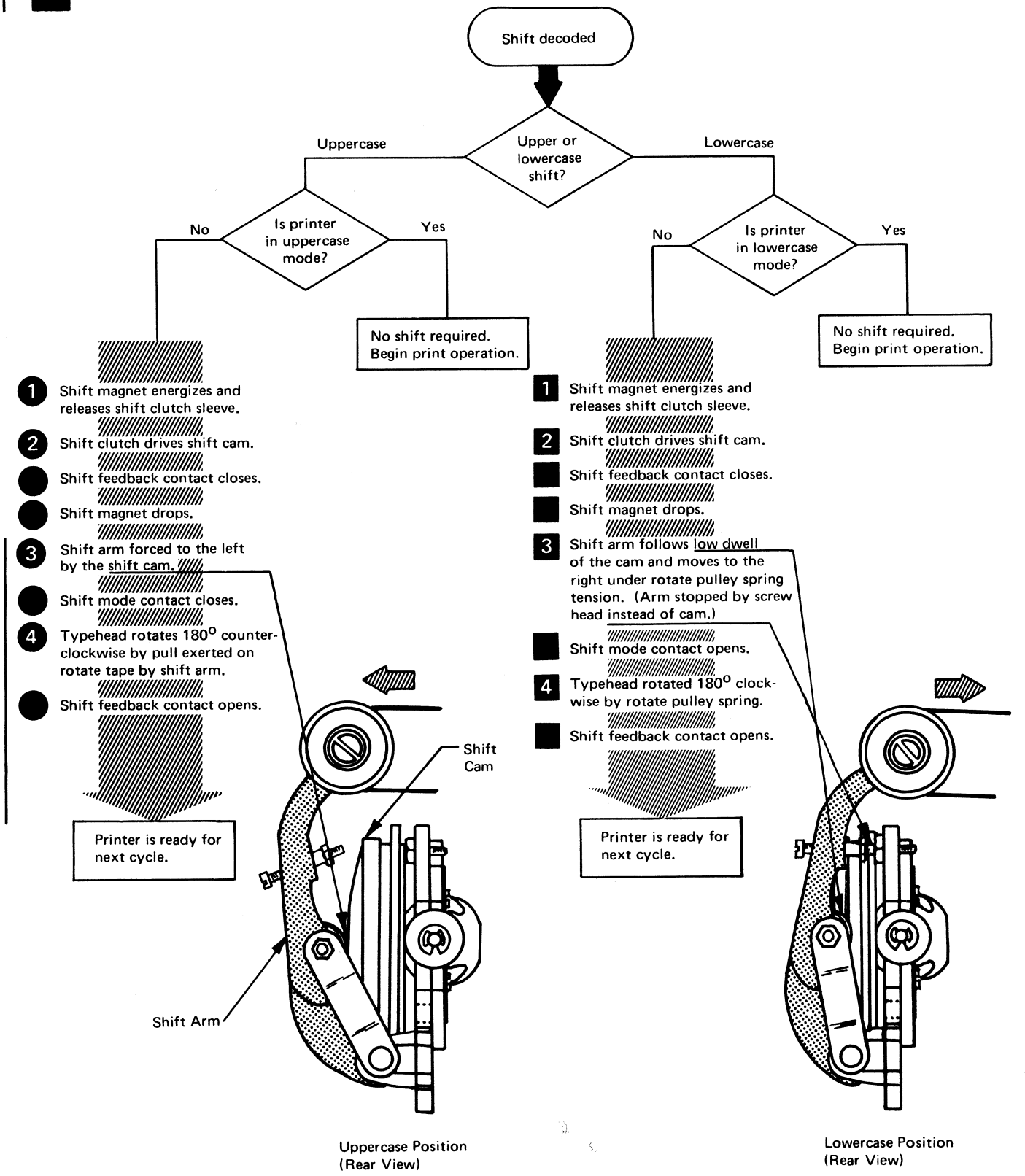
- Pulsed for either a shift to uppercase or a shift to lowercase.
- Pulsing the shift magnet allows the shift cam to rotate 180° during each shift cycle.

Shift Feedback Switch

- Shunt-operated, normally open reed switch.
- Closes during a shift operation and signals the control unit to:
  1. Drop the shift magnet pulse.
  2. Prevent another printer operation from occurring while the typehead is shifting.

TYPEHEAD SHIFT MECHANISM (Part 2 of 4)

B Shift Mechanism Operational Sequence



TYPEHEAD SHIFT MECHANISM (Part 3 of 4)

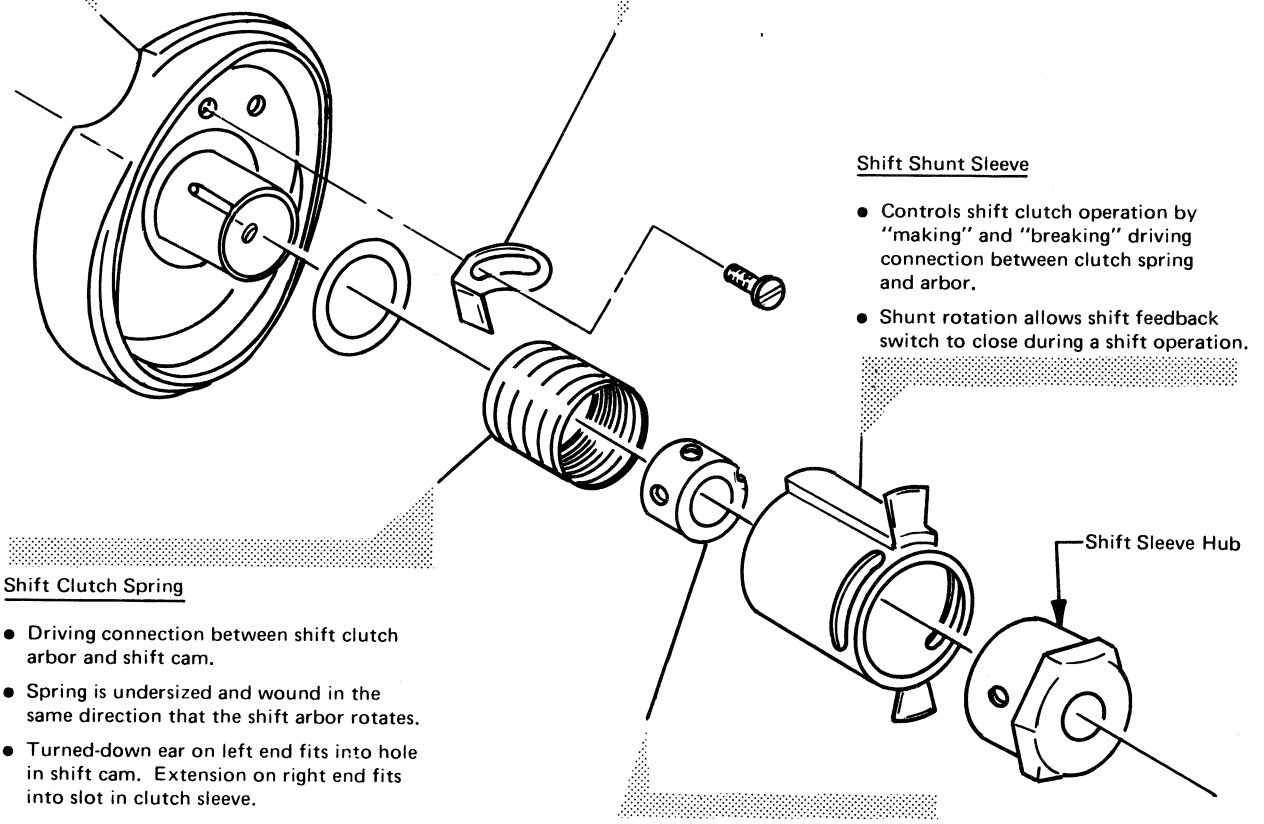
C Driving the Shift Cam

Shift Cam

- Controls shift arm movement.
- Rotates during a shift operation only and receives its motion from the operational shaft.

Shift Overthrow Stop

- Engages rear of step on shift sleeve and prevents shift cam from overthrowing past its rest position at the completion of a shift operation.



Shift Shunt Sleeve

- Controls shift clutch operation by "making" and "breaking" driving connection between clutch spring and arbor.
- Shunt rotation allows shift feedback switch to close during a shift operation.

Shift Sleeve Hub

Shift Clutch Spring

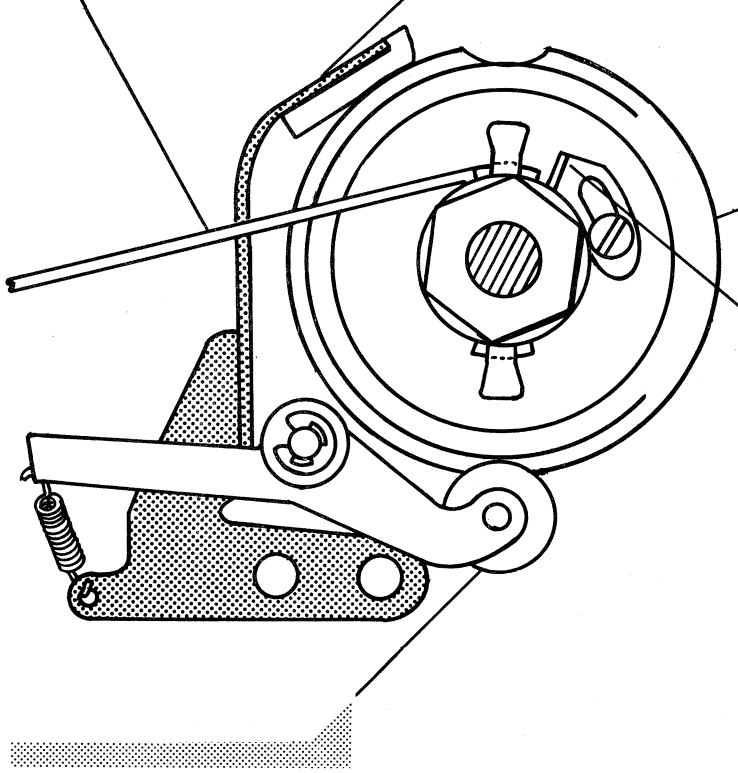
- Driving connection between shift clutch arbor and shift cam.
- Spring is undersized and wound in the same direction that the shift arbor rotates.
- Turned-down ear on left end fits into hole in shift cam. Extension on right end fits into slot in clutch sleeve.
- At rest, spring is held in unwound condition by shift magnet armature engaging one of two steps on shift sleeve.
- When the shift magnet is energized, the sleeve is released, allowing clutch spring to collapse about the arbor and drive the shift cam 180° for a shift cycle.

Shift Clutch Arbor

- Driving member for shift cam.
- Set-screwed to operational shaft.

TYPEHEAD SHIFT MECHANISM (Part 4 of 4)

D Stopping the Shift Cam



1 Shift Magnet Armature

- Engages step on shift sleeve to stop shift sleeve. (Magnet dropped by shift feedback closure.)

Shift Cam Brake

- Ensures same shift speed for both upper and lowercase shift.
- During a shift to lowercase, the shift arm roller is moving from the high dwell to the low dwell of the shift cam and this tends to accelerate cam movement. To prevent cam acceleration, the shift cam brake shoe engages raised surface on cam circumference during a shift to lowercase.

2 Shift Cam

- Momentum of cam causes it to rotate until clutch spring increases in diameter sufficiently to disengage spring from arbor.

3 Shift Overthrow Stop

- Engages rear of shift sleeve step to prevent cam from overthrowing past its rest position when the sleeve is stopped by the magnet armature.

4 Detent Roller

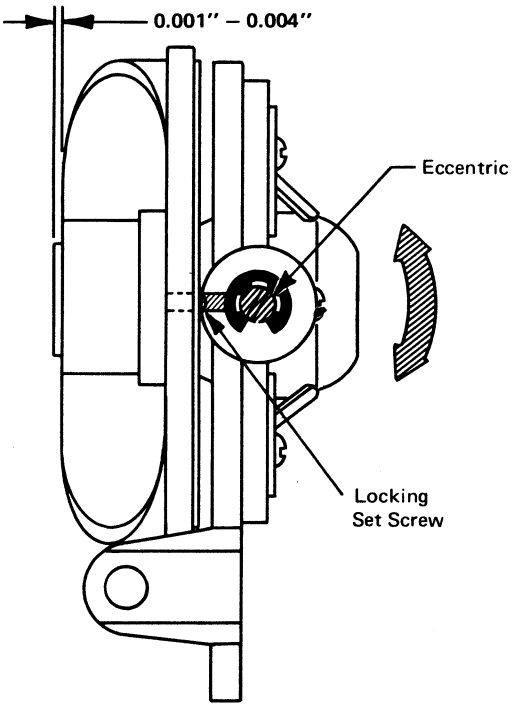
- Spring-loaded into notch in shift cam to prevent backward shift cam rotation at completion of a shift cycle and to maintain both upper and lowercase rest positions.

SHIFT MECHANISM ADJUSTMENT CHECKS

Shift Cam Backup Roller

The shift bearing should extend beyond the shift cam by 0.001" – 0.004".

NOTE Before adjusting the eccentric screw, loosen the locking set screw.

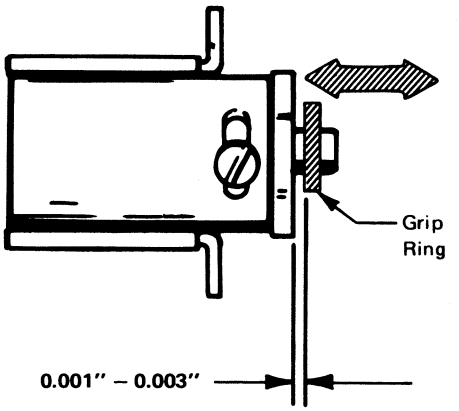


Check: 2-12, 2-64, 2-115

Figure 2-63. Shift Cam Backup Roller (Rear View)

Shift Sleeve End Play

Check for 0.001" – 0.003" end play between the retaining clip and the shift sleeve assembly.



Check: 2-70

Figure 2-64. Shift Sleeve End Play

Shift Cam Brake

The shift cam brake shoe should engage the high lobe of the shift cam by 0.035" – 0.045".

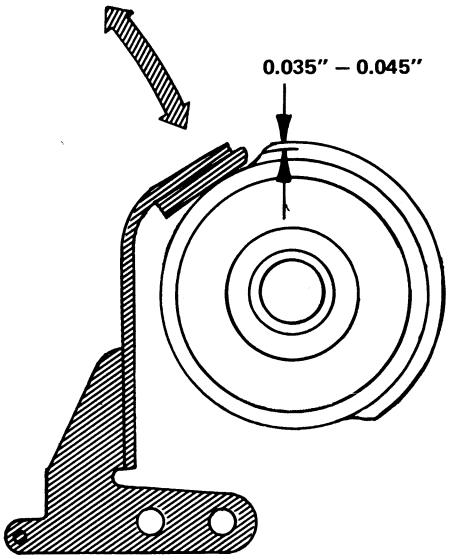
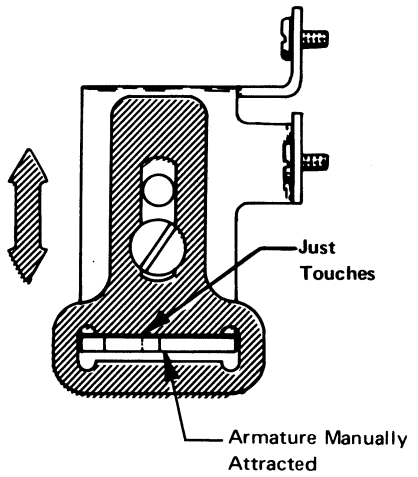


Figure 2-65. Shift Cam Brake

Shift Magnet Upstop

The armature should just touch the upstop when the armature is manually attracted.



Check: 2-67

Figure 2-66. Shift Magnet Upstop

Shift Magnet Bracket

With the shift magnet energized, check for 0.005" – 0.015" clearance between the magnet armature and the shift clutch stop lug.

NOTE The armature must not drag on the plastic sleeve, under any condition.

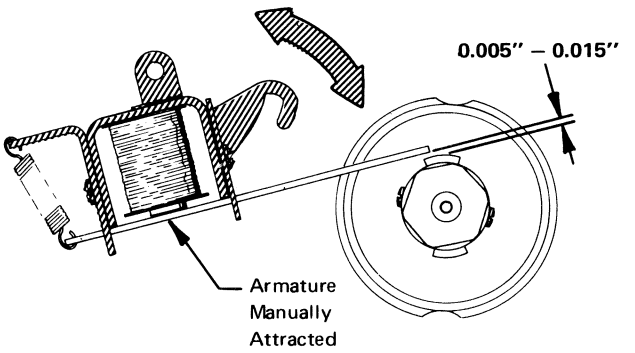
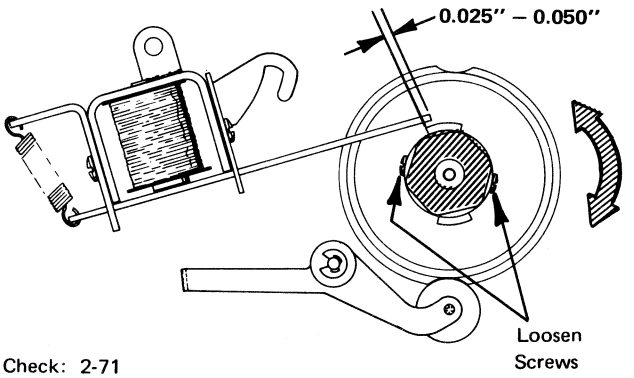


Figure 2-67. Shift Magnet Bracket

Shift Clutch Sleeve

With the printer motor power off and the shift magnet armature energized, the stop lug should move past its latched position by 0.025" – 0.050".



Check: 2-71

Figure 2-68. Shift Clutch Sleeve

Shift Overthrow Stop

With the shift cam at rest, check for a clearance of 0.010" – 0.030" between the stop lug and the overthrow stop.

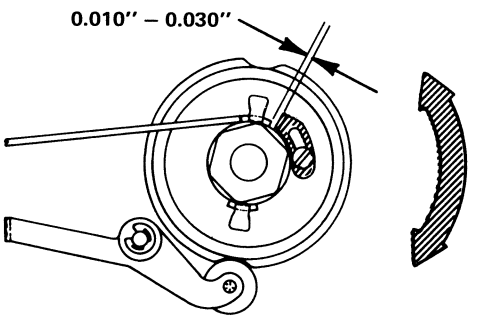
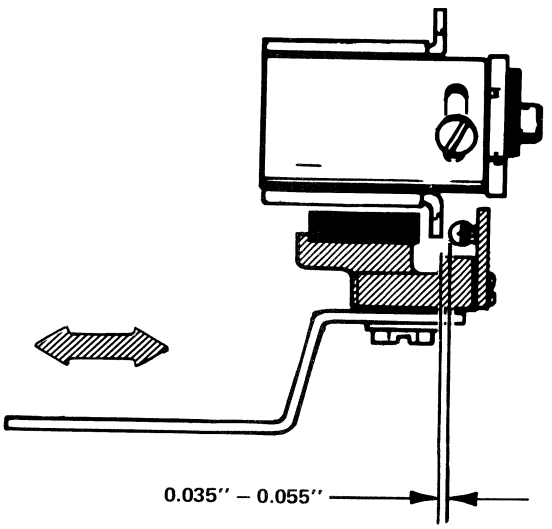


Figure 2-69. Shift Overthrow Stop

SHIFT FEEDBACK ADJUSTMENT CHECKS

Shift Feedback Shunt

Check for 0.035" – 0.055" clearance between the shift feedback shunt and the shift feedback switch.



Check: 2-71

Figure 2-70. Shift Feedback Shunt

Shift Feedback Timing

The shift feedback switch should close between 2° – 15° of shift cam rotation, and it should reopen between 129° – 149° of rotation.

NOTE Zero degrees is the point where the shift cam just begins to rotate.

To check this adjustment: Refer to procedure accompanying Figure 2-37.

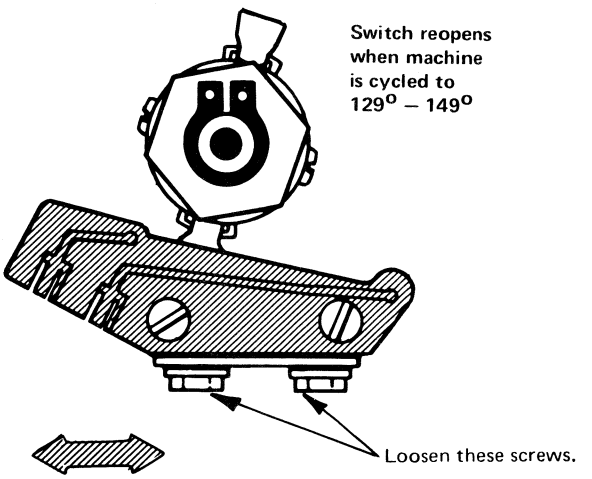


Figure 2-71. Shift Feedback Timing

Shift Mode Shunt

With the shift arm in the lowercase position, the shift mode shunt should be vertically parallel with the shift mode mounting block.

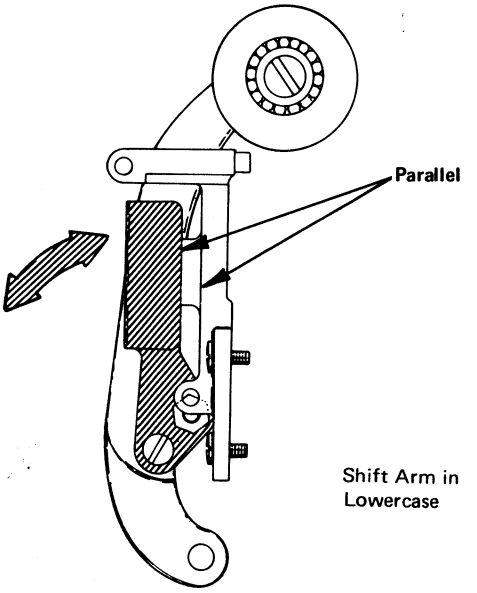


Figure 2-72. Shift Mode Shunt

Shift Mode Switch

With the shift arm in the lowercase position, check for a clearance of 0.035" – 0.055" between the shift mode shunt and the reed switch.

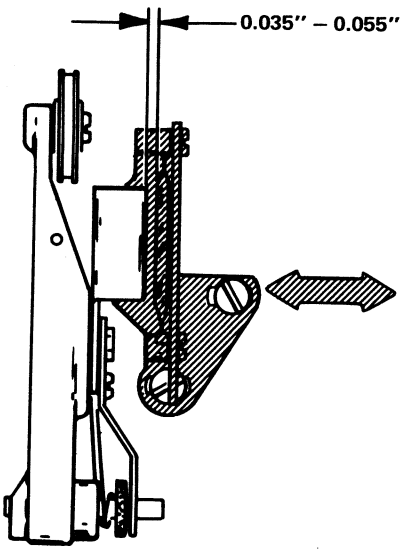


Figure 2-73. Shift Mode Switch

Figure numbers 2-74 through 2-76 have been purposely omitted, to allow for possible future additional adjustments.

(This page has been left blank intentionally, so that the text and illustrations on the following two pages will be opposite each other.)

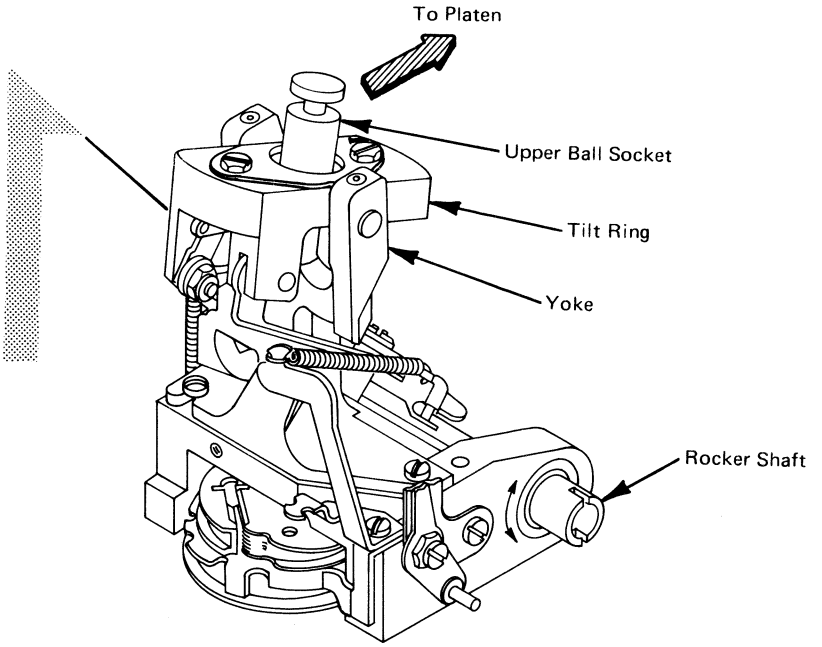
CARRIER AND TYPEHEAD ROCKER

Rocker Objective: To move the typehead to and from the platen during a print operation. See **A**.

Carrier Objective: To transport the typehead and related print mechanisms along the writing line. See **B**.

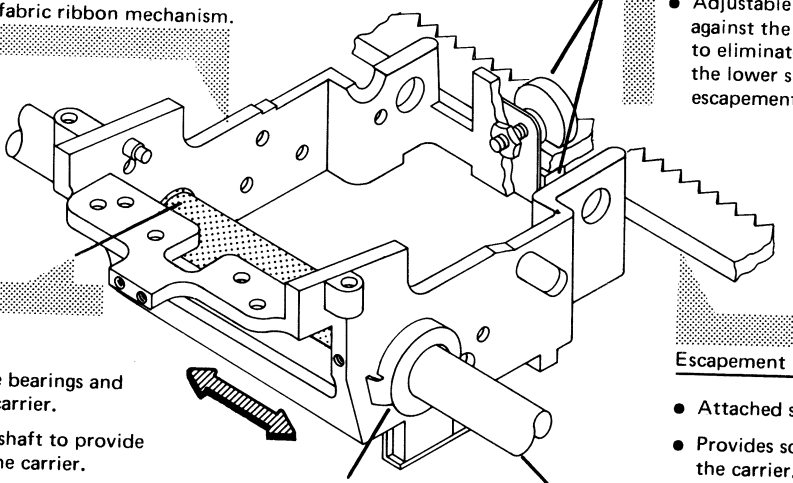
A Typehead Rocker Assembly

- Located in rear portion of carrier.
- Pivots on rocker shaft to move typehead to and from the platen during a print operation.
- Yoke provides a pivot mount for the tilt ring.
- The upper ball socket, attached to the tilt ring, is the mounting post for the typehead.



B Carrier Assembly

- Moves laterally just in front of the platen to transport the typehead and typehead-related mechanisms along the writing line.
- Also supports the fabric ribbon mechanism.



Carrier Shoes

- Provide support for rear of carrier.
- Adjustable upper shoe is spring-loaded against the top of the escapement rack to eliminate any vertical play between the lower shoe and the bottom of the escapement rack.

Print Sleeve

- Fits into two sleeve bearings and rotates within the carrier.
- Slides on the print shaft to provide front support for the carrier.

Escapement Rack

- Attached solidly to powerframe.
- Provides solid rear support for the carrier.

Print Shaft

- Powers print mechanisms in carrier.

Print Shaft Wiper

- Oil soaked felt ring, enclosed in a retaining cup, lubricates the print shaft and bearings in the carrier housing.

NOTE The means of providing motion to the rocker, as well as mechanisms contained in the rocker, are discussed in other sections of the manual.

CARRIER AND ROCKER ADJUSTMENT CHECKS

Rear Carrier Shoes

Check for 0.001" – 0.005" vertical play of the carrier. Adjust the high point of the eccentric toward the right-hand side of the printer (viewed from the front of the printer).

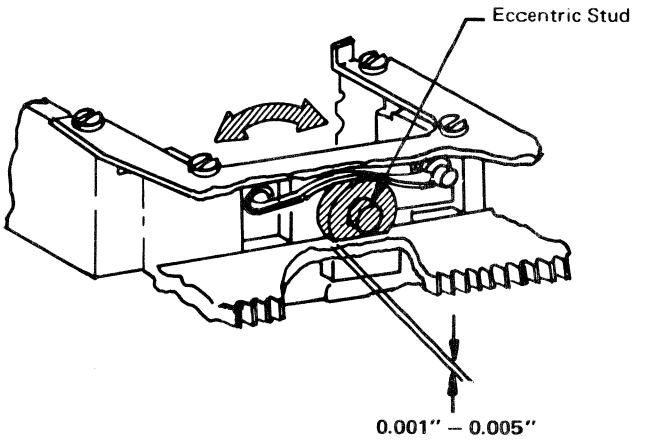


Figure 2-77. Rear Carrier Shoes

Front Carrier Support

Check for 0.001" – 0.005" clearance between the bottom of the front carrier shoe and the carrier support.

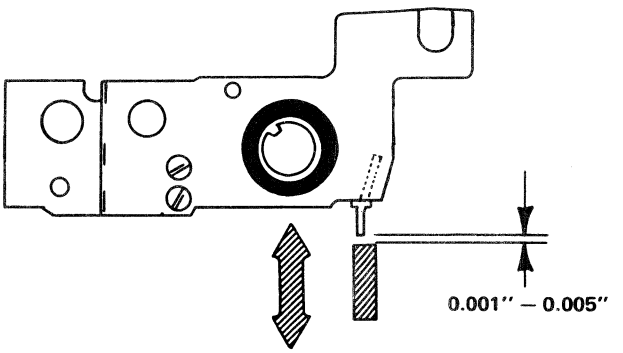


Figure 2-78. Front Carrier Support

Carrier Buffer Screws

Check for 0.001" – 0.003" clearance at the closest point between the escapement rack and the carrier buffer screws.

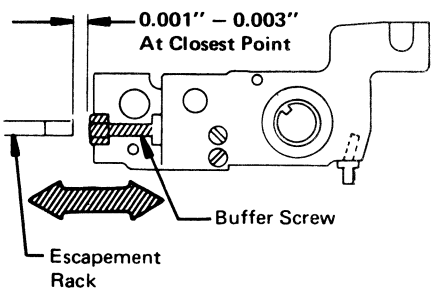


Figure 2-79. Carrier Buffer Screws

Rocker End Play

The rocker must operate freely and with no end play.

Excessive end play in the rocker will affect typehead alignment by allowing the rocker to shift its position left and right.

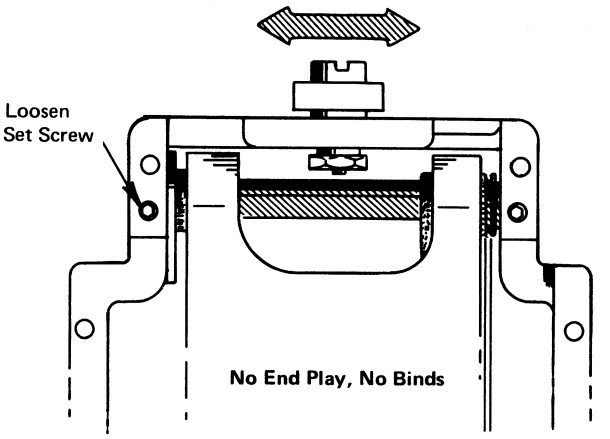


Figure 2-80. Rocker End Play

Rotate Shaft End Play

CAUTION *DO NOT* rotate the typehead clockwise against the tension of the tape, in an effort to break the pulley loose. Tape breakage or other parts damage may result.

Check for 0.001" – 0.004" rotate shaft end play.

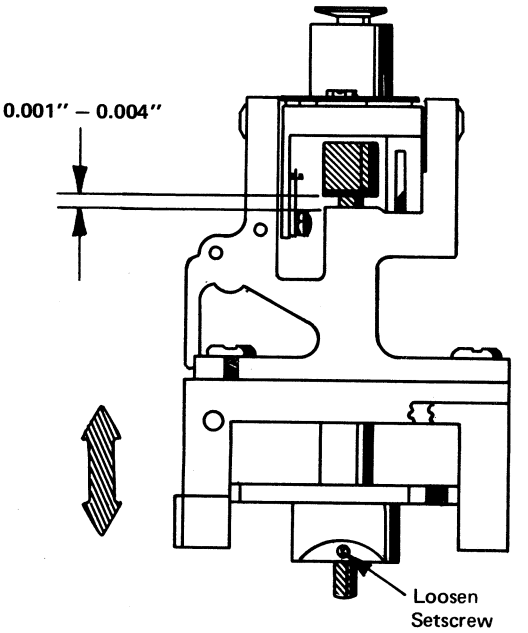


Figure 2-81. Rotate Shaft End Play

Upper Ball Socket

NOTE Vertical play in the upper ball socket will affect vertical alignment and impression.

The upper ball socket must rotate free of binds and with minimum vertical play. Add or remove shims for correct end play.

To check the upper ball socket for binds, remove the ball joint so that the upper ball socket can be rotated by hand. This is done either by simultaneously removing the tilt ring and upper ball socket and checking them off the machine or by removing the upper ball socket and replacing it without the ball joint. If the tilt ring is removed, its position relative to the yoke must be checked by a feeler gage before removal (insert feeler gage between tilt ring and left-hand yoke).

Care must be taken to ensure that the entire rotate system is free from binds. A bind in the upper ball socket can result in poor horizontal print alignment if the rotate detent fails to fully seat in the detent notch before printing occurs.

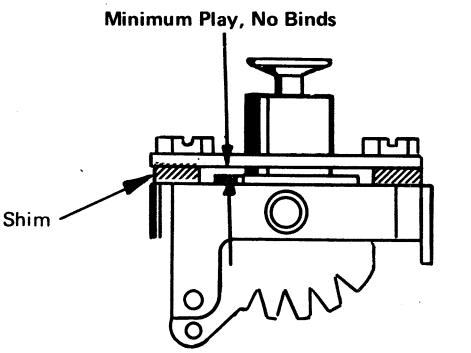


Figure 2-82. Upper Ball Socket

Tilt Ring

The tilt ring must operate freely and with no end play.

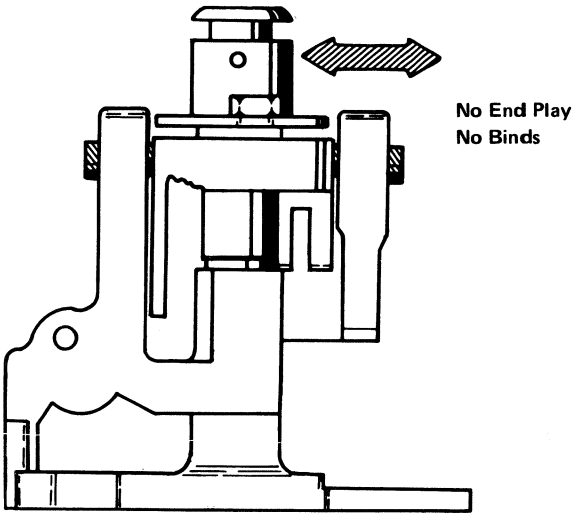


Figure 2-83. Tilt Ring

Rotate Detent

The rotate detent must operate with a slight drag and with no side play. The detent must seat positively.

NOTE Excessive play in the detent will result in poor horizontal alignment, because the detent cannot positively position the typehead.

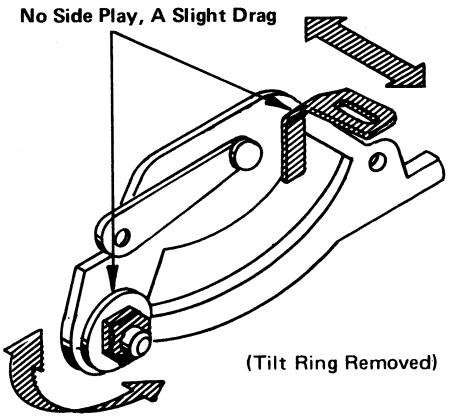


Figure 2-84. Rotate Detent

Tilt Detent

The tilt detent should operate freely, with no side play, slight drag, and no binds. The detent must seat freely.

NOTE Excessive side play in the tilt detent will cause poor vertical print alignment. A bind in the tilt detent will affect both vertical and horizontal alignment, because it will retard or restrict the seating of the tilt detent, which, in turn, will retard or restrict the seating of the rotate detent.

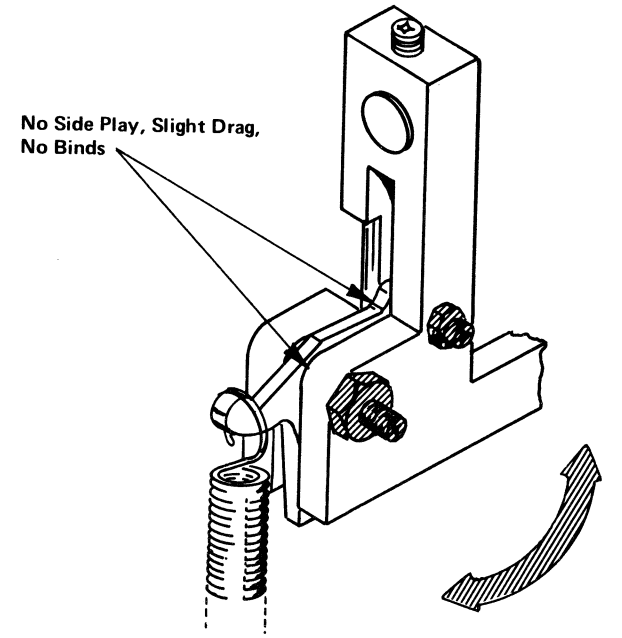
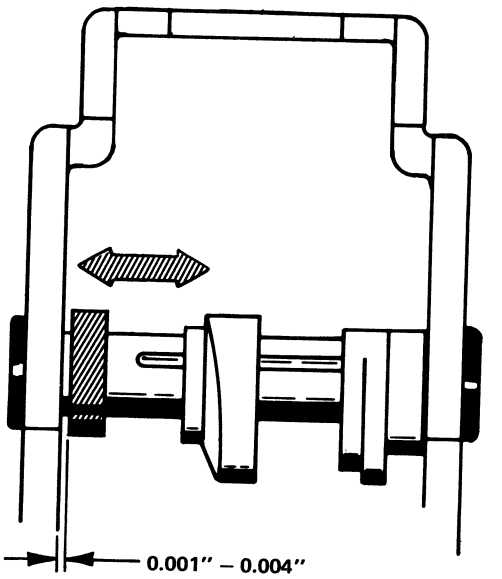


Figure 2-85. Tilt Detent

Print Sleeve End Play

Check for 0.001" – 0.004" print sleeve end play.

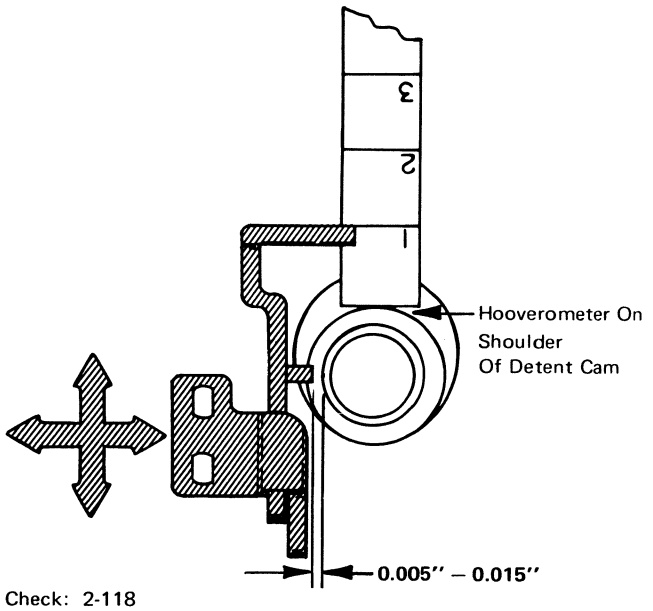


Check: 2-88

Figure 2-86. Print Sleeve End Play

Detent Cam Follower Bracket

With the top of the Hooverometer resting on the shoulder of the detent cam, the top surface of the cam follower pin should be aligned with the No. 1 scribe line on the Hooverometer Also check for 0.005" – 0.015" between the print sleeve and the end of the pin on the cam follower.



Check: 2-118

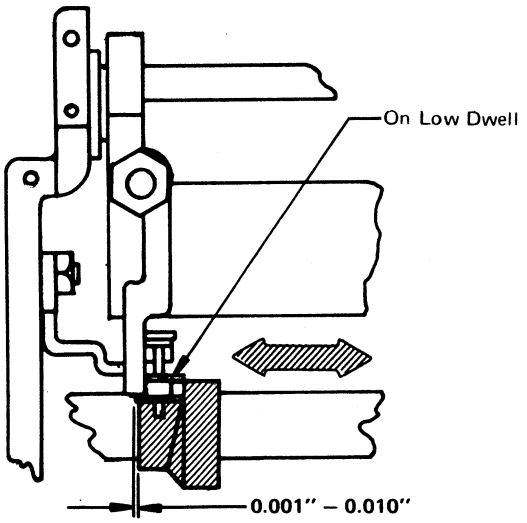
Figure 2-87. Detent Cam Follower Bracket

Detent Cam

CAUTION Excessive detent clearance could cause intermittent erroneous printing or parts breakage.

With the detent cam follower on the low dwell of the detent cam (detents fully seated), check for 0.001" – 0.010" clearance between the detent actuating lever and the detent cam follower roller.

This clearance ensures that the tilt detent will seat fully in the detent notch of the tilt ring. Too much clearance would allow the detents to enter their notches too early and withdraw too late.



Check: 2-89, 2-103

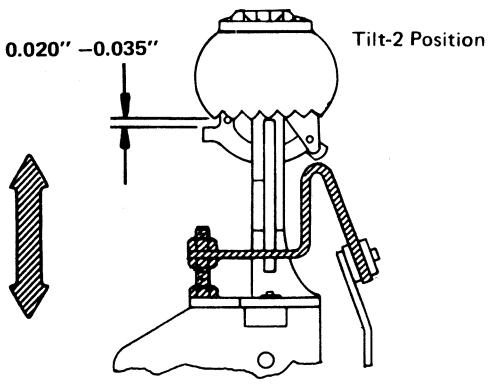
Figure 2-88. Detent Cam

Typehead Skirt Clearance

CAUTION Insufficient skirt clearance will cause intermittent erroneous printing or parts breakage. Too much skirt clearance will cause premature wear on the detent mechanism.

With the cycle shaft at rest and the typehead manually held in a tilt-2 position, check for 0.020" – 0.035" clearance between the rotate detent and the detent teeth on the typehead.

Proper skirt clearance allows the rotate detent to enter and withdraw from the typehead notch area at the proper time with respect to the rotating typehead. If this clearance is insufficient, the rotate detent will enter the notch area too early and withdraw too late.



Check: 2-118

Figure 2-89. Typehead Skirt Clearance

PRINT MECHANISM (Part 1 of 2)

Objective: To power the typehead against the platen, to print any character on the typehead; also to take a dummy (no-print) print cycle for a space function.

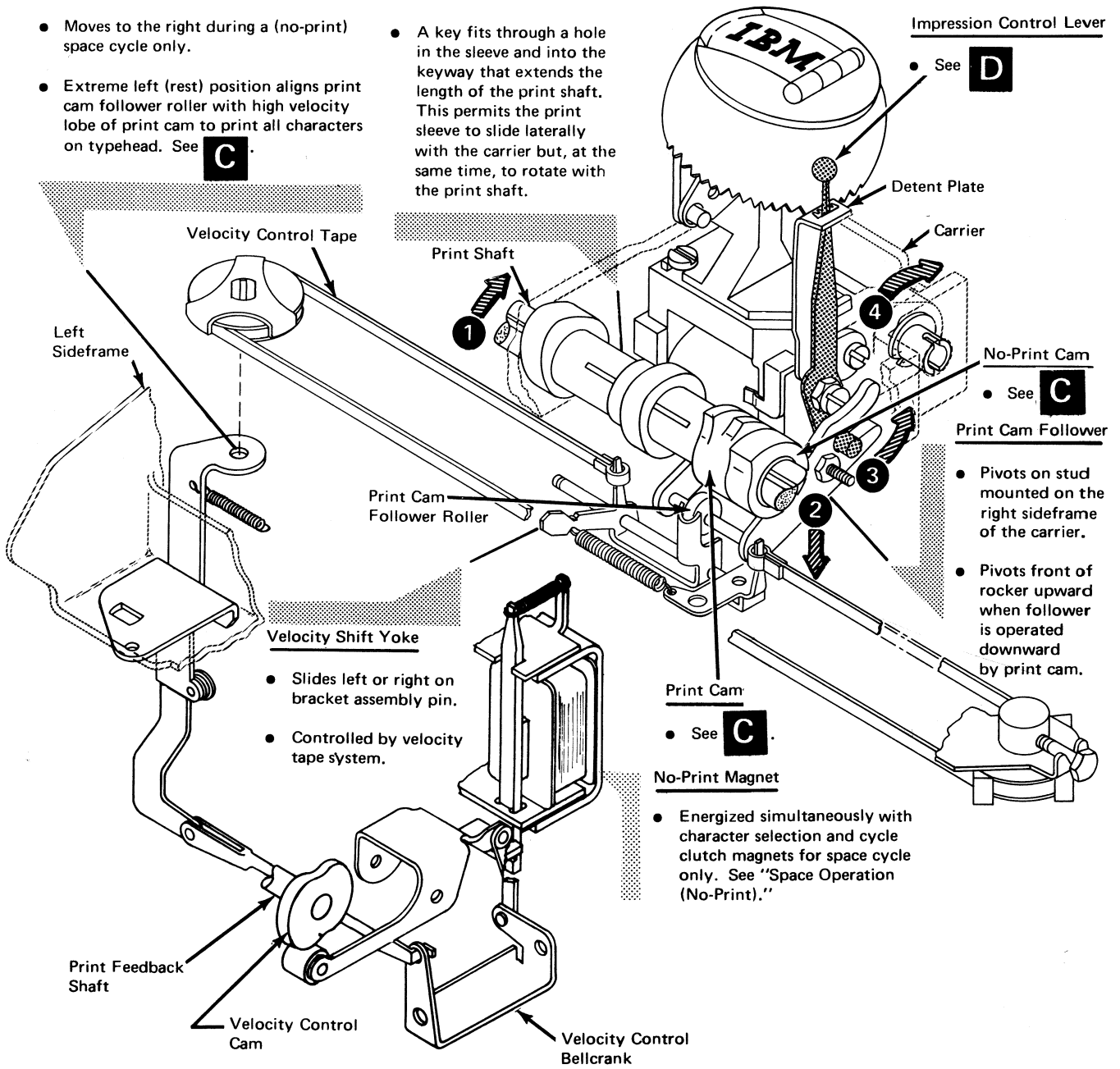
A Print Mechanism Functional Principles

Velocity Lever Assembly

- Spring-loaded to the right, but held to the left by the no-print magnet and the velocity bellcrank assembly.
- Moves to the right during a (no-print) space cycle only.
- Extreme left (rest) position aligns print cam follower roller with high velocity lobe of print cam to print all characters on typehead. See C.

Print Sleeve

- Rides on print shaft and serves as front support for the carrier.
- A key fits through a hole in the sleeve and into the keyway that extends the length of the print shaft. This permits the print sleeve to slide laterally with the carrier but, at the same time, to rotate with the print shaft.

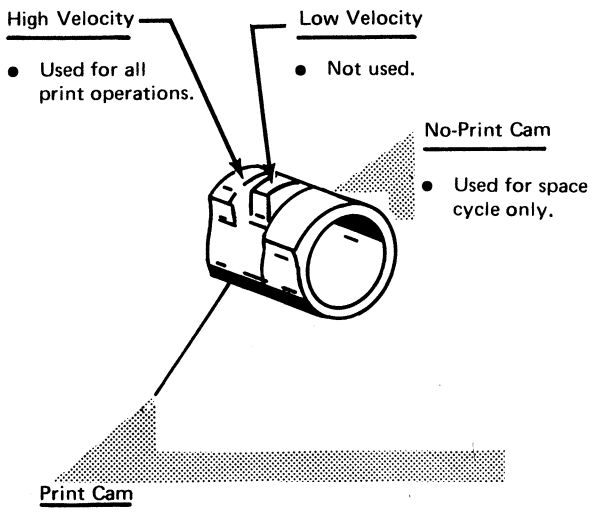


PRINT MECHANISM (Part 2 of 2)

B Print Mechanism Operating Sequence

- Character selection magnet(s) pick.
- Cycle clutch magnet picks.
- Cycle shaft begins rotation.
- 1 Print shaft driven by cycle shaft.
- Print feedback switch closes and drops character selection and cycle clutch magnets.
- 2 High velocity lobe of print cam drives front of print cam follower downward.
- 3 Print cam follower pivots about its mounting stud and lifts the front of the typehead rocker upward.
- 4 Rocker pivots toward the rear, moving the typehead toward the platen at high velocity.
- Print feedback switch opens.
- Character prints and rocker returns to its rest position.

C Print Cam and No-Print Cam

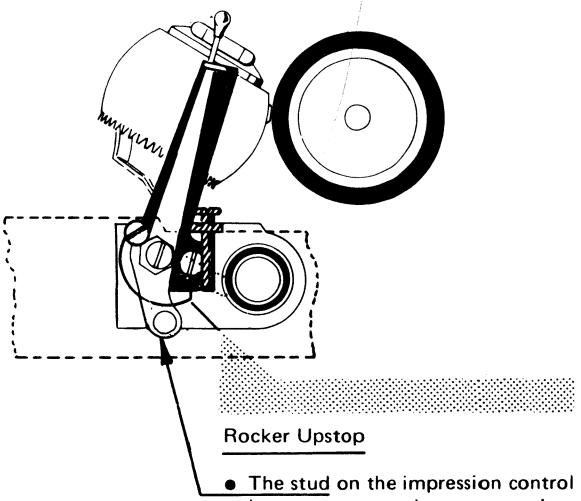


- Camming surface designed so that typehead is powered to within a few thousandths of an inch of the platen. To prevent excessive typehead velocity, the momentum ("free flight") of the rocker carries the typehead the remaining distance.

D Impression Control Lever

- Operates independently of velocity control mechanism and allows operator to vary print impression to correspond to thickness of paper forms.
- Can be positioned to any one of five different impression settings.
- Lever is held in selected position by a notched detent plate. When changing lever to a new position, it must be pushed to the right before moving it forward or back. DO NOT ratchet lever across teeth on detent plate, as this could cause the plate to become loose or wear the teeth.
- When the lever is pulled forward, the pin on the lower portion of the lever moves toward the rear in the forked slot of the print cam follower, increasing the amount of powered travel the typehead will receive. Conversely, moving the lever to the rear decreases the amount of powered travel. The forked slot in the follower is designed so most of the change in powered travel will be felt as a change in the amount of free flight of the typehead. Throughout the entire range of the impression control lever, the typehead free flight should change only slightly (approximately 0.015").

E Rocker Upstop

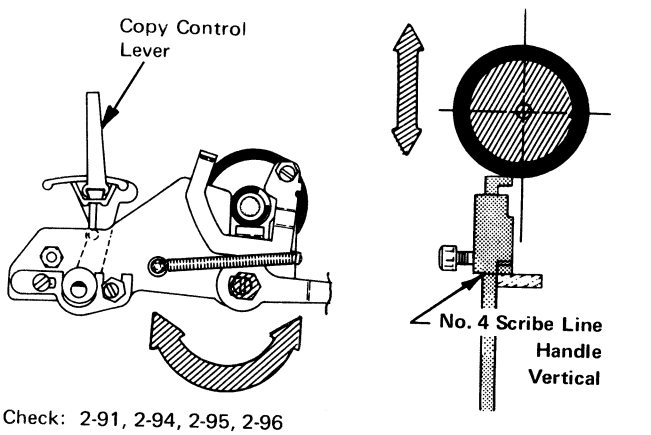


- The stud on the impression control lever encounters the upstop and restricts the free flight of the typehead to ensure that all characters emboss the paper equally.

PRINT MECHANISM ADJUSTMENT CHECKS

Platen Height (Preliminary)

With the copy control lever all the way forward, and the head of the Hooverometer set at the No. 4 scribe line, the platen should just touch the base of the handle when the head is resting on the escapement rack. Check at both ends of the platen.

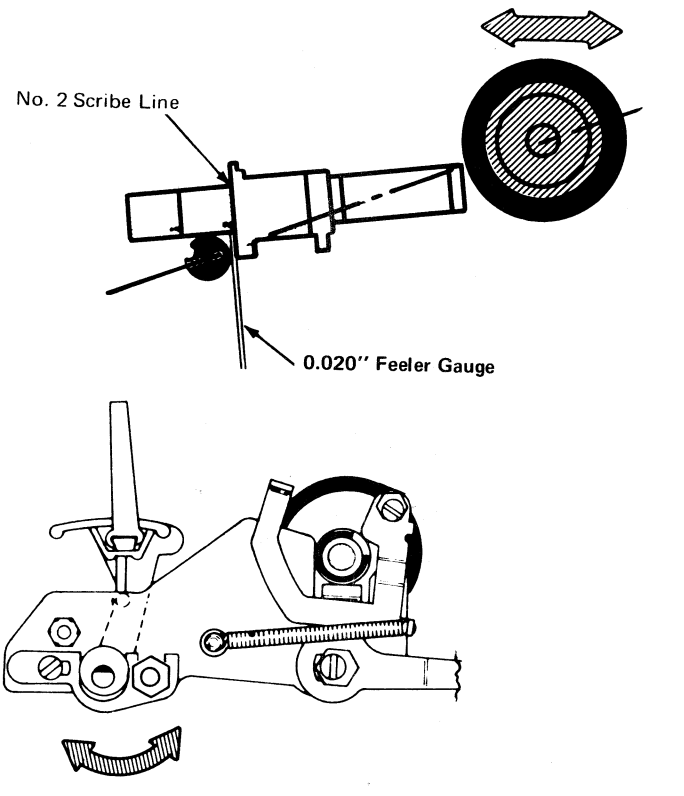


Check: 2-91, 2-94, 2-95, 2-96

Figure 2-90. Platen Height (Preliminary)

Platen (Front to Rear)

With the copy control lever all the way forward, and the head of the Hooverometer set at the No. 2 scribe line and held in the position shown in Figure 2-91, check for 0.020" clearance between the head of the Hooverometer and the print shaft Check at both end of the platen.

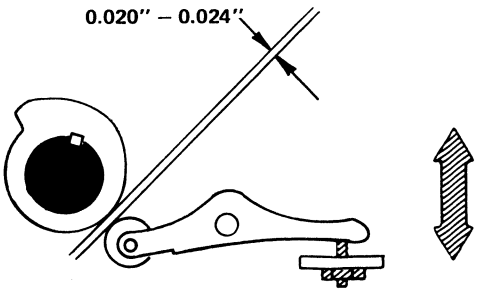


Check: 2-162, 2-90, 2-94, 2-95, 2-97

Figure 2-91. Platen (Front to Rear)

Print Cam Follower Stop

With the print cam at rest, check for 0.020" – 0.024" clearance between the print cam and the print cam follower roller.

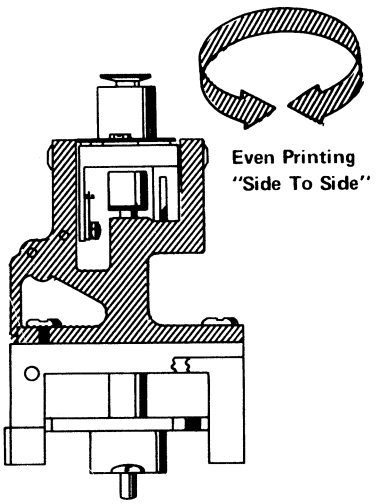


Check: 2-94

Figure 2-92. Print Cam Follower Stop

Yoke Position

The density of the left and right sides of a printed character should be uniform.



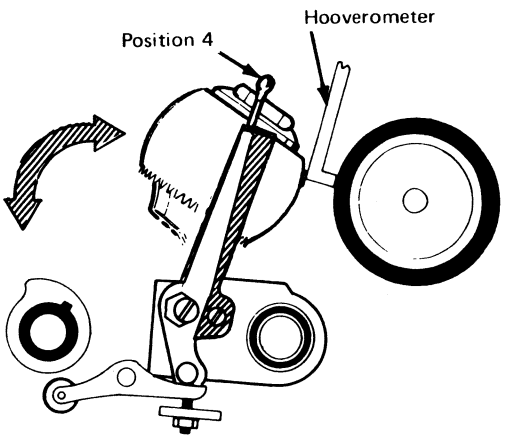
Check: 2-115

Figure 2-93. Yoke Position

Typehead Powered Travel

With the impression control lever in position 4 and the handle of the Hooverometer inserted between the typehead and the platen, both the typehead and the platen should touch the Hooverometer.

NOTE This adjustment and the "Typehead Free Flight" adjustment must be considered together.

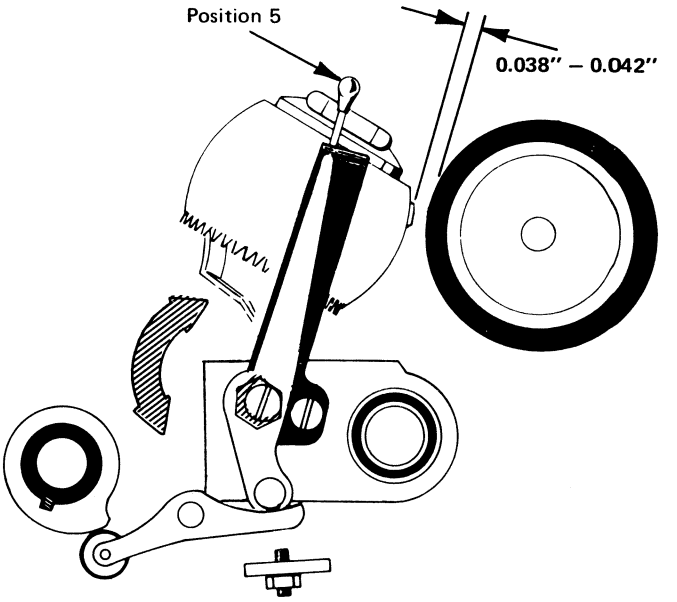


Check: 2-95, 2-97

Figure 2-94. Typehead Powered Travel (Right Side)

Typehead Free Flight

With the impression control lever in position 5, check for 0.038" – 0.042" clearance between the typehead and platen.

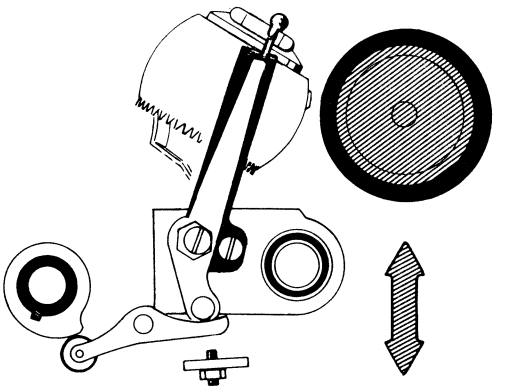


Check: 2-94, 2-97

Figure 2-95. Typehead Free Flight (Right Side)

Platen Height (Final)

Check for uniform print density at the top and bottom of all printed characters. Check at both ends of the platen.



Even Printing, Top and Bottom

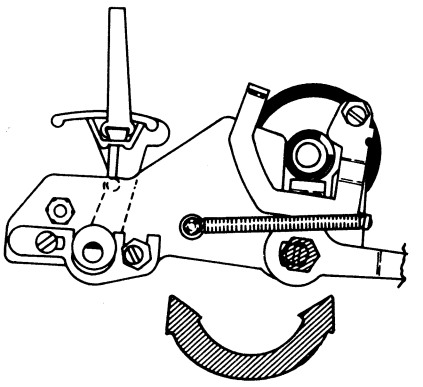


Figure 2-96. Platen Height (Final)

Rocker Upstop

With the impression control lever in position 5 and the copy control lever in position 1, push the typehead against the platen. The adjusting screw should be backed off two turns from the point where the screw forces the upstop to just bear against the top of the stud on the bottom of the impression control lever.

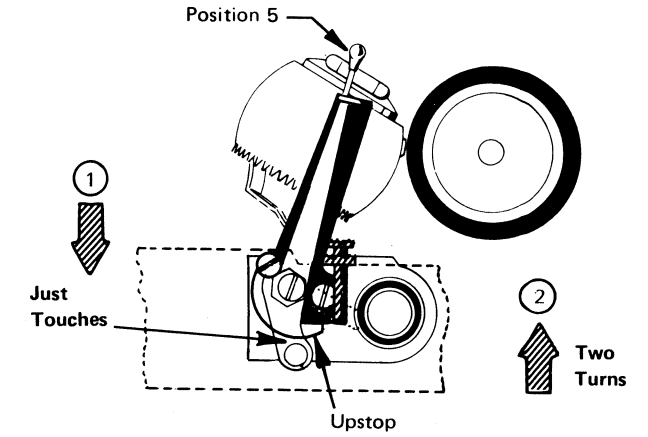


Figure 2-97. Rocker Upstop

Velocity Idler Pulley (High Velocity)

With the no-print armature latched, the print cam follower should be centered on the high velocity lobe of the print cam within 0.010".

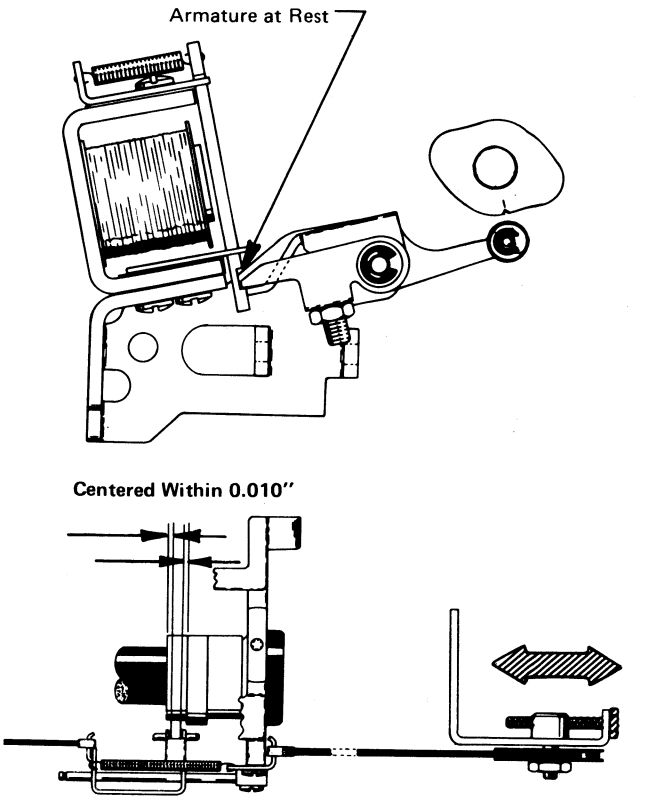


Figure 2-98. Velocity Idler Pully (High Velocity)

Figure numbers 2-99 through 2-100 have been purposely omitted, to allow for possible future additional adjustments.

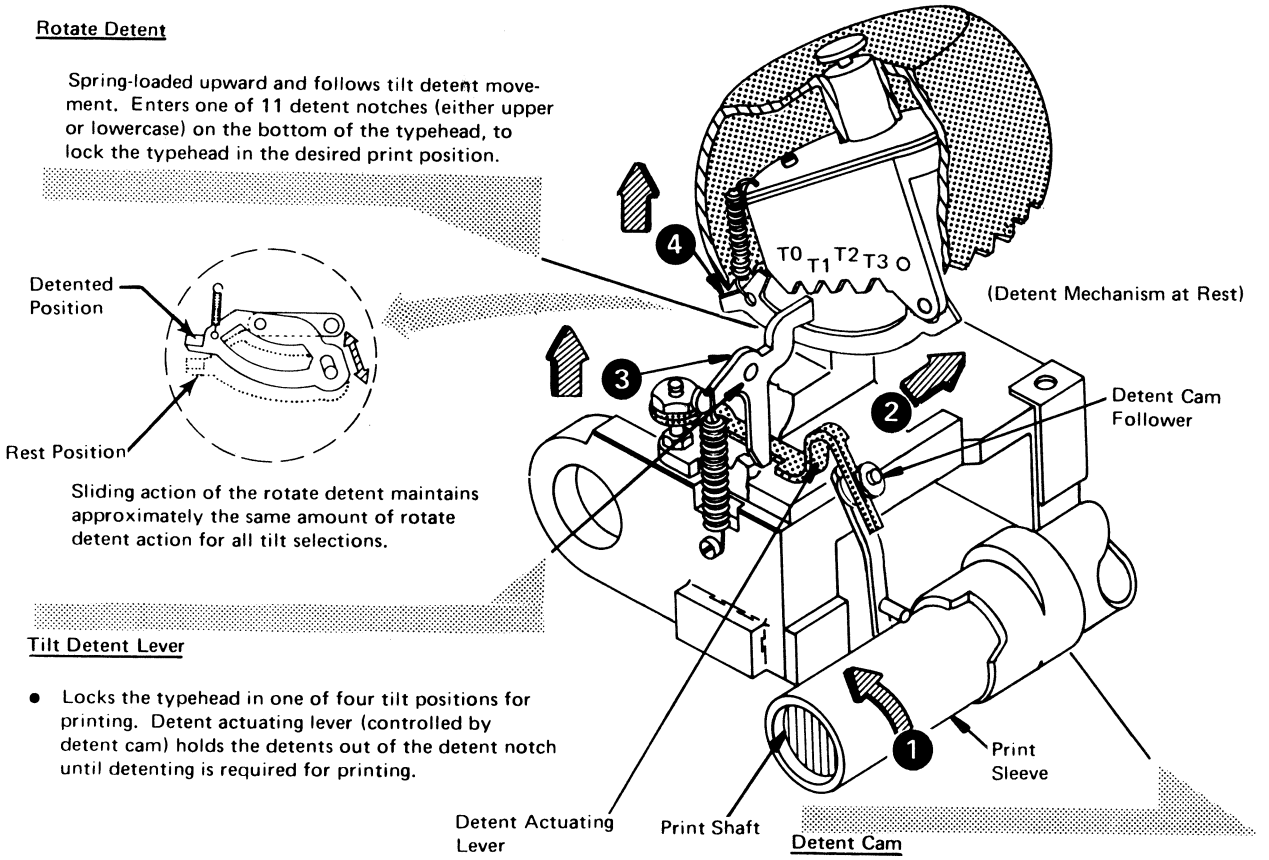
TYPEHEAD ALIGNMENT (Part 1 of 2)

Objective: To position the typehead to an exact printing point, horizontally and vertically.

- The typehead is coarse-aligned by the tilt-and-rotate mechanisms during a print cycle and then detented in a precise printing position by the detent mechanism.
- Typehead alignment directly affects print quality. Because many factors affect typehead alignment, you should review the alignment adjustments for a more thorough understanding of the importance of correct typehead alignment.

A Typehead Alignment Functional Principles

Ultimate objective of the printer is to provide a printed output that is clearly legible.



B Typehead Alignment Operating Sequence

- Print cycle initiated (selection magnet and cycle clutch magnet energized).
- Typehead coarse-aligned in print position by tilt-and-rotate mechanisms.
1. Print sleeve (mounted on print shaft) rotates detent cam to low dwell.
2. Detent cam follower enters low dwell of detent cam.
3. Spring-loaded tilt detent pivots up and enters selected notch in the tilt ring.
4. Rotate detent follows tilt detent movement and enters selected notch on bottom of typehead.
- Tilt-and-rotate detents fine-align the typehead to an exact printing point before it strikes the paper.
- Detents are pulled from notches while rocker assembly is restoring to its rest position.

TYPEHEAD ALIGNMENT (Part 2 of 2)

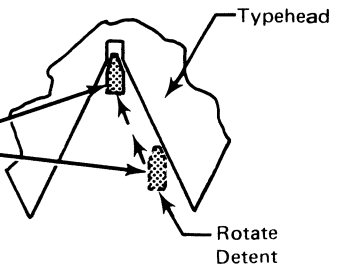
C Detenting

Coarse Alignment

- Initial detent entry determined by tilt and rotate mechanisms.
- Tilt and rotate mechanisms must align typehead and tilt ring to correct notches

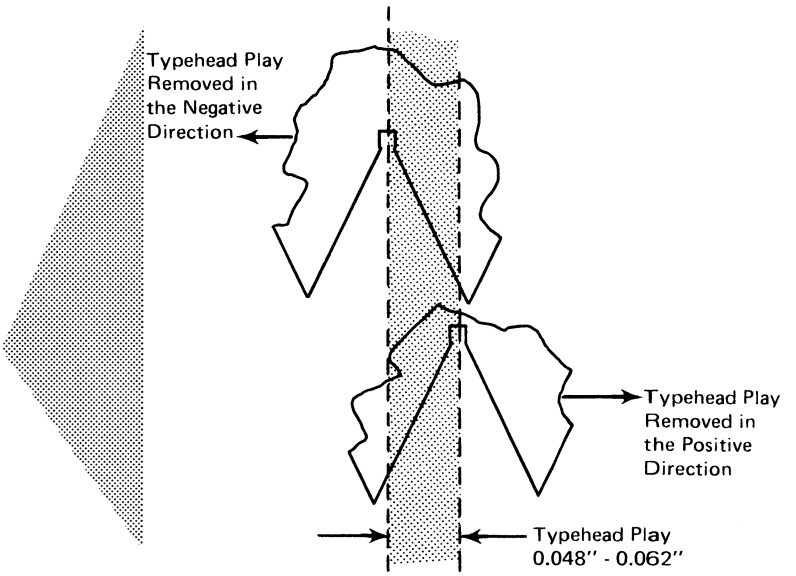
Fine Alignment

- Initial detent entry refined by detent seating fully and locking the typehead.
- See D and E



D Typehead Play

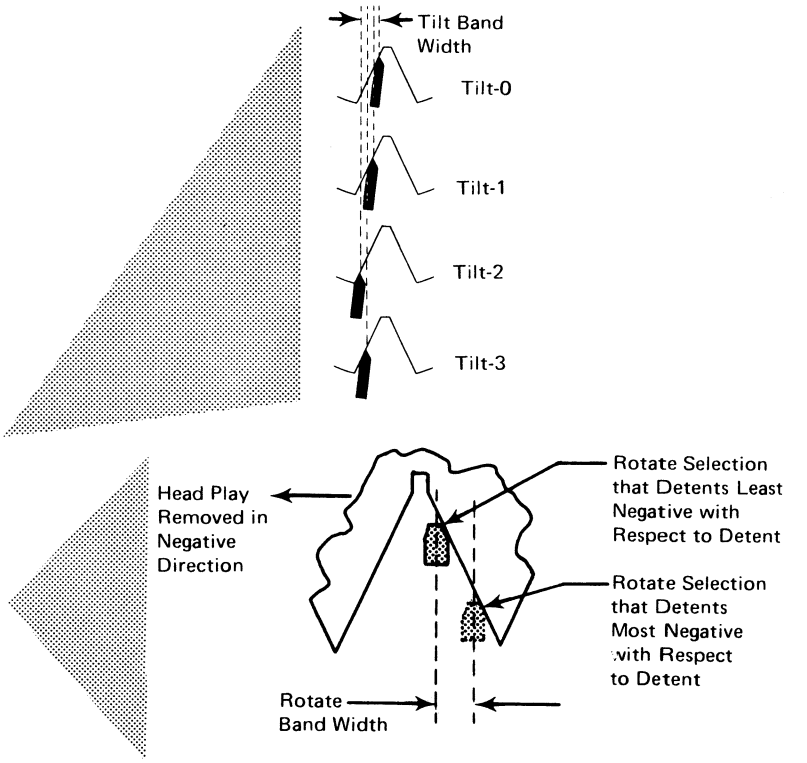
- Built-in play derived from backlash between slots in the ball joint and the pins in the upper and lower ball sockets.
- Allows rotate detent to fine align the selected typehead position after the typehead has been coarse aligned.
- Excessive typehead play could result in incorrect typehead alignment and character selection. Excessive play can be corrected by replacing the ball joint.



NOTE Tilt ring has built-in play derived from tilt pulley link to allow fine alignment of the tilt ring.

E Band Width

- Tilt and rotate mechanisms coarse align tilt ring and typehead so that detents can enter and bottom in the correct notch without utilizing all tilt ring or typehead play. To ensure that detenting failure will not occur, the coarse alignment variation (band width) must be within specific tolerances.
- Band width is controlled by Customer Engineer adjustments.
- Tilt band width is the largest coarse alignment variation between any two of the four tilt positions.
- Rotate band width is the difference in detenting between the rotate selection that detents the least negative and the rotate selection that detents the most negative with respect to the rotate detent.

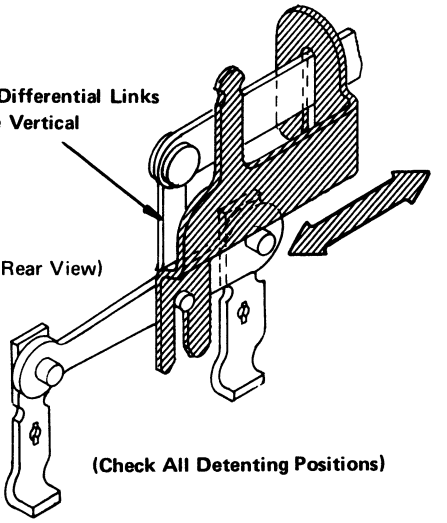


TYPEHEAD ALIGNMENT ADJUSTMENT CHECKS

NOTE Incorrect carrier and rocker and print mechanism adjustments may appear to be typehead alignment adjustment problems.

Rotate Differential Link Guide

The rotate differential links should hang in a true vertical position.

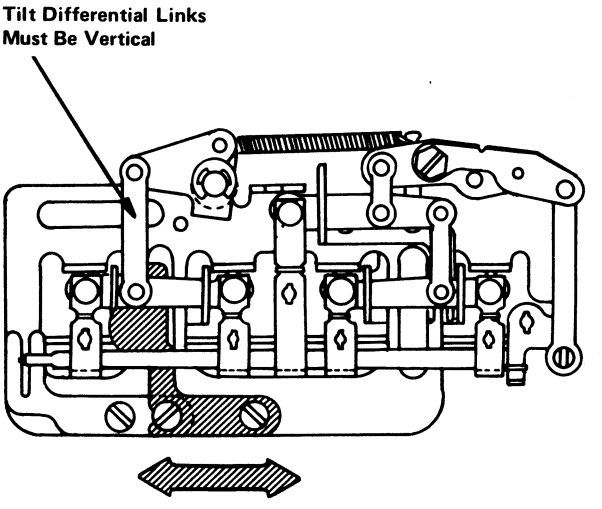


Check: 2-103, 2-109

Figure 2-101. Rotate Differential Link Guide

Tilt Differential Link Guide

The tilt differential links should hang in a true vertical position.



Check: 2-103, 2-105

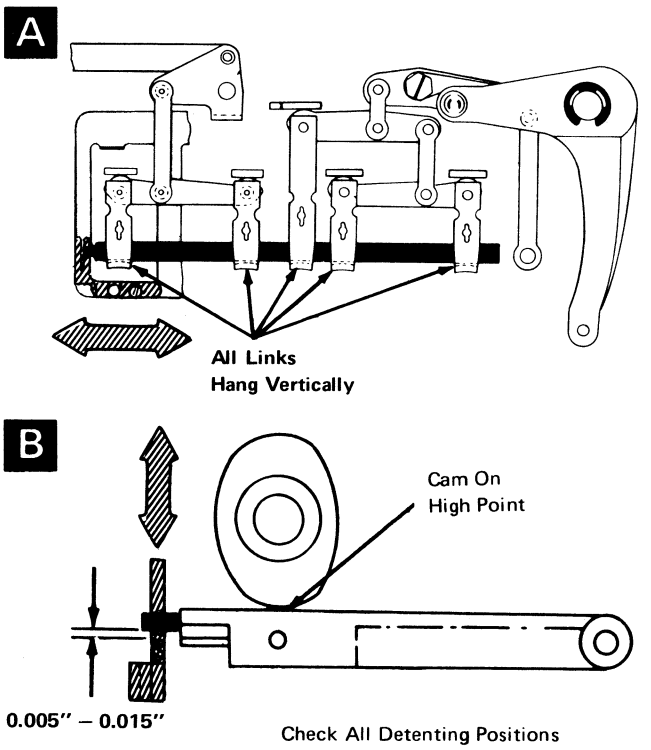
Figure 2-102. Tilt Differential Link Guide

Positive Bail Guide

A **All positive rotate and tilt latches should hang vertically in the latch bail.**

CAUTION Excessive overtravel will allow the latches that are not engaged by the bail to be trapped above the bail.

B **With the positive bail cam followers under the high point of the positive cams, check for 0.005" – 0.015" overtravel of the positive bail beyond the high point of the cams.**



Check: 2-90, 2-94

Figure 2-103. Positive Bail Guide

Print Shaft Timing (Preliminary)

With the cycle shaft latched in its rest position, loosen the print shaft gear and rotate the print shaft until the keyway is approximately in line with the end of the ribbon lift cam follower pivot screw.

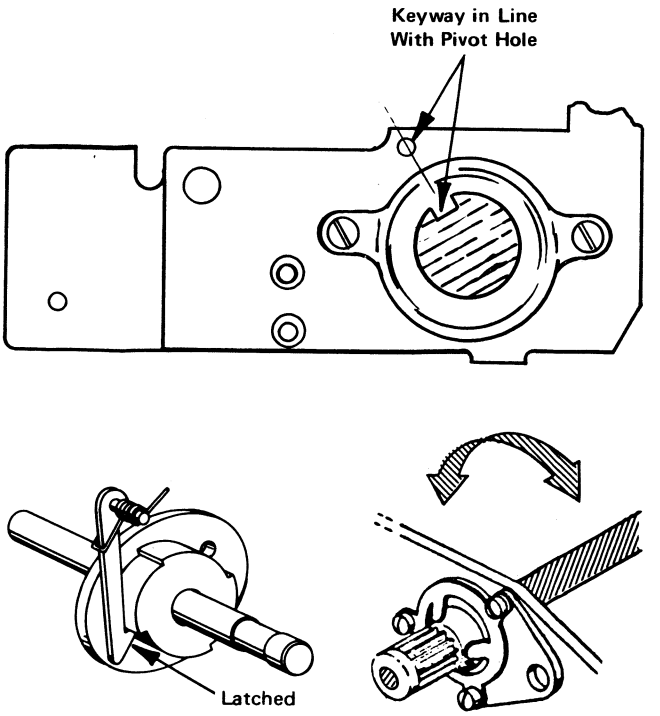


Figure 2-104. Print Shaft Timing (Preliminary)

Tilt Selection Latches

The tilt selection latches should restore to their rest position under the positive bail just as the check pawl latches the check ratchet.

NOTE This adjustment ensures proper latch to bail clearance.

NOTE Each selection latch must receive the same amount of motion from the positive bail, when operated, to produce the proper amount of motion to the tilt arm link for a desired selection. If one of the stop lugs is adjusted too low, its respective latch will reset early under the positive bail, producing an excessive amount of latch clearance for that latch. This means that this latch, when operated, will not receive as much motion from the positive bail as the other latch. This undesirable condition could cause the band width of the system to increase.

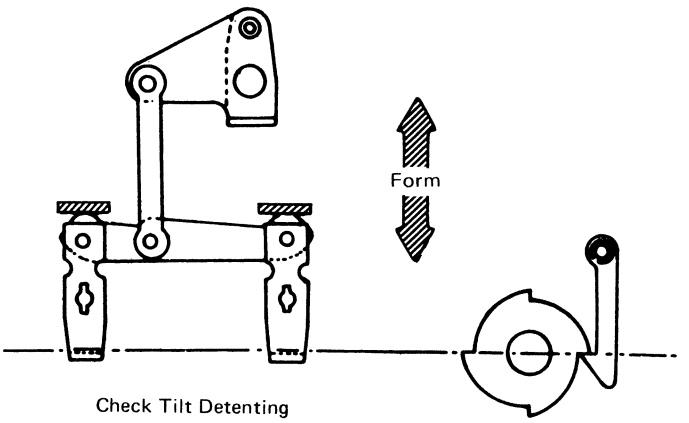


Figure 2-105. Tilt Selection Latches

Tilt Arm Motion

The tilt arm motion should cause the tilt ring to detent equally for both a tilt-3 and a tilt-0 character.

NOTE The tilt-0 and tilt-3 characters may not detent correctly, but they must detent identically. The following adjustment will cause them to detent correctly.

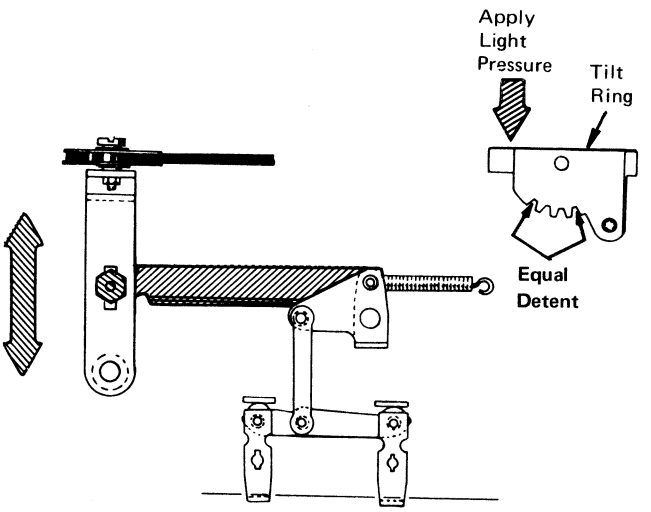


Figure 2-106. Tilt Arm Motion

Tilt Ring Homing

With a tilt-0 character half-cycled and the tilt ring play removed in the restoring direction, the rear of the tilt ring should rise 0.004" – 0.008" when the detent is manually allowed to seat in the detent notch.

To check this adjustment: Half-cycle a tilt-0 character and ensure that the tilt detent enters slightly on the rear side of the detent notch when tilt ring play is removed in the restoring direction. As the tilt detent seats itself, the rear of the tilt ring should rise slightly.

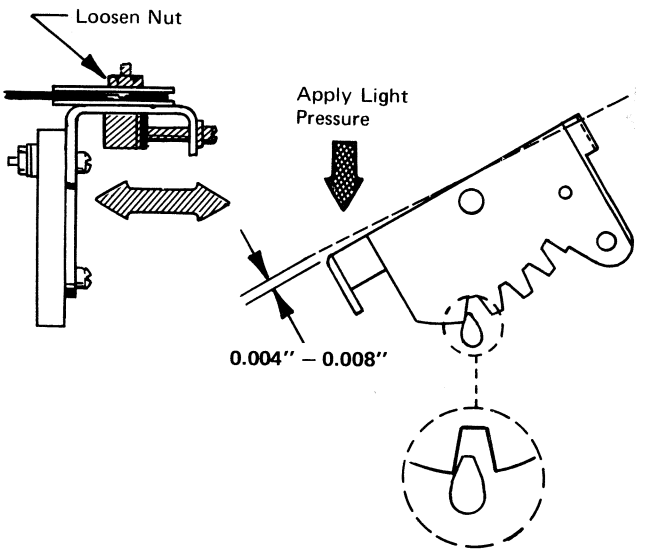


Figure 2-107. Tilt Ring Homing

Rotate Spring Tension

CAUTION The rotate spring exerts counterclockwise tension on the rotate spring cage. Care should be taken when disengaging the retainer from lugs on the cage. Allowing the cage to spin back freely may damage the rotate spring.

With the typehead removed and a lowercase -5 rotate character half-cycled, check for 1-7/8 to 2 pounds rotate spring tension as the shift arm approaches the lowercase position.

To increase rotate spring tension, wind the cage clockwise, ensuring that the retainer engages a lug on the cage before releasing the cage.

To decrease rotate spring tension, hold the cage against spring tension and disengage the retainer. Allow tension to rotate the cage slowly. Ensure that the retainer engages the next lug. Follow the preceding steps, working with only one lug at a time, until desired spring tension is attained.

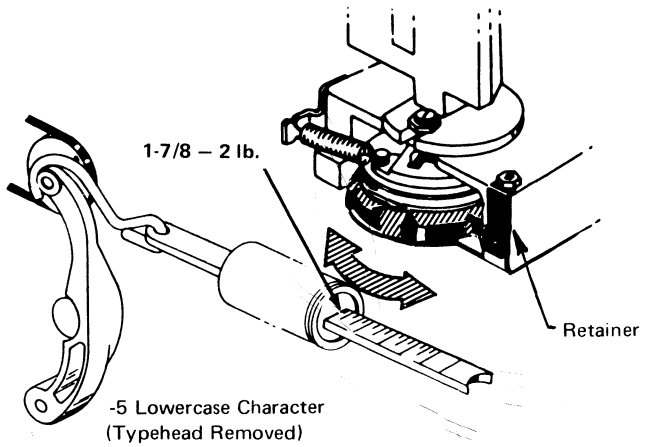


Figure 2-108. Rotate Spring Tension

Positive Rotate Selection Latches

All positive rotate selection latches should restore simultaneously under the positive bail just as the check pawl latches the check ratchet at the end of a print cycle.

NOTE This adjustment ensures proper selection latch clearance.

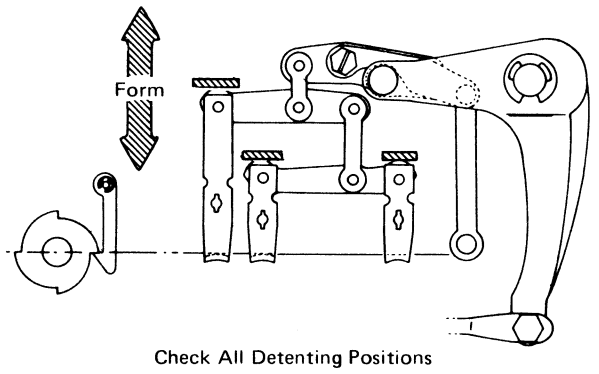


Figure 2-109. Positive Rotate Selection Latches

Negative Five Latch

NOTE Never use the -5 latch for balancing purposes. Use the balance lever only.

The negative latch should reset just as the check pawl latches the check ratchet at the end of a print cycle.

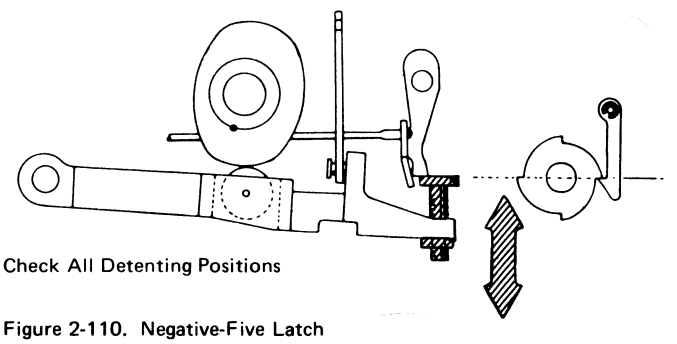


Figure 2-110. Negative-Five Latch

Rotate Arm Vertical (Preliminary)

With the typehead removed and the printer half-cycled to an uppercase zero rotate, zero tilt selection, the vertical tooling mark on the rotate arm should be parallel with the left sideframe.

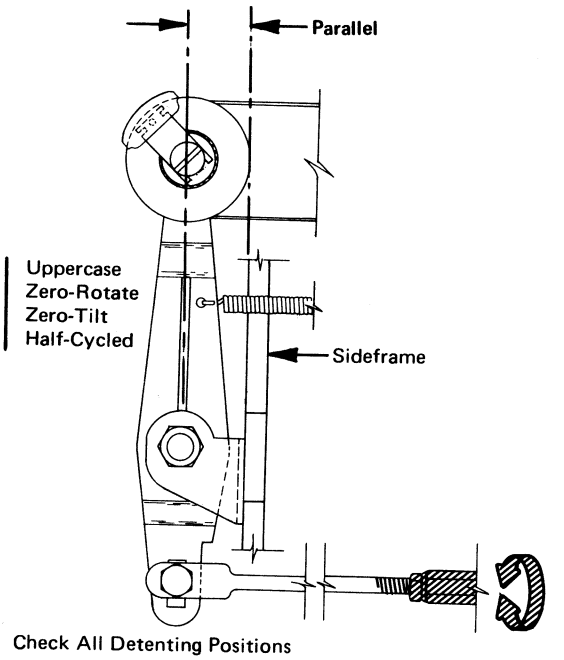


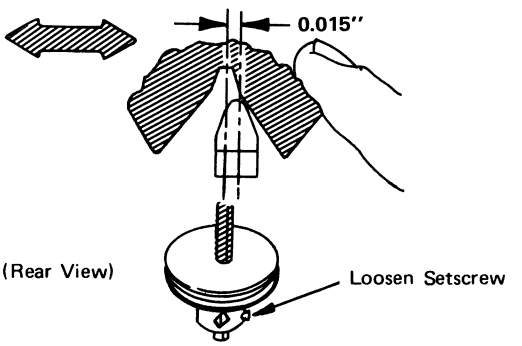
Figure 2-111. Rotate Arm Vertical (Preliminary)

Typehead Homing (Coarse)

CAUTION *DO NOT* rotate the typehead clockwise against the tension of the tape, in an effort to break the pulley loose. Tape breakage or other parts damage may result.

NOTE If the detent enters the correct notch, it will not be necessary to refine this adjustment.

With the printer under power, half-cycle an uppercase, zero-rotate character. With the head play lightly removed in the negative direction, the detent should enter 0.015" from the center of the notch.



Uppercase Zero Rotate Half-Cycled

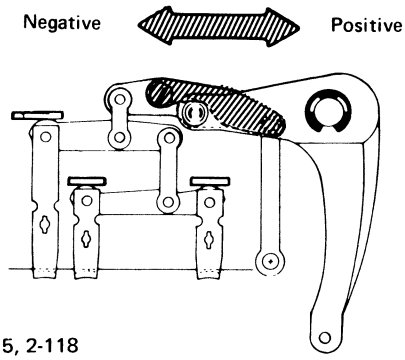
Check: 2-118

Figure 2-112. Typehead Homing (Coarse)

Balance Lever

A half-cycled, uppercase zero rotate character should detent the same as a half-cycled, -1 rotate character.

Uppercase Rotate 0 Detent = Neg. 1 Detent

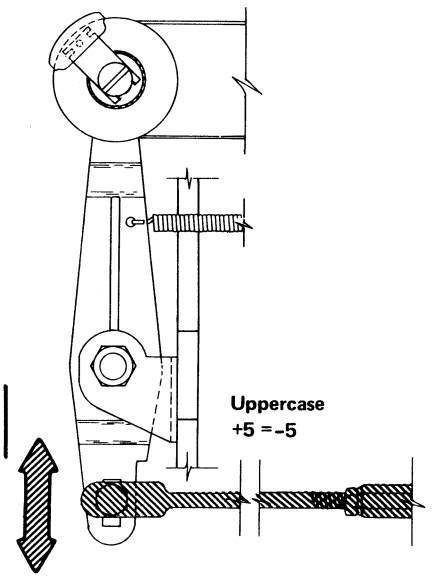


Check: 2-115, 2-118

Figure 2-113. Balance Lever

Rotate Arm Motion

A half-cycled uppercase +5 rotate character should detent the same as a half-cycled -5 rotate character. Lightly remove the head play in the negative direction when checking the detenting.



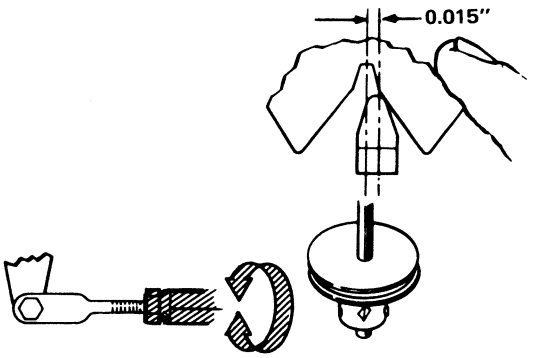
Check: 2-118

Figure 2-114. Rotate Arm Motion

Typehead Homing (Fine)

With the printer under power, half-cycle an uppercase, zero rotate character. With the head play lightly removed in the negative direction, the detent should enter 0.015" from the center of the notch. Check uppercase minus five, minus one, plus five, and zero rotate characters for a maximum band width of 0.015". If the 0.015" bandwidth is exceeded, refine the adjustments shown in Figures 2-113 and 2-114.

NOTE Refer to page 2-71 E for the definition of bandwidth.



Uppercase Zero Rotate Half-Cycled

Figure 2-115. Typehead Homing (Fine)

Rotate Pulley Guard

A Check for 0.003" – 0.005" clearance between the rotate pulley guard and the rotate tape.

B The pulley guard should be positioned as high as possible radially without interfering with the tilt pulley.

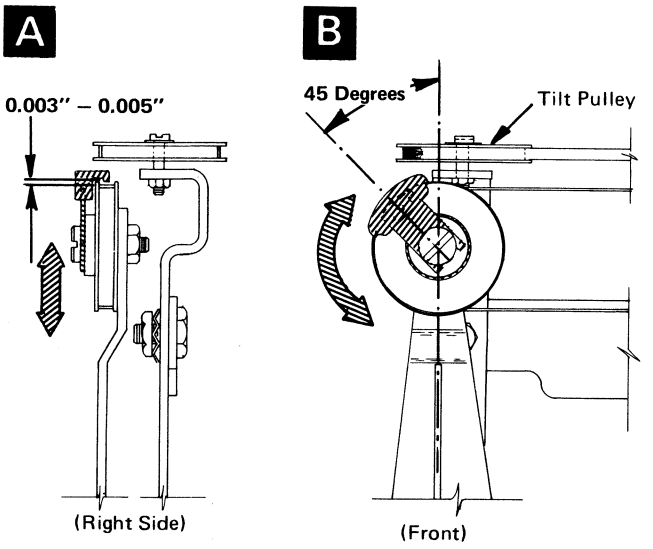
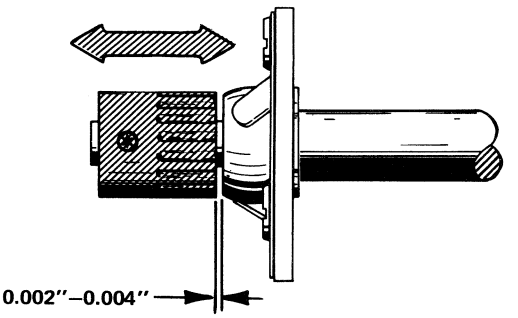


Figure 2-116. Rotate Pulley Guard

Print Shaft End Play

Check for 0.002" – 0.004" clearance between the print shaft gear and the print shaft bearing.



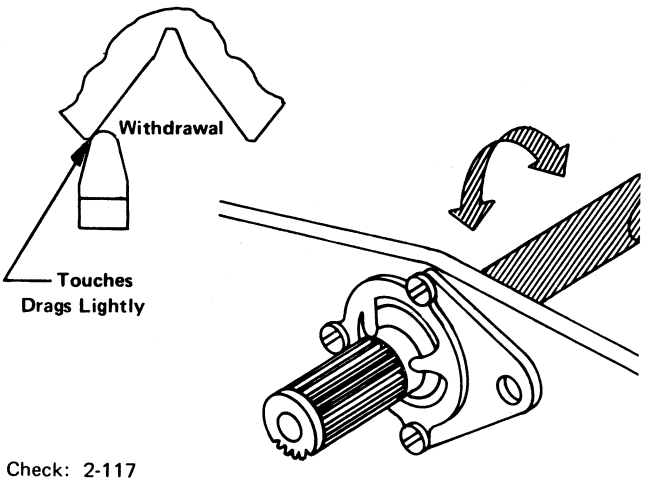
Check: 2-118

Figure 2-117. Print Shaft End Play

Print Shaft Timing (Final)

CAUTION Excessively advanced or retarded detent timing can cause parts damage as well as poor horizontal print alignment or improper selection.

When the printer is slowly hand-cycled to an uppercase, -5 rotate, tilt-2 character, the rotate detent must enter the correct tooth and withdraw without restricting typehead restoration. With typehead play removed in the clockwise direction, the detent will drag lightly on the side of the tooth during withdrawal, but the typehead must not rotate more than 0.030", just as the detent clears the tip of the tooth.



Check: 2-117

Figure 2-118. Print Shaft Timing (Final)

Shift Arm Motion

Check for 180° rotation of the typehead during a shift operation. The detent must enter the -5 lowercase notch in exactly the same way as it enters the -5 uppercase notch.

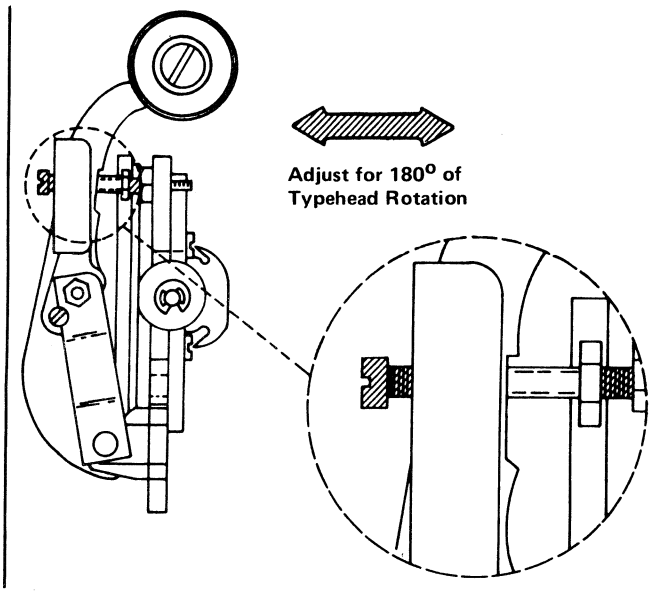
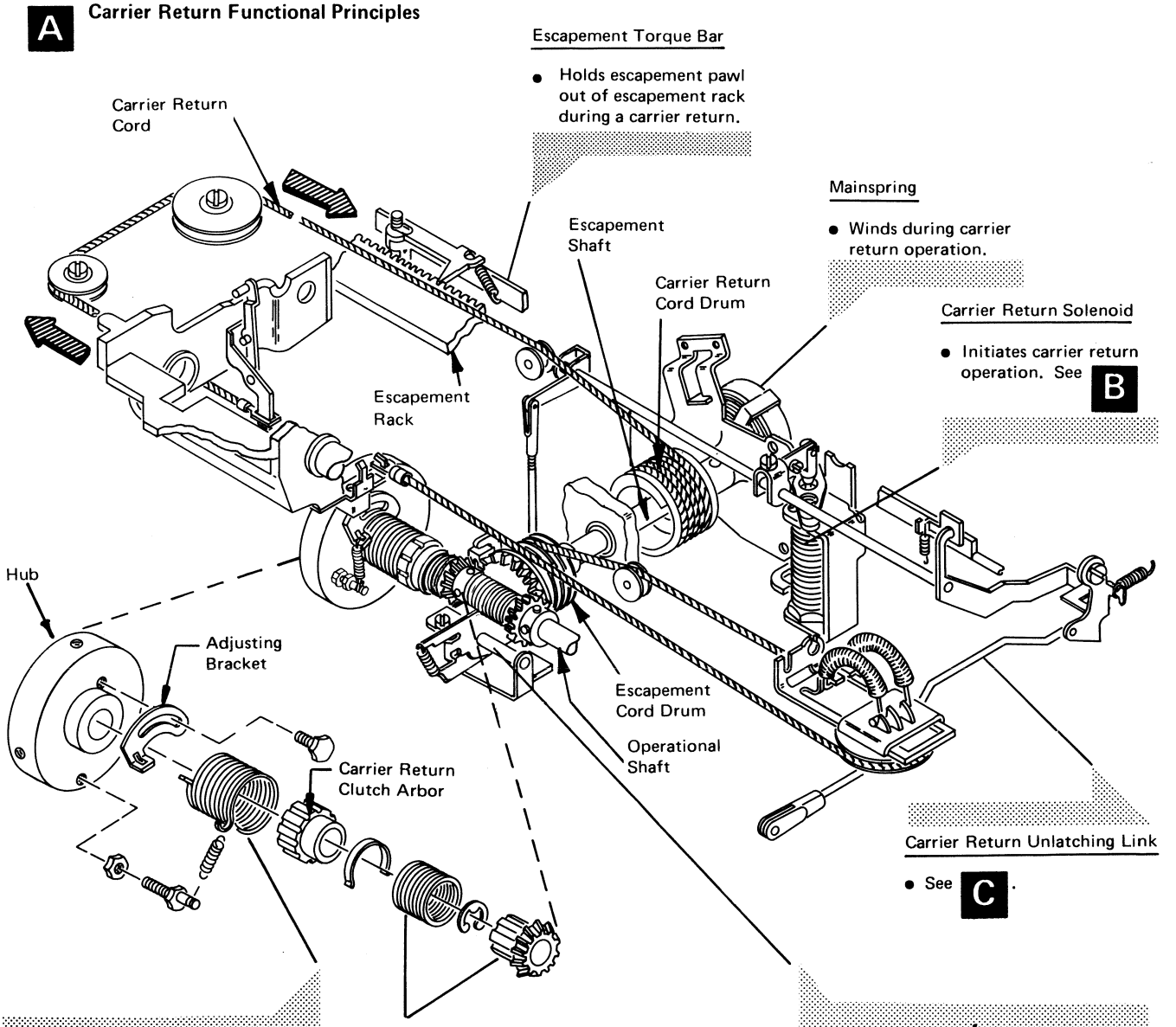


Figure 2-119. Shift Arm Motion

CARRIER RETURN MECHANISM (Part 1 of 3)

Objective: To return the carrier to the left margin.

A Carrier Return Functional Principles



Torque Limiter Spring

- Transfers torque from torque limiter hub to carrier return clutch arbor.
- Wound in opposite direction from operational shaft rotation.
- Permits slippage when carrier is binding or already at left margin, to prevent damage to carrier return mechanism.
- When abnormal amount of torque is required to drive the carrier, the spring unwinds until its inside diameter is larger than the carrier return clutch arbor and the spring stops driving the arbor.

Carrier Return Spring and Pinion

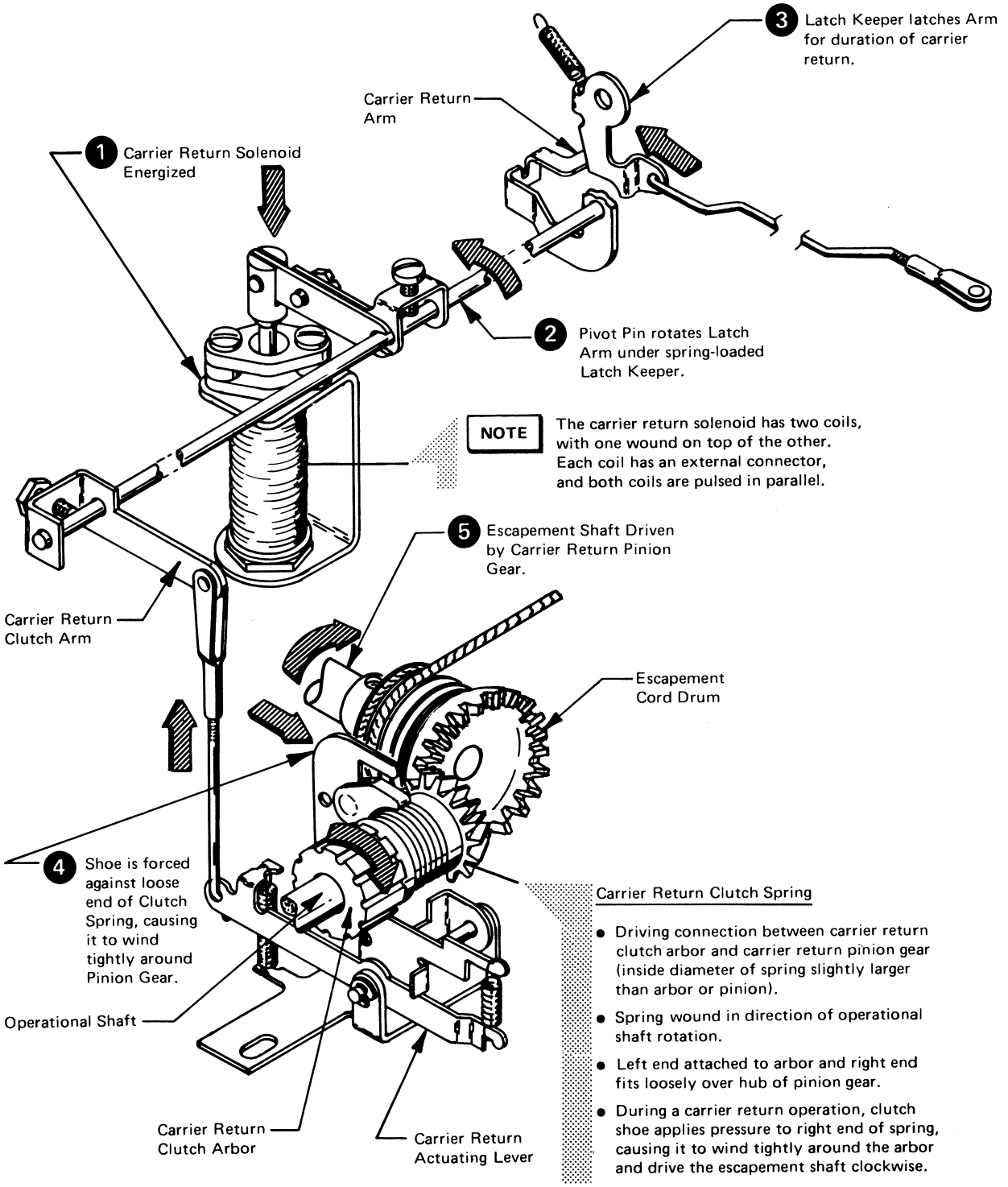
- Drives escapement shaft during carrier return operation.
- Pinion rides freely on operational shaft except during carrier return operation.

Tab Governor

- Limits speed of escapement shaft when carrier moves to the right.
- If mainspring tension attempts to drive escapement shaft faster than the speed of the operational shaft, the tab governor spring compresses and clamps the pinion to the operational shaft. This forces the escapement shaft to rotate at operational shaft speed.

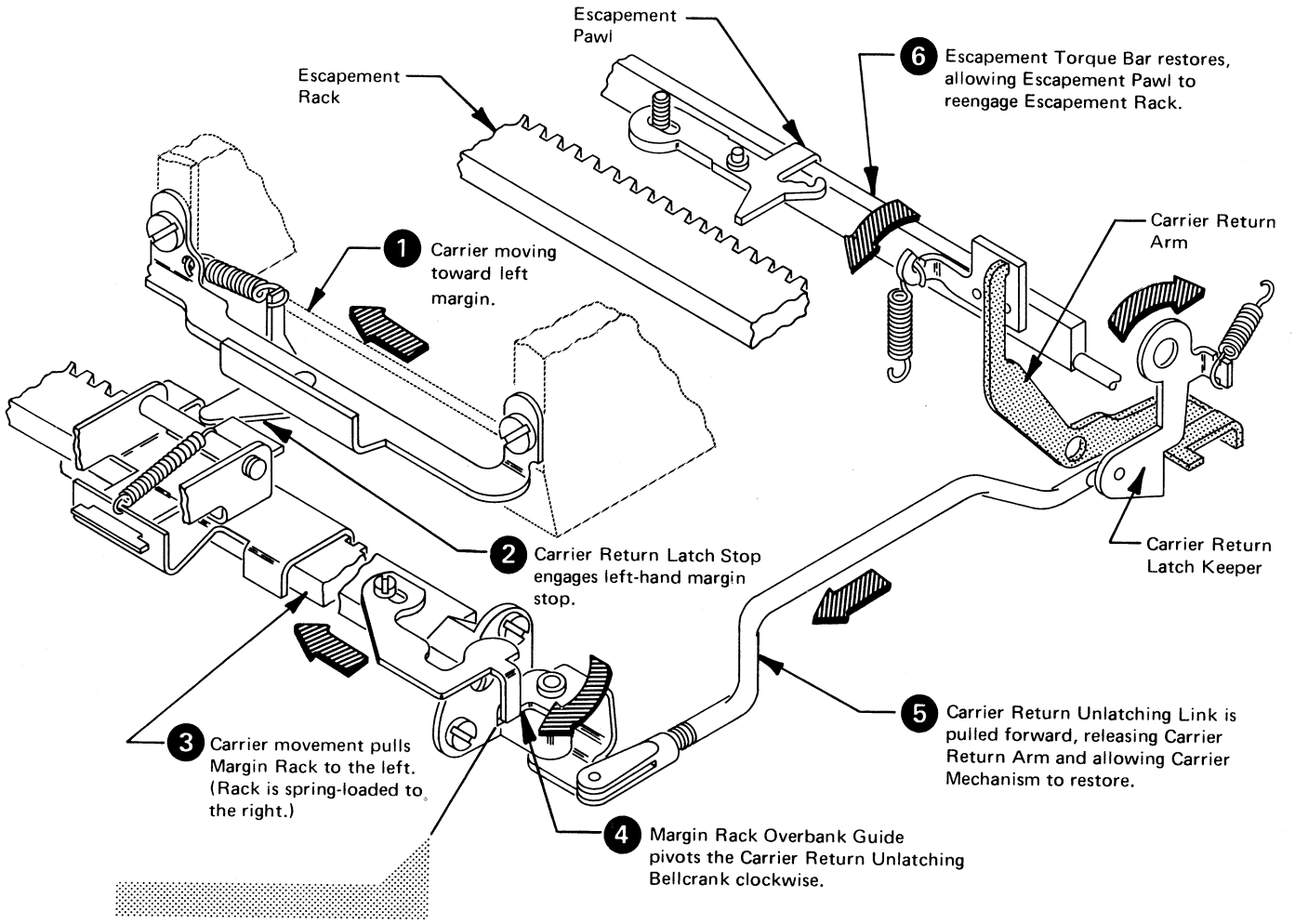
CARRIER RETURN MECHANISM (Part 2 of 3)

B Initiating a Carrier Return



CARRIER RETURN MECHANISM (Part 3 of 3)

C Ending a Carrier Return Operation



Overbank Guide

- Limits carrier travel and serves as an adjustment for escapement pawl to escapement rack tooth relatching clearance when carrier return operation ends.

CARRIER RETURN ADJUSTMENT CHECKS

NOTE Check 2-14, 2-15, 2-16, and 2-17 before proceeding with these adjustments.

Carrier Return Solenoid

The plunger should not touch the solenoid core when it is manually operated.

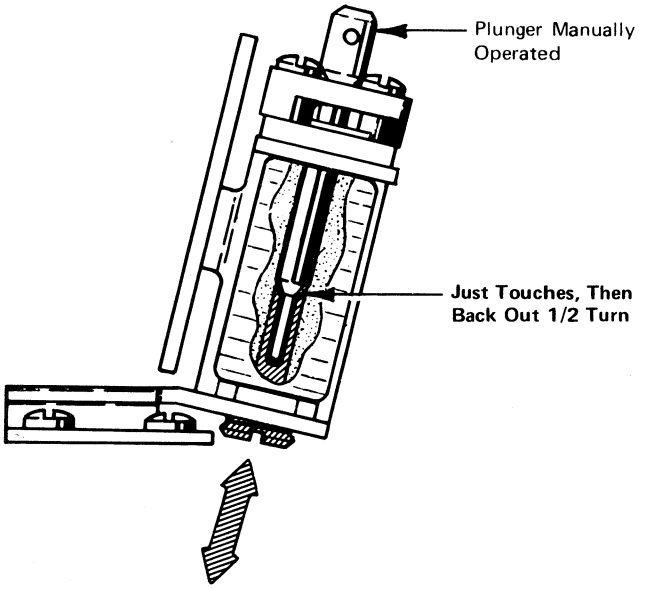


Figure 2-120. Carrier Return Solenoid

Carrier Return Solenoid Plunger

Check for free plunger operation.

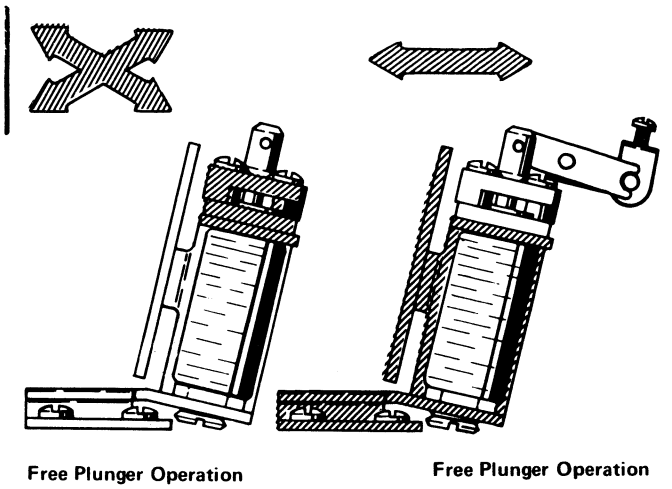
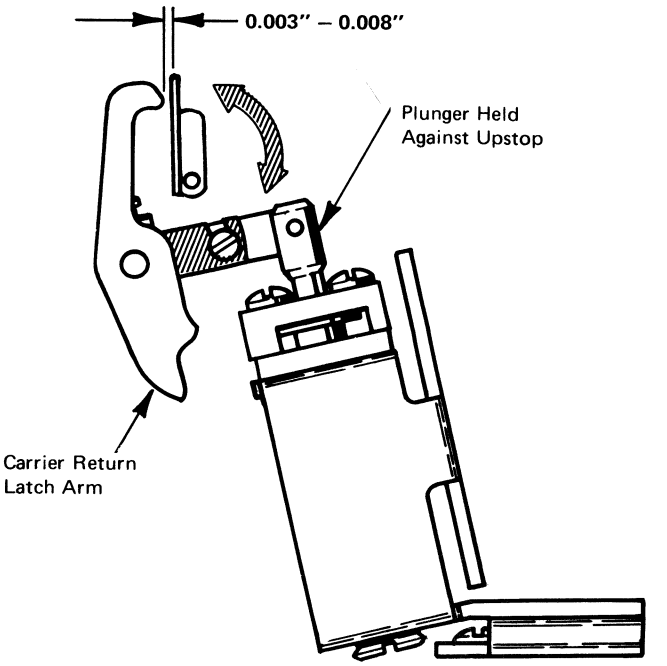


Figure 2-121. Carrier Return Solenoid Plunger

Carrier Return Solenoid Pivot Arm

With the carrier return solenoid at rest (plunger against the upstop), check for 0.003" – 0.008" clearance between the carrier return latch arm and the escapement torque bar lug.



Check: 2-44, 2-47, 2-125

Figure 2-122. Carrier Return Solenoid Pivot Arm

Escapement Pawl Clearance (During Carrier Return)

With the carrier return arm latched by the carrier return keeper, check for 0.005" – 0.010" clearance between the escapement pawl and the escapement rack.

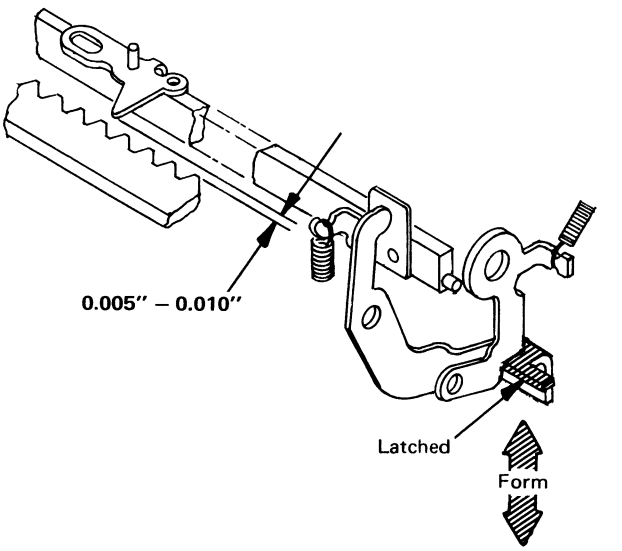
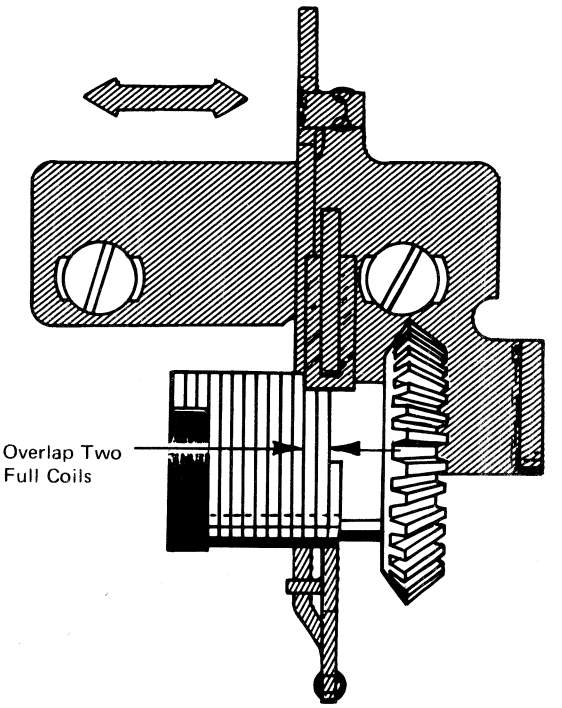


Figure 2-123. Escapement Pawl Clearance (During Carrier Return)

Carrier Return Shoe Bracket

The carrier return shoe must overlap two full coils of the carrier return clutch spring.



Check: 2-125

Figure 2-124. Carrier Return Shoe Bracket

Carrier Return Shoe Clearance

With the printer at rest, check for 0.005" – 0.015" clearance between the carrier return shoe and the clutch spring.

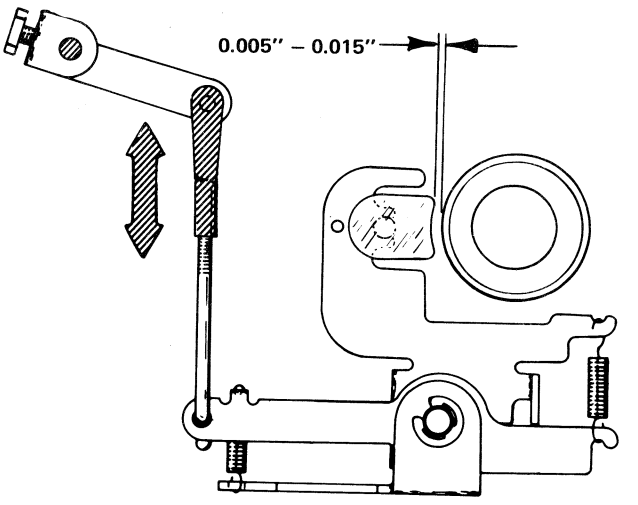


Figure 2-125. Carrier Return Shoe Clearance

Margin Rack Overbank

With the carrier at the left margin, and the stop latch on the carrier pulled to the right with a spring hook, check for 0.001" – 0.005" clearance between the stop latch and the left margin stop.

NOTE This clearance, plus the lateral motion of the margin rack permitted by the overbank guide, provides the carrier with the overbank required for proper escapement pawl reentry at the completion of a carrier return operation.

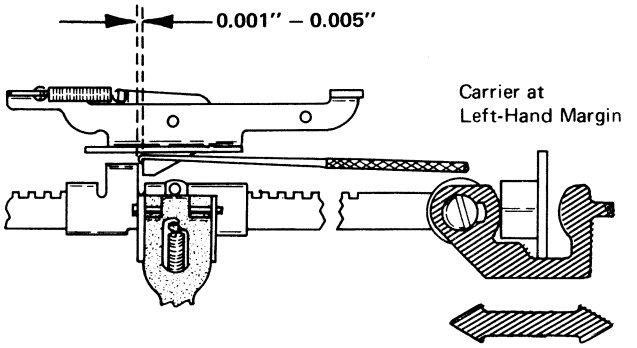


Figure 2-126. Margin Rack Overbank

Carrier Return Unlatching Link

With the margin rack held to its extreme left position, check for 0.001" – 0.015" clearance between the carrier return arm and the latch keeper.

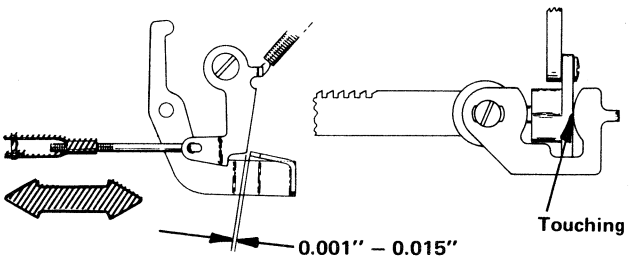
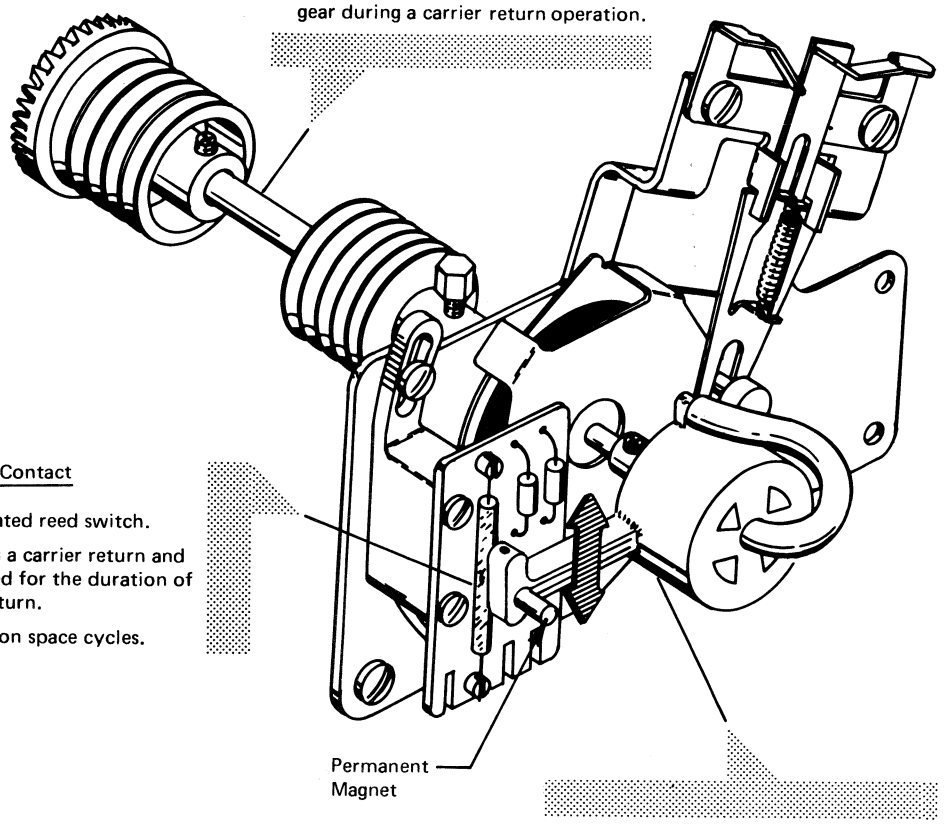


Figure 2-127. Carrier Return Unlatching Link

LONG FUNCTION CONTACT

Objective: To prevent another printer cycle while a carrier return operation is taking place.



LONG FUNCTION CONTACT ADJUSTMENT CHECKS

Fluid Clutch Position

Level 1

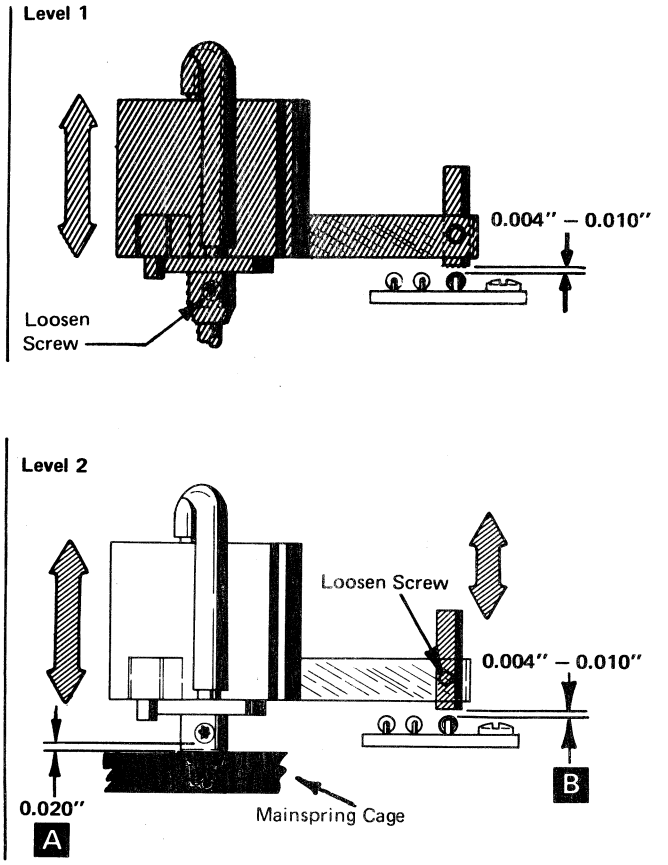
Check for 0.004" – 0.010" clearance between the reed switch and the permanent magnet. To obtain this clearance loosen screw on fluid clutch hub and position fluid clutch assembly.

Level 2

Check for 0.020" clearance between screw mounting the fluid clutch on the shaft and the mainspring cage. To obtain this clearance loosen screw on fluid clutch hub. **A**

Check for 0.004" – 0.010" clearance between the reed switch and the permanent magnet. To obtain this clearance loosen screw holding magnet in fluid clutch arm and position magnet. **B**

NOTE Level 2 has an adjustable permanent magnet.

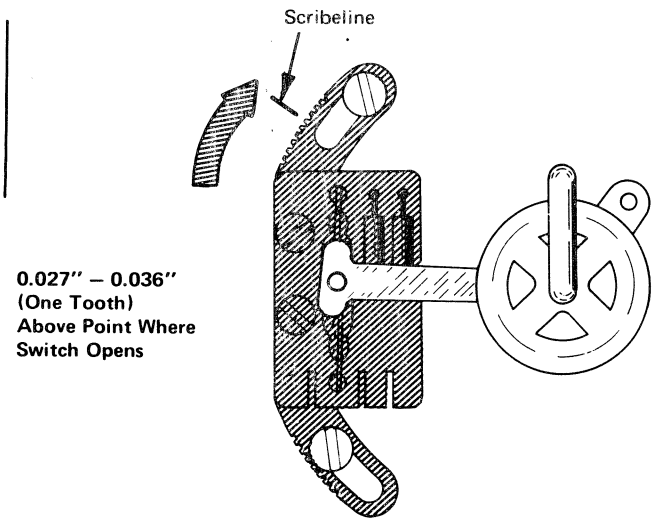


Check: 2-129, 2-130

Figure 2-128. Fluid Clutch Position

Long Function Contact

The reed switch assembly should be positioned 0.027" – 0.036" (one tooth of the adjusting block) beyond the point where the reed switch opens, when the assembly is moved upward from its extreme bottom position.



Check: 2-115

Figure 2-129. Long Function Contact

Fluid Clutch Stops

A **With the fluid clutch manually operated upward until the switch just makes, check for 0.030" – 0.040" overthrow between the clutch lever and the stop.**

B **With the fluid clutch manually operated downward until the switch just makes, check for 0.030" – 0.040" overthrow between the clutch lever and the stop.**

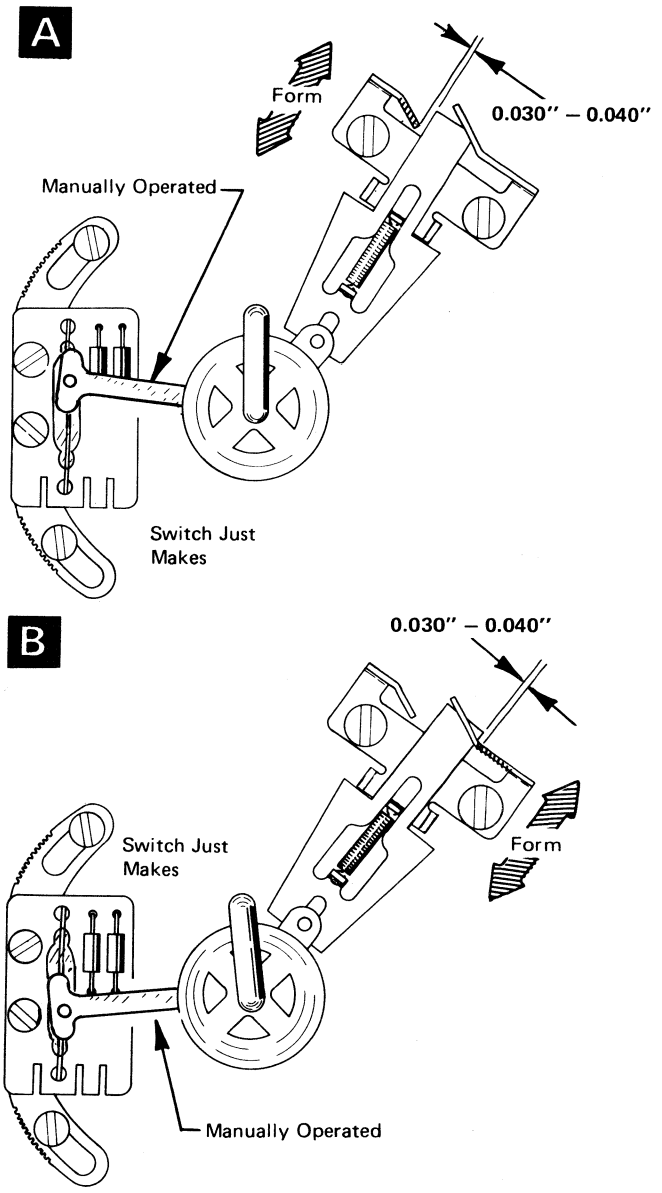


Figure 2-130. Fluid Clutch Stops

Figure numbers 2-131 through 2-133 have been purposely omitted, to allow for possible future additional adjustments.

INDEX MECHANISM (Part 1 of 2)

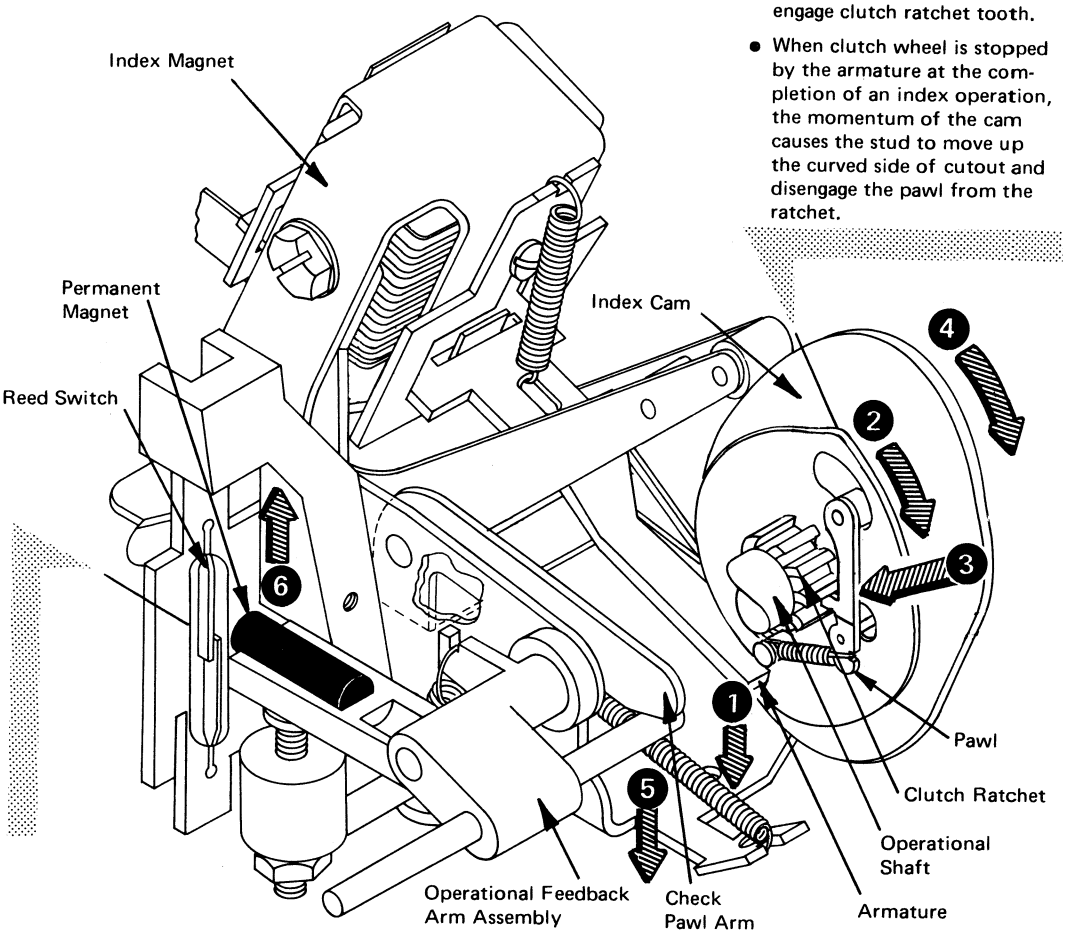
Objective: To advance the platen one line space, vertically, with each carrier return operation.

A Index Mechanism Functional Principles

- Normal operation is to impulse the index magnet and the carrier return magnet simultaneously for a carrier return/index operation.
- Energizing the index magnet allows the index clutch mechanism to drive the index cam through 360° rotation and advance the platen one line space, vertically.

Index Cam Clutch Wheel

- Held in rest position by the index magnet armature.
- Cutout in clutch wheel holds pawl out of engagement with ratchet teeth when clutch wheel is at rest.
- When armature releases clutch wheel, spring-loaded pawl is allowed to drop to bottom of cutout and engage clutch ratchet tooth.
- When clutch wheel is stopped by the armature at the completion of an index operation, the momentum of the cam causes the stud to move up the curved side of cutout and disengage the pawl from the ratchet.



Operational Feedback Switch

- Normally open, magnet-operated reed switch.
- Closes during an index operation to prevent another printer function. Also drops the index and carrier return magnet pulses.
- Permanent magnet receives its motion from an arm of the index cam check pawl.

B Initiating an Index Operation

● Index magnet is energized.

1. Armature releases clutch wheel.
2. Spring-loaded clutch pawl forces clutch wheel to rotate slightly and release the clutch pawl.
3. Clutch pawl drops into tooth on clutch ratchet.
4. Index cam begins rotation.
5. Operational feedback arm is pivoted by arm of index cam check pawl.
6. Permanent magnet is pivoted upward, allowing the operational feedback switch to close.

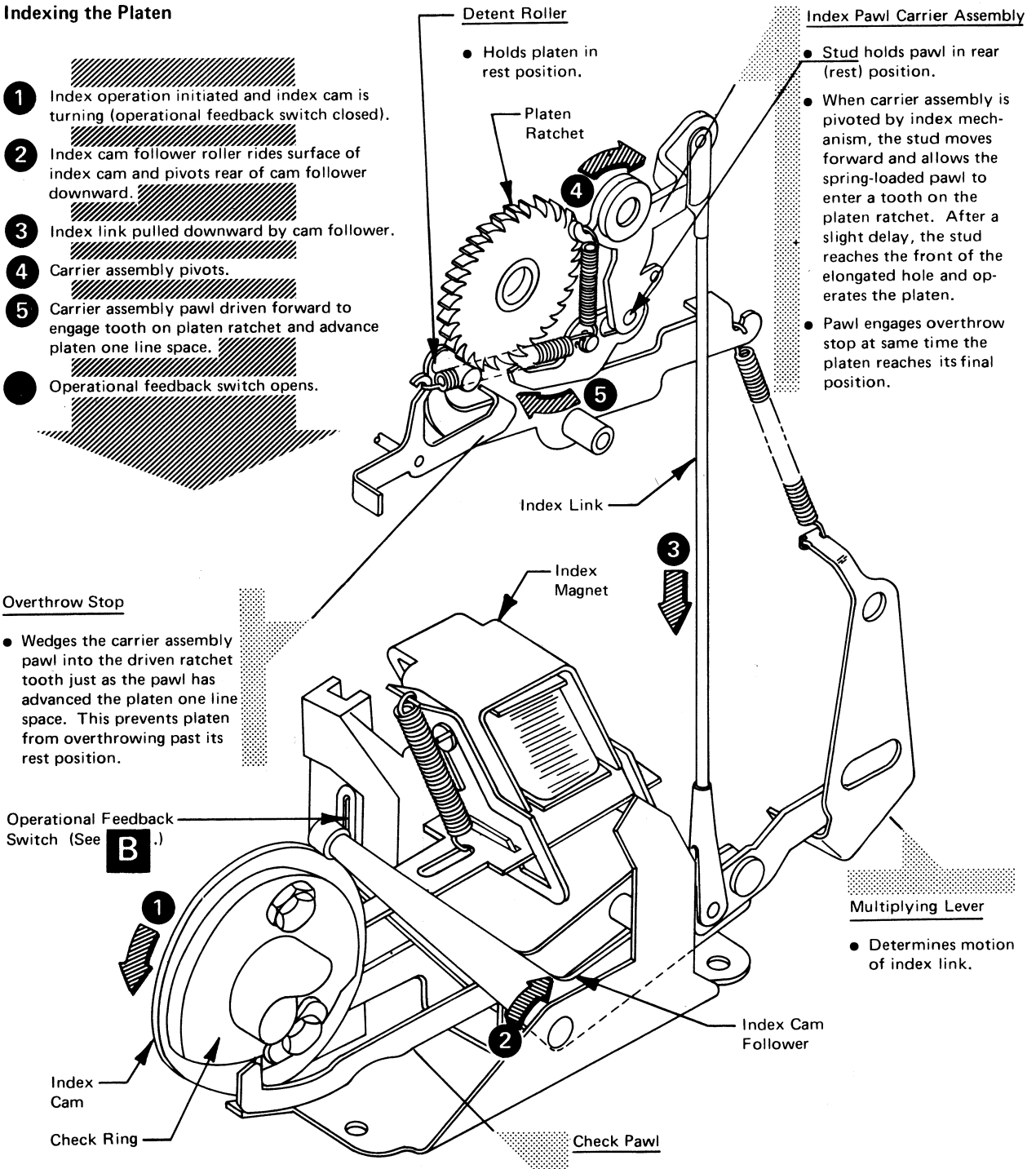
● Index magnet and carrier return magnet pulses drop. (Long function feedback switch prevents another printer function until carrier stops moving.)

INDEX MECHANISM (Part 2 of 2)

C Indexing the Platen

1. Index operation initiated and index cam is turning (operational feedback switch closed).
2. Index cam follower roller rides surface of index cam and pivots rear of cam follower downward.
3. Index link pulled downward by cam follower.
4. Carrier assembly pivots.
5. Carrier assembly pawl driven forward to engage tooth on platen ratchet and advance platen one line space.

● Operational feedback switch opens.



(right, front view)

INDEX MECHANISM ADJUSTMENT CHECKS

NOTE Check 2-18 before proceeding with these adjustment checks.

Index Magnet Pivot Plate

With the armature manually attracted, check for 0.001" – 0.009" clearance between the armature and the pivot plate.

(Magnet Assembly Removed From Printer)

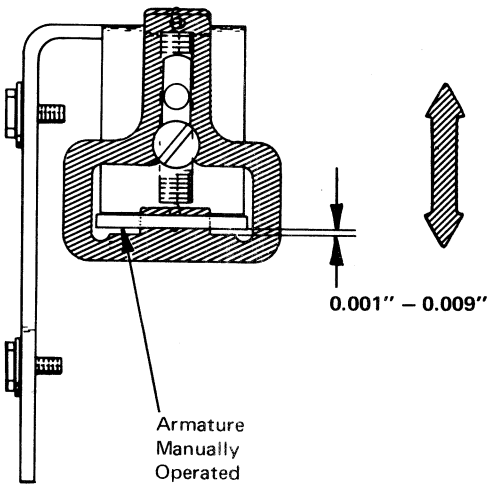
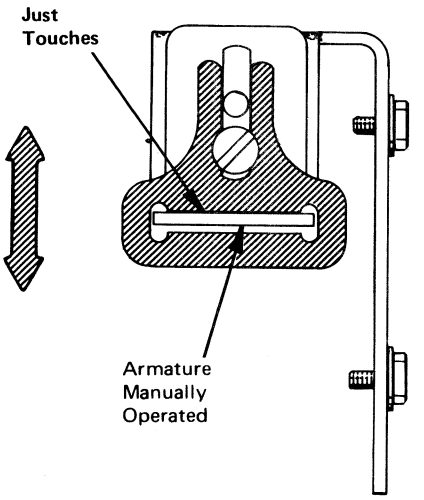


Figure 2-134. Index Magnet Pivot Plate

Index Magnet Armature Upstop

The armature should just touch the armature upstop when the magnet is manually attracted.

(Magnet Assembly Removed From Printer)



Check: 2-136

Figure 2-135. Index Magnet Armature Upstop

Index Cam Release Clearance

With the armature manually attracted, check for 0.005" – 0.015" clearance between the armature and the high lobe of the clutch wheel.

(Magnet Assembly Reinstalled)

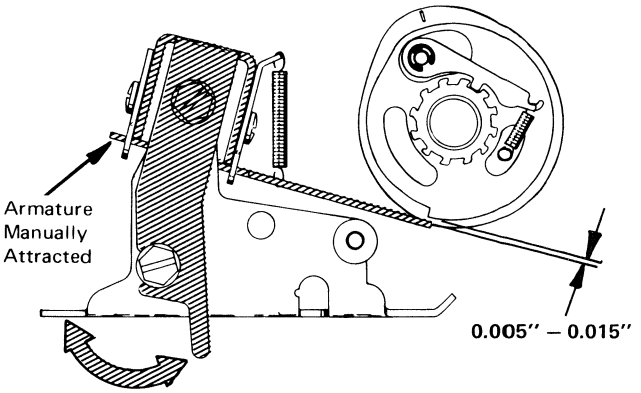
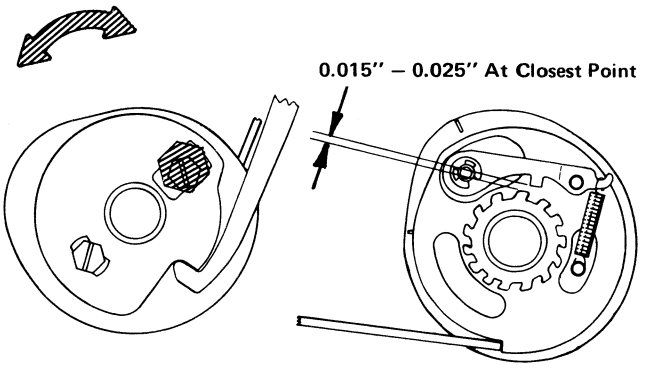


Figure 2-136. Index Cam Release Clearance

Index Clutch Pawl Clearance

With the clutch latched in the rest position, check for 0.015" – 0.025" clearance between the clutch pawl and ratcher teeth.

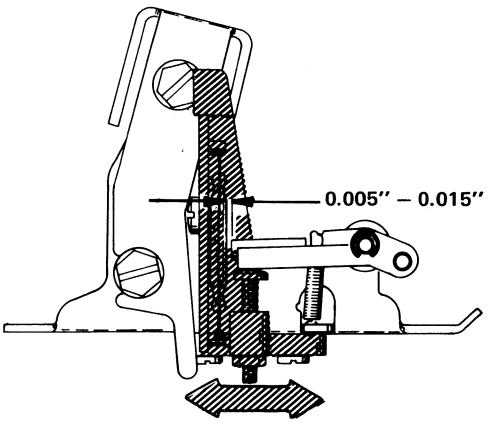


Cam Latched At Rest

Figure 2-137. Index Cam Pawl Clearance

Operational Feedback Magnet Clearance

Check for 0.005" – 0.015" clearance between the permanent magnet and the reed switch.

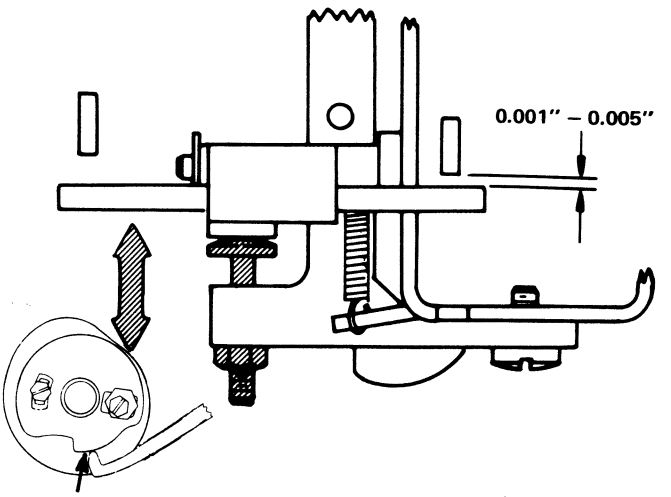


Check: 2-139

Figure 2-138. Operational Feedback Magnet Clearance

Operational Feedback Stop Screw

With the index check pawl resting on the intermediate dwell of the index check ring, check for 0.001" – 0.005" clearance between the magnet arm and the index check pawl.



Check: 2-140

Figure 2-139. Operational Feedback Stop Screw

Operational Feedback Circuit Board

With the index cam latched at rest, insert a 0.045" gage between the adjusting screw and the magnet arm and adjust the circuit board until the switch just closes.

NOTE An alternate method of adjusting the circuit board is to turn the adjusting screw up 1-1/2 turns; position the circuit board until the switch makes, and return the screw to its original position.

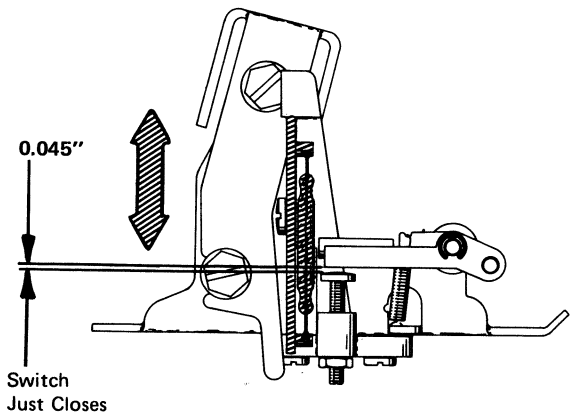


Figure 2-140. Operational Feedback Circuit Board

Index Cam Lever (Front to Rear)

With the index pawl carrier assembly manually operated until the index pawl initially contacts the platen ratchet, check for 0.020" – 0.030" travel before the pawl is fully seated.

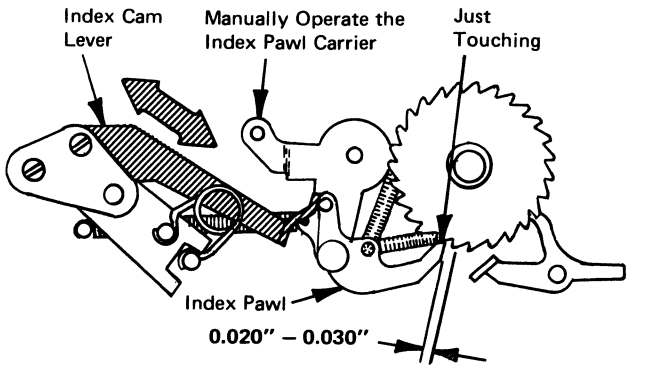
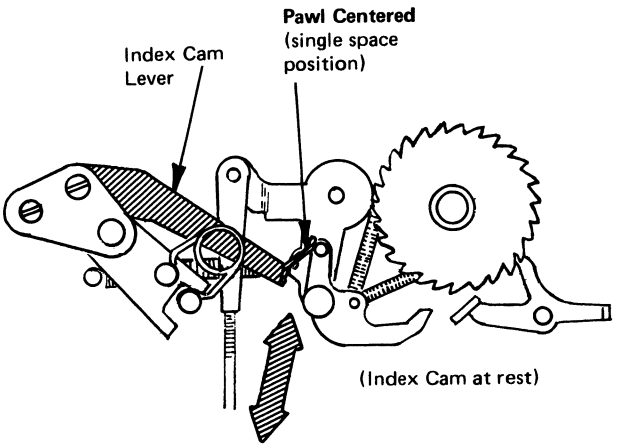


Figure 2-141. Index Selection Pawl (Front to Rear)

Index Cam Lever (Vertical)

With the index cam at rest, the index pawl should be centered on the camming surface of the index cam lever. Note the position of the index selection cam.



Check: 2-141

Figure 2-142. Index Cam Lever (Vertical)

Index Motion

With the index cam lever in the single-space position, the platen ratchet should be driven one full tooth when the printer is hand-cycled through an index operation.

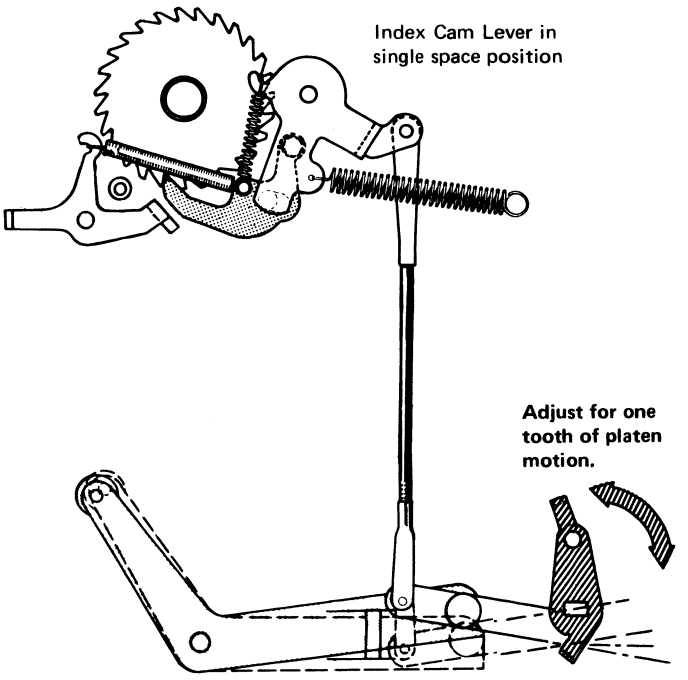


Figure 2-143. Index Motion

Platen Overthrow Stop

With the index cam on high dwell, check for 0.001" – 0.003" clearance between the overthrow stop and the index pawl.

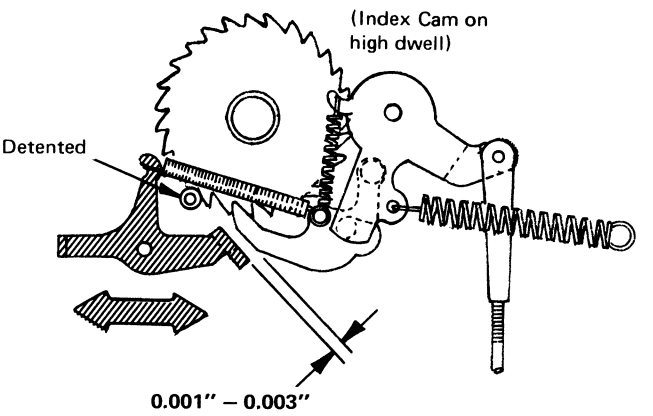


Figure 2-144. Platen Overthrow Stop

Figure number 2-145 has been purposely omitted, to allow for possible future additional adjustments.

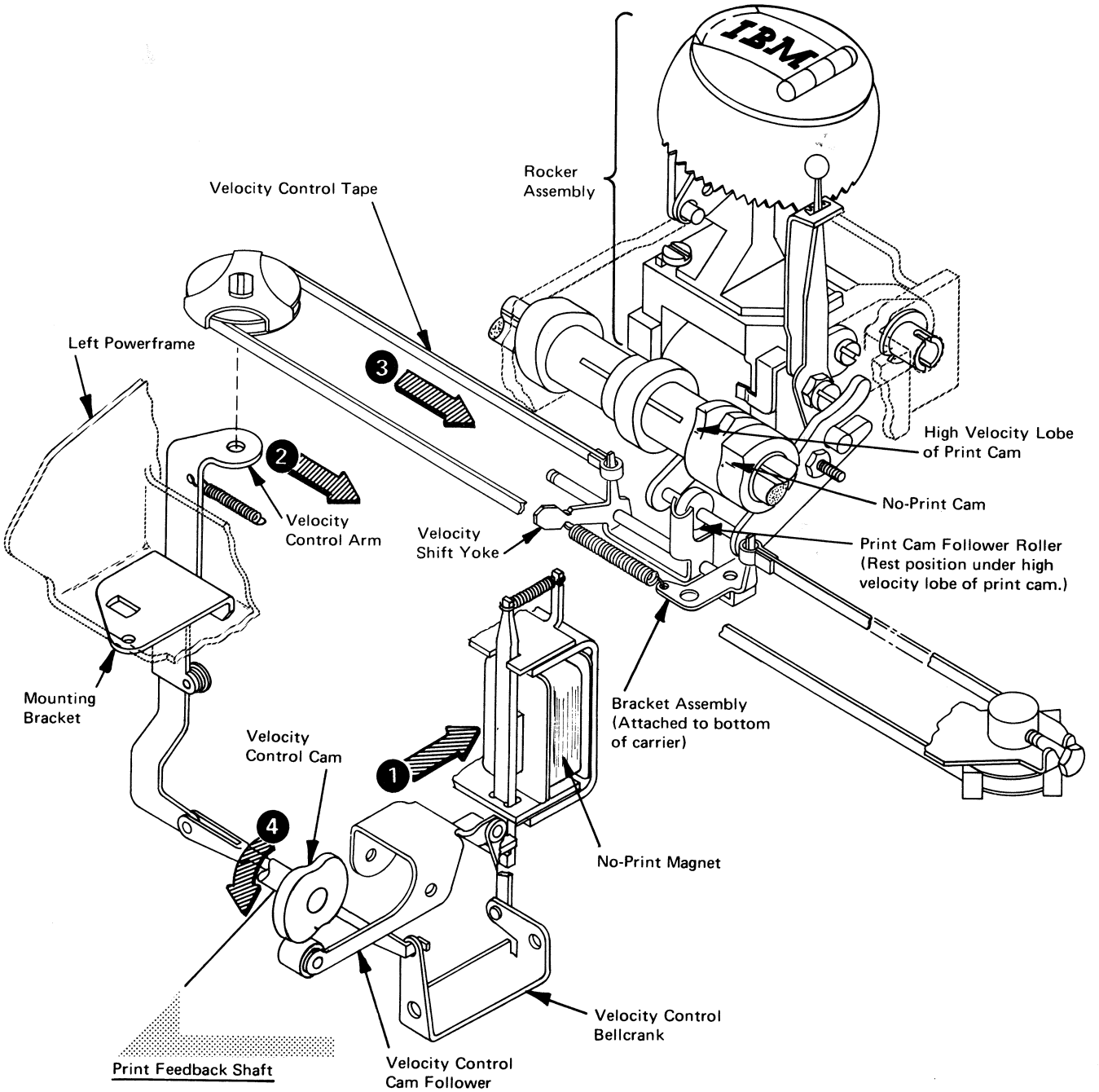
(This page has been left blank intentionally, so that the text and illustrations on the following two pages will be opposite each other.)

SPACE OPERATION ("NO-PRINT") – (Part 1 of 2)

Objective: To allow the typehead to move one space to the right without printing.

A Space ("No-Print") Functional Principles

- Velocity control mechanism positions the print cam follower under the no-print cam for a space function. A space operation is actually a dummy ("no-print") print cycle followed by a normal print escapement (see "Print Escapement Mechanism").



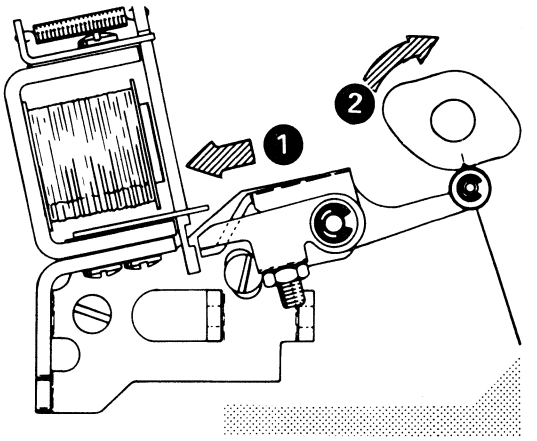
- Gear-driven by cycle shaft.

SPACE OPERATION ("NO-PRINT") – (Part 2 of 2)

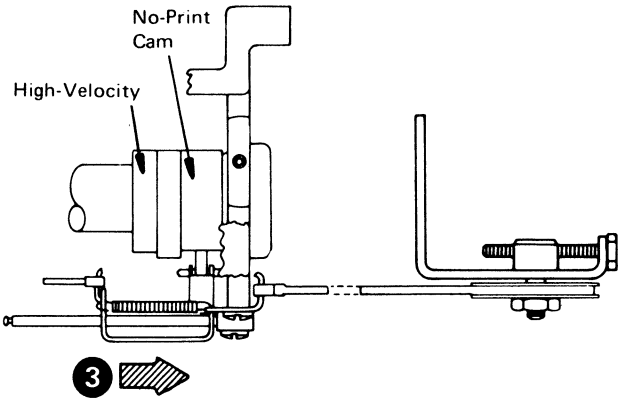
B Space ("No-Print") Operational Sequence

- Character selection magnets (T1, T2, R1, R2, and R2A) energized.
- Cycle clutch magnet energized.
- 1 No-print magnet energized. Armature releases velocity cam follower.
- Cycle shaft begins rotation.
- 2 Velocity control cam rotates and allows velocity control arm to move to the right, under spring tension.
- 3 Velocity tape pays out and allows the spring-loaded velocity shift yoke to position the print cam follower roller under the no-print cam.
- Print Cam follower pivots and lifts the front of the typehead rocker upward.
- Rocker pivots toward the rear, moving the typehead toward the platen, but with insufficient (no-print) velocity to strike the paper.
- Print feedback switch closes and drops the cycle clutch, character selection, and no-print magnets. (See "Print Feedback Switch".)
- 4 Velocity control cam restores the velocity control mechanism to its rest position (print cam follower under high velocity lobe of print cam).
- Print feedback switch opens.
- Rocker assembly returns to its rest position.

Energized Simultaneously



During a space operation, the cam follower rides on the velocity cam for complete space operation (180° rotation).



(Front of Carrier)

SPACE ("NO-PRINT") ADJUSTMENT CHECKS

No-Print Magnet Pivot Plate

With the armature manually attracted, the pivot plate should just touch the slot in the armature.

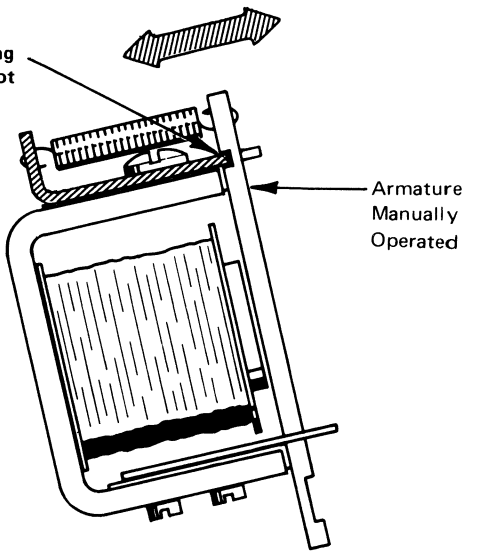
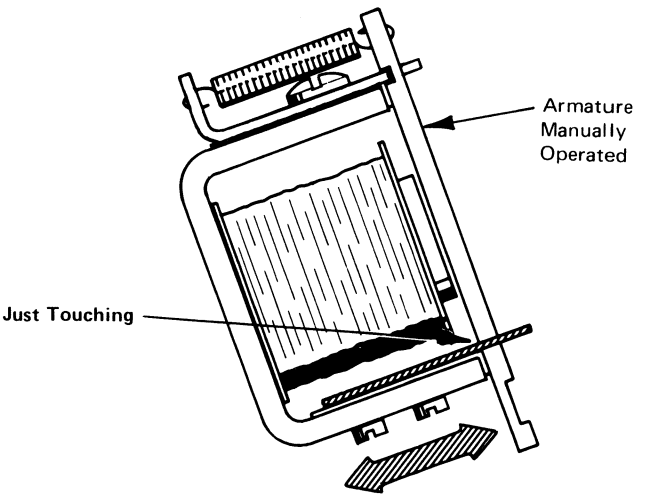


Figure 2-146. No-Print Magnet Pivot Plate

No-Print Magnet Upstop

With the armature manually attracted, the magnet upstop should just touch the armature.



Check: 2-148

Figure 2-147. No-Print Magnet Upstop

No-Print Magnet Assembly

With the magnet armature manually attracted, check for 0.005" – 0.010" clearance between the armature latch arm and the armature.

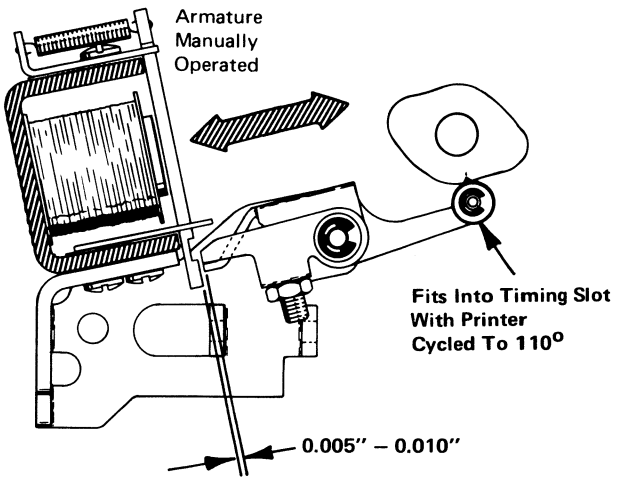
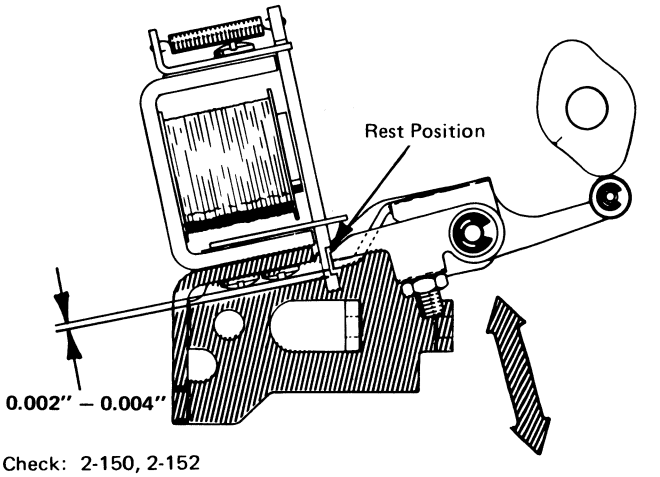


Figure 2-148. No-Print Magnet Assembly

Velocity Bracket (Preliminary)

With the no-print magnet armature latched (at rest) and pulled forward until it is stopped by its pivot slot, check for 0.002" – 0.004" clearance between the armature latching surface and the velocity bail.



Check: 2-150, 2-152

Figure 2-149. Velocity Bracket (Preliminary)

Velocity Control Cam

With the no-print magnet armature manually attracted, the velocity control cam follower roller should fit into the timing slot on the velocity control cam when the printer is hand-cycled to 110°. The timing slot appears on alternate cycles.

NOTE Zero degrees is the point where the print feedback shaft just begins to rotate.

How to check this adjustment: Refer to procedure accompanying Figure 2-37.

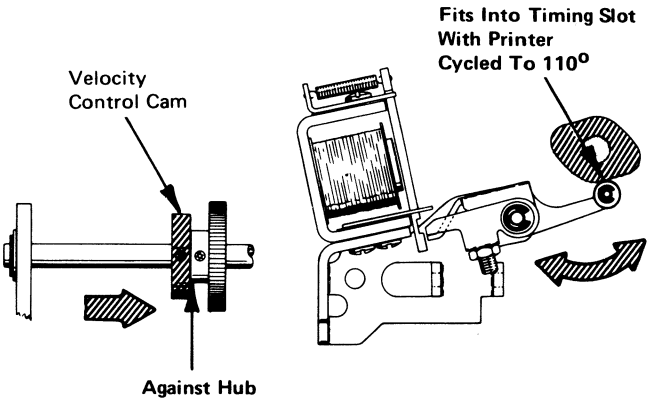
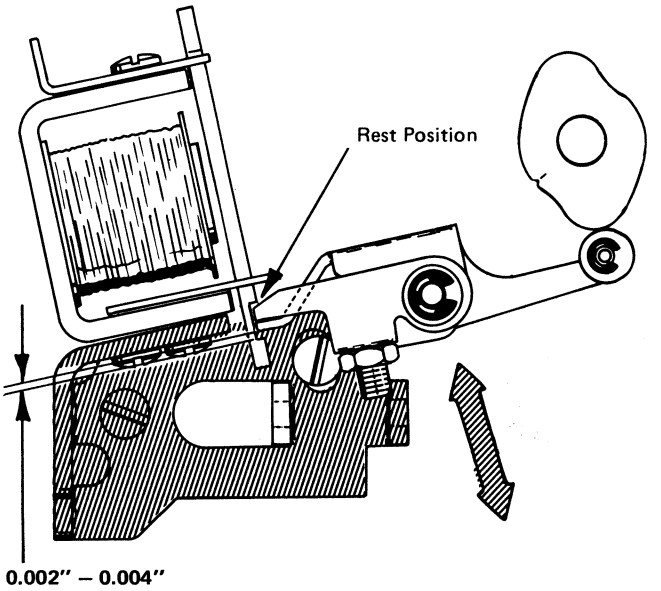


Figure 2-150. Velocity Control Cam

Velocity Bracket (Final)

With the no-print magnet armature latched (at rest) and pulled forward until it is stopped by its pivot slot, check for 0.002" – 0.004" clearance between the armature latching surface and the velocity control cam follower.

NOTE Check pawl must be latched.

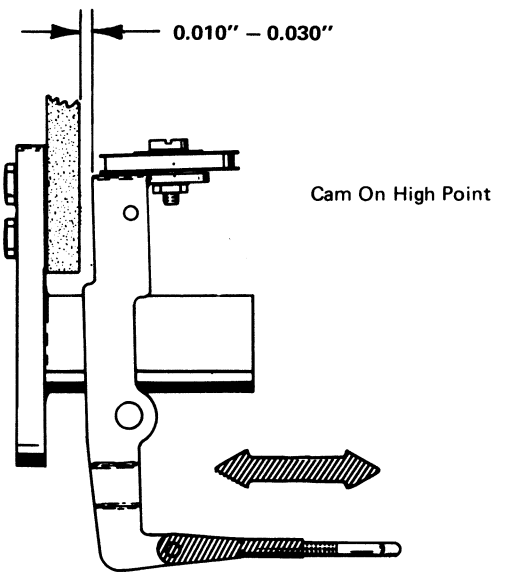


Check: 2-98, 2-152

Figure 2-151. Velocity Bracket (Final)

Velocity Control Arm

With the velocity control cam on high dwell, check for 0.010" – 0.030" clearance between the inside surface of the left powerframe velocity control arm.

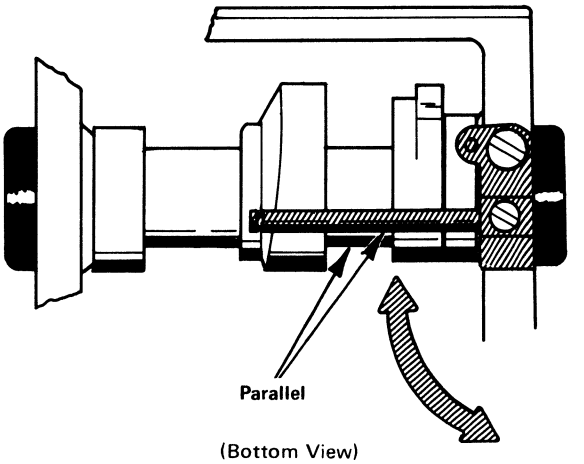


Check: 2-98

Figure 2-152. Velocity Control Arm

Tab Cord Anchor Bracket

The tab cord anchor bracket guide pin should be parallel to the print sleeve.



(Bottom View)

Figure 2-153. Tab Cord Anchor Bracket

Figure numbers 2-154 through 2-155 have been purposely omitted, to allow for possible future additional adjustments.

PAPER HANDLING MECHANISM (Part 1 of 2)

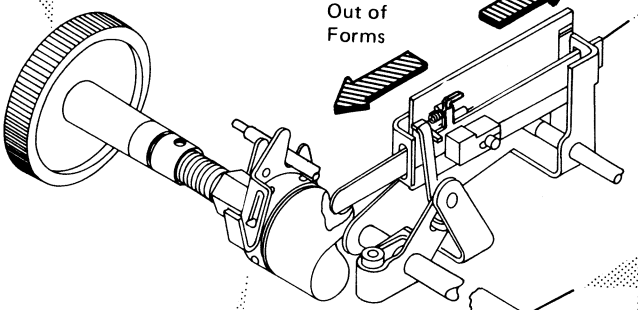
Objective: To feed continuous paper forms vertically and to provide a solid backing for the forms during a print operation.

A Pin Feed Platen

- Allows the use of continuous forms.
- Accommodates a maximum of an original and five carbon copies, of no more than 12 pound paper.
- Held in position by platen latches at each side of the printer powerframe.

Platen Knob

- DO NOT lift printer by platen knobs.



B End-of-Forms Switch

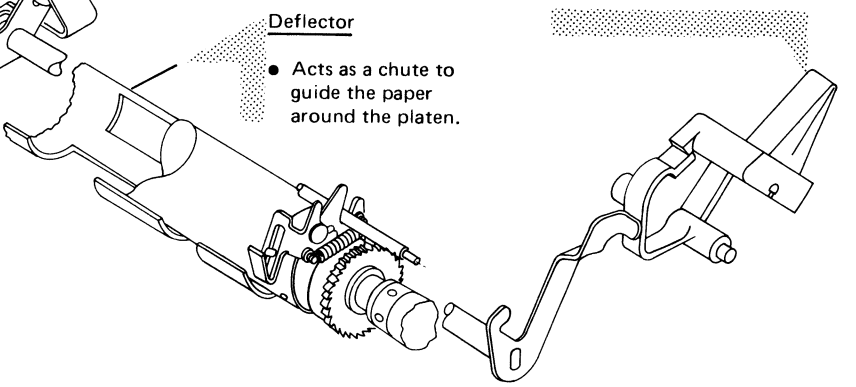
- Magnet actuated reed switch.
- Open for printer operation.
- Closes when the last form passes the platen.
- Also closes when the forms load lever is in the forward position.

C Forms Load Release Lever

- Pull forward to load forms (closes the End-of-Forms switch).
- Should be in rear position for printer operation.

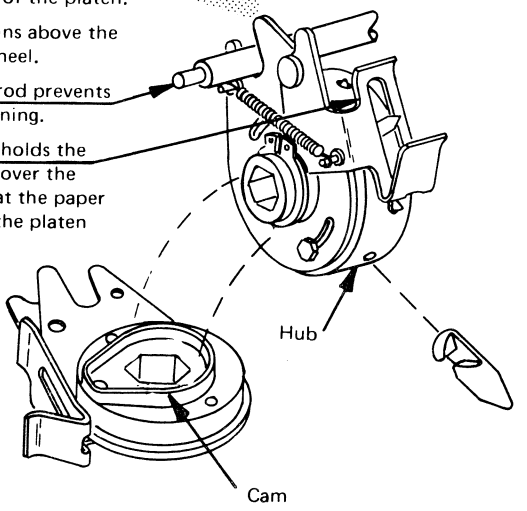
Deflector

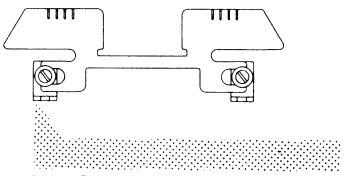
- Acts as a chute to guide the paper around the platen.



Pin Wheel Assembly

- One on each end of the platen.
- A cam lifts the pins above the hub of the pin wheel.
- The cam anchor rod prevents the cam from turning.
- The paper clamp holds the perforated paper over the pins to ensure that the paper will be pulled as the platen turns.





Line Gage Card Holder

- Attached to rear of carrier.
- Assists in holding paper against the platen in the printing area.

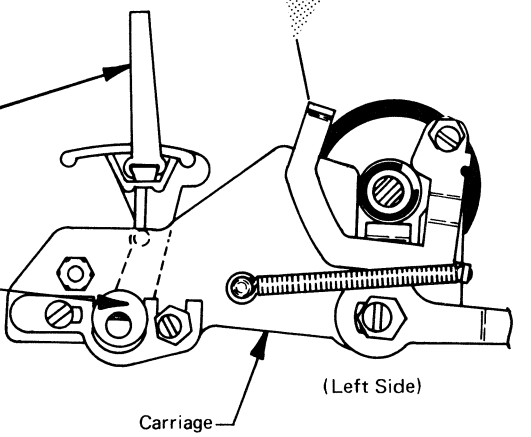
PAPER HANDLING MECHANISM (Part 2 of 2)

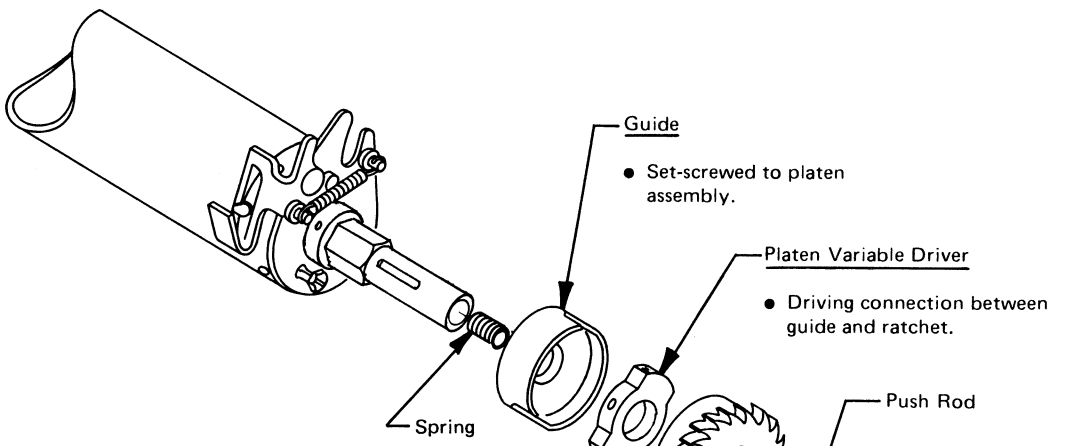
Platen Latches

- Hold platen in position.
- Press latches down to remove platen.
- Platen can be installed by snapping it in place without pressing the latches down.

D Copy Control Mechanism

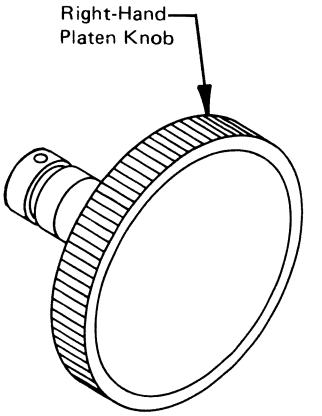
- Positions the platen forward or back for different thicknesses of typing material.
- Five-position copy control lever operates a shaft with an eccentric collar on each end.
- Movement of eccentric collar forces the platen and the entire paper mechanism to move with the carriage.





E Platen Variable

- Allows paper forms to be positioned to an exact point on the writing line.
- Pushing the right-hand platen knob to the left, against its spring, disengages the driver from the ratchet. Platen can now be rotated freely as long as knob is held to the left.
- Releasing the spring-loaded knob allows it to return to the right and reengage the driver and ratchet.



PAPER-HANDLING ADJUSTMENT CHECKS

Platen Latches

The platen latches must hold the platen firmly against the carriage guide plate and carriage bracket.

NOTE The platen must rotate freely without play or binds.

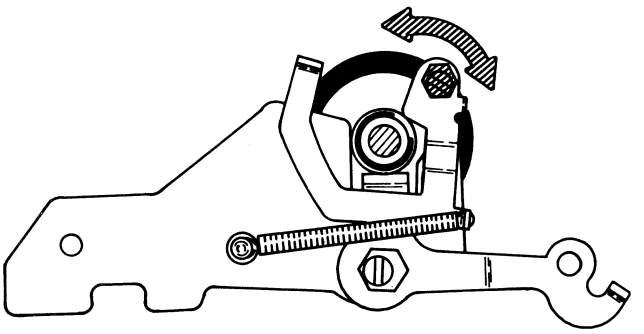


Figure 2-156. Platen Latches

Left-Hand Platen Knob

Check for 0.001" – 0.003" clearance between the left platen knob and bushing.

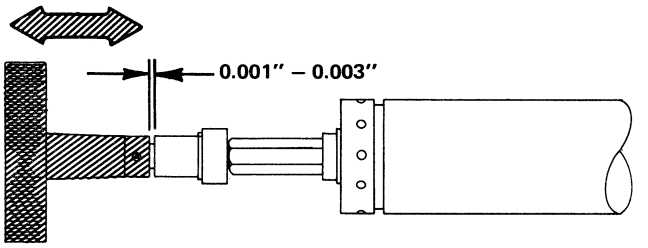


Figure 2-157. Left-Hand Platen Knob

Right-Hand Platen Knob

Check for 0.470" – 0.530" clearance between the right platen knob and the platen bearing.

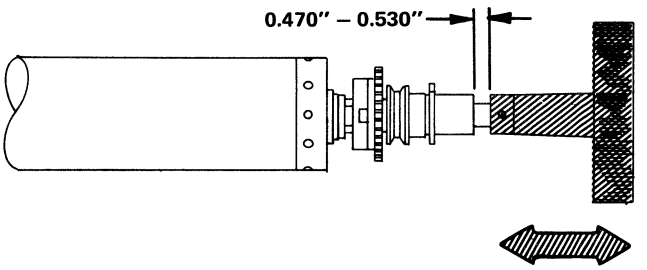


Figure 2-158. Right-Hand Platen Knob

First Character Position

With the carrier against the left margin, adjust the platen until the left edge of an "M" is 0.050" ± 0.030" to the right of the platen groove.

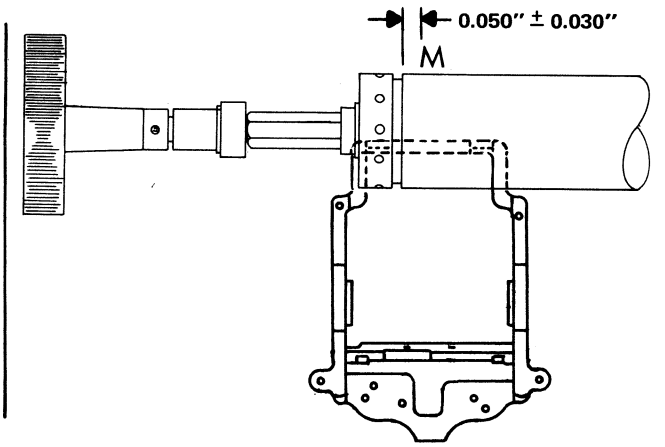


Figure 2-159. First Character Position

Pin Feed Platen

The writing line should be parallel with two corresponding pins, within 0.005".

NOTE One pinwheel adjusting screw should be in the maximum forward position.

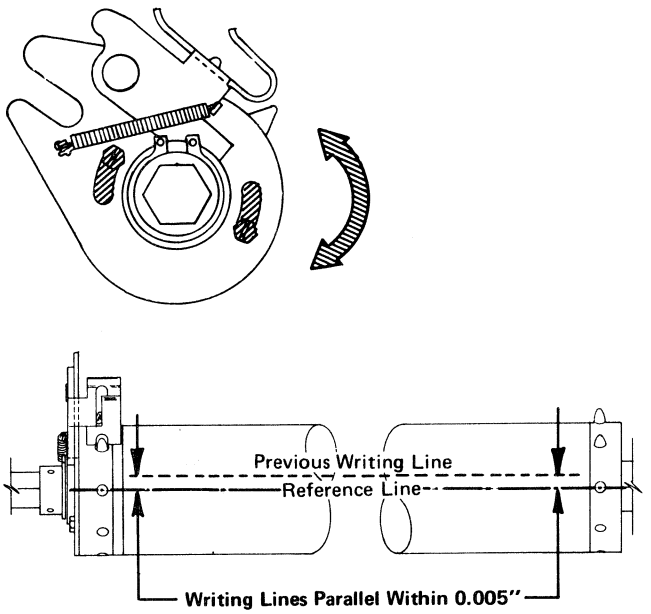


Figure 2-160. Pin Feed Platen

Line Gauge Card-Holder Bracket

Check for 0.035" clearance between the line gauge card-holder and the platen at the closest point. The bracket must not interfere with ribbon lift mechanism.

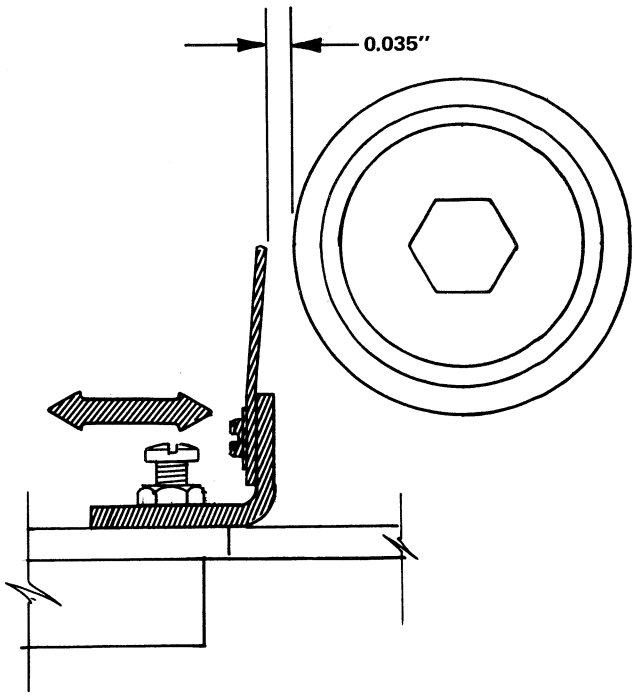


Figure 2-161. Line Gauge Card-Holder Bracket

Line Gauge Card Holder

The graduations on the left side of the card holder should be aligned with the bottoms of a series of printed v's.

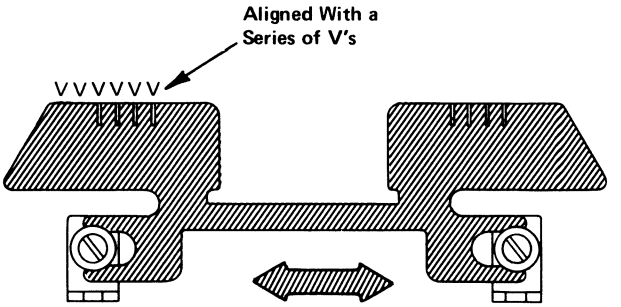
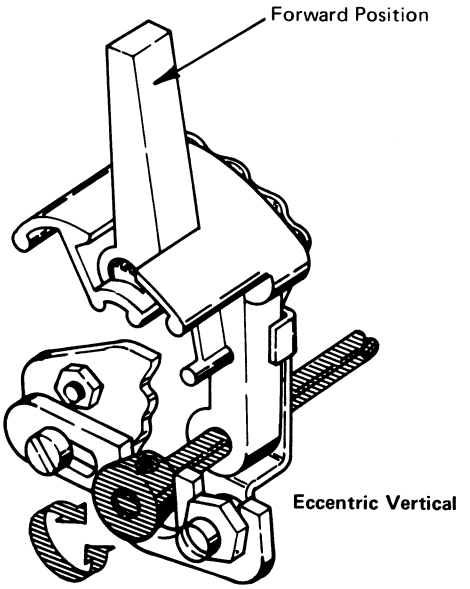


Figure 2-162. Line Gauge Card Holder

Copy Control Lever Shaft

When the copy control lever is detented in the forward position, the high point of the eccentrics should be vertical ± 15°.

NOTE The lever must detent positively in positions 1 and 5.

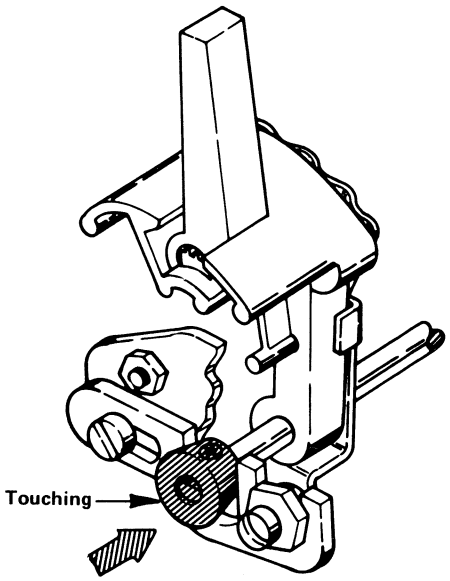


Check: 2-91, 2-94, 2-95, 2-97

Figure 2-163. Copy Control Lever Shaft

Copy Control Eccentric

The copy control eccentrics should just touch the platen adjusting plates on both sides of the paper feed assembly, without binding.

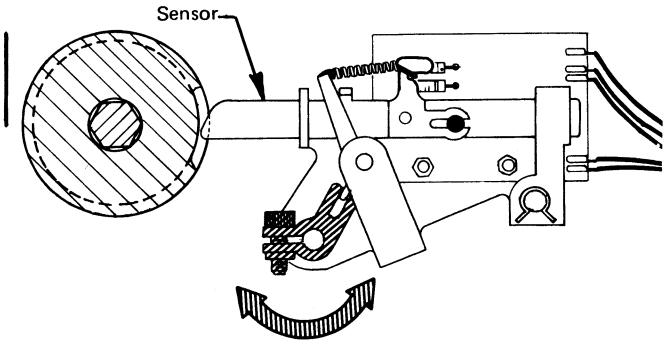


Check: 2-91, 2-94, 2-95, 2-97

Figure 2-164. Copy Control Eccentric

End-of-Forms Sensor

With the forms load lever in the rear position, and no paper in the printer, the sensor should enter the groove in the platen and the switch should close. With the load lever in the forward position, the switch should also be closed. The switch should open just as the sensor leaves the groove in the platen.



Switch should close just as leading edge of Sensor enters groove in platen and also when Forms Load Lever is in forward position.

Figure 2-165. End-of-Forms Sensor

End-of-Forms Assembly

The end-of-forms sensor must operate in the sensor guides without binding and must enter the groove in the platen freely.

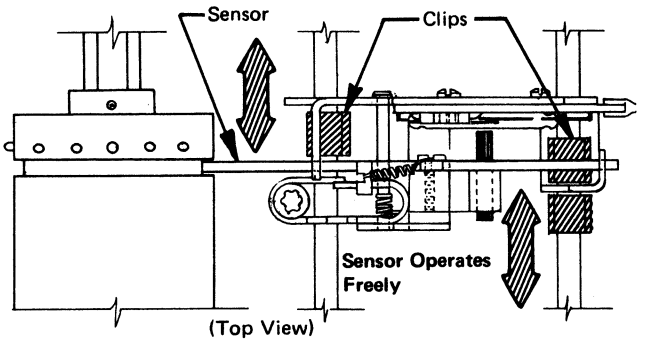


Figure 2-166. End-of-Forms Assembly

End-of-Forms Switch

Check for 0.002" – 0.004" clearance between the permanent magnet and the reed switch.

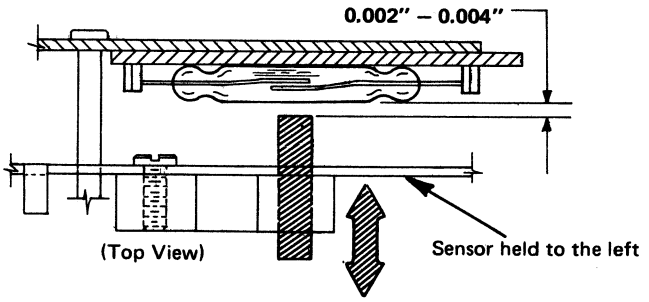


Figure 2-167. End-of-Forms Switch

(This page has been left blank intentionally, so that the text and illustrations on the following two pages will be opposite each other.)

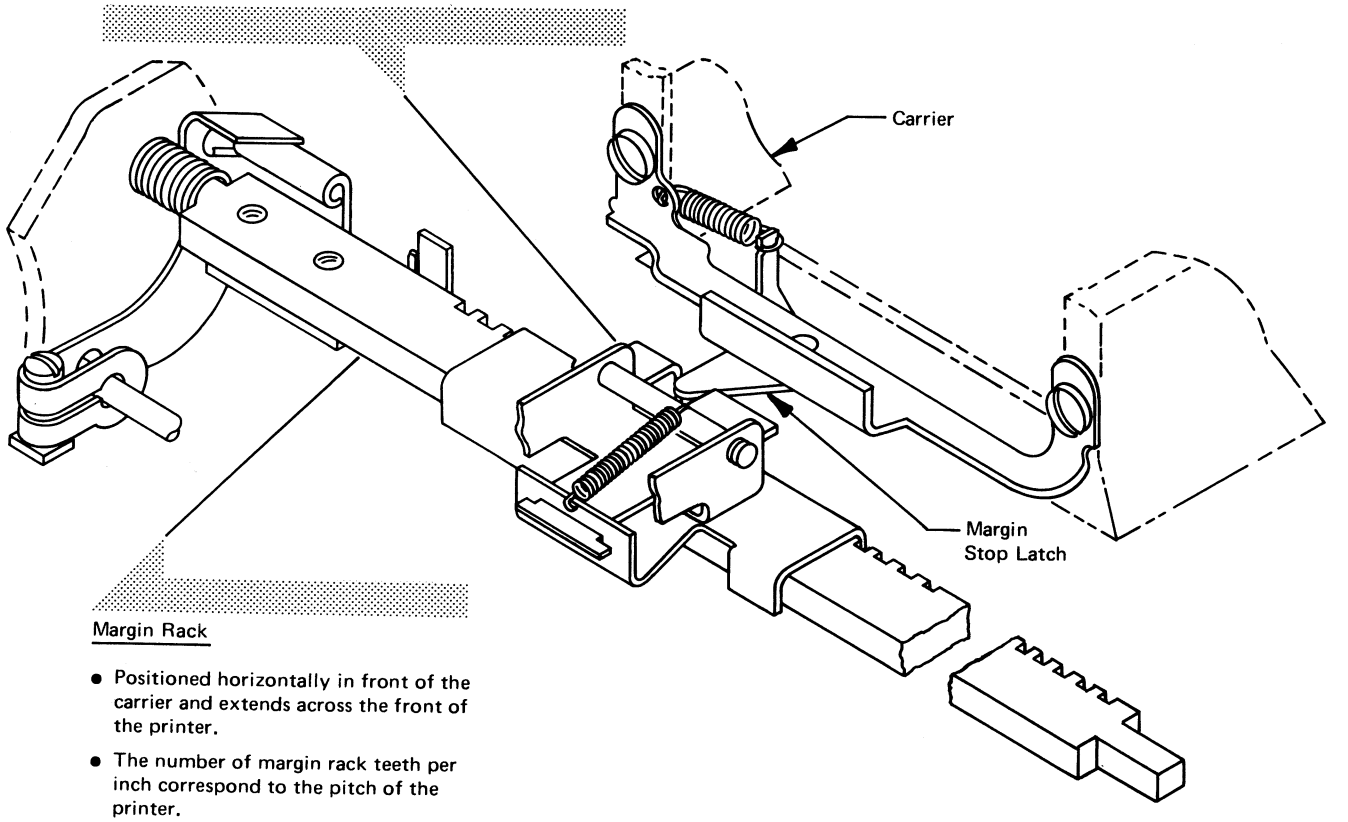
MARGIN CONTROLS (Part 1 of 2)

Objective: To control the distance between the edge of the paper and the printed material and also to signal the end of the writing line.

A Left Margin

Left Margin Stop

- Controls the left margin (distance between the edge of the paper and the printed material).
- When the margin stop latch, attached to the front of the carrier, strikes the stop, this ends carrier movement to the left. (This action forces the margin rack to the left to unlatch the carrier return mechanism at the completion of a carrier return operation.)
- Stop is set by the Customer Engineer.

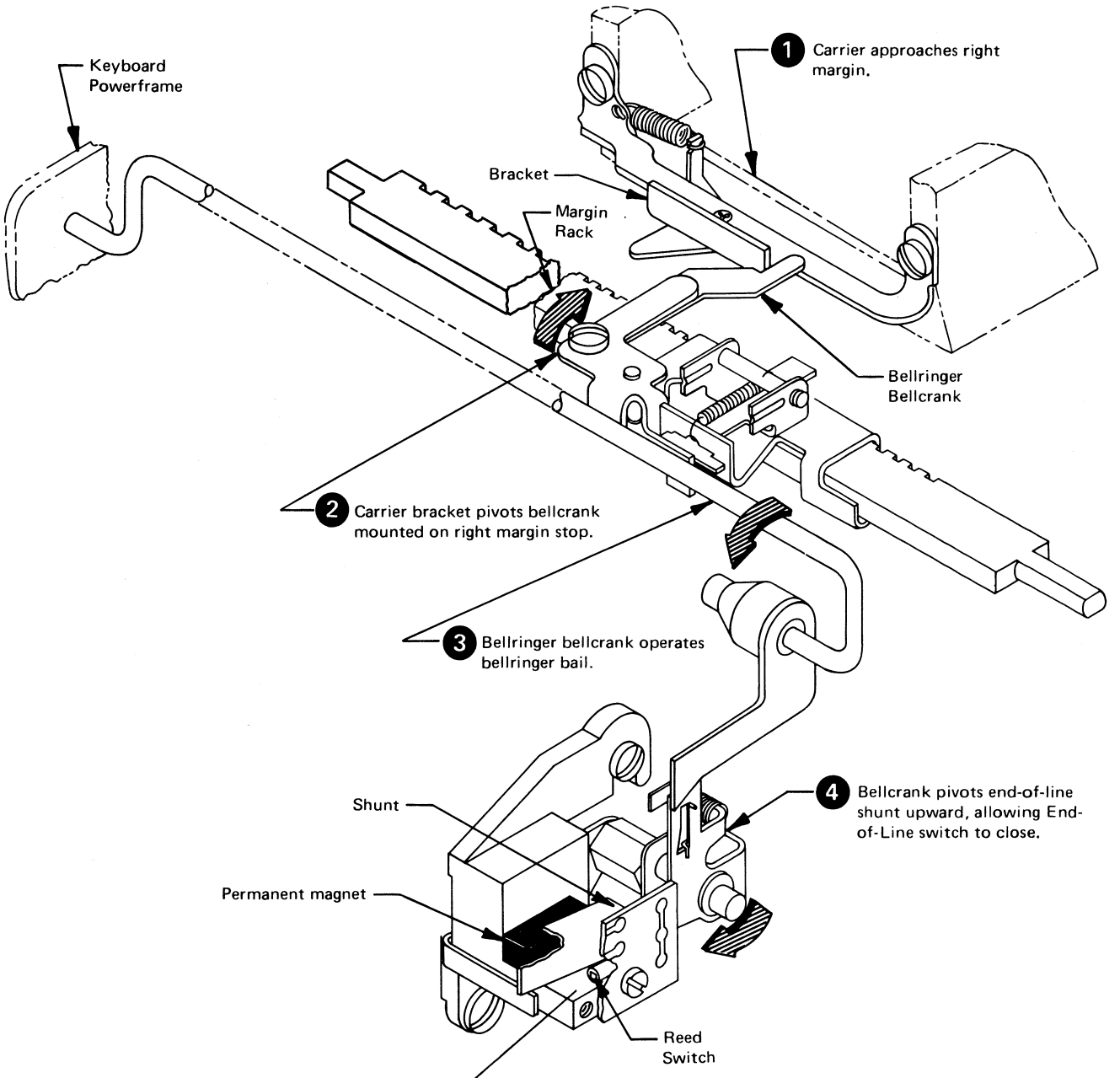


Margin Rack

- Positioned horizontally in front of the carrier and extends across the front of the printer.
- The number of margin rack teeth per inch correspond to the pitch of the printer.

MARGIN CONTROLS (Part 2 of 2)

B Right Margin



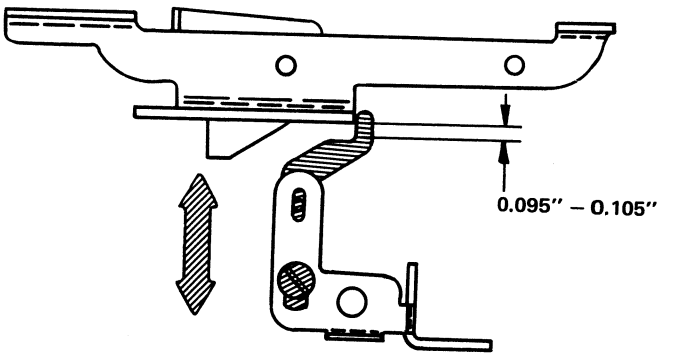
C End-of-Line Switch

- Shunt-operated reed switch.
- Switch closes when carrier is 5 ± 1 spaces from right margin and remains closed at the margin.

END-OF-LINE ADJUSTMENT CHECKS

Bellringer Bellcrank Arm

Check for 0.095" – 0.105" clearance between the adjusting surface on the bellringer bellcrank arm and the margin stop latch bracket.



Check: 2-169

Figure 2-168. Bellringer Bellcrank Arm

End-of-Line Switch

The end-of-line switch should close 5 ± 1 spaces before reaching the right-hand margin stop.

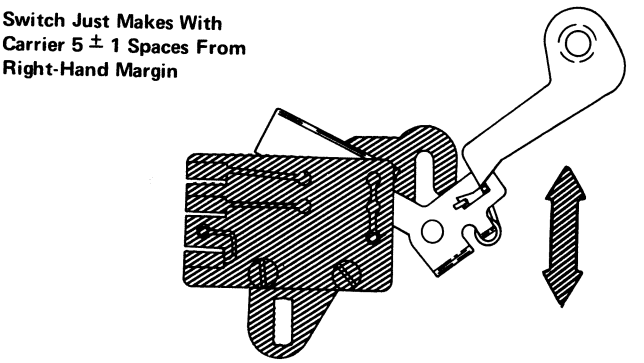


Figure 2-169. End-of-Line Switch

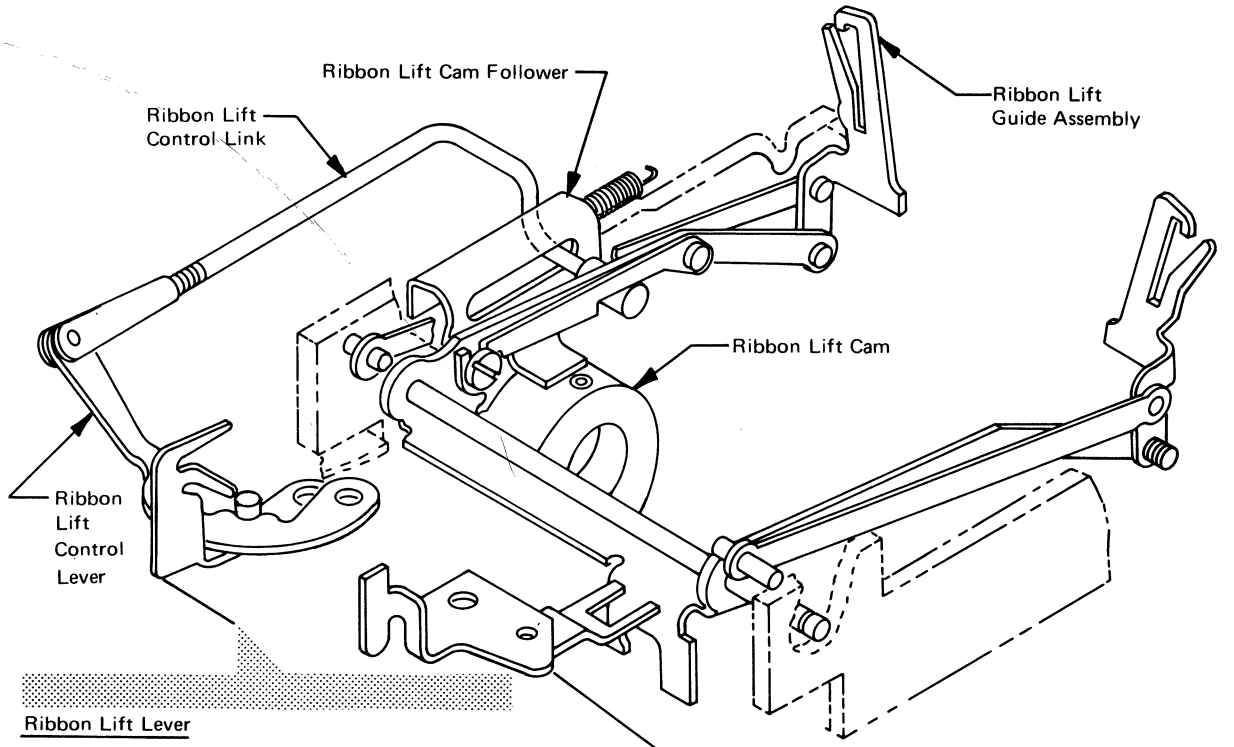
(This page has been left blank intentionally, so that the text and illustrations on the following two pages will be opposite each other.)

FABRIC RIBBON MECHANISM (Part 1 of 3)

Objective: To raise the ribbon to a printing point before the typehead prints; to move the ribbon laterally past the printing point to provide an unused portion for the next print operation; and to reverse the feeding direction when the end of the ribbon is reached.

A Ribbon Lift Mechanism

- Raises the ribbon to the printing point before the typehead prints and then lowers it to allow a visible writing line.
- A single-lobed ribbon lift cam, mounted on the print sleeve, makes a complete revolution to power the ribbon lift mechanism during each print cycle.
- The front to rear position of the control link (controlled by the ribbon lift lever) in the elongated slot of the cam follower determines how high the ribbon will be lifted.
- When the cam rotates, it lifts the cam follower and pivots the ribbon lift guides, to raise the ribbon to the printing point.



Ribbon Lift Lever

- Operator-accessible lever, allowing three-track printing on single-color ribbons.
- Pushing the lever to the left pulls the ribbon lift control link forward, resulting in higher ribbon lift.
- Lever is shown here in the low lift position (control link in the extreme rear of the slot in the cam follower), for printing on top of the ribbon.
- The next position to the left is the medium lift position, for printing in the middle of the ribbon.
- The extreme left position is the high lift position, for printing on the bottom half of the ribbon.

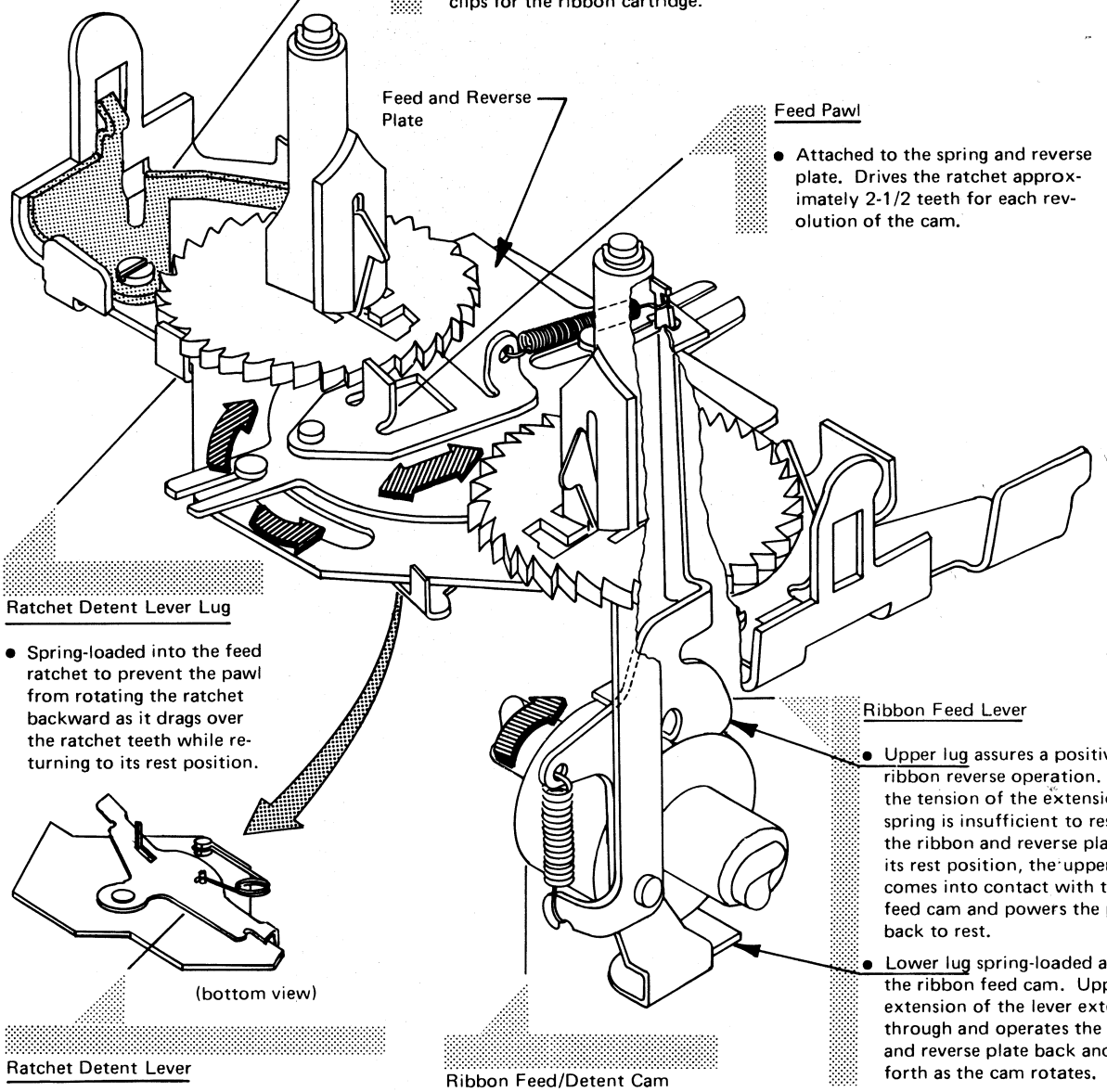
Ribbon Load Lever

- For normal printer operation, the lever is pushed to the left.
- Push the lever to the right, for ribbon cartridge removal and installation. This forces the ribbon lift guide into an extreme lift position and holds it there for accessibility.

FABRIC RIBBON MECHANISM (Part 2 of 3)

B Ribbon Feed

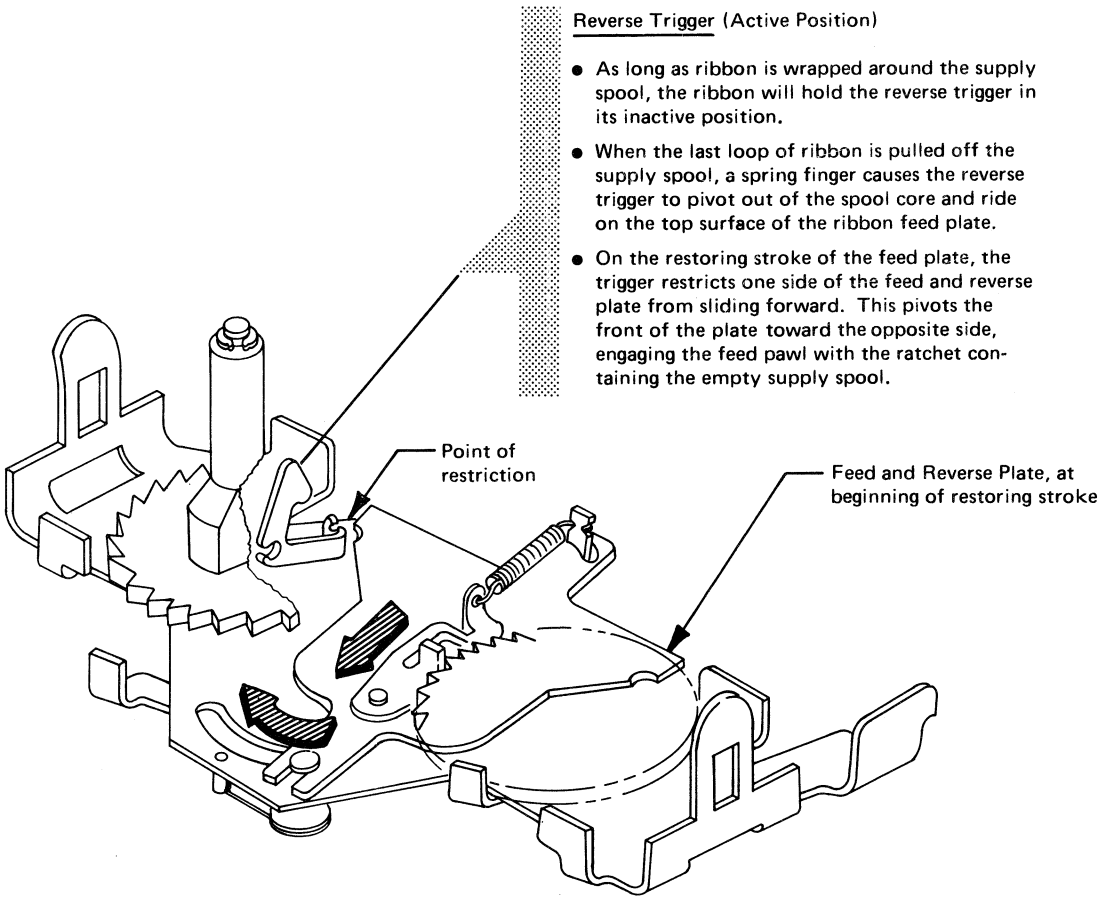
- At the time the typehead prints, the ribbon has completed its feeding operation and is restoring the feed pawl to its rest position.



FABRIC RIBBON MECHANISM (Part 3 of 3)

C Ribbon Reverse

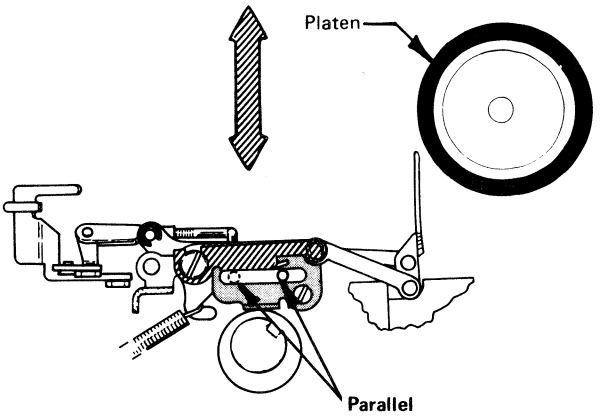
- Reverses the direction of ribbon feed by shifting the feed pawl from the takeup ratchet to the supply spool ratchet, when all the ribbon has been fed from the supply spool.



FABRIC RIBBON ADJUSTMENT CHECKS

Ribbon Lift Guide Plate

With the ribbon lift cam follower on the low dwell of the cam, the ribbon lift guide height should change a maximum of 0.010" when the control lever is moved from the low lift to the high lift position.



Check: 2-171

Figure 2-170. Ribbon Lift Guide Plate

Ribbon Lift Control Link

With the ribbon lift lever in the high lift position, the underscore should strike the ribbon 0.047" – 0.078" from the bottom edge.

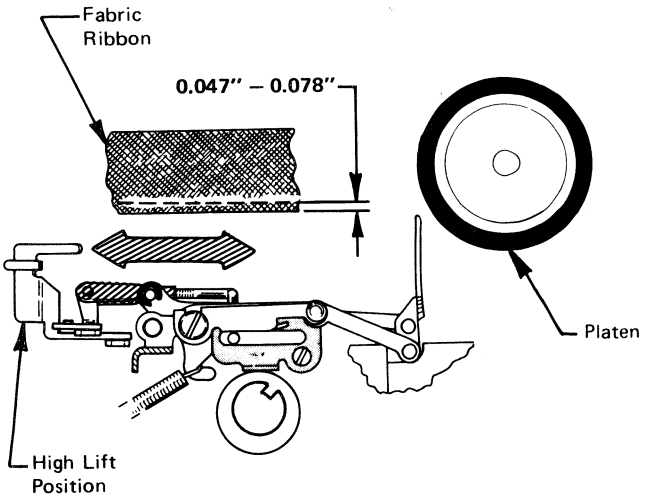
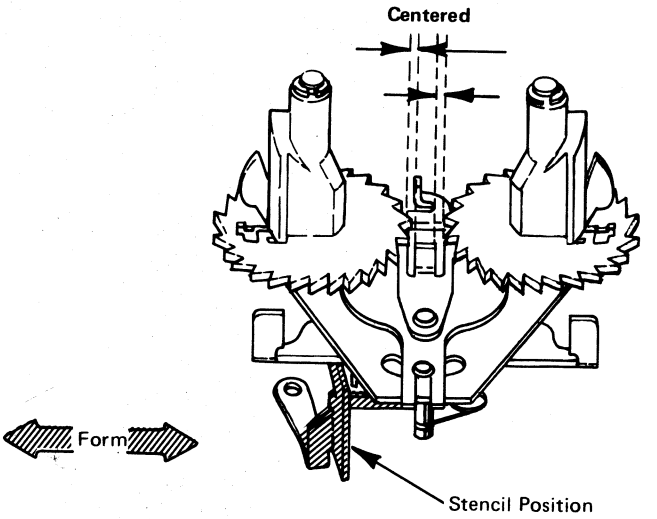


Figure 2-171. Ribbon Lift Control Link

Ribbon Lift Lever (Stencil Position)

With the ribbon lift lever in the stencil position, the feed pawl should be centered between the two ribbon feed ratchets.



Check: 2-173

Figure 2-172. Ribbon Lift Lever (Stencil Position)

Ribbon Lift Lever (Low Lift Position)

With the ribbon lift lever in the low lift position and the detent fully seated in a tooth in either feed ratchet, check for 0.010" – 0.040" clearance between the lever and the detent lever lug Check both sides.

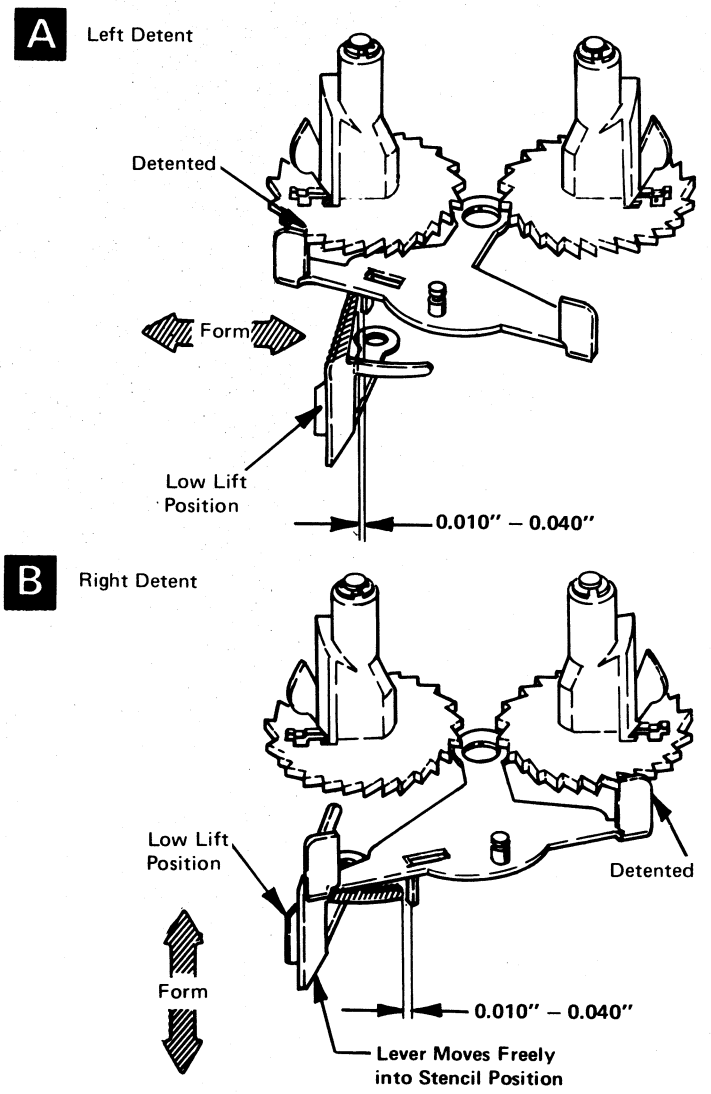
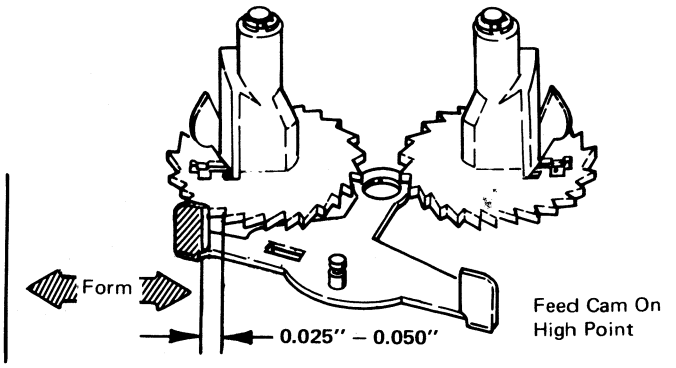


Figure 2-173. Ribbon Lift Lever (Low Lift Position)

Ratchet Detent

With the feed cam hand-cycled to its high dwell, check for 0.025" – 0.050" overthrow between the detent and the ratchet tooth the detent has entered.



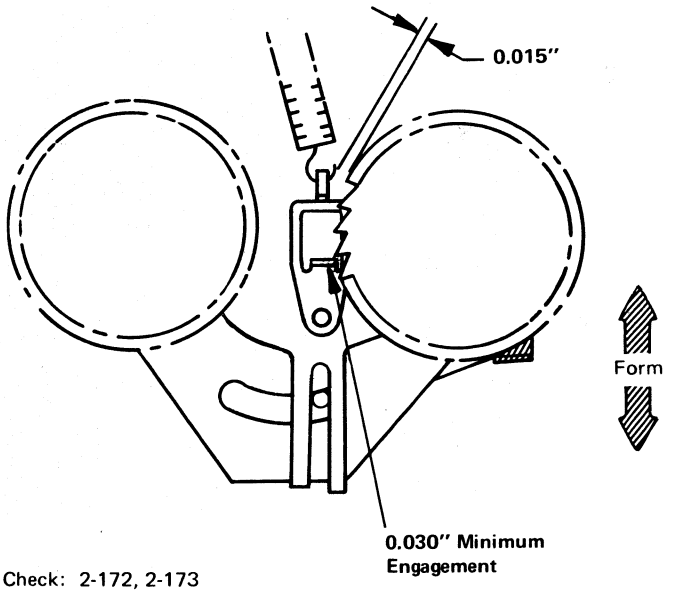
Check: 2-176

Figure 2-174. Ribbon Feed Ratchet Detent

Ribbon Feed Pawl

The feed pawl should engage a ratchet tooth by a minimum of 0.030" during a ribbon-feed operation.

The feed pawl spring lug must clear the feed ratchet by 0.015" at the closest point.



Check: 2-172, 2-173

Figure 2-175. Ribbon Feed Pawl

Ribbon Cartridge Retaining Springs

The cartridge retaining springs should be flush against the feed plate lugs and centered front-to-rear.

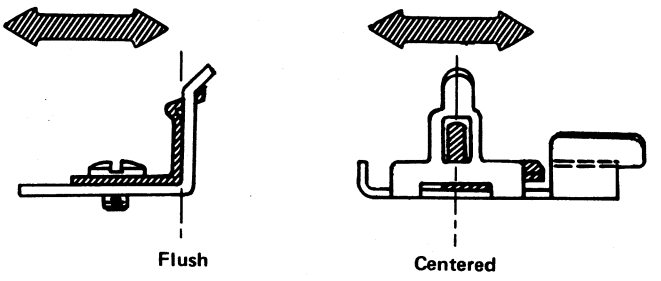
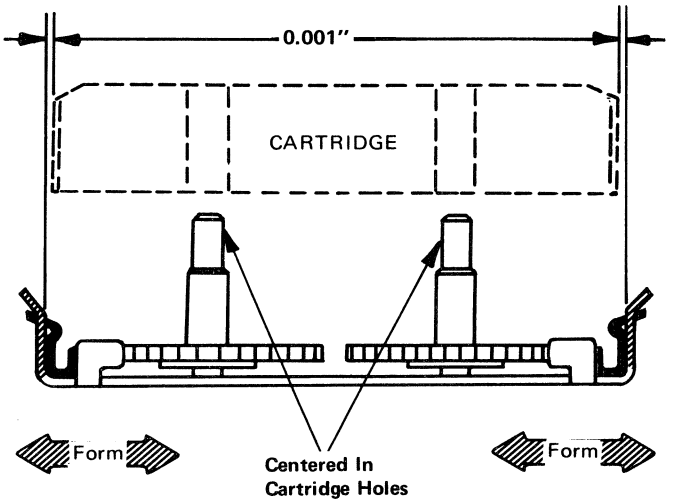


Figure 2-176. Ribbon Cartridge Retaining Springs

Cartridge Guide Lugs

The cartridge guide lugs should be centered in the holes in the cartridge, with a 0.001" clearance between the cartridge and the guides.



Check: 2-176

Figure 2-177. Cartridge Guide Lugs

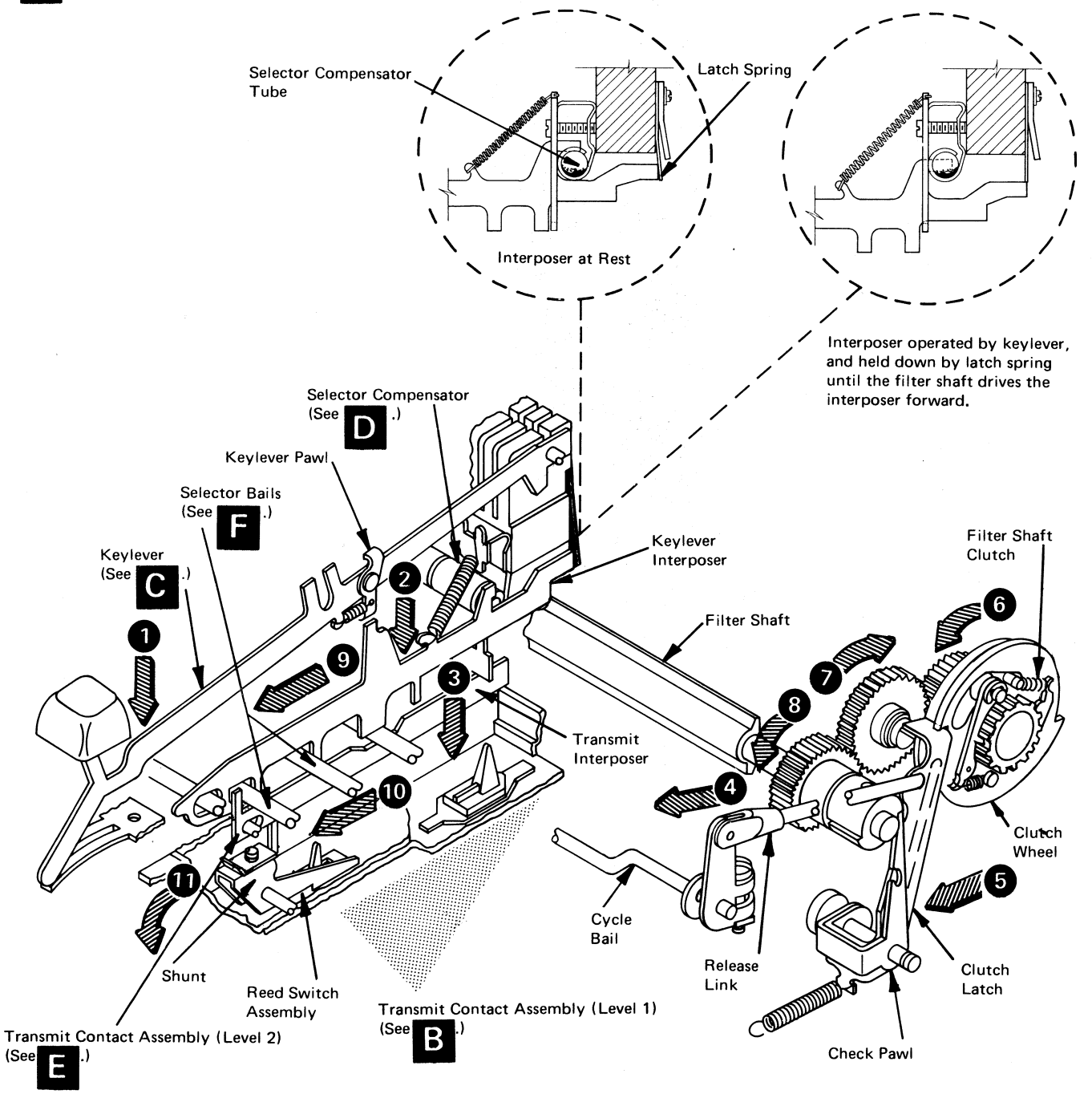
Figure numbers 2-178 through 2-180 have been purposely omitted, to allow for possible future additional adjustments.

(This page has been left blank intentionally, so that the text and illustrations on the following two pages will be opposite each other.)

KEYBOARD (Part 1 of 3)

Objective: To generate and transmit six-bit code to the control unit.

A Keyboard Functional Principles



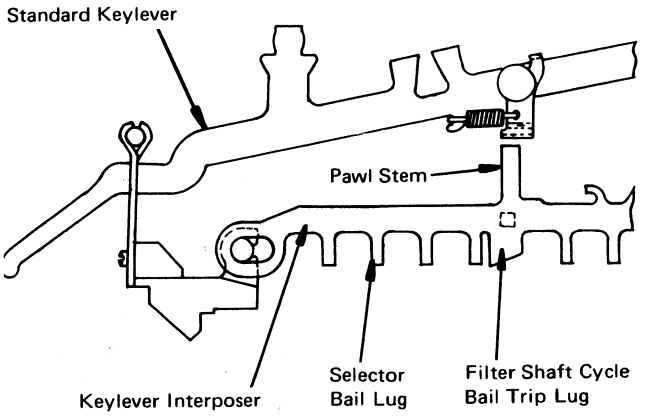
NOTE Typical character or carrier return keylever/interposer operation shown. Spacebar and shift keylever/interposer operations differ and are discussed separately.

KEYBOARD (Part 2 of 3)

B Keyboard Operating Sequence

1. Operator presses keylever.
2. Keylever pawl forces interposer into compensator tube.
3. Keylever interposer operates cycle bail downward.
4. Filter shaft clutch release link is pulled forward.
5. Filter shaft clutch latch is pulled from under clutch wheel stop.
6. Filter shaft clutch engages and drives clutch wheel.
7. Filter shaft clutch gear drives idler gear.
8. Filter shaft rotates 180°.
9. Filter shaft drives keylever interposer forward, which, in turn, drives selector bail(s) forward.
10. Selector bails operate transmit interposer(s) forward.
11. Transmit interposer(s) operate transmit contact shunt(s).
- Transmit contact(s) close and transmit data to the control unit.
- Keyboard mechanism restores.

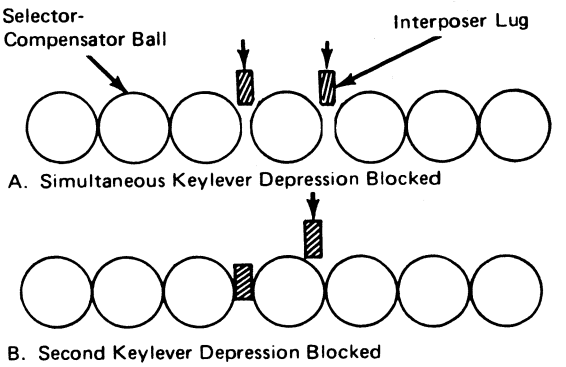
C Standard Keylever and Interposer



- Both the character keys and the function keys have associated interposers that operate in the same manner. This provides interlocking between functions and characters.
- Selector bail lugs on the interposer determine bit coding and operate corresponding selector bails. No two interposers are alike.

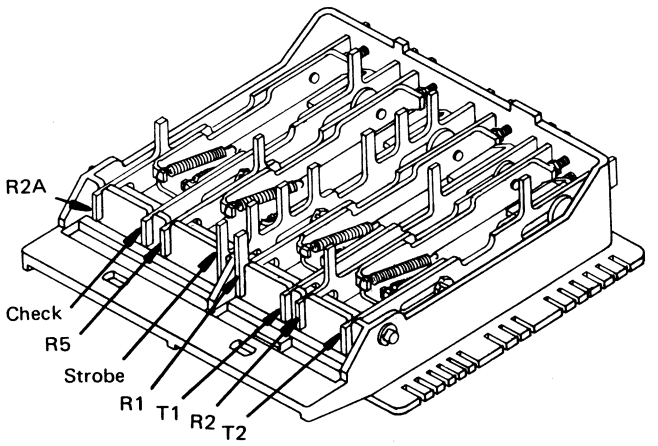
D Selector Compensator Tube

- Closely-spaced steel balls prevent pressing keylevers simultaneously, ensuring that only one interposer at a time can be operated. Ensures a fully interlocked keyboard cycle.

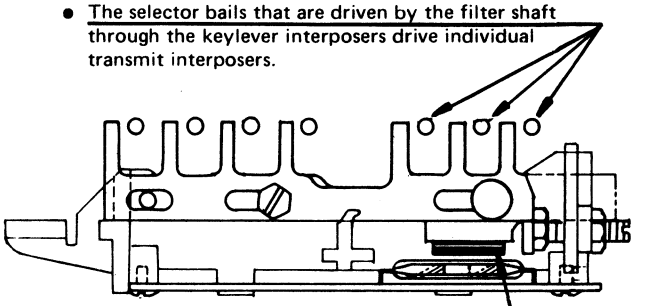


E Transmit Contact Assembly (Level 2)

- Seven data contacts and a strobe contact (reed switches), located in a compact assembly fastened to the underside of the keyboard



- Both characters and functions are assigned discrete keyboard codes which are transmitted by combinations of reed switch closures.
- The strobe contact (selected with every transmit interposer) closes last, to signal the control unit that data is available at the keyboard.
- The selector bails that are driven by the filter shaft through the keylever interposers drive individual transmit interposers.

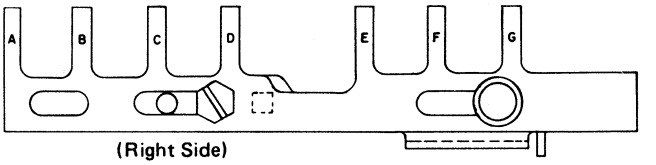


(Right Side)

- A magnet attached to the transmit interposer closes a corresponding reed switch, to generate a character code.
- The transmit interposers driven on any one cycle depends upon the number of lugs (transmit interposer coding) on each individual transmit interposer.

- Transmit and Keylever Interposer Coding

Function	Corresponding Interposer Lug
R1	A
R2	B
R2A	C
R5	D
T1	E
T2	F
Check	G
Strobe	A, B, C, D, E, F, G



(Right Side)

F Selector Bails

- Seven bails, mounted between the keyboard side-frames so they can operate back and forth.
- Operated by lugs on the keylever interposers, they, in turn, operate the transmit interposers.

G Keyboard Interlocking

- No mechanical lock is available on this keyboard. Unwanted keyboard entries must be degated by the control unit.

KEYBOARD ADJUSTMENT CHECKS

Interposer Latch Spring

With the interposer restored, the bottom of the interposer latch spring should be flush with the bottom of the interposer latching surface.

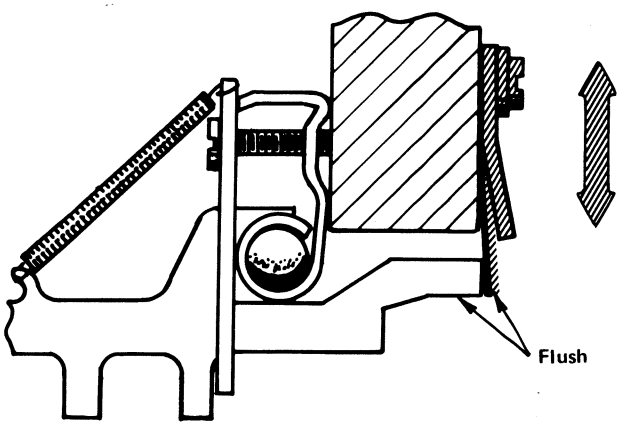


Figure 2-181. Interposer Latch Spring

Compensator Tube

With a middle interposer latched down and held against the right side of the rear guide comb, all balls to the right of the interposer must be in contact. With the same interposer held against the left side of the slot, all balls to the left should be in contact.

NOTE The balls should not be bunched up or staggered from a straight line condition. Check each individual interposer for freedom of entry into the compensator tube.

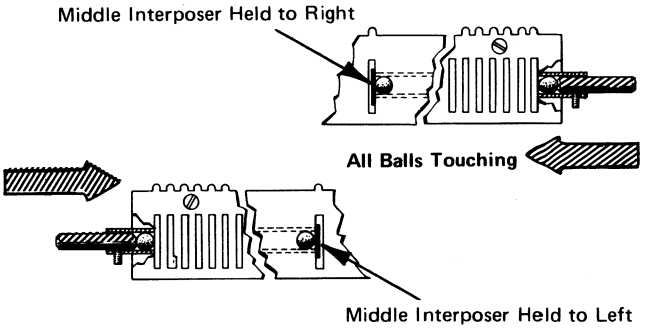


Figure 2-182. Compensator Tube

Selector Bail Plate (Vertical)

The filter shaft cycle bail must be parallel to the interposer bail trip lugs, within 0.004".

NOTE If filter shaft cycle bail is adjusted correctly, all keylever interposer bails should be correct.

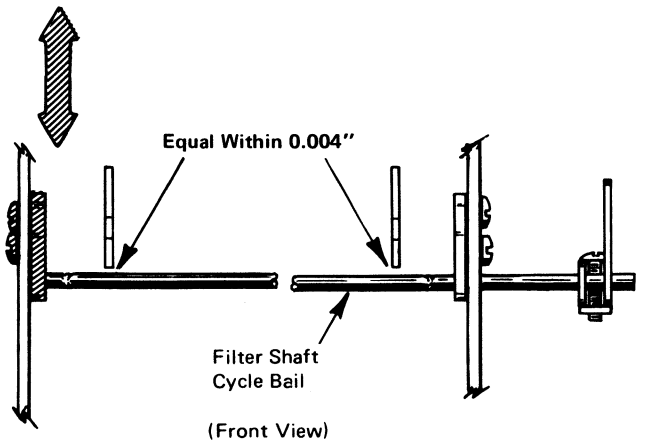


Figure 2-183. Selector Bail Plate (Vertical)

Selector Bail Plate (Front-to-Rear)

The selector bails must be parallel to the interposer selection lugs, within 0.004".

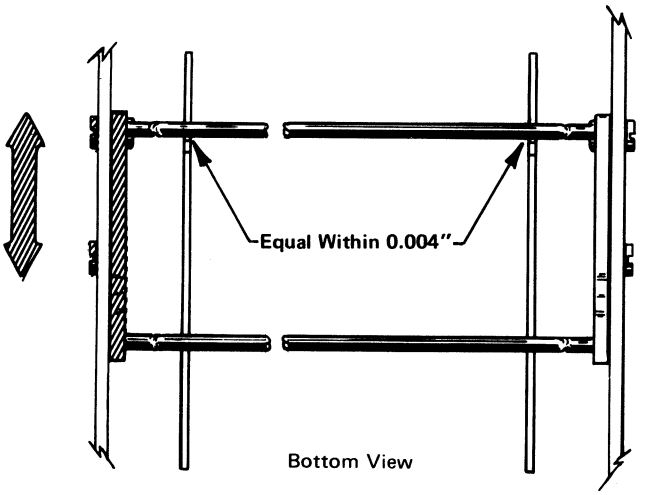


Figure 2-184. Selector Bail Plate (Front to Rear)

Front Keylever Guide Comb

Check for 0.016" – 0.024" clearance between all keylever pawls and the pawl stem of each restored interposer.

1. Use to obtain correct clearance for most pawls.
2. Any keylevers that are not correct after No. 1 should be formed individually with long-nose pliers, or spread with a screwdriver.

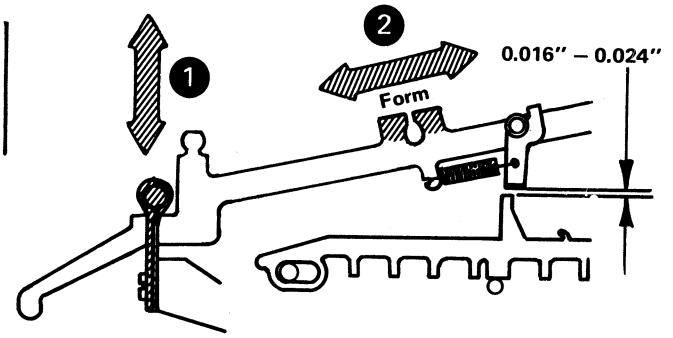


Figure 2-185. Front Keylever Guide Comb

Filter Shaft End Play

Check for 0.002" – 0.004" end play in the filter shaft.

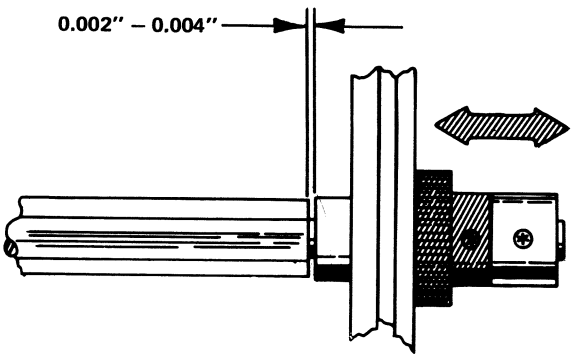


Figure 2-186. Filter Shaft End Play

Filter Shaft Check Ratchet

Check to see that the check ratchet is touching the filter shaft gear.

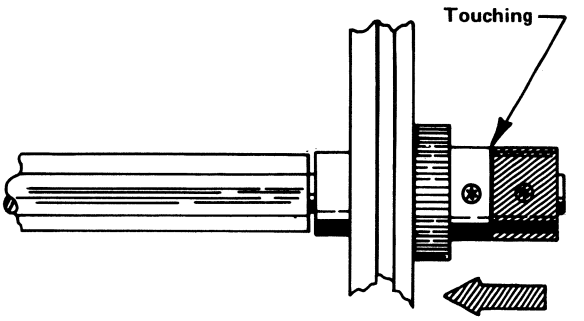


Figure 2-187. Filter Shaft Check Ratchet

Filter Shaft Timing

With the check pawl latched on either lug of the filter shaft check cam, and an interposer latched down, check for 0.015" – 0.020" clearance between the closest point on the face of the filter shaft and the latched interposer.

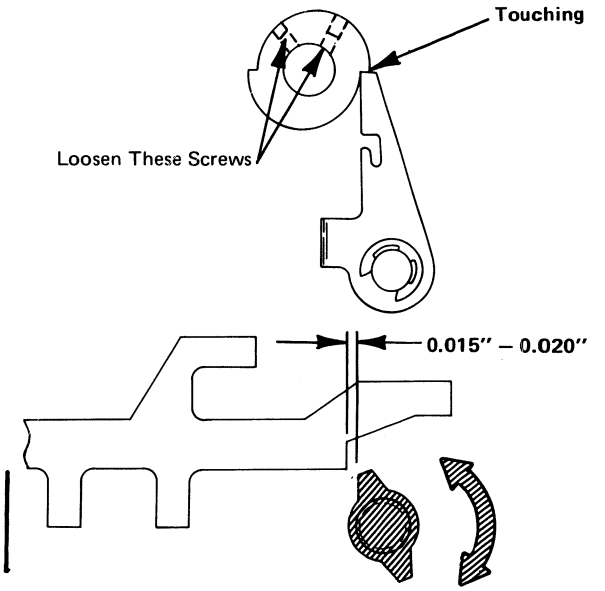


Figure 2-188. Filter Shaft Timing

Filter Shaft Clutch Release Bellcrank

With all interposers restored, the two holes in the clutch release bellcrank must be aligned vertically.

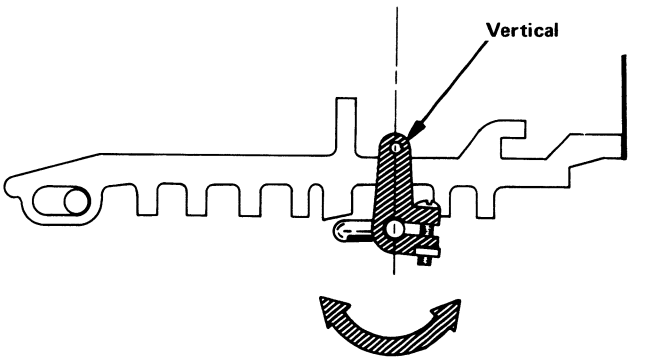


Figure 2-189. Filter Shaft Clutch Release Bellcrank

Filter Shaft Clutch Release Clearance

With an interposer latched down, check for 0.000" – 0.015" clearance between the clutch release wheel and the trip latch.

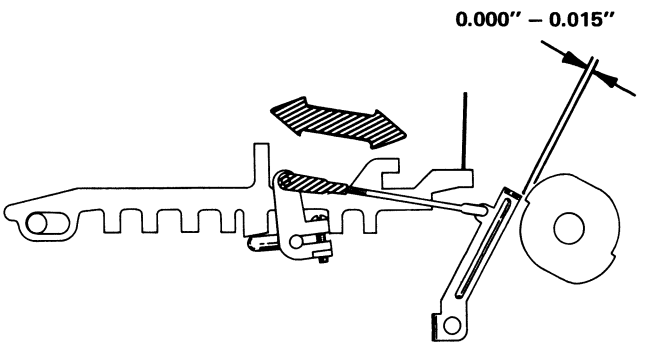


Figure 2-190. Filter Shaft Clutch Release Clearance

Filter Shaft Clutch Pawl Clearance

With the clutch latched at rest, check for 0.015" – 0.025" clearance between the clutch ratchet teeth and the filter shaft cam pawls.

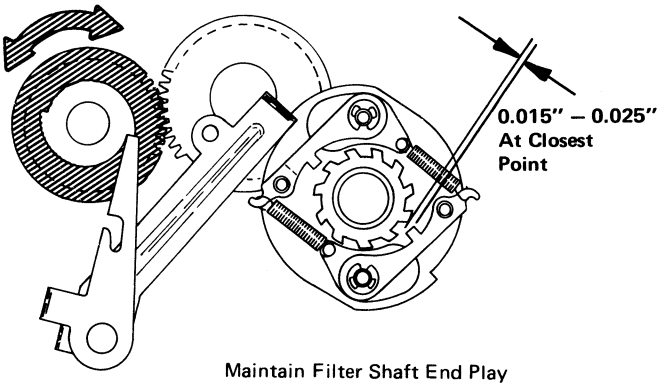


Figure 2-191. Filter Shaft Clutch Pawl Clearance

Filter Shaft Idler Gear Backlash

Check for 0.001" – 0.006" backlash between the filter shaft drive gears.

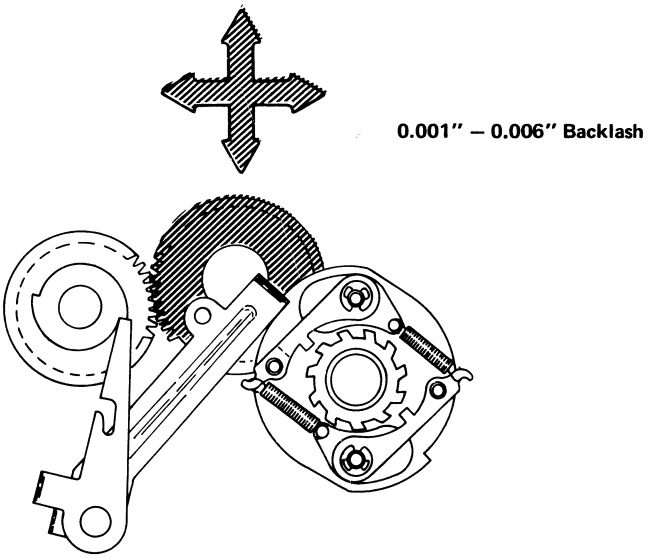


Figure 2-192. Filter Shaft Idler Gear Backlash

Character Transmit Shunts (Level 1)

With the transmit assembly installed and the transmit contact circuit board removed, check for 0.005" – 0.010" clearance between the clip on each character selection shunt and its interposer lug.

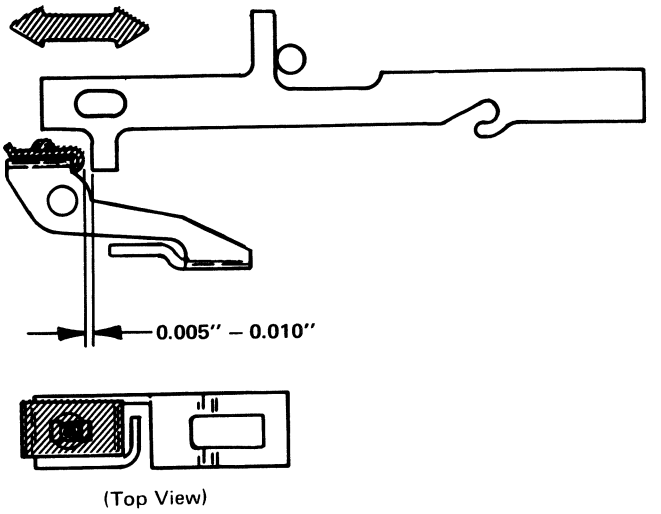


Figure 2-193. Character Transmit Shunts (Level 1)

Strobe Transmit Shunt (Level 1)

With the transmit assembly installed and the transmit contact circuit board removed, check for 0.035" – 0.045" clearance between the clip on the strobe shunt (extreme right) and its interposer driving lug.

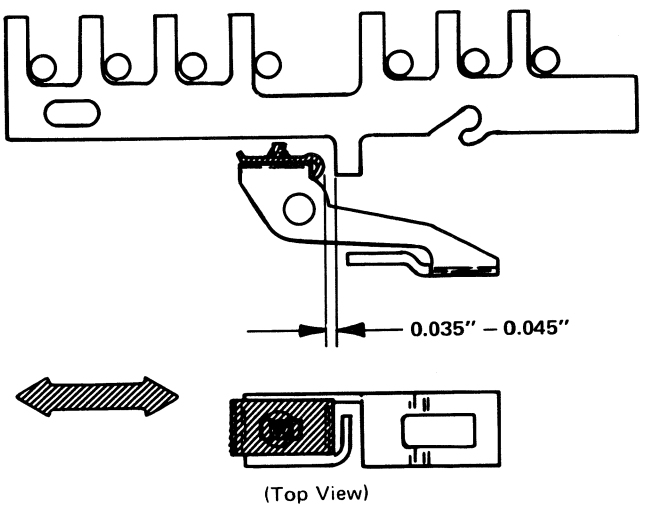


Figure 2-194. Strobe Transmit Shunt (Level 1)

Character Transmit Interposer Home Position (Level 2)

Check this adjustment with the transmit interposer assembly off the printer. Adjust by running the adjusting screw in until the reed switch just closes and then backing the screw out until the reed switch opens, plus an additional 1/4 – 1/2 turns.

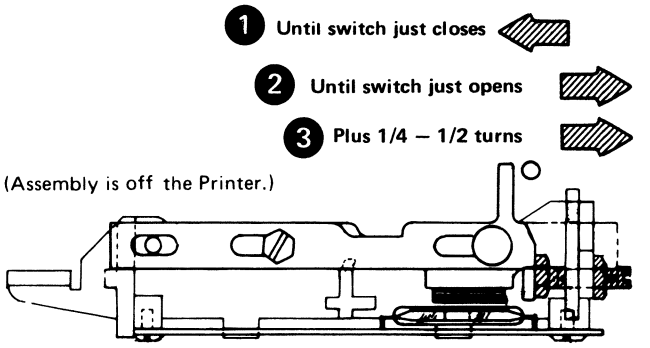


Figure 2-195. Character Transmit Interposer Home Position (Level 2)

Strobe Transmit Interposer Home Position (Level 2)

Check this adjustment with the transmit interposer assembly off the printer. Adjust by running the adjustment screw in until the reed switch just closes and then backing the screw out 2 1/2 – 2 3/4 turns.

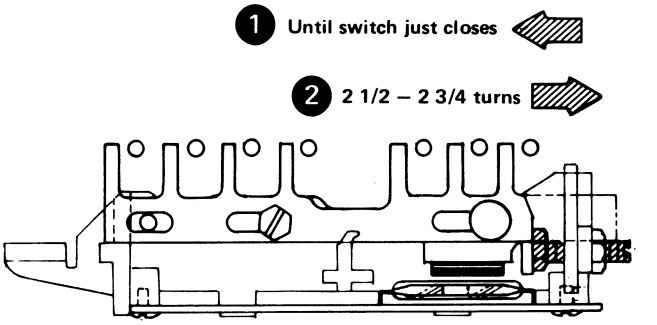


Figure 2-196. Strobe Transmit Interposer Home Position (Level 2)

Transmit-Interposer-to-Bail Clearance (Level 2)

1 With the circuit board removed and the transmit interposer assembly mounted on the keyboard and biased to the rear, lightly load the transmit interposer into the keyboard selection bail, closing up clearances with the keyboard interposer lugs.

2 With the circuit board removed and the transmit interposer assembly mounted on the keyboard and biased to the front, check for 0.005" – 0.013" clearance between each keyboard interposer lug and its corresponding selector bail.

3 Remount the circuit board against the corner locator lugs.

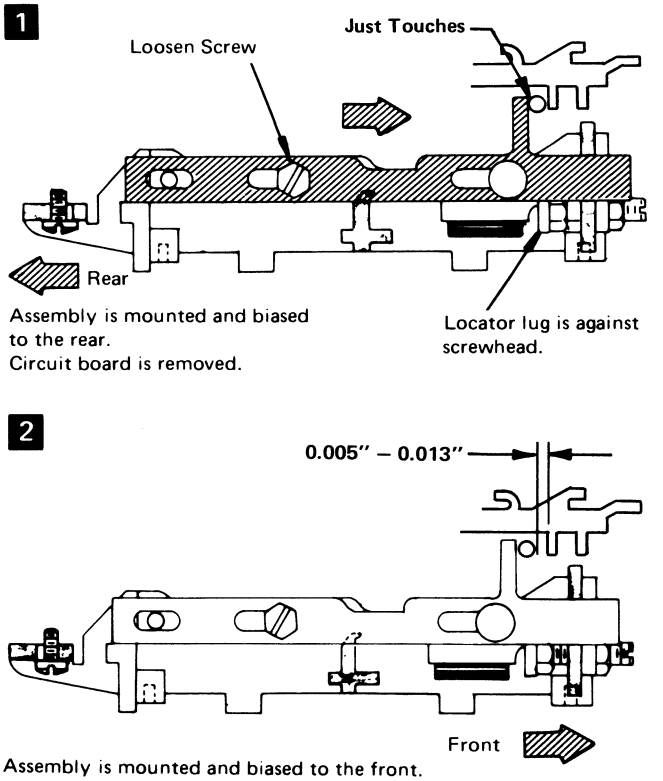
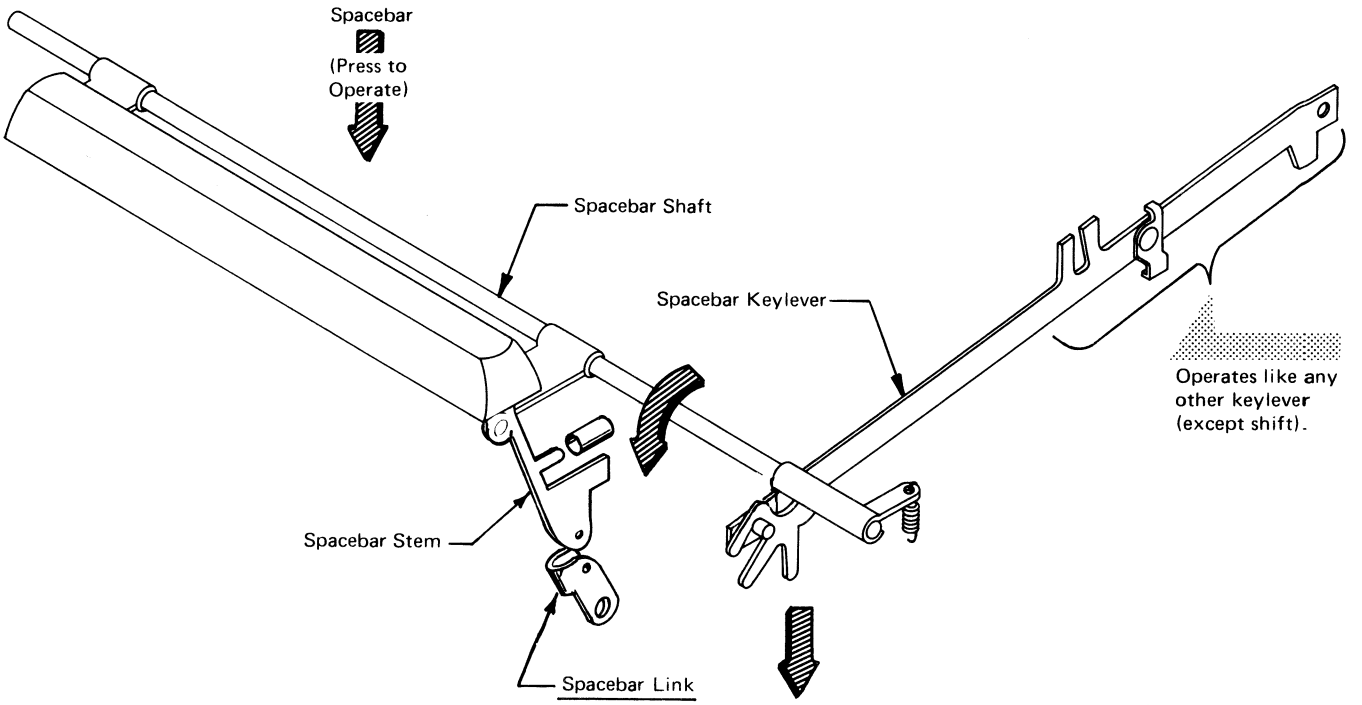


Figure 2-197. Transmit-Interposer-to-Bail Clearance (Level 2)

(This page has been left blank intentionally, so that the text and illustrations on the following two pages will be opposite each other.)

SPACEBAR

Objective: To transmit a space character to the control unit to allow the carrier to move to the right one space without printing a character.

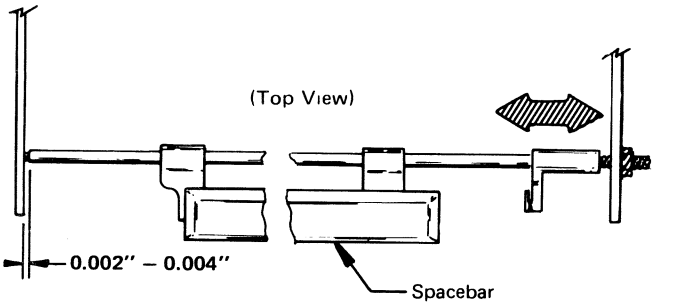


- Prevents the spacebar from tipping forward or back.

SPACEBAR ADJUSTMENT CHECKS

Spacebar Shaft End Play

Check for 0.002" – 0.004" end play between the spacebar shaft and the left keyboard powerframe.

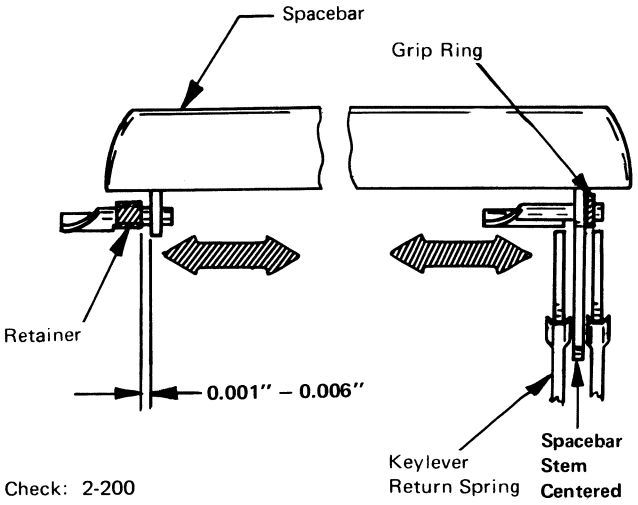


Check: 2-199

Figure 2-198. Spacebar Shaft End Play

Spacebar End Play

Check for 0.001" – 0.006" spacebar end play, with the spacebar stem centered between the keylever return springs.

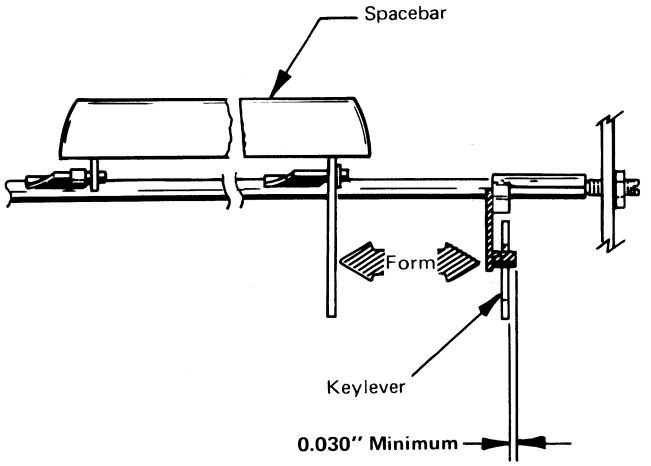


Check: 2-200

Figure 2-199. Spacebar End Play

Spacebar Operating Arm Stud

The stud on the spacebar operating arm must extend a minimum of 0.030" beyond the right side of the spacebar keylever throughout keylever operation. The stud must not bottom when the keylever is fully depressed.



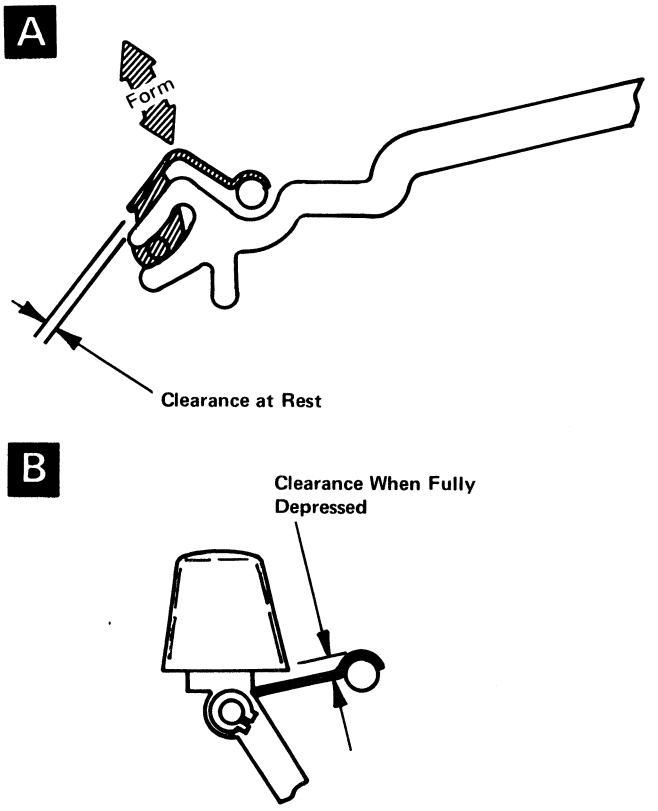
Check: 2-201

Figure 2-200. Spacebar Operating Arm Stud

Spacebar Operating Arm Clearance

A With the spacebar at rest, the operating arm must clear the top of the spacebar keylever.

B With the spacebar fully depressed, the spacebar keybutton must not touch the spacebar arms.



Check: 2-200

Figure 2-201. Spacebar Operating Arm Clearance

(This page has been left blank intentionally, so that the text and illustrations on the following two pages will be opposite each other.)

SHIFT KEY (Level 1)

Objective: To transmit either an uppercase or lowercase code to the control unit to shift the printer into a corresponding printing mode.

A Shift Key Functional Principles (Level 1)

Shift Key

- Press down to generate an uppercase code.
- Releasing the key allows it to return to its rest position.
- Upward motion of the uppercase keylever allows a lowercase code to be generated.

Shift Lock

- Press to lock the uppercase keylever down.
- Pressing and releasing either shift key releases the shift lock.

Shift Bail

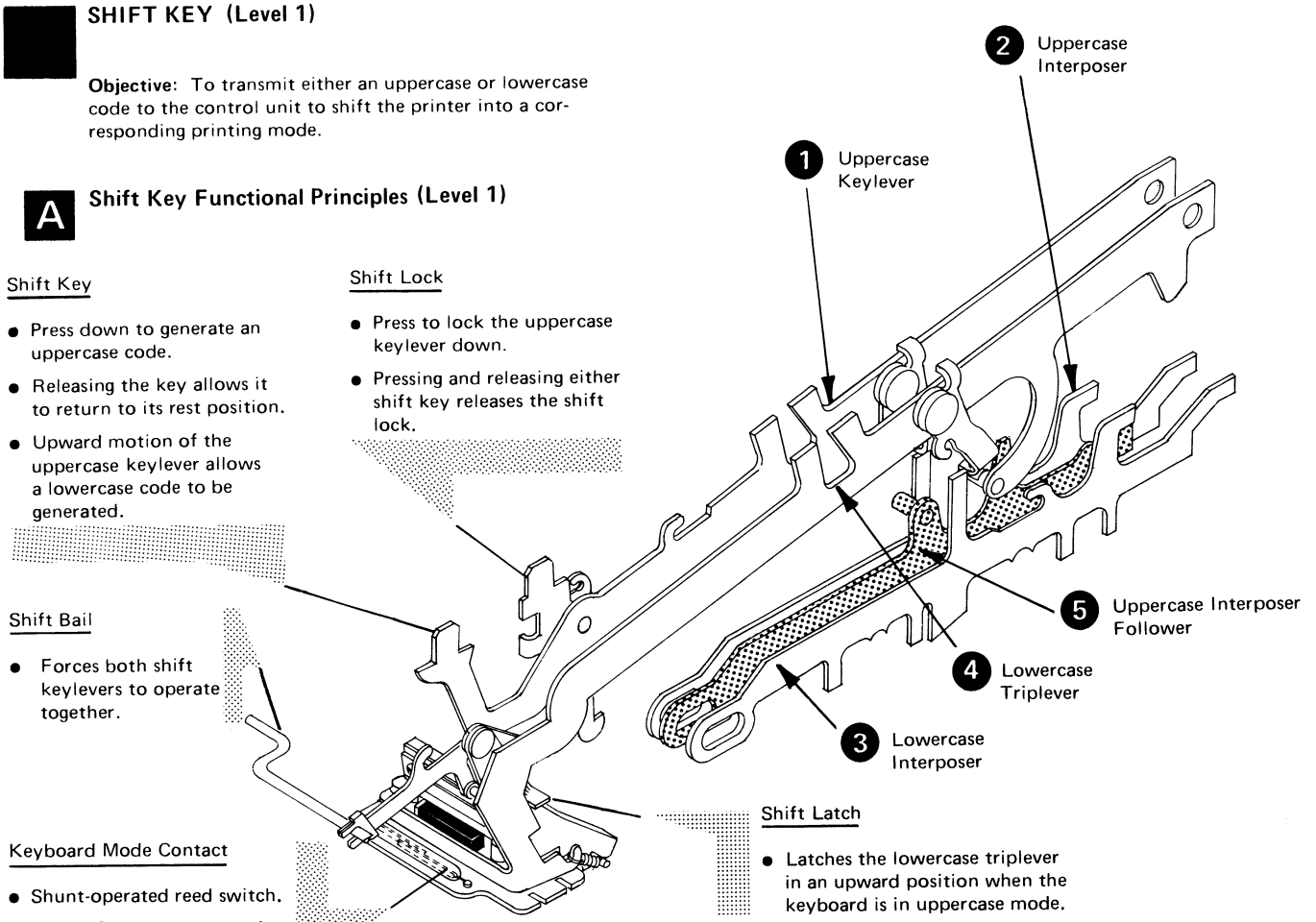
- Forces both shift keylevers to operate together.

Keyboard Mode Contact

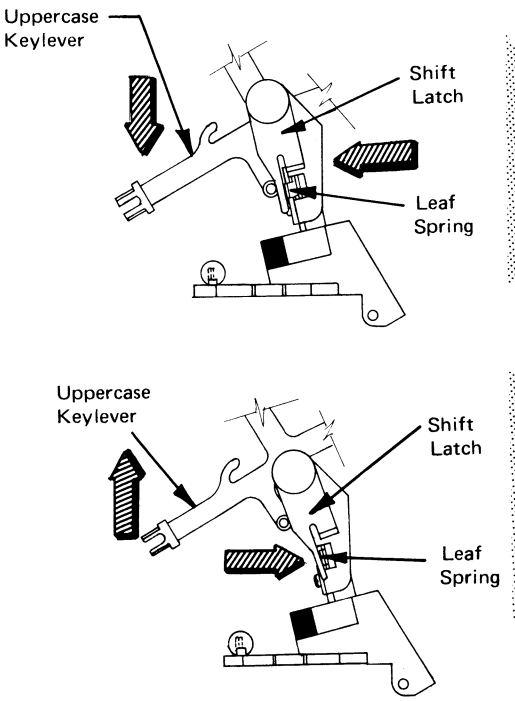
- Shunt-operated reed switch.
- Closed for uppercase mode.
- Open for lowercase mode.

Shift Latch

- Latches the lowercase triplever in an upward position when the keyboard is in uppercase mode.



B Shift Key Operating Sequence (Level 1) (Keyboard in Lowercase Position)



- Press either shift key.
1. Uppercase keylever operates downward.
2. Uppercase interposer is operated down and then is driven forward by the filter shaft.
3. Uppercase interposer follower raises the lowercase triplever into position to operate the lowercase interposer.
4. The lowercase triplever is latched in a raised position by the shift latch.
- Releasing the shift key allows the uppercase keylever and keylever bail to move upward and cam the latch out of the notch in the lowercase triplever.
5. The spring-loaded lowercase triplever moves downward and forces the lowercase interposer into the selector compensator for a lowercase keyboard cycle.

SHIFT KEYLEVER ADJUSTMENT CHECKS (LEVEL 1)

Lowercase Triplever Latch (Level 1)

With the shift key fully depressed, the shift latch must reliably latch the lowercase triplever.

Lowercase Triplever/Interposer Clearance (Level 1)

With the lowercase triplever latched, check for 0.002" – 0.010" clearance between the trip lever pawl and the interposer stem.

NOTE See adjustment 2-185 for uppercase keylever/interposer clearance.

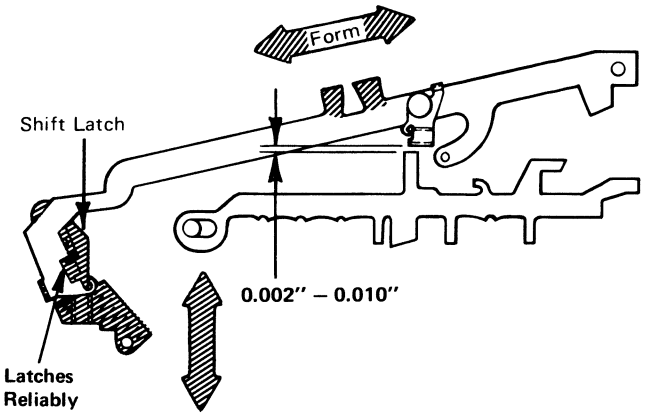


Figure 2-202. Lowercase Triplever (Level 1)

Shift Lock (Level 1)

The shift lock should lock just as the shift occurs or slightly afterward. The shift lock must be easily unlocked by either the right or left shift key.

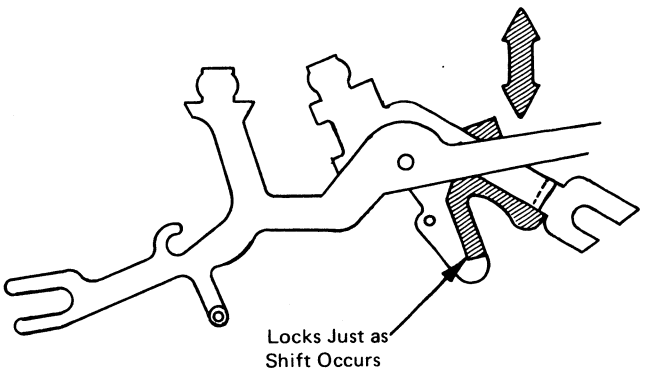
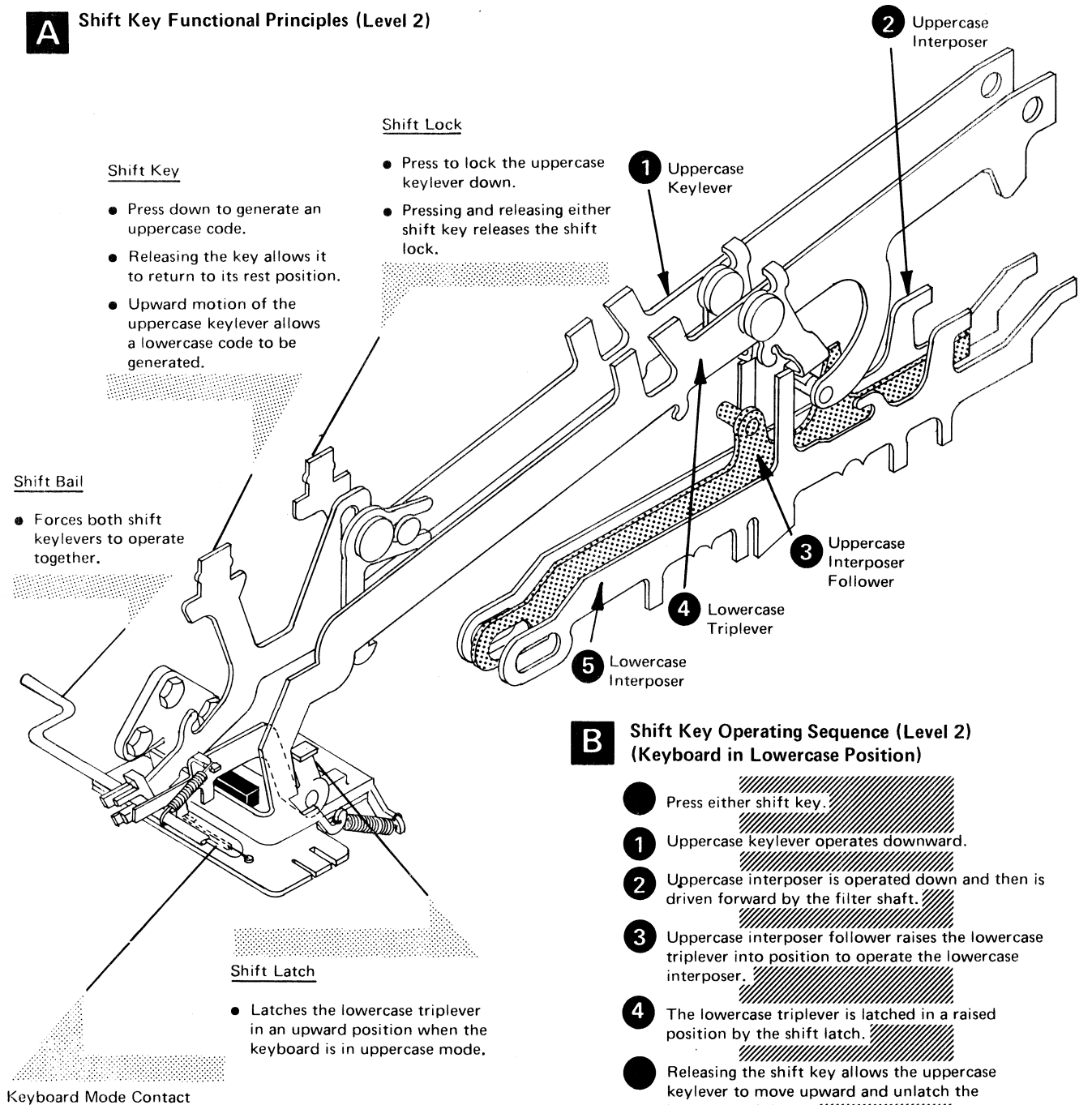


Figure 2-203. Shift Lock (Level 1)

SHIFT KEY (Level 2)

Objective: To transmit either an uppercase or lowercase code to the control unit to shift the printer into a corresponding printing mode.

A Shift Key Functional Principles (Level 2)



Shift Key

- Press down to generate an uppercase code.
- Releasing the key allows it to return to its rest position.
- Upward motion of the uppercase keylever allows a lowercase code to be generated.

Shift Lock

- Press to lock the uppercase keylever down.
- Pressing and releasing either shift key releases the shift lock.

Shift Bail

- Forces both shift keylevers to operate together.

Shift Latch

- Latches the lowercase triplever in an upward position when the keyboard is in uppercase mode.

Keyboard Mode Contact

- Shunt-operated reed switch.
- Closed for uppercase mode.
- Open for lowercase mode.

B Shift Key Operating Sequence (Level 2) (Keyboard in Lowercase Position)

- Press either shift key.
- 1 Uppercase keylever operates downward.
- 2 Uppercase interposer is operated down and then is driven forward by the filter shaft.
- 3 Uppercase interposer follower raises the lowercase triplever into position to operate the lowercase interposer.
- 4 The lowercase triplever is latched in a raised position by the shift latch.
- Releasing the shift key allows the uppercase keylever to move upward and unlatch the lowercase triplever.
- 5 The spring-loaded lowercase triplever moves downward and forces the lowercase interposer into the selector compensator for a lowercase keyboard cycle.

SHIFT KEYLEVER ADJUSTMENT CHECKS (LEVEL 2)

Shift Lock (Level 2)

The shift lock should lock just as the shift occurs or slightly afterwards. The shift lock must be easily unlocked by either the left- or right-hand shift key.

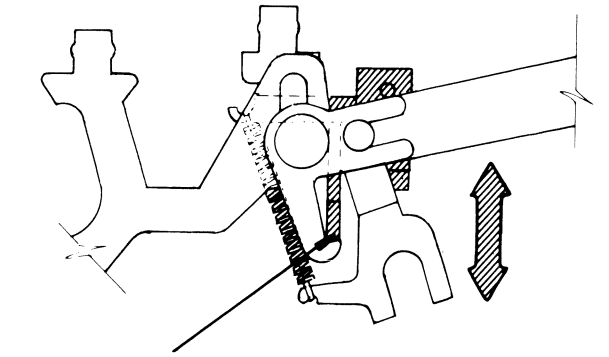


Figure 2-204. Shift Lock (Level 2)

Lowercase Triplever Pawl/Interposer Clearance (Level 2)

With the lowercase triplever latched, check for 0.005" – 0.015" clearance between the triplever pawl and the interposer stem.

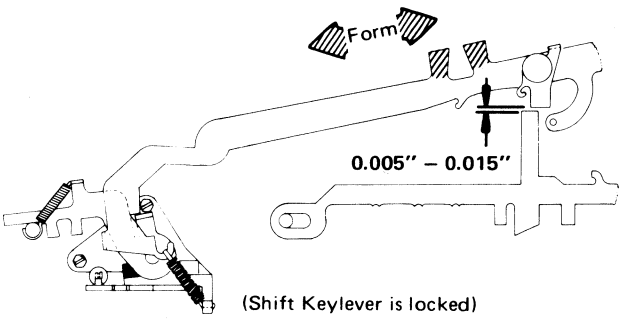


Figure 2-205. Lowercase Triplever/Interposer Clearance (Level 2)

Shift Latch (Level 2)

With the shift keylever locked and the lowercase triplever latched, check for 0.020" – 0.040" engagement of the shift latch and lowercase triplever.

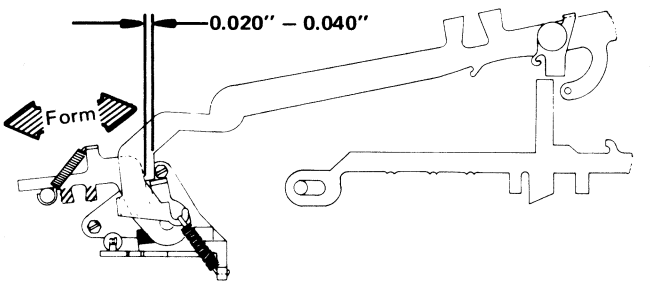


Figure 2-206. Shift Latch (Level 2)

Chapter 3. Reference Data

Contents

EDGE CONNECTOR LOCATIONS

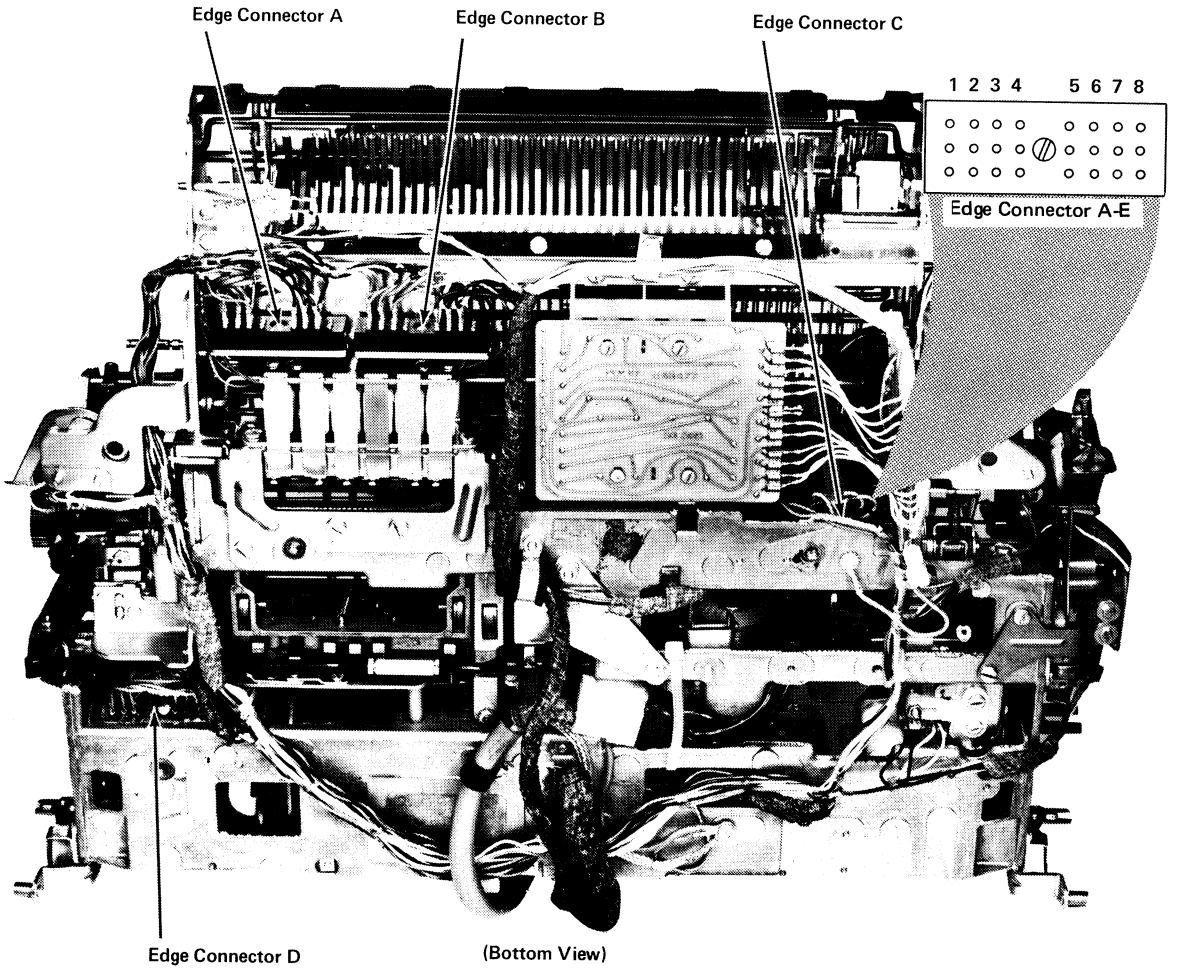


Figure 3-1. Edge Connector Locations (Bottom of Printer)

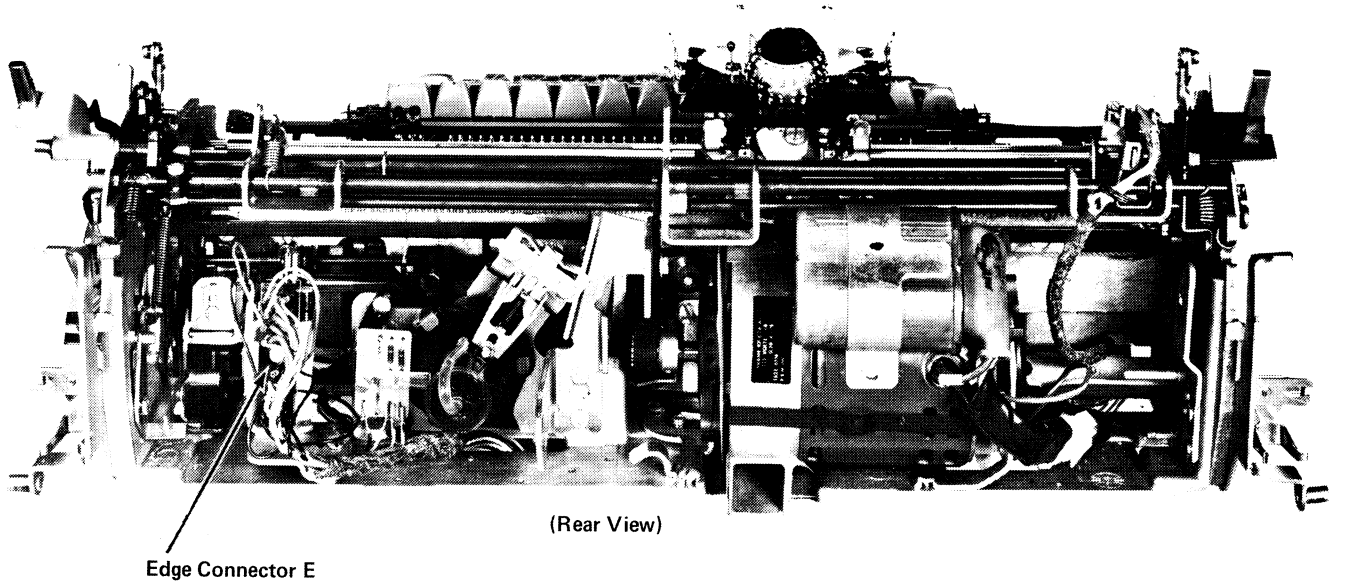


Figure 3-2. Edge Connector Locations (Rear of Printer)

MAGNET, SOLENOID, AND REED SWITCH LOCATIONS

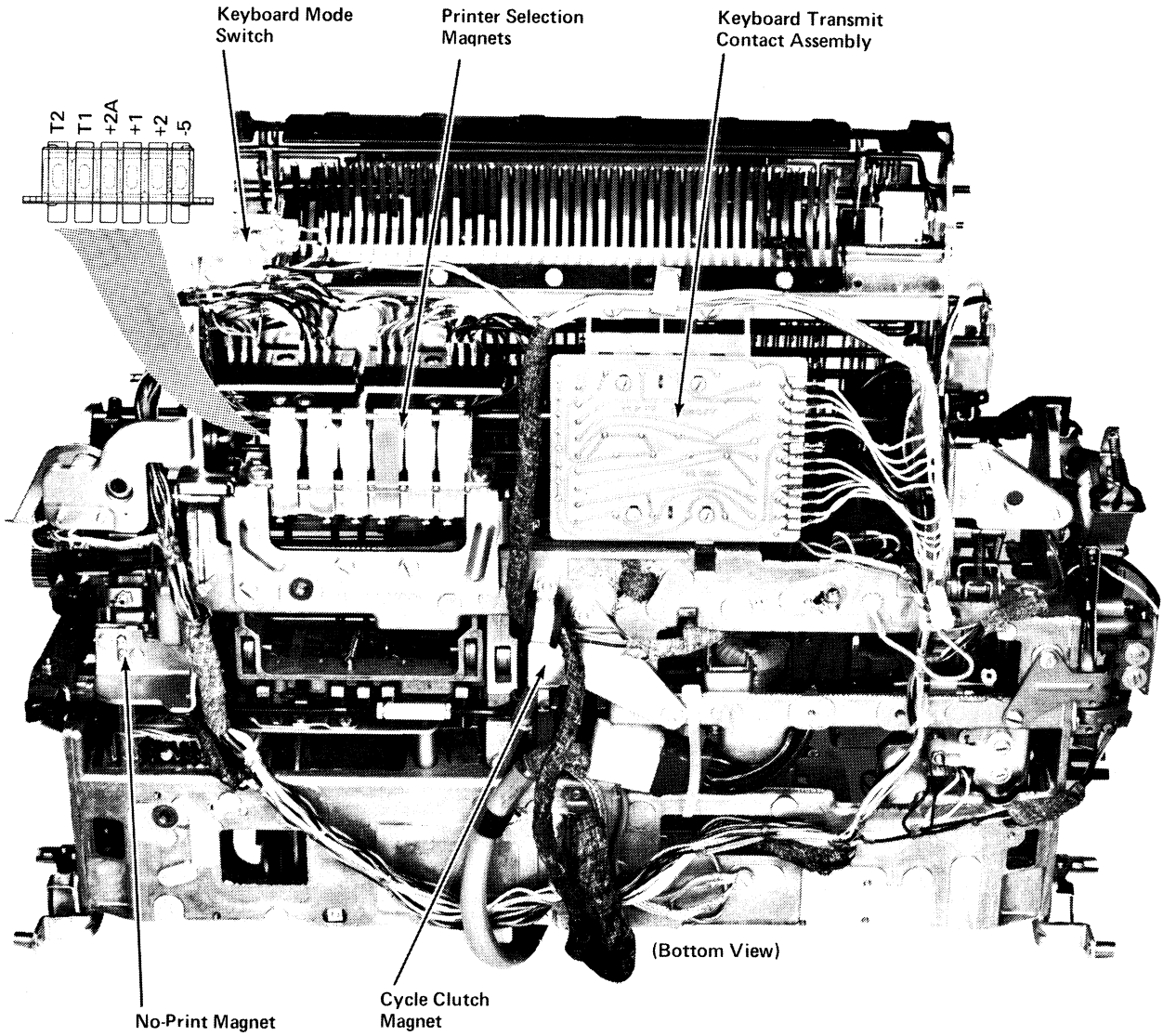


Figure 3-3. Magnet, Solenoid, and Reed Switch Locations (Bottom of Printer)

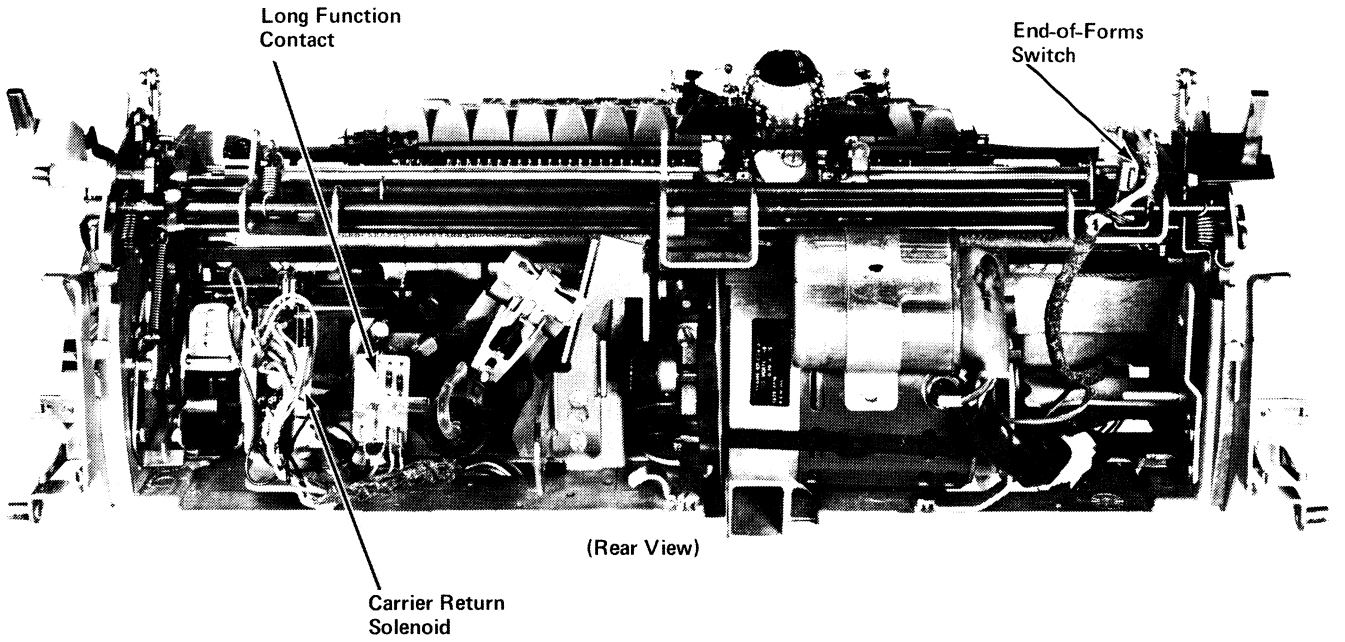


Figure 3-4. Magnet, Solenoid, and Reed Switch Locations (Rear of Printer)

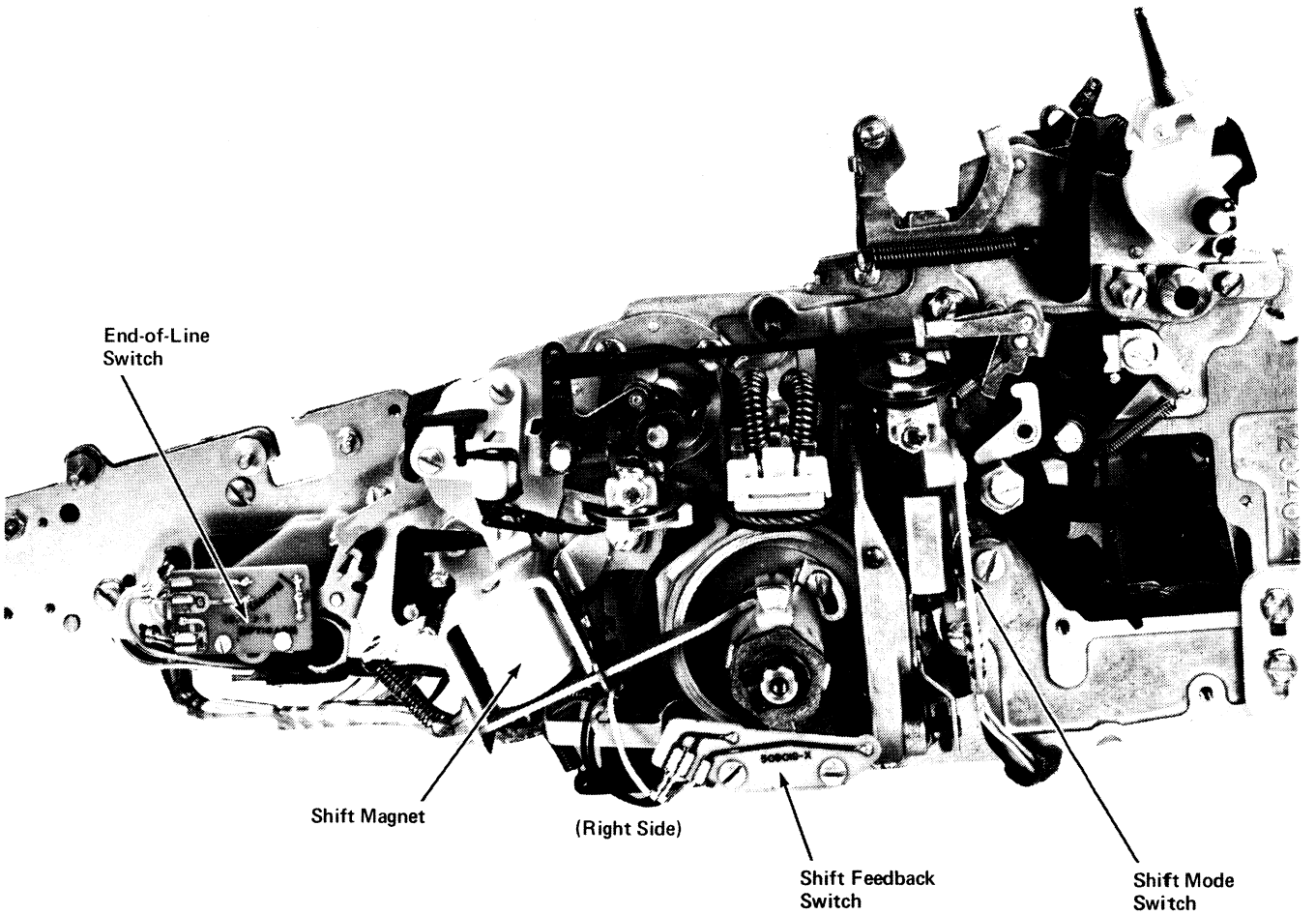


Figure 3-5. Magnet, Solenoid, and Reed Switch Locations (Right Side of Printer)

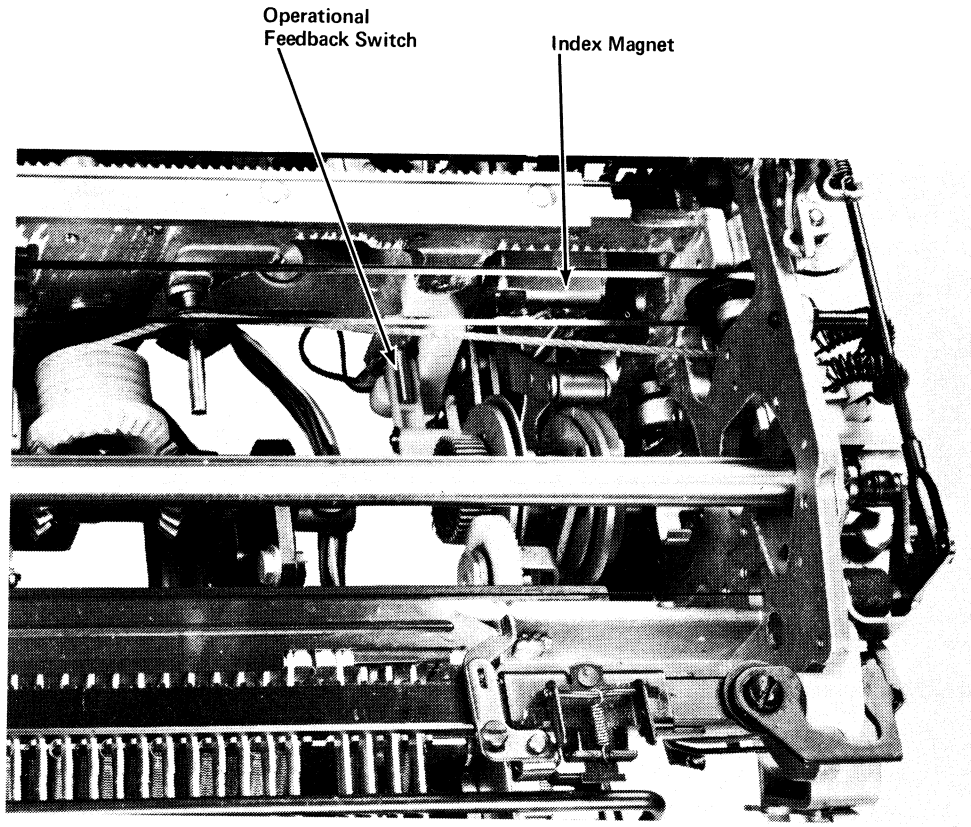


Figure 3-6. Magnet, Solenoid, and Reed Switch Locations (Top, Right of Printer)

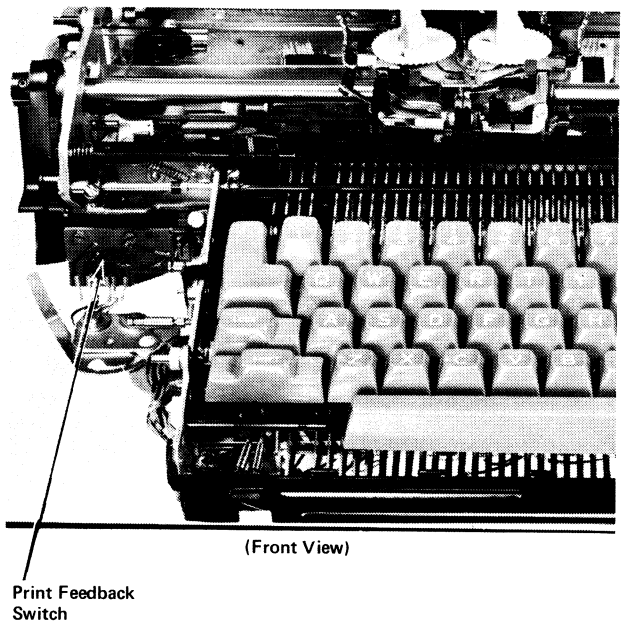
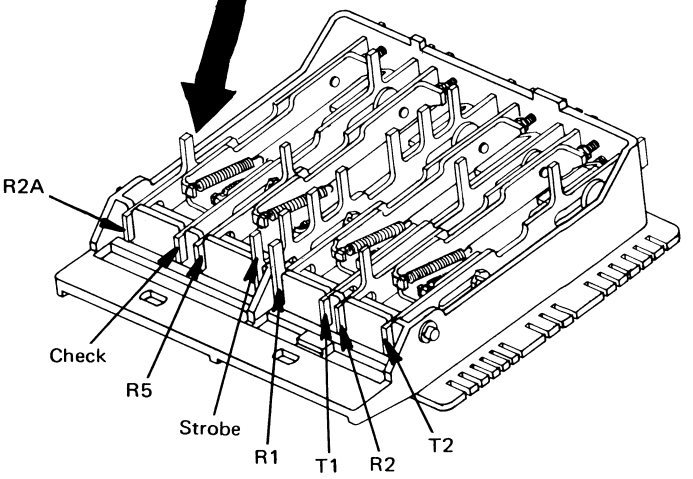


Figure 3-7. Magnet, Solenoid, and Reed Switch Locations (Front of Printer)

KEYBOARD TRANSMIT CODE CHART

Character	Keyboard Transmit Contact Interposers (No Relationship to Tilt-Rotate Magnets)						
	R1	R2	R2A	R5	T1	T2	CK
1	1	0	0	0	1	1	0
2	0	1	0	0	1	1	0
3	1	1	0	0	1	1	1
4	0	0	1	0	1	1	0
5	1	0	1	0	1	1	1
6	0	1	1	0	1	1	1
7	1	1	1	0	1	1	0
8	0	0	0	1	1	1	0
9	1	0	0	1	1	1	1
0	0	0	0	0	1	1	1
A	1	0	0	0	0	0	0
B	0	1	0	0	0	0	0
C	1	1	0	0	0	0	1
D	0	0	1	0	0	0	0
E	1	0	1	0	0	0	1
F	0	1	1	0	0	0	1
G	1	1	1	0	0	0	0
H	0	0	0	1	0	0	0
I	1	0	0	1	0	0	1
J	1	0	0	0	1	0	1
K	0	1	0	0	1	0	1
L	1	1	0	0	1	0	0
M	0	0	1	0	1	0	1
N	1	0	1	0	1	0	0
O	0	1	1	0	1	0	0
P	1	1	1	0	1	0	1
Q	0	0	0	1	1	0	1
R	1	0	0	1	1	0	0
S	0	1	0	0	0	1	1
T	1	1	0	0	0	1	0
U	0	0	1	0	0	1	1
V	1	0	1	0	0	1	0
W	0	1	1	0	0	1	0
X	1	1	1	0	0	1	1
Y	0	0	0	1	0	1	1
Z	1	0	0	1	0	1	0
-	0	0	0	0	0	1	0
&	0	0	0	0	1	0	0
@	0	0	1	1	1	1	1
$	1	1	0	1	1	0	1
#	1	1	0	1	1	1	0
'	1	1	0	1	0	1	1
.	1	1	0	1	0	0	0
/	1	0	0	0	0	1	1
Space	0	0	0	0	0	0	1
CR	0	0	1	1	1	0	0
US	0	1	1	1	0	0	0
DS	0	1	1	1	1	1	0

These characters may differ, to meet the needs of the using system.



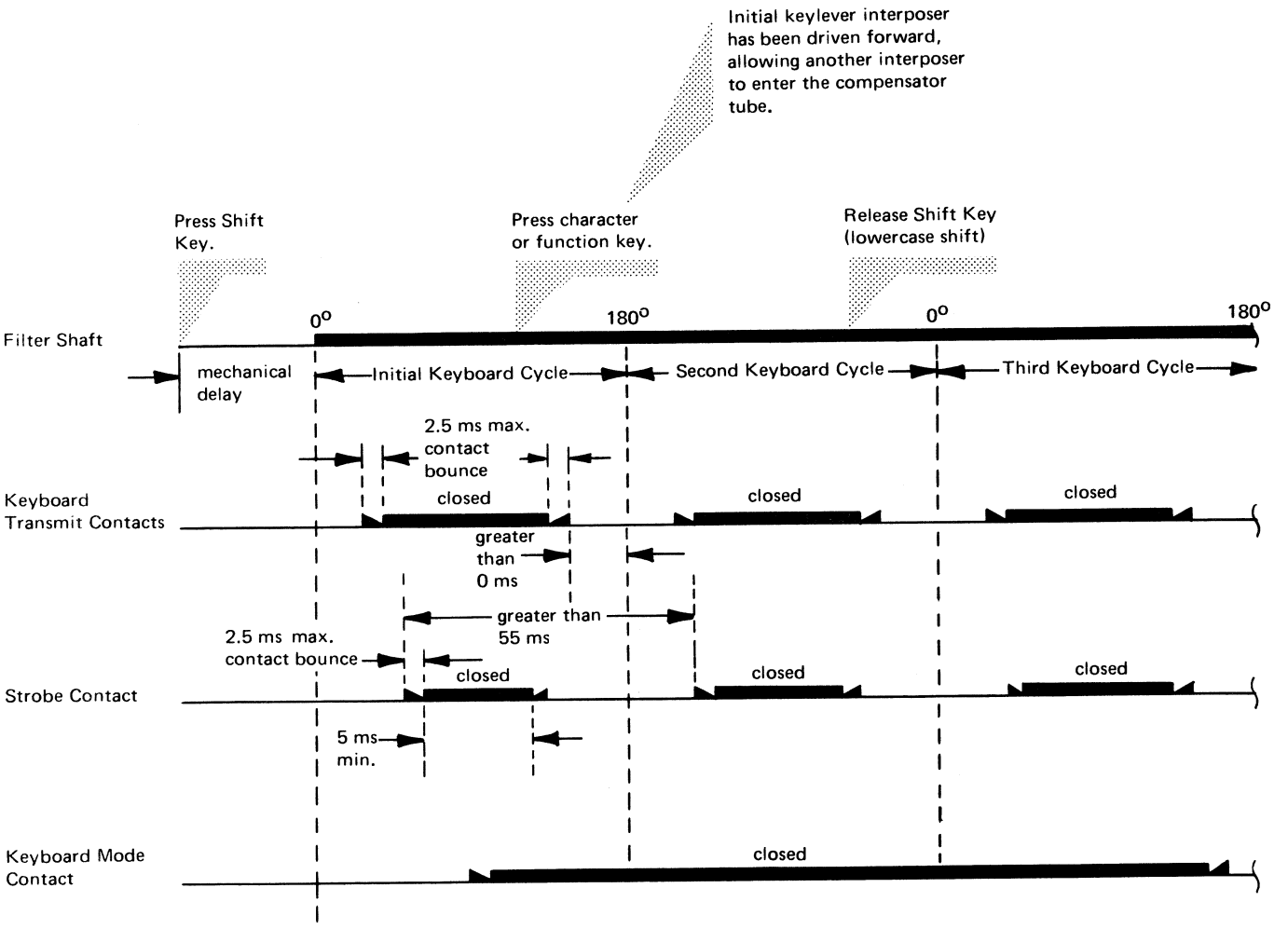
(Top, Right View)

NOTE Only lowercase hemisphere characters are shown. Uppercase hemisphere characters have this same bit configuration plus the bit generated by the keyboard mode contact.

NOTE 1 = Corresponding Bit Contained in Character

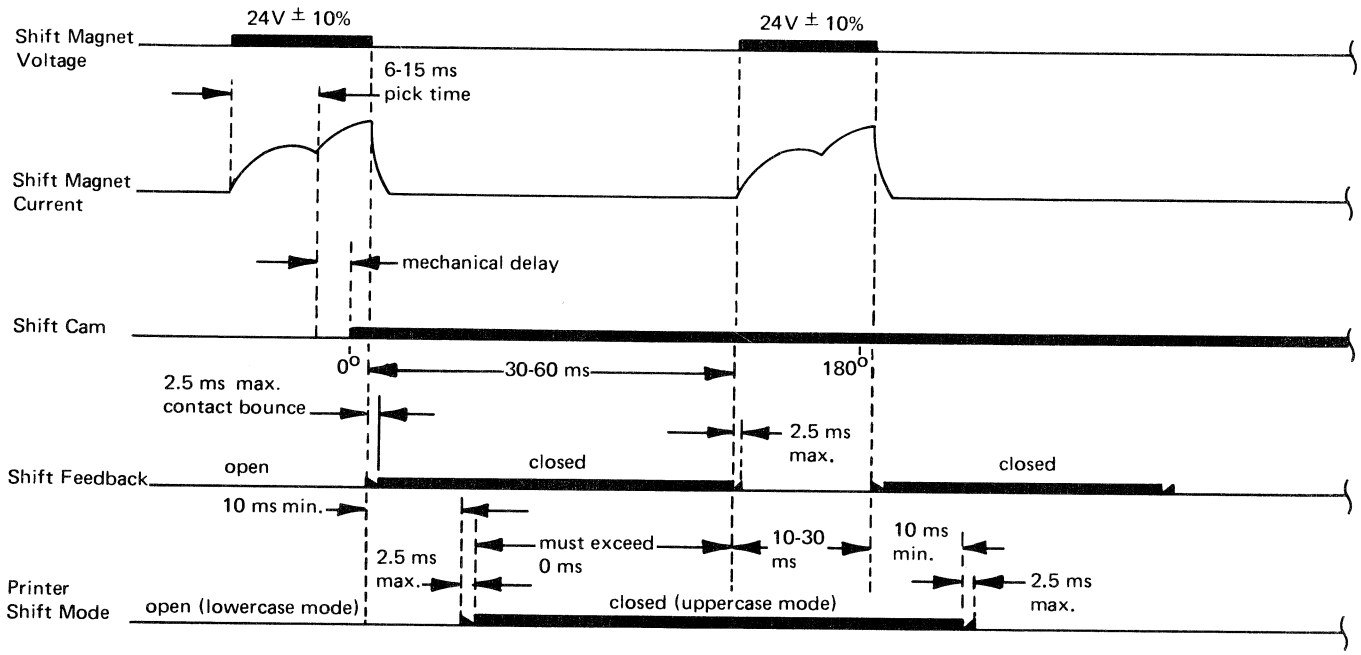
KEYBOARD TRANSMIT TIMING CHART

- This chart shows an example of an uppercase shift character, a printable character, and a lowercase shift character entered at the maximum keyboard entry rate.
- Any combination of characters or functions can be entered at this maximum rate.



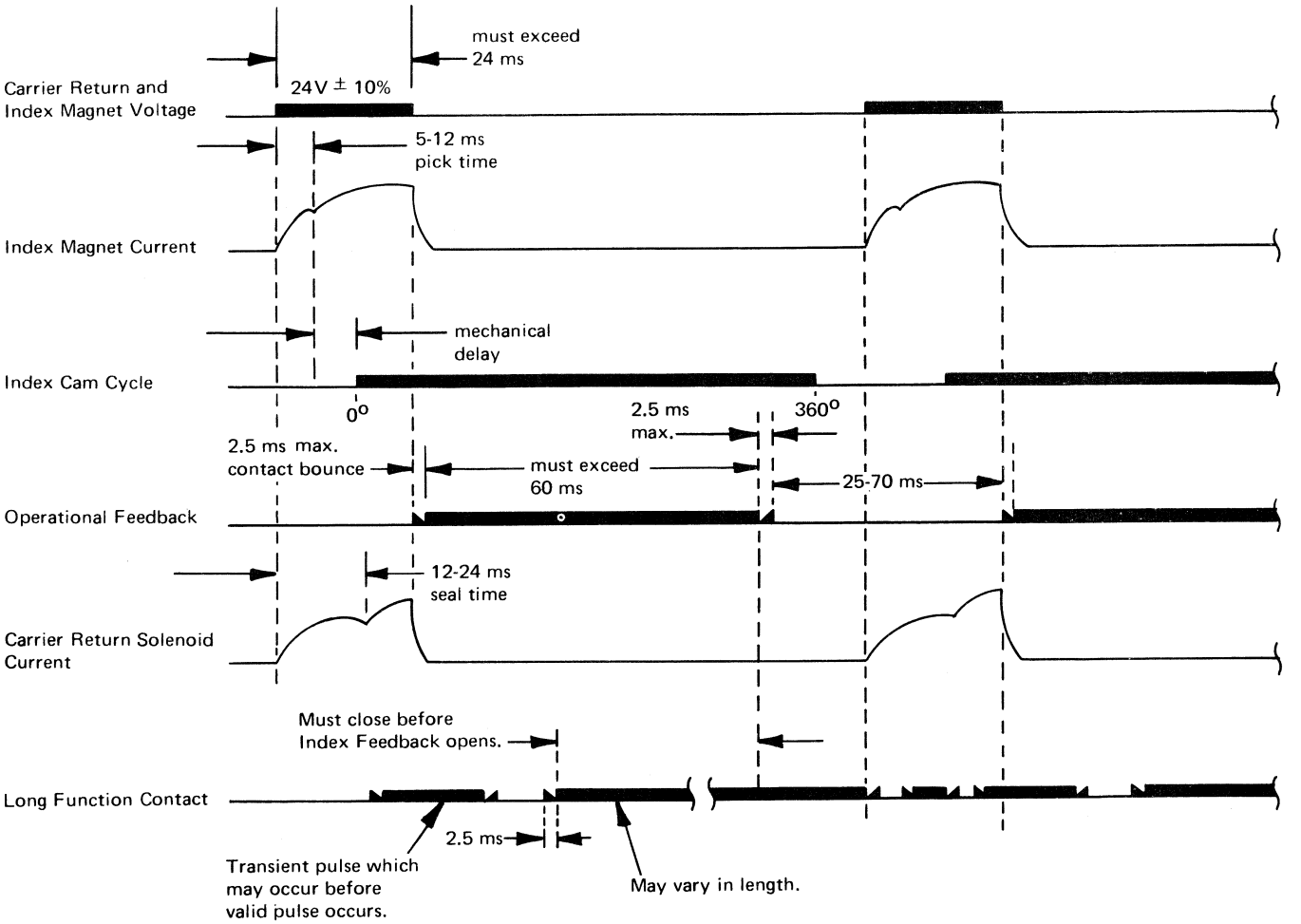
SHIFT TIMING CHART

- Chart shows an example of a lowercase to uppercase shift operation.



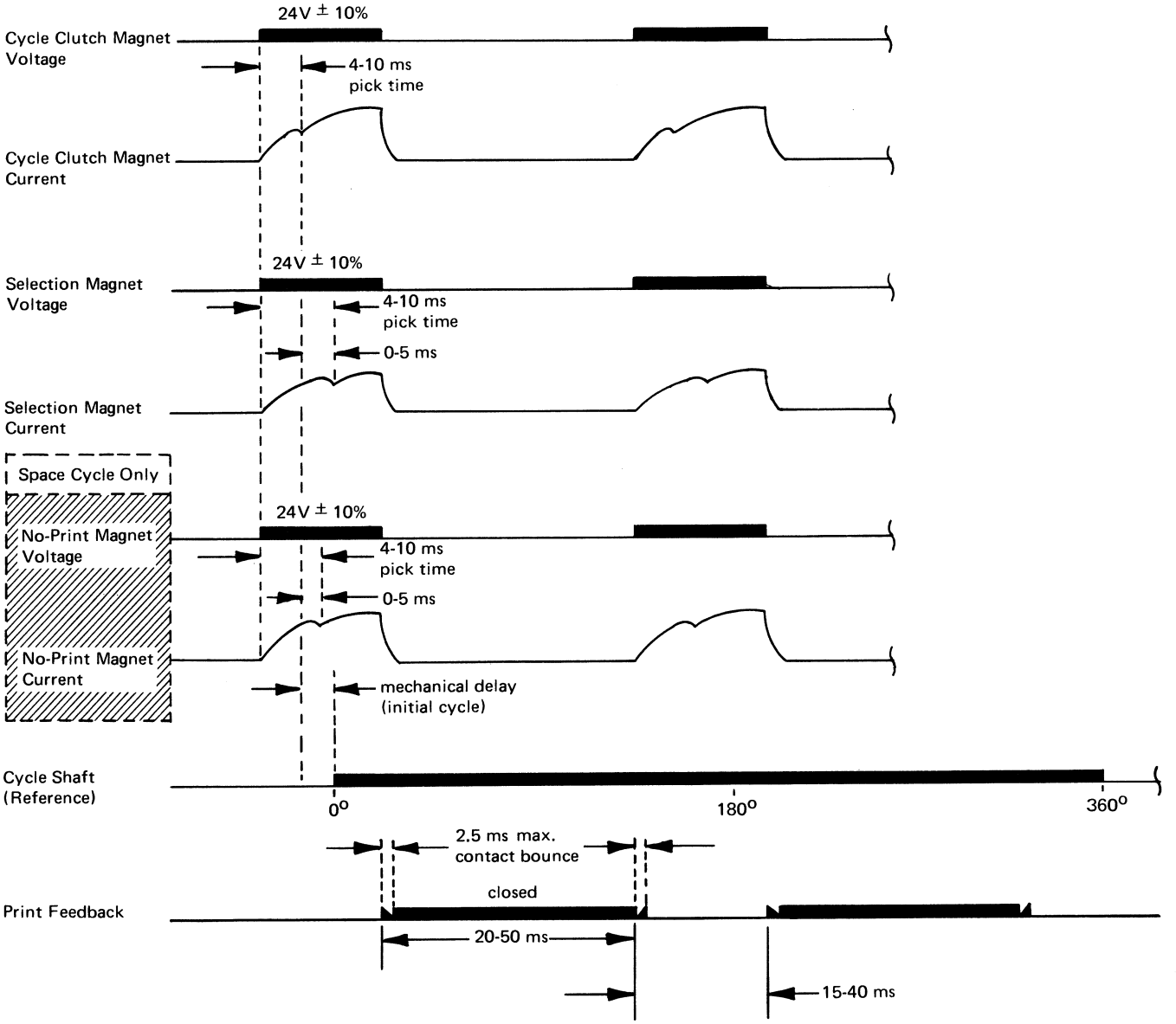
CARRIER RETURN/INDEX TIMING CHART

- Chart shows two consecutive carrier return/index operations.

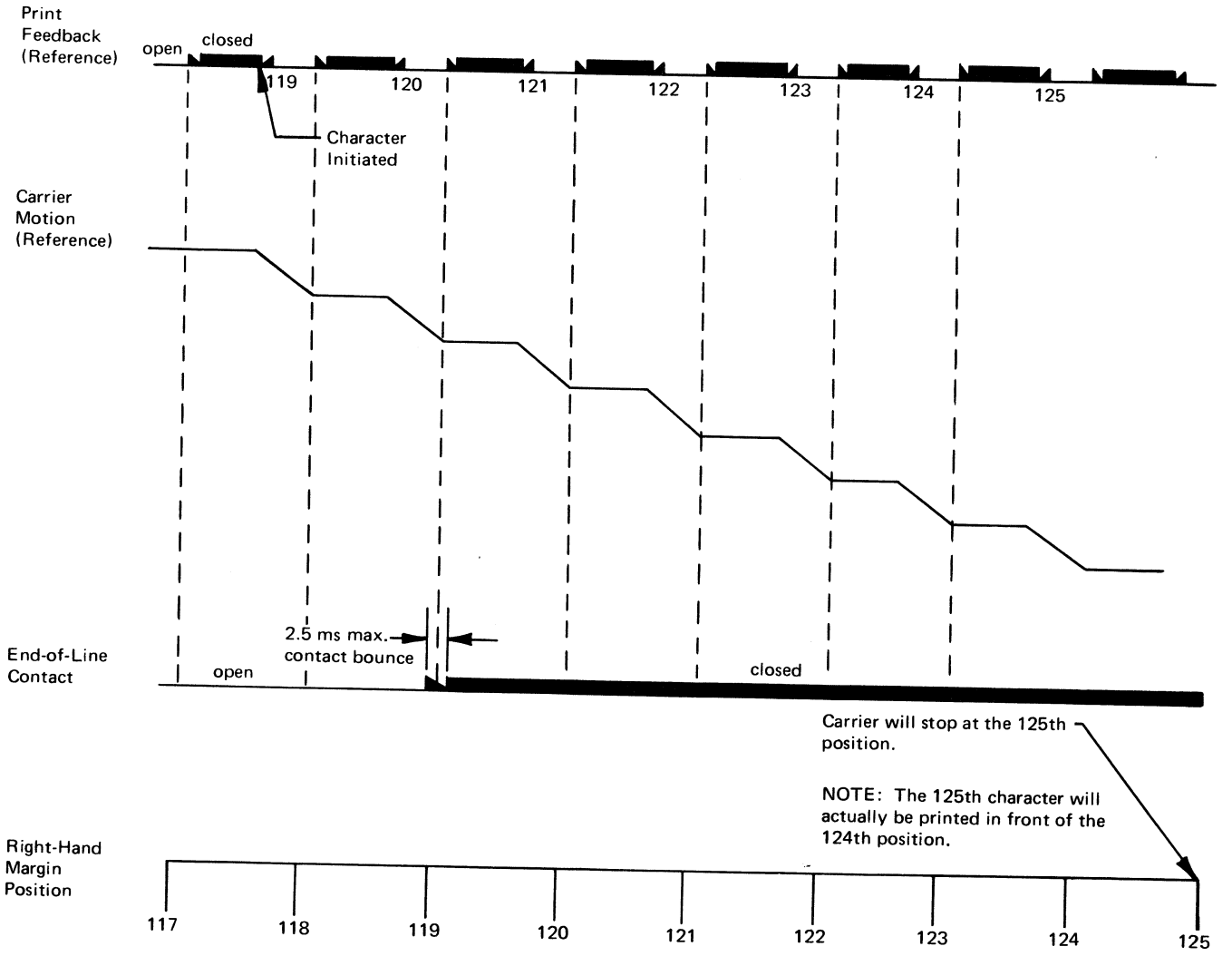


PRINT OPERATION TIMING CHART

- This chart applies to all printable characters as well as to a no-print (space) cycle. Timings indicate maximum operational speed of the printer.



END-OF-LINE CONTACT CHART



NOTE The length of end-of-line may vary from 4 to 6 spaces on the same printer, from one line to the next.

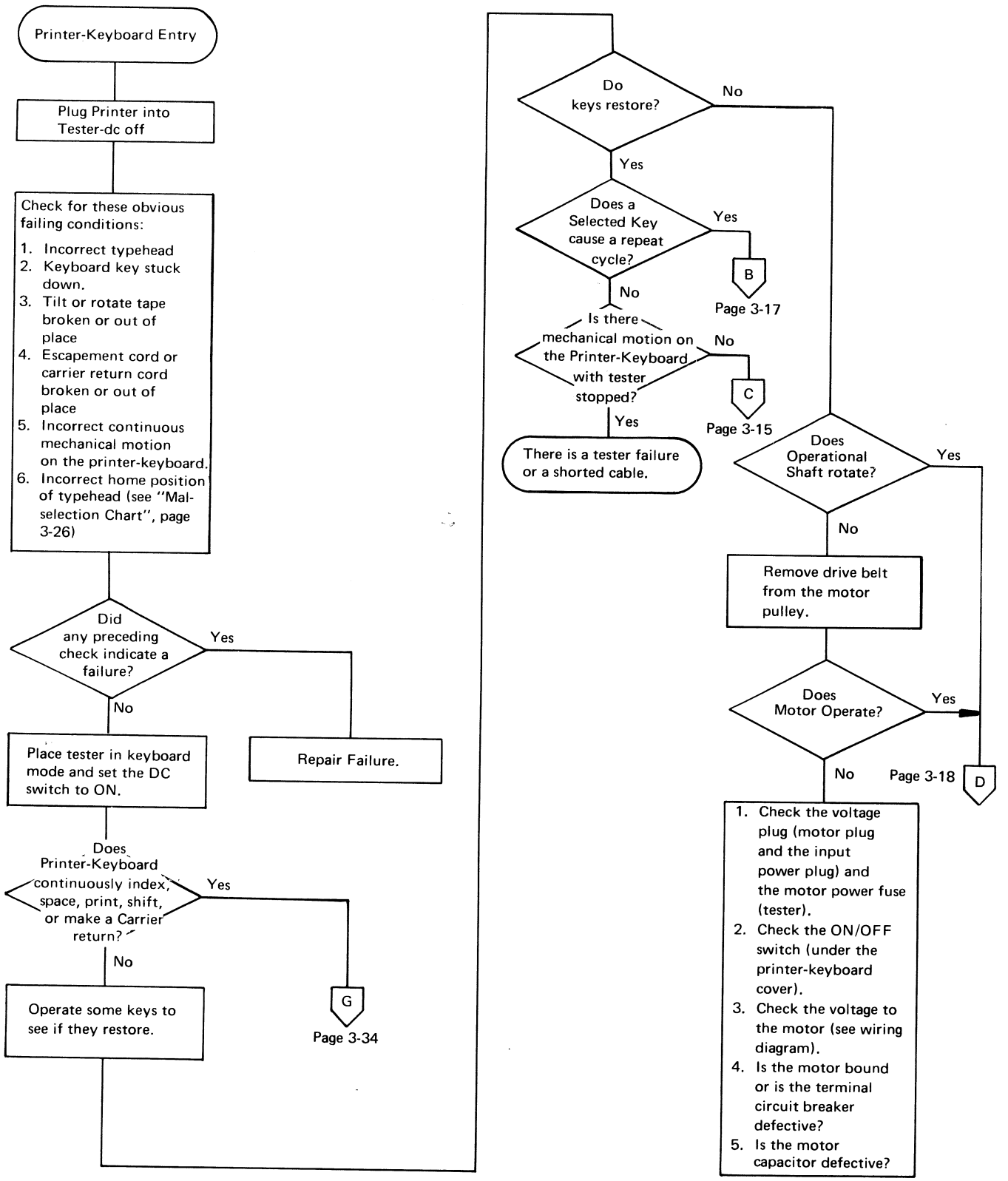
NOTE Adjustment numbers used in these flowcharts correspond to figure numbers in Chapter 2 of this manual.

NOTE If the customer engineer is asked "is the magnet picked?", he may have to meter the magnet to determine this. (A visual check may be misleading because of adjusted armatures, etc.).

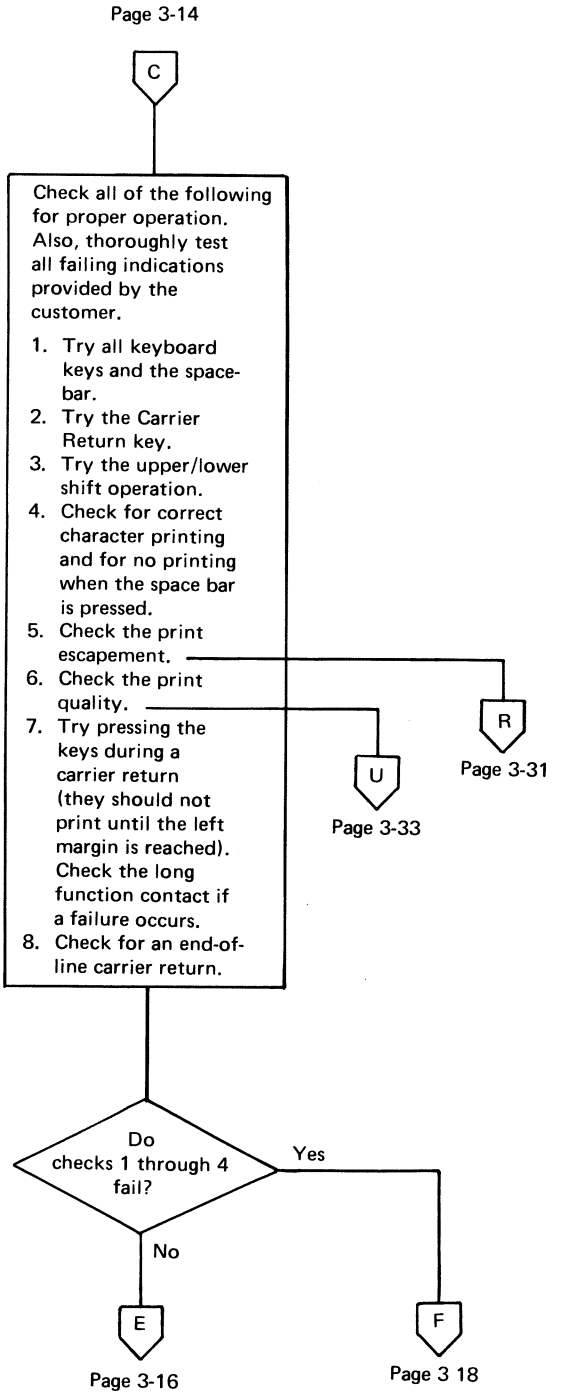
NOTE Noises and burned parts are not covered by these charts.

NOTE These charts are to be used with the NEw Selectric® Tester (NEST). See NEw Selectric® Tester (NEST) Theory-Maintenance, SY27-0089, for tester operation.

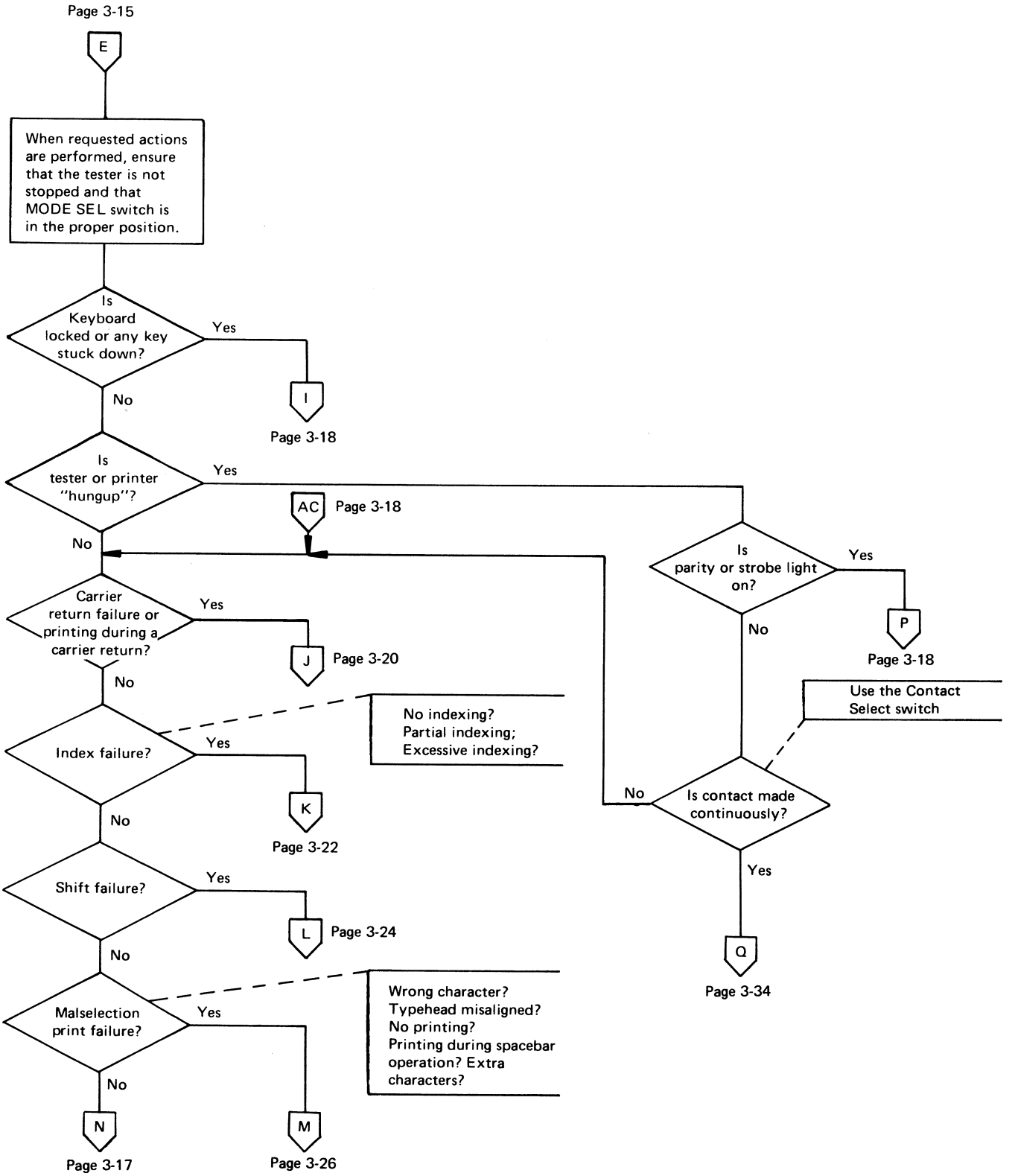
Common Entry Chart (Part 1 of 2)



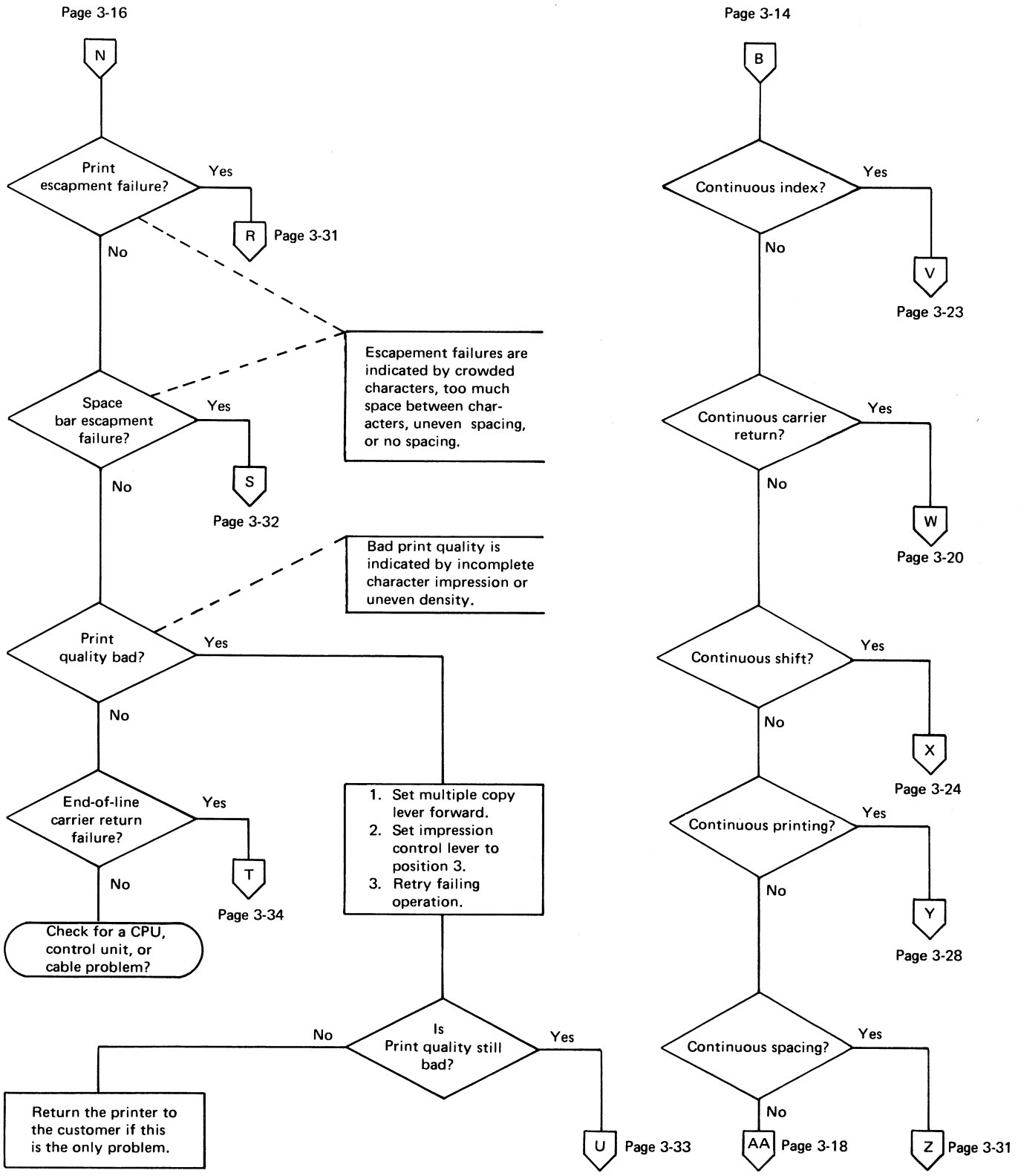
Common Entry Chart (Part 2 of 2)



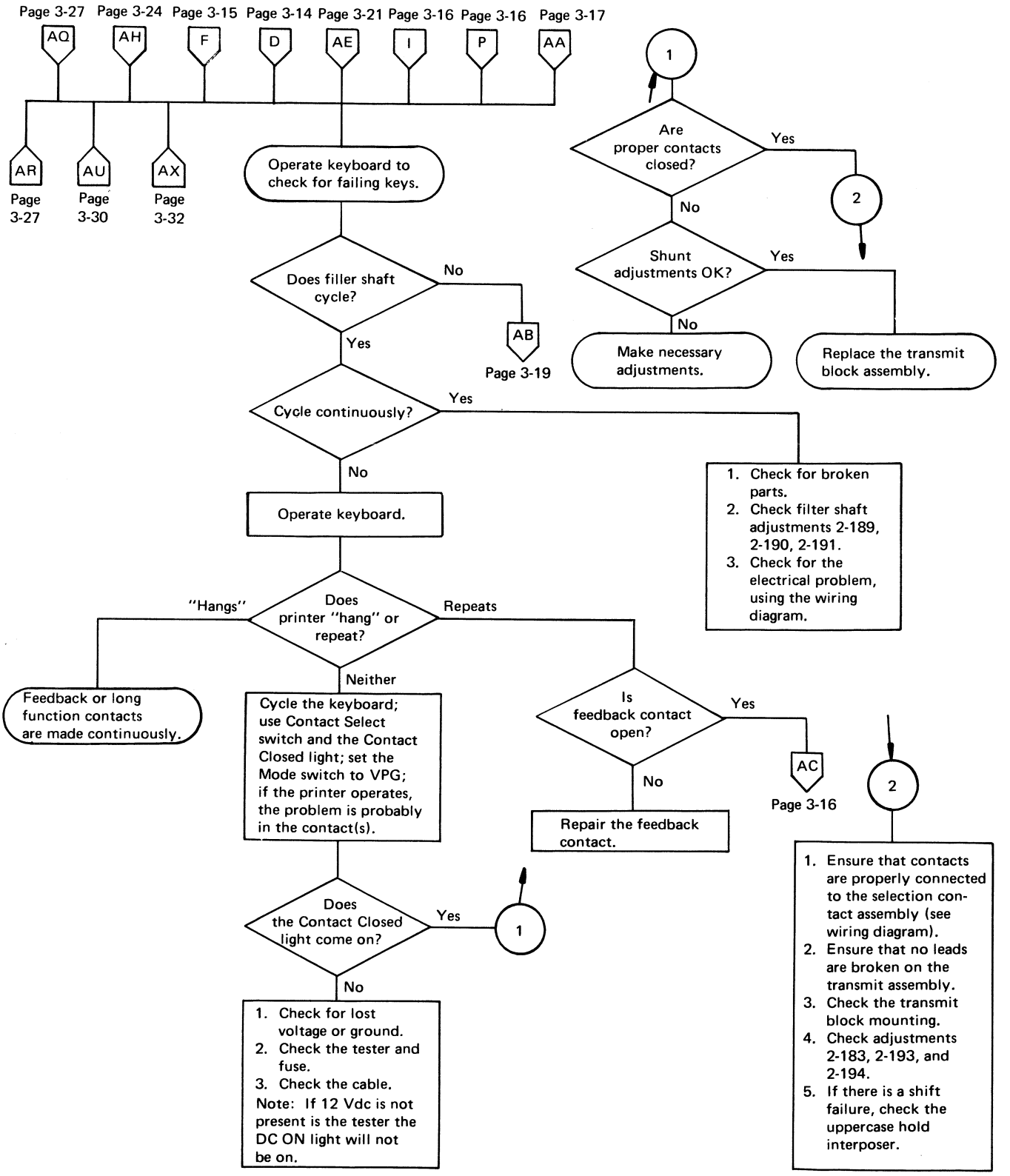
Mechanical Entry Chart (Part 1 of 2)



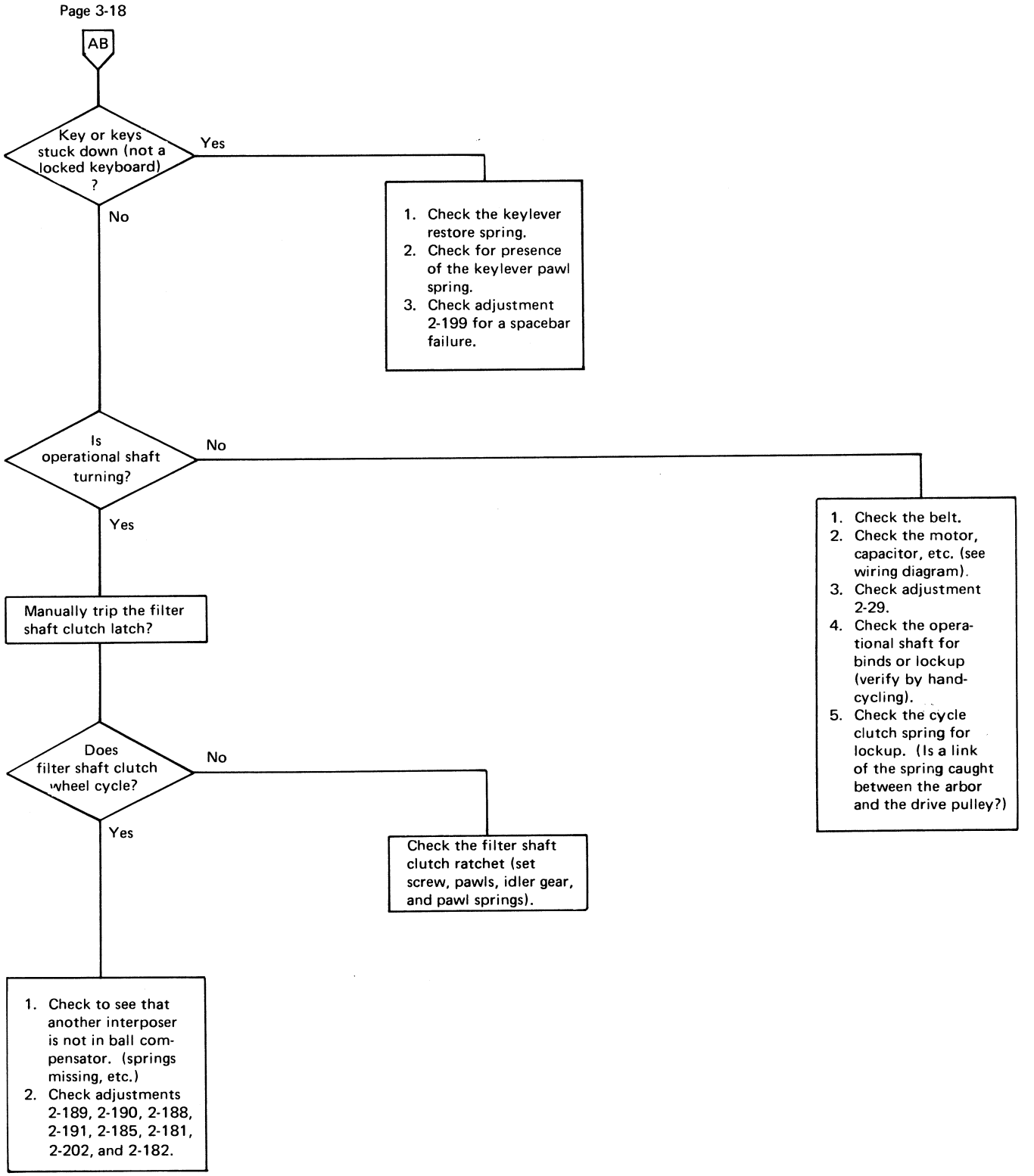
Mechanical Entry Chart (Part 2 of 2)



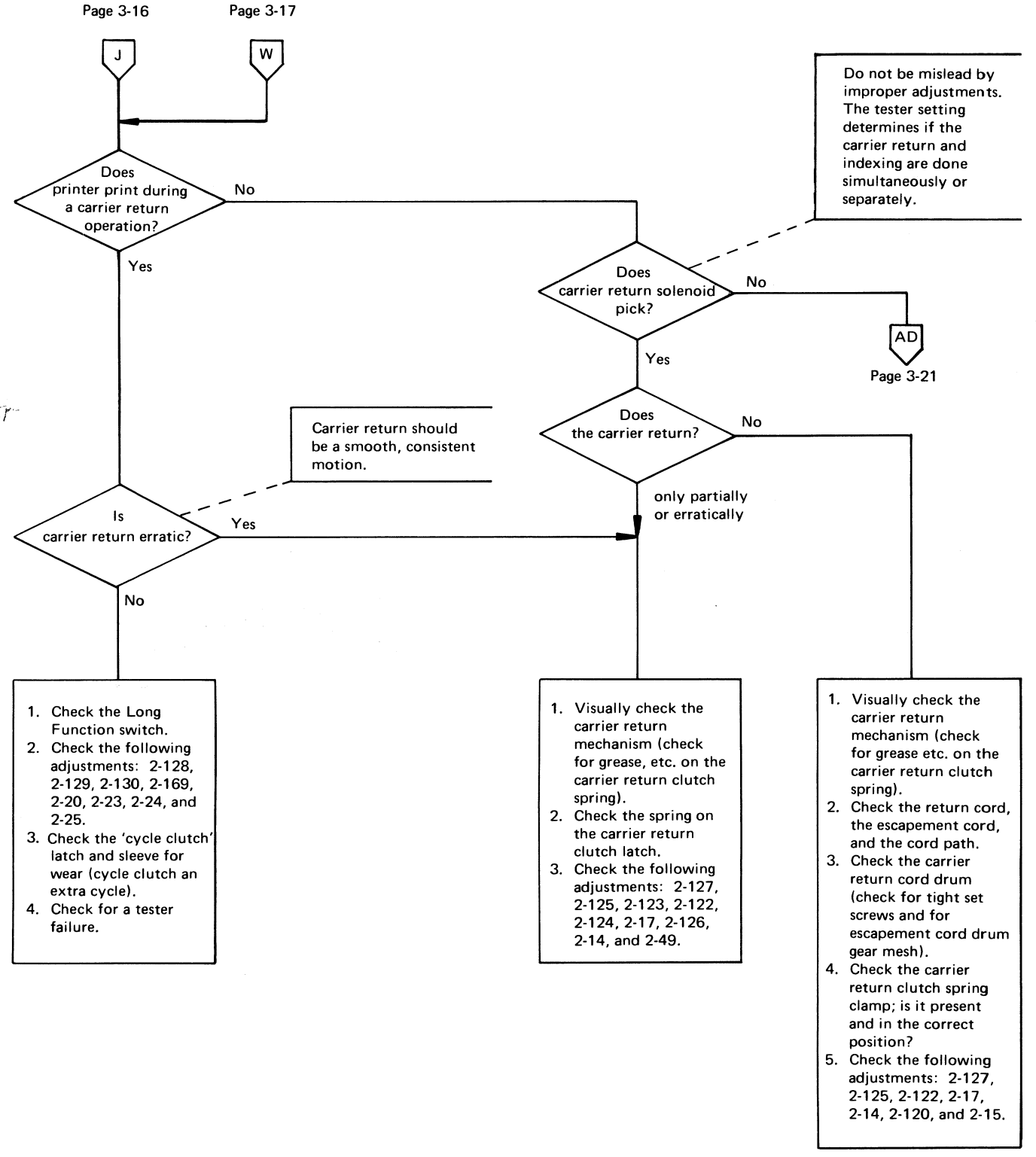
Keyboard Chart (Part 1 of 2)



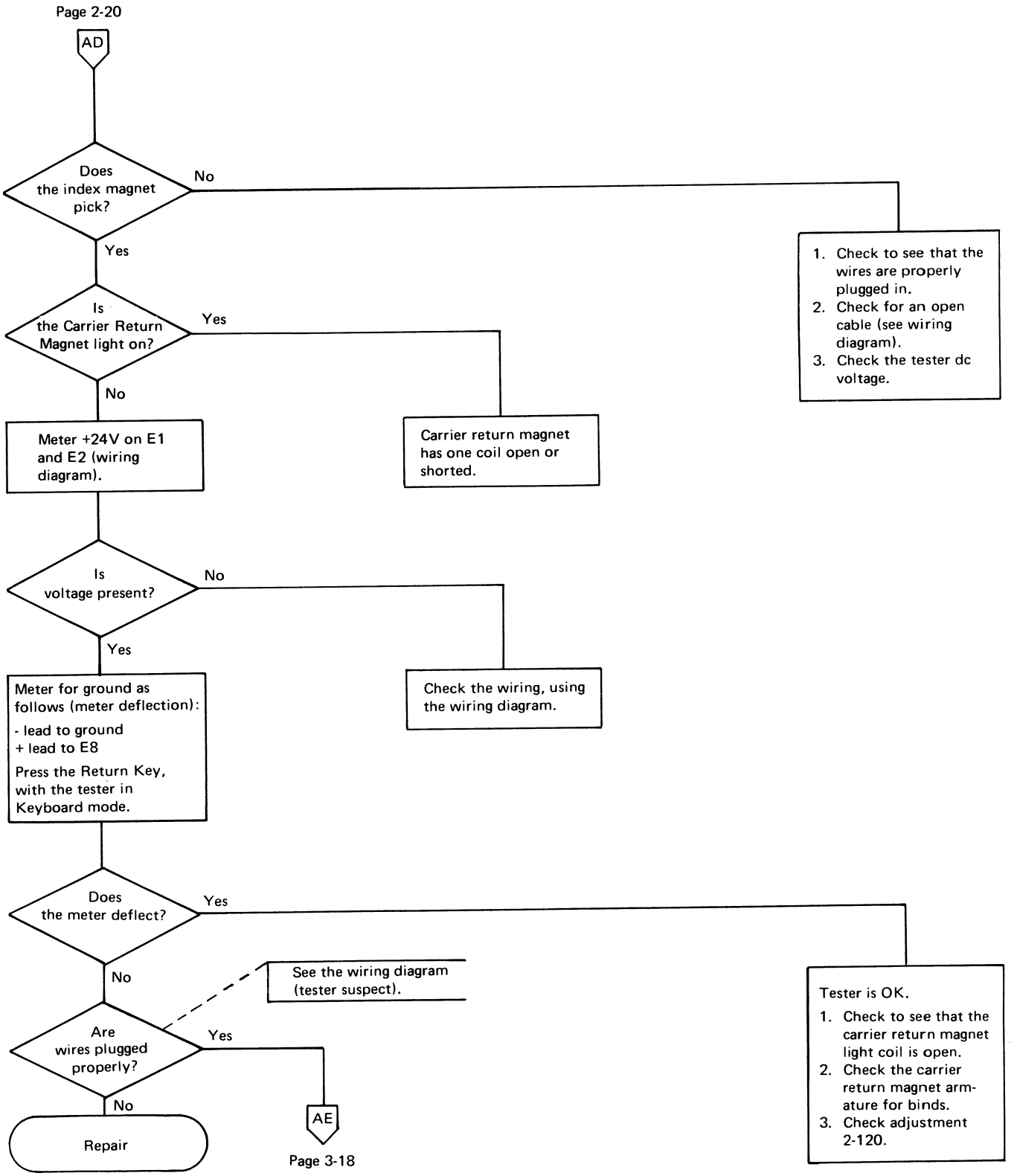
Keyboard Chart (Part 2 of 2)



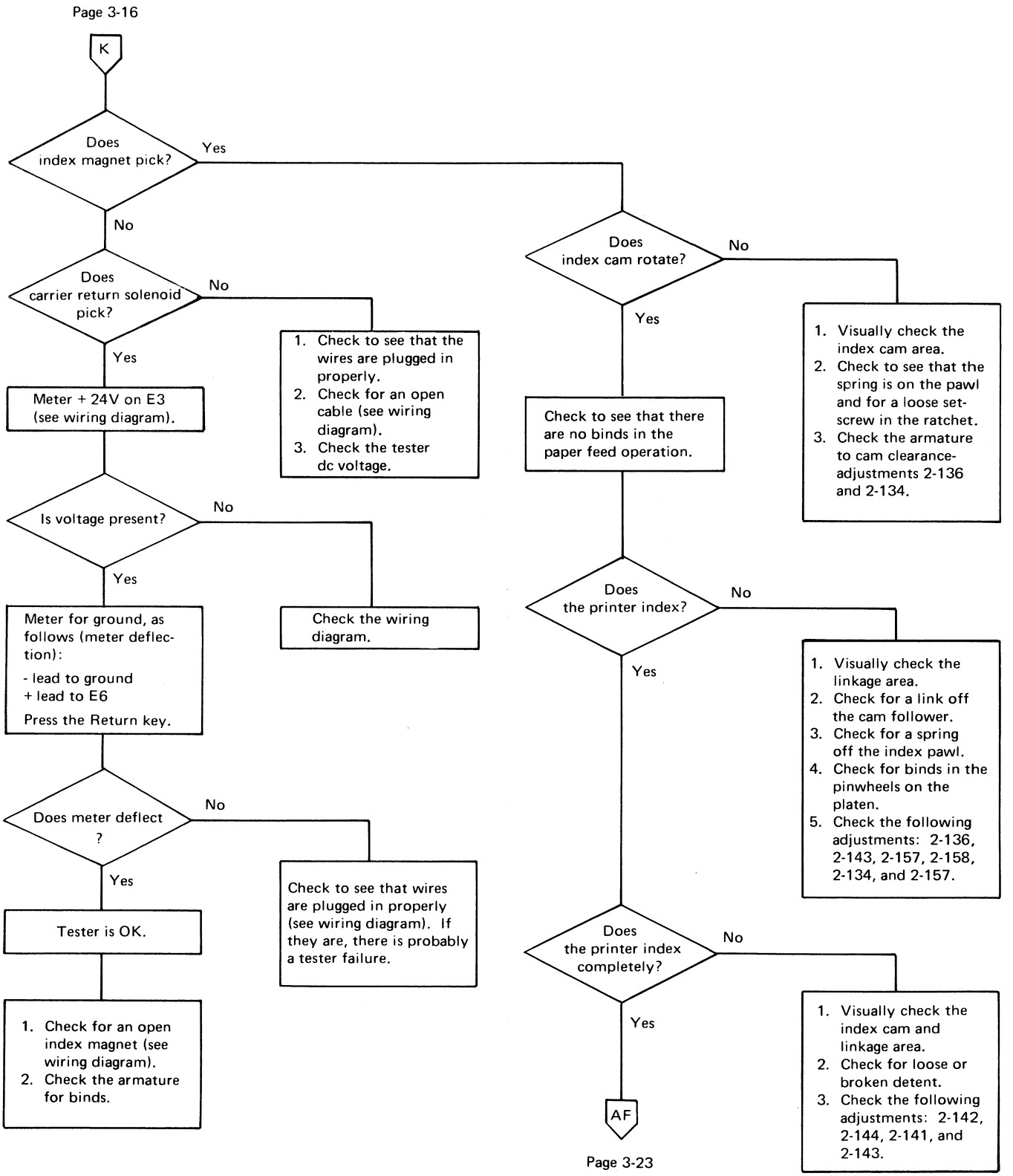
Carrier Return Chart (Part 1 of 2)



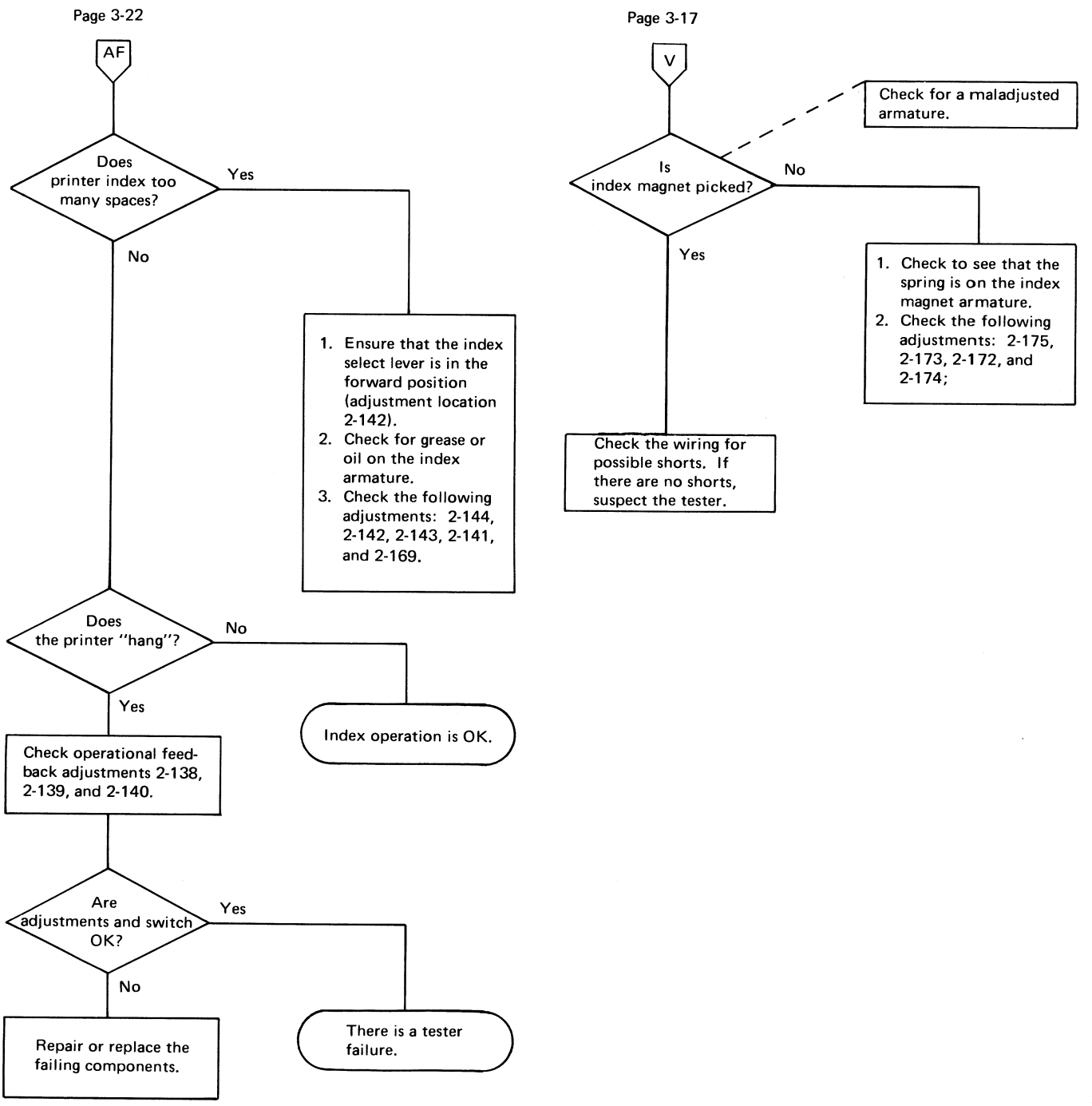
Carrier Return Chart (Part 2 of 2)



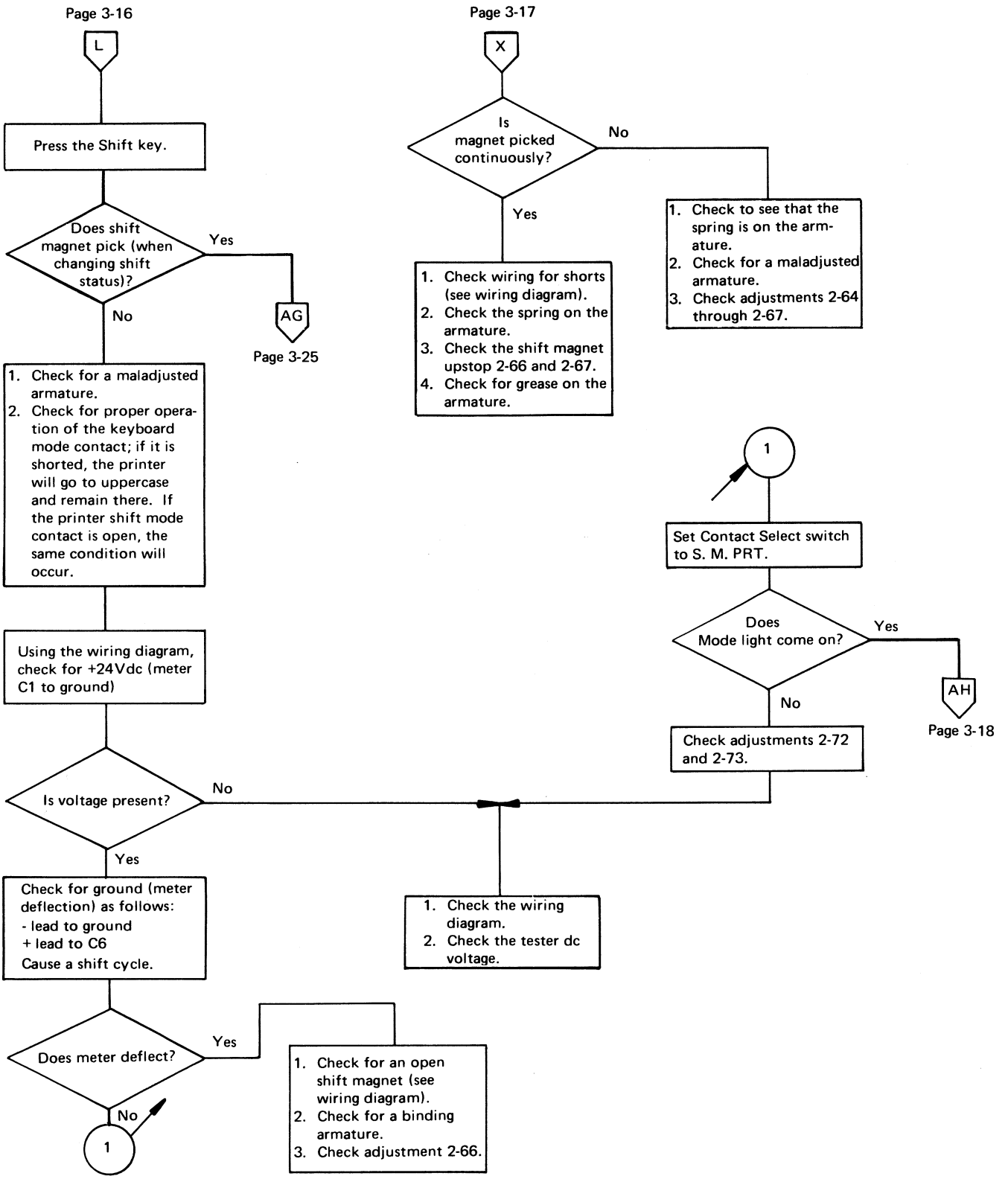
Index Chart (Part 1 of 2)



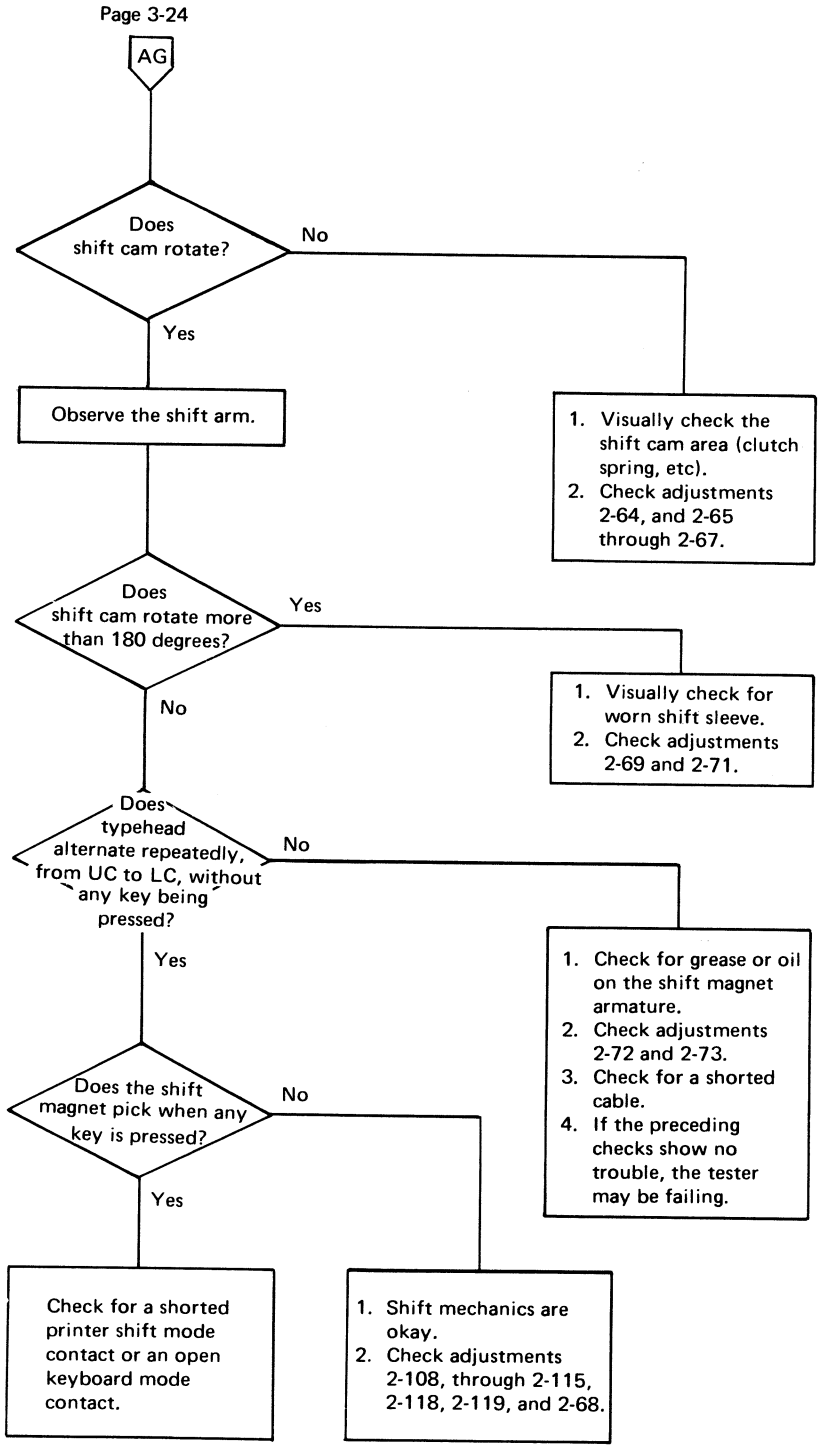
Index Chart (Part 2 of 2)



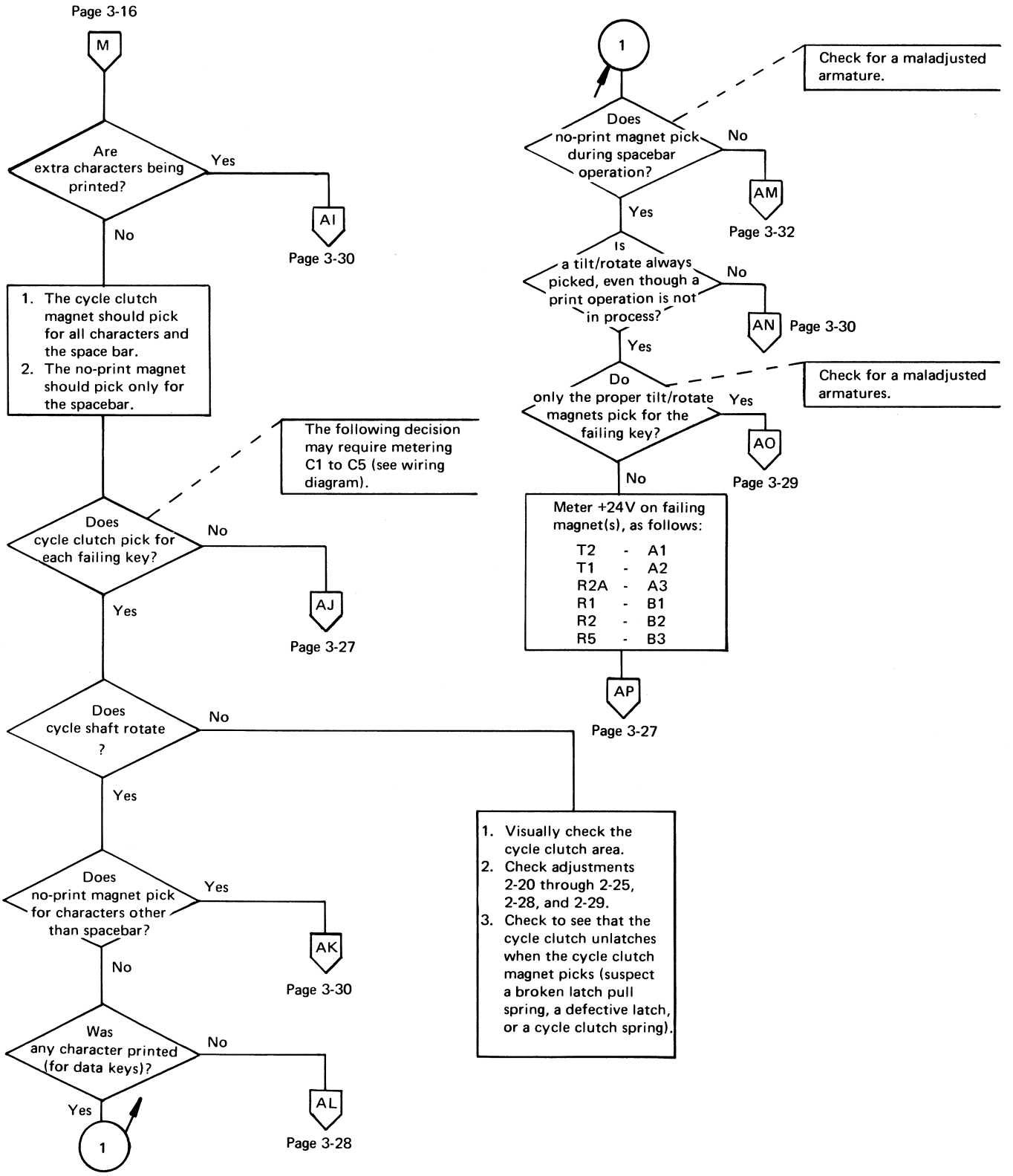
Shift Chart (Part 1 of 2)



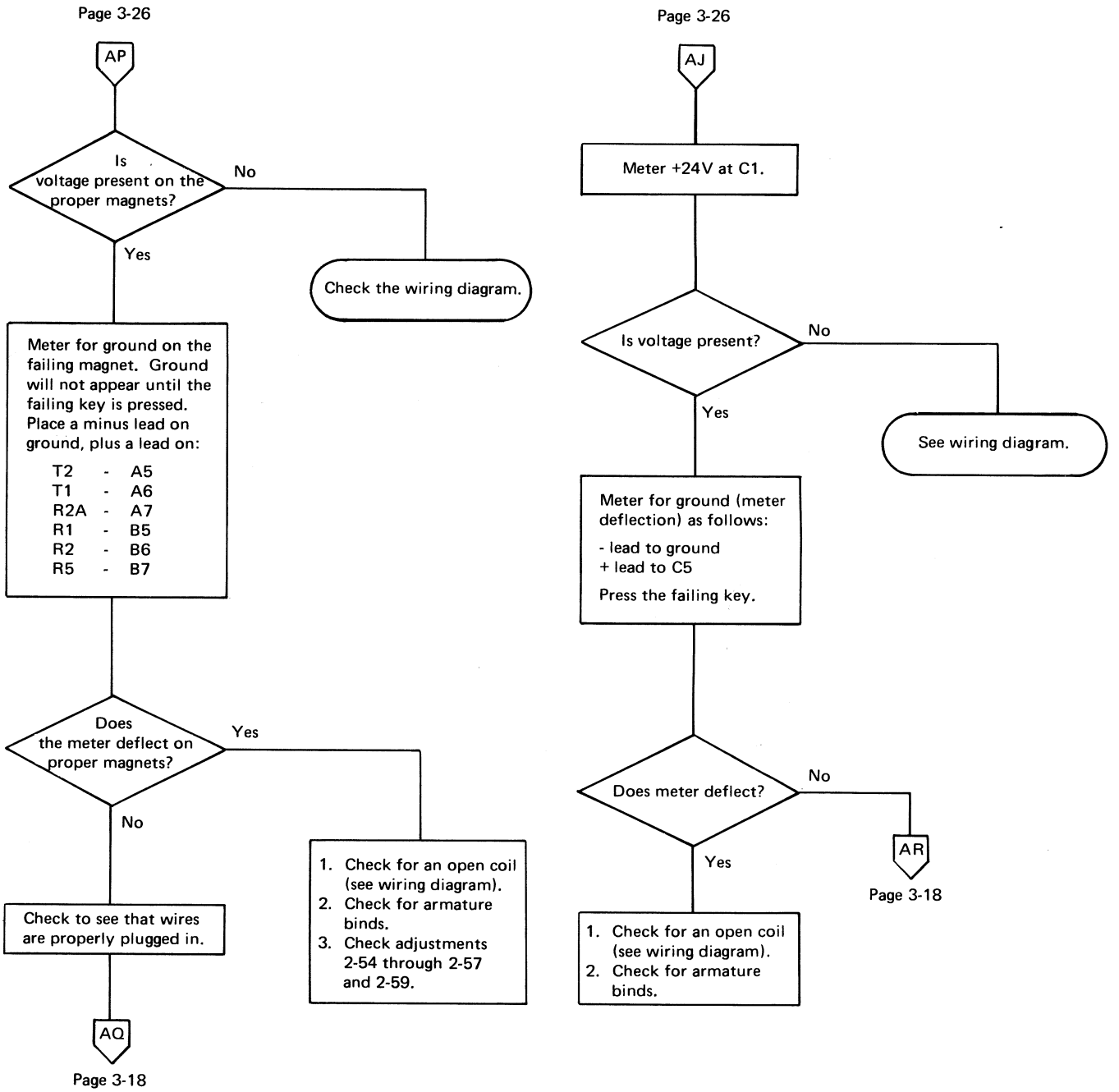
Shift Chart (Part 2 of 2)



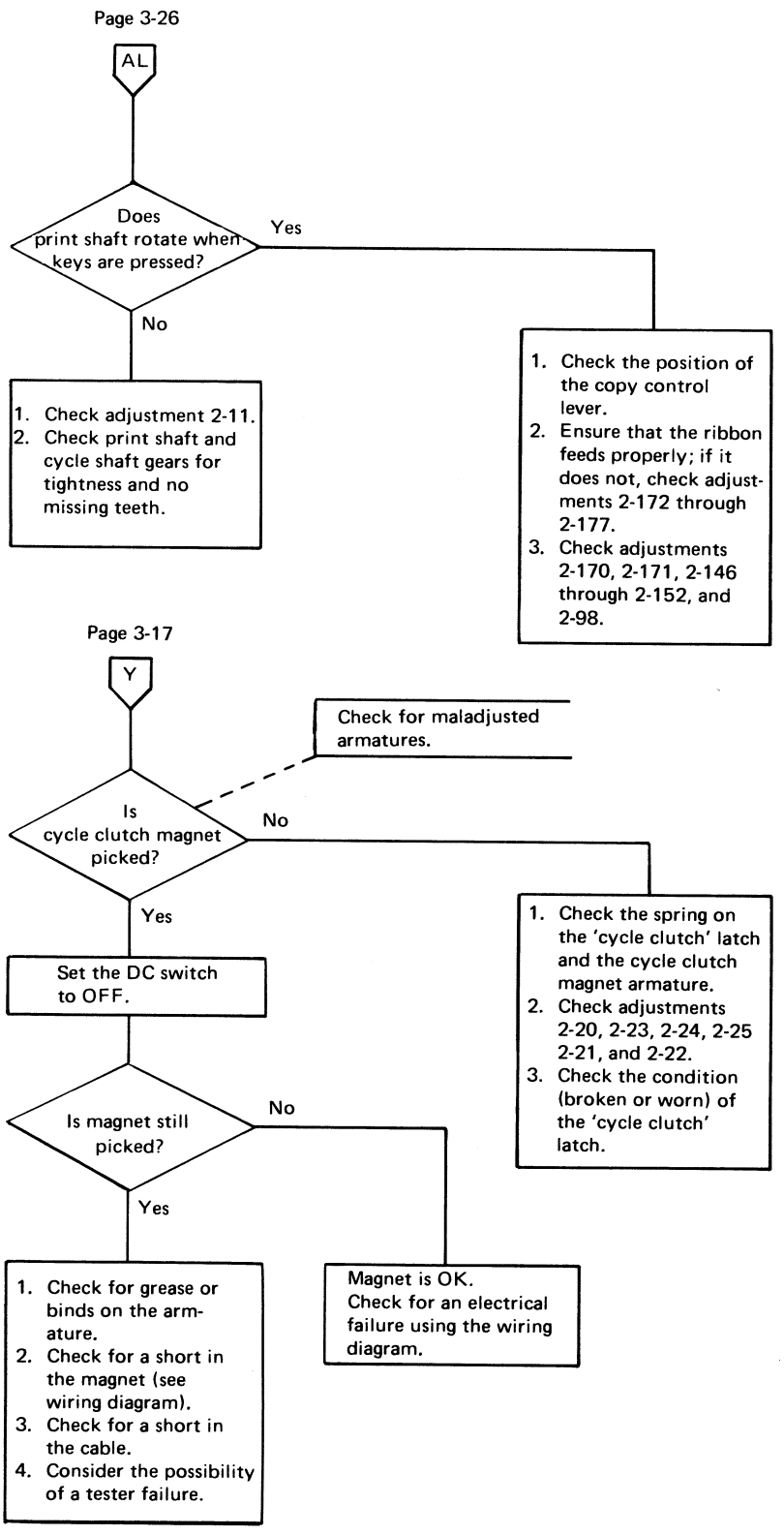
Malselection Chart (Part 1 of 5)



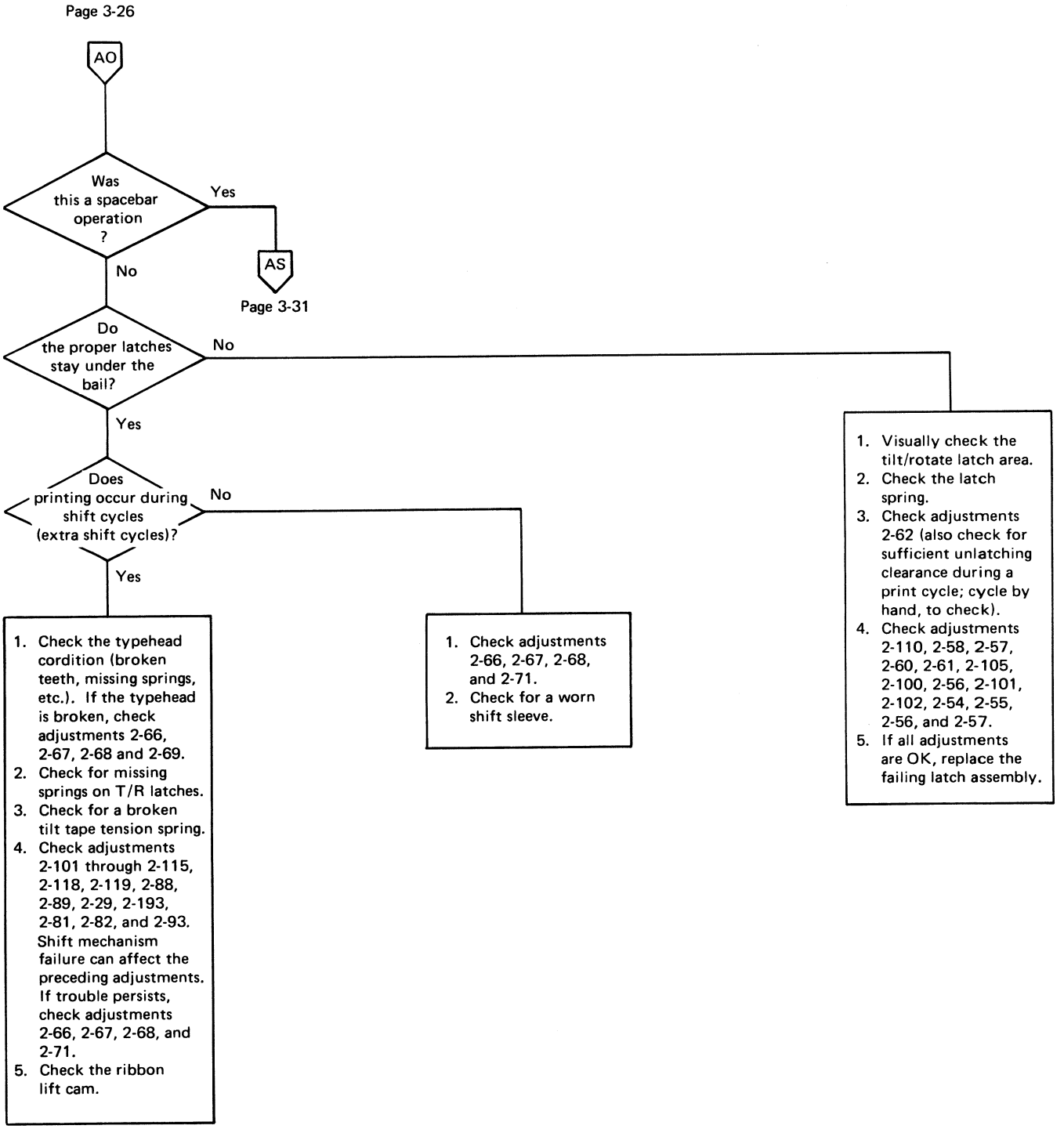
Malselection Chart (Part 2 of 5)



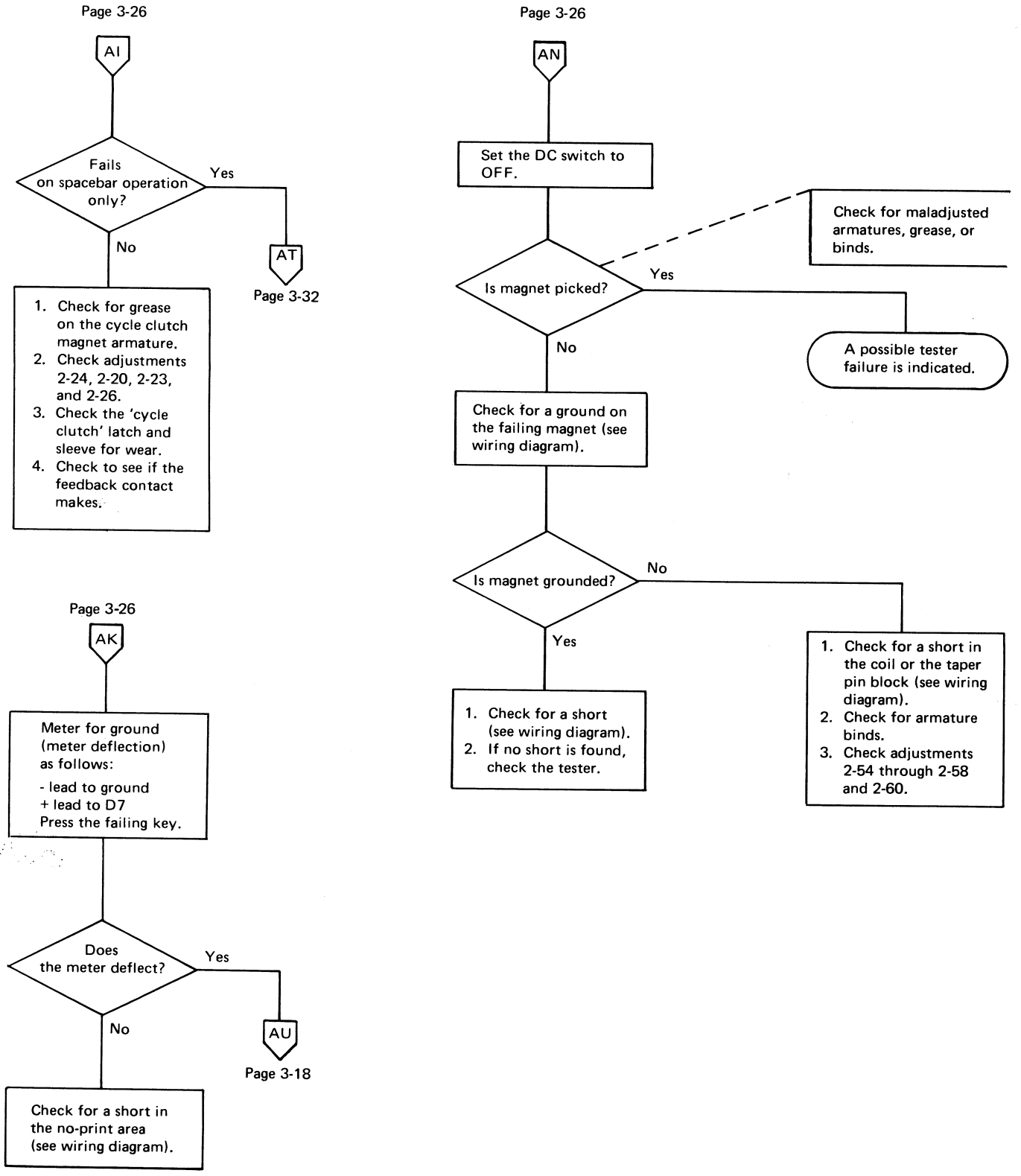
Malselection Chart (Part 3 of 5)



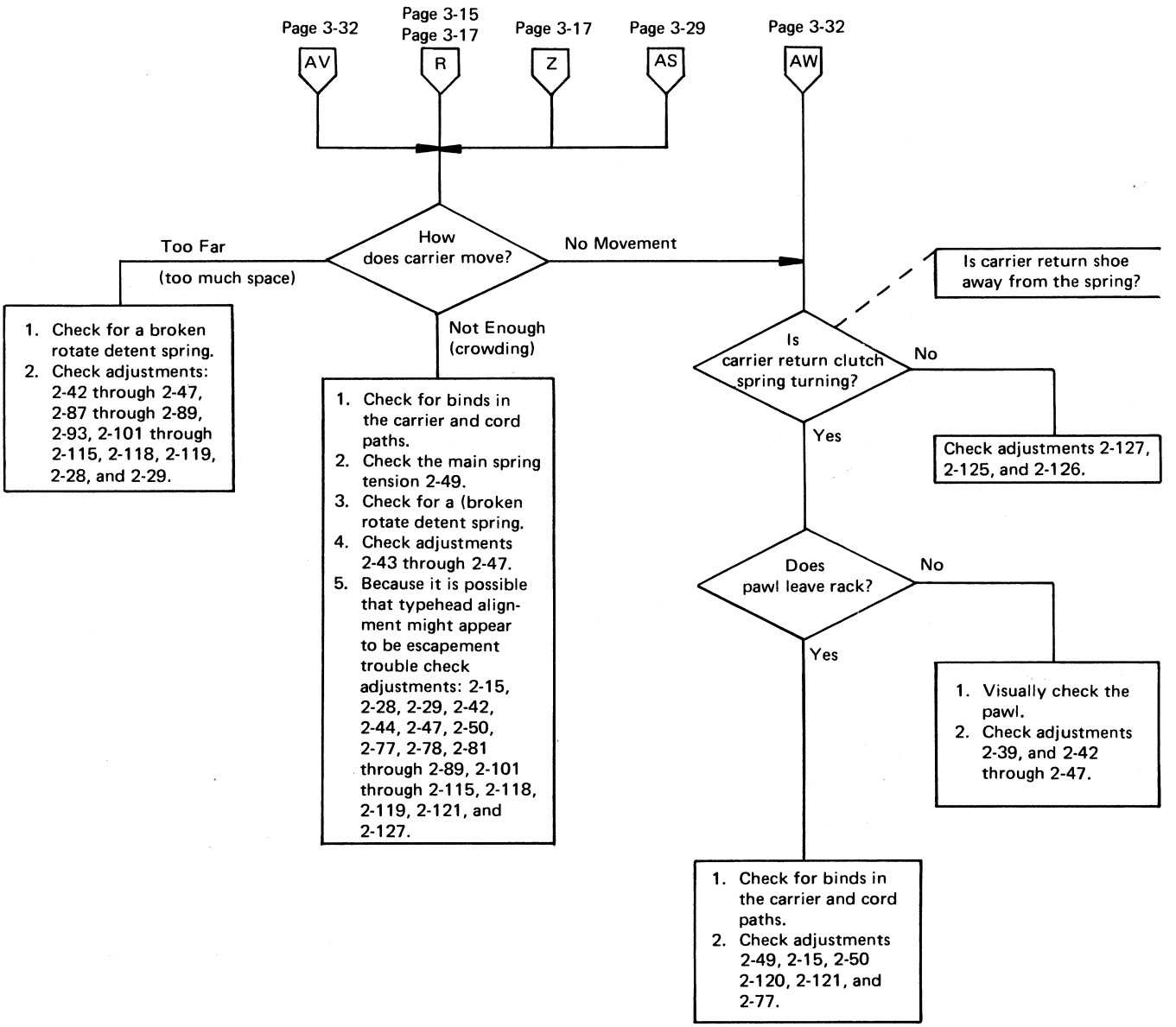
Malselection Chart (Part 4 of 5)



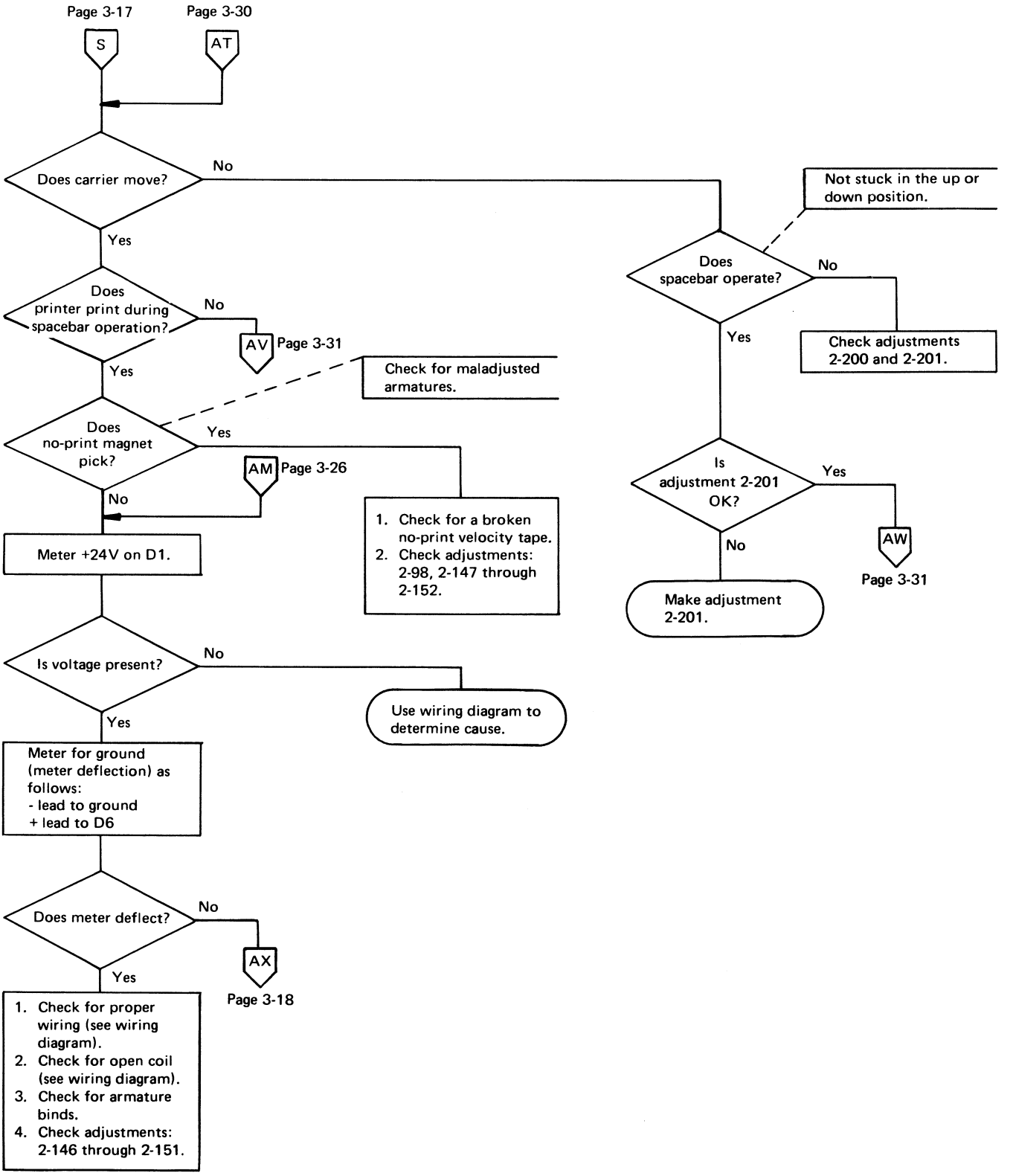
Malselection Chart (Part 5 of 5)



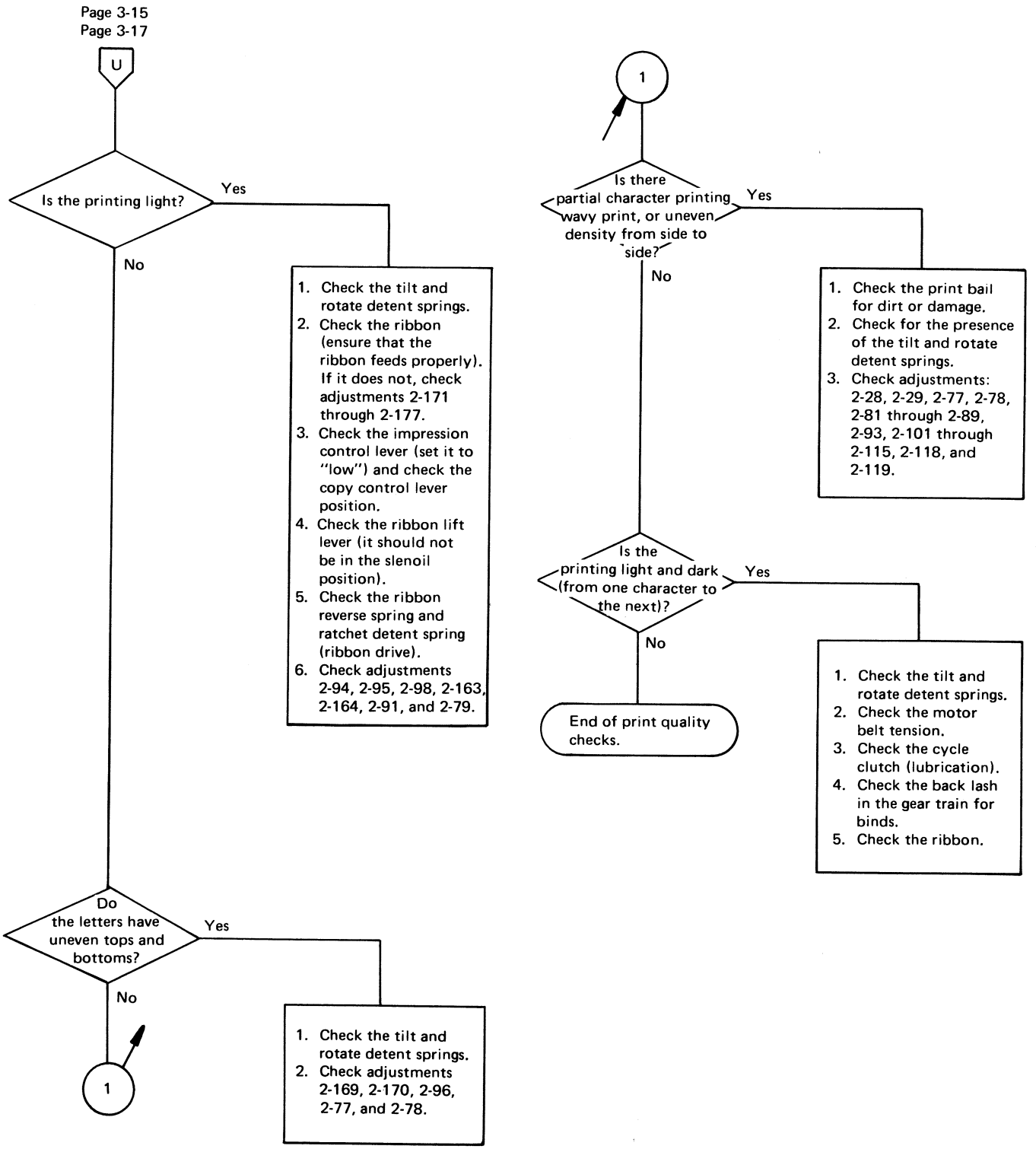
Print Chart


Page 3-32
AV
Page 3-15
Page 3-17
R
Page 3-17
Z
Page 3-29
AS
Page 3-32
AW
How does carrier move?
Too Far
(too much space)
No Movement
Not Enough
(crowding)
1. Check for a broken rotate detent spring.
2. Check adjustments: 2-42 through 2-47, 2-87 through 2-89, 2-93, 2-101 through 2-115, 2-118, 2-119, 2-28, and 2-29.
1. Check for binds in the carrier and cord paths.
2. Check the main spring tension 2-49.
3. Check for a (broken rotate detent spring.
4. Check adjustments 2-43 through 2-47.
5. Because it is possible that typehead alignment might appear to be escapement trouble check adjustments: 2-15, 2-28, 2-29, 2-42, 2-44, 2-47, 2-50, 2-77, 2-78, 2-81 through 2-89, 2-101 through 2-115, 2-118, 2-119, 2-121, and 2-127.
Is carrier return shoe away from the spring?
Is carrier return clutch spring turning?
No
Yes
Check adjustments 2-127, 2-125, and 2-126.
Does pawl leave rack?
No
Yes
1. Visually check the pawl.
2. Check adjustments 2-39, and 2-42 through 2-47.
1. Check for binds in the carrier and cord paths.
2. Check adjustments 2-49, 2-15, 2-50 2-120, 2-121, and 2-77.

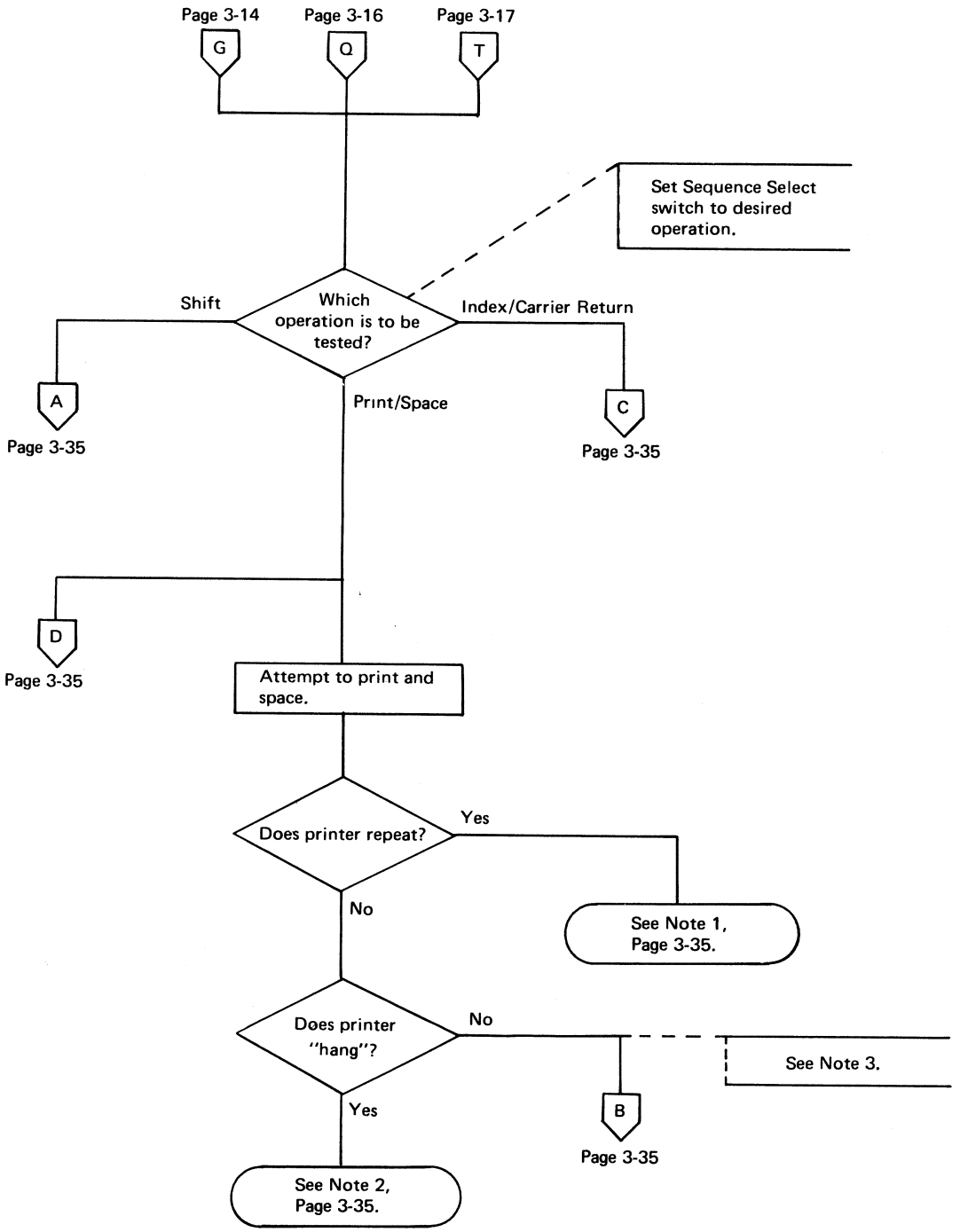
Spacebar Chart



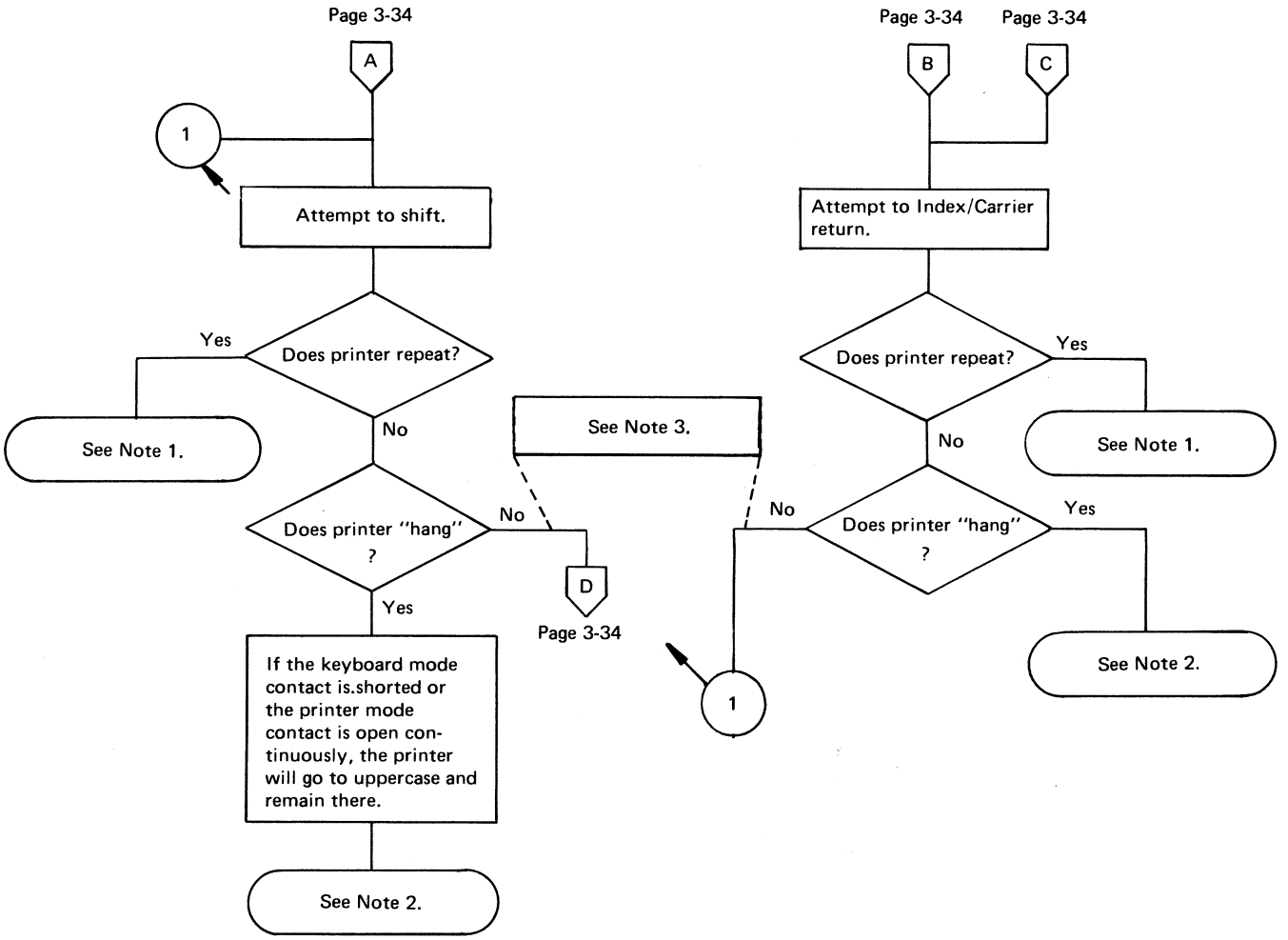
Print Quality Chart



Feedback Chart (Part 1 of 2)



Feedback Chart (Part 2 of 2)



CAUTION Be sure that adjustments 2-20 through 2-29 are correct before adjusting the feedback contacts.

NOTE 1: If printer performs the selected operation one time and then repeats spaces, it may be that a feedback contact fails to make, Check for:

1. No voltage or ground condition present
2. A open cable
3. A tester failure

NOTE 2: If the printer does not operate unless the mode switch is set to VPG (except for the keyboard mechanically cycling), check for a feedback contact closed continuously. Check:

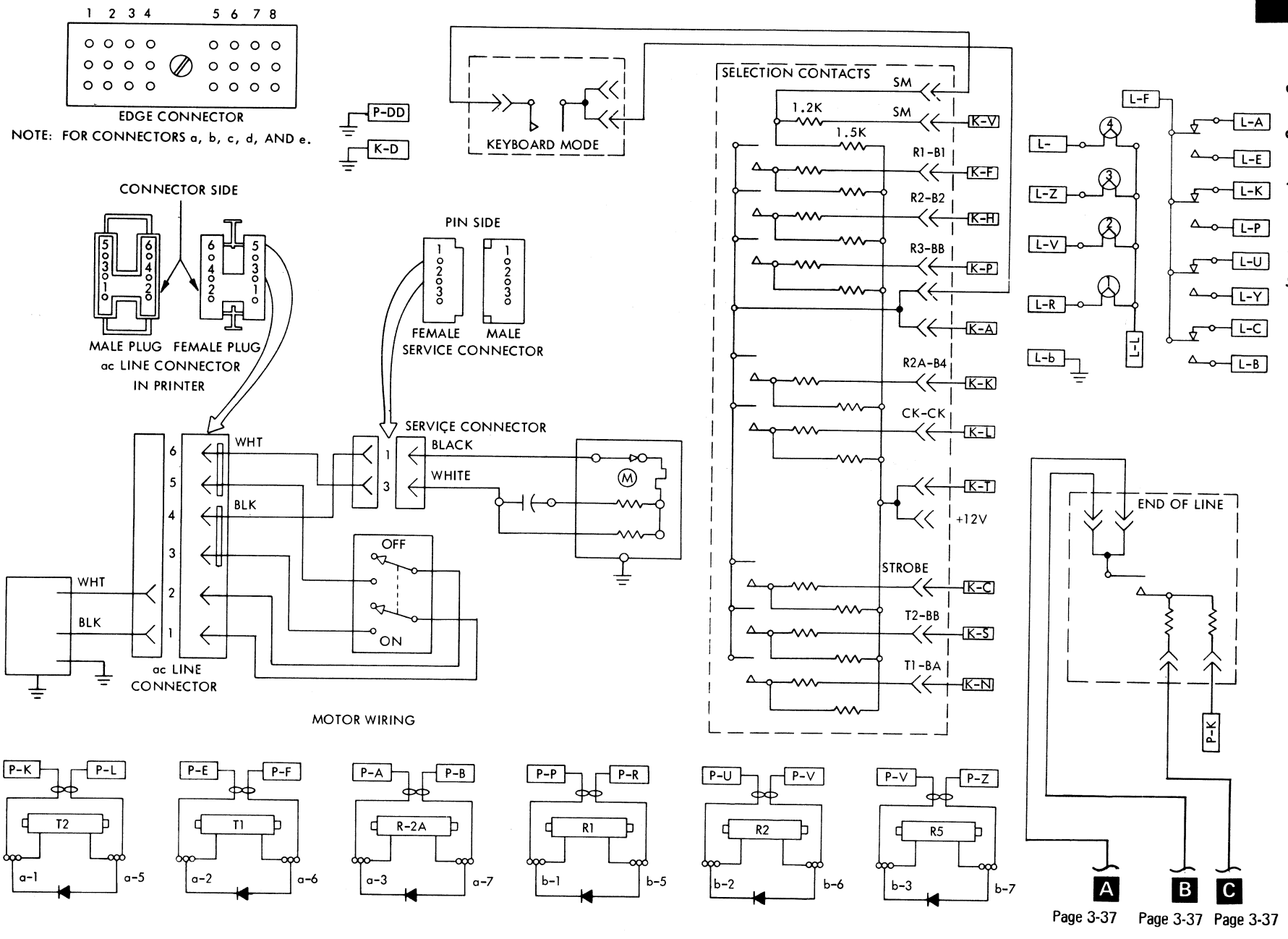
1. Adjustments 2-70, 2-71, 2-37, 2-138, 2-139, 2-140, 2-34, 2-27, and 2-29.
2. For a cable shorted.
3. For a tester failure.

If the printer "hangs" only after a carrier return (from switches or end-of-line contact), the failure is probably in the long function contact. Check adjustments 2-128 through 2-130.

If the printer "hangs'up" at the right margin, check for an end-of-line contact failure, as follows:

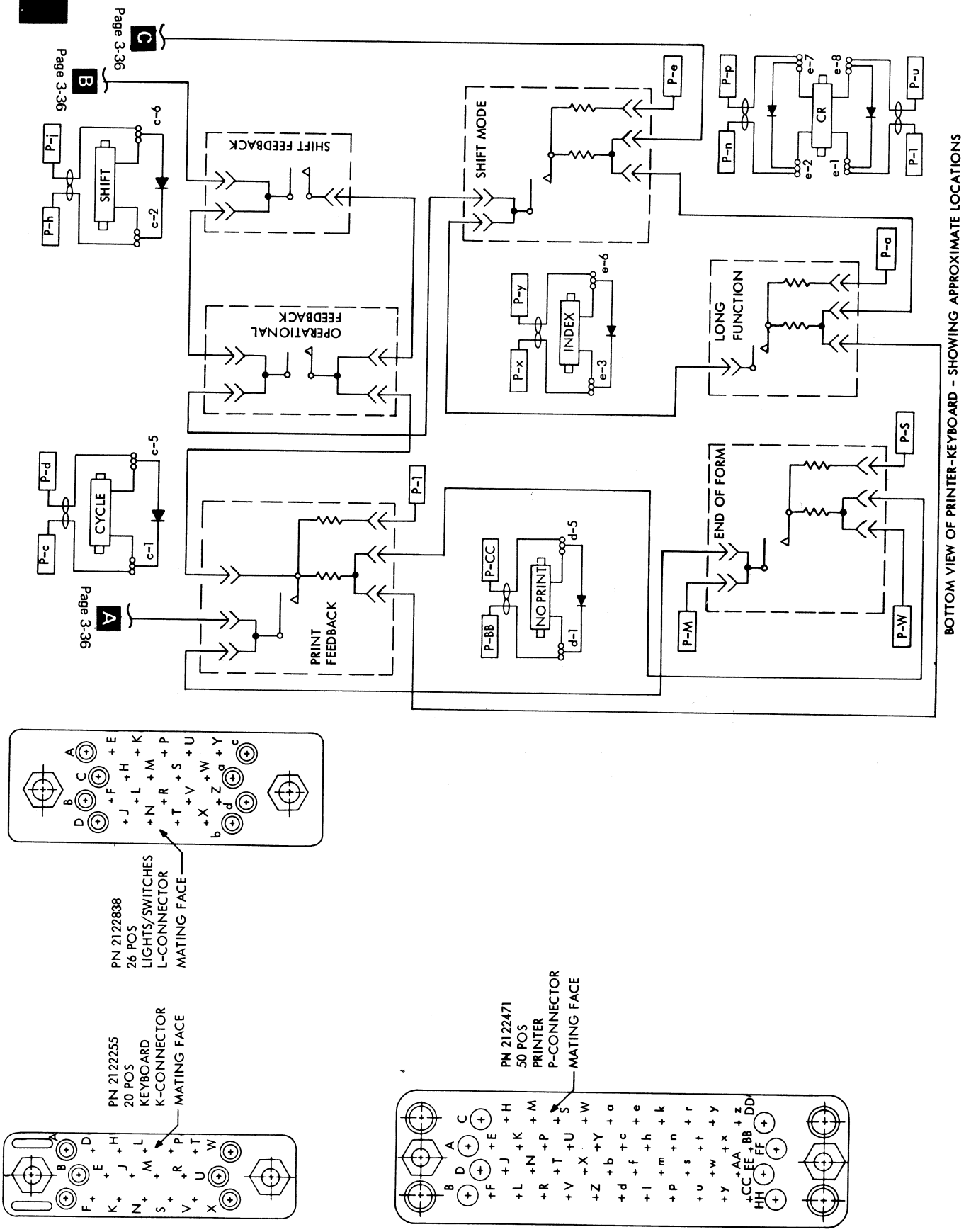
1. Check for a no-voltage or ground condition.
2. Check for an open cable.
3. Check for a tester fallure.

NOTE 3: If shift, print/space, and index/carrier return operations function properly, go to page 3-14.



Page 3-37 Page 3-37 Page 3-37

Wiring Diagram (Part 2 of 2)



Chapter 4. Removals and Replacements

RIBBON MECHANISM REMOVAL

1. Remove the typehead.
2. Remove the ribbon feed mounting screws and clips (No. 1, Figure 4-1).
3. Hold the tilt ring (No. 2, Figure 4-1) toward the rear of the printer.
4. With the other hand, grasp the ribbon mechanism and hold the feed pawl to the rear (No. 3, Figure 4-1).
5. Lift the front of the ribbon mechanism and rotate to the right, rear, for removal.

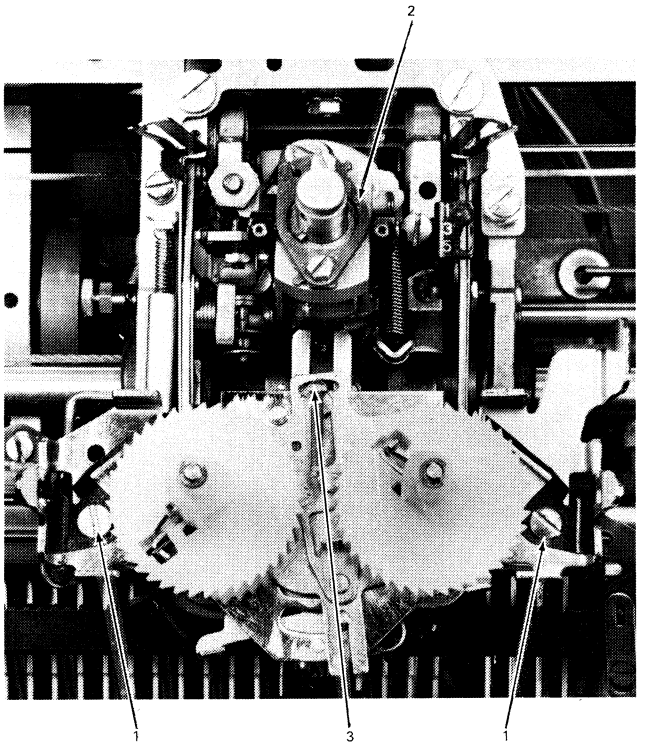


Figure 4-1. Ribbon Mechanism Removal

CORD REPLACEMENT

NOTE The white cord is the only one used.

1. Remove both cords and hand-cycle the printer until the mainspring tension is relaxed (carrier at right-hand margin).
2. Disconnect the carrier return unlatching link (No. 1, Figure 4-2).
3. Manually latch the carrier return mechanism and hand-cycle the printer (while counting the revolutions of the escapement shaft) until the mainspring is wound five full turns.

NOTE After five full turns, continue hand-cycling until the notch in the carrier cord return drum is visible.

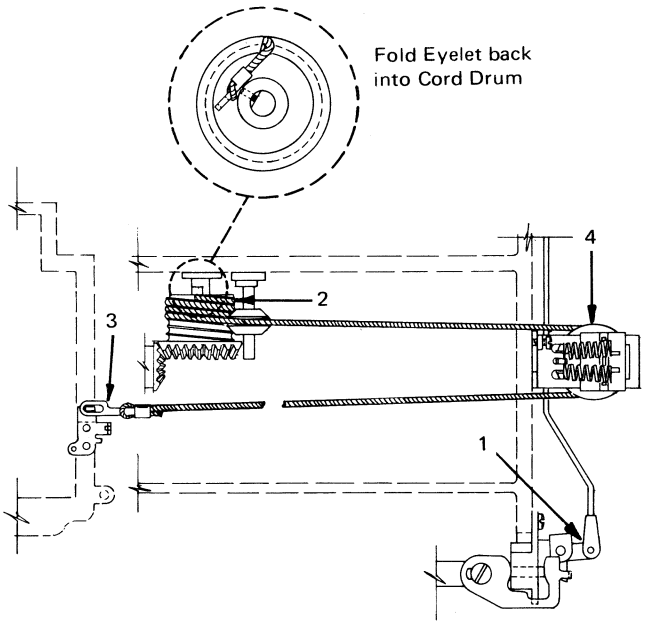


Figure 4-2. Escapement Cord Replacement

4. With the carrier still at the extreme right, feed the carrier return cord around the pulleys and then connect it to the cord drum (No. 1, Figure 4-3).
5. Connect the carrier return cord (No. 2, Figure 4-3), using the pusher end of a spring hook, as shown in Figure 4-3. Insert the spring hook underneath the carrier and hook the eyelet on its mounting bracket.
6. Hold the slack out of the carrier return cord and hand-cycle the carrier fully to the left. This winds the cord evenly on the drum.

NOTE As the carrier approaches the left sideframe, stop hand-cycling when the notch in the escapement cord drum is visible.

7. Connect the escapement cord to the drum, and wind approximately one turn of the cord around the drum (No. 2, Figure 4-2).
8. Thread the cord around the cord tension pulley (No. 4, Figure 4-2), and then connect it to the carrier (No. 3, Figure 4-2).
9. Connect the carrier return unlatching link.
10. Adjust the cord tension.

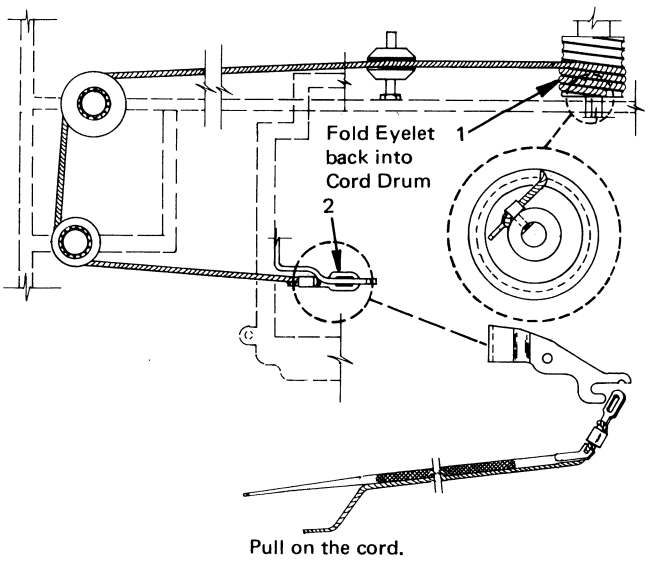


Figure 4-3. Carrier Return Cord Replacement

ESCAPEMENT BRACKET REMOVAL

1. Remove the platen and deflector.

NOTE Mark the position of the escapement bracket.

2. Remove the two card-holder screws (No. 1, Figure 4-4).
3. Remove the two escapement bracket screws (No. 2, Figure 4-4).
4. Work the carrier to the right and out from under the escapement bracket.
5. Remove the escapement bracket.
6. Check the following adjustments after reinstalling the escapement bracket:
   a. Escapement
   b. Escapement pawl clearance on the carrier return

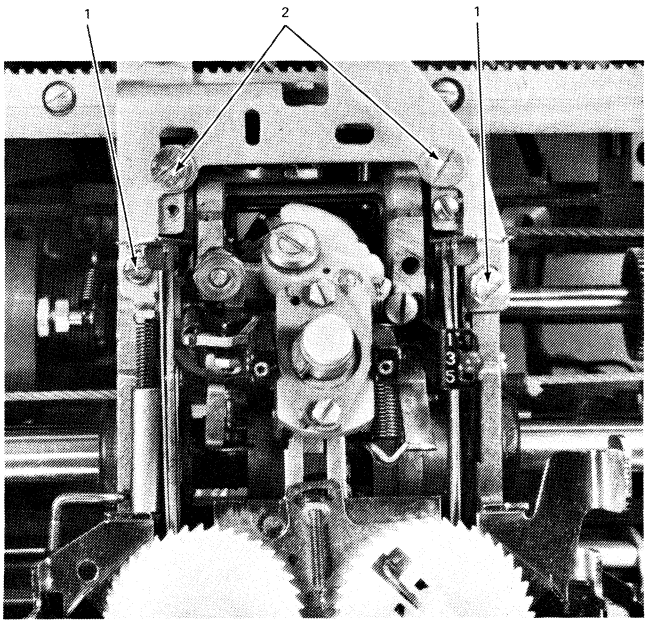


Figure 4-4. Escapement Bracket Removal

VELOCITY TAPE REPLACEMENT

1. Remove the broken tape.
2. Remove the left-hand dust cover.
3. Center the carrier over the cycle shaft.
4. Remove the left-hand pulley tape guard (snaps off) (No. 1, Figure 4-5).
5. Hook the left-hand end of the tape on the velocity shift yoke (No. 2, Figure 4-5).
6. Feed the tape around the pulleys and hook the right-hand end on the tab cord anchor bracket (No. 3, Figure 4-5).
7. Snap on the left-hand pulley tape guard.
8. Check the print cam follower tracking after replacing the tape.

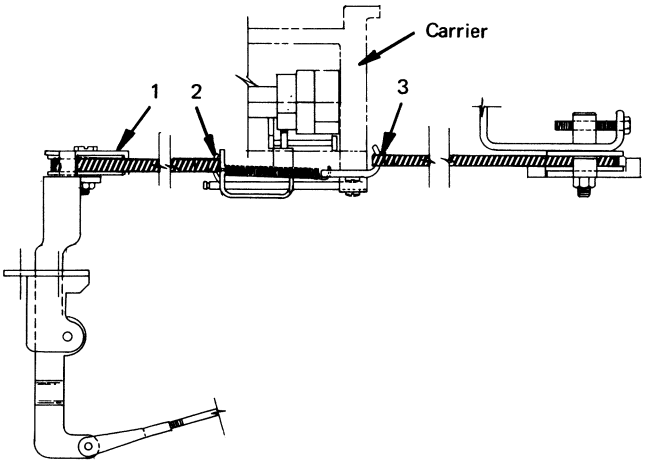


Figure 4-5. Velocity Tape Replacement (Front View)

CYCLE CLUTCH LATCH REMOVAL

1. Remove the bottom hexhead cycle clutch bracket mounting screw (No. 1, Figure 4-6).
2. Loosen the top mounting screw (No. 1, Figure 4-6).
3. Unlock the spring from the latch (No. 3, Figure 4-6).
4. Lift the cycle clutch latch and mounting bracket out (No. 2, Figure 4-6).
5. Check the following adjustments after reinstalling the cycle clutch latch:
   a. All adjustments listed under "Cycle Clutch Removal" (following in thia chapter)
   b. Cycle clutch latch height
   c. Cycle clutch latch restore

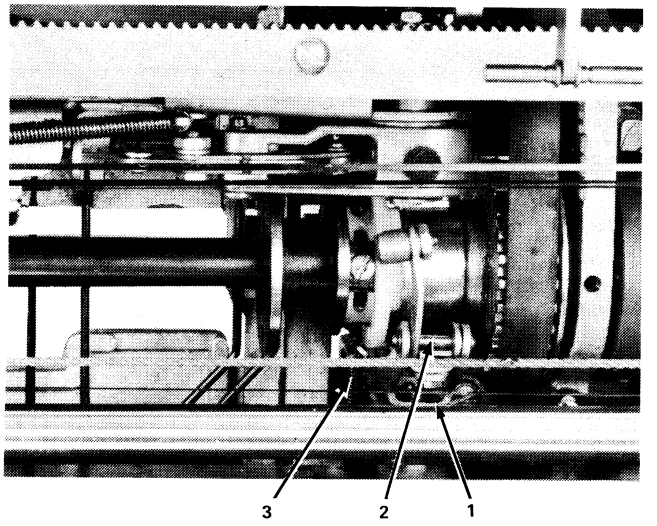


Figure 4-6. Cycle Clutch Latch Removal

BELT REPLACEMENT

1. Remove the typehead.
2. Position the carrier at the extreme right.
3. Remove the left-hand dust cover.
4. Remove the gear guard (No. 1, Figure 4-7).

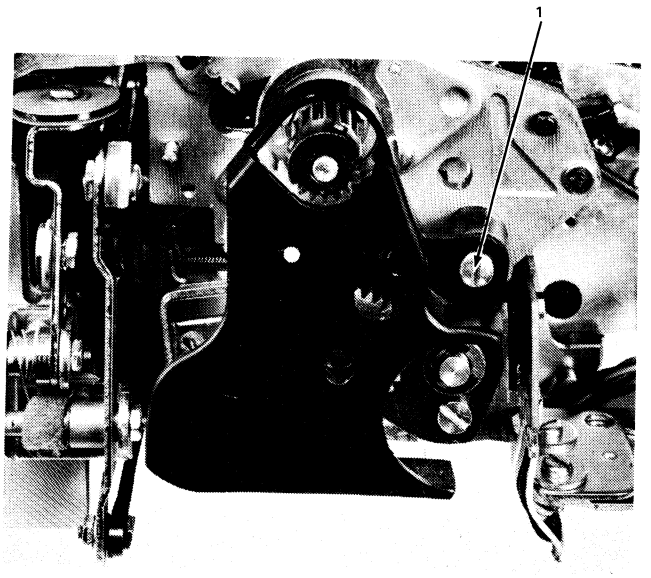


Figure 4-7. Belt Replacement (Left Side of Printer)

5. Remove the cycle clutch check pawl and spring (No. 1, Figure 4-8).

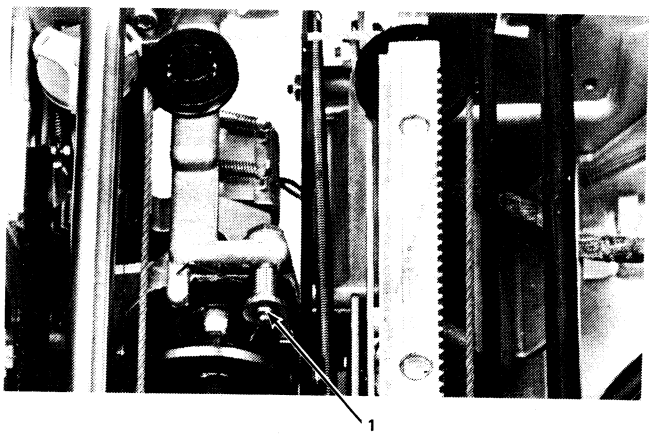


Figure 4-8. Belt Replacement (Top of Printer)

6. Remove the lower idler gear (No. 1, Figure 4-9) by removing the two lower screws first (No. 2, Figure 4-9); then the two upper screws (No. 3, Figure 4-9); and the C-clip (No. 4, Figure 4-9).

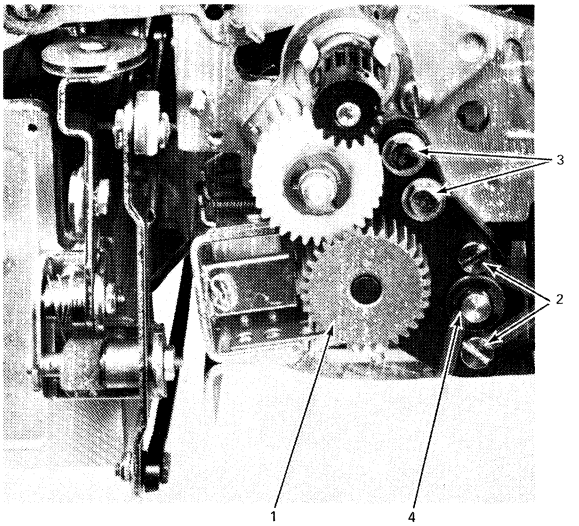


Figure 4-9. Belt Replacement (Left Side of Printer Gear Guard Removed)

7. Disconnect the velocity control link (No. 1, Figure 4-10) and the two screws that attach the velocity bracket to the powerframe (No. 2, Figure 4-10). (This mechanism can now be completely removed, after the two magnet wires are unplugged.)

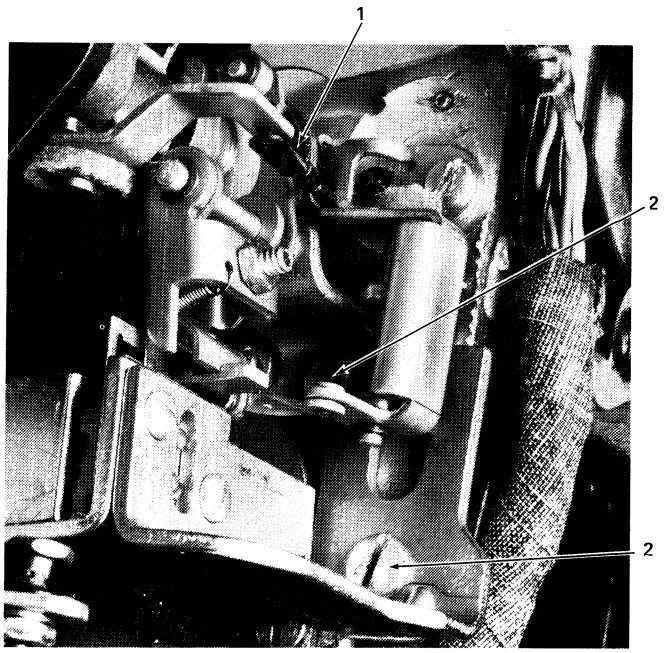


Figure 4-10. Belt Replacement (Left Side of Printer Tilted Up)

8. Remove the cycle shaft gear (No. 1, Figure 4-11).
9. Remove the three cycle shaft bearing plate screws (No. 2, Figure 4-11) and remove the bearing plate. Leave the cycle shaft in place.

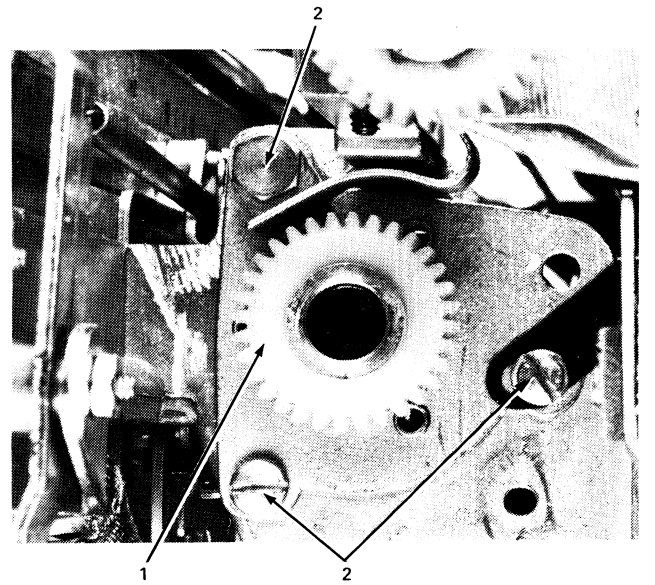


Figure 4-11. Belt Replacement (Cycle Shaft Bearing Plate Exposed)

10. Cut the old belt and remove it from the printer.
11. Force the positive bail down with a screwdriver (no. 1, Figure 4-12), making sure all the latches are under the bail. Insert a Bristo wrench through the lower left bearing plate mounting hole, over the top of the bail, to hold it down.

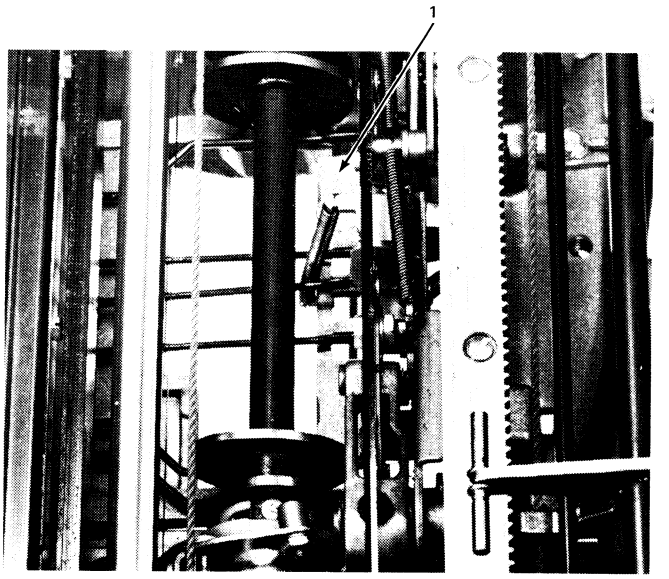


Figure 4-12. Belt Replacement (Top View Showing Positive Bail)

12. Slip the new belt through the bearing plate hole and around the cycle shaft (Figure 4-12). Move the belt along the cycle shaft until it reaches the cycle clutch latch (Figure 4-13). Work the belt between the latch and the cycle clutch sleeve with the aid of a burnishing blade (Figure 4-13).
13. Slip the belt over the motor pulley (it may be necessary to loosen the motor mount).
14. Check the following adjustments after the belt is installed:
    a. Idler gears
    b. Print shaft timing
    c. Cycle clutch latch bracket height
    d. Print feedback timing
    e. Velocity control adjustments

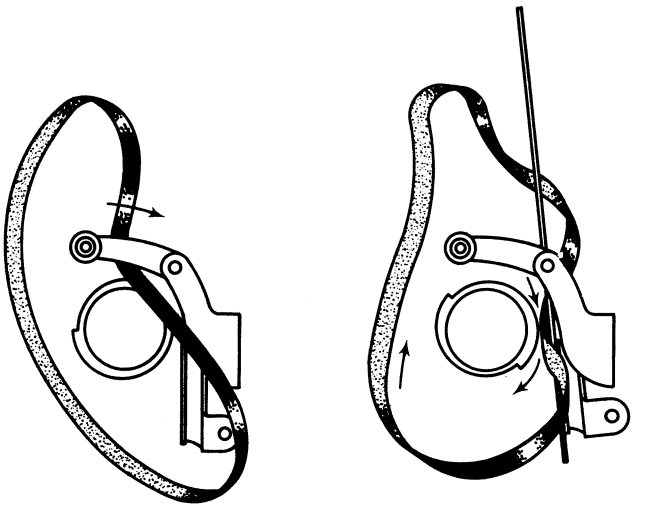


Figure 4-13. Belt Replacement

OPERATIONAL SHAFT REMOVAL AND REPLACEMENT

Removal

1. Remove the shift clutch sleeve and shift clutch spring (See "Shift Clutch Removal", following in this chapter.) *Do not* disturb the clutch arbor.
2. Loosen the setscrews in: the torque limiter hub, tab governor hub, tab governor collar, index/filter shaft cam ratchet, and operational shaft collar (No. 1, Figure 4-14).
3. Remove the clip from the carrier return pinion spring (No. 2, Figure 4-14).
4. Move the operational shaft slightly to the right and remove the retainer clip from the right side of the carrier return pinion (No. 3, Figure 4-14).
5. All parts on the operational shaft are now loose and the shaft may be pulled out to the right, through the bearing. Lift the freed parts out through the top or allow them to drop as the shaft is withdrawn.

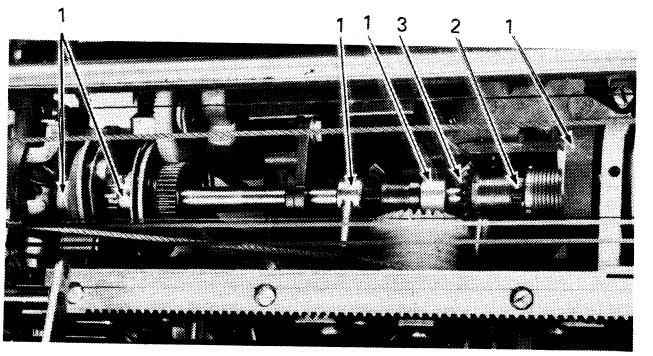


Figure 4-14. Operational Shaft Removal and Replacement (Top, Rear View)

Replacement

Because the shift clutch arbor has not been loosened from the shaft, it is necessary to reinsert the shaft only far enough for the shift clutch arbor to bear against the shaft bearing (0.002" to 0.004" end play), in order to ensure the same position of the carrier return pinion gear as before disassembly. Readjust shift sleeve end play.

To reset the operational cams in their proper positions, observe the track marks on the cam followers. Be sure to tighten the set-screw to the flat side of the operational shaft. Reset the tab governor hub and collar and check for the proper gear mesh and operational shaft end-play.

After reinstallation of the retainer clip on the right-hand side of the carrier return pinion gear, move the torque limiter hub to the right as far as possible. Then spread the torque limiter spring loops and insert a 0.003" feeler gage blade between the torque limiter hub and the carrier return clutch arbor. Tighten the torque limiter hub, then remove the gage.

Install the clip which fastens the carrier return pinion spring to the carrier return clutch arbor.

ROTATE TAPE REPLACEMENT

1. Remove the left and right dust covers.
2. Position the carrier approximately three inches from the left frame.
3. Remove any broken pieces of tape from the printer.
4. Trip the cycle clutch latch and half-cycle a tilt-3, rotate-0 character until the typehead is fully detented.
5. Hold the typehead securely and withdraw the detents.
6. Rotate the typehead three full turns counterclockwise, allowing the detent to reengage the typehead before you remove your hand to take a new grip on the head. Continue into the fourth turn, until the T-slot in the rotate pulley is accessible at the rear of the carrier (No. 1, Figure 4-15), then fully seat the detent.
7. Thread the eyelet end of the new tape through the right front of the carrier, then out through the left side of the rocker and the left sideframe.
8. Insert the T-end in the rotate pulley slot (No. 1, Figure 4-15).
9. Turn the top edge of the tape to the front as it leaves the left end of the rocker shaft. Thread it around the rotate and shift arm pulleys and attach the eyelet end to the right side of the carrier.
10. Grip the typehead, withdraw the detents, and allow the rotate spring to slowly wind the typehead in a clockwise direction (be sure that the tape stays on all three pulleys). This winds the new rotate tape around the rotate pulley.
11. Check the following adjustments after replacing the rotate tape:
    a. Rotate spring tension
    b. Typehead skirt clearance
    c. Alignment

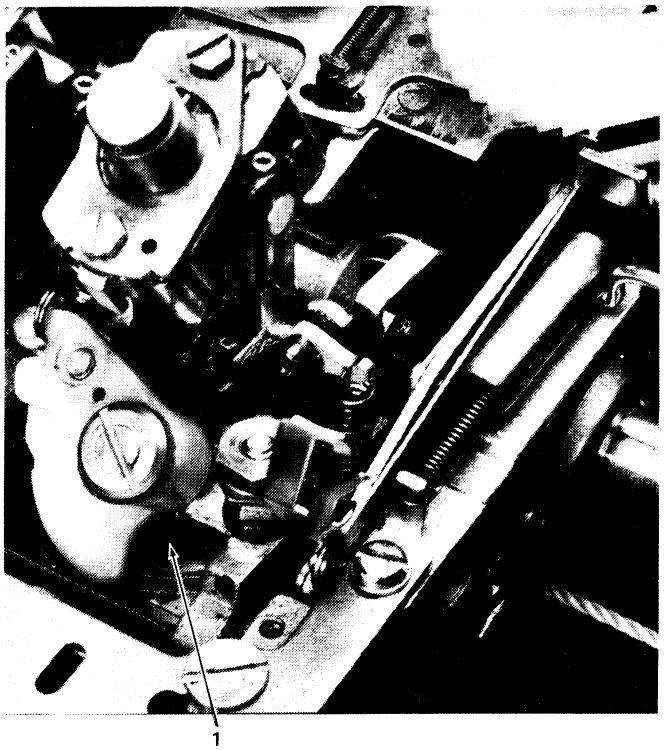


Figure 4-15. Rotate Tape Replacement (Rear of Carrier)

TILT RING AND LOWER BALL SOCKET REMOVAL

1. Remove the left dust cover, ribbon cartridge, and typehead.
2. Center the carrier over the cycle shaft.
3. Shift into uppercase.
4. Half-cycle a rotate-0, tilt-2 character. Note which detent notch the tilt detent is in, for replacement. (Be sure that the printer is still in uppercase.)
5. Loosen the two setscrews (No. 1, Figure 4-16).
6. Remove the two pivot pins (No. 2, Figure 4-16).
7. Remove the tilt ring (No. 3, Figure 4-16) and ball joint.

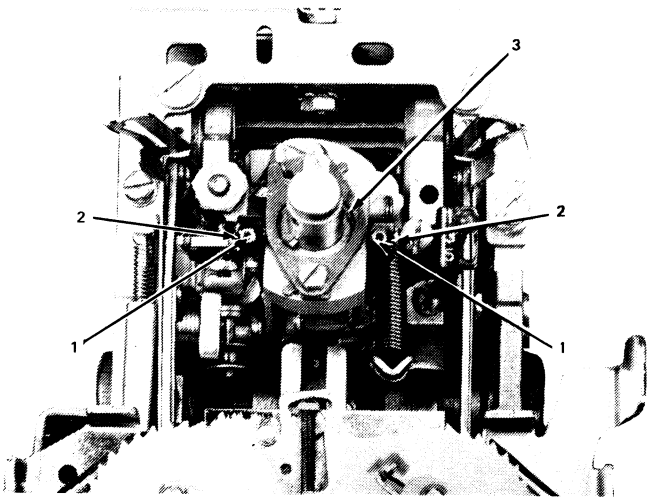


Figure 4-16. Lower Ball Socket and Tilt Ring Removal (Top of Carrier)

For Lower Ball Socket Removal, complete steps 8 and 9.

8. Loosen the rotate pulley setscrew (No. 1, Figure 4-17).
9. Use the butt end of a small spring hook as a follower to push out the lower ball socket (No. 2, Figure 4-17).

NOTE The shank of the spring hook prevents the wedge from being lost.

NOTE When replacing the upper ball socket, be sure the long portion of the pin is toward the right rear corner of the carrier.

10. Check the following adjustments after replacing the lower ball socket and tilt ring:
    a. Lower ball socket end play
    b. Tilt ring
    c. Upper ball socket
    d. Tilt detenting
    e. Typehead homing

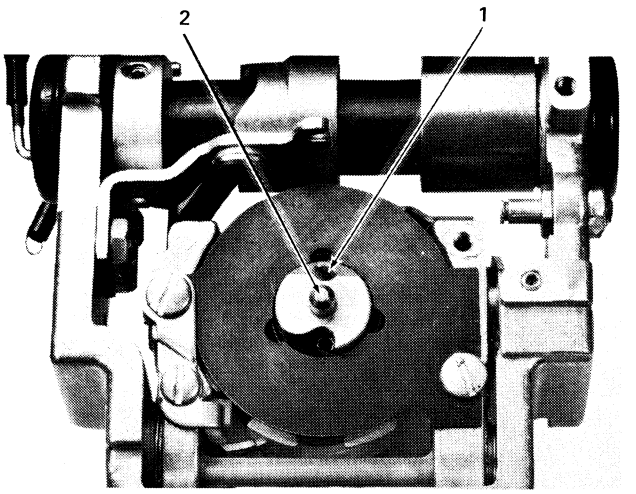


Figure 4-17. Lower Ball Socket and Tilt Ring Removal (Bottom of Carrier)

SELECTOR BAIL REMOVAL

1. Remove the positive bail spring (No. 1, Figure 4-18).
2. Remove the selection latches from under the bail and pull the bail down.

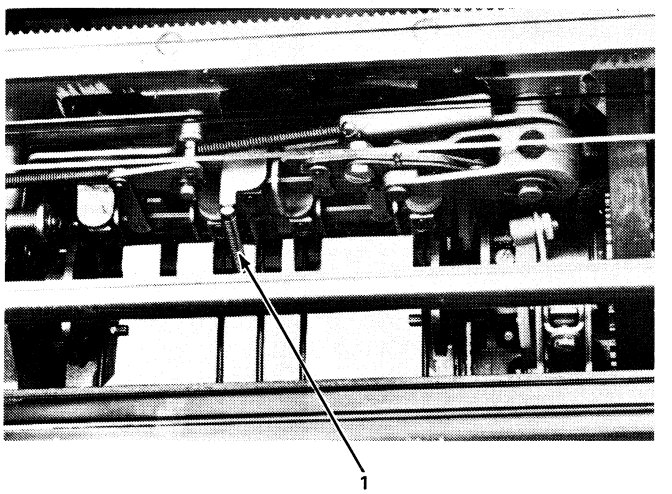


Figure 4-18. Selector Bail Removal (Top of Printer)

3. Remove the gear guard (outside the left powerframe).
4. Remove the lower idler gear (No. 1, Figure 4-19) by removing the two lower screws first (No. 2, Figure 4-19); then remove the two upper screws (No. 3, Figure 4-19) and the C-clip (No. 4, Figure 4-19).

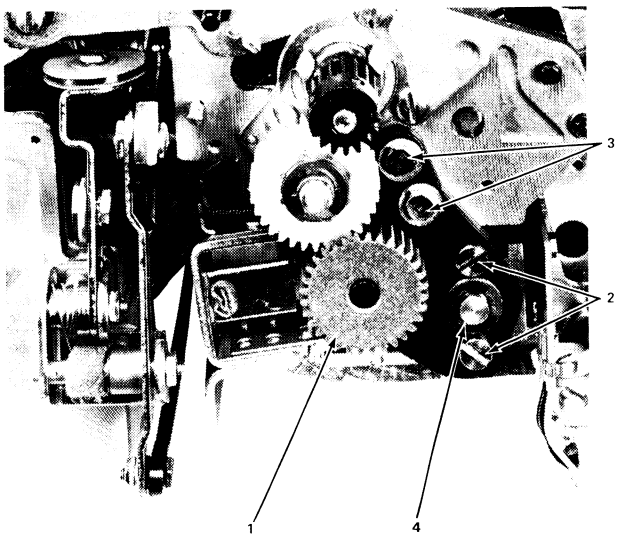


Figure 4-19. Selector Bail Removal (Left Side of Printer, Gear Guard Removed

5. Remove the top screw from the velocity control mounting bracket (No. 1, Figure 4-20). Disconnect the velocity control link (No. 2, Figure 4-20) and rotate the magnet assembly toward the front.
6. Loosen the screw (No. 3, Figure 4-20), move the retainer out of the way, remove the two C-clips (one on each side of the negative-five bail), and pull the bail shaft out.
7. Work the bail assembly out through the bottom of the printer.
8. Check the following adjustments after replacing the selector bail:
   a. Latch clearance
   b. Bail down stop
   c. Alignment
   d. Idler gear backlash
   e. Velocity control

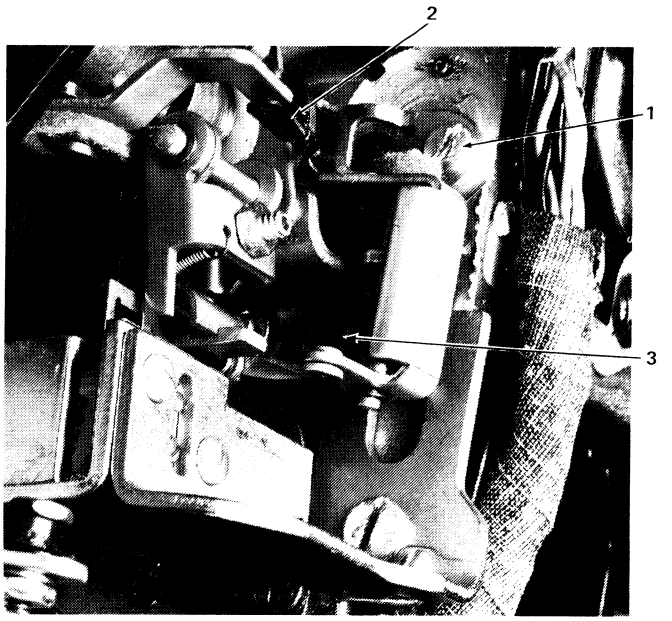


Figure 4-20. Selector Bail Removal (Left Side, Printer Tilted Up)

ESCAPEMENT PAWL REMOVAL

1. Remove the platen and deflector.
2. Remove the nut (No. 1, Figure 4-21).
3. Push the pawl mounting stud down to barely clear the escapement bracket.
4. Remove the escapement pawl spring (No. 2, Figure 4-21).
5. Move the carrier to the right.
6. The escapement pawl and thick spacer will remain in place on the mounting stud, resting on the escapement torque bar. Pick them up.
7. Check the following adjustments after replacing the pawl:
   a. Escapement
   b. Pawl clearance on carrier return

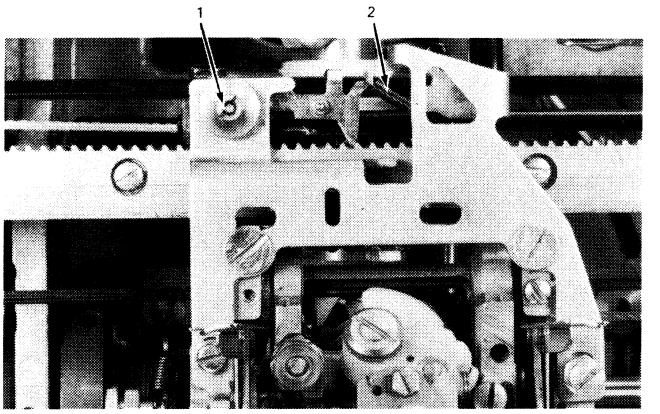


Figure 4-21. Escapement Pawl Removal

TILT SELECTION DIFFERENTIAL REMOVAL

1. Position the carrier at the extreme right.
2. Remove the left dust cover, platen, and paper deflector.
3. Disconnect the tilt and rotate clevis and remove them from the links (No. 1, Figure 4-22).

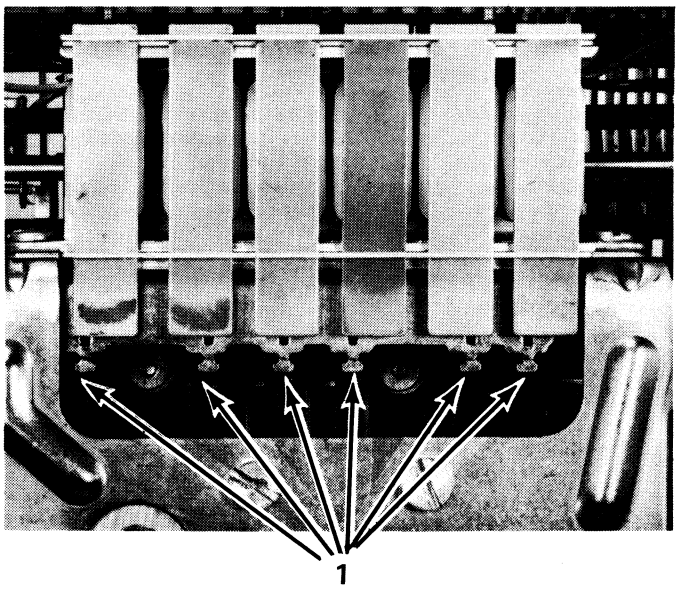


Figure 4-22. Tilt Selection Differential Removal (Bottom of Printer)

4. Remove the motor.
5. Remove the tilt-latch springs (No. 1, Figure 4-23).
6. Remove the tilt links (No. 2, Figure 4-23).

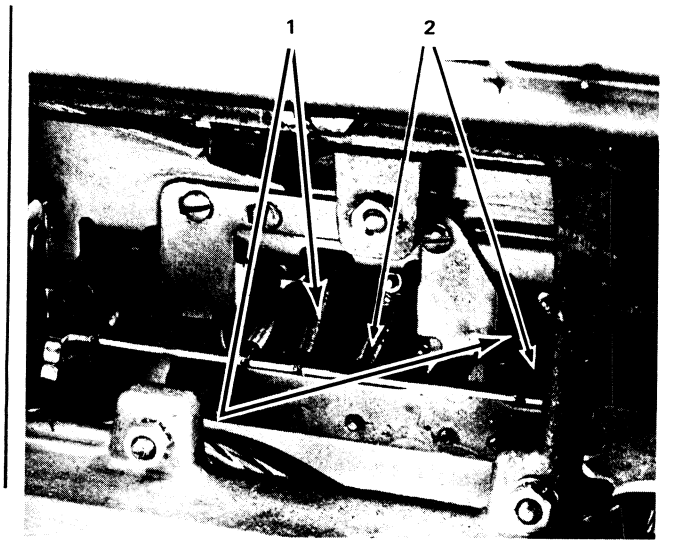


Figure 4-23. Tilt Selection Differential Removal (Rear of Printer, Motor Removed)

7. Remove the positive bail spring (No. 1, Figure 4-24).
8. Remove the tilt-differential spring (No. 2, Figure 4-24).
9. Remove the rotate-arm spring (No. 3, Figure 4-24).
10. Remove the two C-clips and remove the tilt differential assembly (No. 4, Figure 4-24).
11. Check the following adjustments after replacing the tilt-differential assembly:
    a. Latch clearance
    b. Tilt detenting

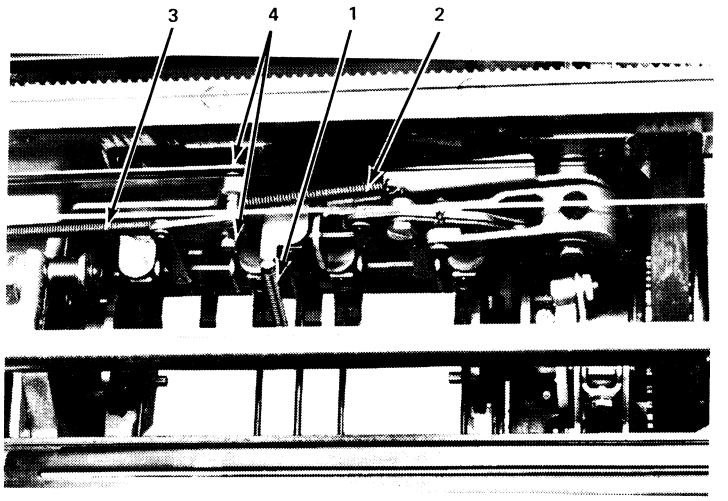


Figure 4-24. Tilt Selection Differential Removal (Top of Printer)

DIFFERENTIAL BRACKET REMOVAL

1. Position the carrier at the extreme right.
2. Remove the left dust cover, platen, and paper deflector.
3. Perform cycle shaft removal (see "Cycle Shaft Removal", following in this chapter).
4. Disconnect the clevises and remove them from the links (No. 1, Figure 4-25).
5. Remove the rotate arm link (No. 2, Figure 4-25).
6. Remove the positive bail spring (No. 3, Figure 4-25).

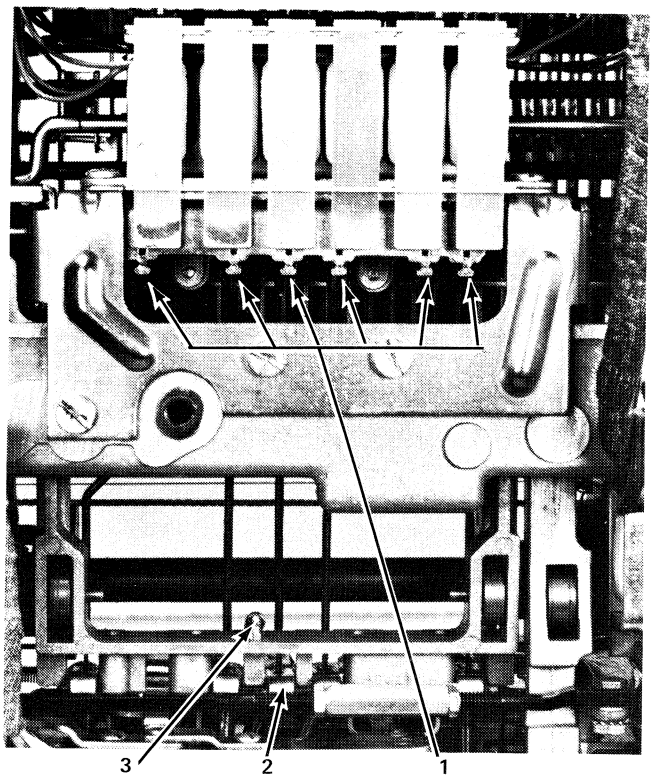


Figure 4-25. Differential Bracket Removal (Bottom of Printer)

7. Remove the motor (snap the spring retainer off each end).
8. Remove all latch springs (No. 1, Figure 4-26).
9. Remove all latch links by pulling them to the rear (No. 2, Figure 4-26).
10. Remove the four differential mounting nuts (No. 3, Figure 4-26). *Do not* lose the selector plate shim in the lower right mounting stud hole (observed from the rear of the printer).

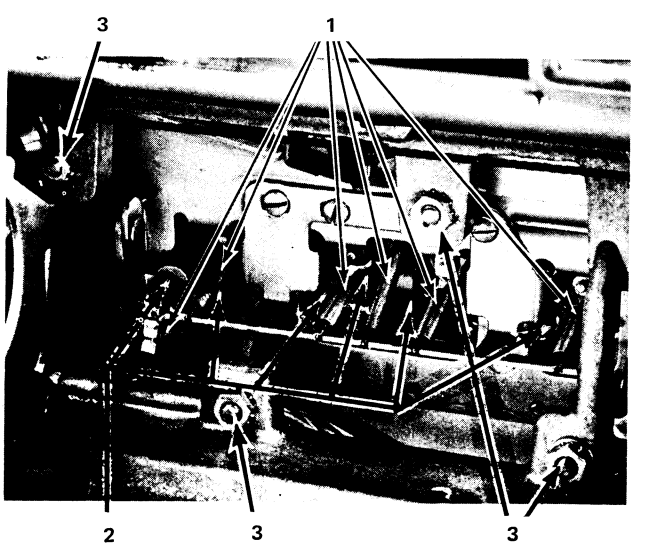


Figure 4-26. Differential Bracket Removal (Rear of Printer, Motor Removed)

11. Remove the cycle clutch latch spring (No. 1, Figure 4-27).
12. Remove the C-clip from the cycle clutch latch pivot pin closest to the cycle clutch pulley, and remove the pivot pin (No. 2, Figure 4-27).
13. Remove the cycle clutch latch guide (No. 3, Figure 4-27).
14. Remove the C-clip from the negative latch link (No. 4, Figure 4-27).
15. Remove the C-clip from the tilt link stud (No. 5, Figure 4-27).
16. Remove the rotate arm and tilt differential springs (No. 6, Figure 4-27).
17. Remove the differential bracket assembly.
18. Check the following adjustments after replacing the differential plate:
    a. All adjustments listed under "Cycle Shaft Removal"
    b. Rotate differential guides
    c. Tilt differential guides
    d. Rotate latch clearance
    e. Tilt latch clearance
    f. Tilt detenting
    g. Typehead alignment
    h. Cycle clutch latch height
    i. Cycle clutch latch restoring

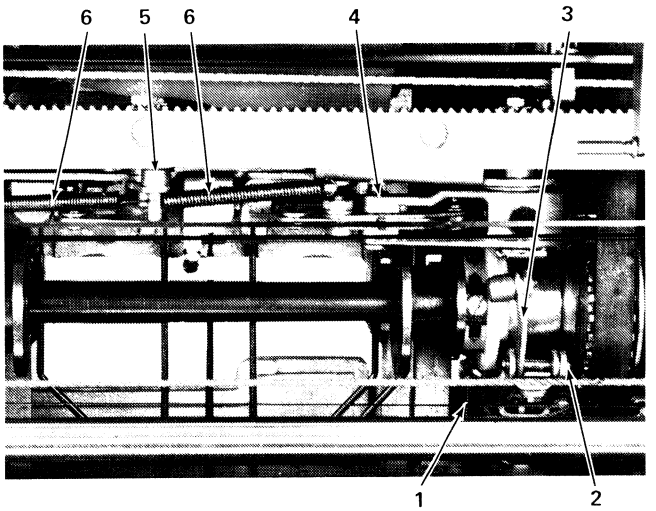


Figure 4-27. Differential Bracket Removal (Top View)

ROTATE SELECTION DIFFERENTIAL REMOVAL

1. Position the carrier at the extreme right.
2. Remove the left dust cover, platen, and paper deflector.
3. Disconnect the clevises and remove them from the links (No. 1, Figure 4-28).
4. Disconnect the rotate link at both ends, and remove it (No. 2, Figure 4-28).
5. Remove the latch bail spring (No. 3, Figure 4-28).

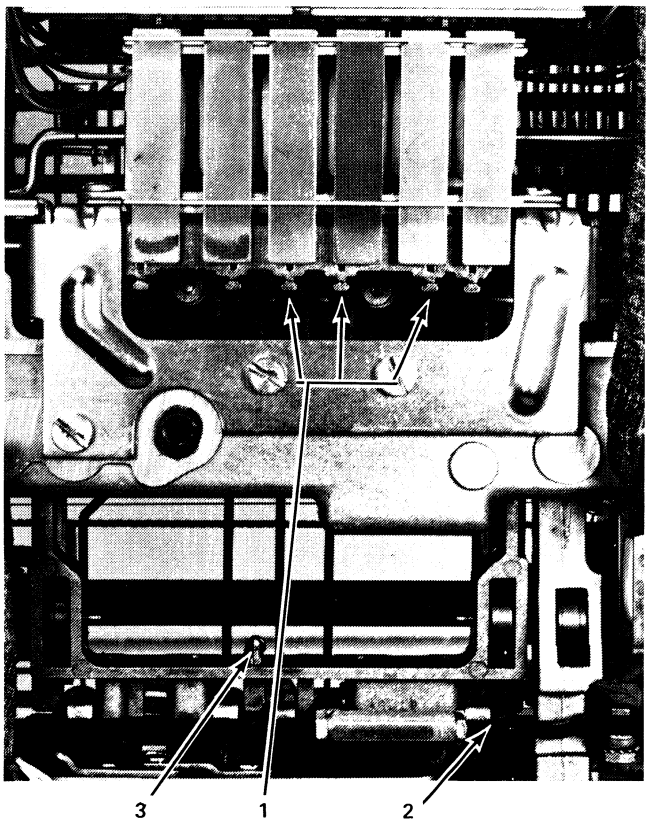


Figure 4-28. Rotate Selection Differential Removal (Bottom of Printer)

6. Remove the motor.
7. Remove the rotate-latch springs (No. 1, Figure 4-29).
8. Pull out the rotate links to the rear (No. 2, Figure 4-29).

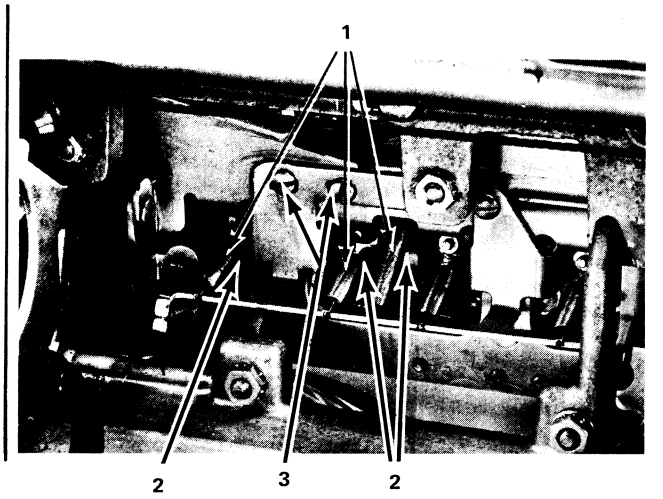


Figure 4-29. Rotate Selection Differential Removal (Rear of Printer, Motor Removed)

9. Disconnect the tilt-differential spring (No. 3, Figure 4-30).
10. Remove the guide-bracket mounting screws (No. 3, Figure 4-29).
11. Remove the balance-arm mounting stud (No. 1, Figure 4-30).
12. Disconnect the minus-five bail drive link from the right end of the balance arm (No. 2, Figure 4-30).
13. Remove the rotate-differential assembly.
14. Check the following adjustments after replacing the rotate-selection-differential assembly.
    a. Rotate differential guides
    b. Rotate latch clearance
    c. Typehead alignment

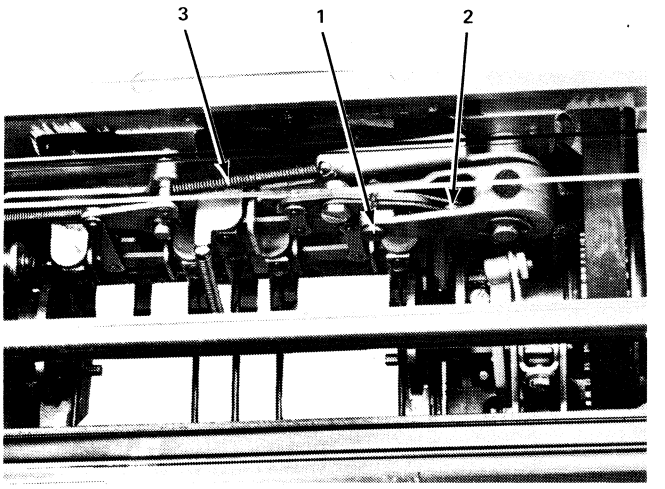


Figure 4-30. Rotate Selection Differential Removal (Top of Printer)

INDEX MAGNET ASSEMBLY REMOVAL

1. Unplug the index magnet coil wires at edge connector E3 and E6.
2. Disconnect the index link at the bottom (No. 1, Figure 4-31).
3. Remove the two carrier return solenoid mounting bracket screws (No. 2, Figure 4-31).

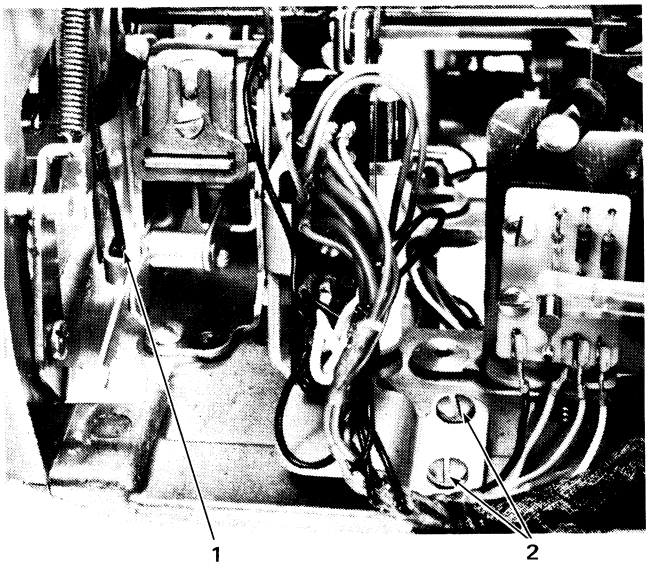


Figure 4-31. Index Magnet Assembly Removal (Rear of Printer)

4. Tilt the machine up and remove the two screws from the operation feedback contact assembly (No. 1, Figure 4-32).
5. Remove the front index magnet assembly mounting screw (No. 2, Figure 4-32).

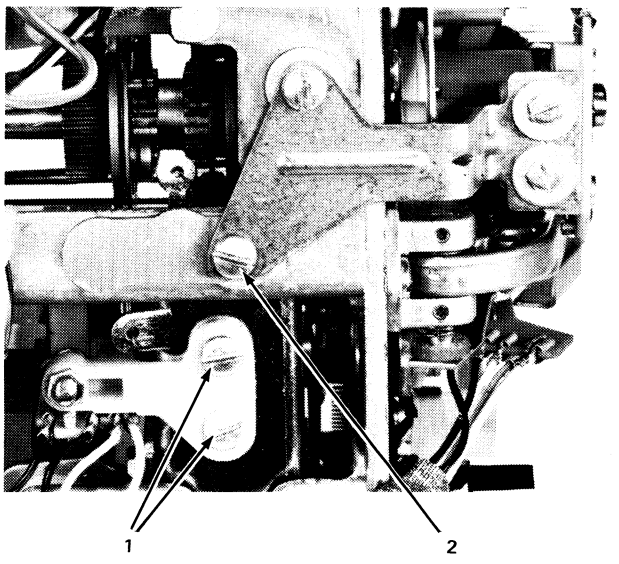


Figure 4-32. Index Magnet Assembly Removal (Bottom of Printer)

6. Return the machine to its normal operating position and remove the rear index magnet mounting screw (No. 1, Figure 4-33).
7. Rotate the carrier return solenoid up out of the way, then remove the index magnet assembly through the rear of the printer.
8. Check:
   1. Carrier return solenoid plunger (free of binds)
   2. Release clearance between index magnet armature and clutch wheel.
   3. Left-to-right position of cam follower and armature.

NOTE Be sure the spacer at the front of the magnet is in place. It goes between the magnet assembly and the power frame at the front of the mounting screw.

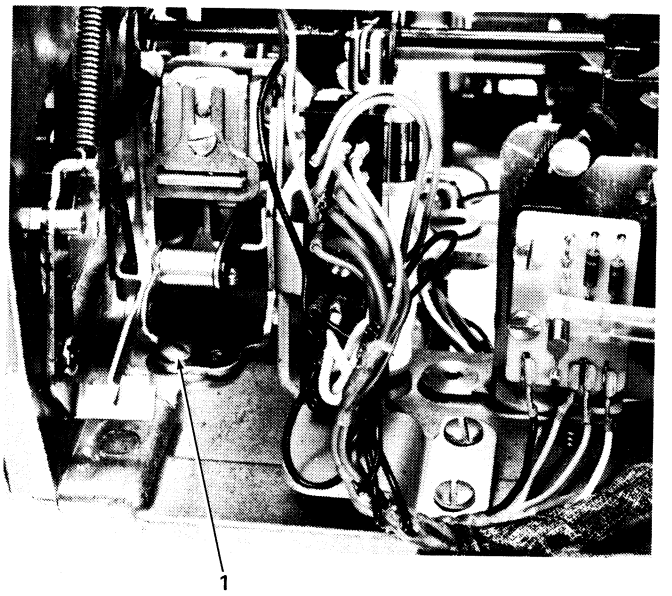


Figure 4-33. Index Magnet Assembly Removal (Rear of Printer)

INDEX CAM FOLLOWER REMOVAL

1. Remove the index magnet (see "Index Magnet Removal" preceding in this chapter).
2. Remove the two inside C-clips (No. 1, Figure 4-34) and slide the pivot shaft to the left until the cam follower is free.

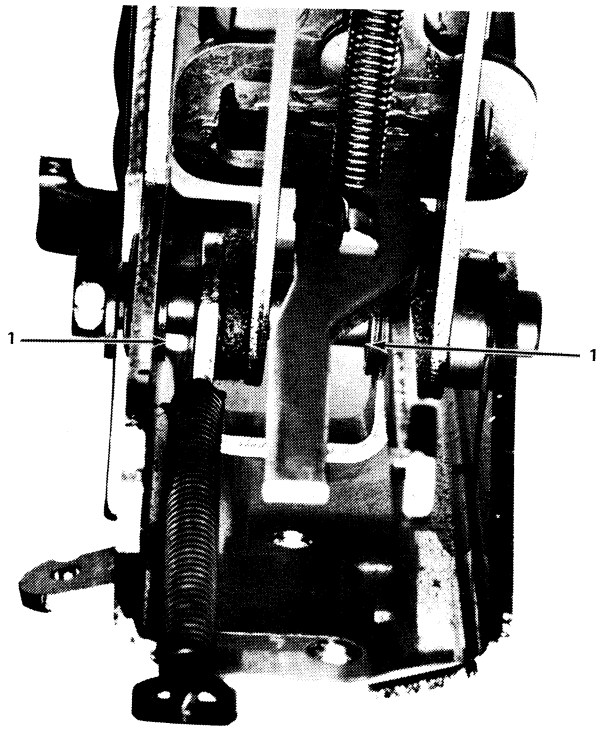


Figure 4-34. Index Cam Follower Removal (Index Magnet Removed From Printer)

CARRIER AND ROCKER REMOVAL

CAUTION Power must be off before carrier and rocker removal is started.

1. Disconnect the ribbon lift spring (No. 1, Figure 4-35).
2. Release rotate spring tension (No. 2, Figure 4-35).

CAUTION Rotate spring exerts counterclockwise tension on the rotate spring cage. Care should be taken in disengaging retainer from lugs on the cage. Allowing the cage to spin back freely may damage rotate spring.

To release rotate spring tension, hold the cage against tension and disengage retainer. Allow tension to rotate the cage slowly. Ascertain that retainer engages next lug. Follow the preceding steps, working with only one lug at a time, until all tension is released.

3. Remove the tilt pulley spring (No. 3, Figure 4-35).
4. Remove the tape anchor screw (No. 4, Figure 4-35).
5. Remove the tilt and rotate tapes (No. 5, Figure 4-35).
6. Unhook the velocity control tape from the bracket assembly (No. 6, Figure 4-35).
7. Remove the card holder. (No. 7, Figure 4-35).
8. Mark the position of the escapement bracket and remove the escapement bracket mounting screws (No. 8, Figure 4-35).
9. Block the right transport pulley slide to relieve the cord tension and unhook the cords from the carrier.
10. Remove the print shaft C-clip (just inside the left powerframe).
11. Remove the escapement cam from the right-hand end of the print shaft.
12. Remove the print shaft (No. 9, Figure 4-35) by moving it to the left.
13. Remove the carrier and rocker assembly by sliding the carrier out from under the escapement bracket.

NOTE If rocker removal is necessary, complete the following steps; if not, go to step 19.

14. Remove the ribbon mechanism (see "Ribbon Removal", preceding in this chapter).
15. Remove the rotate spring cage and pulley (No. 1, Figure 4-36).
16. Remove the tape guide (No. 2, Figure 4-36).
17. Remove the C-clip on the rocker shaft (No. 3, Figure 4-36).
18. Loosen the rocker shaft setscrew (No. 10, Figure 4-35) and remove the rocker shaft (No. 4, Figure 4-36).
19. After reinstalling the carrier and rocker, check the following adjustments:
    a. Carrier and rocker
    b. Typehead alignment
    c. Escapement and escapement pawl clearance on carrier return adjustments.

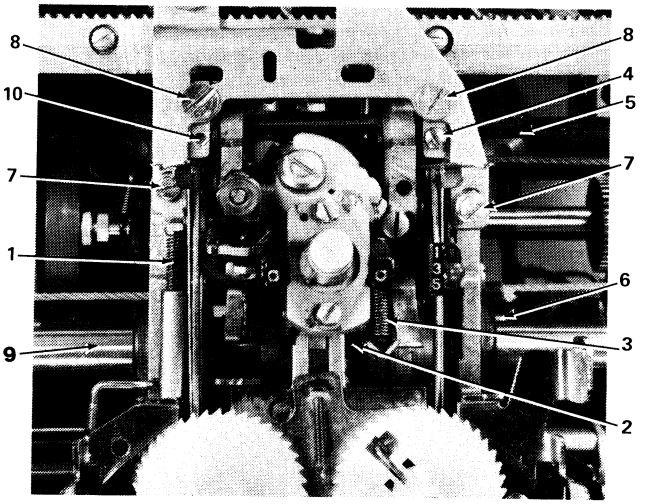


Figure 4-35. Carrier and Rocker Removal (Top of Carrier)

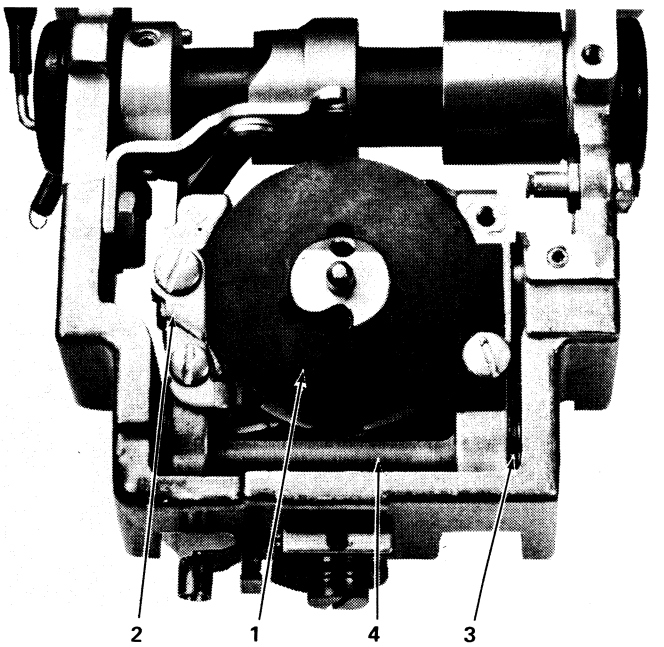


Figure 4-36. Carrier and Rocker Removal (Bottom of Carrier)

ROTATE SPRING REPLACEMENT

1. Perform the steps for carrier removal (omit steps 4, 5, 6, 7, and 9), leaving the tilt and rotate tapes and the cords attached to the carrier.
2. Tilt the front of the carrier toward the rear of the printer.
3. Remove the right-hand screw (No. 1, Figure 4-37) and back out the upper left screw 1/4 inch (No. 2, Figure 4-37). It is not necessary to loosen the lower left screw.
4. Remove the rotate spring retaining plate (No. 3, Figure 4-37). The rotate spring can now be removed.
5. On some machines, it may be necessary to shim the retaining plate to prevent the new rotate spring from binding.
6. Check the following adjustments after the rotate spring is replaced:
   a. Rotate spring tension
   b. Escapement
   c. Typehead homing
   d. Print shaft timing

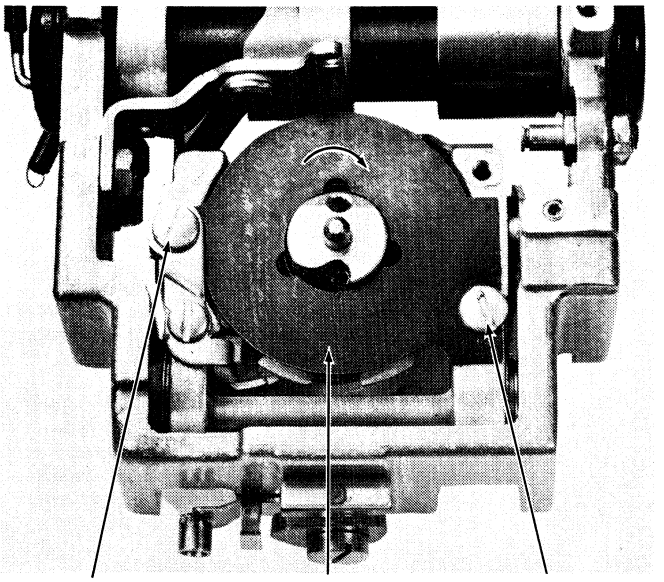


Figure 4-37. Rotate Spring Replacement (Bottom of Carrier)

TILT TAPE REPLACEMENT

1. Remove the left dust cover.
2. Position the carrier 3 inches from the left frame.
3. Half-cycle a rotate-0, tilt-0 character (to lock rotate spring tension).
4. Remove any broken pieces of tape from the printer.
5. Place the eyelet on the tilt pulley bellcrank (No. 1, Figure 4-38).
6. Thread the tape around the left tilt-arm pulley and right tilt-arm pulley and take up the slack in the tape.
7. Withdraw the rotate detent; turn the head counterclockwise to relieve the rotate-tape tension; and restore the detent.
8. Remove the tape retaining pin (No. 2, Figure 4-38) from the carrier and insert the tilt tape, keeping it on top of the rotate tape.
9. Restore the typehead to the rest position.
10. Check the tilt detent adjustment (right tilt pulley).

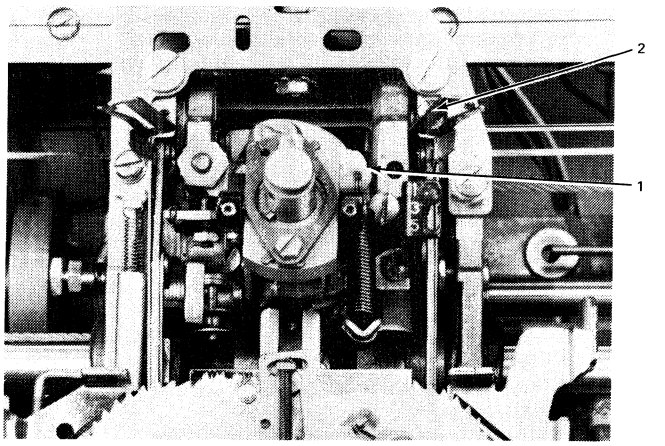


Figure 4-38. Tilt Tape Replacement

CYCLE SHAFT AND CYCLE CLUTCH PULLEY REMOVAL

Cycle Shaft

1. Follow steps 1 through 7 of "Belt Replacement", preceding in this chapter.
2. Force the positive bail down with a screwdriver (No. 1, Figure 4-39), making sure all the latches are under the bail. Insert a fluted wrench through the lower left bearing plate mounting hole, over the top of the bail, to hold it down. Do not remove the positive bail restoring spring.
3. Remove the cycle shaft, pushing the -5 and rotate links out of the way with a spring hook pusher end.
4. When installing a new cycle shaft, remove the cycle shaft gear and the shims from the old shaft and put them on the new one. Be sure the flexible nylon shim is the first one put on.

NOTE The number of shims to maintain 0.001" – 0.006" end play may vary with the new shaft. Shimming should be done with the spring, collar, and sleeve removed. Be sure to install and tighten the screws in the bearing plate. Once correct end play is obtained, reinstall the spring, sleeve, and collar.

5. Check the following adjustments after replacing the cycle shaft:
   a. Idler gears
   b. Cycle shaft end play
   c. Cycle-clutch spring
   d. Cycle-clutch latch bite
   e. Print shaft timing
   f. Print feedback timing
   g. Velocity control

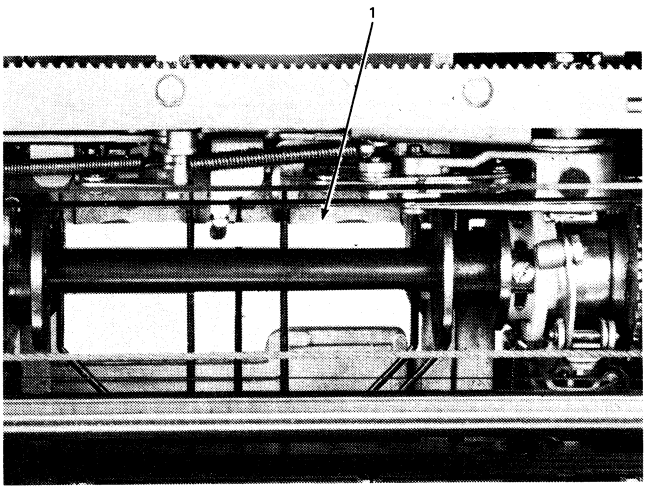


Figure 4-39. Cycle Shaft Removal

Cycle Clutch Pulley Removal

1. Follow the steps for cycle shaft removal.
2. Remove belt from pulley.
3. Remove two setscrews from pulley (one on top of the other, used as a lock screw).
4. Remove cycle clutch hub from pulley.
5. Check the cycle shaft adjustments after the cycle clutch pulley and/or cycle shaft are replaced.

PRINT FEEDBACK REMOVAL

1. Remove the gear guard (No. 1, Figure 4-40).

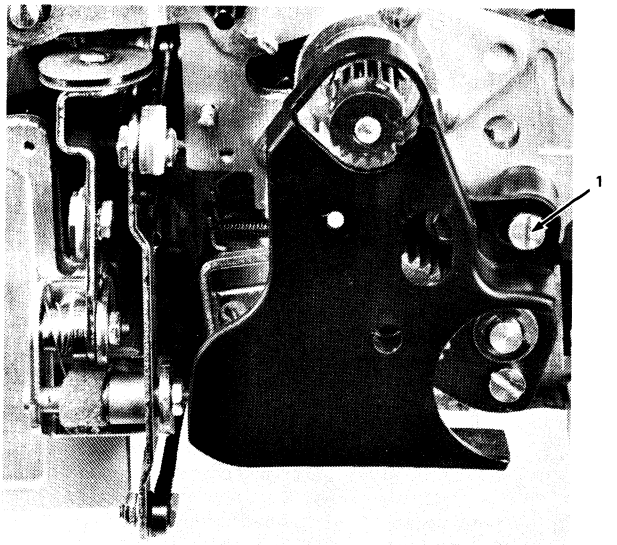


Figure 4-40. Print Feedback Removal (Left Side of Printer)

2. Remove the two print feedback circuit board mounting screws and remove the circuit board (No. 1, Figure 4-41).

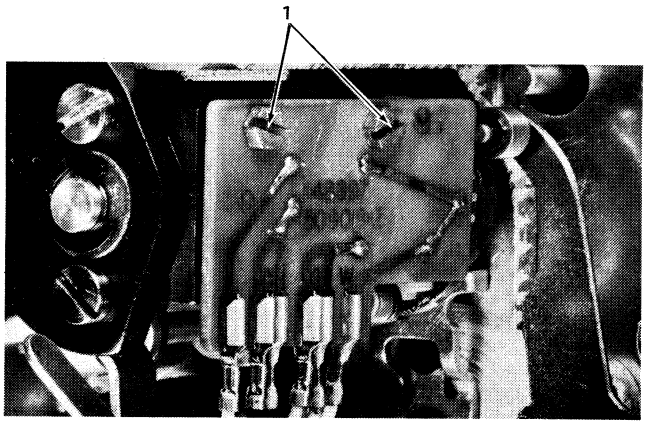


Figure 4-41. Print Feedback Removal (Circuit Board Removal)

3. Remove the two print feedback bracket mounting screws and remove the bracket (No. 1, Figure 4-42).

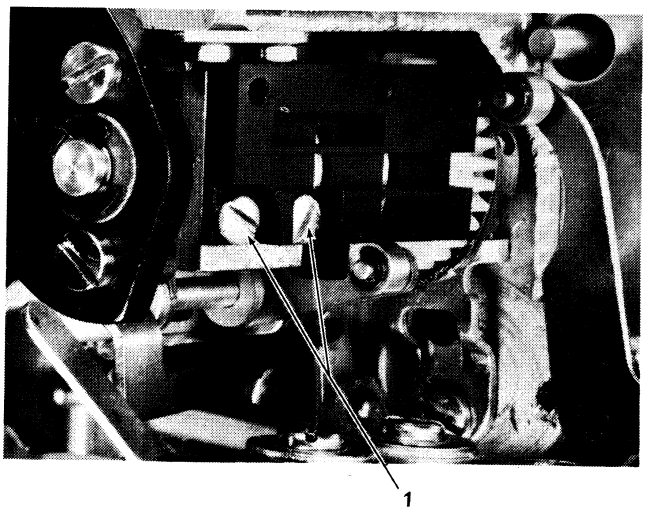


Figure 4-42. Print Feedback Removal (Circuit Board Removed)

4. Remove the print feedback shaft retaining clip (No. 1, Figure 4-43).
5. Remove the two idler assembly mounting screws (No. 2, Figure 4-43).

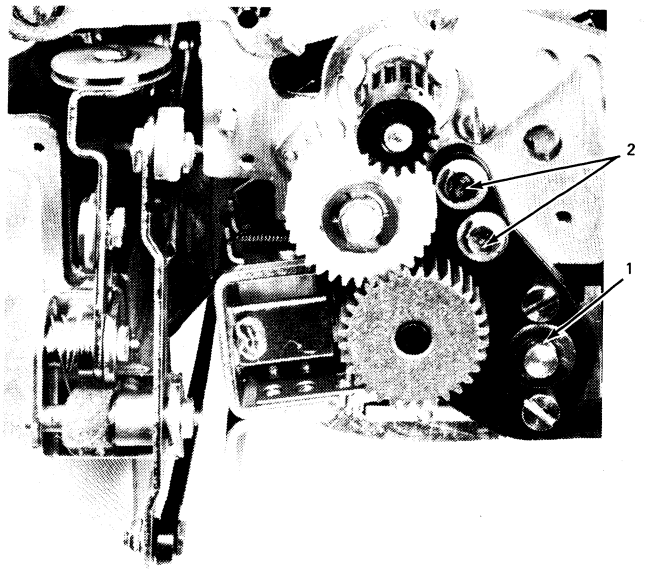


Figure 4-43. Print Feedback Removal (Left Side of Printer, Gear Guard Removed)

6. Loosen, but do not remove, the two screws that mount the velocity control assembly bracket (No. 1, Figure 4-44).
7. Remove the idler assembly.
8. Remove the print feedback shaft.
9. Check the following adjustments after reinstalling the print feedback shaft:
   a. Idler gear
   b. Print shaft
   c. Velocity control
   d. Selection cam

NOTE If parts are removed from the print feedback shaft, the shunt must be installed with the collar toward the left.

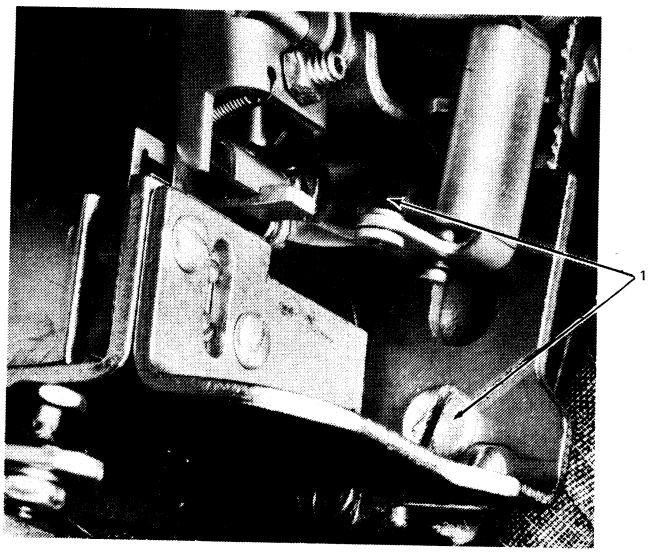


Figure 4-44. Print Feedback Removal (Printer Tilted Up)

SELECTION MAGNETS AND SELECTION INTERPOSER REMOVAL

1. Disconnect the six latch selection link clevises (No. 1, Figure 4-45).
2. Remove the three print magnet assembly mounting screws (No. 2, Figure 4-45).
3. Remove the two screws holding the terminal blocks (No. 3, Figure 4-45).
4. Remove the print magnet assembly.
5. After reinstalling the print magnet assembly, check selection latch link adjustments.

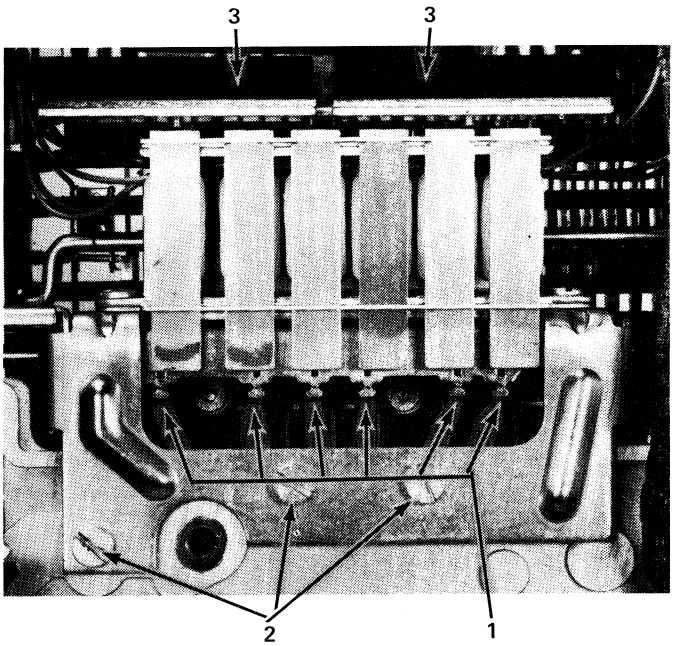


Figure 4-45. Selection Magnets and Selection Interposer Removal (Bottom of Printer)

SHIFT CLUTCH, ARM, AND CAM REMOVAL

Shift Clutch Removal

1. Rotate the sleeve so that the shunts (No. 1, Figure 4-46) are parallel to the shift feedback switch circuit board.
2. Remove the grip clip from the operational shaft (No. 2, Figure 4-46).
3. Remove the sleeve by sliding it off the shaft.

NOTE Observe how the shift clutch spring is attached to the sleeve.

4. Remove the clutch spring.
5. Check the following adjustments when the shift clutch is reinstalled:
   a. Clutch sleeve end play
   b. Shift drive

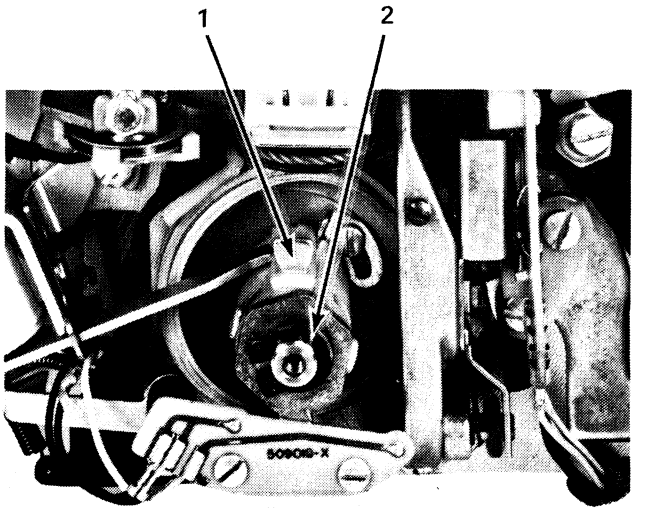


Figure 4-46. Shift Clutch Removal (Right Side of Printer)

Shift Arm Removal

1. Position the carrier at the left and remove the right dust cover.
2. Rotate the typehead counterclockwise and remove the rotate tape from the shift-arm pulley. Place the tape on the right-hand tilt pulley.
3. Loosen the setscrews that hold the shift-arm pivot (No. 1, Figure 4-47).
4. Remove the shift-arm pivot and arm.
5. The following adjustments should be checked after the shift-arm is replaced:
   a. Typehead homing
   b. Shift motion
   c. Printer case mode contact

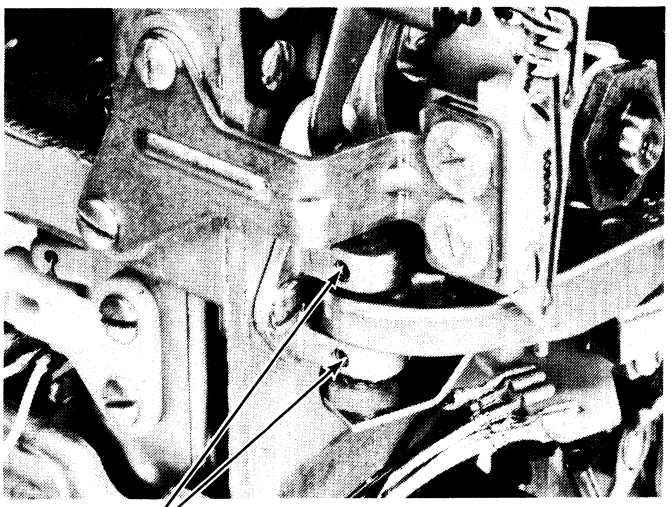


Figure 4-47. Shift Arm Removal (Printer Tilted Up)

Shift Cam Removal

1. Turn the typehead counterclockwise and remove the relaxed rotate tape from the shift-arm pulley. Place the tape around the right-hand tilt pulley.
2. Remove the two screws (No. 1, Figure 4-48) and remove the shift magnet assembly.
3. Remove the cam detent spring (No. 2, Figure 4-48).

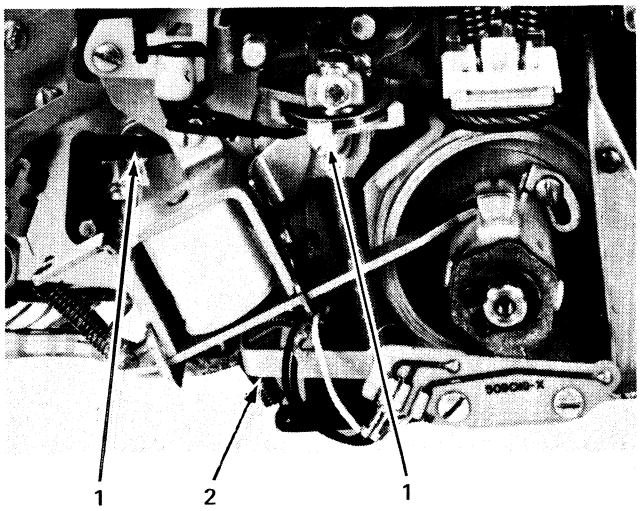


Figure 4-48. Shift Cam Removal (Right Side of Printer)

4. Follow the steps for shift clutch removal.
5. Loosen the rear screw (No. 1, Figure 4-49) and remove the front screw (No. 2, Figure 4-49) on the shift feedback mounting bracket and remove the bracket.
6. Loosen the two setscrews and remove the shift arbor from the operational shaft.

NOTE Do not rotate the operational shaft backward.

7. Remove the shift cam.
8. Check the following adjustments after the shift cam is replaced:
   a. All shift mechanism adjustments
   b. Shift magnet assembly
   c. Upper and lowercase typehead homing
   d. Shift feedback
   e. Shift mode

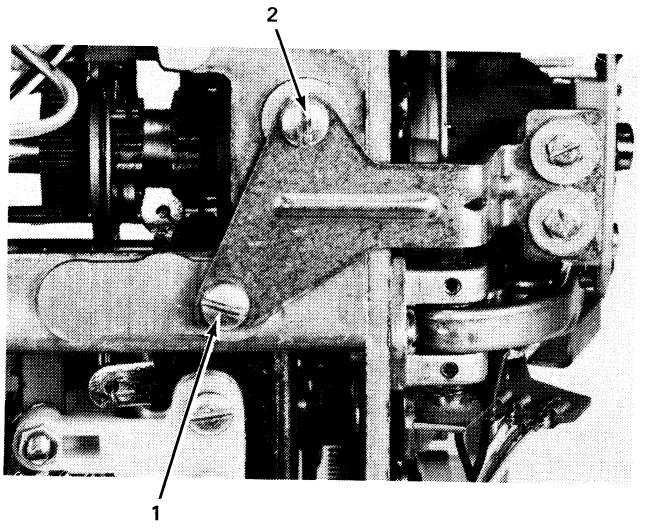


Figure 4-49. Shift Cam Removal (Printer Tilted Up)

KEYLEVER REMOVAL

1. Position the carrier at the extreme right.
2. Remove the guard (snaps off) over the keylever bearing support (No. 1, Figure 4-50).
3. Disconnect the springs (No. 2, Figure 4-50) for the function keys only.
4. Remove the two screws (No. 1, Figure 4-51) and disconnect the carrier return unlatching link (No. 2, Figure 4-51).
5. Remove the margin rack (No. 3, Figure 4-50).
6. Remove the C-clip located near the right end of the keylever fulcrum rod (under keylever bearing guard).
7. Remove the C-clip from the margin release keylever (No. 4, Figure 4-50).
8. Loosen the margin release bellcrank and push it to the left (No. 5, Figure 4-50).
9. Remove the bellringer bellcrank spring (No. 6, Figure 4-50).
10. Remove the bellringer bellcrank (No. 7, Figure 4-50).
11. Use a follower rod and push the pivot rod (No. 8, Figure 4-50) to the right until the margin release keylever is free. Remove the keylever.
12. Remove the LH plate on the bellringer bail (no. 9, Figure 4-50).
13. Remove the bellringer bail (No. 11, Figure 4-11).
14. Remove the keybutton from the keylever that is to be replaced.
15. Remove any keybuttons that extend over the keylever that is to be replaced.
16. Using a follower rod, push the keylever pivot rod (No. 8, Figure 4-50) out until the keylever is free.
17. On keylevers with keylever pawl leaf springs: Disengage the leaf spring from the keylever to be removed. Using a follower rod, move the keylever upstop (No. 10, Figure 4-50) to the right until the keylever to be removed is free.
    On keylevers with individualkeylever pawl coil springs: Raise the pivot end of the keylever to be removed and work it to the rear until it clears the keylever upstop at the front.

NOTE For keybuttons closest to the operator: Move the keylever upstop to the side with a follower rod, until the keylever to be removed is free.

18. Work the keylever out toward the front of the keyboard.

CAUTION To avoid damaging the keylever pawl when replacing a keybutton, move the pawl off the interposer and support the keylever.

19. Replace the keylever in the reverse order of removal.
20. Check the following adjustments after replacing the keylever:
    a. Keylever pawl to interposer clearance
    b. Bell bail lever
    c. Bell ringer bail
    d. Margin rack

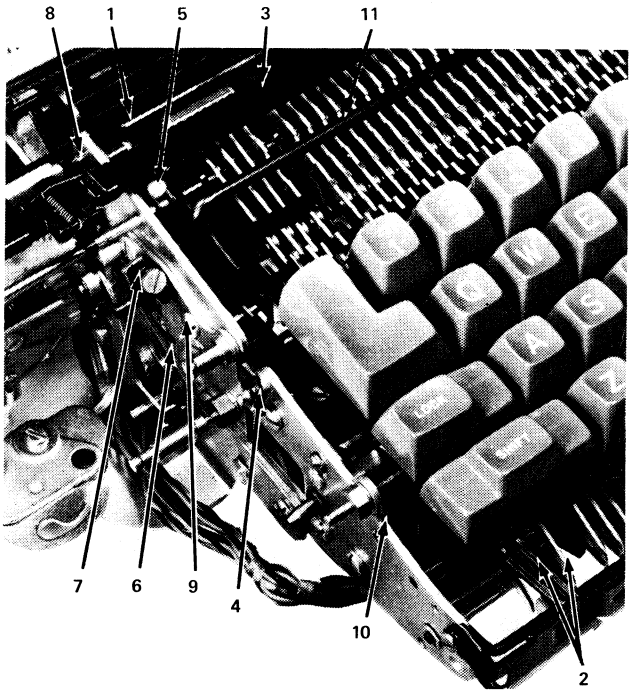


Figure 4-50. Keyboard Removal (Left Side of Keyboard)

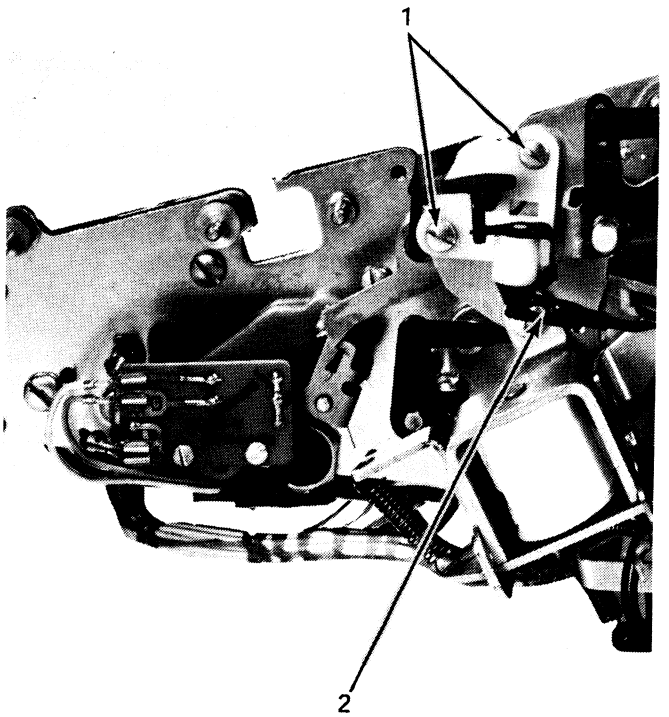


Figure 4-51. Keylever Removal (Right Side of Keyboard)

KEYLEVER INTERPOSER REMOVAL

1. Follow the steps for keylever removal, in the preceding paragraph, for the interposer to be replaced.
2. Use a follower rod to push the fulcrum rod (No. 1, Figure 4-52) to the interposer being removed.
3. Remove the spring from the interposer being removed (No. 2, Figure 4-52).
4. Check the adjustments listed under "Keylever Removal", after the interposer is replaced.

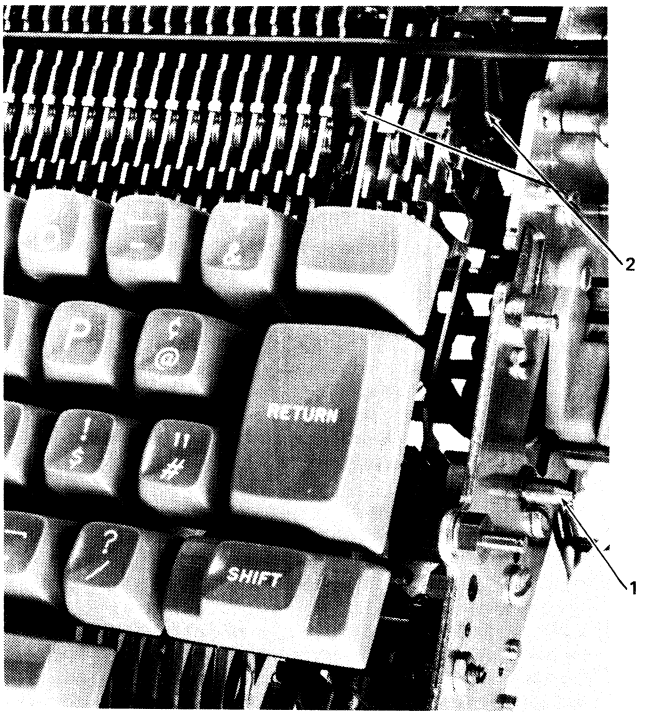


Figure 4-52. Keylever Interposer Removal (Top, Right View of Keyboard)

FILTER SHAFT REMOVAL

1. Tilt the printer up.
2. Remove the shift magnet (No. 1, Figure 4-53).
3. Remove the back check pawl spring (No. 2, Figure 4-53).
4. Remove the filter shaft cam trip link (No. 3, Figure 4-53).
5. Remove the two screws in the trip lever mounting bracket (No. 4, Figure 4-53).
6. Remove the filter shaft, with gears and bearing intact.
7. Check the following adjustments after reinstalling the filter shaft:
   a. Filter shaft cam and gear
   b. Shift magnet

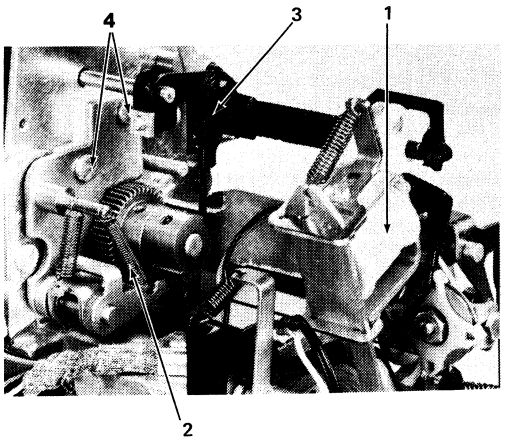


Figure 4-53. Filter Shaft Removal (Printer Tilted Up)

KEYBOARD REMOVAL

1. Loosen the two bellcranks on the margin release shaft (No. 1, Figure 4-54). Move the shaft to the left.

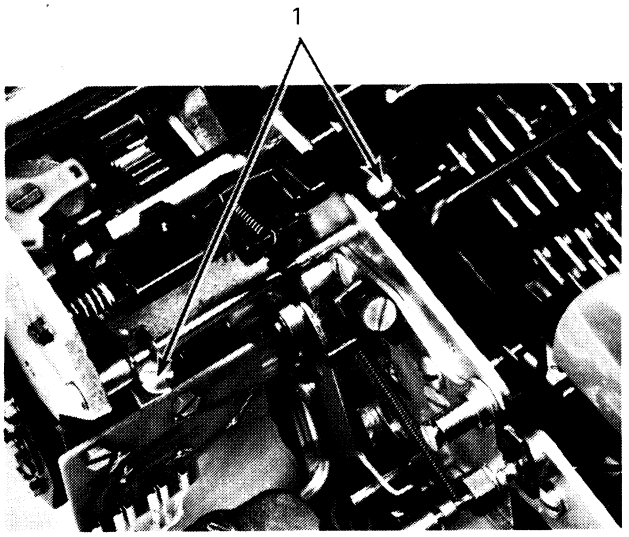


Figure 4-54. Keyboard Removal (Top, Left of Printer)

2. Unplug the four end-of-line terminals (No. 1, Figure 4-55).
3. Remove the nut from the ON/OFF switch (No. 2, Figure 4-55). Push the switch free of the keyboard.

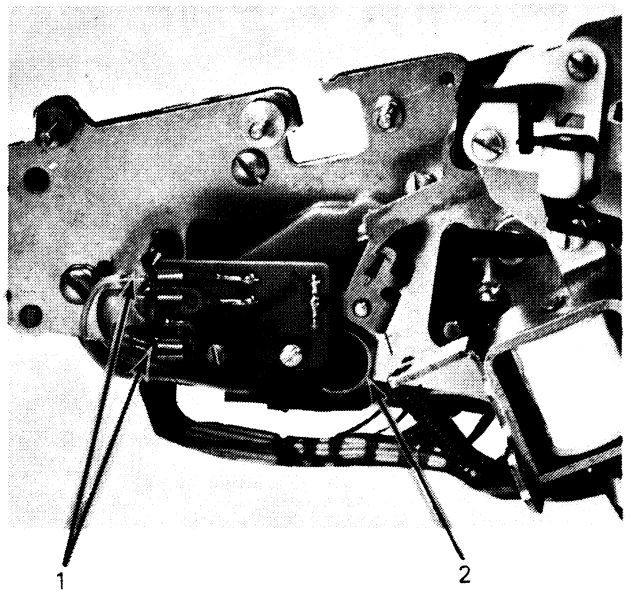


Figure 4-55. Keyboard Removal (Right Side of Keyboard)

4. Unplug the two keyboard mode contact terminals (No. 1, Figure 4-56).
5. Remove the two selection magnet mounting screws (No. 2, Figure 4-56).
6. Remove the screw and cable clamp (No. 3, Figure 4-56).
7. Remove the two terminal block mounting screws (No. 4, Figure 5-56).

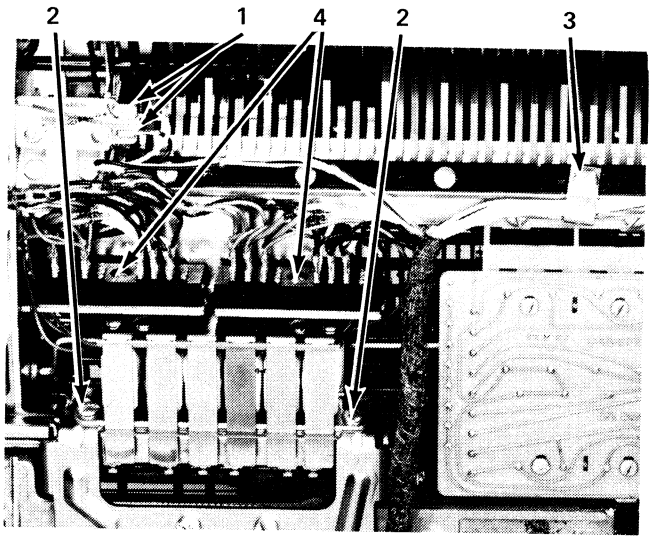


Figure 4-56. Keyboard Removal (Bottom of Keyboard)

8. Remove the two screws (No. 1, Figure 4-57) and remove the shift magnet assembly.
9. Remove the filter shaft cam trip link (No. 2, Figure 4-57).

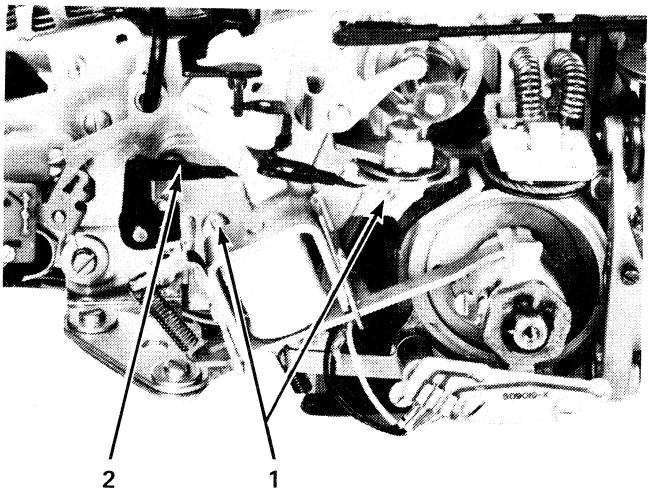


Figure 4-57. Keyboard Removal (Right Side of Printer)

10. Remove the two screws in the filter shaft cam trip lever mounting bracket (No. 1, Figure 4-58).
11. Remove the right-hand keyboard retaining screw (No. 2, Figure 4-53).
12. Disconnect the rear of the filter shaft check pawl spring (No. 3, Figure 4-58).
13. Remove the right-hand bearing and filter shaft.

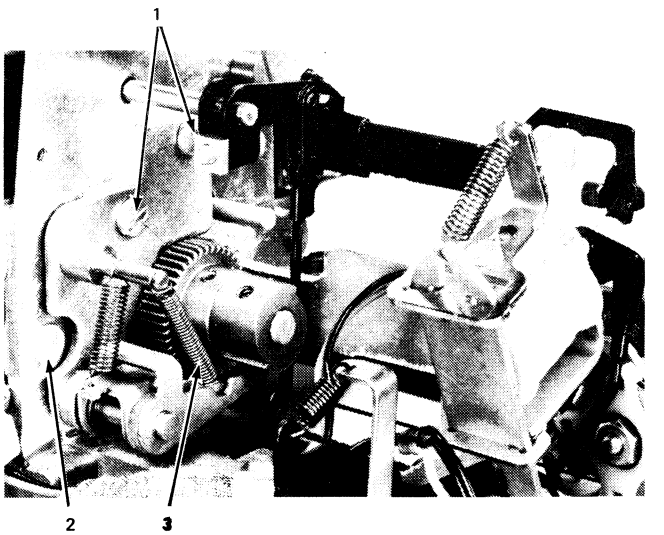


Figure 4-58. Keyboard Removal (Right Side, Printer Tilted Up)

14. Remove the left-hand filter shaft bearing retainer (No. 1, Figure 4-54).
15. Rotate the left-hand filter shaft bearing 90 degrees.
16. Remove the roll pin (No. 2, Figure 4-59).

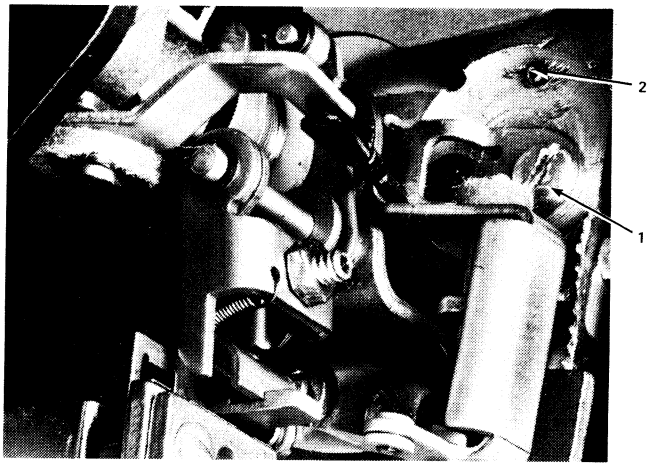


Figure 4-59. Keyboard Removal (Front, Left Corner of Printer)

17. Remove the roll pin (No. 1, Figure 4-60).
18. Remove the keyboard. Work the selection magnet cable around the left-hand keyboard brace.

NOTE It may be necessary to remove the hold-down brace.

19. Check the following adjustments after replacing the keyboard:
    a. Filter shaft cam, end play, and check pawl
    b. Shift magnet
    c. Margin release shaft and bellcranks
    d. Hold-down brace

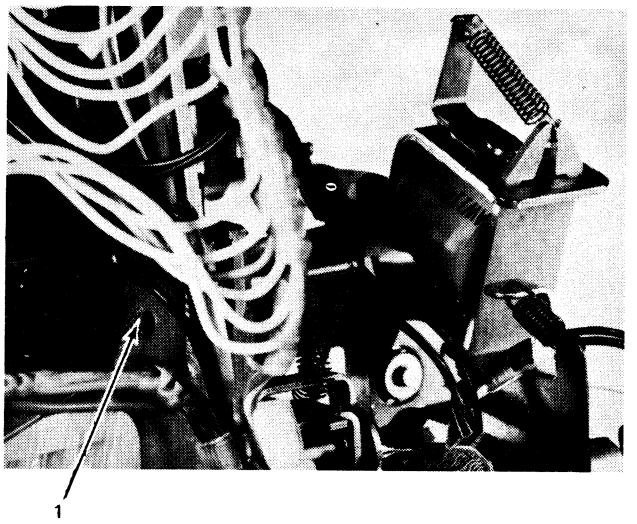


Figure 4-60. Keyboard Removal (Keyboard Roll Pin, Printer Tilted Up)

FOR PROPER PREVENTIVE MAINTENANCE, always turn to page 5-2 and begin with:

1. Preventive Maintenance Scheduling
2. Preventive Maintenance Procedures
3. Inspection and Lubrication Chart

1 PREVENTIVE MAINTENANCE SCHEDULING

The printer should be scheduled for preventive maintenance (PM) after every eight million operations (characters and functions). A minimum of two PM's per year should be performed on low-usage printers.

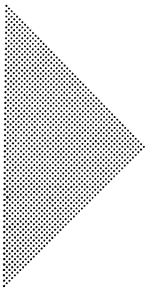
Because the customer's time schedule may not permit a complete lubrication and inspection during each scheduled PM, the preventive maintenance procedures have been divided into four inspection periods. These inspection periods are designed to assist the Customer Engineer in inspecting and lubricating one of the four major areas of the printer during each scheduled PM.

2 PREVENTIVE MAINTENANCE PROCEDURES

Because each printer installation will differ slightly in application and environment, these procedures are to be used only as a guide.

A. Note operator's comments
B. Perform a functional test.
C. Clean the following points with IBM Cleaning Fluid:
   1. Platen
   2. Deflector
   3. Feed Rolls
   4. Bail Rolls
   5. Card Holder (use No. 10 Oil)
   6. Type Elements

D. Inspect and lubricate a different area of the printer, as specified by the inspection and lubrication chart.



Include these steps in every inspection period.

3 INSPECTION AND LUBRICATION CHART (Part 1 of 2)

Inspection Period	Inspect	Lubricate (See Notes 1, 2, and 3)
First Inspection Period	1. Cycle Clutch a. Cycle clutch latch: is parallel and at correct height b. Cycle shaft collar: provides adequate clutch spring unwrap c. Nylon stop: provides correct clutch overthrow d. Cycle shaft end play: is adequate byt not excessive e. Gear mesh: is snug but not binding; setscrews are tight f. Print shaft: is in correct latched position 2. Tilt Mechanism a. Tilt motion: is proper for uniform detenting b. Tilt detenting: is uniform and to specifications 3. Ribbon Feed Mechanism a. Ribbon lift: is at correct height b. Ratchet brake: has sufficient tension c. Ribbon reverse: operates positively d. Ribbon feed pawl: provides two-tooth ribbon feed with overthrow	1. All lubrication points shown in A 2. All circled lubrication points shown in B through F

INSPECTION AND LUBRICATION CHART (Part 2 of 2)

Inspection Period	Inspect	Lubricate (See Notes 1, 2, and 3)
Second Inspection Period	1. Keyboard a. No binding keylevers b. Adequate keylever travel c. All keys work properly d. Filter shaft: is timed for proper interposer engagement 2. Latch Selection a. Latch overhang: at rest b. Selected latches: are pulled clear and are not snapping off the bail c. Type a strike-up and overtype several times to check general condition of selection mechanism 3. Impression and Alignment a. Rotate and tilt tapes: should be free of kinks and nicks b. Rotate and tilt detents: should be neither loose nor binding c. Tilt ring and upper ball socket: should be snug but not binding 4. Rotate Mechanism a. Bandwidth: is within limits b. Print shaft: timing is correct c. Detents: seat fully and clear sufficiently (+5 through -5 characters detent correctly)	1. All lubrication points shown in **B** and **C**. 2. All circled lubrication points shown in **A**, **D**, **E**, and **F**.
Third Inspection Period	1. Magnets a. Attracted armatures: are not touching core; no grease on armatures b. Armature at rest: is not too far from core 2. Cycle Clutch — Trips reliably, with overthrow 3. Reed Switches — Timing and operation is correct	1. All lubrication points shown in **D** and **E**. 2. All circled lubrication points shown in **A**, **B**, **C** and **F**.
Fourth Inspection Period	1. Escapement a. Smooth and positive from margin to margin b. No interference between carrier assembly and platen c. Cords in good condition: not frayed or loose d. Correct right-hand cord pulley tension e. Carrier return shoe: rest clearance is adequate, but not excessive f. Mainspring tension: is correct, especially at right-hand margin. g. Pinion gears: have full mesh but do not bind h. Prints and escapes immediately after printing 2. Motor Drive and Carrier Return a. Motor belt: in good condition and has proper tension b. Shafts: end play is adequate but not excessive; gear mesh is snug but not binding, setscrews are tight c. Carrier return clutch: latches with overthrow; starts to drive carrier before escapement pawl clears rack; and unlatches at left margin, with correct overbank 3. Indexing and paper Feed — Index pawl: has proper rest position, engagement, and throw 4. Shift a. Cam and clutch spring: look for rust b. Clutch: has positive release and full detenting	1. All lubrication points shown in **F**. 2. All circled lubrication points shown in **A** through **E**.

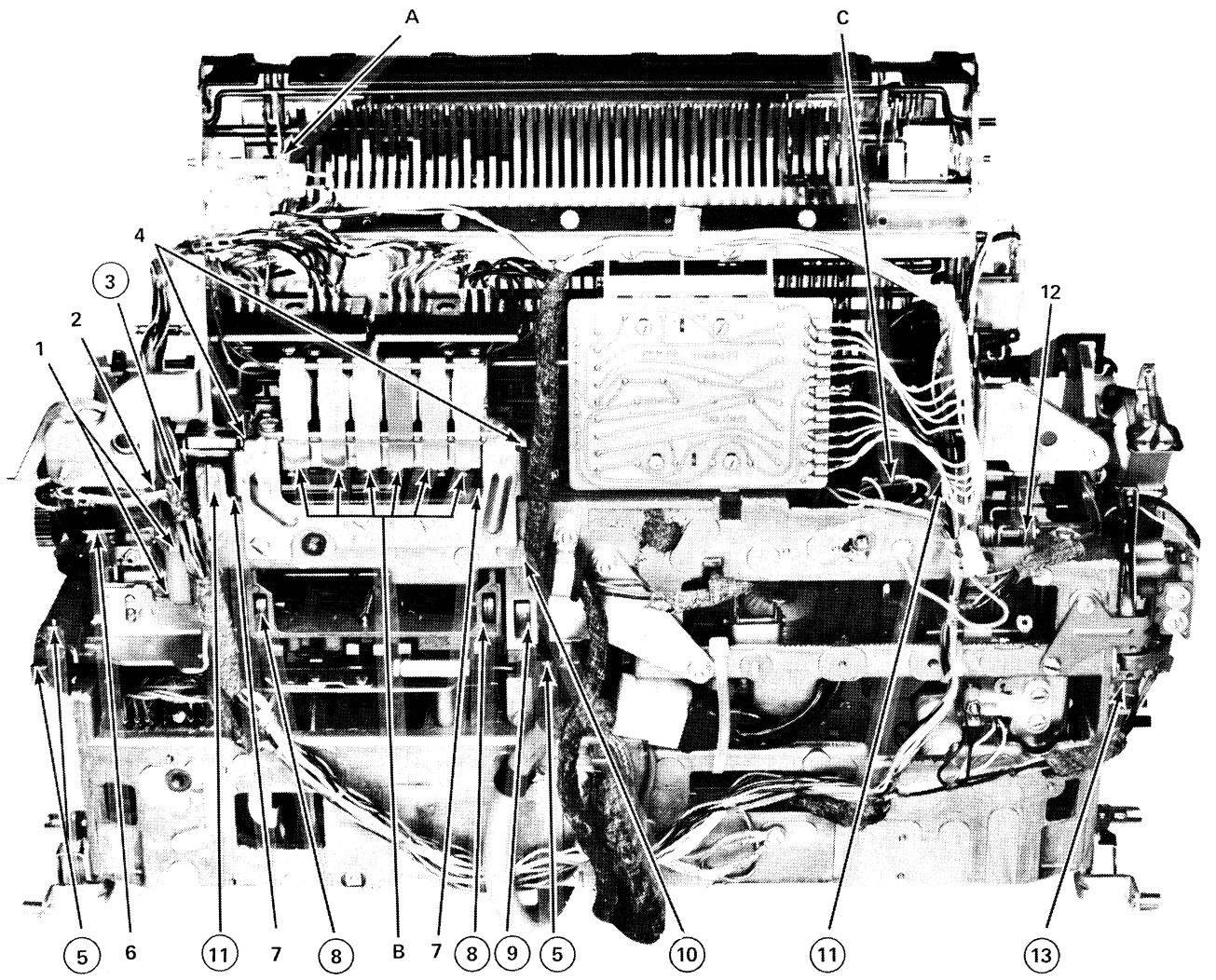
NOTE 1 Lubricate the platen bushings once each year with IBM No. 10 Oil. (Platen not shown.)

NOTE 2 All bearing areas having pressure or sliding motion must be lubricated with IBM No. 23 Grease and all bearing areas having rotational motion must be lubricated with IBM No. 10 Oil, unless otherwise specified.

Lubrication should be applied in quantities sufficient to lubricate the area immediately involved. In no case should lubrication be applied so freely as to cause dripping. Rubber parts should be free of lubricants.

NOTE 3 The value spout oiler nozzle (P/N 9900034) may be inserted into the CE grease gun. This provides a very effective method of applying No. 23 Grease, and it eliminates the need for the special adapter tip required for greasing the cycle clutch.

A LUBRICATION, BOTTOM OF PRINTER



Note: All magnet armatures and stops should be free of lubricants except as specified.

Figure 5-1. Lubrication, Bottom of Printer

IBM No. 10 Oil

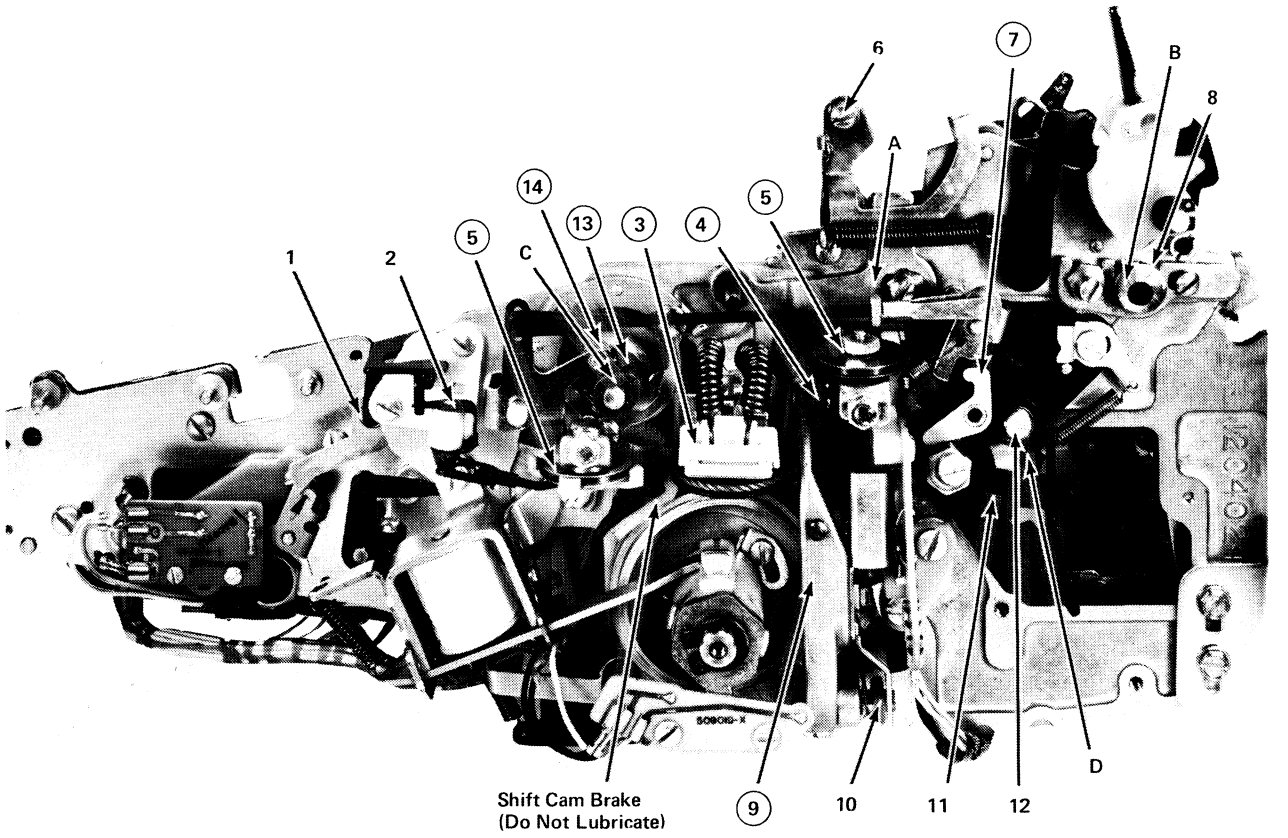
1. Velocity control linkage (wicks)
2. Velocity cam follower roller
3. Selection cam follower roller
4. Selection bail pivots (wicks)
5. Rotate link pivots
6. Velocity tape arm (wick)
7. Positive latch bail pivots (wicks)
8. Positive latch bail roller pivots
9. Negative latch bail roller pivots
10. Negative latch bail pivots
11. Filter shaft bearings
12. Filter shaft cam check pawl (wick)
13. Shift arm pivot

IBM No. 23 Grease

A. Camming and latching surface of shift down keylever latch
B. Contact point between selection armatures and interposers
C. Filter shaft operating surface

(#) **Lubricate every inspection period.**

B LUBRICATION, RIGHT SIDE



Note: All magnet armatures and stops should be free of lubricants except as specified.

Figure 5-2. Lubrication, Right Side

IBM No. 10 Oil

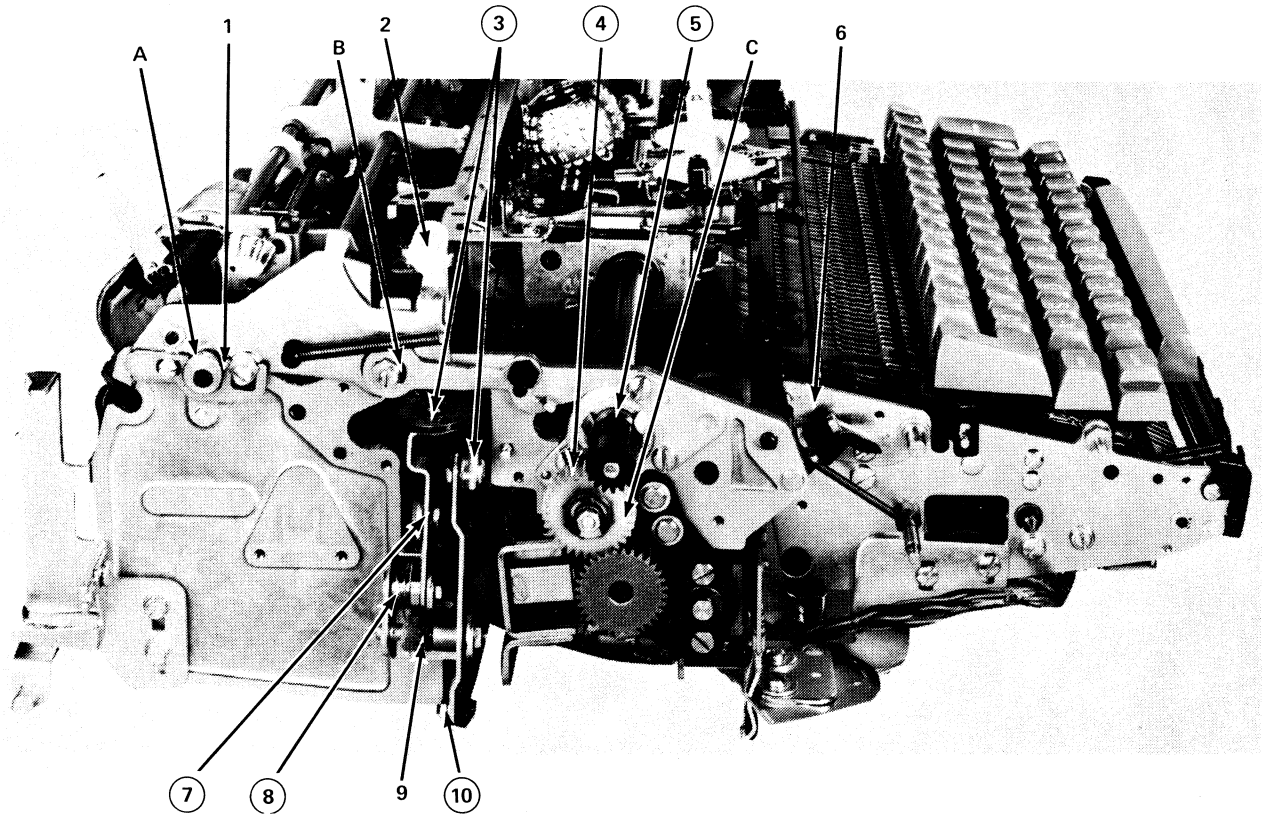
1. Bellringer bail pivot
2. Carrier return unlatching bellcrank pivot
3. Right-hand cord pulley bearing
4. Shift arm pulley
5. Velocity control and tilt pulley bearings
6. Platen release pivot
7. Escapement torque bar pivot
8. Copy control eccentric pivot
9. Shift arm roller
10. Shift arm pivot (wick)
11. Carrier return unlatching link pivot
12. Carrier return latch keeper pivot
13. Print Shaft Bearing
14. Cam follower roller

IBM No. 23 Grease

A. Guide bracket sliding surface
B. Copy control eccentric surface
C. Escapement cam
D. Carrier return latch keeper

(#) **Lubricate every inspection period.**

C LUBRICATION, LEFT SIDE



Note: All magnet armatures and stops should be free of lubricants except as specified.

Figure 5-3. Lubrication, Left Side

IBM No. 10 Oil

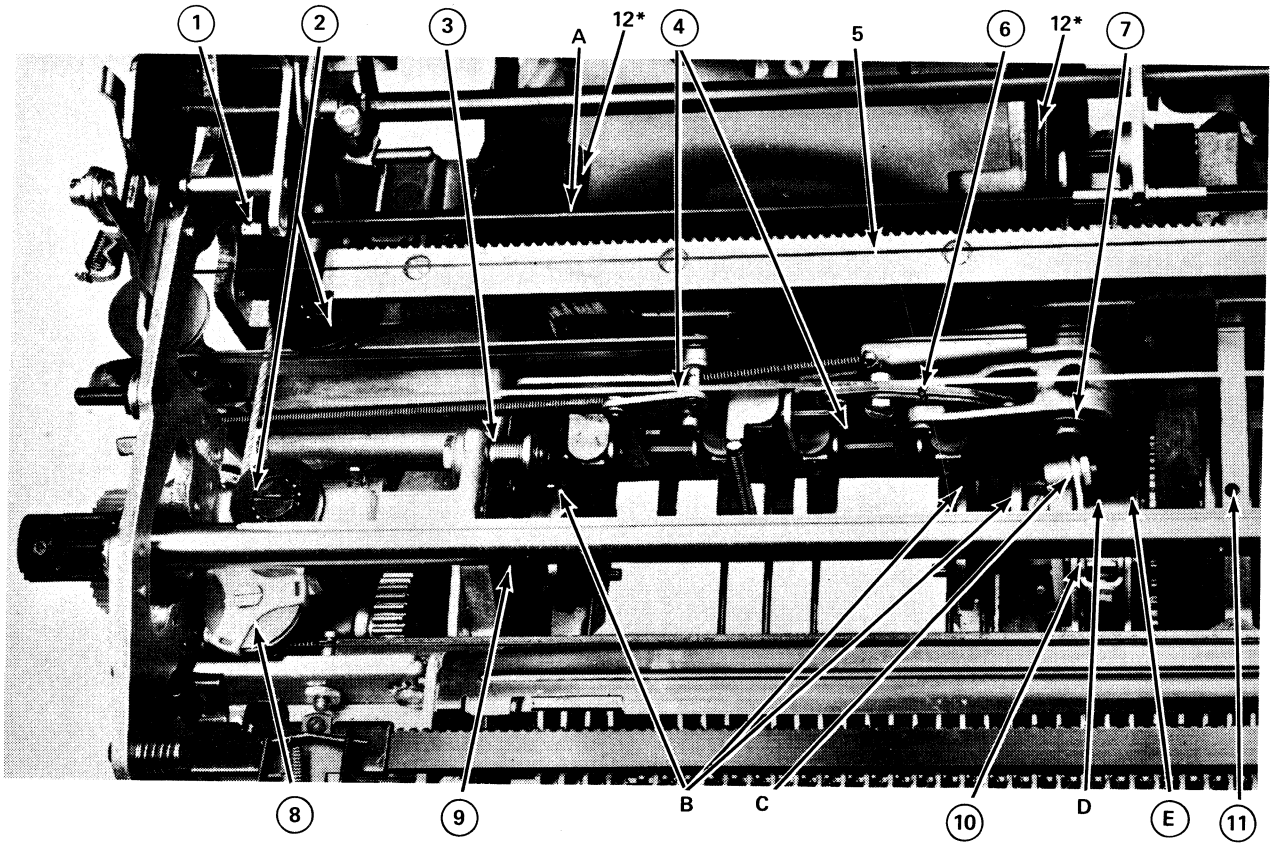
1. Copy control eccentric pivot
2. Platen release pivot
3. Rotate and tilt pulley bearings
4. Idler gear bearings
5. Print shaft bearing
6. Bellringer bail pivot
7. Tilt link pivot
8. Tilt arm pivot
9. Rotate arm pivot (wick)
10. Rotate link

IBM No. 23 Grease

A. Copy control eccentric surface
B. Guide bracket sliding surface
C. Idler gear teeth

(#) **Lubricate every inspection period.**

D LUBRICATION, CYCLE CLUTCH AND DIFFERENTIAL MECHANISMS



Note: All magnet armatures and stops should be free of lubricants except as specified.

Figure 5-4. Lubrication, Cycle Clutch and Differential Mechanisms

IBM No. 10 Oil

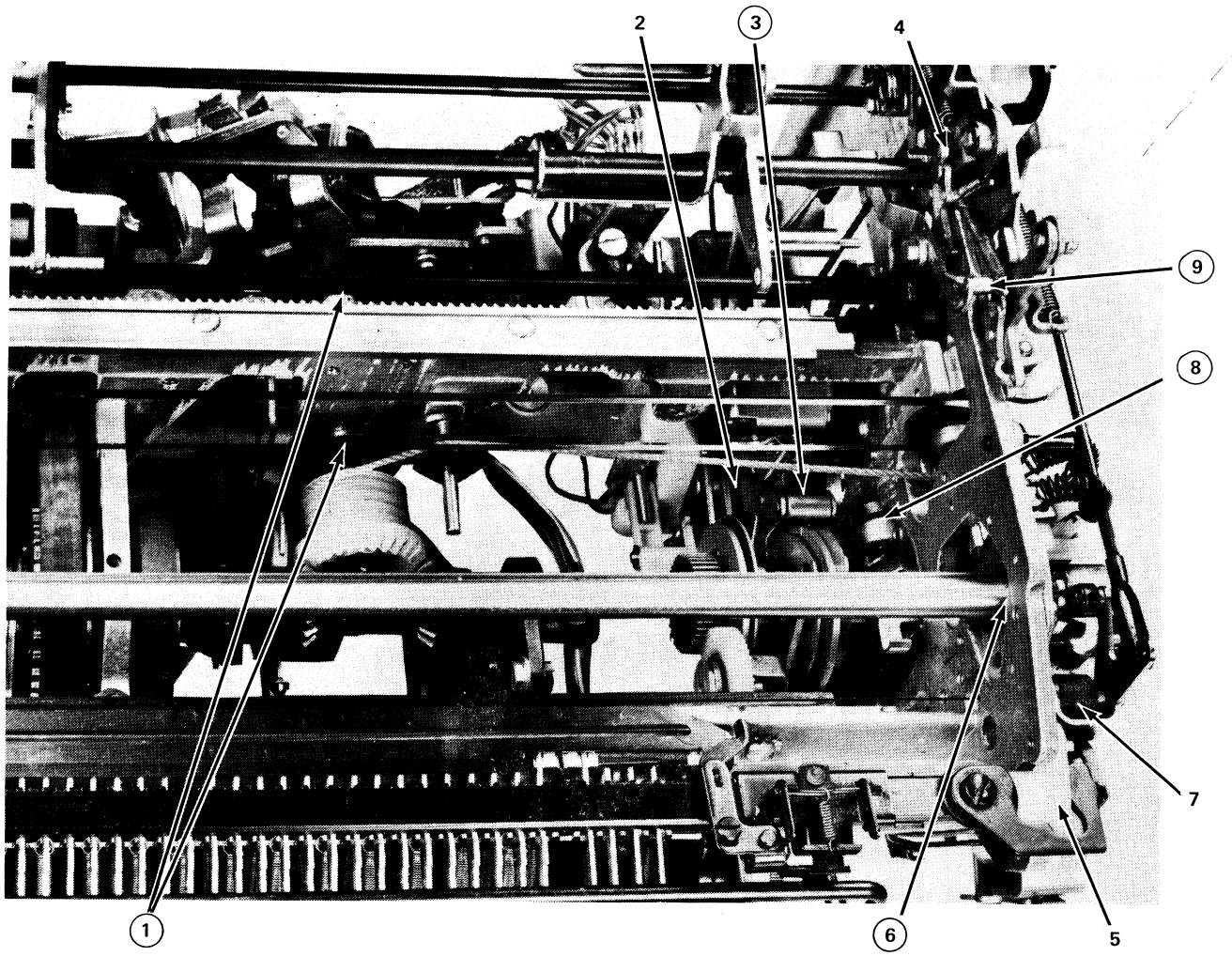
1. Escapement torque bar pivot
2. Carrier return pulleys
3. Cycle clutch check latch pivot
4. All selector latch and differential mechanism points
5. Surface of the escapement rack
6. Balance arm
7. Rotate bellcrank
8. Velocity tape pulley
9. Cycle shaft bearing
10. Cycle clutch latch pivot
11. Center bearing

*12. Motor (2-3 drops once a year)

IBM No. 23 Grease

A. Escapement torque bar (light film)
B. Negative-five cam surface and positive cam surfaces
C. Cycle clutch restoring cam and roller
D. Cycle clutch sleeve surface
E. Cycle clutch (inside)
(Lube hole is between the right-hand positive cam and the negative-five cam.)

(#) **Lubricate every inspection period.**



Note: All magnet armatures and stops should be free of lubricants except as specified.

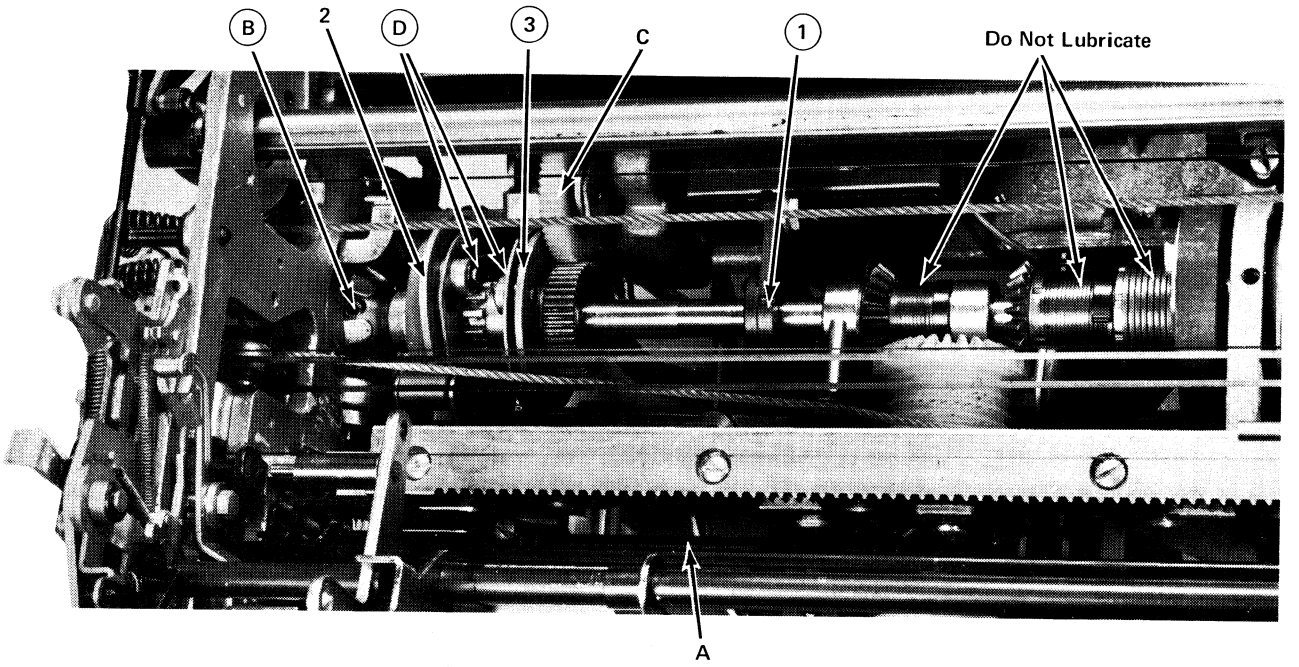
Figure 5-5. Lubrication, Operational Mechanism (Top, Front View)

IBM No. 10 Oil

1. Escapement shaft bearing
2. Index cam follower pivot (wick)
3. Index cam follower roller
4. Index pawl pivot
5. Right-hand margin rack bushing
6. Print shaft bearing
7. Escapement cam follower (wick)
8. Shift cam backup roller
9. Platen detent roller

(#) **Lubricate every inspection period.**

E LUBRICATION, OPERATIONAL MECHANISM (Part 2 of 2)



Note: All magnet armatures and stops should be free of lubricants except as specified.

Figure 5-6. Lubrication, Operational Mechanism (Top, Rear View)

IBM No. 10 Oil

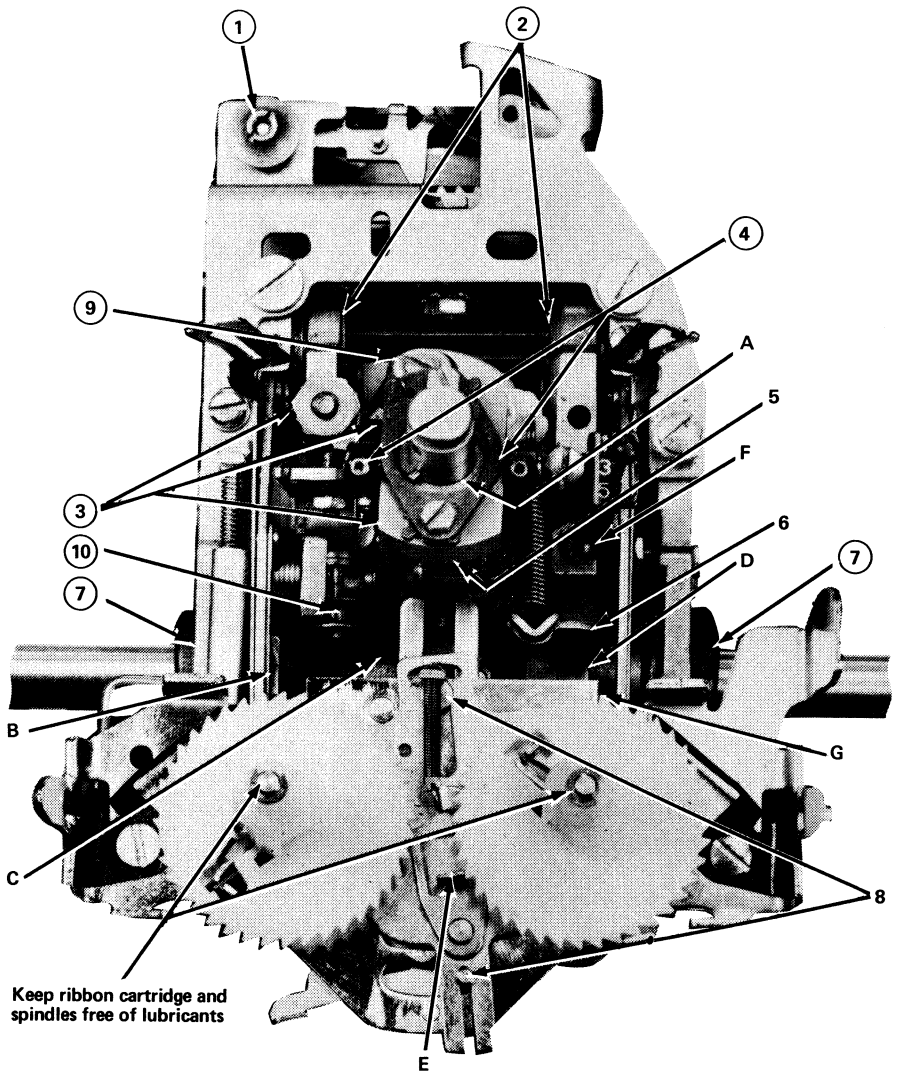
1. Operational shaft support
2. Index cam (oil wick)
3. Filter shaft cam

IBM No. 23 Grease

A. Escapement torque bar
B. Operational shaft bearing and shift clutch
C. Filter shaft idler gear teeth
D. Clutch ratchets

(#) Lubricate every instection period.

F LUBRICATION, CARRIER



Note: All magnet armatures and stops should be free of lubricants except as specified.

Figure 5-7. Lubrication, Carrier

IBM No. 10 Oil

1. Escapement pawl pivot
2. Rocker pivots
3. Detent pivots
4. Tilt-ring pivots
5. Lower ball socket
6. Print cam roller bearing (below cam)
7. Print shaft wipers
8. Ribbon feed and reverse plate
9. Tilt bellcrank pivot
10. Typehead detent cam follower pivot

IBM No. 23 Grease

A. Tilt ring and ball joint
B. Ribbon-lift cam surface
C. Ribbon-feed and detent cam surface
D. Print-cam surface
E. Ribbon-feed pawl
F. Impression control plate pin
G. Velocity yoke shaft (located beneath the print cam)

(#) Lubricate every inspection period.

(Where more than one page reference is given, the major reference is first.)

A

B

C

D

E

F

G

M

N

O

P

R

S

T

U

V

W

Y

Selectric® I/O-II Console Printer-Keyboard Theory-Maintenance

Order No. SY27-0078-1

READER'S COMMENT FORM

Your views about this publication may help improve its usefulness; this form will be sent to the author's department for appropriate action. Using this form to request system assistance or additional publications will delay response, however. *For more direct handling of such request, please contact your IBM representative or the IBM Branch Office serving your locality.*

Possible topics for comment are:

Clarity Accuracy Completeness Organization Index Figures Examples Legibility

What is your occupation? _

Number of latest Technical Newsletter (if any) concerning this publication: _ _ _ _ _ _ _ _ _

Please indicate in the space below if you wish a reply.

Thank you for your cooperation. No postage stamp necessary if mailed in the U.S.A. (Elsewhere, an IBM office or representative will be happy to forward your comments.)

—Cut or Fold Along Line—

Cut or Fold Along Line

Your comments, please . . .

This manual is part of a library that serves as a reference source for systems analysts, programmers, and operators of IBM systems. Your comments on the other side of this form will be carefully reviewed by the persons responsible for writing and publishing this material. All comments and suggestions become the property of IBM.

Fold Fold

First Class
Permit 40
Armonk
New York

Business Reply Mail
No postage stamp necessary if mailed in the U.S.A.

Postage will be paid by:

International Business Machines Corporation
Dept. E01
P.O. Box 12195
Research Triangle Park
North Carolina 27709

Fold Fold

IBM

International Business Machines Corporation
Data Processing Division
1133 Westchester Avenue, White Plains, New York 10604
(U.S.A. only)

IBM World Trade Corporation
821 United Nations Plaza, New York, New York 10017
(International)

Selectric ® I/O-II Console Printer-Keyboard Theory-Maintenance Printed in U.S.A. SY27-0078-1

Selectric® I/O-II Console Printer-Keyboard Theory-Maintenance

READER'S COMMENT FORM

Order No. SY27-0078-1

Your views about this publication may help improve its usefulness; this form will be sent to the author's department for appropriate action. Using this form to request system assistance or additional publications will delay response, however. *For more direct handling of such request, please contact your IBM representative or the IBM Branch Office serving your locality.*

Possible topics for comment are:

Clarity Accuracy Completeness Organization Index Figures Examples Legibility

What is your occupation? _

Number of latest Technical Newsletter (if any) concerning this publication: _ _ _ _ _ _ _ _ _

Please indicate in the space below if you wish a reply.

Thank you for your cooperation. No postage stamp necessary if mailed in the U.S.A. (Elsewhere, an IBM office or representative will be happy to forward your comments.)

Cut or Fold Along Line

Your comments, please . . .

This manual is part of a library that serves as a reference source for systems analysts, programmers, and operators of IBM systems. Your comments on the other side of this form will be carefully reviewed by the persons responsible for writing and publishing this material. All comments and suggestions become the property of IBM.

Fold Fold

First Class
Permit 40
Armonk
New York

Business Reply Mail
No postage stamp necessary if mailed in the U.S.A.

Postage will be paid by:

International Business Machines Corporation
Dept. E01
P.O. Box 12195
Research Triangle Park
North Carolina 27709

Fold Fold

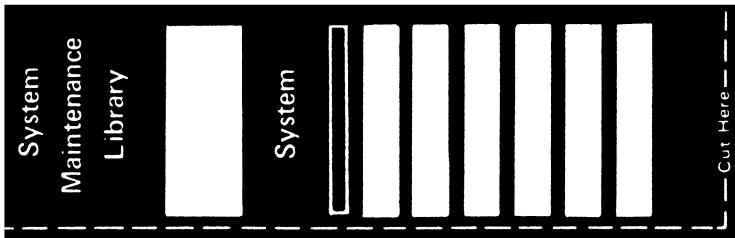
IBM

International Business Machines Corporation
Data Processing Division
1133 Westchester Avenue, White Plains, New York 10604
(U.S.A. only)

IBM World Trade Corporation
821 United Nations Plaza, New York, New York 10017
(International)

Cut or Fold Along Line

Selectric ® I/O-II Console Printer-Keyboard Theory-Maintenance Printed in U.S.A. SY27-0078-1



SY27-0078-1

Selectric® I/O II Console Printer Keyboard Theory Maintenance Printed in U.S.A. SY27-0078-1

IBM

International Business Machines Corporation
Data Processing Division
1133 Westchester Avenue, White Plains, New York 10604
(U.S.A. only)

IBM World Trade Corporation
821 United Nations Plaza, New York, New York 10017
(International)