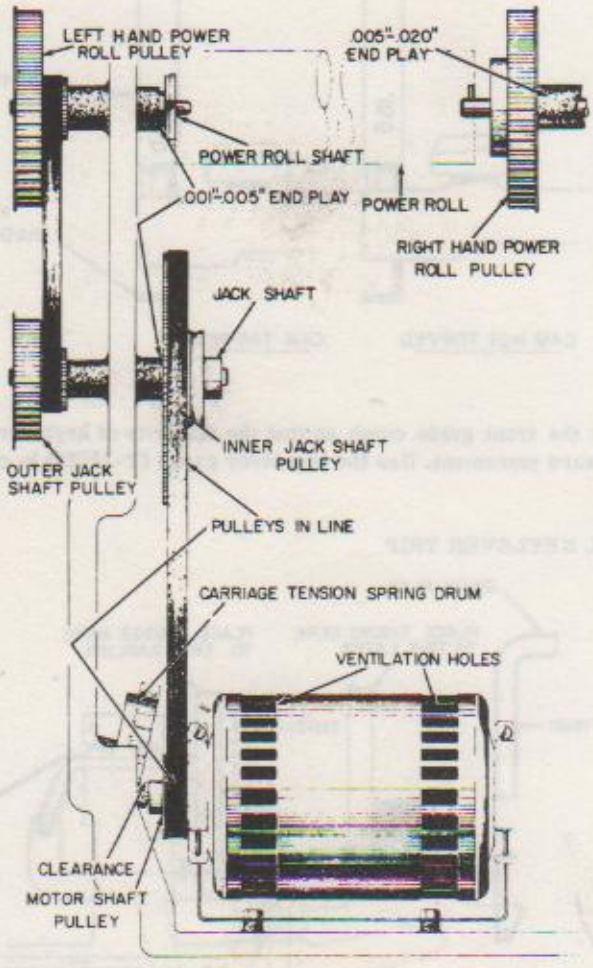
Course: 2300 FLEXOWRITER BASIC (5 Weeks)
2300 UPDATING (1 Week)
DATE: September 23, 1969

Page/Publ.	Description	Remarks
SP 9174	Technical Manual	
1-2-7	Relay's	Parts Man. Page
1-2-8	"	" " "
1-2-9	"	" " "
1-2-10	"	" " "
	Code Chart and Hub Locations 2300	plastified
	Friden Flexowriter Code Chart (Standard Tab. Card punching)	
	Program Chart 2300 Terminal Connector	
	Conversion List Inch-MM	
	Replacement of Cam Springs.	
3301001	Schematic 2301	Printed Quantity: 6
	Specifications of Schematic 3301001	
4503290	Schematic Tabcard Reader	
1100-325	Drawing Tabcard Reader	(2 pages)
	Flexowriter Man. 2200/2300.	
1-1/1-63	Theory Oper. & Adjm. Man. Section	Printed on A4.
2-1/2-20	" " " " " "	" " "
3-1/3-17	" " " " " "	" " "
4-1/4-17	" " " " " "	" " "
5-1/5-23	" " " " " "	" " "
1/23	Theory Oper. & Adjm. Man. Sect. Spec. Feat. "Automatic Vertical Spacer"	" " "
1/25	Theory Oper. & Adjm. Man. Sect. Spec. Feat. "Single Tabcard Reader"	" " "

Friden 2200/2300 SERIES MACHINES

WRITING MACHINE

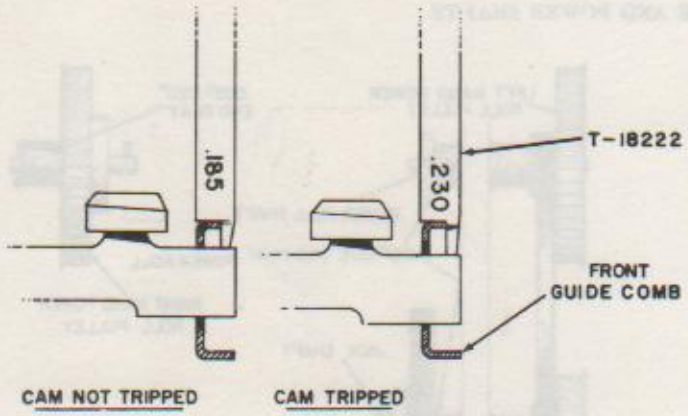
ADJ. 1 MOTOR AND POWER SHAFTS



1. Adjust the jack shaft pulleys for .001" to .005" end play.
2. With the power roll removed, adjust the left hand power roll pulley for .001" to .005" end play.
3. With the power roll removed, adjust the right hand power roll pulley for .005" to .020" end play.
4. Adjust the motor shaft pulley to align with the inner jack shaft pulley maintaining clearance to the carriage tension spring drum.

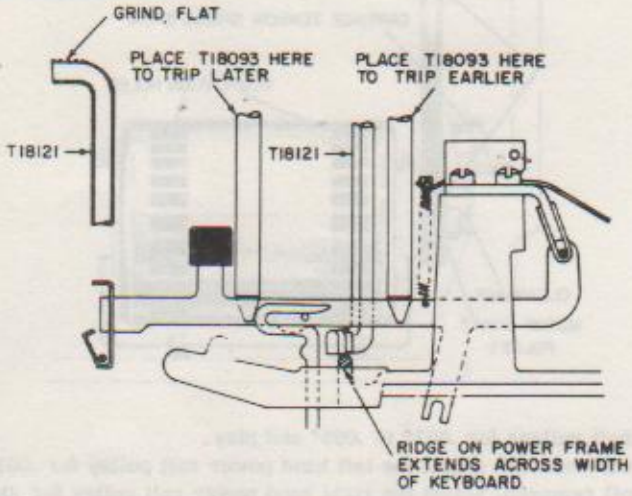
Friden 2200/2300 SERIES MACHINES

ADJ. 2A FRONT GUIDE COMB



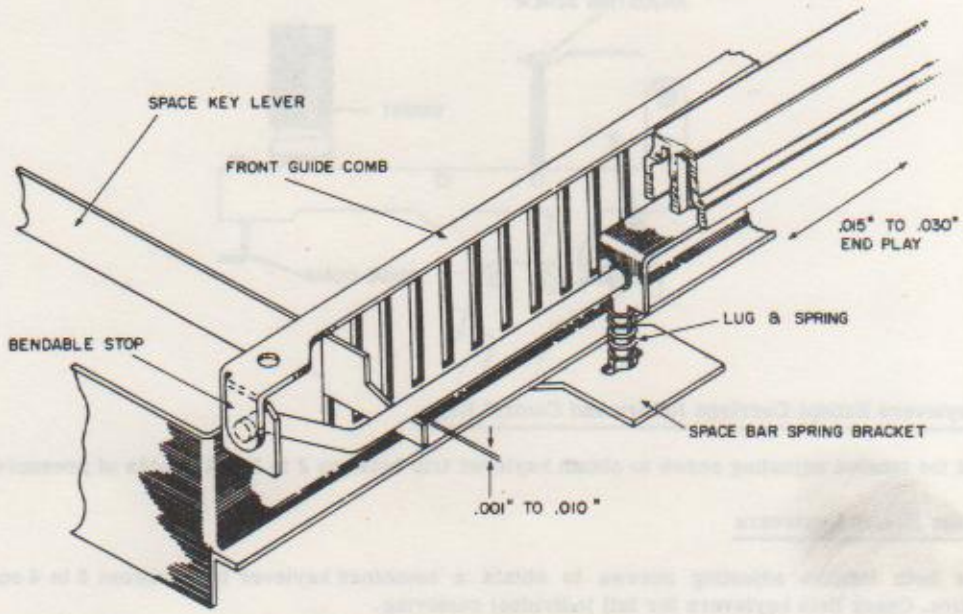
Adjust the height of the front guide comb so that the majority of keylevers trip their cams between .185" and .230" downward movement. Use the trip lever gauge (T-18222) to check this requirement.

ADJ. 2B INDIVIDUAL KEYLEVER TRIP



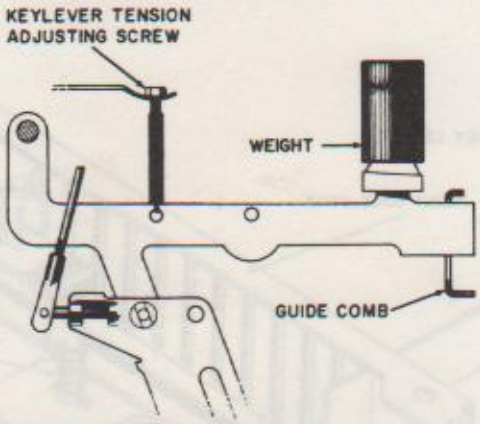
For those keylevers that fall outside the guide comb adjustment range, an individual keylever trip adjustment can be made by forming the keylever. With the keylever supported by selector slide forming tool (T-18121) as shown, place a T-Bender (T-18093) either in front of the support for later cam tripping or behind the support for eariler cam tripping and tap with a hammer.

ADJ. 3 SPACE BAR HEIGHT AND END PLAY



Form the space bar spring bracket to obtain .001" to .010" clearance between the space bar and the space keylever. The bendable stops on the front guide comb may be formed to obtain .015" to .030" end play of the space bar.

ADJ. 4 KEYLEVER TENSION



All Keylevers Except Carriage Return and Control Keys

Adjust the tension adjusting screw to obtain keylever trip between 2 to 3 1/2 ounces of pressure.

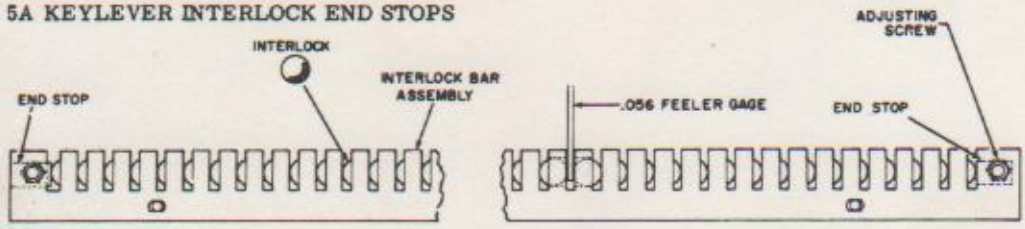
Carriage Return Keylevers

Adjust both tension adjusting screws to obtain a combined keylever trip between 2 to 4 ounces of pressure. Check both keylevers for full individual restoring.

Control Group Keylevers

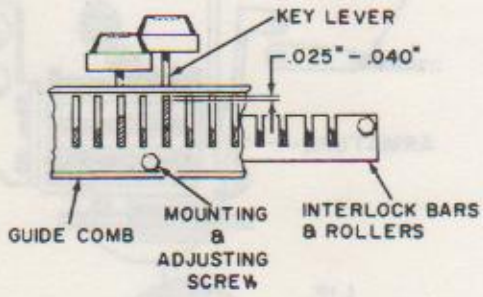
Adjust the tension adjusting screws to obtain micro switch operation between 4 to 6 ounces of pressure.

ADJ. 5A KEYLEVER INTERLOCK END STOPS



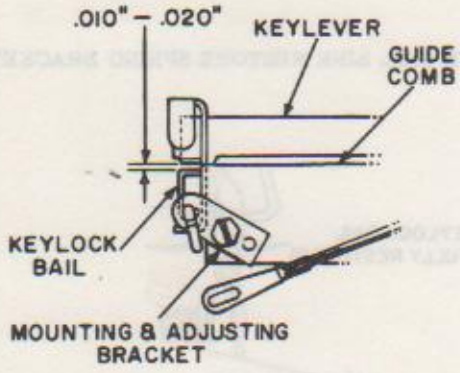
Combine the flat feeler gauges .020", .013", .010", .008", .003" and .002" to obtain .056" and insert into a central slot of the keylever interlock. Position the end stops against the interlocks and tighten their adjusting screws.

ADJ. 5B KEYLEVER INTERLOCK HEIGHT AND ALIGNMENT



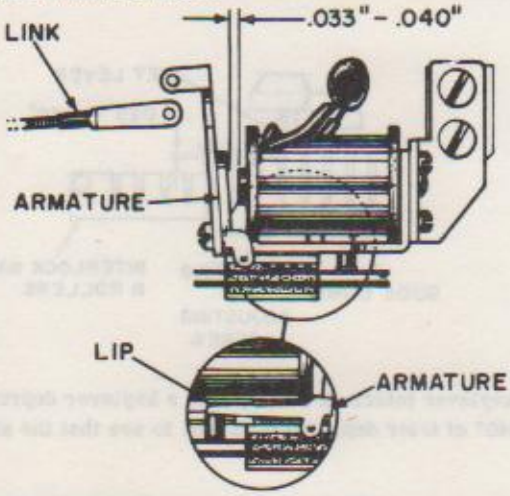
Adjust the height of the keylever interlock so that with a keylever depressed, the other keylevers are interlocked at .025" to .040" of their depression. Check to see that the slots in the guide comb and interlock are aligned.

ADJ. 6 KEYLEVER LOCK BAIL HEIGHT



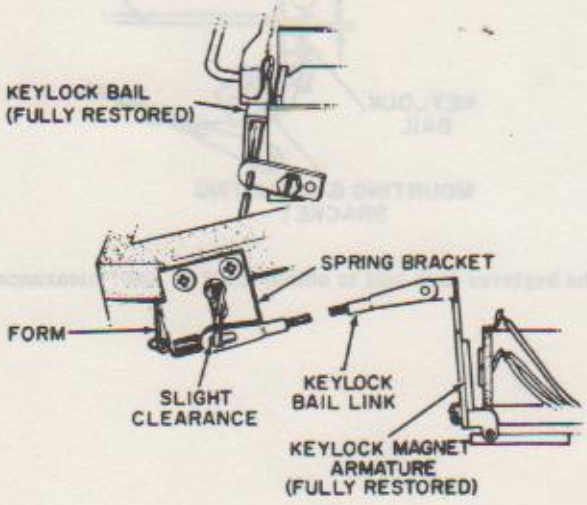
Adjust the height of the keylever lock bail to obtain .010" to .020" clearance to the restored keylevers.

ADJ. 7A KEYLOCK MAGNET ARMATURE GAP



1. With the armature fully restored against the lip, there should be .033" to .040" armature gap at the center of the core.
2. Check for sufficient tension of the moveable contact spring to fully restore the armature against the lip.

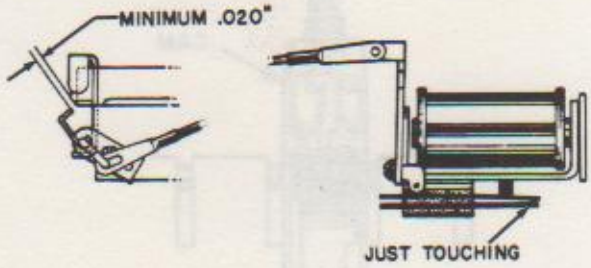
ADJ. 7B KEYLEVER LOCK BAIL LINK RESTORE SPRING BRACKET



1. Form the spring bracket as required to obtain full restoring of the keylever lock bail without excess tension.

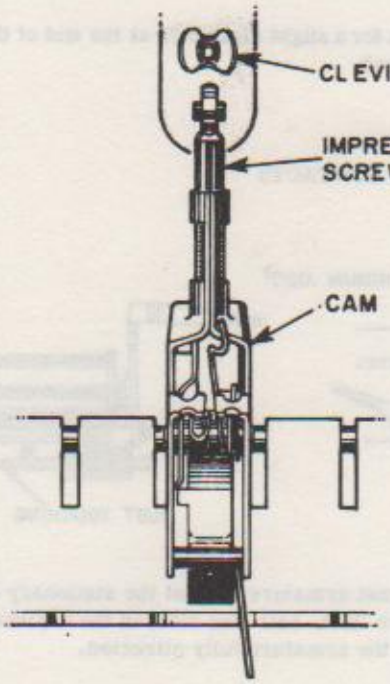
2. Adjust the keylever lock bail link for a slight clearance at the end of the clevis slot with the keylever lock bail and magnet fully restored.

ADJ. 7C KEYLEVER LOCK BAIL CONTACTS



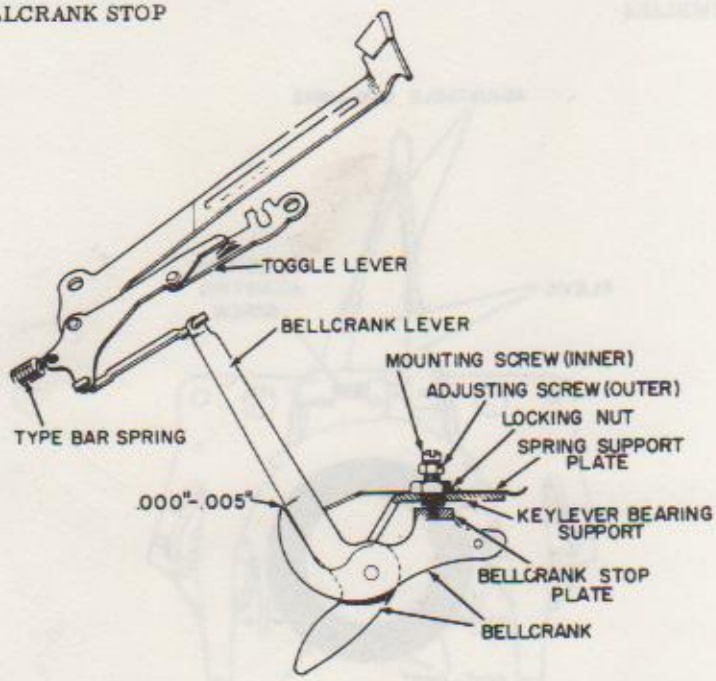
Manually operate the keylock magnet armature. Adjust the stationary contact to make with the moveable contact just as the keylever lock bail has cleared the keylevers by at least .020". Check for .010" minimum contact follow with the armature fully attracted.

ADJ. 8A IMPRESSION SCREWS



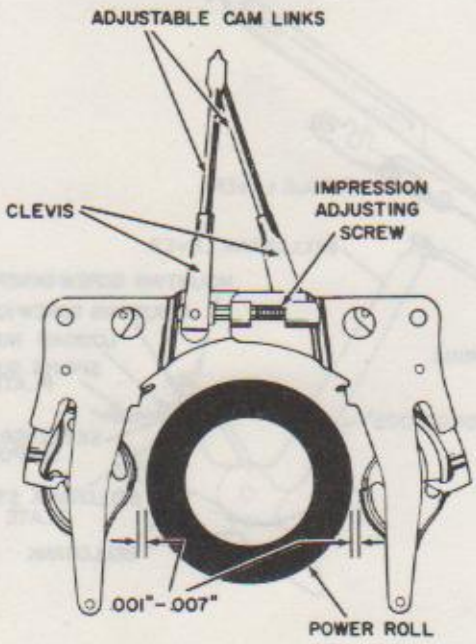
The impression screw is adjusted to increase or decrease the character impression of an individual typebar. Those cams which do not operate typebars should have their impression screws set at the midrange of adjustment keeping in mind that it will affect the distance that parts move when operated by the cam and may be adjusted to prevent a choking off condition if necessary.

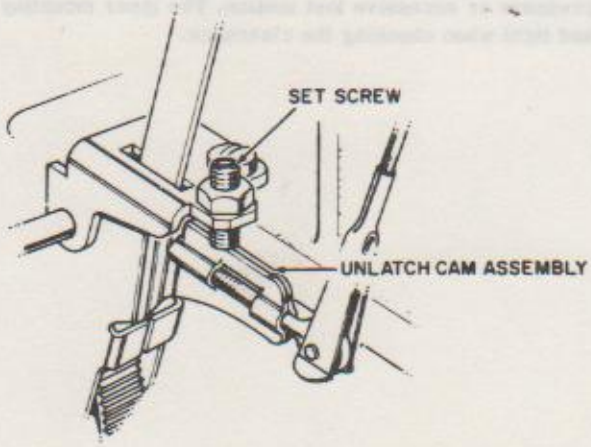
ADJ. 8B BELLCRANK STOP

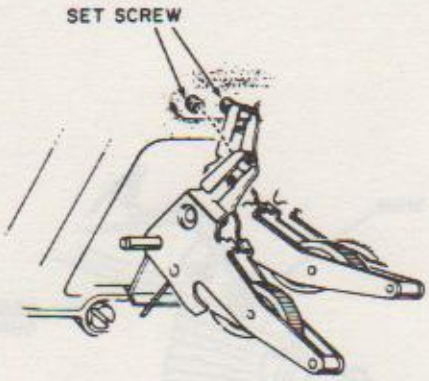


With the power roll removed, adjust the bellcrank adjusting plate up or down to obtain .000" to .005" clearance at the point shown. This clearance can be observed by manually operating the cam assemblies and checking for pressure or excessive lost motion. The inner mounting screws must be loose to change the adjustment and tight when checking the clearance.

ADJ. 8C CAM ASSEMBLIES







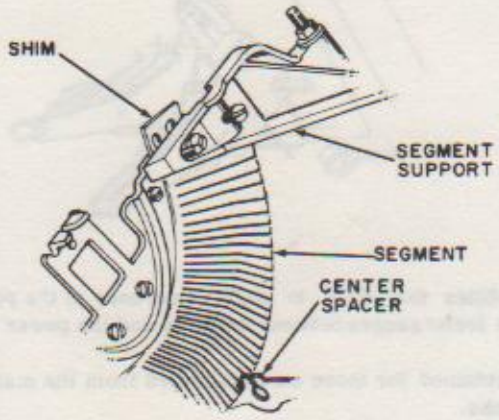
Adjust the cam assemblies for .001" to .007" clearance to the power roll. This clearance can be checked by inserting flat feeler gauges between the cams and the power roll with the machine turned on.

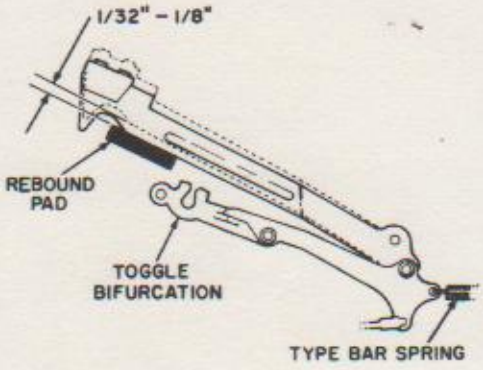
The clearance can be obtained for those cams operated from the main keyboard by turning the clevis on the adjustable cam links.

The unlatch cam is adjusted for clearance to the power roll by turning the set screw in its mounting bracket.

For those machines which have the function keyboard (2201), the cam to power roll clearance is obtained by adjusting the setscrew in the power frame directly above the cam.

ADJ. 9 TOGGLE LOCKING

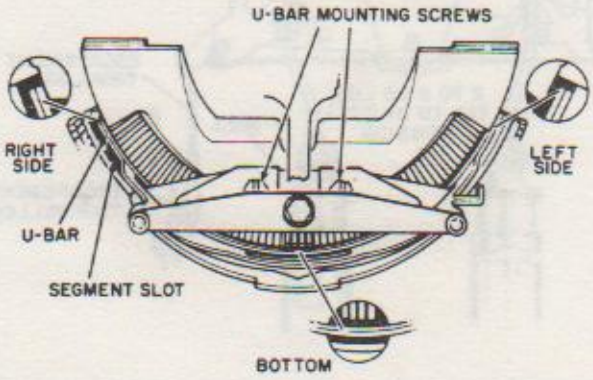




1. The segment can be positioned forward or rearward by adding or removing shims at the upper ends or by opening or closing the bifurcation in the center spacer. Adjusting the center spacer will affect the middle typebars and the placement or removal of shims at either upper end will tend to affect the typebars near the upper ends of the segment. Adjust the position of the segment so that the majority of typebars can be raised off the rebound pad 1/16" plus or minus 1/32".

2. Individual typebars which do not fall within the segment's range of adjustment can be individually adjusted by opening or closing the toggle bifurcation on the typebar.

ADJ. 10A U-BAR FRONT BRACKET

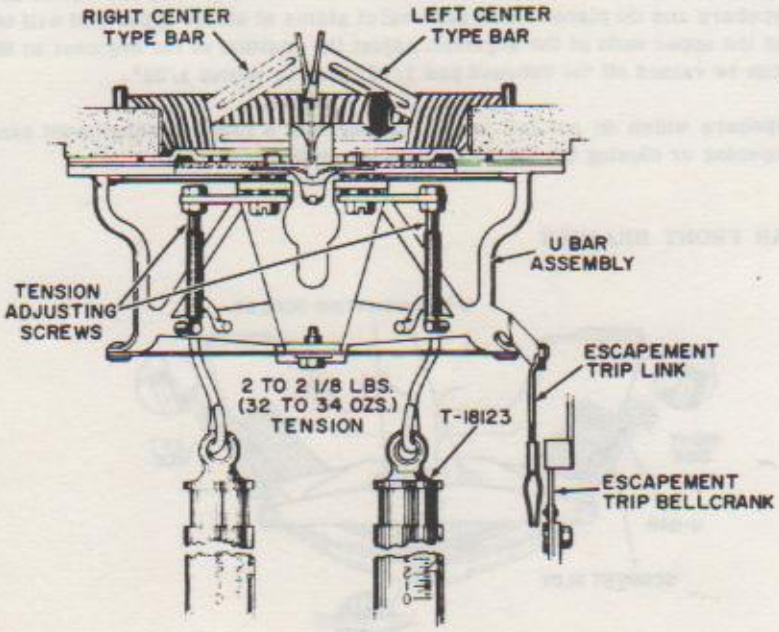


With front and rear U-bar mounting screws loose, position the U-bar in the segment slot as follows:

Right Side - Close to the top (inside) of the slot without touching.
Bottom - Approximately centered in the slot.
Left Side - Close to the bottom (outside) of the slot without touching.

Tighten the mounting screws.

ADJ. 10B U-BAR TENSION

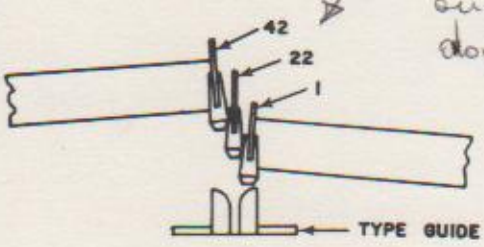


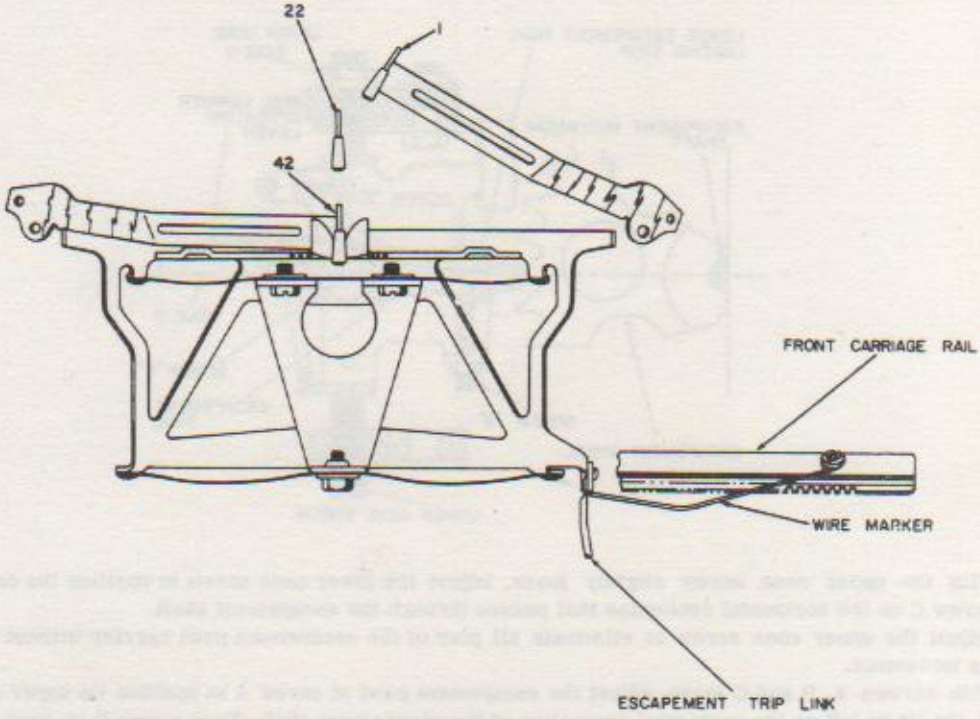
Si svita la vite centrale della balestra sotto per regolare l'escapement

The tension adjusting screws should be evenly set to obtain 2 to 2 1/8 lbs. (32 to 34 ozs.) of tension at the points shown. To check the adjustment, first disconnect the escapement trip link from the escapement trip bellcrank then jog a typebar (opposite the scale) against the U-bar and into the typeguide while steadily increasing the tension of the scale (T-18123). When the U-bar has been drawn far enough rearward by the scale so that the typebar just touches the platen and the U-bar simultaneously, back off the typebar and read the tension indicated on the scale.

ADJ. 10C U-BAR REAR SPRING

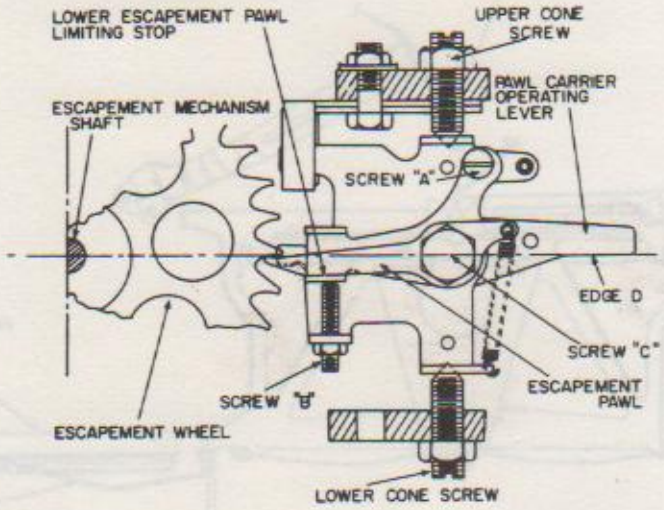
Si svita la vite dietro e si procede così (Se non si registra bene fare anche inversamente 4-2-22-1) dopodiché si stringe la vite dietro





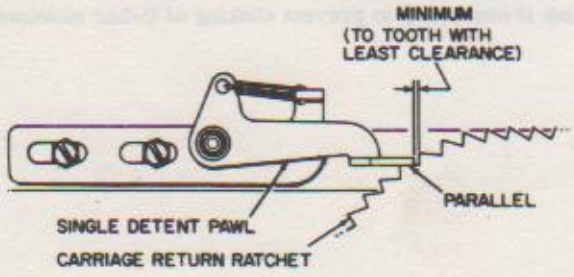
The U-bar spring is adjusted to compensate for the difference in its movement by right, left and center typebars. The major amount of this difference in movement is eliminated by the offset adjustment of the front U-bar spring, however a small difference may still exist. A convenient method of adjustment is to position right, left and center typebars slightly staggered as shown and allow the U-bar to position itself; the amount of stagger determining the adjustment. Using a wire marker for a gauge as shown, check for equal U-bar movement by right, left and center typebars. Disconnect the escapement trip link if necessary to prevent choking of U-bar movement.

ADJ. 11 ESCAPEMENT PAWL CARRIER



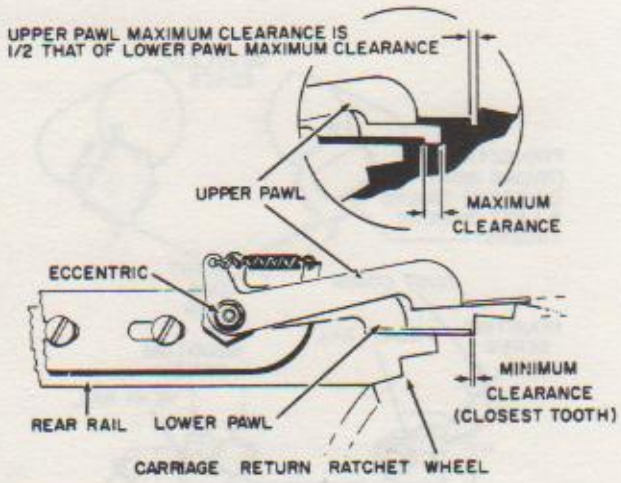
1. With the upper cone screw slightly loose, adjust the lower cone screw to position the center of screw C on the horizontal centerline that passes through the escapement shaft.
2. Adjust the upper cone screw to eliminate all play of the escapement pawl carrier without binding its movement.
3. With screws A, B and C loose, adjust the escapement pawl at screw A to position its upper surface at the tip to fall on the horizontal centerline of the escapement shaft. Turn screw B up snug without changing the adjustment and tighten.
4. Mono-Escapement machines only - Position the pawl carrier operating lever so that edge D falls on the horizontal centerline of the escapement shaft. Tighten screw C.

ADJ. 12A DETENT PAWL - SINGLE



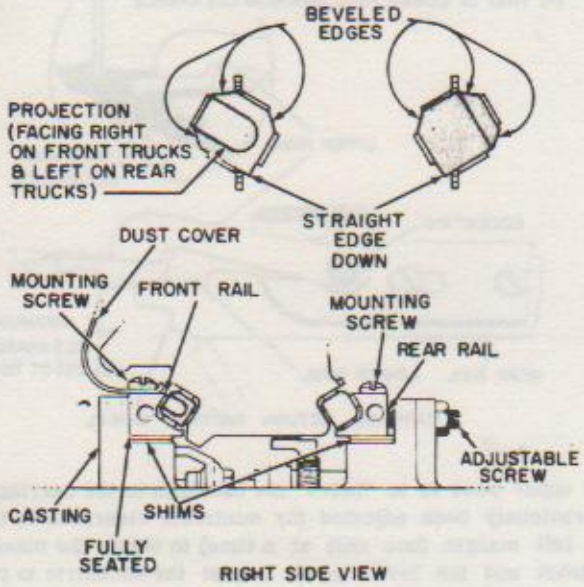
Adjust the detent pawl to have minimum clearance to the closest tooth of the carriage return ratchet.

ADJ. 12B DETENT PAWL - DOUBLE

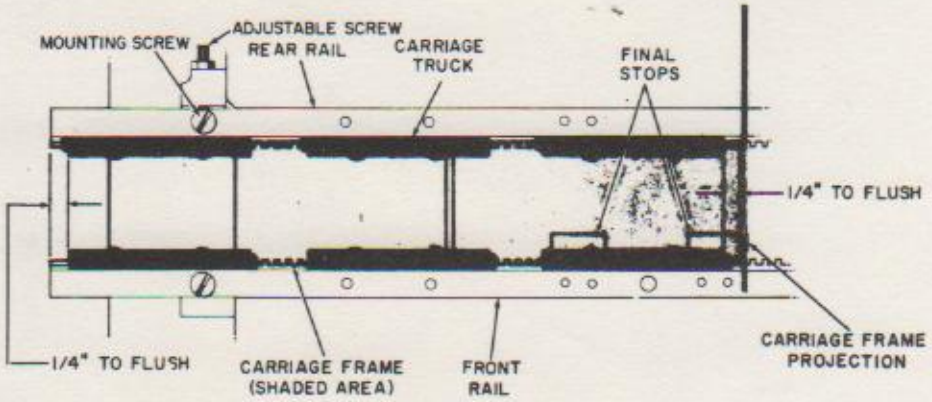


The purpose of the upper pawl is to "halve" the backlash in the carriage return ratchet. The lower pawl should have previously been adjusted for minimum clearance to the closest tooth. Escape the carriage from the left margin (one unit at a time) to obtain the maximum clearance between the carriage return ratchet and the lower pawl. Adjust the eccentric to position the upper pawl for a clearance of approximately one half of the maximum clearance to the lower pawl.

ADJ. 13. CARRIAGE RAILS



RIGHT SIDE VIEW



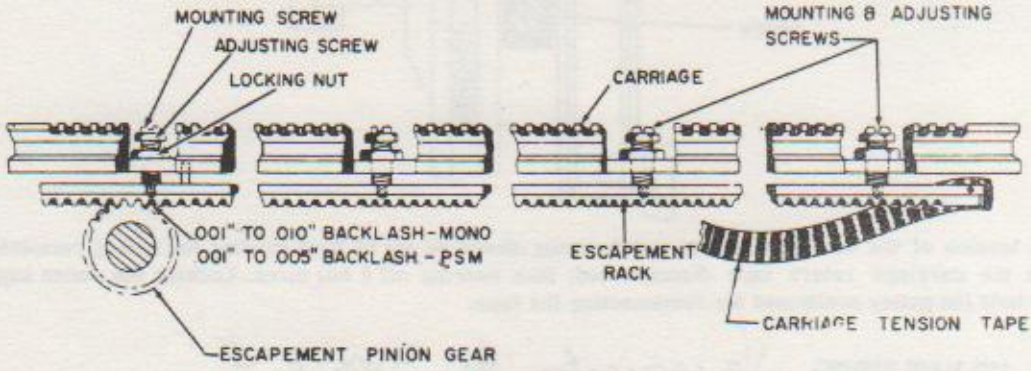
1. The front rail should be fully seated against the casting and laterally centered on its mounting screws.

2. Insert the carriage trucks between the rails and the carriage with their straight edges down. The projection at the end of the trucks should face to the right side on the front rail and to the left side on the rear rail.

3. With the carriage at the right margin and against the final stop, the trucks on the right end should be flush to 1/4" in from the carriage end plate not including the projection. The trucks on the left end should be flush to 1/4" in from the end of the rails. The middle trucks should be centered between the two outer trucks.

4. Adjust the rear rail by positioning the carriage so that a carriage truck is beside the mounting screw. Move the rear rail forward to eliminate all play, and tighten the mounting screws. The adjustment of the rear rail should eliminate all side play without creating binds in the carriage movement. When checking the carriage for binds, have the carriage return and tension tapes disconnected and the escapement rack removed. When the position is correctly set, turn the adjustable screw up snug and tighten without changing the adjustment.

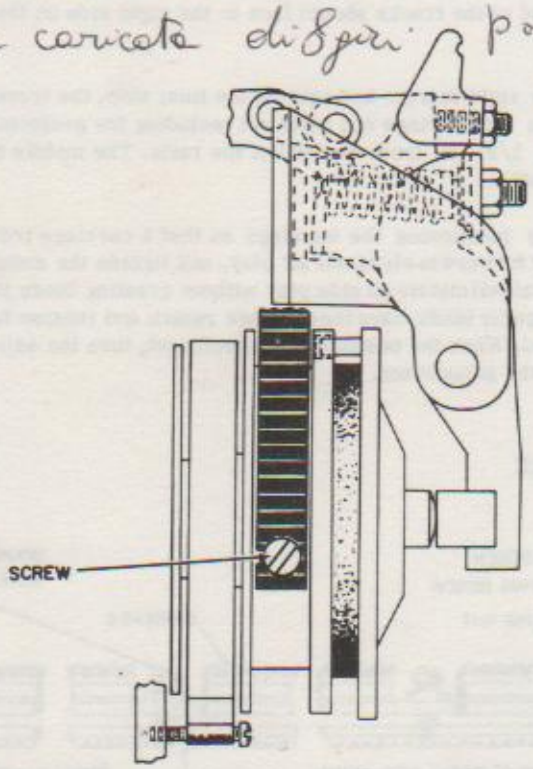
ADJ. 14 ESCAPEMENT RACK



Adjust the escapement rack to escapement pinion gear backlash at .001" to .010" on mono-space machines and at .001" to .005" on PSM machines. Raise or lower the escapement rack evenly by loosening the locking nut and mounting screw and turning the adjustment screw. The mounting screw must then be drawn up to check the adjustment. Do not attempt to turn the adjustment screw while the mounting screw is tight.

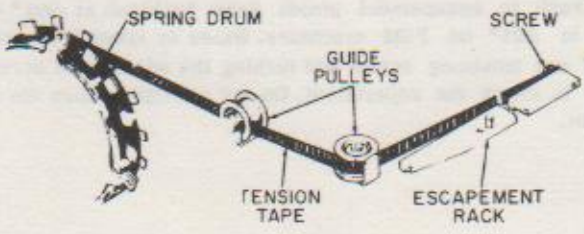
ADJ. 15A CARRIAGE RETURN CLUTCH PULLEY SPRING

La molla va caricata di 8 giri poi si mette la vite che fissa la fettuccia



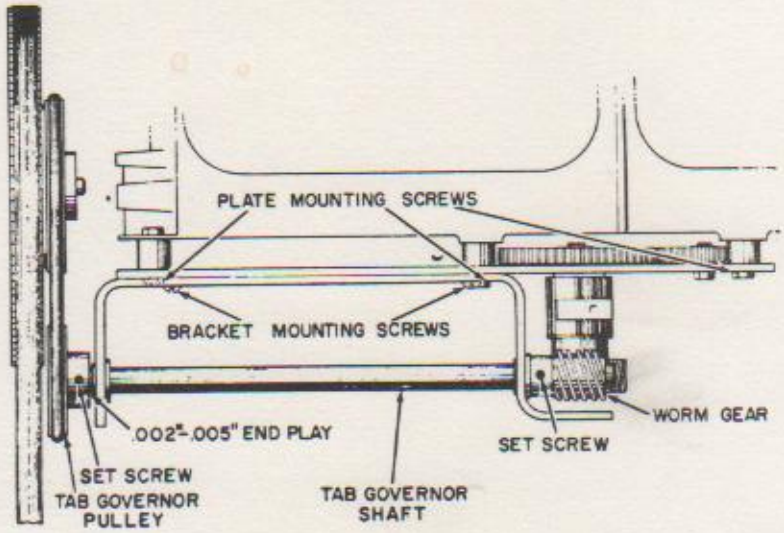
The tension of the carriage return clutch spring should be set by first winding the spring completely with the carriage return tape disconnected; then backing off 8 full turns. Locking the clutch toggle will hold the pulley positioned for reconnecting the tape.

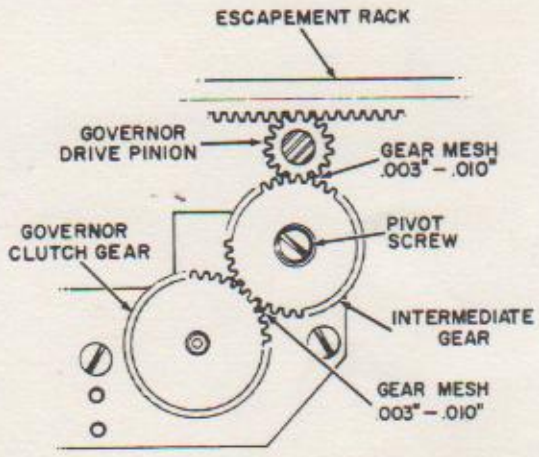
ADJ. 15B MAIN SPRING Va caricata di 3 giri e 1/2



Adjust the tension of the main spring to obtain an escapement pressure of the carriage to between 3 3/4 to 5 1/2 pounds measured at the right margin. Increase the tension as necessary up to 5 1/2 pounds to overcome the tension of the escapement pawl spring(s) and field control switches with the carriage near the right margin.

ADJ. 16 TAB GOVERNOR





1. The tab governor pulley or the worm gear should be adjusted to obtain .002" to .005" end play in the tab governor shaft.
2. There should be .003" to .010" backlash between the governor clutch gear and the intermediate gear. Move the pivot screw to obtain the required backlash.
3. Loosen the plate mounting screws and position the tab governor assembly to obtain a .003" to .010" backlash between the intermediate gear and the governor drive pinion.

ADJ. 17 LINE SPACING CHART

Lines per inch of Form
from Ratchet Tooth Rotation

Platen Ratchet	Number of Teeth	1 Tooth	2 Teeth	3 Teeth	4 Teeth	5 Teeth
1042527	27	4.91	2.46	1.64		
1042529	29	5.28	2.64	1.76		
1042533	33	6.00	3.00	2.00		
1042536	36	6.55	3.27	2.18		
1042538	38	6.91	3.46	2.30		
1042539	39	7.10	3.55	2.37		
1042540	40	7.28	3.64	2.43		
1042544	44	8.00	4.00	2.66		
			4.00	2.66	2.00	
1042548	48		4.37	2.91		1.75
1042549	49		4.46	2.97		1.78
1042550	50		4.55	3.03	2.27	
1042551	51		4.64	3.09	2.32	
1042552	52		4.73	3.15	2.37	
1042555	55		5.00	3.33	2.50	
1042557	57		5.18	3.46	2.59	
1042558	58		5.28	3.52	2.64	
1042559	59		5.37	3.58	2.68	
1042562	62		5.64	3.76	2.82	
1042566	66		6.00	4.00	3.00	

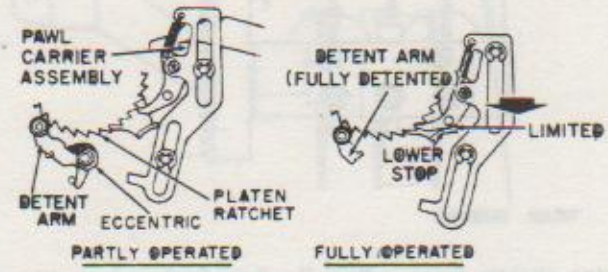
ADJ. 17 LINE SPACING CHART

3 Teeth	4 Teeth	5 Teeth	Index Pawl Carrier	Upper Index Pawl Stop (Two Position)	Upper Index Pawl Stop (Three Position)	Detent Arm
1.64			2021469	2021223	2021224	1046993
1.76			2021469	2021468	2021225	1046994
2.00			2021469	2021468	2021255	1046994
2.18			2021469	2021468	2021225	1046995
2.30			2021469	2021468	2021225	1046994
2.37			2021469	2021468	2021225	1046995
2.43			2021469	2021468	2021225	1046995
2.66			2021469	2021222	2021228	1046994
2.66	2.00		2021469	2021468	2021225	1046994
2.91		1.75	2021469	2021223	2021224	1046993
2.97		1.78	2021469	2021468	2021225	1046994
3.03	2.27		2021469	2021221	2021227	1046997
3.09	2.32		2021469	2021221	2021277	1046997
3.15	2.37		2021469	2021221	2021227	1046997
3.33	2.50		2021469	2021221	2021227	1046998
3.46	2.59		2021469	2021221	2021227	1046997
3.52	2.64		2021469	2021221	2021227	1046998
3.58	2.68		2021469	2021222	2021228	1046998
3.76	2.82					
4.00	3.00					

ADJ. 17 LINE SPACING

1 tooth, 2, 3, 4 and 5 teeth indicate the number of ratchet teeth detented by one carriage return operation. For each ratchet there are two (three optional) settings of the line space lever that will give the lines per inch indicated. To find the correct ratchet and parts necessary to obtain a desired number of lines on a form, count the number of lines in 10" of form, move the decimal one space to the left, and find the nearest number in the chart.

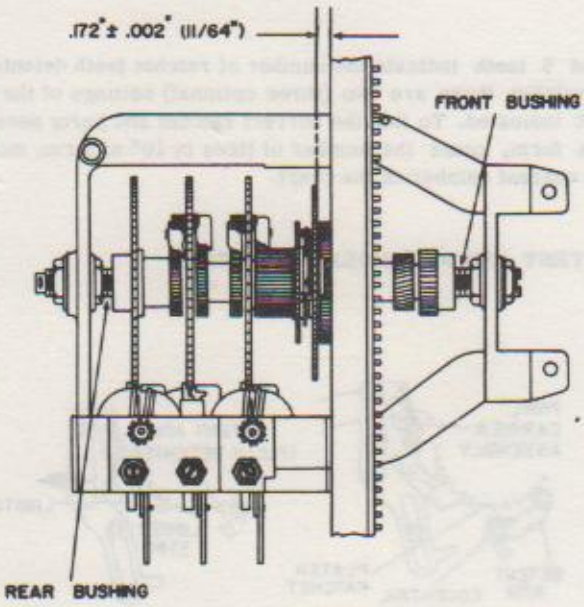
ADJ. 18 RATCHET DETENT ARM AND INDEX PAWL STOP



1. With the line space lever in its forward position, the detent arm should hold the platen ratchet for engagement by the index pawl approximately 1/3 down the face of the tooth. Adjust the detent arm eccentric.

2. Adjust the lower stop to limit further downward movement of the index pawl once the ratchet is fully detented.

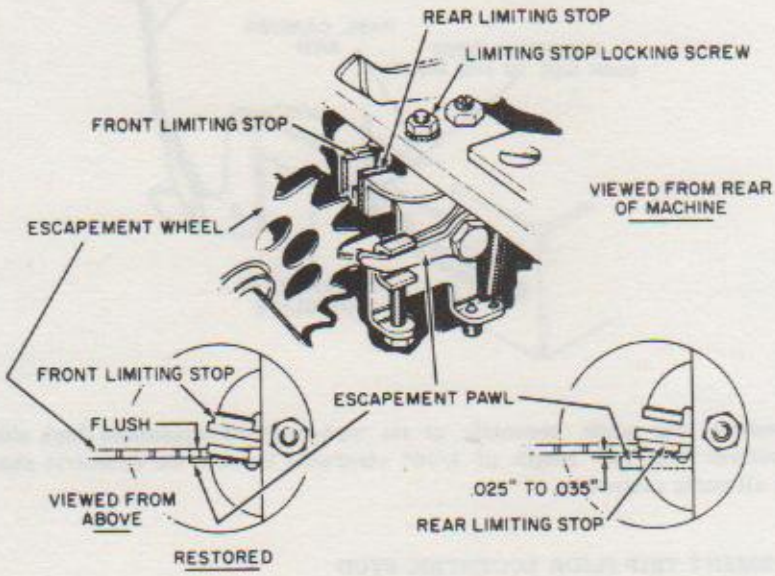
ADJ. 19A ESCAPEMENT SHAFT BUSHINGS



1. With the rear bushing slightly loose, adjust the front bushing to position the front surface of the carriage return ratchet .172" plus or minus .002" (11/64") from the rear surface of the rear rail.

2. Adjust the rear bushing to eliminate all end play of the parts on the escapement shaft without binding their movement.

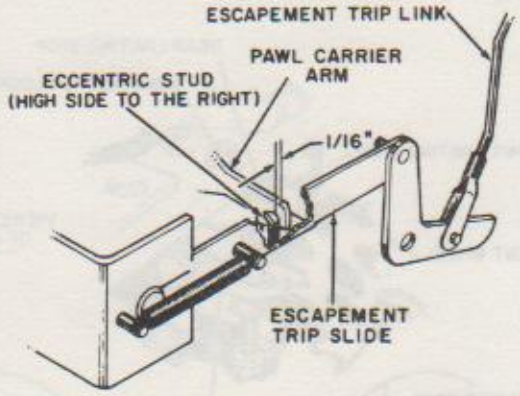
ADJ. 19B FRONT AND REAR PAWL CARRIER STOPS



1. With the limiting stop locking screw loose, set the front limiting stop so that when restored, the front of the escapement pawl is flush with the front of the escapement wheel.

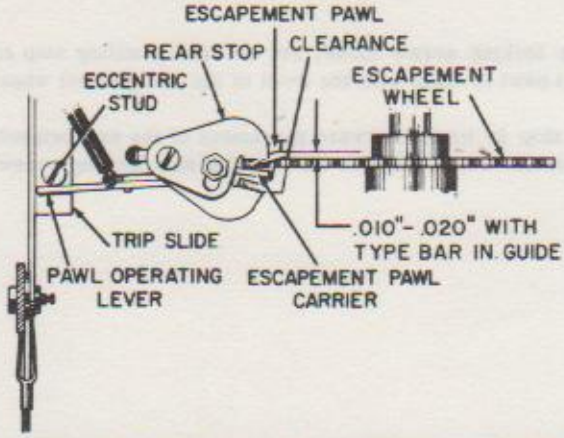
2. Set the rear limiting stop to limit rearward movement of the escapement pawl with .025" to .035" clearance to the escapement wheel. Tighten the limiting stop locking screw.

ADJ. 19C ESCAPEMENT TRIP LINK



With the escapement trip slide eccentric at its mid-range of adjustment (high side to the right) adjust the escapement trip link length of 1/16" clearance between the eccentric stud and the pawl carrier arm with all parts restored.

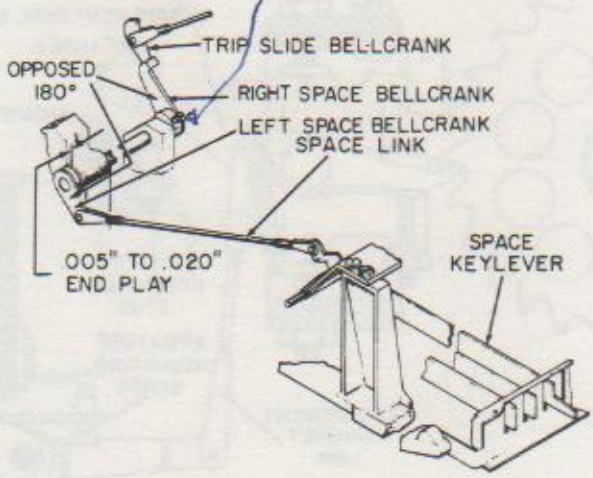
ADJ. 19D ESCAPEMENT TRIP SLIDE ECCENTRIC STUD



With a type bar in the guide, the escapement pawl should be moved to the rear with .010" to .020" clearance to the escapement wheel. Adjust the eccentric stud on the trip slide for this clearance. Check for clearance between the rear stop and the pawl carrier with a type bar in the guide.

ADJ. 19E SPACE BELLCRANKS AND LINK

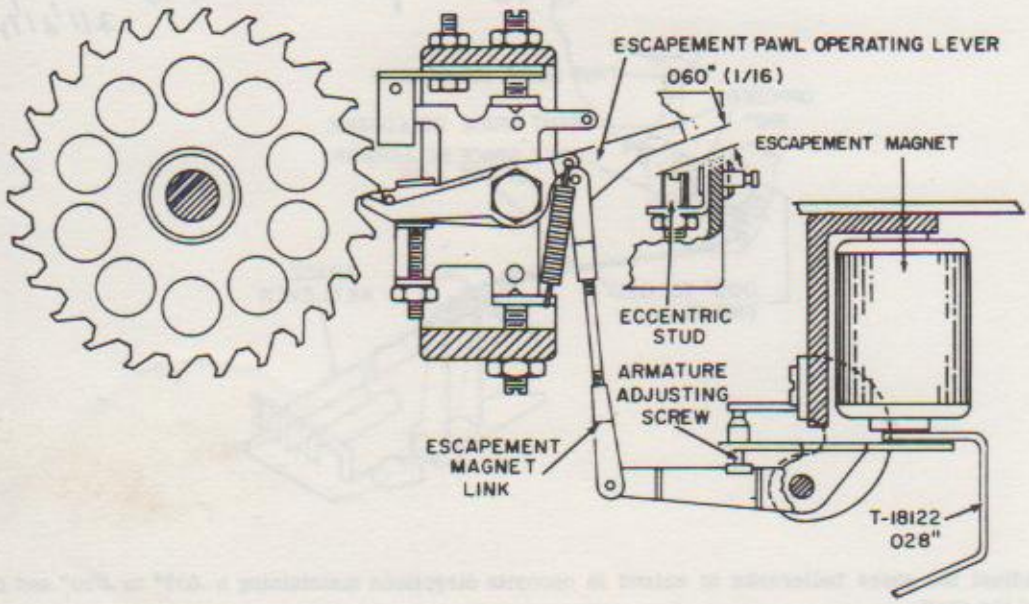
Grano per sfasare di 180° rispetto all'altro.



1. Adjust the space bellcranks to extend in opposite directions maintaining a .005" to .020" end play of the shaft.

2. Adjust the space link to operate the escapement pawl for .010" to .020" clearance to the escapement wheel with the high point of the space cam against the power roll.

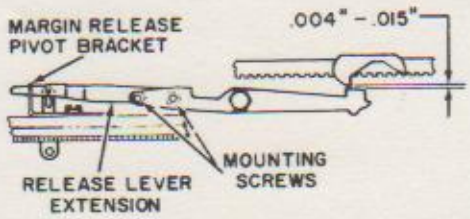
ADJ. 20 ESCAPEMENT MAGNET ARMATURE AND LINKS $\frac{1}{M}$ PSM



1. Adjust the escapement magnet armature for an air gap of .028". Check the clearance with escapement magnet armature gauge (T-18122).

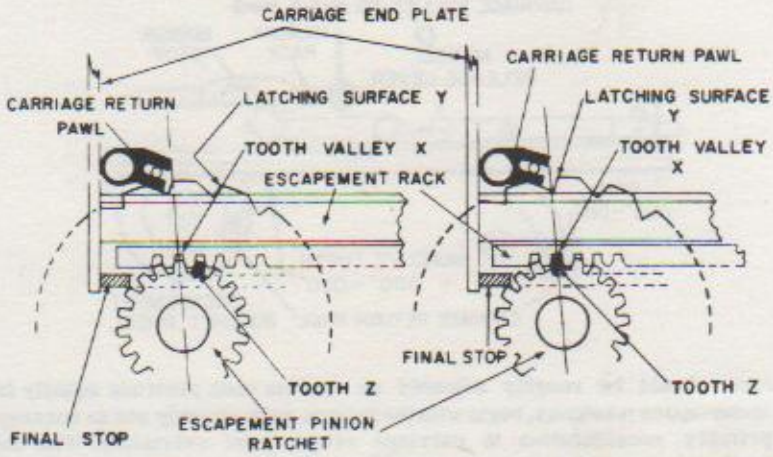
2. Adjust the escapement magnet link for .060" (1/16") clearance between the escapement pawl operating lever and the eccentric stud with all parts restored.

ADJ. 21 MARGIN RELEASE LEVER



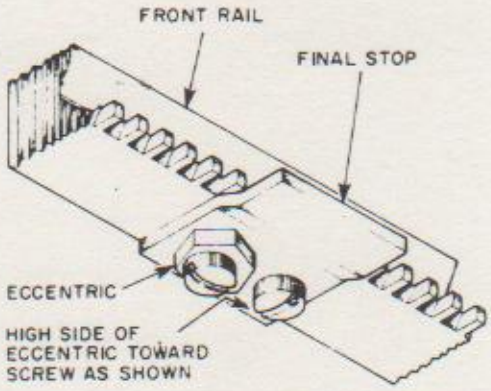
Adjust the margin release lever for .004" to .015" clearance to the margin stop when the release lever extension is raised.

ADJ. 22A ESCAPEMENT RACK ENGAGEMENT - 10 PITCH



As illustrated, the mesh between the escapement pinion ratchet and the escapement rack can be varied. Obtain that particular mesh which results in the least overtravel of the carriage return pawl to the escapement ratchet gear when the carriage is pulled to the right, so that the carriage end plate is against the final stop as shown.

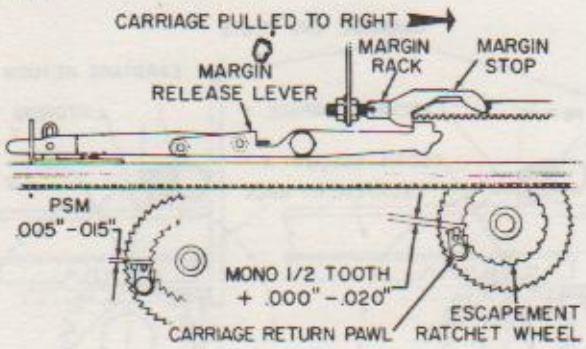
ADJ. 22B ESCAPEMENT RACK ENGAGEMENT - 12 PITCH



On 12 pitch machines, the left final stop is adjustable and is to be adjusted for minimum carriage return pawl over latch with the carriage end plate against the final stop.

Friden 2200/2300 SERIES MACHINES

ADJ. 22C MARGIN RACKS

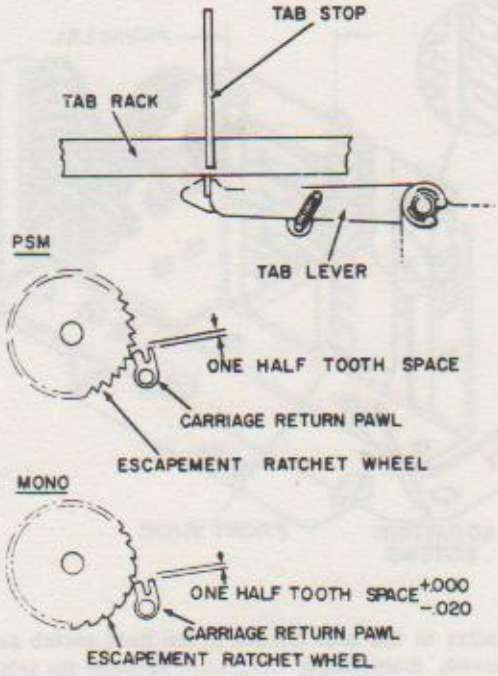


The margin rack should be roughly adjusted so that its ends protrude equally from the carriage end plates. (On mono-space machines, begin with the margin rack roughly set to correspond to the paper scale giving primary consideration to carriage return pawl overlatch). With the carriage pulled to the right so that the margin stop is limited by the margin release lever, the final margin rack adjustment should give:

1. Mono - Space machines - 1/2 tooth + .000" - .020" overlatch of the carriage return pawl.

2. PSM machines - .005" to .015" overlatch of the carriage return pawl.

ADJ. 22D TAB RACK



Adjust the tab rack right or left to match the margin rack. This can be checked by setting a tab stop and the margin stop at corresponding positions. Operate the carriage return key and type a character. Then pull the carriage to the right beyond the margin stop and operate the tab key. At this position the same character retyped should be in the same escaped position.

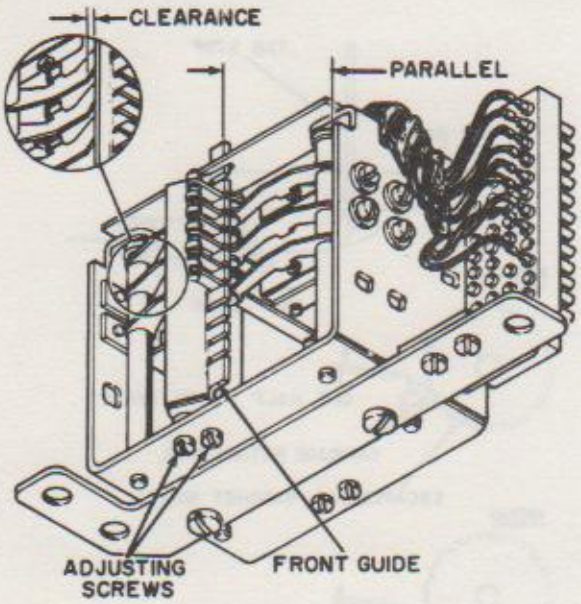
When the tab rack position corresponds to the margin rack, a final adjustment is made (with the carriage held by a tab stop engaged with the tab lever) to obtain:

1. Mono-Space machines - 1/2 tooth + .000" -.020" overlatch of the carriage return pawl to the escapement ratchet wheel.

2. PSM machines - 1/2 tooth overlatch of the carriage return pawl to the escapement ratchet wheel.

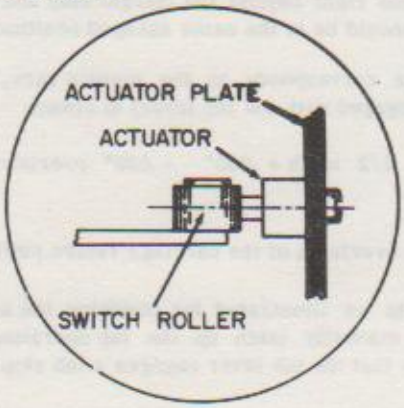
NOTE: To position the parts as illustrated for checking the adjustment, slip the tab governor belt off its pulley and manually latch up the tap operating lever with the power off. Allow the carriage to escape so that the tab lever engages a tab stop and check the adjustment.

ADJ. 22E FRONT GUIDE



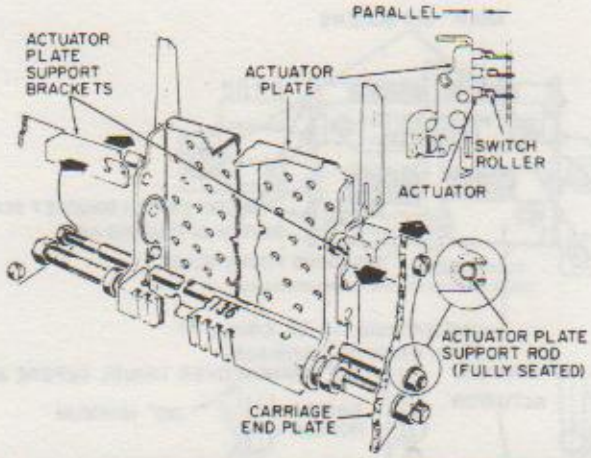
The front guide should be parallel to the side frames of the field switch assembly. Adjust the guide to the front or rear as required, maintaining clearance between the left side of the guide and the switch operating arms as shown.

ADJ. 22F FIELD SWITCH ASSEMBLY HEIGHT



The field switch assembly should be raised or lowered using shims equally placed so that the actuators are vertically centered to the switch rollers.

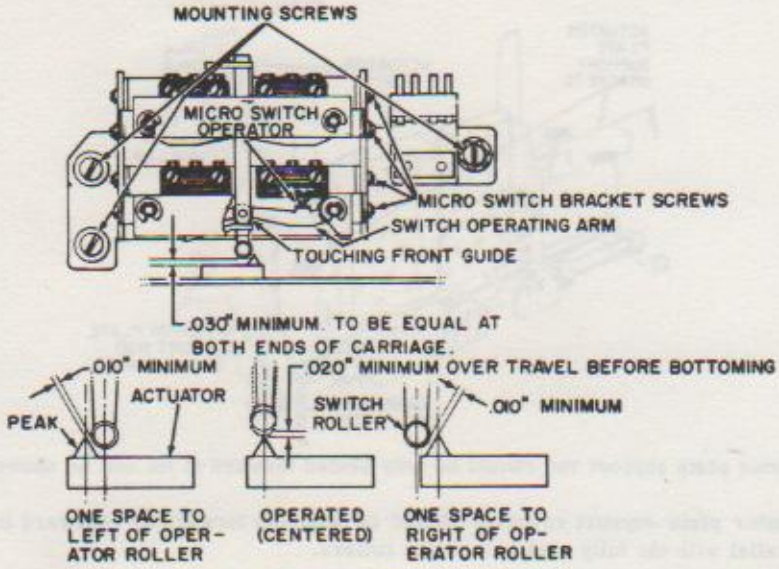
ADJ. 22G ACTUATOR PLATE ALIGNMENT



1. The actuator plate support rod should be fully seated forward in its slot as shown.

2. The actuator plate support brackets should be adjusted forward or rearward to align the actuator plate parallel with the fully restored switch rollers.

ADJ. 22H FIELD CONTROL ASSEMBLY AND MICRO SWITCH POSITIONING

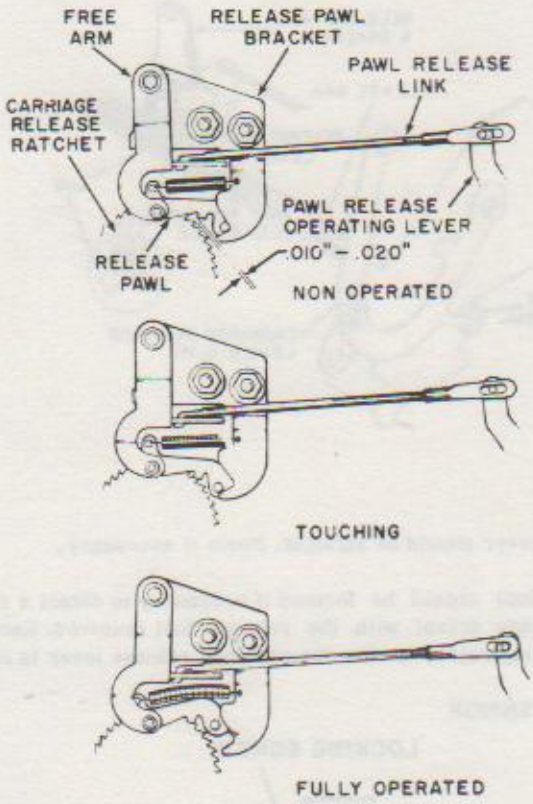


1. Adjust the micro switches forward to fully restore the switch operating arm against the front guide without operating the switch.

2. Position the field switch assembly laterally to center the peak of the actuator on an operated switch roller and to the front or rear to obtain .020" minimum overtravel after the roller is operated.

Check for .010" minimum clearance between the switch roller and the peak of the actuator when they are one space to either side of the operated position. Check also for .030" minimum clearance of the switch roller to the low dwell of the actuator which should be equal at either end of the carriage.

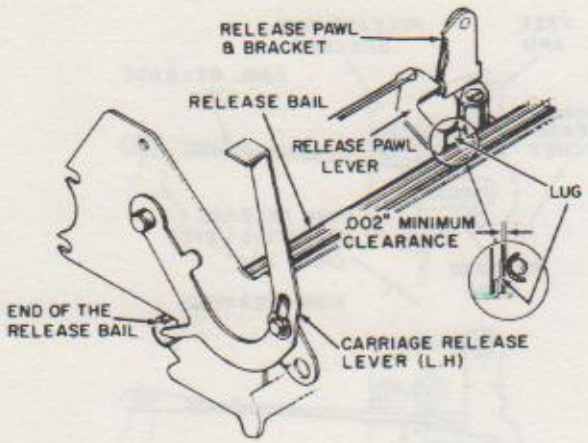
ADJ. 23A RELEASE PAWL BRACKET



1. The release pawl bracket should be positioned to obtain .010" to .020" clearance between the release pawl and the carriage release ratchet in the non-operated position. When operated, the release pawl should make contact at the center of the horizontal face of the lowest tooth possible.

2. Check the free arm and release pawl for free movement and good front to rear engagement. Form the parts as required.

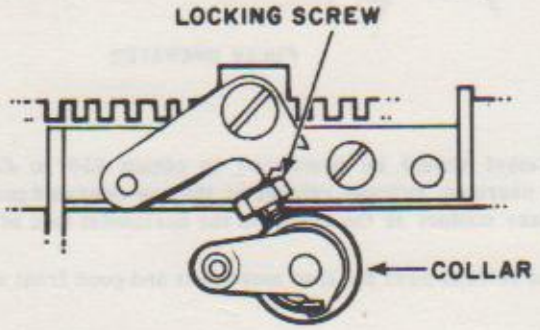
ADJ. 23B RELEASE BAIL



1. The lug on the release pawl lever should be straight. Form if necessary.

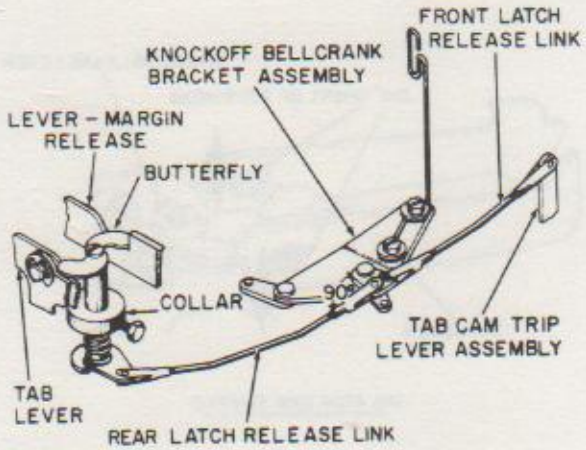
2. The ends of the release bail should be formed if necessary to obtain a minimum clearance of .002" throughout the carriage travel with the release bail restored. Excessive clearance will prevent the carriage from being released when the carriage release lever is operated.

ADJ. 24 BUTTERFLY LEVER TENSION



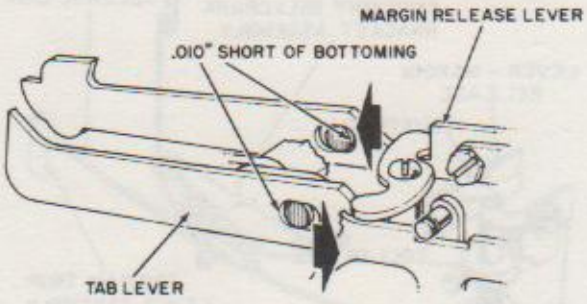
With the collar adjusted so that its locking screw is positioned as shown, there should be only enough tension necessary to fully restore the butterfly lever. Excessive tension can cause tab failures.

ADJ. 25A REAR LATCH RELEASE LINK

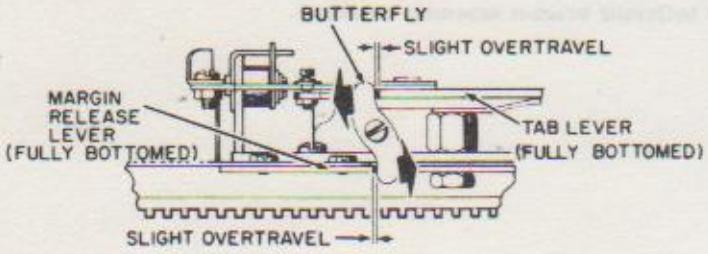


Adjust the rear latch release link so that it is at an approximately 90° relationship to the bellcrank on the knockoff bellcrank bracket assembly as shown.

ADJ. 25B FRONT LATCH RELEASE LINK

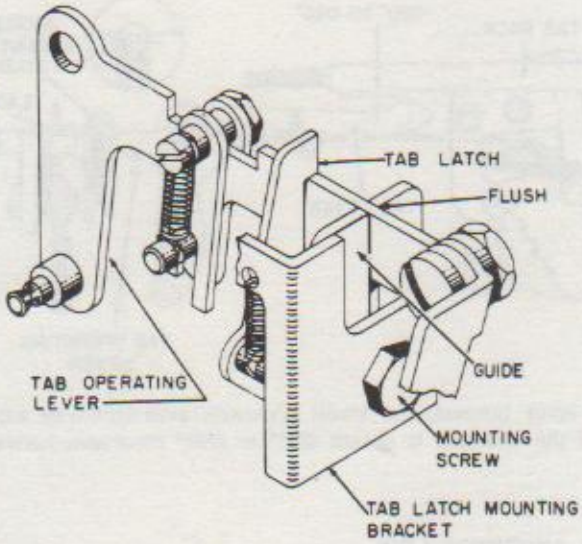


UNLATCH CAM TRIPPED



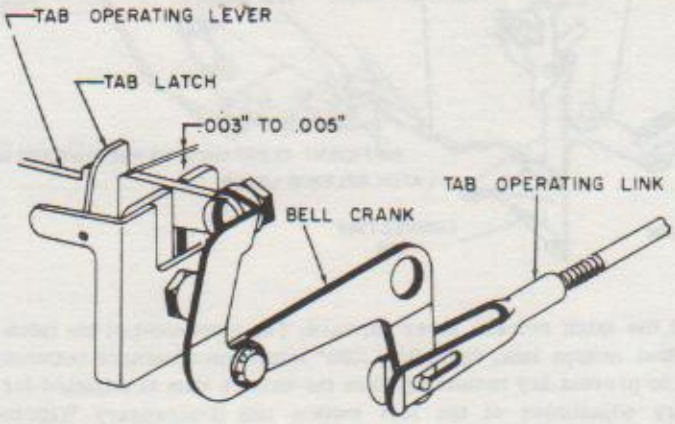
Manual operation of the margin release lever should cause it to trip the unlatch cam not later than .010" before it bottoms. The tab lever should meet the same requirement when manually operated to the left as it would be in a tab operation. With the margin release lever or the tab lever fully bottomed, there should be a slight overtravel of the butterfly. This overtravel insures that the levers are bottoming on their mounting studs rather than the unlatch cam linkage. However, the clearance will not exist if the unlatch cam is tripping too soon. Adjust the front latch release link to obtain these requirements.

ADJ. 26A TAB LATCH MOUNTING BRACKET



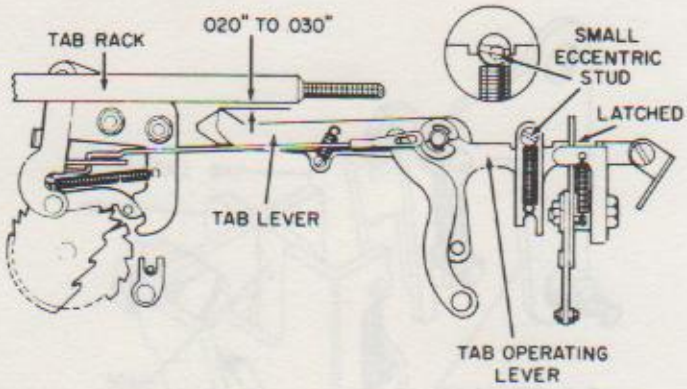
With the tab operating lever latched under the tab latch, adjust the tab latch mounting bracket up or down to position the top of the tab operating lever flush with the top of the guide.

ADJ. 26B TAB OPERATING LINK



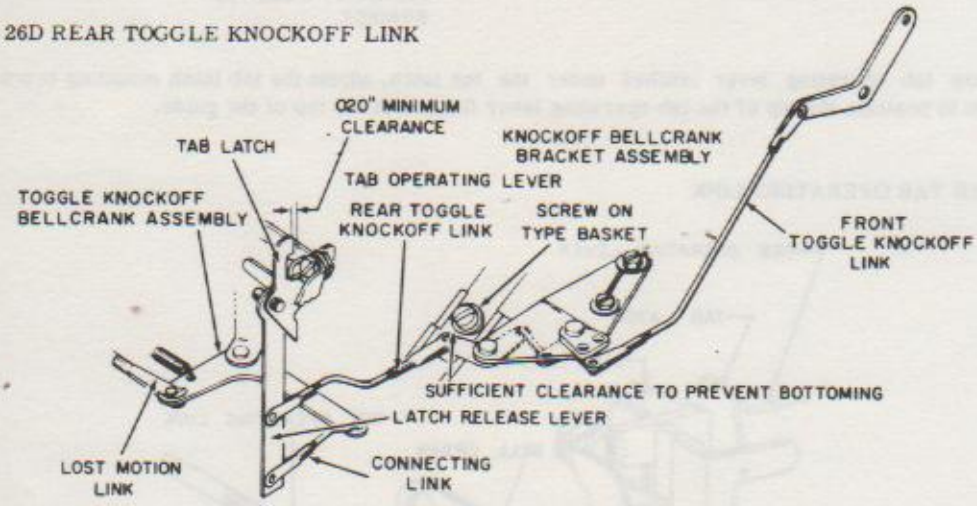
With the high point of the tab cam against the power roll, the tab operating link should be adjusted to hold the tab operating lever for .003" to .005" overlatch to the tab latch.

ADJ. 26C SMALL ECCENTRIC STUD



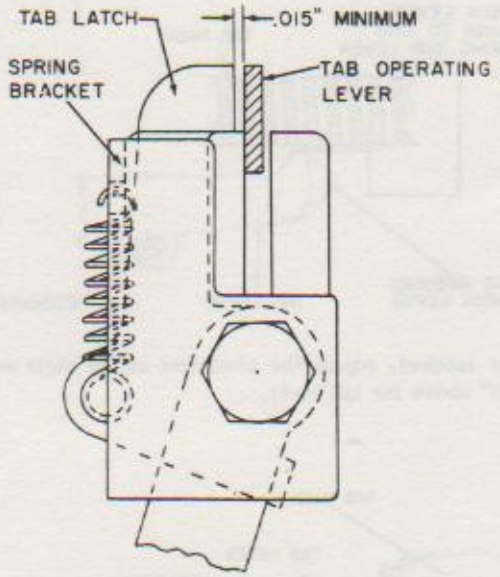
With the tab operating lever latched, the small eccentric stud should be adjusted with its high point toward the right side of the machine to obtain .020" to .030" clearance between the tab lever and the tab rack.

ADJ. 26D REAR TOGGLE KNOCKOFF LINK



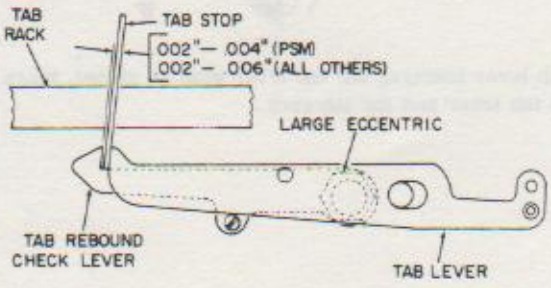
Push the bottom of the latch release lever forward. The movement of the latch release lever should be limited by the lost motion link, but allow .020" minimum clearance between the tab latch and the tab operating lever to prevent any bottoming when the unlatch cam is adjusted for tab latch delatching. Make a preliminary adjustment of the lost motion link if necessary. With the latch release lever held forward as shown for the .020" minimum clearance between the tab latch and the tab operating lever, there should be sufficient clearance to prevent bottoming between the front of the rear toggle knockoff link and the screw on the type basket. Adjust the rear toggle knockoff link if necessary.

ADJ. 26E FRONT TOGGLE KNOCKOFF LINK



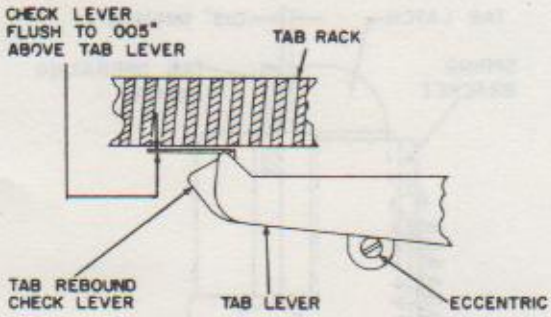
With the high point of the unlatch cam against the power roll, there should be a .015" minimum clearance between the tab latch and the tab operating lever. Excessive clearance will cause the unlatch cam to choke off due to limiting of the tab latch. Adjust the front toggle knockoff link.

ADJ. 27A TAB REBOUND CHECK LEVER - LATERAL ADJUSTMENT



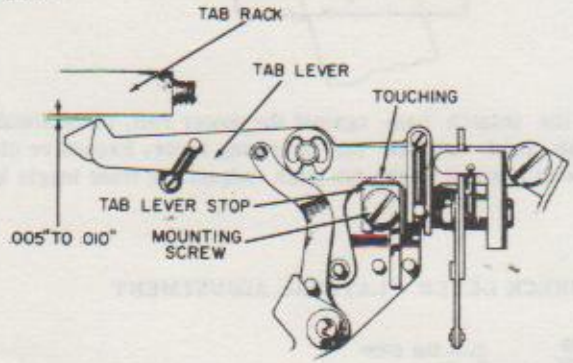
With the power off, the tab governor belt disengaged, the tab operating lever latched and a tab stop engaged as shown, adjust the large eccentric for clearance of the tab rebound check lever to the tab stop as follows: .002" to .004" - PSM; .002" to .006" - all others.

ADJ. 27B TAB REBOUND CHECK LEVER HEIGHT



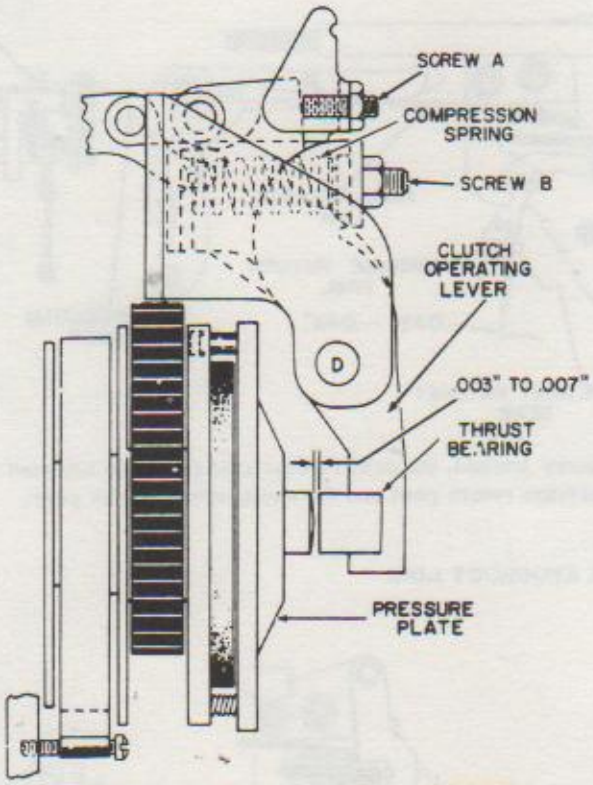
With the tab operating lever latched, adjust the eccentric on the right end of the tab rebound check lever so that it is flush to .005" above the tab lever.

ADJ. 28 TAB LEVER STOP



With the left end of the tab lever touching the tab lever stop as shown, there should be .005" to .010" between the right end of the tab lever and the tab rack.

ADJ. 29 CARRIAGE RETURN CLUTCH THRUST BEARING AND COMPRESSION SPRING

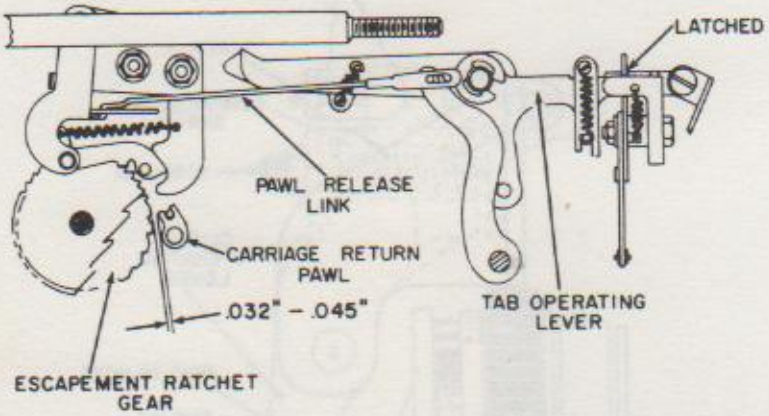


HOME POSITION
(TOGGLE NOT LOCKED)

1. Adjust screw A for .003" to .007" clearance between the thrust bearing and the pressure plate with the toggle restored (not in a carriage return operation). This clearance should be felt rather than seen due to spring tension on the pressure plate. Insert first a .003" and then an .008" flat feeler gauge (T-18009) between the thrust bearing and pressure plate and rotate the pressure plate by pulling on the carriage return tape. The pressure plate should rotate freely with the .003" gauge inserted, but bind on the .008" gauge.

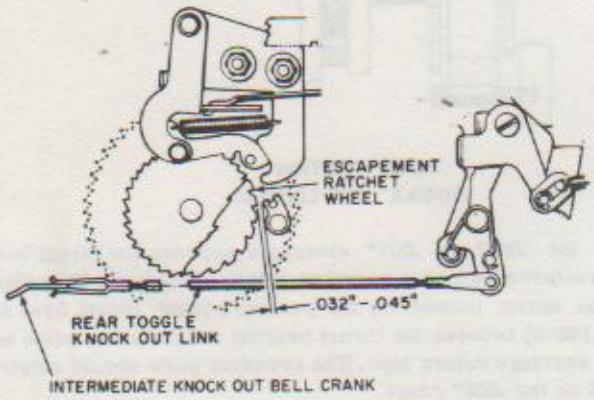
2. With the carriage approximately 1" from the extreme left margin and in a carriage return operation, the pull on the carriage should be from 4 to 6 pounds. Adjust screw B to increase or decrease the carriage return clutch tension.

ADJ. 30A PAWL RELEASE LINK



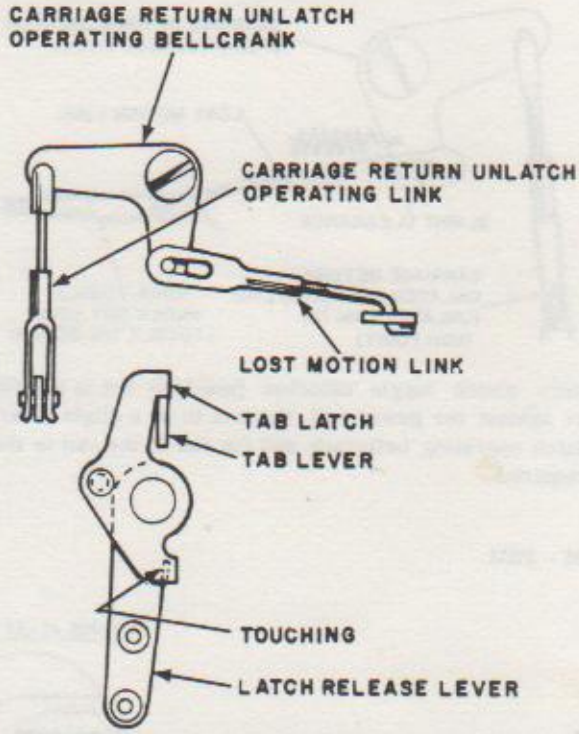
With the tab operating lever latched, the pawl release link should be adjusted to obtain .032" to .045" clearance between the carriage return pawl and the escapement ratchet gear.

ADJ. 30B REAR TOGGLE KNOCKOUT LINK



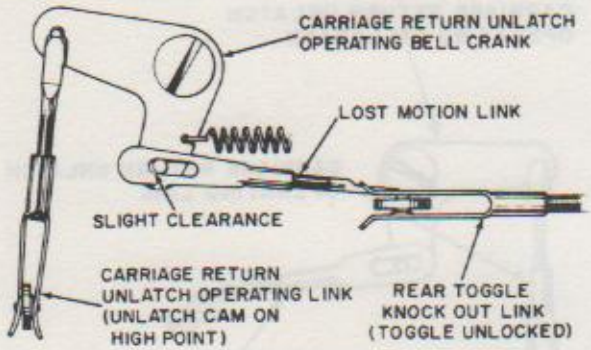
With the carriage return clutch toggle locked, there should be .032" to .045" clearance between the carriage return pawl and the escapement ratchet wheel. Adjust the rear toggle knockout link as required.

ADJ. 30C CARRIAGE RETURN UNLATCH OPERATING LINK



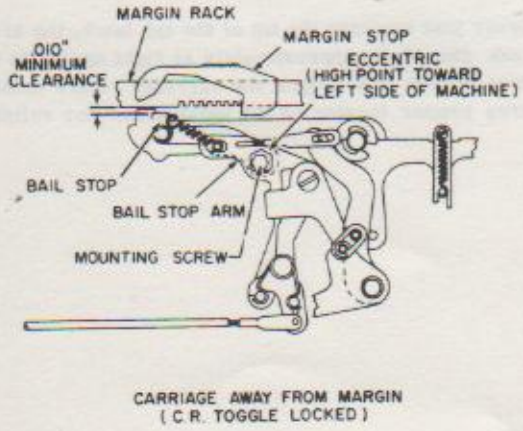
With the tab lever latched and the latch release lever just touching the tip of the tab latch, the arms of the carriage return unlatch operating bellcrank should be approximately at right angles to the carriage return unlatch operating link and the lost motion link. Adjust the carriage return unlatch operating link as required. This adjustment insures proper tension on the unlatch cam for reliable tripping.

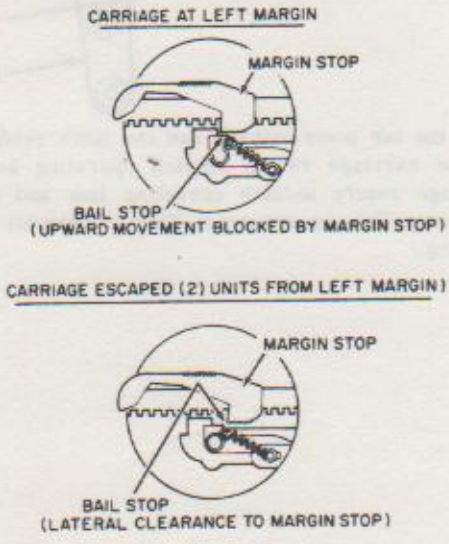
ADJ. 30D LOST MOTION LINK



With the carriage return clutch toggle unlocked (machine not in a carriage return) and the high point of the unlatch cam against the power roll, there is to be a slight clearance between the stud on the carriage return unlatch operating bellcrank and the end of the slot in the lost motion link. Adjust the lost motion link as required.

ADJ. 31 BAIL STOP ARM - PSM

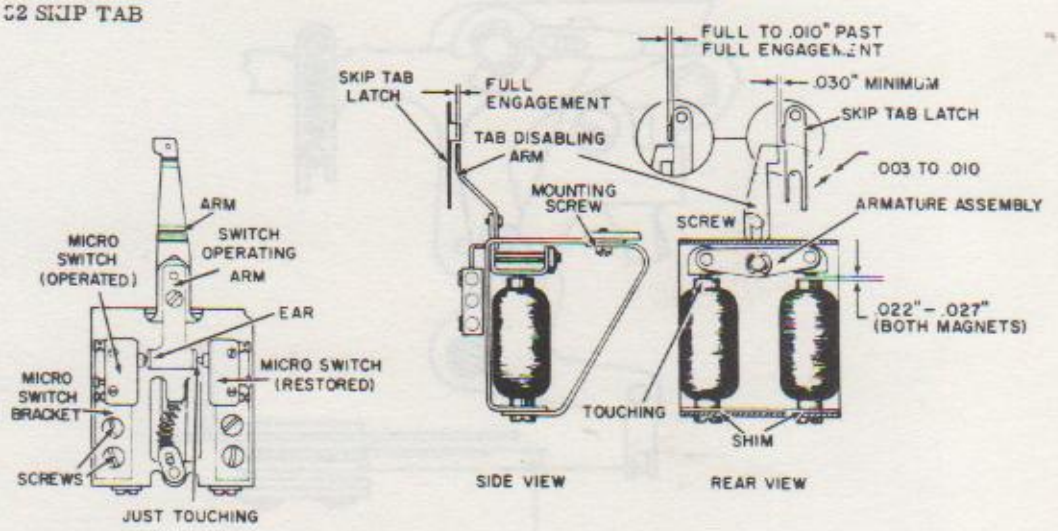




Start with the bail stop arm eccentric high point to the left. With the carriage return clutch toggle locked and the carriage away from the margin as shown (Power Off), there should be .010" minimum clearance between the margin rack and the bail stop. With the carriage at the left margin, the bail stop is to be blocked by the underside of the margin stop during a carriage return operation. With

the carriage escaped two units from the left margin, the margin stop should not restrict the upward movement of the bail stop during a carriage return.

ADJ. 32 SKIP TAB



1. To obtain the proper movement of the tab disabling arm, there should be .022" to .027" air gap at either magnet core. With the other magnet touching the armature assembly, shim the bottom of the magnets as necessary.

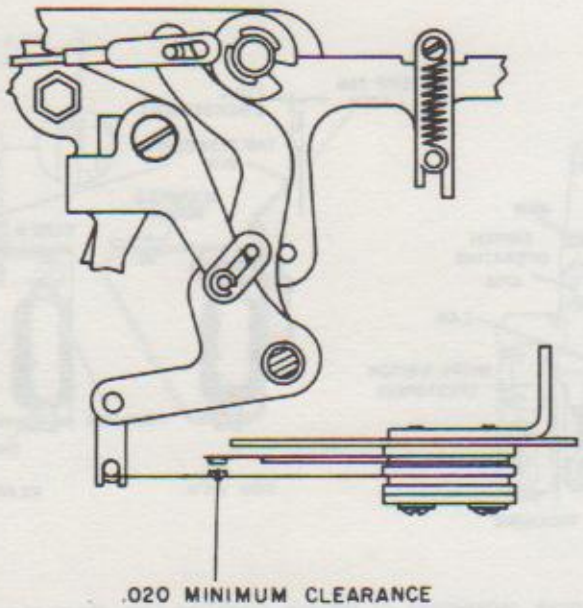
   NOTE: The magnets should be shimmed equally to maintain equal detenting action of the tab blocking arm.

2. With the switch operating arm detented away from a microswitch, adjust that micro switch bracket so that the operator of the micro switch just touches the ear on the switch operating arm.

3. Position the skip tab assembly by loosening its mounting screws to obtain full front to rear engagement of the tab disabling arm to the skip tab latch as shown in the side view.

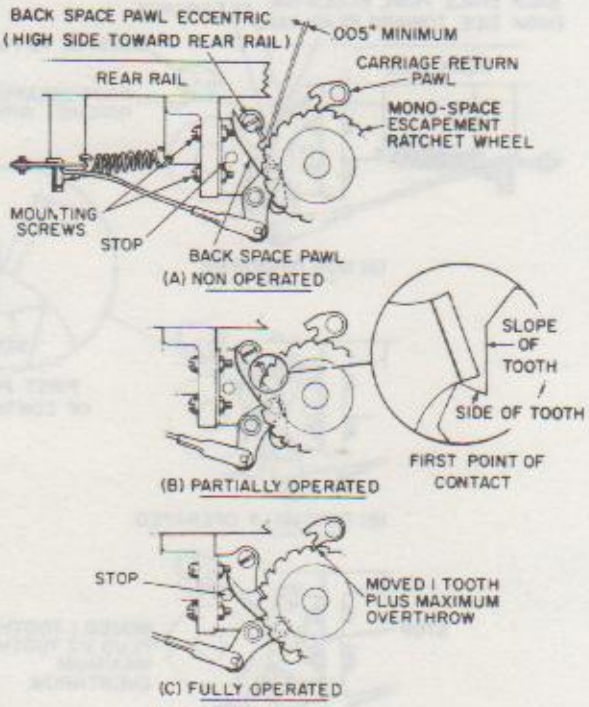
4. Adjust the tab disabling arm to obtain .003" to .010" clearance below the skip tab latch and a .003" to .010" clearance below the skip tab latch and a full to .010" past full engagement of the skip tab latch when the tab disabling arm is in a blocking position (detented toward left side of machine). Check for .030" minimum lateral clearance between the skip tab latch and the tab disabling arm with the disabling arm in restore position (detented toward the right side of the machine). Readjustment of the skip tab assembly at its mounting (step 3) may be necessary to obtain the requirements of step 4.

ADJ. 33 SCRT CONTACTS



When operated, the carriage return and tab contacts should open with .020" minimum clearance. Adjust the stationary springs or the contact mounting bracket as necessary. Check the clearance in both tab and carriage return operations. The contacts should have .010" minimum follow when non-operated.

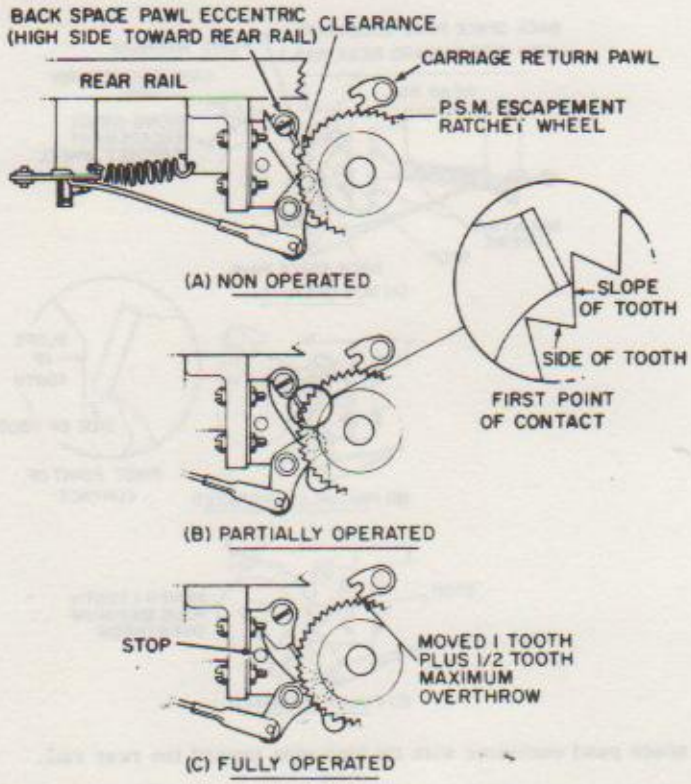
ADJ. 34A BACK SPACE PAWL BRACKET & ECCENTRIC - MONO



1. Set the back space pawl eccentric with its high side toward the rear rail.

2. First, position the back space pawl bracket upward to engage the tooth closest to the rear rail. The main consideration of positioning the bracket from that point is a full but not excessive engagement to the side of a tooth (not the slope) as the back space pawl first contacts the escapement ratchet wheel. With the bracket adjusted for good engagement to the highest tooth possible, check for .005" minimum clearance between the back space pawl and the escapement ratchet wheel in their non-operated position. With the bracket and the eccentric adjusted, the back space pawl should rotate the escapement ratchet wheel for 1 tooth plus maximum over throw to the carriage return pawl before limiting on its stop.

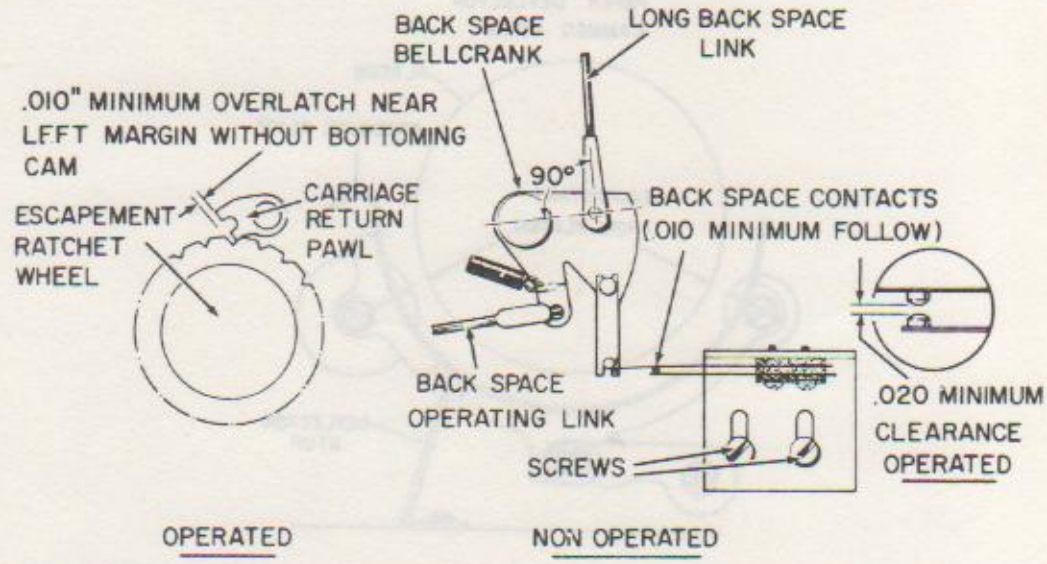
ADJ. 34B BACK SPACE PAWL BRACKET & ECCENTRIC - PSM



1. Set the back space pawl eccentric with its high side toward the rear rail.

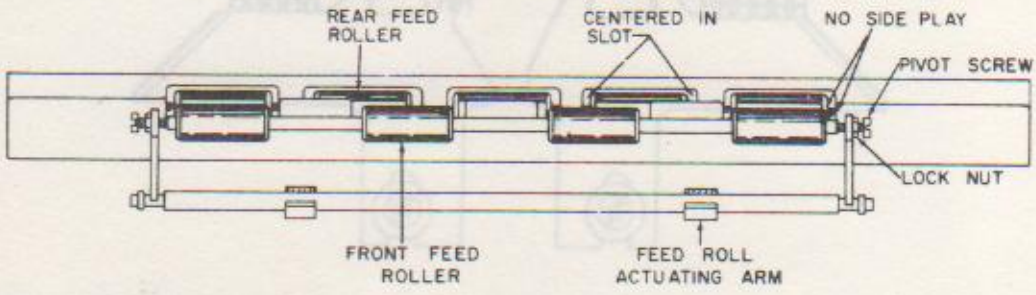
2. First, position the back space pawl bracket upward to engage the slope of a tooth (not the side) closest to the rear rail, and then make a final adjustment of the bracket so that the back space pawl rotates the escapement ratchet wheel 1 1/2 teeth before limiting on its stop. Check for clearance between the back space pawl and the escapement ratchet wheel in their non-operated position.

ADJ. 34C BACK SPACE LINKS & CONTACTS



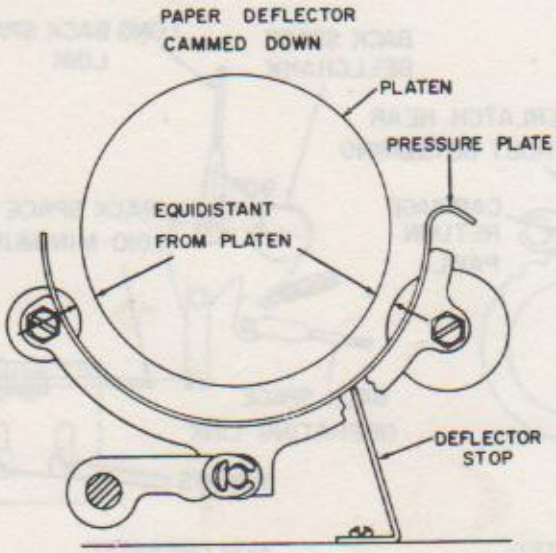
1. The long back space link should be adjusted if necessary to obtain approximately a 90° angle between the long back space link and the back space bellcrank.
2. Adjust the back space operating link so that with the back space cam high point against the power roll, the escapement ratchet wheel is operated one full tooth plus .010" minimum overlatch to the carriage return pawl with the carriage near but not at the left margin. The overlatch should not be so great as to cause the back space cam to choke off on the power roll.
3. With the high point of the back space cam against the power roll, the back space contacts should open with .020" minimum clearance. The contacts should have a .010" minimum follow when non-operated.

ADJ. 35 PAPER DEFLECTOR FEED ROLLERS



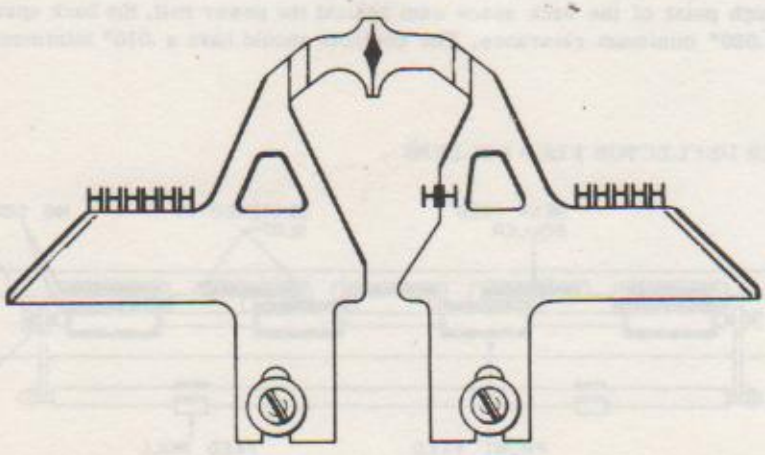
The pivot screws are to be adjusted to center the front and rear feed rollers in their slots without side play but perfectly free to rotate.

ADJ. 36 PAPER DEFLECTOR STOP



When the paper release lever is forward, the deflector stop should be adjusted to hold the front and rear rollers an equal distance from the platen.

ADJ. 37 LINE GAUGE CARD HOLDER - PSM



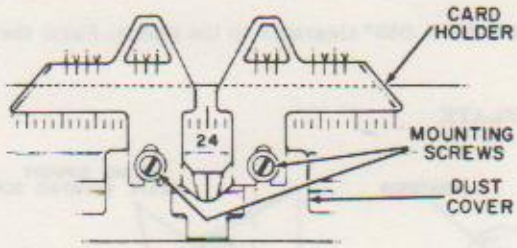
Type a series of H's (5 or 6). Space the carriage 20 or 30 times and type another series of H's. Move the carriage back as indicated below and type two H's approximately in the center of the spaced

portion of the line.

1/32" - Back space the carriage 16 units.
1/36" - Back space the carriage 18 units.
1/40" - Back space the carriage 20 units.
1/48" - Back space the carriage 22 units.

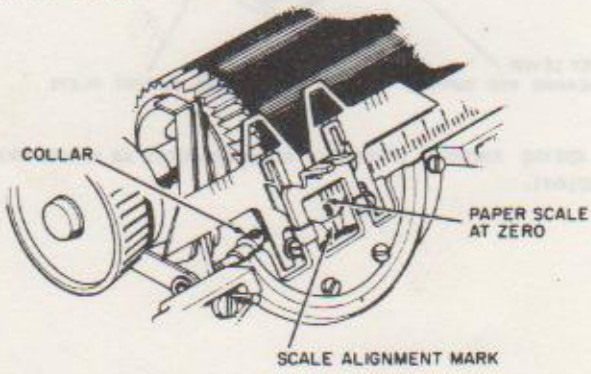
Position the card holder to fall on the writing line and so that the right hand vertical edge is midway between the two H's as shown.

ADJ. 38A LINE GAUGE CARD HOLDER - MONO



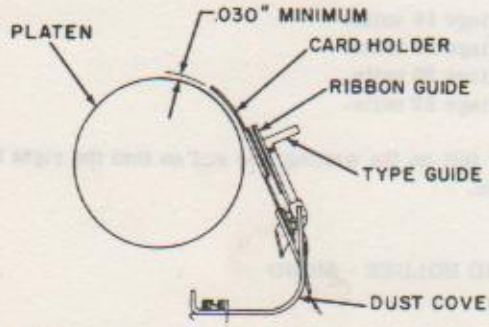
Strike several characters and align the small vertical lines on the line gauge card holder to the center of the characters as shown. Position the card holder up or down to fall on the "writing line".

ADJ. 38B PAPER SCALE - MONO



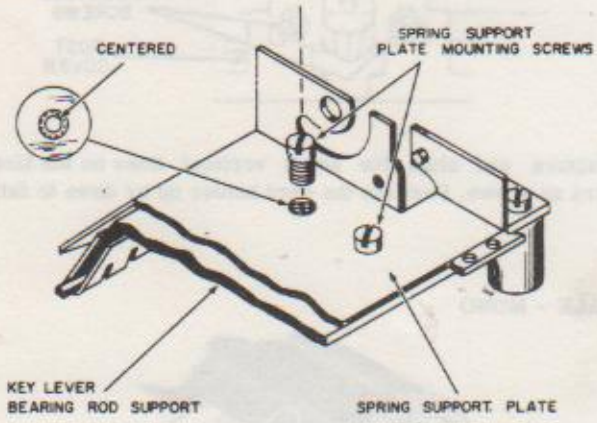
Pull the carriage to the extreme right against the final stop and then release. In this position, the paper scale should read zero at the scale alignment mark. Adjust the collar to the right or left to position the paper scale.

ADJ. 39 LINE GAUGE CARD HOLDER CURVATURE



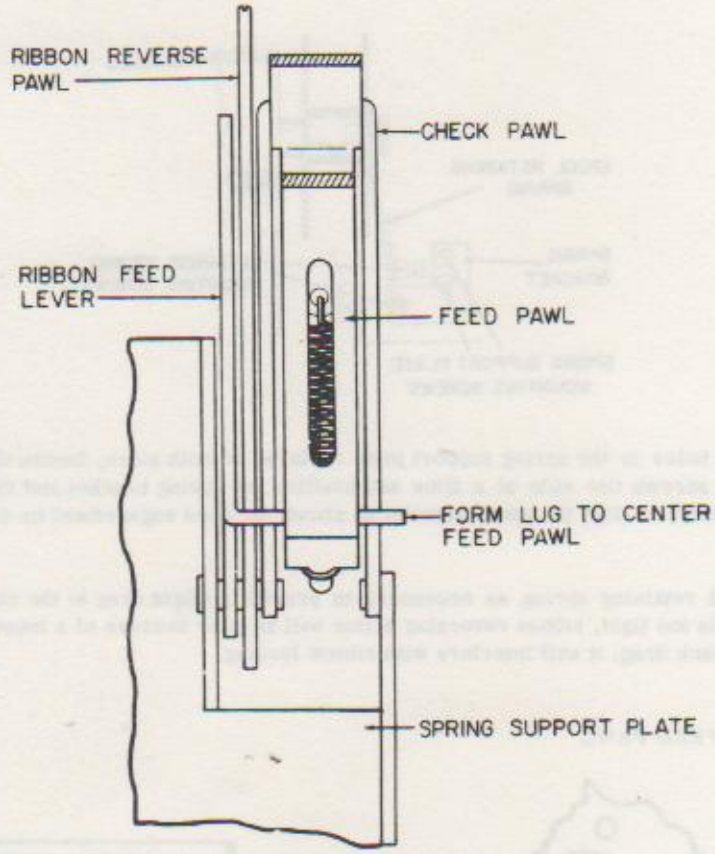
The line gauge-card holder is to have .030" clearance to the platen. Form the card holder as required.

ADJ. 40A SPRING SUPPORT PLATE



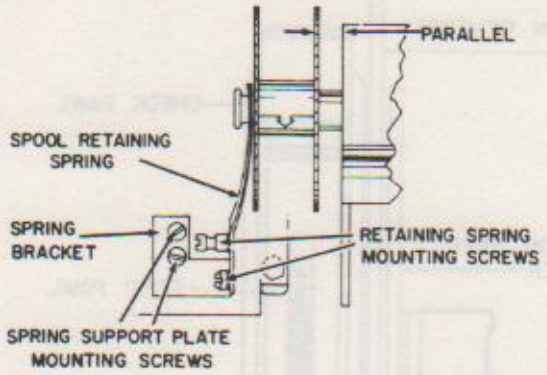
The screw holes in the spring support plate are to be centered as shown over the screw holes in the keylever bearing rod support.

ADJ. 40B RIBBON FEED LEVER LUG



The feed pawl is to be centered in the check pawl as shown so that it is free of all binds. Form the lug of the ribbon feed lever as required.

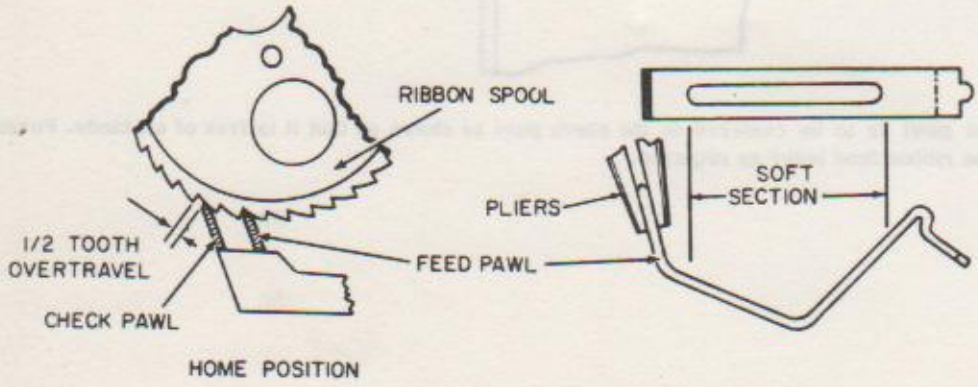
ADJ. 40C RIBBON SPOOL TENSION & ALIGNMENT



1. With the screw holes in the spring support plate centered on both sides, loosen the spring support plate mounting screws one side at a time and position the spring bracket and the spool retaining spring if necessary, to align the spool parallel as shown for good engagement by the feed and check pawls.

2. Form the spool retaining spring as necessary to provide a slight drag to the ribbon spool. If the amount of drag is too light, ribbon reversing action will be poor because of a loosely wound ribbon. If there is too much drag, it will interfere with ribbon feeding.

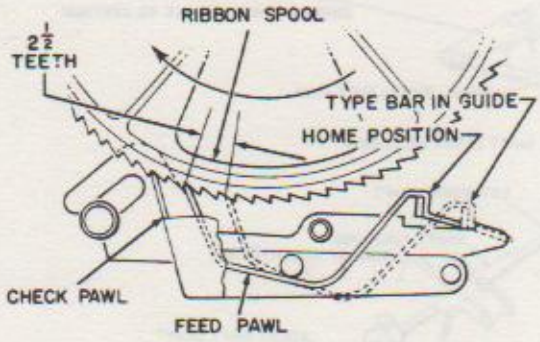
ADJ. 40D RIBBON FEED PAWL

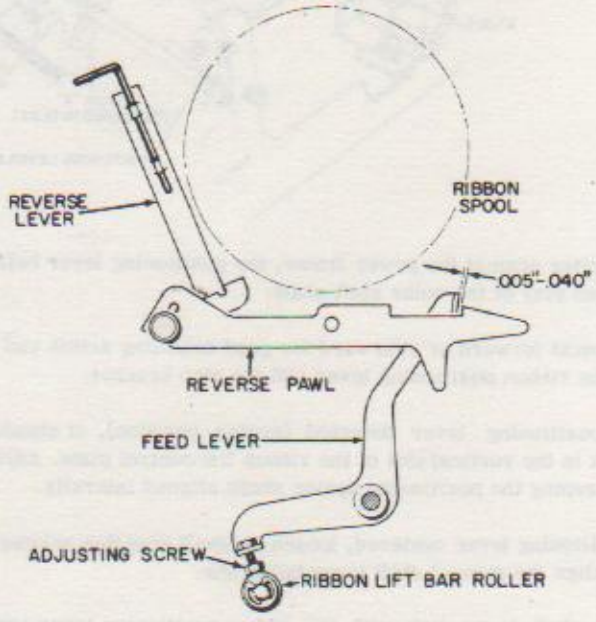


With the ribbon feed mechanism in home position, the check pawl should have approximately 1/2 tooth overtravel to the ribbon spool when the spool is held against the feed pawl. Carefully form the feed pawl as shown to obtain this requirement. Check to see that the feed pawl has good engagement and disengagement from the spool after forming by operating the manual ribbon reverse lever.

Friden 2200/2300 SERIES MACHINES

ADJ. 40E RIBBON FEED LEVER

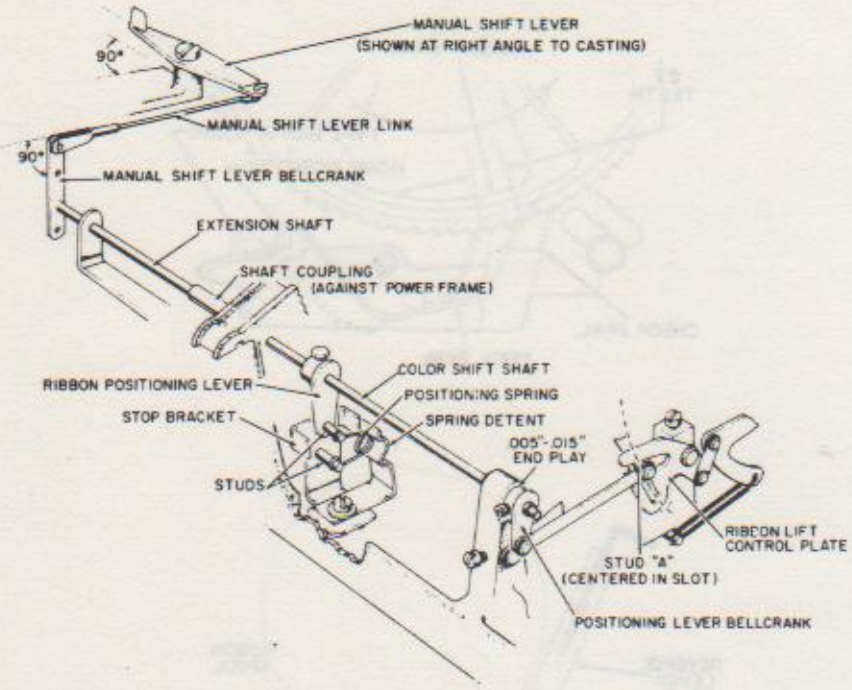




The movement of the ribbon feed lever should operate the feed pawl for an overlatch of approximately 2 1/2 teeth as a typebar is manually raised against the platen. A .005" to .040" clearance between the ribbon reverse pawl and the ribbon feed lever should also be maintained. It is only necessary to have clearance at this point, but a .040" maximum clearance will insure reliable ribbon reversing. Adjust the ribbon feed lever adjusting screw to obtain the above requirements.

Friden 2200/2300 SERIES MACHINES

ADJ. 41 COLOR SHIFT ADJUSTMENT



1. With the shaft coupling against the power frame, the positioning lever bellcrank should be adjusted for .005" to .015" end play of the color shift shaft.

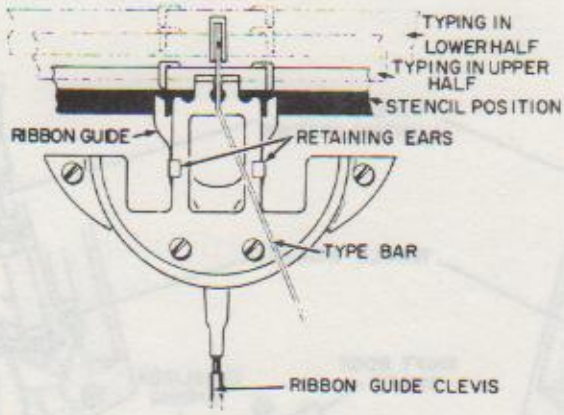
2. Form the spring detent forward or rearward for good detenting action and up or down to vertically align the studs on the ribbon positioning lever and the stop bracket.

3. With the ribbon positioning lever detented (center position), it should position the color shift shaft to align stud A in the vertical slot of the ribbon lift control plate. Adjust the ribbon positioning lever as required keeping the positioning spring studs aligned laterally.

4. With the ribbon positioning lever centered, loosen the shaft coupling screws and rotate the extension shaft to vertically align the manual shift lever bellcrank.

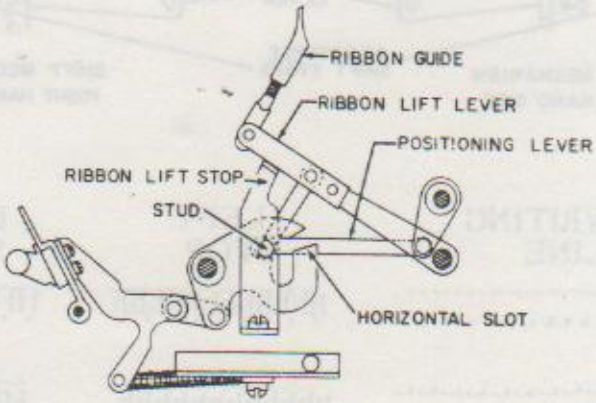
5. Adjust the manual shift lever link with the ribbon positioning lever centered so that the manual shift lever will extend at right angles to the side of the machine.

ADJ. 42 RIBBON GUIDE



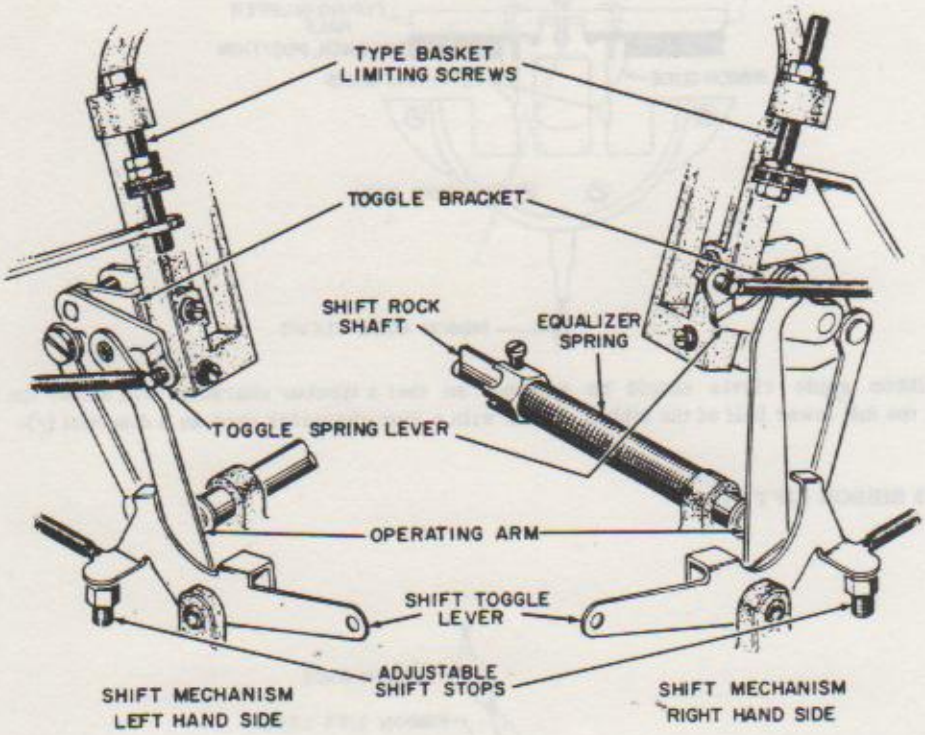
The ribbon guide clevis should be adjusted so that a typebar character will strike the full upper half or the full lower half of the ribbon. Check with a long character such as a diagonal (/).

ADJ. 43 RIBBON LIFT STOP



The stud at the end of the positioning lever should be approximately centered in the horizontal slot of the ribbon lift control plate when the ribbon guide is restored. Form the ribbon lift stop.

ADJ. 44A TYPE BASKET



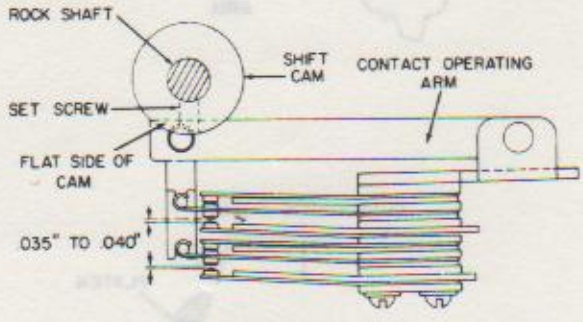
	WRITING LINE	LEFT STOP	RIGHT STOP
TOO HIGH			
TOO LOW			
RIGHT			

1. The equalizer spring is adjusted to counteract the weight of the type basket and enables it to shift upward as easily as it shifts downward. However, a more precise setting of the spring is necessary to establish a writing line guide for the upper and lower case adjustments of the type basket. With the front of the springs unhooked from the toggle spring levers, adjust the equalizer spring tension to float the basket at a point where equal portions of upper and lower case full height characters (H, L, B, etc.) can be typed as shown by the writing line example.

2. Back off the type basket limiting screws so they can not interfere with the adjustments. Unhook the springs from the toggle spring levers and type several lines of full height characters with the basket floating (equalizer spring correctly adjusted). Rehook the springs, shift the basket to lower case and type several full height characters between the previously typed floating characters. Adjust the left adjustable shift stop to position the lower case characters an equal distance between the floating characters as shown by the left stop examples. With the basket in upper case, adjust the right adjustable shift stop for the same requirements as shown by the right stop examples.

3. The type basket limiting screws are to be adjusted for no pressure-no clearance and are not to change the basket positioning in upper or lower case.

ADJ. 44B SHIFT CAM & CONTACTS

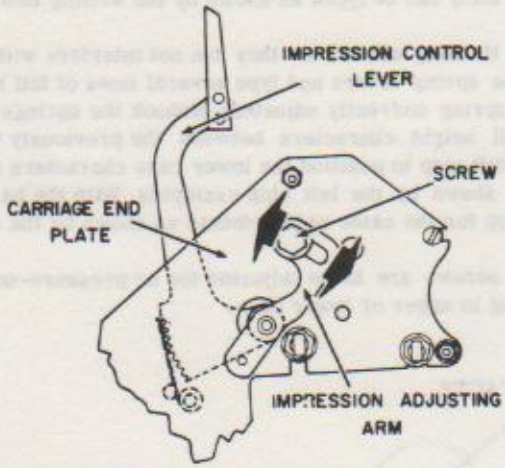


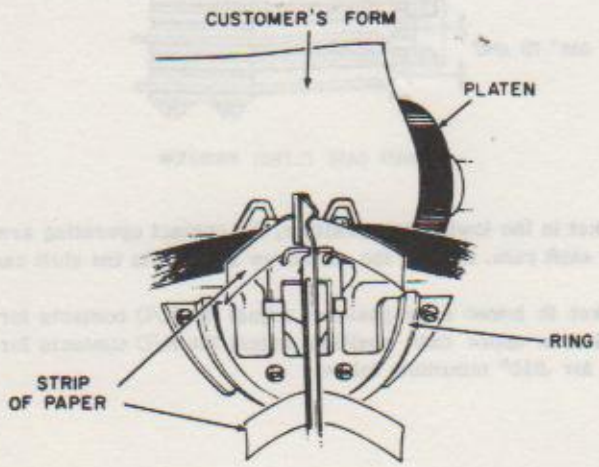
LOWER CASE (LTRS) POSITION

1. With the type basket in the lower case position, the contact operating arm should rest fully against the flat side of the shift cam. Loosen the set screw and rotate the shift cam.

2. With the type basket in lower case position, adjust the N/O contacts for .035" to .040" clearance. With the type basket in upper case position, adjust the N/C contacts for .035" to .040" clearance. Check all contacts for .010" minimum follow.

ADJ. 45 RING & CYLINDER





Set the impression control lever in its most forward position. Bring a typebar against the platen (including the fabric ribbon and the customers form). In lower case the typebar should touch the ring with pressure equal to the pressure against the platen. Also the pressure against the platen should be equal throughout the movement of the carriage. Adjust for these requirements by setting the impression adjusting arms at either side of the carriage. Check the adjustment by inserting a strip or paper first between the ring and a typebar and then between the ribbon and a typebar, with the typebar held against the platen. The drag on the strip of paper as it is pulled should be equal for both ring and cylinder (platen) anywhere on the platen. Use several typebars to insure accuracy. Set carbon ribbon machines for less pressure against the platen than the ring; the amound determined by the quality of typing.