IBM

Typebar Typewriter

Service Manual

Model C

Model D

INTRODUCTION

This manual describes the operational theory and a sequence of adjustments to help in servicing the Model C1, D1 (Standard), the C4, D4 ("Executive") Typewriters, Special Machines and all special attachments. Each model will be indicated by a character/number as follows:

C1 – Model C Standard Typewriter
D1 – Model D Standard Typewriter
C4 – Model C "Executive" Typewriter
D4 – Model D "Executive" Typewriter

It is suggested that the Adjustment/Parts Manual (FN 241-5231) be used with this manual.

Since each typewriter has mechanisms that have been redesigned several times, important changes of that mechanism are referred to as design levels. These levels of changes are indicated by number in the order in which they occurred. Level 1 is the original mechanism design; the changes begin with Level 2.

The Machine Introduction section of this manual includes the functions and applications of the machines and their features.

The Functional Check section is shown in a sequence so that important functions of the machine are checked for proper operation. However, this check does not necessarily follow the sequence of operational theory and adjustments within the manual. The functional check should be used to help locate problems on the machine.

The theory of operation of the machine mechanisms is separated into sections. Operational theory illustrations show the machine at rest unless noted. Red directional arrows on the operational theory illustrations indicate the movement of parts from rest to their operated position. Adjustments for each section follow the theory of operation. In the adjustments part of the sections, each adjustment is in the sequence that the adjustments are to be made. When an adjustment is made, all adjustments that follow in that mechanism must be checked to ensure that the adjustment did not affect an adjustment later in the sequence. The part to be adjusted and the direction it must be adjusted are printed in red. When required, the view 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.

The Removal Procedures section is a numbered sequence of instructions for parts removal. The part can be assembled by reversing the removal steps. If a detailed drawing of an assembly is required, the APM should be used.

All drawings are front right views unless noted, or are easily understood by the reader.

When servicing the typewriter, all safety procedures should be followed. When a function is operated by hand, the power should be disconnected.

SAFETY PRECAUTIONS

All IBM Customer Engineers 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, ground wires, etc., 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, etc., 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 left 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, machine frame, etc.*
5. *Meter continuity checks should be used instead of voltage checks whenever possible.*

General Safety:

1. *Each Customer Engineer is responsible to be certain that no action on his/her part makes the product unsafe or exposes hazards to customer personnel.*
2. *Store 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 power before leaving the customer's office.*
4. *Always place CE tool kit away from walk areas where no one can trip over it.*
5. *Maintain safe conditions in area of machine while performing and after completing maintenance.*
6. *Before starting equipment, make sure fellow CEs and customer personnel are not in a hazardous position.*
7. *All machine covers must be in place before machine is returned to customer.*

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

MODEL C&D TYPEWRITER
SERVICE MANUAL CONTENTS
(ALPHABETICAL)

MACHINE INTRODUCTION

The IBM Model D Typewriter is available in Standard and "Executive" models with either carbon or fabric ribbon. An impression control lever allows the operator to change the impression for the application. A dual impression mechanism is used to give even impression result between upper and lower case characters. A touch control is provided on some Model D typewriters to allow the operator to adjust the touch of the keyboard. The underscore, x, period, backspace, spacebar, and carriage return are typamatic keys.

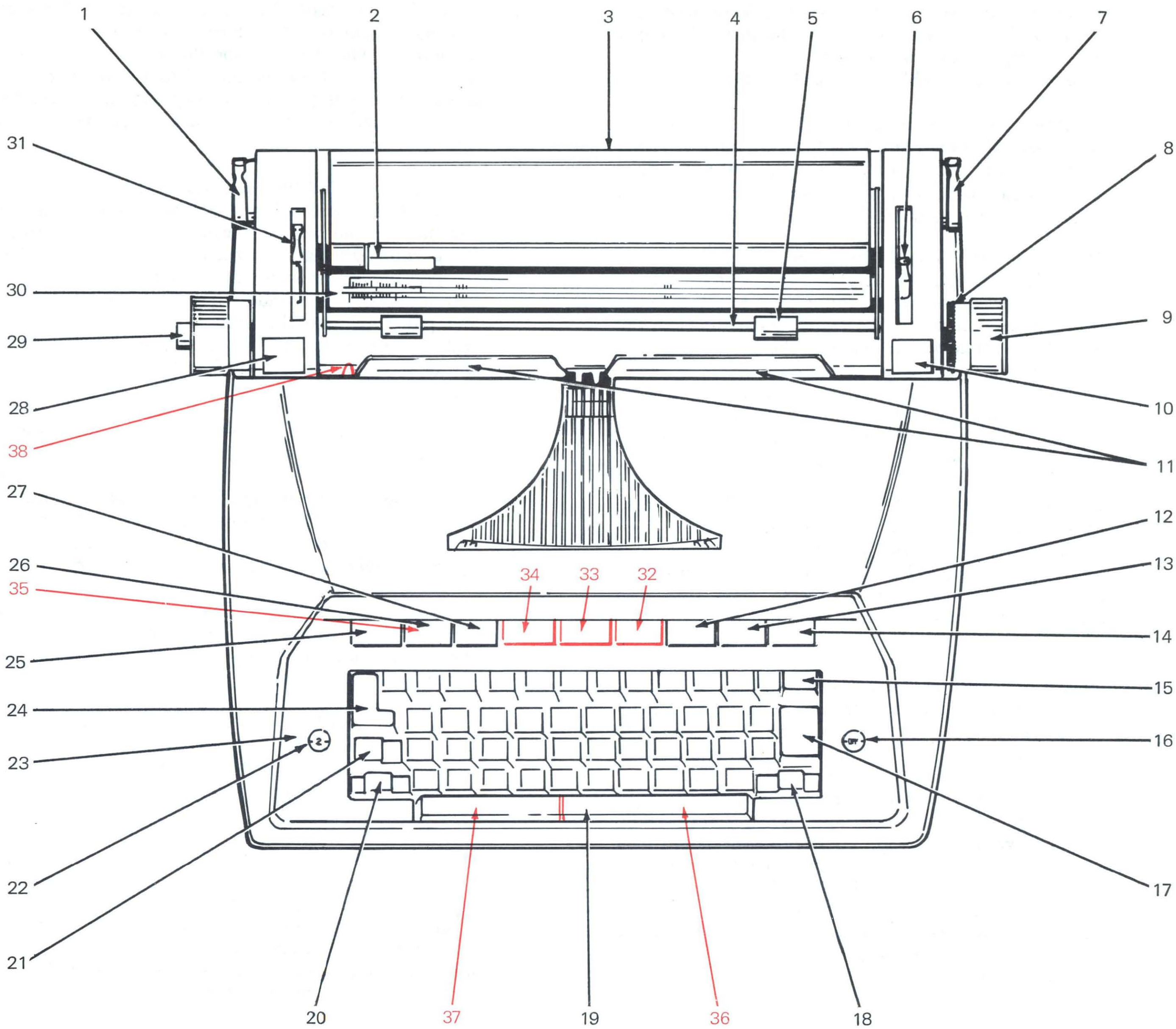
The Model D Standard Typewriter is a single pitch typewriter available in either 6 2/5, 8,9,10,11,12, or 14 pitch. The Model D "Executive" Typewriter is a proportional spacing typewriter available in 1/32, 1/36, or 1/45 pitch.

The applications of the Model D typewriters include all types of correspondence, preparation of master copy for most types of duplication, carbon copies, stencil writing and forms writing. The Model D Typewriter is available with modifications and attachments for almost any application.

The Model C Typewriter is basically the same as the Model D Typewriter. The main difference is that the Model C Typewriter does not have dual impression. The applications are the same for both the Model C and Model D typewriters.

FUNCTIONAL CHECK

This functional check is a procedure that will aid you in determining whether or not an IBM Model C or Model D Typewriter has any malfunctions. It includes checks of every function of the machine, arranged in a useful sequence.



(C4-D4 Functional Differences In Red)

1 – Detent Release Lever
2 – Paper Guide
3 – Rear Paper Table
4 – Paper Bail
5 – Bail Roll
6 – Multiple Copy Lever
7 – Paper Release Lever
8 – Paper-End Indicator
9 – RH Platen Knob
10 – RH Carriage Release Button
11 – Card Holders
12 – Tab Clear Button
13 – Tab Set Button
14 – Margin Reset Button
15 – Backspace Keybutton
16 – On-Off Switch
17 – Carriage Return Keybutton
18 – RH Shift Keybutton
19 – Spacebar
20 – LH Shift Keybutton
21 – Shift Lock Keybutton
22 – Impression Control Lever
23 – Touch Control
24 – Tab Keybutton
25 – Margin Release Button
26 – Half-Space Button
27 – Ribbon Position Button
28 – LH Carriage Release Button
29 – Platen Variable Button
30 – Front Paper Table
31 – Line Space Lever
32 – No-Print Button
33 – Space Expand Button
34 – Expand Button
35 – Repositioning Indicator Button
36 – 2-Unit Spacebar
37 – 3-Unit Spacebar
38 – C4 Repositioning Indicator

LEVERS

A. *Visual Inspection* – Look at the machine carefully for any visibly loose, damaged or missing parts. Also, look for pencils, erasers, paper clips, etc., in the machine.

B. *Paper Insertion* – Insert a single sheet of paper into the machine. It should not wrinkle.

C. *Paper Release* – Pull the paper release lever (7) forward. You should be able to position the paper left and right. Push the paper release lever to the rear. You should not be able to move the paper.

D. *Multiple Copy Control Lever* – Operate the multiple copy control lever (6). It should not bind at either position and the platen should visibly move front-to-rear (about 1/8") (3,18mm). Return the lever all the way forward.

E. *Detent Release* – Pull the detent release lever (1) forward. The platen should turn easily without detenting action when you roll it by hand. Return the detent release lever to the rear. You should feel the detenting action when you turn the platen by hand.

F. *Platen Variable* – Press in on the platen variable button (29). The platen should turn freely to any position with no detenting. The button should reliably restore when it is released.

G. *Carriage Release* – Depress each carriage release button (10 and 28) and move the carriage through its full range. The carriage should move freely without binds and each release button should positively release the carriage without excessive pressure. The escapement pawl should not drag on the escapement rack.

H. *Margin Set* – Reset the left margin (14) and carriage return several times to make sure the left margin holds where it is set. (Reset the right margin. Move the carriage from the left margin to the right. On the Standard Typewriter, the bell should ring approximately six spaces before reaching the right margin. When the carriage reaches the right margin, the carriage should stop. The keyboard should lock with the exception of the shift, carriage return and backspace keylevers. On the C4, D4 typewriter, the bell should ring approximately five spaces (20 units) before reaching the right margin. Also, on the C4, D4 typewriter, the right-hand margin will not stop the carriage movement.)

I. *Margin Release* – Set the left margin at 25. Return to the left margin. Depress the margin release keybutton (25) and then release it. Operate the carriage return. The carriage should go to zero. Type from zero to position 30. You should be able to type through the left margin (set at 25).

STRIKE-UP

A. *Print Quality* – Set the impression control lever (22) at five. Make a strike-up of all characters on the keyboard in this way: type each character with the letter H between each character. Do this in both lower and uppercase.

1. All typebars should have printed without having to apply excessive pressure.
2. All characters should have even impression (color).
3. No characters should be much out of position.
4. There should be even spacing between letters with no character overlap.

B. *Repeat Characters* – D1, D4 typewriters normally have the following repeat characters: hyphen/underscore, X, and period. Model C typewriters normally have only one repeat character, the hyphen/underscore. Slowly depress the repeat keybutton. The character should print one time when depressed. The character should repeat when slightly more pressure is put on the keybutton. Repeat the above procedure for each repeat character on the machine.

C. *Linespacing* – Pull the paper release lever (7) forward to release the feed roll tension. Move the carriage to the far left and set the linespace lever (31) at three. Place your right hand on the right end of the carriage to prevent its movement to the right. Hold the carriage return tape under the left end of the carriage and pull slowly to the right as far as possible. This will rotate the platen three linespaces. As you release the tape, carefully observe the platen – it should not move.

D. *Repositioning Indicator, D4* – Type an uppercase M and depress the repositioning indicator button (35). The wire should line up with the right edge of the M you typed. While holding the repositioning indicator wire up, slowly lift a typebar toward the platen. The wire should release and go down when the typebar is approximately 1/2 the distance to the platen.

Model C4, Level 1 – Type an uppercase M and operate the repositioning indicator (38). The wire should line up with the right edge of the M you typed.

Model C4, Level 2 – Type an uppercase M and operate the repositioning indicator (38). All letter keys should be locked while the wire is up, and the wire should line up with the right edge of the M you typed.

E. *No Print, D4 Only* – Depress the no print button (32) and observe that it locks in place. The no print anvil should be fully extended under the type guide. Type several characters. The carriage should move, but no printing should appear on the paper. Move the no print button back to its normal position. The no print anvil should restore behind the segment.

F. *Cardholder/Scale* – Type a line of uppercase V's. The bottom edge of the V's should rest slightly above the reference line on both cardholders (11). The point of the V's should line up with the vertical marks on the cardholder. Set the left margin as far as it will go to the left. Operate the carriage return and check the location of the carriage at the front scale. The pointer should be on the zero line on the scale.

G. *Ribbon Operation, Carbon Ribbon* – Observe the used ribbon on your machine and the typed copy. Most of the characters should hit the center of the ribbon. There should be no character overlap on the ribbon or voids (white spaces) on the printed characters. Push the ribbon position button (27) down and type a few underscores. The ribbon should not feed and the underscore should miss the ribbon. Return the ribbon position button to its normal position. Position the ribbon reload lever in the remove position; the ribbon take-up spool should not turn. Type any character; the reload lever should return to the type position. On all Model Ds and Model Cs with the modified carbon ribbon, position the ribbon reload lever in the feed position. The ribbon should feed.

Ribbon Operation, Fabric Ribbon – Push the ribbon position button (27) down and type a few underscores. The underscore should miss the ribbon. Return the ribbon position button to its normal position. Type several characters to determine which spool is the feed spool. Mark the feed spool and type a series of characters. No more than 38 characters should be required to operate the feed spool 360 degrees. Operate the ribbon rewind lever or button. The ribbon should all rewind to the left-hand spool. When the right-hand spool is empty, the ribbon should reverse and the rewind lever or button should restore.

H. *Shift* – Operate both shift buttons (18 and 20) one at a time. The shift should be positive in both directions. Type a series of upper and lowercase H's. The bottoms of all the H's should be on a straight line.

I. *Expand Operation, D4* – Push the expand button (34) down. Make another strike-up of all characters with the letter H between each character. Do this in both lower and uppercase. There should be equal spaces between each character. Return this expand button to its normal position.

J. *Space Expand, D4* – Depress the space expand button (33) and operate the two-unit spacebar. It should space three units.

K. *Half-Space Operation, Model D1* – Return the carriage to the left margin and type a series of diagonal marks. Then, return to the margin, roll back to the same writing line and depress the half-space button (26) and hold. Now, type a series of diagonal marks between the first series. There should be equal spaces between the diagonal marks.

KEYBOARD

A. *Spacebar, C1, D1* – Slowly depress the spacebar (19). The spacebar should operate just as the spacebar bottoms. When slight additional pressure is applied, the spacebar should repeat.

Spacebar, C4, D4 – Return the carriage to the left margin and check the two- (36) and three-unit (37) spacebars by first typing a series of lowercase n's separated by two-unit spacebars. Then, return to the margin, turn back to the same writing line and substitute the three-unit spacebar for the n's and the letter i for the two-unit spacebar. You should have a line of n's and i's evenly spaced. On D4 typewriters, check to see that both the three and two-unit spacebars repeat when slightly additional pressure is applied. On Model C4 typewriters, check to see that the three-unit spacebar repeats when slight additional pressure is applied.

B. *Backspace, C1, D1* – Move the carriage to the right margin. Slowly operate the backspace. The carriage should move back one space each time the backspace keybutton (15) is depressed. Move the carriage near the left margin. The carriage should backspace reliably into the left margin. Check to see that the backspace repeats when slight additional pressure is applied to the keybutton.

Backspace, C4, D4 – Starting at any whole number on the right side of the front scale (such as 70), backspace (15) in a series of four operations each. For every four operations, the carriage should move back one whole number. Also, check the backspace in a similar way with the carriage near the left margin. Check to see that the backspace mechanism repeats when slight additional pressure is applied to the keybutton.

C. *Touch Control, C1, C4, Early D1, D4* – Type any single character as you change the resilent keyboard control (23) (touch control) through the full range. You should notice a difference in the touch of the keylevers as you change the control.

D. *Impression Control* – Type any two characters while changing the position of the impression control lever (22) through its full range. You should observe a change in the impression of the characters.

E. *Shift Lock* – Press down on the shift lock (21) and release it. Type a line of repeat underscores. The shift should remain in uppercase. The shift should unlock when either shift button is touched lightly.

F. *Carriage Return And Index* – Operate the return key (17) from a position two, three and four inches from the left margin. Check for reliable single and triple linespace during this operation. The machine should return to the margin positively.

G. *On-Off Switch* – Operate the on-off switch (16) several times. The switch action should be positive and the machine should reliably turn on and off.

With the switch off, try to depress the keybuttons. Only the following keylevers should operate:

Model D1 – Shift, spacebar
Model D4 – Shift, two-unit spacebar
Model C1 – Shift, spacebar, margin set and release
Model C4 – Shift, two-unit spacebar, margin set and release

Turn the switch on and unplug the machine. Depress all the functional keys: tab, shift, spacebar, backspace and carriage return. Plug the machine in. The machine should start under this load.

H. *Tab* – Clear all tab stops (12). Set tab stops (13) at 55, 57, 88 and 90. Operate the tab (24) and check to see that the carriage stops at 55, 57, 88 and 90. This checks for proper operation of the tab mechanism. The tab should operate reliably whether the keybutton is depressed quickly or slowly.

Now, tab all the way to the right. Hold down the tab clear keybutton (12) and operate the carriage return. All the set tab stops should clear automatically without excessive noise.

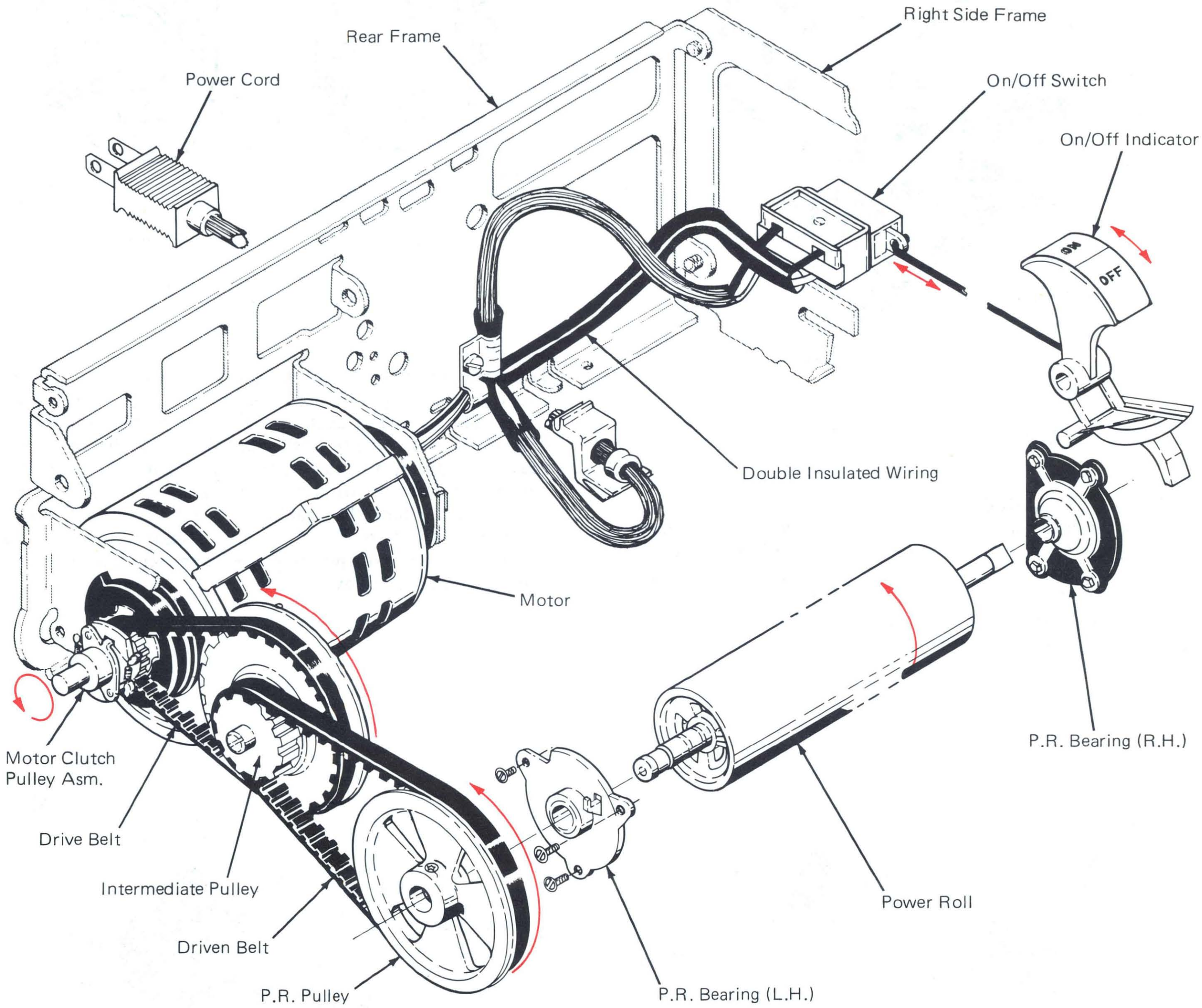
Reset the margins and tab stops as they were when you started. This ends the detailed functional check description.

MOTOR & DRIVE OPERATIONAL THEORY

The purpose of the motor and drive mechanism is to supply a positive, constant speed to the power roll to operate letter and operational cams (Figure 1). Several different types of motors are used in IBM typewriters. The basic types are the shaded pole and the capacitor motor.

The complete electrical system, except for the switch and switch lever, is mounted on the rear frame. The switch and switch lever are mounted on the right side frame (Figure 1).

Power is transmitted from the motor to the power roll.



(Two-Wire Double Insulated)

Figure 1 – Motor & Drive Mechanism

The motor normally used is a three inch shaded pole, induction type motor and normally requires 115 volts, 60 Hz (Figure 2). The characteristics of a shaded pole motor are a low starting torque and constant motor speed.

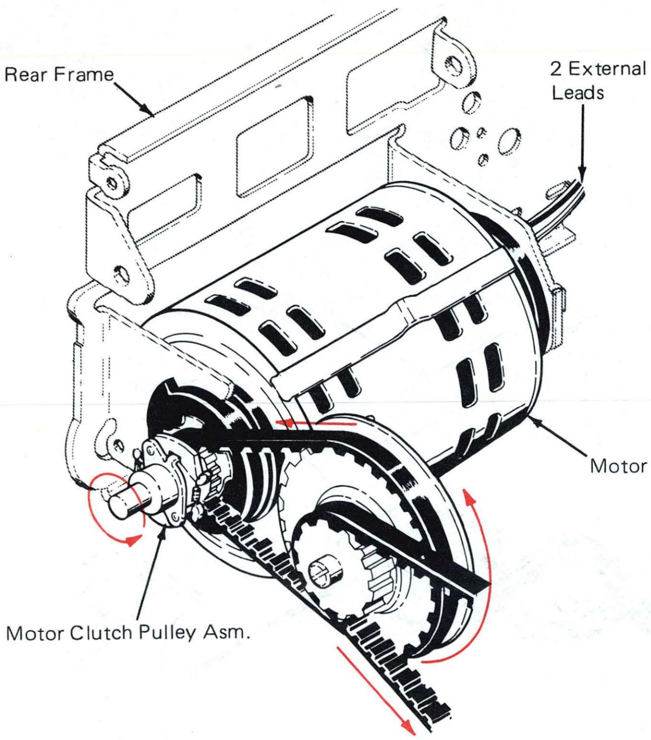


Figure 2 – 3" Shaded Pole Motor

CENTRIFUGAL CLUTCH

Due to the low starting torque, a centrifugal clutch is used in the motor pulley design so the motor is allowed to reach normal operating speed before the clutch engages the drive mechanism. The speed developed by the motor causes the machine to start even when several cams have been released against the power roll with the machine off (Figure 3).

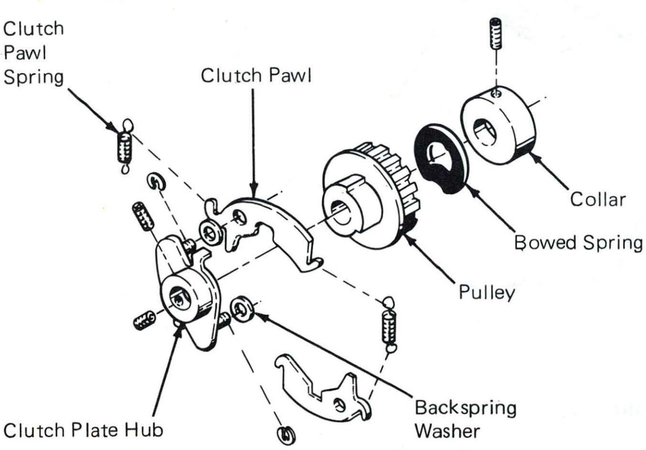


Figure 3 – Motor Pulley – Clutch Asm. (Exploded View)

A clutch plate hub assembly is attached by setscrews to the shaft of the motor just left of the motor pulley. Two clutch pawls pivot on the clutch plate hub assembly. When the motor is off, the pawls are spring loaded against stop lugs on the clutch plate (Figure 4). When the motor is turned on, centrifugal force causes the clutch pawls to pivot on the clutch plate so the tip of one of the two pawls will engage a tooth on the motor pulley (Figure 4). The pulley is then caused to rotate and drive the machine.

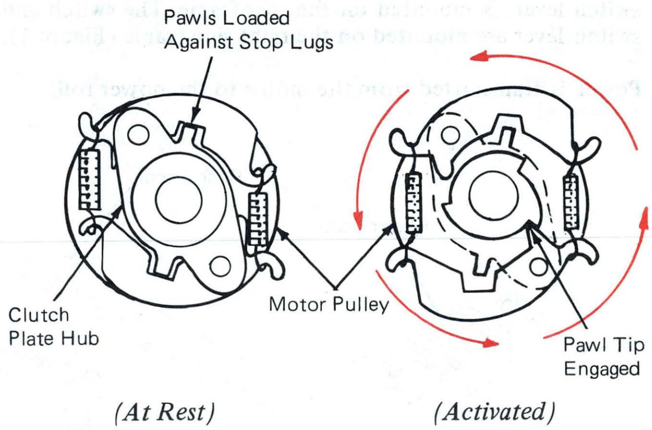


Figure 4 – Clutch Pulley (Left Side View)

To prevent excessive noise during a normal starting operation, a spring washer is placed between the right side of the motor pulley and a collar attached by setscrews to the motor shaft (Figure 5). This spring washer supplies enough pressure to the motor pulley to cause it to rotate with the motor shaft before the clutch pawl engages it when the machine is not under load. When the machine is under load, the motor pulley is allowed to slip on the motor shaft until the motor reaches the normal operating speed and the motor clutch pawl engages the pulley.

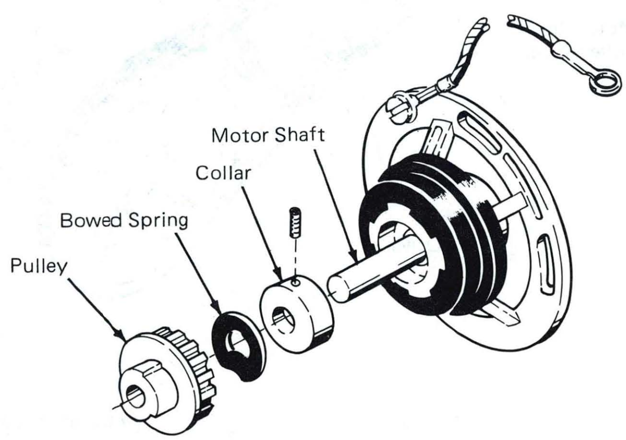


Figure 5 – Clutch Pulley

POSITIVE DRIVE MECHANISM

The positive drive mechanism consists of two belts and pulleys to transfer the rotation of the motor to the power roll (Figure 6). A drive belt transfers the rotation from the motor pulley to the large side of an intermediate pulley. A driven belt transfers the rotation from the small side of the intermediate pulley to the power roll pulley.

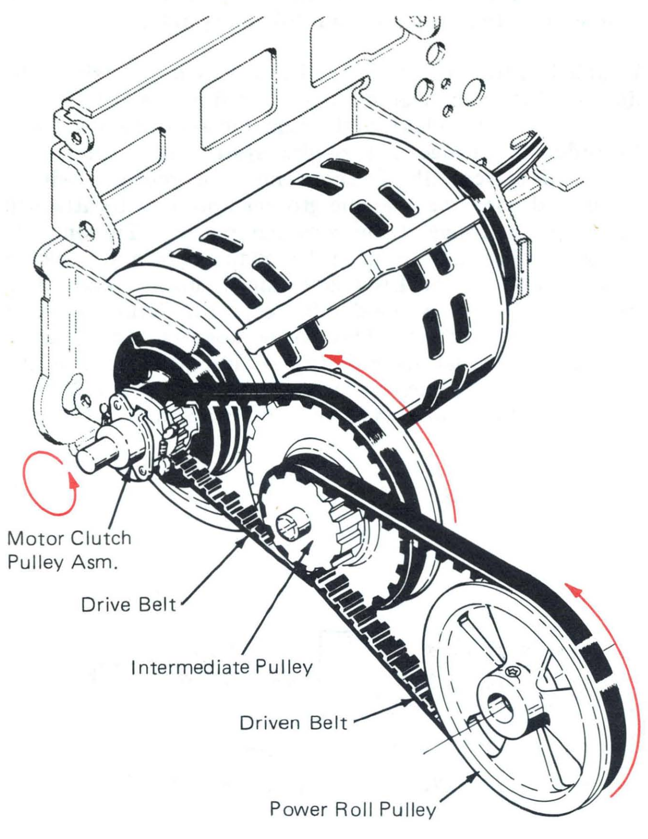


Figure 6 – Positive Drive

Capacitor motors use a capacitor to provide starting force and direction to the motor. The capacitor remains in the circuit to maintain power and control the direction of rotation if the motor is momentarily stopped (Figure 7). Capacitor motors do not require a clutch.

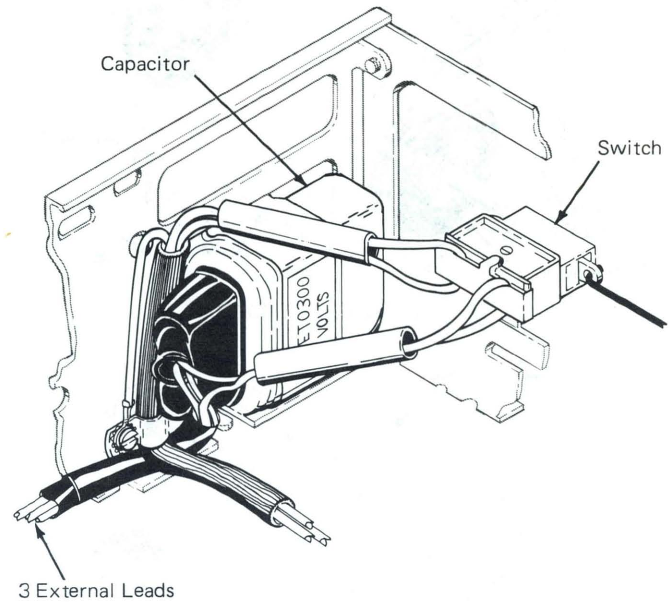


Figure 7 – 3" (76,2mm) Motor – Capacitor Motor System

The power roll in the typewriter is used to drive the cams which in turn operate the typebars and the other various functions of the typewriter. The power roll is mounted on a shaft and is supported in the machine by self-aligning bearings (Figure 8). The power roll pulley is attached to the end of the power roll shaft by two setscrews.

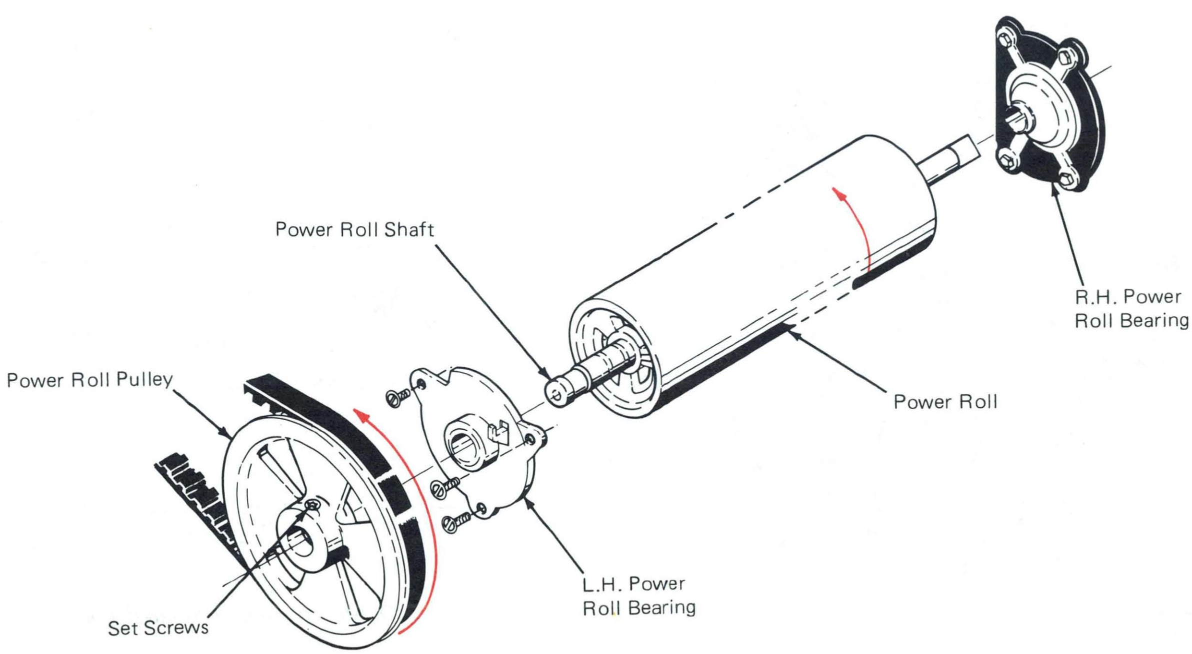
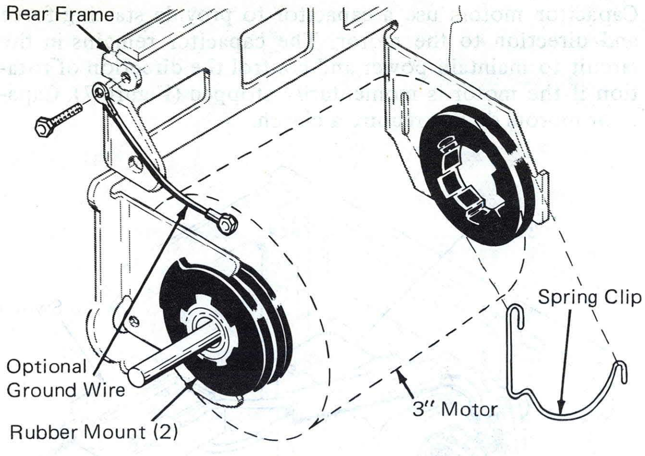
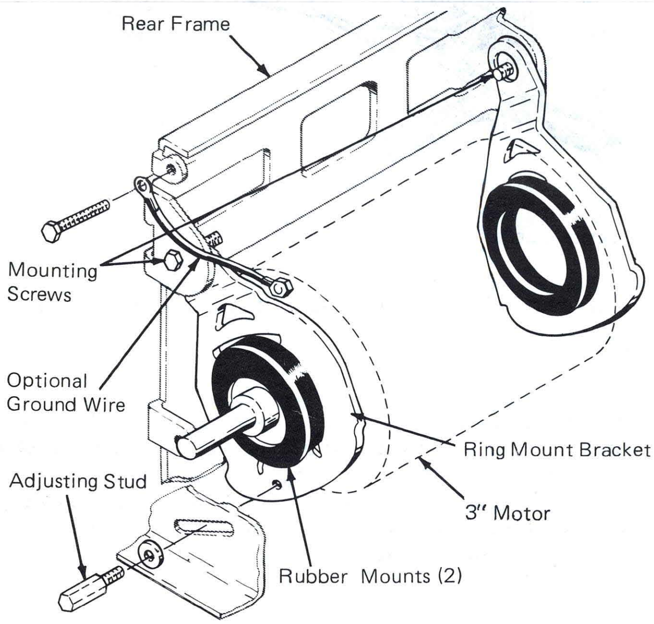


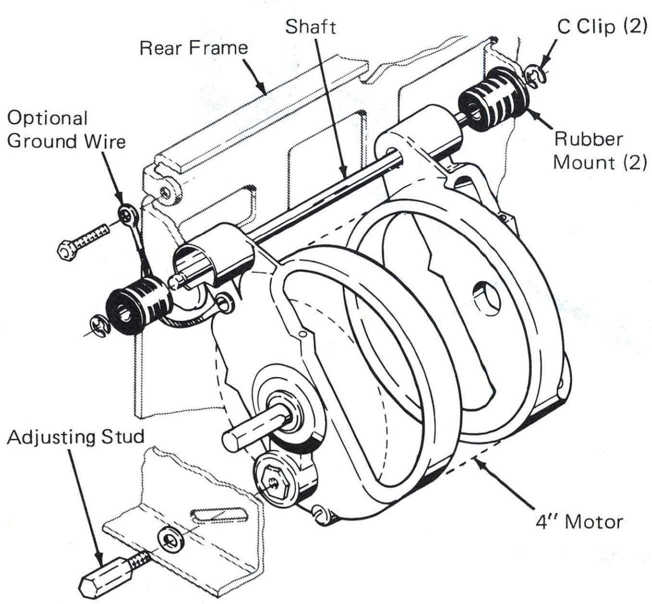
Figure 8 – Power Roll Pulley Assembly



Solid Mount Motor



Ring Mount Motor



Shaft Mount Motor

Figure 9 – Motor Mounting Types

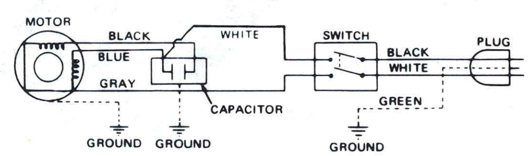
MOTOR MOUNTING METHODS

Three methods are used to mount the motor; solid mount, ring mount, and shaft mount (Figure 9). The ring mount and solid mount methods are used on all 115 volt and 230 volts, 60 Hz, and all DC motors are shaft mounted.

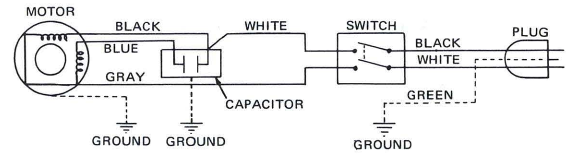
WIRING SYSTEMS

The wiring system (Figure 10) used on the typewriter may be either a three-wire grounded system, a two-wire unground, or a two-wire double insulated system.

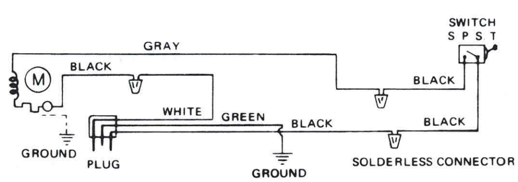
Double insulated machines can be identified by a tab on the linecord below the clamp on the rear frame. A label on the machine will also identify the machine as double insulated. In order to change a two-wire system to a three-wire grounded system, the linecord must be replaced with a three cord wire line and the ground lead must be attached to the power frame at the cord clamp screw. To complete the grounding, a wire must be connected to the motor housing and the the LH rear frame mounting screw. If a capacitor motor is used, the capacitor must also be grounded to the frame. This can be done by removing the insulating material from between the capacitor and the frame of the machine. A machine cannot be changed in the field to double insulation (3 wire to 2 wire, etc.)



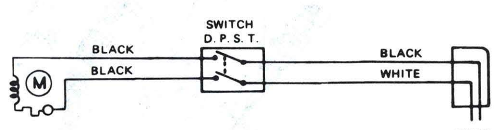
Non Double Insulated Capacitor Motor (S.P.S.T. Switch)



Non Double Insulated Capacitor Motor (D.P.S.T. Switch)



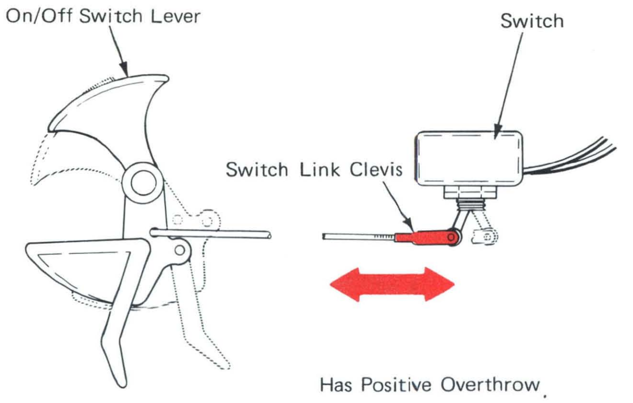
Non Double Insulated, Shaded Pole



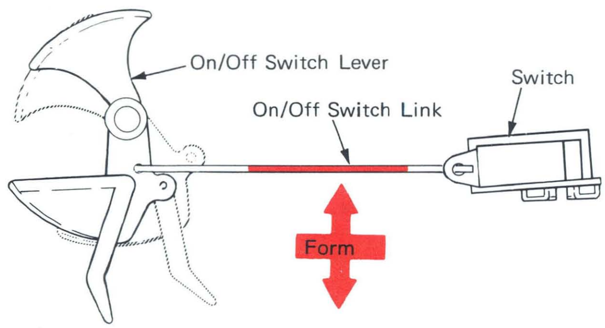
Double Insulated Shaded Pole

Figure 10 – Motor Wiring Diagrams

1. *On-Off Switch* – Adjust the switch link so the switch functions without delay and has positive overthrow in both directions.

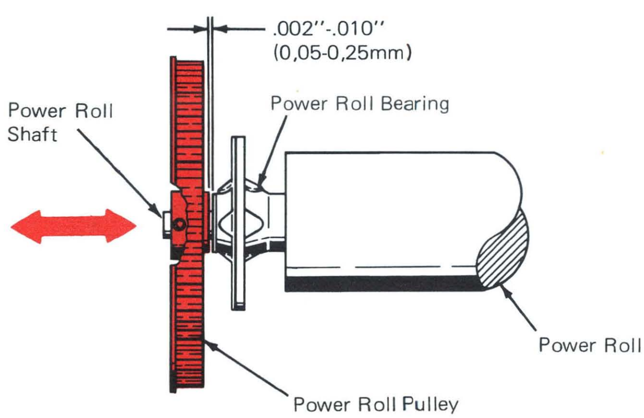


(Right Side View – Model C1 – C4 Adj. Clevis)

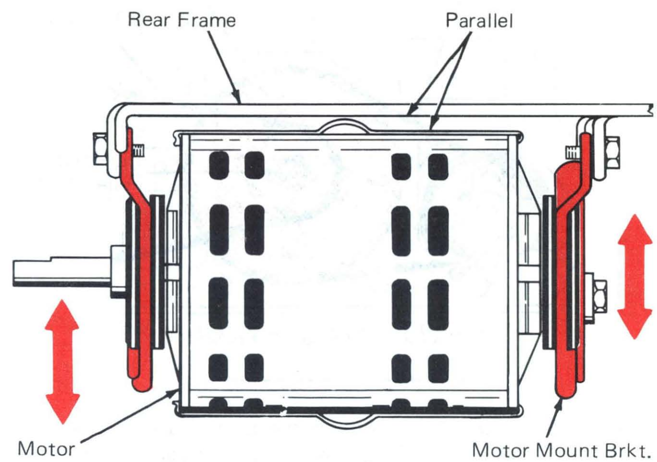


(Right Side View – Model D1 – D4 Form Link)

2. *Power Roll End Play* – Position the power roll pulley on the power roll shaft so there will be .002-.010" (0,05-0,25mm) end play of the power roll.



3. *Motor Mounts, Ring Type* – Adjust the motor mounts so the motor housing will be parallel to the rear frame.



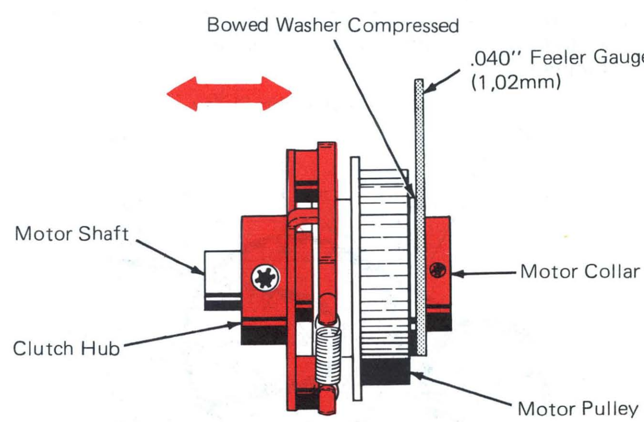
(Top View)

4. *Motor Clutch Hub and Motor Clutch Collar* – Position the clutch hub and the clutch collar on the motor shaft to satisfy the following conditions:

   (a) The drive belt should track evenly on the motor pulley and intermediate pulley without excessive noise.

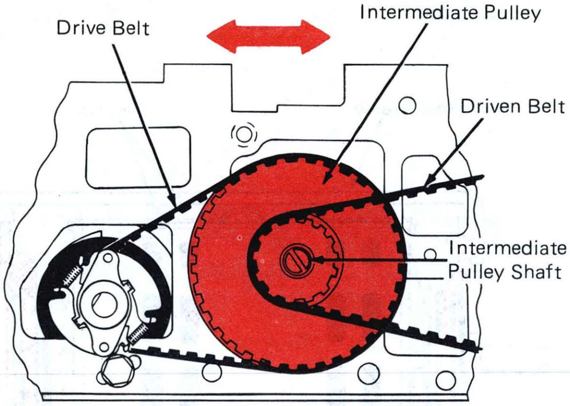
   (b) Position the clutch to the right until the spring washer is compressed half-way between the motor pulley and the collar, then tighten. This should give approximately .040" (1,02mm) clearance between the motor pulley and the collar.

NOTE: To ensure the adjustment is correct, release the functional cams with the power off, then turn the machine on. The motor should be able to start. Also, under normal starting operation, the noise of the pawls engaging should hardly be heard.



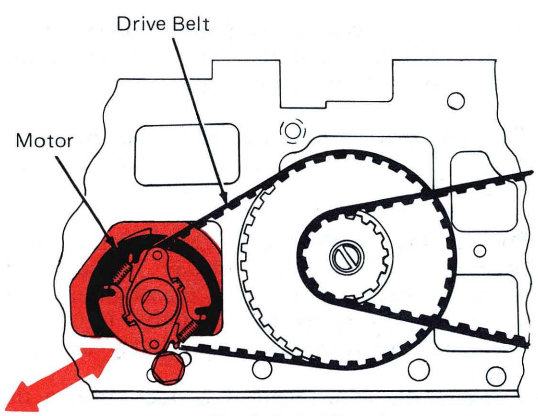
5. *Driven Belt, Level 1* – Adjust the intermediate pulley shaft front to rear so the driven belt will have maximum tension without producing noise.

NOTE: The shaft has a left hand thread.



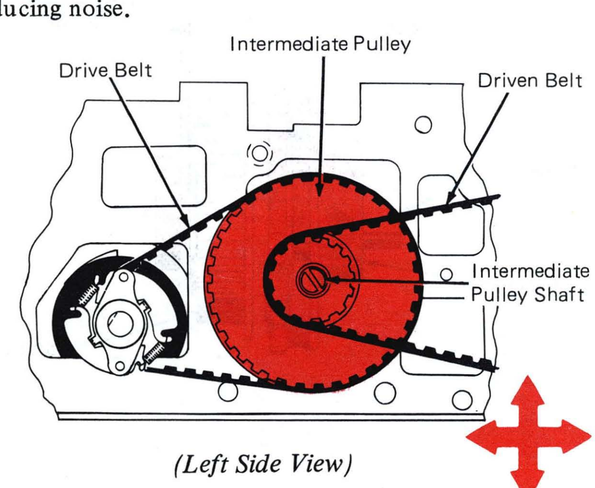
(Level 1 – Left Side View)

Drive Belt, Level 1 – Adjust the motor front or rear so the drive belt will have maximum tension without producing noise.



(Left Side View)

Drive and Driven Belts, Level 2 – Adjust the intermediate pulley shaft to provide maximum belt tension to the drive and driven belt without producing noise.



(Left Side View)

CARRIAGE & RAILS OPERATIONAL THEORY

The purpose of the carriage is to support the paper and to carry it from left to right across the rails for typing (Figure 1).

The carriage consists of two sections; an outer carriage and an inner carriage. The inner carriage is mounted within the outer carriage and supports the paper feed mechanism. The inner carriage front to rear position is controlled by the multiple-copy control lever. This provides ring and cylinder control.

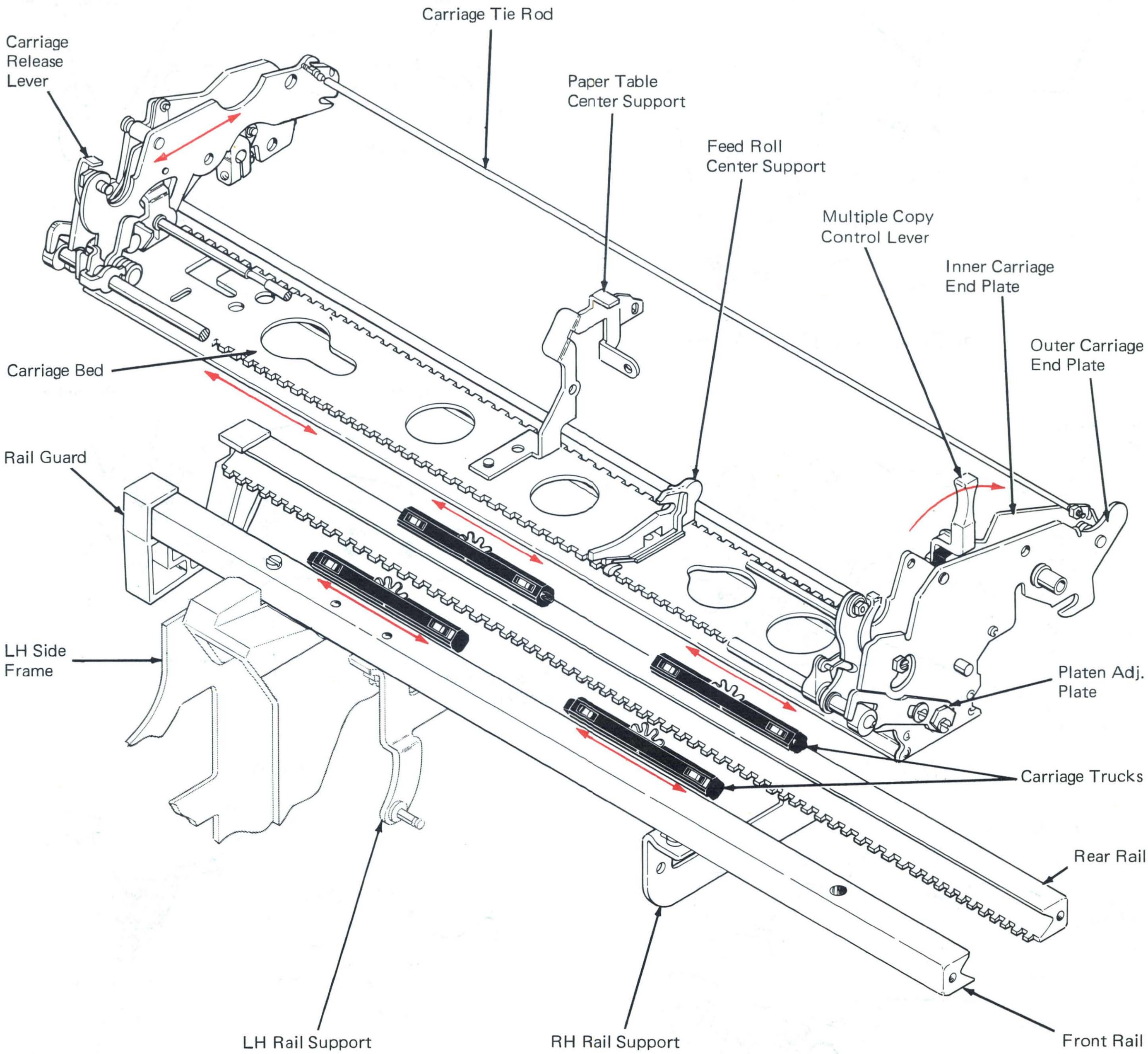


Figure 1 – Carriage & Rails Mechanism

MULTIPLE COPY CONTROL

The multiple-copy control lever, located on the inner carriage end plate, rotates the platen guide shaft and the eccentric collars (Figure 2). The collars rotate within a platen adjusting plate and/or a platen retaining plate that is connected to the outer carriage (Figure 3).

The collars rotate with the shaft, but because they are eccentric, the shaft also moves front to rear. This shaft movement causes the inner carriage to move forward or back.

PLATEN MOUNTING

Although the inner carriage controls the front to rear position of the platen, the outer carriage supports the platen. A platen latch lever mounted on each end plate closes over the top of the platen bushings (Figure 4). Eccentrics in the latch mountings provide adjustment to remove vertical play of the platen bushings. Front to rear movement in the platen mounting is removed by the use of a nylon washer attached to each platen guide way. When the copy control lever is operated, the platen bushings slide front to rear between the parallel surfaces of the latch and end plates.

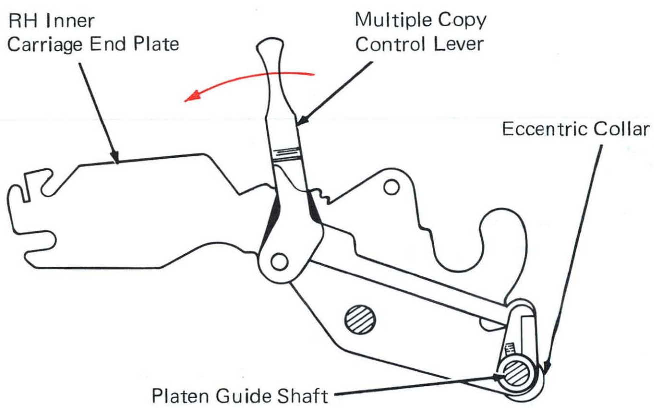


Figure 2 – Copy Control Lever (Left Side View)

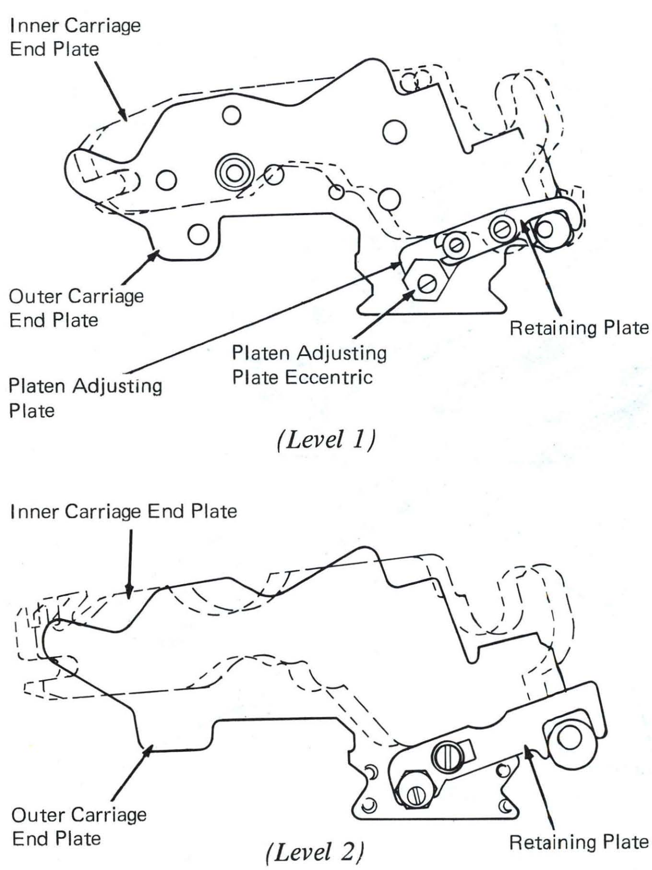


Figure 3 – Inner Carriage Movement (Left Side View)

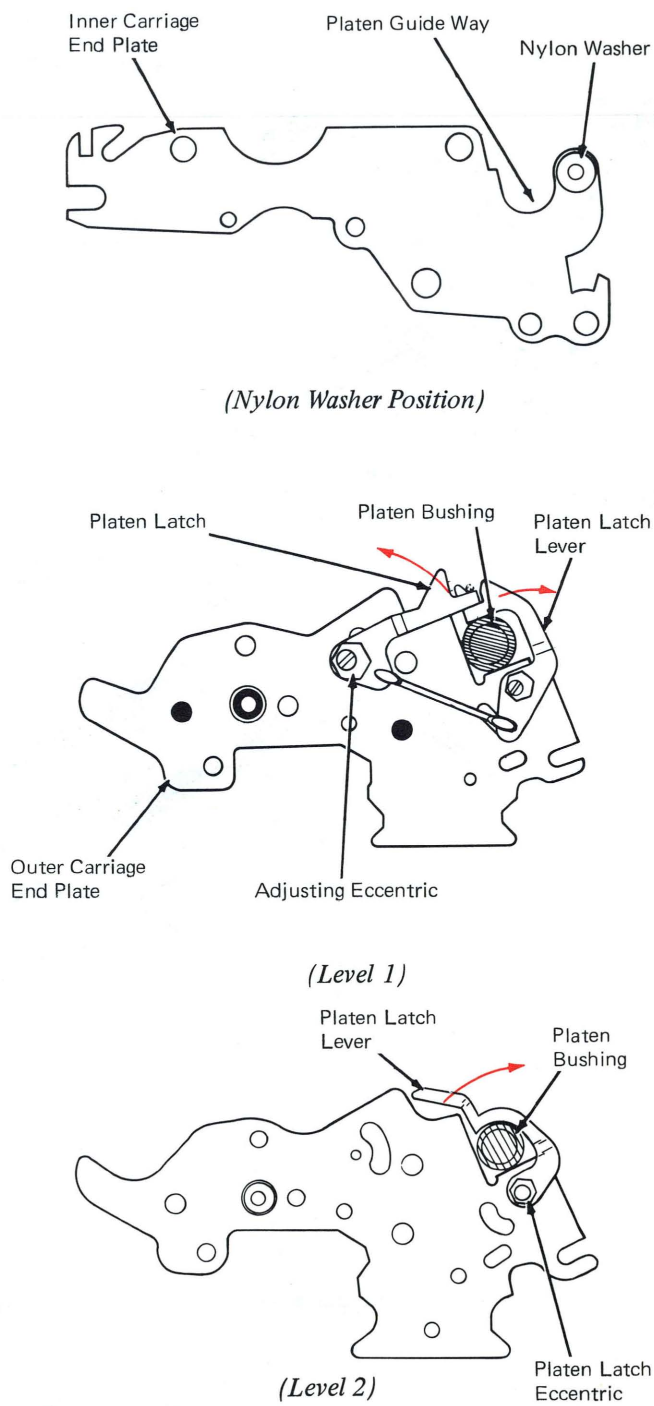


Figure 4 – Platen Latches (Left Side View)

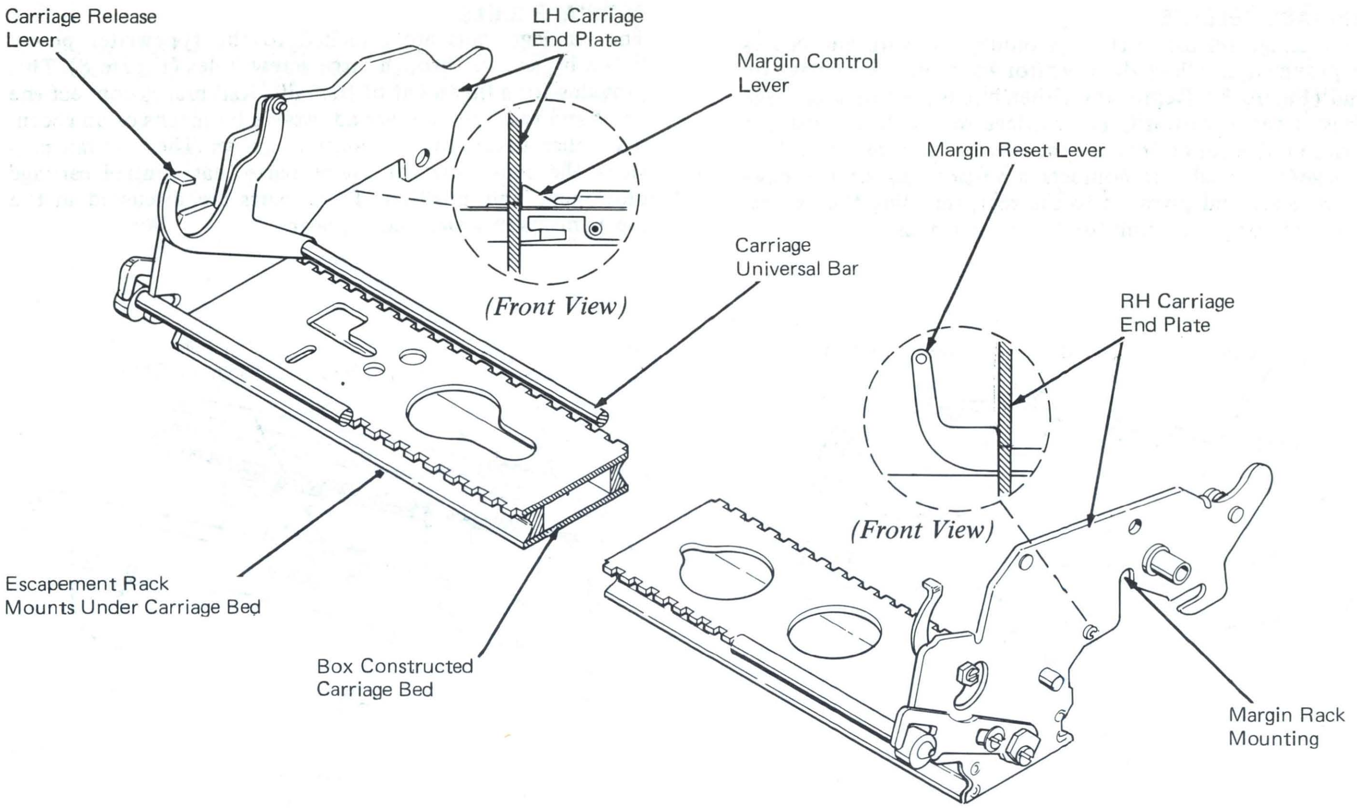


Figure 5 – Outer Carriage Assembly

OUTER CARRIAGE

The outer carriage consists of a welded box-type carriage bed with an end plate welded to each end (Figure 5). In addition to mounting the inner carriage and the paper feed mechanism, the outer carriage mounts the escapement rack, margin rack, and tab rack. The carriage assembly rolls freely on steel rollers mounted in plastic trucks between V-shaped rails. A lug extending upward from the margin control lever contacts the left hand carriage end plate to limit carriage movement to the right. A step on the margin reset lever contacts the right hand carriage end plate to limit carriage movement to the left.

CARRIAGE TRUCKS

Trucks are used to hold the carriage rollers and star wheel in position (Figure 6). Each truck has four rollers that extend through openings in the truck. The position of the truck between the carriage and rails is maintained by a star wheel in the truck. The star wheel is held in place by a pin. Movement of the carriage rotates the star wheel between the upper carriage teeth and lower rail teeth and causes the truck assembly to move with the carriage.

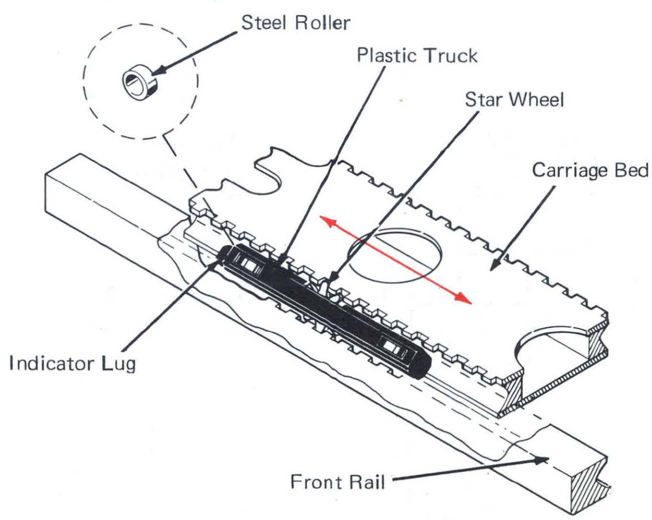


Figure 6 – Carriage Truck & Rollers

CARRIAGE RELEASE

The carriage release buttons, mounted on both end covers are provided to allow the operator to move the carriage by hand (Figure 7). Depressing either button pivots a carriage release lever downward. The carriage release lever pushes a carriage universal bar toward the rear of the typewriter. The carriage universal bar contacts a vertical lug of the pawl release lever and pivots it to the rear, releasing the escapement pawl or pawls from the escapement rack.

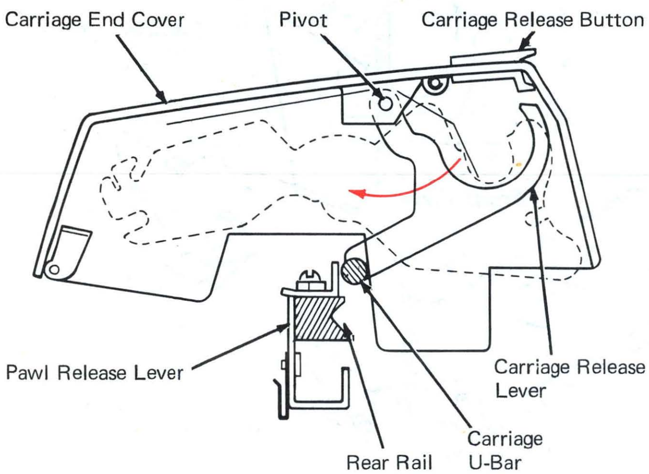


Figure 7 – Hand Carriage Release (Left Side View)

CARRIAGE RAILS

The carriage rails are attached to the typewriter power frame by screws through large screw holes (Figure 8). This provides for adjustment of the rails. Rail braces connect the front and rear rails and are adjustable by means of an eccentric collar under their mounting screws. The rear rail provides the mounting for many parts that control carriage movement and position. These parts are discussed in the mechanisms in which they appear.

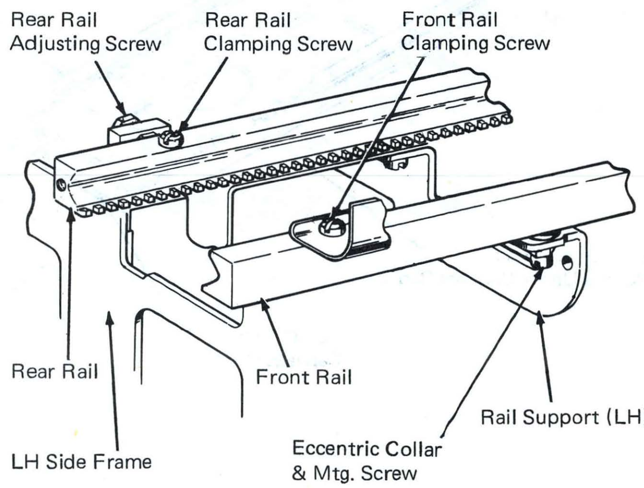
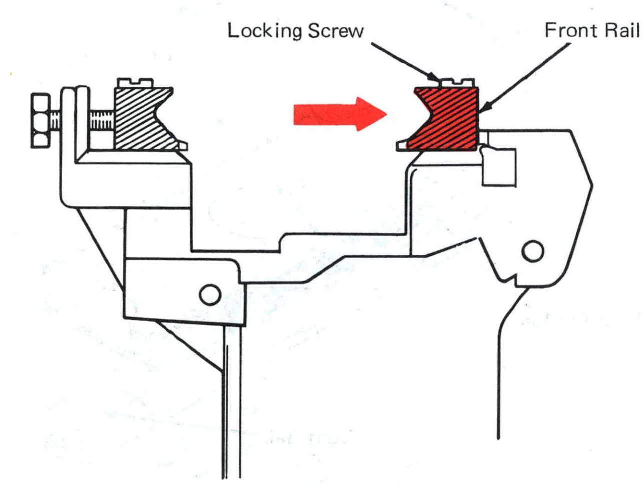


Figure 8 – Carriage Rail Mounting

CARRIAGE & RAILS ADJUSTMENTS

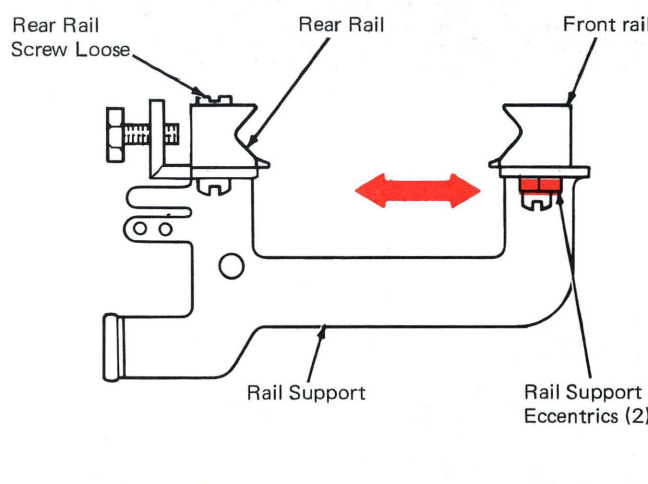
1. *Front Rail* – Move the front rail forward and lock it in place.

   NOTE: Rail shims are used on machines with certain typestyles. The thickness is determined by the shift motion. Be sure to reinstall these shims in case of rail removal and replacement.



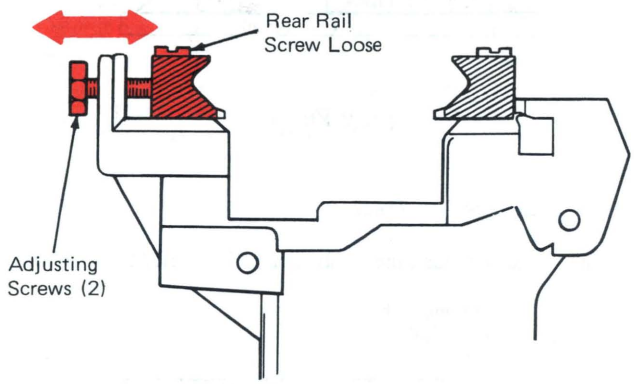
(Left Side View)

2. *Rail Support Eccentrics* – With the carriage centered and the rear rail screws loose, adjust the support eccentrics to remove any front to rear motion of the carriage and yet be free of binds.



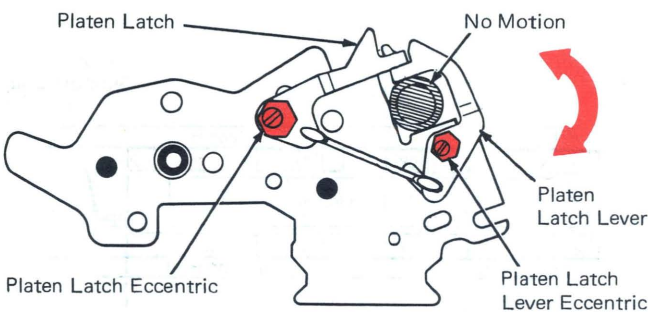
(Left Side View)

3. *Rear Rail Adjusting Screws* – With the rear rail screws loose and the carriage at the far left margin, adjust that end of the rear rail to remove any front to rear motion of the carriage and yet be free of binds. Next, position the carriage at the far right margin and adjust that end. After making this adjustment, the carriage must roll freely from one margin to the other.



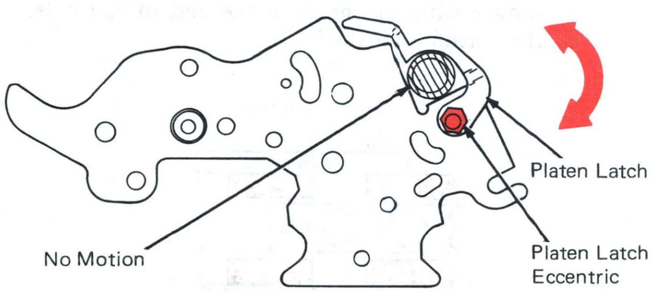
(Left Side View)

4. *Platen Latch Lever Eccentric and Platen Latch Eccentric, Level 1* – With the platen latch lever eccentric and the platen latch eccentric high points toward each other, adjust the eccentrics so the latches meet in one motion and hold the platen bearings so no vertical motion is allowed.



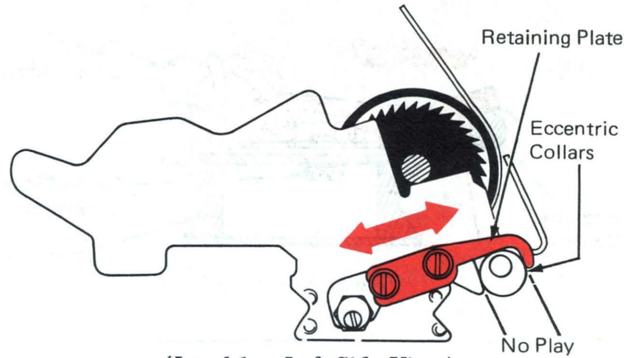
(Level 1 – Left Side View)

Platen Latch Eccentric, Level 2 – Adjust the eccentric to hold the platen bearings so no vertical motion is allowed.

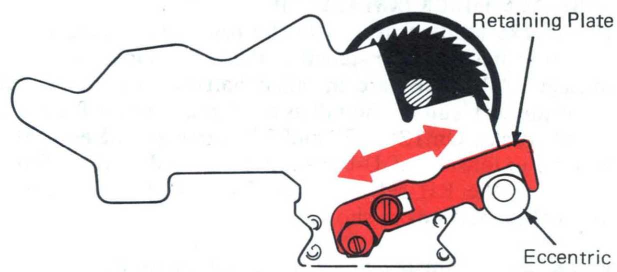


(Level 2 – Left Side View)

5. *Platen Retaining Plate, Level 1 & 2* – Adjust the platen retaining plate to hold the eccentric collars mounted on the guide shaft against the platen adjusting plate without binding.



(Level 1 – Left Side View)

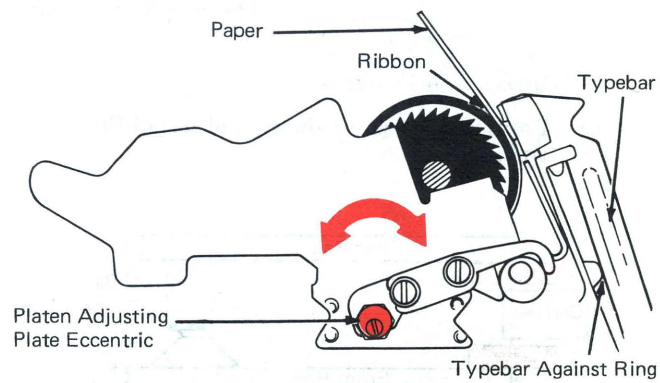


(Level 2 – Left Side View)

6. *Ring and Cylinder* – With the copy lever forward and a single sheet of bond paper in the typewriter and the ribbon lift in lift position, hold a typebar in lower case against the ring. A piece of bond paper held between the ribbon and paper should drag slightly when removed. Adjust the platen adjusting plate eccentrics at each end of the carriage to satisfy this condition. This adjustment must be checked across the whole length of the platen and be equal.

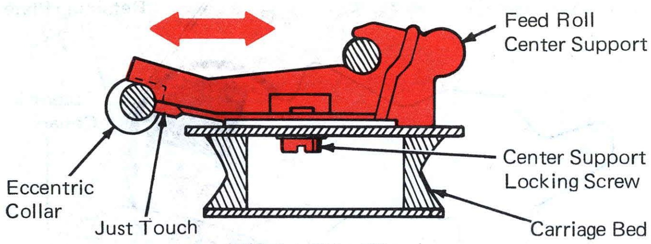
NOTE: Loosen the feed roll center supports when making this adjustment (Figure 1).

SERVICE HINT: It is not necessary to loosen the front retaining plate screw when adjusting ring and cylinder since this screw serves only to hold the retaining plate to the adjusting plate. This applies only to the two piece platen adjusting plate used on Model C and early Model D typewriters.



(Left Side View)

7. *Feed Roll Center Supports* – Reposition the feed roll center supports after any adjustment of ring and cylinder to just touch the eccentric collars on the platen guide shaft.

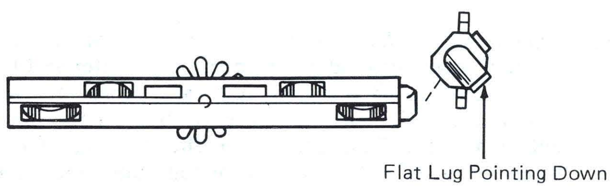


(Right Side View)

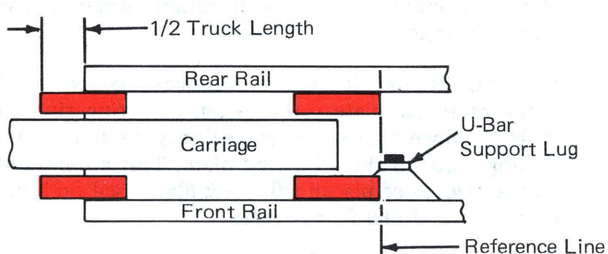
CARRIAGE TRUCK INSTALLATION

The trucks (shown in red) in the following diagrams, indicate the trucks to be installed at the various locations of the carriage. All trucks are installed half-way in the carriage, using the left end of the rail as a reference point for the LH set of trucks. On 13", 17" and 20" carriage, the edge of the vertical extension of U-bar support is used as the reference point for the RH set of trucks. The 24" and 30" carriage uses other methods as shown.

NOTE: Install all trucks with the flat lug on the end of the truck pointing down.



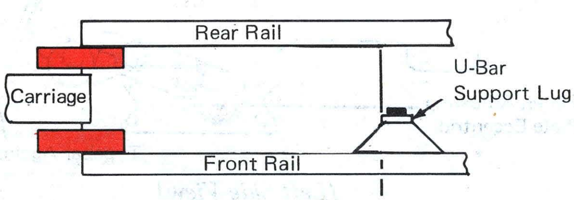
1. *13" Carriage – 4 Trucks* – Position carriage as shown and install all four trucks.



(Top View)

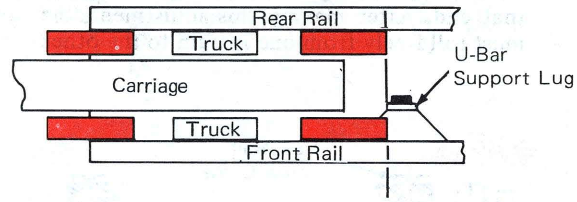
2. *17" Carriage – 6 Trucks* –

(a) Position carriage as shown and install first two trucks.



(Top View)

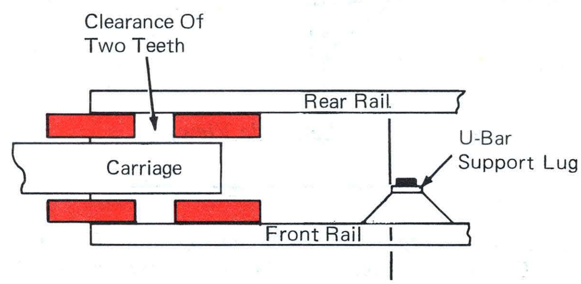
(b) Move carriage and install remaining four trucks.



(Top View)

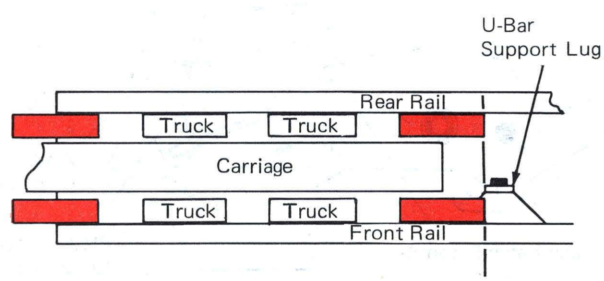
3. *20" Carriage – 8 Trucks* –

(a) Position carriage as shown and install four trucks.



(Top View)

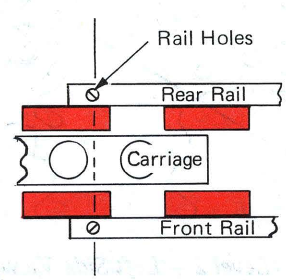
(b) Move carriage and install remaining four trucks.



(Top View)

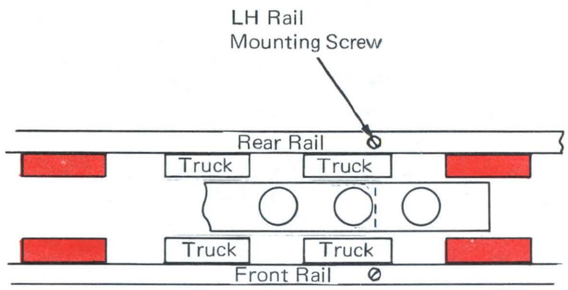
24" Carriage – 8 Trucks –

(a) Line up the second hole in the carriage bed as shown with the holes in the end of the rails, then install four trucks.



(Top View)

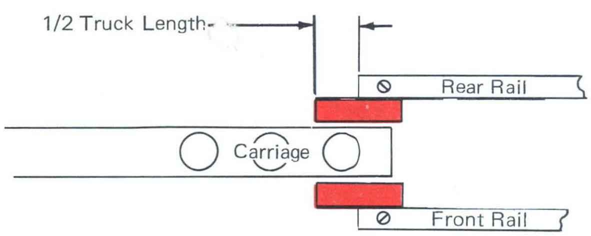
(b) Move the carriage to the right until the second hole in the carriage bed (same hole) lines up with the left rail mounting screws. Then install the four remaining trucks.



(Top View)

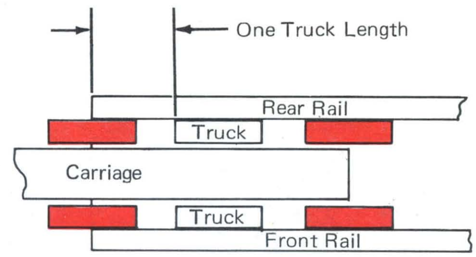
30" Carriage – 10 Trucks –

(a) Line up the first hole in the carriage bed with the end of the rails, then install two trucks.



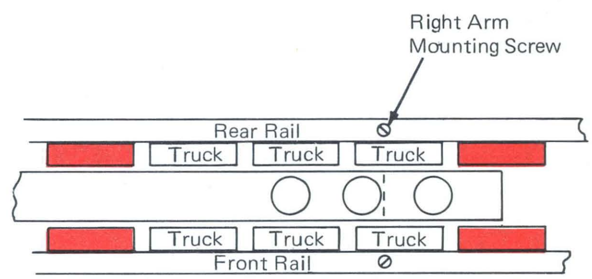
(Top View)

(b) Move the carriage until the first set of trucks is one truck length from the end of the rail. Then install four trucks.



(Top View)

(c) Move the carriage to the right until the second hole in the carriage bed lines up with the right rail mounting screws. Then install the remaining four trucks.



(Top View)

MAINSPRING, GOV. & DECEL. OPERATIONAL THEORY

The three assemblies in this section are mainspring, decelerator, and governor (Figure 1). The mainspring is used to maintain a constant tension on the carriage and to provide power to move the carriage from right to left. The decelerator operates with the governor to give enough deceleration on tab and carriage return operations. The governor is also used to maintain constant speed of the carriage during tabulation.

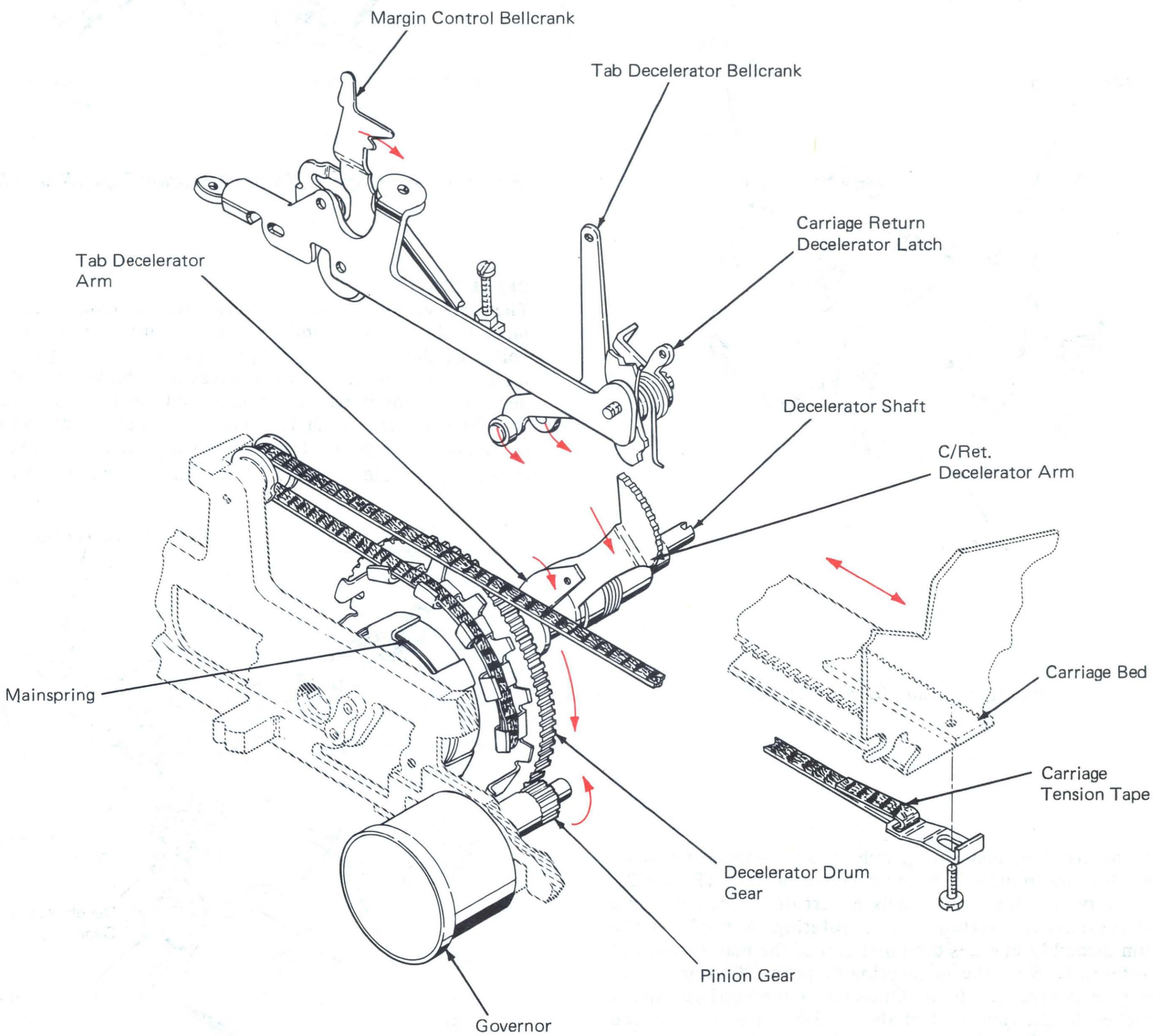


Figure 1 – Mainspring Decelerator & Governor

MAINSPRING

The mainspring is a flat spring wound into a coil and attached to the mainspring holder and mainspring drum assembly (Figure 2).

If the mainspring should be released from its holder, it could come out with enough force to cause serious injury. MAXIMUM CAUTION must be used when removing the mainspring drum from the spring. If it is necessary to separate the drum from the mainspring and holder assembly, be sure that the spring is completely disengaged from the hook on the drum before separating them.

NOTE: Use a safety clip to hold spring in place during removal.

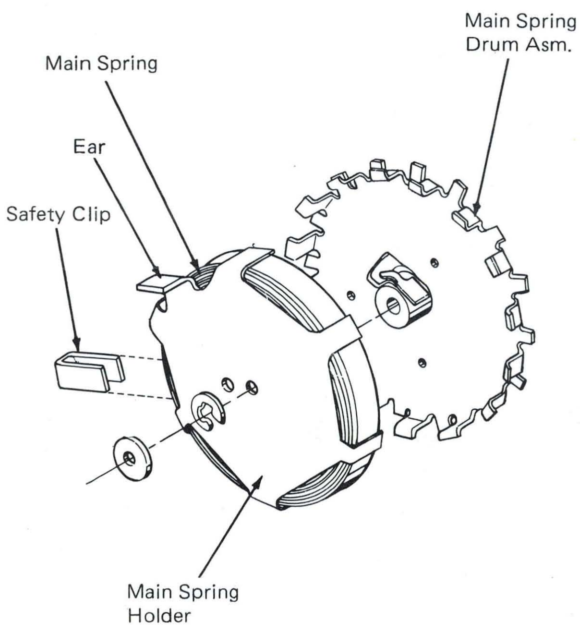


Figure 2 – Main Spring Assembly

The mainspring, mainspring holder, and mainspring drum assembly are mounted on the decelerator shaft (Figure 3). An ear on the holder contacts a part of the power frame and prevents the assembly from rotating. A hook on the drum assembly engages the inner coil of the mainspring and is rotated to wind the mainspring to proper tension before the tape is attached to it. One end of the carriage tape is attached to the right end of the carriage. It extends to the left between the rails, around a pulley on the power frame and back to the drum, attaching to one of the lugs on the drum assembly. The mainspring tension winds the tape on the drum assembly and through the tape, powers carriage movement to the left on escapement, spacebar, and tab operations.

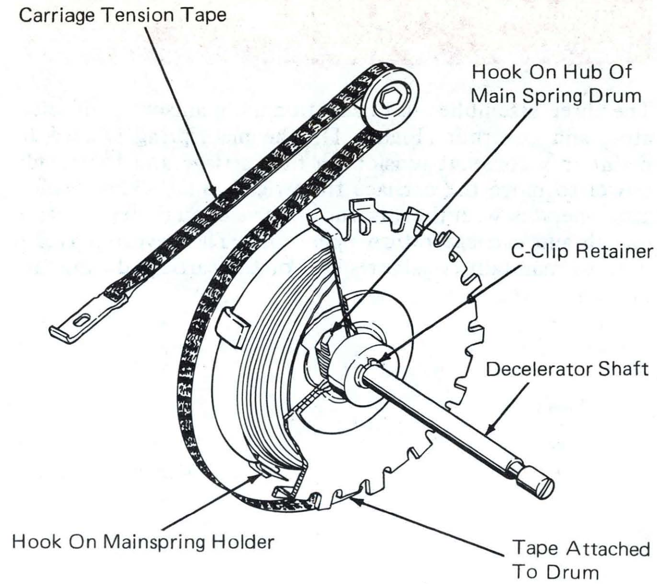


Figure 3 – Main Spring, Drum & Tension Tape (Rear View)

DECELERATOR

The decelerator is an assembly used to reduce carriage impact during tab and carriage return operations. It performs this by transferring the energy of carriage movement to the governor which serves as a brake. All of the decelerator components are mounted on the decelerator shaft (Figure 4). The shaft has threads on the front end and connects to the power frame. It is supported at the rear by an adjusting plate attached to the rear of the power frame.

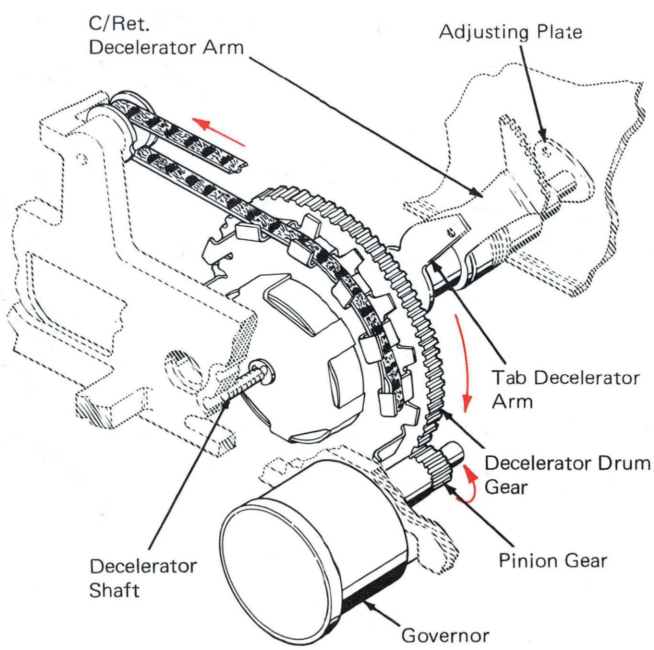


Figure 4 – Decelerator Mounting

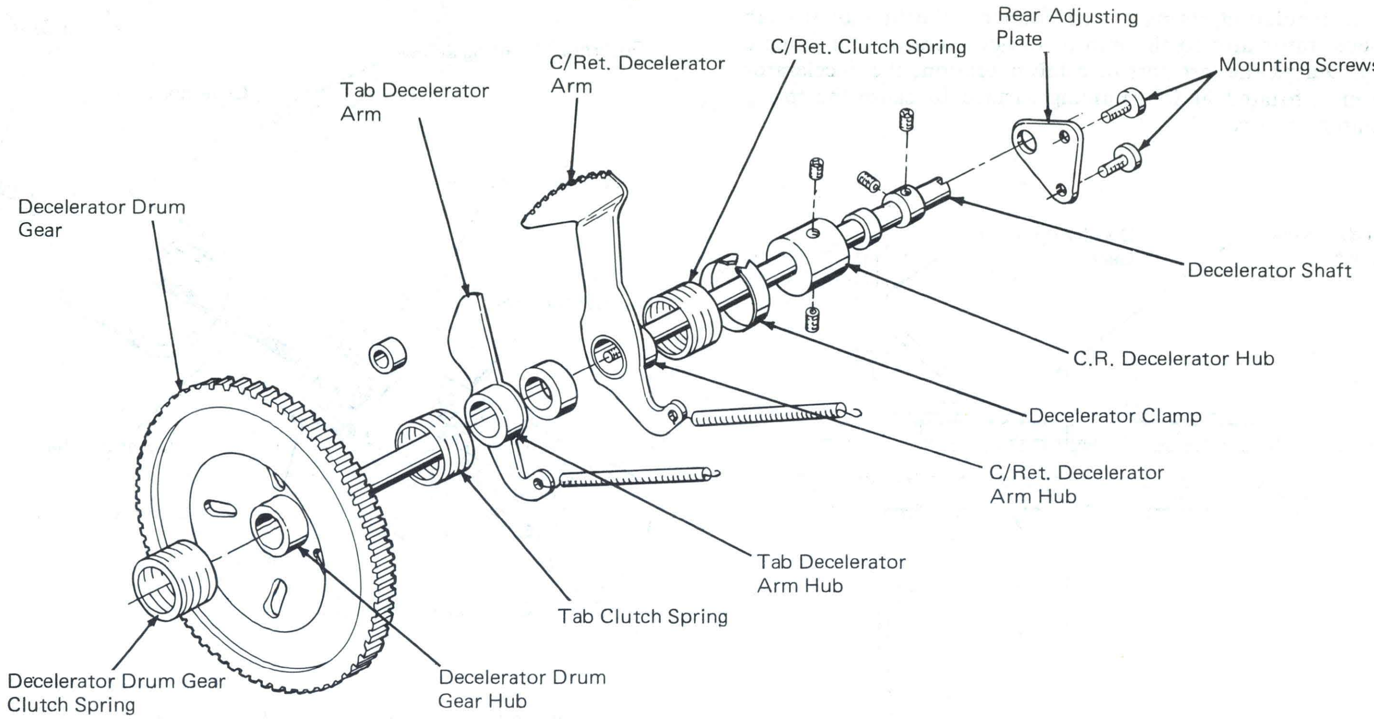


Figure 5 – Decelerator Assembly (Exploded View)

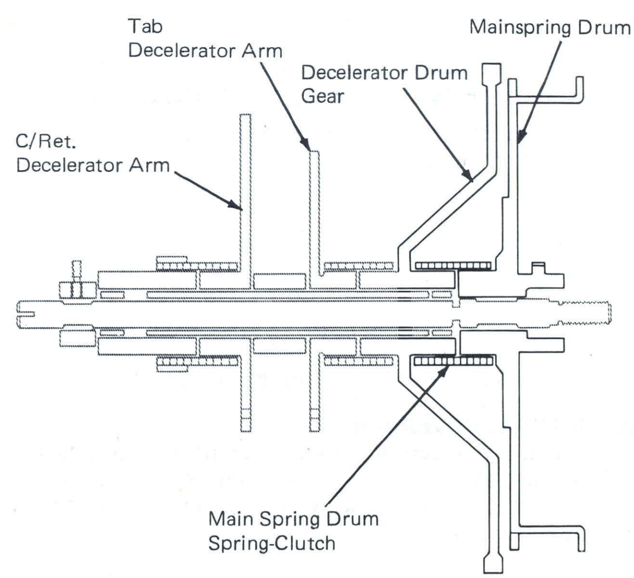
The driving hubs in the three spring clutches of the decelerator assembly (Figure 5) are:

1. Hub of the decelerator drum gear
2. Hub of the tab decelerator arm
3. Hub of the carrier return decelerator arm

The Model D decelerator drum gear is a molded, one piece gear and hub assembly. On the early Model C, a porous bronze bearing mounts the decelerator gear and hub assembly. The decelerator assembly consists of all the parts shown in Figure 5.

The driven hub in each of the three spring clutches is the hub of the decelerator gear (Figure 5). Driving any one of the spring clutches, therefore, will rotate the decelerator gear. Only one spring clutch will drive at any one time.

The mainspring drum spring clutch connects the hub of the mainspring drum to the hub of the decelerator gear (Figure 6). Carriage movement in either direction always rotates the drum. Movement to the left restores the drum and drives the spring clutch. Movement to the right rotates the drum to slip the spring clutch. This spring clutch drives the decelerator gear and governor to control the speed of carriage movement during tabulation.



(Left Side View)

Figure 6 – Main Spring Drum Spring – Clutch Connection

The tabulation spring clutch connects the hub of the tab decelerator arm to the hub of the decelerator gear (Figure 7). During the last part of a tab operation, the decelerator arm is rotated at its camming surface to cause the spring clutch to drive.

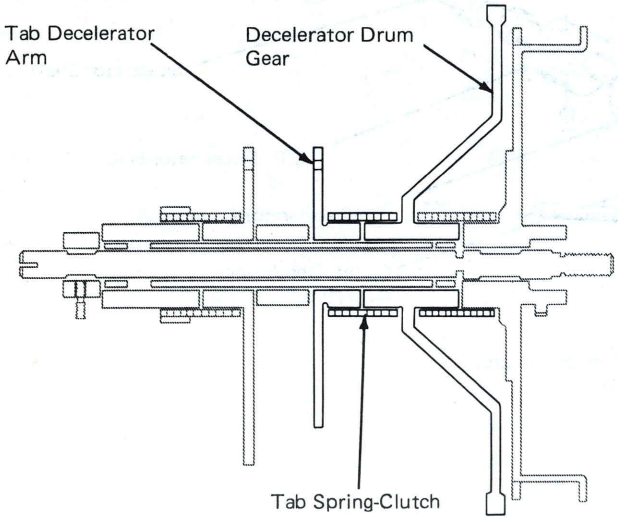
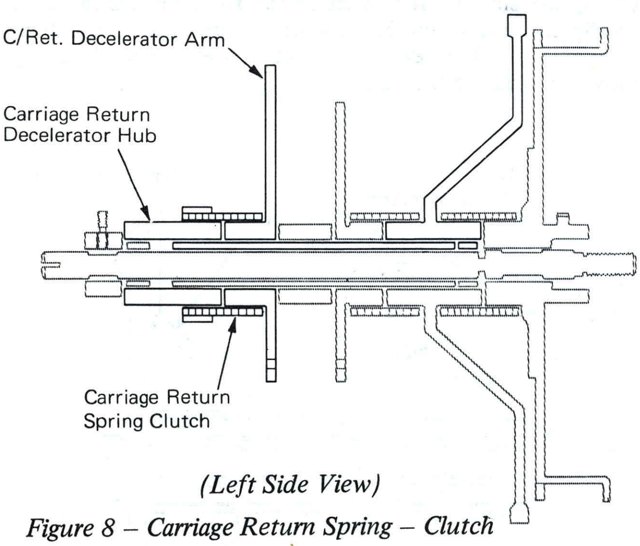


Figure 7 – Tabulator Spring Clutch (Left Side View)

The carriage return spring clutch connects the hub of the carriage return decelerator arm to a carriage return decelerator hub which is attached by screws to the sleeve of the decelerator gear and hub assembly (Figure 8). During the last part of a carriage return operation, the decelerator arm drives the spring clutch. The rotation from the governor causes a reduction in carriage speed.



(Left Side View)

Figure 8 – Carriage Return Spring – Clutch

CENTRIFUGAL GOVERNOR

The centrifugal governor is used to control the mainspring to limit the speed of the carriage during tabulation. The governor also serves to reduce carriage impact on tab and carriage return.

The governor has two arms mounted on a support which is pressed on a shaft and rotated by a pinion gear. The governor pinion gear is also pressed on the same shaft and engages the decelerator gear (Figure 9). The arms are pivot mounted and held toward the center of the governor housing by a spring.

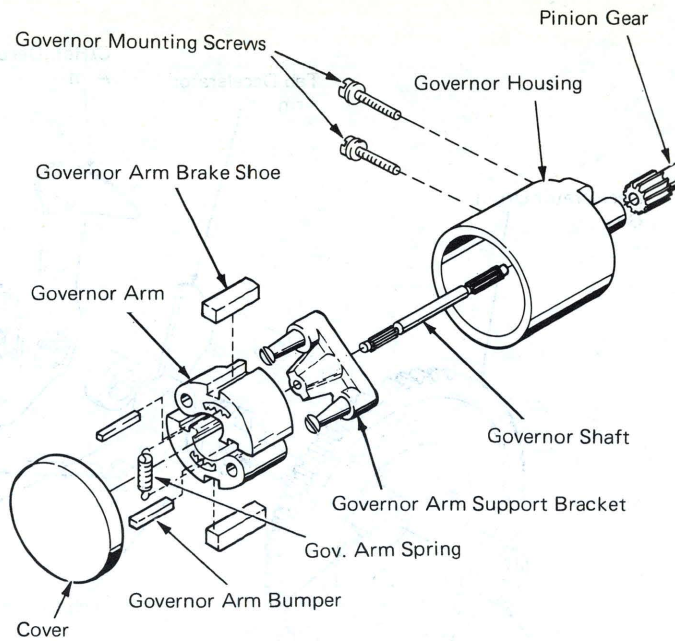


Figure 9 – Governor Assembly (Exploded View)

Motion to operate the governor is supplied by the decelerator gear. As the governor shaft is rotated at increasing speed, the centrifugal force that develops causes the arms to pivot outward overcoming the spring tension. This forces the governor brake shoes against the governor housing (Figure 10). The friction that develops between the brake shoes and the governor housing causes a reduction in the speed of the revolving assembly until the centrifugal force is reduced.

When the centrifugal force becomes less than the tension of the spring between the governor arms, the spring will pull the arms away from the housing. The governor arms do not pivot out again until a certain speed is reached. This is how a constant speed is maintained in the carriage from right to left.

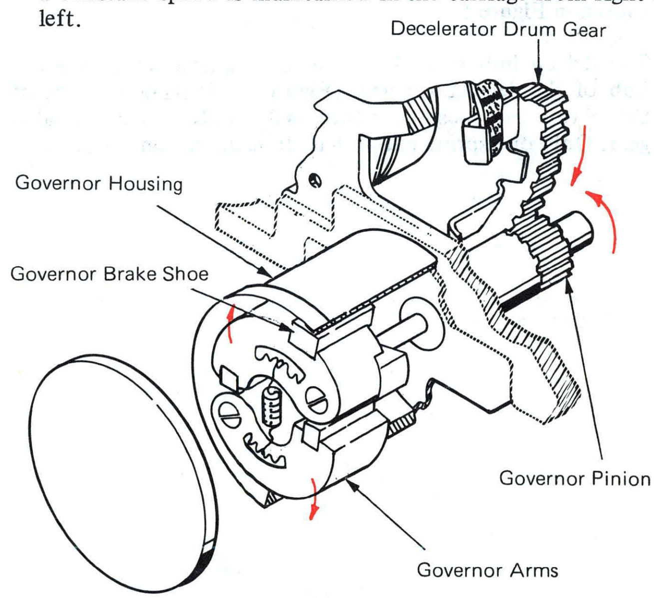


Figure 10 – Governor Arm Operation

The design of the early Model C governor is slightly different from that of the present level. The purpose and operation for both assemblies are the same except that the Level 1 pinion gear is mounted to the governor shaft by a clutch spring and collar and the arms by "C"-clip to the support bracket (Figure 11). The Level 2 pinion gear is mounted to the governor shaft by a pin.

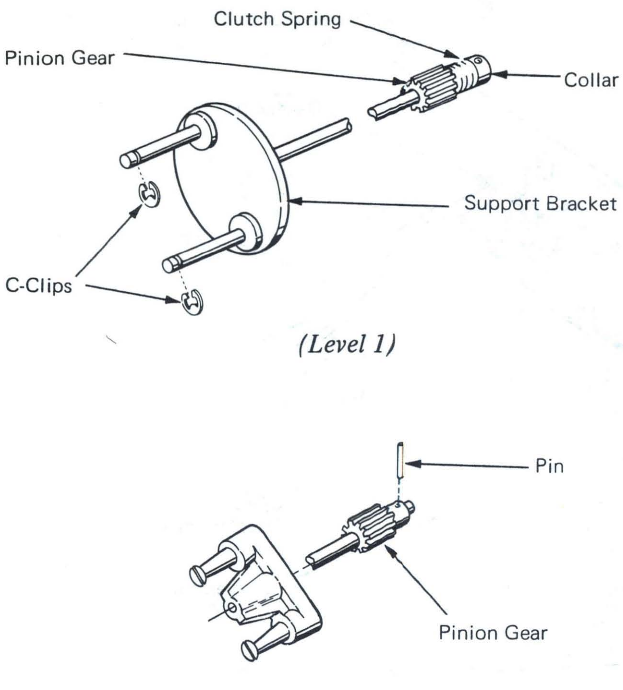


Figure 11 – Governor Arm Mounting

TAB DECELERATION

The motion to operate the tab decelerator comes from the tab check lever (Figure 12). During tabulation, the check lever moves to the right to meet the set tab stop on the carriage. As the tab stop contacts the check lever and pushes it to the left, it rotates the decelerator. A link from the check lever connects to a bellcrank which has a roller on the end of its other arm. The roller is in contact with the tab decelerator arm.

The motion of the check lever causes the bellcrank roller to move down the cam surface of the arm, causing the arm to rotate about the decelerator shaft on which it is mounted (Figure 12). This rotation of the decelerator arm causes the spring clutch to drive the decelerator gear and governor to reduce the carriage impact each time a tab stop is engaged. As the roller enters the notch on the tab decelerator arm, the speed of the governor is reduced to match the carriage drive speed. This removes the load on the tab check lever at unlatching. All deceleration must be completed before unlatching.

The tab check lever at rest is held by a keeper (Figure 12). This also holds the bellcrank roller down on the decelerator arm. When tab is operated, the check lever is released from behind the keeper and moves to the right. This allows the roller to move up on the decelerator cam arm, to the position from which it will start its decelerating action. An extension spring on the lower part of the decelerator arm keeps the cam surface in contact with the roller at all times.

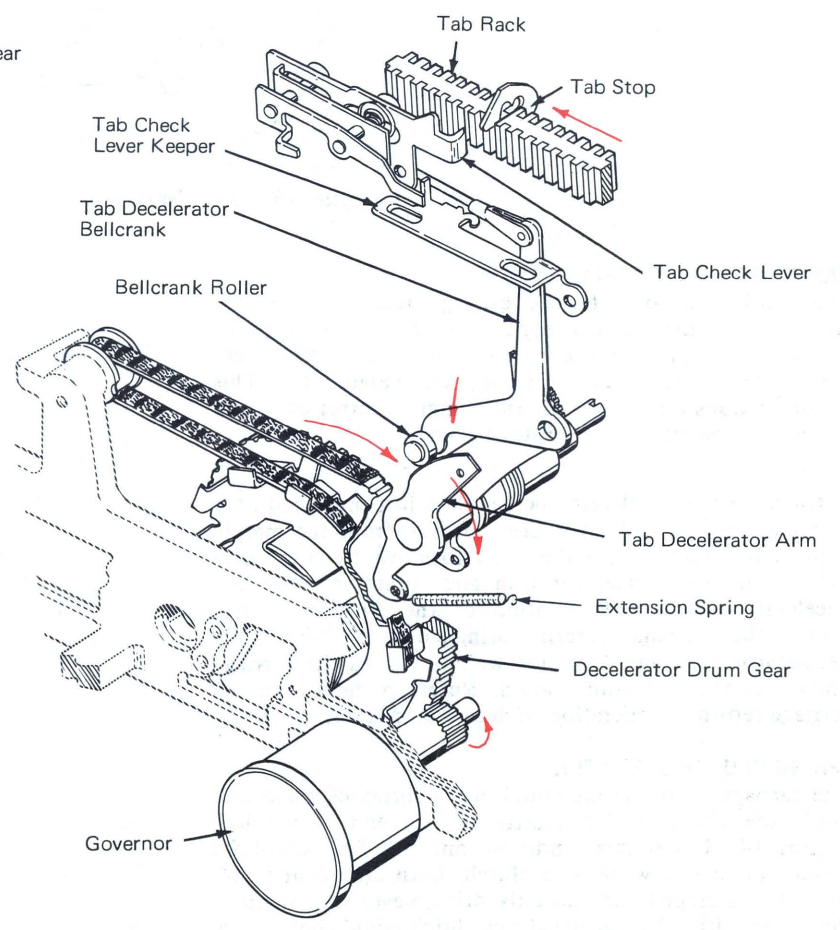


Figure 12 – Deceleration During Tabulation

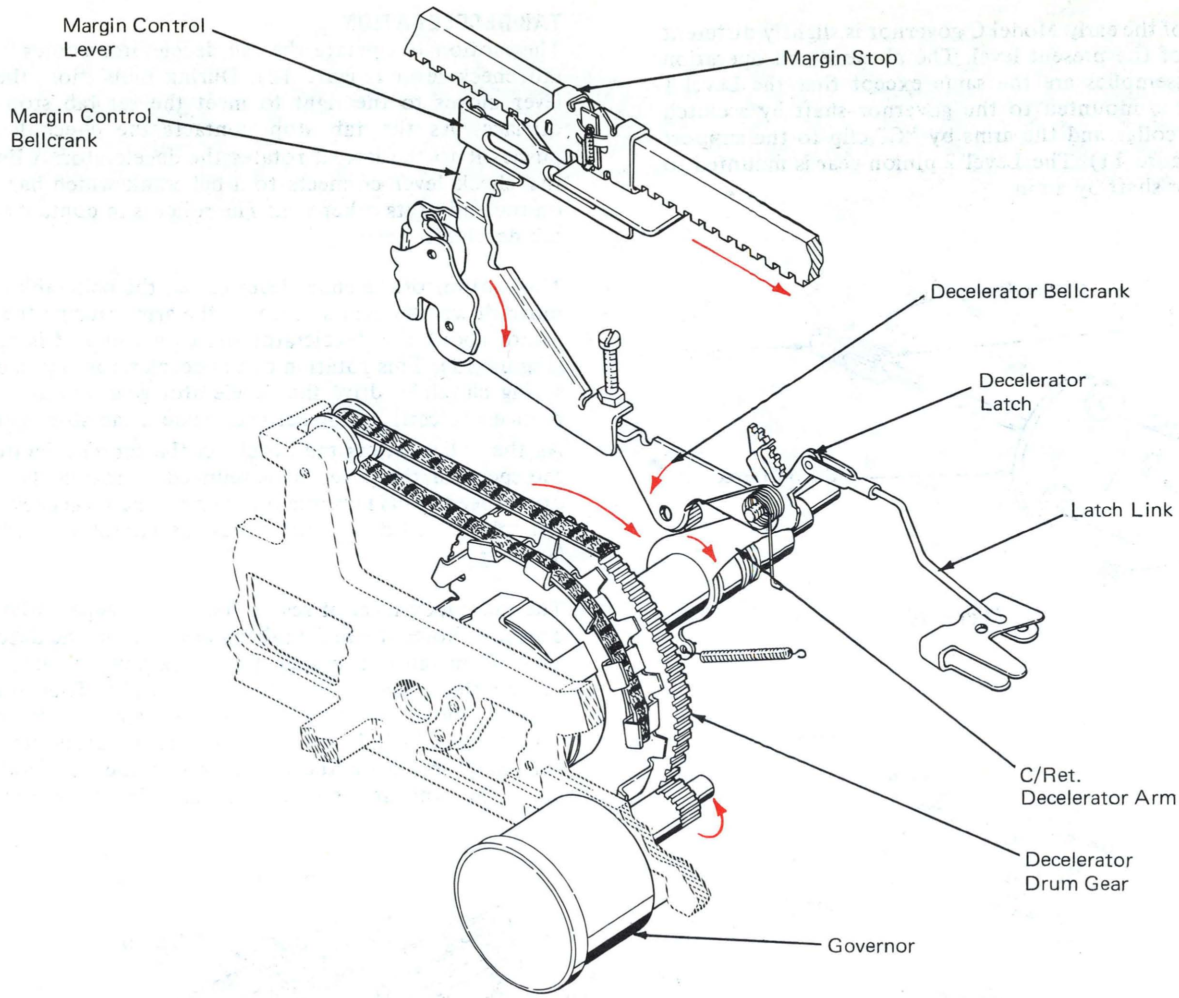


Figure 13 – Deceleration During C.R.

CARRIAGE RETURN DECELERATION

The motion to operate the carriage return decelerator comes from the margin control lever. As the carriage reaches the left margin, the margin stop contacts the margin control lever and pulls it to the right (Figure 13). This action is transferred through the margin control bellcrank to the carriage return decelerator bellcrank.

A roller on the decelerator bellcrank is in contact with the carriage return decelerator arm. Motion from the margin control bellcrank causes the roller to move down the cam surface of the decelerator arm and rotate it about the decelerator shaft. This rotation of the decelerator arm causes the carriage return spring-clutch to drive the decelerator gear and governor which reduces the carriage impact at the left-hand margin. Refer to the section on carriage return for operation of decelerator latch.

SPRING CLUTCH OPERATION

The carriage return spring clutch has a spring clamp which holds the clutch spring tightly to one end of the hub (Figure 14). Under this condition, only the free end of the spring clutch can work as a clutch, both driving and slipping. The clamped end can only drive, never slip. Without the clamp, either half of the spring clutch could slip.

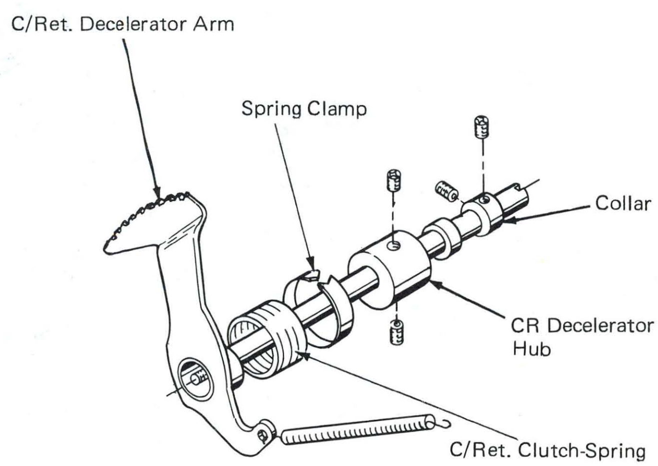


Figure 14 – C.R. Spring – Clutch Clamp

The stress in carriage return deceleration is much greater than in tabulation. Carriage return deceleration starts the governor rotating from a stopped condition. The inertia to be overcome is, therefore, much greater than in tab where the governor is already rotating before deceleration begins.

The amount of deceleration developed on carriage return and tab operations is a result of two conditions:

1. Position of the center spring attachment on the governor arms. Moving the spring near the pivot point causes the decelerator to operate quicker and with greater force applied by the brake shoes.

2. The section of the decelerator arm on which the bell-crank roller works. The distance of the roller from the pivot point of the decelerator arm affects the amount of rotation the decelerator arm receives. The same amount of motion from the roller will rotate the arm further and with more speed if it is applied closer to the pivot point of the arm. This condition is adjusted to get more or less deceleration on tab or carriage return.

A spring clutch consists of two hubs that turn on a shaft (a drive hub and a driven hub) and a clutch spring which connects the two hubs (Figure 15). The only driving connection between the two hubs is the spring clutch which overlaps each hub equally when the parts are assembled. The inside diameter of the spring coil is slightly smaller than the diameter of either hub on which it is fitted. To fit the clutch spring onto the hubs, it must be opened or unwound slightly. If one of the hubs is rotated, the spring will rotate with it, due to this close fit.

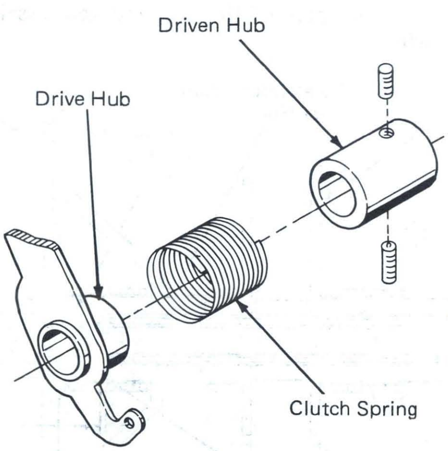


Figure 15 – Spring Clutch Components

The direction in which the hub is rotated, in relation to the direction in which the clutch spring is wound, determines whether the spring clutch will slip or drive. When the driving hub is rotated in the same direction as the clutch spring is wound, the coils of the clutch spring will wind more tightly increasing its grip on the driving hub (Figure 16). This tightening of the clutch spring is transferred across the full length of the spring causing it to grip tighter on the driven hub as well.

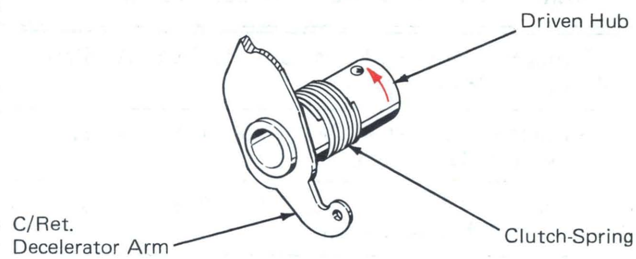


Figure 16 – Spring Tightens To Drive

Rotating the hub in the opposite direction as the clutch spring is wound causes the spring to unwind, allowing it to slip. The amount of force required to open the clutch spring until it slips depends upon the weight of the spring and the amount of force with which it holds the hub (Figure 17).

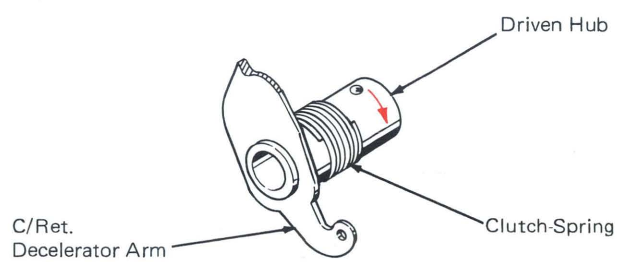
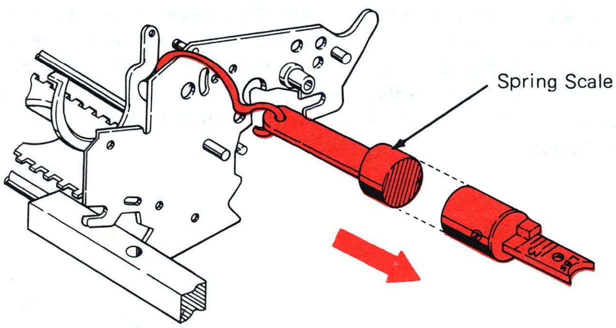


Figure 17 – Spring Opens To Slip

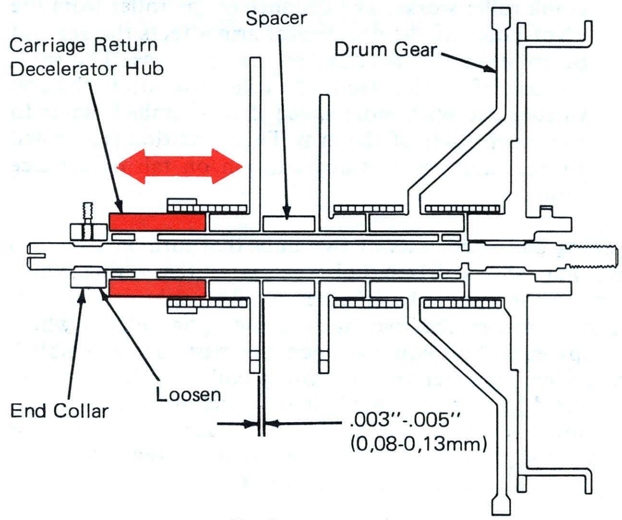
1. *Mainspring Tension* – Adjust by rotating the mainspring drum assembly to give proper tension as shown in the chart.

CARRIAGE PULLED FROM FAR LEFT TO RIGHT
13" Carriage – 3 to 3-1/4 Lbs. (1,36-1,47Kg.) At Start to 4-1/4 Lbs. (1,92Kg) Maximum
17" Carriage – 3 to 3-1/4 Lbs. (1,36-1,47Kg.) At Start to 4-1/4 Lbs. (1,92Kg.) Maximum
20" Carriage – 3-1/2 to 4 Lbs. (1,58-1,81Kg.) At Start to 4-1/4 Lbs. (1,92Kg.) Maximum
24" Carriage – 3-3/4 to 4-1/4 Lbs. (1,70-1,92Kg.) At Start to 4-3/4 Lbs. (2,43Kg.) Maximum
30" Carriage – 3-3/4 to 4 1/4 Lbs. (1,70-1,92Kg.) At Start to 4 3/4 Lbs. (2,43Kg.) Maximum



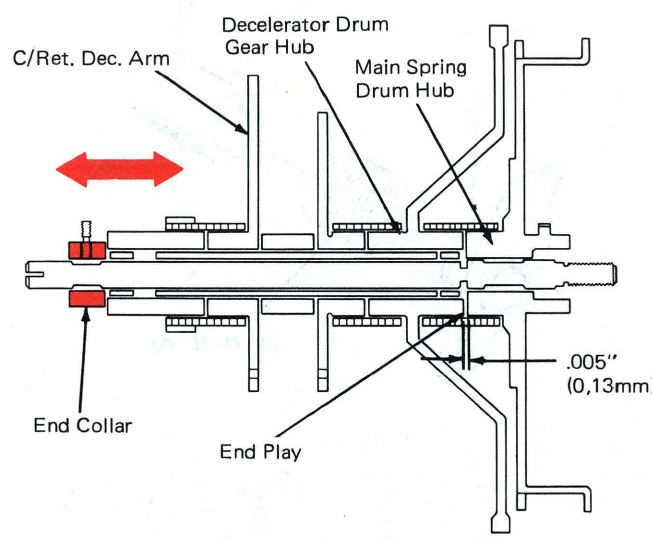
2. *Tab and Carriage Return Decelerator Arm (End Play)* – Adjust the carriage return decelerator hub for .003-.005" (0,08-0,13mm) end play of the arms on the shaft. The end collar may have to be loosened while adjusting the arm end play.

NOTE: On early level decelerators, the setscrews in the spacer between the tab and carriage return decelerator arms should be removed and thrown away before performing this adjustment.



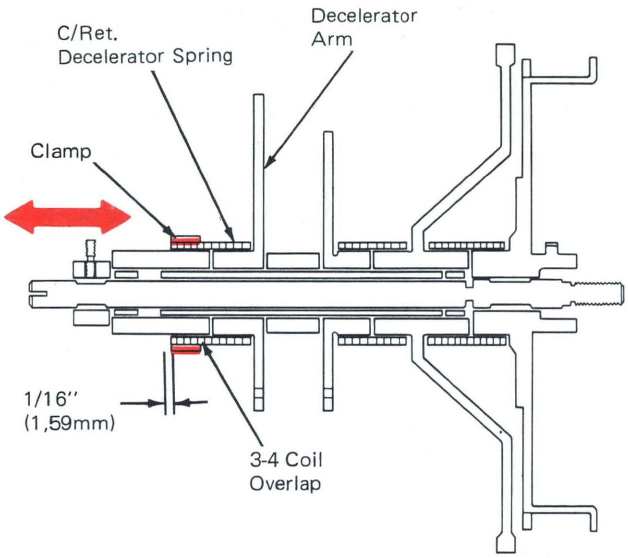
(Left Side View)

3. *End Collar* – Adjust the end collar for .005" (0,13mm) end play of the hub and gear assembly on the shaft.



(Left Side View)

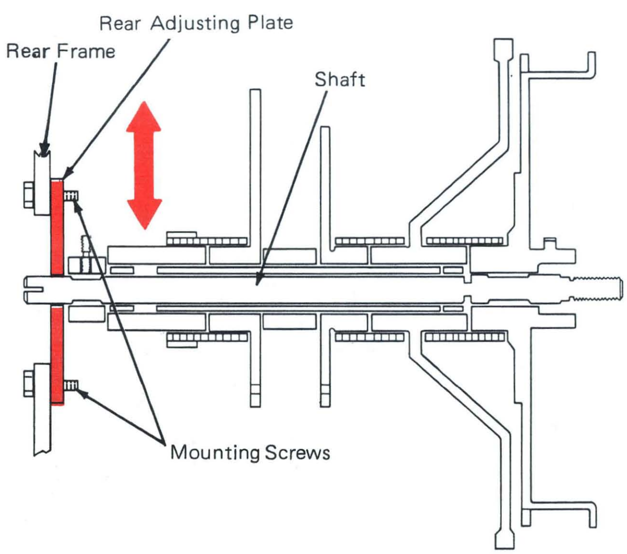
4. *Clamp* – Position the clamp on the carriage return decelerator spring clutch so that the rear edge is flush with or overhanging the clutch spring by 1/16" (1,59mm). Ensure the spring is not against the decelerator arm.



(Left Side View)

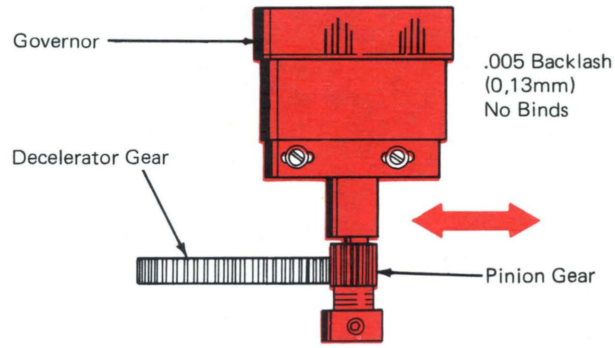
5. *Rear Adjusting Plate* – Loosen the two mounting screws, allowing the shaft to move to its own position, and retighten the screws.

NOTE: These screws should be loose while reinstalling a rear frame.



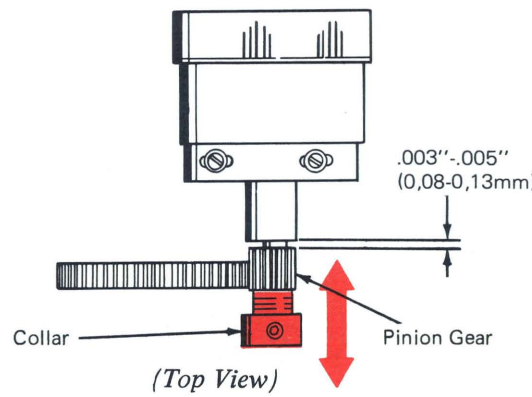
(Left Side View)

6. *Pinion Gear Engagement* – Adjust the governor left or right for the quietest operation. There should be no tight spots or binds for the full length of carriage movement. Backlash should not exceed .005" (0,13mm).



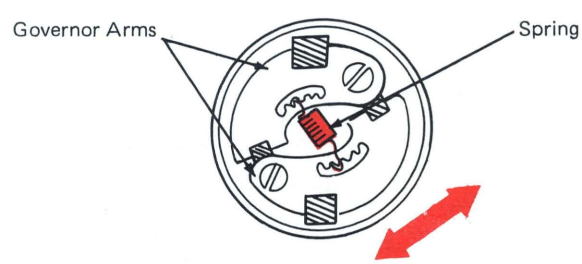
(Top View)

7. *Pinion Gear Collar, Early C* – Adjust so there is .003-.005" (0,08-0,13mm) end play of the shaft.



(Top View)

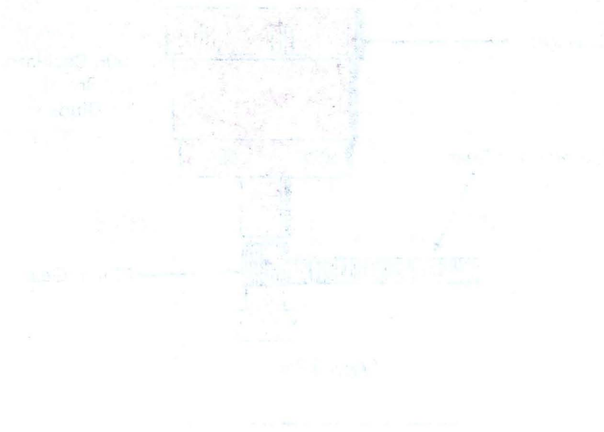
8. *Carriage Tabulation Speed* – Carriage speed should be equal on long tab and carriage return operations. Move the spring closer to the governor arm pivot for more governor action and away from the pivot for less action.



(At Rest)

Change Spring Holes
Tab Speed = C.R. Speed

[illegible] (Fig. [illegible]) [illegible] adjust the geometry to [illegible] for the [illegible] operation. There should be no [illegible] to [illegible] for the [illegible] [illegible] should [illegible]



4. Clutch: Position the drum on the [illegible] [illegible] clutch so that the [illegible] edge [illegible] [illegible] the clutch [illegible] by [illegible] [illegible] [illegible]

C1-D1 ESCAPEMENT OPERATIONAL THEORY

The purpose of the escapement mechanism is to move the carriage one space at a time from right to left during typing and spacebar operations. The position of the carriage is controlled by an escapement pawl, engaging an escapement rack tooth (Figure 1). The spacing of the escapement rack teeth determines the distance the carriage moves on each escapement operation. The escapement rack is mounted on the bottom of the carriage bed. The mainspring supplies the power to move the carriage from right to left.

As the typebar moves toward the platen during a print operation, it contacts and pushes a universal bar to the rear of the machine. The motion of the universal bar is transferred through an adjusting plate which is attached to the left side of the U-bar. As the adjusting plate moves to the rear, it supplies motion through the trip link to the escapement trip lever. This rotates the top of the trip lever toward the front of the machine and pivots the escapement pawl spacer forward which engages the escapement pawl and removes it from the rack.

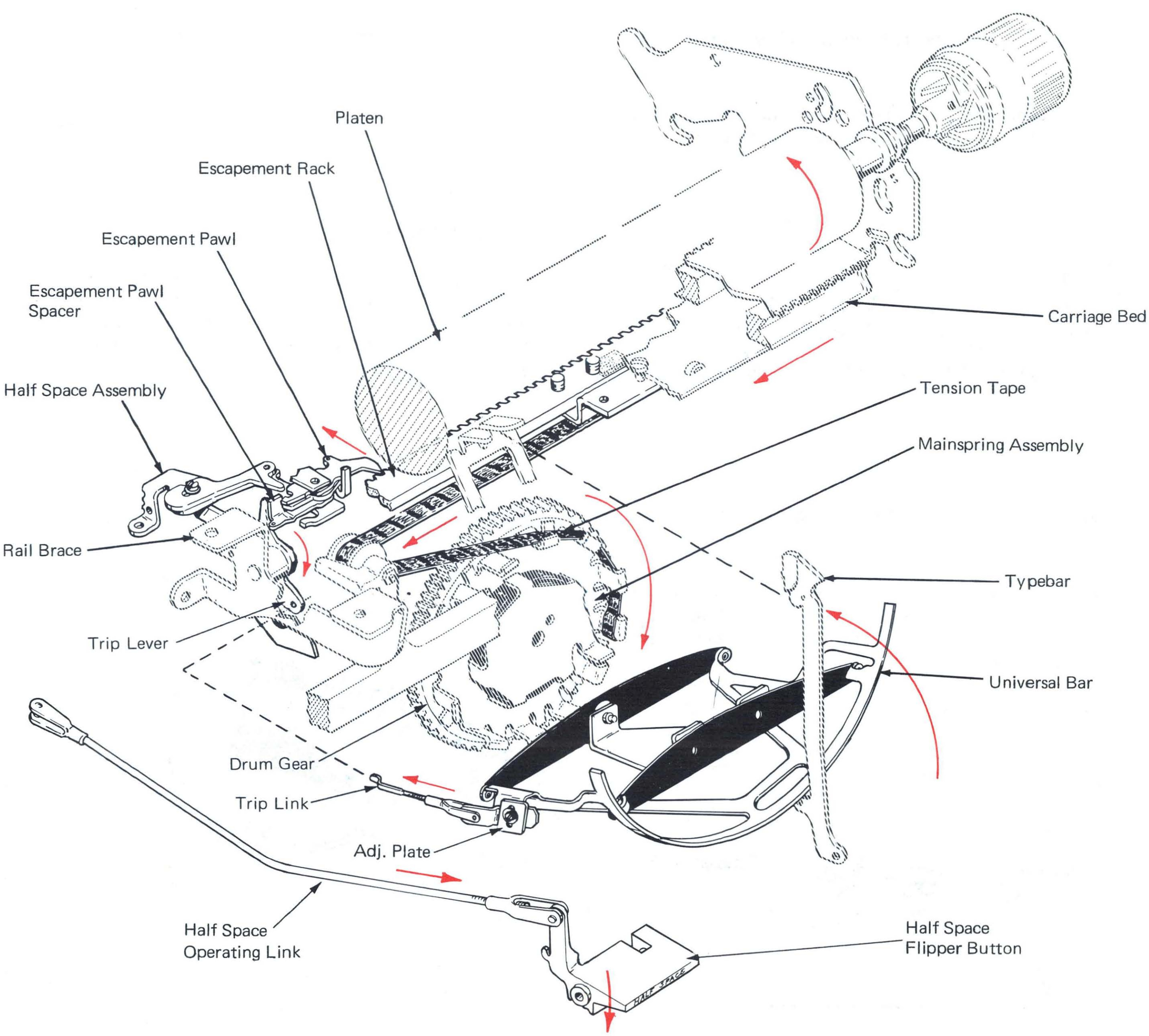


Figure 1 – Escapement Mechanism

ESCAPEMENT PAWL SEQUENCE:

1. A vertical lug on the escapement pawl spacer is partially behind the tail of the escapement pawl and carries the tail of the escapement pawl forward (Figure 2).

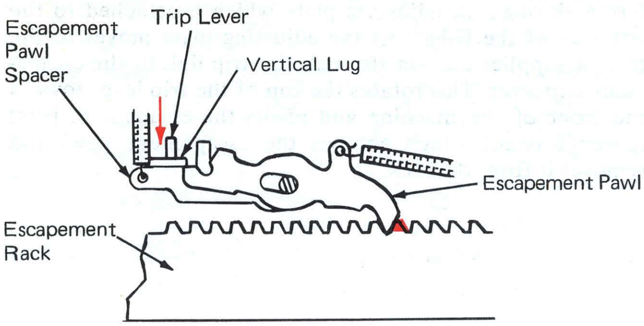


Figure 2 – Escapement Holding (Top View)

2. The escapement pawl pivots about the mounting stud until the pawl tip is out of the rack (Figure 3).

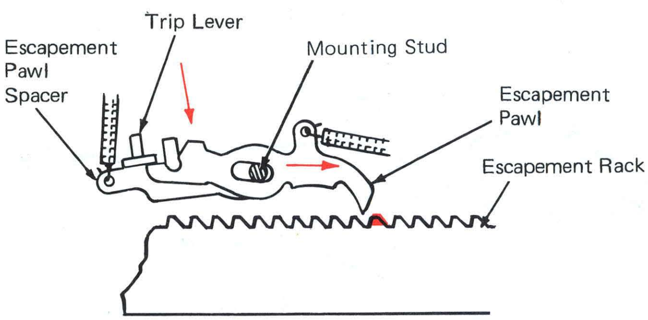


Figure 3 – Escapement Pawl Pivoted Out Of Rack

3. When the escapement pawl is pivoted out of the rack, it is pulled to the right on the elongated mounting hole and into the next tooth of the escapement rack by the pawl spring (Figure 4). The carriage, because of its weight, does not move until the pawl tip is safely positioned in the next rack tooth.

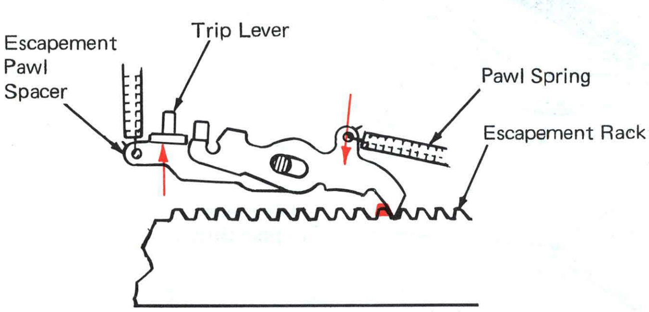


Figure 4 – Escapement Pulled To Right (Top View)

4. As the carriage moves to the left under tension of the mainspring, the escapement pawl is pushed to the left by the rack tooth until the right edge of the elongated mounting hole contacts the mounting stud (Figure 5). The carriage is then stopped and held by the escapement pawl. Due to the weight of the carriage, the typebar will print before the carriage moves.

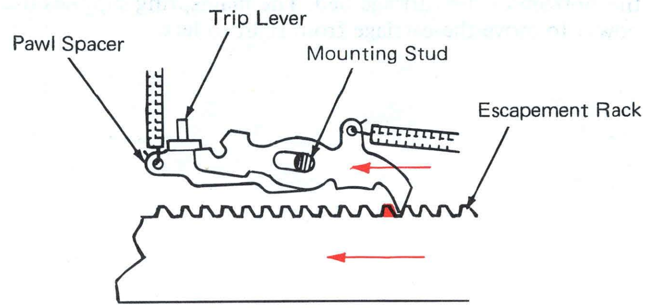


Figure 5 – Escapement Pawl Holding Rack (Top View)

UNIVERSAL BAR

The U-bar is mounted to the back of the segment with two screws (Figure 6). Flexible mounting springs connect the U-bar to the support in a way that allows only front-to-rear movement of the bar. The forward part of the U-bar fits into part of the segment and is contacted by any operating typebar.

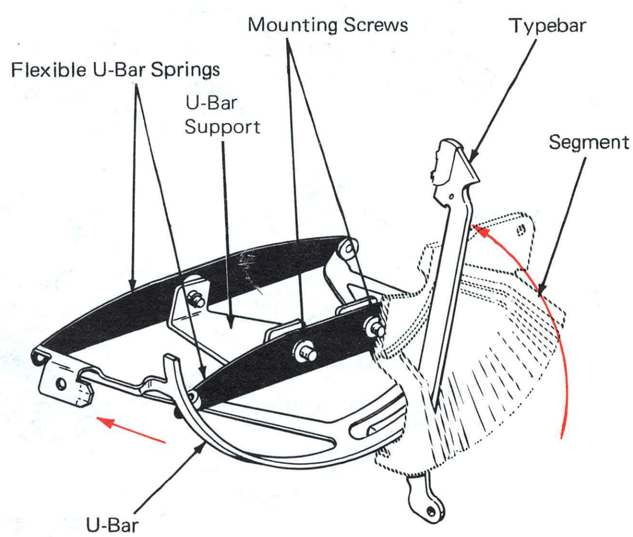


Figure 6 – U-Bar Mounting

PAWL & PAWL SPACER

The escapement pawl and pawl spacer are mounted on a stud attached by a rivet to a lower extension of the escapement pawl mounting bracket (Figure 7). An escapement pawl spring loads the escapement pawl to the right and into the escapement rack. The escapement pawl spacer is used to transfer the motion of the escapement trip lever to the escapement pawl.

It is mounted on the same stud with the escapement pawl; however, the mounting hole is slightly longer than that of the escapement pawl. The elongated mounting hole in the spacer allows it to be pushed to the left by the escapement pawl in case the spacer is still forward when the carriage escapes. A short spring loads the pawl spacer to the right and to the rear.

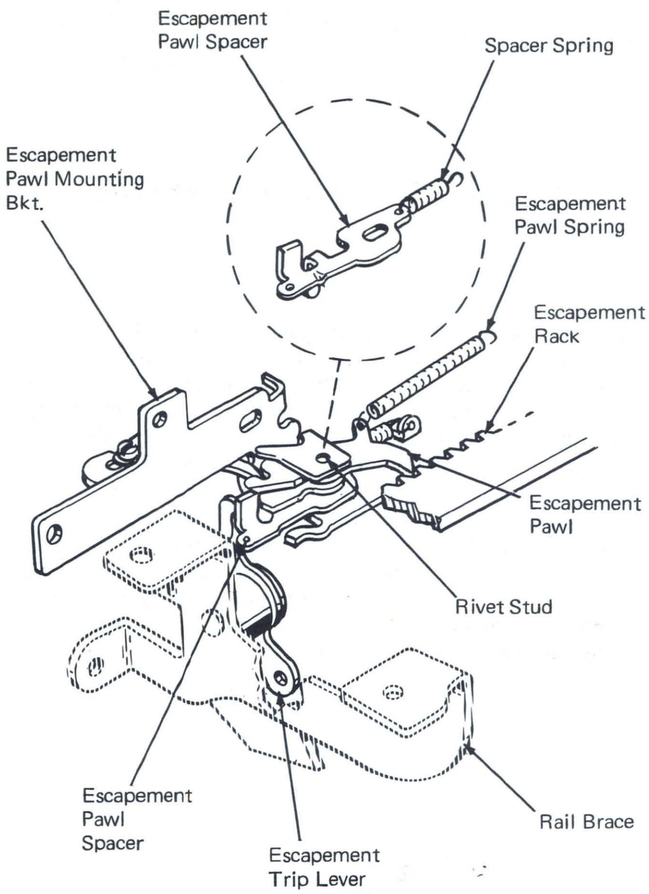


Figure 7 – Escapement Pawl Mounting

HALF SPACE MECHANISM

The Model D Typewriter uses a half-space mechanism to allow escapement in half-space units each time the half-space flipper button is depressed (Figure 8). If the half-space button is held depressed, any escapement operation will give the normal one space escapement but the carriage will hold 1/2 space from the normal holding position, or, in between two typed characters.

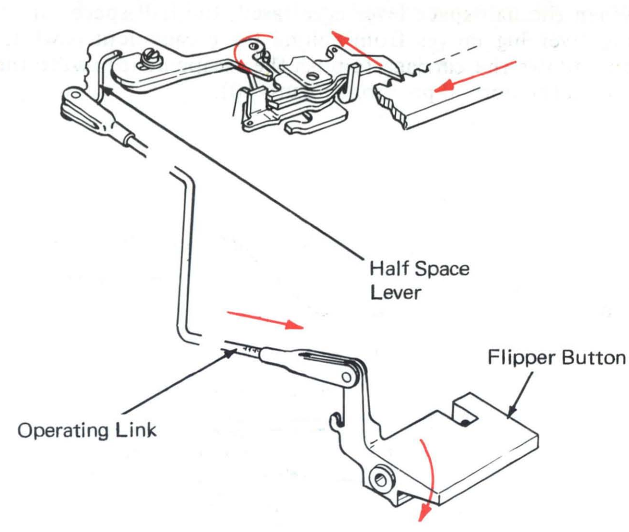


Figure 8 – Half Space Mechanism (Model D)

A half-space adjusting lever is mounted on the half-spacer. A lug on the half-space adjusting lever contacts a lug on the escapement pawl. The escapement pawl is pivoted out of the escapement rack and is pulled to the right, into the next escapement rack tooth by the escapement pawl spring. The tip of the lug on the half-space adjusting lever is now in position behind the lug of the escapement pawl. The lug on the half-space adjusting lever limits the escapement pawl movement to the left (Figure 9).

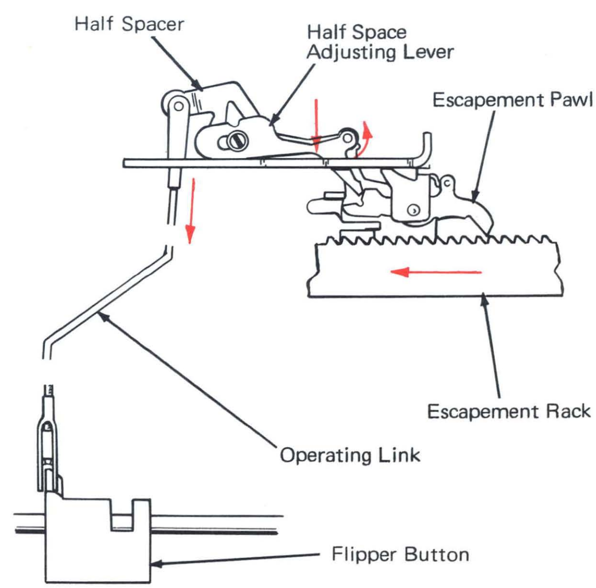


Figure 9 – Half Space Mechanism (Operated) (Top View)

When the half-space lever is released, the half-space adjusting lever lug moves from behind the escapement pawl lug and allows the carriage to push the escapement pawl to the left to the normal position (Figure 10).

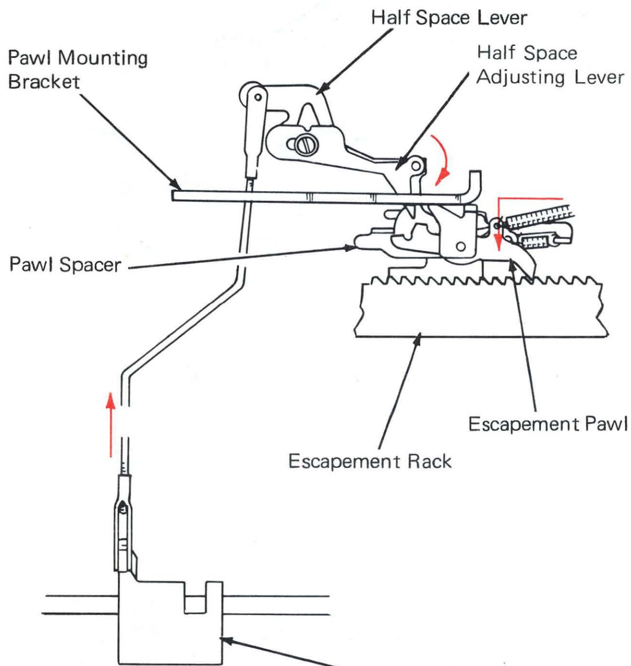


Figure 10 – Half Space Released (Top View)

FLOATING AND NONFLOATING PAWLS

The Model C Standard Typewriter has two types of escapement pawl bracket assemblies: 6-2/5 and 14 pitch machines use a "nonfloating" type of escapement assembly (Figure 11). This assembly has no identification mark on it and has only .038" (0,97mm) left to right motion of the escapement pawl.

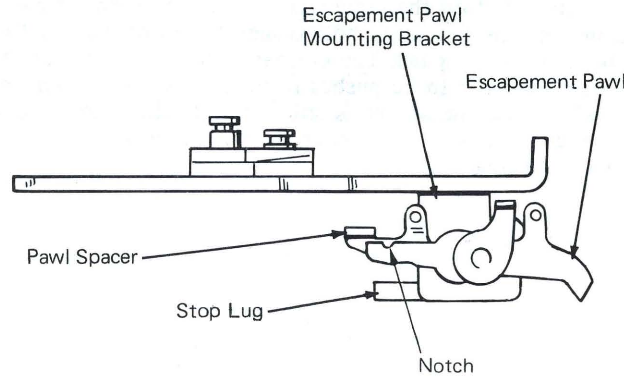


Figure 11 – Level 1 Escapement Pawl Bracket (Top View) (Non-Floating Pawl)

All other pitch machines use an escapement pawl with .058" (1,47mm) motion and a pawl spacer with the vertical lug located .027" (0,69mm) further to the right. This type of pawl bracket assembly is called the "floating" pawl bracket assembly. The "floating" pawl assembly can be identified by a notch in the front edge of the escapement pawl and escapement spacer (Figure 12). The "floating" pawl arrangement allows greater typing speed without type piling. The floating pawl escapement assembly is not used in the 6-2/5 and 14 pitch machines because the clearance between the rack teeth and pawl tip when the pawl reenters the escapement rack would be too small for safe operation during tabulation or escapement.

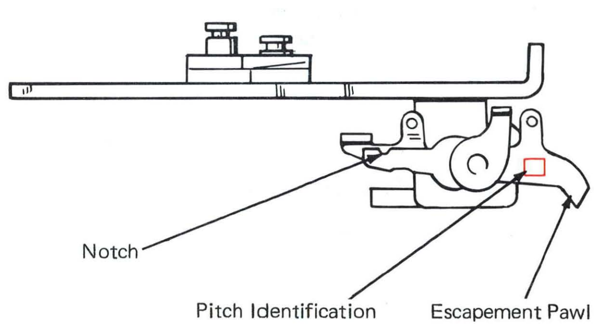
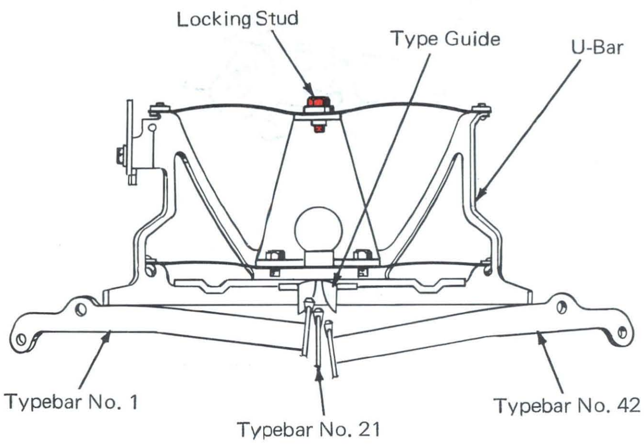


Figure 12 – Escapement Pawl Bracket (Top View) (Floating Pawl)

C1-D1 ESCAPEMENT ADJUSTMENTS

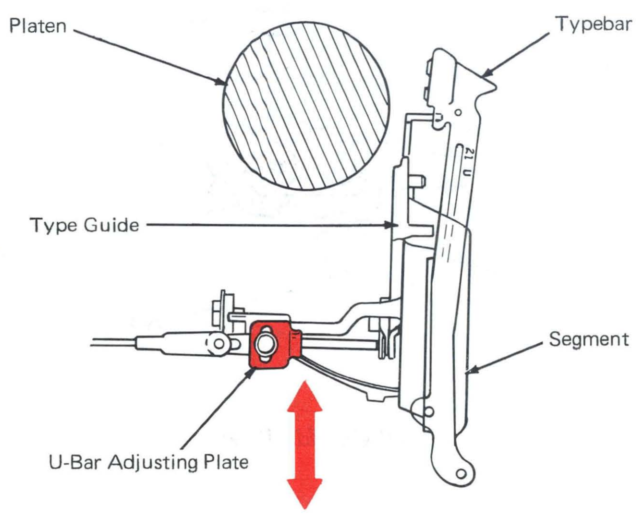
1. *U-Bar (Equal Tripping Point, Left, Center And Right)* – Place the No. 1 typebar approximately 3/8" (9,52mm) from the platen, then place the No. 21 typebar approximately 1/8" (3,18mm) from the face of the No. 1 typebar and the No. 42 typebar approximately 1/8" (3,18mm) from the face of the No. 21 typebar.

   With the typebars in this position, loosen the hexhead stud on the rear of the U-bar, allow the U-bar to find its own position, then tighten the hexhead stud. The left, center and right typebars should release equally.



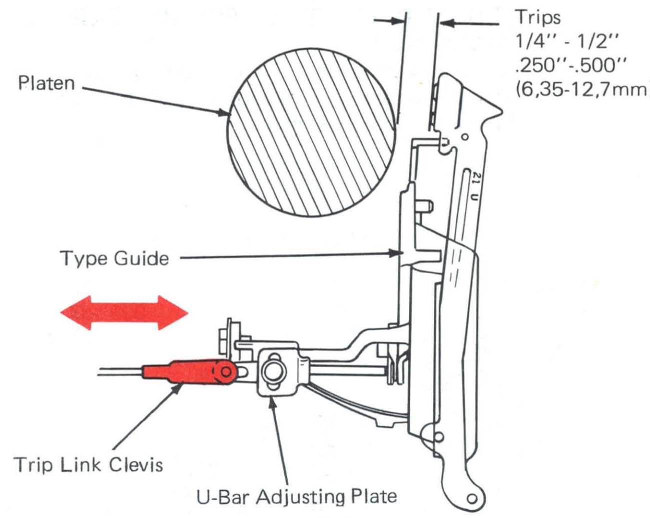
(Top View)

2. *U-Bar Adjusting Plate* – Adjust the U-bar adjusting plate up or down until upper and lowercase tripping points are equal.



(Left Side View)

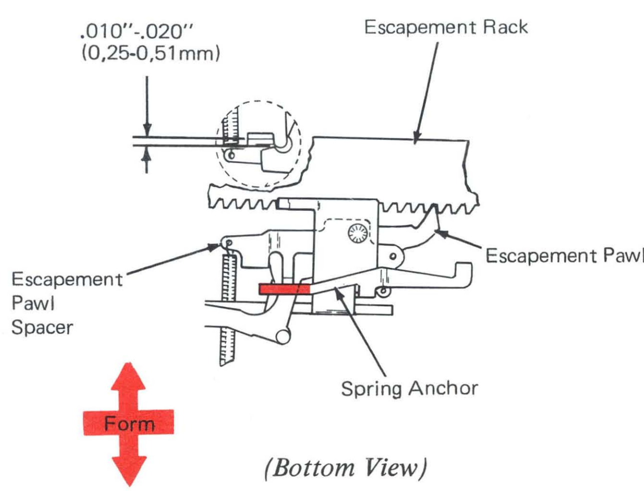
3. *Trip Link Clevis* – Adjust the trip link so that escapement occurs when the type face is 1/4-1/2" (6,35-12,7mm) from the platen. Check this procedure with several typebars and make sure proper escapement occurs.



(Left Side View)

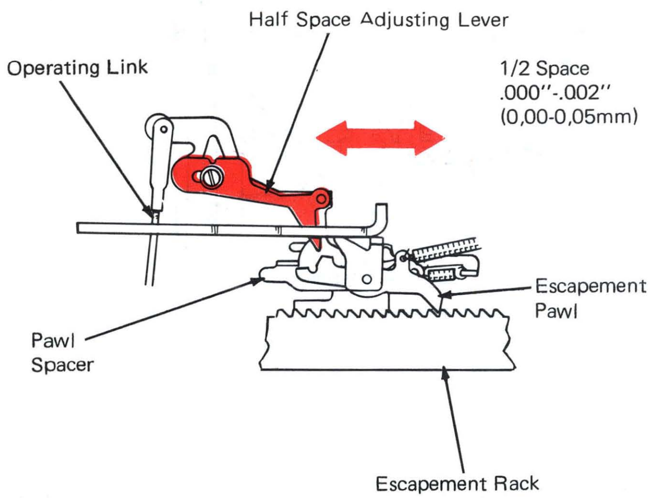
4. *Spring Anchor Extension, D1* – Form the extension to provide .010-.020" (0,25-0,51mm) clearance between the vertical lug of the escapement pawl spacer and the pawl tail with the escapement pawl bottomed in the escapement rack.

SERVICE TIP: This adjustment may be observed as follows: With the carriage all the way to the right, move a typebar toward the platen and observe the movement of the spacer. From the rest position, the spacer should move forward .010-.020" (0,25-0,51mm) before moving the escapement pawl.



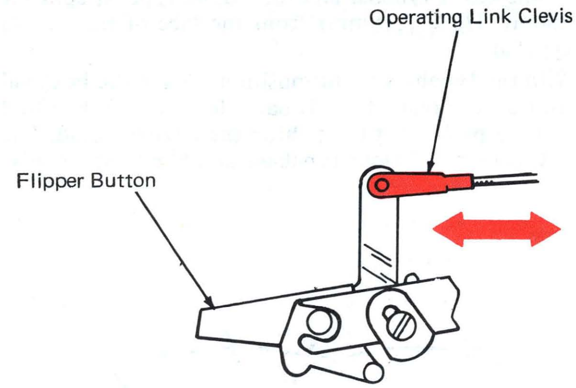
(Bottom View)

5. *Half-Space Adjusting Lever, D1* – Adjust the half-space adjusting lever left or right so when the mechanism is operated, the carriage will move 1/2 space plus .000-.002" (0,05mm). This adjustment may be checked in the following way:
   a. Print a series of diagonals.
   b. Position the carriage as if to strike over the first diagonal.
   c. HOLD THE HALF-SPACE BUTTON DEPRESSED AND PRINT A SECOND SERIES OF DIAGONALS.
   d. If the adjusting lever is positioned correctly, the second series of diagonals will be centered between the first series.



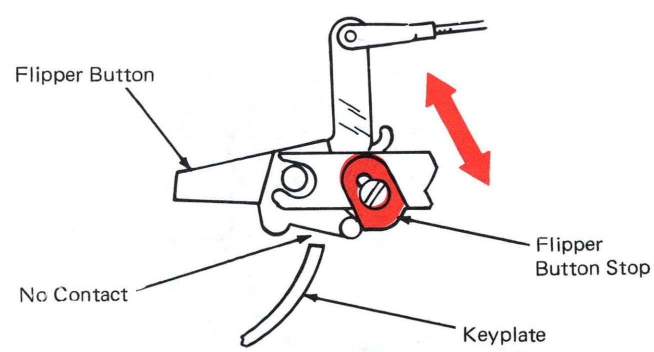
(Top View)

6. *Half-Space Operating Link Clevis, D1* – Adjust the operating link clevis so the top surface of the half-space flipper button is parallel to the base of the machine when at rest.



(Right Side View)

7. *Half-Space Flipper Button Stop, D1* – Adjust the flipper button stop so the flipper button has maximum overthrow after the escapement pawl is operated, but does not contact the keyplate.



(Right Side View)

C4-D4 ESCAPEMENT OPERATIONAL THEORY

The purpose of the C4-D4 escapement is to allow a proper amount of space for each character. For example, the letter I is much thinner than the letter M, therefore when the I is typed, the carriage moves less distance than when the M character is typed. C4-D4 escapement also has an additional expand feature. When operated, it expands the space of all characters and word spaces.

Escapement is caused when a letter cam is released against the power roll. The letter cam performs two functions for escapement (Figure 1).

First, it pulls on a selector bar, which in turn, pivots the selector bail to the rear. This action pushes the interposer bellcrank link to the rear, pivoting an interposer bellcrank. When the interposer bellcrank is pivoted, it lifts an interposer into the path of the escapement trip lever.

Second, the letter cam pivots the typebar against the universal bar, driving it to the rear. The trip link is pushed toward the rear, causing the trip lever to rotate. The trip lever pushes on the raised interposer or interposers that remove the desired number of escapement pawls from the escapement rack.

The carriage is under tension from the mainspring so that when the escapement pawls are removed from the rack, it is pulled to the left until the escapement rack tooth engages on the next available escapement pawl.

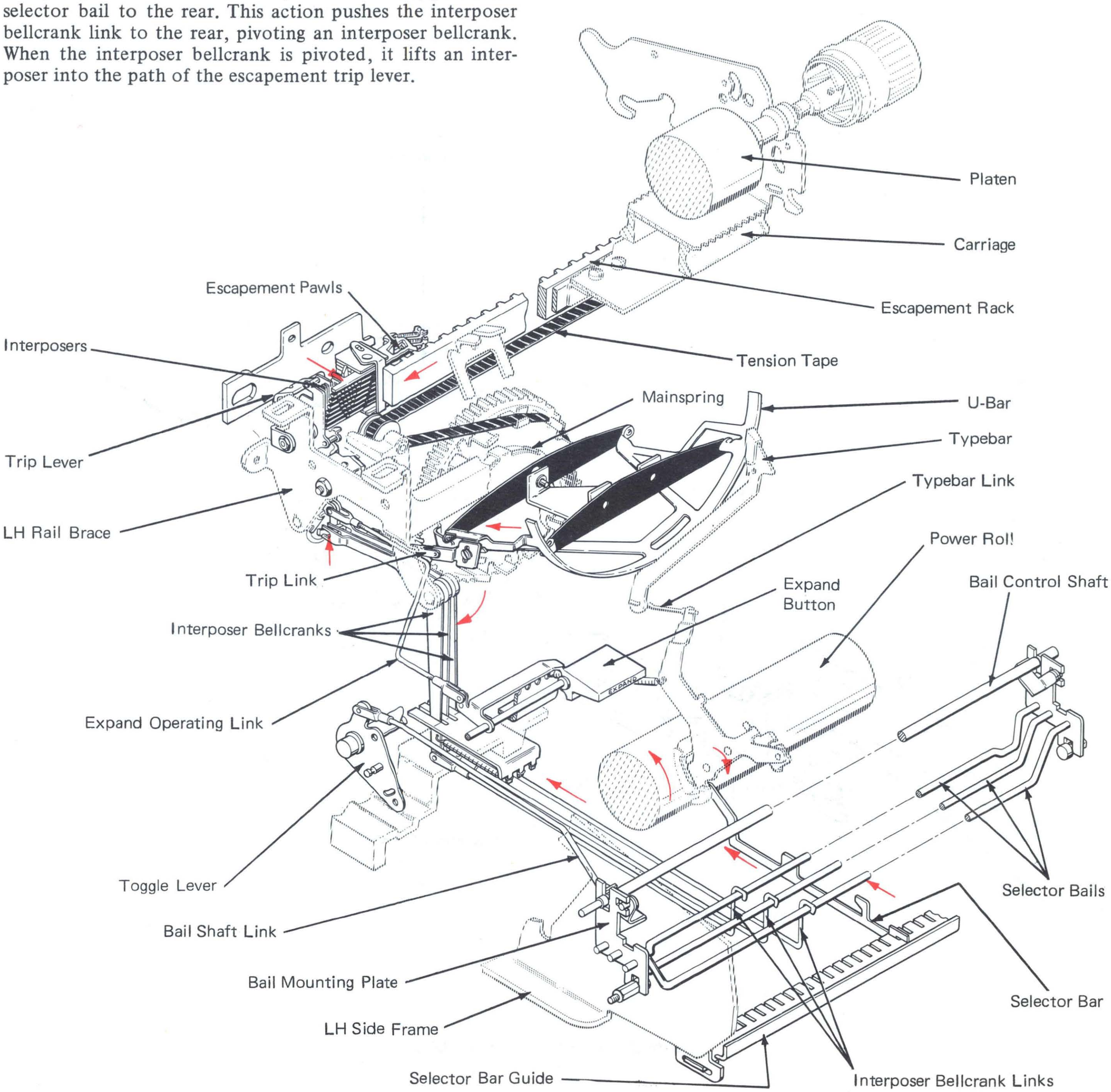


Figure 1 – C4, D4 Escapement & Selection Mechanism

ESCAPEMENT PAWL OPERATION

The C4, D4 escapement pawls (Figure 2) are mounted in a block which is mounted to the tab lever mounting bracket. Each pawl is spring loaded into the escapement rack. An escapement pawl holding against the escapement rack prevents the carriage from moving to the left. When the holding pawl is released from the rack, the carriage moves to the left the proper amount of space, when the character is typed. The escapement selection mechanism determines which pawls are released.

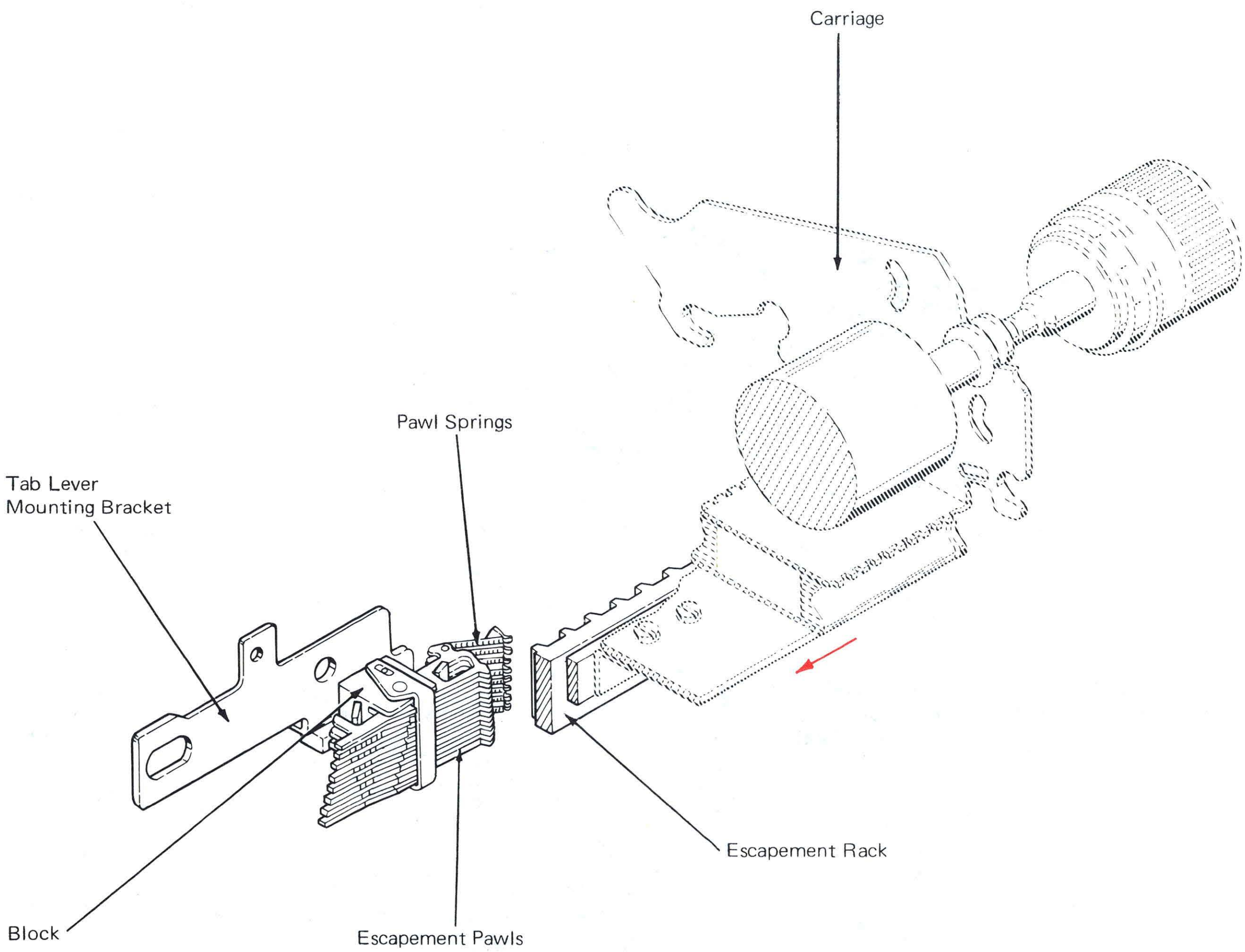


Figure 2 – Escapement Pawl Block

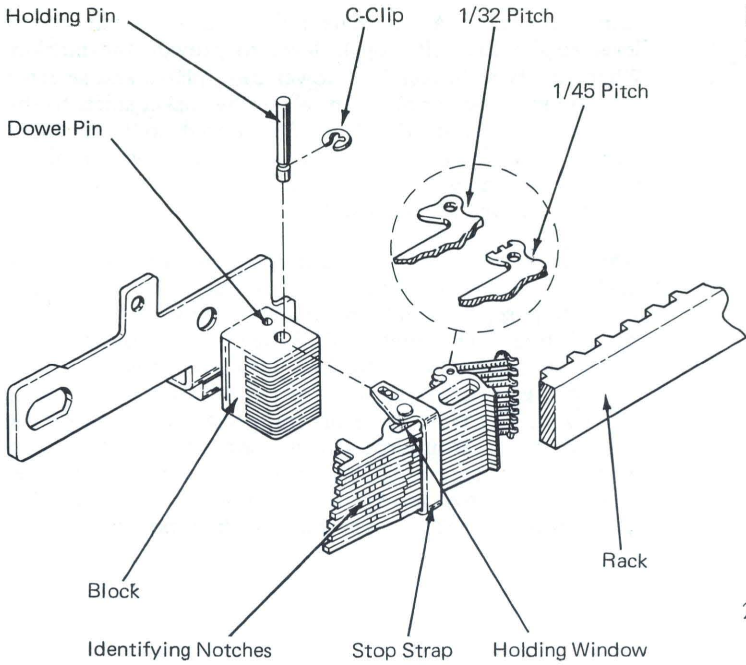


Figure 3 – Escapement Pawl Block

The pawls are held in the pawl block by a holding pin (Figure 3) which passes through the block and through the elongated holding window of each pawl. The elongated holding window is 6 units in length. A C-clip in the bottom slot holds the pin in the pawl block.

Escapement pawls are numbered from 1-8 according to their length and are mounted in the pawl block in numerical order from bottom to top.

The escapement pawls differ in length; the No. 1 pawl, the longest and the No. 8 pawl, the shortest. Starting at the No. 1 pawl, each pawl is 1 unit shorter than the previous pawl. The escapement rack teeth are spaced at 8 units. These differences combine to allow operation of the Proportional Spacing feature.

The pawls are notched (Figure 3) at their tails according to their number, except the 8 pawl which is not notched.

Notches in the pawl spring lugs identify the pitch of the pawls: 1/32 pitch pawls are not marked, 1/36 pitch pawls have one notch and 1/45 pitch pawls have two notches. A stop strap is across the front of the pawl block and is held in position by the step of the holding pin and two short dowel pins in the top and bottom of the block. The stop strap limits pawl motion to the right exactly 6 units.

Only one escapement pawl holds the carriage at any time, the other seven pawls are in position to hold when needed. The action of a single C4-D4 escapement pawl is the same as that of a C1-D1 escapement pawl.

ESCAPEMENT PAWL OPERATING SEQUENCE

1. Escapement pawl at rest holding carriage (Figure 4).

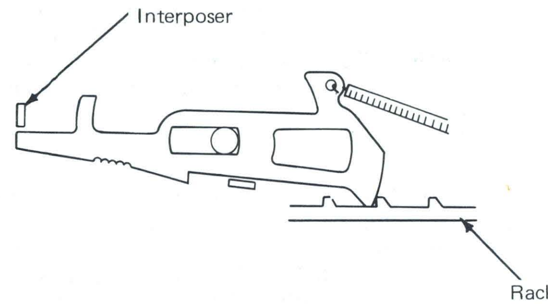


Figure 4 – Escapement Pawl Operation (Top View)

2. The escapement pawl is removed from the rack by motion of interposer applied to its tail (Figure 5). The escapement pawl pivots on the mounting pin; the pawl spring pulls the pawl to the right as soon as it clears the rack tooth.

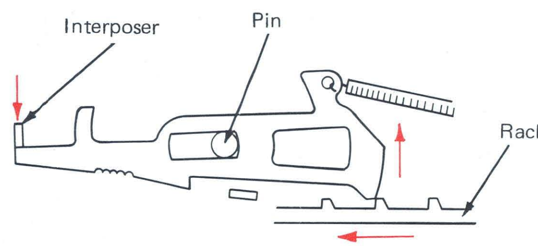


Figure 5 – Escapement Pawl Operation (Top View)

3. As the escapement pawl moves to the right, it clears the operating interposer and pivots back into the rack previous of the next rack tooth and is held by the stop strap (Figure 6).

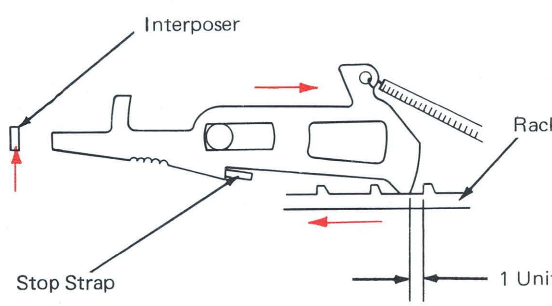


Figure 6 – Escapement Pawl Operation (Top View)

ESCAPEMENT SELECTION

The selection mechanism consists of selector bars, selector bails, interposer bellcrank links, interposer bellcranks and interposers (Figure 7).

The selector bars are hooked to a riveted stud on the forward end of the cam levers and are pulled to the rear by the cam action. The forward ends of the selector bars slide front to rear on a selector bar support which extends across the machine.

The selector bails pivot in the right and left mounting plates. The mounting plates move up and down on the bail control shaft and on pins with slots in the side frames. Control levers at each end of the bail control shaft fit into slots in the bail mounting plates and cause the plates and selector bails to move up and down when the shift mechanism is operated. A bail shaft link connects the bail control lever to the LH shift toggle lever to provide the motion. When the type basket is in lower case, plates and selector bails are in the lower position. When the basket shifts to the uppercase position, the bails are moved to their upper position. By having an upper and lowercase position of the bails, selection of different unit values for a character in upper and lowercase is possible.

When a selector bail is moved to the rear, a link connection pushes the lower arm of an interposer bellcrank to the rear. The interposer bellcranks pivot on a mounting stud on the left rail brace. The upper end of the bellcrank engages a lug on the interposer. When the link pushes the lower bellcrank arm to the rear, the upper arm of the bellcrank raises an interposer. The bellcrank arms are spring loaded toward the front to hold the interposers in their lower position until operated. The spring on the three unit bellcrank is heavier than the other two springs because it must override another spring in the spacebar mechanism which works against it.

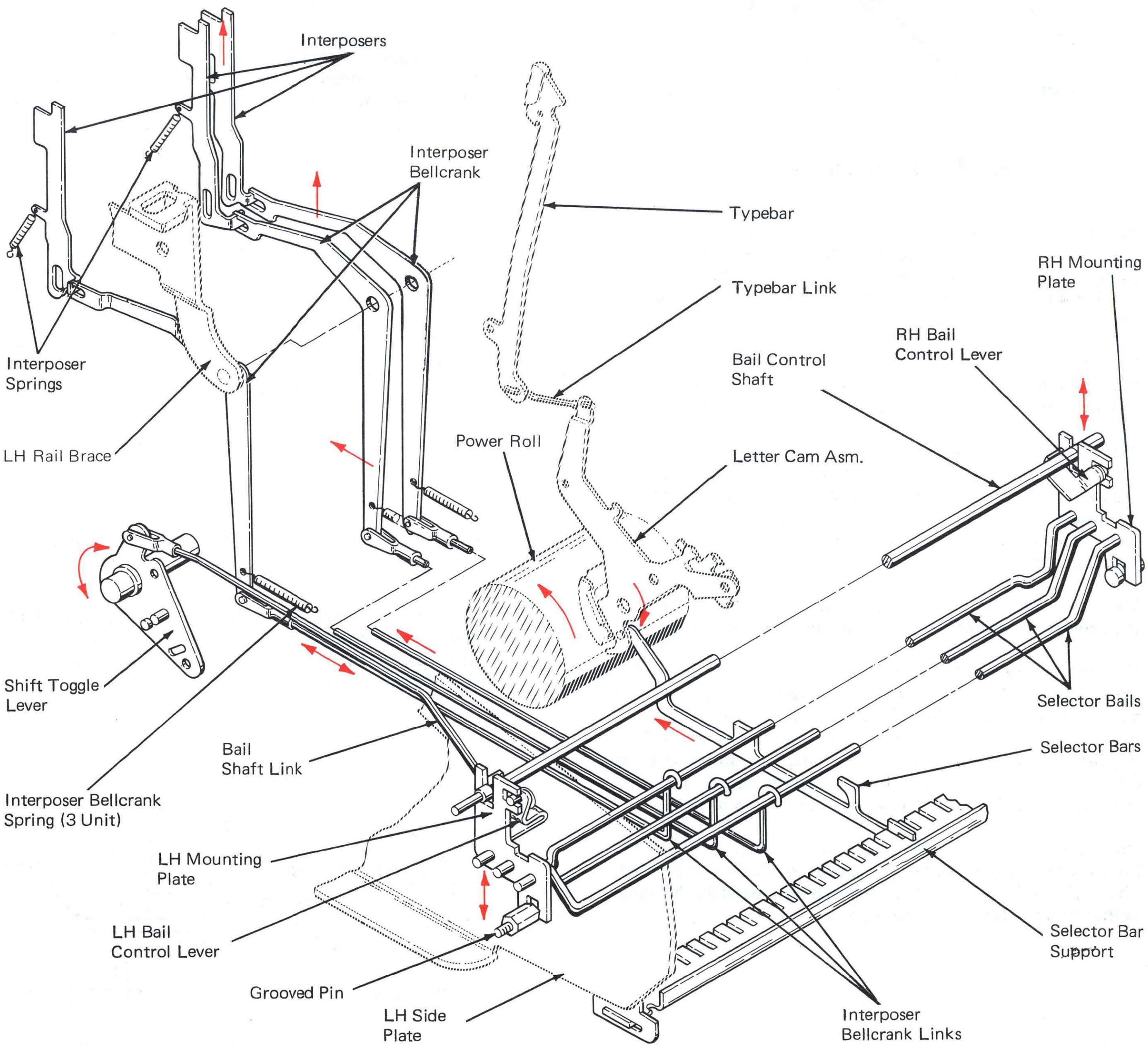


Figure 7 – Selection Mechanism

SELECTOR BARS

Lugs on the selector bars are positioned in front of the bails they are to operate (Figure 8). A full lug will contact the same bail in both upper and lowercase positions of the bail assembly. A lug with either the upper half or lower half cut away will operate the bail in only one of the two positions allowing for a change in selection when shifted.

Typebars having a two-unit character in both upper and lowercase positions do not require a selector bar because a two-unit escapement automatically occurs when the U-bar and trip lever operate.

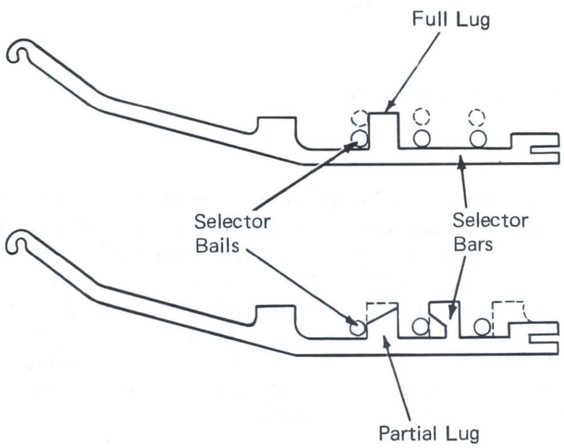


Figure 8 – Selector Bars (Left Side View)

ESCAPEMENT INTERPOSERS OPERATION

The escapement pawls are operated by interposers contacting the pawl tails in the same way as the lug of the C1-D1 escapement pawl spacer. The interposers are fitted in an interposer cage (Figure 9). The cage and the interposers are mounted on a pivot stud on the left side rail brace. The bottom of the assembly is spring loaded to the left on the stud by a compression spring. The upper part of the cage is spring loaded to the right to rest against the escapement pawl tail by a compression spring.

On the C4, an extension spring from the cage to a hook on the pawl strap loads the top of the cage to the right.

The interposer and cage assembly can pivot to the left on the mounting stud as may be required if the carriage escapes before the interposer returns to rest. Free movement of the interposer assembly to the left is necessary to allow the carriage to reach normal escapement movement without damage to parts and to allow interposers to restore as the trip lever restores.

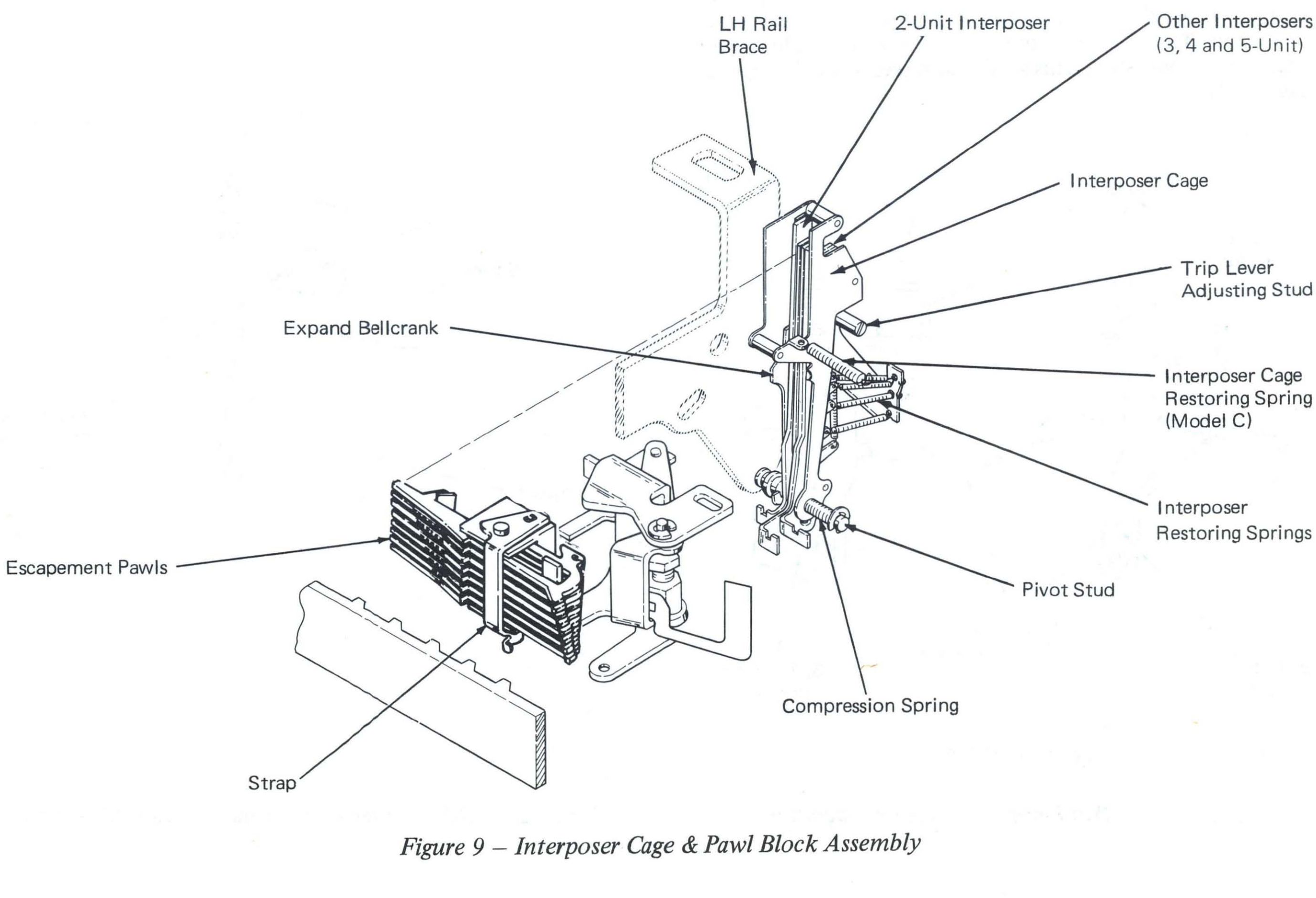


Figure 9 – Interposer Cage & Pawl Block Assembly

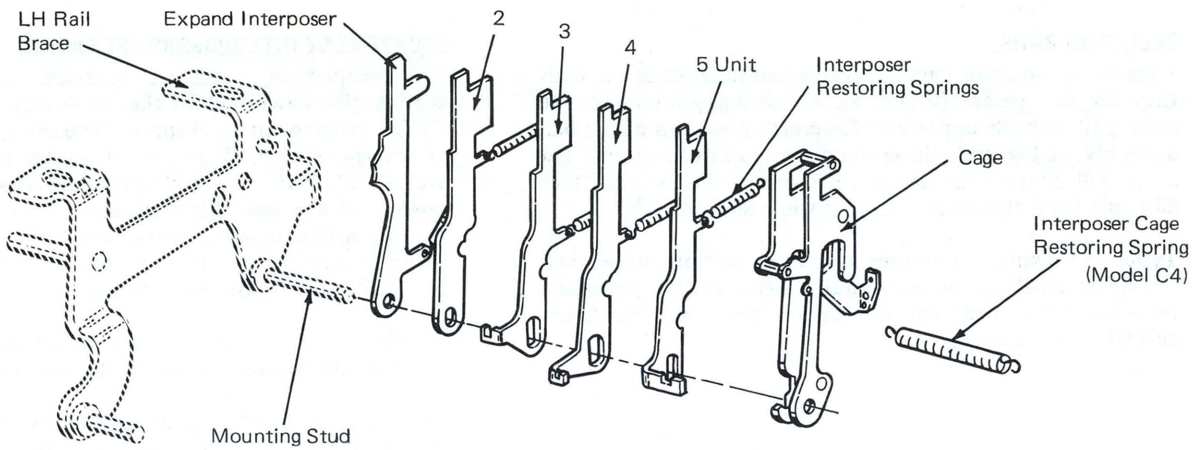


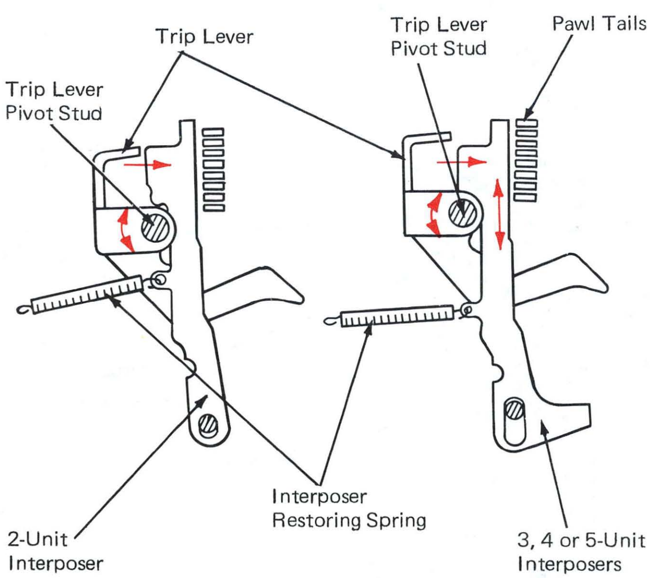
Figure 10 – Interposer Cage Assembly (Exploded View)

The number of escapement pawls removed on an escapement operation is determined by which interposers are operated. The interposer cage (Figure 10) contains a 2-, 3-, 4-, and 5-unit interposer plus an expand interposer. The expand interposer does not operate to remove any escapement pawls, it only serves as a spacer for the interposer cage.

The 3-, 4-, and 5-unit interposers can be raised and lowered because their pivot holes are vertically elongated. The 2-unit interposer has a round hold and is therefore always in the path of the trip lever (Figure 11).

The escapement trip lever is operated by either a typebar motion through the U-bar and link or by a spacebar operation. The trip lever is mounted on the left-hand rail brace by a pivot stud. This stud also serves as the interposer cage guide.

The width of the 2-unit interposer is 1/32 more from front-to-rear than the other interposers (Figure 12). This causes it to be engaged by the trip lever earlier and to be pushed before any other interposer that may be operated with it. This interposer always removes the holding pawl. By always using the 2-unit interposer, force is applied at equal distance from the holding pawl fulcrum point. This provides a constant force for the escapement operation with more even impression results.



(Left Side View)

Figure 11 – Trip Lever & Interposer Operation

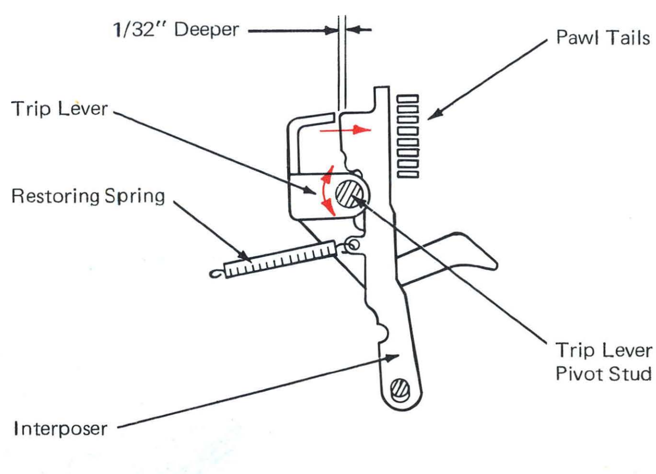


Figure 12 – 2-Unit Interposer Operation (Left Side View)

EXPAND OPERATION

For expanded typing, the operator depresses the expand flipper button at the keyboard. To return to normal typing, the operator raises the flipper button. When the flipper button is depressed, it rotates the expand bellcrank (Figure 13). The bellcrank is spring loaded to the left by the compression spring on the interposer mounting stud.

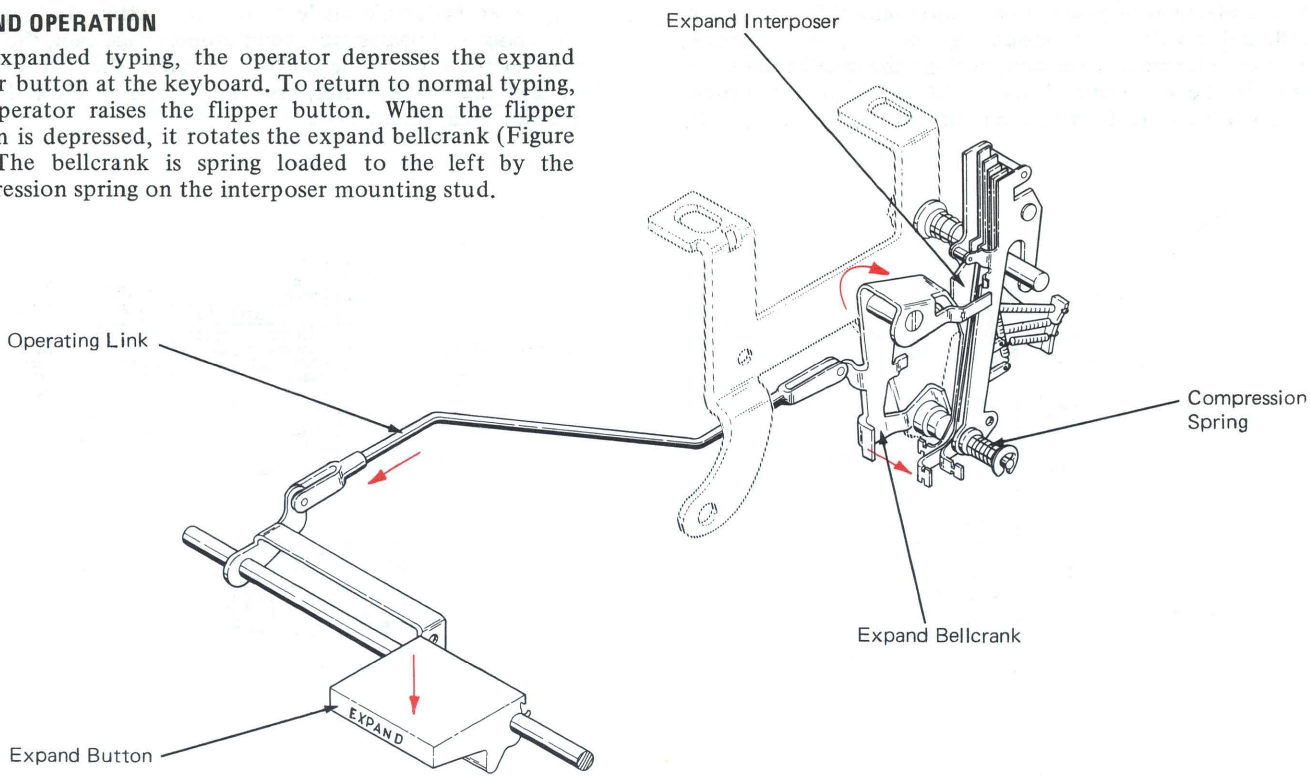
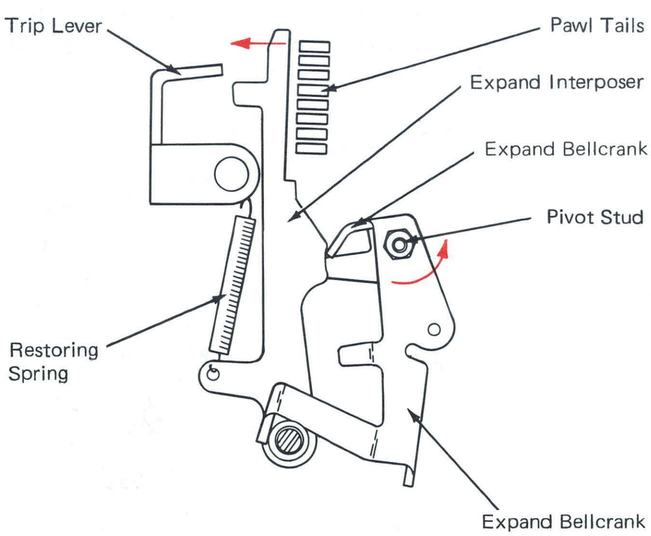
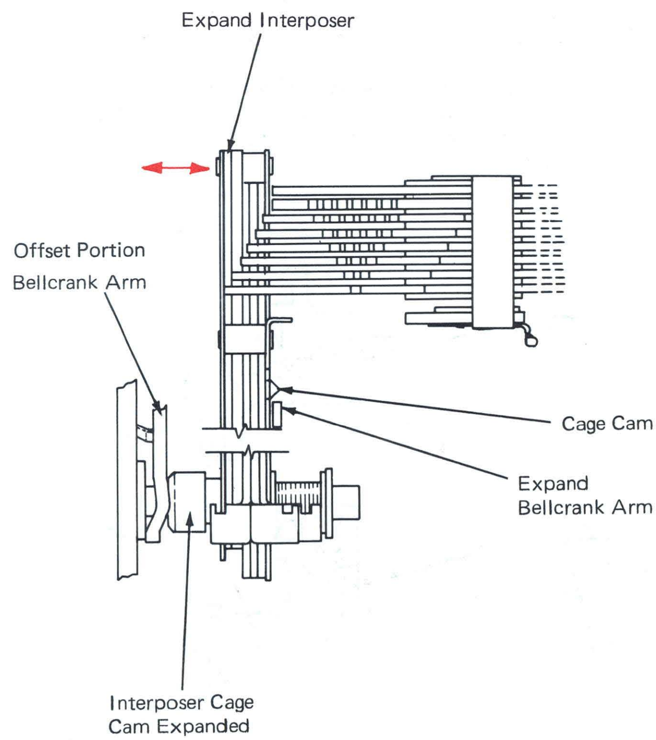


Figure 13 – Expand Operation

As the bellcrank rotates, the bellcrank arm moves down over the interposer cage cam and forces the cage to the left momentarily as the blade of the bellcrank pushes the expand interposer to the rear (Figure 14). At the same time, the offset at the bottom of the bellcrank pushes the bottom of the interposer cage one unit to the right and holds it there.



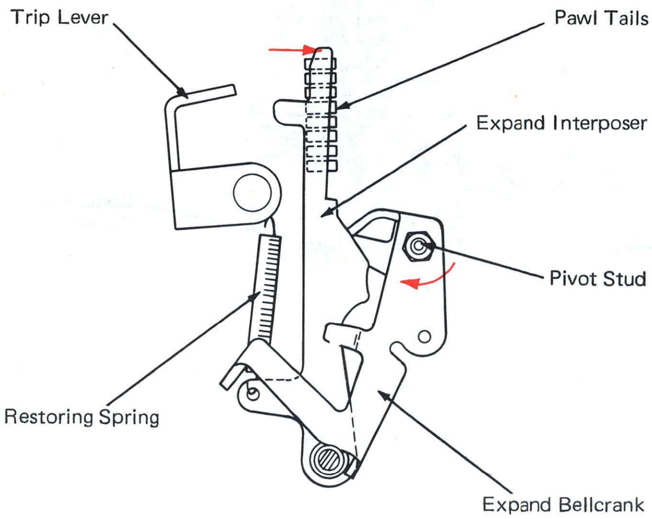
(Left Side View)



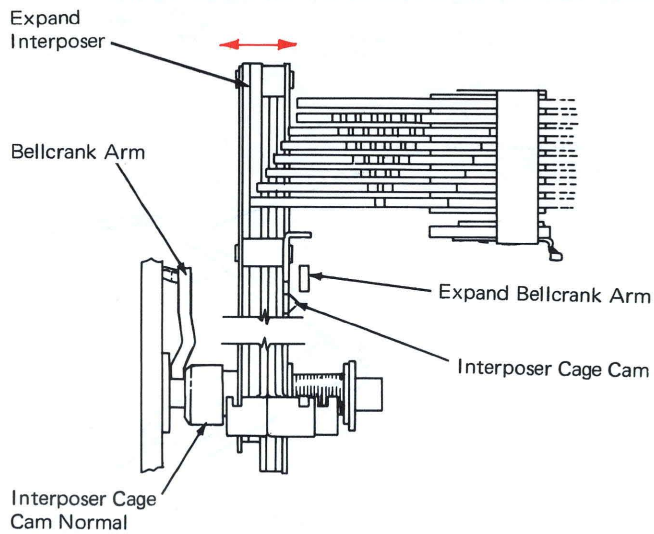
(Front View)

Figure 14 – Expand Mechanism (Expand Position)

As the mechanism returns to normal (Figure 15), the expand bellcrank pivots on the mounting stud. The arm rotates up over the interposer cage cam, pushing the cage to the left to provide the necessary clearance for the expand interposer to come forward from behind the escapement pawl as the expander bellcrank blade moves up. After the expander bellcrank arm passes over the interposer cage cam, the upper part of the cage will again be restored to the right with the side of the expand interposer resting against the tail of the holding escapement pawl.



(Left Side View)

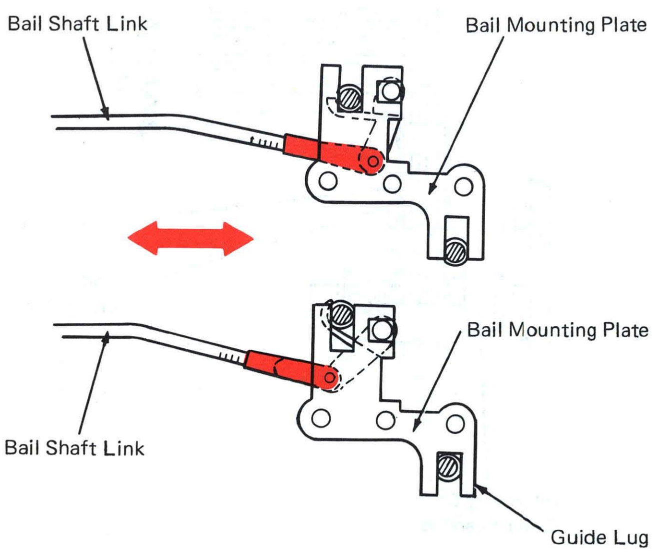


(Front View)

Figure 15 – Expand Mechanism (Normal Position)

C4-D4 ESCAPEMENT ADJUSTMENTS

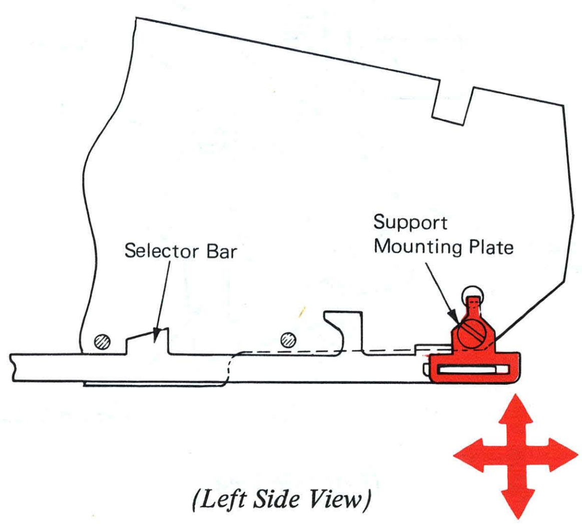
1. *Bail Shaft Link* – Adjust so the operating motion of the bail mounting plates is evenly distributed between their upper and lower extensions.



(Left Side View)

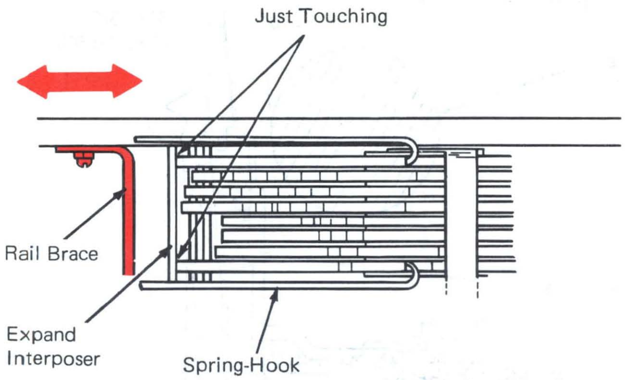
2. *Support Mounting Plates* – Adjust up or down so the selector bars just clear the bails in lowercase. Also adjust as far to the rear as possible without interfering with the restoring action of the selector bars.

NOTE: The bail shaft link and support mounting plate adjustment is to ensure that the bails and selector bars operate freely in lowercase and that the bails have full engagement with the selector bar lugs when in uppercase. Consider the two adjustments together until these conditions are satisfied.



(Left Side View)

3. *Interposer Vertical* – With the No. 5 pawl holding, move the rail brace left or right so that the No. 1 and No. 8 pawls just touch the expand interposer or move it the same amount when the escapement pawls are pulled to the farthest left.



Tighten only the two screws that mount the brace to the rear rail to check the adjustment. After a close adjustment has been made with these two screws tight, the rail brace may be moved slightly (do not form) left or right and locked in place by the rear support screw to make a fine adjustment. Tighten the front brace screw (eccentric mounting screw) after the adjustment is completed.

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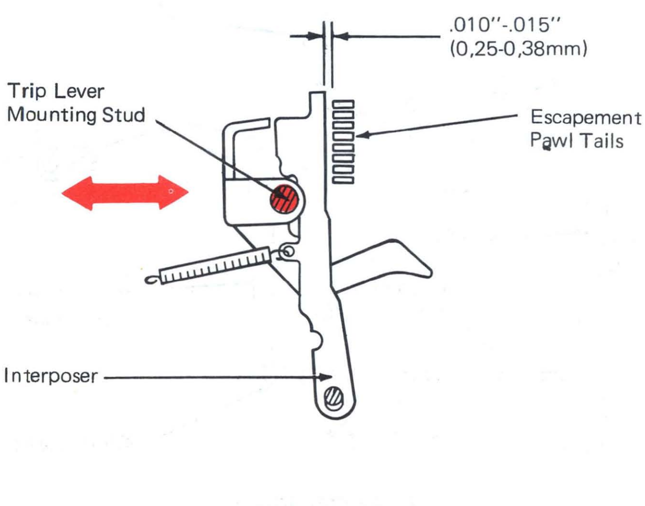
4. *Pawl Tail To Interposer Clearance* – Adjust the trip lever mounting stud for .010-.015" (0,25-0,38mm) clearance between the 2-unit interposer and the tails of the escapement pawls. Check while holding the top and bottom pawls and adjust for at least .010" (0,25mm) between the interposer and the closest pawl tail.



(Left Side View)

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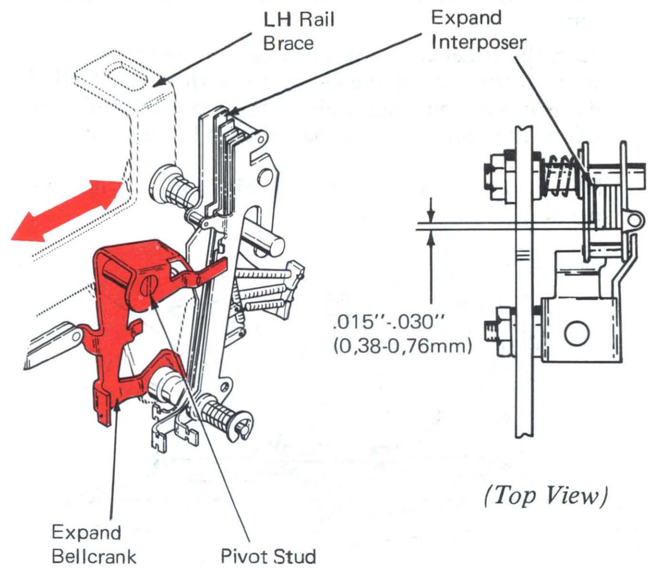
5. *Expander Bellcrank* – Adjust the pivot stud front or rear so that the front edge of the expand interposer is .015-.030" (0,38-0,76mm) to the rear of the 2-unit interposer when in expand.



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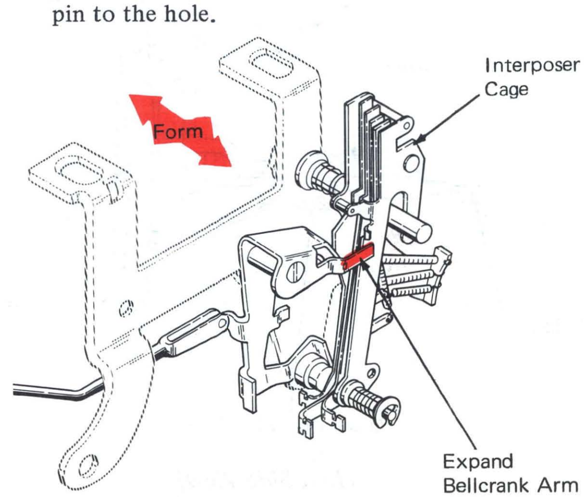
6. *Expand Bellcrank Arm* – Form the arm so it just clears the right side of the interposer cage when in the expand position. Check by pushing the carriage to the right. The interposer cage assembly should follow the holding pawl tail by only a few thousandths of an inch.

SERVICE AIDS: If the interposer bellcrank links are out of adjustment, they should be given a preliminary adjustment before continuing with the following adjustments. A close setting can be made as follows:

a. Operate the 2-unit spacebar to the high point of the cam. This is done to position the trip lever blade directly over the up and down path of the interposers.
b. WITH THE INTERPOSER BELLCRANK LINKS DISCONNECTED, HOLD EACH LINK ALL THE WAY FORWARD. Hold the interposer bellcrank to the rear and match the clevis pin to the hole.



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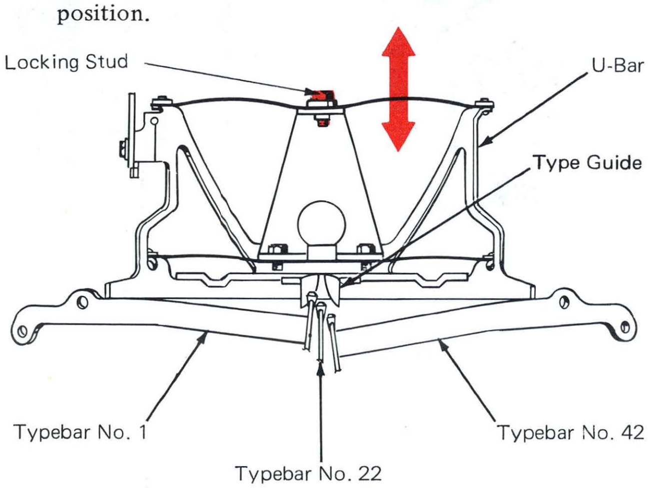
7. *U-Bar (Equal Tripping Point, Left, Center And Right)* – Place the No. 1 typebar approximately 3/8" (9,52mm) from the platen, then place the No. 22 typebar approximately 1/8" (3,18mm) from the face of the No. 1 typebar and the No. 42 typebar approximately 1/8" (3,18mm) from the face of the No. 22 typebar.

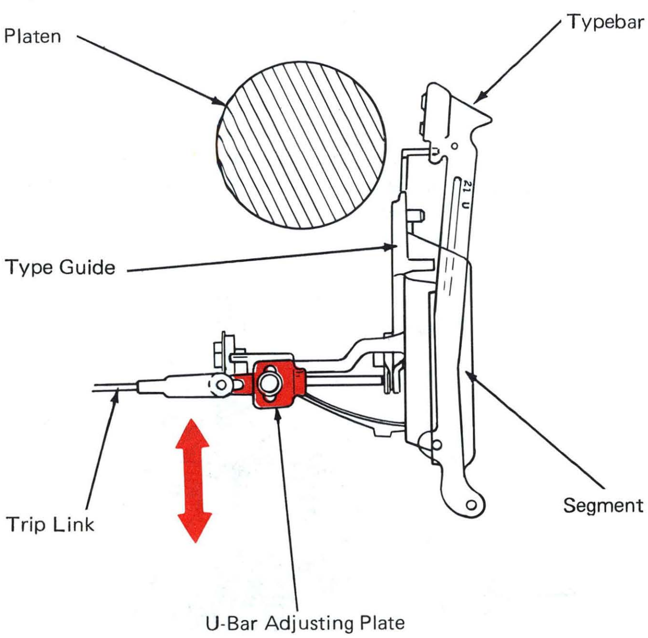
   With the typebar in this position, loosen the hexhead stud on the rear of the U-bar, allow the U-bar to find its own position, then tighten the hexhead stud. The left, center and right typebars should trip equally.

   NOTE: U-bar must be free of binds to find its own position.



(Top View)

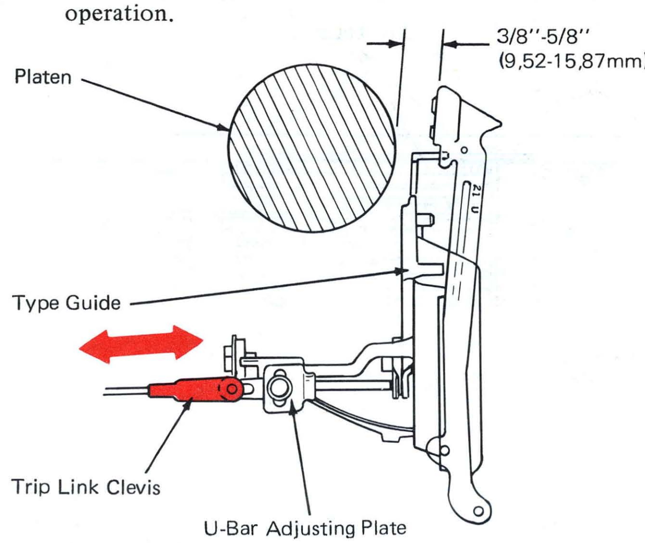
8. *U-Bar Adjusting Plate* – Adjust the U-bar adjusting plate up or down until upper and lowercase tripping points are equal.



(Left Side View)

9. *Tripping Point (Trip Link)* – Adjust so 3-, 4-, or 5-unit escapements are completed when a typeface is 3/8-5/8" (9,52-15,87mm) from the platen.

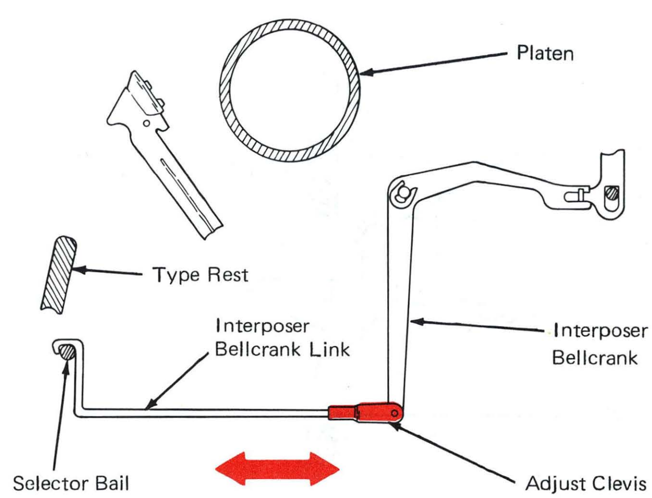
   NOTE: Tripping of the escapement pawls must occur faster on C4-D4 Model than on C1-D1 Models in order to ensure reliable escapement during no print operation.



(Left Side View)

10. *Interposer Bellcrank Links* – Adjust the clevis on the 3-interposer bellcrank link to get the following conditions. Type a letter I across the page and move a 3-unit bar slowly toward the platen. The spacing should increase from 2 to 3 units when the 3-unit typebar is 1/2 to 2/3 of the distance to the platen.

    Repeat the procedure using 4- and 5-unit typebar, check the 4- and 5-unit interposer links.



(Right Side View)

TYPEBAR OPERATIONAL THEORY

The purpose of the typebar operating mechanism is to let the operator depress a keylever and cause a typebar to strike the paper. The operator can also change the keyboard touch as well as the impression of the typebar.

Depressing a letter keybutton causes the keylever to pivot about its fulcrum rod in the keylever bearing support (Figure 1). A lug on the bottom of the keylever rotates the cam trip lever down against the cam, causing the cam to engage the power roll. As the power roll rotates the cam, the rise of the cam causes the cam lever assembly to pivot about the fulcrum rod. The cam lever action pulls on the typebar link, causing the typebar to pivot about the fulcrum wire, driving the typebar toward the platen.

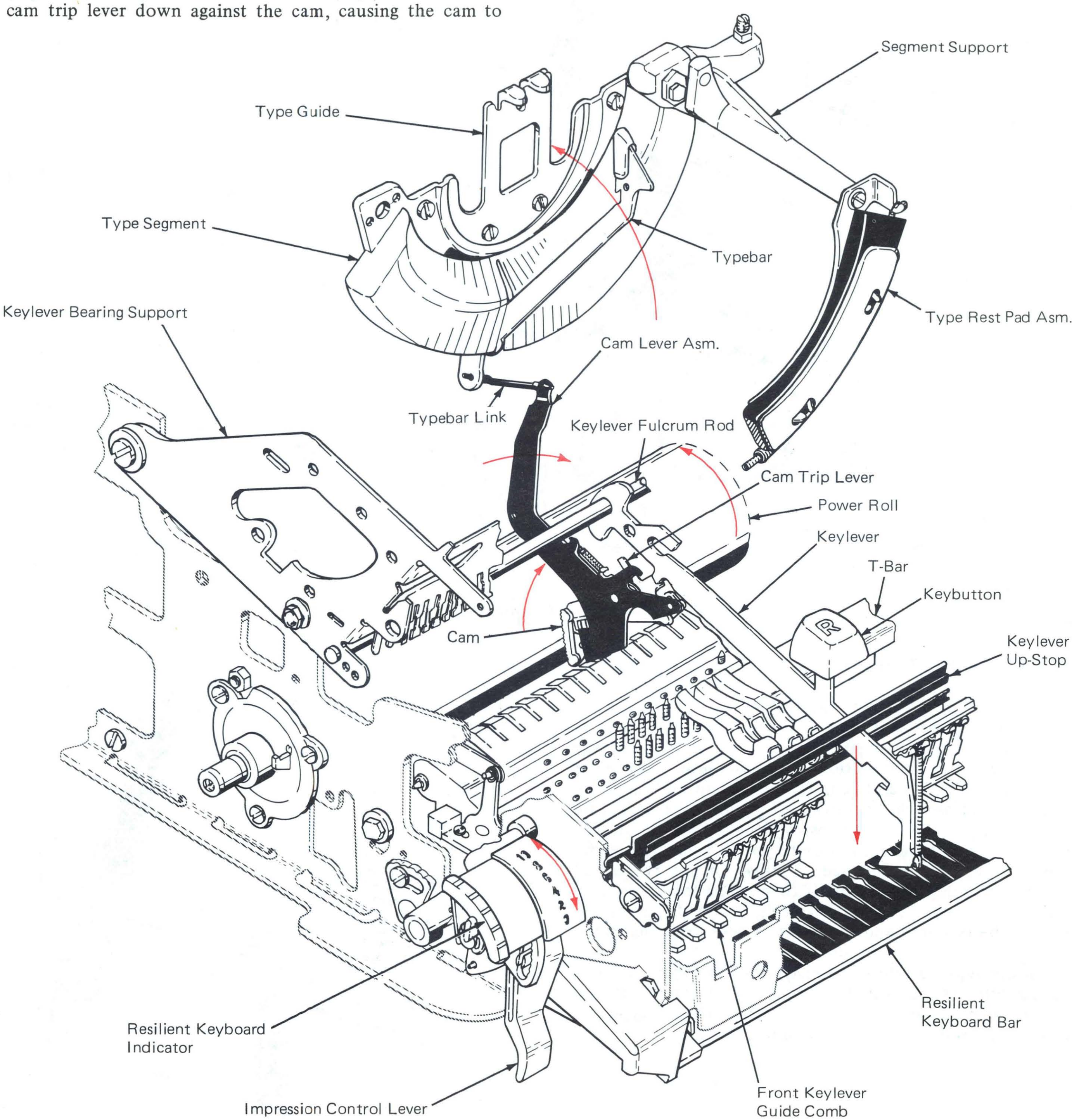


Figure 1 – Typebar Operating Mechanism (D1, D4)

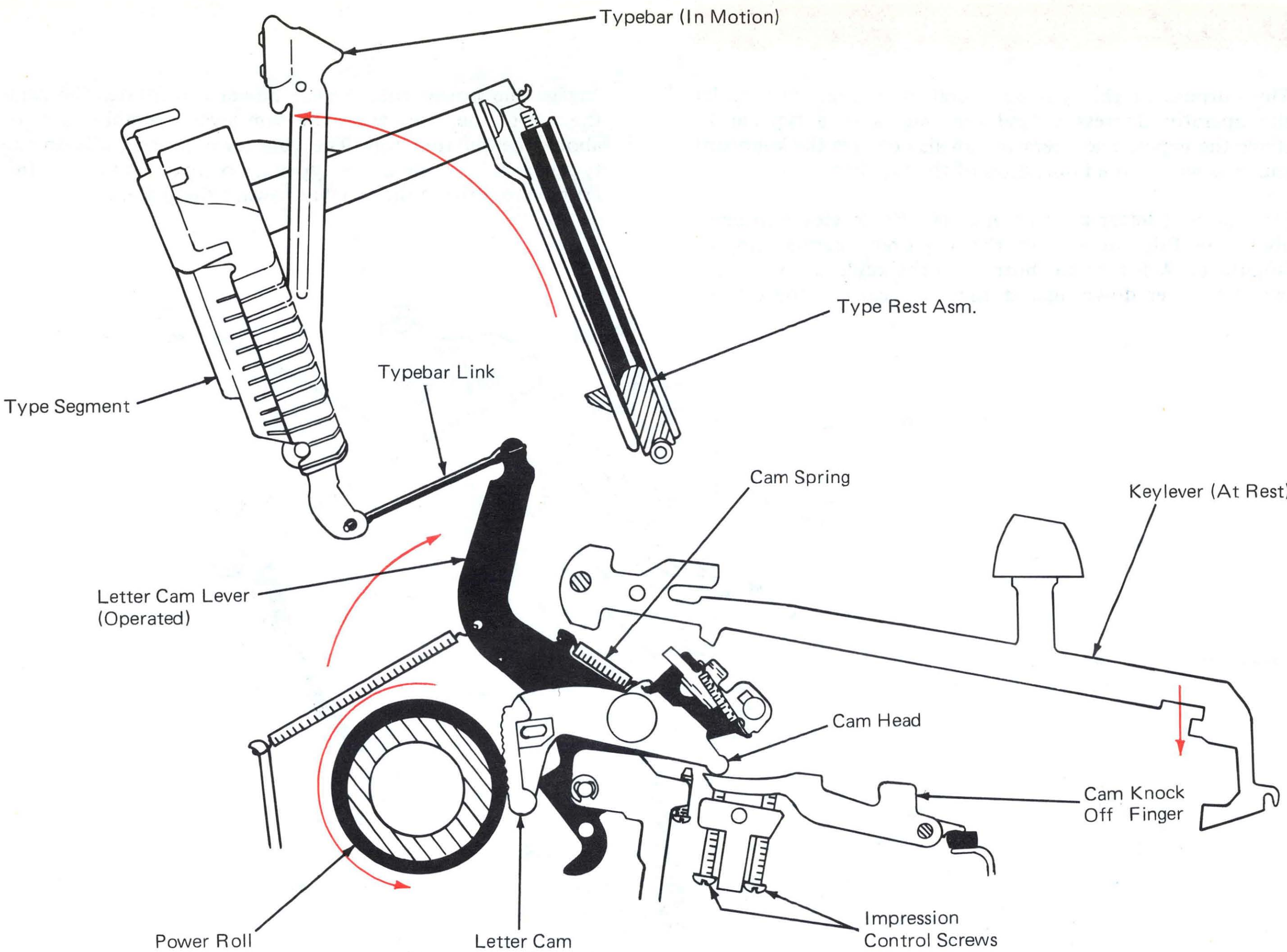


Figure 2 – Letter Cam Operation (Left Side View)

LETTER CAM AND TYPEBAR

Before the typebar reaches the platen, the head of the cam meets the cam knockoff finger (Figure 2). The rotation of the cam is stopped at this point, but the drive of the typebar continues the motion of the cam lever and the rise of the typebar to the platen. The continued motion of the cam lever releases the cam from the power roll and the cam spring restores the cam to rest against the cam lever. The striking force (impression) of each typebar is determined by how far the cam is allowed to drive on the power roll before it reaches the knockoff finger. The longer the cam remains engaged with the power roll, the further the typebar will be powered and the harder it will strike the paper.

When the typebar returns to rest, it strikes a spring loaded, rubber type-rest pad which is mounted between two frames on the segment support (Figure 3). The resilient type rest pad reduces noise and typebar bounce.

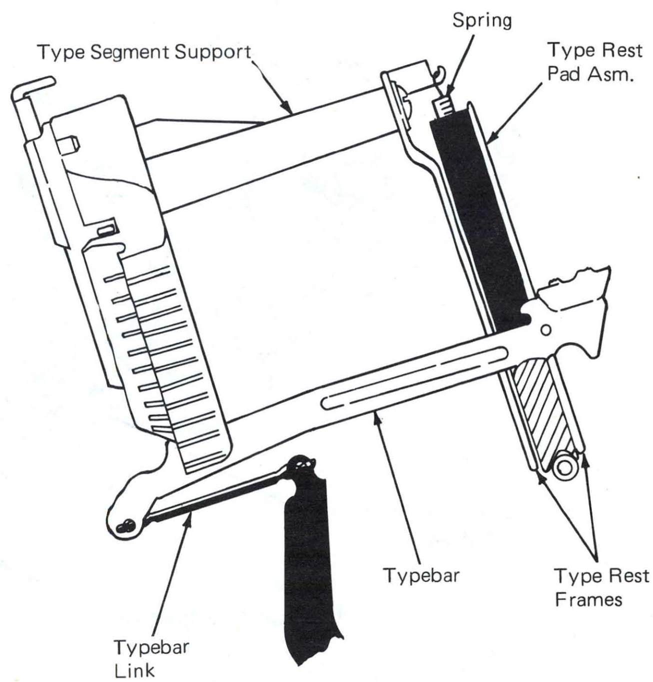


Figure 3 – Segment Support (Left Side View)

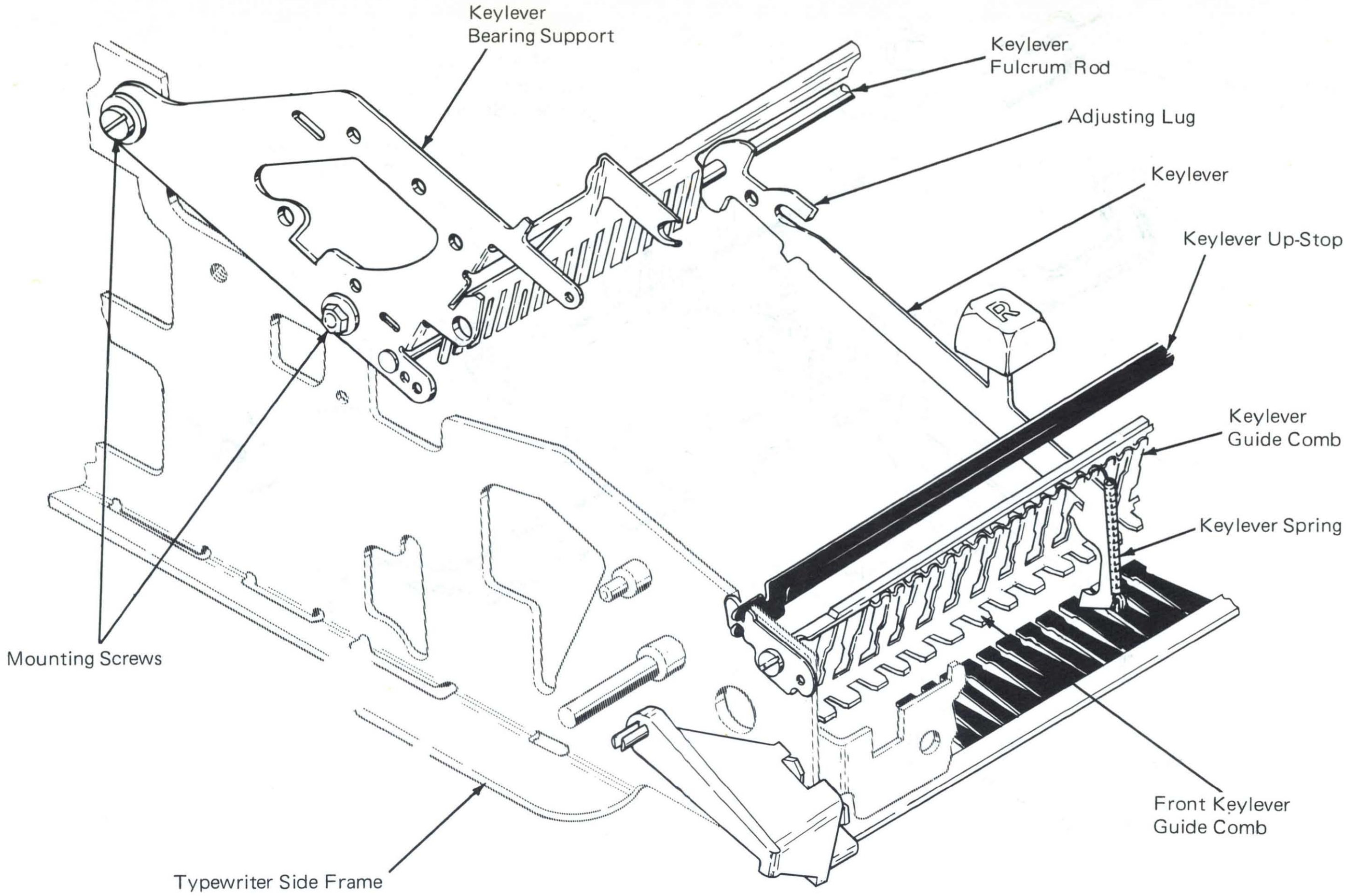


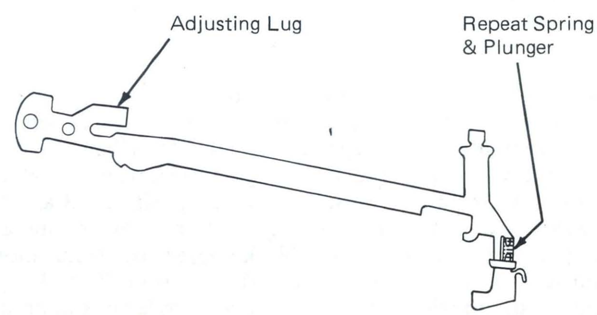
Figure 4 – Keylever Mounting

KEYLEVERS

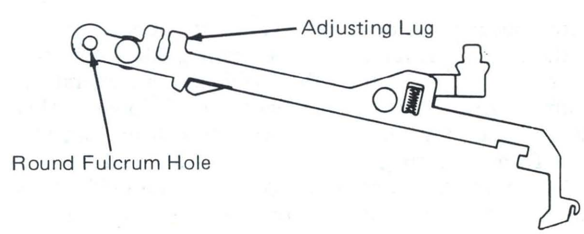
Keylevers are supported at the rear by a fulcrum rod which passes thorugh a hole in each keylever (Figure 4). This rod serves as the fulcrum point for all keylevers. The fulcrum rod is held at each end by the keylever bearing support, which is mounted to the typewriter side frames. The forward end of the keylever bearing support may be raised or lowered to adjust the height of the keylever fulcrum rod.

The forward ends of the keylevers are spaced and controlled by a keylever guide comb. Springs attached from the keylevers to lugs at the top of the guide comb hold the keylevers up in their rest position against a keylever upper stop. A spring of different tension is used for keylevers of each row to provide even touch. An upstop is located between the third and fourth row of keylevers and is mounted to the typewriter side frames. Adjusting lugs on the top of the keylevers provide for each keylever adjustment, to make the cam tripping point the same for all keylevers.

A repeat/nonrepeat X, period, and underscore keylever is provided as a standard feature on the Model D Typewriter. A special one-piece repeat keylever (Figure 5) is used with a standard cam unit in positions 8, 32 and 39 to provide this feature. A two-piece keylever was used on earlier models.



One-Piece Repeat Keylever, D1, D4



Two-Piece Repeat Keylever, C1, C4

Figure 5 – Keylevers (Left Side View)

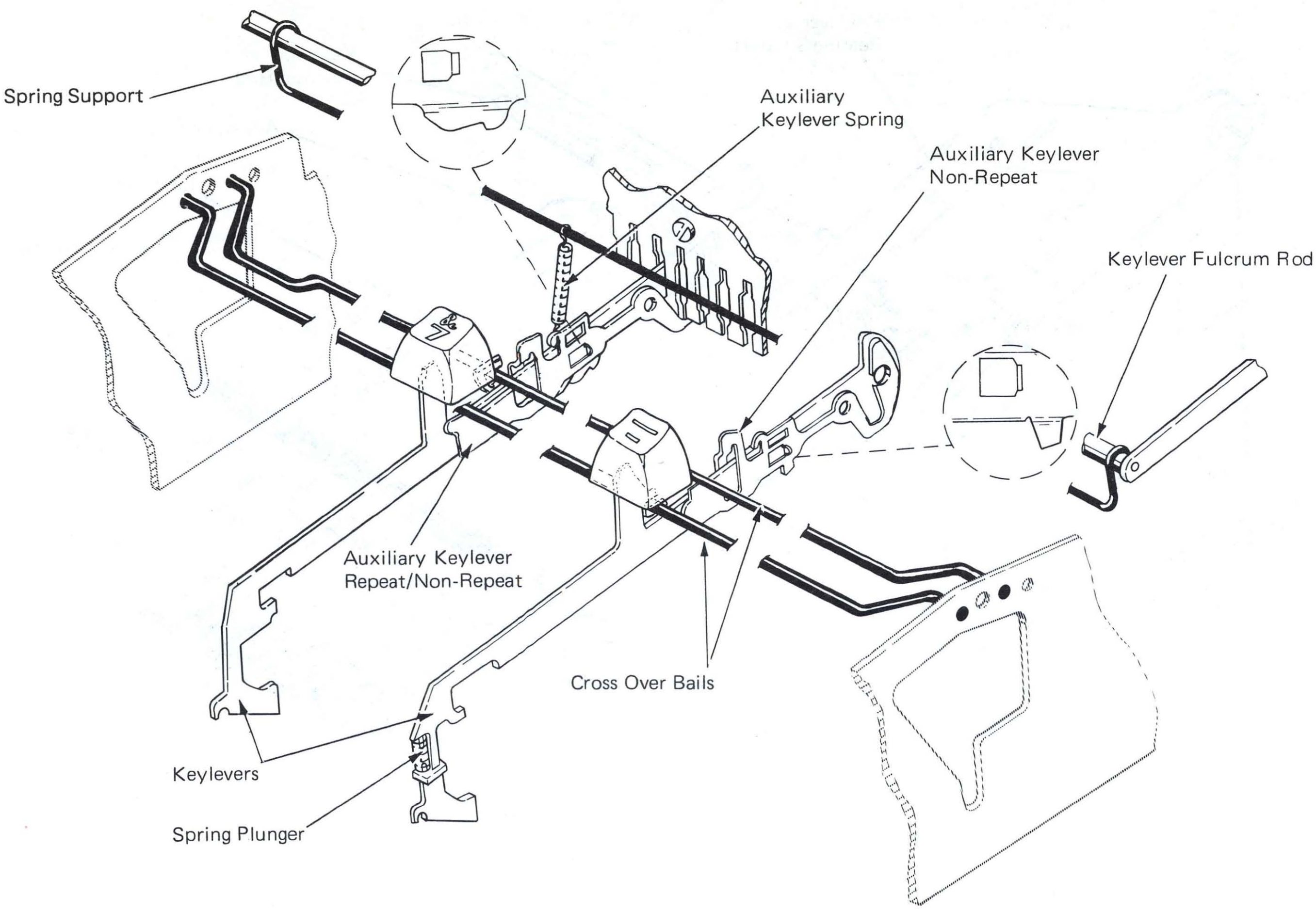


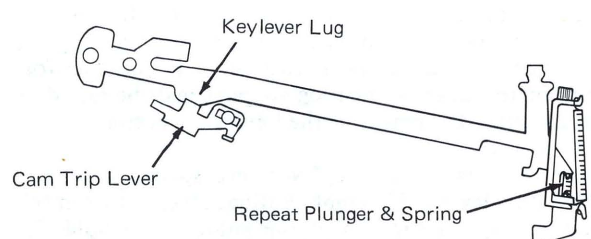
Figure 6 – Repeat Keylever Cross Over Bails D1, D4

On the late Model D typewriter, a center underscore provides a more reliable straight-line printing of the underscore. The basket location of the "underscore" typebar is position 23 and the number seven typebar is position 39 or 41.

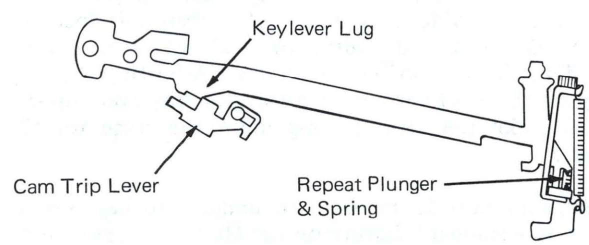
This is done by the use of crossover bails and repeat/nonrepeat auxiliary keylevers to prevent changing the arrangement of the keyboard (Figure 6). When the underscore keylever is depressed, a lug on the keylever contacts a bail and motion is transferred to the position 23 auxiliary keylever and the position 23 letter cam is operated. Depressing the position 23 keylever transfers motion through bails to operate either the position 39 or 41 letter cam. The position 39 or 41 auxiliary keylever is nonrepeat. The position 23 auxiliary keylever is repeat/nonrepeat.

When the repeat/nonrepeat keylever is depressed to the limit of its normal movement in the front guide comb, the rear step on the keylever lug will provide a single operation of the cam (Figure 7). If the keylever is held down in this position, the rear step on the keylever lug will prevent the trip lever from restoring. The keylever is allowed by the spring plunger in the front guide comb. If the keylever is held down in this position, the trip lever will be pushed down by the front step on the keylever lug each time the cam lever assembly tries to restore.

On earlier models the one-piece keylever fulcrum hole is elongated and a heavy spring is used to provide repeat operations. Depressing the keylever to the limit of its downward movement lowers the fulcrum point of the keylever and allows the repeat stop of the trip lug to depress the trip lever for a repeat action of the cam.



(Depressed Normal Travel)



(Repeat Plunger Depressed)

Figure 7 – Repeat Keylever Operation D1, D4 (Left Side View)

CAM LEVER ASSEMBLIES

Cam lever assemblies are mounted in slots in the cam bearing support and are held by a fulcrum rod which passes through a hole in each cam lever (Figure 8). A typebar link connects from the long arm of the cam lever to the typebar. The rest position of the typebar determines the rest position of the cam lever.

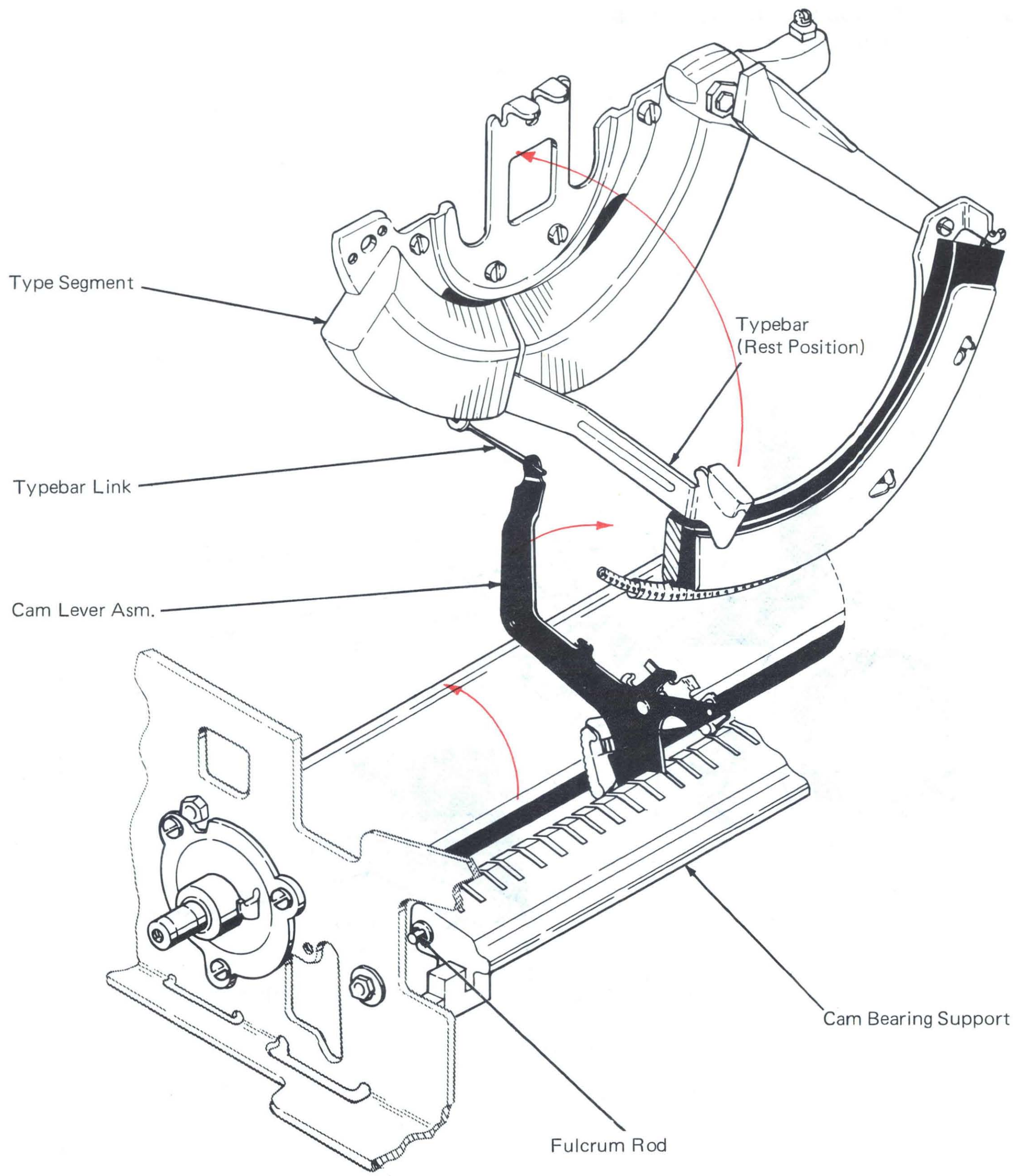


Figure 8 – Cam Lever Asm. Mounting

Each cam lever assembly consists of three main parts: The cam lever, the cam, and the trip lever (Figure 9).

The cam is nylon, molded on a steel body and is mounted to the cam lever by a rivet about which it can rotate. The rest position is determined by a steel stop which is on the side of the cam and contacts a step on the cam lever (Figure 9). The nylon shoe will contact the cam lever when the cam is fully rotated to limit rotation. The trip lever is mounted to the cam lever by a shoulder rivet through an elongated hole in the trip lever. This slot allows the trip lever to slide front to rear on the rivet as well as to rotate about it. A spring from the trip lever back to the cam lever holds the trip lever up and to the rear in the rest position. The trip lever has two lugs. The upper lug contacts the keylever lug and the lower lug contacts the cam.

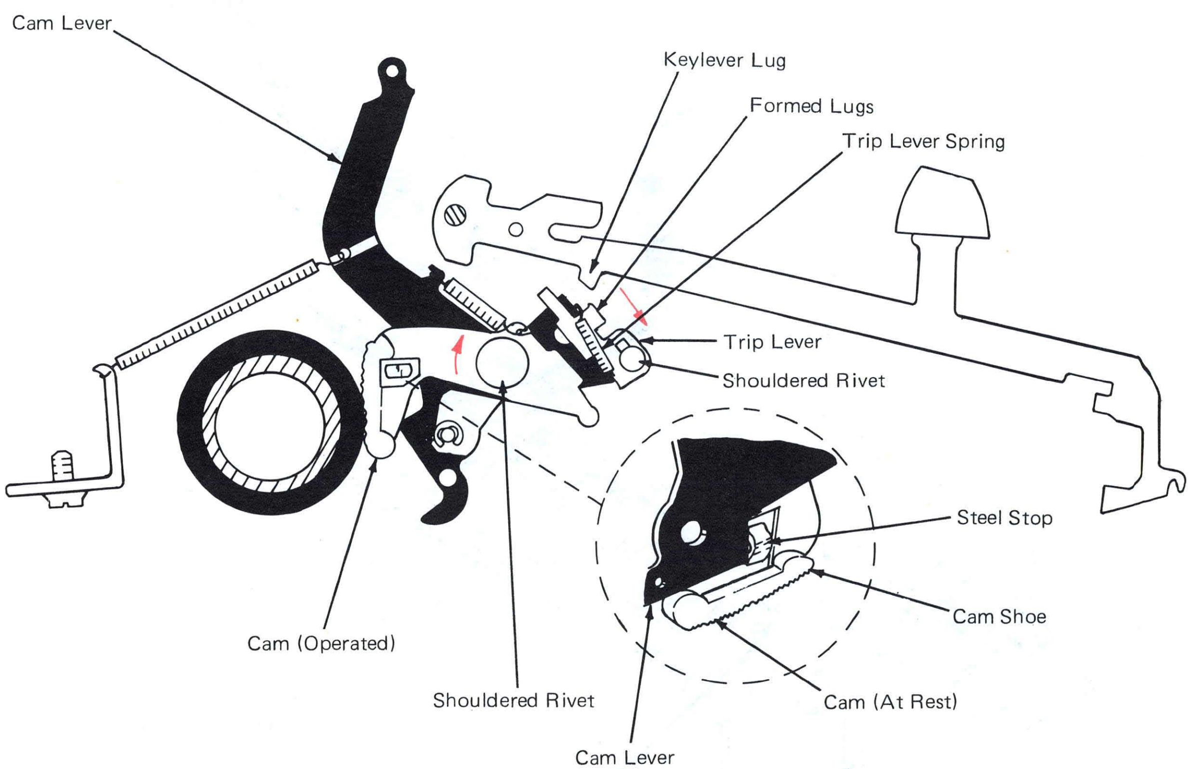


Figure 9 – Cam Lever Assembly (Left Side View)

TYPE IMPRESSION

Type impression is controlled by the timing of the cam knockoff. The further the cam drives the typebar toward the platen, the heavier the impression of the type. On the Model D Typewriter, the finger bar assembly is mounted to the side frame by two screws on each side. A T-bar is mounted in nylon end plates which are mounted to the side frame also. These plates are known as range matching plates (Figure 10).

An impression control arm, mounted at the front by a fulcrum rod, is also attached to the range matching plates and is spring loaded in a downward position. The knockoff fingers are mounted in the finger bar by a fulcrum rod.

The knockoff (impression) screws are mounted in the T-bar. These screws are directly below the knockoff fingers and are used to control the impression of the typebars. The front row of screws controls of the lowercase characters.

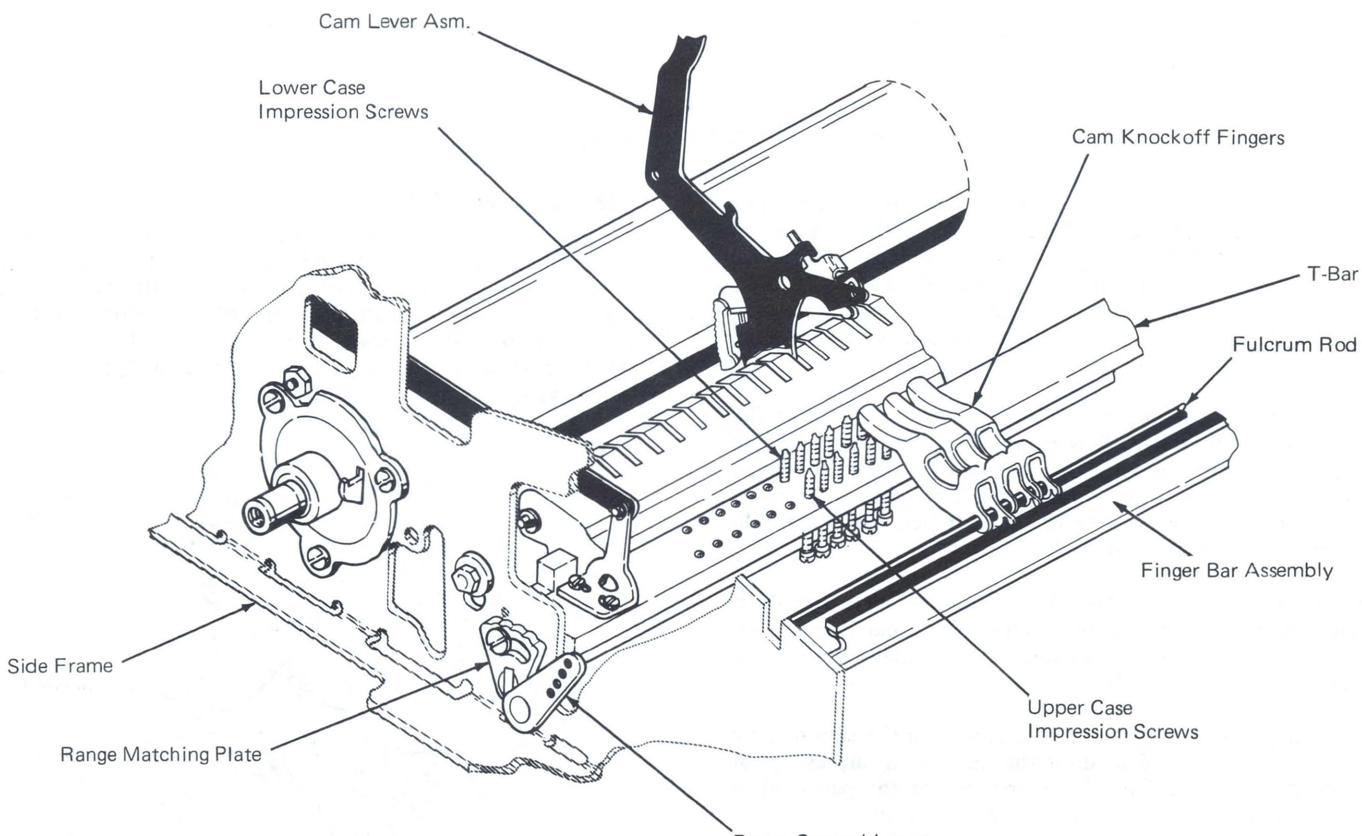


Figure 10 – Type Impression Control (Model D)

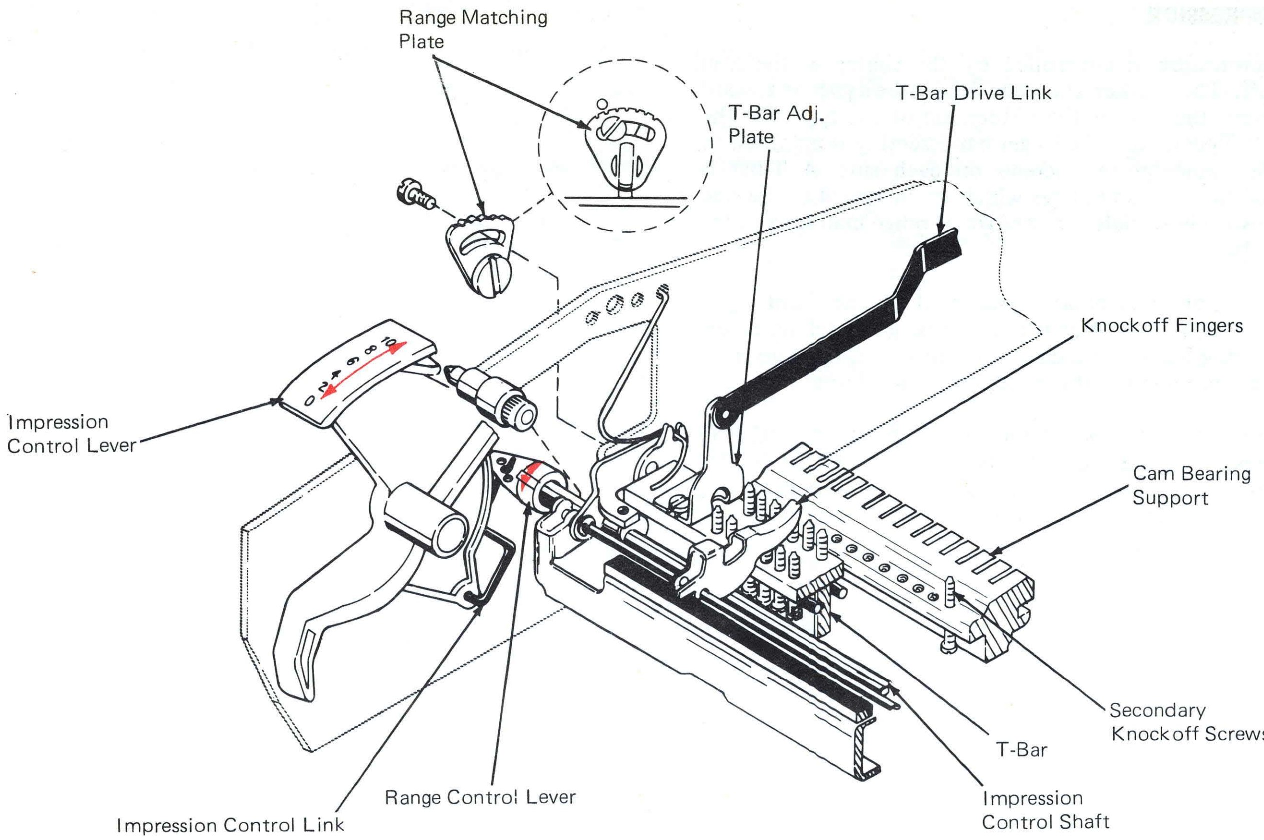


Figure 11 – Impression Control (Model D)

Manual control of impression is changed by rotating the impression control lever (Figure 11). As the impression control lever is rotated, it pulls or pushes on the impression control link, which is attached to the range control lever. The range control lever is connected to the impression control shaft which controls the raising and lowering of the knockoff fingers on the T-bar.

Impression in both upper and lowercase is controlled by the rotation of the T-bar. This rotation allows the uppercase screws to control the knockoff fingers with the shift mechanism in the uppercase mode, and allows the lowercase screws to control the knockoff fingers when the shift mechanism is in the lowercase mode.

A drive link from the shift plate is connected to the T-bar adjusting plate, which is mounted on the T-bar (Figure 11). Therefore, lowering or raising the basket supplies the motion to rotate the T-bar.

Secondary knockoff screws are mounted in the cam bearing support and are used to limit the maximum impression of small characters which will emboss or cut the paper when the impression control is set at a higher setting.

The Model C typewriters do not have the dual impression (adjustments for both upper and lowercase) control system. The knockout bar assembly pivots on pins in the side frame and has only one row of cam adjusting screws.

TYPE IDENTIFICATION

A type mark, used to identify the typestyle (Figure 12), is located between the upper and lowercase typefaces on the slug. An anticlash lug prevents damage to the typeface if one typebar follows another to the platen before the first typebar is out of the way. The typeface is shaped to the same arc as the platen so that all parts of the typeface will strike evenly against it.

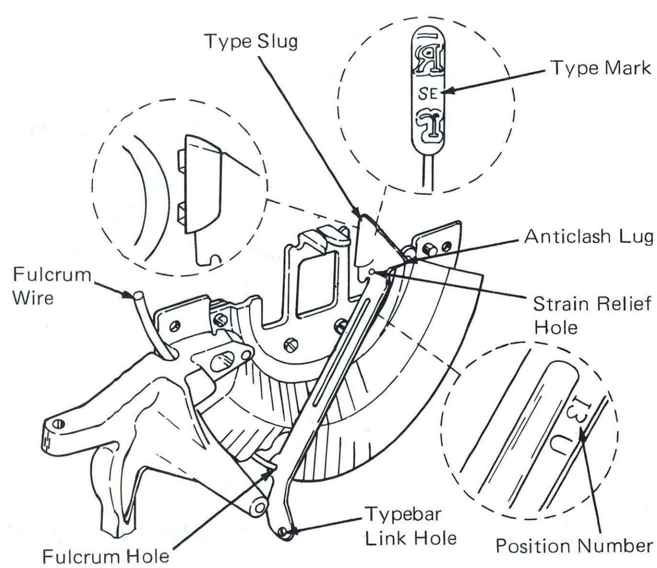


Figure 12 – Typebar Identification

TYPE SEGMENT AND GUIDE

The typebar segment is a partial circle casting with slots cut into it to mount and guide the typebars (Figure 13). The segment also provided the mounting for the universal bar and the type guide. The rear of the segment is cut out, allowing erasures to be pushed through the slots by the typebars during their rise to the platen. Two screws mount the segment to the segment support. Up and down adjustment is made with an eccentric collar under each mounting screw. The collars rotate in horizontally elongated holes in the segment support.

The type guide is a formed part of heavy metal and is attached to the segment by four screws and a dowel pin (Figure 13). The four screws pass through large holes in the type guide, so the guide may be positioned by pivoting it on the dowel pin. The type guide has two parts, the ring and the center guide.

As the typebar moves to the printing position, it is guided by a slot in the segment and the type center guide. Just before the typeface makes contact with the ribbon and the paper to print, the typebar strikes the ring of the type guide (Figure 13). It must then bend above the ring so the typeface can print. The bending motion prevents the typeface from resting on the paper and smearing its image. This relationship between typebar, ring, and platen is known as ring and cylinder.

CHANGEABLE TYPEBARS

Changeable typebars are available to the operator to change typebars in specified positions, this provides a greater number of special characters for the typewriter (Figure 14). They are available for all positions except the alphabetic positions. No tools are required to change these bars, they are just hooked to the fulcrum wire. Spring tension of the universal bar helps to hold them in position of the wire at the time of printing.

Each changeable typebar is designated for one typebar position only and is to be aligned only to the typewriter for which it is ordered. Changeable type ordered with the machine will have the number of the typebar segment position marked on the bar to identify the position in which it is to be used.

A special changeable typebar link using a spring clip is used with changeable typebars. This link will not drop off the cam lever when the operator removes the typebar and releases the link. A blank keybutton is used.

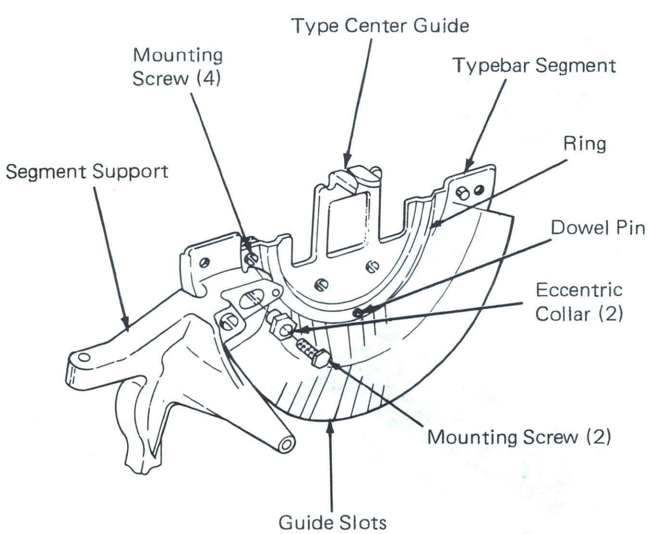


Figure 13 – Typebar Segment

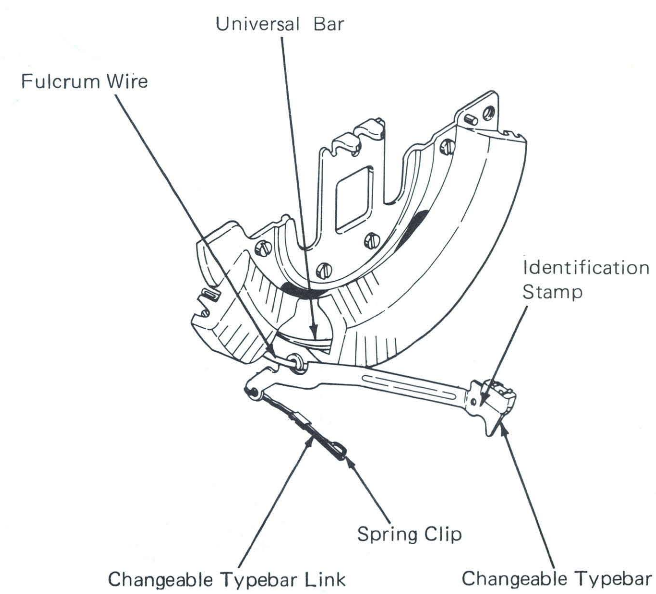


Figure 14 – Changeable Typebars

RESILIENT KEYBOARD

On some machines a resilient keyboard control indicator is located to the left of the impression control lever (Figure 15). Rotating the resilient keyboard indicator raises or lowers the spring mounting bracket and changes the resistance of the keylevers on their downward motion. This provides the operator with a means of changing the keylever resistance to satisfy keyboard touch and timing.

The indicator is marked off in lines of different thickness. In the lowest, or the thin line position, the keylever will bottom in the guide comb slot without contacting the flat spring. In the highest, or the thick line position, the flat spring will be contacted about one fourth of the way down and will increase resistance as the keylever continues downward.

The Model C indicator is marked with the letters L, M, H and intermediate positions between the letters.

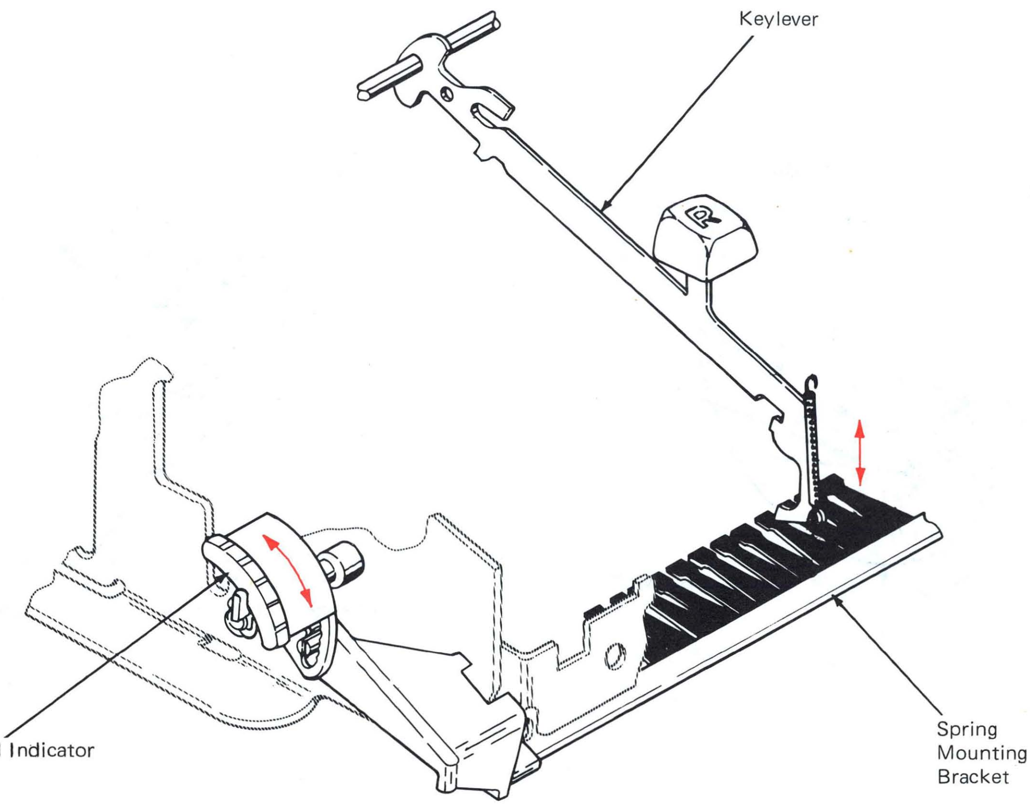
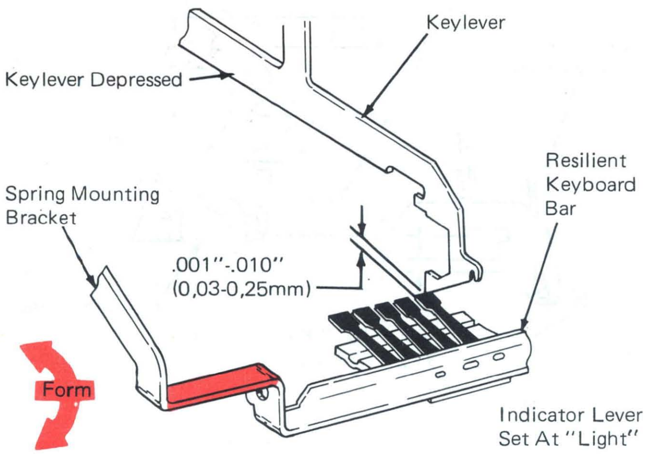
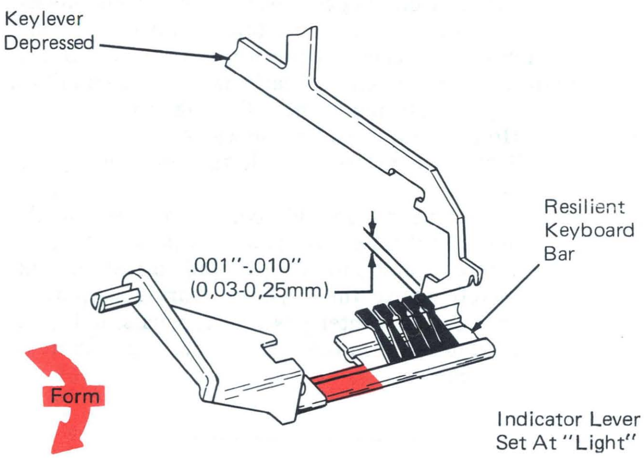


Figure 15 – Resilient Keyboard Control Indicator (Model D)

1. *Spring Finger, Resilient Keyboard* – Form the spring mounting bracket so that when the indicator lever is set at "light" there will be .001-.010" (0,03-0,25mm) between the spring fingers and the keylevers with the keylever fully depressed.



(Level 1)



(Level 2)

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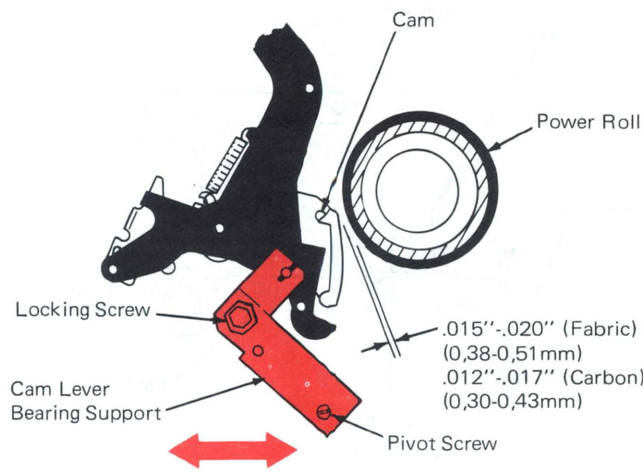
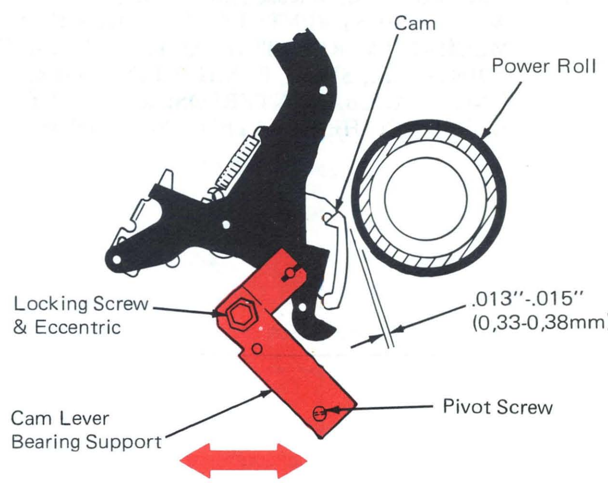
2. *Letter Cam Clearance, C1, C4* – Adjust the cam lever bearing support for a clearance of .015-.020" (0,38-0,51mm) (fabric), and .012-.017" (0,30-0,43mm) (carbon ribbon) between cams and power roll.



(Right Side View)

Letter Cam Clearance, D1, D4 – Adjust the cam lever bearing support for a clearance of .013-.015" (0,33-0,38mm) between cams and power roll.



(Right Side View)

CAUTION: Due to requirements of the dual knock-off mechanism and the special geometry typebars, deviation from the .013-.015" (0,33-0,38mm) letter cam clearance to achieve a different keyboard response is not recommended. Any change in keyboard response should only be attempted by means of cam tripping point (keylever bearing support) and/or keylever cam trip lever clearance at rest.

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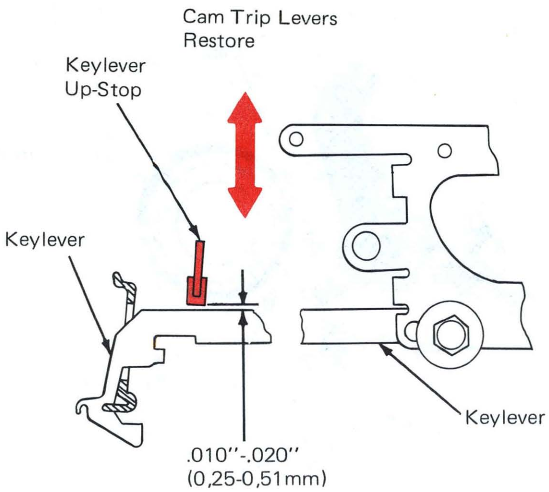
3. *Keylever Upstop* – Adjust up or down so the cam trip levers restore as their keylevers reach a point .010-.020" (0,25-0,51mm) from the upstop.



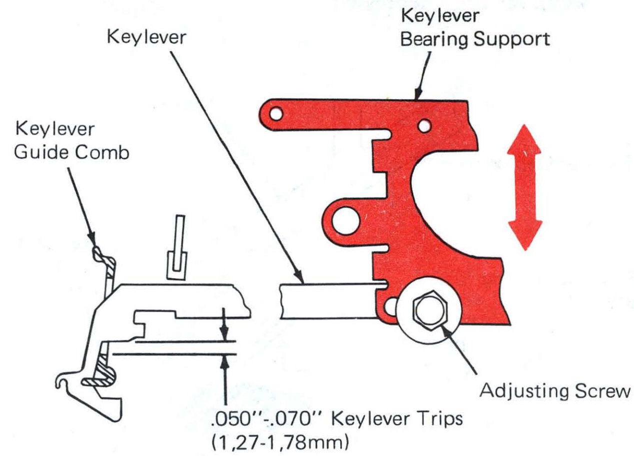
(Right Side View)

CAUTION: Adjustment of the keylever upstop will require checking the areas listed below.

1. Operational cam release and resetting points.
2. ANY ADJUSTMENT IN A PARTICULAR MECHANISM RELATED TO THE RELEASE POINT, E.G., SHIFT PUSHER LINK, THREE-UNIT SPACEBAR INTERPOSER LINK, ETC., REFER TO THE RELATED MECHANISM.

---

4. *Keylever Bearing Support* – Adjust the keylever bearing support up or down so the keylevers release their cams as the keylevers reach a point of .050-.070" (1,27-1,78mm) (1/16"=.062") (1,59mm) from the bottom of the keylever guide comb.



(Right Side View)

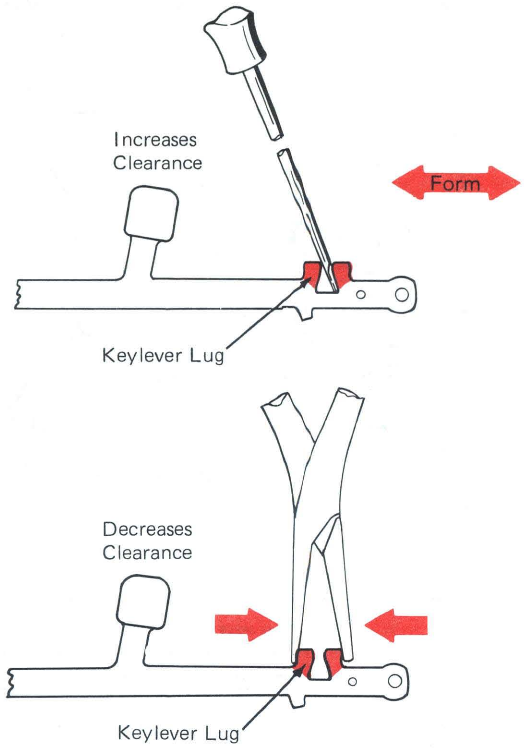
CAUTION: A binding condition between a depressed keylever lug and the cam trip lever can occur on some machines as the cam lever restores. The result of this binding is hard touch and early wear. This condition can easily be detected in the following way:

a. Hold type rest pad all the way down.
b. Type a character and hold the keylever depressed.
c. The typebar should come to rest on the depressed type rest pad. Check several characters. If any end typebars fail to restore completely, move the keylever bearing support to the rear. If center position typebars, only, fail to restore, form the keylever bearing support to the rear.

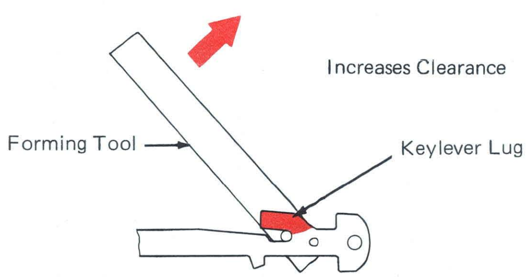
---

5. *Keylever Tripping* – Adjust the keylevers by forming the keylever lug as shown so the keylevers will release the cam 3/4 of the downward motion.

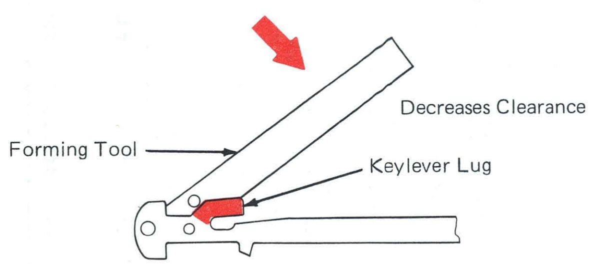
NOTE: Forming tool may be used on C1 and C4 keylever lugs.



(C1-C4 Right Side View)



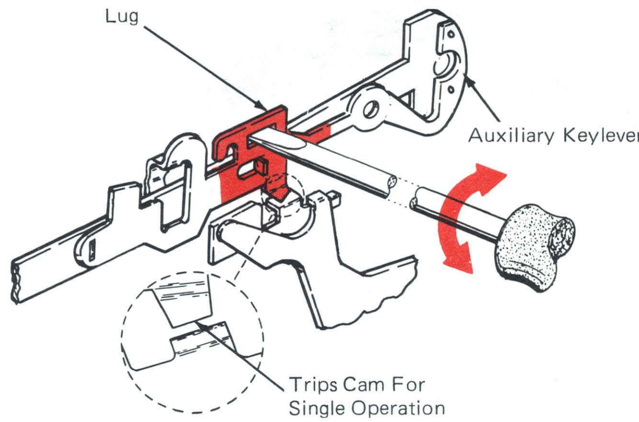
(D1, D4 Right Side View)

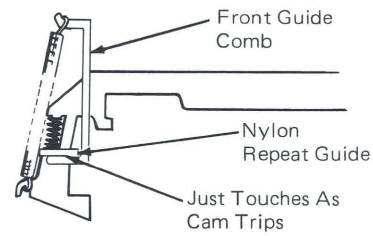


(D1-D4 Left Side View)

6. *Auxiliary Keylever Trip, D1, D4 (Center Underscore)* – The position 23 auxiliary keylever should be adjusted to release the cam for a single operation just as the nylon repeat guide touches the front guide comb.

NOTE: The other auxiliary keylever is adjusted so that it trips the cam as the keylever reaches a point of .050-.070" (1,27-1,78mm) from the bottom of the keylever guide comb.

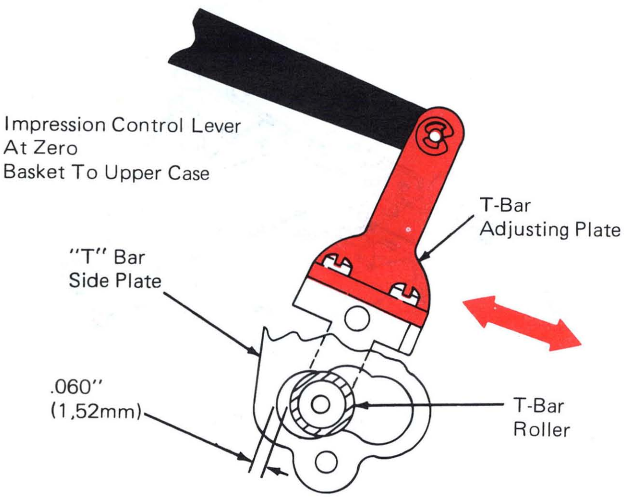




(Right Side View)

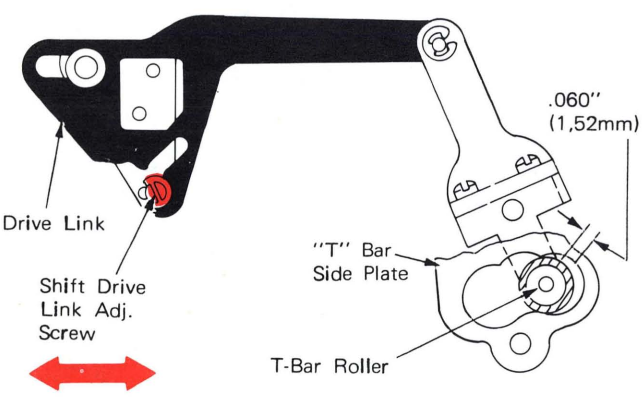
7. *T-Bar Adjusting Plate, D1, D4* – Set the impression control at zero and shift the basket to lowercase. Position the T-bar adjusting plate front-to-rear to provide a clearance of approximately .060" (1,52mm) between the T-bar roller and the REAR of the roller opening in the T-bar side plate.

SERVICE AID: Observe the adjustment from the bottom of the machine. A No. 4 bristo wrench will just fit into the opening when the adjustment is correct.



(Left Side View)

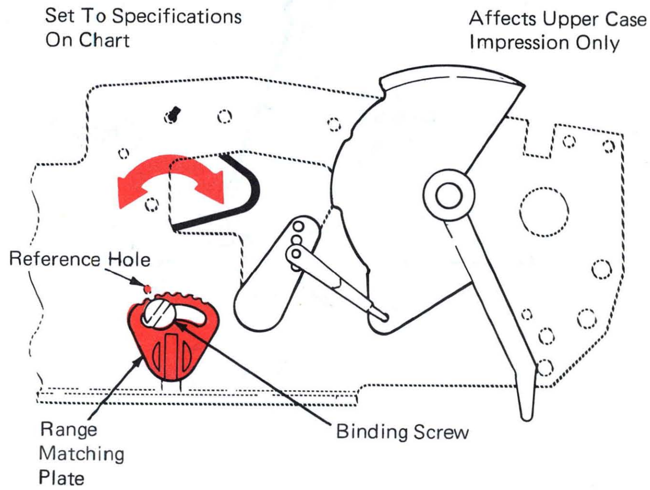
8. *Drive Link Adjusting Screw, D1, D4* – Position the impression control lever at zero and shift the basket to uppercase. Adjust the drive link adjusting screw for a clearance of .060" (1,52mm) between the T-bar roller and the FRONT of the opening in the T-bar side plate.



(Left Side View)

9. *Range Matching Plates, D1, D4* – Loosen the binding screws and position the range matching plates to the setting specified in the dual and secondary knockoff specification chart. Adjust both plates to the same setting.

NOTE: This adjustment affects uppercase impression range only and does not affect the impression setting at zero.



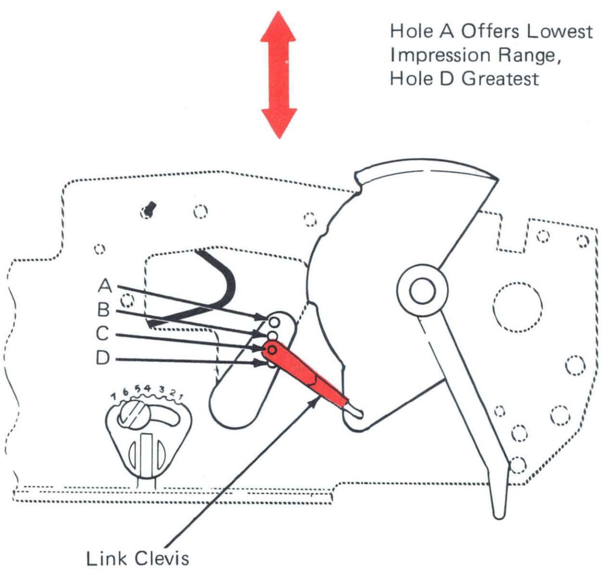
(Left Side View)

DUAL K.O. SPECS BY TYPE STYLE							
		Carbon Ribbon		Fabric Ribbon		*Motor Pulley	
Type Code	Name	Imp. Con. Link Pos.	Range Match Pos.	Imp. Con. Link Pos.	Range Match Pos.	Carbon	Fabric
P	Pica	B	5	C	6	15	15
E	Elite	A	4	C	6	14	14
G	Pica Gothic (SC)	C	5	D	5	15	15
H	Pica Gothic	B	5	C	5	15	15
F	Elite Gothic (DC)	B	5	C	5	14	14
GE	Elite Gothic (SC)	C	5	C	5	14	14
L	Modern Gothic	C	5	D	5	15	15
XG	Med. Roman Gothic	D	5	D	5	15	15
B	Large Pica	B	5	C	6	15	15
PO	Bold Face No. 1	C	7	D	7	15	15
ME	Multigraph Elite	A	4	C	5	14	14
DC	Spec. Gothic	B	5	C	5	15	15
BA	Bookface Academic	C	7	D	7	15	15
BE	Cloister Elite	A	4	C	6	14	14
BM	Micro Elite	A	4	B	5	14	14
BP	Great Primer	C	6	D	6	15	15
PS	Secretarial	B	6	C	6	14	15
LE	Large Elite	B	4	C	6	14	14
PM	Ex. Modern	B	7	D	7	14	15
DB	Dual Basic	B	5	C	5	14	14
RG	Regent Gothic	B	5	C	5	14	14
PE	Ex. Documentary	B	7	D	7	14	15
FD	Micro Gothic (SC)	B	5	C	5	14	14
FF	Micro Gothic (DC)	A	5	B	5	14	14
LB	Large Bookface	D	7	D	7	15	15
FB	El. Gothic Bold	B	6	C	6	14	14
PG	Copperplate Gothic	A	7	B	7	15	15
PH	Ex. Text	A	5	C	5	14	14
M	Acctg. Gothic	C	5	D	5	15	15
AP	Pica No. 2					Exp. Scanning	
PF	Mid Century	C	7	D	7	15	15
PR	Ex. Charter	A	6	C	6	14	14
S	Siamese					World Trade	
FC	Micro Gothic Condensed	B	5	C	6	14	14
EH	Mercury Elite	B	5	C	6	14	14
PB	Bold Face No. 2	B	7	D	7	15	15
OT	Facsimile Goth. No. 2	C	5	D	5	15	15
PT	Bold Face Italic No. 1	C	7	D	7	15	15
PJ	Ex. Heritage	B	7	D	7	14	15
EC	Signet 11	B	5	C	6	14	14
PN	Ex. Registry	B	7	D	7	15	15
PK	Ex. Directory	D	7	D	7	15	15
B2	Diplomat	A	5	C	5	14	14
EF	Portfolio 11	B	4	C	6	14	14
PV	Ex. Testimonial	C	7	D	7	15	15
H2	Manifold "12"	C	5	D	5	14	14
H3	Manifold "10"	C	5	D	5	15	15
H4	Manifold "9"	D	5	D	5	15	15
H5	Manifold "8"	D	5	D	5	15	15
SE	Pres. Elite	B	5	C	6	14	14
SP	Pres. Pica	C	6	D	7	15	15
JM	Ex. Arcadia	C	7	D	7	14	15
FE	Corinthian Script	C	7	D	7	15	15
G2	Artisan 12	B	6	C	6	14	14
G3	Artisan 10	C	6	D	6	15	15
SM	Courier 10	C	5	D	6	15	15
JG	Copperplate No. 2	B	7	C	7	15	15
JE	Ex. Patron	B	7	D	7	15	15
P2	Pica (Opt. Sensing)	B	5	C	6	14	14
C5	Courier (Opt. Sensing)	C	5	D	6	15	15
VA5	1428 Alphameric	C	6	C	6	15	15
JN	Ex. Registry 2	C	7	D	7	15	15
E4	Elite	B	4	C	5	14	14
SR	Courier 12	B	4	C	6	14	14
PQ	Doric	B	7	D	7	14	15
						*14 = 95 ft/min 15 = 103 ft/min	

10. *Impression Control Link Clevis, D1, D4* – Connect the impression control link clevis to the hole specified in the dual and secondary knockoff specification chart.

NOTE: The impression control link location adjustment need not be held as close to specification as the range matching plate. It may be raised or lowered to satisfy a particular application requirement.

CAUTION: Should the impression control link be moved down to increase total impression range, a check must be made to ensure the cams will not over drive the power roll. This can be done by setting impression on ten and hand cycling a character with the power roll pulley. Powered flight should not extend any closer than 7/8" (22,22mm) from the platen.

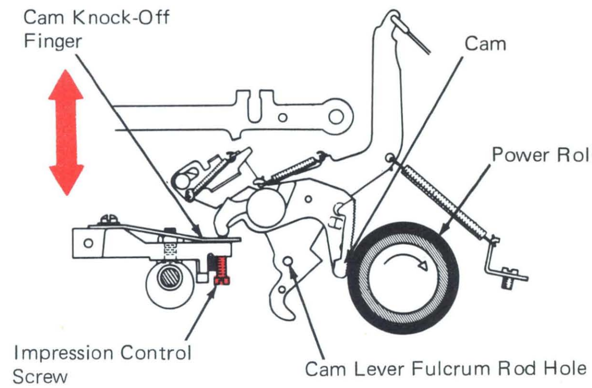


(Left Side View)

11. *Impression, C1, C4* – With the impression control indicator on position 4, turn the impression control screws in or out to give even impression.

NOTE: Impression is affected by many things. Turn the impression control screws only after checking for the following conditions:

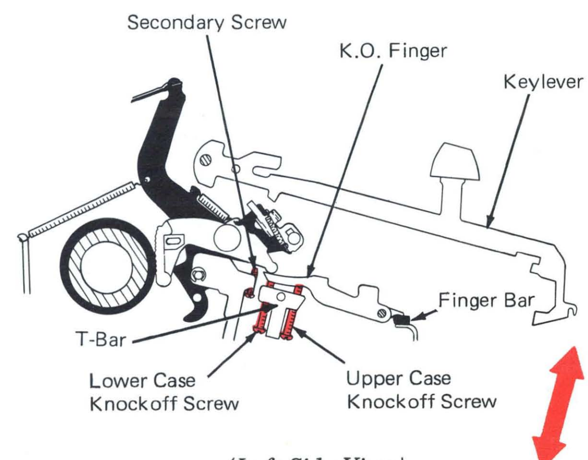
a. A clean segment.
b. Hood type guide entry.
c. CORRECT RING AND CYLINDER.
d. Power roll in good condition.



(Right Side View)

12. *Upper And Lowercase Knockoff Screw, D1, D4* – Adjust to satisfy application requirements only after checking for correct ring and cylinder, good type guide entry, clean segment and a power roll in good condition. The uppercase (front) and lowercase (rear) row of screws are located by UC and LC marked on the T-bar with an arrow pointing to the correct row of knockoff screws.

NOTE: The secondary knockoff screws should be backed out at least two turns before adjusting the UC and LC screws in those positions. Then adjust the secondary knockoff screws for maximum desired impression with the setting at ten.



(Left Side View)

C4-D4 PAWL RELEASE & GROUPING OPERATIONAL THEORY

The purpose of the pawl release and grouping mechanisms is to remove the escapement pawls from the escapement rack and arrange the pawls into two groups of four pawls each (Figure 1). The escapement pawls are released from the rack on carriage return, tab and manual carriage release.

There are two levels of design for the pawl release and grouping mechanism; the C4 – early D4 (level 1) and the late D4 (level 2) design. Each level will be discussed separately in this section, beginning with the simplified pawl block assembly (level 2).

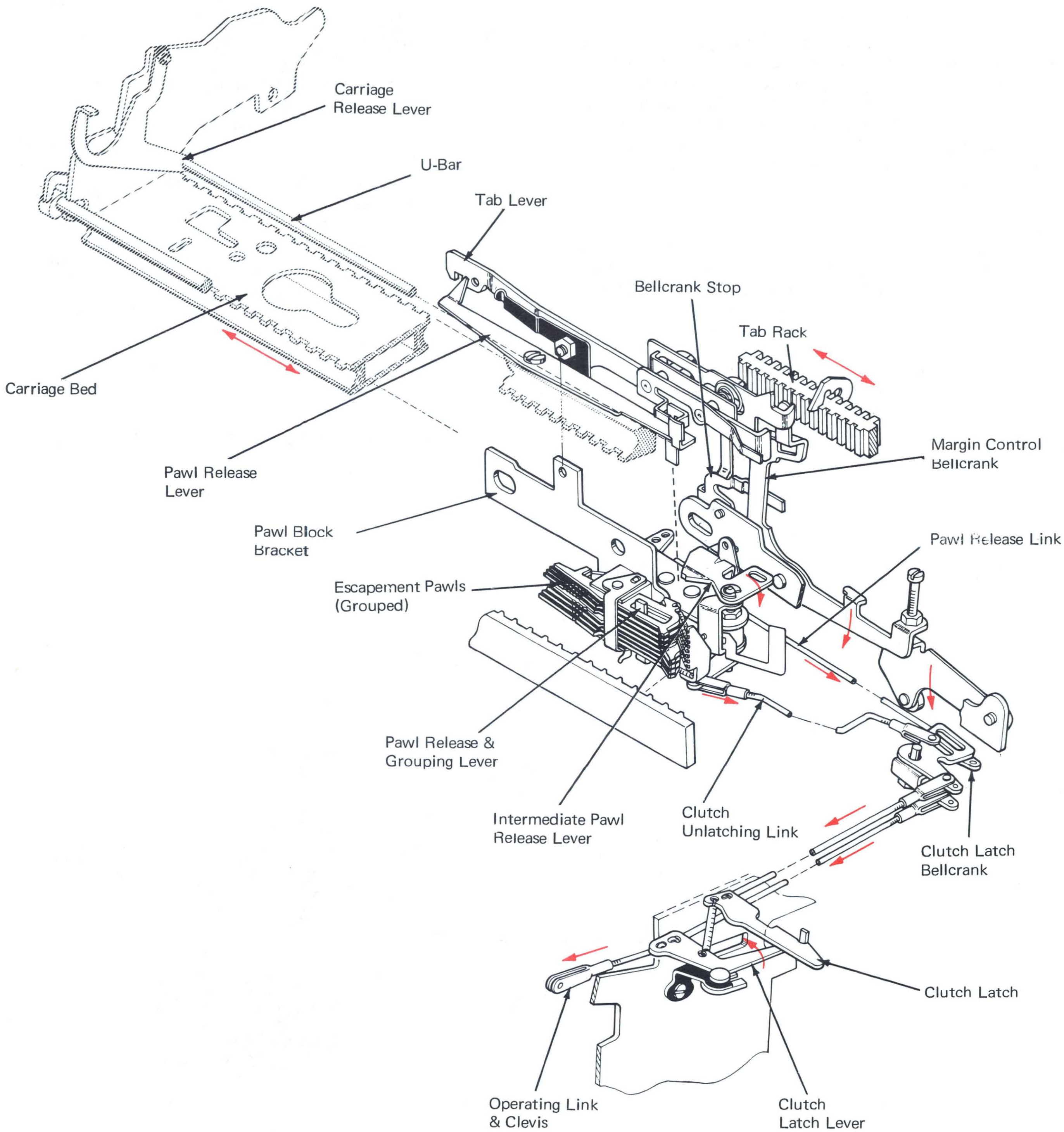


Figure 1 – Pawl Release And Grouping Mechanism (Level 2)

PAWL RELEASE AND GROUPING (LEVEL 2)

During a carriage return operation, the escapement pawls are pivoted out of the escapement rack by the extension of the pawl release and grouping lever (Figure 2). The pawl release and grouping lever performs two functions:

1. To release the escapement pawls from the escapement rack.

2. To group the pawls when released.

PAWL RELEASE OPERATION

Attached to the rear extension of the pawl release and grouping lever is the intermediate pawl release bellcrank. During the carriage return operation the intermediate pawl release bellcrank contacts the lug on the margin control bellcrank and provides the pivot point for the pawl release and grouping lever. This causes the pawl release and grouping lever to pivot on the mounting pin to release and group the pawls.

The pawl release lever is mounted on the rear rail by a shouldered screw that allows it to pivot (Figure 3). On tab or manual carriage release, the extension of the pawl release lever is contacted by either the carriage U-bar or the hook of the tab lever to pivot the pawl release lever to the rear. An extension to the left of the pivot point is contacted by the left end of the tab lever when tab is operated. As the pawl release lever is rotated, the lower lug which extends down behind the rear rail contacts the angular tip of the intermediate pawl release lever. This rotates the intermediate pawl release lever on the mounting pin, which in turn, contacts and rotates the pawl release and grouping lever and removes the pawls from the rack. The intermediate pawl release lever is mounted on the pawl block by the pawl release and grouping lever pin.

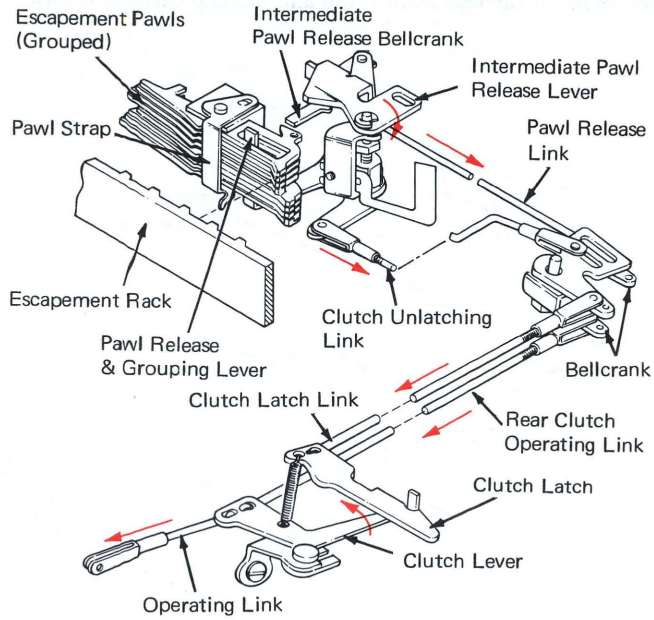


Figure 2 – Pawl Release And Grouping On Carriage Return (Level 2)

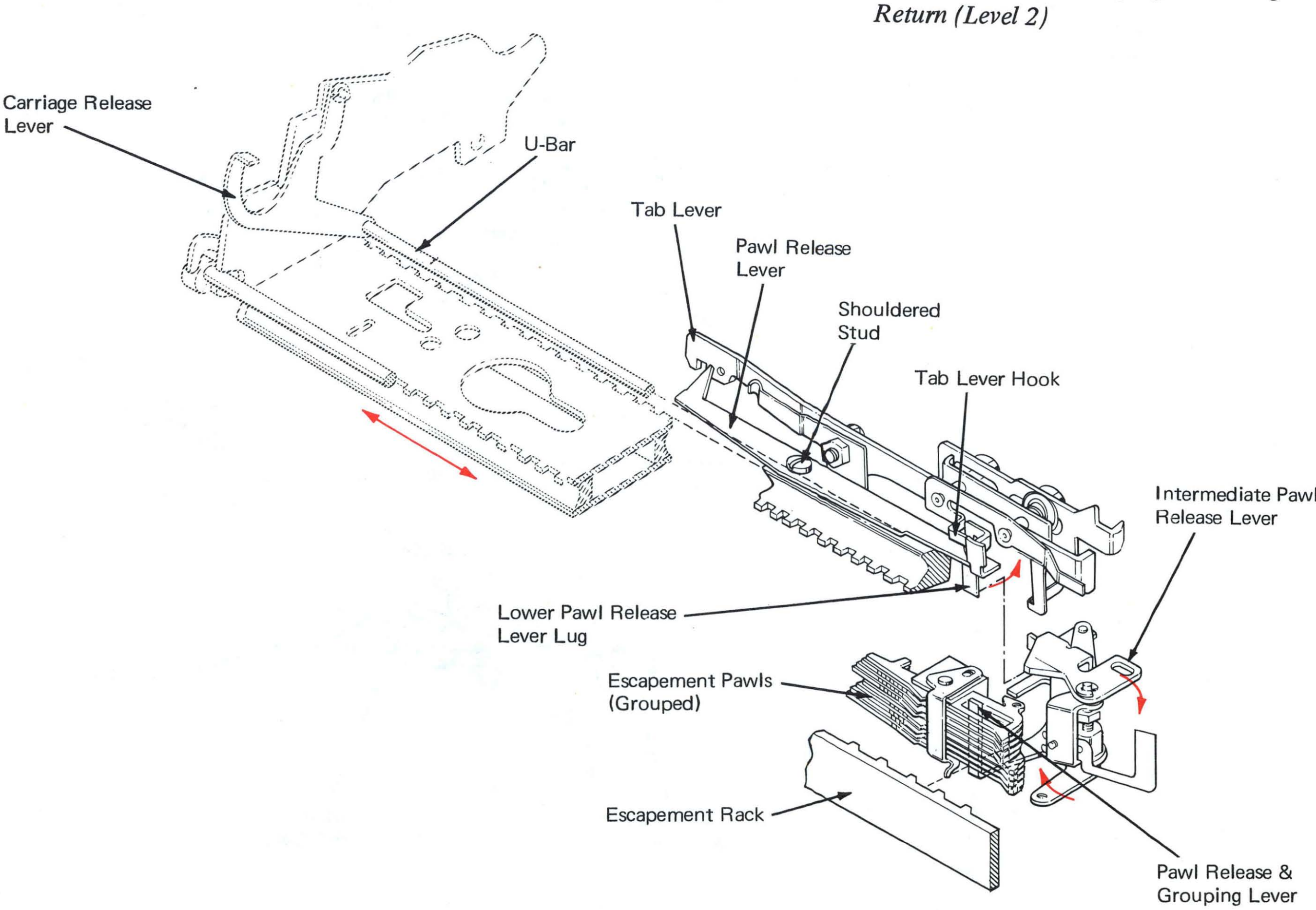


Figure 3 – Pawl Release And Grouping On Tab And Manual Carriage Release (Level 2)

PAWL GROUPING OPERATION

The escapement pawls are grouped during any pawl release operation to provide correct reentry of the pawls into the rack. To get this condition, the pawl release and grouping lever is rotated until the tips of the number 1, 2, 3 and number 4 pawls are in a straight vertical line, with the tips of the number 5, 6, 7 and number 8 pawls in a vertical line four units to the left (Figure 4).

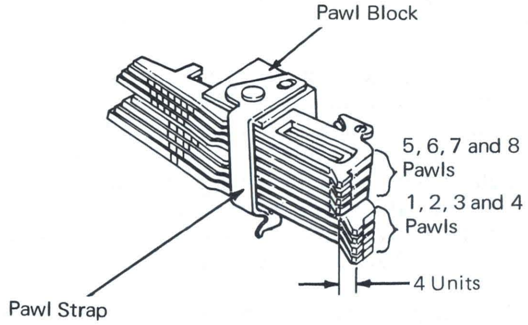


Figure 4 – Escapement Pawls (Grouped)

PAWL RELEASE AND GROUPING (LEVEL 1)

The C4 and early D4 mechanism (Figure 5) performs the same function discussed on level 2; however, there are some differences between the two mechanisms. The basic difference is in the parts used and how they function. All of these parts operate to release the eight escapement pawls from the rack and to group the pawls when released.

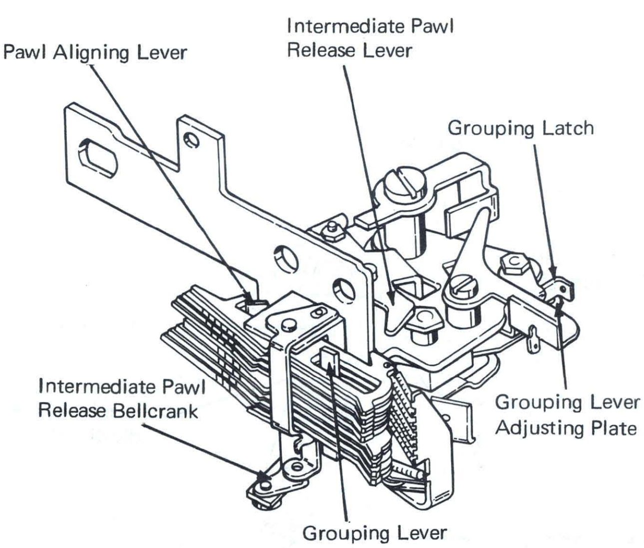


Figure 5 – Escapement Pawl Assembly (Grouped) (Level 1)

As on the level 2 design, the intermediate pawl release lever is mounted on the pawl block assembly by a pivot pin (Figure 6). It is pivoted by the action of the pawl release lever against the angular tip during tab and manual carriage release, or by the pull of the pawl release link through the intermediate pawl release bellcrank during carriage return.

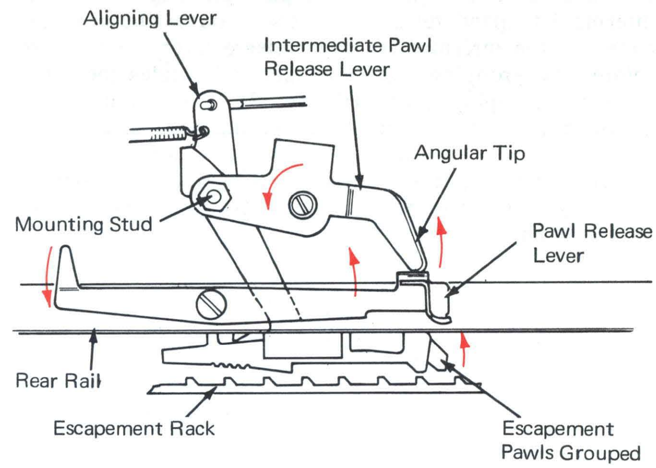


Figure 6 – Pawl Aligning Lever (Top View)

The pawl aligning lever is mounted to the left side of the intermediate pawl release lever by a shaft extending through arms on each part. An extension of the aligning lever extends up behind the escapement pawls and to the right of their aligning lugs (Figure 7).

The aligning lever performs two separate functions:

1. To release the pawls during tab, carriage return, and carriage release. This involves a straight forward movement of the aligning lever and bail. During pawl release the aligning lever is prevented from rotating by the pawl block. The bail is spring loaded against the left side of the pawl block and slides forward with the pawl block. Motion from the intermediate pawl release lever pushes the aligning lever toward the front of the typewriter, causing the bail to move against the back of the pawls and pivot their tips out of the escapement rack (Figure 7).

2. The other function is to align the escapement pawls during a backspace operation, which is discussed in the backspace section of this manual.

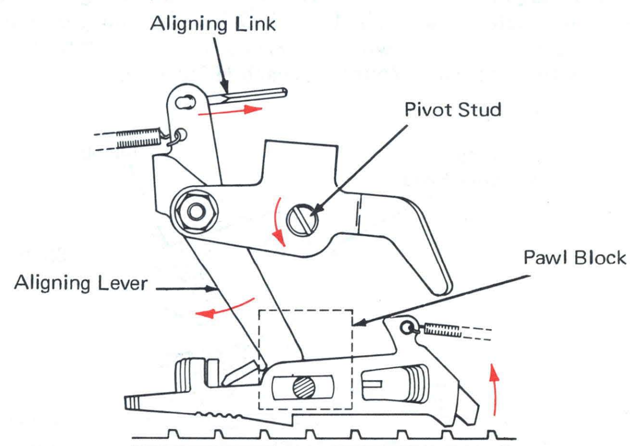


Figure 7 – Pawl Aligning Lever (Top View Level 1)

The same shaft that mounts the pawl aligning lever to the intermediate pawl release lever also mounts the grouping cone. As the intermediate pawl release lever continues to rotate, the grouping cone contacts and rotates the intermediate grouping lever (Figure 8). The intermediate grouping lever pivots on the mounting stud in the pawl block assembly. During this pivoting action, the intermediate grouping lever contacts and rotates the grouping lever adjusting plate which rotates the grouping lever to group the pawls.

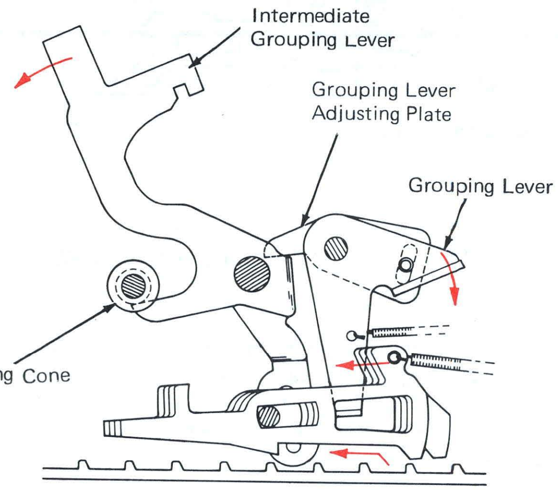


Figure 8 – Grouping Mechanism (Top View)

The grouping lever is mounted on a stud that pivots in the pawl block assembly (Figure 9). The bail of the grouping lever extends up through the grouping windows of the escapement pawls. A spring at the bottom of the grouping lever holds the grouping lever bail toward the right side of the grouping windows. An adjusting plate is attached to the grouping lever through an elongated hole and transfers motion from the intermediate grouping lever to the grouping lever.

As the motion from the intermediate grouping lever rotates the grouping lever, the extension moves against the left side of the grouping windows. This moves the pawls to the left, and brings the left side of their grouping windows into vertical alignment. With the left sides of all the grouping windows held in a straight vertical line by the grouping lever, the pawl tips will be vertically aligned into two groups that consist of four units each (Figure 9).

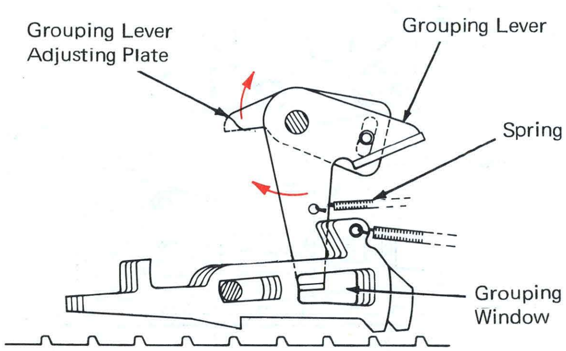


Figure 9 – Grouping Mechanism (Top View)

Another arm of the intermediate grouping lever extends to the rear of the assembly. When the intermediate grouping lever pivots far enough to group the pawls, a spring loaded grouping latch moves into a notch on this arm (Figure 10).

The function of the latch is to hold the pawls grouped only while they reenter the escapement rack. If there was no grouping latch, as soon as the pawls begin to move back into the escapement rack, they would begin to lose their grouping arrangement. This could result in the wrong escapement pawl holding the carriage after a carriage return or tab operation.

The grouping latch consists of two parts: the latch and the latch adjusting plate (Figure 10). The adjusting plate receives the motion of the latch release lever through the pin extension. The adjusting plate is attached to the latch through an elongated hole in the latch and both parts pivot together on a stud at the rear of the pawl block bracket. Motion from the adjusting plate pivots the latch out of the notch in the intermediate grouping lever arm.

A latch release lever is mounted on the same stud as the grouping lever and has an extension that extends up behind the spring lugs of the No. 1 and No. 5 pawls (Figure 10). The rear end of the latch release lever is hook-shaped and transfers the latch release lever motion from the escapement pawls to the grouping latch. The spring lugs of the No. 1 and No. 5 pawls are further to the left when the pawls are grouped; one of them will therefore be the first to reach the latch release lever to operate it. When the pawls reenter the escapement rack, the rack pushes the No. 1 or No. 5 pawl (determined by which group was closest to the rack tooth) until the pawl lug contacts the latch release lever to pivot the grouping latch out of the intermediate grouping lever notch (Figure 10). The pawls are then allowed to restore to their normal arrangement with either the No. 1 or No. 5 pawl always holding the carriage.

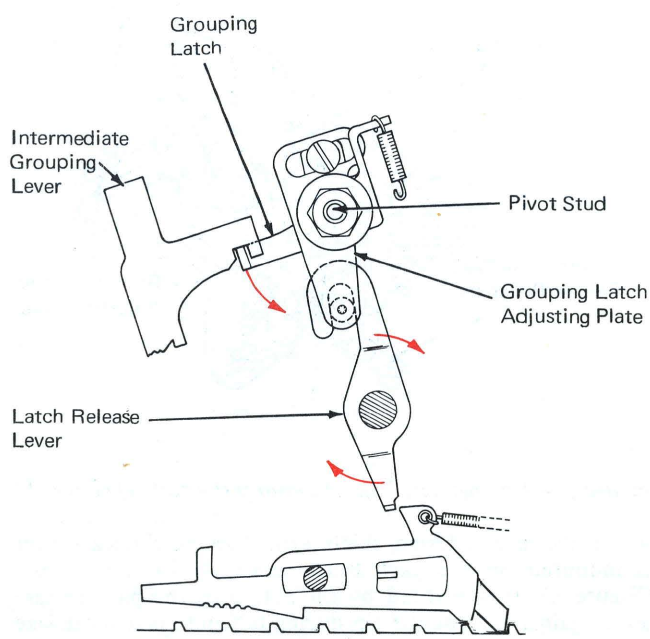
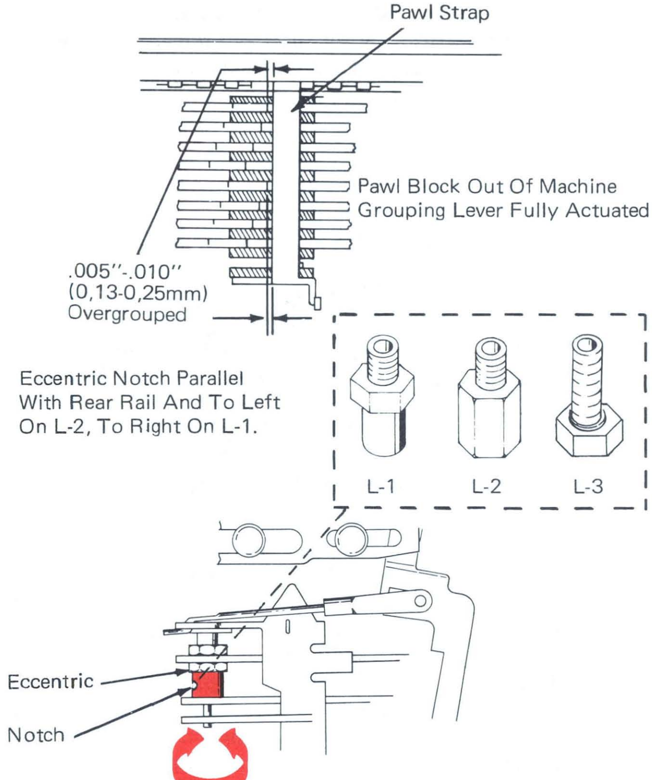


Figure 10 – Grouping Latch (Latched) (Top View)

C4-D4 PAWL RELEASE & GROUPING ADJUSTMENTS

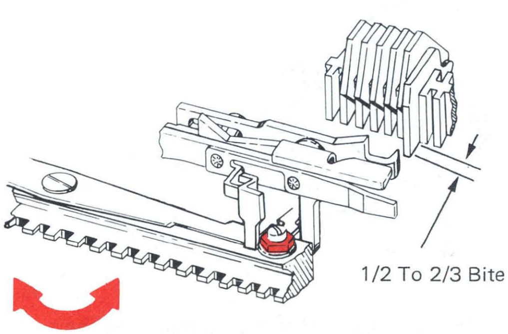
1. *Pawl Release And Grouping Lever Eccentric, D4 (Level 2)* – If the pawl block is out of the machine adjust the eccentric for .005-.010" (0,13-0,25mm) overgrouping with the pawl release and grouping lever fully operated. With the pawl block in the machine, check the position of the eccentric. The notch should be approximately parallel with the rear rail and pointing to the left (from rear of machine) on L-2. On Level 1 notch is to right.

NOTE: Be sure to remove the nylon stop (18-063) from the rear rail on early level machines before starting any adjustments.



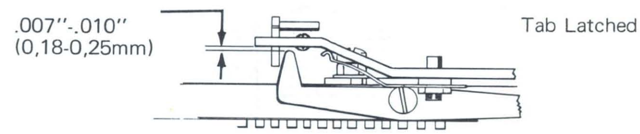
(Rear View)

2. *Tab Latch Eccentric* – Adjust the eccentric for 1/2 to 2/3 overlap of a set tab stop by the check lever when the tab lever is latched out. Keep the eccentric in the right half of rotation. Tab rack adjustments must be correct.

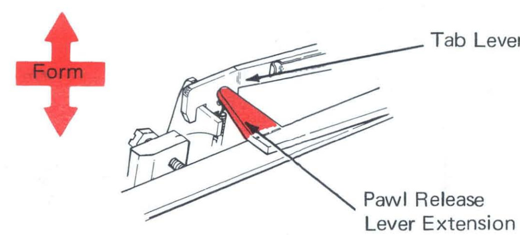


3. *Pawl Release Lever Extension, D4 (Level 2)* – With the tab lever latched, form the extension on the left end of the pawl release lever to get a clearance of .007-.010" (0,18-0,25mm) between the extension of the pawl release lever and the tab lever.

NOTE: Check the tab operating link adjustment for proper overthrow (.010") (0,25mm) of the tab lever past the tab latch with the cam on the high point.

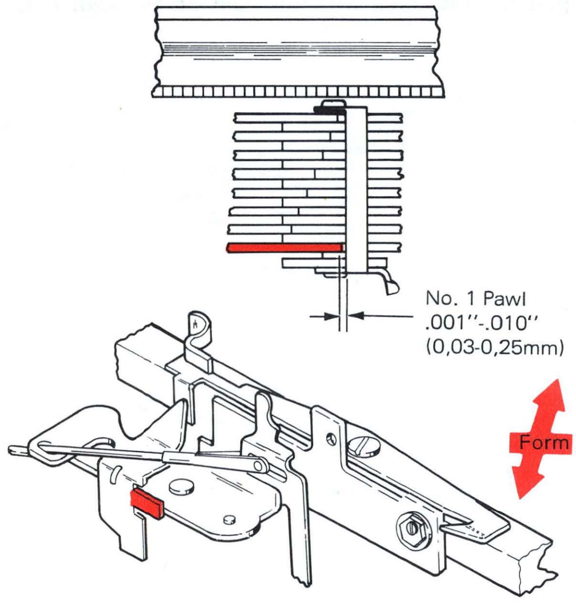


(Top View)



4. *Release and Grouping Lever Rest Position, D4 (Level 2)* –

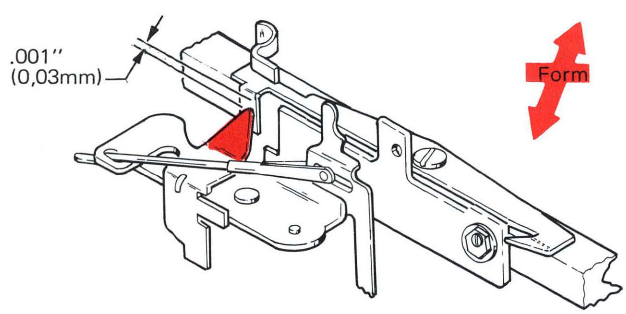
a. Before making this adjustment, disconnect the pawl release, clutch unlatch, auto-group, and aligning links. While holding on the No. 2 escapement pawl, form the lug of the intermediate pawl release and grouping lever for .001-.010" (0,03-0,25mm) clearance between the strap and the No. 1 pawl.



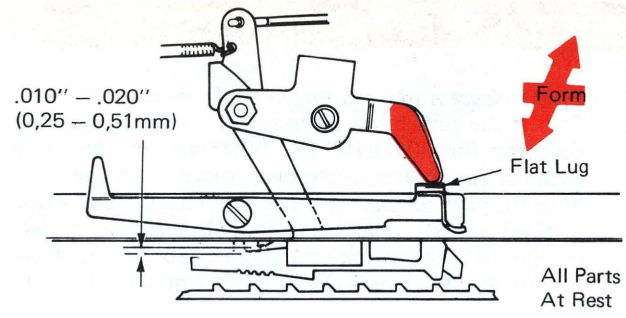
NOTE: Carriage release U-bar must not be binding off the pawl release lever.

The adjustments 4a and 4b can affect each other and may have to be adjusted alternately for proper adjustment.

b. Form the angular tip for .001" (0,03mm) clearance between the tip and the lug on the pawl release lever.

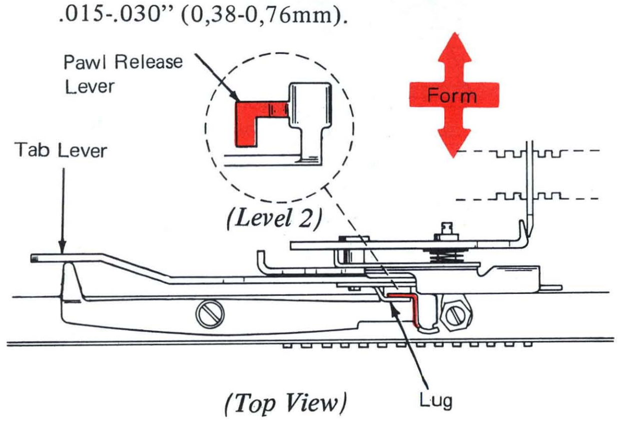


Angular Tip, Pawl Release, C4, D4 (Level 1) – Form the angular tip of the intermediate pawl release lever so there is .010-.020" (0,25-0,51mm) clearance between the upper vertical lug of the pawl aligning lever and the pawl tails when all parts are at rest. Be sure the pawl release lever lug is FLAT against the rear rail.



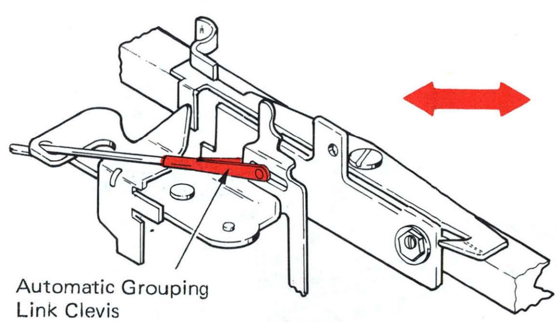
(C4, D4 - Presimplified Pawl Block)

5. *Pawl Clearance, C4, D4* – With the tab lever latched, form the vertical lug on the pawl release lever so the escapement pawls clear the escapement rack by .015-.030" (0,38-0,76mm).

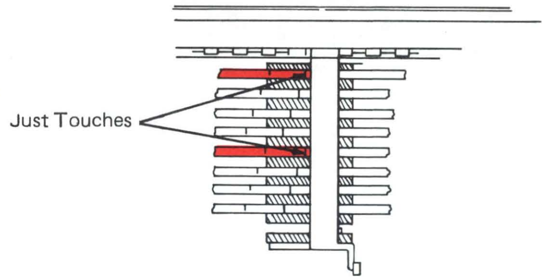


6. *Automatic Grouping Link Clevis (Level 2)* – Position the carriage one unit from the left-hand margin and adjust the automatic grouping link clevis so when the carriage is pushed slowly into overbank, the pawls are fully grouped when the No. 1 or 5 pawl drops over the rack tooth. There should be .015-.020" (0,38-0,51mm) motion remaining before reaching full overbank after the pawl drops. When the carriage is pushed into full overbank, the pawls should be .010-.035" (0,25-0,89mm) off the bottom of the escapement rack.

NOTE: A sound should be heard as the pawl drops into the rack. Some readjustment of the release and grouping lever eccentric may be needed to get this condition. On 17" and 20" machines, check this adjustment with the margin set at 0 and 1.



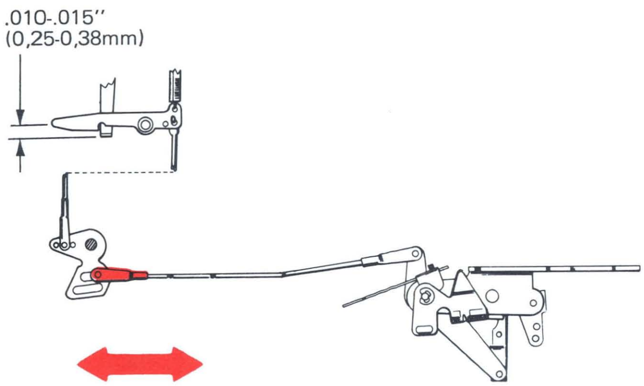
NOTE: Use the left-hand margin, not the side frame, when making this adjustment.



Fully Grouped In Overbank

7. *Clutch Unlatch Links* – Adjust the clutch unlatching link clevis so, with the carriage held in full overbank, a clearance of .010-.015" (0,25-0,38mm) exists between the clutch latch and lever. The clutch should unlatch with .015-.020" (0,38-0,51mm) carriage motion remaining before full overbank.

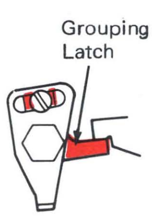
Adjustments for carriage return, tab, backspace, and manual carriage release remain the same.



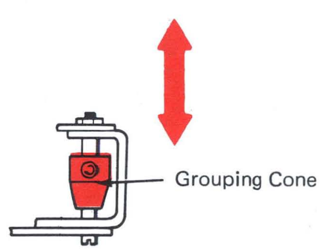
8. *Grouping Cone, C4, D4 – Level 1 (Preliminary)* –

   a. Position the grouping latch in the center of the lateral adjustment range and tighten in place.

   b. With the tab lever latched out, adjust the cone up or down so the grouping latch will drop into the latching notch without contacting either side.



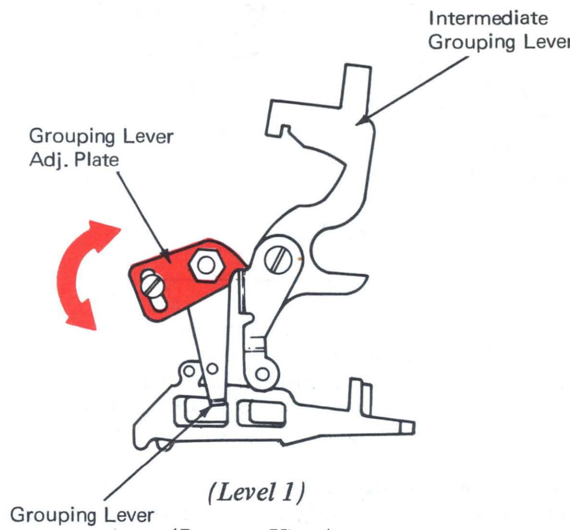
(Bottom View)



(Rear View)

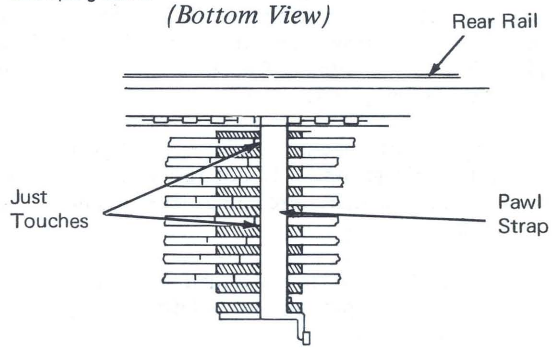
9. *Grouping Lever, C4, D4 (Level 1)* – Adjust the grouping lever adjusting plate so the pawls are fully grouped when the tab lever is latched out.

   When the pawls are correctly grouped, the No. 4 and No. 8 pawls should move away from the pawl strap with any additional movement of the tab lever. Be sure that grouping is maintained by the tab lever, not the automatic grouping lever. It is a good idea to disconnect the grouping latch spring and the pawl aligning link to prevent interference when trying to observe this adjustment.



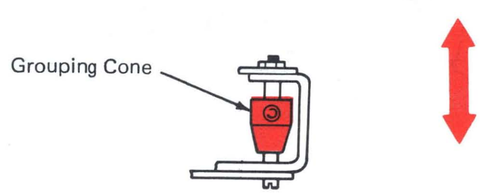
(Level 1)

(Bottom View)



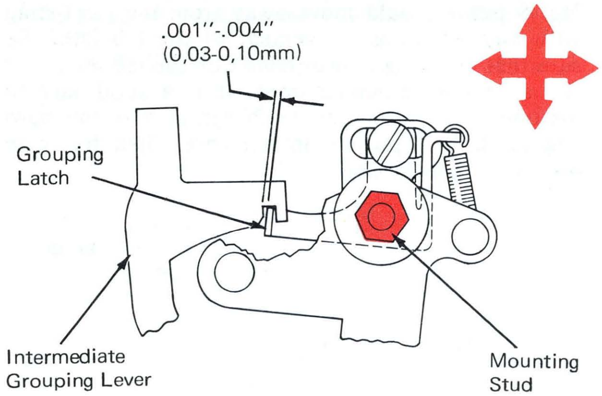
(Bottom View)

10. *Grouping Cone, C4, D4 (Level 1)* – Very slight changes to grouping can be made by moving the grouping cone up or down.



(Rear View)

11. *Grouping Latch Mounting Stud, C4, D4 (Level 1) –* Adjust the stud so the grouping latch will bottom in the notch of the intermediate grouping lever and clear the left side of the notch by .001-.004" (0,03-0,10mm) when the tab lever is latched out.



(Top View)

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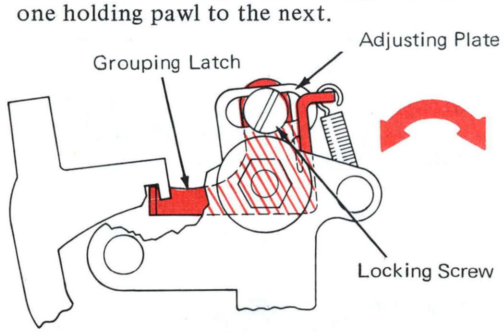
12. *Grouping Latch Adjusting Plate, C4, D4 (Level 1) –* With the pawls grouped and the grouping latch bottomed in the notch, adjust the latch plate so when the No. 1 or No. 5 pawl is pulled to the left approximately one unit, the latch will start to move.

SERVICE INFORMATION: The adjustment of the grouping latch adjusting plate is correct if grouping unlatches reliably and there is no interference between the pawl spring lugs and the unlatching lever bail during normal typing. Check for these conditions using the following procedure:

a. Push the carriage into full overbank position. (If automatic grouping is not functioning, operate the intermediate grouping lever manually to latch up grouping.)

b. Allow the carriage movement to rest slowly to the left. Grouping should unlatch slightly before the carriage comes to rest.

c. Do some typing and check that the grouping latch is not moving as the carriage changes from one holding pawl to the next.



(Top View)

TABULATION OPERATIONAL THEORY

The purpose of the tab mechanism is to let the operator type in columns by quickly moving the carriage across the writing line to predetermined positions. The C1, D1-C4, D4 tab mechanisms have the same theory of operation. The main difference is that on the C4, D4, grouping goes with pawl release and the carriage tab positions are limited to 4 unit positions.

The basic components of the tab mechanis are the cam, tab lever, tab rack, and tab set and clear mechanism (Figure 1). Also in use is the action of the carriage. The operation of the decelerator, governor and mainspring is discussed in another section of this manual.

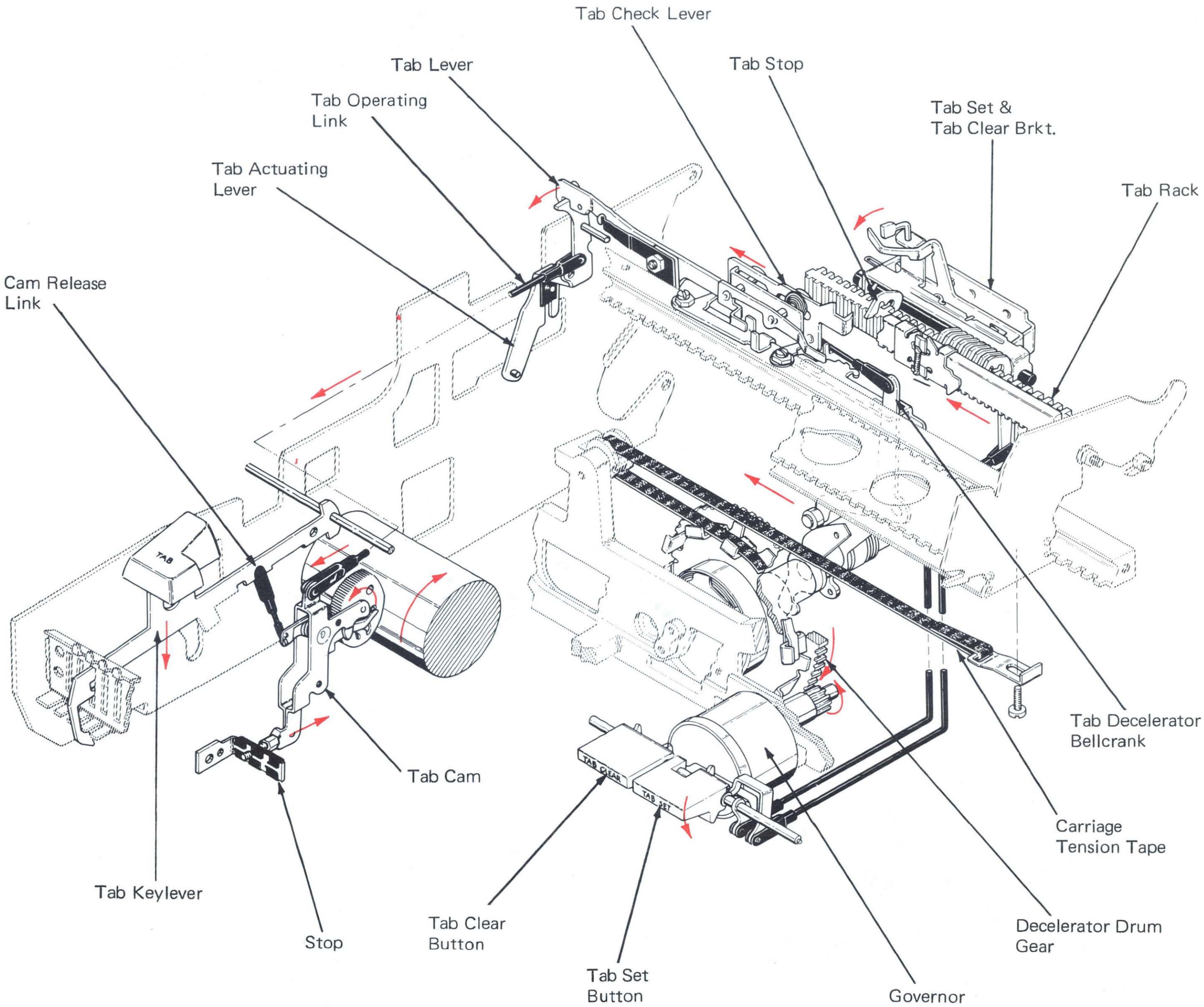


Figure 1 – Tab Mechanism

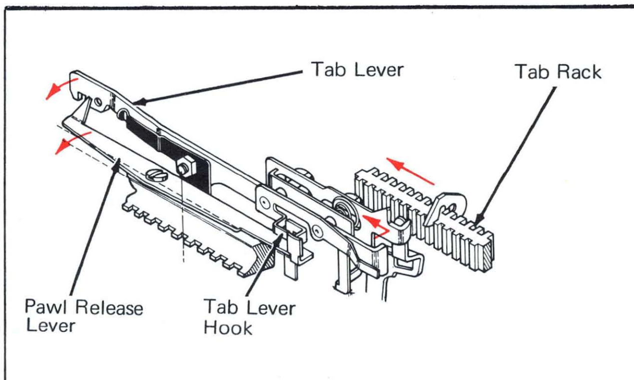
CAM AND TAB LEVER OPERATION

Depressing the tab keybutton (Figure 2) releases the double-lobed tab cam to the power roll. The motion of the cam is transmitted through the operating link to a tab actuating lever which is mounted to the left side frame. This lever pivots toward the front of the machine, pulling the left end of the tab lever with it. The right end of the tab lever pivots to the rear and allows the tab latch, which is mounted on the rear rail, to move into place in front of the tab lever (Figure 2).

As the tab lever pivots to the rear, the hook on the tab lever contacts the pawl release lever and removes the escapement pawl from the rack. At the same time, the tab check lever is released from the keeper, and moves to the right under spring load on elongated mounting holes. It is now in position to engage the first set tab stop. The lug on the keeper contacts an extension of the tab lever to prevent the tab check lever from overthrowing into the rack as the cam goes over the high point.

On the C4, D4, the pawl release lever receives motion from both the tab lever hook and the left end of the tab lever (Figure 2). This supplies more force to the pawl release lever for transfer to the pawl block to complete pawl release and grouping.

Pawl release and grouping is discussed in the pawl release and grouping section of this manual.



C4 – D4 Pawl Release Lever Operation

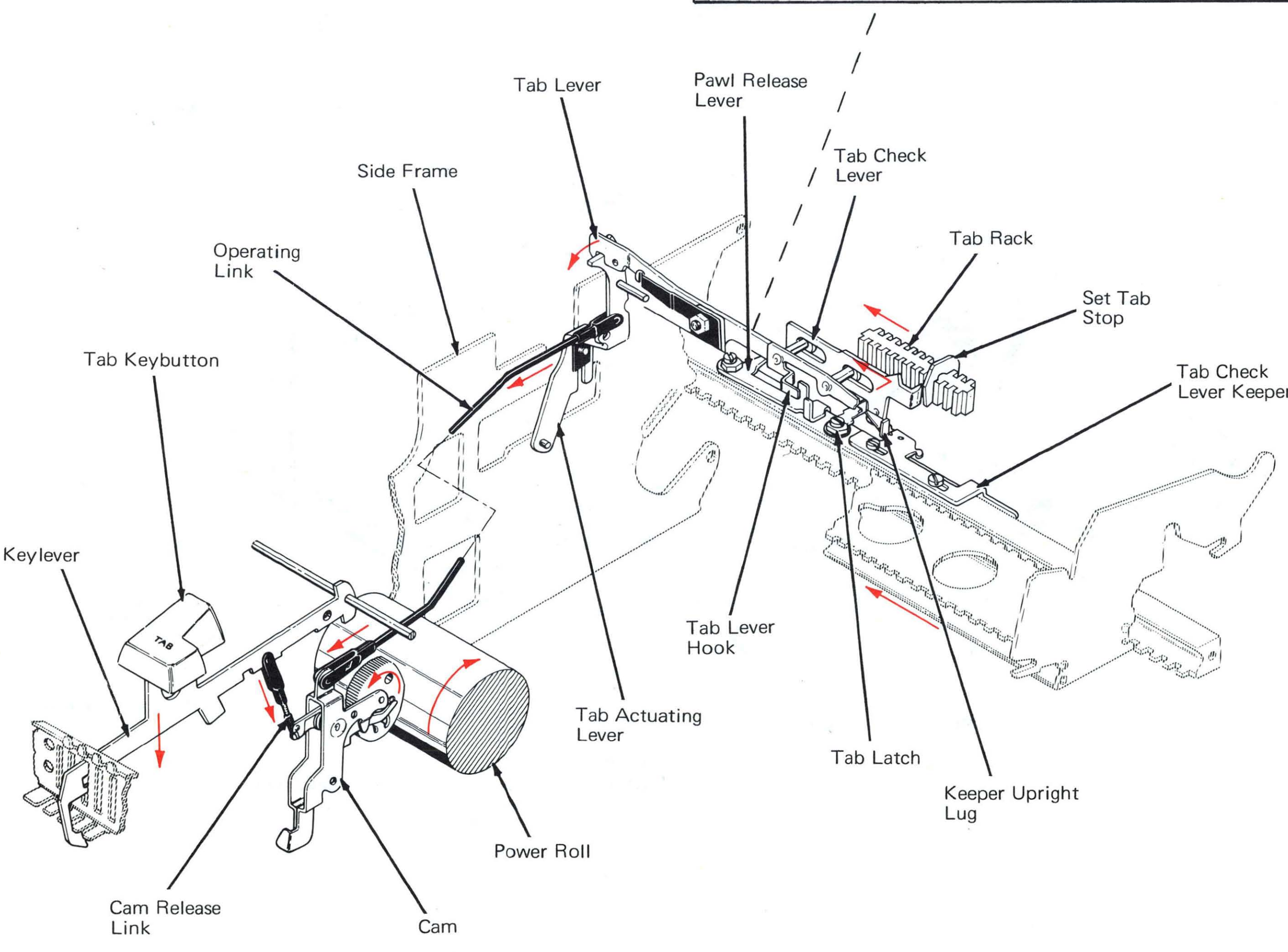


Figure 2 – Tab Mechanism Operation

CARRIAGE MOVEMENT

Spring tension is applied to the tab lever by the extension spring on the tab decelerator arm (Figure 3). When the check lever is released from the keeper, this spring pulls the check lever to the right. This action positions the decelerator for operation.

When the escapement pawl is released, the carriage is pulled to the left under tension of the mainspring. This direction of carriage movement causes the mainspring drum to drive the decelerator drum gear and centrifugal governor. The carriage is free-moving during the first few spaces of a tab operation until it speeds up. Then centrifugal force in the governor causes the rotating friction shoes to drag against the governor housing. This slowing action prevents the carriage from developing excessive speed.

When the carriage has moved to the point where the set tab stop contacts the tab check lever, the carriage motion drives the check lever to the left on elongated mounting holes. This motion, through the adjustable link to the tab decelerator bellcrank, rotates the decelerator and governor to slow the carriage to an easy, controlled stop.

The last part of the check lever motion pushes the tab latch off the tab lever. The tab lever then restores to the rest position, and the escapement pawl reenters the escapement rack to hold the carriage at the new position. The tab check lever again is positioned to the left of the keeper.

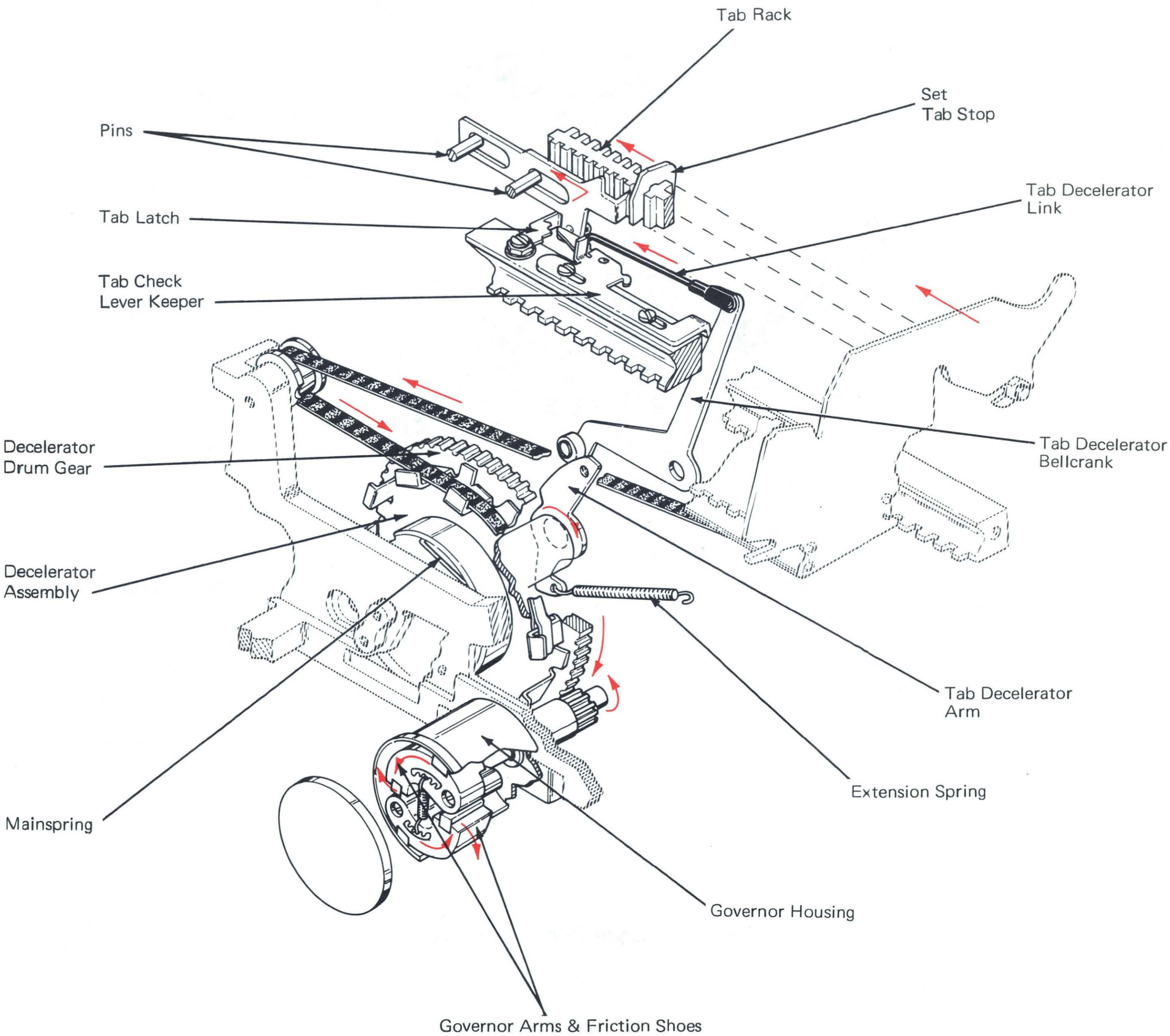


Figure 3 – Governor Decelerator (C1, D1)

FINAL STOPS

If the tab is operated with no set tab stops to the right of the check lever, the right-hand margin stop will contact the check lever to unlatch the tab. If the carriage is already past the right margin, a final stop at the end of the tab rack will unlatch it (Figure 4).

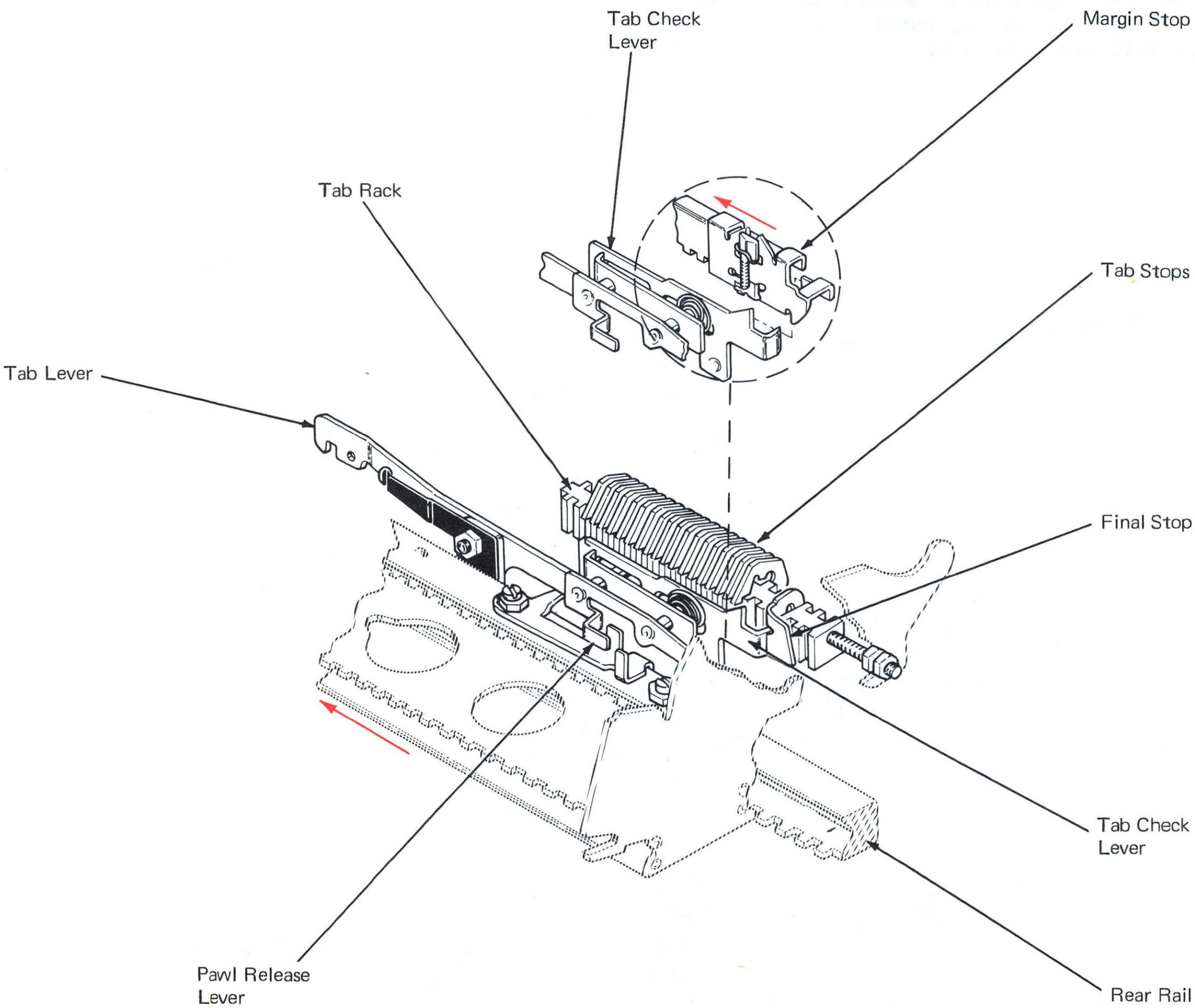


Figure 4 – Margin Stop – Final Stop

TAB LEVER ASSEMBLY

The tab lever assembly (Figure 5) is mounted by a stud in the escapement pawl mounting bracket. The tab lever can pivot front and rear, and up and down. The same type of tab lever is used for all pitch C and D typewriters, including the C4, D4 pitches.

The tab lever assembly may be considered as having three parts. The main part is the tab lever and the other parts are mounted to it. The front side of the tab lever has a hook that pivots the pawl release lever and removes the pawl from the rack when the tab is operated. A part of the tab lever extends down and toward the rear of the machine. The vertical part provides the contact surface for the tab latch. The lower part, extending to the rear, operates a carriage return/tab interlock which allows tab to override carriage return. Two heavy rivet studs are attached to the rear of the tab lever. These studs support the second and third parts of the tab lever assembly.

The second part of the tab lever is the margin control lever. The margin control lever serves no function in operation of the tab. The carriage return section of this manual discusses the margin control lever function.

The third part is the tab check lever, mounted to the same studs as the margin control lever. Because the rest position of the check lever is adjustedpby positioning the keeper, the same tab lever can serve all pitch typewriters. The requirement for the keeper is that it holds the check lever to the left in a position from which it can engage every second tab stop. On different pitch machines, the keeper can be adjusted to meet the check lever requirements. On short tabulations (less than half an inch) the check lever will not reach the limit of the motion to the right before the set tab stop begins to push it back.

The tip of the check lever is held out from the tab lever by the compression spring on the right-hand mounting stud. This spring will compress to allow the tab lever to pivot to the rear and latch even if the check lever is blocked from moving to the rear. This condition may occur if a set tab stop is positioned directly opposite the tip of the check lever when the tab is operated. As soon as the carriage begins to move to the left, the interfering tab stop will move out of the way and allow the check lever to latch to the rear.

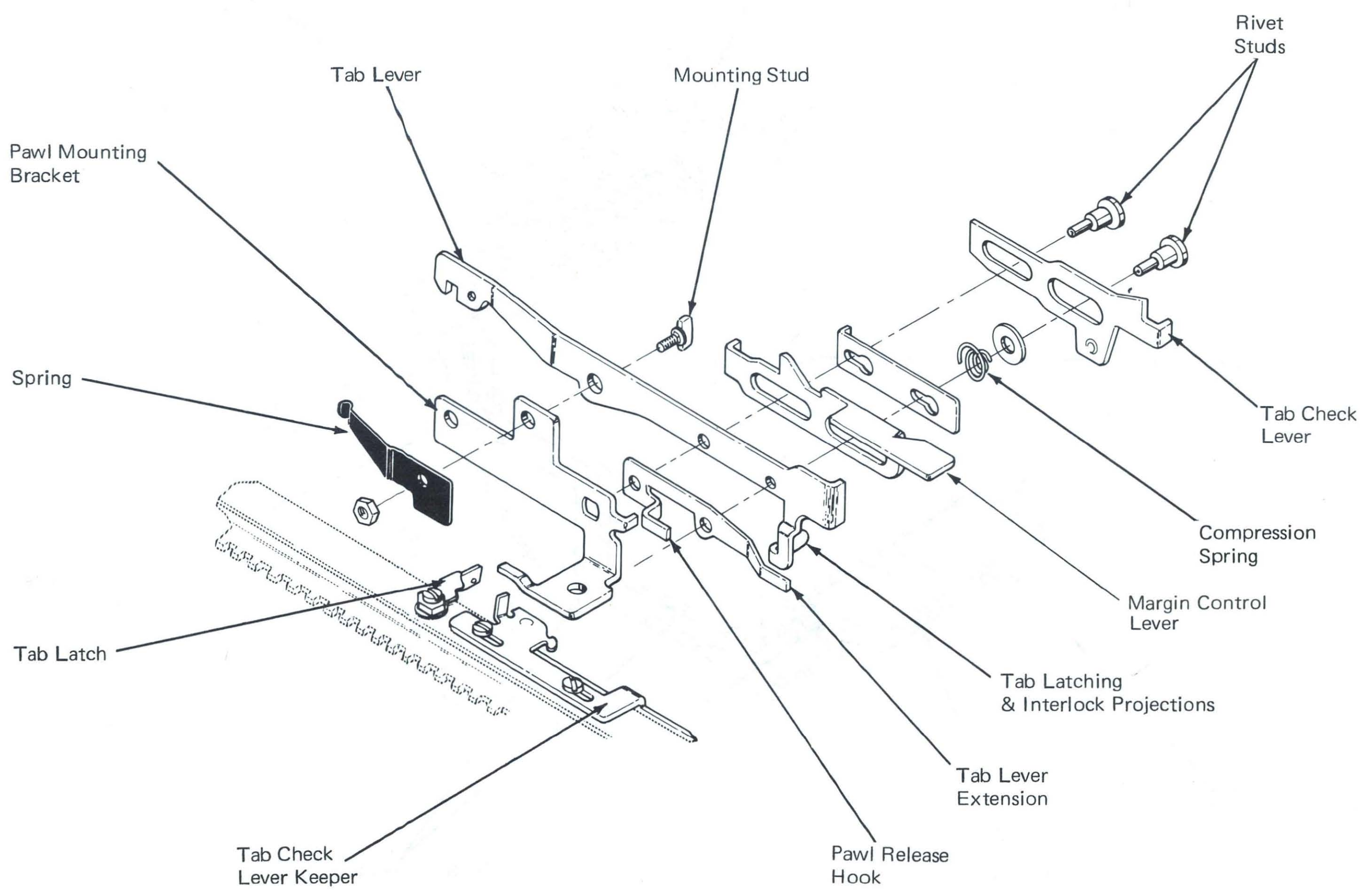


Figure 5 – Tab Lever Assembly

SET AND CLEAR

The operator may set any stop from a rack of tab stops on the carriage (Figure 6). Tab columns may be positioned with a minimum of two spaces between columns. The tab stops are set by a set finger, operated through a link when the tab set button on the front of the typewriter is depressed. The tab stops are cleared by a clearing lever, operated through a link when the tab clear button is depressed. All set tab stops can be cleared at one operation if the tab clear button is held depressed during a full-length carriage return operation. Spring fingers in the rack hold the stops in either the set or cleared position.

During the tab operation, other operations of the carriage are locked out or interrupted by means of interlocks. The carriage return/tab interlock is discussed in the carriage return section. The backspace is locked out by a backspace interlock. This operation is discussed in the backspace section.

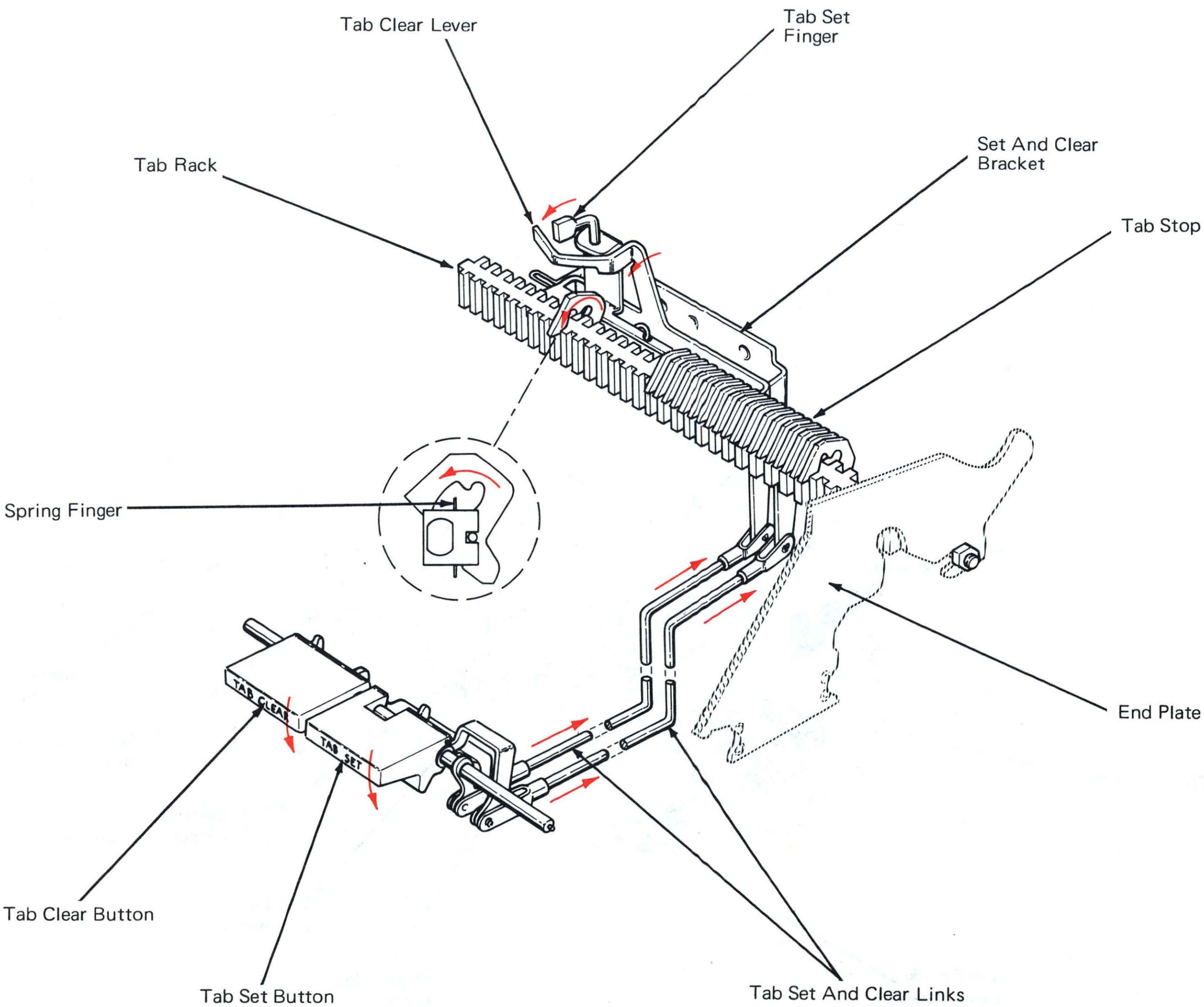
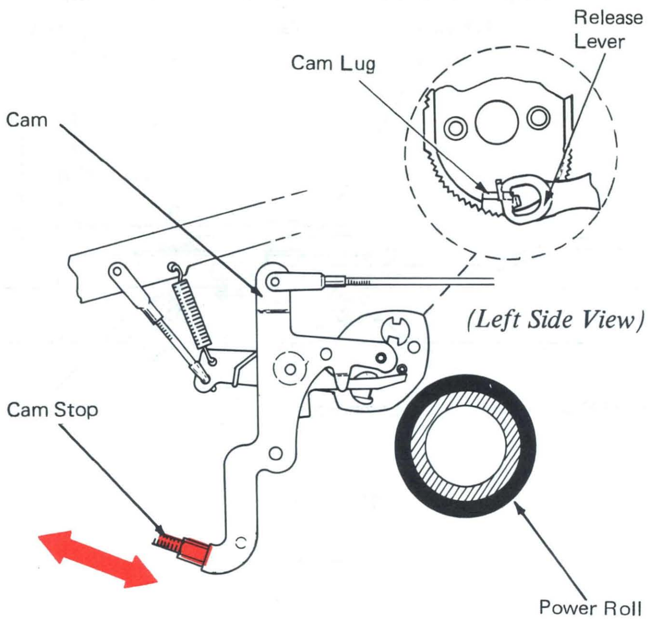


Figure 6 – Tab Set And Clear

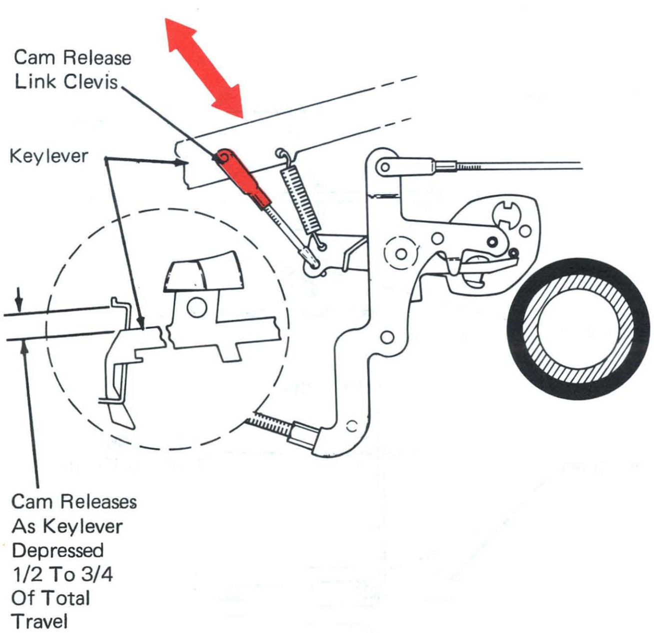
TABULATION ADJUSTMENTS

1. *Cam Clearance* – Adjust the cam stop so the release lever will rest on the rear of the cam lug when the cam is released with the power off.



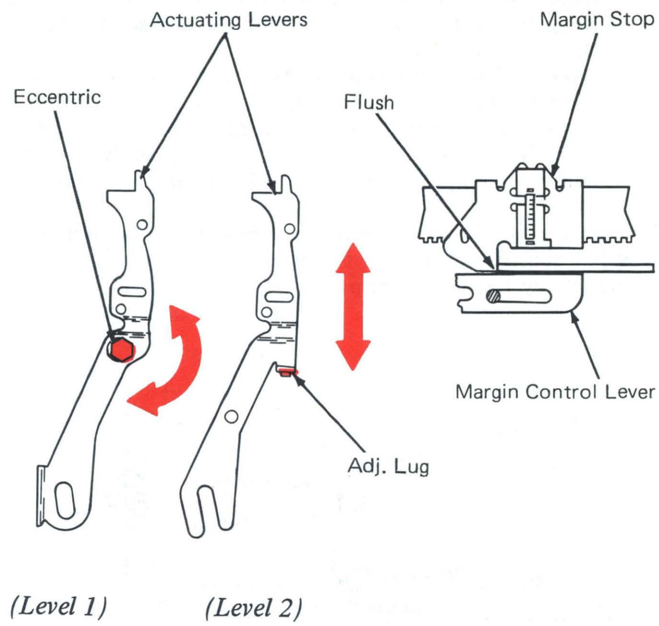
(Right Side View)

2. *Cam Release Link Clevis* – Adjust the clevis so that the cam is released when the keylever is depressed 1/2 to 3/4 of the downward motion.



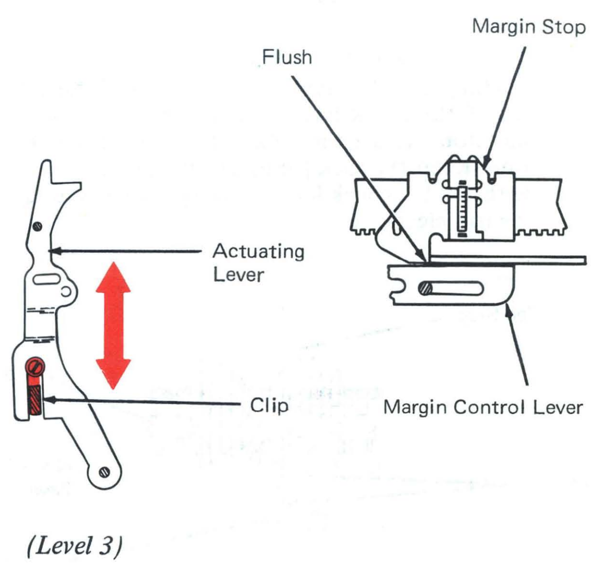
(Right Side View)

3. *Tab Lever Height, C1, C4* – Adjust the actuating lever eccentric or lug until the margin control lever engages the left margin stop by the thickness of the flat of the lever.



(Right Side View)

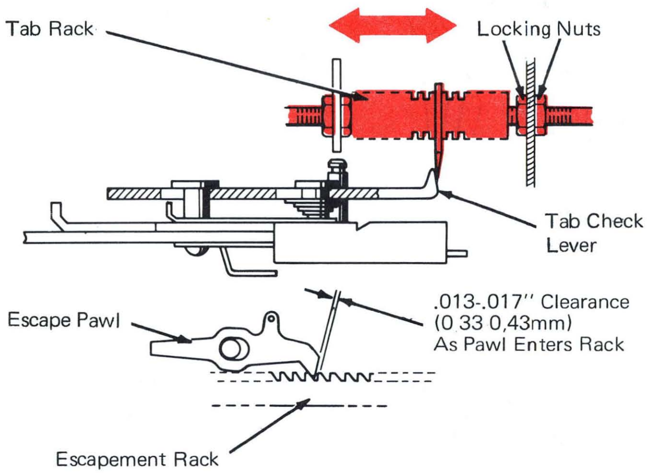
Tab Lever Height, D1, D4 – Adjust the actuating lever clip in the elongated mounting hole so the margin control lever engages the left margin stop by the thickness of the flat of the lever.



(Left Side View)

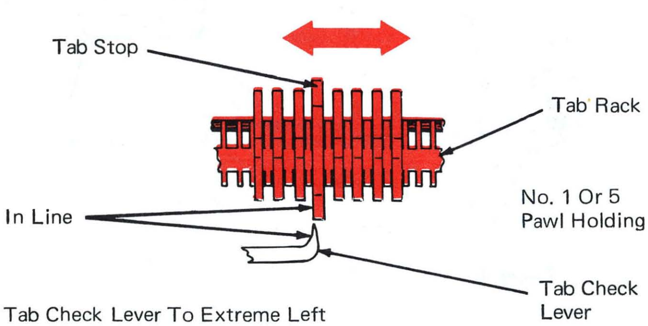
4. *Tab Rack, C1, D1* – With the power off and the cam on the high point, allow the carriage to move to the left so a set tab stop holds the tab check lever to the far left position. Slowly back the cam from the high point. As the escapement pawl enters the escapement rack, there should be .013-.017" (0,33-0,43mm) clearance between the working surface of the escapement pawl and the working surface of the rack tooth. Adjust the tab rack left or right for this condition. Keep the rack parallel to the rear rail and square with the tab check lever.
NOTE: The adjustment of pawl reentry requires that the pawl drop in front of the correct rack tooth with enough clearance to reliably engage this tooth each time. Yet it must not enter the rack so early that it could possibly engage the tooth which came before.

The latest possible time at which the pawl could reenter the rack is when the check lever is driven to the limit of motion to the left by the set tab stop.



(Top View)

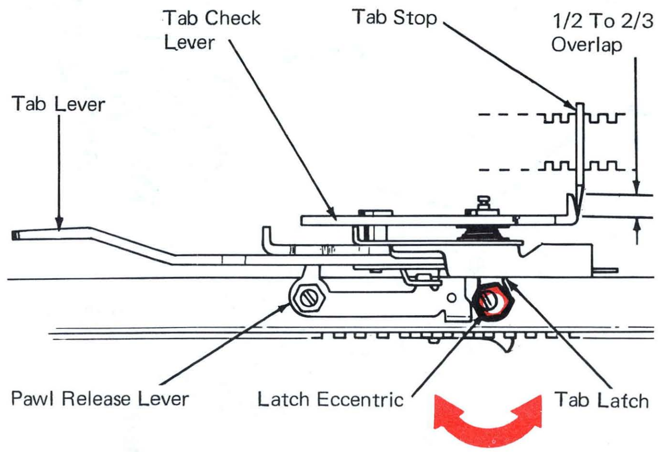
Tab Rack, C4, D4 – With the No. 1 or No. 5 pawl holding, pull the tab check lever to the far left. The tip of the check lever should then line up with a set tab stop. Adjust the rack left or right for this condition. Keep the rack parallel to the rear rail and square with the tab check lever. This will provide for a 1-unit reentry clearance.



(Top View)

5. *Tab Latch Eccentric* – Adjust so the tab check lever engages any set tab stop by 1/2 to 2/3 of exposed surface. Keep the high side of the eccentric to the right.

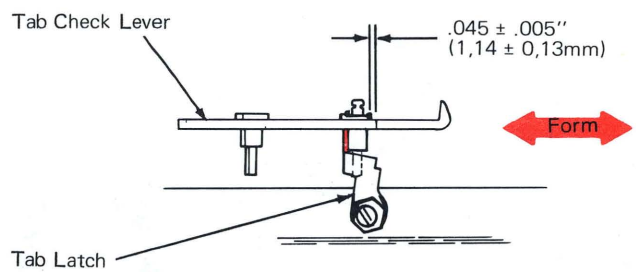
NOTE: Changing the tab latch eccentric adjustment will change pawl clearance and grouping during tab. Tab unlatching is also affected by this adjustment.



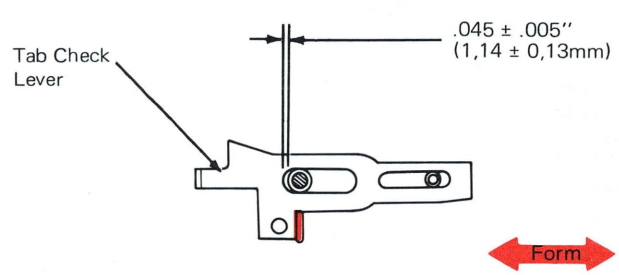
(Top View)

6. *Tab Unlatching* – Form the tab latch extension at the point of contact with the tab check lever so the tab will unlatch just as the tab check lever reaches a point .045 ± .005" (1,14 ± 0,13mm) away from the furthest movement to the left.

NOTE: Late unlatching will result in rebound.



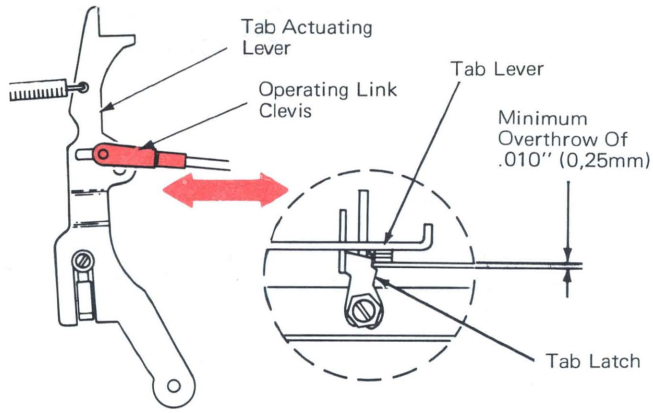
(Top View)



(Rear View)

7. *Operating Link Clevis* – Adjust so the tab lever overthrows the tab latch a minimum of .010" (0,25mm) when the cam is on the high point. Make sure the tab overthrow stop has no resctrictions when observing this adjustment.

NOTE: On C4, D4, the tab lever should latch reliably when the entry of the check lever into the tab rack is blocked by the front edge of a tab stop.



(Left Side View) *(Top View)*

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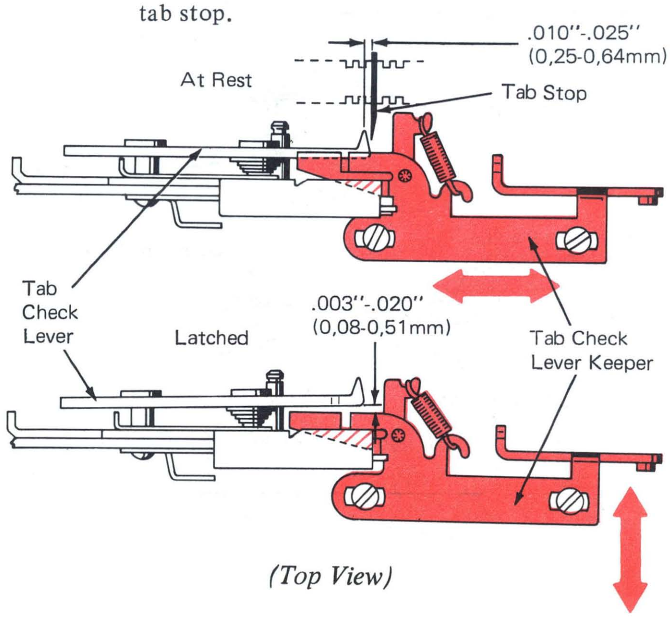
8. *Tab Check Lever Keeper, C1, D1* – Adjust left or right so there is a clearance of .010-.025" (0,25-0,64mm) between the working surfaces of the tab check lever and the set tab stop as the tab lever is moved slowly to the rear. Also, adjust front-to-rear for .003-.020" (0,08-0,51mm) between the tab check lever and keeper with the tab lever latched.

Tab Check Lever Keeper, C4, D4 – With the No. 1 or No. 5 pawl holding adjust the same as C1, D1; however, the adjustment should be improved to satisfy the following check:

a. Set every third tab stop.

b. Tab and strike a four-unit character across full length of carriage. The machine should tab to EVERY tab stop.

c. Repeat check B and use a five-unit character. The machine should tab to EVERY OTHER set tab stop.



(Top View)

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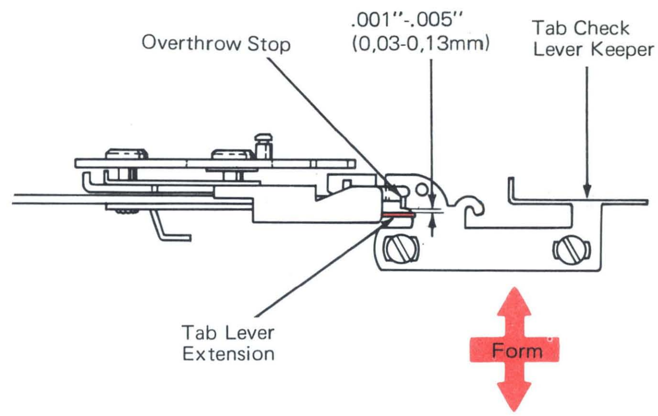
9. *Tab Lever Extension* – With the cam on the high point, form the extension to provide a clearance of .001"-.005" between extension and overthrow stop.



(Top View)

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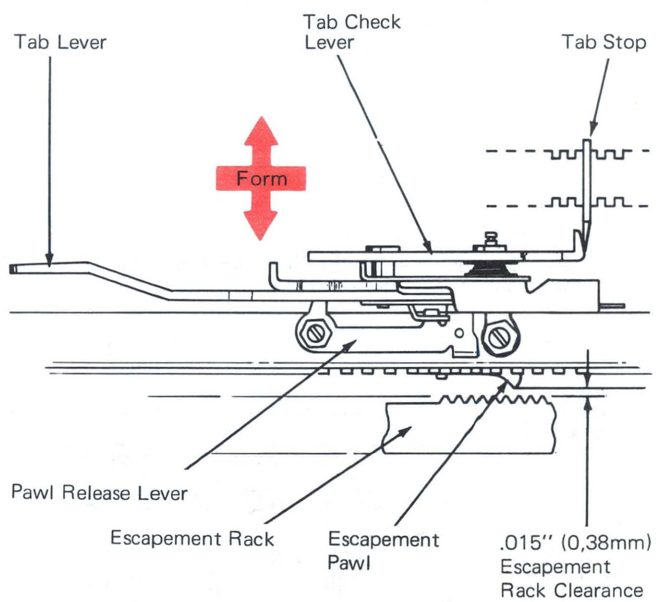
10. *Pawl Clearance* – Form the rear vertical lug on the pawl release lever so the pawls clear the rack by .015" (0,38mm) when the tab lever is latched.

NOTE: This adjustment directly affects grouping; therefore, grouping should always be considered when adjusting for pawl clearance on C4, D4 machines.



(Top View)

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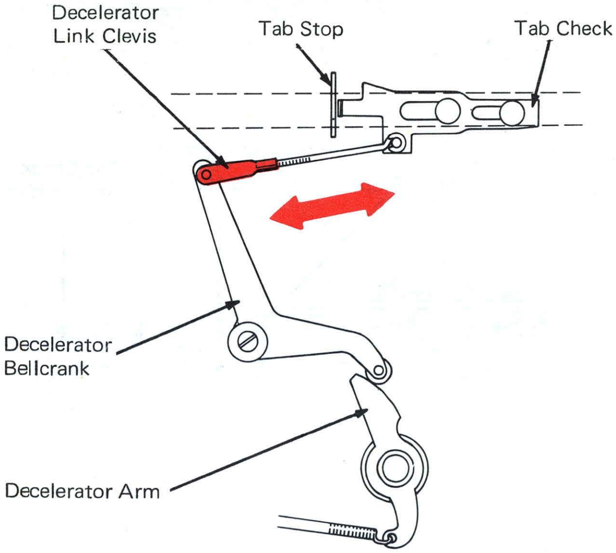
11. *Decelerator Link Clevis* – Adjust for maximum deceleration without delay.



(Rear View)

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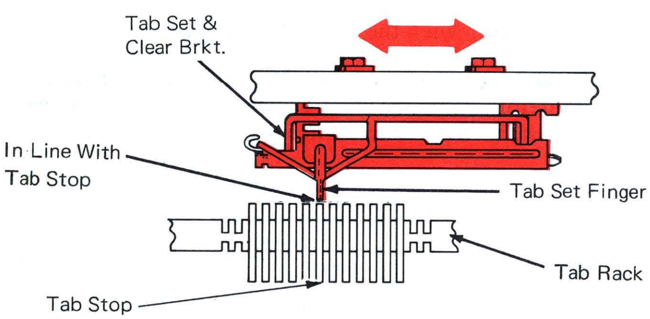
12. *Tab Set* and Clear Bracket – Position left or right so the tab set finger strikes the center of the back of the set tab stop to which the machine is tabulated.



(Top View)

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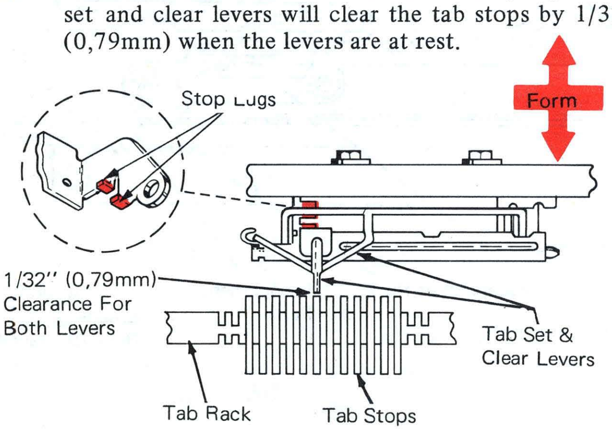
13. *Tab Set and Clear Levers* – Form the stop lugs so the set and clear levers will clear the tab stops by 1/32" (0,79mm) when the levers are at rest.



(Top View)

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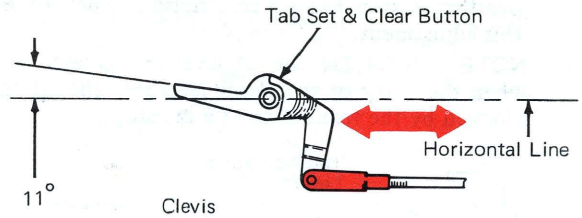
14. *Tab Set and Clear Link Clevis, C1-4* – Adjust so the top surface of the buttons extend 11 degrees above horizontal.



(Right Side View)

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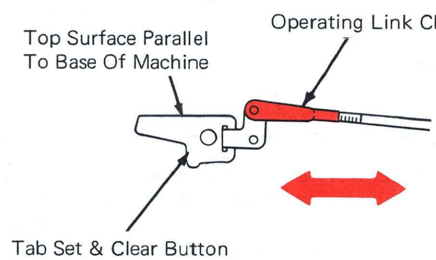
15. *Tab Set and Clear Link Clevis, D1* – Adjust so the top surfaces of the buttons will be parallel to the base of the machine.



(Right Side View)

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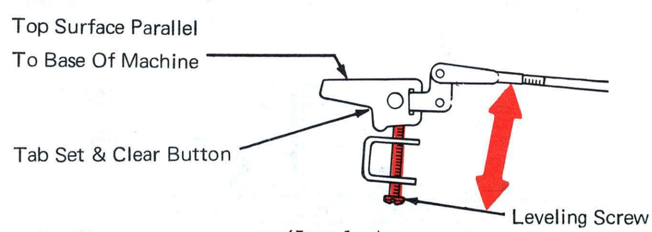
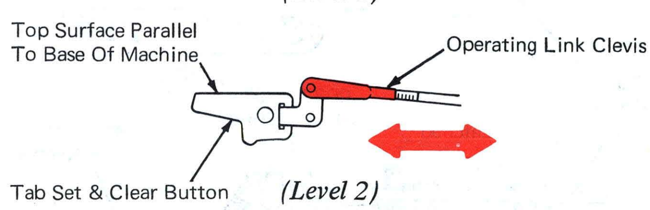
16. *Tab Set and Clear Clevis, D4* – Adjust top surface of buttons to be parallel to the base of the machine by their leveling screws and match the links to the buttons.



(Level 1)



(Level 2)
(Right Side View)

The C1, D1-C4, D4 carriage return and index mechanisms have the same type of operation except for escapement pawl(s) release and grouping. Separate sections, governor and decelerator and C4-D4 pawl release and grouping, contain detailed operational theory and adjustments for those particular functions. Figure 1 shows the C1-D1 mechanisms; difference in levels and the C4-D4 are shown later in this section.

The purpose of the carriage return mechanism is to return the carriage to the left-hand margin and index the paper. A carriage return tape has one end attached to the index pawl carrier that is located on the left end of the carriage. The tape passes under the carriage to the right side of the typewriter with the other end attached to the carriage return clutch pulley (Figure 1). Rotation of the pulley by the carriage return clutch winds the tape and pulls the index pawl which rotates the platen and at the same time, pulls the carriage to the left-hand margin.

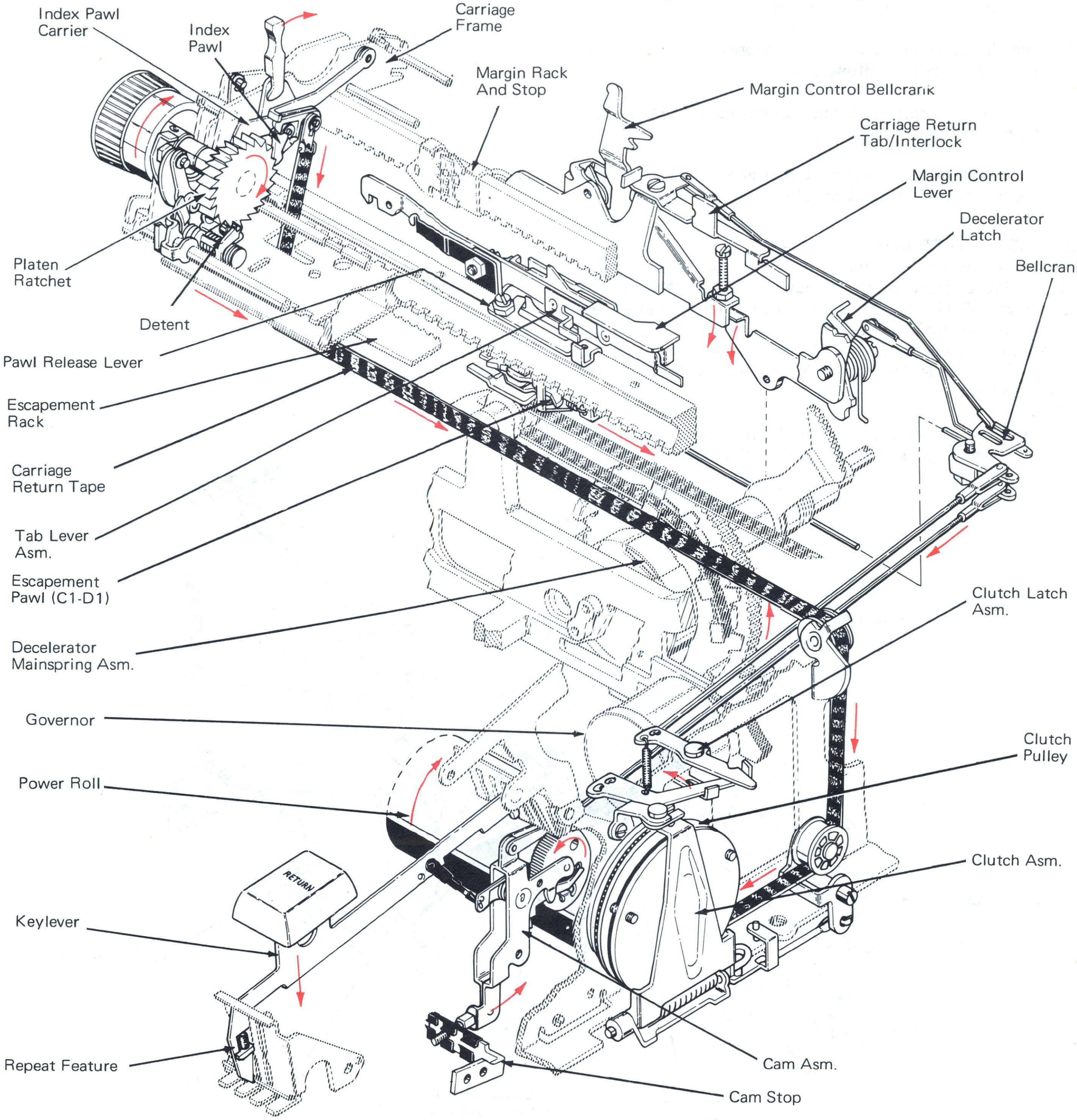


Figure 1 – Carriage Return/Index Mechanism (C1-D1)

CARRIAGE RETURN FUNCTIONS

Functions that must happen during a carriage return/index operation are:

1. The carriage return clutch must be engaged.
2. The escapement pawl(s) is disengaged from the rack to prevent drag.
3. The decelerator and governor are activated to provide a controlled stop of the carriage.
4. The carriage is stopped by the margin control lever contacting the left-hand margin stop.
5. Interlocks must be activated to prevent possible machine damage or malfunction.
6. The carriage return clutch is disengaged when the carriage arrives at the left margin.
7. The mainspring tension is tightened as the carriage moves to the left-hand margin.

CARRIAGE RETURN CAM

The carriage return and index operation is started by depressing the carriage return keylever to release the cam to the power roll (Figure 2). As the cam engages the power roll, it supplies motion through the front clutch operating link to the clutch lever. The clutch lever rotates until the rear vertical lug on the clutch lever engages the notch on the clutch latch.

The rotation of the clutch lever pulls the top of the clutch operating arm to the left against the clutch plate.

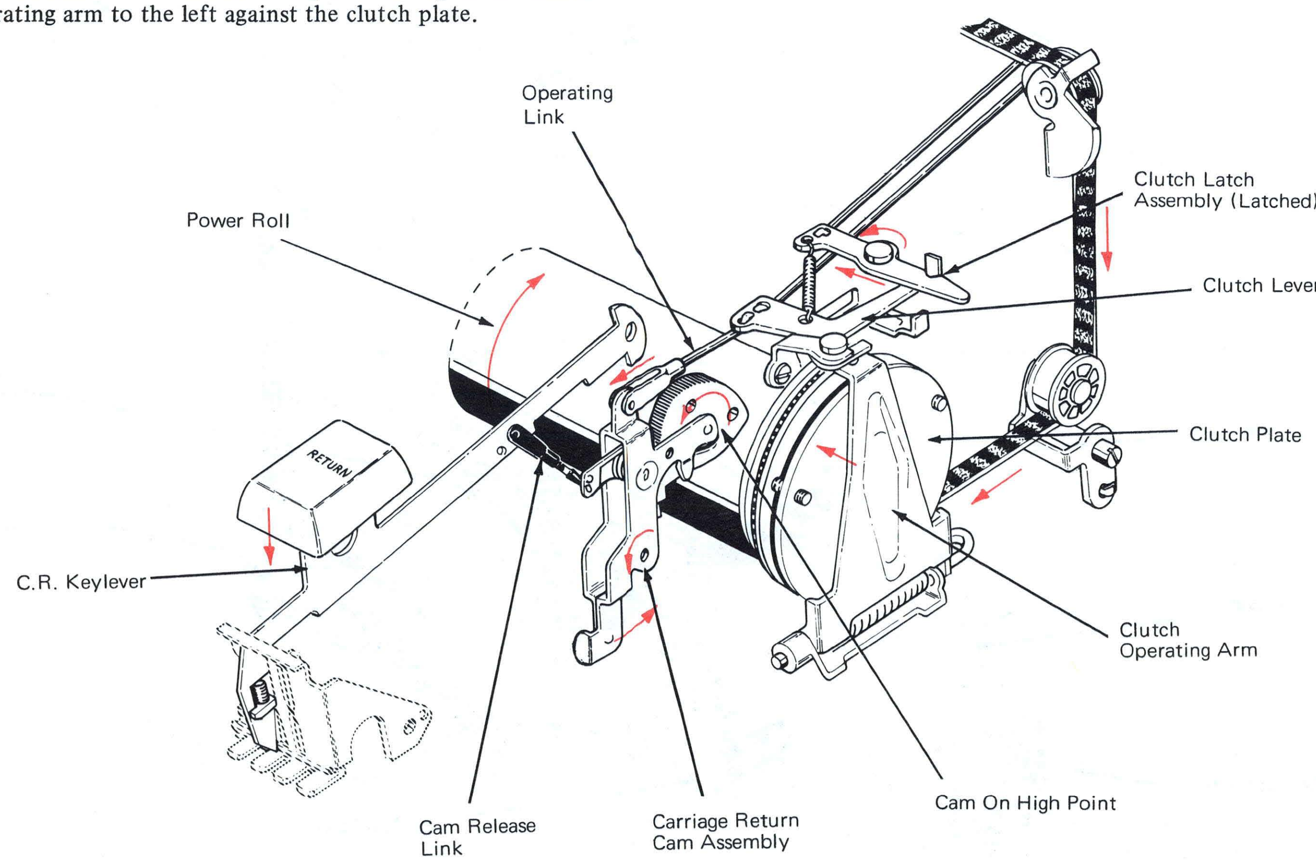


Figure 2 – Carriage Return Activated

CLUTCH ASSEMBLY

The clutch operating arm applies pressure to the clutch disc through the pressure plate. The clutch disc is fixed to the power roll shaft and when it receives pressure from the pressure plate, it causes the pulley to rotate and wind the carriage return tape.

A compression spring at the bottom of the operating arm allows the arm to give and evenly distributes the pressure on the disc. A clutch pulley spring is mounted within the pulley to maintain a constant tension on the tape when the carriage return mechanism is not in use. This tension serves to wind the tape during backspace or manual carriage return.

TORQUE LIMITER

On early model typewriters a retaining bolt and compression spring were used to apply tension on the pressure plate (Figure 3). On late model typewriters, a torque limiting mechanism has been added to the carriage return. This mechanism helps prevent clutch torque buildup. To perform this, the carriage return tape runs on a pulley mounted on an idler bellcrank between the clutch mechanism and the right hand corner pulley. If the clutch torque increases, the tape increases tension on the idler bellcrank and pulley assembly causing it to pivot on the mounting stud. This pulls the bellcrank connecting link which rotates the intermediate bellcrank. An upright stud on the intermediate bellcrank contacts the clutch lever bolt and pulls it to the right, decreasing the spring tension on the pressure plate. This causes the clutch torque to decrease. The more torque buildup on the clutch, the more the torque limiter operates to decrease the torque. In this way the clutch torque remains constant.

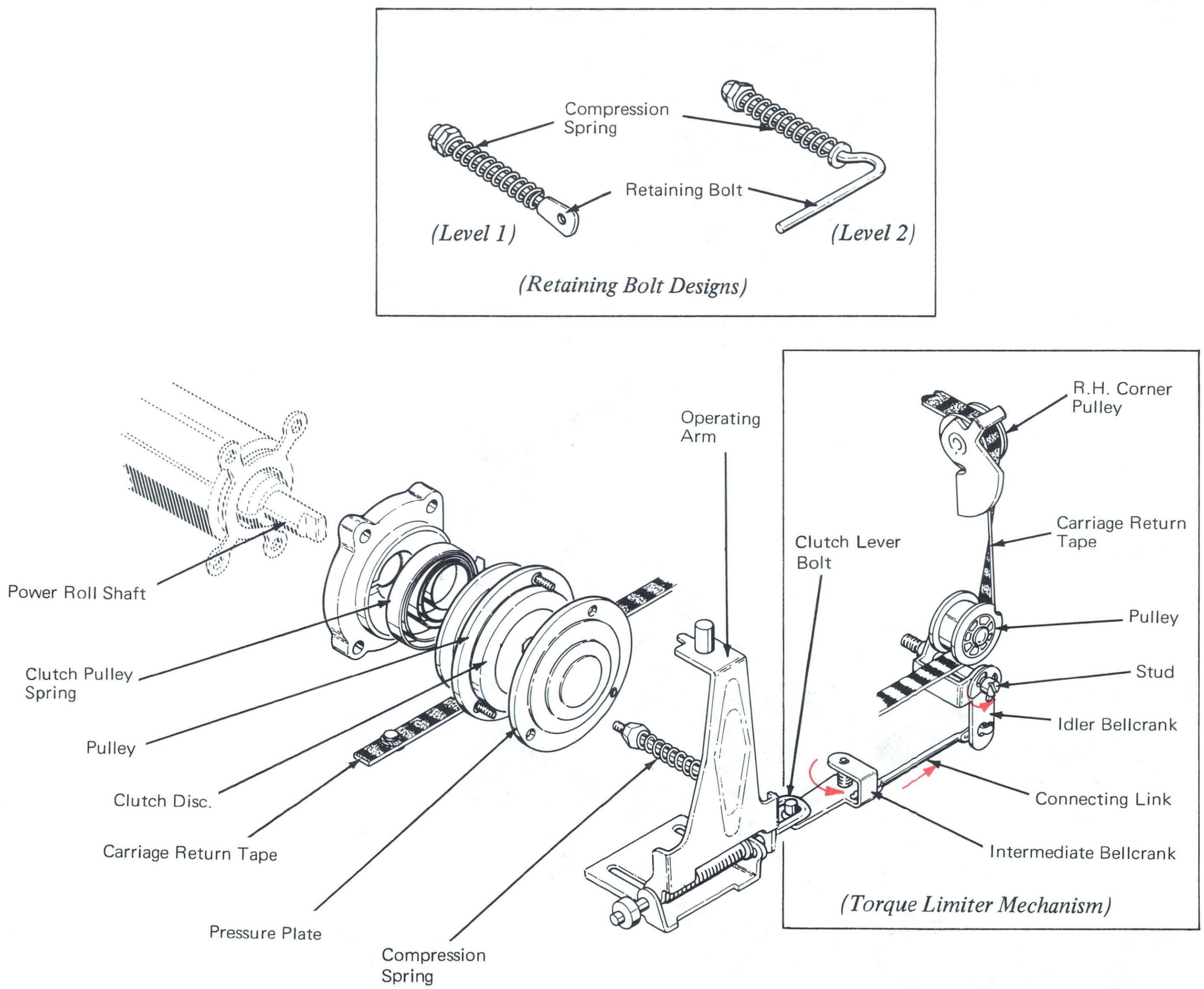


Figure 3 – Carriage Return Clutch Asm.

INDEX MECHANISM
The first pull on the carriage return tape operates the line space mechanism and indexes the platen (Figure 4). When the index pawl carrier is in the upper rest position, the pawl is held clear of the ratchet. As the index pawl carrier is pulled down, spring tension on the index pawl engages the pawl into the ratchet. Rotation of the ratchet causes a spring loaded detent roller to operate over the point of a ratchet tooth. This detent roller holds the platen in the new position. The lower index pawl stop limits the movement of the index pawl.

The position of the line space lever determines the entry of the index pawl into the ratchet.When the line space lever is forward, the index pawl moves the ratchet one tooth, second position 2 teeth, and all the way back the ratchet is moved teeth. Special ratchet (66 teeth, etc.) may move in units of 2 or more spaces.

REPEAT FEATURE
The carriage return has a repeat/nonrepeat feature to allow repeat operations when the keylever is depressed past the normal movement. Further downward movement on the keylever activates the repeat plunger (Figure 4), allowing the cam to repeat as long as the keylever is held in this position. The operator uses this feature of the carriage return to index the platen when the carriage is at the left-hand margin.

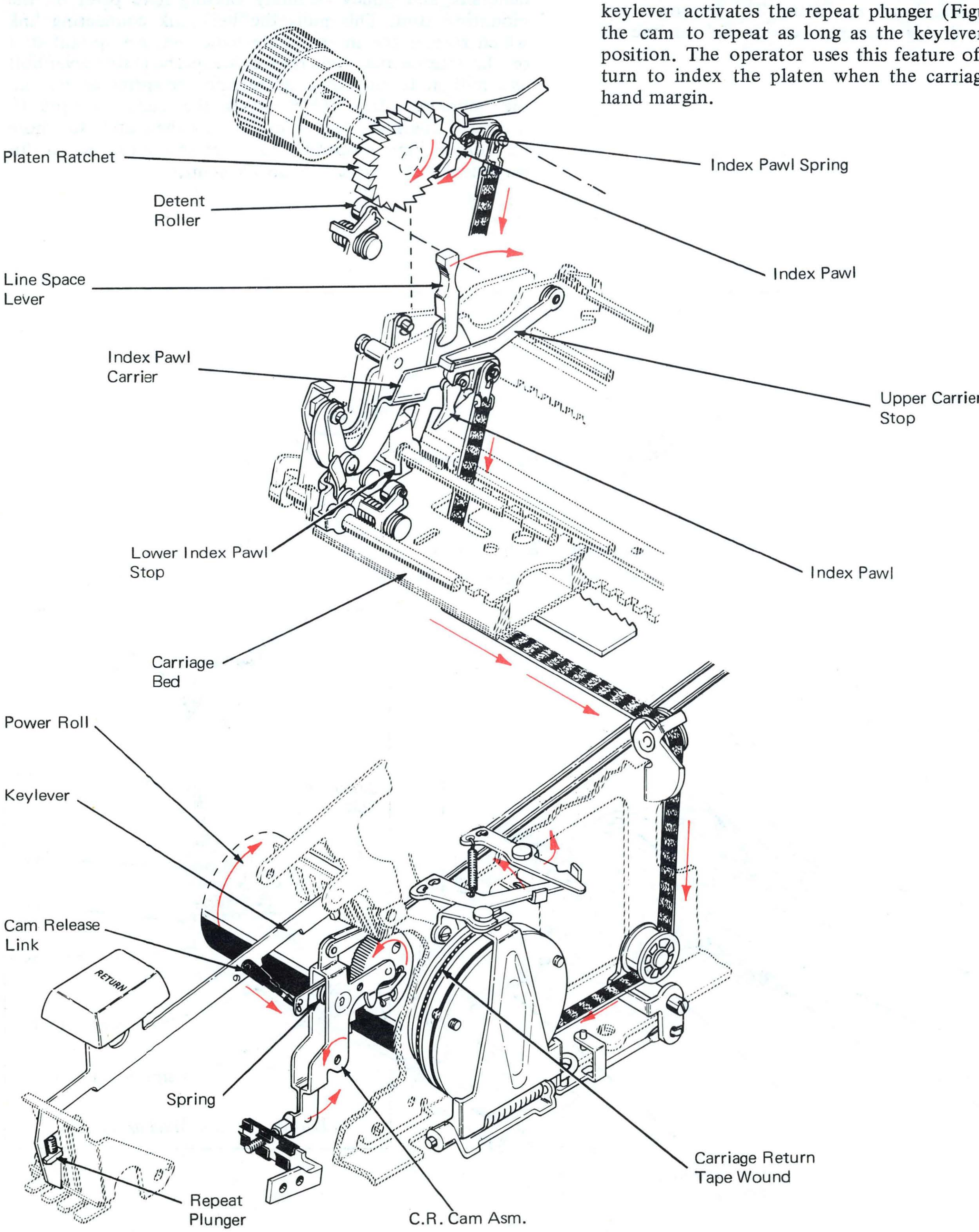


Figure 4 – Indexing And Repeat Operation

PAWL RELEASE

When a carriage return operation is started, the escapement pawl is immediately pulled out of the escapement rack. The escapement pawl is held out of the escapement rack while the carriage is being moved to the left-hand margin to prevent the noise and pawl damage caused by the pawl dragging over the escapement rack teeth (Figure 5). To release the escapement pawl from the rack, the cam motion is tranfered through the operating link to the clutch lever, to the clutch lever link, the clutch lever bellcrank, the pawl release link and pawl release bellcrank.

A lug on the pawl release bellcrank engages a hook-shaped lug on the intermediate pawl release lever, causing it to pivot on the mounting stud. An ear-type lug on the intermediate pawl release lever (located above the mounting stud) engages the pawl release lever, which releases the escapement pawl from the escapement rack. C4, D4 pawl release is discussed in more detail in pawl release and grouping section.

DECELERATOR LATCH

During this same operation the decelerator latch link pulls the decelerator latch out of the teeth on the decelerator arm. This allows the decelerator arm to become activated and ready to receive action to decelerate carriage movement.

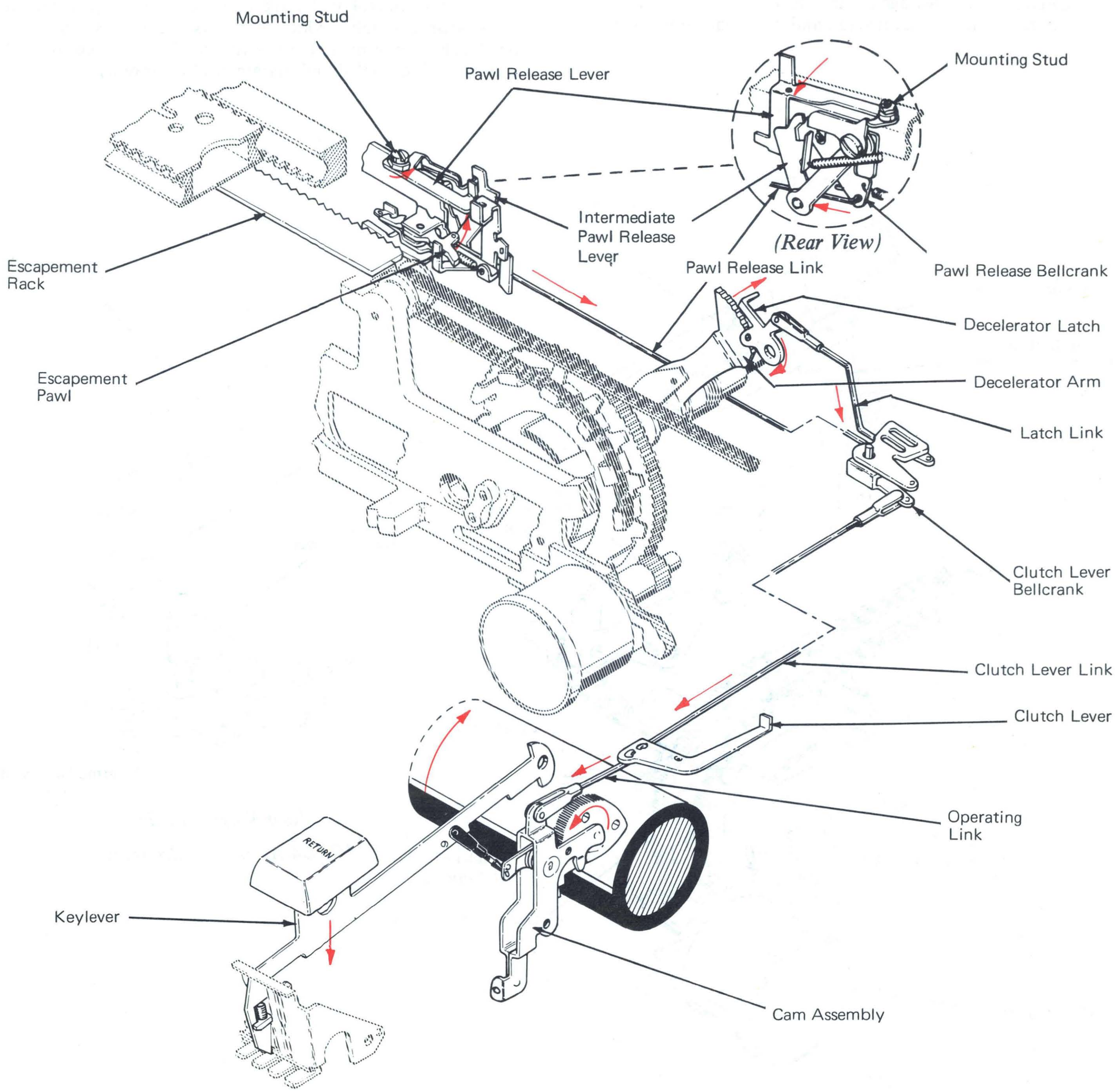


Figure 5 – Escapement Pawl Release

MARGIN CONTROL BELLCRANK

As the carriage moves to the left margin, the left margin stop contacts the margin control lever mounted through elongated mounting holes (Figure 6). This mounting allows the margin control lever to slide from left to right. The margin control lever is spring loaded to the left by the spring tension of the carriage return decelerator arm through the margin control bellcrank. When the left-hand margin stop contacts the margin control lever, it slides the margin control lever to the right. A lug on the margin control lever pivots the margin control bellcrank.

When pivoted, the margin control bellcrank performs 4 functions:

1. Activates the decelerator.
2. Starts escapement pawl reentry.
3. Unlatches the carriage return clutch.
4. Operates carriage return/tab and backspace interlocks.

On the C4, D4 the margin control bellcrank (Figure 6) performs the same basic functions as the C1, D1 except operating the carrier return/tab interlock.

Since the pawls must be grouped for pawl reentry through the automatic grouping link (level 2), the margin control bellcrank rotates the intermediate pawl release lever which contacts and rotates the pawl release and grouping lever to group the pawls at the left-hand margin.

On level 1 (old style pawl block) it rotates the automatic grouping lever to unlatch the clutch and when the clutch has unlatched, continues to rotate the automatic grouping lever to group the pawls when in full overbank. (Refer to pawl release and grouping section.)

DECELERATOR ACTIVATED

The margin control bellcrank operates the carriage return decelerator bellcrank which contacts the cam surfaces of the decelerator arm and slows the carriage to a controlled contact with the left-hand margin stop (Figure 6).

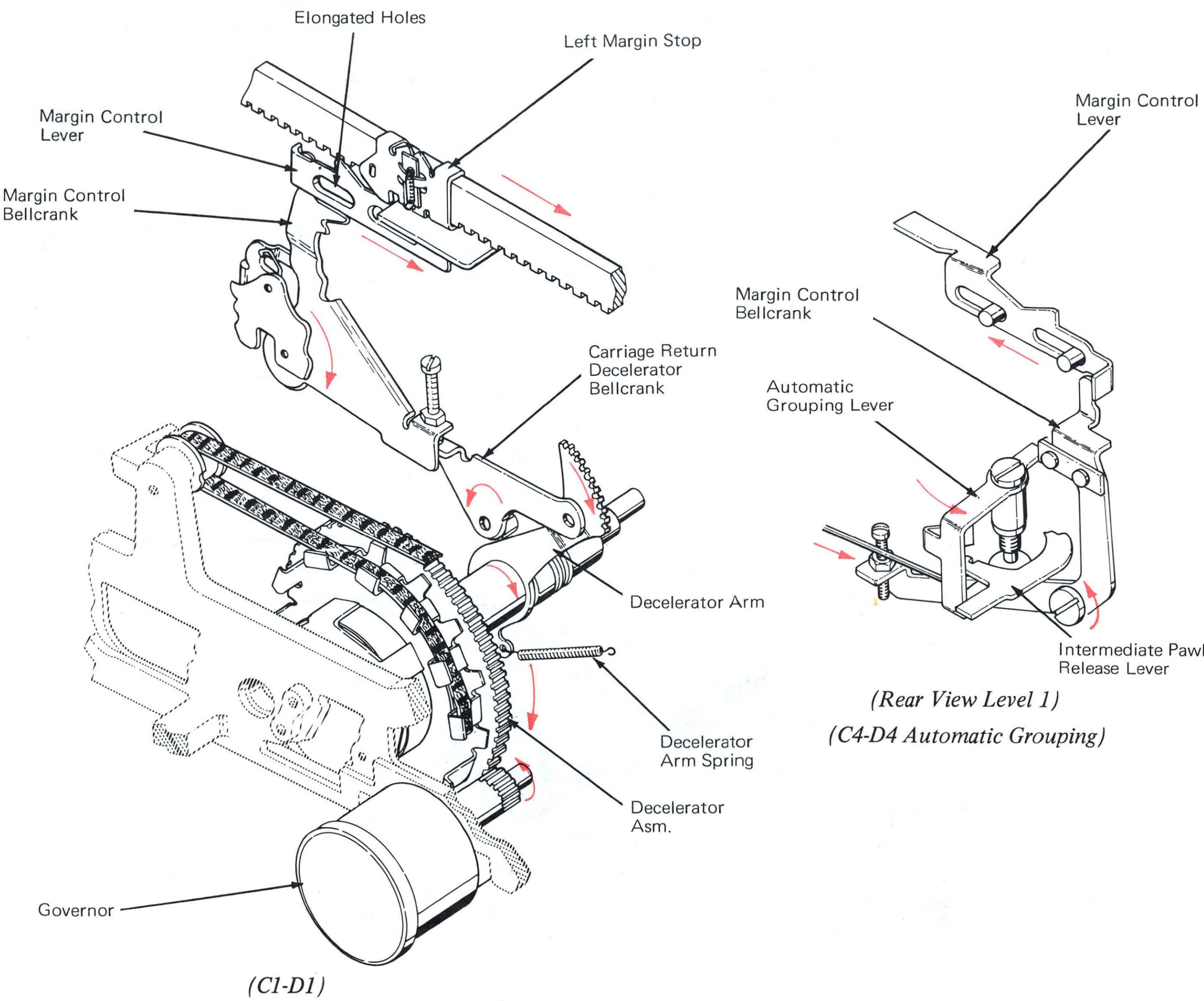


Figure 6 – Decelerator Governor Activated

C1, D1 ESCAPEMENT PAWL REENTRY

The margin control bellcrank contacts a lug on the intermediate pawl release lever to disengage it from the pawl release bellcrank (Figure 7). This allows the escapement pawl to reenter the rack. This operation is timed to occur one to two spaces before the carriage reaches the left-hand margin.

The margin control lever remains operated as long as the carriage is at or near the left margin. It holds the margin control bellcrank in the operated position. The margin control bellcrank keeps the intermediate pawl release lever from latching. While the intermediate pawl release lever is held unlatched, the escapement pawl will remain at the exact left-hand margin during repeated index operations.

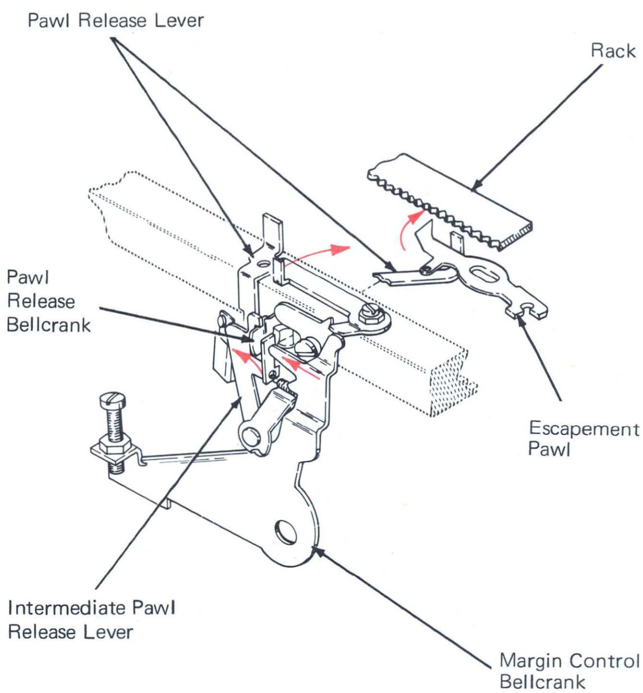


Figure 7 – Escapement Pawl Re-Entry C1-D1 (Rear View)

C4, D4 ESCAPEMENT PAWL REENTRY

On the C4, D4 machines, as the carriage moves into the left margin, the margin control bellcrank is pivoted to release the intermediate pawl release bellcrank. This action starts escapement pawl reentry (Figure).

During a carriage return or repeat operation at or near the left-hand margin the escapement pawls must be allowed to remain in the rack. This is made possible by the margin control bellcrank being rotated away from the stop (Figure 8). While in this position, the lug on the margin control bellcrank is down and out of the path of the intermediate pawl release bellcrank. Now, when the intermediate pawl release bellcrank is pulled by the pawl release link, it is not stopped by the intermediate pawl release bellcrank and may rotate freely without releasing the escapement pawls.

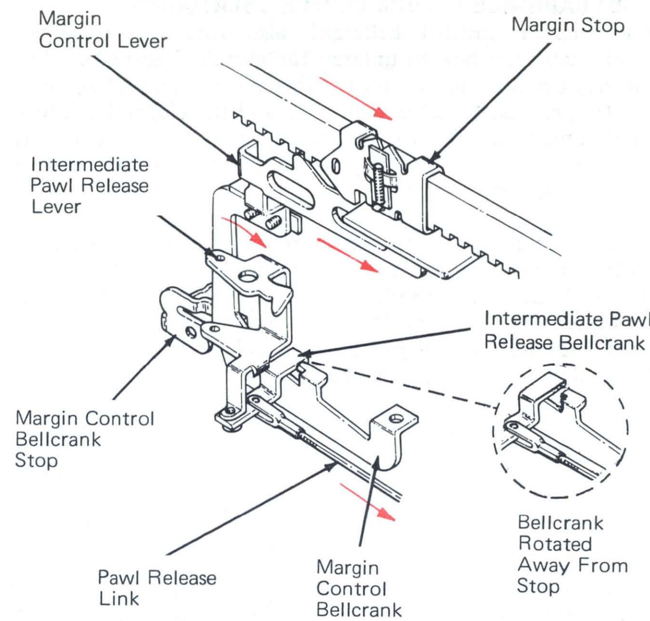


Figure 8 – C4-D4 Pawl Release At LH Margin (Level 1)

When the pawls are released, during carriage return operation, they must be grouped to get correct pawl reentry at the left-hand margin. However, if the carriage is returned without pawl release, as on a short return or a manual carriage return, there would be no grouping.

The automatic grouping mechanism provides grouping at the left-hand margin without pawl release (Figure 9). This mechanism is activated by the automatic grouping link (level 2) when the margin control bellcrank is rotated away from the stop. On level 1, the margin control plate activates automatic grouping (see Figure 6, level 1).

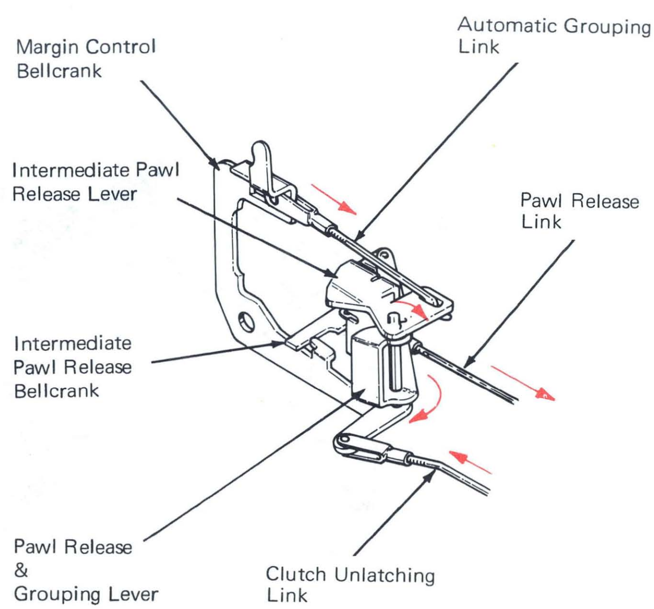


Figure 9 – Automatic Grouping At LH Margin (Level 2)

C1-D1 CARRIAGE RETURN CLUTCH UNLATCHING

The margin control bellcrank also rotates the carrier return/tab interlock to unlatch the clutch (Figure 10). The interlock motion is transmitted through the unlatching link, the (upper) clutch latch bellcrank, and the clutch latch link to disengage the latch from the clutch lever. The clutch is not unlatched until the very last moment to ensure positive return to the left margin.

When the clutch is unlatched, all parts of the carriage return clutch come to rest, and the movement of the clutch lever restores the cam assembly against the cam stop. This movement is also transferred through the (lower) clutch lever bellcrank which pivots the decelerator latch into the teeth of the carriage return decelerator arm.

The elongated slots in the clutch latch and clutch lever bellcranks allow the links to restore to rest while the carriage is at the left margin.

While operated, the margin control bellcrank keeps the carriage return/tab interlock from rotating and through the linkage prevents the clutch latch from latching the clutch lever. As soon as the carriage return cam completes the rotation, all parts restore to rest and the operation is complete (Figure 10).

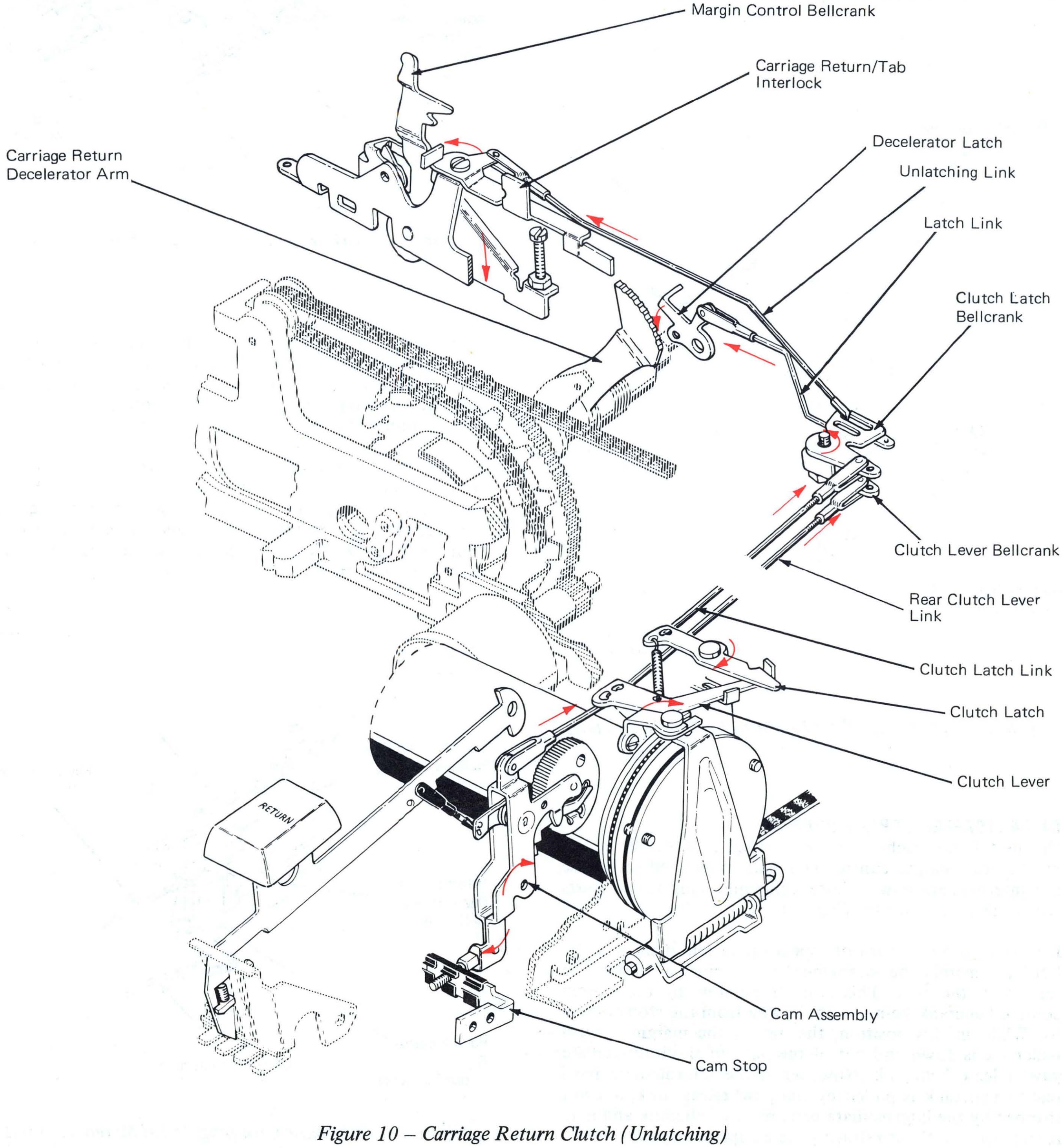


Figure 10 – Carriage Return Clutch (Unlatching)

C4, D4 CLUTCH UNLATCHING

The margin control bellcrank (level 1, Figure 1) through the margin control plate rotates the automatic grouping lever to unlatch the clutch just before the carriage reaches the full overbank position.

The margin control bellcrank (level 2) through the automatic grouping link rotates the intermediate pawl release lever to unlatch the clutch.

C1-D1 CARRIAGE RETURN/TAB INTERLOCK

Three functions are performed by the carriage return/tab interlock during carriage return. These functions are:

1. The transfer of motion from the margin control bellcrank to unlatch the clutch.
2. When carriage return and tab are operated together or if tab is operated while the carriage return is in operation, the tab operation will override the carriage return operation by operating the interlock and unlatching the clutch. When the tab is operated, the tab lever pivots to the rear. The lower extension on the tab lever pivots the carriage return/tab interlock and releases the carriage return clutch (Figure 12). This interlock feature is used to get a partial carriage return and tabulation to the closest set tab stop by touching the tab key just after the carriage return key. This is used to prevent carriage returns all the way to the left margin after each line while typing column work.

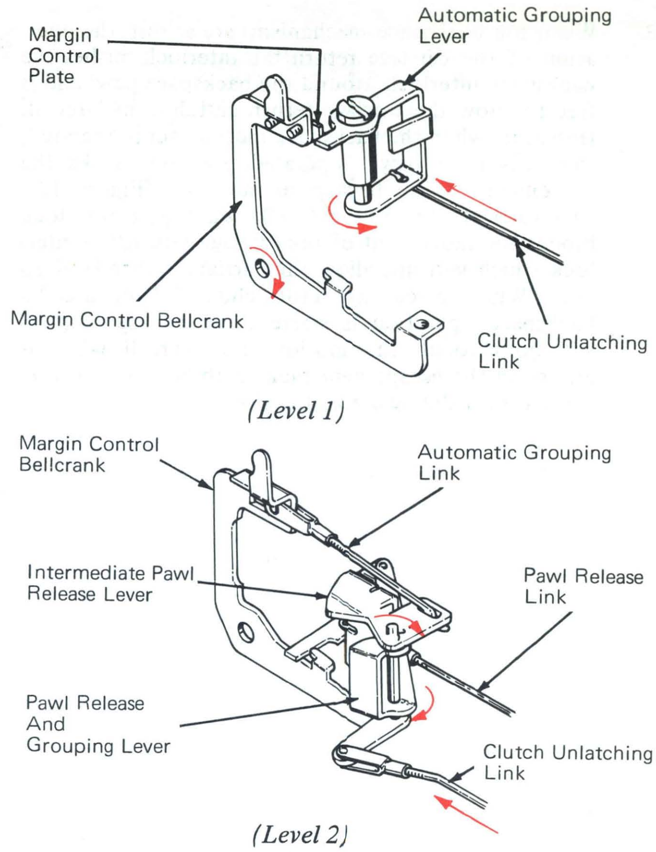


Figure 11 – C4, D4 Clutch Unlatching

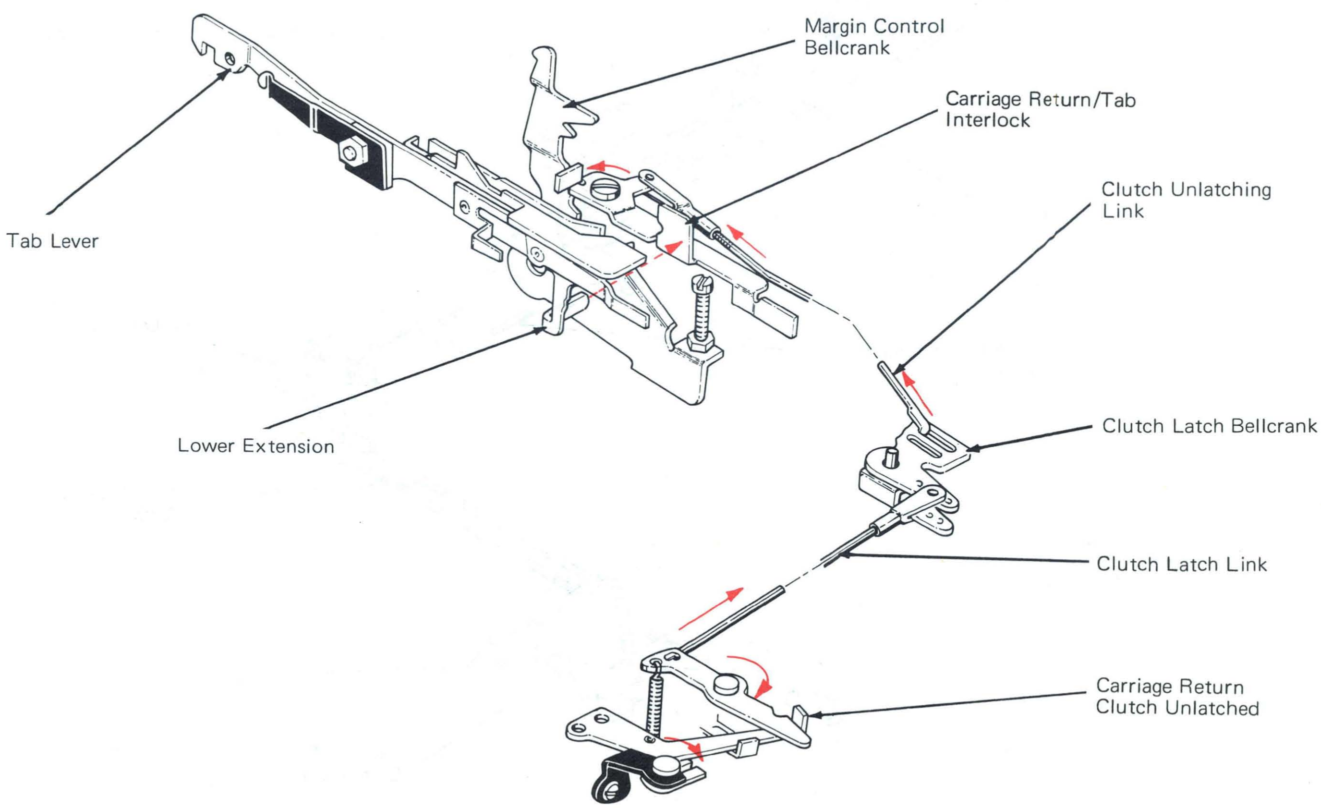


Figure 12 – Carriage Return/Tab Interlock (C1, D1)

3. When the backspace mechanisms are at rest, the operation of the carriage return/tab interlock pushes the backspace interlock around the backspace pawl and is free to allow the carriage return clutch to be latched. However, when the backspace mechanism is operated, the backspace pawl's operated position blocks the movement of the backspace interlock (Figure 13). The vertical lug on the C1-D1 backspace interlock blocks the movement of the carriage return/tab interlock which will not allow the carriage return latch to latch. When the carriage return clutch is latched and a backspace operation is started, the backspace pawl will go through the motion; however, it will not engage in the escapement rack teeth because it is prevented from sliding across the slot.

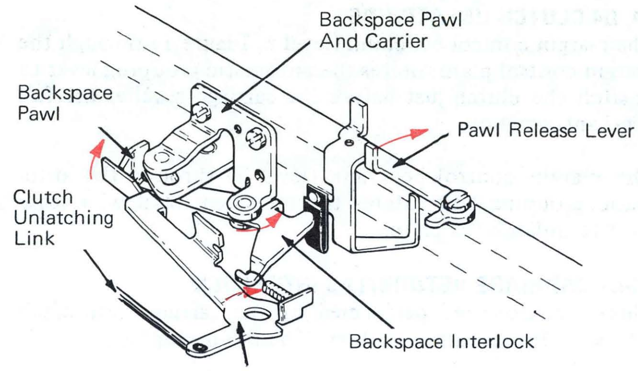


Figure 13 – C1-D1 Backspace Pawl Interlock (Rear View)

C4, D4 INTERLOCK OPERATION

This operation on the C4, D4 (level 2) machine is performed by the pivoting action of the pawl release lever which rotates the intermediate pawl release lever (Figure 14). The intermediate pawl release lever then rotates the pawl release and grouping lever to unlatch the clutch.

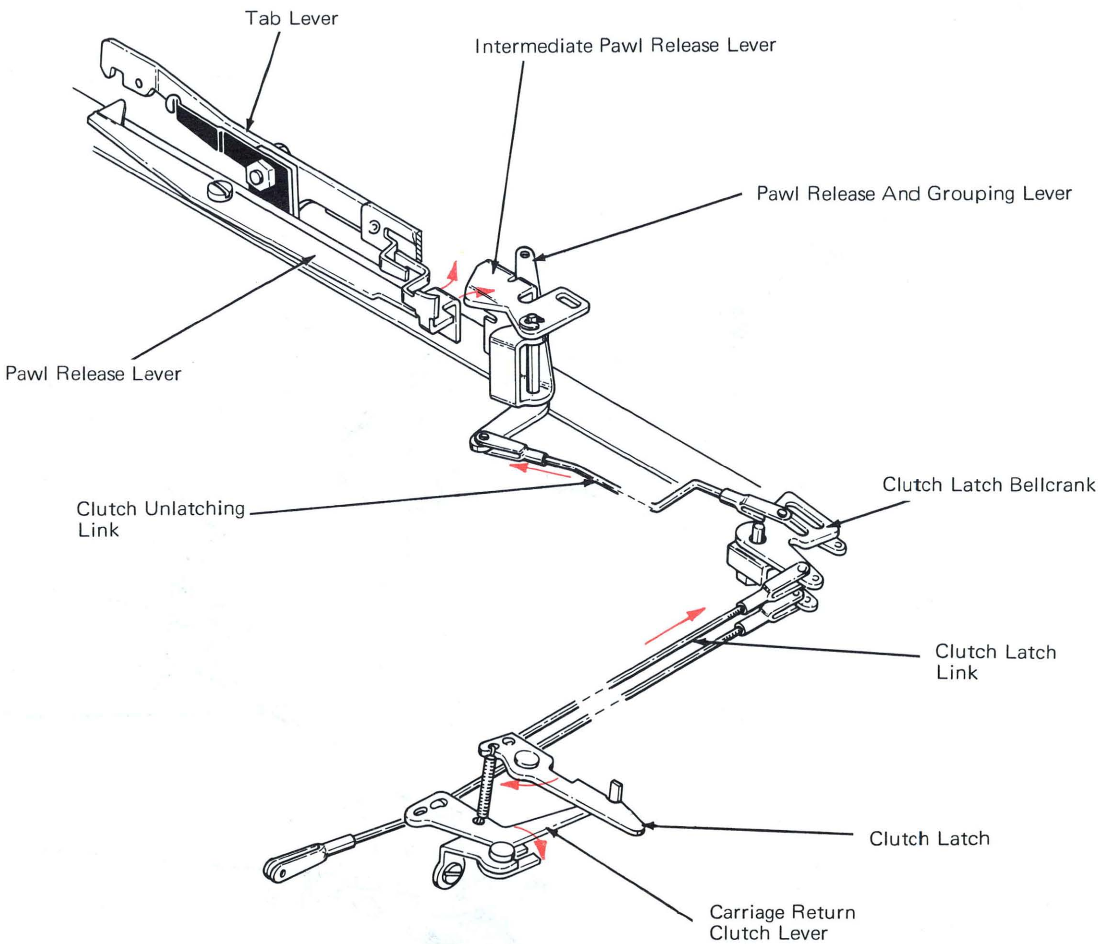


Figure 14 – Carriage Return/Tab Interlock C4, D4 (Level 2)

On the level 1 mechanism, the lower extension on the tab lever pivots the interlock against the automatic grouping lever which pulls on the clutch unlatching link to unlatch the clutch (Figure 15).

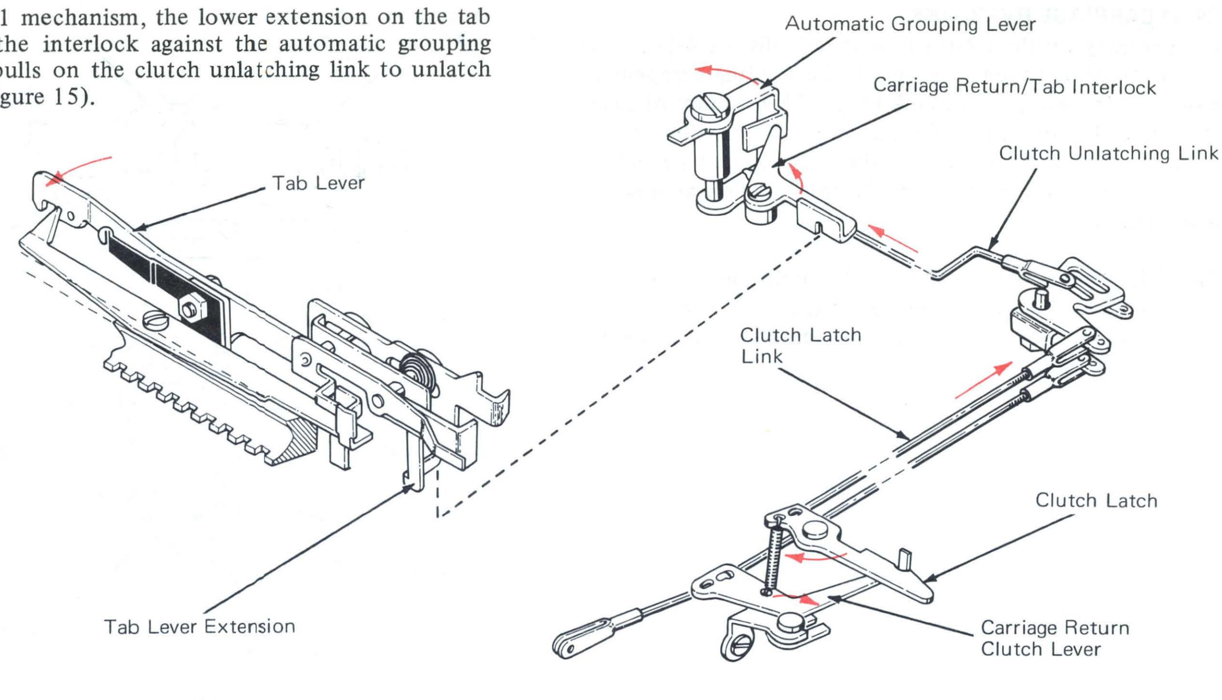


Figure 15 – Carriage Return/Tab Interlock C4, D4 (Level 1)

C4, D4 BACKSPACE INTERLOCK OPERATION

The C4, D4 backspace interlock is provided to prevent the backspace pawls from entering the escapement rack during the carriage return operation (Figure 16). As the pawl release and grouping lever rotates during the pawl release motion, the interlock is placed in position to block the backspace pawls. If the backspace is operated while the interlock is active, the pawl support will rotate but the interlock prevents the backspace pawls from entering the rack.

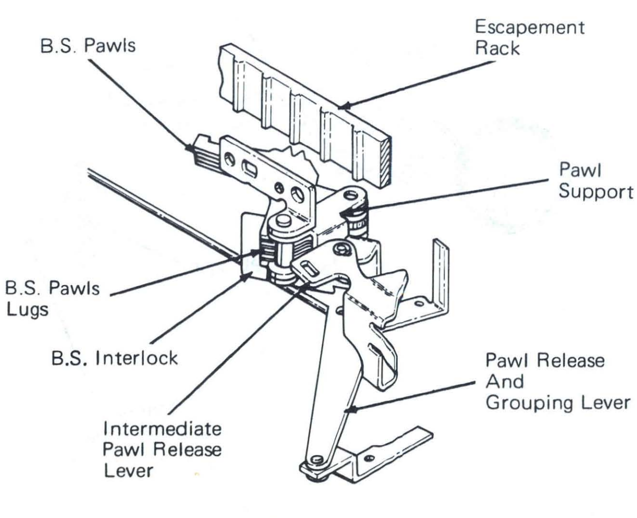


Figure 16 – Backspace Interlock (C4, D4)

C1-D1 CARRIAGE OVERBANK

After the carriage has reached the limit of movement to the right and all clutch parts are restored to rest, the carriage moves back a small distance to the left under mainspring tension. This motion is called overbank (Figure 17). The amount of motion involved is the amount of sliding motion in the escapement pawl (.058" or .038") (1,47mm or 0,97mm) plus the distance that the escapement rack tooth has moved past the pawl to ensure that the pawl will drop safely in front of the tooth. The amount of movement past is controlled by adjusting the position of the margin rack in relation to the escapement rack.

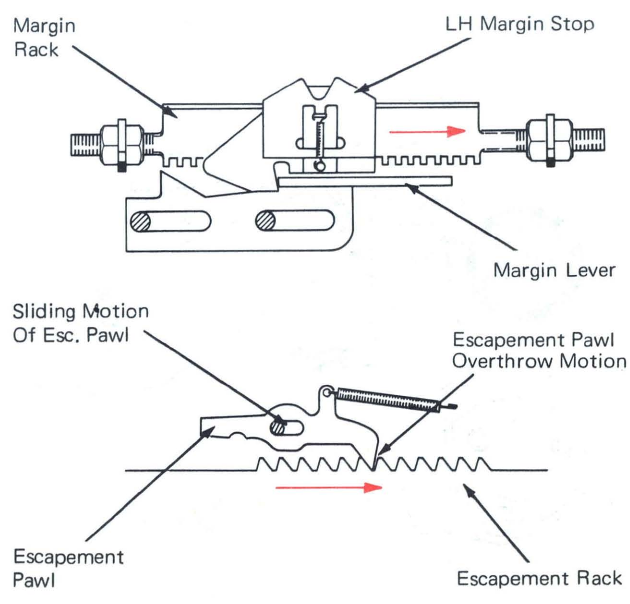


Figure 17 – Carriage Overbank (C1-D1)

C4-D4 CARRIAGE OVERBANK

Pawl reentry on the C4-D4 typewriter calls for 4-1/2 units of clearance between the tip of the holding escapement pawl and the escapement rack tooth. This amount of clearance is called overbank. We arrive at this relationship by adjusting the margin rack so the carriage can be moved 4-1/2 units to the right from the rest position at the left-hand margin.

The 4-1/2 units consists of the 1-1/2 units of pawl reentry clearance and the units of motion in the holding window of the No. 1 and No. 5 pawls as they reenter the rack (Figure 18).

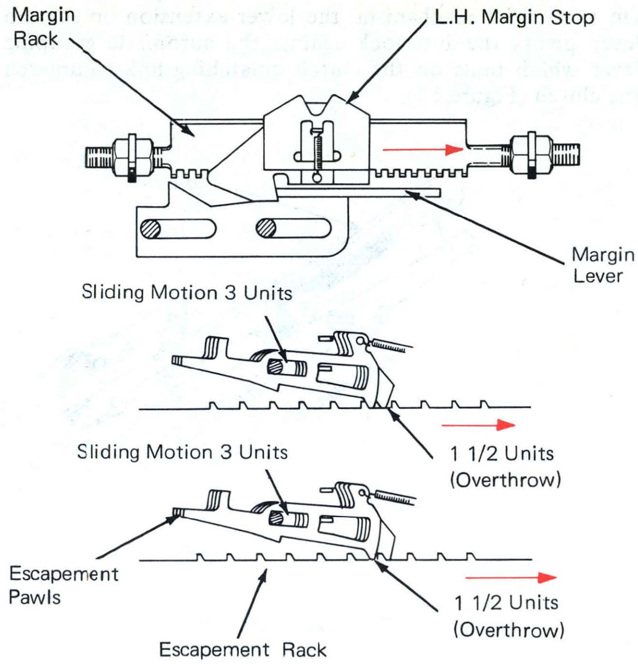


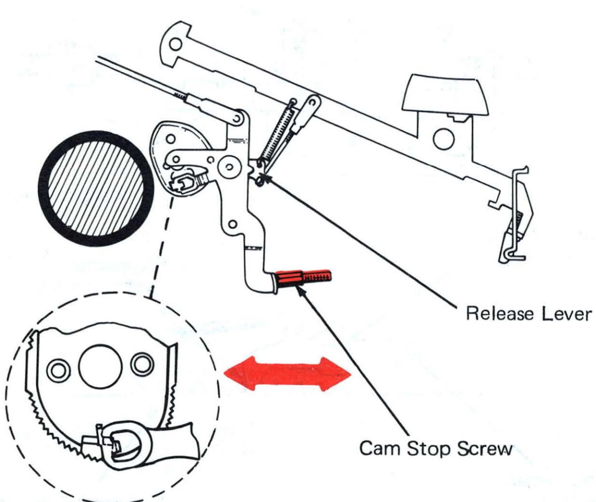
Figure 18 – Carriage Overbank (C4-D4)

CARRIAGE RETURN/INDEX ADJUSTMENTS

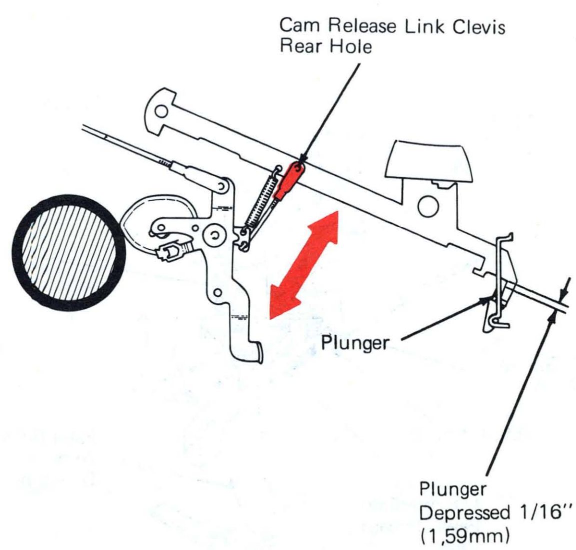
1. *Cam Clearance* – Adjust cam stop screw so the release lever lug drops on the rear of the cam lug.

   NOTE: Be sure the decelerator latch link is not preventing the cam from loading against the cam stop.

2. *Cam Release Link Clevis* – Adjust so the cam repeats when the plunger is depressed 1/16" (1,59mm). The clevis should be in the rear hole of the keylever.

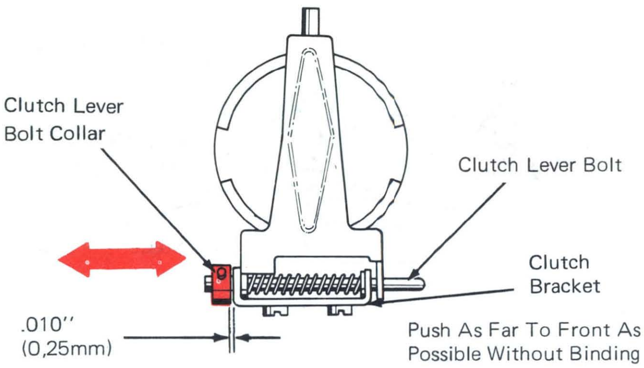


(Left Side View)



(Left Side View)

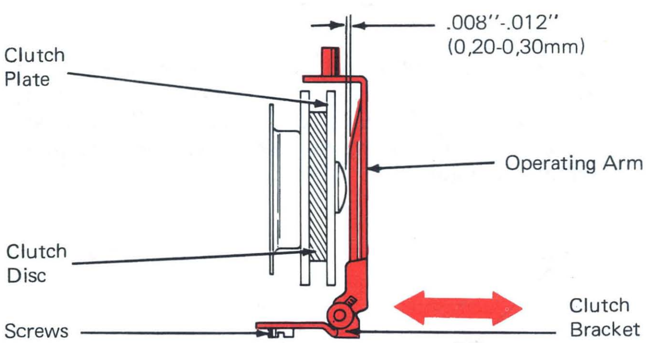
3. *Clutch Lever Bolt Collar* – With the clutch lever bolt pushed to the front of the machine, there should be a clearance of .010" (0,25mm) between the collar and clutch bracket.



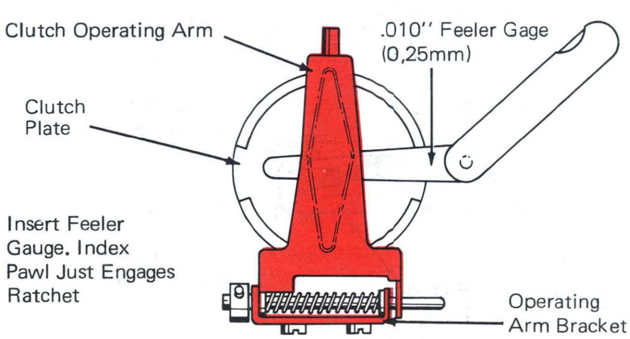
(Right Side View)

4. *Clutch Plate Clearance (Level 1)* – With the clutch plate held tightly against the disc, set clutch clearance for .008-.012" (0,20-0,30mm) using a feeler gauge between the clutch plate and operate arm.

NOTE: Do not tilt the clutch bracket.

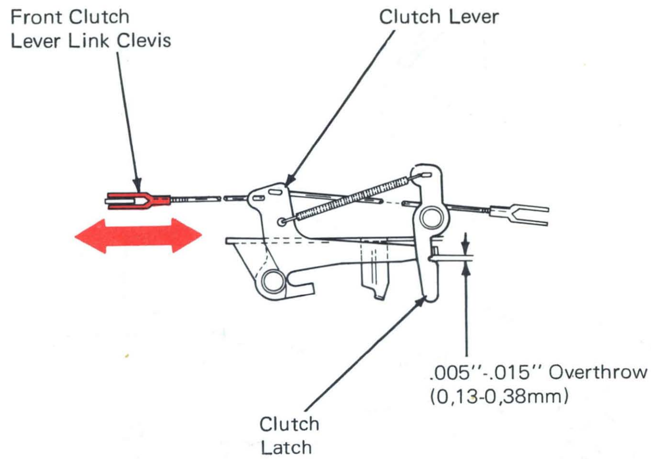


Clutch Plate Clearance D1, D4 (Level 2) – Adjust the operating arm bracket so that with a .010" (0,25mm) feeler gauge inserted between the clutch plate and operating arm, there should be a one-pound pull on the carriage return tape with the machine on. A one-pound pull on the carriage return tape will just pull the index pawl into the platen ratchet.



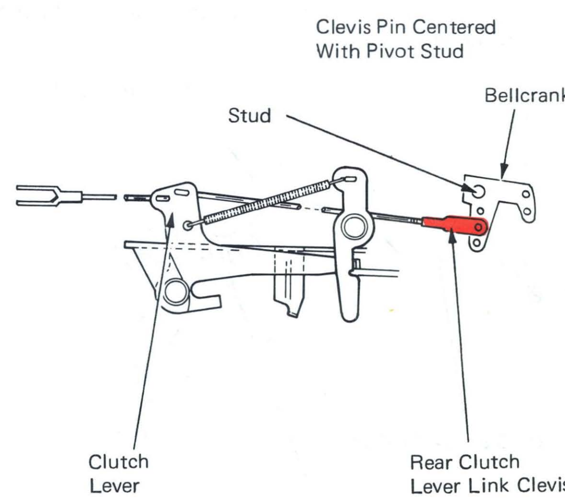
(Right Side View)

5. *Front Clutch Lever Link Clevis* – Adjust for .005-.015" (0,13-0,38mm) overthrow of the clutch lever past the latch. Observe with cam on the high point and with carriage away from left margin.



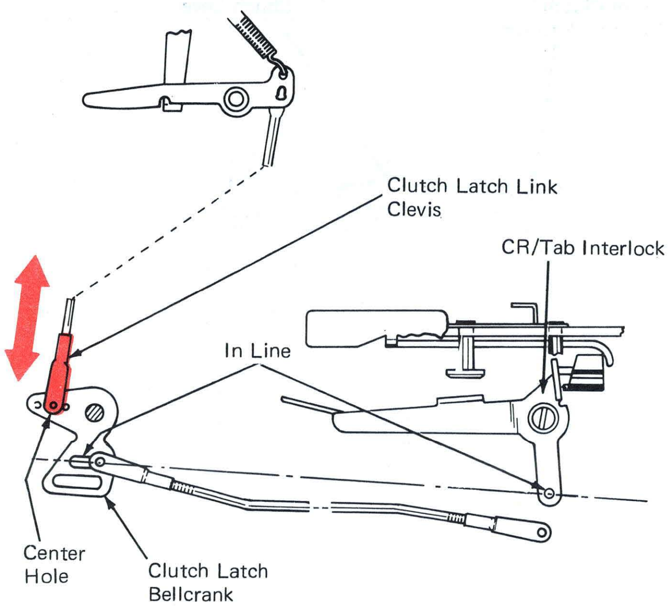
(Top View)

6. *Rear Clutch Lever Link Clevis* – Adjust so the motion of the clevis pin will be evenly distributed over either side of the bellcrank pivot center. Use center hole.



(Top View)

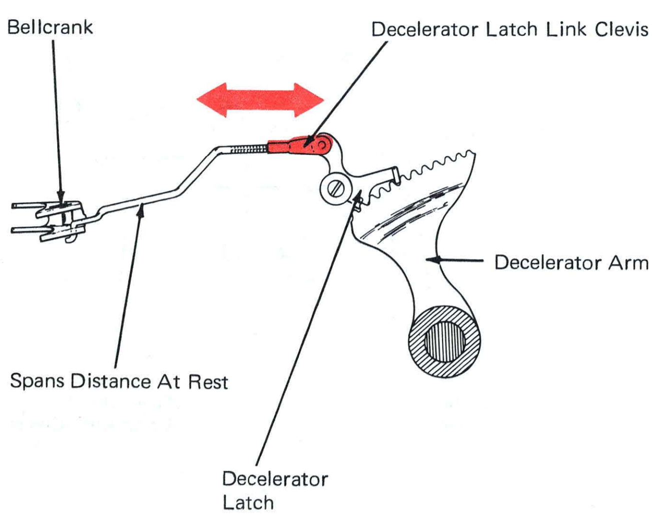
7. *Clutch Latch Link Clevis* – Adjust so the elongated hole in the clutch latch bellcrank is in line with the hole in the carriage return/tab interlock C1-D1 and in line with the hole in the automatic grouping lever C4-D4, when the clutch is latched. Use center hole.



(Top View – Clutch Latched)

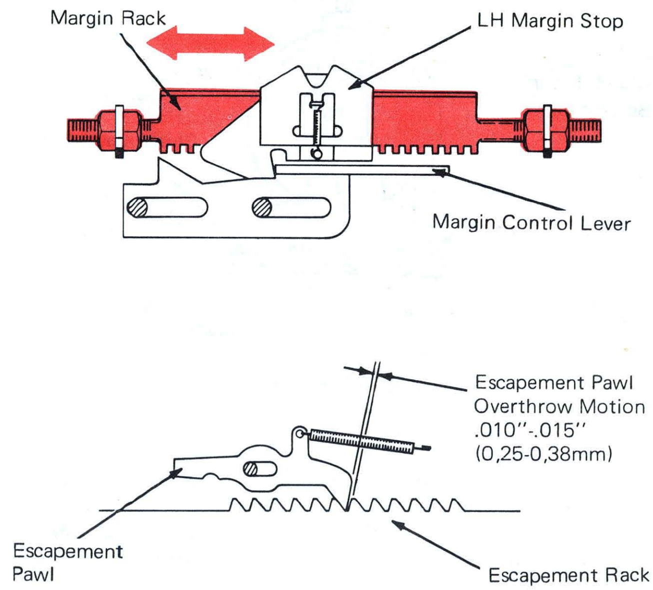
8. *Decelerator Latch Link Clevis* – With the latch engaging a notch of the decelerator arm and the clutch mechanism at rest, adjust the link to just reach the distance from the latch to the bellcrank.

CAUTION: Excessive length will prevent the clutch lever from restoring to the rest position. This will cause an incorrect reading of the clutch plate and cam clearance.



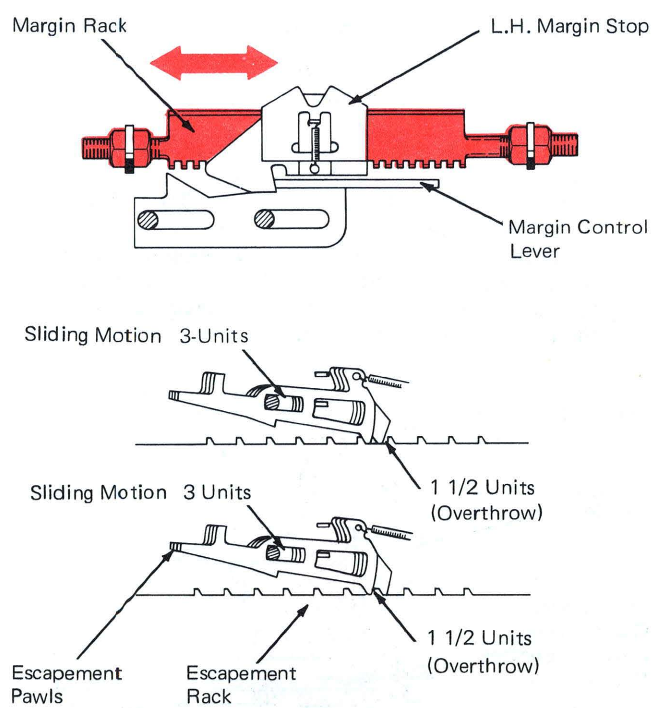
(Rear View)

9. *Overbank, C1-D1* – Adjust the margin rack left or right so an escapement rack tooth will overthrow the escapement pawl by .010-.015" (0,25-0,38mm) just as the carriage reaches full overbank.



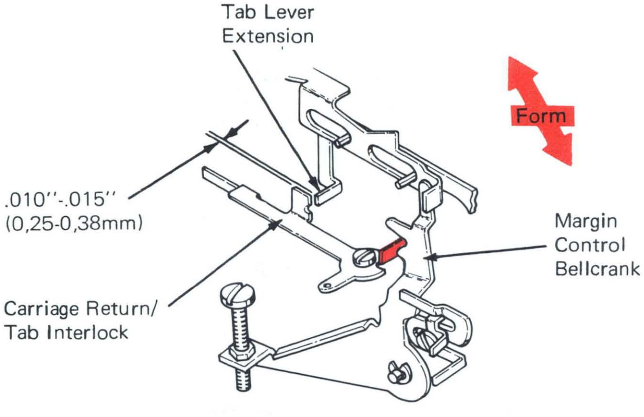
(Top View)

Overbank, C4-D4 – Adjust the margin rack left or right so when the carriage is resting at the left margin, there will be 4-1/2 units of overbank. With the carriage at zero margin, the No. 5 escapement pawl should be holding.



(Top View)

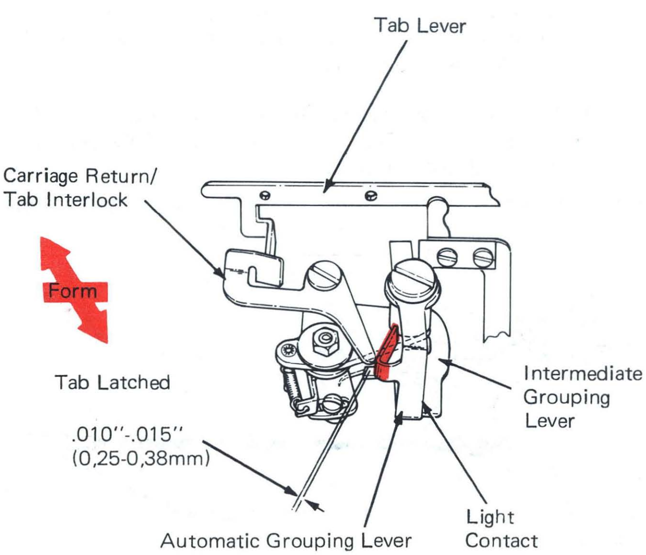
10. *Carriage Return/Tab Interlock, C1-D1* – With the carriage resting at the left margin, form the vertical lug of the interlock so there is .010-.015" (0,25-0,38mm) clearance between the tab lever extension and the interlock contacts the margin control bellcrank.



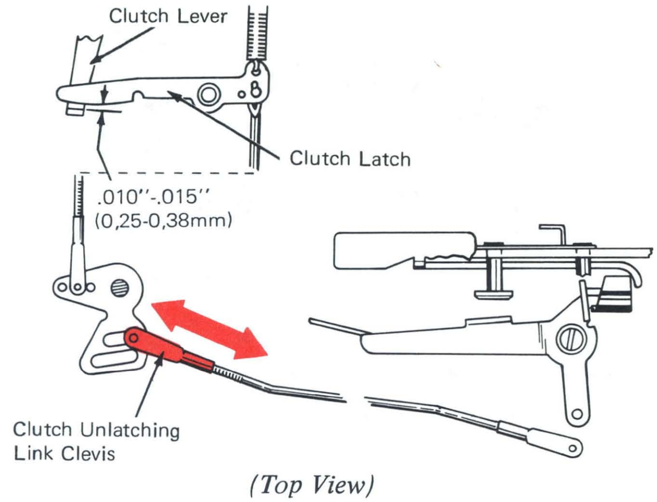
Carriage Resting At Left Margin

Carriage Return Tab Interlock C4, D4 (Level 1) – With the tab lever latched, form the lug on the automatic grouping lever so that it clears the carriage return tab interlock by .010-.015" (0,25-0,38mm) when the automatic grouping lever is held lightly against the intermediate grouping lever.

NOTE: Grouping should be correct before adjusting the interlock, automatic grouping and clutch unlatching.

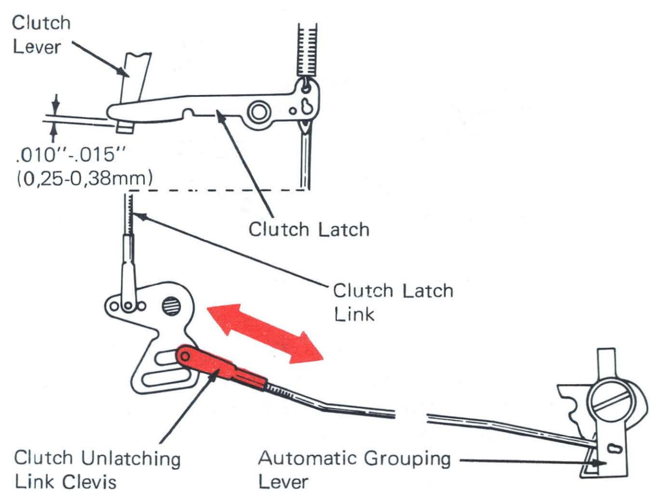


11. *Clutch Unlatching Link Clevis, C1, D1* – Adjust so when the carriage is held tightly into full overbank, there will be .010-.015" (0,25-0,38mm) between the clutch lever and clutch latch when the clutch is at rest. Use inner hole.

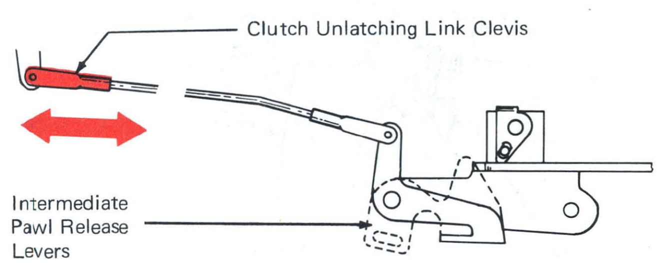


(Top View)

Clutch Unlatching Link Clevis, C4, D4 – Adjust so when the carriage is held into full overbank, there will be .010-.015" (0,25-0,38mm) between the clutch lever and the clutch latch when the clutch is at rest. Use inner hole.



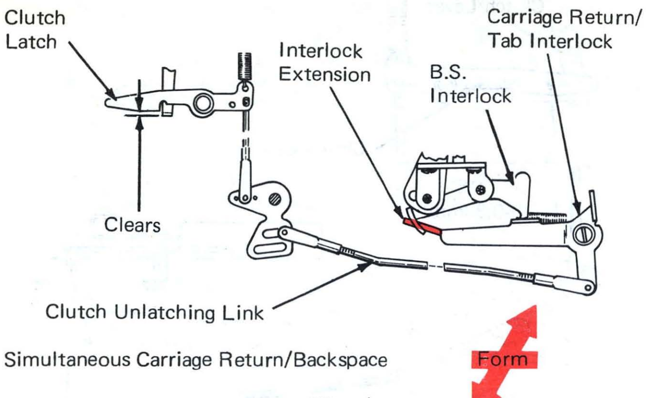
(Level 1)



(Level 2)

(Top View)

12. *Carriage Return/Tab Interlock, Extension, C1-D1* – Form the tip of the interlock to prevent clutch latching when the carriage return and backspace are operated at the same time.



(Top View)

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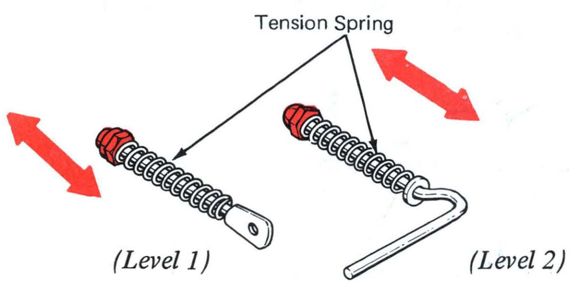
13. *Clutch Tension Spring* – With the linespacing lever in triple index position, adjust the tension nut for positive return 1-1/2" (37,1mm) from the left hand margin.



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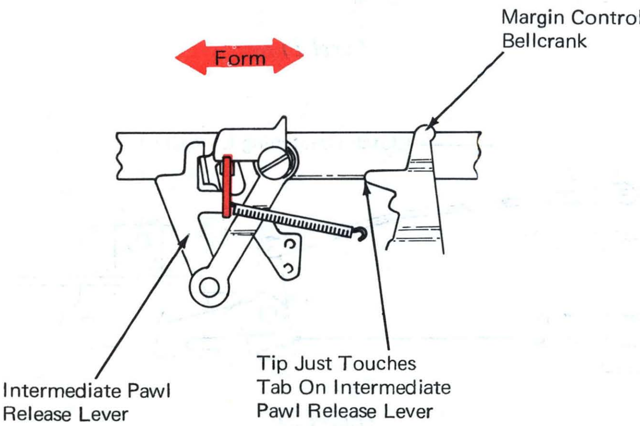
14. *Intermediate Pawl Release Lever, C1-D1* –Form the vertical lug so the tip of the margin control bellcrank contacts it when the carriage is one to two spaces from the left margin.



(Rear View)

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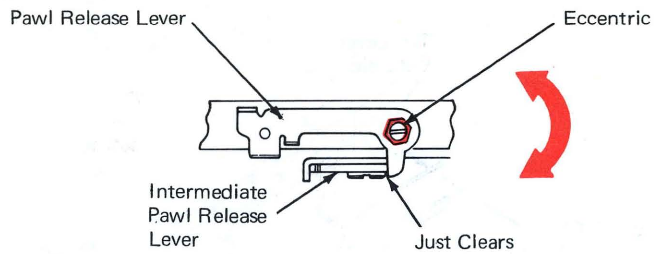
15. *Pawl Release Lever Eccentric, C1-D1* – Adjust so the right side of the ear on the pawl release lever just clears the intermediate pawl release lever when all parts are at rest.

NOTE: Keep the high point of the eccentric in the front half of rotation.



(Top View – At Rest)

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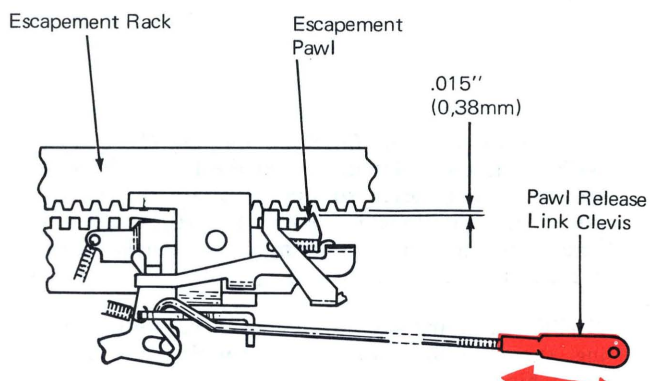
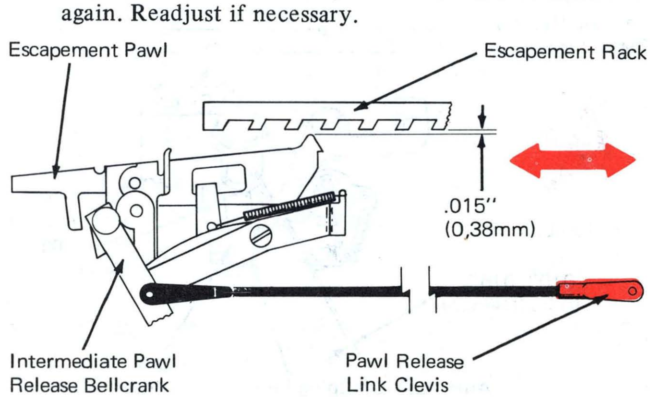
16. *Pawl Release Link Clevis, C1-D1* – Adjust so the escapement pawl will clear the escapement rack by .015" (0,38mm) when the carriage return clutch is latched.



(Bottom View)

Pawl Release Link Clevis, C4, D4 – Adjust so the escapement pawls clear the rack by .015" (0,38mm) with the clutch latched. Carrier should be away from left margin when making this adjustment.

NOTE: After adjusting the pawl release link, the front clutch lever link adjustment should be checked again. Readjust if necessary.



(Bottom View – Carriage Return Clutch Latched)

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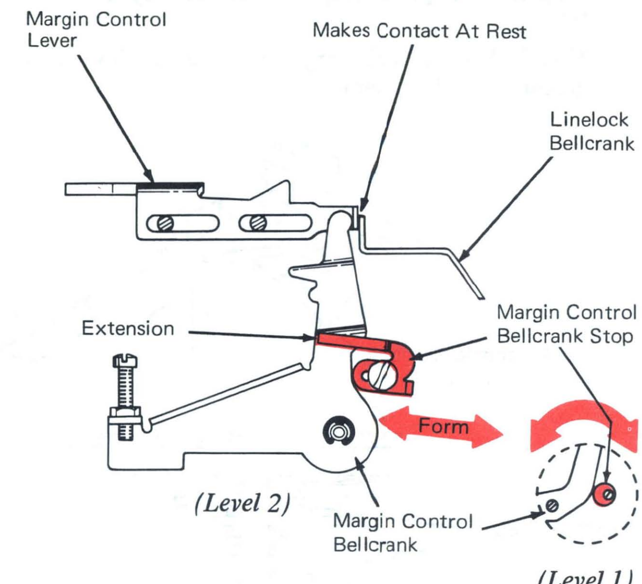
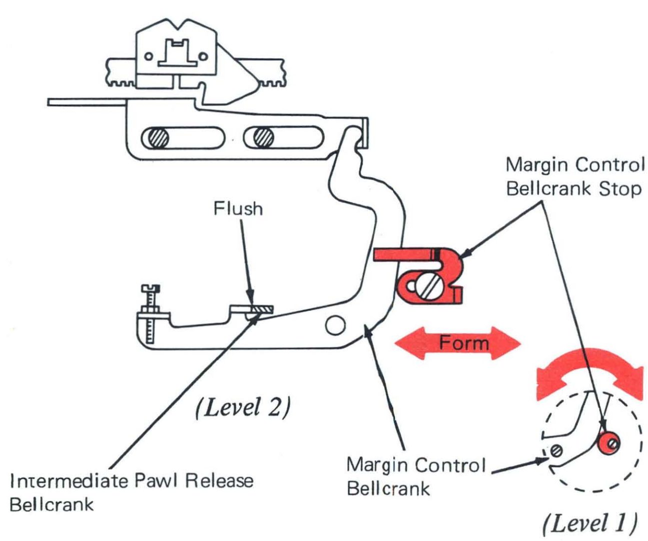
17. *Margin Control Bellcrank Stop, C1-D1* – Adjust so the margin control bellcrank will come to rest against the stop just as it has moved the margin control lever into contact with the linelock bellcrank. On level 2, form the extension to allow minimum front-to-rear motion of the margin control bellcrank.



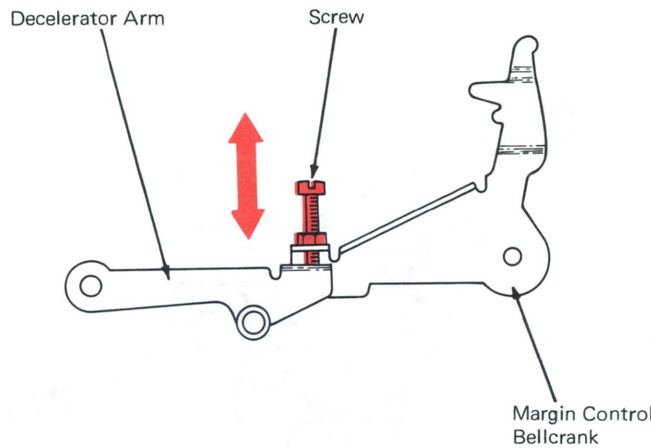
(Rear View)

Margin Control Bellcrank Stop, C4-D4 – Position so the intermediate pawl release bellcrank engages the ear on the margin control bellcrank by the thickness of its own metal. Form the extension on the level 2 stop to allow minimum front-to-rear motion of the margin control bellcrank without binding.



(Rear View)

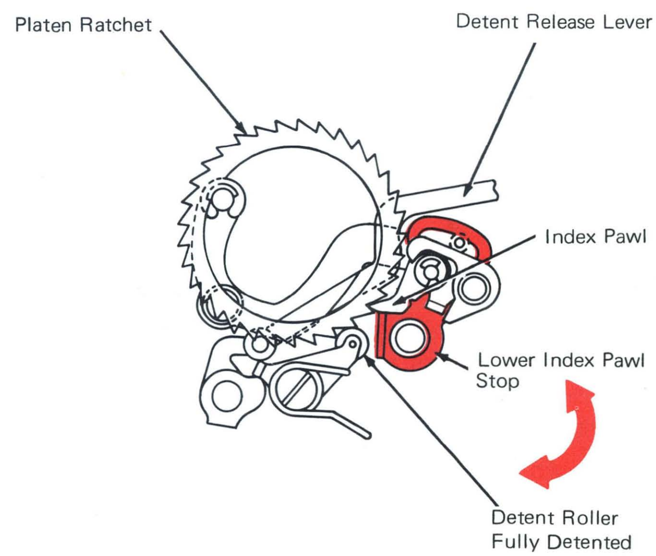
18. *Decelerator Arm* – Adjust the screw in the margin control bellcrank to give maximum deceleration without pulse at the left-hand margin.



(Rear View)

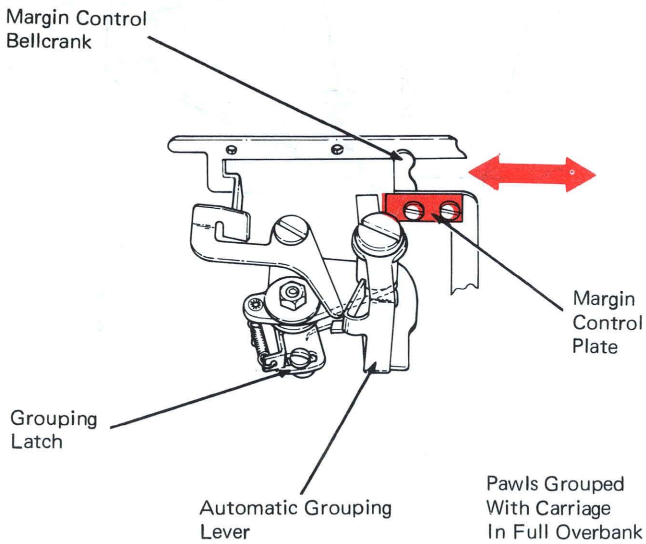
19. *Lower Index Pawl Stop* – Adjust to stop the downward movement of the index pawl just as the detent roller bottoms between two teeth on the platen ratchet.

NOTE: Check by pulling the carriage return tape by hand until the index pawl contacts the stop. Then release the tape. No further rotation of the platen in either direction should be required to bottom the detent roller.



(Right Side View)

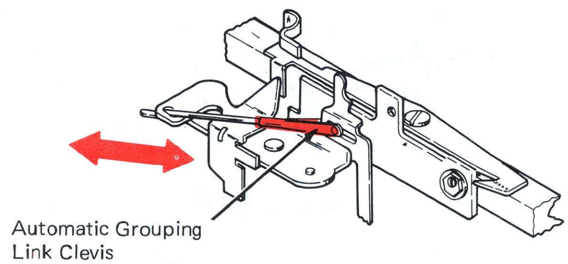
20. *Margin Control Plate, C4, D4 (Level 1)* – Adjust the margin control plate to just fully group the pawls when the carriage is held firmly into full overbank. Observe by watching the grouping latch. It should latch just as the carriage reaches full overbank.

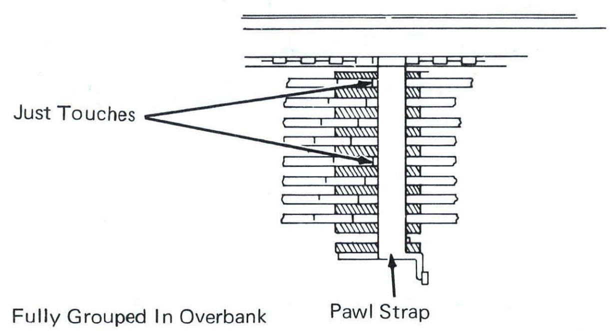


(Rear View)

21. *Automatic Grouping Link Clevis, D4 (Level 2)* – Position the carriage one unit from the LH margin and adjust the automatic grouping link clevis. When the carriage is pushed slowly into overbank, the pawls must be fully grouped when the No. 1 or 5 pawl drops over the rack tooth. There should be .015-.020" (0,38-0,51mm) motion remaining before reaching full overbank after the pawls drop over the rack tooth.

NOTE: Use the LH margin, not the side frame, when making this adjustment.





C1-D1 SPACEBAR OPERATIONAL THEORY

The spacebar mechanism (Figure 1) provides a method of escapement without the printing of characters. As in backspace and carriage return, the spacebar has a typematic feature to allow repeat operations.

There are five different design levels of the spacebar assembly. Levels 1, 2 and 3 are found on the C1, with levels 4 and 5 on the D1. The differences are shown in this section. The operational theory is the same on all levels.

Depressing the spacebar pushes down on the spacebar keylever which rotates about the keylever fulcrum rod in the keylever bearing support. This motion moves the cam release link in a downward direction and pivots the cam release lever to release the spacebar cam to the power roll (Figure 1).

As the cam rotates (Figure 1), the cam frame is pivoted toward the front of the machine. An operating link connected from the cam frame to an escapement lever plate is pulled forward. This rotates the escapement lever plate and the escapement lever shaft. The escapement lever shaft extends through the power frame and has an escapement lever attached to the right end. Rotating the shaft causes the escapement lever to contact the escapement release lever.

The escapement release lever pivots about the mounting on the left rail brace and pushes the escapement pawl spacer forward into contact with the escapement pawl tail. The escapement pawl is then released from the rack as the cam reaches the high point. The carriage then moves one space to the left.

A spring on the escapement lever plate restores the linkage and the cam to the rest position.

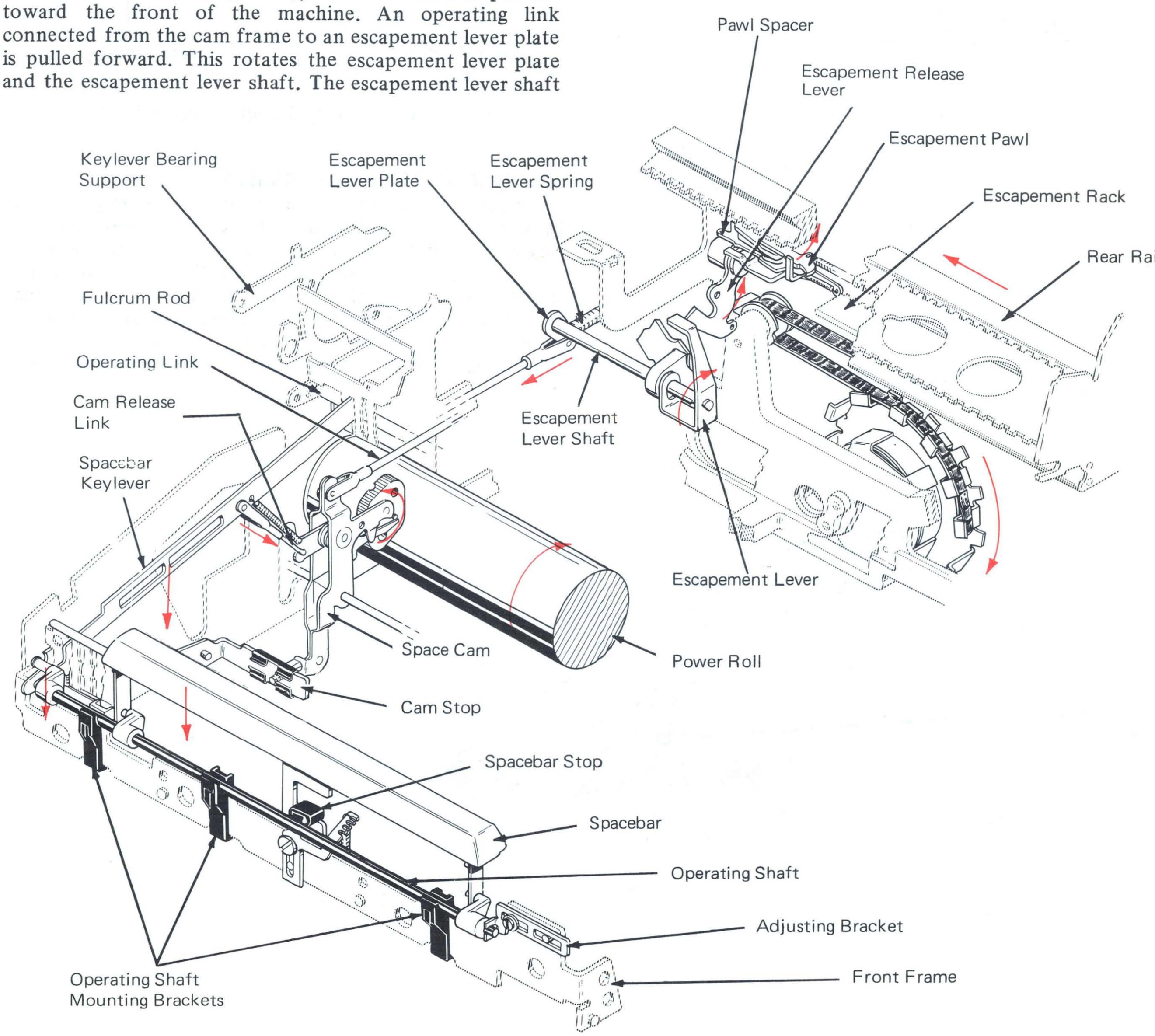


Figure 1 – Spacebar Mechanism (Model D) (Level 5)

REPEAT OPERATION

Repeat operations are done by depressing the spacebar keylever beyond the normal movement for a single operation. During a normal operation, the spacebar keylever bottoms on the spring loaded plunger in the front keylever guide comb (Figure 2).

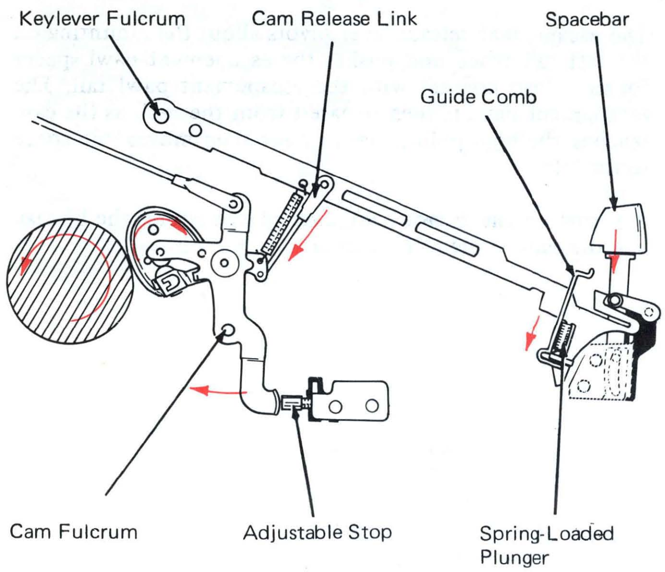


Figure 2 – Normal Operation

Any additional movement of the keylever rotates the non-repeat lug of the cam release lever further toward the center of the cam and out of the path of the cam lug (Figure 3). This allows the cam to repeat as long as the spacebar is held depressed.

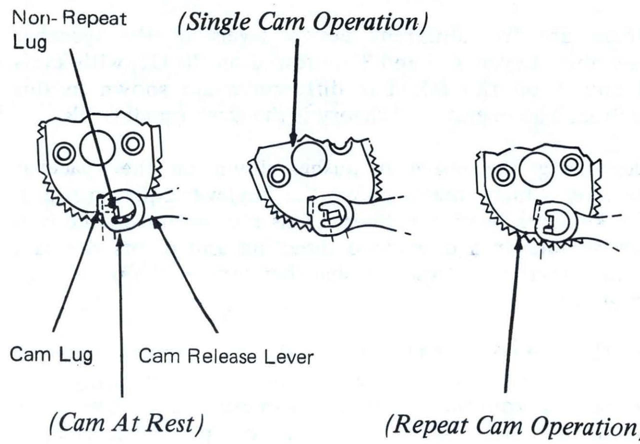


Figure 3 – Repeat/Non-Repeat Spacebar Operation

SPACEBAR REPEAT OPERATION (LEVEL 1)

On the early C 1 Typewriter, repeat operations are performed by depressing the spacebar past the normal position for a single space operation. The position for single space is determined by the spacebar stem contacting the rubber stop on the spring loaded repeat slide (Figure 4). Any slight additional movement of the spacebar holds the repeat slide up. Further depressing the spacebar pushes the repeat slide to the bottom of the slot and allows the cam to operate in the repeat position.

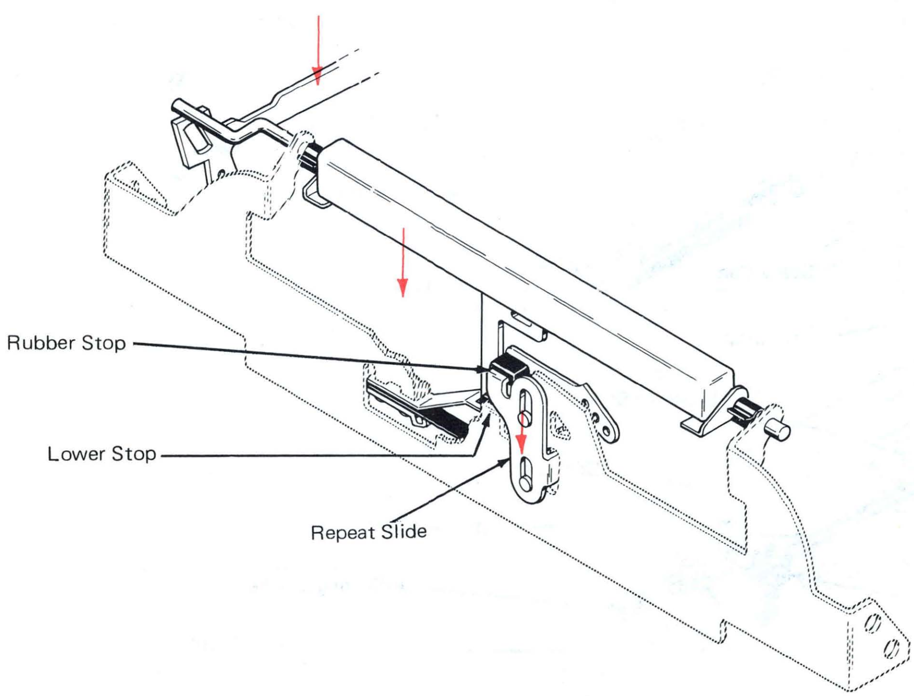


Figure 4 – Repeat Slide (Level 1)

SPACEBAR DESIGN (LEVEL 5)

The D1 spacebar is mounted on the spacebar operating rod by the spacebar guide assemblies (Figure 5). Support brackets molded to the front frame mount the spacebar operating rod and serve as retainers for the spacebar guide assemblies.

The operating rod extends to the left side of the typewriter and rotates downward contacting the keylever to release the cam.

A stop mounted on the front frame engages the lower working surface of the spacebar stem and determines the height of the spacebar in the rest position. The stop also serves to limit the downward movement of the spacebar during repeat operations.

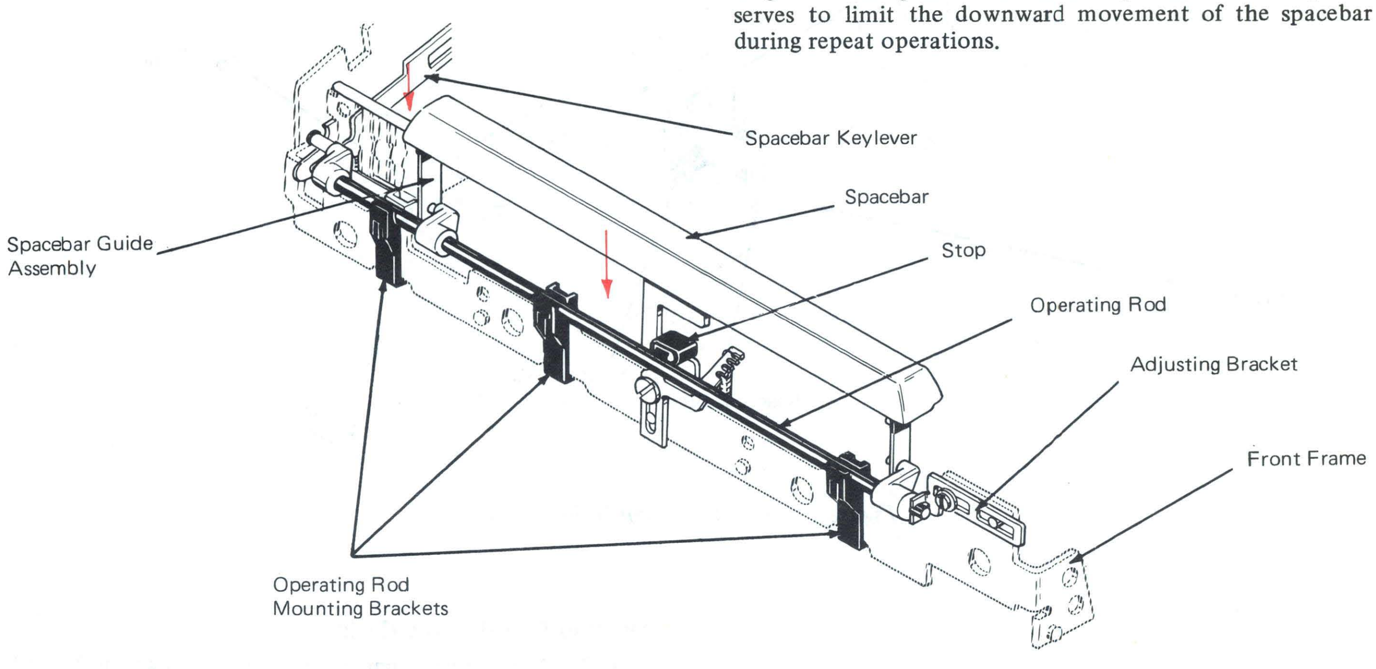


Figure 5 – Spacebar Assembly (Level 5)

SPACEBAR DESIGN (LEVEL 4)

On the D1, level 4, the spacebar operating rod is mounted in holes on the front frame (Figure 6). A keylever actuator is attached to the rod by a screw. All other design is the same as level 5.

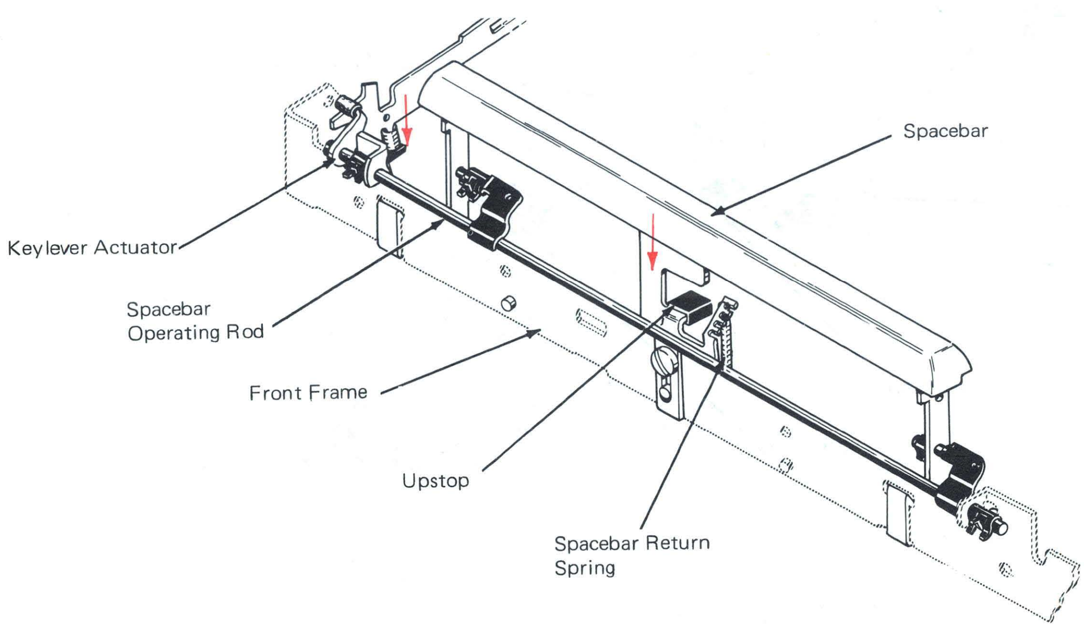


Figure 6 – Spacebar Assembly (Level 4)

SPACEBAR DESIGN, C1 (LEVEL 3)

A new front frame, spacebar stop and spacebar guide are used in this level. The spacebar stop is a formed lug on the front frame, with the spacebar guide being a one-piece part that slips into a hold on the front frame (Figure 7).

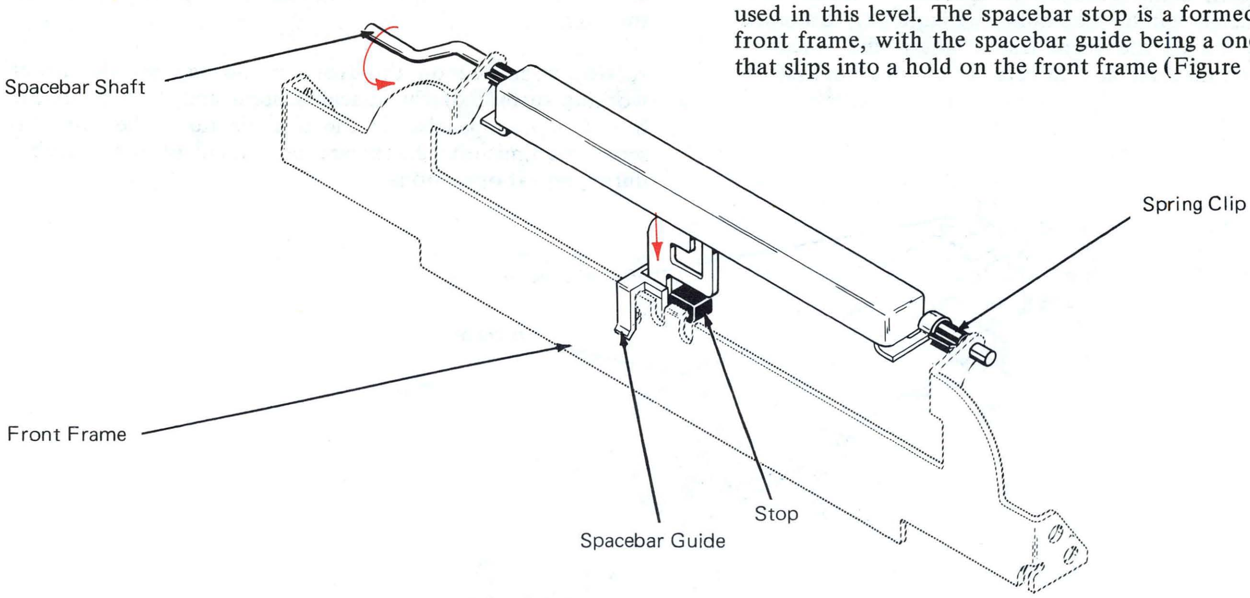


Figure 7 – Spacebar Stem Guide (Level 3)

SPACEBAR DESIGN (LEVEL 2)

The C1 (level 2) spacebar mechanism uses a spring loaded plunger in the keylever guide comb (Figure 8). It also uses only one stop, the final stop, with the upper surface of the stop limiting the downward movement of the spacebar in the repeat area. As on levels 1 and 3, the lower surface of the stop determines the height of the spacebar at rest.

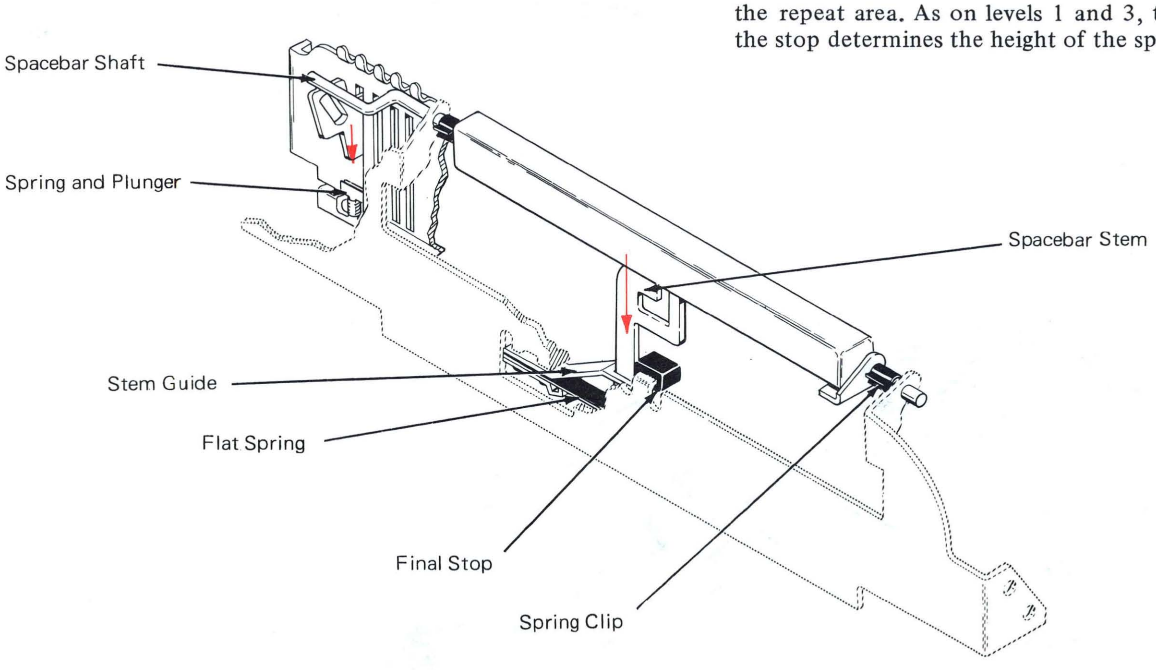


Figure 8 – Spacebar, Spring And Plunger (Level 2)

SPACEBAR DESIGN (LEVEL 1)

The earliest C1 (level 1) spacebar is mounted on brackets on the spacebar shaft with nylon pins and barbed retaining clips (Figure 9). The spacebar has a stem which extends down from the center and through a guide. This keeps the spacebar mounted in a vertical position. The bottom of the spacebar stem contacts a flat spring which provides restoring tension for the spacebar and shaft assembly. This early level mechanism uses two stops, an upper and lower stop. The lower stop determines the rest position of the spacebar and the upper stop, mounted on a sliding bracket, is used to control repeat operation of the spacebar.

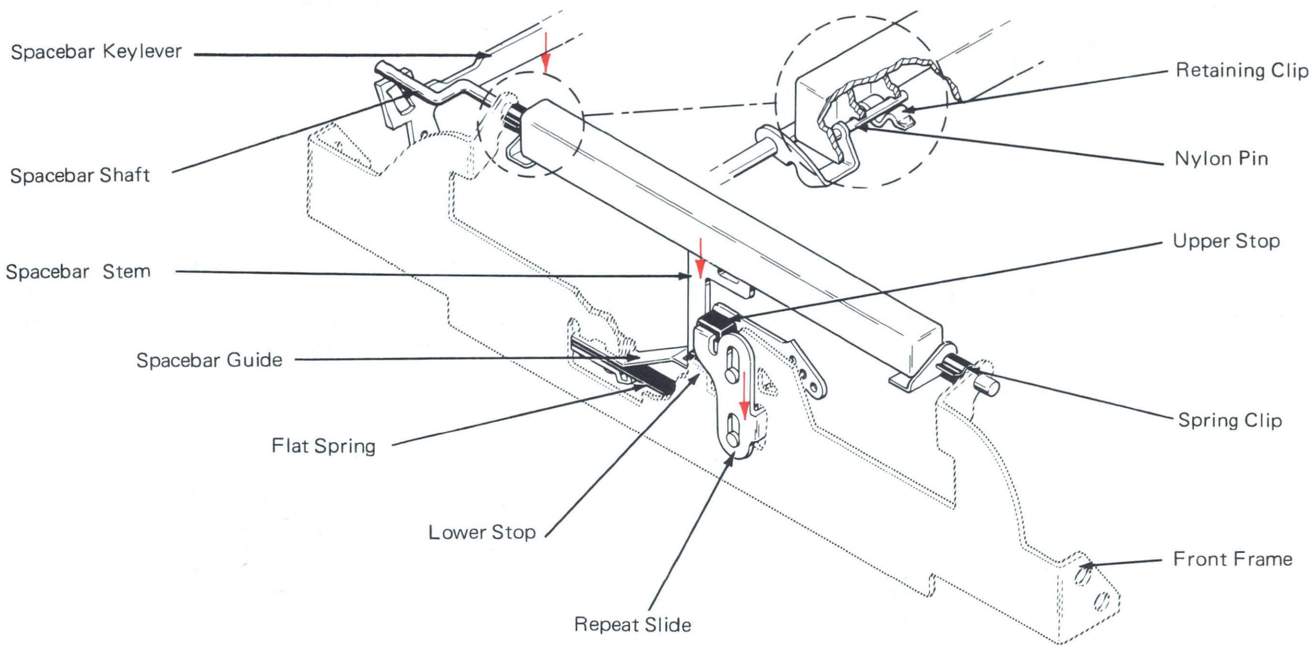
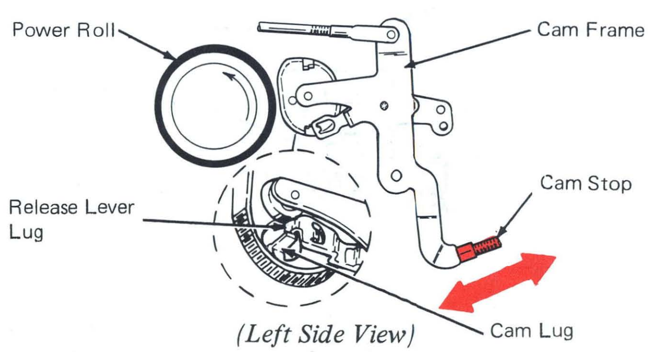


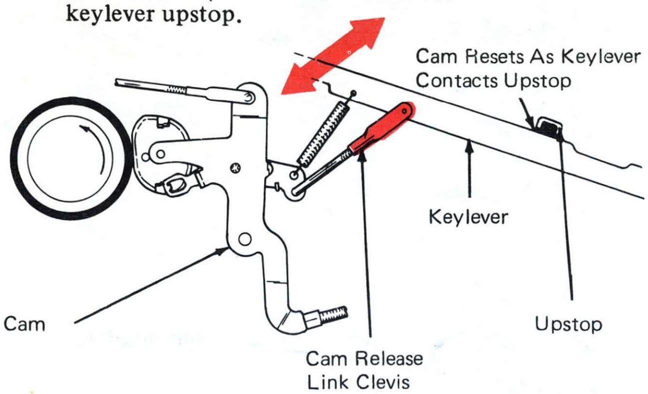
Figure 9 – Spacebar Mechanism (Level 1)

C1-D1 SPACEBAR ADJUSTMENTS

1. *Cam Clearance, C1, D1* – Adjust so the release lever lug rests on the rear of the cam lug when released with the power off.

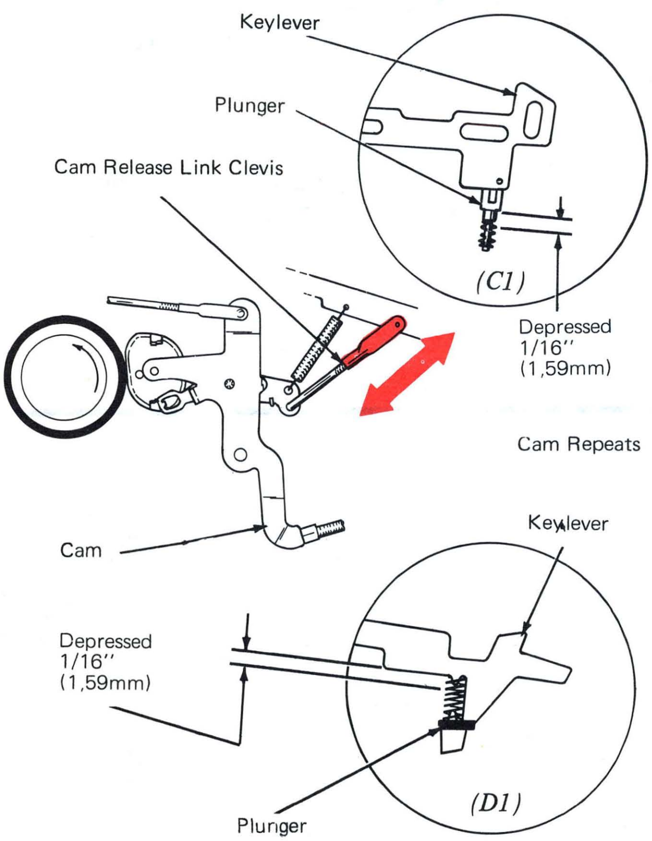


2. *Cam Release Link Clevis (Early CL With Non-Adjustable Upstop And Adjustable Repeat Slide Mounted On The Front Frame)* – Adjust so the cam resets just before the spacebar keylever contacts the keylever upstop.



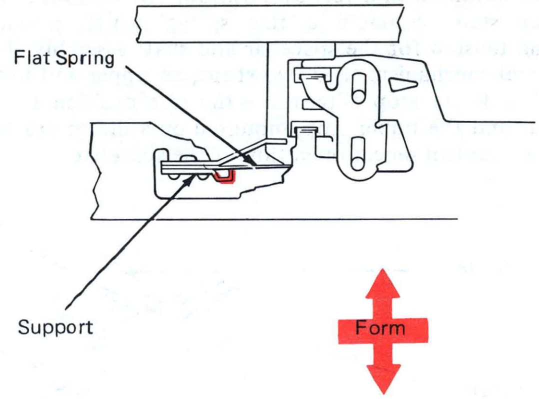
(Left Side View – Level 1)

Cam Release Link Clevis (C1, D1) – Adjust so the cam repeats when the plunger has been depressed 1/16" (1,59mm).

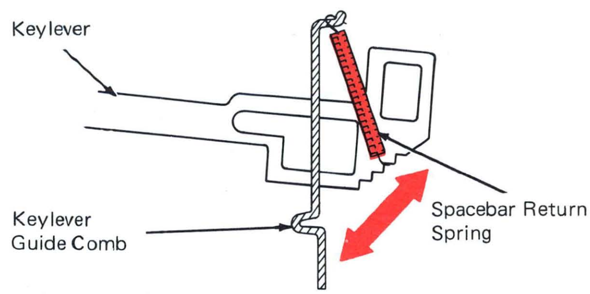


(Left Side View – Level 2)

3. *Spacebar spring return support, Early C1* – Form the support so a force of two to three ounces is required to release the spacebar cam.

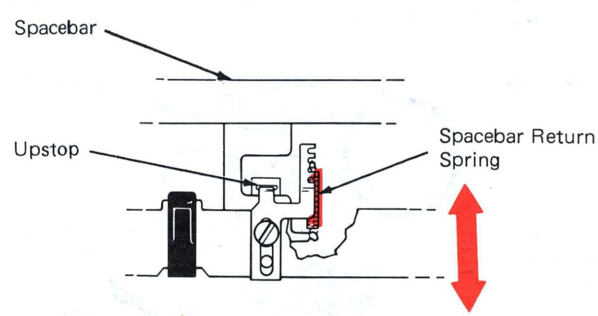


Spacebar Return Spring, C1 (With Adjusting Notches On Lower Front Edge Of The Keylever) – Attach the keylever restoring spring on the notch which will provide for a two to three ounce releasing pressure.

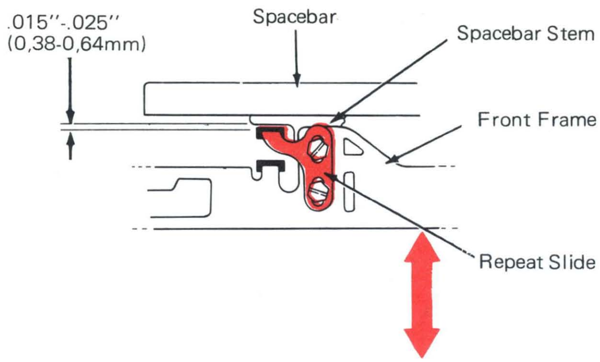


(Left Side View)

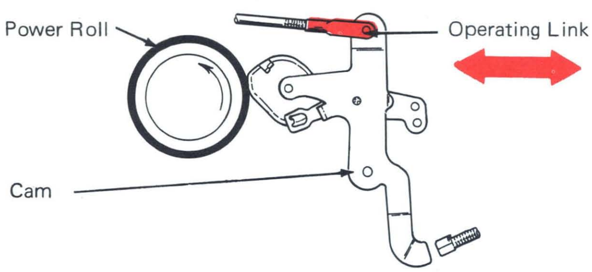
Spacebar Return Spring, D1 – Attach the spring in the multiple selection anchor hole which will provide for a two to three ounce releasing pressure.



4. *Repeat Stop, C1 (With Repeat Slide On Front Frame)* – Adjust vertically for .015"-.025" (0,38-0,64mm) clearance between the stem and the repeat stop just as the cam releases.

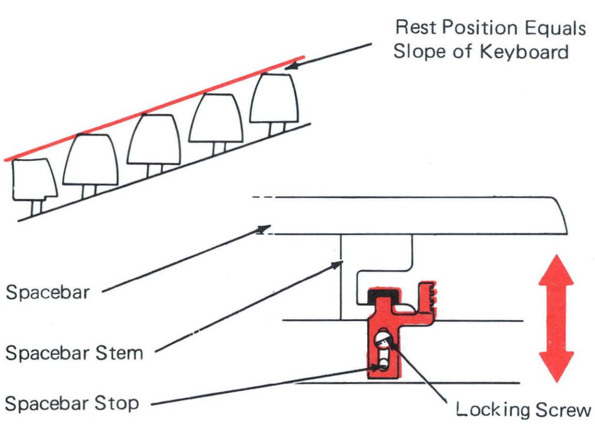


5. *Operating Link, C1, D1* – Adjust so the escapement pawl releases just before the high point of the cam is reached. Check on both lobes.

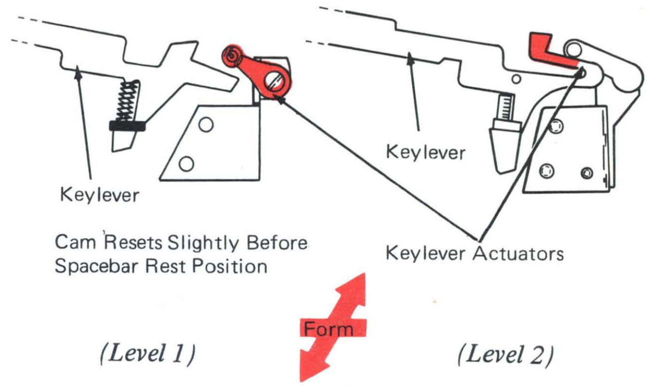


(Left Side View)

6. *Spacebar Stop, D1* – Adjust up or down so that the rest position of the spacebar will be as shown.

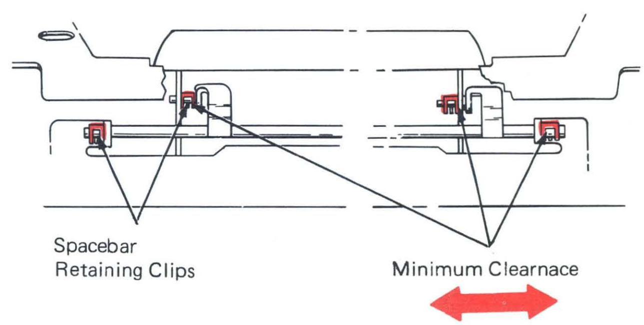


7. *Spacebar Keylever Actuator, D1* – Form as shown so the cam resets slightly before the spacebar stem contacts the upstop.

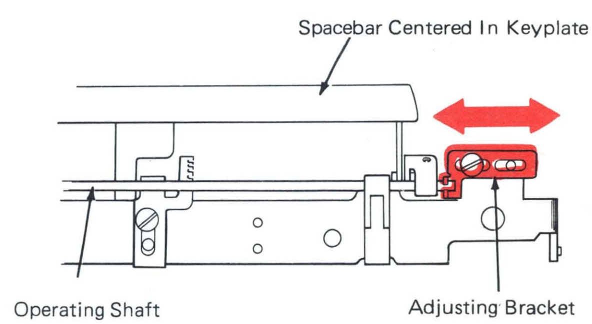


(Left Side View)

8. *Spacebar Shaft Retaining Clips, C1, D1* – Position with their lugs down so the spacebar is centered in the keyplate opening.



9. *Spacebar Adjusting Bracket, D1* – Adjust the bracket left or right to center the spacebar in the keyplate.



C4-D4 SPACEBAR OPERATIONAL THEORY

The purpose of the spacebar is to provide a means of escapement without typing. The C4-D4 spacebar mechanism (Figure 1) is closely related in function to that of the C1-D1. The design uses a 2- and 3-unit spacebar instead of the single spacebar to give proportional spacing between words (Figure 1).

The 3-unit or 2-unit spacebar is also used to add or remove spaces within a line of type so the right-hand margin can be justified.

The D4 spacebar mechanism also includes an expand space feature. When operated, this allows the 2-unit spacebar to produce three units of space. This is used for working with figures, which are 3-unit spacing.

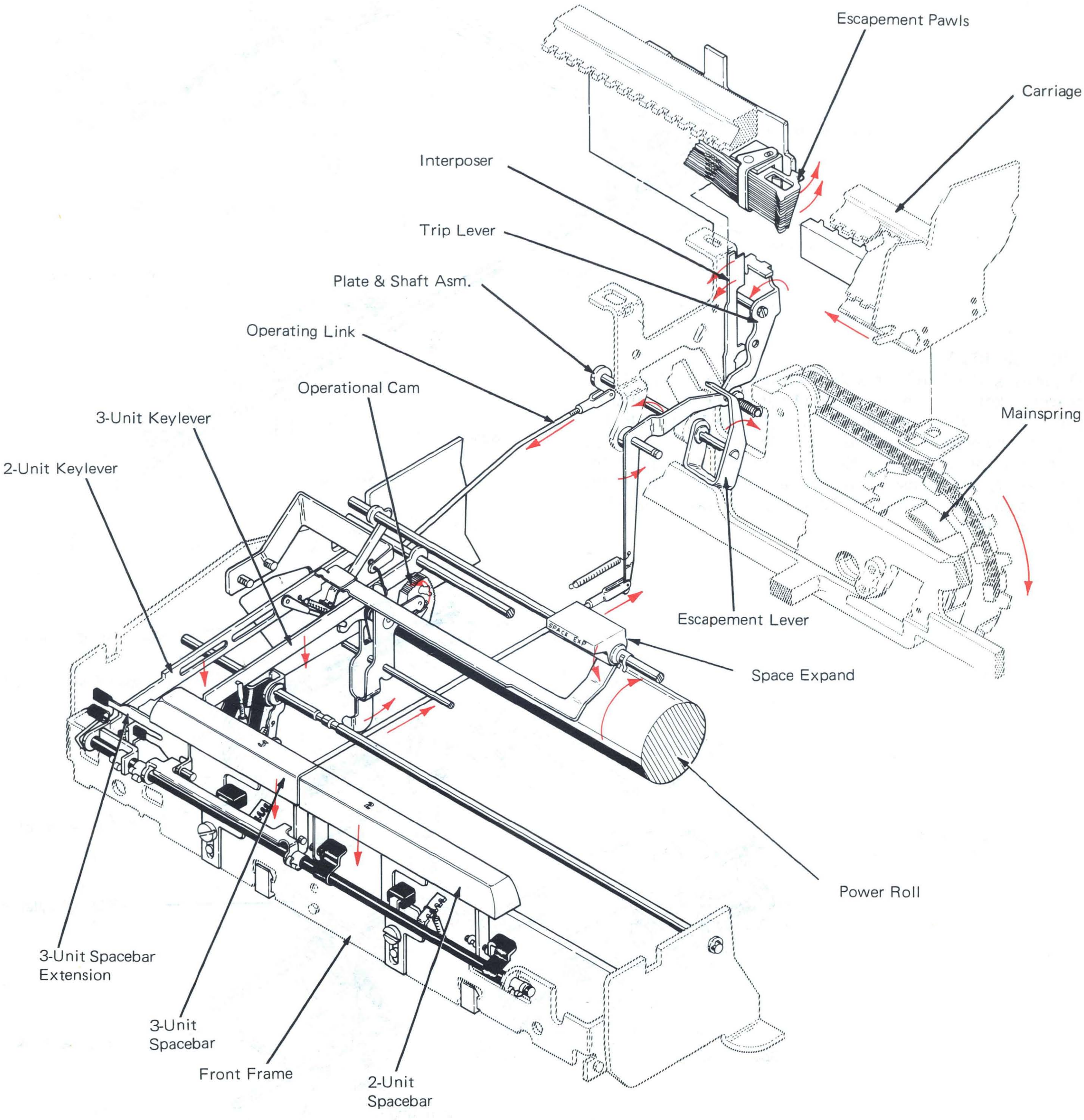


Figure 1 – Spacebar Mechanism (D4)

2-UNIT SPACEBAR

A 2-unit spacebar operation occurs in the same manner as that of the C1-D1 spacebar. The motion of the cam is applied through the operating link, plate and shaft and escapement lever to the lower arm of the escapement trip lever and pivots it against the interposer to release the pawl (Figure 1). The D4 2-unit spacebar is designed to give repeat operations by depressing it below the normal movement. The C4 2-unit spacebar does not repeat.

The 2-unit spacebar (Figure 2) on the D4 is mounted in the same manner as the D1. The assembly is spring loaded up in the rest position by the 2-unit spacebar spring.

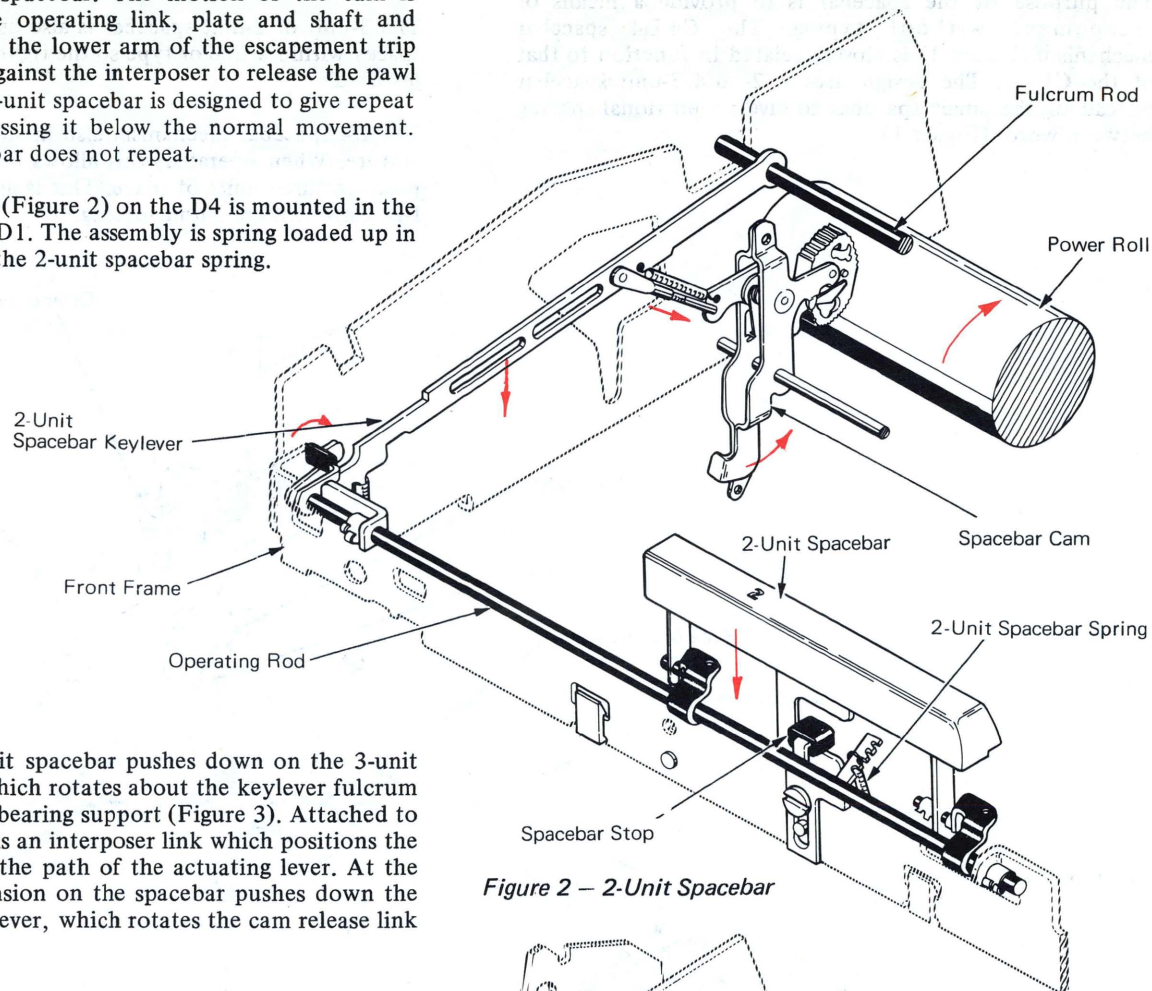


Figure 2 – 2-Unit Spacebar

3-UNIT SPACEBAR

Depressing the 3-unit spacebar pushes down on the 3-unit spacebar keylever which rotates about the keylever fulcrum rod in the keylever bearing support (Figure 3). Attached to the 3-unit keylever is an interposer link which positions the 3-unit interposer in the path of the actuating lever. At the same time, an extension on the spacebar pushes down the 2-unit spacebar keylever, which rotates the cam release link to release the cam.

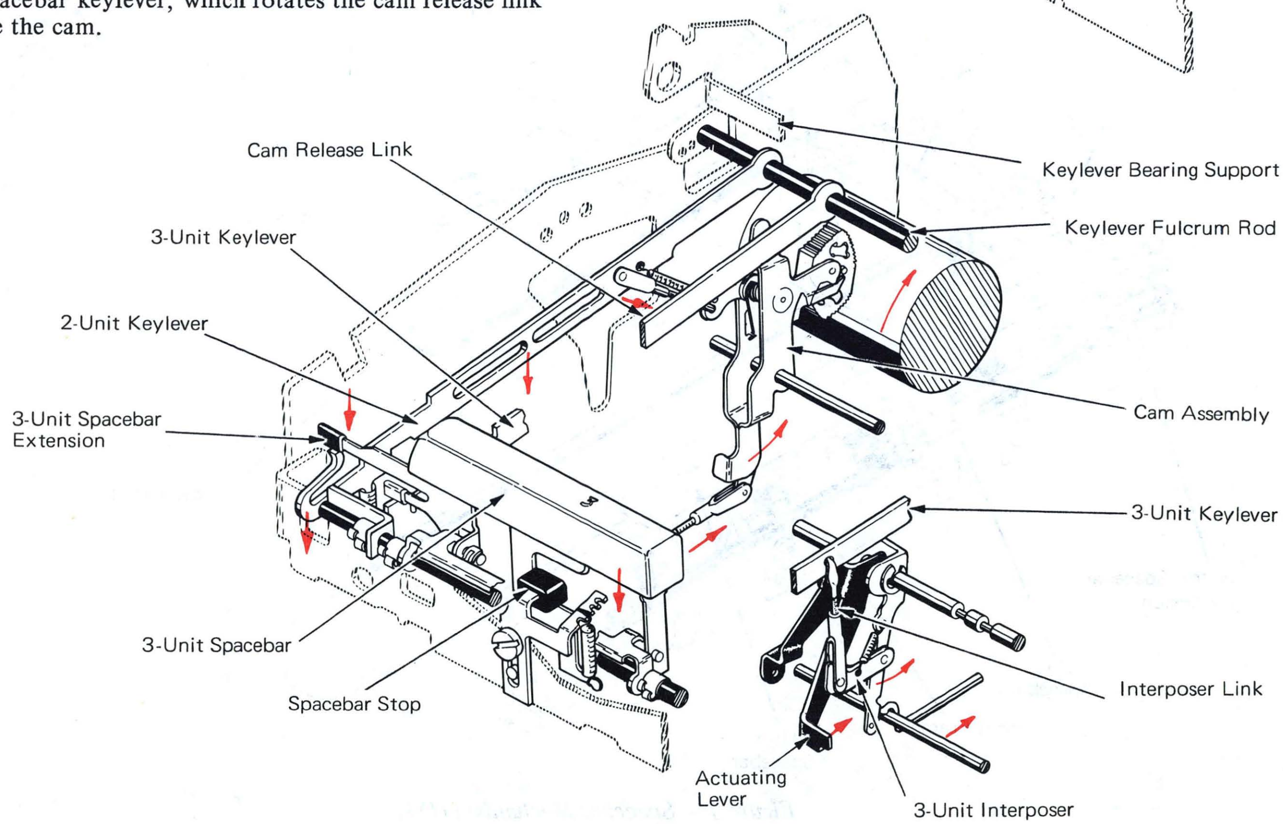


Figure 3 – Keylever, Cam Operation

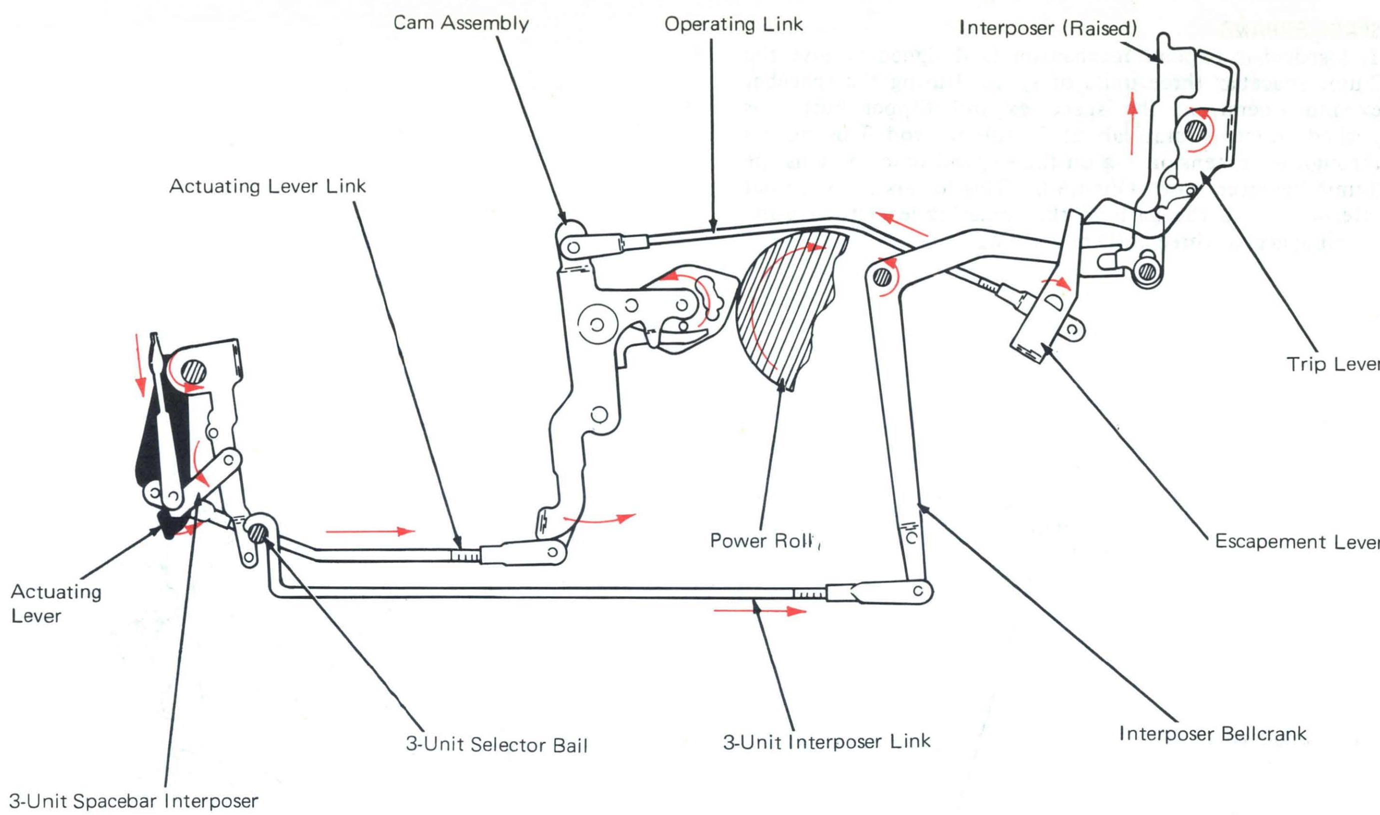


Figure 4 – Spacebar Operation

3-UNIT SPACEBAR OPERATION

As the cam is rotated by the power roll (Figure 4), the bottom of the cam assembly is pivoted toward the rear of the machine. Attached to the lower cam frame is an actuating lever link which is pulled to the rear by the cam assembly. This motion, applied to the actuating lever link and the 3-unit spacebar interposer, operates the 3-unit selector bail. As the selector bail moves toward the rear, it supplies motion to the selector bellcrank to raise the 3-unit interposer in front of the trip lever blade.

During a 2-unit spacebar operation, the actuating lever passes under the spacebar interposer.

At the same time, an operating link from the upper cam frame to the escapement lever is pulled forward. This rotates the escapement lever which contacts and pivots the escapement release lever about the mounting stud on the left rail brace. The release lever contacts the 2- and 3-unit interposers, which pivots forward to release the escapement pawls from the rack. The carriage then moves three units to the left.

The 3-unit spacebar is attached to a bail which is mounted on the operating rod (Figure 5). The rod is mounted in two holes in the front frame, and is held by retainer clips. Two extensions on the left side of the spacebar supply the motion to pivot the keylevers. Mounted to the front frame is the 3-unit spacebar stop. The stop serves to limit the downward movement of the spacebar and connects the spacebar spring.

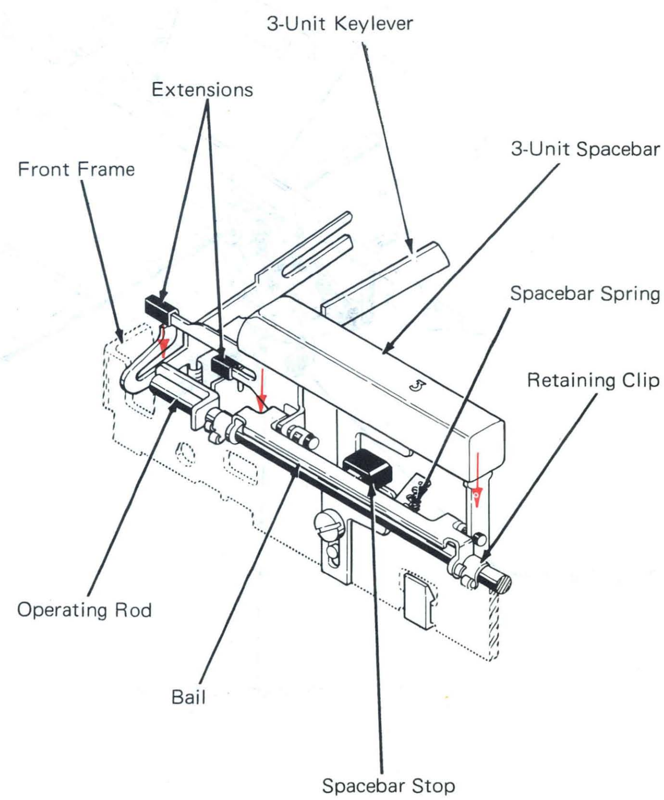


Figure 5 – 3-Unit Spacebar Mounting

SPACE EXPAND

The spacebar expand mechanism is designed to give the 2-unit spacebar three units of space. During the spacebar expand operation, the space expand flipper button is pushed down to rotate about the fulcrum rod. This motion through an extension lug on the expand bracket cams the 3-unit keylever down (Figure 6). This lowers the spacebar interposer into the path of the actuating lever to give the 2-unit spacebar three units of spacing.

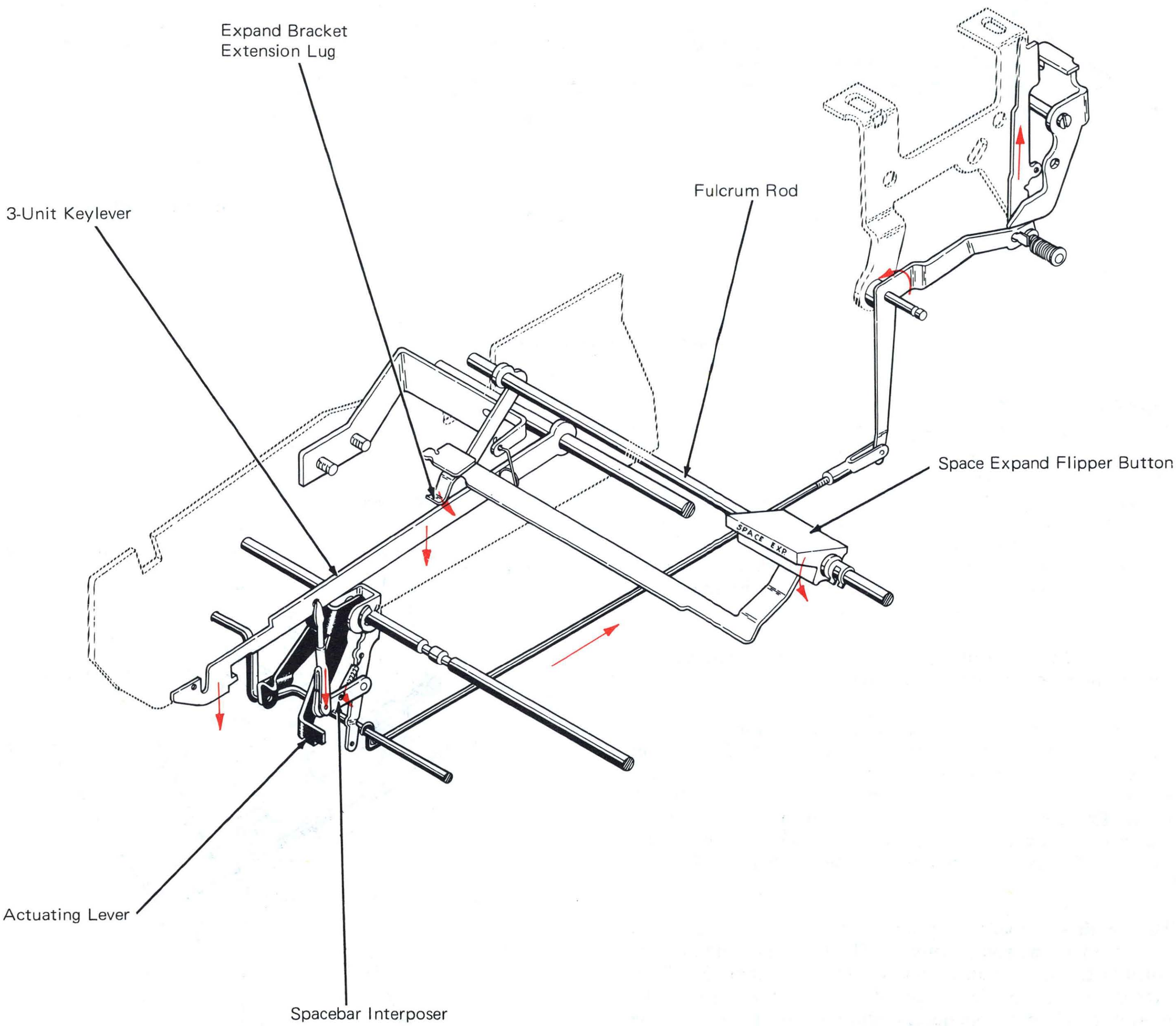


Figure 6 – Space Expand Mechanism

C4 SPACEBAR EXCEPTIONS

The C4 spacebar mechanism is slightly different from the D4 (Figure 7). The basic differences are:

1. Non-repeat 2-unit spacebar.
2. Uses three keylevers.
3. 3-unit spacebar mounts to a support bracket which pivots on a pivot stud on the right side frame.
4. No space expand feature.

The C4-D4 spacebar cam is very similar to that of the C1-D1. The difference is in the high point of the cam. The high point of the executive cam is higher than the standard typewriter to give the cam more motion to raise the interposers.

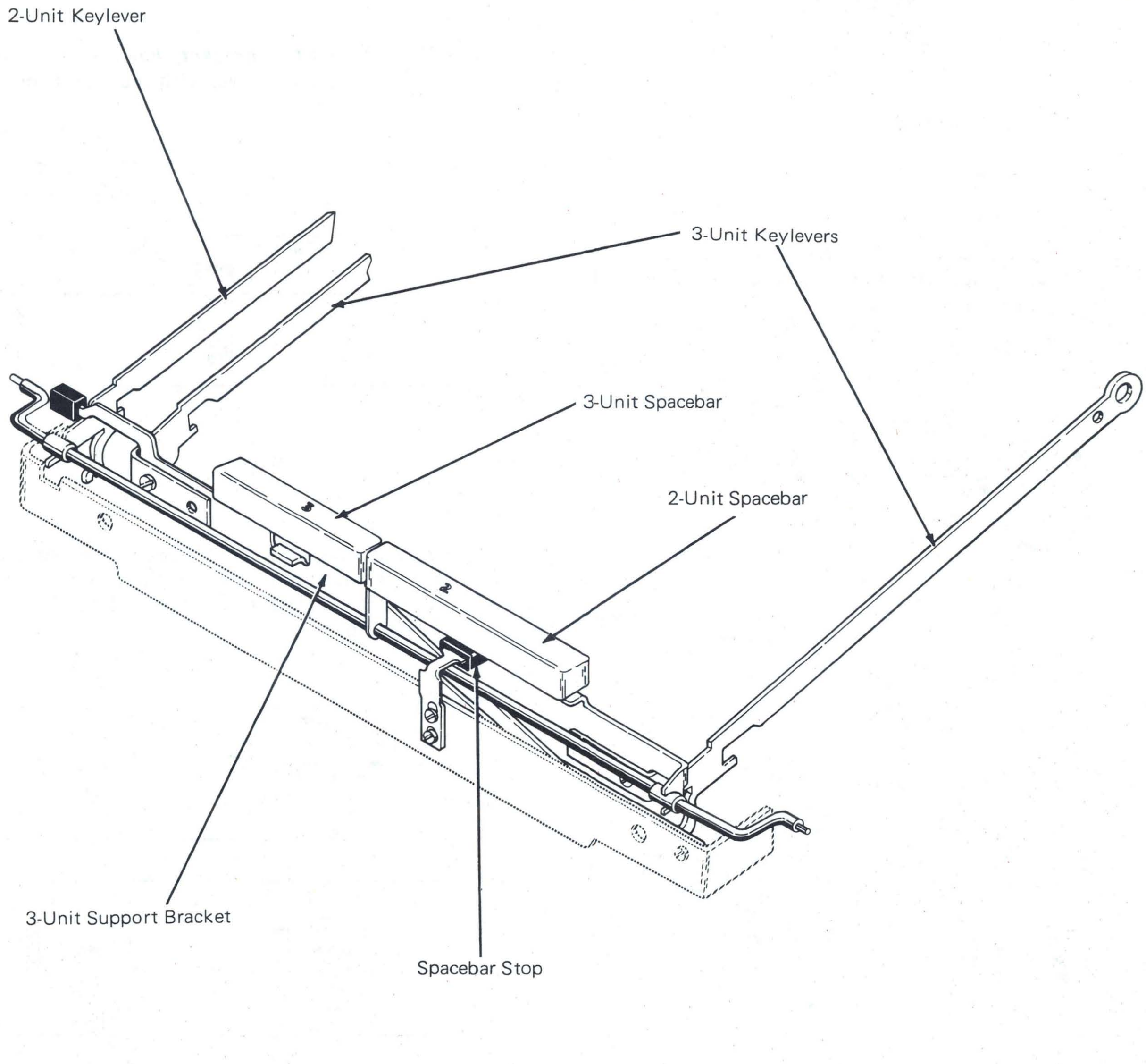
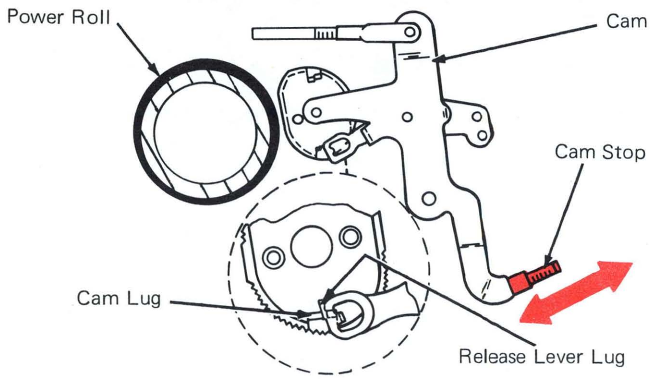


Figure 7 – Spacebar Differences (C4)

C4-D4 SPACEBAR ADJUSTMENTS

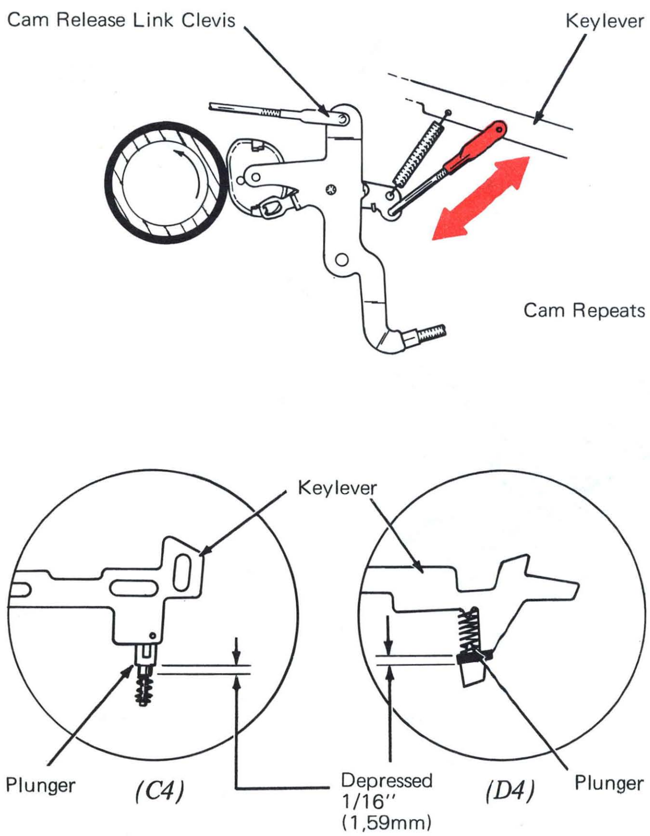
1. *Cam Clearance* – Adjust so the release lever lug rests on the rear of the cam lug when released with the power off.

NOTE: Changing cam clearance will require checking actuating lever link adjustment.



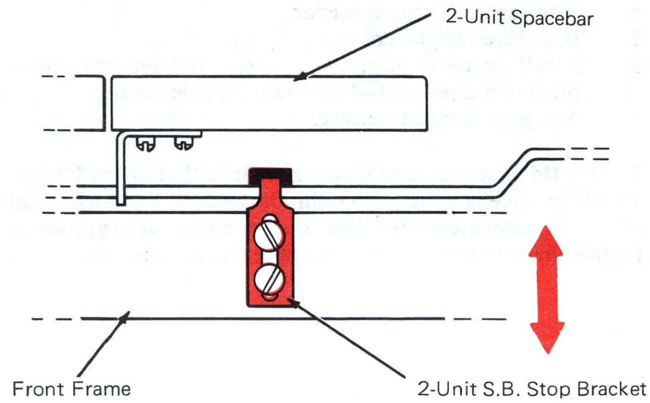
(Left Side View)

2. *Cam Release Link Clevis, C4, D4* – Adjust so the cam will repeat when the repeat plunger is depressed 1/16" (1,59mm).

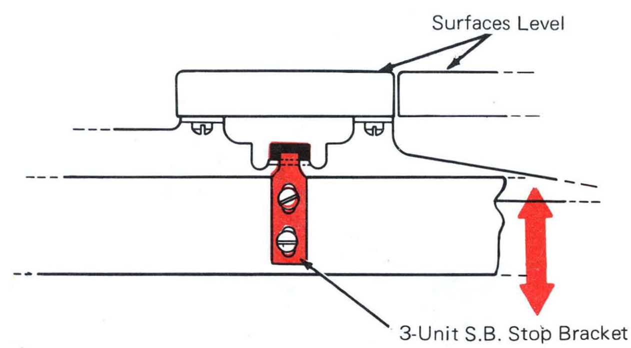


(Left Side View)

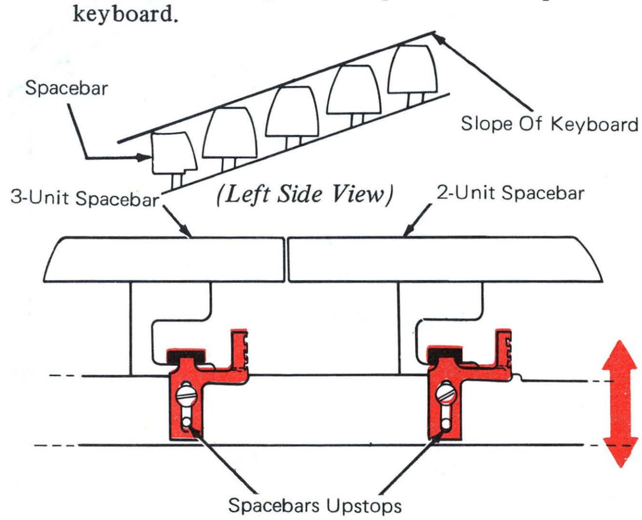
3. *Two-Unit Stop Bracket, C4* – Adjust so the cam releases just as the 2-unit spacebar contacts the stop. The cam should also reset when the spacebar is released.



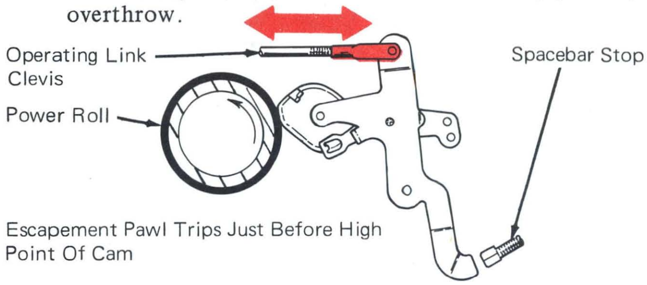
4. *Three-Unit Stop Bracket, Early C4* – Adjust so the 3-unit spacebar is level with the 2-unit spacebar.



5. *Two- And Three-Unit Spacebar Upstops, D4* – Adjust the upstops up or down so the 2- and 3-unit spacebars will have a rest position equal to the slope of the keyboard.

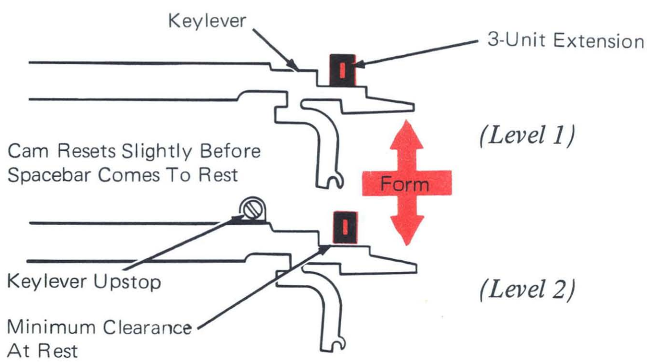


6. *Operating Link Clevis, C4, D4* – Adjust the clevis so that the 3-unit spacebar operation will release out three escapement pawls and have .005" (0,13mm) overthrow.



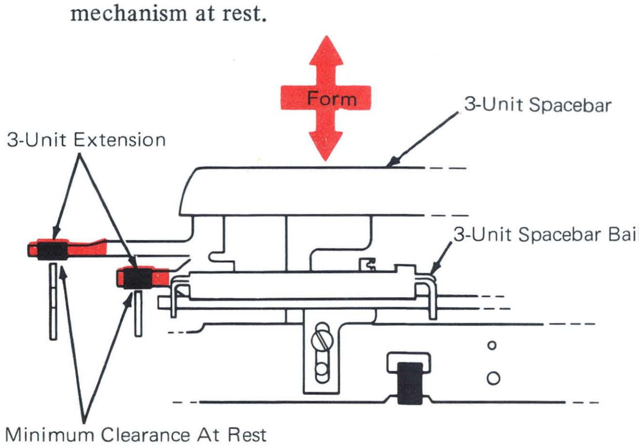
(Left Side View)

7. *Three-Unit Spacebar Extension, C4* – Form the extension for a minimum clearance between the rubber tip and spacebar keylever at rest. On very early C4's, the cam keylever rests against the 3-unit spacebar extension instead of the keylever upstop. On these machines, form the 3-unit spacebar extension so the cam resets slightly before the 3-unit spacebar comes to rest.

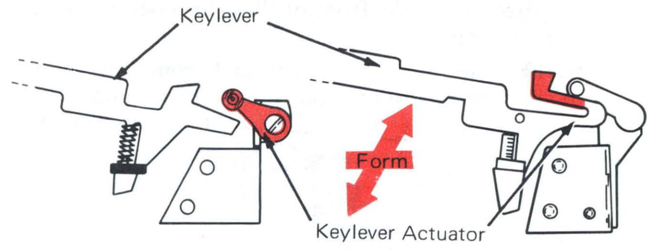


(Left Side View)

8. *Three-Unit Spacebar Extensions, D4* – Form the two extensions so that a minimum clearance exists between the extensions and the keylevers with the mechanism at rest.



9. *Two-Unit Spacebar Keylever Actuator, D4* – Form as shown so cam resets slightly before the 2-unit spacebar restores against the stop.



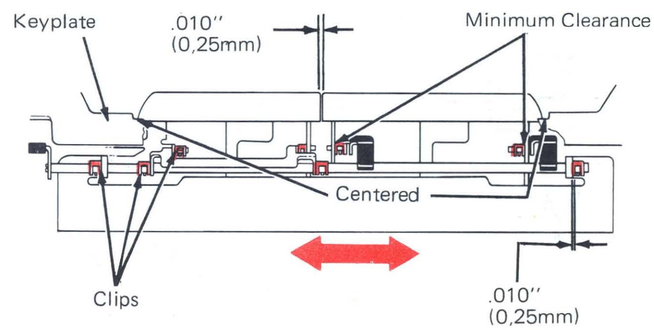
(Level 1) *(Left Side View)* *(Level 2)*

10. *Spacebar Retaining Clips* – Adjust for two conditions:

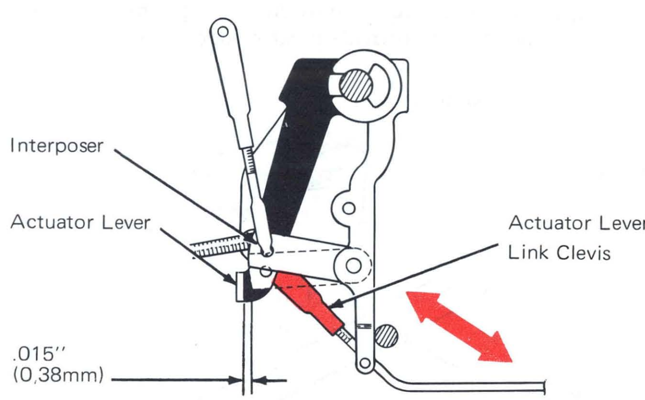
a. Position the clips so that the spacebar is centered in the keyplate.

b. Then adjust the clips so that there is a clearance of .010" (0,25mm) between the 2- and 3-unit spacebars and the same amount of clearance at the outside end of the spacebar guide assemblies.

NOTE: The spacebar retaining clips on the D4 should be positioned with their lugs down.



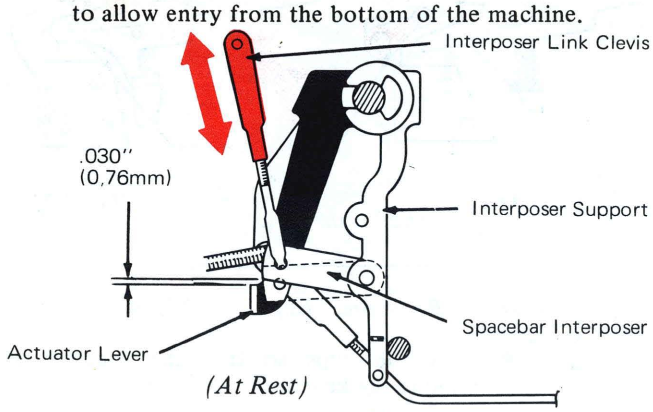
11. *Actuating Lever Link Clevis, C4, D4* – Adjust so the back of the lug on the actuating lever clears the spacebar interposer by .015" (0,38mm) as the 3-unit spacebar is depressed.



(Right Side View)

12. *Spacebar Interposer Link Clevis, C4, D4* – Adjust to allow the interposer to clear the top of the lug on the spacebar actuating lever by .030" (0,76mm) as the lug passes under the front of the interposer during the 2-unit operation.

NOTE: The link has been turned around on the D4 to allow entry from the bottom of the machine.



(At Rest)

(Right Side View)

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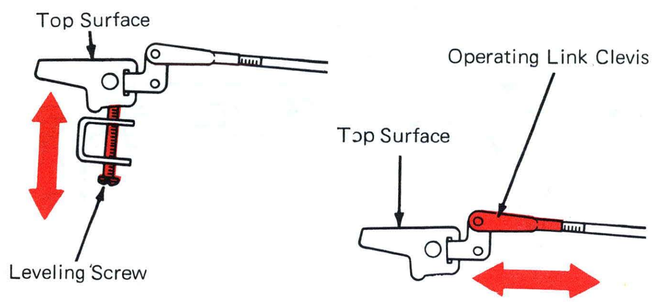
13. *Space Expand Flipper Button, D4* – Adjust leveling screw (Level 1) or operating link clevis (Level 2) so the top surface of the button will be parallel to the base of the machine.



(Level 1) *(Level 2)*

(Right Side View)

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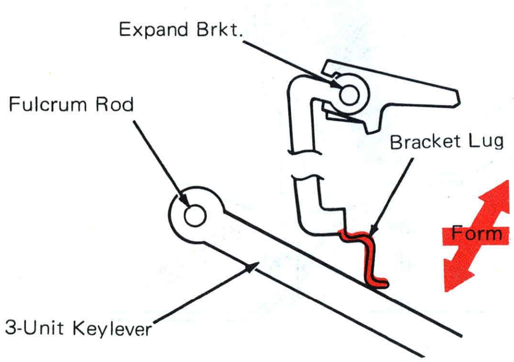
14. *Space Expand Lever (Extension), D4* – Form so the space expand lever is allowed to toggle into the operated position to provide positive detenting.



(Left Side View)

C1-D1 BACKSPACE OPERATIONAL THEORY

The purpose of the backspace mechanism (Figure 1) is to move the carriage to the right, one space at a time. This is done by using a single lobe cam. Cam motion is transferred through an operating link, bellcrank, and a backspace pawl link to the backspace pawl. The backspace pawl has a diagonal elongated hole and is mounted on a stud on the backspace bracket. As the backspace pawl is pulled along this diagonal hole, it is guided into the escapement rack by a guide lug on the bracket. The carriage is pulled to the right and the escapement pawl drops into the former tooth. The backspace pawl is bound momentarily between the rack and the backspace pawl stop. This limits the carriage motion to one tooth for each operation.

The backspace has a repeat/non-repeat feature to allow repeat operations when the keylever is depressed beyond the normal movement. In the normal movement, the backspace keylever bottoms on a spring loaded plunger in the front guide comb (Figure 1). With slight additional pressure, the operator overcomes the spring tension of the plunger. This extra movement of the keylever rotates the non-repeat lug of the cam release lever out of the path of the cam lug and allows the cam to repeat as long as the keylever is held in this position.

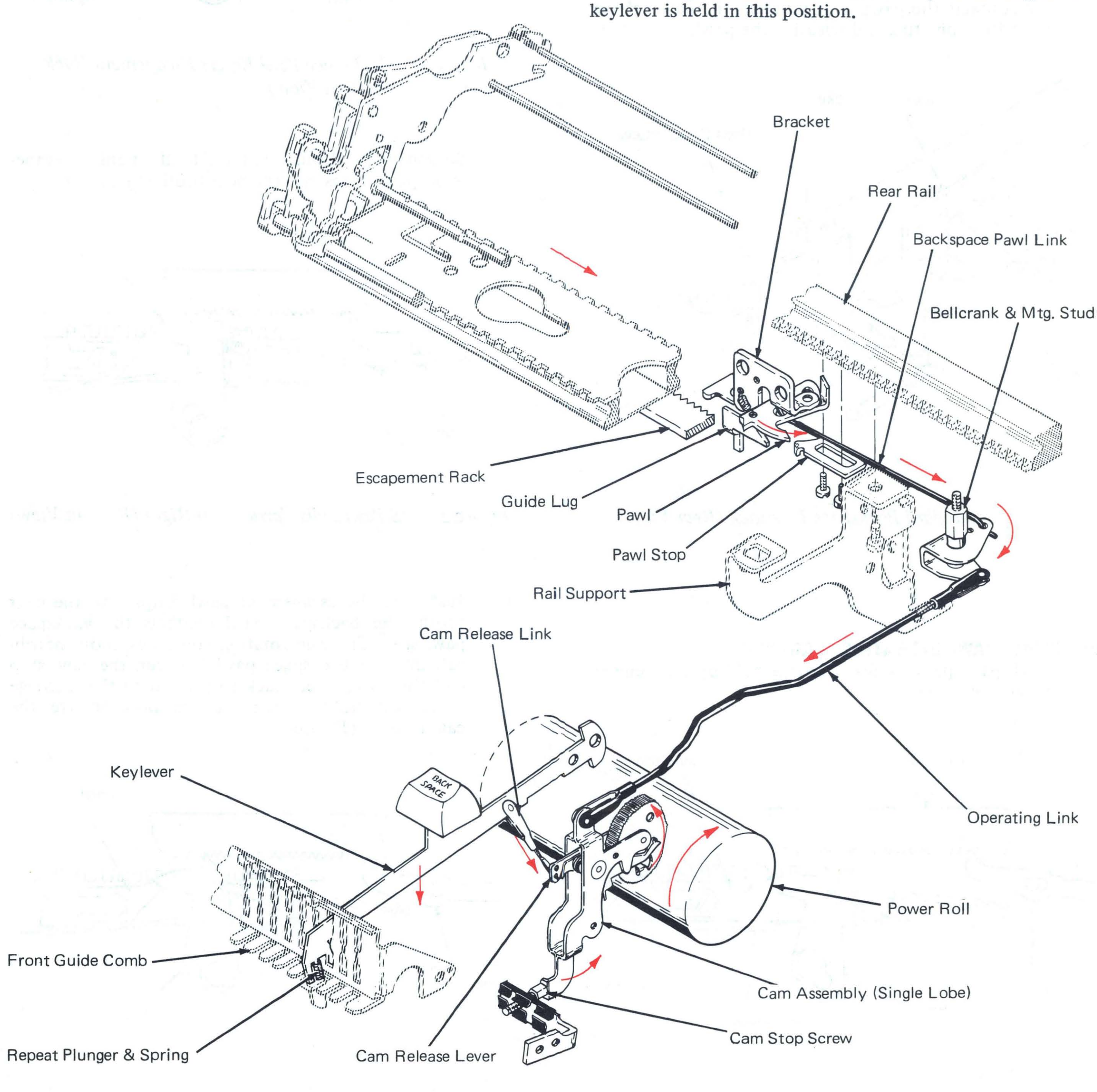


Figure 1 – Standard Backspace Mechanism

BACKSPACE INTERLOCK

A backspace interlock is mounted on the backspace pawl mounting bracket (Figure 2). This interlock works in two ways:

1. It prevents backspace operation anytime the excapement pawl is released. (Carriage return, tabulation, hand carriage release operations.) As the pawl release lever pivots to release the escapement pawl from the rack, the backspace interlock is pivoted into position so the vertical lug on the interlock prevents the backspace pawl from sliding into the rack.
2. It prevents escapement pawl release during a backspace operation. With the backspace pawl in the rack, the backspace interlock cannot pivot, as the vertical lug contacts the pawl. This prevents the pawl release lever from pivoting and releasing the pawl.

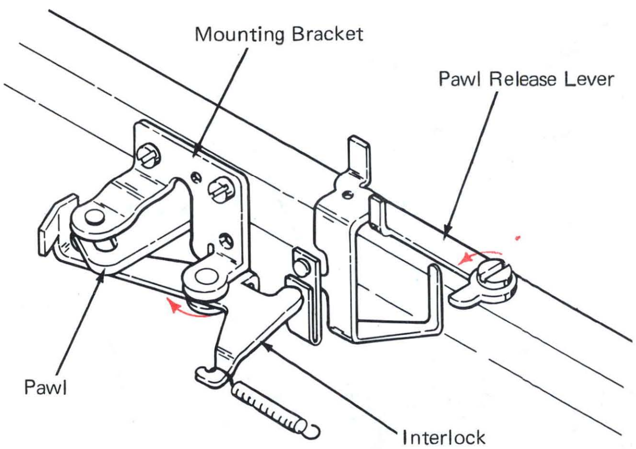


Figure 2 – Standard Backspace Interlock (Rear View)

BACKSPACE PAWL OPERATING SEQUENCE

1. Backspace pawl at rest, carriage held by escapement pawl (Figure 3).

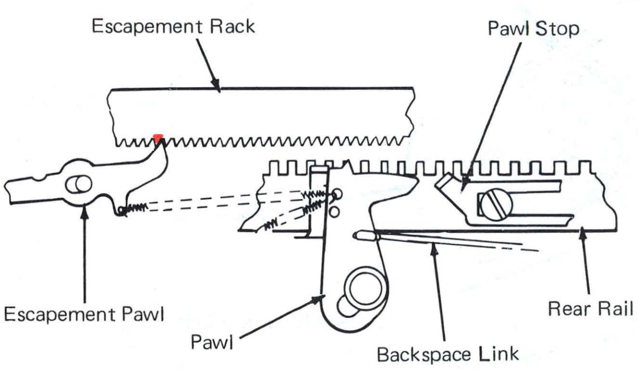


Figure 3 – Backspace Pawl At Rest (Bottom View)

2. Backspace pawl slides along the elongated mounting hole guided into the escapement rack by the guide lug (Figure 4).

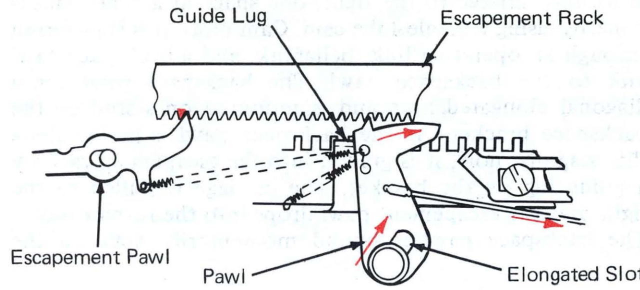


Figure 4 – Backspace Pawl Enters Escapement Rack (Bottom View)

3. Backspace pawl pulls carriage to the right – escapement pawl drops into the next tooth (Figure 5).

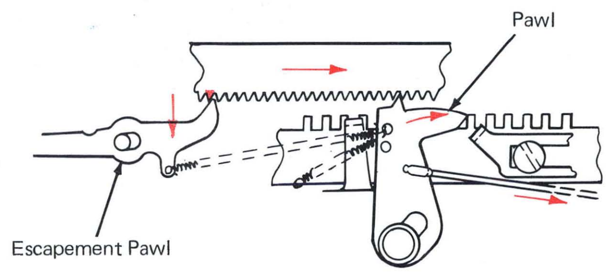


Figure 5 – BS Pawl Pulls Carriage To Right (Bottom View)

4. Just after the escapement pawl dorps into the next tooth, the backspace pawl contacts the backspace pawl stop. The cam rotation continues, momentarily catching the backspace pawl between the pawl stop and the excapement rack to prevent further carriage movement. All parts return to rest position after the cam restores (Figure 6).

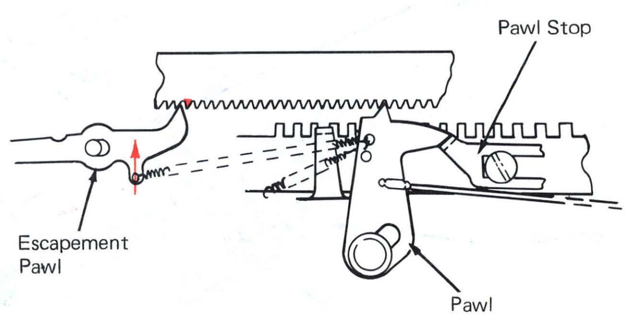


Figure 6 – Backspace Pawl Against Stop (Bottom View)

BACKSPACE INTERLOCK OPERATING SEQUENCE

1. During the carriage return, tabulation and hand carriage release, the escapement pawl release lever causes the interlock to pivot and prevents the backspace pawl from sliding into the elongated mounting hole (Figure 7).

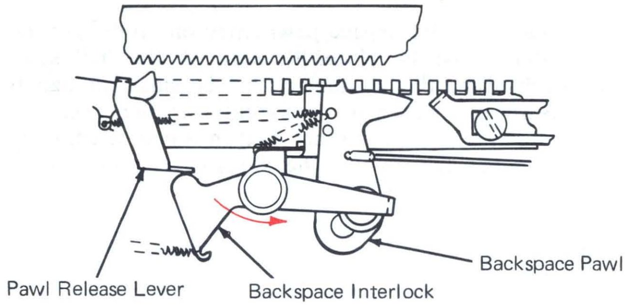


Figure 7 – Pawl Release Lever – Interlock Activated (Bottom View)

2. The backspace pawl pivots without engaging the escapement rack and bypasses the backspace pawl stop (Figure 8).

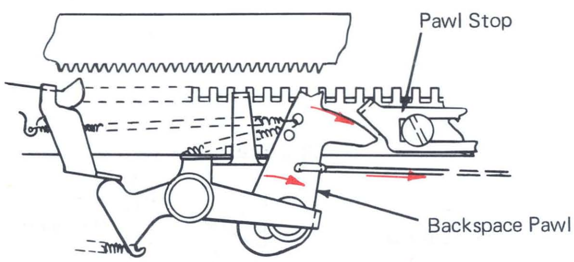


Figure 8 – Backspace Pawl (Not Engaged In Rack) (Bottom View)

3. During a backspace operation, the backspace pawl blocks the interlock from pivoting and prevents pawl release lever operation for an attempted carriage return, tabulation or hand carriage release (Figure 9).

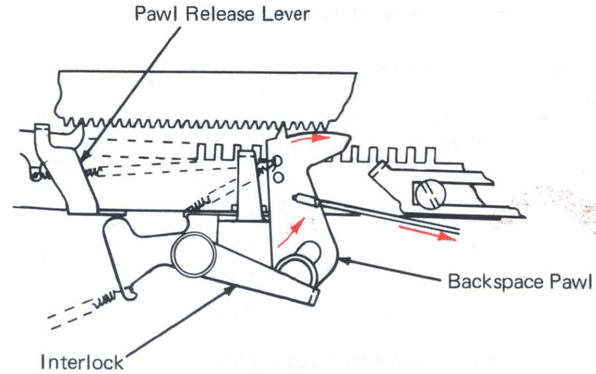
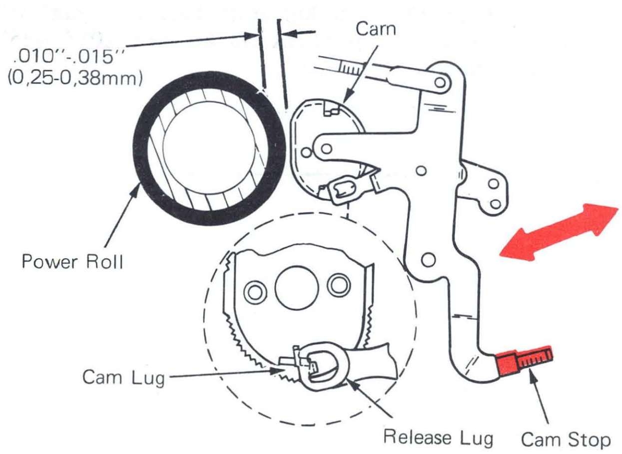


Figure 9 – Backspace Pawl Interlock Activated (Bottom View)

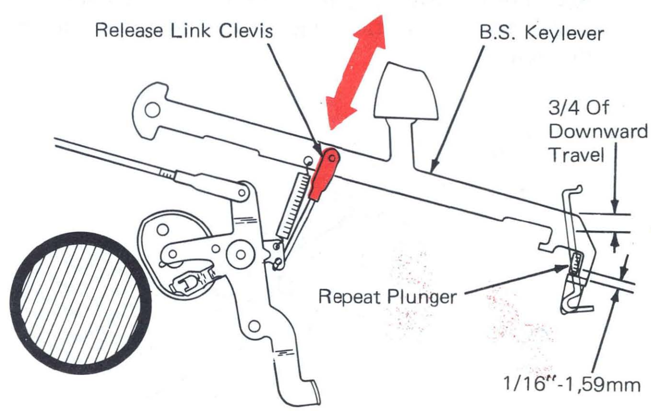
C1-D1 BACKSPACE ADJUSTMENTS

1. *Cam Clearance* – Adjust the cam stop screw for .010-.015" (0,25-0,38mm) cam to power roll clearance. This adjustment can be observed by releasing the cam with the power off. The release lug should rest on the rear half of the cam lug.



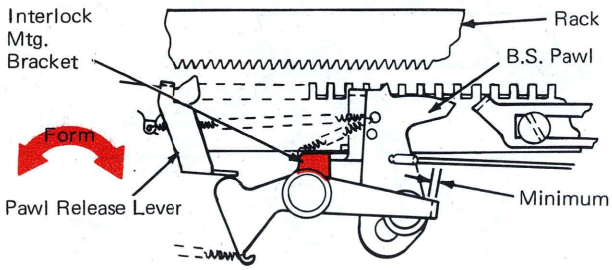
(Left Side View)

2. *Cam Release Link Clevis* – Adjust the release link clevis for cam release when the backspace keylever is depressed three quarters of the downward movement. The cam must repeat with 1/16" (1,59mm) depression of the repeat plunger and must reset when the keylever is released.



(Left Side View)

3. *Backspace Interlock* – The interlock mounting bracket should be formed for minimum clearance between the vertical lug on the interlock and the backspace pawl with the pawl release lever operated. This prevents the backspace pawl from entering the escapement rack when the backspace is operated during escapement pawl release.



(Interlock Operated) (Bottom View)

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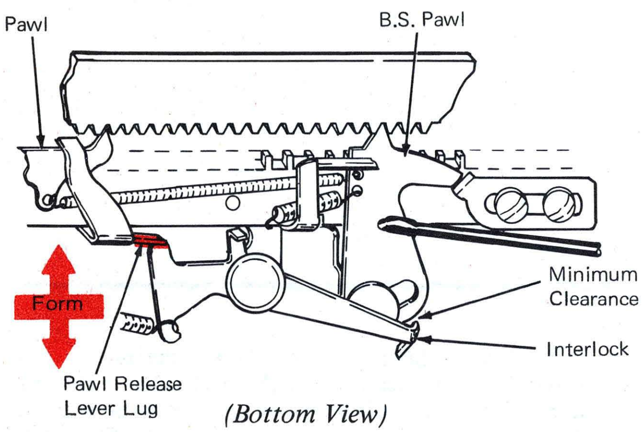
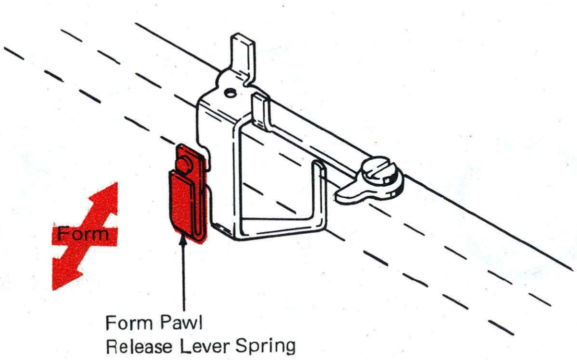
4. *Pawl Release Lever Lug (Level 1)* – With the interlock at rest, form the pawl release lever lug for minimum clearance between the vertical lug on the interlock and the backspace pawl. This will prevent escapement pawl release during a backspace operation.



(Bottom View)

Pawl Release Lever Spring – Level 2 – From the pawl release lever spring so the backspace pawl can move past the vertical lug on the interlock with a minimum clearance.



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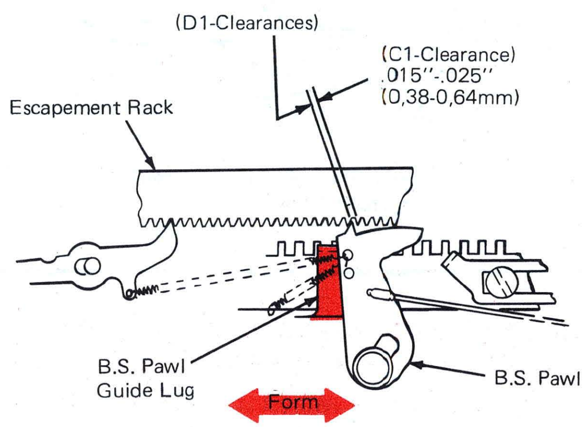
5. *Backspace Pawl Guide Lug* – This adjustment is made by forming the guide lug so the backspace pawl will enter the escapement rack with the proper clearance between the working surface of the backspace pawl and the working surface of the escapement rack tooth.

Model D – Backspace pawl entry on Model D typewriters must be close. Because of the half space mechanism, the clearance must be small enough to ensure the backspace pawl entering the next rack tooth when the half space button is depressed. Form the guide lug to get the adjustment according to pitch.

PITCH	CLEARANCE (D-1)	
6-2/5	.010"-.020"	0,25-0,51mm
8	.010"-.020"	0,25-0,51mm
9	.010"-.020"	0,25-0,51mm
10	.010"-.020"	0,25-0,51mm
11	.008"-.014"	0,20-0,35mm
12	.008"-.014"	0,20-0,35mm
14	.008"-.012"	0,20-0,30mm



(Bottom View)

C-1 – Form the guide lug so the backspace pawl will enter the escapement rack with .015-.025" (0,38-0,64mm) clearance.

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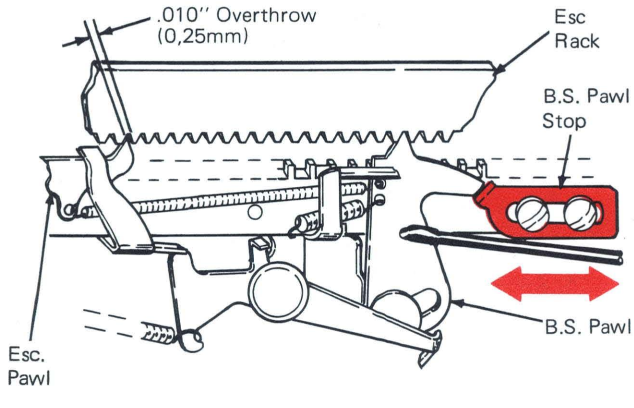
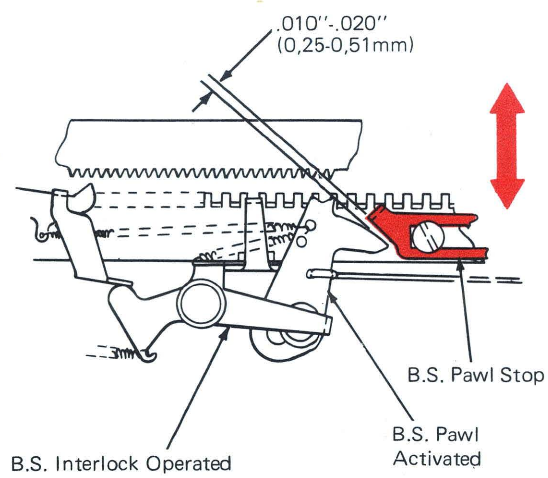
6. *Backspace Pawl Stop* – The backspace pawl stop must be adjusted to satisfy two (2) conditions.

   a. Adjust the pawl stop left to right so the B/S pawl contacts the stop after the escapement pawl has overthrown the next escapement rack tooth by .010" (0,25mm). To make this adjustment, loosen the pawl stop and move to the right and retighten. Slowly hand cycle the backspace operation by using the power roll pulley with power off. When the escapement pawl drops into the next tooth with .010" (0,25mm) overthrow, hold the power roll pulley in place. Loosen the screw holding the pawl stop and move the stop against the backspace pawl and tighten the screws.



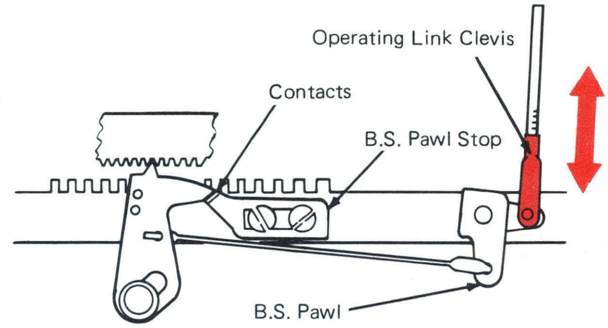
(Bottom View)

   b. Adjust the pawl stop front-to-rear so when the backspace interlock is operated and the backspace pawl is activated, the backspace pawl will clear the stop by .010-.020" (0,25-0,51mm).

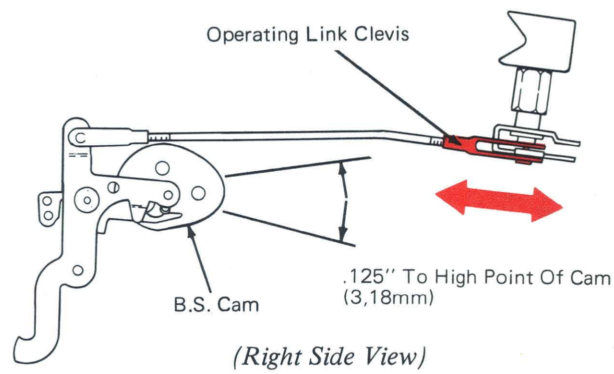


(Bottom View)

7. *Operating Link Clevis* – Adjust the operating link clevis for approximately 1/8 remaining movement of the cam before it reaches the high point after the backspace pawl contacts the stop.



(Bottom View)



(Right Side View)

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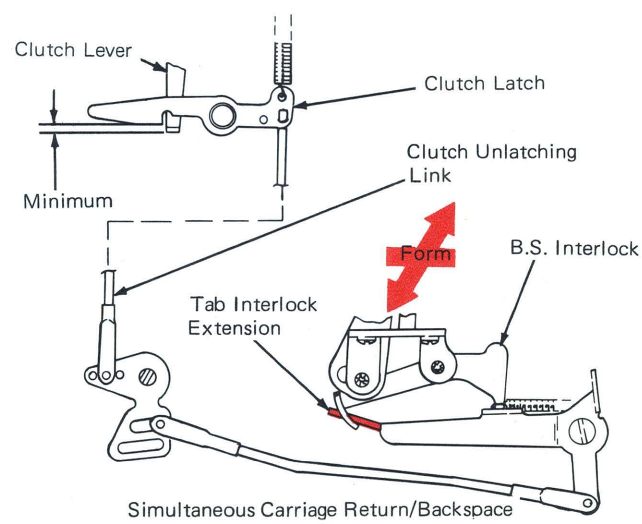
8. *Carriage Return Tab Interlock Extension* – Form the interlock extension toward the backspace interlock to prevent clutch latching when carriage return and backspace are operated together.

NOTE: Carriage return tab interlock and clutch unlatching link adjustments must be correct before performing this adjustment.



(Top View)

C4-D4 BACKSPACE OPERATIONAL THEORY

The C4-D4 typewriters use two types of backspace mechanisms: pawl system and rotary system. Both move the carriage one unit to the right for each backspace operation. The one unit system (per operation) is used on C4-D4 typewriters because of the different units of escapement required for various characters, numerals and symbols. An example is a typed three-unit character. To strike over the three unit character, the one unit system must be activated three times.

1/32 and 1/36 pitch machines use a backspace pawl system (Figure 1). The backspace pawl system, mounted to the rear rail, engages the excapement rack to move the carriage to the right.

Depressing the keylever in the normal movement releases the cam assembly against the power roll. The continuous rotation of the power roll rotates the cam to the high point, pivoting it away from the cam stop and pulling on the operating link. This motion is transmitted through the backspace bellcrank to two areas:

1. It pulls on the backspace pawl link which pulls the backspace pawls. This causes the backspace pawls to pivot and engage the rack which pulls the carriage one space to the right. The pawls then contact the pawl stop to limit the movement of the carriage to one unit.
2. The aligning link is also pulled and rotates the aligning lever on the escapement pawl block. This aligns the escapement pawls for re-entry into the escapement rack.

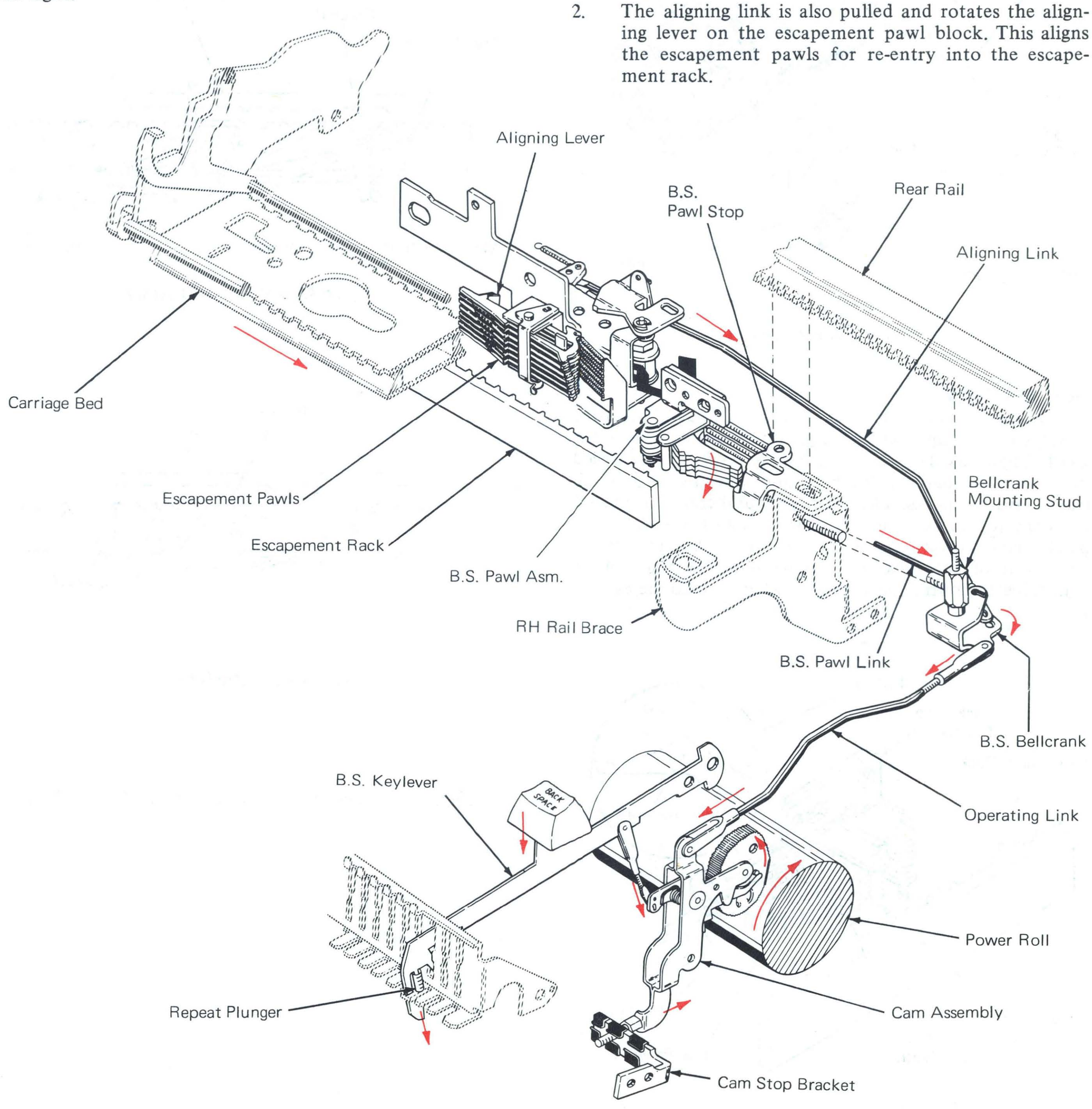


Figure 1 – Backspace Mechanism (Pawl System C4-D4)

REPEAT OPERATION

Further depression of the keylever (Figure 2) depresses the repeat plunger and spring. This moves the cam release arm out of the path of the cam stop lug allowing the cam to rotate continuously. This provides repeated backspace operation until the keylever is released. Releasing the keylever allows the cam release arm to restore to the rest position. The cam is then allowed to come to rest against the stop.

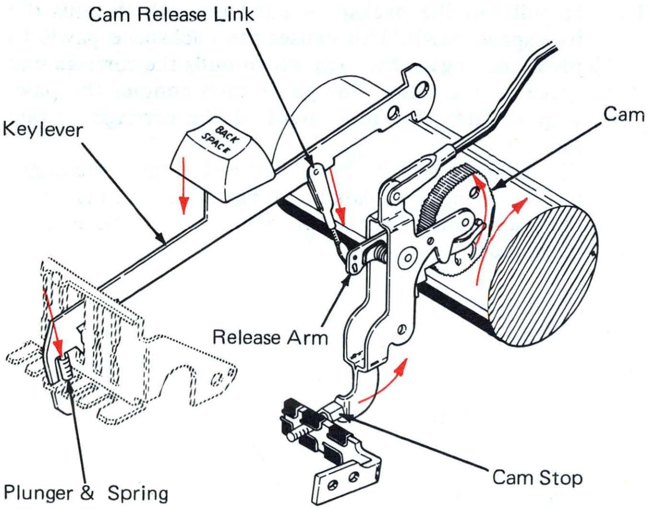


Figure 2 – Repeat Operation

PAWL ASSEMBLY

The backspace pawl bracket consists of four backspace pawls, each having a left and right tooth spaced four units apart (Figure 3). 1/32 pitch backspace pawls are identified by a stamp or mark on the bottom of the pawl. 1/36 pitch pawls have no marks. The pawls are numbered 1 through 4 from the top to bottom. The pawls are spring loaded by 4 pawl springs toward the escapement rack, but at rest are held clear of the rack by a guide pin. The guide pin is adjustable to control backspace pawl entry into the escapement rack.

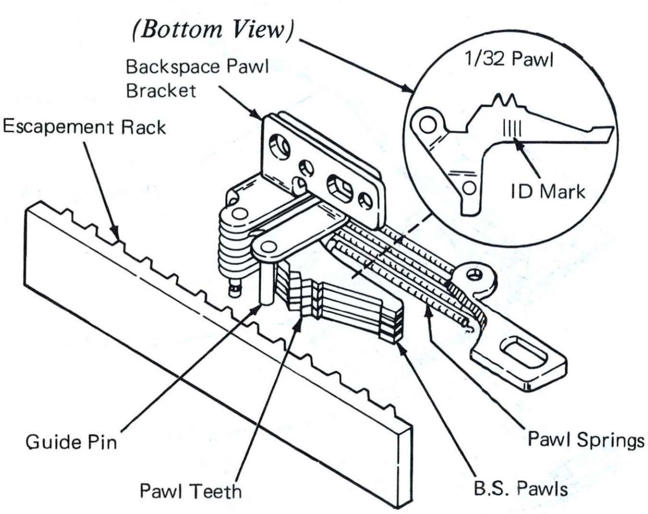
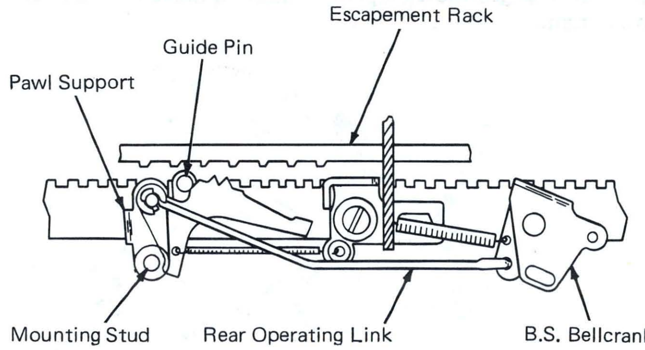


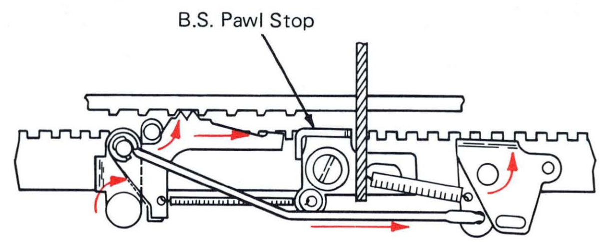
Figure 3 – Backspace Pawls

PAWL OPERATION

The backspace pawl mechanism is operated by a link from the backspace bellcrank to a stud on the pawl support (Figure 4). The pawl support pivots on the mounting stud, carrying the backspace pawls to the right. The movement of the pawls is controlled by the guide pin. All four pawls slide into the escapement rack and one of the pawl teeth, depending on which escapement pawl is holding, engages a rack tooth. As the pawls continue to move, the carriage is pulled one unit to the right. Just as the next holding excapement pawl drops into the rack tooth, the backspace pawl movement is stopped by the backspace pawl stop.



(Backspace Pawls At Rest)

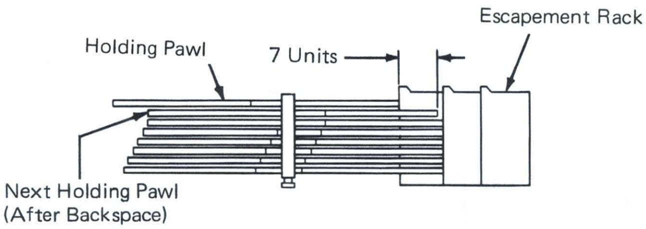


(Backspace Pawls Operated)

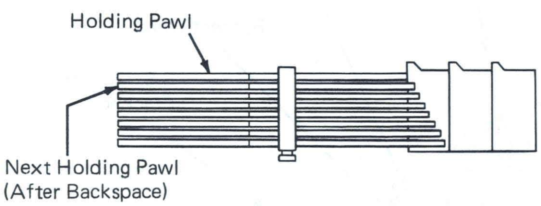
Figure 4 – Backspace Pawl Operation (Bottom View)

ESCAPEMENT PAWL ALIGNMENT

During a backspace operation, the holding excapement pawl changes in reverse sequence to that of escapement. (Number 6 to number 5, number 5 to number 4, etc.) The tip of the next escapement pawl is always seven units to the right of the holding pawl. The escapement pawls are aligned (pulled to the left) so only one unit of carriage motion is necessary (Figure 5) for a backspace operation.



(No. 8 Pawl Holding – Normal Position)



(No. 8 Pawl Holding – Pawls Aligned)

Figure 5 – Holding Escapement Pawl (Front View)

An aligning link from the backspace bellcrank to the aligning lever on the excapement pawl block is used to align the pawls (Figure 6). Motion to operate the aligning link comes from the backspace bellcrank. The aligning lever rotates about the mounting pin in the pawl block. The vertical lug on the aligning lever pulls the escapement pawls to the left into their fully aligned position. Escapement pawl alignment occurs at the same time as the movement of the backspace pawls.

INTERLOCK

A backspace interlock (Figure 7) is provided on the backspace mechanism to prevent the backspace pawls from entering the escapement rack during any pawl release operation (carriage return, tab or hand carriage release). The backspace interlock is attached to the pawl release and grouping lever on the escapement pawl block. As the pawl release and grouping lever rotates during escapement pawl release, the interlock is placed in position to block the backspace pawls. If the backspace is operated while the interlock is active, the pawl support will rotate, but the interlock prevents the backspace pawls from entering the escapement rack.

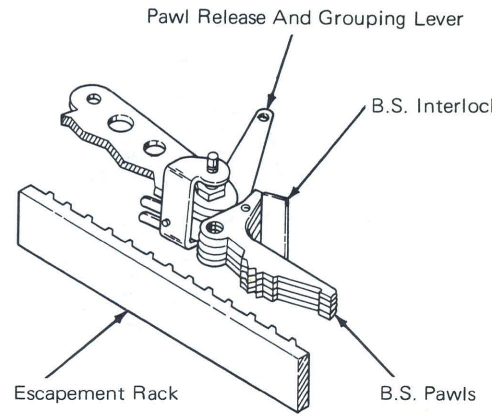


Figure 7 – Backspace Interlock (Level 2)

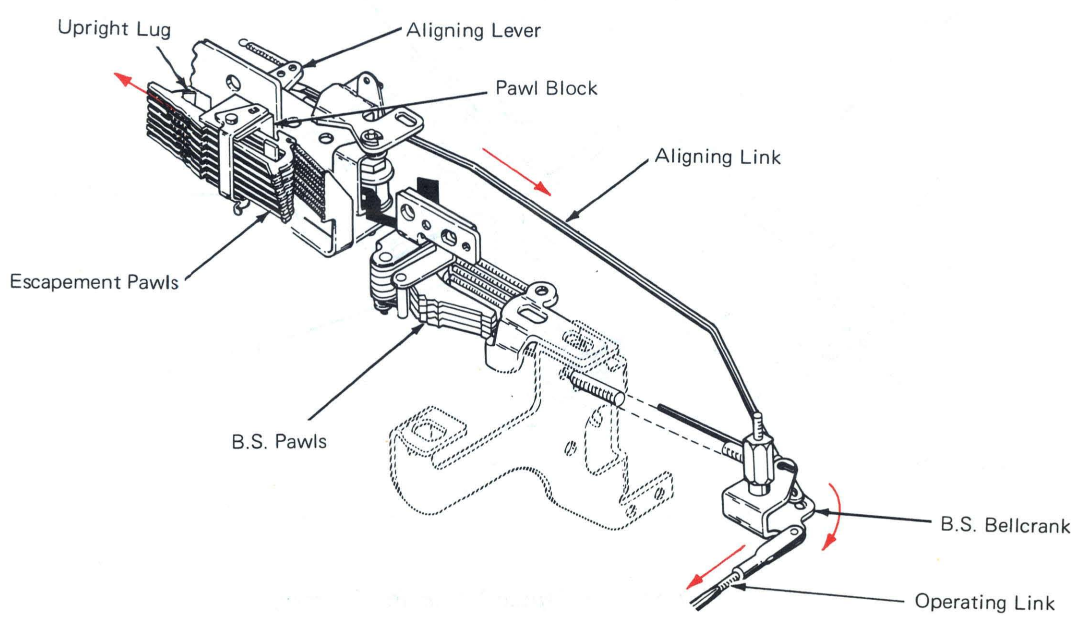


Figure 6 – Pawl Alignment Operation

ROTARY BACKSPACE
A rotary backspace mechanism (Figure 8) is used on the 1/45 pitch C4-D4 typewriters because of the small size of the units. This mechanism uses a pinion gear and a backspace rack in place of the backspace pawl assembly. The rotary backspace does not use the escapement rack for backspace but has a separate backspace rack mounted on the bottom of the carriage. The pinion gear and the ratchet wheel are mounted ona shaft supported by the backspace mounting bracket which is mounted to the rear rail.

Motion is supplied to the ratchet by the same method used in the pawl system from the backspace cam to the pinion gear through the operating link and backspace bellcrank.

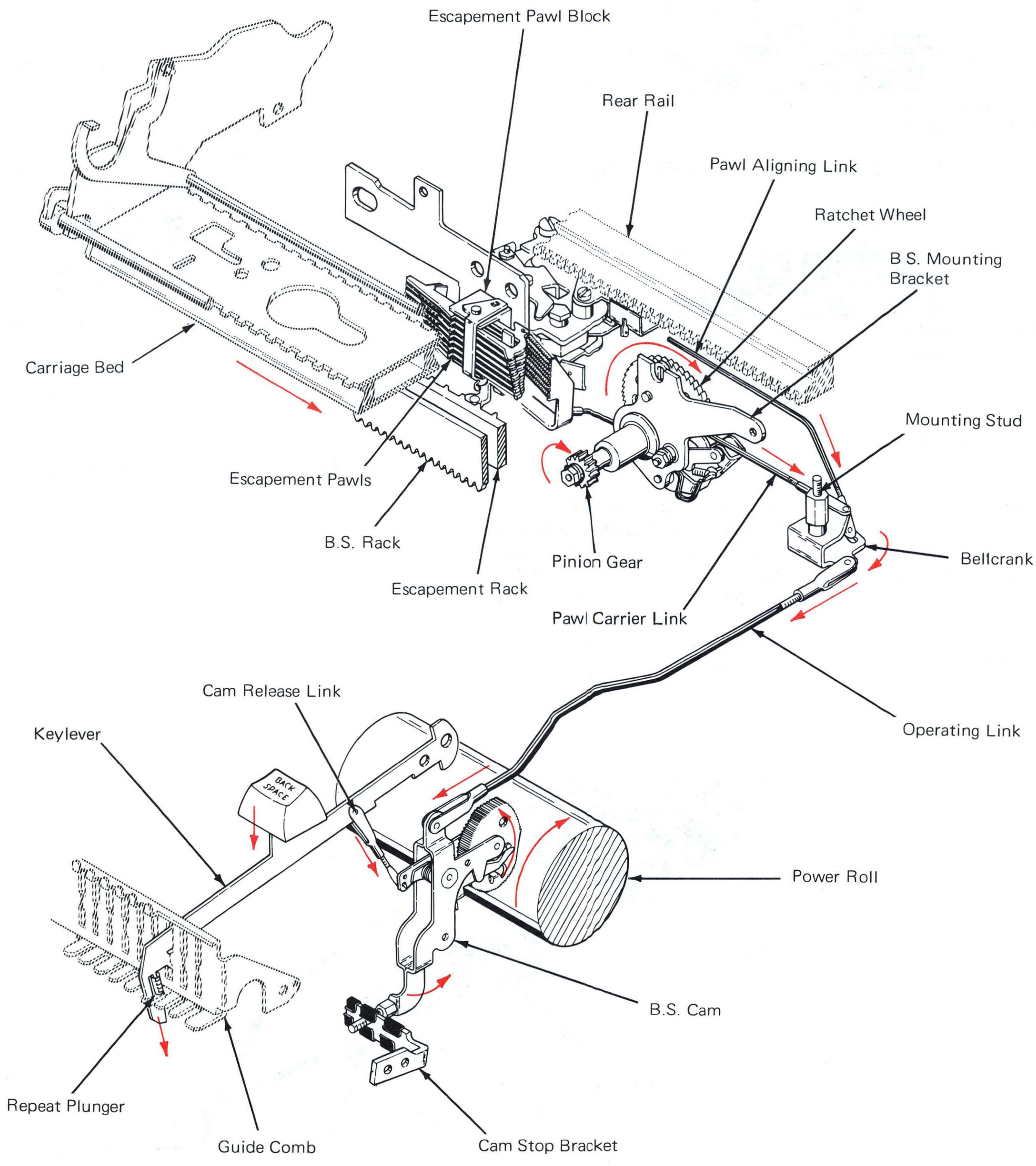


Figure 8 – Backspace Mechanism (Rotary)

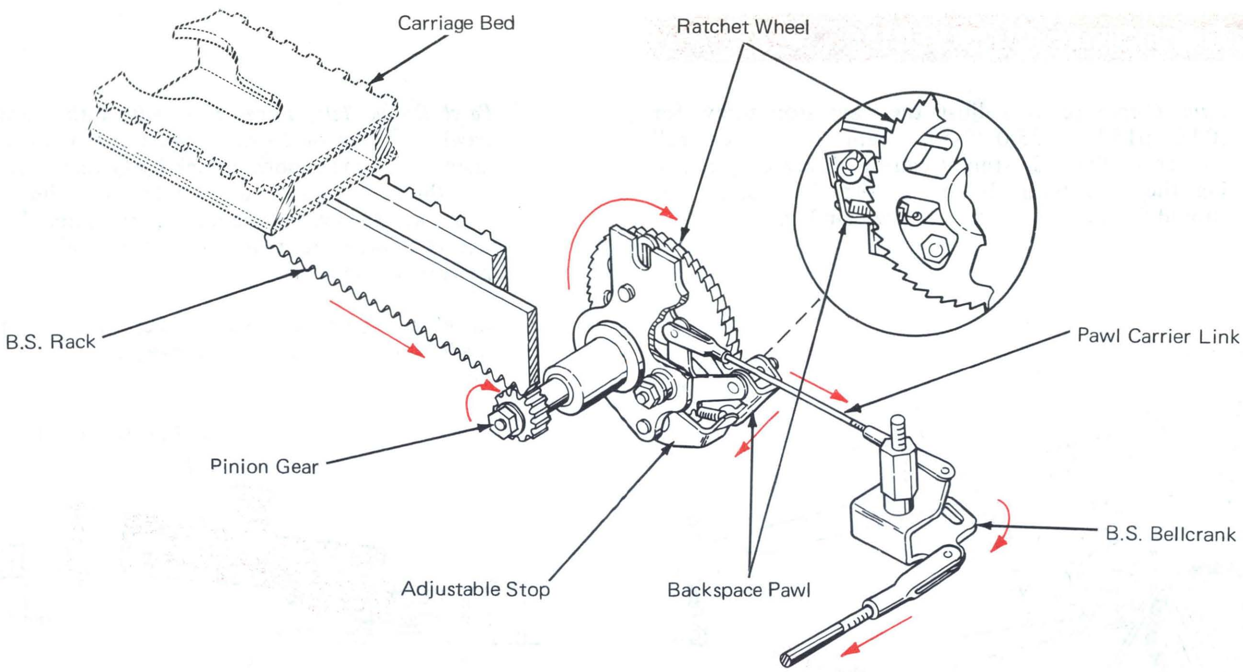


Figure 9 – Rotary Backspace Operation

RATCHET AND PAWL OPERATION

Motion from the backspace bellcrank (Figure 9) pulls on the pawl carrier link and supplies the motion to engage the backspace pawl into the ratchet wheel and rotate it one tooth. The backspace pawl contacts an adjustable pawl stop that stops the pawl after one unit of escapement. Any rotation of the ratchet drives the pinion gear which in turn moves the backspace rack attached to the carriage to the right one unit. The escapement pawl alignment is the same on rotary backspace machines as it is on the pawl system machines.

A backspace interlock link (Figure 10) prevents a backspace operation during any escapement pawl release operation (carriage return, tab or hand carriage release). The interlock is a link connected to the intermediate grouping lever. During escapement pawl release, the intermediate grouping lever rotates and pushes the interlink link, which in turn, pushes and holds the backspace pawl away from the ratchet wheel. If the backspace mechanism is operated during pawl release, the pawl will move the normal amount but will not engage the ratched wheel.

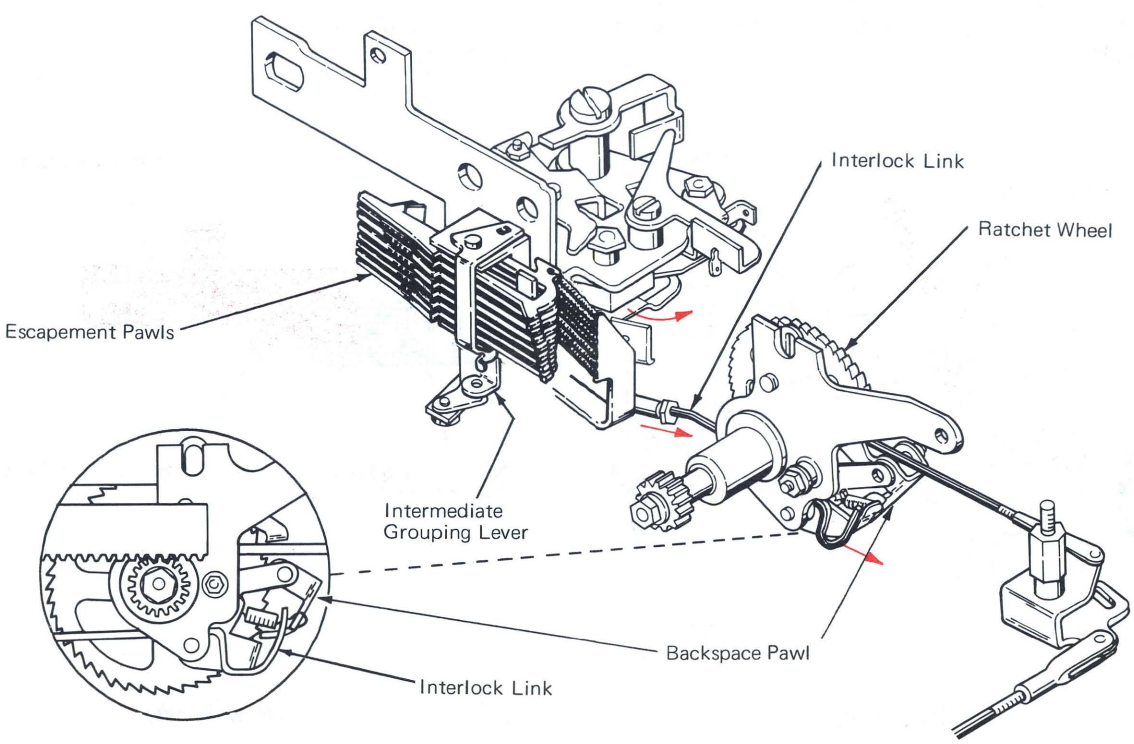
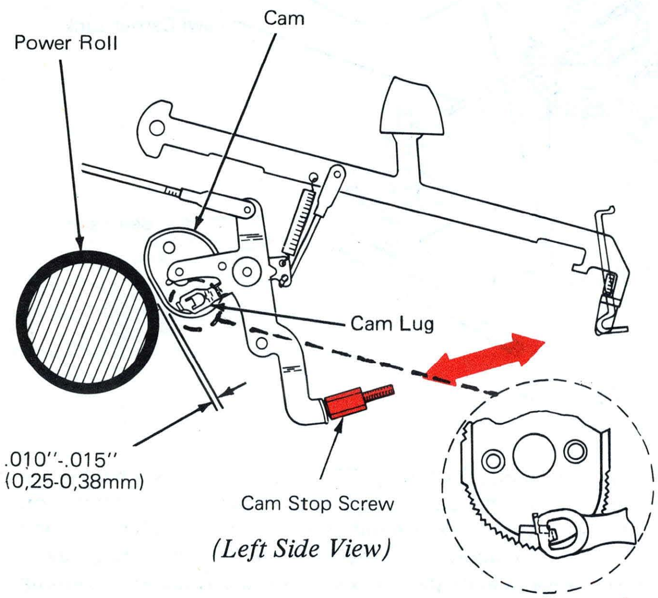


Figure 10 – Rotary Backspace Interlock

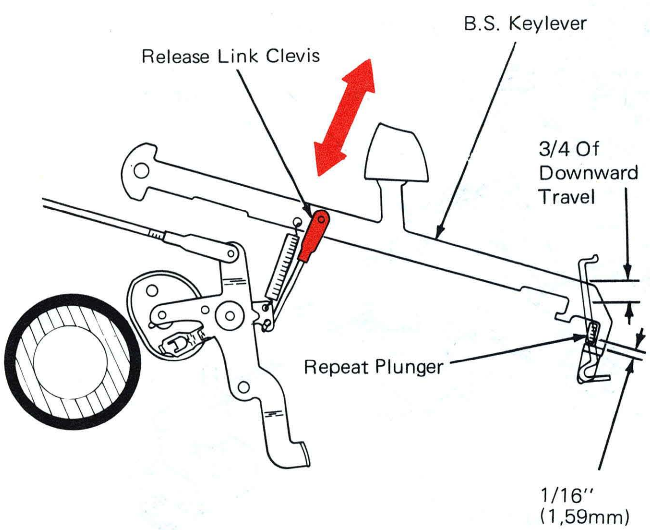
C4-D4 BACKSPACE ADJUSTMENTS

1. *Cam Clearance* – Adjust the cam stop screw for .010-.015" (0,25-0,38mm) cam to power roll clearance. This adjustment can be observed by releasing the cam with the power off. The release lug should fall on the rear half of the cam lug.



(Left Side View)

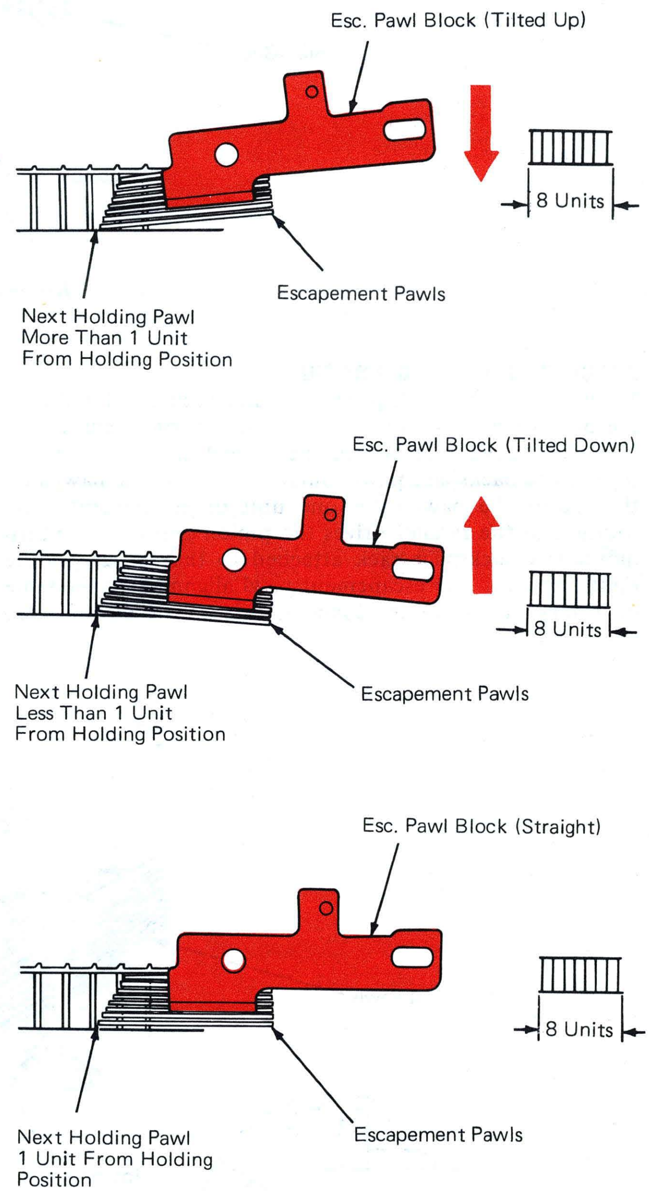
2. *Cam Release Link Clevis* – Adjust the release link clevis for cam release when the backspace keylever is depressed three quarters of its downward movement. The cam should repeat with 1/16" (1,59mm) depression of the repeat plunger and must reset when the keylever is released.



(Left Side View)

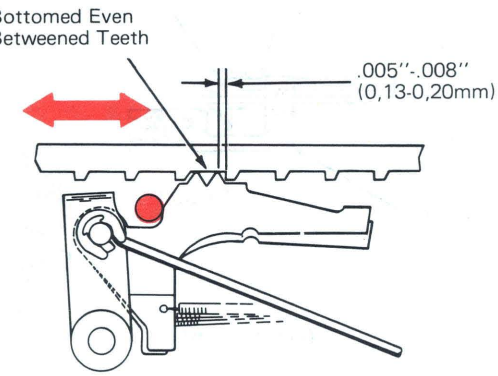
3. *Pawl Block Tilt, Level 1* – Adjust the escapement pawl block up or down so the escapement pawls are aligned to a rack tooth. Check by typing a series of I's and then type a second series between the first. This will place the letters one unit apart. Adjust by loosening the left-hand mounting screw and moving the pawl block up or down.

Level 2 – Same as level I except the adjustment is made with an eccentric to move the pawl block up or down.

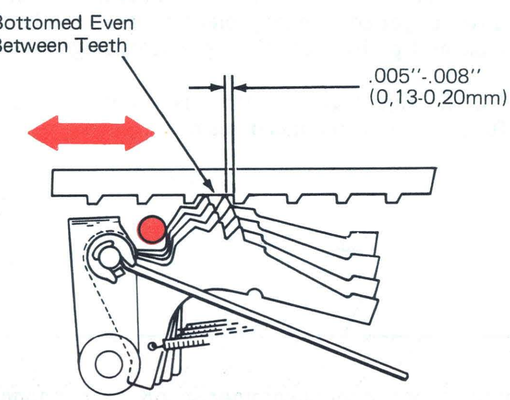


(Rear Views)

4. *Backspace Guide Pin Bracket* – With the carriage holding on the No. 5 pawl for 1/32 pitch (7 on 1/36 pitch), adjust the guide pin bracket so the number 4 backspace pawl enters the escapement rack between two teeth with .005-.008" (0,13-0,20mm) clearance between the working surfaces of the pawl and rack tooth. With the carriage holding on the number 8 pawl for 1/32 pitch (2 for 1/36), the number 1 backspace pawl should enter the escapement rack in the same way as the number 4 backspace pawl. If it does not, the guide pin bracket is tilted or bent.



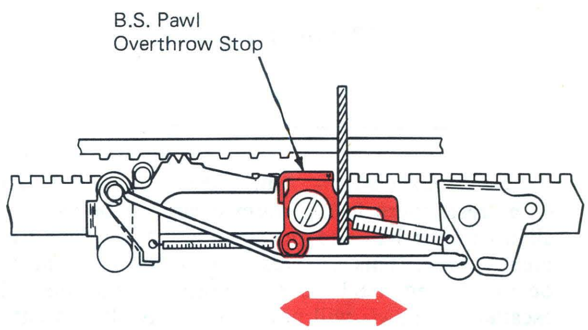
No. 5 or 6 Escapement Pawl Holding (1/32P)
No. 7 or 8 Escapement Pawl Holding (1/36P)



No. 8 or 1 Escapement Pawl Holding (1/32P)
No. 2 or 3 Escapement Pawl Holding (1/36P)

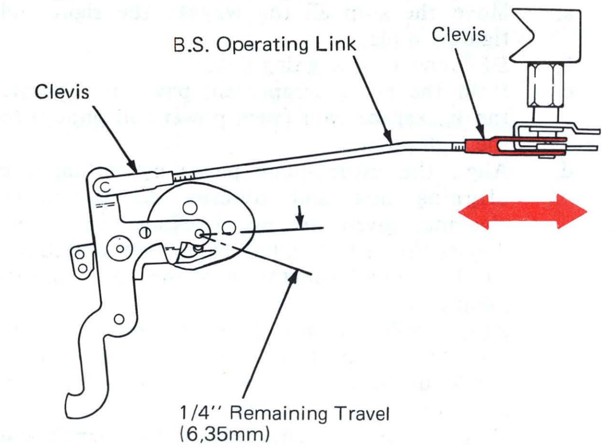
(Bottom View)

5. *Backspace Pawl Stop* – Adjust the stop so any backspace pawl is allowed to move the carriage one unit plus .005-.010 (0,13-0,25mm) as the pawls contact the stop. This can be done as follows:
   a. Move the stop all the way to the right and tighten in place.
   b. Disconnect the aligning link.
   c. Hold the no. 2 escapement pawl and operate the backspace cam (turn power roll pulley) to the high point.
   d. Align the escapement pawls by pulling the aligning link and observe the overthrow clearance given the no. 1 escapement pawl. Adjust the operating link to provide .020-.030" (0,51-0,76mm) overthrow of the no. 1 escapement pawl.
   e. Again, hold the no. 2 escapement pawl and operate the backspace until the backspace pawls just enter the rack; then loosen the stop and move it against the pawls.
   f. Hold the escapement pawls fully aligned and operate the backspace until the escapement rack tooth overthrows the no. 1 escapement pawl by .005-.010" (0,13-0,25mm) and tighten the overthrow stop.

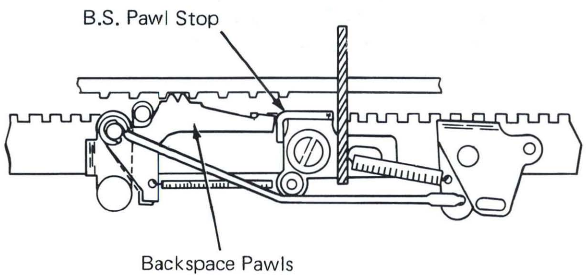


(Bottom View)

6. *Operating Link Clevis* – Adjust the operating link clevis so the backspace cam will have 1/4" remaining rotation before the high point just as the backspace pawls contact the stop.



(Right Side View)



(Bottom View)

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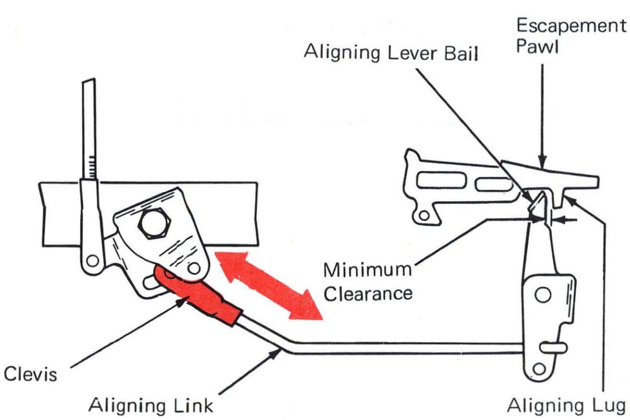
7. *Aligning Link Clevis* – Adjust the aligning link clevis so at rest, there is minimum clearance between the aligning lever bail and the aligning lugs on the escapement pawls. This ensures that full alignment will occur during backspace operation and that the escapement pawls will not be partially aligned during normal escapement operation. This adjustment can be observed by operating the aligning link manually and noting the aligning lever movement before the escapement pawls start to move.



(Top Rear View)

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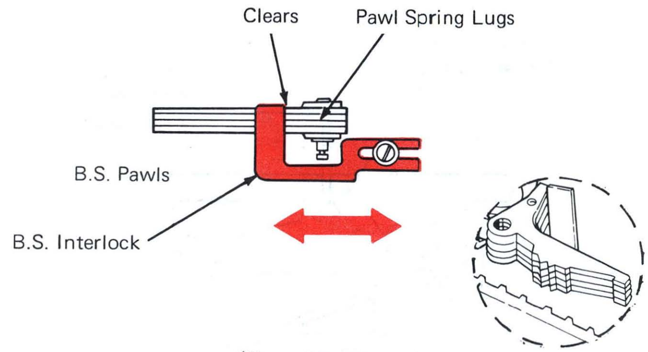
8. *Backspace Interlock* – Adjust the backspace interlock so it will safely clear the right side of the backspace pawl spring lugs and keep the backspace pawls out of the escapement rack during any grouping operation.

NOTE: A final check for reliable backspace should be made by typing "I" and "backspace" repeatedly for the entire length of the carriage.



(Rear View)

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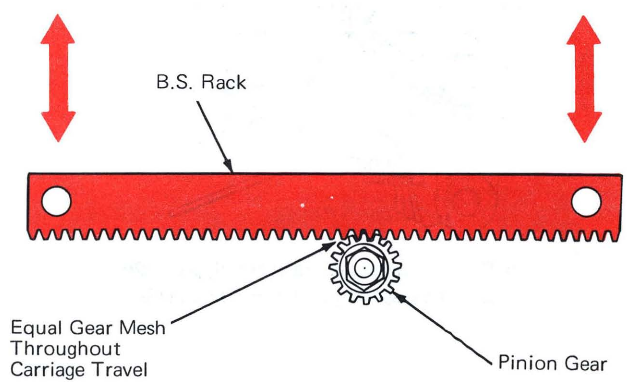
9. *Backspace Rack* – Adjust the backspace rack up or down to get equal engagement between the backspace rack and pinion gear throughout carriage movement.

NOTE: Equal gear contact is a critical area in the functioning of the mechanism.



(Front View)

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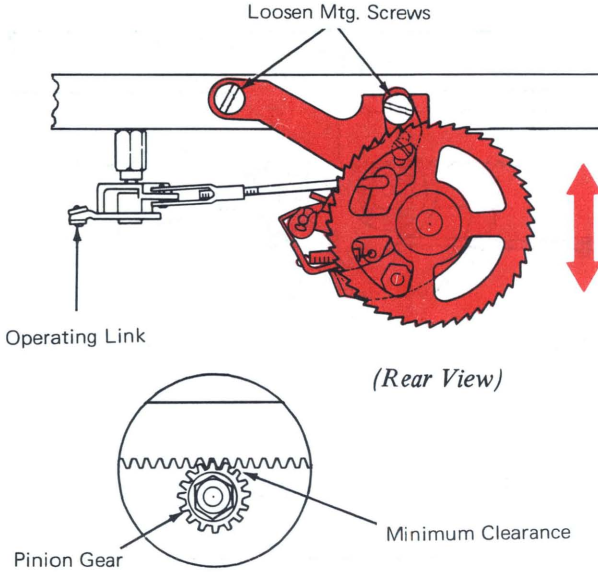
10. *Backspace Pinion Gear (Two Conditions)* –

a. Disconnect the operating link and loosen the two upper stop mounting screws. Adjust the rotary backspace assembly up or down until the pinion gear has minimum backlash with the B/S rack and will still allow free movement of the carriage without binds or tight spots for the full length of carriage.



(Rear View)

(Front View)

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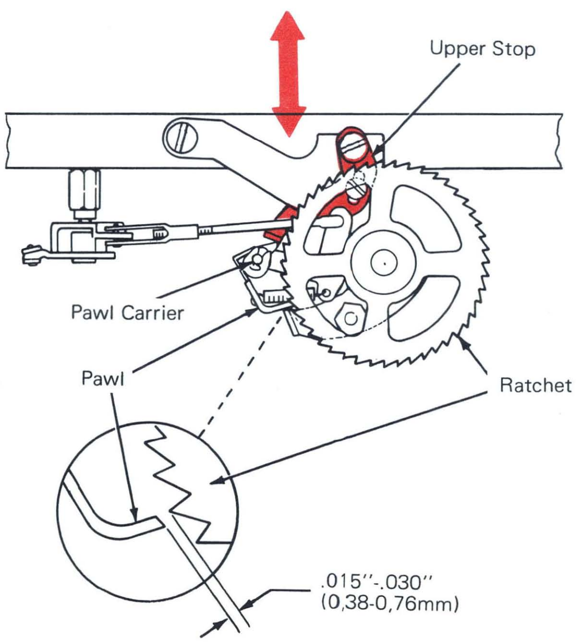
b. Position the upper stop so the pawl carrier will have a rest position which gives .015-.030" (0,38-0,76mm) clearance between the pawl and the ratchet wheel.



(Rear View)

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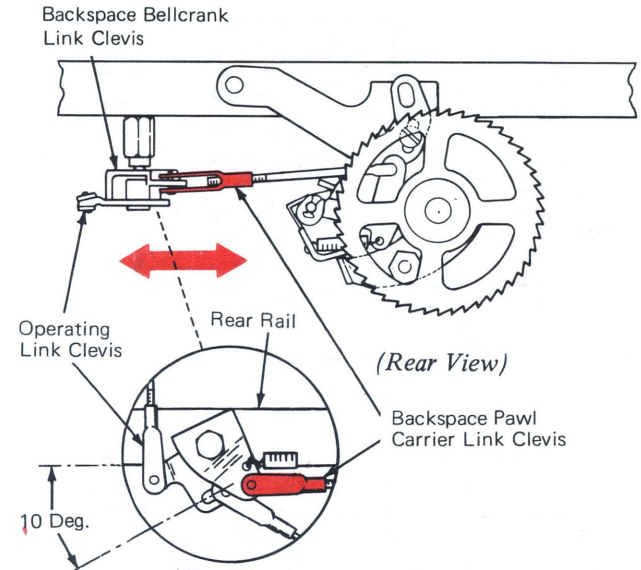
11. *Backspace Pawl Carrier Link Clevis* – With the operating link still disconnected, adjust the backspace pawl carrier link clevis so the slot in the backspace bellcrank will be at an approximate 10 degree angle with the rear rail.



(Rear View)

(Top View)

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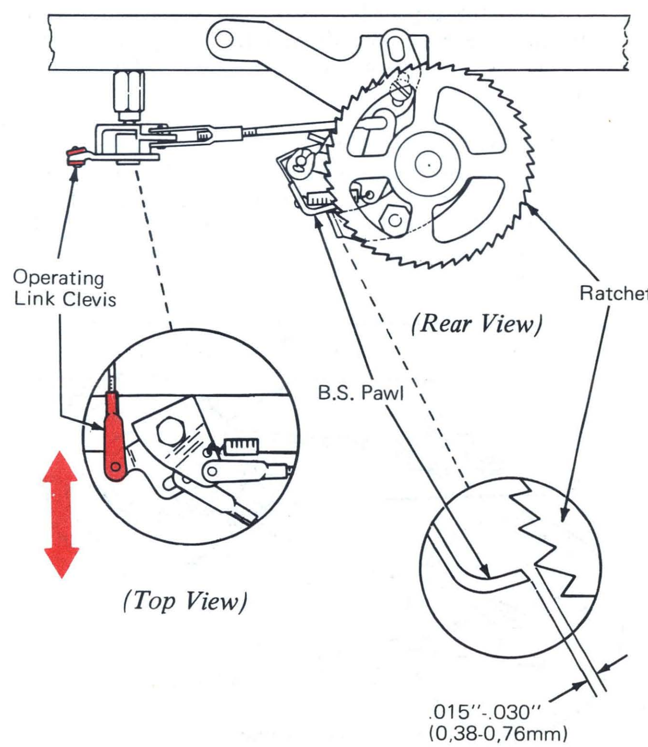
12. *Operating Link Clevis* – Adjust the operating link clevis to provide .015-.030" (0,38-0,76mm) clearance between the backspace pawl and the ratchet teeth with the mechanism at rest.



(Rear View)

(Top View)

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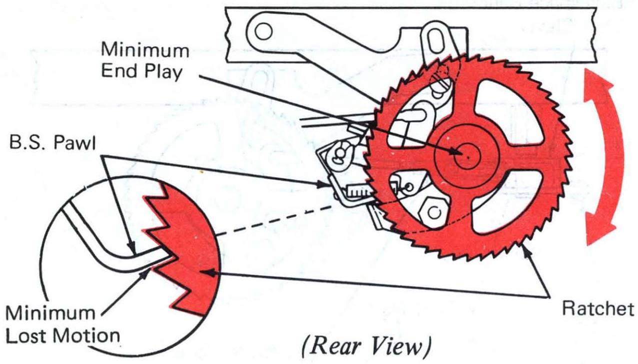
13. *Backspace Ratchet* – Rotate the ratchet on the shaft so the working surface of the pawl will enter the ratchet and pick up a tooth with a minimum of lost motion. Maintain minimum end play.



(Rear View)

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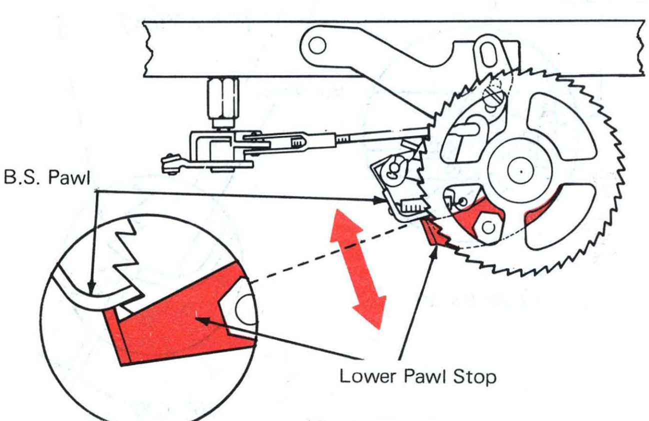
14. *Lower Pawl Stop* – Adjust the lower pawl stop so the backspace pawl contacts the stop just as a fully aligned escapement pawl drops over a rack tooth. This may be done in the following way:
    a. Loosen the lower stop and move all the way down.
    b. Disconnect the aligning link and fully align the escapement pawls by pulling on the link.
    c. Manually operate the backspace until an escapement pawl drops over a rack tooth with minimum overthrow.
    d. Move the lower stop up against the backspace pawl and tighten in place.

NOTE: To check for reliable operation on all escapement pawls, hold the pawls fully aligned and operate the backspace several times. If a backspace failure occurs at the top or bottom of the pawl block, check the aligning lever. The aligning lever may be formed, if necessary, to align the bail parallel to the holding pin.

NOTE: After the lower stop adjustment, the amount of rotation of the cam before the high point as the pawl contacts the stop should be checked. There should be 1/4 to 1/8 rotation remaining (as shown in adjustment 6).



(Rear View)

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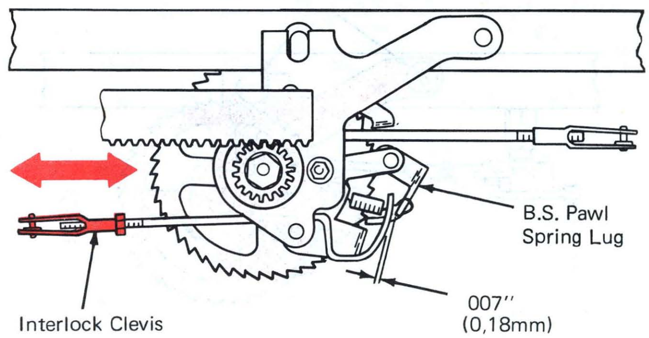
15. *Backspace Interlock Link Clevis* – With the cam on the high point, adjust the interlock link clevis for a clearance of .007" (0,18mm) between the backspace interlock and the backspace pawl spring lug.



(Front View Cam On High Point)

SHIFT OPERATIONAL THEORY

The purpose of the shift mechanism is to raise and lower the type basket to position the upper and lowercase characters on the writing line. On the model D typewriter, the shift mechanism also supplies the motion to rotate the t-bar.

The shift mechanism has two keylevers (Figure 1). The left shift keylever pivots on the keylever fulcrum rod and carries the shift lock mechanism. The right keylever pivots on the keylever fulcrum rod and extends beyond the fulcrum toward the rear of the machine to raise or lower the pusher lever. The underside of each shift keylever has a hook that engages a shift equalizing rod. The equalizing rod pivots in the left and right side frames and causes either keylever to be depressed when the other is depressed. The right keylever carries the cam release link for the shift cam.

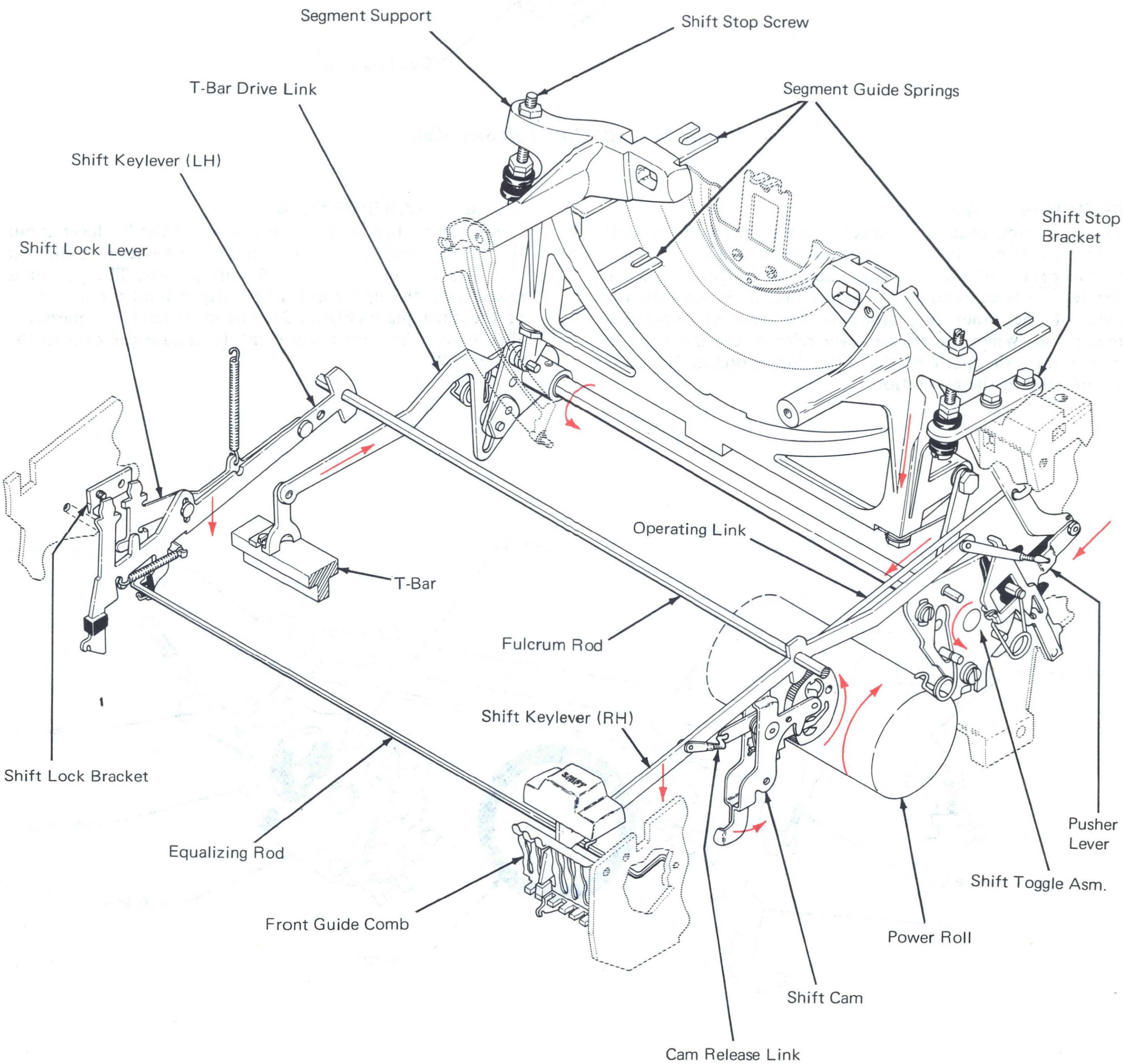


Figure 1 — Shift Mechanism

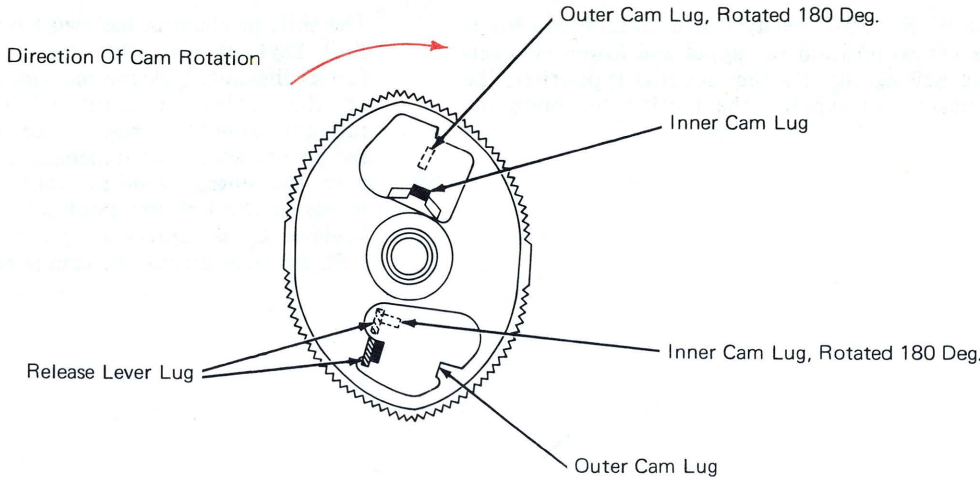


Figure 2 – Shift Cam (Left Side View)

OPERATIONAL CAM

The shift cam, because of special requirements of the shift operation, is double lobed with one of the cam lugs closer to the center of the cam than the other (Figure 2). When the release lever releases the outer lug, it moves into the path of the inner lug, stopping the cam at one-half a revolution. When the release lever releases the inner lug, it moves into the path of the outer lug, stopping it at the completion of the revolution.

KEYLEVER CAM OPERATION

Depressing either shift keybutton pivots the keylever about the fulcrum rod. This motion raises the keylever at the rear and lifts the pusher link and shift pusher. The pusher is raised until the upper arm is directly behind the upper pin of the shift plate (Figure 3). The same keylever operation also lowers the cam release link to release the cam to the power roll.

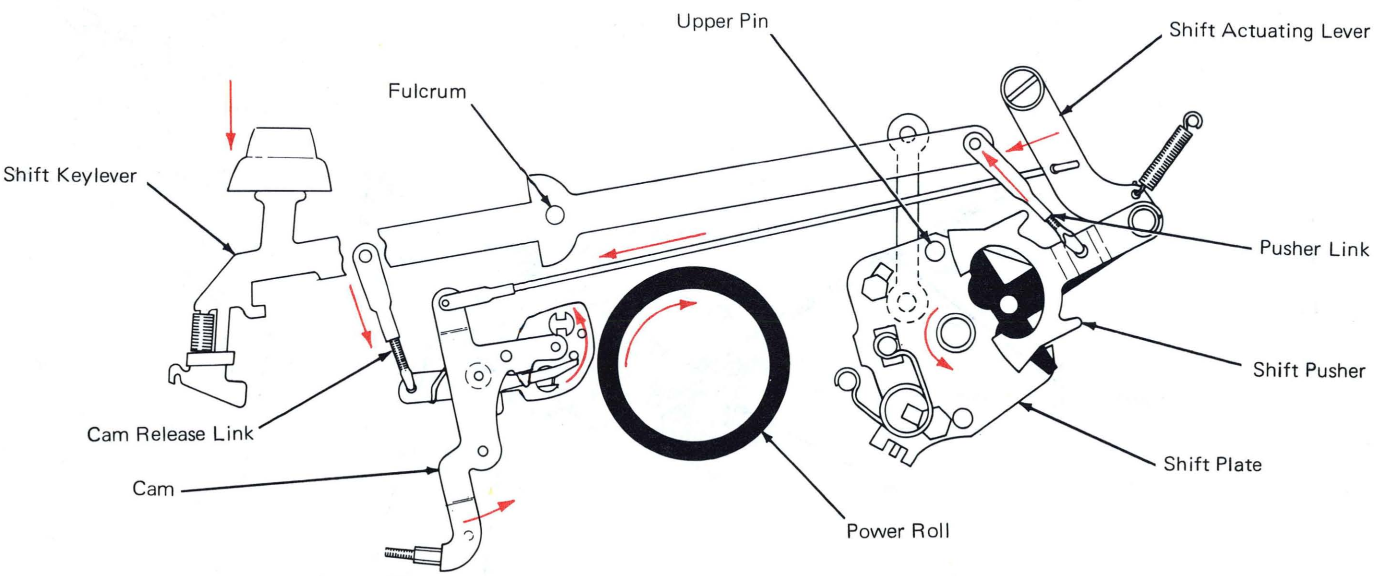


Figure 3 – Shift Actuating (Right Side View)

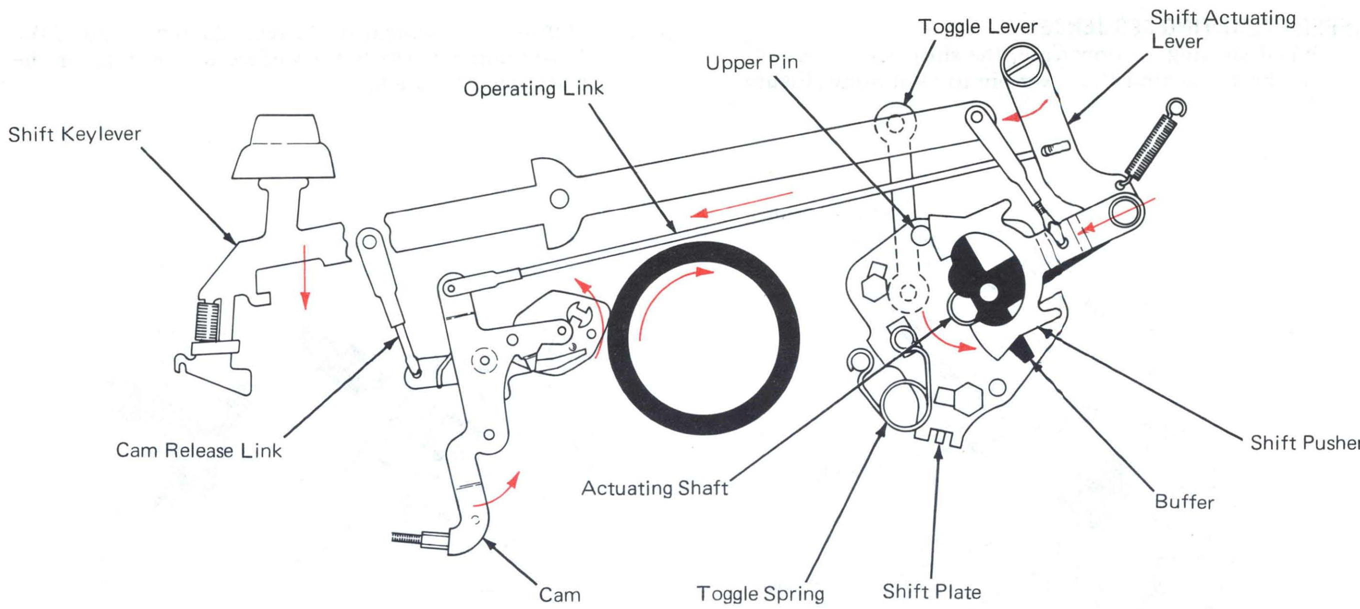


Figure 4 – Shift Actuating (Right Side View)

An operating link from the cam is attached to the shift actuating lever. As the cam rotates, motion is applied to the upper pin by the operating link, the actuating lever and pusher assembly (Figure 4). This rotates the shift plate and toggle levers counterclockwise against the tension of the toggle springs. Rotation of the shift plate and right-hand toggle lever assembly by the pusher causes the actuating shaft and the left-hand toggle assembly to rotate.

When the cam reaches the high point, the pusher action stops. The buffer has moved forward with the pusher but has not done any work yet. The movement of the basket continues the rotation of the toggle and plate assembly and the upper pin leaves the pusher. This rotation carries the toggle springs over center and their spring tension then powers the operation to the completion.

As the shift plate assembly continues to rotate, the lower pin contacts the lower arm of the buffer (Figure 5). Restoration of the buffer to the rear is controlled by the surface of the cam, still engaged with the power roll.

The purpose of the shift buffer is to reduce the noise during a shift operation.

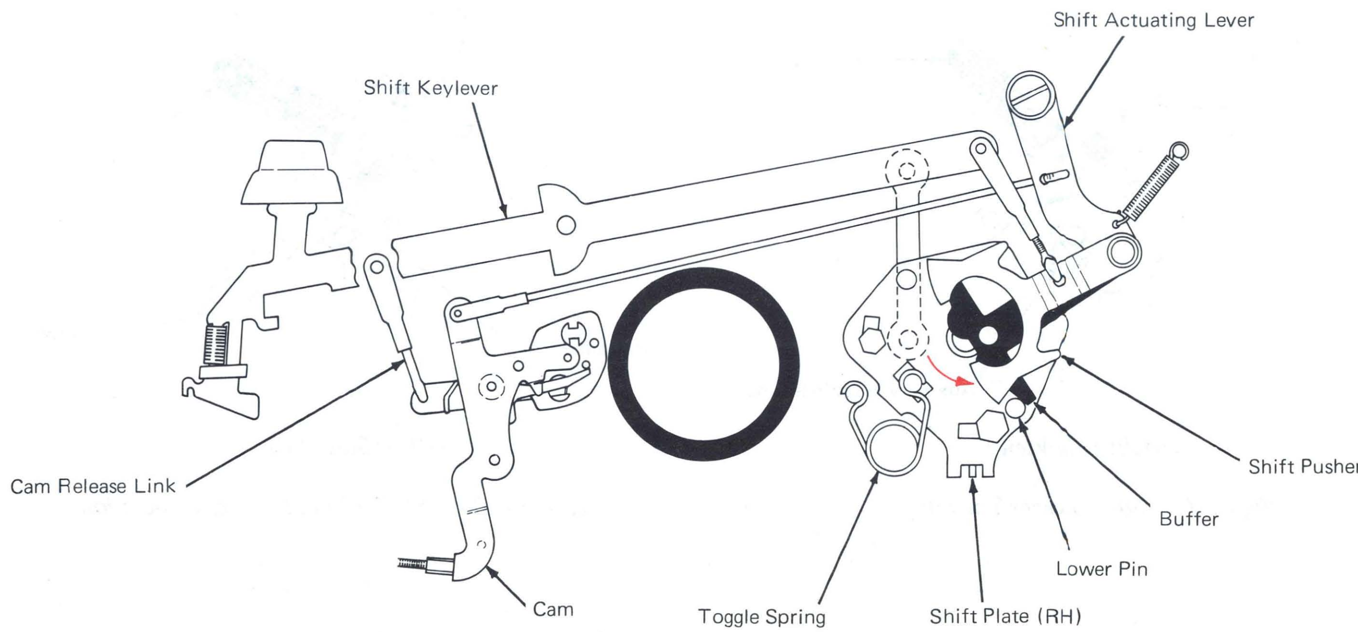
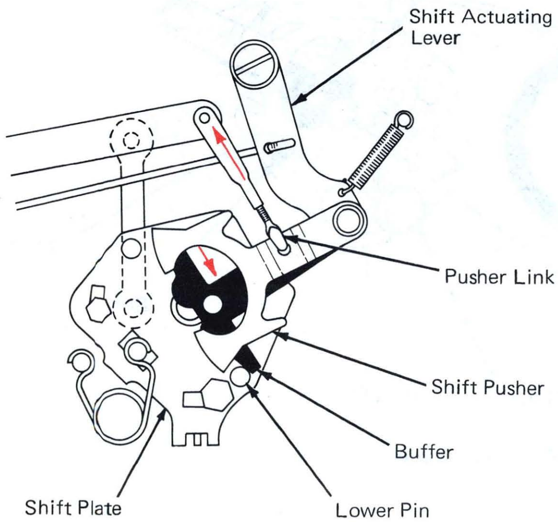


Figure 5 – Shift Actuating (Buffer Engaging Lower Pin – Right Side View)

BUFFER OPERATING SEQUENCE

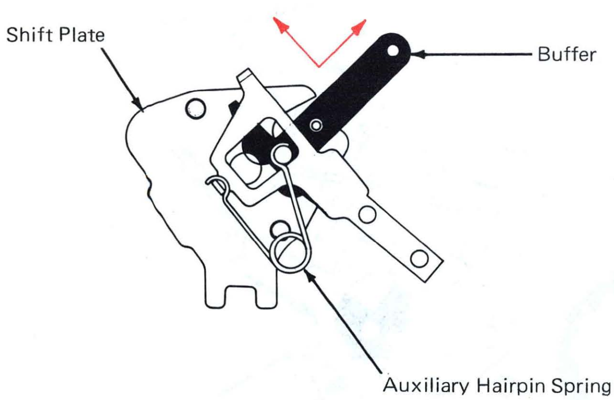
1. When shifting to uppercase, the shift plate positions the buffer behind the lower pin to limit noise (Figure 6).



(Right Side View)

Figure 6 – Buffer Behind Lower Pin

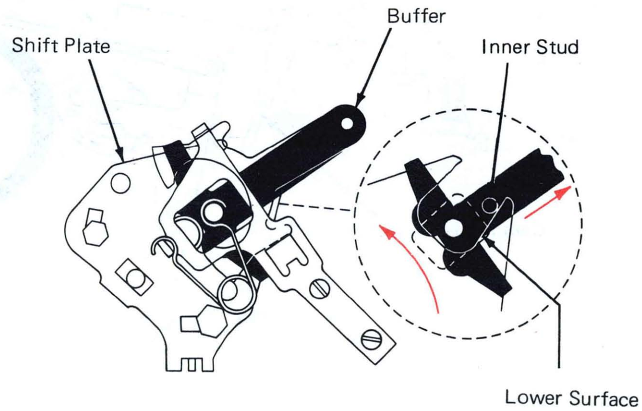
2. After the rotation of the toggle and plate, the buffer leaves the pin (Figure 7).



(Right Side View)

Figure 7 – Buffer Leaves The Pin

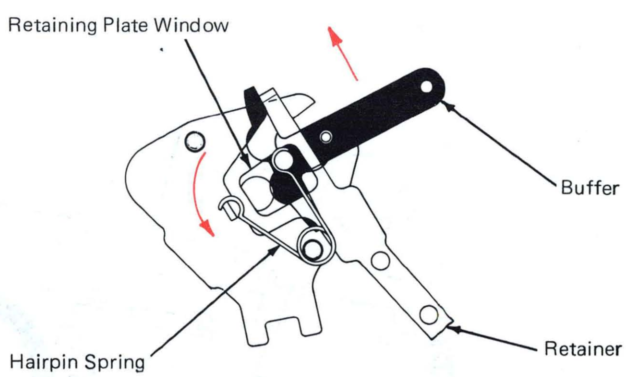
3. During its movement to the rear, the inner stud of the buffer contacts the lower surface of the notch in the shift plate (Figure 8).



(Right Side View)

Figure 8 – Buffer Contacts Shift Plate

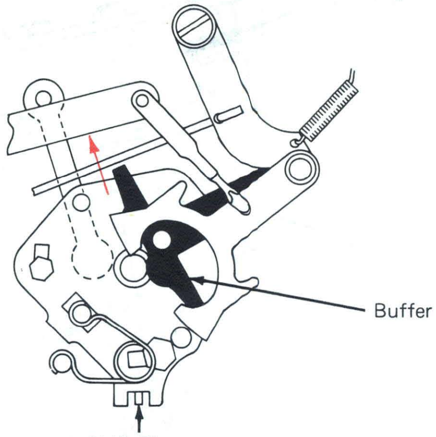
4. This cams the buffer upward until the buffer hairpin spring is over center. The hairpin then continues to raise the buffer until the spring stud contacts the upper edge of the window in the retainer (Figure 9). The buffer is now in position to work on the upper pin on the next operation.



(Right Side View)

Figure 9 – Buffer In Position For Next Operation

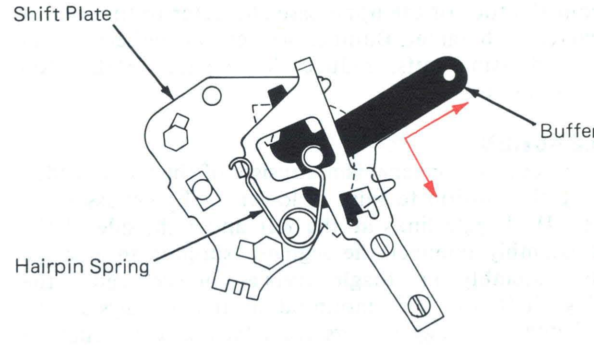
5. When shifting to lowercase, the pusher assembly rotates the shift plate which positions the buffer behind the upper pin. After the cam has rotated over the high point, the buffer hits the upper pin of the shift plate to limit the speed and noise of the shift action (Figure 10).



(Right Side View)

Figure 10 – Buffer Behind Upper Pin

6. The pin on the side of the buffer is cammed down by the notch in the shift plate as the buffer restores to the rear (Figure 11). The notch and hairpin spring position the buffer in line with the lower pin, ready for the next shift operation.



(Right Side View)

Figure 11 – Buffer Restores To Rear

SEGMENT AND SEGMENT SUPPORT

The basket assembly consists of the segment support, segment, type and type rest (Figure 12). The entire basket assembly is held on the power frame by four flat springs called segment guides. The segment guide springs help to support the weight of the basket and allows free vertical motion.

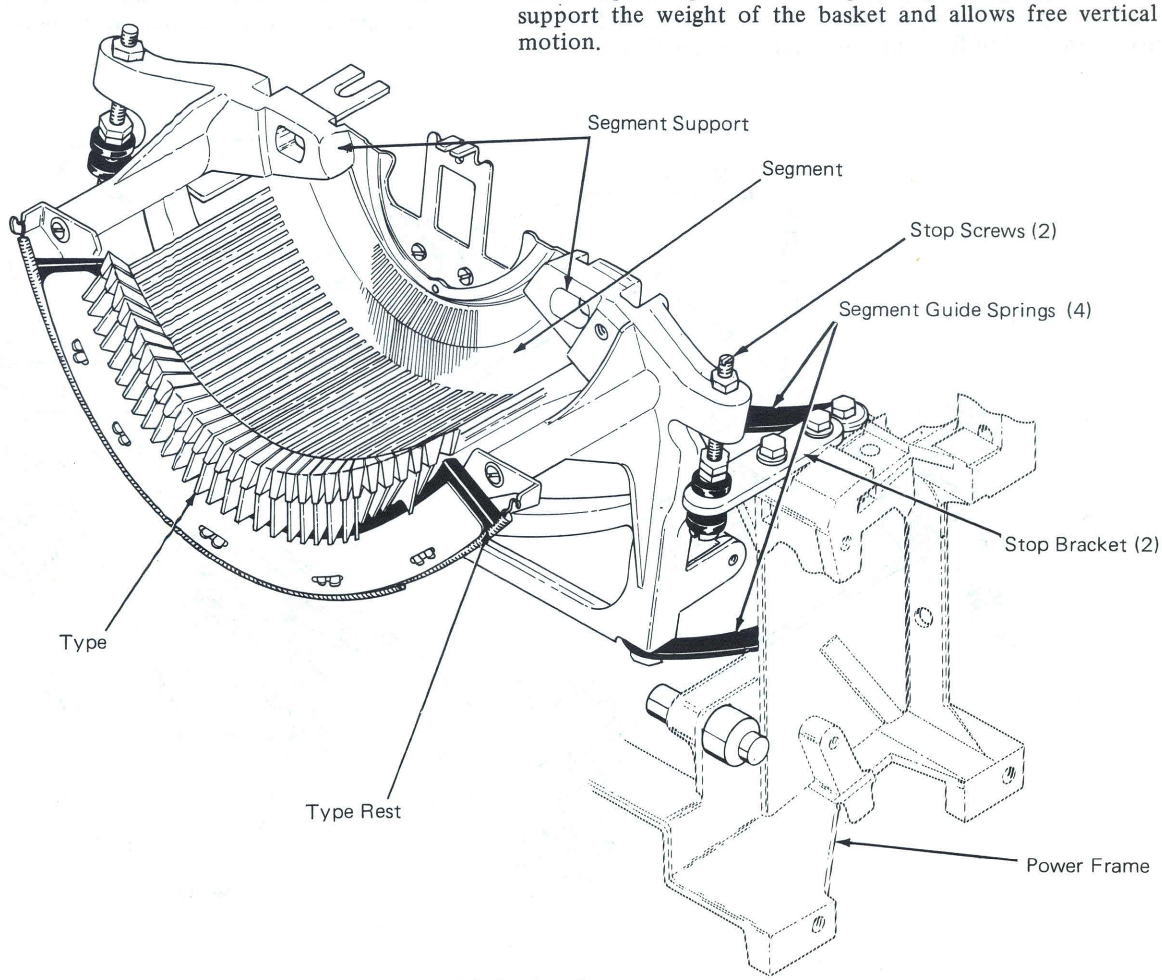


Figure 12 – Shift Basket Asm.

The up and down movement of the basket is limited by stop brackets mounted on the power frame (Figure 13). A stop screw, mounted to the segment support, passes through a hole in the stop bracket. The position of the screw and the adjusting nuts on it regulate the basket position for upper and lowercase typing. The distance the basket moves in going from one case to the other is called shift motion. The distance equals the distance on the type slug from the foot of the uppercase character to the foot of the lowercase character. Bumper washers, at the screw head and the adjusting nuts, reduce the impact on the stop brackets to reduce noise.

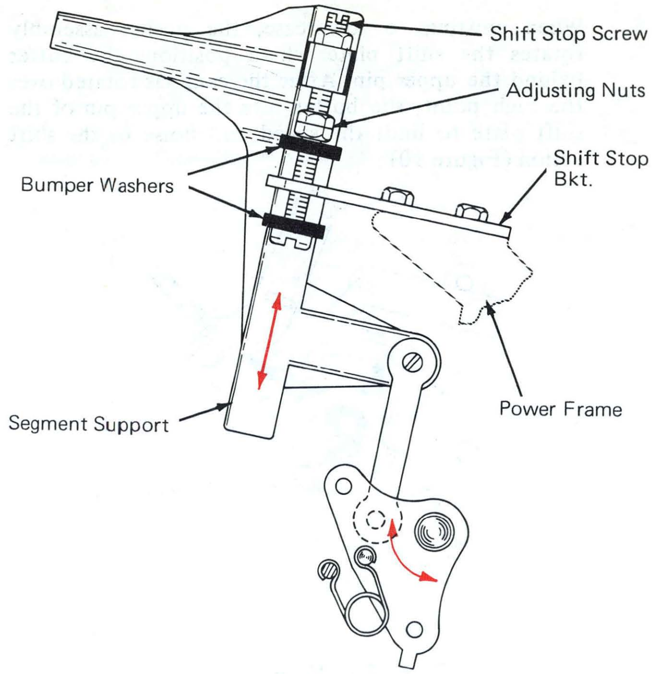


Figure 13 – Stop Bracket Mounting (Right Side View)

TOGGLE ACTION

The shift actuating mechanism consists of the parts needed to supply the motion to raise or lower the basket assembly (Figure 14). Toggle links at the left and right side of the basket assembly connect the segment support to a toggle and shaft assembly. The toggle levers are on each end of the actuating shaft which is mounted in the bearings in the power frame. The toggle levers are attached to the shaft in matched positions to get equal toggle action at each side and are non-adjustable. Rotation of the shaft and toggle levers move the toggle links up or down to shift the basket. Two toggle springs, mounted between studs on the side frames and studs on the toggle levers hold the basket assembly in either the fully raised or lowered position and also helps to move the basket during a shift operation.

A shift plate is screwed to the right-hand toggle lever through elongated holes which allow for adjustment of the position to provide equal pusher to pin clearance on upper and lower pins. The upper and lower pins on the shift plate receive the action from the shift cam. Cam action, applied to the upper pin on the shift plate, rotates the toggle levers and shaft assembly to pull the basket down. When the action is applied to the lower pin, it rotates the assembly in the opposite direction to push the basket up.

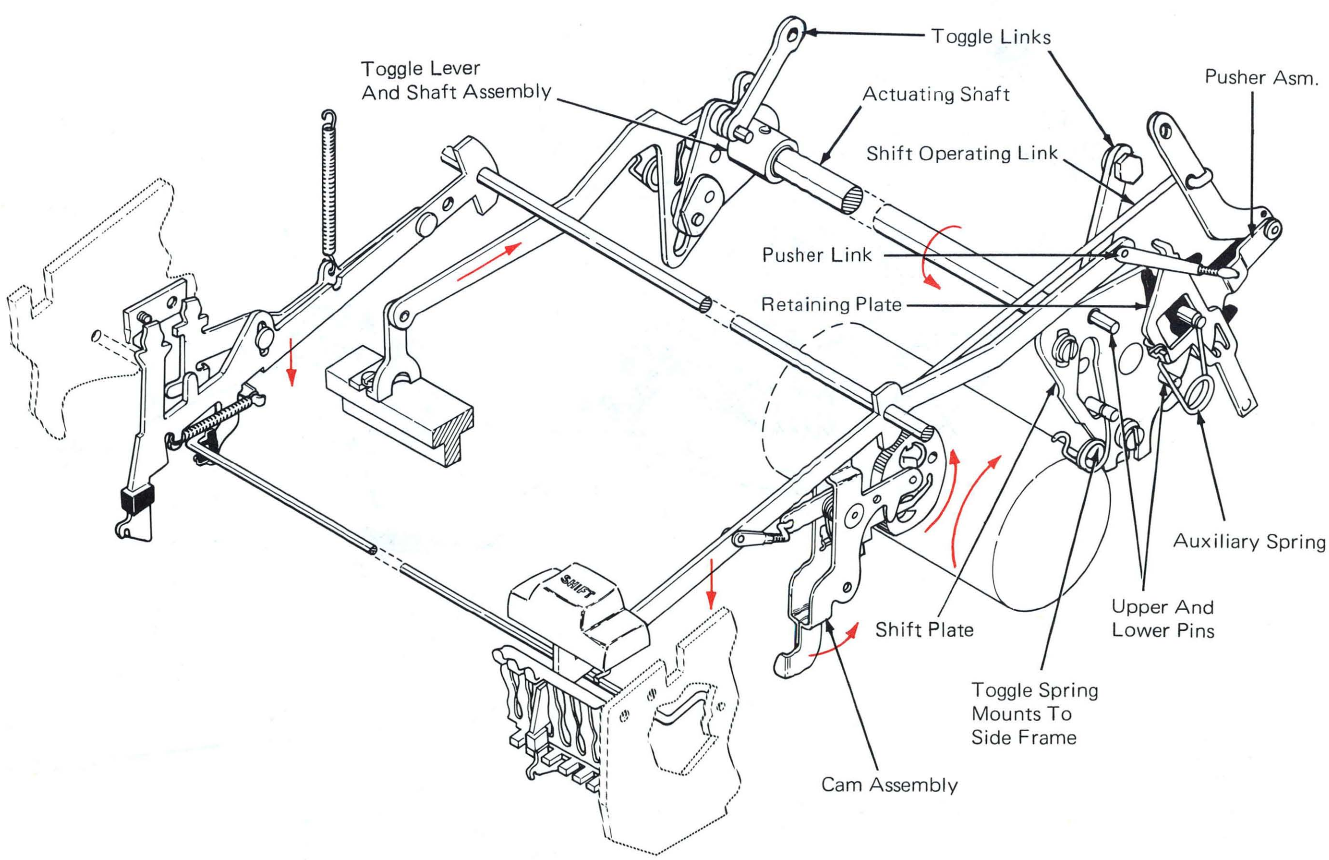


Figure 14 – Shift Actuating Mechanism

SHIFTING OFF

In order for the basket to shift from lowercase and maintain exactly the same ring and cylinder relationship, the lower and upper segment guide springs must be parallel and equal in their effective length (Figure 15). However, because there is a possibility of the type characters to print darker in uppercase than in lowercase, an exact equal ring and cylinder relationship between upper and lowercase is not usually desirable. To get a more even color and impression between upper and lowercase characters, the basket must be caused to shift off cylinder in uppercase.

To obtain the condition of shifting off, shims may be added under the front end of each upper segment guide spring (Figure 15). The shims raise the forward ends of the upper segment guide springs so that they are no longer parallel with the lower segment guide springs. The combined effect is to cause the basket assembly to tip toward the front of the machine when it shifts into the uppercase position. The amount of shifting off required changes with the different type styles, ranging from .001-.012" (0,03-0,30mm). Each .010" (0,25mm) shim added will produce an additional .003" (0,08mm) clearance in the uppercase ring and cylinder relationship.

The shims should be added only while the basket is in the raised position (lowercase typing position) to keep the lowercase ring and cylinder adjustments correct. If only one segment guide spring at a time is released to install shims, the other three segment guide springs will maintain the position of the basket without change.

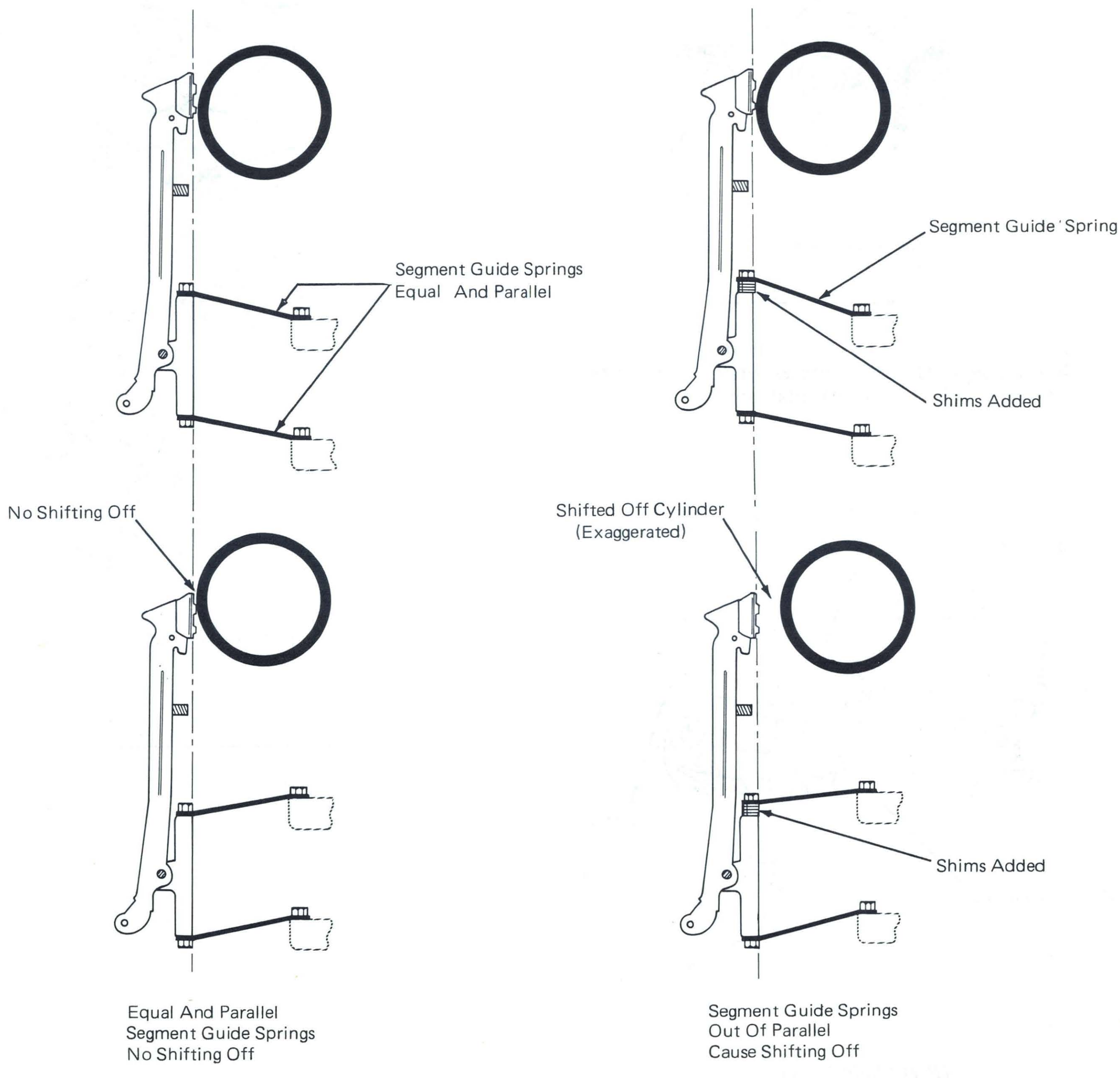
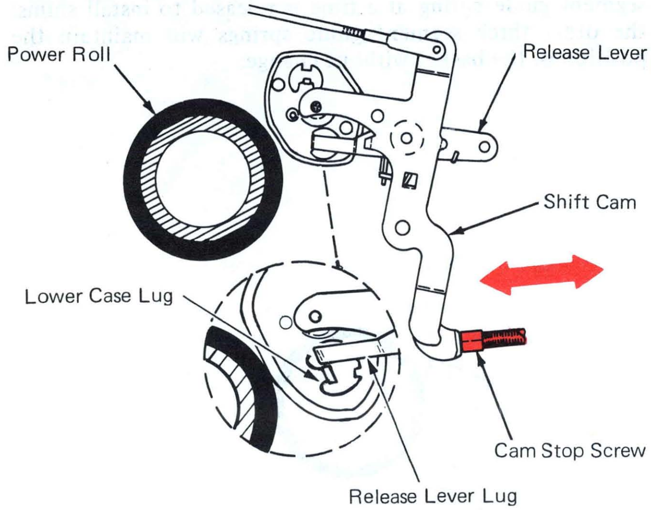


Figure 15 – Adding Shims To Obtain Shifting Off (Right Side View)

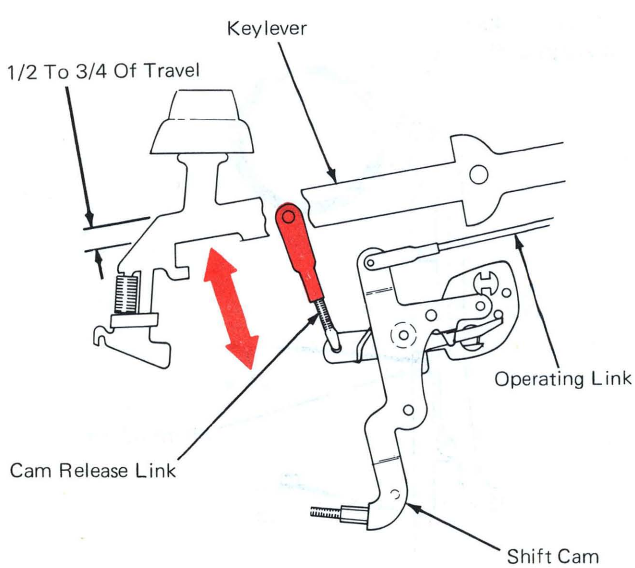
SHIFT ADJUSTMENTS

1. *Cam Clearance* – Adjust the cam stop screw so the release lever lug just clears the lowercase lug when the cam is released with the power off.



(Left Side View)

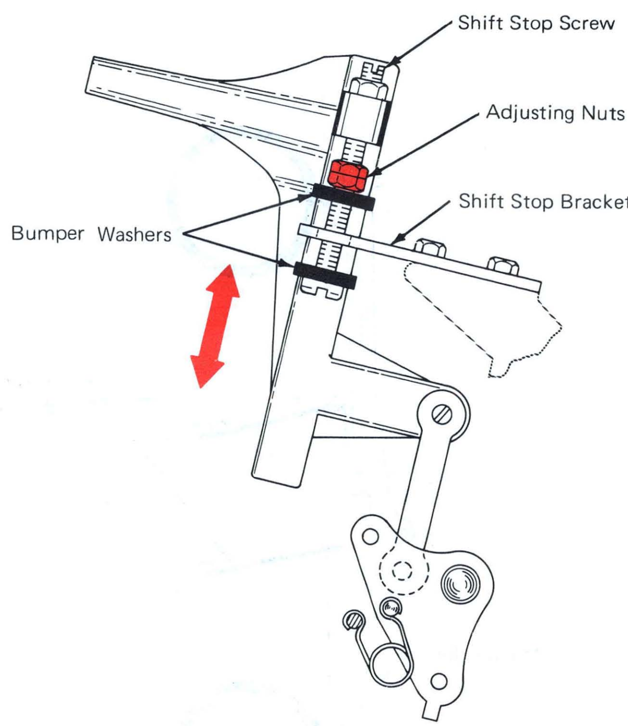
2. *Cam Release Link Clevis* – Adjust the cam release link clevis so the cam releases when the keylever is depressed 1/2 to 3/4 of its total movement.



(Right Side View)

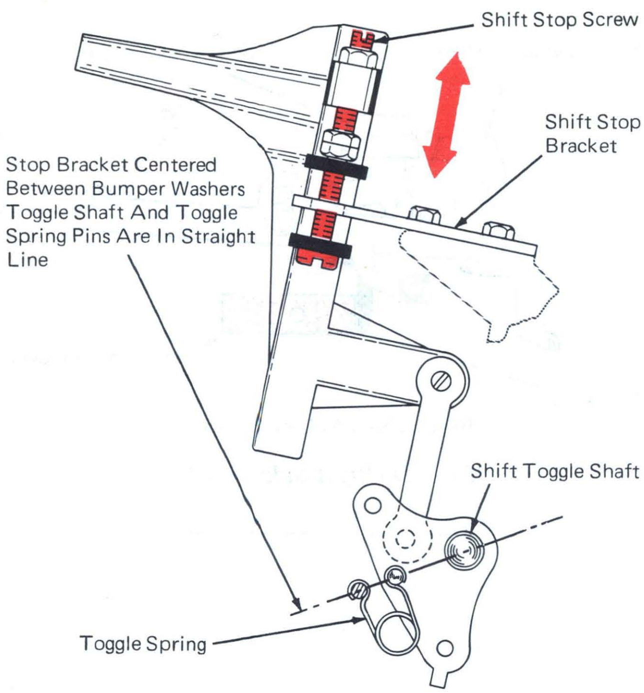
3. *Shift Motion* – Adjust the nuts on the shift stop screw so the uppercase characters print on the same line as the lowercase characters. Be sure to maintain even resting tension on the left and right-hand washers.

SERVICE HINT: It is important that there is equal pressure on each bumper washer after this adjustment is made. To check for equal pressure, insert a strip of bond paper between the bumper washers and stop bracket. Shift down on top of it and pull the paper out, you should feel the same tension as you remove the paper from both sides.



(Right Side View)

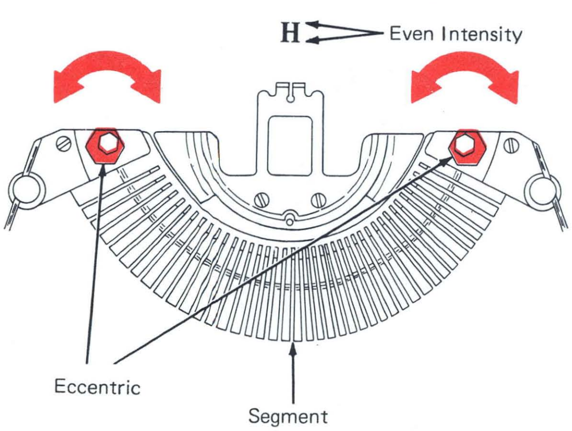
4. *Toggling Action* – Adjust the shift stop screws up or down in the segment suppoer so when the basket is positioned half way between upper and lowercase, the center of the shift toggle shaft and the two toggle spring pins are in a straight line.



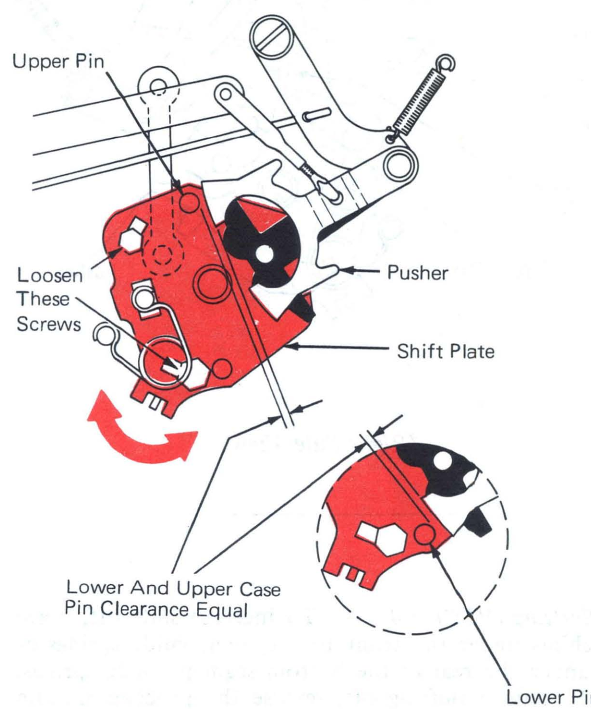
(Right Side View)

5. *Even Top And Bottom Printing* – Adjust the segment mounting eccentrics for even top and bottom impression.

NOTE: Keep the eccentrics even and toward the outside of the bracket.

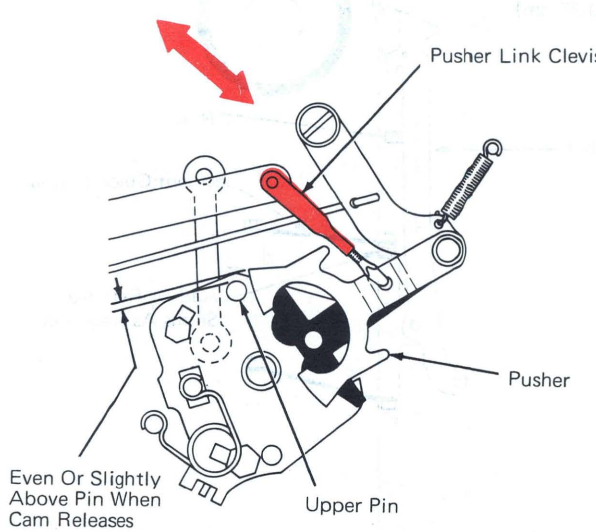


6. *Equal Pin Clearance* – Adjust the shift plate so the pusher will clear the pins by an equal amount when in upper and lowercase.



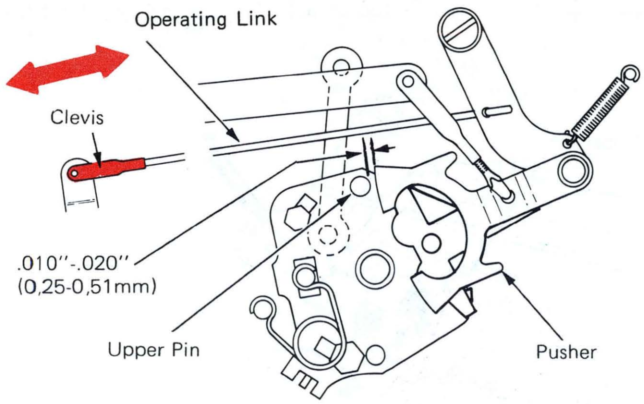
(Right Side View)

7. *Pusher Link Clevis* – Adjust the pusher link clevis so the top edge of the upper pusher is even or slightly above the upper pin when the cam is released.



(Right Side View)

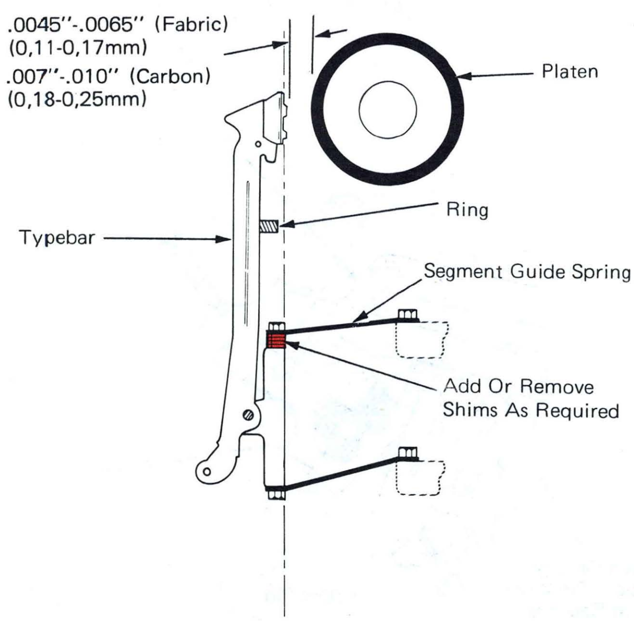
8. *Operating Link Clevis* – Adjust the operating link clevis so the pusher clears the pins by .010-.020" (0,25-0,51mm) when the cam is at rest.



(Right Side View)

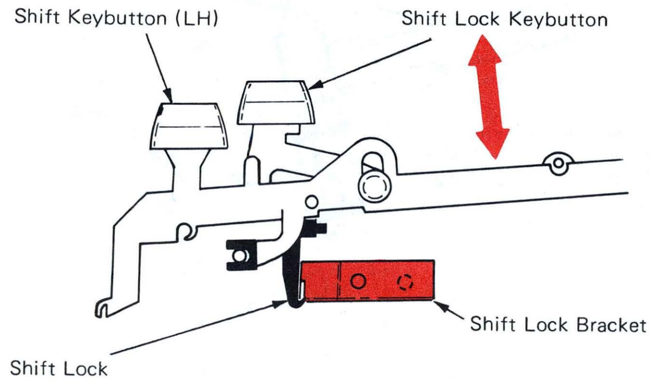
9. *Shifting Off C1, C4* – To increase shift off, place shims under the front top segment guide springs or under the rear of the bottom segment guide springs. To reduce shifting off, reverse this procedure. Shim and retighten one spring at a time. The basket should shift off cylinder from .0045-.0065" (0,11 - 0,17mm) (fabric ribbon) and from .007-.010" (0,18-0,25mm) (carbon ribbon). Adjust only when necessary to reduce uppercase impression.

NOTE: Do not shim the model D1, D4



(Right Side View)

10. *Shift Lock* – Adjust the shift lock bracket so the basket will just shift as the lock engages. Check for easy unlocking, using both shift buttons.



Basket Shifts As Lock Engages

Model D (Right Side View)

CARBON RIBBON OPERATIONAL THEORY

The carbon ribbon was developed for typewriters to give a sharper impression and clearer outline of the type. It is used for both correspondence and reproduction applications. Carbon ribbon is typed on only one time and then discarded. It is therefore fed in only one direction.

The late C-D carbon ribbon mechanism has been redesigned to provide the typist with a method of changing the ribbon without getting carbon on the typist's hands. This mechanism allows clean and easy removal of the take-up spool, simple disposal of the used ribbon, and installation of a new ribbon without touching the ribbon surface (Figure 1).

The ribbon is fed from the right-hand side cartridge through the right-hand corner guide, lift guide, left-hand corner guide and into the left-hand take-up cartridge. The ribbon passes in front of the cardholders.

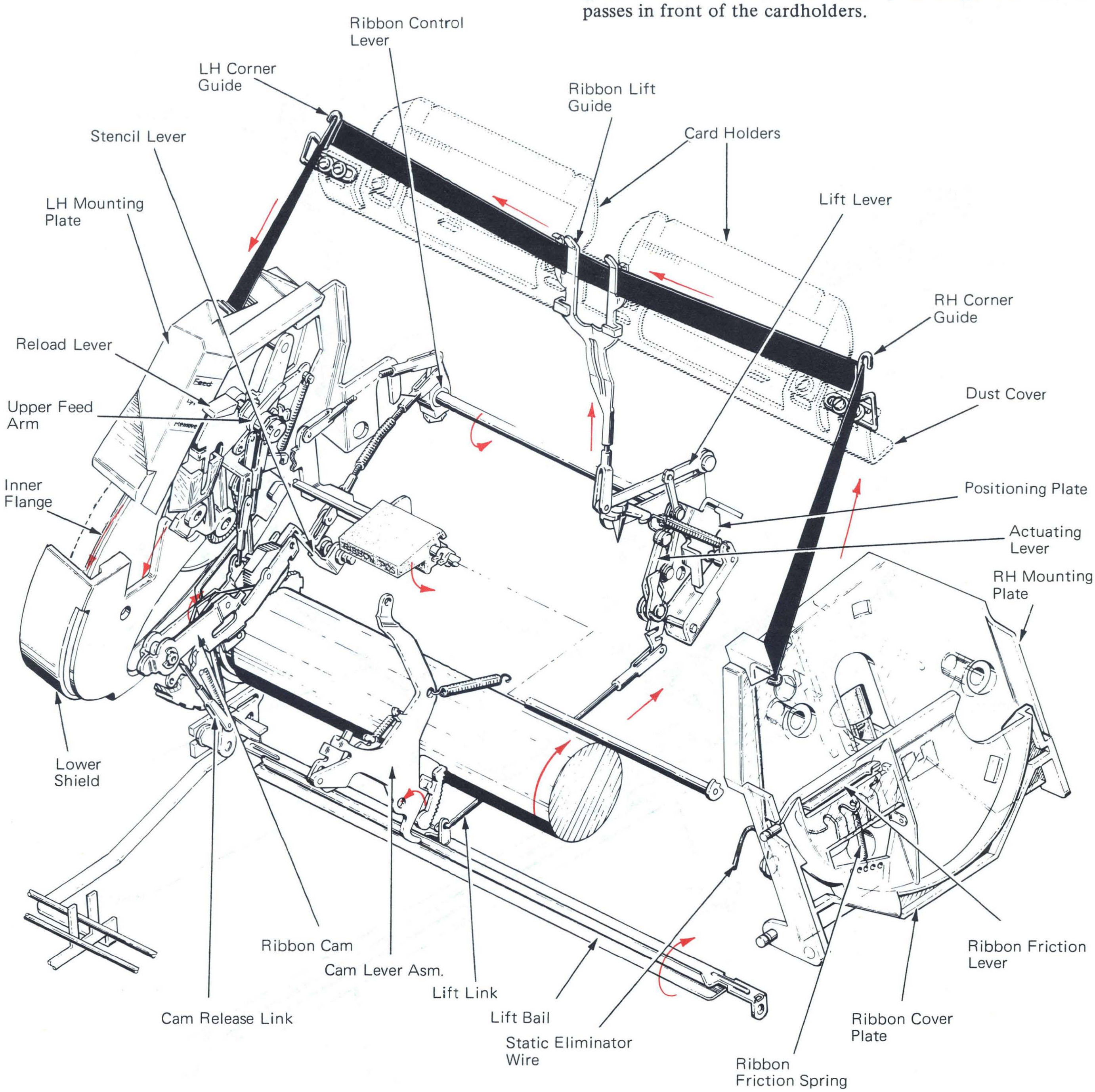


Figure 1 – C1, D1 Modified Carbon Ribbon Mechanism (Level 3)

RIBBON LIFT

The ribbon mechanism consists of two assemblies: the ribbon lift and ribbon feed mechanisms. Operation of any letter cam rotates the ribbon lift bail about the mounting studs on the left and right side frames (Figure 2). The bail has two links attached to it: the cam release link at the left and a ribbon lift link at the middle.

Rotation of the ribbon lift bail pushes the ribbon lift link to the rear, pivoting the actuating lever to the rear also. Attached to the actuating lever is a toggle assembly which provides the motion to raise the ribbon lift lever and the ribbon lift guide. The lift guide, through the ribbon lift lever, positions the ribbon in front of the type face for a print operation.

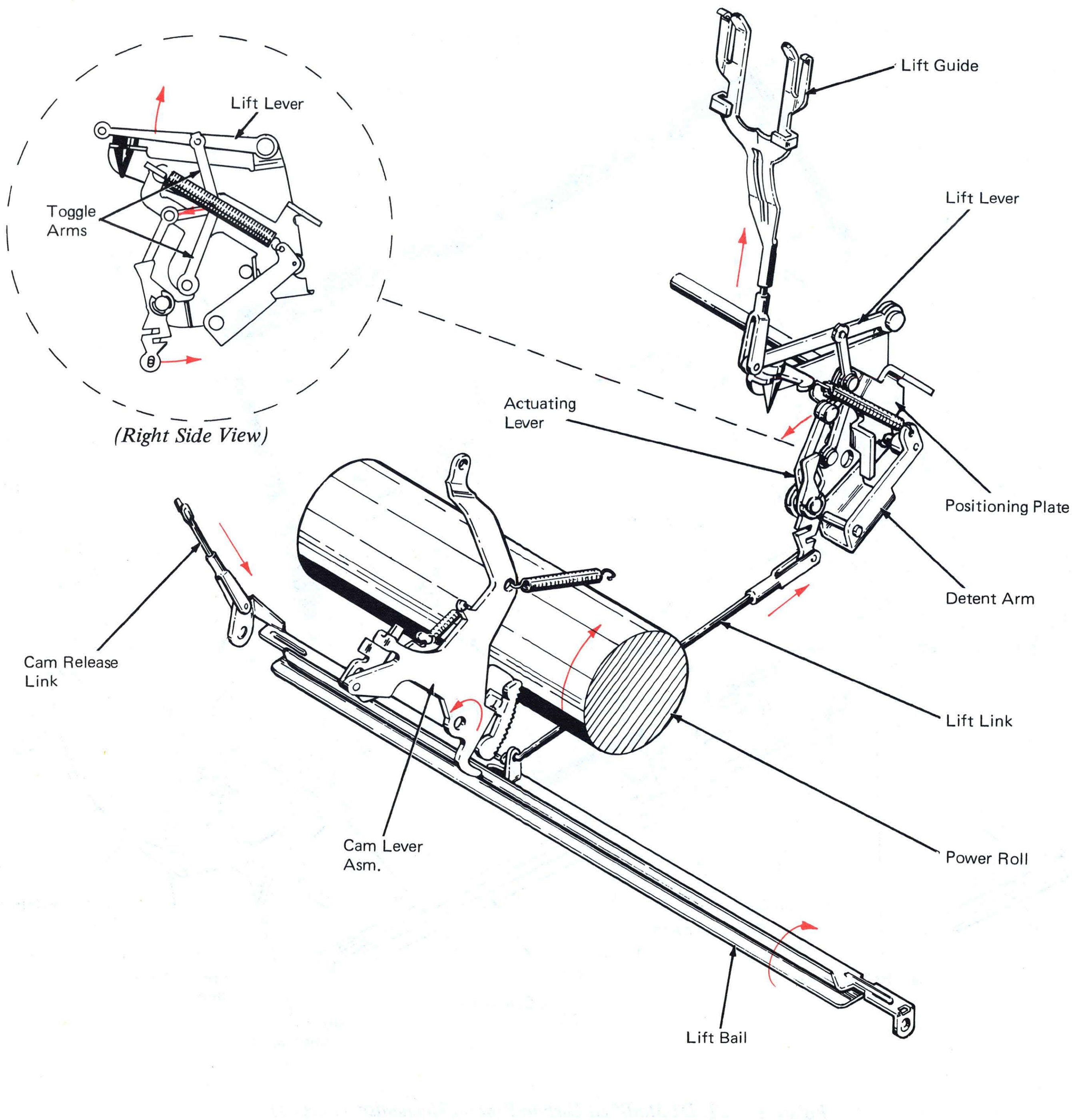


Figure 2 – Carbon Ribbon Lift Mechanism

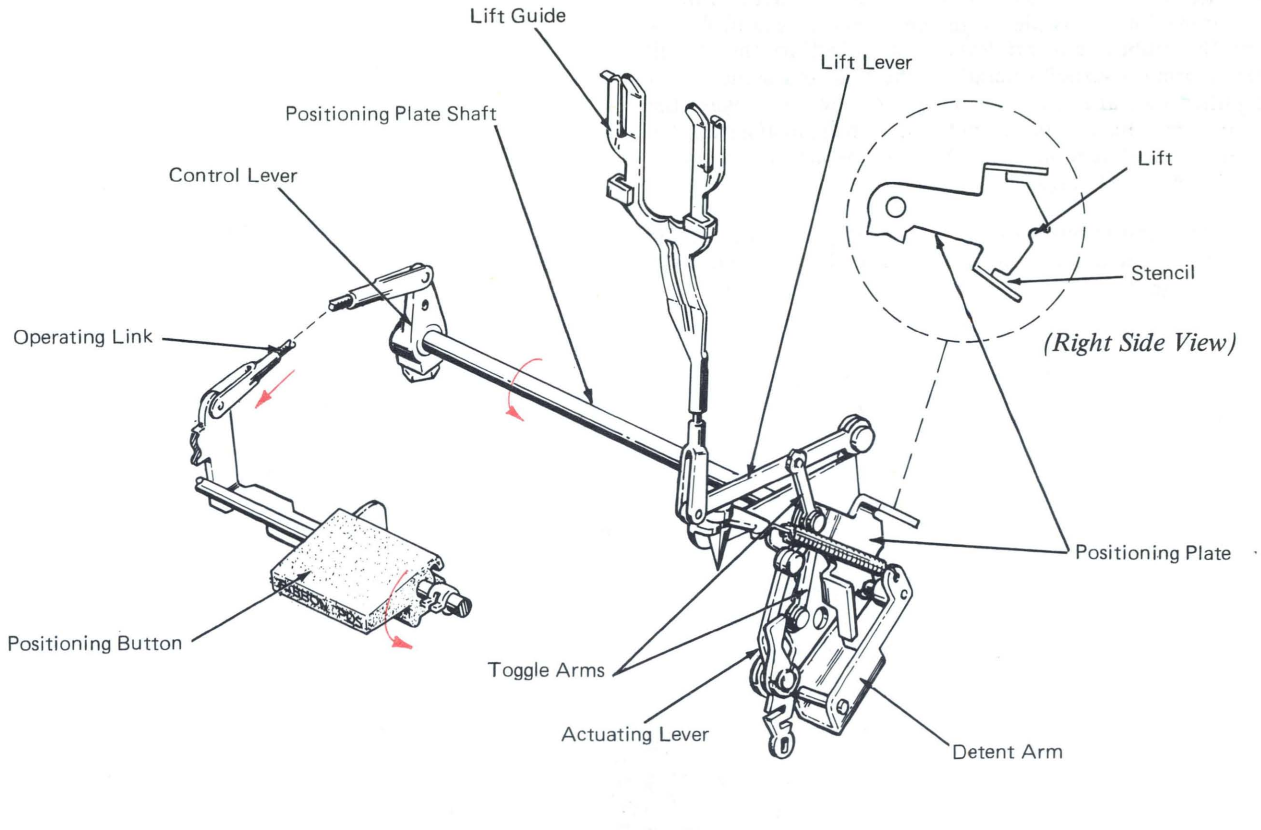


Figure 3 – Ribbon Positioning Mechanism

STENCIL POSITION

The carbon ribbon mechanism has only one lift position, plus a stencil position. Attached to the ribbon positioning button is an operating link which connects to the control lever (Figure 3).

The ribbon control lever is mounted on the positioning plate shaft. Through the motion of the positioning button, operating link, control lever and shaft, the ribbon positioning plate is rotated to change the angle of the toggle assembly (Figure 3)

In the stencil position, the lower arm of the toggle assembly is positioned almost in a straight line with the upper arm (Figure 4). The motion from the ribbon lift bail pulls the toggle arms over center and the ribbon is not lifted. When the ribbon position button is lifted from the stencil position, the lower toggle arm rotates and forms an angle with the upper arm. This allows the ribbon lift guide to be lifted when a letter cam operates.

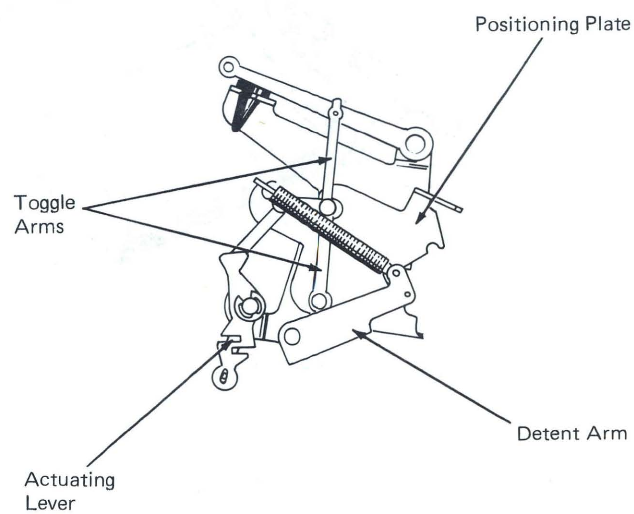


Figure 4 – Stencil Position (Right Side View)

The carbon ribbon feed will not work when the ribbon positioning button is placed in the stencil position. A link from the ribbon control lever is attached to the stencil lever. During a stencil operation, the link and stencil lever are pulled forward, allowing the stencil lever to engage the ribbon cam. This action prevents the cam from engaging the power roll and feeding unused ribbon while typing in the stencil position (Figure 5).

When the ribbon positioning button is placed in the lift position, the stencil control lever is rotated to the rear away from the cam lobe and the cam is allowed to operate.

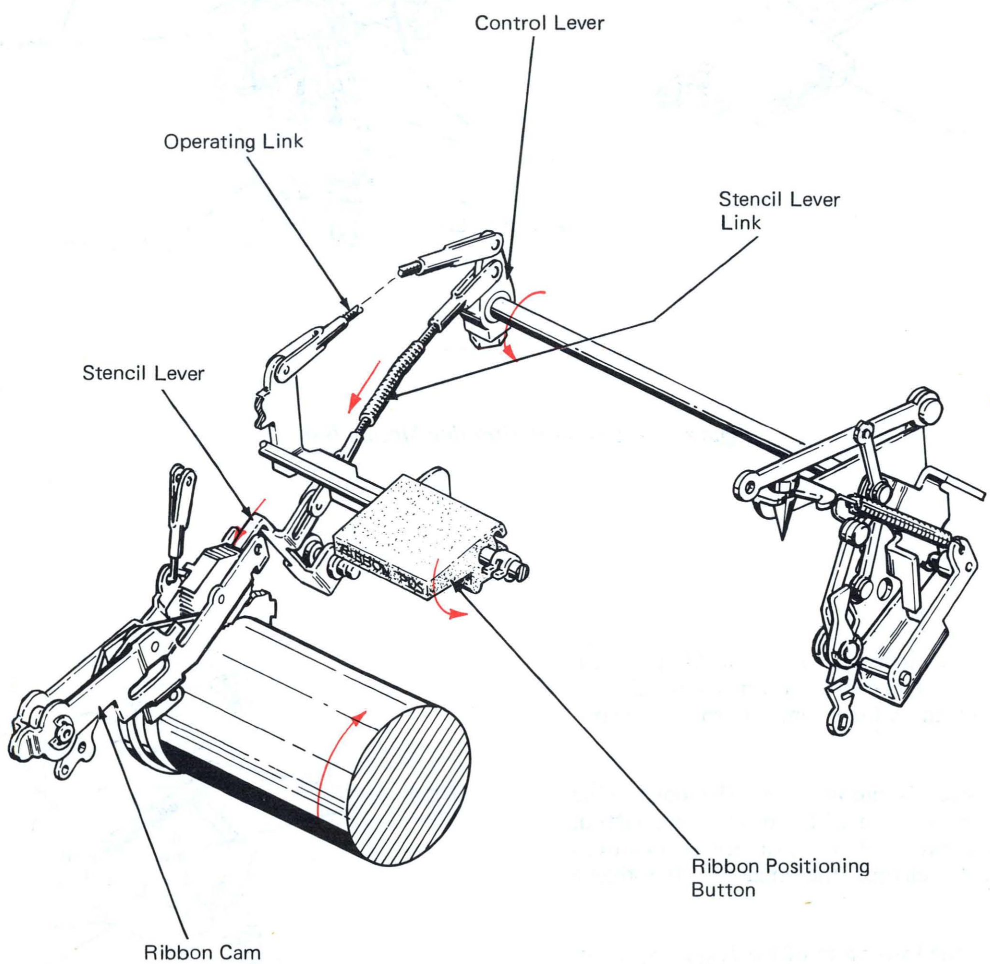


Figure 5 – Stencil Lever Operation

RIBBON FEED (LEVEL 3)

Operation of any letter cam also actuates the ribbon feed mechanism by pivoting the lift bail and releasing the ribbon cam against the power roll (Figure 6).

As the ribbon cam rotates, it pushes up on the ribbon feed link, which is attached to the cam frame. The upper end of the feed link is connected to the feed arm, and as the link moves upward, it pivots the feed arm up also.

The feed arm supplies motion through a spring clutch connection to a pair of geared feed rollers.

The front feed roller is held to the feed roll shaft which is driven by the feed arm through the spring clutch connection. The spring clutch rotates the shaft and roller when the arm is raised, and slips when the arm restores. A spider spring provides friction to prevent the shaft from being rotated back by the spring clutch when the arm restores.

The rear feed roller is mounted on a spring loaded rear pressure arm that holds it against the front roller. Rotation of the front roller drives the rear roller through their gear engagement. The ribbon is held by the rollers and is fed through as the rollers turn. Each feed roller has a grove in the center to allow the use of ribbon strippers to prevent used ribbon from winding on either feed roller.

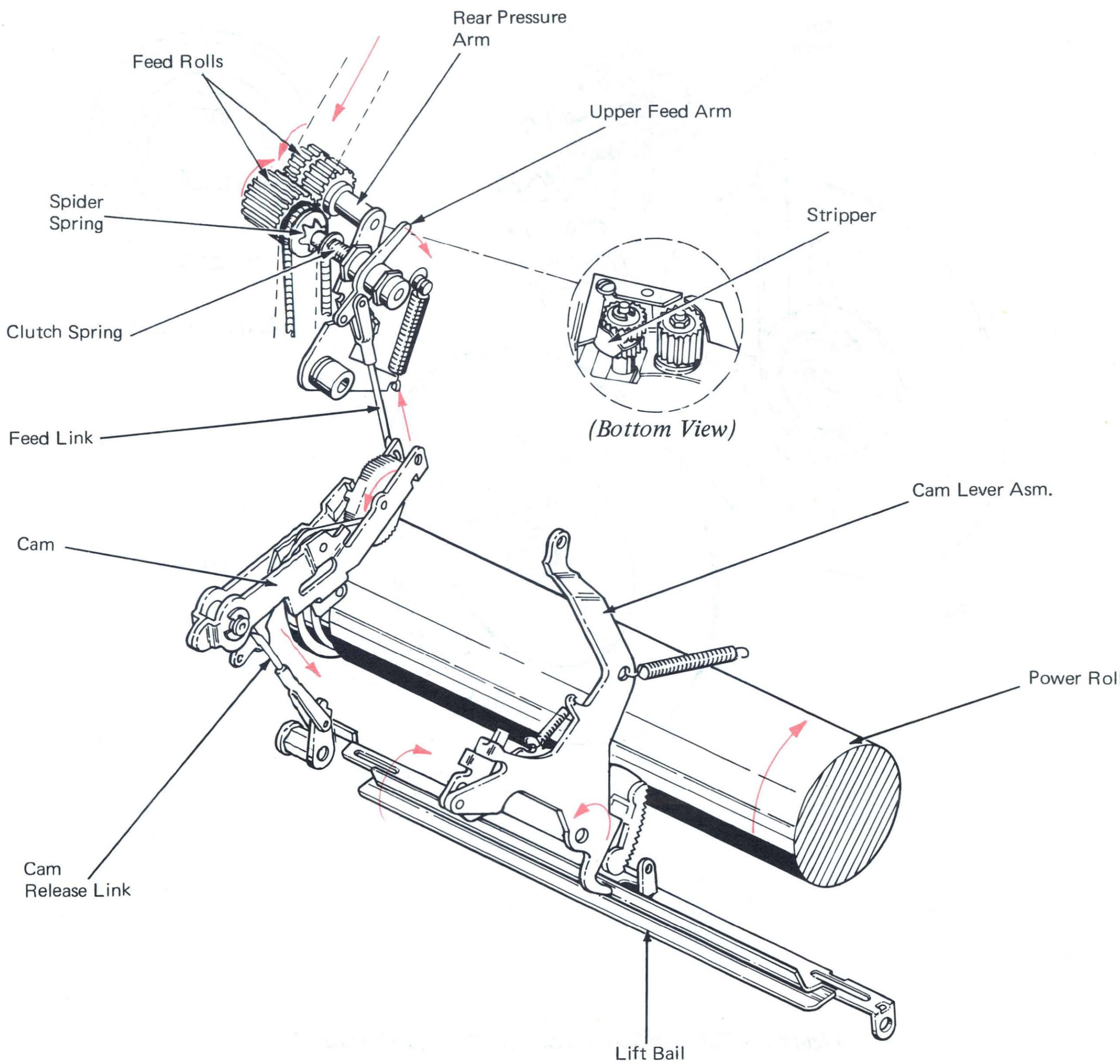


Figure 6 – Carbon Ribbon Feed Operation (Level 3)

TAKE-UP SPOOL LEVEL (3)

A two-piece spool assembly which consists of an inner and outer flange, drive washer, drive spring and inner flange pulley, winds the ribbon when fed through feed rolls (Figure 7). The drive spring is mounted around the ribbon drive washer, through a spring guide and around the inner flange pulley. The drive washer is mounted on the front feed roll shaft. As the ribbon feeds, motion is supplied by the drive washer to the drive spring and inner flange pulley to rotate the take-up spool assembly.

The inner and outer flanges are easily separated by depressing the gray spool release ring. The outer take-up flange can now be removed from the typewriter and the used ribbon released by holding the outer flange with the fingers of both hands and depressing the two "EJECT" buttons at the same time with the thumbs.

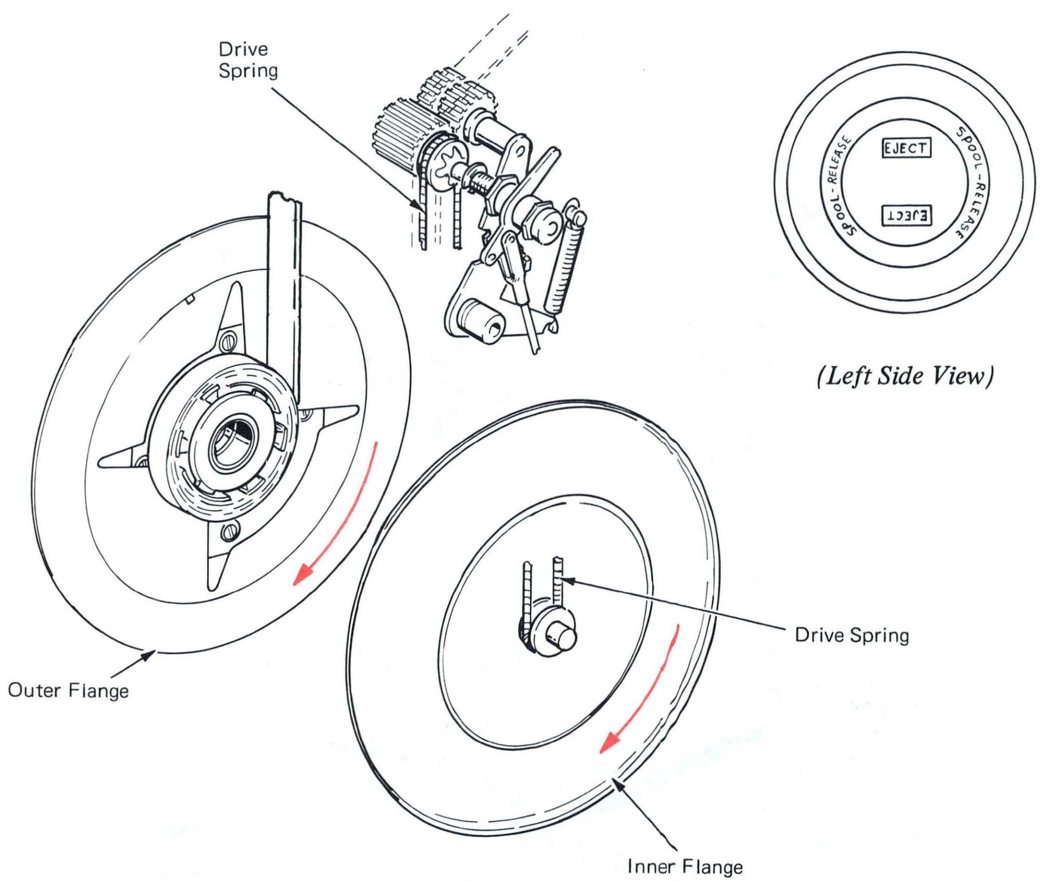


Figure 7 – Take-Up Spool Assembly Spring Drive (Level 3)

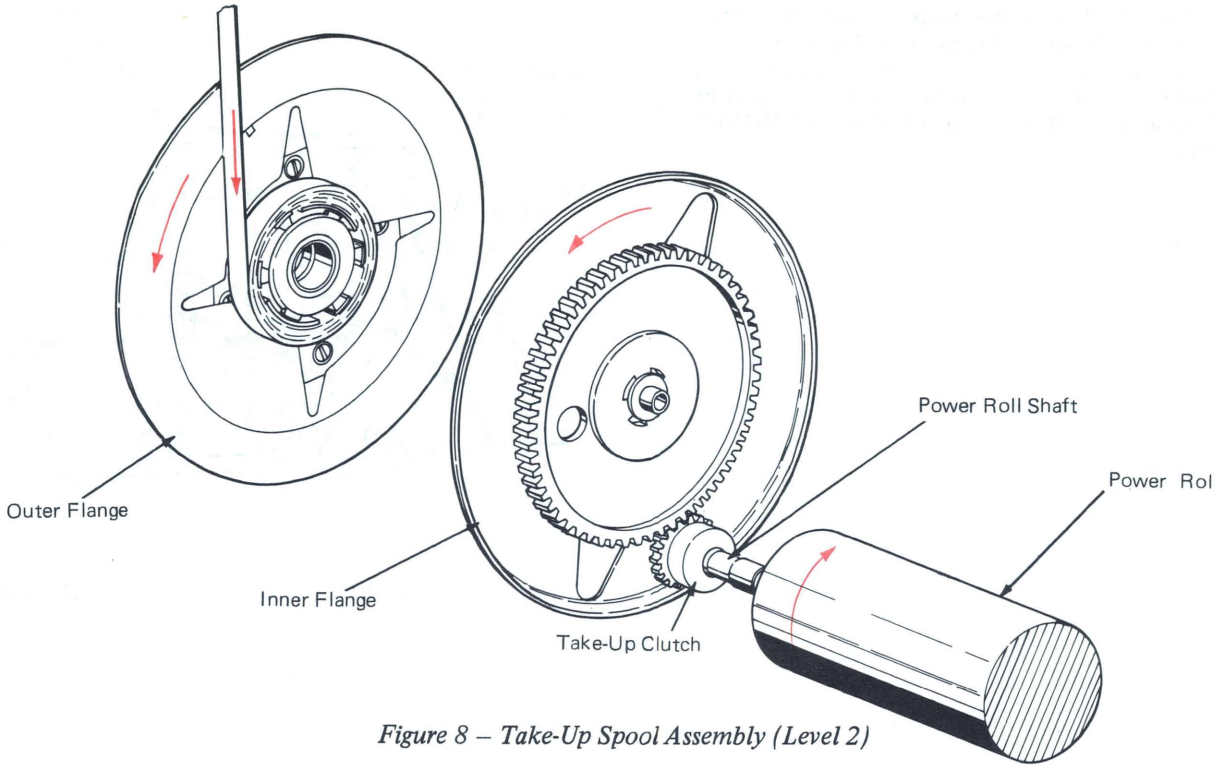


Figure 8 – Take-Up Spool Assembly (Level 2)

TAKE-UP SPOOL LEVEL (2)

The difference between the Level 2 and Level 3 take-up spool assembly is that the inner flange engages a geared take-up clutch instead of the drive spring to supply motion to rotate the spool assembly. The take-up clutch is mounted on the left-hand power roll shaft (Figure 8).

When not feeding, the ribbon is held tightly by the feed roller. This prevents the take-up spool assembly and clutch from rotating. As the ribbon feeds, the spool assembly will rotate to wind the ribbon and maintain tension on it.

A ribbon reload button provides the typist with a means of controlling the ribbon feed mechanism when removing and installing the ribbon. The reload button is mounted on the ribbon reload lever and detented in one of three positions by a spring loaded detent lever (Figure 9).

The three positions are:

1. *Type Position* – When the reload lever is positioned in the "TYPE" mode, the ribbon will feed normally as each typebar is operated (Figure 9).

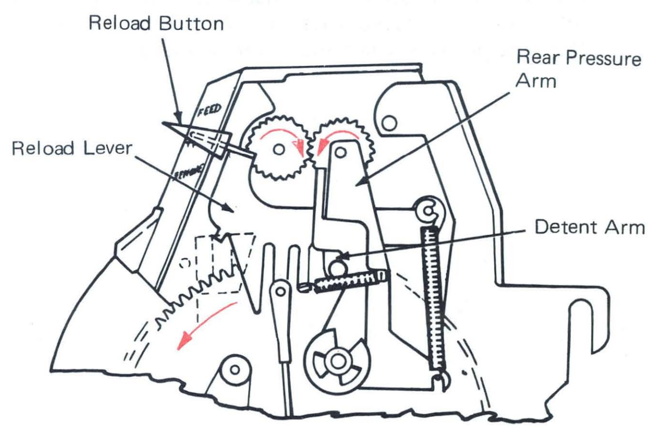


Figure 9 – Type Mode (Right Side View Level 2 And 3)

2. *Remove Position* – When the reload lever is depressed to the "REMOVE" position, the feed rollers separate and the take-up spool rotation is interrupted, allowing the typist to change the ribbon. The rear detent and pressure arms disengage the feed rollers. A lug on the reload lever interrupts the rotation of the takeup spool assembly (Figure 10). The rear detent gear and pressure arms will hold the reload lever in this position until the ribbon feed cam is operated or the reload lever is lifted from the "REMOVE" position.

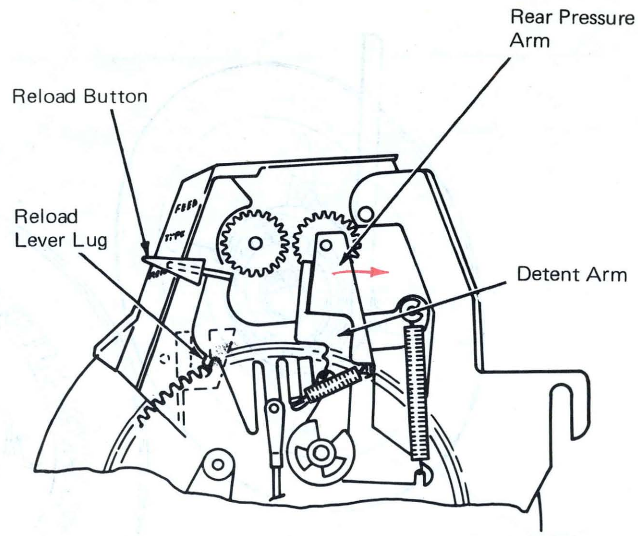


Figure 10 – Remove Mode (Right Side View Level 2 And 3)

3. *Feed Position* – When the reload lever is raised to the "FEED" position, the reload lever through the cam operating bellcrank pulls on the cam release lever. This releases the cam to the power roll for a repeat operation. The ribbon will be rapidly advanced until the reload lever is moved from the "FEED" position (Figure 11). This can be done by manually depressing the reload button or by closing the top cover. An interlock is provided to move the reload button to the type position when the cover is closed.

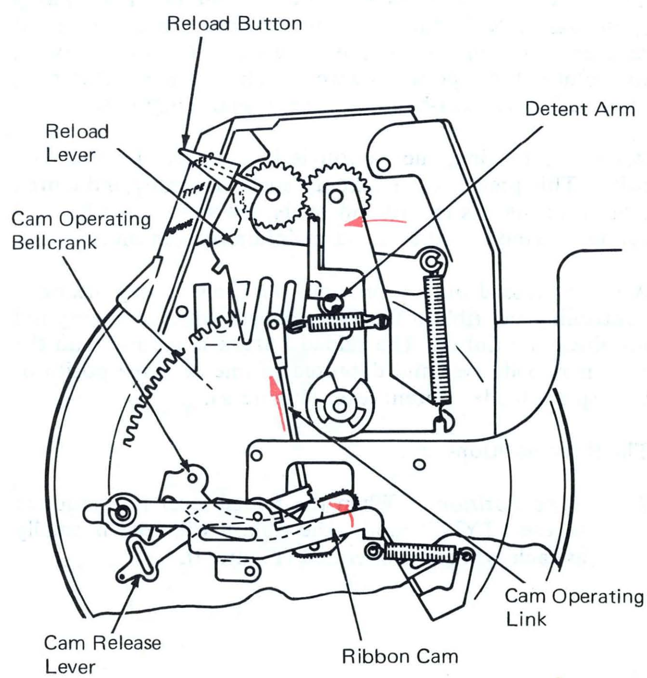


Figure 11 – Feed Mode (Right Side View Level 2 And 3)

RIBBON SUPPLY (LEVELS 2 AND 3)

The supply spool assembly is mounted on the right-hand side of the machine (Figure 12). A cartridge for the ribbon provides clean handling of the ribbon. The cartridge is installed on the right-hand spool mounting plate and held in position by the spring loaded ribbon cover plate.

An adjustable spring loaded ribbon friction lever is mounted in the ribbon cover plate. The friction lever provides tension to the supply spool to prevent spooling off of the ribbon during normal typing.

An auxiliary ribbon supply hub which allows for use of non-cartridge type carbon ribbons is used in the right-hand mounting plate and held in position by spring tension. The hub is hinge-mounted and spring loaded into a hole in the mounting plate.

The static eliminator wire is used to ground the carbon side of the ribbon to prevent tracking problems resulting from a build-up of static electricity, inherent in most plastic back carbon ribbons. The plastic side is grounded by the right-hand ribbon corner guide.

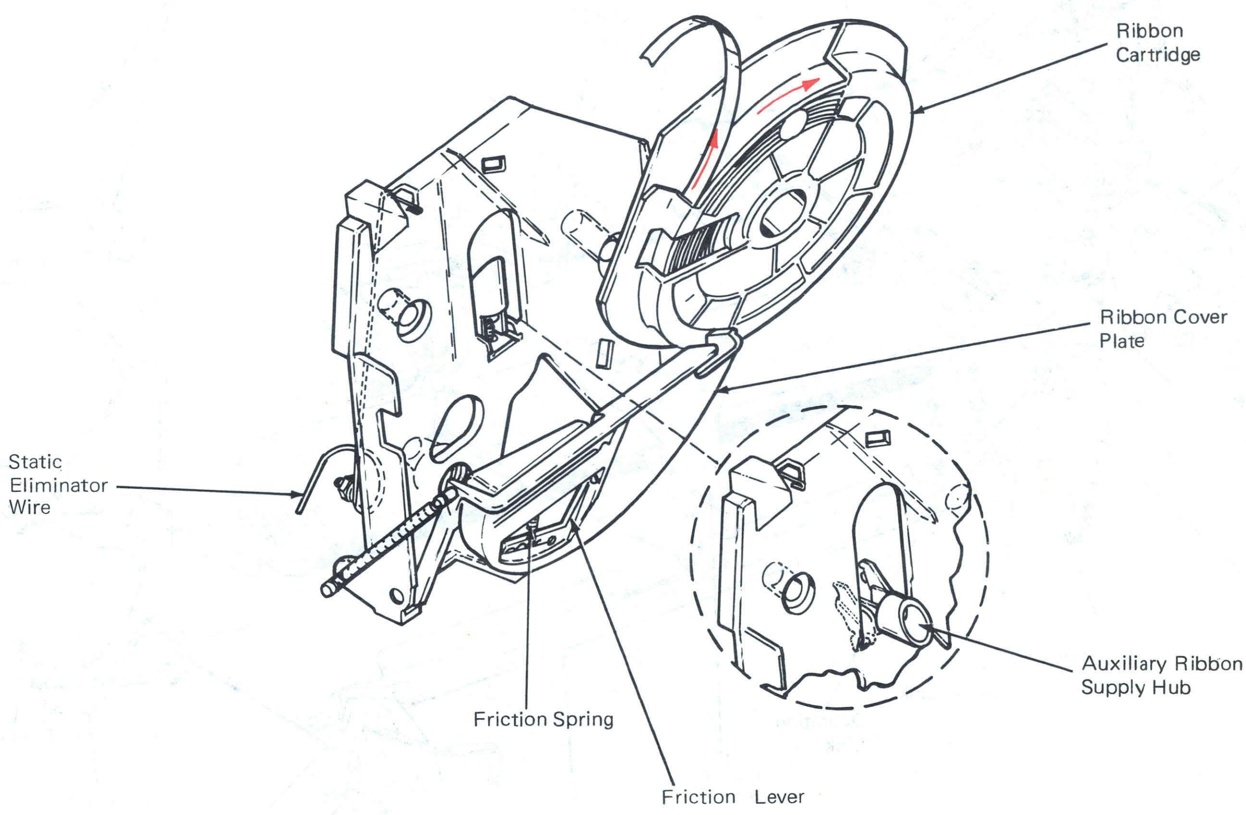


Figure 12 – Supply Spool Assembly (Level 2)

CARBON RIBBON MECHANISM (LEVEL 1)

The early Model C (Level 1) carbon ribbon mechanism is similar to the late Model C and D mechanism. The principle of operation is basically the same; however, the ribbon feed, supply, and take-up spools are different (Figure 13).

RIBBON FEED (LEVEL 1)

Operation of any letter cam supplies motion to rotate the ribbon lift bail. This supplies motion through the cam release link, which releases the cam to the power roll. During its rotation, the cam pulls on the cam operating link and, through the feed bellcrank, pushes up on the feed link. The upward movement of the feed link rotates the upper feed arm, which turns the feed rollers in the same way as the late Model C and D.

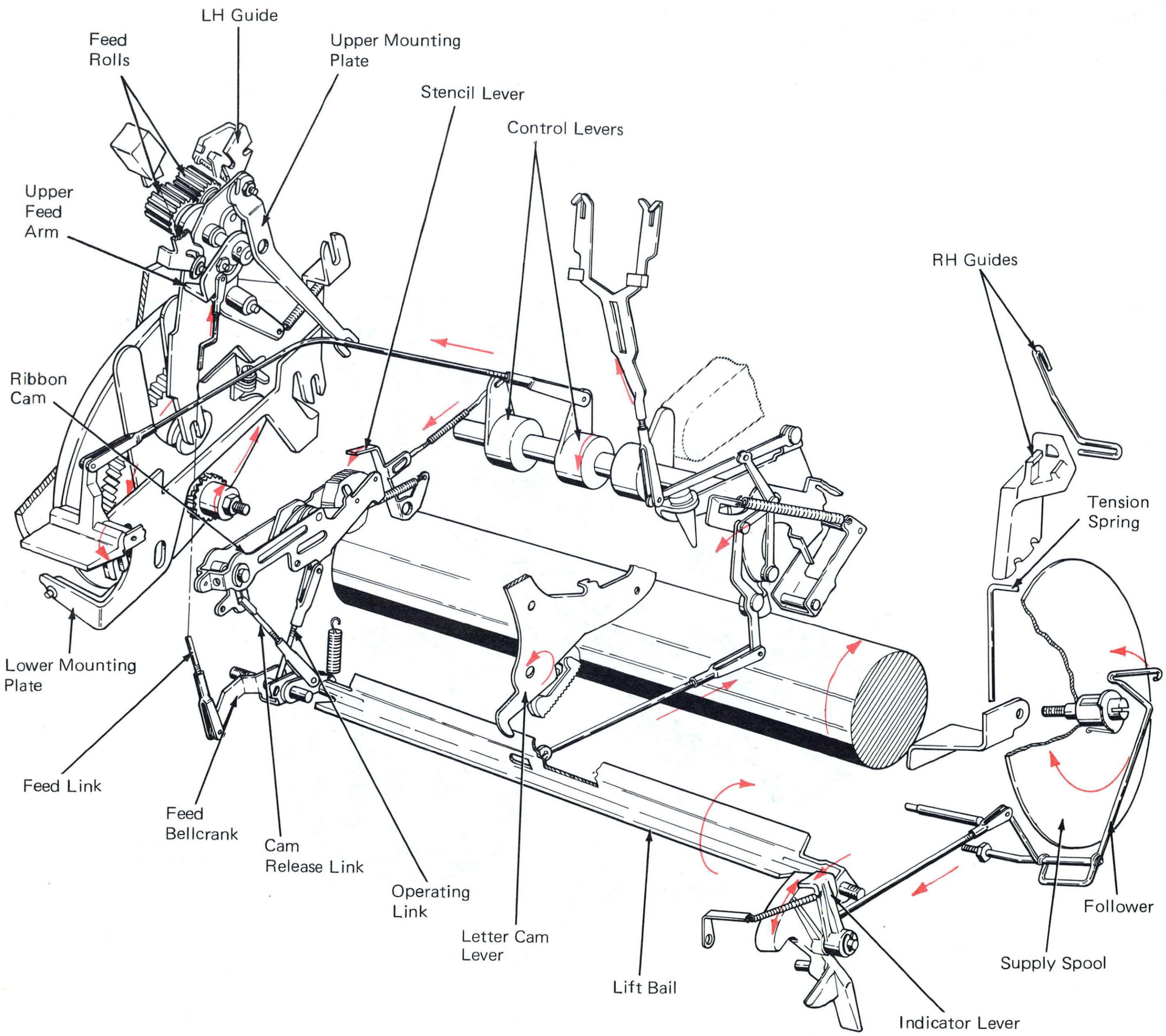


Figure 13 – Early C1 Carbon Ribbon Mechanism (Level 1)

RIBBON TAKE-UP (LEVEL 1)

A two-piece plastic spool winds the ribbon, when fed through the feed rollers (Figure 14). The inner flange engages a drive gear, which supplies the motion to drive the spool. The drive gear is operated by a friction clutch, working in reverse, or its slipping direction. The drive gear and friction clutch are part of an assembly called the take-up drive clutch (Figure 14) which is mounted on a threaded shaft that fits in the LH end of the power roll shaft.

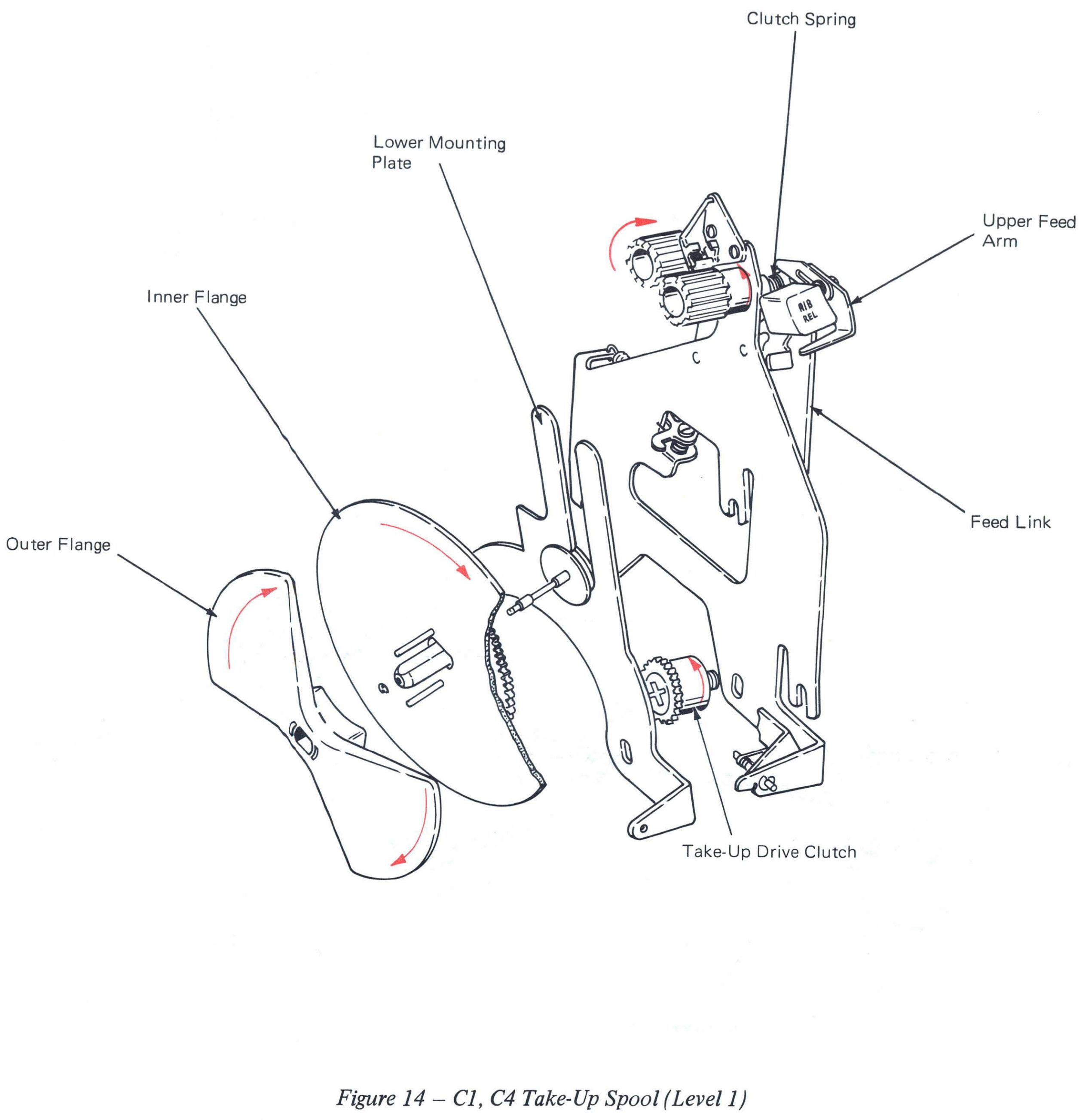


Figure 14 – C1, C4 Take-Up Spool (Level 1)

RIBBON SUPPLY (LEVEL 1)

The ribbon supply spool is mounted on a bracket which is mounted on the right-hand side frame (Figure 15). The spool turns freely on a shoulder mounting screw. Spring fingers on the hub of the spool hold the roll of carbon ribbon. A spring loaded follower rests against the outside diameter of the ribbon and is connected to a red indicator lever mounted on the switch lever stud. As the ribbon supply becomes low, the indicator appears in the switch indicator window.

From the ribbon spool, the carbon ribbon passes in front of a ribbon tension spring. This spring acts as a shock absorber when ribbon is pulled from the spool, and prevents ribbon breakage.

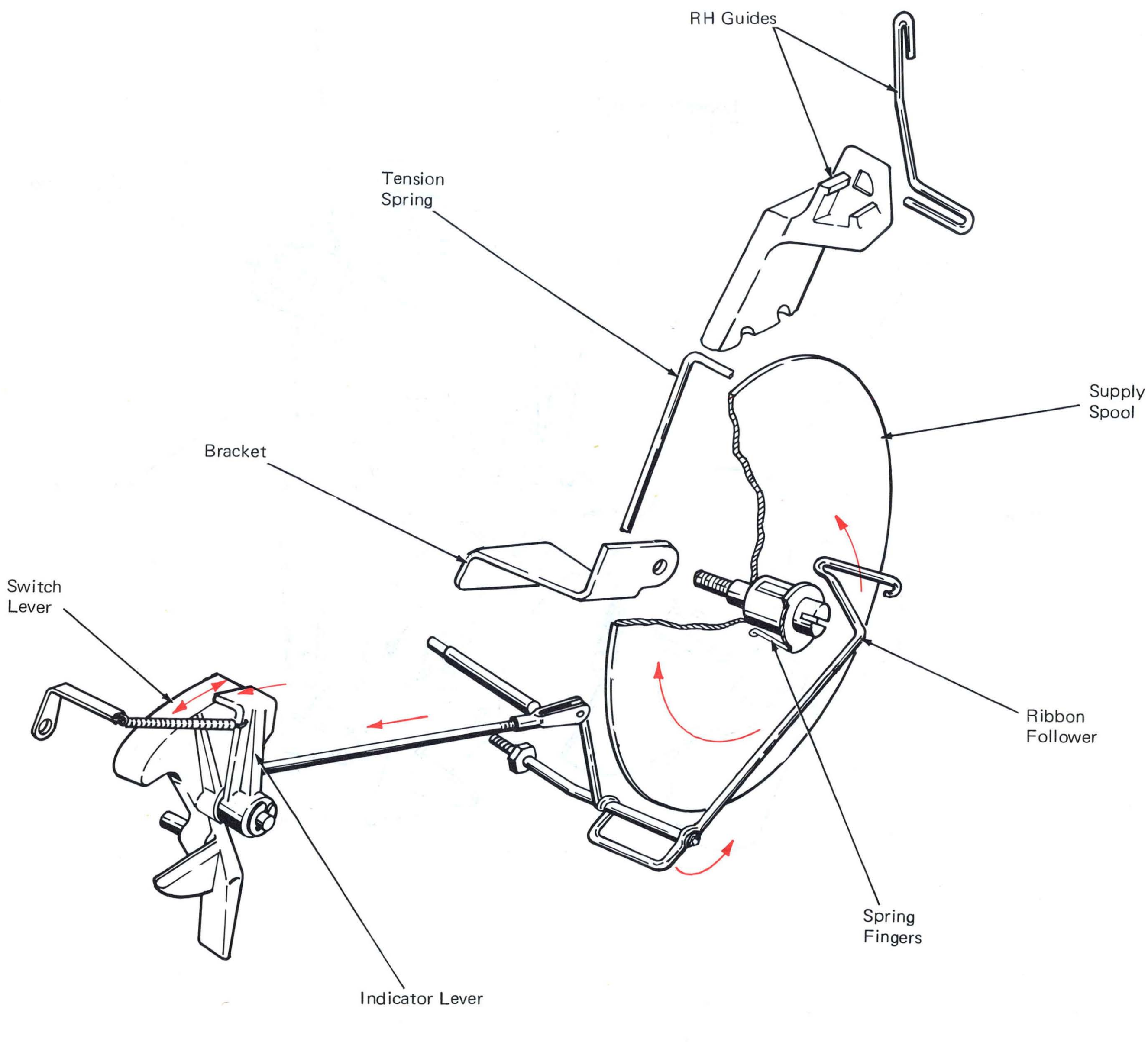


Figure 15 – C1, C4 Supply Spool (Level 1)

PROPORTIONAL FEED (D4 LEVEL 2)

The carbon ribbon proportional feed mechanism (Figure 16) provides enough feed without overlap and prevents excessive ribbon feed regardless of the unit value of the typed character. This mechanism is on the D4 Typewriters only. Without proportional ribbon feed, it would be necessary to feed enough ribbon to allow the character of greatest unit width. This would result in excessive use of ribbon when typing characters of smaller unit value.

By using different amounts of total cam action available, a difference in the amount of ribbon feed is obtained. The full amount of cam action is used to get 5–units of ribbon feed. For 3–units of ribbon feed, part of the cam action is lost motion. This lost motion is inserted between the ribbon feed link and a slotted hole in the upper feed arm.

During the 3–unit feed the proportional feed link rests on a lug of the selector bar (Figure 16). This provides a clearance in the slotted hole in the upper feed arm. Therefore, when the cam is operated, the feed link will move a short distance before reaching the upper surface in the slot. This action produces less ribbon feed.

During a 5–unit feed operation, the selector bar is moved to the rear to allow the proportional feed link to drop down (Figure 17). This action allows the upper feed arm to slip the spring clutch to give full motion of the cam, giving 5–units of ribbon feed.

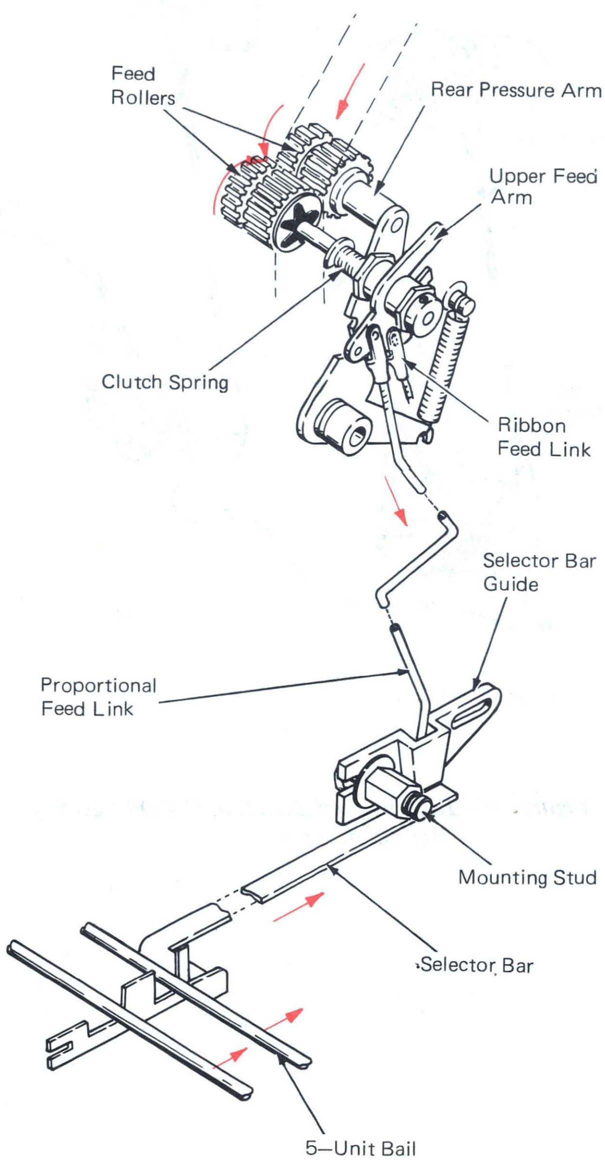


Figure 16 – Proportional Feed Mechanism (D4, Level 2)

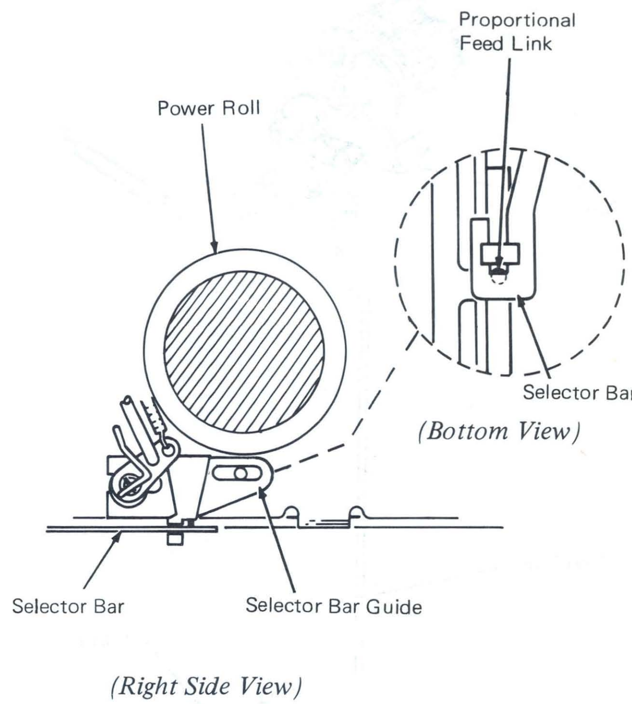


Figure 17 – 3 And 5 – Unit Feed (D4, Level 2)

PROPORTIONAL FEED (C4-D4 LEVEL 1)
Proportional carbon ribbon feed on the C4, and Level 1 D4, consists of a different design level which uses a selector lever, drive feed lever, and lower feed arm to give proportional feeding.

When the ribbon cam is operated, it pulls up on the cam link which is attached to the drive feed lever (Figure 18). This lever extends through the left side frame, and when lifted, moves the lower ribbon feed arm upward.

During the three unit feed, the lower feed arm rests on the selector lever (Figure 19). Lost motion is inserted between the ribbon feed link and a slot in the lower feed arm. As the ribbon cam is operated, the feed lever must move this distance before lifting the feed arm to feed the ribbon.

During a five unit feed operation, the selector lever is moved forward to allow the lower feed arm to drop down. This downward motion of the feed arm slips the spring clutch so that the ribbon feed rollers will receive full motion from the cam to give five units of ribbon feed.

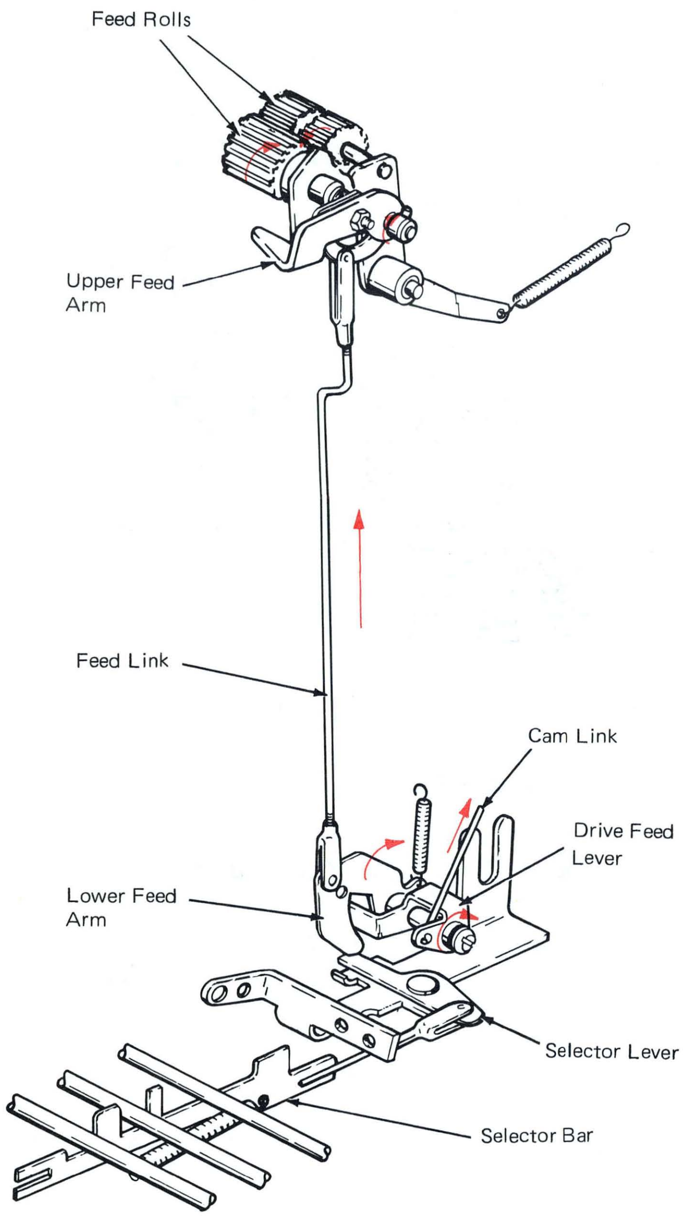


Figure 18 – Proportional Feed (C4-D4 Level 1)

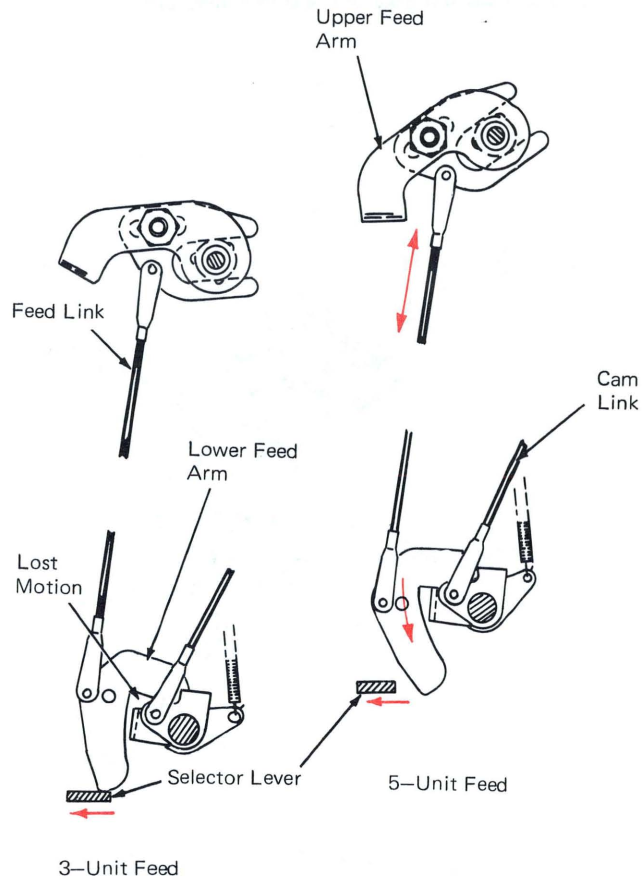
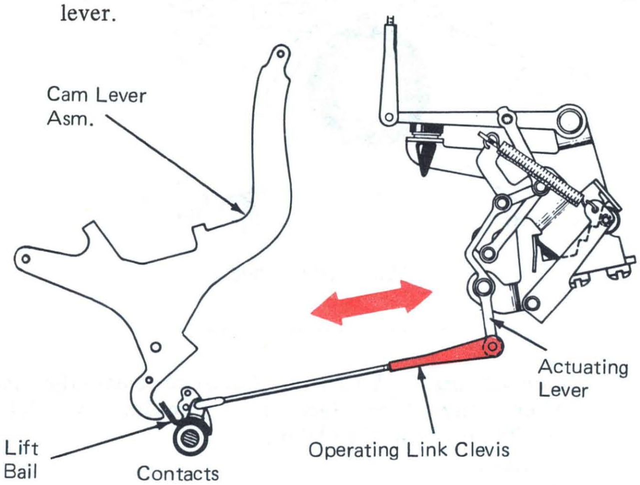


Figure 19 – Ribbon Feed Selection (C4-D4 Level 1) (Right Side View)

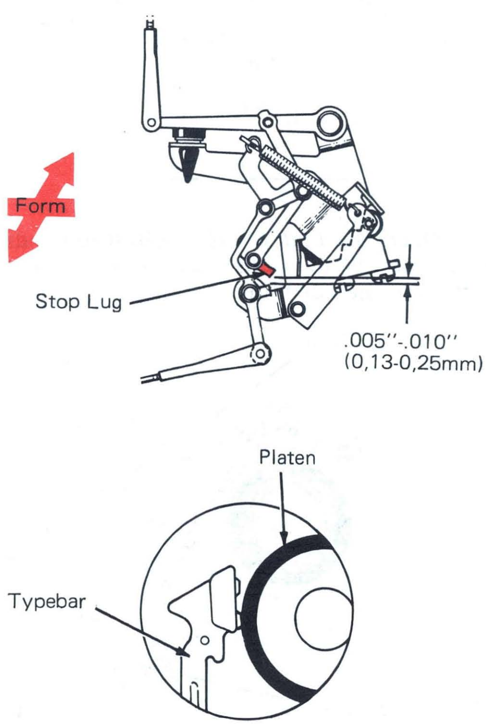
CARBON RIBBON ADJUSTMENTS

1. *Ribbon Lift Operating Link Clevis* – With the lift bail held against the cam tails and all play in the ribbon lift toggle removed to the front of the machine, adjust the clevis to match the hole in the actuating lever.



(Right Side View)

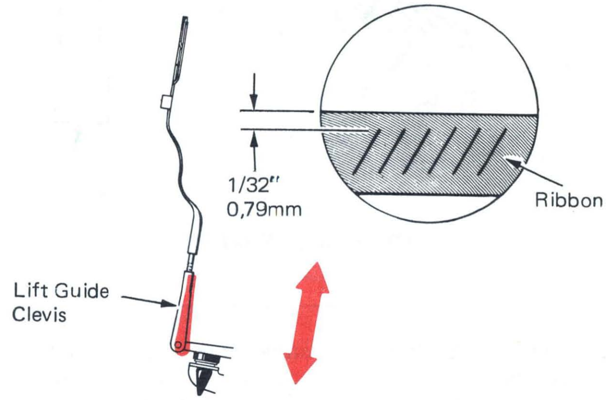
2. *Toggle Plate Stop Lug* – With a typebar held against the platen, form the stop lug for .005-.010" (0,13-0,25mm) clearance with the actuating lever extension (redesigned ribbon lift only).



(Right Side View)

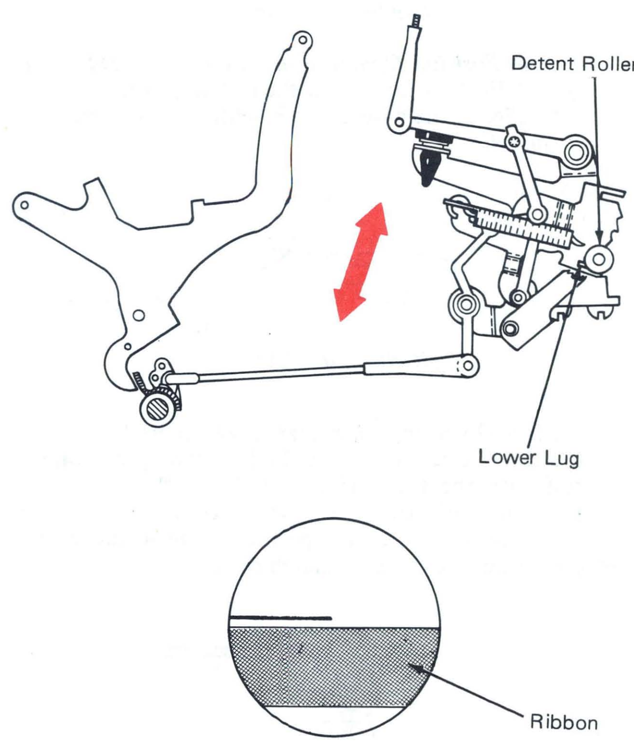
3. *Ribbon Lift Guide Clevis* – Adjust so the top of the characters strike 1/32" (0,79mm) below the upper edge of the ribbon in the lower lift position.

NOTE: With carbon ribbon, the diagonal should strike the center of the ribbon.



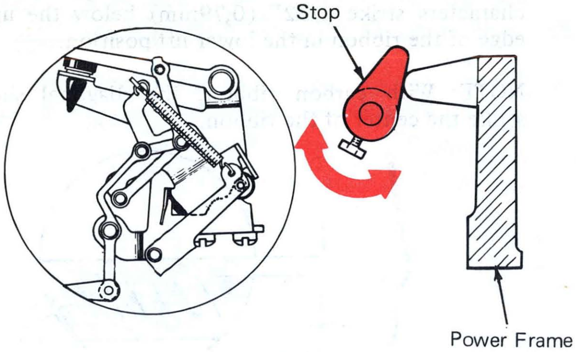
(Right Side View)

4. *Lower Lug* – With the ribbon position button in the stencil position, form so the underscore does not strike the ribbon.



(Right Side View)

5. *Ribbon Control Lever Stop (Early C Carbon Ribbon Only)* – Adjust to limit the ribbon position button to the first lift position.



(Right Side View)

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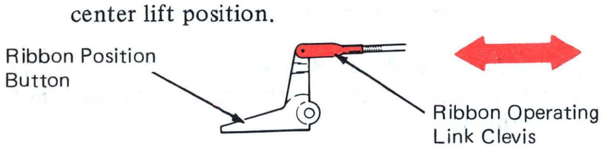
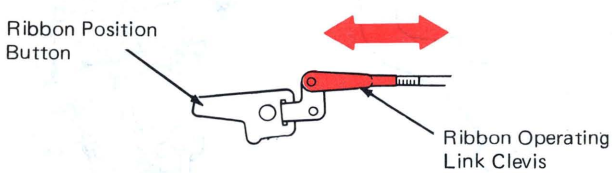
6. *Ribbon Position Operating Link Clevis, C1-C4* – Adjust so the ribbon position button matches the slope of the tab set and clear button when in the first lift position.

NOTE: On Model C modified ribbon feed, the button should match the rewind button when in the center lift position.



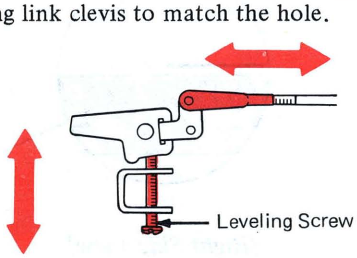
(Right Side View)

Ribbon Position Operating Link Clevis, D1-D4 (Level 2) – Adjust so the top of the ribbon position button is parallel to the base of the machine when in the first lift position.



(Right Side View)

Ribbon Operating Link Clevis, D4 (Level 1) – Adjust the leveling screw so that the positioning button will rest with the top surface parallel to the base of the machine with the link disconnected. With the lift mechanism in the lift position, adjust the ribbon operating link clevis to match the hole.



(Level 1) (Right Side View)

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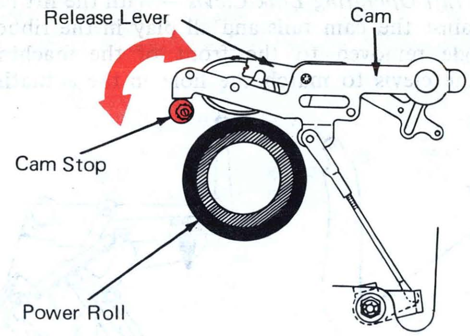
7. *Cam Clearance* – Adjust the cam stop so the release lever falls on the rear of the cam lug when the cam is released with the power off.



(Left Side View)

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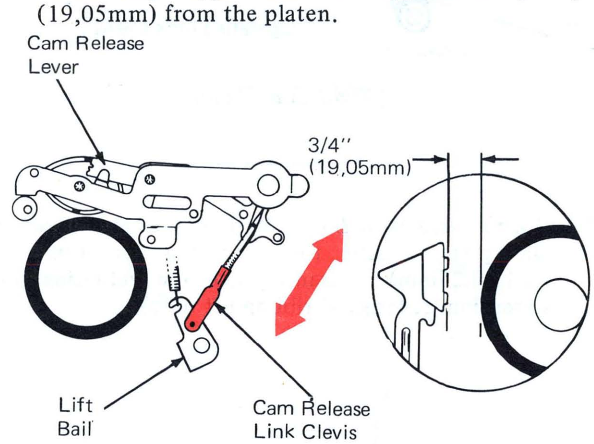
8. *Cam Release Link Clevis* – Adjust to release the cam when any type face is approximately 3/4" (19,05mm) from the platen.



(Left Side View)

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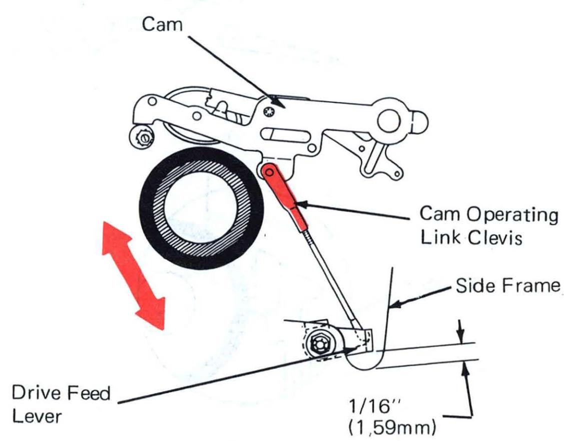
9. *Cam Operating Link Clevis* – Adjust so the drive feed lever rests 1/16" (1,59mm) above the slot in the bottom of the side frame.



(Left Side View)

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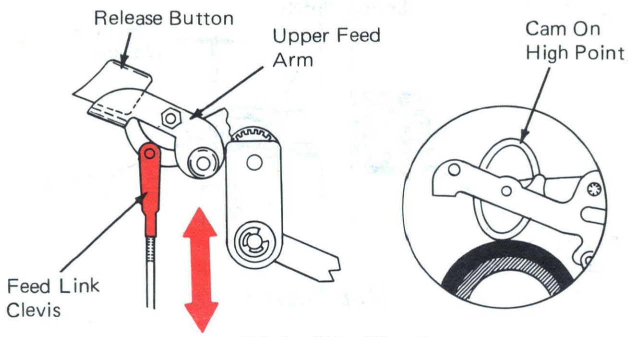
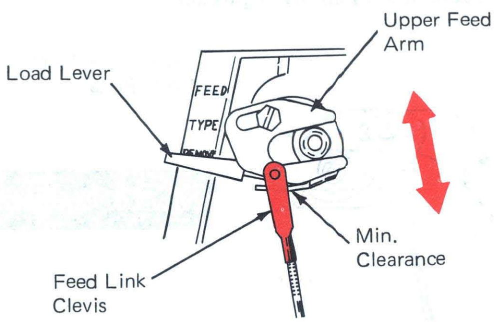
10. *Feed Link Clevis, C1, C4 (Level 1)* – Adjust to safely unlatch the ribbon release button without choking off when the cam reaches the high point.



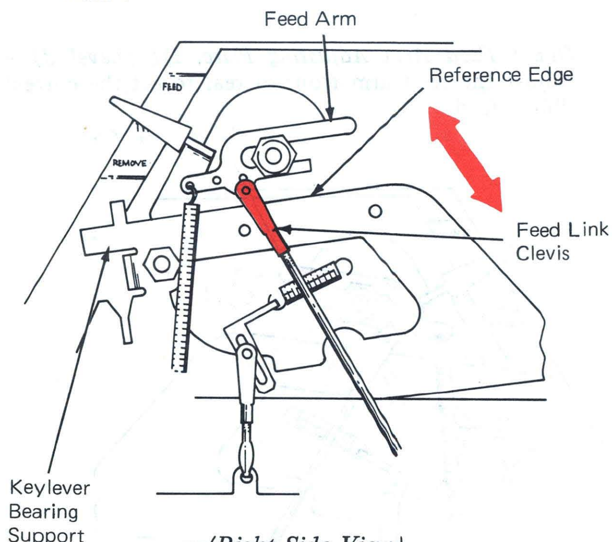
(Right Side View)

Feed Link Clevis, C1, D1 (Level 2) – With the reload lever detented in the remove position, adjust the link for a minimum clearance between the lug on the upper feed arm and the reload lever.



(Right Side View)

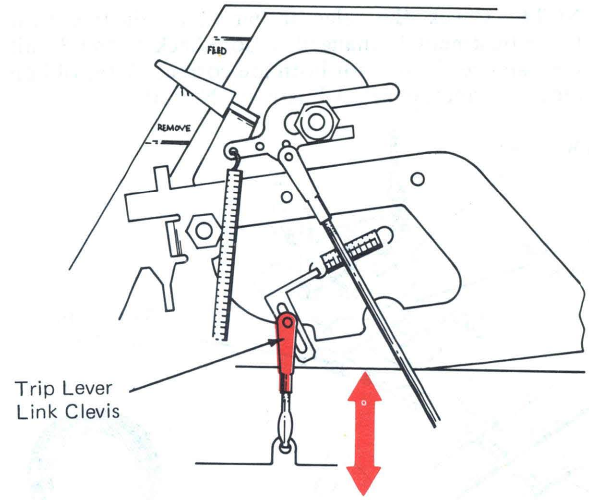
Feed Link Clevis, D1, D4 (Level 3) – Adjust the feed link clevis so the feed arm is slightly below parallel to the top edge of the keylever bearing support side frame.



(Right Side View)

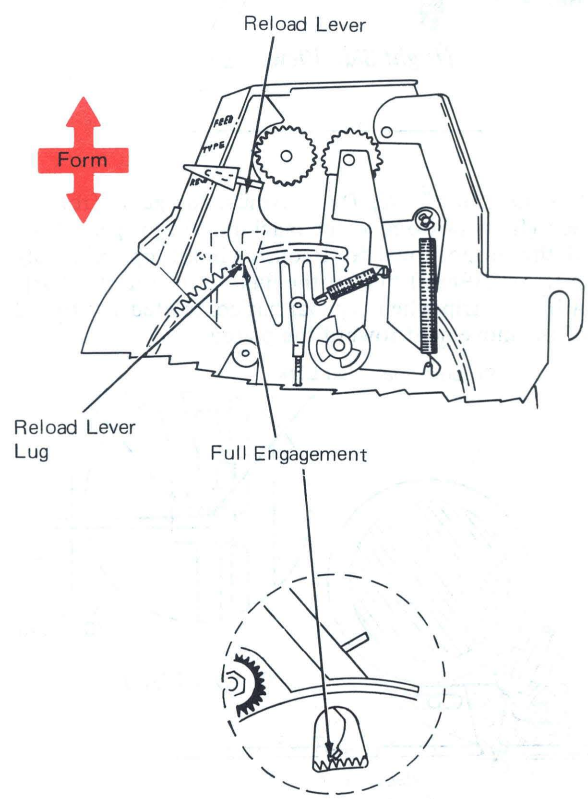
NOTE: Carbon ribbon spring drive take-up – see adj. 28 through 32.

11. *Trip Lever Connecting Link Clevis, D1, D4 (Level 3)* – Adjust the connecting link clevis for positive detent in the feed position and to restore from the remove position with a single typestroke.



(Right Side View)

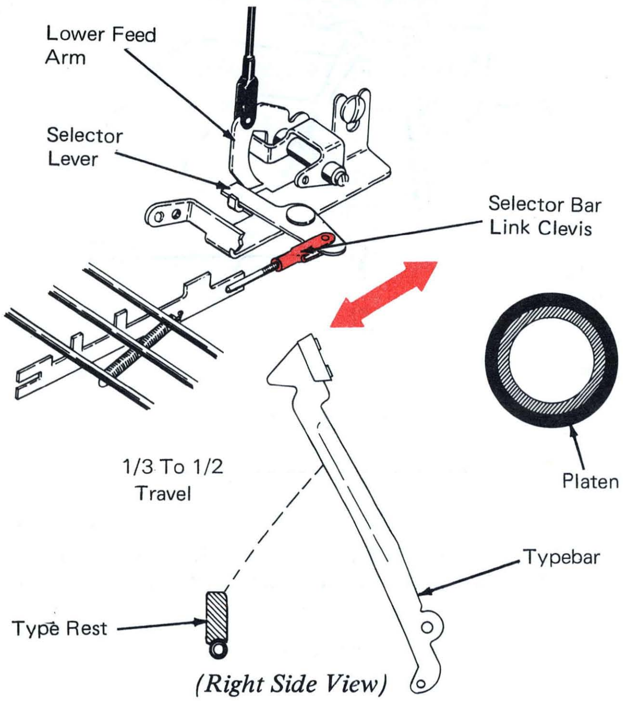
12. *Reload Lever Lug* – With the reload lever in the remove position, form the lug down so it has full engagement with the gear teeth of the take-up flange.



(Right Side View)

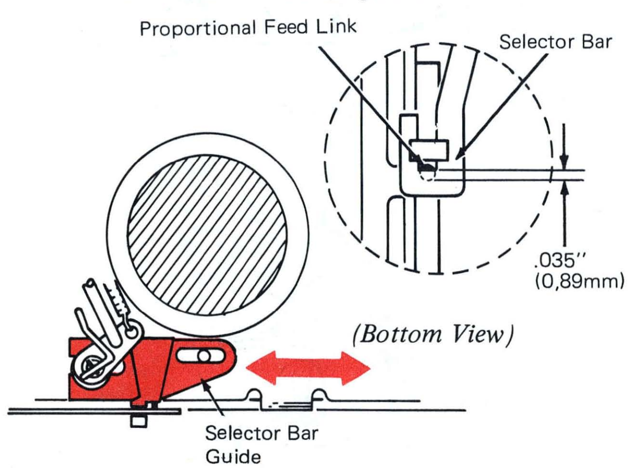
13. *Selector Bar Link Clevis, C4, D4 (Level 1)* – Adjust so the lower feed arm will drop off the selector lever when a four or five unit character has completed 1/3 to 1/2 of the movement toward the platen.

NOTE: Check the selector bar link adjustments if this adjustment is changed. Also, check 5- and 3-unit feed and readjust until both are correct. After ribbon feed is correct, check Adjustment No. 10.



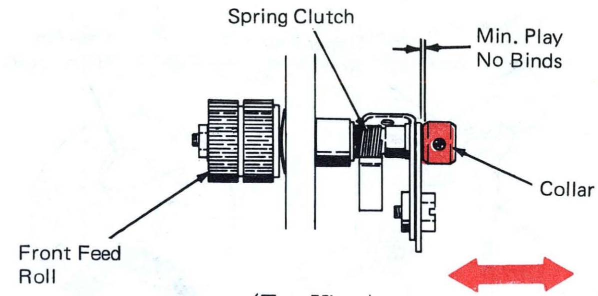
(Right Side View)

14. *Selector Bar Guide, D4* – Adjust the guide front to rear (from bottom of the machine) for proper release of the proportional feed control link [approximately .035" (0,89mm) bite of the link on the selector bar]. Adjust to trip when typebar has completed 1/3 to 1/2 of the movement toward the platen.



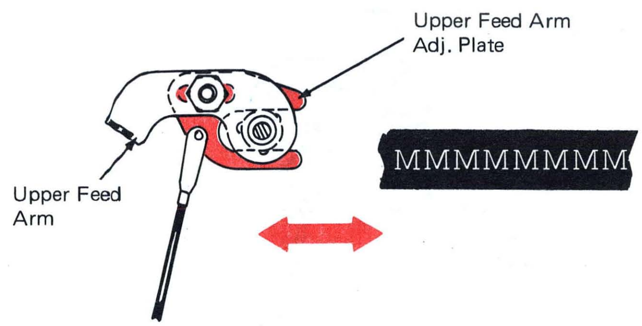
(Right Side View)

15. *Ribbon Feed Spring Clutch* – Adjust the collar for minimum end play without binding.



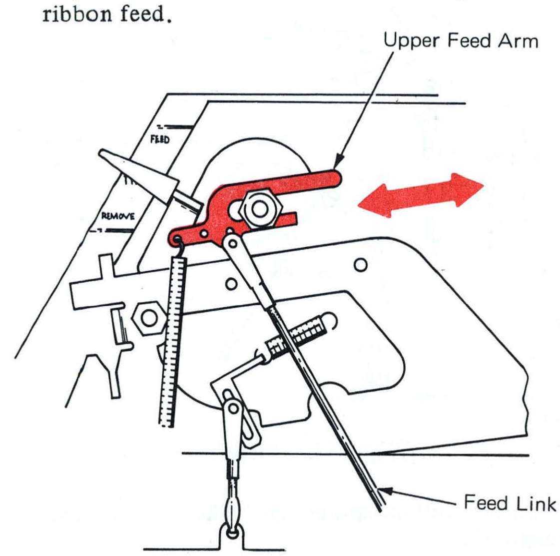
(Top View)

16. *Upper Feed Arm Adjusting Plate, C1, D1* – Adjust so that with 20 character escapements, the ribbon will feed the equivalent of 25 to 27 character escapements on 14 pitch machines and 23 to 25 character escapements on all other pitches.



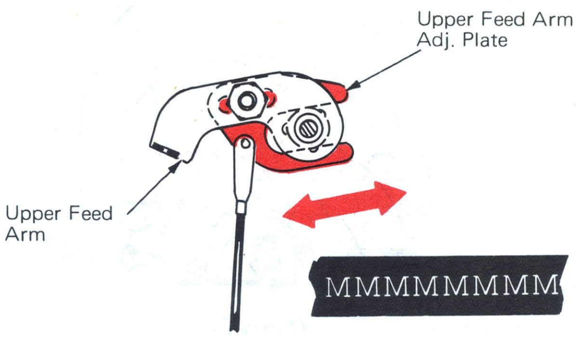
(Right Side View)

Upper Feed Arm Adjusting Plate, D1 (Level 3) – Adjust the feed arm front or rear to get the correct ribbon feed.



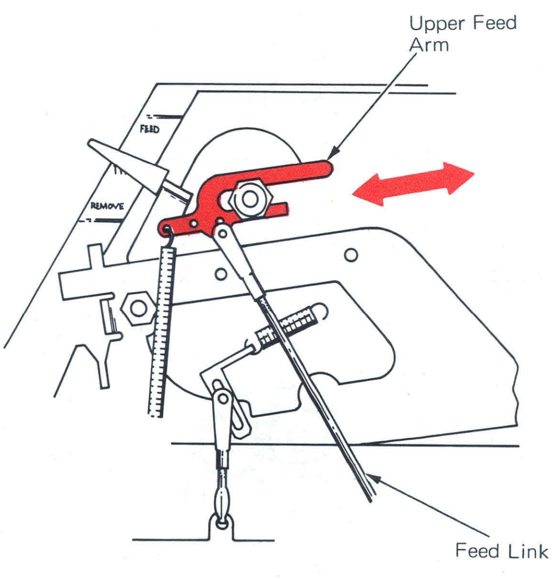
(Right Side View)

17. *Upper Feed Arm Adjusting Plate, C4 Only (Five Unit Feed)* – Adjust so that with 20 five unit escapements, the ribbon will feed the same as 23 to 25 five unit escapements (25 to 27 on 1/45 pitch).



(Right Side View)

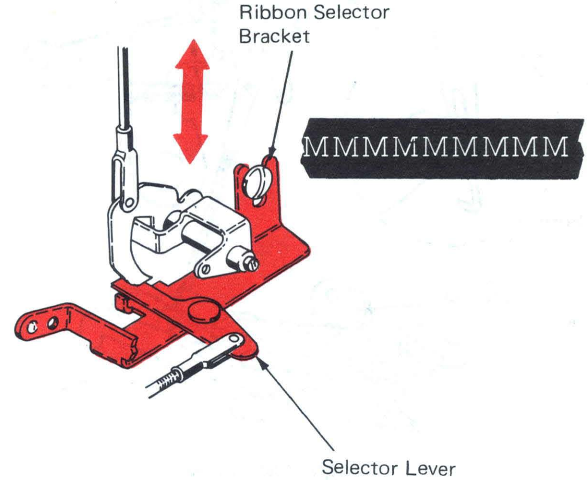
Upper Feed Arm Adjusting Plate, D4 – Adjust the feed arm front or rear to get the correct five unit ribbon feed.



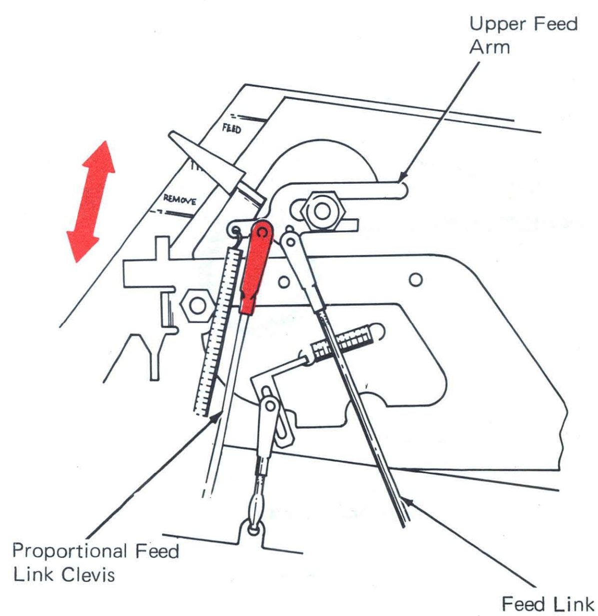
(Right Side View)

18. *Three Unit Feed C4, D4 (Level 1)* – Raise or lower the ribbon selector bracket so that with 20 three unit escapements, the ribbon will feed the same as 23 to 25 three unit escapements (25 to 27 on 1/45 pitch).

NOTE: Check the selector bar link adjustments if this adjustment is changed. Also, check five and three unit feed and readjust until both are correct.

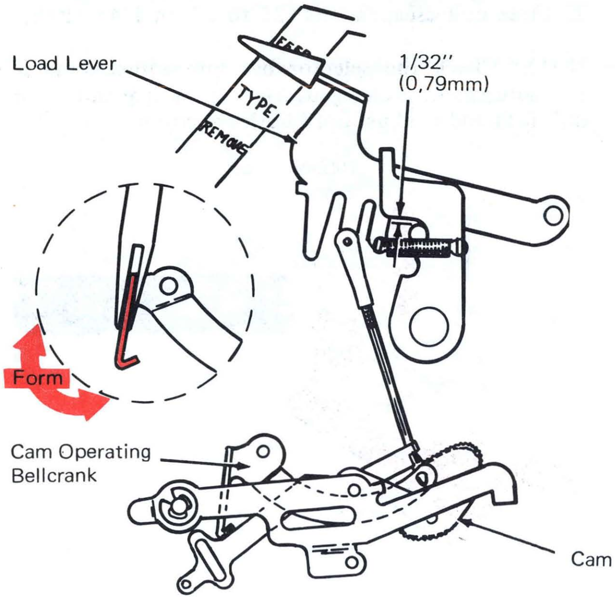


19. *Proportional Feed Link, D4 (Level 3)* – Adjust the proportional feed link clevis for correct three unit ribbon feed.



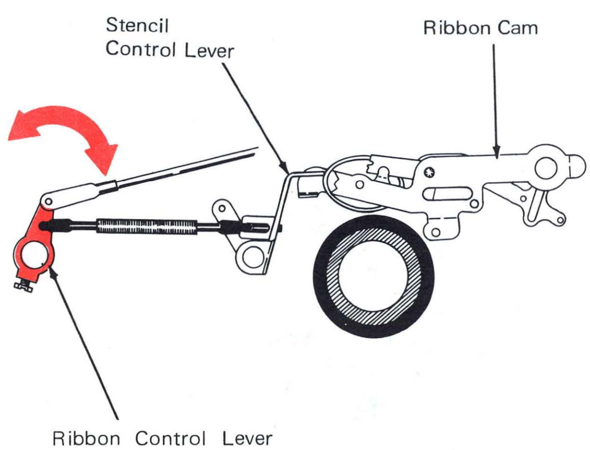
(Right Side View)

20. *Cam Operating Bellcrank (Level 2)* – Adjust by forming so the cam operates when the reload lever is 1/32" (0,79mm) from the feed position detent.



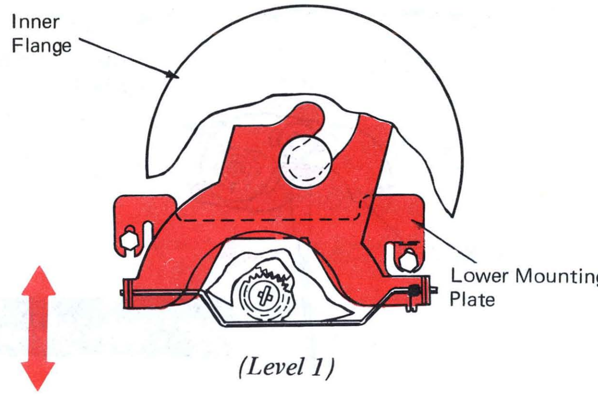
(Right Side View)

21. *Ribbon Control Lever* – Adjust so the ribbon cam will be held from rotating when the ribbon position button is depressed to the stencil position.

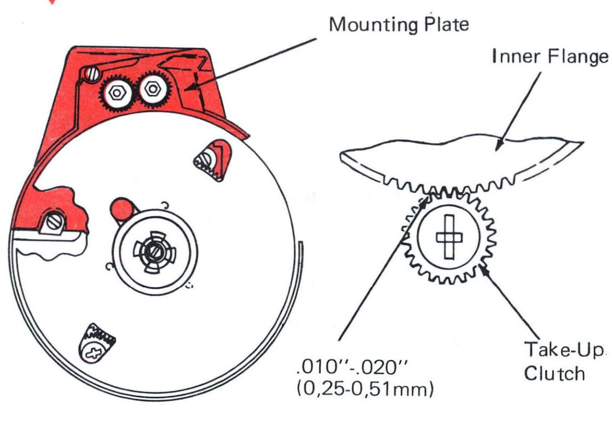


(Left Side View)

22. *Gear Mesh* – Adjust the take-up mounting plate up or down for .010"-.020" (0,25-0,51mm) backlash between the inner flange gear ring and the take-up drive clutch. The inner flange must not load the take-up clutch downward.



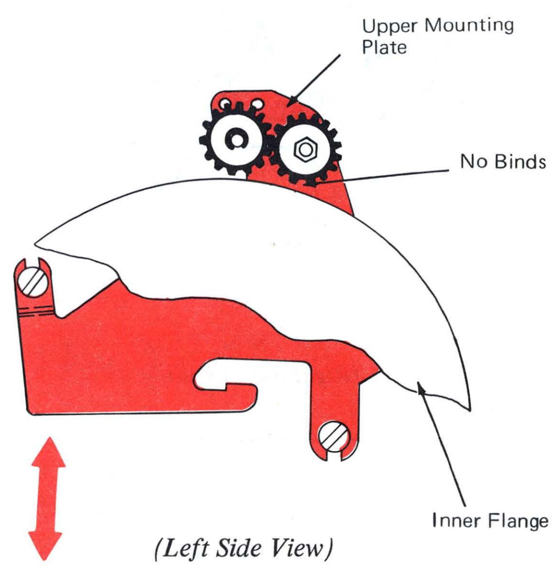
(Level 1)



(Level 2)

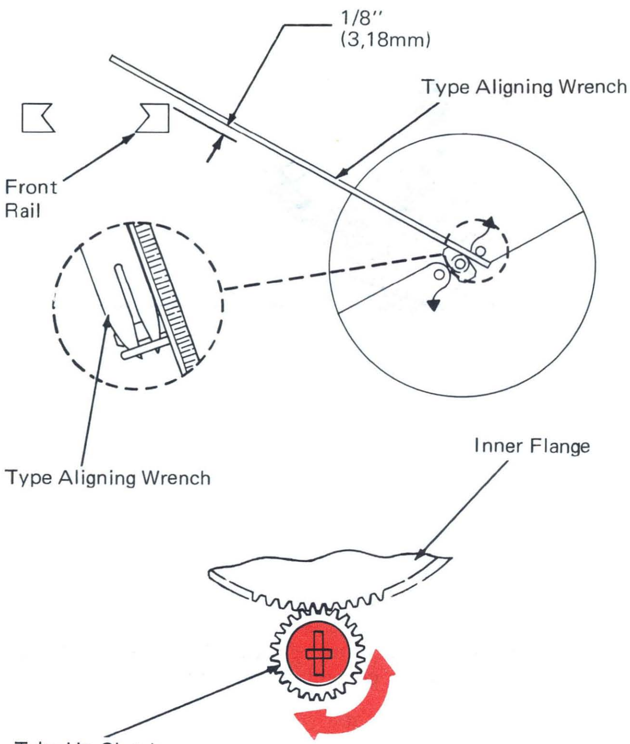
(Left Side View)

23. *Upper Mounting Plate (Two-Piece Take-Up Plate), C1-C4* – Adjust high enough to ensure that the flanges do not interfere with the feed rolls.



(Left Side View)

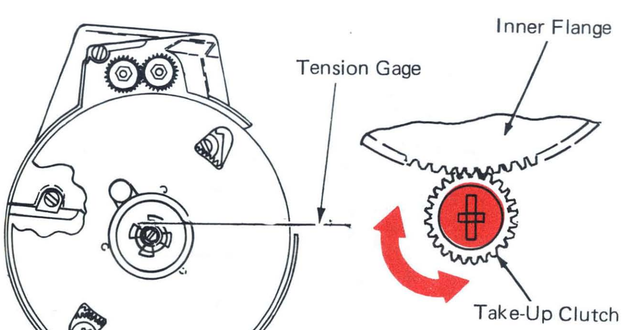
24. *Take-Up Drive Tension, C1, C4 (Level 1)* – Adjust take-up tension for 5.0-5.5 ounces (141,75-155,93g) of tension by turning the slotted adjusting cap with the offset screwdriver. Proper take-up tension may be observed by balancing the type aligning wrench as shown below. Approximately one turn of the adjusting cap equals one ounce change in take-up tension.



(Left Side View)

Take-Up Drive Tension (Level 2) – Adjust take-up tension to the setting in the table below.

NOTE: One tooth motion equals one ounce torque.

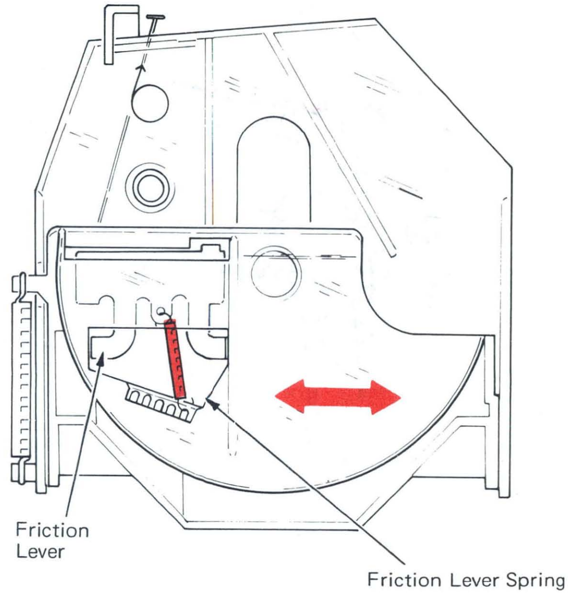


(Left Side View)

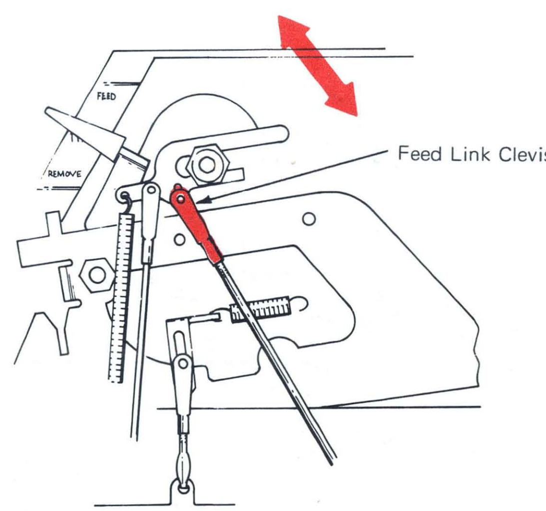
TAKE-UP DRIVE CLUTCH TENSION GUIDE

RIBBON	TENSION
IBM 5121	4 – 4-1/2 ounces
IBM 522	5 – 6 ounces
IBM 555 Mylar	4 ounces
IBM 5550 Acetate	4 ounces

25. *Ribbon Friction Lever* – Adjust friction lever spring left or right in the slots of the ribbon cover plate for just enough tension to prevent the ribbon supply spool from spool off during normal typing.

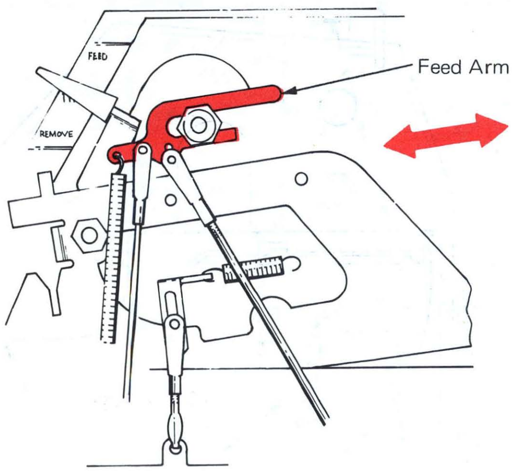


26. *Feed Link* – Adjust the feed link clevis so the feed arm is slightly below parallel to the top edge of the keylever bearing support side frame.

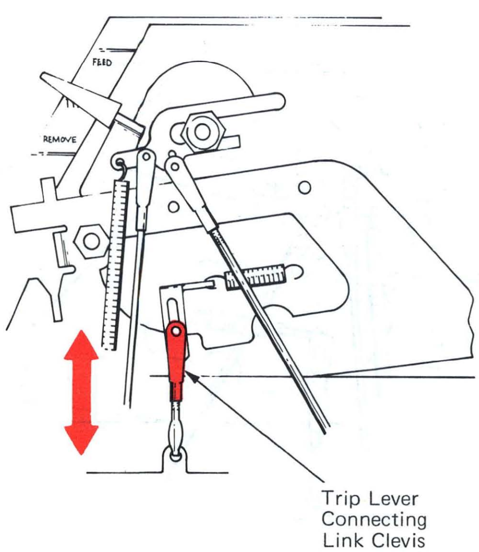


27. *Feed Arm, D1* – Adjust the feed arm front or rear to obtain correct ribbon feed.

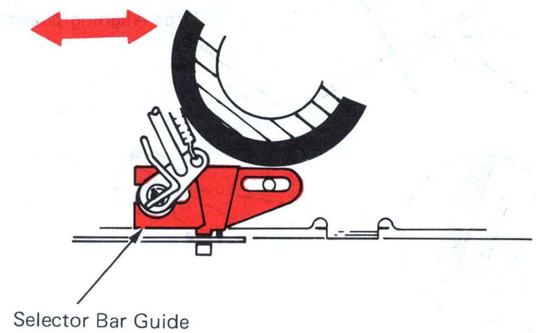
Feed Arm, D4 – Adjust the feed arm front or rear to obtain correct 5-unit ribbon feed.



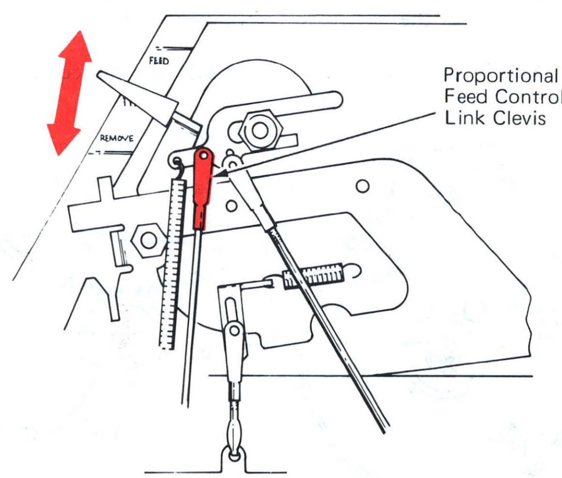
28. *Trip Lever Connecting Link* – Adjust the connecting link clevis for positive detent in auto-feed position and to restore from the remove position with a single typestroke.



29. *Selector Bar Guide, D4* – Adjust the guide front or rear (from bottom of the machine) for proper release of the proportional feed control link (approximately .035" [0,89mm] bite of the link on the selector bar). The typebar should be 1/3-1/2" (8,46-12,70mm) of the movement toward the platen.



30. *Proportional Feed Link* – Adjust the proportional feed link clevis for correct 3-unit ribbon feed.



The purpose of the fabric ribbon mechanism is to feed the ribbon in either direction so the ribbon can be used more than one time. This is done by a reversing feed mechanism that will take up ribbon on either the left or right ribbon spools. Once the end of the ribbon is reached on a spool, the reverse drive mechanism is activated and that spool becomes the take-up spool.

The Level 5 C-D modified positive drive mechanism (Figure 1) was developed to further improve serviceability, reliability and to reduce the number of parts required. This mechanism follows Levels 1, 2, 3 and 4 and may be installed on all C and D Typewriters. The ribbon lift and reversing remains the same as earlier levels. The greatest change is in the area of the ribbon feed mechanism. Level 5 is shown below. Other levels are shown and explained later in this section.

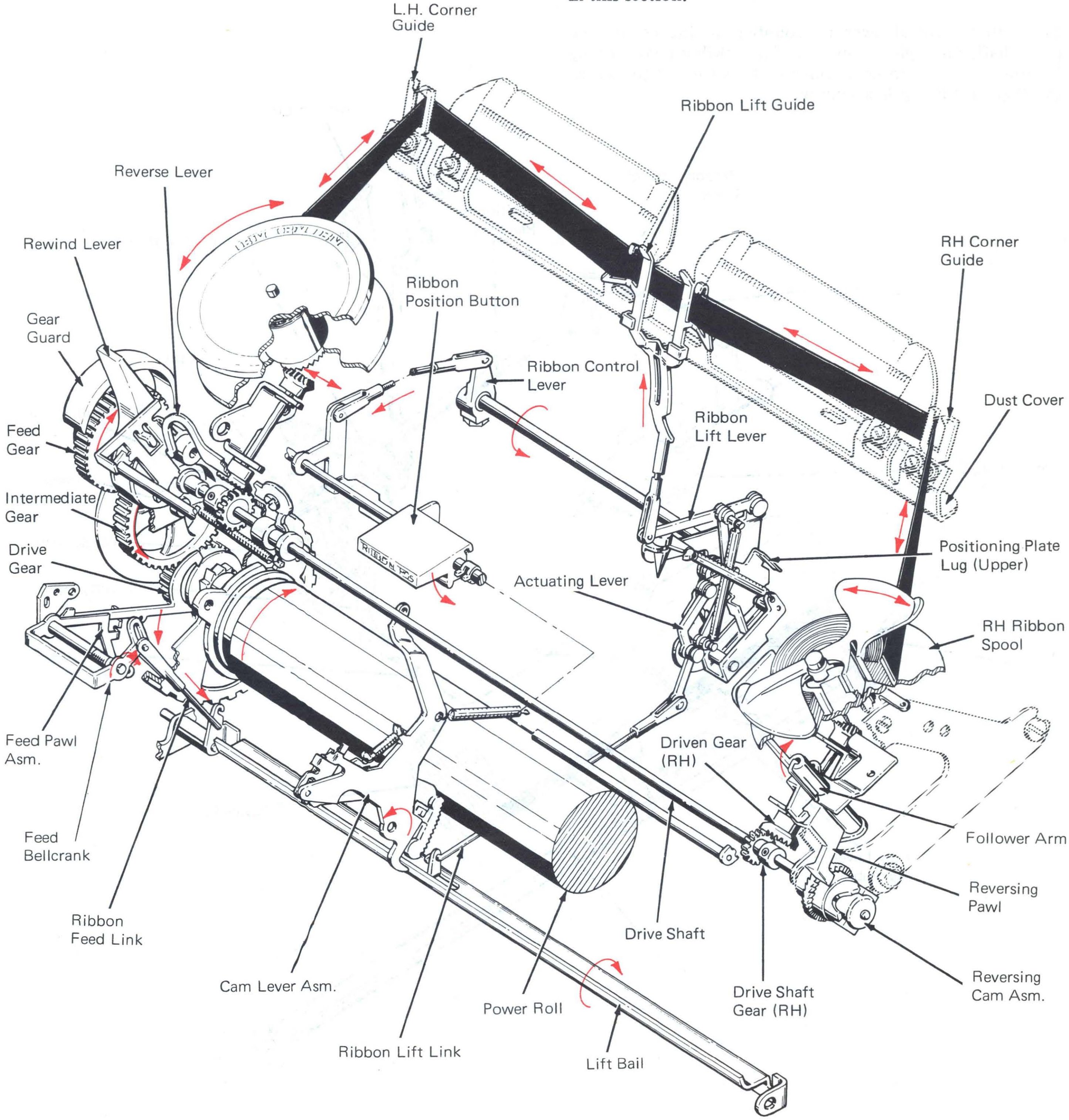


Figure 1 – D1, D4 Fabric Ribbon Mechanism (Level 5)

RIBBON LIFT (ALL LEVELS)

Operation of any letter cam rotates the ribbon lift bail about the mounting stud on the left and right side frame (Figure 2). The bail has two links attached to it: the feed link at the left and a ribbon lift link at the center.

Rotation of the ribbon lift bail pushes the ribbon lift link to the rear, pivoting the actuating lever to the rear also. Attached to the actuating lever is a toggle assembly which provides the motion to lift the ribbon lift lever and the ribbon lift guide. The ribbon lift guide positions the ribbon in front of the type face for a print operation.

The ribbon control lever is mounted on the positioning plate shaft. Through the motion of the "Ribbon Positioning Button," the ribbon positioning plate is rotated to change the angle of the toggle assembly.

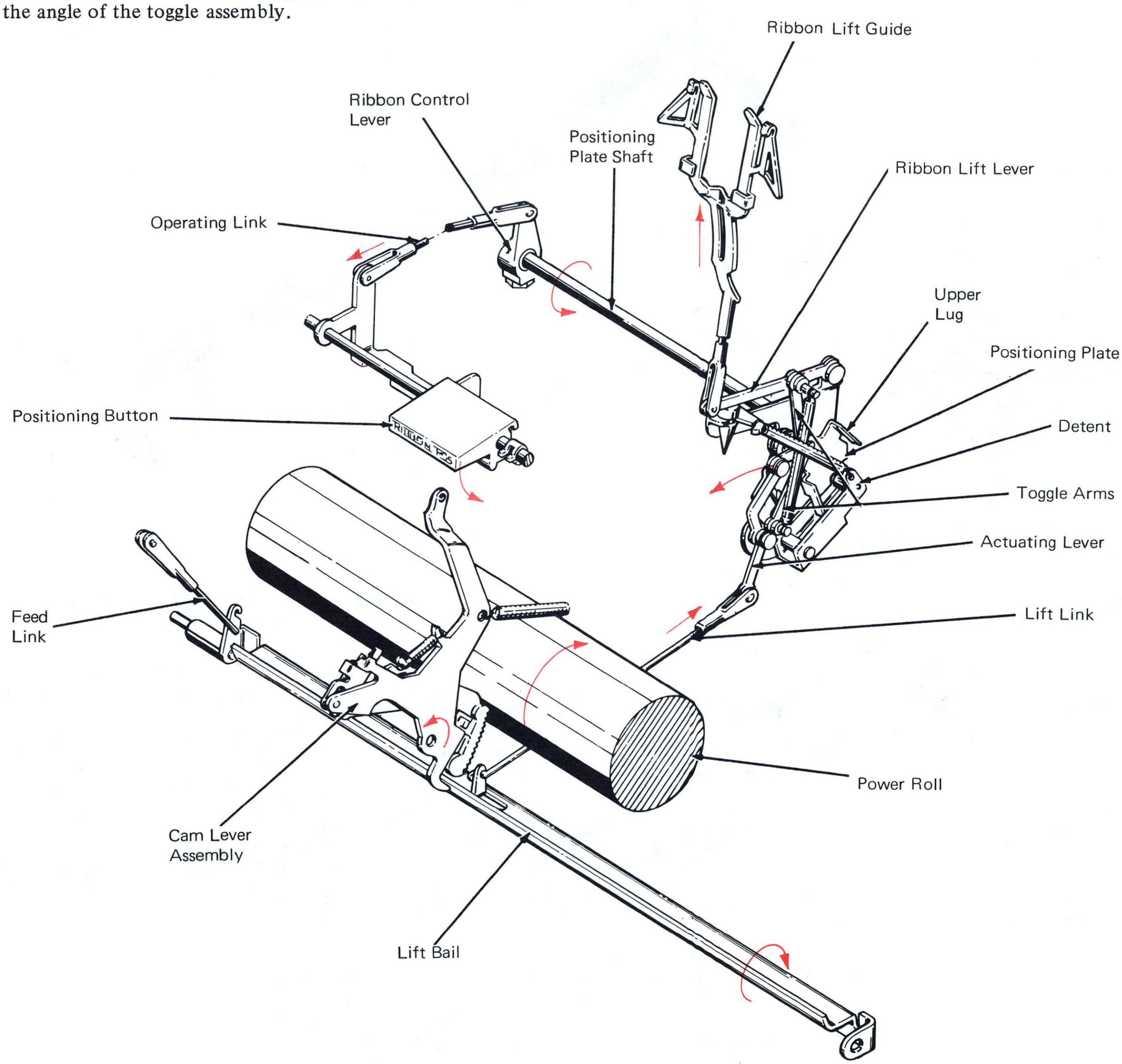


Figure 2 – Ribbon Lift Mechanism

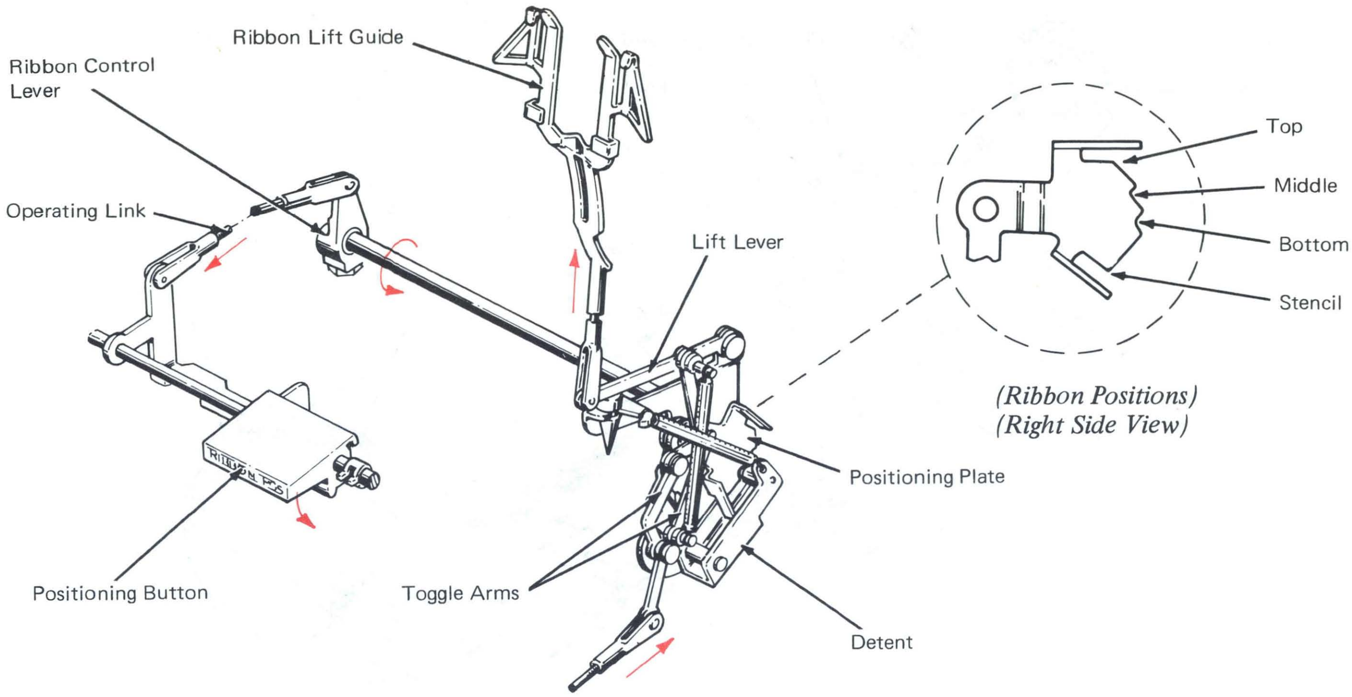
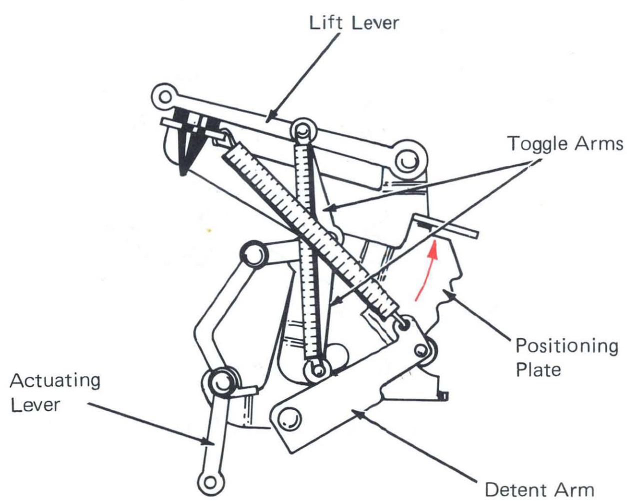


Figure 3 – Lift Positions

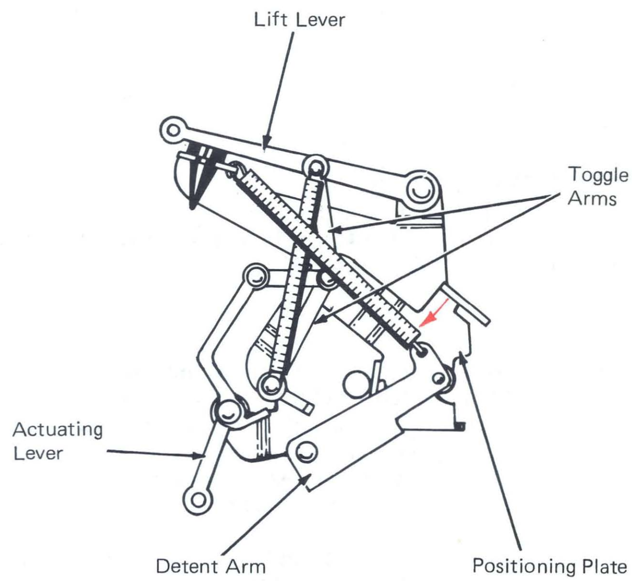
The fabric ribbon lift positioning plate can be rotated to three lift positions plus stencil (Figure 3). The three lift positions use the top, center and bottom of the ribbon. In the stencil position, the lower toggle arm is positioned almost in a straight line with the upper arm (Figure 4). The motion from the ribbon lift bail pulls the toggle over the center and the ribbon is not lifted.

When the "Ribbon Positioning" button is lifted from the stencil position, the lower toggle arm rotates and forms an angle with the upper arm. The higher the lever positions the angle between the toggle arms, the greater the amount of ribbon lifting (Figure 5).



(Right Side View)

Figure 4 – Stencil Position



(Right Side View)

Figure 5 – Toggle Arm Operation

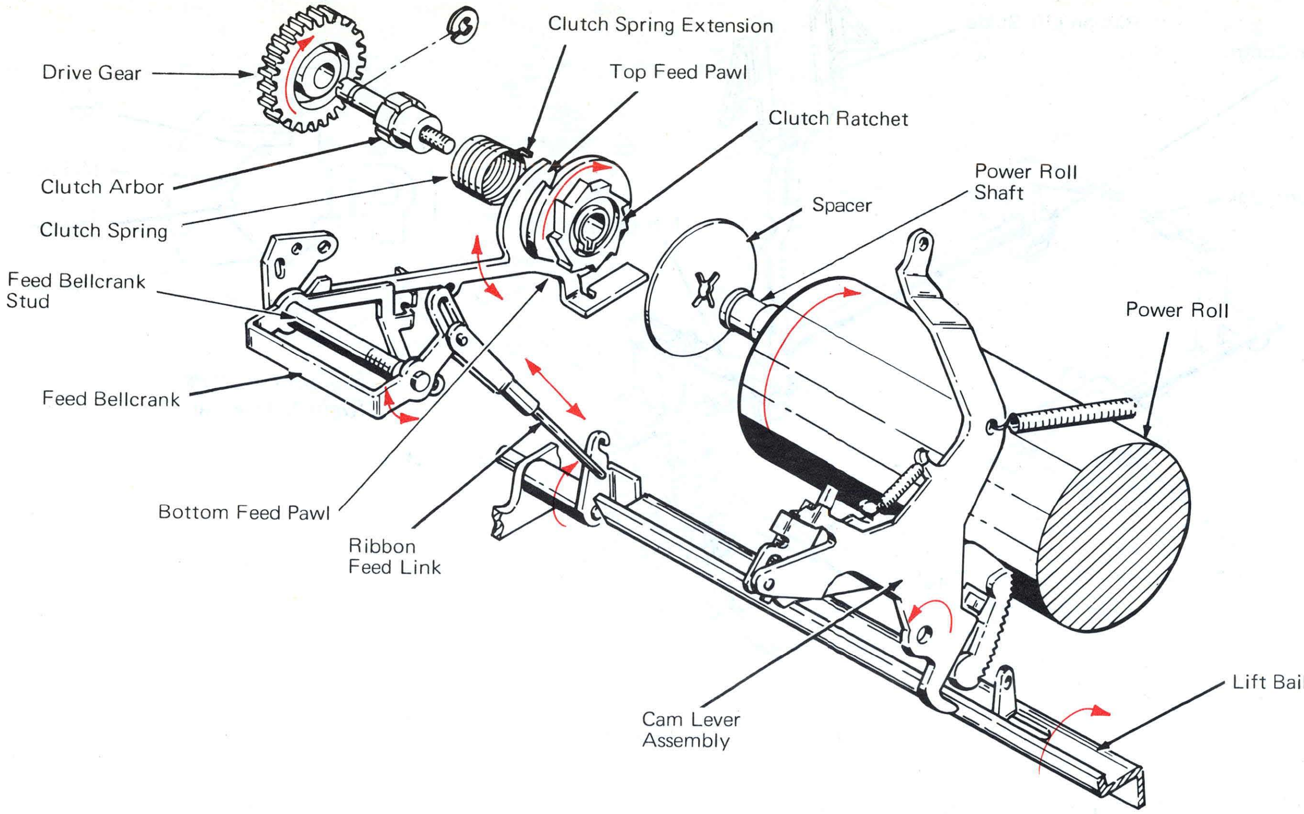


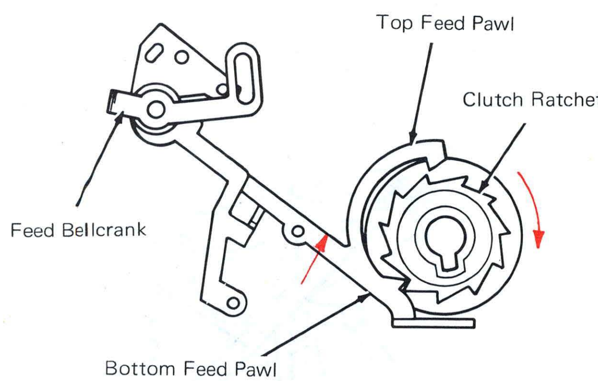
Figure 6 – Fabric Ribbon Feed (Level 5)

RIBBON FEED (LEVEL 5)

When any letter cam is operated, the tail of that cam lever assembly contacts the lift bail (Figure 6). As the ribbon lift bail is rotated, the feed link pulls on the feed bellcrank. The ribbon feed bellcrank is caused to pivot around the mounting stud.

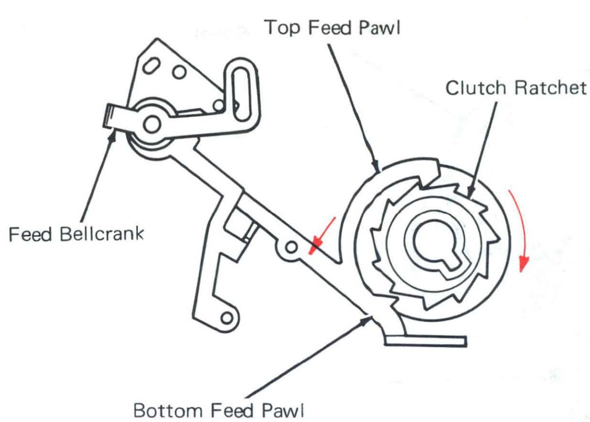
The feed pawl is mounted on the ribbon feed bellcrank stud. A ribbon clutch ratchet is mounted on the clutch arbor which attaches to the end of the power roll shaft. The motion of the power roll rotates the drive gear through the action of the spring clutch. An extension of the clutch spring fits into a hole in the clutch ratchet (Figure 6).

With the power roll turning and the ribbon mechanism at rest (Figure 7), the bottom feed pawl is holding a tooth of the clutch ratchet which prevents the clutch ratchet from rotating. Rotation of the power roll provides an opening or expanding of the clutch spring coils. In this expanded condition, the spring clutch allows the arbor of the clutch stud to turn freely. At this point, motion is not being transmitted to the drive gear.



(Right Side View)

Figure 7 – Bottom Feed Pawl Holding (Level 5)



(Right Side View)

Figure 8 – Top Feed Pawl Holding (Level 5)

During a feed operation (Figure 8), the bottom feed pawl is pulled down, releasing the ratchet. The clutch spring can now drive the turning clutch arbor and rotate the drive gear. As the bottom feed pawl moves down, it pulls the top pawl into position to be contacted by a ratchet tooth.

Returning the feed pawl to rest allows another ribbon feed action as the top feed pawl releases the ratchet. The bottom feed pawl is then moved into the path of the next ratchet tooth.

The rotation of the ribbon clutch is transferred to ribbon drive by the intermediate gear and the feed gear (Figure 9).

The ribbon feed gear is held by a setscrew to the solid ribbon drive shaft, which in turn is attached to the ribbon spools by means of drive and driven gears.

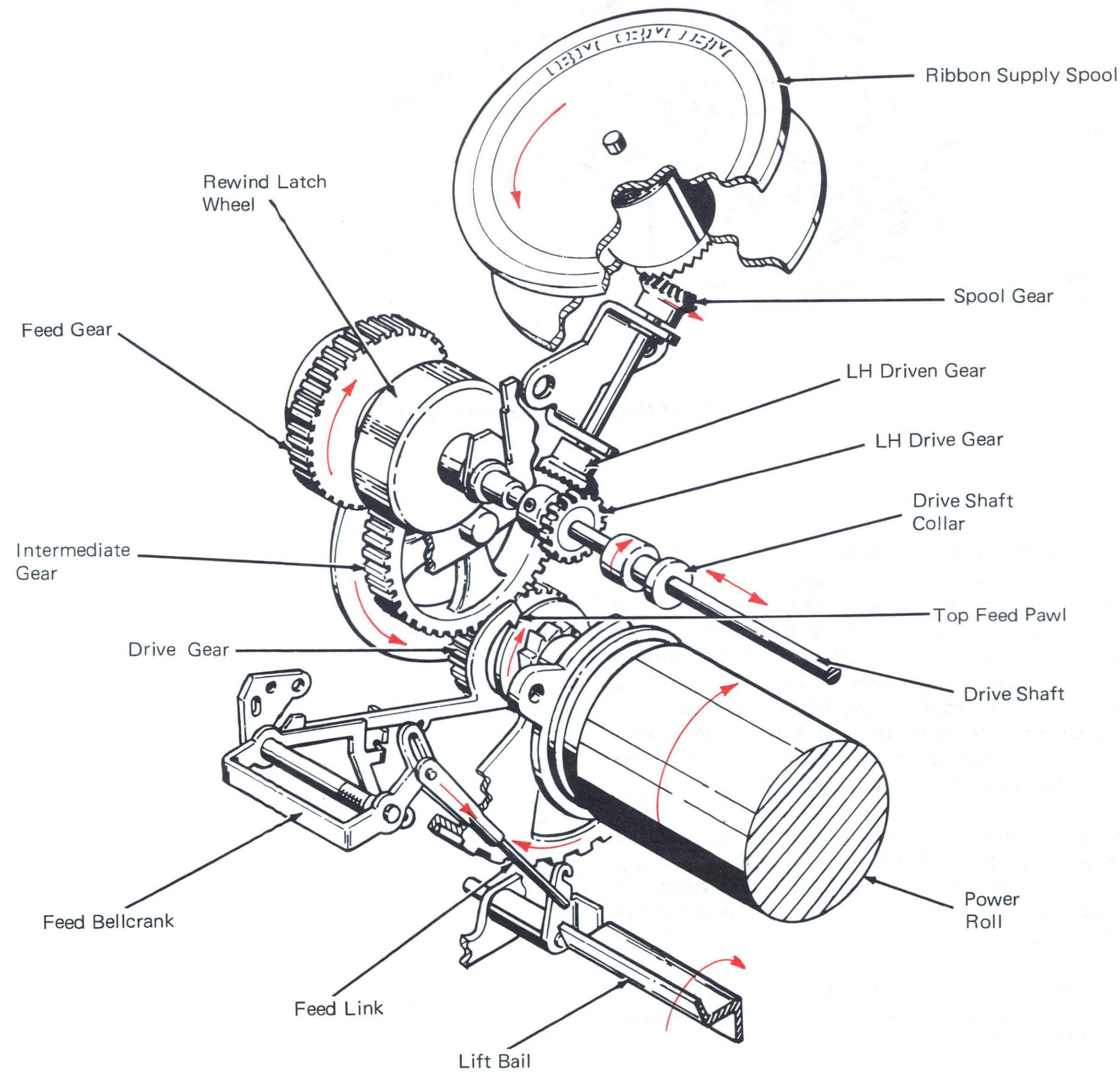


Figure 9 – Drive Shaft Operation (Level 5)

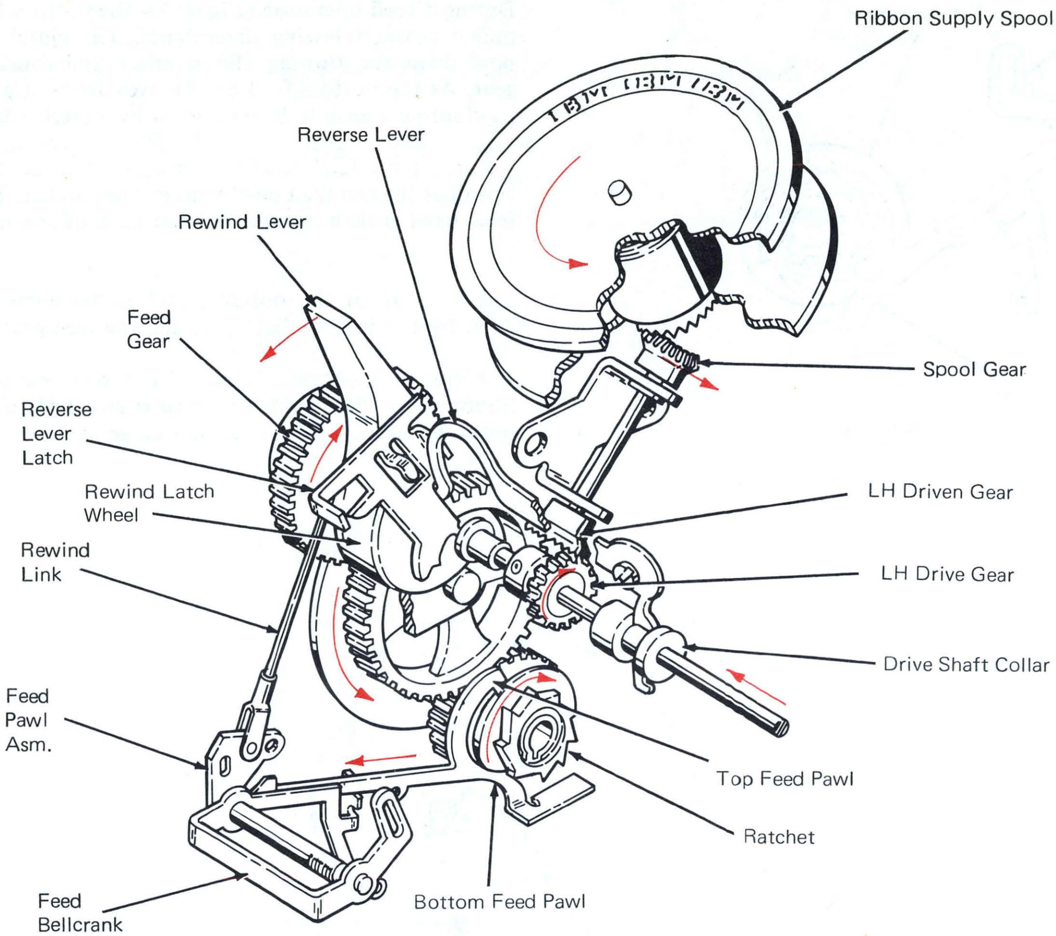


Figure 10 – Rapid Rewind Operation (Level 5)

RAPID REWIND OPERATION (LEVEL 5)

Rapid rewind for ribbon changing is activated by pulling forward on the ribbon rewind lever (Figure 10). If the ribbon is feeding to the right, a projection on the ribbon rewind lever will move the reverse lever latch forward to unlatch the reverse lever. The reverse lever is spring loaded and will force the drive shaft to the left so that the drive gear will engage with the left-hand spool driven gear. This action will make sure that the ribbon will be wound on the left-hand spool during a rapid rewind operation.

The rewind link connects the rewind lever to the feed pawl assembly. A slot on the feed pawl assembly cams the top and bottom pawl forward and disengages them from the clutch ratchet. The rewind lever is held operated by the rewind latch wheel.

When all of the ribbon is off the right-hand spool, the reversing mechanism causes the drive shaft to move back to the right and unlatch the rewind mechanism.

RIBBON REVERSE (LEVEL 5)

A sensing finger is against the ribbon on each spool and activates a reverse operation when the spool becomes empty. Ribbon feed is reversed by shifting the drive shaft laterally and winding ribbon back on the empty spool.

The drive shaft is moved to the right against the tension of the reverse lever spring by a reversing cam. The right sensing finger operates the reversing cam when the right-hand spool is empty. When the drive shaft is moved to the right, it is latched in this position.

The drive shaft is moved to the left by releasing the latch and allowing the reverse lever spring to move the drive shaft to the left. The left-hand sensing finger activates this operation when the left-hand spool is empty.

RIBBON REVERSE, LEFT-HAND SPOOL EMPTY

The left-hand sensing finger is spring loaded toward the hub of the ribbon spool and pivots about a shaft on the mounting bracket (Figure 11).

As the left-hand spool empties, the left-hand sensing finger falls into an opening in the hub of the ribbon spool. This motion causes an extension lug on the sensing finger to contact the reverse lever latch, which moves it forward to release the reverse lever so that the feed shaft can move to the left.

When using a thin fabric ribbon, there is a possibility that the pressure of the sensing finger will force the ribbon into an opening in the spool hub – one or two turns before the spool is empty. The ribbon would then prevent enough rotation of the sensing finger to unlatch the reverse latch.

If the reverse lever fails to unlatch immediately, the left-hand spool will continue to turn and push the sliding motion of the sensing finger to the left. This sliding action of the sensing finger ensures unlatching of the reverse lever under such a condition.

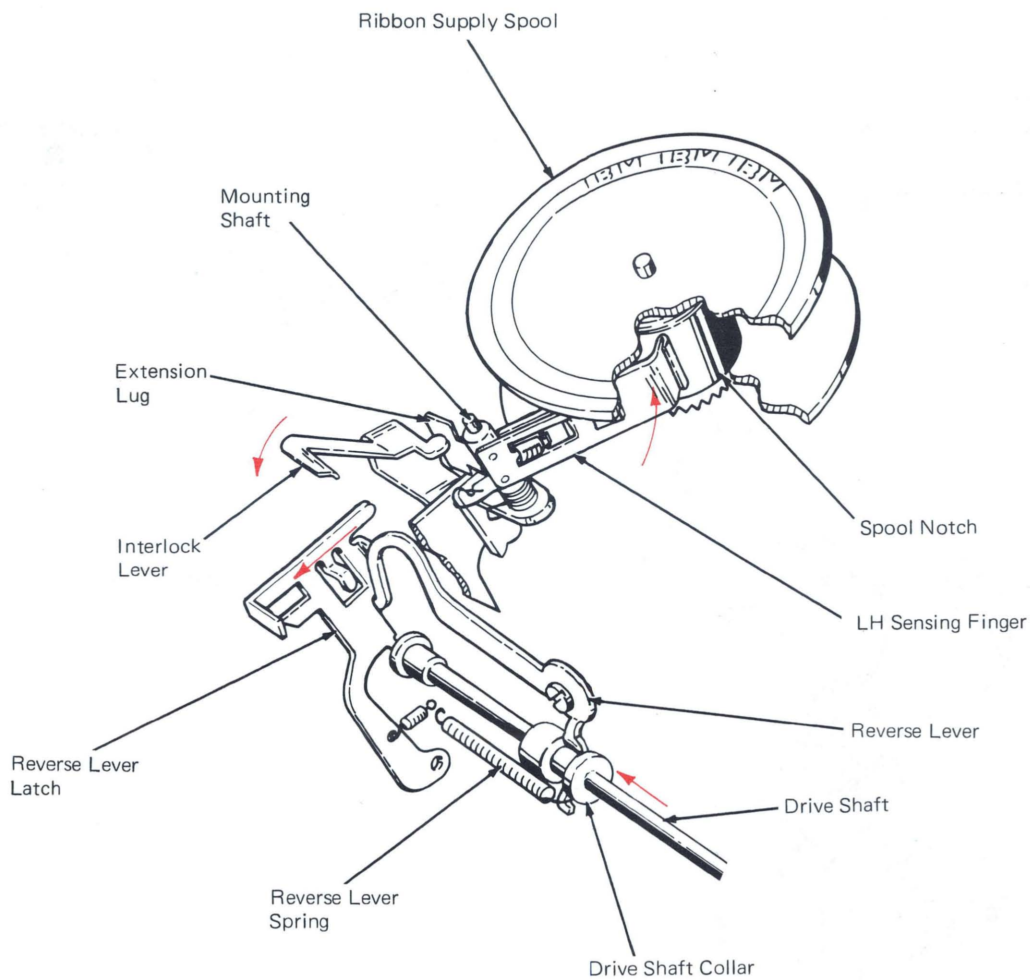


Figure 11 – Fabric Ribbon Reverse

RIBBON REVERSE, RIGHT-HAND SPOOL EMPTY

The right-hand sensing finger is mounted by a bracket to the keylever bearing support. The sensing finger is spring loaded toward the right-hand ribbon spool hub by the sensing cam spring. A reversing pawl is mounted by the same bracket to the keylever bearing support. There is a vertical slot on the top of the cam that engages with the sensing finger (Figure 12).

The right-hand spool has an opening in the hub that is covered by a plastic gate. The gate prevents the sensing finger from entering the spool slot before the spool is empty. As the right-hand spool empties, the plastic gate swings open and engages the sensing finger. Motion of the right-hand sensing finger rotates the reversing pawl which engages a tooth on the primary cam and stops the rotation. As the secondary cam continues to rotate with the drive shaft, it follows the camming surface of the primary cam – pulling the drive shaft to the right until the reverse lever latches.

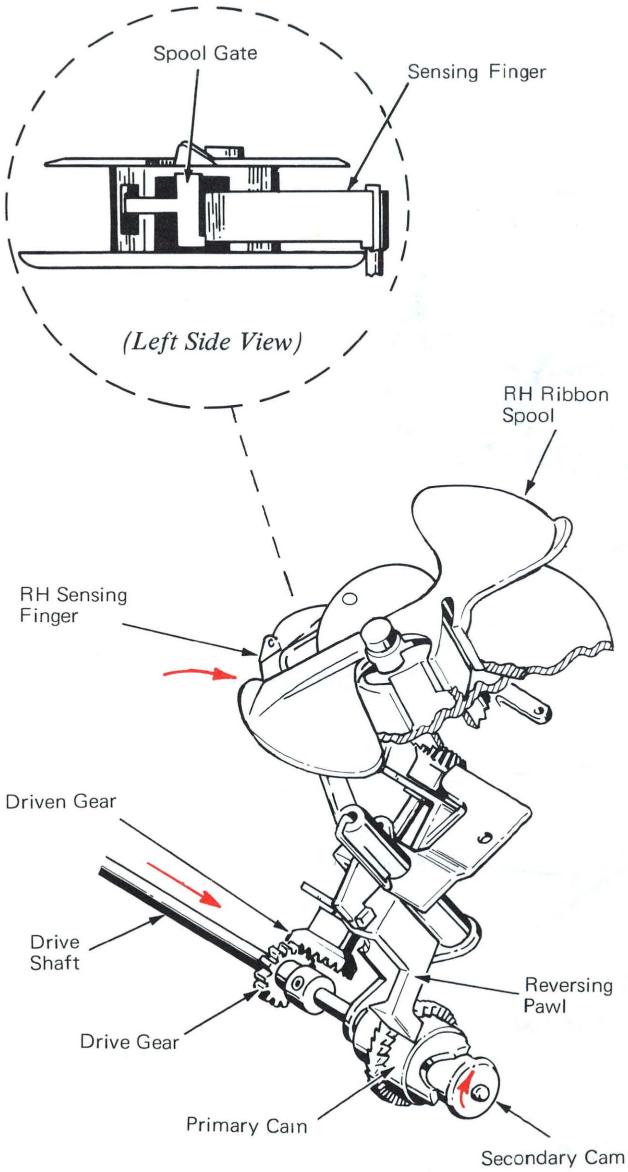


Figure 12 – Fabric Ribbon Reverse

SENSING FINGER

To help the operator when changing ribbon, the sensing finger swings out from between the left-hand spool flange when the front cover is raised (Figure 13). An interlock, spring loaded against a lug on the cover, provides this action. This allows the operator to lift the spool out without interference from, or damage to, the sensing finger.

With the front cover closed, the left-hand sensing finger spring tension provides some tension on the spool. This helps prevent overrunning of the left-hand spool, and spilling off ribbon, when ribbon reverse occurs at the end of a rewind operation. If rewind is operated with the front cover opened, the tension of the sensing finger is removed.

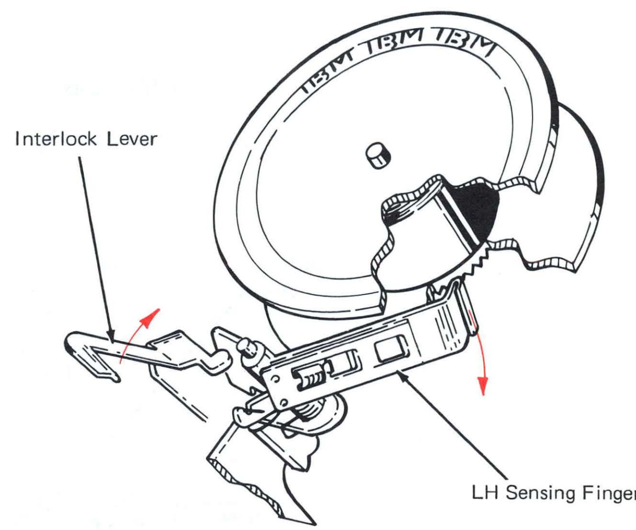


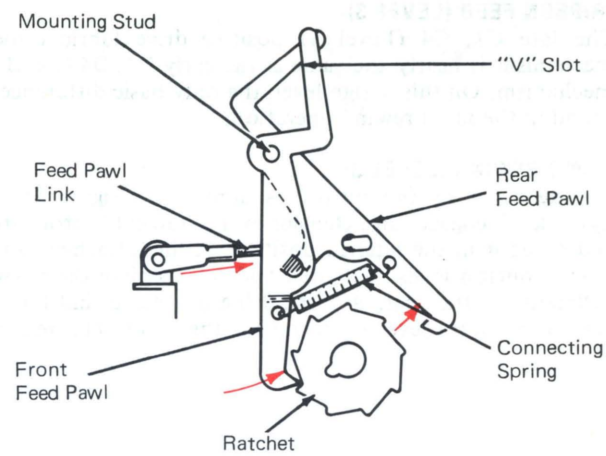
Figure 13 – Cover Interlock Operation

RIBBON FEED (LEVEL 4)

The early D1, D4 (Level 4) mechanism (Figure 14) uses the same basic design as Level 5. Part differences are found in the feed pawls and feed bellcrank. The operational theory is basically the same.

FEED PAWLS (LEVEL 4)

The front and rear feed pawls are mounted and pivoted on a common mounting stud. A spring is connected between the two pawls loading them toward each other. An extension on the rear feed pawl contacts a lug on the front feed pawl to provide a stop and maintain proper clearance between the working surfaces of the feed pawls and the ribbon clutch ratchet (Figure 15). The ribbon clutch is the same for both levels of mechanisms, with the feeding of the ribbon slightly different. Motion to operate the feed pawls comes from the ribbon feed bellcrank through the feed pawl link.



(Right Side View)

Figure 15 – Feed Pawl Mounting (Level 4)

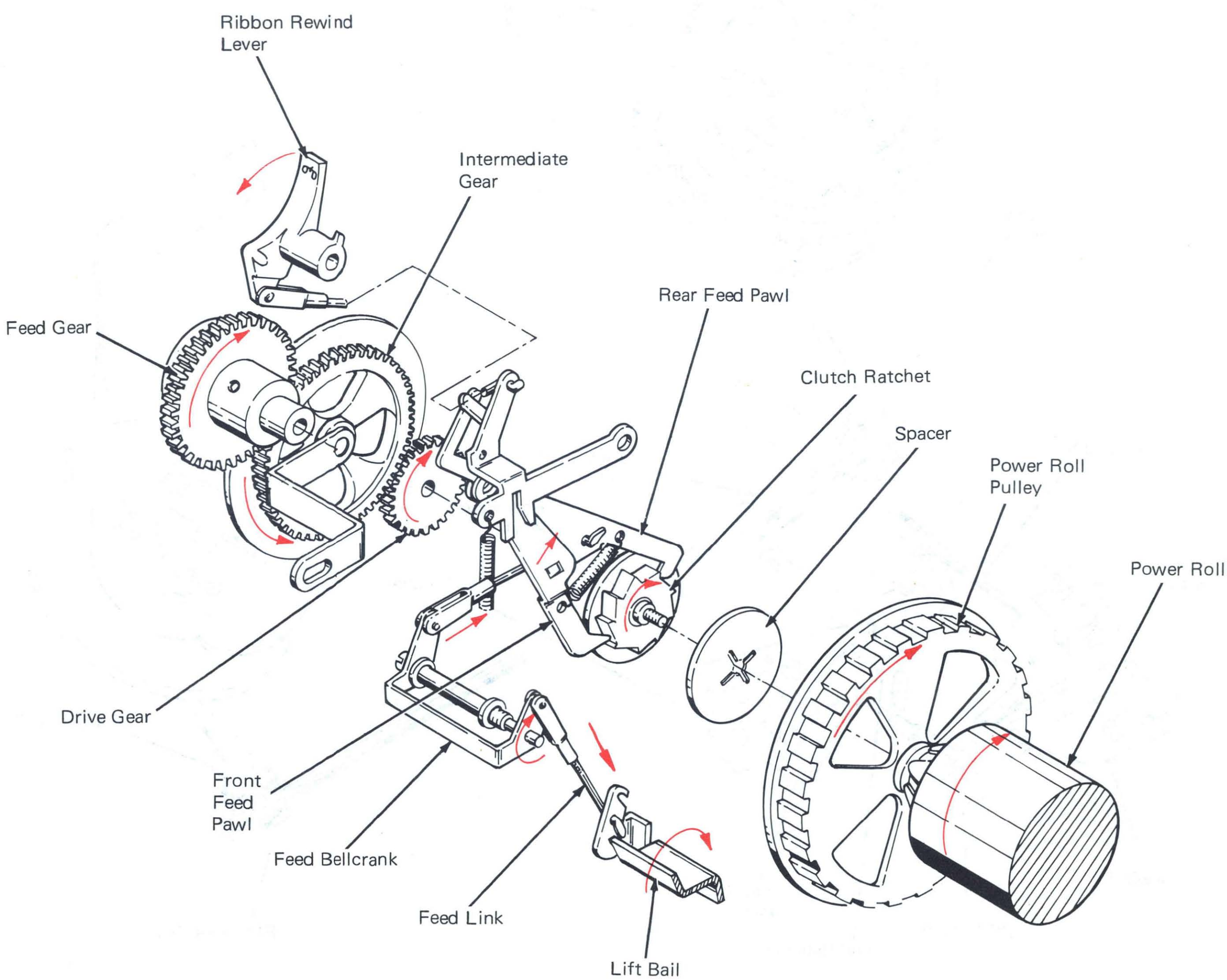


Figure 14 – Early D1, D4 Fabric Ribbon Drive (Level 4)

RIBBON FEED (LEVEL 3)

The late C1, C4 (Level 3) positive drive fabric ribbon mechanism is nearly the same as the early D1, D4 (Level 4) mechanism. On this design level, the only basic difference is found in the rapid rewind operation.

RAPID REWIND (LEVEL 3)

As the rapid rewind button is depressed (Figure 16), a nylon latch engages an extension of the rewind button latch and holds it in the latched position. A link attached to the rewind button is also actuated and acts to pivot the rewind bellcrank to the rear. A vertical lug on the rewind button cams the reverse lever latch toward the front. This releases the reverse lever and the spring loaded drive shaft is pulled to the left, where the drive gear engages with the left-hand driven gear. This action makes sure that the ribbon will be wound on the left-hand spool during rapid rewind operation.

A pin attached to the rewind bellcrank fits in an inverted V slot which is formed by extensions of both the front and rear feed pawls (Figures 15 and 16). As the rewind bellcrank is actuated, the pin rides up the slope of the inverted V slot causing both feed pawls to be moved away from the clutch ratchet. The unlatching of the rapid rewind mechanism is the same as Level 4.

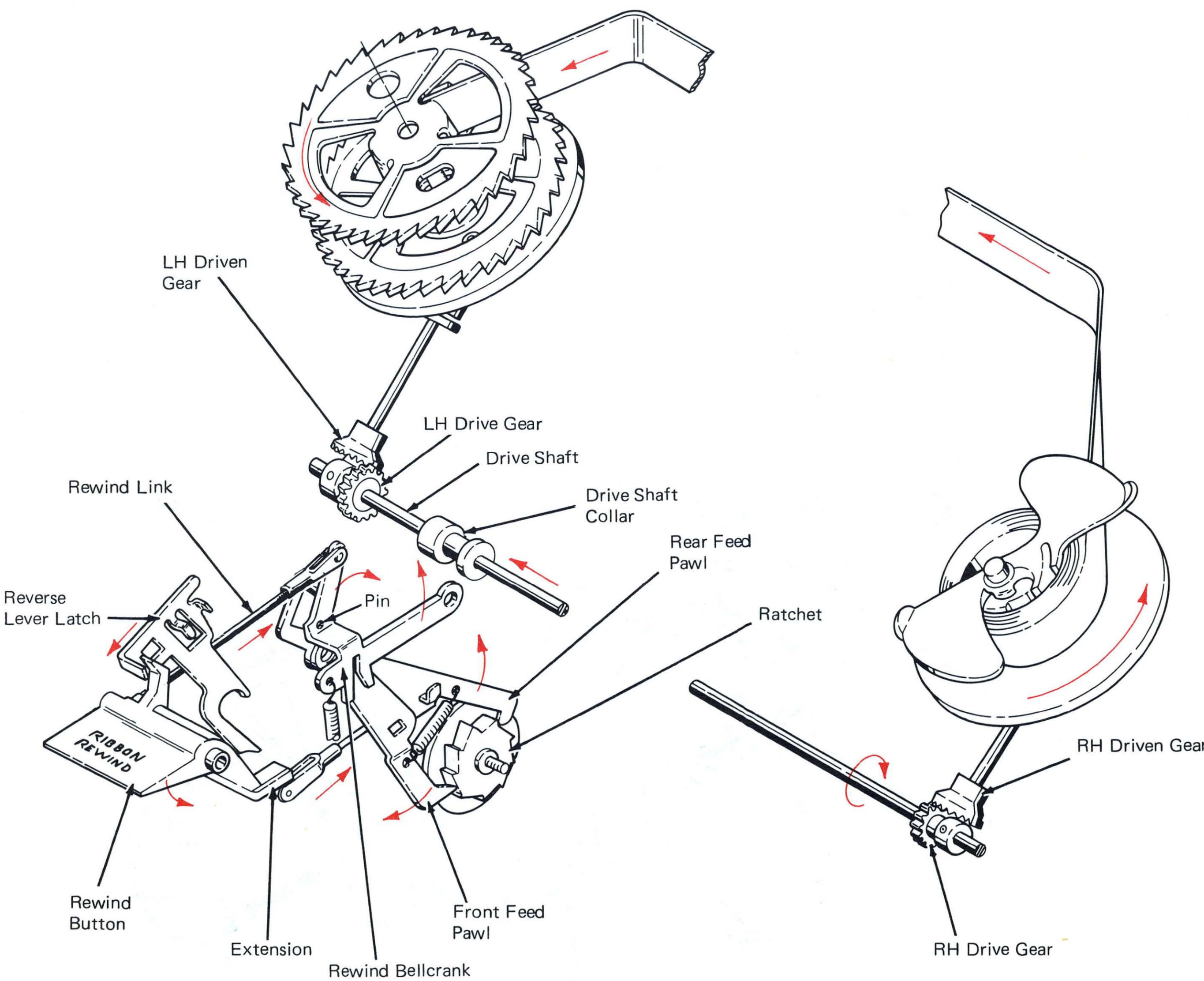


Figure 16 – C1, C4 Fabric Ribbon Mechanism (Level 3)

RIBBON FEED (LEVEL 2)

The Model C Typewriter also uses a modified fabric ribbon mechanism (Level 2). The rapid rewind and left-hand reverse mechanism was simplified, giving a more positive operation and making it easier to adjust (Figure 17). The modified mechanism employs a laterally movable rotating drive shaft which is the same as that of the earlier mechanism. The theory and operation remains unchanged. The ribbon reverse is the same as the current level; however, the rapid rewind mechanism is different.

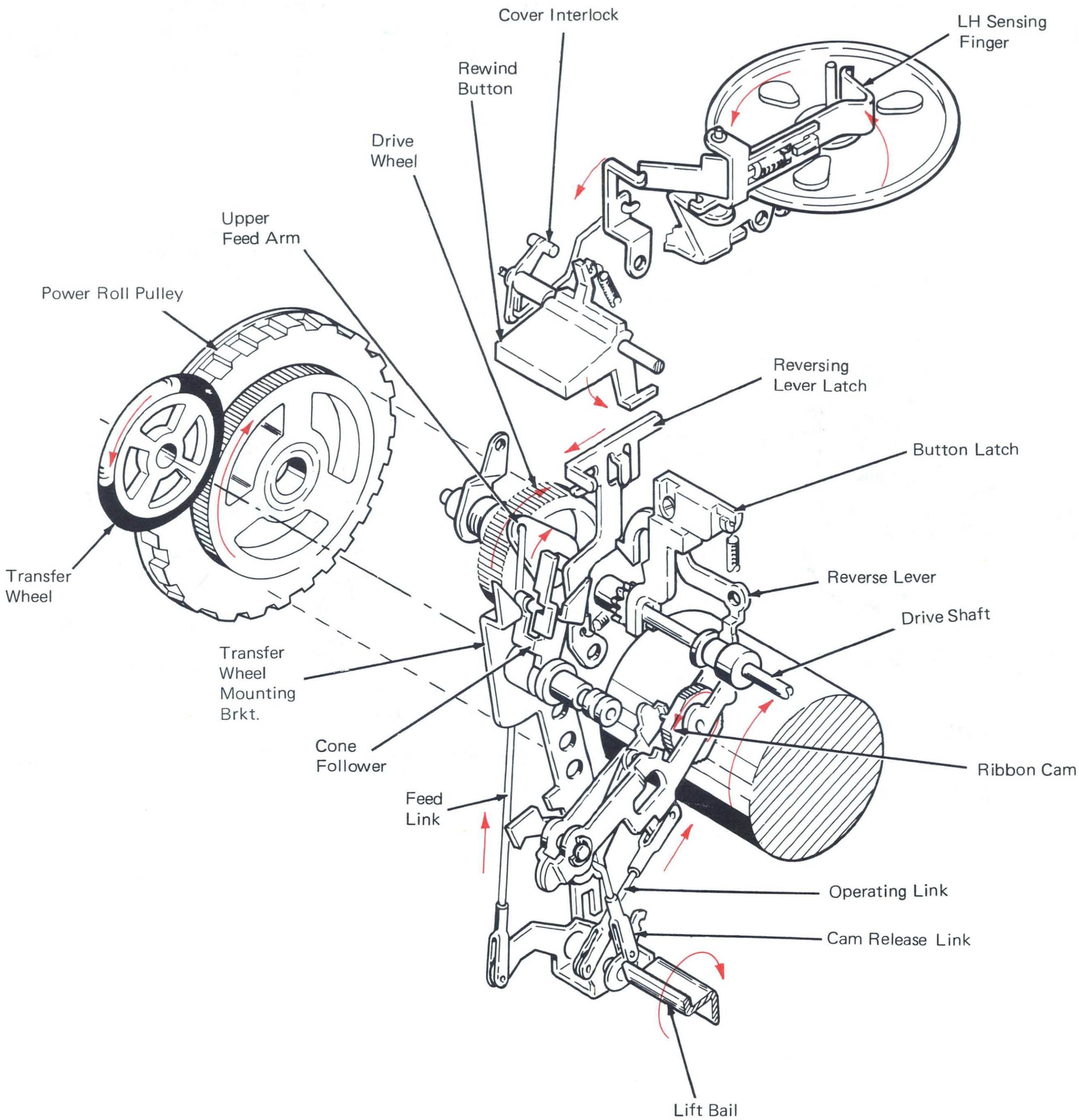


Figure 17 – Fabric Ribbon Drive (Level 2)

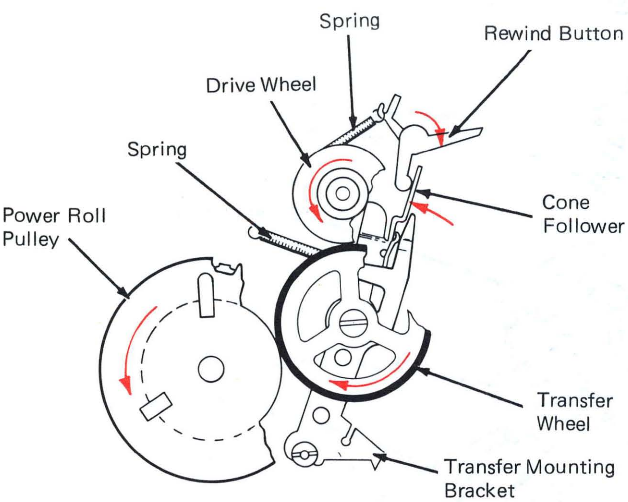
RAPID REWIND (LEVEL 2)

As on all fabric ribbon mechanisms, the rapid rewind mechanism winds the used ribbon on the left-hand spool for changing. This is done by positioning a transfer wheel between a flange on the power roll pulley and the drive wheel (Figure 18). The transfer wheel bracket is spring loaded toward the rear. When not in a ribbon rewind operation, the bracket is held to the front of the machine by the cone follower which pivots about the ribbon cam mounting stud. The cone follower in turn is held by an extension of the ribbon rewind button and the button spring.

As the rewind button is depressed (Figure 18), rotation of the button extension allows the cone follower and transfer wheel bracket to be moved to the rear by the transfer wheel spring. The transfer wheel then engages the power roll pulley and drive wheel.

Further depression of the rewind button causes a second extension of the button to engage, and be held by the button latch (Figure 19). The button latch pivots on the front of the keylever bearing support and is spring loaded in a clockwise direction.

If the ribbon is feeding to the right when the rewind button is depressed, a cone shaped extension of the left-hand drive gear will prevent movement of the cone follower. The transfer wheel will be held from engaging the power roll pulley until an upper extension of the rewind button contacts the reverse lever latch, to unlatch the reverse lever. The drive shaftwill then be moved to the left by the reverse lever spring. As the left-hand drive gear moves with the shaft, it will engage the left-hand driven gear. The cone will disengage the cone follower and allow the transfer wheel to engage the power roll pulley and drive wheel.



(Left Side View)

Figure 18 – Rapid Rewind Mechanism (Level 2)

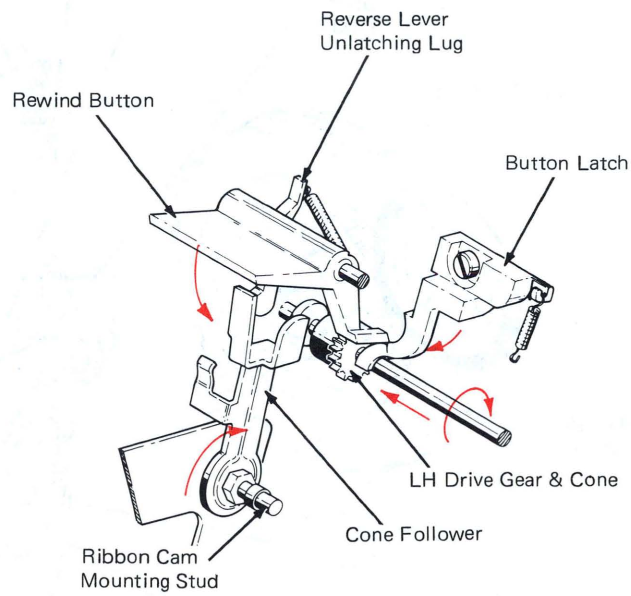


Figure 19 – Rapid Rewind Control Mechanism (Level 2)

RIBBON MECHANISM (LEVEL 1)

As on all fabric ribbon mechanisms, the early Model C (Level 1) fabric ribbon mechanism uses nylon gear drive for quiet operation, rapid rewind of used ribbon, and horizontal mounting of the ribbon spool for easier and faster ribbon changing (Figure 20).

The ribbon lift is the same as the previous levels. However, the ribbon feed is different. The ribbon cam is activated the same as the level covered previously.

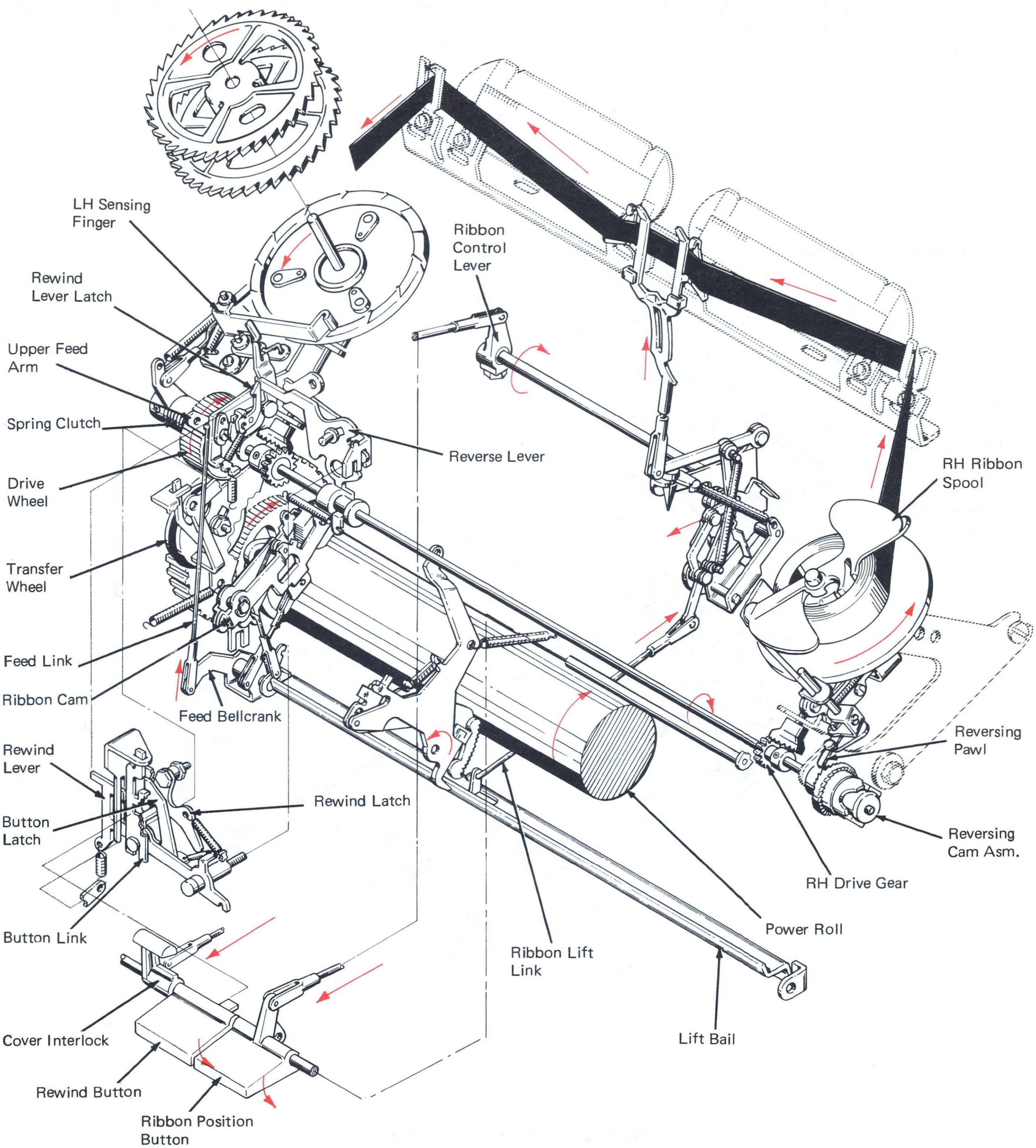


Figure 20 – Fabric Ribbon Mechanism (With Level 1 Drive)

RIBBON FEED (LEVEL 1)

As the ribbon cam rotates, it raises the cam frame (Figure 21). An operating link from the cam to the ribbon feed bellcrank rotates the bellcrank on the mounting stud. The outer arm of the bellcrank is attached to the ribbon feed link. The feed link connects the bellcrank to an upper feed arm on the drive shaft. Motion from the cam and ribbon feed bellcrank causes the upper arm to move up and down.

A primary spring clutch connects the upper feed arm to a drive wheel which is connected to the drive shaft. When the arm is raised, the spring clutch tightens and turns the drive shaft. During downward movement of the arm, the spring clutch slips about the drive wheel hub. A secondary spring clutch and non-rotating arm assembly, located to the left of the drive wheel, tightens when the upper arm moves down and prevents backward rotation of the drive wheel. The motion of the ribbon feed link is therefore transformed into rotary motion of the drive wheel and shaft. The nylon drive gears are held with setscrews to the drive shaft, and transfer the drive shaft rotation to the ribbon spools through the left and right driven gears and driven shafts. The lateral position of the drive shaft determines which driven gear is engaged.

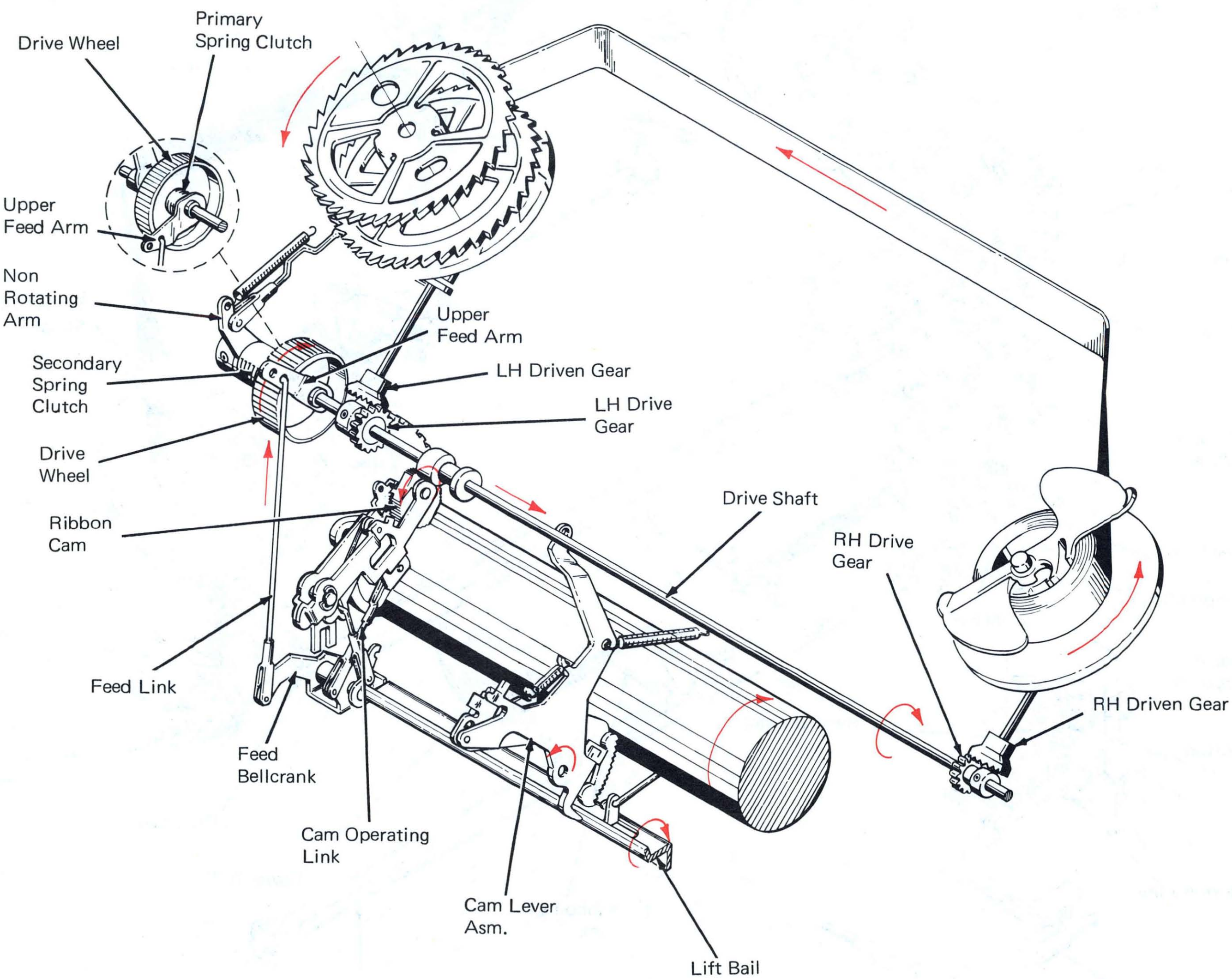


Figure 21 – Ribbon Feed (Level 1)

LEFT-HAND SENSING FINGER (LEVEL 1)

The left-hand sensing finger is spring loaded toward the hub of the ribbon spool and pivots about a shaft on the left-hand sensing cam (Figure 22). The left-hand sensing cam is spring loaded in a counterclockwise direction and pivots about a shaft on the keylever bearing support. An eccentric washer mounted on the cam acts on the unlatching lever. The unlatching lever pivots about the same shaft as the sensing cam but it is not connected to the cam.

RIBBON REVERSE LEFT-HAND SPOOL EMPTY (LEVEL 1)

As the left-hand spool empties, the left-hand sensing finger falls into an opening in the hub of the ribbon spool. This movement of the sensing finger rotates the sensing finger cam by acting on a rear vertical lug of the cam. Rotation of the sensing cam causes the eccentric washer to pivot the unlatching lever to the rear. A link from the unlatching lever pulls the reverse lever latch from the reverse lever. This allows the reverse lever spring to pivot the reverse lever clockwise and pull the shaft to the left. The ribbon reverse for the right-hand spool is the same for all machines.

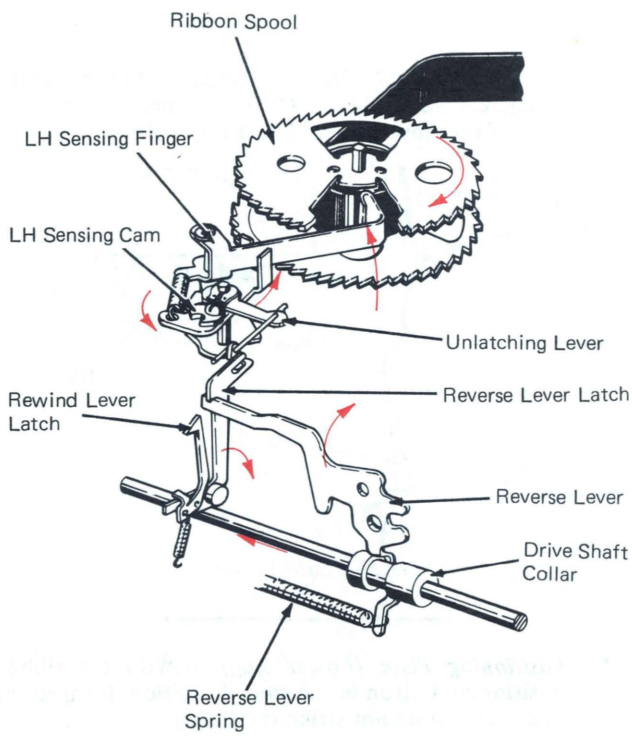


Figure 22 – LH Reverse Mechanism (Level 1)

RAPID REWIND (LEVEL 1)

The operator depresses the rewind button at the keyboard. This motion is transferred through the button link and button latch to raise the rewind lever (Figure 23). The rewind lever and the transfer wheel bellcrank are linked together by a heavy spring. As the rewind lever is raised, the bellcrank pivots against the transfer wheel mounting bracket, pushing it up and to the rear to engage the transfer wheel with the power roll pulley and the drive wheel.

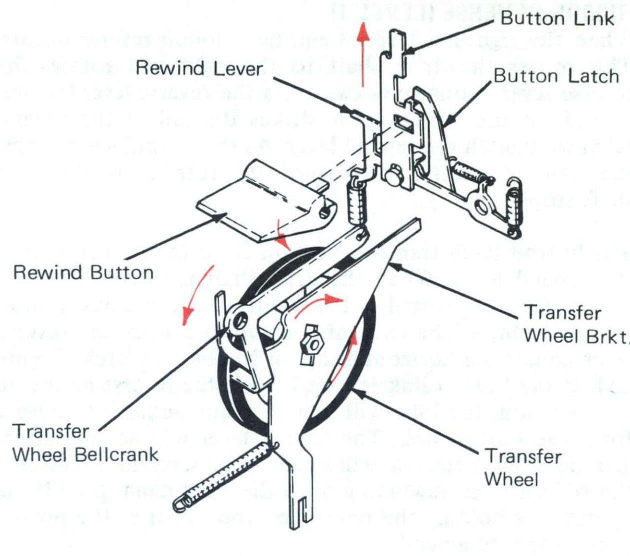


Figure 23 – Rapid Rewind Actuating Mechanism (Level 1)

When the rewind button is fully depressed (Figure 24) and the rewind lever fully raised, the rewind latch contacts under a lug on the rewind lever and holds the rewind mechanism in the operating position. The ribbon will now rewind to the left until the right-hand spool is empty.

If the ribbon is feeding to the right when the rewind mechanism is operated, the ribbon feed must automatically reverse so that the used ribbon will wind onto the removable (left-hand) spool. With the ribbon feeding to the right, the reverse lever is latched and a rewind lever latch is positioned over the rewind lever (Figure 24). Raising the rewind lever engages the rewind lever latch which pivots the reverse lever latch to the rear. Releasing the reverse lever allows the drive shaft to move to the left and operate the left-hand spool for ribbon rewind.

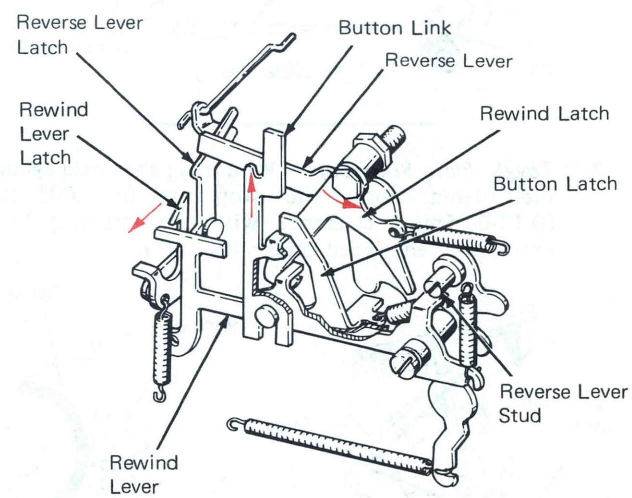


Figure 24 – Rewind Latched (Level 1)

RIBBON REVERSE (LEVEL 1)

When the right-hand spool empties, ribbon reverse occurs. This moves the drive shaft to the right and rotates the reverse lever counterclockwise. As the reverse lever latches, a stud on the reverse lever strikes the tail of the rewind latch to unlatch the rewind lever. As the rewind lever drops, the transfer wheel is disengaged and rotation of the drive shaft stops.

The button latch transfers motion from the button link to the rewind lever. When the drive shaft is to the right, the reverse lever is pivoted to the counterclockwise position. In this position, a lobe extending downward from the reverse lever contacts a horizontal lug on the button latch (Figure 25). If the button link is raised while the reverse lever is in this position, the lobe will cause the button latch to release from the button link. The rewind lever will not be raised, and no ribbon rewind will occur. This same lobe prevents the ribbon from rewinding onto the right-hand spool if the operator is holding the rewind button down as the rewind cycle comes to an end.

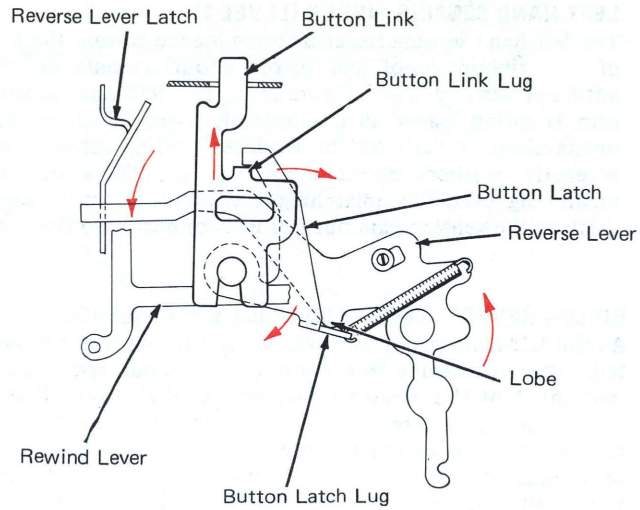
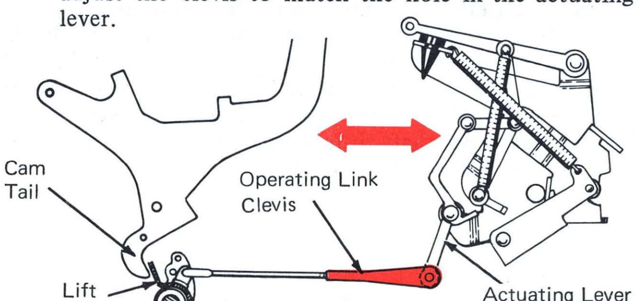


Figure 25 – Rewind Interlock

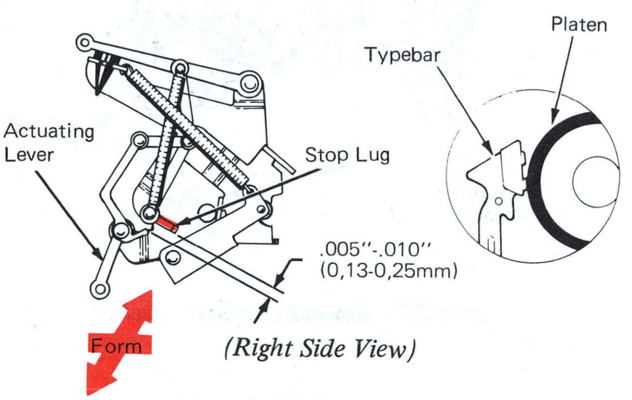
FABRIC RIBBON ADJUSTMENTS

1. *Ribbon Lift Operating Link Clevis* – With the lift bail held against the cam tails and all play in the ribbon lift toggle removed to the front of the machine, adjust the clevis to match the hole in the actuating lever.



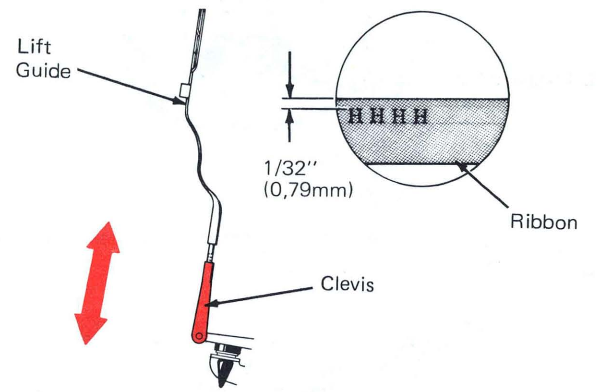
(Right Side View)

2. *Toggle Plate Stop Lug* – With a typebar held against the platen, form the stop lug for .005-.10" (0,13-0,25mm) clearance with the actuating lever extension (redesigned ribbon lift only).



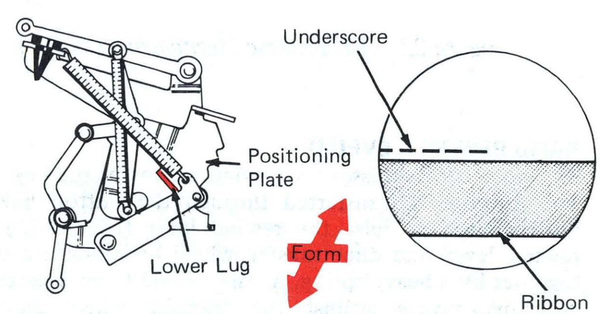
(Right Side View)

3. *Ribbon Lift Guide Clevis* – Adjust so the top of the characters strike 1/32" (0,79mm) below the upper edge of the ribbon in the lower lift position.



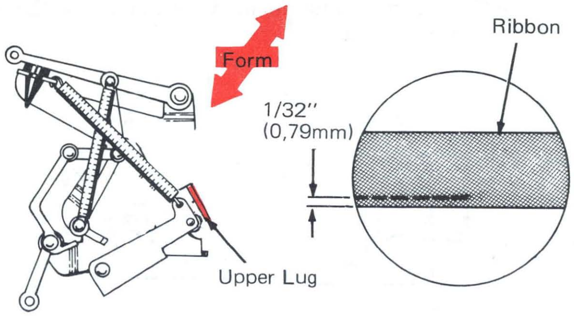
(Right Side View)

4. *Positioning Plate (Lower Lug)* – With the ribbon positioning button in the stencil position, form so the underscore does not strike the ribbon.



(Right Side View)

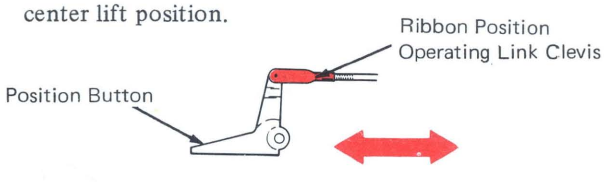
5. *Positioning Plate (Upper Lug – Fabric Ribbon Only)* – Form so the underscore prints 1/32" (0,79mm) above the bottom of the ribbon with the ribbon positioning button in the highest lift position.



(Right Side View)

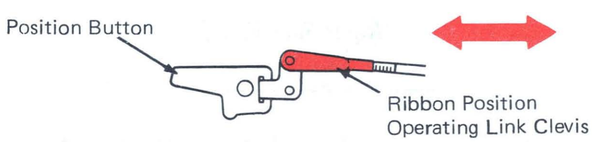
6. *Ribbon Position Operating Link Clevis, C1, C4* – Adjust so the top of the positioning button matches the slope of the tab set and clear button when in the first lift position.

NOTE: On Model C modified ribbon feed, the button should match the rewind button when in the center lift position.



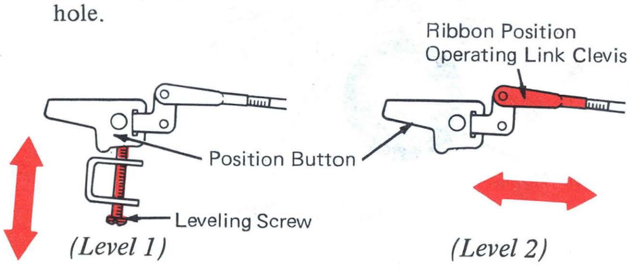
(Right Side View C1, C4)

Ribbon Position Operating Link Clevis, D1 – Adjust so the top of the positioning button is parallel to the base of the machine when in the first lift position.



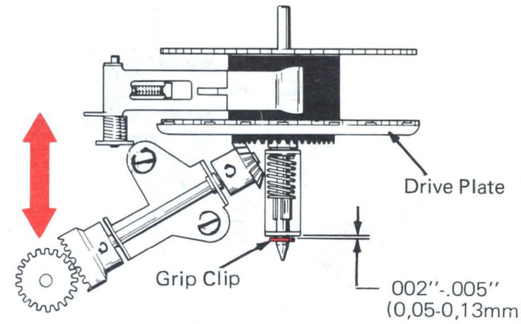
(Right Side View – D1)

Ribbon Positioning Operating Link, D4 (Carbon Ribbon) – Adjust the leveling screw so that the positioning button will rest with the top surface parallel to the base of the machine with the link disconnected. With the lift mechanism in the lift position, adjust the operating link clevis to match the hole.



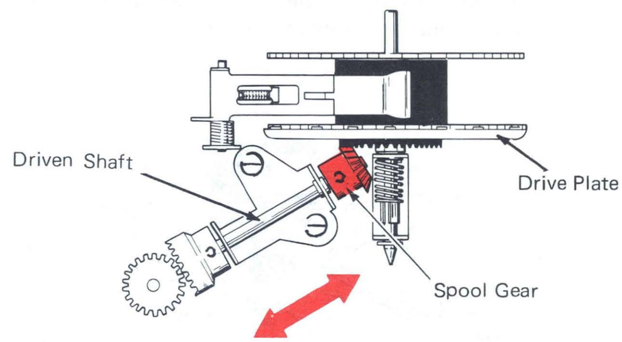
(Right Side View – D4)

7. *Left And Right Drive Plates* – Adjust the grip clip so there is .002-.005" (0,05-0,13mm) vertical end play.



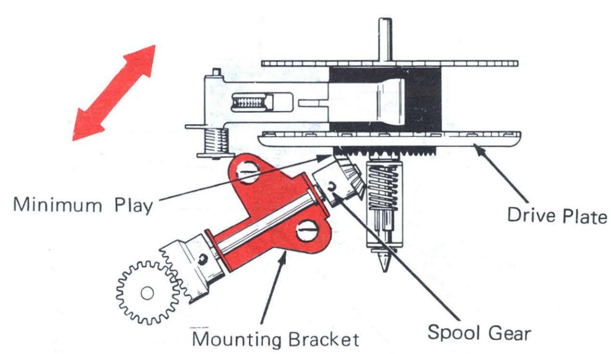
(Right Side View)

8. *Spool Gears* – Position the left and right-hand spool gears on the driven shafts for maximum engagement with the drive plate gears.



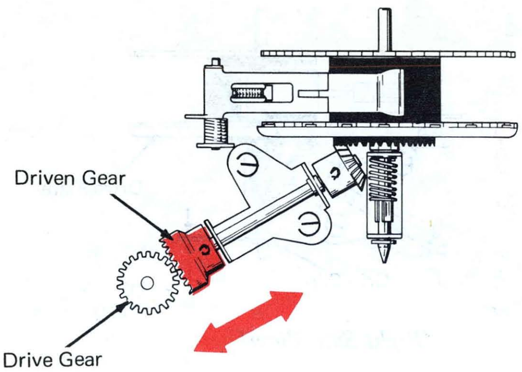
(Right Side View)

9. *Left And Right-Hand Driven Shaft Mounting Brackets* – Position the brackets on the keylever bearing support to allow a minimum play between the drive plate gears and the spool gears without binding.



(Right Side View)

10. *Driven Gears* – Position the driven gears for minimum backlash with the drive gears without binding.



(Right Side View)

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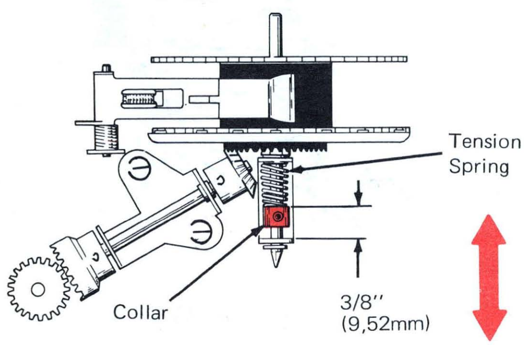
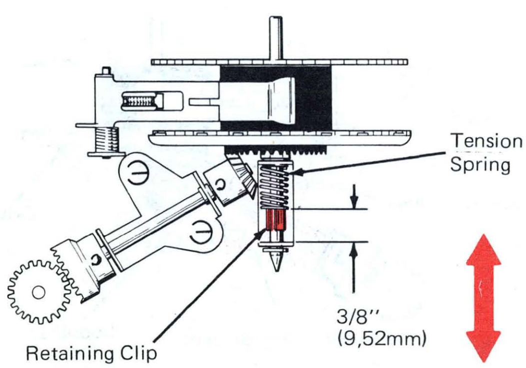
11. *Left And Right Tension Spring (Level 1)* – Adjust the collars on the ribbon spool drive plate shaft so that the ribbon spool springs are approximately 3/8" (9,52mm) from the mounting bracket.



(Right Side View) (Level 1)

Left And Right Tension Springs (Level 2) – Adjust the retaining clips so that the bottom of the ribbon spool springs are approximately 3/8" (9,52mm) from the mounting bracket. Be sure there is equal tension on both sides.



(Right Side View) (Level 2)

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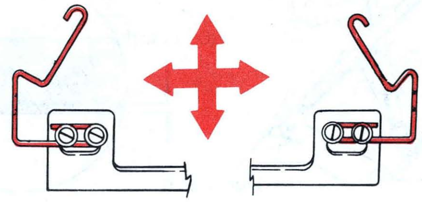
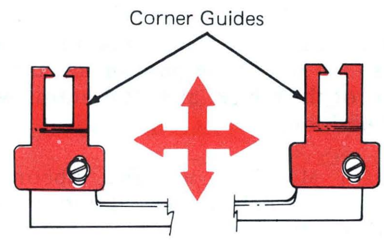
12. *Ribbon Corner Guides* – Adjust so the ribbon feeds from each spool without touching either ribbon spool flange.

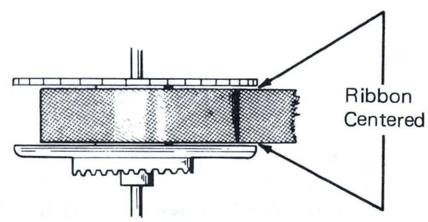
NOTE: Some adjustment is available in the spool mounting bracket.



(Level 1)



(Level 2)



(Right Side View)

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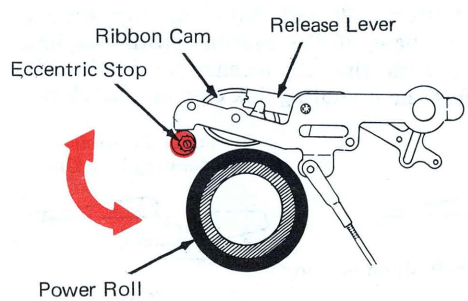
13. *Cam Clearance (Level 1 And 2 Only)* – Adjust the eccentric cam stop so that with the cam released and the power off, the release lever will rest on the rear half of the cam lug.



Level 1 & 2 Only

(Left Side View)

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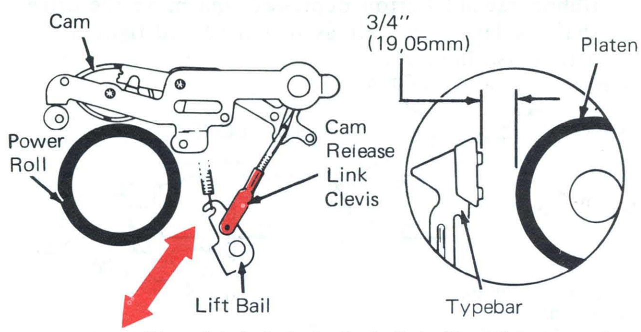
14. Cam Release Link Clevis (Level 1 And 2 Only) – Adjust to release the cam when any type face is 3/4 ± 1/8" (19,05 ± 3,18mm) from the platen.



(Level 1 & 2 Only Left Side View)

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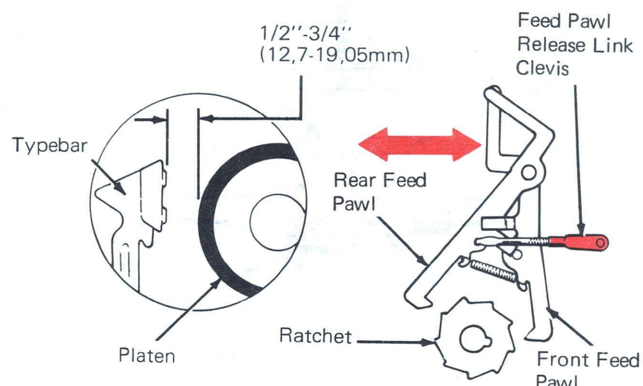
15. Feed Pawl Release Link Clevis, CD (Level 3 And 4) – Adjust so that the feed pawl releases the ratchet when any type bar is 1/2-3/4" (12,7-19,05mm) from the platen. Check left, center and right typebars. Adjust to latest releasing typebar.



(Level 3 & 4 Only Left Side View)

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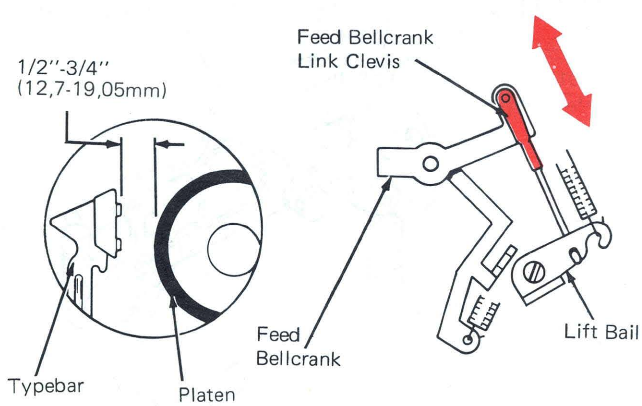
16. Ribbon Feed Bellcrank Link Clevis, D1, D4 (Level 5 Only) – Adjust the ribbon feed bellcrank link clevis so that the spring clutch ratchet is released when any typebar is 1/2-3/4" (12,7-19,05mm) from the platen.



(Right Side View Level 5)

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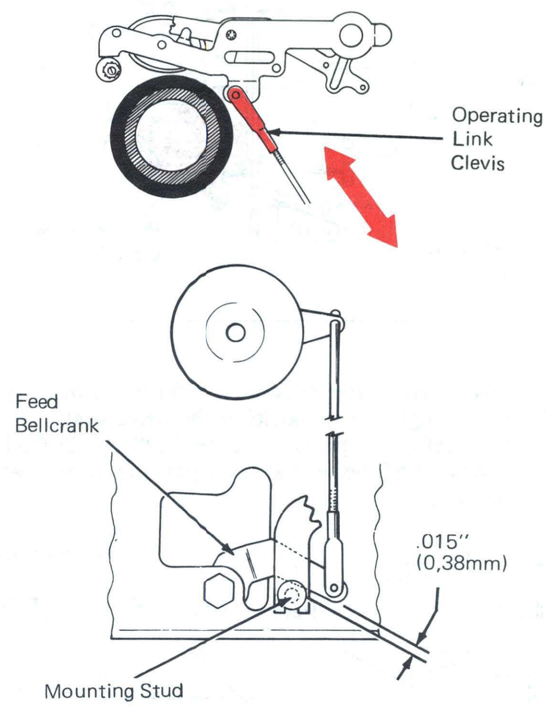
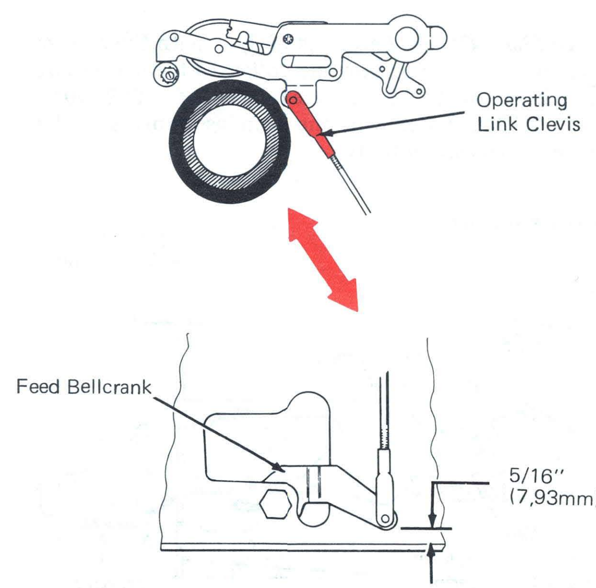
17. Operating Link Clevis (Level 1) – Adjust the ribbon feed bellcrank .015" (0,38mm) above the transfer wheel mounting bracket stud.



(Left Side View Level 1)

Operating Link Clevis (Level 2) – Adjust so the feed bellcrank arm rests 5/16 ± 1/32" (7,92 ± 0,79mm) from the frame.



(Left Side View Level 2)

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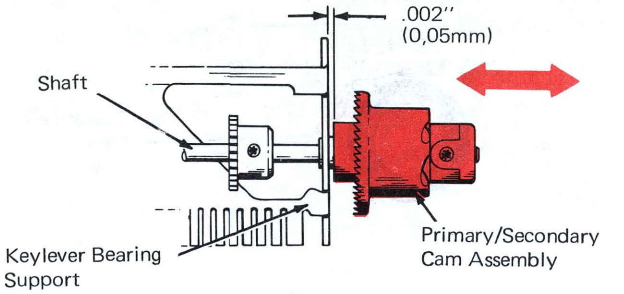
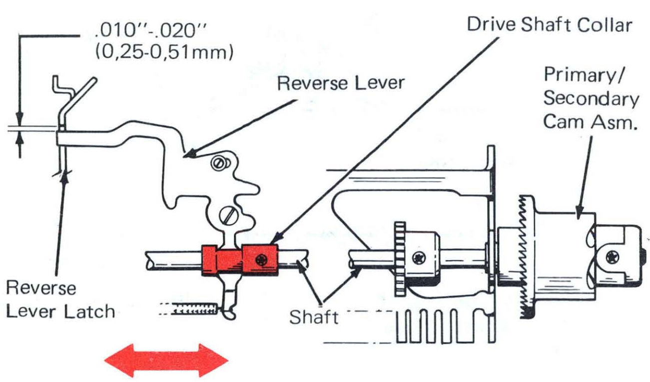
18. *Primary/Secondary Cam Assembly* – Position on the shaft so when the secondary cam is on the high point there is .002" (0,05mm) left-to-right motion of the drive shaft.

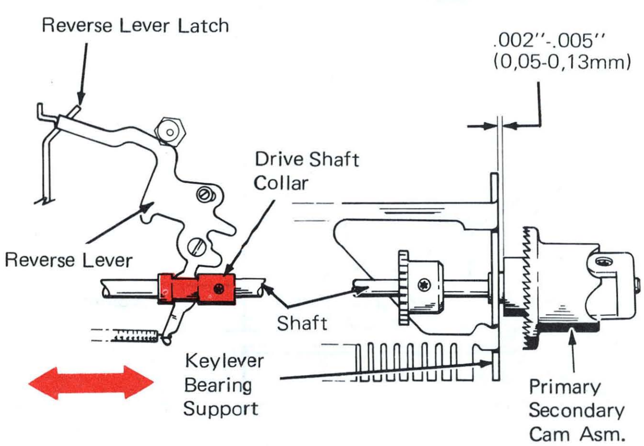


19. *Drive Shaft Collar (Level 1)* – With the primary cam on the high point, position the drive shaft collar on the shaft to provide .010-.020" (0,25-0,51mm) overthrow of the reverse lever past the normal latched position.



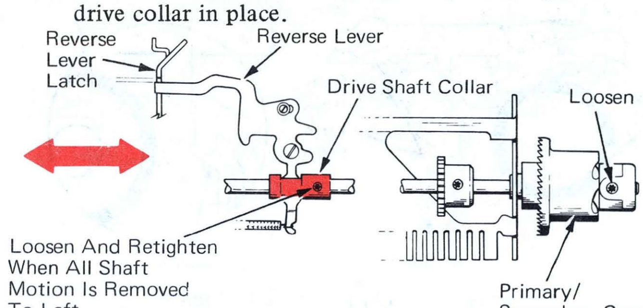
(Level 1)

Drive Shaft Collar (Level 2 And 3) – With the reverse lever unlatched, position the collar on the drive shaft so there will be a clearance of .002-.005" (0,05-0,13mm) between the cam assembly and the keylever bearing support.



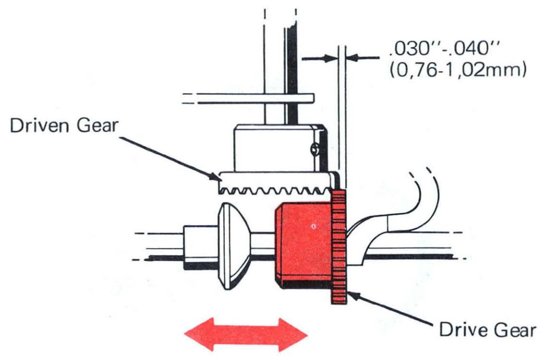
(Level 2 & 3)

Drive Shaft Collar (Level 4 & 5) – Loosen the primary/secondary cam assembly and the drive collar set screws. Disengage the reverse latch. Hold the ribbon rewind button depressed and move the drive shaft as far to the left as it will go and tighten the drive collar in place.

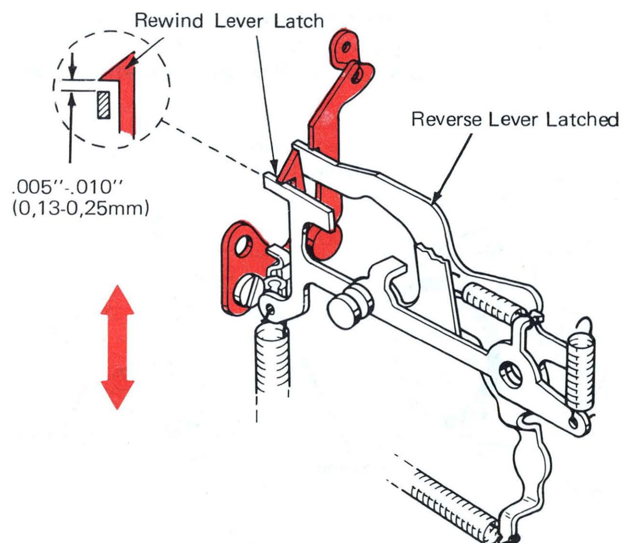


(Level 4 & 5)

20. *Drive Gears* – Adjust the gears so when in their adjusted positions, the inside edge will extend .030".040" (0,76-1,02mm) past the edge of the driven gear.

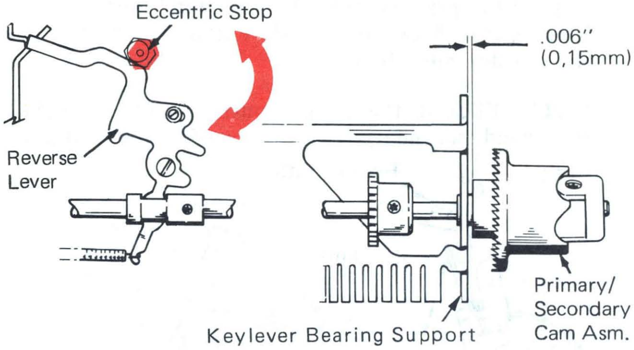


21. *Rewind Lever Latch (Level 1)* – With the reverse lever latched, position the rewind lever latch vertically by moving the mounting plate for .005-.010" (0,13-0,25mm) clearance between the rewind lever and the rewind lever latch.



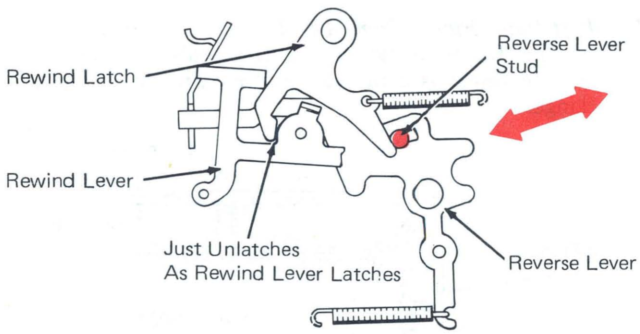
(Level 1)

22. *Reverse Lever Eccentric Stop (Level 1)* – With the reverse lever unlatched, adjust the eccentric stop to provide .006" (0,15mm) clearance between the primary cam and the keylever bearing support.



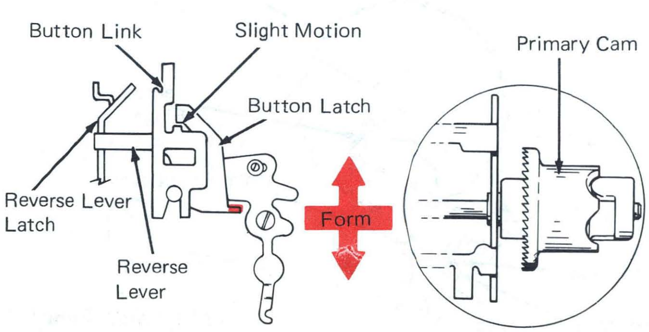
(Level 1 Only)

23. *Reverse Lever Stud (Level 1)* – With the rewind lever latched, position the stud to release the rewind latch just as the reverse lever has moved counterclockwise to a latched position. Late unlatching may cause ribbon spill-off. If spilling off is a problem, the rewind latch may be unlatched up to .015" (0,38mm) before reverse lever latching.



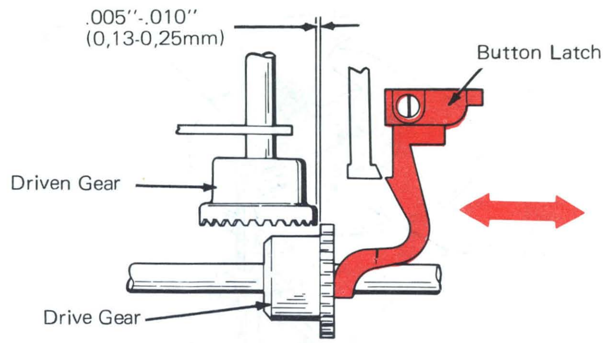
(Level 1 Only)

24. *Button Latch Lug (Level 1)* – With the reverse lever latched, rotate the primary cam and observe that the button latch moves slightly as the reverse lever moves to the overthrow position. This may be observed at the point where the button latch overlaps the button link lug. Form the button latch lug to obtain this condition. The lug is readily accessible if the ribbon position button is removed.



(Level 1)

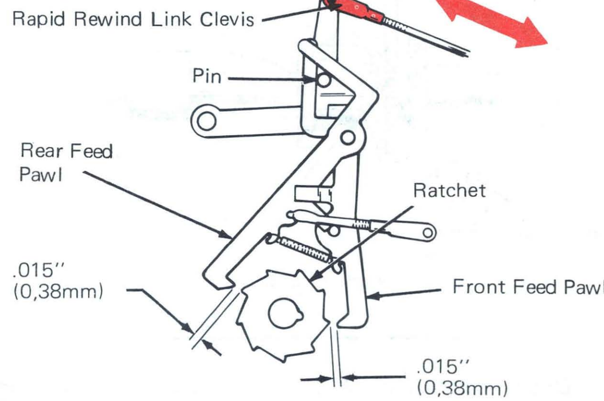
25. *Button Latch (Level 2 And 3 Only)* – Adjust left or right in the elongated mounting hole so the button unlatches when the left drive gear is .005-.010" (0,13-0,25mm) to the right of the driven gear.



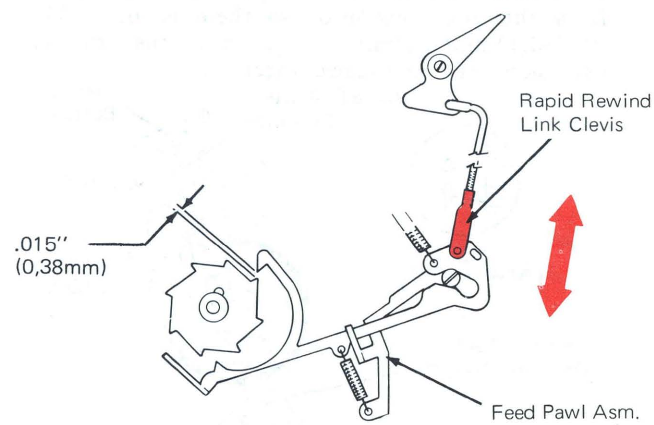
(Level 2 & 3 Only)

26. *Rapid Rewind Link Clevis (Level 3, 4 And 5)* – Adjust so the feed pawls clear the ratchet by a minimum of .015" (0,38mm) with the rapid rewind button latched in the operating position. The pin on the rapid rewind lever should not interfere with the operation of the upper arms during normal feed operation.

NOTE: Forming adjustments are not recommended as a means of adjusting for proper feed pawl operation.

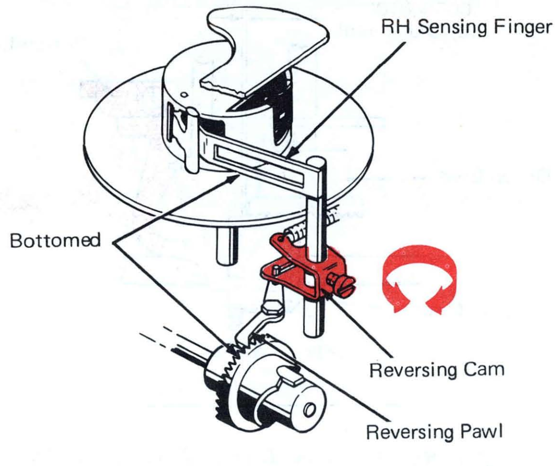


(Level 3 & 4)

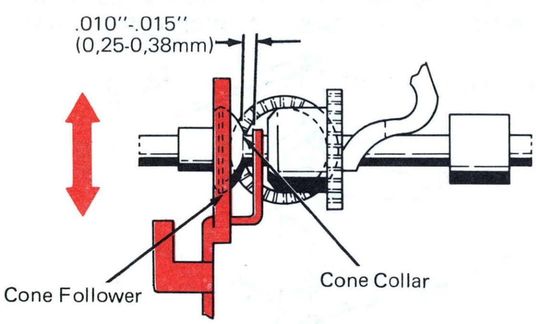


(Left Side View Level 5)

27. *Right Reversing Cam* – With the reverse lever unlatched and the right sensing finger bottomed in the ribbon spool notch, position the right cam on the sensing finger shaft so the reversing pawl bottoms between the teeth on the primary cam.

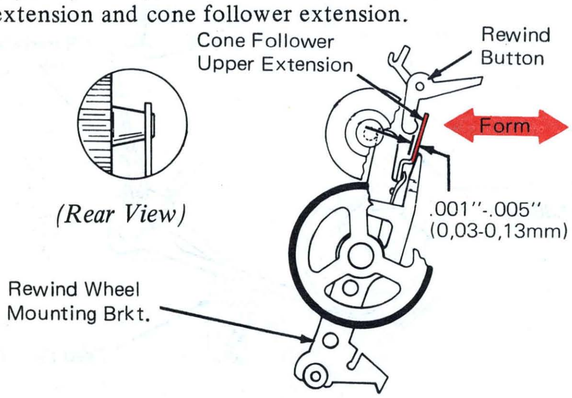


28. *Cone Follower (Level 2 Only)* – With the reverse lever unlatched and the side play in the cone follower held to the right, the follower should clear the right edge of the cone collar by .010-.015" (0,25-0,38mm).



(Level 2 Only)

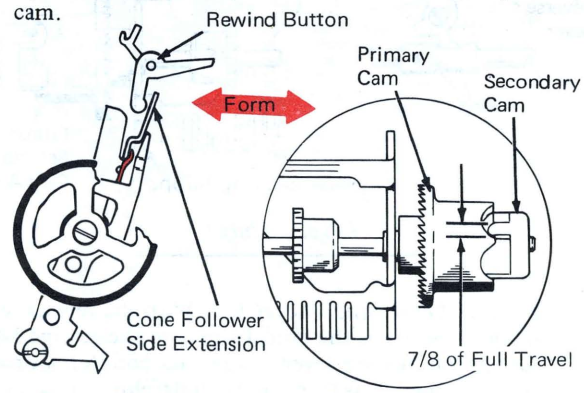
29. *Upper Extension Of Cone Follower* – With the rewind button unlatched and the cone follower held in contact with the smallest diameter of the cone, form the upper extension so there is .001-.005" (0,03-0,13mm) clearance between the button extension and cone follower extension.



(Left Side View Level 2 Only)

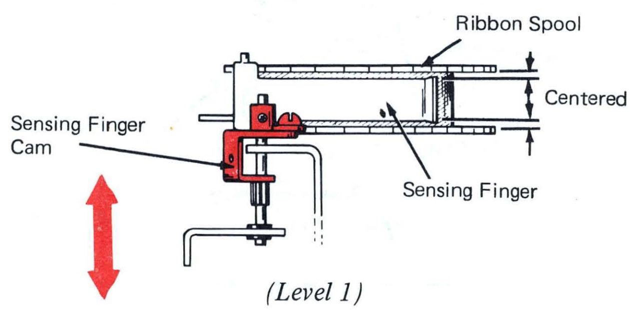
30. *Side Extension Of Cone Follower (Level 2 Only)* – Form the side extension of the cone follower so when the rewind button is held depressed at the end of a rewind cycle, the secondary cam will move 7/8 of the way up the primary cam. During rewind there should be clearance between the side extension and top of the transfer wheel bracket.

NOTE: Flicking the rewind button may cause the right-hand secondary cam to override the primary cam.



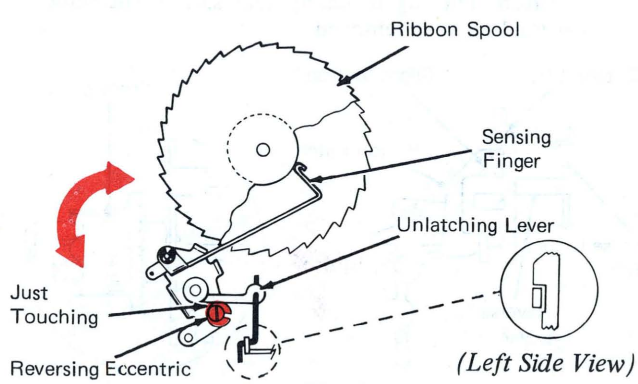
(Left Side View Level 2 Only)

31. *Left-Hand Finger Cam (Level 1 Only)* – Position the sensing finger vertically on the shaft so that the sensing finger is centered between the ribbon spool flanges.



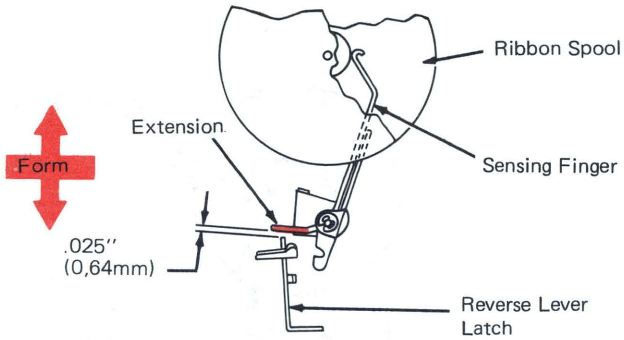
(Level 1)

32. *Left Reversing Eccentric (Level 1)* – With the reverse lever latched and the left sensing finger resting against the ribbon spool hub, position the eccentric washer to just contact the unlatching lever.



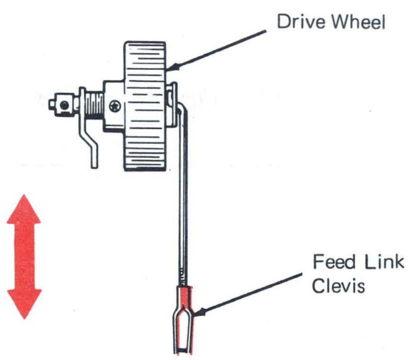
(Top View Level 1)

33. *Left Sensing Finger (Level 2, 3, 4, 5)* – There are two adjustments for the sensing finger. First, form the sensing finger so it centers between the spool flanges. Form sensing finger extension for .025" (0,64mm) clearance with reverse lever latch when sensing finger is resting on ribbon spool hub.



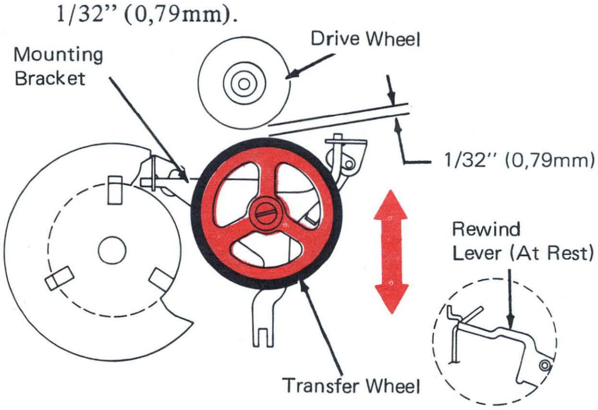
(Top View Level 2,3,4 & 5)

34. *Ribbon Feed Link Clevis (Level 1 And 2 Only)* Adjust to provide one complete revolution of either feeding spool for no more than 38 cam operations.



(Level 1 & 2 Only)

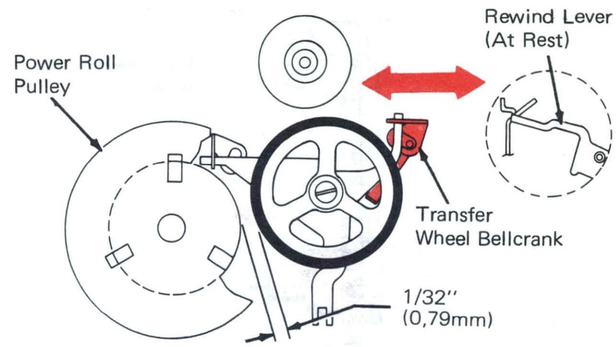
35. *Transfer Wheel (Level 1 Only)* – With the rewind lever at rest, adjust the transfer wheel on the mounting bracket so that it clears the drive wheel by 1/32" (0,79mm).



(Left Side View Level 1 Only)

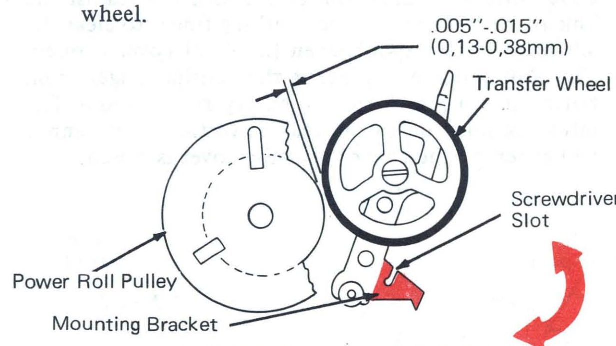
36. *Transfer Wheel Bellcrank (Level 1 Only)* – With the rewind lever at rest, position the bellcrank mounting stud so that the transfer wheel clears the flange on the power roll pulley by 1/32" (0,79mm).

NOTE: Adjustments 35 and 36 must be considered together, because adjusting one will affect the other.



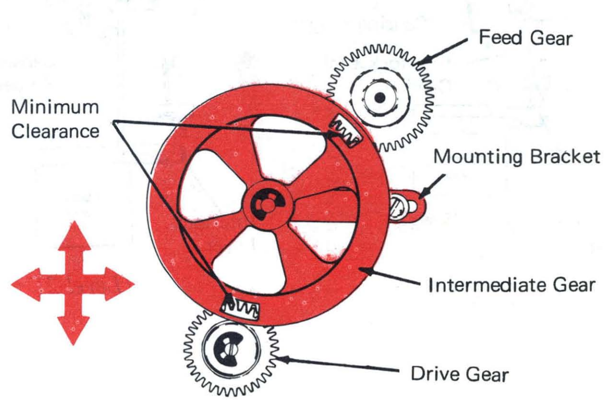
(Left Side View Level 1 Only)

37. *Transfer Wheel Mounting Bracket (Level 2 Only)* – Form the lower stop so the transfer wheel clears the power roll pulley flange by .005-.015" (0,13-0,38mm) when at rest. There must be a clearance between the transfer wheel and the drive wheel.



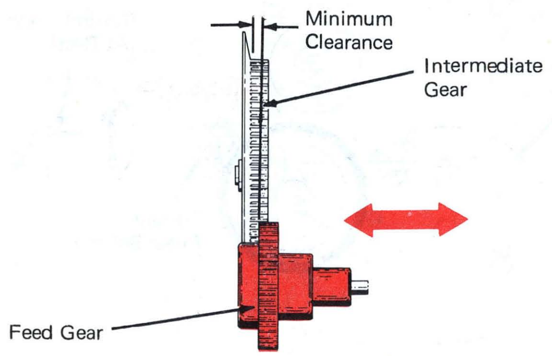
(Left Side View Level 2 Only)

38. *Intermediate Gear (Level 3, 4 And 5)* – Adjust the mounting bracket for minimum backlash with no binds between the intermediate gear and the drive and feed gears.

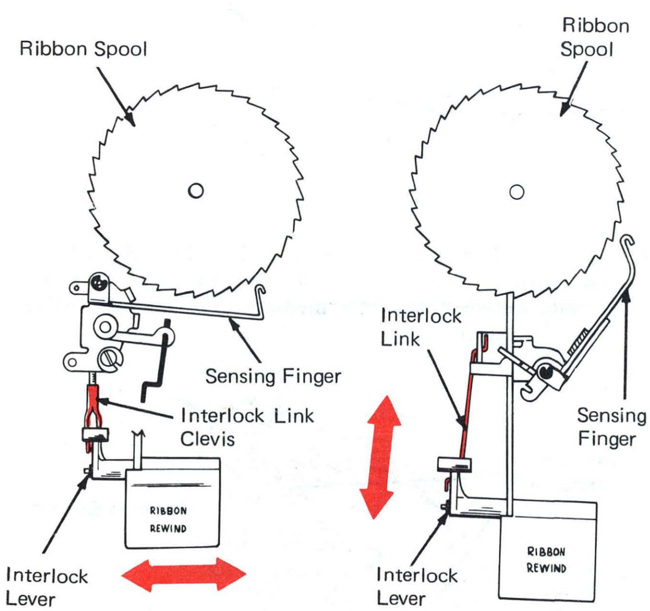


(Left Side View Level 4 & 5)

39. *Feed Gear (Machines With Intermediate Gear), (Levels 3, 4 And 5)* – With the feed and reverse shaft in the far left position, adjust the feed gear left or right for minimum clearance between the feed gear and the flange on the intermediate gear. Observe the clearance through a full 360 degrees rotation of the intermediate gear.



40. *Cover Interlock Link (Level 1 And 2)* – Adjust the link to permit the left-hand sensing finger to clear the left-hand ribbon spool when the front cover is open. The link must not prevent the sensing finger from bottoming in the slot of an empty ribbon spool. The interlock must be to the rear of vertical so it cannot be broken by the cover lug as the cover is closed.

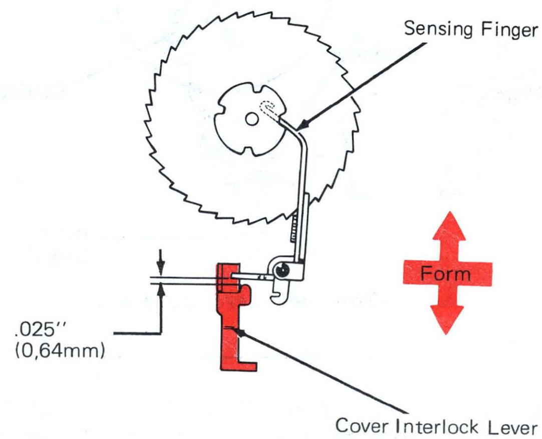


(Level 1)

(Level 2)

(Top View)

41. *Cover Interlock Lever (Level 3, 4 And 5)* – Form the upward extension of cover interlock lever so the lever clears the sensing finger extension when the cover is closed and the sensing finger tip is bottomed in the spool reversing notch. Also, make sure the interlock is not holding the reverse latch.



(Top View Level 3, 4 & 5)

DUAL RIBBON OPERATIONAL THEORY

The purpose of the dual ribbon mechanism is to provide a mechanism that can use both the carbon and fabric ribbons. This is done by using a modified Model B fabric ribbon mechanism and the early Model C carbon ribbon assemblies (Figure 1). The machine is designed to use only one type of ribbon at a time. Since this is a dual mechanism with considerable difference between the fabric and carbon ribbon assemblies, both mechanisms will be discussed separately in this section with the fabric ribbon first.

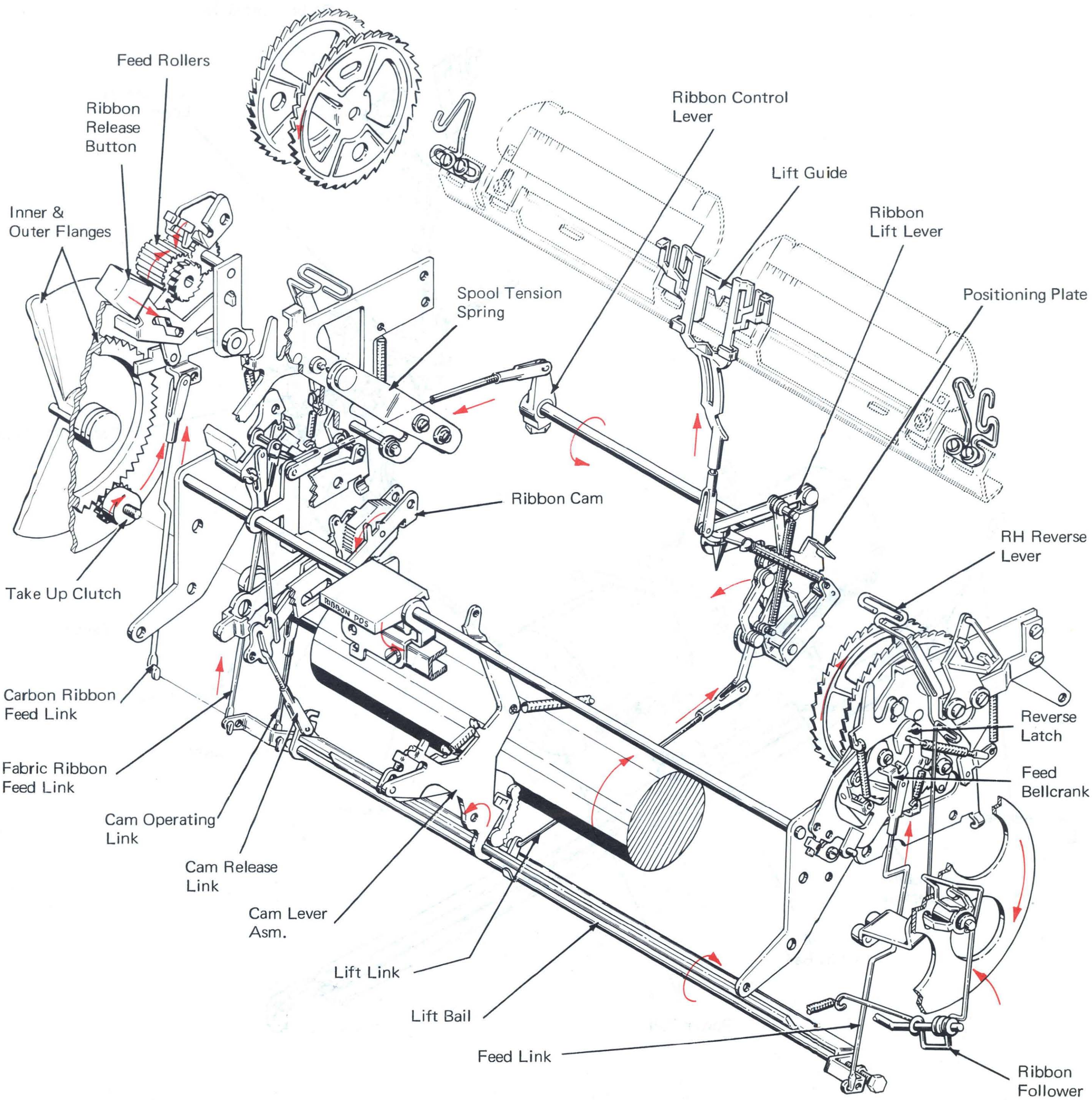


Figure 1 – Dual Ribbon Mechanism

RIBBON LIFT

Operation of any letter cam rotates the ribbon lift bail about the mounting stud on the left and right side frame (Figure 2). The bail has two links attached to it: the cam release link at the left and a ribbon lift link in the center.

Rotation of the ribbon lift bail pushes the ribbon lift link to the rear, pivoting the actuating lever to the rear also. Attached to the actuating lever is a toggle assembly which provides the motion to lift the ribbon lift lever and the ribbon lift guide. The ribbon lift guide positions the ribbon in front of the type face for a print operation.

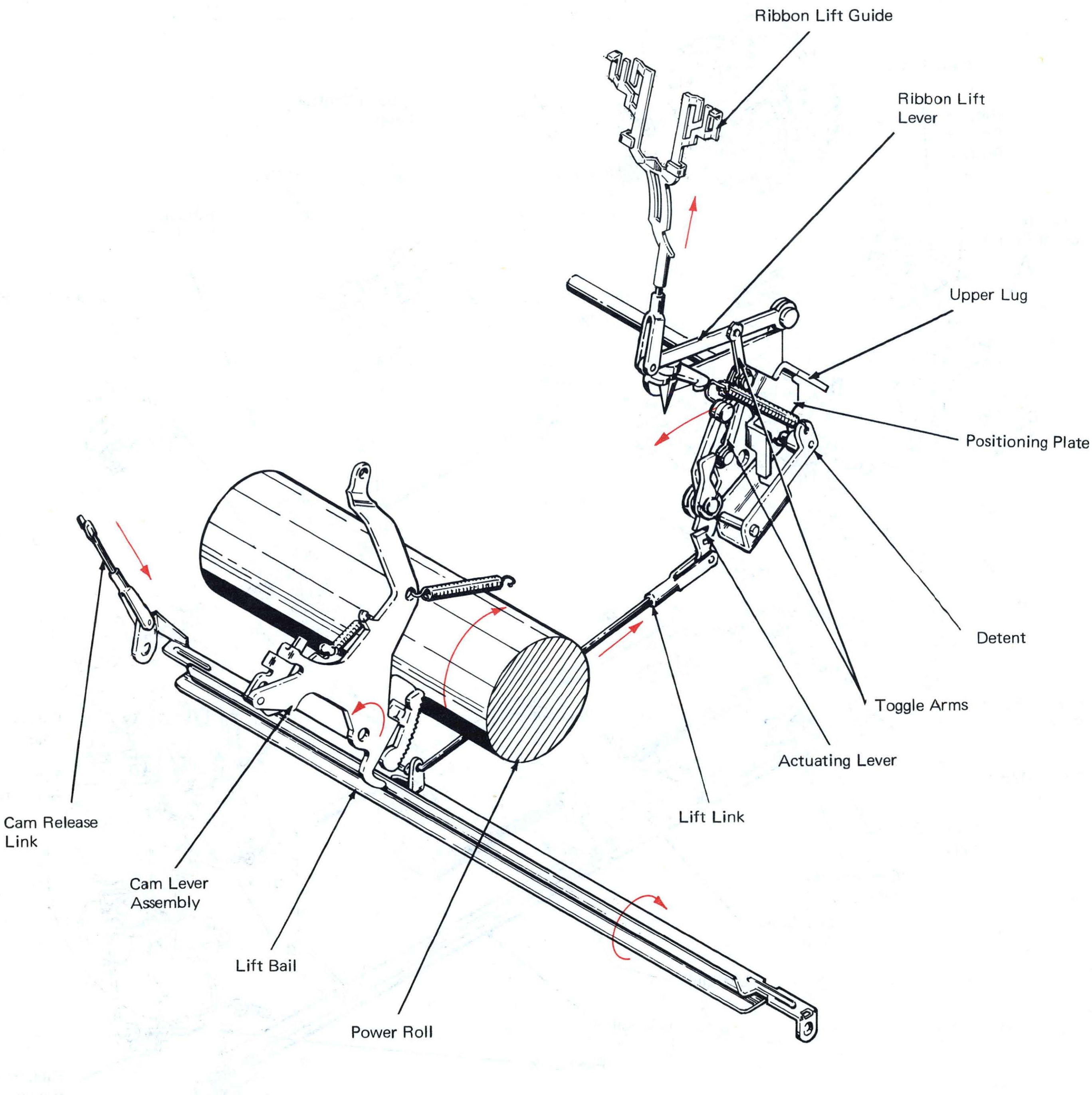


Figure 2 – Ribbon Lift Mechanism

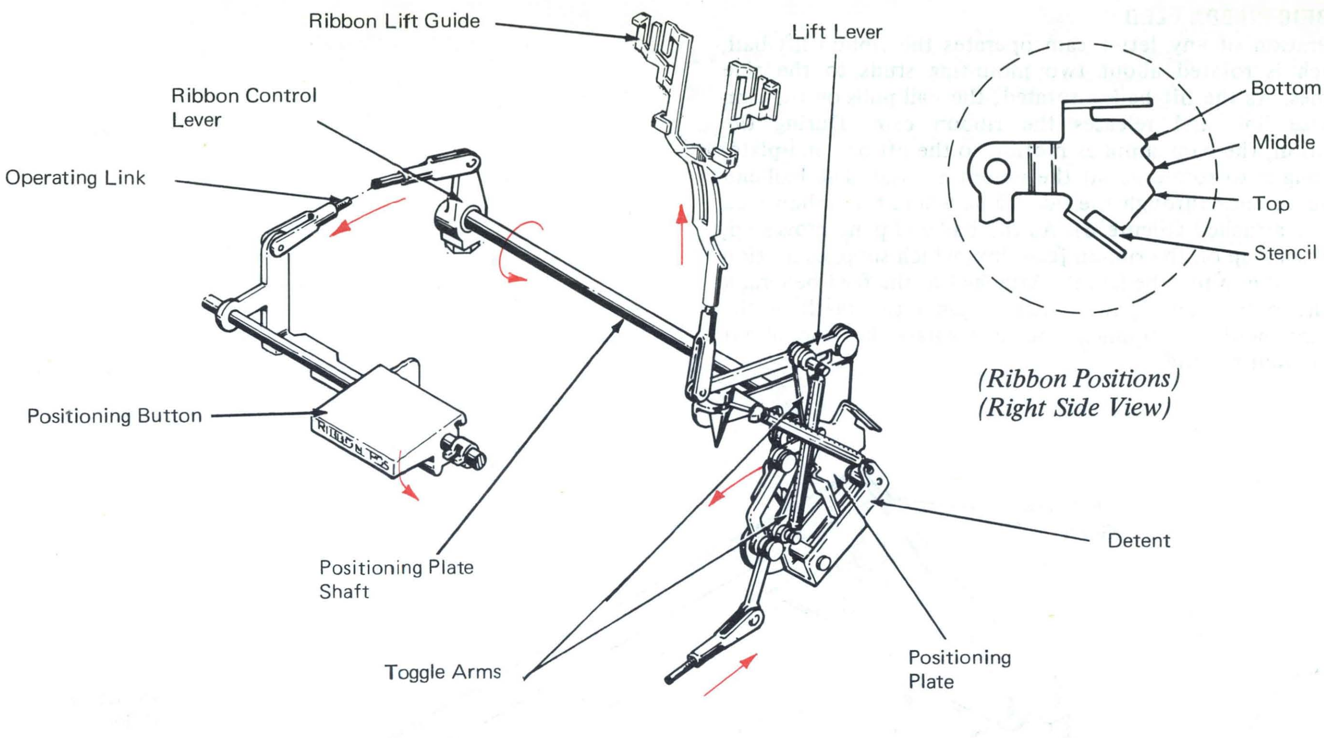


Figure 3 – Lift Positions

The ribbon control lever is mounted on the positioning plate shaft. Through the motion of the positioning button, operating link and positioning plate shaft, the ribbon positioning plate is rotated to change the angle of the toggle assembly (Figure 3).

The fabric ribbon lift positioning plate can be rotated to three lift positions plus stencil (Figure 3). The three lift positions use the top, middle and bottom of the ribbon. In the stencil position, the lower toggle arm is positioned almost in a straight line with the upper arm (Figure 4). The motion from the ribbon lift bail pulls the toggle over the center and the ribbon is not lifted.

When the "Ribbon Position" button is lifted from the stencil position, the lower toggle arm rotates and forms an angle with the upper arm. The higher the lever positions the angle between the toggle arms, the greater the amount of ribbon lifting (Figure 5).

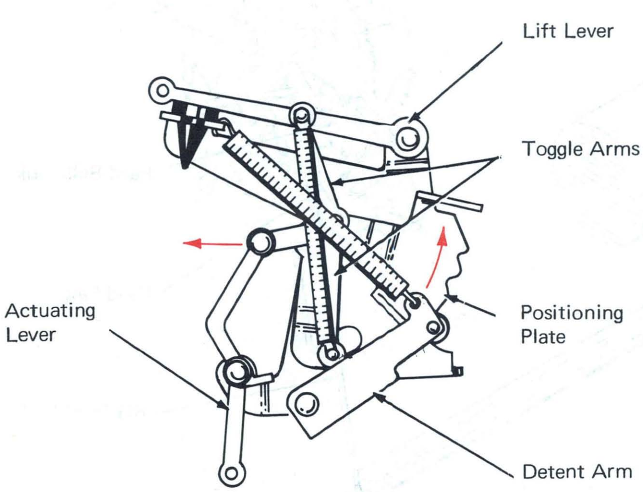


Figure 4 – Stencil Position (Right Side View)

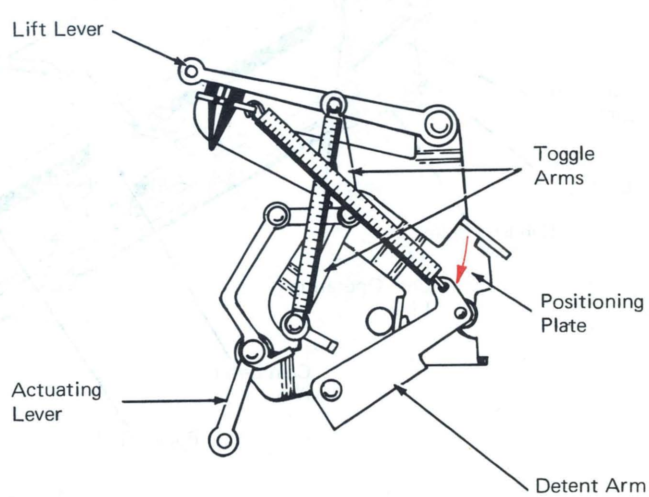


Figure 5 – Toggle Arm Operation (Right Side View)

FABRIC RIBBON FEED

Operation of any letter cam operates the ribbon lift bail, which is rotated about two mounting studs to the side frames. As the lift bail is rotated, the bail pulls on the cam release link and releases the ribbon cam. During the rotation, the cam supplies motion to the lift bail end plate, causing it to rotate about the mounting stud. The bail end plate extends through the side frame where the ribbon feed link is attached (Figure 6). As the bail end plate moves up, it pushes up on the ribbon feed link, which supplies motion to the ribbon feed bellcrank. Attached to the feed bellcrank is the ribbon feed pawl which engages the teeth of the ribbon spool and supplies motion to rotate the spool about the mounting stud.

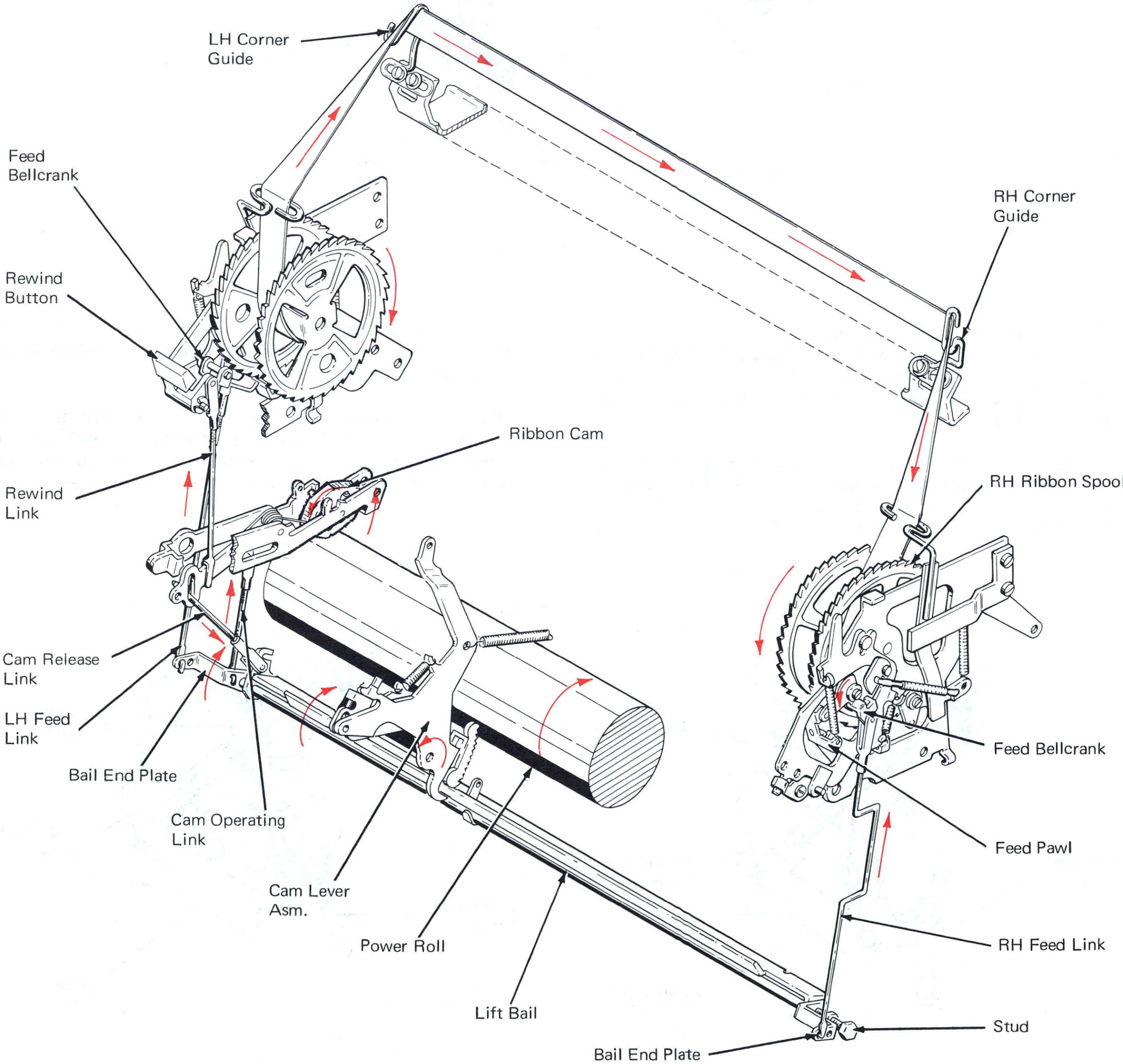


Figure 6 – Ribbon Feed Operation

The feed pawls are mounted on the side plates which are attached to the keylever bearing support. A spool check pawl is also mounted on the side plate. The purpose is to hold the spool while the feed pawl returns to the next tooth (Figure 7). The ribbon spool mounts on a stud on the side plate and on the stud of the spool tension spring. The purpose of the spring is to prevent the "Spooling Off" of the ribbon during feeding.

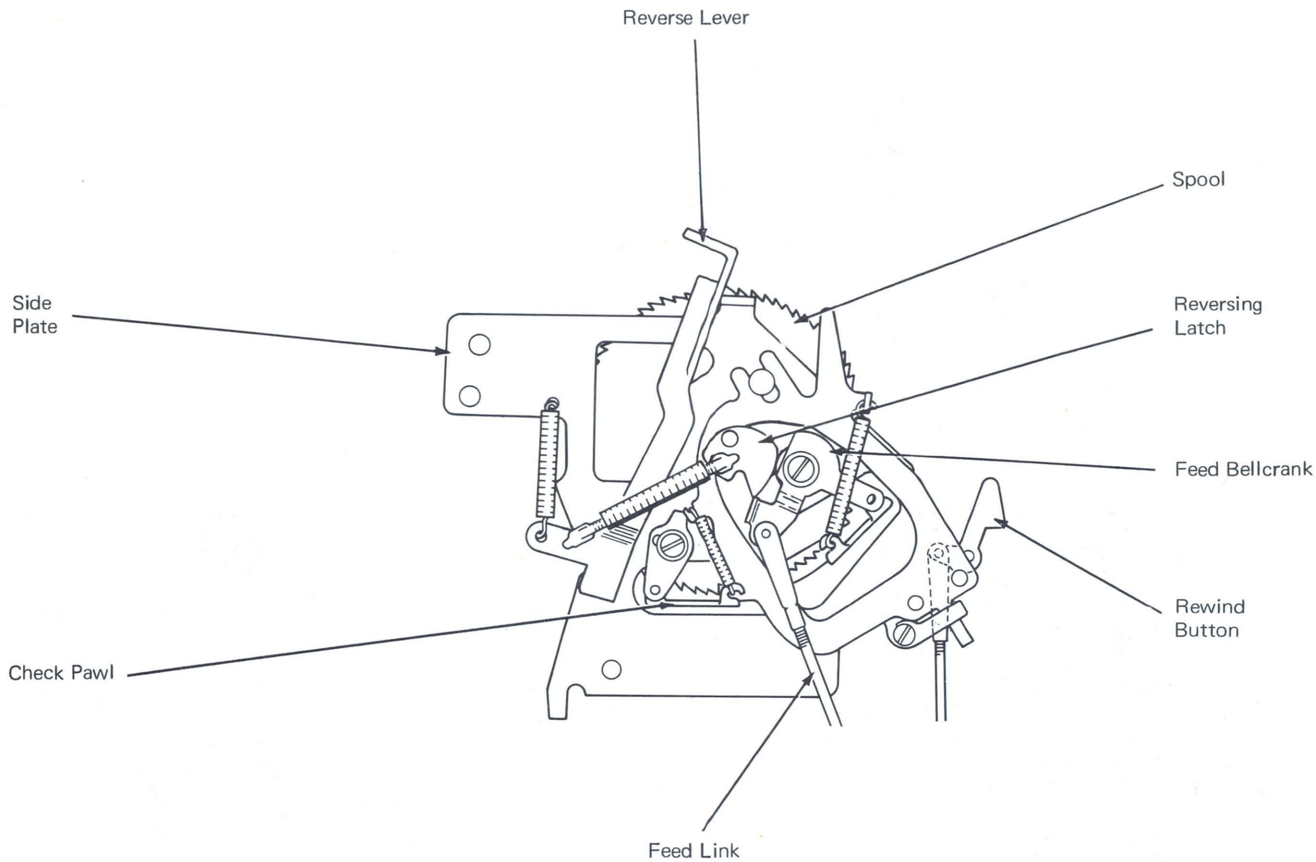


Figure 7 – LH Side Plate

FABRIC RIBBON REVERSE

The reversing of the ribbon is activated by the reverse lever and feed bellcrank working with a reverse latch to shift the reversing bracket (Figure 8). When the ribbon comes to the end, the feed pawl will continue to feed until the ribbon becomes tight. This tightening of the ribbon rotates the reverse lever toward the rear of the machine. A spring link from the reversing lever is attached to a reversing latch, which is pulled down in the path of the feed bellcrank. The reversing latch is riveted to the reversing bracket; therefore, as the pawl is pushed up by the feed bellcrank, it also pushes up the reversing bracket.

The extension lug on the reversing bracket that holds the feed pawl away from the ribbon spool now allows the pawl to engage the spool teeth (Figure 8). A rod assembly connected to both the left and right reversing brackets transfers this motion to the side that feeds ribbon and rotates the reversing bracket to disengage the feed pawl from the spool. The rod assembly is mounted in a bracket that is mounted to the side frames. A toggle spring is used to hold the rod in the operating position. Ribbon reverse is the same for both sides of the mechanism.

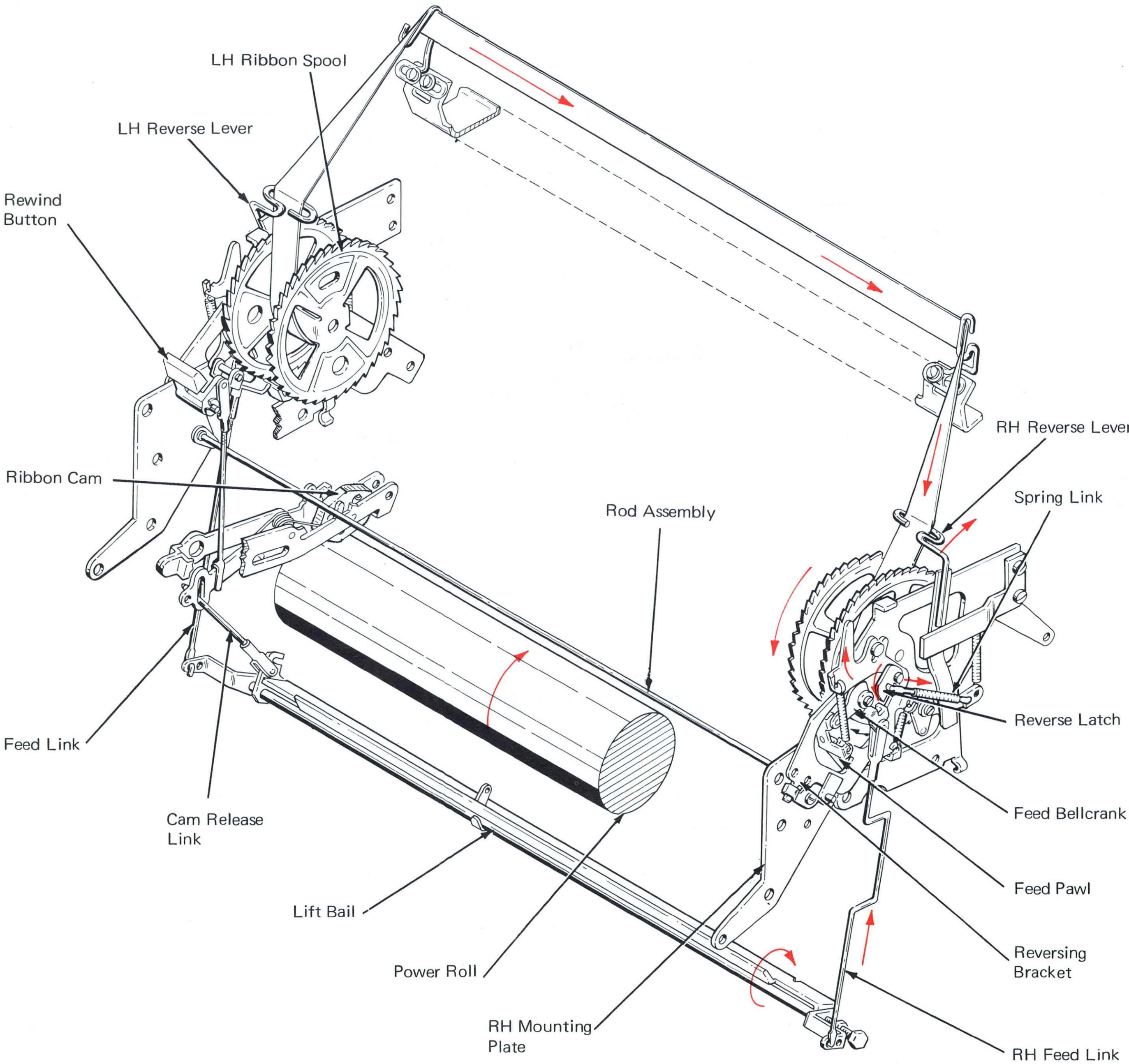


Figure 8 – Ribbon Reverse

CARBON RIBBON

The carbon ribbon attachment consists of the early Model C assemblies with a slight modification to the upper left-hand feed plate (Figure 9). The upper feed plate is made up of a ratchet assembly, escapement wheel and feed rollers. Refer to the carbon ribbon section for operational theory and adjustments.

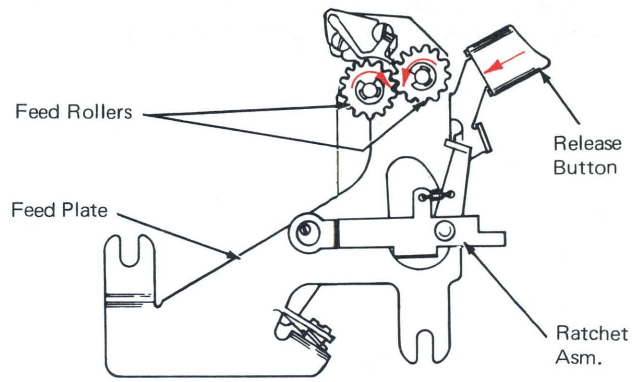
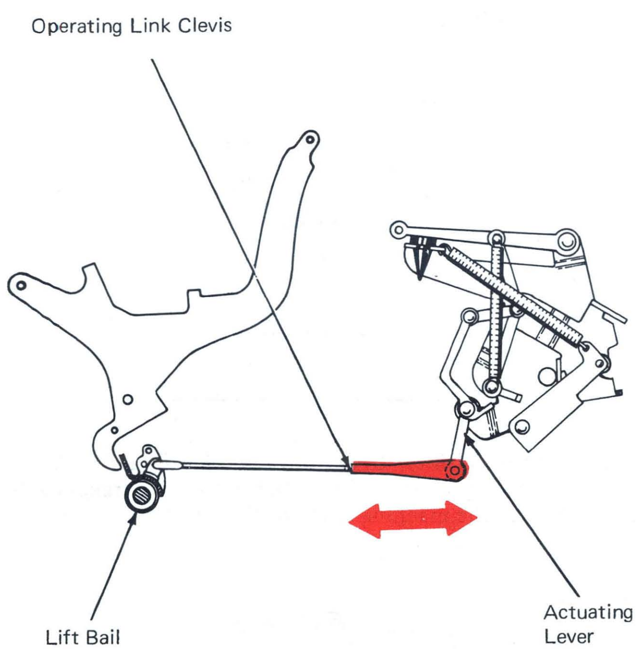


Figure 9 – LH Carbon Ribbon Feed Plate

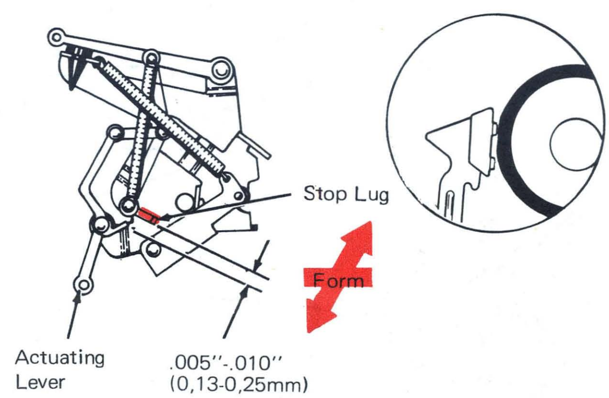
DUAL RIBBON ADJUSTMENTS

1. *Ribbon Lift Operating Link Clevis* – With the lift bail held against the cam tails and all play in the ribbon lift toggle removed to the front of the machine, adjust the clevis to match the hold in the actuating lever.

2. *Toggle Plate Stop Lug* – With a typebar held against the platen, form the stup lug for .005-.010" (0,13-0,25mm) clearance with the actuating lever extension (redesigned ribbon lift only).

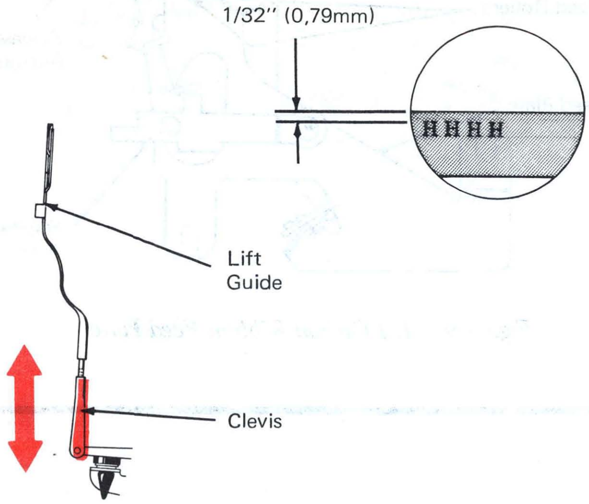


(Right Side View)



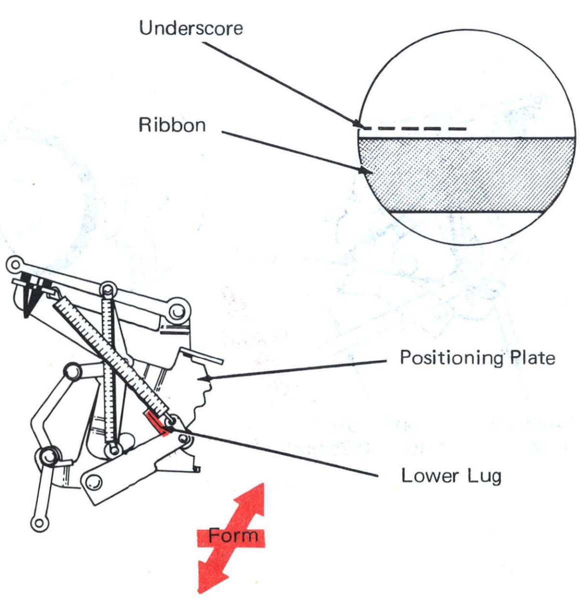
(Right Side View)

3. *Ribbon Lift Guide Clevis* – Adjust so the top of the characters strike 1/32" (0,79mm) below the upper edge of the ribbon in the lower lift position.



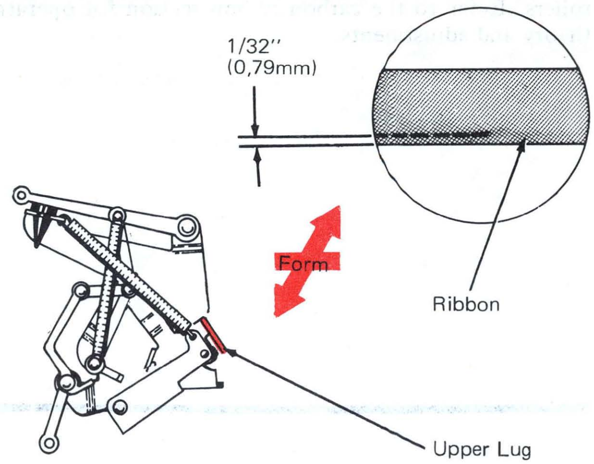
(Right Side View)

4. *Positioning Plate – Lower Lug* – With the ribbon position button in the stencil position, form so the underscore does not strike the ribbon.



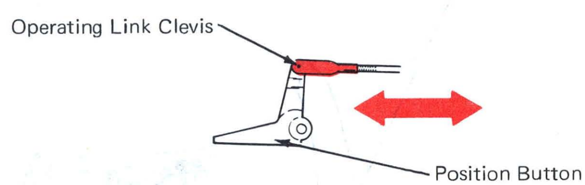
(Right Side View)

5. *Positioning Plate – Upper Lug* – Form so the underscore prints 1/32" (0,79mm) above the bottom of the ribbon in the highest lift position.



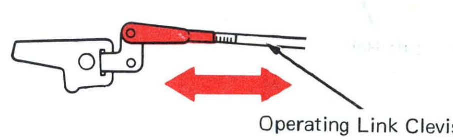
(Right Side View)

6. *Ribbon Position Operating Link Clevis, C1* – Adjust so the top of the positioning button matches the slope of the tab set and clear button when in the first lift position.



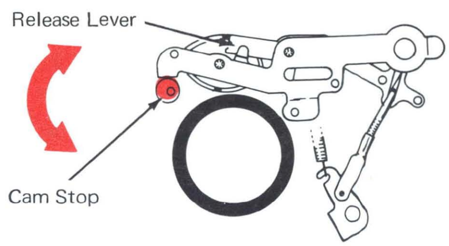
(Right Side View)

7. *Ribbon Position Operating Link Clevis, D1* – Adjust so the top of the positioning button is parallel to the base of the machine when in the first lift position.



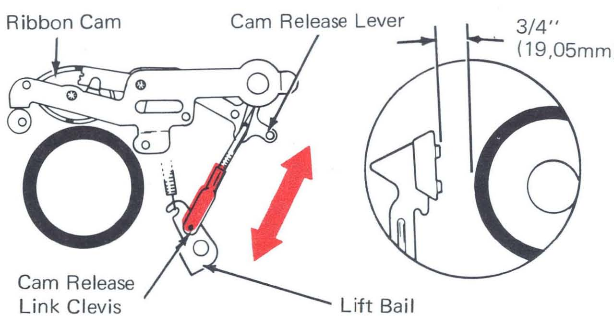
(Right Side View)

8. *Cam Clearance* – Adjust the cam stop so the release lever lug rests on the rear of the cam lug when the cam is released with the power off.



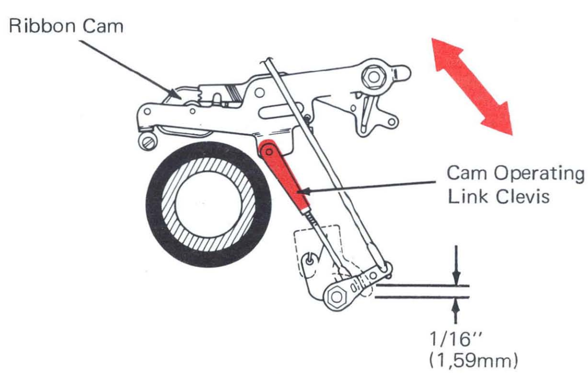
(Left Side View)

9. *Cam Release Link Clevis* – Adjust so the cam releases when any type face is approximately 3/4" (19,05mm) from the platen.



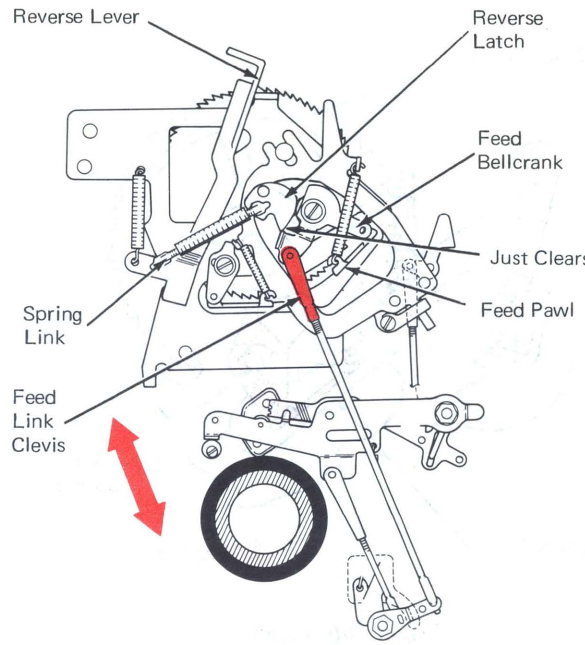
(Left Side View)

10. *Cam Operating Link Clevis* – Adjust so the bail end plate is 1/16" (1,59mm) above the bottom of the slot in the side frame.



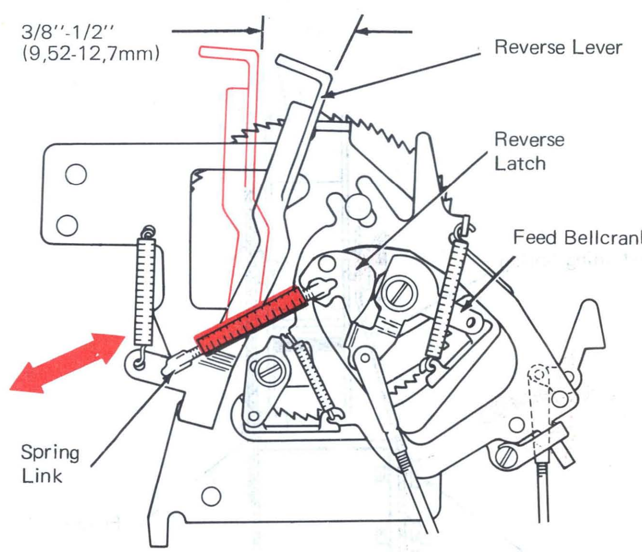
(Left Side View)

11. *Ribbon Feed Link Clevis* – With the cam on the high point, adjust the feed link on the feeding side so the reverse latch will just clear the ribbon feed bellcrank as the latch is moved to the rear.



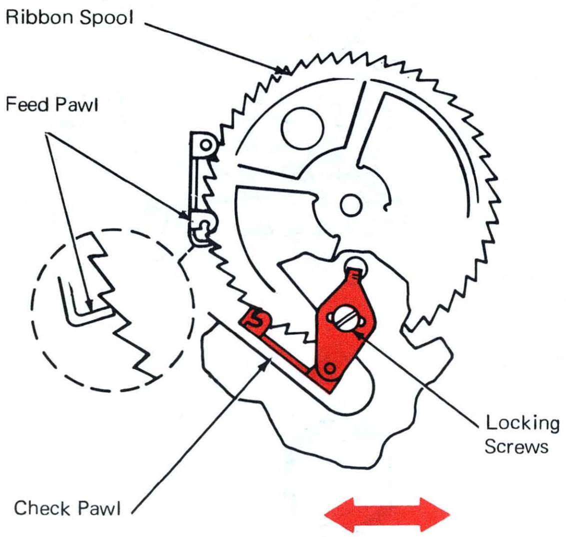
(Left Side View)

12. *Spring Leaks* – Adjust so the ribbon reverses when the reverse lever has moved 3/8-1/2" (9,52-12,7mm) toward the rear.



(Left Side View)

13. *Check Pawl* – Adjust so when the check pawl is in the spool tooth, the ribbon feed pawl will rest halfway between the two teeth.



(Right Side View)

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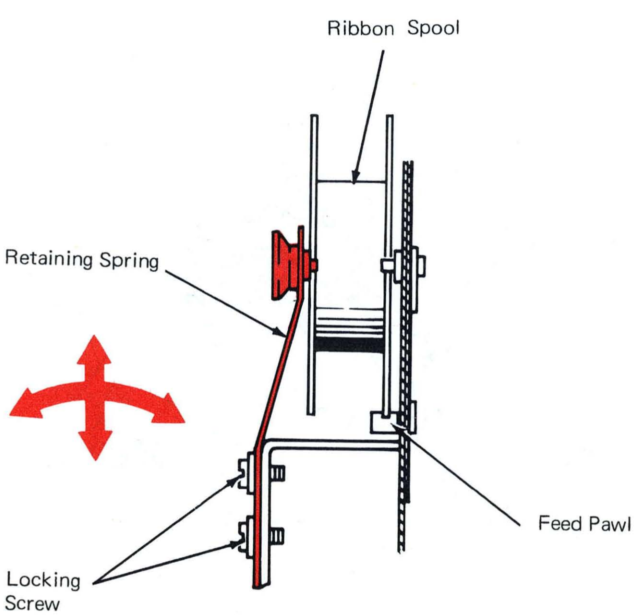
14. *Ribbon Spool Retaining Springs* – Adjust to center the teeth of the ribbon spools on the feed pawls and to provide enough tension to prevent ribbon from spooling off.



PAPER FEED, GUIDES AND PLATEN OPERATIONAL THEORY

The paper feed mechanism (Figure 1) positions the paper on the next writing line. The paper is fed as the platen is rotated by the pressure of rubber feed rolls that hold the paper against the platen. The rear paper table, front paper table, deflector, front paper scale, cardholders, and bail arm rollers are also necessary in paper feed.

The feed rolls are assembled in sets with four feed rolls in each set; two front feed rolls and two rear feed rolls. The number of sets used in a carriage changes with the length of the carriage. Spacing of sets is controlled by feed roll center supports between the sets. The outer sets are held against the center supports by C-clips on the platen guide shaft.

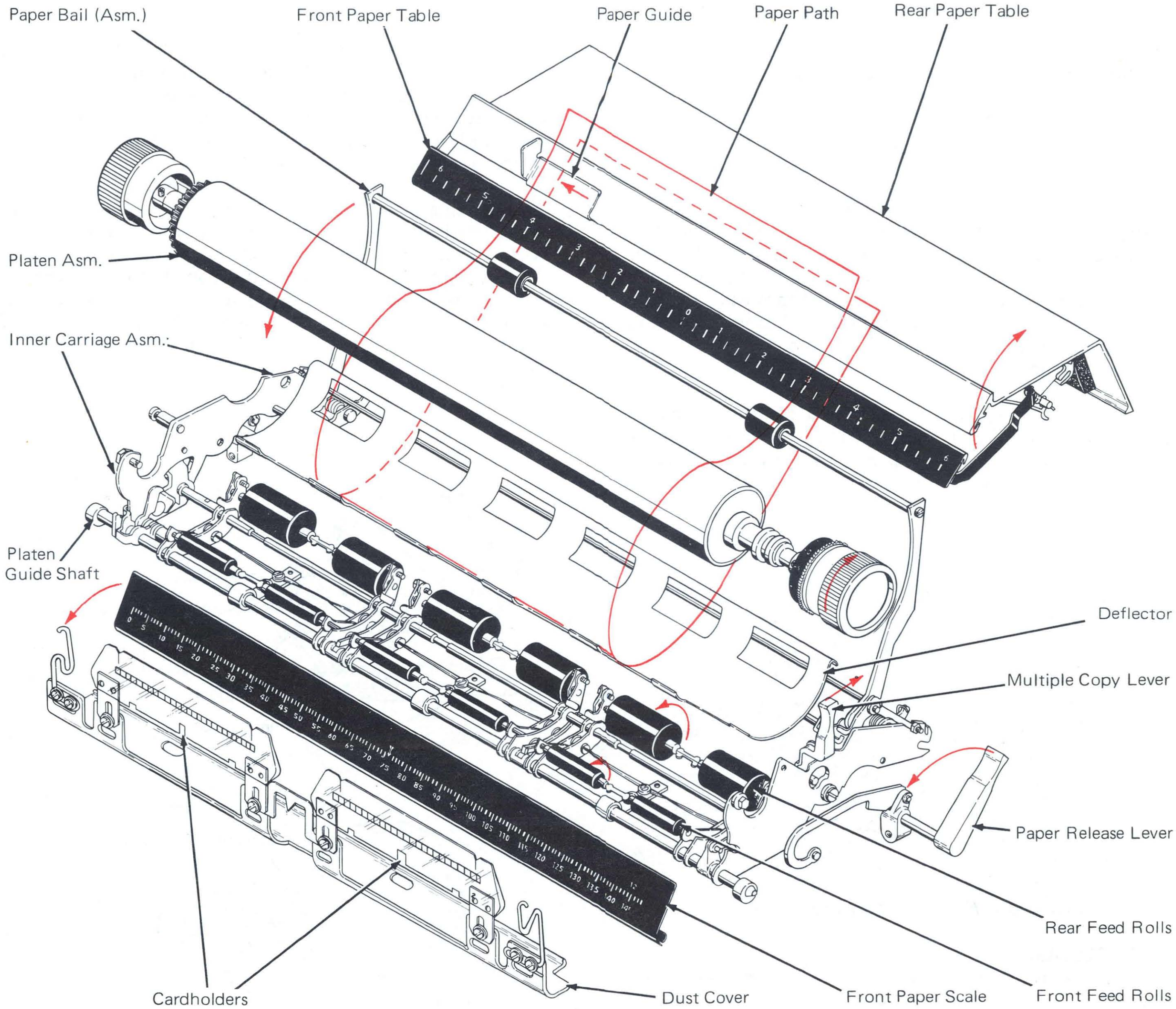


Figure 1 – Paper Feed Mechanism

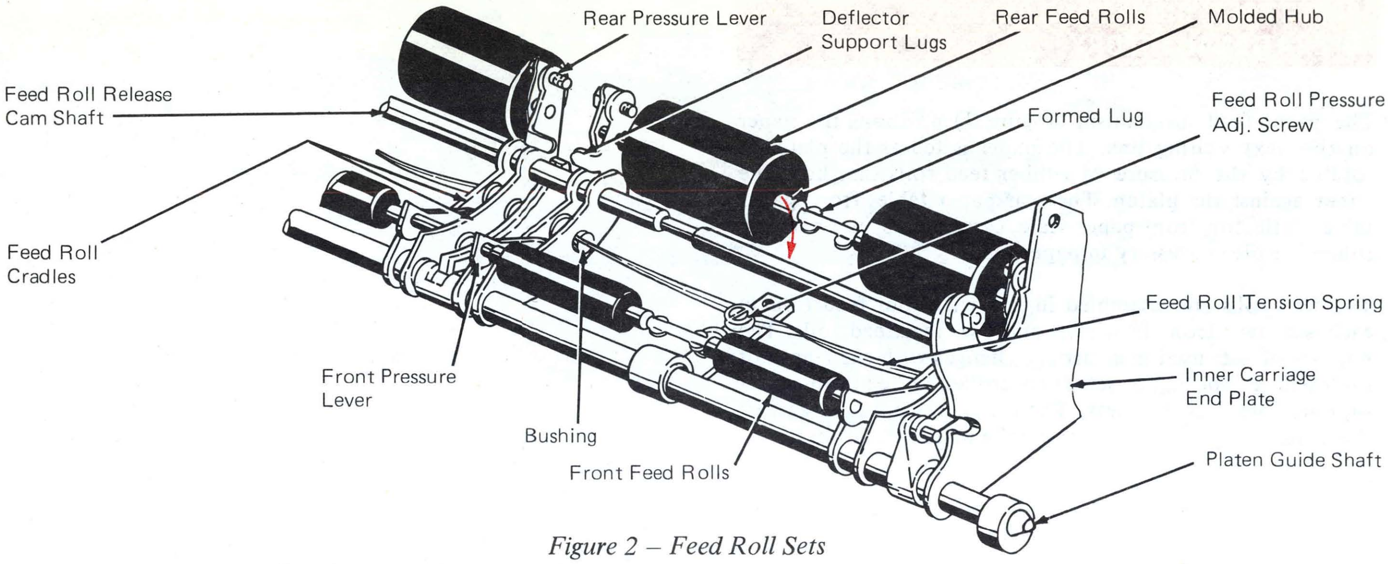


Figure 2 – Feed Roll Sets

FEED ROLLS

The feed rolls are molded on a hub which turns on the feed roll shaft (Figure 2). The position of the feed roll on the shaft is held by formed locating lugs on the shaft. Model C and early Model D typewriters have adjustable spring retaining clips.

Feed roll sets are mounted on two shafts of the inner carriage (Figure 2); the platen guide shaft and the feed roll release cam shaft. Cradles are held across these shafts in twos and mount the front and rear pressure levers between them. Flat tension springs are mounted in bushings in the pressure levers. Turning the feed roll pressure adjusting screws twists the tension spring and allows adjustment of the feed roll tension.

Feed roll center supports are mounted at different places across the carriage bed (Figure 3). They give support under the cradles to prevent the paper feed mechanism from bending in the center.

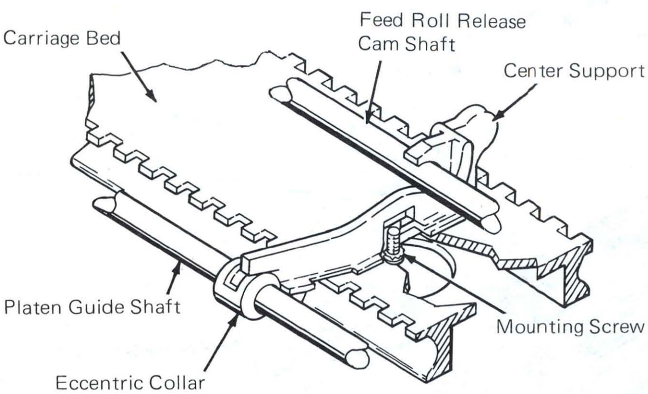


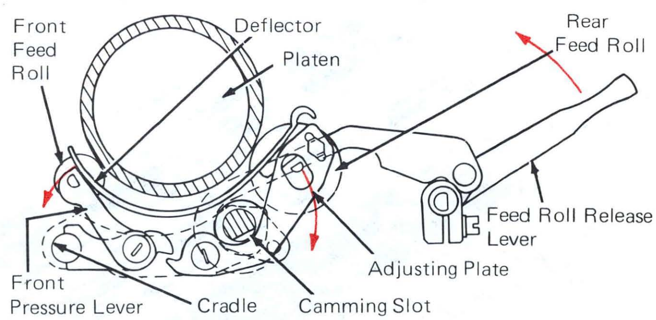
Figure 3 – Feed Roll Center Support

PAPER RELEASE

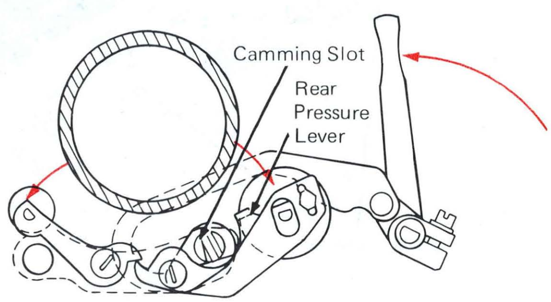
Paper release is performed by lowering all feed rolls at the same time so the paper can be easily repositioned by the operator. Pulling the feed roll release lever forward causes rotation of the feed roll release cam shaft (Figure 4). The cam shaft extends the full length of the inner carriage and passes through each cradle assembly.

Each rear pressure lever rests in a cam slot of the cam shaft. The lower part of the slot allows the rear pressure lever to enter the slot far enough to allow the feed rolls to contact the platen without restriction. Rotating the shaft forces the pressure levers out of the slot and the rear feed rolls away from the platen.

An adjusting plate is attached to the rear pressure lever and moves with it. The rear end attaches to the pressure lever with a hexagonal screw through an elongated hole. The forward end has a hook like extension that moves upward as the pressure lever and plate pivots. The hook contacts a similar hook on the front pressure lever and causes it to pivot also, lowering the front feed rolls away from the platen.



(Paper Release Lever To Rear)



(Paper Release Lever Forward)

Figure 4 – Paper Release (Right Side View)

PAPER FEED

Paper feeding begins at the rear paper table where the operator inserts the paper into the typewriter (Figure 5). The rear paper table supports the paper at the back of the machine and has an adjustable guide to aid the operator in positioning the paper for the left margin. The rear paper table guides the paper into the V between the rear feed rolls and the platen. Support lugs on the rear feed roll pressure levers control the distance between the deflector and platen. Rotation and left-to-right movement of the single piece deflector is prevented by formed lugs on the bottom of the deflector. The front paper table guides the paper back to the rear paper table, preventing it from going back around the platen.

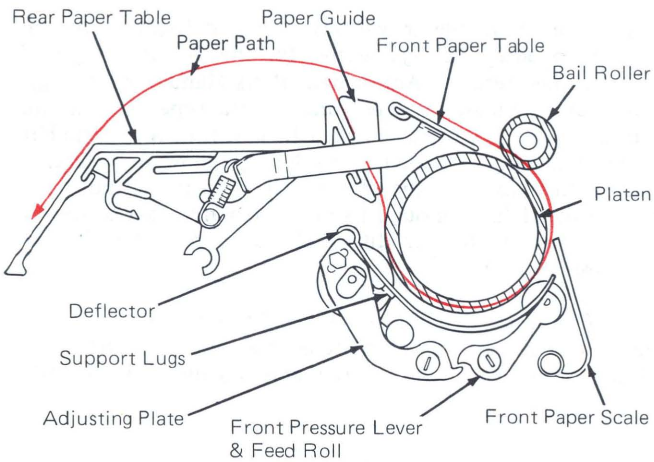


Figure 5 – Paper Feed Path (Left Side View)

PAPER BAIL

The bail rollers turn on a bail shaft that is supported by two bail arms which are spring loaded through the bail cam lever (Figure 6). The rollers have a two piece hub with a slot in the center for a spring clip. This clip holds the bail shaft to keep the rollers from sliding easily across the shaft, yet allows the operator to reposition them as desired.

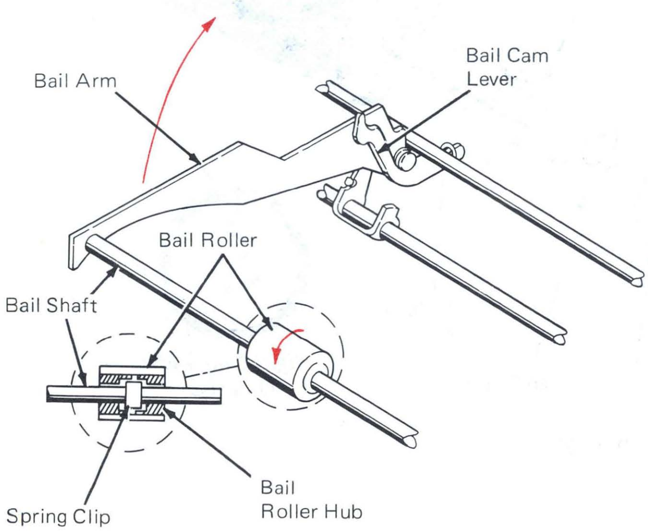
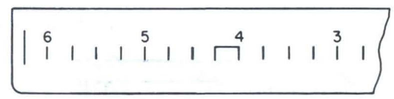


Figure 6 – Paper Bail & Roller Asm.

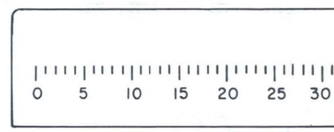
CARDHOLDERS AND SCALES

Cardholders and the front scales have different marks determined by the pitch of the machine (Figure 7). Each model has a front and rear paper scale plus two cardholders.

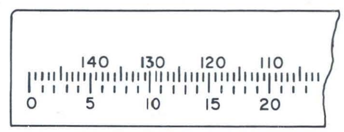
C1 – D1 Paper Table



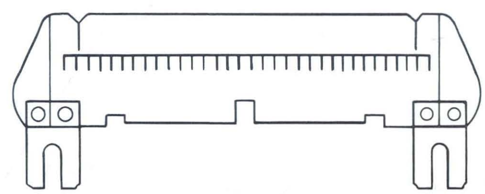
C4 – D4 Paper Table



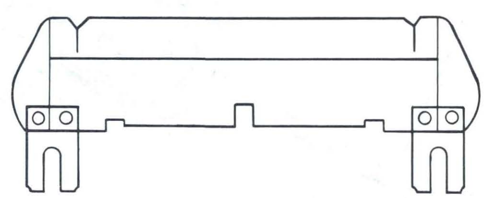
C1 – D1 Front Paper Scale



C4 – D4 Front Paper Scale



C1 – D1 Cardholder



C4 – D4 Cardholder

Figure 7 – Cardholder & Scale Increments

The two cardholders are mounted to the front rail dust cover (Figure 8). The cardholders give the operator a reference position for the writing line. On the C1, D1 the red vertical line marks the center of each letter space. This feature is not used on the C4, D4 machines. The clear view part of the cardholder helps to hold card and paper against the platen without covering the writing line.

The pointer (Figure 8) points to the position of the next character to be typed. It is used by the operator for repositioning the carriage across the writing line. A repositioning indicator may be used for the same purpose and is described in a separate section of this manual.

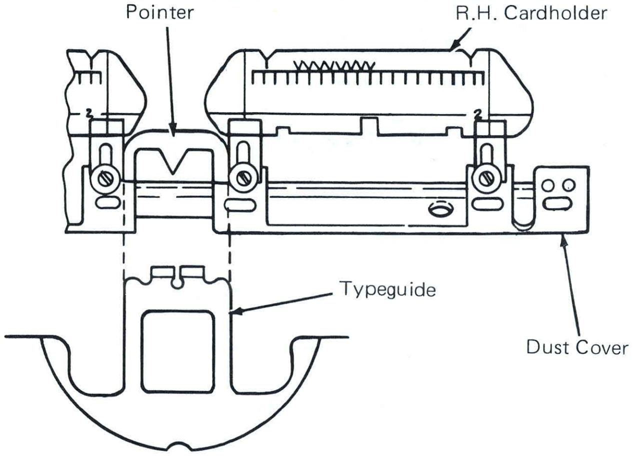


Figure 8 – Cardholder & Pointer (C1–D1)

The platen ratchet provides the means to control the platen rotation for correct line spacing (Figure 9). The number of teeth on the ratchet determines the number of lines per inch that it will space. Refer to carriage return and indexing for further discussion of line spacing.

A clutch connection between the ratchet and the platen allows the operator to disengage the ratchet from the platen and make fine adjustments of the writing line. When the platen variable button is depressed, the platen ratchet driver is disengaged from the ratchet. This allows the platen to be turned without turning the ratchet. Compression springs load the driver to the left against the ratchet. When slots on the outer edges of the driver engage matching slots on the inner part of the ratchet, the platen, driver and ratchet are locked together and will turn as a unit.

Platens are available in various sizes and hardness of the rubber to equip the typewriter for the different type of applications (refer to Adjustment Parts Manual for listing). Selection of a platen is determined by the typestyle and the particular job it will be required to perform. A soft rubber platen will cause a reduction in the type blow and decrease cutting the paper and the ribbon. However, it does not back up the paper hard enough to produce many clear copies. A hard rubber platen produces clearer copies, but it also increases cutting.

A code number is placed on the right end plug for identification. On early level platens, the code number was placed on the left end of the platen rubber (Figure 9).

PLATEN ASSEMBLY

The platen feeds the paper through the carriage and provides a hard backing for the paper. The platen is mounted in the carriage end plates and held by platen latches (Figure 9).

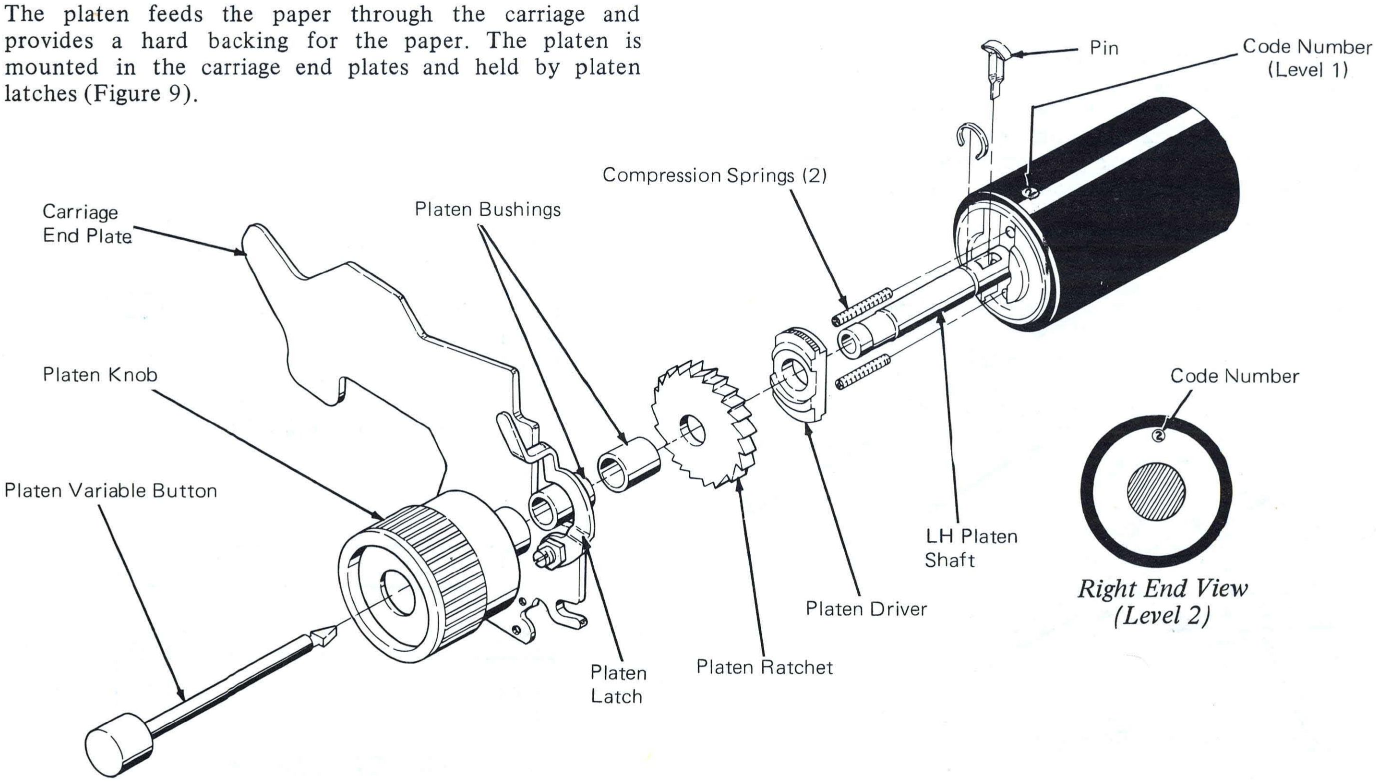


Figure 9 – Platen Clutch Assembly (Level 2)

PAGE END INDICATOR

A page end indicator is attached to the RH platen knob shaft on late Model C and Model D typewriters (Figure 10). The indicator rotates on the knob shaft for resetting at the proper location. This indicator is used by the operator to determine the number of lines remaining before the bottom of the page. A chart in the operator's manual gives the correct setting for different paper lengths.

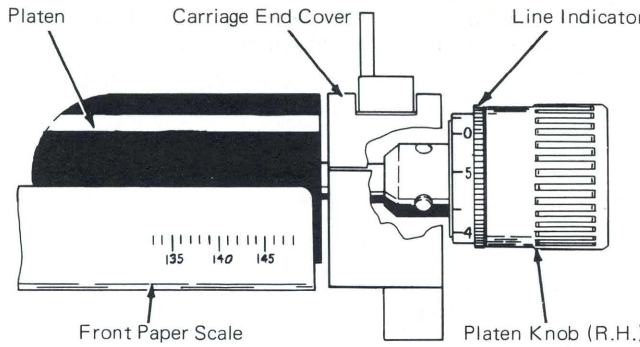
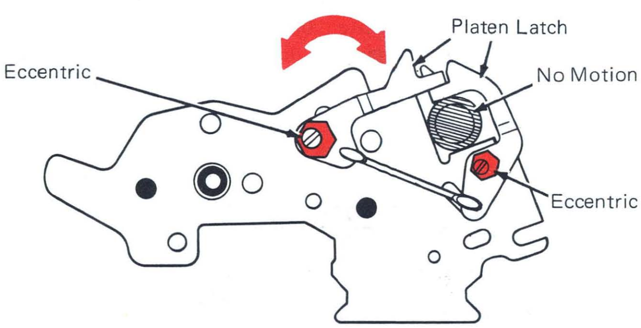


Figure 10 – Line Indicator

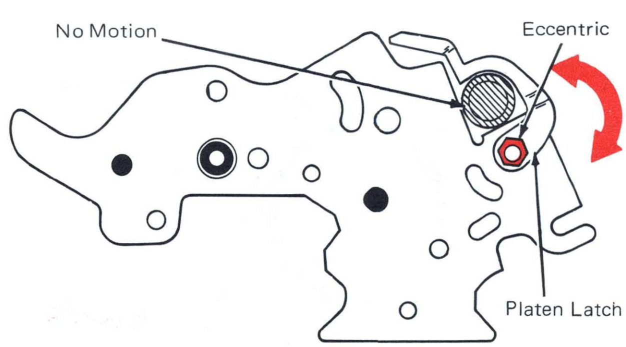
PAPER FEED, GUIDES AND PLATEN ADJUSTMENTS

1. *Platen Latches (Level 1)* – With the platen latch lever eccentric and the platen latch eccentric high points toward each other, adjust the eccentrics so the latches meet in one motion and hold the platen bearings so no vertical motion is allowed.



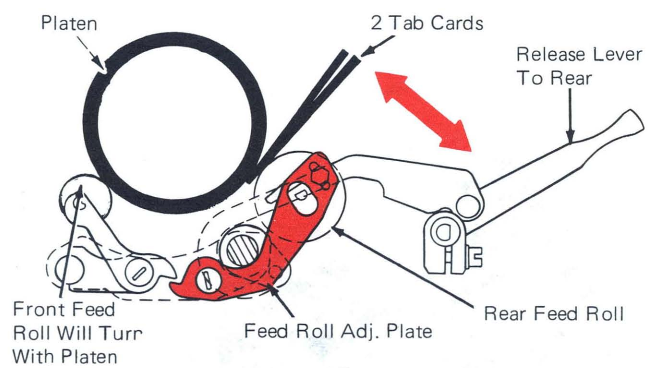
(Level 1 Left Side View)

Platen Latches (Level 2) – Adjust the platen latch eccentric for no vertical or front-to-rear motion of the platen.

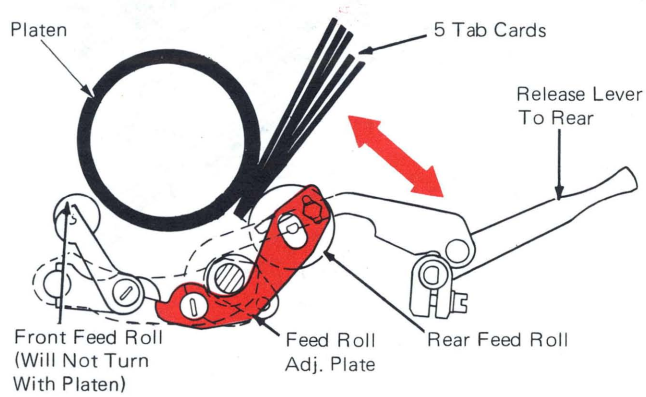


(Level 2 Left Side View)

2. *Feed Roll Adjusting Plate* – With the deflector out, adjust the feed roll adjusting plate so when two tab cards are inserted under the rear feed rolls, the front feed rolls will rotate when the platen is turned and when five tab cards are inserted, the front feed rolls will not turn.
SERVICE INFORMATION: When making this adjustment be sure the feed roll center supports are touching the eccentric collar.
NOTE: The thickness of one IBM tab card is approximately .007" (0,18mm).

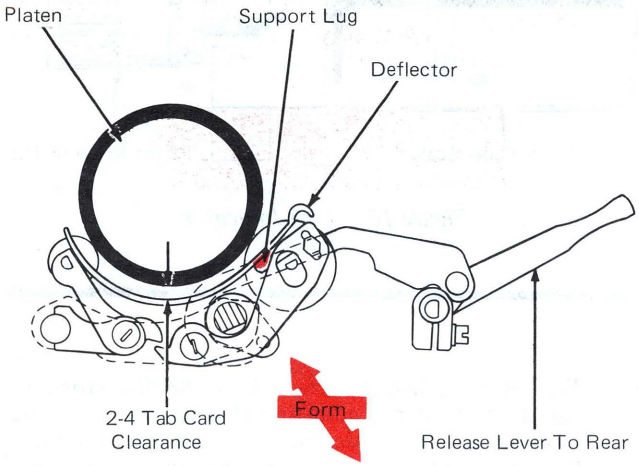


(2 Tab Cards Inserted – Right Side View)



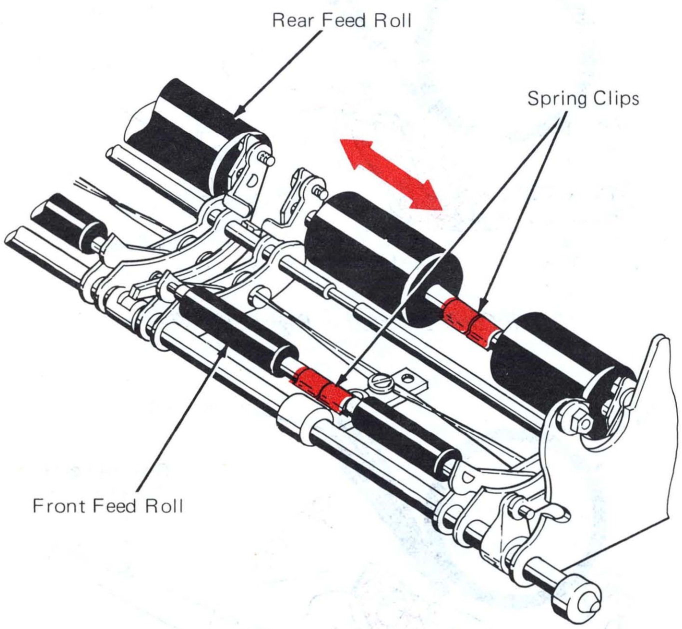
(5 Tab Cards Inserted – Right Side View)

3. *Deflector Support Lugs* – Form the deflector support lugs so there is a clearance of 2 to 4 tab cards between the deflector and platen.



(Right Side View)

4. *Feed Roll End Play (Level 1 Only)* – Adjust the spring clips so that the feed rolls have minimum end play without binds.

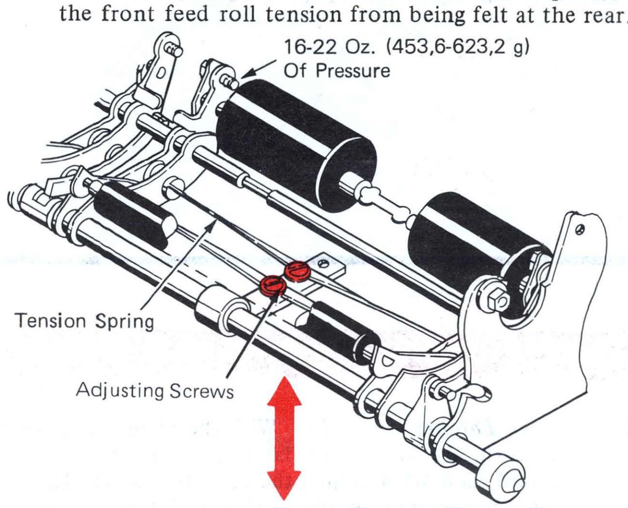


(Level 1 Only)

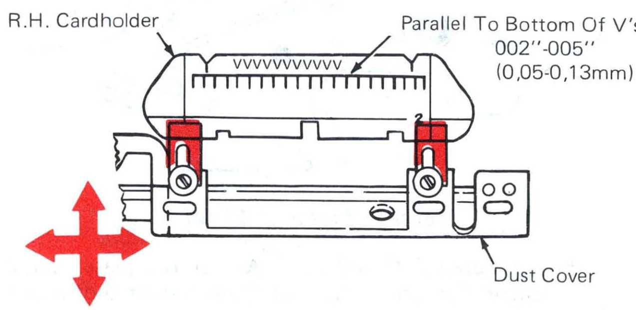
(Minimum End Play No Binds)

5. *Feed Roll Pressure Adjusting Screws* – Center the screw plates between the feed rolls. Adjust each screw until there is a pressure of 16 to 22 ounces (453,6-623,2g) on each pressure lever. Pressure between two feed rolls on the same shaft may be made the same by forming the tension spring with pliers.

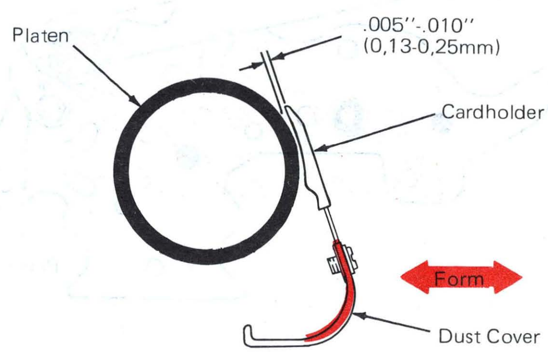
NOTE: Depress the front feed roll shaft to prevent the front feed roll tension from being felt at the rear.



6. *Cardholder* – Adjust the cardholders left to right so the vertical marks line up with the bottom of V's typed on paper. Adjust the cardholder up or down so the horizontal line is parallel to the writing line and so a thin line of white (.002"-.005") (0,05-0,13mm) between the horizontal line and the feet of the character is visible from the operator's position.

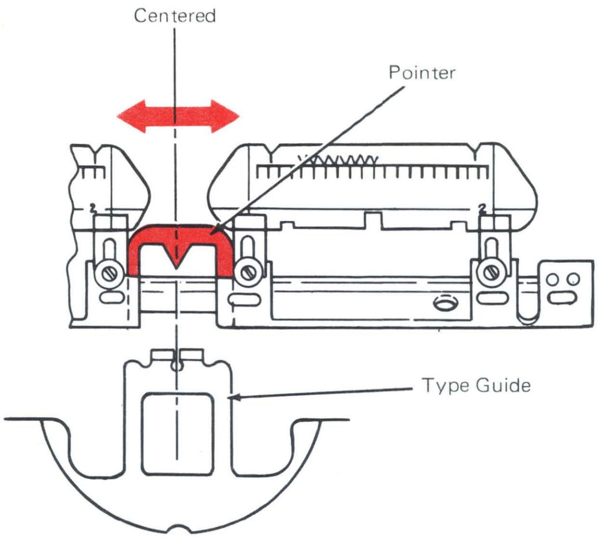


Form the dust cover front-to-rear so the cardholders clear the platen by .005-.010" (0,13-0,25mm).

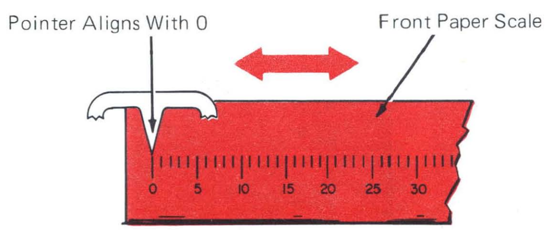


(Left Side View)

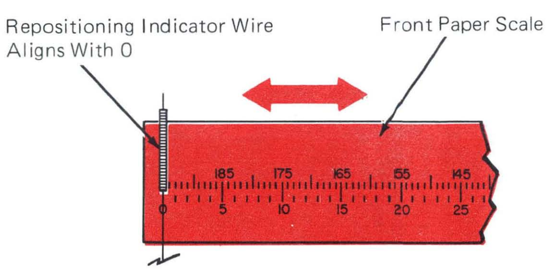
7. *Indicator Pointer* – Center the pointer in the center of the type guide.



8. *Front Paper Scale* – With the margin set at 0, position the front paper scale left or right so the repositioning indicator or pointer lines up with 0 on the scale.

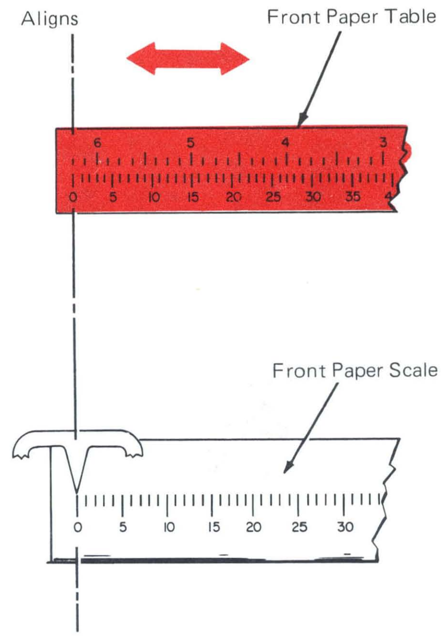


(When Pointer Is Used)



(When Repositioning Indicator Is Used – C4-D4)

9. *Front Paper Table* – Adjust the front paper table left or right so the marks line up with the front paper scale.



MARGIN, LINELOCK AND BELL OPERATIONAL THEORY

The margin, linelock and bell (Figure 1) are three separate mechanisms. They are combined in this section because of their related functions. The margin mechanism determines the beginning and end of a typed line.

The linelock mechanism locks the keyboard to prevent typing when the carriage comes to the end of a typed line (RH margin). It also prevents keyboard operations when the switch is off. The bell mechanism sounds just before the carriage reaches the RH margin to signal the operator.

The term margin refers to the space allowed between the typed material and the edge of the paper. This amount of space is determined by setting both margin stops to exact marks on the front paper scale. The left hand margin stop is used to stop carriage movement to the right; the right hand margin is used to operate the bell and linelock mechanism and to stop carriage movement to the left.

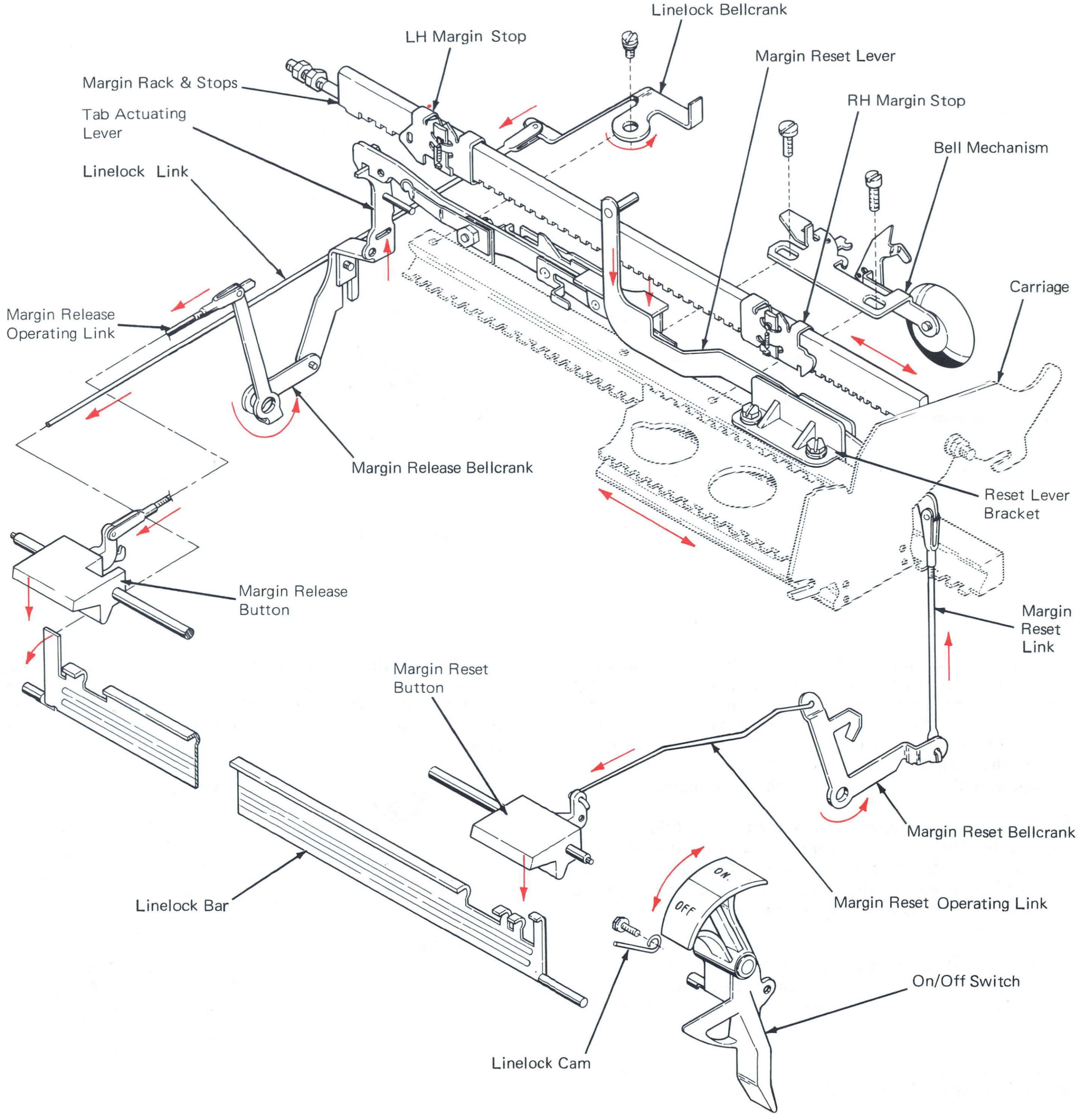


Figure 1 – Margin, Linelock & Bell Mechanism

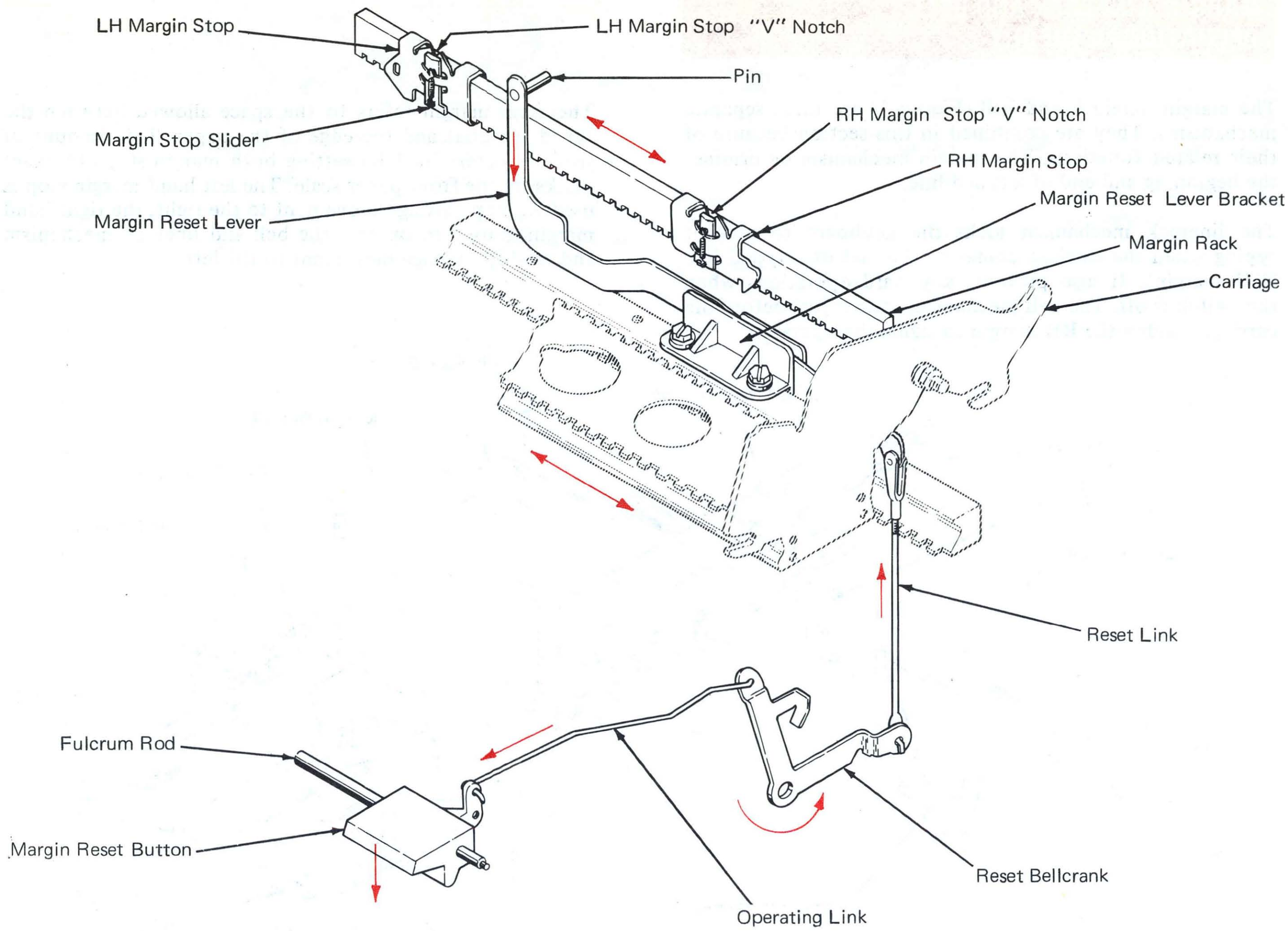


Figure 2 – Margin Reset Mechanism (D1-D4)

MARGIN REST

The margin reset mechanism is used to move the margins to a new position (Figure 2). To do this, use the following steps: first, position the carriage at the present margin; second, depress the margin reset button and hold it down; third, move the carriage to the desired location; and fourth, release the margin reset button. The new location of the carriage will also be the new location of the margin.

The margin reset button is mounted by a fulcrum rod. Depressing the button supplies motion through the operating link, to the reset bellcrank. The rotation of the reset bellcrank pushes the reset link upward, pivoting the left end of the margin reset lever downward.

A pin, attached to the margin reset lever and extending to the rear, enters the V notch in the margin stop assembly and removes the slider from the margin rack teeth (Figure 3).

The carriage may now be moved (by spacebar, backspace or manual carriage release) while the margin stop is held in place. When the carriage is moved to the desired position, releasing the reset button allows the slider assembly to re-engage the margin rack in the new position. The margin reset mechanism is restored to rest by a spring on the reset lever.

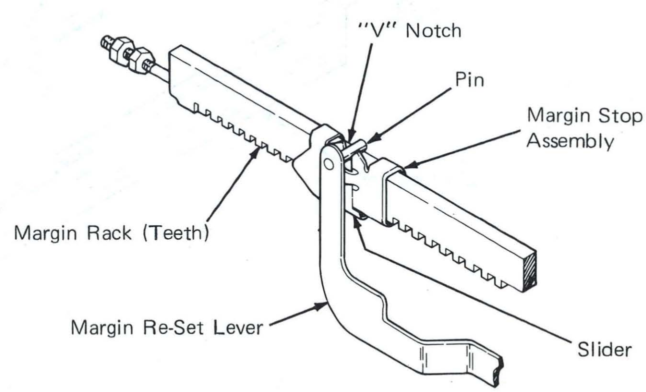


Figure 3 – Margin Reset Operation

The margin reset mechanism on the Model C typewriter (Figure 4) is basically the same as the Model D except that the Model C uses a keylever instead of a link and bellcrank. The keylever is mounted to the right side frame by a stud. The keylever has an elongated hole where the keylever fulcrum rod passes through it. This fulcrum rod is used to limit the up and down movement of the margin reset keylever.

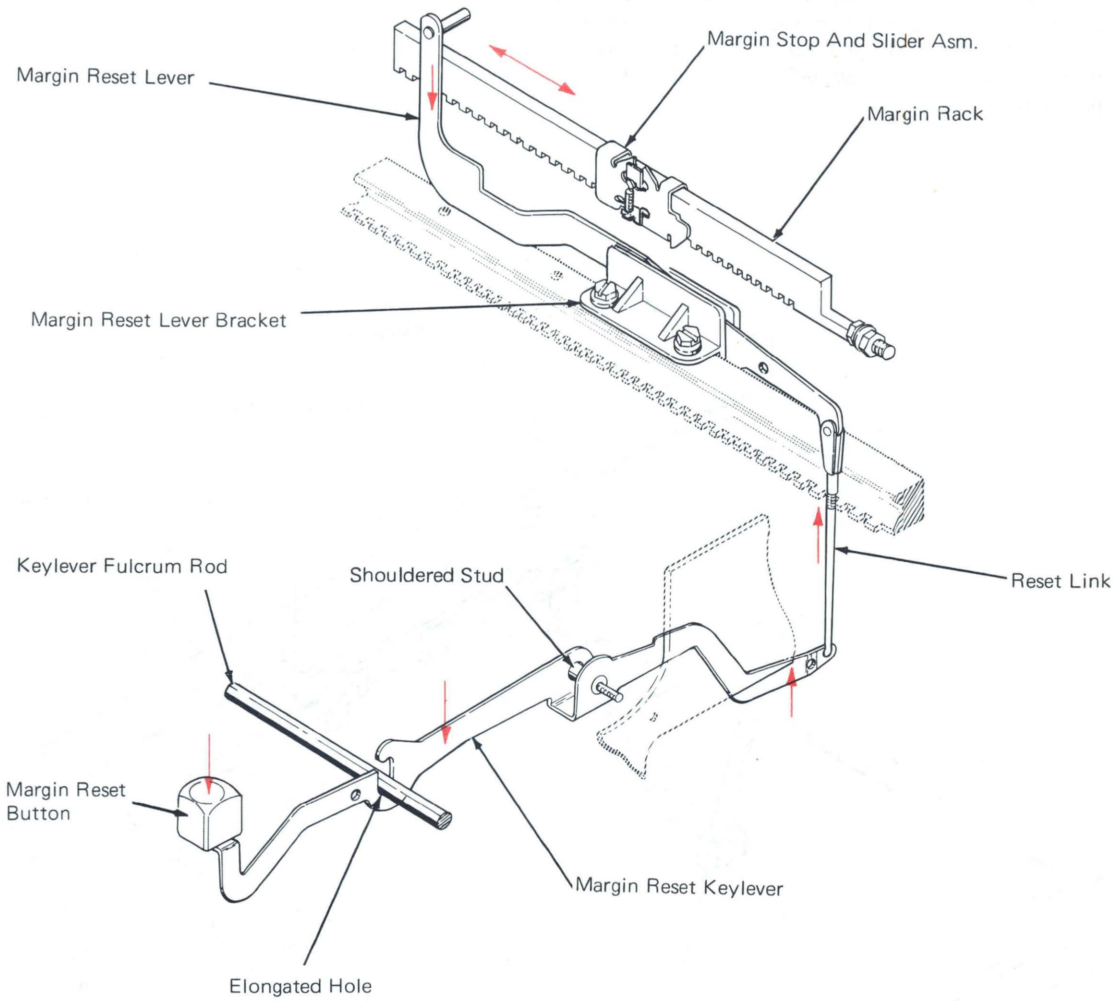


Figure 4 – Margin Reset Mechanism (C1-C4)

MARGIN RELEASE

The margin release button is also mounted by a fulcrum rod (Figure 5). Downward movement of the margin release button pulls forward on the margin release link, which rotates the margin release bellcrank. The margin release bellcrank is mounted by a stud to the left rear side frame. As the bellcrank rotates, it pushes up on the tab actuating lever which is attached to the rear of the bellcrank.

The tab actuating lever fits into a notch on the bottom of the tab lever. The upward motion of the tab actuating lever pivots the tab lever about its pivot stud and lowers the right end of the tab lever. The margin control lever, mounted on the right end of the tab lever, is then lowered below the margin stop. This allows the margin stop to pass over the margin control lever. The carriage can then be moved past the margin without changing the margin stop setting. When the margin release button is released, the combination spring load of the actuating lever and the tab lever springs restores the margin release bellcrank and button to the rest position.

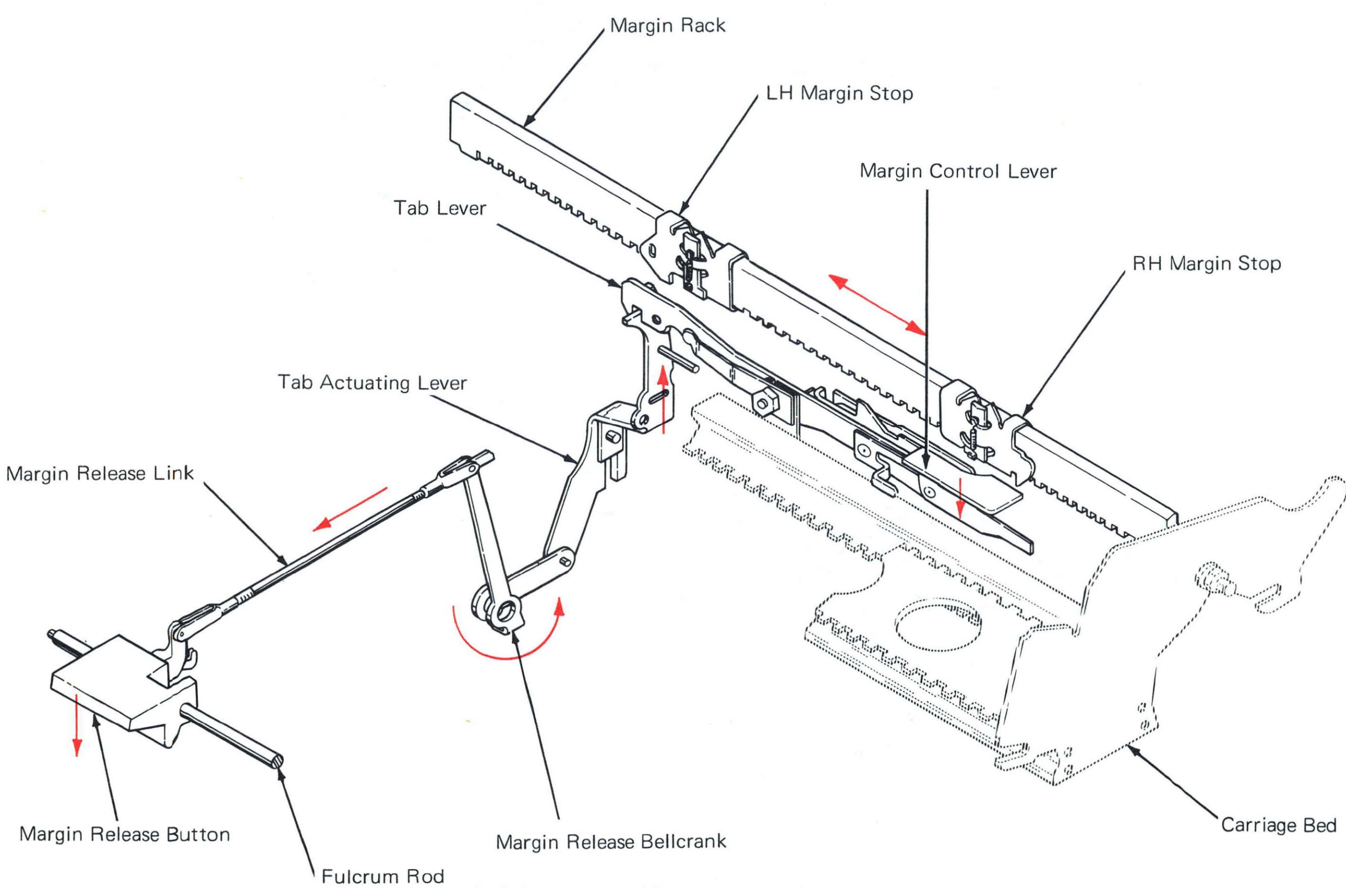


Figure 5 – Margin Release (D1-D4)

When the carriage is brought back from past the margin stops, a cam surface on the back of either margin stop pushes the margin control lever down to allow the margin stop to pass over it (Figure 6).

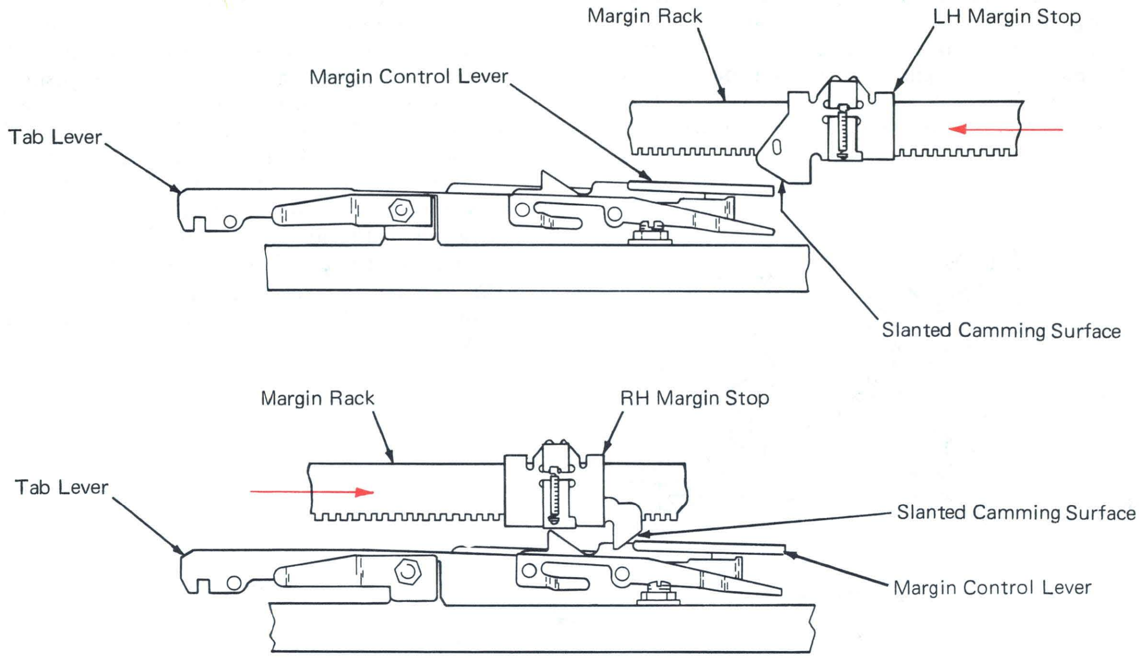


Figure 6 – Margin Stop Camming Surface

On the Model C typewriter, a margin release keylever (Figure 7) is mounted to the power frame by a screw which serves as the fulcrum point for the keylever. The margin release keylever extends to the rear under a formed lug on the tab actuating lever. On early Model C typewriters an eccentric is used instead of the formed lug. The operation of the margin release is the same as that on the D1, D4.

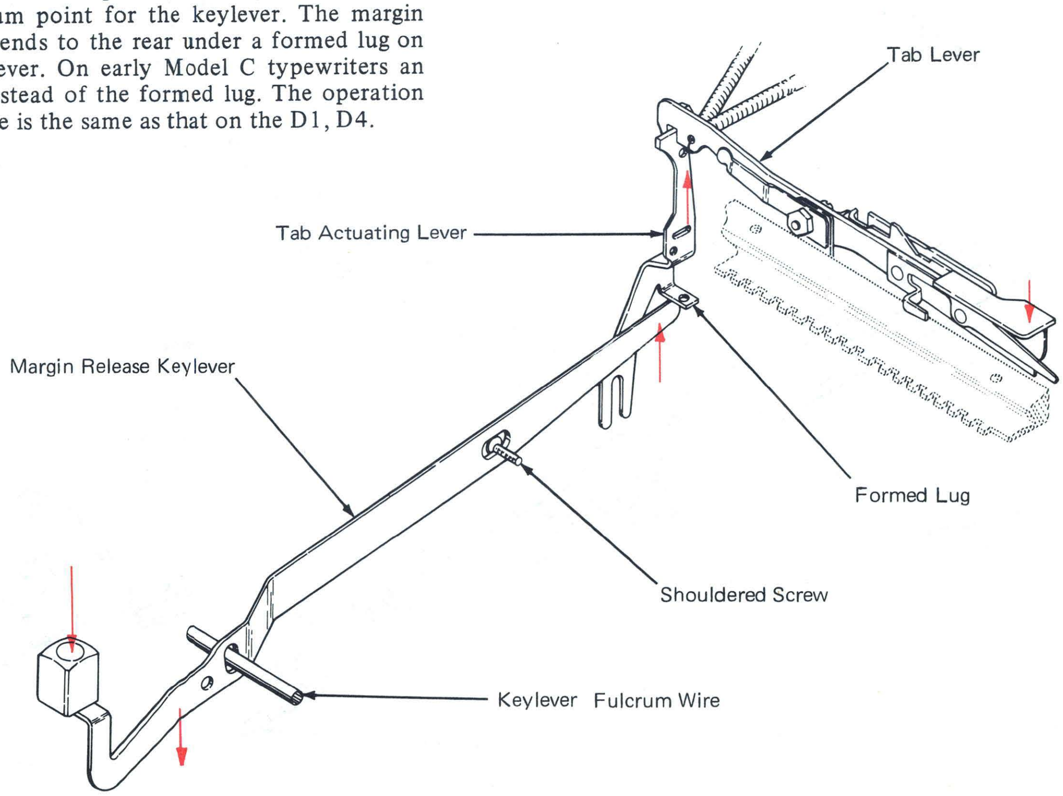


Figure 7 – Margin Release (C1-C4)

MARGIN STOP

The margin stop assembly consists of a stop, slider and a spring (Figure 8). The slider is spring loaded up to engage the teeth of the margin rack.

A multi-tooth slider and margin stop is used for both LH and RH margins. The Model C and early Model D typewriters use a single pin slider and margin stop. A multi-tooth slider and margin stop should be used for replacement on both Model C and D typewriters. These assemblies are identified, as to escapement pitch, by a number as shown in Figure 8.

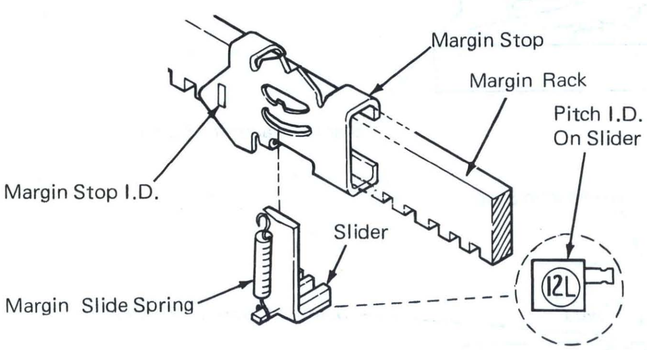


Figure 8 – Margin Stop Assembly

LINELOCK

The purpose of the linelock mechanism (Figure 9) is to lock the keyboard when the switch is turned "off" or when the carriage comes to the end of the writing line (the RH margin). A linelock bar is mounted on a fulcrum rod under the keylevers where it can be pivoted into position to back keylever operation. The fulcrum rod and bar slide left and right as well as pivot forward and back. The linelock bar is spring loaded to the right and to the rear. A bushing on the right end of the fulcrum rod contacts a cam surface on the side of the on/off switch to provide the right-to-left action of the locking bar. The linelock cam pivots the locking bar to the rear when the on/off switch is rotated to the "off" position. A push rod, running from the left side of the linelock bar to the linelock bellcrank on the rear rail, transfers carriage movement from the margin control lever to pivot the locking bar when the carriage reaches the right hand margin. (Models C4-D4 only have the on/off switch keyboard locking mechanism.)

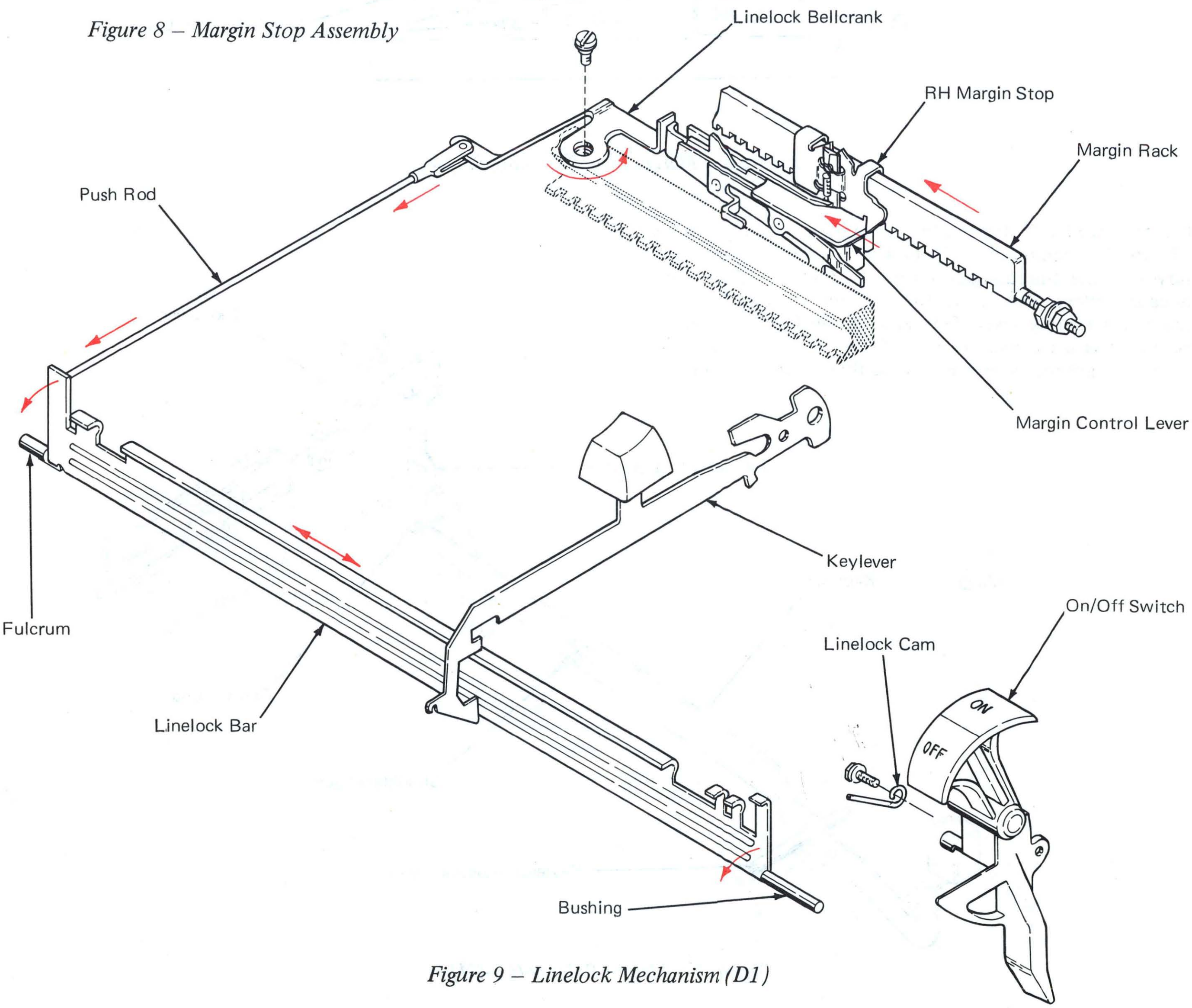


Figure 9 – Linelock Mechanism (D1)

With the switch "on" and the carriage at the right hand margin, C1-D1, only the letter keylevers and the tab keylever are locked. Cutout parts of the locking bar (Figure 10) and the lateral position of the bar allows the spacebar, shift, and backspace keylevers to be operated at the right hand margin. A separate section of the locking bar locks the carriage return keylever only when the switch is turned "off." A lug on the carriage return lock extends through the right side frame where it is contacted by the switch lever.

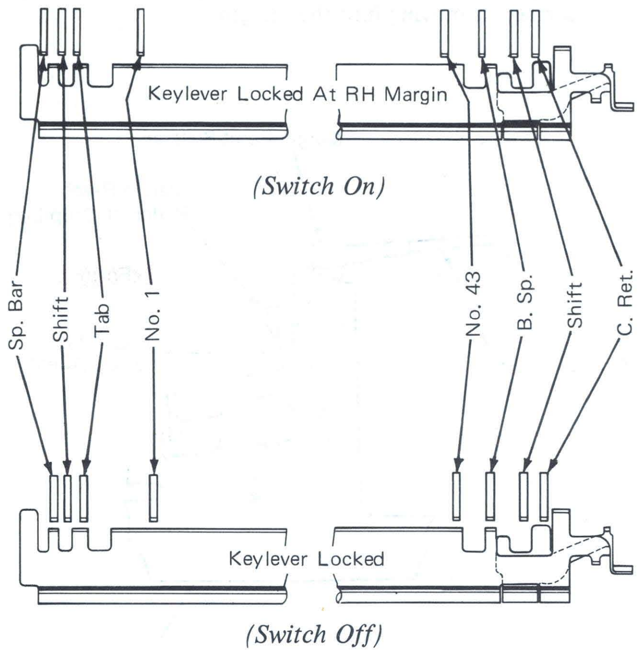


Figure 10 – Keylever Locking Bar (Front View)

Keylevers have a slot just above the area contacted by the locking bar, leaving a lug sticking out at the bottom (Figure 11). This allows the bar to pivot forward and lock the other keylevers, even if one of them may be held down at the time. The keyboard locking bar is common to all models.

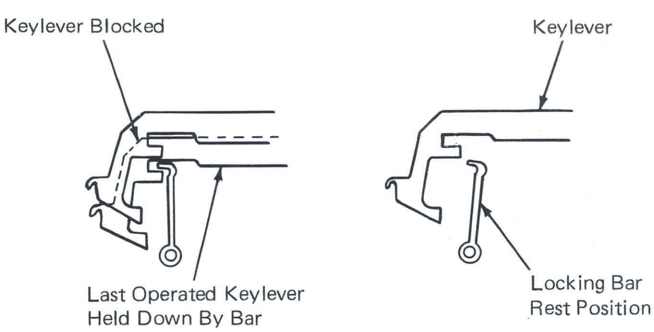


Figure 11 – Locking Bar Action (Right Side View)

BELL MECHANISM

The purpose of the bell mechanism (Figure 12) is to signal the operator when the right hand margin is near. As the right hand margin stop comes to the right margin it operates a bell which is mounted to the rear rail. Components of this mechanism consist of a bracket, bell and bell clapper. The bell clapper is mounted on the bracket in a vertical position. Motion to operate the bell clapper comes from an extension on the margin stop which rotates and releases the bell clapper when the carriage is approximately 10-12 spaces from the right hand margin.

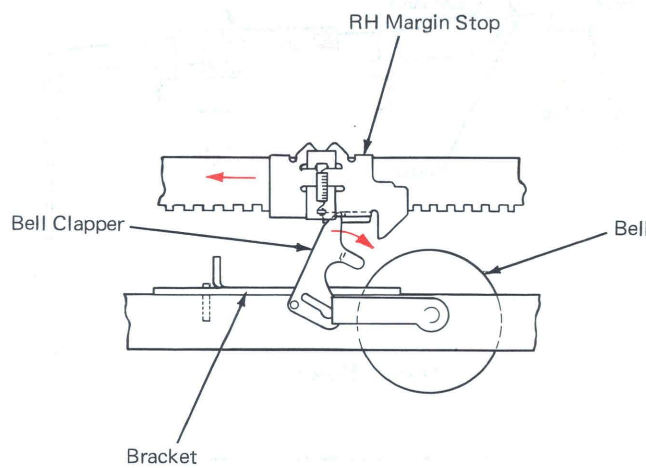
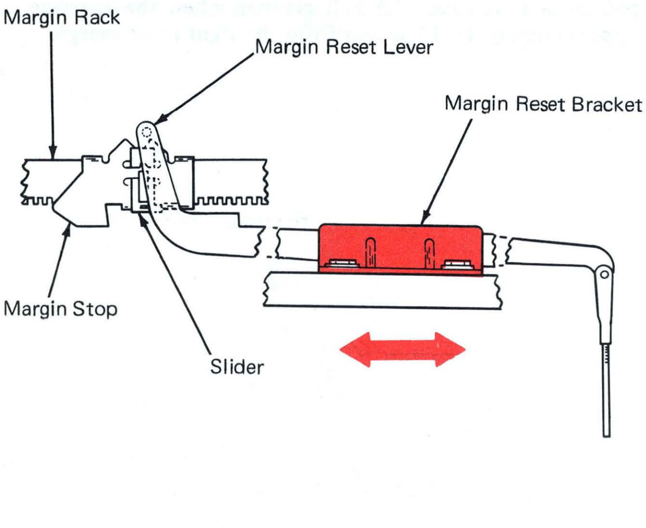


Figure 12 – Bell Mechanism (Front View)

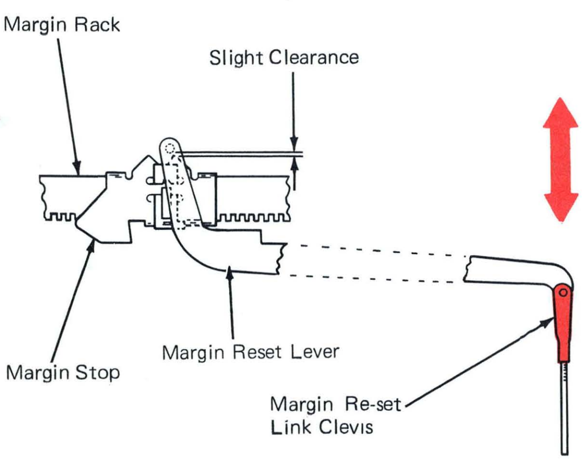
MARGIN, LINELOCK AND BELL ADJUSTMENTS

1. *Margin Reset Bracket* – With the carriage at the left hand margin, adjust the bracket left or right so the slider pin will enter in the correct margin rack tooth when the margin reset lever is released.



(Front View)

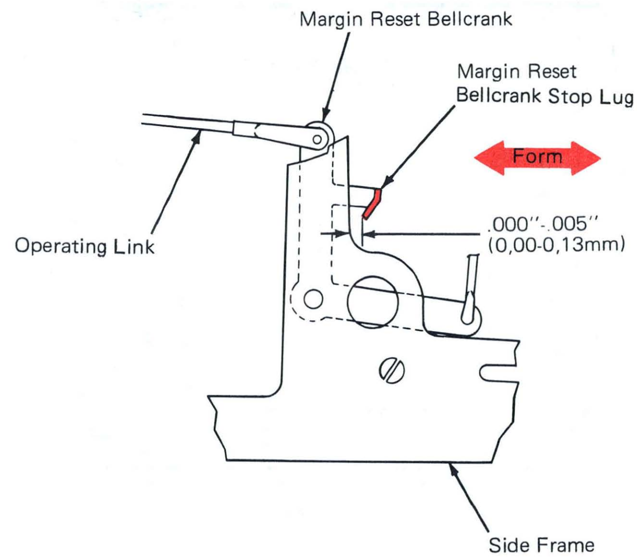
2. *Margin Reset Link Clevis* – Adjust so the margin reset lever will just safely clear the top of the margin stop with all parts at rest.



(Front View)

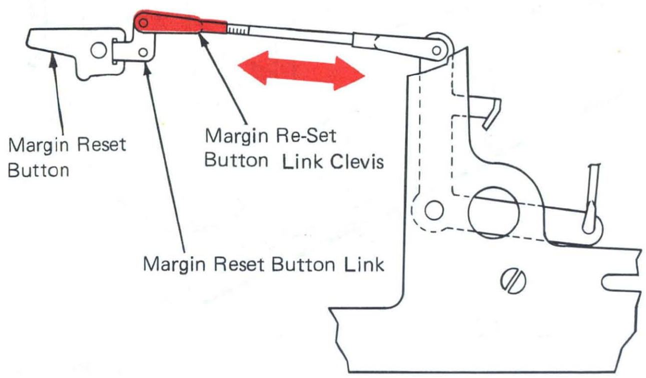
3. *Margin Reset Bellcrank Stop Lug, D1-4* – With the carriage at the left hand margin, depress the margin reset button to bottom the margin reset lever in the margin stop notch and form the lug for .000-.005" (0,00-0,13mm) clearance with the side frame.

NOTE: This adjustment ensures that the margin reset lever can cam into the margin stop notch if the margin reset button is held depressed while the carriage is moving into the margin.



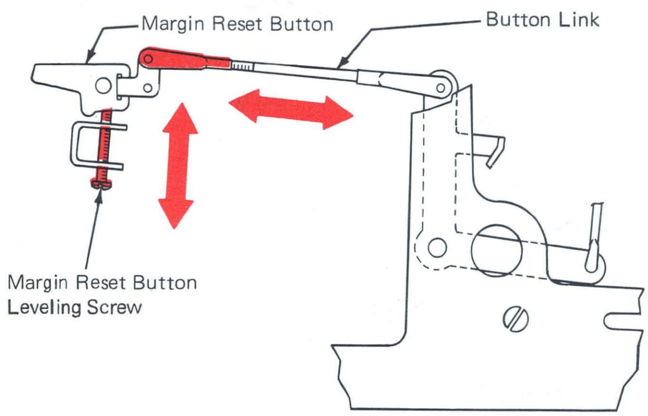
(Level 1) (Right Side View)

4. *Margin Reset Button Link Clevis, D1 (Level 1)* – Adjust so the top surface of the button will be parallel to the base of the machine at rest.



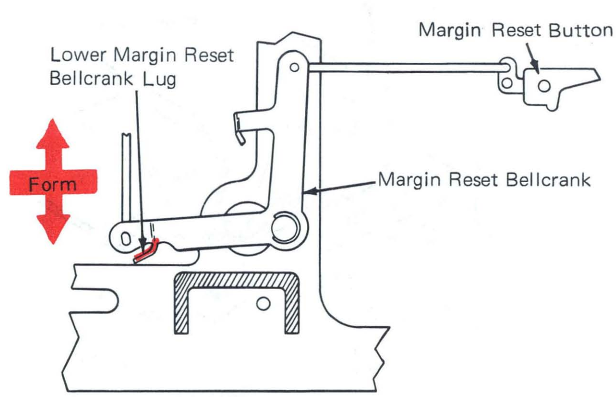
(D1 Level 1 Right Side View)

Margin Reset Button Leveling Screw, D4 (Level 1) – Adjust the leveling screw so the top surface of the flipper button will be parallel to the base of the machine. Adjust the link to match the hole.



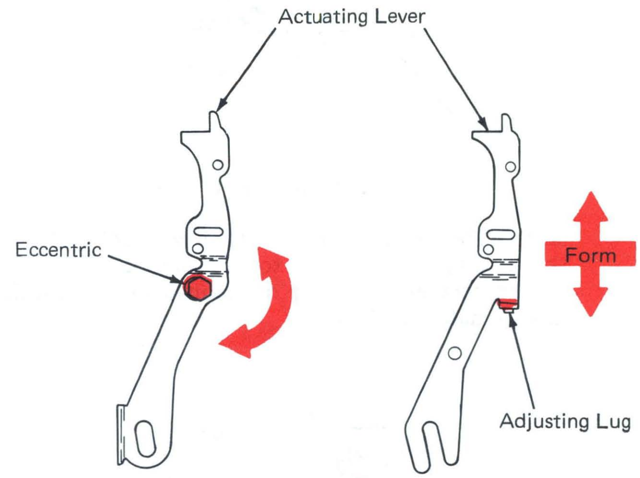
(D4 Level 1 Right Side View)

Margin Reset Bellcrank, D1, D4 (Level 2) – Adjust so the top surface of the button will be parallel to the base of the machine at rest.



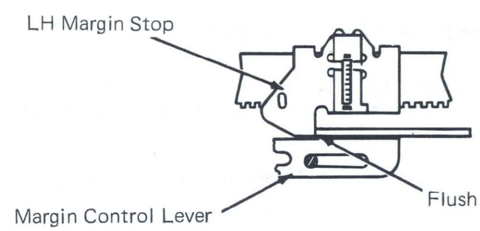
(D1-D4 Level 2 Left Side View)

5. *Tab Lever Height, C1, C4* – Adjust the actuating lever eccentric or lug until the margin control lever engages the left margin stop by the thickness of its metal.



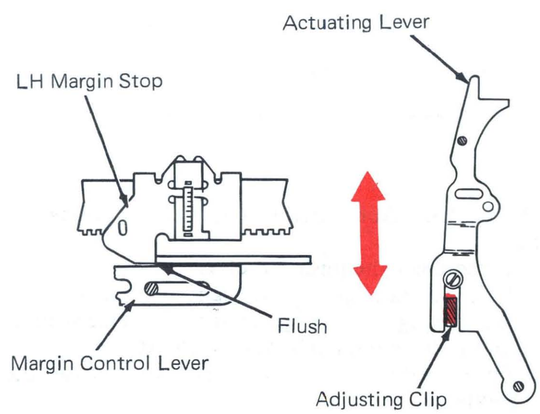
(Level 1) *(Level 2)*

(Right Side View)



(Front View)

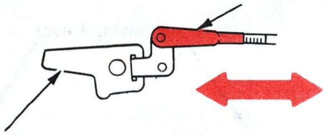
Tab Lever Height, D1, D4 (Level 3) – Adjust the actuating lever clip in its elongated mounting hole so the margin control lever engages the left margin stop by the thickness of its metal.



(Level 3)

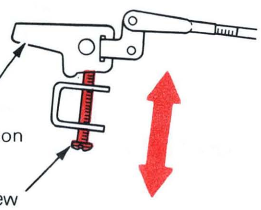
(Front View) *(Left Side View)*

6. *Margin Release Link Clevis, D1* – Adjust so the top surface of the margin release button is parallel to the base of the machine when at rest.



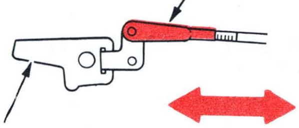
(D1 Right Side View)

Margin Release Button Leveling Screw, D4 – Adjust the leveling screw so the top surface of the button will be parallel to the base of the machine. Adjust the link to match the hole.



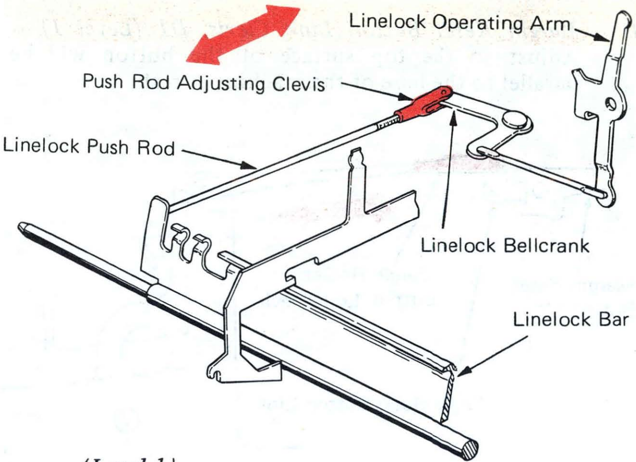
(D4 Level 1 Right Side View)

Margin Release Link Clevis, D4 – Adjust so the top surface of the button is parallel to the base of the machine when at rest.

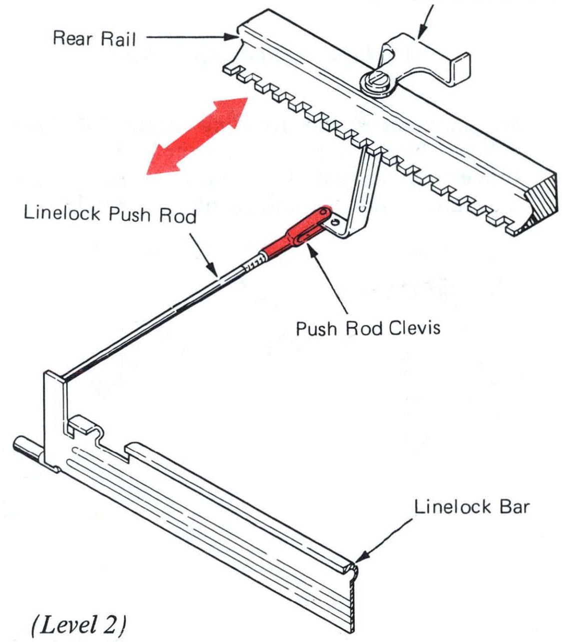


(D4 Level 2 Right Side View)

7. *Linelock Push Rod Clevis, C1, D1* – Adjust as follows:
   a. Disconnect the push rod clevis.
   b. Position carriage at the right margin. Be sure the carriage is resting on the escapement pawl and is not completely against the stop.
   c. Push switch to rear enough to release the keylever.
   d. Hold down a letter keylever.
   e. Push forward on push rod until it stops.
   f. Match the push rod clevis pin with the hole in the bellcrank.

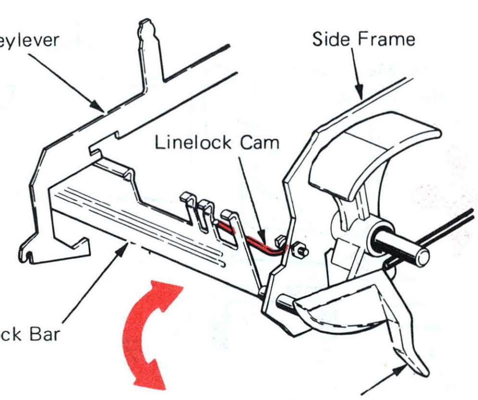


(Level 1)



(Level 2)

8. *Linelock Cam* – With the carriage away from the right margin, form the linelock cam to position the linelock bar under the keylever when the switch is turned off.



REPOSITIONING INDICATOR OPERATIONAL THEORY

The purpose of the repositioning indicator (Figure 1) is to provide the operator with an exact way of checking the carriage position. The indicator is a wire pointer which moves through a cable sheath mounted on the dust cover. An additional feature was added to D4 which automatically removes the wire from the path of an operated typebar.

Depressing the repositioning button pulls forward on the front operating link, which is connected to the repositioning bellcrank. The bellcrank pulls up on the rear operating link to supply motion through the actuating rod to the actuating lever. As the actuating lever rotates, it lifts the wire to the top of the writing line.

The repositioning wire can then be used to relocate a previously typed character. When the carriage is positioned so the right hand side of the typed character is in line with the indicator, the next character will type in the proper space next to it.

The D4 repositioning mechanism features a trigger unlatching assembly. It allows the actuating lever to restore when a typebar is operated while the indicator is in the raised position. This prevents the typebar from damaging the indicator wire. The trigger assembly is attached to the right end of the actuating rod and while in the latched position, engages the lug on the actuating lever (Figure 1).

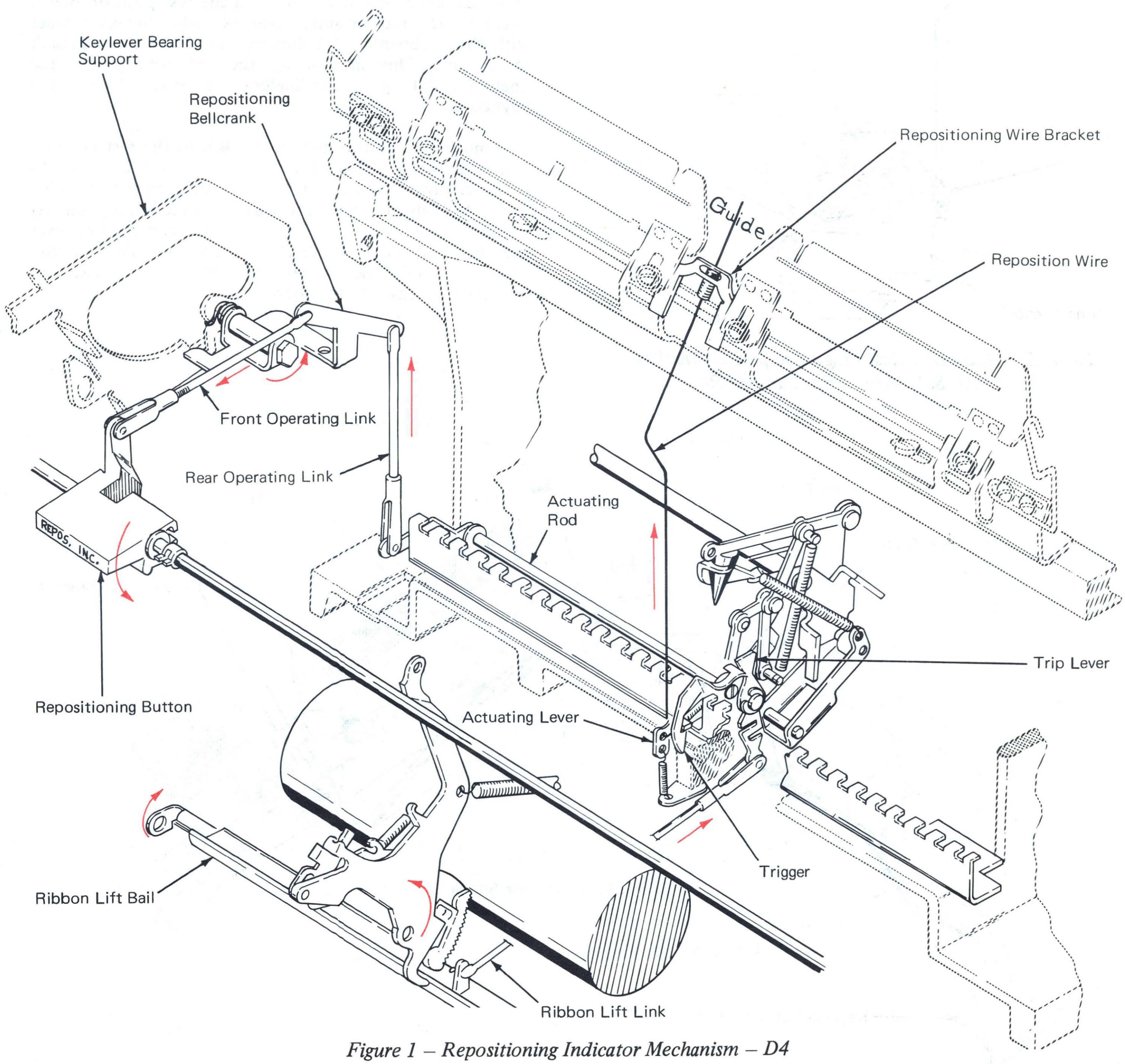


Figure 1 – Repositioning Indicator Mechanism – D4

During a repositioning operation, the trigger remains engaged with the actuating lever. While the wire is in the raised position and a typebar is operated, the letter cam supplies motion through the ribbon lift bail, lift link and the trip lever (Figure 2). The trip lever is mounted on a stud to the ribbon lift assembly. As the trip lever pivots forward, it contacts the trigger, pivoting the trigger to disengage it from the actuating lever. This allows the actuating lever and wire to restore back to the rest position.

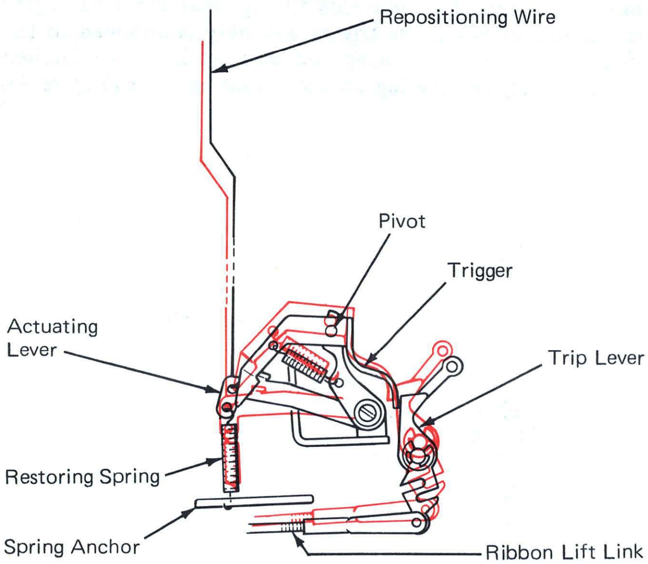


Figure 2 – Automatic Restoring Of Repositioning Wire (Right Side View – Red Parts At Rest)

This operation occurs while the typebar is moving toward the platen; therefore, the trigger assembly will be disengaged from the actuating lever before the typebar strikes the platen.

REPOSITIONING INDICATOR (LEVEL 2)

There are two levels of repositioning indicators for the C4 typewriters. The Level 2 mechanism (Figure 3) has a keyboard lock feature to prevent damage to the wire. The repositioning lever is mounted to the dust cover by a screw When pivoted to the left, the lever pushes the wire through a cable sheath, positioning the wire in line with the top of the writing line.

The repositioning lever has an extension arm at the bottom that extends to the left. In the rest position, this extension arm, under the spring tension from the repositioning lever, holds the keyboard lock feature in the rest position. When operated, the repositioning lever extension breaks contact with the keyboard lock bellcrank and allows the bellcrank to operate. This motion by the bellcrank pushes the linelock rod to pivot the linelock bar forward to lock the keyboard.

The motion to restore the mechanism to the rest position comes from the spring tension of the repositioning lever. As the lever pivots to the right the repositioning wire is pulled to the left, also lowering the wire from the writing line. At the same time, the extension arm of the repositioning lever contacts and lifts the linelock bellcrank. This motion rotates the bellcrank to allow the linelock bar to restore to the rear to release the keyboard.

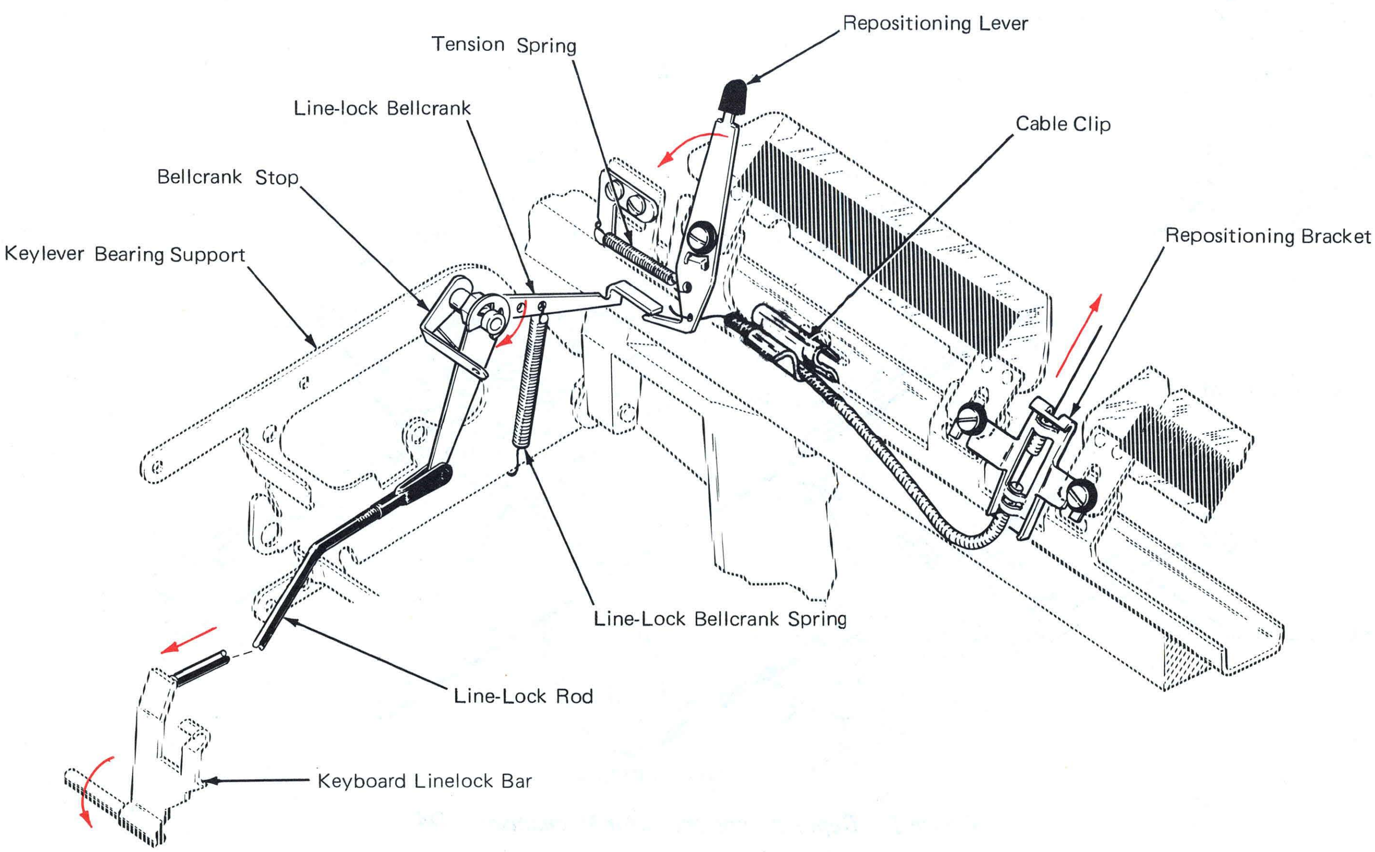


Figure 3 – C4 Repositioning Indicator Mechanism (Level 2)

REPOSITIONING INDICATOR (LEVEL 1)

The Level 1 mechanism (Figure 4) consists of a repositioning lever, wire, cable and bracket. These parts are all mounted on the dust cover. The theory and operation is the same as the Level 2 mechanism. However, it does not lock the keyboard.

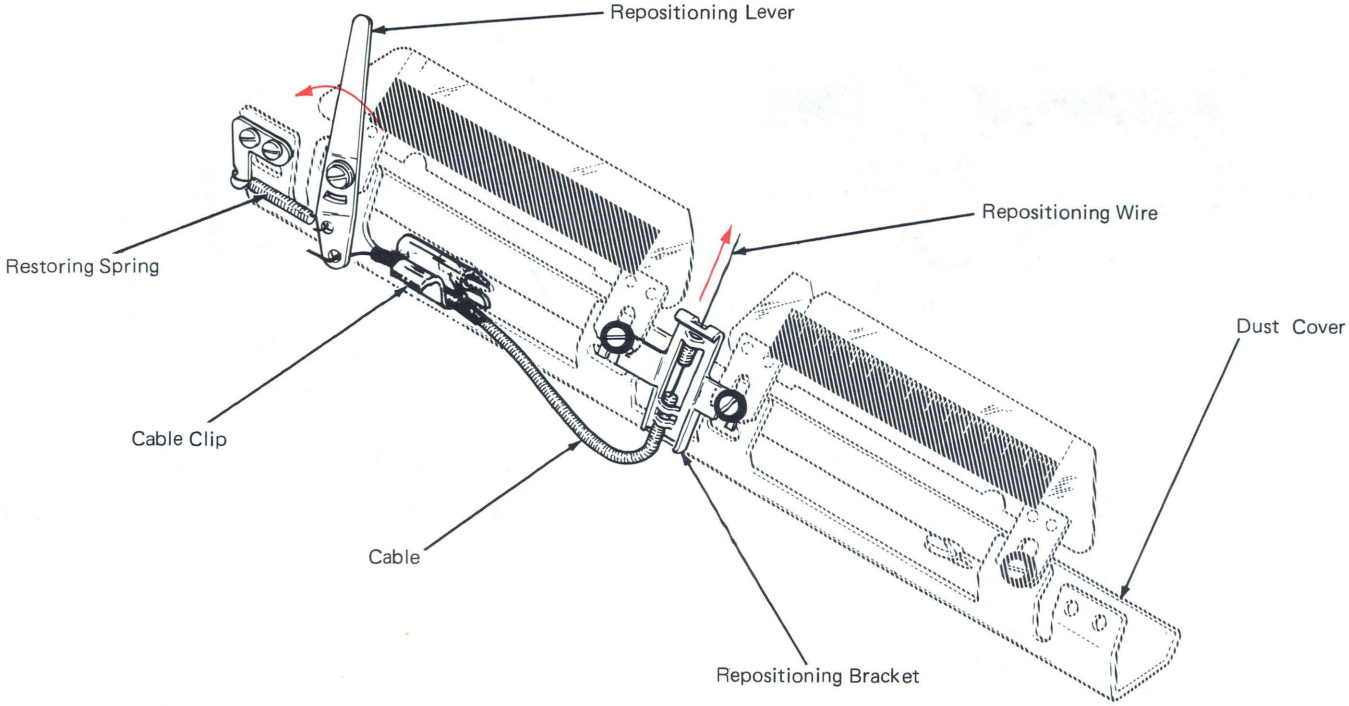
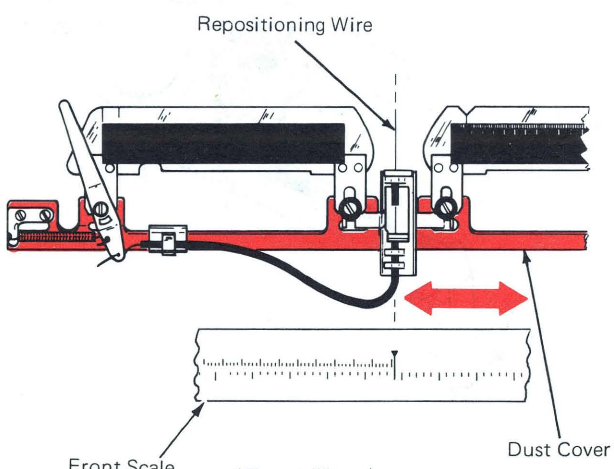


Figure 4 – Repositioning Mechanism (Level 1)

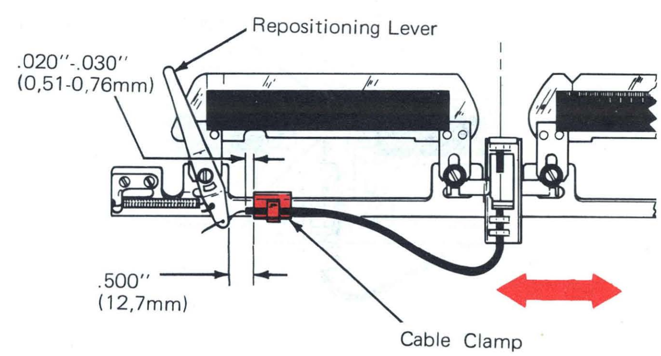
REPOSITIONING INDICATOR ADJUSTMENTS

1. *Front Rail Dust Cover* – Adjust the front rail dust cover to the left or right so that the repositioning wire lines up with the center point on the front scale.



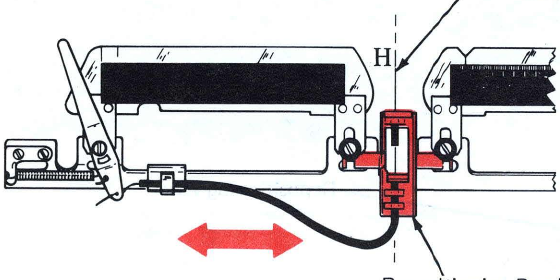
(Front View)

2. *Cable Clamp, C4* – Adjust the clip left or right for a clearance of .500" (12,7mm) between the right edge of the repositioning lever and the clip. Also, adjust the cable to extend .020-.030" (0,51-0,76mm) past the left side of the clip.

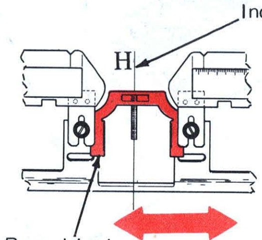


(Front View)

3. *Repositioning Bracket, C4 (Level 1 And 2)* – Adjust the bracket left or right so that when operated, the indicator wire will be vertically aligned with the right side of a typed character.



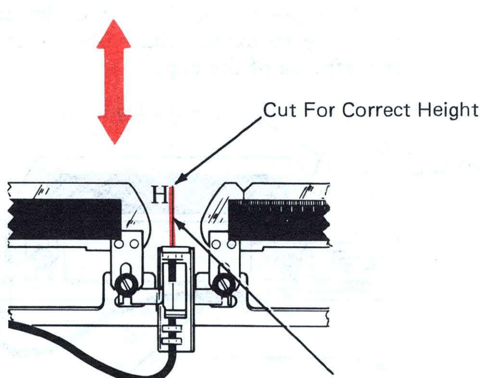
Model C4



Model D4

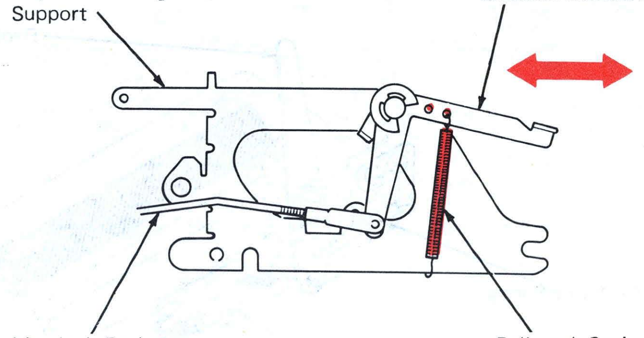
(Front View)

4. *Wire Height, C4 (Level 1 And 2)* – With the repositioning wire in the raised position, cut the wire so that the end of the wire lines up with the top of the uppercase H.



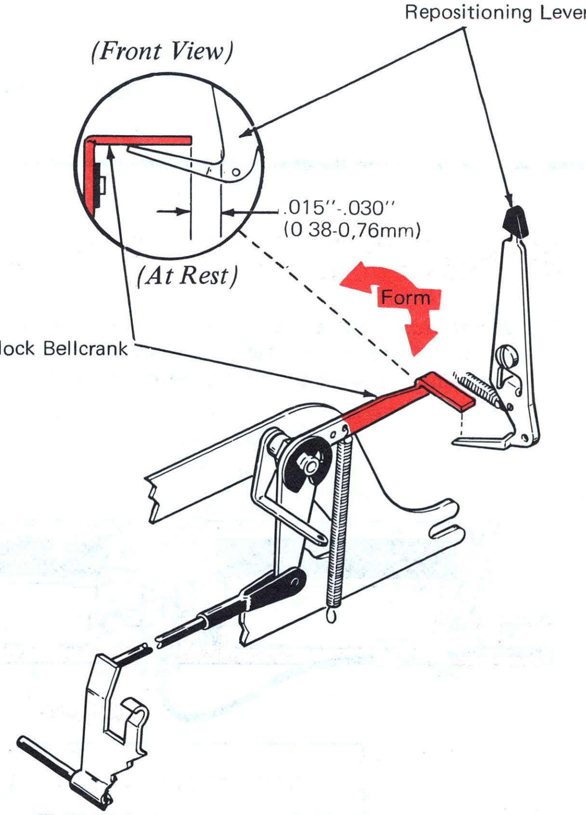
(Front View)

5. *Linelock Bellcrank Spring, C4 (Level 2)* – Connect the linelock bellcrank spring from the keylever bearing support to the hole in the bellcrank that most reliably locks the keyboard.

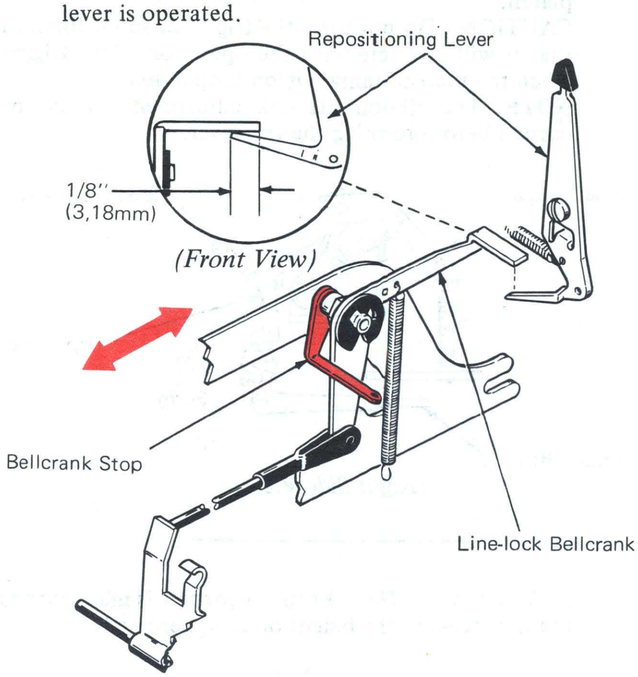


(Right Side View)

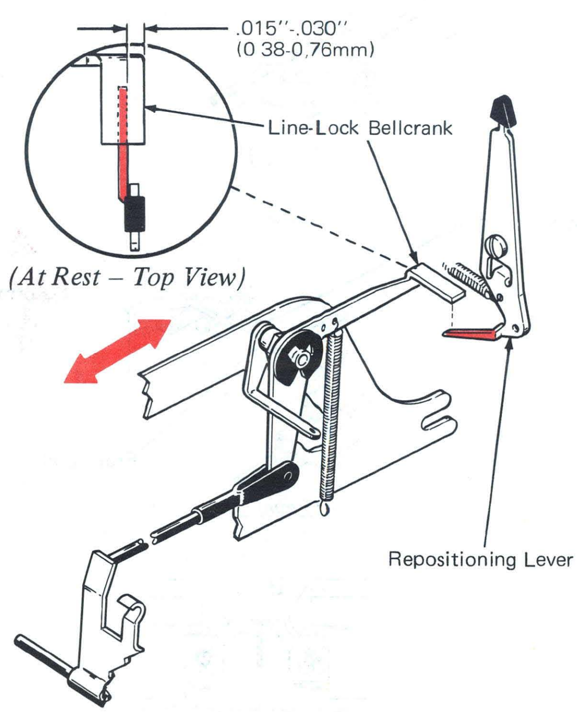
6. *Linelock Bellcrank, C4 (Level 2)* – Form the linelock bellcrank so the right end of the lug is .015-.030" (0,38-0,76mm) from the left side of the repositioning lever with the lever at rest. The rear of the lug should be parallel to the rail.



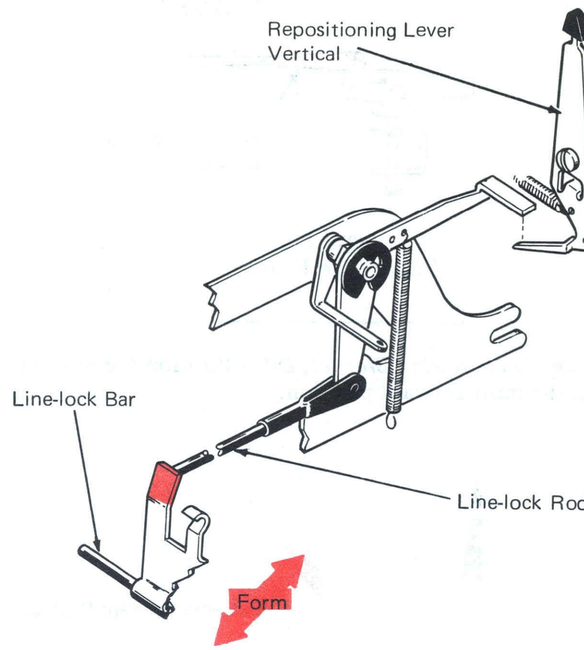
7. *Bellcrank Stop, C4 (Level 2)* – Adjust the bellcrank stop so the bellcrank lug contacts the repositioning lever extension 1/8" (3,18mm) from the tip as the lever is operated.



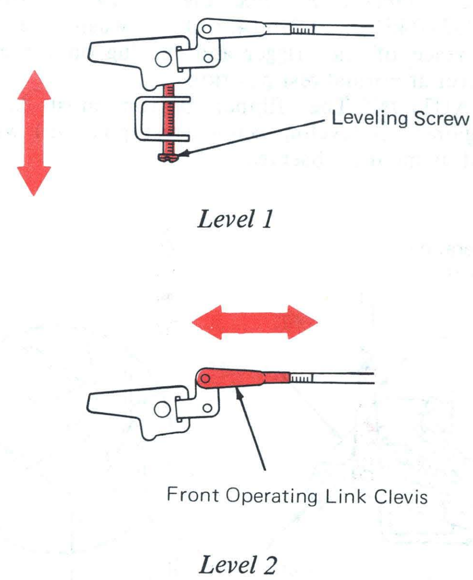
8. *Repositioning Lever Extension, C4 (Level 2)* – Tip is .015-030" (0,38-0,76mm) from the rear edge of the bellcrank.



9. *Linelock Bar, C4 (Level 2)* – Form the lug on the linelock bar to lock the keyboard at the time the right side of the repositioning lever is vertical.

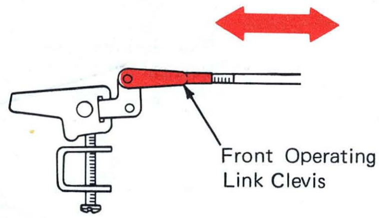


10. *Flipper Button, D4* – Adjust leveling screw or operating link clevis so the top surface of the button will be parallel to the base of the machine.



(Right Side View)

11. Front Operating Link Clevis, D4 (Level 1) – Adjust the clevis in the approximate center of the threads.



Level 1
(Right Side View)

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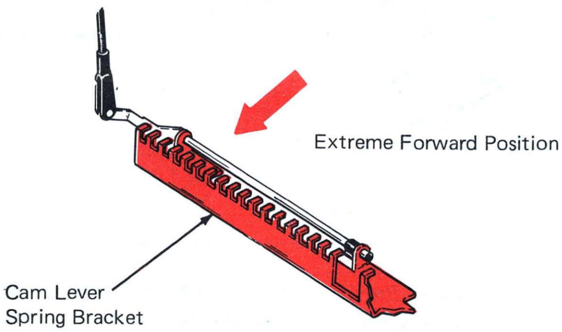
12. Cam Lever Spring Bracket, D4 – Position the bracket in the most forward position.



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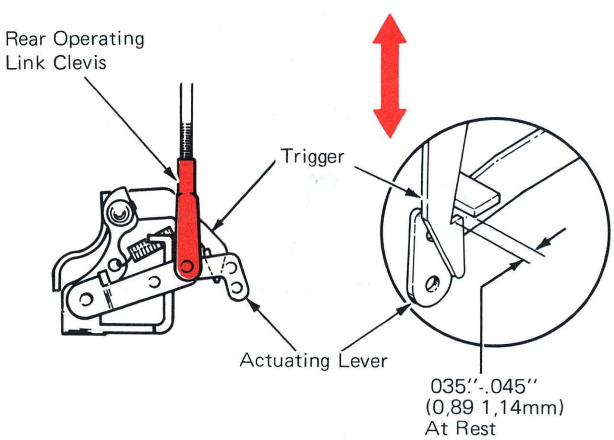
13. Rear Operating Link Clevis, D4 – Adjust for .035-.045" (0,89-1,14mm) between the working surface of the trigger and the lug on the actuating lever at normal rest position.
CAUTION: The flipper button must be resting against its leveling screw (rest position) when this adjustment is observed.



(Left Side View)

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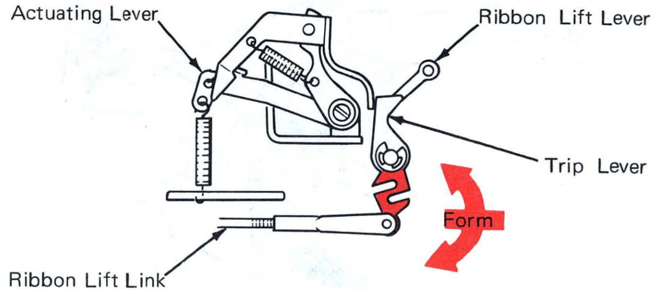
14. Trip Lever, D4 – Form with a screwdriver so the trigger releases the actuating lever when a typebar has completed 1/2 to 2/3 of its movement toward the platen.
CAUTION: Do not form the trip lever so far forward that it will interfere with the operation of the trigger when the repositioning button is operated.
NOTE: The ribbon lift link adjustment should be correct before forming the trip lever.



(Right Side View)

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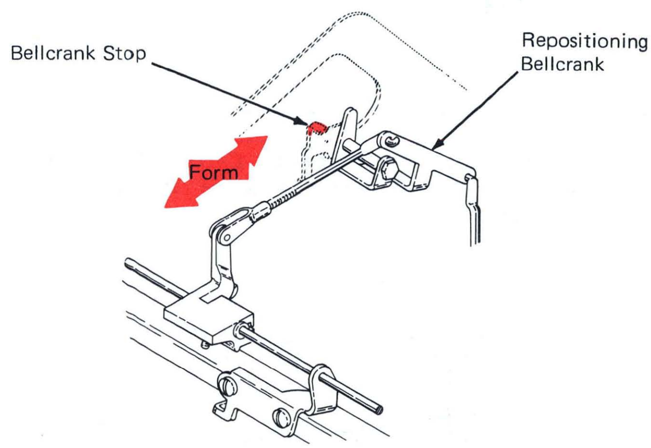
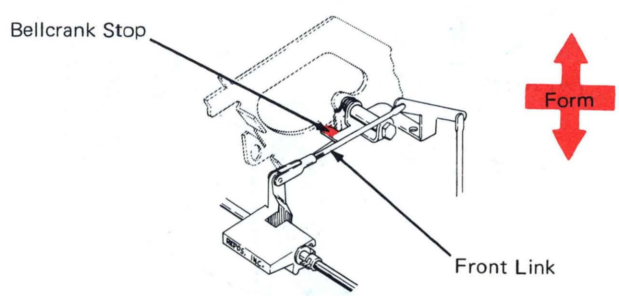
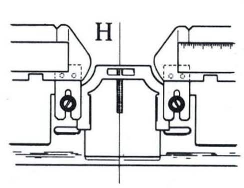
15. Bellcrank Stop, D4 – Form so contact is made just as the wire reaches the height of an uppercase H.



(Level 1)



(Level 2)



NO PRINT OPERATIONAL THEORY

The purpose of the no-print mechanism is to provide a means of preventing the typebars from striking the paper during centering yet allow the carriage to move the proper amount of space. This allows the operator to determine the amount of space a given line will take up without printing that line on the paper.

Downward movement of the no-print flipper button pulls forward on the no-print link which is connected to the no-print bellcrank (Figure 1). This motion rotates the bellcrtank about its mounting pin counterclockwise, supplying motion to the no-print actuating lever. As the actuator lever pivots to the left, it pushes the attached anvil and slider to the left also. This positions the anvil in the path of the typebars to prevent the bars from striking the paper.

The no-print flipper button is mounted to the keylever bearing support by a fulcrum rod. A link from the flipper button is attached to the no-print bellcrank. The bellcrank is mounted by a pivot pin to a bracket which is attached by two screws. The no-print actuating lever is mounted to the upper segment support by a pin and C-clip (Figure 1). The actuating lever is in a vertical position in a bracket on the segment support. The bracket is mounted to the right typebar fulcrum wire retainer screw. A spring attached to a bracket on the right side frame loads the bellcrank in a clockwise position. Pulling up on the flipper button restores the no-print mechanism to the rest position.

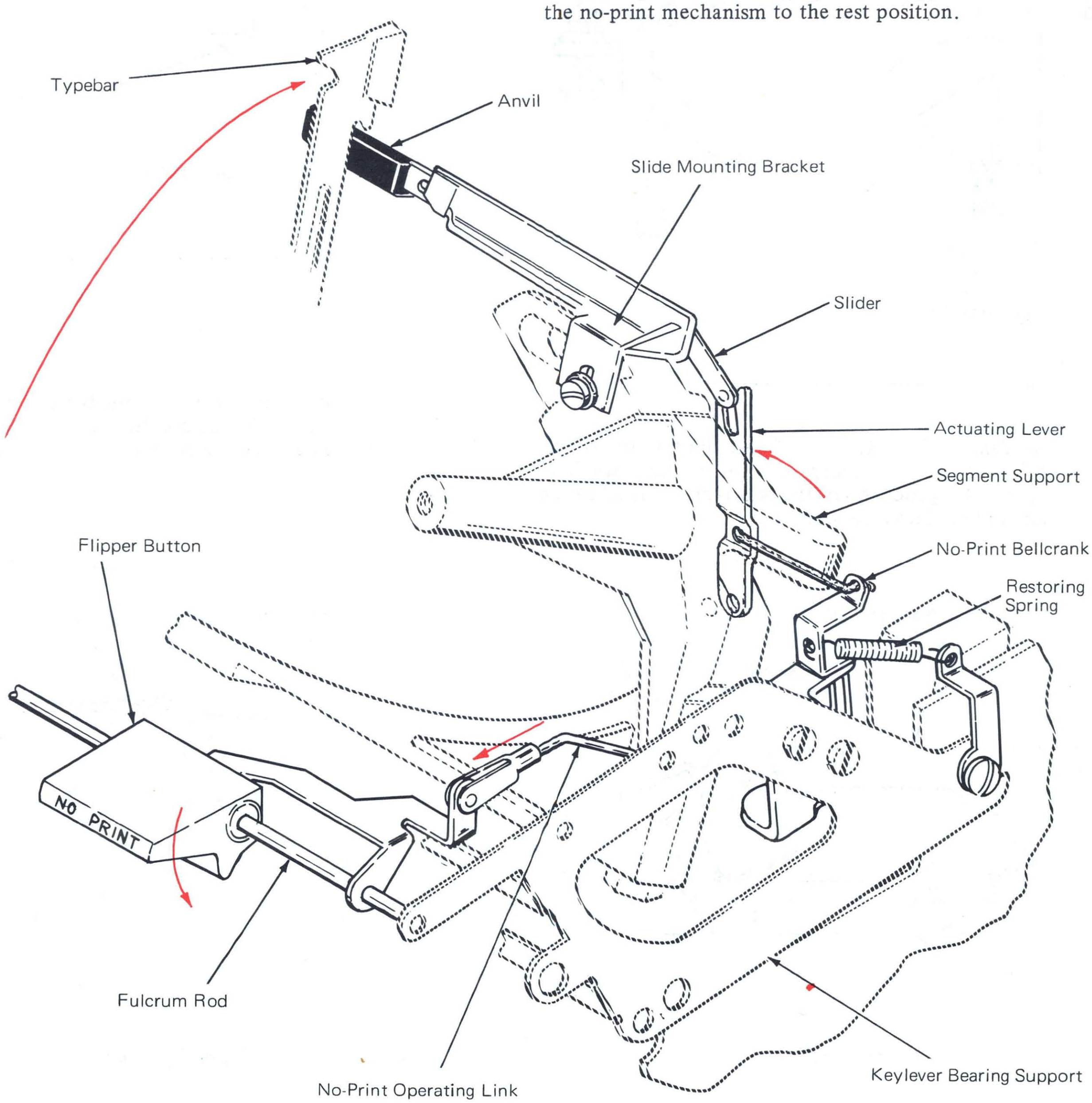
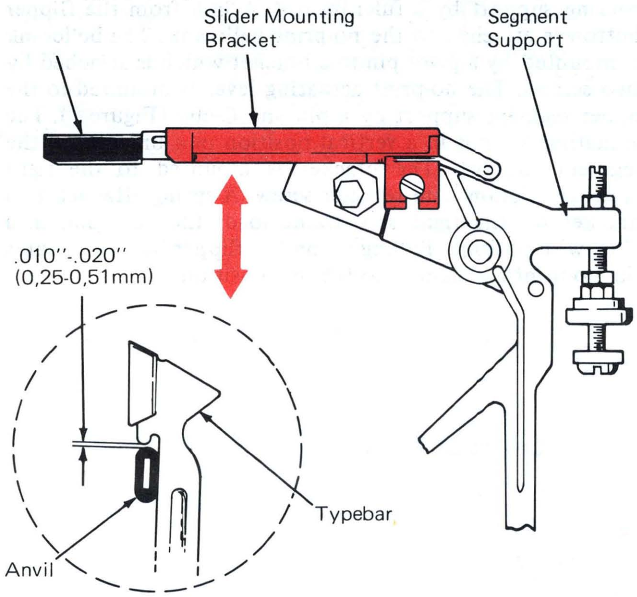


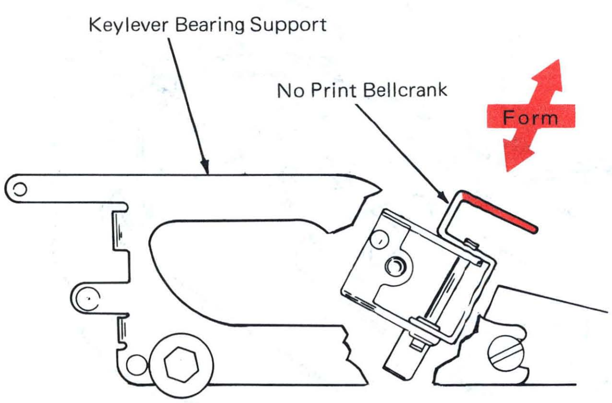
Figure 1 – No-Print Mechanism

1. *Slider Mounting Bracket, D4* – Adjust to rest parallel to the top of the segment. With the anvil in the operated position, check for a clearance of .010-.020" (0,25-0,51mm) between the anvil and the typebar lug.



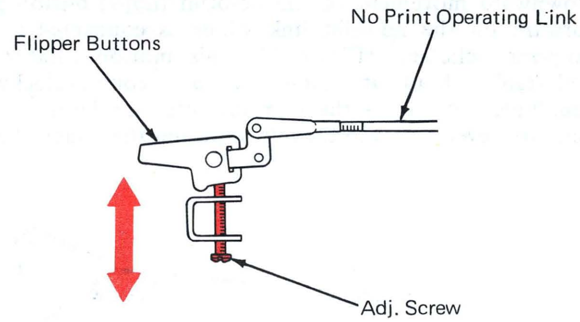
(Left Side View)

2. *No Print Bellcrank, D4* – Form the top arm of the bellcrank so the slider anvil will reach its fully operated position when the bellcrank has reached the far counterclockwise position.



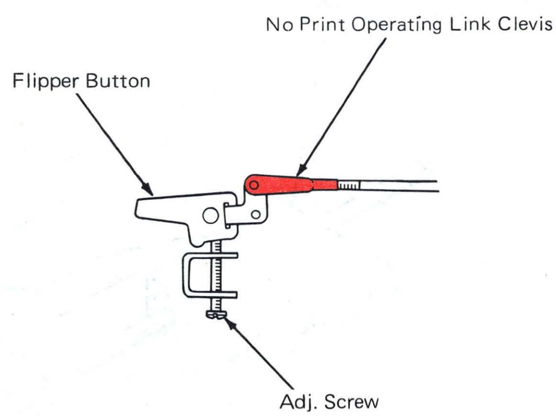
(Right Side View)

3. *No Print Flipper Button Leveling Screw And Link, D4* – Adjust the leveling screw so the top surface of the button will be parallel to the base of the machine.



(Right Side View)

4. *Operating Link Clevis* – With the slider bar all the way to the right, adjust the link to reach across the distance between the bellcrank and the button at rest.



(Right Side View)

COVERS OPERATIONAL THEORY

The cover assemblies for the D1-D4 typewriter consists of five main components: the front cover, the end covers, rear cover, the keyplate and the bottom cover (Figure 1).

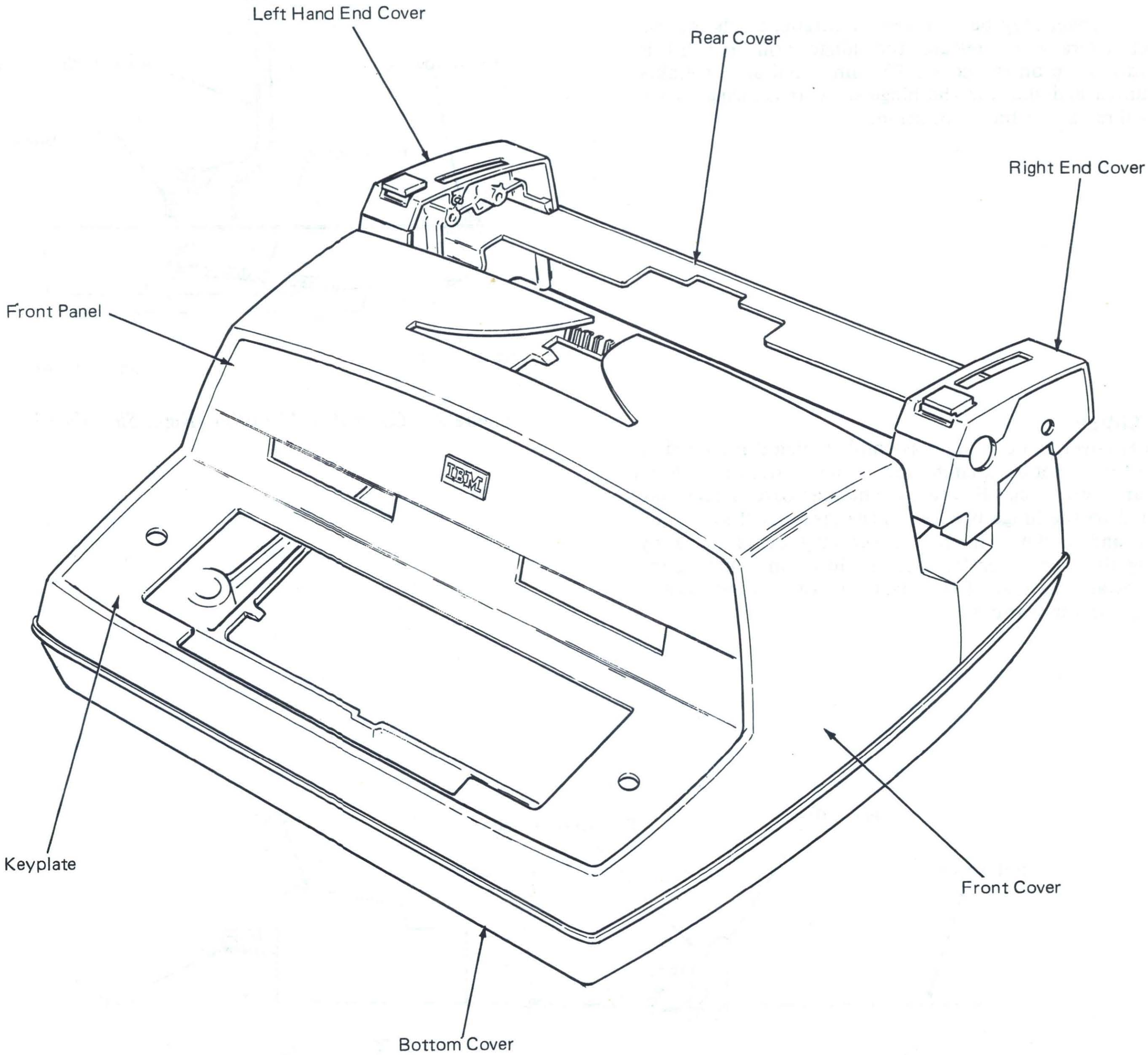


Figure 1 – Model D1, D4 Cover Assembly

FRONT COVER

The front cover consists of the cover and cover hinge arms. The arms are used to mount the cover at the rear and to hinge the cover during opening. The arms are mounted through a hinge bracket and connected to a hinge arm assembly (Figure 2). Latch pins located on the inside of the front cover are used to hold the cover at the front by the cover latch. The front panel section of the front cover contains a cover interlock that operates the LH ribbon sensing mechanism on fabric ribbon machines. On carbon ribbon machines, the interlock operates the ribbon release lever (ref. to ribbon sections). A replaceable IBM logo is mounted to the panel; the D4 has the word "Executive" on the panel.

The front cover may be removed by forcing the hinge arm bracket laterally to release the hinge arm and lifting forward and up on the cover. The hinge and arm assembly is mounted and slides in the hinge slots. It is spring loaded so it will remain in the up position.

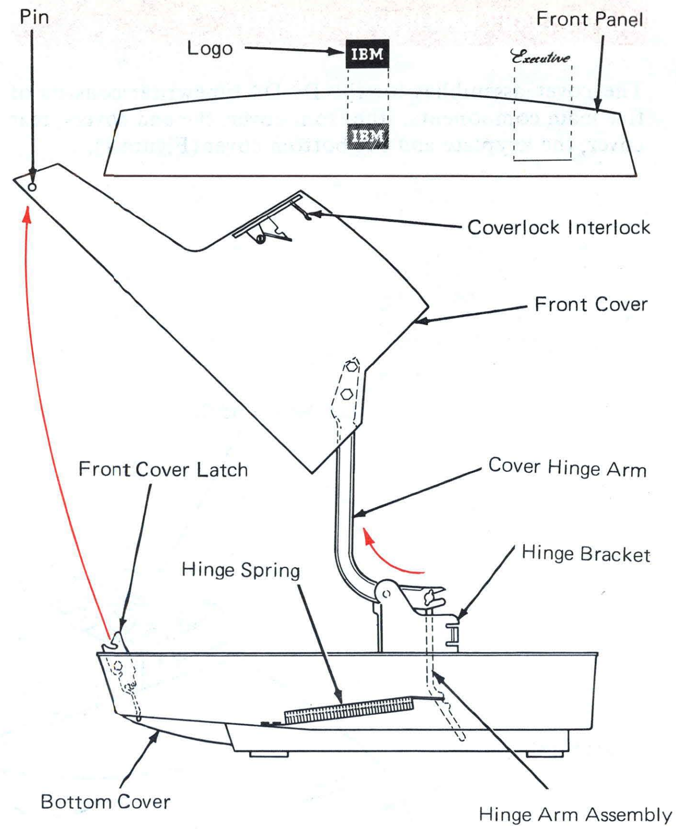


Figure 2 – Cover Arm Mounting (Right Side View)

REAR COVER

The rear cover is a one-piece assembly which is mounted to the bottom cover by a latch bracket, rear cover bracket and the rear cover latch (Figure 3). The rear cover latches are mounted to the hinge bracket on the insdie of the cover by a stud and C-clip. The rear cover may be removed by rotating the rear cover latch levers down and pushing the cover toward the rear of the machine. An IBM logo is also mounted on the rear cover.

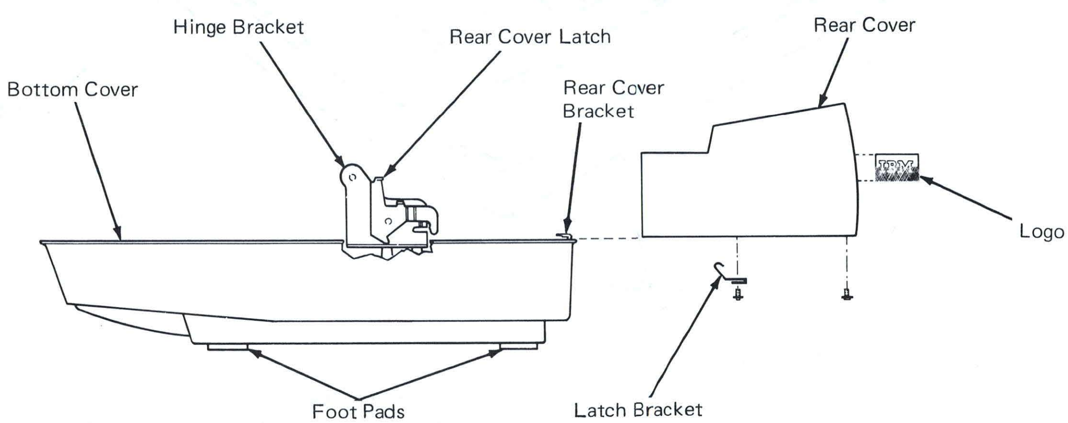


Figure 3 – Rear Cover (Right Side View)

KEYPLATE

The keyplate is a one-piece assembly that is used to cover the keyboard (Figure 4). It is mounted on the bottom cover by the keyplate brackets. The keyplate may be removed by forcing the rear or front of the bracket down to release the keyplate.

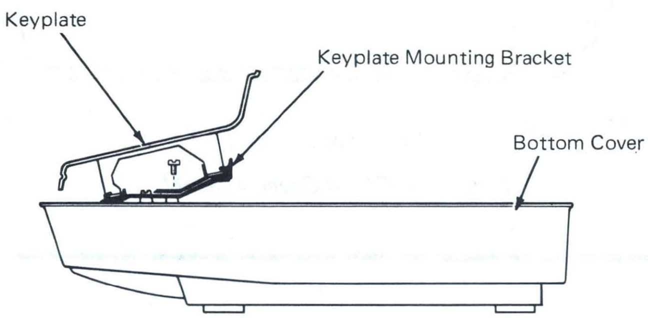


Figure 4 – One Piece Keyplate Assembly (Right Side View)

BOTTOM COVER

The bottom cover assembly consists of a cover and removeable bottom panel. It mounts all the cover latches and keyplate brackets (Figure 5). The machine is mounted on front and rear inserts which are mounted in the base foot assembly.

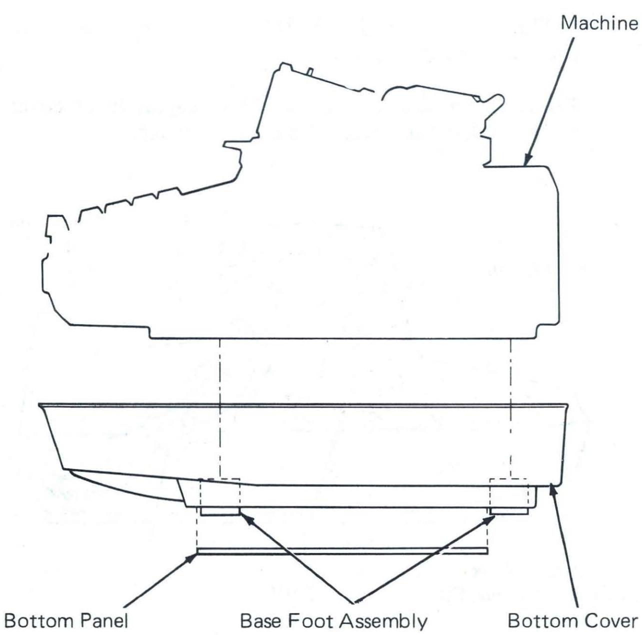


Figure 5 – Bottom Cover Assembly (Right Side View)

TILT-UP FEATURE

Tilt-up studs on the side frame slide on a special track in the cover when tilting the machine up (Figure 6). A tilt bracket attached to the left rear of the cover engages a stud on the side frame to latch the machine in the tilt-up position.

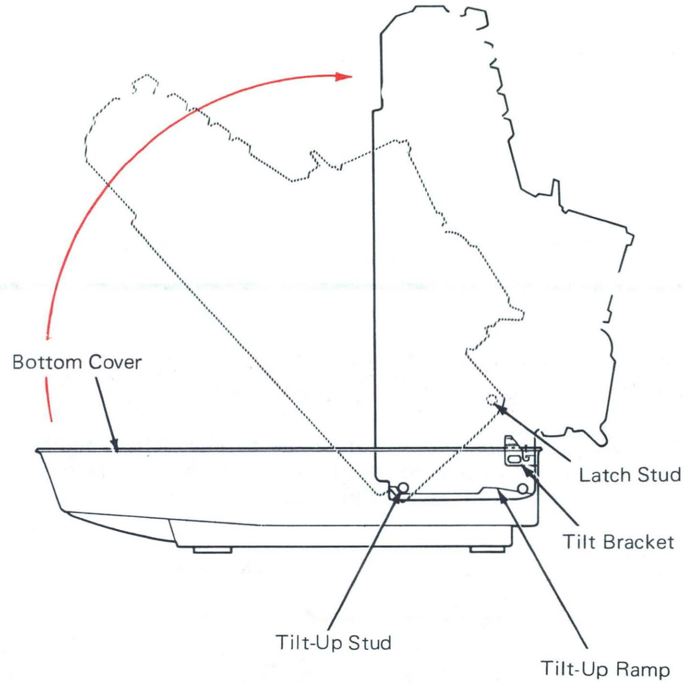


Figure 6 – Tilt-Up Studs And Cover Brackets (Right Side View)

END COVER

The end covers are mounted to the carriage end plate by two set screws (Figure 7). The top half of the end cover is raised by lifting up on the front of the cover which pivots on a pin. The carriage release button is mounted to the end cover by a hinge pin.

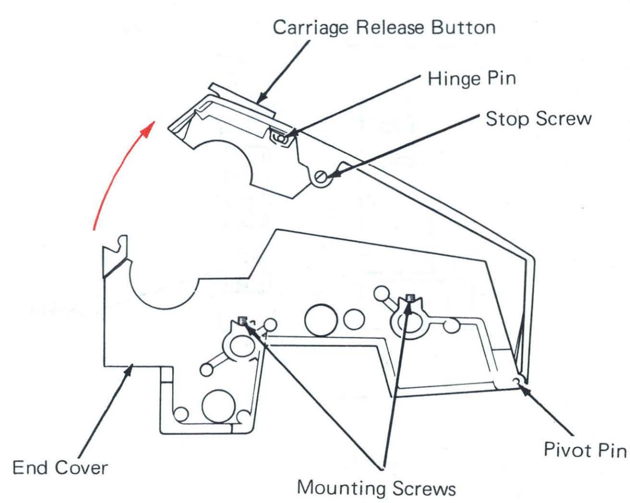
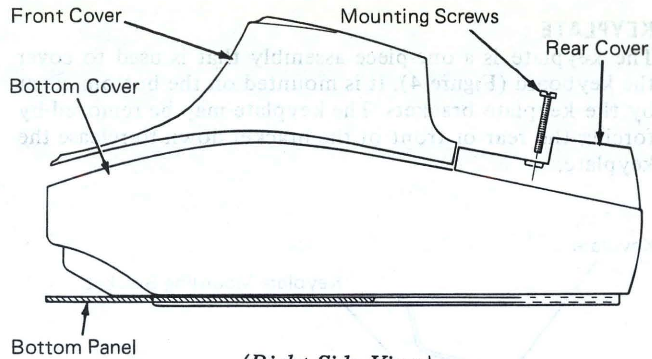


Figure 7 – Carriage End Covers (Right Side View)

C1-C4 COVER DIFFERENCES

The C1-C4 covers (Figure 8) are basically the same as the Model D, except for a difference in looks and the mounting of the rear cover and bottom panel.

The rear cover is mounted by two screws and the bottom panel slides in and out the molded slots in the bottom cover.

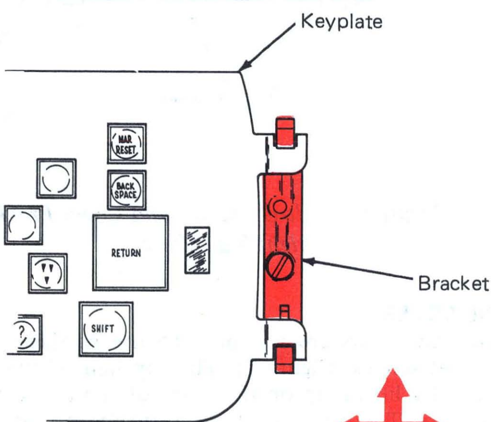


(Right Side View)

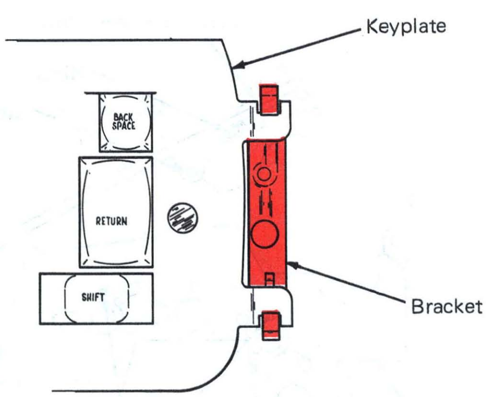
Figure 8 – C1-C4 Cover Assembly

COVERS ADJUSTMENTS

1. *Keyplate Bracket* – Adjust the bracket left to right and front to rear so that there are no binds between the keybuttons and the keyplate.



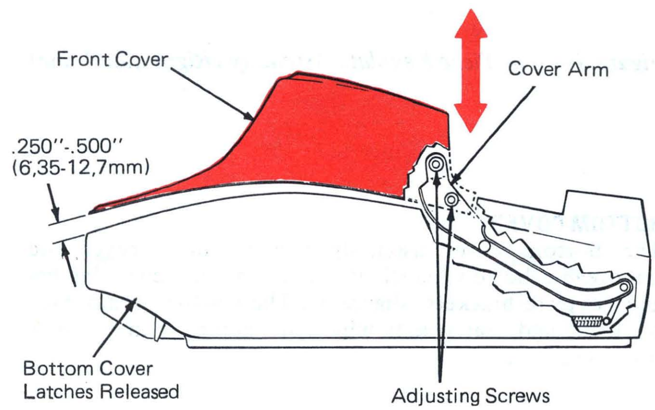
C1-C4



D1-D4

(Top View)

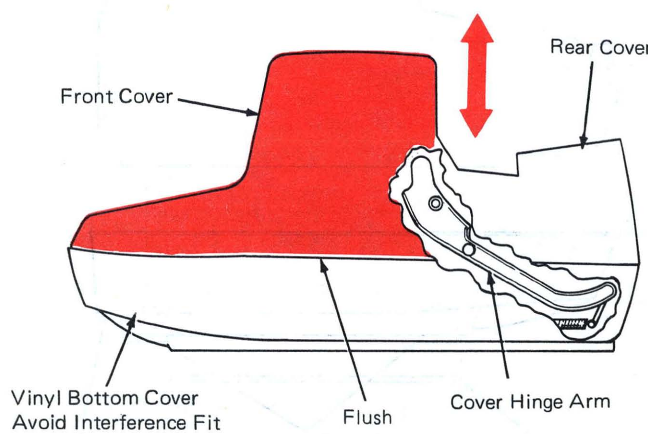
2. *Front Cover C1, C4* – Adjust the cover so that when the cover latches are released, the cover will open .250-.500" (6,35-12,7mm) under its spring tension.



(Right Side View)

NOTE: The Level 1 D1, D4 front cover is adjusted the same as the C1, C4.

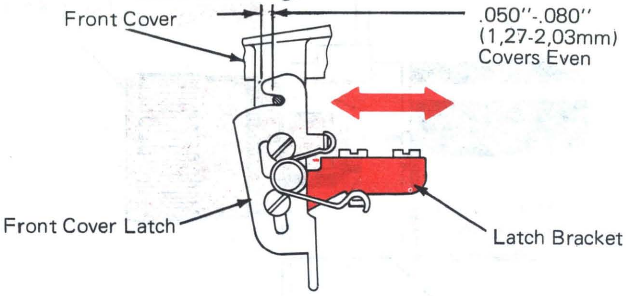
Front Cover, D1, D4 (Level 2) – Adjust front cover so that it fits flush with the bottom cover.



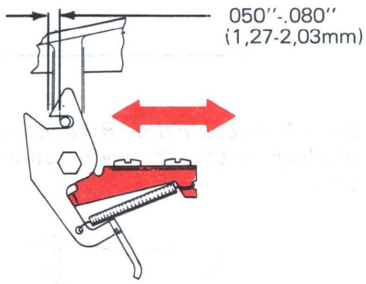
(Right Side View)

3. *Front Cover Latch, C1, D4* – Two ways:

a. Adjust the front cover latch so that the latch extends .050-.080" (1,27-2,03mm) past the front cover lug.

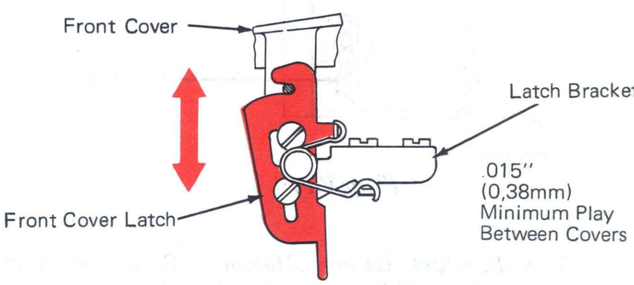


(Level 1 – Right Side View)

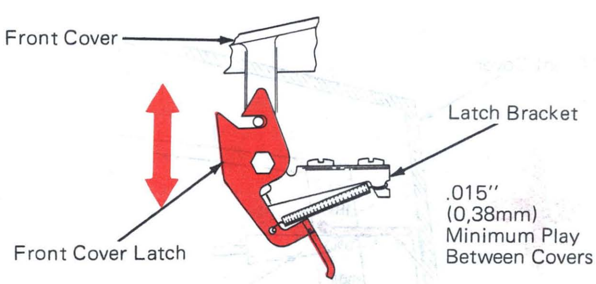


(Level 2 – Right Side View)

b. Adjust the cover latch up or down so that there is a minimum of .015" (0,38mm) end play between covers.



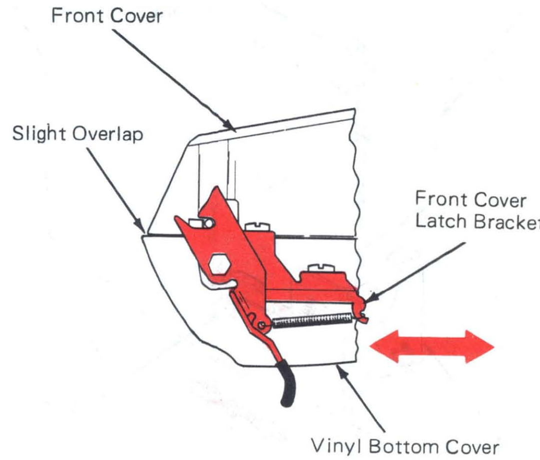
(Level 1 – Right Side View)



(Level 2 – Right Side View)

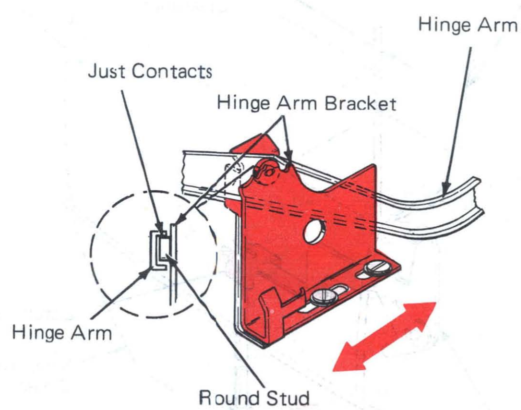
NOTE: The D1, D4 (Level 1) front cover latch is adjusted the same as the C1, C4.

4. *Front Cover Latch, D1, D4 (Level 2)* – Adjust the front cover latch so that there is a slight overlap between the front and bottom covers.



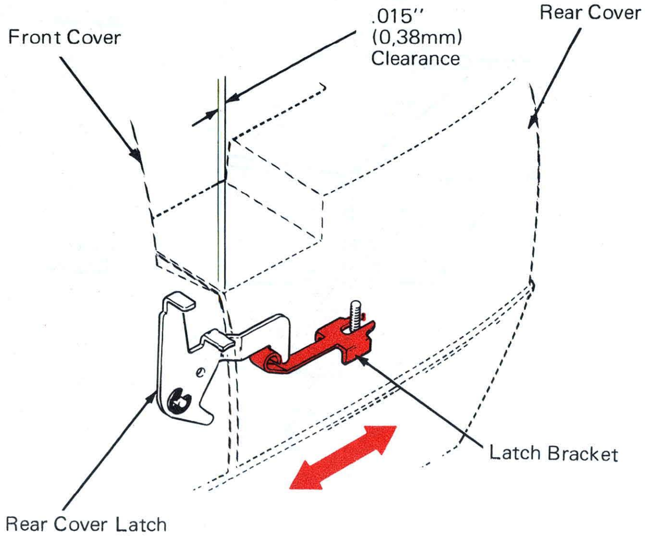
(Level 2 Right Side View)

5. *Hinge Arm Bracket, D1, D4 (Level 2)* – Position the bracket toward the rear until contact is just made between the round stud on the bracket and the rear part of the cover hinge arm with the top cover closed.



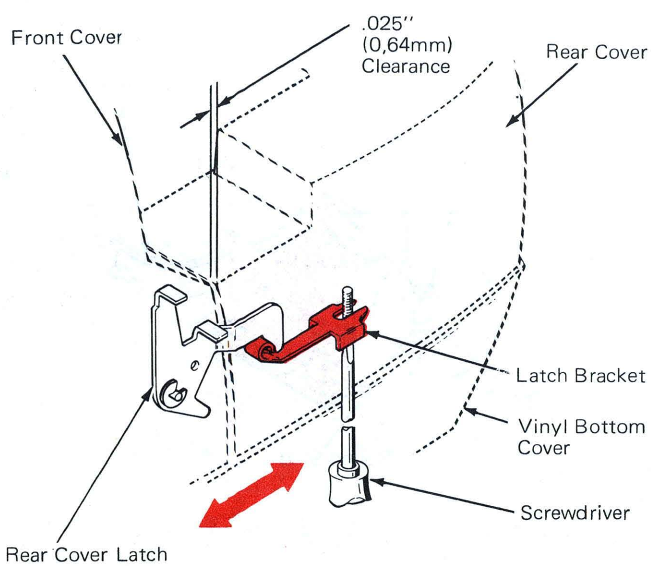
(Level 2)

6. *Rear Cover Latch Bracket, D1, D4 (Level 1)* – Adjust the rear cover latch bracket so that there is .015" (0,38mm) clearance between the rear and front cover.



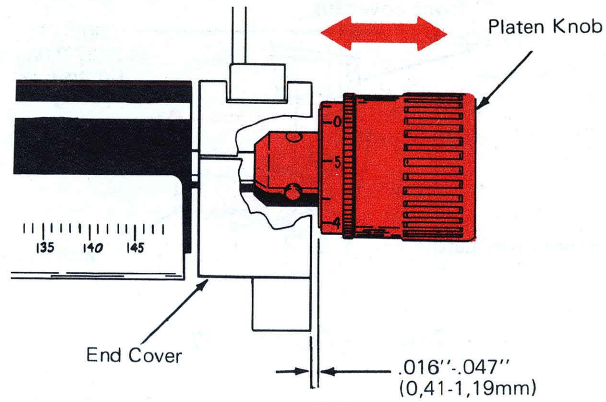
(Level 1)

Rear Cover Latch Bracket, D1, D4 (Level 2) – Adjust the rear cover latch bracket so that there is .025" (0,64mm) clearance between the rear and front cover.

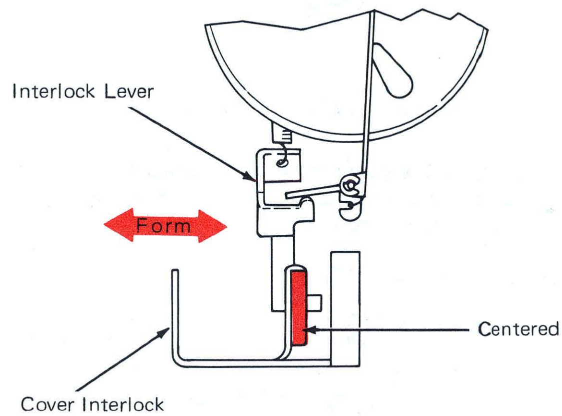


(Level 2)

7. *Platen Knobs* – Adjust the platen knobs to the left or right for a clearance of .016-.047" (0,41-1,19mm) with end covers.

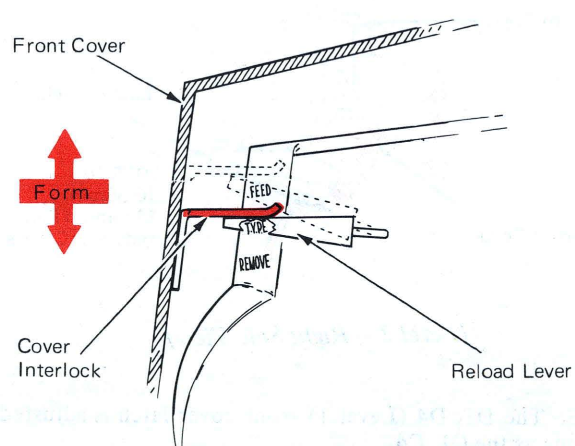


8. *Cover Interlock Fabric Ribbon* – Form the lug on the interlock so that the lug is centered on the interlock lever.



(Top View)

Cover Interlock Carbon Ribbon – Form the cover interlock to reliably restore the reload lever from feed position to type position when the top cover is closed.



(Right Side View)

DECIMAL TAB OPERATIONAL THEORY

The decimal tabulator is a special typewriter designed mainly for typing columns of figures. The tab mechanism of this machine positions the carriage for the number of digits to be typed. When typing columns of figures, the operator sets the tab stops on the decimal point of the column. As she types the column, she will depress one of the ten tab keybuttons, determined by the number of digits to be typed. The carriage will then stop the required number of digits from the decimal point. This mechanism will automatically provide space for the commas in numbers of more than one thousand (Figure 1).

The main difference between the decimal tab and the standard typewriter is that the length of the tab check lever is variable. An interposer assembly, attached to the end of the tab check lever, contains ten interposers. These interposers are positioned one escapement space away from each other. On a tab operation, one of these interposers will be raised and will operate the tip of the tab check lever by contacting the set tab stop on a tab operation. Since the interposer will be raised during tabulation, the tab stops are set in a lowered position.

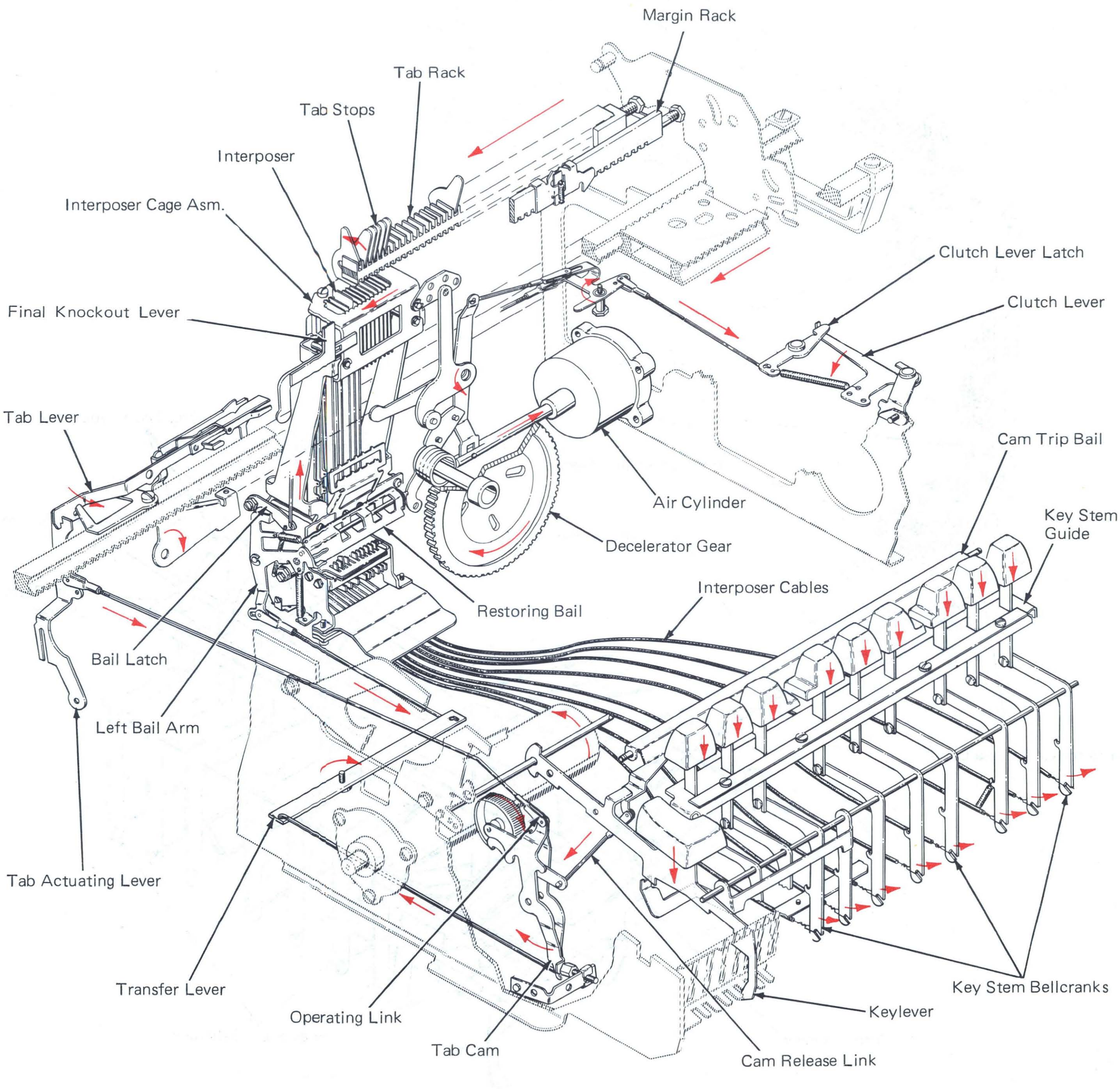


Figure 1 – Decimal Tab Mechanism

INTERPOSER OPERATION

The ten interposers in the interposer assembly are mounted side by side in a nylon guide comb (Figure 2). Each of these interposers has an interposer link, an interposer release lever, an interposer cable assembly, and a key stem. Each interposer link is spring loaded up and forward by a spring. The interposer link, and therefore the interposer, is held down by the interposer link keeper. Downward movement of a decimal tab keybutton rotates the key stem bellcrank and pulls on the interposer cable. This cable is attached to the interposer release lever which rotates and pushes the bottom of the interposer link toward the rear. As the forward extension of the link is disengaged from the interposer link keeper, the interposer link spring pulls the link and the interposer up into an operating position.

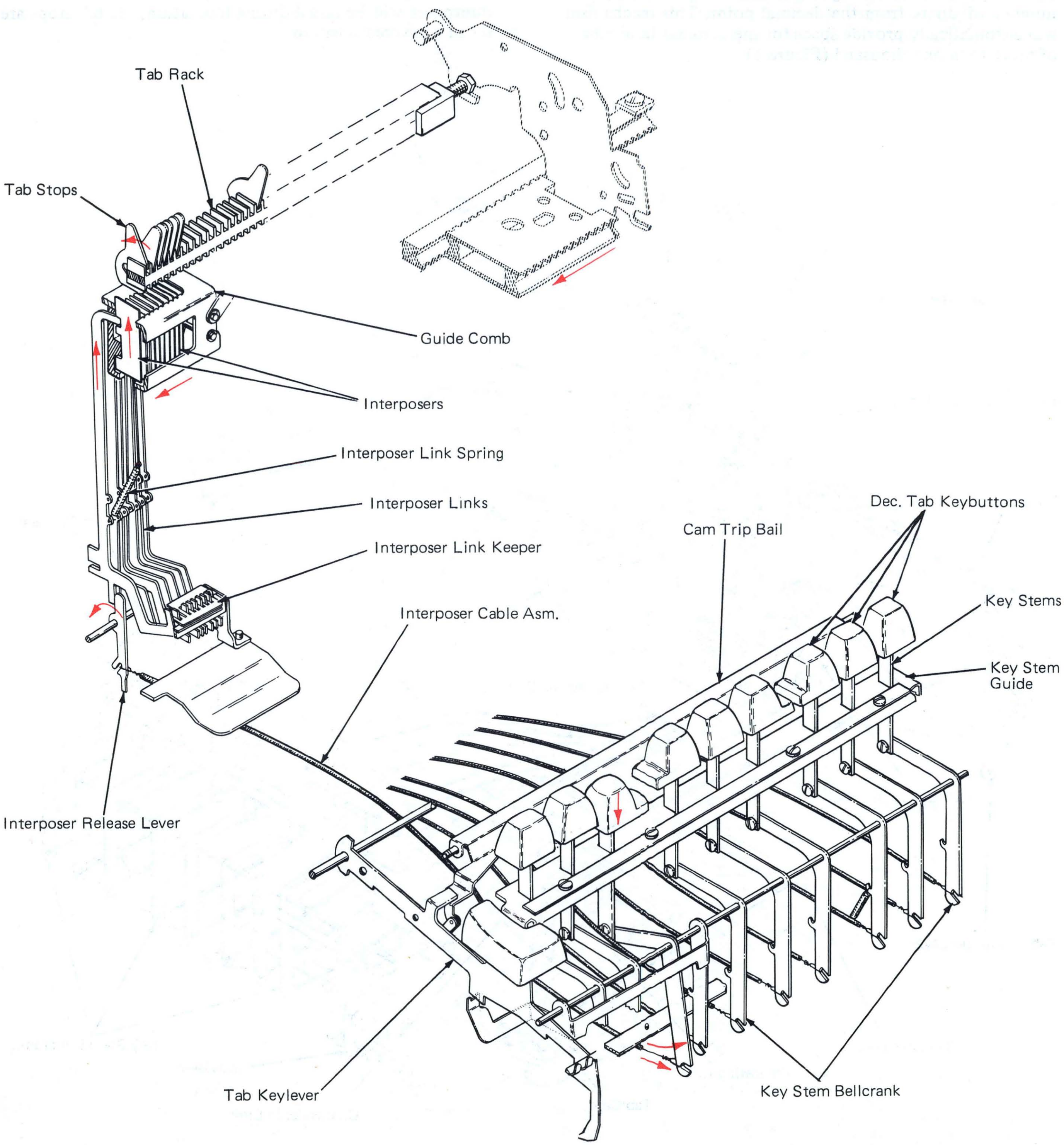


Figure 2 – Interposer Mounting

DECIMAL TAB CAM

Depressing one of the decimal tab keybuttons not only releases an interposer but also releases a tab cam (Figure 3). The key stem contacts and rotates the cam trip bail which in turn trips the cam. The decimal tab uses a single lobe cam for slow operation to allow the interposer to be raised before the tab lever is operated.

The tab cam, in addition to operating the tab lever (as discussed in the C-D tab mechanism) also operates an interposer restoring mechanism. As the cam operates, it pushes to the rear on a push link which transfers motion by a transfer lever to a bail operating link. The bail operating link pulls forward on the bottom of the left bail arm, pivots the top toward the rear where it is latched by the bail latch.

As the left bail arm pivots, the bail arm restoring spring is extended and supplies a restoring spring load to the restoring bail assembly. The restoring bail is mounted on, and pivots about, a shaft between the left and right bail arms. In the rest position, it is behind the restoring lugs of the interposer links. When operated the interposer link moves to the rear. The interposer restoring lug pivots the bottom of the restoring bail to the rear.

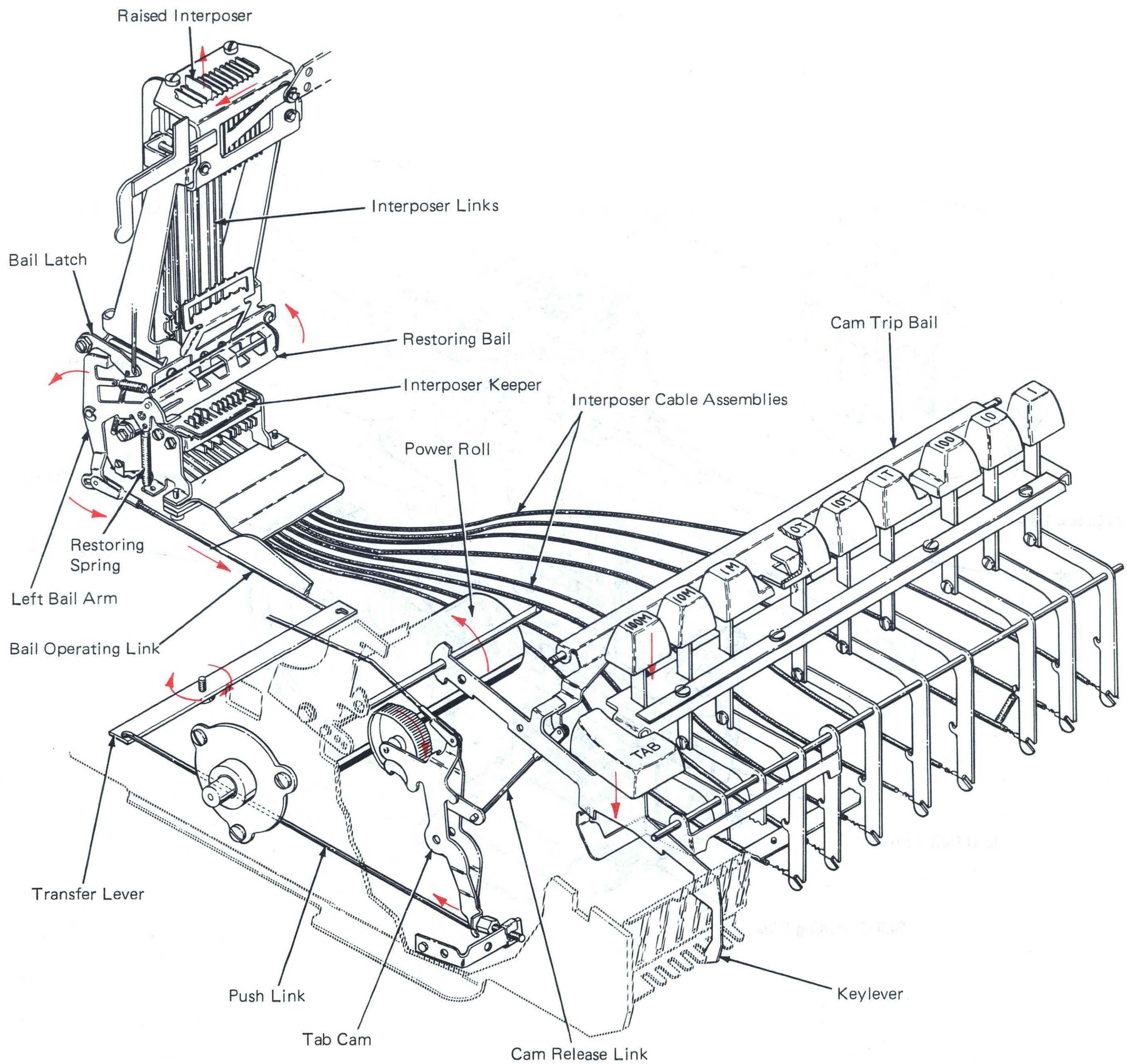


Figure 3 – Decimal Tab Operation

As the restoring bail is raised by the pivot of the bail arm, it passes above the restoring lugs on the interposer links and the bottom of the bail pivots forward under spring tension. In this tilted position, it is then above the restoring lugs of the interposer links (Figure 4).

TAB CHECK LEVER

The interposer cage operates as the tip of the tab check lever. A flat link connects the cage assembly to the tab check lever (Figure 5). At rest, the tab check lever is held to the left by the tab check lever keeper. As the tab lever moves to the rear past the keeper, the tab check lever is pulled to the right by the decelerator arm spring. The interposer cage also moves to the right and allows the decelerator arm to rotate counterclockwise in preparation for stopping the carriage.

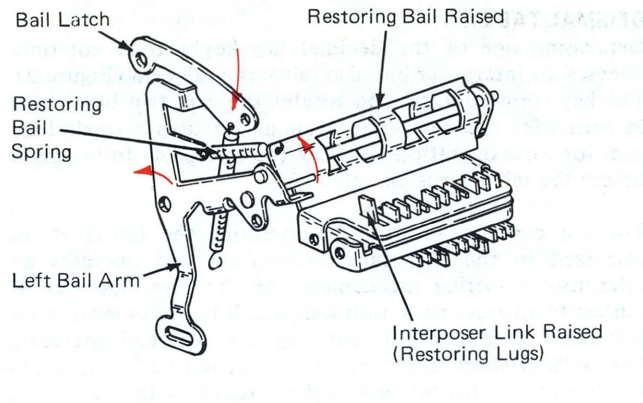


Figure 4 – Interposer Link Raised

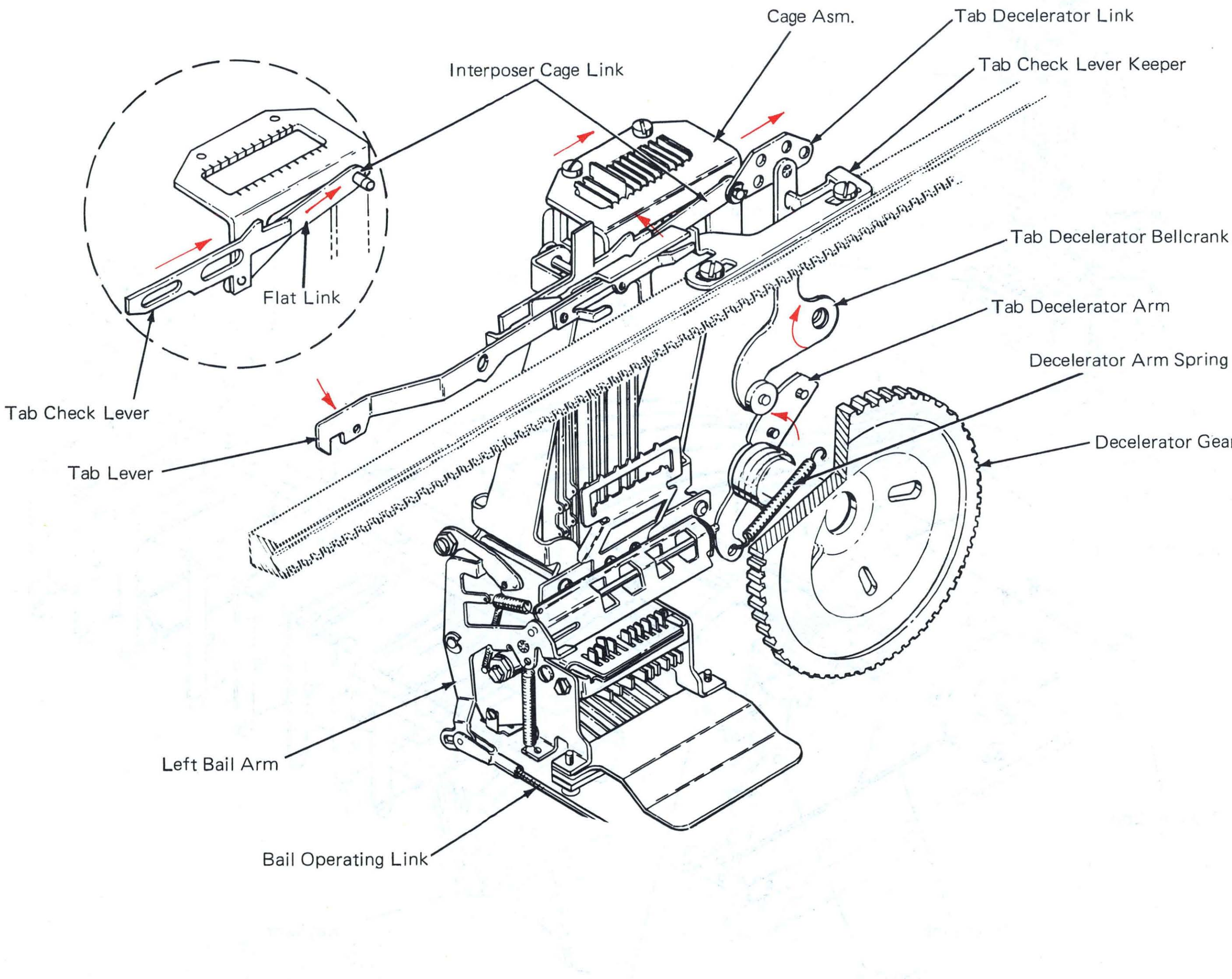


Figure 5 – Interposer Cage

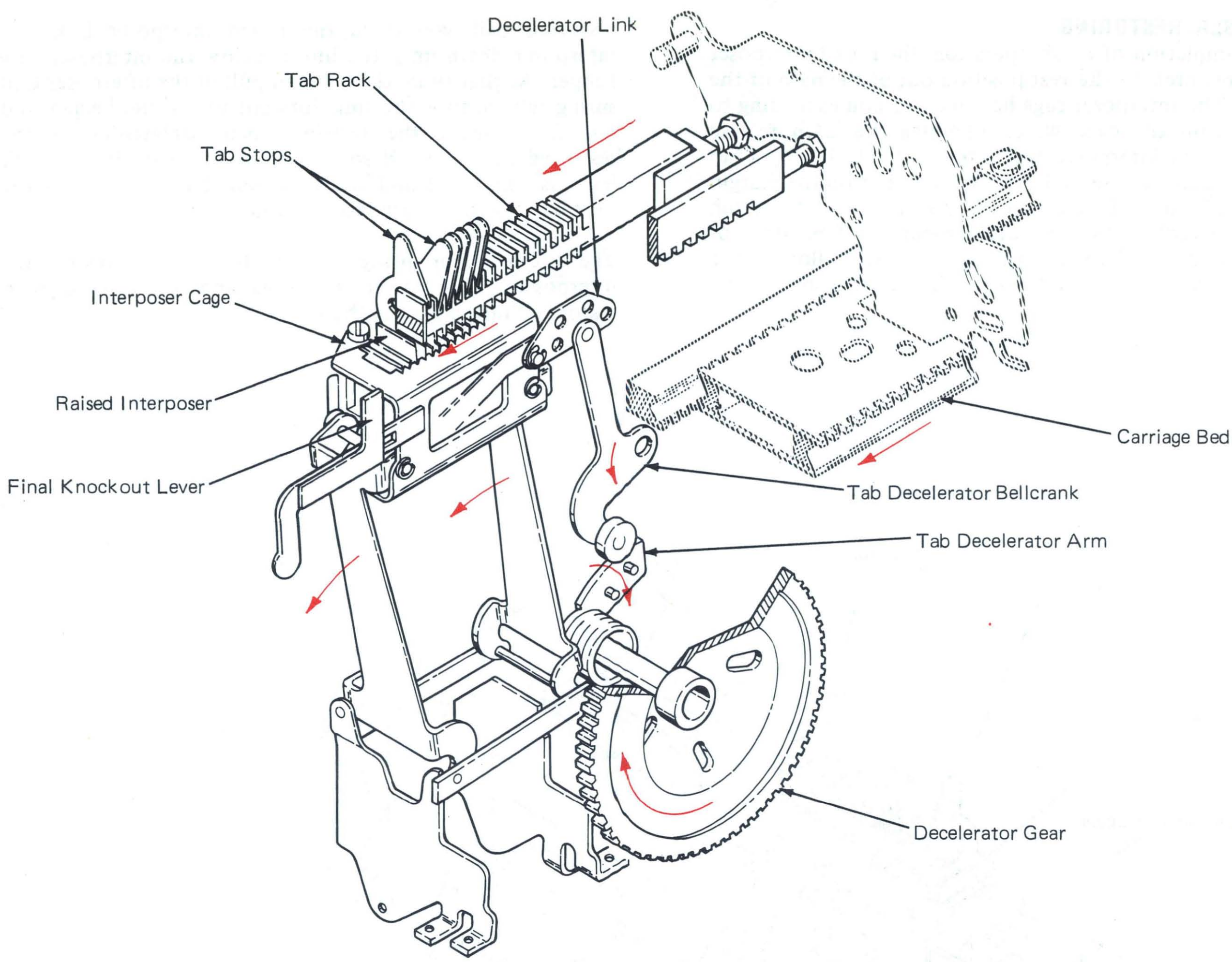


Figure 6 – Deceleration Operation

DECELERATION
When the raised interposer contacts a set tab stop, the interposer cage is forced to the left (Figure 6). This action operates the decelerator bellcrank to cause the decelerator action to occur.

TAB LEVER
Also, as the interposer cage is forced to the left, the tab check lever contacts the tab latch extension and unlatches the tab lever (Figure 7). As soon as the tab lever is unlatched, it restores to the rest position and allows the escapement pawl to re-enter the escapement rack. Also, the tab check lever is restored and held to the left by the keeper.

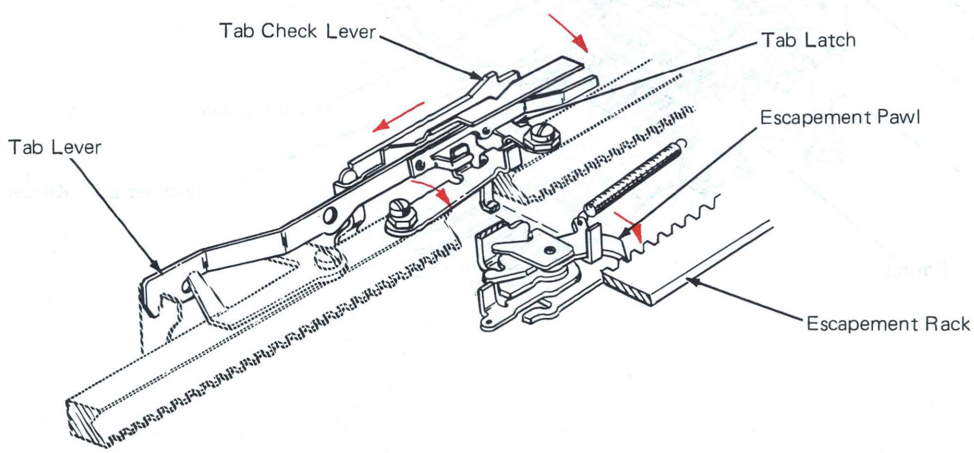


Figure 7 – Unlatching of Tab

INTERPOSER RESTORING

At the completion of a tab operation, the raised interposer must be restored to the rest position out of the path of the tab stop. The interposer cage has an extension extending to the left from the cage which operates the latch release bellcrank as the interposer cage is forced to the left by a tab stop. The latch release bellcrank is mounted on the margin control bellcrank pivot screw. A link connects the latch release bellcrank to the bail latch (Figure 8). Operation of the latch release bellcrank raises the bail latch allowing the restoring bail to be pulled down by the bail arm spring. The restoring bail will drive the raised interposer link and interposer down until the link is below the interposer link keeper. At that time, the forward pull of the interposer link spring will restore the link forward under the keeper and out from under the restoring bail. Unlatching of the restoring bail is timed so that it occurs just after the tab lever is unlatched and the escapement pawl re-enters the rack but before the carriage has come to rest.

The left bail arm spring supplies the power to restore the interposers. This power is limited and is not enough to restore all interposers at the same time.

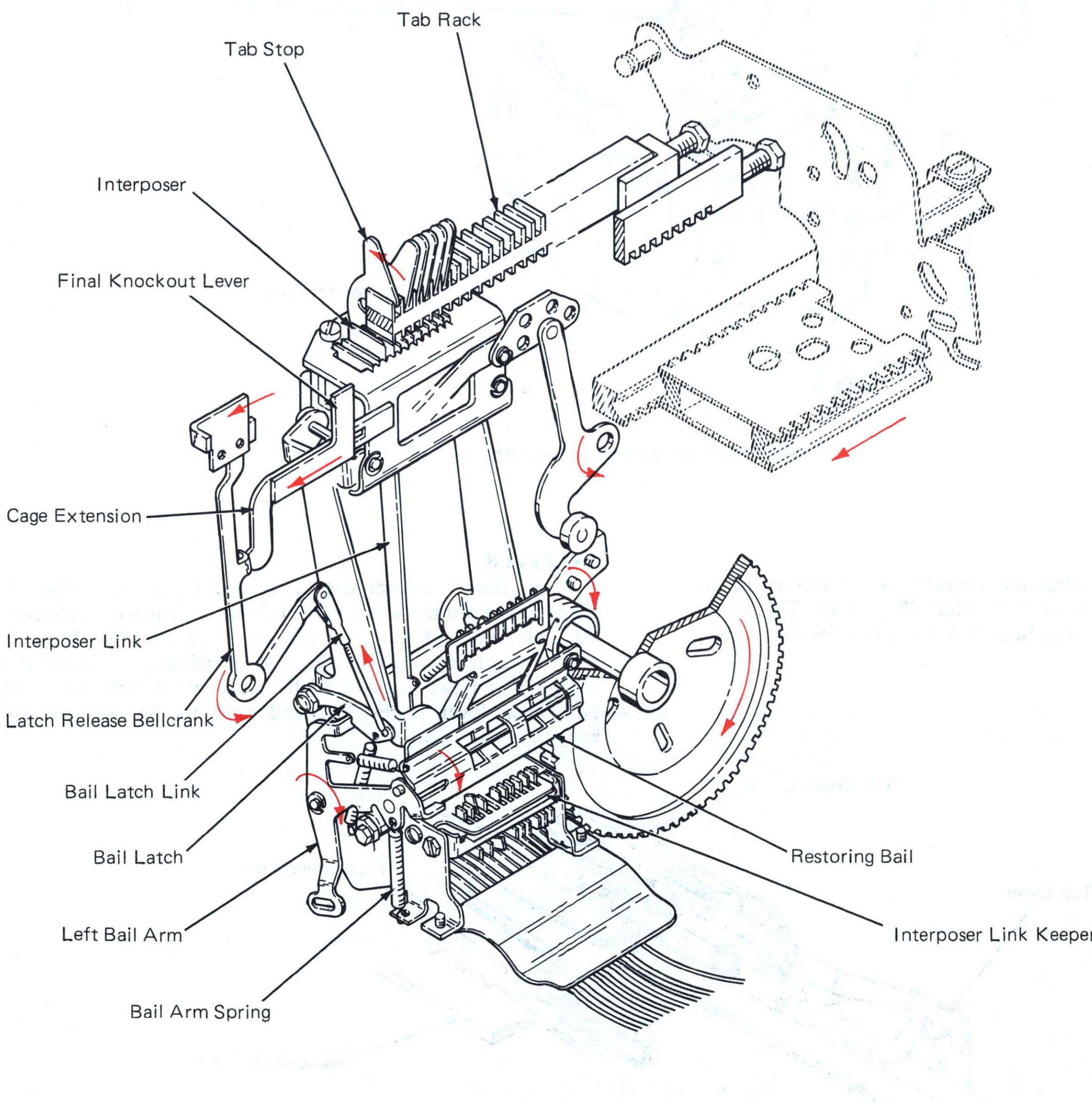


Figure 8 – Restoring of Interposer

INTERPOSER INTERLOCK
An interlock has been built into the interposer cage that blocks out all other interposers after one interposer is raised (Figure 9). This interlock is not 100% effective if the operator depresses more than one decimal tab keybutton at the same time.

MARGIN STOP EXTENSION
If the tab mechanism is operated when no tab stops are set, the tab lever must be unlatched to restore the interposer to the rest position. If tabulation occurs when the right margin stop is to the right of the tab check lever, the margin stop extension will contact the tab check lever and force it to the left to unlatch the tab lever and restore the interposer to the rest position (Figure 10).

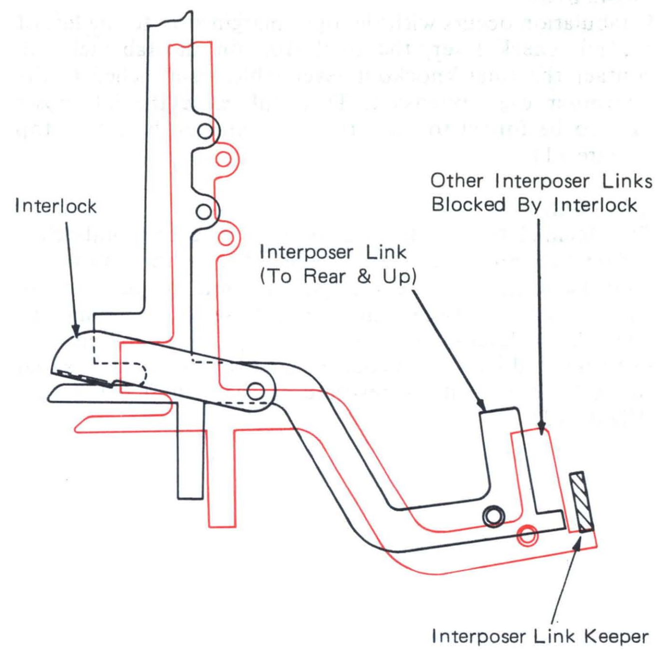


Figure 9 – Interposer Link Interlock (Black Interposer is in Raised Position)

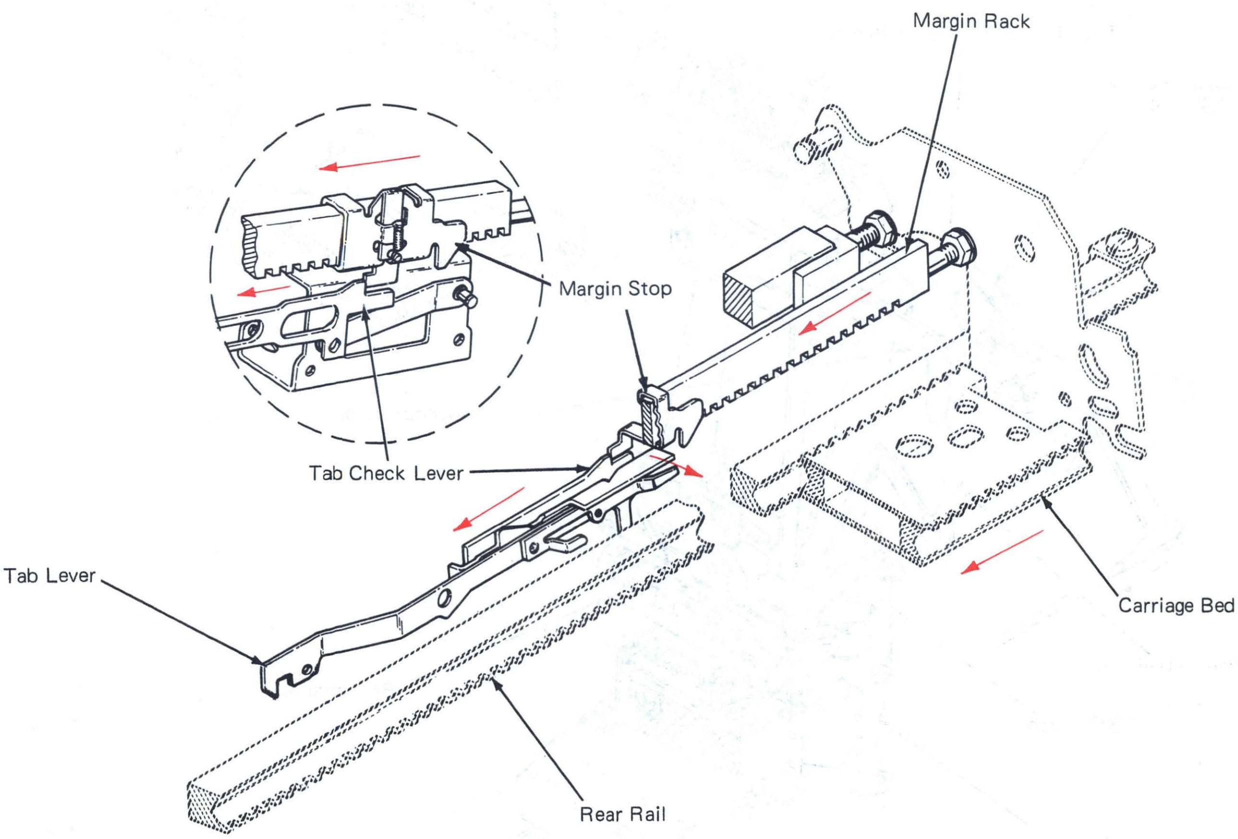


Figure 10 – Unlatching of Tab (Margin Stop)

FINAL STOP

If tabulation occurs with the right margin stop to the left of the tab check lever, the final stop on the tab rack will contact the final knockout lever which is attached to the interposer cage extension. This will cause the interposer cage to be forced to the left as if contacted by a tab stop (Figure 11).

LINELOCK

The decimal tab is adjusted so the tab lever is unlatched before the interposers are restored. On a short tab to the right hand margin, the interposers could possibly fail to restore. A link between the latch release bellcrank and the linelock bellcrank provides a way of unlatching the restoring bail by the linelock mechanism. This ensures that the interposers will be restored at the right hand margin (Figure 12).

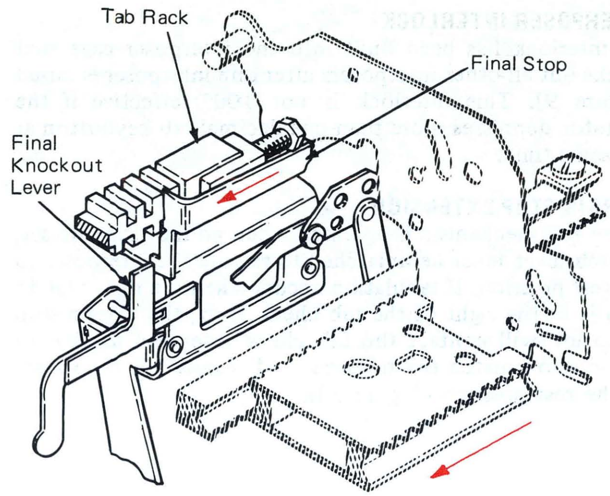


Figure 11 – Unlatching of Tab (Final Stop)

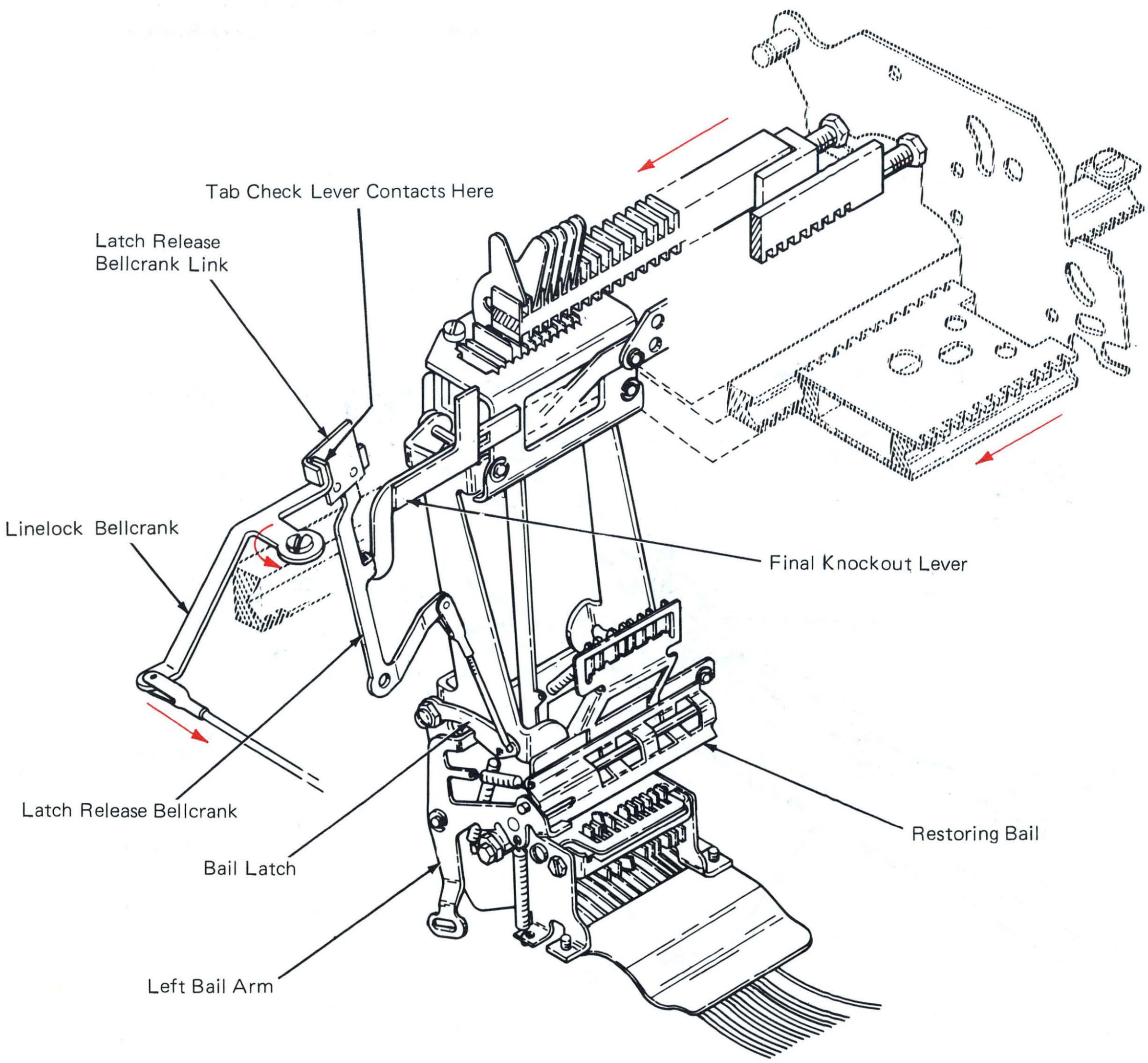


Figure 12 – Linelock Unlatching of Tab (At Right Hand Margin)

CARRIAGE RETURN/TAB INTERLOCK

To prevent the carriage from locking when the carriage return and tab are operated at the same time, an interlock is operated by the tab lever (Figure 13). When the tab lever is latched, the carriage return tab interlock rotates the clutch latch bellcrank preventing the clutch from latching. During carriage return, if the tab mechanism is operated, the carriage return tab interlock rotates the clutch latch bellcrank to unlatch the carriage return clutch. Tab-backspacing interlocking is the same as on the standard typewriter.

CARRIAGE RETURN/BACKSPACE INTERLOCK

To prevent the carriage return and backspace from locking when operated at the same time, an extension on the backspace bellcrank blocks the movement of the clutch latch bellcrank.

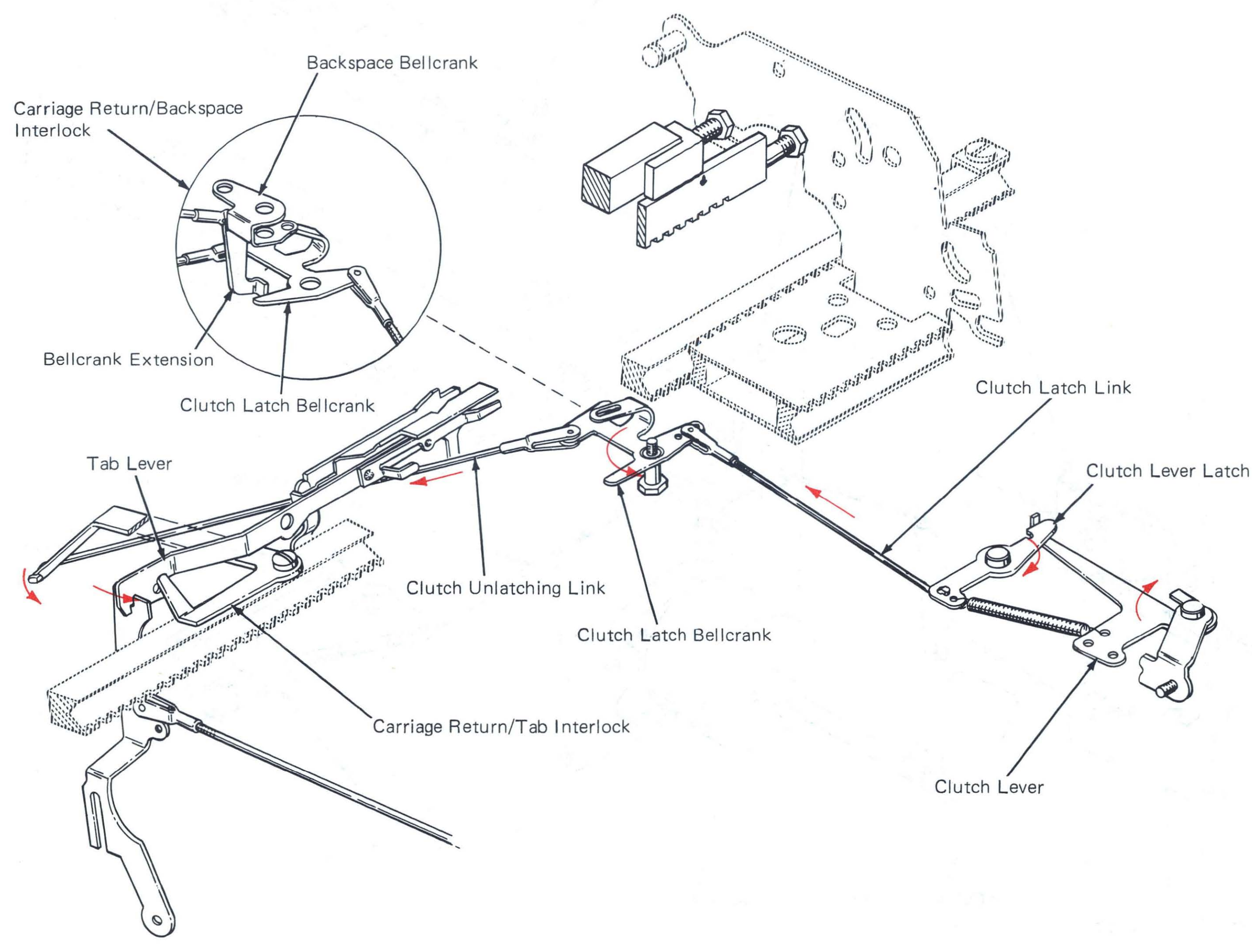


Figure 13 – Carriage Return Interlocks

AIR CYLINDER

Due to the addition of the interposer cage, the decelerator is used on tab only. An air cylinder is used to slow the carriage during the return operation (Figure 14).

As the carriage moves to the left margin the LH margin stop contacts the margin control lever pulling it to the right in its elongated holes. The extension of the margin control lever pivots the margin control bellcrank which in turn pivots the air cylinder bellcrank. This action pushes the air cylinder shaft to the right and brings the carriage to a slow stop.

Also, the pivot action of the air cylinder bellcrank pivots the clutch latch bellcrank which unlatches the carriage return clutch latch.

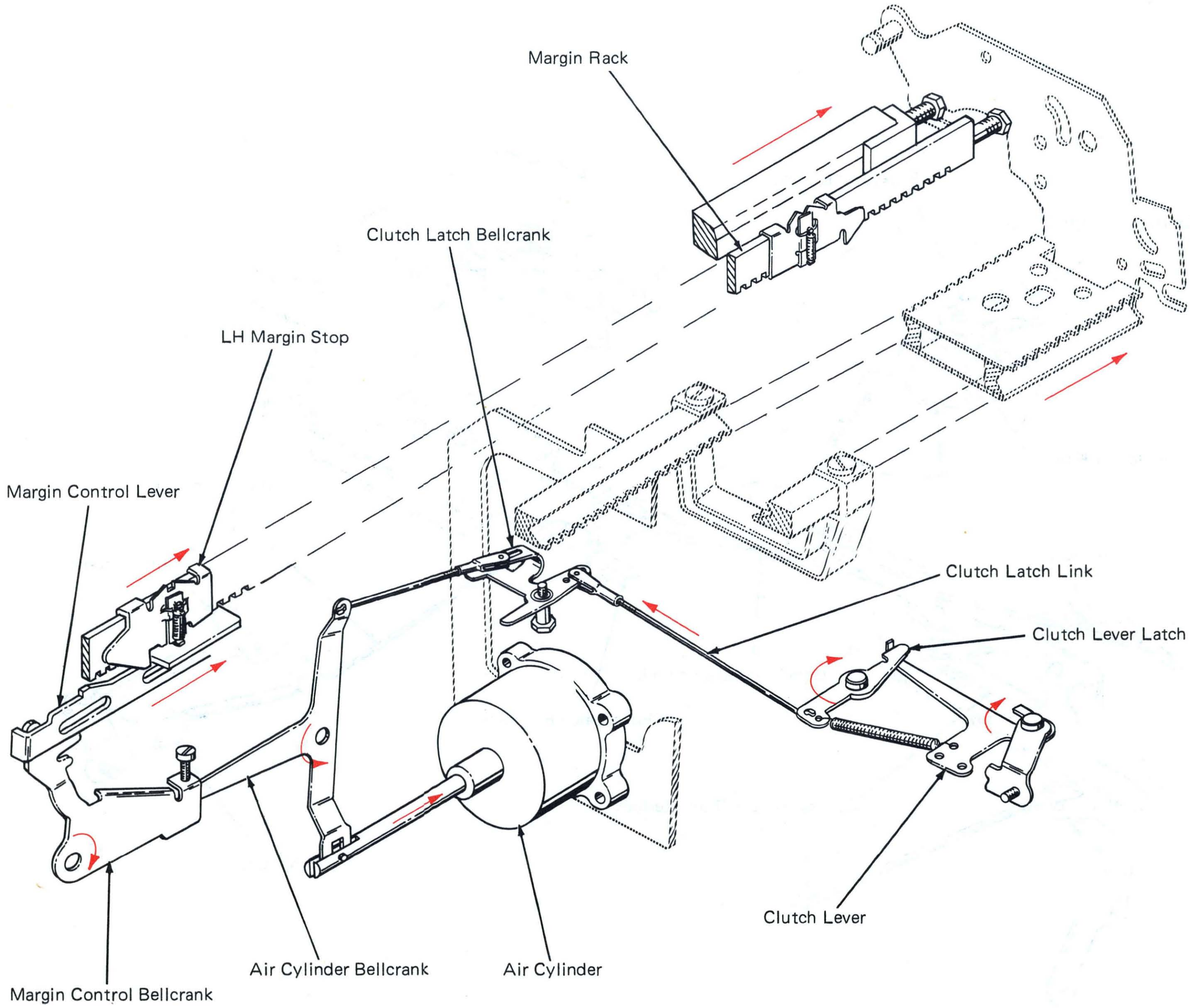
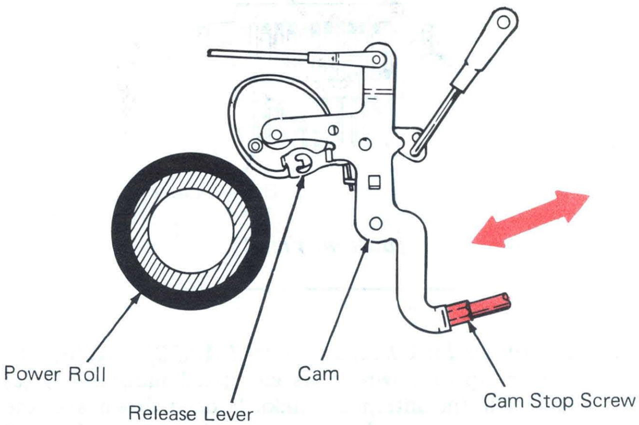


Figure 14 – Air Cylinder Operation

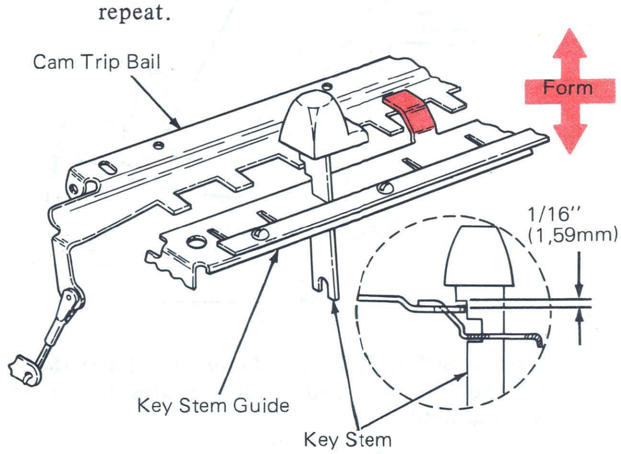
DECIMAL TAB ADJUSTMENTS

1. *Cam Clearance (Level 1 And 2)* – Adjust the cam stop screw so the release lever lug drops on the rear of the cam lug when released with the power off.

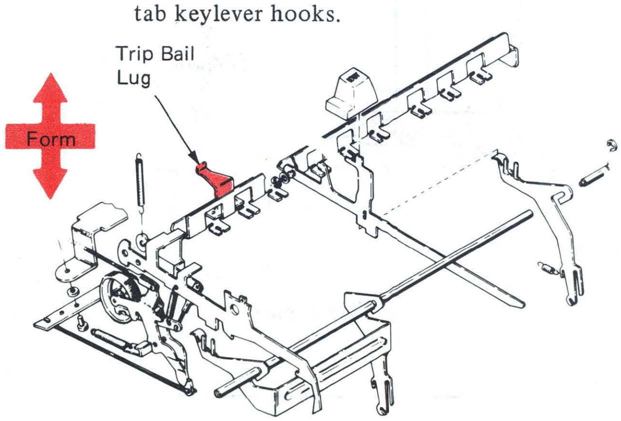


(Left Side View)

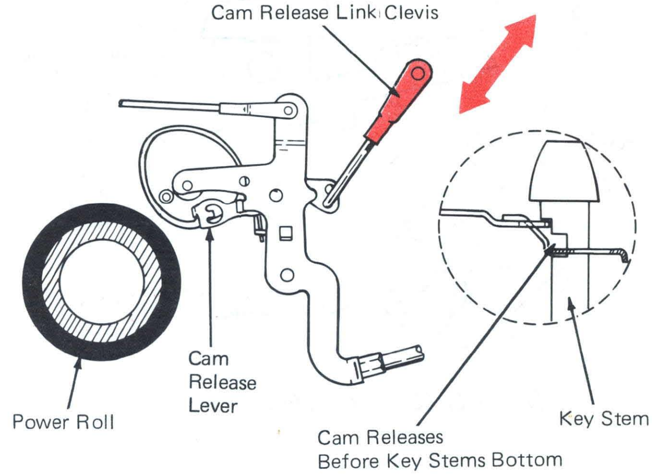
2. a. *Cam Trip Bail Rest Position (Level 1)* – Form the lug in the center of the decimal tab keystem guide to get a clearance of 1/16" (1,59mm) between the fingers of the cam trip bail and the tops of the notches in the keystem. Not enough clearance at this point may allow the cam to repeat.



b. *Height Of Cam Trip Bail (Level 2)* – Form the lug on the left end of the trip bail to get an average clearance of .020" (0,51mm) between the fingers of the cam trip bail and the decimal tab keylever hooks.

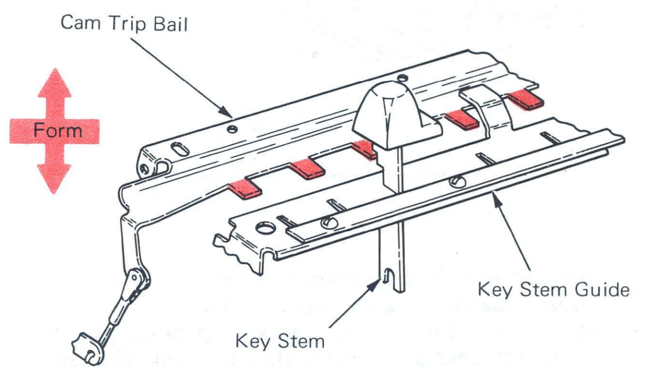


3. *Cam Release Link Clevis (Level 1 And 2)* – Adjust the cam release link clevis to allow the cam to be released as late as possible in the movement of the keybuttons, but before the keystems bottom on the guide.

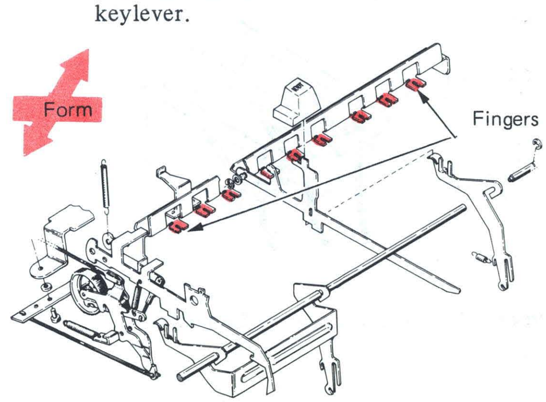


(Left Side View)

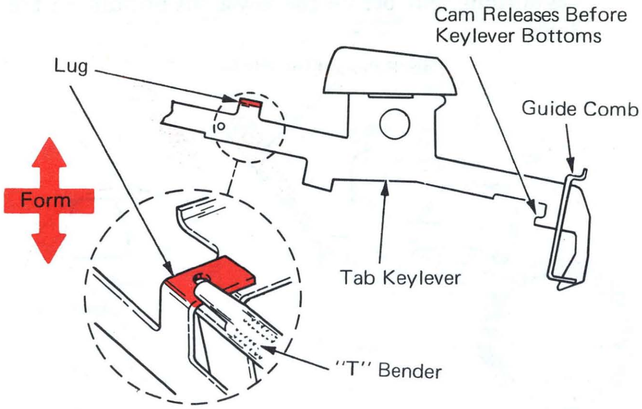
4. a. *Separate Cam Release (Level 1)* – Form the fingers of the cam trip bail so that all keystems cause the cam to be released just before they reach their full downward movement.



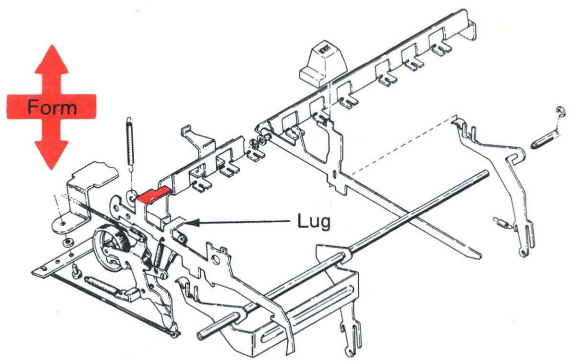
b. *Separate Cam Release (Level 2)* – Form the fingers on the cam trip bail to adjust each keylever for the same cam release point. The cam trip bail should release the cam as late as possible in the downward motion of the keylever.



5. *Tab Keylever Lug (Level 1 And 2)* – Form the lug of the tab keylever so the cam will release just before the tab keylever bottoms in the guide comb.

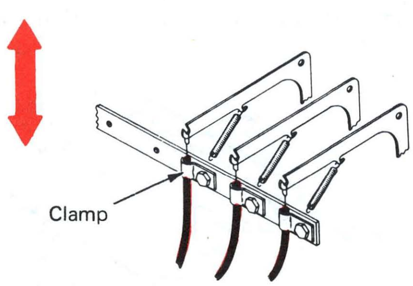


(Level 1) (Left Side View)



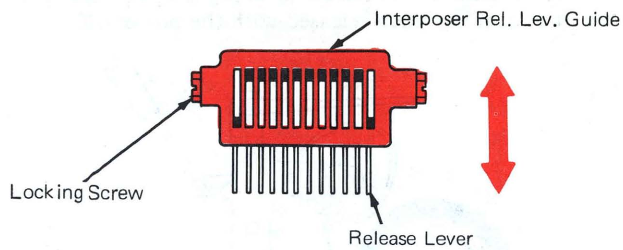
(Level 2)

6. *Interposer Cable Assemblies (Level 1 And 2)* – Loosen the front cable clamps and adjust the ends of the cables forward or back separately so the interposer links are released slightly before the cam is released. If the interposer and cam release relationship is not correct, flicking of the keybuttons could cause the cam to be released without selecting an interposer.



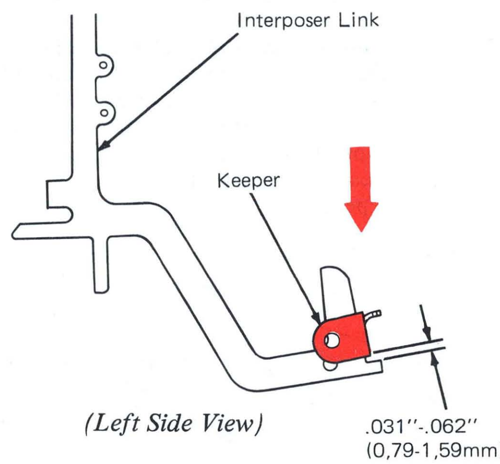
Interposer Releases Slighty Before Cam Releases.

7. *Interposer Release Lever Guide (Level 1 And 2)* – Adjust the interposer release lever guide so the release lever bottoms in the guide just as the interposers are released.



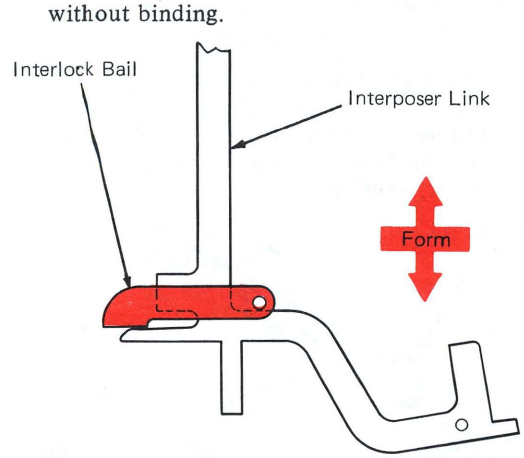
(Bottom View)

8. *Interposer Link Keeper (Level 1 And 2)* – Adjust the keeper up or down in its elongated mounting holes so, with the interposer links latched down and the cage at rest the links will be 1/32-1/16" (0,79-1,59mm) above their far downward position. Check this by pulling down on the interposer links.



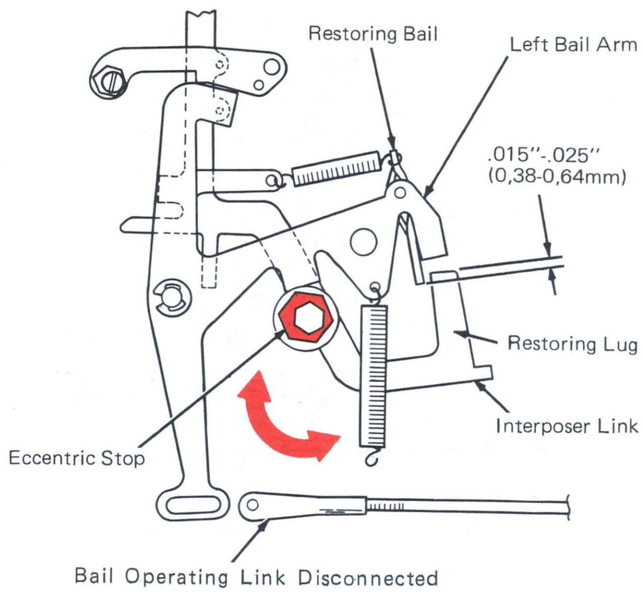
(Left Side View)

9. *Interposer Interlock Bail (Level 1)* – Form the arms on the interlock bail so it operates up or down without binding.



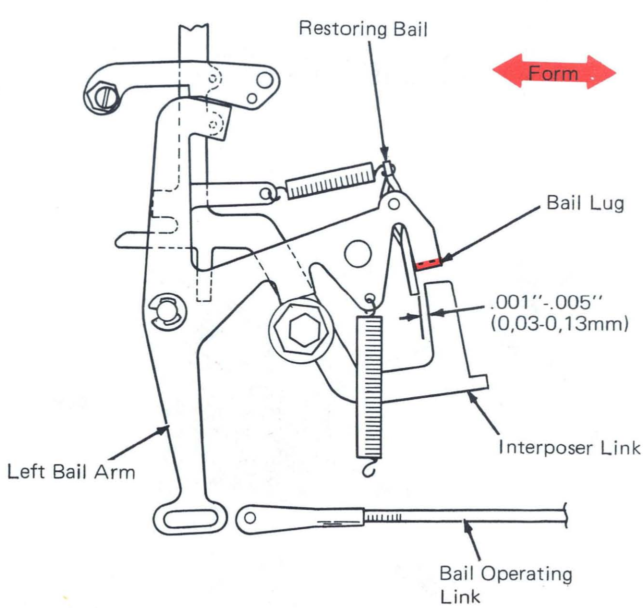
(Left Side View)

10. *Bail Assembly Eccentric Stop (Level 1 And 2)* – Adjust the eccentric stop so, with all parts at rest, the restoring bail overlaps the restoring lug of the interposer link by .015-.025" (0,38-0,64mm). The bail operating link must be disconnected when making this adjustment.



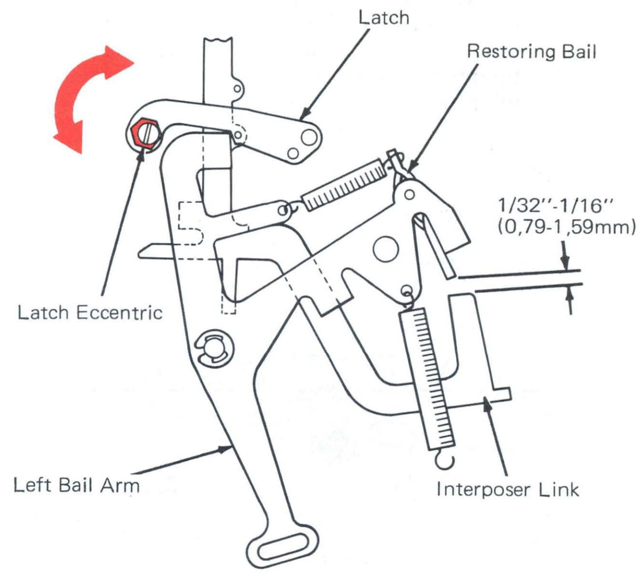
(Left Side View)

11. *Restoring Bail Lug (Level 1 And 2)* – Form the lug on the left bail arm to get a clearance of .001-.005" (0,03-0,13mm) between the bail and the lugs of the interposer link when the interposers and the bail are at rest.



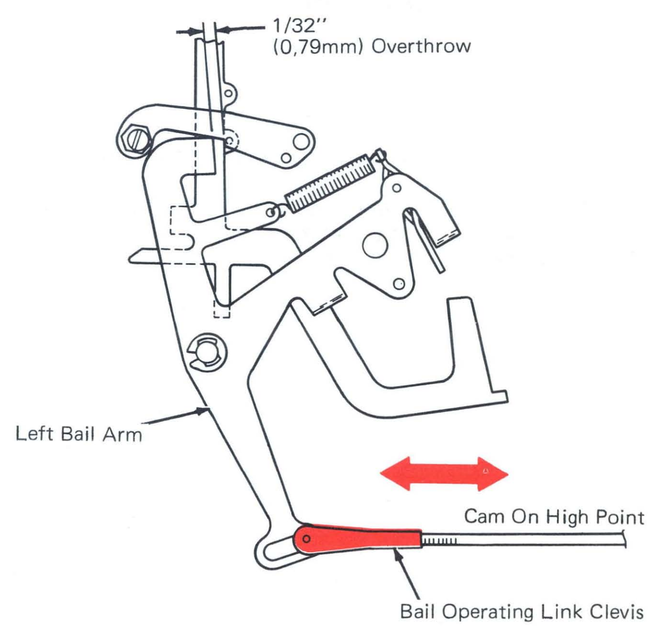
(Left Side View)

12. *Bail Latch (Level 1 And 2)* – Adjust the bail latch eccentric to get 1/32-1/16" (0,79-1,59mm) clearance between the bail and an interposer link when the link is raised and the bail is latched up.



(Left Side View)

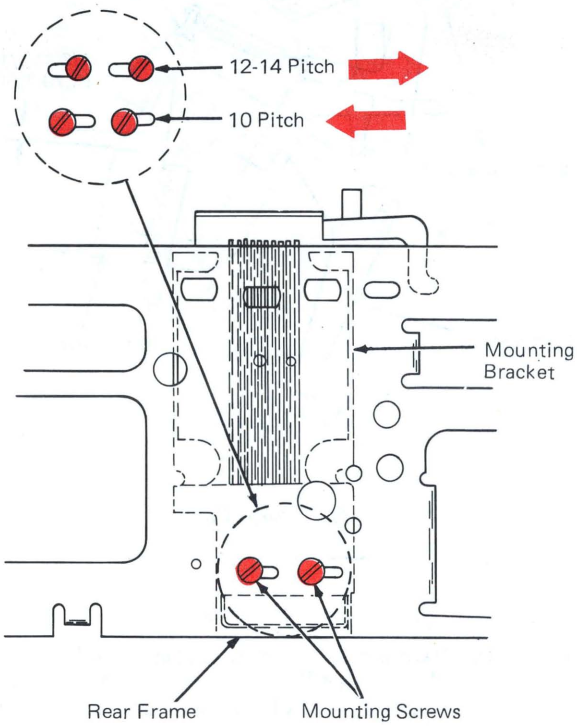
13. *Bail Operating Link Clevis (Level 1 And 2)* – Adjust the bail operating link clevis so when the cam reaches its high point, the left bail arm latching surface will have 1/32" (0,79mm) clearance from the latch.



(Left Side View)

14. *Interposer Mounting Bracket (Level 1 And 2)* – The interposer control bracket must be adjusted to satisfy two conditions:

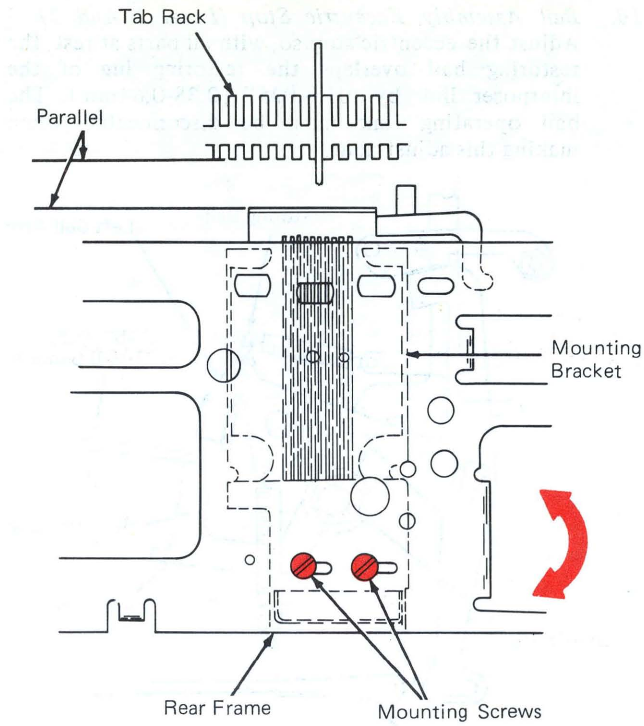
a. The mounting screws should be in the right side of the mounting holes (observed from the rear) for 12 and 14 pitch machines and in the left side or 10 pitch machines. This ensures that the interposer links will be vertical when the interposer cage is at rest.



(Rear View)

CAUTION: Be sure all links move up and down freely after any adjustment of the interposer mounting bracket.

b. Adjust the mounting bracket rotationally until the top of the interposer cage is parallel with the tab rack.

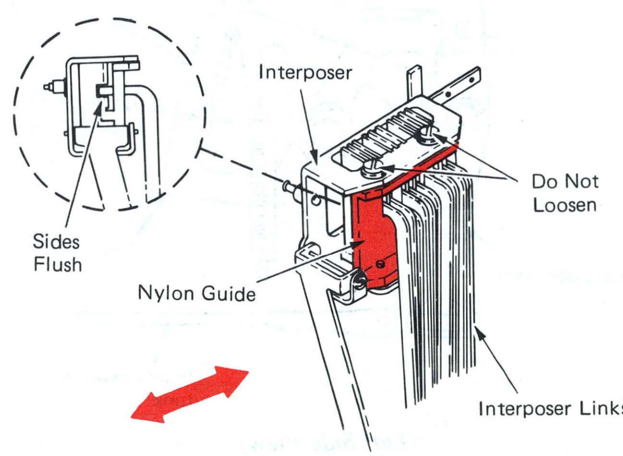


(Rear View)

CAUTION: Before making the following adjustments, do not loosen any screws on the interposer cage assembly.

15. *Interposer Link Guide (Level 1 And 2)* – Pry the interposer link nylon guide left or right so that the two outside interposer links are centered laterally in the interposers.

If all links cannot be centered easily, each link may be pulled out of the nylon guide and formed for this condition.



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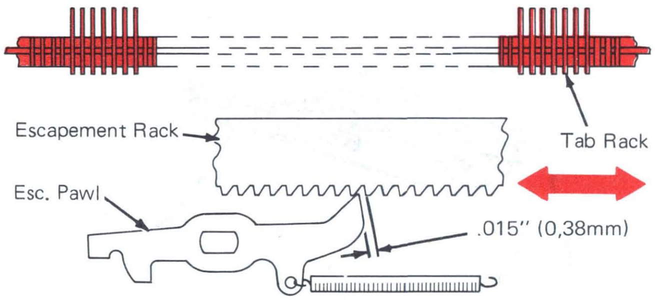
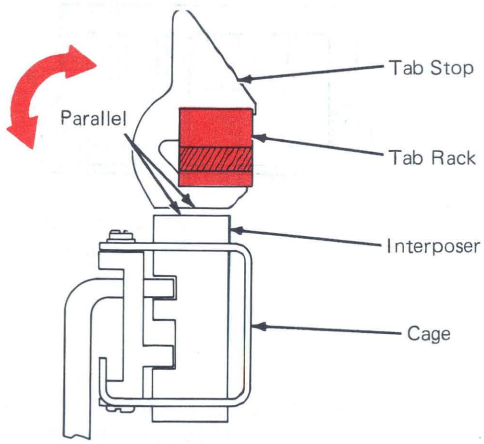
16. *Tab Rack (Level 1 And 2)* – The tab rack must be adjusted to satisfy four conditions:

a. Adjust the tab rack left or right so the escapement pawl enters the rack with a clearance of .015 (0,38mm). With the power off and the cam on the high point, allow a set tab stop to come to rest against a raised interposer to force the interposer cage fully to the left. Slowly back the cam from the high point to observe the escapement pawl entry.



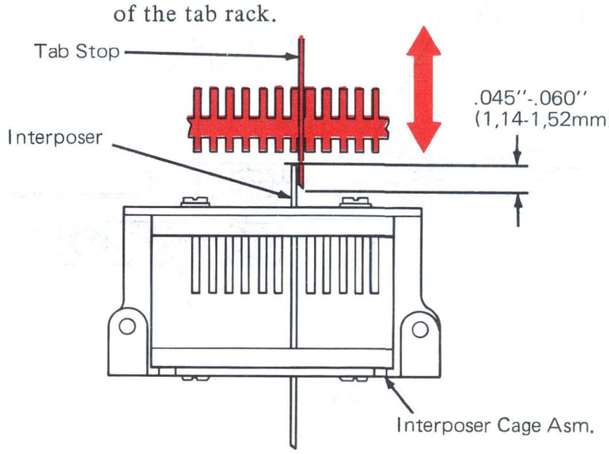
(Bottom View)

b. Rotate the tab rack about its axis so the lower edge of a set tab stop is parallel with the top of the interposers.

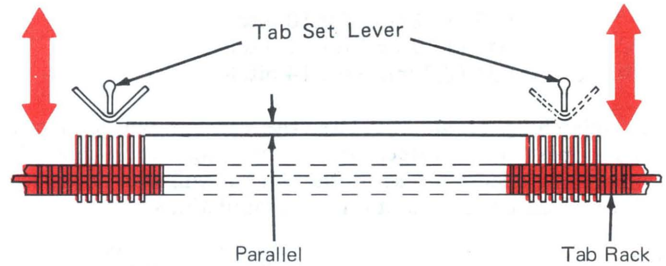


(Left Side View)

c. Adjust the tab rack up or down so a raised interposer will overlap a set tab stop by .045-.060" (1,14-1,52mm). This adjustment must be checked on both ends and in the center of the tab rack.

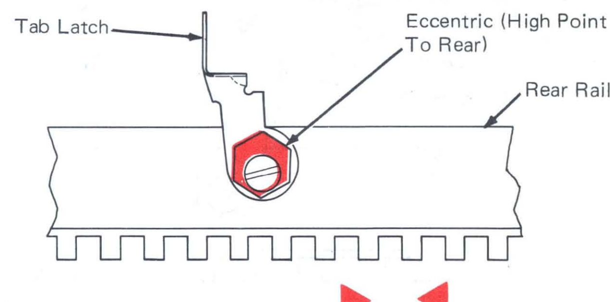


d. Adjust the right end of the tab rack forward or back so it is parallel with the rear rail. Check by observing that the clearance between the unset tab stops and the tab set lever remains the same as the carriage is moved left to right.



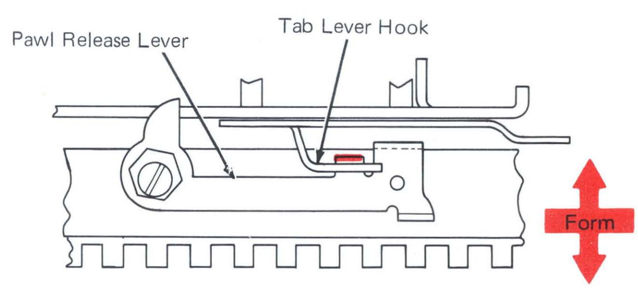
(Top View)

17. *Tab Latch Eccentric (Level 1 And 2)* – Adjust the tab latch eccentric high point all the way to the rear.

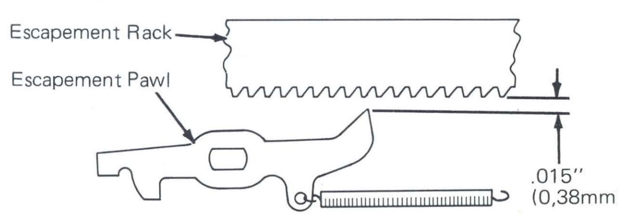


(Top View)

18. *Pawl Clearance (Level 1 And 2)* – Form the rear upright lug of the pawl release lever for .015" (0,38mm) clearance between the escapement pawl tip and the escapement rack when the tab lever is latched out.



(Top View)

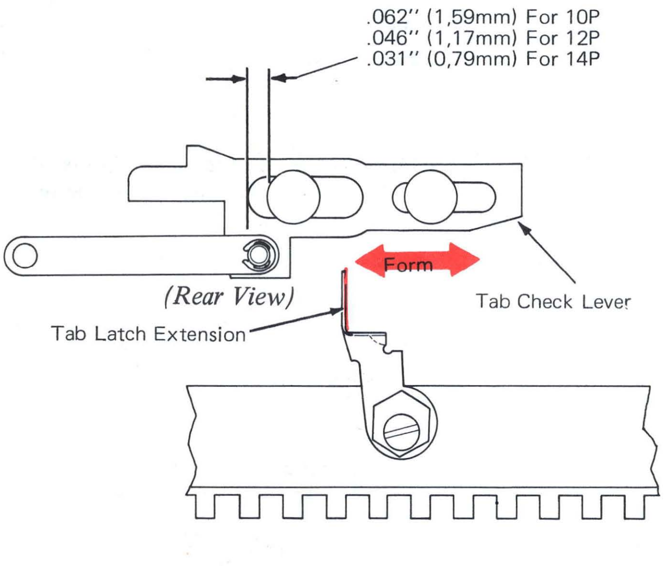


(Bottom View)

19. *Tab Latch Extension (Level 1 And 2)* – Form the tab latch extension at the point of contact with the tab check lever so the tab will unlatch when the tab check lever is the correct distance away from its farthest movement to the left.

a. .062 (1,58mm) for 10 pitch
b. .046 (1,17mm) for 12 pitch
c. .031 (0,79mm) for 14 pitch

If unlatching occurs too late, the carriage will stop one space past the correct point on long tabulations. If unlatching occurs too soon, the carriage will stop one space short of the correct point on short tabulations.



(Top View)

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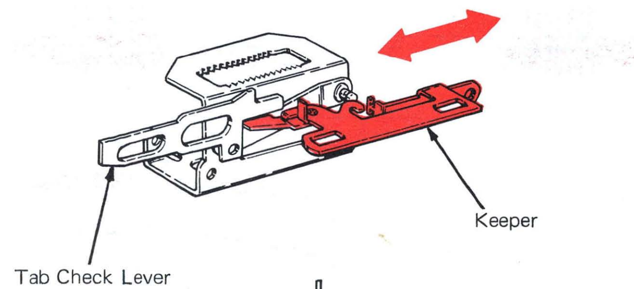
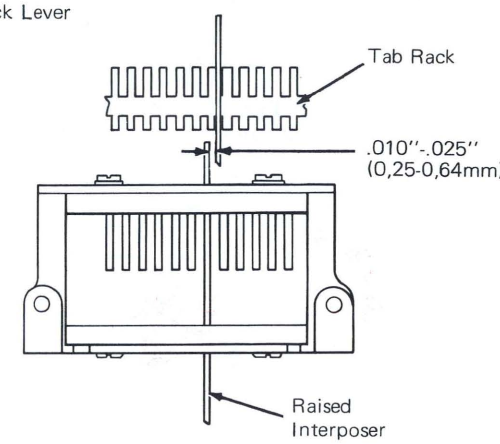
20. *Tab Check Lever Keeper (Level 1 And 2)* – The tab check lever keeper must be adjusted to satisfy two conditions:

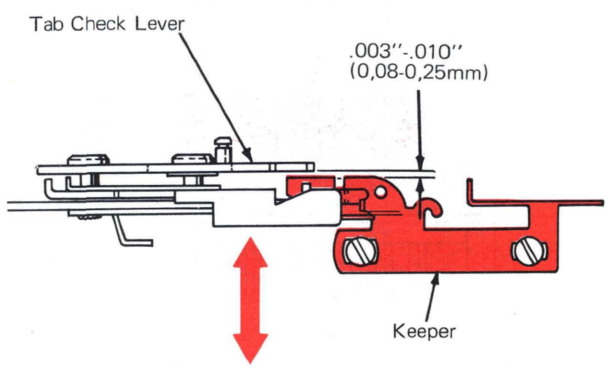
a. Adjust the tab check lever keeper left or right in the following manner. Tabulate to a tab stop and backspace twice. Depress the same tab key with the machine turned off. The raised interposer should clear the side of the tab stop by .010-.025" (0,25-0,38mm).





(Rear View)

b. Adjust the left end of the tab check lever keeper front-to-rear to obtain .003-.010" (0,08-0,25mm) clearance between the check lever and the keeper when the tab lever is held to the rear by the tab latch.



(Top View)

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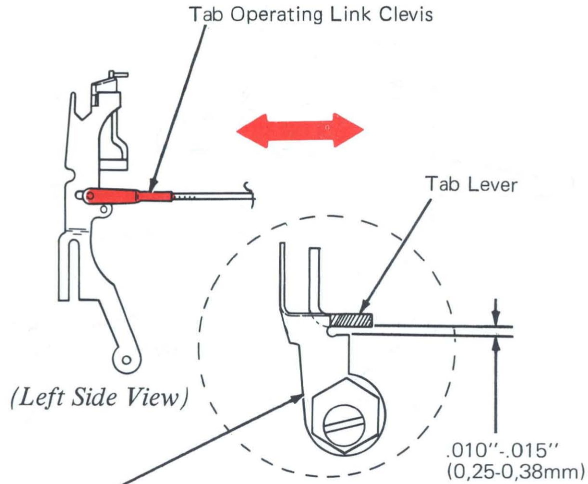
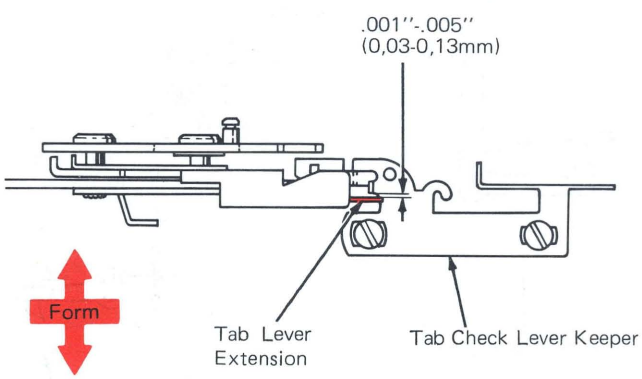
21. *Tab Operating Link Clevis (Level 1 And 2)* – Adjust the tab operating link clevis so, with the cam on its high point, there is a clearance of .010-.015" (0,25-0,38mm) bewteen the tab lever and the latching surface of the tab latch.



(Left Side View)

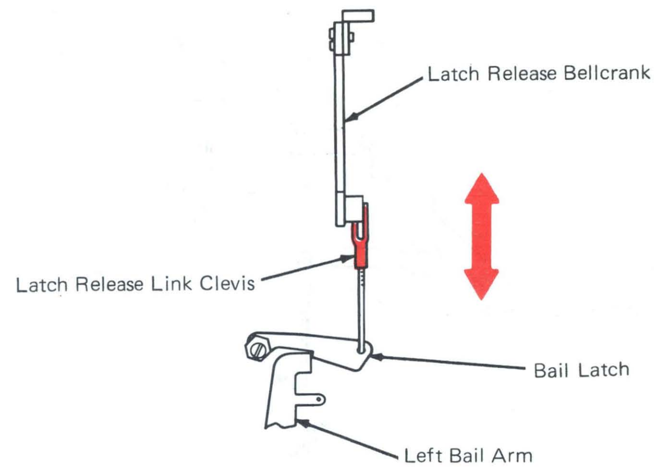
(Top View)

22. *Tab Lever Extension (Level 1 And 2)* – Form the tab lever extension so, with the cam on its high point, there is a clearance of .001-.005" (0,03-0,13mm) between the tab lever extension and the overthrow stop on the tab check lever keeper.



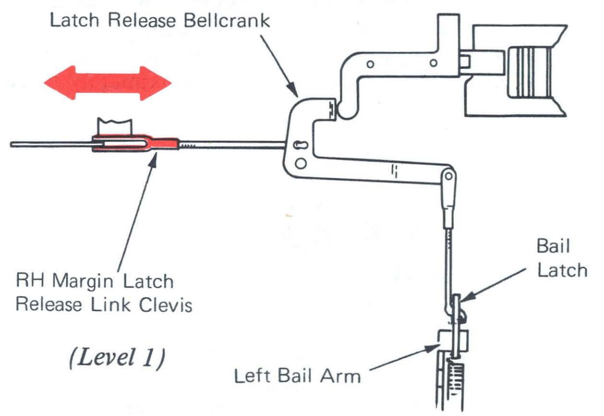
(Top View)

23. *Latch Release Link Clevis (Level 1 And 2)* – Adjust the latch release link clevis so the left bail arm is released just after the tab lever is unlatched. Both parts should be unlatched as near the same point as possible; however, the left bail arm must never be released before the tab lever is unlatched.



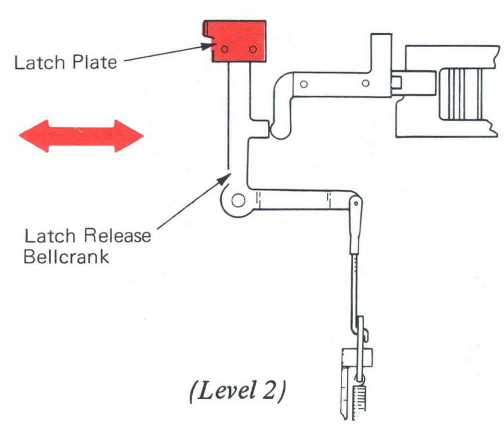
(Left Side View)

24. *Right Hand Margin Latch Release Link Clevis (Level 1)* – Adjust the release link clevis so the left bail arm will just fail to latch with the carriage resting against the right hand margin. With the carriage away from the margin, the left bail arm must safely latch.



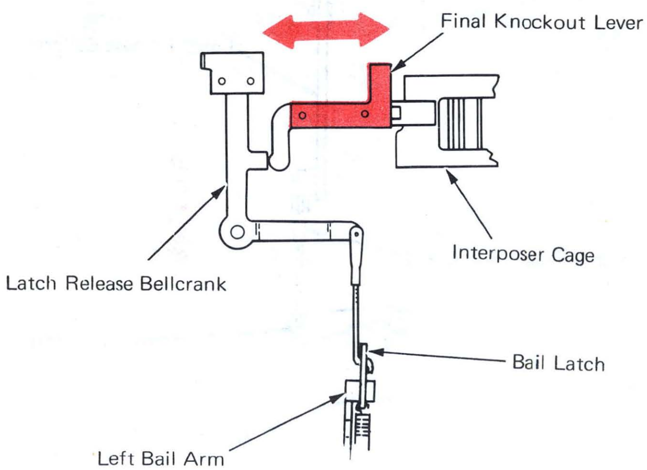
(Level 1)

Right Hand Margin Latch Release Link Clevis (Level 2) – Adjust the latch plate left or right to get the same condition described for Level 1 above.

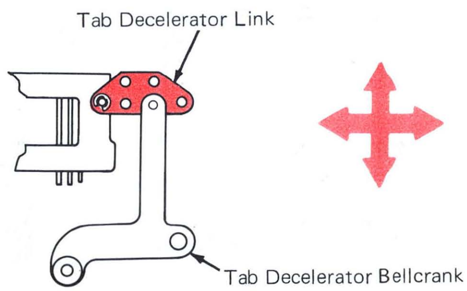


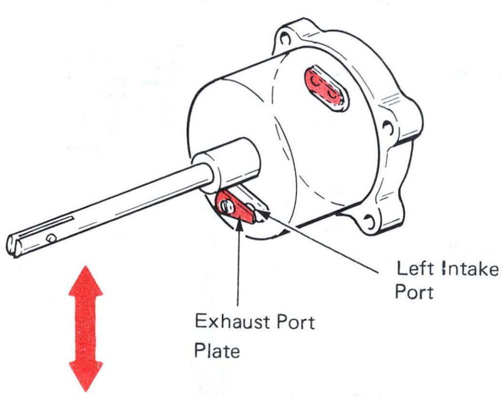
(Level 2)

25. *Final Knockout Lever (Level 1 And 2)* – Adjust the final knockout lever left or right so the left bail arm will just fail to latch if the tab is operated when the carriage is in its farthest left position past the right margin stop.

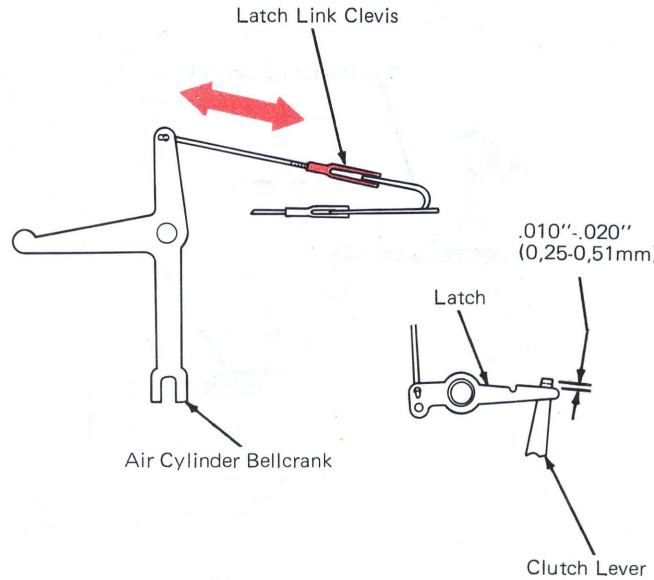


26. *Tab Decelerator Link (Level 1 And 2)* – Position the stud of the tab decelerator bellcrank in the hole of the tab decelerator link which will give the desired deceleration. The air cylinder should allow the carriage to come to rest with a minimum of shock and without delay. The air cylinder RH exhaust port plate may be adjusted to get proper deceleration (opening the port decreases decelerating action). The LH intake port should be set approximately halfway open.



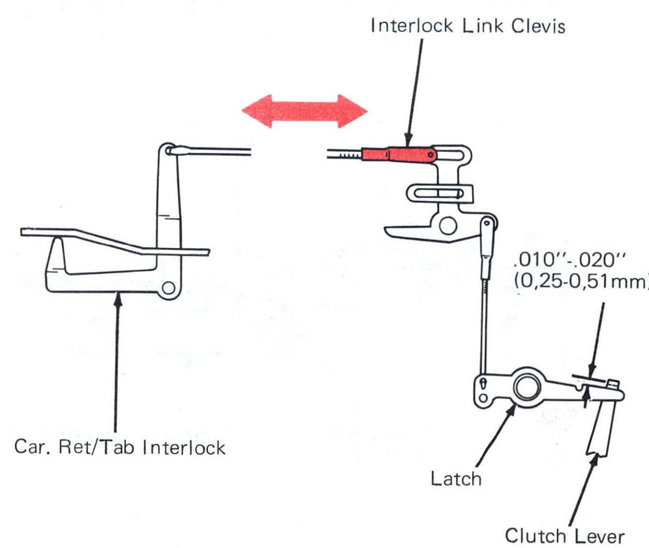


27. *Carriage Return Clutch Unlatching (Level 1 And 2)* – Adjust the clutch latch link clevis for .010-.020" (0,25-0,51mm) clearance between the clutch latch and the lug of the clutch lever with the carriage held fully to the right against the left hand margin stop.



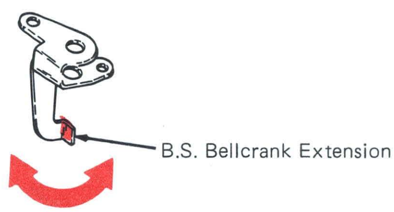
(Top View)

28. *Carriage Return Tab Interlock (Level 1 And 2)* – Adjust the carriage return/tab interlock link clevis for .010-.020" (0,25-0,51mm) clearance between the clutch latch and the lug of the clutch lever with the tab lever latched to the rear. Be sure the clutch latch is not restricted when the tab lever is at rest.

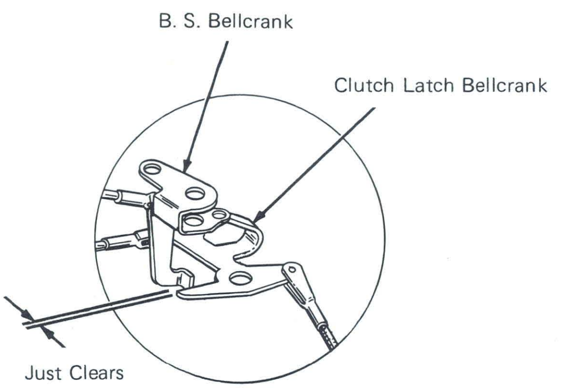


(Top View)

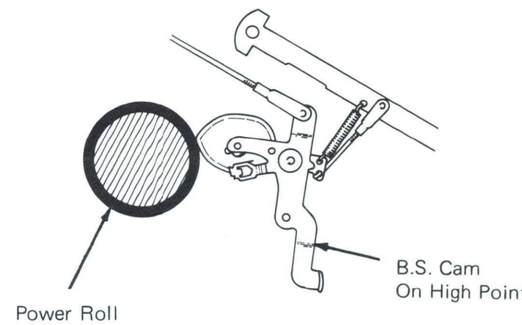
29. *Carriage Return Backspace Interlock (Level 1 And 2)* – Form the extension of the backspace bellcrank to satisfy the following conditions:



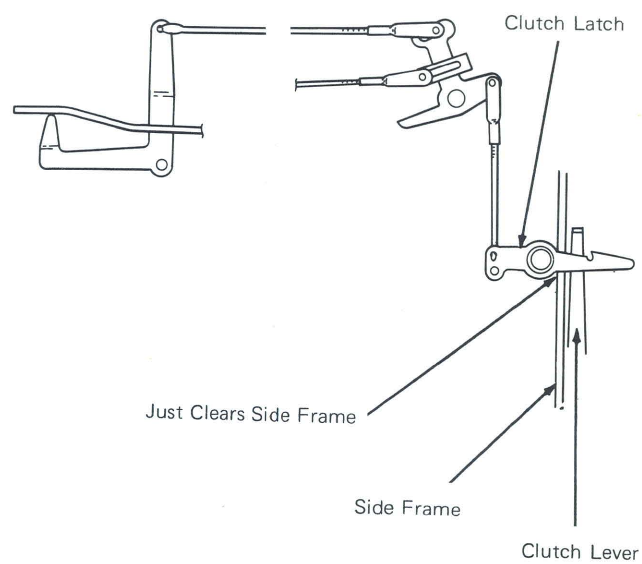
a. With the clutch latched, the backspace bellcrank extension should just clear the clutch latch bellcrank.



b. The clutch lever should just clear the side frame when the backspace cam is at its high point.



(Left Side View)



(Top View)

The purpose of the IBM Braille Typewriter is to provide a machine to produce typed communications for blind persons.

There are two levels of Braille writing: (1) Grade I, in which every word is typed out letter by letter, and (2) Grade II, which includes all of Grade I plus 189 abbreviations.

The IBM Braille Typewriter is an advance in communications between sighted and blind people. A person who can type is able to type Grade I Braille. The typewriter is so arranged that a person already knowing Braille will be able to produce Grade II because the typewriter keyboard contains all the dot combinations possible in the Braille cell.

On the IBM Braille Typewriter (Figure 1) the standard lowercase typewriter keyboard arrangement is used for Grade I. The abbreviations for Grade II are in the uppercase positions.

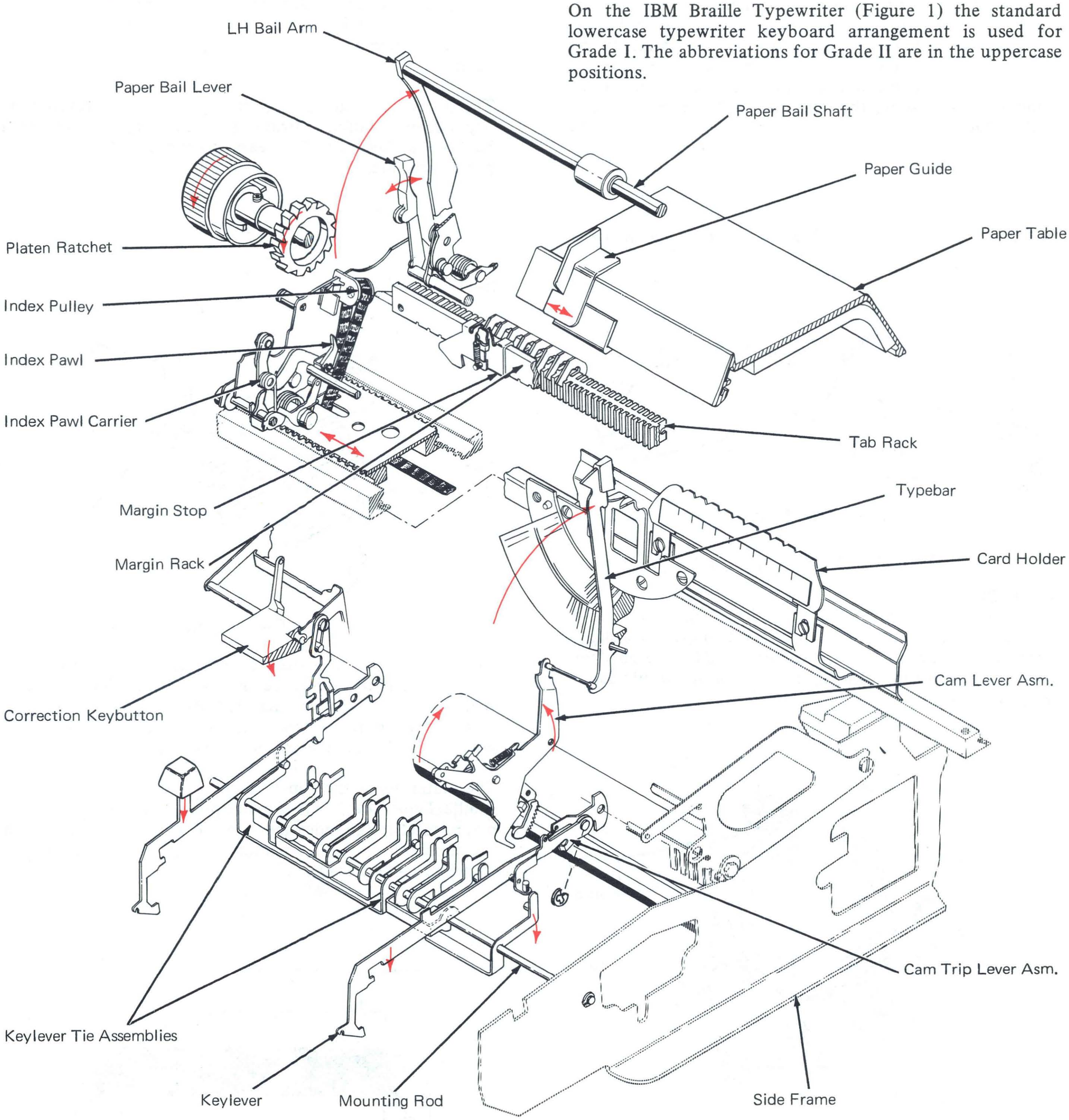


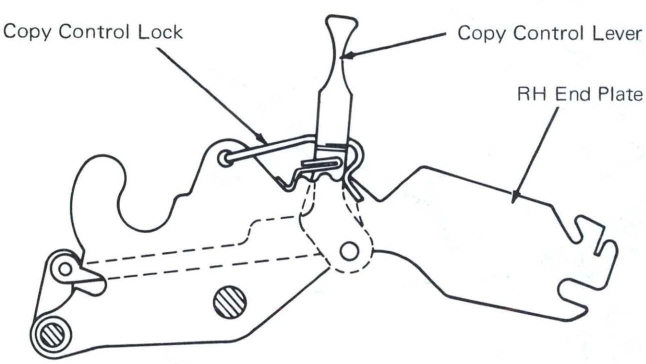
Figure 1 – IBM Braille Typewriter

The Braille Typewriter comes only in the Model D and the theory of operation is the same as the D1, except for the following mechanisms:

1. Carriage And Rails
2. Paper Feed
3. Typebar Operating
4. Escapement
5. Carriage Return

COPY CONTROL LOCK

The Braille Typewriter comes only in the 13 inch carriage length. It differs in only two areas: copy control lever (Figure 2) and the spring mounting plate (Figure 3). On the Standard and "Executive" typewriters the copy control lever is used to prevent or control embossing. Since Brailling is embossing, the copy control lever is locked at position "A."

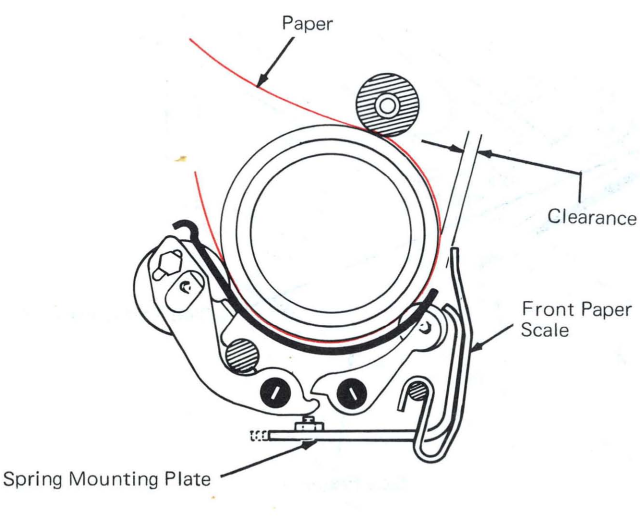


(Right Side View)

Figure 2 – Copy Control Lock

PAPER FEED

To aid in feeding the paper into the machine, a special spring mounting plate (Figure 3) is used to provide a slight clearance between the front paper scale and the platen. This prevents the paper from hitting the scale which would cause feed problems.



(Left Side View)

Figure 3 – Spring Mounting Plate

Paper feeding begins at the rear paper table where the operator inserts the paper into the typewriter (Figure 4). The rear paper table supports the paper at the back of the machine and has an adjustable guide to aid the operator in positioning the paper from the LH margin. The paper is fed into the machine until the top edge of the paper, which is behind the platen, appears level with the paper table. Then by advancing the platen eight "clicks," paper should be on the first writing line.

Typing will be left to right from the bottom to the top of the page. During typing the paper advances under the special paper guide. This directs the paper toward the rear of the typewriter, holding the paper in its correct typing position.

The paper bail holds the paper in position and prevents the paper from bending outward. The Braille Typewriter uses a bail release lever to allow easy positioning of the bail for paper inserting.

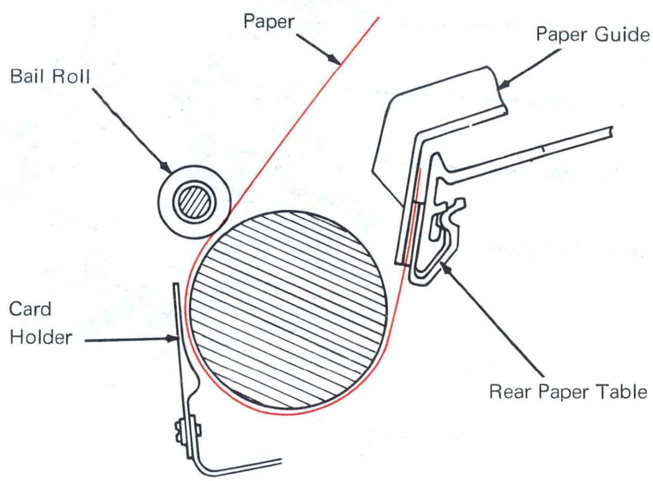


Figure 4 – Paper Feeding (Right Side View)

Across the top edge of the clear view cardholders (Figure 5) are notches that are marked in 1/4" (6,35mm) increments. When an error must be corrected after the paper has been removed from the typewriter, the notches are used as a guide for realigning the cell on the paper.

The platen feeds the paper in the opposite direction on the Braille Typewriter. This is made possible by using a special platen ratchet and index mechanism. The only difference in the standard and Braille platen is the platen ratchet, which comes in 14 teeth only.

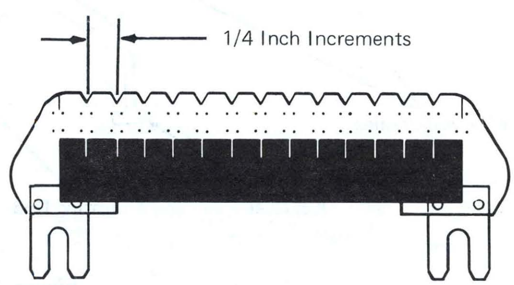


Figure 5 – Card Holder

TYPEBAR OPERATING

The typebar operation for the Braille Typewriter is much the same as the D1. The basic difference is in the following:

1. Keylevers
2. Correction Key
3. Type Guide

Through the use of special keylever tie assemblies and cam trip lever assemblies, the Braille Typewriter uses only 35 cam lever assemblies (Figure 6). The keylever tie assemblies are mounted on a shaft to the side frame. When depressing a keylever, it contacts a lug on the tie assembly causing it to rotate about the mounting shaft. An extension arm on the tie assembly contacts and rotates the cam trip lever assembly to trip the cam. By using the keylever tie and cam trip lever assemblies, two keylevers can operate the same cam lever assembly. This removes the need for 7 cam lever assemblies.

The cam trip lever assemblies are mounted on the keylevers by a stud and C-clip (Figure 6). This allows the cam trip lever to pivot separately from the keylever to trip the cam. A spring from the keylever lug to the cam trip lever assembly restores the assembly to the rest position.

The chart (Figure 7) below shows the keylever arrangement and the cam levers common to both keylevers.

Keylevers	Cam Lever Asm.
1 & A	2
2 & B	20
3 & C	12
4 & D	10
5 & E	9
6 & F	14
7 & G	18
8 & H	22
9 & I	29
0 & J	26

Figure 7 – Keylever Arrangement

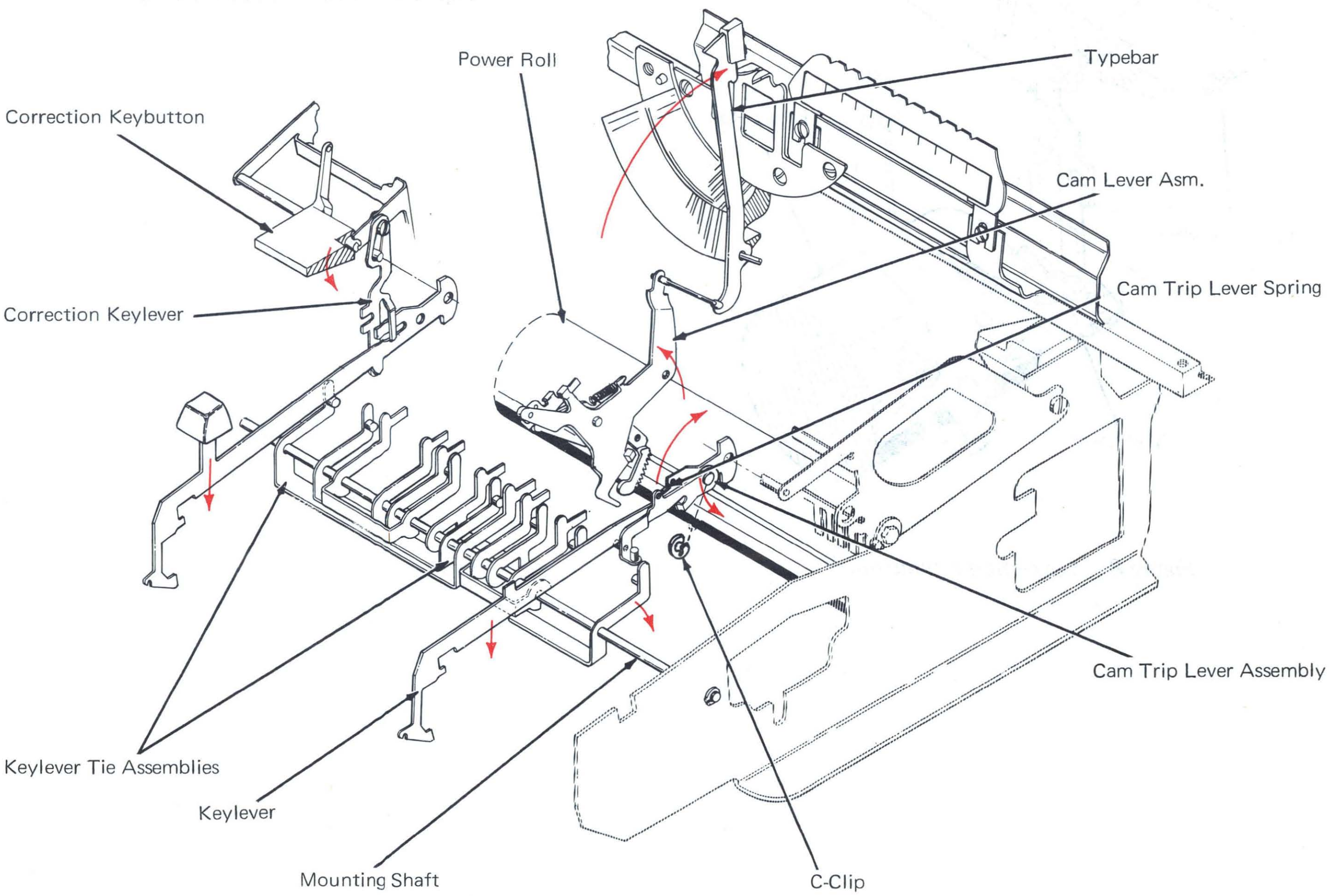


Figure 6 – Typebar Operation

CORRECTION TYPEBAR

The Braille Typewriter is equipped with a special correction typebar which presses flat any cell embossed in Braille. The type face uses a flat surface which does not emboss the paper. This provides the operator with a means of erasing a previously typed cell and therefore allows a new cell to be typed.

The correction keybutton and keylever is mounted on the keylever bearing support (Figure 8). During a correction, motion from the keybutton is transferred to the correction keylever. A special keylever guide engages the trip lever to trip the cam.

Repeating characters are not used on the Braille Typewriter.

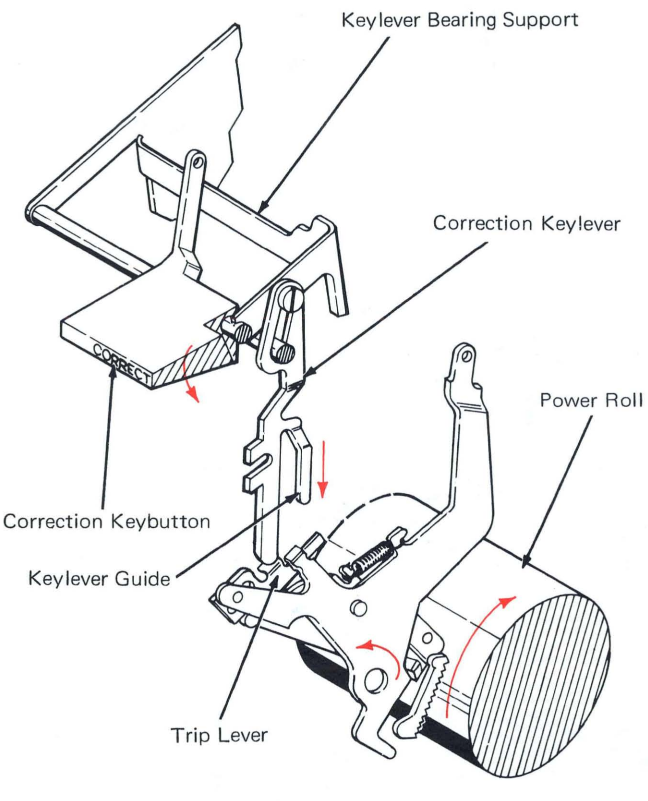


Figure 8 – Correction Keybutton

TYPE GUIDE

The type guide is a formed part of heavy metal and is attached to the segment by four screws and a dowel pin (Figure 9). The ring on the type guide has been removed to give heavier impression and also because of the non-smearing of characters on the Braille machine.

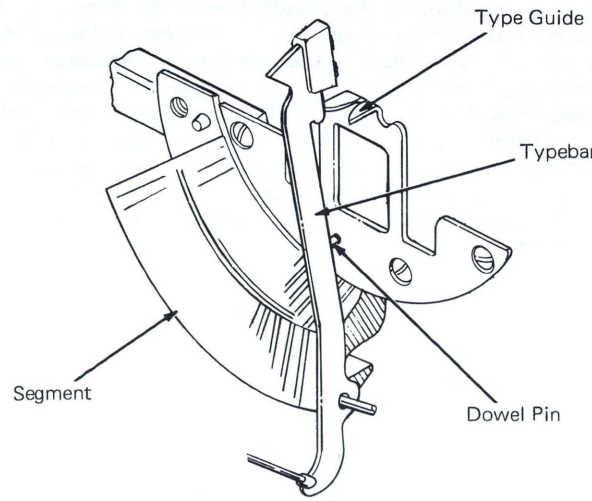


Figure 9 – Type Guide Mounting

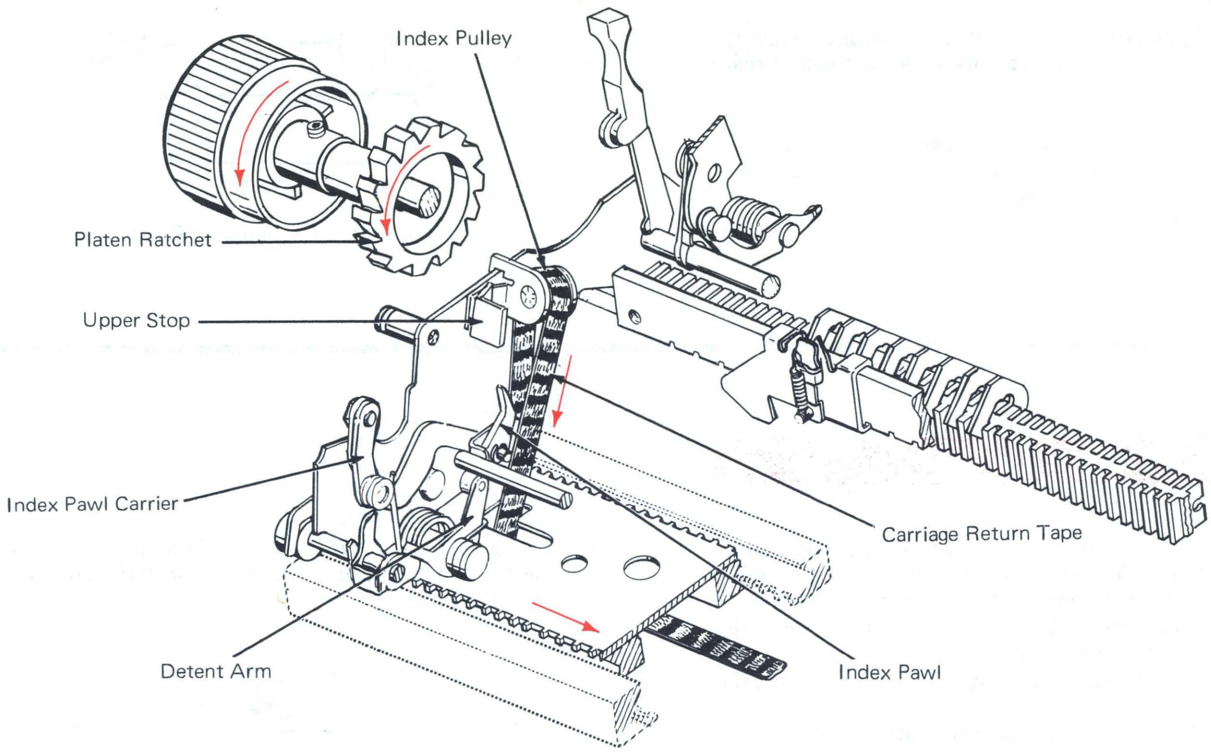


Figure 10 – Index Operation

CARRIAGE RETURN AND INDEX

The Braille carriage return mechanism uses the same theory of operation as the D1. The difference is found in the indexing operation. The Braille Typewriter indexes the platen in the opposite direction to that of the D1. This is referred to as reverse indexing. This operation is made possible by using a special index pulley mounted on the inner carriage end plate (Figure 1).

The index pawl carrier is spring loaded downward instead of upward. With the pawl carrier in this position, the carriage return tape can now be mounted around the index pulley and connected to a hook on the carrier arm.

The index pawl is also mounted in the opposite direction as the other IBM typewriters. The platen ratchet teeth are also reversed; therefore, when the carriage return mechanism is activated, instead of pulling down on the pawl carrier, the Braille Typewriter tape pulls the carrier up. As the pawl carrier begins to move up, the index pawl is pivoted into the ratchet, rotating the platen to the next writing line. An upstop mounted on the inner carriage end plate serves to limit the pawl movement.

The index mechanism on the Braille Typewriter does not have a linespace lever. It features only single linespacing, which provides 2.5 lines per inch. The carriage return is a non-repeat operation, which is done through the use of a clip on the keylever. Refer to Braille backspace (Figure 11) for this clip.

SPECIAL PLATEN

The Braille platen uses a special soft rubber and the ratchet comes in 14 teeth only.

BACKSPACE

The backspace key, located on the upper right side of the keyboard, will move the carriage back one space each time it is depressed. This operation is non-repeat, meaning that through the use of a clip on the keylever, typamatic operation of the backspace will not work (Figure 11).

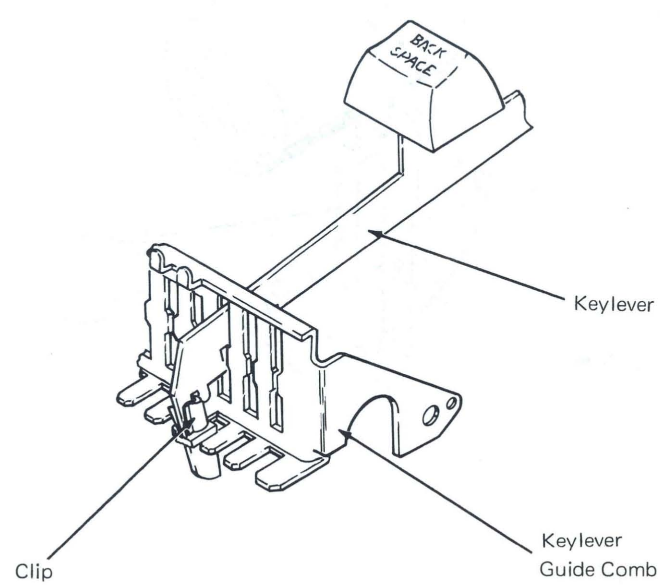


Figure 11 – Keylever Clip

ESCAPEMENT

The Braille Typewriter is a 4 pitch machine using the floating type of pawl block assembly without the half-space attachment.

The escapement rack teeth are spaced at 1/4 of an inch (Figure 12). This is the only difference in the Braille and standard escapement mechanisms.

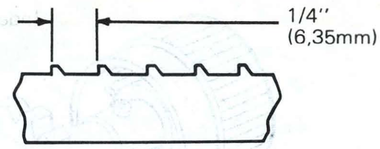
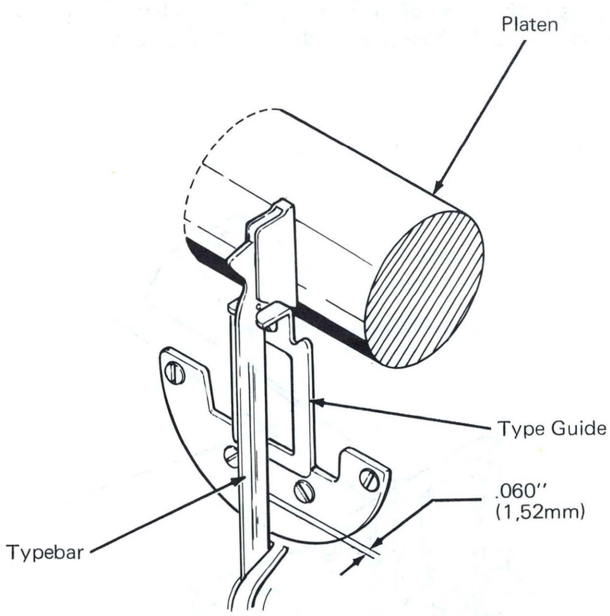


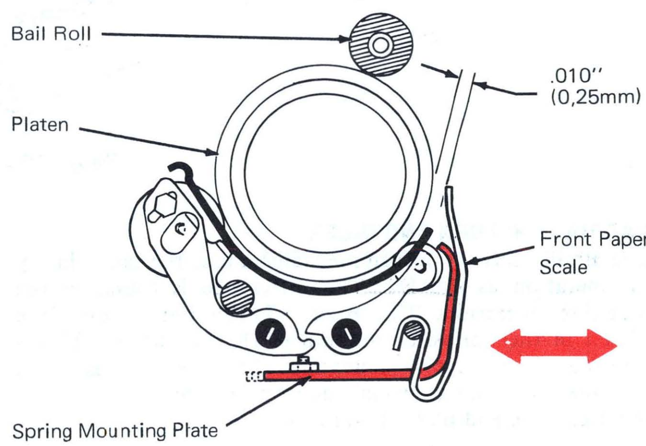
Figure 12 – Escapement Rack

BRAILLE ADJUSTMENTS

1. *Ring And Cylinder* – Press a center typebar against the platen. Adjust the platen adjusting plate eccentrics at each end of the carriage so that there will be a clearance of .060" (1,52mm) between the typebar and the type guide.
   NOTE: Loosen the center supports when making the adjustment.
   SERVICE AID: It is not necessary to loosen the front retaining plate screws when adjusting ring and cylinder since the screws serve only to hold the retaining plate to the adjusting plate.

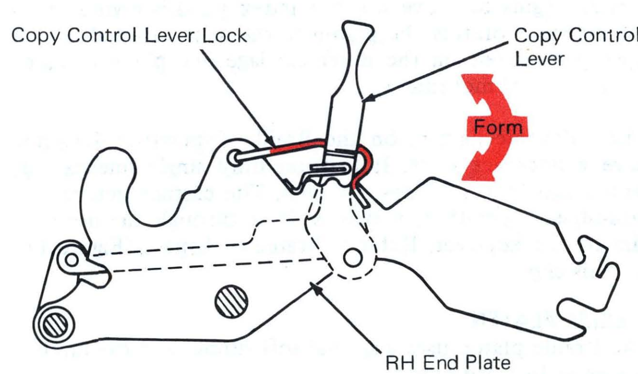


2. *Spring Mounting Plate* – Adjust front-to-rear to space the front paper scale a minimum of .010" (0,25mm) from the platen.



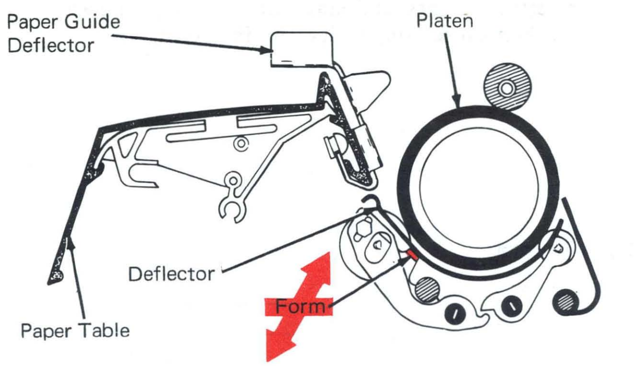
(Left Side View)

3. *Copy Control Lever Lock* – Form so that the copy control lever will maintain the position of A.



(Right Side View)

4. *Support Lugs* – Form the support lugs so that the top edge of the deflector is in line or slightly behind the paper table.
NOTE: Form the deflector to ensure that the paper will feed into the paper guide deflector correctly.



(Left Side View)

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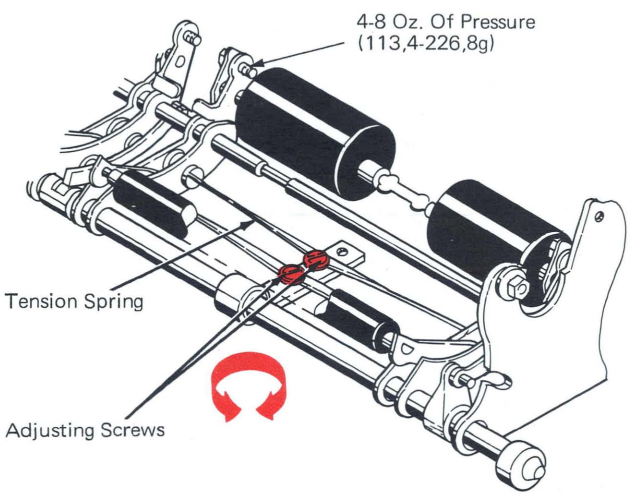
5. *Feed Roll Pressure Adjusting Screws* – Center the screw plates between the feed rolls. Adjust each screw until there is a pressure of 4-8 ounces (113,4-226,8g) on each pressure lever. Pressure between two feed rolls on the same shaft may be equal by forming the tension spring with pliers.



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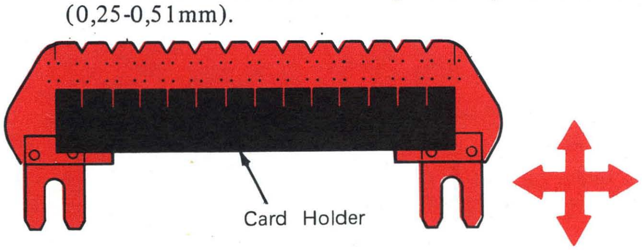
6. *Cardholder* – Adjust left or right so the indicator marks center on the lowercase "x." Adjust up or down so that the edge is parallel to the bottom row of dots on a typed line.
NOTE: Form the dust cover front or rear so that the cardholders will clear the platen by .010-.020" (0,25-0,51mm).



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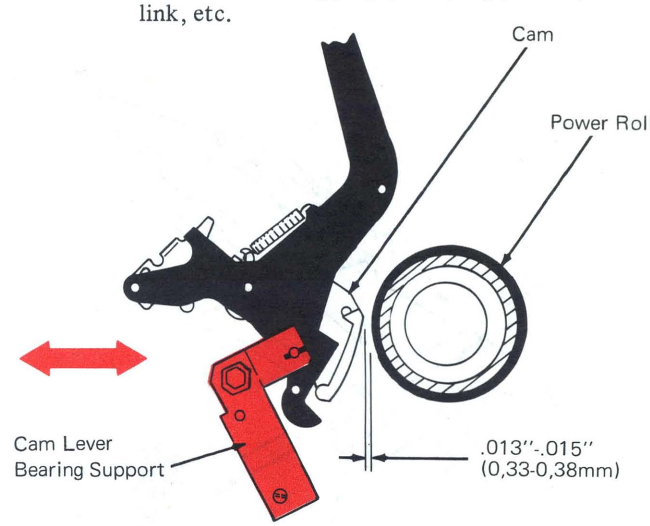
7. *Letter Cam Clearance* – Adjust the cam lever bearing support for a clearance between the letter cams and the power roll of .013-.015" (0,33-0,38mm).
CAUTION: Adjustment of letter cam clearance will require checking, in sequence, all the areas listed below:

   a. Keylever bearing support
   b. Keylever upstop
   c. Operational cam clearance
   d. Operational cam tripping and resetting points
   e. Operating link for each operational cam
   f. Any adjustment in a particular mechanism related to its tripping point, e.g., shift pusher link, etc.



(Right Side View)

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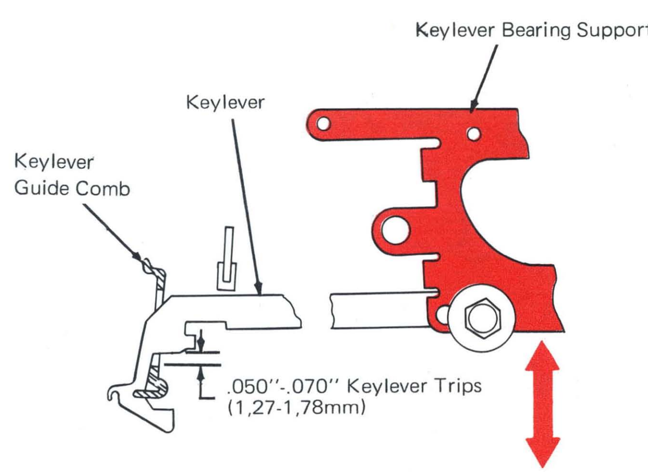
8. *Keylever Bearing Support (Tripping Point)* – Adjust the keylever bearing support up or down so the keylevers trip their respective cams as the keylevers reach a point of .050-.070" (1,27-1,78mm) from the bottom of the keylever guide comb.



(Right Side View)

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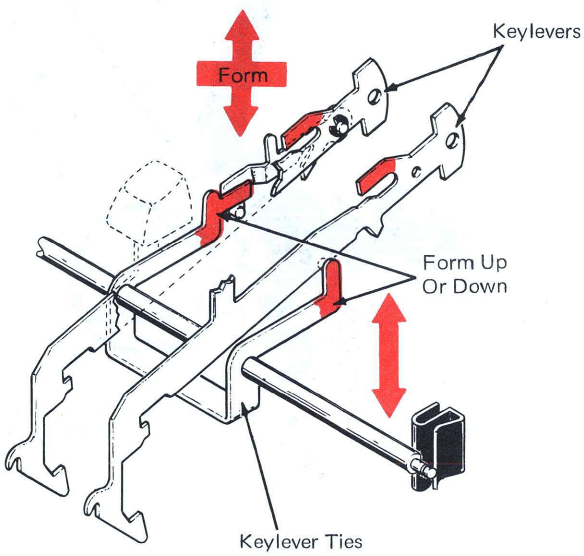
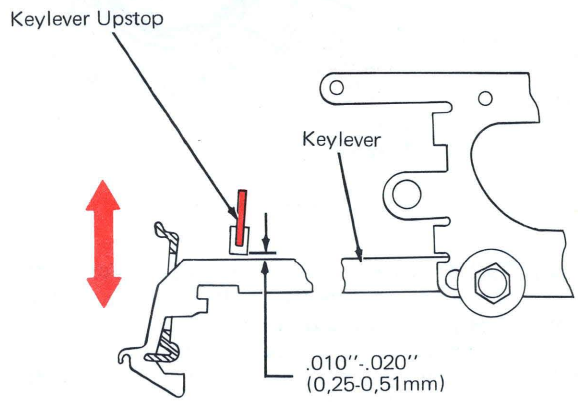
9. *Separate Keylever Trip* – Separate keylevers may be formed to satisfy the requirements as follows:

a. All alphabetical keylever adjustments remain the same as Model "D" Standard.
b. Separate adjustment of the numerical keylevers must be performed after the adjustments of the alphabetical keylevers.
NOTE: If correct trip point cannot be obtained by the separate numerical keylever adjustments, the keylever ties may be formed.
SERVICE HINT: Rotate the transfer keylever tie shaft so the flat surface is down for removal of keylever ties.



10. *Keylever Upstop* – Adjust up or down so the cam trip lever restores as the keylevers reach a point of .010-.020" (0,25-0,51mm) from the upstop. Check restoring of all letter keylevers.
CAUTION: Adjustment of the keylever upstop will require checking the operational cam tripping and resetting points and any adjustment in a particular mechanism relating to its tripping point.



(Right Side View)

11. *Upper And Lower Case Knockoff Screws* – Because of design requirements of the dual knockoff mechanism, certain adjustments must exist on the machine before making the dual knockoff adjustments. Check the following adjustments and readjust as needed.

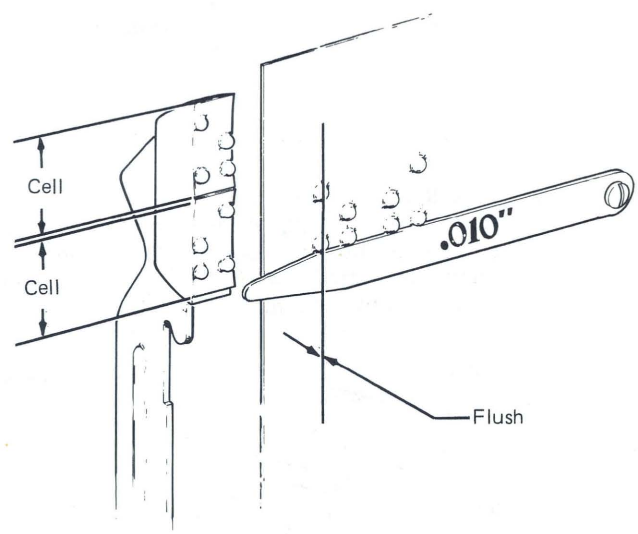
   a. Ring And Cylinder – Check single typebar ring and cylinder adjustments for .060" (1,52mm) between the typebar and the typeguide as illustrated in Carriage And Rails Adjustment No. 1.
   b. Power Roll Speed – The Model "D" Braille Typewriter uses the 15-tooth-motor pulley.
   c. Drive Link Adjusting Screw – Position the impression control lever at zero and adjust the drive link adjusting screw to the far rear of its adjustment range.
   d. T-Bar Adjusting Plate – Set the impression control lever at ten and shift the basket to lower case. Position the T-Bar adjusting plates front-to-rear to provide a clearance of approximately .005" (0,13mm) between the T-Bar roller and the rear of the roller opening in the T-Bar side plate.
   e. Range Mounting Plate – The range mounting plates must be positioned at position 1.
   f. Impression Control Link – The impression control link must be placed in position A.
   g. Upper And Lower Case Knockoff Screws – Adjust to satisfy requirements only after correct ring and cylinder, good typeguide entry, clean segment and a power roll in good condition are known to exist. The upper case (on top) and the lower case (on bottom) rows of screws are designated by UC and LC stamped on the T-Bar with an arrow pointing to the respective row of knockoff screws.

Impression is affected by many things. Turn the impression control screws only after checking the following conditions:

1. A clean segment.
2. Good type guide entry.
3. Correct ring and cylinder adjustments – Carriage And Rails Adjustment No. 1.
4. Power roll in good condition.

When the impression control screws on the keyboard require adjustment, the following procedure is suggested:

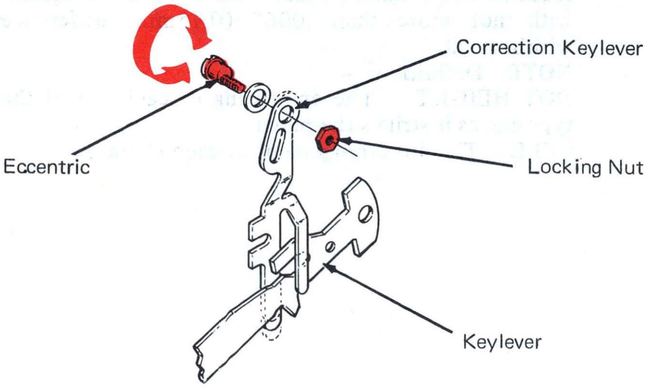
1. Place a 100 pound American Printing House transcriber stock in the Braille Typewriter.
2. Set the impression lever at 10.
3. Strike up an example of the keyboard in order starting with Q,A,Z,W,S,3,X,etc.
4. Remove the paper and observe the dot height. The required dot height is a minimum of .010" (0,25mm) with not more than .006" (0,15mm) difference within a cell.
   NOTE: Definitions –
   DOT HEIGHT – The embossing of each dot of the typeslug as it strikes the paper.
   CELL – The dot arrangement of each character.



12. *Correction Keylever* – The correction keylever mounting stud should be adjusted to satisfy the following conditions:

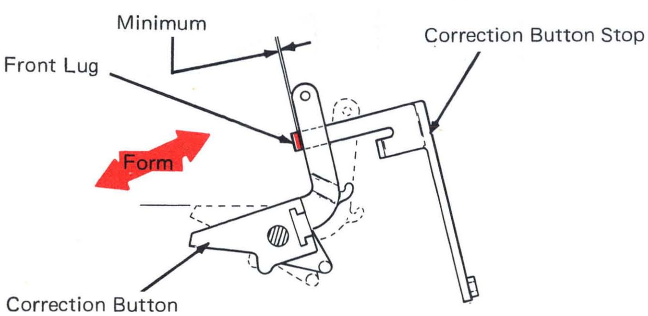
a. Adjust the eccentric mounting stud so that the correction keylever positively trips the cam.

b. When adjusting the stud, make sure the correction keylever will not hold the cam from restoring when the correction button is held depressed.



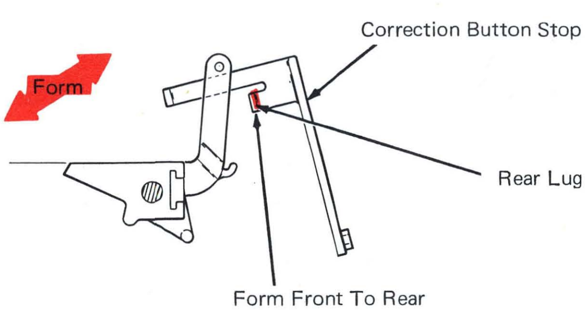
13. *Correction Button Stop* –

a. Form the front lug front-to-rear so that the correction button contacts the stop with minimum overthrow just as the correction keylever trips the cam.



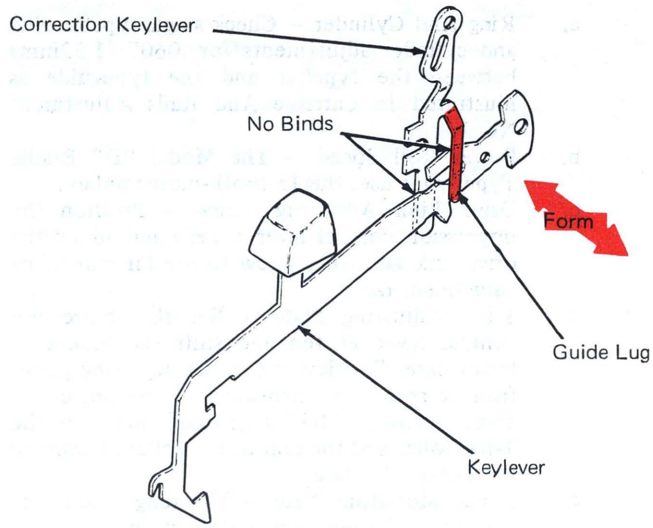
(Right Side View)

b. Form the rear lug front-to-rear so the correction button is in line with the remaining buttons.



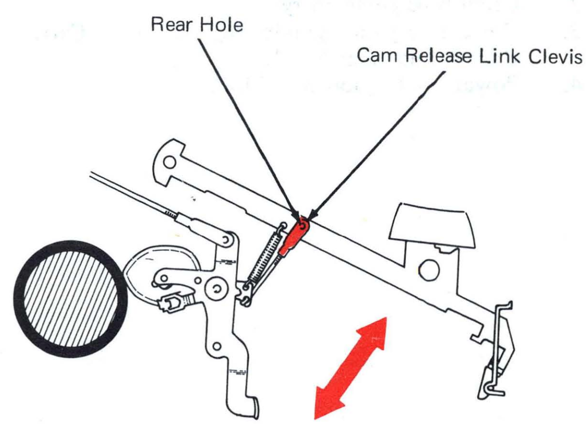
(Right Side View)

14. *Correction Keylever Guide* – Form to provide a minimum of side play without binds.



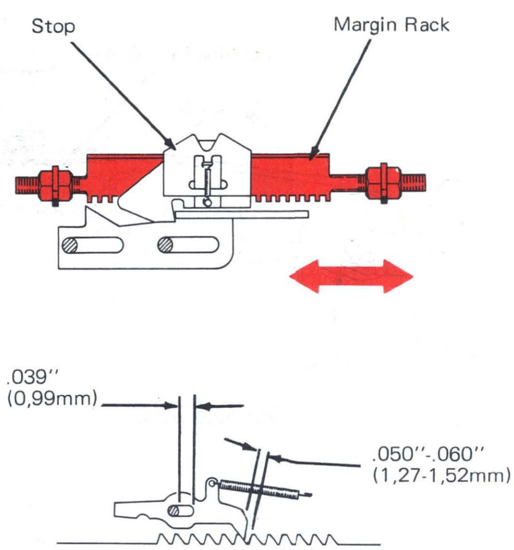
15. *Cam Release Link Clevis* – Adjust so the cam trips when the keylever has completed three-fourths of its total movement. The cam must reset when the keylever is released.

NOTE: The carriage return is a non-repeat operation.

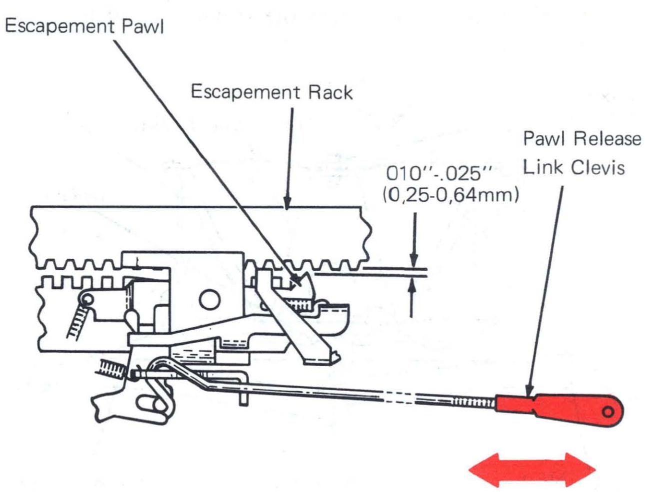


(Left Side View)

16. *Overbank* – Adjust the margin rack left or right so the escapement rack tooth will overthrow the escapement pawl by .050-.060" (1,27-1,52mm) just as the carriage reaches full overbank.

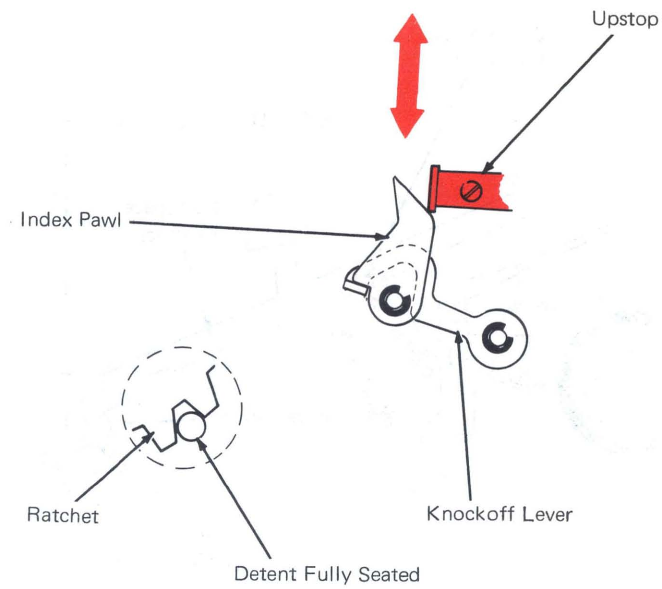


17. *Pawl Release Link Clevis* – Adjust so the escapement pawl will clear the escapement rack by .010-.025" (0,25-,064mm) when the carriage return is latched out.



(Bottom View)

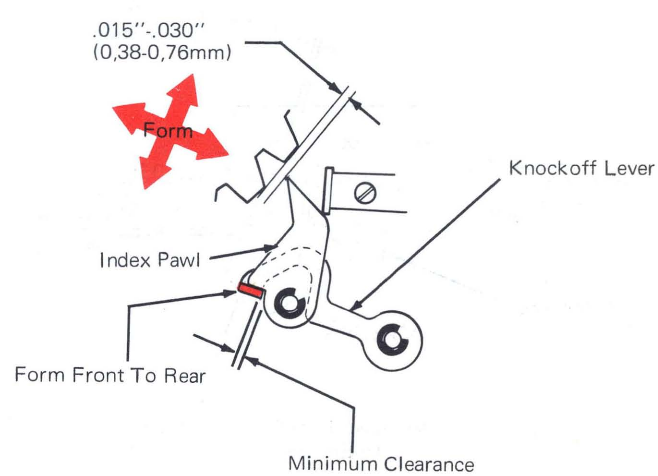
18. *Upstop* – Adjust so that when the index pawl is against the upstop, the detent roller is fully bottomed in the platen ratchet.



(Right Side View)

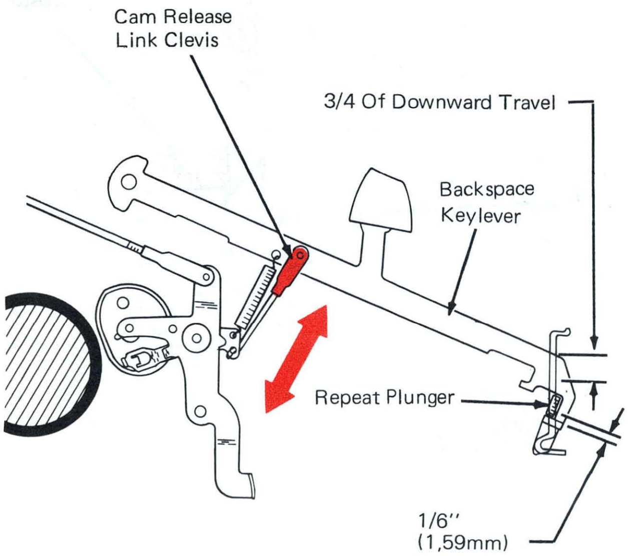
19. *Lower Pawl Stop* – Two conditions:

a. Form the lower lug of the knockoff lever up or down to maintain .015-.030" (0,38-0,76mm) clearance of the index pawl to ratchet at rest.
b. Form the lower lug of the knockoff lever front-to-rear as close as possible to the index pawl without binding.



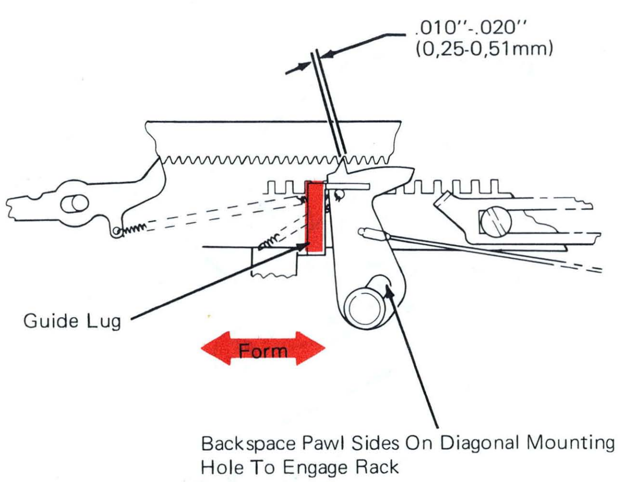
(Right Side View)

20. *Cam Release Link Clevis* – Adjust so the cam trips when the keylever has completed three fourths of its total movement. The cam must reset when the keylever is released.
NOTE: The backspace is a non-repeat operation.



(Left Side View)

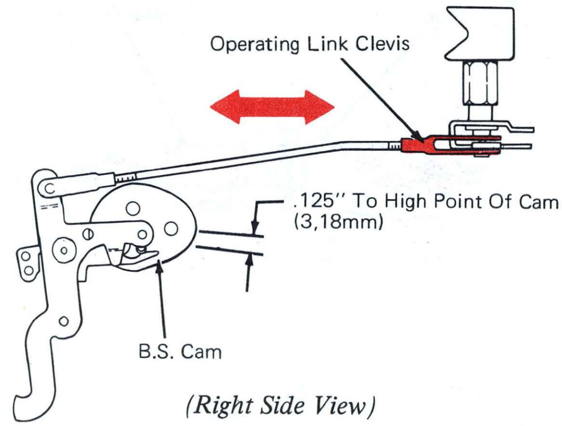
21. *Backspace Pawl Guide Lug* – Form the lug left or right to guide the backspace pawl into the escapement rack with .010-.020'' (0,25-0,51mm) clearance between the working surface of the escapement rack tooth and a working surface of the backspace pawl just as the backspace pawl contacts the escapement rack.



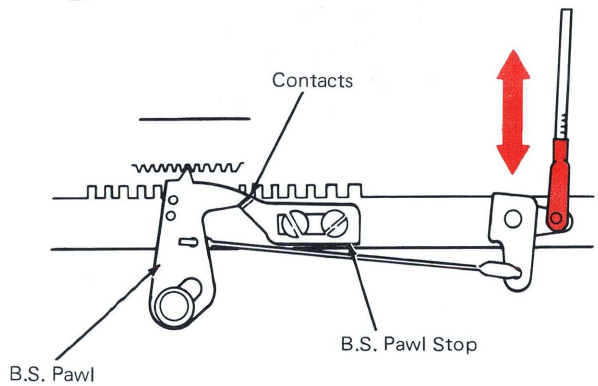
(Bottom View)

22. *Operating Link Clevis* – Adjust to satisfy the following conditions:

a. Adjust the operating link so the carriage will be positively backspaced to the LH margin.
b. Check to be sure the backspace pawl returns to its rest position.

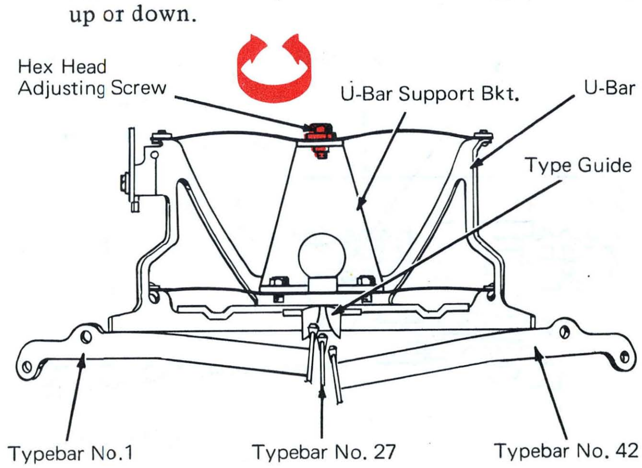


(Right Side View)



(Bottom View)

23. *U-Bar (Equal Tripping Point Left, Center, And Right)* – Place typebars as shown below and loosen the hex head stud. The U-Bar will move to its proper position. If the left and right typebars trip equally and the center bars do not, form the U-Bar support bracket up or down.



(Top View)

OPEN END CARRIAGE OPERATIONAL THEORY

The purpose of the open end carriage is to provide a special machine for the typing of blueprint, engineering drawing or similar applications where the forms are too wide for the standard 30" carriage. The open end carriage machine is available only on a special engineering request basis. All special parts must be ordered in accordance with the existing SER Procedures.

The paper handling areas of this machine cannot be expected to perform as well as the standard typewriter. Because of the size and type of forms used, rollback or advancing the form may require the operator to align them more often. This can be minimized by maintaining paper handling adjustments, but complete correction may not be possible.

The open end carriage is a modified Model C1 or D1, D4 carriage. The platen is mounted on a yoke and all controls are located above the typing area. The paper release lever is mounted to the right hand end plate assembly.

PAPER FEED GUIDES

The paper guide assemblies and bail arm assemblies are mounted on the paper table and supported at the rear by the carriage tie rods. Nylon rear paper roll tensioners and inner paper guides are attached to the rear paper guide assemblies. The nylon is used to prevent marking on the paper by the paper guide assemblies.

BAIL ARM ASSEMBLY

The bail arm assemblies and the front paper roll tensioners are mounted to the paper guide assemblies. The bail roll shaft is mounted through holes in the bail arm assemblies and held in place by collars.

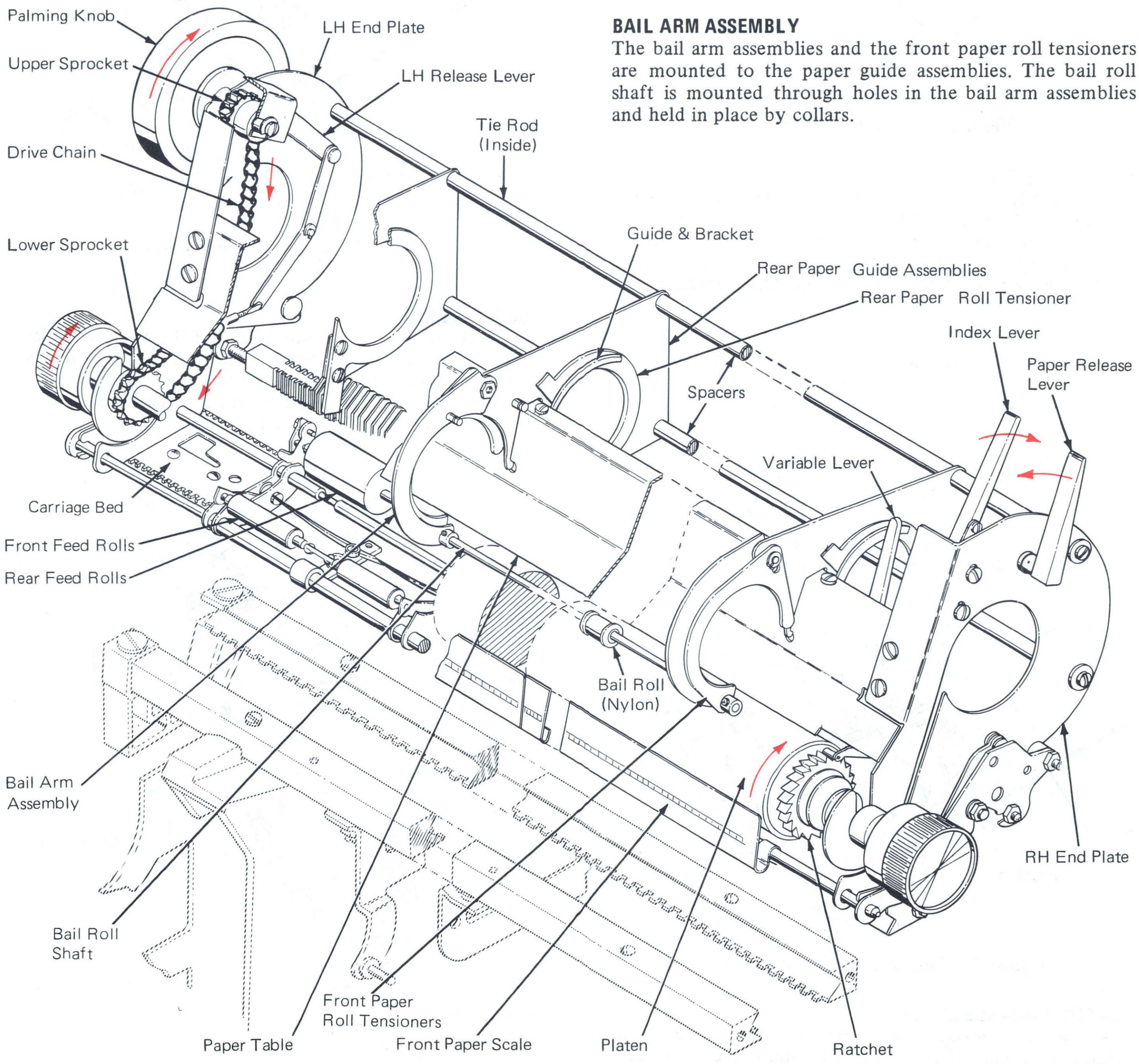


Figure 1 – Open End Carriage Assembly

PAPER ROLL RETAINER

Telescoping of the forms at the ends can be held to a minimum by the use of the paper roll retainer (Figure 2). There may be a tendency of the form to buckle at the writing line and if this causes underprinting, the operator must be instructed to adjust the form to remove the buckle. Alignment of the forms at the ends can be held to a minimum by the use of the paper roll retainer (Figure 2).

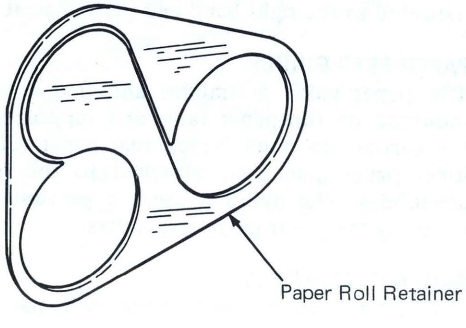


Figure 2 – Paper Roll Retainer

LINESPACE LEVER

Linespacing is done by rotating the linespace lever which is also mounted on the RH carriage end plate (Figure 3). Pushing to the rear on the lever cams the index pawl down which engages the ratchet to rotate the platen. This mechanism is limited to only one linespace operation at a time.

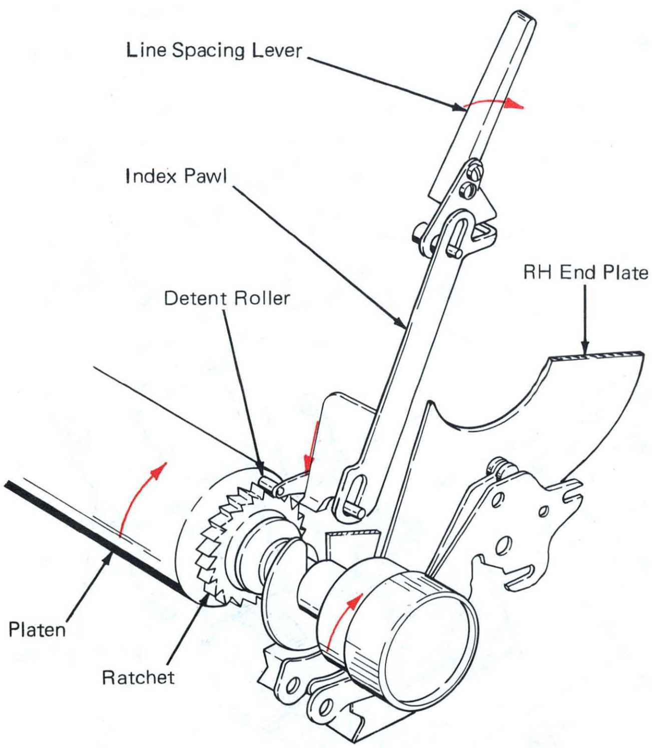


Figure 3 – Line Spacing Lever Assembly

PLATEN VARIABLE LEVER

The open end carriage uses a special platen variable lever (Figure 4) instead of a button. It is mounted on the paper table by a bracket. The lever extends down and engages a line variable actuator mounted on the cover sleeve. Pins attached to the actuator fit into two holes in the cover sleeve and when in the activated position, engages the platen ratchet driver to disengage it from the ratchet. The platen can then be rotated to the desired location without rotating the ratchet.

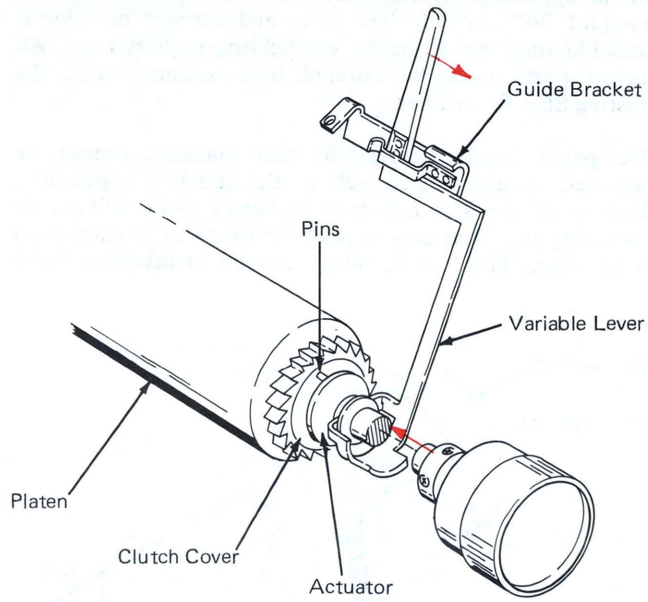


Figure 4 – Platen Variable Lever

PALMING KNOB

The palming knob is mounted on the LH carriage end plate and through an upper sprocket and a special platen drive chain is connected to a lower sprocket on the LH platen shaft (Figure 5). The palming knob is used to feed the drawing into the typing position.

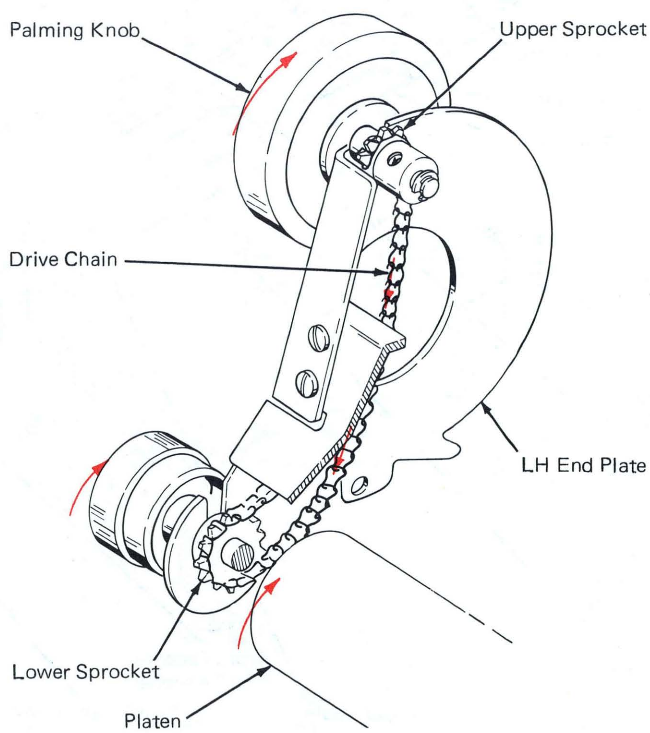


Figure 5 – Palming Knob Assembly

CARRIAGE RELEASE

The carriage release lever (Figure 6) is mounted on the palming knob shaft and through linkage extends down to the carriage U-Bar. By pivoting the release lever to the rear, motion is transferred to the carriage U-Bar to release the escapement pawl from the rack.

OPERATOR INSTRUCTIONS

1. Roll the drawing from the bottom with the printed side in to make a tube less than 1 1/2" (38,10mm) in diameter.
2. Insert this roll (from either the right or left end) through the loops in the rear of the carriage. The paper release lever is on the right end of the carriage. Front take-up loops, which also are used as a bail, can be raised until the drawing is fed far enough to come under the rollers. Keep the roll toward the front of the machine to keep from damaging the spring loops (Level 1). Center the typing area in the carriage.
3. Guide the edge of the document through the slots in the carriage end frames and under the platen. The platen may be turned by the large palming knob (top left on carriage) or indexed a line at a time by the index lever on the right end of the carriage.
   NOTE: The platen is not automatically indexed at carriage return.
4. The platic retainer should be slipped over the extended end of the roll to contain it. If the drawing buckles at the writing line during roll back, the operator can manually re-roll the drawing inside the supply loops.

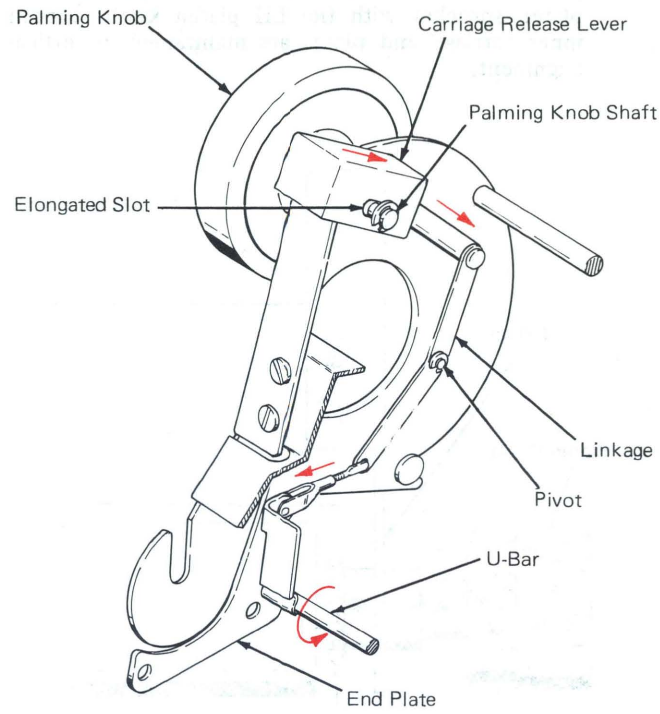
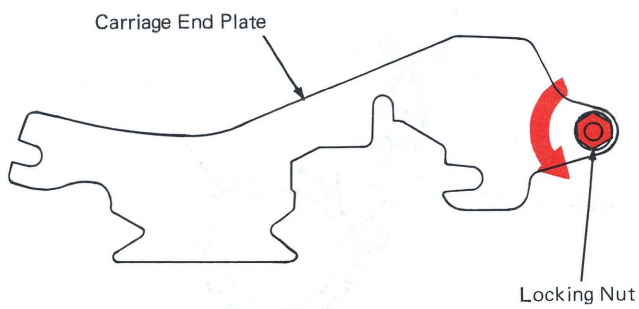


Figure 6 – Carriage Release Lever

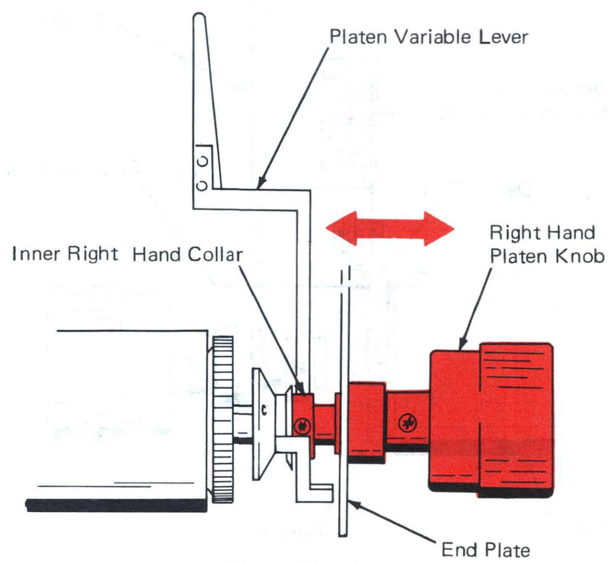
OPEN END CARRIAGE ADJUSTMENTS

1. *Ring And Cylinder* – Before trying the ring and cylinder adjustments, the rear screw and locknut on both the carriage end plates must be loosened to allow inner carriage movement. After loosening the feed roll center supports, the ring and cylinder is adjusted in the same way as in the paper feed section.



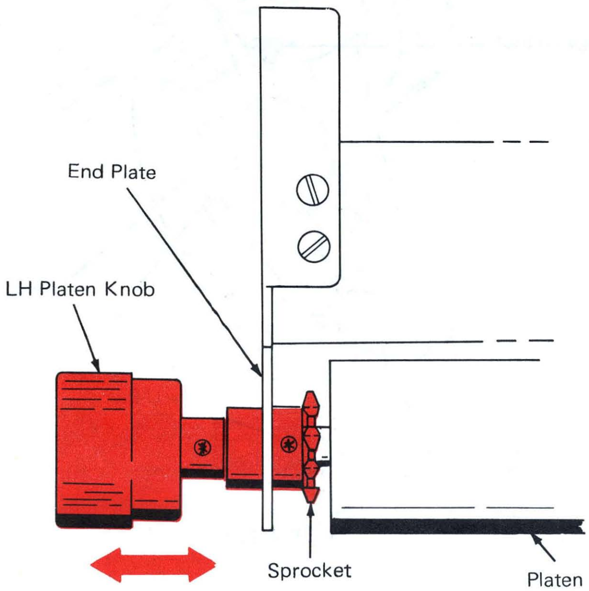
(Right Side View)

2. *Platen Variable Release Lever* – Adjust the RH platen knob in with the inner RH collar to get platen variable release when the variable lever is in the operated position.
   NOTE: This should be done with the LH knob and sprocket loose on the platen shaft and the feed rolls in the released position.

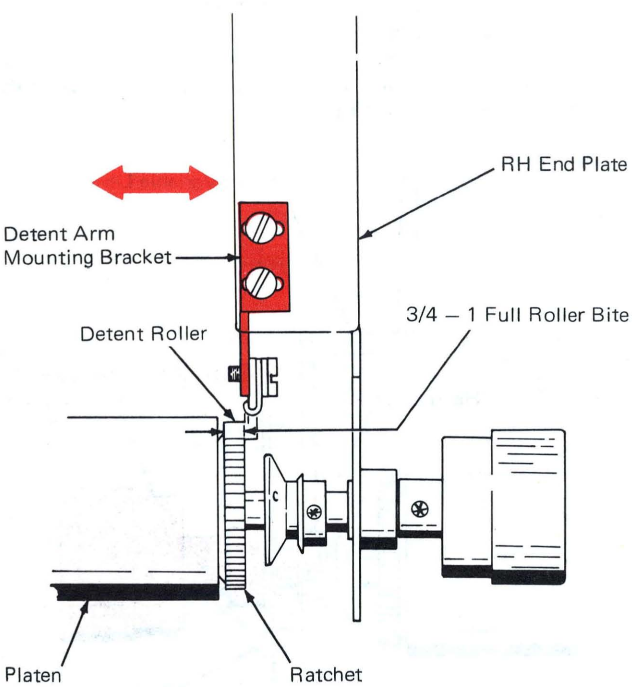


(Front View)

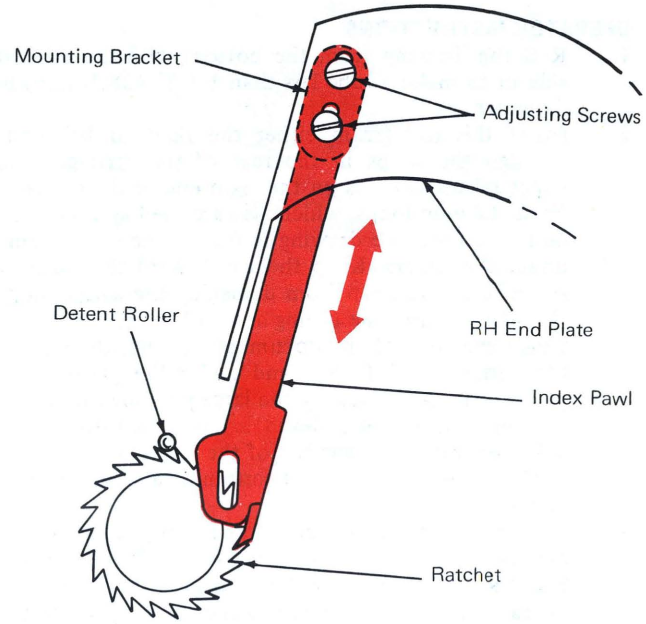
3. *LH Platen Knob And Sprocket* – Adjust the LH platen sprocket with the LH platen knob so both inner carriage end plates are maintained in vertical alignment.



4. *Detent Arm Mounting Bracket* – Adjust the detent arm mounting bracket left or right so the detent roller will have 3/4 to 1 full roller engagement on the platen ratchet.

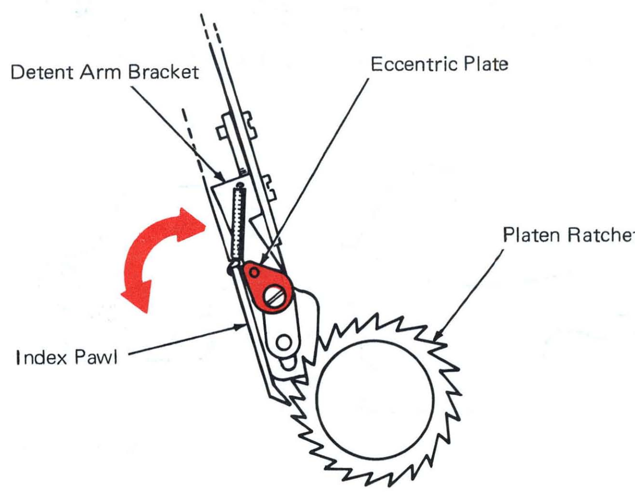


5. *Platen Indexing* – Adjust the index pawl mounting bracket up or down in the elongated holes to provide enough motion to index the proper number of teeth and have the detent bottom in the platen ratchet.



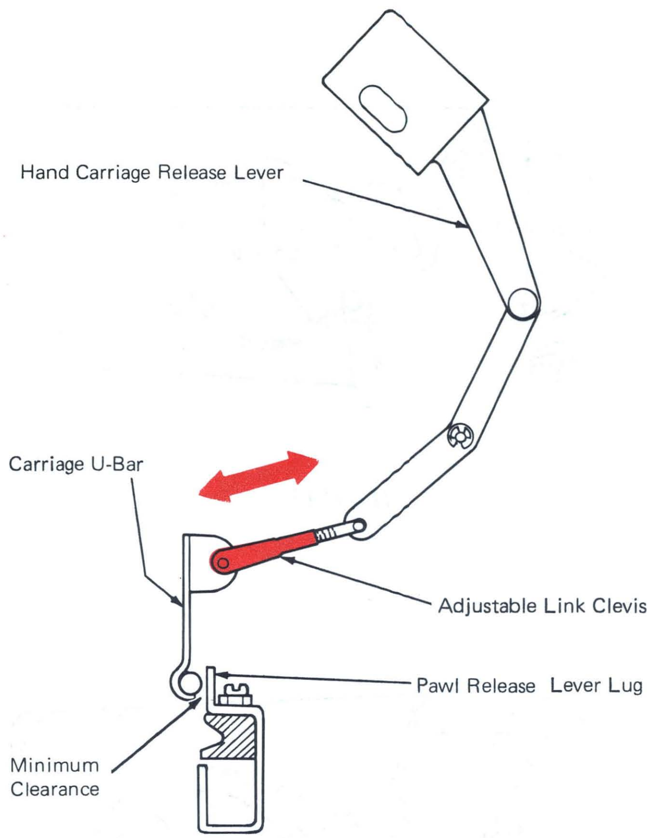
(Right Side View)

6. *Eccentric Plate* – Adjust the eccentric plate on the detent arm bracket so the tip of the index pawl will enter near the top of the platen ratchet tooth.



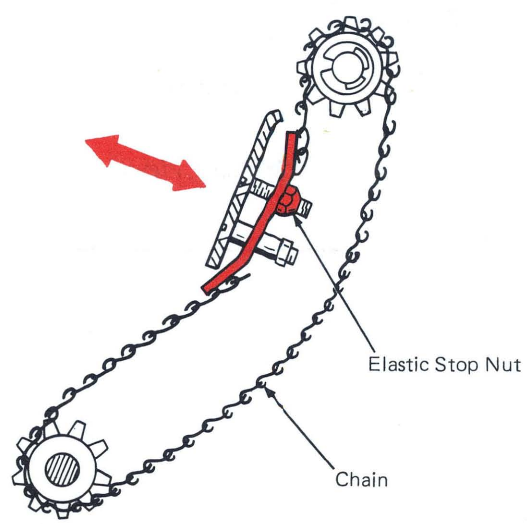
(Left Side View)

7. *Hand Carriage Release* – Adjust the link on the lower end of the carriage release lever to get minimum clearance between the carriage U-Bar and the lug on the pawl release lever.



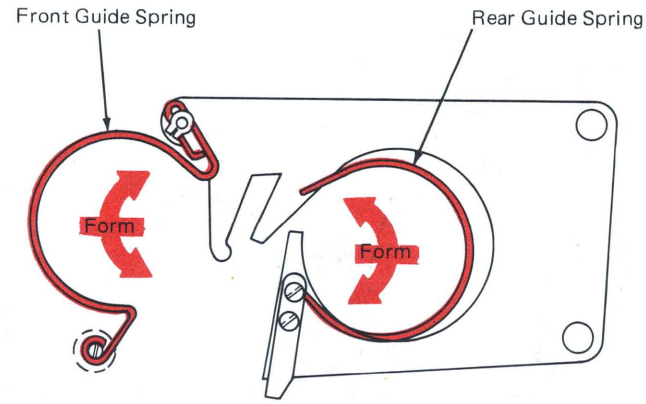
(Right Side View Of Left Hand Side)

8. *Chain Adjustment* – Tighten the stop nut to prevent tooth disengagement and provide free rotation of the platen when palm fed in either direction. Some slack in the chain is necessary.



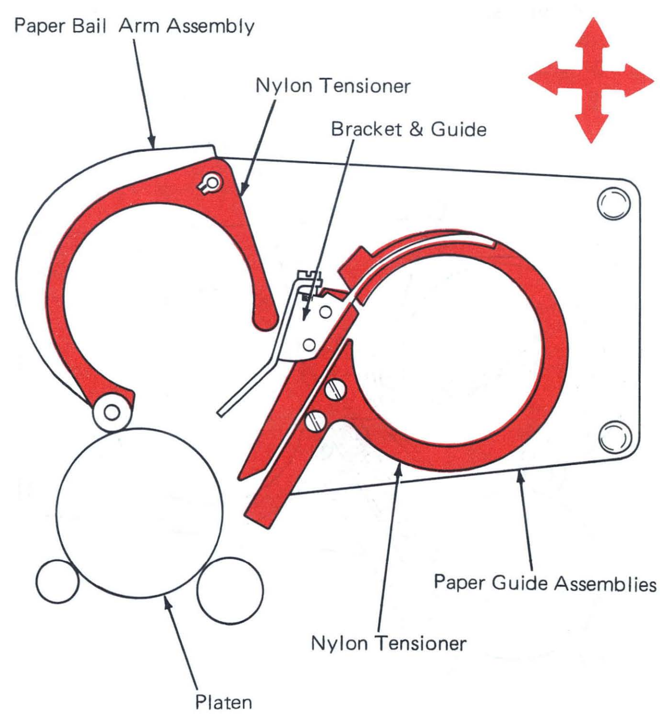
(Right Side View Of Left Hand Side)

9. *Front And Rear Guide Springs (Level 1)* – Form the front and rear guide springs to allow it to expand and restore without binds.



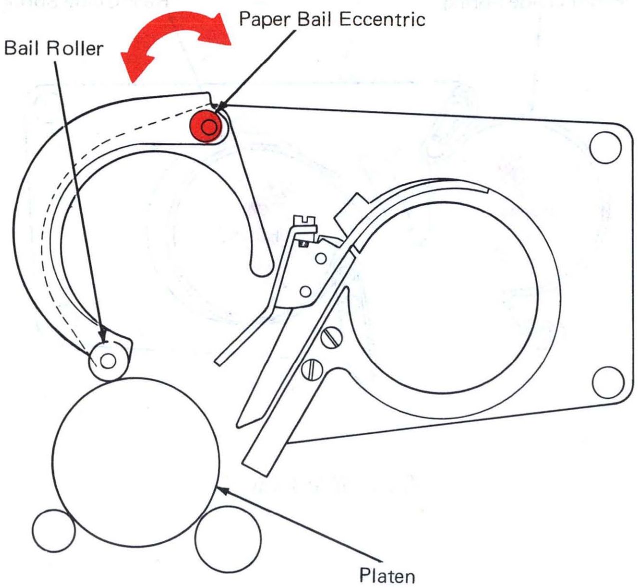
(Right Side View)

10. *Nylon Tensioners And Inner Paper Guides (Level 2)* – Adjust the nylon tensioners and nylon inner paper guide to prevent the paper from contacting the paper guide assemblies, bail arm assemblies, bracket and guide.



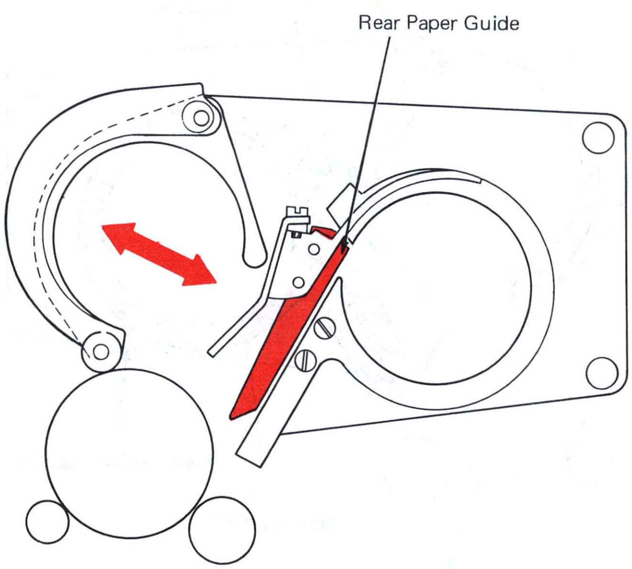
(Right Side View)

11. Paper Bail Eccentric – Adjust the paper bail eccentric so that all of the paper bail rollers have equal pressure on the platen.



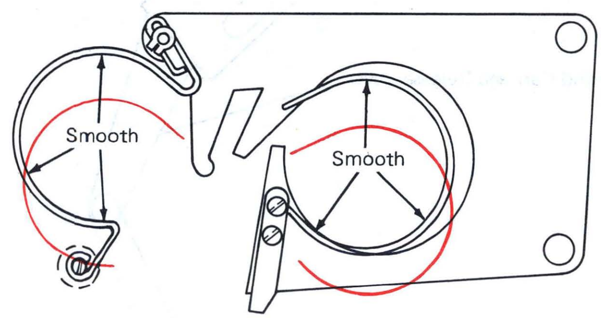
(Right Side View)

12. Rear Paper Guides – Adjust the rear paper guides to allow for the thickness of the sheet without causing any binds.

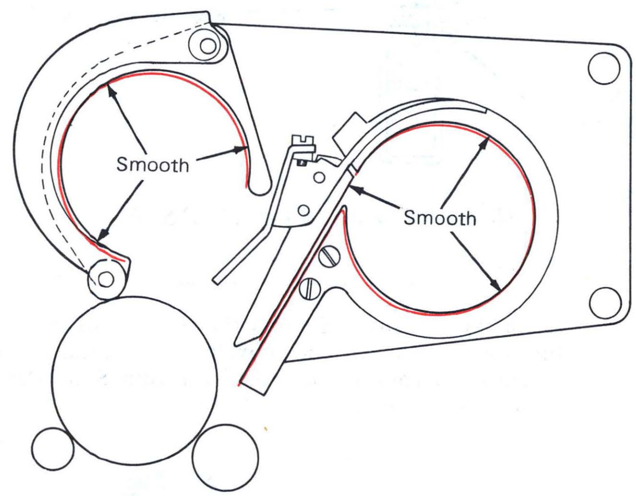


(Right Side View)

13. Edges Of Paper Guides (Level 1 And 2) – Smooth the edges of the paper guides if coarse and causing paper feed problems.



(Level 1)



(Level 2)

(Right Side View)

FORMSCARRIER OPERATIONAL THEORY

The purpose of the formscarrier is to have a way of carrying forms to a lift platen machine and to provide an easy way to reuse the carbons (Figure 1). The attachment uses a strip of carbon or carbon packs, with a maximum length of 28" (711,20mm) and provides for slitting fanfold forms as desired.

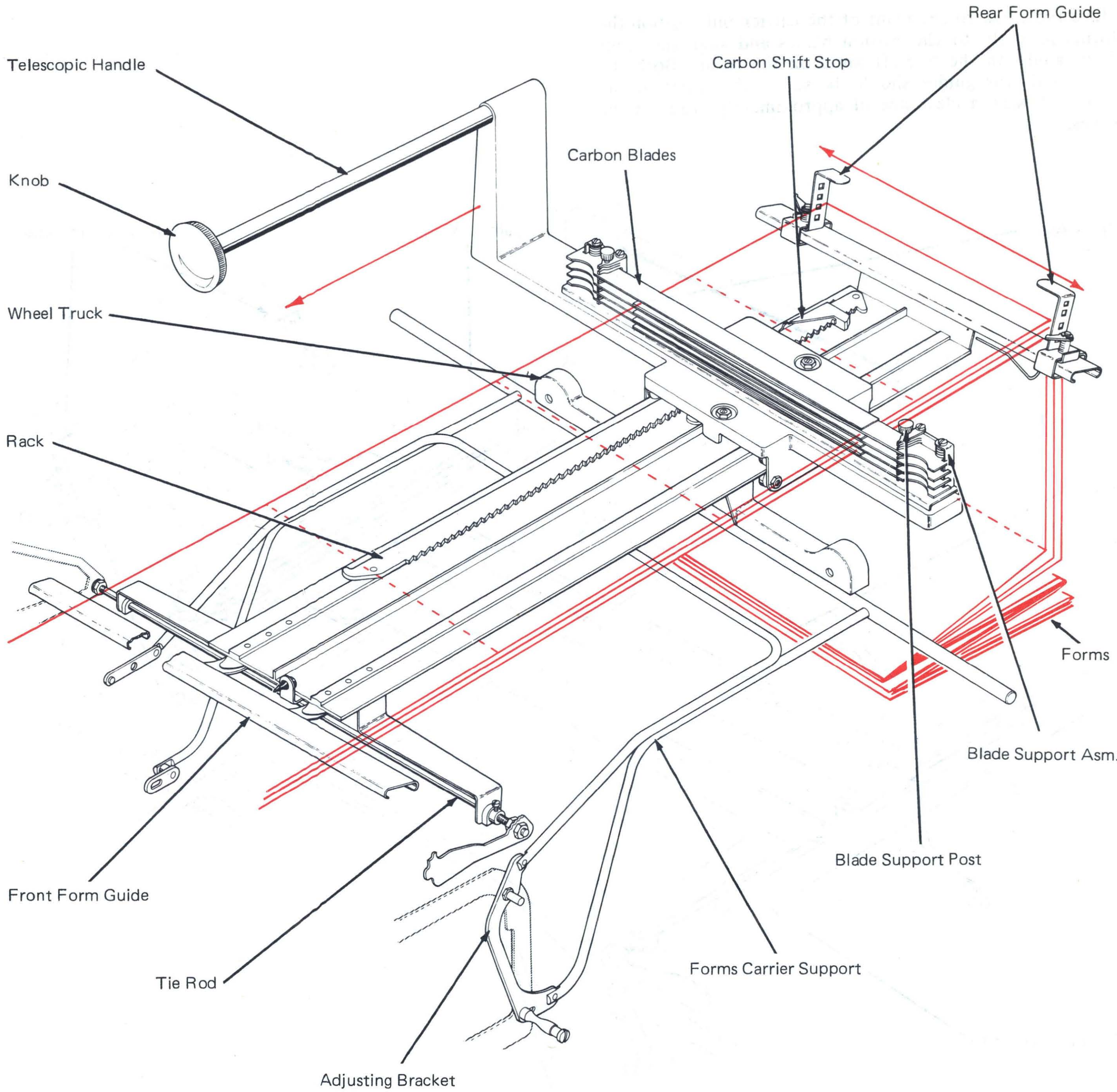


Figure 1 – Formscarrier

THREADING FORMS

The formscarrier is threaded by positioning the truck at the extreme rear, with the blade support in place and carbon blades assembled to it (Figure 2). The forms should be threaded forward between the rear form guide far enough to reach the top cover of the typewriter. Hold the forms in place by catching the right edge of the form under the form clamp wire which slides out of the rear form guide. Position the form guides on the rear form guide assembly so the form parts feed properly into the carbon blades.

Move the truck to the front of the carrier and position the forms properly to the carbon blades and align the front form guide on the tear-off knife on the forms. Both the front and rear guides should be set to the width of the form, allowing a clearance of approximately 1/32" at the edges.

The carbon blades should be loaded, with carbon either in sheets or in packs, by placing the form over the blade and attaching a clip. The carbon sides should face up and be square on the blades. Most applications require a heavier carbon sheet or a blank sheet behind the original form, to prevent the type from embossing the form and cutting the carbon. The supply of forms should always be located as high as possible under the rear form guide to aid the paper feed and to ensure positive linespacing.

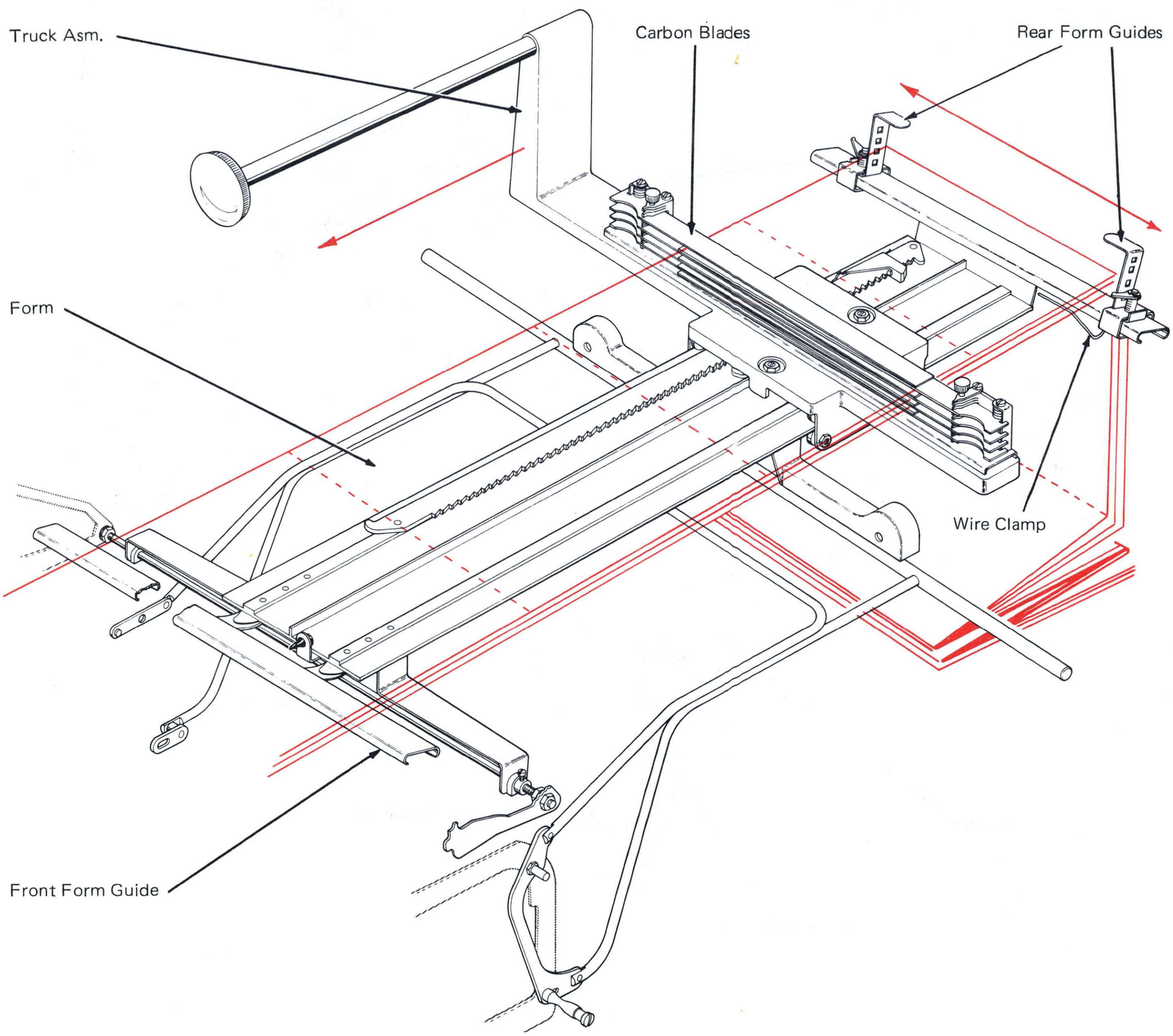


Figure 2 – Formscarrier Threading

FORMSCARRIER SUPPORT

The front of the formscarrier is attached to nylon bushings on the carriage tie rod by means of two latches. A wheel truck, with two nylon wheels, is located under the center of the formscarrier and operates on a rail on the formscarrier support (Figure 3).

The formscarrier support is mounted to the typewriter by engaging two adjustable brackets mounted on the left and right side frames.

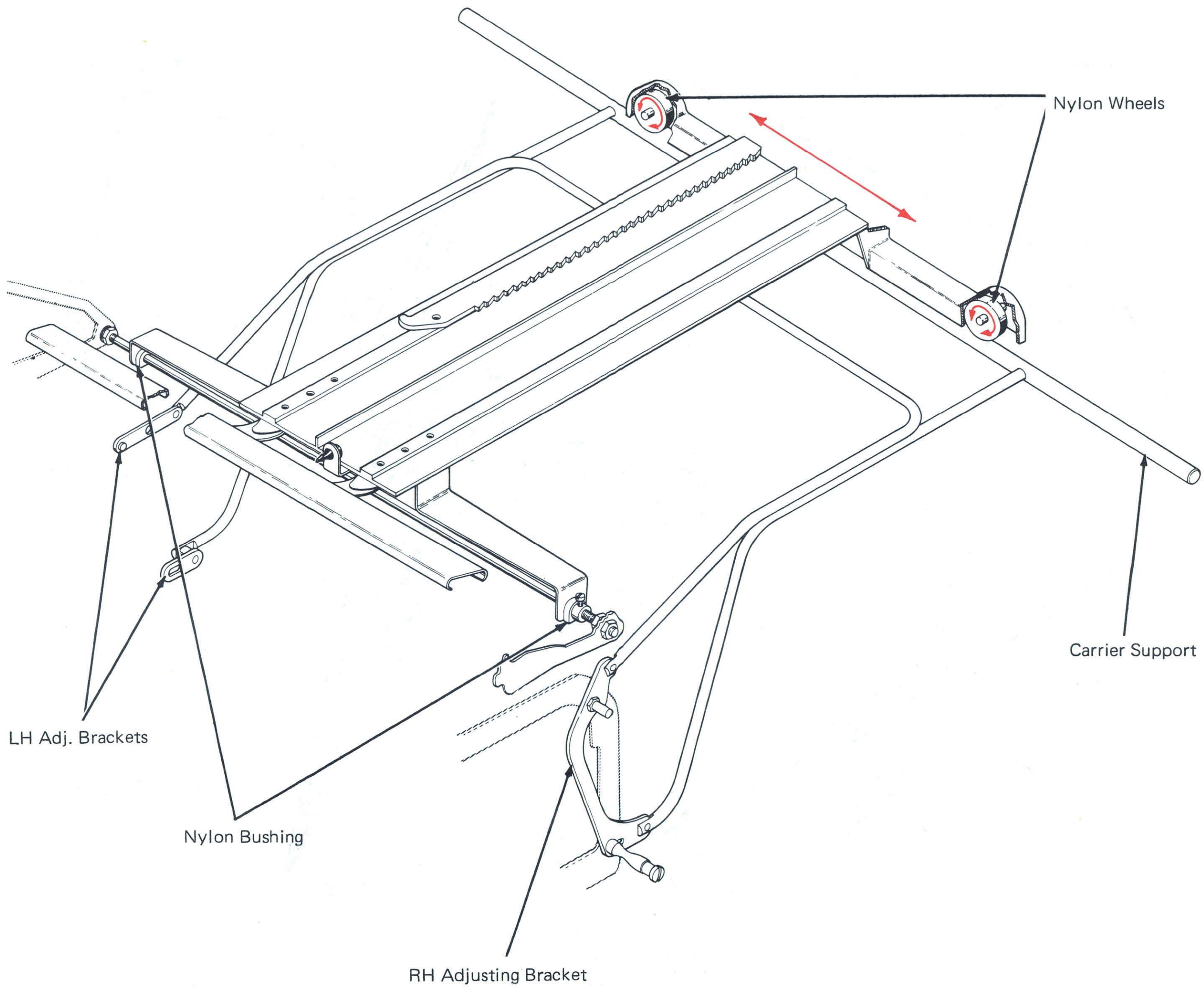


Figure 3 – Formscarrier Support

FORM LENGTH ADJUSTMENT

A truck, equipped with 10 nylon rollers mounted in twos, operates on three rails that are a part of the body of the formscarrier. The truck is operated by an extended, adjustable handle. The handle allows quick adjustment of the truck to make up for the different length of carbon and adjustment of the carbon carrier stop from the typist's normal position (Figure 4).

The extended handle is held in position by a pin placed in any one of a series of holes in the bottom of the larger handle section (Figure 4). The pin is released by a wire trigger on the back of the knob. This trigger extends through to the rear end of the inner section and is so formed that it disengages the pin from the holes by a lift sliding action.

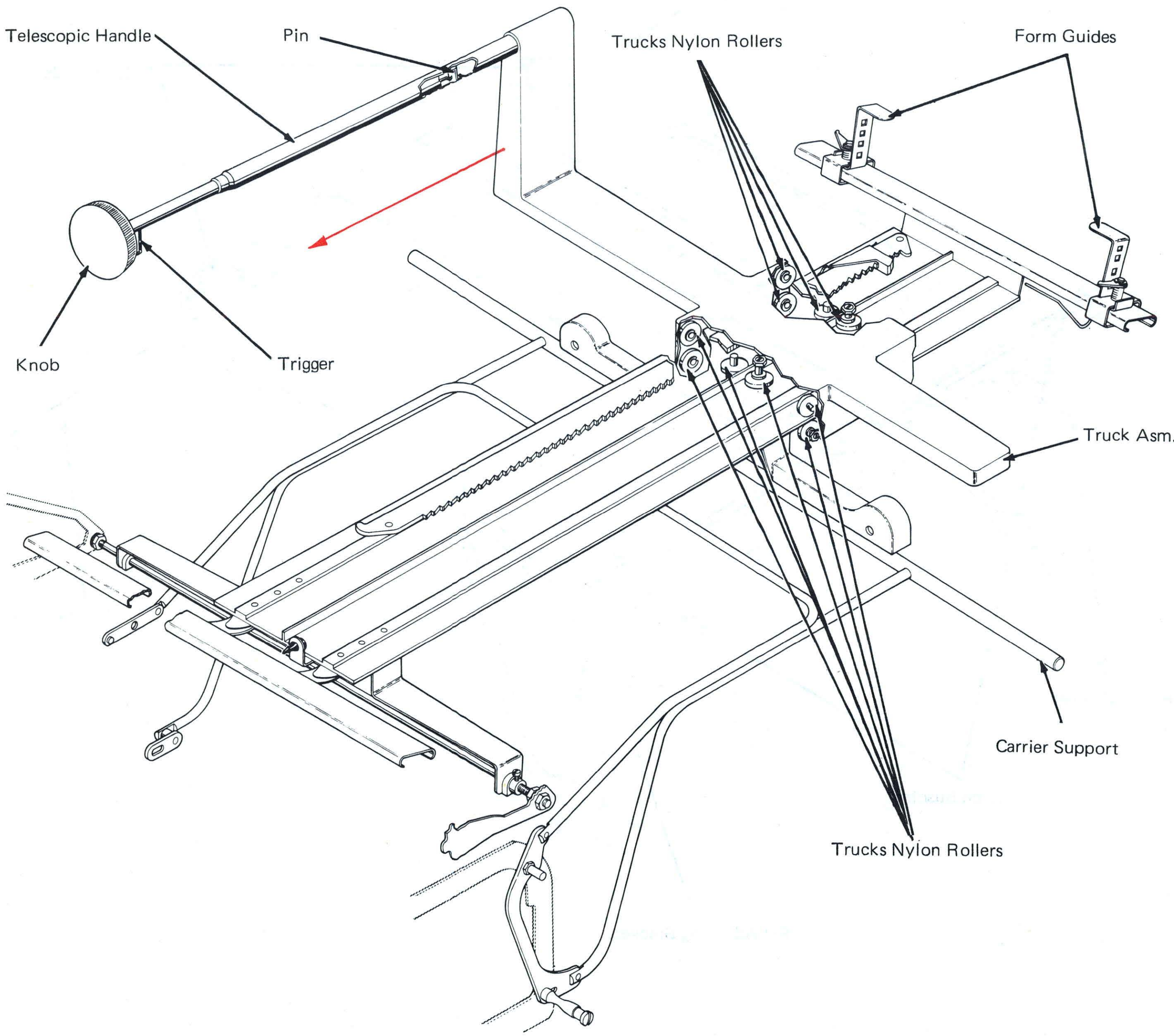


Figure 4 – Truck Rollers

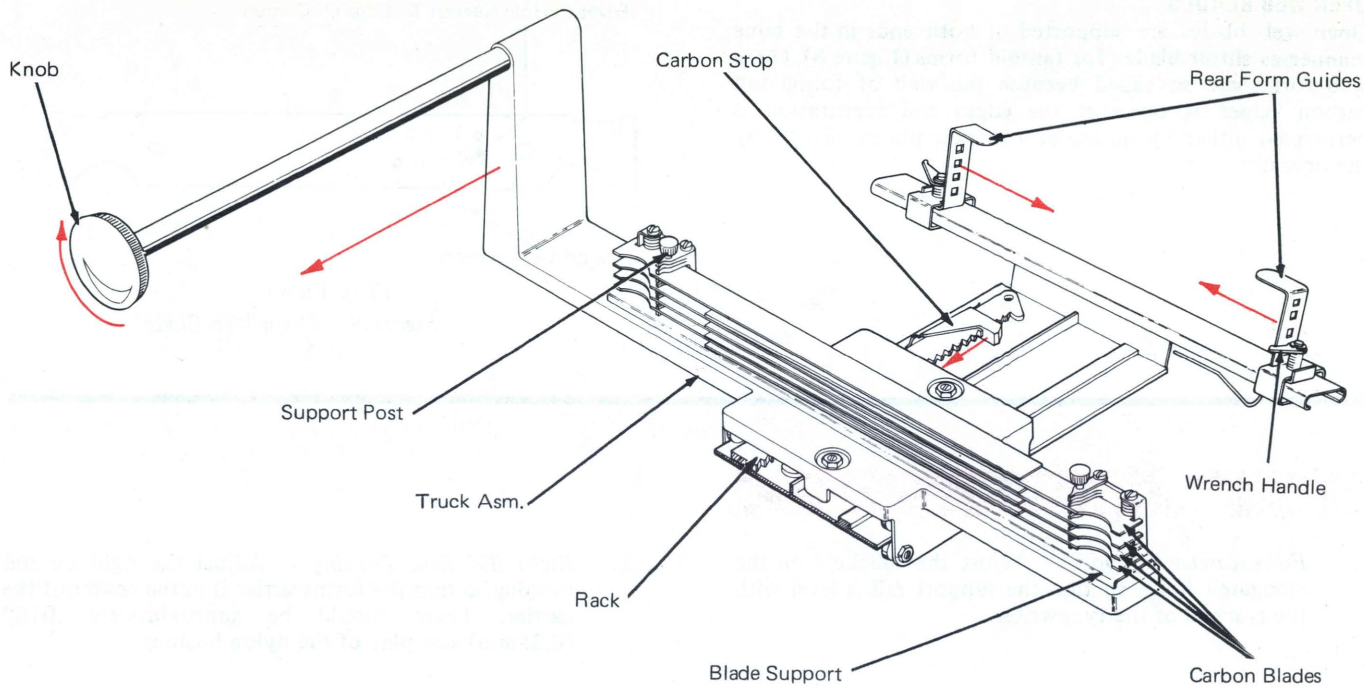


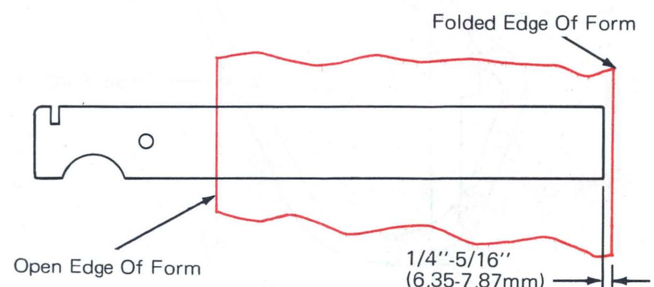
Figure 5 – Relocation of Truck

FORM GUIDES AND STOPS
A carbon stop, similar to a margin stop, is located on a rack on the top of the formscarrier. The stop serves to limit the movement of the truck to the rear (Figure 5). The carbon stop is relocated by moving the truck to the rear until the truck contacts the stop, and giving a clockwise twist of the knob which disengages the stop and allows it to be moved to a new location. Two form guides, on the rear form guide assembly, position the form on the carrier. The form guides have small wrench like handles which allow the guides to be manually adjusted from right to left (Figure 5).

BLADES
Blades for supporting the carbon sheets or packs are carried on slotted parts attached to a blade support. The blade support is attached to the truck by two positioning pins.

Blade support assemblies are available in two styles; the 8-blade support assembly, accepting up to a 9-part form, and the 16-blade support assembly which can accept up to a 17-part form.

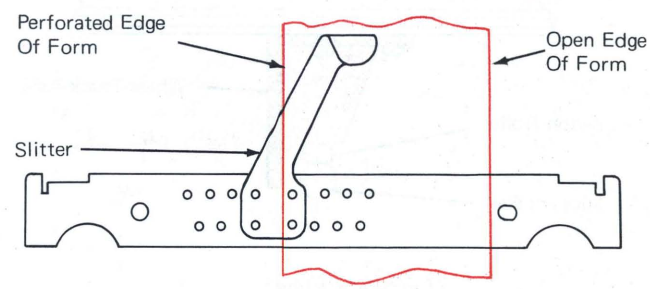
FANFOLD BLADES
Fanfold blades are used to hold carbon paper within the folds of a fanfold form. The alternate folding of the fanfold form paper looks like a fan in the design. The purpose of the folds is to keep the parts of the form in proper sequence. Fanfolds are supported on one end by one blade support. The free end of the fanfold blade must clear the inside folded edge of the form by 1/4-5/16" (6,35-7,94mm) (Figure 6). The form guides must be positioned correctly so this clearance can exist. The clearance is necessary to allow free carbon shifting within the form.



(Top View)

Figure 6 – Fanfold Blade

SLITTER BLADES
Slitter blades are used when it is necessary to separate the parts of a fanfold form. This is performed by the slitter blades during the carbon shifting operation. Slitter blades are supported on both ends by blade supports (Figure 7).

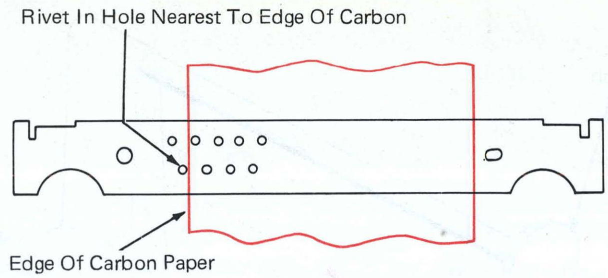


(Top View)

Figure 7 – Slitter Blade

OPEN WEB BLADES

Open web blades are supported at both ends in the same manner as slitter blades for fanfold forms (Figure 8). Open web forms are so called because the web of forms and carbon paper is open at the edges and registration is performed either by means of a register pin or visually by the operator.

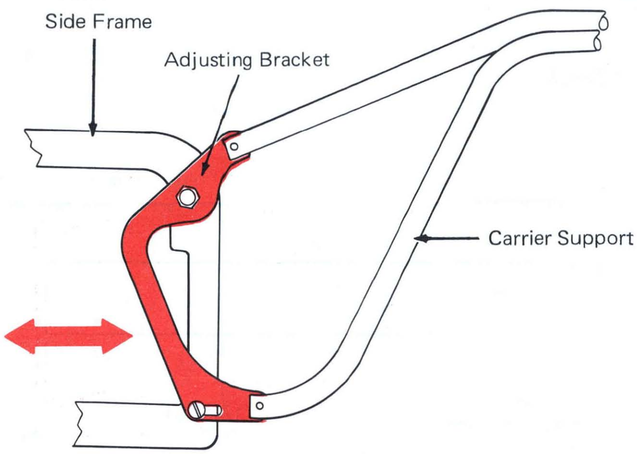


(Top View)

Figure 8 – Open Web Blade

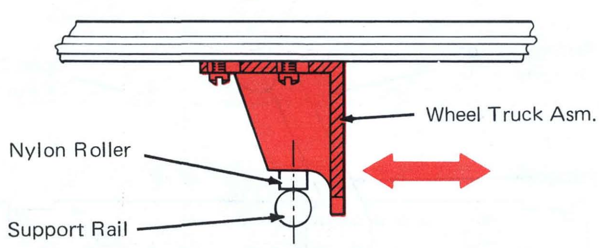
FORMSCARRIER ADJUSTMENTS

1. *Formscarrier Support* – Adjust the brackets on the elongated holes so that the support rail is level with the rear rail of the typewriter.



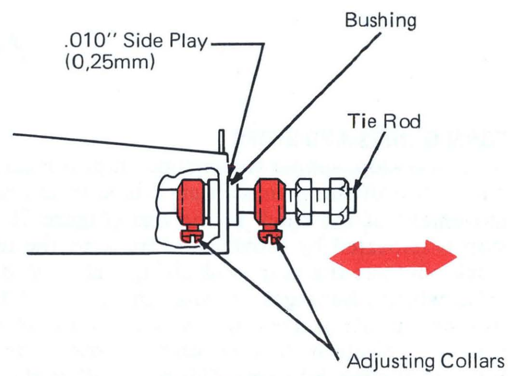
(Right Side View)

2. *Wheel Truck* – Adjust the wheel truck forward or backward so that the nylon rollers operate on the center of the support rail.



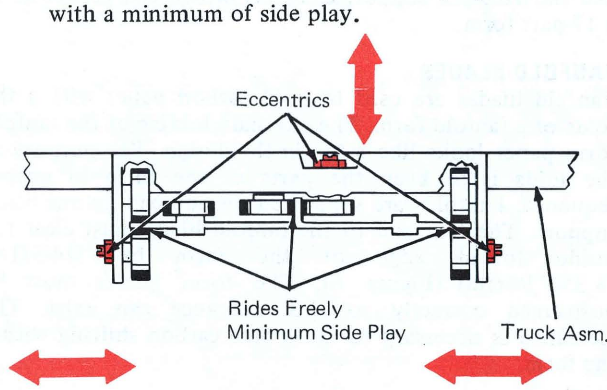
(Left Side View)

3. *Right Tie Rod Bushing* – Adjust the right tie rod bushing so that the formscarrier is in the center of the carrier. There should be approximately .010" (0,25mm) side play of the nylon bushing.

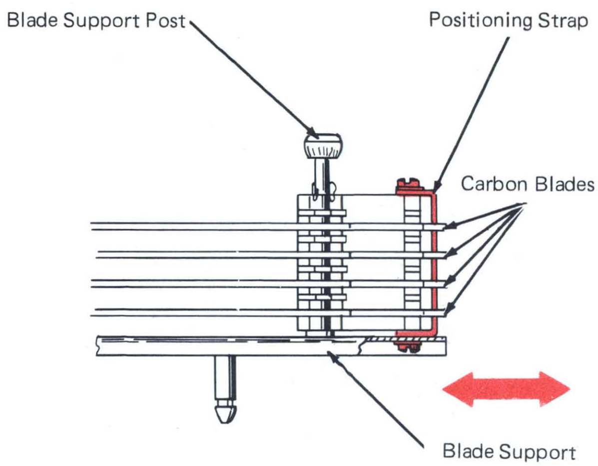


(Top View)

4. *Carrier Wheel Eccentrics* – Adjust the carrier wheel eccentrics so that the truck assembly operates freely with a minimum of side play.



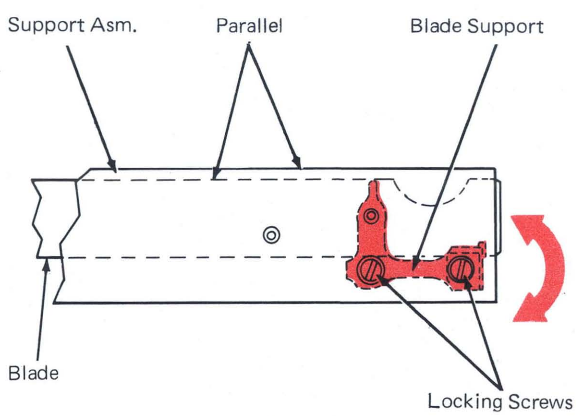
5. *Positioning Straps* – Adjust the positioning straps so that there is minimum motion of the carbon blades in the support posts.



6. *Blade Support Post* –

   a. Open Web Forms: Adjust the blade support post so that the carbon blades are held parallel to the blade support assembly.
   b. Fanfold Forms: Adjust the blade support post so that the carbons are directed slightly toward the inside fold.

NOTE: This adjustment can be made by loosening the blade support mounting screws and turning the post.



(Bottom View)

LIFT PLATEN FORMSWRITER OPERATIONAL THEORY

The purpose of the lift platen formswriter (Figure 1) is to provide a lifting platen for the typing of forms and to allow easy reuse of carbons. This allows the carbon sheets and formscarrier to be pushed back to the next form. In addition to the lifting platen, the formswriter also contains the following:

1. Tear-Off Blade
2. One Piece Deflector Assembly
3. Adjustable Platen Detent Arm
4. Index Pawl And Stop (Stronger Than Standard Index)

TEAR-OFF BLADE

The tear-off blade provides a means of tearing off the forms after they are typed. The blade is supported by arm assemblies at each end which are attached to the front of the left and right carriage end plates. During the lowering of the platen, latches mounted on the arm assemblies engage the platen shaft and lock the blade in place.

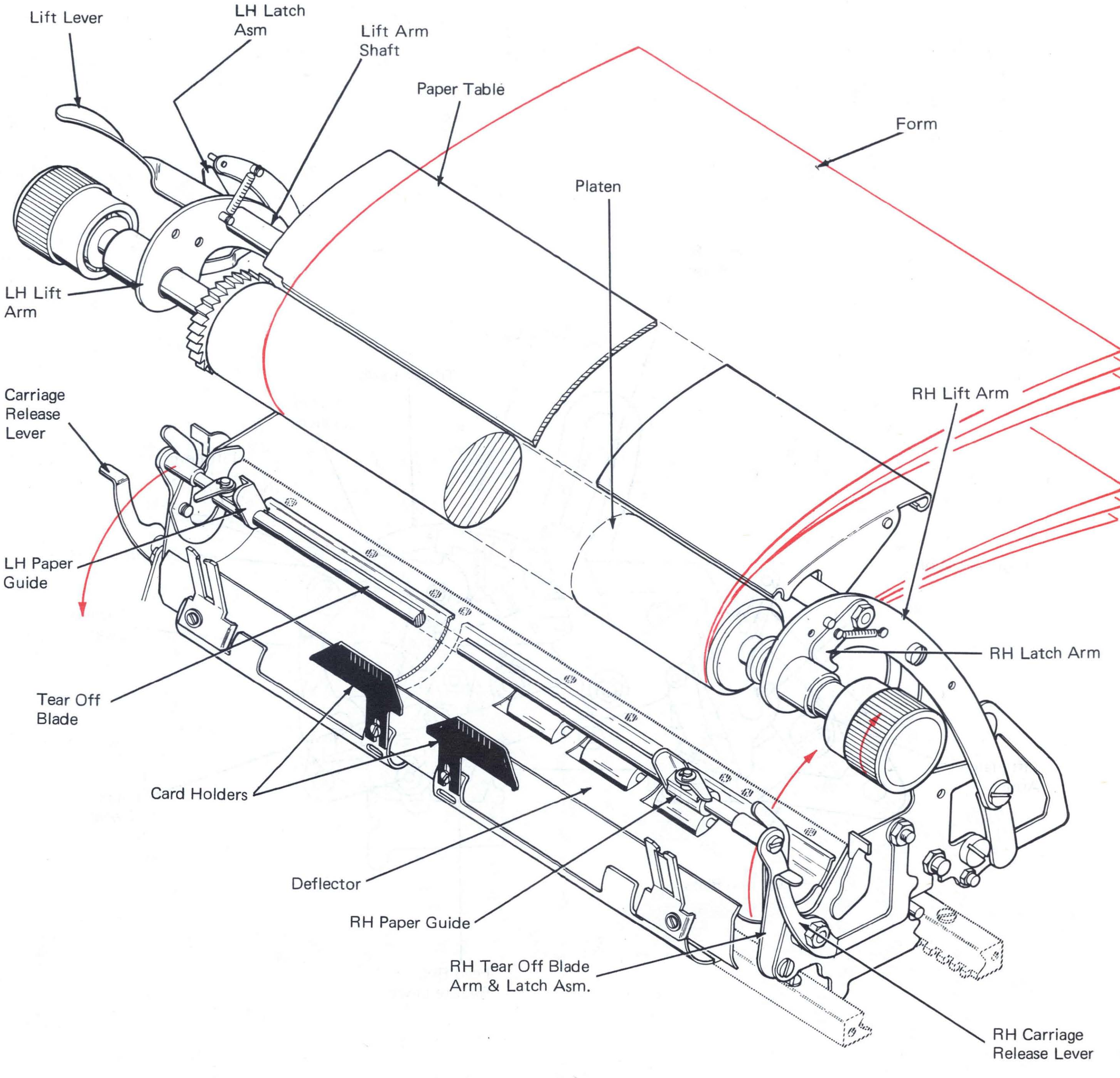


Figure 1 – Lift Platen Formswriter

PLATEN LIFT

The platen may be raised by means of the lift lever, which is mounted on the LH platen lift arm (Figure 2). Mounted on the lift lever is an eccentric stud. The stud supports the LH platen latch and works with the platen latch and trigger lever to release the latches during a lifting operation. The lift arm shaft runs the full length of the carriage and mounts the LH and RH latches.

PLATEN LATCH

The latch catch is attached to the LH platen lift arm. It serves to hold the LH platen latch while the platen is in the lift position.

The trigger lever is mounted on the same eccentric stud as the latch catch and is pivoted by the lift lever to position the trigger for the lowering of the platen. As the platen is lowered, the latch catch contacts the LH latch keeper and is pushed upward until it disengages the latch. This allows both platen latches to restore under the keeper. At the same time, the trigger assembly contacts and rotates the feed roll release lever down, pivoting the deflector assembly away from the platen. As soon as the platen latches are in place, the deflector assembly restores to the working position against the platen. Thin, hooked wire springs are used to attach the deflector to the equalizing shaft.

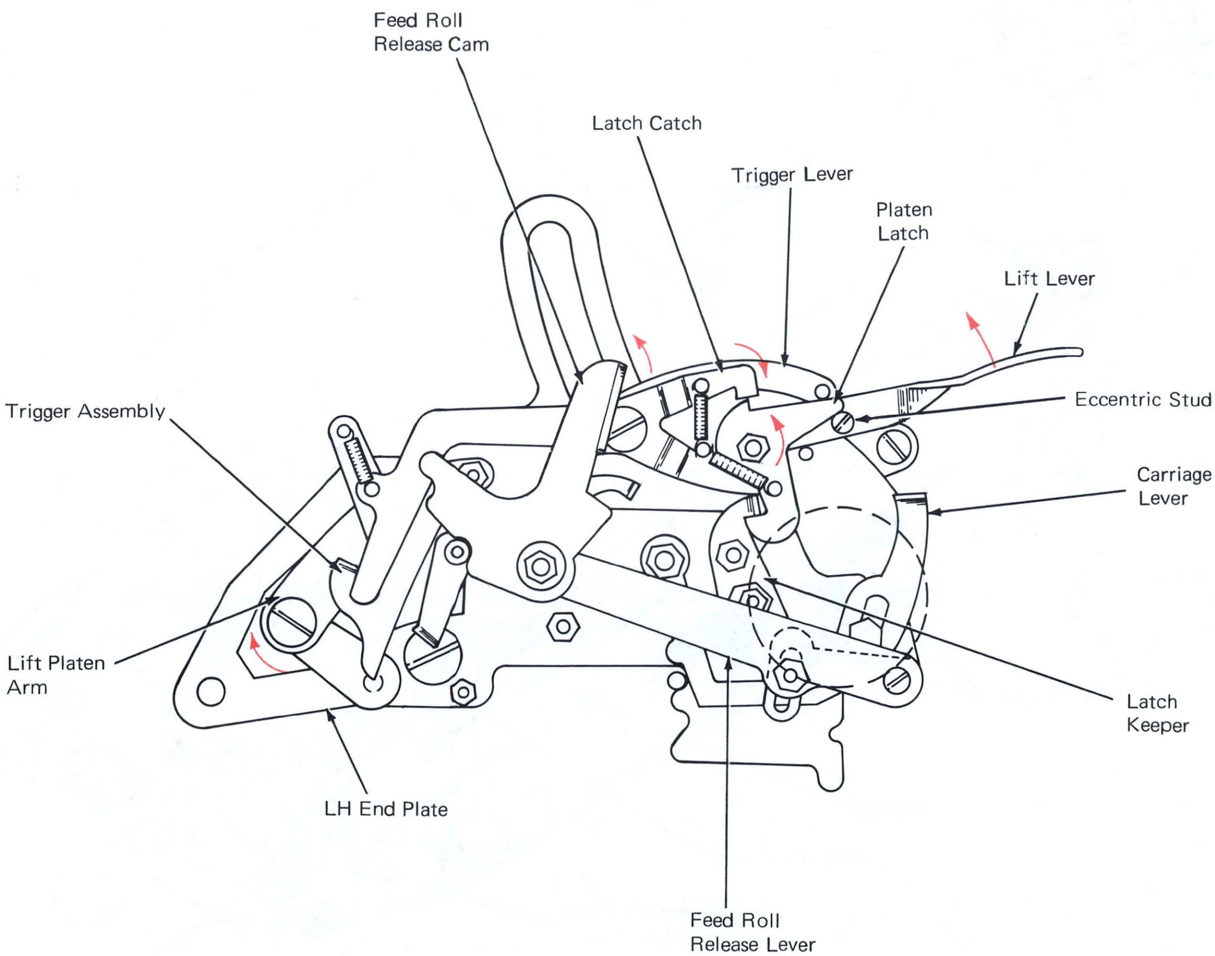
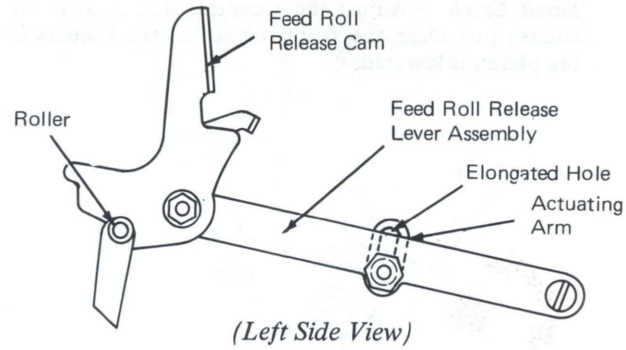


Figure 2 – Lifting Operation (Left Side View)

FEED ROLL RELEASE

The feed roll release cam (Figure 3) is attached to the left end of the carriage by a stud. A roller on the feed roll release lever assembly operates on a lower surface of the cam and is attached to the feed roll actuating shaft. Pushing the feed roll release cam to rear cams the release lever assembly down to rotate the feed roll actuating shaft to release the feed rolls.

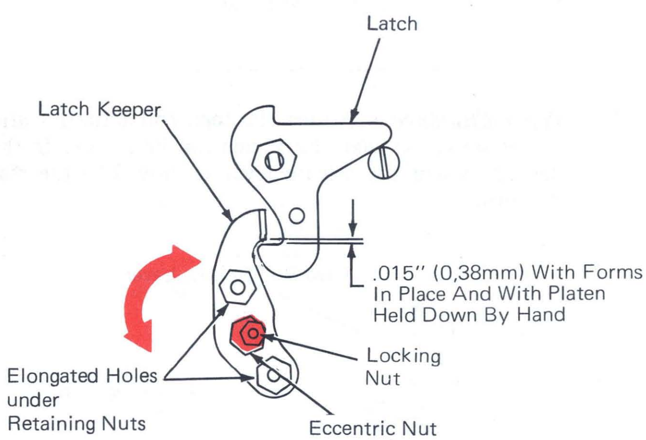


(Left Side View)

Figure 3 – Feed Roll Release Operation

LIFT PLATEN FORMSWRITER ADJUSTMENTS

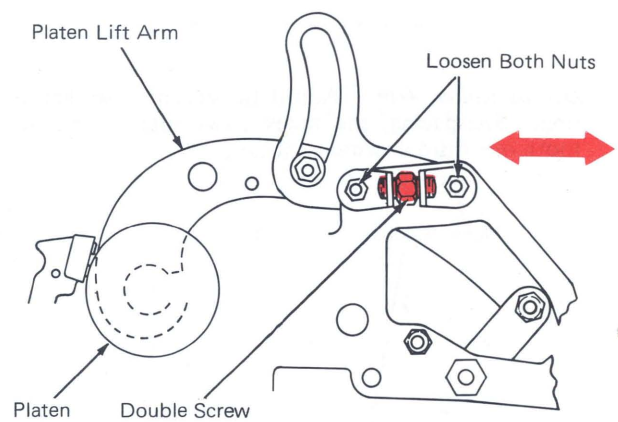
1. *Latch Keeper* – With the forms in the machine, adjust the eccentric so that there is a clearance of .015" (0,38mm) between the latch and the lower edge of the latch keeper.



(Left Side View)

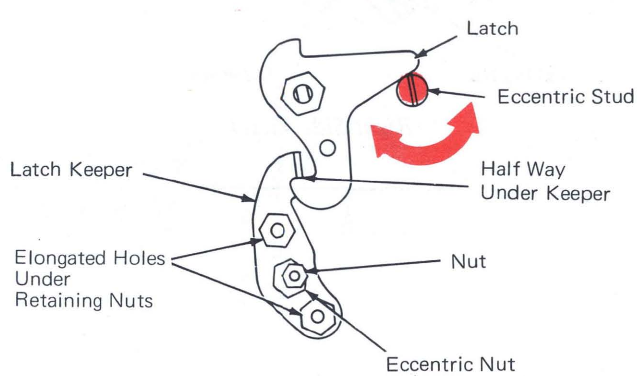
NOTE: This clearance is observed with the platen pressed down by hand, first on one side, then the other. The keepers are adjusted by loosening the two keeper locking nuts and the locking nut on the stud that holds the eccentric nut.

2. *Ring And Cylinder* – Adjust the double screws so that with forms in the machine, there should be a light drag on the forms from the typebar.



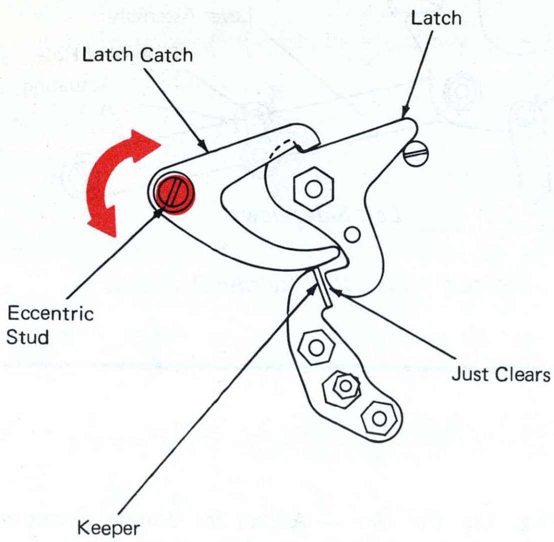
(Right Side View)

3. *Eccentric Stud* – With the platen latched down, adjust the eccentric stud on the platen lift lever so that the latches will rest halfway under the keepers.



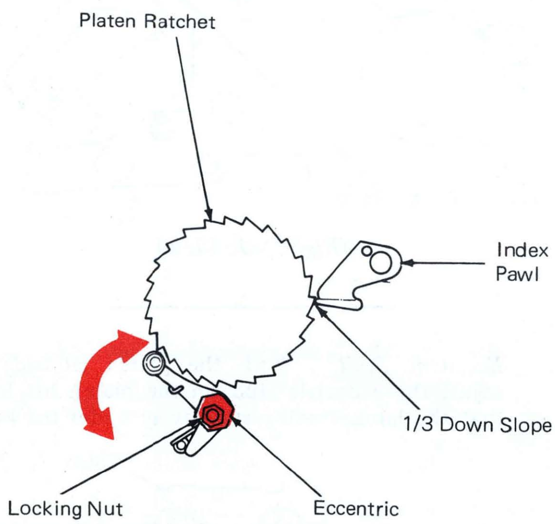
(Left Side View)

4. *Latch Catch* – Adjust the eccentric stud so that the latches just clear the front surface of the keepers as the platen is lowered.



(Left Side View)

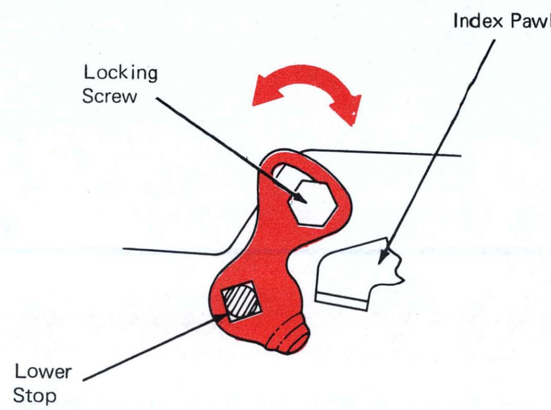
5. *Detent Roller Arm* – Adjust the eccentric so that on single linespacing, the index pawl enters a ratchet tooth one third down on a tooth.



(Right Side View)

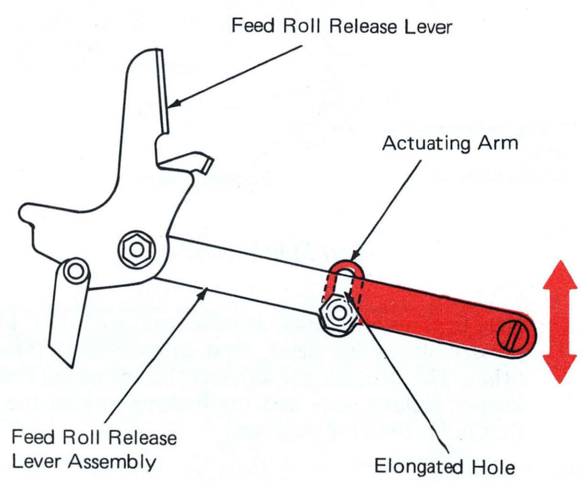
6. *Lower Index Stop* – Adjust the stop so that the platen ratchet rotates one full tooth.

NOTE: Check with the platen latched down and forms in the machine.



(Right Side View)

7. *Paper Clearance* – Adjust the feed roll actuating arm up or down so that the forms can be shifted in the carriage when the release lever is moved to the rear position.



(Left Side View)

PIN FEED PLATEN OPERATIONAL THEORY

The purpose of the pin feed platen is to feed continuous forms. This is performed by two pin wheel assemblies, one on each end of the platen core. Platen cores come in lengths to accept most standard width forms (Figure 1).

The form is aligned with the pin wheels by forms guides mounted on the lower guide rod. The form is maintained in position on the pins by a feed finger attached on the front paper scale. Special cardholders are used to prevent interference of the pins with the cardholder.

During operation, the feed roll release lever is held forward in the released position because the feed rolls are not required to feed the paper.

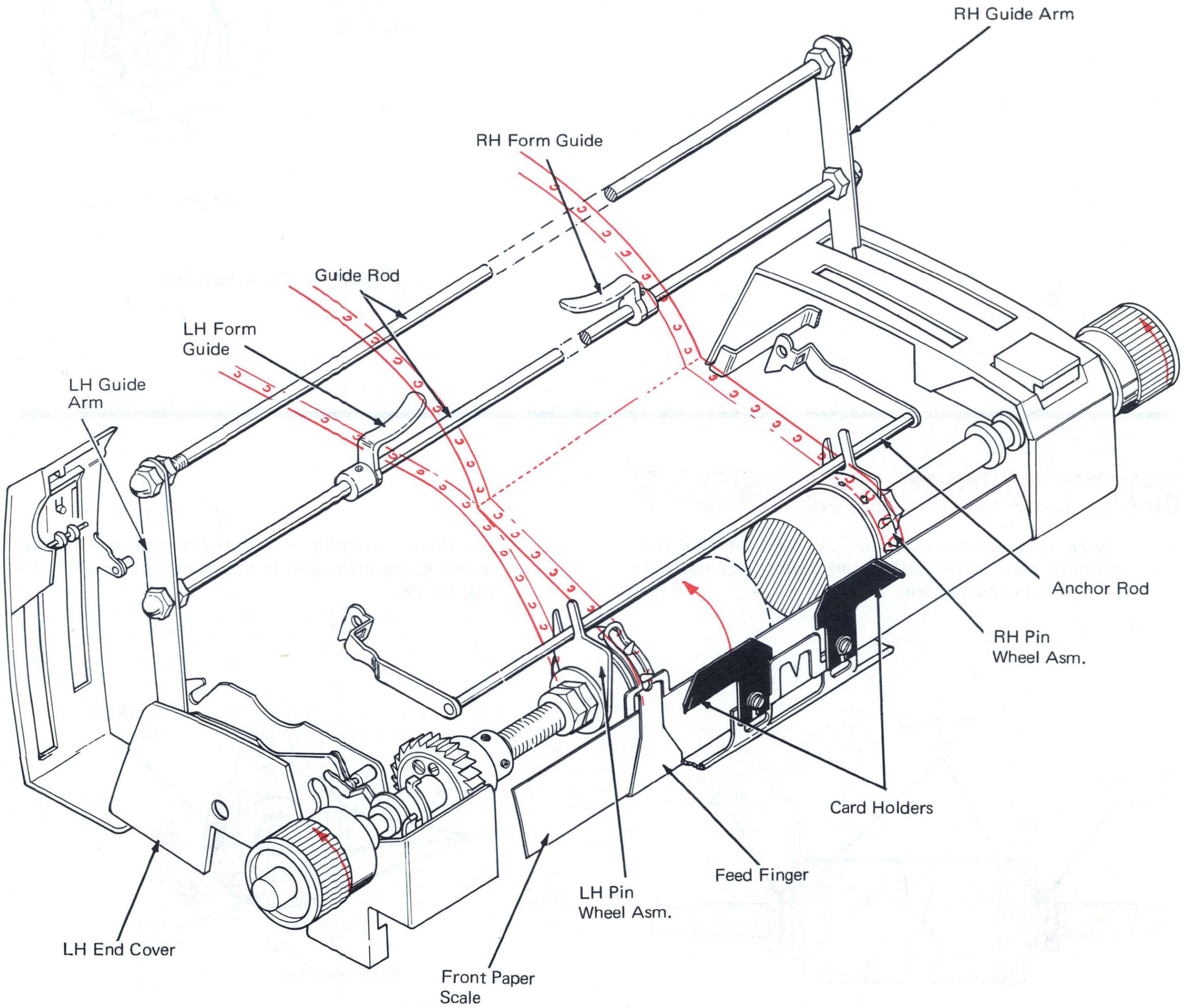
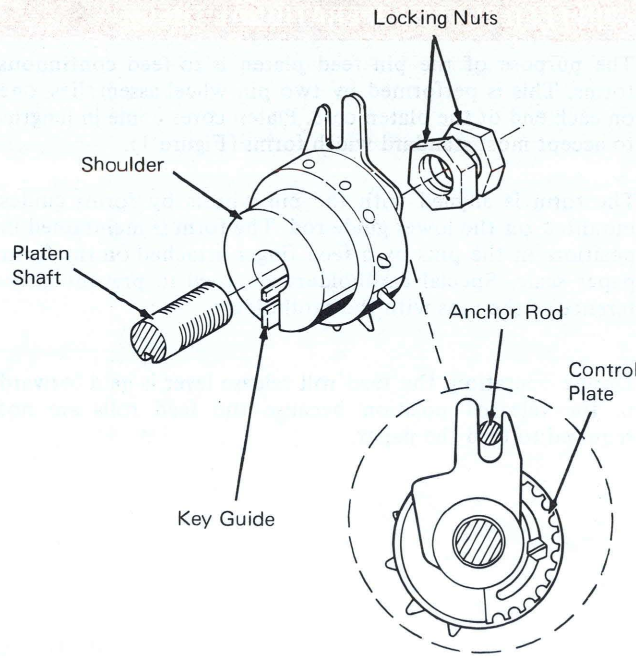


Figure 1 – Pin Feed Platen

PIN WHEEL ASSEMBLY

A guide key in the pin wheel fits into a slot in the platen shaft (Figure 2). A shoulder of the pin wheel body fits into a bushing in the platen core. Nuts are used on both sides to press the pin wheel bodies into the platen core.

Each pin wheel body has eleven holes, evenly spaced around the surface with a pin in each hole. A cam attached to the pin wheel body causes the pins to slide in and out of their holes. Attached to the cam is a control plate which is held to the cam anchor rod. The cam is held in place by the control plate while the pin wheel body rotates with the platen when indexing. This means that the pins will exit and enter the pin wheel body at an exact position, therefore providing the motion necessary to feed forms through the typewriter.

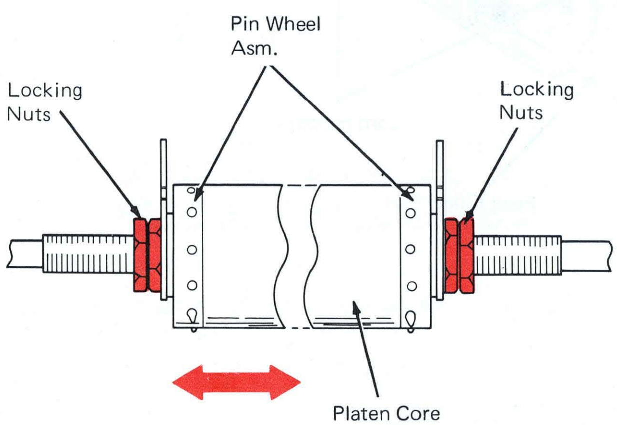


(Right Side View)

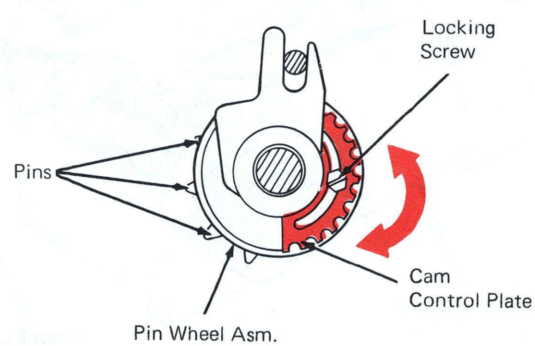
Figure 2 – Pin Wheel Asm.

PIN FEED PLATEN ADJUSTMENTS

1. *Platen Core Lateral Position* – Loosen the lock nuts on both ends of the platen and center the core. Turn lock nuts in and tighten.

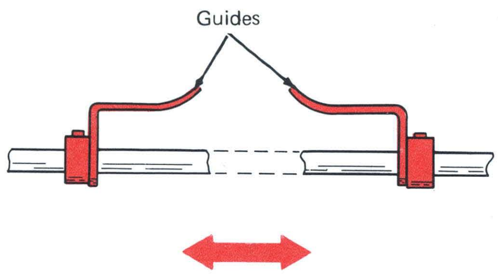


2. *Pin Wheel Assembly* – Adjust the cam control plate so the lower pin begins to exit the hole just above the front scale.

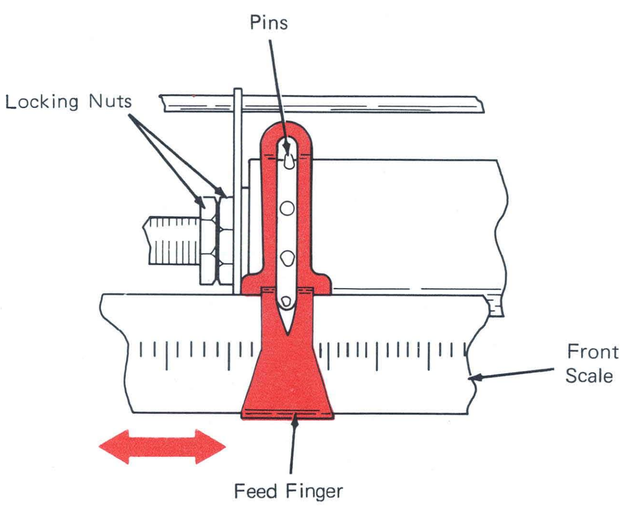


Right Side View

3. *Form Guides* – Adjust the LH and RH guides to align the form with the platen pins.

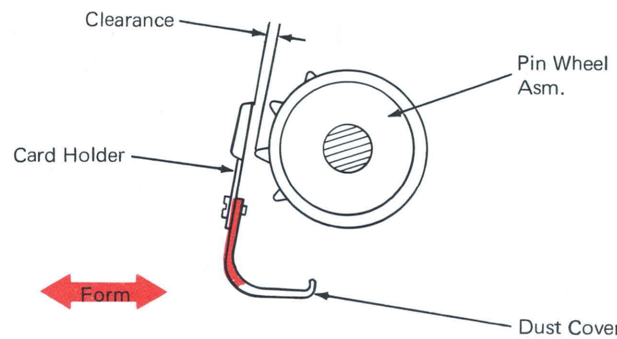


4. *Feed Finger* – Adjust the feed fingers left to right on the front scale so the slots in the feed fingers fit over the pins in the pin wheel assemblies.

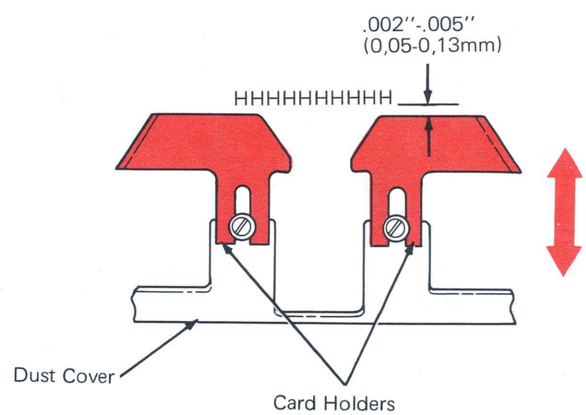


5. *Cardholders* – Two conditions:

   a. Adjust the cardholders front-to-rear to clear the pins in the platen.



   b. Adjust the cardholders up or down so the top edge is parallel to the writing line and so a thin line of white .002-.005" (0,05-0,13mm) is visible from the operator's position between the reference edge and the feet of the characters.



PIN FEED LIFT PLATEN OPERATIONAL THEORY

The purpose of the pin feed lift platen (Figure 1) is to provide a lifting pin feed platen for positive registration of continuous forms. The pin feed lift platen attachment is mounted on a standard lift platen formswriter carriage, with the lifting of the platen being the same for both attachments. Refer to the lift platen formswriter section of this manual for the operation.

PLATEN DETENT

The platen detent is located on the lifter arm assembly shaft directly over the platen ratchet. This allows the platen to remain in place while the platen is in the raised position. The knife and holder assembly replaces the tear-off blade used on the standard lift platen machine.

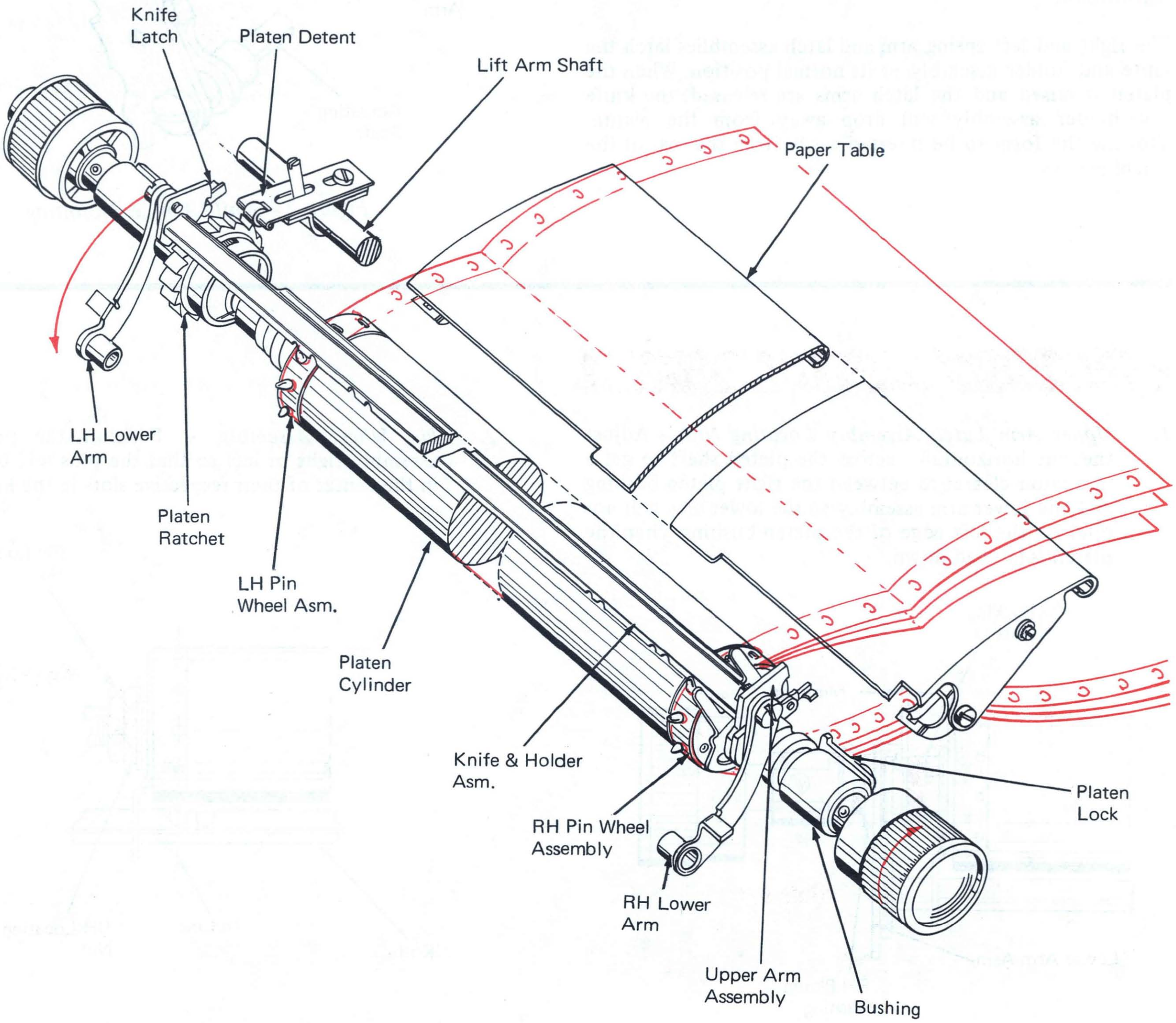


Figure 1 – Pin Feed Lift Platen

KNIFE HOLDER ASSEMBLY

The knife holder assembly serves two purposes:

1. To provide an edge on which to remove the completed form.
2. To hold the paper tightly on the platen pins while the platen is in either the raised or lowered position.

This is performed by having the knife and holder assembly connected to the platen shaft by the right and left upper arm, latch assemblies, and to the actuating shaft by the right and left lower arm assemblies in such a way as to rotate it about the platen in a fixed arc when the platen is being raised (Figure 2).

The yokes of the right and left pin wheel assemblies are connected to the knife and holder assembly. This ensures that an extended pin will always be across from the knife and holder assembly during the rotation about the platen, and at the same time, keeps the form in the original registration.

The right and left spring arm and latch assemblies latch the knife and holder assembly in its normal position. When the platen is raised and the latch arms are released, the knife and holder assembly will drop away from the platen, allowing the form to be inserted easily from the rear of the machine.

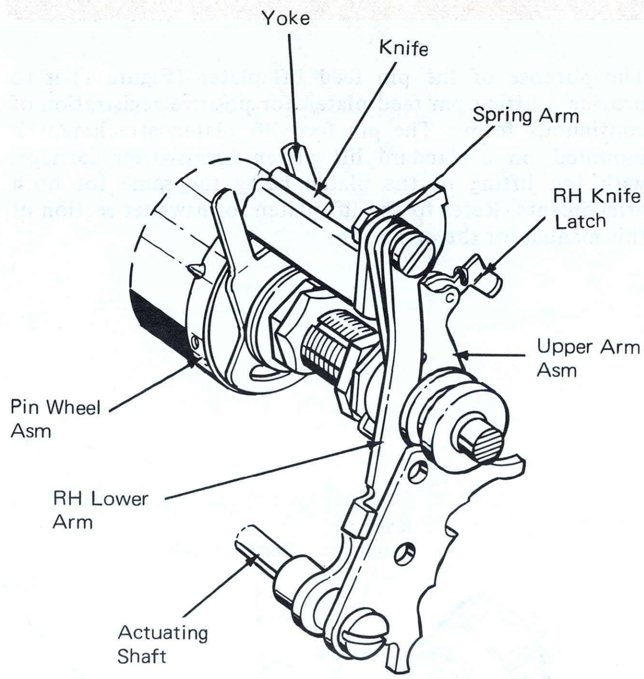
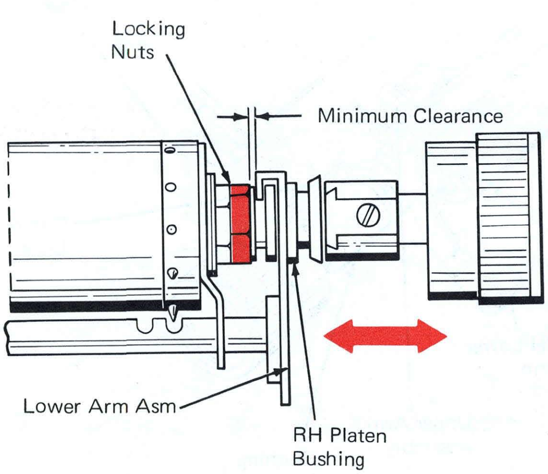


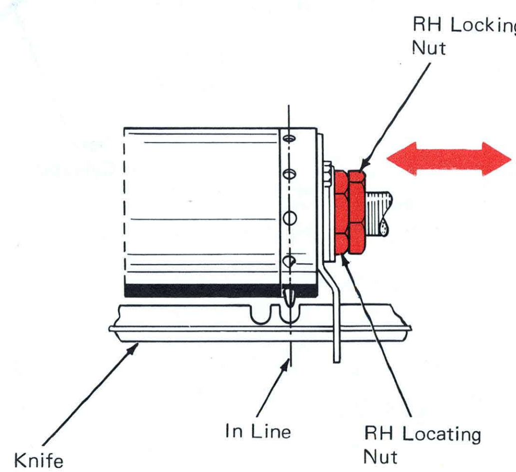
Figure 2 – Knife Asm. & Mounting

PIN FEED LIFT PLATEN ADJUSTMENTS

1. *Upper Arm Latch Assembly Locating Nut* – Adjust the nut horizontally across the platen shaft to get a minimum clearance between the right platen bushing and the lower arm assembly so.the lower arm will not bind on the left edge of the platen bushing when the platen is latched down.

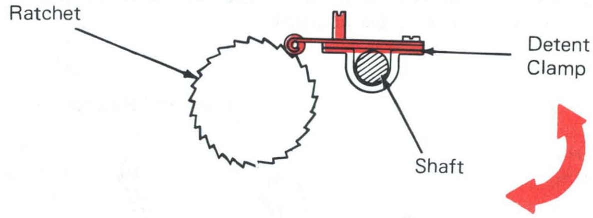


2. *Pin Wheel Assembly* – Position the pin wheel assembly right or left so that the pins will be aligned in the center of their respective slots in the knife.



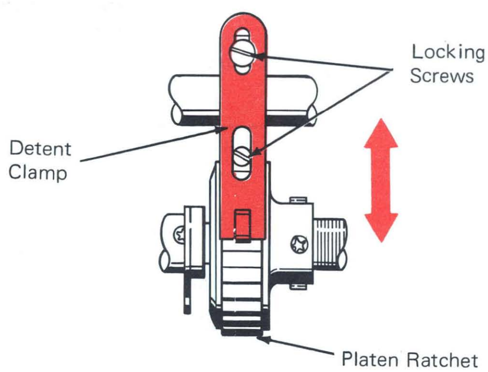
3. *Detent Roller* – Two ways:

a. Rotate the detent clamp on the shaft and lock it in place to maintain enough pressure to hold the ratchet in position.



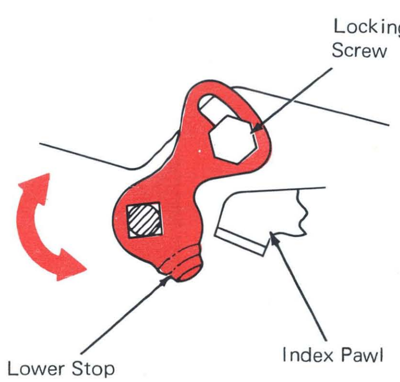
(Right Side View)

b. Adjust the detent clamp front-to-rear so that the index pawl enters the ratchet one third down on the tooth.



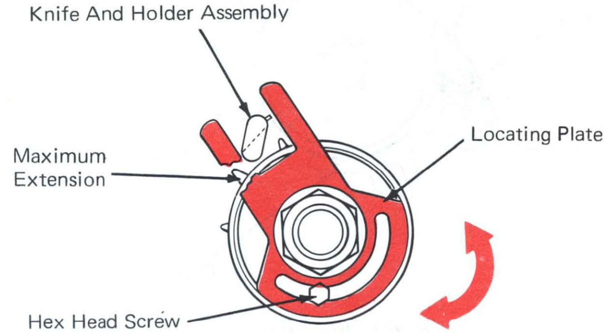
(Top View)

4. *The Lower Stop* – Adjust the lower stop for a full one tooth movement of the platen ratchet, with forms in platen and platen latched down.



(Right Side View)

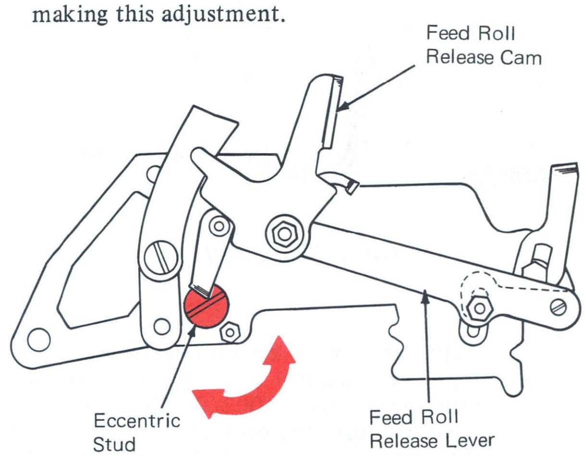
5. *Pins* – Adjust rotationally by loosening the hex head screws in the opening of the locating plates and rotating the plates until the pins reach their maximum extension at the lower edge of the tear-off knife when the platen is latched down.



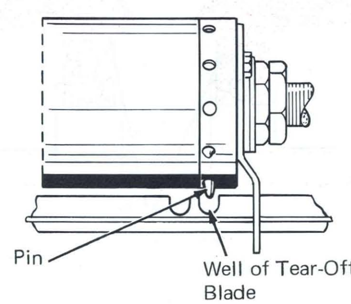
(Right Side View)

6. *Eccentric Lifter Stop Stud* – Adjust so that when the platen is raised and the form is at the tear-off point the pins of the platen will set in the holes of the tear-off blade.

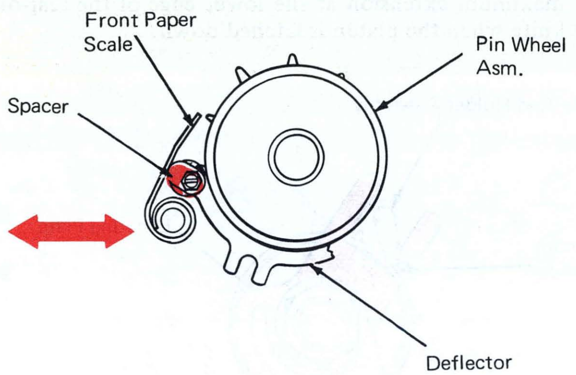
NOTE: Check carbon draw back for binds after making this adjustment.



(Left Side View)



7. *Front Paper Scale* – Adjust the guide spacer so that the front paper scale just clears the platen in the latched down position.



(Right Side View)

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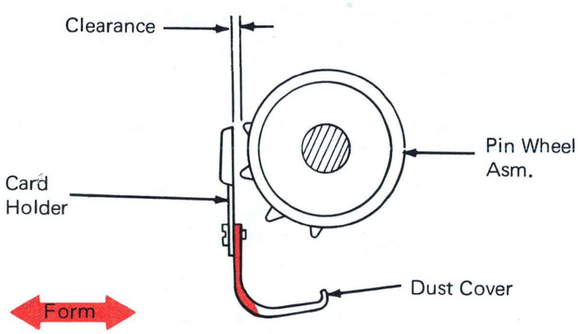
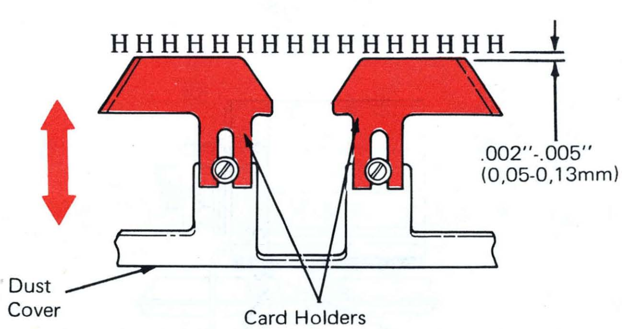
8. *Cardholders* – Two conditions:

   a. Adjust the cardholders front-to-rear to clear the pins in the platen.



(Right Side View)

   b. Adjust the cardholders up or down so that the top edge is parallel to the writing line and so a thin line of white (.002-.005") (0,05-0,13mm) is visible from the operator's position between the reference edge and the feet of the characters.



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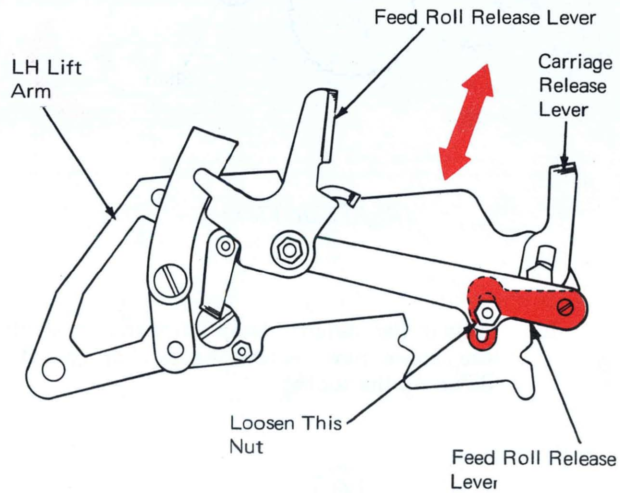
9. *Paper Feed Clearance* – Paper feed clearance is adjusted by inserting the forms then loosening the locking nut of the screw which holds the feed roll release lever assembly. Move the arm assembly up or down to allow the rear edge of the deflector to drop away from the form when the release lever is in the maximum released position.



(Left Side View)

CARD HOLDING PLATEN OPERATIONAL THEORY

The purpose of the cardholding platen is to allow typing on the top or bottom of thick cards. The cards are inserted behind a metal blade that runs the full length of the platen (Figure 1). The blade has a groove under both edges to allow a card to be held by either the top or bottom. A sliding card stop is mounted on the blade to aid in positioning the card across the blade in the card slot. Adjustments remain the same as the standard platen.

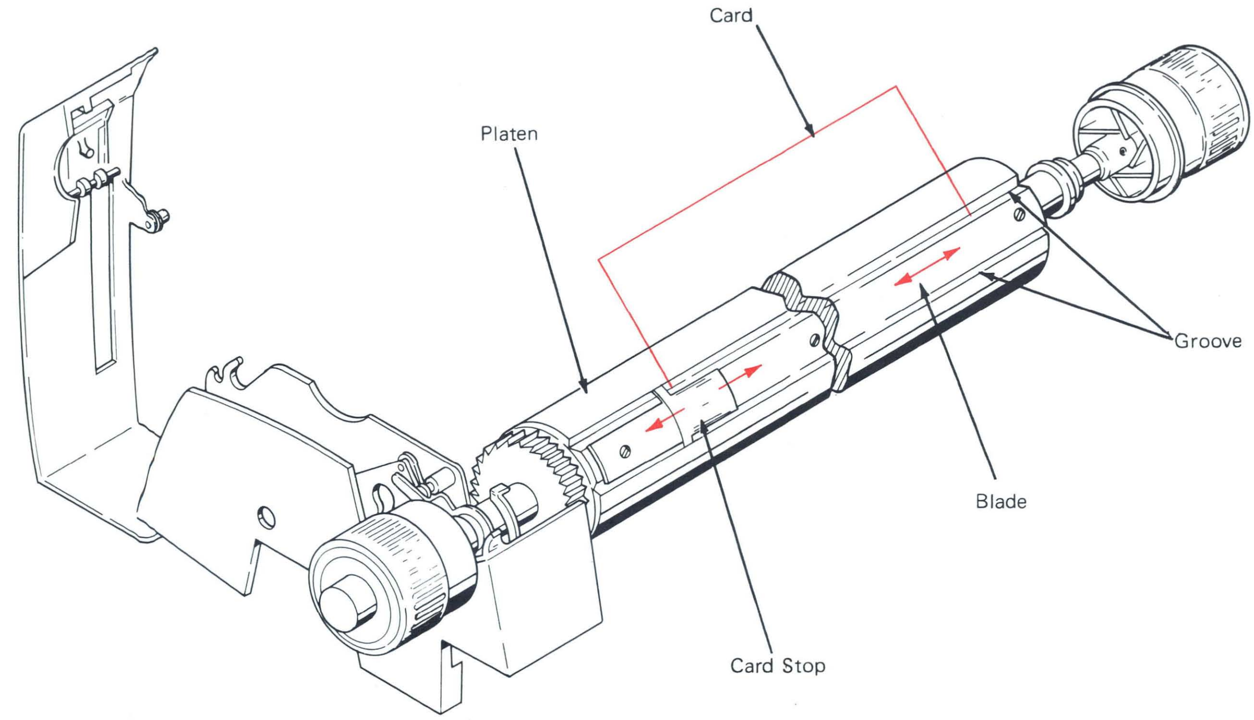


Figure 1 – Card Holding Platen

The purpose of the cardholding station is to allow typing on the top or bottom of thick cards. The cards are inserted behind a metal blade that runs the full length of the platen (Figure 1). The blade has a groove under both edges to allow a card to be held by either the top or bottom. A sliding card stop is mounted on the blade to aid in positioning the card across the blade in the same spot. Alignment remains the same as the standard platen.

CARD POSITIONING PLATEN OPERATIONAL THEORY

The purpose of the card positioning platen is to properly position cards into the machine for typing (Figure 1).

This attachment is operated by rotating the platen toward the rear using the special left-hand platen knob, called the palming knob (Figure 1). This locates the cardholding blade in the proper position (behind the bail rolls). The bottom edge of the card is then inserted in the blade against an adjustable left-hand card stop. The platen is then palmed forward to the first writing line position. The information (such as three lines of address) is typed on the card. When the card has been completed, the carriage is returned, the platen is palmed toward the rear, the completed card removed and the next card inserted.

A metal blade which runs the full length of the platen has a groove under both edges to allow a card to be held by either the top or bottom of the blade. A sliding card stop is mounted on the blade to aid in positioning the card across the blade in the card slot.

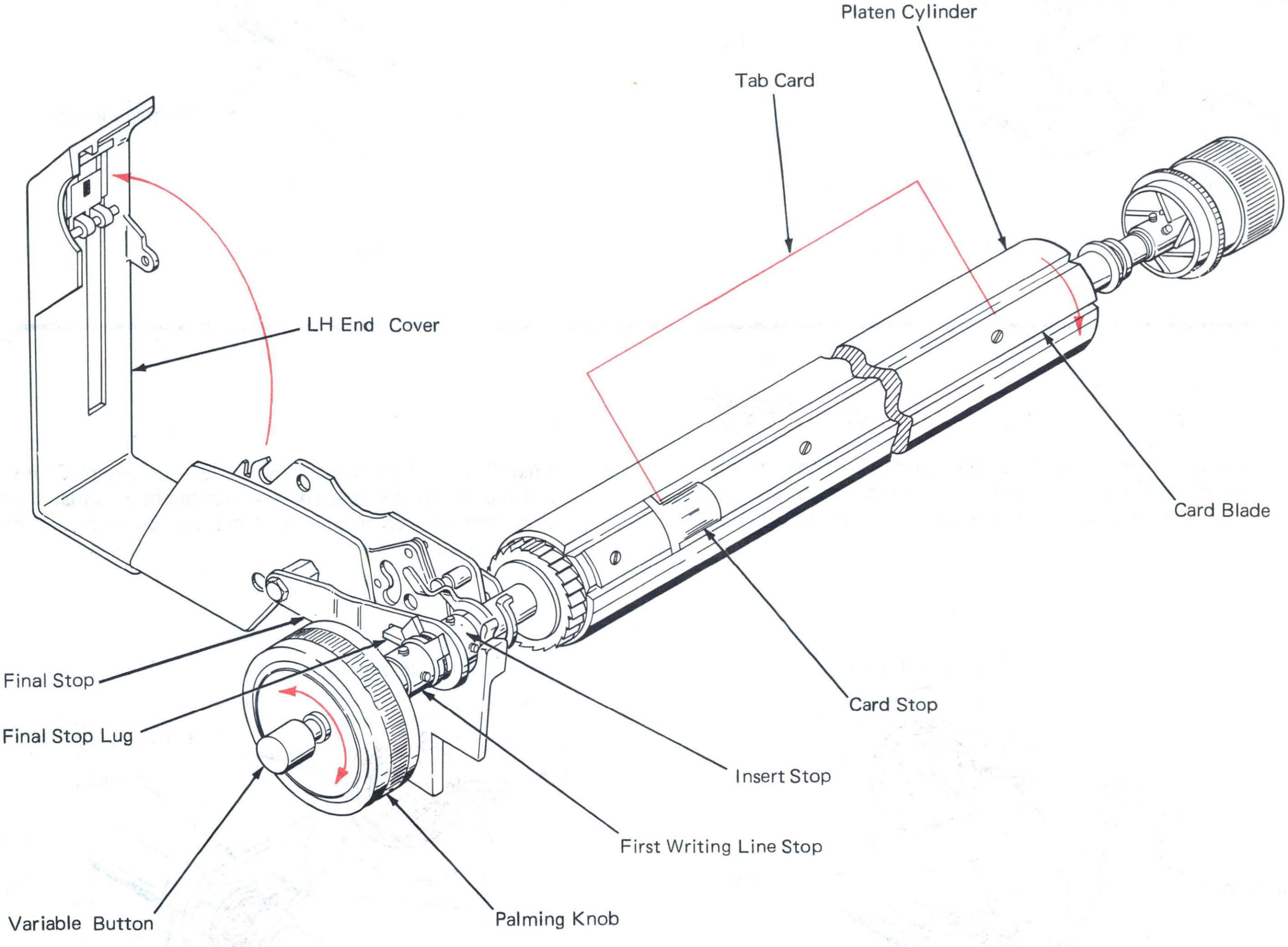


Figure 1 – Card Positioning Platen

The over-size platen knob provides quick placement and removal of the card. The movement of the carriage is limited by the large knob. Therefore, to allow typing at the left card margin, it is necessary to position the card at the far right of the carriage. The palming knob (Figure 2) uses a detent with a ratchet attached to the platen shaft to rotate the platen. The detent spring allows the detent to slip when one of the stops contacts the final stop. This prevents excessive pressure on the stops when they hit the final stop.

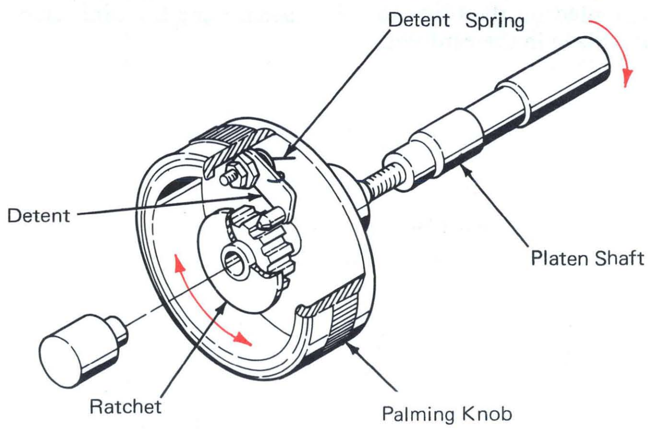


Figure 2 – Palming Knob Asm.

A final stop (Figure 3) located on the left end of the platen is combined with an insert stop and first writing line stop to control the rotational position of the platen. The final stop is held at the rear by a mounting stud, which is mounted to the margin rack.

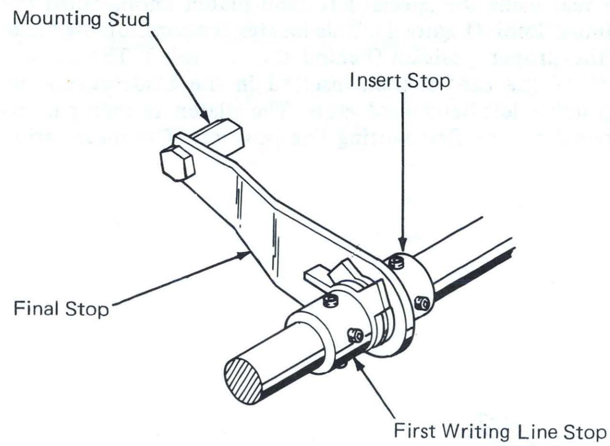
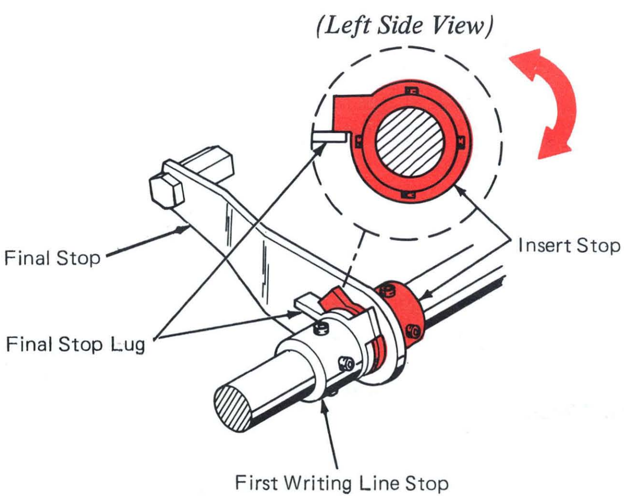


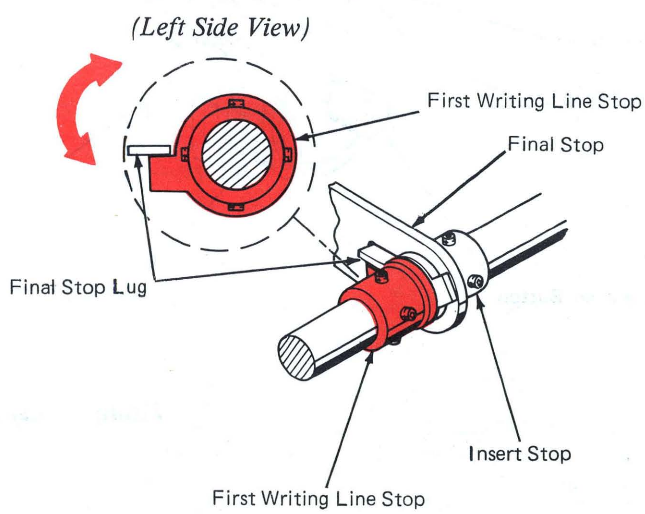
Figure 3 – Stops

CARD POSITIONING PLATEN ADJUSTMENTS

1. *Insert Stop* – Rotate the platen to the desired position for card placement, adjust the insert stop assembly to contact the top of the final stop lug.



2. *First Writing Line Stop* – With the card inserted and the platen on the desired first writing line, adjust the first writing line stop to contact the bottom of the final stop lug.



The purpose of the check writer (Figure 1) is to provide a positive means of inserting, locating and feeding a check or card in the typewriter. In addition, the information being typed can also be typed on a register sheet inserted around the platen by having a sheet of carbon between the register and the check or the card.

The check writer attachment consists of a check holder, which allows inserting and positioning checks or cards, and a power driven bail. An adjustable stop, which can be used left or right, is provided with the check holder. It may be positioned to allow horizontal alignment of the check.

The check holder may be adjusted vertically to position the first writing line in any position from 1 7/16-2" (36,51-50,80mm) from the bottom of the check. The power driven bail assembly, when provided, ensures proper linespacing of the check from the first writing line through to the bottom of the check. The bail assembly uses a gear wheel working together with the gear on the platen to give proper linespacing. Slots in the bail assembly engage the pivot shaft and mount in special brackets to the carriage.

The bail rolls are driven by the bail shaft through a keyed slot and blade arrangement that connects the two rotationally, yet allows left to right movement of the bail rolls.

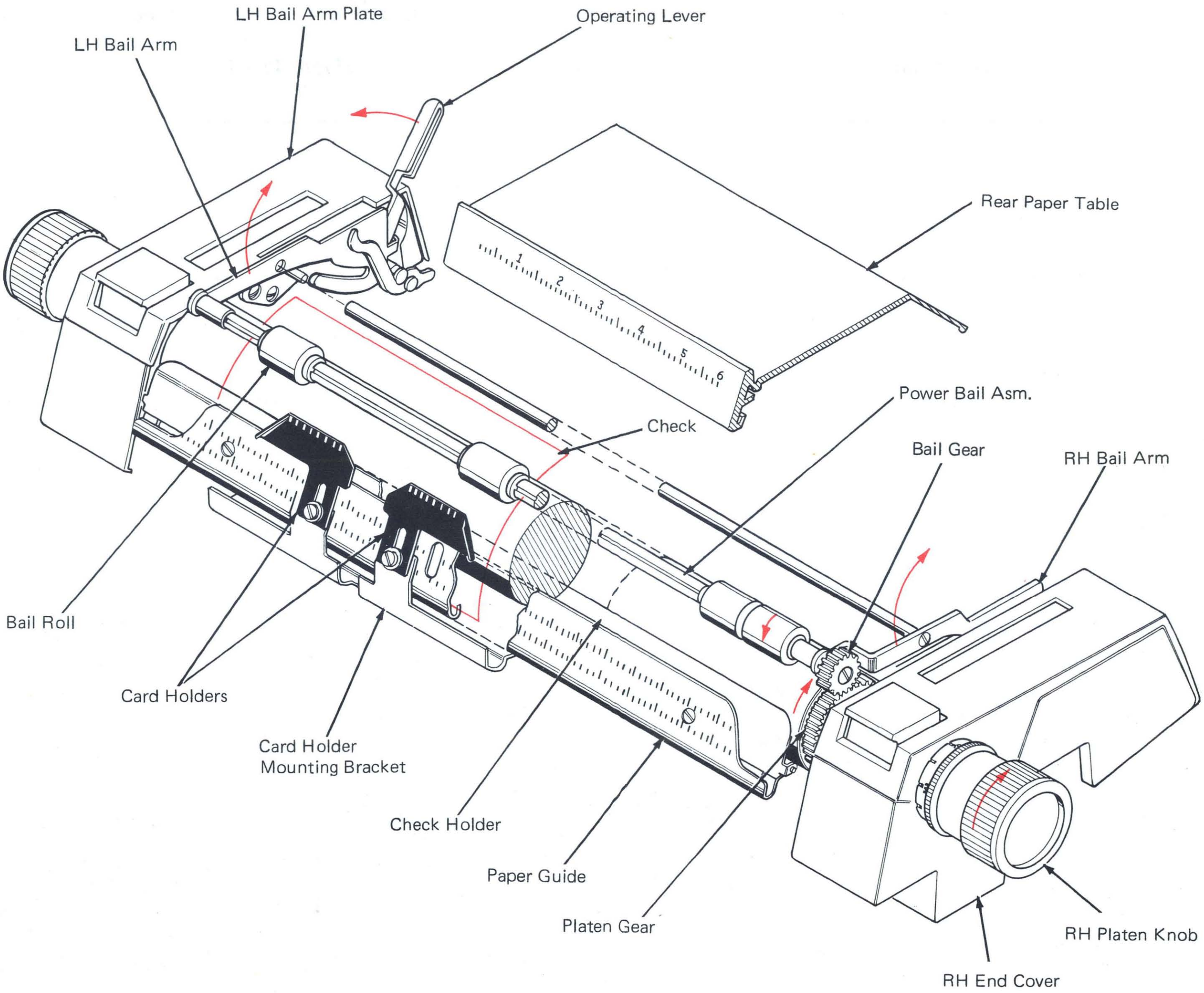
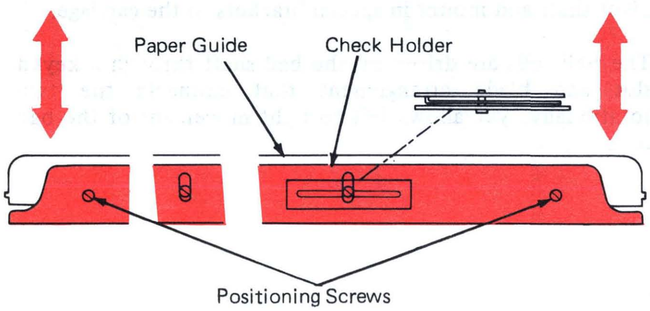


Figure 1 – Checkwriter

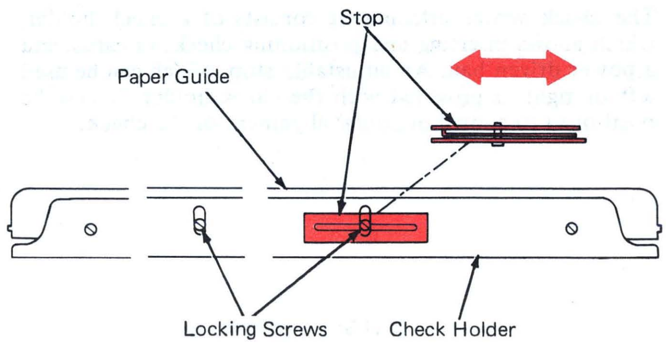
1. *Check Holder* – Adjust the check holder up or down to position the first writing line about 7/16" (11,11mm) from the top of the check.

   NOTE: The screws mounting the check holder to the front paper guide should be drawn up tight without preventing the holder from being moved manually.



(Front View)

2. *Check Stop* – The check stop is mounted on either end of the front paper guide and is adjusted to properly position the check into the holder.



(Front View)

STROKE COUNTER OPERATIONAL THEORY

The purpose of the stroke counter is to record actual usage of the typewriter. This is performed by a non-resetting mechanical counter mounted on the LH side of the rear frame (Figure 1). A link connects the trip lever to a stud attached to the stroke counter arm. The stroke counter is operated by the trip lever on each escapement operation. A part of the rear cover may be cut away as shown in Figure 1 so the counter will be visible without removing the cover.

When installing the stroke counter on a Decimal Tab Typewriter, a special connecting link must be used.

Stroke counters for the Model C-D Typewriter are available with a 10 to 1,100 to 1, or 240 to 1 ratio. This means that for every 100 escapement operations, the 100 to 1 ratio counter will advance one, etc.

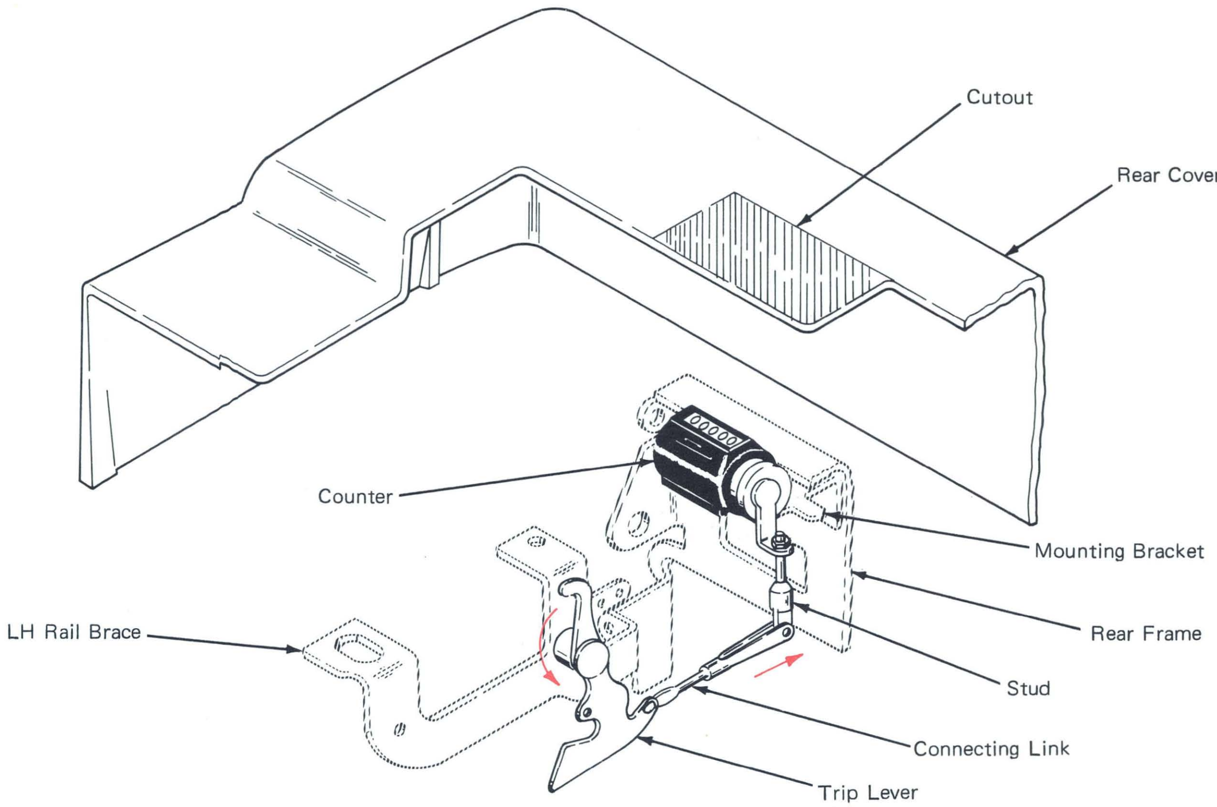
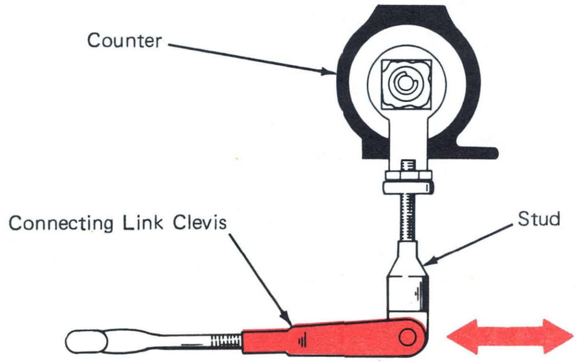


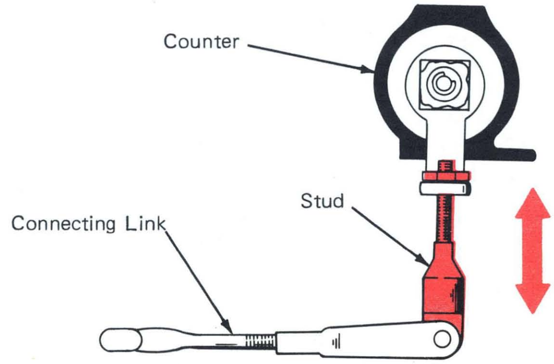
Figure 1 – Stroke Counter

STROKE COUNTER ADJUSTMENTS

1. *Stroke Counter Connecting Link Clevis* – Adjust the connecting link clevis so the stroke counter arm does not bind off with the trip lever fully actuated.



2. *Extension Stud* – Adjust the extension stud up and down so the operation is recorded on each keystroke.



PALM TAB OPERATIONAL THEORY

The purpose of the palm tab is to provide a means of operating the tabular key with the bottom part of the hand as well as with a finger on the tab keybutton (Figure 1). This mechanism is available in both left and right hand attachments.

Pushing down of the palm tab button rotates the palm tab keylever about the keylever fulcrum rod in the keylever bearing support. This supplies motion to the equalizing rod which is mounted to the side frames. A hook and hook bracket mounted on the LH tab keylever is pivoted down by the equalizing rod to release the tab cam. The palm tab keybutton is mounted on a slide plate to the front frame by means of two slide plate screws. When changing to the palm tab, it will be necessary to change the front frame also.

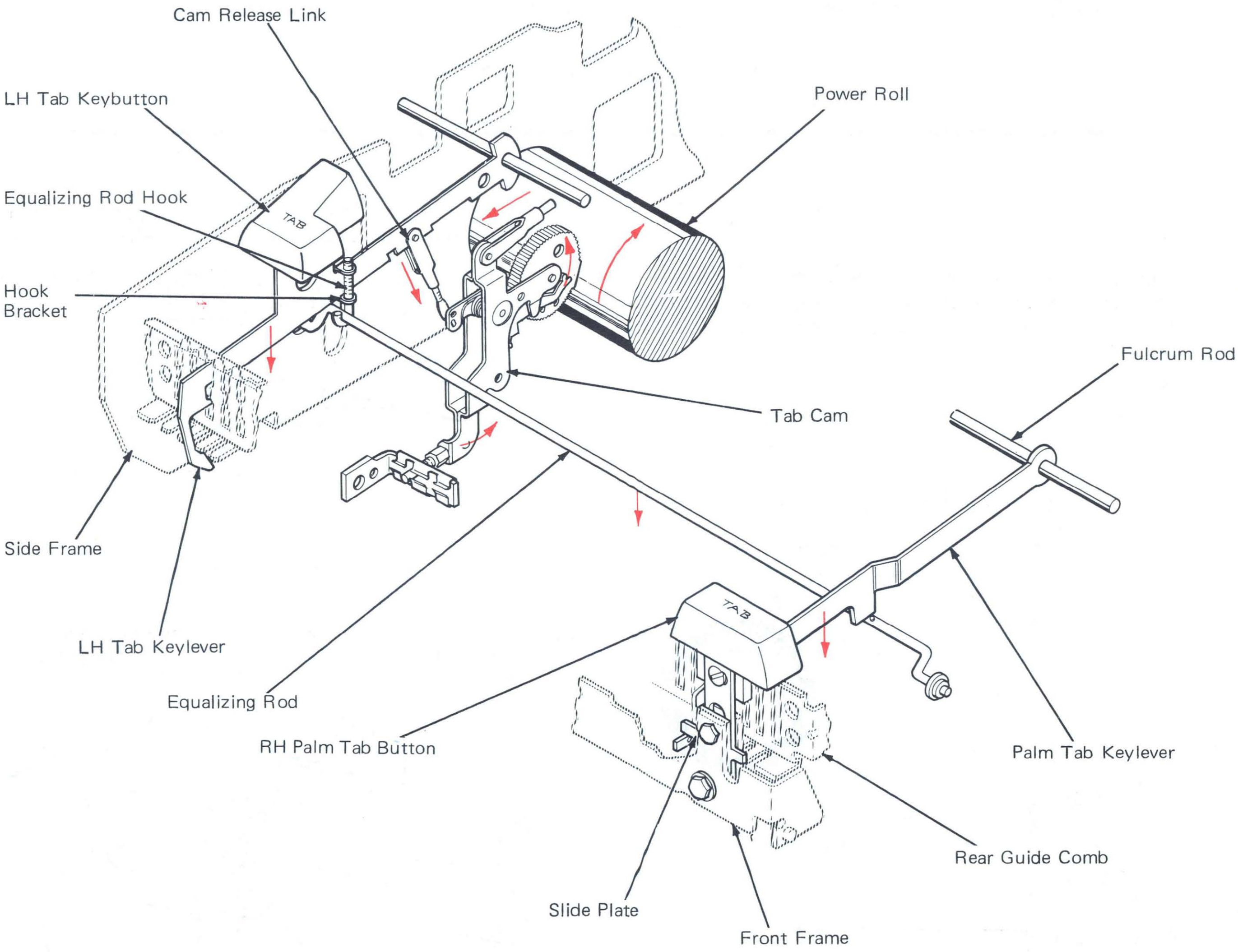


Figure 1 – RH Palm Tab Mechanism

The theory of operation for the LH palm tab is the same as the RH palm tab. The basic difference is that the LH palm tab uses the same keylever for both regular tab and palm tab operations. Also, the equalizing rod, hook, and hook bracket is not required (Figure 2).

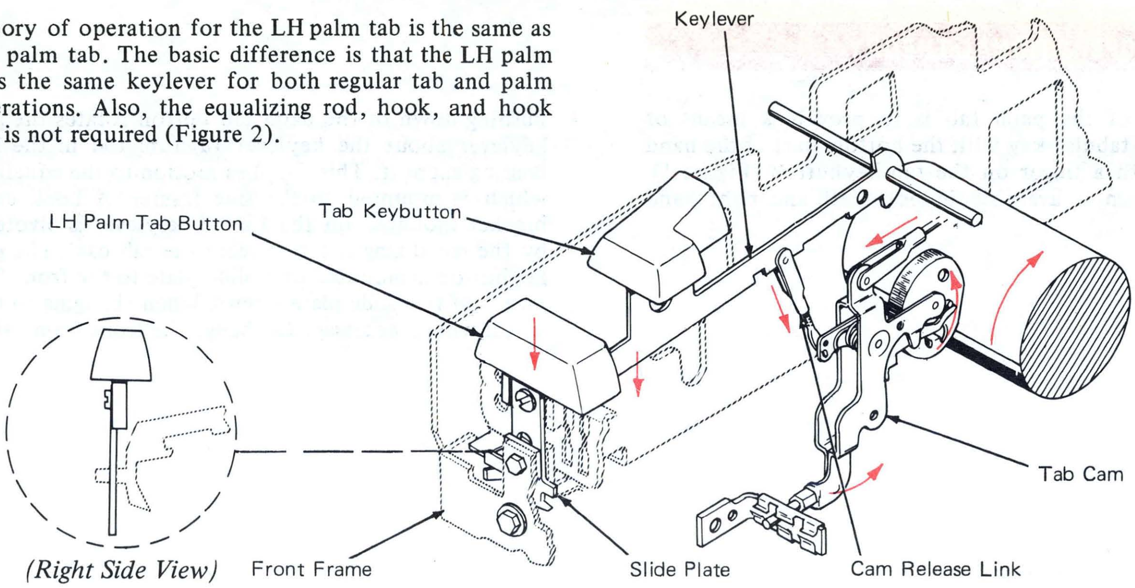
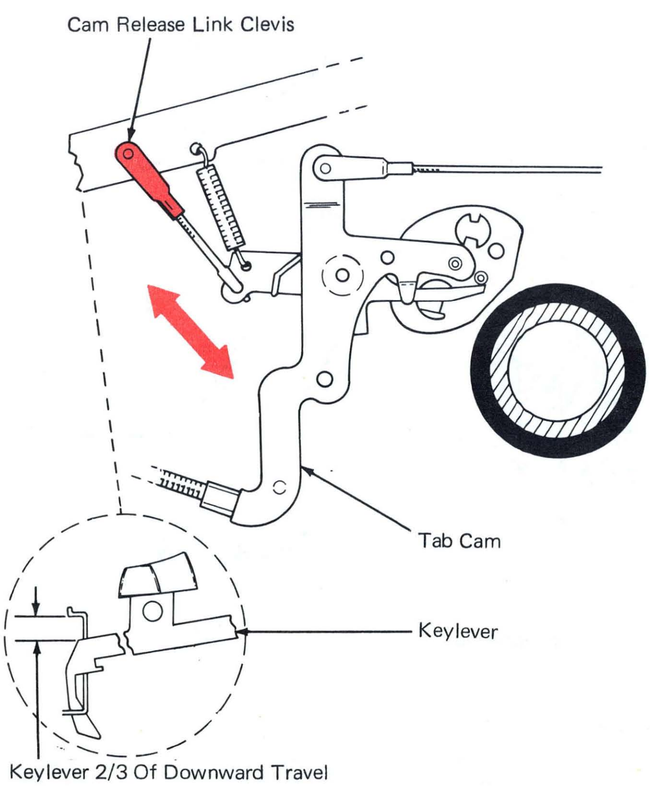


Figure 2 – LH Palm Tab Mechanism

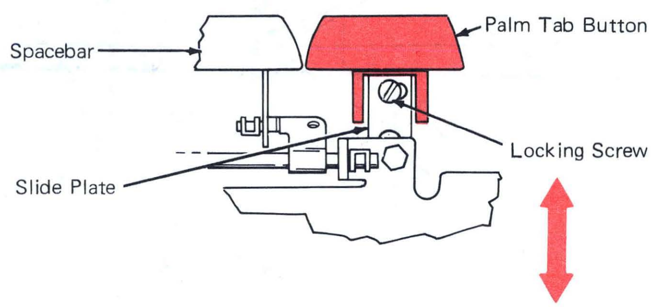
PALM TAB ADJUSTMENTS

1. *Cam Release Link Clevis* – Adjust the cam release link clevis so that the cam will trip when the keylever is depressed 2/3 of the downward movement.

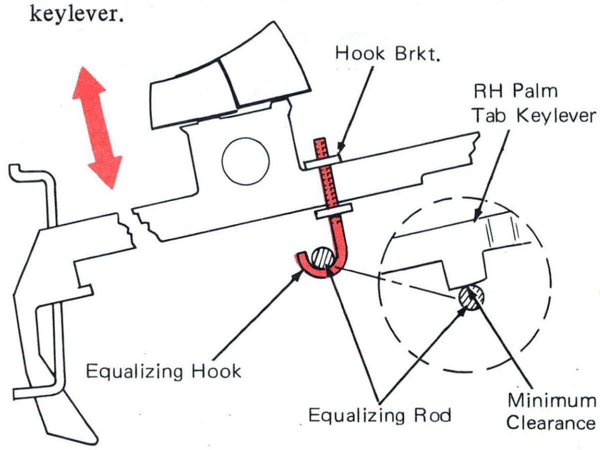


(Right Side View)

2. *Palm Tab Keybutton* – Adjust the height of the palm tab keybutton to align with the spacebar keybutton.



3. *Hook* – Adjust the hook for minimum clearance between the equalizing rod and the RH palm tab keylever.



(Right Side View)

CLAMPTYPE PLATEN OPERATIONAL THEORY

The purpose of the clamp type platen is to provide a means of properly positioning forms into the typewriter (Figure 1).

This special platen gives a quick front feed, with the clamp opening wide to accept a single card or multiple part form. When the platen is rotated toward the rear, against the arm assemblies, the cardholding blade is opened so that the form can be quickly inserted. As the platen is rotated forward to the writing line, the card blade is allowed to close and clamps the form to the platen.

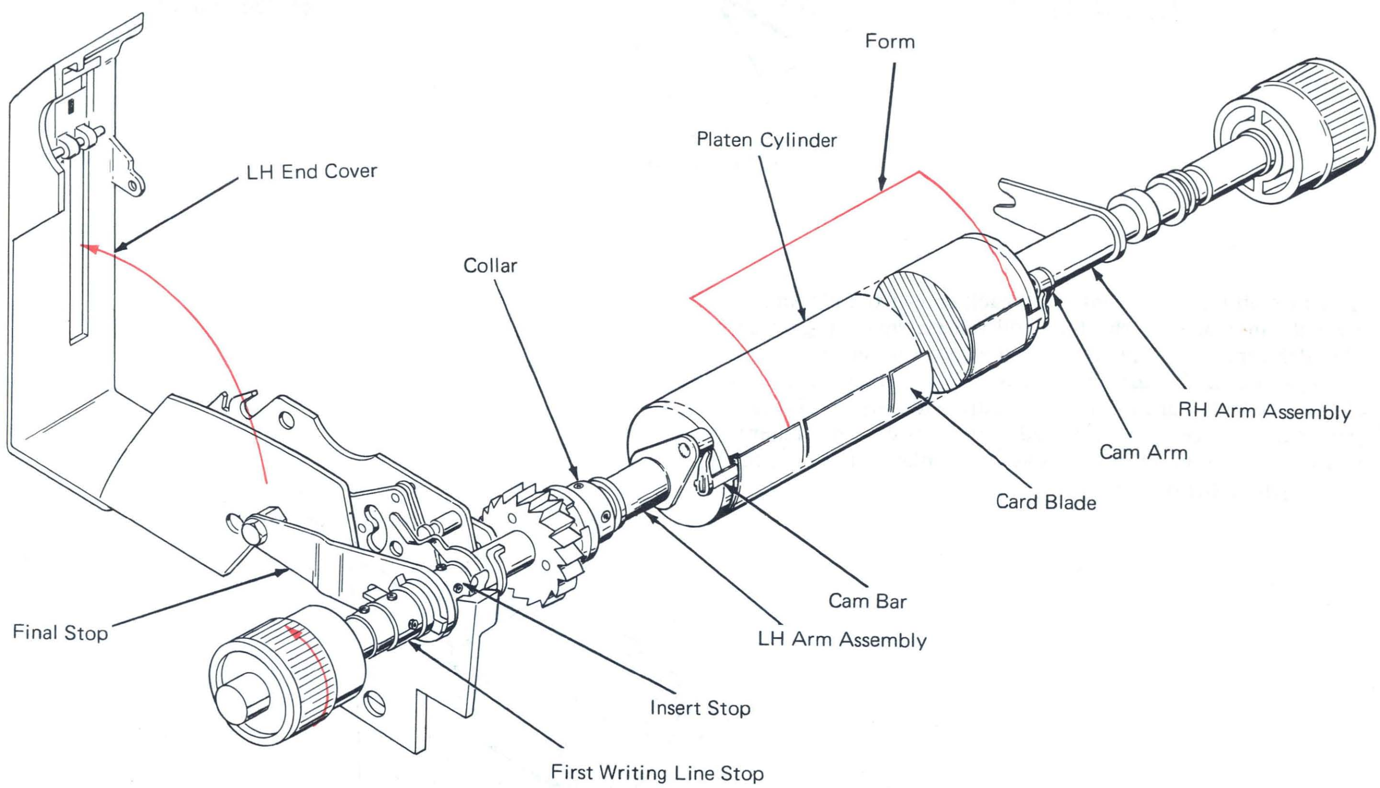


Figure 1 – Clamp Type Platen

A final stop located on the left end of the platen is used with an insert stop and first writing line stop to control the rotational position of the platen (Figure 2). The final stop is held at the rear by a mounting stud, which is mounted to the margin rack.

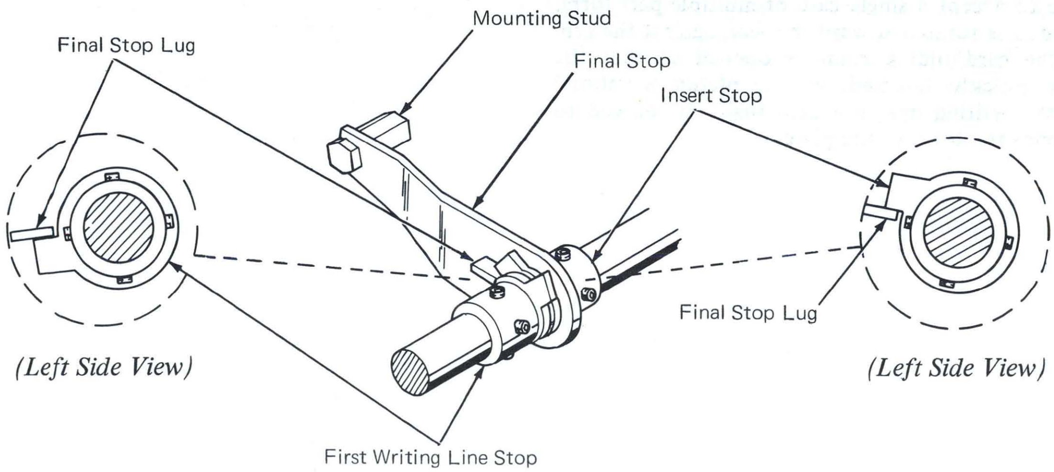


Figure 2 – Stops

Arm assemblies are mounted on each end of the platen and are held in place by the feed roll release shaft (Figure 3). The RH arm assembly has a cam arm mounted to it by a screw, while the LH arm is a one-piece part. During rotation of the platen toward the rear, the cam bar contacts the cam arms which forces the card blade open for card placement. The cam bar mounts in a groove in the platen and runs the full length of the platen.

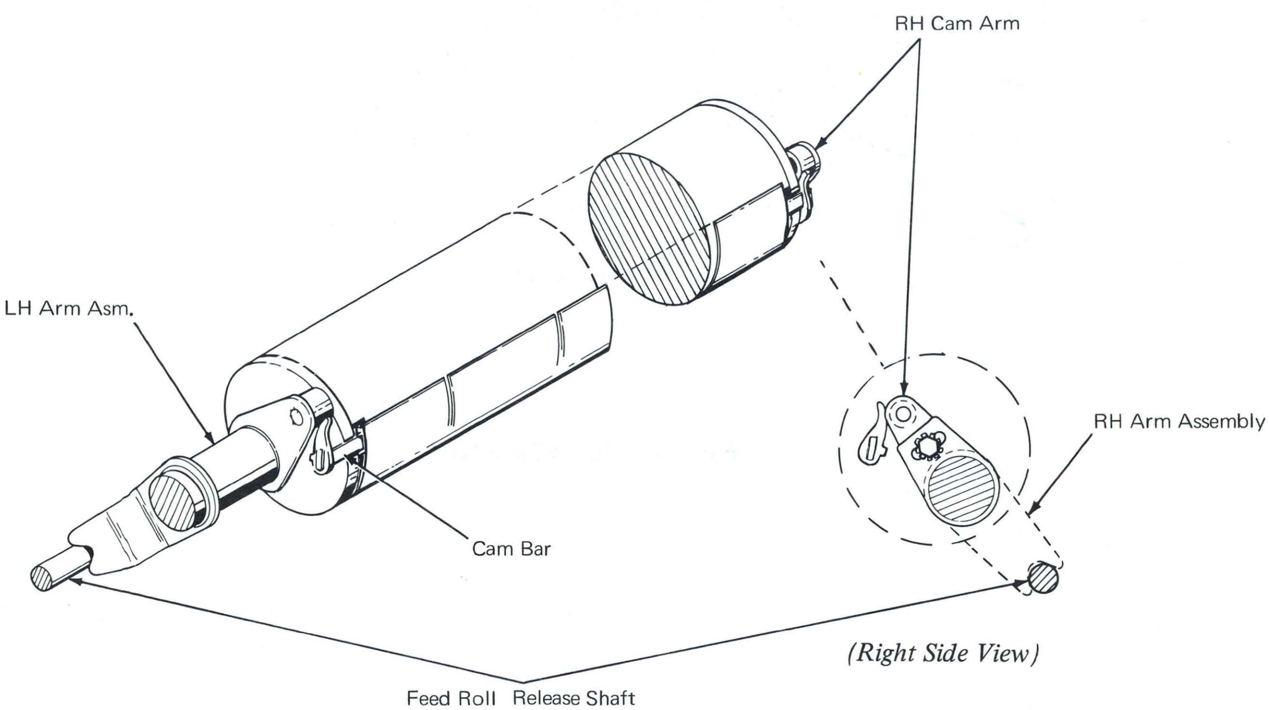
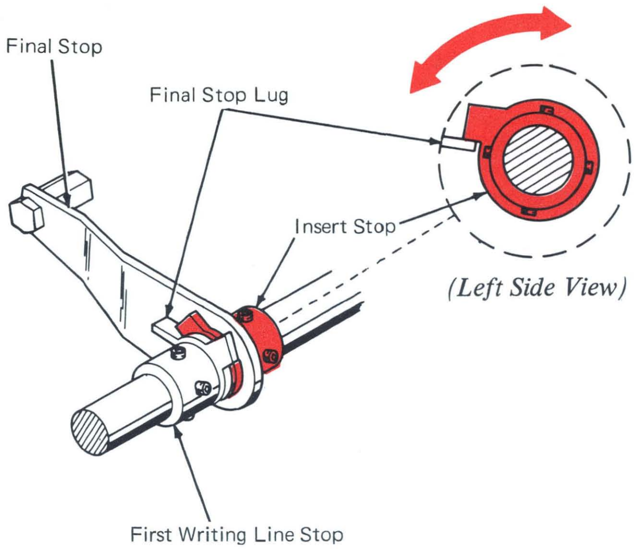


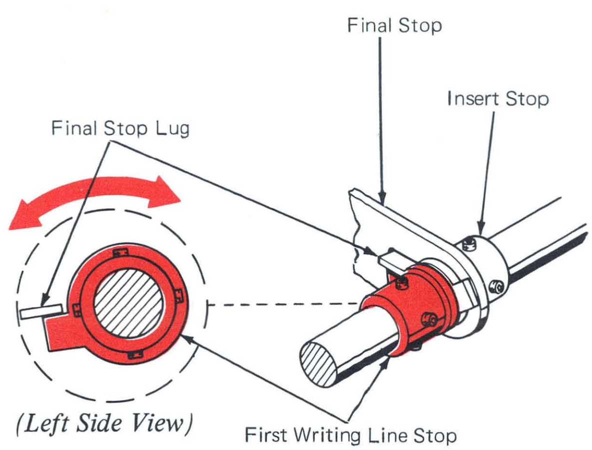
Figure 3 – Arms & Cam Bar Asm.

CLAMPTYPE PLATEN ADJUSTMENTS

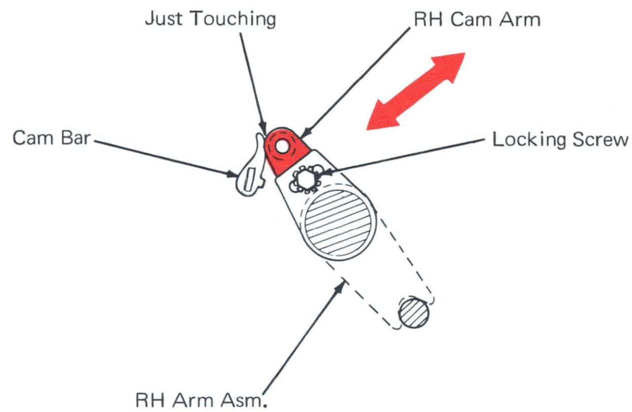
1. *Insert Stop* – Rotate the platen to the desired position for card placement, adjust the insert stop assembly to contact the top of the final stop lug.



2. *First Writing Line Stop* – With the card inserted and the platen on the desired first writing line, adjust the first writing line stop to contact the bottom of the final stop lug.



3. *RH Cam Arm* – With the LH cam arm just touching the cam bar, adjust the RH cam arm to just touch the cam bar as shown.



(Right Side View)

VISIBLE INDEX CARD HOLDER OPERATIONAL THEORY

The purpose of the visible index cardholder is to provide a card carrying attachment for the typing of visible index cards, yet allow standard typing if desired (Figure 1).

The visible index cardholder moves vertically in the area normally taken up by the front paper scale. Two elongated slots in the card carrier guide the vertical motion. The card carrier has a spring card blade running the length of the platen which holds the card in the typing position. Two sector gears mounted on each end of the platen provide vertical motion for the carrier. Feeding the cards past the writing line in this way keeps the cards flat.

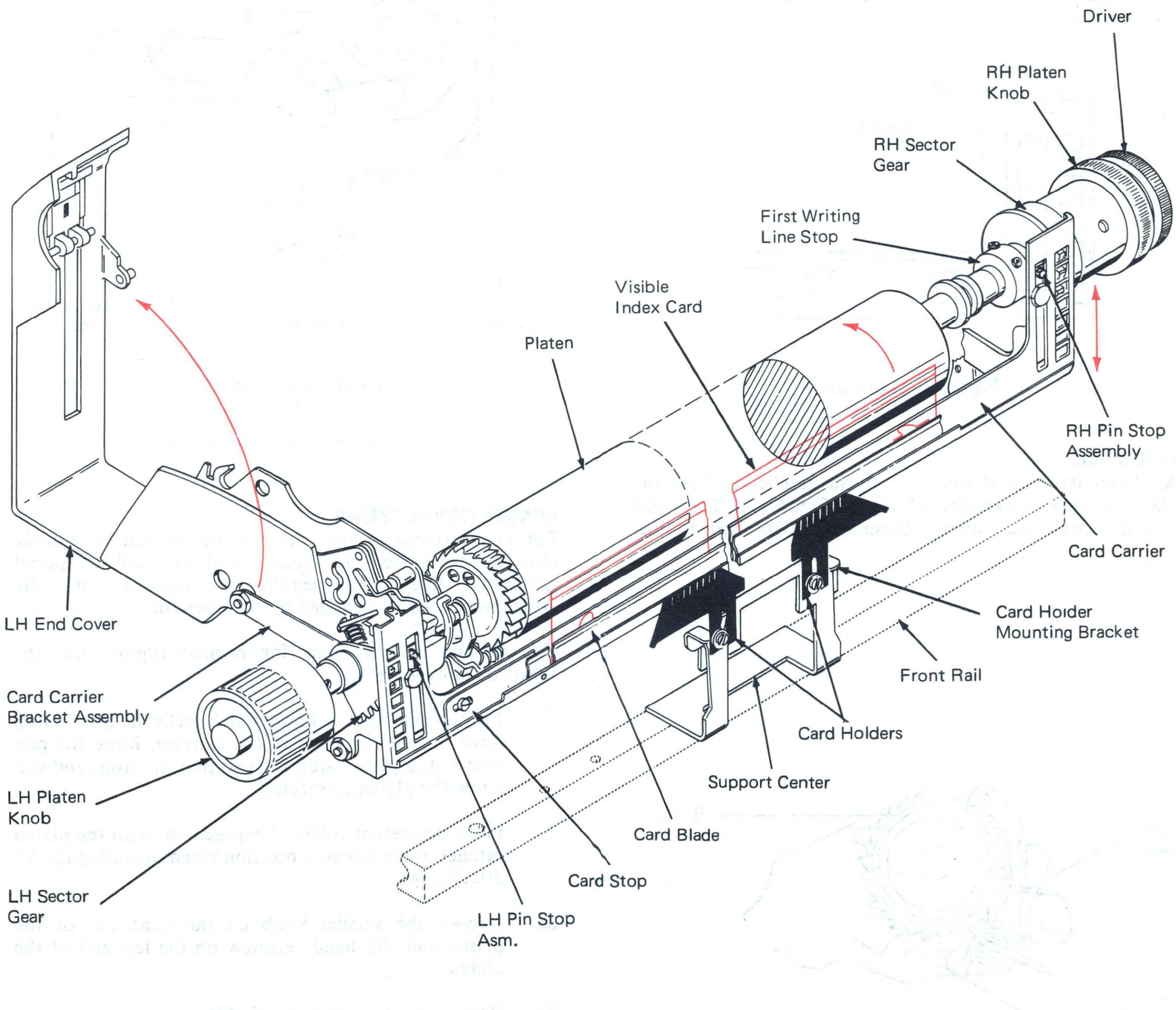


Figure 1 – Visible Index Card Platen

CARD CARRIER

During card placement, the card carrier is positioned by turning the platen toward the rear until the card carrier reaches the upper limit of movement.

The carrier is then in a position slightly above the normal ribbon level and the card can be inserted and located against the LH card stop where it is held in proper registration (Figure 2).

Operation of the carriage return mechanism linespaces the card where more than one line of typing is required. After the card is typed, the platen should be advanced by hand to raise the carrier to the upper position where the complete card can be removed and the next card inserted. (The person typing must be informed about typing with the card carrier in this raised position as the type will strike the metal carrier.)

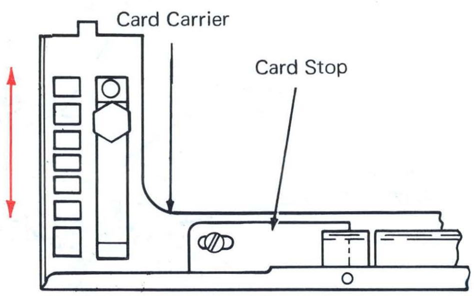
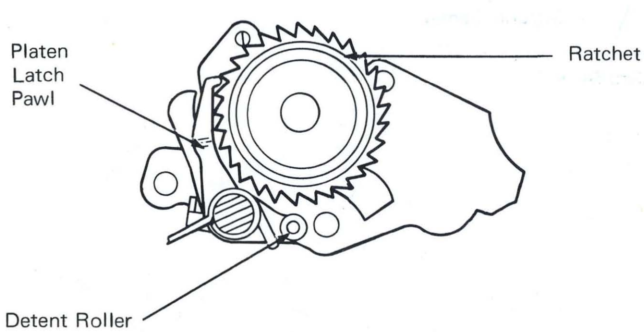


Figure 2 – Card Stop

LINESPACE

A platen latch pawl operates in the ratchet to hold the platen during linespacing of cards (Figure 3). The usual detent roller is used during linespacing of standard typing.

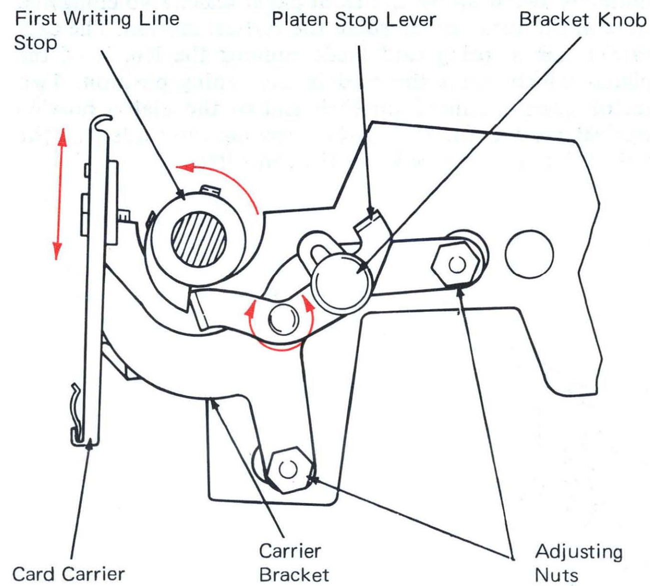


(Right Side View)

Figure 3 – Platen Latch Pawl Operation

FIRST WRITING LINE STOP

An adjustable first writing line stop is used with the horizontal card stop to properly position the card for typing (Figure 4). The platen stop lever is mounted on the RH card carrier bracket and while in the active position, serves to limit the rotation of the first writing line stop.



(Right Side View)

Figure 4 – Platen Stop Lever

CONVENTIONAL TYPING

For conventional typing, the card carrier can be quickly changed to a non-functioning position, and a special removable line gauge cardholder supplied with the attachment is easily installed by the operator.

To prepare the machine for normal typing, use the following procedure:

1. Loosen the bracket knob which locks the platen stop lever on the right end of the carriage. Raise the rear end of the platen stop lever so that the front end will allow the platen to rotate.

2. Place the detent roller in engagement with the platen ratchet in the released position when operating the VI attachment.

3. Loosen the smaller knob on the right end of the platen and the hand setscrew on the left end of the platen.

4. Replace the line gauge cardholders.

INDEX CARD TYPING

To prepare the machine for visible index card typing, use the following procedure:

1. Lift the line gauge cardholder out of the typewriter.

2. Hold the card carrier down and rotate the RH sector gear upward until the tops of the teeth just touch the tops of the square holes in the card carrier. Hold it in this position while tightening the smaller knob on the right end of the platen.

3. Hold the card carrier down and rotate the LH sector gear upward until the tops of the teeth just touch the tops of the square holes in the card carrier. Center the teeth of the section (left-right) in the square holes of the card carrier and tighten the hand setscrew.

4. Engage the platen latch pawl with the platen ratchet.

5. Rotate the platen to bring the card carrier all the way up.

6. Loosen the bracket knob on the right end of the carriage. Push down on the rear of the platen stop lever and tighten the knob.

7. Pull the paper release lever forward.

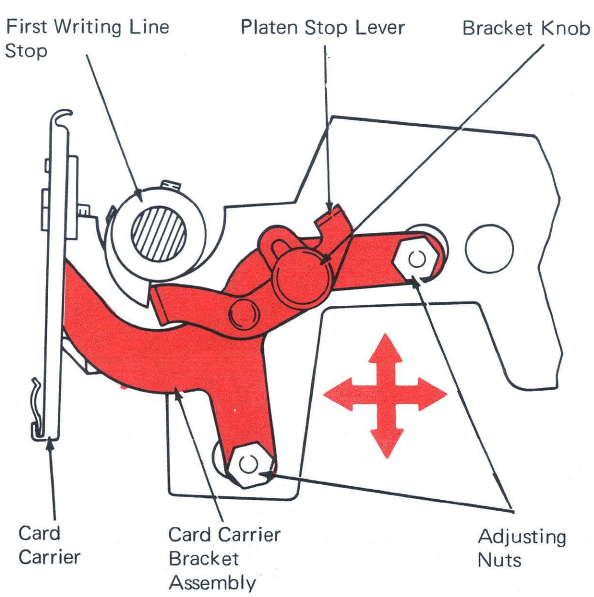
8. Hold the platen variable button in and rotate the platen down until it stops.

NOTE: To maintain proper registration, do not use the platen variable button while the machine is set for card typing.

VISIBLE INDEX CARD HOLDER ADJUSTMENTS

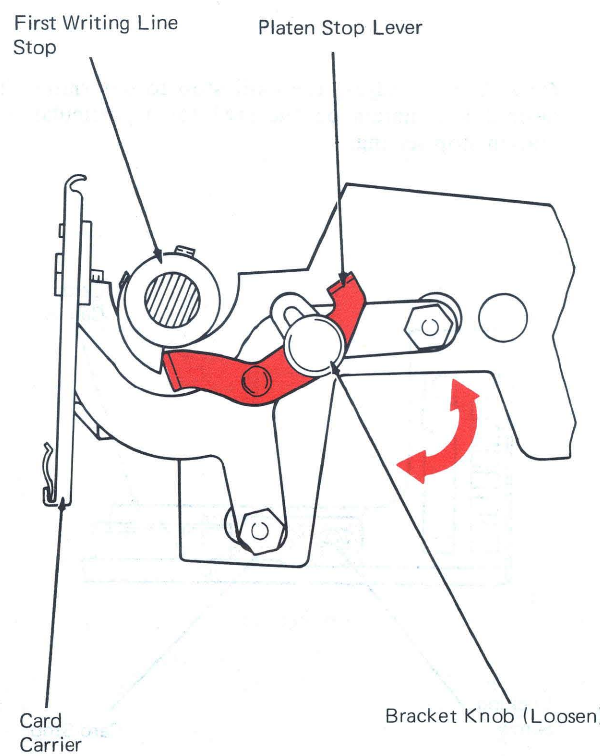
1. *Card Carrier Bracket Assemblies* – Adjust the brackets up or down for a parallel condition of the card carrier. The brackets should be positioned forward or back so that the card carrier is free to move vertically without contacting parts to the front or rear of it.

   NOTE: After any up or down adjustment of either card carrier bracket, it is necessary to perform steps 2 through 8 of the preparation for visible index card typing before checking the parallel condition of the card carrier. This is necessary because the position on both sectors will be affected by an change in the height of the card carrier, and the height of the card carrier is controlled by the card carrier brackets.



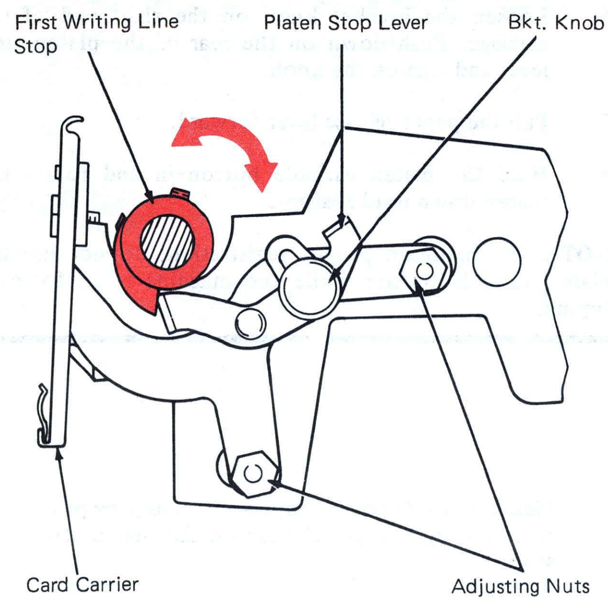
(Right Side View)

2. *Platen Stop Lever* – Adjust the platen stop lever so that it fully engages the lug on the first writing line stop.



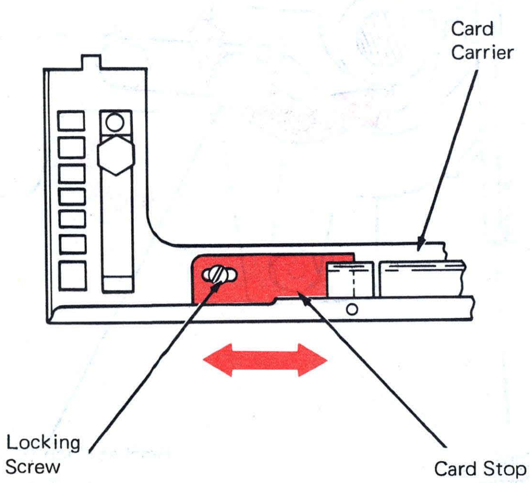
(Right Side View)

3. *First Writing Line Stop* – With the platen latch pawl holding the platen and the card carrier at the desired first writing line position, adjust the first writing line stop to contact the platen stop lever.



(Right Side View)

4. *Card Stop* – Adjust the card stop to determine the desired left margin on the card for a particular left margin stop setting.



The purpose of the leading edge gage is to provide the operator with a method of positioning the tear-off line of the forms directly along the tear-off blade. This should place the first writing line of the form on the writing line of the machine (Figure 1). The forms must be standard with 15/16" (23,81mm) space from the top edge of the writing line to top of the form.

The leading edge gage is usually used with the lift platen formswriter and is operated in the following way:

1. Rotate the gage to the operating (or latched) position.
2. Insert the forms and pull forward until it touches the gage stop.
3. Close platen; the forms should be on the first writing line.
4. Rotate gage to rear (unlatched) position.

The leading edge gage is pivot mounted and is provided with a latch which holds it in the operated position. In the non-operated position, the gage is unlatched and rotated to a position parallel to the carriage. A stop lever mounted on the latch post serves to limit this rotatiion of the gage and is held in position by a detent spring on the underside of the cover.

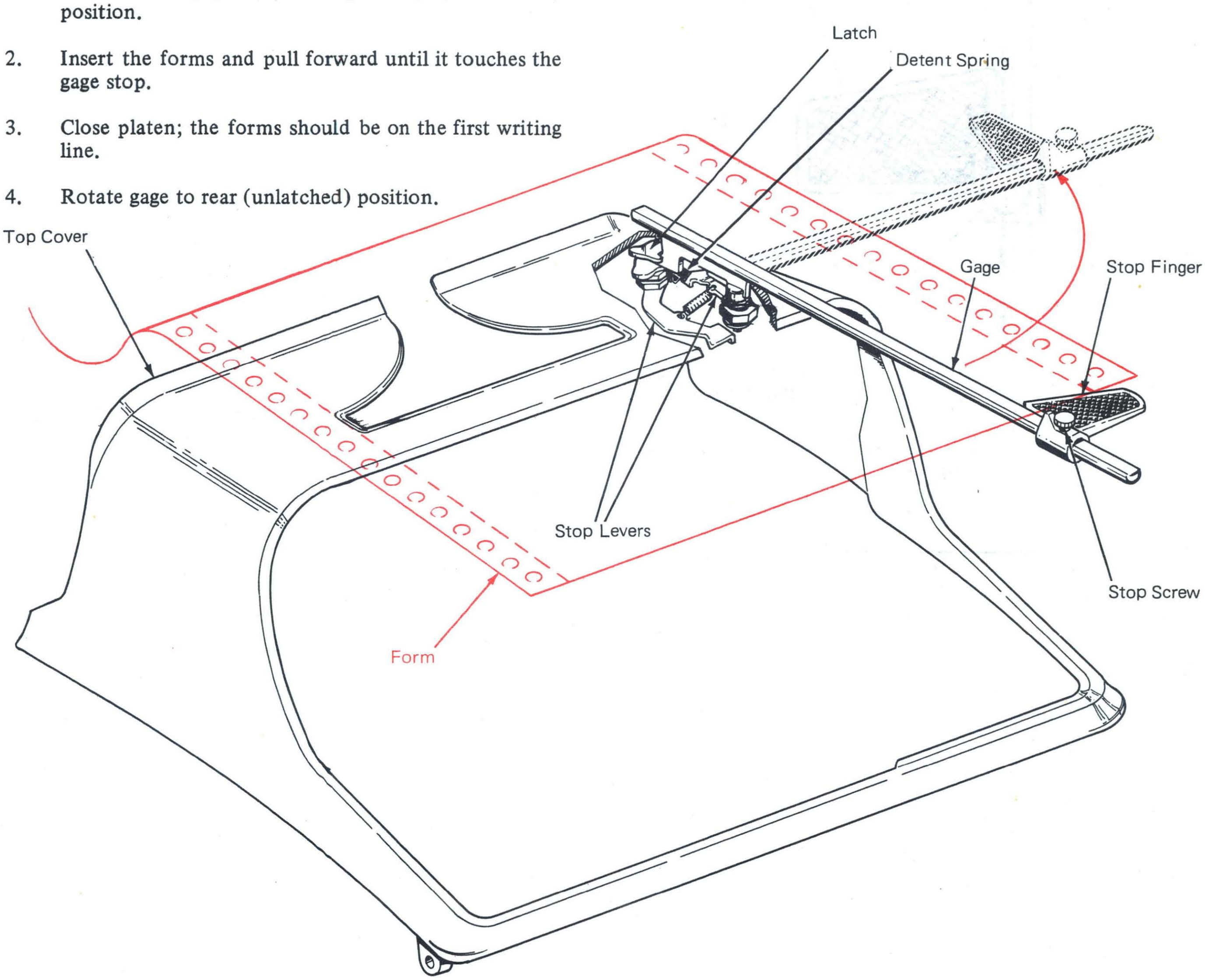
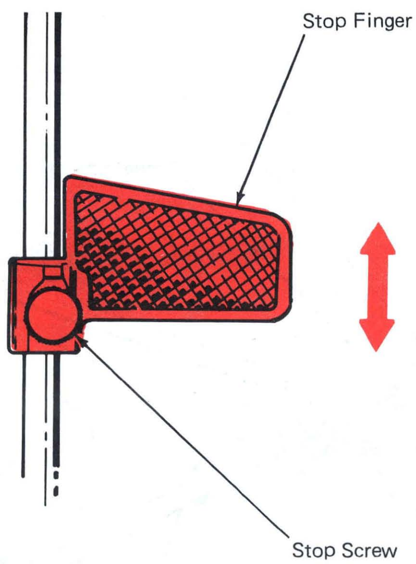


Figure 1 – Leading Edge Gage

LEADING EDGE GAGE ADJUSTMENTS

1. *Stop* – The stop should be adjusted so that the tear-off line will be directly along the tear-off blade when the platen is closed.



(Top View)

The purpose of the form line selector is to provide a way of positioning a pin feed form at the first writing line (Figure 1).

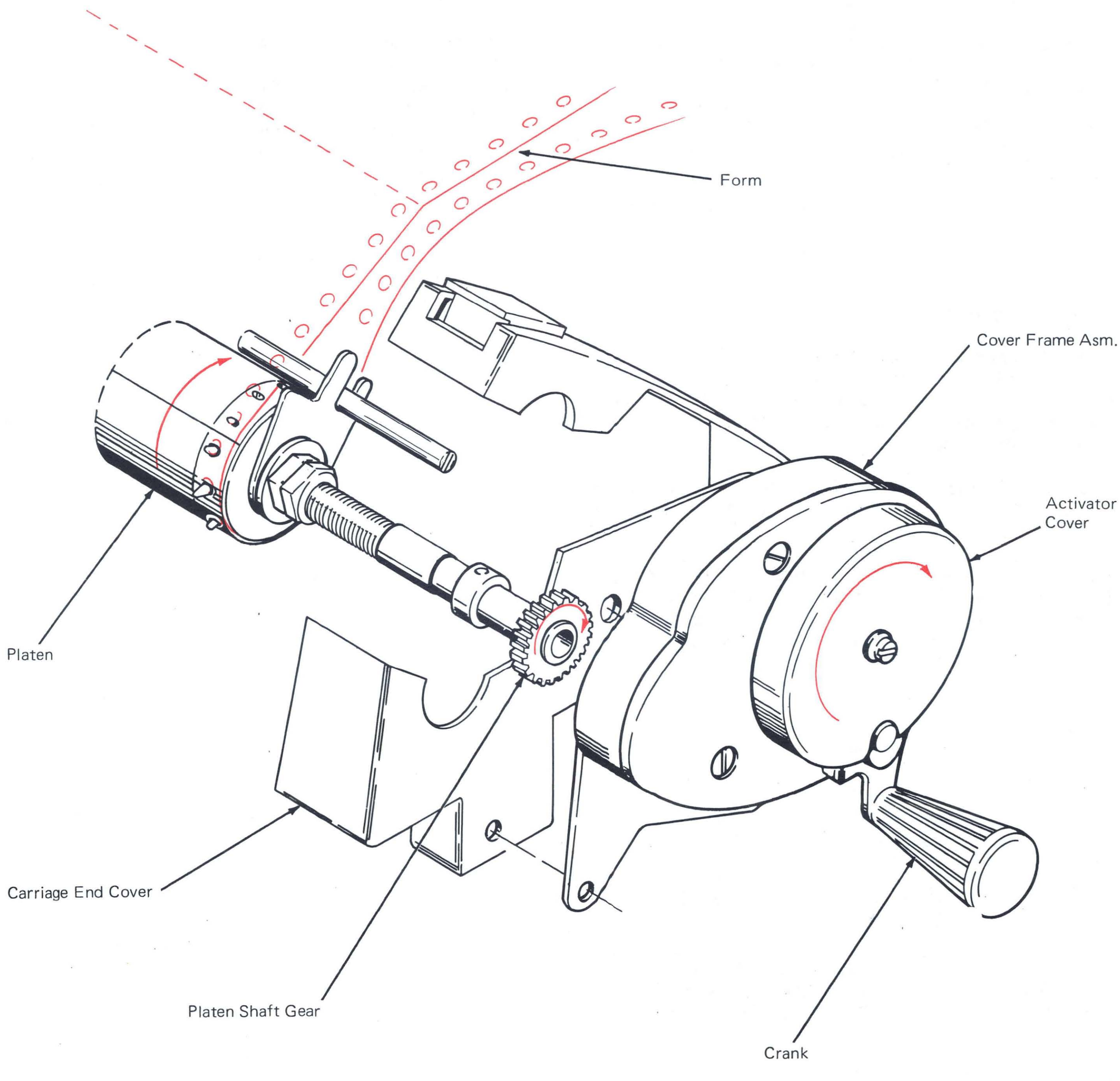


Figure 1 – Form Line Selector

SELECTOR GEARS

The form line selector mechanism is located on the right end of the carriage. It is operated by a crank which is attached to the platen by three gears called the crank gear, the intermediate gear, and the platen shaft gear (Figure 2). As the crank is turned in a clockwise direction (viewed from the right side of the machine), the platen is rotated the required amount to position the forms in the machine.

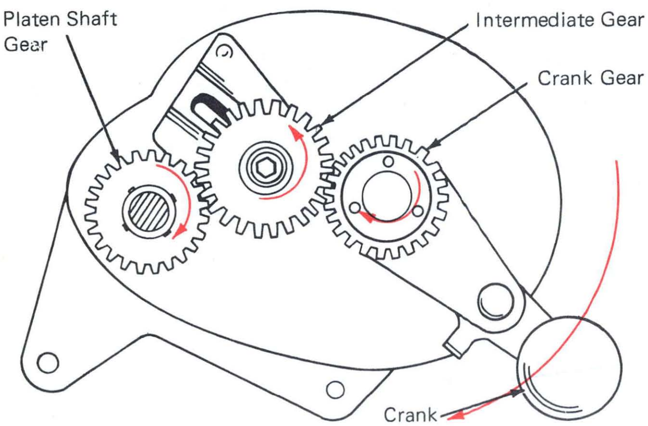


Figure 2 – Gear Arrangement (Right Side View)

ACTIVATOR STOP OPERATION

The activator located on the crank (Figure 2), when turned by hand, is moved into an activator stop. This action stops any further hand rotation on the crank and platen. When the crank is released and a linespace is made, the crank activator bypasses the activator stop and the crank is ready for re-use when necessary.

The activator stop or stops are attached to any of the 18 positions located on a ring on the outside of the frame cover assembly. A stop called the first activator stop has a rounded tip called a pointer (Figure 3). This stop limits the motion of the crank at the first writing line. If there are to be other activator stops, they are without pointers and are usually used to skip from one writing line (not the first writing line) to another within the limits of a form.

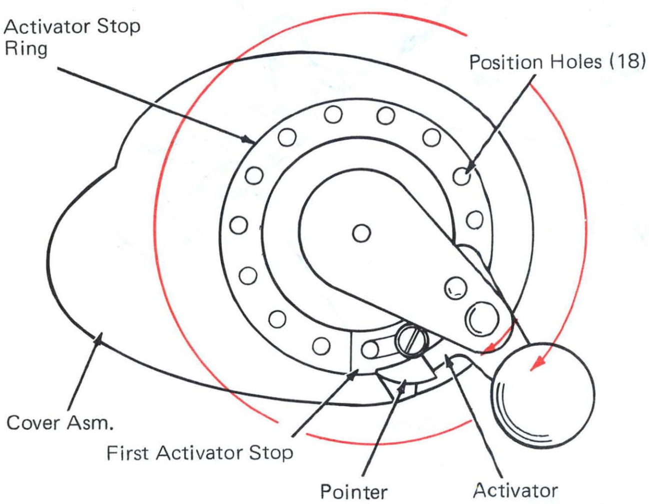


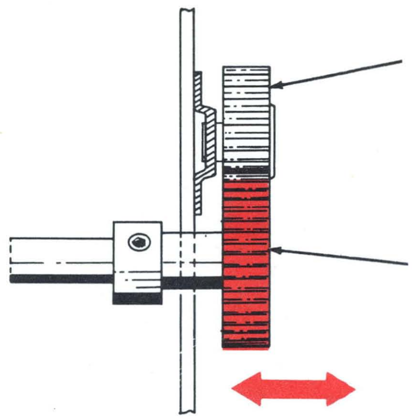
Figure 3 – Activator Stop

See the chart below for proper crank gear size and number of stops required for various forms lengths.

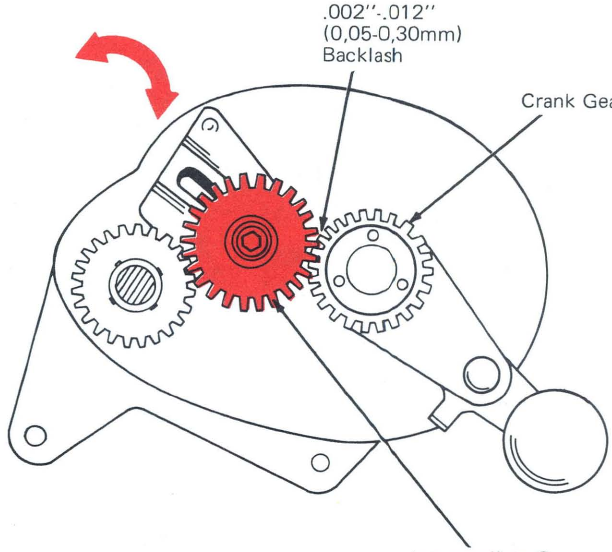
Form Length	Crank Gear Size (No. Of Teeth)	Required Stops For First Writing Line
1 3/4" (45mm)	42	4
1 5/6" (47,6mm)	44	4
2" (50,8mm)	48	4
2" (50,8mm)	36	3
2 1/2" (64mm)	60	4
2 3/4" (70mm)	66	4
2 5/6" (72mm)	51	3
3" (76,2mm)	36	2
3 1/3" (85mm)	60	3
3 1/2" (89mm)	42	2
3 2/3" (93,1mm)	44	2
4" (101,6mm)	48	2
4 1/4" (108mm)	51	2
5" (127mm)	60	2
5 1/2" (139,7mm)	66	2
6" (152,4mm)	36	1
7" (177,8mm)	42	1
7 1/3" (186,3mm)	44	1
8" (203,2mm)	48	1
8 1/2" (216mm)	51	1
10" (254mm)	60	1
11" (279,4mm)	66	1
12" (304,8mm)	72	1

FORMSLINE SELECTOR ADJUSTMENTS

1. *Platen Shaft Gear* – Adjust the platen shaft gear left to right so that it aligns with the intermediate gear.

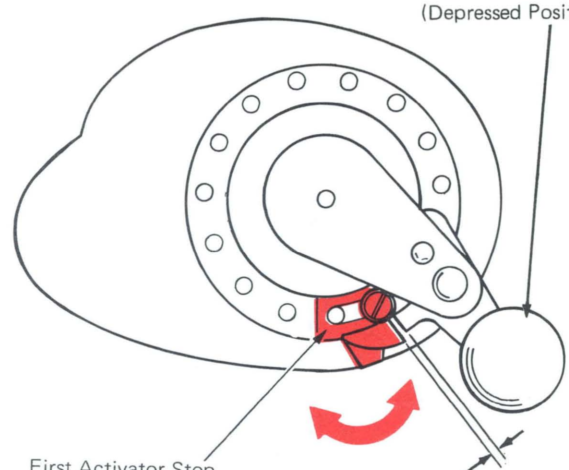


2. *Intermediate Gear* – Adjust the intermediate gear front-to-rear so that there is a backlash of .002-.012" (0,05-0,30mm) between the gear and the crank gear.



(Right Side View)

3. *Activator Stop* – With the form at the desired first writing line, position the first activator stop (with the pointer) so that it will have 1/64" (0,40mm) clearance with the activator in the depressed position.



(Right Side View)

REMOVAL PROCEDURES

This section contains removal procedures for main assemblies/components only. The Model C and D Adjustments/Parts Manual shows detail drawings of all parts and should be used when further removal or replacement instructions are required. The drawing shows the location of the component to be removed and names main parts that are involved in the removal.

Some removals refer back to certain steps of a previous removal to prevent repeating the same information.

COVER REMOVAL (MECH 04)

LEVEL 3 (D1, D4)

1. Remove the rear cover. Place a screwdriver between latch lugs and pull down (Figure 1).
2. Remove the front cover by forcing out on the hinge brackets and lifting up and forward.
3. Remove the keyplate.
4. Remove the two front frame screws from the inside of the machine.
5. Lift machine out of bottom cover.

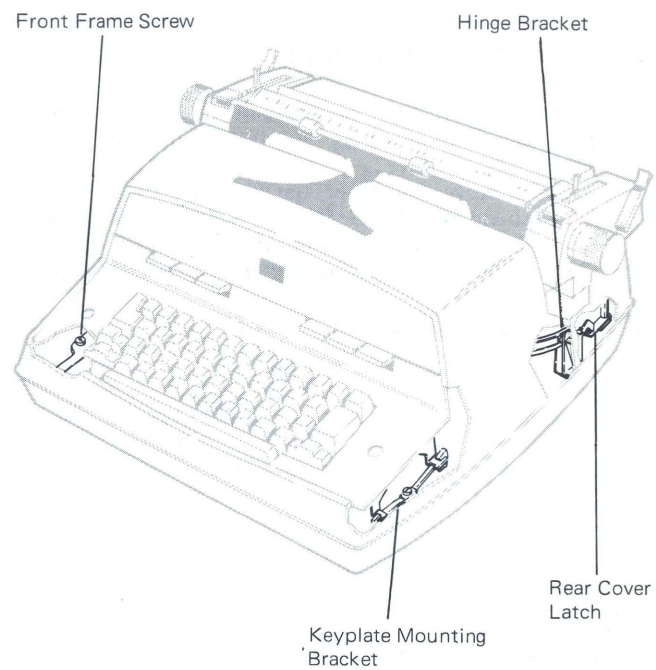


Figure 1 – Cover Removals

COVER REMOVAL LEVEL 1 AND 2 (C1, C4)

REFER TO THE APM FOR DRAWINGS

1. Remove the two screws from the top of the rear cover. Lift off cover.
2. Remove front cover and keyplate (same as Level 3).
3. Remove the four base screws on the bottom cover (Level 1) and the two front frame screws from the inside of machine (Level 2).
4. Lift machine out of bottom cover.

MOTOR REMOVAL (MECH 11)

1. Remove covers (refer to cover removal).
2. Tilt machine up. Remove bottom cover on Level 1.
3. Remove motor pulley and drive belt (Figure 2).
4. Insert the blade of the large screwdriver between the right motor clamp and the right end of the motor.
5. Force the clamp to the right and the motor to the left. At the same time, work the motor out until it is clear of the right clamp.
6. Remove the motor from the machine.
7. The following adjustments should be checked after replacing the motor:
   a. Motor clutch and motor clutch collar.
   b. Drive belt tracking.
   c. Drive belt tension.

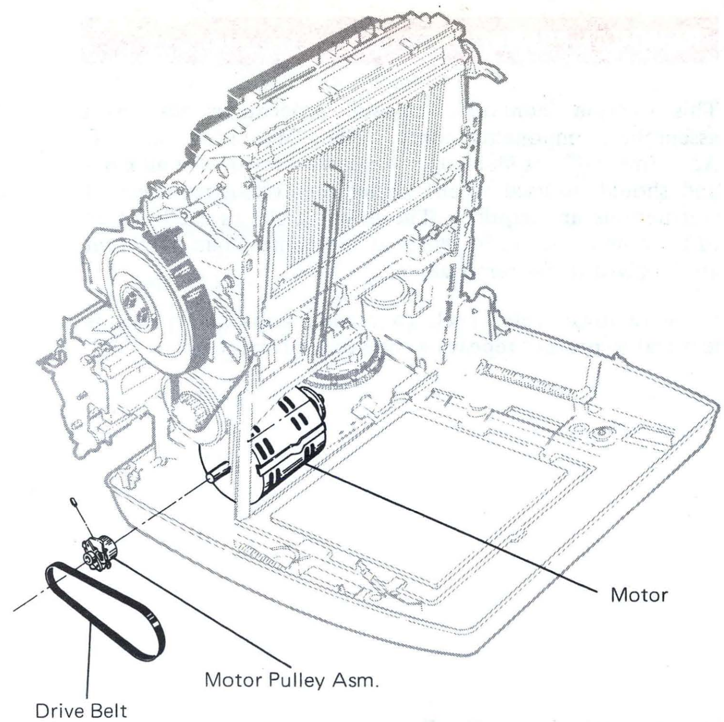


Figure 2 – Motor Removal

POWER ROLL REMOVAL (MECH 11)

1. Remove ribbon feed pawl assembly and intermediate gear (fabric ribbon only – late Model C and Model D).
   a. Remove the outer flange, inner flange, lower shield and clutch. On early C remove the ribbon mounting plate (carbon ribbon only).
2. Remove the power roll pulley and driven belt (Figure 3).
3. Latch up the carriage return clutch.
4. Remove the three screws from the LH power roll bearing.
5. Remove the power roll and LH bearing.
6. The following adjustments should be checked after replacing the power roll:
   a. Power roll end play.
   b. Cam clearance.
   c. Driven belt tension.
   d. Ribbon feed bellcrank link (fabric ribbon).
   e. Rapid rewind link (fabric ribbon).

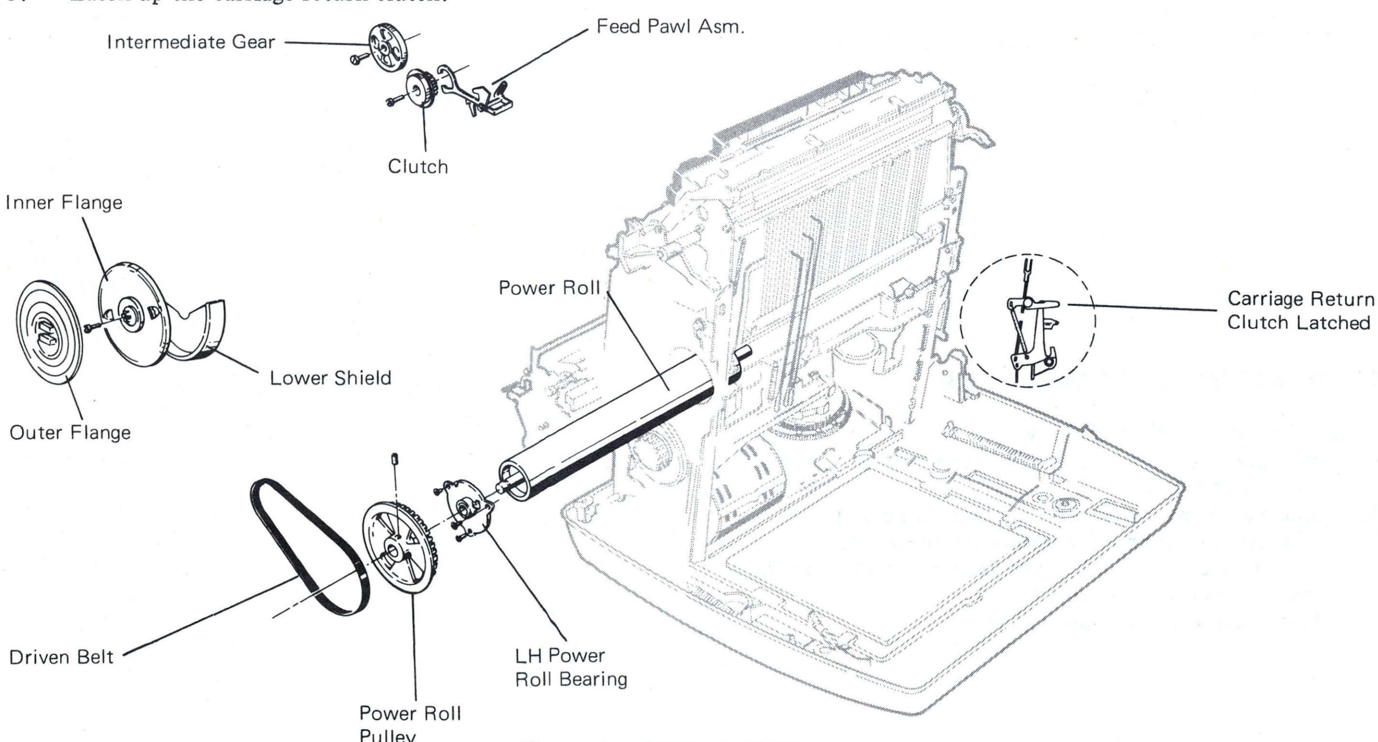


Figure 3 – Power Roll Removal

CARRIAGE REMOVAL (MECH 03)

1. Disconnect the carriage tension and carriage return tapes from the carriage. Connect both tapes to the railguards to prevent losing their adjustments (Figure 4).
2. Remove the paper table.
3. Remove the platen.
4. Remove the margin reset bracket.
5. Remove carriage end covers.
6. Remove tab lever mounting stud.
7. Move the carriage to the right until the end plate contacts the margin control lever.
8. Using heavy screwdriver, lift end plate over the lug on the margin control lever and remove carriage.
9. The following adjustments should be checked after replacing the carriage:
    a. Carriage truck installation.
    b. Margin reset bracket.
    c. End cover.
    d. Tab latching.

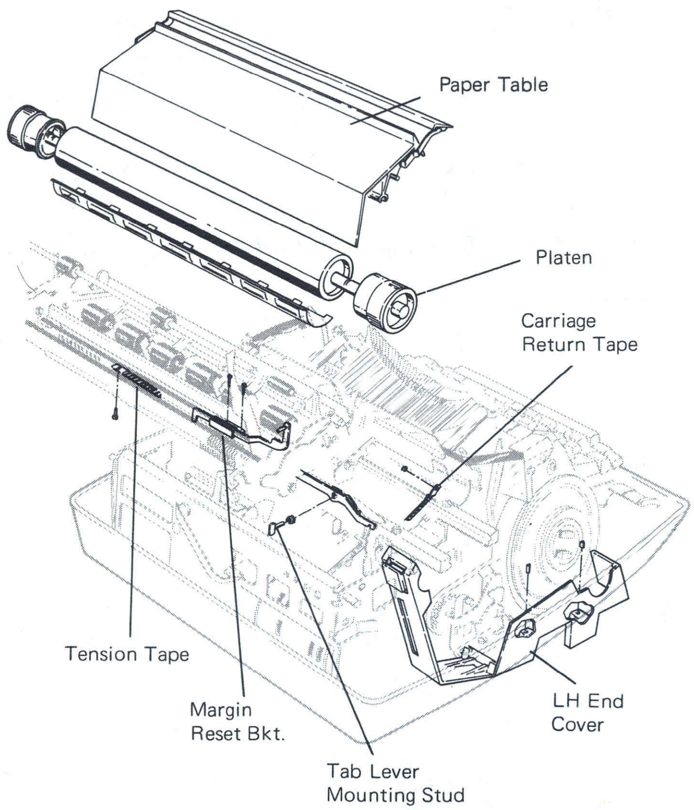


Figure 4 – Carriage Removal

INNER CARRIAGE REMOVAL (MECH 02)

REFER TO THE APM FOR DRAWINGS

1. Remove the paper table, platen and both platen retaining plates.
2. Remove the front rail dust cover and eccentric collar from the left end of the platen guide shaft.
3. Disconnect the copy control lever link.
4. Release the detent roller spring and disconnect the carriage return tape.
5. Disconnect the springs which connect the inner carriage to the outer carriage.
6. Move the carriage to the far right and pull forward on the inner carriage to remove it.
7. The following adjustments should be checked after replacing the carriage assembly.
    a. Platen retaining plate.
    b. Ring and cylinder.
    c. Cardholders.
    d. Repositioning indicator (C4, D4, only).

DECELERATOR REMOVAL (MECH 06)

1. Remove covers. (Refer to cover removal.)
2. Remove carriage tension tape and release the mainspring tension (Figure 5).
3. **Install mainspring safety clips.**
4. Remove centrifugal governor.

NOTE: Steps 5, 6, and 7 apply to late Model D with decelerator adjusting plate on rear frame. For early level machines go to Step 8 and continue removal.

5. Disconnect springs.
6. Remove adjusting plate.
7. Loosen decelerator, slide to rear through enlarged hole in rear frame, and remove through bottom of machine.
8. Disconnect tab set and clear links.
9. Remove drive belt.
10. Remove the rear frame.
11. Remove the decelerator assembly from the machine.
12. The following adjustments should be checked after replacing the decelerator:
    a. Tab and carriage return decelerator arm.
    b. Decelerator end collar.
    c. Decelerator spring clamp.
    d. Decelerator rear support bearing.
    e. Carriage tension.
    f. Governor pinion gear engagement.
    g. Tab set and clear links.
    h. Drive belt tracking and tension.

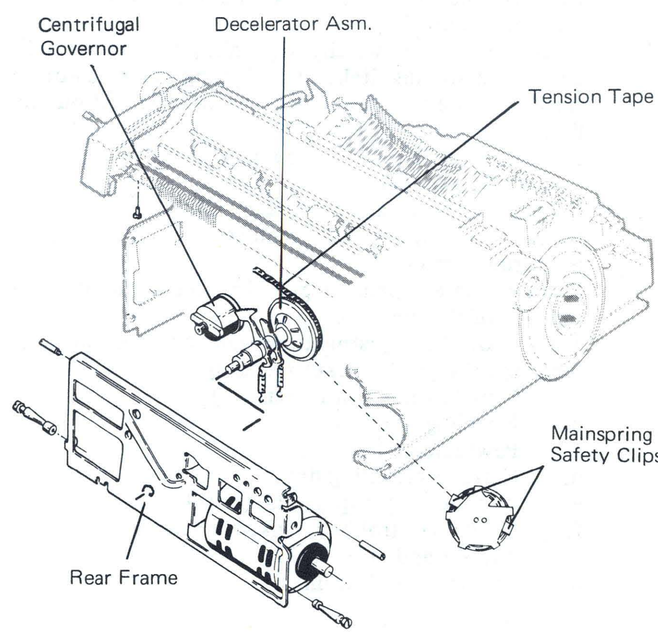


Figure 5 – Decelerator Removal

ESCAPEMENT PAWL BRACKET ASSEMBLY C1, D1 (MECH 06)

1. Perform steps 1 through 7 of carriage removal; do not completely remove carriage. Using the heavy screwdriver, lift the end plate over the lug on the margin control lever and move the carriage to the right until the RH truck is even with the rails.
2. Disconnect the backspace interlock spring.
3. Remove the margin control bellcrank (Figure 6).
4. Disconnect the tab decelerator link.
5. Remove the linelock bellcrank.
6. Disconnect the tab latch and tab lever springs.
7. Remove the pawl bracket mounting screw.
8. Disconnect the half-space link (Model D1).
9. Disconnect the pawl spacer spring (Model D1).
10. As the bracket is removed from the rear, disconnect the escapement pawl spring.
11. The following adjustments should be checked after replacing the pawl bracket.
    a. Margin control bellcrank stop.
    b. Tab decelerator link.
    c. Margin reset bracket.
    d. Linelock link.
    e. Halfspace link (Model D1).

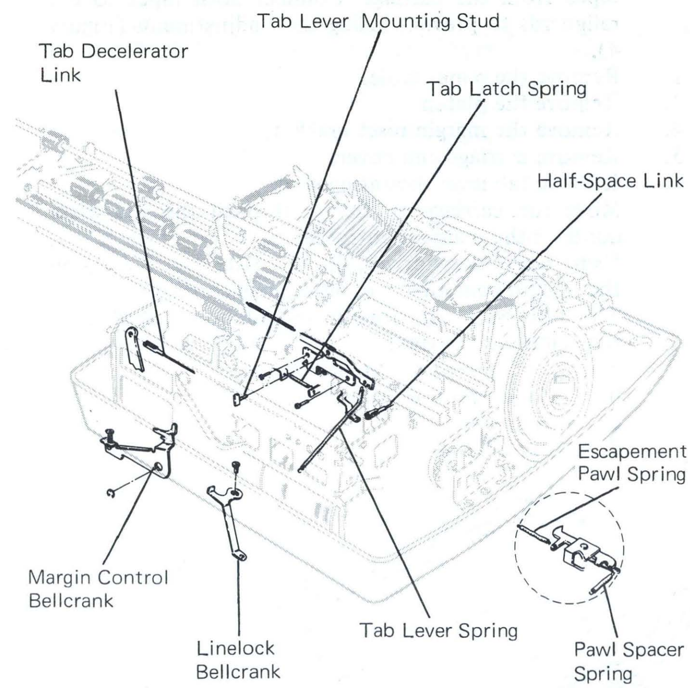


Figure 6 – C1, D1 Escapement Pawl Bracket Removal

ESCAPEMENT PAWL BRACKET REMOVAL C4, D4 (MECH 06)

1. Remove the rear cover and the tab set and clear bracket (Figure 7).
2. Disconnect the pawl aligning link, pawl release link, clutch unlatching link, and aligning lever restoring spring. On Level 2 disconnect the automatic grouping link.
3. Remove the tab lever mounting stud, but do not remove the tab lever.
4. Remove the margin control bellcrank.
5. Block the carriage and remove the pawl bracket mounting screws.
6. Remove the escapement pawl bracket assembly from the rear of the machine.
7. The following adjustments should be checked after replacing the pawl bracket assembly:
    a. Pawl block (must be vertical).
    b. Pawl aligning link.
    c. Pawl release link.
    d. Clutch unlatching link.
    e. Automatic grouping link (Level 2).
    f. Margin control bellcrank stop (Level 2).
    g. Tab set and clear bracket.
    h. Tab set and clear links.

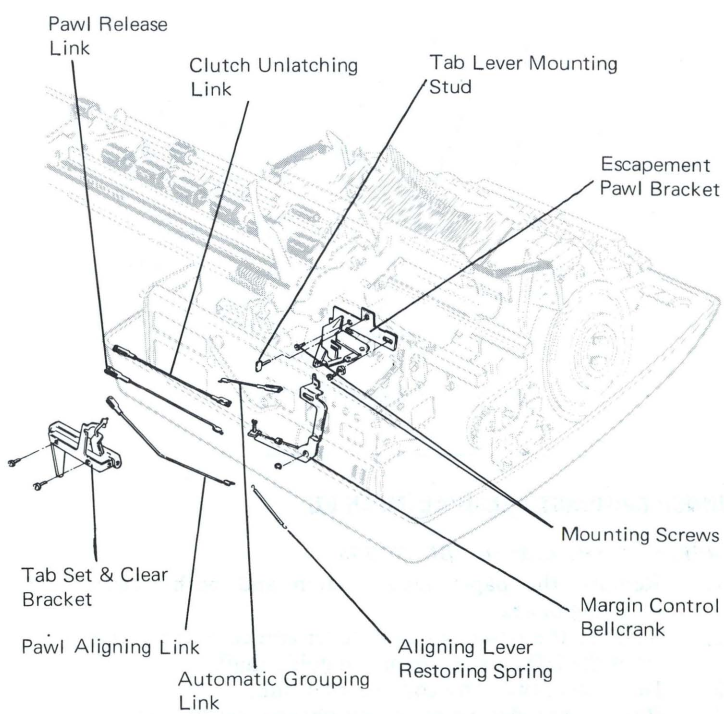


Figure 7 – C4, D4 Escapement Pawl Bracket Removal

RAIL SUPPORT AND INTERPOSER ASSEMBLY REMOVAL (MODEL C4, D4 – MECH 07)

1. Remove the covers (refer to cover removal).
2. Remove drive belt.
3. Remove rear frame assembly with motor (Figure 8).
4. Remove escapement trip link.
5. Disconnect and tape interposer connecting links.
6. Remove interposer bellcrank guide bracket.
7. Remove rail support bracket screw.
8. Loosen, but do not remove, the mounting screws on the rail support bracket.
9. Remove the screws while holding rail support and interposer assembly. Remove assembly through the rear of the machine.
10. The following adjustments must be checked after replacing the parts:
    a. Interposer must be vertical.
    b. Pawl rails – interposer clearance.
    c. Expand bellcrank.
    d. Expand bellcrank arm.
    e. Escapement trip link.
    f. Tab set and clear links.
    g. Rear support bearing.
    h. Drive belt tracking and tension.
    i. Rail adjustments.

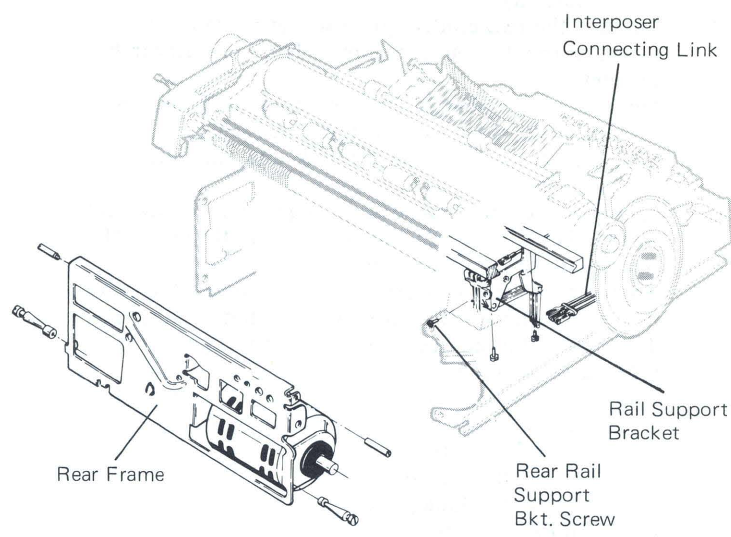


Figure 8 – C4, D4 Rail Support Removal

UNIVERSAL BAR (MECH 06)

1. Remove the platen, deflector, and front rail dust cover (Figure 9).
2. Disconnect the ribbon lift guide clevis and remove the guide from the machine.
3. Drop the type by removing the typebar fulcrum wire.
4. Disconnect the clevis of the escapement trip link.
5. Remove the segment mounting screws.
6. Remove the segment and universal bar from the machine.
7. Remove the two hexagonal screws which hold the universal bar to the segment.
8. The following adjustments should be checked after replacing the parts:
    a. U-Bar (equal escapement point, left, center and right).
    b. U-Bar adjustment plate.
    c. Escapement trip link.
    d. Even top and bottom printing.
    e. Ribbon lift guide.
    f. Cardholders.
    g. Repositioning indicator (C4, D4).

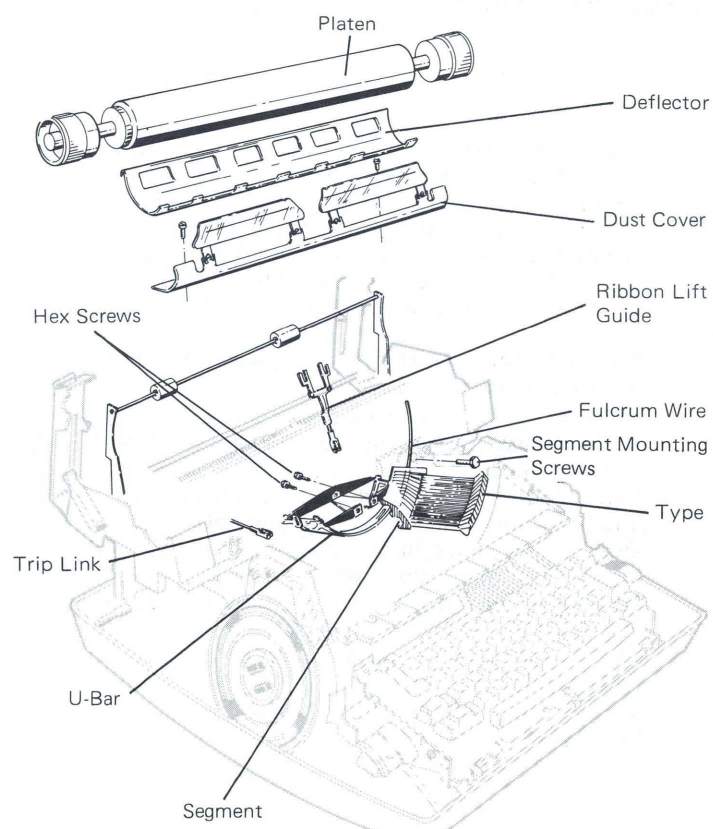


Figure 9 – U-Bar Removal

FINGER BAR AND T-BAR ASSEMBLY REMOVAL (D1, D4 MECH 19)

1. Remove front, rear covers and keyplate (refer to cover removal).
2. Remove the two control plate springs (Figure 1).
3. Remove the two upper screws from the finger bar bracket.
4. Move the finger bar fulcrum wire left and then right disconnecting the impresssion control arms.
5. Disconnect the bail control link and the shift cam release link.
6. Remove the two remaining finger bar screws and work the finger bar assembly out throught the opening in the right side frame.
7. To remove the T-Bar assembly, disconnect the drive link and remove the two range matching plates. The T-Bar assembly can be worked out through the right side frame opening.
8. The following adjustments should be checked after replacing the finger bar and T-Bar assembly:
   a. T-Bar drive link.
   b. Drive link adjusting screw.
   c. Range matching plate.
   d. Impression link.
   e. Upper and lower case knock-off screws.
   f. Shift cam release.

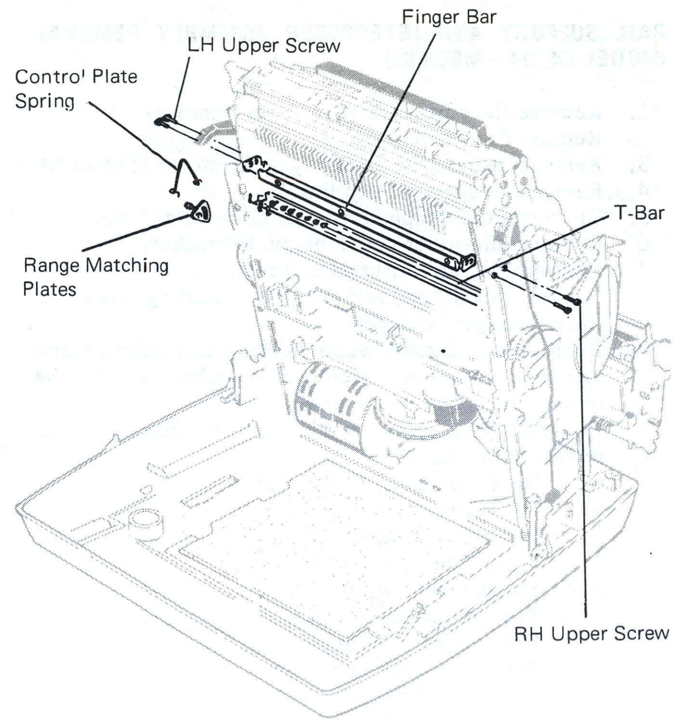


Figure 10 – Finger Bar & T-Bar Assembly Removal

KEYLEVER REMOVAL MODEL D (MECH 19)

1. Remove the top cover, rear cover and keyplate and tilt the machine up (refer to cover removal).
2. Remove the keylever up stop, power roll (refer to power roll removal) and front frame of the "Executive" typewriter. It may also be necessary to remove the flipper button assembly or cut the noise suppressor blanket to remove the keylever (Figure 11).
3. Move the proper typebar to the typeguide and block it with another typebar.
4. Drop the proper cam and one cam on each side. (It is not necessary to completely remove the cams.) (Refer to letter cam assembly removal.)
5. Remove the keybutton and any keybuttons that will interfere with the keylever to be removed.
6. Drop the keylever in the rear and, by raising the keyboard noise suppression blanket, slide the keylever down and to the rear and remove from machine.
7. The following adjustments should be checked after replacing the keylever:
   a. Keylever to trip lever clearance.
   b. Keylever up stop.
   c. Power roll end play.
   d. Flipper buttons (if removed).

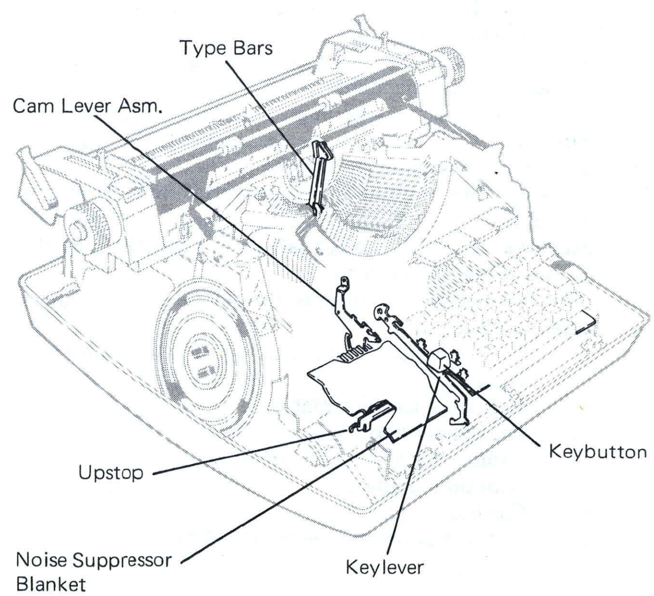


Figure 11 – D1, D4 Keylever Removal

KEYLEVER REMOVAL MODEL C (MECH 19)

REFER TO THE APM FOR ILLUSTRATION.

1. Remove the front cover and keyplate.
2. Disconnect the keylever spring.
3. Remove the keylever up stop.
4. Move the keylever fulcrum wire until the keylever is loose.
5. Bend the keylever so that it will drop between the two letter cams below it. (It may be necessary to carefully separate the letter cams.)
6. Push the fulcrum wire end of the keylever down and toward the rear until the hooked end of the keylever can slip out of the keylever guide comb.
7. Lift the keylever out. It may be necessary to remove the keybutton next to the keylever being removed.
8. The following adjustments should be checked after the keylever is replaced:
   a. Keylever to trip lever clearance.
   b. Keylever up stop.

LETTER CAM LEVER ASSEMBLY REMOVAL (MECH 19)

1. Remove power roll (refer to power roll removal).
2. Remove the typebar from the cam lever to be removed.
3. Insert another fulcrum wire to the proper place and drop the cam lever which is to be removed (Figure 12).
4. Disconnect the cam lever spring from the spring bracket.
5. Remove the assembly from the bottom of the machine.
6. The following adjustment should be checked after replacing the parts:
   a. Power roll end play.

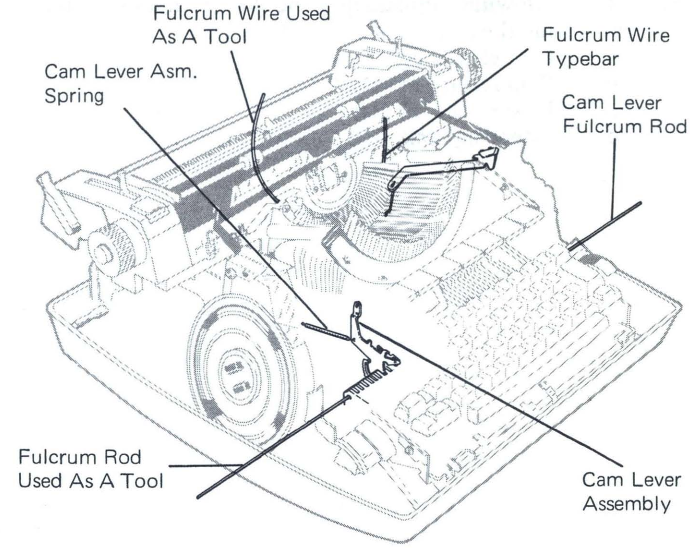


Figure 12 – Letter Cam Lever Removal

OPERATIONAL CAM REMOVAL (MECH 01, 03, 16, 17, 18)

RIGHT HAND OPERATIONAL CAMS (D1, D4)

1. Tilt the machine up in the bottom cover.
2. Remove the power roll (refer to power roll removal).
3. Remove the RH control plate spring.
4. Remove the RH range matching plate.
5. Disconnect the cam release link and operating link.
6. Remove the two C-clips from the cam fulcrum wire and slide the wire to the left to allow the cam to be rotated down.
7. Use a screwdriver and push up on the T-Bar (D1, D4). The cam can be dropped out through the bottom (Figure 13).
8. The following adjustments should be checked after replacing the parts:
   a. Power roll end play.
   b. Cam clearance.
   c. Cam release link.
   d. Range matching plate.
   e. Operating link.

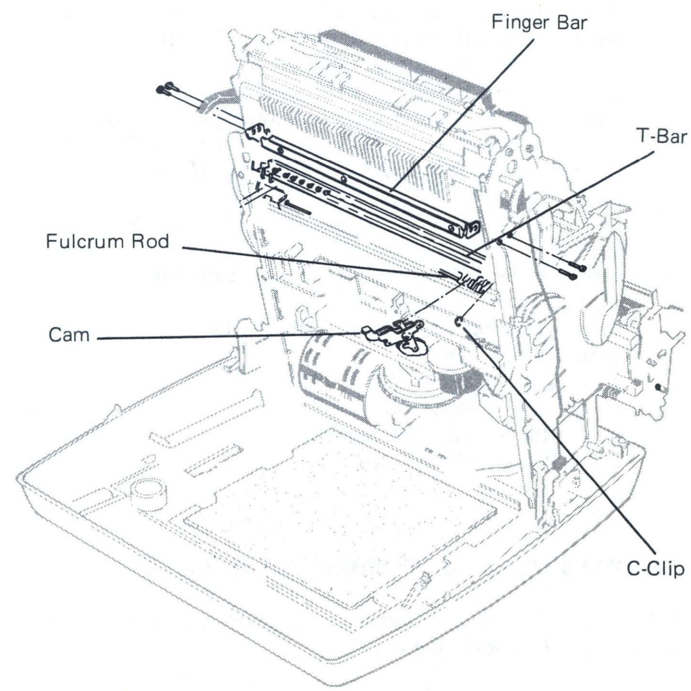


Figure 13 – D1, D4 RH Operational Cam Removal

RIGHT HAND OPERATIONAL CAM REMOVAL (C1, C4)

1. Tilt the machine up in the bottom cover.
2. Remove the power roll (refer to power roll removal).
3. Remove the knockout bar assembly (Figure 14).
4. Disconnect the cam release link and operating link.
5. Remove the two C-clips from the cam fulcrum wire and slide the wire to the left to allow the cam to be rotated down.
6. Remove the cam.
7. The following adjustments should be checked after replacing the cam:
   a. Cam clearance.
   b. Cam release link.
   c. Power roll end play.
   d. Operating link.

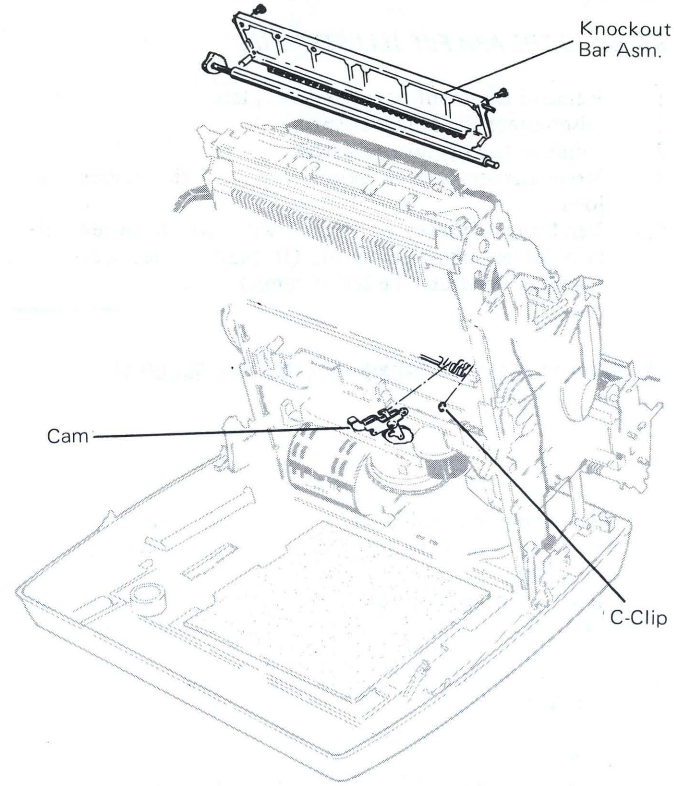


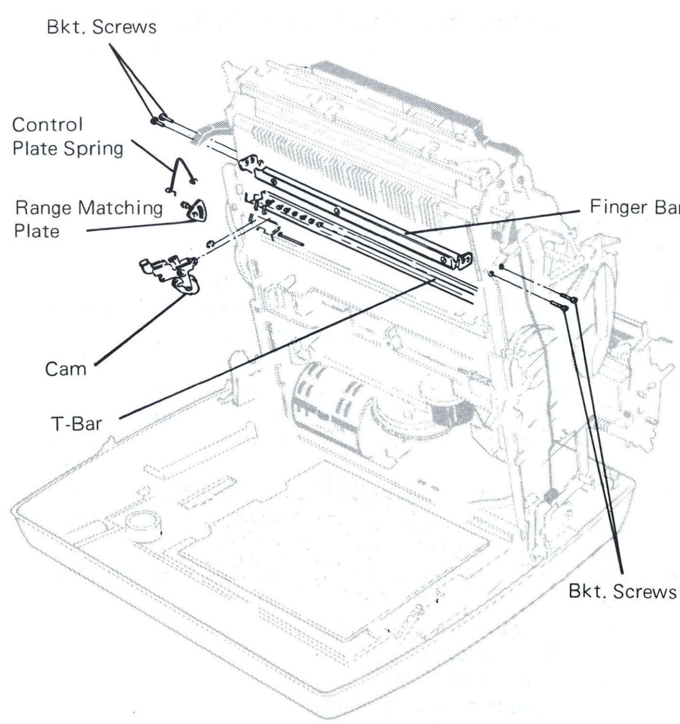
Figure 14 – C1, C4 RH Operational Cam Removal

LEFT HAND OPERATIONAL CAMS (D1, D4)

1. Tilt the machine up in the bottom cover.
2. Remove the power roll (refer to power roll removal).
3. Remove the LH control plate spring (Figure 15).
4. Remove the four finger bar bracket screws.
5. Remove the LH range matching plate.
6. Disconnect the cam release link and operating link.
7. Push the knock-off finger fulcrum wire to the right far enough to disconnect the LH impression control plate.
8. Raise the T-Bar and impression control shaft up and foward.
9. Remove the LH operating cam fulcrum wire, and the cam can now be removed.
10. The following adjustments should be checked after replacing the cam:
    a. Cam clearance.
    b. Cam release link.
    c. Range matching plate.
    d. Power roll end play.
    e. Operating link.

LEFT HAND OPERATIONAL CAM REMOVAL (C1, C4)

Refer to C1, C4 right hand operational cam removal. The removal for both cams is basically the same.



Fiugre 15 – LH Operational Cam Removal

TAB LEVER REMOVAL (MECH 18)

1. Remove the rear cover and paper table (refer to cover removal).
2. Remove the platen, deflector, left end cover and margin reset lever (Figure 16).
3. Disconnect the tension tape and screw it to the RH rail end.
4. Remove the tab lever mounting stud.
5. Push the carriage to the right until the left carriage end plate contacts the final stop on the tab lever.
6. Place the large screwdriver bewteen the tab lever and the end plate and force the tab lever down. This will allow you to push the carriage past the final stop.
7. Disconnect the tab latch spring and tab decelerator link. The tab lever can be lifted straight up and out.
8. The following adjustments should be checked after replacing the tab lever:
   a. Tab latch.
   b. Pawl clearance.
   c. Tab lever extension.
   d. Tab decelerator link.
   e. Margin reset lever.

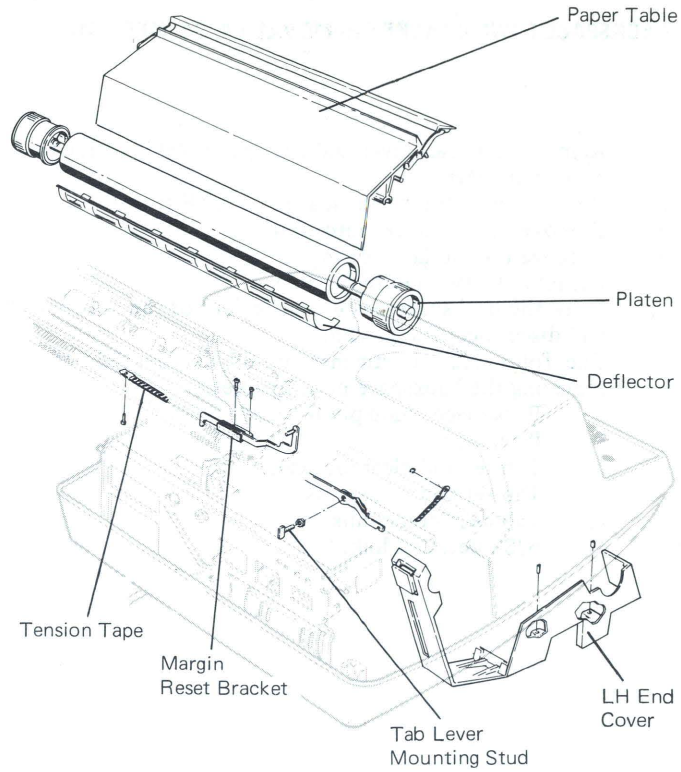


Figure 16 – Tab Lever Removal

BACKSPACE PAWL REMOVAL (MODEL C1, D1 – MECH 01)

1. Remove the rear cover (refer to cover removal).
2. Remove the carriage return/tab interlock (Figure 17)
3. Disconnect any springs that are connected to the hex head backspace mounting bracket stud (Level 1).
4. Disconnect the backspace interlock spring.
5. Remove the two backspace pawl mounting bracket screws.
6. As the bracket is removed from the machine, disconnect the escapement pawl spring.
7. When the bracket is pulled out far enough to turn it to one side, remove the backspace pawl link.
8. The following adjustments should be checked after replacing parts.
   a. Interlock.
   b. Pawl release lever lug.
   c. Pawl guide lug.
   d. Pawl stop.
   e. B/S operating link.

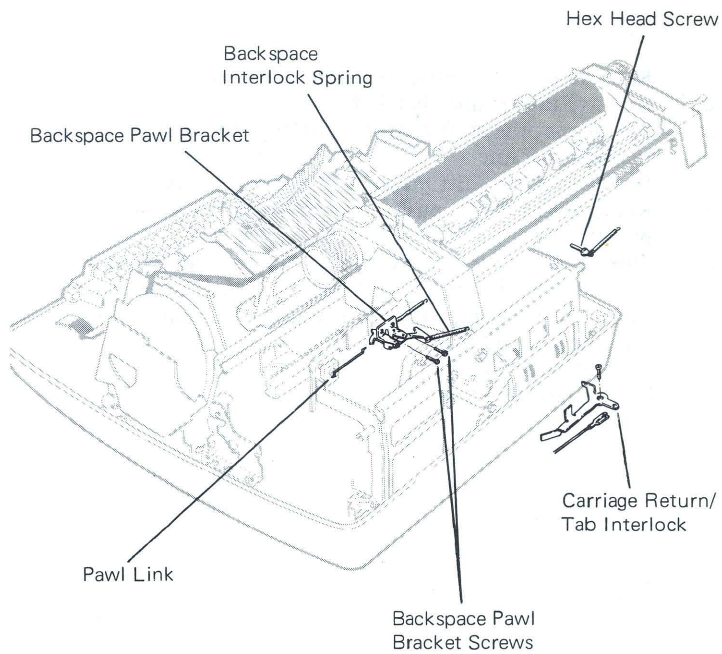


Figure 17 – C1, D1 Backspace Pawl Removal

BACKSPACE PAWL BRACKET REMOVAL C4, D4 (MECH 01)

1. Remove the rear cover and rear paper table (refer to cover removal).
2. Remove the tab set and clear bracket (Figure 18).
3. Remove the tab decelerator link.
4. Remove the tab latch spring.
5. Remove the two mounting screws.
6. Work the backspace pawls bracket out of the machine and disconnect the pawl link.
7. The following adjustments should be checked after replacing the backspace pawl bracket.
   a. Backspace guide pin bracket.
   b. Pawl stop.
   c. Tab set and clear bracket.
   d. Tab set and clear links.
   e. Tab decelerator link.
   f. B/S operating link.

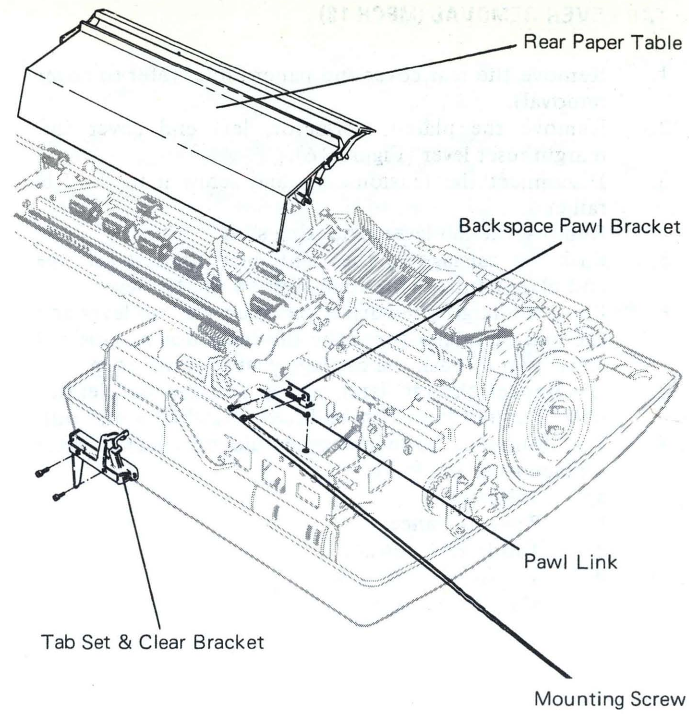


Figure 18 – C4, D4 Backspace Pawl Bracket Removal

SHIFT BUFFER REMOVAL (MECH 16)

1. Remove the shift buffer spring (Figure 19).
2. Remove the retainer bracket.
3. Disconnect the shift pusher actuating arm spring from the power frame.
4. Disconnect the shift pusher and operating links.
5. Remove the shift pusher mounting screw from the power frame.
6. When replacing the shift pusher screw, be certain the shoulder portion is in the hole of the actuating arm.
7. The following adjustments should be checked after replacing the pusher:
   a. Pusher link.
   b. Operating link.

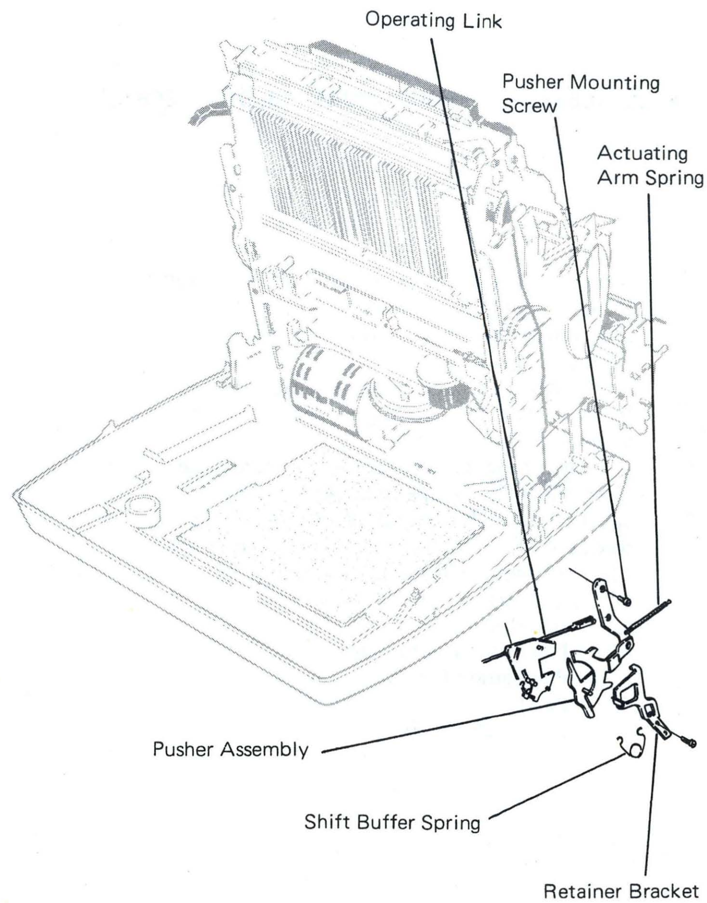


Figure 19 – Shift Buffer Removal

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