

BULLETIN 165B  
(Supersedes all issues of 220B)

BULLETIN 165B

ADJUSTMENTS  
TYPING REPERFORATOR  
(MODEL 14)

**TELETYPE<sup>®</sup>**  
CORPORATION  
SUBSIDIARY OF *Western Electric Company* INC.  
CHICAGO, ILLINOIS, U. S. A.



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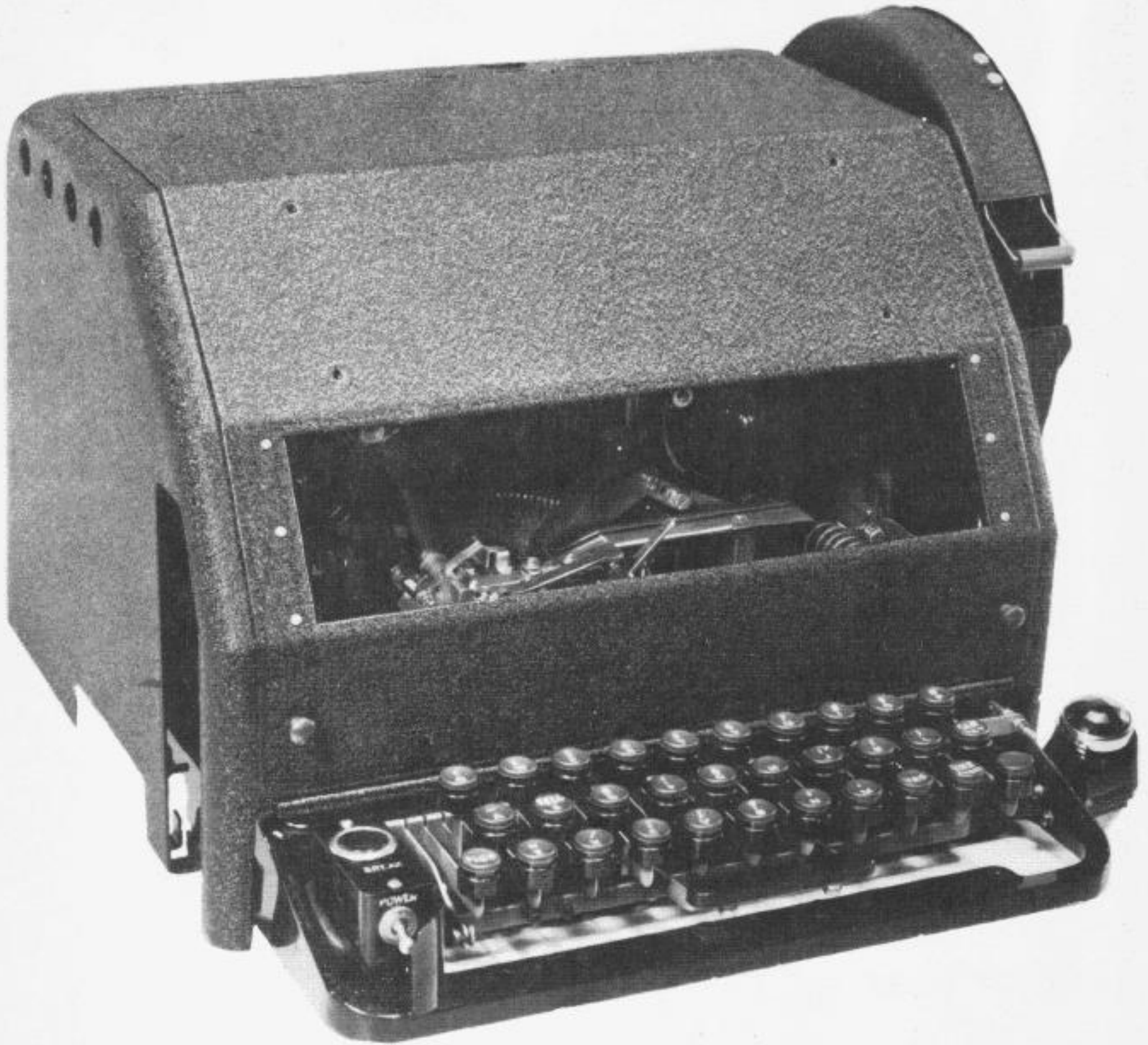


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PAGE NUMBERS	CHANGE IN EFFECT
A	CHANGE 1
B to D	ORIGINAL
E to I	CHANGE 1
1-1 to 1-3	CHANGE 1
2-1 to 2-19	CHANGE 1
3-1 to 3-11	CHANGE 1
4-1 to 4-5	CHANGE 1
5-1 to 5-3	CHANGE 1
6-1 to 6-3	CHANGE 1
7-1 to 7-5	CHANGE 1
8-1 to 8-19	CHANGE 1

The above list indicates the effective pages as of the date of issue. Upon receipt of Change Pages, insert them numerically and discard any superseded pages.

165B



SENDING - RECEIVING TYPING REPERFORATOR WITH COVER

165B

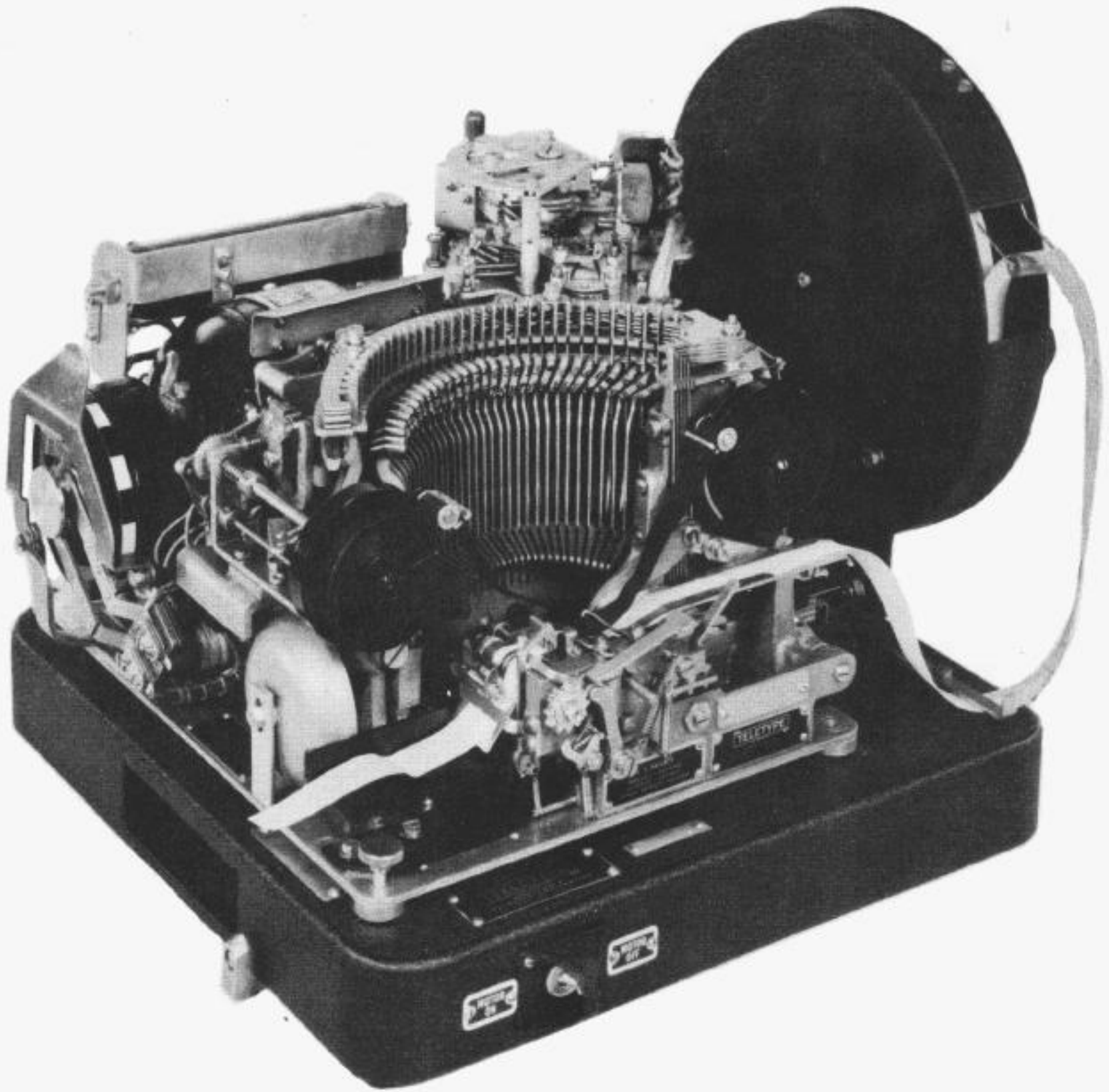


RECEIVING - ONLY TYPING REPERFORATOR (HIGH BASE)  
COMPLETE WITH COVER

ORIGINAL

C

165B



TYPICAL RECEIVING - ONLY (LOW BASE) TYPING REPERFORATOR

D

ORIGINAL



## CONTENTS

Paragraph	Page	Paragraph	Page
<b>SECTION 1 - GENERAL DESCRIPTION AND ADJUSTMENT PROCEDURES</b>			
1. General Description . . . . .	1-1	27. Locking Wedge . . . . .	2-5
2. General Adjustment Procedures . .	1-1	28. Locking Lever Spring Tension . . .	2-6
3. Miscellaneous Instructions . . . . .	1-2	29. Selector Arm Stop Detent . . . . .	2-6
a. Motor . . . . .	1-2	30. Selector Arm Stop Detent Spring Tension . . . . .	2-6
b. Receiving Range Measurement .	1-2	31. Selector Lever Spring Tension . . .	2-6
c. Pulling Magnet Selector . . . . .	1-2	32. Selector Magnet Bracket Position Adjusting Arm . . . . .	2-6
d. Holding Magnet Selector . . . . .	1-3	33. Selector Magnet Bracket . . . . .	2-6
e. Character or Function Selected Manually . . . . .	1-3	34. Armature Lever Spring . . . . .	2-7
f. Type Bar Removal . . . . .	1-3	35. Selector Arm Operating Screw . . .	2-7
g. Type Bar Replacement . . . . .	1-3	36. Selector Arm Spring . . . . .	2-7
<b>SECTION 2 - TYPING REPERFORATOR ADJUSTMENTS</b>			
1. Main Shaft Clutch Spring Tension .	2-1	37. Stop Lever Eccentric Screw . . . . .	2-7
2. Selector Separator Plates . . . . .	2-1	38. Trip Latch Spring Compression . .	2-7
3. Main Shaft . . . . .	2-1	39. Stop Lever Spring Tension . . . . .	2-7
4. Main Shaft Clutch Throwout Lever.	2-1	40. Selector Stop Arm and Stop Lever Engagement Positioning Link . . .	2-7
5. Main Shaft Clutch Throwout Lever Spring Tension . . . . .	2-1	41. Tape Feed Out Lever . . . . .	2-8
6. Motor Gears . . . . .	2-1	42. Trip-Off Screw . . . . .	2-8
<b>PULLING MAGNET SELECTOR ADJUSTMENTS</b>			
7. Selector Armature Bracket Link Friction . . . . .	2-1	<b>END OF HOLDING MAGNET SELECTOR ADJUSTMENTS</b>	
8. Selector Lever Spring Tension . . .	2-1	43. Type Basket Assembly Removal . .	2-8
9. Selector Armature . . . . .	2-2	44. Function Bar Spring Brackets . . .	2-8
10. Selector Armature Bracket Link . .	2-2	45. Pull Bar Spring Tension . . . . .	2-8
11. Selector Armature Bracket . . . . .	2-2	46. Type Basket Assembly Replacement	2-9
12. Armature Stops . . . . .	2-3	47. Main Bail Guides . . . . .	2-9
13. Armature Locking Wedge . . . . .	2-3	48. Main Bail Guide Post . . . . .	2-10
14. Armature Locking Lever Spring Tension . . . . .	2-3	49. Pull Bar Guide . . . . .	2-10
15. Stop Lever Eccentric Screw . . . . .	2-3	50. Main Bail Adjusting Screw, Preliminary . . . . .	2-10
16. Stop Lever Spring Tension . . . . .	2-3	51. Ribbon Spool Cups . . . . .	2-10
17. Trip Latch Spring Compression . .	2-3	52. Ribbon Spool Shaft Gears . . . . .	2-10
18. Selector Stop Arm and Stop Lever Engagement Positioning Link . . .	2-4	53. Ribbon Spool Shaft Brackets . . . .	2-11
19. Tape Feed Out Lever . . . . .	2-4	54. Ribbon Spool Shaft Compression Spring . . . . .	2-11
20. Armature Trip Off Eccentric Screw . . . . .	2-4	55. Ribbon Spool Shaft Slot . . . . .	2-11
21. Selector Magnet Coil . . . . .	2-4	<b>RIBBON REVERSE MECHANISM ADJUST- MENTS ON UNITS NOT EQUIPPED WITH RIBBON REVERSE ARM YIELD SPRING</b>	
22. Selector Magnet Bracket . . . . .	2-4	56. Left Ribbon Reverse Arm Shaft . . .	2-11
<b>END OF PULLING MAGNET SELECTOR ADJUSTMENTS</b>			
<b>HOLDING MAGNET SELECTOR ADJUSTMENTS</b>			
23. Armature Lever Pivot Screw . . . .	2-4	57. Right Ribbon Reverse Arm Shaft . .	2-11
24. Selector Core and Armature Alignment . . . . .	2-4	58. Ribbon Reverse Pawl Link . . . . .	2-11
25. Selector Arm Pivot Screws . . . . .	2-5	<b>END OF RIBBON REVERSE MECHANISM ADJUSTMENTS ON UNITS NOT EQUIPPED WITH RIBBON REVERSE ARM YIELD SPRING</b>	
26. Selector Arm Bracket . . . . .	2-5	<b>RIBBON REVERSE MECHANISM ADJUST- MENTS ON UNITS EQUIPPED WITH RIBBON REVERSE ARM YIELD SPRING</b>	
<b>CHANGE 1</b>			
			59. Left Ribbon Reverse Arm Shaft . . .
			60. Ribbon Reverse Arm Shaft Collars . . . . .
			61. Ribbon Reverse Pawl Links . . . . .

CONTENTS

Paragraph	Page
62. Ribbon Reverse Arm Yield Spring . . . . .	2-12
END OF RIBBON REVERSE MECHANISM ADJUSTMENTS AFFECTED BY THE RIBBON REVERSE ARM YIELD SPRING	
63. Ribbon Feed Shaft Safety Spring Compression . . . . .	2-12
64. Ribbon Feed Shaft Detent Plunger Spring Compression . . . . .	2-12
65. Ribbon Feed Lever Spring Tension . . . . .	2-12
66. Ribbon Check Pawl . . . . .	2-12
67. Ribbon Check Pawl Spring . . . . .	2-13
68. Ribbon Feed Pawl . . . . .	2-13
69. Ribbon Feed Pawl Spring . . . . .	2-13
70. Right and Left Ribbon Reverse Pawls Spring Tension . . . . .	2-13
71. Left Function Pull Bar Spring Bracket . . . . .	2-13
72. Right Function Pull Bar Spring Bracket . . . . .	2-13
73. Pull Bar Guard . . . . .	2-13
74. Punch Arm Casting . . . . .	2-13
75. Punch Bail Bearings . . . . .	2-13
76. Punch Bail Front Pivot Bearing Plate . . . . .	2-13
77. Feed Roll Bearings . . . . .	2-14
78. Tape Tension Lever Stud . . . . .	2-14
79. Feed Roll Detent, Preliminary . . . . .	2-14
80. Feed Pawl Eccentric, Preliminary . . . . .	2-14
81. Feed Pawl Spring Tension . . . . .	2-14
82. Code Bar Bell Cranks . . . . .	2-14
83. Main Bail Adjusting Screw, Final . . . . .	2-15
84. Vertical Lever Pivot Screw . . . . .	2-15
85. Punch Selector Finger Backstop . . . . .	2-15
86. Punch Bail Link . . . . .	2-15
87. Punch Bail Upstop Screw . . . . .	2-16
88. Feed Roll Detent, Final . . . . .	2-16
89. Feed Pawl Eccentric, Final . . . . .	2-16
89.1 Feed-Out Roller Eccentric . . . . .	2-16
90. Tape Stripper Plate . . . . .	2-16
91. Tape Tension Lever Spring Adjustment . . . . .	2-16
92. Shift Rocker Post . . . . .	2-17
93. Shift Rocker Lever Post . . . . .	2-17
94. Shift Bell Crank . . . . .	2-17
95. Shift Bell Crank Guide . . . . .	2-17
96. Shift Rocker . . . . .	2-17
97. Ribbon Guide . . . . .	2-17
98. Feed Roll Detent Lever Spring Tension . . . . .	2-17
99. Punch Arm Spring Tension . . . . .	2-17
100. Punch Bell Crank Spring Tension . . . . .	2-18
101. Platen Shift Spring Tension . . . . .	2-18
102. Platen Yield Spring Tension . . . . .	2-18
103. Shift Lever Spring Tension . . . . .	2-18
104. Tape Guide Spring . . . . .	2-18
105. Figures Pull Bar . . . . .	2-18
106. Main Bail Spring . . . . .	2-18
107. Main Bail Cam Clutch Torque . . . . .	2-18
108. Selector Clutch . . . . .	2-18

SECTION 3 - TYPING REPERFORATOR OPTIONAL FEATURE ADJUSTMENTS

MAGNET OPERATED TAPE FEED OUT MECHANISM (PULLING MAGNET) ADJUSTMENTS

1. Tape Feed Out Magnet Yoke . . . . .	3-1
2. Tape Feed Out Magnet Armature . . . . .	3-1
3. Tape Feed Out Magnet Bracket . . . . .	3-1
4. Tape Feed Out Magnet Armature Spring Tension . . . . .	3-1

END OF MAGNET OPERATED TAPE FEED OUT MECHANISM (PULLING MAGNET ADJUSTMENTS)

MAGNET OPERATED TAPE FEED OUT MECHANISM (HOLDING MAGNET) ADJUSTMENTS

5. Magnet Coil and Yoke . . . . .	3-1
6. Armature . . . . .	3-1
7. Spring Bracket . . . . .	3-1
8. Armature Spring Tension . . . . .	3-1

END OF MAGNET OPERATED TAPE FEED OUT MECHANISM (HOLDING MAGNET) ADJUSTMENTS

UNIVERSAL TRANSFER CONTACT ASSEMBLY ADJUSTMENTS

9. Universal Transfer Contact Assembly, (Two Contact) Preliminary . . . . .	3-1
10. Universal Transfer Contact Assembly, (Two Contact) Final . . . . .	3-2

END OF UNIVERSAL TRANSFER CONTACT ASSEMBLY ADJUSTMENTS

TAPE FEED OUT COUNTER MECHANISM ADJUSTMENTS

11. Worm Follower Bail Spring Tension . . . . .	3-3
12. Tape Feed Out Counter Magnet Armature Spring Tension . . . . .	3-4
13. Worm Follower Bail . . . . .	3-4
14. Counter Worm Shaft . . . . .	3-4
15. Worm Follower Contact Springs . . . . .	3-4
a. Contact Spring . . . . .	3-4
b. Contacts . . . . .	3-4
16. Worm Follower Contact Bracket . . . . .	3-4
17. Tape Feed Out Counter Magnet . . . . .	3-4
18. Tape Feed Out Counter Magnet Yoke . . . . .	3-5
19. Tape Feed Out Counter Magnet . . . . .	

CONTENTS

Paragraph	Page	Paragraph	Page
Armature Contacts . . . . .	3-5	<b>AUTOMATIC TAPE FEED OUT MECHANISM (FPR64 and FPR67 ONLY)</b>	
20. Worm Follower Backstop . . . . .	3-5	44. Feed Out Detent Eccentric . . . . .	3-8
21. Worm Follower Sprint Tension . . . . .	3-5	45. Detent Lever Spring Tension . . . . .	3-8
22. Worm Feed Pawl Spring Tension . . . . .	3-6	46. Feed Out Gear . . . . .	3-9
<b>END OF TAPE FEED OUT COUNTER MECHANISM ADJUSTMENTS</b>			
<b>TAPE FEED OUT PUSH BUTTON ADJUSTMENTS</b>			
24. Push Button Contacts . . . . .	3-6	47. Feed Out Clutch Teeth . . . . .	3-9
25. Push Button Contact Spring . . . . .	3-6	48. Feed Out Clutch Spring Tension . . . . .	3-9
<b>END OF TAPE FEED OUT PUSH BUTTON ADJUSTMENTS</b>			
<b>SIGNAL BELL MECHANISM ADJUSTMENTS</b>			
26. Pull Bar Lockout Lever . . . . .	3-6	49. Trip Lever Adjusting Screw . . . . .	3-9
27. Bell Hammer Post . . . . .	3-6	50. Trip Lever Spring Tension . . . . .	3-9
28. Bell Hammer Eccentric Screw . . . . .	3-6	51. Clutch Solenoid Travel Limit Screw . . . . .	3-9
29. Signal Bell . . . . .	3-7	52. Clutch Solenoid Contacts . . . . .	3-9
<b>END OF SIGNAL BELL MECHANISM ADJUSTMENTS</b>			
<b>MECHANICAL END OF LINE INDICATOR MECHANISM ADJUSTMENTS</b>			
30. Indicator Worm Shaft . . . . .	3-7	53. Metering Worm Follower . . . . .	3-9
31. Lamp Contacts . . . . .	3-7	54. Metering Magnet Bracket . . . . .	3-9
32. Contact Bracket . . . . .	3-7	55. Metering Magnet Armature . . . . .	3-10
33. Worm Follower . . . . .	3-7	56. Metering Magnet Armature Spring Tension . . . . .	3-10
34. Worm Follower Spring Tension . . . . .	3-7	57. Metering Feed Out Contact Adjusting Screw Position . . . . .	3-10
35. Release Ball Spring Tension . . . . .	3-7	58. Metering Contact Arm Spring Tension . . . . .	3-10
36. Worm Feed Pawl Spring Tension . . . . .	3-7	59. Metering Follower Arm Stop Screw . . . . .	3-10
37. Cam Lever Spring Tension . . . . .	3-7	60. Worm Follower Return Spring Tension . . . . .	3-10
<b>END OF MECHANICAL END OF LINE INDICATOR ADJUSTMENTS</b>			
<b>BACKSPACE MECHANISM ADJUSTMENTS</b>			
38. Ribbon Lift Lever Spring Tension . . . . .	3-7	61. Metering Tape Feed Out Adjusting Screw . . . . .	3-10
39. Backspace Lever Spring Tension . . . . .	3-7	62. Feed-Out Clutch Teeth . . . . .	3-11
40. Backspace Feed Pawl Spring Tension . . . . .	3-8	63. Feed-Out Detent Eccentric . . . . .	3-11
41. Feed Pawl Spring Tension . . . . .	3-8	64. Clutch Trip Armature Lever . . . . .	3-11
<b>END OF BACKSPACE MECHANISM REQUIREMENTS</b>			
<b>CLUTCH THROWOUT LEVER CONTACT MECHANISM ADJUSTMENTS</b>			
42. Throwout Lever Contacts . . . . .	3-8	65. Clutch Magnet Switch . . . . .	3-11
43. Throwout Lever Contact Bracket . . . . .	3-8	66. Metering Intermediate Gear . . . . .	3-11
<b>END OF CLUTCH THROWOUT LEVER CONTACT MECHANISM ADJUSTMENTS</b>			
<b>SECTION 4 - TYPING REPERFORATOR BASE ADJUSTMENTS</b>			
<b>KEYBOARD BASE ADJUSTMENTS</b>			
<b>END OF AUTOMATIC TAPE FEED-OUT MECHANISM</b>			
1. Universal Bar Pilot Screw . . . . .	4-1	2. Tape Out Lever Adjusting Clamp . . . . .	4-1
2. Tape Out Lever Adjusting Clamp . . . . .	4-1	3. Trip-Off Pawl Stop Plate . . . . .	4-1
3. Trip-Off Pawl Stop Plate . . . . .	4-1	4. Bell Hammer Bracket . . . . .	4-1
4. Bell Hammer Bracket . . . . .	4-1	5. Bell . . . . .	4-1
5. Bell . . . . .	4-1	6. Bell Hammer Extension Stop . . . . .	4-1
6. Bell Hammer Extension Stop . . . . .	4-1	7. Bell Hammer Spring Tension . . . . .	4-1
7. Bell Hammer Spring Tension . . . . .	4-1	8. Tape-Out Lever Spring Tension . . . . .	4-1
8. Tape-Out Lever Spring Tension . . . . .	4-1	9. Locking Pawl Spring Tension . . . . .	4-1
9. Locking Pawl Spring Tension . . . . .	4-1	10. Lock Loop Spring Tension . . . . .	4-1
10. Lock Loop Spring Tension . . . . .	4-1	11. Transmitting Cam Sleeve . . . . .	4-2
11. Transmitting Cam Sleeve . . . . .	4-2	12. Locking Lever Shaft . . . . .	4-2
12. Locking Lever Shaft . . . . .	4-2	13. Locking Lever . . . . .	4-2
13. Locking Lever . . . . .	4-2	14. Contact Lever Compression Spring Pressure . . . . .	4-2
14. Contact Lever Compression Spring Pressure . . . . .	4-2	15. Transmitting Contacts . . . . .	4-2
15. Transmitting Contacts . . . . .	4-2	16. Transmitting Contact Springs . . . . .	4-2
16. Transmitting Contact Springs . . . . .	4-2		

## CONTENTS

Paragraph	Page	Paragraph	Page
16.1 Lock Loop Backstop		3. Line and Selector Circuit	
Adjustment . . . . .	4-2	Closing Jack . . . . .	5-1
17. Clutch Throwout Lever . . . . .	4-2	4. Tape Feed Out Relay . . . . .	5-1
18. Clutch Spring Compression . . . . .	4-2	a. Contract Spring Mounting Screws	5-1
19. Lock Loop Roller . . . . .	4-2	b. Adjusting Stud . . . . .	5-2
20. Intermediate Pawl Eccentric . . . . .	4-3	c. Adjusting Nut . . . . .	5-2
21. Clutch Throwout Lever . . . . .	4-3	d. Armature . . . . .	5-2
22. Trip-Off-Pawl Eccentric . . . . .	4-3	e. Contact Springs . . . . .	5-2
23. Clutch Throwout Lever Spring		f. Stud . . . . .	5-2
Tension . . . . .	4-3	g. Contact Adjustment Sequence . .	5-2
24. Trip-Off-Pawl Spring Tension . . . . .	4-3	h. Contacts . . . . .	5-2
25. Keylever Spring . . . . .	4-3	5. Tape Out Signal Contact Assembly .	5-3
26. Slip Connection Springs . . . . .	4-3	6. Keylever Lock Bar Eccentrics . . .	5-3
27. Line Shorting Jack Contacts . . . . .	4-3	7. Repeat Space Rod . . . . .	5-3
28. Line Shorting Jack Springs . . . . .	4-3	8. Repeat Space Rod Bracket . . . . .	5-3
		9. Repeat Space Rod Spring Tension .	5-3
<b>END OF KEYBOARD BASE ADJUSTMENTS</b>			
<b>RECEIVING ONLY (HIGH) BASE ADJUSTMENTS</b>			
29. Slip Connection Springs . . . . .	4-4	<b>SECTION 6 - MOTOR ADJUSTMENTS</b>	
30. Line Shorting Jack Contact . . . . .	4-4	<b>GOVERNED MOTOR ADJUSTMENTS</b>	
31. Line Shorting Jack Springs . . . . .	4-4	1. Governor Shell . . . . .	6-1
32. Tape Retaining Arm Spring		2. Governor Contacts . . . . .	6-1
Tension . . . . .	4-4	3. Speed Adjusting Wheel Friction	
		Washer Spring . . . . .	6-1
<b>END OF RECEIVING ONLY (HIGH) BASE ADJUSTMENTS</b>			
<b>RECEIVING ONLY (LOW) BASE ADJUSTMENTS</b>			
33. Tape Out Lever Adjusting Clamp . .	4-4	4. Motor Armature Shaft . . . . .	6-1
34. Bell Hammer Bracket . . . . .	4-4	4.1 Speed Adjusting Lever Stop	
35. Bell . . . . .	4-4	Plate . . . . .	6-1
36. Bell Hammer Extension Stop . . . .	4-4	5. Inner and Outer Disc Contact	
37. Bell Hammer Spring Tension . . . .	4-4	Springs . . . . .	6-1
38. Tape-Lock-Lever Spring Tension .	4-5	6. Governor Brush Spring Plate	
39. Locking Pawl Spring Tension . . . .	4-5	Bracket . . . . .	6-2
40. Slip Connection Springs . . . . .	4-5	7. Governor Brush Springs . . . . .	6-2
41. Line Shorting Jack Contacts . . . . .	4-5	a. Inner Disc Brush Spring	
42. Line Shorting Jack Springs . . . . .	4-5	Adjustment . . . . .	6-2
		b. Outer Disc Brush Spring	
<b>END OF RECEIVING ONLY (LOW) BASE ADJUSTMENTS</b>			
<b>SECTION 5 - TYPING REPERFORATOR BASE OPTIONAL FEATURE ADJUSTMENTS</b>			
1. Break Operation . . . . .	5-1	Adjustment . . . . .	6-2
a. Control Relay Outer Contacts . .	5-1	c. Adjustment of Brush Spring . . .	6-2
b. Control Relay Inner Contacts . .	5-1	8. Governor Adjusting Bracket . . . . .	6-2
c. Control Relay Middle Spring . . .	5-1	9. Armature End Thrust Spring	
2. Make Operation		Pressure . . . . .	6-2
a. Control Relay Outer Spring . . . .	5-1	<b>END OF GOVERNED MOTOR ADJUSTMENTS</b>	
b. Control Relay Inner Contacts . .	5-1	<b>SYNCHRONOUS MOTOR ADJUSTMENTS</b>	
c. Control Relay Middle Spring . . .	5-1	10. Starting Switch . . . . .	6-2
<b>END OF MOTOR CONTROL RELAY ADJUSTMENTS</b>			
<b>SECTION 7 - LUBRICATION OF TYPING REPERFORATOR AND BASE</b>			
		11. End Thrust . . . . .	6-3
		<b>END OF SYNCHRONOUS MOTOR ADJUSTMENTS</b>	
		1. General . . . . .	7-1
		2. Selector Mechanism . . . . .	7-1
		3. Pulling Magnet Selector . . . . .	7-1
		4. Holding Magnet Selector . . . . .	7-1
		5. Main Shaft . . . . .	7-1
		6. Intermediate Shaft . . . . .	7-2

## CONTENTS

Paragraph	Page	Paragraph	Page
7. Main Bail . . . . .	7-2	16. Backspace Mechanism . . . . .	7-3
8. Pull Bars, Type Bars and Code Bar Locking Lever . . . . .	7-2	17. Clutch Lever Contact Mechanism .	7-4
9. Ribbon Mechanism . . . . .	7-2	18. Motor Unit . . . . .	7-4
10. Platen Shift Mechanism . . . . .	7-2	19. Keyboard Base . . . . .	7-4
11. Universal Contact Mechanism . . . .	7-3	a. Upper Side of Keyboard Base . .	7-4
12. Tape Feed Out Counter Mechanism	7-3	b. Underside of Keyboard . . . . .	7-4
13. Reperforating Mechanism . . . . .	7-3	20. Receiving Only (High) Base . . . . .	7-4
14. Signal Bell Mechanism . . . . .	7-3	21. Receiving Only (Low) Base . . . . .	7-4
15. Mechanical End of Line Indicator .	7-3	22. Automatic Tape Feed-Out Mechanism . . . . .	7-5



## SECTION I

## GENERAL DESCRIPTION AND ADJUSTMENT PROCEDURES

## 1. GENERAL DESCRIPTION

a. The Teletype Model 14 typing reperforator provides means for recording telegraph messages on standard width (11/16") perforator tape. Printed characters and corresponding chadless code perforations are automatically recorded in the same operation. This typing reperforator is commonly used for relaying purposes as the recorded message may be automatically retransmitted by a transmitter distributor. The printed characters simplify tape relaying procedures by eliminating the necessity of reading the code perforations.

b. A complete typing reperforator consists of a typing reperforator unit with motor, mounted on a sending-receiving base, a receiving-only (low) base, or a receiving-only (high) base, and a cover. The typing reperforator unit so mounted is shown in the front of this bulletin.

c. The typing reperforator unit consists essentially of a motor, a main shaft assembly, selecting mechanism (either pulling or holding magnet), typing and perforating mechanism, tape feeding mechanism, and ribbon feeding mechanism. When operated in conjunction with a sending-receiving base, back spacing mechanism is necessary and end-of-line indicating mechanism is usually required. A tape feed-out feature may also be provided.

d. When a sending-receiving base is included, it permits operation of the typing reperforator for local preparation of tape and also permits direct keyboard transmission to the signal line if that should be desirable. The sending-receiving base consists essentially of a transmitting shaft, transmitting contacts, keylevers and mechanism for controlling transmission, power switch and line-break key, tape container, and circuit connection facilities. This base is also arranged to accommodate certain optional features such as motor-control relay and end-of-line indicating lamp.

e. The receiving only low base is a sheet metal structure which includes tape reel, power switch, and circuit connection facilities. It may include optional features such as signal line relay base and a motor control relay.

f. The receiving only high base consists of a metal framework which includes tape reel, power switch, line relay mounting base, and circuit connection facilities. It may include optional features such as motor control relay and tape feed-out mechanism.

g. Chadless perforation of the tape leaves its surface intact for printing purposes. However, the characters perforated in the tape are six positions in advance of the printed characters. This fact should be considered when severing the tape or inserting it in a transmitter distributor. When used for transmission the end of the tape should include all the typewritten characters in the message, and the first typewritten character of the message must be preceded by at least six sets of code perforations in order to transmit the entire message.

## 2. GENERAL ADJUSTMENT PROCEDURES

a. This bulletin covers requirements and adjusting procedures for the maintenance of typing reperforators. Unless otherwise indicated, the adjusting data and spring tensions specified herein are identical for 60, 75 and 100 word per minute operation. Adjustments are arranged in a sequence that would be followed if a complete readjustment of a unit were undertaken. In following such a procedure, parts or assemblies which are removed to facilitate adjustment should not be replaced until all other adjustments which would be facilitated by the removal of these parts are made. If one adjustment is changed, related adjustments should be checked.

b. The spring tension values indicated in this bulletin are scale readings which should be obtained when Teletype scales are used as specified. Springs which do not meet the requirements specified and for which no adjusting procedure is given should be replaced by new springs. Ordering information may be obtained from the Teletype parts bulletin.

c. Before proceeding to adjust any part, read the applicable portion of the adjusting text carefully. After the adjustment is completed, be sure to tighten any screws or nuts which may have been loosened. If a part that is mounted on shims is to be dismantled, the number of shims used at each of its mounting screws should be noted so that the same shim pile-ups can be replaced when the part is remounted.

d. Care should be exercised in removing or installing the cover to avoid damaging parts in close proximity. As a precaution, make certain that the platen is latched in the LETTERS position, and raise or lower the cover slowly with a vertical movement. In handling the typing reperforator, use the handles provided under the left hand ribbon spool bracket and above the punch arm cam roller.

### 3. MISCELLANEOUS INSTRUCTIONS

#### a. MOTOR

(1) 110 volt 50 or 60 cycle synchronous motors may be operated from a 110 volt 50 or 60 cycle alternating current power supply if the frequency does not vary more than plus or minus .75%, in which case series governed motors should be used. D. C. shunt governed motors may be used on 110 volt D. C. power circuits. When governed motors are used, a speed indicator (tuning fork) is required for the purpose of checking the motor speed. The fork is equipped with shutters on the ends of the tines. The governor is equipped with a target having black spots on a white background (Figure 108).

(2) To check the speed, the target should be well illuminated. Tap the speed indicator against the hand to make it vibrate. Hold the indicator so that the shutters are close to the eye and view the target through the openings in the shutters. If the motor is running at the correct speed, the target will appear stationary. If the motor speed is too fast, the target will appear to be moving in the direction of rotation, and if too slow, in the opposite direction.

#### NOTE

There is a possibility of setting the speed incorrectly. The speed could be half the desired speed, or some multiple thereof, even though the spots appear stationary when viewed through the shutters of the speed indicator. This should be kept in mind if trouble is experienced in operation.

(3) When increasing or decreasing the motor speed, the speed adjusting lever or the governor adjusting bracket respectively should be momentarily depressed. See Figure 108 for location of parts.

#### b. RECEIVING RANGE MEASUREMENT

(1) The range finder assembly, which is used for the purpose of orienting the selector to the incoming signals, is mounted on the selector above the main shaft of the Typing Reperforator.

(2) Since there are two types of selecting mechanisms (pulling and holding magnet), it will be necessary to describe separately the measurement of their receiving-range margins. Refer to subparagraphs c. and d. below.

#### c. PULLING MAGNET SELECTOR (Figures 4 to 13)

(1) Before proceeding to measure the receiving range, the armature spring tension should be set, by means of its adjusting screw, as follows:

(a) When a distortion test set is available for measuring the receiving range of a unit, the armature spring tension may be varied from 6 to 7 ounces in order to obtain the range specified in the Distortion Test Set Bulletin 181, Issue 2. This tension should be checked with the armature in the marking position and the spring stretched to its operated position length.

(b) When no distortion test set is available, but the unit is equipped with a line relay, the selector armature spring adjusting screw should be positioned so that it will require from 6 to 6-3/8 ounces to stretch the spring to position length when the armature is in its marking position.

(c) When no distortion test set is available and the unit is not equipped with a line relay, turn the armature spring adjusting screw in a clockwise direction until errors appear in the copy. Then, from this point, count the number of turns the adjusting screw can be turned in a counterclockwise direction before errors again appear in the copy. Turn the adjusting screw back (clockwise) half this number of turns to a point midway between the two failing points (the middle of the armature spring margins) and lock the adjusting screw with its lock nut.

#### NOTE

To secure reliable clutch trip, the armature spring tension should be checked to ascertain that it is not below 4-1/2 ounces.

If no errors appear in the copy throughout the entire physical range of the spring so that the above procedure cannot be followed, set the spring tension at 6 to 6-3/8 ounces and lock the adjusting screw. The receiving range should be rechecked after the armature spring range has been determined.

(2) Transmit RY (the letters R and Y sent alternately) to the typing reperforator continually while the receiving range is being determined as described in the following paragraphs:

(a) While RY is being received, loosen the index arm thumb screw and shift the index arm of the range finder toward 0 until errors appear in the copy. Then move the arm back slowly until errors no longer appear; at least 72 char-



acters should be received without error. This position indicates one limit of the orientation range. Note the position of the index arm on the scale.

(b) Determine the opposite end of the receiving range by repeating the foregoing procedure with the index arm near the opposite end of the scale. After the two limits of the receiving range have been found, set the index arm of the range scale midway between these two points.

#### d. HOLDING MAGNET SELECTOR

Before proceeding to measure the receiving range, set the armature spring tension in the manner prescribed in paragraph 34, "ARMATURE LEVER SPRING". Then proceed with this range measurement, transmitting RY as described under PULLING MAGNET SELECTOR, subparagraph c. (2) above.

#### e. CHARACTER OR FUNCTION SELECTED MANUALLY

When the instructions for making an adjustment specify the "setting up" of a certain character or function, the following method should be used: Rotate the motor fan or governor counterclockwise, as viewed from the fan or governor end, until the locking lever (see Figure 9 if the unit is equipped with a pulling magnet selector and see Figure 14 if the unit is equipped with a holding magnet selector) is about to drop off the long high part of the locking cam. Move the armature extension (if the unit is equipped with a pulling magnet selector) or the selector arm (if the unit is equipped with a holding magnet selector) to the operated (marking) or unoperated (spacing) side in accordance with the first selecting impulse of the code combination to be set up. Refer to the code chart Figure 109. Hold the armature extension or the selector arm in this position,

and again rotate the motor fan or governor until the top (No. 1) sword has been positioned and the locking lever is on a peak of the locking cam. Position the armature extension or the selector arm extension in accordance with the second impulse of the code combination to be set up and repeat the procedure followed in positioning the top (No. 1) sword. Position all of the swords following the foregoing procedure. When all swords have been positioned and the main clutch has been engaged, further rotation of the motor fan or governor will cause the unit to select the character or to perform the function which has been "set up".

#### f. TYPE BAR REMOVAL

Remove the ribbon and ribbon guide. Remove the platen guide shaft from the platen block (Figure 46). Push the platen block toward the rear and rotate it clockwise out of the path of the type bars. To remove a type bar, pull it forward and downward as far as it will go and lift its pivoted end from the type bar segment. In case it cannot be readily disengaged from the bearing rod or if it is one of the type bars at the extreme left-hand end of the type bar segment, back off the retaining screw at the left end of the type bar bearing rod, not more than one full turn, in order to facilitate the removal of the type bar.

#### g. TYPE BAR REPLACEMENT

To replace a type bar, reverse the procedure followed in removing it, lifting the pull bar to engage the bottom tooth in the type bar with the bottom notch in the pull bar. If the pull bar is properly engaged with the type bar, the top of the pull bar will be in line with the other pull bars, when the type bar is resting against the type bar backstop. After replacing the type bars, tighten the bearing rod retaining screw moderately tight and replace the platen guide shaft, the ribbon guide, and the ribbon.



## SECTION 2

## TYPING REPERFORATOR ADJUSTMENTS

1. MAIN SHAFT CLUTCH SPRING TENSION  
(Figure 1)

With the teeth of the driven clutch member resting against the teeth of the driving member, but not engaged, hook a 32 ounce scale over the throwout cam on the driven clutch member and pull as nearly in line with the shaft as possible. It should require 24 to 30 ounces (32 to 42 ounces for 75 word per minute spring or 40 to 64 ounces for 100 word per minute spring) to separate the clutch teeth.

## 2. SELECTOR SEPARATOR PLATES (Figure 2)

## NOTE

The separator plate leaf springs are adjusted during the initial assembly of the unit and should require attention only if the selector has been damaged or dismantled. If it is found necessary to check the adjustment, extreme care should be exercised in the removal and replacement of the selector lever springs to guard against distorting them. The subsequent selector adjustments will be facilitated if the swords and selector levers are replaced in the identical positions they formerly occupied.

The ends of the leaf springs should be .050" to .060" below the under surface of the straight portions so that they exert a light pressure against the swords. To adjust, bend the leaf springs at their narrow portions.

## 3. MAIN SHAFT.

The cams on the selector cam sleeve (Figure 3 for location of parts) should line up with their associated selector levers throughout a complete revolution. To adjust, position the main shaft with its four bearing bracket screws loosened.

4. MAIN SHAFT CLUTCH THROWOUT LEVER  
(Figure 3)

With the motor operating, open and close the signal line and then stop the motor. There should be from .010" to .020" clearance between the teeth of the two clutch members. The clutch throwout lever should be free on its pilot screws with not more than .002" end play. To adjust, position the lever by means of its pilot screws.

5. MAIN SHAFT CLUTCH THROWOUT LEVER  
SPRING TENSION (Figure 3)

With the clutch throwout lever resting against the lower surface of the driven clutch member, hook an 8 ounce scale over the clutch throwout lever at the spring hole and pull horizontally at right angle to the clutch throwout lever.

It should require 2-1/2 to 4 ounces to start the lever moving.

## 6. MOTOR GEARS

There should be a barely perceptible amount of backlash between the motor pinion and the highest point on the main shaft gear throughout a complete revolution of the main shaft. To adjust, position the motor with its mounting screws loosened.

PULLING MAGNET SELECTOR ADJUSTMENTS  
(Figure 7)

## NOTE

Refer to Section 1, paragraph 3. b. for Pulling Magnet Armature Spring Adjustment. Paragraphs 7 to 22 inclusive apply only to those units equipped with the Pulling Magnet Selector.

7. SELECTOR ARMATURE BRACKET LINK  
FRICTION (Figure 4)

Remove the selector armature bracket link screw. With an 8 ounce scale hooked in the link screw hole and pulled at right angle to the link, it should require some tension, not over 8 ounces, to start the link moving. If necessary to adjust, remove the link and contract or spread its slotted end.

## 8. SELECTOR LEVER SPRING TENSION (Figure 4)

With the code bars in the MARKING position and the main bail in its highest position, move the swords manually to the spacing position. Hook a 32 ounce scale over the end of each selector lever at the selector cam sleeve and pull radially to the main shaft. It should require 6 to 10 ounces to start each selector lever moving.

## 9. SELECTOR ARMATURE (Figure 5)

a. The armature should be free on its pivot screws, with barely perceptible end play. There should be some clearance, not more than .008" between the lower surface of the armature locking wedge and the No. 1 sword under the following conditions:

(1) No. 1 selector lever resting on the peak of its cam.

(2) No. 1 sword held against the upper separator plate without bending the latter.

(3) Armature end play taken up in a direction to reduce the specified clearance to a minimum. The selector armature spring adjustment is explained in Section 1, Paragraph 3. c.

b. To adjust, proceed as follows:

(1) If there is no clearance between the armature locking wedge and the No. 1 sword, loosen the lock nut on the upper pivot screw and with the armature play taken up in a direction to make the clearance a maximum, adjust to obtain the specified clearance noting that a quarter-turn of the screw is equivalent to approximately .006". Remove the armature bracket and adjust the lower pivot screw to obtain the proper armature end play. Replace the armature bracket and recheck the adjustment in accordance with subparagraph a. above.

(2) If there is more than .008" clearance, remove the armature bracket and adjust the lower pivot screw. Replace the bracket and adjust the armature end play by means of the upper pivot screw.

## 10. SELECTOR ARMATURE BRACKET LINK (Figures 6 and 7)

a. The position of the armature bracket should be such that a line through the center of the No. 1 sword extends approximately through the centers of the armature pivot screws when the swords are held midway between the stop posts by means of the 72581 gauge pins. To adjust, proceed as follows: Unhook the locking lever spring, loosen the magnet bracket mounting screws, and move the bracket to its rear-most position. Loosen the armature bracket mounting screws, the link screw, and back off the armature stops. Move the armature bracket eccentric out of the way so that it will not interfere with the adjustment. Rotate the main shaft until No. 1 selector lever rests on the peak of its cam.

b. Hold the swords in a position midway between the two stop posts by means of the 72581

gauge pins inserted between the stop posts and the swords. Be sure that both the armature extension arms are between the sword arms. With the swords held in this position, place the 73370 locating gauge over the end of the No. 1 sword so that the two legs of the gauge are against the ends of the sword arms. Move the bracket to a position where both armature extension arms are against the flat surface between the legs of the gauge. Hold the bracket in this position and tighten the link screw only.

## 11. SELECTOR ARMATURE BRACKET (Figure 7)

a. The position of the armature bracket should be such as to provide some clearance, not more than .040", between each sword and either stop post under the following conditions:

b. Rotate the main shaft until the No. 1 selector lever is resting on the peak of its cam. With the armature in its unoperated (spacing) position, move the spacing arm of the No. 1 sword against the armature extension.

c. Place a .040" wire gauge against the spacing stop post and move the armature slowly toward the marking position. The blade of the sword should strike the .040" gauge before the armature leaves the spacing arm of the sword. Under these conditions, the armature will move the sword to within not more than .040" of the stop post. Remove the .040" gauge and repeat the above procedure. The armature should leave the spacing arm of the sword before the blade of the sword strikes the spacing stop post. Under these conditions, there will be some clearance between the sword and the stop post.

d. Unhook the armature spring at its adjusting screw. With the No. 1 selector lever on the peak of its cam and the armature in its operated (MARKING) position, move the marking arm of the No. 1 sword against the armature extension. Then rotate the armature slowly toward the spacing position until the armature just leaves the marking arm of the No. 1 sword. Check the clearance between the No. 1 sword and the marking stop post in the same manner as described in the foregoing paragraph.

e. With each selector lever on the peak of its cam, each associated sword should be tried for the foregoing requirement of some clearance, not more than .040" between each sword and the stop posts.

f. To adjust, tighten the armature bracket mounting screws just enough so that the bracket may be moved by tapping it lightly. By rotating the bracket on its pivot, the clearance between the sword and the stop posts may be

regulated. If this clearance is more than .040", move the bracket in a direction to bring the armature toward the sword. If there is no clearance, move the bracket in the opposite direction to bring the armature away from the sword.

g. If the clearance between the sword and one stop post is close to zero and the clearance between the sword and the other stop post is more than .040", it will be necessary to refine the "SELECTOR ARMATURE BRACKET LINK" adjustment as follows:

h. Loosen the armature bracket mounting screws and the armature link screw and move the armature bracket to the right or left so that the rear end of the link will move in the direction corresponding to the post at which a greater clearance is desired; i.e., if the clearance between the sword and the right stop post is less than that between the sword and left stop post, move the bracket to the right. Tighten the link screw and proceed to adjust the armature bracket according to the preceding paragraph. Replace the armature spring.

i. After the bracket is set and both screws are tightened move the bracket eccentric clockwise against the bracket and tighten the screw. The eccentric and link will, thereafter, determine the position of the bracket. The bracket may be removed by simply removing the two bracket mounting screws. In replacing, the bracket should be held against the eccentric stop while the two bracket mounting screws are tightened.

#### 12. ARMATURE STOPS (Figure 8)

The No. 1 sword arms (right and left) should clear the associated arm of the selector armature extension by .035" to .037"\* when the front edge of the opposite sword arm is against its armature extension arm and the No. 1 selector lever is on the high part of its cam. To adjust the clearance of the right arm, remove the locking lever spring and reposition the unoperated stop screw with the armature in the unoperated position. To adjust the clearance of the left arm, reposition the operated stop nut with the armature in the operated position, and with the coils energized. If either clearance is changed, recheck the clearance of the other arm. If necessary, pinch the nut to make it tight on its screw. Replace the locking lever spring (Figure 7 for location of stops).

#### \*NOTE

The upper limit may be increased up to .042" only if necessary in order to permit

meeting the requirements for clearance given under the heading "ARMATURE TRIP-OFF ECCENTRIC SCREW". (Paragraph 20)

#### 13. ARMATURE LOCKING WEDGE (Figure 9)

There should be .006" to .012" clearance between the point of the armature locking wedge and the point of the locking lever when the two points are in line and the locking lever is on the high part of the locking cam. To adjust, position the locking wedge, with its lock nut loosened, forward or backward in its slot in the armature extension.

#### 14. ARMATURE LOCKING LEVER SPRING TENSION (Figure 9)

With the locking lever on the high part of the locking cam, hook a 32 ounce scale over the locking lever at the spring hole and pull in line with the spring. It should require 10 to 14 ounces to start the lever moving.

#### REMOVE THE RANGE FINDER ASSEMBLY

#### 15. STOP LEVER ECCENTRIC SCREW (Figure 10)

The stop lever on the range finder assembly should overtravel the latching surface of the trip latch by some, but not more than .006". To adjust, position the stop lever eccentric screw with its nut loosened. Make certain that the retightening of the eccentric screw nut does not disturb the adjustment.

#### 16. STOP LEVER SPRING TENSION (Figure 11)

With the trip latch plunger held operated, hook an 8 ounce scale at the end of the stop lever on the range finder assembly and pull horizontally at right angle to the lever. It should require 3/4 to 1-1/4 ounces to start the lever moving. Make certain that the stop lever eccentric screw has been adjusted before checking this requirement.

#### 17. TRIP LATCH SPRING COMPRESSION (Figure 10)

When measuring this requirement, the range finder assembly should be held in a horizontal position. An 8 ounce scale should be held in a vertical position and applied to the step of the trip latch. It should require 1 to 1-1/2 ounces (2-3/4 to 3-1/4 ounces for 100 words per minute) when pushing upward to start the trip latch moving.

REPLACE THE RANGE FINDER ASSEMBLY. IN REPLACING THE RANGE FINDER, MAKE CERTAIN THAT THE TAPE FEED-OUT LEVER FITS UNDER THE LEFT END OF THE TRIP LATCH PLUNGER; ALSO AVOID JAMMING THE TRIP LATCH PLUNGER AGAINST THE ARMATURE TRIP OFF ECCENTRIC SCREW WHEN REMOUNTING. See Figure 12.

#### 18. SELECTOR STOP ARM AND STOP LEVER ENGAGEMENT POSITIONING LINK (Figure 13)

With the selector magnet armature in the spacing position, rotate the selector cam sleeve until the stop arm moves the stop lever to the maximum of its overtravel beyond the latching shoulder of the trip latch. This overtravel should be at least half, but not more than the width of the stop lever. Obtain this requirement with the range indicator set at 15, at 60 and at 105 on the range scale. To adjust, position the range scale assembly with its mounting screws and the positioning link mounting screw loosened just enough to hold it friction tight.

#### 19. TAPE FEED-OUT LEVER (Figure 12)

The tape feed out lever should be free to rotate with a minimum amount of end play. To adjust, position the tape feed-out lever adjusting collar with its set screw loosened. This collar is located immediately under the tape feed-out lever.

#### 20. ARMATURE TRIP OFF ECCENTRIC SCREW (Figures 10 and 12)

There should be some clearance, not more than .004" between the stop lever and the trip latch when the armature is in the unoperated position and the selector cam sleeve is rotated until the stopping edge of the stop lever is directly below the latching surface of the trip latch. While checking the above clearance, take up the play in the stop lever with a screwdriver applied axially adjacent to the spring hole as close to the bearing as possible with thrust in the direction of the trip latch. This clearance should be held to a minimum to favor the "at least .002 inch" end play of the trip plunger.

The trip latch plunger should have at least .002" end play when the armature is held in the attracted position and when the stop lever is resting against its eccentric stop post.

To adjust, loosen the trip off eccentric screw lock nut and position the eccentric screw to meet the first requirement. The latter requirement serves as a check on the trip off eccentric

screw adjustment and also on the adjustment of the armature stops (Paragraph 12).

#### 21. SELECTOR MAGNET COIL (Figure 7 for location of parts)

The top edge of the core of the upper magnet coil should align (within 1/64") with the top edge of the armature. To adjust, position the magnet coil with its mounting screws loosened.

#### 22. SELECTOR MAGNET BRACKET (Figure 7)

There should be .002" to .007" clearance (.003" to .010" if armature is chrome-plated) between each magnet core and the armature anti-freeze strip when the magnet coils are energized with approximately .060 amperes of current and the armature is against the operated stop nut (marking stop). The sides of the cores should align with the edge of the armature and the ends of the cores should be parallel to the face of the armature. To adjust, position the bracket with its mounting screws loosened.

#### END OF PULLING MAGNET SELECTOR ADJUSTMENTS

#### HOLDING MAGNET SELECTOR MECHANISM ADJUSTMENTS (Figure 14)

#### REMOVE THE RANGE FINDER ASSEMBLY

#### 23. ARMATURE LEVER PIVOT SCREW (Figure 17)

With the armature lever spring and the selector arm spring unhooked, the armature lever should be free on its pivots with barely perceptible end play. To adjust, position the upper pivot screw with its lock nut loosened.

#### 24. SELECTOR CORE AND ARMATURE ALIGNMENT—PRELIMINARY (Figure 15 for location of parts)

a. When the armature is in its operated position, it should touch both magnet pole faces approximately at their centers, and the cores should be located equidistant, with respect to the outer edge of the armature as gauged by eye when a light reflector such as a piece of white paper is held behind the magnet. To adjust, remove the selector magnet bracket from the typing unit and reposition the magnet core assembly with its mounting screws loosened while holding the assembly so that the cores are vertical and the armature, by its own weight, rests against the pole faces. Tighten the magnet core assembly mounting screws and replace the selector magnet bracket.

### b. SELECTOR CORE AND ARMATURE ALIGNMENT—FINAL

With the armature lever spring and the selector arm spring in position (hooked) manually rotate the shaft and selector cam sleeve so that the armature lever slowly moves the armature toward the magnet core. Observe that the armature touches both core ends simultaneously and approximately in the centers of curvature; gage by eye, holding a light background behind the magnet and the armature assembly. Adjust by repositioning the magnet core by means of its elongated mounting holes and mounting screws. Tighten the screws.

#### NOTE

The adjustment may have to be modified in order to obtain the required receiving margins and to prevent slow release of the armature due to oil-seal. The margin requirement and the minimum magnetic pull requirement of 56 ounces should be considered as "Final Check" for the armature and core alignment.

### 25. SELECTOR ARM PIVOT SCREWS (Figures 16 and 17)

With the armature lever spring, the selector arm spring, and selector arm stop detent spring unhooked, the selector arm should be free on its pivots with barely perceptible end play, and the locking lever should overtravel the left-rear and right-front edges of the locking wedge. There should also be a minimum clearance of .008" between the selector arm and the armature lever, and a minimum clearance of .010" between the selector arm and the selector arm stop detent when the play in the detent is taken up in a direction to make this clearance a minimum.

a. To adjust the end play, position the upper pivot screw.

b. To adjust minimum clearance, remove the selector magnet bracket and the selector arm bracket and position both pivot screws of the selector arm.

### 26. SELECTOR ARM BRACKET (Figure 14)

a. The position of the selector arm bracket should be such as to provide some clearance, not more than .040", between each sword and either stop post, under the following conditions:

b. With the locking lever spring, the armature lever spring and the selector arm spring removed, rotate the main shaft until the No. 1 selector lever is resting on the peak of its

cam. With the selector arm in its unoperated (SPACING) position, move the spacing arm of the No. 1 sword against the selector arm extension. Then rotate the selector arm slowly toward the MARKING position until the selector arm just leaves the spacing arm of the No. 1 sword. There should be some clearance, not more than .040", between the No. 1 sword and the spacing stop post.

c. With the selector arm in its operated (MARKING) position, move the marking arm of the No. 1 sword against the selector arm extension. Then rotate the selector arm slowly toward the SPACING position until the selector arm just leaves the marking arm of the No. 1 sword. There should be some clearance, not more than .040", between the No. 1 sword and the marking stop post.

d. With each selector lever on the peak of its cam, each associated sword should be tried for the foregoing requirement of some clearance, not more than .040".

e. To adjust, loosen the selector arm bracket mounting screws just enough to make the bracket friction tight. Then, to equalize the clearance between the swords and the stop posts loosen the centralizing eccentric screw lock nut and turn the eccentric screw clockwise to provide more clearance on the spacing side or counterclockwise to provide more clearance on the marking side.

#### NOTE

Make certain that the selector arm stop detent does not interfere with the adjustment.

f. The centralizing eccentric screw should always be located so that its indicating line is adjacent to the marked scale that has been provided on the bracket to aid in gauging the amount the screw must be turned. Tighten the lock nut when the selector arm has been centralized.

g. To obtain the some clearance, not more than .040", requirement between the swords and the stop posts, insert the 90783 adjusting wrench in one of the two holes provided and turn the wrench to move the bracket closer to or farther from the swords as required. Then tighten the selector arm bracket mounting screws. Replace the locker lever spring, selector arm spring, and the armature spring.

### 27. LOCKING WEDGE (Figure 18A)

With the locking lever on a high part of its cam, the end of the locking wedge should clear the locking lever by .005" to .012" when the

end of the wedge is held in line with the locking lever. To adjust, position the locking wedge in its guide with its mounting screw loosened.

#### 28. LOCKING LEVER SPRING TENSION (Figure 18A)

With the locking lever on the high part of its cam, hook an 8 ounce scale on the end of the locking lever at the spring hole, and pull in line with the spring. It should require from 4 to 5-1/2 ounces (7 to 10 ounces for 100 word per minute spring) to start the lever moving away from the cam.

#### 29. SELECTOR ARM STOP DETENT (Figure 16)

With the locking lever on the low part of its cam, there should be an equal amount of clearance, within .003", between the sides of the locking wedge and the locking lever when the selector arm is placed first in the marking and then in the spacing position. To adjust, turn the selector arm stop detent eccentric post with its mounting screw loosened just enough to make the post friction tight.

#### NOTE

When checking the MARKING position, be sure that the selector arm operating screw does not interfere with the movement of the selector arm.

#### 30. SELECTOR ARM STOP DETENT SPRING TENSION (Figure 16)

With the stop detent spring unhooked from the top separator plate, hook an 8 ounce scale in the spring eye. It should require 4 to 5 ounces to pull the spring to its position length (6-3/4 to 7-3/4 ounces for 100 word per minute spring).

#### 31. SELECTOR LEVER SPRING TENSION (Figure 18B)

With the code bars in the MARKING position and the main bail in its highest position, move the swords manually to the SPACING position. Hook a 32 ounce scale over the end of each selector lever at the selector cam sleeve and pull radially to the main shaft. It should require 6 to 10 ounces to start each selector lever moving.

#### NOTE

Before checking the tension of the selector lever springs, make certain that the selector levers are free and without bind.

#### 32. SELECTOR MAGNET BRACKET POSITION ADJUSTING ARM (Figure 19)

With the main shaft in the stop position, rotate the selector cam sleeve until the locking lever just drops off the high part of its cam; then rotate the cam sleeve backward until the rotation is stopped by the locking lever. Under this condition, there should be a clearance of .058" to .065" between the armature lever and the face of a tooth on the armature lever cam. To adjust, loosen the selector magnet bracket mounting screws and the selector magnet bracket adjusting arm mounting screws just enough to make the bracket and adjusting arm friction tight. Then position the selector magnet bracket by means of the adjusting arm, using the 90783 adjusting wrench. To do this, insert the adjusting wrench in the hole above the end of the adjusting arm, and rotate the wrench. Tighten the bracket and adjusting arm mounting screws.

#### NOTE

When checking the above requirement, the armature lever should be held approximately .045" from the bottom of the notch of its cam.

#### 33. SELECTOR MAGNET BRACKET (Figures 15A and B)

#### NOTE

When making this adjustment the selector arm should be kept in the MARKING position.

With the selector magnet energized, the clearance between the selector arm operating screw and the selector arm should be .004" to .006" greater when the armature lever is on a peak of its cam than when it is opposite an indent of its cam.

a. To adjust, de-energize the selector magnet and rotate the selector cam sleeve until the armature lever is resting on the peak of the armature lever cam. While holding the cam sleeve in this position, turn the main shaft to a point where it moves the lever the greatest distance.

b. With the selector magnet still de-energized, loosen the selector magnet bracket mounting screws and, by means of its adjusting screw, rotate the selector magnet bracket so that the armature just touches the pole faces; then turn the adjusting screw an additional one-tenth of a turn counterclockwise. This will press the armature firmly against the magnet cores. While making the one-tenth of a turn adjustment, take up the slack in the adjusting screw to avoid lost motion.



c. With the selector magnet energized, measure the clearance between the selector arm operating screw and the selector arm and if there is no clearance back off the selector arm operating screw to provide at least .006" clearance. Then rotate the selector cam sleeve so that the armature lever is opposite an indent of its cam and again measure the clearance between the selector arm operating screw and the selector arm. If the difference in the two clearances exceeds .006" the selector magnet bracket adjusting screw should be turned clockwise. If the difference in the clearance is less than .004", turn the screw counterclockwise. Tighten the selector magnet bracket mounting screws and adjusting screw lock nut.

#### 34. ARMATURE LEVER SPRING (Figure 15A)

Unhook the armature lever spring from its spring arm and rotate the main shaft until the armature lever is on a high part of its cam. With a 32 ounce scale hooked on its spring eye, pull the spring to its position length. The following tensions should apply:

a. If a distortion test set is available, the spring tension should be set at the optimum value within the limits of 13 to 24 ounces.

b. If no distortion test set is available, the spring tension should be 17 to 19 ounces, except when coils are connected in parallel without a 1000 ohm shunt. Under this latter condition the tension should be 13 to 15 ounces (22 to 26 ounces for 100 word per minute spring). To adjust, position the spring arm with its mounting nut loosened. Tighten the mounting nut.

#### 35. SELECTOR ARM OPERATING SCREW (Figure 20)

With the selector magnet energized and the selector cam sleeve rotated so that the armature lever is opposite an indent of its cam, there should be a clearance of .003" to .006" between the selector arm operating screw and the selector arm. To adjust, position the selector arm operating screw with its lock nut loosened.

#### 36. SELECTOR ARM SPRING (Figure 21)

Unhook the selector arm stop detent spring. With the armature lever on a high part of its cam, and the locking lever held away from the locking wedge, hook an 8 ounce scale over the end of the locking wedge and pull parallel to the selector arm spring. It should require 1-1/4 to 1-3/4 ounces to start the selector arm moving. To adjust, reform the outer loop of the selector arm spring.

CHANGE 1

#### CAUTION

Care should be taken not to nick, crimp, or otherwise deform the spring or spring wire when reforming the loops.

#### 37. STOP LEVER ECCENTRIC SCREW (Figure 22)

The stop lever on the range finder assembly should overtravel the latching face of the trip latch by some, but not more than .006". To adjust, position the stop lever eccentric screw with its nut loosened. Then retighten the nut making certain that the tightening of the nut does not disturb the adjustment.

#### 38. TRIP LATCH SPRING COMPRESSION (Figure 22)

#### NOTE

When measuring this requirement, the range finder assembly should be held in a horizontal position.

Apply the push end of an 8 ounce scale, held in a vertical position, to the trip latch, as near to the stop lever as possible. It should require 1 to 1-1/2 ounces (2-3/4 to 3-1/4 ounces for 100 word per minute spring), when pushing upward, to start the trip latch moving.

#### 39. STOP LEVER SPRING TENSION (Figure 11)

#### NOTE

Make certain that the stop lever eccentric has been adjusted before checking this requirement.

With the trip latch plunger held operated, hook an 8 ounce scale on the end of the stop lever of the range finder assembly and pull horizontally at right angle to the stop lever. It should require 3/4 to 1-1/4 ounces to start the lever moving.

REPLACE THE RANGE FINDER ASSEMBLY. IN REPLACING THE RANGE FINDER, MAKE CERTAIN THAT THE TAPE FEED-OUT LEVER FITS UNDER THE LEFT END OF THE TRIP LATCH PLUNGER; ALSO AVOID JAMMING THE TRIP LATCH PLUNGER AGAINST THE ARMATURE TRIP OFF SCREW. (See Figure 24.)

#### 40. SELECTOR STOP ARM AND STOP LEVER ENGAGEMENT POSITIONING LINK (Figure 23)

## NOTE

This adjustment applies only to those units equipped with the adjustable range scale and positioning link.

With the selector magnet armature in the SPACING position, rotate the selector cam sleeve until the stop arm moves the stop lever to the maximum of its overtravel beyond the latching shoulder of the trip latch. This overtravel should be at least half but not more than the width of the stop lever. Obtain this requirement with the range indicator set at 15, at 60 and at 105 on the range scale. To adjust, position the range scale assembly with its mounting screws and the positioning link mounting screw loosened just enough to hold it friction tight.

## 41. TAPE FEED OUT LEVER (Figure 24)

The tape feed-out lever should be free to rotate with a minimum amount of end play. To adjust, position the tape feed-out lever adjusting collar with its set screw loosened. This collar is located immediately under the tape feed-out lever.

## 42. TRIP OFF SCREW (Figures 24 and 22)

There should be some clearance, not more than .004" between the stop lever and the trip latch when the armature is in the unoperated position and the selector cam sleeve is rotated until the stopping edge of the stop lever is directly below the latching surface of the trip latch. While checking the above clearance, take up the play in the stop lever with a screwdriver applied axially adjacent to the spring hole as close to the bearing as possible with thrust in the direction of the trip latch. This clearance should be held to a minimum to favor the "at least .002 inch" end play of the trip plunger.

The trip latch plunger should have at least .002" end play when the armature is held in the attracted position and when the stop lever is resetting against its eccentric stop post.

To adjust, loosen the trip off screw lock nut and position the screw to meet the first requirement. The latter requirement serves as a check on the trip off screw adjustment and also on the adjustment of the selector magnet bracket (paragraph 33).

## END OF HOLDING MAGNET SELECTOR MECHANISM ADJUSTMENTS

## REMOVE THE TYPE BASKET ASSEMBLY

IN ORDER TO MEASURE THE "PULL BAR SPRING TENSION" OR ADJUST THE "FUNCTION BAR SPRING BRACKETS," IT IS NECESSARY TO REMOVE THE TYPE BASKET ASSEMBLY.

## 43. TYPE BASKET ASSEMBLY REMOVAL

a. Remove the mounting screws of the vertical lever bracket and remove the vertical lever assembly (Figure 49).

b. Remove the pull bar guide mounting screws. With the swords in the MARKING position and the main bail roller on the high part of its cam, move the right end of the pull bar guide forward until the "T" levers disengage from the code bars. Remove the pull bar guide assembly; avoid losing the shims that may be at either mounting screw hole between the pull bar guide and the casting.

c. Remove the three type basket assembly mounting screws.

d. With the main bail roller on the low part of its cam and with the extensions of the function pull bars above any associated levers, hold the type basket assembly by grasping the assembly with the fingers in back of the pull bars and the thumbs against the type bars. Tilt the left end of the assembly slightly upward and raise the assembly upward and out of the reperforator.

## 44. FUNCTION BAR SPRING BRACKETS (Figure 25)

The pull bars supported by the function bar spring brackets should be free and without bind and they should have approximately equal clearance between the corresponding edges of the function bar spring brackets. To adjust, rotate both the right and the left function bar spring brackets with their mounting screws loosened.

## NOTE

On units with Serial No. 105160 and higher, this clearance should be some to .006" and equal. This must be kept in mind if for any reason the plate is reinstalled.

## 45. PULL BAR SPRING TENSION (Figure 26)

a. Unhook the spring from each pull bar. With an 8 ounce scale held in a vertical position, hook the scale in the spring eye. It should require 3 to 4 ounces to extend any pull bar spring (with associated type bar) to its position length and 5-1/2 to 6-3/4 ounces to extend any pull bar spring (without associated type bar) to its position length.

## NOTE

For adjustments of pull bar springs that are attached to either the right or left function pull bar bracket, see "RIGHT FUNCTION PULL BAR SPRING BRACKET" and "LEFT FUNCTION PULL BAR SPRING BRACKET" adjustments.

## REPLACE THE TYPE BASKET ASSEMBLY

## 46. TYPE BASKET ASSEMBLY REPLACEMENT

If the type basket has been removed for checking the foregoing requirements, it should now be replaced by the following procedure.

a. Replace the type basket by reversing the procedure followed in removing it. Replace the mounting screws.

b. With the swords in the MARKING position and the main bail roller on the high part of its cam, remount the pull bar guide (use a string or wire to hold the pull bars inward against the type bar backstop to facilitate replacement of type basket). Hold the right end of the guide forward, and move the front end of the "T" levers toward the left until the "T" levers engage the notches in the code bars. Insert the spacers between the guide and the casting. Replace the mounting screws but do not tighten them.

c. With the vertical levers in the proper slots, lay the vertical lever bracket where it can be conveniently picked up later with the left hand. Use the right forefinger to hold the vertical link bell cranks in engagement with their respective punch bell cranks so that the punch selector fingers are moved to their extreme right position. Grasp the vertical lever bracket in the left hand with the thumb against the vertical levers near their upper ends and the forefinger while holding the code bar bell cranks against the vertical levers. The other fingers of the left hand can be used to hold the bracket so that the vertical levers are approximately 1/4" from the open ends of the slots. Replace the vertical lever bracket with the upper ends of the vertical lever bell cranks in back of the vertical links in the slots of the bracket. It may be necessary, while holding the vertical link bell cranks with the right forefinger, to move the bell cranks slightly to the right and left so that they will enter the slots in the vertical lever bracket. After the bell cranks are in the slots of the bracket, the bracket and pull bar guide can be shifted until the code bars enter the proper spaces between the separator plates. Replace the bracket mounting screws. Before tightening the pull bar guide mounting screws

make certain that the "T" levers are engaged with the notches of their respective code bars.

## 47. MAIN BAIL GUIDES (Figure 27)

## NOTE

This adjustment applies only to units equipped with a main bail having roller guides.

a. The main bail should be free throughout its travel and the roller guides should be so positioned that the requirements specified in the following adjustments can be met: "PULL BAR GUIDE" adjustment (Figures 29 and 30) - Paragraph 49; "MAIN BAIL ADJUSTING SCREW-PRELIMINARY" adjustment (Figure 3) - Paragraph 50; and "MAIN BAIL ADJUSTING SCREW-FINAL" (Figures 50B and 51B) - Paragraph 83.

b. To determine freeness, position the main shaft so that the main bail is in its uppermost position and remove the main bail spring. The main bail should fall to its lower position by means of its own weight when the ribbon feed lever roller is held away from the main bail plunger. If the main bail is free, the position of the bail guides need not be checked unless difficulty in meeting the requirements of the aforementioned adjustments is encountered.

c. To adjust the main bail roller guides, proceed as follows:

(1) Position the pull bar guide so that it is in the middle of the adjustment provided by its elongated mounting holes, and loosen both mounting screws of each main bail roller guide.

(2) With the BLANK combination set up and the main bail opposite the humps on the unselected pull bars, position the main bail roller guides so that the clearance between the main bail and the LETTERS and FIGURES pull bar humps is approximately equal. Tighten the upper mounting screw of the right hand guide so that the guide is friction tight.

(3) With the main bail roller on the high part of its cam, shift the main bail roller guides, if necessary, so that the clearance between the code bars and the LETTERS and FIGURES pull bars is approximately equal. (It may be necessary to advance the main bail adjusting screw to obtain clearance between the pull bars and code bars). Tighten the lower mounting screw of the right hand main bail roller guide friction tight.

(4) Recheck adjustment (2) and fully tighten both mounting screws of the right hand guide after making any necessary readjustments.

(5) Remove the main bail spring and position the left-hand main roller guide so that the main bail is free throughout its travel. After tightening the mounting screws of the left-hand bail roller guide, check the freeness of the main bail by raising it to its uppermost position, manually, and releasing it while holding the ribbon feed lever roller away from the main bail plunger. It should fall to its lower position by means of its own weight. Replace the main bail spring.

#### 48. MAIN BAIL GUIDE POST (Figure 28 for location of parts)

##### NOTE

This adjustment applies only to units equipped with the main bail guide post and an adjustable eccentric bushing.

a. The main bail should be free throughout its travel and the eccentric bushing should be so positioned that the following adjustments can be met:

"PULL BAR GUIDE" adjustment and "MAIN BAIL ADJUSTING SCREW" adjustment (preliminary and final): Paragraphs 49, 50 and 83.

b. To adjust the main bail guide post proceed as follows:

(1) Position the pull bar guide so that it is in the middle of the adjustment provided by its elongated mounting holes.

(2) With the BLANK combination set up, rotate the main shaft until the main bail is opposite the humps on the unselected pull bars. Position the eccentric bushing so that the guide post is away from the bottom of the bail slot and so that the clearance between the main bail and the LETTERS and FIGURES pull bar humps is approximately equal.

(3) With the main bail roller on the high part of its cam, see that the clearance between the code bars and the LETTERS and FIGURES pull bars is approximately equal. (It may be necessary to advance the main bail adjusting screw to obtain clearance between the pull bars and the code bars.)

(4) Recheck adjustment (2). To obtain both requirements outlined in (2) and (3), it may be necessary to relocate either the eccentric bushing, the type basket, or the pull bar guide.

(5) After positioning the guide post, recheck requirements and adjustments in a. above.

#### 49. PULL BAR GUIDE (Figures 29 and 30)

a. With the BLANK combination set up and the main bail opposite the pull bar humps, there should be .008" to .020" clearance between the unselected pull bars and the main bail when the play of the main bail is taken up in the direction to make this clearance a minimum; with the LETTERS combination set up there should be .008" to .020" clearance between the main bail and the blank pull bar (Figure 29).

b. There should be .004" to .080" clearance between the end of the No. 1 "T" lever and the bottom of the slot in the code bar measured at the point of closest approach. Also check to see that there is some clearance between the ends of Nos. 2, 3, 4 and 5 "T" levers and their respective code bars measured at the point of closest approach. To adjust, position the pull bar guide with its mounting screws loosened (Figure 30).

#### 50. MAIN BAIL ADJUSTING SCREW—PRELIMINARY (Figure 3)

##### NOTE

Refer to Paragraph 83 for "MAIN BAIL ADJUSTING SCREW—FINAL" adjustment.

When the BLANK and LETTERS combinations are set up alternately and the main bail roller is on the high part of its cam, there should be .010" to .050" clearance between the unselected pull bars and the inner edge of the code bars when the play in the main bail and the pull bars is taken up in a direction to make this clearance a minimum. To adjust, position the main bail adjusting screw with its lock nut loosened.

#### 51. RIBBON SPOOL CUPS (Figures 31 and 32)

a. The center of the left hand ribbon roller should be 4-11/16" to 4-13/16" from the re-perforator base plate. To adjust, position the ribbon spool cup with its lock nut loosened.

b. The center of the right hand ribbon roller should be 2-3/16" to 2-5/16" from the top surface of the tape guide. To adjust, position the ribbon spool cup with its lock nut loosened.

#### 52. RIBBON SPOOL SHAFT GEARS (Figure 32)

The ribbon spool shafts should have some end play, not over .010". To check or change this adjustment, shift the ribbon feed shaft, if necessary, to avoid interference between the ribbon feed shaft gear and the ribbon spool shaft gear, and push the ribbon spool shaft toward the rear of the unit. To adjust, position the ribbon

spool shaft bevel gear, locating it so that the set screw engages the flat on the shaft.

#### NOTE

If the unit is equipped with an end of line indicator mechanism or tape feed-out control mechanism, the required end play in the right hand ribbon spool shaft should be obtained by positioning the rear collar on the right hand ribbon spool shaft.

#### 53. RIBBON SPOOL SHAFT BRACKETS (Figures 32 and 38 for location of parts)

The ribbon spool shaft brackets should align with the edges of the base plate and there should be a minimum amount of backlash between the bevel gears on the ribbon spool shafts and the bevel gears on the ribbon feed shaft throughout a complete revolution of the ribbon spool shafts when the ribbon feed shaft is in its extreme left hand and right hand position, respectively. To adjust, position the ribbon spool brackets.

#### NOTE

If the unit is equipped with an end of line indicator mechanism or a tape feed-out counter mechanism, the right hand bracket should be adjusted so that the front edge of the right hand ribbon spool cup is approximately in line with the front edge of the left hand ribbon spool cup, and the gear backlash should be obtained by positioning the gear on the right hand ribbon spool shaft.

#### 54. RIBBON SPOOL SHAFT COMPRESSION SPRING (Figure 32)

Move the ribbon feed shaft to its left hand position. Hook an 8 ounce scale over the pin in the right ribbon spool shaft and pull horizontally at right angle to a line through the center of the pin and the center of the ribbon spool shaft. It should require 2-1/2 to 5 ounces to start the ribbon spool shaft moving. To adjust, position the spring collar with its set screw loosened. Move the ribbon feed shaft to its right hand position and adjust the left hand compression spring in the same manner.

#### 55. RIBBON SPOOL SHAFT SLOTS (Figure 33 for location of parts)

The ribbon spools should be held firmly in place on the ribbon spool shafts. To adjust, spread the prongs at the end of the ribbon spool shafts.

#### RIBBON REVERSE MECHANISM ADJUSTMENTS ON UNITS NOT EQUIPPED WITH RIBBON REVERSE ARM YIELD SPRING

#### 56. LEFT RIBBON REVERSE ARM SHAFT (Figure 33)

a. The front end of the left ribbon reverse arm shaft should clear the left ribbon spool cup by .005" to .025" when the ribbon reverse arm is held against the bracket to make the clearance a minimum. To adjust, position the ribbon reverse arm on the ribbon reverse arm shaft with its set screw loosened.

b. With the left ribbon reverse arm in the normal position against the ribbon spool cup, the left ribbon reverse arm shaft should have some end play, not more than .010". To adjust, position the collar on the shaft with its set screw loosened. Locate the set screw so that it is easily accessible.

#### 57. RIGHT RIBBON REVERSE ARM SHAFT

a. There should be some clearance, not more than .010", between the front end of the right ribbon reverse arm shaft and the ribbon spool cup when the play of the shaft is taken up in a direction to make the clearance a maximum. To adjust, position the collar on the shaft with its set screw loosened.

b. The rear of the slot in the right ribbon reverse arm should be in line with or slightly behind the rear flange of the ribbon cup roller. To adjust, position the right ribbon reverse arm on the ribbon reverse arm shaft with its set screw loosened.

#### 58. RIBBON REVERSE PAWL LINK (Figure 34)

The ribbon reverse bail should clear both left and right ribbon reverse pawls by .015" to .040" when the ribbon reverse bail is opposite the reverse pawls and the ribbon reverse arms are against the ribbon spool cups. When checking the .015" clearance between either ribbon reverse pawl and the ribbon reverse bail, the play in the ribbon reverse bail should be taken up in a direction to make the clearance a minimum. When checking for the .040" clearance, the play in the ribbon reverse bail should be taken up in a direction to make the clearance a maximum. To adjust, position the ribbon reverse arms with their set screws loosened; at the same time make certain that the ribbon reverse pawl links do not bind on their shoulder screws.

END OF RIBBON REVERSE MECHANISM ADJUSTMENTS ON UNITS NOT EQUIPPED WITH RIBBON REVERSE ARM YIELD SPRING.

RIBBON REVERSE MECHANISM ADJUSTMENTS ON UNITS EQUIPPED WITH RIBBON REVERSE ARM YIELD SPRING.

59. LEFT RIBBON REVERSE ARM SHAFT (Figure 35)

a. With the ribbon reverse shaft held forward to make the clearance a minimum, there should be from .005" to .025" clearance between the rear of the left spool cup and the front end of the ribbon reverse shaft.

b. To adjust, loosen the set screw of the spring block, and if necessary, the set screws of the ribbon reverse shaft collar and link. Position the shaft while holding the ribbon reverse arm against the ribbon spool bracket and the spring block against the reverse arm. Tighten the set screw.

60. RIBBON REVERSE ARM SHAFT COLLARS (Figure 35)

Both right and left ribbon reverse arm shafts should have some end play, not more than .010". To adjust, position the collar on each shaft with its set screw loosened. Locate the set screws so that they are easily accessible when the ribbon reverse arms are held up against the ribbon spool cups.

61. RIBBON REVERSE PAWL LINKS (Figure 36)

The ribbon reverse bail should clear both left and right hand ribbon reverse pawls by .015" to .040" when the ribbon reverse bail is opposite the reverse pawls and the ribbon reverse arms are against the spool cups. When checking the .015" clearance, the play in the ribbon reverse bail should be taken up in a direction to make the clearance a minimum. When checking the .040" clearance, the play in the ribbon reverse bail should be taken up in a direction to make the clearance a maximum. To adjust, position the spring block on the left ribbon reverse shaft and the sleeve on the right ribbon reverse shaft.

62. RIBBON REVERSE ARM YIELD SPRING (Figure 36)

Position the ribbon reverse bail so that it will block the full travel of the ribbon reverse arm, and with the ribbon reverse pawl resting against the ribbon reverse bail, apply the push end of an 8 ounce scale, held at a right angle to

the ribbon reverse arm at the center where the ribbon is threaded. It should require 1-1/2 to 4-1/2 ounces to start the ribbon reverse arm moving. To adjust, remove and bend spring.

END OF RIBBON REVERSE MECHANISM ADJUSTMENTS

63. RIBBON FEED SHAFT SAFETY SPRING COMPRESSION (Figure 38)

With the main bail in its extreme upper position, slide the ribbon feed shaft to its left hand position. Apply the push end of a 12 pound scale to the upper end of the right ribbon reverse pawl, and push vertically downward. It should require 3 to 5 pounds to start the spring collar moving.

NOTE

When measuring this tension, hold the ribbon feed shaft to prevent it from moving. Slide the ribbon feed shaft to its right hand position and check the ribbon feed shaft left safety spring in a similar manner.

REMOVE THE RIBBON FEED PAWL AND RIBBON CHECK PAWL (Figure 40)

64. RIBBON FEED SHAFT DETENT PLUNGER SPRING COMPRESSION (Figure 38)

With the ribbon feed shaft in its left hand position, apply the push end of a 12 pound scale to the left end of the shaft and push in line with the shaft. It should require 1-1/2 to 3-1/2 pounds to move the shaft to its right hand position.

65. RIBBON FEED LEVER SPRING TENSION (Figure 39)

With the ribbon feed lever roller in the plunger indent, hook a 32 ounce scale over the top of the ribbon feed lever and pull horizontally toward the front of the unit. It should require 12 to 18 ounces to start the lever moving.

REPLACE THE RIBBON FEED PAWL AND THE RIBBON CHECK PAWL

66. RIBBON CHECK PAWL (Figure 40)

The upper end of the ribbon check pawl should be 1/16" (plus or minus 1/64") below the lower surface of the pull bar guide. To adjust, position the ribbon check pawl with its mounting screw loosened.

## 67. RIBBON CHECK PAWL SPRING (Figure 40)

With an 8 ounce scale hooked over the extreme lower end of the ribbon check pawl and pulled at right angle to the pawl, it should require 6 to 8 ounces to start the pawl moving away from the ratchet. Make certain that the working edge of the pawl does not bind against a tooth on the ratchet when taking this pressure. To adjust, bend the ribbon check pawl spring.

## 68. RIBBON FEED PAWL (Figure 40 for location of parts)

With the main bail in its topmost position locate the ribbon feed pawl so that its engaging surface with the ratchet is back of the vertical centerline of the ratchet and so that the ratchet will be rotated one or two teeth for every revolution of the main shaft. Make this check throughout a complete revolution of the ribbon feed shaft.

To adjust, position the ribbon feed pawl by means of its mounting screw.

## 69. RIBBON FEED PAWL SPRING (Figure 40)

With the ribbon feed shaft pushed to the right, the main shaft in its stop position and an 8 ounce scale hooked over the extreme front edge of the ribbon feed pawl and pulled at right angle to the pawl, it should require 6 to 8 ounces to start the pawl moving away from the ribbon feed ratchet. Make certain that the feeding edge of the pawl does not bind against a tooth on the ratchet when tension is being measured. To adjust, bend the ribbon feed pawl spring.

## 70. RIGHT AND LEFT RIBBON REVERSE PAWLS SPRING TENSION (Figure 37)

With the ribbon feed shaft in its left hand position, hook an 8 ounce scale over the spring post on the left ribbon reverse lever and pull in line with the spring. It should require 1-3/4 to 3-3/4 ounces to start the lever moving. Move the ribbon feed shaft to its right-hand position and check the right ribbon reverse pawl spring in the same manner.

## 71. LEFT FUNCTION PULL BAR SPRING BRACKET (Figure 41A)

With the main bail in its extreme downward position, hook an 8 ounce scale over the LETTERS pull bar, just below the hump, and pull horizontally at right angle to the pull bar. It should require 1 to 1-1/2 ounces to start the pull bar moving. To adjust, position the spring bracket with its mounting nut loosened.

## 72. RIGHT FUNCTION PULL BAR SPRING BRACKET (Figure 41B)

With the main bail in its extreme upward position and the code bar bell cranks (Figure 50 or 51) held away from the code bar locking lever, hook an 8 ounce scale over the code bar locking lever just above the No. 1 code bar and pull horizontally at right angle to the locking lever. It should require 3-1/2 to 5 ounces to start the locking lever moving. To adjust, position the spring bracket with its mounting nut loosened.

## 73. PULL BAR GUARD (Figure 42)

a. When the two end type pallets are held against the platen there should be some clearance between their pull bars and the pull bar guard; at the same time it should not be possible to manually disengage these pull bars from their respective guide slots. To adjust, add or remove washers and shims at the pull bar guard mounting holes.

b. The center pull bars should meet the requirements of a. above. To adjust, position (push or pull) the pull bar guard with one of its mounting screws loosened.

## 74. PUNCH ARM CASTING (Figure 43)

a. There should be approximately equal clearance between the ends of the punch arm casting and the lock nuts of the pilot screws.

b. The punch arm casting should have some end play on its pilot screws, not over .005"

c. To adjust, position both pilot screws with their lock nuts loosened to meet the first requirement. Position the front pilot screw only to meet the latter requirement. Tighten both lock nuts.

## 75. PUNCH BAIL BEARINGS (Figures 44 and 45 for location of parts)

The punch bail should have some end play on its pivot bearing screws, not over .005". To adjust, position the front pivot bearing screw with its lock nut loosened.

## 76. PUNCH BAIL FRONT PIVOT BEARING PLATE (Figures 44 and 45)

a. The punch selector fingers should be positioned to meet the following requirements:

(1) As viewed from the left, with the punch selector fingers held against their respective punches, the rear edge of the rear finger and

the front edge of the front finger should be within the outer edges of their respective punches.

(2) As viewed from the left, there should be some clearance, not more than .003", between the rear selector finger and its punch when the front selector finger just touches its associated punch (Figure 45).

b. To adjust, loosen the front pivot bearing screw lock nut and tilt the front pivot bearing plate to the left or right by means of the tilt and clamp screws, to meet the first requirement. To meet the latter requirement operate the punch bail by hand until the punch selector fingers almost touch the punches and position the front pivot bearing plate vertically by means of the tilt and clamp screws so that, when the front selector finger just touches its punch there will be some clearance not more than .003", between the rear selector finger and its associated punch. Recheck (1). Then tighten the front pivot bearing screw lock nut.

#### 77. FEED ROLL BEARINGS (Figure 46)

With the feed roll detent, the feed pawl, and the tape tension lever held away from the feed roll, the feed roll should turn freely in its bearings and should have some end play, not over .004". To adjust, first position the rear bearing bracket and its mounting screws to provide freedom of rotation and then adjust the bearing bushing in this bracket to provide end play.

#### 78. TAPE TENSION LEVER STUD (Figure 47)

a. The tape tension lever stud should be centrally located with respect to the feed roll pins. This requirement should be measured as follows:

(1) Take up the feed roll end play towards the star wheel and the tension lever end play toward its adjusting nut. The edge of the lever slot may touch the feed roll pins on the side of the pins nearest the ratchet but there must be clearance on the other side.

(2) Take up the feed roll end play away from the star wheel and the tension lever end play away from the tension adjusting nut. The edge of the lever slot may touch the feed roll pins on the side farthest away from the ratchet but there must be clearance on the other side.

b. To adjust, add or remove shims between the shoulder on the tape tension lever stud and its mounting bracket.

#### 79. FEED ROLL DETENT—PRELIMINARY (Figure 48)

##### NOTE

Refer to Paragraph 88 for FEED ROLL DETENT—FINAL adjustment.

With the punch bail in its operated position, insert the 73517 feed roll positioning gauge in the punch block guide slot so that the projection on the gauge stops against the feed hole punch. The position of the feed roll should be such that a pin on the feed roll lines up with the center hole of the gauge. To adjust, position the feed roll by means of the feed roll detent eccentric (Figure 44), locating the eccentric so that the high part is toward the left.

#### 80. FEED PAWL ECCENTRIC—PRELIMINARY (Figure 49)

##### NOTE

Refer to Paragraph 89 for "FEED PAWL ECCENTRIC—FINAL" adjustment.

With the punch arm cam roller on the low part of its cam, the feed pawl should rest in the bottom of the notch which is just below the horizontal center line of the feed roll.

To adjust, position the feed pawl eccentric, locating it so that the high part of the eccentric is toward the left.

#### 81. FEED PAWL SPRING TENSION (Figure 44)

With the main shaft in the stop position, hook a 32 ounce scale over the feed pawl just above the curved bearing portion and pull horizontally to the left. It should require 7 to 10 ounces to start the feed pawl moving away from the feed roll.

##### NOTE

The lower end of a spring connected to a feed pawl with long spring hole extension should be in the right hand notch of the spring post. Springs connected to pawls with short extension should be in the left hand notch of these posts.

#### 82. CODE BAR BELL CRANKS (Figures 49, 50A and 51A)

a. The code bars should move freely between the code bar bell crank separator plates.



b. The code bar bell cranks illustrated in Figure 50A should meet the following requirement: With the code bars positioned for BLANK selection, rotate the main shaft, until the right ends of the code bars and the adjacent parallel edges of the associated code bar bell cranks are at a point of closest approach. Under this condition the clearance at this point should be .010" to .050".

c. The code bar bell cranks illustrated in Figure 51A should meet the following requirement: With the code bars positioned for BLANK selection and the locking lever resting against the code bars, there should be .010" to .050" clearance between the right ends of the code bars and the adjacent edges of the associated code bar bell cranks.

d. To adjust, make certain that the vertical lever bracket is mounted approximately in a vertical position and align the code bar bell cranks with the code bars by adding or removing shims between the lower separator plate and the shoulder on the pivot post to meet the first requirement. The latter requirement may be met by loosening the pivot post lock nut and moving the pivot post horizontally in the elongated mounting hole in the vertical lever bracket. Tighten the pivot post lock nut.

#### NOTE

When making the foregoing adjustments, make certain that the extension on each code bar bell crank fully engages the vertical lever and at the same time does not overlap sufficiently to interfere with the adjacent vertical lever.

Likewise, each code bar bell crank should fully engage the end of the associated vertical lever (vertically) but the upper end of any vertical lever should not interfere with the free movement of the code bar bell crank immediately above the one with which that vertical lever operates.

#### 83. MAIN BAIL ADJUSTING SCREW—FINAL (Figure 50B or 51B)

#### NOTE

Refer to Paragraph 50 for MAIN BAIL ADJUSTING SCREW—PRELIMINARY adjustment.

With the code bars positioned for LETTERS selection and the main bail cam roller on the high part of its cam, there should be at least .010" clearance between the front edges of the code bars and the adjacent edges of the code

bar bell cranks. To obtain this clearance, re-adjust the main bail adjusting screw (Figure 3), keeping within the previously specified limits of .010" to .050" between the pull bars and code bars.

#### 84. VERTICAL LEVER PIVOT SCREW (Figure 49)

With the code bars positioned to the right (LETTERS combination), and the code bar bell cranks resting against the code bars, the right edge of the punch engaging projections on the punch selector fingers should be in approximate alignment with the right edges of the punches, when all play in the associated parts is taken up by pressing the punch selector fingers lightly toward the left. To adjust, position the vertical lever pivot screw in its mounting slot.

#### 85. PUNCH SELECTOR FINGER BACKSTOP (Figure 49 for location of parts)

a. When the punch selector fingers are held to the right against the backstop, the left ends of the punch selector fingers should engage the guide comb in the left end of the punch bail by not less than one half the thickness of the comb.

b. When the main bail is in its lowest position, there should be some clearance between the backstop and the right end of all punch selector fingers. To adjust, position the punch selector finger backstop with its mounting screws loosened.

IN ORDER TO CHECK THE TWO FOLLOWING ADJUSTMENTS, IT WILL BE NECESSARY TO REMAKE THEM.

#### 86. PUNCH BAIL LINK (Figure 49 for location of parts)

a. Back off the main bail spring adjusting screw until the spring arm is in a position that will reduce the spring tension on the main bail to a minimum.

b. Back off the punch bail upstop screw.

c. Loosen the clamping screws of the punch bail link and adjust the length of the link by shifting the adjusting projections with a screwdriver so that when the LETTERS combination is selected and the unit is operated under power the LETTERS combination will be perforated and the feed hole will be just punched cleanly through the tape.

d. Restore the main bail spring adjusting screw approximately to its former setting, and tighten its lock nut.

### 87. PUNCH BAIL UPSTOP SCREW (Figure 49 for location of parts)

a. With BLANK combination selected and with the punch arm cam roller on the highest part of its cam, advance the upstop screw (in the punch bail) against the bottom plate of the punch block until an unperforated section of tape can be inserted in the punch block. Then back off the upstop screw until the tape is just held friction tight between the feed hole punch and the upper die plate. Back off the upstop screw an additional one quarter turn and tighten the lock nut.

b. Operate the unit under power with the LETTERS combination selected and determine whether or not the feed holes are punched cleanly in the tape. (By cleanly is meant a well defined hinged lid with no fibrous edges and with no appreciable tear at the hinged portion of the feed hole lid. A slight tear is permissible at the hinged portion of the code perforations.) If the feed holes are not cleanly punched, a refinement of the "PUNCH BAIL LINK" adjustment and "PUNCH BAIL UNSTOP SCREW" adjustment may be necessary.

### 88. FEED ROLL DETENT—FINAL

#### NOTE

Refer to paragraph 79 for FEED ROLL DETENT—PRELIMINARY adjustment.

Refine the adjustment of the feed roll detent eccentric so that the perforations in the tape meet the standard spacing of ten holes to the inch. This may be checked by perforating a length of tape consisting of a series of nine BLANK combinations followed by a LETTERS combination and checking it against the 95960 tape gauge.

### 89. FEED PAWL ECCENTRIC—FINAL (Figure 49 for location of parts)

#### NOTE

Refer to paragraph 80 for "FEED PAWL ECCENTRIC—PRELIMINARY" adjustment.

a. Manually rotate the main shaft until the feed pawl is in its uppermost position. Hold the detent roller away from the star wheel and continue to rotate the shaft slowly and evenly until the feed pawl is in its lowermost position. Allow the detent roller to come in contact with the feed roll star wheel. The detent roller should not tend to move the star wheel in a clockwise direction.

b. The feed pawl should rotate the feed roll one step only.

c. When the feed pawl (on its downward stroke) just engages a feed roll tooth, there should be some clearance between all punch pins and the associated engaging surfaces of the punch bail assembly.

d. The tip of the tooth on the star wheel which will be first contacted when the detent roller re-engages the star wheel to rotate it in a counterclockwise direction, must be above a line drawn through the center of the star wheel and the center of the detent roller. The four checks must be met on all ratchet teeth.

e. To adjust, position the feed pawl eccentric bushing with its locking screw loosened.

### 89.1 FEED-OUT ROLLER ECCENTRIC (FPR64 and FPR67 only) See Figure 43

a. With the feed out roller on the high part of the feed cam, the tape should be clearly punched and there should be some clearance between the punch upstop screw and its stop, as indicated by some play between the feed out roller and the feed out cam when the punch arm is manually pulled against its spring tension.

b. To adjust position the feed out roller eccentric (lower roller on the punch arm) with its lock nut loosened. If necessary, refine the "Punch Bail Upstop Screw" adjustment. Operate the Automatic Tape Feed Out Mechanism under power to recheck for clearly punched tape.

### 90. TAPE STRIPPER PLATE (Figure 44 for location of parts)

#### NOTE

In some units the tape chute serves as a tape stripper plate. In such cases, the tape chute should be adjusted to meet the following requirement:

There should be some clearance, not over .010", between the upper edge of the tape stripper plate and the feed roll. Check throughout a complete revolution of the feed roll. To adjust, position the stripper plate with its mounting screws loosened.

### 91. TAPE TENSION LEVER SPRING (Figure 52)

Hook a 32 ounce scale over the end of the slotted extension of the tape tension lever and pull at right angle to the lever. It should require a pull of 14 to 16 ounces to start the slotted extension of the lever moving away from the feed roll. To adjust, rotate the tape tension lever stud in either a clockwise or counterclockwise direction, with its lock nut loosened.

## NOTE

The above spring tension applies only to units having the new 110974 spring with 15 turns as compared to 18 turns on the spring formerly used.

## 92. SHIFT ROCKER POST (Figure 53 for location of parts)

The sides of the shift rocker post should be parallel to the platen shaft. Adjust by loosening the shift rocker post lock nut and rotating the post. Tighten the lock nut.

## 93. SHIFT ROCKER LEVER POST (Figure 54A for location of parts)

The front surface of the shift rocker lever post should be parallel to the front edge of the base plate. To adjust, rotate the shift rocker lever post with its lock nut loosened.

## 94. SHIFT BELL CRANK (Figure 53)

With the platen shaft held so that the front face of the downward extension of the shift bell crank is opposite the mark in the top surface of the shift lever, the horizontal extension of the shift bell crank should line up approximately with the vertical center line through the shift rocker bearing screw. To adjust, bend the horizontal extension of the shift bell crank.

## NOTE

Some of the early shift levers were not marked. The mark should be .140" to the rear of the forward shoulder.

## 95. SHIFT BELL CRANK GUIDE (Figure 54 for location of parts)

The platen assembly should shift freely in the shift bell crank guide slot and the printing face on the platen should be approximately horizontal. To adjust, position the shift bell crank guide with its mounting screws loosened.

## 96. SHIFT ROCKER (Figure 54)

With the main bail spring set approximately for its operating tension (14 to 15 pounds), place a .156" spacer ("a" wrench #125775) between the main bail spring adjusting lever and the spring adjusting screw so that the other end of the lever rests against the selector plate. Move the platen assembly to its forward (FIGURES) position and select the letters\* pull bar. Rotate the main shaft until the main bail roller is on the low part of its cam. This point is determined by rocking the motor shaft

clockwise and counterclockwise and observing when the shift bell crank is in its rearmost position. (Main bail in its extreme upward position.) The vertical end of the shift bell crank should overtravel the rear shoulder of the shift lever by some, not more than .015", when the play in the shift lever is taken up, at its left hand end, toward the rear of the unit. To adjust, position the shift rocker with its adjusting screw loosened, to meet this requirement. Remove the spacer.

## \*NOTE

On units equipped with "unshift on space" pull bars, select both the LETTERS and SPACE combination in succession and observe which pull bar gives the shift bell crank the least travel; select this combination to make the shift rocker adjustment.

## 97. RIBBON GUIDE (Figure 46 for location of parts)

a. The ribbon should be centrally located with respect to any type pallet.

b. The height of the ribbon guide should be such that the ribbon is held approximately 1/32" above the tape.

c. In operation, the ribbon should remain central with respect to the type pallets, and the rear should not curl.

d. Position the ribbon guide toward the front or rear to meet the first requirement. Bend the ribbon guide adjacent to the main casting to meet the second requirement. The latter requirement may be met by bending the forward end of the lower part of the ribbon guide upward to eliminate the tendency to curl.

## 98. FEED ROLL DETENT LEVER SPRING TENSION (Figure 52)

With a 32 ounce scale hooked over the detent lever at the roller and pulled at right angle to the detent lever, it should require 10 to 15 ounces to start the roller moving away from the star wheel.

## 99. PUNCH ARM SPRING TENSION (Figure 49)

With the punch arm cam roller on the low part of its cam, hook a 12 pound scale over the punch arm spring post and pull in line with the spring. It should require 3-1/2 to 4-1/2 pounds to start the roller moving away from its cam.

#### 100. PUNCH BELL CRANK SPRING TENSION (Figure 49)

With the main bail roller on the high part of its cam and the tape guide removed, hook an 8 ounce scale under the horizontal arm of each punch bell crank at the spring and pull vertically upward. It should require 2 to 3 ounces to start each bell crank moving.

#### 101. PLATEN SHIFT SPRING TENSION (Figure 46 for location of parts)

With the platen in the LETTERS position, apply the push end of a 64 ounce scale to the front end of the platen shaft and push horizontally toward the rear. It should require 5 to 7-1/2 ounces to start the shift bell crank extension moving away from the rear shoulder of the shift lever.

#### 102. PLATEN YIELD SPRING TENSION (Figure 46)

With the platen shaft held in the extreme rear position, apply the push end of a 64 ounce scale to the front end of the platen guide shaft and push horizontally toward the rear. It should require 12 to 20 ounces to start the platen block moving on the platen shaft.

#### 103. SHIFT LEVER SPRING TENSION (Figure 55)

With the shift bell crank held toward the rear (away from the shoulder on the shift lever) apply an 8 ounce scale to the shift lever and push downward in line with the right edge of the platen shaft. It should require 1/2 to 1-1/2 ounces to start the lever moving.

#### 104. TAPE GUIDE SPRING (Figure 46 for location of parts)

The tape guide spring should be positioned so that the edge of the spring is parallel to the upper edge of the punch unit casting. The curved pressure tip should engage the tape at a point opposite the cutout in the tape guide and should press the tape firmly against the rear side of the guide channel in the punch block without buckling the tape. To adjust, position the spring with its mounting screw loosened and bend the spring to provide the required spring pressure.

#### NOTE

If the tape guide prevents the tape guide spring from pressing the tape against the side of the guide channel in the punch block, add sufficient shims between the tape guide mounting post and the perforator main

bracket, to just meet the foregoing requirement. Maintain some clearance between the rear edge of the tape guide and the punch bail.

#### 105. FIGURES PULL BAR (Figure 55)

With the main shaft clutch fully disengaged and the shift bell crank fully latched in the LETTERS position, there should be .010" to .020" clearance between the toe on the figures pull bar extension and the shift lever when the main shaft clutch is fully disengaged and the shift bell crank is fully latched in the LETTERS position. To adjust, position the figures pull bar extension with its mounting screws loosened.

#### 106. MAIN BAIL SPRING (Figure 3 for location of parts)

a. The printing blow, i.e., the force with which the type bars strike the platen and the force required for shifting the platen shaft assembly from the FIGURES to the LETTERS position, should be sufficient to print good copy and obtain dependable operation.

b. With the motor running, send alternate LETTERS and FIGURES combinations to the typing reperforator unit. To adjust, back off the main bail spring adjusting screw until the platen fails to return to the LETTERS position. Then turn the screw in a clockwise direction until the platen just moves to the LETTERS and FIGURES positions without any failures. Turn the screw clockwise an additional 1-1/2 turns and tighten the lock nut. With the main shaft clutch disengaged and a 25 pound scale hooked to the spring adjusting lever directly below the spring, it should require not more than 15-1/2 pounds to start the spring adjusting lever moving.

#### 107. MAIN BAIL CAM CLUTCH TORQUE (Figure 56)

This torque should be measured after the motor has been running at least ten minutes with the main bail cam stationary. Press downward on the main bail so as to move the main bail cam roller away from its cam and at the same time hold the cam lever roller (if present) and the punch arm cam roller away from their cams. With a 32 ounce scale hooked into the screw hole on top of the main bail cam and pulled at right angle to the radius, it should require a pull of 10 to 24 ounces to start the cam moving opposite to its normal direction of rotation.

#### 108. SELECTOR CLUTCH (Figure 57)

When the motor has been running at least ten minutes with the cam sleeve held stationary,

hook a 32 ounce scale to the selector cam sleeve stop arm and pull at right angle to the stop arm. It should require 14 to 18 ounces (16 to 22 ounces with 100 word per minute spring) to hold the selector cam sleeve stationary while the shaft is running. To adjust, position the capstan nut with a screwdriver.

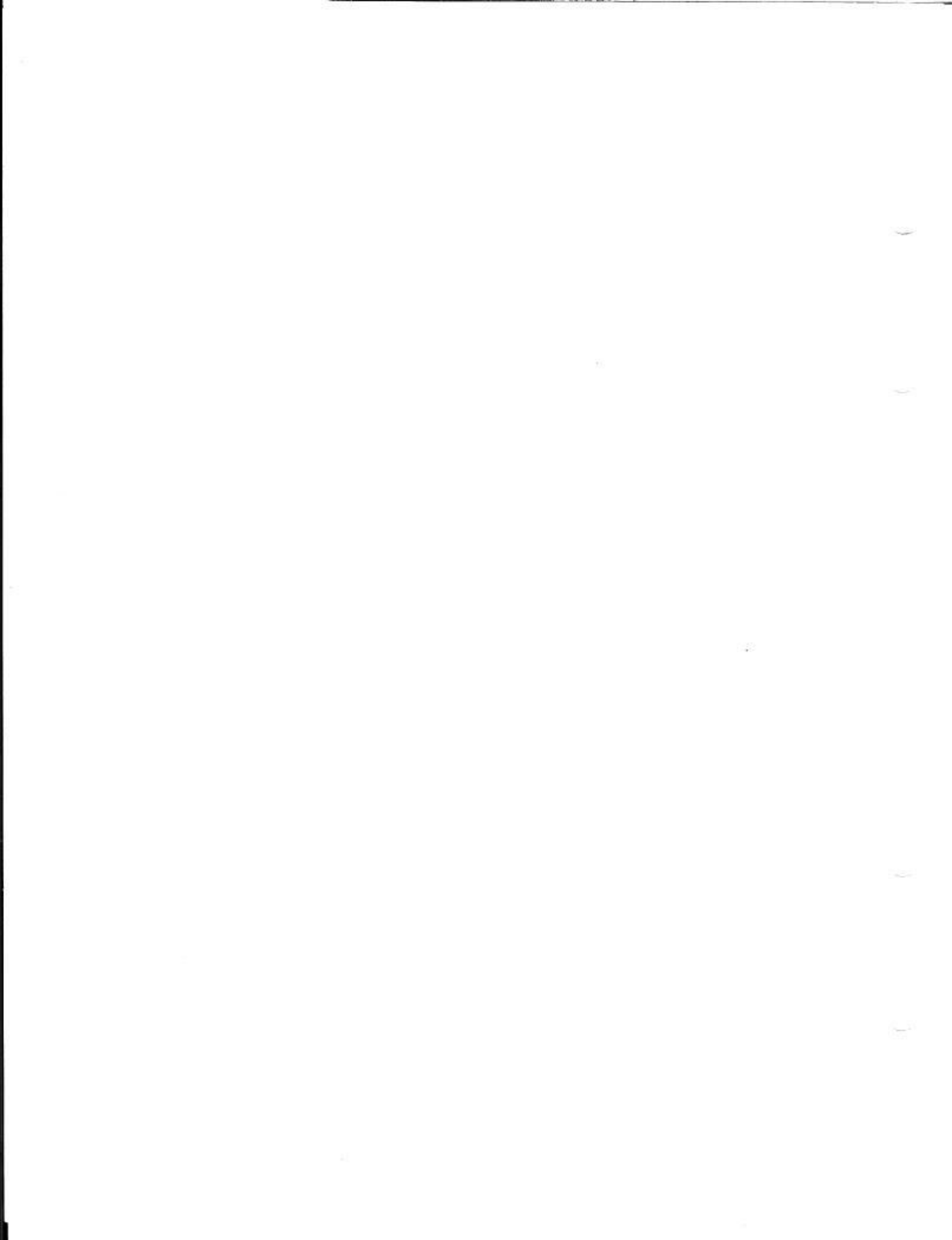
NOTE

On old style units not equipped with the 122974 capstan nut, 122838 spacer and 72517

keyed nut it may be necessary to either install these parts or to add the following shims to the old parts in order to obtain the above torque:

96763 shim (.012" thick)  
96764 shim (.016" thick)  
96765 shim (.020" thick)

To install the capstan nut, the offset ends must be held in line by using a pair of pliers or a clamp while the nut is screwed into place.



## SECTION 3

## TYPING REPERFORATOR OPTIONAL FEATURE ADJUSTMENTS

MAGNET OPERATED TAPE FEED-OUT  
MECHANISM (PULLING MAGNET)  
ADJUSTMENTS1. TAPE FEED-OUT MAGNET YOKE (Figure  
58 for location of parts)

a. When the tape feed out magnet is energized with approximately .045 amperes of current, there should be some clearance, not over .015", between the magnet armature and the magnet yoke. To adjust, add or remove shims between the magnet core and the magnet yoke.

b. The vertical projection on the magnet yoke should align with the vertical projection on the magnet. To adjust, loosen the magnet mounting screw and align the projections on the yoke and magnet. Recheck after tightening the mounting screw.

2. TAPE FEED-OUT MAGNET ARMATURE  
(Figure 58 for location of parts)

The magnet armature should be positioned approximately in the center of the adjustment provide by its mounting screw holes. To adjust, position the armature with its mounting screws loosened.

3. TAPE FEED-OUT MAGNET BRACKET (Fig-  
ures 12 and 58 for location of parts)

When the main shaft is rotated until the latching face of the stop lever is directly below the latching surface of the trip latch and the tape feed out magnet coil is energized with approximately .045 amperes of current, there should be .030" to .045" clearance between the stop lever and the tip latch. Under these conditions, the face of the magnet armature should be parallel to the ends of the magnet cores. To adjust, position the magnet bracket with its mounting screws loosened.

4. TAPE FEED-OUT MAGNET ARMATURE  
SPRING TENSION (Figure 58)

Unhook the armature spring from its spring post and hook an 8 ounce scale in the spring eye. With the armature in the unoperated position, it should require 2 to 3 ounces to extend the spring to position length. Rehook the spring.

END OF MAGNET OPERATED TAPE FEED-  
OUT MECHANISM (PULLING MAGNET)  
ADJUSTMENTSMAGNET OPERATED TAPE FEED-OUT  
MECHANISM (HOLDING MAGNET)  
ADJUSTMENTS5. MAGNET COIL AND YOKE (Figure 59 for  
location of parts)

The magnet yoke should be in line with the magnet bracket, and the clearance between the magnet coil terminals and the magnet yoke should be equal on both sides. To adjust, loosen the magnet mounting screw and position the coil and yoke. Recheck after tightening the mounting screw.

## 6. ARMATURE (Figure 59 for location of parts)

With the tape feed-out lever fully operated, the armature face should be flush against the magnet core and yoke and in line with them. To adjust, position the armature with its mounting screws loosened.

7. SPRING BRACKET (Figure 59 for location  
of parts)

The base of the spring bracket should be parallel to the axis of the magnet coil. To adjust, position the spring bracket with its mounting screws loosened.

## 8. ARMATURE SPRING TENSION (Figure 59)

With the armature unoperated, unhook the spring from the spring bracket and hook an 8 ounce scale in the spring eye and pull horizontally. It should require 3/4 ounces to 1-1/4 ounces to stretch the spring to position length.

END OF MAGNET OPERATED TAPE FEED-  
OUT MECHANISM (PULLING MAGNET)  
ADJUSTMENTSUNIVERSAL TRANSFER CONTACT  
ASSEMBLIES ADJUSTMENTS9. UNIVERSAL TRANSFER CONTACT ASSEM-  
BLY (TWO CONTACTS)—PRELIMINARY  
(See Figure 60 for location of parts)

**REMOVE THE UNIVERSAL TRANSFER CONTACT ASSEMBLY FROM THE TYPING REPERFORATOR**

- a. Remove the contact operating lever spring.
- b. The stop of the outer contact spring (farthest from the contact mounting bracket) should be parallel to the side of the mounting bracket. To adjust, bend the stop.
- c. With the middle contact spring held away from the outer contact spring, and with an 8 ounce scale hooked over the outer contact spring just above the contact points, it should require 1/2 to 1 ounce to just start each leg of the outer contact spring moving away from its stop. To adjust, bend each leg of the outer contact spring.
- d. The break and make of the contact points of the middle and outer contact springs should be approximately simultaneous. The middle contact spring should be tensioned against the outer contact spring so that the legs of the outer contact spring are forced away from their stop, some to .006". To adjust, bend the middle contact spring.
- e. With the middle contact spring resting normally against the outer contact spring, there should be .015" to .020" clearance between the contact points of the inner contact spring (nearest to the contact mounting bracket) and the contact points of the middle contact spring. The make and break of the contact points of the inner contact spring and middle contact spring should be approximately simultaneous. To adjust, bend the stop of the inner contact spring.
- f. With an 8 ounce scale hooked over the inner contact spring just above the contact points, it should require 1/2 to 1 ounce to just start each leg of the inner contact spring moving away from its stop. To adjust, bend each leg of the inner contact spring. Recheck adjustment 9 e.
- g. Rehook one end of the contact operating lever spring in the eye of the mounting bracket. With an 8 ounce scale hooked in the spring eye, and with the contact operating lever held so that it just makes contact with the insulator of the middle contact spring, it should require 6 to 8 ounces to extend the spring to the eye of the contact operating lever. Hook the spring in the eye of the lever.

**REMOUNT THE UNIVERSAL TRANSFER CONTACT ASSEMBLY ON THE TYPING REPERFORATOR**

**10. UNIVERSAL TRANSFER CONTACT ASSEMBLY (TWO CONTACTS)—FINAL (Figure 60 for location of parts)**

- a. The top surface of the contact operating lever mounting bracket should be approximately parallel to the base plate of the typing reperforator. Position this mounting bracket. The contact operating lever extension which is operated by the main bail, should be approximately midway between the No. 1 and No. 2 pull bar positions. Check with the main bail in both the upper and lower positions. Position the contact mounting bracket to meet the latter requirements.
- b. If the typing unit is equipped with switching contacts, set up the selection for a pull bar having an associated transfer contact and rotate the motor until the main bail rises sufficiently to allow the top pair of transfer contacts to just close. There should be a clearance of .025" to .035" between the insulator on the middle contact spring and the hump on the contact operating lever. To adjust, move contact operating lever bracket up or down.
- c. If the typing unit does not have a switching contact there should be approximately 1/8" between the insulator on the long contact spring and the hump on the operating lever when the bail is in its lower position. To adjust, move the contact operating lever bracket up or down.

**10.1 UNIVERSAL TRANSFER CONTACT ASSEMBLY (THREE CONTACTS)—PRELIMINARY (See Figure 60 for location of parts)**

**REMOVE THE UNIVERSAL TRANSFER CONTACT ASSEMBLY FROM THE TYPING REPERFORATOR**

- a. Remove the contact operating lever spring.
- b. The stop of the No. 5 contact spring should be parallel to the side of the contact mounting bracket. To adjust, bend the stop.
- c. With the No. 4 contact spring held away from the No. 5 contact spring, and with an 8 ounce scale hooked over the No. 5 contact spring just above the contact points, it should require 1/4 to 3/4 ounce to start each leg of the No. 5 contact spring moving away from its stop. To adjust, bend each leg of the No. 5 contact spring.
- d. With an 8 ounce scale hooked over the No. 4 contact spring just above the contact points, it should require 3 to 3-1/2 ounces to separate the contact points of the No. 4 and No. 5 contact



springs. The break and make of the contact points of the No. 4 and No. 5 contact springs should be approximately simultaneous. To adjust, bend the No. 4 contact spring. Make certain that the No. 4 contact spring forces the legs of the No. 5 contact spring .004" to .015" away from their stop.

e. With the No. 4 contact spring resting normally against the No. 5 contact spring, there should be .020" to .025" clearance between the contact points of the No. 3 and No. 4 contact springs. To adjust, bend the stop of the No. 3 contact spring.

f. With an 8 ounce scale hooked over the No. 3 contact spring just above the contact points, it should require 1/2 to 1 ounce to start each leg of the No. 3 contact spring moving away from its stop. The make and break of the contact points of the No. 3 and No. 4 contact springs should be approximately simultaneous. To adjust, bend each leg of the No. 3 contact spring. Recheck adjustment 10.1 e.

g. There should be some clearance, not more than .006" between the insulators of the No. 2 and No. 4 contact springs. To adjust, bend the No. 2 contact spring.

h. There should be .015" to .020" clearance between the contact points of the No. 1 and No. 2 contact springs. To adjust, bend the stop of the No. 1 contact spring.

i. With an 8 ounce scale hooked over the No. 1 contact spring just above the contact points, it should require 1/2 to 1 ounce to start each leg of the No. 1 contact spring moving away from its stop. The make and break of the contact points of the No. 1 and No. 2 contact springs should be approximately simultaneous. To adjust, bend each leg of the No. 1 contact spring. Recheck adjustment 10.1 h.

j. Rehook one end of the contact operating lever spring in the eye of the mounting bracket. With an 8 ounce scale hooked in the spring eye, and with the contact operating lever held so that it just makes contact with the insulator of the No. 4 contact spring, it should require 6 to 8 ounces to extend the spring to the eye of the contact operating lever. Hook the spring in the eye of the lever.

#### REMOUNT THE UNIVERSAL TRANSFER CONTACT ASSEMBLY ON THE TYPING REPERFORATOR

#### 10.2 UNIVERSAL TRANSFER CONTACT ASSEMBLY (THREE CONTACTS)—FINAL (See Figure 60A for location of parts)

a. The top surface of the contact operating lever mounting bracket should be approximately parallel to the base plate of the Typing Reperforator. Position this mounting bracket. With the contact mounting bracket located as far to the right as possible and the contact operating lever between No. 1 and No. 2 pull bars, there should be at least .020" clearance between both pull bars and the contact operating lever. Check with the main bail in both the upper and lower positions. Make certain that at least .020" clearance also exists between the contact operating lever and the main bail guide when the lever is held to make the clearance a minimum. Position the contact mounting bracket to meet the latter requirements.

b. Select a pull bar having an associated transfer contact ("Figs." or "H" pull bar) and rotate the motor until the main bail rises sufficiently to allow the top pair of contacts to just close. There should be .025" to .035" clearance between the insulator on the No. 4 contact spring and the hump on the contact operating lever. Also, the contact operating lever should engage the insulator by at least the full thickness of the lever when the main bail is in its uppermost position. To adjust, position the contact operating lever mounting bracket up or down. Recheck adjustment 10.2 a. and readjust if necessary.

#### NOTE

When installing a cover over the typing reperforator and associated base, make certain that the cover stop arm does not interfere with the mounting bracket of the universal transfer contact assembly. If necessary, bend the cover stop arm to the left.

#### END OF UNIVERSAL TRANSFER CONTACT ASSEMBLIES ADJUSTMENTS

#### TAPE FEED-OUT COUNTER MECHANISM ADJUSTMENTS

#### REMOVE COVER FROM THE COUNTER MECHANISM

#### 11. WORM FOLLOWER BAIL SPRING TENSION (Figure 62)

a. The type of counter unit shown in Figure 62, used on typing reperforator units equipped with main bail roller guides, should meet the following requirement:

With the worm follower resting in the bottom of a groove of the worm and the magnet armature contacts held away from the

armature, hook an 8 ounce scale over the end of the armature and pull vertically upward.

It should require 1/2 to 1-1/2 ounces to start the worm follower moving downward away from the worm.

b. The type of counter unit shown in Figure 61 should meet the following requirement:

Remove the magnet armature spring from the spring post. With the worm follower held in the bottom of a groove in the worm, hook an 8 ounce scale over the armature near the bend and pull vertically upward. It should require 3 to 6 ounces to start the lower armature extension moving away from the worm follower bail. Replace the spring.

#### NOTE

While taking this spring tension, there should be some clearance between the bottom of the bakelite piece on the No. 4 contact spring and the magnet armature. If necessary, hold the No. 4 contact away from the magnet armature to obtain this clearance.

#### 12. TAPE FEED-OUT CONTAINER MAGNET ARMATURE SPRING TENSION (Figure 61)

#### NOTE

This requirement applies only to counter units having a spring attached to the armature as shown in Figure 61.

Unhook the worm follower bail spring. With the worm follower pin resting in the bottom of a groove in the worm and with some clearance existing between the insulator on the No. 4 contact spring and the magnet armature (hold the No. 4 spring if necessary), hook an 8 ounce scale under the end of the armature and pull vertically upward. It should require 1/2 to 1-1/2 ounces to start the magnet armature moving. Rehook the spring.

#### REPLACE THE TAPE FEED-OUT COUNTER MECHANISM COVER

#### 13. WORM FOLLOWER BAIL (Figures 61, 62, and 63 for location of parts)

The position of the worm follower bail on the ribbon reverse shaft should be such that the front edge of the extension of the worm follower bail is approximately in line with the front edge of the magnet armature extension. To adjust, loosen the worm follower bail sleeve set

screw and position the sleeve. Before tightening the set screw position the sleeve so that the set screw is accessible when a screwdriver is inserted in the space between the code bar bell cranks and the extreme right-hand type bar.

#### 14. COUNTER WORM SHAFT (Figure 64 for location of parts)

a. The worm shaft should be centrally located endwise in its bracket.

b. The shaft should be free to turn with minimum end play.

c. To meet the first requirement, loosen the worm set screw and the collar set screw. Locate the worm shaft centrally with relation to its bracket, then push the worm and the two washers against the rear vertical projection of the bracket and tighten the worm set screw. To meet the latter requirement, unhook the worm shaft spring and position the collar on the shaft by means of its set screw. Rehook the spring.

#### 15. WORM FOLLOWER CONTACT SPRINGS (Figure 65A)

##### a. CONTACT SPRINGS

With the push end of an 8 ounce scale applied to the front contact spring near the contact point, it should require 2 to 4 ounces to start the spring moving away from its stop. To adjust, remove and bend the front contact spring.

##### b. CONTACTS

There should be a gap of .015" to .025" between the contact points. To adjust, bend the rear contact spring.

#### 16. WORM FOLLOWER CONTACT BRACKET (Figure 65B)

When the worm follower is resting in the groove at the end of the worm, the contact should be closed with some overtravel, not more than .010", measured between the front contact spring and the lower edge of the stop. To adjust, position the contact bracket.

#### 17. TAPE FEED-OUT COUNTER MAGNET (Figure 66)

When the magnet coil is energized with approximately .060 amperes of current, there should be some clearance, not over .015", between the magnet armature and the two ends of the magnet yoke. To adjust, add or remove shims between the magnet mounting core and the magnet yoke.

## NOTE

When tightening the magnet mounting screw, position the magnet so that the magnet terminals are approximately equidistant from the magnet yoke.

#### 18. TAPE FEED-OUT COUNTER MAGNET YOKE (Figure 67)

When the magnet coil is energized with approximately .060 amperes of current, the worm follower should clear the high part of the worm by .015" to .030". To adjust, position the magnet yoke with its mounting screws loosened.

#### 19. TAPE FEED-OUT COUNTER MAGNET ARMATURE CONTACTS (Figures 68A and 68B)

For reference purposes, the contact springs are numbered 1 to 5 from top to bottom. See figure 68.

a. With an 8 ounce scale hooked to contact spring No. 2 or No. 5 near the contact point, and contact springs No. 1 and No. 4, respectively, held upward to clear No. 2 and No. 5 contacts, it should require not less than 2 ounces to start No. 2 and No. 5 contact springs, respectively, moving away from their stops. See Figure 68B. To adjust, bend contact springs No. 2 and No. 5.

b. When the magnet coil is energized with approximately .060 amperes of current, there should be .040" to .050" clearance between the contact points of No. 4 and No. 5 contact springs. See Figure 68B. To adjust, position the contact bracket with its mounting screws loosened.

c. With an 8 ounce scale hooked to No. 4 contact spring near the contact point, it should require 1-1/2 to 3 ounces to separate the contact points of No. 4 and No. 5 contact springs. See Figure 68A. To adjust, bend the No. 4 contact spring.

d. With an 8 ounce scale hooked to No. 3 contact spring near the contact point, it should require 1-1/2 to 2-1/2 ounces to start the contact spring moving away from its stop. See Figure 68A. To adjust, bend the No. 3 contact spring.

e. With the magnet armature in its unoperated position, there should be a gap of .010" to .015" between the contact points of No. 3 and No. 4 contact springs. See Figure 68A. To adjust, bend the No. 3 contact spring stop and recheck the contact spring tension.

f. When the magnet coil is energized with approximately .060 amperes of current, there should be a gap of .010" to .020" between the contact points of No. 1 and No. 2 contact springs. See Figure 68B. To adjust, bend the No. 2 contact spring stop and recheck the contact spring tension.

g. With the magnet armature in its unoperated position and an 8 ounce scale applied to No. 1 contact spring near the contact point, it should require 1-1/2 to 2-1/2 ounces to separate the contact points of No. 1 and No. 2 contact springs. (See Figure 68A). To adjust, bend the No. 1 contact spring.

#### 20. WORM FOLLOWER BACKSTOP (Figures 64 and 67)

The worm follower contact should close with not less than 140 operations of the cam lever. To adjust, proceed as follows:

a. Position the worm follower backstop as far toward the rear on its bracket as the elongated mounting holes will permit (Figure 64). Hold the magnet armature in its operated position in order to fully return the worm follower. In this position the worm follower should rest against its backstop. If it does not, move the backstop forward until it just touches the worm follower.

b. Rotate the main shaft to a position where the manual operation of the cam lever will advance the worm shaft ratchet one tooth at a time. With the worm follower in its rearmost position, operate the cam lever by pressing toward the left, at its forward end. Continue to operate the cam lever and count the number of operations until the worm follower contacts just close. It should require not less than 140 operations to accomplish the contact closure. If less than 140 operations are required, recheck the "WORM FOLLOWER BAIL" adjustment and readjust the worm follower backstop. See Figures 64 and 67 for location of parts.

#### 21. WORM FOLLOWER SPRING TENSION (Figure 63)

With the worm follower bail held so that the worm follower pin is away from the worm, hook an 8 ounce scale over the end of the worm follower and pull approximately parallel to the spring. It should require 1-1/2 to 3-1/2 ounces to move the worm follower against the insulator of the rear contact spring.

## 22. WORM FEED PAWL SPRING TENSION (Figure 69)

With the cam lever on the high part of its cam, hook an 8 ounce scale over the end of the feed pawl at the spring hole and pull in line with the spring. It should require 3 to 5-1/2 ounces to start the pawl moving.

## 23. CAM LEVER SPRING TENSION (Figure 70)

With the cam lever roller on the low part of its cam, hook a 64 ounce scale over the cam lever at the spring hole and pull in line with the spring. It should require 28 to 38 ounces to start the lever moving.

### END OF TAPE FEED-OUT COUNTER MECHANISM ADJUSTMENTS

#### TAPE FEED-OUT PUSH BUTTON ADJUSTMENTS

## 24. PUSH BUTTON CONTACTS (Figure 71A)

There should be .010" to .050" gap between the contact points when the push button is held fully depressed. To adjust, bend the contact spring stop.

## 25. PUSH BUTTON CONTACT SPRINGS (Figure 71)

a. With the push end of an 8 ounce scale applied to the shorter contact spring directly above the contact point, it should require a push of 3-1/2 to 6 ounces, applied as nearly horizontal as possible, to start the contact spring moving away from its stop (Figure 71A). To adjust, bend the shorter contact spring.

b. With the push end of an 8 ounce scale applied to the head of the push button, it should require a push of 4 to 8 ounces to separate the contacts (Figure 71B). To adjust, bend the longer contact spring.

### END OF TAPE FEED-OUT PUSH BUTTON ADJUSTMENTS

#### SIGNAL BELL MECHANISM ADJUSTMENTS

## 26. PULL BAR LOCKOUT LEVER (Figures 72 and 73)

a. With the platen in the FIGURES position, the BLANK combination selected and the main shaft rotated until the main bail is in its uppermost position, there should be .004" to .040" clearance between the S or J pull bar (according to type) and the code bars (Figure 72C).

b. There should be .004" to .040" clearance between the BELL pull bar and the code bars when the foregoing selection is applied with the platen in the LETTERS position (Figure 73C).

c. With the platen in the FIGURES position, the BELL combination selected and the main shaft rotated until the main bail has moved to approximately .010" below the BELL pull bar notch, there should be at least .010" clearance between the BELL pull bar and the lockout lever roller that is in contact with the S or J pull bar (Figure 72A and B). When measuring this clearance the play of the platen shaft, the shift rocker and the lockout lever should be taken up in the direction that minimizes the clearance.

d. To adjust, position the adjusting lever with its mounting screws loosened.

#### NOTE

As an increase in pull bar clearance also increases the load on the platen shift return spring, the platen shift mechanism should be checked (manually) for correct operation.

## 27. BELL HAMMER POST (Figure 74 for location of parts)

With the BELL pull bar selected and the main bail at its highest point, the tip of the BELL pull bar toe should be in line with the outside surface of the bell hammer. Check this adjustment by holding the bell hammer spring to one side and sighting along the side of the bell hammer. To adjust, position the bell hammer post.

## 28. BELL HAMMER ECCENTRIC SCREW (Figure 74)

a. Units which do not have a type bar associated with the BELL pull bar should be adjusted as follows: With the BELL pull bar selected and the main bail in its uppermost position, there should be a clearance of .065" to .085" between the bell hammer lip and the bell hammer post.

b. Units in which a type bar is operated by the BELL pull bar should be adjusted as follows: With the BELL pull bar selected, there should be a clearance of .020" to .040" between the bell hammer lip and the bell hammer post when the BELL type bar is held against the platen. To adjust, position the bell hammer eccentric screw with its lock nut loosened.

## 29. SIGNAL BELL

The signal bell should be positioned so as to obtain the most satisfactory tone. It should also be positioned to provide at least .010" clearance between the bell and all brackets and screws, and at least .004" between the bell and the tape chute or platform. To adjust, position the signal bell with its mounting screw loosened.

END OF "SIGNAL BELL MECHANISM"  
ADJUSTMENTS

"MECHANICAL END-OF-LINE INDICATOR  
MECHANISM" ADJUSTMENTS

## 30. INDICATOR WORM SHAFT (Figure 75)

The worm shaft should be free to rotate, with a minimum amount of end play, when the worm shaft spring is detached from the contact bracket. To adjust, position the worm shaft collar with its set screw loosened.

## 31. LAMP CONTACTS (Figure 75)

a. With the push end of an 8 ounce scale applied to the front contact spring near the contact point, it should require 3 to 4 ounces to start the spring moving away from its stop. To adjust, remove the spring from the contact assembly and bend it.

b. There should be a gap of .015" to .025" between the contacts. To adjust, bend the rear contact spring.

## 32. CONTACT BRACKET (Figure 76)

With the worm follower resting in the groove at the front end of the worm shaft, the lamp contacts should be closed and there should be some, not more than .010" clearance between the front lamp contact spring and the lower end of its stop. To adjust, position the contact bracket with its mounting screws loosened.

## 33. WORM FOLLOWER (Figure 75 for location of parts)

The lamp contacts should not close sooner than the 62nd operation of the printer and not later than the 67th operation, when the printer is operated under power. To adjust, rotate the main shaft to a position where the manual operation of the cam lever will advance the worm shaft ratchet one tooth at a time. With the worm follower in its rearmost position, operate the cam lever by pressing toward the left at its forward end until the pin on the worm follower just enters a thread on the worm. Continue to operate the cam lever 62 additional times. Then adjust the position of the release bail by means

of the sleeve and the adjusting bracket mounting screws, so that the contacts just close. Check the adjustment several times with the printer operating under power.

## 34. WORM FOLLOWER SPRING TENSION (Figure 77)

Hook an 8 ounce scale over the end of the worm follower and pull approximately parallel to the spring, holding the release bail so that the follower pin is away from the worm. It should require 1-1/2 to 3-1/2 ounces to move the worm follower to a point where it touches the rear contact spring insulator.

## 35. RELEASE BAIL SPRING TENSION (Figure 78)

Hook a 32 ounce scale over the edge of the release bail near the spring hole, and pull upward. It should require 7 to 11 ounces to start the bail moving.

## 36. WORM FEED PAWL SPRING TENSION (Figure 69)

With the cam lever roller on the high part of the main bail cam, hook an 8 ounce scale over the end of the feed pawl at the spring hole and pull in line with the spring. It should require 3 to 5-1/2 ounces to start the feed pawl moving.

## 37. CAM LEVER SPRING TENSION (Figure 70)

With the cam lever roller on the low part of the main bail cam, hook a 64 ounce scale over the cam lever at the spring hole and pull in line with the spring. It should require 28 to 38 ounces to start the cam lever moving.

END OF "MECHANICAL END-OF-LINE  
INDICATOR MECHANISM" ADJUSTMENTS

BACKSPACE MECHANISM REQUIREMENTS

## 38. RIBBON LIFT LEVER SPRING TENSION (Figure 79)

Hook a 32 ounce spring scale under the ribbon lift lever directly below the spring hole and pull vertically upward. It should require at least 28 ounces to start the lever moving.

## 39. BACKSPACE LEVER SPRING TENSION (Figure 80)

Hook an 8 ounce spring scale beneath the rear extension of the backspace lever at the back side of the main bracket and pull upward at a right angle to the lever. It should require 1 to 2-1/2 ounces to start the lever moving.

#### 40. BACKSPACE FEED PAWL SPRING TENSION (Figure 80)

Hook an 8 ounce scale over the end of the backspace feed pawl and pull in line with the spring. It should require 1/2 to 1-1/2 ounces to start the feed pawl moving.

#### 41. FEED PAWL SPRING TENSION (Figure 81)

With the main bail cam in the stop position, hook a 32 ounce scale to the feed pawl just above the curved bearing portion shown in the figure and pull horizontally toward the left. It should require 7 to 10 ounces to start the feed pawl moving away from the feed roll.

#### NOTE

The lower end of the spring connected to a feed pawl with long spring hole extension should be in the right hand notch of the spring post. Springs connected to pawls with short extensions should be in the left hand notch of these posts.

The backspace mechanism should be capable of backspacing a length of tape containing 72 characters of regular text matter with one LETTERS combination after each nine characters by consecutively depressing the backspace lever 72 times. The tape should not buckle or be damaged by the backspace operation. It may be necessary to refine the "PUNCH BAIL UPSTOP SCREW" adjustment or to remove dirt and burrs from the parts.

#### END OF "BACKSPACE MECHANISM" REQUIREMENTS

#### CLUTCH THROWOUT LEVER CONTACT MECHANISM ADJUSTMENTS

#### 42. THROWOUT LEVER CONTACTS (Figure 82)

a. When an 8 ounce scale is hooked over the end of each short contact spring at the contact point and pulled horizontally at right angle to the springs, it should require 1/2 to 2 ounces to start the short contact springs moving away from their stops.

To adjust, bend the short contact springs. Tension of the contact spring may be increased either by removing the spring from the pileup and bending, or by inserting a bank pin between the spring and the stop near the clamped ends and squeezing the spring and its stop together with pliers.

#### NOTE

It may be found convenient to remove the bracket and spring assembly from the selector mounting plate to make these a. and b. adjustments.

b. There should be a gap of .015" to .020" between each pair of contact points. To adjust, bend the long contact springs.

#### 43. THROWOUT LEVER CONTACT BRACKET (Figure 82)

a. With the clutch throwout lever on the high part of the driven clutch member, hook an 8 ounce scale over the end of each short contact spring at the contact point and pull at right angle to the spring. It should require a pull of not less than 1/2 ounce to separate each contact point. To adjust, position the contact bracket with its mounting screws loosened.

#### NOTE

After the preceding adjustment has been made, the following requirement should be met:

b. With the main shaft in its stop position, there should be some clearance between the clutch throwout lever and the insulator of the long contact spring (Figure 82). If this requirement cannot be met, it will be necessary to remake THROWOUT LEVER CONTACT adjustment, Paragraph 42 b., by bending the short contact spring with its stop and then bending the long contact spring to meet the specified requirements. Then recheck a. of THROWOUT LEVER CONTACT adjustment.

#### END OF CLUTCH THROWOUT LEVER CONTACT MECHANISM ADJUSTMENTS

#### AUTOMATIC TAPE FEED-OUT MECHANISM (FPR 64)

#### 44. FEED-OUT DETENT ECCENTRIC (Figure 112 for location of parts)

With the feed-out clutch shaft manually rotated until the trip lever has fully disengaged the driven clutch, the concave portion of the projection on the detent cam should engage the detent roller. To adjust, position the detent lever bearing eccentric stud, with its lock nuts loosened, so that the detent lever is at its highest point.

#### 45. DETENT LEVER SPRING TENSION (Figure 113)

With the detent lever roller on the low part

of its cam; hook a 32 ounce scale over the detent lever just below the roller and pull at right angle to the lever. It should require from 8 to 12 ounces to start the detent roller moving away from its cam.

46. FEED-OUT GEAR (Figures 112 and 114 for location of parts)

There should be some backlash, not more than .010" as gaged by feel, between the clutch driving member gear and its driving gear on the main shaft. To adjust, position the feed-out assembly on the base plate with its mounting screws loosened.

47. FEED-OUT CLUTCH TEETH (Figure 114)

With the motor running, engage and disengage the clutch a few times. With the driven clutch thus disengaged by the trip lever stud and with the play in the driving clutch member taken up in a direction to make clearance between clutch teeth a minimum, there shall be a clearance of .010" to .020" between the teeth of the two clutch members. To adjust, stop motor, remove trip lever stud and add or remove shims between trip lever mounting stud and casting.

48. FEED-OUT CLUTCH SPRING TENSION (Figure 115)

With the clutch teeth engaged, rotate the driving clutch member just enough to eliminate friction between the clutch teeth. Hook a 32 ounce spring scale over the throwout cam of the driven clutch and pull in line with shaft. It shall require from 21 to 25 ounces to just separate the teeth.

NOTE

For clutch solenoid assembly adjustments: Connect solenoid energizing adapter cord to the 15 prong plug. Connect adapter cord to 115 volts d.c. power supply. Place the adapter cord toggle switch in the clutch solenoid 'ON' position.

49. TRIP LEVER ADJUSTING SCREW (Figure 112)

With the clutch solenoid energized (approximately 215 milliamperes), there should be from .003" to .008" clearance between the trip lever stud and the high part of the disengaging cam on the driven clutch member. To adjust, position the trip lever adjusting screw with its lock nut loosened.

50. TRIP LEVER SPRING TENSION (Figure 113)

With the trip lever stud free of the disengaging cam on the driven clutch member, hook a 32 ounce spring scale under the trip lever, between the spring eye and the trip lever stud close to the spring, and pull at right angle to the lever. It should require from 8 to 10 ounces to start the trip lever moving.

51. CLUTCH SOLENOID TRAVEL LIMIT SCREW (Figure 113)

With the clutch solenoid unoperated, the trip lever stud on the low part of the clutch disengaging cam, and with the solenoid bell crank resting against the solenoid travel limiting screw, there should be from .020" to .030" clearance between the bell crank and the trip lever adjusting screw. To adjust, position the solenoid travel limit screw with its lock nut loosened.

52. CLUTCH SOLENOID CONTACTS (Figure 113 for location of parts)

With the trip lever stud on the low part of its cam the solenoid sensitive switch contacts should be open. To adjust, position the solenoid contact adjusting screw in the trip lever extension until the contacts just open as indicated by a continuity meter; then increase the contact opening by turning the screw an additional quarter of a turn.

53. METERING WORM FOLLOWER (Figure 116 for location of parts)

The worm follower should have not more than .005" end play at its shoulder screw. To adjust, add .004" (82392) shims between the head of the shoulder screw and contact lever.

54. METERING MAGNET BRACKET (Figure 117)

a. Loosen the bracket mounting screws. Loosen the bearing bracket mounting screw friction tight. Press the armature (preliminary) flat against the core and tighten the bearing bracket mounting screw. Manually hold the worm follower in engagement with and at the point on the worm where least clearance is found between armature and pole piece. There should be from .003" to .006" clearance between the armature and pole piece measured at the closest point.

b. Release and manually hold the follower in engagement with an end of the worm. There should be at least .003" clearance between the armature and the pole piece measured at their closest point.

c. Again release, place, and manually hold the follower in the opposite end of the worm. There should be at least .003" clearance between the armature and pole piece measured at the closest point.

d. To adjust, position the magnet bracket by rotating it about its upper mounting screw.

#### 55. METERING MAGNET ARMATURE (Figure 118)

With the armature held by its spring, against the armature upstop on the armature bearing bracket, there should be from .015" to .025" (.030" if necessary) clearance between the armature and the pole piece measured at the closest point. To adjust, remove the bearing bracket and bend the armature between its spring hole and bearing extensions. Bend away from the bearing bracket stop to increase and toward the stop to decrease this air gap. Recheck and if necessary readjust the magnet bracket as directed in paragraph 54 above.

#### 56. METERING MAGNET ARMATURE SPRING TENSION (Figure 118)

With an 8 ounce scale hooked over the armature at its spring hole and pulled in line with the spring, it should require from 3 to 5 ounces to start the armature moving.

#### 57. METERING FEED-OUT CONTACT ADJUSTING SCREW POSITION (Figure 116 for location of parts)

When contacts are closed, the contact arm should be approximately perpendicular and the contacts should engage squarely with less than .002" at either top or bottom.

#### 58. METERING CONTACT ARM SPRING TENSION (Figure 116)

With the metering contacts closed and with the tape feed-out lever held away from the contact arm, hook an 8 ounce scale under the contact arm just below the contact, and pull at right angle to the arm. It shall require from 2-1/2 to 4-1/2 ounces to start the arm moving.

#### 59. METERING FOLLOWER ARM STOP SCREW (Figure 116)

With the armature operated and the follower arm held against its return stop screw, there should be at least .010" clearance between the arm and the intermediate gear. To adjust, position the stop screw with its lock nut loosened.

#### 60. WORM FOLLOWER RETURN SPRING TENSION (Figure 116 for location of parts)

The spring shall have sufficient tension to return the follower to its rest position when the metering magnet is de-energized after the worm follower has traveled approximately 1/8" from its rest position, but the tension shall not be so great as to restrict the travel of the follower when "Blank" tape is being fed out.

#### 61. METERING TAPE FEED-OUT ADJUSTING SCREW (Figure 119)

a. With the worm rotated until the follower is at the extreme limit of its travel, but not disengaged from the last tooth on the worm, there should be at least .005" clearance between the feed-out contacts.

b. To adjust, position the contact lever with the feed-out adjusting screw loosened. Connect the motor power cord to the 115 volts a.c. power supply. Connect the 15 prong plug to the 15 slot receptacle of special W.U. 39-A test box. Connect the test box power plug to 115 volts d.c. power supply. Place test box toggle switch in the "ON" position. Start at least a 90" length of perforator tape feeding through the printer reperforator tape channel. Depress the Tape Feed-Out button of the test box.

c. The reperforator shall perforate a minimum of 30" of tape before the feed-out contacts are opened and the unit is stopped. Refine the tape feed-out adjusting screw if necessary, to obtain the minimum of 30" of tape.

d. Recheck and readjust, if necessary, the feed-out contact adjusting screw to obtain at least .005" clearance between the contacts when the follower is at extreme limit of travel. Place the typing reperforator motor switch and the test box toggle switch in the "OFF" positions. Disconnect the typing reperforator from power source and test box.

#### AUTOMATIC TAPE FEED-OUT MECHANISM (FPR 67)

#### NOTE

The FPR 67 is similar to the FPR 64 except that it has the improved Automatic Tape Feed-Out Mechanism 129242 and electrical plug and cable arrangement with a special base plate to accommodate these assemblies.



## 62. FEED-OUT CLUTCH TEETH (Figure 120)

With the driven clutch disengaged by the clutch trip stud and the play in the driving clutch member taken up in a direction to make clearance between clutch teeth a minimum, there should be a clearance of .010" to .020" between the teeth of the two clutch members. To adjust, add or remove No. 7654 shims between the armature stud and the casting.

## 63. FEED-OUT DETENT ECCENTRIC (Figure 121 for location of parts)

With the feed-out clutch shaft manually rotated until the trip lever has fully disengaged the driven clutch, the concave portion of the projection on the detent cam should engage the detent roller. To adjust, position the detent lever bearing eccentric stud, with its lock nuts loosened, so that the detent lever is at its highest point, or the requirements are met.

## 64. CLUTCH TRIP ARMATURE LEVER (Figure 121)

With the clutch magnets energized, i.e. with the armature pulled down to the magnet cores, there should be .008" to .012" clearance between the clutch trip stud and the top of the highest part of the disengaging cam on the driven clutch member. To adjust, remove the coils and add or remove the No. 82392 shims provided for this purpose. Replace the coils and recheck adjustment.

## 65. CLUTCH MAGNET SWITCH (Figure 122 for location of parts)

This switch, operated by the extension on the clutch trip armature, should be positioned so as to operate (close contacts) and have a minimum overtravel of .015" when the armature rests against the magnet cores, and to open the contacts when the clutch is disengaged with magnets de-energized. To adjust, position the switch bracket with its mounting screws loosened.

## 66. METERING INTERMEDIATE GEAR (Figure 123)

Throughout one complete revolution of the intermediate gear there should be some, but not more than .008", backlash between this gear and the worm. To adjust, position the stud bearing with its mounting nut loosened. Retighten the stud bearing nut and recheck the backlash.

## 67. METERING WORM FOLLOWER STUD (Figure 122)

When the armature is unoperated, there should be .010" to .020" between the outside diameter of the worm and the end of the tip on the follower stud throughout its travel along the entire length of the worm. To adjust, proceed as follows:

a. With the clamp plate screw loosened, press the armature flat against the yoke and the magnet core, bring the notch edge of the clamp plate against the armature and retighten the clamp plate screw.

b. Position the stud clearance adjusting screw with its lock nut loosened.

c. If the requirements of subparagraph a. are not met, refine the "METERING INTERMEDIATE GEAR" adjustment.

## 68. METERING SWITCH (Figure 123 for location of parts)

With the worm follower stud engaged in the last spiral of the worm (farthest from intermediate gear) the switch should be operated (open) with a minimum of .015" overtravel. To adjust, position the switch bracket with its mounting screws loosened.

## 69. METERING TAPE FEED-OUT ADJUSTING SCREW (Figure 123 for location of parts)

Up to approximately 40" of tape may be fed-out automatically. To adjust, position the metering tape feed-out adjusting screw for desired length of tape.



## SECTION 4

## TYPING REPERFORATOR BASE ADJUSTMENTS

## KEYBOARD BASE ADJUSTMENTS

## REMOVE THE BASE COVER PLATE

1. UNIVERSAL BAR PILOT SCREW (Figure 83 for location of parts)

The trip off pawl should be approximately midway between the sides of the slot in the casting, and the universal bar should have some end play, not more than .010". To adjust, position the universal bar pilot screws.

2. TAPE OUT LEVER ADJUSTING CLAMP (Figure 84)

There should be a clearance of 1/4" (plus or minus 1/32") between the tape out lever and the tape reel roller, with the locking pawl touching the front face of the bell hammer extension and the play of the bell hammer taken up in a direction away from the bell. To adjust, position the adjusting clamp with its clamping screw loosened, making sure that the locking pawl bushing has no end play between the shoulder on the shaft and the adjusting clamp, when the clamping screw has been tightened.

3. TRIP OFF PAWL STOP PLATE (Figure 83)

There should be .040" to .060" clearance between all keylevers and the universal bar. To adjust, position the trip off pawl stop plate with its mounting screws loosened.

4. BELL HAMMER BRACKET (Figure 85)

There should be some clearance, not more than .008", between the bell hammer extension and the bell operating post when the bell hammer is held in its locked position by the locking pawl. To adjust, remove the tape reel container and position the gear guard with its mounting screws loosened.

5. BELL (Figure 86)

There should be .002" to .004" clearance between the bell hammer and the bell when the bell hammer is resting against the gear guard. To adjust, position the bell with its mounting screw loosened.

## NOTE

The above clearance should be .005" to .020" on units equipped with the 111691 Bell Hammer Assembly.

6. BELL HAMMER EXTENSION STOP (Figure 85)

With the locking pawl engaging the bell hammer extension, there should be .020" to .040" clearance between the lower side of the bell hammer extension and the bell hammer extension stop. To adjust, position the bell hammer extension stop with its mounting screw loosened.

7. BELL HAMMER SPRING TENSION (Figure 86)

With the bell hammer resting against the gear guard, hook an 8 ounce scale in the spring hole and pull in the line with the spring. It should require 3 to 5 ounces for the one piece design, which measures approximately two inches in length between the pivot points, or 2 to 4 ounces for the two piece design, which measures approximately 1 inch between the pivot points, to start the hammer moving.

8. TAPE OUT LEVER SPRING TENSION (Figure 84 for location of parts)

Remove the locking pawl spring. Hook an 8 ounce scale in the spring hole of the locking pawl and pull toward the rear of the base. With the bell operating post rotated out of the way it should require 3 to 4-1/2 ounces to cause the locking pawl to just butt against the bell hammer extension.

## NOTE

The spring tension requirement on units equipped with the tape out contact assembly should be 6 to 8 ounces.

9. LOCKING PAWL SPRING TENSION (Figure 87)

With the locking pawl resting against the front face of the bell hammer extension and the tape out lever held down, hook an 8 ounce scale in the spring hole and pull in line with the spring toward the front. It should require 1/2 to 1-1/2 ounces to start the pawl moving.

10. LOCK LOOP SPRING TENSION (Figure 88)

Rotate the transmitting shaft until the lock loop roller is resting on the low part of its cam. Hook an 8 ounce scale in the lock loop spring hole and pull in line with the spring. It should require 4 to 5 ounces to start the lock loop moving.

### 11. TRANSMITTING CAM SLEEVE (Figure 89)

The transmitting cam sleeve should have some end play, not more than .002". To adjust, loosen the adjusting nuts and position the bushing in the rear bearing bracket between them. Retighten the nuts.

### 12. LOCKING LEVER SHAFT (Figure 88)

With the locking levers in the spacing position and all the contact levers on the high part of their cams, there should be some clearance, not more than .010", between the contact levers and the locking levers when the locking levers are pressed downward by hand to make this clearance a minimum. To adjust, position the locking lever shaft with its mounting nuts loosened.

### 13. LOCKING LEVER (Figure 88)

With the LETTERS key depressed and the lock loop roller resting on the low part of its cam, there should be at least .010" clearance between any locking lever finger and the lock loop blade. Make a similar check when the BLANK key is depressed. To adjust, position the main bracket with its four mounting screws loosened.

### 14. CONTACT LEVER COMPRESSION SPRING PRESSURE

The compression spring between the contact levers and the front bracket should exert sufficient pressure against the contact levers to hold the contact levers where they are placed. Check this requirement on all contact levers when they are in their indents on the transmitting cams, and not under pressure from the contact springs.

### 15. TRANSMITTING CONTACTS (Figure 88)

With each contact lever on the high part of its cam, the contact gap should be .017" to .025" (.015" to 0.25" for start-stop contacts).

#### NOTE

If no signal measuring device is available, ALL contact gaps should be:

.017" to .023" for units operating at 60 or 75 WPM

.020" to .025" for units operating at 100 WPM

To adjust, bend the shorter contact springs.

### 16. TRANSMITTING CONTACT SPRINGS (Figure 90)

With each contact lever on the low part of

its cam, it should require a pressure of 4-1/2 to 5-1/2 ounces to open the contact when pressing against the spring above the contact point. To adjust, bend the longer contact spring. Recheck the contact gap adjustment (Paragraph 15 above).

### 16.1 LOCK LOOP BACKSTOP ADJUSTMENT (Figure 111)

With the lock loop held against the backstop screw there should be .020" to .060" clearance between the lock loop roller and the lock loop cam when the transmitting cam sleeve is rotated to make this clearance a minimum. Adjust by positioning the backstop screw. (See Figure 1.)

### 17. CLUTCH THROWOUT LEVER (Figure 83)

There should be .005" to .015" clearance between the clutch teeth when the clutch is fully disengaged. To adjust, position the clutch throwout lever by means of shims placed between the bearing screw and the bracket.

### 18. CLUTCH SPRING COMPRESSION (Figure 91)

Hook a 32 ounce scale to the driven member projection and pull directly in line with the shaft. It should require 9 to 12 ounces to separate the clutch teeth.

### 19. LOCK LOOP ROLLER (Figure 88 for location of parts)

This adjustment applies only to keyboards equipped with a lock loop having an elongated mounting hole for the roller pivot screw.

Rotate the keyboard shaft until the clutch teeth are disengaged. Press the lock loop roller against its cam to fully disengage the clutch teeth, and position the locking levers directly below the lock loop blade to make the clearance a minimum. Under these conditions, there should be .008" to .015" clearance between the lock loop blade and the locking lever having the least clearance. To adjust, position the roller pivot screw in its elongated mounting hole.

#### NOTE

On some keyboards an eccentric roller pivot screw is used which provides extra adjusting margin. In these cases the shoulder screw should be mounted with the high part of its eccentric extending toward either end of the slot in the lock loop, depending upon which direction the additional margin of adjustment is required.

20. INTERMEDIATE PAWL ECCENTRIC (Figure 83)

There should be .050" to .060" clearance between the trip off pawl and the intermediate pawl when the trip off pawl is resting against the stop plate and the intermediate pawl is against its eccentric. To adjust, position the intermediate pawl eccentric with its lock nut loosened.

21. CLUTCH THROWOUT LEVER ECCENTRIC (Figure 83 for location of parts)

With the transmitter shaft in the stop position and the clutch fully disengaged, hold the clutch throwout lever against the driven clutch member. Under this condition the intermediate pawl should be held firmly between the clutch throwout lever and the intermediate pawl eccentric. To adjust, position the clutch throwout lever eccentric with its lock nut loosened.

NOTE

On some units the driven clutch member has a tendency to settle back when the clutch throwout lever is held against it, slightly altering the stop position. On units where this condition prevails, the clutch throwout lever eccentric adjustment should be made and checked after this settling has occurred.

22. TRIP OFF PAWL ECCENTRIC (Figure 83 for location of parts)

Hold the clutch throwout lever against the outer surface of the throwout cam of the driven clutch member, and at the same time hold the clutch throwout lever eccentric against the clutch throwout lever. Under this condition, the point on the trip off pawl should clear the point on the intermediate pawl by not more than .004" when a keylever is being depressed. To adjust, position the trip off pawl eccentric. The high part of the eccentric should be positioned toward the rear of the keyboard.

NOTE

If necessary, bend the rear extension of the trip off pawl stop plate so that with the trip off pawl in its operated position, there is .002" to .040" clearance between this formed end of the stop plate and the lower edge of the trip off pawl.

23. CLUTCH THROWOUT LEVER SPRING TENSION (Figure 83 for location of parts)

With the clutch teeth engaged and the clutch throwout lever resting against the low part of

the driven clutch member, hold the intermediate pawl against its eccentric and at the same time hook an 8 ounce scale over the throwout lever, just above the spring hole, and pull in line with the spring. It should require 1-1/2 to 2-1/2 ounces to start the throwout lever moving.

24. TRIP OFF PAWL SPRING TENSION (Figure 92)

Unhook the trip off pawl spring. With an 8 ounce scale hooked in the spring eye, it should require 2-3/4 to 3-3/4 ounces (4-1/2 to 5-1/2 for 100 word per minute spring) to pull the spring to its normal position length.

25. KEYLEVER SPRING (Figure 93)

The opening between the ends of all keylever springs, excepting the spacer keylever spring, should measure 1-3/16". The spacer keylever spring should measure 1-15/16" across the opening between the ends. To adjust, bend the springs.

26. SLIP CONNECTION SPRINGS (Figure 94)

a. With a suitable scale held parallel to the front edge of the front bracket on the base unit and the end of the scale held against the front post of the slip connection terminal block, there should be 7/16" to 15/32" space between the front post and the crimped portion of No. 16 slip connection spring. Measure the distance from the rear post to No. 11 spring in the same manner. To adjust, bend springs No. 11 and No. 16.

b. With a straight edge placed against the crimped portion of springs No. 11 and No. 16, there should be some clearance, not over .015" between the straight edge and springs No. 12 to No. 15, inclusive. There should also be a clearance not exceeding .015" between the straight edge and springs No. 17 and 18. To adjust, bend the contact springs.

27. LINE SHORTING JACK CONTACTS (Figure 95A)

With the typing reperforator unit in position on the base, there should be .020" to .060" clearance between the upper and lower contact springs. To adjust, bend the upper contact spring and stiffener.

28. LINE SHORTING JACK SPRINGS (Figure 95B)

With the typing reperforator unit removed from the base, apply a 12 pound scale to the top of the curved portion of the lower contact spring and push vertically downward. It should

require 1-1/2 to 3 pounds to separate the upper and lower contact springs .030". To adjust, bend the lower contact spring.

#### END OF KEYBOARD BASE ADJUSTMENTS

#### RECEIVING ONLY (HIGH) BASE ADJUSTMENTS

#### 29. SLIP CONNECTION SPRINGS (Figure 94)

a. With a suitable scale held parallel to the edge of the front bracket on the base unit and the end of the scale held against the front post of the slip connection terminal block, there should be 7/16" to 15/32" clearance between the front post and the crimped portion of No. 16 slip connection spring. Measure the distance from the rear post to No. 11 spring in the same manner. To adjust, bend spring No. 11 and No. 16.

b. With a straight edge placed against the crimped portion of the springs No. 11 and No. 16, there should be some clearance, not over .015", between the straight edge and springs No. 12 to No. 15, inclusive. There should also be a clearance not exceeding .015" between the straight edge and springs No. 17 and No. 18. To adjust, bend the contact springs.

#### 30. LINE SHORTING JACK CONTACTS (Figure 95A)

With the typing reperforator unit in position on the base, there should be .020" to .060" clearance between the upper and lower contact springs. To adjust, bend the upper contact spring and stiffener.

#### 31. LINE SHORTING JACK SPRINGS (Figure 95B)

With the typing reperforator unit removed from the base, apply a 12 pound scale to the top of the curved portion of the lower contact spring and push vertically downward. It should require 1-1/2 to 3 pounds to separate the upper and lower contact springs .030". To adjust, bend the lower contact spring.

#### 32. TAPE RETAINING ARM SPRING TENSION (Figure 96)

Hook an 8 ounce scale to the end of the tape retaining arm and pull vertically upward. It should require not less than 5 ounces to raise the tape retaining arm approximately one inch from its leather stop.

#### END OF RECEIVING ONLY (HIGH) BASE ADJUSTMENTS

#### RECEIVING ONLY (LOW) BASE ADJUSTMENTS

#### REMOVE THE BASE COVER PLATE

#### 33. TAPE OUT LEVER ADJUSTING CLAMP (Figure 84)

There should be a clearance of 1/4" (plus or minus 1/32") between the tape out lever and the tape reel roller, with the locking pawl touching the front face of the bell hammer extension and the play of the bell hammer taken up in a direction away from the bell. To adjust, position the adjusting clamp with its clamping screw loosened, making sure that the locking pawl bushing has no end play between the shoulder on the shaft and the adjusting clamp, when the clamping screw has been tightened.

#### 34. BELL HAMMER BRACKET (Figure 85)

There should be some clearance, not more than .008", between the bell hammer extension and the bell operating post when the bell hammer is held in its locked position by the locking pawl and the play is taken up to make this clearance a minimum. To adjust, remove the tape reel container and position the gear guard with its mounting screws loosened.

#### 35. BELL (Figure 86)

There should be .002" to .004" clearance between the bell hammer and the bell when the bell hammer is in the unlocked position. To adjust, position the bell with its mounting screw loosened.

#### NOTE

The above clearance should be .005" to .020" on units equipped with the 111691 Bell Hammer Assembly.

#### 36. BELL HAMMER EXTENSION STOP (Figure 85)

With the locking pawl engaging the bell hammer extension, there should be .020" to .040" clearance between the lower side of the bell hammer extension and the bell hammer extension stop. To adjust, position the bell hammer extension stop with its mounting screw loosened.

#### 37. BELL HAMMER SPRING TENSION (Figure 86)

With the bell hammer resting against the gear guard, hook an 8 ounce scale in the spring hole

and pull in line with the spring. It should require 3 to 5 ounces to start the hammer moving if one piece design, or 2 to 4 ounces if 2 piece design.

38. TAPE OUT LEVER SPRING TENSION (Figure 84 for location of parts)

Remove the locking pawl spring. Rotate the transmitting shaft gear until the bell operating post is out of contact with the bell hammer extension. Then hook an 8 ounce scale in the spring hole of the locking pawl and pull toward the rear of the base at right angle to the front edge of the pawl. It should require 3 to 4-1/2 ounces to cause the locking pawl to just butt against the bell hammer extension.

NOTE

The above spring tension requirement should be 6 to 8 ounces on units equipped with the tape out signal contact assembly.

39. LOCKING PAWL SPRING TENSION (Figure 87)

With the locking pawl resting against the front face of the bell hammer extension and the tape out lever held down, hook an 8 ounce scale in the spring hole and pull in line with the spring toward the front. It should require 1/2 to 1-1/2 ounces to start the pawl moving.

40. SLIP CONNECTION SPRINGS (Figure 94)

a. With a suitable scale held parallel to the front edge of the front bracket on the base unit and the end of the scale held against the

front post of the slip connection terminal block, there should be 7/16" to 15/32" clearance between the front post and the crimped portion of No. 16 slip connection spring. Measure the distance from the rear post to No. 11 spring in the same manner. To adjust, bend spring No. 11 and No. 16.

b. With a straight edge placed against the crimped portion of the springs No. 11 and No. 16, there should be some clearance, not over .015" between the straight edge and springs No. 12 to No. 15, inclusive. To adjust, bend the contact springs.

41. LINE SHORTING JACK CONTACTS (Figure 95A)

With the typing reperforator unit in position on the base, there should be .020" to .060" clearance between the upper and lower contact springs. To adjust, bend the upper contact spring and stiffener.

42. LINE SHORTING JACK SPRINGS (Figure 95B)

With the typing reperforator unit removed from the base, apply a 12 pound scale to the top of the curved portion of the lower contact spring and push vertically downward. It should require 1-1/2 to 3 pounds to separate the upper and lower contact springs .030". To adjust, bend the lower contact spring.

END OF RECEIVING ONLY (LOW)  
BASE ADJUSTMENTS





## SECTION 5

## TYPING REPERFORATOR BASE, OPTIONAL FEATURE ADJUSTMENTS

## MOTOR CONTROL RELAY ADJUSTMENTS

## 1. BREAK OPERATION (Figure 97)

## a. CONTROL RELAY OUTER CONTACTS

There should be a gap of .005" to .015" between the inside contact and the middle contact, when the relay plunger is held operated. To adjust, bend the outside contact spring.

## b. CONTROL RELAY INNER CONTACTS

There should be a gap of .025" to .030" between the inside contact and the middle contact when the relay plunger is held operated. To adjust, bend the inside contact spring.

## c. CONTROL RELAY MIDDLE SPRING

When the relay plunger is in the unoperated position, hook an 8 ounce scale over the middle contact spring as close as possible to the wiper contact and pull horizontally at right angle to the contact spring; a pull of 5 to 6 ounces should cause the middle contact to break contact with the inside contact. To adjust, bend the middle contact spring and recheck adjustment b. above.

## 2. MAKE OPERATION (Figure 98)

## a. CONTROL RELAY OUTER SPRING

With the relay plunger held operated, hook a 32 ounce scale over the end of the outside contact spring and pull horizontally at right angle to the spring; a pull of 12 to 16 ounces should cause the outside contact to just break contact with the middle contact. To adjust, bend the outside contact spring.

## b. CONTROL RELAY INNER CONTACTS

With the relay plunger held operated, there should be .030" to .040" gap between the contact surfaces of the inside and middle contacts. To adjust, bend the inside contact spring.

## c. CONTROL RELAY MIDDLE SPRING

With the relay plunger unoperated, hook an 8 ounce scale over the middle contact spring at the side of the contact and pull horizontally at right angle to the contact spring. It should require 1-1/2 to 2 ounces to cause the middle contact to break contact with the inside contact. To adjust, bend the middle contact spring. Recheck adjustment b. above.

END OF MOTOR CONTROL  
RELAY ADJUSTMENTS3. LINE AND SELECTOR CIRCUIT CLOSING  
JACK (Figure 99)

a. When the jack plunger is held flush with the relay connection block mounting plate, there should be a gap of .010" to .015" between the contact points of No. 3 and No. 4 contact springs. See Figure 99B. To adjust, bend the No. 3 contact spring.

b. When the jack plunger is held flush with the relay connection lock mounting plate, there should be a gap of .020" to .025" between the contact points of No. 1 and No. 2 contact springs. See Figure 99B. To adjust, bend the No. 2 contact spring.

c. When an 8 ounce scale is hooked to contact springs No. 1 or No. 4 at right angle to the springs, it should require a pull of 5 to 7 ounces to separate the contact points of contact springs No. 1 and 2 or of contact springs No. 3 and 4, respectively. See Figure 99A. To adjust, bend the No. 1 and No. 4 contact springs.

4. TAPE FEED-OUT RELAY (Figures 100, 101,  
102, and 103)

## a. CONTACT SPRING MOUNTING SCREWS

(1) The width of the contacting surface of each spring should be wholly within the length of the contacting surface of its mating contact spring. The maximum misalignment should not be over one-third of the width of the contacting surface. (Figure 100).

(2) The hinge pins should not bind in the holes of the hinge bracket (Figure 101 for location of parts).

(3) The spring tangs should rest on the spool head so that the free end of the tang extends back of the front face of the spool head (Figure 102).

(4) The width of the spring tang should lie entirely within the projection of the top and bottom edges of the slots in the spool head, but the tang should not rub on the spool head when moved in the direction of travel of the spring from its normal position of rest on the spool head (Figure 102).

(5) With the spring tensions of contact springs "X" and "5" approximately equal (if not, adjust per paragraph e. (1) of CONTACT SPRING TENSION), both legs of the armature should bear against the hinged bracket when the armature is in either the operated or the unoperated position (Figures 101 and 103).

(6) To adjust, slightly loosen the contact spring mounting screws (Figure 101) and position the springs and hinged brackets.

b. ADJUSTING STUD (Figure 101 for location of parts)

There should be some clearance between the armature and the adjusting stud over the entire armature travel. To adjust, bend the stud with a pair of long nose pliers.

c. ADJUSTING NUT (Figure 101 for location of parts)

The armature travel adjusting nut should be sufficiently tight on the stud to prevent its being readily turned with the thumb and forefinger. To adjust, back off the adjusting nut from the adjusting stud until its slotted portion is free of the stud, then force the slotted parts of the nut closer together, using a pair of long nose pliers.

d. ARMATURE (Figure 101)

There should be .045" to .050" clearance between the armature stop pins and the core. To adjust, turn the adjusting nut.

e. CONTACT SPRINGS (Figure 103 for location of parts)

(1) Contact springs "X" and No. 5 should be tensioned toward the armature so that the armature will be held against the adjusting nut by a pressure of 20 to 45 grams when a gram scale is applied to the back of the armature at a point approximately midway between the points where the stop pins are located and pushed against the tension of the contact springs. To adjust, bend contact springs "X" and No. 5.

(2) Contact springs Nos. 1, 3, and 4 (Figure 103 for location of parts) should be tensioned toward the armature so that it requires a pressure of 30 to 50 grams to start the tang of each spring moving away from the side of the slot next to the armature when the armature is held in the operated position, and a gram scale is applied to contact springs Nos. 1, 3, and 4. To adjust, bend contact springs Nos. 1, 3, and 4.

(3) Contact spring No. 2 (Figure 103 for location of parts) should be tensioned toward the

armature so that it requires a pressure of 20 to 40 grams to cause it to break contact with No. 3. To adjust, bend the tang of No. 2 contact spring and recheck its spring pressure.

f. STUD

With the armature unoperated, there should be at least .006" clearance between the end of the stud and No. 2 contact spring (Figure 103 for location of parts). To adjust, bend the tang of No. 3 contact spring and recheck its spring pressure.

g. CONTACT ADJUSTMENT SEQUENCE

On BREAK-MAKE contacts of the spring combinations, the normally closed contacts should break before the normally open contacts make. Gauge by eye. To adjust, modify the spring tensions, stud gaps, and contact adjustments as required.

h. CONTACTS (Figure 103 for location of parts)

(1) With the armature in the unoperated position, both contacts of the forked spring No. 2 should make with the contacts of spring No. 3. To adjust, bend the contacts of spring No. 2.

(2) The MAKE contacts of the No. 2 and No. 5 contact springs should make contact with their mating contacts on the No. 1 and No. 4 contact springs at approximately the same time. The BREAK contacts of the No. 2 contact springs should separate from their mating contacts on the No. 3 spring at approximately the same time. To adjust, bend the contacts of the No. 2 and No. 5 contact springs.

(3) Contact springs No. 2 and No. 5 should meet the following requirements:

(a) When the relay is electrically energized (with approximately .030 amperes of current) against a .016" gauge inserted between the armature and the core, none of the MAKE contacts on either the No. 2 or No. 5 contact springs should make contact with a mating contact on the associated No. 1 and No. 4 contact spring.

(b) When the relay is electrically energized (with approximately .030 amperes of current) against a .009" gauge inserted between the armature and the core, at least one of the MAKE contacts on each of the No. 2 and No. 5 contact springs should make contact with its mating contact on the associated No. 1 and No. 4 contact springs.

(c) When the relay is electrically energized (with approximately .030 amperes of current)

against a .005" gauge inserted between the armature and the core, both BREAK contacts on the No. 2 contact spring should be separated from their mating contacts on the associated No. 3, BREAK contact spring. To adjust, bend the tang on each of the No. 1 and No. 4 contact springs and then recheck their pressure.

#### 5. TAPE OUT SIGNAL CONTACT ASSEMBLY (Figure 104)

a. The short contact spring and stop should be aligned approximately parallel to the mounting bracket. If necessary, bend to meet this requirement. (Refer to NOTE of Section 4, paragraph 38, "TAPE OUT LEVER SPRING TENSION").

b. Hook the pull end of an 8 ounce scale at right angle to, and over the ends of both legs of the bifurcated short contact spring. It should require a scale reading of some but not more than 1 ounce to move the spring away from its stop. (Figure 104 for location of parts.)

c. There should be .010" to .020" clearance between the contacts. Bend the long contact spring to obtain this clearance.

d. Position the contact assembly bracket to meet the following conditions:

(1) With the bell hammer locking pawl touching the front face of the bell hammer extension, the contact points should just close.

(2) With the bell hammer locking pawl fully engaging the bell hammer extension and the tape follow arm in the down or "full" position, there should be some clearance, not more than .050" between the contact bakelite extension and the tail of the bell hammer locking pawl.

#### 6. KEYLEVER LOCK BAR ECCENTRICS (Figure 110)

With the keylevers resting against the leather upstop and the lock bar in its extreme left hand position, the keylevers should be blocked by the projections on the lock bar and there should be at least .010" clearance between the bottom of the keylevers and the top of the projections. To adjust, position the eccentric bushings on which the lock bar mounts.

#### 7. REPEAT SPACE ROD (Figure 83 for location of parts)

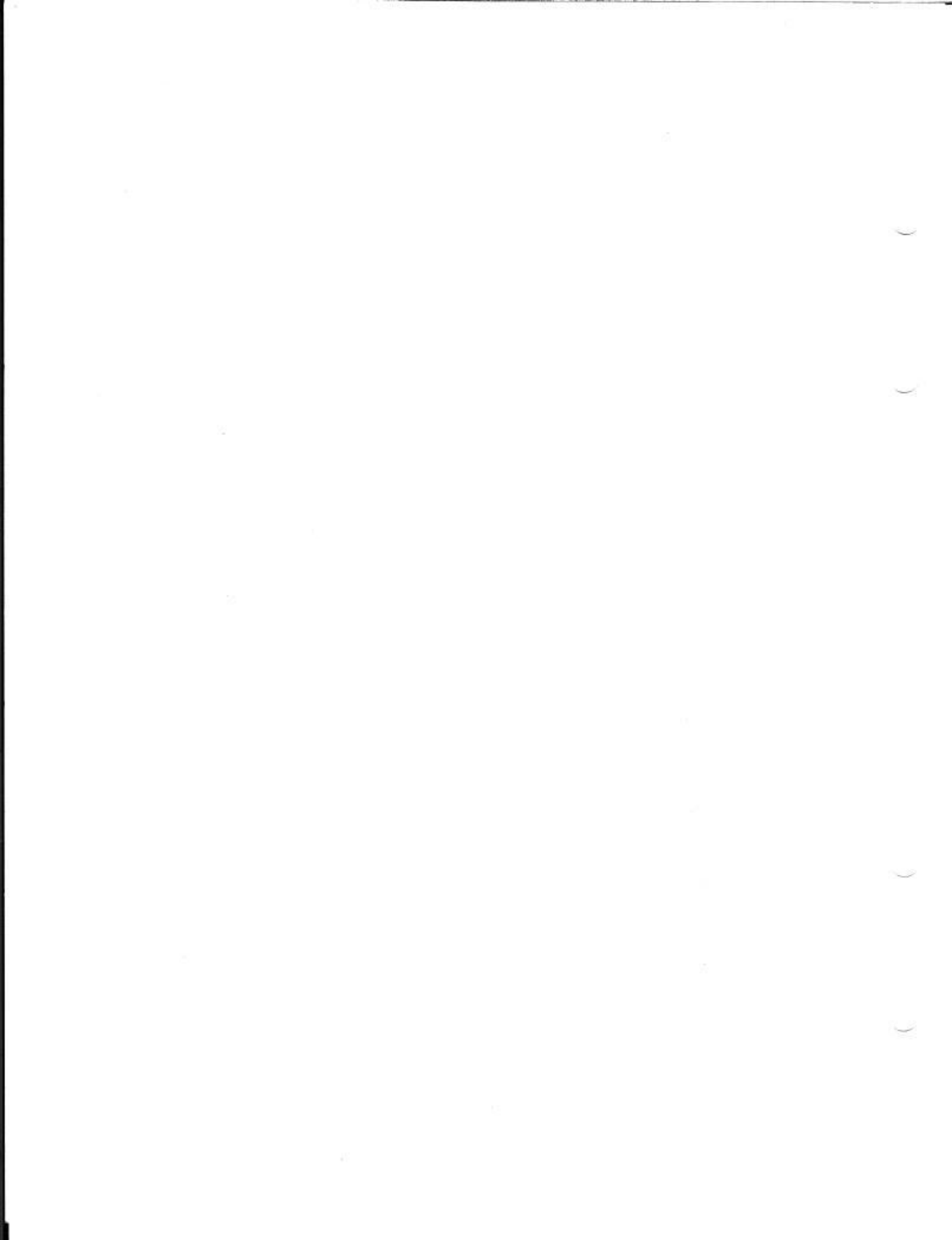
There should be .010" to .020" clearance between the clutch throwout lever and the high part of the throwout cam, when the space bar is held depressed by applying pressure at approximately the center of the space bar until the bar rests lightly against its downstops. To adjust, position the adjusting nuts.

#### 8. REPEAT SPACE ROD BRACKET

The repeat space rod bracket should be adjusted so that the face of the section with the elongated hole is parallel to the rear edge of the rear transmitter bracket in order to assure free movement of the repeat space rod. The end of the repeat space rod should engage the intermediate pawl at least 1/2 the thickness of the pawl when the space bar is fully depressed.

#### 9. REPEAT SPACE ROD SPRING TENSION (Figure 83 for location of parts)

Hold the repeat yoke unoperated. Hook an 8 ounce scale over the repeat space rod just below the spring and pull horizontally toward the front of the keyboard. It should require 3/4 to 1-3/4 ounces to start the rod moving.



## SECTION 6

## MOTOR ADJUSTMENTS

## GOVERNED MOTOR ADJUSTMENTS

REMOVE THE GOVERNOR ADJUSTING BRACKET, BRUSH SPRING PLATE, TARGET, AND GOVERNOR COVER

1. GOVERNOR SHELL (Figure 105 for location of parts)

## REMOVE THE SPEED ADJUSTING SPRING

a. The governor contact points should meet squarely and there should be at least .010" clearance between the governor spring bracket and the rim of the governor shell. To adjust, position the governor spring bracket with its mounting screws loosened.

## NOTE

If necessary, reposition the "fixed contact" bracket to facilitate squaring up the contacts.

b. There should be a gap of .015" to .040" between the governor contacts. To adjust, bend the governor contact spring.

## REPLACE THE SPEED ADJUSTING SPRING

2. GOVERNOR CONTACTS

a. All governor contacts can be adjusted for alignment of edges; only those governor shells which provide elongated mounting holes for the fixed contact bracket permit adjustment of the contact for height by positioning the contact bracket.

b. The governor contacts should be in line and meet squarely so that maximum contact surface is provided. (Check with the retractile spring tension adjusted so that the contacts just make, or to the limit of the adjusting screw.)

(1) Line up edges of contacts by means of the floating contact hinge mounting screw.

(2) Adjust contacts for squareness from right to left by positioning the height of the fixed contact bracket using the elongated mounting holes in the governor shell.

(3) To adjust from front to back, twist the floating contact hinge, applying pressure to the arm near the contact.

## NOTE

Check by use of a .002" gauge (smaller if available). Check with gauge between edges of the contacts to see that the gauge enters (or does not enter) equally on all sides.

3. SPEED ADJUSTING WHEEL FRICTION WASHER SPRING (Figure 105)

To measure this requirement, remove the governor adjusting bracket and governor cover and rotate the speed adjusting wheel to a point where the governor contact pressure is 13 to 14 ounces, as indicated by hooking a 32 ounce scale over the contact spring next to the contact point and pulling parallel to the speed adjusting spring. Then insert a bank pin (radially) in the leather rim of the speed adjusting wheel, and hook a 32 ounce scale over the pin and pull at a tangent to the periphery of the adjusting wheel. It should require 16 to 24 ounces to start the wheel moving. To adjust the friction, remove the friction washer and bend the large projections.

4. MOTOR ARMATURE SHAFT (Figure 108 for location of parts)

There should be at least .006" clearance between the adjusting lever wearing strip and the adjusting wheel when the adjusting wheel is opposite the wearing strip and the play of the armature is taken up in a direction to make this clearance a minimum by overcoming the armature end thrust spring. To adjust, install shims on the armature shaft between the governor hub and the end frame casting if necessary.

- 4.1 SPEED ADJUSTING LEVER STOP PLATE (Figure 108)

There should be from .006" to .050" clearance between the adjusting lever wearing strip and the governor when the speed adjusting lever is held against the stop plate. To adjust, position the adjusting lever stop plate by means of its elongated mounting holes.

5. INNER AND OUTER DISC CONTACT SPRINGS (Figure 106)

a. The inner and outer disc contact springs should conform to the following requirements, which may be checked by removing the governor cover, target, and brush spring plate (Figure 107).

(1) The distance from the inside surface of the governor cover to the highest point on the contact springs should be  $25/32''$  to  $27/32''$ .

(2) Place a "D" (89955) socket wrench over the nut located in the center of the governor cover that is used to hold the contact springs in place. With a 6" scale, measure the radial distance from the vertical surface of the wrench to the point where the scale touches the curved surface of the inner disc contact spring. This distance should be  $17/32''$  to  $19/32''$ .

(3) In a similar manner, measure the distance from the wrench to the point of contact on the outer disc contact spring. This distance should be  $7/16''$  to  $1/2''$ .

b. To adjust, bend the contact springs. Replace the governor cover, target, and brush spring plate.

#### 6. GOVERNOR BRUSH SPRING PLATE BRACKET (Figure 107 and 108)

The governor brush spring plate bracket should be positioned to meet the following requirements:

a. A line established by the center of the outer disc and the center of one of the brushes should pass through some portion of the other brush (Figure 107).

b. The surface of the brush spring plate bracket, on which the brush spring plate is mounted, should be in alignment with the outer surface of that part of the governor cover on which the target is mounted (Figure 108).

c. The bracket should be parallel to the edge of the motor base plate.

d. To adjust, position the brush spring plate bracket with its mounting screws loosened.

#### 7. GOVERNOR BRUSH SPRINGS (Figure 108)

a. INNER DISC BRUSH SPRING: Hook an 8 ounce scale over the inner spring just in front of the carbon contact brush. Pulling horizontally away from the motor, it should require  $4-1/2$  to  $5-1/2$  ounces to start the brush moving away from the disc.

b. OUTER DISC BRUSH SPRING: Apply an 8 ounce push scale against the outer brush spring, just in front of the carbon contact brush. Pushing horizontally toward the motor, it should require  $4-1/2$  to  $5-1/2$  ounces to start the brush moving away from the disc.

c. ADJUSTMENT OF BRUSH SPRINGS: To obtain the correct brush spring pressure, remove and bend the brush springs. When the springs are placed and the pressure obtained, make certain that the contact brushes lie flat against their respective discs, and that the outer edges of the brushes are either flush with, or not more than  $3/64''$  inside the outer edges of the discs. Replace the governor adjusting bracket.

#### NOTE

If necessary, level off brushes by passing a piece of No. 00 sandpaper between the brush and disc.

#### 8. GOVERNOR ADJUSTING BRACKET (Figure 108)

The adjusting surface of the governor adjusting bracket should clear the speed adjusting wheel by  $.020''$  to  $.060''$ . To adjust, bend the governor adjusting bracket.

#### 9. ARMATURE END THRUST SPRING PRESSURE

With the push end of a 12 pound scale applied against the governor end of the shaft and pushed parallel with the shaft, it should require at least 7 pounds pressure to start the shaft moving.

#### END OF GOVERNED MOTOR ADJUSTMENTS

#### SYNCHRONOUS MOTOR ADJUSTMENTS

#### 10. STARTING SWITCH

#### NOTE

These requirements should not be checked unless there is reason to believe the starting switch is out of adjustment.

a. Remove the motor unit from the base and remove the motor fan and pinion.

b. Remove the switch end shield screws and the switch commutator mounting screws, also the switch and shield.

c. Pull out the rotor until the brush holder spring is accessible and remove the spring.

d. Spring tension for 50 to 60 cycle motors should be  $1-3/4$  to 2 ounces and 2 to  $2-1/2$  ounces respectively, when extended to a length of 5 inches, using an 8 ounce scale.

e. The brush holders should be mounted by means of the center set of mounting holes and should be free.

f. The brush holder stop pins should be safely within the holes of the fiber disc when all the play in the brush holders has been taken up to make the engagement of the pins with the disc a minimum.

g. Replace the brush holder spring, making certain that the spring eyes are fully engaged with each other.

h. Replace the switch commutator screws and tighten the two screws alternately, a little at a time, until both screws are tight.

i. Replace the switch and shield screws, using the same precaution in tightening as above.

#### 11. END THRUST

a. Apply the push end of a 12 pound scale against the fan end of the shaft and push parallel with the shaft. It should require at least 7 pounds pressure to start the shaft moving.

b. Replace the motor fan and pinion. Replace the motor unit on the base and check the motor plate adjustment (Section 2, paragraph 6).

END OF SYNCHRONOUS  
MOTOR ADJUSTMENTS





## SECTION 7

## LUBRICATION OF TYPING REPERFORATOR AND BASE

## 1. GENERAL

a. The oil and grease specified in the supplement furnished with this bulletin should be used to lubricate the Model 14 Typing Reperforator.

b. Oil both loops of all helical springs that exert a nominal tension of less than 2-1/2 pounds. Apply grease to both loops of all helical springs that exert a nominal tension of 2-1/2 pounds or more.

c. Unless otherwise specified, one or two drops of oil at each of the places indicated will be sufficient. Use oil for lubrication at all of the places listed in the following paragraph except where use of grease is specified.

## 2. SELECTOR MECHANISM

## NOTE

Be careful not to get oil or grease between the pole faces of the selector magnets and the armature.

## a. RANGE SCALE ASSEMBLY

- (1) TRIP LATCH PLUNGER.
- (2) TRIP LATCH - at pivot.
- (3) BELL CRANK - at pivot.
- (4) STOP LEVER - at (2) bearings.

## b. CODE BARS - at posts.

c. TAPE FEED-OUT LEVER - at bearing and at point of contact with trip latch bell crank.

## 3. PULLING MAGNET SELECTOR (Applies only to units so equipped)

a. ARMATURE EXTENSION - at (2) pivot screws very sparingly and at (2) points of contact with sword arms.

b. SWORDS AND SELECTOR LEVERS - drop oil between separator plates.

c. SELECTOR "T" LEVERS - all points of contact.

d. LOCKING LEVER - at pivot, separator surface and locking tip.

e. SELECTOR CAM SLEEVE - each cam peak and locking lever cam surface.

f. LOCKING WEDGE - at locking tip.

## 4. HOLDING MAGNET SELECTOR (Applies only to units so equipped)

a. ARMATURE LEVER - at (2) pivot screws sparingly.

b. SWORDS AND SELECTOR LEVERS - Drop oil between separator plates.

c. SELECTOR "T" LEVERS - all points of contact.

d. SELECTOR ARM - at (2) pivot screws, at (2) points of contact with sword arms and at detent.

e. SELECTOR ARM DETENT - at bearing and at point of contact with armature lever.

f. LOCKING LEVER - at pivot, separator surface and locking tip.

g. SELECTOR CAM SLEEVE - each cam peak and locking lever cam surface.

h. LOCKING WEDGE - at locking tip.

i. SELECTOR ARM OPERATING SCREW-HEAD - oil sparingly.

## 5. MAIN SHAFT

REMOVE RANGE SCALE REAR MOUNTING SCREW, SWING SCALE OUT OF THE WAY AND FILL SHAFT WITH OIL THROUGH HOLE IN CENTER OF RETAINING DISC. REPLACE RANGE SCALE AND ITS REAR MOUNTING SCREW.

a. LOCKING LEVER CAM FELT OIL RING - saturate.

b. SELECTOR CAM CLUTCH FRICTION WASHERS - saturate.

c. MAIN BAIL CAM FRICTION DISC AND FELT WASHER - saturate.

d. BALL BEARINGS - (2).

e. CLUTCH THROWOUT LEVER - oil at (2) bearings. Grease end of lever.

- f. CLUTCH - oil freely.
- g. CLUTCH BUSHING FELT WICKS - Oil through (2) holes on bushing below punch cam.
- h. COMPRESSION SPRING - (3) Allow oil to flow into prongs under springs.
- i. GEARS - grease.
- j. MAIN BAIL CAM - grease.
- k. PUNCH ARM CAM - grease.

#### 6. INTERMEDIATE SHAFT

- a. BEARINGS - Fill (2) oil cups.
- b. GEARS - grease (2).

#### 7. MAIN BAIL

- a. MAIN BAIL OPERATING ARM ROLLER - Oil, grease, oil.
- b. MAIN BAIL PLUNGER - Fill oil cup and saturate oil wick.

On all units equipped for improved lubrication, remove the 1/4 x 32 screw and lock washer from the plunger bushing. Saturate oil wicks and fill plunger with oil. Replace lock washer and screw.

- c. MAIN BAIL LEVER - Fill oil cup just above terminal block and oil end of lever in main bail plunger.
- d. MAIN BAIL - Fill groove with oil. If unit is not equipped with main bail roller guides, put drop of oil on top of square vertical guide post.
- e. MAIN BAIL GUIDE ROLLERS AND PIVOTS AND SURFACES OF GUIDES - (2) oil, apply grease to surfaces of guide rollers and guides, and again oil.
- f. MAIN BAIL ADJUSTING SCREW - grease end of screw.
- g. MAIN BAIL SPRING ANCHOR - grease.
- h. MAIN BAIL LEVER SPRING POST - (8) 90752 felt washers - saturate.

#### 8. PULL BARS, TYPE BARS, AND CODE BAR LOCKING LEVER

- a. PULL BARS - one drop of oil on top of each bar.

- b. PULL BAR LOCKOUT LEVER - pivot and (2) rollers.

- c. TYPE BAR AND PULL BAR GEARS - Pull each type bar down against platen and put drop of oil on top of each type bar gear at rear of segment slot.

- d. CODE BAR LOCKING LEVER - Grease lever at point of contact with main bail.

#### 9. RIBBON MECHANISM

- a. RIBBON FEED RATCHET AND FEED GEARS - oil teeth.

- b. RIBBON FEED SHAFT DETENT PLUNGER AND DETENT.

- c. RIBBON FEED SHAFT - (2) oil holes.

- d. RIBBON FEED LEVER - oil hole.

- e. RIBBON FEED LEVER - Roller and bearing.

- f. RIBBON SPOOL SHAFTS - (2) bearings each.

- g. RIBBON REVERSE PAWLS AND LINKS - (4) bearings on each side.

- h. RIBBON REVERSE ARM SHAFTS - (2) bearings each.

- i. RIBBON FEED SHAFT DETENT - grease plunger and detent.

#### 10. PLATEN SHIFT MECHANISM

- a. SHIFT ROCKER FORK.

- b. SHIFT ROCKER AND SHIFT ROCKER ARM - (2) pivot bearings.

- c. SHIFT ROCKER LEVER - pivot bearing and point of contact with shift rocker arm.

- d. PLATEN SHAFT - (2) bearings.

- e. PLATEN BLOCK SHAFT BEARING.

- f. PLATEN GUIDE SHAFT BEARING.

- g. SHIFT LEVER - (2) bearings.

- h. SHIFT LEVER - where it comes in contact with shift bell crank.

- i. SHIFT BELL CRANK GUIDE.

- j. FIGURES PULL BAR - toe (extension).

- k. BELL HAMMER - pivot.

## 11. UNIVERSAL CONTACT MECHANISM

- a. CONTACT OPERATING LEVER - pivot and point of contact with main bail.
- b. MAIN BAIL - thin film of oil where contact operating lever hits main bail.

## 12. TAPE FEED-OUT COUNTER MECHANISM

- a. WORM FOLLOWER BAIL - (2) bearings.
- b. FEED PAWL.
- c. CAM LEVER ROLLER - pivot.
- d. WORM SHAFT - (2) bearings.
- e. DETENT DRAG SPRING - grease.
- f. FEED RATCHET - grease.
- g. CAM LEVER ROLLER - grease surface.
- h. COUNTER CONTROL MAGNET ARMATURE - (2) bearings.
- i. WORM FOLLOWER - shoulder screw bearing.
- j. TAPE OUT MAGNET - armature lever bearing.

## 13. REPERFORATING MECHANISM

- a. PUNCH ARM CASTING ROLLER - oil-grease-oil.
- b. PUNCH ARM CASTING BEARINGS - (2) oil holes.
- c. PUNCH BAIL ADJUSTING LINK - (2) bearings.
- d. PUNCH BAIL PILOT SCREW - (2) bearings.
- e. PUNCH SELECTOR FINGER BELL CRANK - at bearings and at slots in punch selector fingers.
- f. VERTICAL LEVER BELL CRANKS - at bearings and at points of contact with punch bar bell cranks.
- g. VERTICAL LEVER LOWER GUIDE COMB - slots.
- h. VERTICAL LEVER PIVOT SCREW.
- i. VERTICAL LEVER UPPER GUIDE COMB SLOTS.

j. CODE BAR BELL CRANKS - at bearing and point of contact with vertical levers and code bar locking lever.

k. PUNCH SELECTOR FINGERS - at point of contact with punches and punch bail guide comb.

l. FEED PAWL - bearing.

m. FEED ROLL - Oil (2) bearings and grease teeth.

n. FEED ROLL DETENT - bearing and roller.

o. STAR WHEEL - grease surfaces.

p. TAPE TENSION LEVER - (2) bearings.

## 14. SIGNAL BELL MECHANISM

- a. BELL HAMMER LEVER - bearing.
- b. TOE OF BELL PULL BAR.
- c. REMOTE SIGNAL BELL CONTACT LEVER - bearing.

REMOVE EXCESS OIL FROM THE TYPE BAR SEGMENT AND THE TYPING REPERFORATOR BASE AND MAKE CERTAIN THAT THERE IS NO OIL OR GREASE ON THE SELECTOR MAGNET POLE FACES OR THE ARMATURE FACE

## 15. MECHANICAL END OF LINE INDICATOR MECHANISM

- a. WORM SHAFT - (2) bearings.
- b. RELEASE BAIL - (2) bearings.
- c. FEED PAWL - pivot.
- d. CAM LEVER ROLLER - pivot.
- e. WORM SHAFT - grease worm.
- f. DETENT DRAG SPRING - grease.
- g. FEED RATCHET - grease.
- h. CAM LEVER ROLLER - grease surface.
- i. CARRIAGE RETURN PULL BAR - toe.

## 16. BACKSPACE MECHANISM

- a. FEED PAWL - at pivot point; grease surfaces which contact feed roll and backspace lever.
- b. FEED PAWL SPRING - at spring post and eye in feed hole.

c. BACKSPACE LEVER - pivot point, grease surface which contacts feed pawl.

d. BACKSPACE LEVER SPRING - at spring post and eye in lever.

e. BACKSPACE FEED PAWL - pivot point, grease point which engages star wheel.

f. BACKSPACE FEED PAWL SPRING - at both spring posts.

g. RIBBON LIFT LEVER - pivot point.

h. RIBBON LIFT LEVER SPRING - at spring post and eye in lever.

#### 17. CLUTCH LEVER CONTACT MECHANISM

Apply grease sparingly to the surface of the insulator of the contact spring against which the clutch throwout lever bears and to the corresponding surface of the clutch throwout lever.

#### 18. MOTOR UNIT

a. MOTOR PINION - grease.

b. MOTOR BEARING OILERS - (2) grease - use grease gun.

c. MOTOR SPEED ADJUSTING LEVER - pilot screw.

#### 19. KEYBOARD BASE

a. UPPER SIDE OF KEYBOARD BASE.

(1) TRANSMITTING SHAFT BEARINGS - fill two oil cups.

(2) DRIVEN CLUTCH MEMBER - drop oil through coils of spring.

(3) INTERMEDIATE PAWL - at pivot.

(4) TRIP-OFF PAWL - at pivot and also surface bearing on trip-off pawl eccentric.

(5) REPEAT SPACE ROD - at bearing points and points of contact.

(6) CLUTCH THROWOUT LEVER - two bearings.

(7) LOCK LOOP - two bearings.

(8) LOCK LOOP ROLLER - bearing.

(9) TAPE OUT LEVER - either side of bearing.

(10) TAPE OUT BELL HAMMER - two pivots.

(11) LOCKING LEVERS - five bearings.

(12) CONTACT LEVERS - one drop of oil on side of each lever, placed so oil will run down on pivot.

(13) SPACER BAR - four pivots and also pivot for spacer key lever.

(14) KEYLEVERS - front guide.

#### NOTE

Do not permit lubricant to remain on that part of keylevers which extend in front of the keylever front guide.

(15) KEYBOARD GEAR - grease.

(16) TRANSMITTING SHAFT CAMS - (7) apply a light film of grease to surfaces of each.

b. UNDER SIDE OF KEYBOARD BASE

(1) UNIVERSAL BAR - two pivots.

(2) SELECTOR BAR ROLLERS - one pivot each.

(3) SELECTOR BARS - at each guide bracket.

(4) KEYLEVERS - each keylever just in front of selector bars.

(5) KEYLEVER REAR BEARING ROD - drop of oil on bearing rod at four equidistant points.

(6) KEYLEVER SPRINGS - apply oil at point where spring engages notch in keylever.

(7) KEYLEVER SPRINGS - apply thin coat of grease.

#### 20. RECEIVING ONLY (HIGH) BASE

a. TAPE REEL BEARING - oil hole.

b. TAPE RETAINER ARM BEARING - each side.

c. TAPE RETAINER ARM SPRING - where it comes in contact with top of mounting bracket.

#### 21. RECEIVING ONLY (LOW) BASE

a. GEAR THAT OPERATES BELL - grease.

b. GEAR THAT OPERATES BELL - fill oil cup.

c. TAPE OUT LEVER - either side of bearing.

d. TAPE OUT BELL HAMMER - two pivots.

## 22. AUTOMATIC TAPE FEED-OUT MECHANISM

## a. TAPE FEED-OUT CLUTCH AND SOLENOID MECHANISM

- (1) BELL CRANK PIVOT - (2).
- (2) TRIP LEVER BEARINGS - (2).
- (3) TRIP LEVER STUD.
- (4) TRIP LEVER SPRING.
- (5) WORM - grease.
- (6) CLUTCH DISENGAGING CAM - grease.
- (7) DETENT CAM - grease.
- (8) DETENT ROLLER - oil - grease.
- (9) CLUTCH COMPRESSION SPRING.
- (10) CLUTCH - oil freely.
- (11) SPIRAL GEAR - grease.
- (12) FEED CAM - grease.

(13) DETENT LEVER BEARING.

(14) DETENT LEVER SPRING - (2).

## b. TAPE FEED-OUT METERING MECHANISM

- (1) ARMATURE BEARING - (2) - oil sparingly.
  - (2) ARMATURE SPRING - (2) - oil sparingly.
  - (3) FEED-OUT LEVER PIVOT - oil sparingly.
  - (4) CONTACT OPERATING LEVER - oil sparingly.
  - (5) PUNCH ARM BRACKET ROLLER.
- c. GEARS - apply light film of grease.
- d. CLUTCH TEETH - apply light film of grease.
- e. CAMS - apply light film of grease.
- f. CLUTCH SHAFT GEAR - oil hole.
- g. PIVOT POINTS - oil.
- h. SPRINGS - oil.



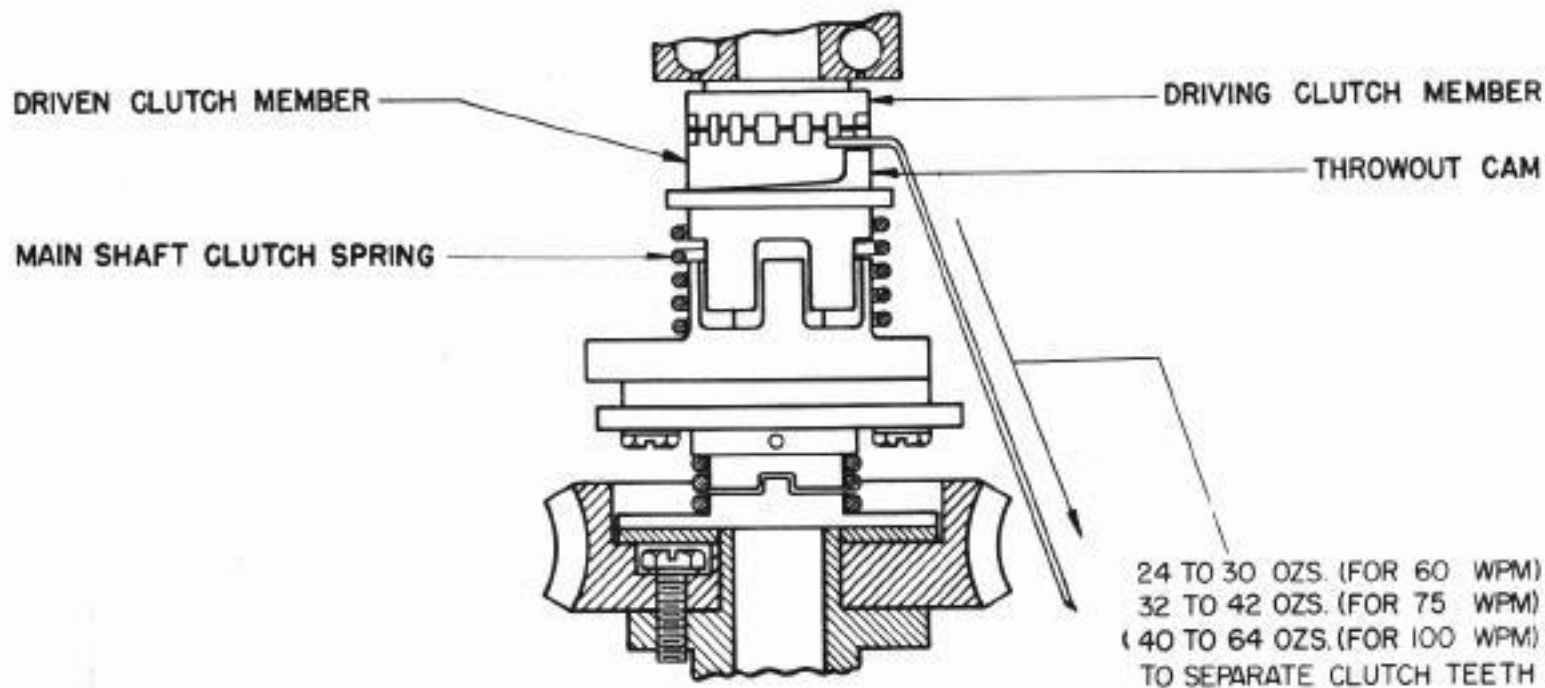


FIGURE 1

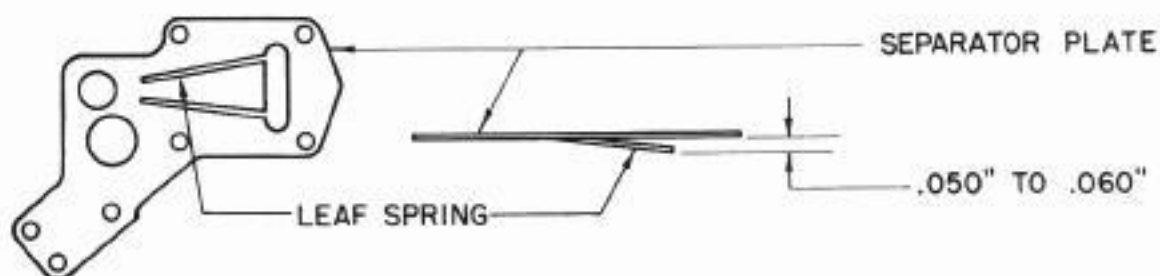


FIGURE 2

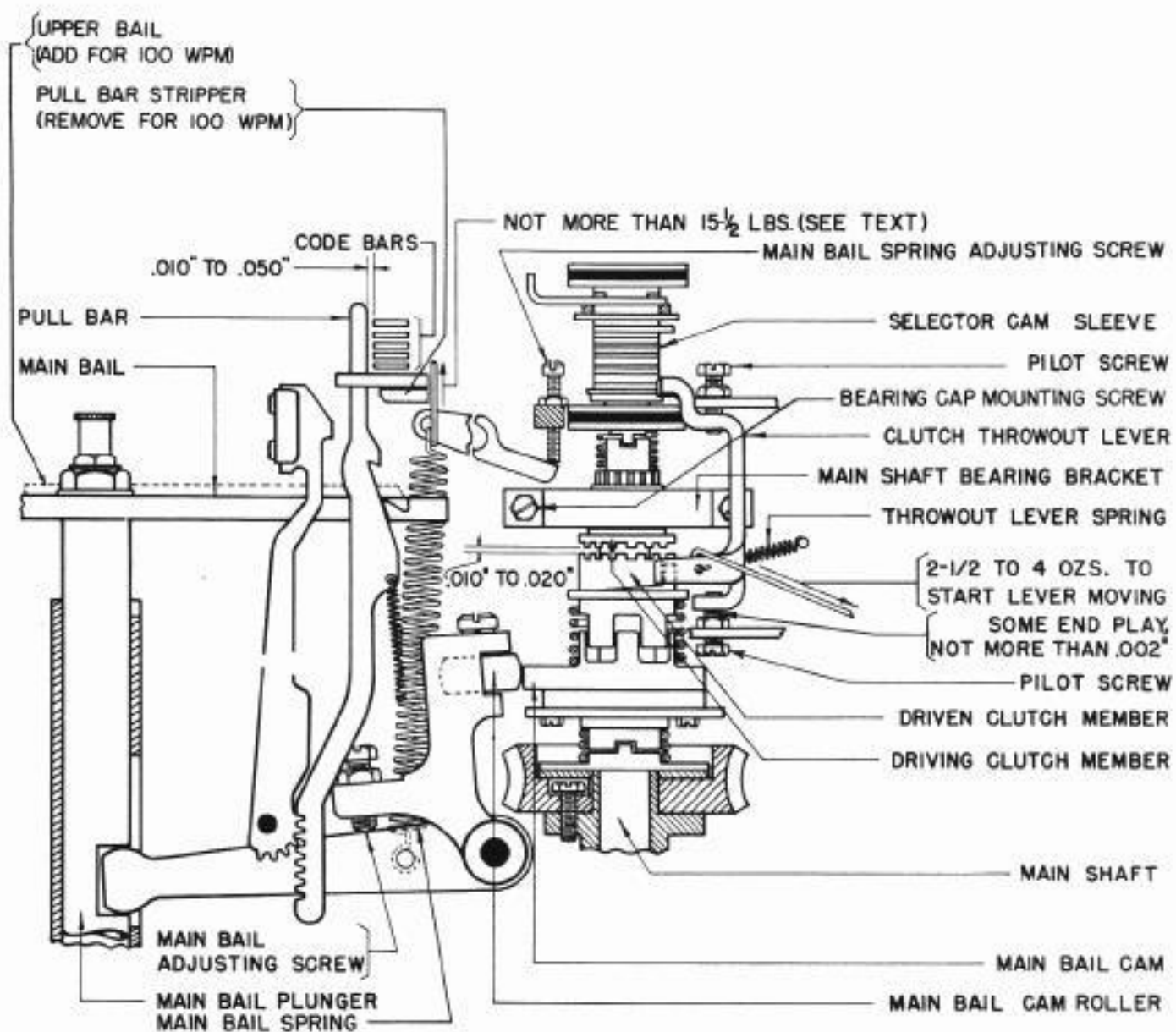


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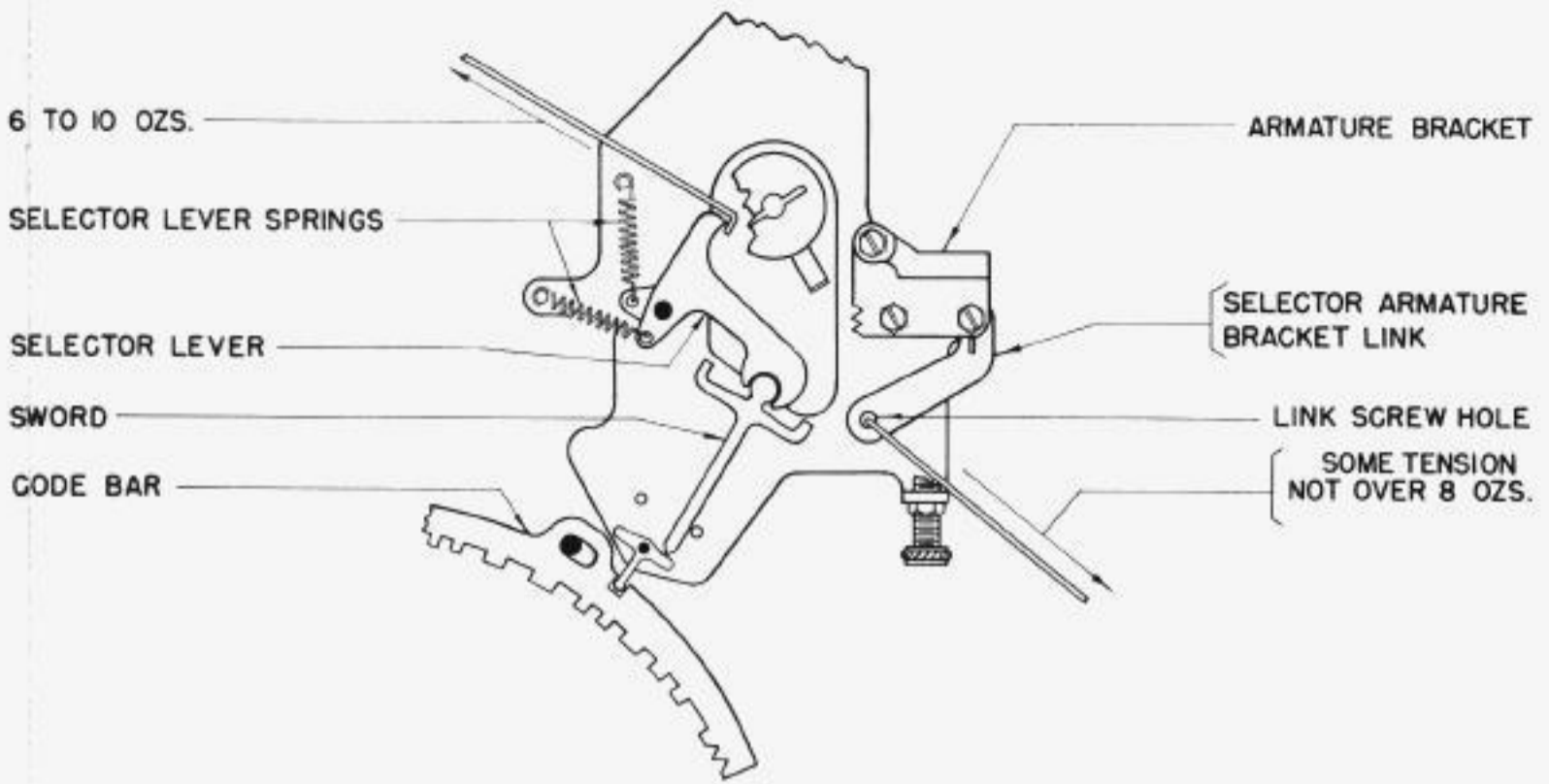


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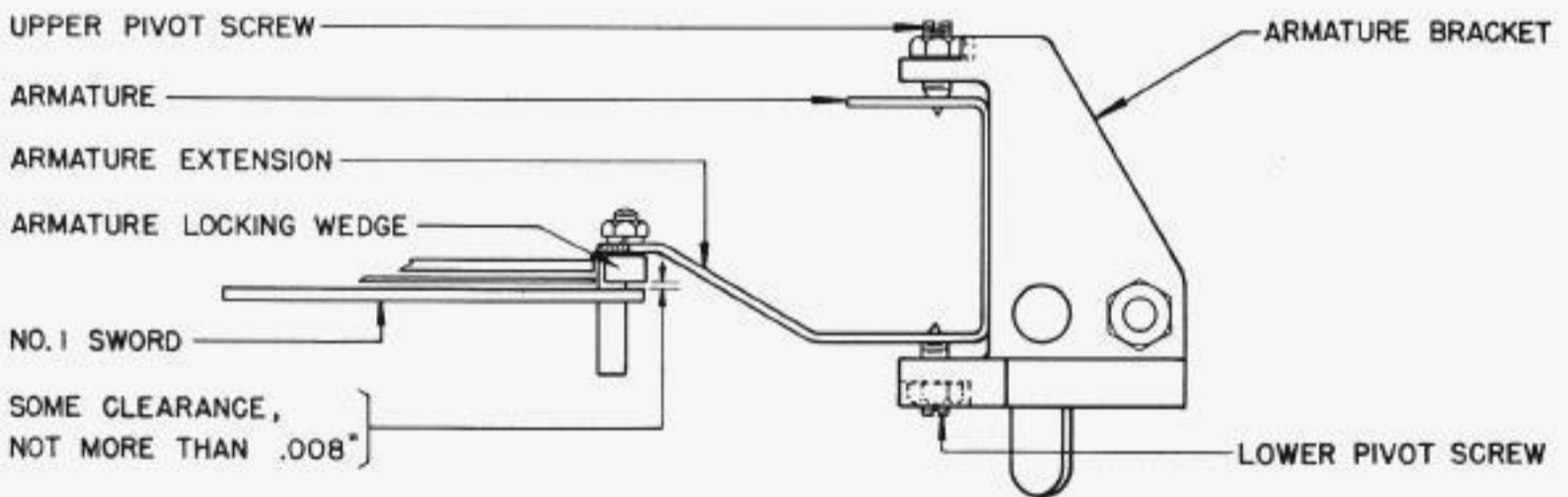


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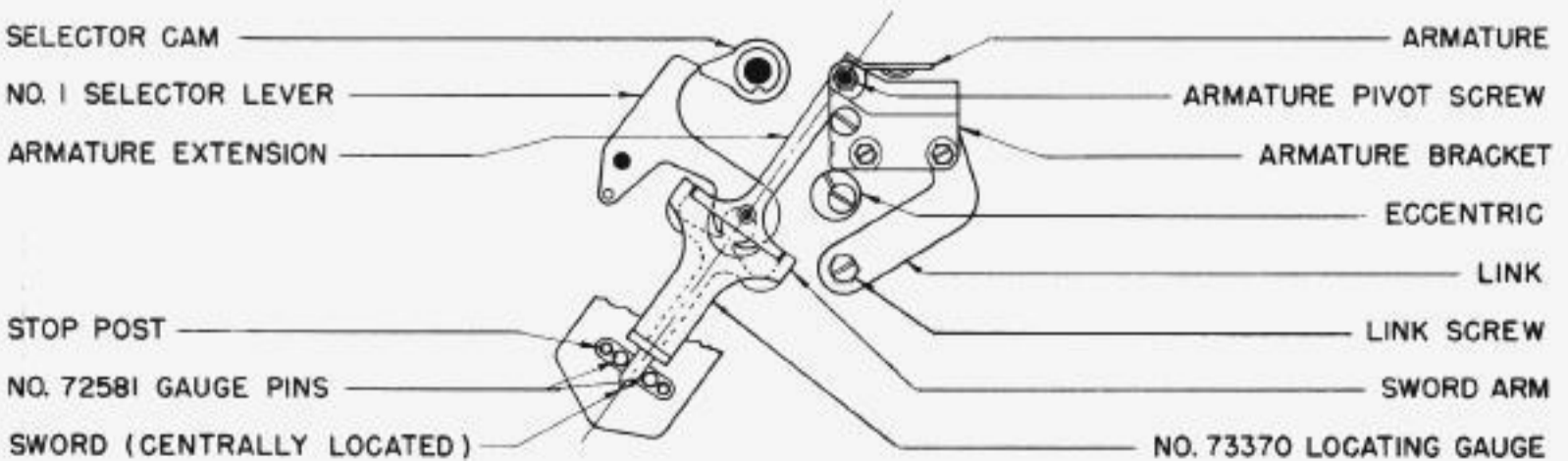


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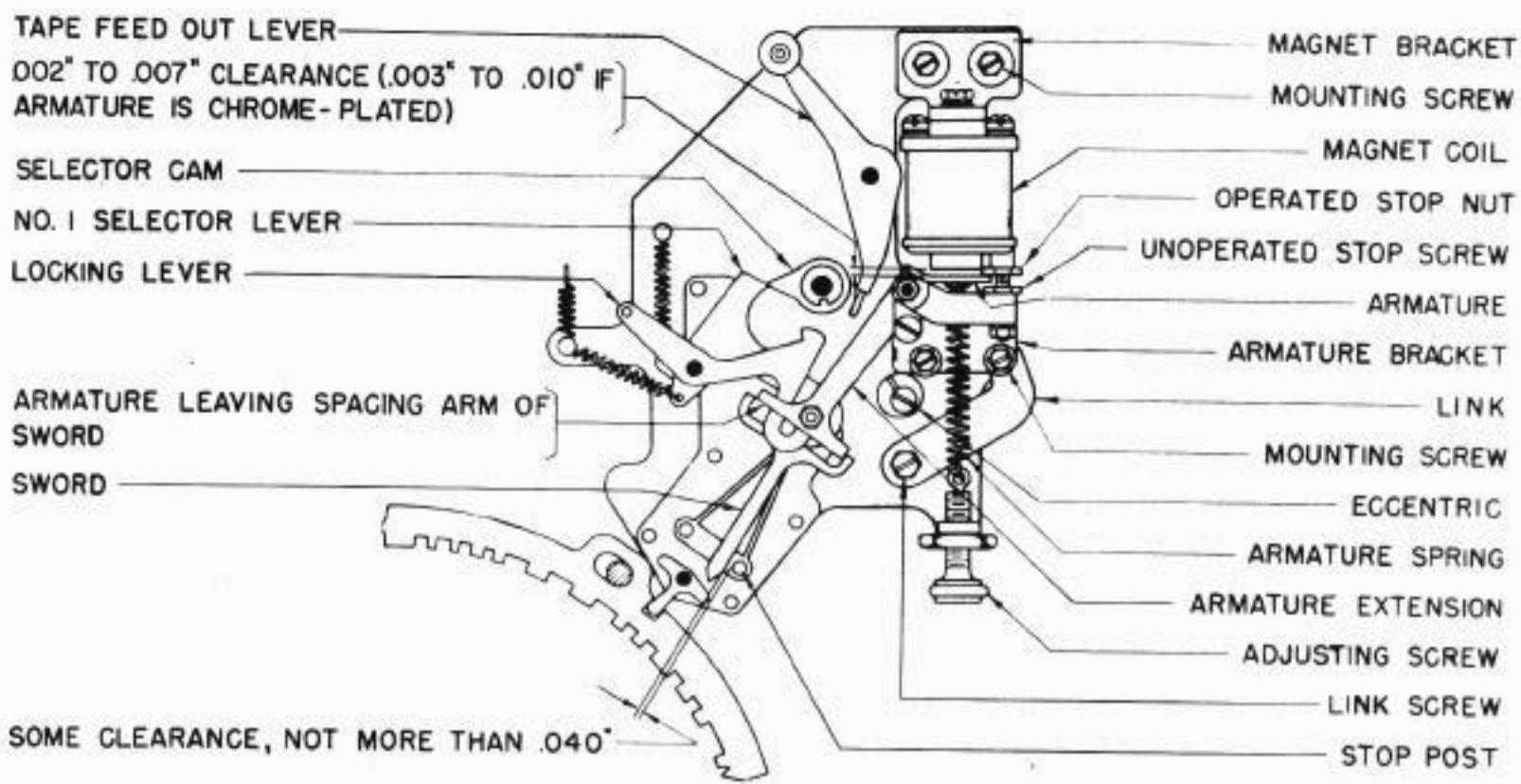


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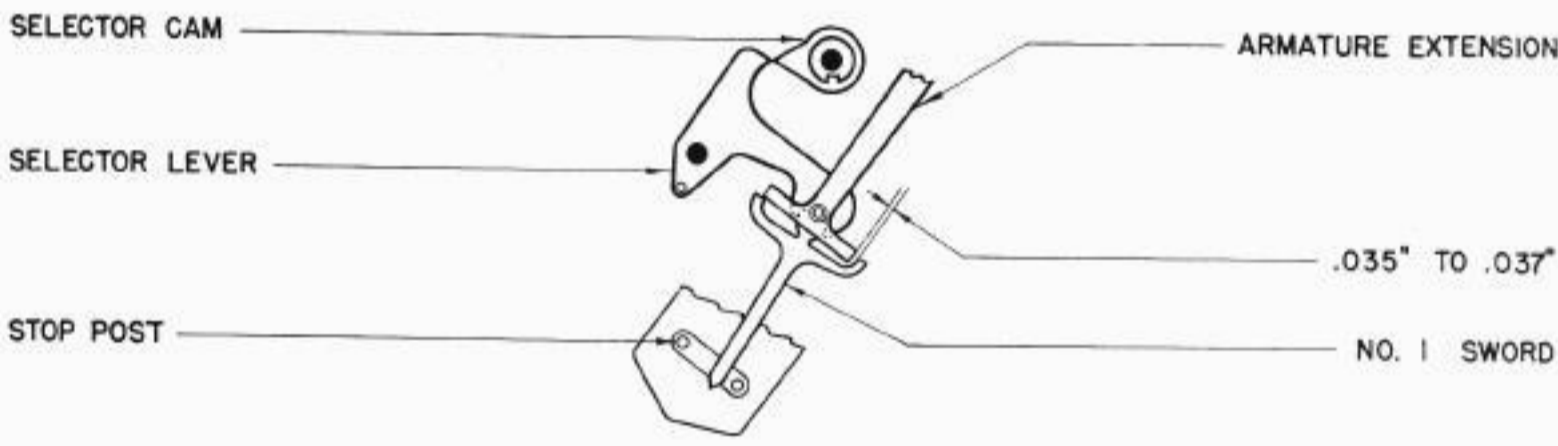


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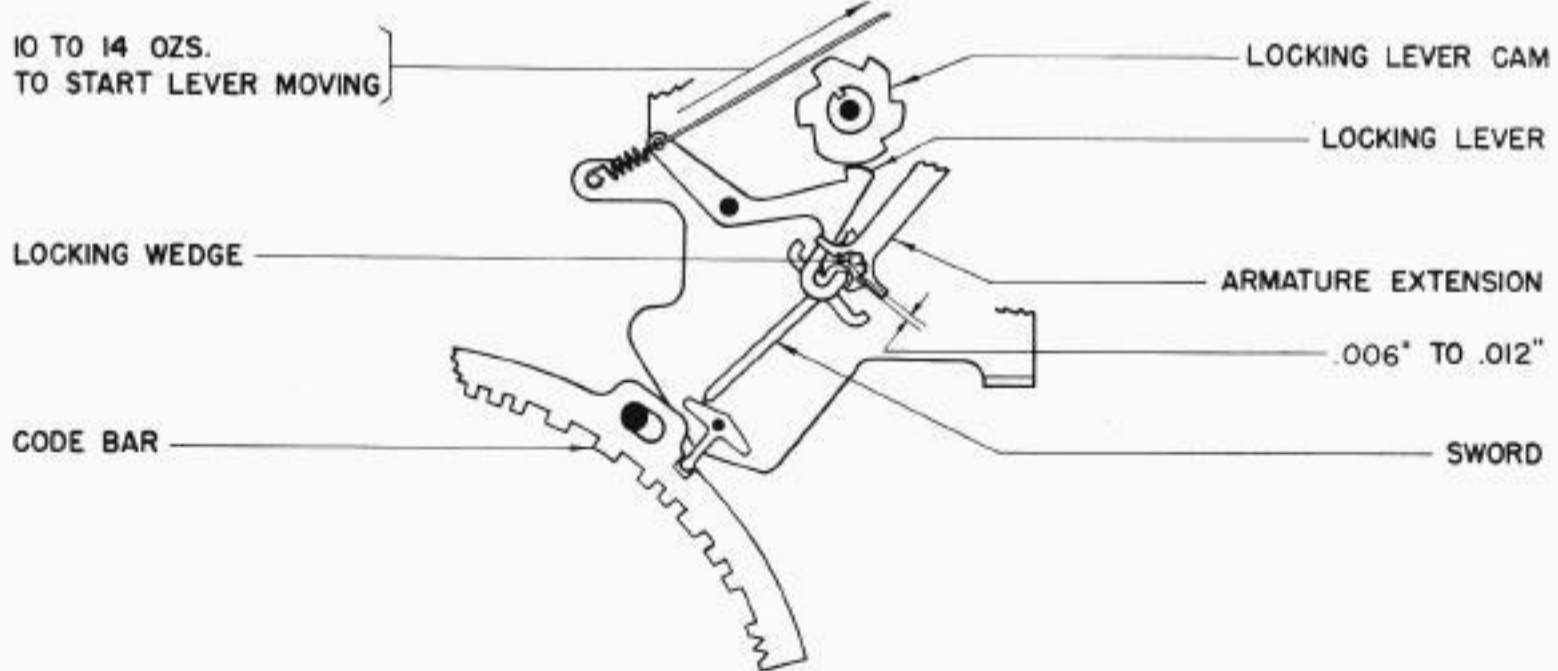


FIGURE 9

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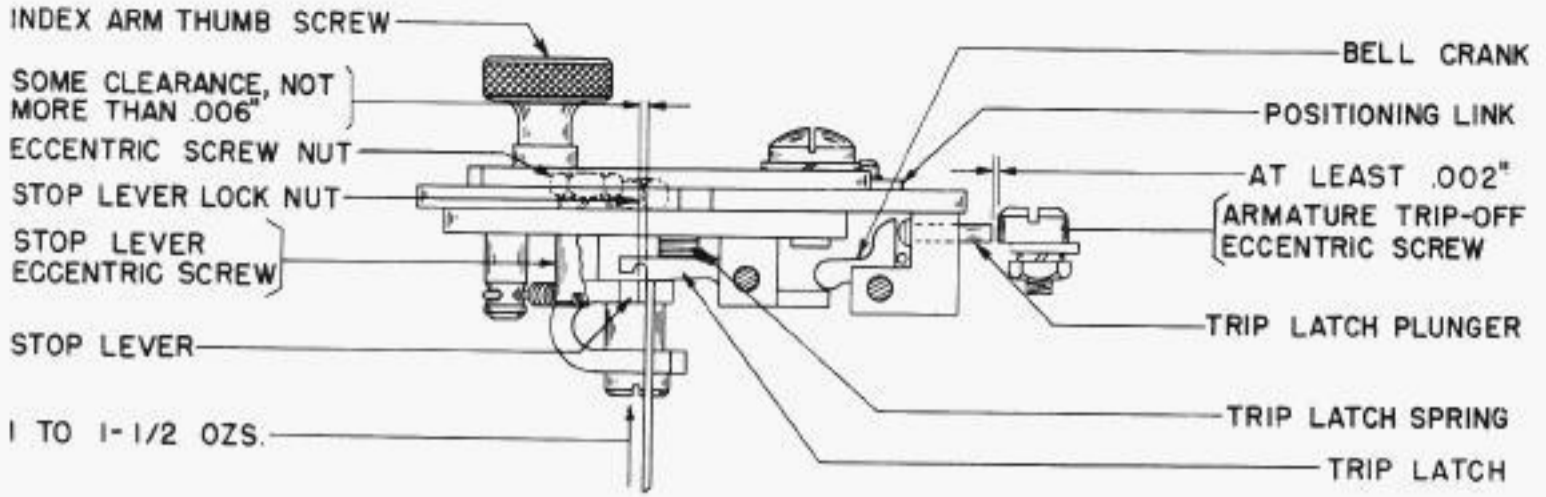


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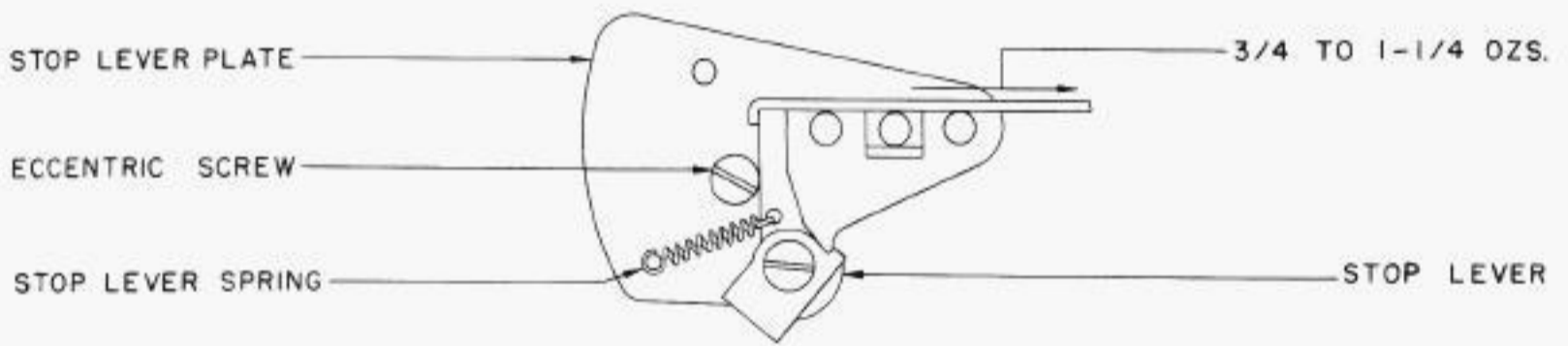


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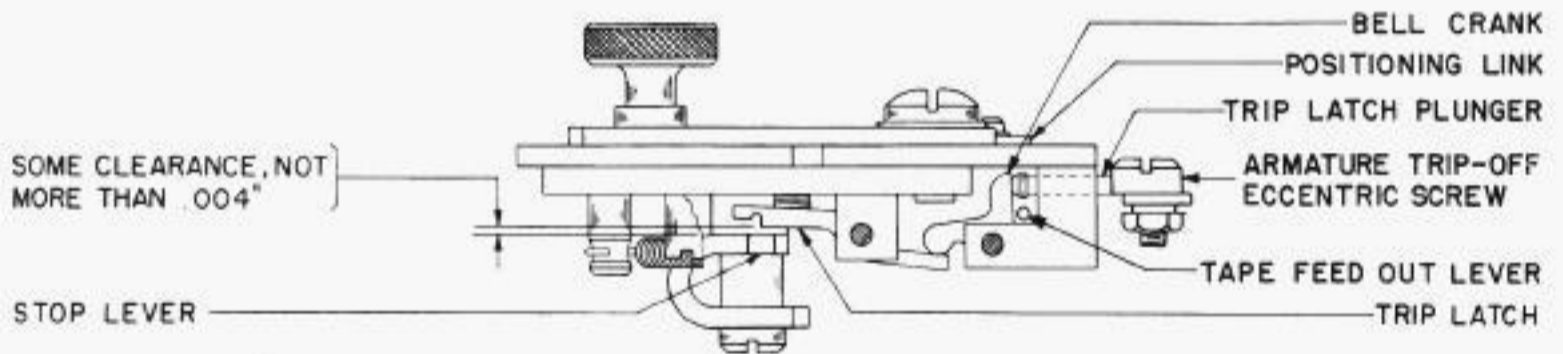


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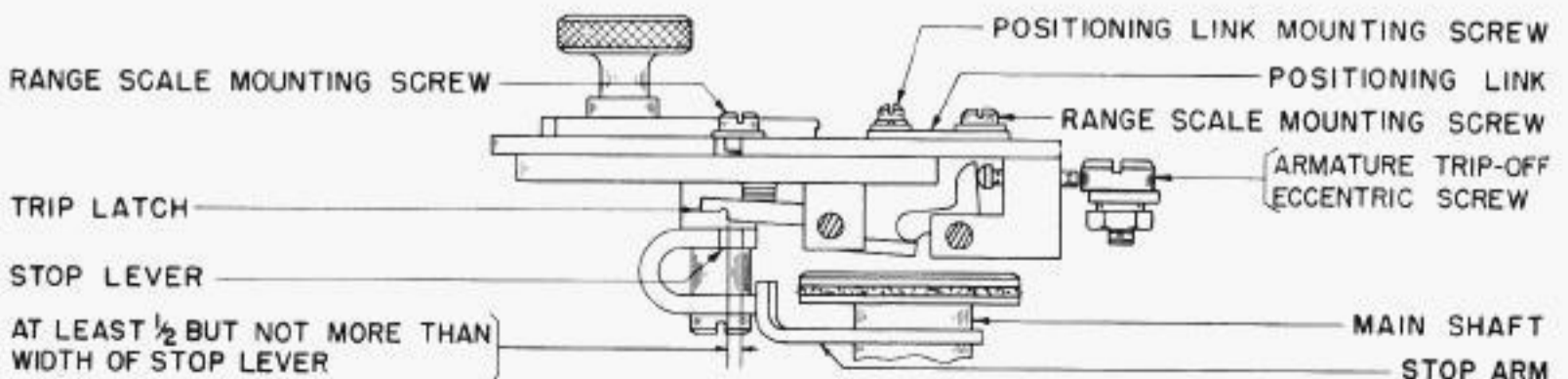


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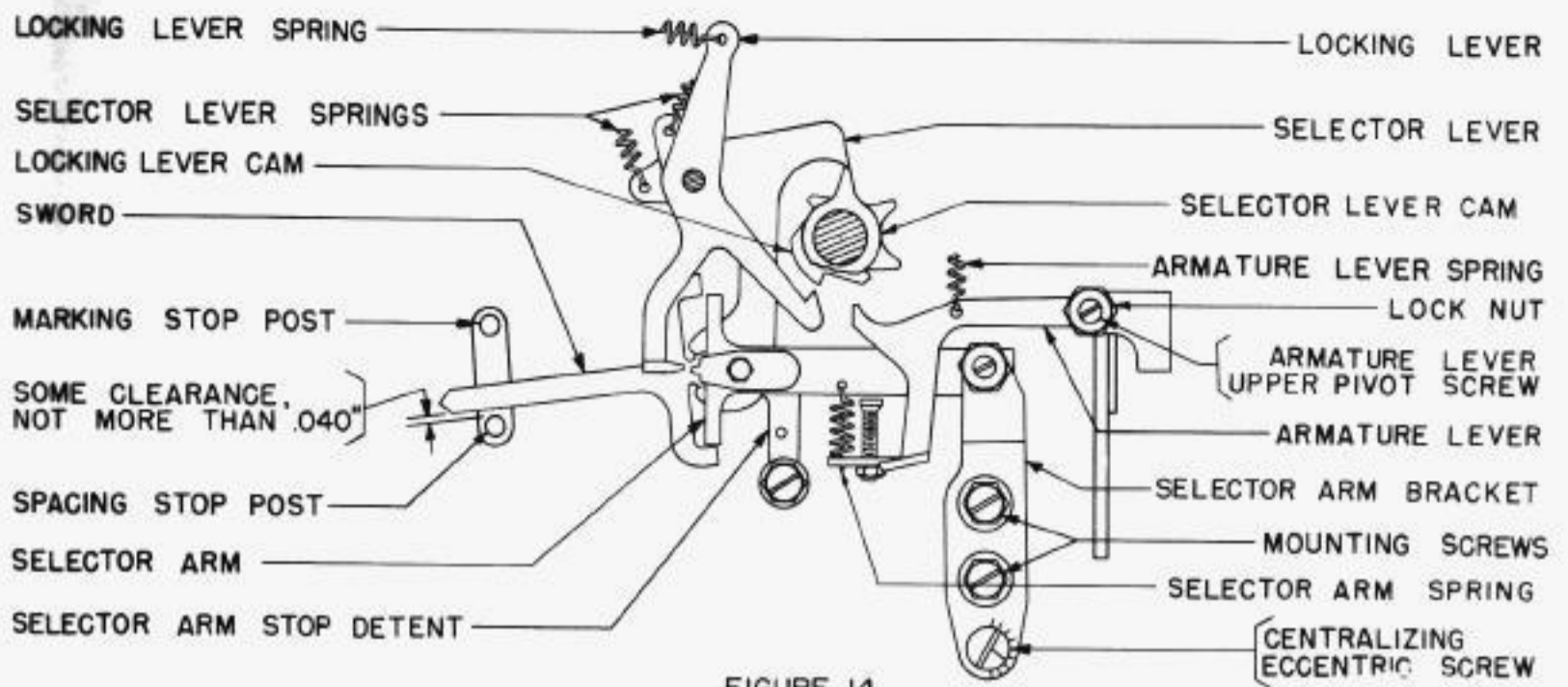


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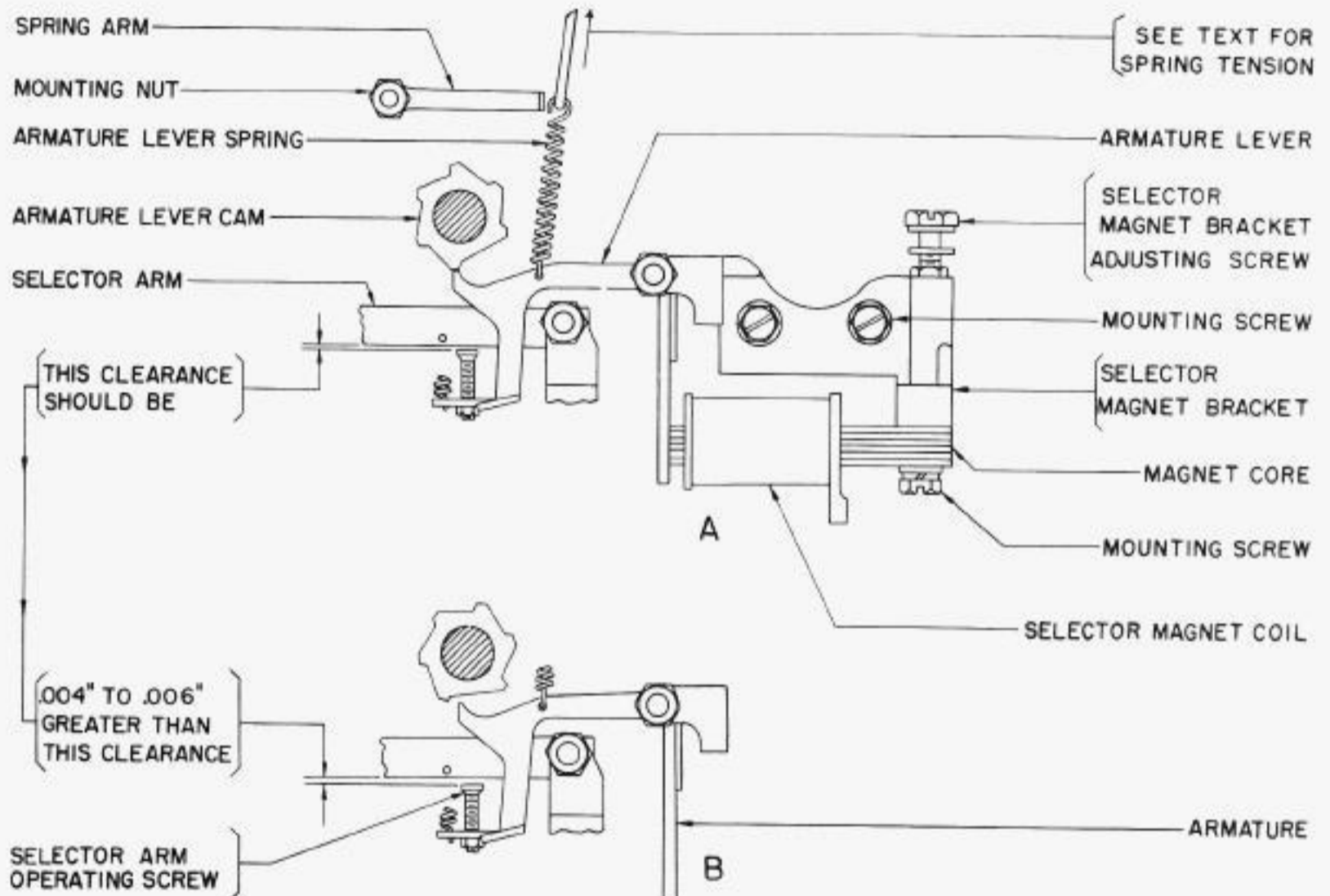


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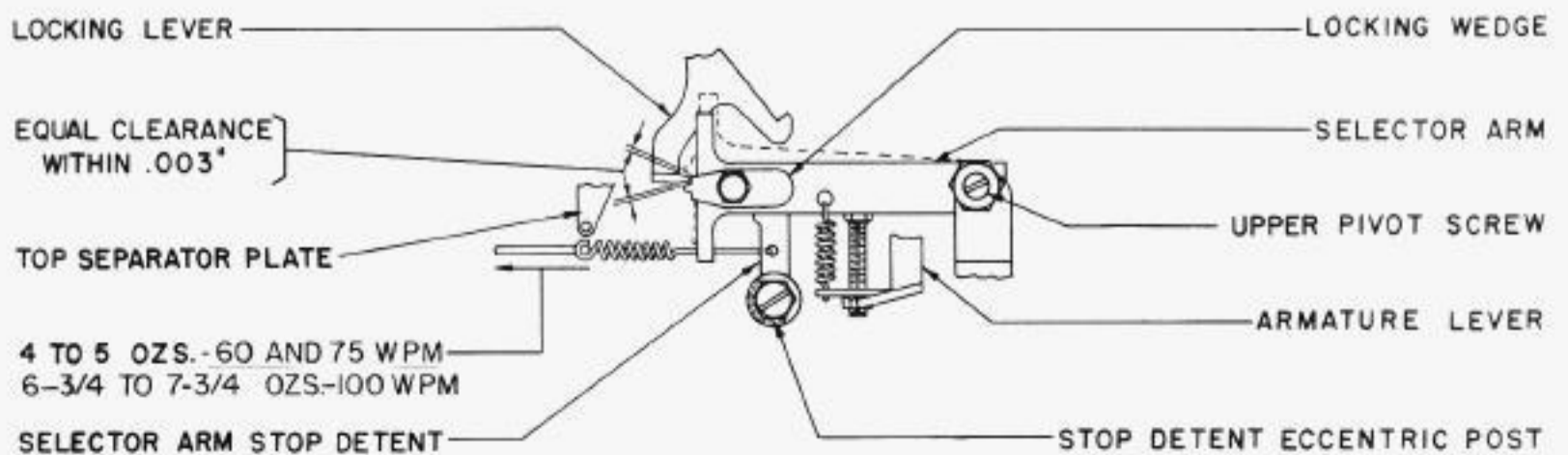


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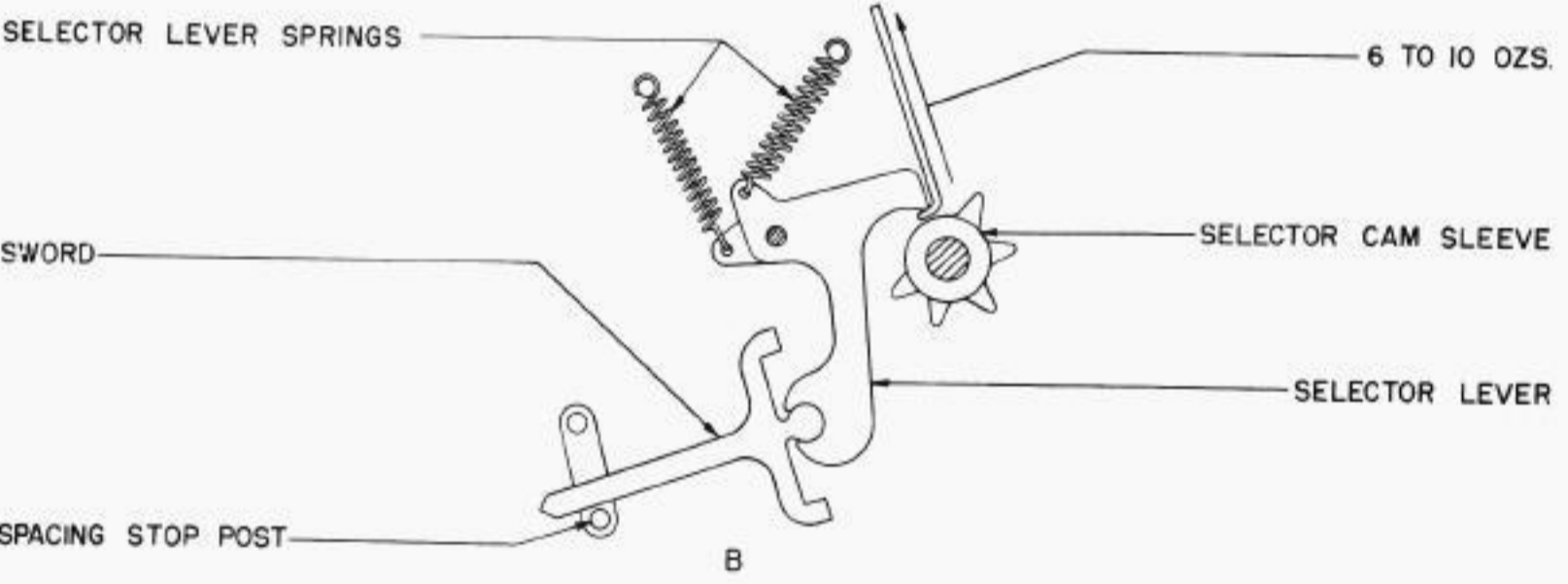
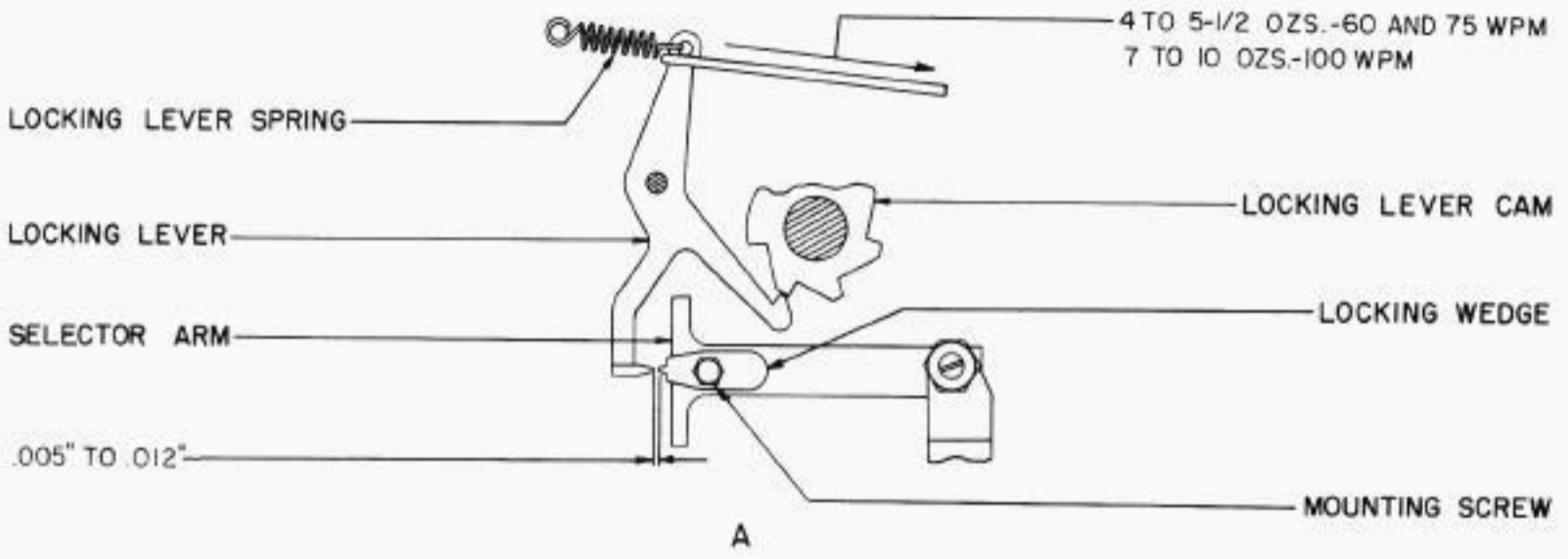
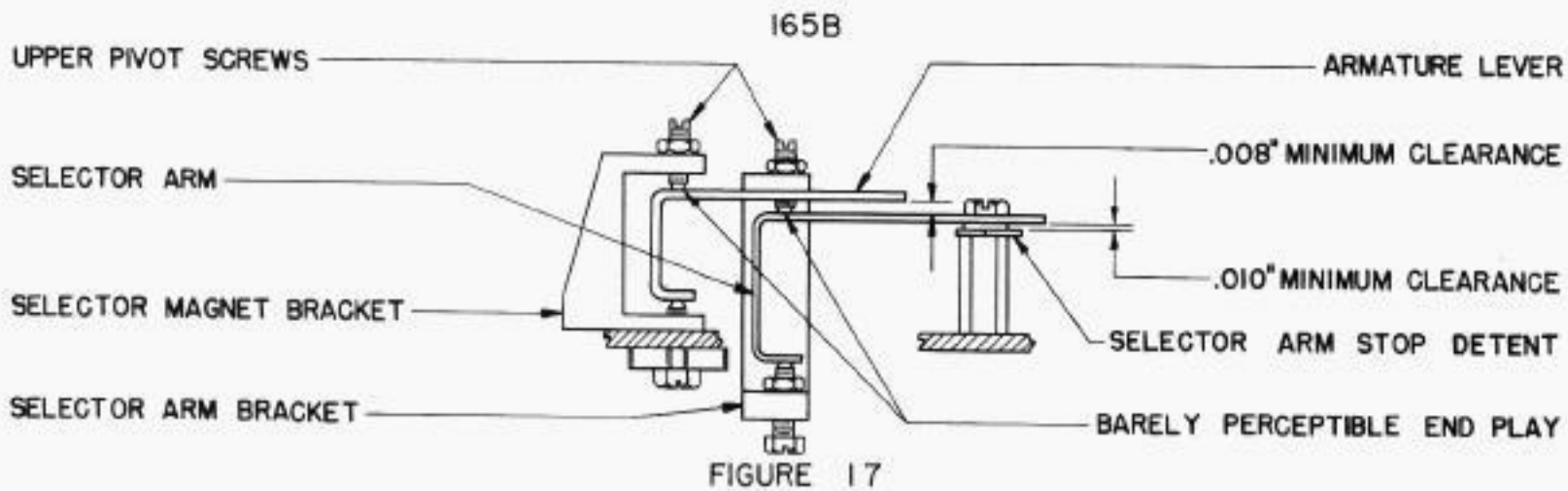


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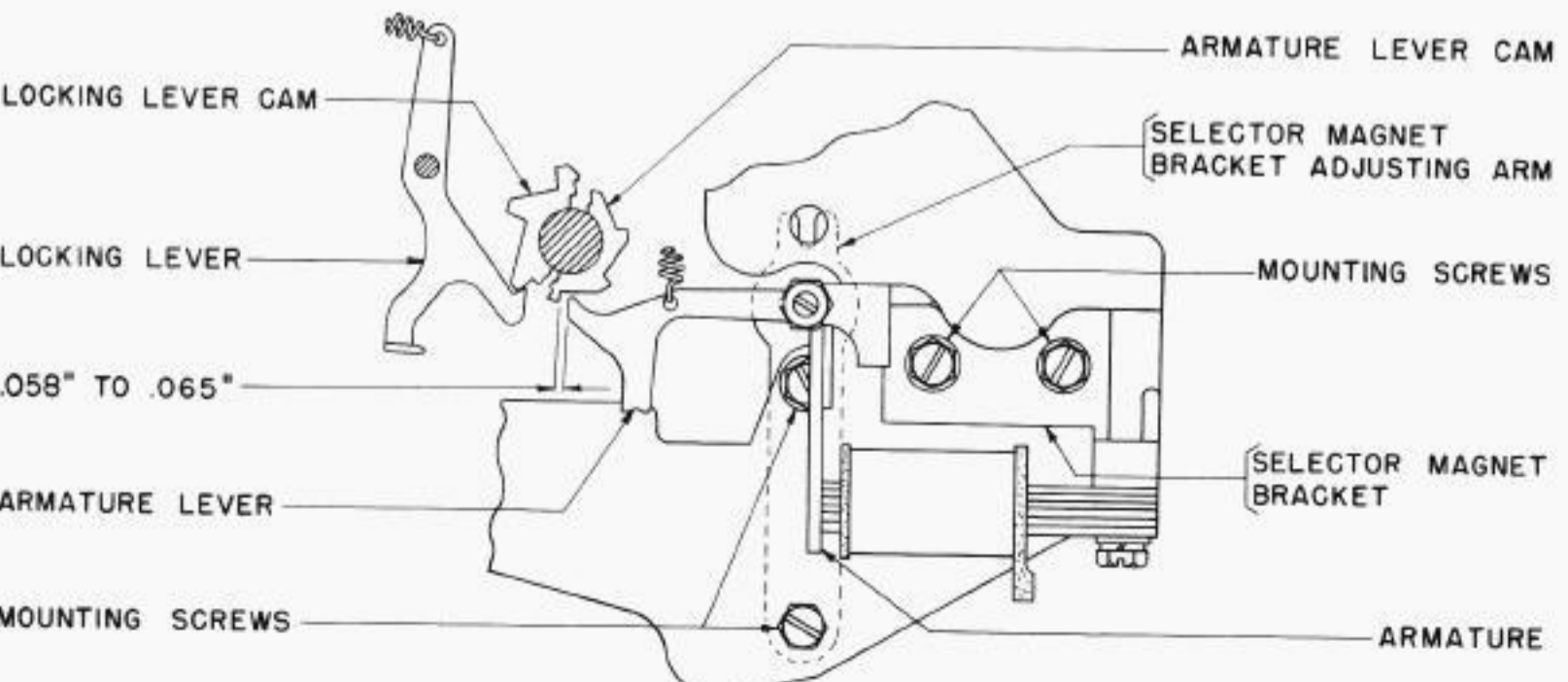


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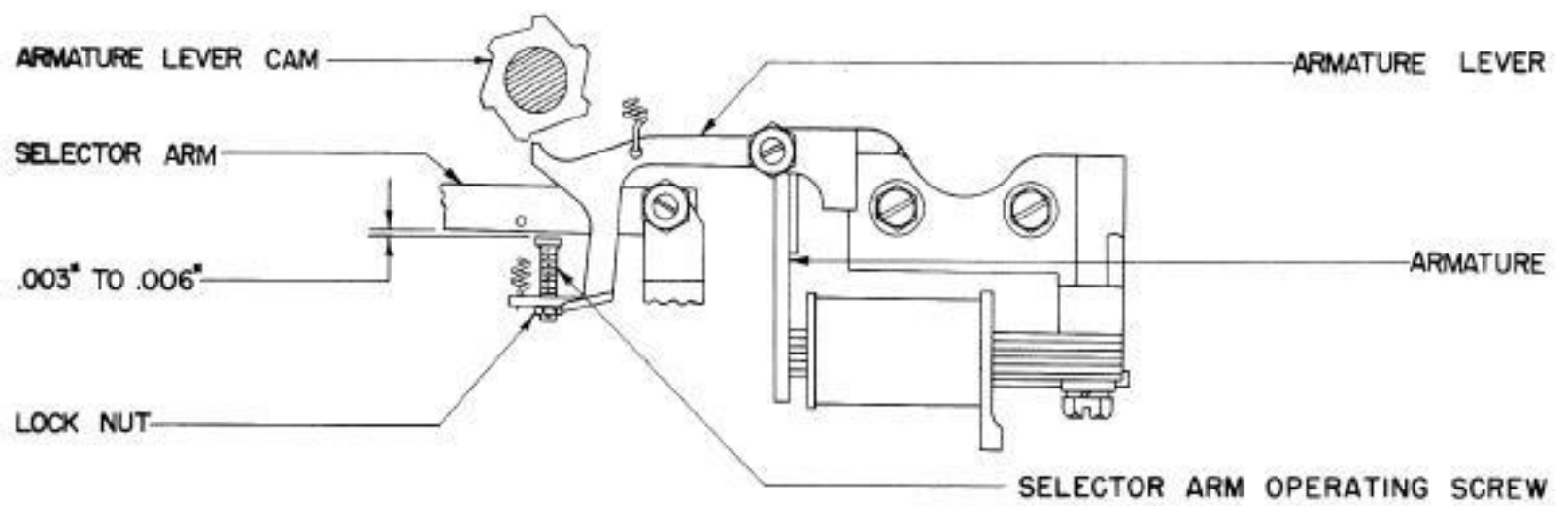


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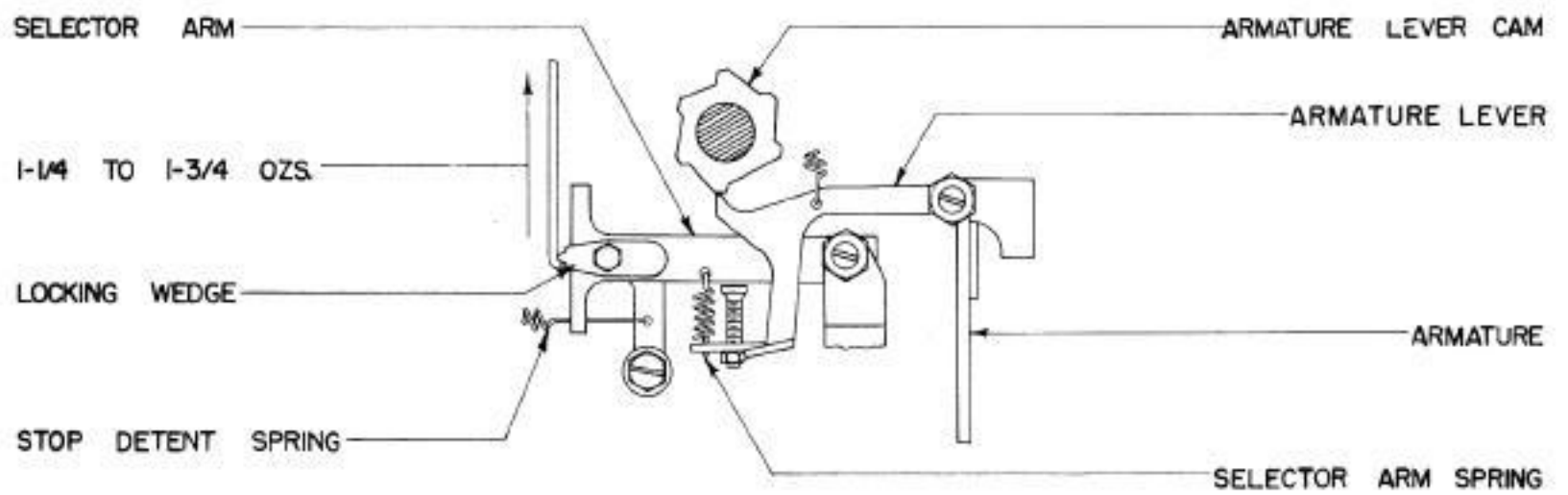


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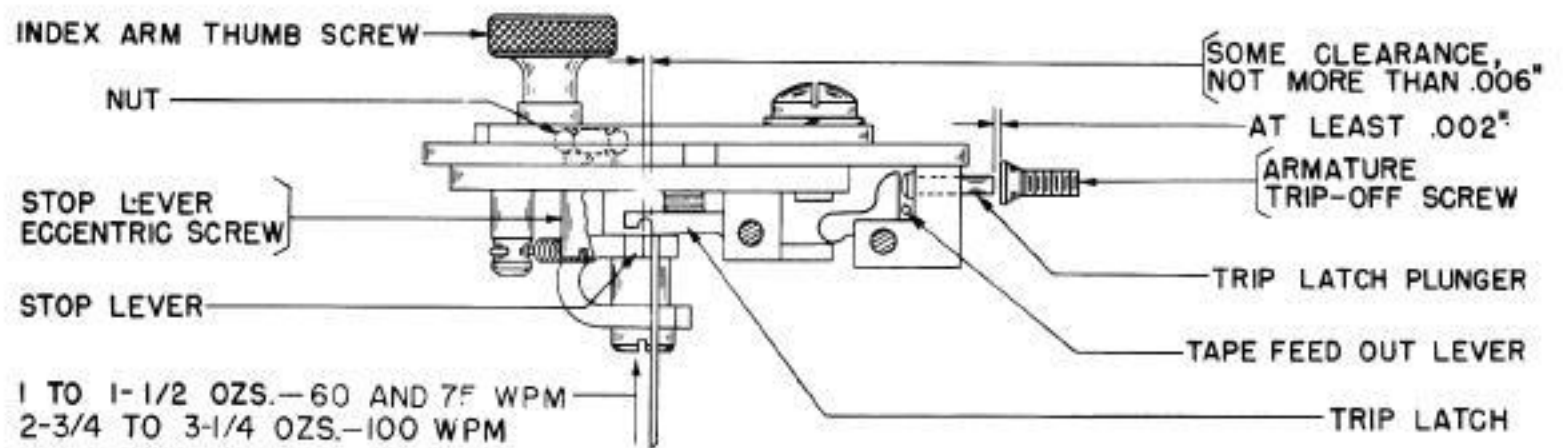


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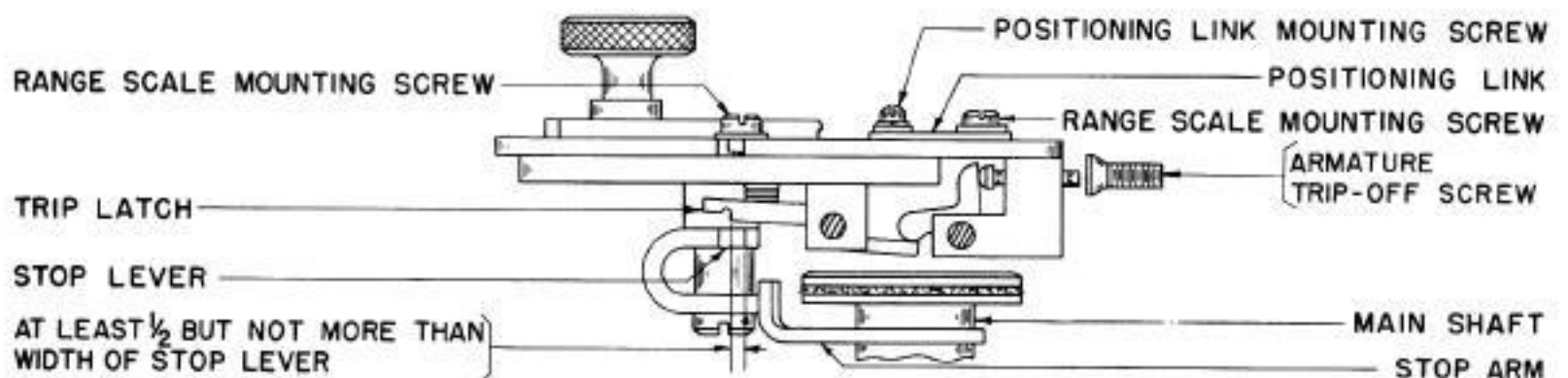


FIGURE 23

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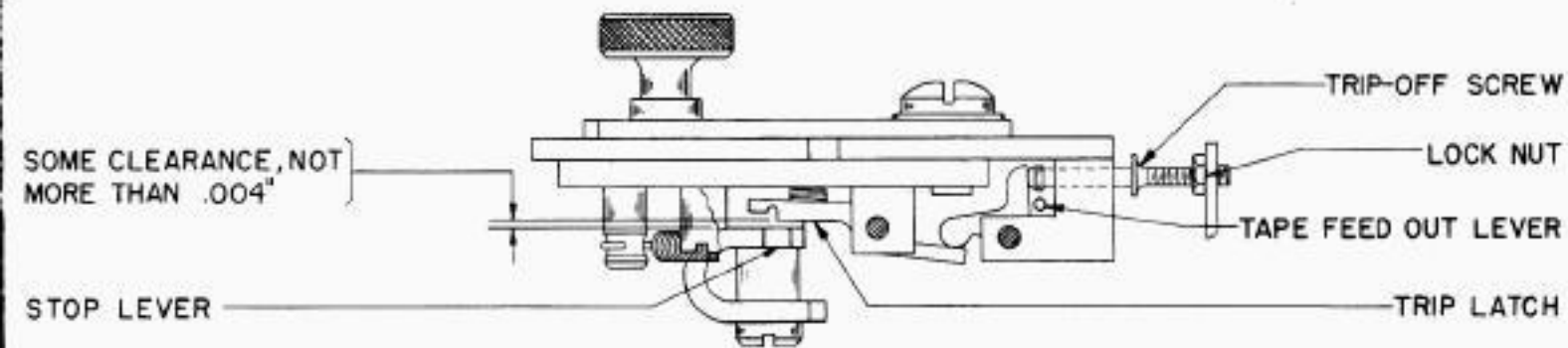


FIGURE 24



FIGURE 25

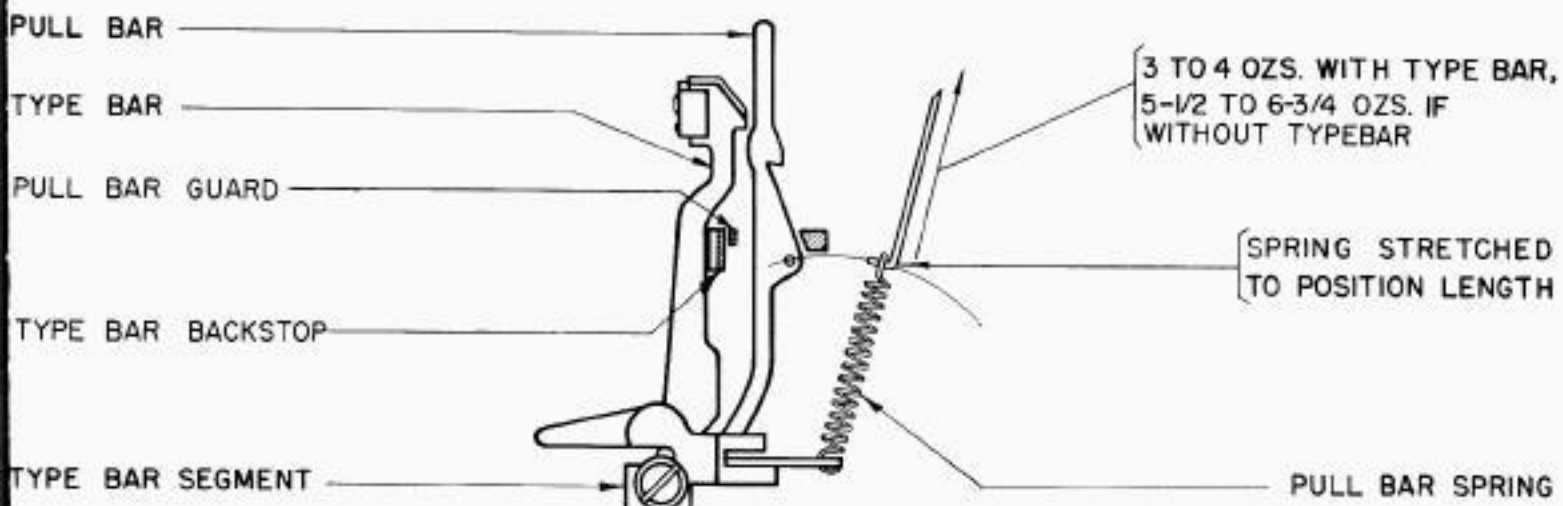


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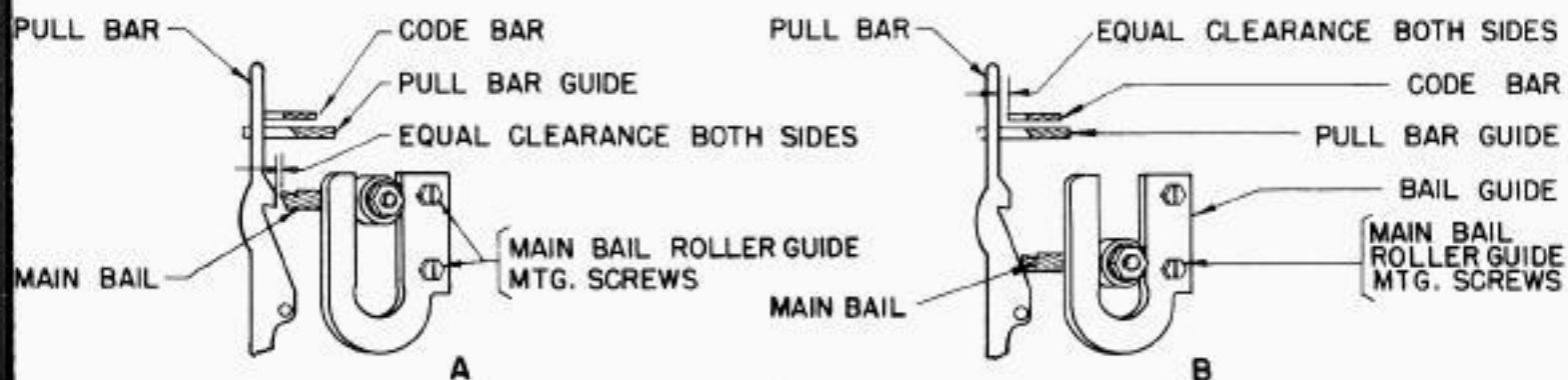


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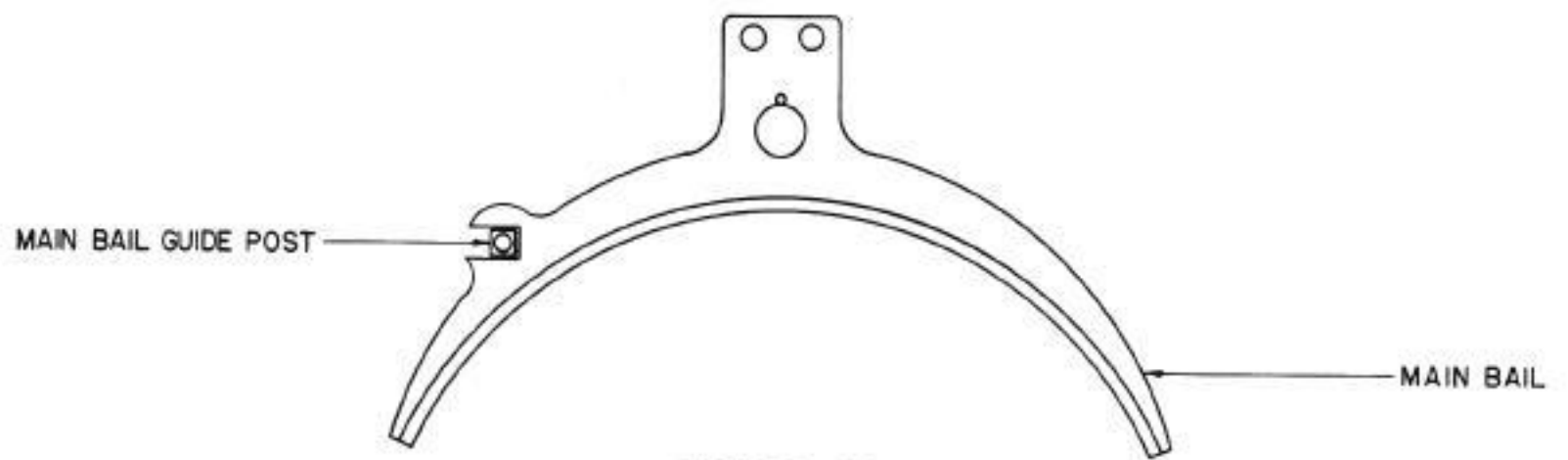


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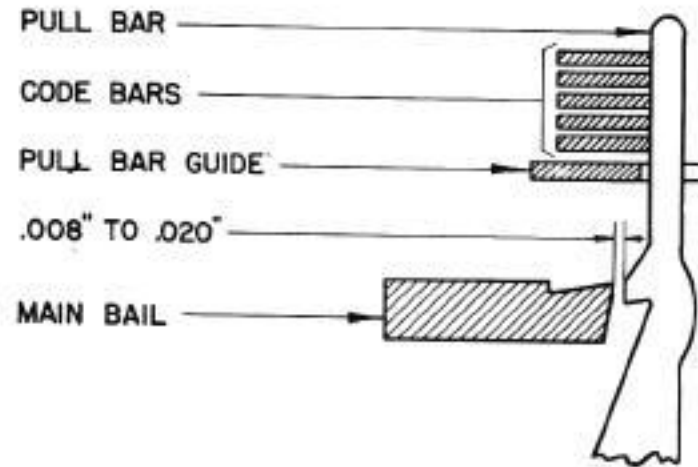


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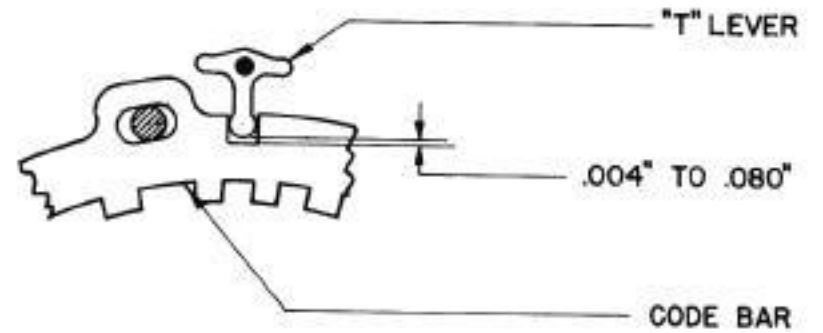


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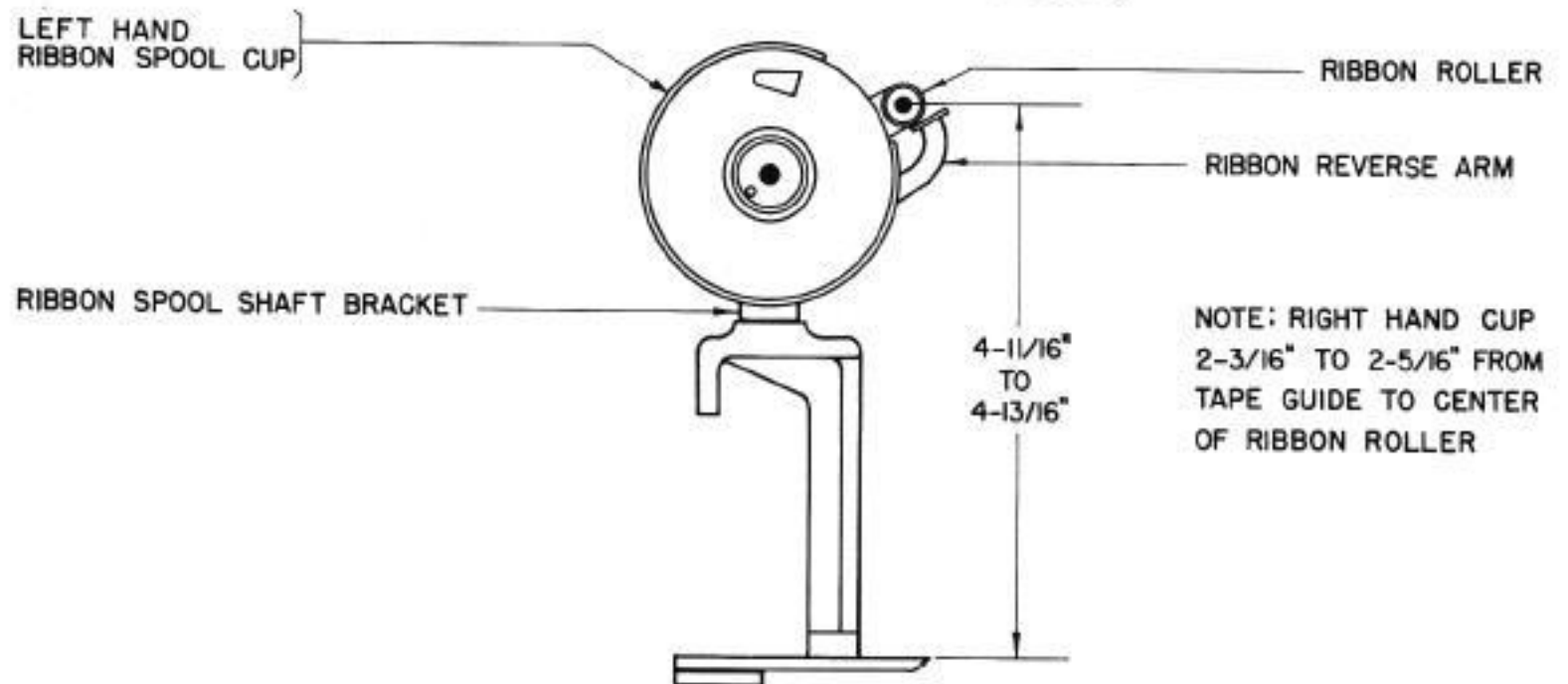


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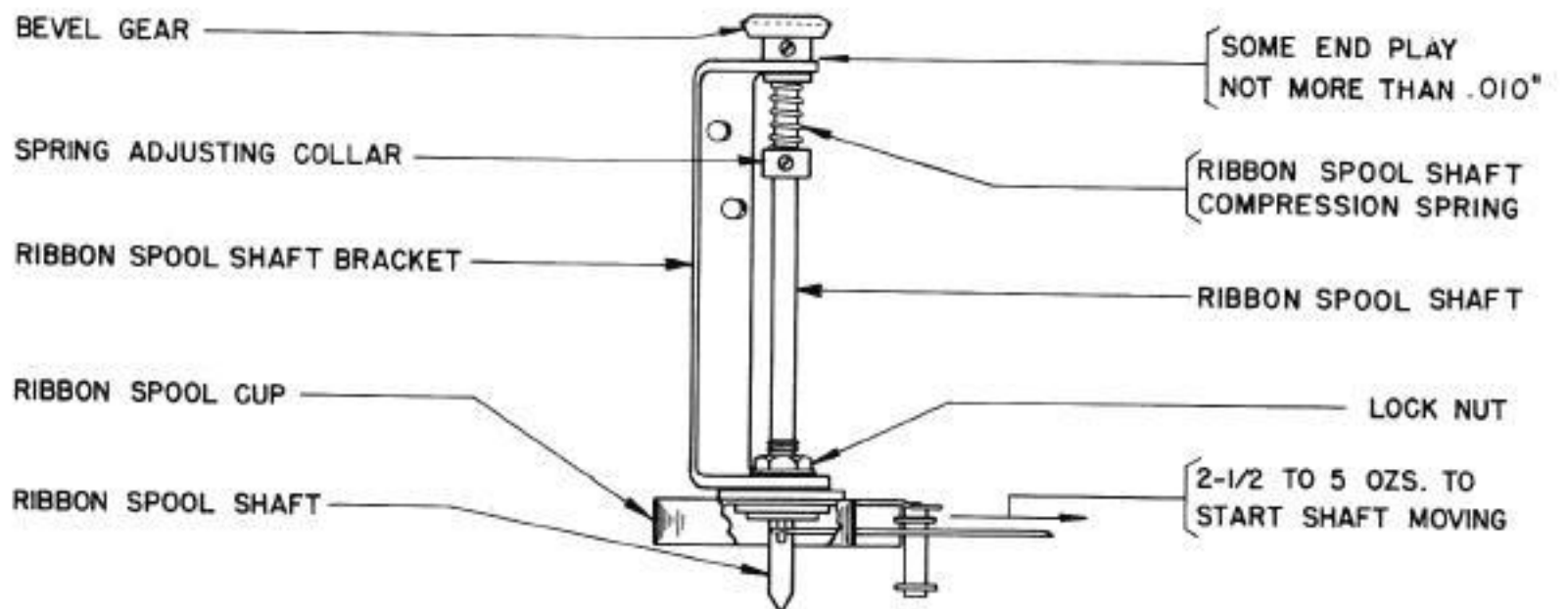


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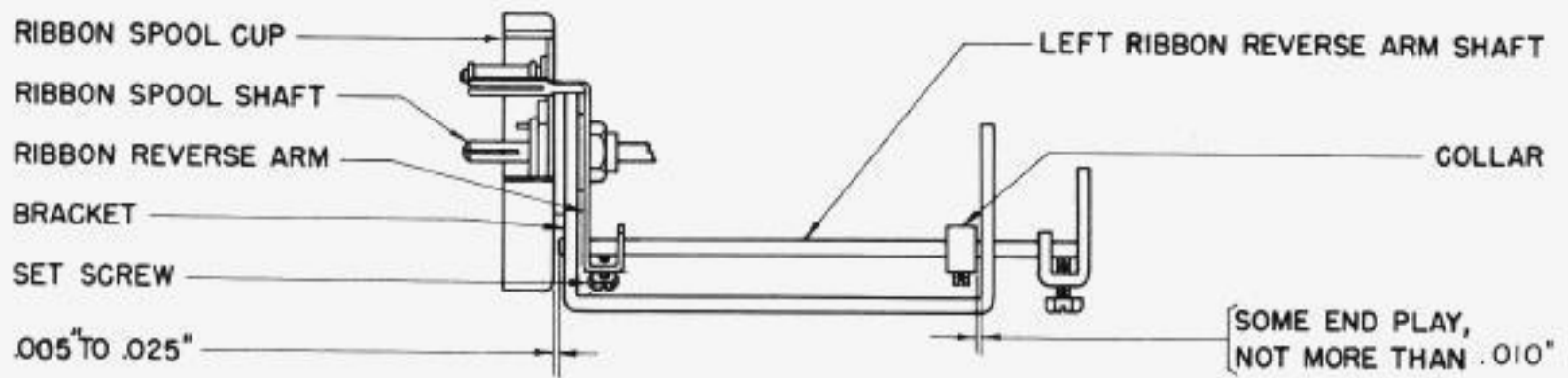


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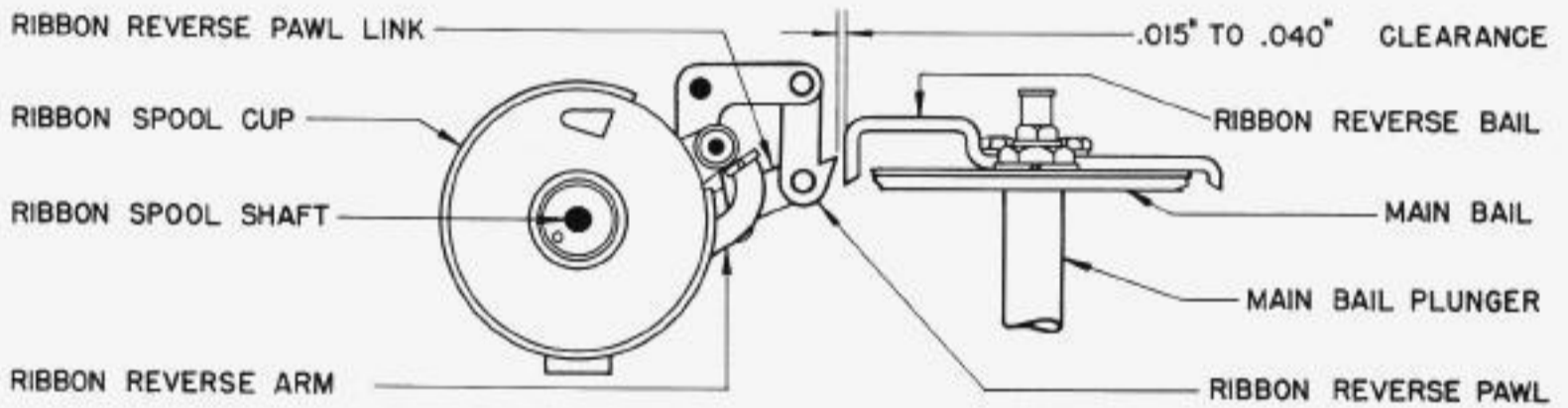


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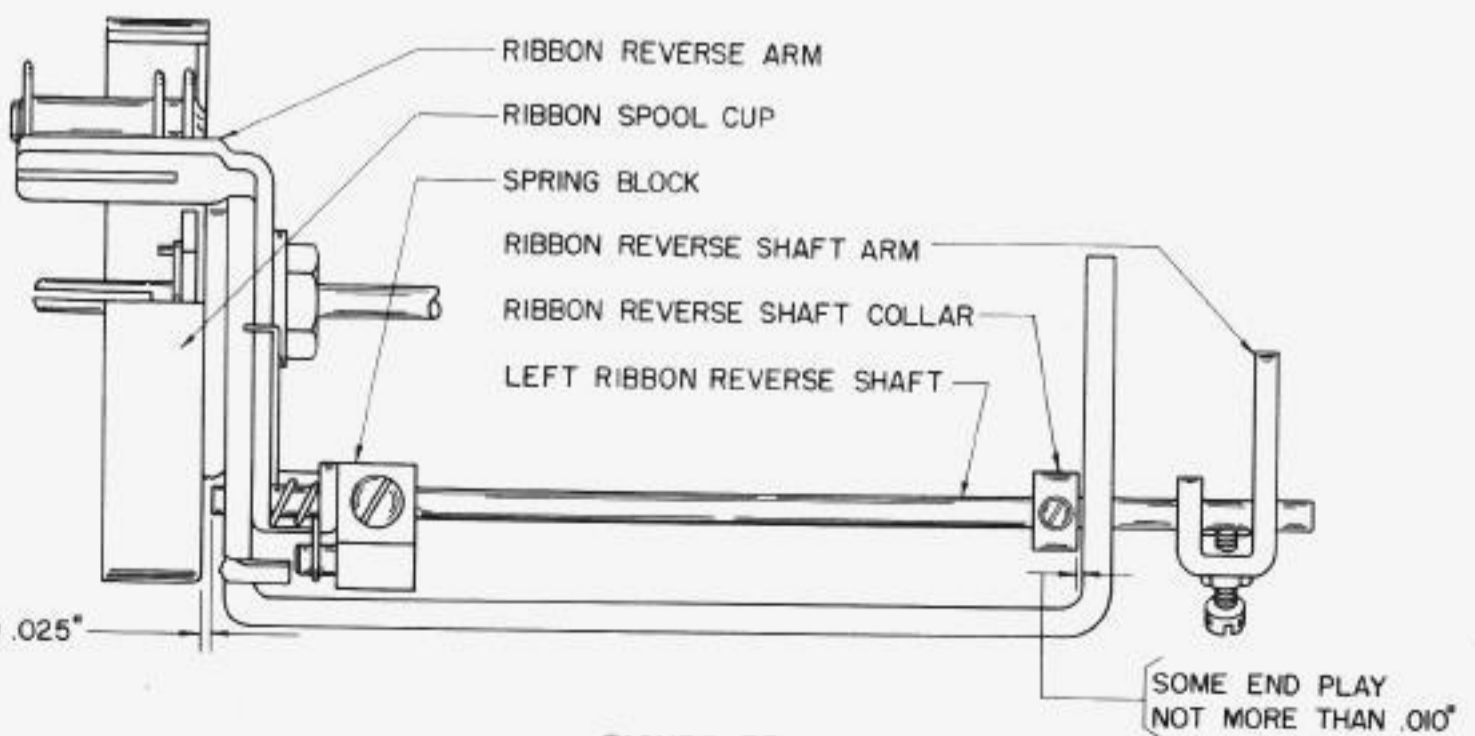


FIGURE 35



POSITION OF RIBBON REVERSE BAIL WHEN TAKING RIBBON REVERSE ARM YIELD SPRING TENSION

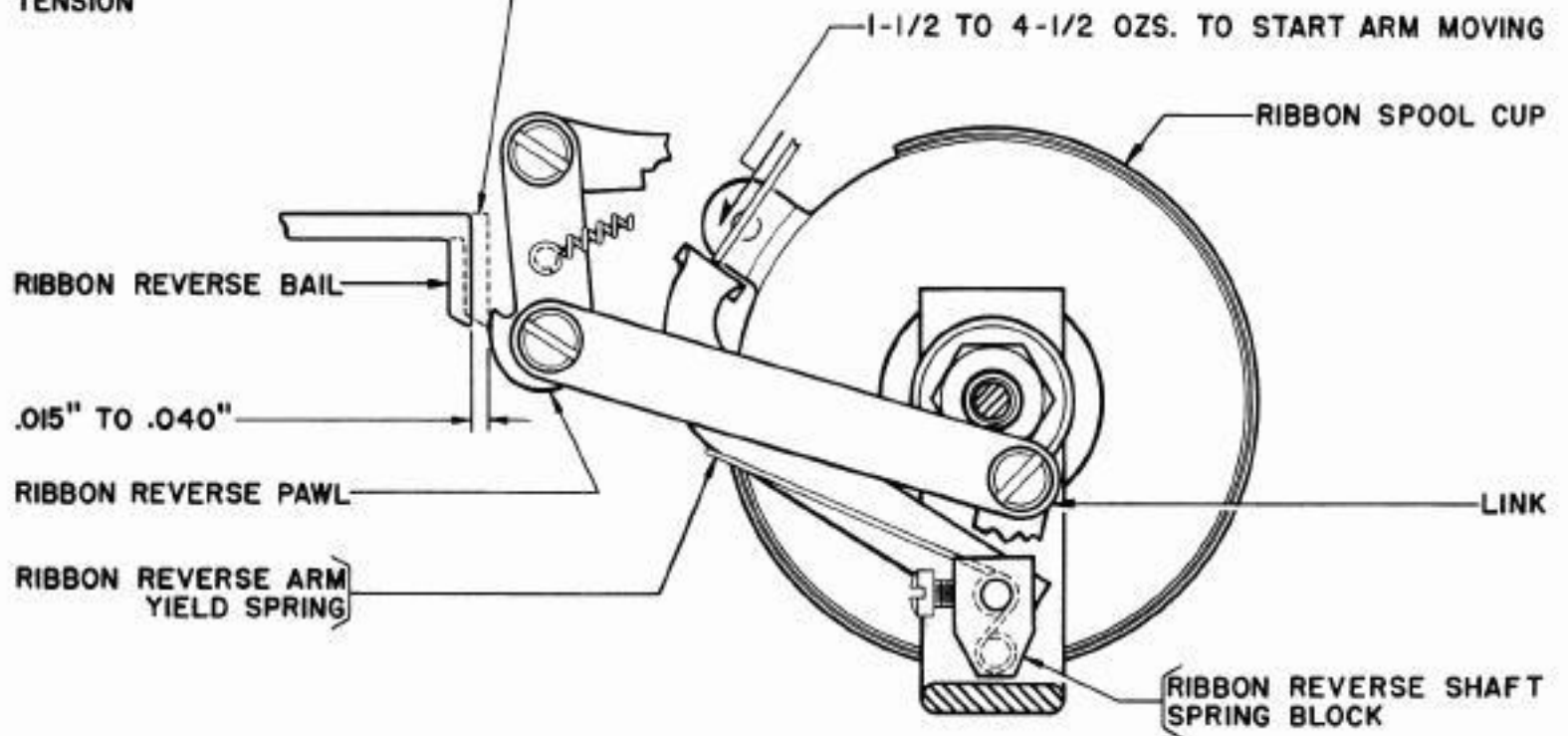


FIGURE 36

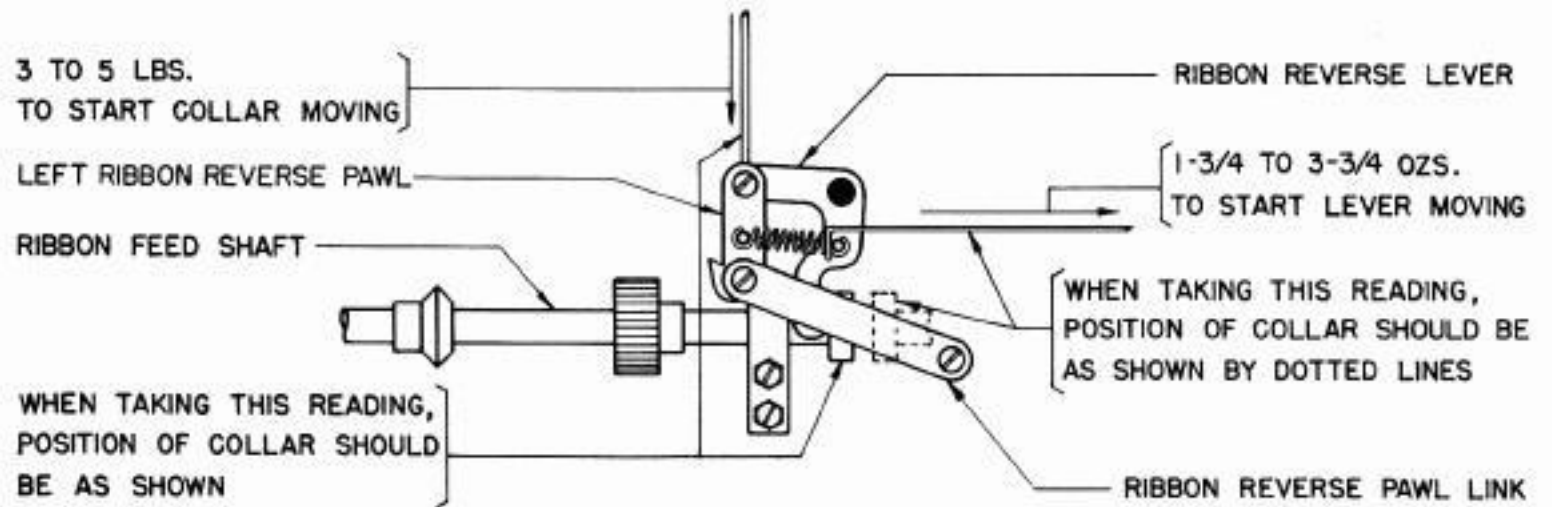


FIGURE 37

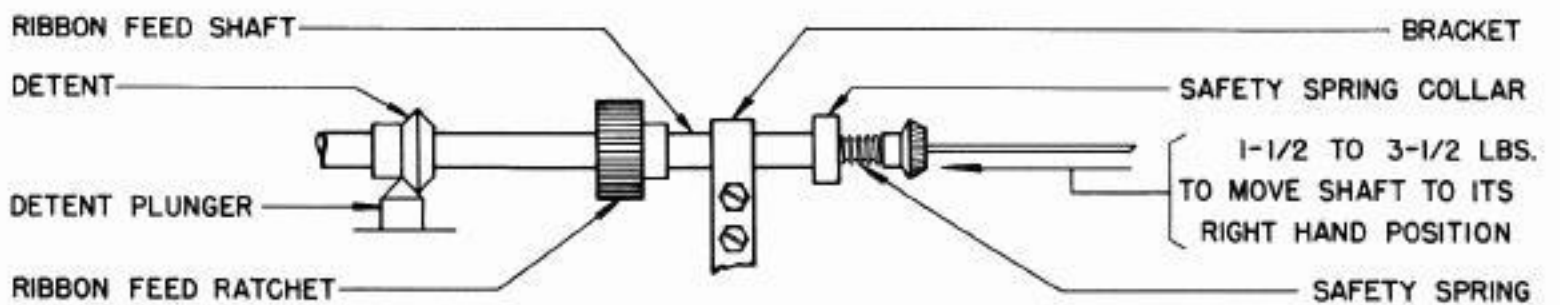


FIGURE 38

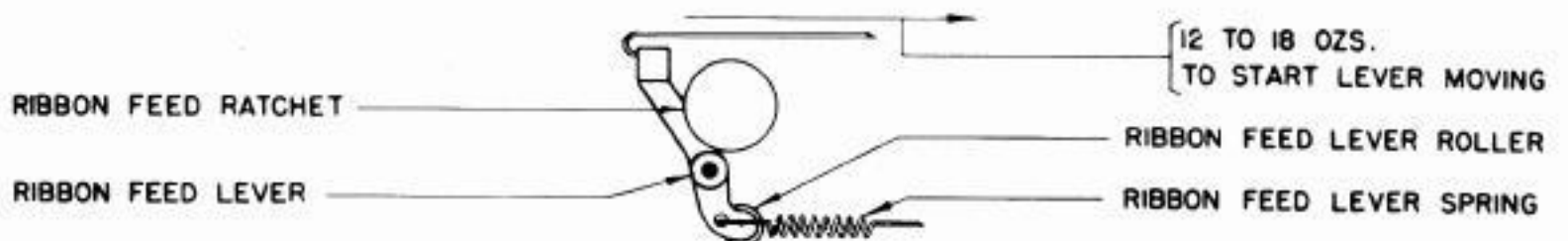


FIGURE 39

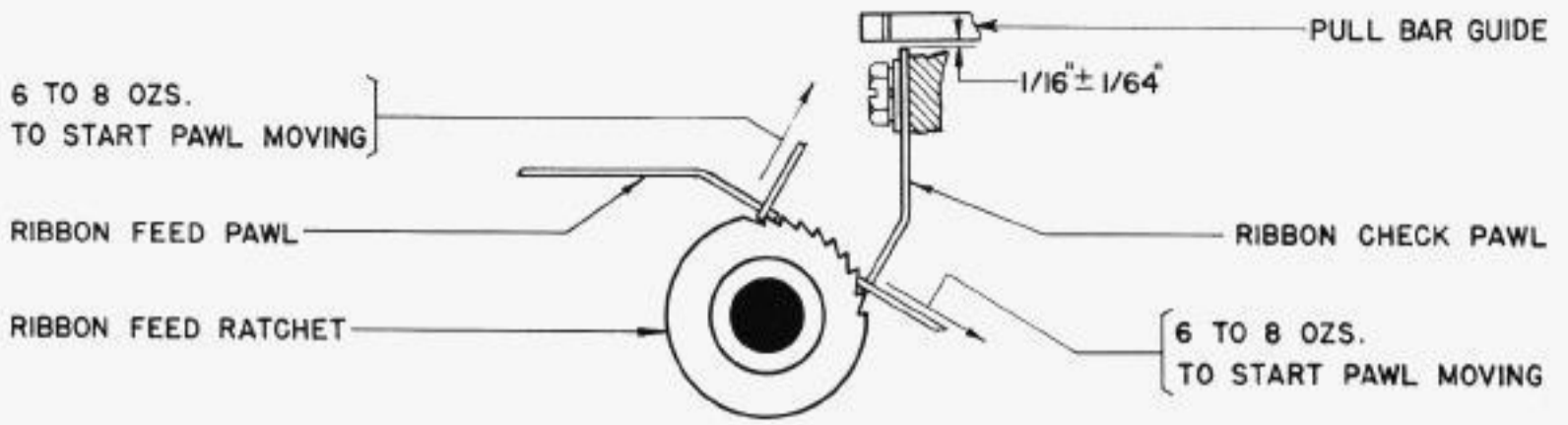


FIGURE 40

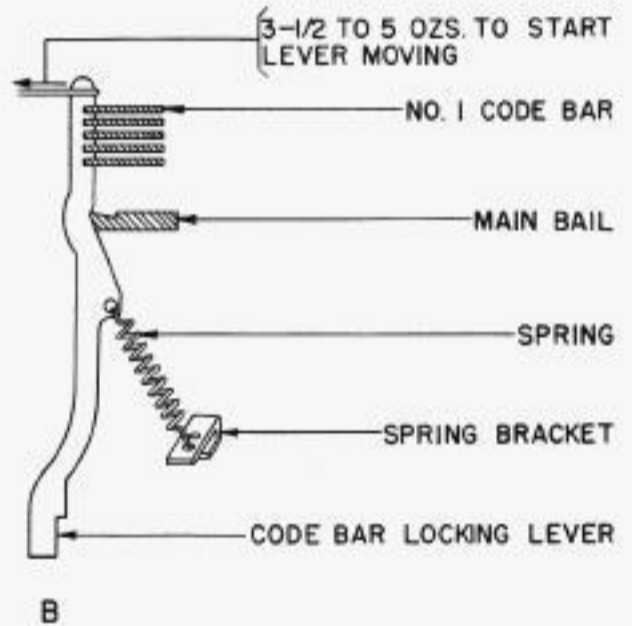
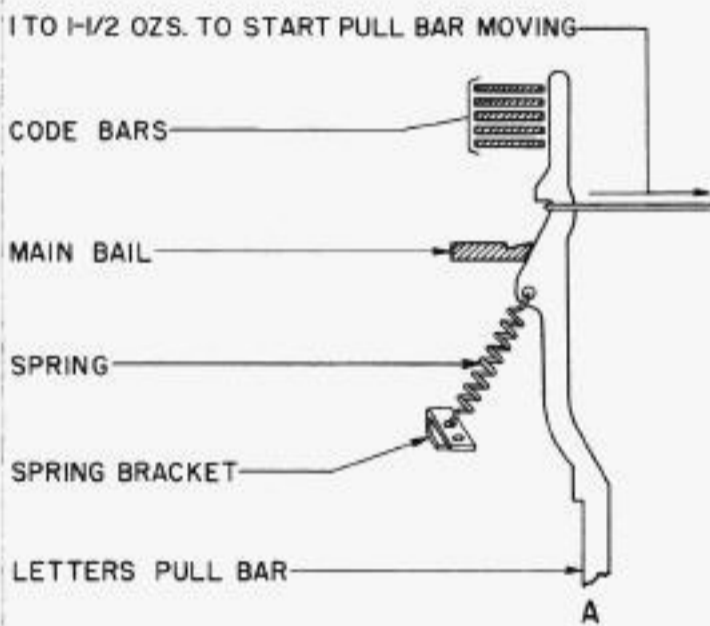


FIGURE 41

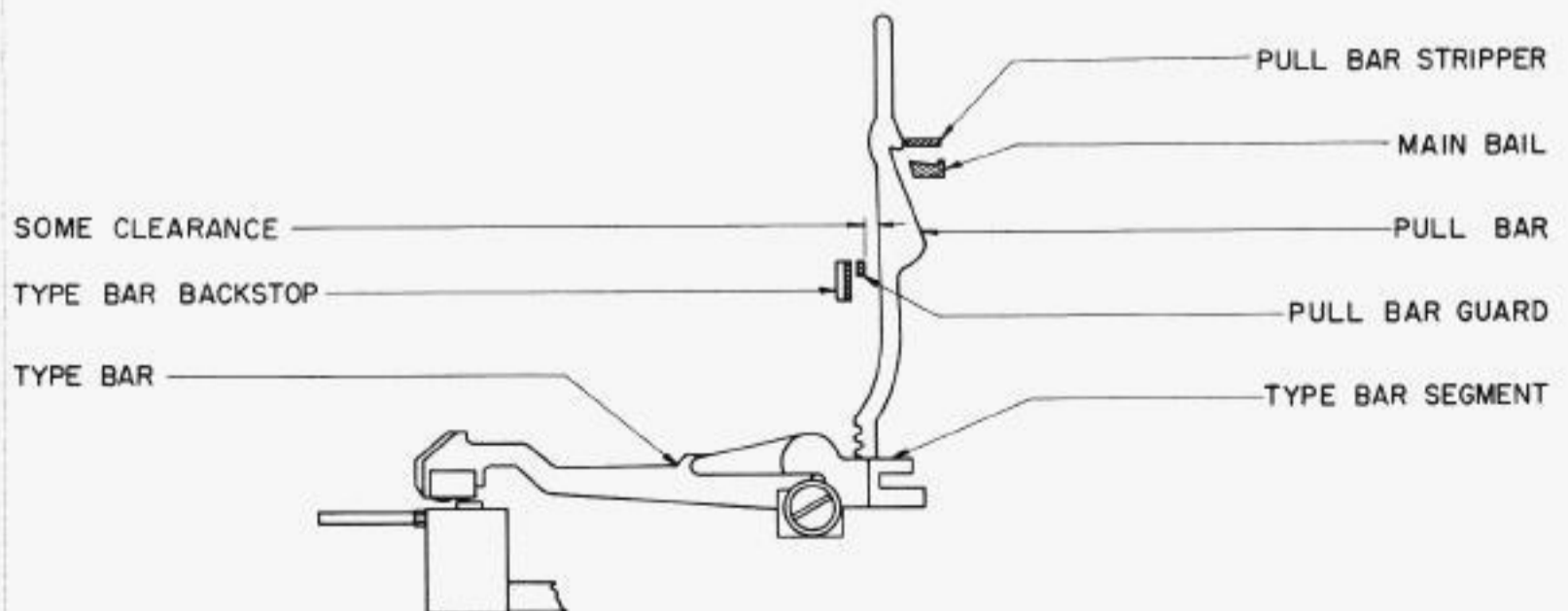


FIGURE 42

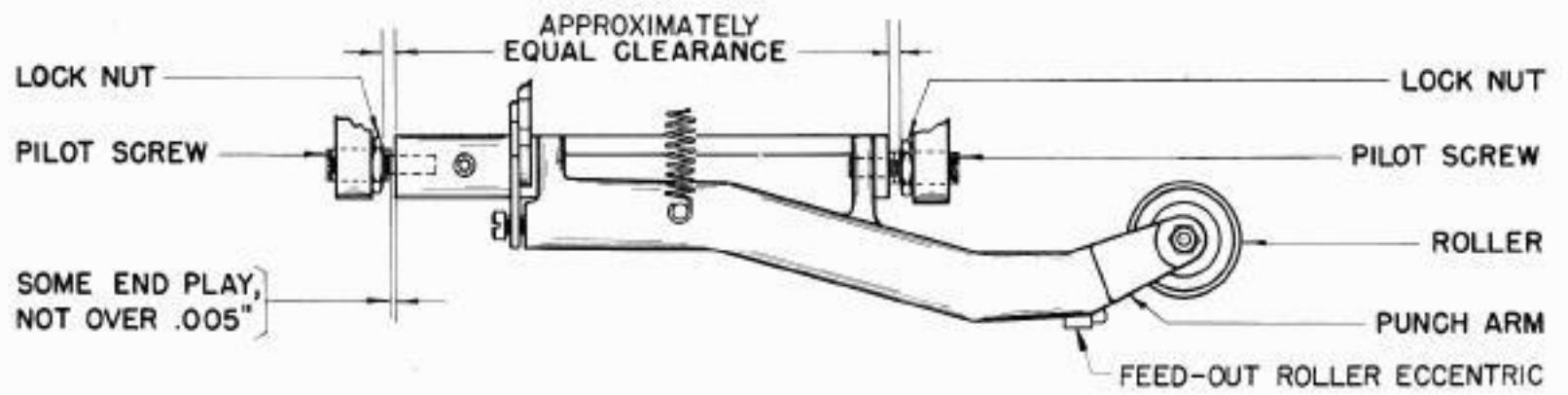


FIGURE 43

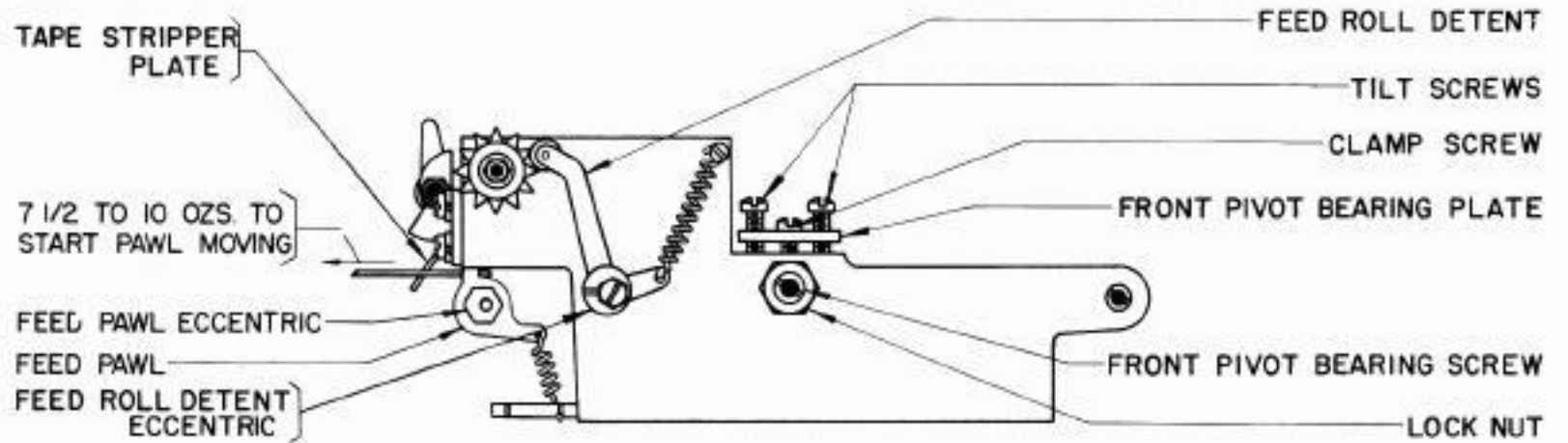


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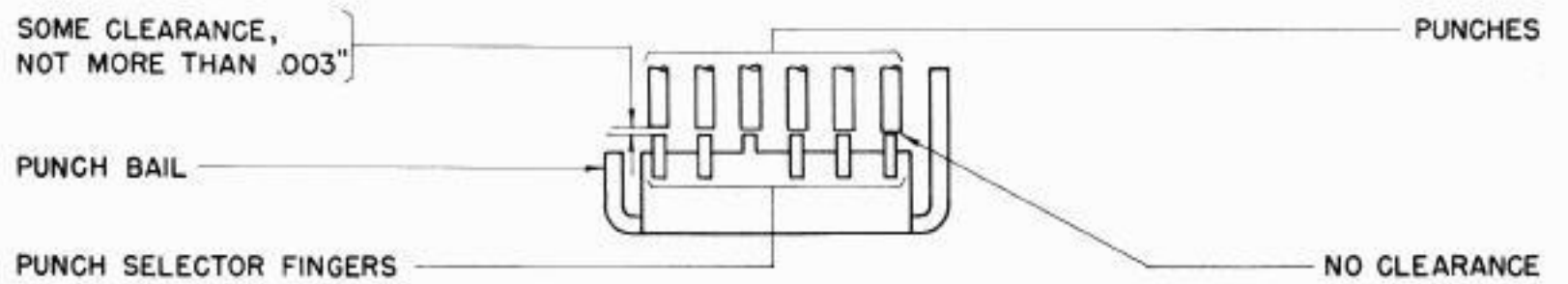


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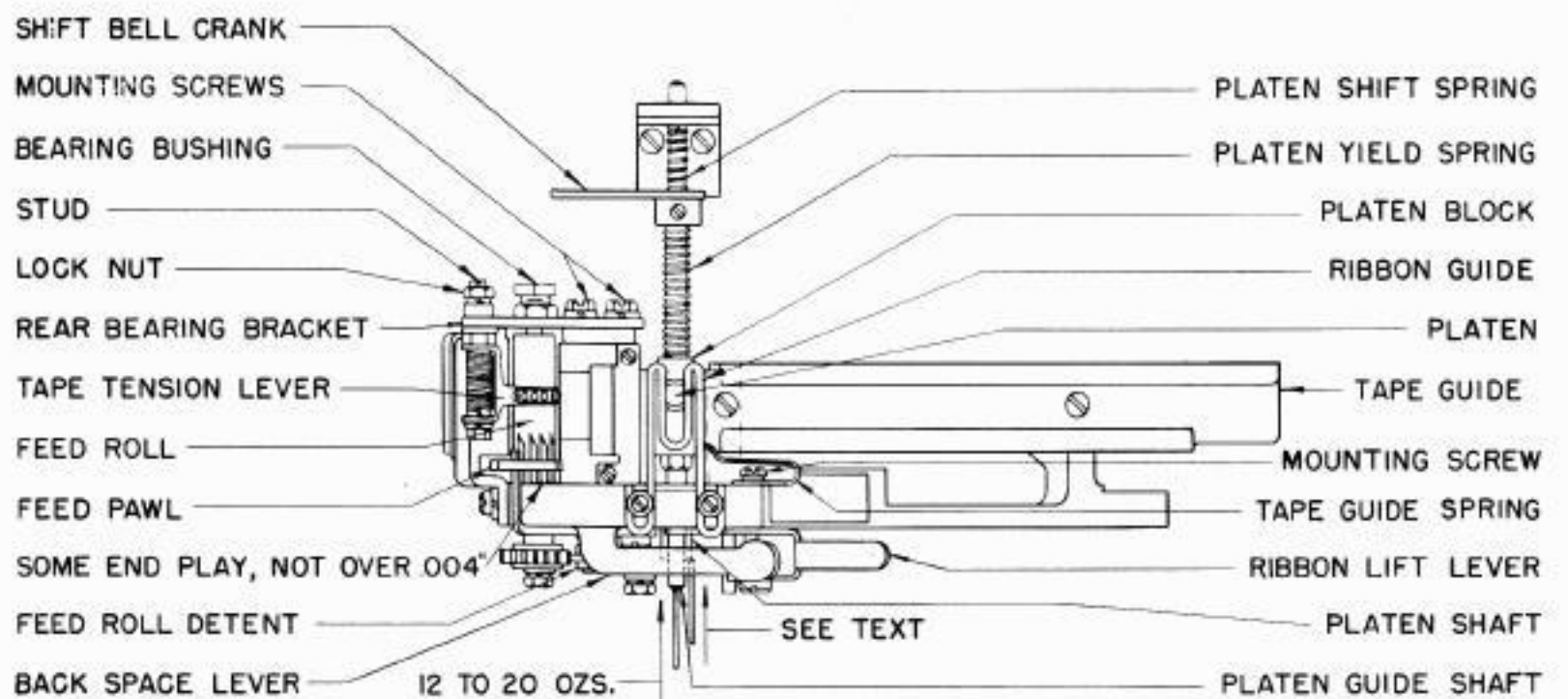


FIGURE 46

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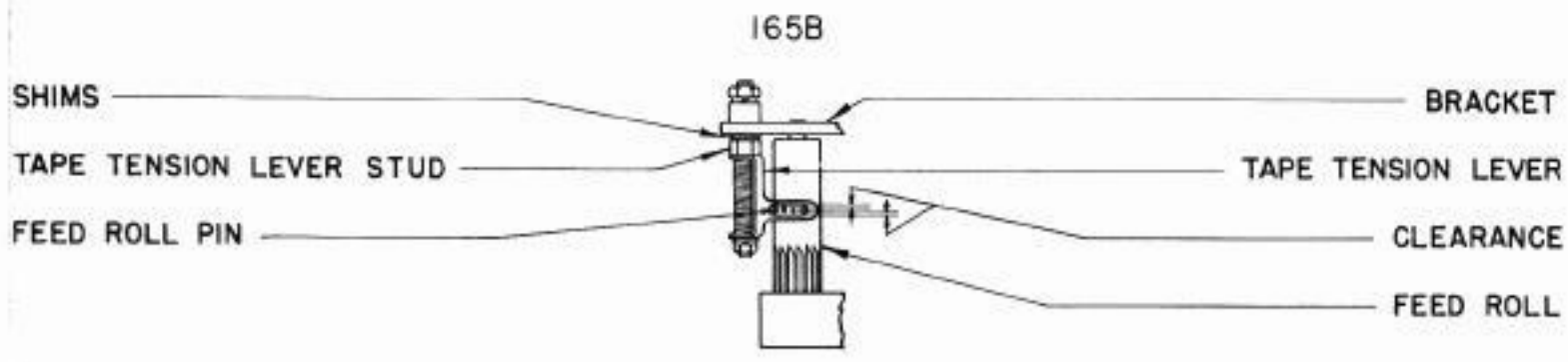


FIGURE 47

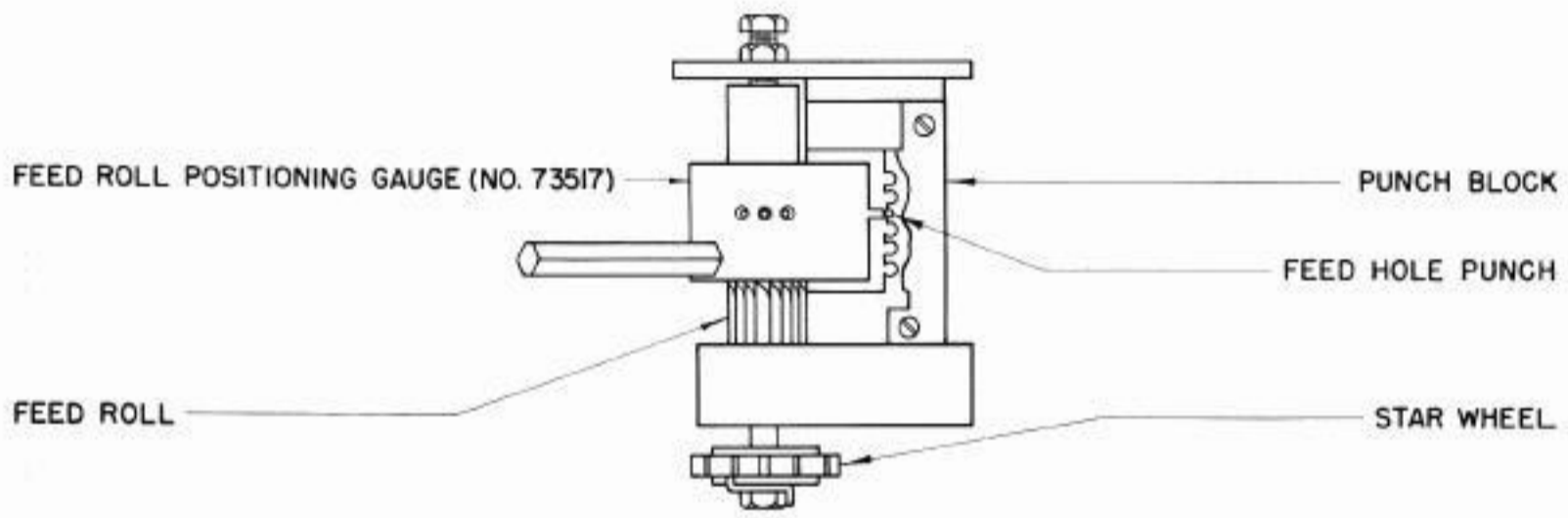


FIGURE 48

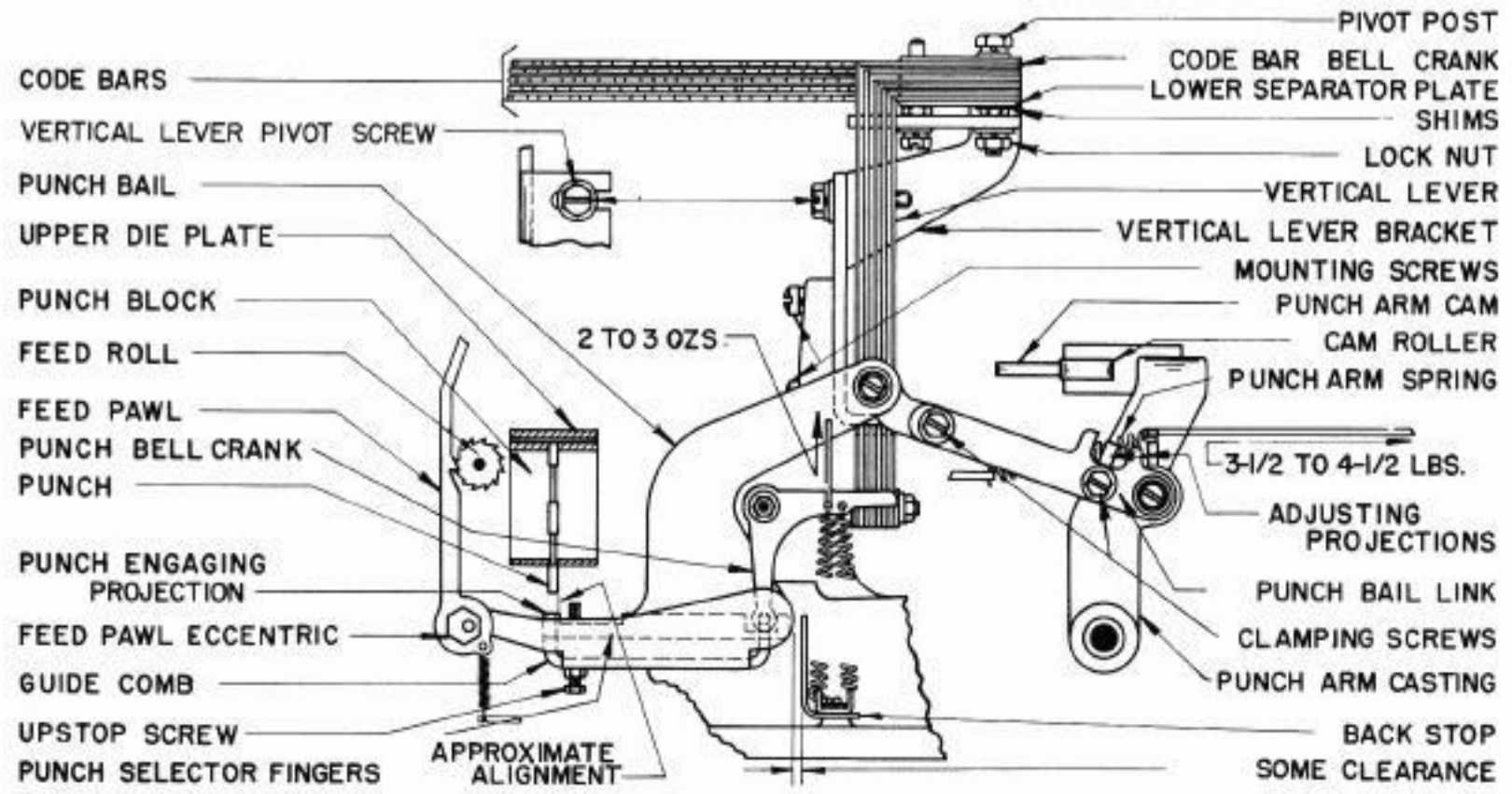


FIGURE 49

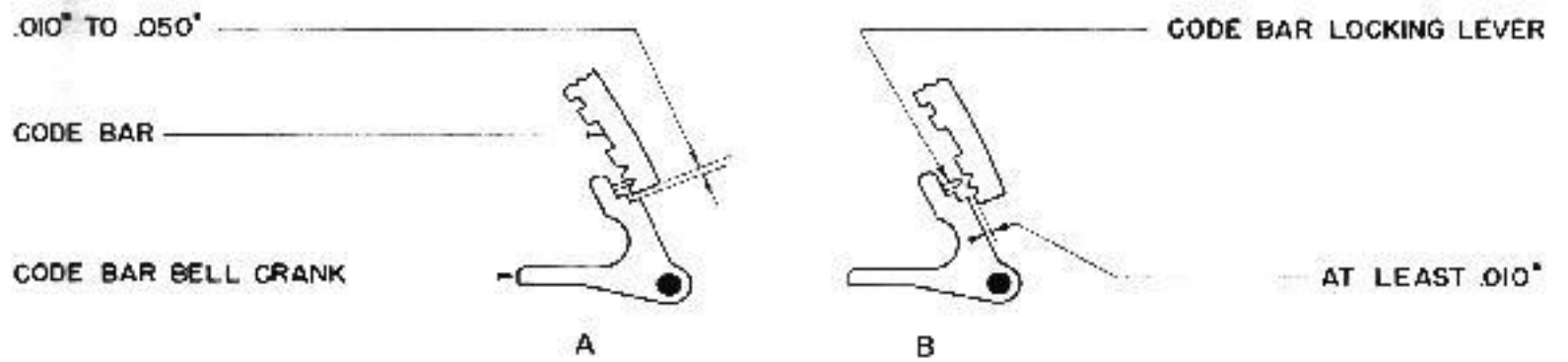


FIGURE 50

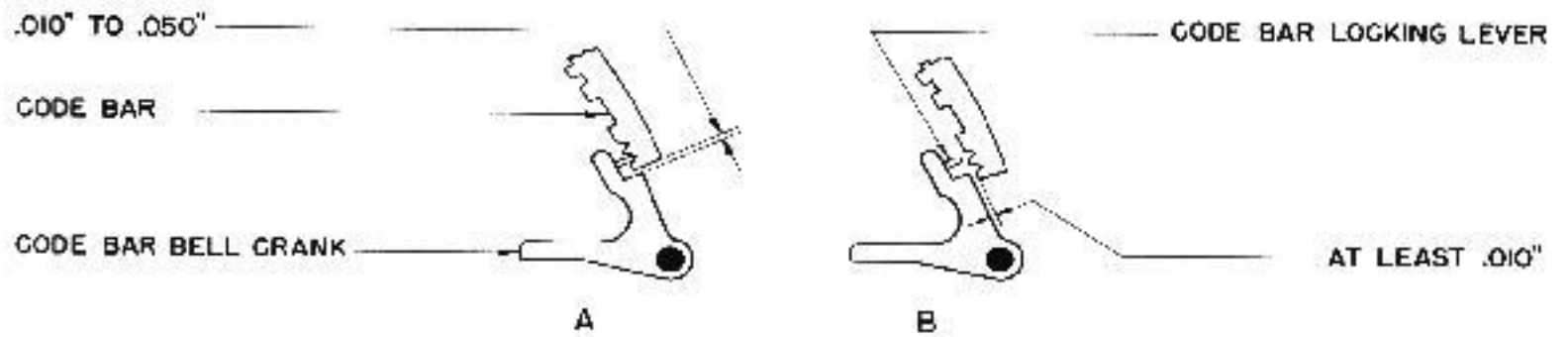


FIGURE 51

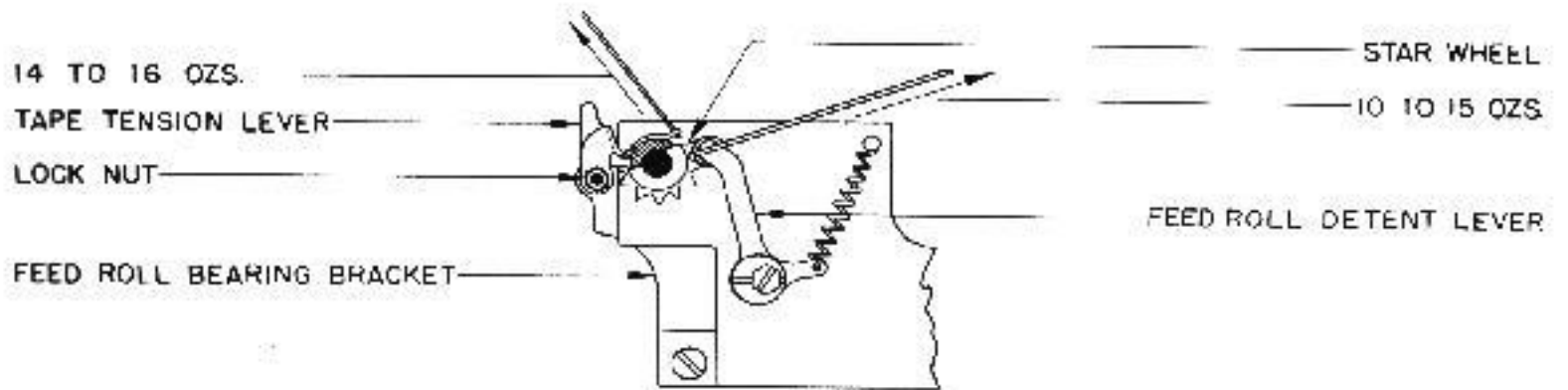
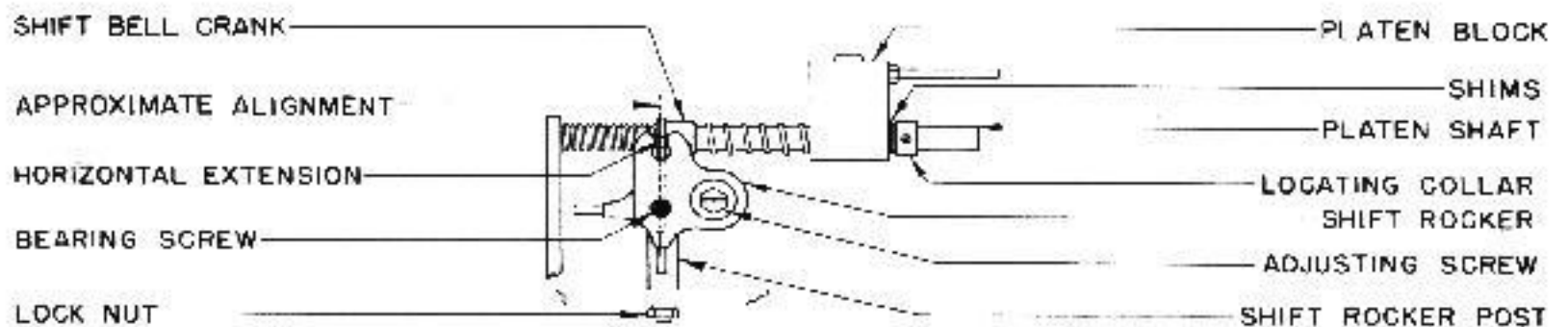
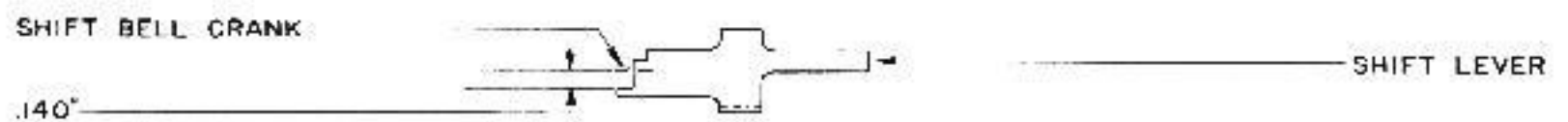


FIGURE 52



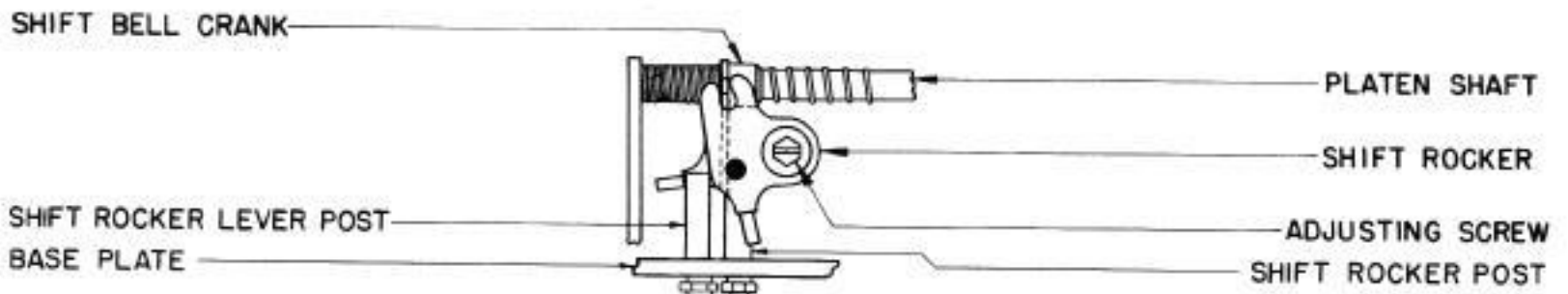
A



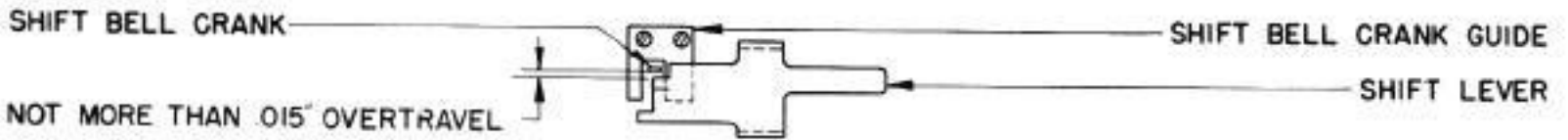
B

CHANGE I

FIGURE 53



A



B

FIGURE 54

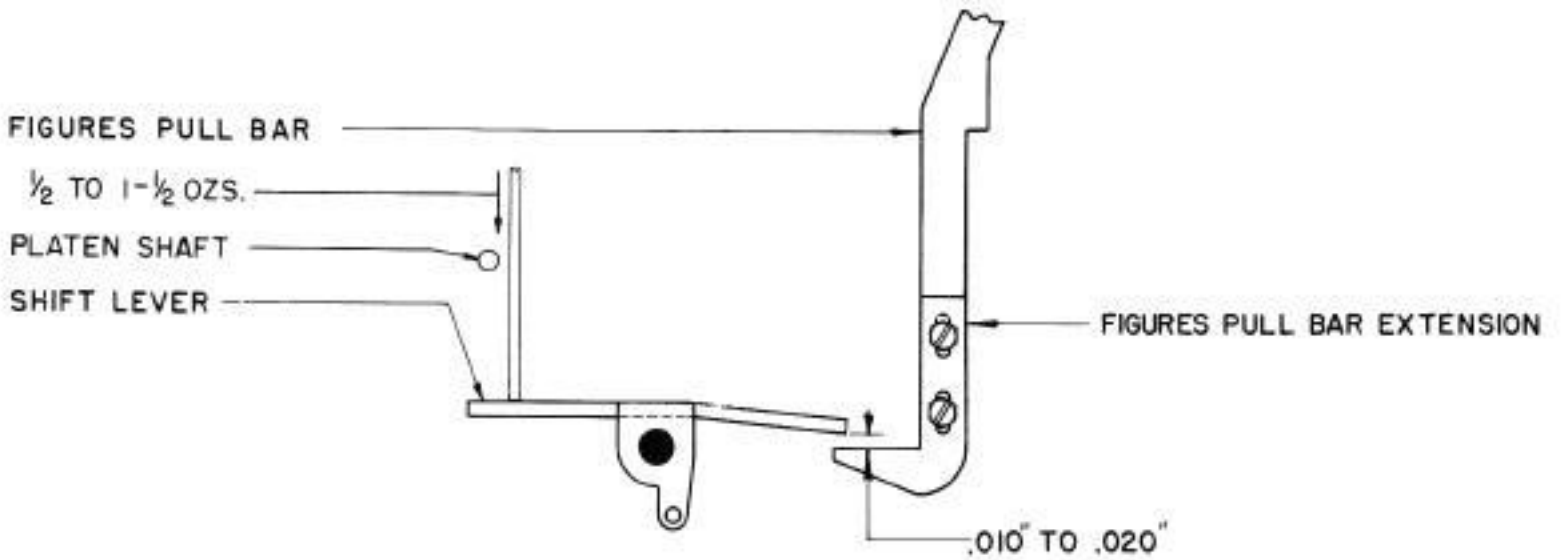


FIGURE 55

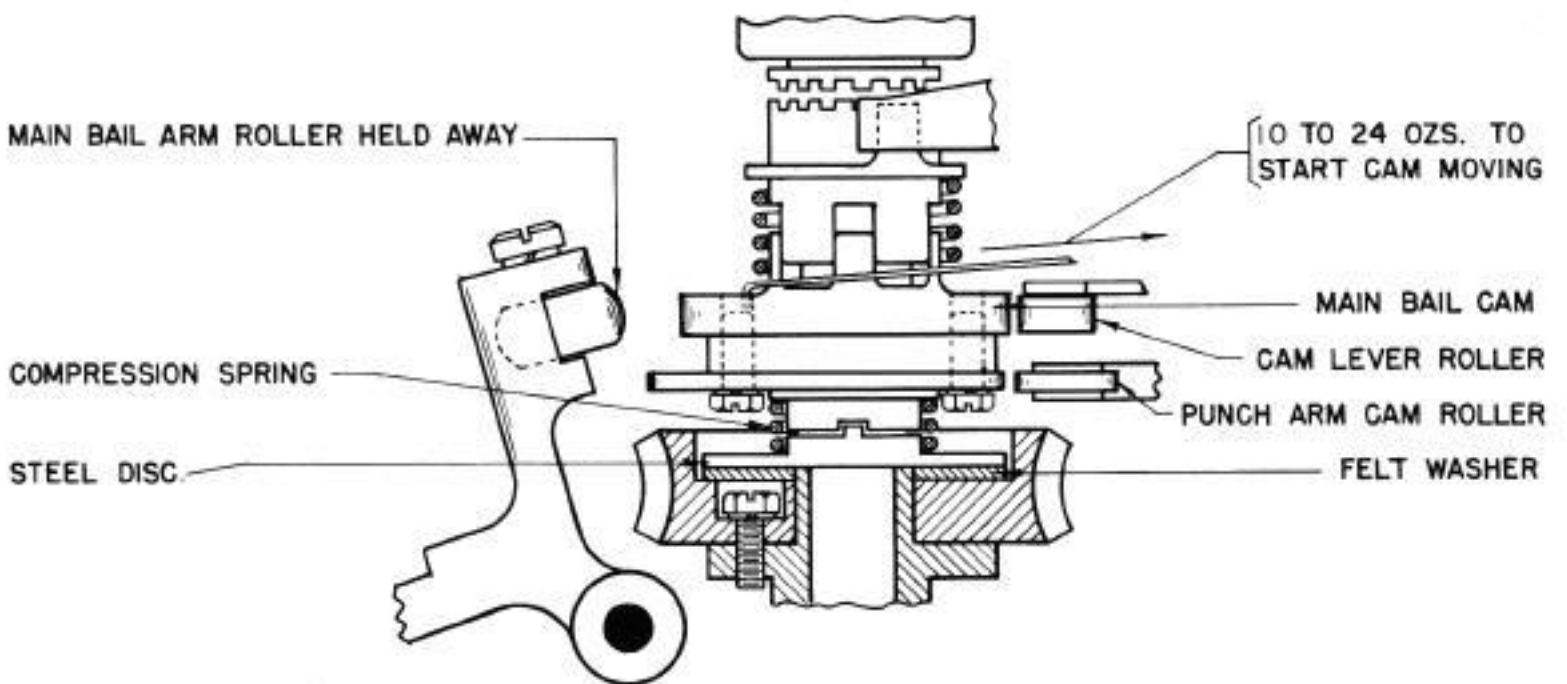


FIGURE 56

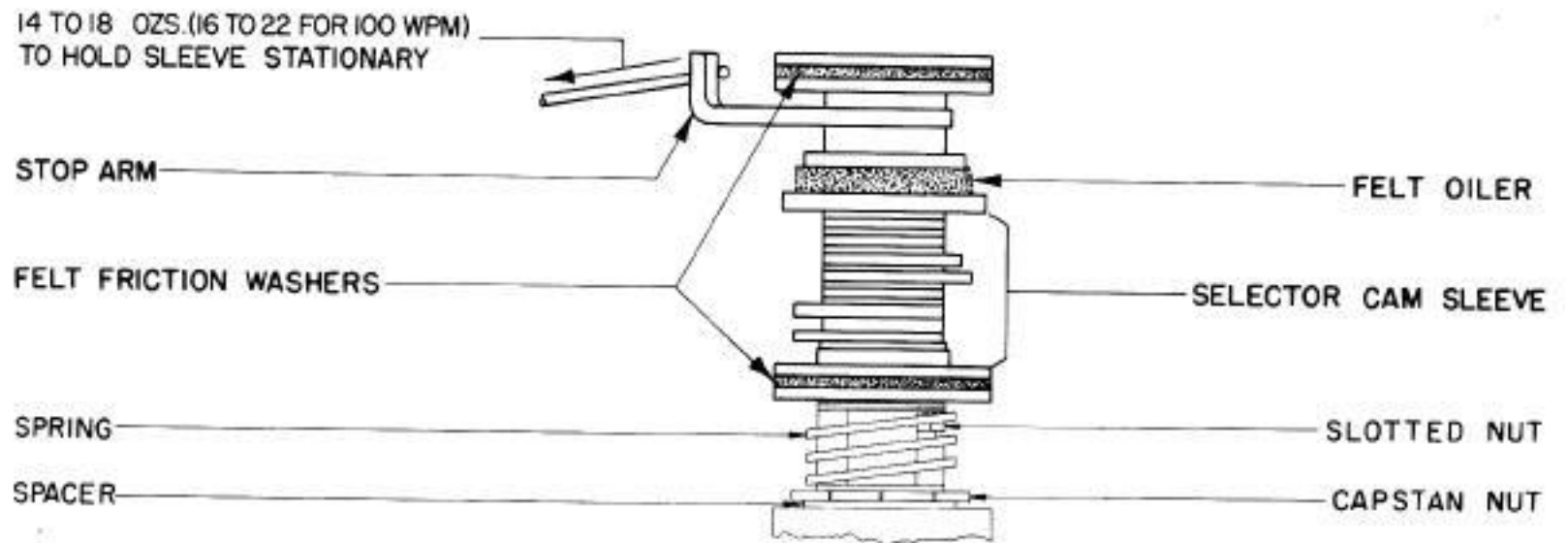


FIGURE 57

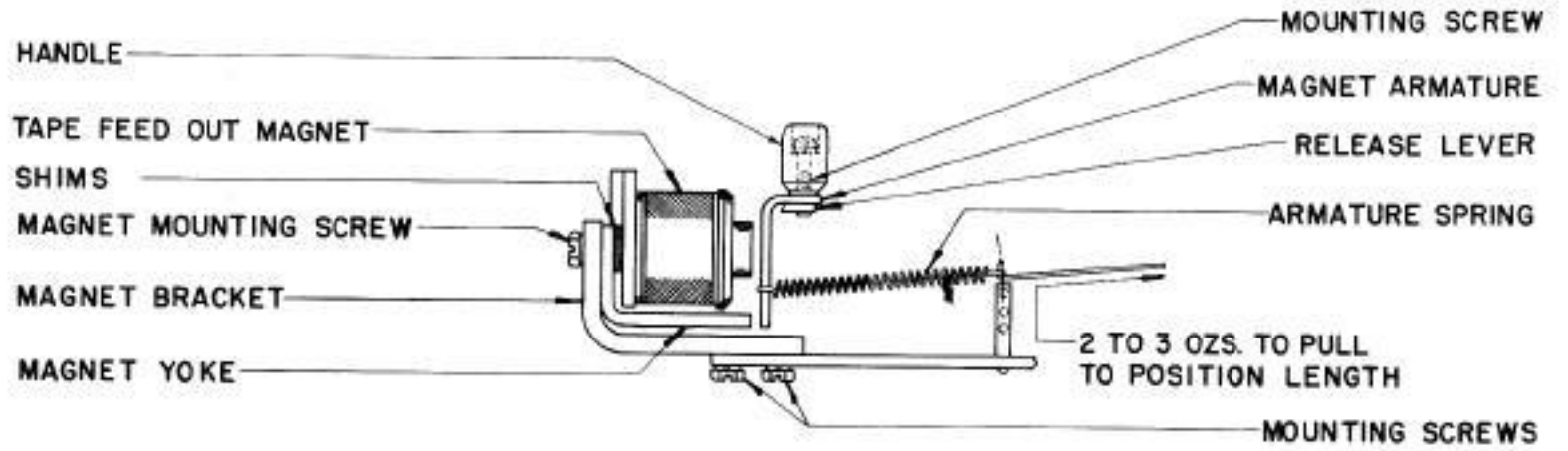


FIGURE 58

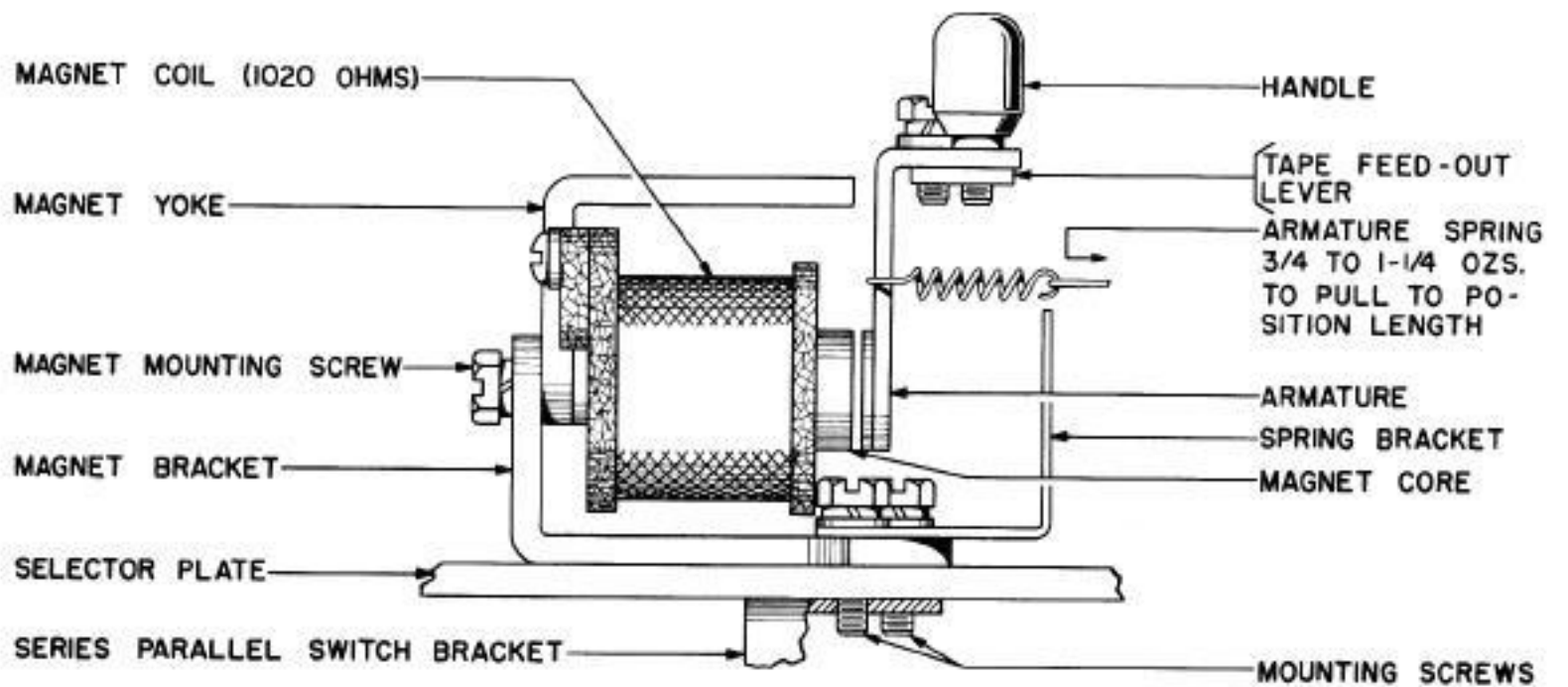


FIGURE 59

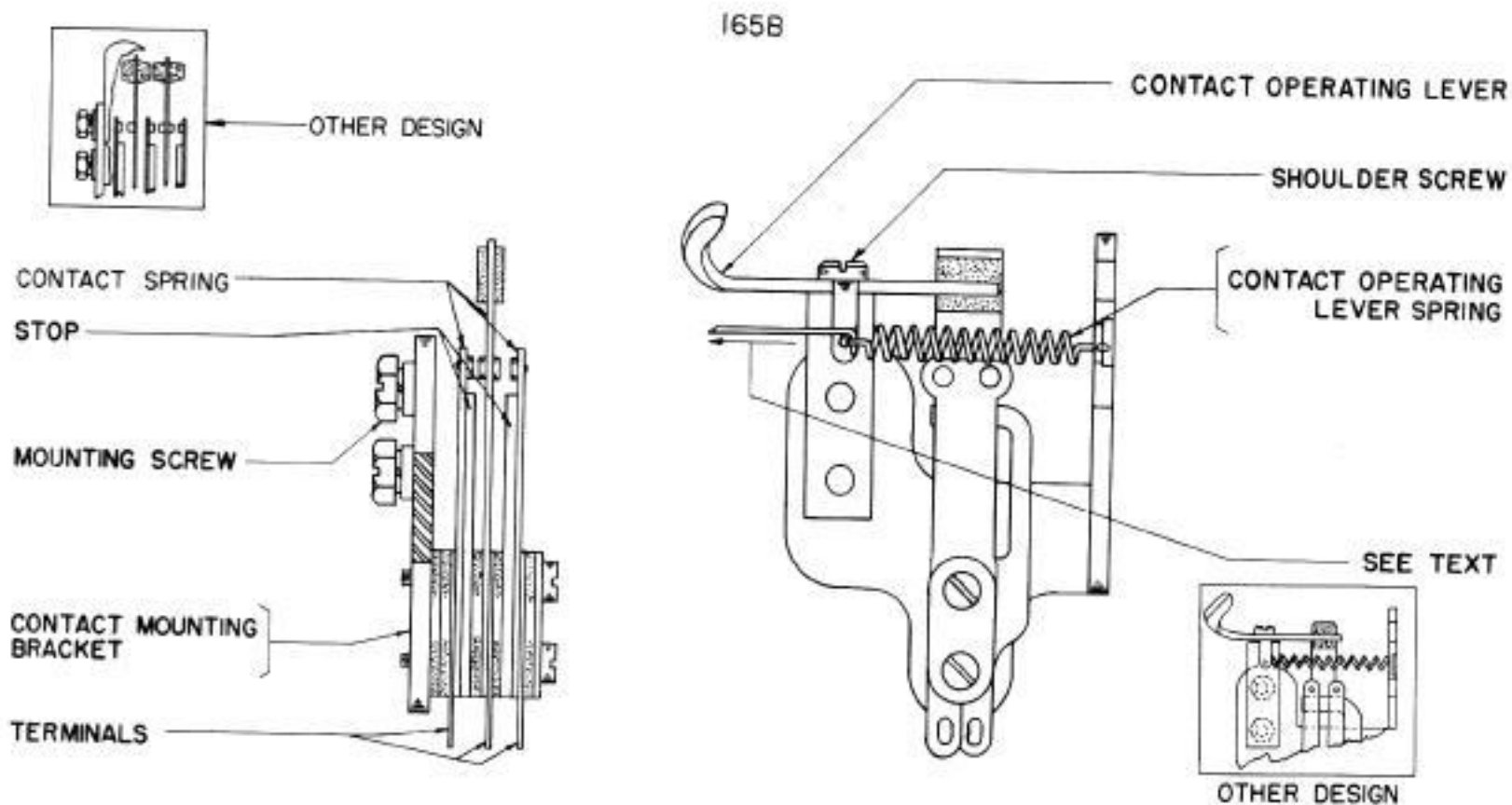


FIGURE 60

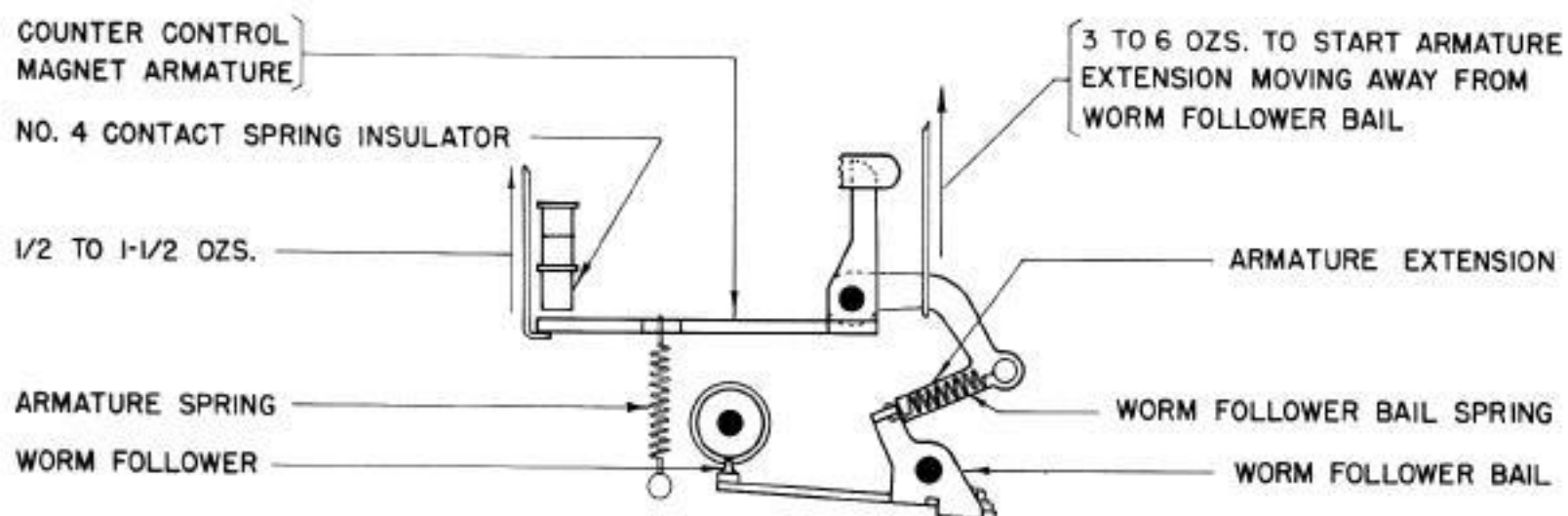


FIGURE 61

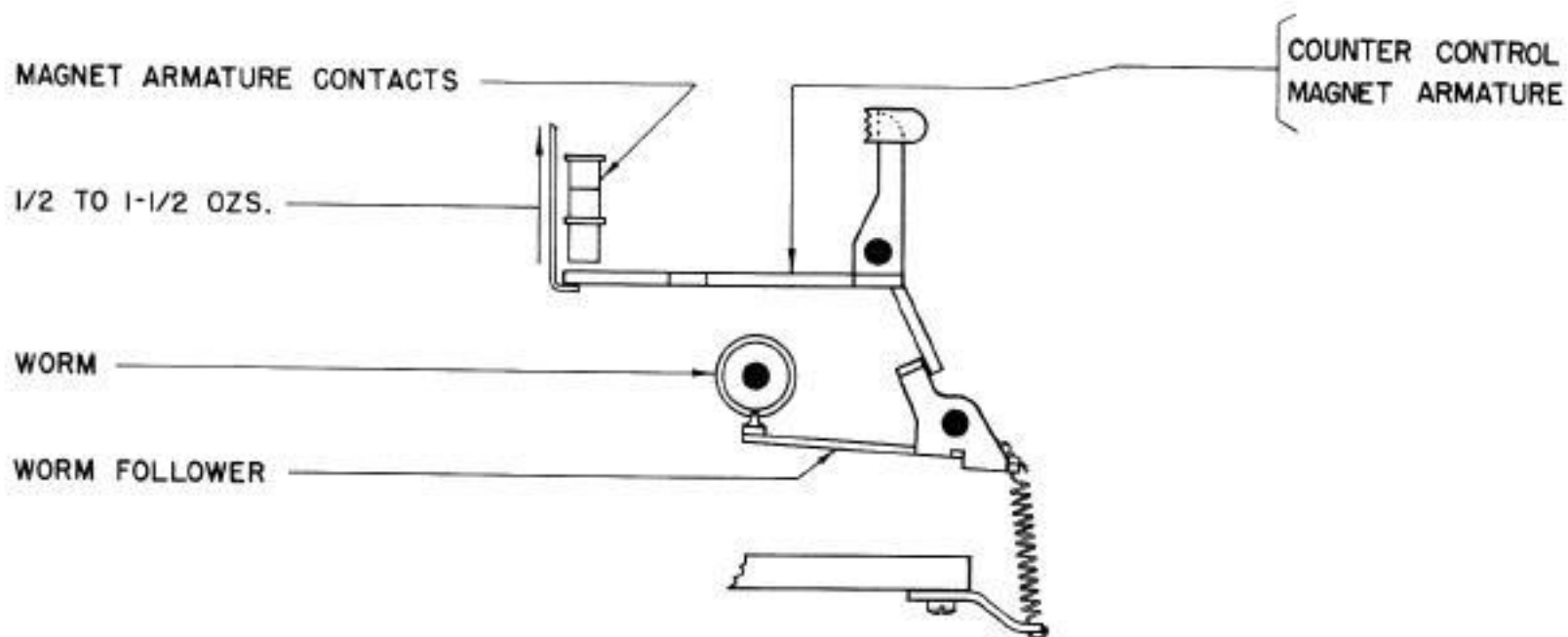


FIGURE 62



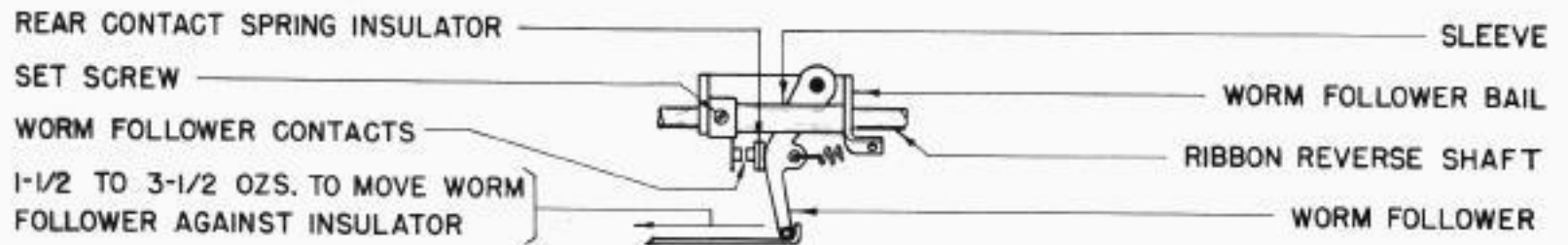


FIGURE 63

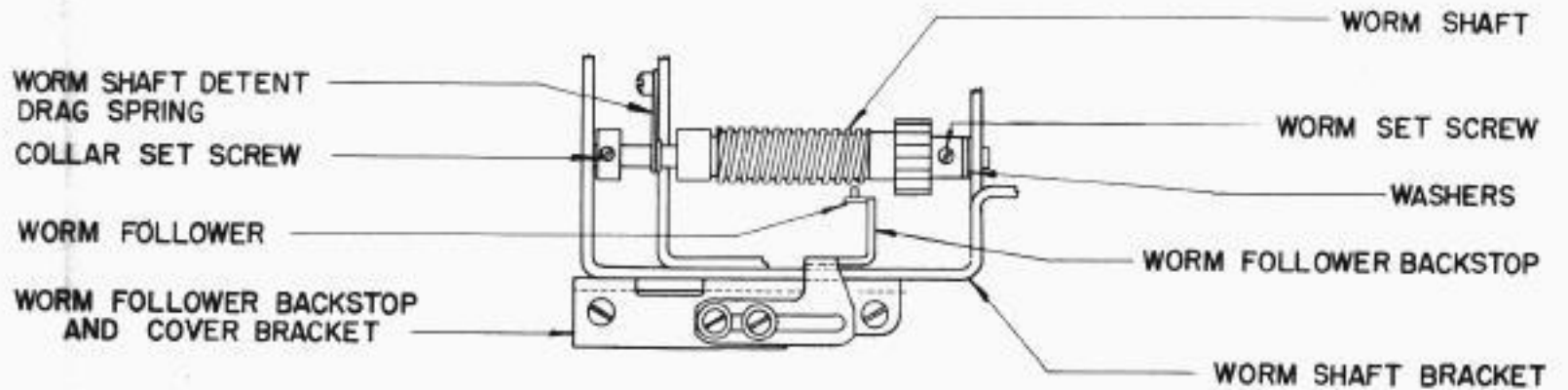


FIGURE 64

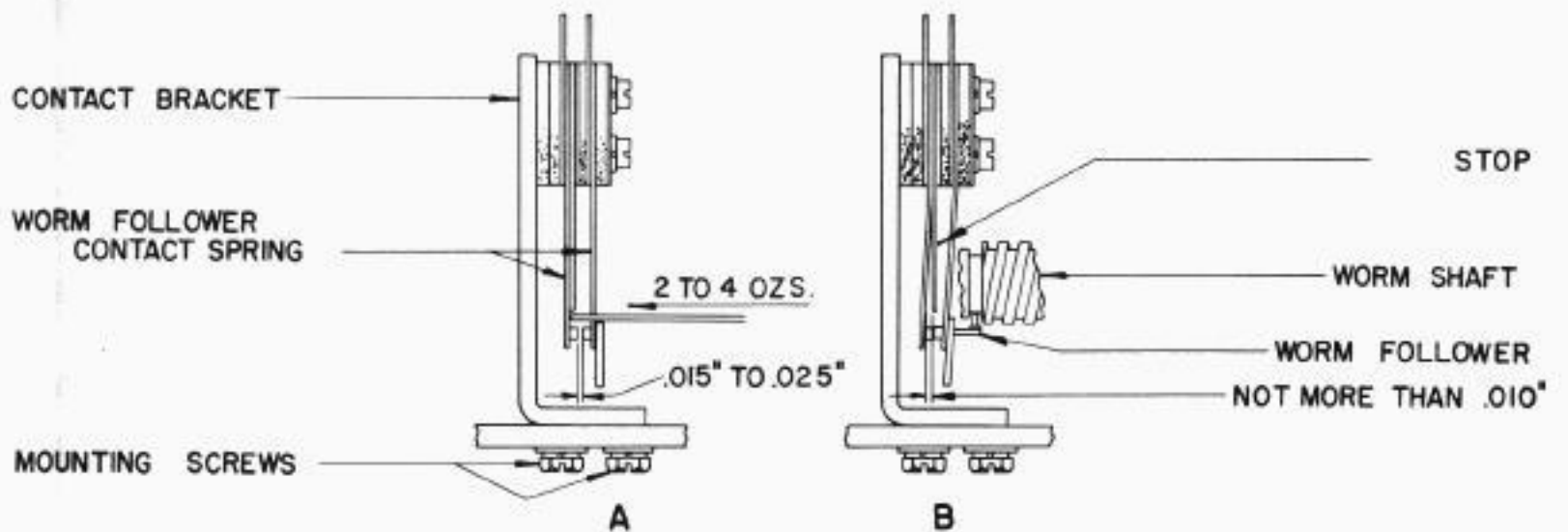


FIGURE 65

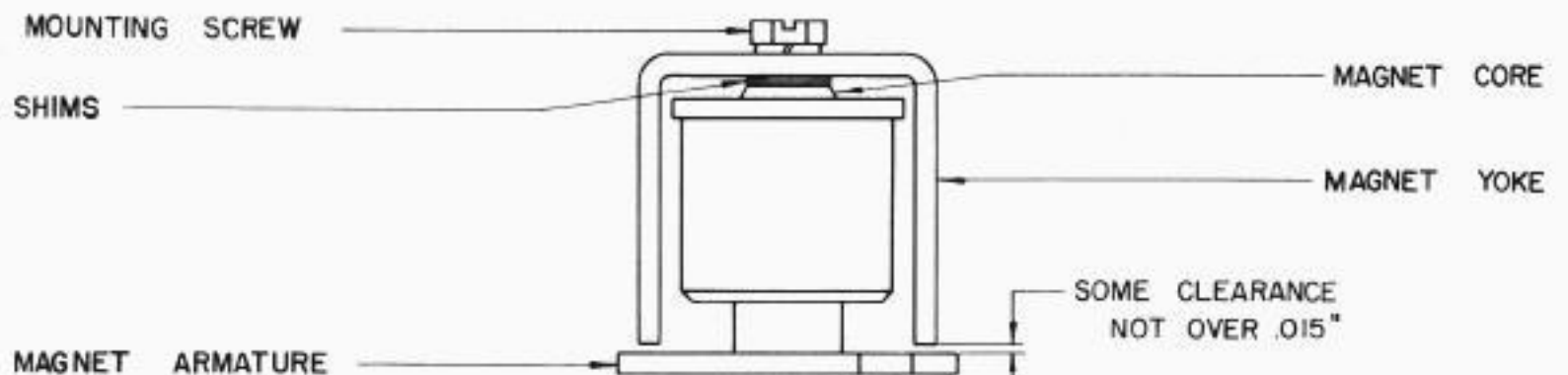


FIGURE 66

CHANGE I

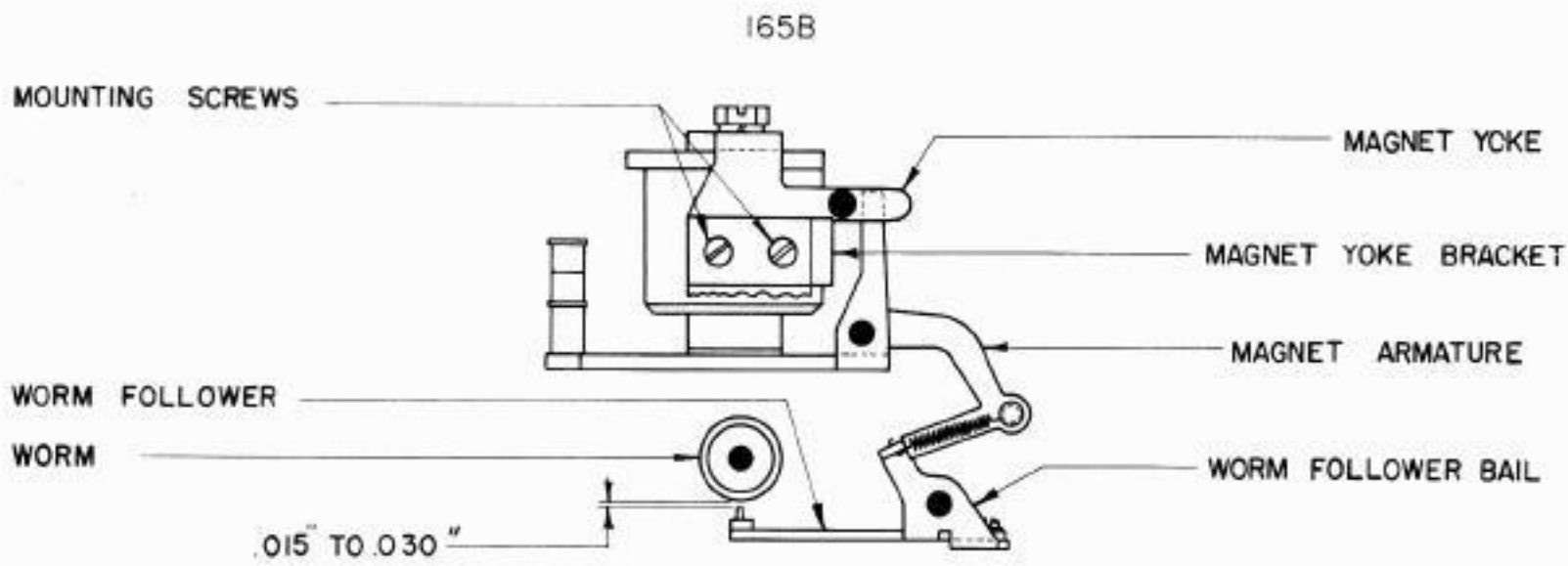


FIGURE 67

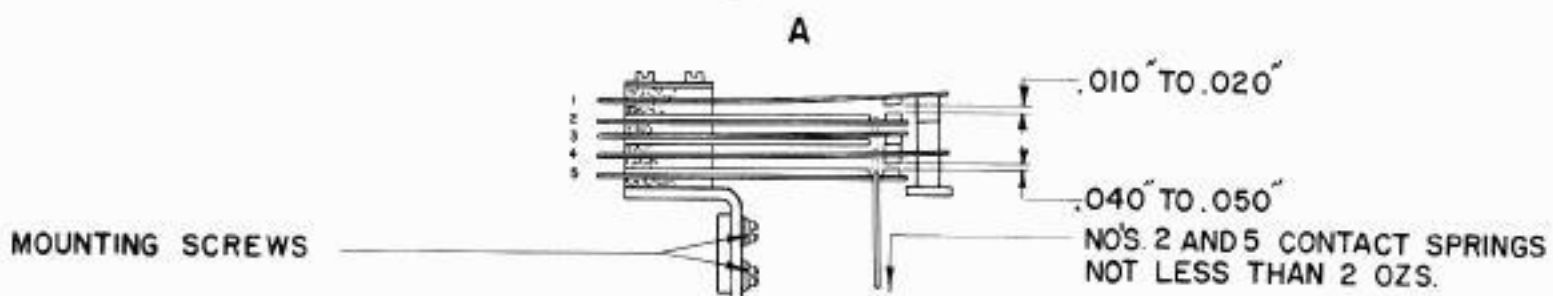
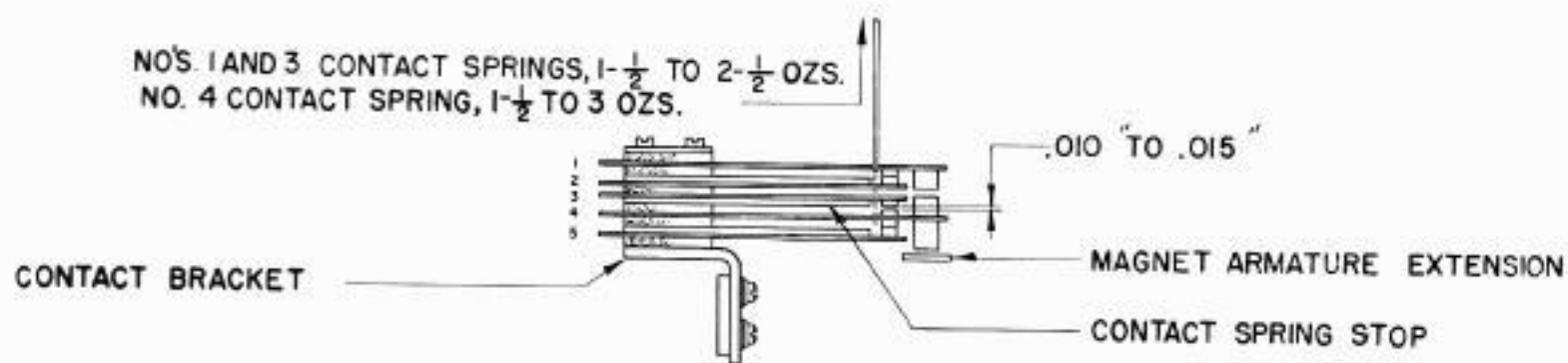


FIGURE 68

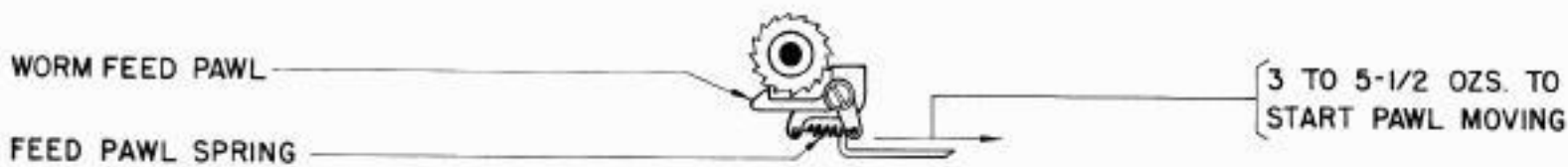


FIGURE 69

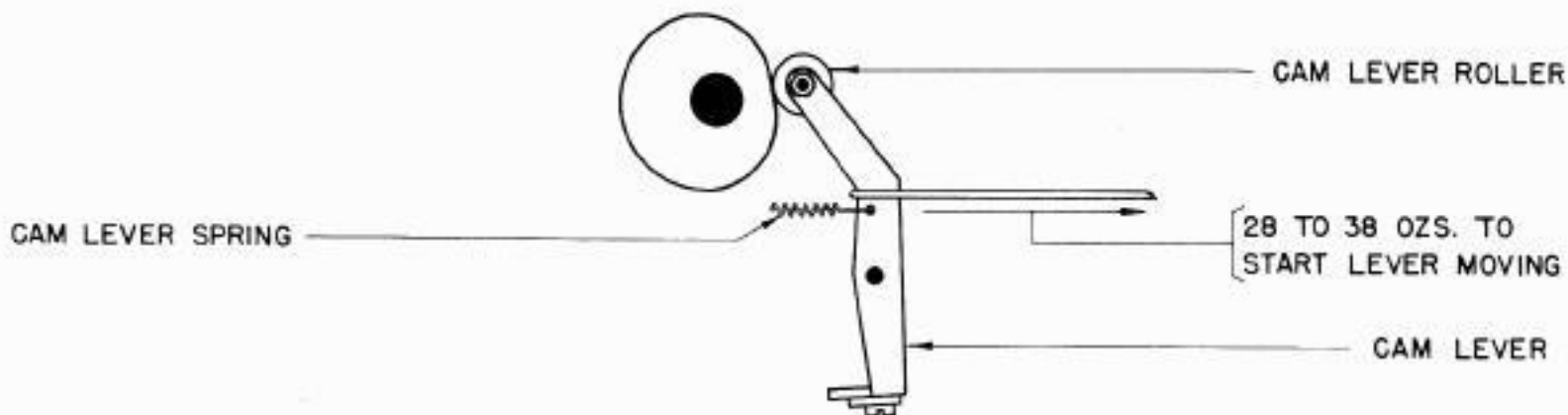


FIGURE 70

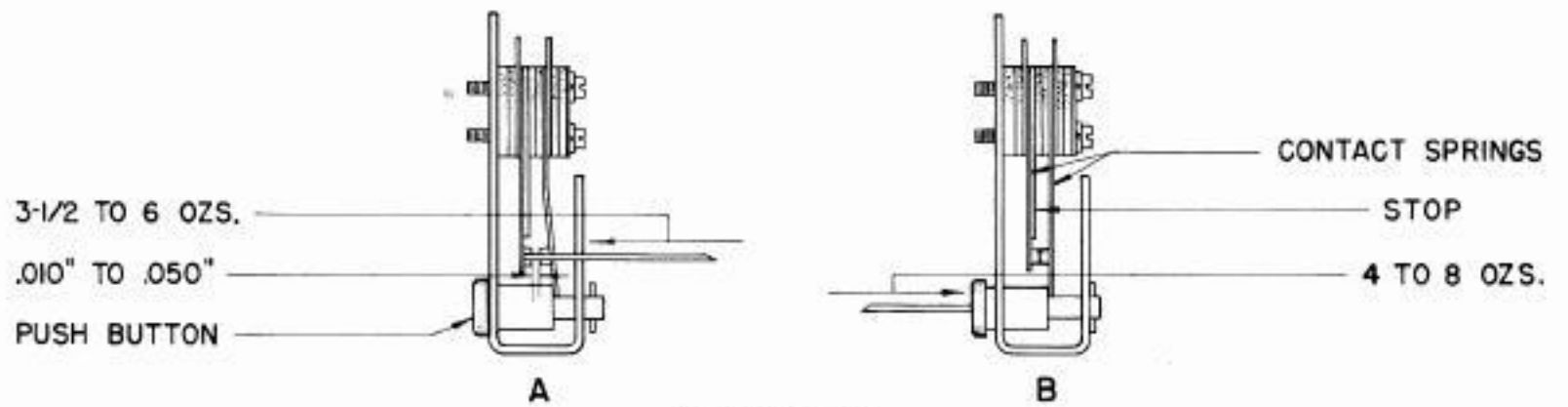


FIGURE 71

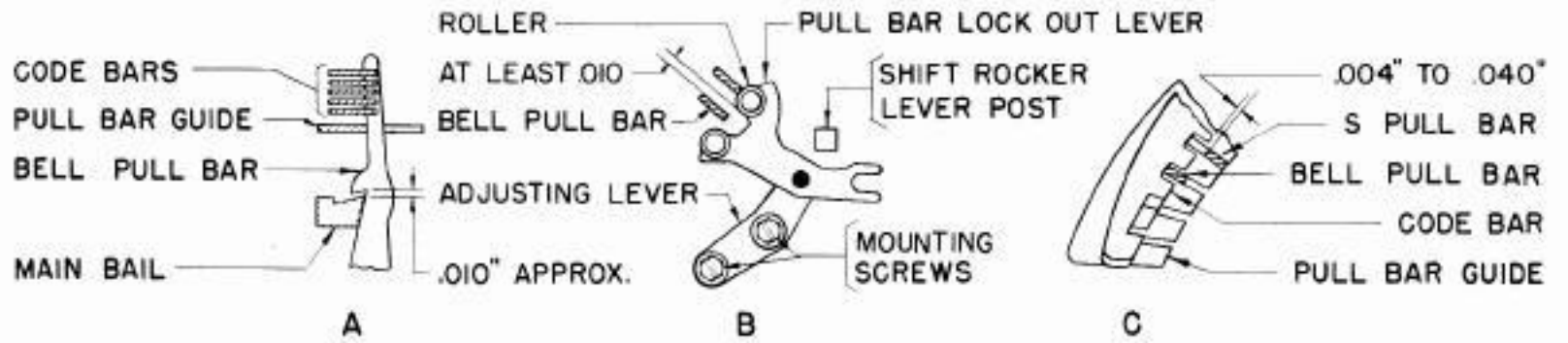


FIGURE 72

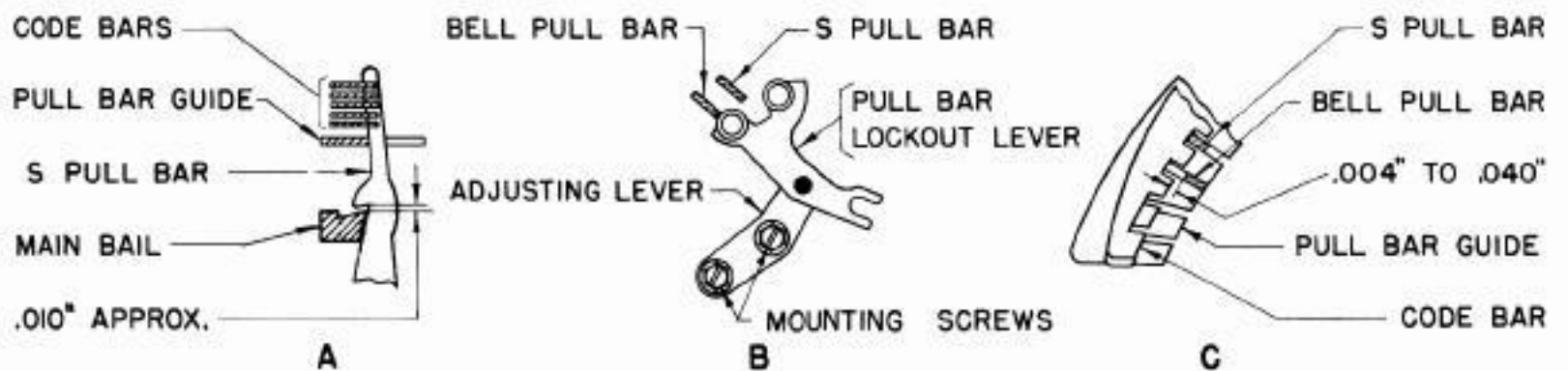


FIGURE 73

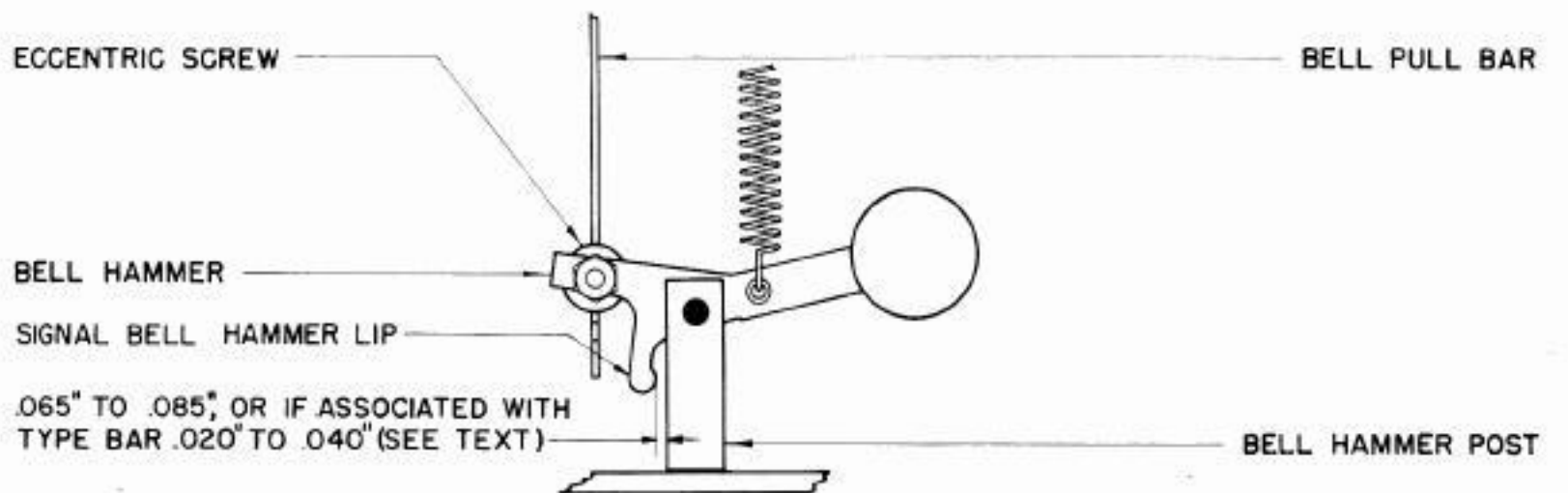


FIGURE 74

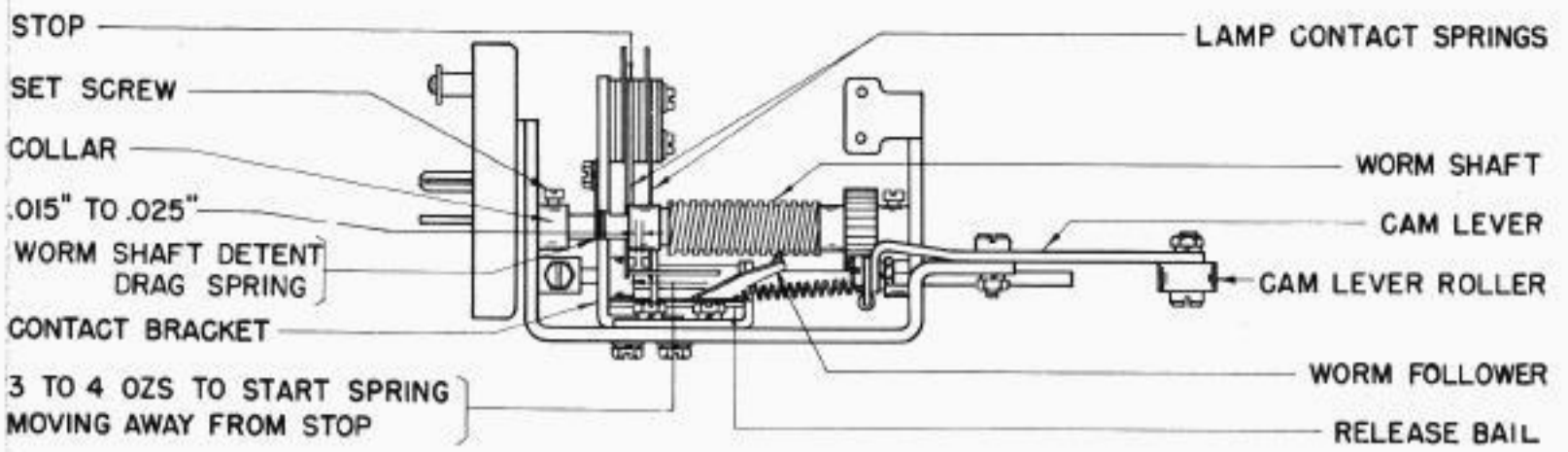


FIGURE 75

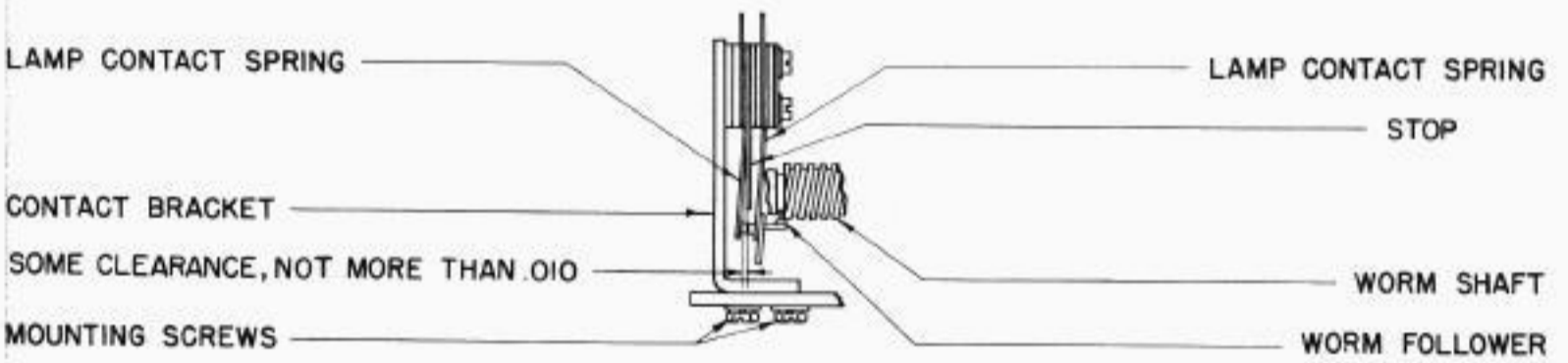


FIGURE 76

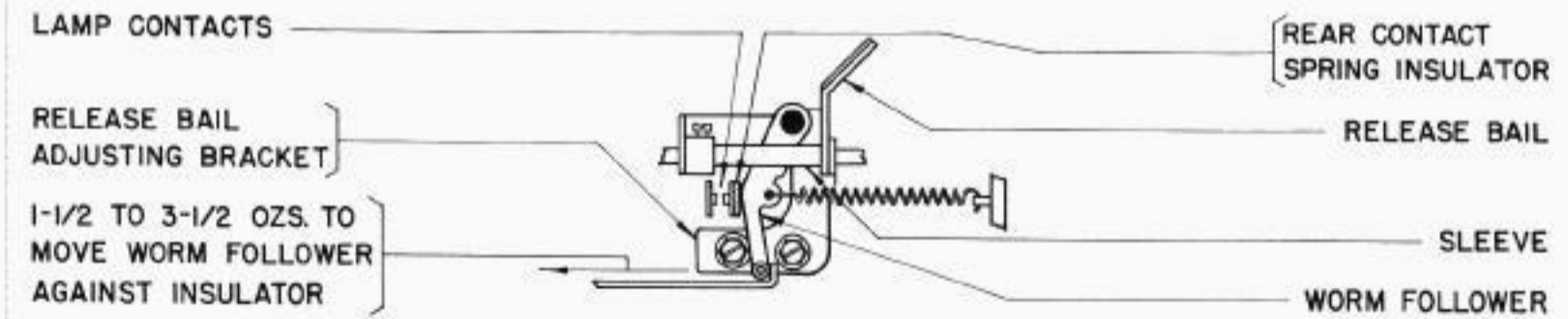


FIGURE 77

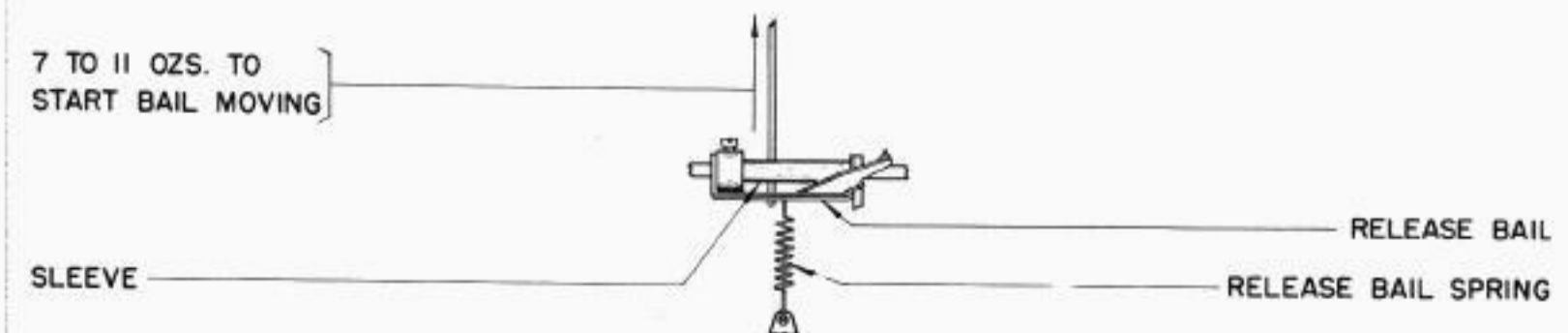


FIGURE 78

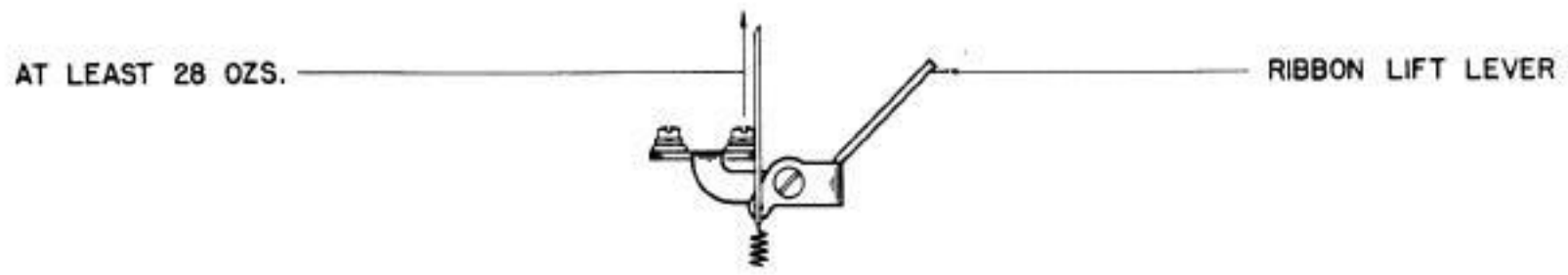


FIGURE 79

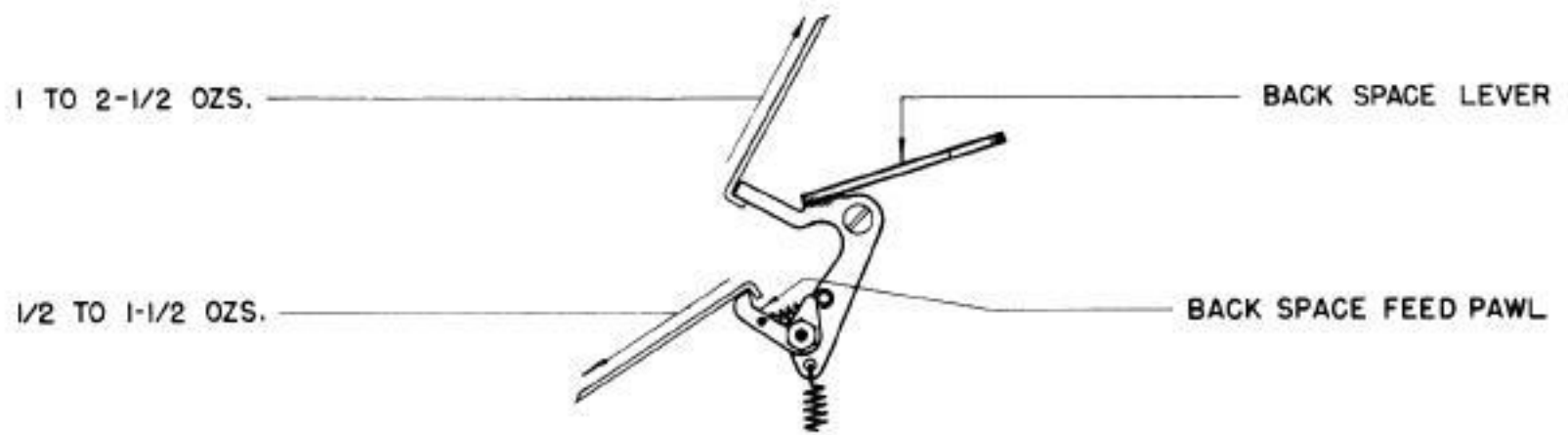


FIGURE 80

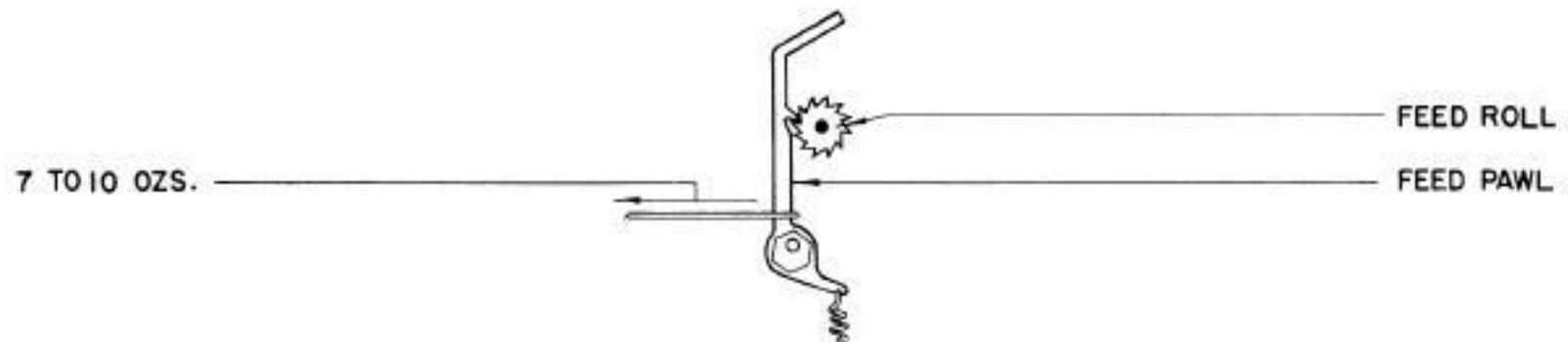


FIGURE 81

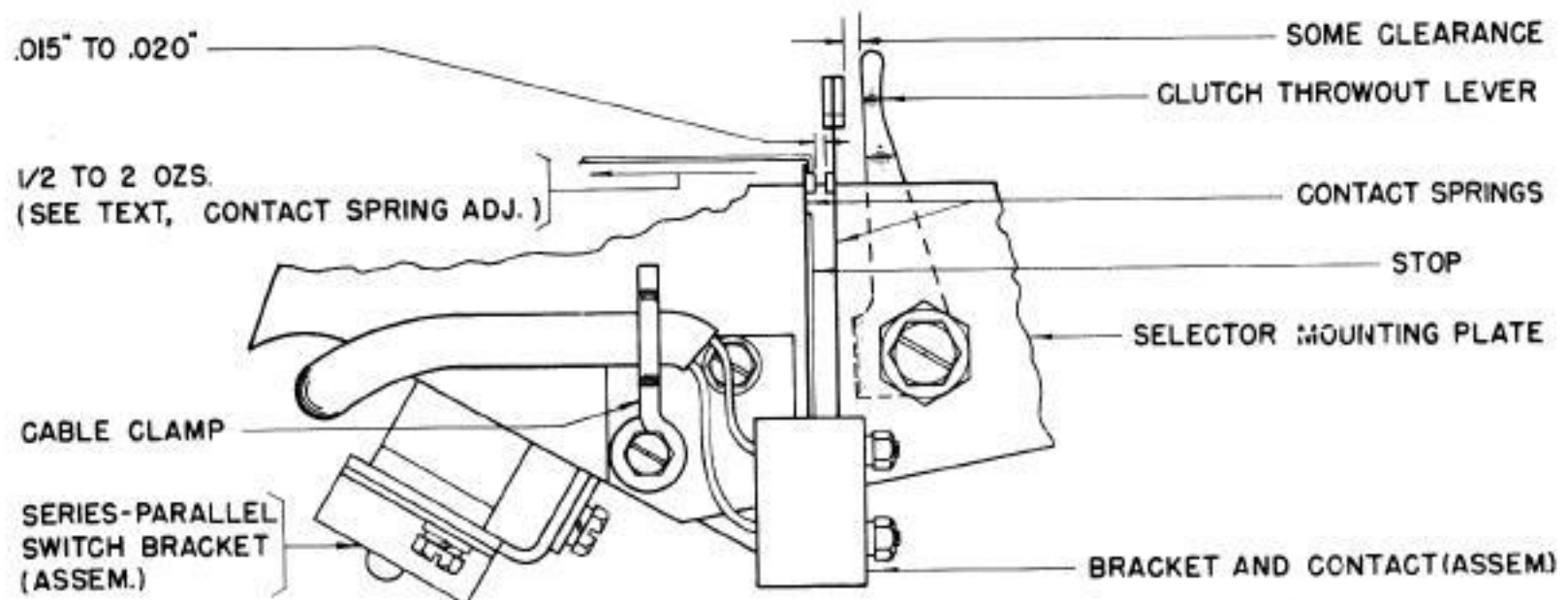


FIGURE 82

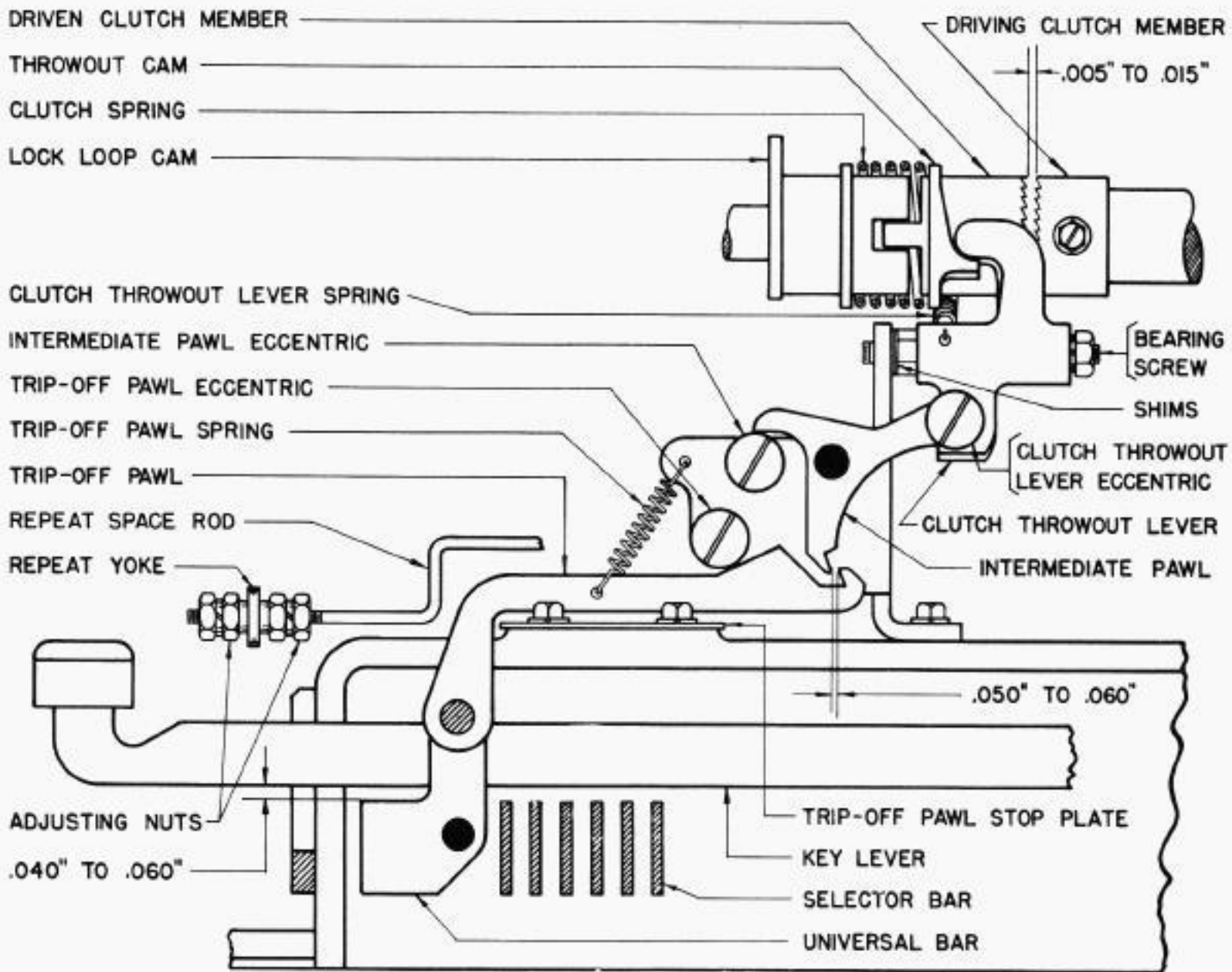


FIGURE 83

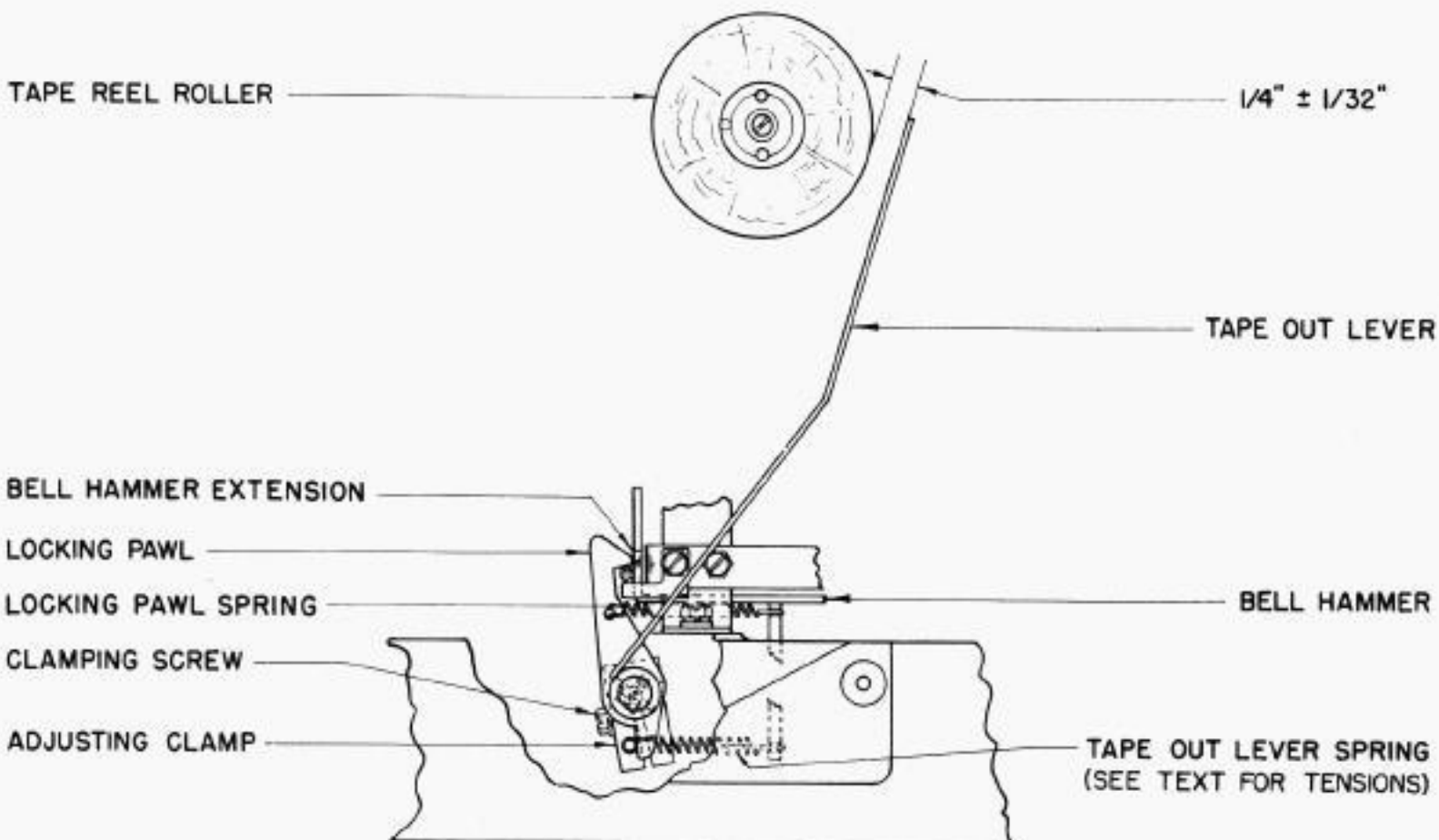


FIGURE 84

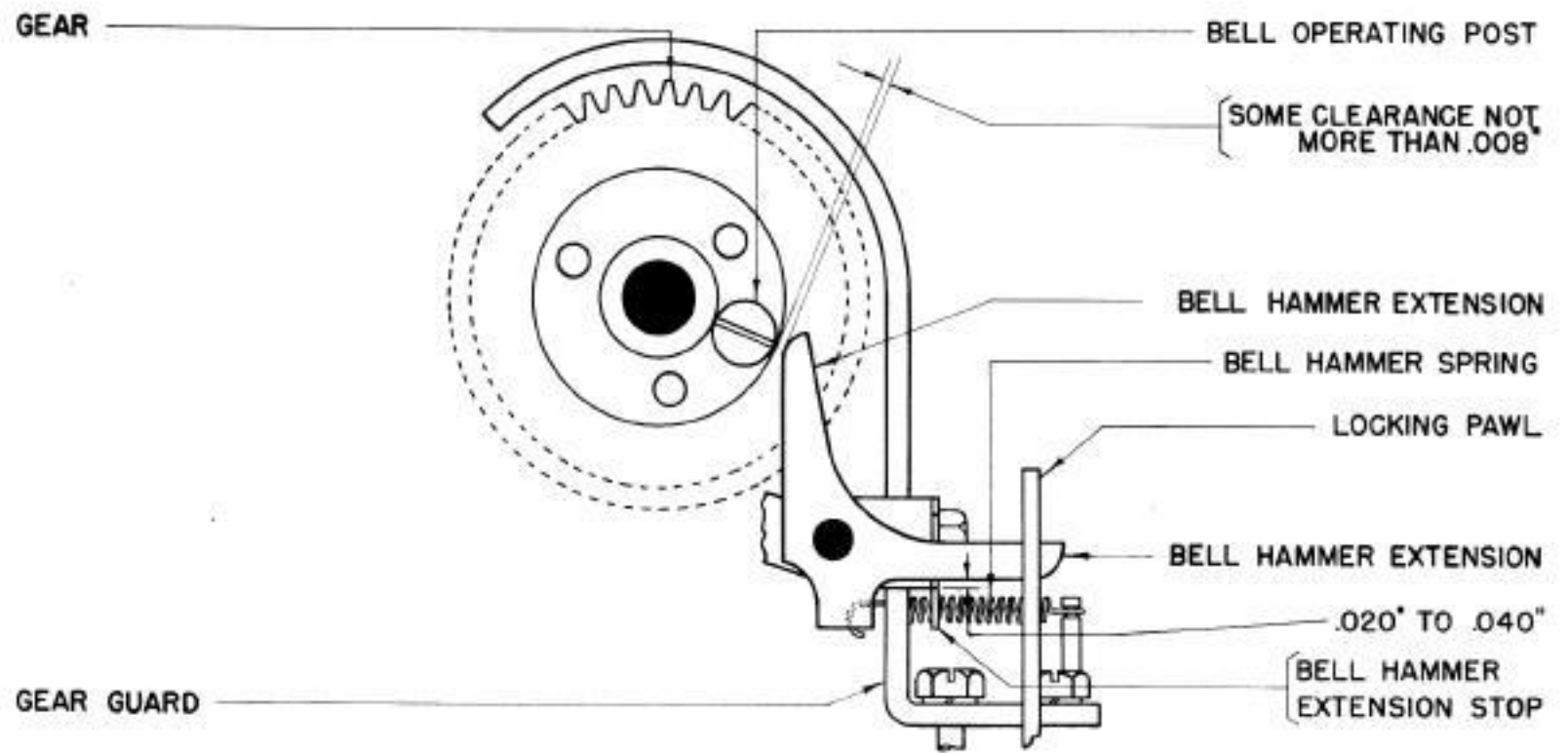


FIGURE 85

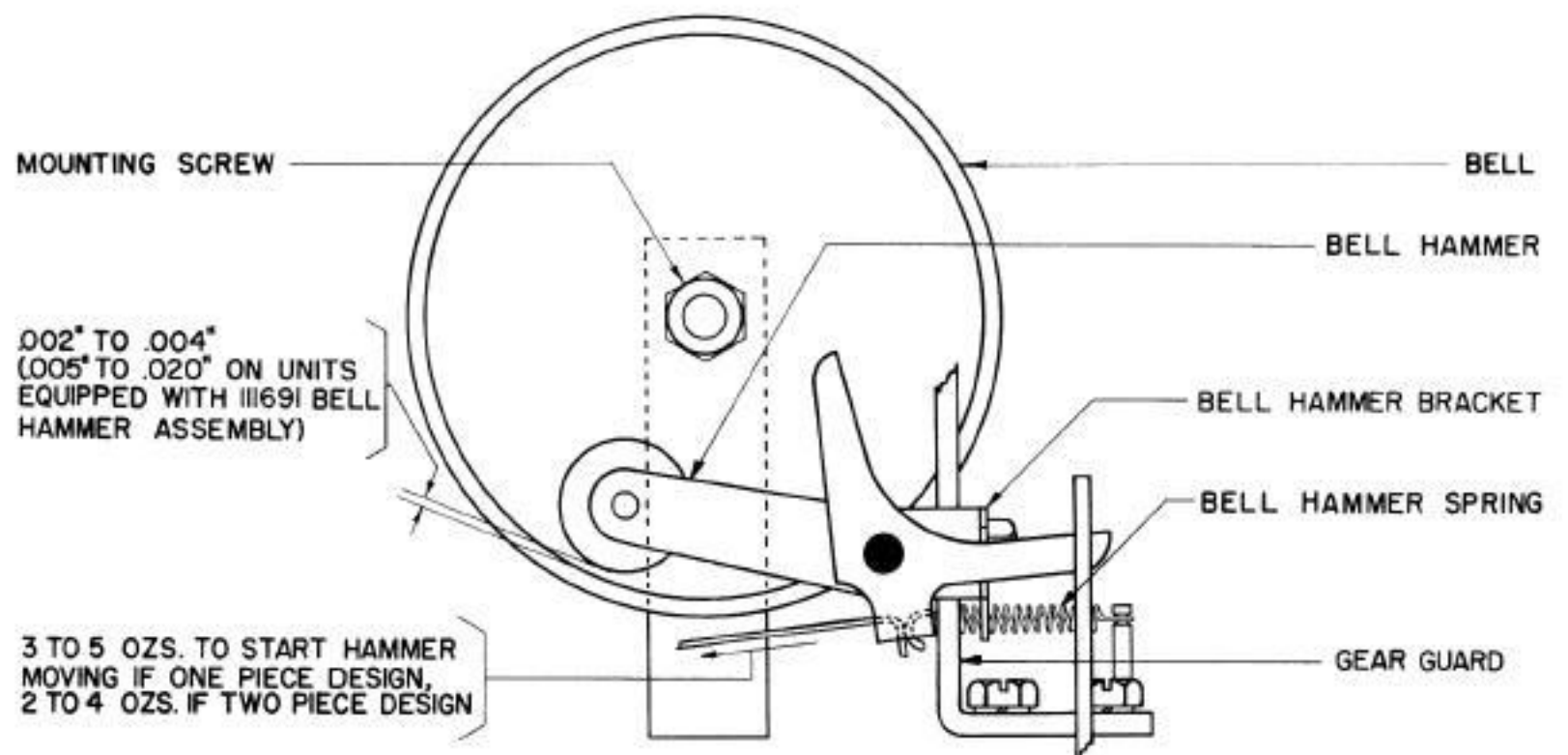


FIGURE 86

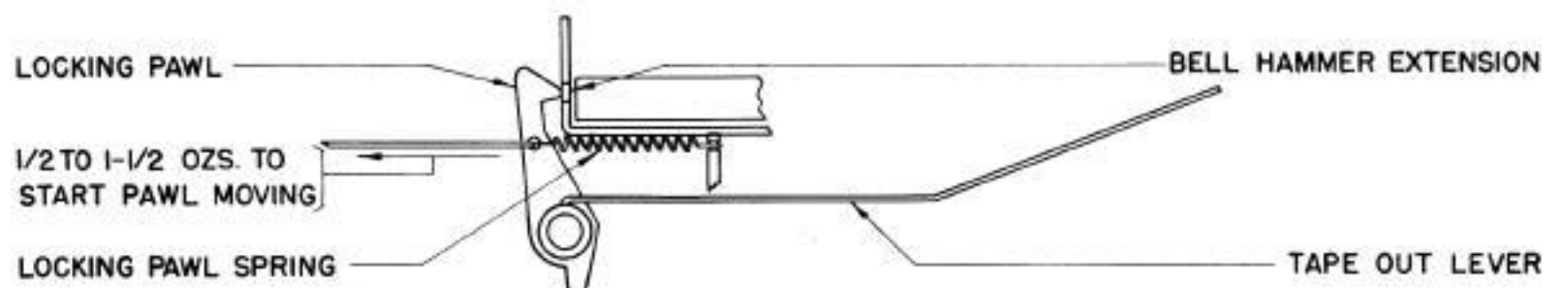


FIGURE 87

CHANGE I

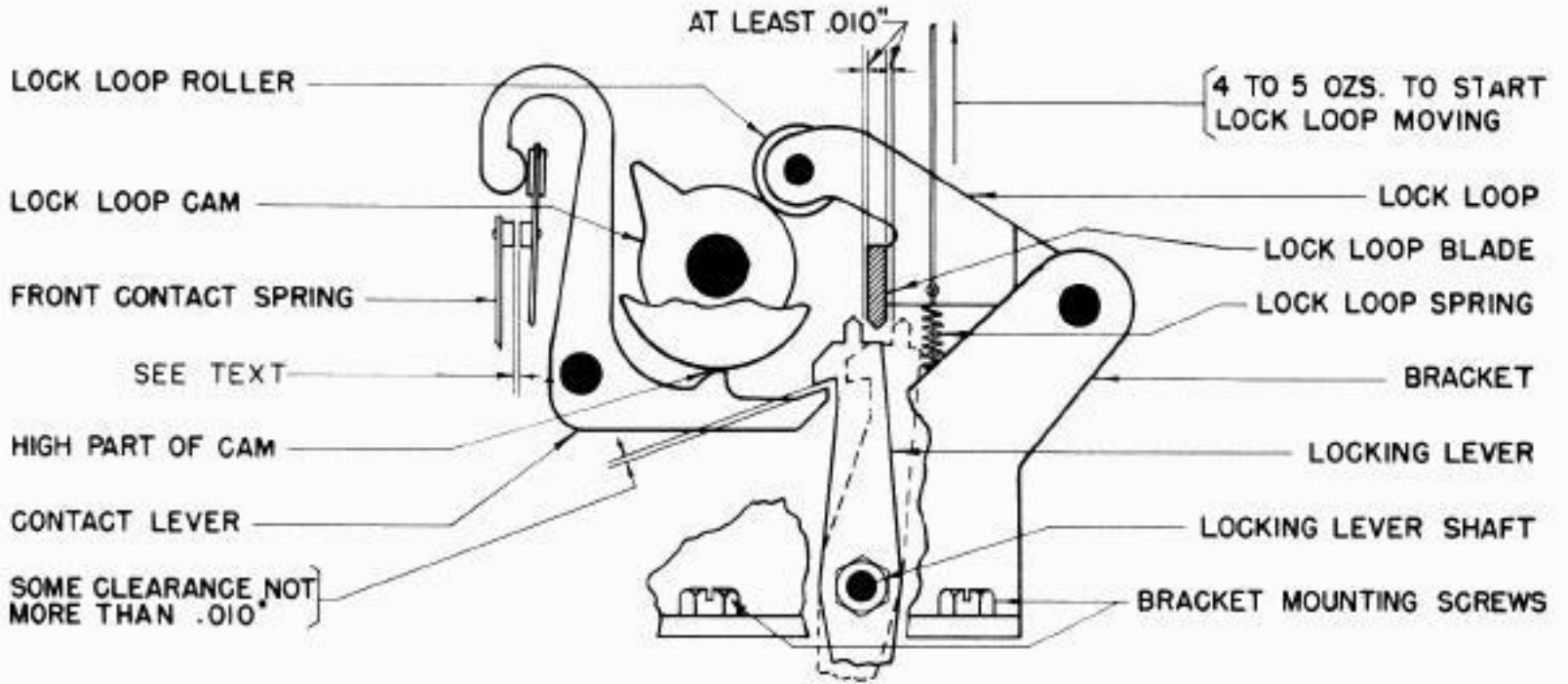


FIGURE 88

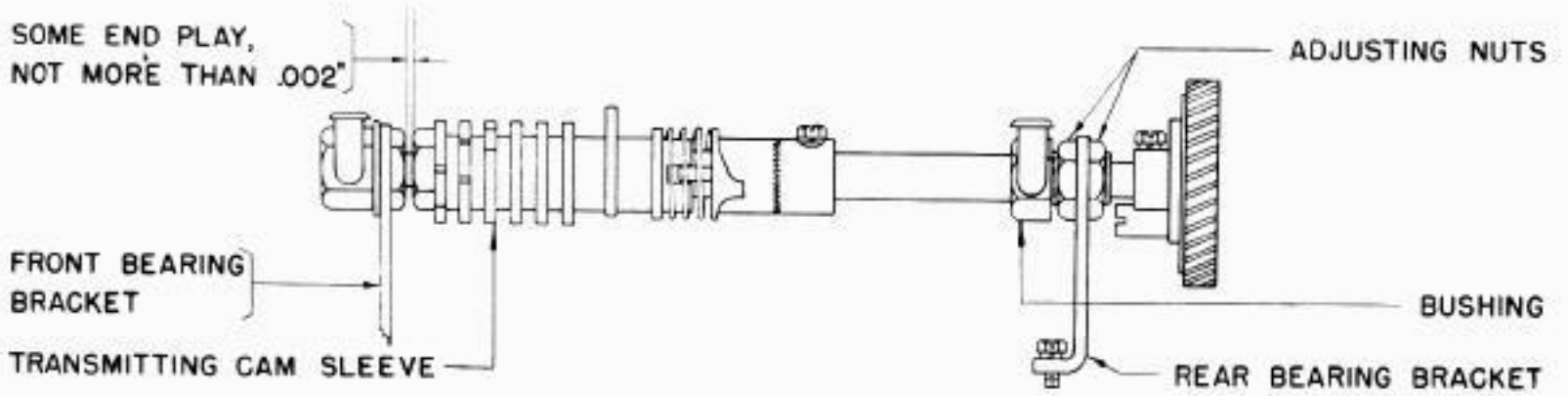


FIGURE 89

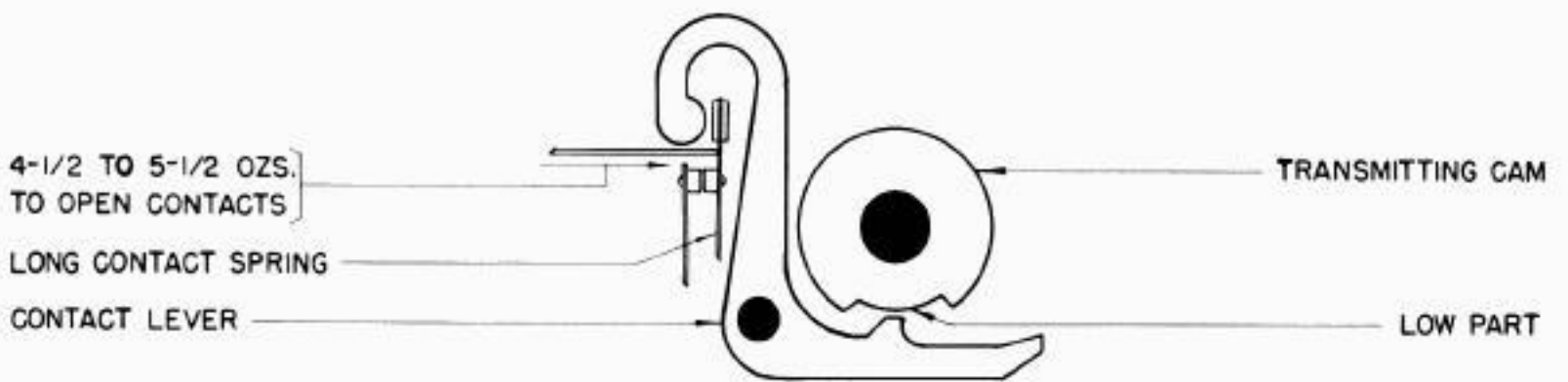


FIGURE 90

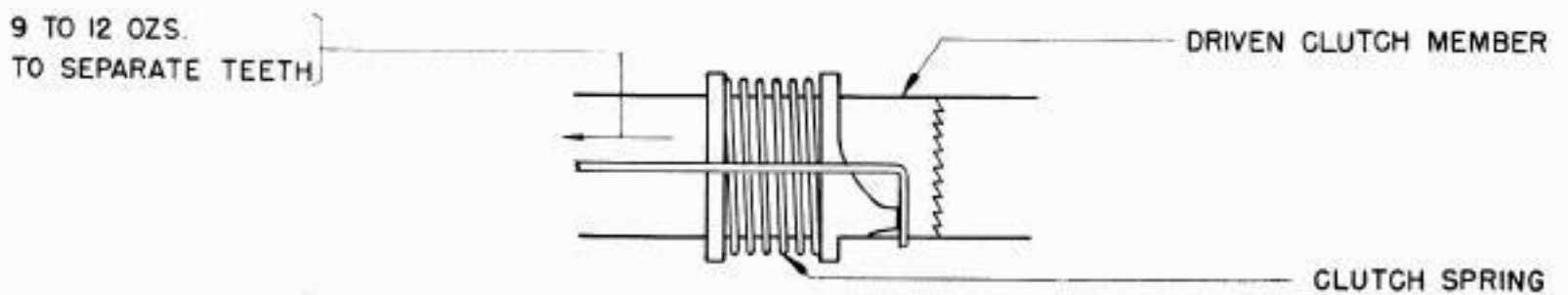
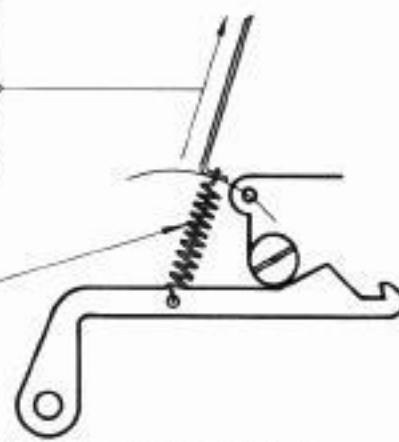


FIGURE 91



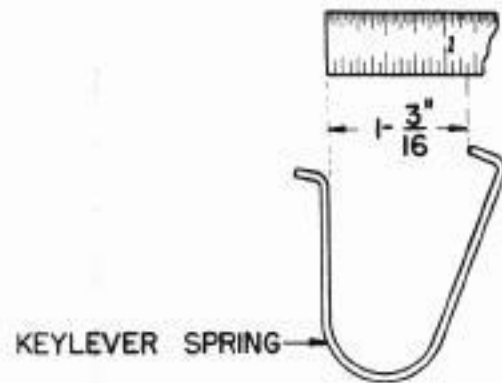
4-1/2 TO 5-1/2 OZS. (FOR 100 WPM)  
 2-3/4 TO 3-3/4 OZS. (FOR 60 OR 75 WPM)  
 WHEN PULLED TO ITS  
 POSITION LENGTH

TRIP-OFF PAWL SPRING

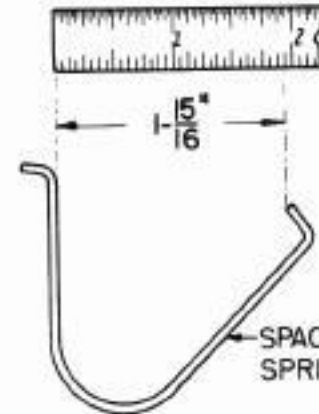


TRIP-OFF PAWL

FIGURE 92

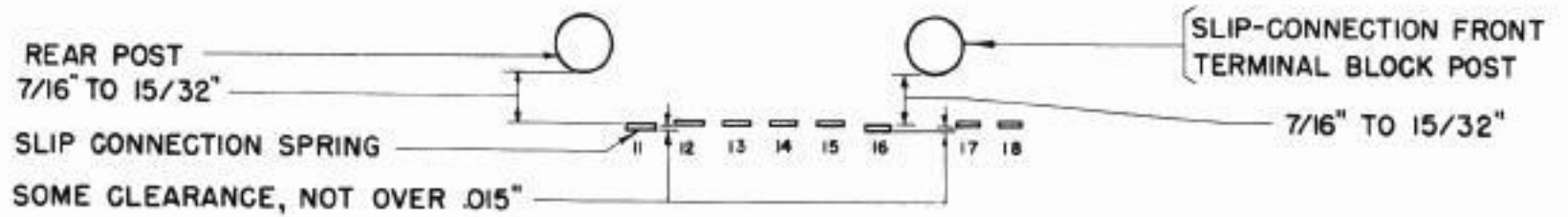


KEYLEVER SPRING



SPACER KEYLEVER SPRING

FIGURE 93



REAR POST  
 7/16" TO 15/32"

SLIP CONNECTION SPRING

SOME CLEARANCE, NOT OVER .015"

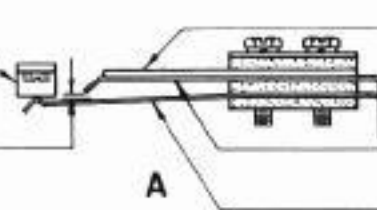
SLIP-CONNECTION FRONT  
 TERMINAL BLOCK POST

7/16" TO 15/32"

FIGURE 94

INSULATOR ON TYPING  
 REPERFORATOR UNIT

.020" TO .060"



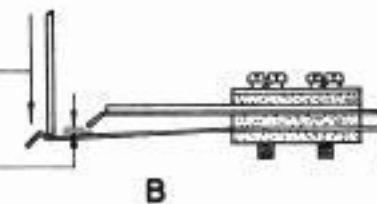
STIFFENER

UPPER CONTACT SPRING

LOWER CONTACT SPRING

1-1/2 TO 3 LBS. TO SEPARATE .030"

.030"



B

FIGURE 95

CHANGE I

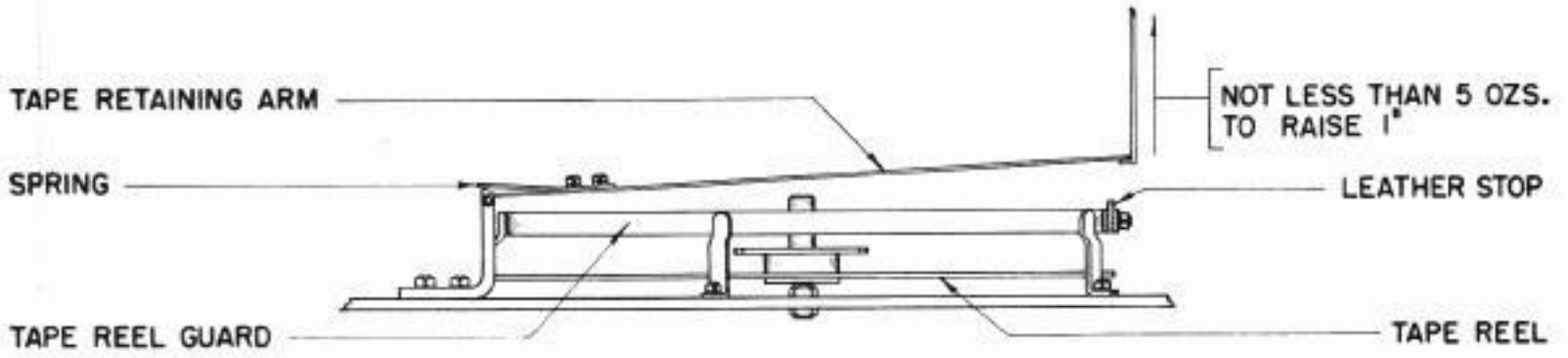


FIGURE 96

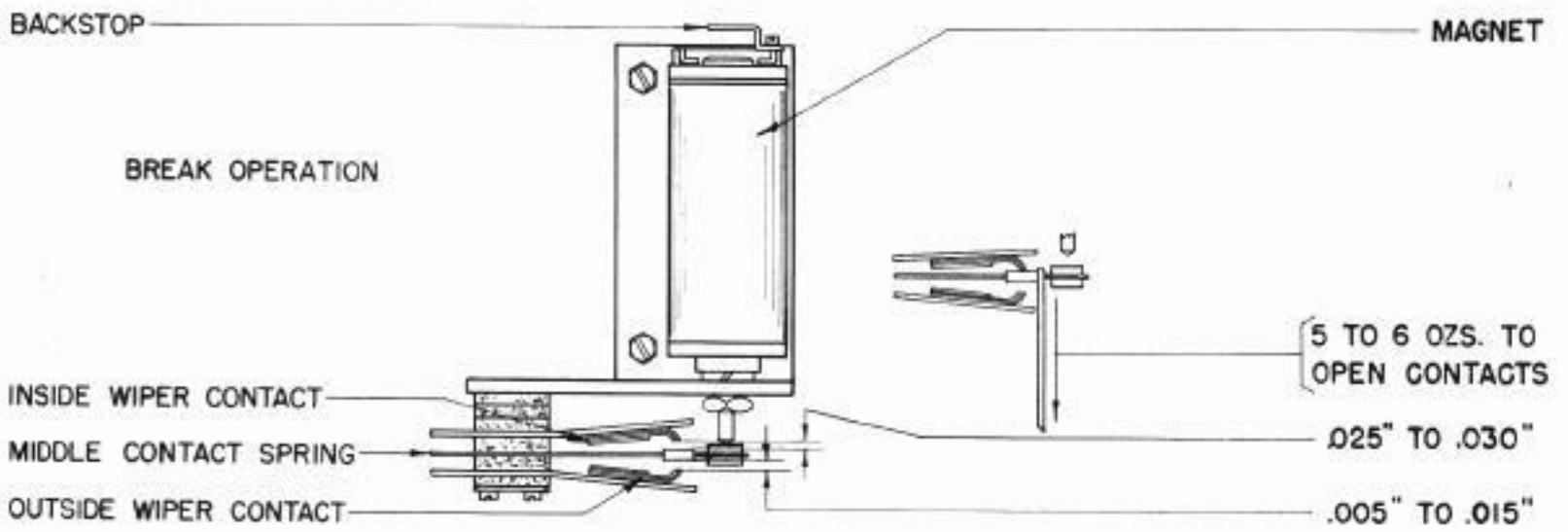


FIGURE 97

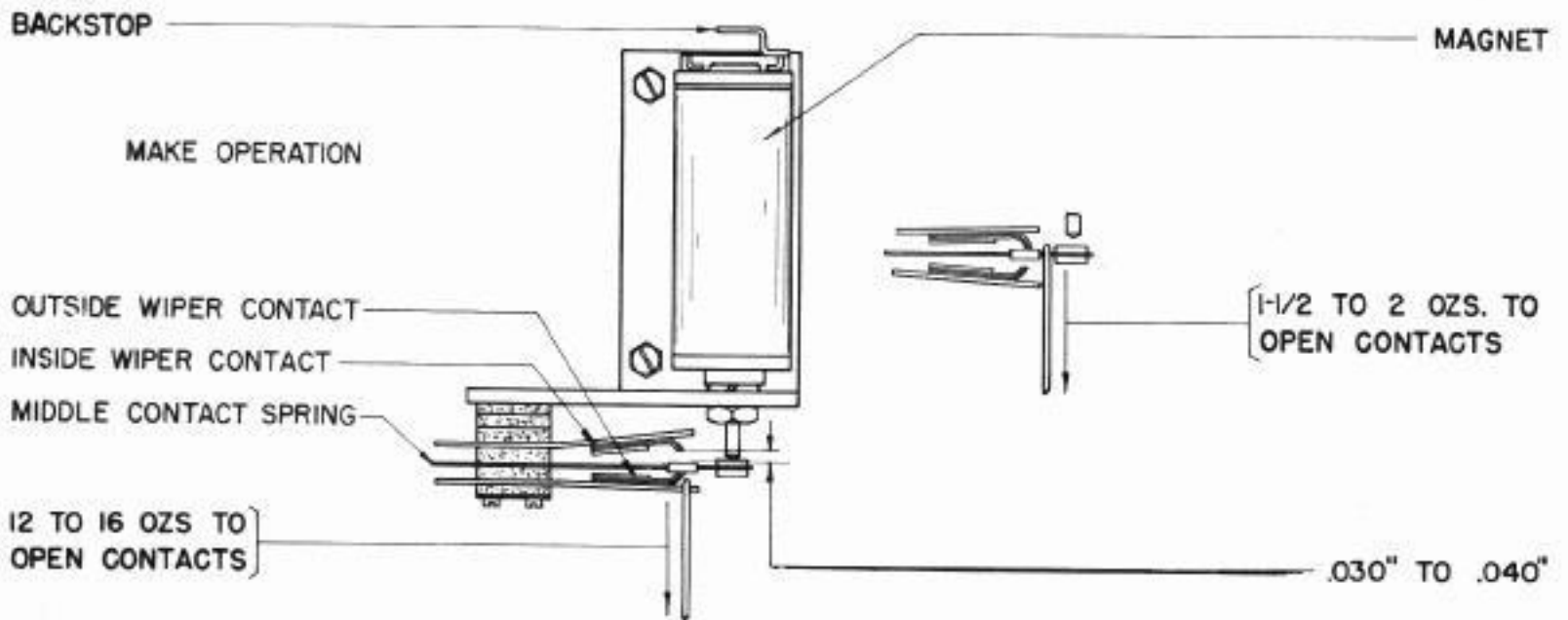


FIGURE 98

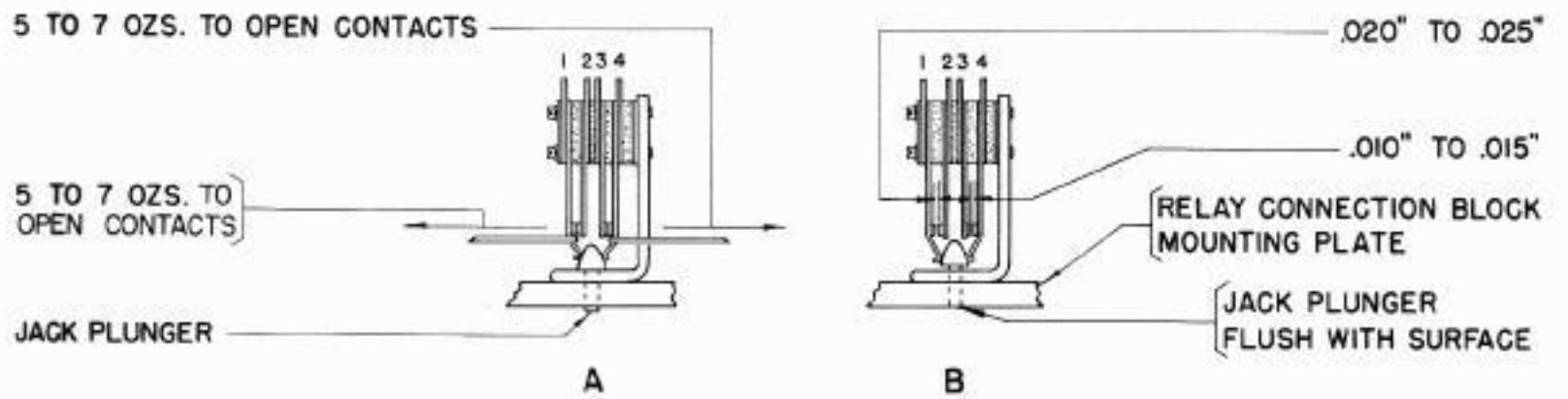


FIGURE 99

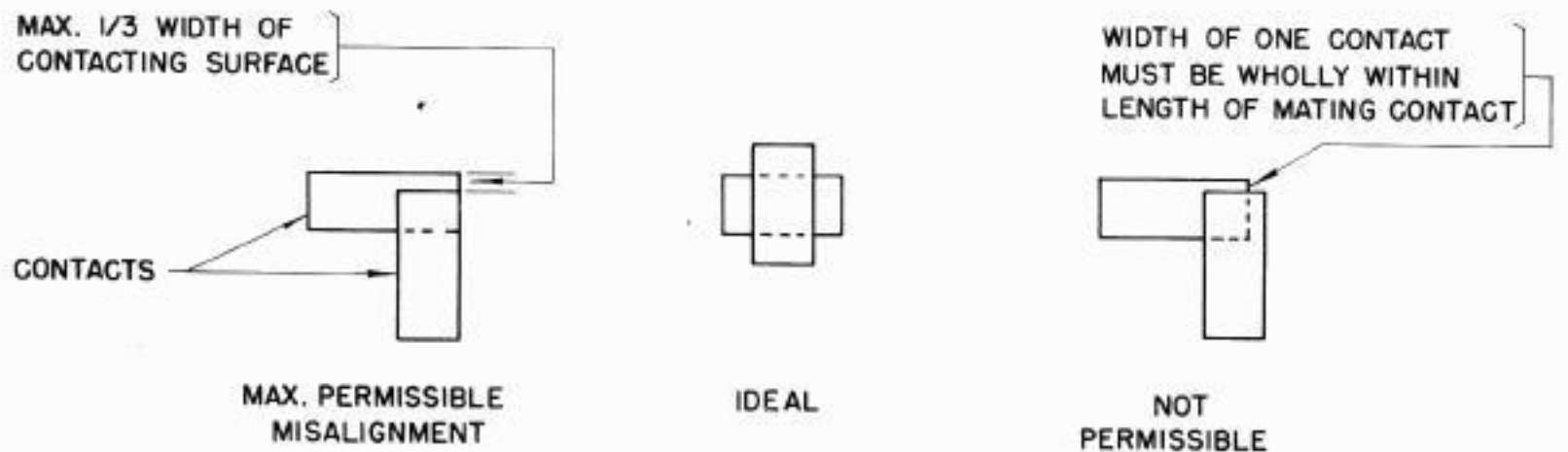


FIGURE 100

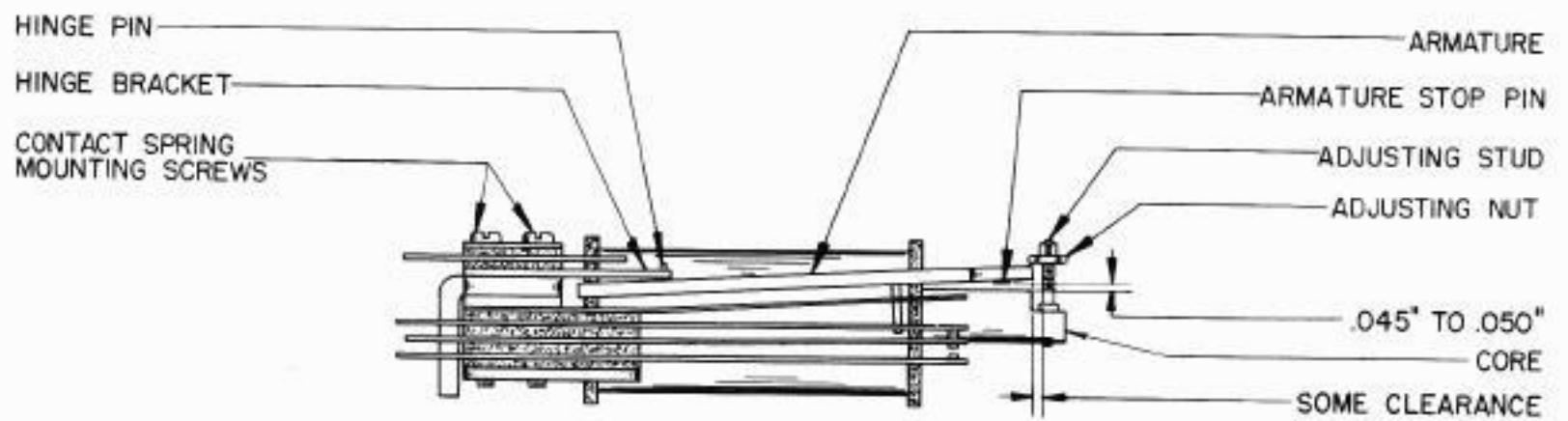


FIGURE 101

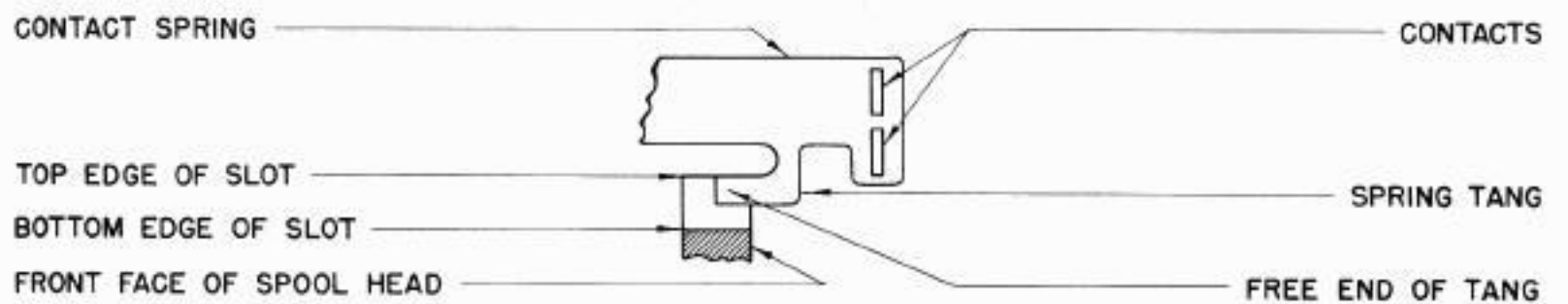


FIGURE 102

CHANGE 1

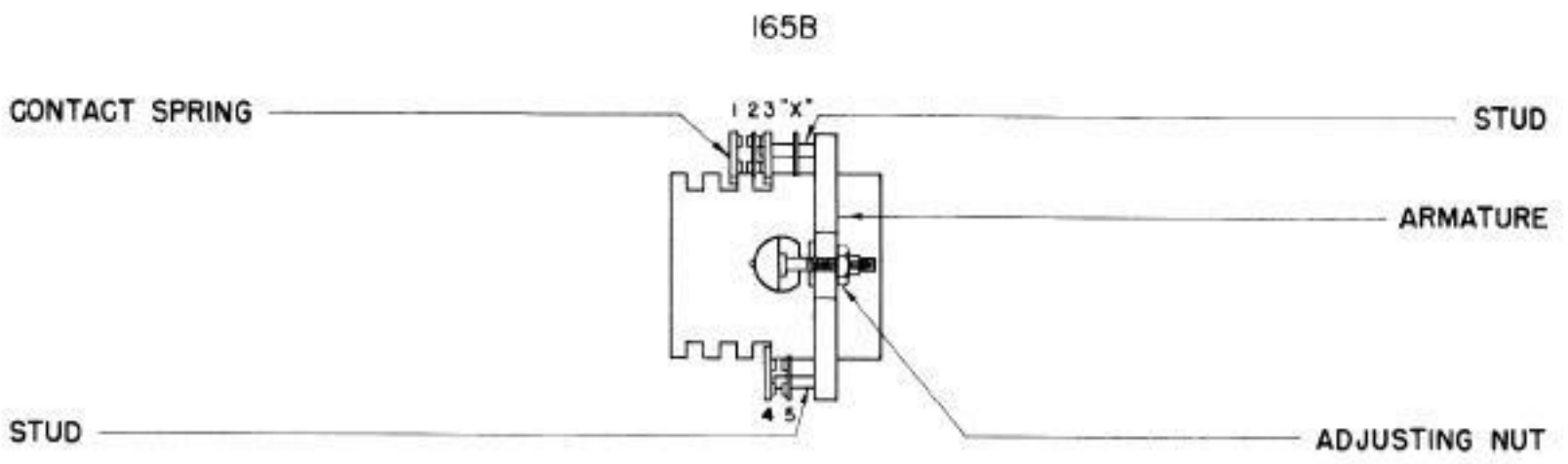


FIGURE 103

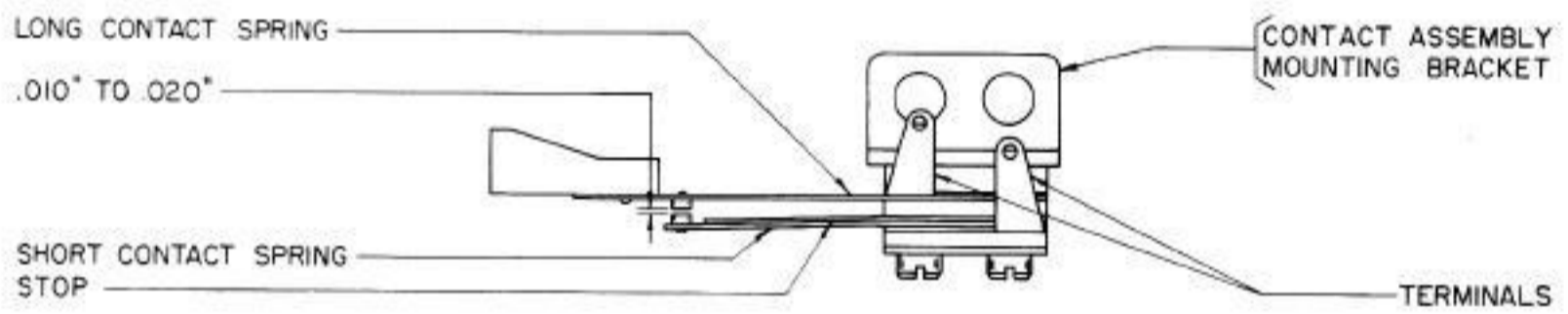


FIGURE 104

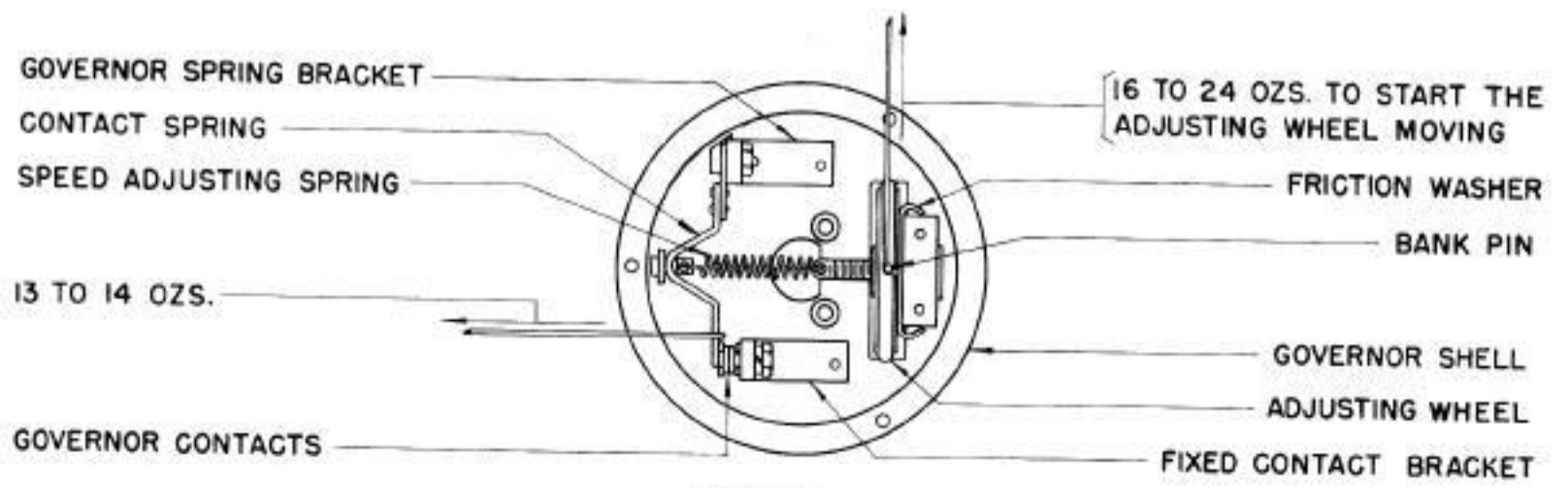


FIGURE 105

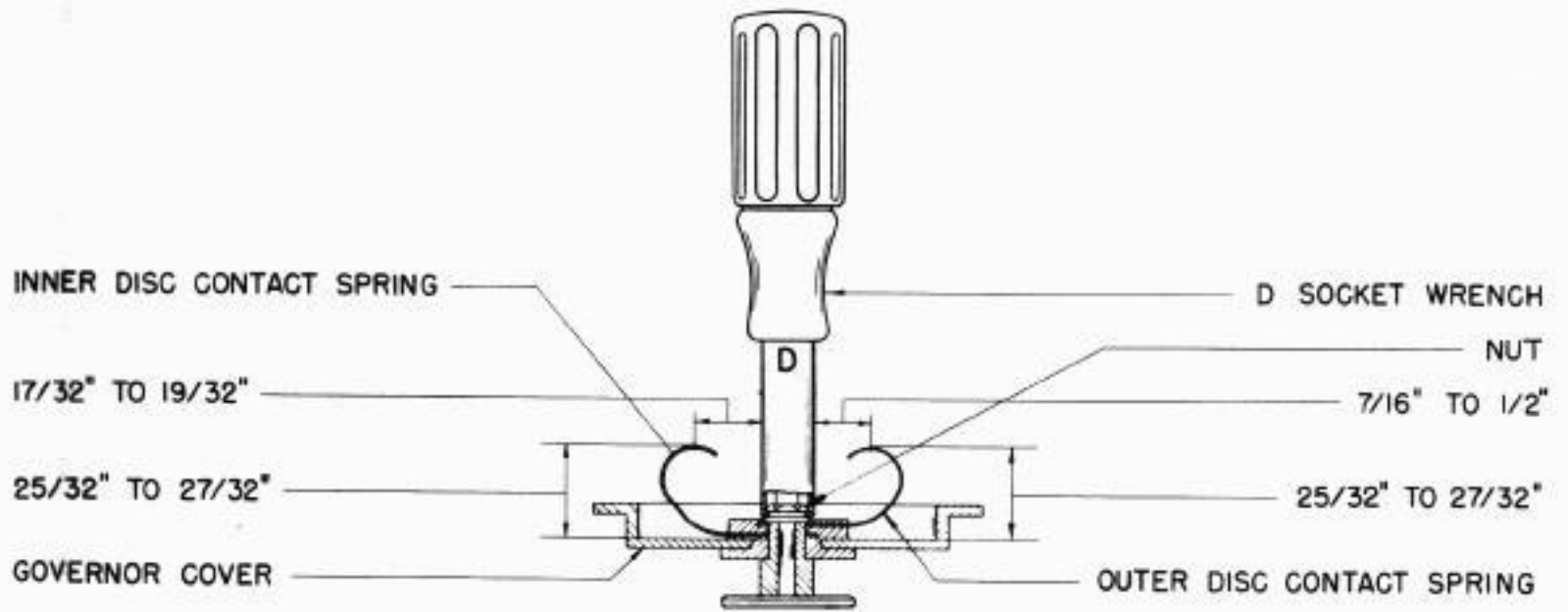


FIGURE 106

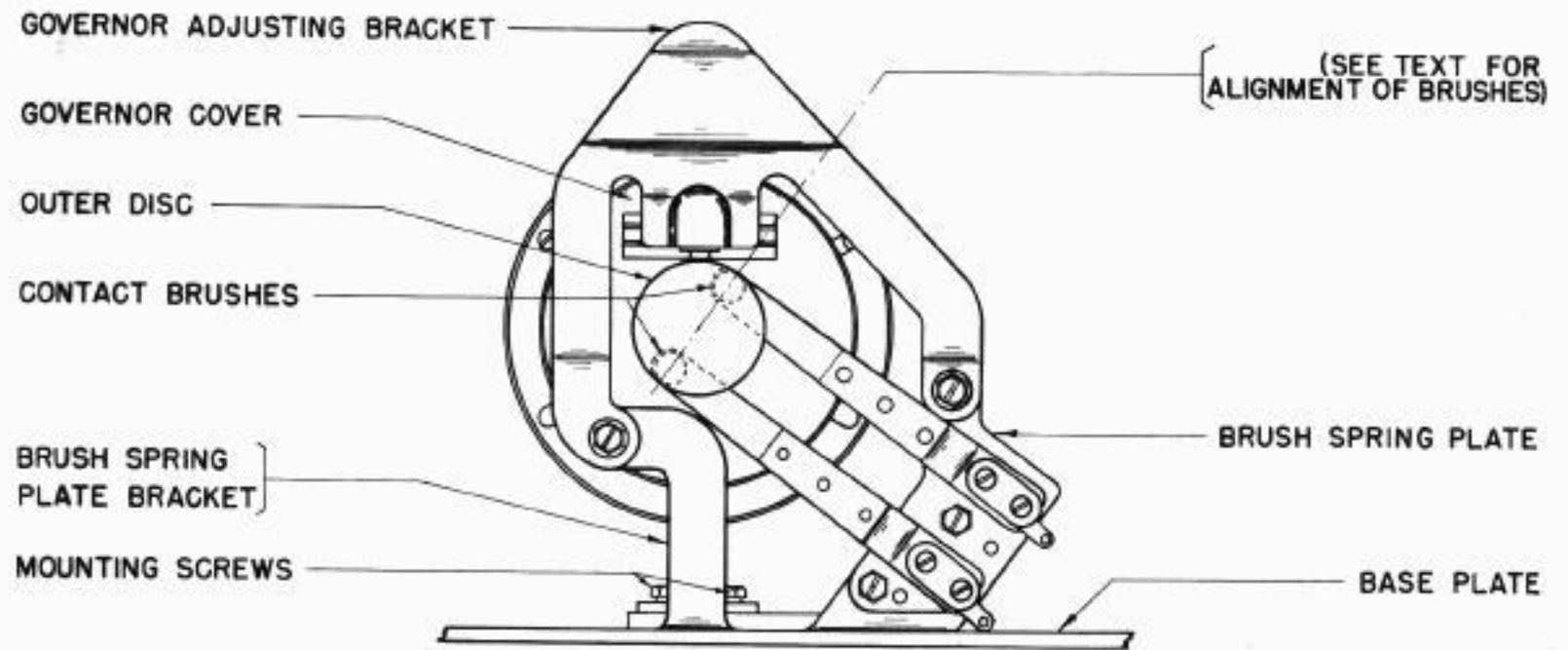


FIGURE 107

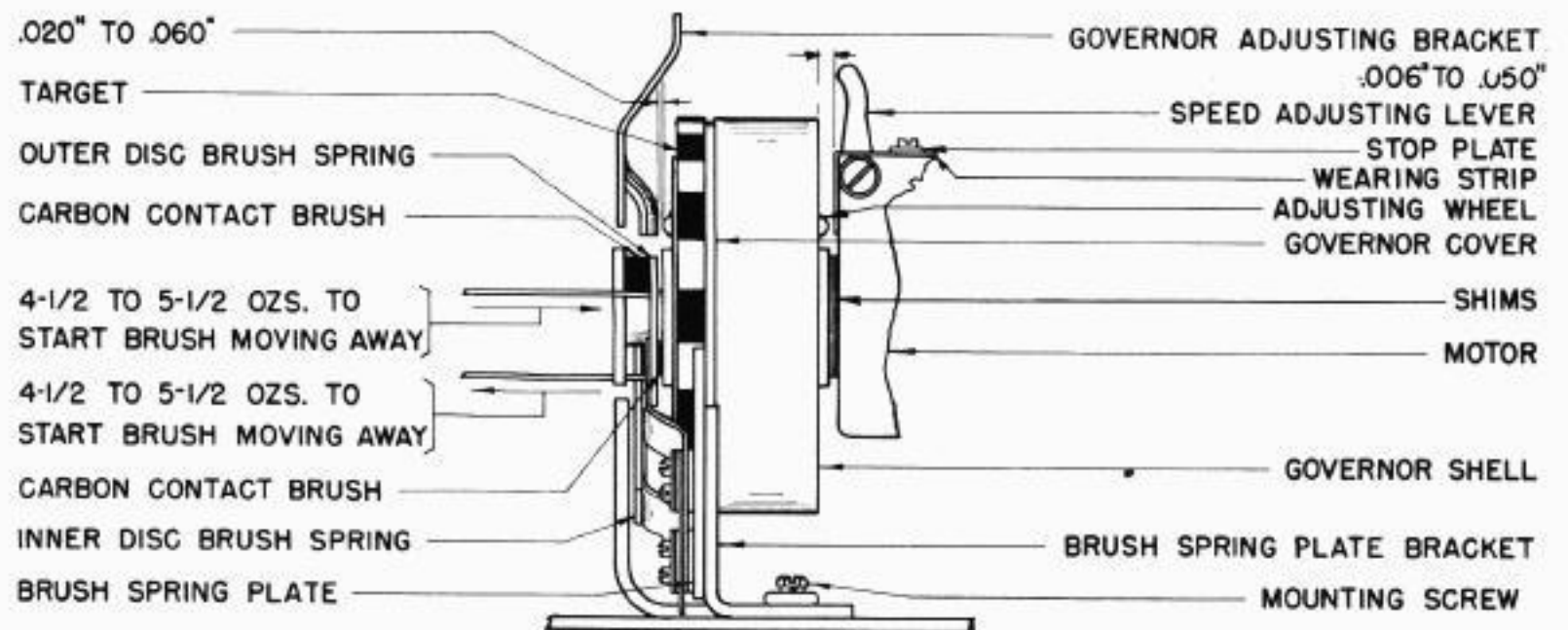


FIGURE 108

UPPER CASE	WEATHER SYMBOLS	†	⊕	○	/	3	→	↘	↓	8	✓	←	↖	.	⊙	9	∅	1	4	Δ	5	7	⊖	2	/	6	+	-	<		SPACE	LTR. SHIFT	FIG. SHIFT	
	COMMUNICATIONS	-	?	:	\$	3	!	B	ℳ	8	'	(	)	.	,	9	∅	1	4	Δ	5	7	;	2	/	6	"	∞	<					
LOWER CASE		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	BLANK	C.R.	L.F.		SPACE	LTR. SHIFT	FIG. SHIFT
	1	●	●	●	●	●					●	●					●	●		●	●	●	●	●	●	●					●	●		
	2	●		●						●	●	●	●				●	●	●			●	●	●						●	●	●		
	FEED HOLES	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○		
	3			●		●		●	●	●		●	●	●	●	●	●	●		●	●	●	●	●	●	●				●	●			
	4		●	●	●		●	●			●	●	●	●	●	●			●			●	●	●	●			●		●	●			
	5	●						●	●				●	●		●	●	●			●	●	●	●	●	●					●	●		

FIGURE 109

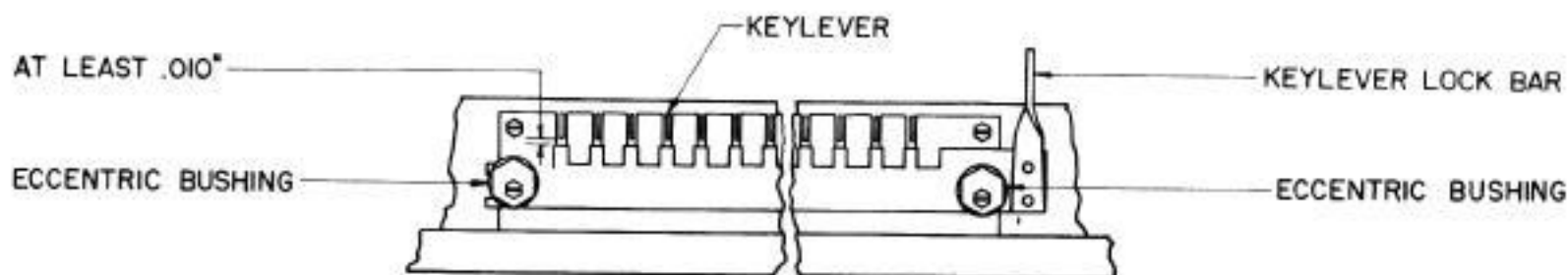


FIGURE 110

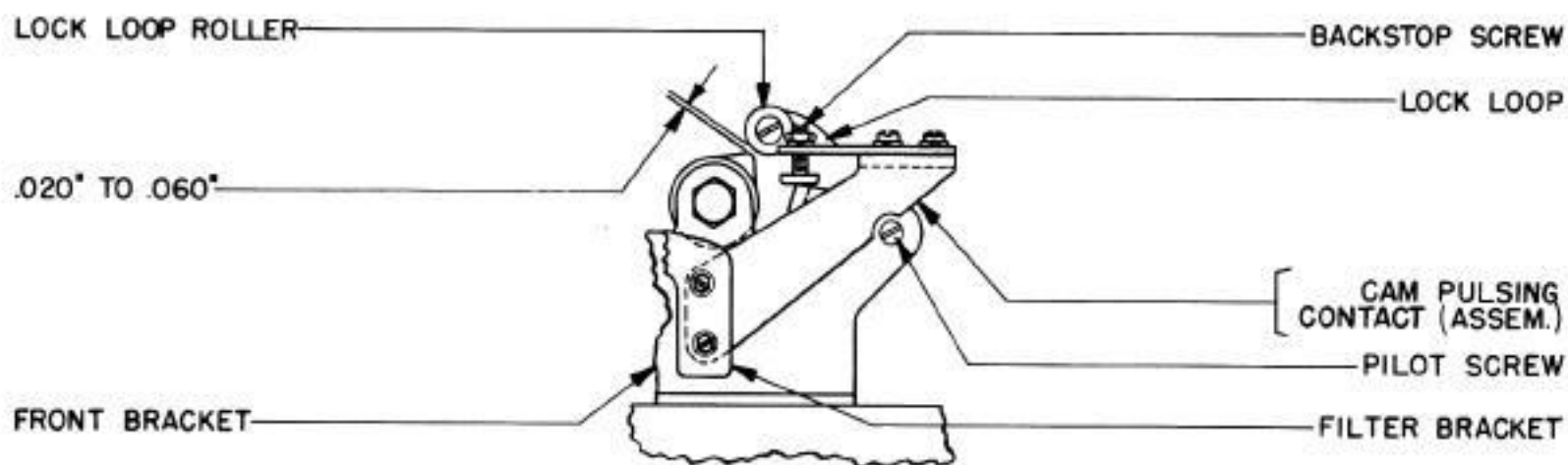


FIGURE 111

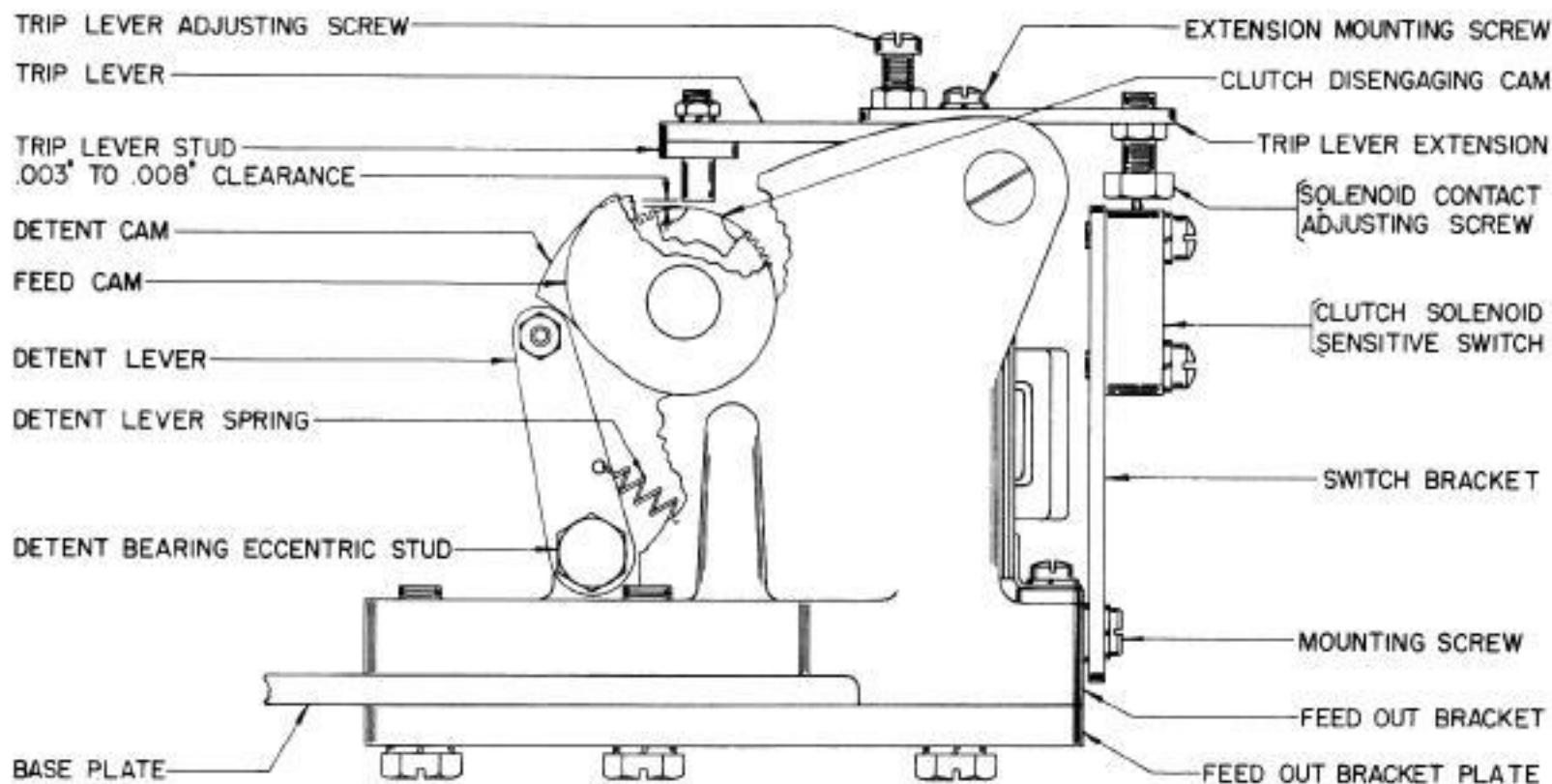


FIGURE 112

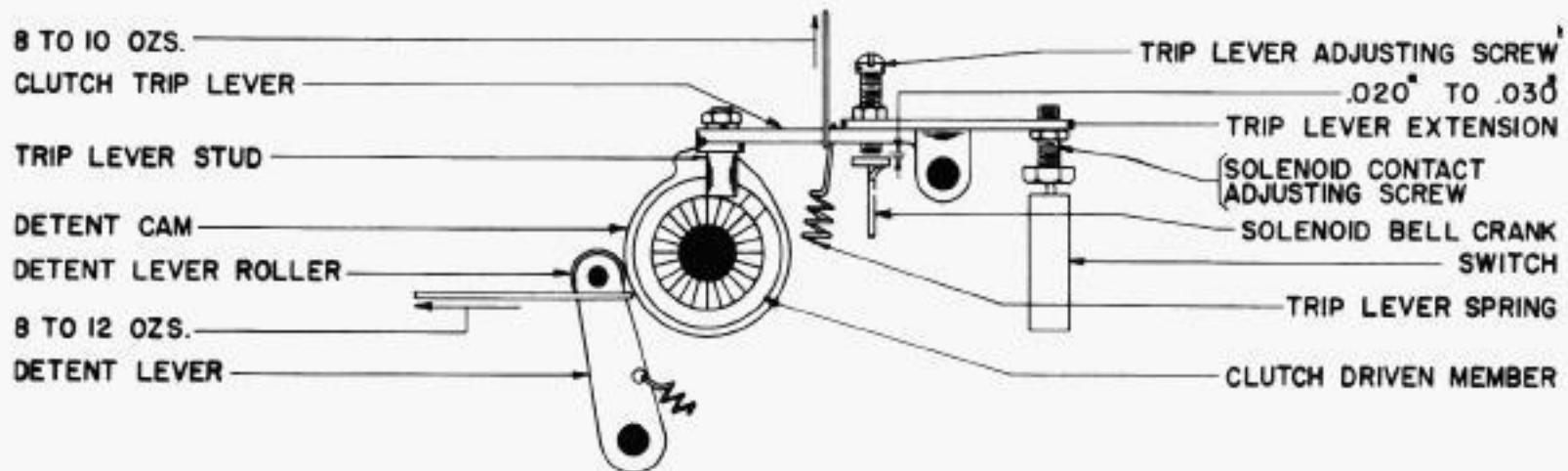


FIGURE 113

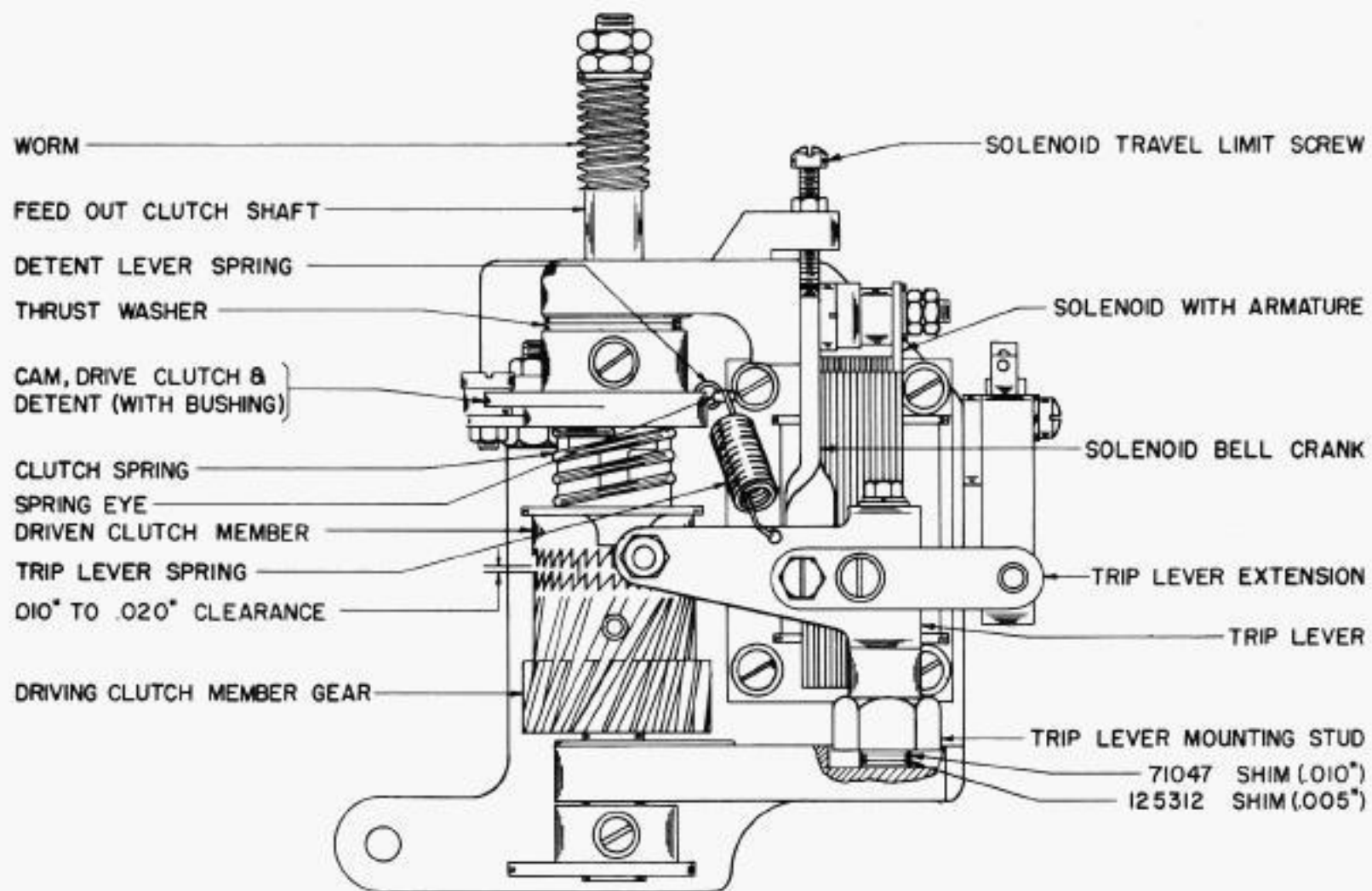


FIGURE 114

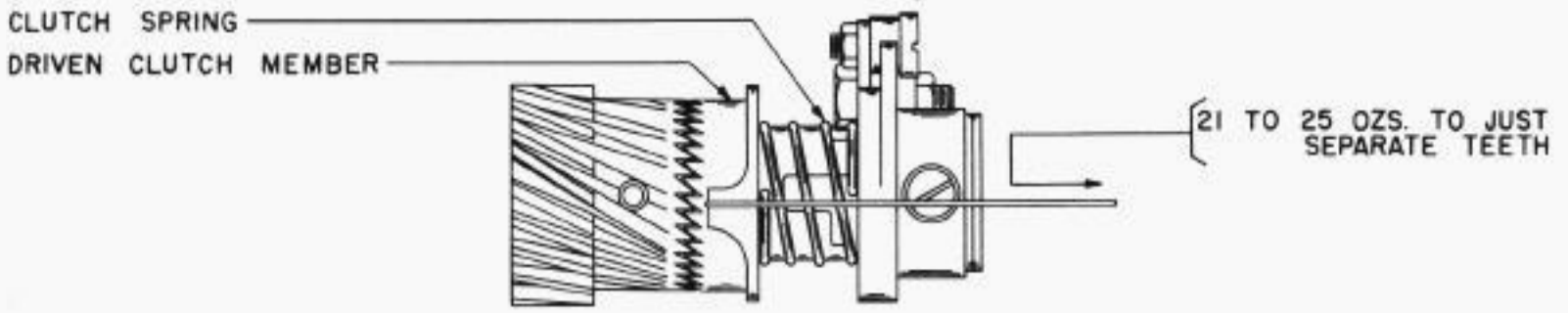


FIGURE 115

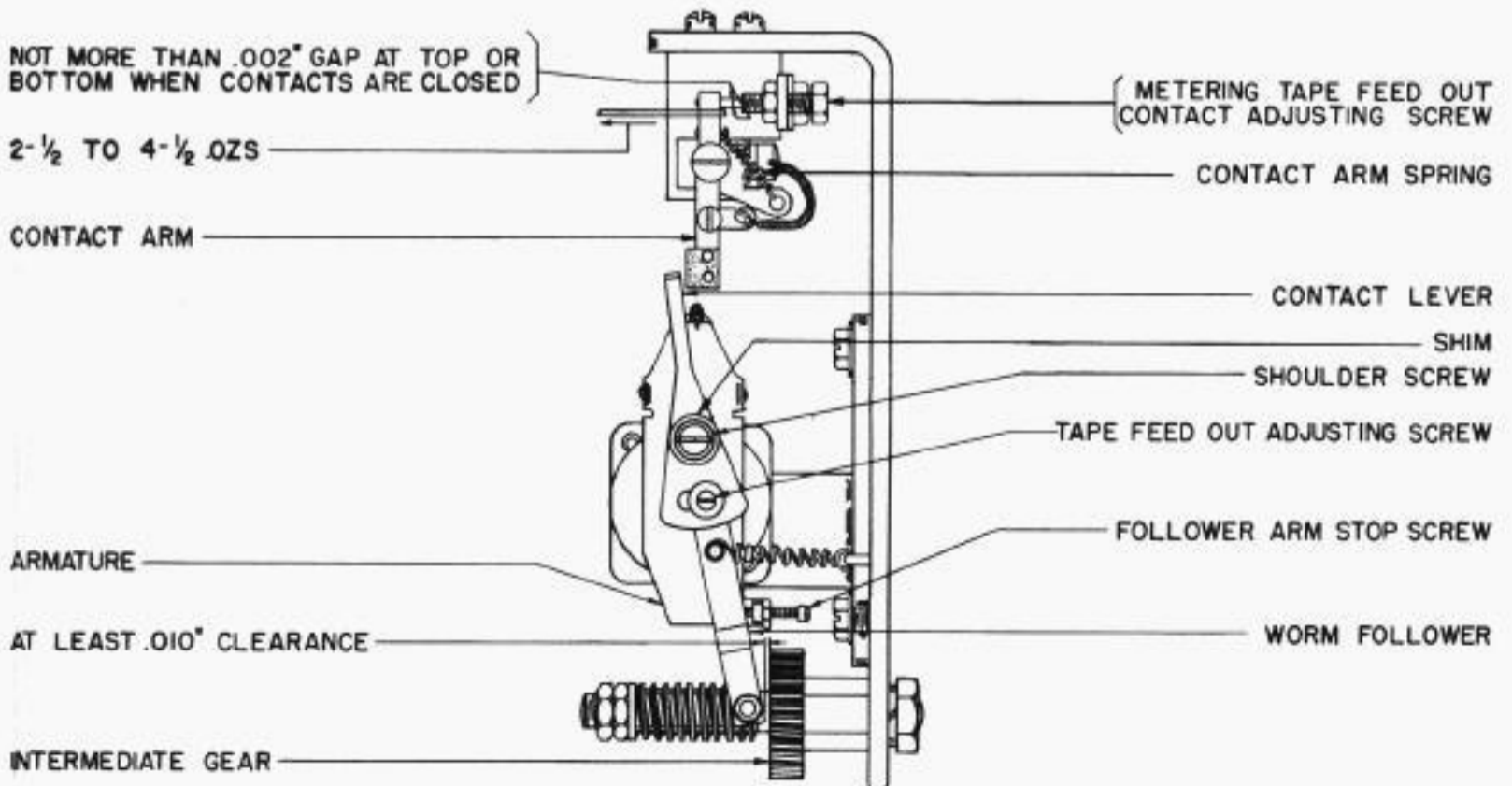


FIGURE 116



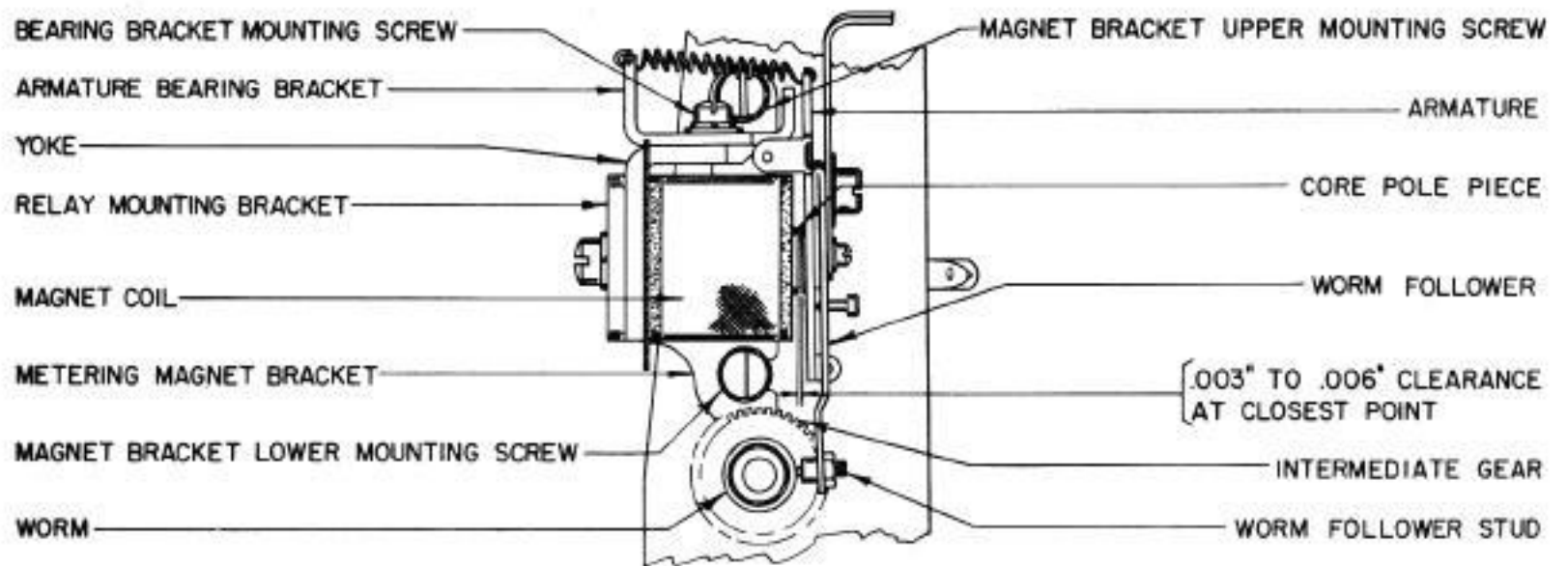


FIGURE 117

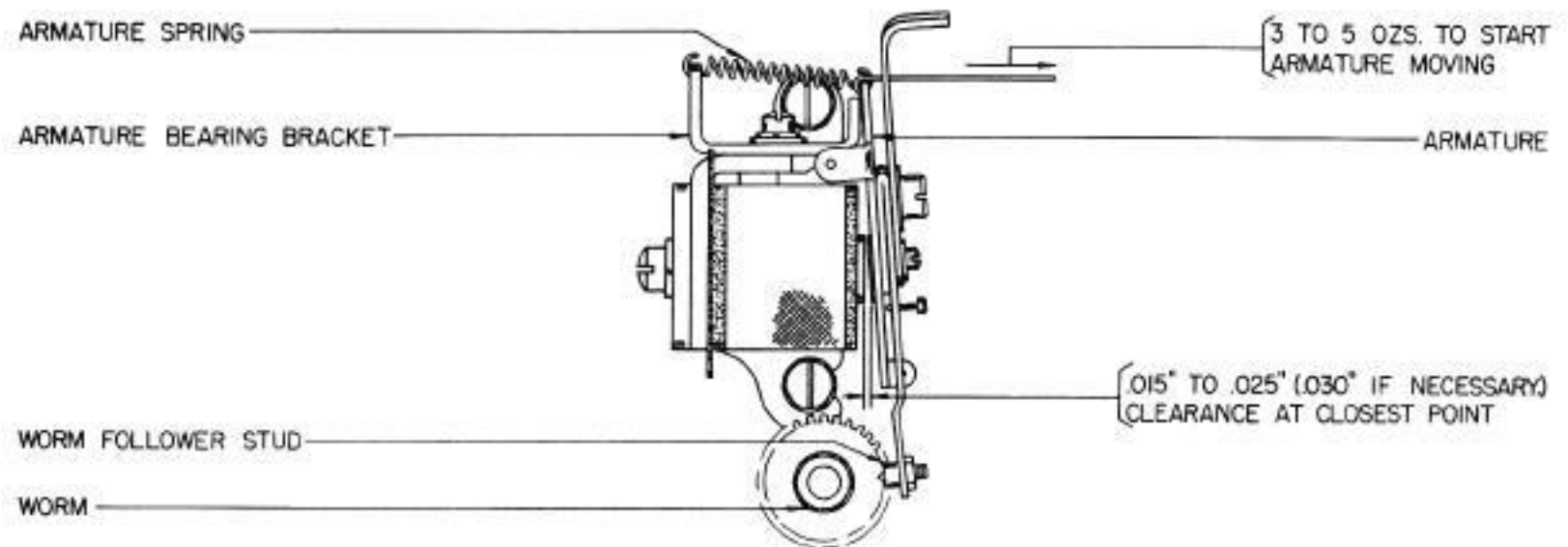


FIGURE 118

CHANGE I

165B

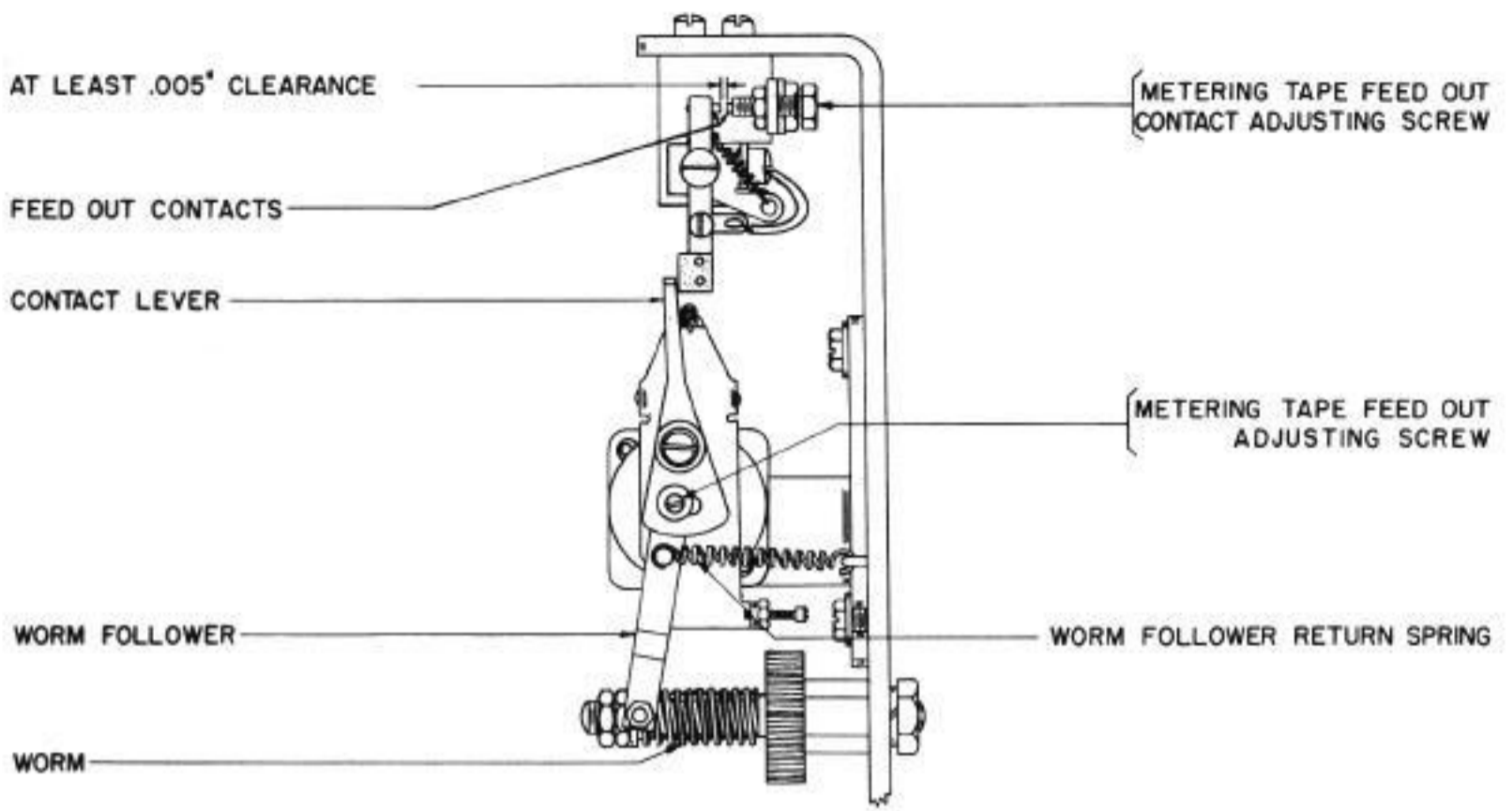


FIGURE 119

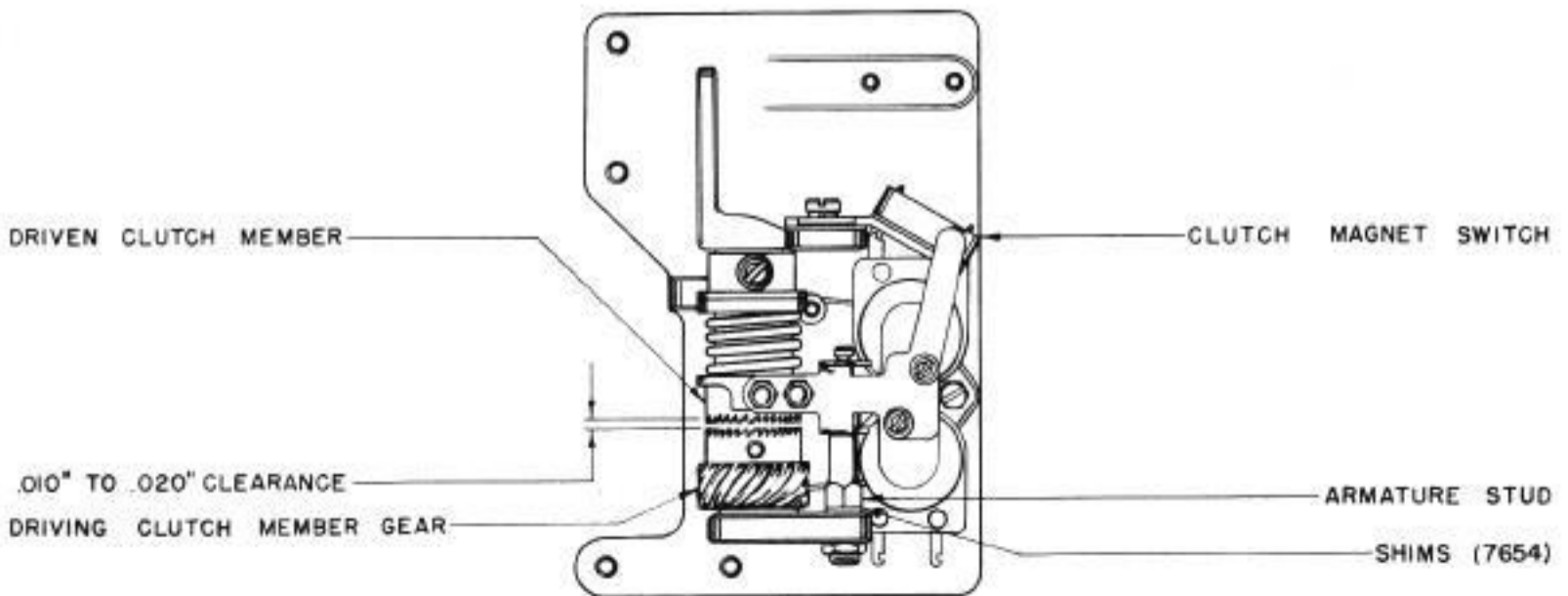


FIGURE 120

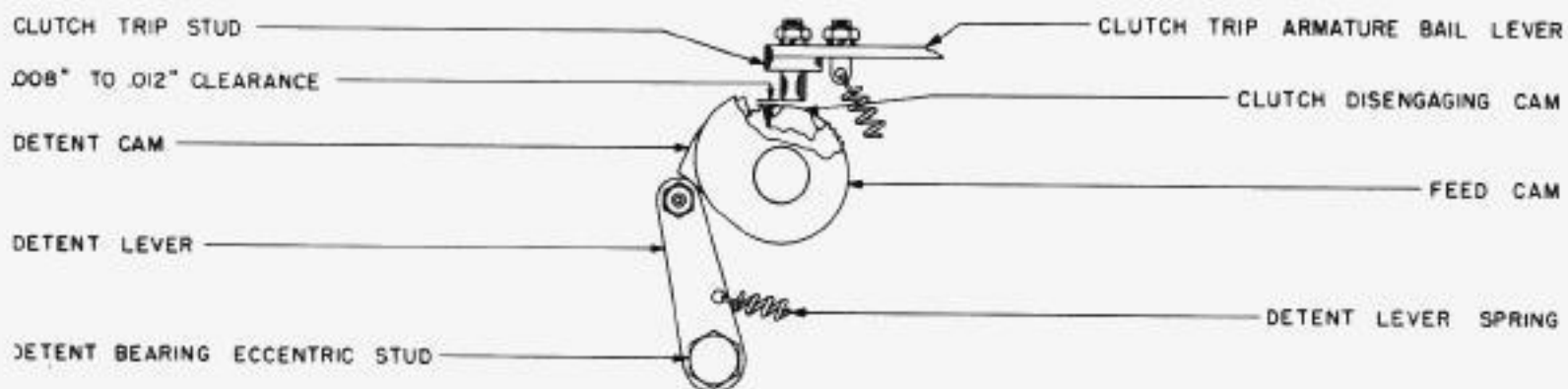


FIGURE 121

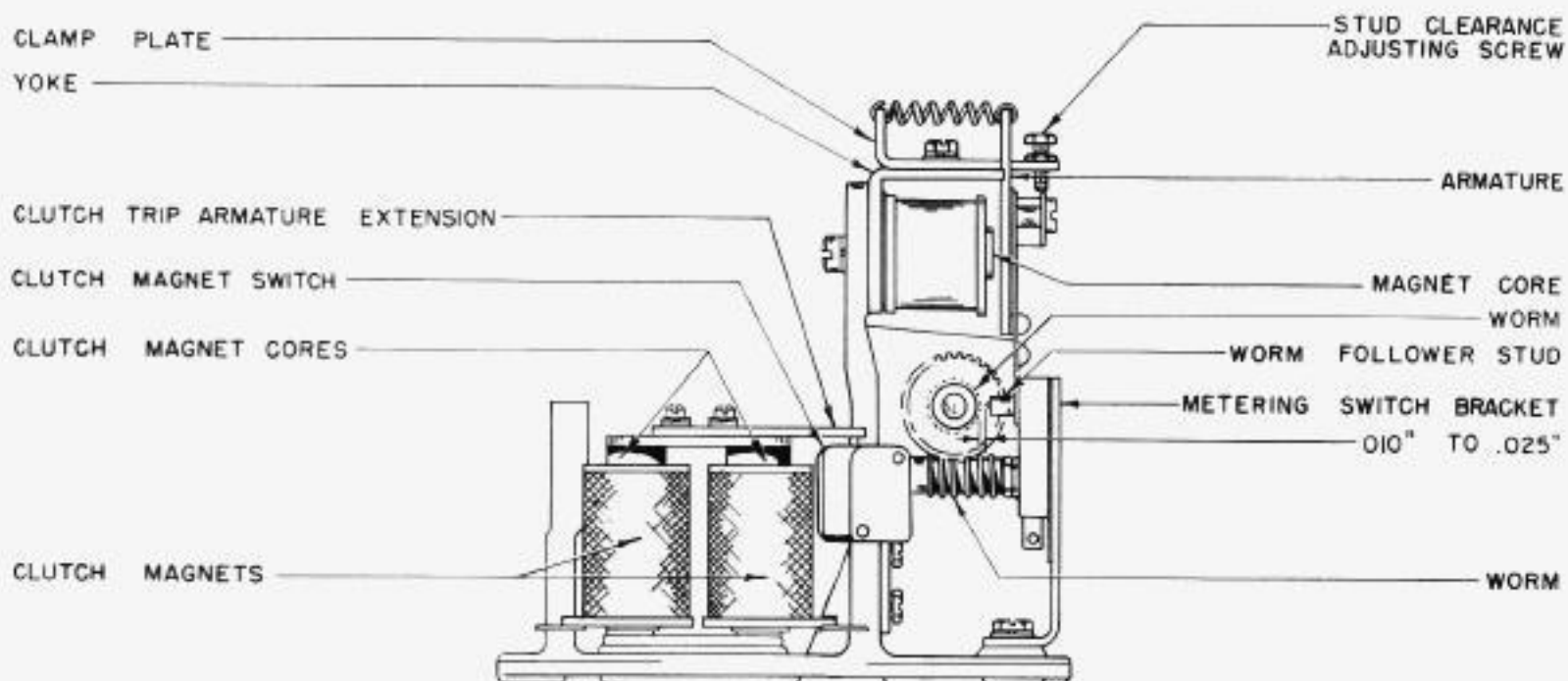


FIGURE 122

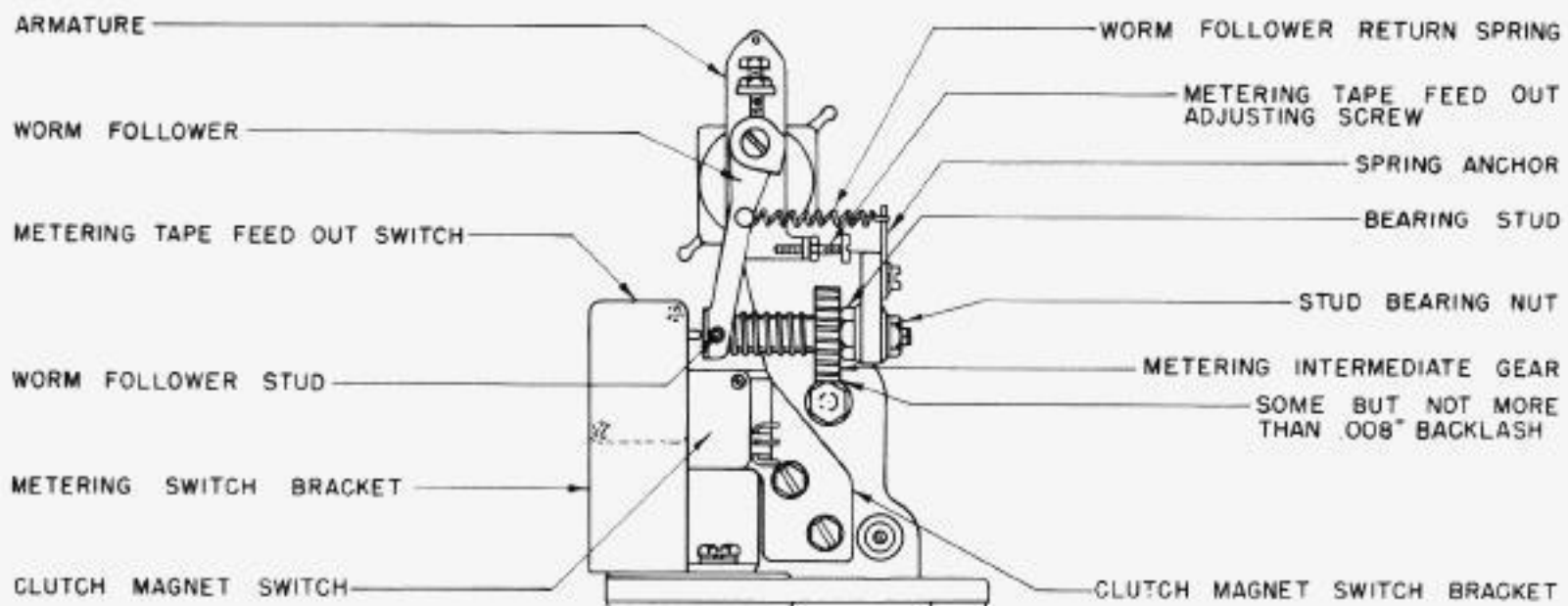


FIGURE 123