TYPEWRITER
MECHANICAL TRAINING MANUAL
VOLUME 3—NOISELESS

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INTRODUCTION

The standard lengths of Carriages of the Noiseless Typewriter are referred to by alphabetical symbols, i.e.,

11"—A  12"—B  14"—C  18"—D

These letters are used in ordering parts and it is important that there be no discrepancy for model parts desired.

The type of the Remington Noiseless is marked between the characters of the typehead face. Plus 6 designates Pica Type; Plus 3 designates Elite Type.

The Underwood Noiseless Typewriter, manufactured 1937 to 1944, usually have UP for Underwood Pica Type and UE for Underwood Elite Type. There is a difference in size between the plus 3 and the UE type characters. Underwood type with plus 3 are identical with Remington plus 3 type, but the difference lies between the plus 3 and UE type used on some models of the Underwood Noiseless.

Scales of the Margin Rack, Bails and Paper Table can be identified by the length and figures on the Racks:

<table>
<thead>
<tr>
<th>Length</th>
<th>Symbol</th>
<th>10 Pitch</th>
<th>12 Pitch</th>
</tr>
</thead>
<tbody>
<tr>
<td>11&quot;</td>
<td>A</td>
<td>90</td>
<td>110</td>
</tr>
<tr>
<td>12&quot;</td>
<td>B</td>
<td>110</td>
<td>130</td>
</tr>
<tr>
<td>14&quot;</td>
<td>C</td>
<td>130</td>
<td>160</td>
</tr>
<tr>
<td>18&quot;</td>
<td>D</td>
<td>160</td>
<td>210</td>
</tr>
</tbody>
</table>

Always specify 10 pitch or 12 pitch when ordering.

ORDERING PARTS

Caution should be exercised in ordering parts, comparing the parts in the Parts Catalog to the part of the particular machine, to insure accuracy. The Balance Shaft listed in the new Remington-Rand and Ames Parts Catalog for Noiseless Standard Machines is for the new style Shift Rails having the Spring Arms welded to the Shift Rail. This Balance Shaft has tapered counter-sunk holes and is specifically made for the Shift Rails that have the Arms welded to the Shift Rail. For older models, order the parts from the older parts catalog. If the supplier does not have the particular part ordered but the manufacturer has provided a substitute, it will be furnished. It is always helpful to the supplier to supply the serial number of the machine with parts orders.

When ordering parts for different length carriages, always use the proper symbol, A, B, C or D. When ordering parts for pitch (spacing) order 8 pitch, 10 pitch or 12 pitch, etc. Pica and Elite are Type Styles and may not indicate the spacing of the machine, for example, the machine could be Elite Type on Pica Spacing.

When ordering Type or Actions, give the location of the part in the machine, and if you want special type, specify both characters of the type head and which character is located upper or lower. The number of the Keylever operating the type action should be supplied on such orders.

In ordering Key tops, specify the character on the key top, i.e., if you want the ditto marks over the figure 2, so specify.
REBUILDING NOISELESS TYPEWRITER
DISMANTLE, ASSEMBLE AND ADJUST

1. Remove Paper Table.
2. Remove Platen:
   A. Remove Variable, bushing and spring.
   B. Remove Right Hand Platen Knob, bushing and spring.
3. Remove Paper Pan (trough).
5. Remove Feed Rolls.
6. Remove Paper Bail and rolls (Remove springs inside Bail rollers).
7. Disconnect Drawband.
   A. Loosen nut of Spring Drum Ratchet Pawl and Ratchet Tension off Spring of Drum.
8. Remove Drawband.
10. Remove Retainer Plate.
11. Unlock Lock Nut; Screw in Carriage Retainer Screw (adj.). Shift Carriage to capitals. Remove the retainer. Back Indicator on Pressure Indicator away from "O". Remove Roller Bracket. (Platen must be removed and Pressure Indicator backed away from "O" before removing).
12. Shift Carriage to Capitals.
13. Remove Carriage from Shift Rail. (To the right, facing machine from rear).
14. Prepare corroded parts for plating.
15. Check all racks for proper pitch.
17. Disconnect Shift Springs from Shift Spring Arms.
18. Disconnect Ribbon and Remove Ribbon Vibrator Screw.
19. Remove Spring Clip from Set Key Pin.
20. Remove Set Key Pin.
22. Unlock Balance Shaft Pivot Screw Lock Nut and back off Pivot Screw. Remove complete Shift Rail from C/T.
23. Remove Tab. Key Levers and Comb Filler Strip, Tab. Key Lever Comb upper, and Back Space Up-Stop.
24. Remove Type Bars.
25. Remove Type Bar Comb.
26. Remove Type Actions.
27. Remove Rear Cover (6 screws) and Bell (1 screw with washer behind bell).
28. Remove Spring Drum. (One screw on under side of Frame Brace).
29. Remove lower Tab. Key Comb (2 screws).
30. Remove Center Tie Connecting Link Pin and Pressure Indicator.
31. Remove Center Tie.
   A. Unlock lock nuts and back off screws on Frame Lugs.
32. Remove Spring Clips (Ribbon Guards) from Spool Casings.
33. Remove Ribbon Spools and Ribbon Cases.
34. Remove Top Plate (6 top plate screws, Margin Release Spring and Universal Bar Hanger).
35. Remove Space Bar. (Remove adjusting nuts from end of Pull Wire).
36. Remove Escapement (Remove bushing from under escapement on older models).
37. Disconnect Keylever Tension Springs and remove Keylever Spring Plate.
38. Remove Line Lock Bail. (Do not stand machine up until keylevers removed).
39. Unlock Keylever Fulcrum Rod and remove Keylevers and Keylever Fulcrum Rod.
40. Remove Universal Vibrator Bar (Unlock one pivot only).
41. Remove Margin Release Keylevers.
42. Remove Keylever Combs upper.
43. Remove Back Space Keylever, Back Space Connecting Link.
44. Remove Bichrome and Touch Adjusting Screw.
45. Remove Toggle Link.
46. Remove Shift Shaft with Shift Levers.
47. Remove Back Space Bellcrank.

BARE FRAME BUILD-UP:

2. Replace Shift Shaft and Touch Adjusting Screw.
3. Replace Back Space Bellcrank and test for freeness (Grease Bearing Points).
4. Replace Toggle Link. The Lower Toggle Screw must be adjusted so that the Link is free with minimum of play. LOCK NUT MUST BE TIGHT TO FRAME.
5. Replace Back Space Keylever and Connecting Link—check for freeness.
6. Replace Margin Release Keylever (Grease bearing).
7. Hook Spring on Margin Release Keylever. (Hook from the frame side with open end of loop towards the inside of machine.)
8. Replace Universal Vibrator Bar:
   A. Grease Pivot Holes.
   B. Minimum of play with freedom of the part.
9. Replace Bichrome:
   A. Grease shaft.
   B. Eliminate up/down play of Bichrome Bracket on Screws.
   C. Check Bichrome for free. Hook up Bichrome Detent Spring.
   D. Hook Spring from Bichrome to Universal Vibrator Bar Link.
10. Replace Space Bar.
12. Replace Fulcrum Rod. Place Washers in first and last slots in standard machine.
13. Replace Keylevers: (Filler Washer in first and last slot of Lower Comb).  
   A. Start with No. 2 Keylever and end with No. 43 on standard keyboard.  
   B. Leave first slot of Keylever Comb empty on standard keyboard.  
14. Replace Line Lock:  
   A. Minimum of play.  
   B. Return Spring in good condition.  
   C. Hole of Bail must not be worn too much.  
15. Lock Keys with Fulcrum Rod. DO NOT STAND MACHINE UP UNTIL LINE LOCK IS IN PLACE AND FULCRUM ROD IS LOCKED.  
16. The Handle of the Fulcrum Rod will be perpendicular to the Comb when locked, facing or pointing to front of machine with machine on back.  
17. Replace Keylever Tension Springs:  
   A. All Spring Loops are turned in same direction, to the left side of machine, facing from front.  
   B. All Springs are hooked to the second notch in the Keylevers. Individual extra tension set when actions and typebars assembled, if necessary.  
18. Keylevers must be free, no binding in the comb. All Keylevers are numbered and must be in their proper sequence and place.  
19. Keylever Clips must be in proper position. Keylevers do not rub each other.  
20. Replace Ribbon Drive Shaft and Ribbon Detent.  
   A. The setting between the R. H. Cam and Detent Gear is approx. 9⁄16" from high point of Cam to Gear.  
   B. The high point of Cams always faces the inside of machine.  
   C. The high points of the Cams are on opposite sides of the shaft.  
21. Replace Escapement:  
   A. Insert Bushing in Machine not equipped with Knee Action Type Escapement.  
   B. Center to hole in rear upper frame brace. Space Bar Pull-Wire through hole of Rocker.  
   C. Position Bracket so that the Tab. Esc. Arm is positioned on the center of the fixed Dog Extension.  
22. Hook up Back Space Dog and test for freeeness.  
23. Replace Top Plate:  
   A. SCREWS MUST BE TIGHT.  
   B. Hook Spring from Margin Release to Ribbon Vibrator Shaft FROM FRAME SIDE  
24. Replace Universal Bar Hanger Bracket. Position it between the "8" and "T" keylevers, must not bind levers.  
25. Replace Ribbon Casings. Don't snub down screws until spools in place and set.  
26. Replace Ribbon Spools. Facing machine from front—Spool with slot on R. H. side will be on R. H. side of machine; each machine must have a R. H. and L. H. Spool set in proper place.  
27. Spools should have approx. .009" vertical play.  
28. Spools must have proper spring tension. Use a 1.41 oz. weight. Spring collar adjusted until tension of spool barely picks up weight.  
29. Ribbon reverse must be snappy and positive. The gears must mesh properly.  
   A. No grinding of gears.  
   B. Safe in mesh.  
30. Replace Center Tie:  
   A. Grease C/T seat.  
   B. Check Margin Release Pivot. Remove excess play.  
   C. Position C/T and check for seating.  
   D. Adjust End Gib Screws on Frame Lugs. Lock Lock nuts tight. (Adjust small Gibs on C/T end to remove rock).  
   E. C/T must be snug but free.  
   F. Adjust Gib Screws on C/T Retainer Strap.  
31. Replace Spring Drum. Mesh to Driving Gear on Ribbon Drive Shaft. Must be safe in mesh, no getting or binding. Cover tight. Spring on Arbor.  
32. Replace Center Tie Connecting Link. Replace Pin and 2 nuts.  
33. Replace Pressure Indicator.  
34. Replace Tab. Comb Lower. Facing machine from rear, from right to left, C/T Clear Key in first slot; Tab. Blade in second slot and Set Keylever in twelfth slot.  
35. Replace Rear Cover:  
   A. Adjust lugs so that the side play is at a minimum and C/T will operate without binding.  
   B. Replace Springs from C/T posts to rear cover. Check C/T operation with Pressure Indicator.  
   C. Recheck C/T for seating.  
   D. Check C/T Support Screw for Rear Cover. .002" shim must not be able to go between Support Screws and C/T.  
36. Grease Universal Bar slightly.  
37. Check all Keylevers for freeeness and clips in proper place.  
38. Assemble Type Actions:  
   A. Each Action Link must be free.  
   B. Saddles Free.  
   C. Each action must be checked for the correct number. Always check numbers on actions to insure proper position for each Action.  
   D. Place first 2 actions in machine with saddles over U-Bar. Frames positioned properly in segment.  
39. Replace Action Clamp:  
   A. Check to determine saddles over the U-Bar.  
   B. Tighten Screws. Clamp must not be set back of impression Screws.  
   C. Hook up the two Actions. Free Links and test keylever action. To test, hold gravity weight forward and test keylever for holding up or dragging.
40. Replace Typebar Comb:
   A. No oil in Segment or Comb.
   B. Comb screws must be tight.
   C. All Actions must be free.

41. Replace Typebars:
   A. No oil on Typebars.
   B. All Typebar heads must be thoroughly clean.
   C. Position Typebars in their proper places.
   D. Typebars free and upper banks bars toggle action snappy.

42. Assemble Typebars:
   A. Position Bars in Combs.
   B. Hook Typebar Arm to Bellcrank.
   C. Position Center Link. Must float on stud of Typebar itself.
   D. Test Typebar for freeness in the Comb.

43. Hook Back Links to Typebar Stud:
   A. Links must be safe on Typebar Stud.
   B. Links must float on pin.

44. Check for collision of Typeheads and form accordingly.

45. All Saddles must be over the U-Bar.

46. Check Typeguide:
   A. Use a gauge if available. (Remove first action right of C/T Connecting Link when gauge is used.)
   B. Position straight position (in and out) by comparing the Typehead in relation to the top and bottom of the Guide. Typehead should appear even at both top and bottom, when the action and typebar are completely forward.
   C. Position for height. Use one of the center typebars. Position Guide in relation to side typebars for centering.

47. Check Bars for pounding the Guide.

48. Typebar hangs up:
   A. Disconnect Back Links.
   B. Check center link for floating.
   C. Test for freeness of Typebar in comb.
      (1) Typebar arms not lined up with bellcrank.
      (2) Typebar bent.
      (3) Dirt in Comb.
      (4) Oil on Typebar or Segment.
   D. Hook up back Links.
   E. Disconnect Typebar Arm from Bellcrank, hold gravity weight forward, and test keylever and action links for freeness, freeing if necessary.


51. Replace Tab. Lever Shaft.

52. Free the Levers.

53. Replace Tab. Comb Filler Strip (Down stop for Tab. Levers).

54. Free up Tab. Set and Clear Levers in C/T.
   A. All levers must be in their proper slot of the Lower Comb. Facing machines from the rear, the Set Key goes in first slot on the left, the Clear Key goes in first slot on the right, while the Tab. Key goes in the second slot on the right.

55. Grind Carriage and Shift Rail if necessary.

56. Refit Shift Rail to the Carriage Rail:
   A. Minimum of play.
   B. No binds or rough rails.

57. Fit Shift Rails to Carriage Rail. Make certain that the roller retainers are in good shape, no flat rollers, retainers must be straight and the Bracket in good condition. Center Roller Retainer in Rails.

58. Adjust End Plates with eccentric. Tighten the rear screw of End Plates before adjusting.

59. Tighten Rail Holding Screws.

60. Test for play between rails. To determine location of play, note the position of the Roller Retainers when play between rails occurs. Move the rollers out of position, then tap in on the Back Rail at point where play was found. If the rail was tapped too hard a bind will occur. Loosen Rail Holding Screw at point of bind and retighten. NEVER DRIVE BACK RAIL OUT. Loosen Screws then retighten. If the Back Rail is driven out to remove the bind it will pit the rail. If rollers are at the position where the Back Rail is tapped in, pits in the rail will appear. ALL HOLDING SCREWS MUST BE TIGHT. Always check condition of combs before fitting.

61. Check Balance Shaft:
   A. Free.
   B. Very minimum of play in the Bearing Screw, laterally and horizontally. If necessary use a thin washer between Balance Shaft and Rail End.
   C. Balance Shaft Screws must be tight.

62. Check the Scale:
   A. Lines o. k.
   B. Screws tight.
   C. Correct pitch.

63. Check Balance Shaft Pivot Screws of C/T. Change, if worn.

64. Oil Pinion Shaft in Block. Grease Pinion and Balance Shaft Pivot Screw Holes.

65. Assemble Shift Rail to Machine:
   A. Adjust Pivot Screws and lock lock-nuts. Test for play and free.
   B. Replace Set Key and Clip. Free Set Keylever of C/T.


67. Position Toggle Link. Should set flat against plate of Balance Shaft with no rub when Shift Levers are raised or lowered.
68. Replace Tapered Toggle Screw and Lock Nut.
69. Adjust Tapered Toggle Screw:
   A. No play between End Plate and Toggle Link on Screw. Lock locknut.
   B. Shift operates freely.
70. Replace Carriage to Shift Rail.
   A. Center Roller Retainer in Rail.
   B. Check Rails for proper fit, freeness and no roughness.
71. Replace Roller Bracket:
   A. Back off Pressure Indicator.
   B. No Platen in Carriage.
72. Check Rollers for rolling and flat spots.
73. Replace Retainer Bracket.
74. Replace Retainer Plate. Short measurement is vertical. Smooth side is against C/T retainer plate.
75. Adjust Retainer Gib Screw to where the play between Carriage Rail and C/T Retainer Plate is at a minimum. Shift must operate free, carriage not bind. Lock Nut must be locked.
76. Hook up Shift Springs.
77. Adjust mesh between Feed Rack and Pinion Gear.
   A. Shift Feed Rack Pivot Brackets.
   B. Move Pinion back in Bracket if necessary.
   C. Mesh must be fairly deep and even all the way across carriage.
78. Square Margin Release with Support Plate of C/T.
79. Adjust Margin Release so that it has a little play between Margin Release and C/T at rear.
80. Adjust Left Margin. Clearance between L. H. Margin Stop and Margin Release between .010" and .015".
   A. Adjust with eccentric on left hand (from rear) side of Feed Rack. Check plate after adjusting left margin. Make certain Plate is towards the rear as much as possible.
   B. High point of eccentric will never point to the front of machine.
81. Drawband hooked up and tension applied to Spring Drum before setting L. H. Margin.
82. Adjust Tabulator Mechanism:
   A. Set, Clear and Tab. Levers all must be free in their proper places and C/T Tab and Clear Keys adjusted properly in C/T Plate.
   B. Hook Tab. Escape Bracket Spring through Lower Frame Brace and insert clip through loop of spring to hold in place.
83. Check Left Margin clearance (0.010" to 0.015") before setting up Tab. Rack.
84. Set up Levers (Set, Clear and Tab.) in relation to Tab. Rack.
   A. Tab.—Adjust with Screw and Lock nut on Tab. Keylever. Screw adjusted until the Tab. Lever of C/T comes to within 1/32" of Tab. Rack when the Tab. Keylever is held down.
   B. Stops will be "in" and Tab. Rack position straight.
85. Clear Key:
   A. Push some stops "out" on each end of Tab. Rack.
   B. Adjust the screw on the Clear Key lever until the Clear Key on C/T almost touches the stops without holding the Clear Key Lever down.
   C. Hold Clear Key lever DOWN. The C/T Clear Key will be adjusted until the C/T Clear Key doesn’t rub Tab. Rack on either upper or lower case. C/T Clear Key adjusted to the Tab. Rack with Screw on Back of C/T Clear Key.
86. Set Key Lever adjusted with screw on Keylever. Screw adjusted until Set Key Finger of C/T almost touches the Tab. Stop (stops "in") but does not rub or touch any stops on capitals or lower case or in the shifting operations, on all set keys where the complete Set Key Lever of the C/T is all one unit. Later model Set Keys having part of the unit attached to the Shift Rail and having a Link Stud connection is adjusted by the Screws of the Set Keylever. The screw is adjusted only to the point of taking up slack in the linkage. The Set Key Finger will lay against the Shift Rail in its rest position.
   A. Set Key Fingers are straight for Pica: Offset for Elite.
87. Adjust Tab. Keylever Trip:
   A. Trip takes place a little before the Tab. Keylever limits on Comb.
   B. Form Tab. Escape. Arm to adjust trip. Form Tab. Escape. Lever up to slow down trip; down to speed up the trip.
88. Adjust Tab. Brake: Slow up the Escapement to the point where the Carriage doesn’t bounce excessively when Tab. Blade contacts the Tab. Stop. The second adjusting screw from the right (facing machine from rear) adjusts the brake.
89. Adjust the Brake Release:
   A. Adjust so there is no brake on Escapement Friction Wheel when not tabulating.
   B. Adjust with third Adjusting Screw from right (facing machine from rear) on Escapement.
   1) If Release screw is in too far—fixed dog becomes partly disengaged from Starwheel—skipping will occur. Tab. Lever of C/T will have lost motion before picking up Tab. Escape. Arm.
   2) If not enough brake release the Carriage will hang up and run sluggish in typing as Escapement will have brake at all times.
90. Position Tab. Rack. Set Rack at a position that will permit the Tab. Blade to go between every stop in tabulating with every stop out. Tab. Blade should not knock any stops in when tabulating.
91. Test Clear Key for clearing all stops fully.
92. Position Set Key Finger:
   A. Should line up directly in line with stop.
   B. Should push out stop that lines up with flat tip of C/T Clear Key.
93. Test Tab. for tabulating to proper space:
   A. Position L. H. Margin Stop against Margin Release of C/T. Depress Set Keylever and Set Stop.
   B. Move Margin Stop and Carriage and tabulate—Margin Stop should line up in exactly same place that Stop was set at when Margin Stop set against Margin Release of C/T.
   C. If the Bail is on machine and set properly, position the bail on the Indicator of the Typebar Comb. Set Stop at any number on the bail. Move Carriage to right and tabulate—the Carriage should stop at the same bail setting as originally located.
   D. If Tab. is off one or more spaces either way, do not reposition Tab. Rack if blade goes between every stop. ALWAYS reposition Set Key Finger to proper stop.

94. Reassemble Variable to Platen: Replace Spring and Platen Bushing.
   A. Positioning of Bushing and Screw. The large hole in the Platen Shaft and the deep counter-sunk hole of the Variable Shaft must line up.
   B. The Bushing is tapered and will start through big hole of Platen Shaft. Tap Bushing in place then replace holding screw in opposite side of Platen Shaft Hole. The screw must be tight and the bushing must not turn while the screw is being tightened. The Platen bearing and spring must be in place before attaching the Variable to the Platen Shaft with Bushing and Screw.

95. Assemble Spring, Bearing, and Knob to the right end of the Platen.

96. Check the Variable:
   A. The Ratchet must turn freely on the Variable with the Variable Shaft pulled out.
   B. The Ratchet must not slip or turn when the Variable is in.

97. Reassemble Feed Rolls: All Feed Rolls must turn freely and be spaced properly.

98. Check Feed Roll Cradle screws—check Feed Roll release mechanism.

99. Recheck ALL CARRIAGE SCREWS FOR TIGHTNESS.

100. Replace Feed rolls in Carriage—check for operation.

101. Replace Paper Pan springs and silencers.


103. Replace Paper Pan.

104. Replace and Adjust Platen:
   A. Adjust Platen Locks with thrust bearing screw.
   B. Platen Lock Lever should have a detent action in latching.
   C. Adjust Platen for end shake:
      (1) Adjust R. H. Platen Knob to correct end shake or relieve tight platen.
      (2) Release feed rolls (Feed Roll Release Lever) and release Ratchet. Detent to test platen for freeness.
   D. Test Platen for freeness. Make certain aligning scale not rubbing platen.

105. Check Aligning Scale opening. The opening must be back of the Type Guide opening so that the Type doesn’t hit the aligning scale in typing.

106. Adjust .060" clearance between Type Guide and Platen when Pressure Indicator is against the Stop Screw or “O” Position.

107. Adjust the Line Lock. Adjust to lock properly by forming the arm of the Margin Release Lever of the C/T having the Line Lock Pull Wire connected to it.
   A. PICA SET-UP: The R. H. Margin Stop comes up to the Margin Release Lever of the C/T. Space once—line Lock locks. Line Lock is always adjusted with .060" set and pressure indicator set at .060" position. Left Margin must be set, before setting Line Lock or Tab.
   C. Line Lock Bail must have minimum of side play but be free on pivots.
   D. Bail Return Spring must be in good condition and set up so that the spring contacts at all times. Pull Wire must clear key levers and action links.
   E. Margin Release Levers must be free.
   F. When Line Lock locks too soon form Margin Release Throw Arm forward; if locks too late form Margin Release Throw Arm to rear. Test for proper locking after adjusting.

G. LINE LOCK TROUBLES:
   (1) The Bail is bent too close to the Key levers from constant pounding on keys.
   (2) Short key lever, one Key lever slips through Line Lock.
   (3) Bent Line Lock, center locks slip through.
   (4) Too much side play of Margin Release Stroke on C/T.
   (5) Pica Set-Up for Elite Machine.
   (6) Weak Return Spring on Pull Wire.
   (7) Bail too high and the Line Lock Bail does not slide under the Key lever hooks.

108. Adjust the Bell Ringer:
   A. Bell Wire must not be positioned too close to Margin Rack.
   B. The Bell should not ring on the Carriage return.
   C. Bell Wire must be free.
   D. Bell Wire must clear top of C/T and must not bind on Frame member at bottom of bell wire. Brackets must be tight.
   E. Space Washer must be behind bell.
109. Adjust Space Bar: Check Escapement Rocker for Dog position in relation to Starwheel at "6 o'clock" position of fixed dog. Fixed dog should show slightly above top of Starwheel Tooth. Stepping Dog must clear bottom of Starwheel Tooth. Adjust Dogs to Starwheel with first adjusting screw from the right on the escapement (facing machine from rear).

110. Check Escapement Rocker: For side play and freeness. Adjust tension.
   A. Use the weight gauge.
   B. Apply tension to spring on R. H. Pivot Screw from rear of machine.

111. Adjust Space Bar Down Stop: Space Bar should not travel below frame front.

112. Adjust Space Trip:
   A. Trip should take place before Space Bar limits on down stops.
   B. Trip is adjusted by screwing in on nuts at end of Space Bar Pull Wire (through rocker). Lock locking nut when trip adjusted properly.

113. Adjust Space Bar Up-Stop: Space Bar should limit approx. 1/8" below Keylever Tops.

114. Adjust Space Bar tension with weight.

115. Adjust Back Space mechanism:
   A. Linkage must be free
   B. Dog must be clear of Starwheel .

(1) If dog is not clear of Starwheel, press down on Back Space Keylever until it limits, then add a little more pressure on the Key—added force of lever will permit the Back Space Dog to clear Starwheel.

(2) If Back Space Keylever is forced down too far, the Back Space Keylever will hit Shift Levers in operation. To Correct: Hold thumb under Back Space Keytop, force up from lower (rear) end of Keylever with heavy screw-driver. If Back Space overthrows, shift the Rocker on its Pivots, usually from right to left. Test for overthrow. Back Space fast, then very slow for at least one complete turn of Starwheel.

116. Escapement Dogs Position:
   A. Horizontal clearance between Dogs .063" to .068".
   B. Creep (Step) Adjustment between Dogs, approximately .040".


118. Shifts: Shift Rail locked in normal position to prevent bouncing.
   A. Rail Lock is adjusted by the Toggle Adjusting Screw. If screw too high, no lock of Shift Rail in normal position; if screw too low, too much lock of Shift Rail and Shifts will catch in operation. Adjusting Screw located on Frame Lug at bottom of Toggle Link. Screw in inside screw.

B. Check Shift Keylevers for height in relation to lower row of Keylevers. Adjust height with eccentric on Toggle Linkage. Check Roller Bracket (rollers free and turn). Retainer adjusted to a minimum of play. Check Balance Shaft Pivots (lock nuts tight and screws adjusted to a minimum of play, toggle linkage free and a minimum of play) for .060" position. (No ribbon, or paper, between platen and guide.)

C. Shift Keys must be free and lined up so that they don't drag in comb when shifting.

    (1) Check Shifts for freeness.
       (a) If bind occurs, remove upper fore screw (tapered screw that connects Toggle Link to Balance Shaft End Plate, L. H., facing machine from front).
       (b) Determine if the bind is in the Shift Rail and Carriage or Toggle Link and Shift Keys — replace tapered screw when trouble is cleared.

119. Assemble Ribbon: The Ribbon is set on the right spool and threaded through the Vibrator to the left spool on the Noiseless Standard Machine. Check Ribbon Reverse.

120. ON FEET: Back off Pressure Indicator to where letters barely print (normal case only). Strike off letters to determine if machine on feet.

   A. "On Feet" adjustments concern a majority of the letters—not just one or few individual letters.

   B. "On Feet" adjustment is made with the eccentric on the left hand end plate of the Balance Shaft. Loosen all three holding screws of end plate, adjust the eccentric, then lock the screws again. All three screws must be tight after setting on feet position of carriage.

121. PARALLEL PLATEN: (Must be flat on C/T). To position flat against C/T on later models, position .022" shim between tifs of roller bracket and the retainer plate of the C/T—keep hands off the carriage and check drag on shim—drag should be even on both shims. If not, shift the rail by adjusting the right hand end plate of the Balance Shaft. Tighten screws when carriage retainer rail is parallel to the C/T.

   A. Check the printing with the Indicator backed off. If the impression is light on one end and dark on the other, tap in on the dark end. Caution: Support Carriage with hand to prevent springing Shift Rail. If the Carriage is still out of parallel, peen light end out by tapping a center punch lightly between the retainer rail and the Carriage Frame.
122. IMPRESSION:
A. Position Pressure Indicator at 12 o'clock position.
B. Turn all impression screws in until they touch the action, so that all actions are set against the back of the screw grooves.
C. Adjust all impression screws until all actions print a uniform gray character.
D. If the impression of an action is too heavy back off the impression screw of that action until the letter does not print; then screw in on the impression screw until the proper print is secured. Never back the impression screws off and leave them. All actions must be flush against the impression screw heads.

123. ADJUST MOTION:
A. Must be "on" with and without shift locks. Set motion without shift lock, then adjust each shift lock to the motion.
B. If the "motion" adjustment is quite a bit off, back off the toggle stop screw next to side of frame on frame lug.
C. Adjust screw on left hand end plate of balance shaft (top of plate) and lock lock nuts of adjusting screw when motion is set.

124. SHIFT LOCKS should lock safely and release easily.
A. Shift locks must be set so that they can be released with either shift lever — both locks should lock uniformly.
B. The locks are adjusted up or down with the elongated slots. On late models the top of the lock plate should be parallel to the bottom of the lock key in locking. Readjust toggle stop screw (next to frame).
C. To adjust the weight of the shifts apply tension of shift spring (screw in on spring screw), to lighten shifts. Back off spring tension to make the shifts heavier. Turn same number of turns on each screw. The shifts should be light and snappy.

125. Aligning Scale:
A. Strike off a line of small "i".
B. The lines of the scale should line up with the i's. The opening of the scale must be clear of the guide opening.
C. The scale must also be positioned to the platen so that one sheet of paper passes between the platen and the scale. The scale must be straight—must not bind the vibrator or hit on paper finger brackets or paper finger stop screws of the paper finger rail.

126. Escapement Trip:
A. The impression must be even before adjusting.
B. Insert four sheets of paper in the platen.
C. Pressure indicator must be set at zero "0".
D. Check the actions for trip:
   (1) Trip should take place as type touches the paper (four sheets)
   (2) Trip of all actions should be uniform.
   (3) Check trip on each end and level U-Bar if necessary. If end actions trip even and the center trips slow or fast, move the U-Bar in or out by adjusting U-Bar link to the center hanger bracket — move link in to speed trip in center, out to slow trip the center.

127. Universal Bar must be free:
A. U-Bar Hanger Bracket
B. U-Bar clear of "8" and "1" key lever.
C. Trip pull wire (Escapement connection) must be free in the U-Bar Hanger Bracket. The pull wire must be clear of the tab, levers, space lever and shift shaft. The escapement rocker must be free.

128. TO ADJUST, adjust the shouldered nuts at the ends of the escapement connection links until the U-Bar Trip takes place when type touches four sheets of paper inserted in platen. Lock lock nut after adjusting and recheck trip after locking nut.
A. TO SPEED UP TRIP on an action that is slow and the impression set correctly, peen the saddle of the slow action. If the trip is too fast after peening then file the action saddle. The trip is governed by pressure of the action saddle on the U-Bar. This adjustment is rare and must be done very carefully.

129. Ribbon Cover:
A. The Ribbon vibrator must be free as well as all moving parts of the ribbon mechanism.
B. Check the bichrome for up/down play on pivot screw. Remove play.
C. Adjust space bar inner lock mechanism.
   (1) Adjust with eccentric.
   (2) Adjustment for inner lock:
      (a) Position bichrome to stencil position.
      (b) Depress "B" or "C" key lever.
      (c) Universal vibrator bar should have approx. 1/32" before it contacts the inner lock arm with key lever held down.
D. Adjust bichrome stop bracket so that the U-Vibrator Bar Link throws approximately the same distance on each side of the stencil cut of the vibrator shaft arm front.
E. Check the throw of the U-Vibrator-Bar Link above the vibrator shaft arm front. If the Link throws more above vibrator shaft arm front on either red or black position, the vibrator shaft arm is not straight across. Position vibrator shaft arm front straight across.
   (1) Form the vibrator shaft arm rear to position vibrator shaft arm front.
   (2) The spring from margin release to vibrator shaft must be hooked on both pieces (margin release key and vibrator shaft from the frame side towards the inside).
F. Position Bichrome on black position, hold keylever down. The end of the Vibrator Shaft Arm Front should touch the lips of the Bichrome without pressure on the Bichrome. If the Bichrome arm is too low, form up the meet Vibrator Shaft Arm front. Strike off character "$\frac{1}{2}$" a few times, hold it down and note position of the ribbon in relation to the $\frac{1}{2}$. A small part of the $\frac{1}{2}$ should show above the ribbon (top of the 1). Tilt Vibrator Bracket to get the desired results.

G. Check the print. With a keylever held down, Vibrator can have a little movement in black position—no movement in red position. The lips of the U-Vibrator-Bar are formed to eliminate individual bleeding, when all letters print ok except one or two of them. If the lips are formed too high, the key will have a spongy action.

130. Refer to Aligning Sequence.

131. Check Machine against the Check Sheet:
   Sample sheet for completed machine.
   A. Strike off Motion without locks—with right hand and left hand locks.
   B. Strike off Impression, Capital first and Normals directly below. Strike all letters, Pressure Indicator at 12 o’clock.
   C. Strike off all letters against the “X”—Capitals first and Normals directly below, with Pressure Indicator at Zero.
   D. Strike off all letters, Capitals and Normals and check for bleeding or color mixing.

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MECHANIC’S NOTES:
CLEAN AND ADJUST

SEQUENCE

1. Remove the Platen, Feed Rolls, Bail Rolls, Paper Pan, springs and Cover Plates.
2. Remove the Ribbon.
3. Remove the Type Bar Comb and the Typebars.
   A. The Typebars and Comb should have no oil on them and should be cleaned separately. If the Type Bars are handled carefully, they will not bind in reassembly unless the were binding previous to removal.
4. Clean the machine and lubricate well.
5. Check all actions for freeness before replacing the Typebars.
6. Remove all oil from the Typebar Segment that lodged there in oiling or lubricating machine.
7. Replace the Typebar Comb.
8. Replace the Typebars, checking each one for freeness as they are assembled.
9. Check the Type Guide for “in and out” position.
10. Grind and clean the Platen, check the feed rolls for freeness on shaft, and condition.
11. With the Platen out of machine, check the Feed Rack Mesh in relation to the Pinion Gear. Adjust if necessary.
12. Adjust the Left Margin, if necessary.
13. Replace the Feed Rolls and check for freeness in the cradle.
15. Replace and adjust Platen.
16. Check the Center Tie for being seated, side play and rock.
17. Check the condition of the Balance Shaft Pivot Screws.
18. Check the Toggle Link Connections and adjust if necessary.
19. Check the Shifts for freeness, check Roller Bracket and Retainer adjustment.
20. Check the Carriage for proper fitting.
21. Check Tabulator mechanism and Margin Release of the C/T.
22. Check Carriage Tension.
23. Check the .060” setting and operation of C/T with Pressure Indicator.
24. Replace Ribbon.
26. Check the Line Space mechanism.
27. Check Escapement Dogs in relation to Star-wheel.
28. Check the Back Spacer and Space Bar mechanism.
29. Check Ribbon Cover and Feed.
30. Check the Line Lock.
31. Check alignment and make minor corrections if necessary.
32. Check machine for appearance and touch-up if necessary.
33. Position Aligning Scale, if necessary.
34. Position all scales to correspond.
35. Check all screws for tightness.

NOISELESS TYPEWRITER—

ADJUSTMENT CHECK SHEET

1. CENTER TIE:
   a. Seated properly on rear upper frame member.
   b. No rock on ends.
   c. Very minimum of side play—rear cover adjusted correctly to the Center Tie.
   d. All adjusting screws secure.
   e. Center Tie operates with the pressure indicator without holding up.
2. CARRIAGE:
   a. Rails must be smooth—carriage rail fitted to the Shift Rail with a minimum of play. Carriage must be free with no drags.
   b. Roller Retainers must be centered to the Shift Rail and must not protrude from the Shift Rail when the Carriage is at the extreme right or left.
   c. Roller Bracket and Carriage Retainer must be adjusted properly.
   d. Check for “flat on Center Tie”.
3. MAINSPRING:
   a. Proper tension on spring (approx. 1 1/2 lbs. of pull on carriage).
   b. Proper mesh gears and smoothness of operation.
   c. Drawband in good condition and proper length for size carriage.
4. PLATEN:
   a. No end shake—platen must turn freely.
   b. Knob set screws tight.
   c. Platen concentric.
   d. .060” clearance between Platen and Type Guide when properly adjusted.
   e. Parallel.
5. VARIABLE:
   a. Bushing and screw holding Platen and Variable together must be secure.
   b. Check for slippage.
   c. Correct operation of variable.
6. PAPER FEED:
   a. Feed roll tension uniform and proper.
   b. Feed roll bearings lubricated.
   c. Feed rolls perfectly free on shaft.
   d. Feed roll release operates properly.
7. LINE SPACING:
   a. Spacing correct on 1—2—3.
   b. No creep in Platen after line spacing.
   c. Line Space Lever and mechanism free in operation.
   d. Ratchet detent positioned to the ratchet correctly.
   e. Proper tension on ratchet detent spring.
   f. Line space pawl spring in good condition.
8. SHIFT MECHANISM:
   a. All linkage free with a very minimum of play.
   b. Pivots adjusted properly with lock nuts tight.
   c. Toggle adjusted so that the Shift Rail is locked in the lower case.
   d. Proper height of the Shift Keylevers.
   e. Shifts light and snappy.
   f. Shift Locks adjusted properly.

   a. “On Feet” set on normal case with the Pressure Indicator set at 12 o’clock position. 1 sheet of paper in platen.
   b. Platen parallel.
   c. Impression set with the Pressure Indicator at 12 o’clock position, all letters print light gray. 1 sheet of paper in platen.
   d. Motion properly adjusted. Pressure indicator set at Zero, 1 sheet of paper in the platen, motion the same with or without shift locks.
   e. Toggle stop screw adjusted after motion is set.

10. UNIVERSAL BAR:
    a. Must be free with all linkage secure.
    b. All saddles of the type actions must be over the U-Bar.
    c. Trip must be uniform and should take place at the paper when 4 sheets of paper are inserted in the platen.
    d. Play held to a minimum in all U-Bar linkage.

11. ESCAPEMENT:
    a. Starwheel and Knee action free.
    b. Six o’clock position of the fixed dog correct.
    c. Dogs positioned to the Starwheel properly for height.
    d. Rocker free with a minimum of play at the Rocker Pivots.
    e. Rocker Spring tension correct.
    f. Proper clearance between dogs (if checked on machines that skip or pile).

12. SPACE BAR:
    a. Complete freedom of linkage and operation —no play in pivots.
    b. Trip adjusted properly.
    c. Felt bumpers adjusted properly and in good condition.
    d. Proper tension on the space bar.

13. BACK SPACER:
    a. Free in linkage.
    b. No overthrow in operation either fast or slow.
    c. Backspace Keylever must not hit on the Shift Keylever.

14. RIBBON:
    a. Ribbon spools free of binds and in their proper places. Left and right spools are not interchangeable.
    b. Ribbon vibrator and its components free.
    c. Letters must not cut off in black or red, caps or normals.
    d. Colors must not mix on red or black.
    e. Ribbon must have positive reverse.
    f. Proper clearance or play in spools and correct tension on the spools.
    g. Proper mesh of gears in spools and smooth operation in winding.
    h. Space bar interlock adjusted properly.

15. ALIGNING SCALE (Line Finder):
    a. Adjusted correctly to the platen for clearance.
    b. Lined properly to a line of iiiii’s.
    c. Correct scale for the type of carriage and pitch of machine.
    d. Card stop arms set at .060” from the scale.

16. LEFT MARGIN:
    a. Overthrow checked and set for positive operation.
    b. Proper rack (pitch) for machine.
    c. Clearance between Left Margin Stop and Marg. Rel. set at .010” to .015”.
    d. Margin Rack screws tight.
    e. Margin stops easily positioned.
    f. Feed Rack meshed to the Pinion properly.

17. BELL:
    a. Ringer adjusted to the Margin Stops properly.
    b. Bell rings as loud as possible.
    c. Bell wire free and not holding up carriage in operation.

18. LINELOCK:
    a. Adjusted to lock at the right time.
    b. Bail free on its pivots with a minimum of end play.
    c. All keylevers locked.
    d. Bail returns properly when Margin Release operated.

19. TABULATOR:
    a. Tab. Rack adjusted properly.
    b. Tab. Set and Clear Keys free in operation and adjusted to Tab. Rack properly.
    c. Tabulator Brake and Brake Release set properly.
    d. Tabulator Trip correct.
20. KEYBOARD:
   a. Keytops straight, level and spaced properly.  
      Must be neat.
21. ALIGNMENT:
   a. All letters in line.
   b. Side alignment accurate.
   c. No blurs in typing and in stencil writing.  
      (4 sheets of paper).
   d. All typebars free.
   e. All type actions free.
   f. Noise held to a minimum.
22. COVER PLATES:
   1. Cover Plates cushioned and tight.
   2. Test typebars for noise with top cover in place.
   3. Check stencil operation with front cover in place.  Adjust bichrome arm if necessary.
23. MACHINE APPEARANCE:
   a. Platen clean.
   b. Plating in good condition and polished.
   c. No mars on frame.
   d. All excess grease removed and designators clean and clear.
   e. Type heads clean—no filled letters.
   f. Bail and scales correspond.
24. TYPING CHECK:
   a. Type as fast as possible and check results  
      for skipping, piling and alignment.

MECHANIC'S NOTES:
THE CENTER TIE:

1. The Center Tie (C/T) is the heart of the Noiseless typewriter. It is moved forward or rearward by action of the Pressure Indicator, bringing the platen forward or moving it rearward for the benefit of more or less carbon copies. The Center Tie carries the Balance Shaft (Shifting Mechanism), Carriage and Platen. Any rocking action (uneven seating) of the C/T would be reflected in an uneven writing line and poor motion. "Seating" of the C/T means that it is positioned flat on its raceway to the extent that a .002" shim cannot be inserted between the C/T and the Race Way. Careful and accurate adjustment is essential.

2. ADJUSTMENTS: Adjustments are presented first as a C/T being installed into a machine in assembly. Later, under Par. 2B, instructions for seating a C/T in an assembled machine (to correct a high C/T) will be given.

C/T adjustments also include adjustments of the Rear Cover pertaining to the C/T. In installing a C/T, proper pitch "tab plate" and in the old models, proper Set Key Finger are necessary. Set Key Finger for the late model machines is on the Shift Rail.

A. To install a C/T in machine:
(1) Grease the Raceway and the C/T.
(2) Check to make sure that the C/T will seat before attempting adjustment. Use .002" shim. Margin Release Shaft positioned properly to the Margin Release Keylever.
(3) Adjust the Gib Screw on the Frame Lub on each side of the C/T (just above Gib Screws, End Adj.) so the Gib Screws hold a slight drag on the C/T when C/T moved back and forth on its seat. Check with .002" shim to determine that C/T is still seated after Gib Screws are adjusted.
(4) Adjust the two (2) small Gib Screws (Gib Screws, end Adj.) on each end of the C/T until they just touch the rear upper Frame Member. These Gibs are adjusted to determine that there is no rock of the C/T on either end. Check with .002" shim to determine C/T is still seated. Determine the C/T will move back and forth with a drag but without a definite bind.
(5) Adjust the two (2) small Gib Screws on the C/T Retainer Strap (forward end of C/T). Check to determine that C/T is still seated, using .002" shim.
(6) Position Spring Drum and Shift Tension Springs in machine.
(7) Position Lower Tab. Comb to the Rear Lower Frame Member with two (2) Screws, placing the Set Key Lever of the C/T in the first slot on the left (from the rear) and the Clear Key and Tab. Key of the C/T in the first and second slots respectively, on the right (from the rear).
(8) Position Rear Cover to the Frame. All Screws must be tight.
(9) Adjust the Rear Cover Lugs, R. H. and L. H. to the Center Tie Lug, R. H. and L. H. in such manner that there will be a very minimum of side twist or up/down movement of the C/T. The lugs of the C/T have elongated holes and are adjustable up/down. Rear Cover Lugs, R. H. and L. H. have elongated holes and are adjustable toward the side of the machine to take out side play of the C/T. Check the C/T for being seated on its race way after adjusting the Lugs.
(10) Adjust the C/T Support Screws (up-stop screws) of the Rear Cover until the screws touch the C/T. Check the C/T for seating using .002" shim.
(11) Connect the C/T Connecting Link to the C/T with screw and two (2) nuts.
(12) Attach C/T Adjusting Springs, L. H. and R. H. which hold C/T under constant spring tension. Check the C/T for seating using .002" shim.

B. SERVICING INSTRUCTIONS: The C/T Protector Bumpers should be in place on rear frame to keep the machine weight off the C/T when machine is tipped up on its back to make adjustment.

(1) Cause of Trouble: All three of these causes are important factors. A bent type guide will show up when you check the .060". A high C/T will show up on the impression.
(a) Center Tie off its seat.
(b) .060" off.
(c) Type Guide Bent.
(2) High Center Tie: Check in sequence given until you locate the trouble.
(a) Back off the Center Tie Support Screws, R. H. and L. H. of the Rear Cover. (These screws will hold up the C/T in relation to its seat and can also cause the C/T to hang up when the Pressure Indicator is backed off.
(b) Disconnect the C/T Adj. Springs R. H. and L. H. Loosen Center Tie Lugs, R. H. and L. H. Check the C/T for seating, using .002" shim. (Lugs of the C/T may cause the C/T to hang up when the Pressure Indicator is being used).
(c) Loosen Gib Screws (2) front end of C/T on C/T Retainer. (If these Gibs are "in" too far they will cause the C/T to raise in the rear). Check the C/T for seating with .002" shim.
(d) Loosen Gib Screws on ends of the C/T, R. and L. (Gib Screws, End Adj.) which are adjustable to remove rock of C/T. Check the C/T for seating.
(e) Loosen Frame Lug Gib Screws (located above Gib, Screws, End Adj.) which hold the C/T down. (If one of these screws is down too far the C/T will be tilted off its seat.) Check the C/T to determine that it seats with no adjustments made (it is not necessary to remove the Rear Cover to make any Service Checks.) Adjust now as indicated under Paragraph 2A (2), (3), (4), (5), (9), (10), (11) and (12). Be sure all screws and nuts are tight.

The Center Tie Cams (along the side of the C/T are adjusted after the C/T is positioned to the proper location (see .060". The Cams are set approximately .010" in front of the C/T and should stop the C/T at no closer than .050" in case an operator tried to make an adjustment and threw the .060" off.
CARRIAGE FITTING.

1. The Carriage is fitted to the Shift Rail so that there is a very minimum of play between the Front and Back Rail when the Carriage is riding on the Roller Retainers (trucks). The Retainers, once positioned correctly, will not shift their position in operation, as the retainers are set on a bracket having a small gear operating in a comb of the Carriage Rail and another Comb of the Shift Rail. The Roller Retainers are positioned so that they will not extend through the end of the Shift Rail when the Carriage is at either extreme right or left.

   The Carriage must run smoothly, be free of binds and play held to a minimum. Adjustments are given in sequence and should be followed. Latest models do not have the End Plates, otherwise adjustments are the same. Sequence shown with Carriage removed (See Paragraph 3) to remove.

2. ADJUSTMENTS:

   - **A.** Check the rails for being straight, examine for chatter marks and grind the rails if necessary. Examine the combs of the rails and straighten the teeth if necessary. Make certain the Carriage Rail is held securely to the Carriage ends.

   - **B.** Check the Roller Retainers for being straight, for flat rollers and Roller Retainer Bracket for being malformed. The small gear of the bracket must be free and teeth in good condition.

   - **C.** Center the Roller Retainers so they will not extend through the end of the Rail when the Carriage is at either extreme end.

   - **D.** With the Rail Locking Screws loose, adjust the Eccentrics of the End Plates of the Shift Rail. These Eccentrics will pull the back rail toward the front. The Left End Plate Eccentric brings the Back Rail forward or rearward on the left side and will affect the Carriage fit when the Carriage is at the left end of the Shift Rail. The Eccentric should be so adjusted that they removed the play between the Shift Rail and Carriage Rail when the Carriage is at that end of the Shift Rail.

   - **E.** Lock all Holding Screws securely. Check along the Carriage for Play along the Shift Rail. If play occurs, note the position of the rollers where the play occurs. **MOVE THE ROLLERS OUT OF THE POSITION WHERE THE RAIL WAS LOOSE** and with the Screws still tight tap in on the Back Rail. If the rail is tapped too hard, the Carriage will bind and if this occurs, loosen the screw nearest the bind and retighten. If it still shows play at that position, tap the rail in again. **NEVER TAP IN ON THE RAIL WITH THE ROLLERS BEHIND THE POINT THAT YOU ARE TAPPING AS THE RAILS ARE MUCH SOFTER THAN THE ROLLERS AND WILL MAKE DEEP PITS IN THE RAILS.**

3. To Remove Carriage: (See Page 16)
PAPER FEED.

1. The feed rolls must be perfectly free on their shafts, uniform in size and concentric in form and in good condition. The Feed Roll Release Lever should release the Feed Rollers sufficiently to clear 12 sheets of paper.

2. ADJUSTMENTS:

A. Feed Roll Tension: Feed roll tension is adjusted by a screw on the rear of the Feed Roll Cradle and should be adjusted to hold one sheet of paper firmly. Spacers must clear Feed Rollers.

B. Paper Pan (Trough): The Pan should clear the platen by not more than the thickness of six (6) sheets of paper. The Paper Trough positions on pins with a spring and felt silencer under the trough on both ends (pins). The pins may lean slightly to give the trough clearance of the Platen on either end. The felt silencers are used to cut down the rattle of the trough in typing and shifting.

C. Paper Fingers: Paper Fingers should slide smoothly on the Paper Finger Rail and should be formed to the Platen so that the metal does not rub the Platen. Rollers should be free. Specify left or right hand finger in ordering.

Paper Bale: To properly align the paper bale to the scales of the machine (margin rack and paper table):

1. Position the left margin stop on a number (we’ll use 30) then position the carriage to the left margin setting against the margin release lever of the C/T.

2. Strike the letter i. (That would put you on space 31).

3. Backspace one space. (That will put you back on 30).

4. Roll the paper up until the letter i is directly under the bale the letter i should line up with the 30 of the bale. If not shift the bale on its elongated holes until the letter i lines up with the 30 of the bale.

5. Position the bale on the indicator bracket of the type bar comb. If the line of the indicator does not line up with the 30 of the bale, position the indicator bracket of the comb on its elongated holes to the correct position.
ROLLER BRACKET AND RETAINER.

1. The Roller Bracket and Retainer are the mediums by which the Carriage is held to the C/T in order that the Carriage can be kept solid, free in movement and hold the writing line uniformly on both capitals and normals. The Retainer is adjusted to the Roller Bracket and the adjustments must be close. If Retainer is adjusted too close, the shifts will bind and the Carriage will hold up in writing. The Roller Bracket and Retainer must be removed in order to remove the Carriage.

2. TO REMOVE CARRIAGE:
   A. Disconnect Drawband—Attach end over Rear Cover to Ratchet Pawl of Spring Drum.
   B. Remove the Retainer Gib Plate Screw and Gib Plate.
   C. Unlock the lock nut of the Retainer Adjusting Screw. Screw in on the Adjusting Screw and with the Carriage to the extreme right (from the rear). Shift to Capitals and remove the Retainer. The Retainer is removed when the Carriage is at the extreme right to get the Retainer in a position away from the Feed Roll Cradle.
   D. Back the Pressure Indicator away from the Zero Stop, lift the Platen from the machine (to prevent bending the Type Guide in removing the Roller Bracket), press the carriage forward, pull back and down on the roller bracket. The Bracket should come out without difficulty.
   F. Remove the Carriage to the right (from the rear).

3. TO REPLACE CARRIAGE:
   A. Replace the Carriage from the right side (from the rear), shifted to capitals.
   B. Center Roller Retainers.
   C. Replace the Roller Bracket (Platen must be removed and Pressure Indicator backed off from the Zero Stop.
   D. Move the Carriage to the extreme right, shift to capitals and replace the Retainer Bracket. Screw the Adjusting Screw toward you a couple of turns to hold the Retainer to the Roller Bracket. Release Shift Lock.
   E. Replace the Retainer Gib Plate and Screw. This screw must be locked solid and it may be necessary to screw in on the adjusting screw before the screw becomes locked solidly.
   F. Adjust the Adjusting Screw until the play between the Roller Bracket and Retainer is held to a minimum but the Carriage runs freely, and shifts free without a drag.
   G. Place .002" shim between the pad on each side of the Roller Bracket and the Retainer Plate of the C/T. Check the drag on the two shims. If the drag is uneven, shift the Balance Shaft by loosening the two screws holding the Balance Shaft End Plate on the right end of the Balance Shaft (facing the machine from the front). The drag on the two shims should be even when the Carriage is centered to the machine, Carriage Retainer Rail parallel to the Center Tie Retainer Plate.

   A. Tab. Rack must be removed to remove Carriage from this model.
   1. Remove R. H. screw holding Tab. Rack to Carriage end (Facing Machine from rear).
   2. Remove end Bracket, with Tab. Rack attached, from Carriage end. Remove 1 screw and 1 nut. Do not remove Tab. Rack from Bracket and Tab. Adjustments, will not be disturbed.
   B. Remove Lock nut from Retainer Adjusting screw—Remove Gib Plate. Hold finger behind the Adjusting Screw, so that the Gib Plate and Screw do not fall into the Escapement Shaft hole. Shift to caps and remove Retainer Bracket and component parts. Remove R. H. Paper Finger.
   C. Attach draw band over Rear Cover and attach to Spring Drum Ratchet Pawl. Shift to caps.
   D. Remove Carriage to Right (from rear).

The Carriage of this model can not be removed until removal of Tab. Rack and attached Bracket.

MECHANIC'S NOTES:
PLATEN AND VARIABLE

1. The Platen of the Noiseless Typewriter must be perfectly true (concentric) to insure uniform impressions, better carbons and good alignment. A poor ground (eccentric) platen will cause an uneven impression in different positions of the platen. The Type Head of the Noiseless does not have the freedom of movement to the Platen as does the standard front stroke typewriter, the pressure of the action being adjusted so that it will barely reach the surface of a perfectly concentric platen when the Pressure Indicator is at the 12 o'clock position. Good carbons, impressions and alignment are impossible with an eccentric platen.

2. ADJUSTMENTS: The Platen must be fitted properly in the Carriage without end shake and up/down movement, but perfectly free to spin when Ratchet Detent and Paper Feed Roll Release Levers are released.

A. Variable Clamp Bushing and Screw: It is extremely important that the Variable Clamp Bushing and Screw are tight.

1. Holes on Platen Shaft, where the Clamp Bushing and Screw fit are two different sizes. The Clamp Bushing fits through the larger hole of the Platen Shaft into the deeper countersunk hole of the Variable Shaft. Before replacing the Clamp Bushing Screw, tap the Bushing securely into the Platen hole and the Variable Shaft hole. This will prevent the Bushing from turning while the screw is being tightened. If this connection is loose, the Platen will move through vibration, in writing.

B. Platen Fitting:

1. The R. H. Knob is adjustable, by threading on the Platen Shaft, to remove end shake and secure proper fit. To adjust, back off R. H. Platen Knob slightly (turn counter-clockwise); back off Platen Locking Screw; tighten (turn clockwise) the Platen Knob tightly. Check for freedom of clockwise.


3. Platen Locks, L. H. and R. H.: Platen Locks must be adjusted to eliminate up/down play in the Platen but must not cause a bind in the Platen (which may be determined by spinning the Platen, with Ratchet Detent and Paper Feed Roll Release Levers released). The Platen Locks should snap locked (detent action) with all up/down play in the Platen removed. Adjust by loosening the Platen Lock Adjusting Nut and turning Platen Lock Adjusting Screw. Relock Lock Nut after adjusting. Check Platen for freeness and play after adjusting.

C. VARIABLE:

1. To Remove: Back off the Variable Clamp Screw until only one thread of the screw is holding. Tap on the Screw to force the Bushing through the Platen Shaft. Remove Bushing and Screw. Pull Variable from the Platen; remove the Platen Bearing and Spring. To Replace: Reverse procedure.

2. Adjustment: The only adjustment is to determine that all springs are in good condition, clutch dogs not badly worn, teeth inside the ratchet in good condition and the parts correctly assembled in the variable in re-assembling. If the round spring inside the Variable is not in the notches of the clutch dogs, the Variable will not operate properly.

To remove Platen from Model No. 6 and some of the Underwood Noiseless Models, the following sequence is most practical.

1. Un-screw the R. H. Platen Knob from the Platen.

2. Remove R. H. Platen Bushing. Slip out to the right.

3. Remove the Variable Clamp Bushing and Screw.

4. Remove L. H. Platen Knob.

5. Remove Line Space Lever Bracket.

a) Screw at top in front of Line Space Lever.

b) Screw Holding Line Space Lever to Carriage End.

c) Screw holding Bushing that holds Ratchet Detent Spring. (Loosen screw, place finger above the Bushing, next to the Detent Spring). Remove Ratchet Detent Spring and Screw.

6. Remove Variable from Platen Shaft.

7. Lift Platen up and out. (Some of the older Model 6 machines have 10" Platen).

Reverse above procedure to replace Platen. Adjust Platen for end shake before replacing Line Space Bracket. This model does not have a demountable Platen.

LINE SPACE LEVER

1. The Standard Ratchet for the Noiseless Typewriter has 30 teeth. The Ratchet must have a corresponding standard pawl in order to operate correctly.

2. ADJUSTMENTS: Check all screws for tightness before attempting adjustment.

A. Release the Detent from the Ratchet with the Detent Release Lever. Adjust the Ratchet Detent Bracket Adjusting Eccentric so that the Detent Roller barely clears the teeth of the Ratchet without contacting any. Tighten the locking screw of the eccentric.

B. Position the Line Space Lever to the extreme right. While holding the lever in this position, turn the Platen to determine if there is any movement in the Platen. If movement, adjust the Line Space Pawl Limit Screw. The roller of the detent must position squarely between the teeth of the Ratchet.

C. There should be no play between the lip of the small Bracket attached to the Line Space Lever and the Pawl. Form the lip of the Bracket to take up the slack.

D. Ratchet Detent Tension: To apply more tension to the Ratchet Detent Bracket, lift the Platen out of the machine; with a socket wrench screwdriver combination, Wrench ST-40016, unlock the Lock Nut and Screw in on the Detent Tension Adjusting Screw.
PLATEN AND VARIABLE

LINE SPACE LEVER

DETENT TENSION ADJ. SCREW
RATCHET DETENT LEVER
RATCHET DETENT SPRING
LINE SPACE PAWL LIMIT SCREW
LINE SPACE PAWL
RATCHET DETENT BKT.
RATCHET DETENT BKT. ADJ. ECC.
VARIABLE LOCK
SHIFTING MECHANISM

1. The Shifting Mechanism includes adjusting of the Toggle Linkage, Shift Keylevers, Shift Shaft, Shift Rail, Balance Shaft, Knee Action, Roller Bracket and Retainer Adjustment of the Carriage. The Shift Locks are not adjusted until the motion has been set.

2. ADJUSTMENTS: The Correct sequence of the Shifting Mechanism is:

A. Adjust the Toggle Link Short Adjusting Screw (located under the toe of the Toggle Link Short) until the Shift Key has a catch before it depresses fully (machine setting on its back while adjusting Toggle Link Adjusting Screw, Short). If this screw is "in" too far, the rail will not lock in normal case (small letters) and the Shifts will bounce in shifting. If this screw is "backed off" too far, the Shifts will catch too hard (when the machine is resting on the rear cover) and will also have a catch in shifting in normal operating position. The Toggle Link will have lost motion if the screw is "backed off" too far.

B. Check the Shift Keylevers for height in relation to the bottom row of keylevers. The Keytop of the Shift Key should be positioned so that about half of the keytop is above regular keylevers keytops. Adjust the height with the Shift Height Adj. Eccentric.

C. Check all linkage for play and all screws for tightness.

D. Adjust Carriage Retainer to Carriage Retainer Rail (See Roller Bracket and Retainer Page 16) and parallel the Retainer Rail of the Carriage to the Retainer Plate of the Center Tie.

E. Parallel the Platen: Back off the Pressure Indicator to a position where the letters print very lightly. Strike off letters on each end of the Platen. If the letters are light on the R. H. end of the Platen, prick punch the Retainer Rail on the light side (R. H. Carriage end in this instance) in the notch that the Retainer Rails sets into the Carriage End so that the Retainer Rail will be forced toward the Center Tie. The impression will be heavier on the end prickled. Care should be taken in this adjustment to secure that it is pricked only to the point necessary for letters on each end of the Platen to print with the same density. If the Platen is too far out of parallel, then shift the Shift Rail (by adjusting the R. H. End Plate of the Balance Shaft). If the Retainer Rail is parallelled to the Retainer Plate of the Center Tie (flat on center tie position) the requirement for peening or prick punching is lessened.

F. Check Shifts for Operation: Free, light and snappy. To make the Shifts lighter, apply more tension to the Shift Tension Spring; to make Shifts heavier, lessen tension of the Shift Tension Springs. Always increase or lessen tension on both springs uniformly.

3. ADJUSTING (TROUBLE SERVICING): If a bind occurs in the Shifting Mechanism which cannot be immediately located, the following steps will aid in locating the trouble by the process of elimination:

A. Disconnect the screw holding the Toggle Link to the Balance Shaft End Plate, (upper front screw).

   (1) Raise the Carriage and Rail in the SHIFTING motion (by hand) to determine if there is any bind or drag. If binding, the trouble is in Pivot Screws—check to determine if adjusted too tight and always examine pivots for wear, replacing if necessary.

   (2) Balance Shaft positioned on the C/T so that some of the Shifting Mechanism is binding on the C/T (Shift Spring Arms Set Key Bracket, balance shaft hitting on the C/T Connecting Lug of the C/T or the Balance Shaft causing the Toggle to bind on the C/T in the Shifting operation.)

   (3) Roller Bracket and Retainer improperly adjusted.

   (4) Balance Shaft binding on the Shift Rail. The Shift Rail must be removed to make this check only.

   (5) Check all End Plate holding screws for tight—check Pivot Screw Lock Nuts for tightness.

B. Check Shift Keys, Shift Shaft and Toggle Adjustments.

   (1) Shift Keys centered in the Keylever Comb.

   (2) Shift Key Shaft properly adjusted on its Pivot Screws (free without end shake).

   (3) Toggle Link has play or free linkage on the Shift Height Eccentric and the Connecting Screw holding the Toggle Link to the Shift Keylever Shaft.

   (4) Lower Toggle Screw adjusted properly. (Minimum of play on the large tapered screw). To adjust Large Tapered Screw, unlock the large lock nut between the Toggle Link and the Frame, adjust the tapered screw, then relock the lock nut to the frame. The large Tapered Screw should not move when shifting as the lock nut is due to hold it in a stationary position.

   (5) Check the Lower Fore Screw. Nut must be tight. Screw is tapered to remove the play between links.

   (6) Position machine on its feet facing back of machine—pick up the Shift Keylever and notice the position of the Toggle Link in relation to the Balance Shaft End Plate. The Toggle Link should slide along the End Plate with no drag and without noticeable clearance between the Toggle Link and the End Plate. If the Toggle Link is too close to the End Plate of the Balance Shaft, there will be a bind before the Toggle is connected which will be more pronounced when the Toggle Link and End Plate are connected. If the Toggle Link is too far from the End Plate, the Toggle Link must be pulled in the connection and a drag in the Shifts will show up. To line the Toggle to the End Plate, push against the Toggle Link until the desired position has been reached.
(7) Connect the Toggle Link to the Balance Shaft with a tapered screw. Adjust the tapered screw (Upper Fore Screw) until there is no play between the Toggle Link and the End Plate, then lock the lock nut. Unless all screws and lock nuts are secure, time will be wasted in making these adjustments.

(8) If the preceding steps are followed the Shifting Mechanism should operate freely. If the Set Keylever is not adjusted properly the Shifts may drag. The Knee action will also bind the Shifts. It is important that the linkage floats on its rivets. The Knee action is set in connection with the Motion. (See Motion, Page 25).
.060" SETTING.

1. Proper setting of the .060" clearance between the rear of the Type Guide and the Platen with the Pressure Indicator at Zero Stop Screw is essential if proper impressions are to be secured.

2. ADJUSTMENTS: Determine that Type Guide is straight and C/T seated before attempting adjustments.

   A. Place .060" Gauge between Platen and the Type Guide.

   B. Turn Pressure indicator toward the Zero Stop (counter-clockwise). Turn until the .060" Gauge has a very light drag. If the drag occurs before the Pressure Indicator is at the Zero Stop Screw, loosen the Pressure Indicator Locking Screw and position the handle at the Stop Screw, then Tighten Locking Screw.

   C. If there is no drag on the .060" Gauge and the handle is on the Zero Stop Screw, loosen the Pressure Indicator Locking Screw and position the handle away from the Zero Stop Screw (clockwise), relock the Pressure Indicator Locking Screw and turn the handle toward the Zero Stop Screw gradually. If the desired position is reached before the handle returns to Zero Stop Screw adjust as indicated in 2B above.

3. UNDERWOOD, Special:

   The .060" of the Underwood having the Pressure Indicator on the side of the Frame, R. H. is controlled by adjusting the screw on the small plate attached to the front of the C/T. To adjust: The Pressure Indicator handle should be to the front of the machine and the clearance between the Platen and the Type Guide .060". If the distance is more or less, loosen the set screw on the top of the Plate on Front of C/T, place a screwdriver between the two Center Actions and adjust the screw on the front of the plate until the .060" is set. The Pressure Indicator Shaft of this model has an eccentric cam on the end of it, the C/T being under spring tension is moved forward or rearward by the cam when turned. It is unnecessary to remove any parts to make this adjustment.
"ON FEET" ADJUSTMENT.

1. For the "On Feet" setting, a ribbon should be placed in the machine and the Pressure Indicator "backed off" to a position where the letters all print very lightly. The "On Feet" adjustment is made with the small letters printing and the following adjustments must be correctly made before attempting this adjustment:
   A. Center Tie seated with no rocking.
   B. Toggle adjusted properly and rail locked in normal case.
   C. Platen Parallel and all of the Shifting Mechanism correctly adjusted.
   D. Platen adjusted properly (See Platen adjustments).
   E. .060" position set.

2. ADJUSTMENTS: This adjustment must be made before setting "Motion."
   A. Back off the Pressure Indicator to a position where the letters print lightly, carriage in normal non-shift position.
   B. Check to determine that a majority of letters are printing fully.
   C. If majority of letters are light on top or bottom, in printing, adjust the Balance Shaft End Plate, by loosening 3 holding screws and raising or lowering the Carriage with the Eccentric (see Drawing). When the Type have been put "on-feet", tighten all three holding screws securely, as one of these screws remaining loose can cause bind of the Shift. The "on-feet" position must be made before setting the motion as the shifting of the end plate will throw the motion adjustment off.
IMPRESSIONS

1. Impression is the adjustment of the individual action on the Top Plate in relation to the Platen so that all type bars contact the Platen with the same force. The .060" must be set and the C/T Seated before adjusting the impression. The Actions are moved in and out in the top plate by the screws the action frame sets in, located at the top of the Top Plate.

2. ADJUSTMENTS:
   A. Check the .060".
   B. Position the Pressure Indicator at 12 o’clock position or just a little to the left of straight up.
   C. Adjust the Screws on the front of the Top Plate that the Action Frame sets in (impression Screws) shown in drawing but not labeled. The letters of the individual actions should print a light gray color, when the impression screws are adjusted correctly.
   D. If the impression of an action prints heavy, back off the impression screw until the letter does not print, then screw “in” on the screw until the proper print is made. NEVER BACK “OFF” THE IMPRESSION SCREWS TO GET THE PROPER IMPRESSION — ALWAYS BACK OFF UNTIL THE LETTER DOES NOT PRINT, THEN TURN “IN” UNTIL PROPER PRINT IS SECURED. If the screw is backed off for the adjustment, the action will move to the front of the machine after some use and the impression of that particular action will be off. The Action Frame must set against the head of the impression screw. DO NOT LOOSEN THE ACTION CLAMP SCREWS WHEN ADJUSTING IMPRESSION.
   E. Impression will affect trip and must be adjusted before the final U-Bar Trip Adjustment.
"MOTION" AND SHIFT LOCKS.

1. Before adjusting the "motion", the Shifting Mechanism must be properly adjusted. Any maladjusting of the Shift Mechanism can cause faulty "motion". The C/T should be properly adjusted (see Center 'Tie'), and the Toggle Link Stop Screw "backed off" so that the screw is not limiting the travel of the Toggle Link.

2. ADJUSTMENTS:
   A. Adjust the motion with the Motion Adjusting Screw located on the Balance Shaft End Plate, L. H. This Screw limits the travel of the Carriage in Shifting. The letters Hh should be used. The bottom cleats of the capital H and the bottom cleats of the small h should be on a straight line. The motion should be checked for uniformity across the entire length of the platen. If the motion is uneven across the platen, check the following:
      1) Worn Balance Shaft Pivot Screws, or end shake of the Shaft on the Pivot Screws.
      2) Play or excessive wear of the Shift Key Shaft Pivot Screws.
      3) Too much lost motion of the Balance Shaft.
      4) Toggle Link connections loose.
      5) Center Tie not seated properly or with end rock.
      6) Carriage Loose on Rail.

   B. Adjust Shift Locks:
      1) Lock Plates are moved up/down on elongated holes to their proper position. Motion should be the same with each Shift Lock as without Shift Locks, and the Carriage should be fairly solid in cap position with the Shift Locks locked. Locks should be set so that they lock uniformly and must be safe, which can be checked by hitting corner of machine with edge of hand. With both locks locked, release of one should unlock that side just prior to release of opposite side:

   C. Knee Action:
      1) Knee Action should be adjusted to the Escape ment Shaft so that there is little play between the Knee Action linkage and the hub of the Escape ment Starwheel when the shafts are in locked position. The Knee Action retains the Starwheel pressure against the fixed dog so that piling can be eliminated, and also breaks the arc of the Escape ment Shaft in shifting to prevent the Capital letters and small letters from crowding in shifting.
      2) If the Knee Action is too high on the Escape ment Shaft, the Carriage will hold up in writing when on Caps. If the Knee Action is too low on the Escape ment Shaft the Knee Action may hit the Tab. Key levers and letters would vary in shifting, i.e., Knee Action set right oOoO the small o is centered between the capital O's. If Knee Action is low the small o will not center between capitals.

   D. Toggle Link Stop Screw:
      1) This screw helps support the Toggle and should be adjusted to where the screw touches the Toggle when the shafts are in their locked position. If the screw is too high, the Motion will show the Capital H above the small h. This adjustment is made AFTER the motion is set, the Shift Locks adjusted and Knee Action adjusted.
      2) Make sure that the Toggle Stop Screw and not the Toggle Link Adjusting Screw is being adjusted in this last step. The two screws are side by side. The Toggle Stop Screw is the one nearest the frame and has the larger head. If the Toggle Adjusting Screw is adjusted by mistake, all the Shift Adjustments will be off including the motion.
ESCAPEMENT.

1. The Escape ment is composed of three sections, The Main Escape ment Bracket, the Tabulator Escape ment Bracket and the Rocker. (1) The Main Escape ment Bracket consists of the Starwheel with its Knee Action linkage, the Tab. Brake Bracket (with brake tension spring and brake release adjusting screw attached), the Tab. Brake Friction Wheel, Rocker Return Spring and the Pivot Screws and their component parts. (2) The Tab. Escape ment Bracket consists of the Tab. Arm, Tab. Escape ment Arm (which moves the fixed dog from the starwheel in tabulating) and the Tab. Escape ment Bracket return spring which maintains a continuous pull on the Tab. Escape ment Arm holding the brake from the friction wheel when not tabulating. (3) The Rocker consists of the Fixed Dog, the Stepping Dog and their component parts.

2. ADJUSTMENTS:

A. The Rocker:
(1) The Rocker should be weighed in to get uniform weight on the Rocker. This is performed with a Rocker Weight Gauge. Place the Gauge on the Rocker and depress the Feed Rack Release Lever of the Carriage, the Rocker Weight Gauge should drop slowly. If a weight gauge is not available, turn the Rocker Spring Tension Washer about 1/8 of a turn. Too much weight on the Rocker Return Spring will cause a heavy touch — too little tension will cause piling.

(2) The Rocker should be positioned on its Pivots so that the Fixed Dog is in a 6 o’clock position with the Starwheel tooth (carriage tension against the fixed dog). Facing the machine from the rear, the R. H. Pivot is adjusted by backing off the Rocker Tension Lock Nut; remove the Rocker Tension Washer (with etched teeth); remove the Rocker Tension Spring and unlock the Rocker Pivot Lock Nut which is located under the Rocker Tension Return Spring. Never attempt to adjust the R. H. Pivot Screw without following the procedure.

(3) If the Brake Release is adjusted “in” too far, the Tab. Escape ment arm will partially disengage the Fixed Dog from the Starwheel and will cause skipping in operation. If there is not enough adjustment on the Release Screw, there will be brake on the friction wheel at all times and the machine will pile. There should be a slight amount of clearance between the Tab. Escape ment Arm and the Fixed Dog when the Tab. Keylever is in its inactive position. The Tab. Arm is formed to regulate the Tab. Trip.

3. TO REMOVE ESCAPEMENT (from completely assembled machine):

A. Disconnect the Universal Bar Trip Connecting Link from the Universal Bar Hanger Bracket and slide the connecting link back through the Rocker without disturbing the U-Bar Trip Adjustment.

B. Remove the Lock Nut and the Adjusting Nut from the end of the Space Bar Connecting Link. This will throw off the Space Bar Trip Adjustment.

C. Unlock the Lock Nut of the L. H. (from the rear) Pivot Screw and back off the Pivot Screw. Slip the Rocker out to the left.

D. Remove the Tabulator Keylever Pivot Shaft, raising the levers upward from the Escape ment. There is no need of removing the levers from the machine.

E. Remove the Spring Clip from the end of the Tab. Escape ment Return Spring.

F. Loosen the Knee Action Screws holding the Knee Action to the Escape ment Shaft, shifting to capitals.

G. Remove the two (2) screws holding the Escape ment to the Frame Brace and remove the Tab. Escape ment Bracket and Main Escape ment Bracket.

4. TO REPLACE ESCAPEMENT: Reverse above procedure.

5. All parts of Escapements with Knee Action are the same on both 10 pitch and 12 pitch. Starwheels differ only on 8 pitch, 14 pitch and 16 pitch. The same applies to back space dogs. Machines without Knee Action have a different Starwheel and Backspace Dog for each pitch make.

6. CAUSES OF SKIPPING:

A. Too much clearance between the Dogs, both horizontal and vertical.

B. Space Bar and U-Bar Trip too fast.

C. Dogs too low in relation to the Starwheel.

D. Chipped tooth on Starwheel, pinion or Feed Rack.

E. Chipped or badly worn Dogs.

F. Brake Release Screw “in” to far.

THE ESCAPEMENT DOGS.

1. The horizontal clearance between the Fixed Dog and the Stepping Dog is from .065” to .068”. If the distance between the two dogs is more than .068”, then skipping will occur. If the distance is less than .063” piling will probably result.

2. ADJUSTMENTS:

A. The “Creep Clearance” (step) is the clearance between the Face of the Stepping Dog and the face of the Fixed Dog. In the drawing, the figure that is given is approximately .040”. There may be .062” or less play on the holding or Pivot Screws for the two Dogs. The Lock Nuts must be tight and the Dogs free on the Screws without spring tension. Occasionally a Fixed Dog will be burred on its Pivot hole and will hang up. The .040” clearance is sufficient to insure that the Dogs will not cause piling or skipping. With the Rocker positioned in machine at 6 o’clock position, to get the half step, it will be necessary to increase or decrease the “clearance.” Creep clearance is the space between the face of the two Dogs when the Stepping Dog is held under pressure. To adjust this clearance, unlock the lock nut at the tail of the Rocker and move the “Creep Adjusting Screw” in the elongated slot. Wrench ST 40023 can be used for this adjustment and no parts need be removed to make the adjustment. Always check the condition of the dogs when the escape ment is either “in” or “out” of the machine.

B. The Dogs should be positioned to the Starwheel so that the edge of the Fixed Dog shows slightly above the Starwheel Tooth and the Stepping Dog clears the bottom of the Starwheel Tooth. This adjustment is made by the Rocker Limit Bracket Adjusting Screw. If the Dogs are too low in relation to the Starwheel, the touch becomes heavy as the Rocker is forced to pull the Rocker Limit Bracket in tripping. If the Dogs are too high in relation to the Starwheel, the Escape ment will cause the machine to pile.
"CREEP" CHECK

CLEARANCE BETWEEN FACE OF FIXED DOG AND FACE OF STEPPING DOG WITH PRESSURE APPLIED AGAINST STEPPING DOG.
1. As in the standard front stroke typewriter, the Universal Bar actuates the Escapement Rocker, causing the trip. Forming, twisting or bending of the Universal Bar will result in maladjustment and invite serious trouble. Adjustments to the Universal Bar mechanism should be confined to actual requirement in order to prevent throwing the mechanism into a bind.

2. ADJUSTMENTS: The main difficulty with machines in the field is that the two ends of the U-Bar are out of parallel, for one reason or another, causing the typewriters on one side to trip farther away from the platen than the other.

A. Uniform Trip Adjustment:

1) **U-Bar Ends out of Parallel: Trip not uniform:**
   
   (a) Spring U-Bar Suspension Bracket on side of early tripping (bars tripping too far from platen) **downward** and simultaneously spring the Bracket on the opposite side **upward**. This adjustment should even the trip on the ends of the U-Bar. If the bars in the Center trip nearer the Platen, after the ends are paralleled, it is necessary to move the U-Bar rearward, which may be done by positioning the U-Bar Link Center to the rear in its elongated slot in the center bracket of the Top Plate.

   (b) The U-Bar Links, L. H., R. H., and Center are installed in elongated slots and in extreme cases it may be necessary to reposition all three links to parallel the U-Bar.

2) **Trip Adjustment Sequence:** Do not attempt adjustment until Impression is Set (See Impression) which positions actions uniformly in relation to the U-Bar.

   (a) U-Bar Trip is set with Trip Adj. Nut, after loosening Lock Nut. Be sure to tighten Lock Nut after adjusting.

   (b) .060" must be correct.

   (c) Position Pressure Indicator at Zero (handle against Stop Screw).

   (d) Insert 4 sheets of paper in platen.

   (e) Check the trip. Trip should be uniform and take place at the time typehead reaches the paper (4 sheets inserted).

   Caution: If there is too much trip on the U-Bar, skipping will occur when an operator follows through heavily on the keys.

B. **Service Troubles:**

1) **U-Bar Hangs Up** Causes:

   (a) U-Bar Pivot too tight.

   (b) U-Bar Hanger binding on Keylever 8 or J.

   (c) U-Bar Hanger positioned causing Escapement Connecting Link to bind on Tabulator Keylever.

   (d) Escapement Connecting Link binding on Space Keylever, Shift Keylever Shaft or positioned against the side of the hole in the Escapement Rocker.

   (e) Rocker binding on its Pivots.

   (f) Saddle of an action not over the U-Bar.

2) **Trip too slow:** If trip is too slow, blurring of letters will be prominent as the Carriage will move at the same time the type contacts the Platen. Trip must take place before the type actually contacts the Platen. **If an individual action** trips too slow and the Impression is Set, take the action out of machine and peek the saddle so that the Saddle will contact the U-Bar sooner. Care must be taken in this operation. When the action has been returned to machine, after peening the saddle, the impression of that action and the other action held by the same action clamp must be rechecked.

3) **Trip too fast:** If one **action** trips faster than the rest (farther from platen), take action out of machine and file a little from the saddle so that the saddle does not contact the U-Bar so soon. All Action Saddles MUST be over the U-Bar for machine to operate properly. Extreme care must be taken to prevent filing too much from the saddle.
2. ADJUSTMENTS:

A. Back Space Dog:

(1) If the Back Space Dog is not clear of the Starwheel teeth, press down on the Back Space Keylever, forcing the lever down past its normal stop position. This will force the Dog from the Starwheel. If the Back Space Keylever is forced down too far, the Back Space Keylever will have too much up/down play and will hit on the Shift Keylever when back spacing. To remove this play, hold the Back Space Keylever in an upward position with the thumb at the bend below the Key top while forcing the rear end of the Keylever upward by applying pressure on a heavy screwdriver inserted under the rear end of the keylever. This will shorten the throw and remove the up/down play from the keylever. Check Back Space Dog for clearance with Starwheel teeth, after forming the Back Space Keylever.

(2) Overthrowing: The Backspace should never overthrow (skip) whether operated fast or slow. If overthrowing occurs, shift the Escapement Rocker slightly (usually to the left, facing the machine from the rear). Sometimes the Back Space Dog may be formed a little to make the correction. The Back Spacer should back space approximately 1½ spaces when the Back Space Keylever is fully depressed.
MARGIN RELEASE

1. Tracing the action of the Margin Release Keylever, it will be noted that the Margin Release Keylever limits on the Down Stop of the Keylever Comb (upper). Following the assembly through, it will be seen that when the front end of the Margin Release Keylever is moved downward, the rear of the lever is raised, moving the Margin Release Shaft upward to the limit of the Margin Release Limit Bracket of the Keylever Comb (lower), which is adjustable. On the end of the Margin Release Shaft is the Margin Release Trunion of the C/T held in place by a screw on the Margin Release Trunion Bracket. The Margin Release Lever throws rearward when the Margin Release Keylever is depressed. The Trunion of the Margin Release lever of the C/T operates on Pivot Screws, it being very important that there is no play at the Pivot Screws. The Margin Release must be free from side to side—pivot screws too tight will cause bind.

2. ADJUSTMENTS:
   A. Margin Release Trunion Pivots: To remove play: Unlock the Lock Nut of the Lower Pivot Screw, making adjustment to eliminate up/down play at the pivots but the Margin Release Trunion pivots freely on the Pivots. Excessive play on these pivots will cause the Margin Release lever to throw rearward when the left Margin Stop is thrown against the Margin Release Lever.
   B. Margin Release: The Margin Release (lever) must not rest against the C/T in the rear but must set squarely against the plate of the C/T to eliminate rock when the Margin Stop contacts it. The position of the Margin Release is controlled mostly by positioning the Margin Release Limit Bracket (lower Keylever Comb) and positioning the Margin Release in or out in relation to the Margin Stops by the Set Screw holding the Margin Release Trunion to the Margin Release Shaft. If the lever is "in" too far, the lever will catch on the Margin Stops and the Carriage may not be readily moved. The Margin Release must be formed to properly position the lever to the C/T. If there is no play between the Margin Release and the C/T, the Line Lock will not be permitted to release as the Margin Release (lever) will limit or hang up on the C/T before the Line Lock has a chance to release. This will show up especially when the Line Lock is locked and it is necessary to back space to make a correction. The Back Space will operate but the Line Lock will not release.
   C. Over-Bank:
      (1) Improper clearance between the Margin Release and the L. H. Margin Stop.
      (2) Six o'clock position incorrect.
      (3) Knee Action Screws slightly loose.
      (4) Margin Release not formed to the C/T so that the Margin Release is solid.
      (5) Dogs of the Escapement Rocker too loose.
      (6) Margin Rack Screws loose.
   D. Left Margin passes by Margin Release Lever:
      (1) Margin Release not positioned "in" far enough in relation to Margin Stops.
      (2) Play in the Trunion Pivots of Margin Release Lever of C/T.
      (3) Bent Margin Rack.
      (4) Margin Release not formed squarely to the C/T.

LEFT MARGIN

L. H. MARGIN ADJUSTMENT.

1. The Left Hand Margin is the setting between the L. H. Margin Stop and the Margin Release Lever of the C/T. This setting must be made before adjusting the Tabulator mechanism or the Line Lock. If the Tabulator is not in adjustment and the machine has been in use for quite awhile, always check the Left Margin before moving the Tab. Rack as the L. H. Margin clearance becomes greater as the machine is used.

2. ADJUSTMENTS:
   A. Position the Carriage so that the L. H. Margin Stop is against the Margin Release Lever of the C/T. The clearance between the Margin Release and the L. H. Margin Stop should be between .010" and .015". Check 6 o'clock position before adjusting L. H. Margin.
   B. Facing machine from the rear, L. H. Margin is adjusted by loosening locking screw and turning Eccentric until proper clearance is set. Lock the Locking Screw securely after proper clearance is adjusted. The Left Hand Margin Adjusting Eccentric is located on the left end of the Feed Rack (facing machine from rear).
      (1) The small Plate that the Eccentric sets in must be square and pulled toward the rear of machine so that the Eccentric Plate does not interfere with the lifting of the Feed Rack when the Feed Rack is released.
      (2) High point of the Eccentric must never face the front of machine.
      (3) L. H. Margin must not overthrow. The Margin Release of the C/T should be so formed that it does not rock when the Margin Stop is pressed against the Margin Release of the C/T. It should have a little play between itself and the back of the C/T and be free both in side operation and "in and out" operation. The Margin Release must not protrude to the extent that it stops the Carriage in returning the Carriage after the Margin has been released. (The Margin Stops are tapered and the Margin Release of the C/T must not project past this taper).
TABULATOR MECHANISM.

1. Depressing the Tabulator Keylever, it travels downward until it limits on the Tab. Comb Filler. When the Tab. Keylever is depressed, the end of the Keylever is raised, picking up the Tab. Blade of the C/T. The Tab. Blade picks up the Tab. Arm of the Escapement (which functions to hold the Tab. Brake from the Friction Wheel of the Escapement), releasing the Tab. Brake to contact Friction Wheel, and continuing to kick the Fixed Dog from the Starwheel, freeing the Carriage, with only the Tab. Brake providing slight friction, until the Tabulator Blade contacts a stop which has been set on the Tabulator Rack. When the Tabulator Keylever is released, the Fixed Dog again engages the Starwheel tooth and the Tab. Escape. Arm, which is under heavy spring pressure, contacts the Brake Release Screw on the Brake Bracket and pulls the brake from the friction wheel.

2. ADJUSTMENTS: When adjusting the Tabulator, it is necessary to adjust the levers first. The Tab. Blade and the Clear Key operate between two adjustable brackets and these brackets (on the rear side of the C/T) are adjusted so that the Tab. Blade and Clear Keys of the C/T set straight and levers work freely with a very minimum of play. The Tab. Set and Clear Key levers must also be free and the levers in their proper position in the Lower Tab. Comb. Their position in the Lower Tab. Comb (machine on its back), clear Key levers in the first slot from the left; Tab. Blade in the second slot from the left and Set Keys in the first slot from the right.

A. Tabulator Keylever: Depress the Tab. Keylever, noting the position of the Tab. Blade in relation to the Tab. Rack. The Tab. Blade should travel to within 1/32" of the Tab. Rack. The adjustment is made on the Tab. Keylever by screwing "in" on the Adjusting Screw of the Tabulator Keylever itself. All Tabulator Stops of the Tab. Rack should be "in".

B. Clear Keylever: With some Tabulator Stops set on each end of the Tab. Rack, adjust the screw of the Clear Keylever until the Clear Key of the C/T is held towards the stops that are set. The Clear Key of the C/T should nearly touch the Stops when the clear key lever is idle (not held depressed). Depressing the Clear Key Lever, the Clear Key of the C/T will probably ride hard against the Tabulator Rack. Adjust the Screw on the back of the Clear Keylever of the C/T until the Clear Key of the C/T barely misses the Tab. Rack with the Stops "in" (not set). The Clear Key should knock in all stops when this adjustment is set properly.

C. Set Keylever: The Set Key of the machines having the Shift Spring Arms welded to the Shift Rail are adjusted with the screw on the Set Keylever itself and are adjusted just to take the slack out of the linkage (see drawing). On the old style machines, having the Set Key as part of the C/T, the adjustment is made with the same screw but the Set Keylever of C/T should be brought forward until the Set Key Finger nearly touches the stops of the Tab. Rack when the Stops are "in". The finger has to clear the Stops on both capitals and normals. On the new style, as indicated in the drawing, the Set key Finger rests on the rail in its rest position. If the Set Keylever is not adjusted properly the Shifts will hold up or drag.

D. Tabulator Trip: Tab. Arm of the Escapement formed to regulate the Tab. Trip, the Trip should take place just before the Tab. Keylever limits on the Tab. Comb Filler.

E. Tabulator Brake: Back off the Brake Release Screw and check the Tab. Brake without release. The Brake should be sufficient to slow down the Carriage but not tie up the Carriage. Adjust the Brake Screw to regulate the Tab. Brake.

F. Brake Release: Adjust (screw "in") on the Brake Release until the Brake Release Screw works in and out slightly when the Tab. Keylever is depressed and released. The Dog may be partially disengaged from the Starwheel if the Release Screw is "in" too far. There should be a little play between the Tab. Escape. Arm and the Fixed Dog after the release has been set. If there is not enough release, there will be brake on the friction wheel in normal operation which will cause piling.

G. Tabulator Rack: Check Left Margin before adjusting. Position the Tab. Rack so that the Tab. Blade will operate between all the Tab. Stops when they are set, without knocking "in" any of the stops. Lock all holding screws securely when the Rack has been positioned properly—no further adjustment of the Rack will be necessary.

H. Set Key Finger: Adjust Tab. Rack before adjusting Set Key Finger. The Tab. Blade will stop the Carriage at any point at which the Set Key Finger sets a stop "out" when the Tabulator Key is depressed. If the Stop is set at 30 and in tabulating the carriage stops at 29 or 31, the Set Key Finger has pushed out the wrong stop. Do not move the Tabulator Rack to make the correction. Position the Set Key Finger to the correct stop. When the Set Key is set correctly the Stop that the Set Key knocks "out" should line up with the flat edge of the tapered Clear Key Lever of the C/T.
BELL RINGER

1. The Bell Ringer is activated by the R. H. Margin Stop.

2. ADJUSTMENTS:
   A. Spacer washer must be behind the bell to assure a loud ring.
   B. Raise the Lower Bell Ringer Bracket to help Bell Wire clear the C/T.
   C. Position the Upper Bracket to control the depth that the bell wire will contact the Margin Stop.
      (1) Bell Wire will hold up the Carriage if the Wire is contacting the Margin Stop too hard.
   D. Form, by placing a Screwdriver at the position shown in the drawing, tapping on the screwdriver lightly. This will cause the Bell Hammer to be closer to the bell and it will also cause the spring to have more tension.
   E. If the Bell Wire is bent too much, the Bell Wire will bind. Position the screwdriver behind the Bell Wire at the same location and spring the Bell Wire out slightly. Care must be taken in the Bell Wire adjustment as the wires are weak and break very easily.
   F. The Bell Wire can be formed slightly at the top to control the amount of spaces the Carriage will travel after the bell rings to the Line Lock.

Note: The new style Bell Ringer does not have a striking ball. It is not necessary to remove the lower bracket to replace a bell wire. The upper bracket must be removed.
1. The Space Key must be free on its pivots and must have sufficient tension on the return spring to prevent spacing from vibration in shifting. The Trip is regulated so that the Escapement Rocker is permitted to fully return in its limit bracket and the Space Key Interlock adjusted properly. The purpose of the Space Key Interlock is to lock the alphabet Keylevers while the operator has the Space key depressed. Since the Space Bar is operated by the thumb, which is sluggish in action as compared with the fingers, quite often the Space Bar is not permitted to restore upward to permit the last part of the escapement of the carriage to take place before the operator strikes the alphabet keys for the first letter of the next word following the space bar operation. When this occurs, the first two letters of a word following the Space Bar operation may not be evenly spaced. If the Interlock is functioning properly and the operator is slow in getting the thumb off the Space Bar and strikes the alphabet key, the keylever will strike the Universal Vibrator Bar (top) and the bottom of the Universal Vibrator Bar will contact the top of the Space Key Interlock Lever, which, in turn, will speed up the return of the Space Key to its normal rest position, allowing the last half of the escapement drop to take place before the type strikes the printing point.

2. ADJUSTMENTS:

A. Space Bar Height. There should be approximately 7/16" space between the top of the Space Bar and the bottom of the keytops of the bottom bank of Keylevers. Form the lips of the Space Bar Up-Stop bracket to get proper height. Both up-stops should limit on the Up-Stop felt at the same time.

B. Space Bar Down Travel: Adjust the Down Stops to a position that will permit the Space Bar to limit before the Space Bar travels below the frame front. Lock the Lock Nuts of the Down Stops when the proper position is set. Space Bar should limit on both down stops at the same time.

C. Space Key Pivot Adjustment: There should be no play on Space Key Pivot Screws, yet should be free without return spring tension. Space Levers should clear Keylever comb.

D. Space Key Connecting Link (Pull Wire) must clear all parts and float in the hole in the Rocker.

E. Escapement Rocker Free: Escapement Rocker should be checked for freeness on its pivots and for excessive play. Adjust Rocker Return Spring Tension. Too little tension will cause piling, too much tension will cause heavy touch.

F. Space Trip: The Space Trip should take place about 1/16" before Space Bar limits on down stops. Adjustment is made with the small nuts on the rear end of the Connecting Link. Too much travel of the Space Bar to its down stop will result in the Rocker being held forward when the Space Bar is in its rest position and skipping in both the Space Key operation and Keylever operation is likely.

G. Space Key Interlock: To adjust: Hold the B Keylever to its limit position, keylever fully depressed. Adjust the Interlock with Space Key Interlock Eccentric to where the Universal Vibrator Bar has about 1/32" further travel before it contacts the Interlock Arm. If the Interlock is too close to the Universal Vibrator Bar, the Universal Vibrator Bar will limit on the Interlock Arm when a Keylever is depressed causing a spongy bumper keylever touch.

H. Space Key Tension: Apply tension by loosening Space Key Adjusting Collar Screw, positioning the Collar downward, tighten set screw. To reduce tension, position the Collar upward.
LINE LOCK.

1. In tracing the action and movement of parts as indicated in the drawing, it will be determined essential for (1) The L. H. Margin to be adjusted properly; (2) R. H. Margin Stop comes to the Margin Release Lever of C/T, space once; (3) Margin Release of the C/T moves to the left, pivoting on the Margin Release Trunion; (4) Attached to the Margin Release Lever is the Margin Release Throw Arm to which the Line Lock Pull Wire is attached. When the Pull Wire moves back, the Line Lock Bail moves back to contact the hook of the keylevers. (5) When the Margin Release Keylever is released, the Margin Release Trunion Spring, located on the Margin Release Trunion, pulls the Margin Release of the C/T back to its original position, restoring the Line Lock Bail to inactive position.

2. ADJUSTMENTS:

A. The correct setting for a 10 pitch machine is for the R. H. Margin Stop to come to the Margin Release Lever of the C/T, space once and the Keylevers should lock on the Line Lock Bail. If the Line Lock locks too soon, position the Throw Arm on the Margin Release Lever of the C/T slightly forward. This will cause the Line Lock bail to set forward from the Keylevers and the Line Lock will not lock as soon. The Line Lock must be set so that the Keylevers clear the bail when the pressure indicator is backed off. When the C/T is backed off the Line Lock throw is automatically shortened. If the Line Lock Bail does not lock soon enough, position the throw arm slightly to the rear and shorten the throw of the Line Lock. Pressure Indicator should be positioned at the Zero Position when adjusting the Line Lock.

B. The 12 pitch setting must be made so that the locking takes place in the following manner: The R. H. Margin Stop comes to the Margin Release Lever of the C/T, space once and the Keylevers should not touch the bail, space a second time and the Keylevers should all lock on the bail. The throw is set the same as the 10 pitch machine.

C. Line Lock Bail: The Line Lock Bail may become bent and will not lock the keys all the way across the Keyboard, in which event the bail must be straightened. This can be done by springing in on one end with a screwdriver and out with another to twist the bail into a straightened position. The Bail must be free on its Pivots with a very minimum of side play; the Spring must be in good condition and the hole through the Bail, holding the Pull Wire, must not be worn or elongated.

1) To Remove Line Lock:

(a) Disconnect the U-Bar Trip Connecting Link from the U-Bar Hanger Bracket. Remove the U-Bar Hanger Bracket.

(b) Remove the Tabulator Set and Clear Key Levers and the Upper Tabulator Comb (above the keyboard).

(c) Loosen the Pivot Screw of the U-Bar and position the U-Bar upward so that the action saddles will not drop off the U-Bar.

(d) Loosen the Set Screw of the L. H. Line Lock Pivot Screw and slide the Pin out of the Bail (but not out of the casting).

(e) Disconnect the Line Lock Pull Wire from the Margin Release Throw Arm, turn the Pull Wire sideways so that the Pull Wire will pass under the Margin Release Shaft and work the Line Lock to the front of the machine and out.

2) To Replace Line Lock: Reverse above procedure, sliding the Pull Wire between the figure 9 and comma keylevers. Proceed with caution. Always recheck the U-Bar trip after replacing a bail in this manner.

MECHANIC'S NOTES:
1. The Ribbon is motivated directly by the Spring Drum to the Ribbon Drive Shaft. It is imperative that the gears be set correctly and that the Pawls of the Spring Drum be in good condition. The ribbon spools are either “right” or “left” and may not be interchanged. The spool can be identified by position of slot on either side of the Tripping Lever. If the slot is on the left side of the Tripping Lever, it is the “left” spool and should be placed on the left side of the machine (facing from front); if the slot is on the right side of the Tripping Lever, it is the “right” spool. The Spool pictured in the center of the drawing is a “left” spool and should be positioned on the L. H. side of the machine. In replacing a ribbon, it should be placed on the “right” spool and threaded through the Ribbon Vibrator to the “left” spool with the little clip (at the end of a new ribbon) positioned so that the ribbon will not slip out of the slot when it is ready to reverse.

2. ADJUSTMENTS:

A. Cams: The Cams must be tightly held by their screws and so positioned on the Ribbon Drive Shaft that the high point of the cams both face the center of the machine, but, the high points must be on opposite sides of the shaft in order for the reversing action to take place (see drawing).

B. Detent Gear: The Detent Gear is set at a position approximately 1/2" from the high point of the Cam. The distance from the Cam to the Detent Gear completely controls the reversing operation as far as spacing is concerned, with the Tripping Levers and the Spool Plungers free to contact the Cams. Detent Arm Stud must be safe in the Slot of Detent Gear.

C. Driving Gear: The Driving Gear on the left side of the Driving Shaft must be meshed properly in the Gear of the Spool Shaft. This is set after the Detent Gear has been positioned in a positive reverse position. This Gear is meshed so that it is in safe mesh to the Spool Shaft Gear, yet not too deep to cause the Gears to grind when turning the Driving Shaft by hand.

D. Ribbon Spools: Ribbon Spools must be in their proper position: the bushing must be completely set in the Top Plate and the looped end of the Push Type Spring should set on the casting. The up/down play in the spools should be from .009" to .012". The Spools must turn freely. Never oil the plunger Shafts. The only lubrication needed is a little oil on the BEARING Points of the Spool. A little grease may be used to help silence the gear operation but use sparingly. Adjust the small collar of the Spool Shaft to a point where the spring will hold up the weight of a full ribbon plus the weight of a spool cover. 1.41 oz. weight gauge can be used.

E. Ribbon Casings: Ribbon Casings should not be securely tightened until the Spool Bushing is setting down completely on the Top Plate. The Casings have elongated slots and should be positioned so that the lower cut out of the casing is to the center of the machine and positioned so that the ribbon unwinding from the spool will pull toward the front of the machine slightly before the ribbon goes to the Vibrator.

F. Spring Drum: The same Spring Drum is used on 11" and 12" carriages. A stronger spring is needed for the longer carriages. A and B model (11" and 12") machines have no stamping on the Spring Drum Cover. C-D is stamped on the 14" and 18" carriages Drum Covers and E-F-G on the Covers of the longer carriages.

(1) To mesh the Spring Drum to the Ribbon Shaft Gear, it may be necessary to loosen the Screws of the Ratchet Gears and reposition the Spring Drum Gear to the Driving Shaft Gear. Care must be taken to determine that the Ratchet Gears are set to prevent binding the Spring Drum in operation and that the Gears are not set to permit holding pawls of the Spring Drum to drop behind the Ratchet Gears.

(2) To wind a Spring Drum, after the Draw-band has been connected to the Drum and Carriage, unlock the Locking Nut on the rear of the drum (through hole of Rear Cover). Screw “in” on the slotted screw of the Nut until proper amount of tension is applied, then lock the Lock Nut. A loose Lock Nut will place a drag on the Spring Drum and cause the Carriage to operate sluggishly.

(3) To release tension from the Spring Drum: Unlock the Lock Nut on the back of the Drum and ratchet the tension off the spring. Short cuts may permit the spring to release from the pin of the Arbor, inside the cover, necessitating disassembly to connect.

(4) To Remove Spring Drum: Relax mainspring tension. Remove the Screw holding the Spring Drum to the rear Upper Frame Brace (on the underside of the Frame Brace, directly below the center of the Spring Drum Bracket). Remove the two (2) Center Tie Holding Springs (See Center Tie). Remove the six (6) screws holding the rear cover to the Frame. Remove the Rear Cover. Remove Spring Drum to the rear. To replace: Reverse this procedure. Mainspring tension should be approximately 1 1/2 pounds on 11" and 12" machines.

(5) If the Spring Drum Gear of the Drive Shaft is meshed to the wrong side of the Spring Drum Shaft Gear, the Ribbon movement will operate backwards, opposite its correct direction. The Spring Drum Gear of the Drive Shaft should be positioned to the left side of the Spring Drum Shaft Gear. When the Gear is meshed to the correct side of the Spring Drum Shaft Gear, the Ribbon Crank will turn clockwise.
RIBBON COVER.

1. To prevent confusion, proper sequence of adjustment is given. Do not skip a step of this procedure, otherwise the purpose of the sequence is defeated.

2. ADJUSTMENTS:

A. Bichrome Switch must not have up/down play on the screw.

B. Universal Vibrator Bar must be free on its pivots without end shake.

C. Position the Bichrome Switch in Stencil position (the Universal Vibrator Bar Link should line up with the center of the Stencil slot in the drawing). Depress the "B" keylever, holding down to its full travel. Adjust the Space Bar Inter-Lock Arm of the Space Bar with the Adjusting Eccentric of the Interlock Arm (See Space Bar Drawing) to a position where the Universal Vibrator has an additional 1/32 to 1/4 inch to the Interlock Arm (B Keylever held depressed). This will prevent "bumper" of the Interlock Arm in normal typing—which would cause a spongy touch.

D. Position the Bichrome Stop Bracket so the Bichrome travels an equal distance on each side of the Stencil Slot when shifting the Bichrome from black to red position.

E. Check the throw of the Universal Vibrator Bar Link, above the Vibrator Shaft Arm front. The Link should have the same travel above the Vibrator Shaft Arm front on the black side that it has on the red side. If the travel is unequal then the Vibrator Shaft Arm Front is tilted. To level the Arm, use Tools ST-40077 and ST-40078 and form the VIBRATOR SHAFT ARM REAR. Never form the Vibrator Shaft Arm Front to level the Front Arm. It may be necessary to increase or decrease the amount of "throw" that the Universal Vibrator Link travels in relation to the Vibrator Shaft Arm Front (reach) for if the clearance is not sufficient it will not be possible to switch from the Stencil Position to Black or Red and a spongy touch will also develop. If the "travel" is too high, the Ribbon will not cover properly. Form the Universal Vibrator Bar at the point that the link is attached to the Universal Vibrator Bar. Make certain that the Link is free on the shouldered screw after forming the U-Vib. Bar.

F. Position the Bichrome on the Black position (handle of the Bichrome will be to the right). Depress a Keylever. The end of the Vibrator Shaft Arm Front should just touch the lip of the Bichrome. If not, spring Bichrome Lip "up" to meet the Vib. Shaft Arm Front. If the Bichrome is formed too high, a "bumper" action will occur. If this adjustment is not properly made, bleeding will occur in black if the keylevers are struck hard, or a bumper action will occur.

G. Striking the 1/2/2/2/2/2/2/2/2, the Ribbon should cover all but the very tip of the I. Tip the Vibrator Bracket with a pair of pliers at the point directly over the R. H. Balance Shaft End Plate to get the desired results. Never tip the bracket to the extent that the Vibrator sets below the Vibrator Guide Slot on the Pinion Shaft Bracket.

H. If one or two characters bleed after this procedure has been followed, then the lips of the U-Vib.-Bar must be formed for the individual characters. The Ribbon Vibrator should have no further travel in red when a keylever is depressed.
ALIGNING SCALE

1. The Aligning Scale is positioned to the Platen so that a thin line of light will show between the top of the Scale and the bottom of a small line of iiiii’s. The Scale should clear the Platen so that one sheet of paper will pass between the Platen and the Scale. It is essential that the Platen be removed, when forming the Scale toward the Platen, so that the Scale will not become “kinked” causing it to contact the Paper Finger Stop Screw which will bind the Carriage in spacing. The correct Scale should be used in order that the lines will line up with the letters, i.e., 10 pitch scale for 10 pitch machine, etc.

2. ADJUSTMENTS:
   A. Strike off a line of small iiiii’s.
   B. Position Scale to line of i’s as shown in drawing for height position. If the lines of the Scale do not line up with the i’s, push against the side of the Scale until the proper position is attained.
   C. If the Scale is too far from the Platen, remove the Platen and form the Scale to the Platen gradually. Replace the Platen and recheck. If the Scale is rubbing the Platen, form it away from the Platen very carefully.
   D. The Card Arms and Card Arm Stops were omitted from this drawing. Card Arm Stops are set at .060” from the Scale, after the Scale has been set.
KEYLEVER AND TYPE ACTION.

1. Keylevers: All Keylevers are numbered and, if removed, must be returned to their proper position in the machine. The Keylevers are staggered in order that the Actions will perform more efficiently. If an action is placed in the wrong position, the Keylever of the misplaced action will travel approximately ¼" to ½" further than the Keylever next to it when the two Keylevers are held down simultaneously. It will also affect the Ribbon Throw of the Keylevers attached to the misplaced actions. If a Keylever is misplaced the lever will not conform with the Keyboard, the Clip and Action Pull Link Stud will not be in the right position and the Action connected to that keylever will be very spongy.

The Keylevers all have notches for a slight individual tension to a single keylever. To increase or decrease the tension on all the Keylevers, adjust the Nuts on the Touch Adjusting Screw. Unlock the Lock Nut and apply more tension on the screw to increase the tension; back off on the nuts to decrease the tension. Unless the machine is special (86 or 88 character keyboard) the first and last slots of the Keylevers will not have Keylevers in them and a filler washer will be in the first and last slots of the Keylevers Comb lower. The Margin Release Keylever is in the last slot of the Keylevers Combs. Standard Keyboard machines but a special Margin Release and Back Space and Margin Release Keylevers must be used in an 88 character keyboard machine. If the machine is 86 character keyboard, the Back Spacer or Margin Release Lever would be special on the side that the extra Keylever is used. The Fulcrum for the Keylevers should always be locked in operation. It is locked when the handle points directly at the table or desk when the machine is in normal operating position. If a machine has been dismantled, make certain that all Keylevers Clips and Levers are clear of each other and that the Levers are all free as soon as the tension springs are hooked up, as the Keylevers are extremely hard to free up when the machine is completely assembled. It is imperative that all Keylevers be free.

2. Dead Keys: (Spanish Accents). If a dead key is required on only one half of an action, then a special “dead key” action must be used. This action will permit one key lever to trip the Universal Bar while the other keylever of the same action will not trip. These are usually used on machines requiring Spanish Keyboards. The exact position of the action plus the number of the Keylever that is to be “dead” must be supplied when ordering “dead key” actions.

3. To Remove a Type Action: It is necessary to disconnect the two Pull Links of the Action to be removed from the Keylevers; remove the Type Bar; Remove the Action Hanger Clamp; remove the action, tipping it slightly down and to the front and out after the action frame has cleared the front segment. It is unnecessary to remove any other parts either to remove or replace a type action. Reverse the procedure to replace the Action.

MECHANIC'S NOTES:

The old style key tops may be replaced with the new style key tops by filling the slots of the new style key tops with Acetone until the Keytop softens and then press the Keytops into position. When the Acetone dries (evaporates) the Keytop will be tight. The old style Keylevers (key tops had metal clamp to hold to levers) are thicker than the new style levers and had no limit stop. By using Acetone the new style Keytops can be put on without cracking the Keytops. Do not get Acetone on the face of the Keytop. Acetone can be purchased at any drug store without prescription. If the top is broken on a keylever equipped with keyrings, replace it with a new style Keytop, place the old designator on the Keytop and replace the ring to make the Keyboard uniform.
KEYLEVER AND TYPE ACTION

PLATEN ROLL
UPPER TYPE HEAD
TYPEBAR
LOWER TYPE HEAD
TOP PLATE SEGMENT
TYPEBAR STUD
ACTION LINKS
GRAVITY WEIGHT
L. H. ECC. & LOCK NUT TO ADJ. LOWER TYPE HEAD
TOP PLATE

TYPE GUIDE
TYPEBAR ARM
KEYLEVER COMB, LOWER
KEYLEVER FULCRUM
BELLCRANK
UNIVERSAL BAR
SADDLE
TYPE ACTION PULL LINKS
KEYLEVER FOR LOWER TYPE
KEYLEVER FOR UPPER TYPE

KEYLEVER TENSION SPRING
TOUCH ADJ. SCREW
KEYLEVER SPRING PLATE
TOUCH ADJ. NUTS
KEYLEVER COMB UPPER
THE TYPEBARS.

1. The Typebars are not numbered, but care must be taken to make certain that all bars are replaced to their proper position. **The bars and segment slots must be free of oil or grease.** The Typebar can be removed and replaced **without removing any other parts.** To remove a bar: Spread the action links slightly with a hook and slip the Links from the Type Bar Stud. Slip the Center Link from the Type Bar Stud; spread the Clip of the Type Bar Arm and release the Type Bar Arm from the Bellcrank of the Action and remove the Typebar. To replace the Typebar: Position Typebar in Comb, connect Type Bar Arm to Action Bellcrank; push the action holding the Typebar next to the one being inserted, slightly forward, to permit the Type Bar Stud to clear the typehead; then let the Type Bar fall back into the Comb. Replace the Center Link making certain that it floats on the Type Bar Stud.

   The Center Link must not lay against the Typebar or Action Links for freeness of operation. Replace Rear Action Links to the Typebar. Links must not be too loose on the Stud and must not be cramped. If the Action Links are cramped, the Links will not be free on their pivot. One Link usually sets slightly higher than the other, level the links.

2. To position Type in the Type Guide: adjust the Eccentricon the side of the Actions. The Eccentric on the right hand side of the action adjusts the Type up or down on the top half of the Typebar. Tighten the Lock Nut after adjusting. The R. H. Eccentric (Upper half of bar) should always be adjusted FIRST, as it affects the position of the Action Bellcrank and will throw the adjustment off on the lower part of the bar. For example, take the I-M Typebar. If the M (lower type head) is high or low, first check the position of the I Typehead. If the I is all right in alignment, adjust the M with the L. H. Eccentric of the Action. If, on the same bar, the I is high or low as well as the M, in alignment, adjust the R. H. Eccentric first to bring the I in line, then check the M. The adjustment for the "I" could very easily have pulled the M into position also. If not, adjust the "M" with the L. H. Eccentric. A very simple rule to remember is "to always adjust the Upper Type of any action First," then always check the lower type. Adjusting the lower type will not throw off the adjustment of the Upper Type of the same bar but if the Upper Type is adjusted it will definitely affect the lower type of the same bar's position. The Type Bar Arms must line up with the Bellcrank for best operation.

A. **SLUGGISH TYPE ACTION:** If a sluggish typing action occurs, use the following procedure to locate the trouble:

   (1) Check Rear Action Links—must be free on stud and pivot.
   (2) Disconnect Action Links, check Center Link for floating on Type Bar Stud.
   (3) Slide Type Bar back and forth in the Typebar Comb. Position Type Bar Arm in relation to Bellcrank if necessary. If Typebar binds in Comb, straighten Bar.

(4) Connect Rear Action Links.
(5) Disconnect Type Bar Arm from Bellcrank; hold Arm from Bellcrank and the Action held in forward position, test Keylever and Bellcrank action and free up if necessary.

(6) Connect Typebar Arm to Action Bellcrank.

3. **TYPE:** Each Type head is bevelled for its particular position in relation to the Type Guide. Always note the exact side of the Typebar that the Type head was removed from in changing type. It is very much advisable to change one Type head at a time to insure that they are in their correct place. Typebar Arms come in "rights" and "lefts", and "right" and "left" offset, and should be checked carefully to see that the correct ones are used in replacing. The offset Arms are for the two Center Typebars to aid in clearing the C/T Connecting Link. Brass rivets are used on the 1, 2, 21, 22 Bars only in replacing Type heads.

MECHANIC'S NOTES:
THE TYPE GUIDE:

The type guide becomes worn from constant typing use and must some time be replaced. This can be done without a type aligning gauge but it is more accurate if aligned with the gauge. If the type gauge is not available—place the new guide on the gauge screws and adjust the screws until they barely hold the guide. Depress the "h" keylever and hold the action forward in the guide, position the guide for height on the action. Release the "h" action and depress the X keylever, hold the action in its forward position at the guide and align the guide so that the X type head slides lightly off the right side of the guide in the opening. Release the X action and depress the Period keylever and hold the action forward. The type head should contact the guide on the left side of the opening and slide through the opening. Lock the guide screws securely and then try other type for entering the guide. If the eccentrics have not been disturbed the majority of the type should enter the guide properly. The guide may move when locking the holding screws and it is important that a second check of type entering the guide properly is made before the eccentrics for raising or lowering type in the guide are disturbed.

When using the guide gauge, remove the 7-H typebar and the 23-24 action. Remove the type comb upper. Remove the platen and paper trough. Back off on the pressure indicator. Shift to caps. Remove the old guide by loosening the 3 holding screws and lifting the guide upward. (On old style machines the guide screw holes were not made so that the guide could be removed in this manner, the guide screws had to be removed and it was necessary to remove the Shift Rail and Carriage to do this). Replace the old guide with a new one, draw the holding screws up until the screws hold only friction tight. Position the Guide Gauge so that the front of the gauge is inside the guide opening, the back of the gauge is in the type action hanger slot, and the thin edge of the gauge lies in the type bar segment lower. Place a sheet of light paper behind the guide. Hold the gauge flat on the rear slot of the top plate (type action hanger slot) and position the guide on the gauge so that no light shows above the top of the gauge in the guide. If there is any side play in the guide slot in relation to the gauge, equalize the space on either side of the gauge. When the guide is positioned properly, lock the guide holding screws. Recheck the guide with the gauge to see that the guide has not shifted while being locked in place. The guide gauge should slide freely in the segment and through the guide with no light showing at the top of the gauge and equal spacing on either side of the gauge. Do not slide the guide gauge too far forward when setting as the segment, that the actions hang from at the bottom of the type segment lower, is often tapered close to the front. This gauge (ST-40092) cannot be used on the model No. 6 Remington or the old style Underwood Noiseless. Use it only on machines where the action is suspended from the type bar segment. The Flat Top Underwood and the Model No. 6 Remington actions were fastened to a segment just in front of the center tie nose and only slightly above the center tie nose. It is not necessary to remove the Carriage or rail when this gauge is used, unless the old style type guide that did not have the slotted screw holes is used.

The guide should be checked also to see that the type does not push through the guide farther at the bottom than the top. If so, lean the guide forward slightly (towards the platen). If the type pushes through farther at the top than the bottom of the guide, lean the guide towards the front of the machine slightly. If the guide is not correct in its in and out position when the distance from the bottom of the guide slot to the platen is .060" then the distance from the top of the guide will be more and the type will not strike the platen evenly. If the top of the guide is too close to the platen then the distance from the top of the guide will be set at .060" and the bottom of the guide will be over .060". This will show up on your impressions. The print will be off feet. Always recheck the .060" clearance between the guide and platen after resetting or replacing a type guide.

MECHANIC'S NOTES
TYPE GUIDE

TYPE GUIDE MUST BE STRAIGHT
NOTE TYPE CLEARANCE TOP AND BOTTOM

TYPE GUIDE

TYPE BAR FROM CENTER MACHINE

TYPEBAR FROM L. H. SIDE MACHINE

TYPEBAR FROM R. H. SIDE MACHINE
ALIGNING NOTES FOR THE NOISELESS TYPEWRITER.

This is a procedure that should help in the alignment of the Noiseless typewriter. Much of the alignment of "service machines" can be accomplished by the eccentric adjustment on the actions but the entire procedure will be covered in these notes.

The typewriter must be checked thoroughly for excessive play in the toggle linkage, center tie and shift rail, and carriage roller bracket and retainer. Excessive play in any of these places will cause an uneven writing line and an uneven motion from one end of the carriage to the other. The center tie must also be seated on its runway and must be adjusted so that it has no rock on the ends and no side play. There should be no side play on the balance shaft pivot screws or between the Balance Shaft and the Shift Rail Arms. Make sure Platen Locks are locked and adjusted properly. Check the motion.

After checking the linkage etc., for excessive play then the .060" should be checked. There should be .060" between the platen and the Type Guide when the pressure indicator is against the Stop Screw. When the .060" is set properly back the Pressure Indicator off and check the machine for "on feet". If the machine is not "on feet" loosen the three (3) screws on the Balance Shaft end plate—(left side of the Balance Shaft) and adjust the Eccentric until the machine is On Feet. Check the "on feet" with the normal case. Tighten all screws after adjusting "on feet".

Set the pressure indicator in a position at center or just a little to the left of center. "Strike off" for impression—Capitals first and normals directly underneath. This is done in order that a comparison can be made between capitals and normals. If the capitals print lighter than normals—shim back of the center Tie Retainer Plate. Two (2) shims of equal thickness are used and after shimming always reset the .060. The shims should be put behind the plate, at the top if the capitals are light and behind the Plate at the bottom if the normals are light. Shim until the capitals and normals appear to be the same. Never shim behind the retainer plate for only one or two letters but only when the majority of letters vary between capital and normal. The .060 must be rechecked before "striking off" the impression again.

Put all type "on the guide" and take out noise. This is accomplished by adjusting the eccentrics on the actions. The Eccentric on the right side of an action adjusts the upper banks and the Eccentrics on the left side of the action adjusts the lower banks of the machines. Always adjust the right Eccentric before adjusting the left Eccentric as an adjustment of the right Eccentric changes the Type Bar Arm position and will throw the lower bank letters of the same action off adjustment. After the upper bank is adjusted properly, lock the Lock Nut of the Eccentric and proceed to adjust the lower bank of the same action. It is extremely important that all Eccentrics are locked in their adjusted position.
With the pressure indicator set slightly left of center, set impressions evenly on all type. Adjust the impression screws until the type prints as evenly as possible and a gray color on one sheet of paper. If the impression is too heavy, back the Impression Screw off until the type does not print, then screw the screw in, until the proper setting is made. Never get the proper color by backing off the screw—always back off ‘til it does not print, then screw back in, otherwise the action will shift after use. If the upper Characters of a type bar print light and the lower characters of the same bar print heavy, then the bar should be “blocked” or stretched. If this cannot be accomplished for lack of a “block” then the bar can be “bit”. The biting of a bar is done behind the type head on the bar itself and not on the type. There should be very little need for biting type on the noiseless machines as the factory set up is very rigid in that respect and your most common adjustment will be the eccentrics.

If the characters of both upper and lower bank of the same bar are light on the top or bottom, then the type bar arm is elevated up or down. If the type prints light on top—elevate the arm up. If light on bottom, elevate the arm down. Always recheck the type for being in the Guide, after elevating.

Occasionally there will be a bar that cannot be adjusted completely with the eccentric. In such cases it is necessary to bite the type head. The bitting is done above or below the type itself. There may be bars that have to be stoned to raise or lower properly in the guide without noise. The rule for bitting or stoning can be summed up as follows:

1. Bite upper bank up only.
2. Bite lower bank down only.
3. When upper bank high and type in the Guide freely, stone bottom of type for alignment.
4. When lower bank is low and type in Guide freely, stone top of type.

After biting a bar—always check type choking in the Guide. Stone type if the type choked in the Guide after bitting.

Biting the type heads can be disastrous if care is not taken. If a type head is ruined by careless, haphazard bitting, the machine may be held up indefinitely. So extreme caution is necessary.

To bring out an individual character, if the other three characters of the same bar are printing properly, bite the typebar itself behind the character that is required to be stretched or tilted.

After the impression is properly set, then strike the entire keyboard off on 4 sheets of paper against the letter X, first in capitals and then in normals underneath the capitals. This is the check for alignment of letters, and will show up all blurs.

If the side spacing is off, then the type is not going into the guide properly. The type must slide into the guide by having the beveled edge of the type, strike the side of the guide before the type strikes the platen. Adjust the letters for height with the eccentrics of the actions.

If the type is not entering the Guide properly (sliding off the guide) check to determine if the other half of the same bar is entering properly. If not, depress partially the upper bank keylever of the bar and push the tail of the typebar in the same direction that the type must travel to slide off the guide properly. Do not “kink” the bar, merely lean the tail slightly. If one half of the bar is off, depress upper bank Keylever slightly and spring the type head in the correct direction. Care must be taken to prevent colliding typeheads. All type from the Center Tie Connecting Link to the left must “slide off” the right side of the Guide. All type from the right of the Center Tie Connecting Link must “slide off” the left side of the guide. If the side alignment is quite erratic, the type guide is probably out of position.

Strike each letter on stencil both on capitals and normals. If any letter blurs, then the letter is not entering the guide properly and the type strikes the platen too soon. In other words the type is not “sliding off” the side of the Guide.

When a machine is considered aligned, type sentences, using all letter and capitals. Good alignment means a good printing line.