IBM

Electronic Typewriter

Service Manual
Supplement

November, 1982

SR-28-0045-0

IBM Electronic Typewriter 85

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SAFETY PRECAUTIONS

All IBM customer service representatives are expected to take every safety precaution possible and observe the following safety practices when servicing IBM equipment.

Mechanical Safety:

1. *Safety glasses must be worn.*
2. *All safety devices, such as guards, shields, signs, and ground wires, must be restored after maintenance. When a guard or shield is removed to observe or make an adjustment, that shield must be replaced when work in the area is completed.*
3. *Watches, rings, necklaces, ID bracelets, or other jewelry must be removed when servicing the machine.*
4. *Care must be used when working near moving parts. Keep hair away from moving parts. Avoid wearing loose clothing that might be caught in the machine. Shirt sleeves must be kept buttoned or rolled above the elbows. Ties must be tucked in the shirt or have a tie clasp approximately three inches from the end. Tie chains are not recommended.*

Electrical Safety:

1. *The equipment referenced in this manual may use high voltages. Check voltage labels!*
2. *Safety glasses must be worn when checking energized circuits.*
3. *If a circuit is disconnected for servicing or parts replacement, it must be reconnected and tested before allowing the use of the machine.*
4. *Power should be removed from the machine for servicing whenever possible. Remember, when checking voltages, avoid contacting ground potential, such as metal floor strips or machine frame.*
5. *Meter continuity check should be used instead of voltage checks whenever possible.*
6. *Do not apply power to any part, component, or subassembly when it is not physically mounted in the machine.*

General Safety:

1. *Each customer service representative is responsible for ensuring that no action on his/her part makes the product unsafe or exposes customer personnel to hazards.*
2. *Store the removed machine covers in a safe, out-of-the-way place where no one can trip over them.*
3. *If you must leave the machine in a down condition, always install the covers and disconnect the power before leaving the customer's office.*
4. *Always place the CSR tool kit away from walk areas where no one can trip over it.*
5. *Maintain safe conditions in the area of the machine while performing and after completing maintenance.*
6. *Before starting the equipment, make sure fellow CSRs and customer personnel are not in a hazardous position.*
7. *All machine covers must be in place before returning the machine to the customer.*

NOTE: Refer to the Safety CEMs relating to this product(s) for further safety precautions.

INTRODUCTION

This manual describes the operational theory and the sequence of adjustments to help in servicing the additional features of the IBM Electronic Typewriter 85. This manual covers the following 67XX models:

MACHINE MODEL	TYPE CODE
IBM 85 (All Models - 15") (394 mm)	6714
IBM 85 (All Models - 19") (485 mm)	6724

Those who use this manual must be familiar with the operator instructions. It is suggested that the 50/60/75/85 Adjustment Parts Manual (F/N SR-28-0088) and the 50/60/75 Service Manual (F/N S544-4014) be used with this manual. Also, the special tools listed in the 50/60/75 Service Manual may be used as required.

The Machine Introduction section of this manual includes the functions and applications of the IBM 85.

The sequence of the functional check allows checking of the machine's important functions for proper operation. However, this check does not necessarily follow the sequence of operational theory and adjustments in the manual. The functional check should be used to help locate problems on the machine.

The mechanism sections of this manual are separated into two parts: operational theory and adjustment.

In the adjustment section, adjustments are in the sequence that they are to be made. When an adjustment is made, all adjustments that follow in that mechanism must be checked to ensure that this adjustment did not affect an adjustment later in the sequence. The part to be adjusted and the direction the part must be adjusted are printed in red. When needed, the view, the model of machine, level of design and mode or condition of the equipment is noted under the drawing. There may be times when adjustment sequences or tolerances differ from those in other related publications. However, the publication with the latest date should normally be considered the most current.

If a complete drawing of an assembly is required, the parts section of the Adjustment Parts Manual should be used.

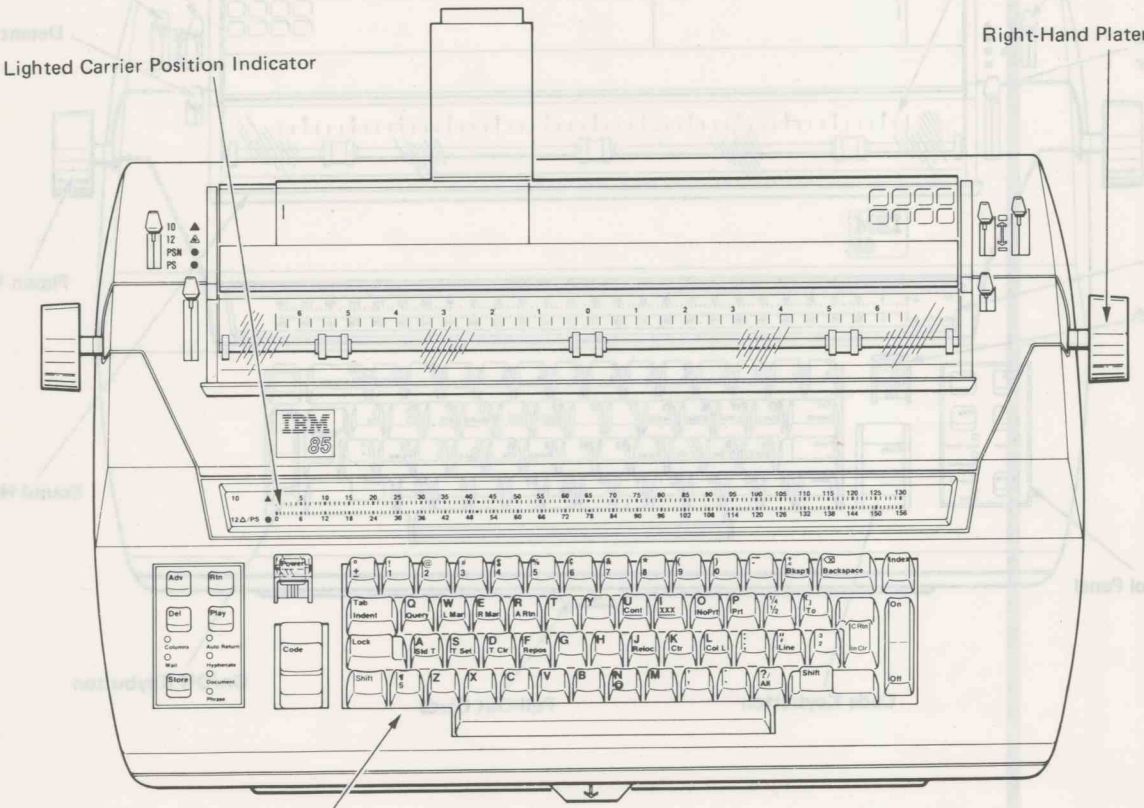
The Removal Procedures section is a numbered sequence of instructions for parts removal. The parts can be assembled by reversing the removal steps.

IBM ELECTRONIC TYPEWRITER 85
SERVICE MANUAL CONTENTS
(ALPHABETICAL)

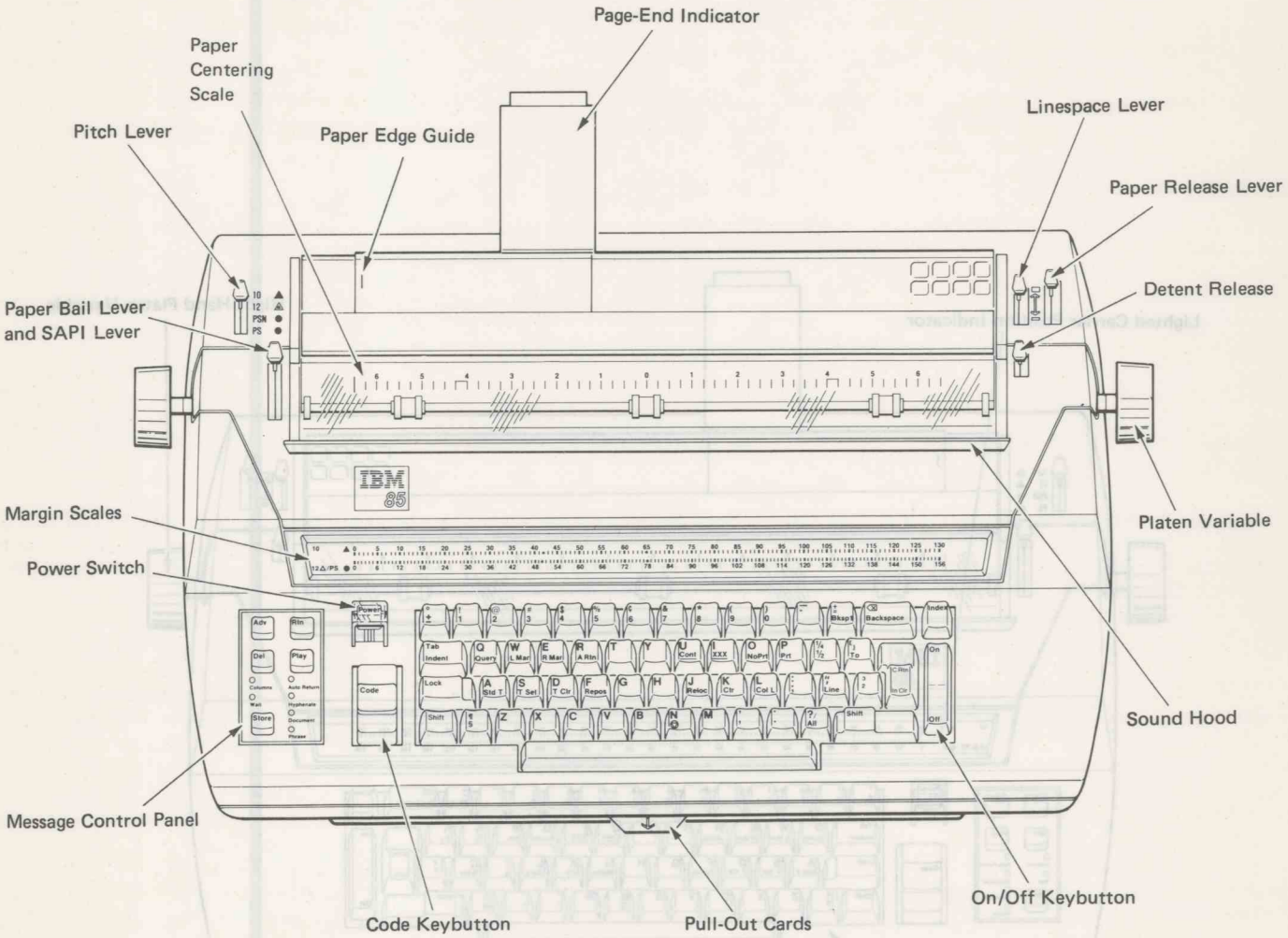
MACHINE INTRODUCTION

The IBM 85 has a new cover design and additional features. The following is a list of the differences between Models 50/60/75 and the IBM 85:

Character Function
Escapement Motor
Electronic Keyboard
Index Mechanism
Right Margin Justification
Lighted Carrier Position Indicator
Right Hand Platen Variable



IBM Electronic Typewriter 85



IBM Electronic Typewriter 85

FUNCTIONAL CHECK

PERFORM THE FUNCTIONAL CHECK BEFORE AND AFTER EVERY SERVICE CALL.

Before you start the functional check, review the following warnings about the memory and the electronic margins and tabs.

Warning

- When you are servicing a customer's machine NEVER TURN OFF THE POWER SWITCH WITHOUT INFORMING THE OPERATOR. Turning off the power switch clears the memory plus all the set tab and margin stops.

- Exercising the machine in the Document or Phrase storage mode affects the text the operator has entered into memory. Select an empty section of the memory if you need to store text.

- If you must change or clear stored tab or margin settings, write a list of the tab positions and margins so you can return the settings to their original positions.

NOTE: Remember these items as you service the machine.

VISUAL INSPECTION

Look at the machine carefully for any loose, damaged or missing parts. Also look for pencils, erasers, paper clips, or any unusual material in the machine.

POWER SWITCH/MOTOR SWITCH

With the power switch on, turn on the motor switch. The machine should begin motor switch reset just before the switch detents and just after the AC motor begins to run. With the motor on you should not hear any unusual noise from the machine.

SEMI-AUTOMATIC PAPER INSERTION

Insert a sheet of paper. Pull the paper bail lever all the way forward, then release it. The platen should index to the proper writing line.

PAPER RELEASE

Pull the paper release forward. The paper should freely move around the platen and to the left and right. Push the lever to the rear. The feed rolls should hold the paper tightly.

DETENT RELEASE

Pull the detent release lever forward. Make sure the platen detent is fully disengaged from the platen gear. Push the detent release lever to the rear. Make sure the platen detent is fully engaged with the platen gear.

PLATEN VARIABLE

Push the right platen knob in all the way. The platen should turn freely. The ratchet should engage the platen when the knob is released.

BELL

Set a right margin. Tab or type through the right margin. The bell should ring five to seven characters before the carrier reaches the set right margin, or at the beginning of the last tab operation before the right margin.

KEYBOARD

Press down all the keybuttons including the operational keybuttons (Shift, Backspace, Carrier Return, and others). All keybuttons should move down easily and the correct operation should occur before the keybutton bottoms.

REPEAT CHARACTERS

Press and release the Hyphen/Underscore keybutton. The correct character should print one time only. The character should repeat when the keybutton is held for more than one-half second. Repeat this procedure for the period, *X*, Backspace, Carrier Return, and Index.

TAB

Operate the tab. The carrier should move to the right before the keybutton contacts the downstop.

SHIFT

Type alternate uppercase and lowercase characters. The characters should print in the proper case. Slowly press the Shift Lock. The keybutton should lock down just as or slightly after shift occurs. Lock the Shift in uppercase and type a full line of underscores. The lock should not release by vibration.

The shift should unlock when either Shift keybutton is lightly pressed. Allow the Shift keybutton to move up. The machine should shift to lower case before the Shift keybutton reaches the rest position.

ERROR CORRECTION

Type a character, then press the correcting keybutton one time. The character must be completely removed from the paper (or covered up if cover-up tape is used).

LINESPACING

Type several lines of underscores in all the linespace lever positions. The space between the lines should be even for all linespace lever positions. The lever should detent in all positions. Check and make sure the machine indexes the number of lines indicated by the position of the linespace lever.

PITCH SELECTION

When the pitch selection lever is moved to different positions, the carrier should move to the set left margin position for each pitch. When the pitch selection lever is moved, the proper lighted carrier position indicator should light.

CARDHOLDER

1. Type a line of *H*s in uppercase, 10 pitch or 12 pitch. The horizontal line on the cardholder should be parallel to the bottom of the *H*s.

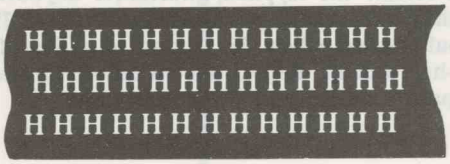
2. Move the carrier and platen so one of the *H*s is in the box at the top of the cardholder. The *H* should be centered in the box.

LIGHTED CARRIER POSITION INDICATOR

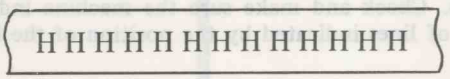
Move the carrier to the far left side. The carrier pointer should line up with the zero on the margin scale.

IMPRESSION CONTROL

1. Move the impression control lever from 1 to 5. The element should move away from the platen.
2. Remove the cassette and look at the ribbon. The pattern should look like this:



3. The characters should not overlap and should be positioned on the ribbon with a clearance at the top and bottom edge.
4. Inspect the copy for ribbon flaking and ribbon particles on the copy.
5. With a Tech III ribbon installed on the machine, inspect the ribbon pattern. The characters should overlap and there should be a clearance at the top and bottom edge of the ribbon. Type several lines of underscores. The type should not fade.
6. Inspect the ribbon. There should be no folds or twists.
7. Operate the spacebar. The ribbon should not feed.
8. Look at the correcting tape. The pattern should look like this:



9. The characters should not overlap and should be centered on the tape.

CONTROL PANEL CHECK

1. Press Code plus R (D-04) three times. The print shaft cycles each time. The Auto Return and Hyphenate messages turn on in the following sequence:

   a. Both the Auto Return and Hyphenate messages are on.

   b. Both the Auto Return and Hyphenate messages are off.

   c. The Auto Return message is on.

   NOTE: Begin this sequence with the Auto Return message on.

2. Press Code plus L (C-09). The print shaft cycles. The Auto Return message goes out and the Columns message turns on. Press return (Rtn), then press Code plus L (C-09). The Auto Return message turns on and the Columns message turns off.
3. Press Store and a number (1-99). The print shaft cycles and the phrase message turns on. Press the Store keybutton. The print shaft cycles and the Phrase message turns off.
4. Select any EMPTY section of memory. Press Store and the character for the empty storage area. The Document message turns on and the print shaft cycles.
5. Type *AAA* (C-01), *BBB* (B-05), and *CCC* (B-03).
6. Press the return (Rtn) keybutton three times. The print shaft cycles and the carrier repositions.
7. Index the paper up and press advance (Adv). The print shaft cycles once and the carrier repositions.
8. Press delete (Del). The print shaft cycles once.
9. Press Play. *CCC* plays out.
10. Press return (Rtn) twice. The print shaft cycles and the carrier repositions.
11. Press delete (Del) twice. The print shaft cycles each time and deletes the remaining information.
12. Press Store. The print shaft cycles and the Document message goes off.

POWER SUPPLY OPERATIONAL THEORY

The power supply provides the operating voltages for the logic boards and the magnets. The operating voltages are +5 VDC, –5 VDC, +8.5 VDC, +13.2 VDC, and +24 VDC. The power supply consists of a transformer, rectifier board, and power supply board. The power supply board also provides the power on reset signal to the electronics (Figure 1).

The power supply board contains three special protection circuits. The foldback circuit protects the +24 VDC when the +24 VDC is shorted to ground. The foldback circuit protects the power supply against overheating. When the short is removed, the +24 VDC will return to normal without requiring a main power reset.

The second protection circuit protects the X + 5 VDC when it is shorted. This is a current limiting device that keeps the power supply from overheating. A motor switch reset will restore the X + 5 VDC after the short is removed.

The third protection circuit protects the power supply if any of the other voltages are shorted (+5 V, +8.5 V, – 5 V, and +13 V). If any of these voltages are shorted, the main power must be turned off, then back on, to restore the voltages.

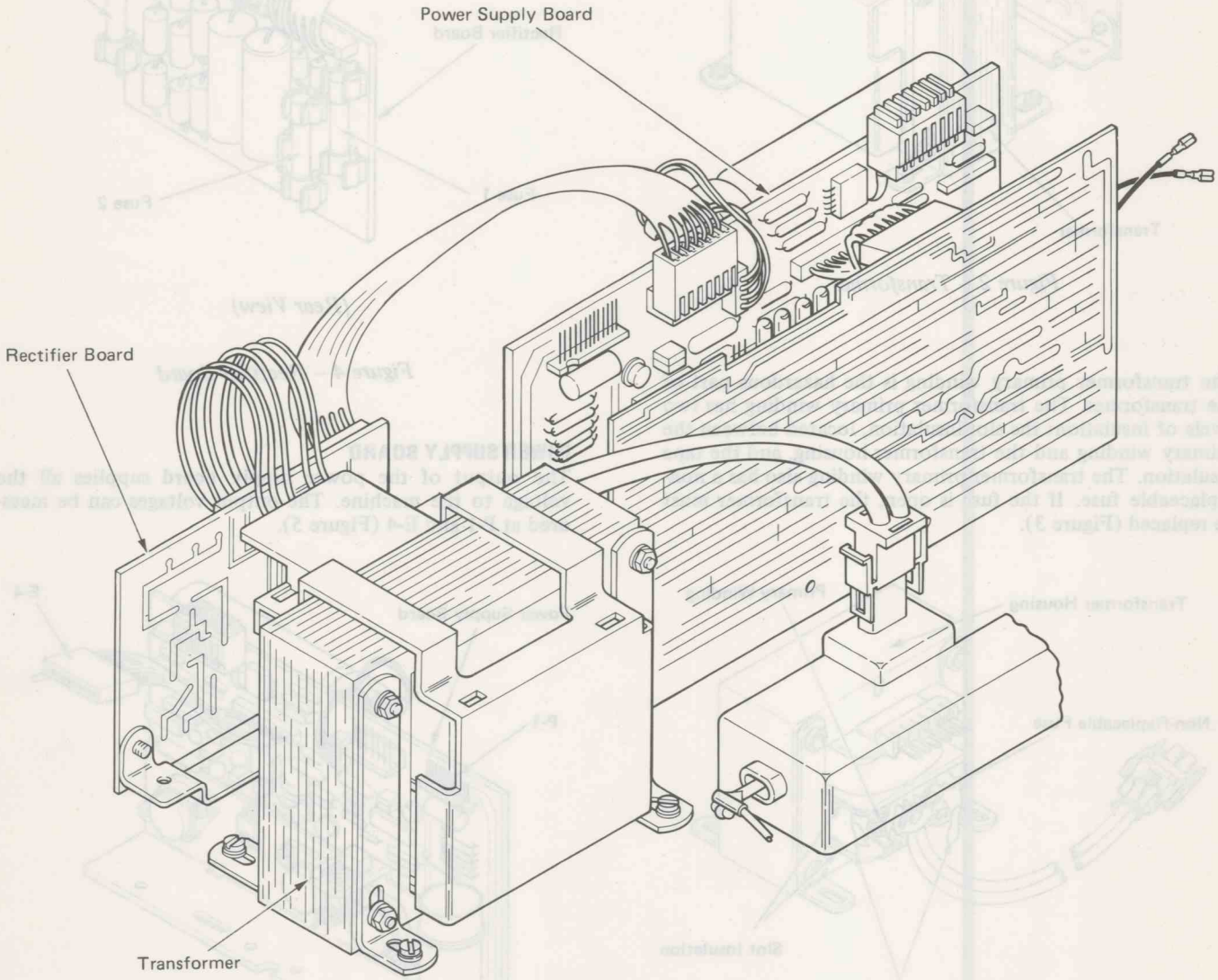


Figure 1 – Power Supply Assembly

TRANSFORMER

The transformer provides the necessary AC voltages to the rectifier board (Figure 2). The transformer cover must be in place at the end of each service call.

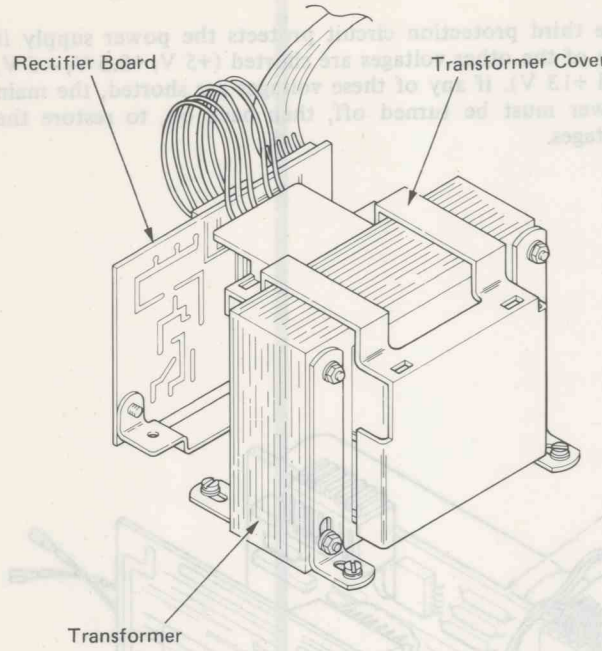


Figure 2 – Transformer

The transformer primary winding is the hazardous part of the transformer. The transformer primary winding has two levels of insulation: the slot insulation, located between the primary winding and the transformer housing, and the tape insulation. The transformer primary winding also has a non-replaceable fuse. If the fuse is open, the transformer must be replaced (Figure 3).

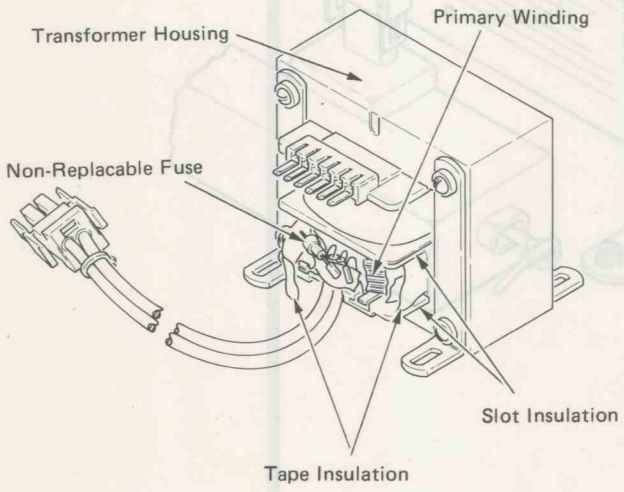
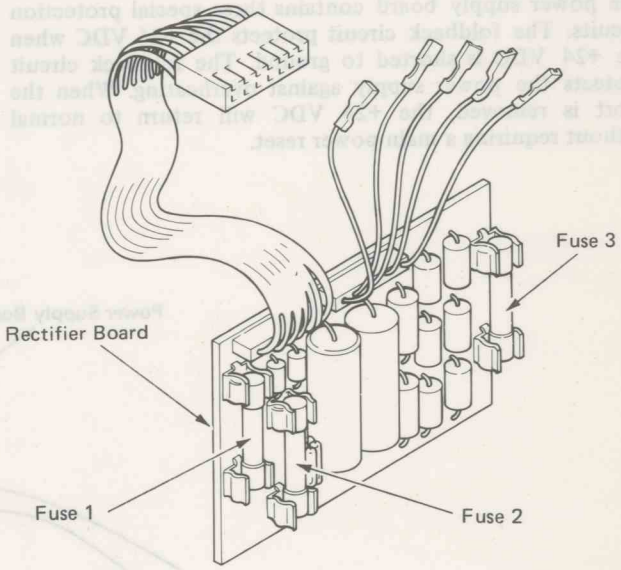


Figure 3 – Transformer Insulation

RECTIFIER BOARD

The rectifier board changes the AC voltage from the transformer into DC voltages for the power supply board. The rectifier board has three fuses on the back of the board. Fuse 1 is for the voltages to the processor and driver boards. Fuses 2 and 3 are for voltages to the escapement control board, keyboard control board, and the emitter boards (Figure 4).



(Rear View)

Figure 4 – Rectifier Board

POWER SUPPLY BOARD

The output of the power supply board supplies all the voltage to the machine. The output voltages can be measured at P-1 and E-4 (Figure 5).

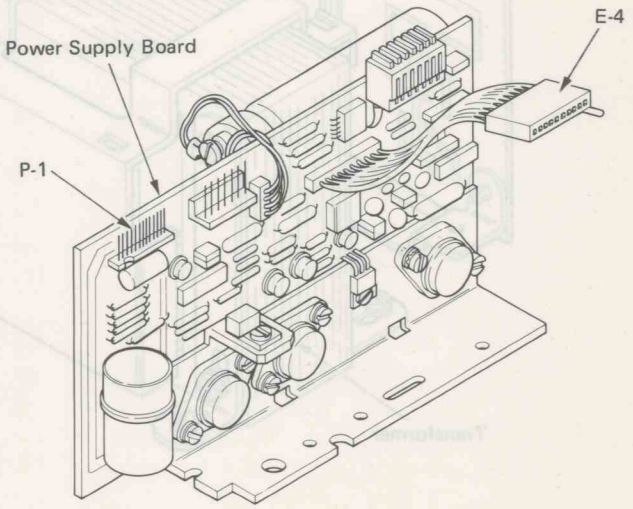


Figure 5 – Power Supply Board

AC MOTOR AND DRIVE OPERATIONAL THEORY

The AC line cord carries the voltage to the motor switch. The motor switch is located in the primary power box. Two motor leads connect the motor to the motor switch.

The AC motor is 115 V, 60 Hz, shaded pole. A fan inside the motor housing cools the machine when the motor is running (Figure 1).

W.T. NOTE: The voltage and frequency will vary to satisfy the country requirements.

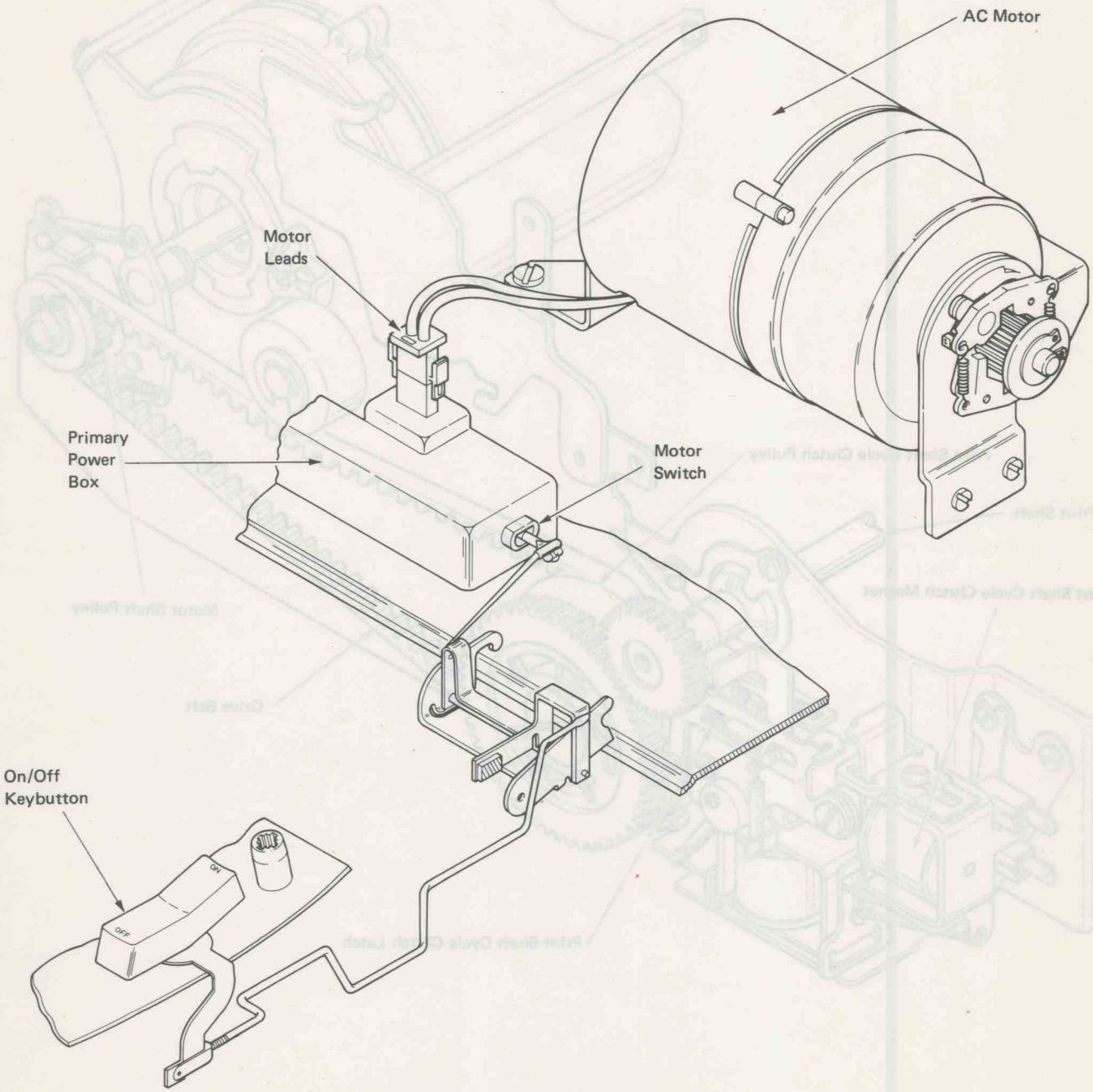


Figure 1 – Motor

The AC motor and drive mechanism provides motion for the index mechanism and print shaft. The motor and drive mechanism consists of: the AC motor, motor clutch, motor shaft pulley, drive belt, print shaft cycle clutch pulley, print shaft cycle clutch assembly, print shaft cycle clutch latch, and print shaft cycle clutch magnet (Figure 2).

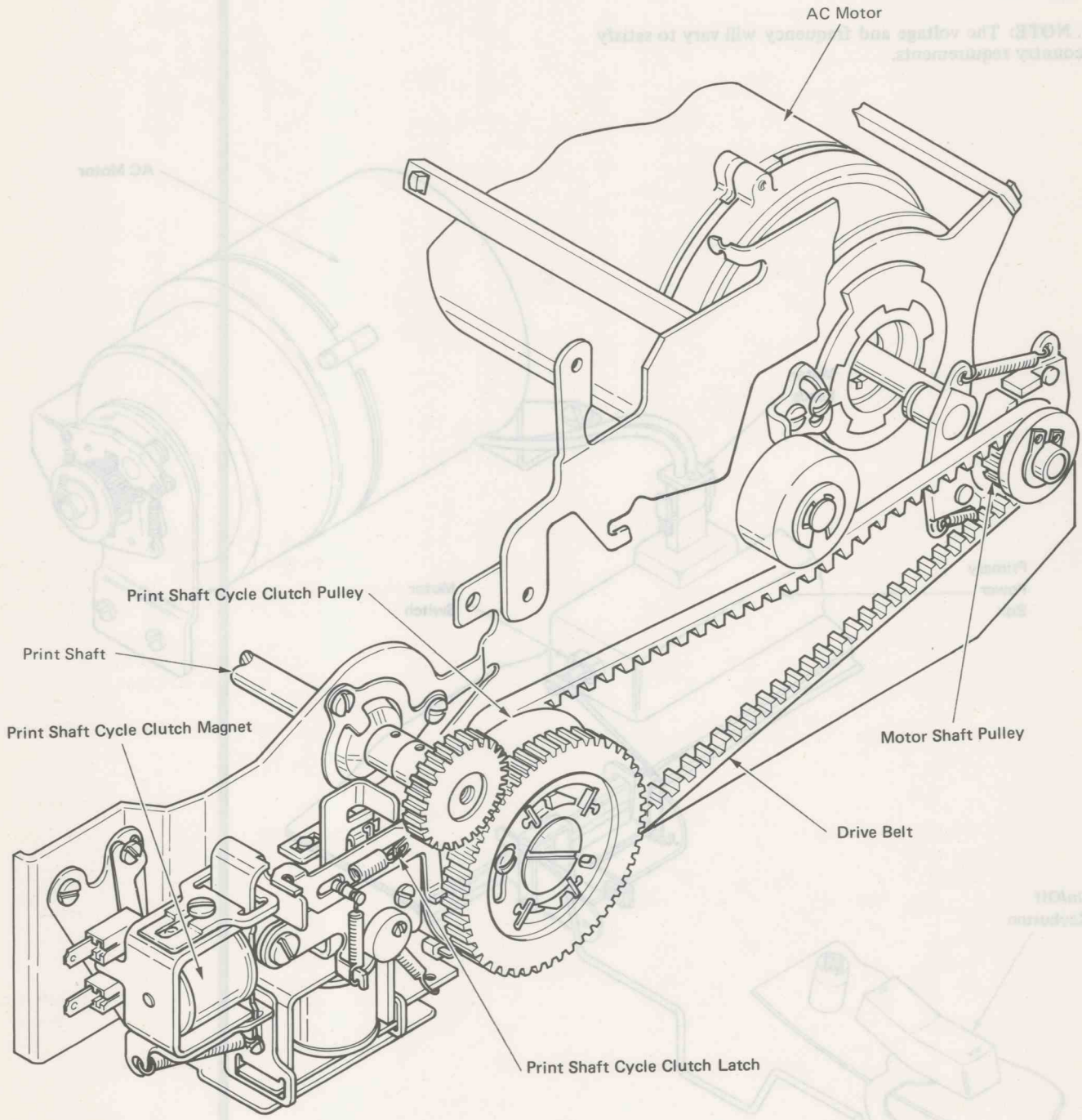


Figure 2 – Motor and Drive Mechanism

AC MOTOR

The motor shaft turns the motor pulley with the motor clutch. The motor support prevents the motor from moving forward under power. The drive belt transfers motion from the motor pulley to the print shaft cycle clutch pulley (Figure 3).

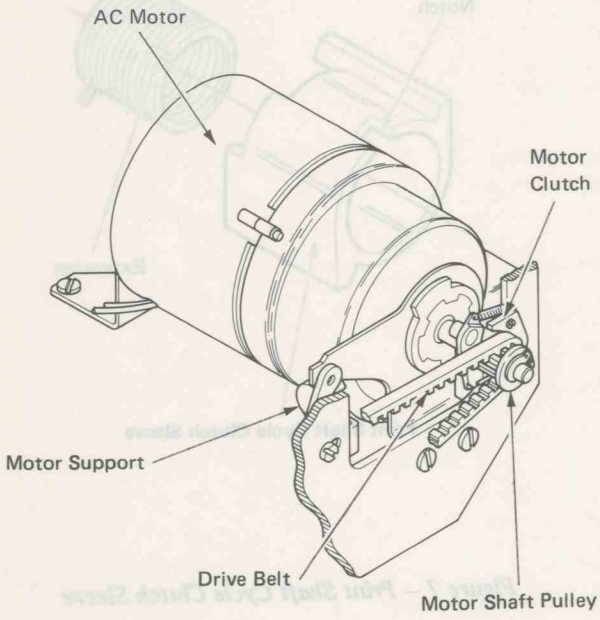


Figure 3 – AC Motor

PRINT SHAFT CYCLE CLUTCH DRIVE ARBOR

The print shaft cycle clutch drive arbor is attached to the right side of the print shaft cycle clutch pulley. The drive arbor turns when the motor is running (Figure 4).

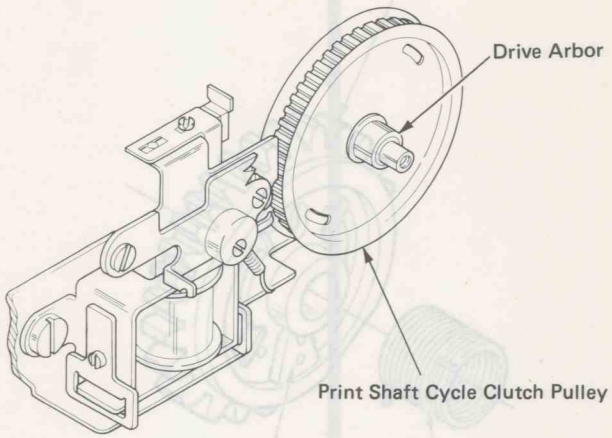


Figure 4 – Drive Arbor

PRINT SHAFT CYCLE CLUTCH SPRING

The print shaft cycle clutch spring transfers motion from the drive arbor to the driven arbor. The driven arbor is located on the print shaft cycle clutch gear (Figure 5).

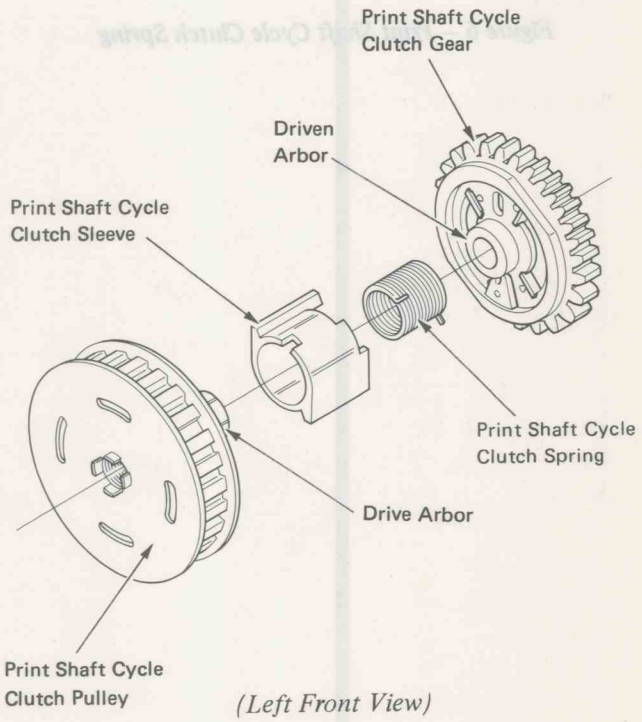
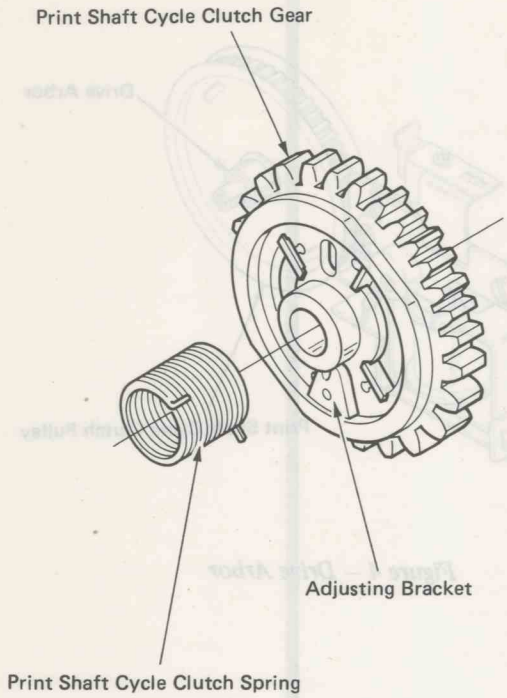


Figure 5 – Print Shaft Cycle Clutch Spring

The right end of the print shaft cycle clutch spring is secured by the adjusting bracket on the print shaft cycle clutch gear (Figure 6).



(Left Front View)

Figure 6 – Print Shaft Cycle Clutch Spring

The extension on the left side of the print shaft cycle clutch spring fits into a notch in the print shaft cycle clutch sleeve (Figure 7).

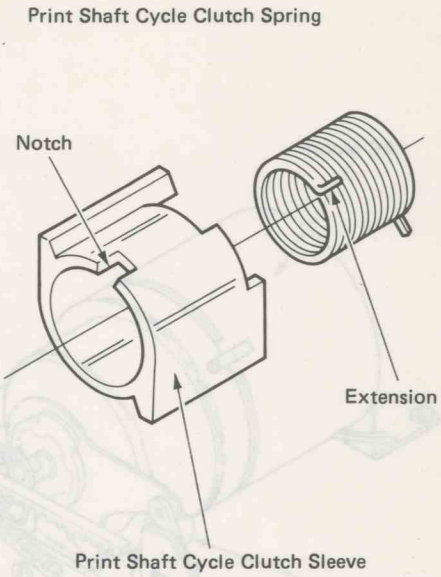


Figure 7 – Print Shaft Cycle Clutch Sleeve

PRINT SHAFT CYCLE CLUTCH SLEEVE

The print shaft cycle clutch sleeve is held at rest by the print shaft cycle clutch latch. The print shaft cycle clutch sleeve engages the rear of the print shaft cycle clutch latch (Figure 8).

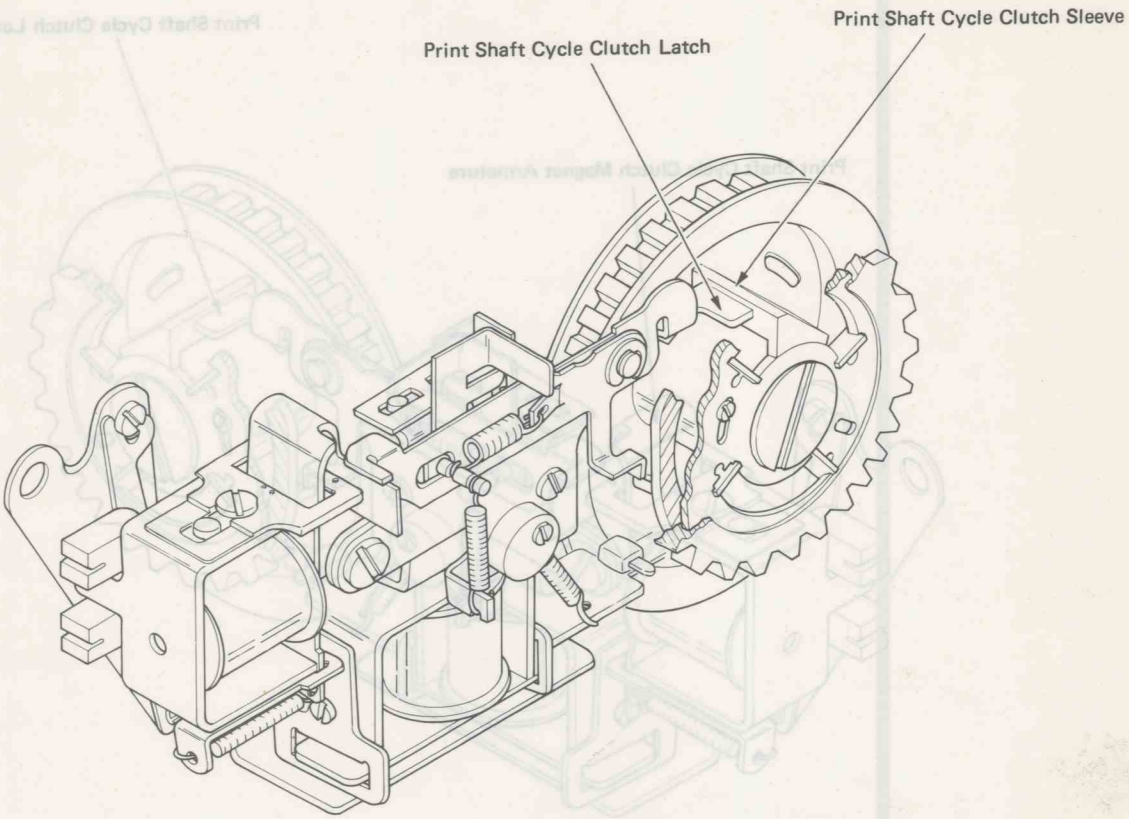


Figure 8 – Print Shaft Cycle Clutch Sleeve

PRINT SHAFT CYCLE CLUTCH LATCH

The print shaft cycle clutch latch is held at rest by the print shaft cycle clutch magnet armature (Figure 9).

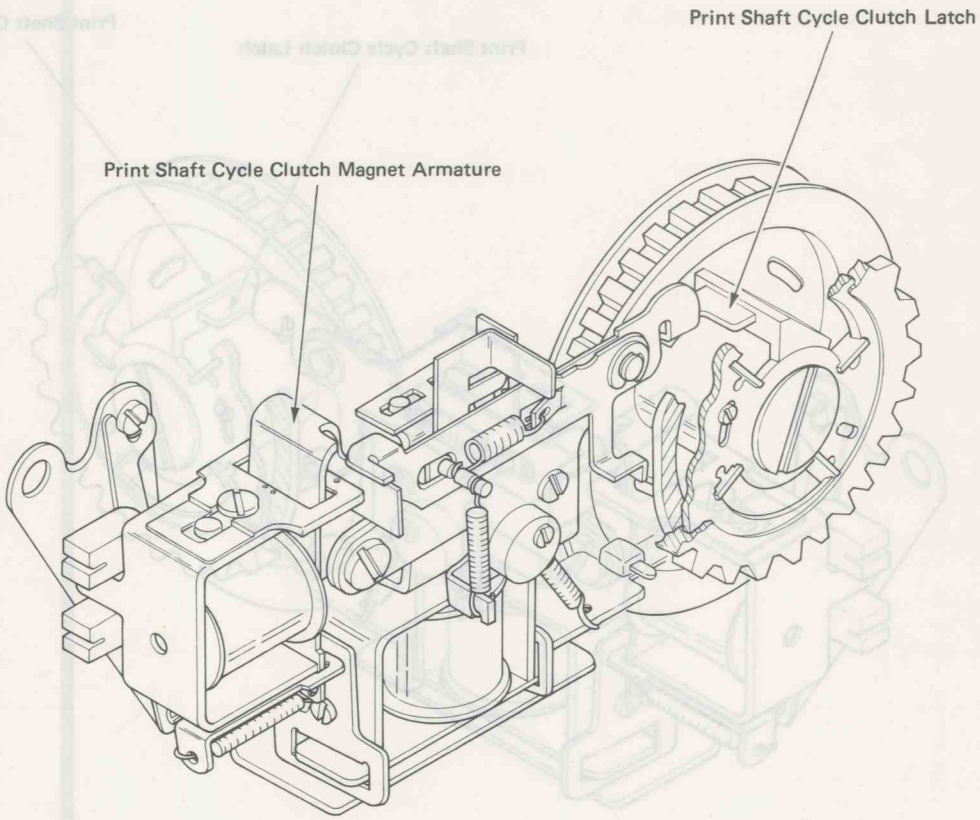


Figure 9 – Print Shaft Cycle Clutch Latch

PRINT SHAFT CYCLE CLUTCH RELEASE

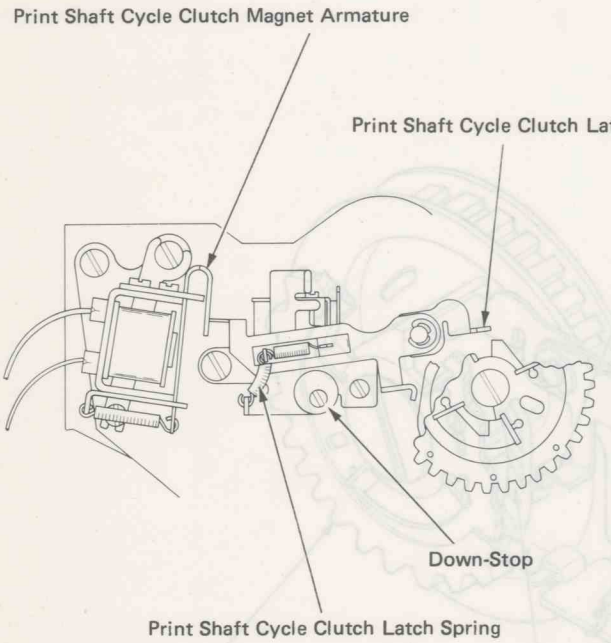
When print shaft rotation is needed, the electronics energize the print shaft cycle clutch magnet.

The print shaft cycle clutch magnet armature moves to the front. The cycle clutch latch spring pulls the front of the print shaft cycle clutch latch down. The front of the print shaft clutch latch travels down until it contacts the down stop (Figure 10).

This releases the print shaft cycle clutch sleeve and the print shaft cycle clutch spring.

The print shaft cycle clutch spring engages the drive arbor on the print shaft cycle clutch pulley and the driven arbor on the print shaft cycle clutch gear. The spring then transfers motion to the driven arbor on the print shaft cycle clutch gear.

The print shaft cycle clutch gear drives the print shaft gear which is set-screwed to the print shaft (Figure 11).



(Right Side View)

Figure 10 – Print Shaft Cycle Clutch Release

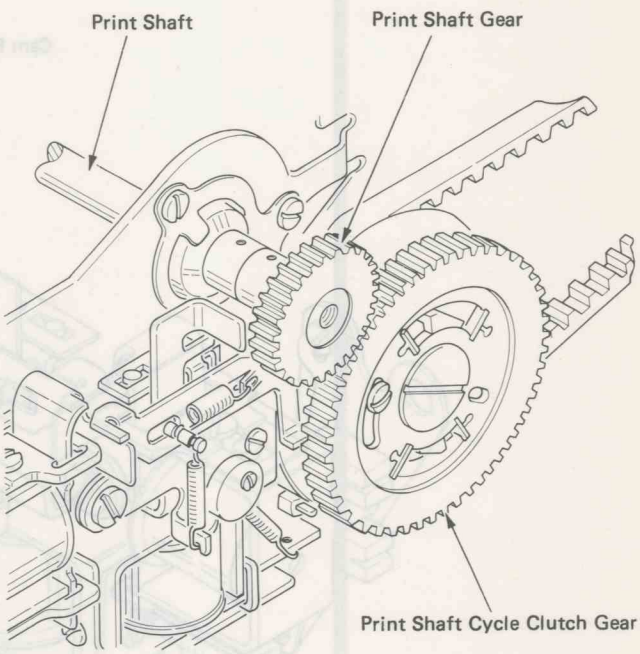


Figure 11 – Print Shaft Gear

PRINT SHAFT CYCLE CLUTCH LATCHING

As the print shaft cycle clutch gear rotates, a cam follower on the print shaft cycle clutch latch contacts a cam surface on the left side of the print shaft cycle clutch gear (Figure 12).

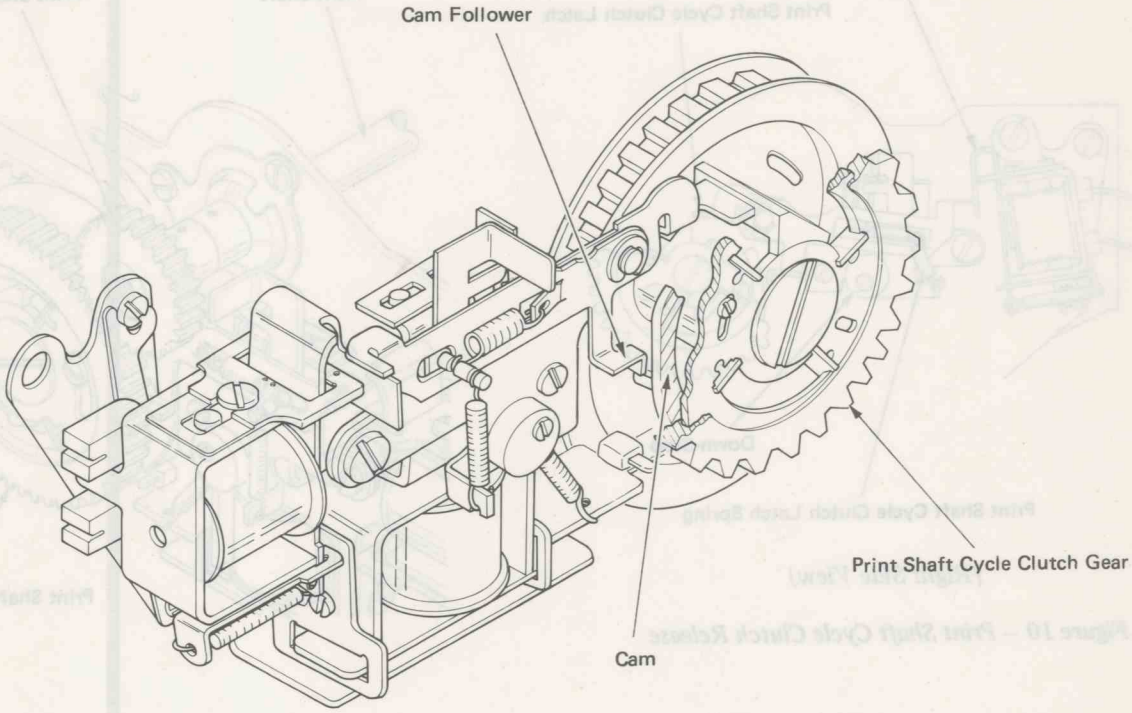


Figure 12 – Print Shaft Cycle Clutch

This restoring cam drives the cam follower to the front and pivots the front of the print shaft cycle clutch latch up. This allows the magnet armature to restore under the front of the print shaft cycle clutch latch.

The print shaft cycle clutch contacts the print shaft cycle clutch and drives the latch against the shock-absorbing spring. The print shaft cycle clutch gear continues to rotate a small amount after the print shaft cycle clutch latch engages the step on the print shaft cycle clutch sleeve. This additional rotation disengages the print shaft cycle clutch spring from the drive arbor.

The print shaft check pawl contacts a step on the print shaft check cam to prevent the print shaft cycle clutch spring from reengaging the drive arbor (Figure 13).

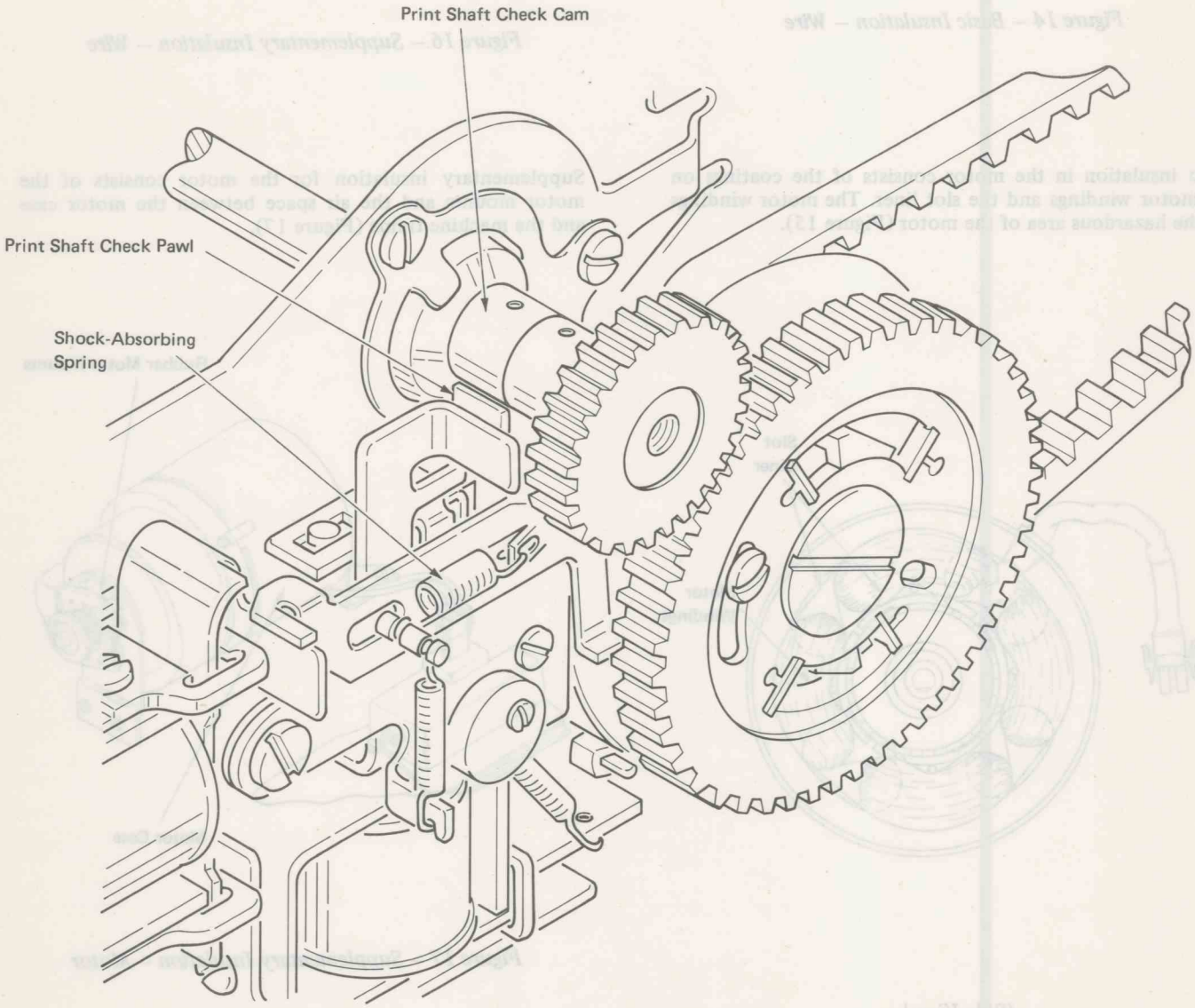


Figure 13 – Print Shaft Check Cam

ELECTRICAL INSULATION

The electrical insulation of a double-insulated machine consists of three types: basic insulation, supplementary insulation, and reinforced insulation.

Basic insulation prevents short circuiting by keeping the wires from touching (Figure 14). Basic insulation also provides primary protection against electrical shock for the user. Basic insulation on a wire is the first layer of insulation.

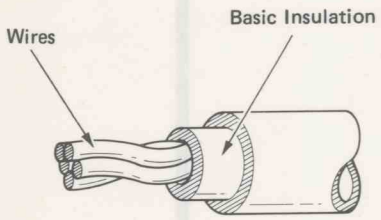


Figure 14 – Basic Insulation – Wire

Supplementary insulation is an additional layer of insulation over the basic insulation (Figure 16). It protects the user from electrical shock if the basic insulation fails. Supplementary insulation on the line cord is the layer around the wires in the line cord.

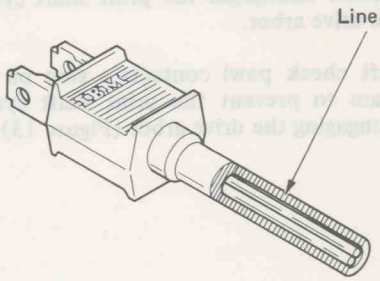
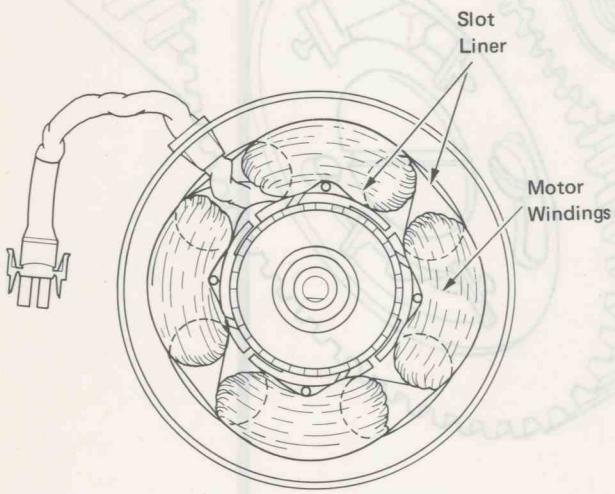


Figure 16 – Supplementary Insulation – Wire

Basic insulation in the motor consists of the coatings on the motor windings and the slot liner. The motor windings are the hazardous area of the motor (Figure 15).



(Side View)

Figure 15 – Basic Insulation

Supplementary insulation for the motor consists of the motor mounts and the air space between the motor case and the machine frame (Figure 17).

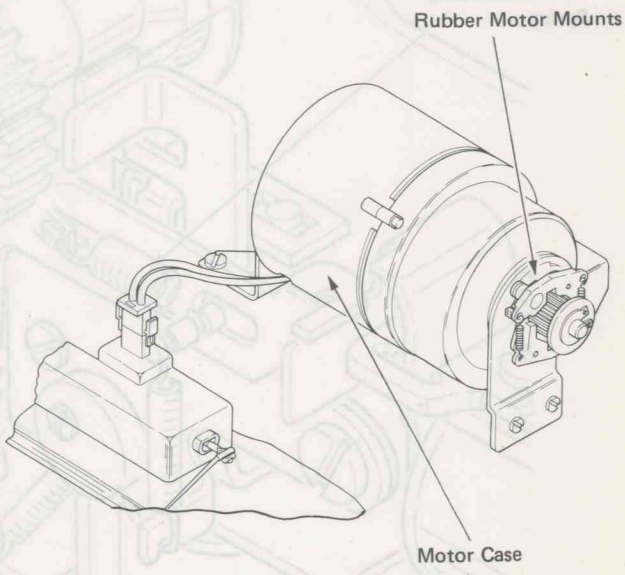
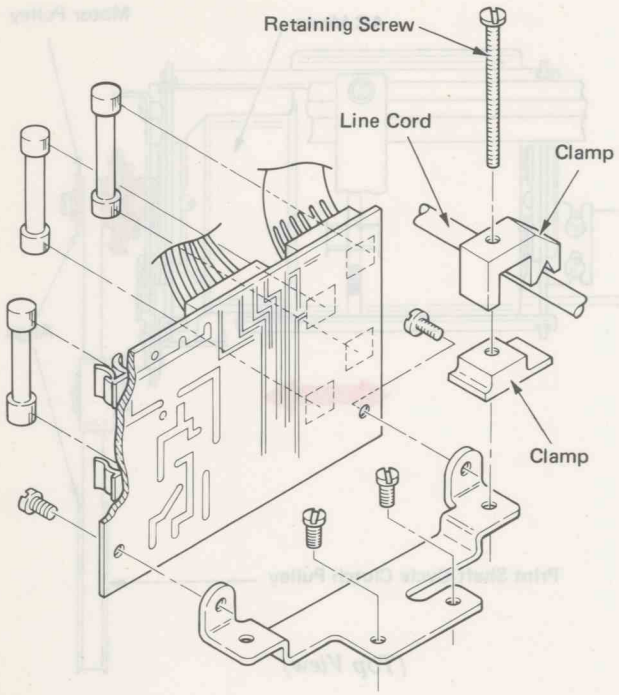


Figure 17 – Supplementary Insulation – Motor

MOTOR WIRING

The wiring in the IBM 85 is exactly positioned to reduce the exposure of wire damage and electrical shock. The wiring in the machine must be positioned exactly as shown (Figure 18).



(Left Front View)

Figure 18 – Power Supply Board

AC MOTOR AND SWITCH

A switch controls the voltage to the AC motor. The switch is operated from the keyboard by two links and a bell-crank.

CAUTION

The AC motor in this machine has only basic insulation between the motor shell and line voltage. Always turn the motor switch off before you touch any of the metal parts of the motor (Figure 19).

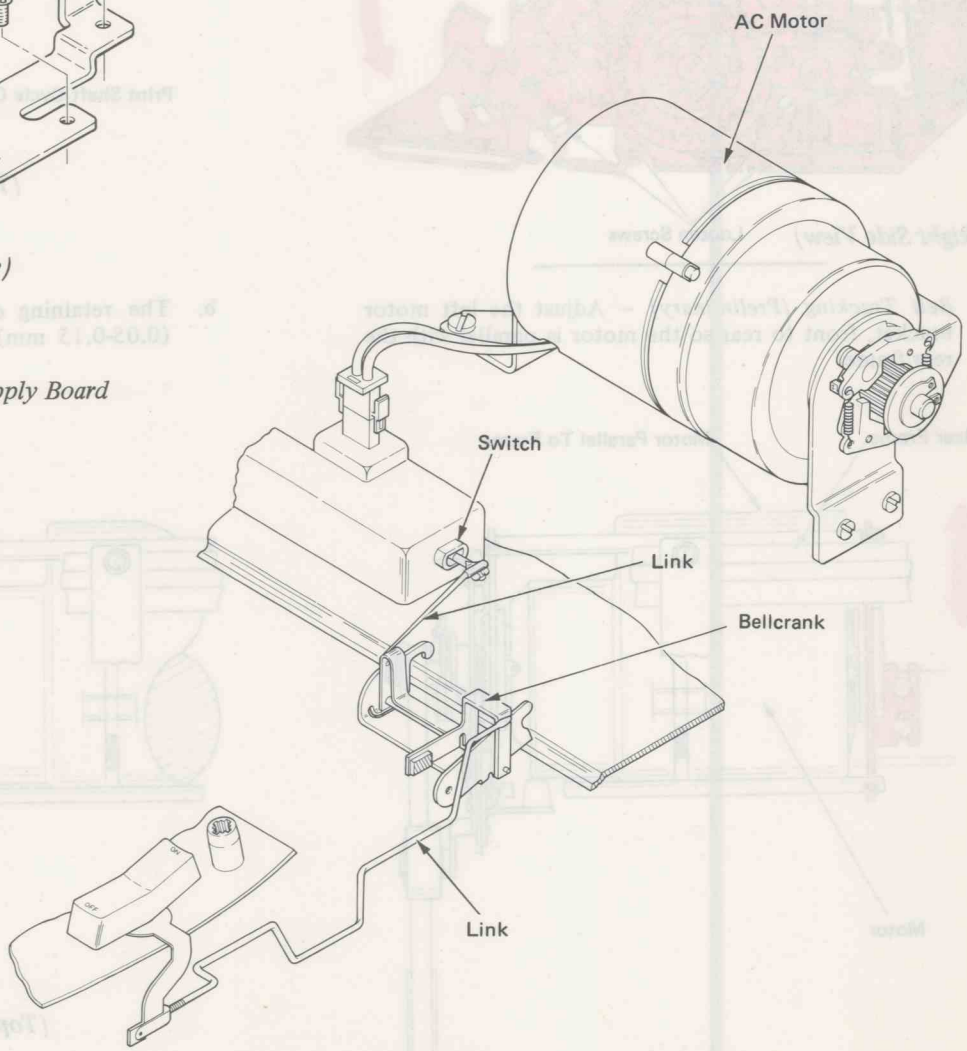
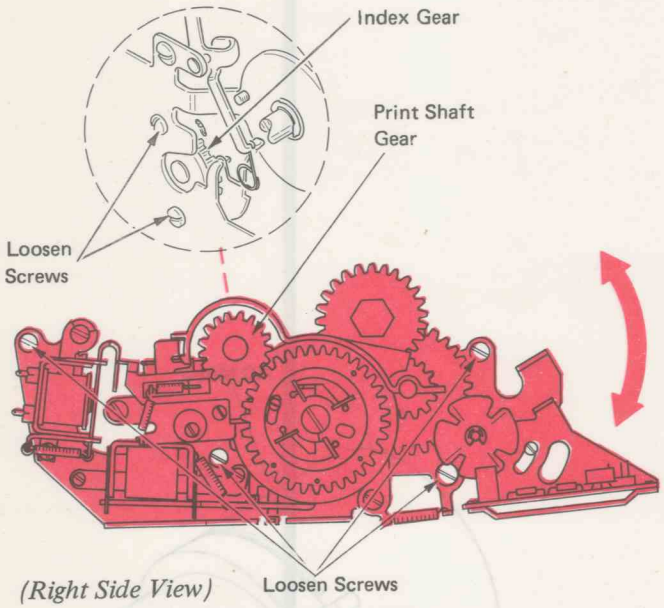


Figure 19 – AC Motor and Switch

AC MOTOR AND DRIVE ADJUSTMENTS

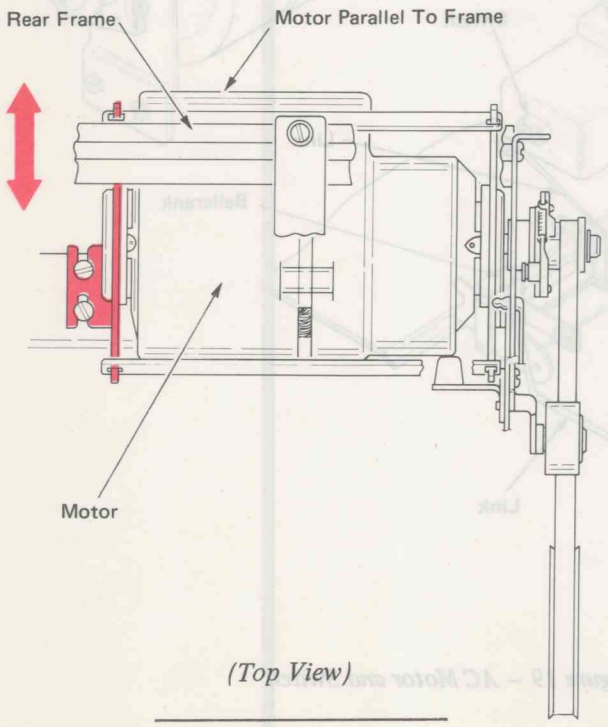
Safety Precaution: Whenever working on the IBM 85 AC motor, turn the motor switch off prior to touching the motor shaft or shell. Do not hold motors in your hand to test. (To check for a faulty motor, make a resistance check between the motor shell and the motor leads, using a volt ohmmeter. A reading of infinity indicates good insulation.)

1. *Side Plate Adjustment* – Adjust side plate for minimum backlash and no binds between print shaft gear and cycle clutch gear.



(Right Side View)

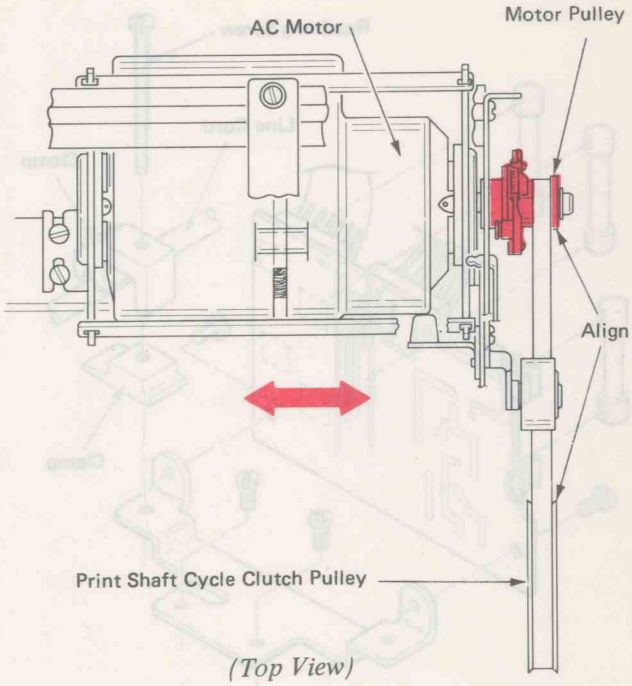
2. *Belt Tracking (Preliminary)* – Adjust the left motor bracket, front to rear so the motor is parallel with the rear frame.



(Top View)

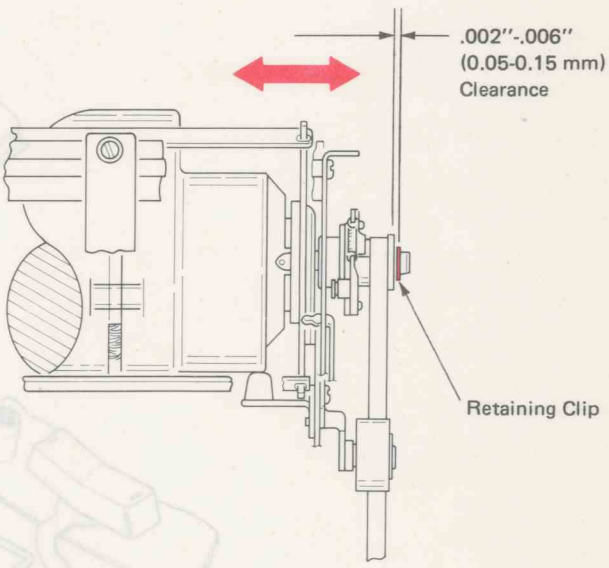
3. *Motor Pulley* – Adjust:

   a. The motor clutch left or right to align the flange on the motor pulley with the outer flange of the print shaft cycle clutch pulley.



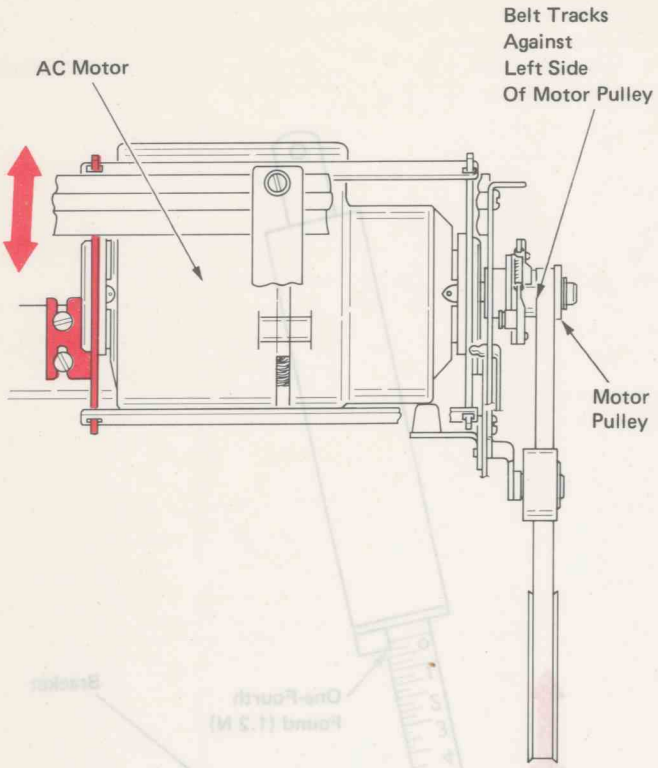
(Top View)

   b. The retaining clip left or right for .002"-.006" (0.05-0.15 mm) clearance from the motor pulley.



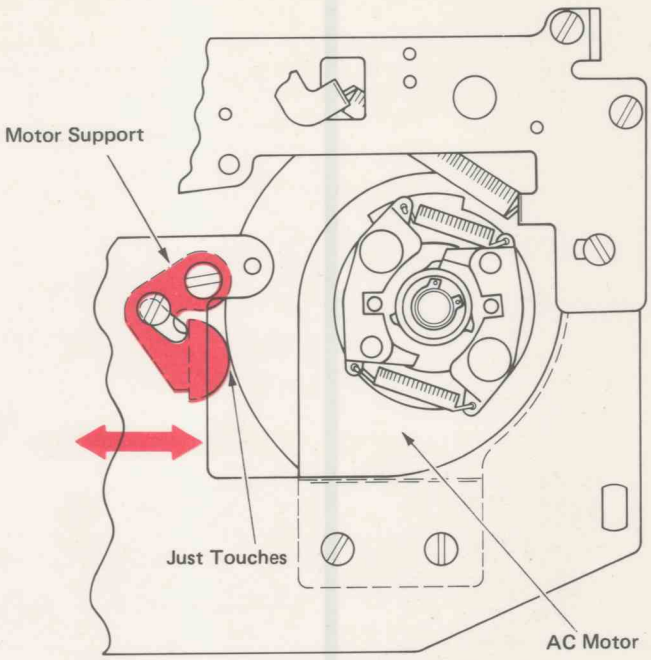
(Top View)

4. *Belt Tracking (Final)* – Adjust the left motor bracket front to rear, so the drive belt tracks against the left side of the motor pulley.



(Top View)

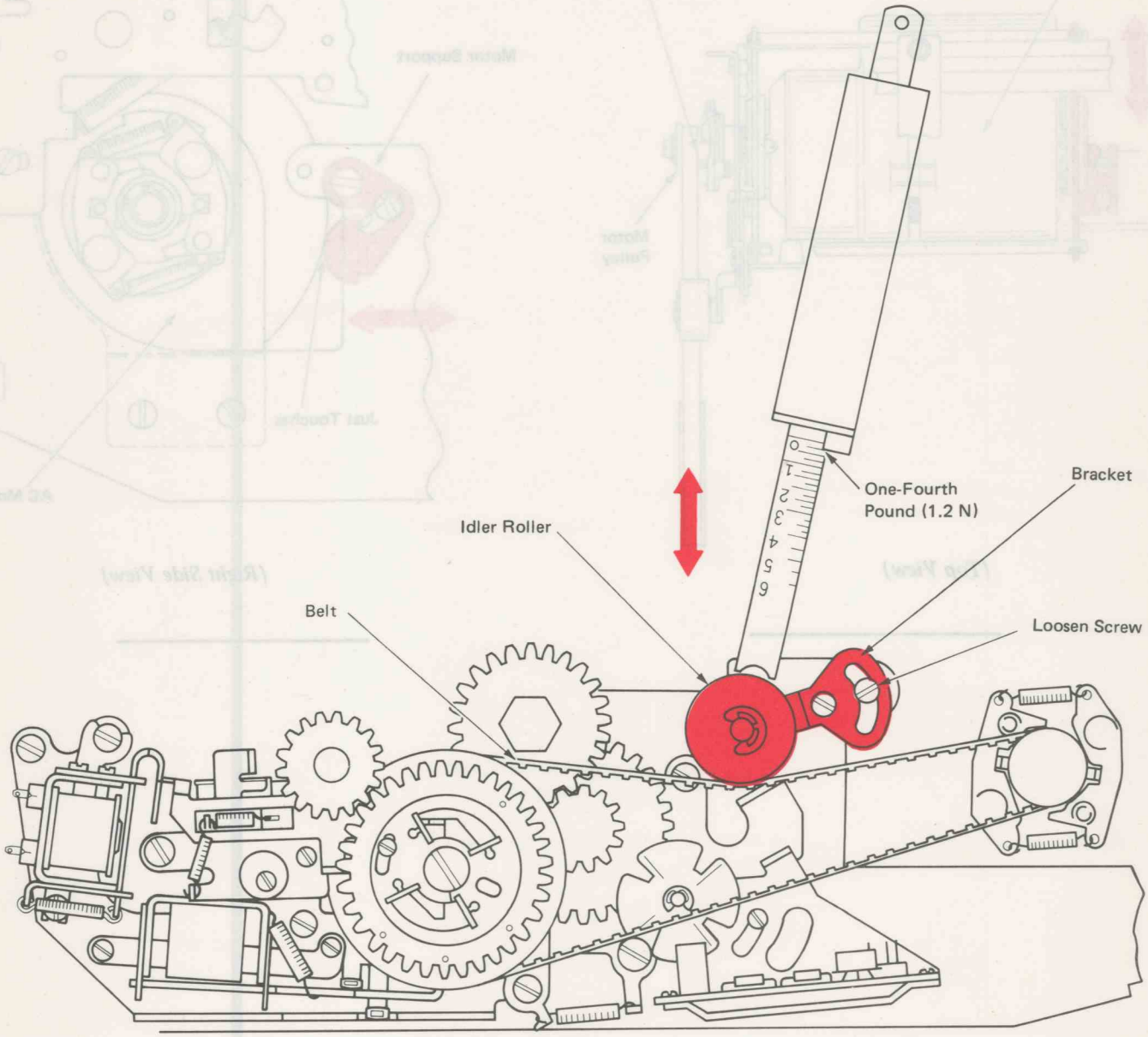
5. *Motor Support* – Move the motor support front to rear to just touch the motor with the machine off.



(Right Side View)

6. *Idler Roller* – Adjust the roller up and down for belt tension.

   Loosen the idler roller mounting screws. Apply one-fourth pound (1.2 N) force to the top of the idler roller, tighten screws.

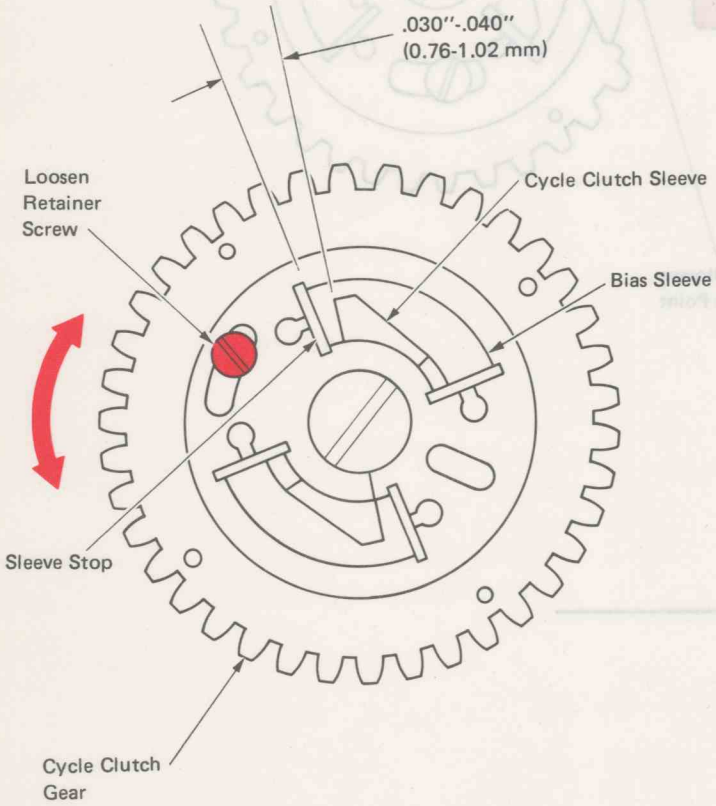


(Right Side View)

7. *Print Shaft Cycle Clutch Spring –*

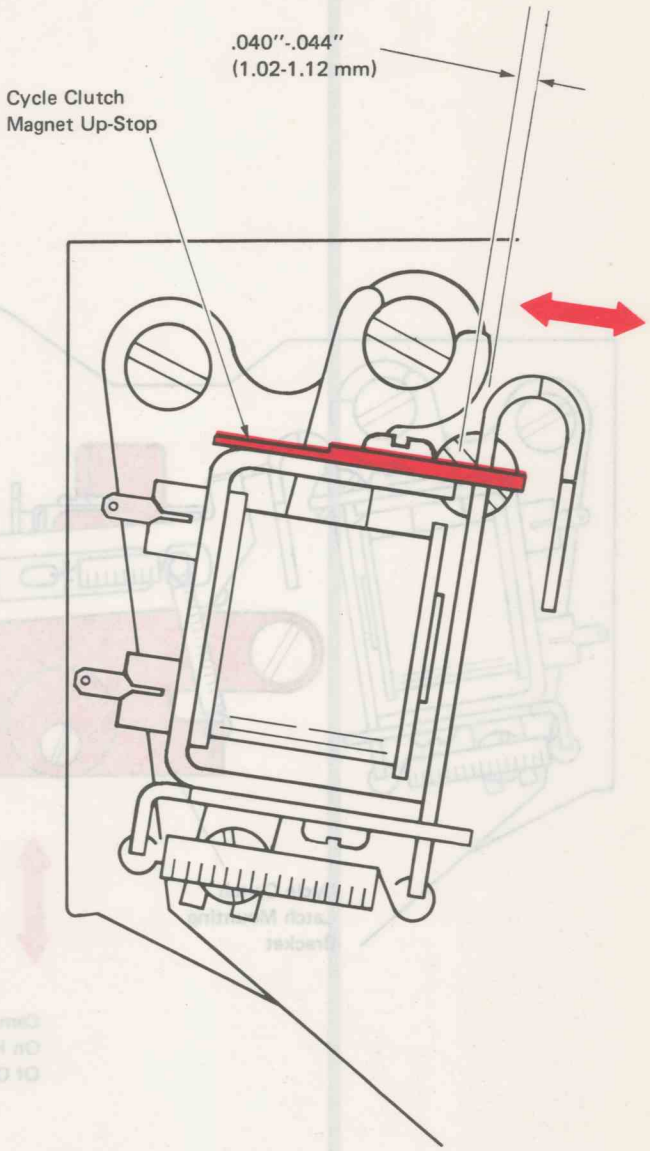
a. Adjustment Check
   1) Release the print shaft cycle clutch magnet.
   2) Hold the cycle clutch gear and rotate the cycle clutch pulley, or drive belt, top to front counterclockwise one or two teeth.
   3) Bias the cycle clutch sleeve top to rear until all motion is removed.
   4) Check for .030"-.040" (0.76-1.02 mm) between the front of the print shaft cycle clutch sleeve and the sleeve stop.

b. Adjustment
   1) With the machine at rest, release the print shaft cycle clutch magnet.
   2) Hold the cycle clutch gear and rotate the cycle clutch pulley, or drive belt, top to front counterclockwise one or two teeth.
   3) Bias the cycle clutch sleeve top to rear until all motion is removed.
   4) Loosen the screw on the retainer.
   5) Bias the print shaft cycle clutch sleeve top to rear for .030"-.040" (0.76-1.02 mm) between the front of the print shaft cycle clutch sleeve and the sleeve stop.
   6) Tighten the screw on the retainer and check by operating several times.



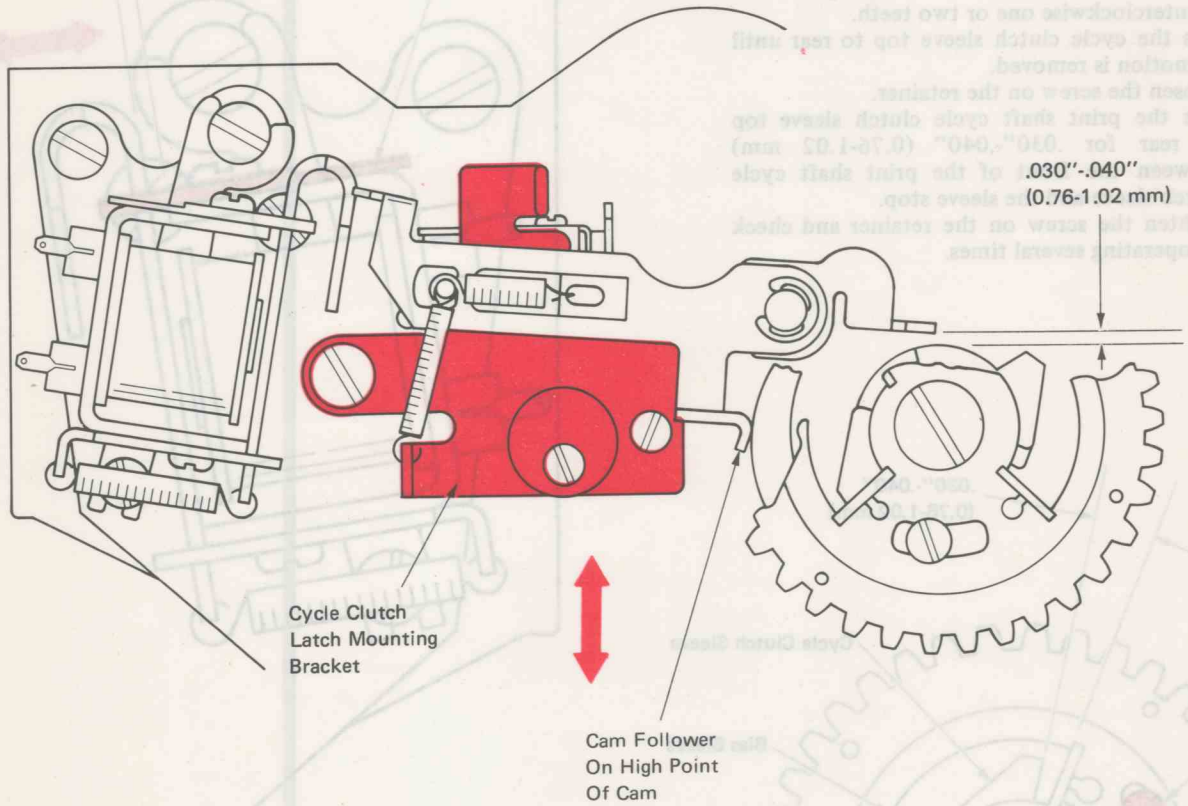
(Right Side View)

8. *Print Shaft Cycle Clutch Magnet Armature Up-Stop –* With the magnet de-energized, adjust the up-stop front to rear for .040"-.044" (1.02-1.12 mm) clearance between the armature and the residual.



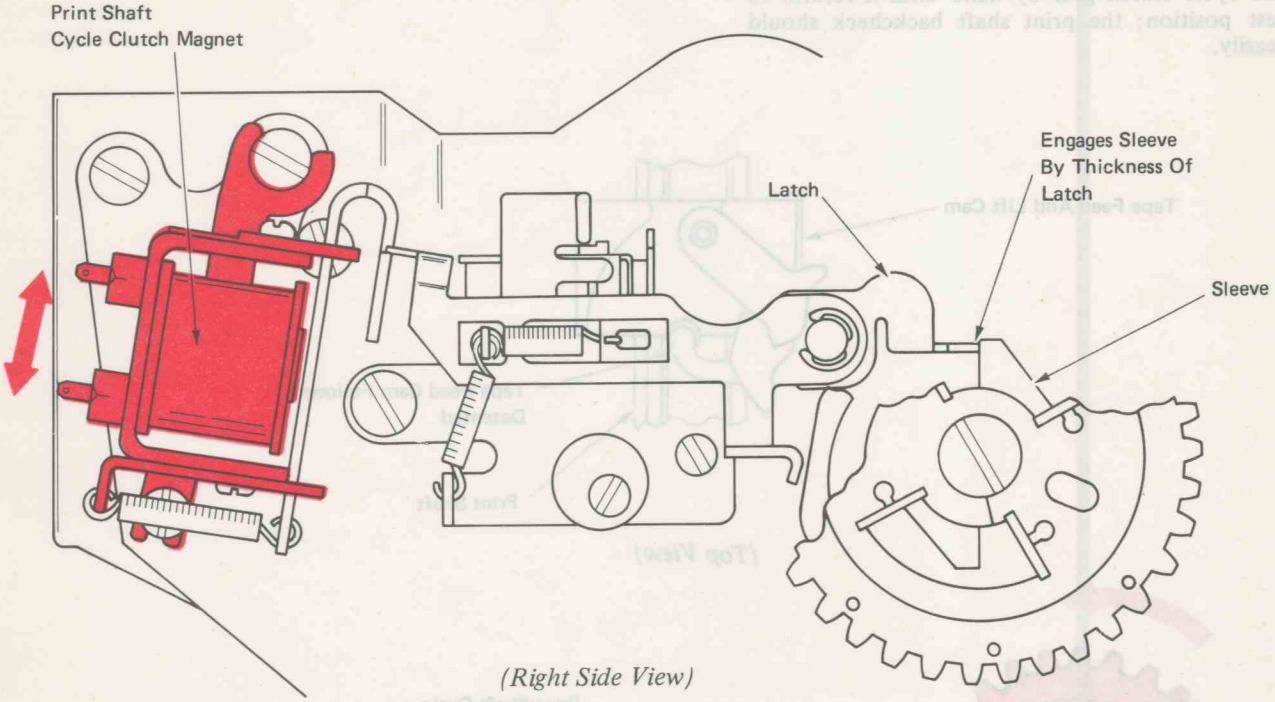
(Right Side View)

9. *Cycle Clutch Latch Mounting Bracket* – Position the cam follower on the high point of the restoring cam. Adjust the mounting bracket radially for .030"-.040" (0.76-1.02 mm) clearance between the latch and the cycle clutch sleeve. Use the pusher end of the spring hook to check this adjustment.



10. *Print Shaft Cycle Clutch Magnet* – With the print shaft cycle clutch magnet de-energized, adjust the print shaft cycle clutch magnet to satisfy the following four conditions:

a. Adjust the print shaft cycle clutch magnet up and down so the cycle clutch latch engages the cycle clutch sleeve by the full thickness of the latch.

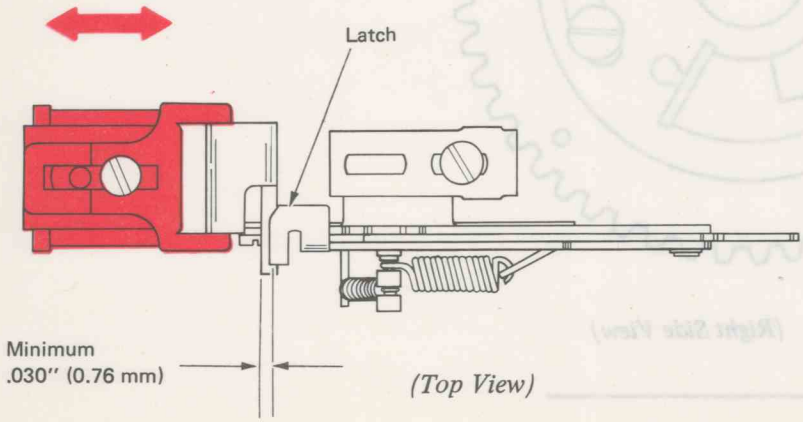


(Right Side View)

b. Adjust the print shaft cycle clutch magnet front to rear for .030" (0.76 mm) minimum engagement with the print shaft cycle clutch latch tail.

c. Ensure that the print shaft cycle clutch magnet armature clears the latch by .003" (0.08 mm) minimum with the print shaft cycle clutch magnet energized.

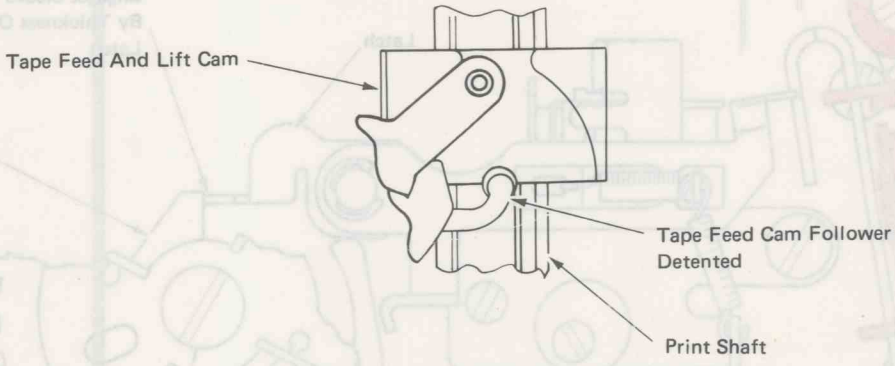
d. Energize the cycle clutch magnet; cycle clutch latch must fall freely without contacting the armature.



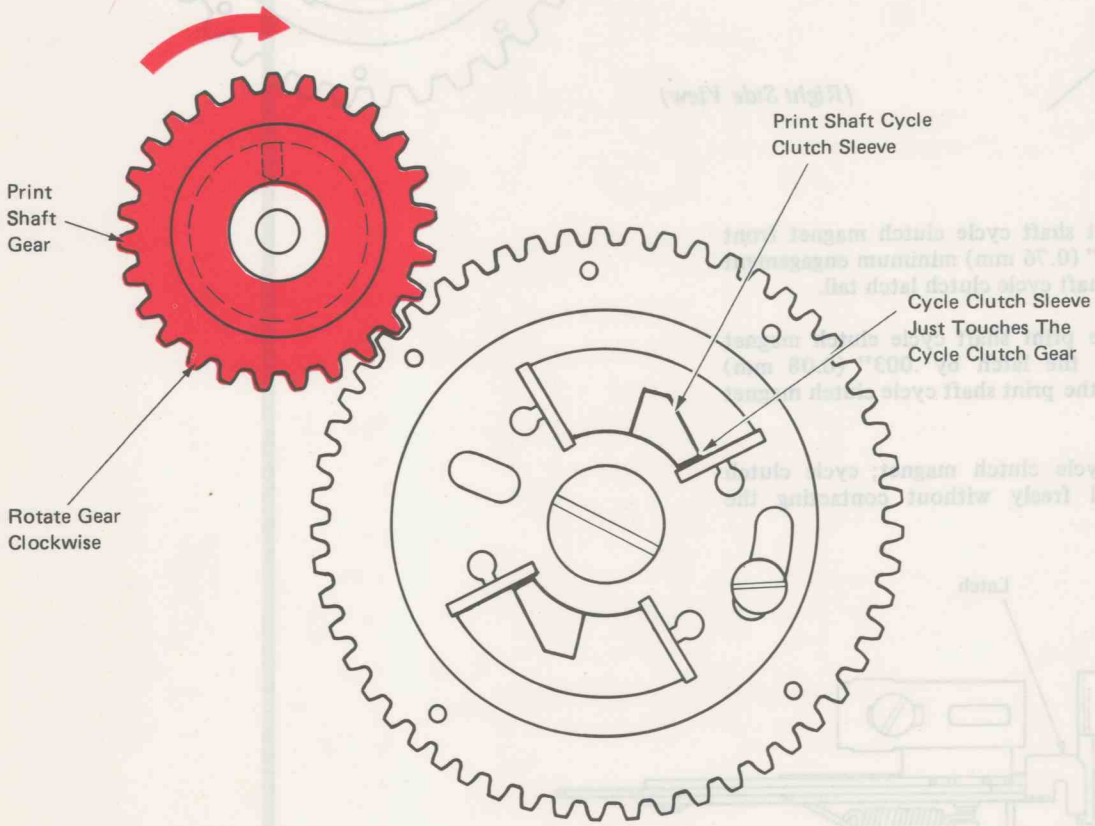
(Top View)

11. *Print Shaft Gear* – With the print shaft cycle clutch latched and the tape feed cam follower detented, loosen the screws in the print shaft gear. Rotate the print shaft gear clockwise until the print shaft cycle clutch sleeve touches the inside of the print shaft cycle clutch gear. Tighten the screws. Do not tighten the screws in the keyway.

Manually unlatch the print shaft cycle clutch and rotate the cycle clutch gear by hand until it returns to the rest position; the print shaft backcheck should latch easily.



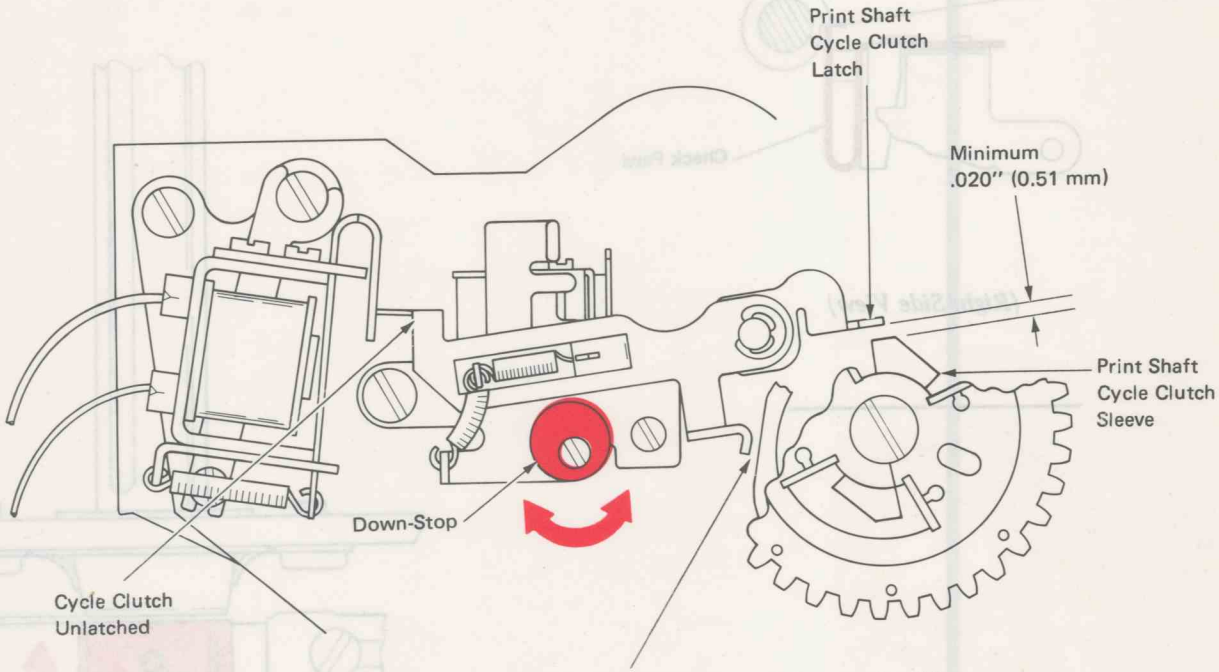
(Top View)



(Right Side View)

12. *Down-Stop (Print Shaft Cycle Clutch Latch)* – With the cycle clutch unlatched, adjust the down-stop for a minimum of .020" (0.51 mm) clearance between the latch and the cycle clutch sleeve.

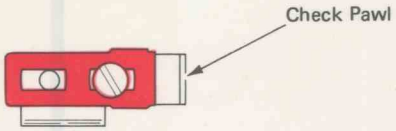
To check this adjustment, rotate the print shaft cycle clutch sleeve to position the top of the sleeve under the latch. Observe this through the hole in the cycle clutch gear.



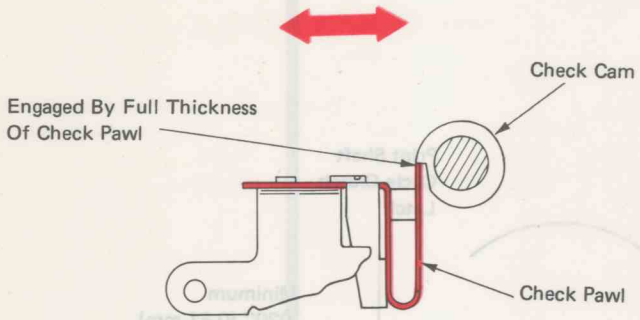
NOTE: The cycle clutch latch cam follower should not touch the restoring cam when the cycle clutch latch is released.

(Right Side View)

13. *Check Pawl* – Adjust the check pawl front to rear to engage the check cam by the full thickness of the pawl.



(Top View)



(Right Side View)

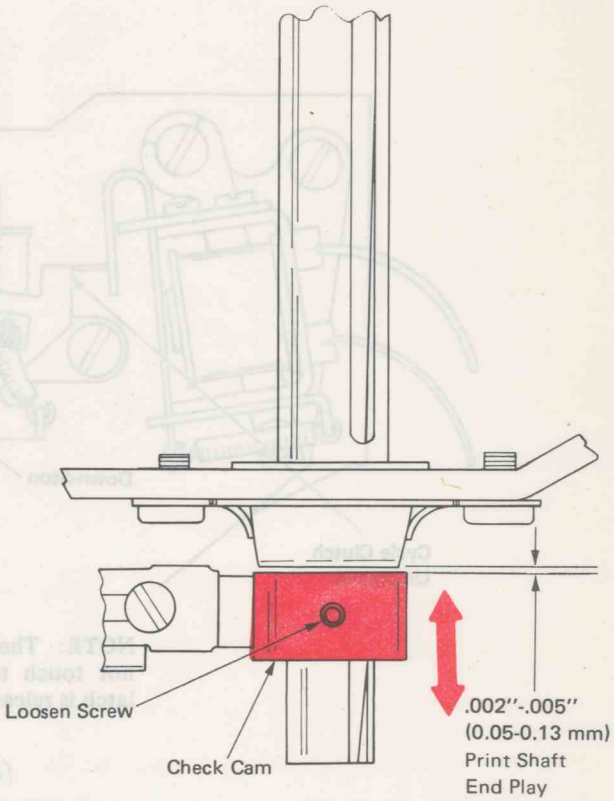
14. *Check Cam* – Adjust the check cam as follows:

a. With the print shaft cycle clutch latched and the print shaft at home, loosen the screws in the check cam.

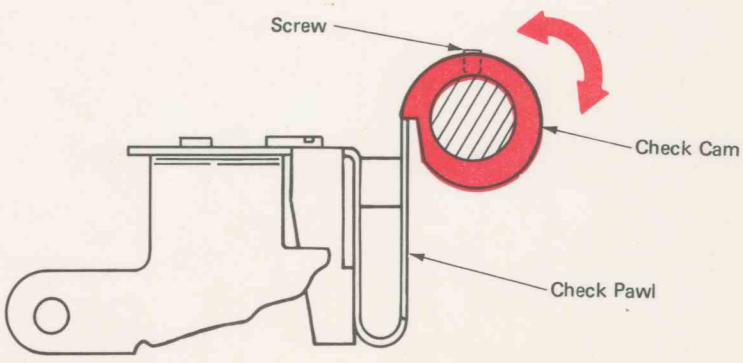
b. Rotate the check cam until the latch surface on the cam touches the check pawl.

c. Move the cam left to right for .002"-.005" (0.05-0.13 mm) clearance from the print shaft bearing.

NOTE: When hand-cycling a cycle clutch operation with the print shaft, the check cam should latch reliably. Under power the check cam may not always latch reliably because of friction in the drive. This is acceptable. The check cam is used as a safety factor to start the print shaft at 0° after wear occurs.



(Top View)



(Right Side View)

KEYBOARD OPERATIONAL THEORY

The electronic keyboard is the input device for the IBM 85. The keyboard assembly consists of the keyboard and the keyboard control board (Figure 1).

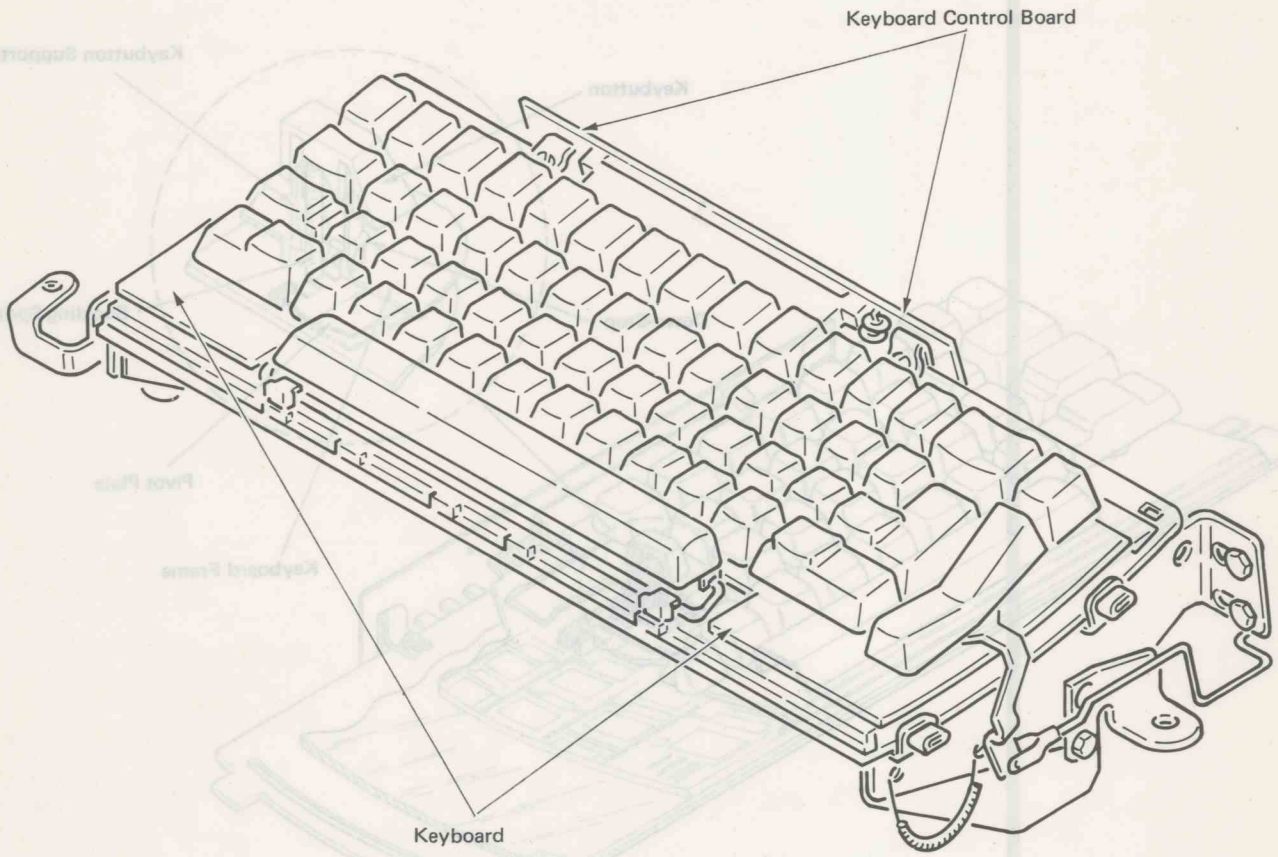


Figure 1 – Keyboard Assembly

KEYBUTTON OPERATION

The keybutton assembly consists of the combined keybutton and stem, the buckling spring, down-stop, pivot plate, and the keyboard frame (Figure 2).

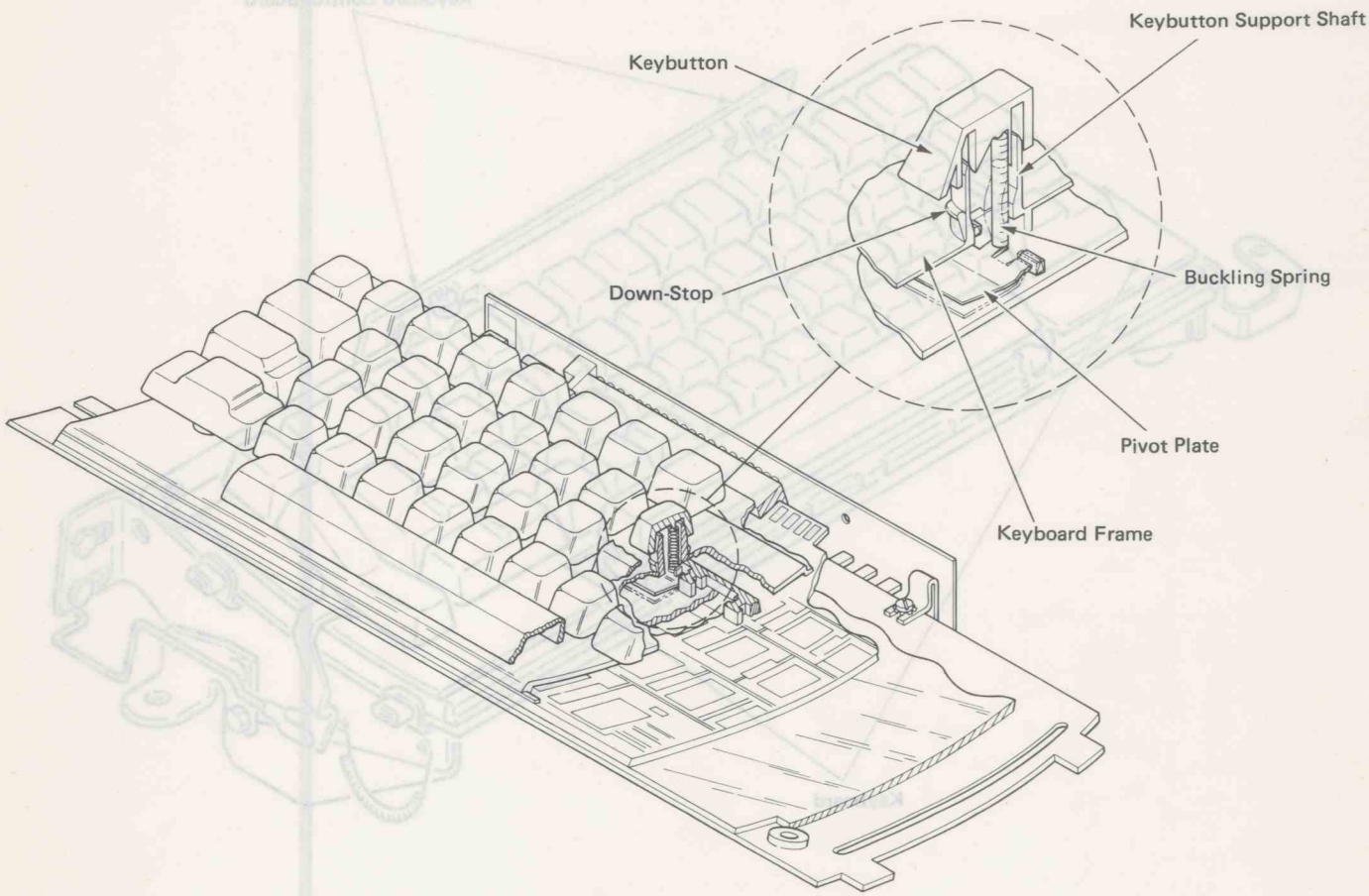


Figure 2 – Keybutton Assembly

At rest, the buckling spring is straight and maintains pressure on the rear of the pivot plate. This holds the front of the plate away from the pad card, which is inside the keyboard assembly.

When a keybutton is pressed, the spring buckles, transferring pressure to the front of the pivot plate. This pivots the front of the plate down against the pad card. An O-ring on an extension of the keyboard frame surrounds the keybutton stem and acts as a down-stop for the keybutton (Figure 3).

When the keybutton is released, the spring straightens and moves the keybutton and pivot plate back to its rest position.

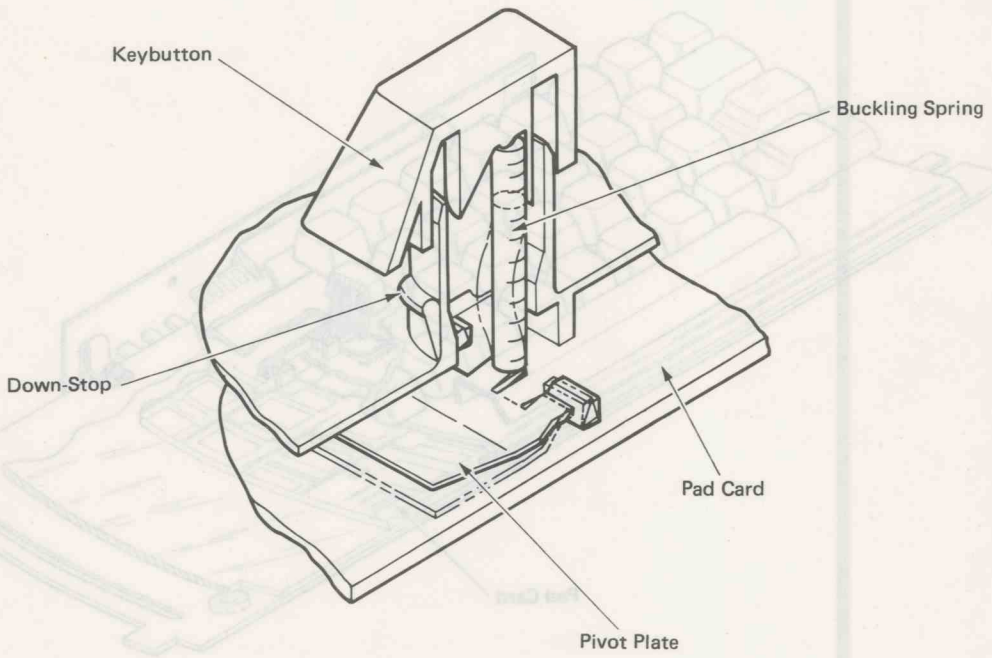


Figure 3 – Pivot Plate

PAD CARD

The pad card has a pattern of conductive material on each side for the drive and sense lines. The pad card is mounted between the keyboard frame and the bottom plate of the keyboard. The pad card has an edge connector which connects the drive and sense lines to the keyboard control board.

When the keybutton is pressed the pivot plate moves down. This acts as a capitance switch to couple a drive line to a sense line (Figure 4).

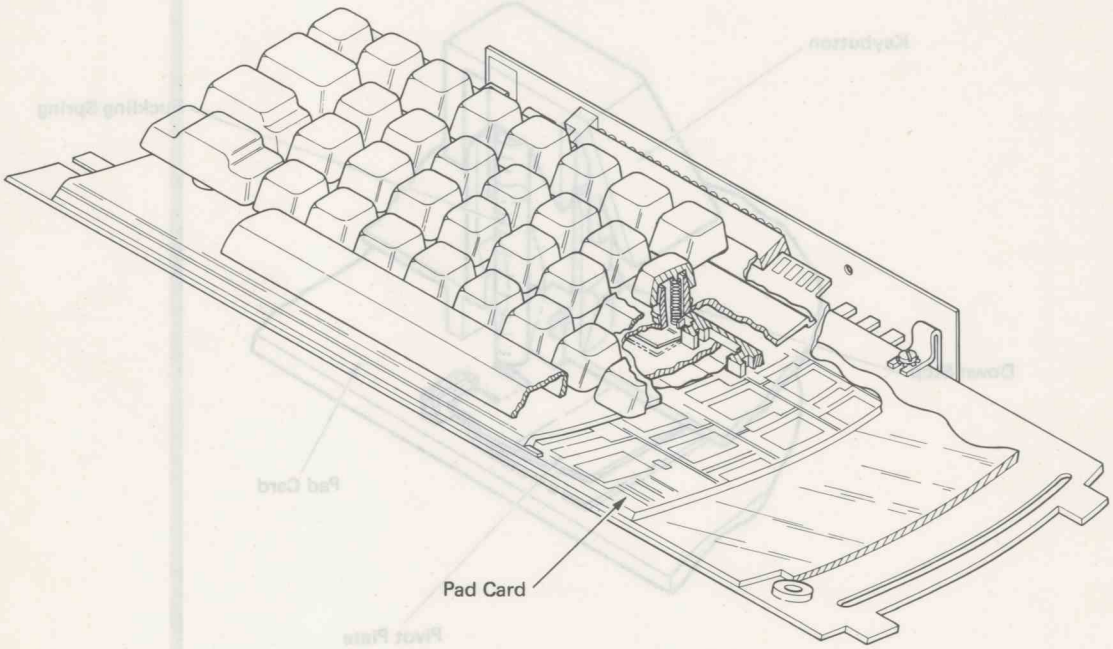


Figure 4 – Pad Card

KEYBOARD CONTROL BOARD

The keyboard control board mounts on the rear of the keyboard. It connects to the pad card by an edge connector (Figure 5).

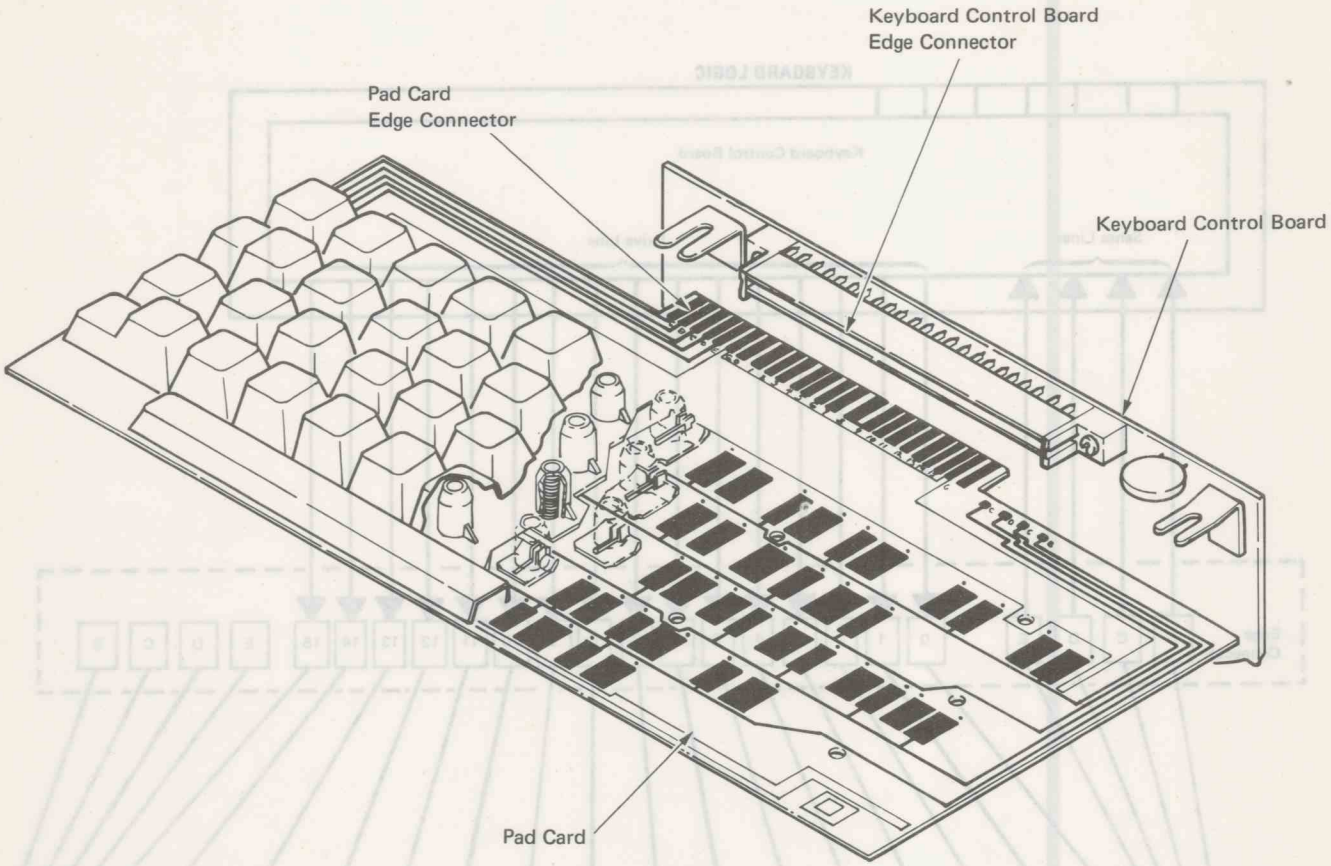


Figure 5 – Keyboard Control Board

The keyboard control board sends a drive signal through each of the 16 drive lines in sequence, repeating the sequence approximately 100 times per second. Each time the keyboard control board signals a drive line, it scans the four sense lines for an active signal. If a keybutton is pressed, an active drive line will be coupled by the pivot plate to a sense line and the sense line will be active. The keyboard control board determines which keybutton is pressed by knowing which one of the 16 drive lines is active and which one of the four sense lines is active. The individual key is identified in the keyboard control board by the cross point of one sense line and one drive line (Figure 6).

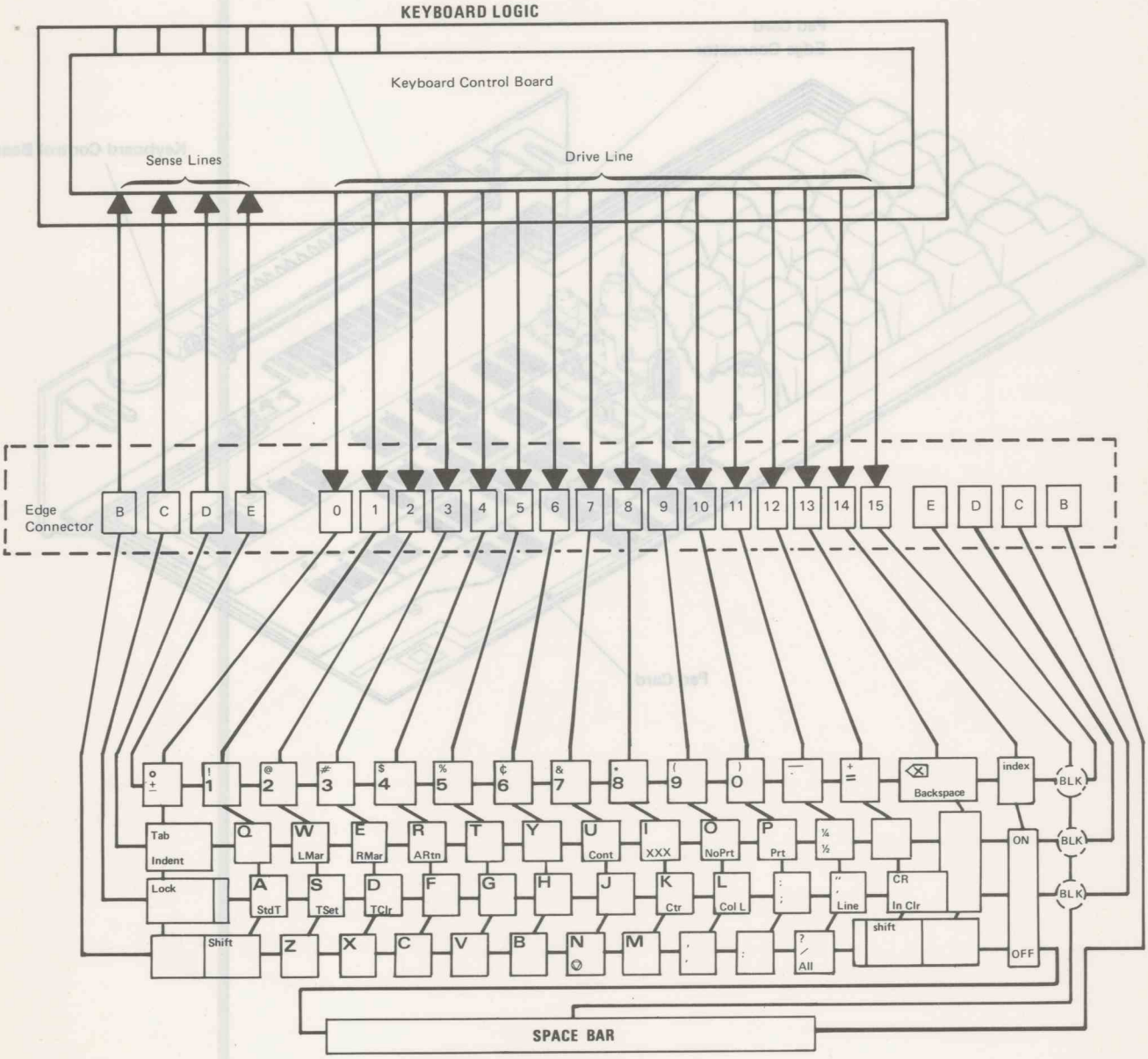


Figure 6 – Pad Card Layout

SHIFT LOCK

The shift bail is located under the keybuttons between rows B and C. The shift bail consists of the shift locking lug, restore spring, and two pivot arms (Figure 7).

When the shift lock button is pressed, the shift bail and shift locking lug pivot top to rear. When the shift lock button reaches the down-stop, the shift locking lug enters a notch in the shift lock button. This holds the lock down.

SHIFT LOCK RELEASE

The shift lock can be released by pressing down on either of the shift keybuttons. Pressing down a shift keybutton causes the keybutton to contact the pivot arm. The pivot arm rotates the shift bail top to front and releases the shift lock.

The shift lock keybutton has its own pivot plate. When the shift is locked, the keyboard control board outputs the keyboard mode signal with the bail code signal.

When the keybutton is released, the spring straightens and moves the keybutton and pivot plate back to its rest position.

WT KEYBOARDS

Connector L-10 on the driver board and connector K-4 on the keyboard control board may require a jumper for world trade and domestic keyboards and processors. For specific information, see the chart in the 50/60/75/85 Part Number List (F/N S241-6058).

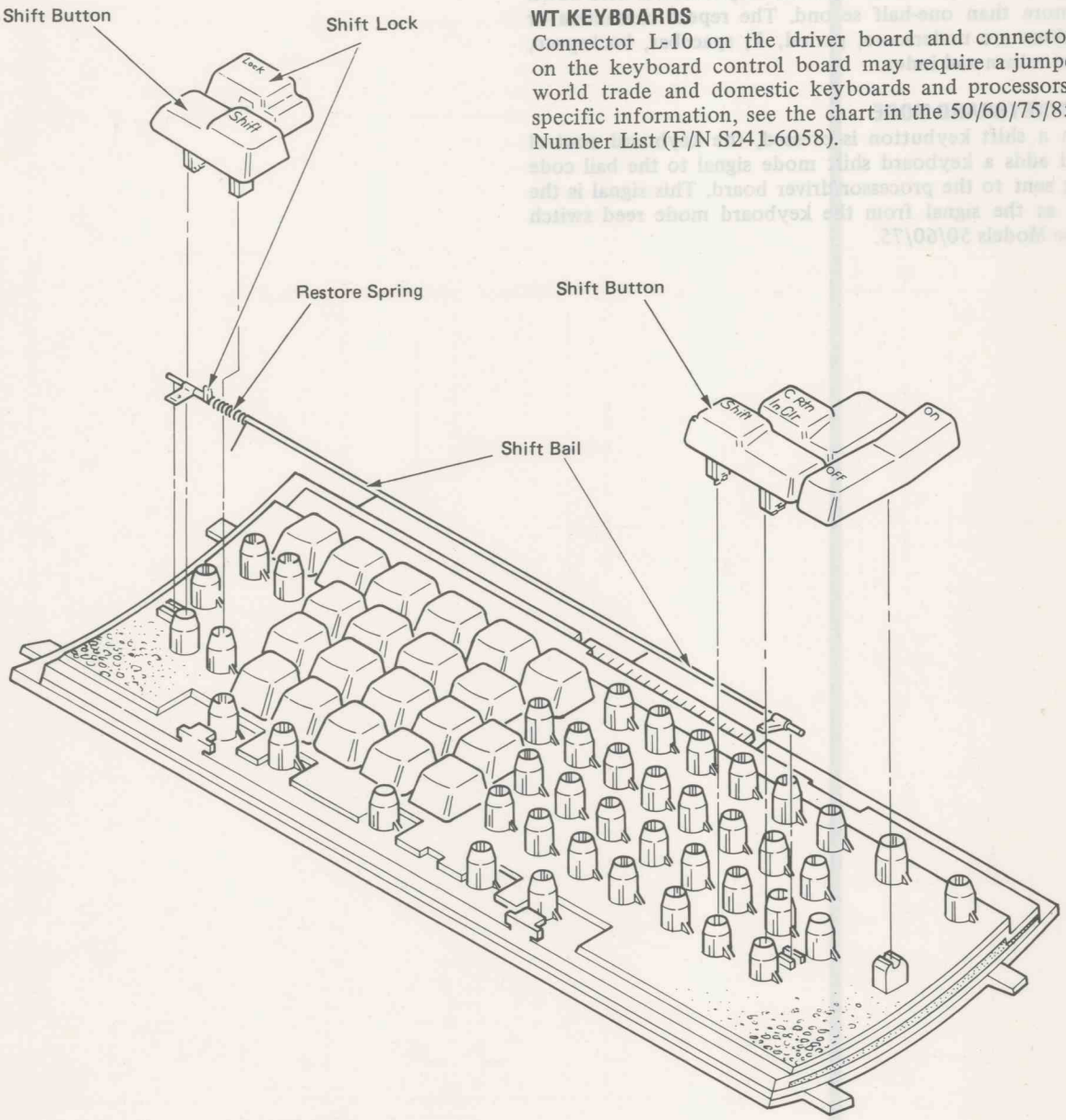


Figure 7 – Shift Lock and Bail

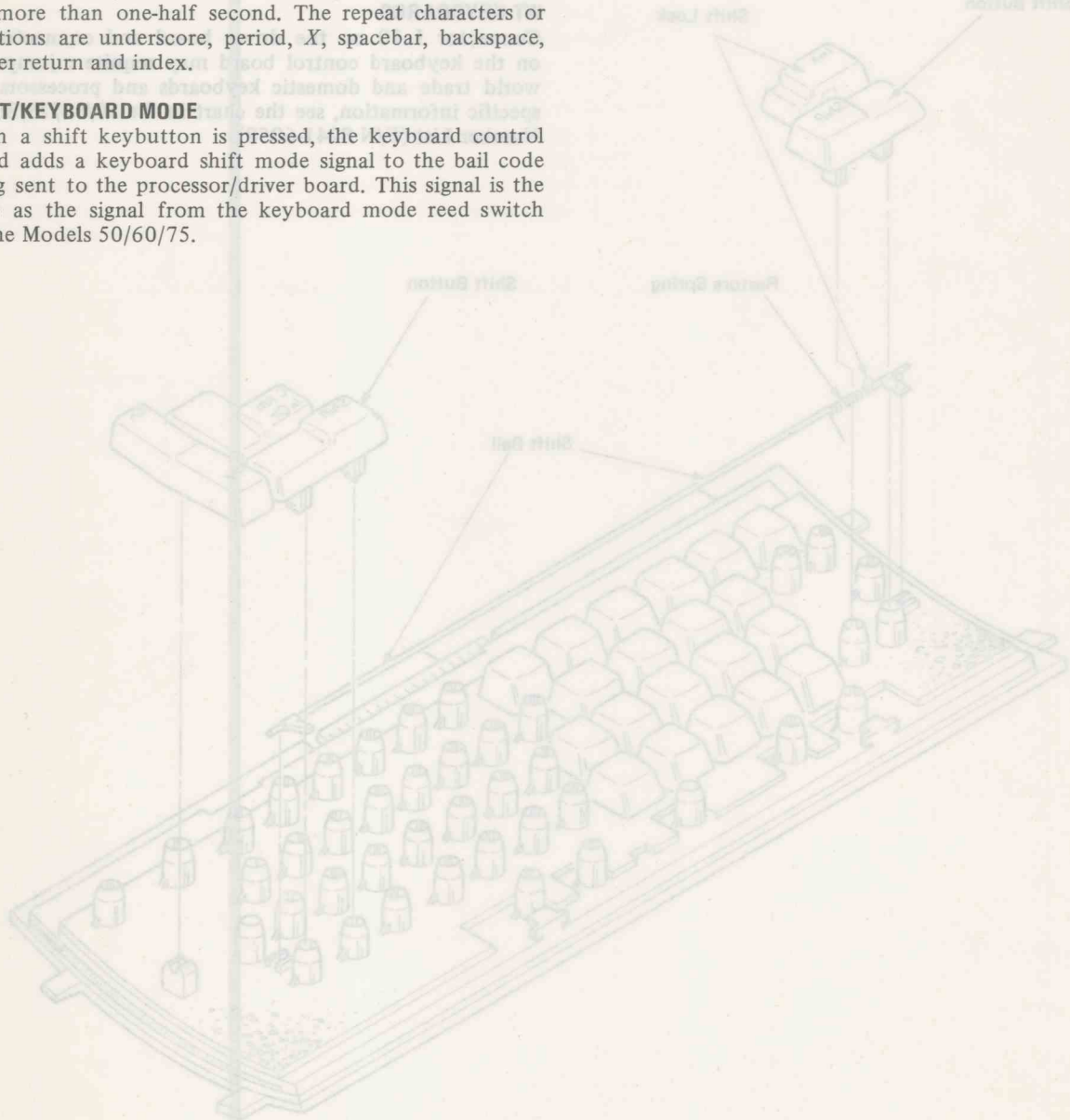
The keyboard control board converts the drive/sense line signal into a bail code signal which is sent to the processor/driver boards through the keyboard cable. This bail code is identical to the codes sent by the keyboard reed switches on the Models 50/60/75. The keyboard control board must read the drive line signal on two successive scans before it will output the bail code. Once the bail code has been sent out, the keyboard control board will not output the same bail code unless it detects the keybutton was first restored to the rest position, or unless the selection is a repeat character or function.

REPEAT CHARACTERS/FUNCTIONS

The keyboard control board will repeat the bail code for a repeat character/function when the keybutton is held down for more than one-half second. The repeat characters or functions are underscore, period, *X*, spacebar, backspace, carrier return and index.

SHIFT/KEYBOARD MODE

When a shift keybutton is pressed, the keyboard control board adds a keyboard shift mode signal to the bail code being sent to the processor/driver board. This signal is the same as the signal from the keyboard mode reed switch on the Models 50/60/75.



ESCAPEMENT OPERATIONAL THEORY

The escapement mechanism moves the carrier left and right and positions the carrier for print and correction operations.

The escapement mechanism consists of the escapement motor, leadscrew, the escapement control and release mechanism, and the escapement control board (Figure 1).

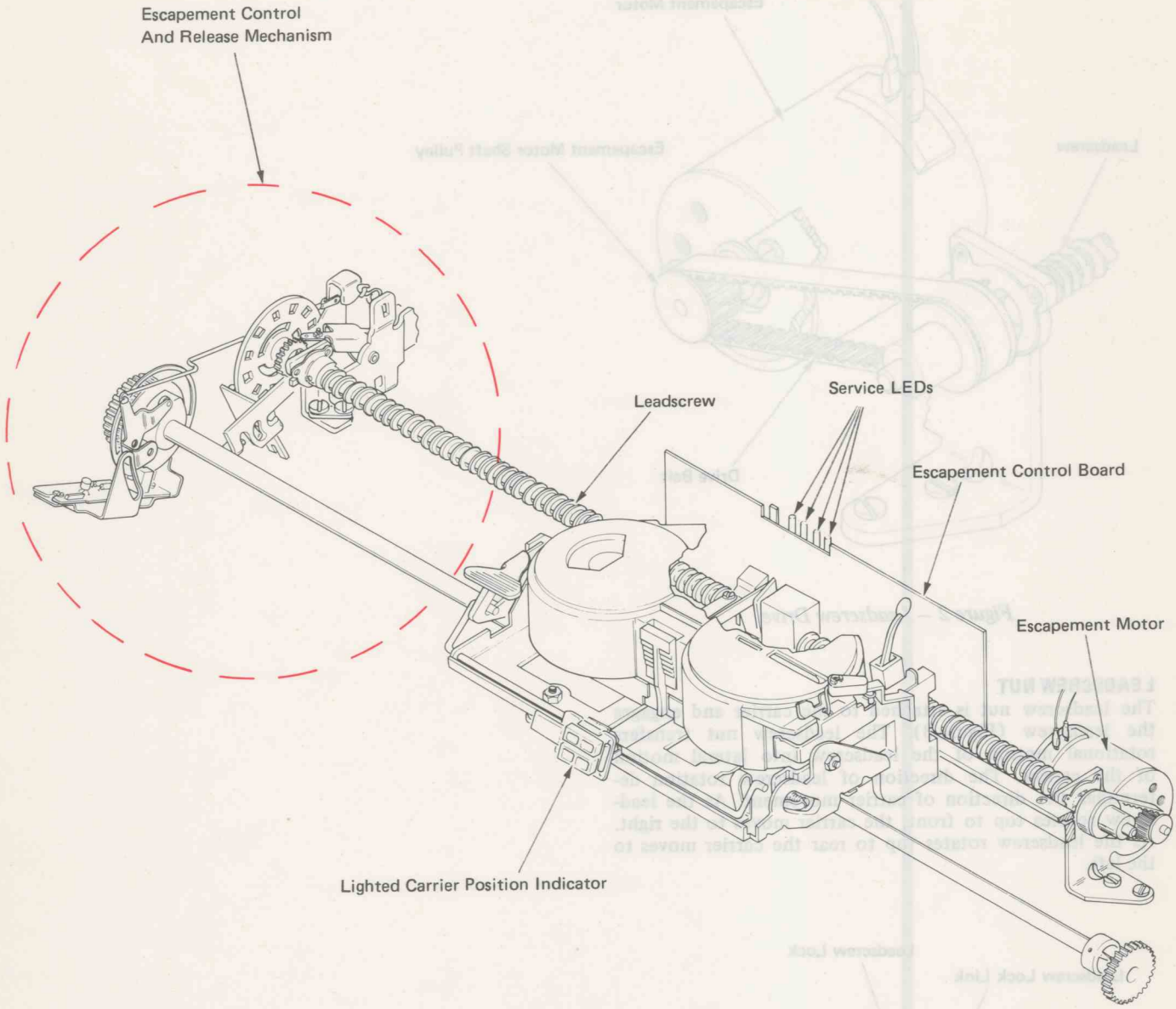


Figure 1 – Escapement Mechanism

A two-directional DC escapement motor provides the motion to turn the leadscrew. The turning motion of the escapement motor shaft pulley is transferred to the leadscrew by a drive belt.

The electronics control the speed and the direction of rotation of the escapement motor (Figure 2).

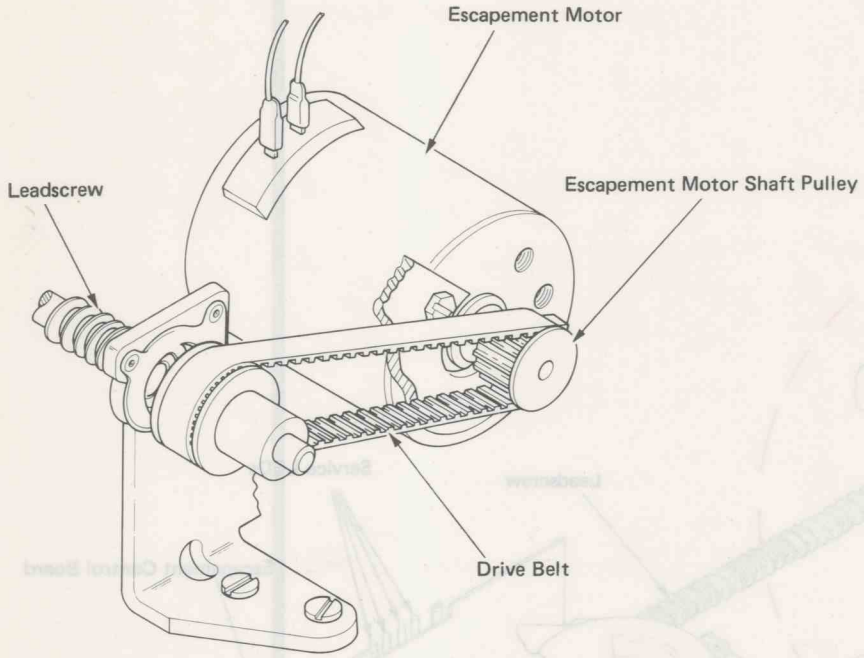


Figure 2 – Leadscrew Drive

LEADSCREW NUT

The leadscrew nut is attached to the carrier and engages the leadscrew (Figure 3). The leadscrew nut transfers rotational motion of the leadscrew into lateral motion of the carrier. The direction of leadscrew rotation determines the direction of carrier movement. As the leadscrew rotates top to front, the carrier moves to the right. As the leadscrew rotates top to rear the carrier moves to the left.

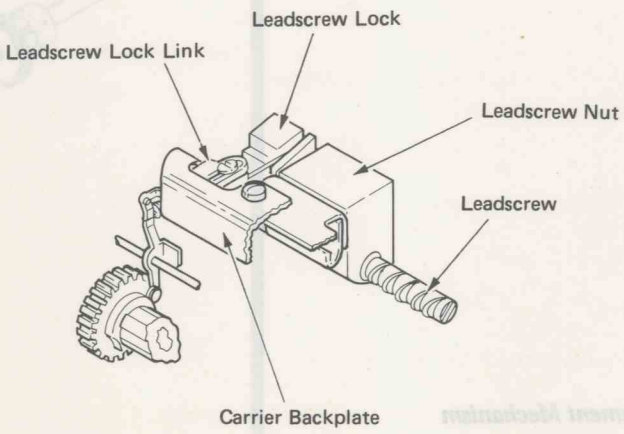


Figure 3 – Leadscrew Nut

ESCAPEMENT MOTOR CONTROL

The escapement motor is controlled by electronics located in the escapement control board. The processor/driver board tells the escapement control board when to start and stop an escapement operation. The escapement control board is located in the rear of the machine (Figure 4).

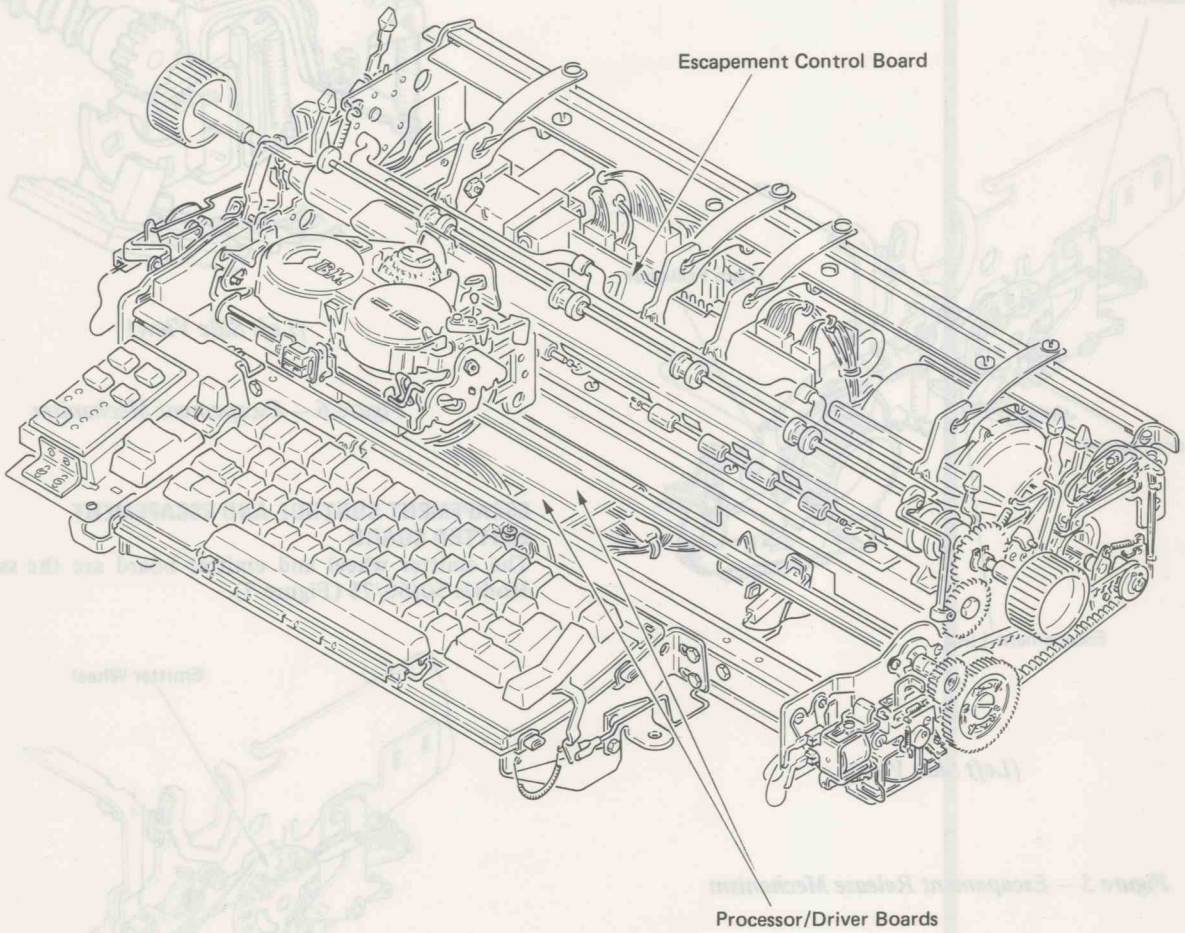


Figure 4 – Escapement Motor Control

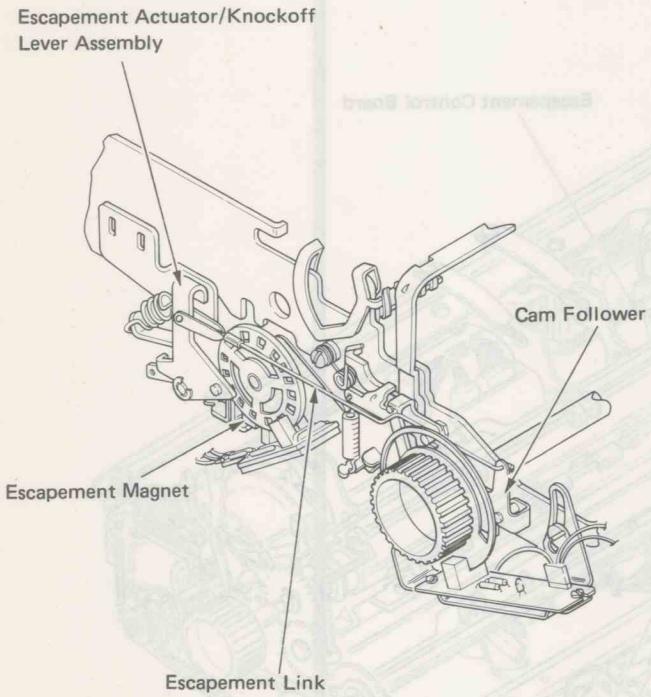
ESCAPEMENT RELEASE

The escapement release mechanism is similar to the Model 75 with two exceptions:

1. The escapement inhibitor has been removed.

2. The escapement timing has been changed.

The escapement cam on the left end of the print shaft transfers motion through the cam follower to the escapement link and escapement actuator/knockoff lever assembly to drive the escapement pawl out of the ratchet. The escapement magnet holds the pawl out of the ratchet until the escapement operation is complete (Figure 5).



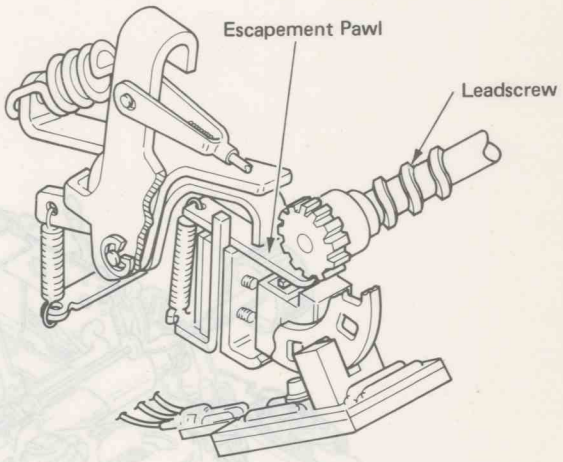
(Left Side View)

Figure 5 – Escapement Release Mechanism

ESCAPEMENT BIAS

Escapement bias occurs before the pawl release on every escapement cycle. Escapement bias is the rotation of the leadscrew in the direction the carrier will move. This allows the leadscrew to begin turning as soon as the escapement pawl is driven out of the leadscrew ratchet.

The escapement cam timing has been changed so the escapement pawl remains in the leadscrew ratchet tooth until after print. This is done because there is no inhibitor to prevent the leadscrew from turning during print (Figure 6).

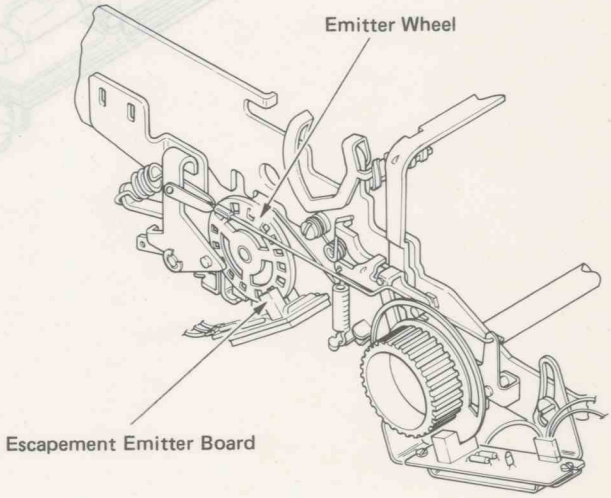


(Left Side View)

Figure 6 – Escapement Mechanism

ESCAPEMENT CONTROL AND ESCAPEMENT EMITTER BOARD

The emitter wheel and emitter board are the same as the Models 50/60/75 (Figure 7).



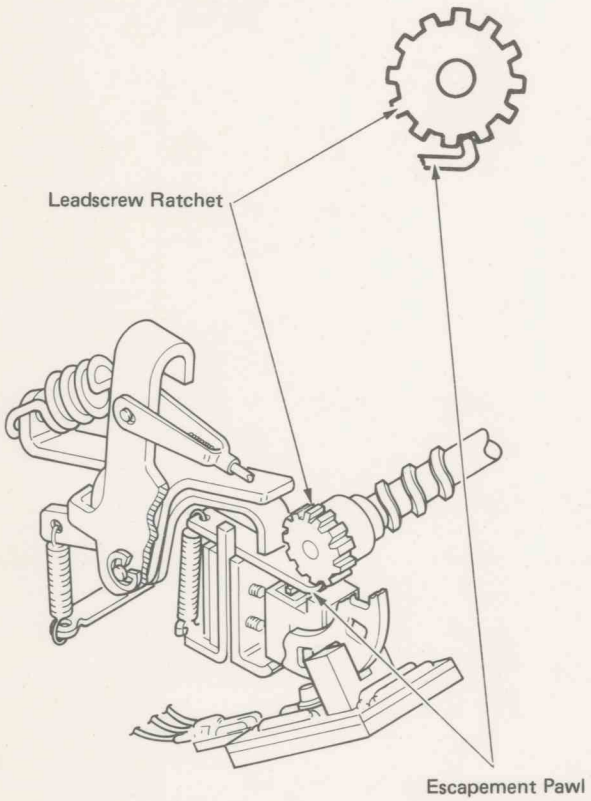
(Left Side View)

Figure 7 – Escapement Control

NO-ESCAPEMENT CYCLE

On the Models 50/60/75 the inhibitor prevented the leadscrew from turning during a no-escapement cycle. This allowed the escapement pawl to reenter the same tooth in the leadscrew ratchet after the no-escapement cycle.

When a no-escapement cycle on the IBM 85 occurs, the escapement motor reverses the leadscrew rotation so the escapement pawl can reenter the same tooth of the escapement ratchet. This eliminates the need for an inhibitor (Figure 8).



(Left Side View)

Figure 8 – No-Escapement Cycle

DIRECTION CONTROL

The direction the escapement motor will turn is controlled by the drive circuit on the escapement control board.

As voltage is applied to one lead on the motor, the other lead is switched to ground and the motor shaft turns top to front. As voltage flows through the motor in the opposite direction, the motor shaft turns top to rear (Figure 9).

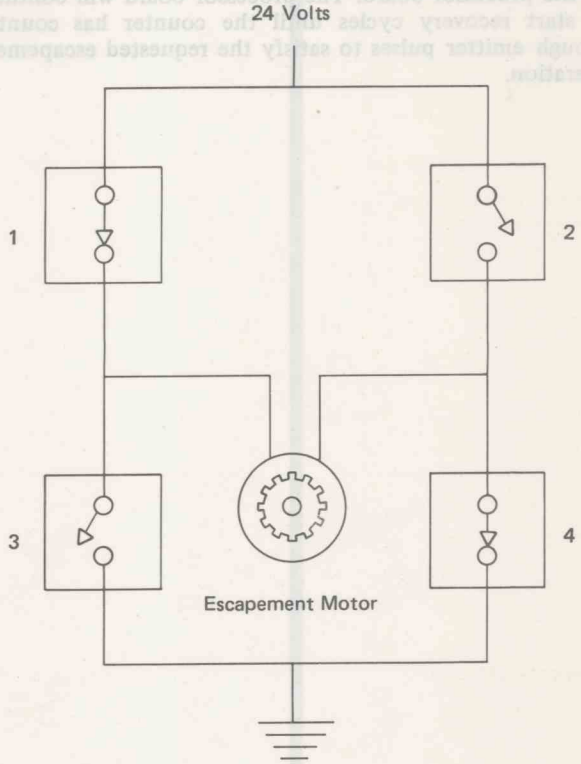


Figure 9 – Direction Control Circuit

SPEED CONTROL

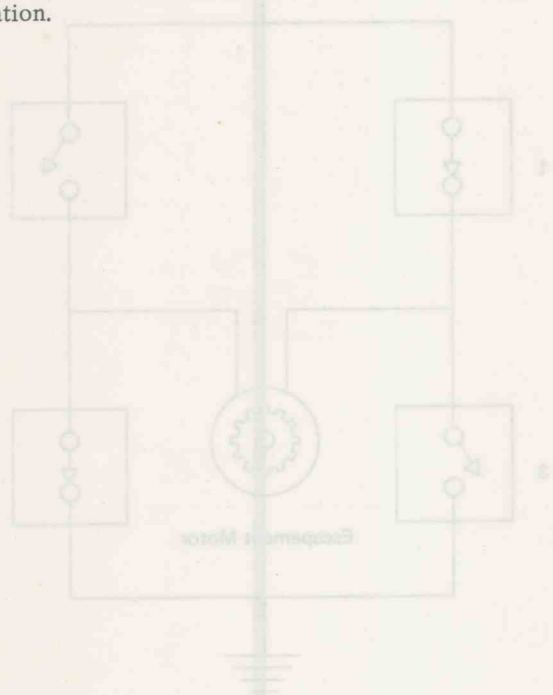
The escapement control board monitors the speed of the emitter pulses to regulate the speed of the escapement motor. Voltage to the escapement motor is increased until the emitter pulses are seen by the escapement control board at the proper speed. This keeps the leadscrew turning at the correct speed.

Voltage to the escapement motor is regulated by the escapement control board. As the voltage is increased the motor torque increases, which increases the speed of leadscrew rotation. The voltage to the escapement motor is increased to overcome small amounts of friction.

The emitter pulses go through the escapement control board to the processor/driver board where they are counted. When the correct number of emitters are counted, voltage to the escapement motor is dropped and the escapement magnet is de-energized by the escapement control board.

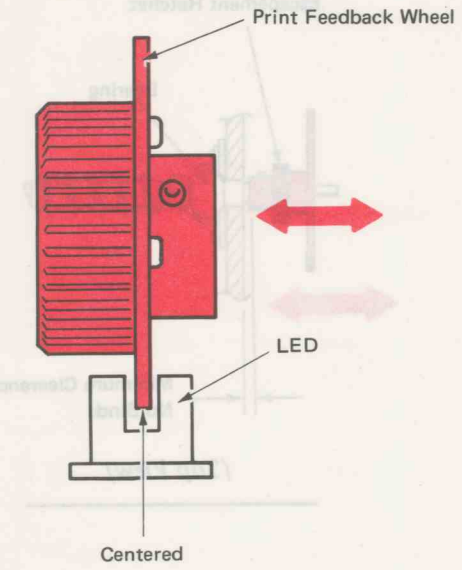
RECOVERY CYCLE

The IBM 85 has a special circuit in the processor board that prevents machine lockups caused by escapement failures. When a slow, or no, escapement operation occurs, that cannot be overcome by additional voltage to the escapement motor, the processor board initiates an extra print shaft cycle clutch operation, or recovery cycle. Each time the processor board starts a recovery cycle, the escapement control board electronically creates one pre-condition escapement emitter pulse and sends it to the counter on the processor board. The processor board will continue to start recovery cycles until the counter has counted enough emitter pulses to satisfy the requested escapement operation.



ESCAPEMENT ADJUSTMENTS

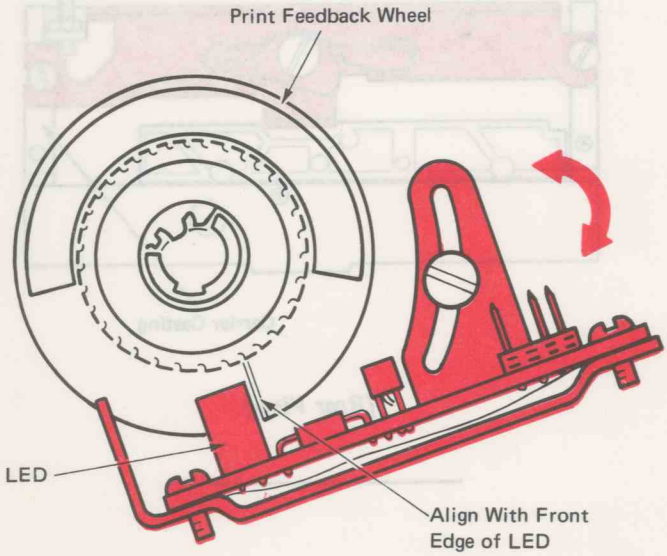
1. *Print Feedback Wheel* – Center the print feedback wheel in the LED.



(Front View)

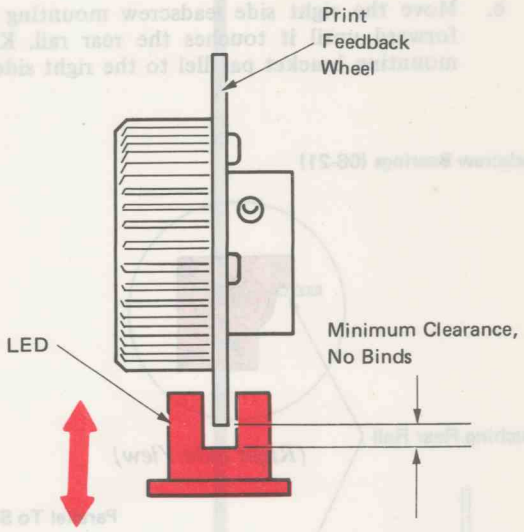
2. *Print Feedback Timing* – With the print shaft in the home position, adjust the print feedback board as follows:

   a. Align the scribe mark with the front edge of the LED.



(Left Side View)

   b. Adjust the print feedback board up or down for minimum clearance, no binds, between the LED and the bottom of the print feedback wheel.



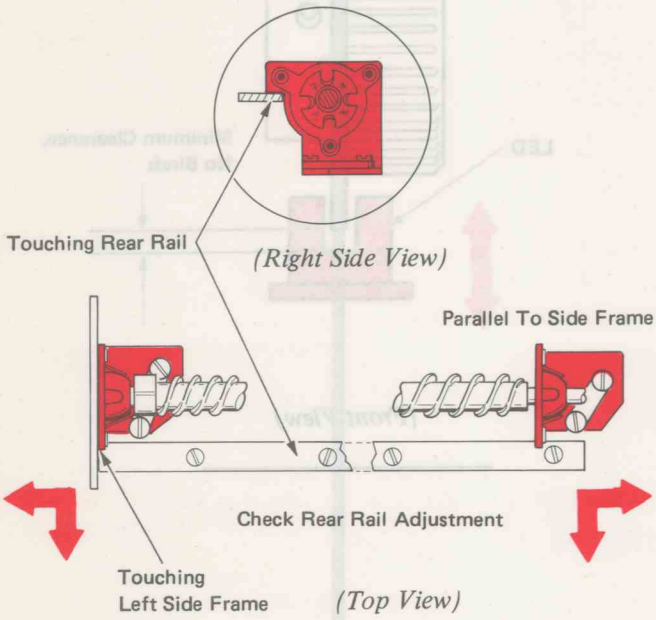
(Front View)

3. *Leadscrew Bearings* – Adjust by the following:

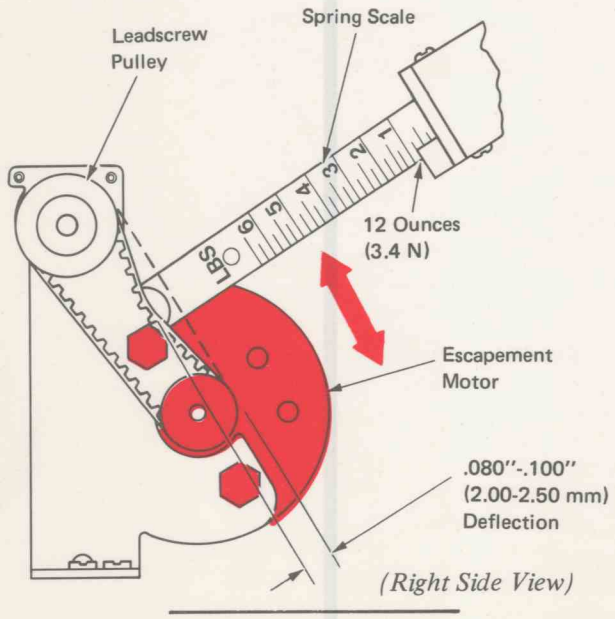
   a. Move the left side leadscrew mounting bracket forward until the top of the bracket touches the rear of the rail. Keep the mounting bracket parallel to the left side frame.

   b. Move the right side leadscrew mounting bracket forward until it touches the rear rail. Keep the mounting bracket parallel to the right side frame.

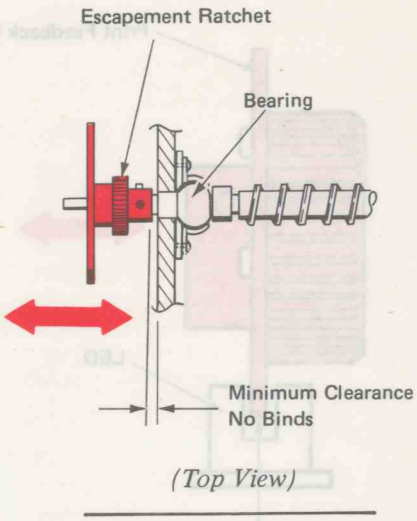
Leadscrew Bearings (06-21)



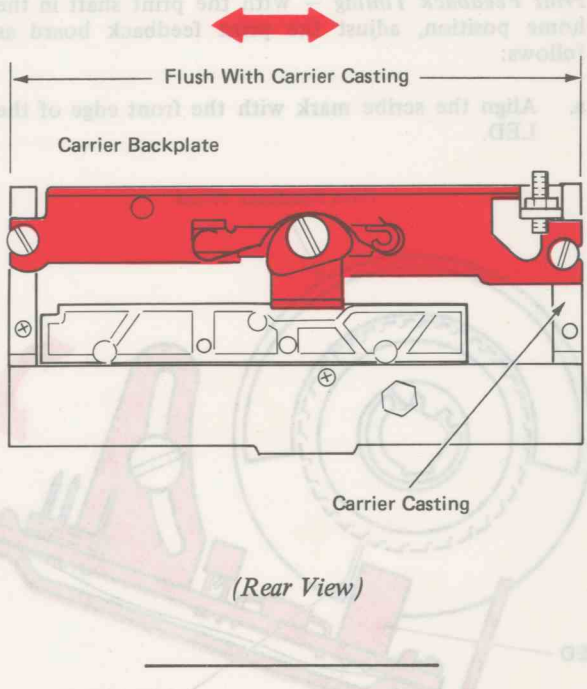
4. *Escapement Motor Belt Tension* – Adjust the escapement motor front to rear for .080"-.100" (2.00-2.50 mm) belt deflection with 12 ounces (3.4 newtons) applied midway between the pulleys.



5. *Leadscrew End Clearance* – Adjust the escapement ratchet left or right for minimum clearance with no binds as the leadscrew rotates. Maximum end play should not exceed .002" (0.05 mm).



6. *Carrier Back Plate* – Adjust the carrier back plate left to right until it is flush with the carrier casting.



7. *Leadscrew Nut* – Adjust the leadscrew nut as follows:

a. Loosen the two screws at the rear of the leadscrew nut one and one-half turns and press down on the leadscrew nut.

b. Center the leadscrew in the leadscrew nut by pulling the leadscrew up slightly.

c. Manually rotate the print shaft until the leadscrew lock locks the leadscrew nut.

d. Loosen the lock link screw.

e. Ensure that the leadscrew lock locks the leadscrew nut.

f. Tighten the two screws at the rear of the leadscrew nut.

g. Loosen the two carrier drive nut bracket screws and center the carrier drive nut bracket with the carrier rear plate.

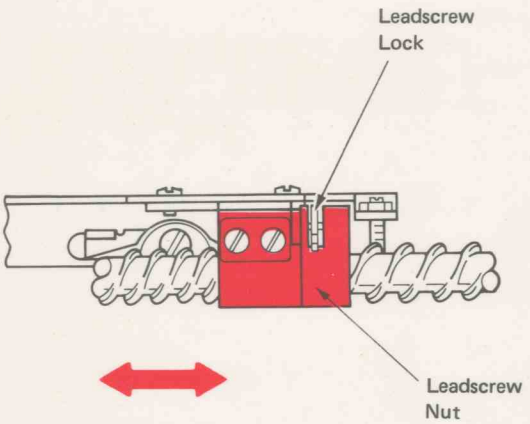
h. Tighten the two carrier drive nut bracket screws.

i. Rotate the print shaft past the half-cycle position until the lock link moves forward .015"-.030" (0.38-0.76 mm).

j. Tighten the lock link screw.

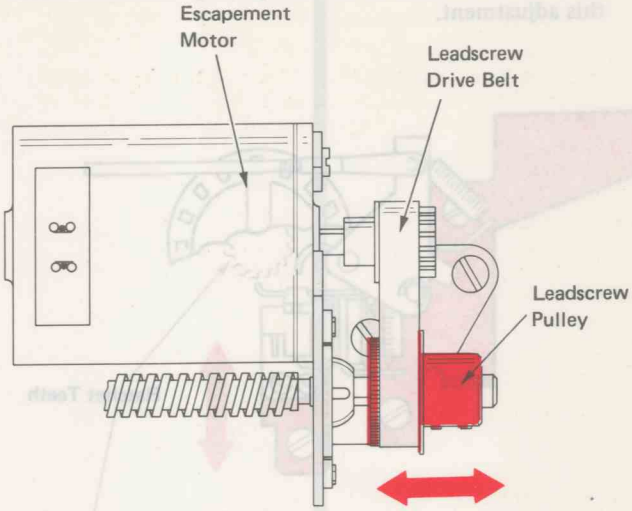
k. With the print shaft at rest, the carrier should have slight side-to-side movement with a small amount of pressure applied.

l. With the print shaft half-cycled, the carrier should have no side-to-side movement with a small amount of pressure applied.



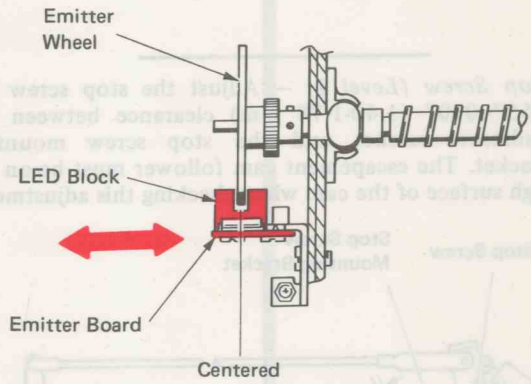
(Right Rear View)

8. *Leadscrew Pulley* – Adjust the leadscrew pulley left to right to eliminate left to right belt tracking during forward and reverse operations.



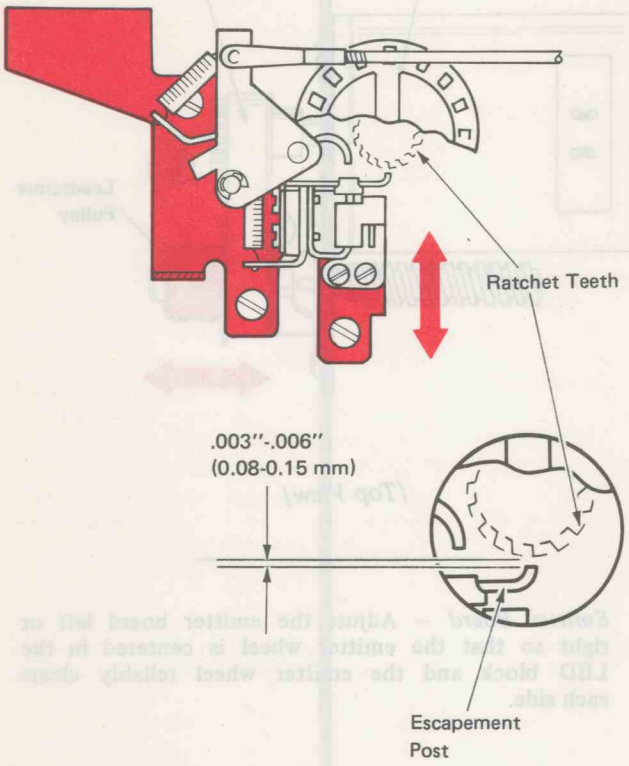
(Top View)

9. *Emitter Board* – Adjust the emitter board left or right so that the emitter wheel is centered in the LED block and the emitter wheel reliably clears each side.



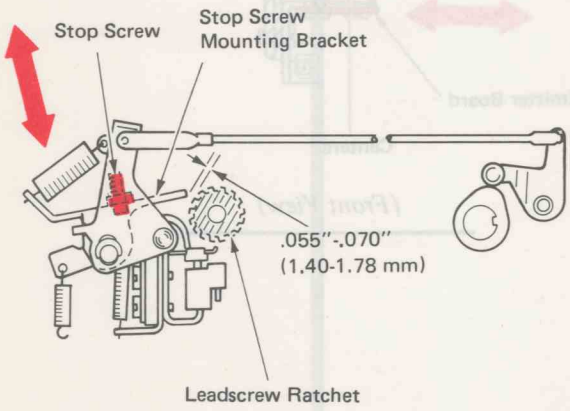
(Front View)

10. *Escapement Pawl Clearance* – Adjust the escapement bracket up or down for a clearance of .003"-.006" (0.08-0.15 mm) between the escapement pawl and the ratchet teeth. The escapement pawl must be held in the energized position to check this adjustment.



(Left Side View)

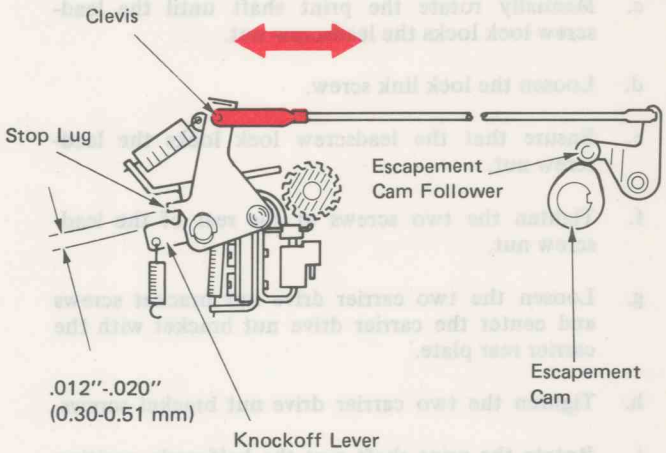
11. *Stop Screw (Level 1)* – Adjust the stop screw for .055"-.070" (1.40-1.78 mm) clearance between the leadscrew ratchet and the stop screw mounting bracket. The escapement cam follower must be on the high surface of the cam when checking this adjustment.



(Left Side View)

12. *Escapement Link* – Adjust the escapement link clevis for a clearance of .012"-.020" (0.30-0.51 mm) between the stop lug on the actuator and the knockoff lever.

The escapement cam follower must be on the high surface of the cam when checking this adjustment.



(Left Side View)

13. *Emitter Bracket* –

NOTE: This adjustment must be made to ensure it is correct because it cannot be checked.

When replacing an emitter board or when adjusting the emitter bracket, if service LED 1 is on, start with step *a*. If service LED 1 is off, start with step *e*.

Warning: Use caution with power on when loosening or tightening the holding screw. Contact made with the screwdriver could damage the emitter board.

a. Make the bracket mounting screw friction tight.

b. Bias the emitter wheel top to front so the ratchet tooth contacts the escapement pawl.

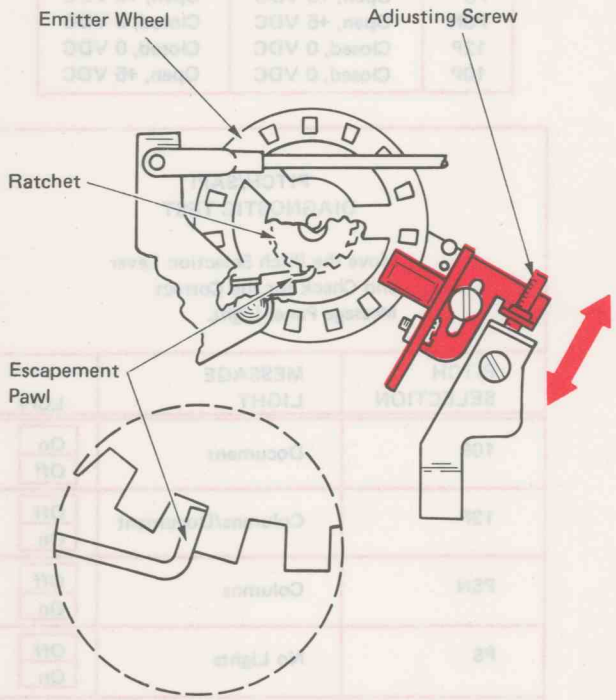
c. Center the adjusting screw in its mounting plate.

d. If service LED 1 is still on, turn the adjusting screw counterclockwise until the light turns off.

e. While biasing the emitter wheel top to front, turn the adjusting screw clockwise until service LED 1 turns on.

f. When service LED 1 turns on, turn the adjusting screw counterclockwise four turns. Apply slight pressure to the adjusting screw to ensure that the emitter bracket moves as the screw is turned.

g. Tighten the mounting screw.



(Left Side View)

14. *Leadscrew Stop* – Adjust the leadscrew stop radially on the leadscrew so that the top surface of the stop is level with the top surface of the rear rail. The leadscrew should be rotated one and one-half to two ratchet teeth (top to front) from the position where the carrier contacts the left side frame and then held top to rear against the escapement pawl while making this adjustment. Loosen the leadscrew stop setscrews to change this adjustment.

a. Position the carrier approximately six inches from the left side frame.

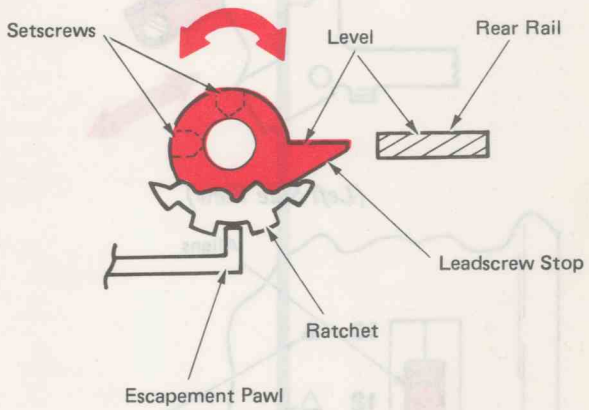
b. Loosen the setscrews on the leadscrew stop.

c. Loosen the nut on the leadscrew stop screw and turn the screw until the lower end of the screw is level with the top of the rear rail.

d. Ensure that the carrier is against the left side frame.

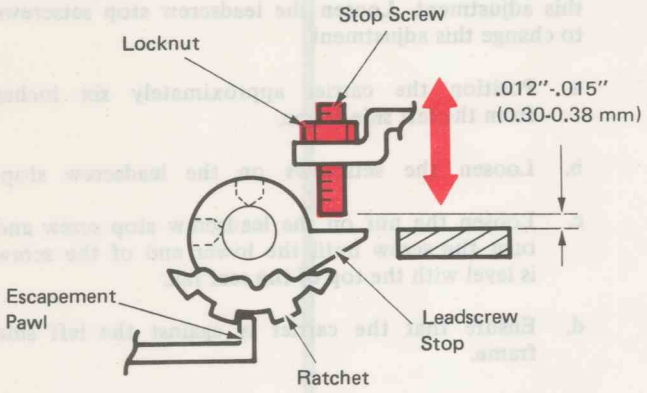
e. Manually release the escapement pawl and rotate the ratchet top to front one and one-half to two teeth, then allow the escapement pawl to engage the ratchet.

f. Manually load the ratchet top to rear and adjust the leadscrew stop so that the top surface contacts the stop screw, then tighten the setscrews.



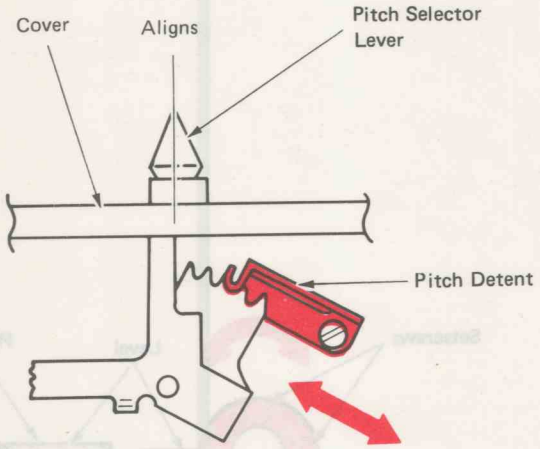
(Left Side View)

g. Adjust the leadscrew stop screw counterclockwise one-half turn, then tighten the locknut.

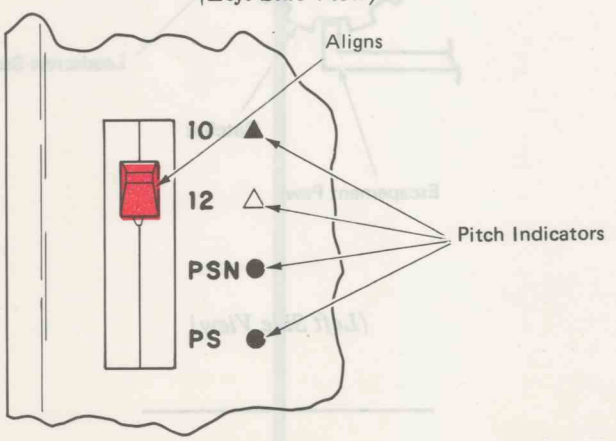


(Left Side View)

15. *Pitch Detent* – With the pitch selector lever in the 12 pitch position, adjust the pitch detent so that the pitch selector lever aligns with the 12 pitch indicator on the cover.

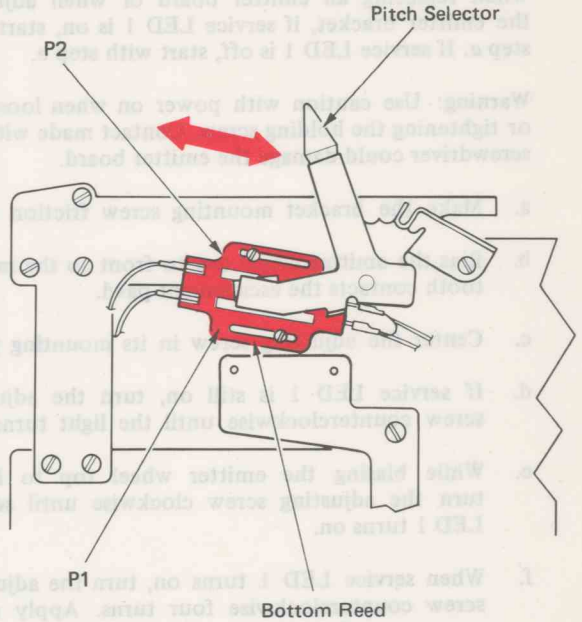


(Left Side View)



(Top View)

16. *Pitch Selection Reed Switches* – Adjust the pitch selection reeds up or down in the 12 pitch position for both reed switches 0 VDC. Then check all other positions for correct voltage.



(Left Side View)

	Bottom P1	Top P2
PS	Open, +5 VDC	Open, +5 VDC
PSN	Open, +5 VDC	Closed, 0 VDC
12P	Closed, 0 VDC	Closed, 0 VDC
10P	Closed, 0 VDC	Open, +5 VDC

PITCH/SAPI
DIAGNOSTIC TEST

Move the Pitch Selection Lever and Check for the Correct Message Panel Light.

PITCH SELECTION	MESSAGE LIGHT	LCPI
10P	Document	On / Off
12P	Columns/Document	Off / On
PSN	Columns	Off / On
PS	No Lights	Off / On
SAPI	Hyphenate	

INDEX OPERATIONAL THEORY

The index mechanism feeds the paper through the machine. The index mechanism consists of the index magnet, index magnet armature, index clutch assembly, index gear train, platen ratchet, platen, and index feedback mechanism (Figure 1).

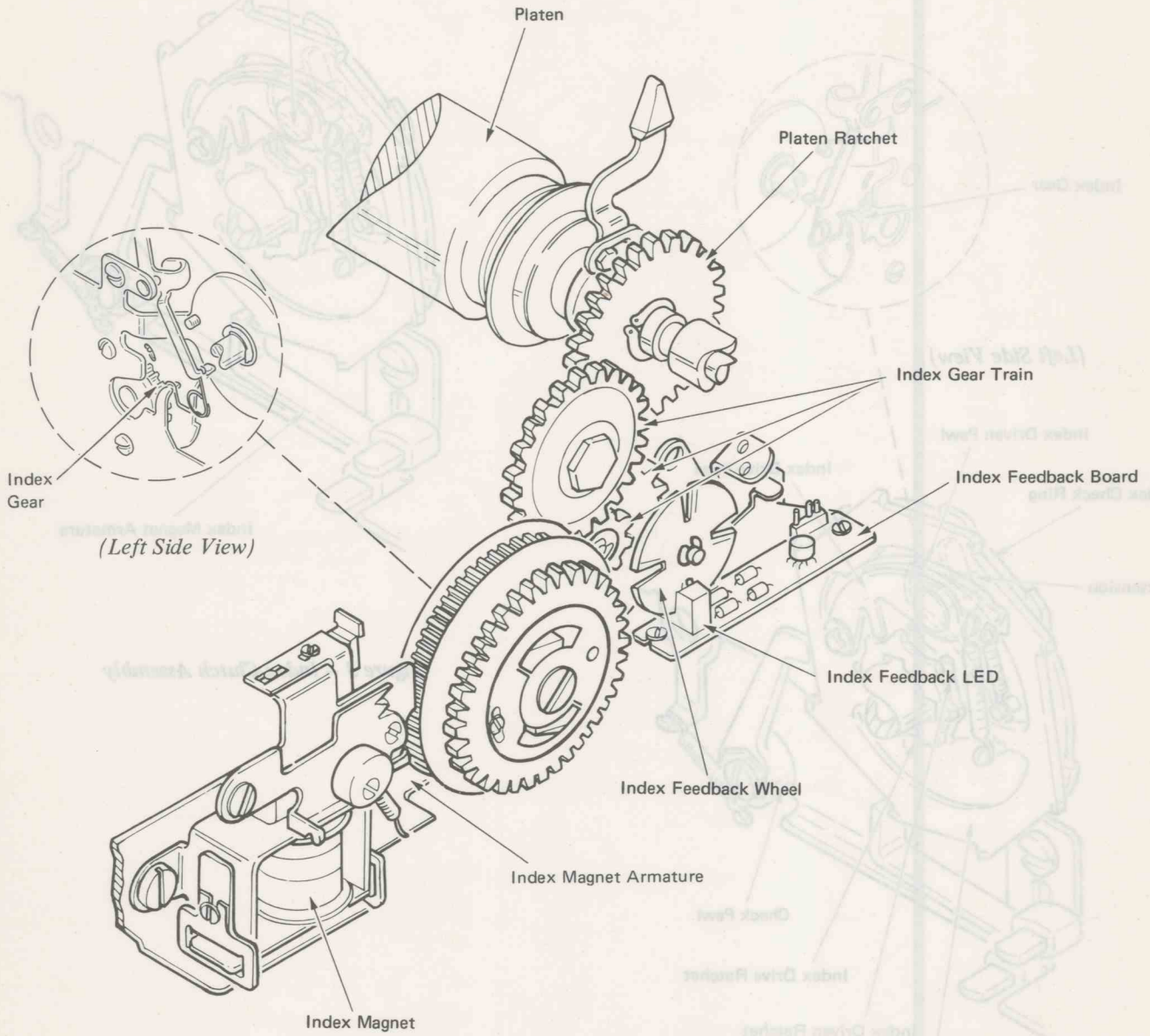


Figure 1 – Index Mechanism

INDEX OPERATION

The index drive ratchet is keyed to the print shaft cycle clutch pulley and rotates with it. The index-driven ratchet is keyed to the index gear. The index drive and driven pawls mount on an extension of the index check ring. The pawls are spring-loaded toward the drive and driven ratchets. The index-driven pawl rests on an extension on the left side of the index drive pawl. This extension goes through an opening in the index release ring and a slot in the index check ring (Figure 2).

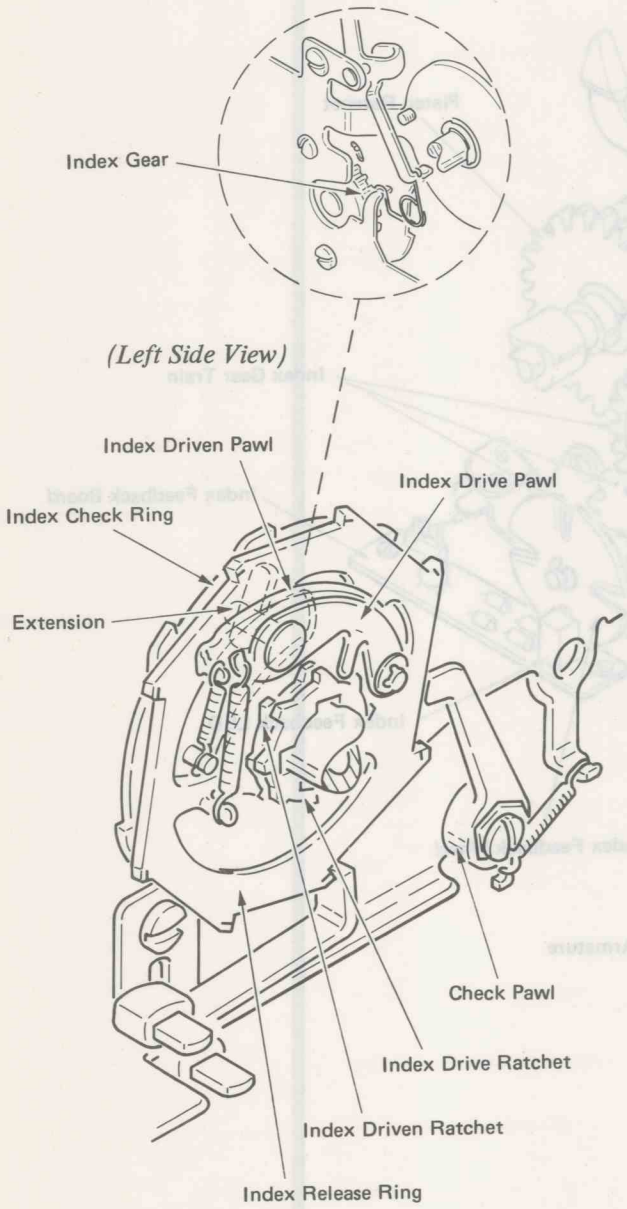


Figure 2 – Index Clutch Assembly

At rest, the rear of the index magnet armature acts as a latch and holds the release ring (Figure 3). The check pawl rests on the pawl locating surface on the opening in the release ring. This holds the pawls away from the ratchets. The detent assembly prevents the platen ratchet from turning when the index mechanism is at rest.

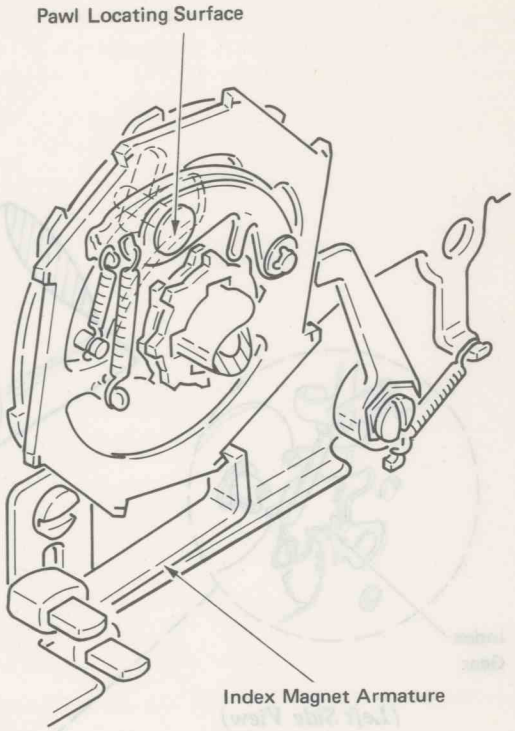


Figure 3 – Index Clutch Assembly

When an index operation is required, the escapement control board energizes the index magnet. The armature moves down, releasing the release ring, which rotates top to front under spring tension. This allows the drive and driven pawls to move into the path of the ratchets. The drive ratchet engages the drive pawl and drives it top to front. The drive pawl transfers motion to the check ring and driven pawl through the mounting stud on the check ring. The driven pawl engages the driven ratchet and drives the ratchet and index gear top to front. The index gear train transfers motion from the index gear to the platen ratchet and index feedback gear (Figure 4).

As the index operation nears completion, the escapement control board de-energizes the index magnet. The index latch moves up into the path of the release ring and stops the ring from rotating. Further rotation of the index check ring drives the extension of the drive pawl up the pawl locating surface in the release ring opening. This pivots the pawls out of the path of the ratchets. The check pawl engages a step on the index check ring and prevents top to rear motion of the check ring.

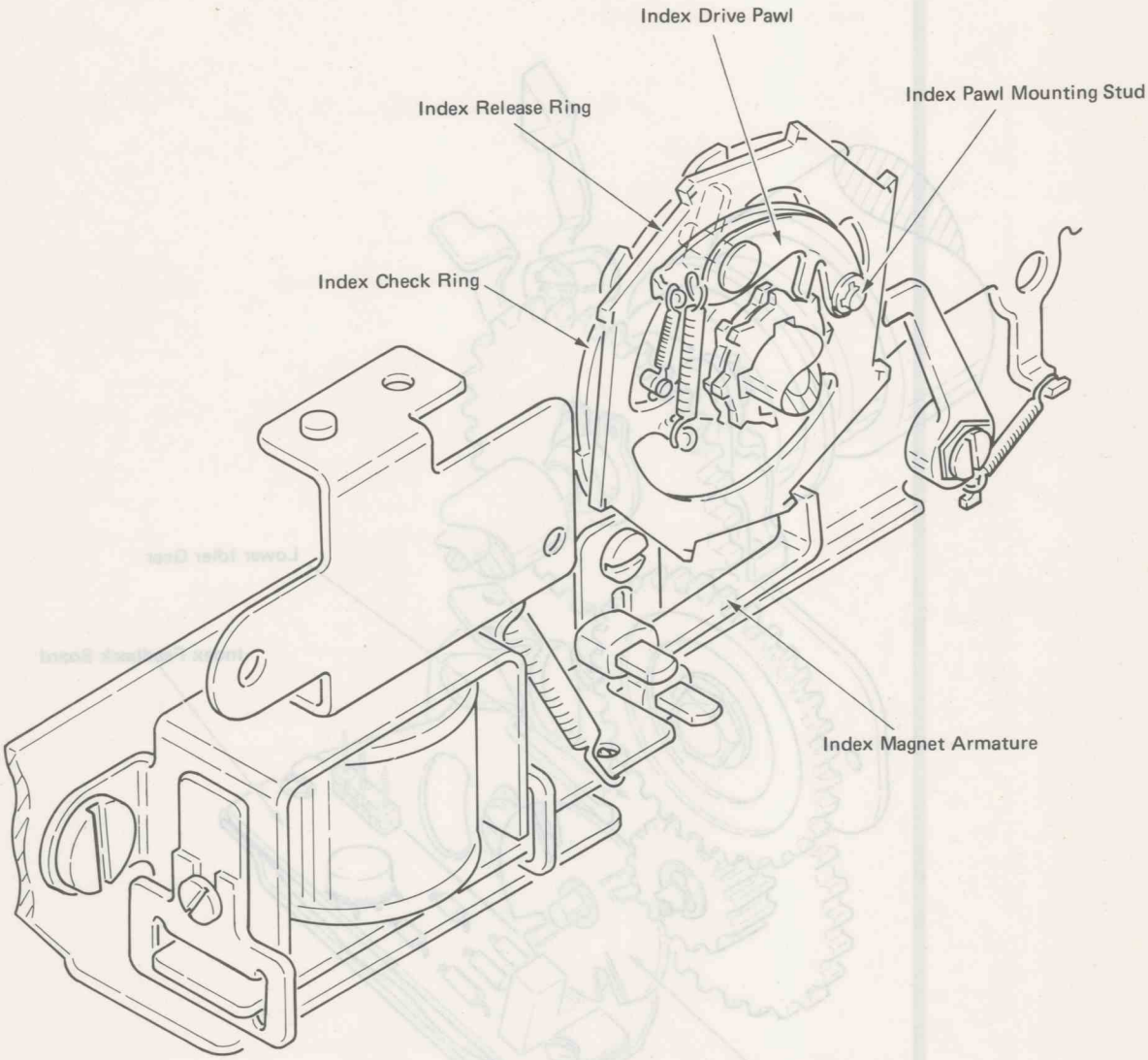


Figure 4 – Index Release

INDEX FEEDBACK MECHANISM

The index feedback mechanism sends the electronics an emitter pulse for each tooth of platen rotation. It consists of the index feedback wheel and the index feedback board.

The index feedback wheel rotates through a sensor mounted on the feedback board. The sensor is a phototransistor and LED similar to the escapement emitter board. The lower idler gear drives the emitter wheel (Figure 5).

When the detent roller is seated in a notch of the platen ratchet, the feedback wheel blocks the light from the LED. This sends a 5 V signal to the escapement control board. As the feedback wheel rotates during an index operation, an opening on the wheel permits the light from the LED to be detected by the sensor. This sends a 0 V pulse to the escapement control board. The sensor pulses once for each tooth of platen rotation. The escapement control board monitors the pulses and de-energizes the index magnet when the correct number of emitter pulses have been detected.

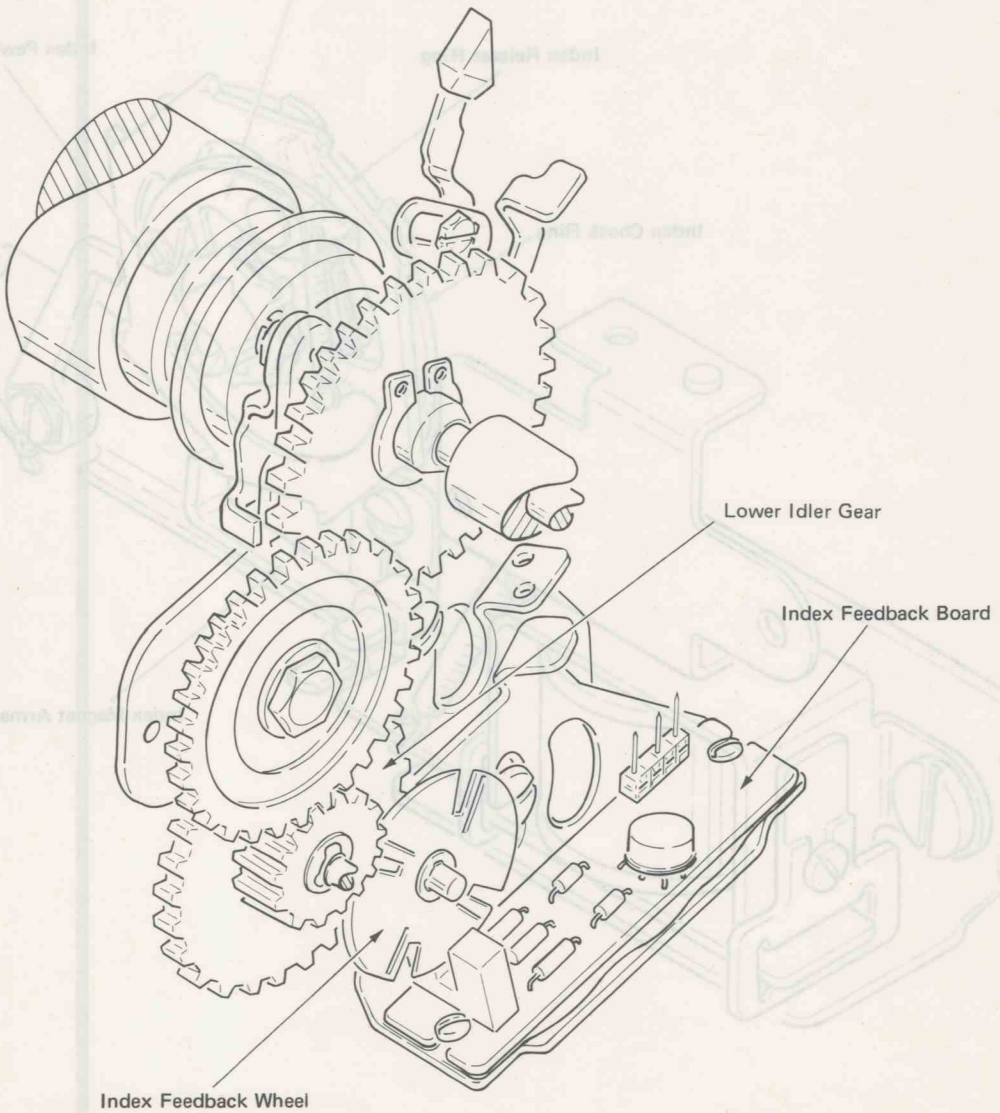


Figure 5 – Index Feedback

INDEX SELECTOR LEVER

The index selector lever controls the number of lines the IBM 85 will index. Two reed switches are operated by a magnet on the index selector lever. The condition of the reed switches (open or closed) is monitored by the escapement control board. The escapement control board determines the number of emitter pulses required for each index selection by the condition of the reed switches (Figure 6).

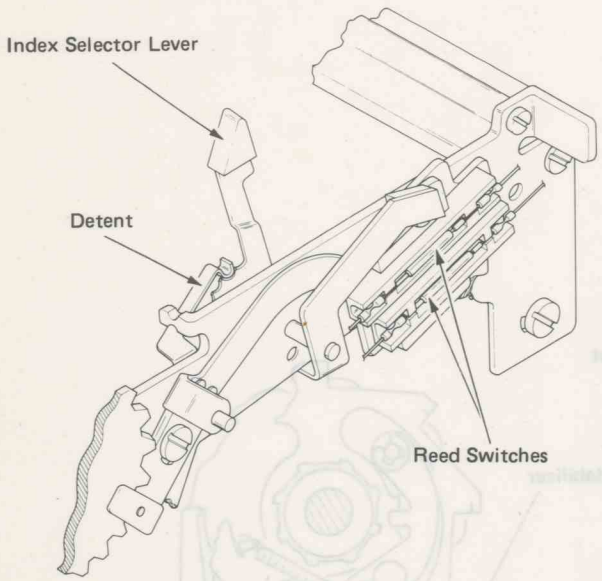


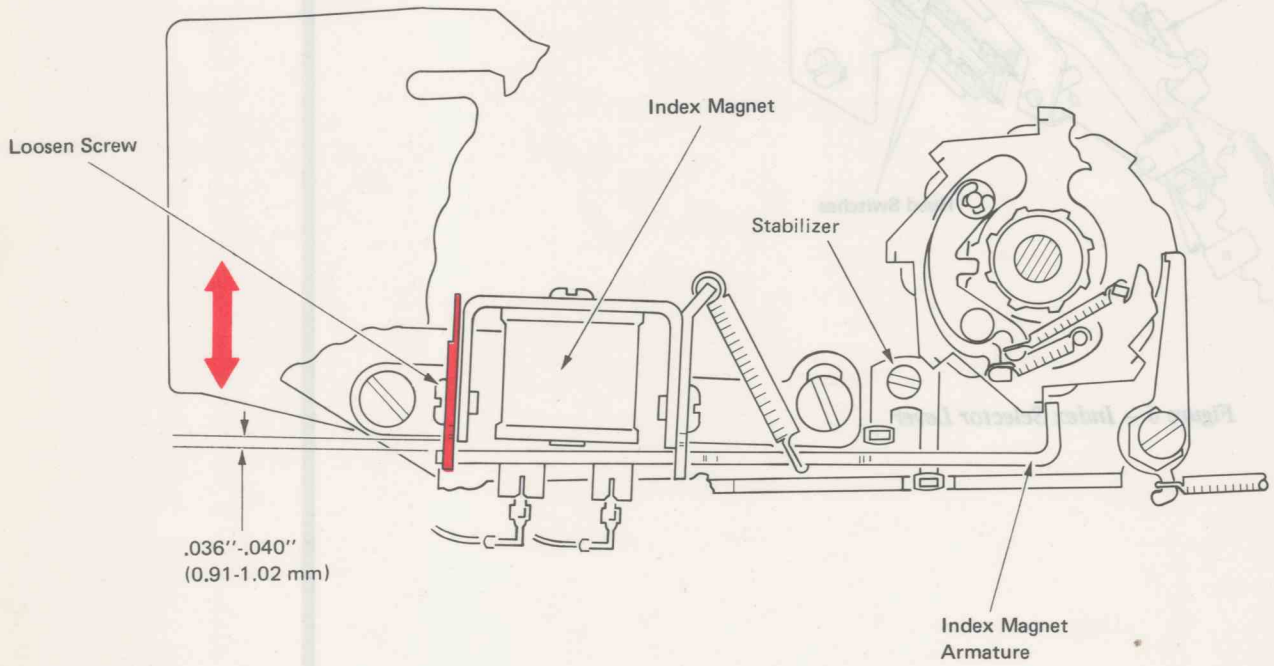
Figure 6 – Index Selector Lever

INDEX ADJUSTMENTS

1. *Index Magnet Up-Stop* – Adjust the up-stop for .036"-.040" (0.91-1.02 mm) between the residual and the magnet armature with the index magnet armature latched.

   NOTE: This adjustment is set at the factory and should not need readjusting unless the index magnet has been disassembled. When installing a new index magnet, check this adjustment before installation.

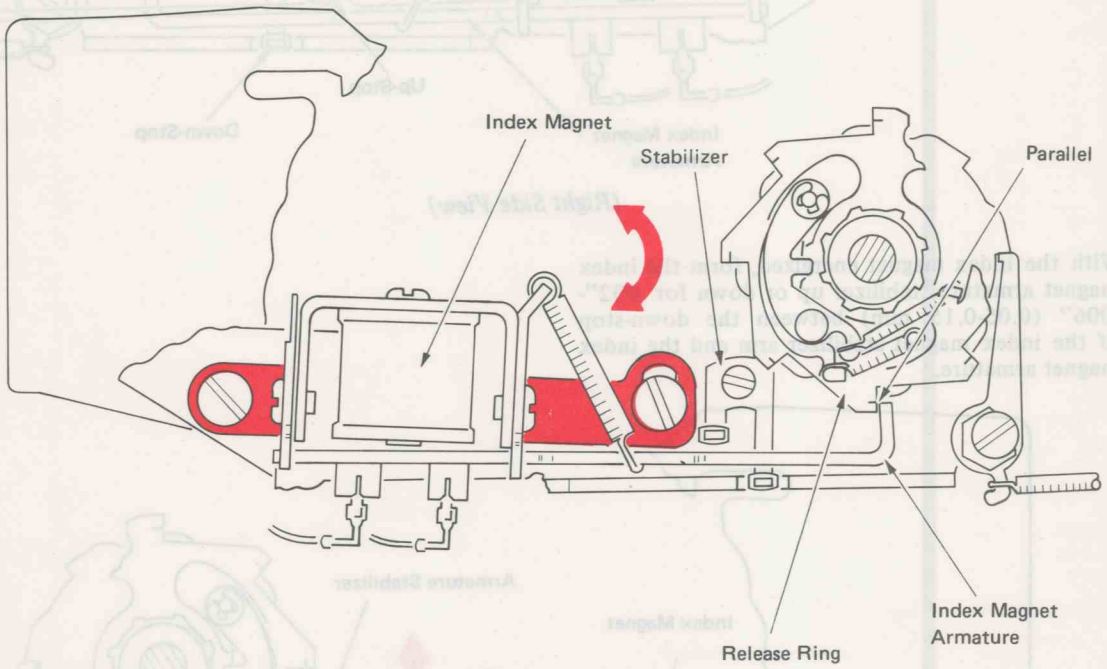
   NOTE: Ensure that the stabilizer does not interfere with this adjustment.



(Right Side View)

2. *Index Magnet Armature* – Adjust the index magnet armature up and down until the tip of the armature is parallel with the scribe mark on the release ring. To see the scribe mark, use a flashlight and align the holes in the cycle clutch drive pulley and the cycle clutch gear.

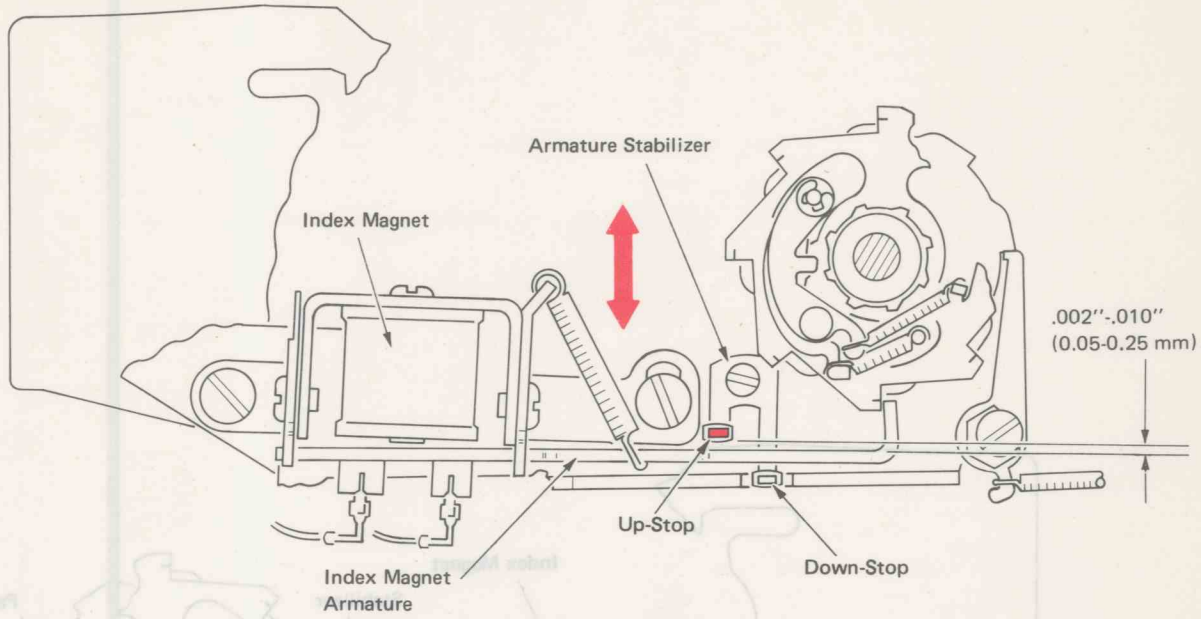
NOTE: Ensure that the stablilizer does not interfere with this adjustment.



(Right Side View)

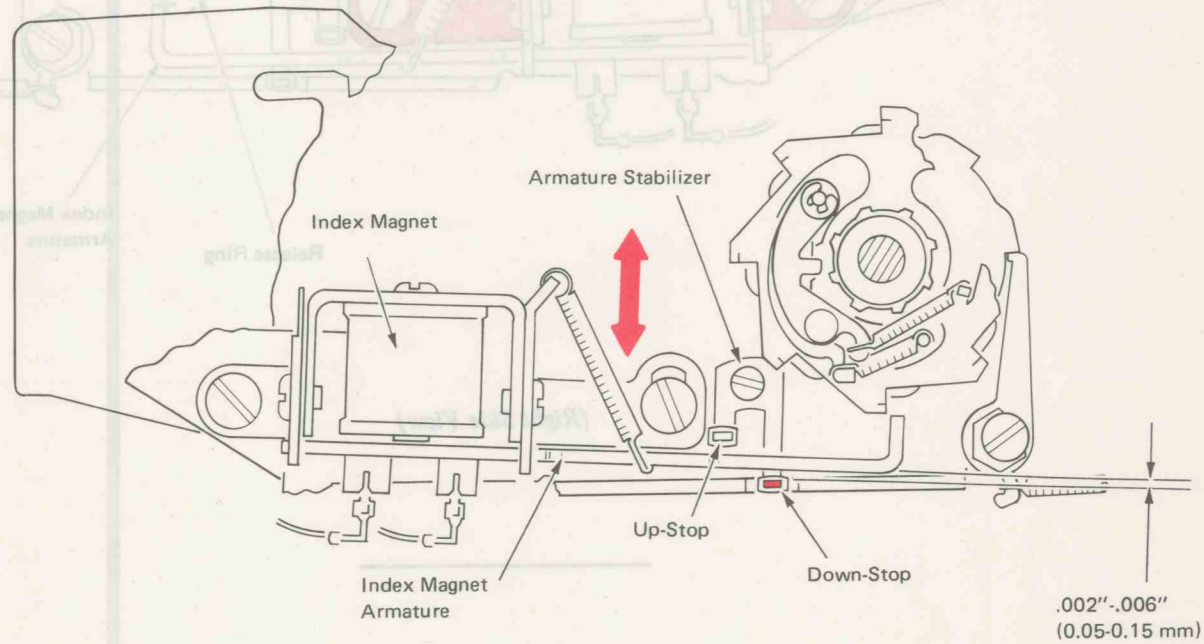
3. *Armature Stabilizer* – Adjust the armature stabilizer as follows:

a. With the index magnet at rest, form the index magnet armature stabilizer arm up or down for .002"-.010" (0.05-0.25 mm) between the up-stop of the index magnet stabilizer arm and the index magnet armature.



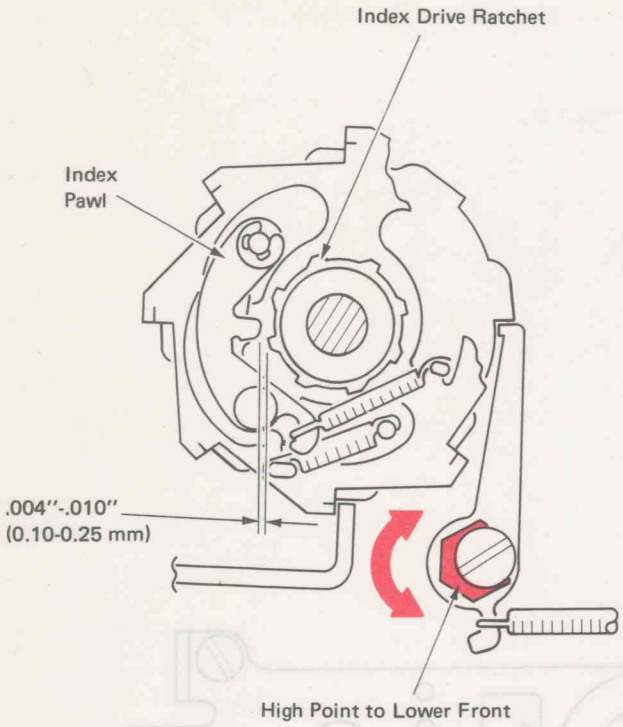
(Right Side View)

b. With the index magnet energized, form the index magnet armature stabilizer up or down for .002"-.006" (0.05-0.15 mm) between the down-stop of the index magnet stabilizer arm and the index magnet armature.



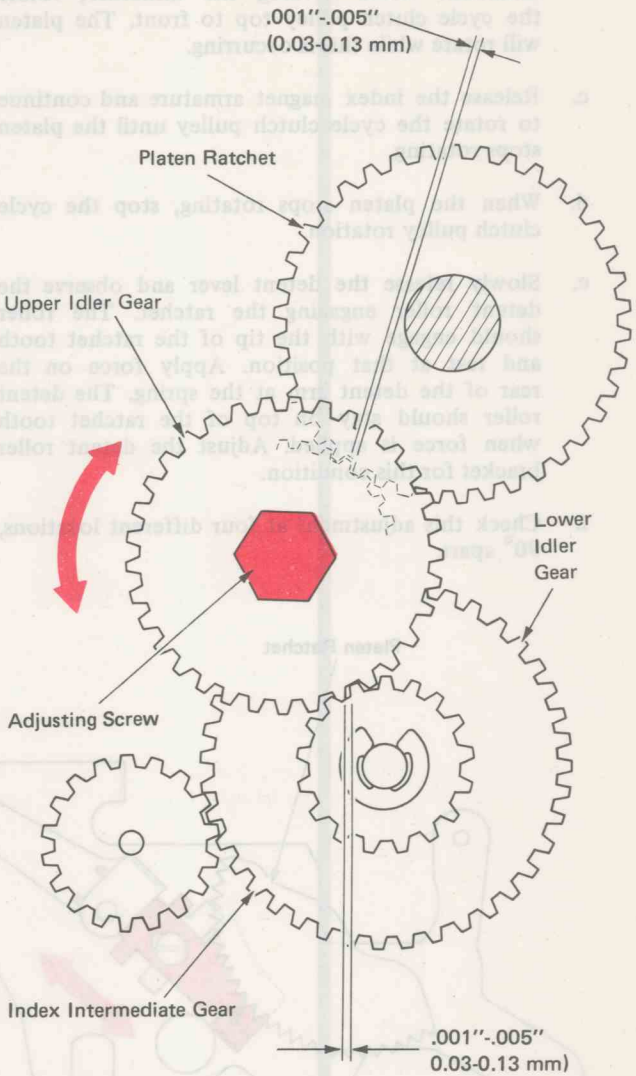
(Right Side View)

4. *Check Pawl* – Adjust the eccentric so the index pawls have .004"-.010" (0.10-0.25 mm) clearance from the index drive ratchet. Keep the high point of the eccentric toward the front lower part of the adjustment. Turn the eccentric counterclockwise until the pawls buzz, then turn clockwise until the pawls just stop buzzing.



(Right Side View)

5. *Index Gear Mesh* – Adjust the upper idler gear for .001"-.005" (0.03-0.13 mm) backlash with the platen gear and the lower idler gear.



(Right Side View)

6. *Detent Roller* – Adjust the detent roller as follows:

a. With the feedrolls against the platen, release the detent roller.

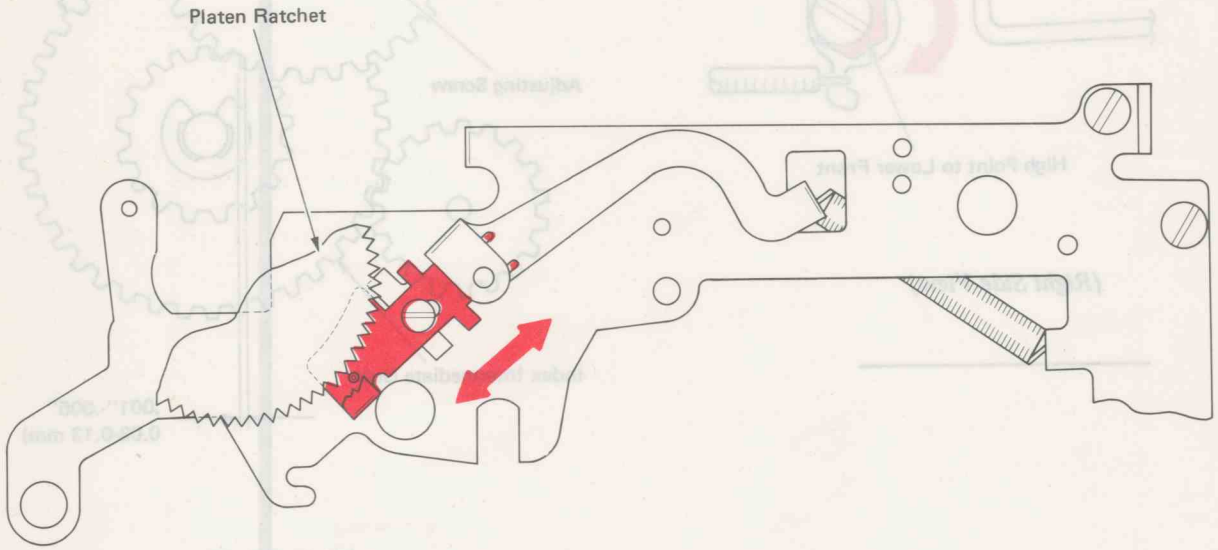
b. Manually release and hold the index magnet armature. While holding the armature, rotate the cycle clutch pulley top to front. The platen will rotate while this is occurring.

c. Release the index magnet armature and continue to rotate the cycle clutch pulley until the platen stops rotating.

d. When the platen stops rotating, stop the cycle clutch pulley rotation.

e. Slowly release the detent lever and observe the detent roller engaging the ratchet. The roller should engage with the tip of the ratchet tooth and rest at that position. Apply force on the rear of the detent arm at the spring. The detent roller should stay on top of the ratchet tooth when force is applied. Adjust the detent roller bracket for this condition.

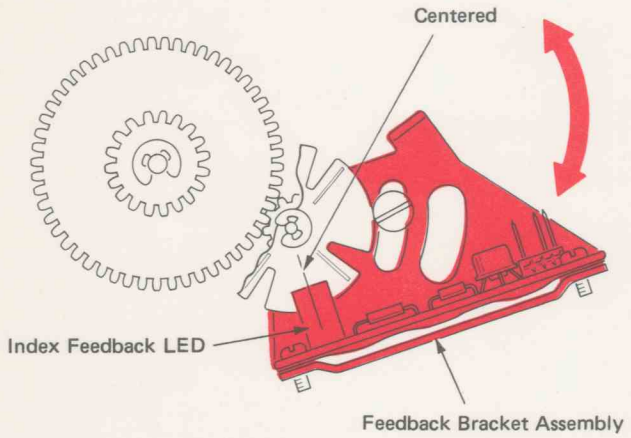
f. Check this adjustment at four different locations, 90° apart.



(Right Side View)

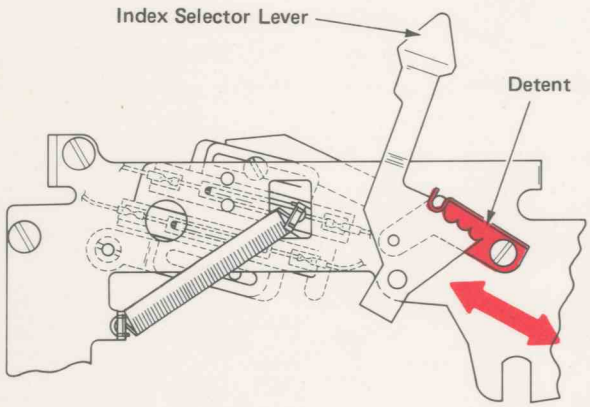
7. *Index Feedback LED* – Adjust the index feedback LED radially until the LED is centered between two openings.

NOTE: If this adjustment cannot be made, remove the feedback wheel; rotate the wheel one tooth and slide the wheel back onto the shaft.

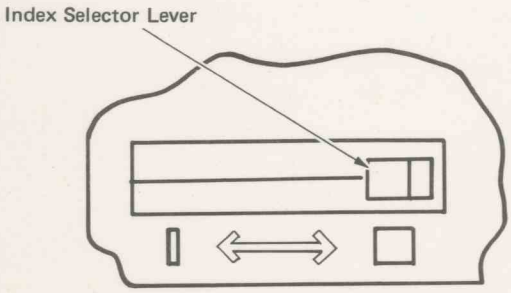


(Right Side View)

8. *Index Selector Lever* – With the index selector lever in the rear position, adjust the detent on the index selector lever front to rear to line up with the rear detent position on the top cover.



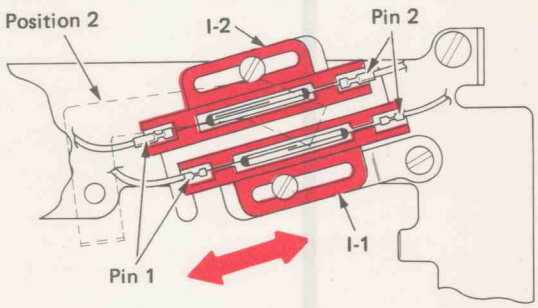
(Right Side View)



(Top View)

9. *Index Reed Switches* – Adjust reed switch 1 and reed switch 2 in line space position 2 so both reed switches are 0 V. Check all other line space positions for correct voltage.

Line Space Position	Bottom I-1 Condition	Top I-2 Condition
1	Open, +5 V	Open, +5 V
1½	Open, +5 V	Closed, 0 V
2	Closed, 0 V	Closed, 0 V
3	Closed, 0 V	Open, +5 V

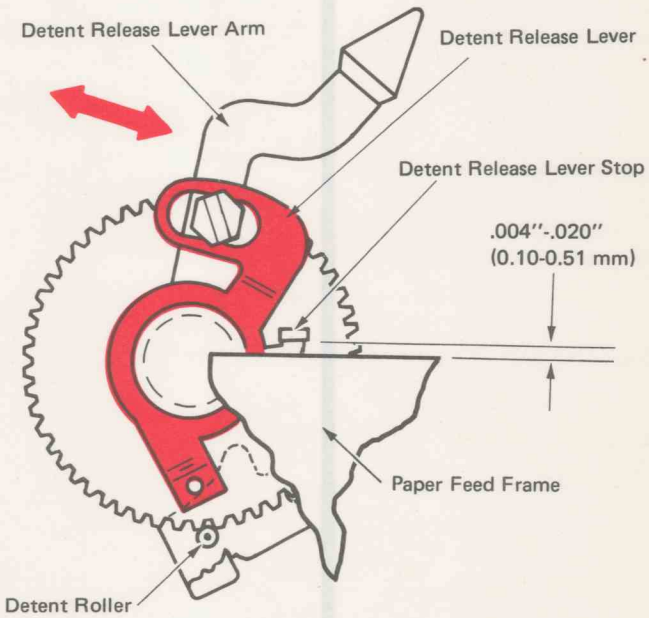


(Right Side View)

10. *Platen Detent Release Lever* – Adjust the platen detent release lever as follows:

a. With the detent roller fully engaged in the platen ratchet, bias the detent release lever to the front.

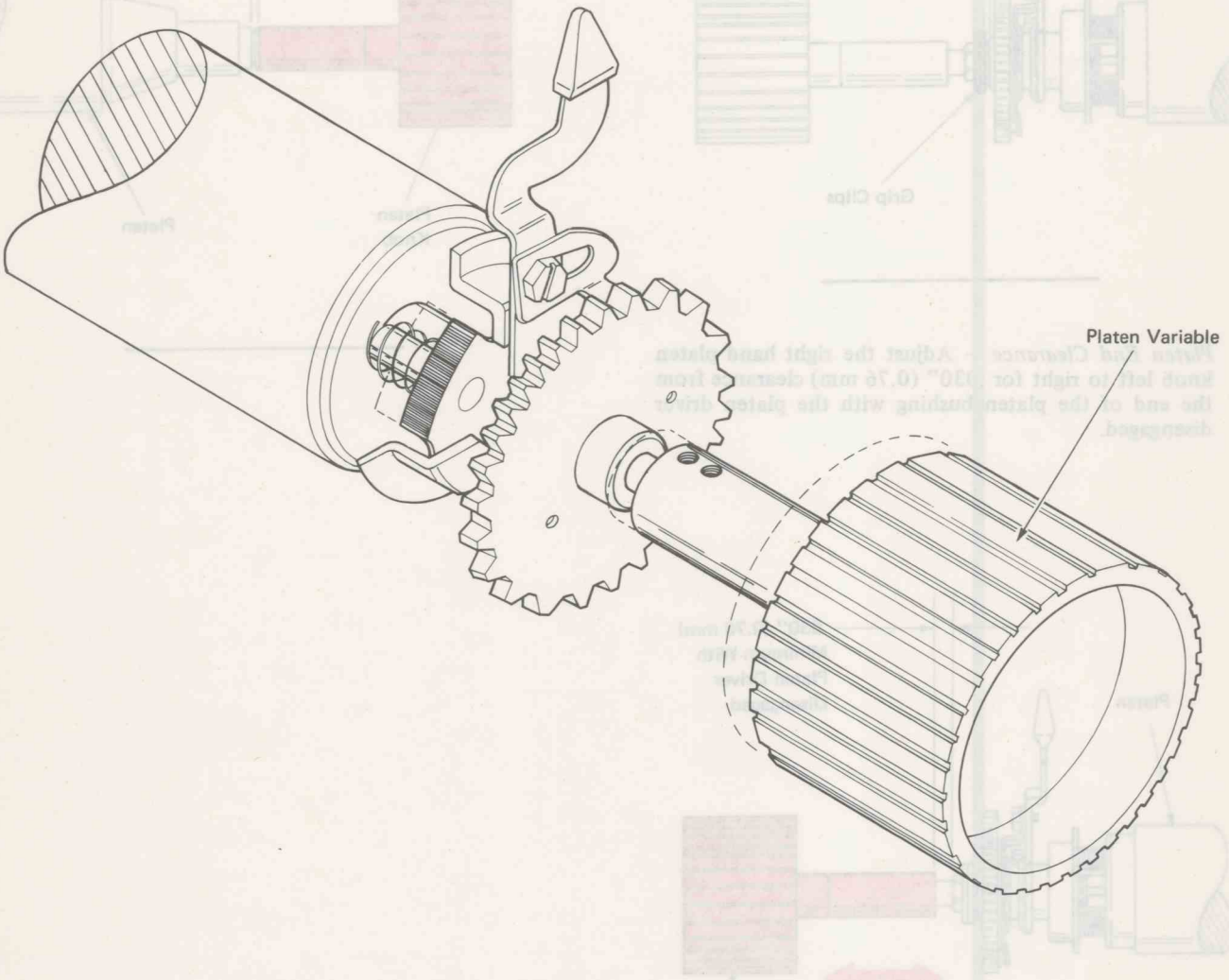
b. Adjust the detent release lever arm so the detent release lever stop clears the paper feed frame by .004"-.020" (0,10-0.51 mm).



(Right Side View)

PAPER FEED OPERATIONAL THEORY

The paper feed mechanism differs from the Models 50/60/75 typewriters only in that the platen variable is located on the right end of the platen (Figure 1).

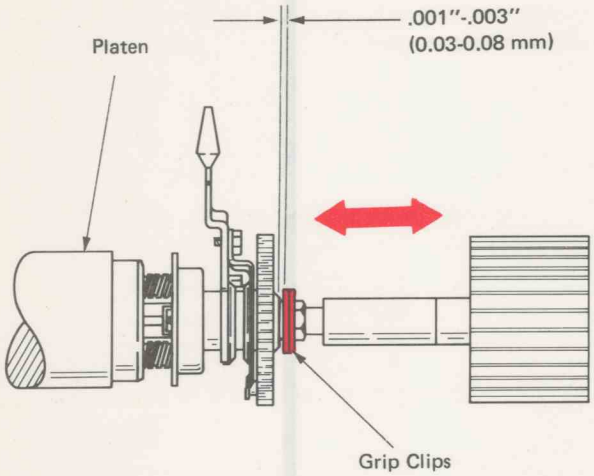


(Right Side View)

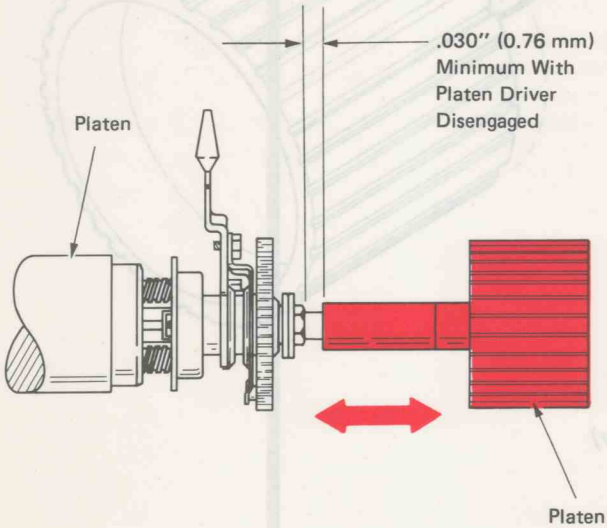
Figure 1 – Platen Variable

PAPER FEED ADJUSTMENTS

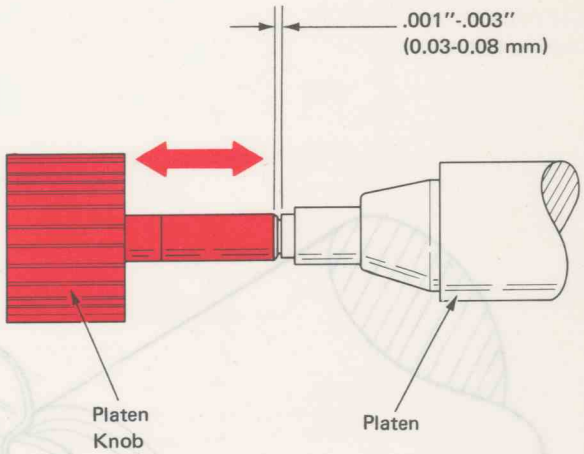
1. *Ratchet End Clearance* – Adjust the grip clips left to right for .001"-.003" (0.03-0.08 mm) from the ratchet.



2. *Platen End Clearance* – Adjust the right hand platen knob left to right for .030" (0.76 mm) clearance from the end of the platen bushing with the platen driver disengaged.



3. *Left Platen Knob* – Position the platen knob left or right for .001"-.003" (0.03-0.08 mm) clearance between the bushing and the platen knob.



LIGHTED CARRIER POSITION INDICATOR OPERATIONAL THEORY

A lighted carrier position indicator is mounted to the carrier. The lighted carrier position indicator is wired into the carrier connector. The logic in the processor/driver board switches the lighted carrier position indicator from 10 to 12 pitch to match the position of the pitch selection lever (Figure 1).

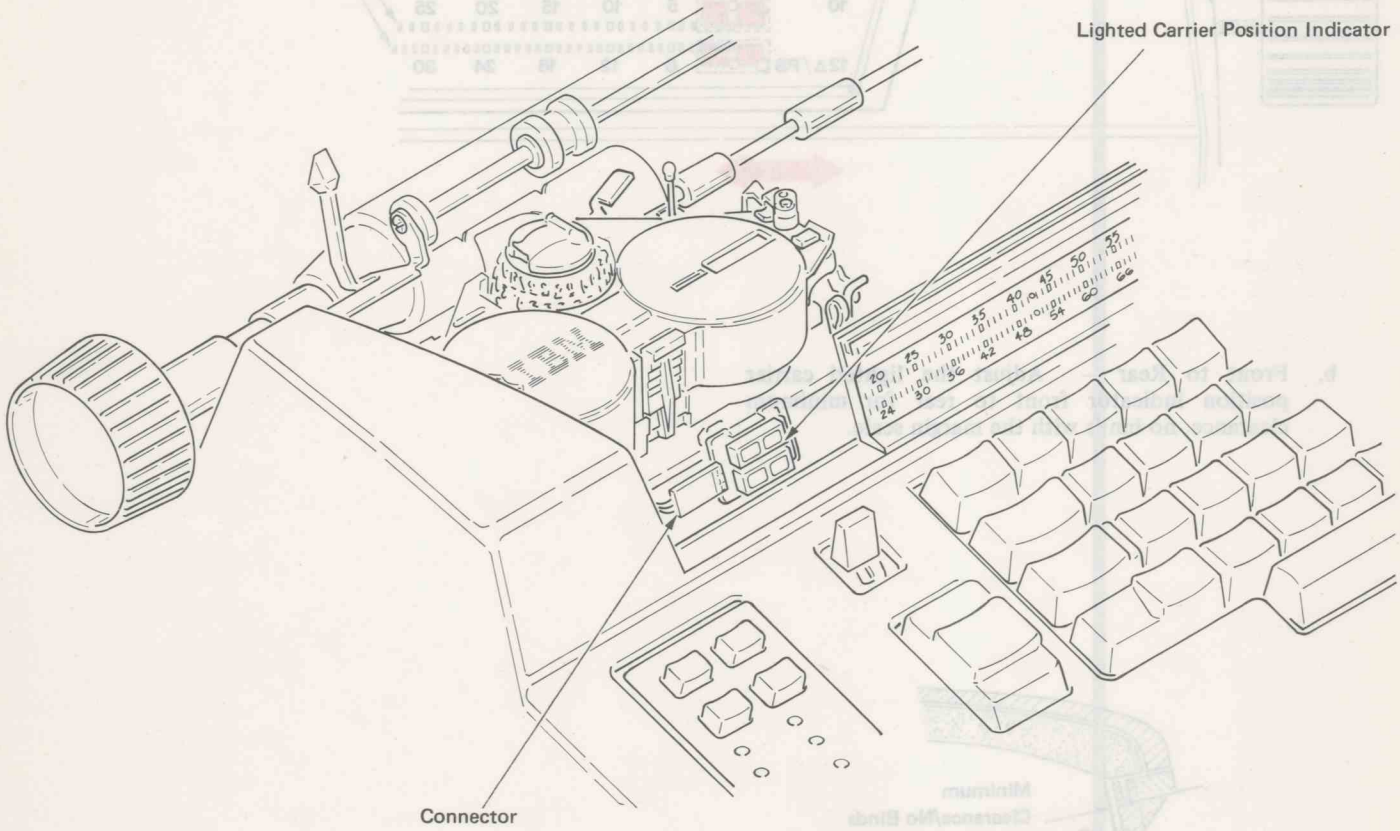
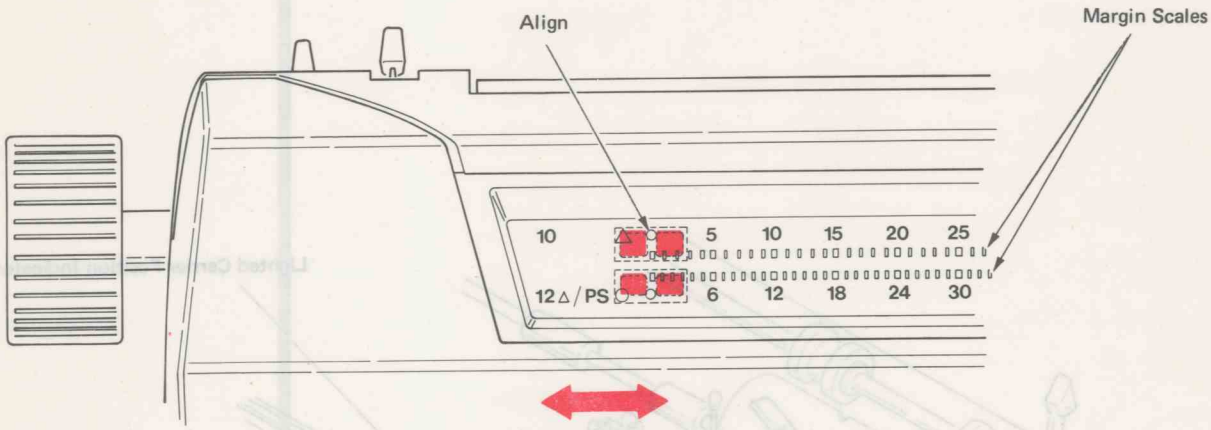


Figure 1– Lighted Carrier Position Indicator

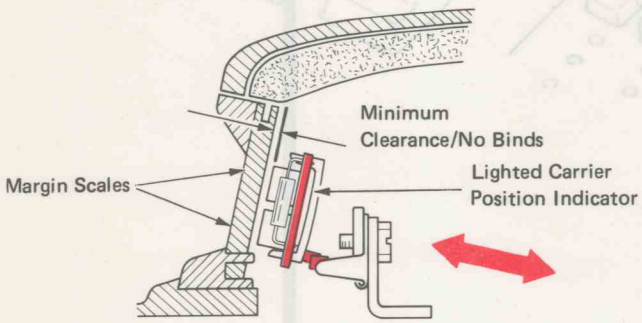
LIGHTED CARRIER POSITION INDICATOR ADJUSTMENT

1. *Lighted Carrier Position Indicator –*

   a. Left and Right – Move the lighted carrier position indicator left or right until the center of the lighted carrier position indicator aligns with the zero on the 10 and 12 pitch margin scales, with the lighted carrier position indicator at the zero position on the writing line.



   b. Front to Rear – Adjust the lighted carrier position indicator front to rear for minimum clearance, no binds with the margin scale.



(Right Side View)

COVERS OPERATIONAL THEORY

The covers protect the operator from possible injury from the mechanisms inside the machine. In addition, the covers protect the machine from damage from impact or contamination.

The IBM 85 has three covers: the top cover, the bottom cover and the center cover (Figure 1).

TOP COVER

The top cover is attached to the center cover by a pair of hinges. The top cover may be opened and closed by the operator to gain access to the ribbon and type element.

CENTER COVER

The center cover is attached to the bottom cover by the two bottom cover latches. Two arms in the center cover latch the center cover to the bottom cover. The cover is removable for service.

BOTTOM COVER

The bottom cover supports the typewriter and the center cover. The bottom cover is insulated to reduce noise. There are two cutouts in the bottom cover for lifting the IBM 85.

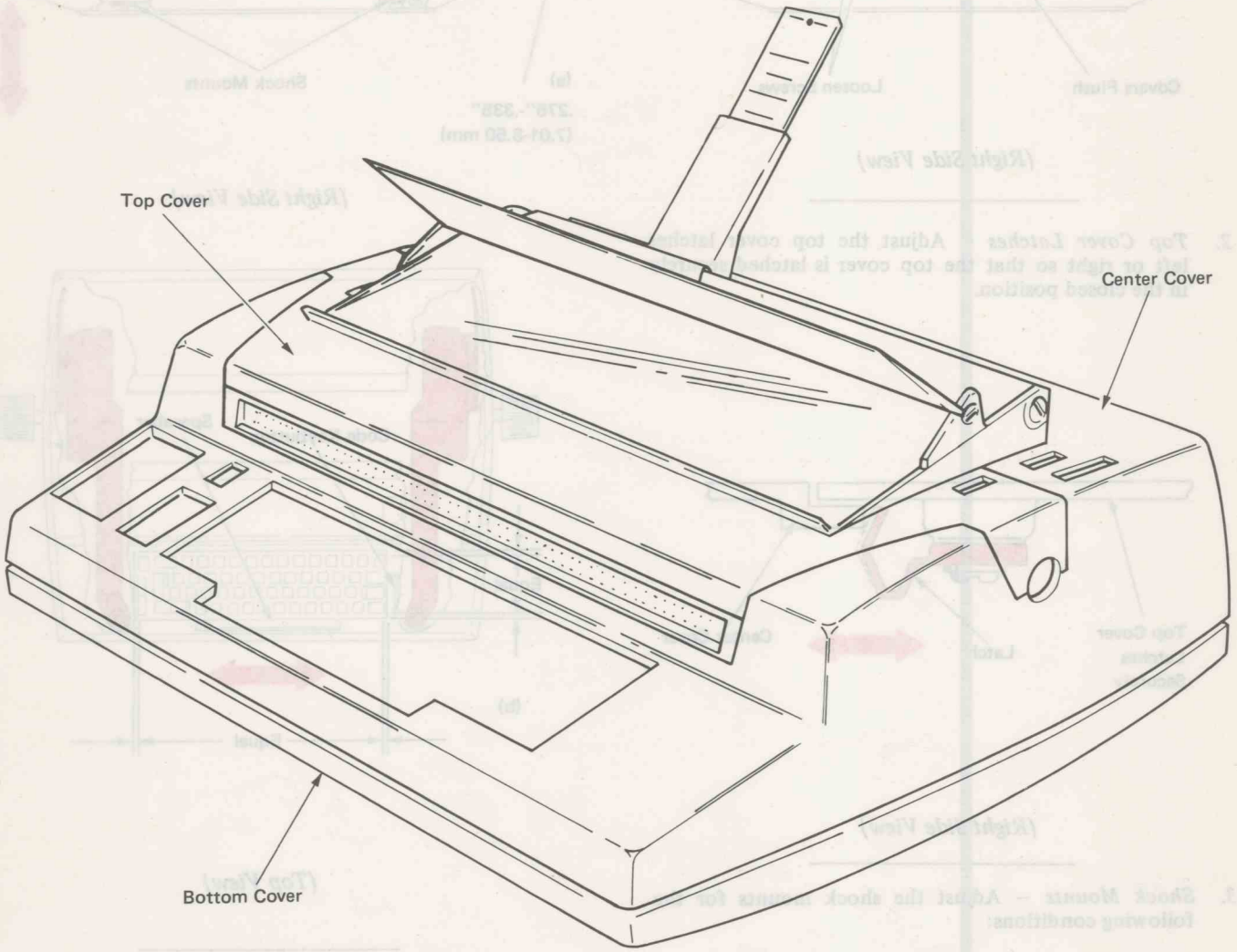
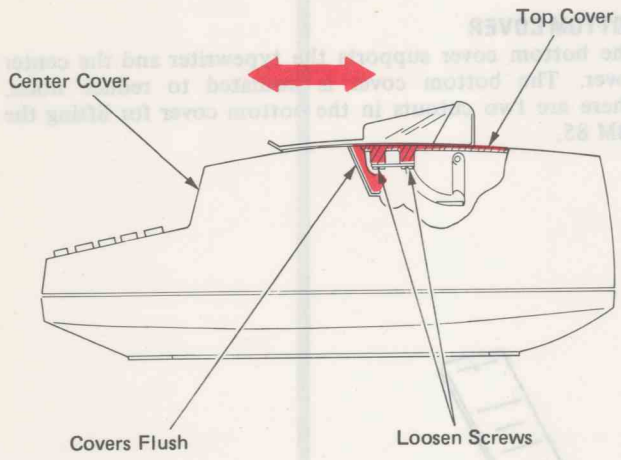


Figure 1 – Covers

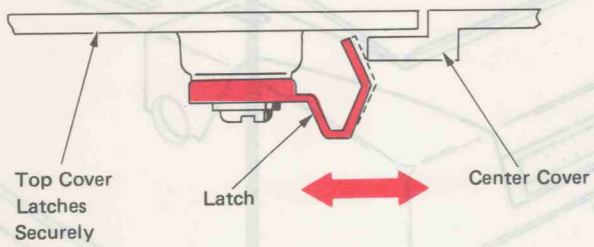
COVERS ADJUSTMENTS

1. *Top Cover Hinges* – Adjust the top cover front to rear on the hinges to fit flush with the center cover.



(Right Side View)

2. *Top Cover Latches* – Adjust the top cover latches left or right so that the top cover is latched securely in the closed position.



(Right Side View)

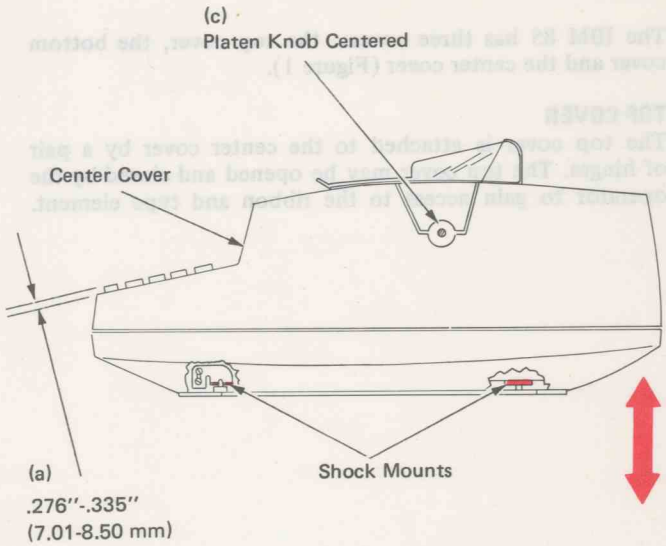
3. *Shock Mounts* – Adjust the shock mounts for the following conditions:

   a. The spacebar should be .276"-.335" (7.01-8.50 mm) above the surface of the cover.

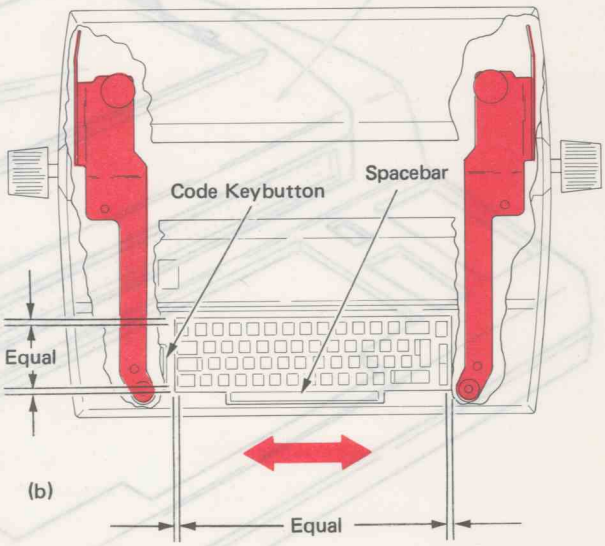
   b. All openings for keybuttons should have equal front to rear and left to right clearance.

   NOTE: The Code keybutton position may be adjusted separately.

   c. The platen knobs should be centered top to bottom in the cover openings.

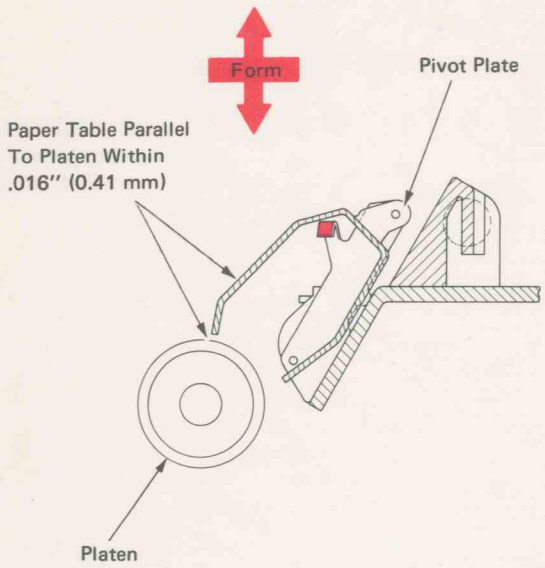


(Right Side View)



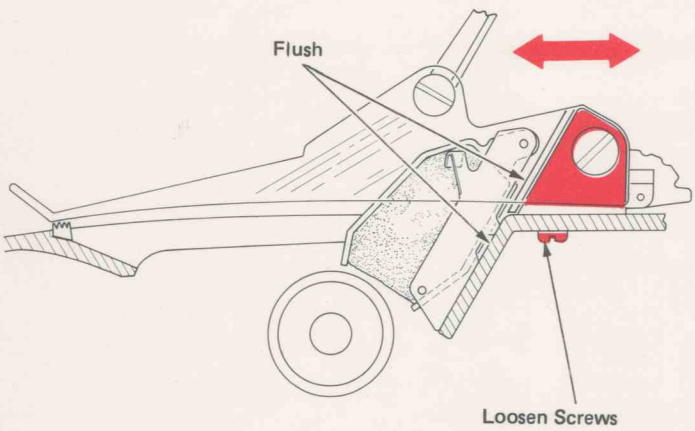
(Top View)

4. *Paper Table* – Adjust the pivot plates so that the front edge of the paper table is parallel with the platen within .016" (0.41 mm).



(Right Side View)

5. *Acoustical Filter Hood* – Adjust the hood so that the front edge of the hood support is flush with the front of the center cover. Loosen the mounting screws to make this adjustment.



(Right Side View)

MEMORY PROTECTION OPERATIONAL THEORY

The Memory Protection Feature (MP) for the IBM 85 protects information stored in memory if power fails or if the machine is accidentally unplugged.

The Memory Protection Feature consists of rechargeable nickel cadmium batteries, an electronic card, mounting brackets, a cable, a switch, and the memory protection indicator (Figure 1). There are two packs of batteries with six batteries in each pack.

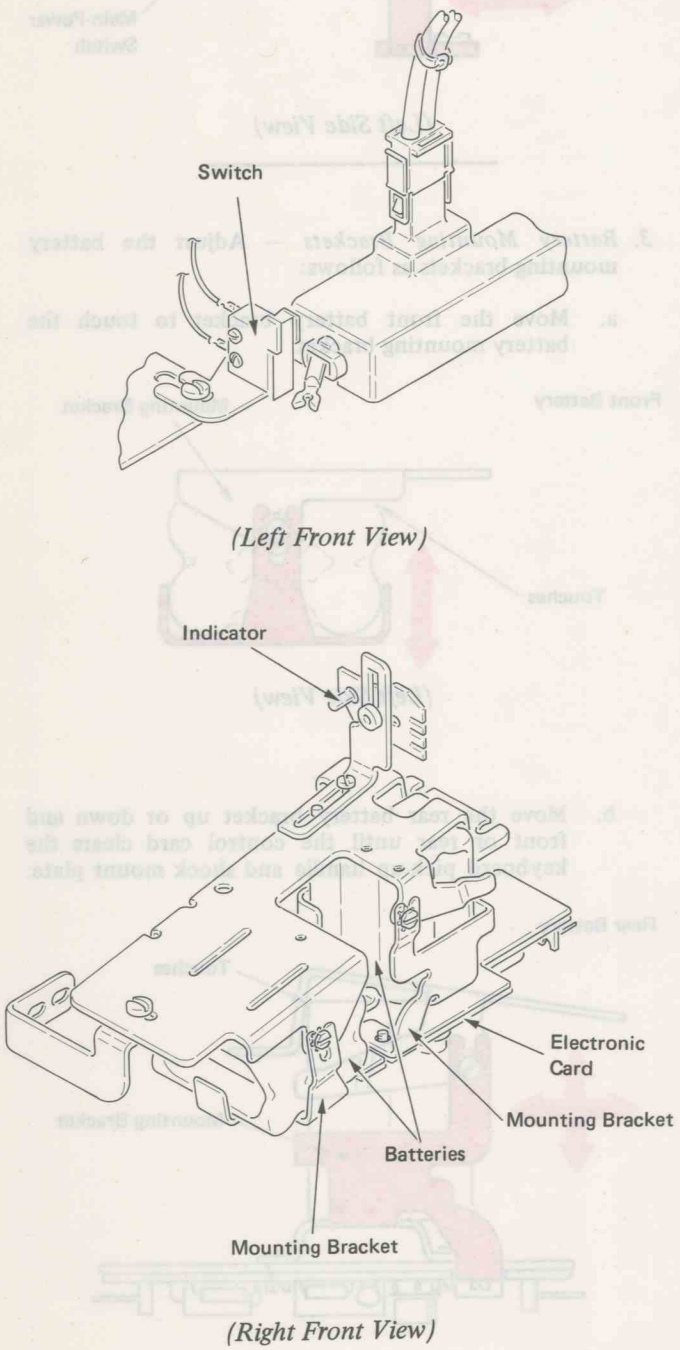


Figure 1 – Memory Protection Mechanism

MEMORY PROTECTION SWITCH

Turning the main power switch on and off also turns the memory protection switch on and off. The memory protection switch indicates to the control card whether the main power is on or off. The memory protection switch closes and memory is cleared when the main power is turned off.

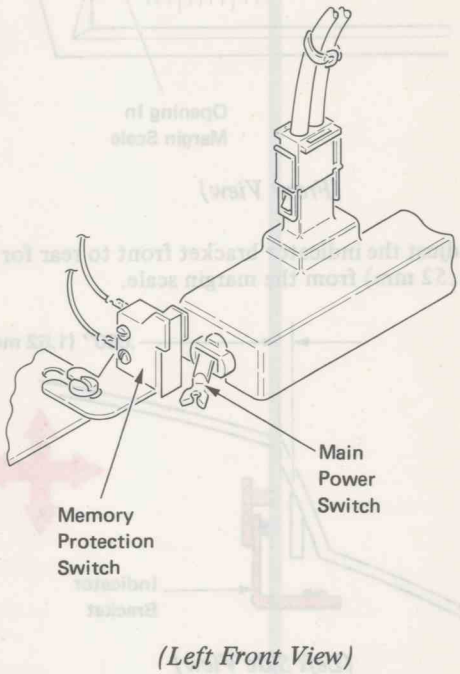


Figure 2 – Memory Protection Switch

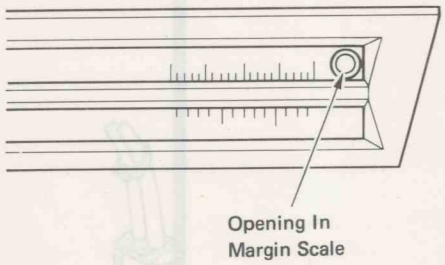
MEMORY PROTECTION OPERATION

When the main power voltage drops below approximately 90 VAC or the line cord is unplugged, the MP control card places the typewriter in the protect mode. During the protect mode, the batteries supply the necessary voltages to the power supply to protect the memory. The MP indicator light comes on and stays on to inform the operator that the typewriter is in the protect mode. While in the protection mode, the typewriter cannot be operated. When power is restored, the machine performs a POR and the carrier moves to its last position. If the power stays off for a longer time than the batteries' capability, the MP indicator turns off when memory protection ceases. When the power is restored, the MP control card recharges the batteries.

MEMORY PROTECTION ADJUSTMENTS

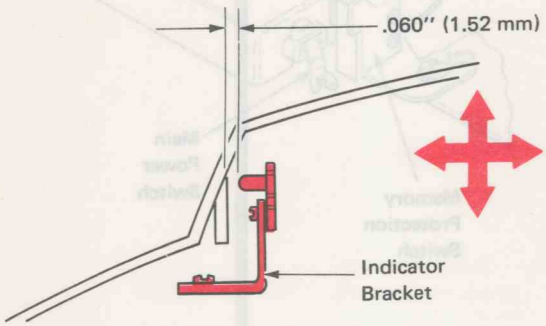
1. *Memory Protection Indicator* – Adjust the indicator bracket as follows:

   a. Adjust the indicator bracket to show the indicator in the lower right part of the opening in the margin scale.



(Front View)

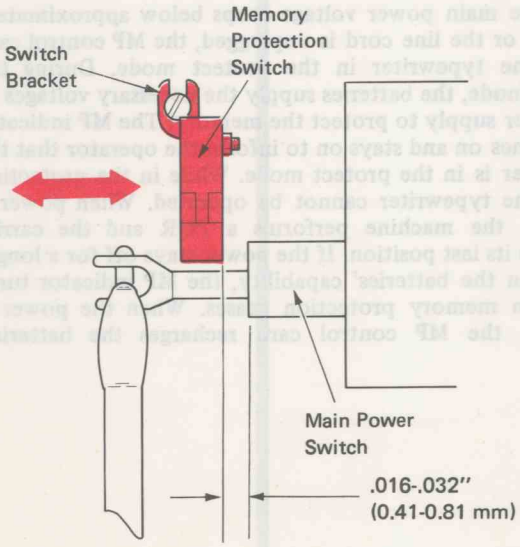
   b. Adjust the indicator bracket front to rear for .060" (1.52 mm) from the margin scale.



(Left Side View)

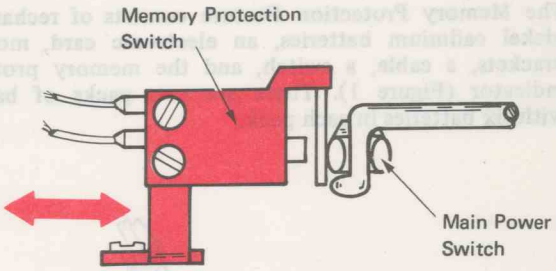
2. *Memory Protection Switch* – Adjust the switch bracket for the following conditions:

   a. Left to right for a clearance of .016"-.032" (0.41-0.81 mm) between the memory protection switch and the main power switch.



(Top View)

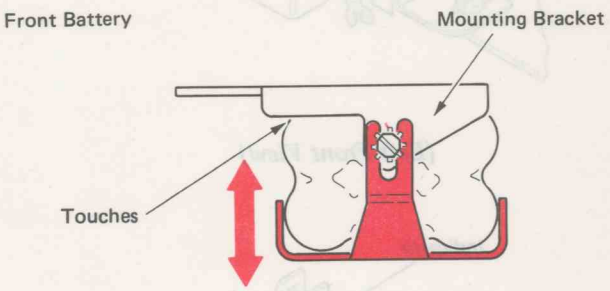
   b. Front to rear to make the switch operate reliably with the main power switch in both the on and off positions.



(Left Side View)

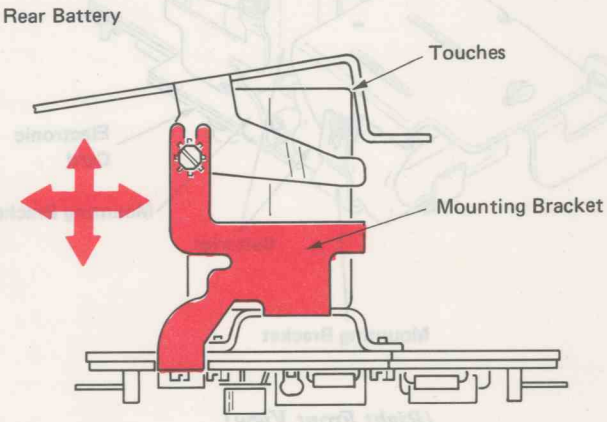
3. *Battery Mounting Brackets* – Adjust the battery mounting brackets as follows:

   a. Move the front battery bracket to touch the battery mounting bracket.



(Left Side View)

   b. Move the rear battery bracket up or down and front or rear until the control card clears the keyboard pick-up handle and shock mount plate.



(Left Side View)

The electronic boards in the IBM 85 are electrically connected to each other and each board has a particular function. The function of each is as follows.

KEYBOARD CONTROL BOARD

The keyboard control board sequentially sends out drive signals to the keyboard and monitors the sense line signals from the keyboard. The keyboard control board also converts the combination of drive line and sense line signals required for a particular character, into bail code signals. The bail code signals are then sent to the processor/driver boards. The keyboard control board also monitors the code and delete signals.

MESSAGE CONTROL PANEL

The message control panel is connected directly to the processor/driver boards.

PROCESSOR/DRIVER

The processor responds to all input signals and tells the driver board what component requires a ground signal. The processor board uses +5 VDC for logic signals while the driver board uses +13 VDC signals to control the carrier magnets and solenoids and the bell magnet. The processor/driver also monitors the pitch switches. The processor/driver requires pitch information to determine the length of required escapement operations. The processor/driver determines the direction and speed the escapement motor will turn.

The processor/driver board tells the escapement control board when to activate and deactivate the print shaft cycle clutch magnet and the escapement magnet.

The processor uses the keyboard bail signals to determine which carrier magnets and solenoids should be energized. The processor/driver controls character selection by energizing carrier magnets and solenoids as on the 50/60/75. Is uses the print feedback signal to control the timing of character selection.

ESCAPEMENT CONTROL BOARD

The escapement control board receives command signals (+5 VDC) from the processor/driver boards. The drive circuit on the escapement control board then controls the voltage to the escapement motor. The escapement motor controls the speed and the direction of the leadscrew.

The escapement control board also controls the print shaft cycle clutch magnet and the index magnet.

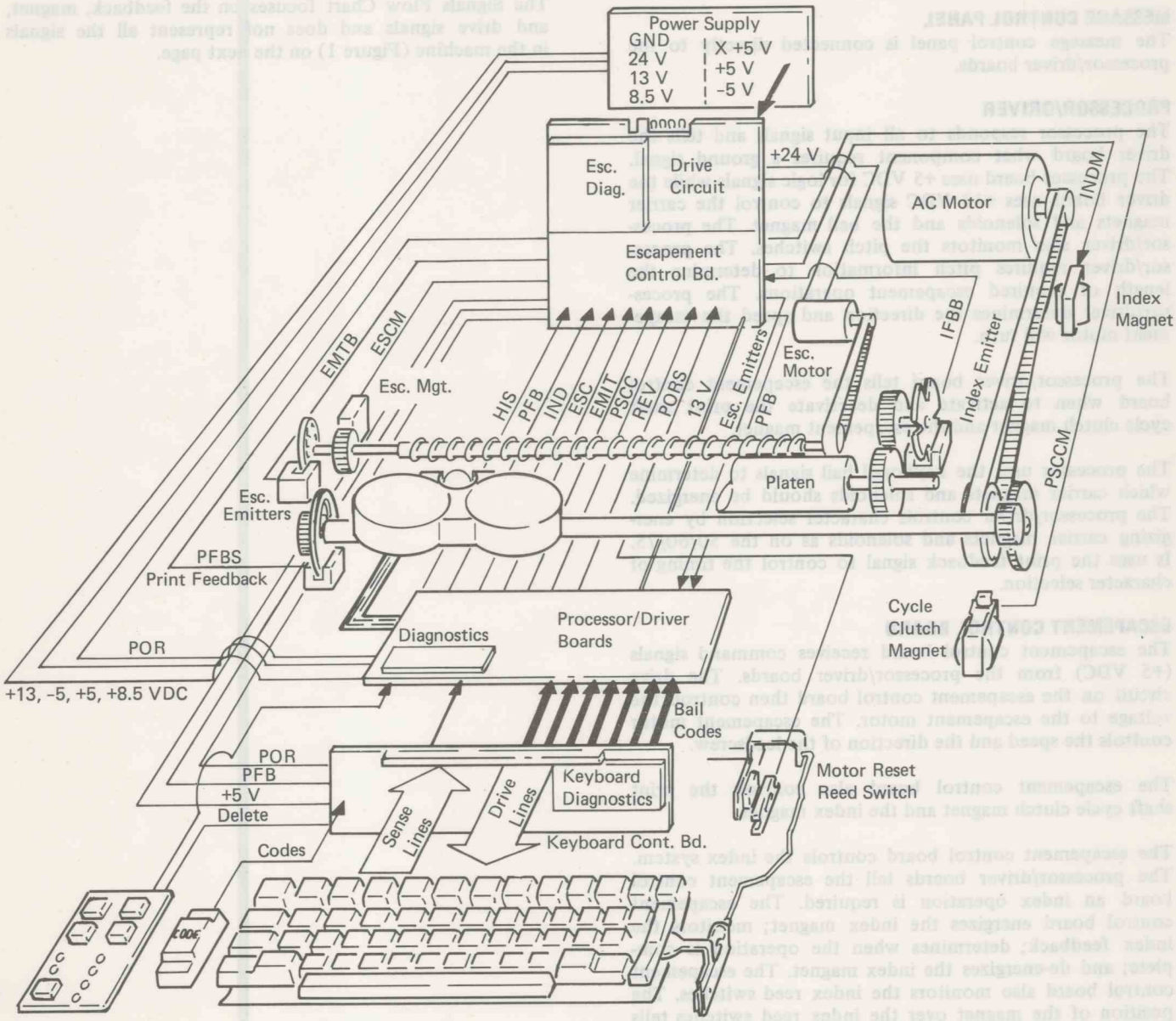
The escapement control board controls the index system. The processor/driver boards tell the escapement control board an index operation is required. The escapement control board energizes the index magnet; monitors the index feedback; determines when the operation is complete; and de-energizes the index magnet. The escapement control board also monitors the index reed switches. The position of the magnet over the index reed switches tells the escapement control board the number of lines to be indexed.

POWER SUPPLY BOARD

The power supply board provides all the regulated voltages required to run the machine. The outputs of the power supply are broken into two groups, Group 1 and Group 2. Group 1 voltages are +5 VDC, –5 VDC, +8.5 VDC, and +13 VDC. These voltages provide the power to the processor board to maintain memory and also provide power to the magnets and solenoids. Group 2 voltages are X + 5 VDC and +24 VDC. Their voltages power the escapement control board, keyboard and all the feedback emitter boards.

SIGNALS FLOW CHART

The Signals Flow Chart focuses on the feedback, magnet, and drive signals and does not represent all the signals in the machine (Figure 1) on the next page.



Signals Flow Chart

REMOVALS

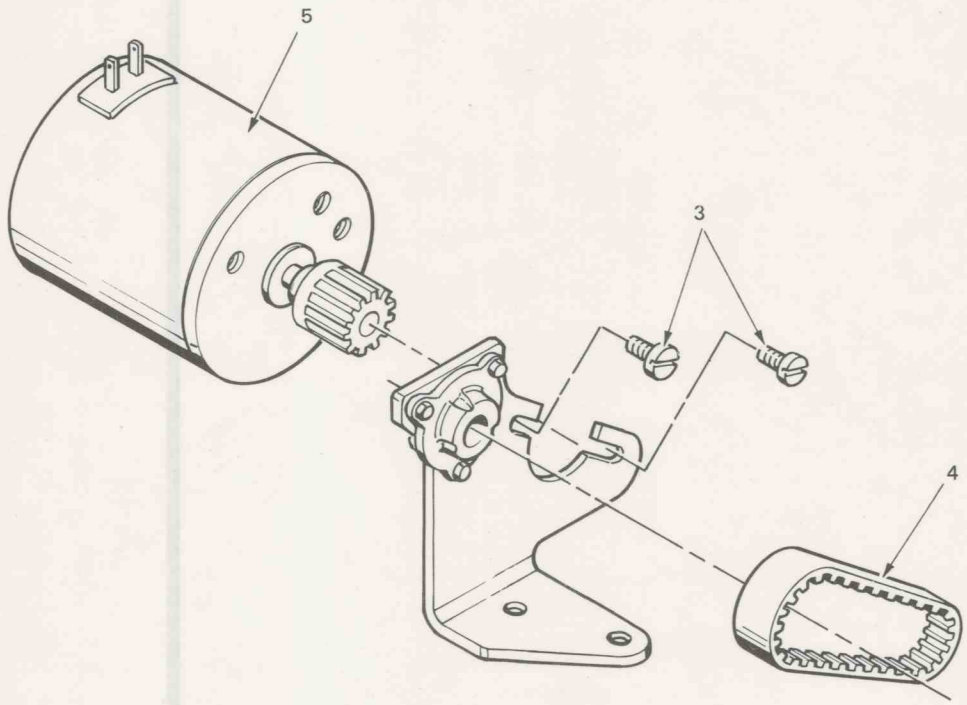
This section contains removal procedures for main parts and assemblies. The drawings in the parts manual should be used when more removal or assembly information is needed.

Parts in the drawings shown with the removal procedure are numbered with reference to the removal sequence. Some removals refer to certain steps of a previous removal procedure to prevent repeating information.

The procedures in this section are suggested methods of removal or replacement and are given as an aid in servicing the IBM 85. Some persons may find another method better for them.

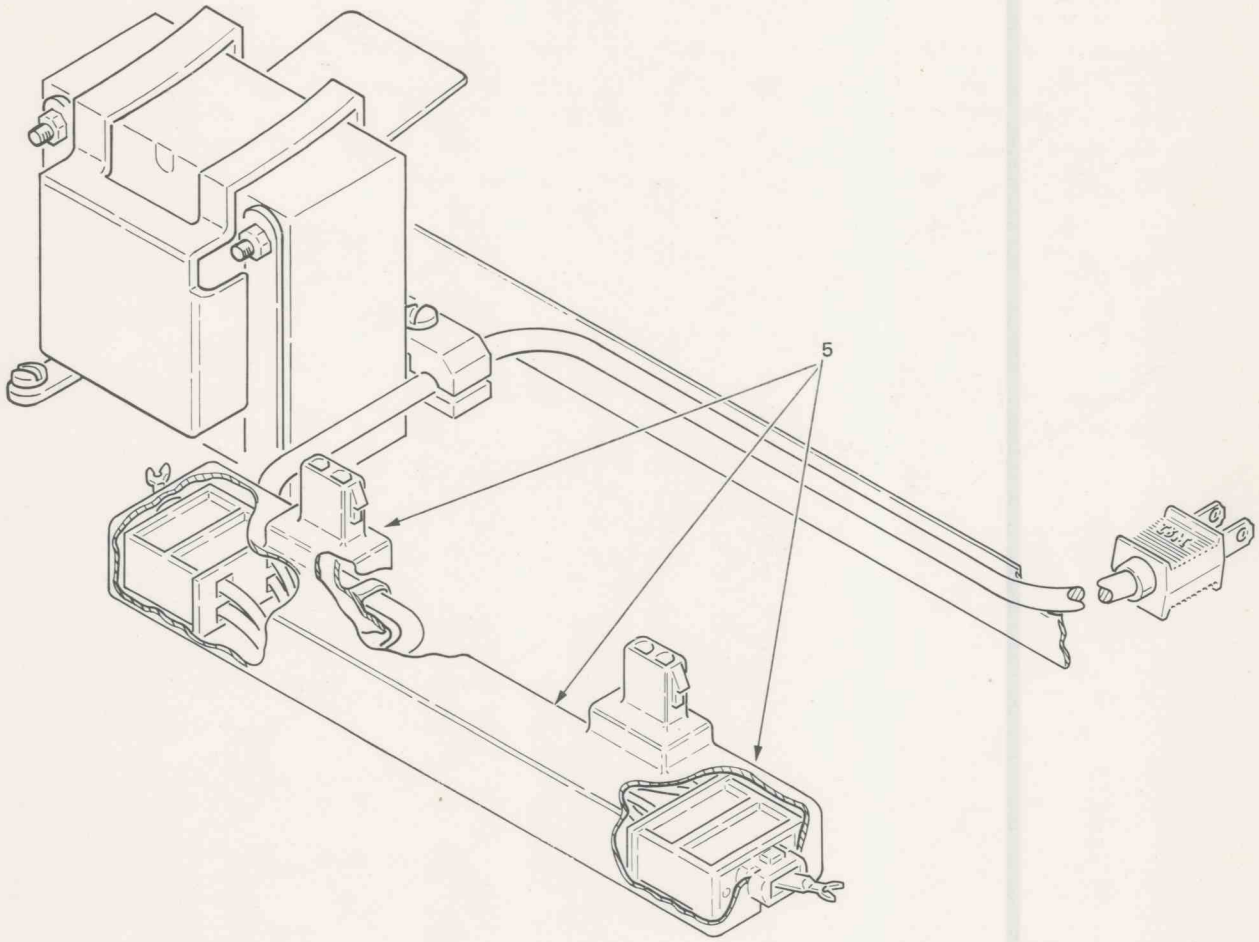
ESCAPEMENT MOTOR

1. Turn off the main power switch.
2. Remove the right side paper feed support bracket on long carriage machines.
3. Remove the two outside screws from the power supply and escapement control boards and pivot both boards.
4. Loosen and remove the escapement motor mounting screws.
5. Remove the leadscrew drive belt.
6. Remove the escapement motor.



PRIMARY POWER BOX, LINE CORD

1. Unplug the line cord from the outlet.
2. Remove the power supply and escapement control boards.
3. Remove the left side paper support bracket (shield).
4. Unplug the motor and transformer from the primary box connector.
5. Loosen and remove the primary power box screws.
6. Loosen and remove line cord strain relief screw.
7. Remove the bottom of the primary box and line cord.
8. When reinstalling the primary power box, the line cord routing must be as shown below.



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Service Manual Supplement
Order No. SR-28-0045-0

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