

IBM

EXECUTIVE

ELECTRIC TYPEWRITER

MODEL B4

CUSTOMER ENGINEERING REFERENCE MANUAL

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ELECTRIC TYPEWRITER**MODEL B4 (Serial 100,000 and above)****FEATURES COMMON TO MODEL B1**

Several features of the **Executive Electric Typewriter** are common to the standard model and will not be repeated in this section. These features include.

Motor and Drive	Repositioning Cams
Key Levers, Letter Cams,	Shift
Typebars	Carriage
Margin Set	Paper Feed
Margin Release	Cloth Ribbon Feed
Alignment	

CARRIAGE AND RAILS

Removal

1. Remove the three interposer bellcrank links and their springs.
2. Remove the lower interposer bellcrank guide comb.
3. Disconnect the tab governor pawl link if present.
4. Remove the rear case.
5. Disconnect the tab operating link.
6. Disconnect the expander link at the rear.
7. Unhook the escapement trip link.
8. Disconnect the rebound check interlock lever link if present.
9. Disconnect the backspace operating link at the bellcrank.
10. Disconnect the clutch unlatching link.
11. Remove the C clip from the carriage return pawl release lever.
12. Remove the margin set lever.
13. Disconnect the carriage tension tape and slowly let the main spring take it up until the end clip of the tape is caught by the small idler pulley where it will be held.
14. Disconnect the carriage return tape from the indexing mechanism and allow it to be drawn back as far as its idler pulley.
15. Remove the four rail screws and run the carriage all the way to the right side of the machine so that the interposer bellcranks will be visible from the top. Lift the carriage off, being careful of the tab operating link and the connection on the universal bar which normally holds the trip link. By twisting the carriage and the rails around slightly to the right, they will lift off.

Rail Adjustments

Refer to "Rail Adjustments, Model B1".

FLOATING INTERPOSERS SELECTION

Interposer Removal

INTERPOSERS may be easily removed after the carriage and rails are removed.

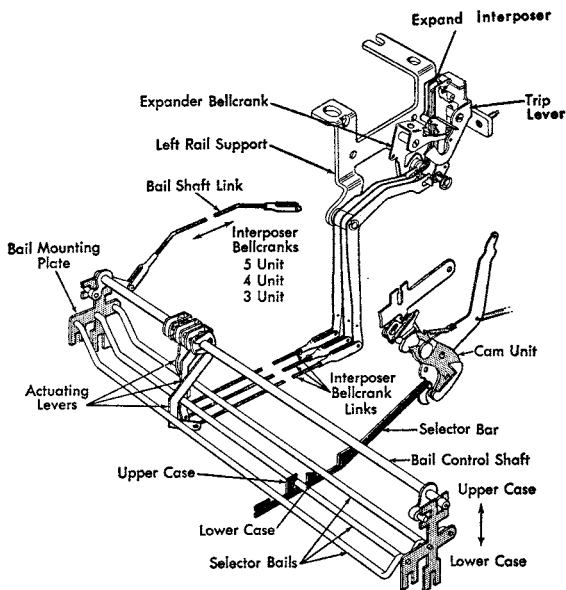


Figure 1. Escapement Selector Mechanism

Adjustments

1. SHIFT MOTION. Check for proper adjustment. Any change in shift motion necessitates a change in the bail shaft link adjustment.

2. BAIL SHAFT LINK. Adjust so that the bail mounting plates will move to their upper extreme (upper case) and not bind off on the bail control shaft (Figure 1). When the mounting plates are in the lower extreme (lower case) they should not bind off on the bail mounting plate guide pins.

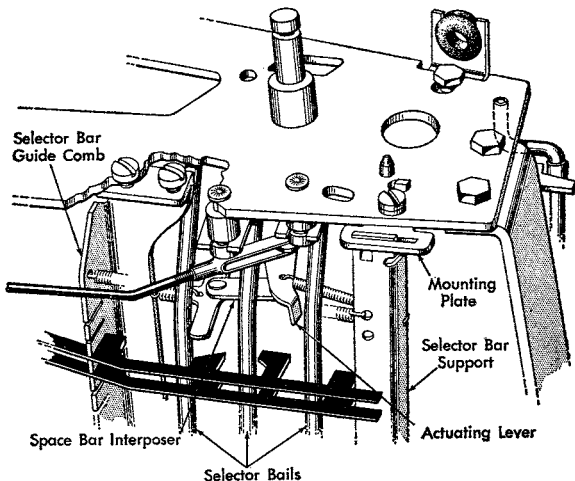


Figure 2. Selector Bar Adjustments

3. SELECTOR BAR SUPPORT MOUNTING PLATES Adjust up or down so that the selector bars just clear the bails in the lower case position (Figure 2).

4. SELECTOR BAR GUIDE COMB. Raise this as high as possible and lock it in place (Figure 2). This should allow free travel of the selector bars.

Unit Interposer

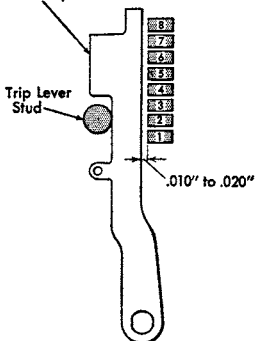


Figure 3. Pawl Tail to Interposer Clearance

5. PAWL TAIL TO INTERPOSER CLEARANCE. (Figure 3). Adjust the trip lever mounting stud for

a .010" to .020" clearance between the 2-unit interposer and the tails of the escapements pawls. Check by moving the trip lever while watching the movement of the 2-unit interposer. This should be checked while the carriage is being held by the 1 escapement pawl and also while the 8 pawl is holding the carriage. Adjustment should be made in relation to the closest pawl tail. Be sure a clearance is maintained between the right side of the interposer cage and the pawl tails. Check by pulling the cage to the left at the top and releasing it slowly, while exerting a pressure toward the front. It should not hang up on any pawl tails.

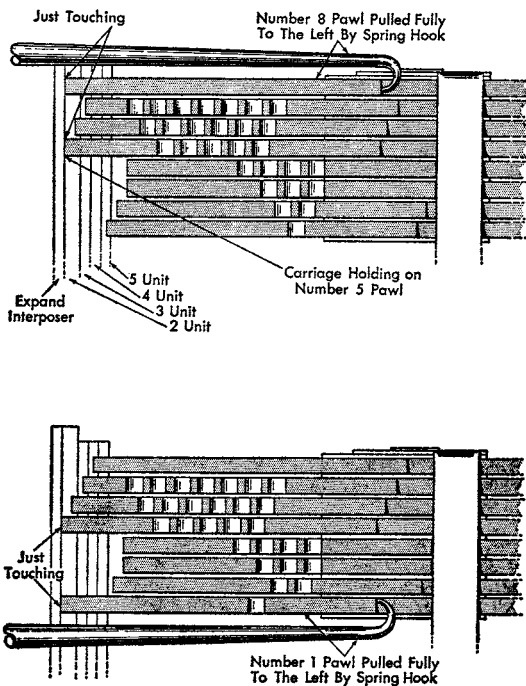


Figure 4. Interposer Verticalness

6. INTERPOSER VERTICALNESS. Adjust in the following manner:

- a. Position the carriage to the right so the pawl

tails are visible and the carriage is holding on the 5 escapement pawl (Figure 4).

b. Move the 1 and the 8 escapement pawls fully to the left. Each escapement pawl tail should just touch the expand interposer or move it an equal amount to the left (Figure 4). Unequal movement indicates need for shifting the rear of the rail support to the right or left.

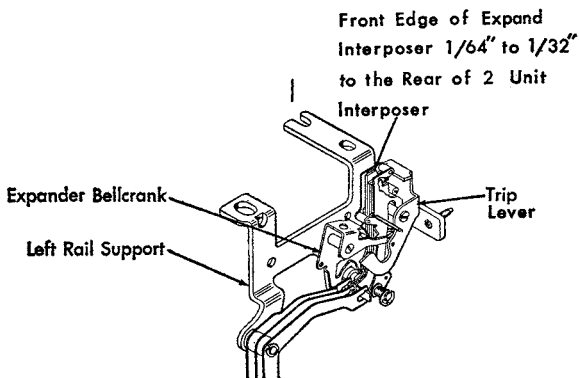


Figure 5. Expander Bellcrank Adjustment

7. EXPANDER BELLCRANK. Adjust this by moving its pivot stud front or rear. Position this stud so that the front edge of the expand interposer, when in the expand position, is $\frac{1}{64}$ " to $\frac{1}{32}$ " to the rear of the front edge of the 2-unit interposer (Figure 5).

8. EXPANDER BELLCRANK ARM. Form the expander bellcrank arm so that it will just clear the right side of the interposer cage when the interposer cage is in the expanded position.

9. TRIP LINK. Adjust so that the holding escapement pawl is tipped when the type face is $\frac{3}{8}$ " \pm $\frac{1}{8}$ " from the platen.

10. INTERPOSER BELLCRANK LINKS. (Figure 1). Adjust as follows: Type the "i" key repeatedly and move a 3-unit typebar slowly toward the platen. The spacing should increase from 2 to 3 units when the 3-unit typebar is one-half to two-thirds of the distance to the platen. This procedure should also be used to check the 4-unit and 5-unit interposer bellcrank links,

however, use a 4-unit and 5-unit typebar, respectively.

NON-FLOATING INTERPOSERS SELECTION

INTERPOSER REMOVAL is the same as for the floating interposers.

Adjustments

1-5. Refer to "Floating Interposers Selection, adjustments 1 through 5," this section.

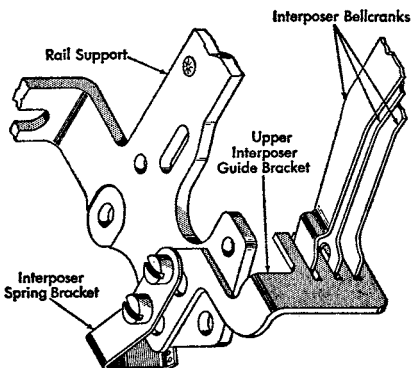


Figure 6. Upper Guide Bracket Adjustment

6. UPPER INTERPOSER BELLCRANK GUIDE BRACKET. Position this to its lower limit and lock it in place (Figure 6).

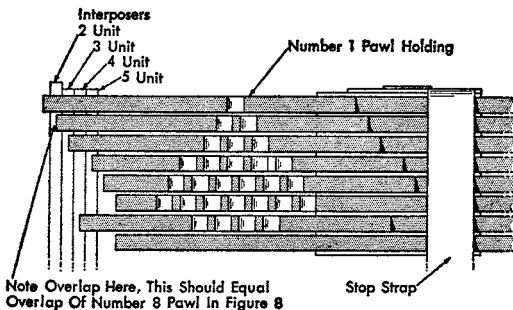


Figure 7. Overlap of Number 2 Pawl

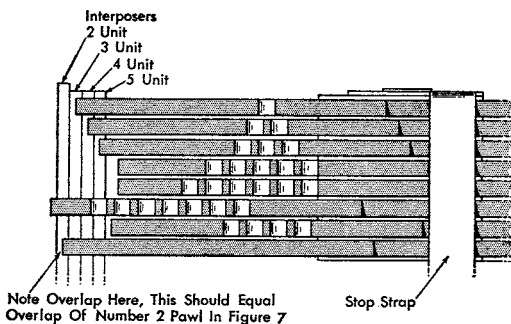


Figure 8. Overlap of Number 8 Pawl

7. INTERPOSER VERTICALNESS is obtained by moving the left rail support to the left or right. Position the carriage to hold on the 1 escapement pawl. Check the overlap of the 2 pawl tail on the 2-unit interposer (Figure 7). Position the carriage to hold on the 7 pawl and check the overlap of the 8 pawl on the 2-unit interposer (Figure 8). The overlap should be equal in both cases without regard for the actual amount of overlap. This will prove the interposers to be vertical with respect to the pawl tails.

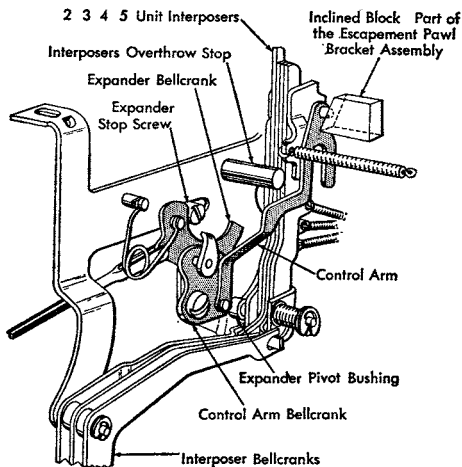


Figure 9. Expander Mechanism

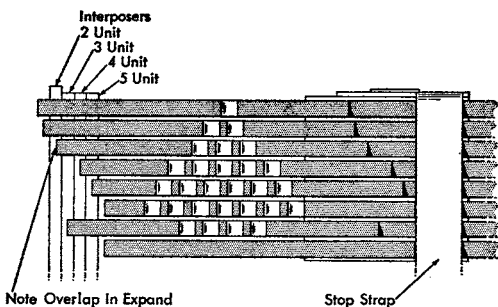


Figure 10. Interposers in Expand Position

8. EXPANDER STOP SCREW. Position this in its elongated hole (Figure 9) to allow for one full unit of expansion when the expand button is pushed up. To check this, have the carriage hold on the 1 escapement pawl (Figure 7) and observe the overlap of the 2 escapement pawl tail on the 2-unit interposer. Move the expand button to the expand position. Observe that the 3 escapement pawl tail now has the same overlap on the 2-unit interposer (Figure 10) as the 2 escapement pawl tail had in the non-expand position.

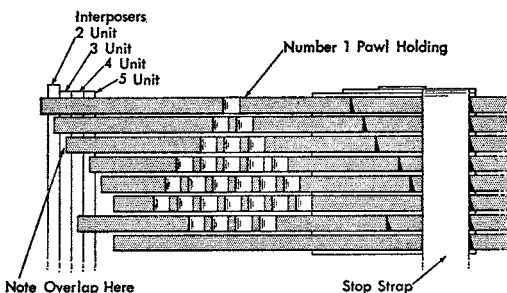


Figure 11. Interposer Overlap, Normal

9. OVERLAP. Adjust by moving the control arm bellcrank to the front or rear (Figure 9). Position the bellcrank so that when the carriage is held by the 1 escapement pawl the 3 escapement pawl tail will overlap the 3-unit interposer by one-half the thick-

ness of the interposer (Figure 11). The overlap should be observed by the 3 escapement pawl tail overlapping the 3-unit interposer, because the 2-unit interposer is the same thickness on all pitches.

10. PAWL TAIL TO INTERPOSER CLEARANCE. Refer to "Floating Interposers Selection, adjustment 5," this section.

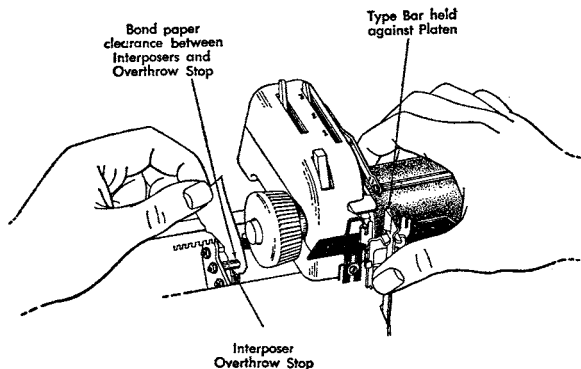


Figure 12. Interposer Overthrow Clearance

11. TRIP LINK. Refer to "Floating Interposers Selection, adjustment 9," this section

12. INTERPOSER OVERTHROW STOP. Adjust so that by holding a typebar against the platen, a clearance the thickness of bond paper will be visible between the interposer and the overthrow stop (Figure 12). Test several typebars for this condition.

13. INTERPOSER BELLCRANK LINKS. Refer to "Floating Interposers Selection, adjustment 10," this section.

14. INTERPOSER SPRING BRACKET. Form this slightly to the rear for more tension on the interposer springs if the interposers restore sluggishly (Figure 6).

ESCAPMENT Removal

PAWL BLOCK ASSEMBLY

1. Remove the rear case and both carriage end covers.

2. Remove the tab rack and margin rack.
3. Disconnect the pawl aligning link, pawl release link, and the clutch unlatching link.
4. Disconnect the air cylinder bellcrank spring at the pivot point for the margin control bellcrank.
5. Disconnect the pawl aligning lever spring.
6. Disconnect the spring from the left end of the tab lever.
7. Disconnect the tab latch spring.
8. Remove the spring from the escapement pawl stop strap which connects to the interposer cage.
9. Remove the margin control bellcrank.
10. Block the carriage to prevent movement and remove the two screws which secure the pawl block to the rear rail. The assembly may then be removed from the rear rail. The assembly may then be removed from the rear of the machine.

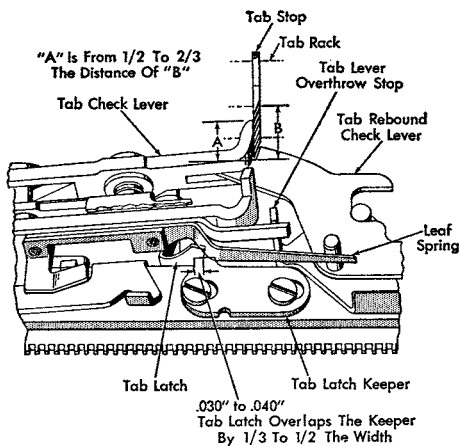


Figure 13. Latch Keeper Adjustment

GROUPING

Adjustments

Remove the carriage - return - tab interlock, and disconnect the pawl release link. These parts should not be replaced until grouping adjustments are completed.

1. **TAB LATCH KEEPER.** Position this so that the tab check lever covers one-half to two-thirds of the exposed surface of a set tab stop when the tab lever is held out by the keeper (Figure 13). At the same time the keeper should be moved left or right for .030" to .040" (.040" to .050" with floating selection) engagement of the latch on the keeper.

2. **THE ANGULAR TIP** of the intermediate pawl release lever is adjusted by forming so as to allow $\frac{1}{32}$ " to $\frac{1}{16}$ " clearance between the upright bail of the pawl aligning lever and the pawl tails when all parts are at rest (Figure 14). Before forming the tip, be sure it is resting against the pawl release lever and that the apron of the pawl release lever is flat against the rear rail.

3. **PAWL CLEARANCE** is obtained by forming the rear upright lug of the pawl release lever so that the escapement pawls clear the rack by $\frac{1}{64}$ " when the tab lever is latched out (Figure 14).

4. **THE GROUPING CONE** is adjusted up or down so that it is approximately $\frac{1}{16}$ " from its extreme down position. This is a preliminary adjustment which may be changed slightly, after adjusting the grouping lever, in order to facilitate obtaining accurate grouping.

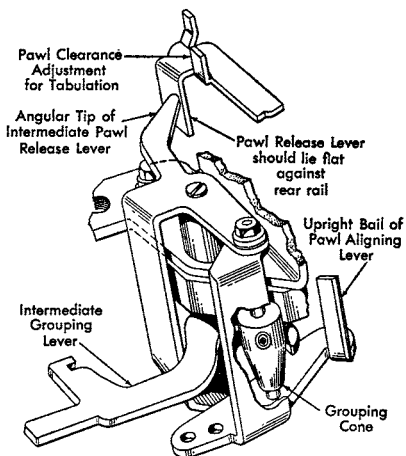


Figure 14. Pawl Release Mechanism

5. THE GROUPING LEVER. Adjust by repositioning this on the grouping lever adjusting arm (Figure 15) so that the escapement pawls are accurately grouped. Accurate grouping is observed by following these steps:

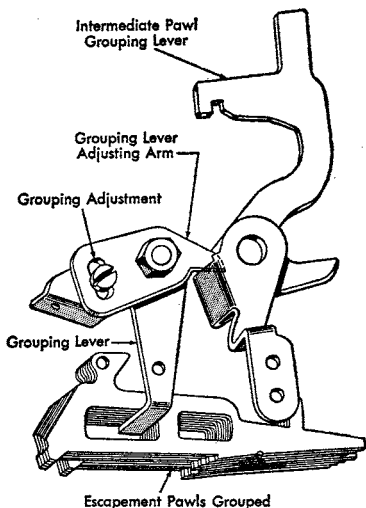


Figure 15. Grouping Adjustment

a. The left margin stop should be moved at least an inch to the right of its extreme left position so that the margin control lever can be positioned between this stop and the left carriage end plate. In this manner, the carriage may be held in an almost full right position so that the escapement pawls may be viewed without interference.

b. Position the carriage as described in "a" above and hold it to prevent movement.

c. Latch out the tab lever.

d. Check to see that the stop notches of the 4 and 8 escapement pawls are touching the pawl stop strap and that the stop notches of the 3 and 7 pawls are one unit away from the stop strap. The 2 and 6 pawls will be two units away from the stop strap and the 1 and 5 pawls will be three units from the stop strap (Figure 16). When looking down between the rails to check grouping, be sure that grouping is

maintained by the tab lever and not because the margin control plate has moved the automatic grouping lever. Because the numerical sequence of the

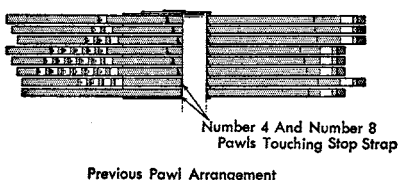
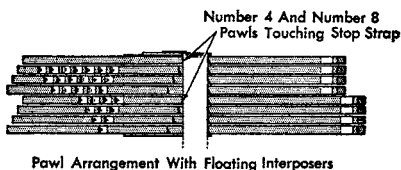


Figure 16. Escapement Pawls Grouped

escapement pawls may vary, note the number of the escapement pawl before checking its notch with relationship to the stop strap when in the grouped position (Figure 16).

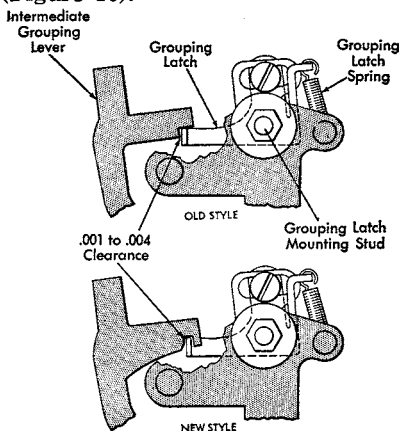


Figure 17. Grouping Latch Mounting Stud Adjustment

It may be necessary to readjust the pawl grouping cone if the grouping lever cannot be positioned far enough to obtain proper grouping.

6. GROUPING LATCH MOUNTING STUD. Adjust to the left or right so that with the tab lever latched and held by the keeper, the grouping latch will bottom in the notch of the intermediate grouping lever and clear the left side of this notch by .001" to .004" (Figure 17).

7. GROUPING LATCH ADJUSTING PLATE (Old Style). With the carriage resting on the 1 or 5 escapement pawl, move the grouping latch in relation

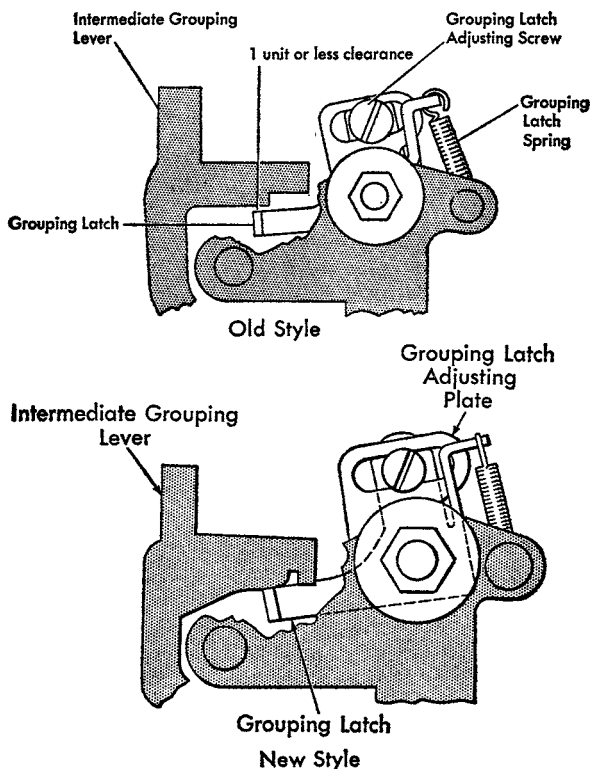


Figure 18. Grouping Latch Adjusting Plate

to the latch plate until the latch clears the intermediate grouping lever by one, or slightly less than one unit (Figure 18).

7a. GROUPING LATCH ADJUSTING PLATE (Floating Selection) (Figure 18). Adjust by centering the grouping latch adjusting screw in the slot of the grouping latch adjusting plate. To check this adjustment:

1. Hold the carriage so that the pawls will remain free of pressure by the rack teeth.

2. Latch up grouping by moving the automatic grouping lever by hand until the latch will drop into the notch of the intermediate grouping lever. This will allow the pawls to remain in the rack while grouped.

3. Hold the grouping latch in the notch of the intermediate grouping lever.

4. With a spring hook pull the 1 or 5 escapement pawl to the left until the spring lug is felt to strike the bail of the latch releasing lever. The distance the pawl moves should be one unit or slightly less and can be gaged by the movement of the escapement pawl tail across an interposer. It may be necessary to slightly readjust the grouping latch adjusting screw to satisfy this condition.

TABULATION

Adjustments

1. TAB LEVER PIVOT STUD. Adjust for a slight amount of end play to prevent binding of the tab lever (Figure 19).

2. CAM CLEARANCE. Refer to "Spacebar, adjustment 1, Model B1".

3. THE CAM RELEASE LINK should be placed in the front hole of the keylever. Adjust the link to trip the cam when the keylever has completed two-thirds to three-fourths of its downward travel (Figure 20).

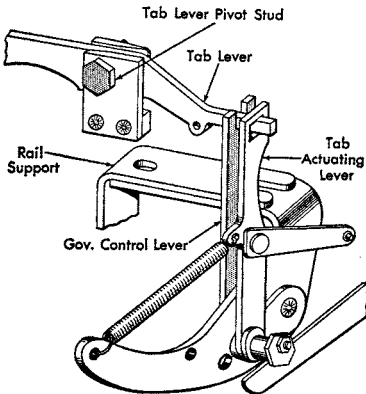


Figure 19. Tab Lever Pivot

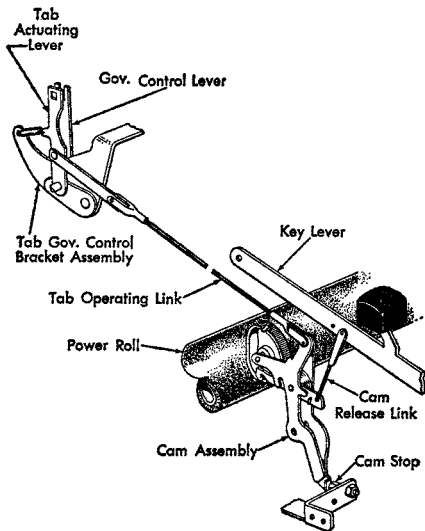


Figure 20. Tab Actuating Mechanism

4. **TAB LATCH KEEPER.** Refer to "Grouping, adjustment 1", this section.

5. **TAB OPERATING LINK.** Refer to "Tabulation, adjustment 6, Model B1".

6. **HEIGHT OF MARGIN CONTROL LEVER.** Refer to "Margin Release, adjustment 1, Model B1".

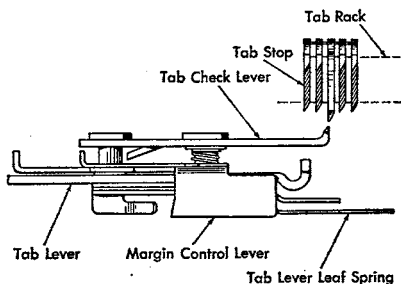


Figure 21. Tab Rack Adjustment

7. **THE TAB RACK** must be adjusted two ways:

a. With the carriage resting on the 2 or 6 escapement pawl, the tab rack should be adjusted left or right until the tip of the tab check lever will be in line with the nearest set tab stop (Figure 21). This adjustment will determine the correct re-entering position of the escapement pawls in relation to the escapement rack teeth upon completion of a tab operation.

b. Position the right end of the rack front or rear by means of its elongated mounting hole so that the tab check lever will take an equal bite on all set tab stops. When tightening the adjusting nuts, maintain the front face of any set tab stop parallel to the tip of the tab check lever and at the same time make sure that the carriage end plates are not sprung.

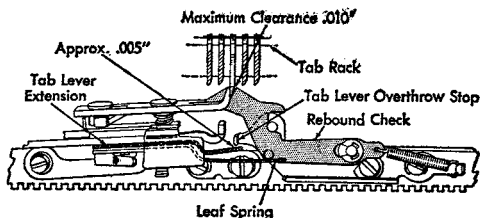


Figure 22. Rebound Check Bracket Adjustment

8. THE REBOUND CHECK BRACKET should be adjusted two ways:

a. Position the bracket left or right so that the rebound check lever will clear the right-hand face of any set tab stop by a maximum of $.010''$ when the left-hand face of the stop is pressed firmly against the tab check lever (Figure 22).

b. Position the bracket front or rear so that when the rebound check is in its operating position and against the pin in its bracket, the leading edge of the rebound check lever will clear the tab rack by $.010''$ to $.015''$ (Figure 22).

9. TAB LEVER EXTENSION. Form this so that, with the tab cam on its high point the extension will clear the tab lever overthrow stop by $.005''$ (Figure 22). Check both cam lobes and adjust to the one which gives maximum throw.

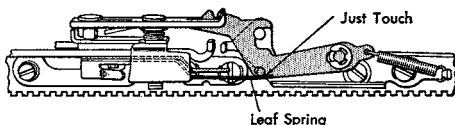


Figure 23. Leaf Spring Adjustment

10. LEAF SPRING. Form to just contact the upright stud of the rebound check lever when the check lever is at rest (Figure 23).

11. PAWL CLEARANCE. Refer to "Grouping, adjustment 3", this section.

12. TAB GOVERNOR PAWL LINK. Refer to "Tabulation, adjustment 9, Model B1".

13. FRICTION GOVERNOR PRESSURE. Refer to "Tabulation, adjustment 10, Model B1". Correct tabulation should not be checked by backspacing. It is suggested that a piece of paper be inserted and long and short tabs be checked by typing the lower case l to be sure a straight column is formed.

14. TAB SET AND CLEAR BRACKET. Adjust by tabulating to a set tab stop and then moving the tab set and clear bracket so that the tab set lever is directly behind that tab stop. Care should be taken not to adjust the bracket too low, because in that position the tab clear lever could damage the tab stop springs.

15. TAB SET LEVER STOP. Refer to "Tabulation, adjustment 12, Model B1".

16. TAB CLEAR LEVER STOP. Refer to "Tabulation, adjustment 13, Model B1".

17. TAB SET AND CLEAR LINKS. Refer to "Tabulation, adjustment 14, Model B1".

CARRIAGE RETURN

Adjustments

1. CAM CLEARANCE. Refer to "Spacebar, adjustment 1, Model B1".

2. THE CAM RELEASE LINK. Refer to "Carriage Return, adjustment 2, Model B1".

3. FRONT CLUTCH LEVER LINK. Adjust so that, with the cam on its high point, the clutch lever will clear the clutch latch by .020" to .025" (Figure 24).

4. REAR CLUTCH LEVER LINK. Adjust with the cam and the carriage return pawl release lever in their rest positions. The link should just span the distance between the clutch lever and the elongated hole of the clutch lever bellcrank (Figure 24).

5. CLUTCH LATCH LINK. Adjust with the cam at rest so that the elongated hole in the clutch latch bellcrank is parallel to the rear rail (Figure 24).

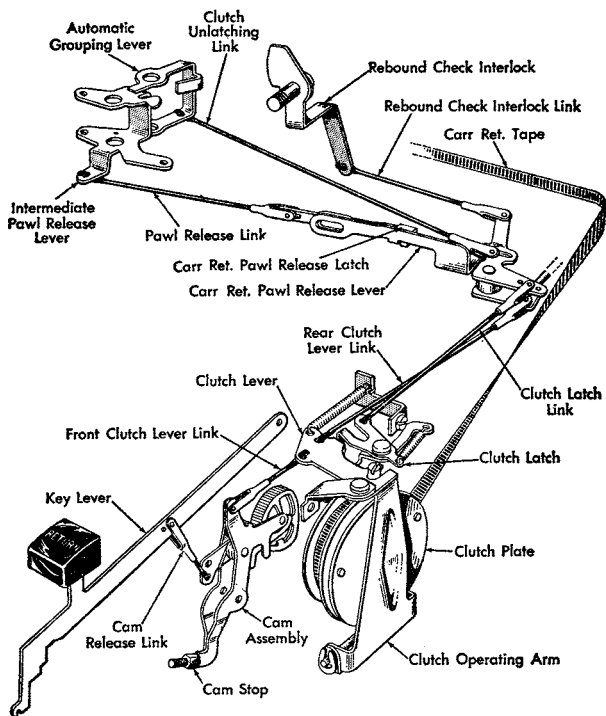


Figure 24. Carriage Return Mechanism

6. REBOUND CHECK INTERLOCK LINK. Refer to "Carriage Return, adjustment 17, Model B1".

7. THE CARRIAGE-RETURN-TAB INTERLOCK should reliably unlatch the clutch whenever the tab lever is moved to its latched position. With the tab lever latched, form the lug on the automatic grouping lever so that it clears the carriage-return-tab interlock by .010" to .015" (Figure 25).

8. MARGIN CONTROL PLATE. Adjust to allow .001" to .004" clearance between the grouping latch and the left side of the notch in the intermediate grouping lever. This clearance is observed when the carriage is held to the extreme right so that the margin control lever is against its final stop (Figure 26).

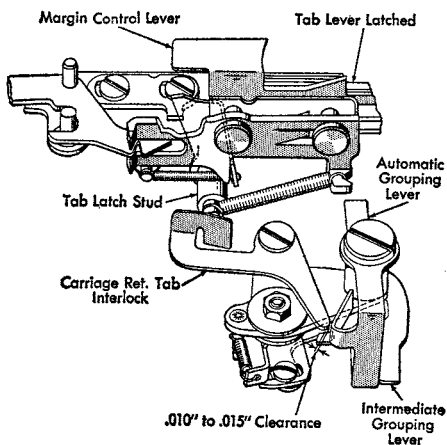


Figure 25. Carriage-Return-Tab Interlock Adjustment

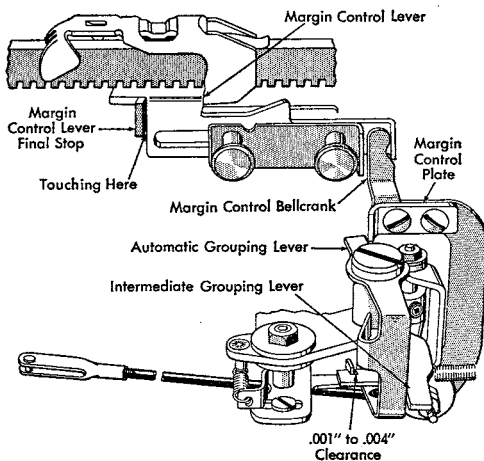


Figure 26. Margin Control Plate Adjustment

9. CLUTCH UNLATCHING LINK. Adjust so that the clutch will unlatch when the margin control lever is $\frac{1}{64}$ " from its final stop (Figure 27).

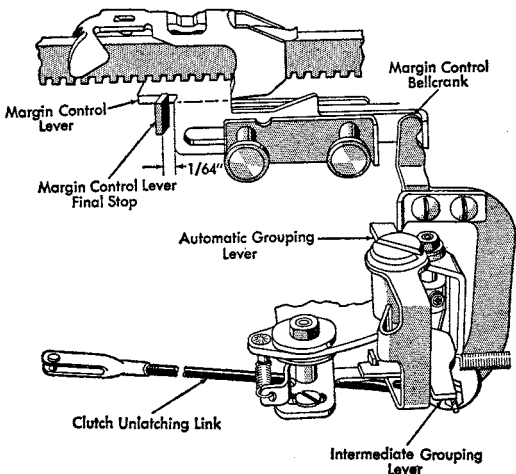


Figure 27. Unlatching Link Adjustment

10. PAWL RELEASE LINK. Adjust so that the escapement pawls clear the escapement rack by $\frac{1}{64}$ " when the clutch is latched (Figure 28).

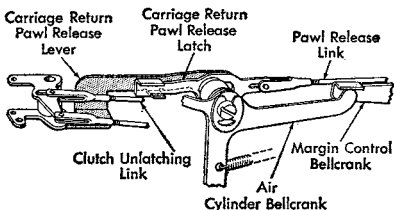


Figure 28. Pawl Release Adjustment

11. MARGIN RACK. Adjust to the left or right so that when the carriage is returned to the left margin there will be $4\frac{1}{2}$ units of overbank between the margin control lever and its final stop (Figure 29). Correct overbank can be observed by counting the number of backspaces in this area. When observing this adjustment, hold the backspace interlock to the rear away from the backspace pawls. Otherwise, the interlock may keep the backspace pawls from operating.

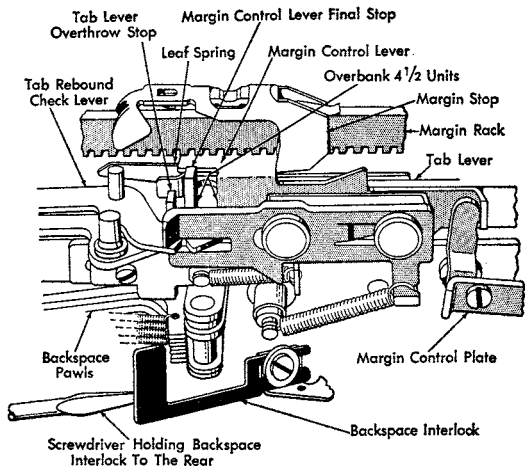


Figure 29. Overbank Adjustment

12. CLUTCH PLATE CLEARANCE. Refer to "Carriage Return, adjustment 18, Model B1".

13. AIR CYLINDER. Refer to "Carriage Return, adjustment 19, Model B1".

14. AIR CYLINDER PORTS AND CLUTCH COMPRESSION SPRING. Refer to "Carriage Return, adjustment 20, Model B1".

15. CLUTCH PULLEY SPRING. Refer to "Carriage Return, adjustment 21, Model B1".

SPACEBARS

Adjustments

1. CAM CLEARANCE. Refer to "Spacebar, adjustment 1, Model B1".

2. CAM RELEASE LINK. Adjust so that the cam will be released when the keylever has completed two-thirds to three-fourths of its downward travel (Figure 30).

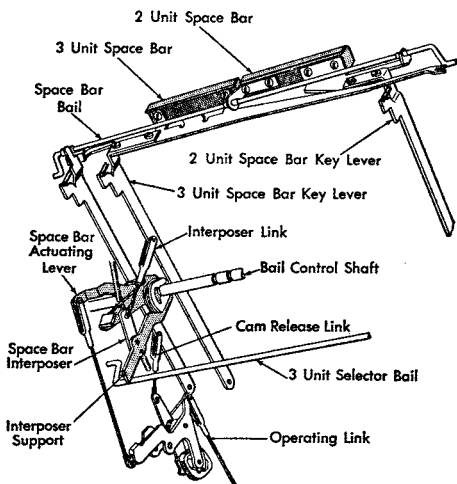


Figure 30. Spacebars

3. THREE-UNIT SPACEBAR INTERPOSER LINK from the keylever is to be adjusted to allow the interposer to clear the top of the formed lug on the spacebar actuating lever by $\frac{1}{32}$ " as the lug passes under the front of the interposer during 2-unit spacebar operation (Figure 31).

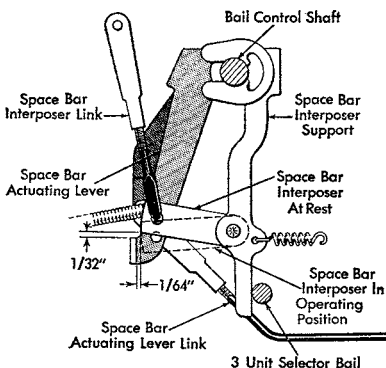


Figure 31. Spacebar Interposer Adjustments

4. **THE LINK FROM THE ACTUATING LEVER** to the cam is to be adjusted so that the back of the lug on the actuating lever clears the spacebar interposer by $\frac{1}{64}$ " as the 3-unit spacebar is depressed (Figure 31).

5. **OPERATING LINK.** Adjust so that just before the spacebar cam reaches its high point, when rotated by hand, it will trip the escapement pawls out of the escapement rack (Figure 30). This adjustment should be checked while holding the 3-unit spacebar depressed. When the operating link is properly adjusted the interposers will move about $\frac{1}{64}$ " farther forward after the last escapement pawl has been tripped.

BACKSPACE Adjustments

1. **PAWL BLOCK ADJUSTING PLATE.** Adjust up

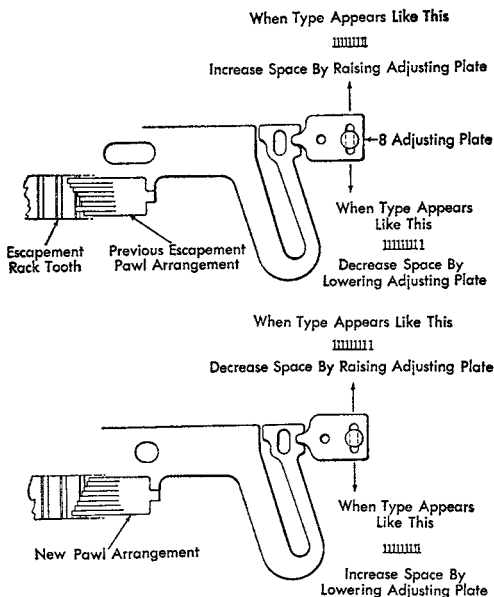


Figure 32. Pawl Block Adjustment

or down to position the escapement pawls perpendicular to a rack tooth. To check for this condition,

type a series of lower case i's, backspacing after each i. Where a difference in spacing between every eighth i exists, the adjusting plate may be moved up or down to correct this condition (Figure 32).

2. BACKSPACE GUIDE-PIN BRACKET. Position this on the rear rail to satisfy two conditions:

a. With the carriage resting on the 5 or 6 escapement pawl for the $\frac{1}{32}$ " escapement, or on the 7 or 8 escapement pawl for the $\frac{1}{36}$ " escapement, the backspace guide pin should guide the backspace pawls into the rack so that the points of the number 4 backspace pawl will bottom evenly between two teeth in the escapement rack (Figure 33).

b. The guide pin must guide the remaining backspace pawls into the escapement rack in the same manner as the 4 backspace pawl. To observe this, place the carriage on an escapement pawl so that when the backspace is operated the 1 backspace pawl will bottom in the rack between teeth. Raise the tails of the 4, 3, 2 backspace pawls to observe an equal clearance as the 1 backspace pawl bottoms in the rack (Figure 34).

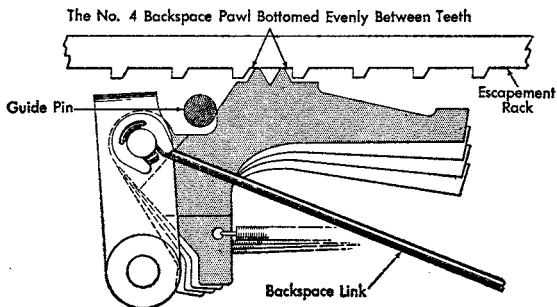


Figure 33. Guide Pin Adjustment

3. CAM CLEARANCE. Refer to "Spacebar, adjustment 1, Model B1".

4. CAM RELEASE LINK. Refer to "Tabulation, adjustment 3," this section.

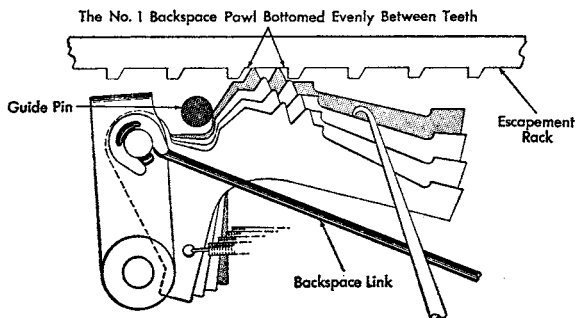


Figure 34. Checking Guide Pin Verticalness

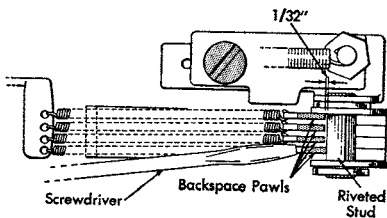


Figure 35. Operating Link Adjustment

5. BACKSPACE OPERATING LINK. Adjust so that when the cam is at rest, the backspace pawl spring lugs will clear the riveted stud in the backspace pawl support by $\frac{1}{32}$ " (Figure 35). If the cam fails to move the carriage far enough to backspace properly, this clearance may be increased slightly.

6. THE PAWL ALIGNING LINK is adjusted to fully align the pawls when the backspace cam is on its high point (Figure 36). Unhook the aligning link and place the backspace cam on its high point. Pull the aligning link to fully align the escapement pawls and match the pin in the clevis to the working side of the elongated hole in the backspace bellcrank. Check for full alignment at the high point of the backspace cam by checking for movement to the left by the escapement pawls when pulled or pushed with a spring hook. There should be no movement, but this may indicate over-alignment. In this case back off one-half turn on the aligning link and check the movement of the escapement pawls again to eliminate any choke-off.

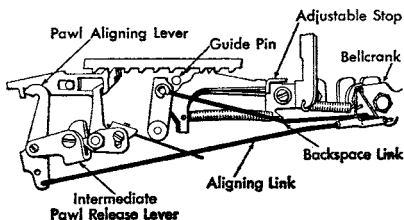


Figure 36. Aligned Link Adjustment

7. BACKSPACE PAWL STOP. Adjust as follows:
 a. Position the carriage to hold on the 1 escapement pawl.

b. Trip the backspace cam with the power off and rotate the power roll by hand while observing the 8 escapement pawl movement. When the 8 escapement pawl drops into the next rack tooth, the backspace pawl stop should be positioned to prevent any further movement of the backspace pawls (Figure 36).

On machines where the escapement pawls are arranged so that the 8 is on top and the 1 on the bottom, the carriage should be held by the 2 escapement pawl while the 1 escapement pawl is observed dropping into the next escapement rack tooth.

If backspace fails after completing the previous adjustments the backspace operating link may be shortened slightly. However, with the cam at rest the backspace pawls should be no less than $\frac{1}{64}$ " from the escapement rack. Any change in the operating link adjustment will necessitate a readjustment of the pawl aligning link and backspace pawl stop to satisfy the conditions previously described for those adjustments. If all adjustments are properly made, $\frac{1}{4}$ " travel should remain on the surface of the cam when the backspace pawls contact their stop.

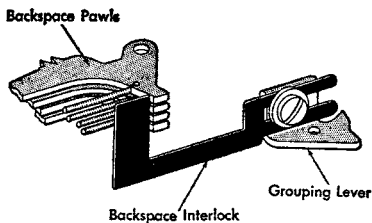


Figure 37. Backspace Interlock Adjustment

8. BACKSPACE INTERLOCK. Adjust so that when actuated, 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 carriage release operation (Figure 37).

ROTARY BACKSPACE

Adjustments

1. CAM CLEARANCE. Adjust the cam stop screw for .010" to .015" clearance between the cam and the power roll. The pawl-carrier link must be disconnected when this adjustment is made.

2. CAM RELEASE. Adjust the cam release link so the the cam will be released after the backspace keylever has been depressed $\frac{2}{3}$ to $\frac{3}{4}$ of its full travel.

3. PAWL BLOCK ADJUSTING PLATE. Refer to "Backspace, adjustment 1," this section.

4. BACKSPACE RACK. Adjust this up or down to obtain equal mesh between the backspace rack and pinion gear (Figure 38). This mesh should be checked at several places along the length of the backspace rack.

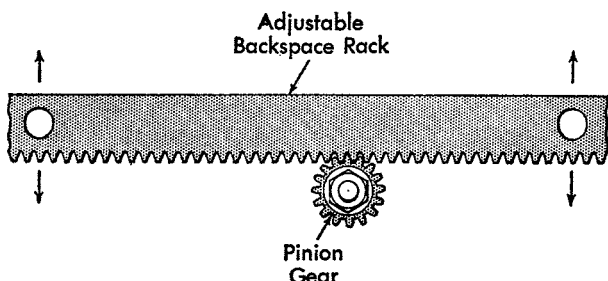


Figure 38. Backspace Rack Adjustment

5. UPPER PAWL STOP. Adjust so that when the backspace pawl is at rest it will clear the ratchet teeth by $\frac{1}{64}$ " to $\frac{1}{32}$ " (Figure 39).

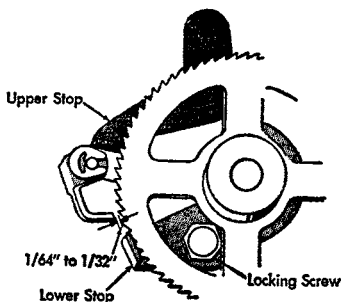


Figure 39. Upper Pawl Stop Adjustment

6. THE BACKSPACE PINION GEAR must mesh properly with the rack teeth (Figure 40). Adjustments may be made by loosening the screw which holds the main bracket to the rear rail just over the ratchet wheel. By loosening this screw slightly, the bracket may be tapped up or down until the pinion gear has a minimum of backlash and will still permit free movement of the carriage, without binding, for the full length of carriage travel. This is a very important adjustment which must be set carefully and critically. The screw must be tightened securely to prevent the adjustment from slipping during operation.

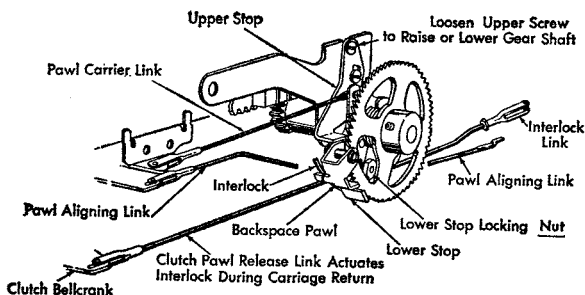


Figure 40. Rotary Backspace Mechanism

7. BACKSPACE PAWL CARRIER LINK. Adjust so that the slot in the bellcrank on the rear rail will lie at a 10 to 20 degree angle with the rear rail when the cam is at rest (Figure 41). **CAUTION.** If the angle is too great the backspace pawl may not be disengaged from the ratchet when the mechanism is at rest.

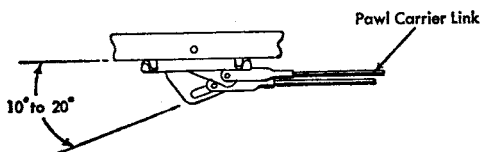


Figure 41. Pawl Carrier Link Adjustment

8. BACKSPACE OPERATING LINK. Adjust to just bridge the gap between the hole in the bellcrank and the backspace cam when the cam is at rest.

9. BACKSPACE RATCHET. Position this on its shaft so that the top surface of the backspace pawl will be even with the point of the ratchet tooth as the pawl enters the ratchet (Figure 42).

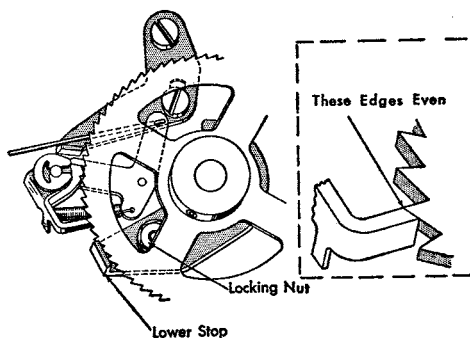


Figure 42. Backspace Ratchet Adjustment

10. ALIGNING LINK. Adjust the aligning link so that the escapement pawls will be fully aligned when $\frac{1}{4}$ " travel remains on the surface of the cam.

11. LOWER PAWL STOP. Set this by partially loosening the hex head locking nut just under the ratchet wheel and tapping the stop up or down (Figure 42). Select a position for the stop where it will limit the motion of the pawl just after the desired escapement pawl drops into the rack tooth and lock the stop in place. The cam should then have about $\frac{1}{4}$ " of travel before passing its high point. If less than $\frac{1}{4}$ " travel remains on the surface of the cam, the pawl

carrier link or operating link may be shortened slightly. After changing this adjustment, be sure there is still $\frac{1}{64}$ " to $\frac{1}{32}$ " clearance between the backspace pawl and the backspace ratchet with all parts at rest.

12. BACKSPACE INTERLOCK LINK. Adjust so that when the backspace cam is on its high point there will be approximately .007" clearance between the backspace interlock and the backspace pawl spring lug (Figure 40).

RIBBON

Adjustments

1. RIBBON CENTER GUIDE. Form this toward the platen as closely as possible. Be careful to avoid the possibility of a bind against the line gage card holder.

2. RIBBON LIFT GUIDE CLEVIS. Adjust so that the diagonal will strike in the middle of the ribbon.

3. CORNER GUIDES. Adjust high enough to relieve strain in the center guide in order to discourage breakage at that point.

4. RIBBON TAKE-UP. Tension of the spring-belt driven take-up mechanism should be sufficient to take up the slack ribbon as it is fed through the feed rollers. If there is insufficient take-up drive, the spring belt should be replaced with a new one.

4a. RIBBON TAKE-UP, Direct Drive. An improved, direct drive take-up mechanism is installed on later model B's. The take-up spool is mounted in such a way as to permit vertical motion. A large disc-shaped pulley, attached to the take-up spool and shaft assembly, runs directly on a rubber-tired pulley which is attached to the power roll pulley. This rotates the take-up spool in a direction opposite to that of previous take-up spools. Variable tension may be obtained by adjusting the hex-headed screw in the power roll pulley against a spring washer. A locking plate on the stud and next to the power roll pulley must be loosened before the screw can be adjusted.

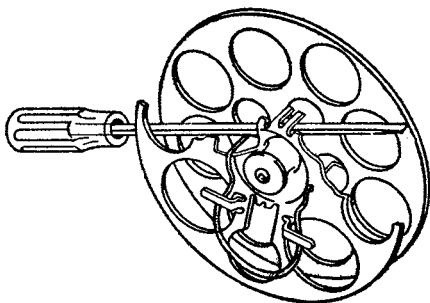


Figure 43. Take-up Tension Adjustments

To measure the tension of the direct drive take-up mechanism, insert the 5" square shank screwdriver in the empty take-up spool as shown (Figure 43). The end of the blade should be flush with the edge of the spool. With the machine turned on, the handle of the screwdriver will remain horizontal if the tension is correct. Check to be certain that the take-up spool is free to move vertically. Too much looseness in the retaining lugs may result in noise. This can be overcome by forming the lugs inward toward the magazine plate.

5. CAM CLEARANCE. Refer to "Ribbon, adjustment 1, Model B1".

6. CAM RELEASE LINK. Refer to "Ribbon, adjustment 2, Model B1".

7. CAM LINK. Refer to "Ribbon, adjustment 3, Model B1".

8. PROPORTIONAL RIBBON FEED. Check this by typing twenty 3-unit or 5-unit characters. The ribbon should feed an equivalent of 23 plus 2 minus 0 of these same characters.

9. SELECTOR BAR LINK. Adjust so that the lower ribbon feed arm will drop off the selector lever when a 4 or 5-unit typebar has completed one-third to one-half of its travel toward the platen (Figure 44).

10. FIVE-UNIT FEED. Adjust by means of the upper adjusting arm. Moving the arm toward the shaft will increase the amount of feed, and away from the shaft will decrease the amount of feed (Figure 44).

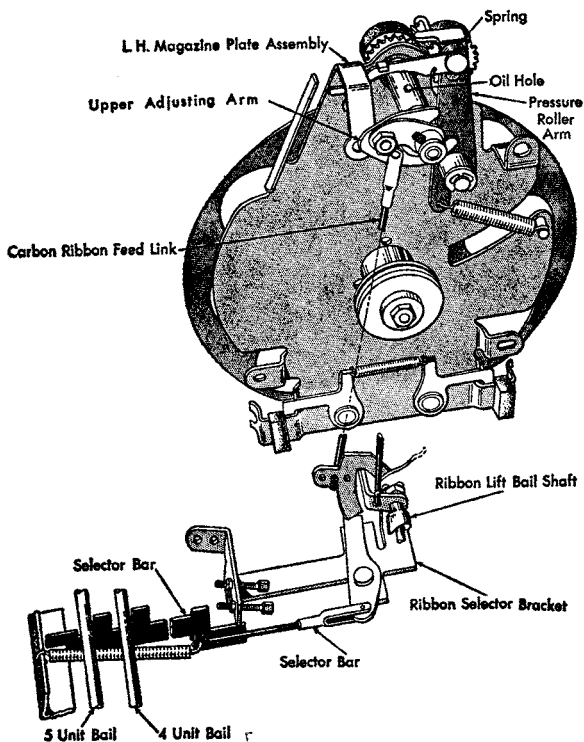


Figure 44. Carbon Ribbon Mechanism

11 THREE-UNIT FEED. Adjust by varying the position of the ribbon selector bracket up or down. Lowering the bracket will increase the amount of feed, while raising it will decrease the feed. Recheck the five-unit adjustment and selector bar link adjustment, and change if necessary (Figure 44).

12. STENCIL CONTROL LINK. Adjust so that with the color control button in the stencil position the ribbon feed cam will not rotate.

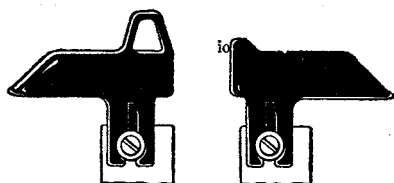
CARD HOLDERS

Adjustments

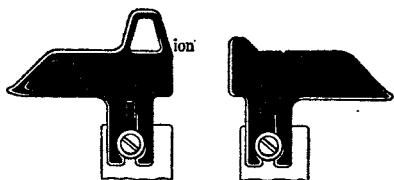
1. **LINE GAGE CARD HOLDER.** Adjust so that the horizontal edge is parallel with the feet of the type characters. When viewed from the operators position, a thin line of white should be visible between the feet of the characters and the reference edge of the card holder.

2. **FRONT RAIL DUST COVER.** For machines without a Repositioning Indicator move the front rail dust cover left or right until the card holders serve as a position finder. Test for proper position by placing the right side of any typed character even with the vertical edge of the right card holder. Space according to the following table and type the next succeeding character (Figure 45).

Pitch	Units
$\frac{1}{32}$ normal	12
$\frac{1}{32}$ expanded	13
$\frac{1}{36}$ normal	14
$\frac{1}{36}$ expanded	15
$\frac{1}{45}$ normal	16
$\frac{1}{45}$ expanded	17



Position the "o" as shown above



Space the Carriage 12 units and type the "n"

Figure 45. Card Holder Position

2a. FRONT RAIL DUST COVER, REPOSITIONING INDICATOR. For machines with a Repositioning Indicator adjust the front rail dust cover left or right until the raised indicator just clears the right edge of the last typed character (Figure 46). Cut the wire to a length so that the top of the wire in the raised position is even with the top of an upper case character such as the capital N.

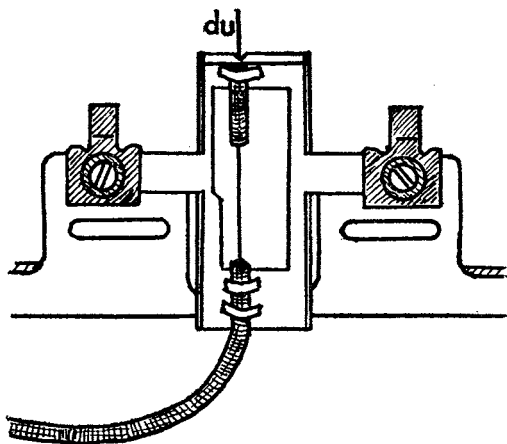


Figure 46. Repositioning Indicator

FRONT PAPER SCALE

Adjustments

- 1. FRONT PAPER SCALE.** With the left margin stop at its extreme left position and with the carriage resting at the margin, adjust so that the zero position on the scale will be aligned with the indicating pointer (cable pointer for machines with a Repositioning Indicator) on the dust cover.
- 2. FRONT PAPER TABLE.** Refer to "Paper Feed, adjustment 4, Model B1".

IBM EXECUTIVE TYPE STYLES

IDENT. MARK	TYPE CODE	TYPE STYLE	ESCAPE-MENT	APPROX. POINT SIZE	RATCHET TEETH	PLATEN	
						CLOTH RIBBON	CARBON RIBBON
PO	16	Bold Face No. 1	1/32"	12	29	8	8
PS	26	Secretarial	1/32"	12	29	2	1
PM	32	Modern	1/32"	10	29	8	2
PE	40	Documentary	1/32"	11	29	8	2
PG	46	Copperplate Gothic	1/36"	12 & 6	29	8	2
PH	47	Text	1/45"	9	33	2	1 or 2
PF	50	Mid-Century	1/36"	12	29	8	2 or 8
PR	51	Charter	1/45"	8	33	2	1 or 2
PB	57	Bold Face No. 2	1/36"	10	29	8	2
PT	59	Bold Face Italic	1/32"	12	29	8	2 or 8
PJ	61	Heritage	1/36"	10	29	8	2
PN	65	Registry	1/36"	12	29	2	2
PK	66	Directory	1/32"	14	44	8	8
PV	71	Testimonial	1/32"	12	29	8	8
JM	79	Arcadia	1/32"	10	29	2	2

MODEL B4

CUSTOMER ENGINEERING

40

UNIT WIDTH CHART

BOLD FACE #1, BOLD FACE ITALIC, DOCUMENTARY, MODERN, SECRETARIAL ($\frac{1}{32}$ " unit types) or **BOLD FACE #2** ($\frac{1}{36}$ " unit type)

All lower case alphabetical characters, and numbers, period and comma, are 3 units except:

flitj—2 units w—4 units m—5 units

All upper case alphabetical characters are 4 units except:

I—2 units SJ—3 units WM—5 units

ARCADIA ($\frac{1}{32}$ " unit type)

All lower case alphabetical characters, and numbers, period and comma, are 3 units except:

flitjr—2 units mw—4 units

All upper case alphabetical characters are 3 units except:

IJ—2 units CDGHNOQU—4 units MW—5 units

DIRECTORY ($\frac{1}{32}$ " unit type)

All lower case alphabetical characters, and numbers, period and comma, are 3 units except:

flitj—2 units hnuw—4 units m—5 units

All upper case alphabetical characters are 4 units except:

FLITJE—3 units MW—5 units

HERITAGE ($\frac{1}{36}$ " unit type) or **TESTIMONIAL** ($\frac{1}{32}$ " unit type)

All lower case alphabetical characters, and numbers, period and comma, are 3 units except:

flitj—2 units w—4 units m—5 units

All upper case alphabetical characters, are 4 units except:

IJ—2 units SBP—3 units WM—5 units

MID-CENTURY ($\frac{1}{36}$ " unit type)

All lower case alphabetical characters, and numbers, period and comma, are 3 units except:

flitsjr—2 units wm—4 units

Upper case alphabetical characters are mainly 3 and 4 units, as shown below:

I—2 units HAYCUDKVXZ—4 units

BESTFJLPR—3 units NOWGMQ—5 units

COPPERPLATE GOTHIC ($\frac{1}{36}$ " unit type)

All lower case alphabetical characters are 3 units except:

ij—2 units mw—4 units

All upper case alphabetical characters are 1 unit larger than lower case, except for "I" which is 2 units in both cases.

Numbers, period and comma are 2 units in the lower case, 3 units in the upper case.

REGISTRY ($\frac{1}{36}$ " unit type)

All lower case alphabetical characters, period and comma, are 3 units except:

flitjr—2 units mw and all numbers—4 units

All upper case alphabetical characters are 4 units except:

I—2 units J—3 units MW—5 units

CHARTER ($\frac{1}{45}$ " unit type)

All lower case alphabetical characters, and numbers, period and comma, are 3 units except:

flitsjr—2 units w—4 units m—5 units

All upper case alphabetical characters are 4 units except:

IJ—2 units BEFLPSZ—3 units MW—5 units

TEXT ($\frac{1}{45}$ " unit type)

All lower case alphabetical characters, and numbers, period and comma, are 3 units except:

flitsjr—2 units w—4 units m—5 units

All upper case alphabetical characters are 4 units except:

IJ—2 units BEFLPRS—3 units MW—5 units