

**This Material Should Not
Be Distributed Outside of
ENGINEERING SPECIFICATION FOR THE
Teletype Corporation
MODEL 29 AND 35 TYPING UNIT (LP600 THROUGH 800 SERIES)**

TABLE OF CONTENTS

<u>Section</u>	<u>Description</u>	<u>Total Pages : In Section</u>
I	General Description and Engineering Requirements	2
II	Detailed Description and Theory of Operation	3
III	Adjustments, Special Requirements, and Lubrication	102
IV	Manufacturing Information	14
V	Installation and Servicing Instructions	9

PAGE CHECK LIST

<u>Section</u>	<u>Pages</u>	<u>Date</u>
I	I-1	4-9-63
	I-2	1-10-64
II	II-1	8-27-62
	II-2	8-27-62
	II-3	* 6-02-64
III	III-1	8-27-62
	III-2	1-7-63
	III-3	3-22-63
	III-4	* 6-02-64
	III-5	8-27-62
	III-6	8-27-62
	III-7	8-27-62
	III-8	3-1-63
	III-9	3-1-63
	III-10	8-27-62
	III-11	4-29-63
	III-12	8-27-63
	III-13	8-27-63
	III-14	10-5-62
	III-15	10-5-62
	III-16	8-27-62
	III-17	4-9-63
	III-18	8-27-62
	III-19	8-27-62
	III-20	2-12-64
	III-21	2-12-64
	III-22	2-12-64
	III-23	8-27-62
	III-24	8-27-62
	III-25	8-27-62
	III-26	2-12-64
	III-27	2-12-64
	III-28	2-12-64
	III-29	8-27-62
	III-30	2-12-64
	III-31	1-18-63
	III-32	8-27-62
	III-33	10-02-63
	III-34	10-02-63
	III-35	2-11-63
	III-36	4-9-63

PAGE CHECK LIST

<u>Section</u>	<u>Pages</u>	<u>Date</u>
III	III-37	12-12-62
	III-38	8-27-62
	III-39	1-12-64
	III-40	8-27-62
	III-41	8-27-62
	III-42	* 6-02-64
	III-42A	* 6-02-64
	III-43	1-07-63
	III-44	3-22-63
	III-45	8-05-63
	III-46	5-01-63
	III-47	3-22-63
	III-48	3-22-63
	III-49	3-22-63
	III-50	3-22-63
	III-51	2-12-64
	III-52	3-22-63
	III-53	3-22-63
	III-54	2-12-64
	III-55	3-22-63
	III-56	3-22-63
	III-57	3-22-63
	III-58	3-22-63
	III-59	3-22-63
	III-60	3-22-63
	III-61	3-22-63
	III-62	2-12-64
	III-63	3-22-63
	III-64	3-22-63
	III-65	3-22-63
	III-66	3-22-63
	III-67	3-22-63
	III-68	3-22-63
	III-69	3-22-63
	III-70	3-22-63
	III-71	4-14-64
	III-72	3-22-63
	III-73	4-09-63
	III-74	3-22-63
	III-75	3-22-63
	III-76	3-22-63
	III-77	3-22-63
	III-78	3-22-63
	III-79	3-22-63
	III-80	2-12-64
	III-81	9-09-63
	III-82	3-22-63
	III-83	3-22-63
	III-84	3-22-63
	III-85	3-22-63
	III-86	3-22-63
	III-87	4-09-63
	III-88	3-22-63
	III-89	3-22-63
	III-90	3-22-63
	III-91	3-22-63
	III-92	3-22-63
	III-93	3-22-63

Continued

PAGE CHECK LIST

<u>Section</u>	<u>Pages</u>	<u>Date</u>
III	III-94	3-22-63
	III-95	3-22-63
	III-96	3-22-63
	III-97	3-22-63
	III-98	3-22-63
	III-99	8-05-63
	III-100	* 6-02-64
	III-101	* 6-02-64
	III-102	* 6-02-64
	**III-103	5-25-64
	IV	IV-1
IV-2		* 6-02-64
IV-3		8-27-62
IV-4		8-27-62
IV-5		8-27-62
IV-6		8-27-62
IV-7		8-27-62
IV-8		8-27-62
IV-9		10-05-62
IV-10		8-27-62
IV-11		8-27-62
IV-12		8-27-62
IV-13		* 6-02-64
IV-14		* 6-02-64
V	V-1	8-27-62
	V-2	8-27-62
	V-3	8-27-62
	V-4	8-27-62
	V-5	8-27-62
	V-6	8-27-62
	V-7	8-27-62
	V-8	8-27-62
	V-9	8-27-62

ENGINEERING SPECIFICATION FOR THE
MODEL 29 AND 35 TYPING UNIT (LP600 THRU 800 SERIES)

SECTION I

GENERAL DESCRIPTION AND ENGINEERING REQUIREMENTS

1. GENERAL DESCRIPTION

- a. This typing unit is very similar to the five level unit except for the following:
 - (1) The selector assembly has been changed so as to inhibit bounce in the magnet armature.
 - (2) The code bar positioning mechanism has been changed so that six intelligence bits and, in some units, seven bits may be transferred to the code bars.
 - (3) The type box is positioned from left to right directly, through a lever system, from a code bar positioning intermediate arm.
 - (4) On the automatic send-receive sets which may require a feature in which the page copy is kept in step with the tape both horizontally and vertically, the spacing clutch trip mechanism is altered. The spacing clutch is tripped from the operation of the function clutch rather than from the type box clutch operation.
- b. Standard accessories used on the five level unit may be applied to this unit, except those in obvious conflict with the coding system used.
- c. The unit operates at speeds of 60 to 100 WPM by means of gear changes.
- *d. The selector coils are factory wired for 30 MA operation but may be changed for 60 MA operation by means of shifting the straps at the coils. Certain typing units (WADS System) are designed for 500 MA operation.
- e. The LP600 series shall operate with a six level code, the LP700 series shall operate with a seven level code and the LP800 series shall operate with an eight level code.
- f. The six level selector is contoured for a 1.5 unit stop pulse; the eight level for a 2.0 unit stop pulse. The sequence of the received Code Signals shall be 1, 2, 3, 4, 5, 6 for six level; 1, 2, 3, 4, 5, 6, 7, 8 for eight level. (On early model Six Level the sequence was 0 through 5 and on early model Eight Level the sequence was 0 through 7.)

2. ENGINEERING REQUIREMENTS

- a. Refer to Specification 6275S.

3. ACCESSORY MODIFICATION KITS

- a. Accessory Modification Kits listed on 6 and 8 level bills of material refer to Model 28 Specification.
- **b. An electro-mechanical mechanism for placing the Model 35 printers in the "print" or "non-print" condition is available for use on Model 35 printers.

SECTION II

DETAILED DESCRIPTION AND THEORY OF OPERATION

1. DETAILED DESCRIPTION

a. Refer to Specification 6275S

2. THEORY OF OPERATION

a. Arrangement of Code Bars

(1) Nine code bars are included in this unit. The arrangement varies according to the code system used. The sequence from top to bottom is:

(a) Six level (modified Teletype code) - Suppression, #5, #2, #6, #3, #4, common, automatic carriage return - line feed, and #1.

(b) Eight level (IBM code) - Suppression, #6, #2, #7, #3 #1, common, #8 and #4. A #5 Code Bar is non-existent since the #5 Code Bit is "parity" and not needed for printer operation.

(c) Eight level (Fieldata and ASA Code) - Suppression, #2, #5, #1, #4, #3, common, #7, #6. A #8 Code Bar is non-existent since the #8 Code Bit is not used for printing. On Fieldata code printers the #7 Code Bar is available for automatic CR-LF.

NOTE: On early models the first pulse was designated as the zero pulse. (See Section I, Par. 1. f.) Therefore for these models, substitute #0 for #1 and decrease each number by one in the above paragraphs.

b. Code Bar Positioning

(1) The code bars are positioned in the same manner as on the five level except all code bars (excluding print suppress bar) are positioned by the scissors mechanism.

c. Type Box Shift Function

(1) The five level nomenclature of this function is "figures-letters shift."

- *(2) The shift operation occurs on the presence of a marking or spacing #1 (6 level) Code Bit. On a mark, the selector push lever operates the intermediate arm. This arm contains a "tail", which through a system of linkages, positions a pair of pawls to the right. A cam follower, following a cam connected to the code bar clutch, operates the left pawl. (On a spacing #1 Bit, the pawls would be positioned to the left and the right pawl operated.) This pawl operates a toggle which in turn rotates the shift bar counterclockwise operating the right shift link breaker slide. The type box is then positioned to the left in the same manner as on the five level unit. On 8 level, IBM code, a mark or space #4 Code Bit shifts the type box. On 8 level Fielddata code #6 Bit shifts; on the 8 level ASA code #7 Bit shifts the type box. (See NOTE in Paragraph II, 2. a. (1) for early models)

d. Spacing Clutch Trip

- *(1) On units described in Page I-1, Paragraph 1. a. (4), the standard method of tripping the spacing clutch by a cam plate on the main rocker shaft is changed. In these units a cam is mounted on the function clutch system. A follower which engages this cam, operates the spacing trip lever bail.
- (2) The spacing clutch trip in this system occurs at approximately the same time it occurred when the clutch is tripped by the main rocker shaft. The operation of space suppression from the stunt box is not altered.

e. Remainder of Unit

- (1) For theory of operation of the remainder of the unit refer to Specification 6275S. Where quantities of parts are mentioned in relation to the code level, (i.e. five selecting levers on the five level selector) it should be noted that on six level the number of parts is six, etc.

*NOTE: The various units correspond to the following codes:

LP600	Fielddata Code
601	Expanded Baudot Code
602	Expanded Baudot Code
603	Fielddata Code
LP800	IBM 705 Code
801	IBM 705 Code
802	IBM 705 Code
803	Fielddata Code
804	Fielddata Code
805	ASA Code - WADS Service, Sprocket Feed
806	ASA Code - WADS Service, Friction Feed
807	IBM 705 Code
808	IBM 705 Code
810	ASA Code - Basic Friction Feed
811	ASA Code - Basic Sprocket Feed

f. Printing Suppression

- (1) This mechanism prevents tripping of the type box clutch thereby suppressing printing and spacing when the sixth and seventh pulses are spacing or when the third, fourth, fifth, sixth and seventh pulses are marking. This is accomplished by a pair of coded blocking levers actuated by the code bars of the typing unit. Movement of these levers in conformance to a "suppress" permutation set up by the code bars causes the type box clutch trip lever to be blocked with subsequent omission of the printing cycle.
- (2) As can be seen in Figure 16, the right end of this lower blocking lever is so coded that when the sixth and seventh code bars are spacing the left end of the blocking lever will block movement of the blocking bail which in turn blocks the clutch trip arm through the clutch suppression arm. The center blocking lever is coded to respond when the third, fourth, fifth, sixth and seventh code bars are marking and in a like manner causes suppression.
- (3) The upper blocking lever is under control of the suppression code bar which does not respond directly to the code permutation but must be acted on by levers selected in the stunt box. It is normally fixed in the spacing position except when used as part of the print, non-print solenoid mechanism.
- (4) Print, Non-Print Solenoid Mechanism - (Figures 45, 46, 47)
 - (a) This mechanism moves the suppression code bar to the spacing position for "print" and returns the bar to the "marking" position for "non-print." The suppression bar is not fixed in the spacing position as was indicated in paragraph (3) above but is power driven to the spacing position through the action of a remotely controlled solenoid. The mechanism accomplishes print suppression through action of the upper blocking lever which, when the solenoid is de-energized, prevents tripping of the type box clutch. When the solenoid energizes, the upper blocking lever is pulled away from the blocking bail blade permitting the type box clutch to be tripped initiating the printing cycle.
 - * (b) The solenoid will operate on 48V DC. A transfer contact actuated by the solenoid can be used to latch the solenoid in an energized position for continuous duty printing.
 - (c) The following printers are equipped with the print, non-print solenoid mechanism for use in selective calling:

LP818 ASA Code, Sprocket Feed
LP819 ASA Code, Friction Feed

Refer to Specifications 60,773S, 60,829S or 60,830S.

SECTION III

ADJUSTMENTS, SPECIAL REQUIREMENTS AND LUBRICATION

1. GENERAL

- a. The adjustments of each unit are arranged in a sequence that would be followed in the production of new apparatus or if a complete readjustment of a unit were undertaken. If one adjustment is changed, related adjustments should be checked.
- * b. The spring tensions given in this specification are indicated values and should be checked with proper spring scales in the position specified.

<u>Scale Specified</u>	<u>Teletype Part No.</u>
8 oz.	110443
32 oz.	110444
64 oz.	82711
15 lb.	135059

- c. References made to "Left" or "Right", "Up" or "Down", "Front" or "Rear", etc. apply to the unit in its normal operating position as viewed from the operator's position in "Front" of the unit.
- d. Frequent reference is made to the several clutches being in certain positions. Unless otherwise specified, where the "stop position" of any clutch is referred to, the clutch must be fully latched.
- e. During shipment of the equipment and/or long periods of storage, it is possible that lubricant from adjacent mechanisms may have migrated to the selector magnet pole faces and armature. Therefore, it is suggested that to obtain the most efficient operation of the selecting mechanism, insert a piece of bond paper between the armature and pole faces to soak up any lubricant which may have accumulated. When removing the bond paper make sure no lint or bits of torn paper remain between the pole faces and armature.
- f. Reference is made to the "Figures" and "Letters" position of the type box. "Figures" and "Letters" in these references are not related to the alpha or numeric characters located in the type box, but that the "Figures" position is the rest position on the right side of the type box and the "Letters" position is the rest position on the left side of the type box.

2. CONDITIONING OPERATIONS AND ADJUSTMENTS

- a. Conditioning Operation

- (1) The following conditioning operations should be observed to prevent damage when making a complete adjustment of the typing unit assuming that all adjustments are incorrect.
 - (a) Loosen the shift rocker lever drive arm clamp.
 - (b) Move the vertical positioning lever eccentric adjusting studs in the rocker shaft right and left brackets to their lowest position. (Dot on eccentric screw towards bottom of unit.)
 - (c) Loosen the two clamp screws in each of the horizontal positioning drive linkage bearing posts.
 - (d) Move the reversing slide extensions to their uppermost position.
 - (e) Loosen the function reset bail blade clamp screws.
 - (f) Loosen the clamp and pivot screws on the shift rocker arm bearing bracket and move to extreme downward position.
 - (g) Loosen the carriage return lever clamp screw.
 - (h) Loosen the type box cable clamp slide mounting screws.
 - (i) Loosen the reversing slide post.
 - (j) Loosen the clamp screw on the shift drive pawl operating bail.

b. Adjustments

(1) Range Finder Knob Adjustment

- * (a) The mark on the range finder knob mounting plate should be in line with the "ϕ" mark on the knob within ± 3 divisions when the rack is in either one of its extreme positions, and the inner teeth of the knob and the teeth of the sector assembly are engaged.
- (b) To adjust - loosen knob mounting nut and engage teeth of sector in that relation which will most closely align the mark on the plate with the "ϕ" on the knob.

(2) Selector Armature Adjustment (See Figure 1)

- (a) There shall be .025 to .045 clearance between the edge of the armature hinge clamp strip and the pivot edge of the casting; the outer edge of the armature shall be flush with the outer edge of both cores within .015.

- (b) The first requirement (.025 to .045 clearance) need not be made or checked if the requirements of the selector magnet bracket adjustment and receiving margin adjustment are met.
 - (c) To facilitate adjustment, remove the range finder assembly and the magnet assembly.
 - (d) Adjust the armature spring adjusting nut so that the armature spring holds the armature firmly against the pivot edge of the casting. Then position the armature and backstop by means of their mounting screws.
- (3) Selector Armature Downstop - Preliminary - (See Figure 2)
- (a) Requirement: Magnet de-energized. Lock levers on the high part of their cam. With the armature resting against its downstop, there shall be .025 to .030 inch clearance between the end of the armature and the left edge of the left pole piece.
 - (b) To Adjust: Loosen the downstop mounting screw friction tight and position the downstop to meet the requirement. Tighten the screw firmly.
- (4) Selector Magnet Bracket - (See Figures 3 & 4)
- **NOTE:** The appropriate Preliminary Selector Armature Spring Tension Adjustment must be made prior to this adjustment.
- (a) Requirement: With the magnet energized and the armature in contact with the front pole piece, there shall be .020 to .035 clearance between the end of the armature extension and the shoulder on the spacing lock lever when the spacing lock lever is on each peak of its cam.
 - (b) To Adjust: Loosen the two magnet bracket mounting screws and the adjusting link clamp screw. Move the adjusting link to locate the bracket in the required position. Tighten the adjusting link clamp screw.
 - (c) Requirement: With the magnet energized and the armature in contact with the front pole piece, there shall be some clearance, not more than .003 between the upper surface of the armature extension and the upper step of the spacing lock lever when the play of the lock lever on its mounting is taken up in a downward direction to make this clearance a minimum. (See Figure 3)
 - (d) To Adjust: Position the upper end of magnet bracket. Tighten the bracket mounting screws.

- (e) Requirement: Marking lock lever on the low part of the cam. Magnet energized. Armature in contact with left pole piece. The clearance between the lower surface of the armature extension and the upper surface of the mark lock lever shall have some clearance. (See Figure 4)
 - (f) To Adjust: Position upper end of magnet bracket with mounting screws loosened. Recheck requirement (a), (c).
- (5) Selector Clutch Drum Adjustment
- * (a) With the selector clutch in the stop position, the selector cam shall have some end play, but not more than .010".
 - * (b) To adjust: Position the clutch drum on the main shaft with its mounting screw and nut loosened. Tighten the mounting screw and nut.
- (6) Code Bar Shift Lever Drive Arm Adjustment
- (a) With the code bar shift lever link in the uppermost position and the play in the code bar shift lever and the scissors operating link taken up in a downward direction, there shall be some clearance, not more than .025 between the top of the rollers and the top of the cam slots in the code bar shift lever which provides the minimum clearance.

- (b) Adjust by positioning the operating arm on the shaft by means of its clamp screw. When making this adjustment, position the operating arm lengthwise on the shaft so that the shaft has a perceptible end play, not more than .006.
- (7) Transfer Lever Eccentric Adjustment
- (a) With any selection set up in the push levers (use "rub out"), the selector clutch in its stop position, and the code bar shift lever link in its uppermost position, there shall be .010 to .025 clearance between the rear shift lever and the rear edge of the shift bar which is farthest from the rear shift lever when the play in the bar is taken up to make the clearance maximum.
 - (b) To Adjust: Rotate the main shaft until the code bar shift lever link is in the uppermost position and loosen the transfer lever bearing clamp screw. Rotate the eccentric bushing to the required position, keeping both of the adjusting holes above a horizontal center line. Tighten the clamp screw.
- (8) Intermediate Arm Backstop Bracket Adjustment
- * (a) With the push levers stripped and all code bar shift bars to the right, the selector clutch in its stop position, and the code bar shift lever link in its lowermost position, there shall be .010 to .025 clearance between the front shift lever and the front edge of the inner step of the shift bar which is farthest from the front shift lever when the play of the parts is taken up in a direction to make the clearance maximum.
 - (b) To Adjust: Position the backstop bracket by means of its two clamp screws.
- * (9) Code Bar Shift Lever Adjustment
- * (a) The motion of the two code bar shift levers shall be equalized with respect to the code bar travel. Select a "blank" combination and rotate the main shaft until the code bar shift lever link is in its uppermost position. There shall be .002 to .025 between the front code bar shift lever and the nearest code bar shift bar shoulder. Select the "rub out" combination and the same condition and requirement should be met between the rear code bar shift lever and the nearest code bar link shoulder.

NOTE: When checking this adjustment take up the play in the direction to make the clearance a maximum.

- *(b) To adjust: Loosen the two screws on the respective code bar shift lever link adjustment plate (front or rear), and adjust with screw driver by means of projections on top of the link and plate. Tighten screws after adjustments.

(10) Selector Cam Lubricator Adjustment

- (a) Position the lubricator by means of its mounting screws so that there is at least .020 clearance between the high surface of the lock lever cam and the edge of the lubricator reservoir.
- (b) When the cam is rotated, the high surface of the selector lever cams should contact the wick, but the cam should not move the wick upward more than approximately 1/32 inch - gauged visually.

NOTE: There shall be some clearance between the mark lock lever spring and the oil reservoir.

(11) Selector Clutch Stop Arm Adjustment

- *(a) With the range scale set at 60 and the selector clutch in the stop position, the selector clutch stop arm shall engage the clutch shoe lever by approximately the full thickness of the stop arm.
- (b) Adjust by positioning the stop arm on its bail by means of the stop lever clamp screw.

(12) Code Bar Clutch Trip Lever Adjustment

- (a) With the selector clutch and code bar clutch in their stop position, the code bar clutch trip lever should engage the clutch shoe lever by the full thickness of the shoe lever.
- *(b) To Adjust: Position the trip lever on its shaft by means of its clamp screw. When making this adjustment, position the trip lever so that the trip lever shaft has some play, not more than .006.

(13) Function Clutch Trip Lever Backstop Adjustment -- Figure 6
(On Units Equipped with Adjustable Backstop)

- (a) Requirement
 - 1. Code bar clutch and function clutch disengaged. Function clutch trip lever should engage clutch shoe lever by full thickness of shoe lever.

- (b) To Adjust
1. Position the function clutch trip lever stop bracket with its mounting post loosened.
- (14) Function Clutch Trip Lever Trip Arm Adjustment - Figure 6
(On Units Equipped with Adjustable Backstop)
- (a) Requirement
- *1. Code bar clutch and function clutch disengaged. Minimum 0.040, maximum 0.050 inch between edge of bail of function clutch trip lever and projection on trip lever trip arm.
 2. When making this adjustment position the trip lever trip arm so that the trip shaft has some end play, not more than .006.
- (b) To Adjust
1. Position trip arm on trip shaft with its clamp screw loosened.
- (15) Function Clutch Trip Lever Adjustment (On Units Equipped with One Piece Trip Lever)
- *(a) With the code bar clutch and the function clutch in their stop position, the function clutch trip lever shall engage the clutch shoe lever by the full thickness of the shoe lever.
 - (b) To Adjust: Position the trip lever on its shaft by means of its clamp screw. When making this adjustment position the trip lever so that the shaft has some end play, not more than .006;
- (16) Clutch Trip Shaft Set Collars Adjustment
- (a) Locate the spacing clutch latch lever set collar so that the clutch latch lever has some play, not more than .008.
 - (b) Locate the line feed clutch trip lever set collar so that when the lever is held against the collar the right hand end of the stop extension on the trip lever is approximately in line with right hand end of the clutch shoe lever.
 - (c) Locate the left hand set collar so that the line feed clutch latch lever has some side play, not more than .008.

- (17) Anti Deflection Plate Adjustment (On Units with a Support Bracket)
- (a) With the function, spacing, line feed and type box clutches latched in the stop position, hook a 12 lb. scale under the trip shaft next to the anti-deflection plate, pull perpendicular to the adjusting plate. It shall require 1 to 5 lbs. to move the shaft away from the adjusting plate.
 - (b) To Adjust: Position the plate against the trip shaft with the plate mounting screws friction tight.
- (18) Spacing Clutch Trip Lever Adjustment
- (a) Place the spacing clutch in the stop position. Trip the trip lever and slowly rotate the main shaft until the trip lever is aligned with the shoe lever. Take up the play of the shoe lever inward by snapping the trip lever over the shoe lever. Measure and record the clearance between the clutch drum and the shoe lever. Repeat for each of the other two stops. Place the spacing clutch in the stop position at the shoe lever farthest from the drum. The clearance between the trip lever and the clutch drum shall measure .018 to .035 less than the clearance between the drum and the shoe lever. There shall be some "overbite" on all three stop lugs as gauged by eye.
 - (b) Adjust by means of the trip lever clamp screw.
- (19) Line Feed Clutch Trip Lever Eccentric Post Adjustment
- * (a) With the line-feed clutch in the stop position, trip the trip lever and slowly rotate the main shaft until the trip lever is aligned with the shoe lever. Take up the play of the shoe lever inward by snapping the trip lever over the shoe lever. Measure the clearance between the clutch drum and the shoe lever and record. Place the line-feed clutch in the stop position at the shoe lever closest to the clutch drum.
 - **1. For three-stop clutch, the clearance between the trip lever and clutch drum shall measure .018 to .035 less than the clearance between the drum and the shoe lever.
 - **2. For six-stop clutch, the clearance between the trip lever and clutch drum shall measure .012 to .025 less than the clearance between the drum and the shoe lever.
 - (b) To Adjust: Back off the trip lever adjusting screw and position the trip lever eccentric stop post.
- (20) Line Feed Clutch Trip Lever Adjusting Screw Adjustment

- (a) With the function slide arm in its rear position and with the clutch trip lever against its eccentric stop, hold the trip arm against its function slide arm. There shall be some clearance, .002 to .006 between the end of the trip lever adjusting screw and the trip arm.
 - (b) To Adjust: Position the adjusting screw.
 - ** (c) There shall be at least .004 clearance between the line-feed trip lever and all the line-feed clutch shoe levers when form-out and vertical tab is selected.
 - ** (d) To Adjust: Check and refine, if necessary, the following adjustments.
 - **1. Function Reset Bail
 - **2. Line-Feed Clutch Trip Lever Eccentric Post
 - **3. Line-Feed Clutch Trip Lever Adjusting Screw
 - **4. Form-Out and Vertical Tab Mounting Bracket
- (21) Type Box Clutch Trip Lever Eccentric Post Adjustment
- (a) With the type box clutch in its stop position the trip lever shall engage the clutch shoe lever by the full thickness of the shoe lever.
 - (b) To Adjust: Position the trip lever eccentric post.
- (22) Type Box Clutch Trip Lever Trip Arm Adjustment
- (a) With the clutch trip shaft cam follower on the lowest surface of the cam in the code bar clutch unit, the type box clutch trip lever inner face should clear the clutch disc stop arm outer face by .030 to .065.
 - (b) To Adjust: Position the trip lever trip arm on the trip shaft by means of its clamp screw. When making this adjustment, position the trip arm on the shaft so that the type box clutch latch lever has some side play, not more than .008.
- (23) Clutch Shoe Lever Adjustment
- (a) With the clutch stop lever engaged (clutch released), measure the gap between the clutch shoe lever and the clutch stop lug. Trip the clutch and rotate the clutch until the clutch shoe lever is toward the bottom of the unit. Align the head of the clutch drum mounting screw with the clutch stop lug. In order to seat the clutch shoes against the drum, compress the shoe lever against the clutch stop lug and allow the two members to snap apart. There shall be .005 to .085 greater gap between the clutch shoe lever and clutch stop lug than obtained with the clutch stop lever engaged.

NOTE: On multiple stop clutches measure the clearance at the stop lug which is adjacent to the notch in the clutch adjusting plate.
 - (b) To Adjust: Loosen the two clamp screws in the clutch disc and rotate the adjusting plate by engaging a wrench or screwdriver on the adjusting plate extension.

NOTE: After making the above adjustment, it is necessary to determine that the clutch shoes do not drag against the drum when the clutch is released. Engage the clutch stop lever (clutch released) and remove the drum screw and lockwasher so that the drum is free to rotate. Rotate the drum slowly in the normal direction of rotation. There should be no drag on the drum.

- (c) If necessary, refine the above adjustment towards the maximum clearance to meet the requirement.
 - (d) Replace the drum mounting screw and lock washers.
- *(24) Clutch Drum Position Adjustment (Except Selector)
- (a) Each clutch unit should have some end play, not more than .015, checked with the clutch shoe lever held in the disengaged position.
 - (b) Adjust by positioning the clutch drum on the main shaft by means of the drum mounting screw and the spacing clutch set collar by means of its mounting screws.
- *(25) Spacing Gear Clearance Adjustment
- (a) There shall be a minimum backlash without binding in the spacing gears.
 - (b) Adjust by means of shims between the spacing shaft bracket and the front plate inserting shims at the upper mounting screw to increase the clearance and at the lower mounting screw to decrease the clearance.
- *(26) Spacing Gear Phasing Adjustment
- (a) With the spacing clutch in its stop position the index line on the spacing pawl shall be between the two lines on the pawl retaining washer.
 - (b) To Adjust: Hold the pawls in the position specified and engage the spacing shaft gear with the clutch gear so that the spacing shaft gear mounting screw hole is in line with the tapped hole in the spacing shaft.
- *(27) Line Feed Clutch Gear Phasing Adjustment
- (a) With the line feed clutch in its stop position, both line feed pawls shall be engaged with the platen gear.
 - (b) To Adjust: Position the line feed clutch in its stop position, loosen the pawl assembly bearing post and mesh the pawl gear with the clutch gear so that both pawls are engaged with the platen gear.
- *(28) Rocker Shaft Left Hand Bracket Adjustment
- (a) The rocker shaft left hand bracket shall be firmly seated against the inner bearing race on the rocker shaft.
 - (b) To Adjust: Hold the rocker shaft in its extreme left hand position and position the bracket against the inner bearing race by means of its two mounting screws.

(29) Rocker Shaft Bracket Eccentric Stud Adjustment

- (a) Before making this adjustment position the left and right vertical eccentric links so that the dot on the eccentric faces the rear of the unit.
- * (b) Place the type box clutch in the stop position. With the play of the locking roller arm taken up toward the front of the unit, there shall be .055 to .090 clearance between the lower surface of the locking roller and the shoulder of the locking lever. The rocker shaft drive link bearing stud shall be free in its bearing when the type box clutch is in the stop position and when it is rotated 180°.
- * (c) To adjust, position the eccentric stud in the lower end of the rocker shaft left hand crank arm, keeping the "dot" (offset of the eccentric) below the center line of the drive link. Check that the rocker shaft drive link bearing stud is free in the type box clutch bearing when the clutch is in the stop position and when it is rotated 180° by moving the drive link parallel to the main shaft. Refine the adjustment if necessary.

NOTE: Any change in this adjustment, after making related adjustments, will require rechecking the following adjustment.

1. Horizontal positioning drive linkage bearing posts.
2. Vertical positioning lever eccentric studs - right and left.
3. Vertical positioning lock lever extensions - right and left.
4. Ribbon feed lever stop bracket - right and left.
5. Function stripper blade arms - right and left.
6. Spacing clutch trip lever bail cam plate (if used).
7. Printing track.
8. Printing arm.
9. Reversing slide extension adjustment.
10. Ribbon reversing pinions.

(30) Right Hand Vertical Positioning Lever Eccentric Stud Adjustment

- (a) With the type box clutch in its stop position and the common code bar in its spacing position there shall be .030 to .050 clearance between the toe of the right hand vertical positioning lever and the bottom of the common code bar.

- (b) To Adjust: Position the eccentric stud in the rocker shaft bracket with the offset toward the rear.

NOTE: When measuring the gap, take up the play in the common code bar by pressing downward on the code bar adjacent to the code bar guide block, to make the clearance a minimum.

(31) Left Hand Vertical Positioning Lever Eccentric Stud Adjustment

- (a) The right and left vertical positioning levers should buckle equally within .006.
- (b) To check, with the common code bar in its spacing position trip the type box clutch and rotate the main shaft until the toe of the right hand vertical lever touches the common code bar and buckles the lower lever by approximately .008. The left hand lever should be buckled equally within .006.
- (c) To Adjust: Position the eccentric post on the inner arm of the rocker shaft left hand bracket with the eccentric off-set toward the rear.

(32) Vertical Position Lock Lever Extension Adjustment

- (a) With the letters combination set up in the code bars and the main side lever at the upper end of its travel and the vertical positioning lock lever fully engaged with the vertical slide projection at the lower surface, the surface of the follower arm rear extension and the bent over ear on the main side lever shall be in contact or separated by not more than .004.
- (b) The vertical surface in the notch of the vertical positioning lock lever should be in contact with or within .012 of the rear surface of the vertical slide projection.

NOTE: When checking these clearances, take up the play in the left and right vertical positioning lever assemblies individually by using a 32 oz. scale, applying 8 oz. tension in an upward direction between the two mounting screws of the type box track.

- (c) Adjust both the right and left lock lever extensions by means of their clamp screws.

(33) Spacing Clutch Trip Lever Bail Cam Plate Adjustment (if used)

- *(a) With the spacing clutch stop lever trip arm in its upward position and with the type box clutch rotated through approximately half its cycle disengage all function pawls from their function bars. There shall be .010 to .040 clearance between the top surface of the clutch stop lever trip arm extension and the shoulder of the trip lever.
 - (b) To Adjust: Position the cam plate on the rocker shaft by means of its mounting screws. The forward edge of the cam plate shall be parallel to the square shaft.
- (34) Function Reset Bail Adjustment

- (a) Rotate the function clutch so that the clutch disc stop lug is toward the bottom of the unit, with the function pawls unlatched from their function bars, there should be from .018 to .035 clearance between the front edge of the function bar and the edge of the bail blade when the function bar is held in its maximum rearward position. Measure this clearance on all function bars located in Slots 1, 4, 11, 18, 23, 33, 38, and 41 of the function box.

NOTE: In event a function bar is not located in the above mentioned slot, select the closest function bar, or in event there are bars located on both sides of slot, select the one with the higher number.

- (b) To Adjust: Position the blade on the function bail with the mounting screws friction tight.
- *(c) With each function lever held in its maximum rearward position, the associated function pawl should overtravel its function bar with not less than .002 clearance when pulled with a tension of not more than 32 ounces. All slot arrangements which are of the latching type variety must latch under manual operation. To check, select each latching arrangement code individually, rotate the main shaft and observe the latching of the latch on its associated function lever. If necessary, refine within the .018 to .035 clearance to meet this requirement.

*CAUTION: Manually operate each function lever to its maximum rearward position with a tension of no more than two pounds to prevent parts distortion. Do not latch more than one pawl at a time because function bail loads affect pawl overtravel. The carriage return lever clamp screw should be loose unless the carriage return lever adjustment has been made.

- (d) In order to latch the function pawls it will be necessary to lower the stripper blade. Rotate the function clutch until the clutch disc stop lug is toward the bottom of the unit. Strip off any function pawls which may have been selected.

(35) Reversing Slide Stud Adjustment

- (a) With the type box clutch in its stop position and the sixth code bar from the top in its spacing position the reversing slide detents shall be fully seated with the slide in its right hand position.
- (b) With the sixth code bar in its marking position the reversing slide detents shall be fully seated with the slide in its left hand position.
- (c) To Adjust: Position the reversing slide stud by means of its clamp nut.

(36) Reversing Slide Bracket Adjustment

- (a) With the type box clutch, code bar clutch, and the function clutch in the stop position, move the reversing slide toward the right and left through its full motion. The right motion shall buckle the left horizontal positioning linkage and the left motion shall buckle the right horizontal positioning linkage. The amount of buckling shall be .035 to .050 gauged between the lower edge of the inner link and the upper surface of the outer link stop extension.

NOTE: Gauge at point of maximum clearance.

- (b) To Adjust: Position each reversing slide extension by means of its mounting screw.

(37) Horizontal Positioning Drive Linkage Bearing Posts Adjustment

- *(a) With the type box clutch in its stop position and the code bars in the spacing position the clearance between the longest horizontal stop and the positioning linkage slides shall be .090 to .110 and the clearance at the two sides shall be equal within .008, checked with the positioning linkage in its straight position. Move the reversing slide to its right and left position to check both sides.

- *(b) To Adjust: Loosen the two screws in the drive linkage bearing posts and the two screws in the bearing posts tie bar. With the reversing slide in its right hand position locate the right hand bearing post so that there is a clearance of .095 to .105 between the longest horizontal stop and the right hand positioning lever slide. Tighten the two screws in the bearing posts tie bar. (Do not tighten the bearing posts mounting screws). Move the reversing slide to its left hand position and check the clearance between the longest horizontal stop and the left hand positioning lever slide. Equalize the clearance at the right and left positioning lever slides within .008 by moving the two bearing posts as a unit. Tighten the two screws which mount the bearing posts. The horizontal positioning mechanism must be free of "jams" or "binds". The mechanism is said to be "free" if the typebox clutch disc has "some movement" in the normal direction of rotation in the "stop position."

NOTE: Check to see that each positioning linkage returns freely to its straight position after buckling. Recheck the reversing slide extensions adjustment.

(38) Shift Link Bracket Position Adjustment (Preliminary) -
(See Figure 7)

- (a) With the code bar and type box clutches in the stop position, the clearance between the shift breaker slide and the pad on the shift link shall be .030 to .050 with the link in the buckled position and the shift breaker slide pushed upwards against its stop. The clearance at the two sides shall be equal within .010
- (b) To Adjust: Position the shift link mounting brackets up or down by means of the play in the mounting holes.

(39) Shift Rocker Lever Bearing Bracket Adjustment (See Figure 7)

- (a) With the code bar and type box clutches in the stop position, raise the right end of the shift rocker lever to its uppermost position holding the right shift breaker slide against its stop. Check that the left shift link is straight and hold the left shift breaker slide against the shift link pad. There shall be .050 to .070 clearance between the shift rocker lever and the lower end of the left shift breaker slide. Check the right side in a similar manner.

*(b) To Adjust: Position the shift rocker lever bearing bracket with its clamp screw loosened friction tight.

*(40) Shift Rocker Lever Adjustment (See Figure 8)

*(a) With alternate left and right shift selections made and with the shift drive pawl operating bail cam follower on the high dwell portion of its cam, the clearance between the raised end of the shift rocker lever and the lower end of its associated shift breaker slide when the slide is held against its stop shall be equal within .010 with the clearance on the opposite when that side is selected.

*(b) To Adjust: Loosen the shift rocker lever clamp screw friction tight and position the shift rocker lever. Tighten the clamp screw.

*(41) Shift Drive Pawl Operating Bail Adjustment (See Figure 8)

*(a) With the shift drive pawl operating bail cam follower on the high dwell portion of its cam, there shall be some to .015 clearance between the shift rocker bail and the lower end of the raised shift breaker slide when the slide is held against its stop.

*(b) To Adjust: Position the operating bail cam follower arm by means of its clamp screw. Recheck the shift rocker lever adjustment.

*(42) Shift Drive Pawl Guide Bracket Adjustment (Figure 10)

(a) Requirement

1. Code bar clutch disengaged, cam follower spring removed. Movement of its operating bail should cause the shift drive pawl to move freely in its guide bracket throughout its entire travel. Clearance between the shift drive pawl and the bottom of the slot in its guide bracket should be "some to .010" inch.

(b) To Adjust

1. Position the shift drive pawl guide bracket with its clamp screw and clamp nut loosened friction tight. Recheck after bracket is retightened.

*(43) Shift Selector Arm Bell Crank Adjustment (Figure 11)

(a) Requirement

- * 1. Shift push lever marking position (toward front) selector clutch and code bar clutch disengaged. The shift pawl should clear, by some to .008 the end of the shift drive pawl bearing post.

(b) To Adjust

- 1. Loosen the shift selector arm bell crank clamp screw friction tight, and position to meet the requirement.

(44) Oscillating Rail Slide Position Adjustment

- (a) Locate the spacing cut-out arm and the automatic CR-LF arm (if used) in their maximum counterclockwise position on the spacing drum. With the spacing clutch in its stop position and the spacing pawl which is farthest advanced engaged with the shoulder of the tooth which is immediately above the cut-away section in the ratchet, the right end of the oscillating rail slide should clear the edge of the pulley by .025 to .050.

NOTE: Factory use only - clearance measured at the closest point.

- (b) To Adjust: Position the slide with the cable clamp screws loosened.

(45) Carriage Cables Adjustment

- (a) There should be at least .006 clearance between the carriage return latch bearing post and the lower cable. The cable should clear the lower edge of the left hand horizontal position bell crank operating link not less than .030 when the horizontal mechanism drive bail is in its lowest position.
- (b) To Adjust: Return the carriage to its left hand position. Loosen the cable equalizing clamp screw only about 1 turn. Position the printing carriage cable pulley bearing studs, by means of their mounting screws, to meet the requirement. Check to see that the cable has moved around its equalizing clamp to assume an equalized position, gauge by feel. Tighten the clamp screw.

(46) Carriage Return Spring Adjustment

- (a) With the spacing drum in its returned position and the printing bail in its extreme lower position, hold the spacing pawls, the buffer slide, and the carriage return latch so that they do not interfere with the spacing drum. Remove the lower cable roller spring. Apply the pull end of a 4 lb. scale to the ratchet drum teeth and pull tangent to the drum. It shall require 3-1/2 to 4 lbs. to start the ratchet drum moving.

- (b) To Adjust: Loosen the nut on the front end of the spring drum bearing post and position the spring.

*(47) Printer Carriage Lower Roller Adjustment

- *(a) Loosen the lower screw nut about 1/6 turn. Rotate the eccentric so that the carriage vertical play on the track is minimum without binding. Tighten the nut.

NOTE: The offset side (chamfered corner) of the eccentric should be toward the right side of the printer.

*(48) Carriage Return Latch Adjustment

- (a) With the carriage fully returned and the play in the carriage return bail taken up by holding the right side of the bail against its tru-arc retainer, there should be .004 to .040 clearance between the right hand side of the carriage return lever and the left hand edge of the carriage return latch.
- (b) To Adjust: Position the latch bail plate by means of its clamp screw.

*(49) Carriage Return Lever Adjustment

- (a) There shall be .006 to .035 clearance between the shoulder on the carriage latch and the top of the carriage return lever extension when the carriage return function pawl is hooked over its function bar and the spacing drum is held so the carriage return latch is in its latched position.
- *(b) To check, rotate the function clutch until the clutch disc stop lug is toward the bottom of the unit.
- (c) To Adjust: Position the carriage return lever on its bail by means of the lever clamp screw.

*(50) Dashpot Vent Screw Adjustment

- (a) The type carriage shall return from any length of line without bouncing; that is, when a printer is operated from automatic transmission at any speed with one carriage-return and one line-feed signal between lines, the first character of each line shall be printed in the same location (gauged by eye) as it would be if the unit were operated slowly in manual operation.
- *(b) To Adjust: On dashpots with dual vent holes at the end of the cylinder, turn the vent screw down until a slight pneumatic effect is perceptible. Back off the screw until the effect disappears. Then back the screw off an additional 1/4 turn and lock the screw with the lock nut. On dashpots with a single vent hole at the end of the cylinder, back the screw off one full turn instead of 1/4 turn.

*(51) Printing Carriage Position Adjustment

- *(a) With the type box in the "Letters" position and the printing carriage in the approximate mid-point of its track set up a combination which will position the print hammer in the upper left corner of the type box and rotate the printer shaft so the type box is in the printing position. Locate the printing carriage by means of its cable so that the printing hammer is in alignment with the type pallet in the upper left corner. Tighten the cable clamp screws.

NOTE: Play in the type box carriage should be taken up alternately in each direction and the print hammer set at approximately the center of this play.

*(52) Oscillator Shift Linkage Adjustment (Final)

- (a) With the type box in position to print the upper left corner character at the mid-point of the platen, shift the type box to the "Figures" position. The proper type pallet should align with the print hammer.
- (b) To Adjust: Position the oscillator left hand shift link bracket by means of its two clamp screws. With the printer operating alternating characters (see note), refine the adjustment for correct alignment if necessary.

NOTE: Play in the type box carriage should be taken up in both directions and the print hammer set to approximately center of this play. Gauge by eye.

*NOTE: On 6 level units use "M" and "."; on 8 level IBM coded units use "A" and "I"; on fielddata coded units use "B" and "&"; on ASA coded units use "&" and "C".

*(53) Printing Hammer Bearing Post Adjustment

- (a) With the type box in the upper left corner of the figures field and the print hammer in contact with the type pallet, the face of the hammer should fully be on the end of the type pallet.
- (b) To Adjust: Add or remove shims between the shoulder on the hammer bearing post and the stop bracket. When checking take up the play in the hammer operating bail downward, on the post.

(54) Printing Track Adjustment

- (a) With the printing bail in its maximum down position hold the printing bail latching extension left face in line with the latch shoulder. The front of the latching extension on the hammer, operating bail should clear the rear surface of the latch by .015 to .040.
- (b) To Adjust: Set up the lower case "blank" selection and position the printing bail by means of its two mounting screws. The clearance shall be checked when the printing arm slide on the lower end of the print arm of the print hammer carriage is positioned over the left hand printing bail mounting screw, and also when the guide block slide is positioned over the right hand printing bail mounting screws.

(55) Print Hammer Stop Bracket Adjustment

- (a) With the print hammer in the upper left type box position and with the printing bail in its maximum downward position, place the push end of an 8 ounce scale to the print hammer stop bracket at the base of the spring ear form and apply a pressure of 8 ounces toward the platen.
- * (b) There should be .005 to .020 clearance between the print hammer and the type pallet at the end of the platen which has the least clearance.
- (c) To Adjust: Position the stop bracket by means of its mounting screw.

(56) Printing Carriage Lever Arm Adjustment

- (a) With the print carriage near the middle of the platen, print hammer operating bail spring bracket in its No. 1 position, the printing bail in its maximum down position and the print hammer bail against the stop, there should be some clearance, not more than .015 between the hammer bail forward extension and the carriage lever arm.

- (b) Adjust the arm by means of its mounting screws. When checking hold the play in the carriage lever to make the clearance maximum.

NOTE: With the printing bail in its upper position, the hammer operating bail extension should over-travel the latch shoulder by at least .006. If necessary, refine the adjustment to meet this condition. Check both right and left positions.

(57) Print Hammer Operating Bail Spring Adjustment

- (a) Position the bracket in Notch 1 for printing one to three copies, Notch 2 for four and five copies, and Notch 3 for six or more copies.

(58) Left Hand Margin Adjustment (Friction Feed Mechanism Only)

- (a) With the type box clutch in the stop position, the spacing drum in its returned position, and the type box shifted to the "Letters" position, the center of the "LETTERS" print indicator on the type box should be "xx" (See NOTE 1 of Figure 9) plus or minus 1/16 from the left edge of the platen. On spacing drums equipped with a pivot-type stop arm the range of adjustment available is from 0 to 1 inch from the left edge of the platen. On spacing drums equipped with ring-type stop arms the range of adjustment is any length line up to 85 characters. (Average position of left edge of 8-1/2" paper is normally 1/8" in from edge of platen.)

- (b) To Adjust: Position the stop arm on the spacing drum by means of its clamp screws.

- *(c) With the spacing clutch in the stop position, the front spacing pawl farthest advanced, the dashpot arm fully operated, and the play of the spacing gear pinion taken up in a clockwise direction, there shall be from some to .008 clearance between the pawl and the shoulder of the ratchet tooth immediately ahead. Check the rear pawls when it is farthest advanced to see that it drops in and bottoms in the ratchet.

- (d) To Adjust: Refine paragraph (b) of this adjustment.

(59) Left Hand Margin Adjustment (Sprocket Feed Mechanism Only)

- (a) With the type box clutch in the stop position, and the type box shifted to the "Letters" position, the center of the "LETTERS" print indicator on the type box should be "xx" inch. (See NOTE 1 of Figure 9) plus or minus 1/16

to the right of the centerline of the sprocket pins in the left hub. The range of adjustment is any length line up to 85 characters.

- (b) To Adjust: Position the stop arm on the spacing drum by means of its clamp screws.
 - *(c) With the spacing clutch in the stop position, the front spacing pawl farthest advanced, the dashpot arm fully operated, and the play of the spacing gear pinion taken up in a clockwise direction, there shall be from some to .008 clearance between the pawl and the shoulder of the ratchet tooth immediately ahead. Check the rear pawl when it is farthest advanced to see that it drops in and bottoms in the ratchet.
 - (d) To Adjust: Refine paragraph (b) of this adjustment.
- (60) Spacing Cut-Out Transfer Bail Set Collar Adjustment (For Units Equipped with Spacing Cut-Out Lever Bail Set Collar)
- (a) If necessary locate the carriage so that the spacing cut-out lever is not engaged. With the play in the spacing cut-out transfer bail and lever taken to the right so that the bail is against the tru-arc. There shall be some to .008 clearance between the set collar and the spacing cut-out lever.
 - (b) To Adjust: Move the set collar by means of its clamp screw.
- (61) Right Hand Margin Adjustment (For Units Equipped With Individually Adjustable Cut-Out Arms)
- (a) With the type box clutch in the stop position the carriage in position to print the "xx" character, (See NOTE 1 of Figure 9) and the front spacing pawl farthest advanced, there should be a clearance of .006 to .025 between the upper edge of the spacing cut-out arm and the spacing cut-out lever when the cut-out lever is held in its maximum upper position. On units containing the two piece spacing cut-out bail (separate spacing cut-out lever with spring) it will be necessary to hold the spacing cut-out bail towards the rear of the unit by pushing through the hole in the front plate.
 - (b) To Adjust: Position the spacing cut-out arm on the spacing drum by means of the clamp screws.

NOTE: On units equipped with a pivot-type arm, the range of adjustment is from 65th to 85th character. On units equipped with a ring-type cut-out arm, the range of adjustment is any length line up to 85 characters

- (c) On units equipped with a ring-type automatic carriage return-line feed trip arm spacing cut-out lever combination, the spacing cut-out is automatically present two characters after the automatic carriage return-line feed setting, and therefore, is not adjustable.

*(62) Type Box Alignment Adjustment (For Units Equipped With a Type Box Carriage Assembly Containing an Adjustment Screw)

- (a) The printed impression at the top and bottom of the characters should be equal, gauged visually.
- (b) To Adjust: Position the type box carriage so that the adjustment screw and lock nut (located directly below the type box) are accessible and loosen the nut.

NOTE: Recheck the Print Hammer Stop Bracket Adjustment and readjust if necessary.

- (c) Operate the printer, repeating the characters "E-Z". Turn the screw in or out (in steps of about 1/4 turn only for each trial) to meet the requirement. Turn the screw in to increase the impression at the bottom of the character. Turn the screw out to increase the impression at the top of the character. Tighten the lock nut.

*(63) Ribbon Reverse Spur Gear Adjustment

- (a) With the right hand ribbon reversing lever in its maximum down position and left hand ribbon reversing lever should be in its maximum up position
- (b) Adjust by means of the spur gear mounting nuts after loosening the set screws in the ribbon reverse detent cam. Loosen the left hand spur gear nut. Securely tighten the right hand spur gear nut. Move the right hand ribbon reversing lever in its maximum up position and tighten the left hand spur gear nut.

NOTE: With the type box clutch rotated 1/2 revolution and the right hand ribbon reversing lever in its upper position, manually move the right ribbon lever under the ribbon reversing lever. There shall be some clearance between the lower surface of the ribbon reversing lever and the upper surface of the ribbon lever. Check the left side in a similar manner. Refine the adjustment if necessary.

*(64) Ribbon Reverse Detent Adjustment

- (a) With the link buckled in the downward position, there shall be some to .055 clearance between the detent link and the detent lever when the play is taken up lightly toward the right side of the printer.
- (b) To Adjust: Hold the left ribbon reversing lever in its maximum downward position and tighten the detent assembly upper set screw. Buckle the toggle link upward and tighten the lower set screw.

*(65) Ribbon Feed Lever Bracket Adjustment

- (a) Left hand unit: With the left hand ribbon reverse lever in its maximum upper position and the ribbon unit in its maximum upper position, hold the ratchet against the detent lever. There should be .015 - .035 clearance between the front face of the feed lever and the shoulder of a tooth in the ratchet. To adjust, position the feed lever bracket by means of its mounting screws.
- (b) Right hand unit: Move the right hand ribbon reverse lever in its maximum upper position and make the adjustment in the same manner as specified for the left hand unit.

NOTE: Rotate the printer shaft. The ratchet should step one tooth only on each cycle of operation. If necessary, refine the adjustment to meet this requirement.

*(66) Line Feed Spur Gear Detent Eccentric Adjustment

- (a) With the line feed clutch in its stop position rotate the platen by means of the manual paper feed hand wheel so that the detent is seated between two teeth in the platen gear. Manually seat the line feed bars into complete engagement with the line feed spur gear. The detent shall contact one gear tooth and contact or have not more than .010 clearance between the adjacent gear tooth.

- (b) To Adjust: Position the detent eccentric bushing keeping the high side of the eccentric above the center of its mounting screw.

*(67) Stripper Blade Cam Position Adjustment

- (a) The stripper blade cam shall move the stripper blade arm an equal amount in both the upward and downward directions.
- (b) To Adjust: Loosen the screws which mount the drive arm to the function clutch. With the function clutch in the stop position, observe the overtravel of the peak of the cam with respect to the peak on the arm. Check this overtravel on the lower part of the cam when the clutch is rotated so the cam has turned as far as it can to move the arm downward. Equalize the overtravel (gauged by eye) by using the screwdriver adjustment on the link. Tighten the mounting screws.

*(68) Automatic Carriage Return-Line Feed Trip Arm Adjustment
(For Units Equipped With Automatic CR-LF Mechanism)

- *(a) With the type box clutch in the stop position, the front feed pawl farthest advanced and the carriages positioned two spaces before the desired character (See NOTE 1 of Figure 9) there should be .040 to .055 between the leading edge of the trip arm and the code bar operating bell crank.
- (b) To Adjust: Position the automatic carriage return-line feed trip arm by means of its mounting screws.

NOTE: On units equipped with a pivot type arm, the range of adjustment is from the 65th to the 85th character. On units equipped with a ring type trip arm, the range of adjustment is any length line up to 85 characters.

*(69) Platen End Play Adjustment (Sprocket Feed Only)

- (a) With the line feed pawls disengaged, the platen shaft should have some end play, maximum .010 inches.
- (b) To Adjust: Loosen the 151346 Screw and position the 153692 Gear on the platen shaft. Tighten the screw.

(70) Sprocket Hub Adjustments (For Sprocket Feed Mechanisms Only)

(a) Parallelism Adjustment

1. The printing line should be parallel to a line drawn perpendicular to the edge of the paper within $1/32$ inch.
2. To adjust, loosen the right sprocket hub clamp screw. Position the hub.

(b) Sprocket Pin Separation Adjustment

1. Place a single sheet of sprocket feed paper on the platen. The sprocket pins should be centrally located in the feed holes.
2. To adjust, position the right hub. Tighten the hub clamp screw.

NOTE: Adjustments (a) and (b) are directly related; therefore, both should be checked before tightening the clamp screw.

(c) Printing Line Position Adjustment

1. The bottom of the printing line shall be $1/32 \pm 1/64$ above a horizontal line even with or a multiple of $1/6$ inch from the bottom of any left sprocket hole.
2. To Adjust: Loosen the left gear cam retaining screws. Position the platen and tighten the screws.

** NOTE: This adjustment is a function of the type of form and the location of the first printed line; therefore, the tolerances are field limits and need not be held in the factory.

(71) Paper Straightener Collars Adjustment (For Friction Feed Mechanisms Only)

- (a) The left hand paper straightener collar shall be spaced $9/32$ to $21/64$ from the left shoulder on the shaft. The right collar shall be spaced $1/16$ to $5/64$ from the right shoulder on the shaft.

- (b) To Adjust: Position the collars on the shaft by means of their set screws.
- (72) Paper Fingers Adjustment (For Friction Feed Mechanisms Only)
- (a) Position the paper fingers on the shaft so that the pressure end of the fingers overlaps the paper by $3/8$ to $1/2$ inch.
- (73) Front Guide Bracket Adjustment (For Sprocket Feed Mechanisms So Equipped)
- (a) The sprocket pins should be centrally located in the paper slots.
- (b) To Adjust: Loosen the mounting arm clamp screws. Bring the guide bracket against the platen and locate horizontally so that the pins are in the center of their respective slots.
- (c) The gap between the platen and the front guide bracket should be:

<u>Stapled Copy</u>	<u>Unstapled or Single Copy</u>
Min. .050	.020
Max. .105	.060

** NOTE: It is desirable to have the clearance at the minimum which will pass the stationery freely. This minimum is dependent upon the type of paper, number of copies, stapling, etc.

- (d) To Adjust: Rotate the mounting arms about the shaft. Tighten the mounting screws. Adjust while in the latched position.

NOTE: Adjustments (a) and (c) are directly related; therefore both should be rechecked before tightening the clamp screws.

(74) Paper Finger Adjustment - Right and Left (For Sprocket Feed Mechanism So Equipped)

- (a) The sprocket pins should be centrally located in the paper finger slot.
- (b) To Adjust: Loosen the mounting arm clamp screws. Bring the paper finger against the platen and locate it horizontally so that the pins are in the center of the paper finger slot.
- *(c) The gap between the platen and the paper finger extensions should be:

<u>Stapled Copy</u>	<u>Unstapled or Single Copy</u>
Minimum .050	.020
Maximum .150	.060

NOTE: It is desirable to have the clearance at the minimum which will pass the stationery freely. This minimum is dependent upon the type of paper, number of copies, stapling, etc.

- (d) To Adjust: Rotate the mounting arms about the shaft, while in the latched position. Tighten the mounting screws.
- (e) There shall be a minimum of .035 inch clearance between the ribbon guide and the leading edges of the paper fingers and both right and left paper fingers must be parallel to the same printed line as gauged by eye.
- (f) To Adjust: Select "Rub Out" combination and rotate the type box clutch one-half revolution and position the paper fingers by means of the elongated mounting holes. Tighten the mounting screws.

NOTE: Adjustments (a), (c) and (e) are directly related; therefore, the three should be rechecked after tightening the clamp and mounting screws.

(75) Paper Tray Adjustment (Sprocket Feed Printers Only)

- *(a) The gap between the paper tray and the platen should be:

<u>Stapled Copy</u>	<u>Unstapled or Single Copy</u>
Minimum .050	.020
Maximum .150	.060

NOTE: It is desirable to have the clearance at the minimum which will pass the stationery freely. This minimum is dependent upon the type of paper, number of copies, stapling, etc.

- (b) To Adjust: Loosen the rear mounting screws friction tight and position the paper tray. Tighten the screws.

- (76) Code Bar Detent Adjustment
- (a) With the front plate removed and all the clutches in the stop position, the suppressor and shift code bars should detent approximately equal as gauged by eye.
 - (b) To Adjust: Equalize the detenting by adding or removing shims between the detent casting and the code bar bracket.
- (77) Margin Contact Cam Plate Adjustment (Preliminary)
- (a) Place the typing unit on a keyboard and set the type box carriage in position to print the "xx" character. (See NOTE 1 of Figure 9) Rotate the cam plate so that the margin indicator lamp circuit just breaks at this point. Tighten the cam plate screws. Operate the printer from the keyboard and check to see that the margin indicator lamp lights within ± 2 characters of character specified. If necessary, refine the adjustment to meet this requirement. Range of adjustment is from the 5th to 85th character.
- (78) Upper Solenoid Adjustment (See Figure 12, if used)
- (a) With the solenoid held in the energized condition, position the solenoid so that there is a .060 to .080 gap between the solenoid bail stop and the code bar detent housing.

NOTE: Take up play in bail to the left to make this clearance a maximum.
 - (b) To Adjust: Loosen the two solenoid adjusting screws and position the solenoid to the requirement.
 - (c) Apply 110 volts AC to the solenoid. If the solenoid buzzes, the suppression bar is stopped before the solenoid is in its proper energized condition. Refine above adjustment.
- (79) Lower Solenoid Adjustment (See Figure 13, if used)
- (a) With the solenoid in the de-energized condition there shall be a .030 to .070 gap between the clutch suppression arm and the end of the solenoid lever.
 - (b) To Adjust: Loosen the two solenoid adjusting screws and position the solenoid to the requirement.
- (80) Print Suppression Mechanism Adjustment (See Figure 16, if used)
- (a) The blocking lever extensions shall be fully engaged by the associated code bars.
 - (b) To Adjust: Loosen the two mounting screws friction tight and position the print suppression assembly so that the lower blocking lever extension is equally engaged by the #6 and #7 Code Bars as gauged by eye.

- (81) Print Suppression Blocking Levers Adjustment (See Figure 16, if used)
- (a) With the #6 Code Bar marking and the #7 and Suppression Code Bars spacing, the clearance between the blocking levers and the blocking bail blade shall be equal as gauged by eye.
 - (b) To Adjust: Position the eccentric post keeping the high part of the eccentric towards the front of the unit.
- (82) Type Box Clutch Suppression Arm Adjustment (See Figure 16, if used.)
- (a) With the blocking bail in the blocked position, rotate the main shaft until the function clutch shoe lever is opposite the function clutch trip lever. There shall be:
 - 1. At least .003 clearance between the type box clutch trip arm extension and the clutch trip lever.
 - 2. At least .006 clearance between the function clutch shoe lever and the function clutch trip lever.
 - (b) To Adjust: Position the suppression arm by means of its mounting screws.
- (83) Vertical Tabulator Slide Retainer Adjustment (See Figure 17)
- (a) There shall be some, not more than .012, clearance between the vertical tab slide and the retaining edge of the retainer.
 - (b) To Adjust: Move the retainer to its extreme forward position and locate it up or down to satisfy the requirement.
- (84) Mounting Bracket Adjustment (See Figure 18)
- * (a) Select the "Form Out" code combination and rotate the main shaft until the form-out slide is in its forward-most position. There shall be from some not more than .020 clearance between the form-out (inside) blocking lever and the form-out slide when the play in the blocking lever is taken up to make the clearance a minimum.
 - * (b) Select the "Vertical Tab" code combination and rotate the main shaft until the vertical tab slide is in its forward-most position. There shall be at least .002 clearance between the vertical tab slide and the vertical tab blocking (outer) lever when the play in the blocking lever is taken up to make the clearance a minimum.

- (c) To Adjust: Loosen the mounting bracket screws and position the lower portion of the mounting bracket to satisfy both requirements (a) and (b).
- (85) Form Start Gear Play Adjustment (See Figure 18)
- (a) There shall be a barely perceptible amount of backlash between the bakelite idler gear and the form start gear.
 - (b) To Adjust: Position the gear pivot post on its bracket by means of the nut in the center of the handwheel. The gears should re-mesh properly when checked in at least three position, 120° apart.
- (86) Blocking Arm Adjustment (See Figure 19)
- (a) There shall be .005 to .045 clearance between the bottom of the blocking lever and the top of the slide when the follower is on the peak of a stop plate.
 - (b) To Adjust: Trip the line feed clutch and rotate the main shaft until the follower is on the peak of the stop plate and then position the adjustable arm by means of the mounting screws. Make this adjustment for each blocking lever.
- (87) Indexing Disc Adjustment (See Figure 18)
- *(a) With the line feed clutch in its stop position and the stop plate adjacent to the follower there shall be .020 to .040 clearance between the stop plate and the follower. Slack in the idler gear and form start gear shall be taken up to make this gap a minimum.
 - (b) To Adjust: Pull the gear out of engagement with the idler and turn the handwheel clockwise until a stop plate just operates the follower and then engage the first tooth on the idler. Position the disc by utilizing the three mounting screws.
- (88) Transmitter Control Switch Adjustment (See Figure 19)
- (a) Transfer Contact Spring Tension - With the blocking levers in the unoperated position, hook an 8 oz. scale over the long contact spring just above the contact point and pull at right angles to it. It shall require 2 to 3 ozs. to just open the contacts.
 - (b) To Adjust: Bend the long contact spring.

- ** (c) Normally Open Contact Spring Tension (Figure 19) -
With the blocking levers in the unoperated position,
hook an 8 oz. scale over the short contact spring just
above the contact point and pull at right angles to it.
It shall require 1 to 2 oz. to just move the short
contact spring away from the stiffener.
- ** (d) To Adjust: Bend the short contact spring.
- ** (e) Normally Closed Contact Spring Tension (Figure 18) -
With the blocking levers in the operated position,
hook an 8 oz. scale over the short contact spring
just above the contact point and pull at right angles
to it. It shall require 2 to 3 oz. to just move the
short contact spring away from the stiffener.
- ** (f) To Adjust: Bend the short contact spring.
- ** (g) Normally Open Contact Gap (Figure 19) - With the blocking
levers in the unoperated position, there shall be .008
to .012" gap between the normally open contacts.
- ** (h) To Adjust: Bend the stiffener.
- ** (i) Contact Bracket Adjustment (Figure 19) - With the
Form-out blocking lever resting on top of the form-out
slide, there shall be some to .005 clearance between
blocking lever and the insulator tip of the swinger.
- ** (j) To Adjust: Position the contact assembly bracket with
the mounting screws loosened.
- ** (k) Vertical Tab Blocking Lever Arm Adjustment (Figure 19) -
With the Vertical Tab Blocking Lever resting on top of
the slide, there shall be some to .005 clearance between
the blocking lever arm and the insulator pad.
- ** (l) To Adjust: Position the blocking lever arm with the
mounting screw loosened.
- ** (m) Select the "Form-Out" code combination and rotate the
main shaft until the form-out slide is in its forward-
most position and the form-out blocking lever drops
behind the slide. This shall close the normally open
contacts and there shall be min. .008" clearance between
the normally closed contact points. (Figure 18)

- (n) To Adjust: Refine the normally open contact gap adjustment and the contact bracket adjustment.
- (o) Select the "Vertical Tab" code combination and rotate the main shaft until the vertical tab slide is in its forward-most position and the vertical tab blocking lever drops behind its slide. This shall close the normally open contacts and there shall be min. .008" clearance between the normally closed contact points. (Figure 18)
- (p) To Adjust: Refine the normally open contact gap adjustment and the vertical tab blocking lever arm adjustment.

(89) Pointer Adjustment

- * (a) With the line feed clutch in its stop position and the form out stop plate adjacent to the follower (as shown in Figure 18) the pointer on the printer side frame shall line up with the notch in the index disc.
- * (b) To Adjust: Loosen the pointer mounting screw on the printer side frame and position the pointer so it lines up with the notch on the index disc and also clears any stop plate by approximately 1/16".

(90) Form-Out Stop Adjustment

- * (a) A form-out stop plate should be placed in the numbered slots on the index disc corresponding to the length of form to be used.
- * (b) The form-out device may be synchronized with a form by first positioning the form so that the typing unit will print on the first typing line of the form. (See note below.) With the form in this position, pull the form start gear out of engagement with the idler and turn it until the pointer on the printer side frame is lined up with the notch in the index disc. The form start gear is held in engagement with the idler by means of a spring and may be disengaged by pulling the handwheel assembly to the left.

NOTE: When the typing unit is in the stop position, the top of the ribbon guide lines up with the bottom of the printing line.

(91) Tabulation Stop Adjustment

- * (a) The tabulation stops within a form may be synchronized by first positioning the form so the typing unit will print on the first typing line of the form. This procedure is outlined in the form-out stop adjustment. Next, line feed the platen to the desired first printing

line in that form. Place a tab stop plate in the index disc slot which will line up with the follower. In the same manner place tab stop plates in the succeeding desired printing lines within the form. Tab stop plates may be placed on their sides in the index disc slots to nullify undesired printing positions on the form.

(92) Off-Normal Contact Adjustment (Figure 20)

- (a) Short Contact Spring Tension - With the follower lever in the operated position, hook an 8 oz. scale over the short contact spring just above the contact point and pull at right angles to it. It shall require 2 to 3 oz. to just move the short contact spring away from the stiffener.
- (b) To Adjust: bend the short contact spring.
- (c) Long Contact Spring Tension - With the follower lever in the unoperated position, hook an 8 oz. scale over the long contact spring just above the contact point and pull at right angles to it. It shall require 2 to 3 oz. to just open the contacts.
- (d) To Adjust: bend the long contact spring.
- (e) Contact Bracket Adjustment - With the follower lever on the peak of a form-out stop plate, there shall be from .010" to .020" clearance between the contact points.
- (f) To Adjust: position the contact assembly bracket with the mounting screws loosened.
- (g) Follower Lever Adjustment - With the index disc rotated to bring the form-out stop plate one slot away from the operating position (previous adjustment) there shall be from .010" to .020" clearance between the follower lever and the insulator tip.
- (h) To Adjust: Rotate the eccentric post until requirement is met.

(93) Off Line Form Out Solenoid Adjustment - (Figure 21)

- (a) Form-out lever backstop adjustment - With the line feed clutch trip lever against its eccentric post and the form-out lever against the formed extension of the mounting plate, there shall be some to .010" clearance between the trip lever and the form-out lever.

- (b) To Adjust: Loosen the screw which fastens the two parts of the form out lever. Hold the lower end of the form-out lever against the mounting plate extension and position the upper end to meet the requirement. Tighten the mounting screw.
- (c) Solenoid Lever Adjustment (Figures 21 and 22) - When the solenoid plunger is seated, the form-out slide, through the combined motions of the non-repeat slide, form-out lever and form-out bail, shall have moved forward to allow the form-out blocking lever to fall in behind it, and there shall be from .020" to .030" clearance between slide and blocking lever.
- (d) To Adjust: Rotate eccentric screw to meet the requirement. Make this adjustment with the high point of the eccentric guide upwards.
- * (e) Non-Repeat Slide Adjustment - (Figures 21 and 22) - With solenoid plunger seated, the non-repeat slide shall just trip off from its engagement with the form-out lever.
- (f) To Adjust: Rotate the eccentric guide to meet the requirement. The high point of the eccentric shall be towards the front of the machine.

NOTE: This adjustment will insure that the non-repeat slide is stripped out of engagement with the form-out lever before the solenoid plunger is fully seated. It will also reduce the .020 - .030 clearance between the form-out blocking lever and the form-out slide (paragraph (c) above) at the point of stripping. Check that there is at least some clearance at this point.

(94) Low Paper and Paper Out Alarm Adjustment (Sprocket Feed) -
See Figure 23

- (a) Without paper in the unit, the rear ends of the switch operating levers shall be in their lowermost position. The switch plungers shall be depressed and the normally opened contacts shall be closed. The ends of the switch levers shall be within the outline of the typing unit frame.
- (b) With the rear ends of the switch operating levers lifted to the height of the plane of the upper surface of the paper guide, the switch plungers shall be extended and there shall be some clearance between the switch levers and the plungers.

- (c) To Adjust: Loosen the switch mounting plate mounting screws friction tight. Position the plate to meet the requirements. Tighten the mounting screws.
- (95) Paper Out Alarm Assembly Adjustment - Friction Feed (See Figure 24)
- (a) The upper switch shall operate when the paper supply is reduced to approximately 10 to 15 feet on the roll.
- (b) The paper follower bell crank shall operate the upper switch when the follower is 1/4 inch from the flat side of an empty paper spool.
- (c) To Adjust: Loosen the two bracket mounting screws and position the bracket. Tighten the screws.
- (96) Horizontal Tab Operating Lever Link Adjustment (See Figure 25)
- * (a) Rotate the function clutch until the function pawl stripper blade is in its lower position and the function reset bail roller is on the high part of its cam. Pull the horizontal tab function pawl to the rear until latched on its function bar. There shall .005 to .025 clearance between the operating lever extension link and the blocking lever with the play taken up in a manner to minimize clearance.
- NOTE: When pulling the function pawl to the rear, if the operating lever cam plate should be stripped off the tabulator slide arm before the function pawl is latched on its function bar, temporarily disable the cam plate stripper bail arm by loosening its adjusting screw.
- (b) To Adjust: Position the extension link on the operating lever with the mounting stud friction tight.
- (97) Horizontal Tab Operating Lever Cam Plate Adjustment (See Figure 27)
- (a) With the horizontal tab slide arm unoperated and the operating lever against the adjusting screw, there shall be some to .005 clearance between the slide arm and the cam plate.
- (b) To Adjust: Position the adjusting screw. Tighten the lock nut.

(98) Horizontal Tab Spacing Trip Lever Adjustment (Figure 27)

- *(a) With the spacing clutch trip lever arm against its stop and the operating lever against the adjusting screw, there shall be some to .010 clearance between the spacing trip lever and the trip lever arm.
- (b) To Adjust: Loosen the mounting screw and the mounting stud friction tight. With the spacing trip lever riding on the clutch trip lever arm, slowly rotate the operating lever adjusting plate by means of the screwdriver pry slots until the spacing trip lever just falls off the trip lever arm. Tighten the mounting screw and stud.

(99) Cam Plate Stripper Bail Adjustment (Figure 28)

- (a) With the operating lever and the horizontal tab slide arm in their unoperated positions, rotate the spacing clutch until the high part of the restoring cam is opposite the stripper bail. There shall be .010 to .025 clearance between the stripper bail and the high part of the restoring cam.
- (b) To Adjust: Position the stripper bail on the stripper bail arm with the bail arm friction tight.

(100) Spacing Cut-Out Transfer Bail Set Collar Adjustment (See Figure 29)

- (a) The transfer bail shall have some to .008 end play.
- (b) To Adjust: Position the set collar with the adjusting screw loosened.

(101) Right Margin Adjustment (Figure 32)

- (a) There shall be .006 to .025 clearance between the spacing cut-out lever on the spacing drum and the bail extension arm.
- (b) To Check: Place the typebox in position to print character on which spacing cut-out is desired. (See NOTE 1 of Figure 9) Pull forward on part of transfer bail extending below mounting shaft until bail is in fully operated position. Gauge clearance.

- ** (c)** To Adjust: Position cut-out lever with clamp screws loosened.

NOTE: Four screws must be loosened to adjust cut out lever. Do not loosen hex head screw that clamps front ring.

**** (102)** Tabulator Pawl Adjustment Preliminary (Figure 30)

NOTE: Prior to this adjustment, check the following, left margin and spacing gear phasing adjustments.

- ** (a)** Beginning with the 15th slot counterclockwise from the roller on the slotted ring, position tab stops approximately an equal number of slots apart over the remaining length of the printing line. To move stops, hook small sized spring hook in the hole in stop. Pull the tabulator stop straight out from the spacing drum and slide it on the garter spring while continuing to pull it straight out. The spacing drum may have to be rotated manually to facilitate locating stops in some slots.

CAUTION: Check to insure that all stops are fully seated in the slots and not turned sideways.

- ** (b)** With all clutches disengaged and the front spacing feed pawl in lower position, position the pawl adjusting plate at the center of the vertical and horizontal adjustments. To adjust vertically, loosen both right and left screws. To adjust horizontally, loosen only the left screw. The horizontal adjustment is always made after the vertical adjustment.
- ** (c)** Disengage the spacing feed pawls and let spacing drum return to its maximum counterclockwise position. Keeping the spacing clutch disengaged manually, advance the spacing drum until the first stop is immediately to the left of the pawl. Adjust the horizontal position of the pawl adjusting plate so that the tabulator stop is in line with the left edge of shoulder on the pawl. Tighten screws.
- ** (d)** With the blocking lever and operating lever extension link in their unblocked position, disengage spacing feed pawls and let spacing drum move back exactly 2 full spaces. Both spacing feed pawls should be fully

engaged. With the extension link blocked by the blocking lever, gage clearance between slope on pawl and tab stop. Note clearance. Advance drum until next stop is just to the left of the tab pawl. Let spacing drum move back two full spaces. With the extension link blocked by the blocking lever gage note clearance as before. Repeat procedure for the remaining three stops. Note the stop that gives maximum clearance and use this stop as a reference stop for the final vertical and horizontal adjustments.

(103) Tabulator Pawl Vertical Adjustment (Final) (Figure 31)

- * (a) Using the stop with the maximum clearance as determined in the preliminary adjustment, position the spacing drum until this tab stop is opposite the shoulder on the tabulator pawl. With the operating lever extension link blocked by the blocking lever, there shall be .055 to .075 clearance between the tab stop and the tab pawl
- (b) To Adjust: Position the pawl adjusting plate with both screws loosened. Tighten the right screw only using a wrench to hold the bushing from turning.

(104) Tabulator Pawl Horizontal Adjustment (Figures 33 and 34)

- (a) With all clutches in stop position and the front spacing feed pawl in lower position, position the spacing drum so that the tab stop with maximum clearance as determined in the preliminary adjustment is immediately to the left of the pawl. The operating lever extension link should be forward in its unblocked position. Disengage feed pawls and let spacing drum move back one (1) full space. Both feed pawls should be fully engaged. Pull back extension link to blocked position on blocking lever. Trip spacing clutch stop lever and slowly rotate main shaft and spacing clutch until blocking lever is just tripped allowing the extension link to move forward. At this point some portion of the clutch disk stop lug should be aligned with the rear surface of the spacing shaft gear. Take up play in spacing shaft toward rear of unit.
- (b) To Adjust: Condition unit as above. Trip spacing clutch and rotate clutch until the middle of the stop lug is in line with the rear surface of the spacing shaft gear. If blocking lever has tripped too soon, first adjust the pawl adjusting plate to the left until the blocking lever can be placed in the blocked position on the extension link. Slowly move the

adjusting plate to the right, with left screw loosened, until blocking lever just trips. When adjusting for trip off point, care should be taken that the blocking lever is cammed down by the tab stop and not pulled or pushed out of blocked position when prying adjusting plate with screw driver. Recheck trip off point against position of clutch stop lug as before.

NOTE: After obtaining trip off point of blocking lever, continue rotating spacing clutch to its full stop position. The tab pawl should be to the right of the tab stop. When the extension link is moved to the rear, the blocking lever should move to its blocked position. If the tip of the tab pawl should remain on the end of the tab stop, readjust the pawl to the right until there is .003 to .008 clearance between the right surface on the tab stop and the left edge of the pawl tip.

**** (105) Tabulator Stops Settings (Figure 35)**

**** (a)** To move the stops hook a small spring hook in the hole in the stop and pull straight out from the drum. Slide stop on spring while continuing to pull out from drum. Position drum to facilitate moving stops. CAUTION: CHECK TO INSURE THAT ALL STOPS ARE FULLY SEATED IN SLOTS AND NOT TURNED SIDEWAYS.

**** (b)** Columnar Tabulator Stops: Place carriage in position to print first character in column. Insert stop in slot immediately to left of tabulator pawl. To facilitate installation, mark the desired slot position then rotate drum to a more accessible position. For slots near the left margin, count the number of space operations from the left margin and place stop in corresponding slot number beginning with slot No. 1 just to right of roller.

NOTE: When printing forms, check stop settings with relation to columns. Corresponding stops on all machines connected in a circuit must be the same number of spacing operations from left margin.

**** (c)** Right Margin Tabulator Stop (With Wide Shelf)

NOTE: Prior to this adjustment check the right margin and tabulator pawl adjustments. Position printing carriage at right margin (spacing cutout operated). Insert stop with wide shelf in slot immediately to left of pawl. The shelf should extend to the right so that the pawl rests on it.

**(106) Transmitter-Distributor Transfer Control Contacts
(Figure 36)

**(a) Transfer Contact Spring Tension

- **1. With the operating lever in the unoperated position, hook an 8 oz. scale over the long contact spring just above the contact point and pull at right angles to it.
- **2. It should require 2-1/2 to 3-1/2 oz. to just open the contacts.
- **3. To adjust, bend the long contact spring.

**(b) Normally Open Contact Spring Tension

- **1. With the operating lever in the unoperated position, hook an 8 oz. scale over the short contact spring just above the contact point and pull at right angles to it.
- **2. It should require 1 to 2 oz. to just move the short contact spring away from the stiffener.
- **3. To adjust, bend the short contact spring.

**(c) Normally Closed Contact Spring Tension

- **1. With the operating lever in the operated position, hook an 8 oz. scale over the short contact spring just above the contact point and pull at right angles to it.
- **2. It should require 2 to 3 oz. to just move the short contact spring away from the stiffener.
- **3. To adjust, bend the short contact spring.

**(d) Preliminary Contact Assembly Bracket Adjustment

- **1. With the operating lever in the unoperated position, there shall be .020 to .025 " between the stud on the operating lever and the long contact spring.
- **2. To adjust, position the contact assembly bracket with the mounting screw loosened. The bracket pivots about a pin at the upper end of the bracket.

- (e) Transmitter Control Contact Gap
 - 1. With the operating lever in the operated position, there shall be .010 to .015" between the normally closed contacts.
 - 2. To adjust, bend the stiffener.
 - (f) Normally Open Contact Gap
 - 1. With the operating lever in the unoperated position, there shall be .010 to .015" gap between the normally open contacts.
 - 2. To adjust, bend the stiffener.
 - (g) Final Contact Bracket Adjustment
 - 1. With the operating lever in the unoperated position, there shall be some clearance between the stud on the operating lever and the long contact spring.
 - 2. To adjust, remake Adjustments (d), (e) and (f).
- (107) Stripper Bail Arm Adjustment-(Figure 41)
- (a) Requirement: With the single-double line-feed lever in the single line-feed position, select the line-feed function and rotate the main shaft until the line-feed clutch just trips and the stripper slide is in its lowest position. With all the play of the stripper slide, bail and function pawl taken in the downward direction, there shall be .010 to .020 clearance between the top edge of the stripper slide bail and the lower surface of the line-feed function pawl. This clearance must be measured and the adjustment made where the clearance is minimum.
 - (b) To Adjust - Loosen the stripper slide bail arm clamping screw and position the arm. When tightening the clamping screw laterally position the bail arm to clear the stripper slide.
 - (c) Requirement: With the single-double line-feed lever in the double line-feed positions and the line-feed combination selected, the line-feed trip lever shall reset at a point over, or just past, the second stop lug by not more than 1/3 the distance between lugs.
 - (d) To Adjust: If necessary, refine the Line-Feed Trip Lever Adjusting Screw Adjustment to meet this requirement. Recheck Paragraph (a) of this adjustment.
- *(108) Print, Non-Print Solenoid Plunger Adjustment - (Figures 45, 46, 47, 48)

- * (a) Requirement: With the solenoid plunger held against the stop inside of the solenoid, the outer edge of the end of the suppression code bar should line up with the outer edge of ends of spacing code bars 1, 2, 3, 4, 5, 6 or 7. Also, when the suppression code bar is spacing, the tines of the suppression bar should line up with the tines of the #2 code bar.

- (3) Transfer Lever Spring Tension
- (a) With the transfer levers in the spacing position hook an 8 oz. scale over the spring extension of the intermediate arm and pull in line with the spring while holding the transfer levers in the spacing position.
 - (b) It shall require 1-1/2 to 2-1/2 oz. to move the intermediate arm. (Except Nos. 4 and 5 for WADS).
 - ** (c) It shall require 2-1/4 to 3-1/4 oz. to move intermediate arms No. 4 & No. 5 on basic LP810-811 for WADS.
- (4) Common Transfer Lever Spring Tension
- (a) With the transfer levers in the spacing position apply the push end of an 8 oz. scale to the front edge of the common transfer lever at the top and push horizontally toward the rear of the printer.
 - (b) It shall require 1/2 to 1-1/4 oz. to move the lever.
- (5) Start Lever Spring Tension
- (a) Unhook the clutch latch lever spring. With the stop arm bail in the indent of its cam and the range scale set at 60, apply the push end of an 8 oz. scale to the formed over surface at the stop arm and push at a right angle to the stop arm.
 - (b) It shall require 2-1/2 to 4-1/2 oz. to move the stop arm.
- (6) Selector Clutch Latch Spring Tension
- (a) With the latch resting against the low part of the clutch disc, hook an 8 oz. spring scale over the latch at the bend and pull at a right angle to the latch.
 - (b) It shall require 2 to 3-1/2 oz. to move the latch.
- (7) Marking Lock Lever Spring Tension
- (a) Set up "rub out" combination and rotate the main shaft to stop position of the selector clutch. Entering from the rear of the printer, place push end of an 8 oz. scale against the lower horizontal extension of the marking lock lever, keeping the scale above the hexagonal range scale assembly support post and push horizontally.
 - (b) It shall require 1-1/2 to 3 oz. to start the lever moving.
- (8) Spacing Lock Lever Spring Tension
- (a) With the selector armature released and the spacing lock lever resting on any low part of its cam, apply the push end of an 8 oz. scale to the lowermost end of the spacing lock lever and push in line with the spring.
 - (b) It shall require 3 to 6 oz. to move the spacing lock lever away from its pivot.

(9) Selector Lever Spring Tension

- (a) With the printer upside down, and the push lever reset bail on the peak of its cam, apply the push end of an 8 oz. scale to the selector lever spring extension adjacent to the spring and push at a right angle to the spring extension.
- (b) It shall require 1-1/2 to 3 oz. to move the selector levers.

NOTE: Unhook the start lever spring to facilitate checking if it is necessary to check the selector lever springs in the vicinity of the start lever spring.

*(10) Selector Armature Spring Tension Adjustment

- *(a) For units employing selector armature with single antifreeze button only.

**1. Preliminary

**a. With the locking levers and the start lever on the high part of their cams, hook an 8 oz. spring scale over the end of the armature extension and pull as nearly vertically as possible.

**b. It shall require the following tensions to move the armature to the marking condition.

.060 Ampere .030 Ampere .500 Ampere

2-1/2 to 3 ozs. 1-1/2 to 2 ozs. 4-1/2 to 5-1/2 ozs.

**NOTE: This spring tension can be adjusted for maximum selector performance only when the printer is connected to the specific circuit over which it is to operate under service conditions. Since there are several operating speeds and since circuits vary widely, it is impossible to adjust the spring for maximum performance at the factory. The foregoing spring tension requirement is given to permit operation prior to measurement of receiving margins. Readjustment made to obtain satisfactory receiving margin should not be distributed in order to meet the requirements of this adjustment.

- *(b) For units employing selector armature with two antifreeze buttons only.

1. Preliminary - Refer to Figure 44

- a. With the locking levers and the start lever on the high part of their cams, hook an 8 oz. spring scale over the end of the armature extension and pull as nearly vertical as possible.
- * b. It shall require approximately the following tensions to move the rear antifreeze button against the magnet core:

<u>.060 Ampere</u>	<u>.030 Ampere</u>	<u>.500 Ampere</u>
3/4 ozs.	5/8 ozs.	1-1/8 oz.

2. Final

- a. When a distortion test set is available, the selector armature spring tension should be refined, if necessary, to obtain satisfactory receiving margins. THE FRONT ANTIFREEZE BUTTON MUST CONTACT THE MAGNET CORE WHEN THE MAGNET COILS ARE ENERGIZED.

(11) Code Bar Clutch Latch Lever Spring Tension

- (a) With the clutch latch lever resting on the high surface of the clutch disc, hook an 8 oz. scale under the latch lever spring arm, immediately in front of the spring and pull upward.
- (b) It shall require 5 to 7-1/4 oz. to move the latch lever away from the clutch disc.
- (c) Measure the function clutch, spacing clutch, line feed clutch and type box clutch latch lever spring tension in the same manner as specified for the code bar clutch lever spring.

(12) Operating Lever Cam Plate Spring Tension (On Units Equipped With Operating Lever Cam Plate Stripper Bail)

- (a) With the spacing clutch in the stop position, hook a 32 ounce scale underneath the rear edge of the cam plate stripper bail that runs parallel to the clutch trip shaft and pull upward in line with the spring.
- (b) It shall require 4 to 9 ounces to start the stripper bail moving.

(13) Trip Shaft Spring Tension

- (a) Rotate the selector cam so that the code bar clutch stop lever cam follower is on the low part of its cam. Apply an 8 oz. scale to the cam follower at the spring and pull in line with the spring.
 - (b) It shall require 1 to 2 oz. to start the cam follower moving.
- (14) Code Bar Clutch Cam Follower Spring Tension
- (a) With the cam follower on the low part of its cam, unhook the spring from its spring bracket. Hook a 32 oz. scale in the spring.
 - (b) It shall require 20 to 24 oz. to pull the spring to its working length.
 - (c) Replace the spring.
- (15) Shift Drive Pawl Return Spring Tension (Figure 10)
- (a) With the drive pawl operating bail roller on the low part of the cam, unhook the spring from its spring bracket. Hook a 32 oz. scale in the spring.
 - (b) It shall require 6 to 12 oz. to pull the spring to its installed length.
 - (c) Replace spring.
- (16) Spacing, Line Feed, Type Box, and Function Clutch Trip Lever Spring Tension
- (a) Spacing Clutch Trip Lever Spring Tension
 - 1. With the spacing clutch trip lever resting on the outer surface of the clutch disc stop arm, hook a spring scale under the trip lever spring arm immediately in front of the spring and pull upward.
 - 2. It shall require 11 - 16 ounces to move the trip lever away from the clutch disc stop arm using a 32 ounce scale.
 - (b) Line Feed Clutch Trip Lever Spring Tension
 - 1. Measure the line feed clutch trip lever spring in the same manner.
 - * 2. It shall require 10-13 . ounces to move the trip lever away from the clutch disc stop arm using a 32 ounce scale.

- (c) Type Box Clutch Trip Lever Spring Tension
1. Measure the type box clutch trip lever spring in the same manner.
 2. It shall require 5-7-1/4 ounces to move the trip lever away from the clutch disc stop arm using an 8 ounce scale.
- (d) Function Clutch Trip Lever Spring Tension (On Units Equipped With An Adjustable Back Stop)
1. Measure the function clutch trip lever spring in the same manner
 2. It shall require 1-1/2 to 4 oz. to move the trip lever away from the clutch disc stop arm using an 8 oz. scale.
- (17) Intermediate Lever Spring Tension (On Units Equipped With Three Piece Spacing Clutch Trip Lever Bail)
- (a) Trip spacing clutch and turn the main shaft so that the spacing clutch stop lever arm is in its unoperated position.
 - (b) Unhook the spring from the intermediate lever bail and with an 8 ounce scale pull to installed length. It shall require 1-1/2 to 3-1/2 ounces to pull spring to installed length.
- (18) Single Stop Clutch Shoe Lever Spring Tension
- (a) With the clutch engaged, hook a 32 oz. scale on the extension of the clutch shoe lever near the bend and pull tangent to the lever. Hold the clutch from rotating.
 - (b) It shall require a pull of 15 to 20 oz. to move the shoe lever into contact with the clutch disc stop extension.
- (19) Multiple Stop Clutch Shoe Lever Spring Tension
- (a) With the clutch engaged, hook a 32 oz. scale on the extension of the clutch shoe lever near the bend and pull tangent to the lever. Hold the clutch from rotating.
 - (b) It shall require a pull of 16 to 22 oz. to move the shoe lever into contact with the clutch disc stop extension.

(20) Clutch Shoe Spring Tension

- (a) Hook an 8 oz. spring scale tangent to the shoe friction surface at the edge of the primary shoe friction surface which is nearest to the point of the two shoes.
- (b) It shall require a pull of 3 to 5 oz. to start the primary shoe moving away from the secondary shoe at their point of contact.

NOTE: The clutch drum must be removed from the clutch assembly in order to measure this spring tension.

(21) Spacing Trip Lever Bail Spring Tension

- (a) With the spacing trip lever bail against its down stop, unhook the spring from the mounting bracket. Hook a 32 oz. scale to the spring loop.
- (b) It shall require 8 to 12 oz. to pull the spring to its position length.
- (c) Replace the spring.

(22) Spacing Trip Lever Spring Tension

- (a) With the type box clutch in its stop position, hook an 8 oz. scale on the lower end of the lever and pull toward the rear.
- (b) It shall require 2-1/2 to 5 oz. to start the lever moving.

(23) Spacing Clutch Trip Cam Follower Spring Tension (if used) (Figure 14)

- (a) With the function clutch in the stop position, unhook the spring from the spring ear. Hook a 8 oz. scale to the spring loop.
- (b) It shall require 2-1/2 to 3-1/2 oz. to pull the spring to its position length.
- (c) Replace the spring.

(24) Spacing Cut-Out Bail Spring Tension

- (a) Apply an 8 oz. push scale to the lower surface of the front end of the bail and push parallel to the front plate.
- (b) It shall require 1 to 3-1/2 oz. to start the bail moving.

(25) Space Suppression By-Pass Spring Tension (On Unit Equipped With Separate Cut-Out Lever and Spring)

- (a) With typing unit upside down hook a 32 ounce scale on the spacing cut-out lever extension pawl next to the spring and pull towards the rear of the unit.

- (b) It shall require 20 to 26 oz. to start the pawl moving.
- (26) Function Reset Bail Spring Tension
- (a) With the printer upside down, hold the No. 1 Code Bar in its marking position so that no function bar is selected. Rotate the printer shaft until the function reset bail springs are in their minimum length position. Place the pull rod of a 32 oz. scale between the clutch trip shaft and the space suppression bail and hook the scale on the front edge of the reset bail approximately at the middle of the bail. Pull toward the rear.
 - (b) It shall require 10 to 22 oz. to start the bail moving.
- (27) Vertical Knee Link Spring Tension
- (a) With the vertical position lever toes in contact with the upper code bar but not buckled, hook a 32 oz. scale on the lower part of the link just above the forward extension on the link and pull toward the rear.
 - (b) It shall require a pull of 4 to 12 oz. to move the link extension away from the vertical position lever. Check the right and left springs.
- (28) Vertical Positioning Lock Lever Spring Tension
- (a) With the type box clutch in its stop position, hook an 8 oz. scale over the upper end of the lock lever and pull toward the rear.
 - (b) It shall require a pull of 5 to 8 oz. to start the lock lever moving. Check both the right and left lever springs.
- (29) Ribbon Reverse Lever Spring Tension
- (a) Hook an 8 oz. scale over the reverse lever just in front of the spring and pull in line with the spring.
 - (b) It shall require 1-1/2 to 3 oz. to start the lever moving. Check both the right and left springs.
- (30) Ribbon Feed Pawls Spring Tension
- (a) With the ribbon feed pawls in their uppermost position, apply the push end of an 8 oz. scale to the long pawl near the spring and push downward.
 - (b) On the short pawl, apply to scale at a point directly to the right or left at the long pawl spring and push downward.
 - (c) It shall require 3/4 to 2 oz. to start the pawl moving. Measure each of the four pawls.

NOTE: If the minimum requirement on the short pawl cannot be met, adjust the torsion spring by pulling its lower end to the rear to obtain the requirement.

(31) Ribbon Ratchet Friction Spring

- (a) With the ribbon feed pawls disengaged, hook an 8 oz. scale on a tooth in the ratchet and pull tangent to the ratchet.
- (b) It should require a pull of 3 to 7-1/2 oz. to rotate the ratchet. Check both right and left springs.

(32) Ribbon Tension Spring Tension

- (a) With the ribbon removed, position the ribbon feed ratchets so that the spool driving pin is directly to the right of the spool shaft on the right hand unit and to the left on the left hand unit. Hook an 8 oz. scale in the driving pin and pull toward the front of the printer.
- (b) It shall require 3 to 5-1/2 oz. to start the spool shaft rotating, measure both right and left units.

(33) Space Suppression Bail Springs Tension

- (a) With the suppression bail in its rear position, apply the push end of an 8 oz. scale to the rear edge, near the middle of the bail and push forward.
- (b) It shall require 1/2 to 1-1/2 oz. to move the bail away from its backstop.

(34) Single-Double Line Feed Stripper Lever Spring Tensions

- (a) With the line feed clutch in the stop position and the line feed lever in the single line feed position, check the spring tensions as follows:
 - 1. Torsion Spring - Hook an 8 oz. scale under the rear of the lever and pull up. It shall require 1/2 to 2 oz. to move the lever.
 - 2. Tension Spring - Hook an 8 oz. scale over the rear of the lever and pull to the right. It shall require 1/2 to 2 oz. to move the lever to the right.

(35) Line Feed Pawls Bell Crank Spring Tension (For Friction Feed Mechanisms Only)

- (a) Rotate the line feed clutch so that the left hand line feed pawl is in its maximum rear position. Hook a 32 oz. scale on the upper end of the pawl and pull toward the rear.
- (b) It shall require 19 to 24 oz. to start the pawl moving.

- (36) Platen Detent Spring Tension
- (a) With the detent seated between two teeth in the platen gear, hook a 32 oz. scale on the detent lever just to the rear of the detent and pull at a right angle to the detent lever.
 - (b) It shall require 16 to 32 oz. to move the detent.
- (37) Hand Wheel Slide Spring Tension
- (a) Apply an 8 oz. push scale to the top of the slide and push downward.
 - (b) It shall require 3 to 8 oz. to start the slide moving.
- (38) Paper Pressure Roller Lever Spring (For Friction Feed Mechanisms Only)
- (a) Apply a 64 oz. push scale to the lower end of the rear levers and push approximately in line with the spring.
 - (b) It shall require 28 to 36 oz. to start the lever moving. Measure each of the two center levers (the four outer levers have no springs).
- (39) Paper Finger Shaft Spring Tension (For Friction Feed Mechanisms Only)
- (a) Hook an 8 oz. scale under the front horizontal edge of the right hand paper finger and pull upward.
 - (b) It shall require 3 to 6 oz. to move the left finger away from the platen.
- (40) Paper Bail Spring Tension (For Friction Feed Mechanisms Only)
- (a) With the paper bail resting against the platen, hook a 32 oz. scale over the upper edge of the bail near the end of the platen. Pull forward.
 - *(b) It should require 7 to 20 oz. to move the bail away from the platen. Check each end.
- (41) Paper Straightener Lever Spring Tension (For Friction Feed Mechanisms Only)
- (a) Apply an 8 oz. push scale to the upper edge of the lever directly above the straightener rod and push downward.
 - (b) It shall require 1-1/2 to 4 oz. to move the lever. Measure both the right and left lever springs.

- (42) Line Feed Pawl Bell Crank Spring Tension (For Sprocket Feed Mechanisms Only)
- (a) Rotate the line feed clutch so that the left hand line feed pawl is in its maximum rear position. Hook a 64 oz. scale on the upper end of the pawl and pull toward the rear.
 - (b) It shall require 28 to 38 oz. to start the pawl moving.
- (43) Guide Bracket, or Paper Finger Shaft Spring Tension (For Sprocket Feed Mechanisms Only)
- (a) Hook a 16 oz. scale under the guide bracket shaft spring extension and pull upward.
 - (b) It shall require 6 to 10 oz. to move the bracket against the platen.
- (44) Feed Pin Spring (For Sprocket Feed Mechanisms Only)
- (a) With the platen positioned so that the left and right pins to be tested are aligned with the slots in the guide bracket it shall require 6 to 8 oz. to start a pin moving. To check, apply an 8 oz. scale to the tip of the pin and push toward the platen.
- (45) Guide Bracket Latch Spring Tension (For Sprocket Feed Mechanisms Only)
- (a) With the guide bracket pushed against the platen, hook a 32 oz. scale under the guide bracket latch at the spring hook and pull in line with the spring.
 - (b) It shall require 8 to 12 oz. to start the latch moving.
- (46) Ribbon Reverse Detent Lever Spring Tension
- (a) Buckle the toggle upward, hook a 32 oz. scale on the detent lever just below the spring hole and pull toward the rear.
 - (b) It should require 10 to 18 oz. to start the lever moving.
- (47) Type Pallet Spring Tension
- (a) Remove the type box from the printer and apply an 8 oz. push scale vertically to the end of the pallet shank. Push in line with the pallet shank.
 - (b) It shall require 1/4 to 3/4 oz. to move the pallet. Check each pallet.

- (48) Type Box Carriage Roller Arm Spring Tension
- (a) With the type box carriage installed on the typing unit, hook a 64 oz. scale over the type box latch, just to the right of the locking detent, and pull upward.
 - (b) It shall require from 28 to 36 oz. to start the roller (under the spring scale) moving away from the type box track.
- (49) Spacing Feed Pawls Spring Tension
- (a) With the spacing shaft rotated until one of the spacing feed pawls is in its least advanced position on the ratchet drum and fully engaged with the ratchet, unhook the spring from the spring bracket and hook an 8 oz. scale in the spring.
 - (b) It shall require 3 to 5 - oz. to pull the spring to its position length. Replace the spring.
 - (c) Check the other spacing pawl spring in the same manner as the first.
- (50) Carriage Return Latch Spring Tension
- (a) With the spacing drum in its returned position, hook an 8 oz. scale on the lower end of the latch spring extension and pull in line with the spring.
 - (b) It shall require 3 to 4-1/2 oz. to start the latch moving.
- (51) Transfer Slide Spring Tension
- (a) Move the slide to its extreme left hand position. Unhook the spring from the slide and hook an 8 oz. scale in the spring.
 - (b) It shall require a pull of 3-1/2 to 4-1/2 oz. to extend the spring to its working length.
 - (c) Replace the spring.
- (52) Spacing Feed Release Link Spring Tension
- (a) Hook an 8 oz. scale on the front end of the bell crank extension, perpendicular to the extension, and pull to the left.
 - (b) It should require 1/2 to 2-1/2 oz. to start elongation of the spring.
- (53) Decelerating Slide Spring Tension
- (a) With the printing bail in its down position, the print carriage and the horizontal slide assembly in their right hand positions, hook an 8 oz. scale in back of the horizontal lock lever and over the end of the right hand decelerator slide.

- (b) It shall require 1/2 to 1-1/2 oz. to start the slide moving.
 - (c) Move the printing carriage and the horizontal slide assembly to their left hand position and check the left hand decelerator slide spring in a similar manner.
- (54) Automatic CR-LR Bell Crank Spring Tension (For Units Equipped With This Mechanism)
- (a) With the function clutch in stop position, hook a 32 oz. scale on the upper end of the bell crank at the bend, immediately in front of the front plate. Pull toward the right.
 - * (b) It shall require 2-1/2 to 7 oz. to move the bell crank.
- (55) Horizontal Slide Lock Lever Spring Tension
- (a) With the lock lever in its upper position, hook a 64 oz. scale on the lever spring extension and pull in line with the spring.
 - (b) It shall require 28 to 43 oz. to start the lever moving upwards.
- (56) Lower Cable Roller Bail Spring Tension
- (a) Unhook the spring from the lower cable roller bail. Move the bail downward until its extension is resting on the opening in the front plate. Hook a 32 oz. scale in the spring and pull to position length.
 - (b) It should require a pull of 26 to 30 oz.
 - (c) Replace the spring.
- (57) Horizontal Stop Slides Spring Tension
- (a) With the code bars in their marking position, and the type box clutch rotated about 1/4 turn from its stop position, hold an 8 oz. scale on the left end of the middle slide and the right end of the upper and lower slides. Hold the oscillating rail shift slide mechanism so that the decelerating slides do not bear against the stop slides. Pull forward.
 - (b) It shall require 1/2 to 1-1/2 oz. to move the upper and lower slides, 1-3/4 to 3 oz. to move the middle slide. Check each slide.
 - (c) When checking the upper and lower slides hold the middle slide about 1/32 inch forward away from the upper and lower slides.
- (58) Oscillator Shift Linkage Spring Tension (Hairpin Spring Design)
- (a) With the right hand link in the straight or unbuckled position, hook a 32 oz. scale under the right hand link adjacent to the formed rearward extension and pull upward. It shall require 6 to 14 oz. to start the link buckling.

- (b) Buckle the right hand linkage and straighten the left hand linkage. Hook the scale under the left hand link adjacent to the formed rearward extension and pull upward. It shall require 6 to 14 oz. to start the link buckling.
- (59) Horizontal Positioning Knee Links Spring Tension (Torsion Spring Design)
- (a) With a link in the straight or unbuckled position, apply the push end of a 32 oz. spring scale to the end of the upward extension of the link and push downward.
 - (b) It shall require 9 to 14 oz. to start the link buckling. Measure both links.
- (60) Horizontal Motion Reversing Slide Detent Spring Tension
- (a) With the slide in its left hand position, hook an 8 oz. scale in the upper detent right hand notch and pull upward.
 - (b) It shall require 2 to 4-1/2 oz. to start the detent moving.
- (61) Print Hammer Operating Bail Spring Tension
- (a) Remove the hammer yield spring. With the bail in its latched position and with the spring adjusting bracket in its left hand notch, hook a 32 oz. scale over the front end of the bail arm and pull toward the left.
 - (b) It shall require 10 to 13 oz. to move the bail.
 - (c) Replace the hammer yield spring.
- (62) Hammer Yield Spring Tension
- (a) With the print hammer operating bail resting against its stop, apply an 8 oz. push scale against the front edge of the hammer lever directly above the yield spring. Push in line parallel with the spring.
 - (b) It shall require 1 to 2-1/2 oz. to move the hammer lever.
- (63) Print Hammer Operating Bail Latch Spring Tension
- (a) With the printing arm operating bail in its maximum upper position, apply an 8 oz. push scale to the left edge of the pawl near the front end of its forward extension. Push toward the right.
 - (b) It shall require 3 to 4-1/2 oz. to move the pawl.

- (64) Print Hammer Plunger Spring Tension
- (a) Hook an 8 oz. scale on the plunger against its shoulder and pull at a right angle to the plunger.
 - (b) It shall require 3 to 5-3/4 oz. to move the plunger.
- (65) Keyboard Lock Bell Crank Spring Tension (If Used)
- (a) Hook an 8 oz. scale on the front arm of the bell crank approximately at its mid-point and pull upward.
- NOTE: When checking this tension, the printer should be in a bottom side upward position.
- (b) It shall require 1/2 to 1-1/2 oz. to move the bell crank.
- (66) Function Bars Spring Tension
- (a) With the function clutch rotated until the function bail is withdrawn from the function bars, hook an 8 oz. scale on the upward extension at the rear end of the function bar. Hold the function pawl away from the function bar and pull toward the rear.
 - (b) It shall require 2-1/2 to 3-1/2 oz. to move the function bar. Measure each function bar spring.
 - (c) To make this check with the stunt box removed from the typing unit, hold the function bar so that the top of its rear upward extension is approximately in line with the lower horizontal edge of the pawl back of the pawl shoulder.
- (67) Function Pawl Spring Tension
- (a) With the horizontal edge of the pawl (back of the pawl shoulder) resting on top of the function bar upward extension, hook an 8 oz. scale on the hook at the end of the pawl and pull in line with the pawl.
 - (b) It shall require 3 to 5 oz. to move the pawl. Measure each pawl spring.
- (68) Function Levers Spring Tension
- (a) With the function levers in their unoperated position, hook an 8 oz. scale over the lever immediately above the function pawl. Hold the suppressor bail forward and pull toward the rear. (On levers with contacts, hold off the contact.)
 - (b) It shall require 1-1/2 to 2-3/4 oz. to move the lever. Measure each lever spring.

(69) Code Bar Detent Spring Tensions

- (a) Remove the code bar detent assembly from the typing unit and apply the pull end of an 8 oz. scale to a detent ball. Pull in line with the ball travel.
- (b) It shall require 1-1/2 to 3-1/2 oz. to start the depression of a ball. Check each ball.

NOTE: Unless there is reason to believe that the springs are causing operating failures, it is necessary to remove the detent block and make detent measurements.

CAUTION: When removing the detent assembly from the code bar bracket be careful to maintain the correct number of shims at the upper and lower mounting screws.

(70) Code Bar Yield Spring Tension

- (a) With the selector, code bar, and type box clutches in their stop positions and the number one code bar in its spacing (right) position, hook a 32 oz. scale to the front shoulder of the number one code bar link and pull to the right.
- (b) It shall require from 14 to 23 oz. to start the code bar link pivot moving away from the code bar.
- (c) Check the number two and common code bars and associated links in the same manner.

(71) Stunt Box Switch Spring Tension (For Switches Equipped With a Block and Separate Top Plate)

- (a) With the switch contact arm in its closed position, hook an 8 oz. scale under the contact arm adjacent to the contact arm insulator and pull up.
- (b) It should require 1 to 2 oz. to open the switch contact.

(72) Shift Pawl Selector Link Yield Spring Tension (Figure 11)

- (a) With the shift selector push lever marking position (toward front), selector clutch and code bar clutch disengaged, unhook the shift pawl selector link yield spring from the bell crank, and hook an 8 oz. scale in the spring.
- (b) It shall require 5 to 7 oz. to pull the spring to its installed length.

- (73) Solenoid Spring Tension (Figures 12 & 13) if used.
- (a) With the solenoid in the de-energized condition unhook the front end of the spring. Pull with an 8 oz. scale to installed length.
 - (b) It should require 2 to 3 oz. to pull the spring to installed length.
 - (c) Replace the spring.
- (74) Stabilizing Spring Tension (Figure 15)
- (a) With the type box clutch in the stop position, unhook the top end of the spring. Pull with 32 oz. scale.
 - (b) It should require 5 to 8 oz. to pull the spring to its maximum working length.
- (75) Horizontal Shift Link Shock Absorber Spring (Figure 37)
- (a) Position the type box carriage at the left side of the typing unit. With the right hand shift link in the straight or unbuckled position, hook a 15 lb. scale over the right hand screw which mounts the link to the rail and pull to the right.
 - (b) It shall require 10 to 12 lbs. to start the shock absorber slide moving.
- (76) Horizontal Tab Operating Lever Extension Link Spring (Figure 25)
- (a) Unhook the trip arm latch lever spring. With the operating lever in the operated position and with the slide arm against the blocking lever, hook a 32 oz. scale over the rear of the operating lever slide arm and pull horizontally to the rear.
 - (b) It shall require 8-3/4 to 10-3/4 oz. to start the link moving.

NOTE: On units equipped with transmitter control contacts, hold the contact spring away from the stud while measuring this tension

- (77) Horizontal Tab Intermediate Bail Spring Tension (Figure 26)
- (a) With the trip lever arm and the intermediate bail in the unoperated position, unhook the intermediate bail spring.
 - (b) It shall require 1-1/2 to 3/1/2 oz. pull with an 8 oz. scale to pull the spring to installed length.
- (78) Horizontal Tabulator Slide Arm Spring (Figure 28)
- (a) With the operating lever in the operated position and the slide arm in the unoperated position, apply the push end of an 8 oz. scale to the slide arm at the formed extension just in front of the space suppression bar and push horizontally forward
 - (b) It shall require 1-1/2 to 4 oz. to start the slide moving.
- (79) Horizontal Tab Operating Lever Cam Plate Spring (Figure 28)
- (a) With the operating lever in the unoperated position and the horizontal tab function pawl unlatched, hook a 32 oz. scale over the stripper bail arm at the lower adjustment pry point and pull vertically upward.
 - (b) It shall require 4 to 9 oz. to start the stripper bail moving.
- (80) Horizontal Tab Pawl Spring (Figure 31)
- (a) With the tab pawl in its unoperated position, hook an 8 oz. scale over the pawl at the spring hole and pull in line with the spring.
 - (b) It shall require 3 to 5 oz. to start the pawl moving.
- (81) Horizontal Tab Blocking Lever Return Spring (Figure 31)
- (a) With the operating lever slide arm held to the rear, hook an 8 oz. scale over the blocking lever just to the right of the tabulator pawl and pull downward.
 - (b) It shall require 2-1/2 to 4-1/2 oz. to start the lever moving.

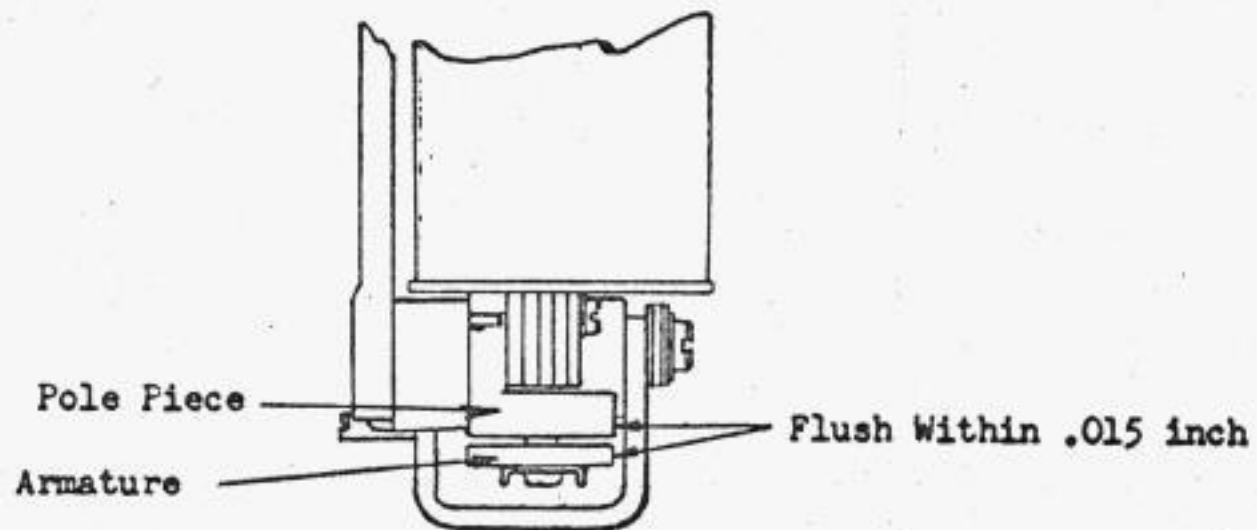
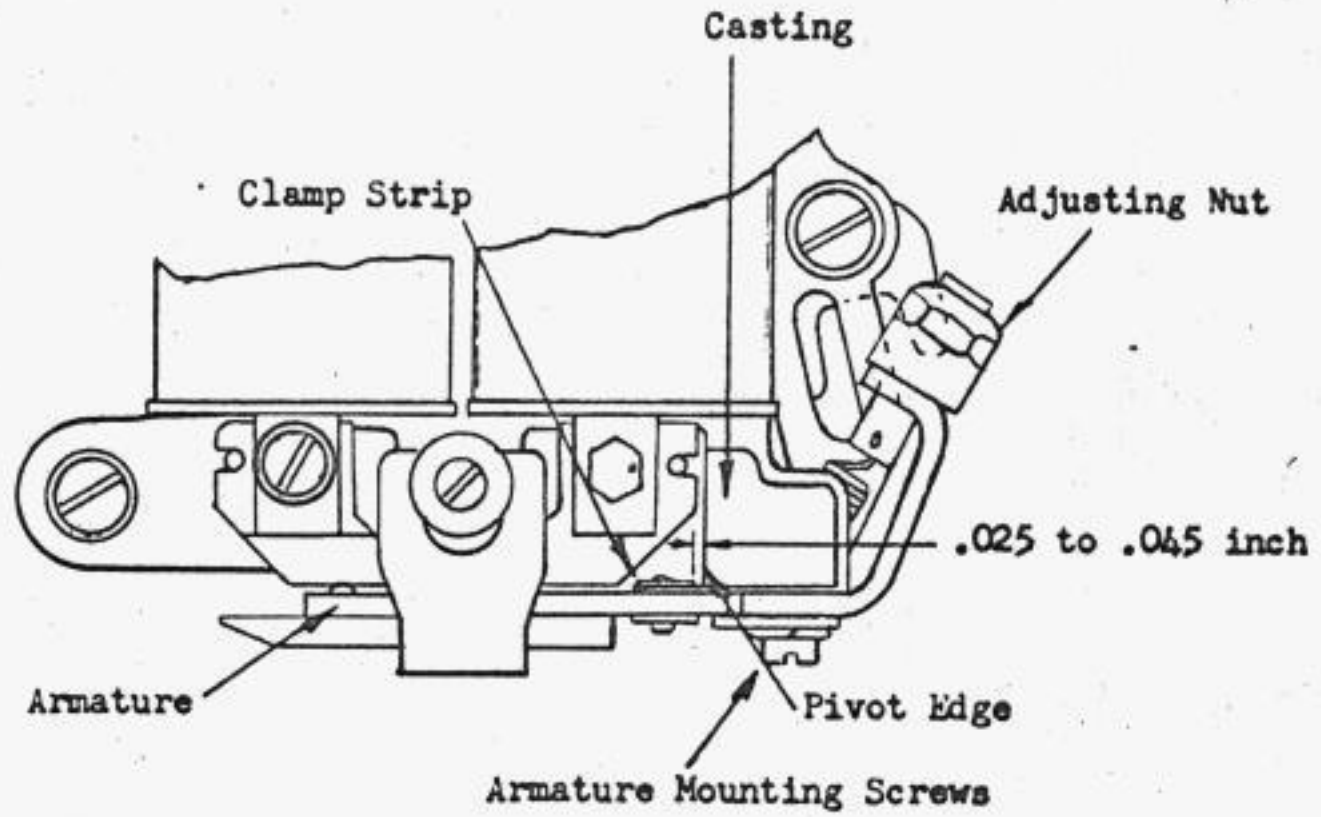
- (82) Print Suppression Blocking Levers Spring (Figure 16)
- (a) With all code bars positioned to the right (spacing) and with the typebox clutch in the stop position, apply the push end of an 8 oz. scale to the lower blocking lever at the spring and push parallel immediately adjacent to the spring.
 - (b) It shall require 2-3/4 to 3-3/4 oz. to start the lever moving.
- (83) Print Suppression Blocking Bail Spring (Figure 16)
- (a) With all the code bars positioned to the right (spacing) and with the typebox clutch in the stop position, hook an 8 oz. scale on the blocking bail at the spring hole and pull horizontally to the rear.
 - (b) It shall require 1/2 to 1-1/2 oz. to start the bail moving.
- (84) Paper Out Alarm Bell Crank Follower Spring Tension (Figure 24)
Friction Feed Only
- (a) With the roll of paper removed from the unit, hook an 8 oz. scale over the switch operating arm of the bell crank at the step in the arm and pull horizontally towards the rear.
 - (b) It shall require 3-1/2 to 4-1/2 oz. to move the lever far enough to just clear the lower switch.
- (85) Paper Out Alarm Sensing Lever Spring Tension (Figure 23)
Sprocket Feed Only
- (a) Hook an 8 oz. scale over the rear end of the sensing lever and pull vertically upward.
 - (b) It shall require 1/2 to 1 oz. to lift the end of the lever which rides the paper until it is on the same plane as the upper surface of the paper guide.
 - (c) Measure both sensing lever springs in the same manner.
- (86) Vertical Tab Blocking Lever Spring Tension (Figure 38)
- (a) With the blocking lever arms resting on top of their slides, unhook the blocking lever spring from the mounting bracket and hook an 8 oz. scale in the spring.
 - (b) It shall require 9 to 11 oz. to pull the spring to its operating length.
 - (c) Check both blocking lever springs in this manner.

- (87) Vertical Tabulator Bail Spring Tension (Figure 39)
- (a) With the extension of the tabulator bail resting against its backstop, hook an 8 oz. scale under the tip of the bail and pull vertically upward.
 - (b) It shall require 3 to 8 oz. to move the bail away from its backstop.
- (88) Form-Out Pawl Spring Tension (Figure 40)
- (a) With the extension of the form-out pawl resting against its backstop, hook an 8 oz. scale under the tip of the pawl and pull in line with the spring.
 - (b) It shall require 3 to 8 oz. to move the pawl away from its backstop.
- (89) Form-Feed Out Torsion Spring Tension (Figure 5)
- (a) Rotate the mainshaft until the line feed clutch is in the stop position. Disengage the line feed clutch trip lever. Hook an 8 oz. scale over the lower end of the form feed out bail and pull horizontally to the rear while holding the page feed out blocking lever away from the feed out slide.
 - (b) It shall require 2 to 6 oz. to start the bail moving towards the rear of the unit.
- (90) Form Feed-Out Non-Repeat Slide Spring Tension (Figure 21)
- (a) With the typing unit upside down and the form feed-out solenoid unoperated, unhook the non-repeat slide spring from the bracket and hook an 8 oz. scale in the spring.
 - (b) It shall require 1-1/2 to 2-1/2 oz. to pull the spring to position length.
- (91) Stripper Slide Spring Tension (Figure 42)
- (a) With the stripper blade in its lowermost position, unhook the stripper slide spring from the slide and hook an 8 oz. scale in the spring.
 - (b) It shall require a pull of 2 to 3 oz. to extend the spring to position length.
 - (c) Replace the spring.
- (92) Stripper Slide Bail Torsion Spring Tension (Figure 43)
- (a) With the single-double feed lever in the single position, select the line-feed function and rotate the main shaft until the stripper slide bail just strips the line-feed function pawl. Hook an 8 oz. scale over the top of the stripper slide bail and pull horizontally towards the rear.
 - (b) It shall require 1 to 1-1/2 oz. to just start the bail moving.

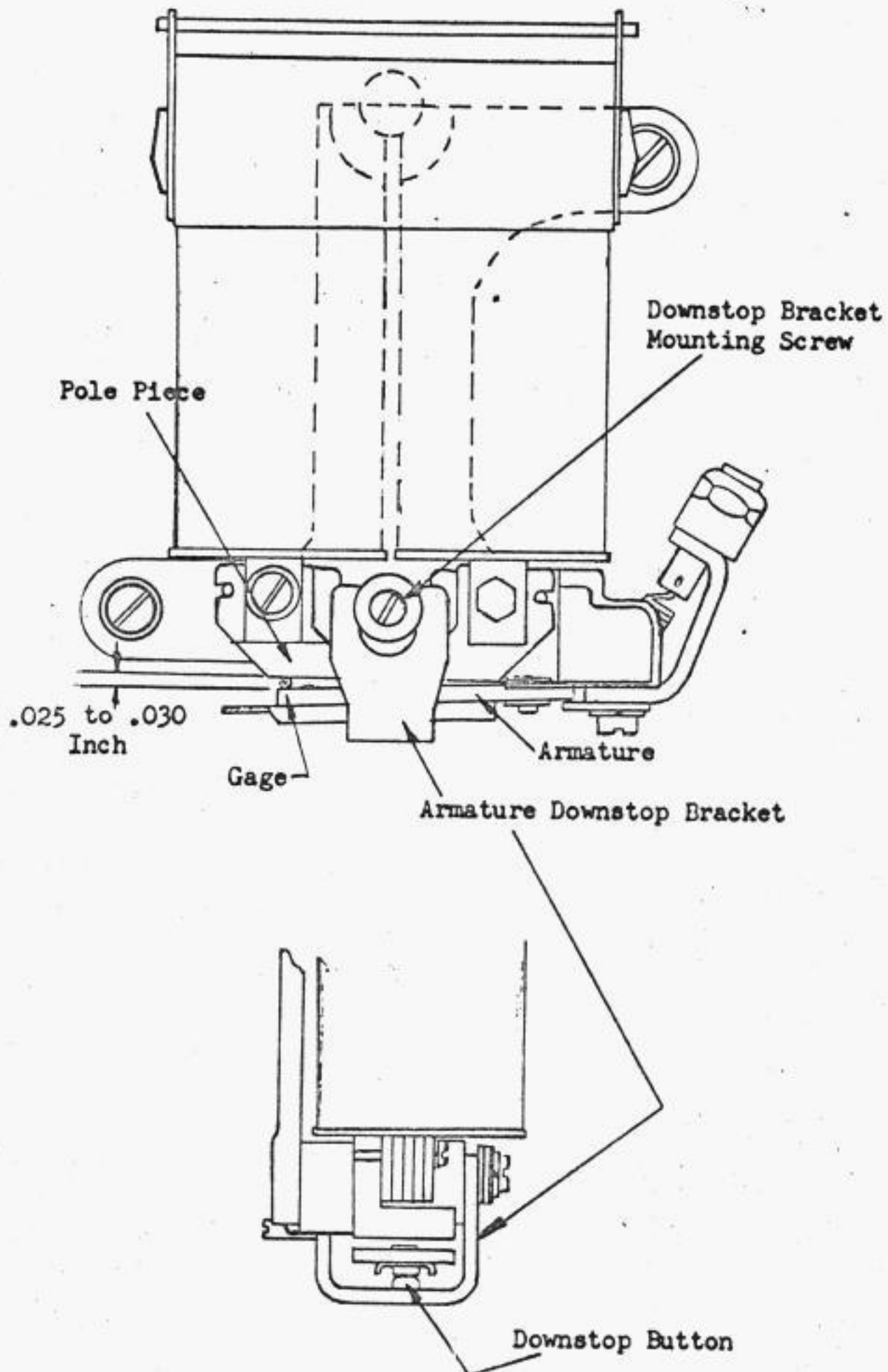
4. LUBRICATION

- a. KS7470 Oil should be used for the lubrication of all points where oil is specified. KS7471 Grease should be used where grease is specified. All felt lubricating washers and all moving surfaces should be thoroughly lubricated. However, over-lubrication which will allow oil to drip or grease to be thrown on other parts should be avoided. Special care should be exercised to avoid getting oil or grease on contact point faces, or on the selector armature or pole faces.

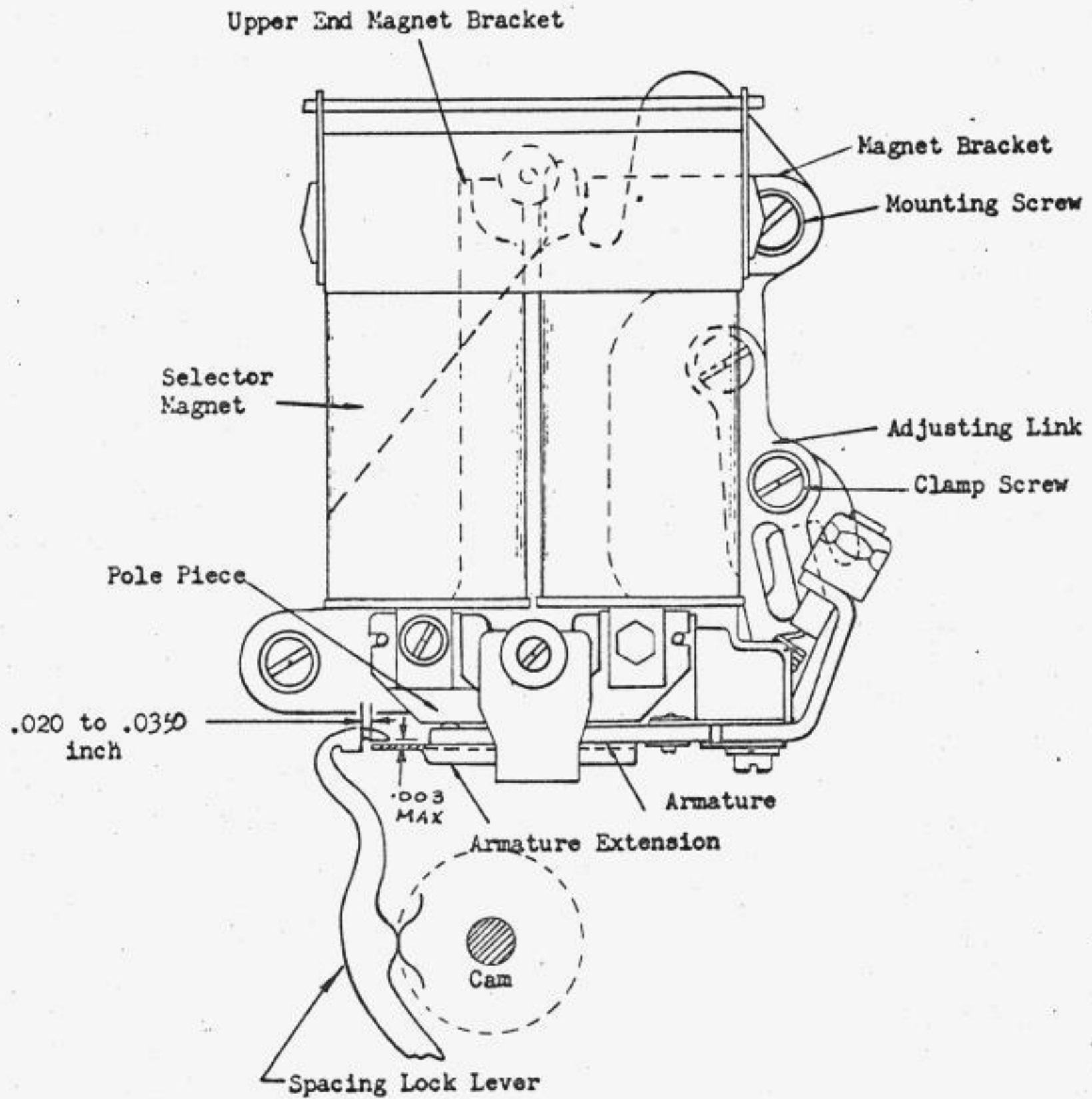
- b. Lubricate all spring eyes with one drop of oil. Saturate all spring wicks.
- c. The teeth of all gears and of the range scale knob (knob and gear) are to be covered with a light coat of grease.
- d. All felt oil retainers are to be saturated with oil.
- ** e. Function Reset Bail Cam Shaft Drive Mechanism
 - (1) Function Cam Roller - Saturate felt oiler and apply 3 drops of oil on other side of roller bearing.
 - (2) Cam Shaft Drive Link - Saturate felt oiler and apply 3 drops of oil each to both sides of front and rear bearing bushing.
- * f. All pivots and sliding surfaces are to be oiled.
- * g. The leather wick should be saturated and the oil reservoir filled.
- * h. Apply oil to all oil holes including the spacing shaft bearing and the scissors operating arm shaft.
- * i. Grease print hammer guide and stop, stripper blade driving cam, contact arm engaging surfaces, the spacing clutch trip cam and camming surface, the horizontal shift shock absorber slides at the shoulder screws and at the link bearing studs, and the tops and bottoms of the shift breaker slides.
- * j. Oil all pivot points on print, non-print solenoid mechanism. Do not oil sliding cylindrical surface or pole face end of solenoid plunger.



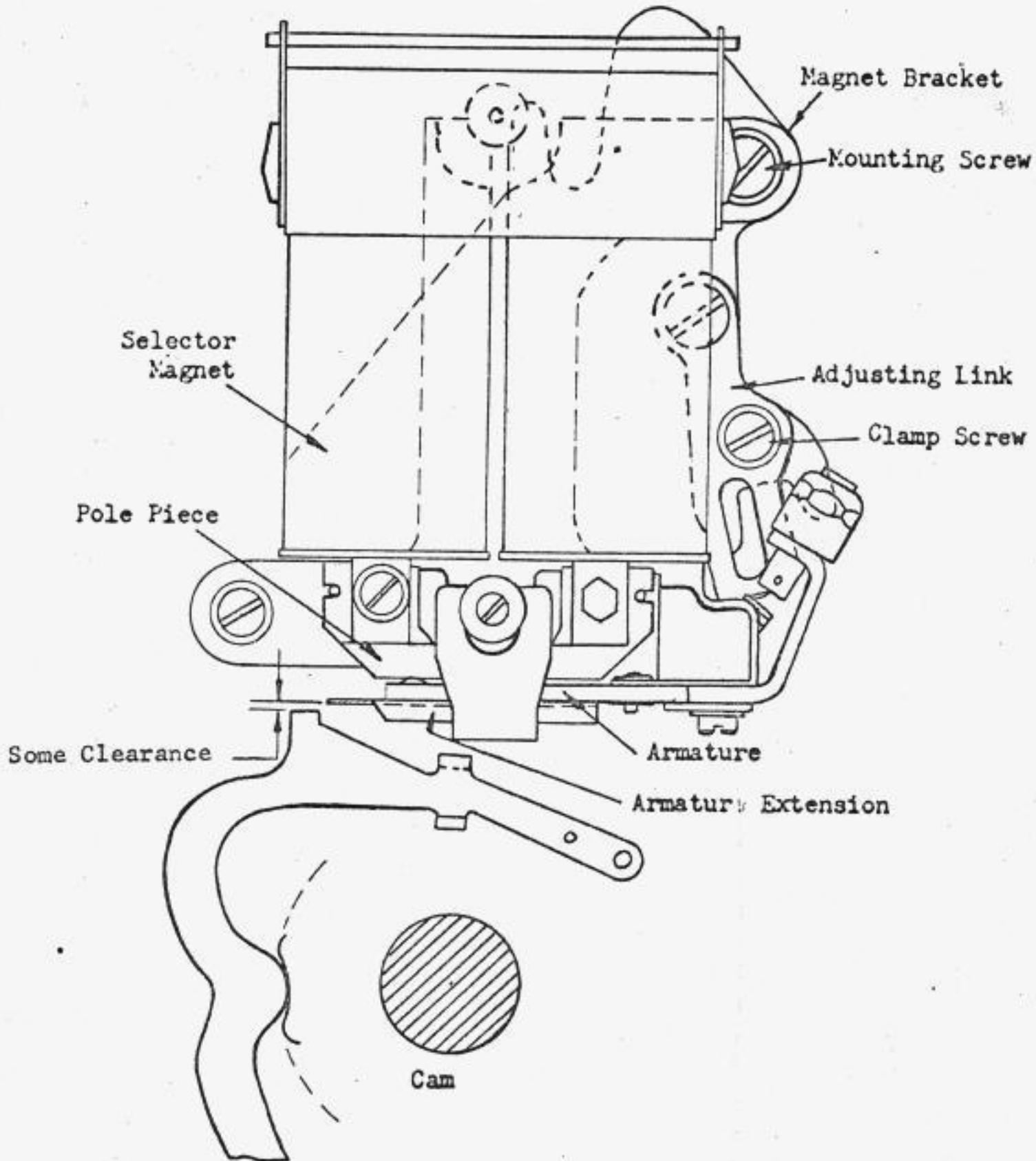
SELECTOR ARMATURE ADJUSTMENT



SELECTOR ARMATURE DOWNSTOP ADJUSTMENT



SELECTOR MAGNET BRACKET HORIZONTAL ADJUSTMENT



SELECTOR MAGNET BRACKET - VERTICAL ADJUSTMENT

Figure 5

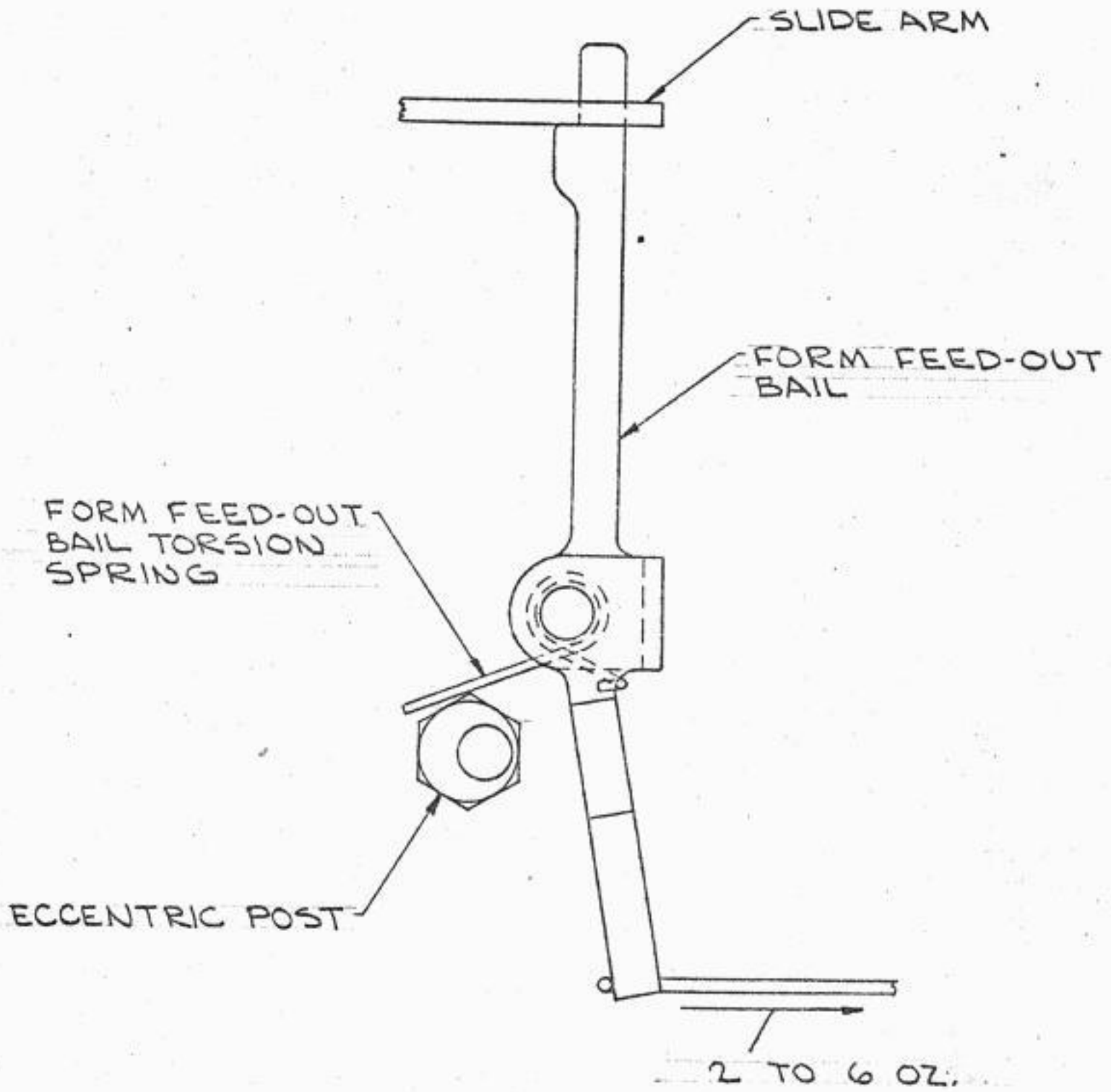
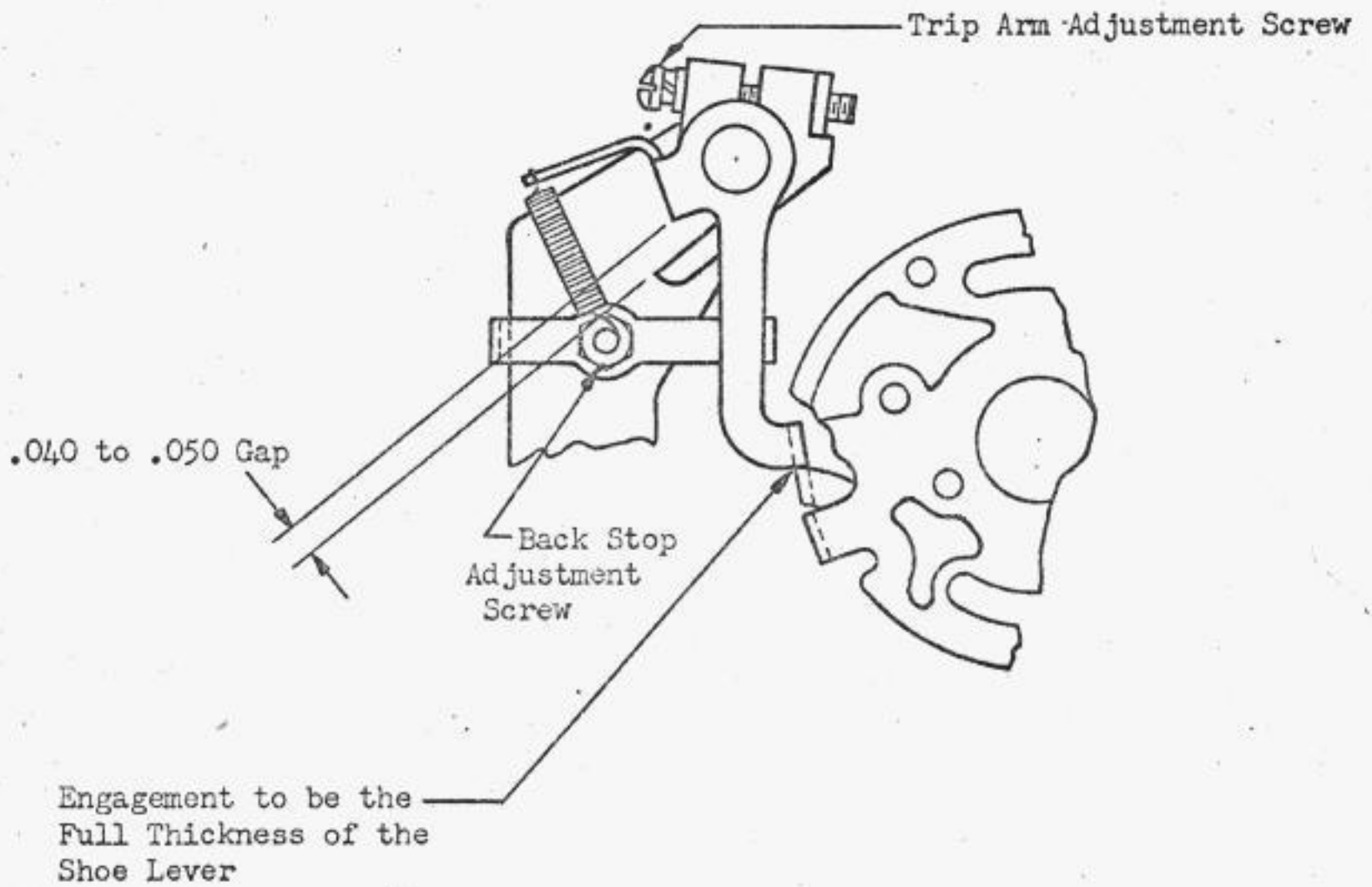


FIGURE # 5



FUNCTION CLUTCH TRIP LEVER
BACKSTOP & TRIP ARM
ADJUSTMENT

Figure 7

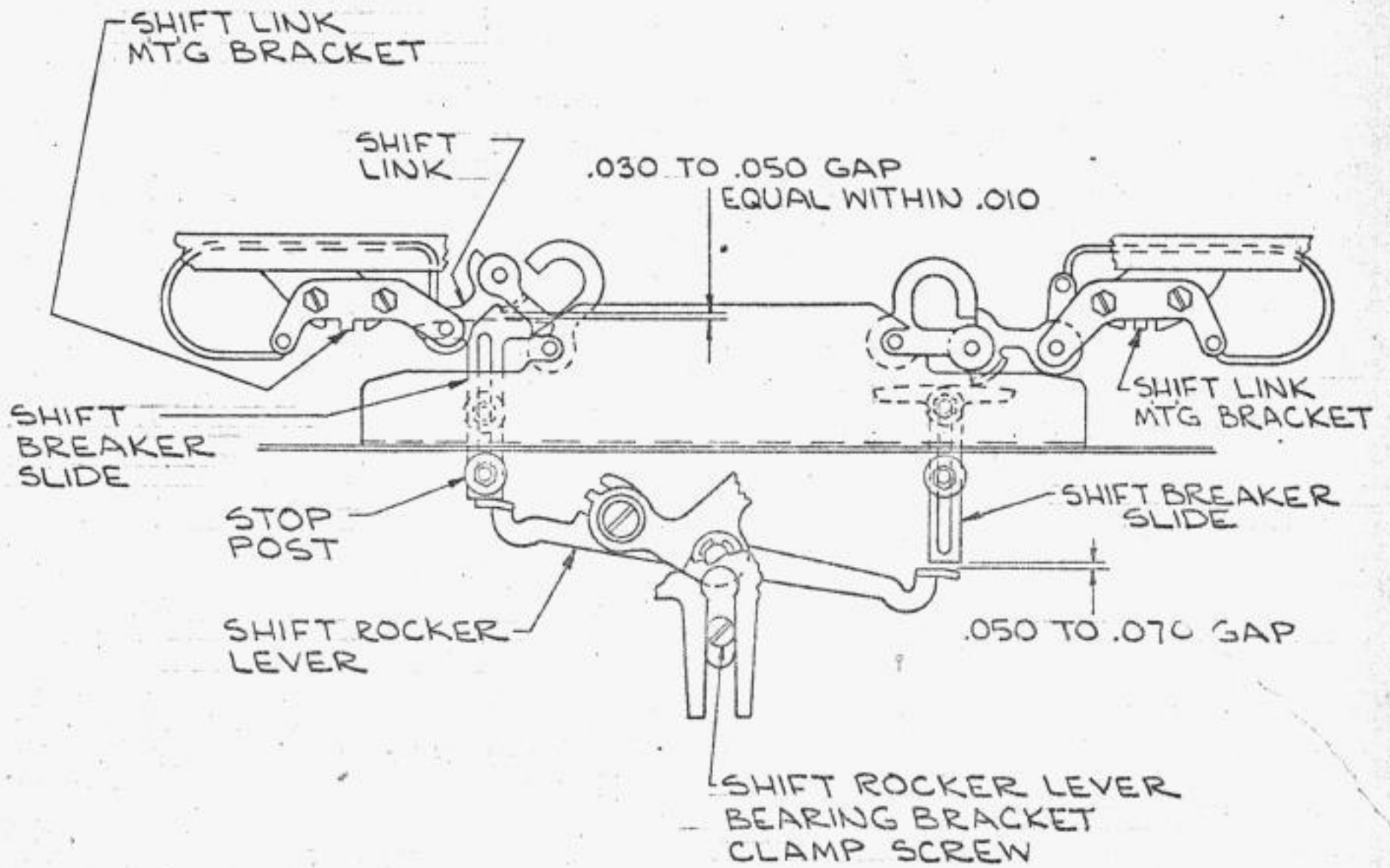


FIGURE # 7

Figure 8

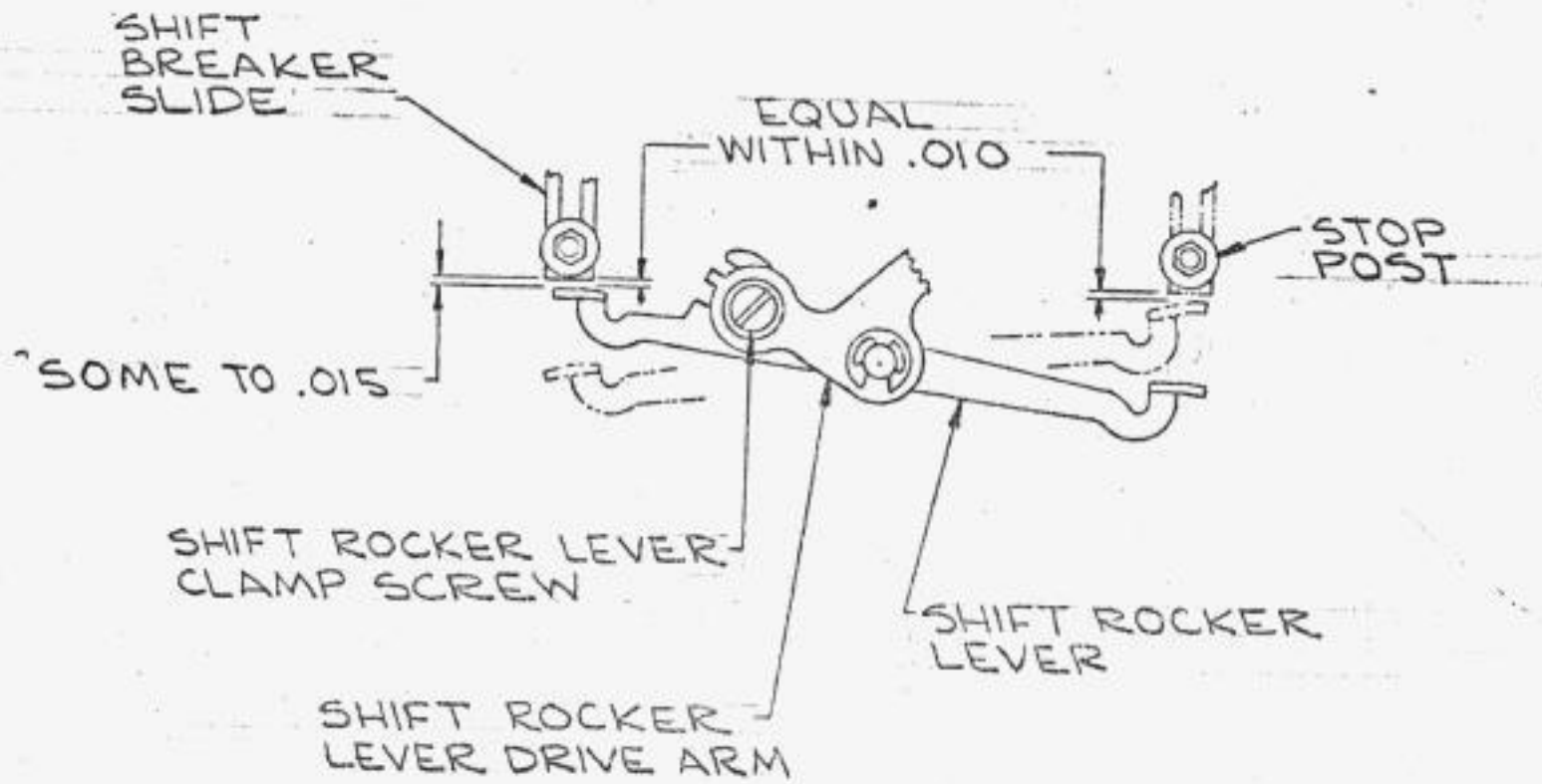


FIGURE # 8

VARIABLE ADJUSTMENTS CHART

NO.	1		2		3		4	5	6	7	8	9			10			11			12		13		14	
	LEFT HAND MARGIN	RIGHT HAND MARGIN (II)	AUTOMATIC CR - LF (III)	REC MARGIN	MARGIN CAM PLATE	FORM FEED						LINE FEED	UNSHIFT ON SPACE	MOTOR STOP	KEYBOARD LOOK	SPACE SUP. ON BLANK	PAGE FEED - OUT	179184 CLIP	154650 CLIP							
	FROM PAPER EDGE	CHAR. PER LINE	CHAR. SPACE OUT-OUT	RETURN DURING OPER.	ADJUST IN POS. TO PRINT CHAR.	TAKEN AT AMPS.	CHAR.	INCHES	SPACES	COND-ITON	CLIP POS.	CLIP POS.	CLIP POS.	CLIP POS.	CLIP POS.	CLIP POS.	CLIP POS.	CLIP POS.	CLIP POS.	CLIP POS.	CLIP POS.	CLIP POS.	CLIP POS.	CLIP POS.	CLIP POS.	
A	5/8	5	16	74	72	.020 SERIES	13 ± 1	2	SINGLE	DISABLE	22	X	35	X	22	X	22	X	22	X	22	X	22	X	22	X
B	1/2	5/8	57	76	74	.050 (PARALLEL)	33 ± 1	4	DOUBLE	ACTIVE	28	X	35	X	28	X	28	X	28	X	28	X	28	X	28	X
C	7/8	1	72	73	70	.030 SERIES	52 ± 2	7																		
D	NOTE III	75	76	73	71	.500 (PARALLEL)	67 ± 2	5 1/2																		
E	NOTE X	NOTE II	NOTE II	37	36		17 ± 1																			
F	NOTE III	NOTE III	NOTE III		73		44 ± 2																			
G		70	71				33 ± 1																			
H		49	50				74 ± 1																			
J	3/4	1/2	NOTE XIII				40 ± 2																			
K		65	66				60																			
L		21	22				16 ± 2	4 1/4																		
M	3/8	1/8	46	47			79 ± 2																			
N		48	49																							
P	3/8	3/8	84	85	22	20	40 ± 2	3 1/2																		
Q		72	72																							
R	9/16	5/16	80	81			75 ± 2																			

NOTES

I REFER TO UNIT BILL OF MATERIAL FOR ADJUSTMENT SETTING.

II RIGHT MARGIN ADJUSTMENT IS CHARACTERS - 5 CHARACTERS PER INCH (PAPER IS 4 1/4 IN. WIDE) ADJUST LAST CHARACTER 6 1/8 INCHES FROM LEFT EDGE OF PLATEN.

III LEFT MARGIN ADJUSTMENT 1 INCH AVERAGE FROM LEFT EDGE OF PAPER. ADJUST 1ST CHARACTER 2 13/16 INCHES TO THE LEFT OF CHARACTER PRINTED IN ADJUSTMENT (III).

IV RIGHT MARGIN ADJUSTMENT 35 CHARACTERS - 5 CHARACTERS PER INCH. ADJUST LAST CHARACTER 7 1/8 INCHES FROM LEFT EDGE OF PLATEN.

V LEFT MARGIN ADJUSTMENT 1 INCH AVERAGE FROM LEFT EDGE OF PAPER. ADJUST FIRST CHARACTER 5.8 INCHES TO THE LEFT OF CHARACTER PRINTED IN ADJUSTMENT (III).

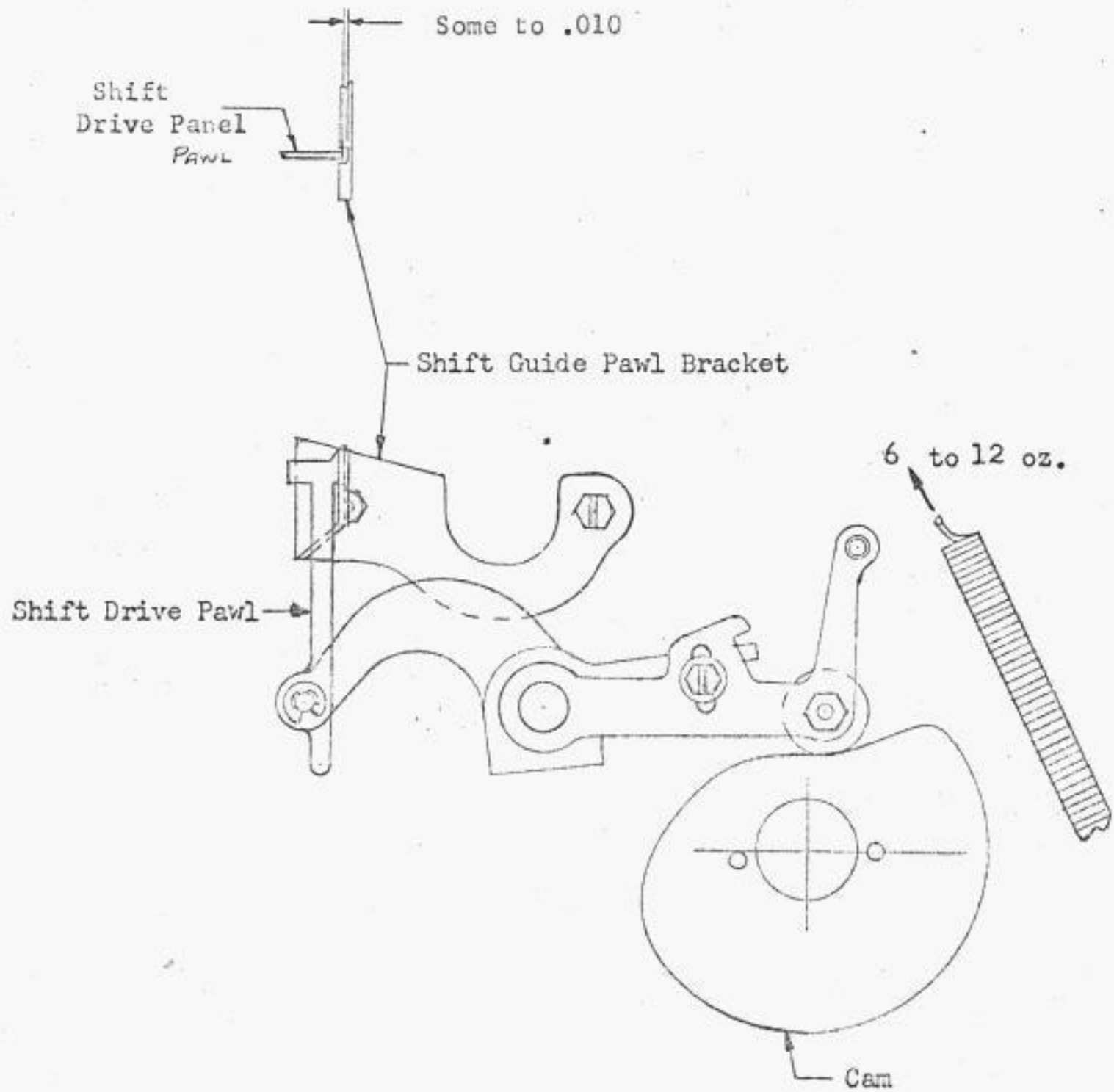
VI RIGHT HAND MARGIN ADJUSTMENT NOT REQUIRED WHEN AUTOMATIC CR & LF ADJUSTMENT IS MADE.

VII MARGIN CAM PLATE ADJUSTMENT IS USED TO CONTROL AUTO - CR AND L.F. WHEN 153911 MOD. KIT FOR CONTINUOUS SPACING AND TRIPLE L.F. IS USED.

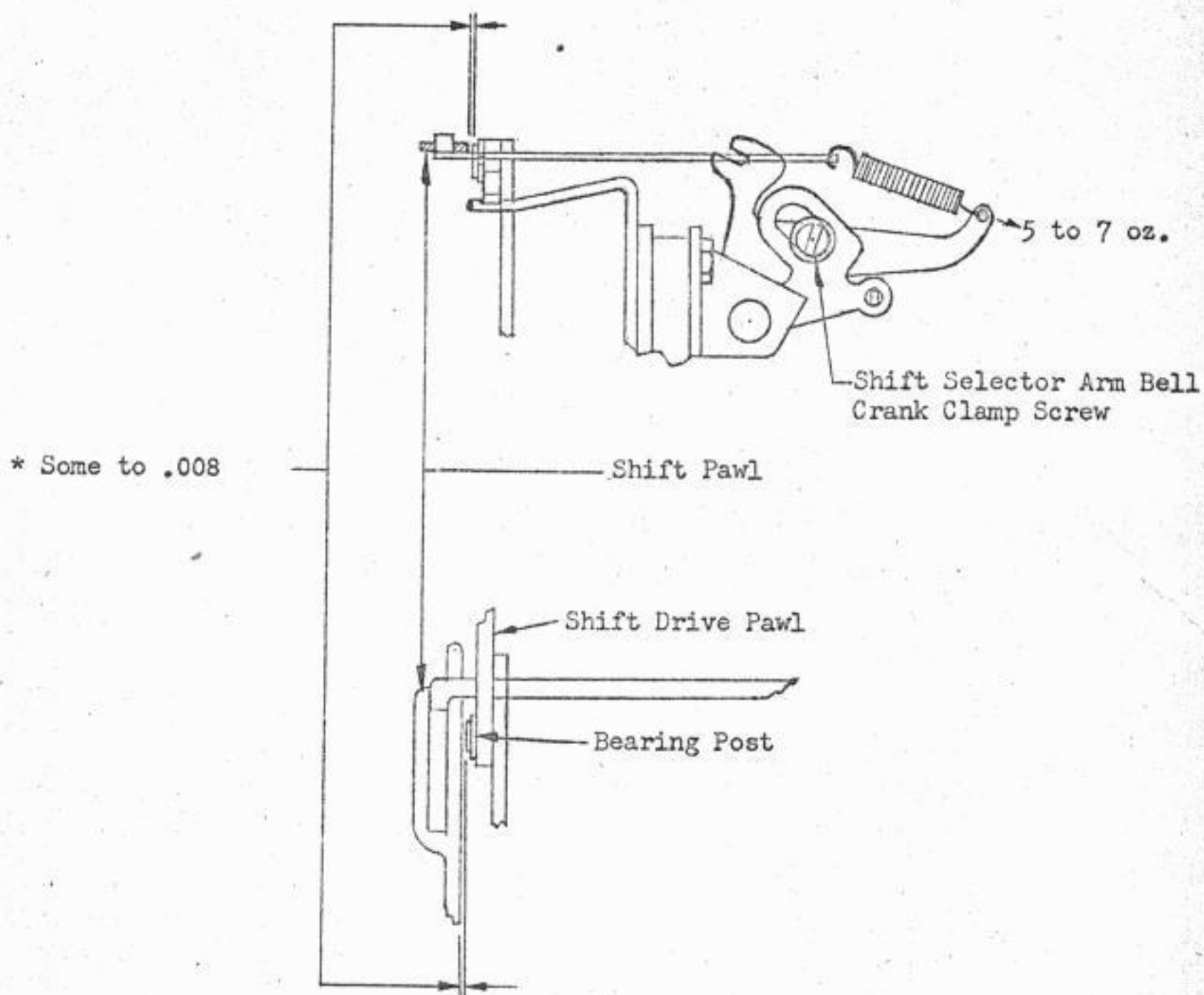
VIII RIGHT HAND MARGIN ADJUSTMENT. 44 CHARACTERS - 6 CHARACTERS PER INCH.

IX DUE TO WADS SYSTEM REQUIREMENTS THESE ADJUSTMENTS ARE NOT VARIABLE AND MUST BE MADE ACCORDING TO THE FOLLOWING LP 805 - 1A, 2Q, 4D, 5D, 6D, 7A, 14A LP 806 - 1B, 2Q, 4D, 5D, 7A, 14A

↑ APPLIES TO BELL UNITS ONLY

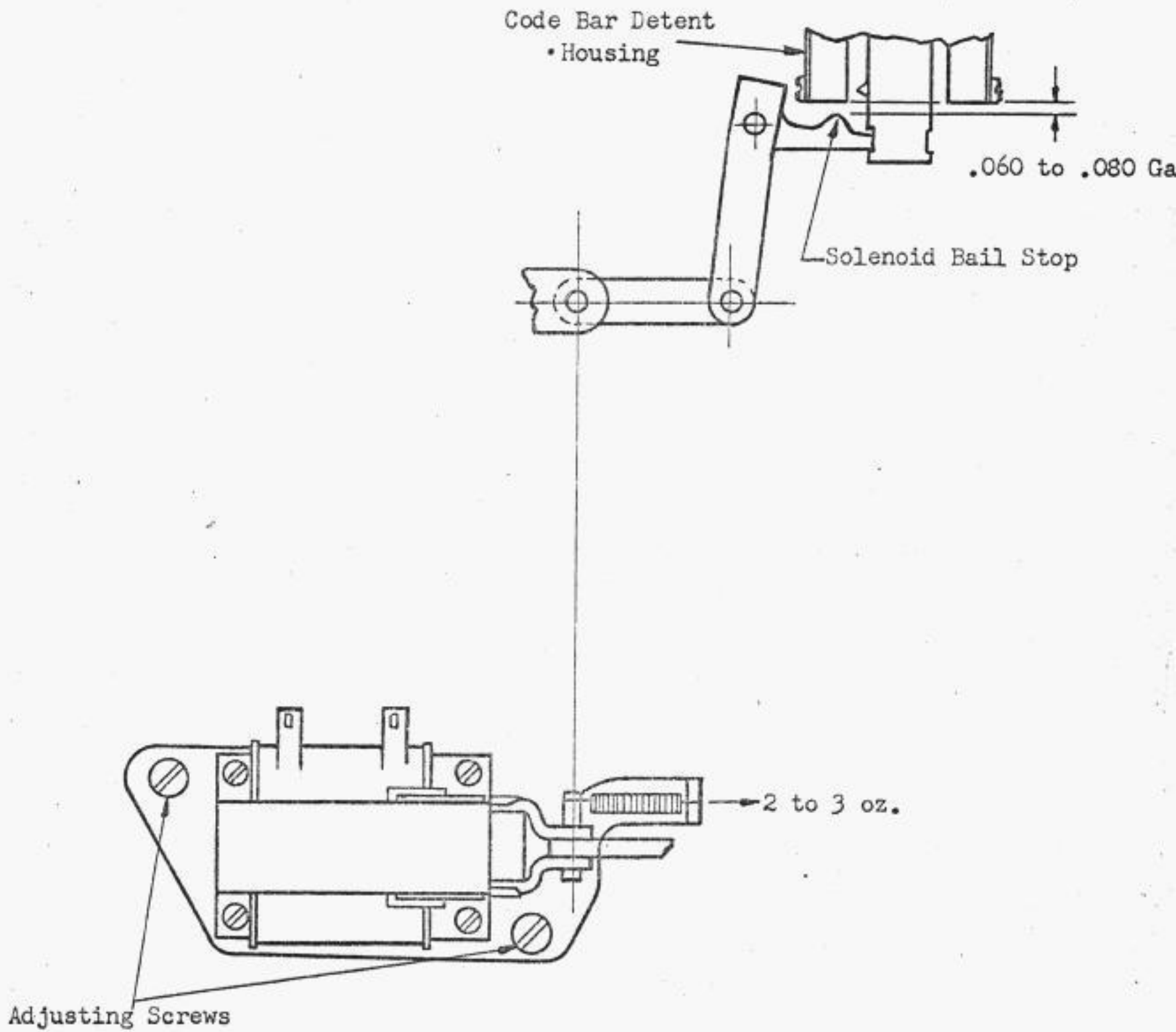


SHIFT DRIVE PAWL GUIDE
BRACKET ADJUSTMENT

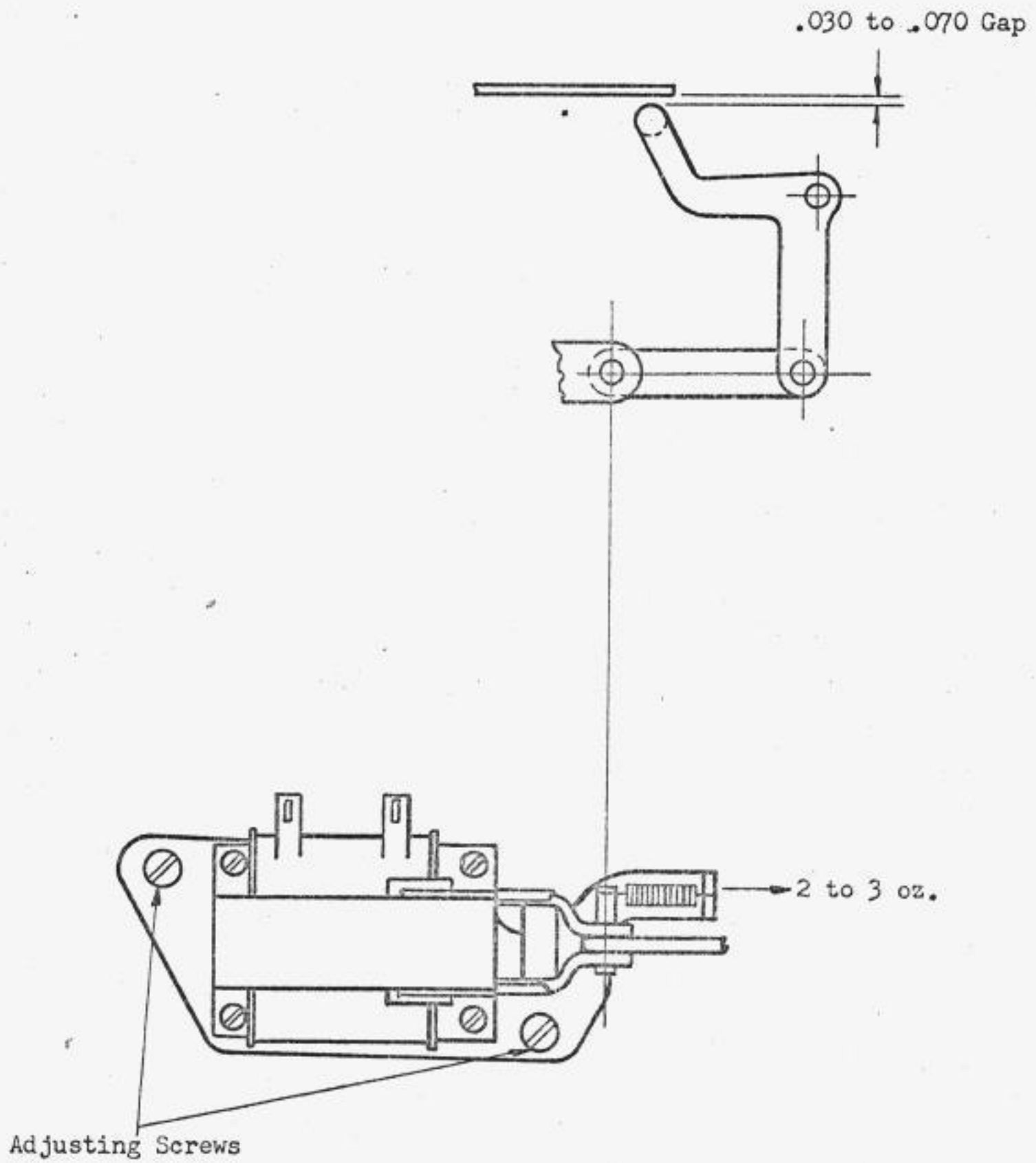


SHIFT SELECTOR ARM BELL
CRANK ADJUSTMENT

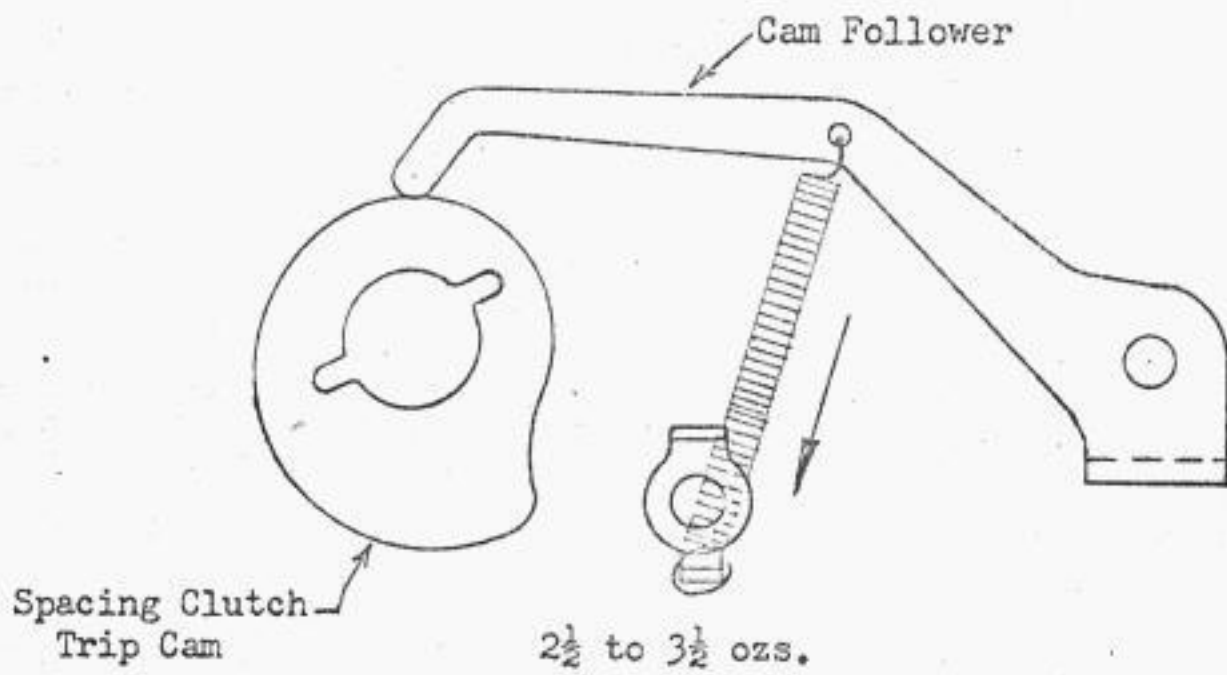
UPPER SOLENOID ADJUSTMENT



LOWER SOLENOID ADJUSTMENT



SPACING CLUTCH TRIP CAM
FOLLOWER SPRING TENSION



STABILIZING SPRING TENSION

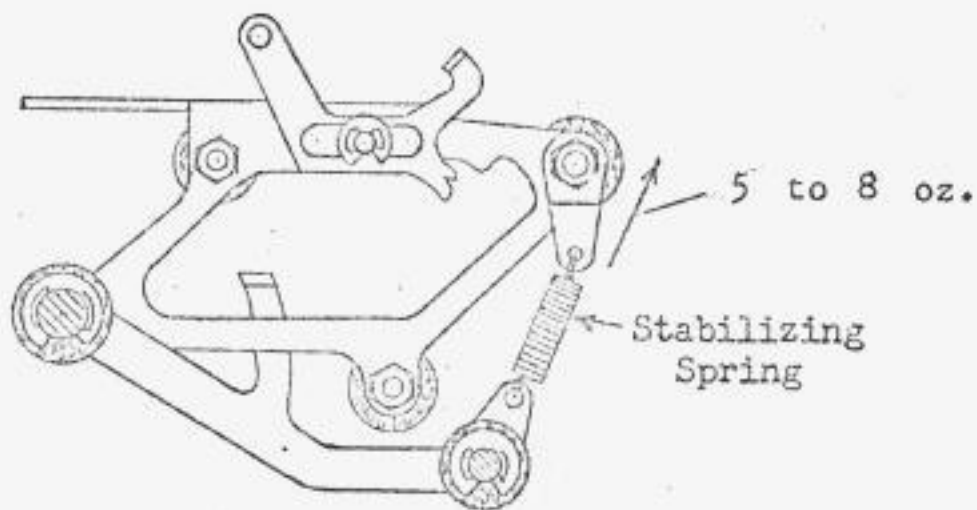


Figure 16

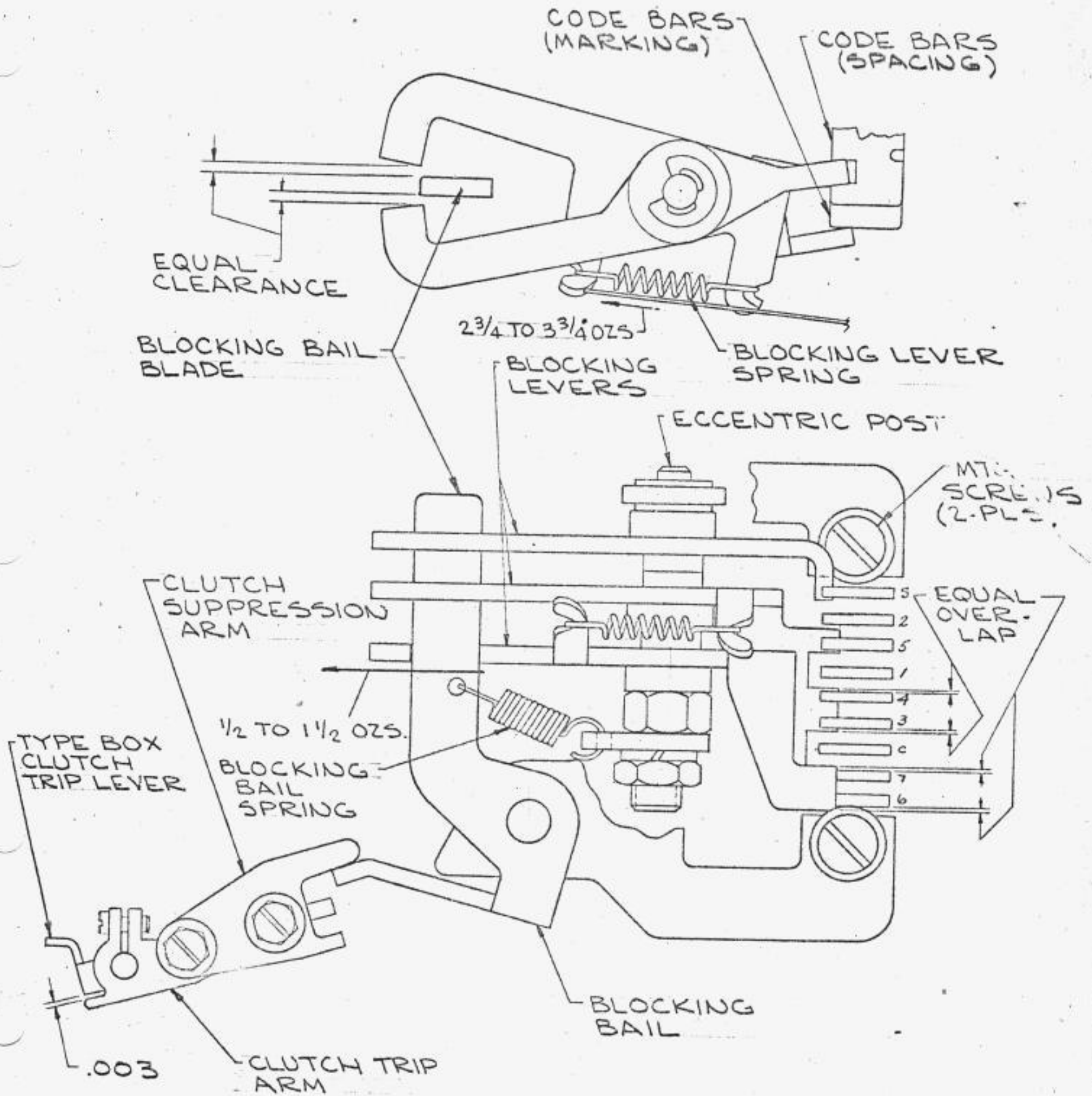


FIGURE #16

Figure 17

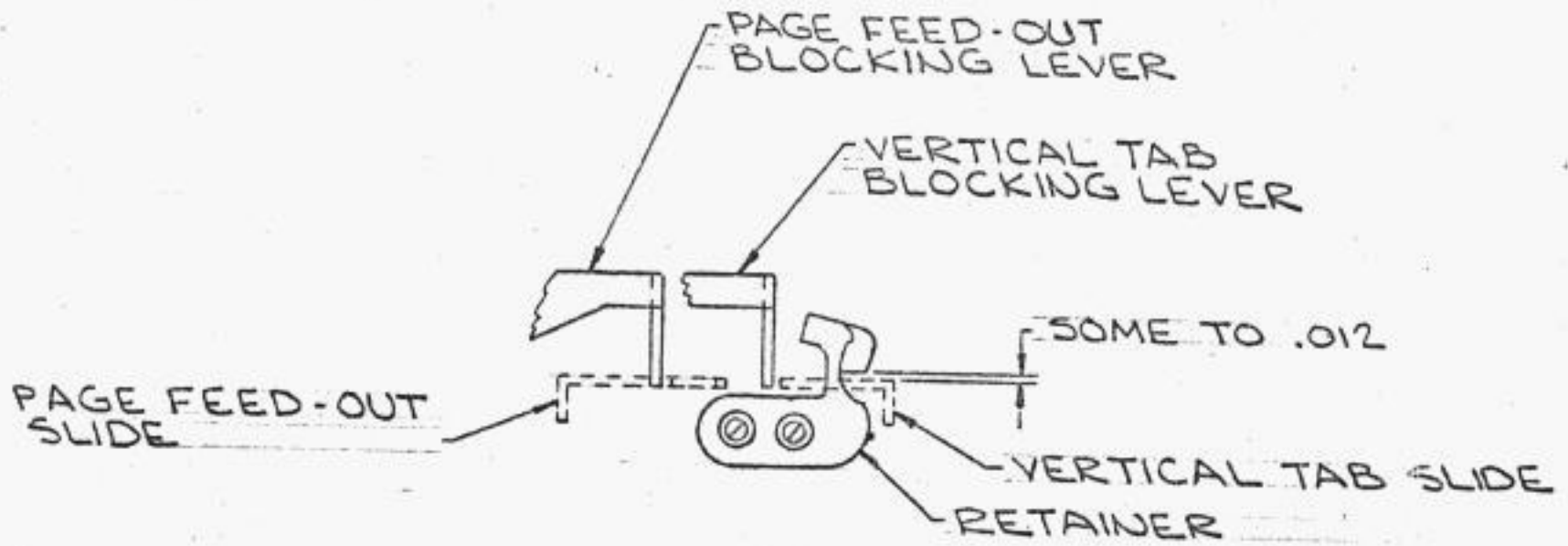


FIGURE #17

Figure 18

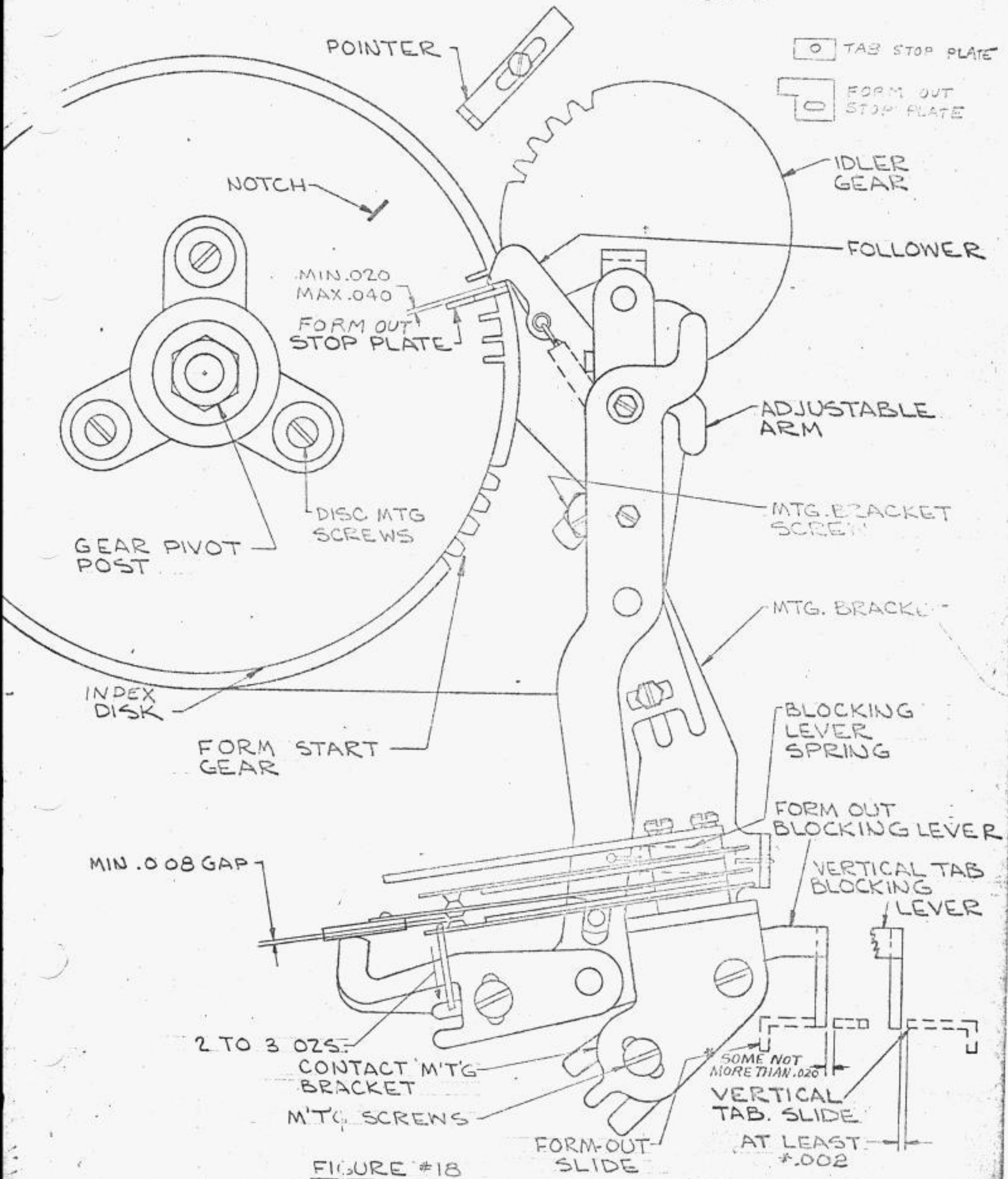


Figure 19

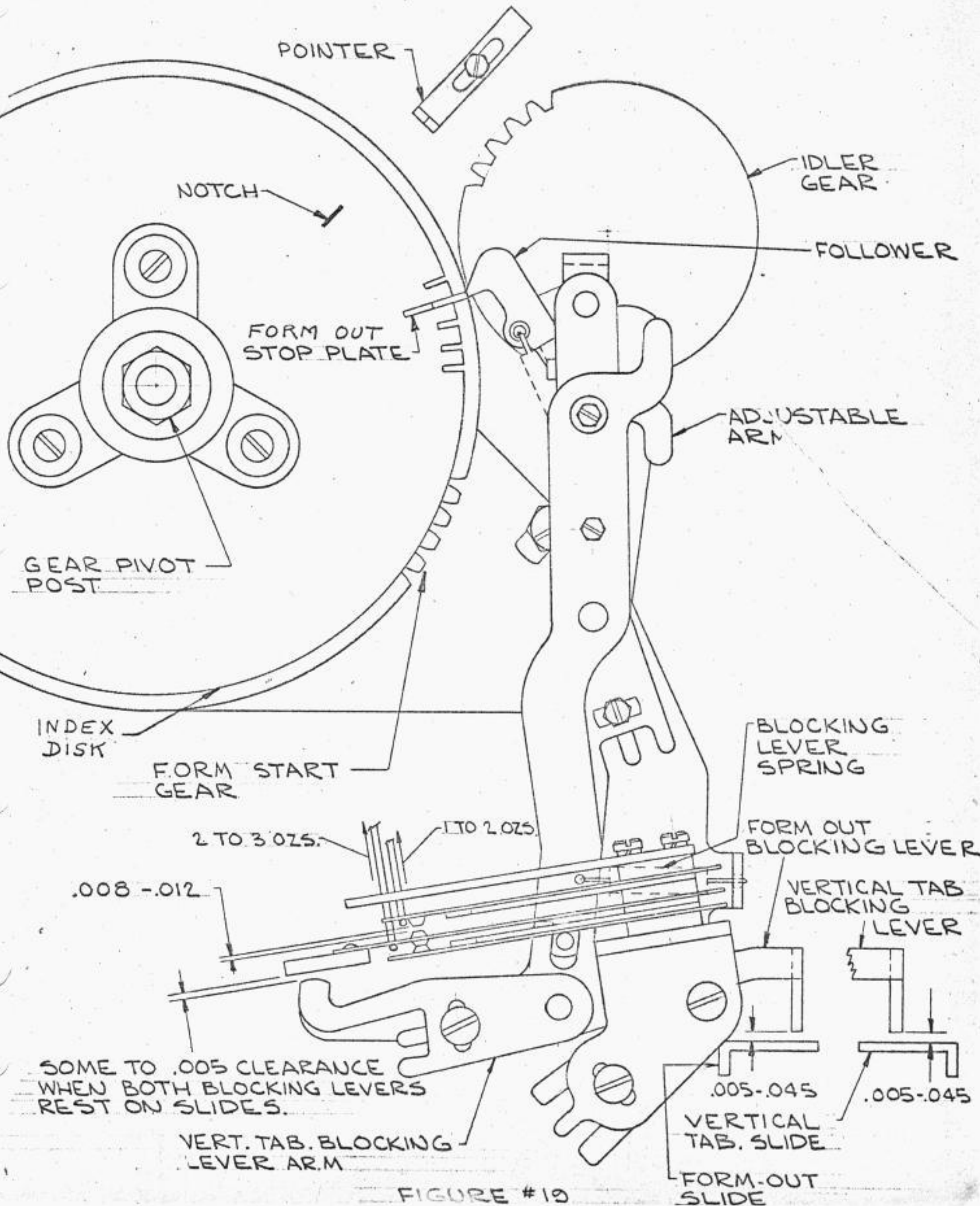


Figure 20

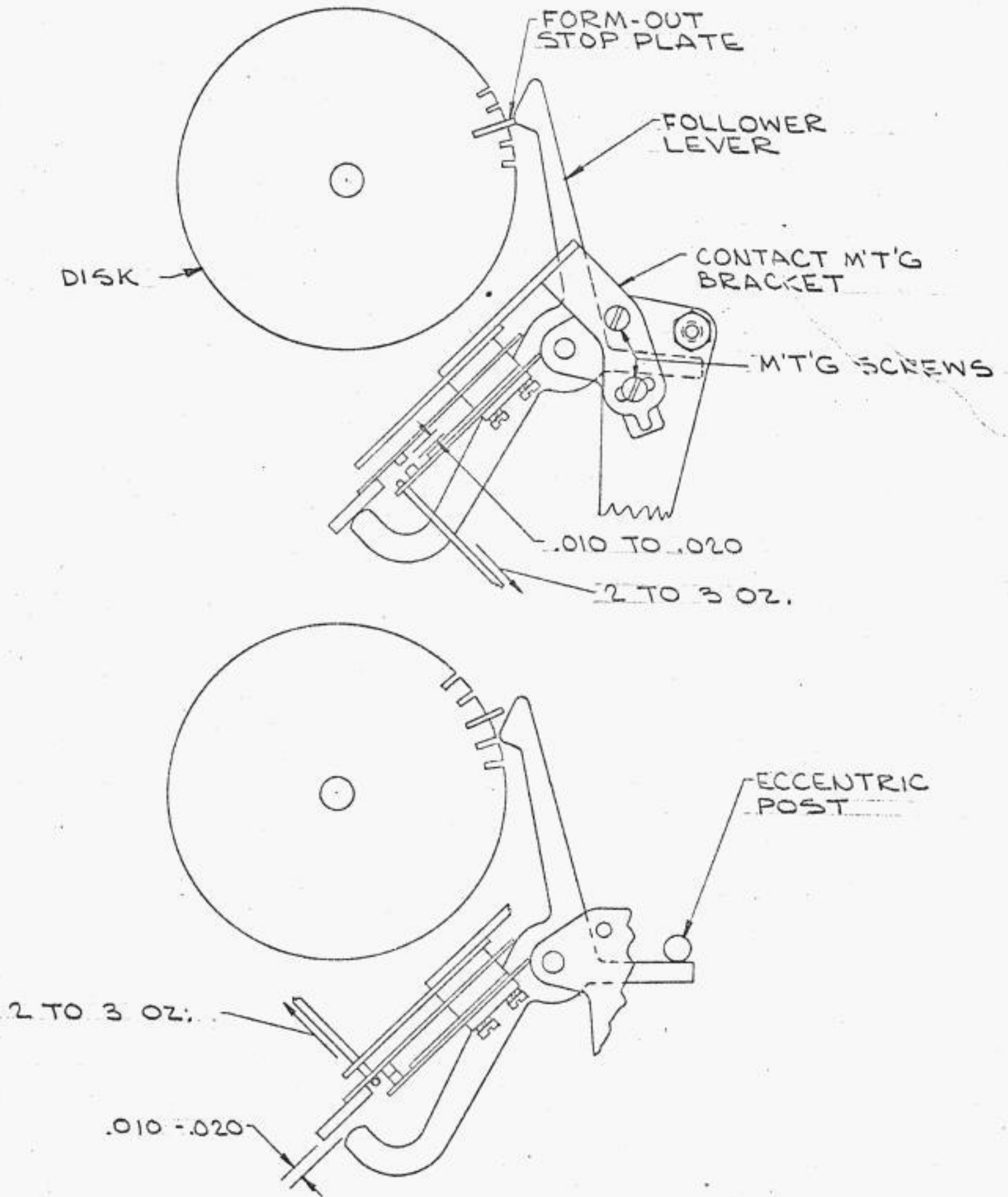


FIGURE # 20

Figure 21

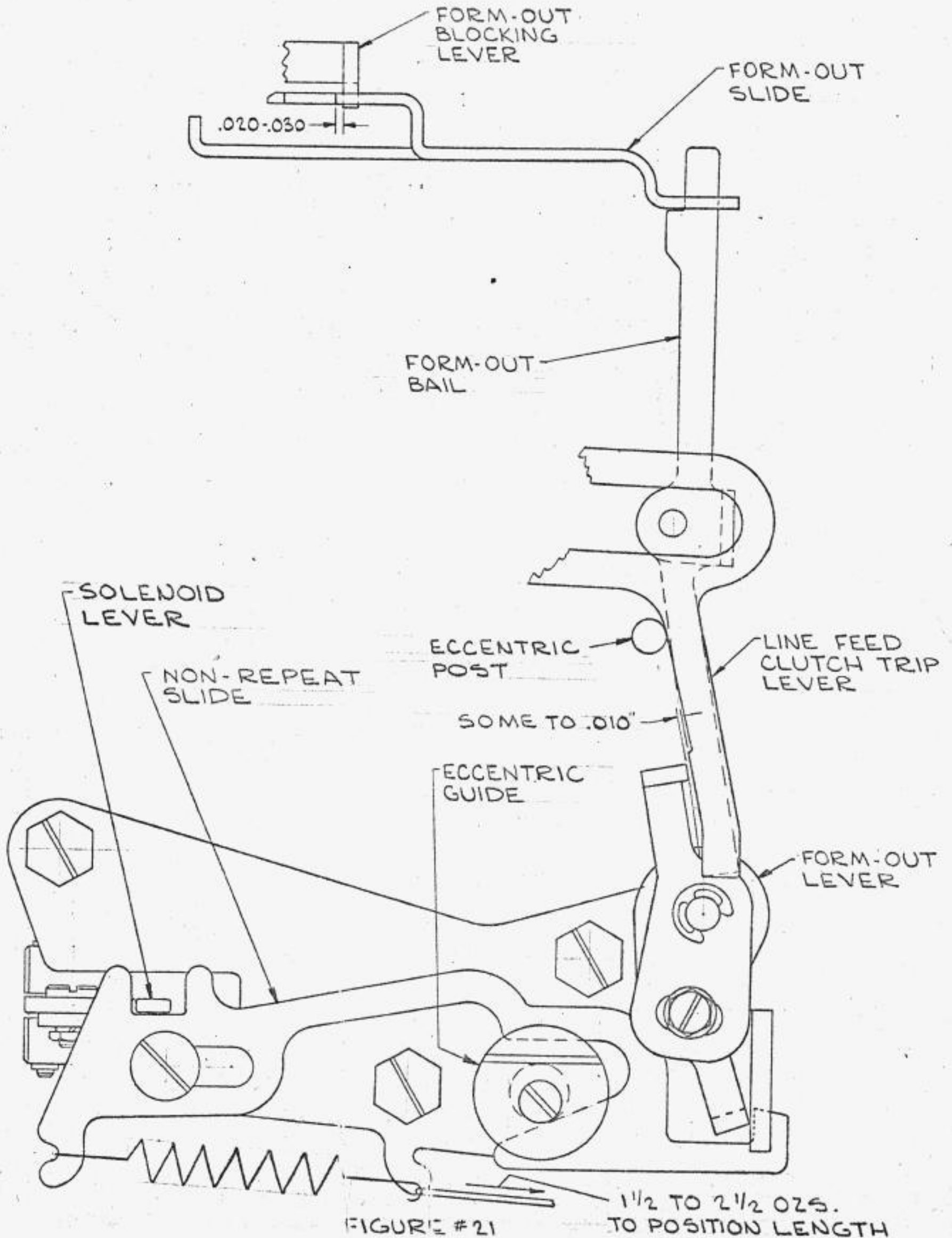


Figure 22

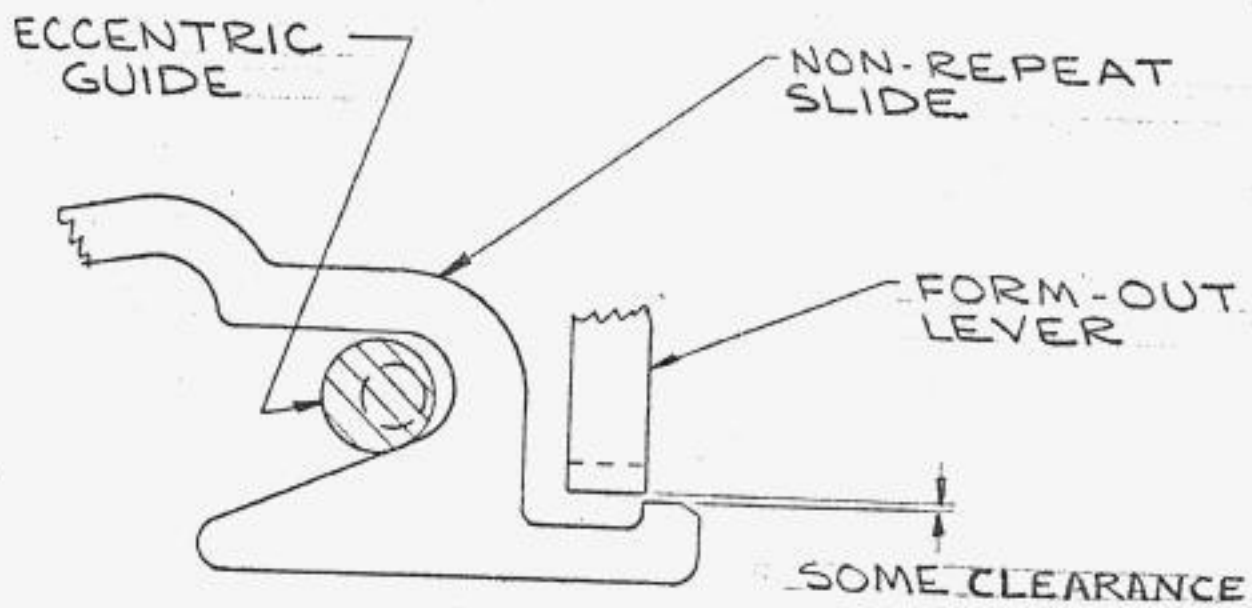
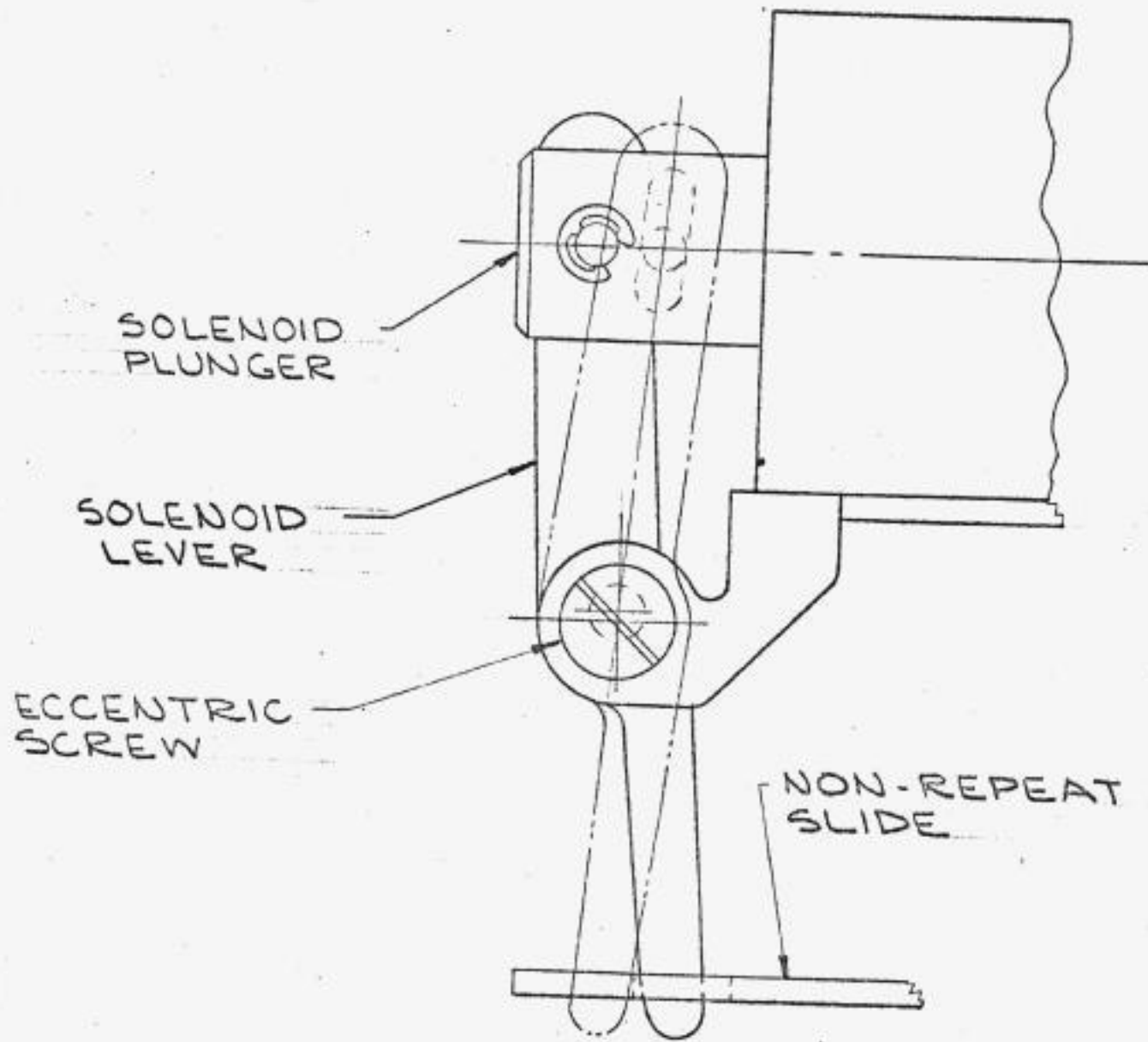


FIGURE #22

Figure 23

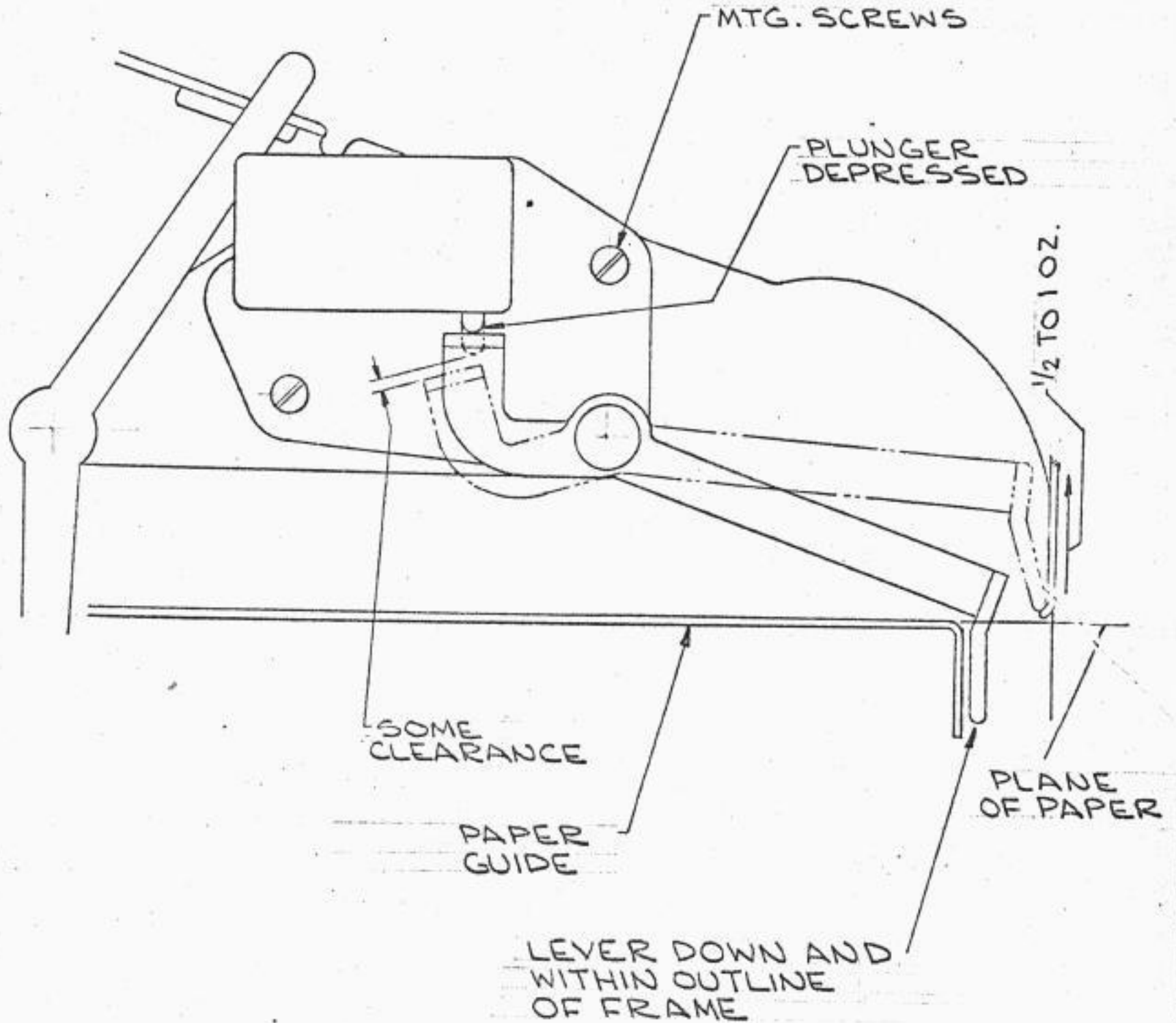


FIGURE #23

FIGURE 24

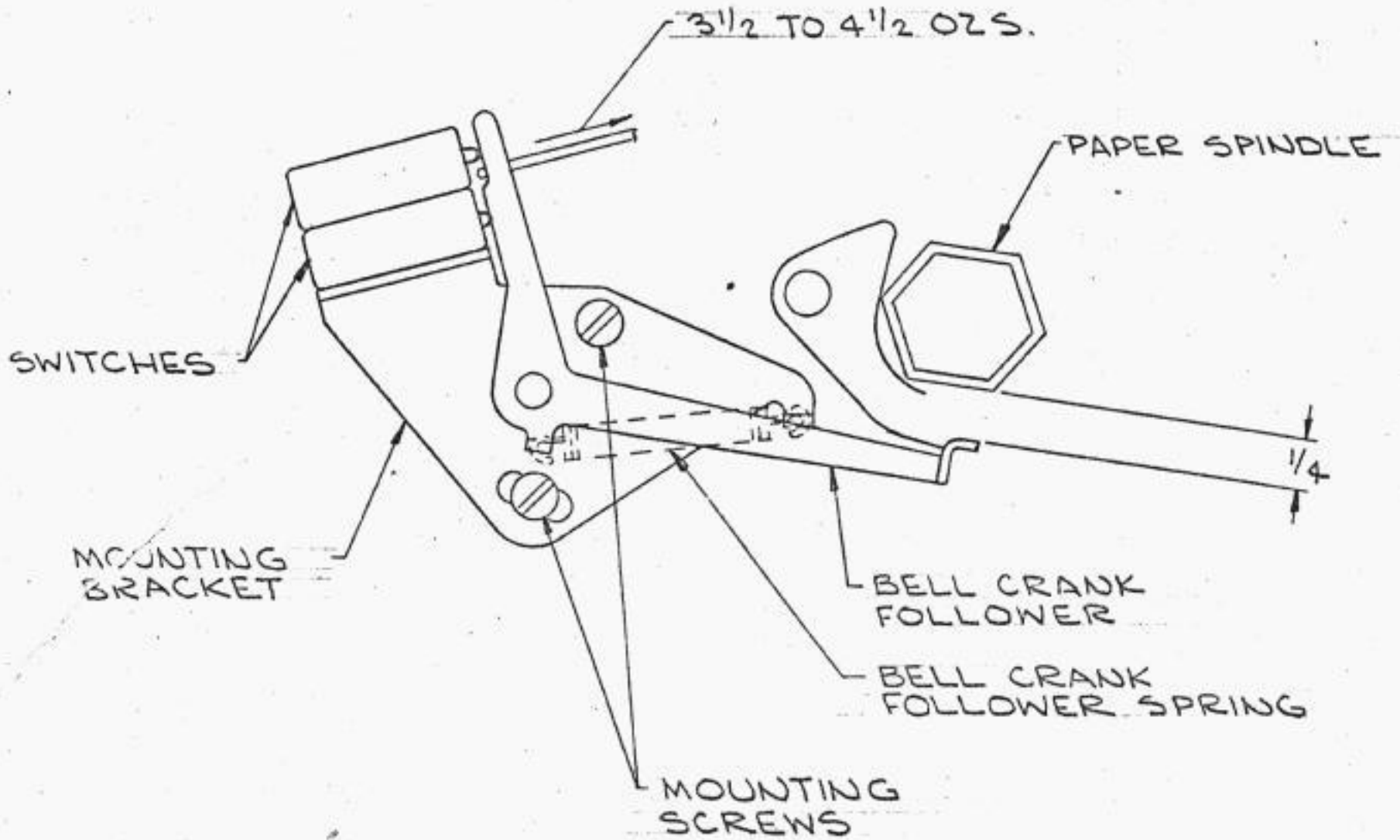


FIGURE # 24

Figure 25 and 26

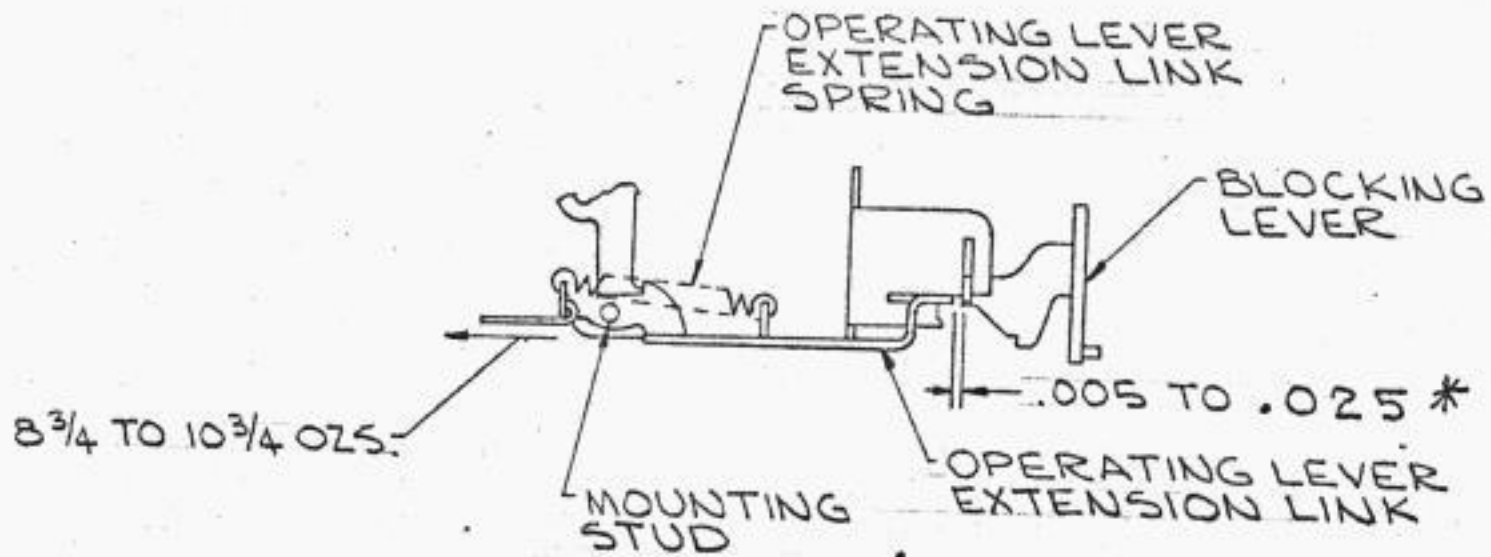


FIGURE #25

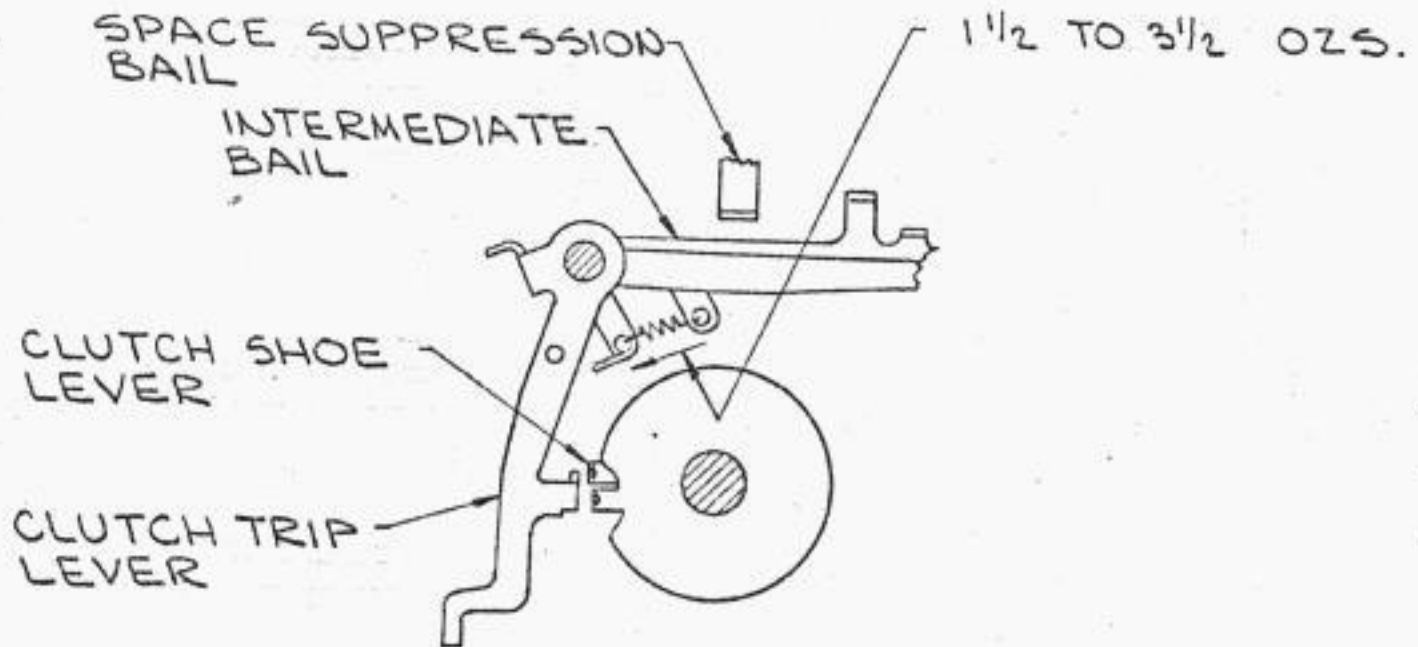


FIGURE #26

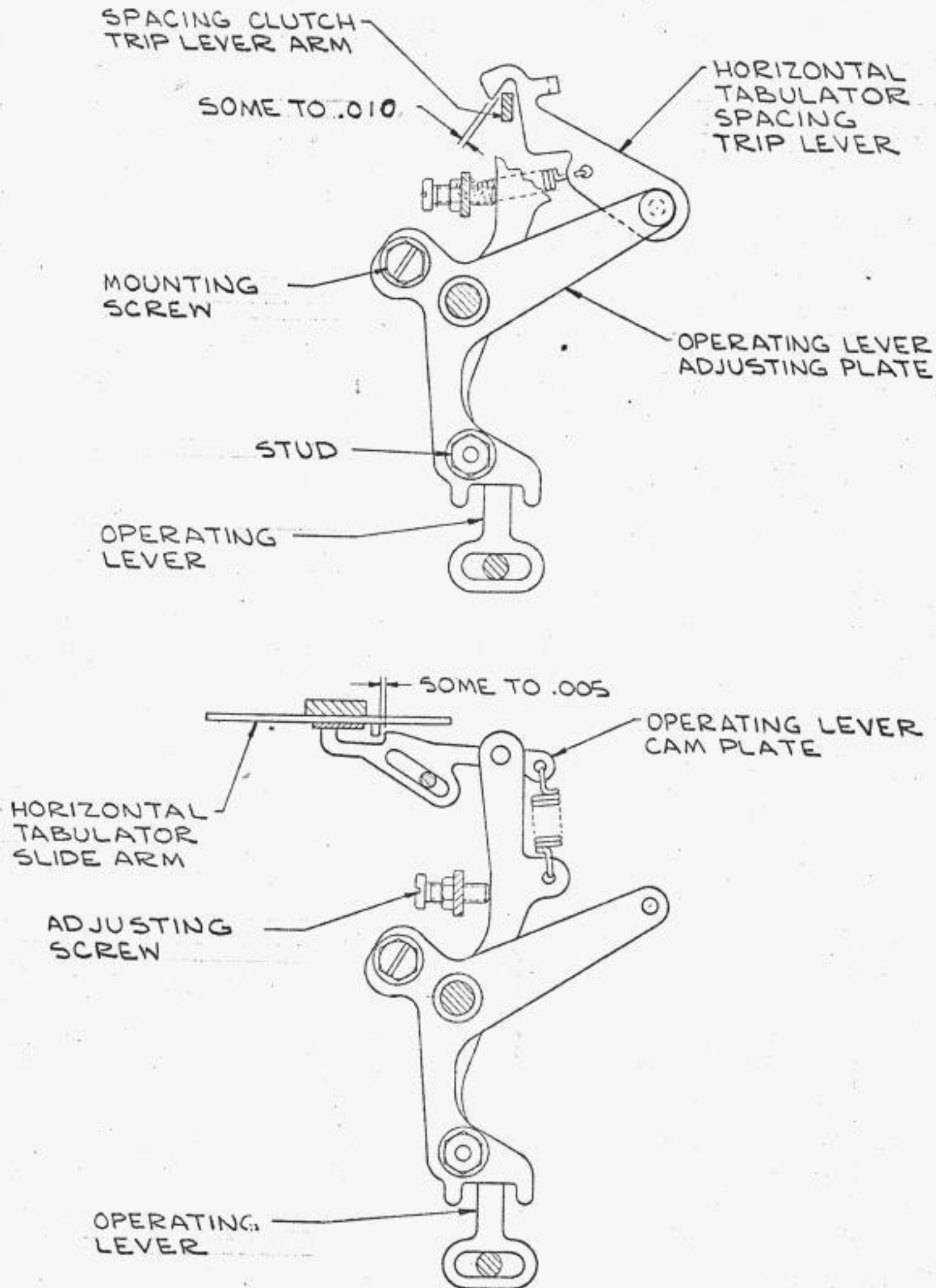


FIGURE #27

Figures 28 and 29

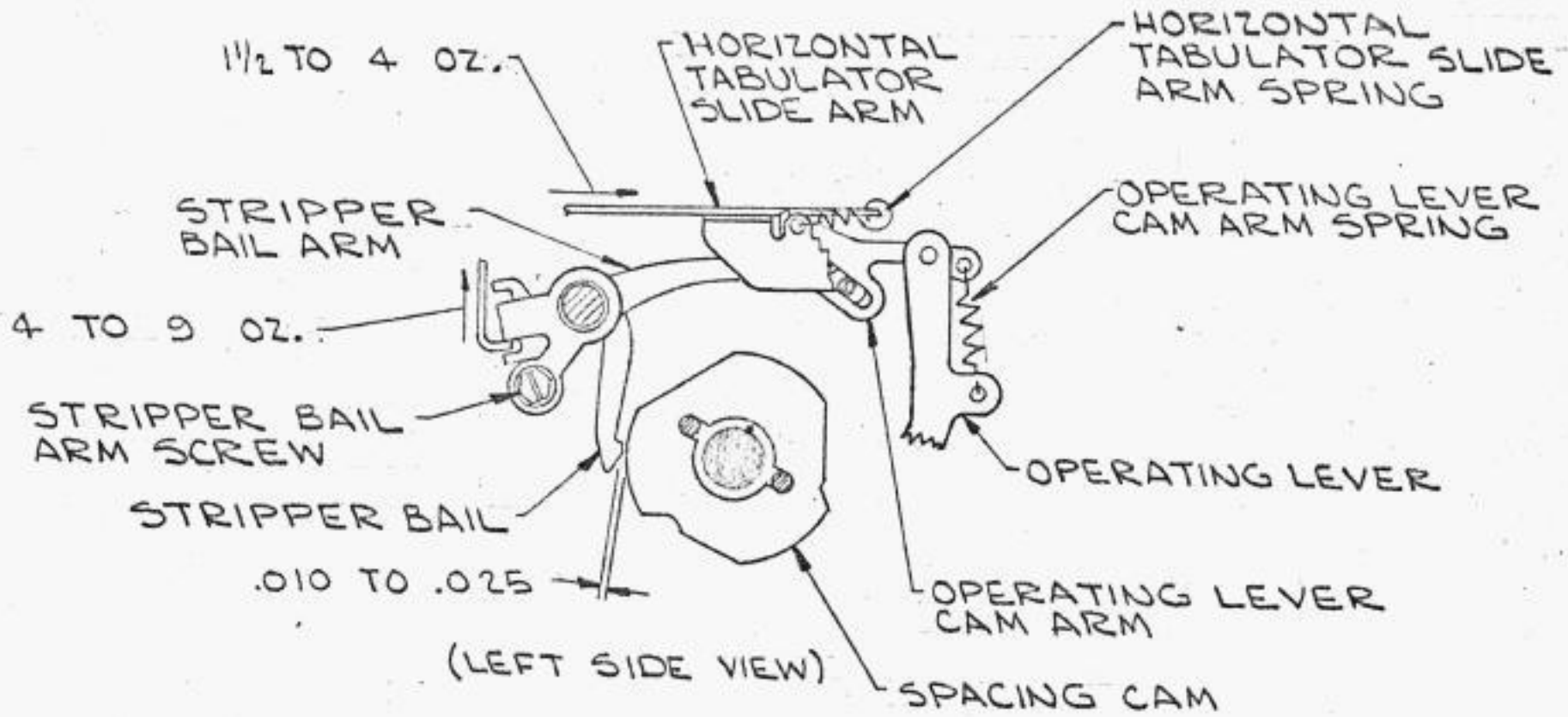


FIGURE # 28

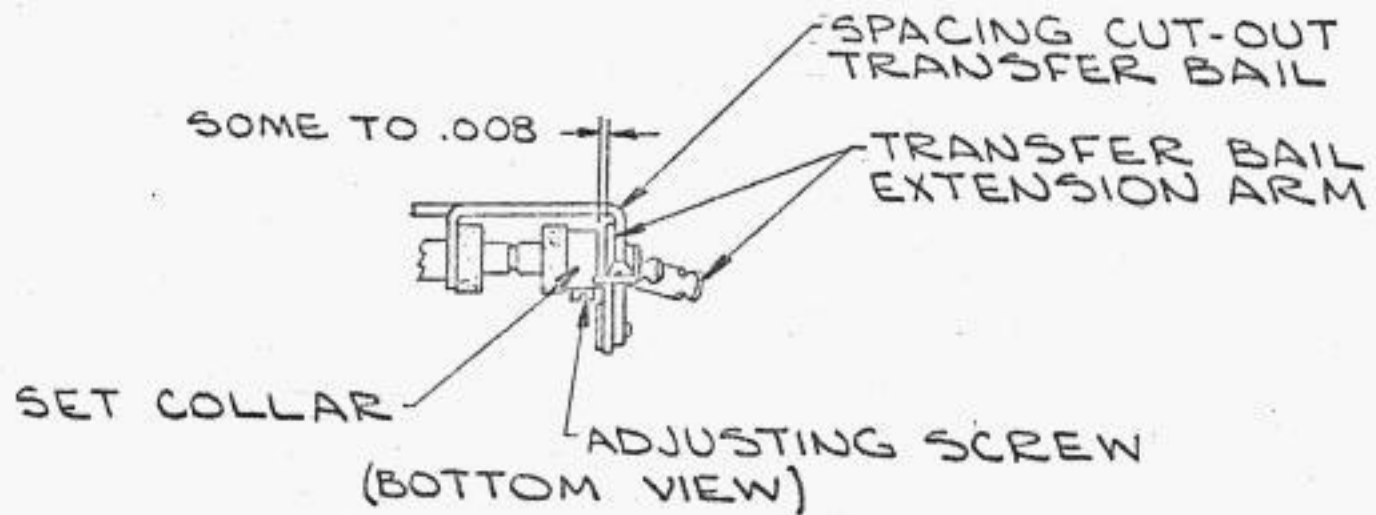


FIGURE # 29

Figure 30

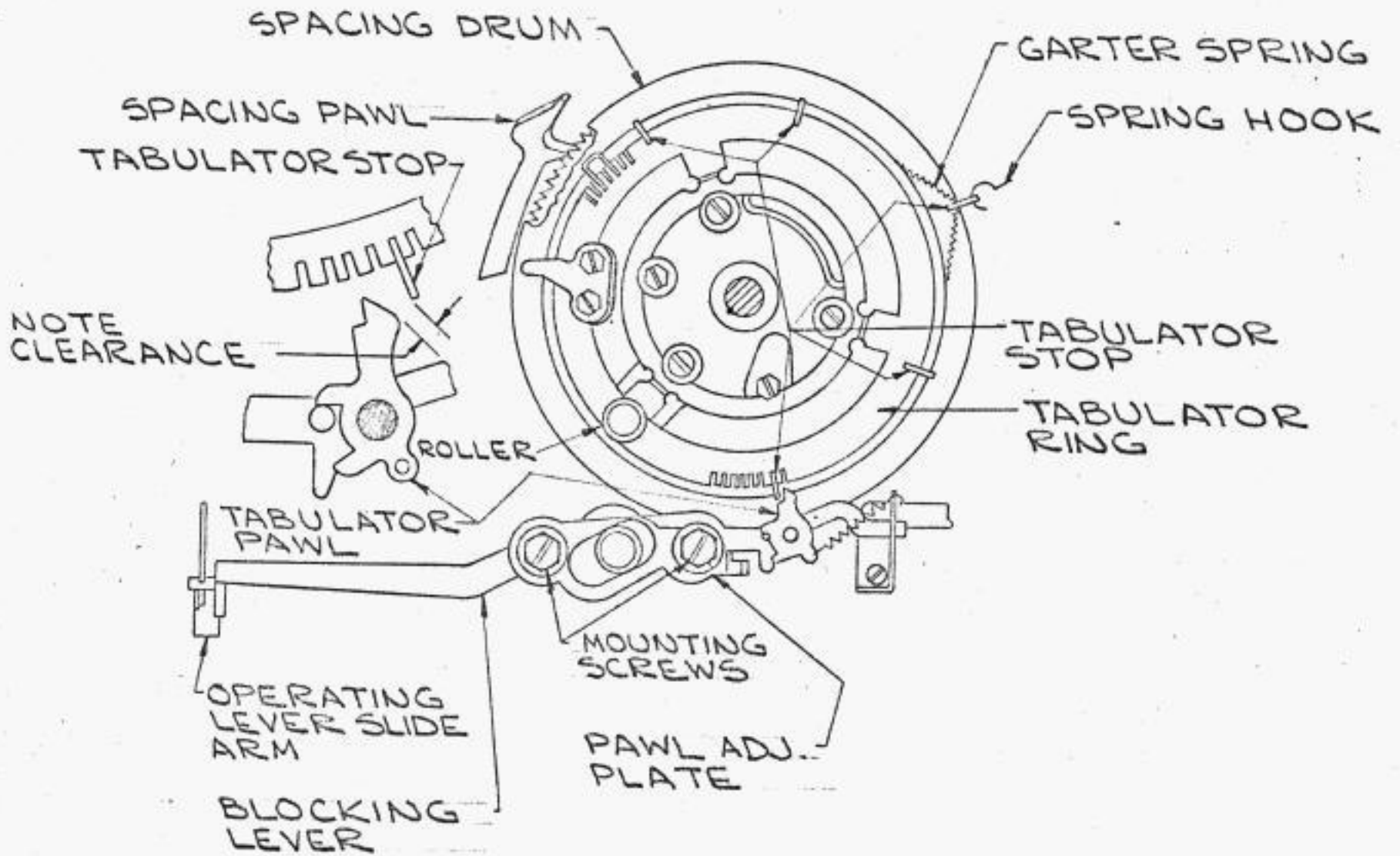


FIGURE #30

Figures 31 and 32

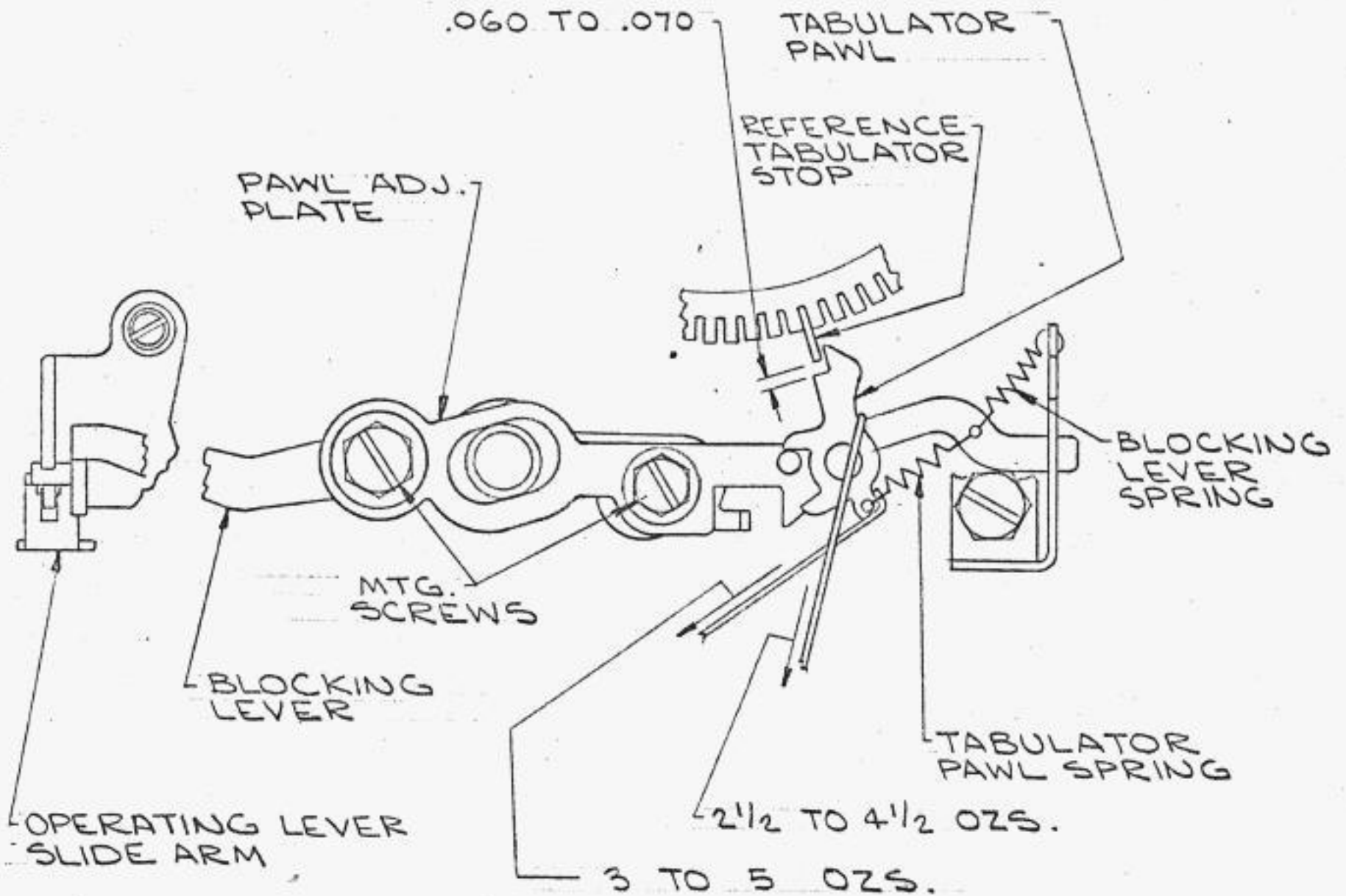


FIGURE # 31

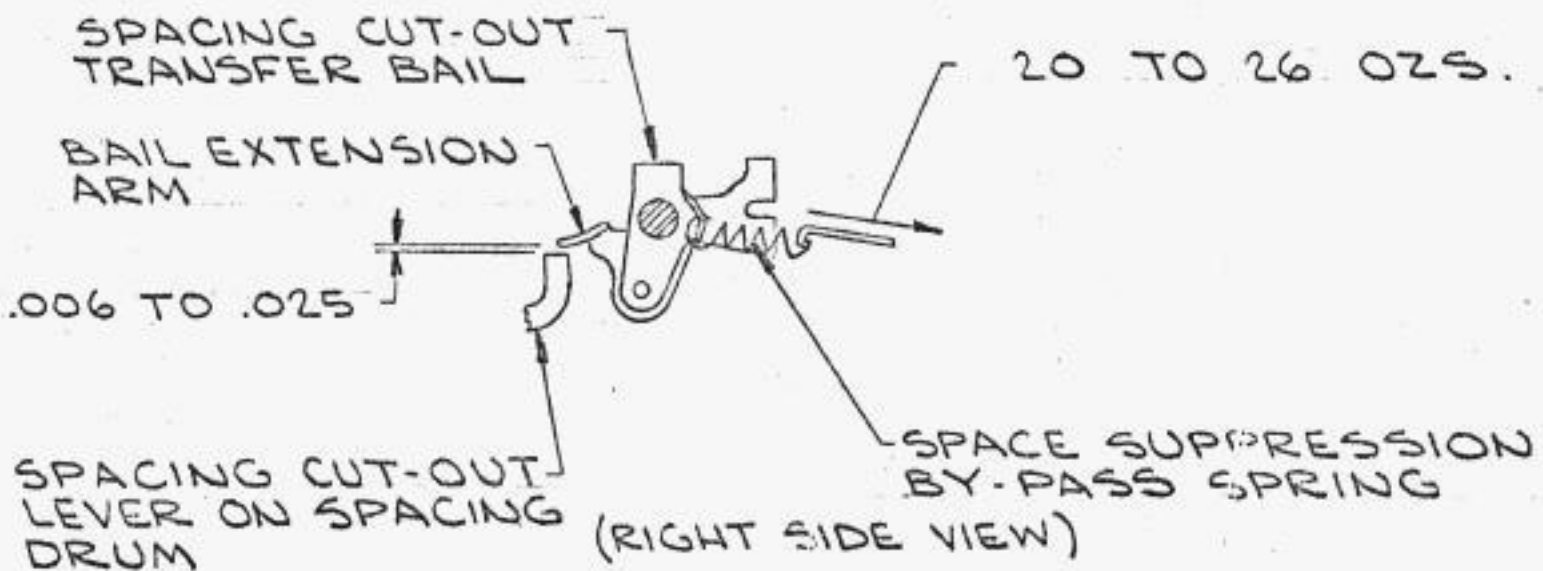


FIGURE # 32

Figures 33 & 34

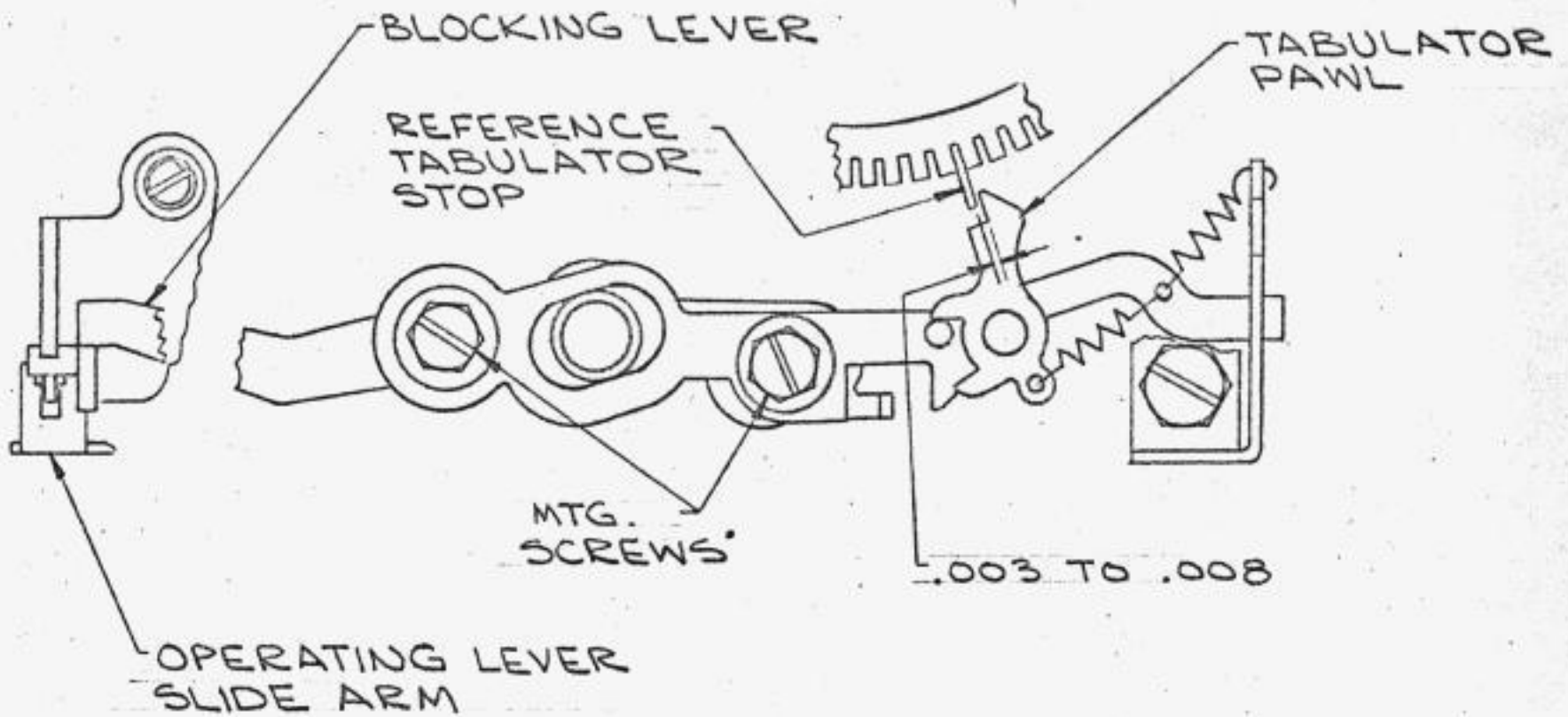


FIGURE #33

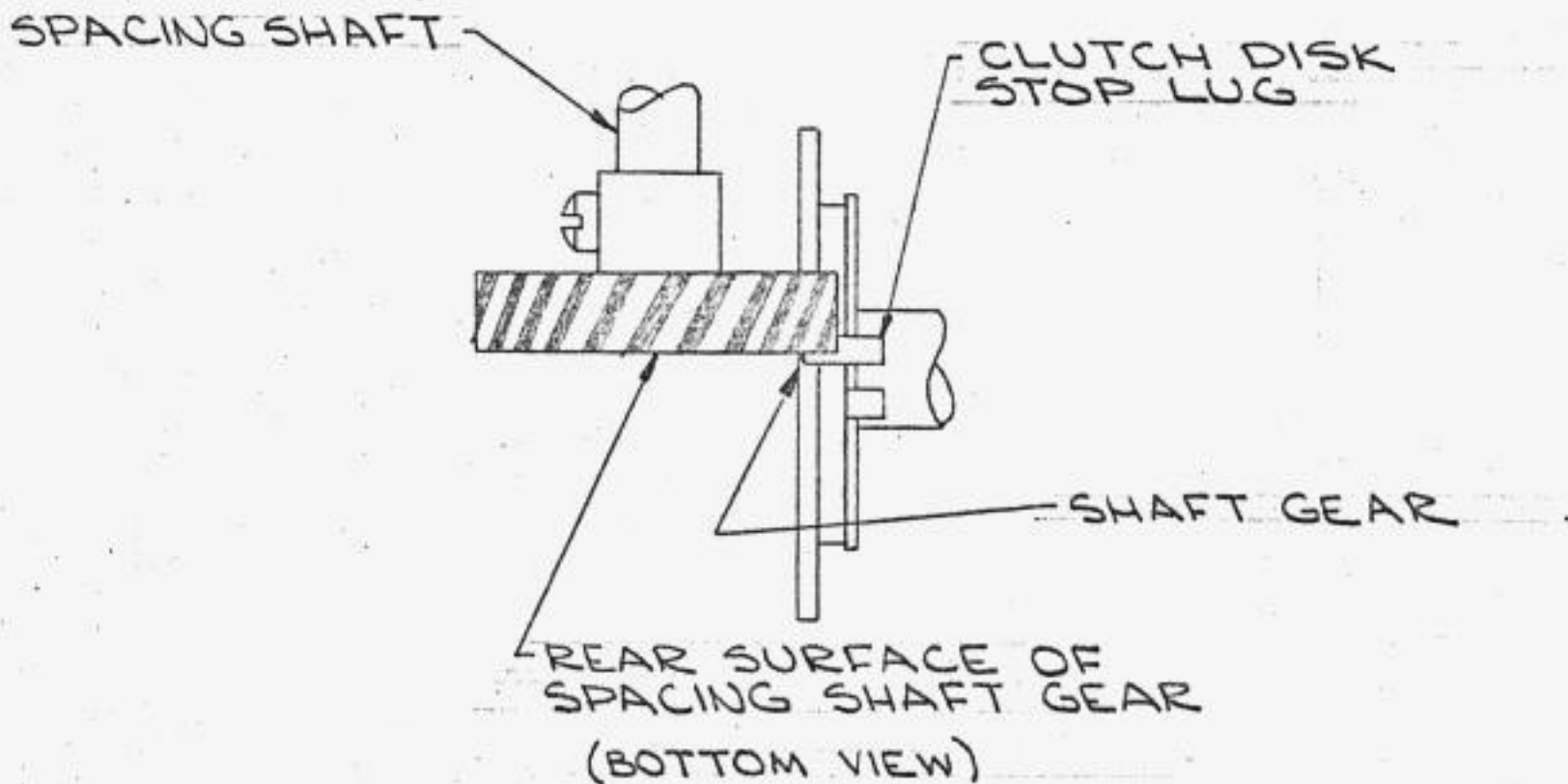


FIGURE #34

Figures 35 & 36

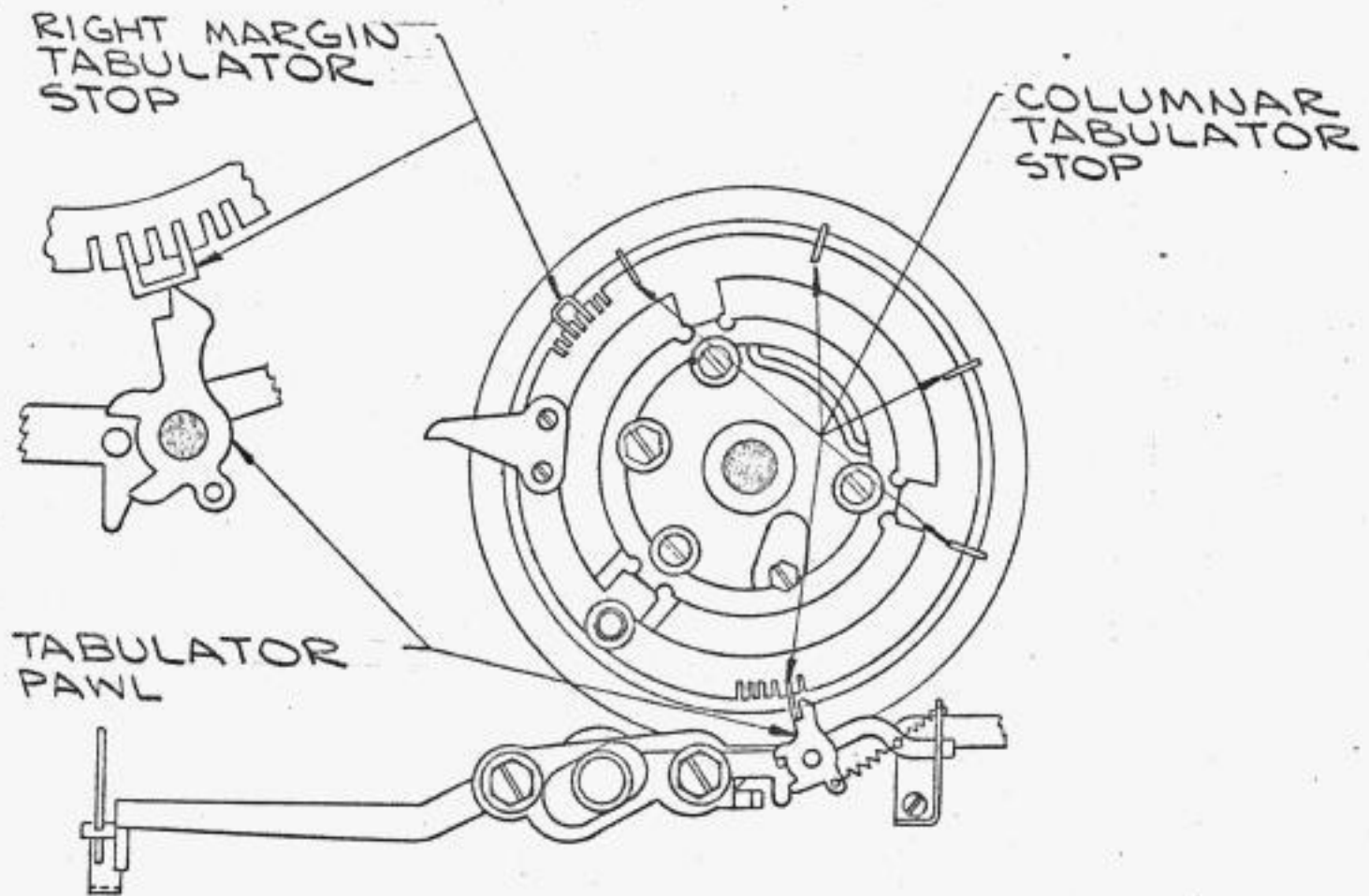


FIGURE # 35

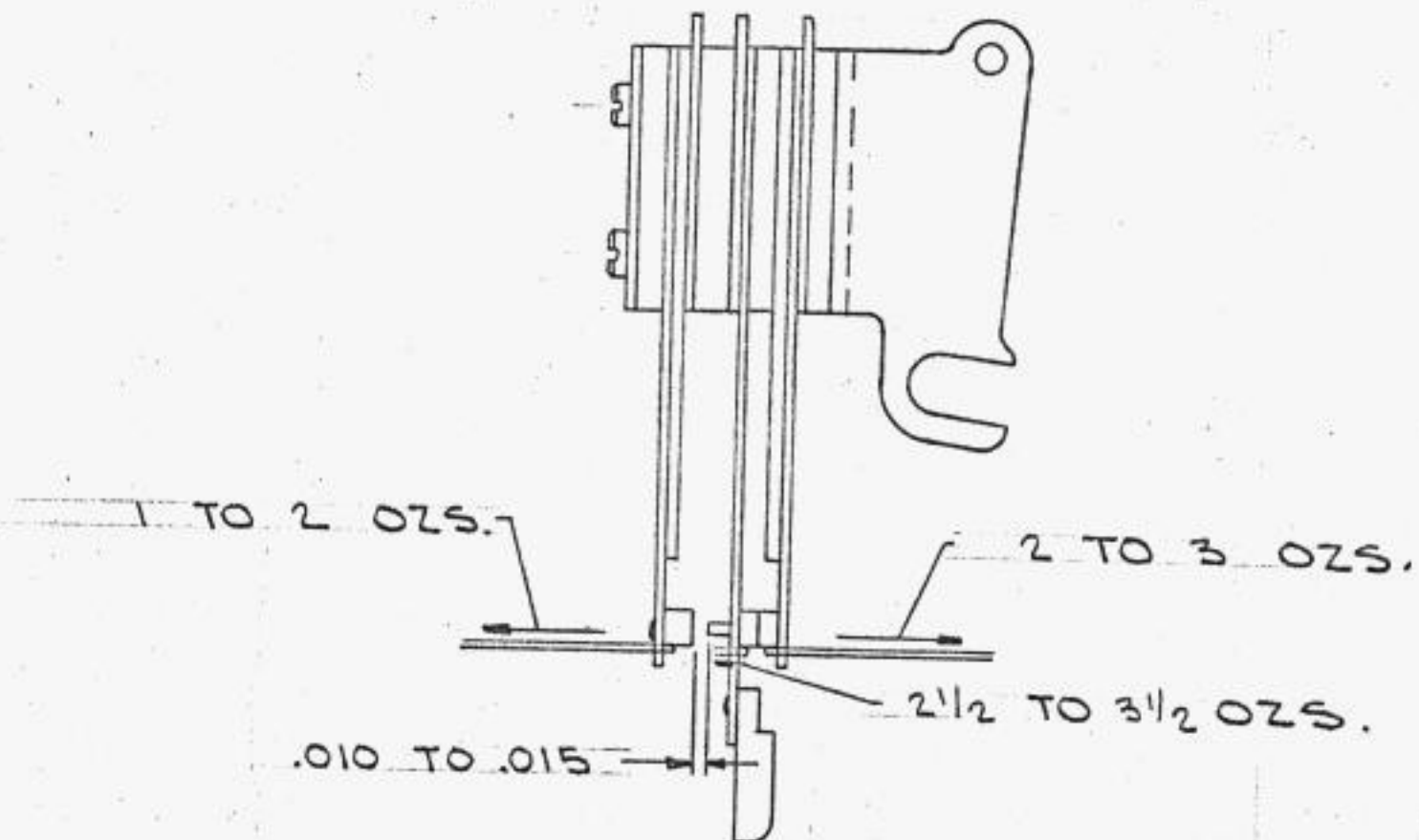


FIGURE # 36

Figure 37

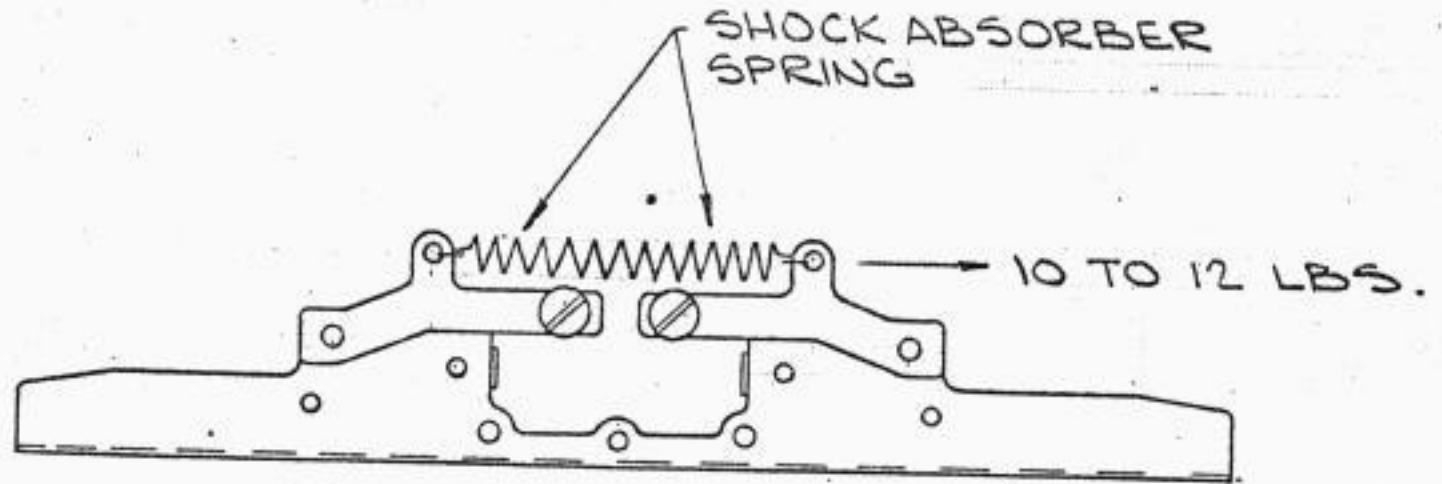


FIGURE #37

Figure 38

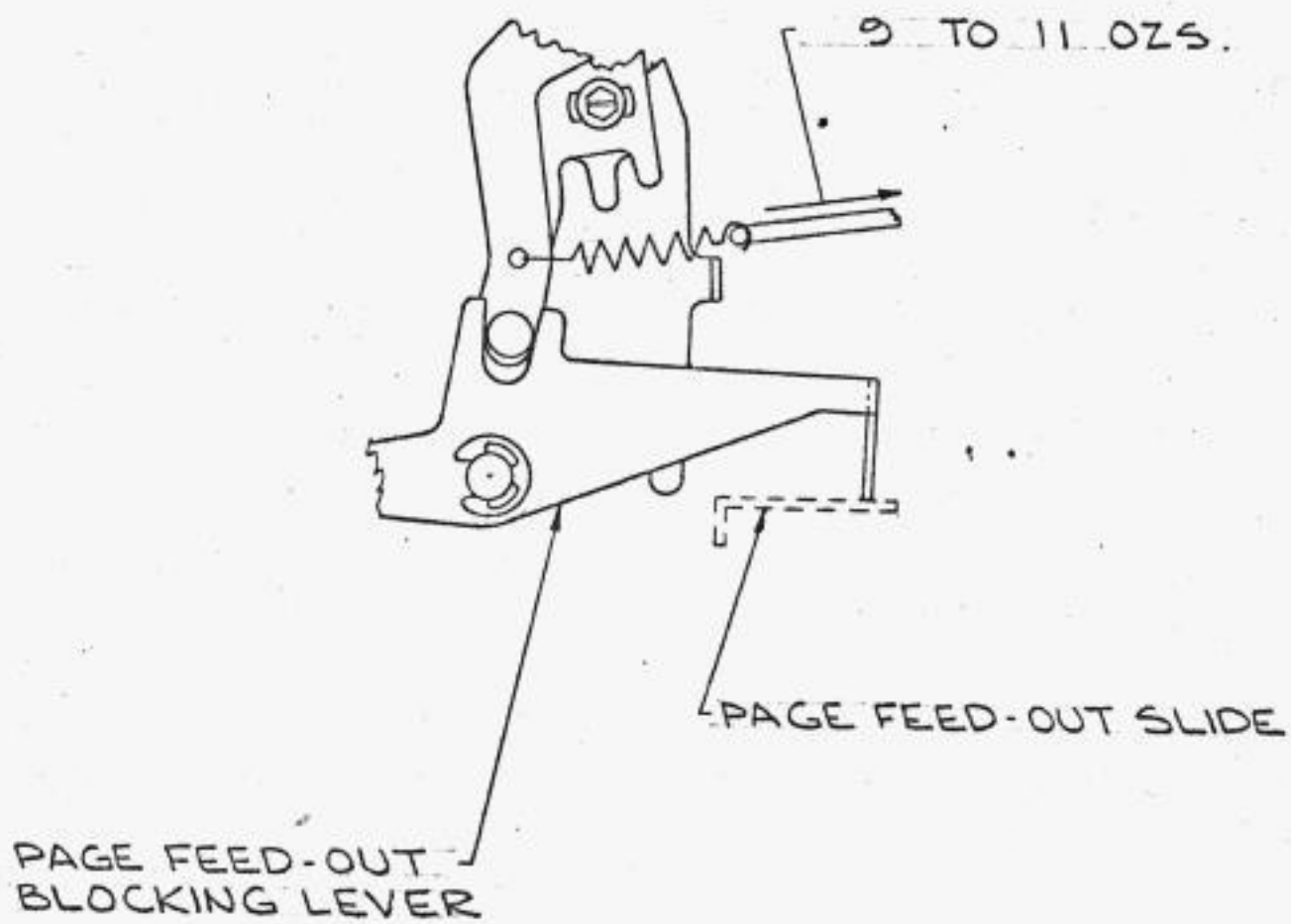


FIGURE # 38

Figures 39 & 40

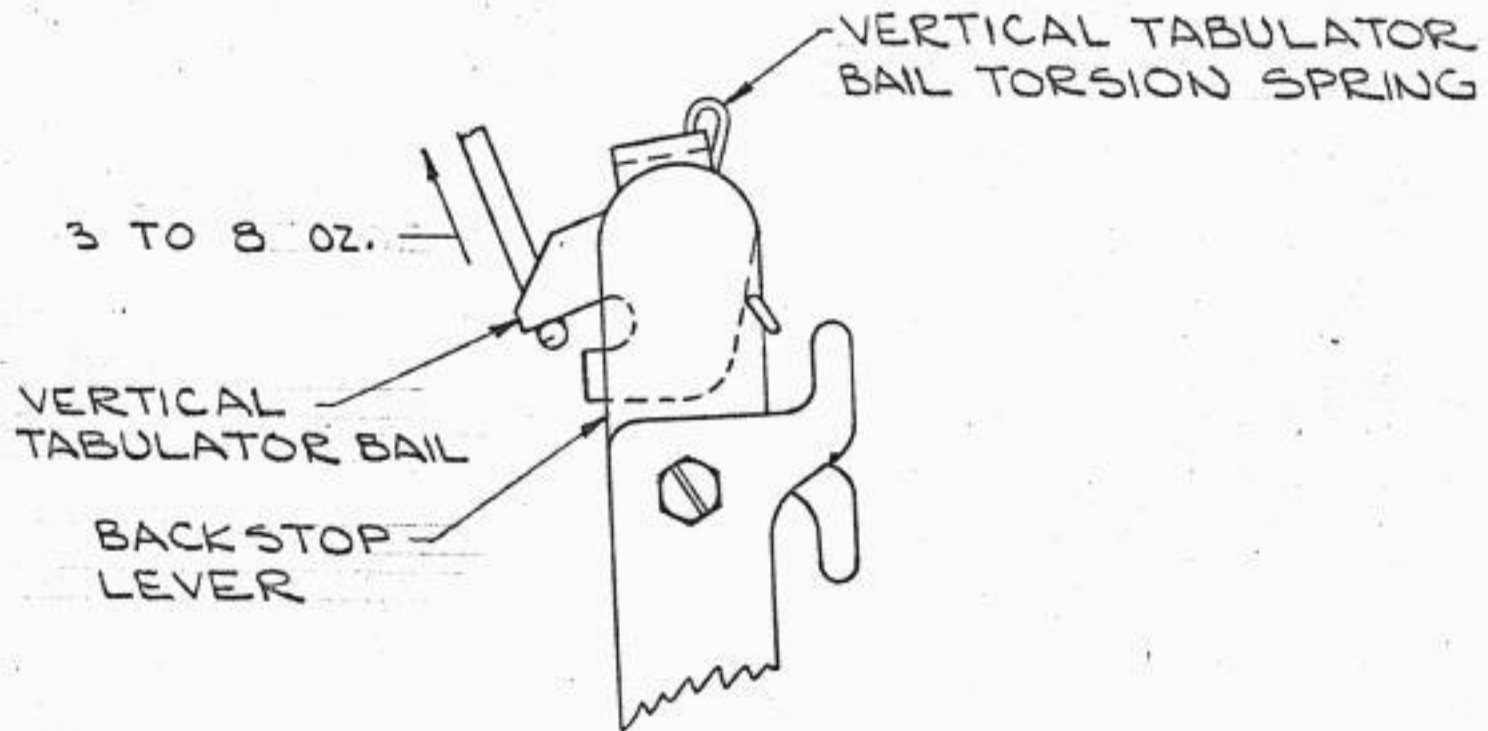


FIGURE # 39

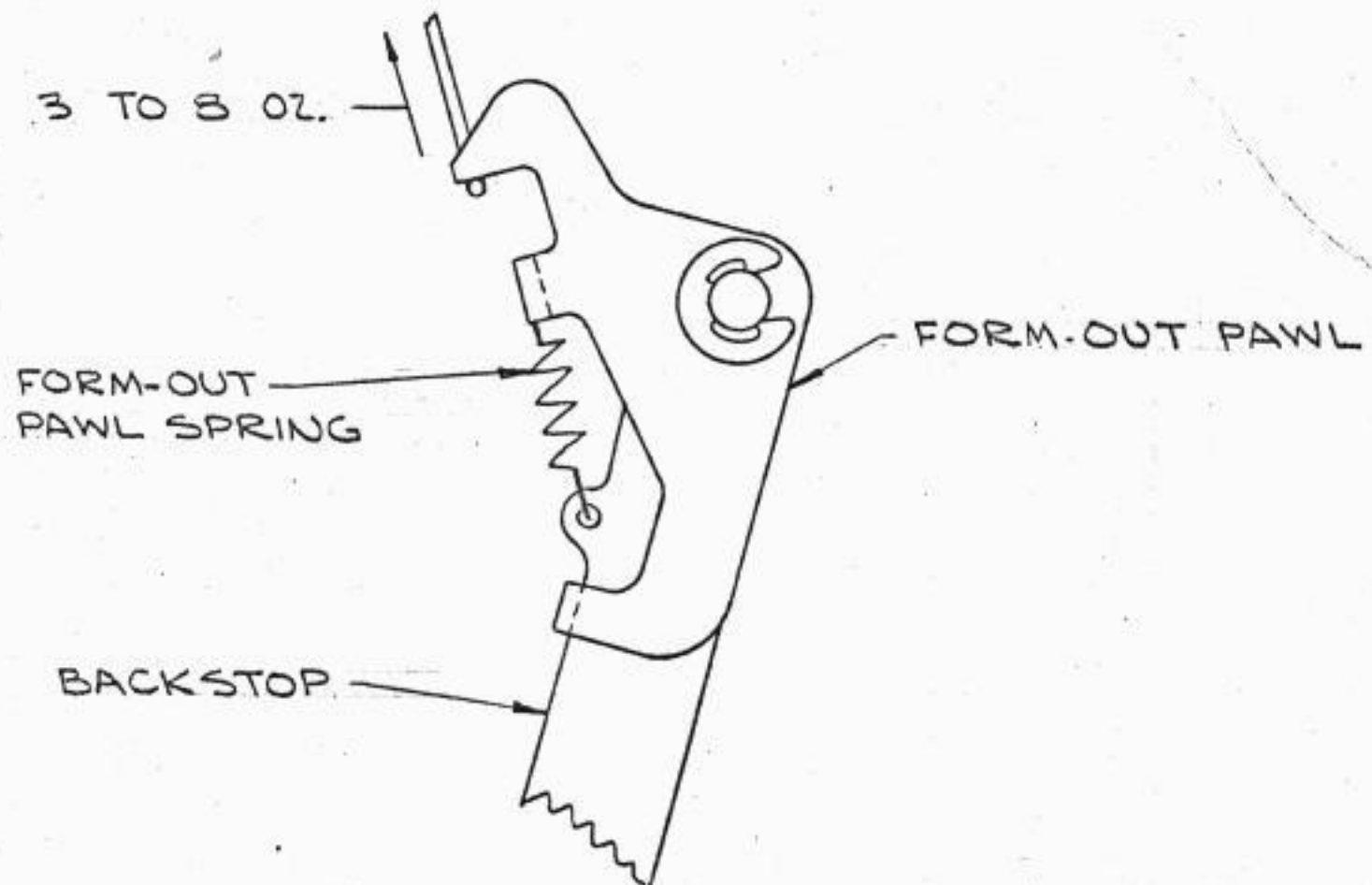
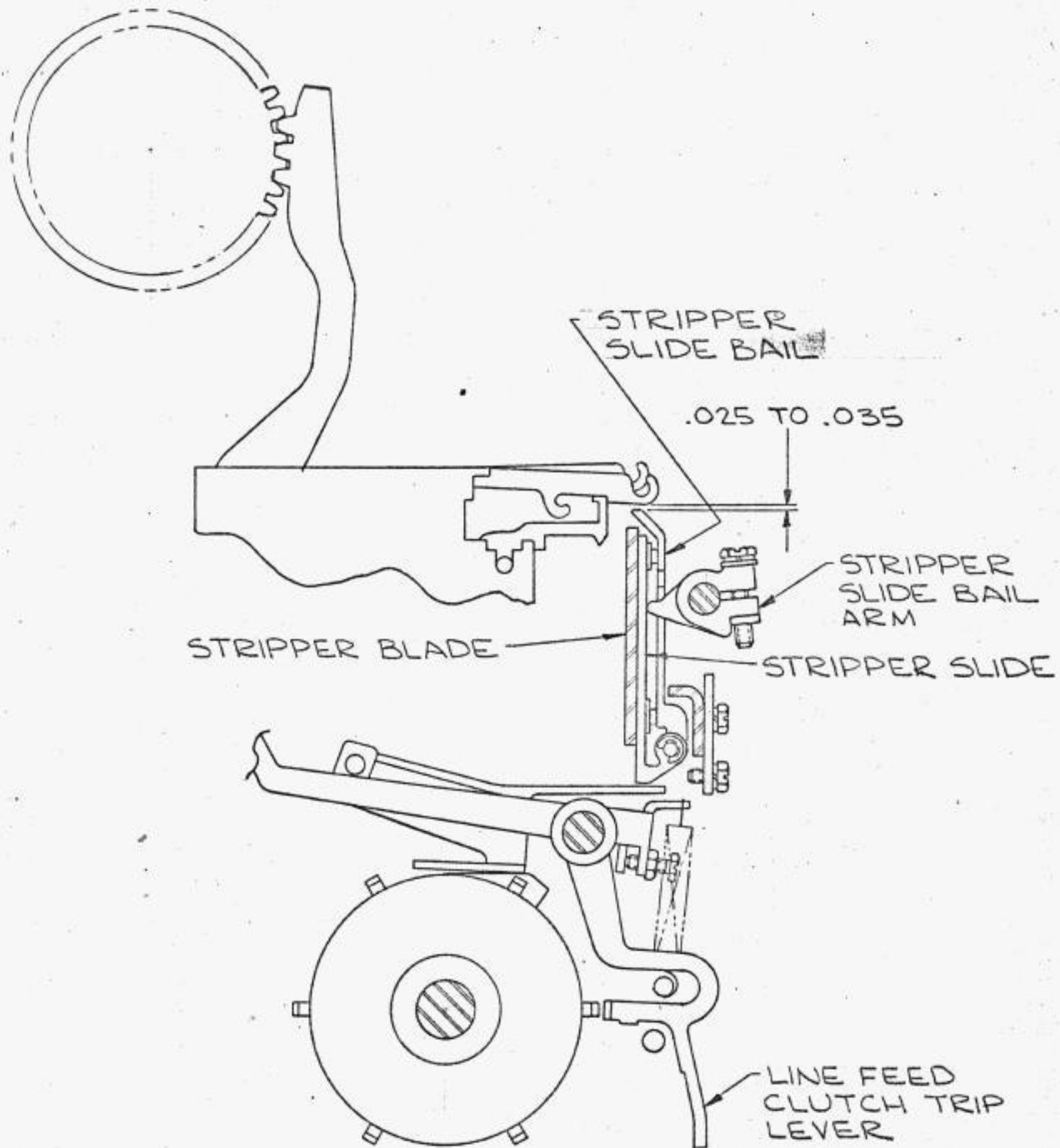
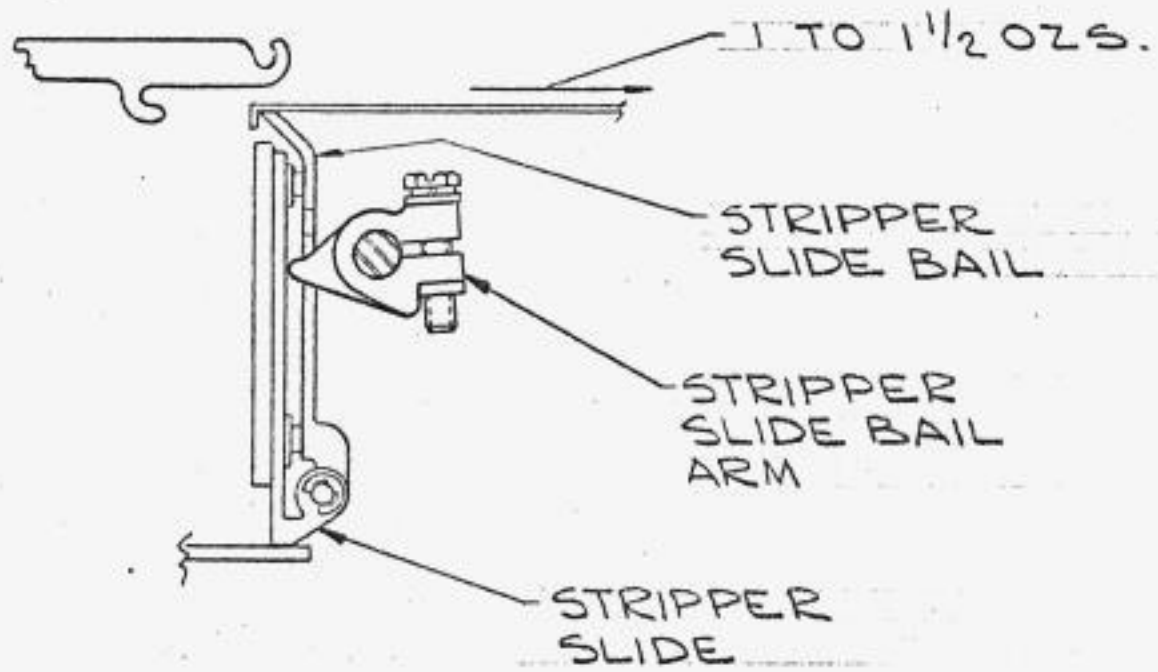
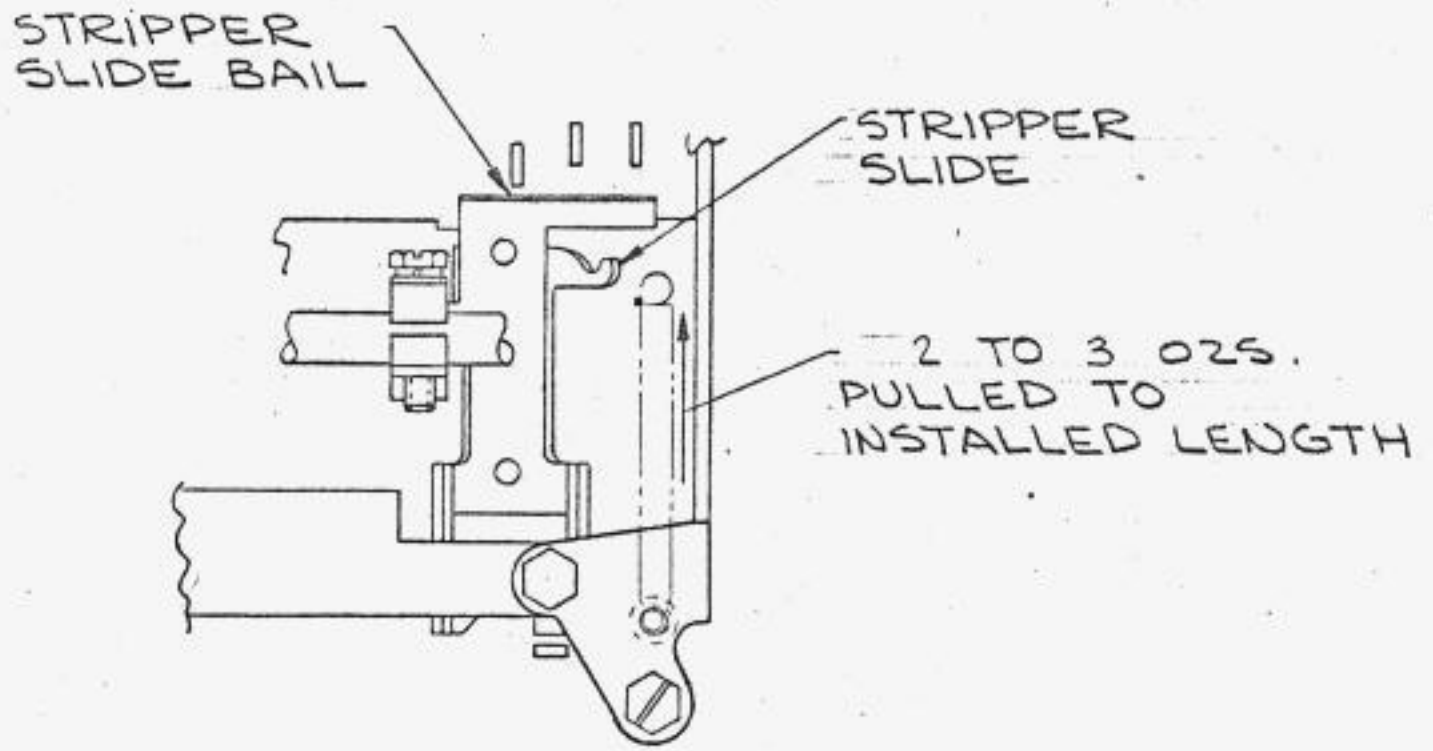
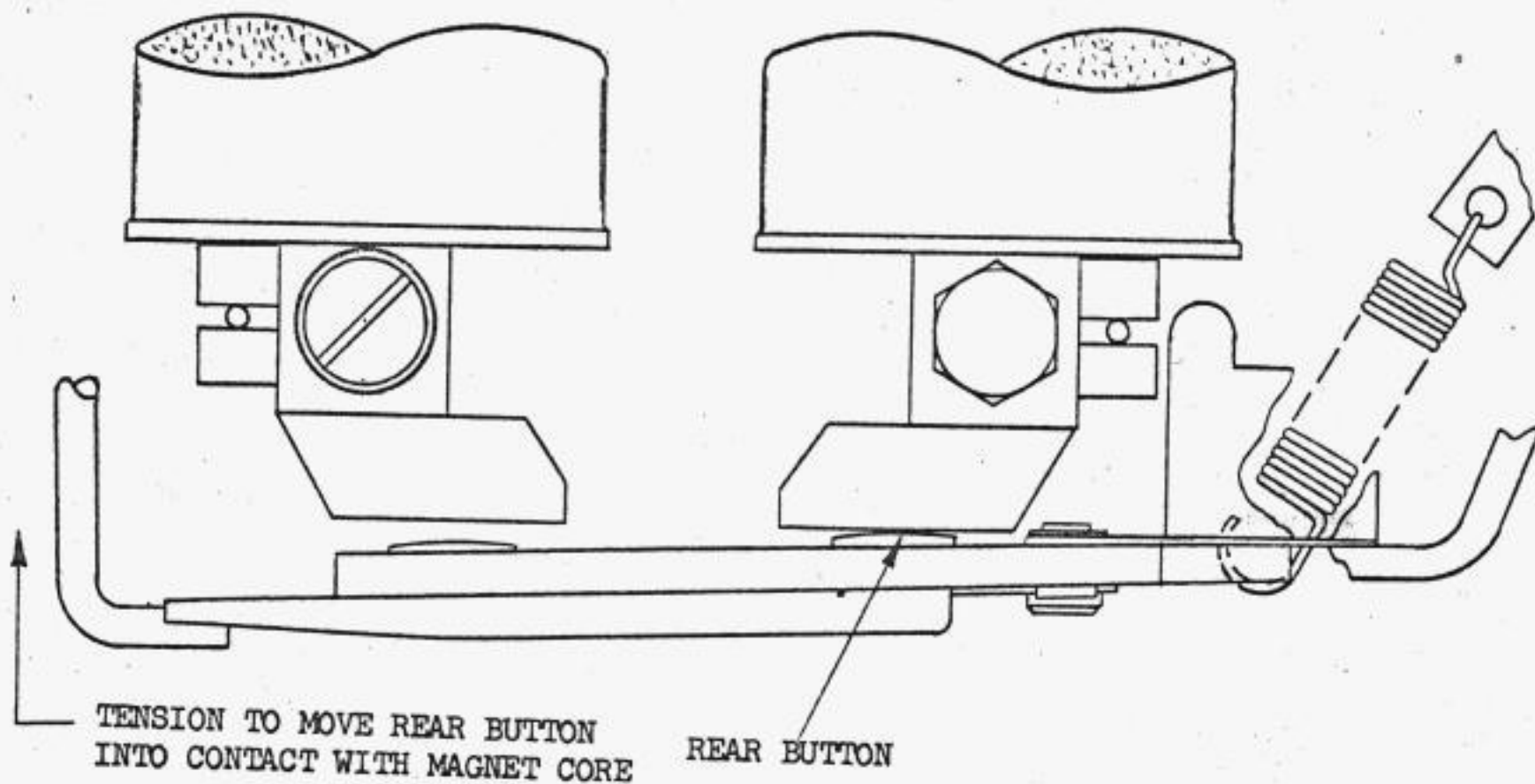


FIGURE #40



STRIPPER SLIDE BAIL ARM ADJUSTMENT
FIG.# 41





.060 AMPERE

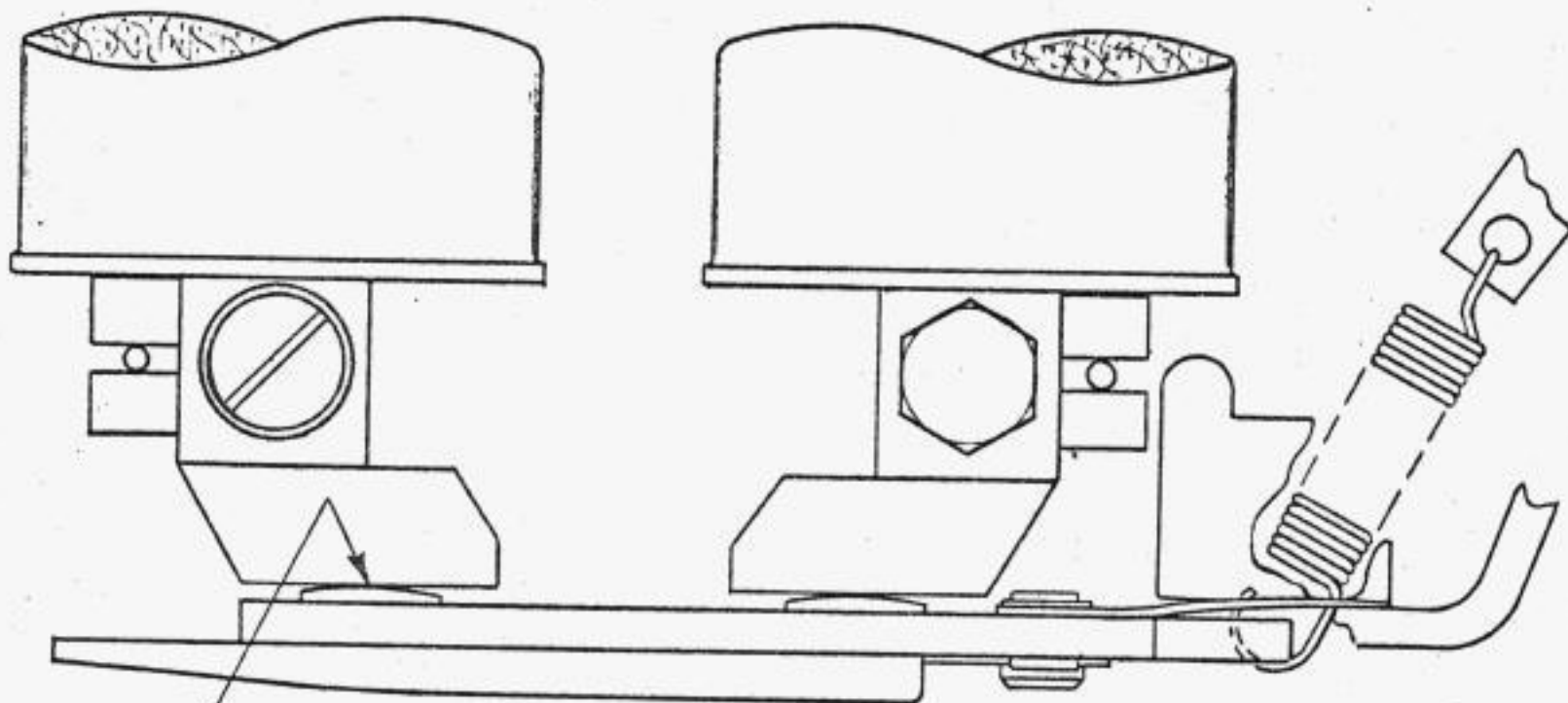
* 3/4 ozs.

.030 AMPERE

5/8 oz.

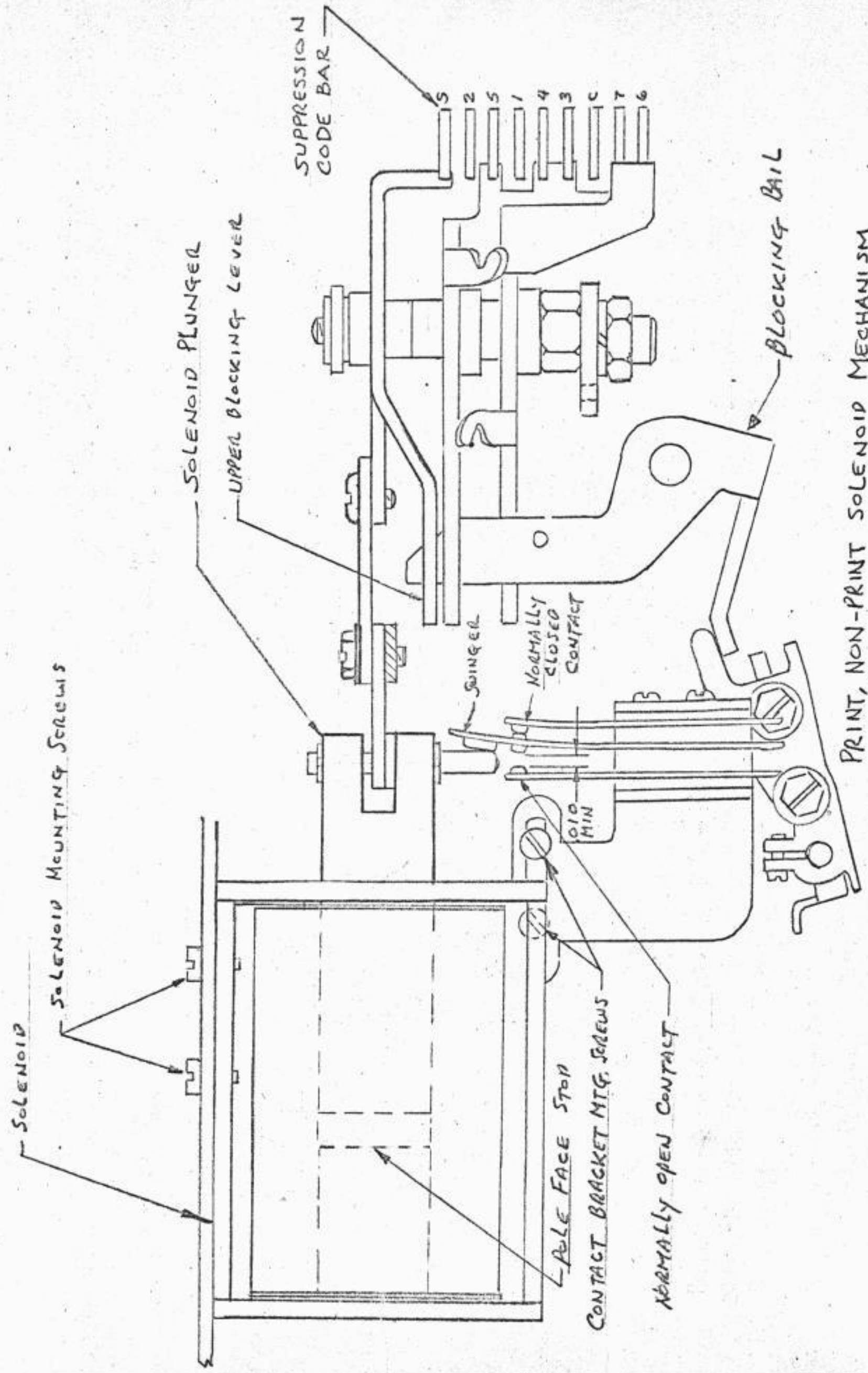
.500 AMPERE

* 1-1/8 oz.



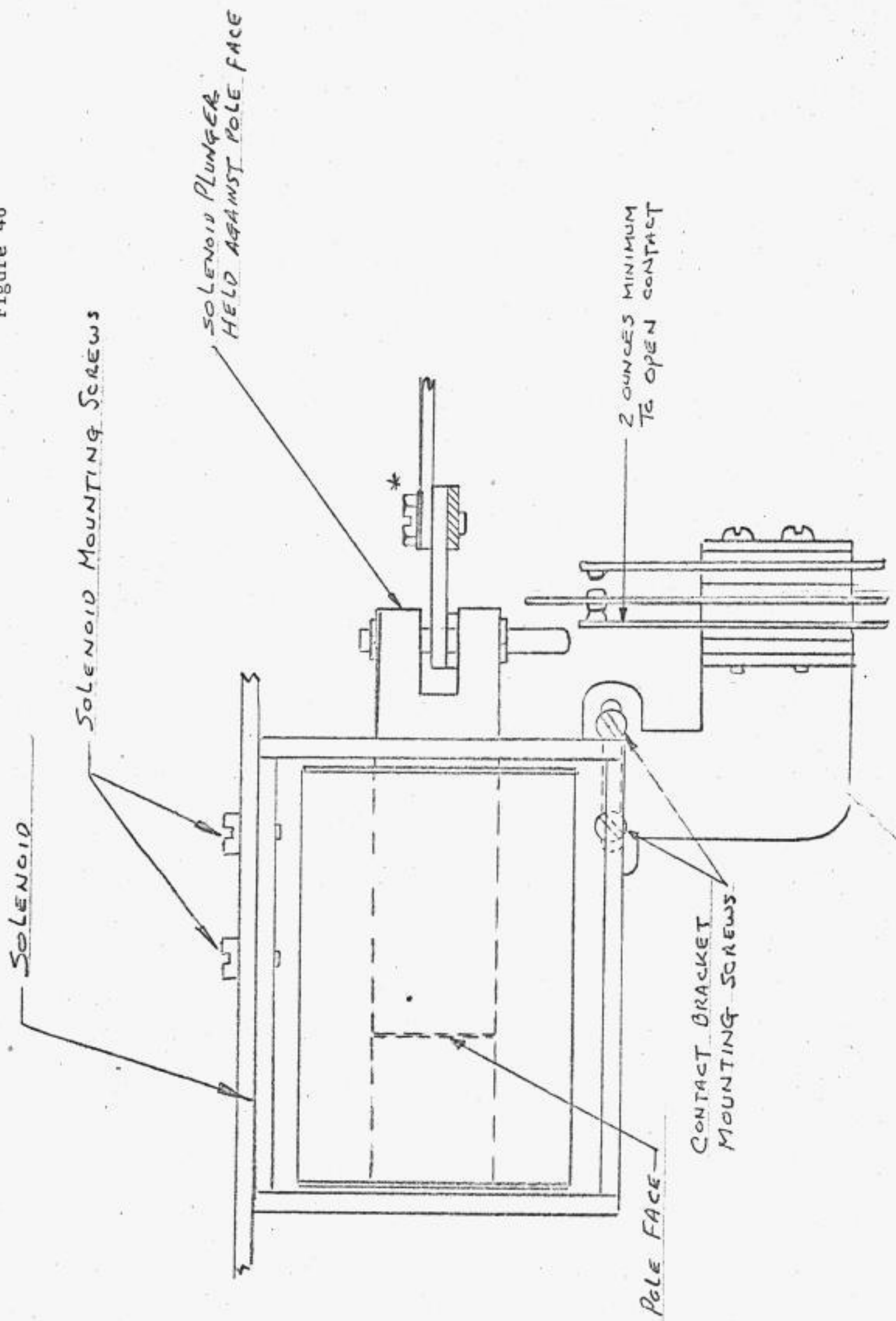
COILS ENERGIZED. FRONT BUTTON MUST BE IN CONTACT WITH
MAGNET CORE. IF NECESSARY, REDUCE ARMATURE SPRING TENSION
TO MEET THIS REQUIREMENT.

FIGURE 44



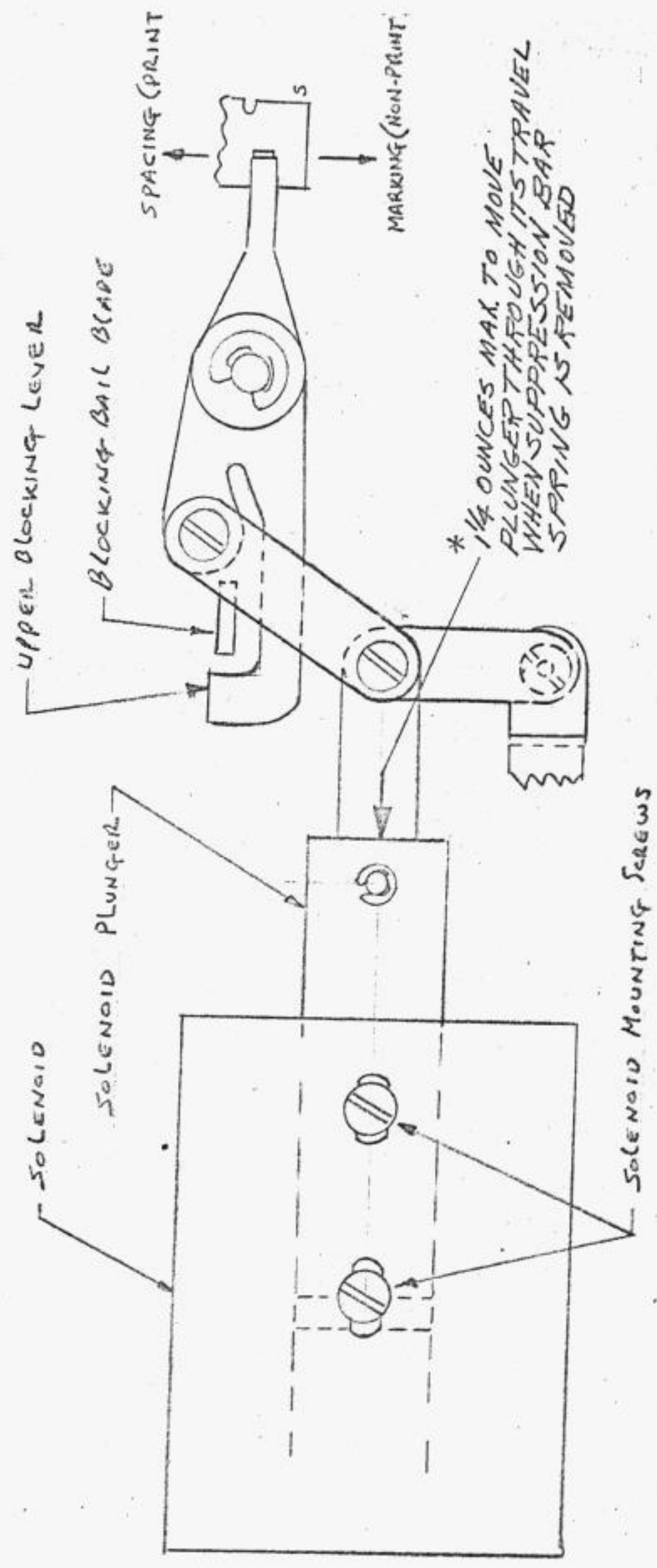
PRINT, NON-PRINT SOLENOID MECHANISM
(SOLENOID DEENERGIZED)

FIGURE 45



PRINT, NON-PILOT SOLENOID MECHANISM
(SOLENOID ENERGIZED)

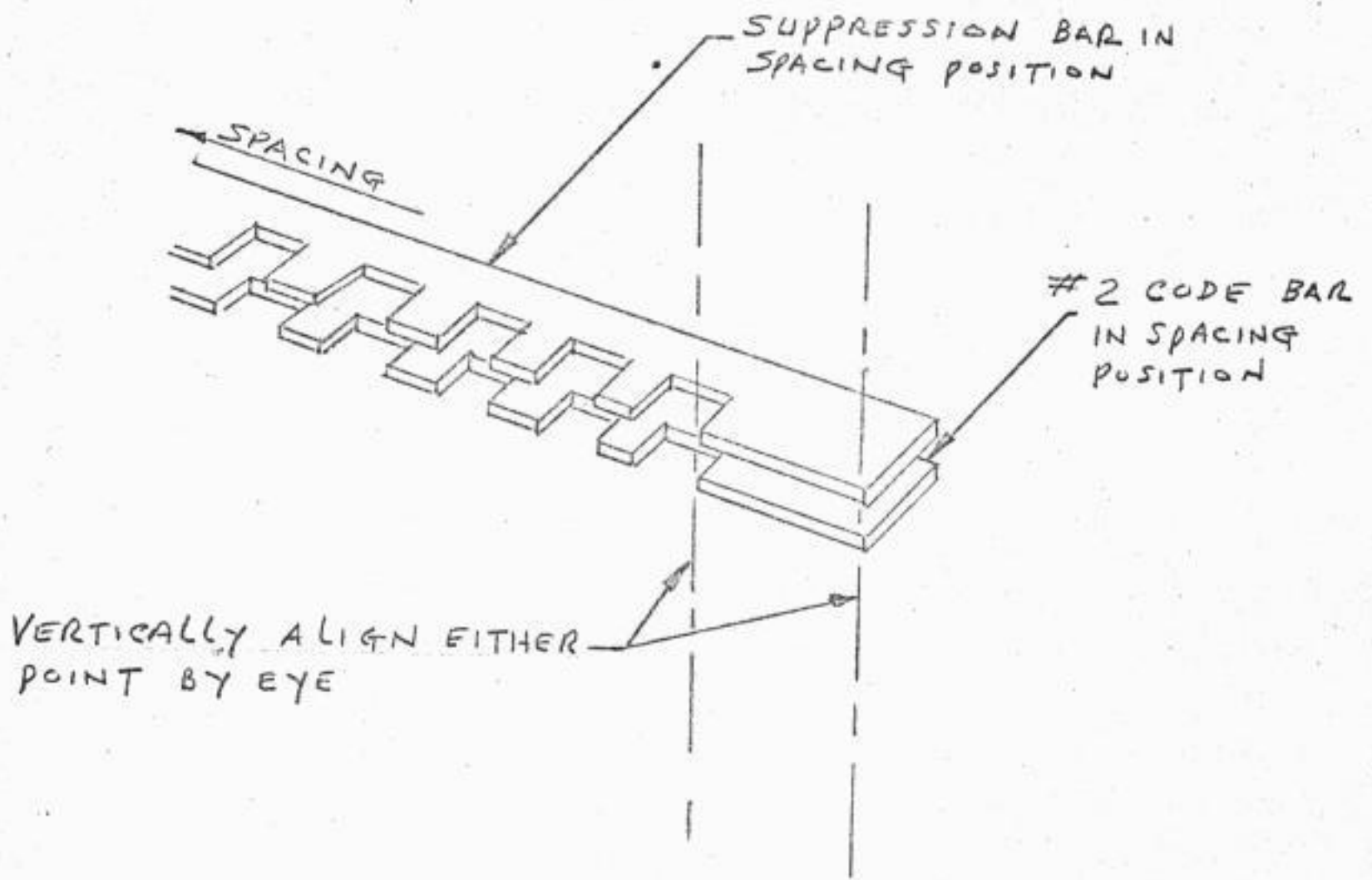
FIGURE 46



PRINT NON-PRINT SOLENOID MECHANISM
(SOLENOID DEENERGIZED, SUPPRESSION CODE BAR MARKING)

FIGURE 47

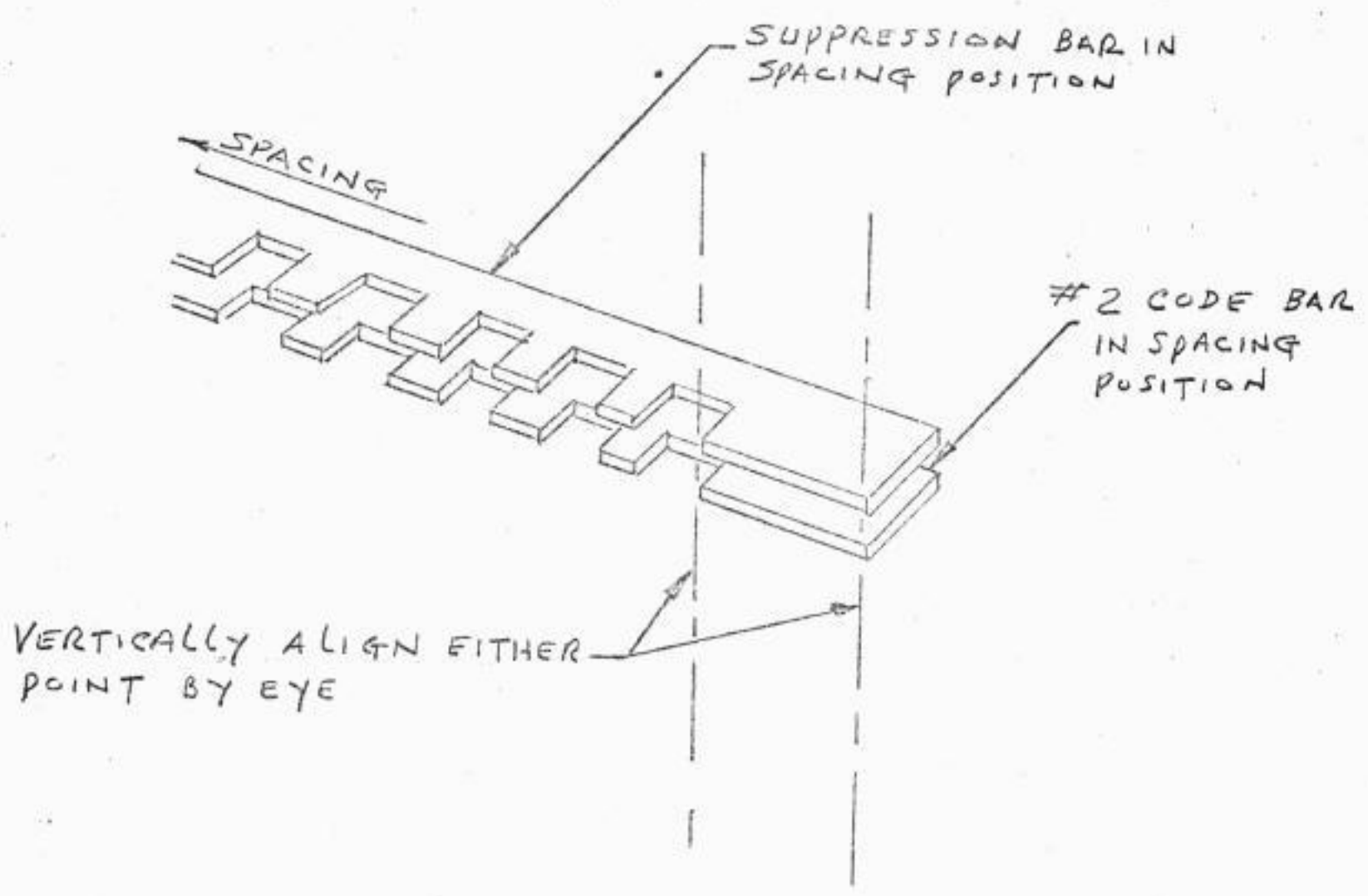
Figure 48



SOLENOID PLUNGER ADJUSTMENT

FIGURE 48

Figure 48



SOLENOID PLUNGER ADJUSTMENT

FIGURE 48

SECTION IV

MANUFACTURING INFORMATION

1. GENERAL

- a. The units shall be manufactured in accordance with released prints, bills of material, and engineering specifications.
- b. The units shall withstand a 500 volt DC breakdown test between the terminals and frame.
- c. All screws and nuts shall be tight and free from burrs. Springs shall be securely anchored.
- d. The finish shall be free from cracks, scratches, blisters and corrosion.
- e. All soldered connections shall be tight, free from corrosion and shall not interfere with moving parts of the unit.
- f. All moving parts shall be free from binds.
- g. The wiring shall conform to applicable WD's (See B/M).

2. TYPING UNIT

a. Selector Magnet Assembly

- (1) The selector magnet coil insulation shall be free of cuts, tears or abrasions.
- * (2) With the magnet energized, there shall be a minimum of .005 inch clearance between the armature and the pole pieces. (Figure 51).
- * (3) With the armature resting against its adjusted downstop, there shall be a minimum of .002 inch clearance between the right end of the armature and the armature backstop bracket. Check two places. (Figure 50).

b. Operating Test

- (1) The typing unit shall operate 15,000 words printing the standard "Irrigation" paragraph without error or trouble of any kind at 100 speed, and 700 words at 60 speed.
- (2) At the end of the operating test the unit shall be examined for wear and breakage of parts. If any perceptible wear or any breakage has occurred during the test, action shall be taken to assure that the trouble has been corrected on all units in process.

*(3) Type Alignment (See Figure 49)

(a) The type alignment shall be such that the maximum up and down deviation is not more than .006 and the maximum left and right deviation is not more than .010 on standard characters.

(4) The single-double line feed shall cause the line feed function to operate as indicated.

(5) Friction Feed Units

(a) The platen mechanism shall be capable of passing through at least six copy, roll type paper.

(b) The friction feed printer must accommodate a five inch diameter roll of paper. The cables in the area of the roll shall be dressed and tied such that they will not interfere with operation of the printer when the five inch diameter roll is used.

(6) Sprocket Feed Units

(a) The unit shall be checked for paper feeding ability with six copies of continuous superfold form stationery of the particular width specified by the accessory group to the typing unit.

c. Receiving Margin Adjustment

(1) The receiving margin test shall be made with a DXD conforming to the applicable level. The receiving margins of the selector shall conform to the minimum requirements given in the following table. This table applies to units operating at 100 WPM with a current of 60 MA or 500 MA (coils in parallel).

<u>Level</u>	<u>Zero Dist.</u>	<u>% Overall Bias</u>	<u>% E.D. at Bias Opt. Setting</u>
6	72	40	35
8	72	38	35

(2) To adjust, refine the selector armature spring tension adjustment. On units employing the two button selector armature, the front antifreeze button must contact the magnet core when the magnet coils are energized.

d. Vertical Tab and Form Out

(1) The printer shall be capable of tabulating one or more lines (Single-double line feed set for single line feeding).

(2) The "Form-Cut Stop Adjustment" (Section III) and the "Tabulation Stop Adjustment" (Section III) are field adjustments. At the factory, the units shall be assembled and checked with the

Tab-stops set at approximately equal intervals according to the number of stops specified on the B/M. Form-out stops are located in the numbered slots of the disc. Stops not required for the length of form to be used shall be fully retracted.

e. Horizontal Tabulator

(1) Operational tests of the horizontal tabulator mechanism should include the following test while receiving from a transmitter distributor. Position the tabulator stops so that after the tabulator selection is received the printing carriage shall travel the following distances before stopping in any given column location; 1, 2, 3, 4, 5, 6, and 7 spaces. At the end of the line the tabulator operation is disabled by the spacing cutout mechanism. Check this by transmitting three or more tabulator selections when the end of line is reached. In the transmitter tape the first character following the tabulator selection should be "delete".

(2) These tests should be made at 60, 75, and 100 WPM operation.

3. STUNT BOX SWITCH ASSEMBLY (SWITCHES EQUIPPED WITH A BLOCK AND SEPARATE TOP PLATE)

a. With the switch mounted on the stunt box, lightly take up the play of the contact arm to make play minimum. There should be at least .006 clearance between the side of the contact arm and vertical face of the contact clip. If the switch is a transfer type with contacts front and rear, the clearance is to be checked at both front and rear clips.

b. Care should also be exercised in lacing or routing the cables so as not to tug or pull unnecessarily on the contact spring causing distortion or damage to the spring.

4. SUPPLEMENTARY ADJUSTMENT INFORMATION (For Factory Use Only)

a. Transfer Lever Eccentric Adjustment (Section III)

(1) Requirements, unchanged.

(2) To Check

(a) Select the "Rub Out" combination and rotate the main shaft until the selector and code bar clutch shoe levers engage their respective stop arm.

(b) Trip the code bar clutch and rotate the main shaft until the code bar shift lever link is in its uppermost position.

(c) Take up the play in the code bar shift bar forward and the rear code bar shift lever towards the rear to obtain a maximum clearance between the blade and the links.

- (d) Check the clearance between the links and the blade and note the link with the greatest clearance.
 - (e) Select the combination with #1 marking, all others spacing and rotate the main shaft until the selector and code bar clutch pry bars engage their respective stop levers.
 - (f) Repeat steps (b) and (c).
 - (g) Check the clearance between the No. 1 and common links and the rear blade and note.
 - (h) Select the combination with #2 marking, all others spacing and rotate the main shaft until the selector, code bar and line feed clutch pry bars engage their respective stop levers.
 - (i) Repeat steps (b) and (c).
 - (j) Check the clearance between the No. 2 and common links and the rear blade and note.
- (3) Requirement 1: The combination with the greatest clearance between the rear scissors blade and the code bar link, shall have a clearance of .010 to .025.
- (4) Requirement 2: Both of the adjusting holes in the bearing shall be toward the top.
- b. Code Bar Clutch Trip Lever Adjustment (Section III)
- (1) To check: Place the unit so that the main shaft and clutch mechanism face the operator. Place the selector and code bar clutches in the "stop position" and rotate the main shaft until the head of the clutch drum mounting screw is aligned with the spacing gear.
 - (2) Trip the code bar clutch lever and slowly rotate the main shaft until the shoe lever is aligned with the trip lever.
 - (3) Take up the play of the shoe lever inward by snapping the trip lever over the shoe lever.
 - (4) Measure the clearance between the clutch drum and the shoe lever and record.
 - (5) Slowly rotate the main shaft until the trip lever just falls off of the stop lug.
 - (6) Requirement 1: The code bar clutch shall have some end play, not more than .006". The minimum end play requirement shall be considered satisfied if the trip lever return positively and without hesitation toward the clutch drum when the trip lever is raised approximately one quarter inch ($\frac{1}{4}$ ") above the drum and released.

- (7) Requirement 2: The clearance between the trip lever and the clutch drum shall measure .018 to .035 less than the clearance between the drum and the shoe lever.

c. Function Clutch Trip Lever Adjustment (Section III)

- (1) Requirement, unchanged.
- (2) To check: Place the unit so that the main shaft and clutch mechanism face the operator.
- (3) Place the selector, code bar and function clutches in the "stop position".
- (4) Rotate the main shaft until the head of the clutch drum mounting screw is aligned with the spacing gear.
- (5) Take up the play of the function clutch shoe lever inward with a screwdriver.
- (6) Requirement 1: The function clutch trip lever shall engage the full thickness of the shoe lever.

NOTE: In case of doubt, ET-138056 Gauge shall be used in the following manner to verify the requirement. First, position the gauge so that the trip lever enters the slot in the gauge. Then the gauge shall be moved in the same direction until the shoe lever just enters the slot in the gauge. As long as the shoe lever enters the gauge, the requirement is satisfied.

- (7) To check: Rotate the main shaft until the code bar clutch cam follower is on the low part of its cam.
- (8) Requirement 2: The clutch trip shaft shall have some end play, not more than .006.

NOTE: The minimum end play requirement shall be considered satisfied if the function clutch trip lever returns positively and without hesitation when the trip lever is depressed against the clutch drum and released.

d. Clutch Trip Shaft Set Collars Adjustment (Section III)

- (1) To check: Place the unit so that the main shaft and clutch mechanism face the operator. The main shaft can be in any position except that the latch lever shall not touch or engage the trip lever and/or the clutch disc lug.
- (2) Requirement 1: The spacing clutch latch lever shall have some end play, not more than .008. The minimum end play requirement shall be considered satisfied if the latch lever returns positively and without hesitation towards the clutch when the latch lever is positioned approximately one quarter ($\frac{1}{4}$) inch away from the clutch disc and released.

- (3) Requirement 2: Unchanged.
- (4) Requirement 3: The line feed clutch latch lever shall have some end play, not more than .008. The minimum end play requirement shall be considered satisfied if the latch lever returns positively and without hesitation toward the clutch disc when the latch is positioned approximately one quarter ($\frac{1}{4}$ ") away from the clutch disc and released.

e. Spacing Clutch Trip Lever Adjustment (Section III)

- (1) To Check
 - (a) Place the unit so that the main shaft and clutch mechanism face the operator.
 - (b) Place the spacing clutch in the stop position.
 - (c) Rotate the main shaft until the head of the clutch drum mounting screw is aligned with the spacing gear.
 - (d) Release the trip lever and slowly rotate the main shaft until the trip lever is aligned with the shoe lever.
 - (e) Take up the play of the shoe lever inward by snapping the trip lever over the shoe lever.
 - (f) Measure the clearance between the clutch drum and the shoe lever and record.
 - (g) Repeat steps (a) to (f) for the two following clutch stops. Record the clearance between the clutch drum and the shoe lever for each of the stops.
 - (h) Place the spacing clutch in the stop position at the shoe lever farthest from the drum.
 - (i) Repeat steps (c), (d) and (e).
 - (j) Slowly rotate the main shaft until the trip lever just falls off the stop lug. Check Requirement 1.
 - (k) Rotate the main shaft and place the spacing clutch in the stop position at each of the other two stops. Check Requirement 2 in each of these two stops.
- (2) Requirement 1: The clearance between the trip lever and the clutch drum shall measure .018 to .035 less than the clearance between the drum and the shoe lever.
- (3) Requirement 2: There shall be some "overbite" on all three stop lugs as gauged by eye.

f. Line Feed Clutch Trip Lever Eccentric Post Adjustment (Section III)

(1) To Check

- (a) Place the unit so that the main shaft and clutch mechanism face the operator.
 - (b) Place the line feed clutch in the stop position.
 - (c) Rotate the main shaft until the head of the clutch drum mounting screw is aligned with the spacing gear.
 - (d) Release the trip lever and slowly rotate the main shaft until the trip lever is aligned with the shoe lever.
 - (e) Take up the play of the shoe lever inward by snapping the trip lever over the shoe lever.
 - (f) Measure the clearance between the clutch drum and the shoe lever and record.
 - (g) Repeat steps (b) to (f), for the two following clutch stops. Record the clearance between the clutch drum and the shoe lever for each of the stops.
 - (h) Place the line feed clutch in the stop position at the shoe lever farthest from the drum.
 - (i) Repeat steps (c), (d) and (e).
 - (j) Slowly rotate the main shaft until the trip lever just falls off the stop lug. Check Requirement 1.
 - (k) Rotate the main shaft and place the line feed clutch in the stop position in each of the other two stops.
- (2) Requirement 1: The clearance between the trip lever and the clutch drum shall measure .018 to .035 less than the clearance between the drum and the shoe lever.
- (3) Requirement 2: There shall be some "overbite" on all three lugs as gauged by eye.

g. Clutch Shoe Lever Adjustment (Section III)

- (1) Requirement, unchanged.
- (2) To adjust or check: With the clutch engaged, apply the pull end of a 64 oz. scale over the clutch shoe release lever and pull opposite the stop lug on the disc with a force of 32 ozs. Release the pressure slowly and check the requirement.

h. Rocker Shaft Bracket Eccentric Stud Adjustment (Section III)

- (1) To check: Rotate the main shaft so that the code bar, function and typebox clutches are in the stop position. Hold the locking arm towards the front (only during the process of checking Requirement No. 1).
- (2) Requirement 1: There shall be .055 to .090 clearance between the bottom of the locking arm and the shoulder on the horizontal positioning lock lever.
- (3) Requirement 2: The dot on the eccentric stud shall be in the bottom rear quarter.

i. Reversing Slide Stud Adjustment (Section III)

- (1) To determine whether detent rollers are fully seated in either left or right hand notches, shift the No. 3 Code Bar to its spacing position. Move the reversing slide back and forth very slightly. If the bottom detent lever follows the slide for any perceptible distance in a horizontal direction without moving up or down, the requirement is satisfied.

j. Horizontal Positioning Drive Linkage Bearing Posts Adjustment (Section III)

- (1) To Check
 - (a) Rotate the main shaft so that the code bar, function and type box clutches are in the stop position.
 - (b) Return the printing carriage.
 - (c) Place the Code Bars in their spacing position.
 - (d) Move the reversing slide to the right.
 - (e) Check the clearance at the right positioning lever for Requirement 2 and record. The right positioning lever shall be in the straight (unbuckled) position.
 - (f) Move the reversing slide to the left.
 - (g) Check the clearance at the left positioning lever for Requirement 2 and record. The left positioning lever shall be in the straight (unbuckled) position.
 - (h) The difference in measurements taken in steps (e) and (g) must satisfy Requirement 3.
- (2) Requirement 1: The positioning levers shall freely return to their normal straightened position (unbuckled) when manually buckled.

- * (3) Requirement 2: There shall be .090 to .110 clearance between the longest horizontal stop and the positioning lever slides.
- (4) Requirement 3: The clearance at the two sides (as measured in Requirement 2) shall be equal within .008.
- (5) To check: Move or rotate the typebox clutch disc in the normal direction of rotation.
- (6) Requirement 4: The horizontal positioning mechanism must be free of "jams" or "binds". The mechanism is said to be "free" if the typebox clutch disc has "some movement" in the normal direction of rotation in the "stop position".

k. Printing Track Adjustment (Section III).

- (1) Requirement, unchanged.
- (2) To adjust or check: Print hammer operating bail spring bracket in position No. 1, select "Rub-Out" and rotate the main shaft until the typebox clutch has rotated 1/2 revolution.
- (3) Position the print carriage by means of the right side of the print carriage frame so that the printing arm slide is over the horizontal positioning lock lever pivot stud.
- (4) Trip the code bar clutch and rotate the main shaft until the typebox clutch has rotated 1/2 revolution.
- (5) Unhook the print hammer operating bail spring from the printing bail. Release the spacing pawls and position the printing arm slide over the printing bail left mounting screw.
- (6) Take up the play between the printing track and the carriage frame by inserting a plastic wedge between the track and both the right and left side of the carriage frame in such a way that the wedge is not in contact with the printing arm.
- (7) With the print hammer operating bail against its backstop, take up the play in the print carriage lever towards the rear of the unit and the play in the print hammer operating bail latch in a downward direction. Take up the play in the print hammer operating bail in a downward direction by lightly applying a spring hook to the bail close to the felt oiler without moving the print carriage and release the pressure.
- (8) Position the print hammer operating bail with a .005" flat wire feeler gage so that the face of the latching extension is in line with the tip of the shoulder on the print hammer operating bail and check the requirement.

- (9) Repeat the above procedure for the right side and rehook the print hammer operating bail spring.

1. Print Hammer Stop Bracket Adjustment

- (1) Requirement: Unchanged.
- (2) To Adjust or Check: Select "Rub-Out" and rotate the main shaft until the typebox clutch has rotated 1/2 revolution and typebox carriage is in "Rub-Out" position. Position the print carriage, by means of the right side of the carriage frame, so that the guide block is over the horizontal positioning lock lever pivot stud. With "Rub-Out" selected, rotate the main shaft until the printing bail is in its uppermost position.
- (3) Select the "M" combination, trip the code bar clutch and rotate the main shaft until the typebox clutch has rotated 1/2 revolution. Place the carriage in the extreme left position and release the typebox latch lever or insert the ST130781 Gage in the typebox carriage carefully.
- (4) Take up the play of the typebox or gage towards the front of the unit by inserting an "A" screwdriver between the typebox or gage mounting ears and the carriage roller at the right side of the carriage and repeat for the left side. Leave the "A" screwdriver between the left typebox or gage mounting ear and the carriage roller and secure the typebox or gage by means of the typebox latch.
- (5) Apply the pull end of a 32 oz. spring scale to the right of the "Letters" indicator on the typebox or gage and pull with a force of 12 oz. Release the pressure and remove the scale.
- (6) Apply the push end of an 8 oz. spring scale to the base of the print hammer operating bail backstop at the carriage frame and push with a force of 8 oz. and check the requirement.
- (7) Repeat the above procedure with the print carriage in the extreme right position of the platen and remove the "A" screwdriver.

m. Print Carriage Lever Arm Adjustment

- (1) Requirement: Unchanged.
- (2) To Adjust or Check: With the print hammer operating bail spring bracket in the No. 1 position, select "Letters" and rotate the main shaft until the typebox clutch has rotated 1/2 revolution.

- (3) Position the print carriage by means of the right side of the carriage frame, so that the guide block slide is over the horizontal positioning lock lever pivot stud.
- (4) Apply the pull end of a 64 oz. spring scale over the upper end of the printing carriage lever arm between the two adjusting screws and pull horizontally to the right until the body of the scale can be hooked over the right side of the printing carriage track.
- (5) Position the carriage such that there is 40 ± 2 oz. of pressure on the carriage. Take up the play of the printing carriage lever arm towards the front of the unit manually and release. Check the requirement.

NOTE: The "some clearance" requirement is considered met if the roller on the print hammer operating bail can be manually rotated for one revolution.

n. Right Hand Margin Adjustment

- (1) To Adjust: Unchanged.
- (2) Requirement and Check: The 66th character shall print in its proper position as indicated in the type alignment requirement. The 67th character shall print over the 66th character with a maximum of $\frac{1}{2}$ of the 67th character overlapping to the right of the 66th character.

o. Ribbon Reverse Detent Adjustment (Section III)

- (1) When seating the detent in the detent cam, the requirement will be satisfied if the detent does not touch either of the rear surfaces of the detent cam, and if the clearance between the detent and the rear surface of the detent cam in both the upper and lower positions is equal within .020".

p. Ribbon Feed Lever Bracket Adjustment (Section III)

(1) Left Hand Unit

(a) To Check

1. Place the left ribbon reverse lever in its uppermost position.
2. Rotate the typebox clutch one-half turn.
3. Place the typing unit upside down.
4. Rotate the watchet until the detent lever drops into the notch closest to the fixed anchor of the ribbon spool yield spring.

5. Press inward on the detent lever (at tru-arc on bearing post) to take up play of pawl on bearing post. Seat the ratchet against the detent lever while pressing ratchet inward and downward (as viewed from the bottom). Take up the play of the feed lever forward by pushing from the rear where the feed lever is mounted on the bearing post.

NOTE: It is intended that all the play be taken up and held while gauging this adjustment.

- (2) Requirement 1: There shall be from .015 to .035 between the feed lever and the shoulder of a ratchet tooth.
- (3) Requirement 2: The peaks of at least two ratchet teeth shall be between the front edges of the feed and the detent levers.

NOTE: As long as the requirement is met, any interference between the ribbon feed lever spring and the bracket is acceptable.

- (4) While making and checking this adjustment, do not use armature clip that mounts to right ribbon spool bracket (152828).
- (5) To check: Trip the typebox clutch and rotate the main shaft.
- (6) Requirement 3: The ratchet shall advance one tooth only on each rotation of the typebox clutch.
- (7) Right Hand Unit
 - (a) Place the right hand reversing lever in its uppermost position and repeat in the same manner as specified for the left hand unit.

q. Horizontal Positioning Slide Lock Lever Spring Tension (Section III)

- (1) This requirement is measured as specified, because damage to the spring will result by repeated removal, when measuring. However, since excessive friction of the lock lever on its mounting shows up in what appears to be excessive spring tension, the following means may be used prior to the installation of the horizontal slide lock lever spring to determine whether the friction is excessive.
 - (a) The lock lever should be free to move in its guide from its uppermost position downward. Using an 8 oz. scale, it shall require a maximum of 6 oz., applied at the top center of the lock lever downward to a point where the lock lever touches the lock lever roller.

TYPE ALIGNMENT

Vertical

The requirement shall be considered met when the difference between the highest and lowest character in a line is not more than .012.

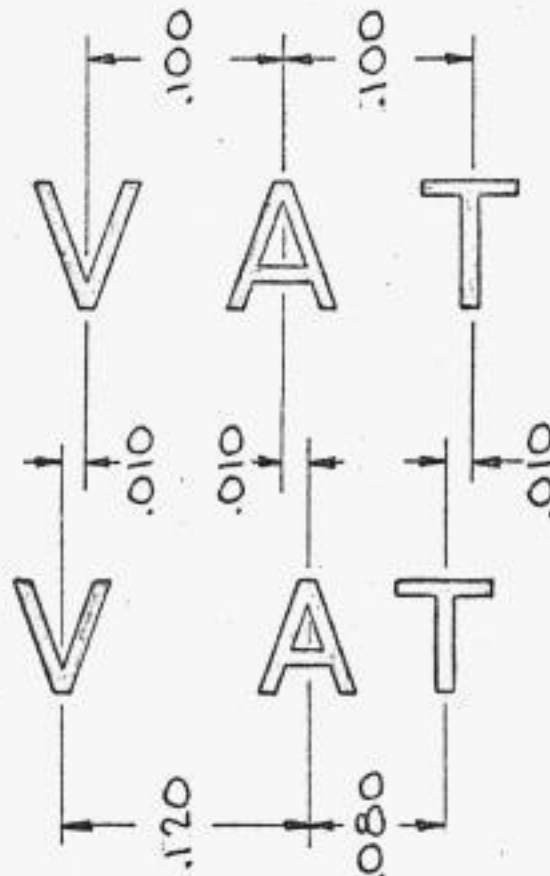
EXAMPLE:

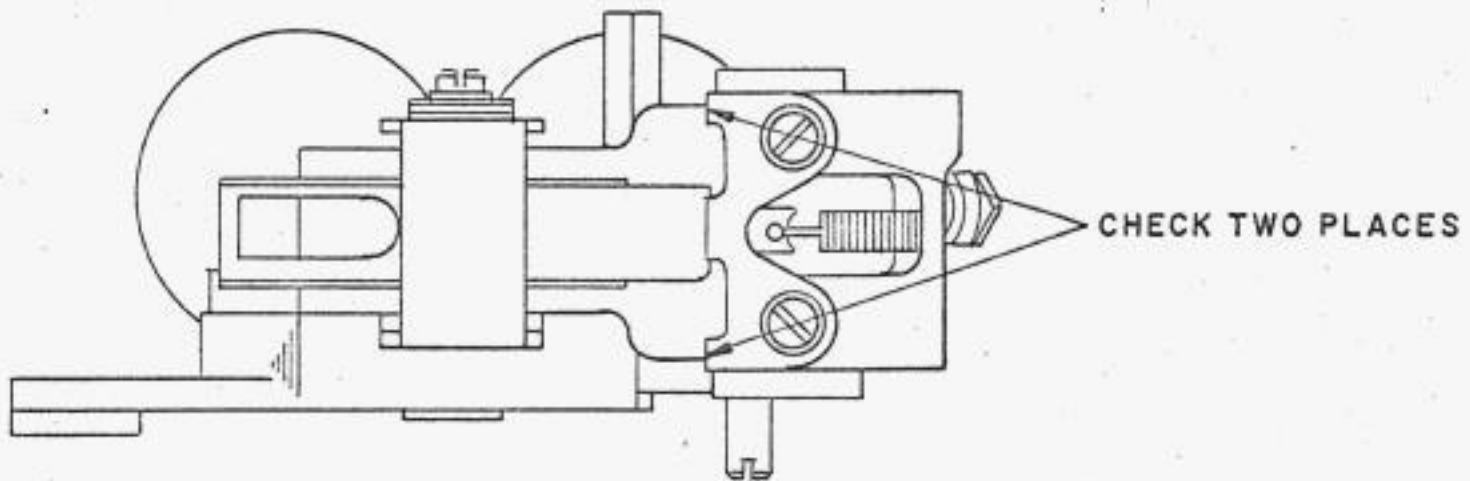
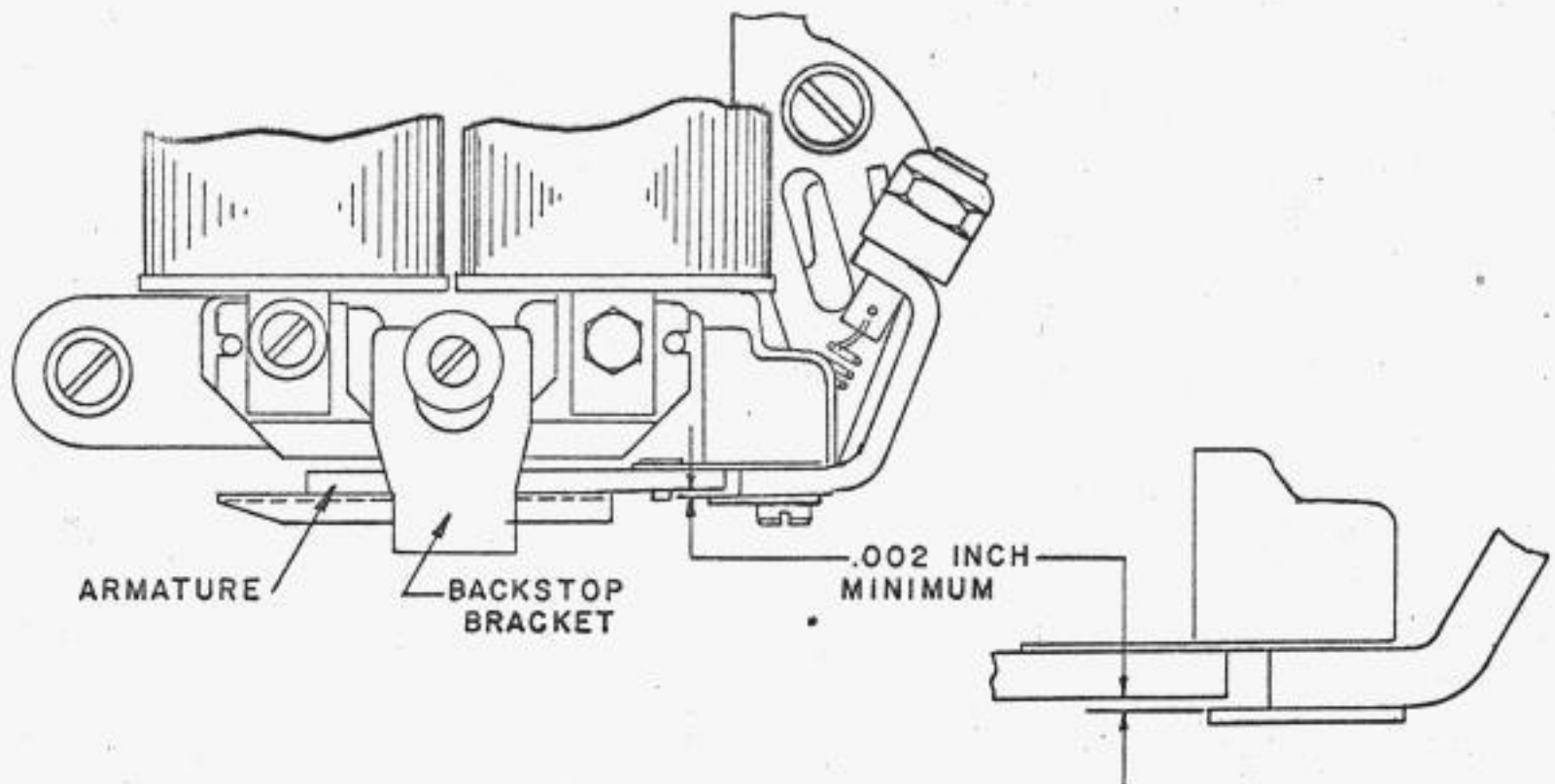


Horizontal

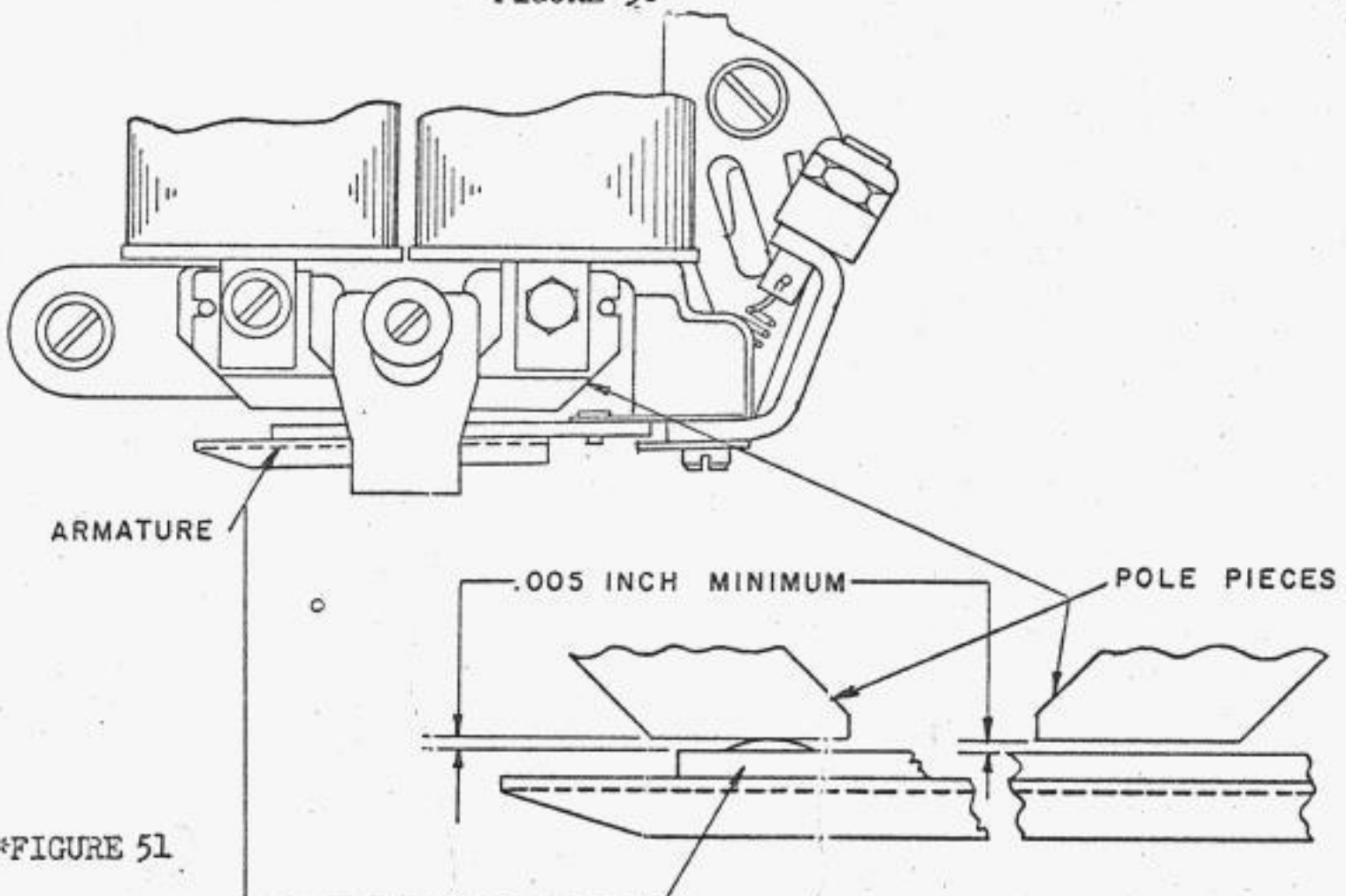
Any combination of two characters may have a center distance not less than .080 nor more than .120, (except the first two characters which may vary an additional .004).

EXAMPLE:





*FIGURE 50



*FIGURE 51

SECTION V

INSTALLATION AND SERVICING INSTRUCTIONS

1. INSTALLATION

- a. Adjustments required during initial installation of a printer set prior to placing the keyboard and typing unit into the cabinet, may be found in Specification 6311S; Engineering Specification for Model 28 Complete Set and Accessories.

2. SERVICING INSTRUCTIONS

a. To Remove the Type Box From Its Carriage

- (1) Trip the type box latch toggle to the right.
- (2) Lift the right end of the type box up to an angle of approximately 45° and pull the type box toward the right to disengage it from the left hand bearing stud.
- (3) Reinstall the type box in the reverse order. The type box should be firmly seated on the bearing studs and the point of the latch toggle should be placed in the notch in the type box plate before moving the toggle to its latched position.

b. To Remove the Print Carriage From the Printer

- (1) Loosen the two screws in the print carriage cable clamp and disengage the cable from the clamp.
- (2) Move the carriage to the left end of its track and tilt the lower part of the carriage forward to disengage the rollers from the track.
- (3) Reinstall in the reverse order.
- (4) When reinstalling the carriage see that the printing lever arm is correctly re-engaged with the printing bail.
- (5) Position the carriage clamp on the cable for correct printing position as specified in the adjustment specification.

c. To Remove the Type Box Carriage From the Printer

- (1) Move the type box carriage to its extreme right hand position.
- (2) Hold the code bars in marking position and rotate the main shaft so that the type box is in its uppermost position.
- (3) Remove the retainer ring from the stud in the right hand end of the type box carriage link and disengage the link from the carriage.

- (4) Rotate the printer shaft so that the type box is in its lowest position.
 - (5) Hold the ribbon guide forward and the ribbon lever back and pull the carriage toward the right to disengage it from the carriage track.
 - (6) Reinstall the carriage in the reverse order.
- d. To Remove the Front Plate Assembly From the Keyboard Base
- (1) Remove the printer from the keyboard base.
 - (2) Remove the retainer ring from the type box carriage link right hand stud and disengage the link from the carriage. (See instructions for removing the link retainer in paragraph "c".)
 - (3) Remove the two screws which secure the main bail drive bracket to the rocker shaft.
 - (4) Remove the spacing shaft gear.
 - (5) Remove the four screws which secure the front plate assembly to the printer frame.
 - (6) Pull the front plate assembly forward to disengage it from connecting parts in the printer unit.
 - (7) Reinstall the front plate assembly in the reverse order.
 - (8) When reinstalling the front plate assembly make sure that the code bar bell cranks, the shift slide lever, and the reversing slide lever, the automatic CR-LF bell crank, and the carriage return lever extension are properly engaged with their mating parts before tightening the front plate mounting screws. Replace the spacing shaft gear. (See adjustment specification for instructions on phasing the spacing gears.)
- e. To Remove the Function Box Unit From the Printer
- (1) Remove the printer from the keyboard base.
 - (2) On sprocket feed typing units it is necessary to remove the paper tray and low paper and paper out alarm assembly (if present). Remove the alarm assembly by removing the two screws which mount the assembly to the plate attached to the side frame. The assembly is then removed to the rear but left attached by its cable. Remove the paper tray by lifting upward at the rear corners to disengage the pins from the retainer springs. Continue to lift upward at the rear while removing the paper tray to the rear.

- (3) Remove the rear tie bar from the typing unit frame. It is not necessary to untie any cable which may be fastened to this bar as the slack in the cables will allow the bar to be moved to clear the function box withdrawal.
- (4) Rotate the function clutch until the stripper blade driving arm is in its lower position, remove the screw from the cam shaft collar and disconnect the collar stud from the driving arm.
- (5) Remove the two screws that secure the function box assembly in the printer.
- (6) Lift the function box assembly upwards to disengage it from its locating brackets and pull toward the rear to disengage the shift fork and the pilot pins from the code bar unit.
- (7) Remove the contact unit assembly from the function box. It is only necessary to remove the contact unit assemblies if it is desired to completely detach the function box from the typing unit. Generally there is enough slack in the cable to permit servicing of the function box while still attached to the typing unit by means of the cable.
- (8) Reinstall the function box unit in the reverse order.
- (9) When reinstalling the function box assembly, push it forward in its guide rails to within about 1/8" of its final position, then manually disengage the function pawls from their function levers and push the function box assembly forward and down so that it is latched in place on its locating brackets.

f. To Remove the Code Bar Assembly From the Printer

- (1) Remove the printer from the keyboard base.
- (2) Remove the function box assembly. (See instructions for removing the function box assembly.)
- (3) Remove the front plate assembly. (See instructions for removing the front plate assembly.)
- (4) Remove the two screws in each side frame which secure the code bar assembly in the printer frame.
- (5) Remove the code bar shift bar retainer plate from the code bar right hand casting.
- (6) Remove the code bar links from the code bars and pull the code bar assembly forward and to the left.
- (7) Reinstall the code bar assembly in the reverse order.

- (8) Loosen the code bar assembly tie bar screws and hold the code bar assembly castings back and down firmly against their locating surfaces in the printer frame and tighten the mounting screws. Tighten the tie bar screws.

g. To Remove the Main Shaft Assembly From the Printer

- (1) Remove the printer from the keyboard base.
- (2) Remove the selector cam assembly. (See instructions for removing the selector clutch assembly with clutch.) (Set the printer upside down.)
- (3) Remove the clamp collar (with oiler) from the right end of the shaft.
- (4) Remove the carriage to its left hand position.
- (5) Remove the screw which secures the spacing shaft in the spacing pawl assembly.
- (6) Remove the spacing shaft with gear.
- (7) Remove the main shaft right hand bearing retainer plate.
- (8) Remove the type box clutch connecting link retainer plate at the clutch stud and remove the link.
- (9) Remove the two screws from the main shaft left hand bearing retainer.
- (10) Unhook the springs from the stop levers and latch levers on all clutches and the clutch trip shaft cam follower spring. (Position the code bar clutch so the low part of the trip cam clears the cam follower.) Unhook the code bar clutch cam follower spring.
- (11) Remove the link connecting the function clutch and the stripper blade arm.
- (12) Unhook the two springs connecting the function bar reset bail and the shaft with bearings.
- (13) Move the main shaft assembly toward the left to disengage the bearings from the printer side frames, and to disengage the code bar clutch and function clutch link from their connecting pins.
- (14) Lift the left end of the shaft assembly out of the side frame and position the shaft so that the function clutch link passes the suppression assembly bracket and remove the shaft assembly from the printer.

- (15) When assembling the clutch units which have cams and disc marked "O" for identification, the marked side of the parts should face away from the clutch side of the assembly. The function and code bar clutch units should have their driving links assembled so that the larger end of the hub faces away from the clutch side of the assembly.
- (16) Reinstall the shaft assembly in the reverse order.
- (17) To phase the spacing gears and line feed gears, see the adjusting specification.
- (18) Remake the stripper blade drive cam adjustment as specified in Section III. Only on units having single stop function clutch.

h. To Remove the Platen

- (1) Remove the line feed spur gear.
- (2) Remove the platen bearing retainers.
- (3) Remove the paper finger shaft (friction feed) or the guide bracket (sprocket feed).
- (4) Hold off the detent and lift the platen out of the side frame.
- (5) Replace the platen in the reverse order.
- (6) When replacing the platen bearing retainers, put the retainer upper screw in first. Leave the screw slightly loose. Press the lower end of the retainer down and hook it into the elongated hole in the side frame. Replace the lower screw. Tighten both screws.

i. To Replace the Function Bars in the Function Box

- (1) Remove the function box from the typing unit. (See instructions for removing the function box.)
- (2) Unhook the function bar spring.
- (3) Hold the function bar toward the rear of the function box and disengage the function pawl from the function bar.
- (4) Pull the function bar toward the front to remove it from the function box.
- (5) Replace the function bar in the reverse order.

j. To Remove the Selector Cam Assembly with Clutch

- (1) Lift the push lever bail cam follower from the cam and latch it in the raised position on the ledge of the push lever guide by sliding it to the left. Lift the selector levers and the marking lock lever from their cams by moving the marking lock lever forward until the armature drops behind it.
- (2) Remove the nut and screw which mount the selector clutch drum and position the selector clutch so that the stop lug is in the uppermost position.
- (3) Hold the start lever and the spacing lock lever away from their cams with the forefinger of the left hand and withdraw the cam assembly by sliding it to the right while rocking it back and forth slightly.
- (4) To replace the cam assembly, reverse the procedure used in removing it except for the following.
- (5) As the cam assembly approaches its fully installed position, it will be necessary to position the code bar clutch trip cam follower and the selector clutch latch so they ride on their respective cam surfaces.
- (6) Restore the push lever bail and the armature to their normal operating positions.

k. To Remove the Selector Mechanism

- (1) In order to remove the selector mechanism from the typing unit, the selector cam assembly must be removed.
- (2) Remove the felt wick from the wick holder and remove the wick holder.
- (3) Unhook the common transfer lever spring from the push lever guide.
- (4) Remove the remaining three selector mounting screws (one is inside the side frame) and lift the selector from the side frame.
- (5) To replace the selector mechanism, reverse the procedure used in removing it.

l. To Remove the Code Bar Positioning Mechanism

- (1) Remove from the selector the spring attached to the common transfer lever and restore any operated push lever to the spacing position by raising the reset bail.

- (2) Loosen the clamp screw on the shift lever drive arm, and remove the two screws which mount the mechanism - one to the side frame, the other to the selector mechanism.
- (3) Manipulate the transfer levers and code bar shift bars while gently twisting the mechanism so as to slide the mechanism off the code bar extension.
- (4) To replace the mechanism on the typing unit, reverse the procedure used in the removing of it, except for the following.
- (5) With the main shaft in the stop position, push the code bar shift bars to the marking position (left or in). Manipulate the code bar shift bar and transfer levers so that the shift bars line up with their respective slots, and slide the shift bars through the slots, one at a time.

m. To Remove Selector Magnet Assembly

- (1) Remove the range finder by removing the two screws and the nut which mounts it to the selector.
- (2) Remove the cable from the coil terminal screws.
- (3) Remove the two magnet assembly mounting screws and lift the assembly out of the hole in locating plate.

n. To Replace the Draw Wire Rope

(1) Upper Draw Wire Rope

- (a) Return the carriage to the left position.
- (b) Unwind the carriage return spring. (Loosen the nut on the front of the spring drum bearing post and operate the ratchet escapement lever.)
- (c) Remove the wire rope from the clamp on the printing carriage, and the clamp on the oscillating rail slide.
- (d) Loosen the clamp screw which secures the wire rope to the spring drum, and remove the cable from the drum.
- (e) Remove the screw in the spacing drum which secures the ends of the wire rope, and remove the cable from the drum.
- (f) Replace the wire rope in the reverse order.

(2) Lower Draw Wire Rope

- (a) Remove the screw which secures the wire rope to the spacing drum, and remove the end of the wire rope from the drum.

- (b) Loosen the screws which secure the margin bell contact cam plate on the spring drum and position the plate to expose the wire rope mounting screw.
 - (c) Remove the wire rope screw and remove the cable from the spring drum.
 - (d) Loosen the screws in the bearing studs on the printing carriage wire rope rollers, and move the studs toward the center of the printer.
 - (e) Replace the wire rope in the reverse order.
 - (f) When installing the draw wire ropes observe that each wire rope is in its correct track around the drums. (The lower wire rope is toward the front of the drums.)
 - (g) Adjust the position of the type box, the printing carriage, the margin contact cam plate and the cable tension as specified in the adjusting specification.
- o. To Replace the Pallets or Pallet Springs in the Type Box
- (1) Remove the type box from its carriage (see instructions for removing the type box from its carriage).
 - (2) Remove both screws and nuts that secure the front plate to the rear plate assembly. Separate the two plates.
 - (3) Remove the spring from the pallet by compressing the spring slightly and pulling the formed end out of the slot in the pallet.
- NOTE: This spring should be discarded once it has been removed from its assembly.
- (4) Replace pallet (omit this step if replacing spring only).
 - (5) Install new pallet spring making sure that the formed end of the spring extends through the slot in the pallet.
 - (6) Line up the front plate with the rear plate assembly and draw the two plates together until the head of the pallet leaves the rear plate by approximately 1/16". This may be accomplished by using two 6-40 screws (at least 11/32" long) and nuts in place of the screws and nuts removed in step (2) and tightening them only enough to hold the pallets as specified above. (Do not clamp the plates together until all pallets have been moved into their correct position.)
 - (7) Manipulate the pallets until they fall into their respective openings in the front plate and press plate together.

- (8) Replace screws and nuts used in step (6) with screws and nuts removed in step (2).

p. To Replace Springs or Contact Arms in the Switch Assembly (Switches Equipped with a Block and Separate Top Plate)

- (1) Remove the function box.
- (2) Remove the two 151689 Screws and 110743 Lock Washers which secure the switch to the function box.
- (3) Unsolder any existing connections to the terminal and spring. Care should be exercised when unsoldering the cable to the contact spring and also when lacing or routing the cables so as not to tug or pull unnecessarily on the contact spring causing distortion or damage to the spring.
- (4) Remove the top plate with springs.
- (5) Remove the contact arms.
- (6) Remove the spring from the top plate. To remove the spring, clean the solder from the spring and place the end of a small screwdriver on the shoulder of the spring and push downward.
- (7) To reinstall the contact spring, place the loop end of the spring into the required position in the terminal plate. Hook a spring hook in the loop of the spring and pull the spring into position.
- (8) Before mounting the contact plate on the switch block, check to make sure the end of the spring is on top of the formed over contact end. Mount the terminal plate with springs and the block in the required location on the stunt box and hold in place with the 151689 Screws and 110743 Lock Washers.
- (9) Resolder the cables removed to their former locations.
- (10) Insert the pointed end of the contact arm with the notch of the contact arm in the downward position, between the bent up end of the spring and formed end of the contact. Push the arm in position so the notch is fully engaged.
- (11) Check to see that the contact arm insulator is in alignment with the function lever. If necessary, loosen the screws and position the switch to meet the requirement. Check to see that there is some clearance between the contact arm and vertical face of the clip. If the switch is a transfer type with contacts both front and rear, check both contacts.

* Indicates Change
** Indicates Addition