

ADJUSTMENTS AND LUBRICATION

MODEL 14  
REPERFORATOR TRANSMITTER DISTRIBUTOR

(FRXD)

**TELETYPE<sup>®</sup>**  
**CORPORATION**

SUBSIDIARY OF *Western Electric Company* INC.

SKOKIE, ILLINOIS, U.S.A.

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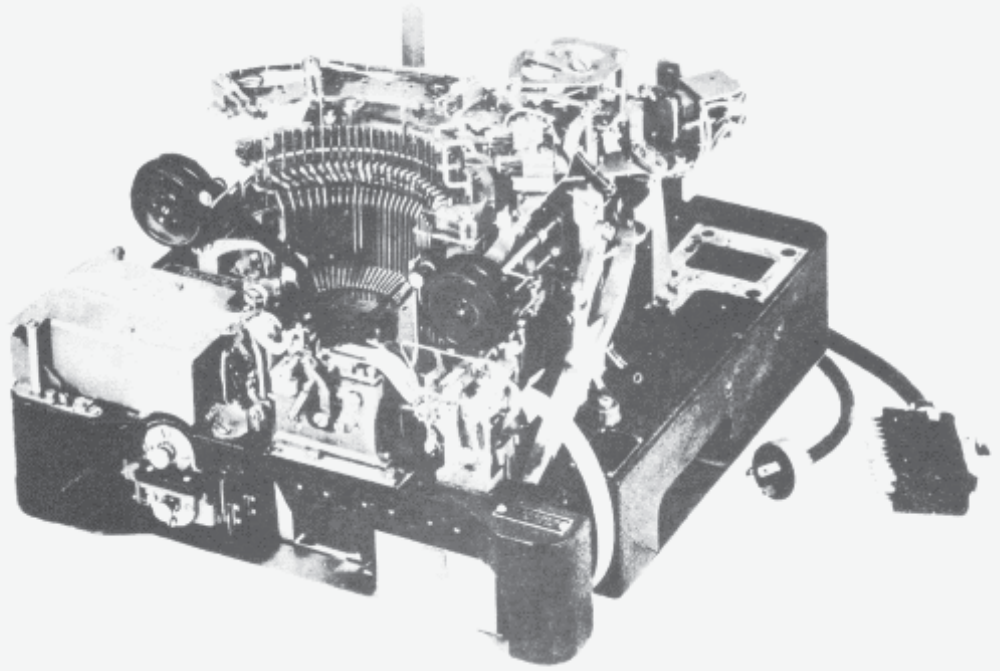
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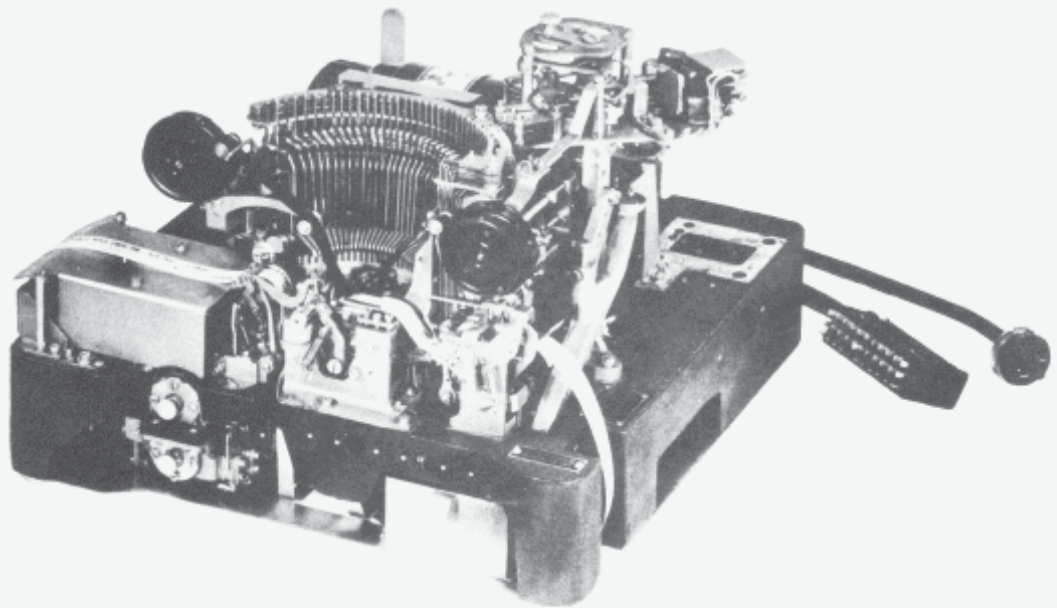
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REPERFORATOR TRANSMITTER DISTRIBUTOR  
FRXD9



REPERFORATOR TRANSMITTER DISTRIBUTOR  
FRXD10

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## SECTION 1

## GENERAL DESCRIPTION

## 1. GENERAL

a. The Model 14 Reperforator Transmitter Distributor (FRXD) is a motor driven mechanism which combines in a single unit the functions of a typing or non-typing reperforator and a tape transmitter distributor. It translates signals of the start-stop five-unit code, reperforates the message, and retransmits it from the reperforated tape for relaying purposes. Units equipped with typing reperforators also print the message on the tape.

b. The unit provides a fully automatic mechanism in which the chadless perforated tape may be stored in the form of a loop to accommodate any delay in transmission, or in which all the combinations in the tape up to and including the last character perforated may be immediately transmitted. This is accomplished by means of a pivoted transmitter that moves along the tape, as it becomes taut, until it reaches a position one character space away from the point of code perforation. The code (Figure 84) utilizes five selecting elements in combinations of current and no-current intervals to form thirty-two code combinations. In order to maintain synchronism between transmitting and receiving units, each group of five selecting intervals is preceded by a START interval and followed by a STOP interval. Intervals during which current is transmitted are designated as MARKING intervals whereas

those during which no current is transmitted are designated as SPACING intervals.

c. A complete unit consists essentially of a base casting, a motor, selecting mechanism, reperforating mechanism, tape feeding mechanism, a pivoted transmitter with a tape sensing mechanism, and a distributing mechanism. Units that also print the message have, in addition, typing and ribbon feeding mechanisms. A cover may also be included.

d. In order to permit the last character combination perforated in the tape to be sensed by the pivoted transmitter one character space from the code punches, the feed holes must be perforated in the tape before it reaches the code punches. This is accomplished by means of a prepunch mechanism located to the right of the code punch block.

e. The units are equipped with either of two perforating mechanisms, one which produces fully perforated tape, the other which produces chadless tape. The perforated portions are not completely severed from chadless tape. Thus, chad disposal is eliminated and the legibility of the printed characters is not impaired. Since the platen is located to the right of the code punches, printing takes place six character spaces behind the perforation. This fact should be kept in mind when tearing the message tape or inserting it in an external transmitter.

## SECTION 2

### MAINTENANCE

#### 1. GENERAL

a. This section covers adjustments, spring tensions and lubrication for the Reperforator Transmitter Distributor.

b. Adjustments are arranged in a sequence that would be followed if a complete readjustment of a unit were undertaken. In following such a procedure, parts and assemblies which are removed to facilitate adjustments should not be replaced until other adjustments which would be facilitated by the removal of these parts are made. If one adjustment is changed, related adjustments should be checked.

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

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

#### e. SELECTING A CHARACTER OR FUNCTION

When the instructions for making an adjustment specify the SETTING UP of a certain character or function, the following method should be followed: Rotate the motor fan or governor counterclockwise, as viewed from the fan or governor end, until the selector armature locking lever (see Figure 6) is about to drop off the long high part of the locking cam. Hold or release the selector armature to move the selector arm to the operated (MARKING) or unoperated (SPACING) side in accordance with the first selecting impulse of the code combination to be set up. Refer to the code chart (Figure 84). With the selector arm in this position rotate the motor fan or governor until the top (No. 1) selector sword has been positioned and the locking lever is on the peak of the locking cam. Position the selector arm in accordance with the second impulse of the code

combination to be set up and repeat the procedure followed in positioning the top (No. 1) selector sword. Position all of the selector swords following the foregoing procedure. When all swords have been positioned and the main shaft clutch has been engaged, further rotation of the motor fan or governor will cause the unit to select the character or to perform the functions which have been set up.

#### f. SPEED SETTING

(1) When governed motors are used, a speed indicator (tuning fork) is required for the purpose of checking the motor speed. The fork is equipped with shutters attached to the end of the tines. The governor is equipped with a target having black spots on a white background (Figure 83).

(2) To check speed, the target should be well illuminated. Tap the speed indicator fork lightly to make it vibrate. Hold the fork so that the shutters are close to the eye and view the target through the openings in the shutters. If the motor is running at the correct speed, the target will appear to be stationary. If the motor is running too fast, the spots will appear to be moving in the direction of motor rotation; if too slow, in the opposite direction. To increase the speed, operate the speed adjusting lever (Figure 83). To decrease the speed, operate the governor adjusting bracket (Figure 82).

#### NOTE

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

#### g. TO MEASURE RECEIVING RANGE

(1) Mounted on the selector mounting plate above the top end of the main shaft of the reperforator is the range finder assembly which is used for the purpose of orienting the selector to the incoming signals. Transmit RY (the letters RY sent alternately) to the reperforator continually while the receiving range is being determined. The range may be taken as follows:

(2) While RY is being received, loosen the index arm thumb screw (Figure 14) and shift the index arm of the range finder toward 0 until errors appear in the copy. Then move the arm back slowly until errors no longer appear; at least 72 characters should be received without error. This position indicates one limit of the orientation range. Note the position of the index arm on the scale. Determine the opposite end of the receiving-range by repeating the foregoing procedure with the index arm near the opposite end of the scale. After the two limits of the receiving-range have been found, set the index arm of the range scale midway between these two points.

#### NOTE

If facilities for transmitting biased test signals to the reperforator transmitter distributor are available, the index arm should be set at the optimum setting for the reception of biased signals.

#### h. TO MOVE THE MOTOR UNIT

(1) To facilitate some adjustments, the motor unit should be moved out of the way in the following manner. Remove the motor unit base plate mounting screws. Slide the motor unit, tape reel and relay assembly out of the way. When replacing the motor unit, make sure that the motor pinion is meshed with the gear on the main shaft and make sure that the base plate is resting against the eccentric stop on the right-hand side.

#### NOTE

When moving the motor unit on which the relay assembly and tape reel assembly are mounted, care should be taken so as not to damage the tape-out contacts or the cables.

(2) Before proceeding to adjust the unit, it will be necessary to remove the following: Ribbon and ribbon spools (if present), base plate, tape chute, baffle plate (if present), transmitting and/or switching control contacts cover plate, sensing shaft cover plate, lower chad chute (if present) and gear guard.

## 2. ADJUSTING PROCEDURE

### a. MAIN SHAFT CLUTCH SPRING TENSION (Figure 4)

With the teeth of the driven clutch member resting against the teeth of the driving member, but not engaged, hook a 64 ounce scale over the throwout cam on the driven clutch member and pull as nearly in line with the shaft

as possible. It should require 24 to 30 ounces (for 60 wpm) and 32 to 42 ounces (for 75 wpm) to separate the clutch teeth.

### b. SELECTOR SEPARATOR PLATE ADJUSTMENT (Figure 5)

#### NOTE

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

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

### c. MAIN SHAFT ADJUSTMENT

The cams on the selector cam sleeve should line up with their associated selector levers. Because of the "build-up" of tolerances, the maximum out of line condition for any cam and its associated lever should not exceed .010". To check alignment, rotate the selector cam sleeve at least one complete revolution. To adjust (for units not equipped with a 117387 lower bearing retainer), loosen the four screws that hold the main shaft bearing caps (Figure 3) and set the position of the main shaft. Tighten the screws. For units equipped with a 117387 lower bearing retainer, the following applies: Tighten the upper cap mounting screws. Position the bearing retainer on the lower bearing cap so that the bridge rests against the lower face of the ball bearing and that it clears the lower bearing cap. Tighten the lower bearing cap mounting screws.

### d. MAIN SHAFT CLUTCH THROWOUT LEVER ADJUSTMENT (Figure 3)

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

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

With the clutch throwout lever resting against the lower surface of the driven clutch member, hook an 8 ounce scale over the clutch throwout lever at the spring hole and pull horizontally at right angle to the clutch throwout lever. It should require 2-1/2 to 4 ounces to start the lever moving.

f. MOTOR POSITION AND GEAR MESH ADJUSTMENT

(1) With the motor base plate eccentric stop approximately in the center of its adjustment and with the base plate resting against this stop, a horizontal center line through the main shaft gear should coincide approximately with a horizontal line through the center of the pinion. If necessary, adjust the height of the motor by means of shims between the motor feet and the base plate. Use the same number of shims under each motor foot. The shims not used should be retained beneath their respective mounting screw lock washers to prevent the screws from protruding beneath the base plate.

(2) Position the motor on its base plate by means of its mounting screws and the elongated holes so that there is a barely perceptible amount of backlash between the motor pinion and the main shaft gear; check for one complete revolution of the main shaft gear.

NOTE

The gear play may be refined by pivoting the motor base plate about the left-hand screw and by readjusting the eccentric stop.

REMOVE THE RANGE FINDER ASSEMBLY

g. HOLDING MAGNET SELECTOR ADJUSTMENTS

(1) ARMATURE PIVOT SCREW ADJUSTMENT (Figure 6)

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

(2) SELECTOR MAGNET ADJUSTMENT (Figure 7)

(a) SELECTOR CORE AND ARMATURE ALIGNMENT — Preliminary

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

(b) SELECTOR CORE AND ARMATURE ALIGNMENT — Final

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

NOTE 1

When the cores are in proper adjustment, it should require at least 3-1/2 pounds pull, with a 64 ounce scale applied at right angle to the armature edge in line with the armature lever, to separate the armature from the cores when a current of .020 amperes is flowing through the magnet coils (coils in series shunted by a 5000 ohm resistor).

NOTE 2

The adjustment may have to be modified in order to obtain the required receiving margins and to prevent slow release of the armature due to oil-seal. The margin requirement and the minimum magnetic pull requirement of 3-1/2 pounds should be considered as "Final Check" for the armature and core alignment.

(3) SELECTOR ARM PIVOT SCREW ADJUSTMENT (Figures 8 and 9)

With the armature spring, the selector arm spring, and selector arm stop detent spring

unhooked, the selector arm should be free on its pivots with barely perceptible end play, and the locking lever should overtravel the top and bottom edges of the locking wedge. There should also be a minimum clearance of .008" between the selector arm and the armature extension and a minimum clearance of .010" between the selector arm and the selector arm stop detent when the play in the detent is taken up in a direction to make this clearance a minimum. The end play may be adjusted by means of the upper pivot screw. If the minimum clearance requirements are not met it will be necessary to remove the selector magnet bracket and the selector arm bracket and adjust both pivot screws of the selector arm.

#### (4) SELECTOR ARM BRACKET ADJUSTMENT (Figure 6)

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

(b) Remove the locking lever spring, the selector arm spring and armature spring. Rotate the main shaft until the No. 1 selector lever is resting on the peak of its cam. With the selector arm in its unoperated (spacing) position, move the spacing arm of the No. 1 sword against the selector arm extension. Then rotate the selector arm slowly toward the marking position until the selector arm just leaves the spacing arm of the No. 1 sword. There should be some clearance, not more than .040", between the No. 1 sword and the spacing stop post.

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

(d) With each selector lever on the peak of its cam, each associated sword should be tried for the foregoing requirement of some clearance, not more than .040". To adjust, loosen the selector arm bracket mounting screws just enough to make the bracket friction tight. Then, to equalize the clearance between the swords and the stop posts, loosen the centralizing eccentric screw lock nut and turn the eccentric screw clockwise to provide more clearance on the spacing side or counterclockwise to provide more clearance on the marking side.

#### NOTE

Be sure that the selector arm stop detent does not interfere with the adjustment.

(e) The centralizing eccentric screw should always be located so that its indicating line is adjacent to the marked scale that has been provided on the bracket to aid in gauging the amount the screw must be turned. Tighten the lock nut when the selector arm has been centralized. To obtain the "some clearance, not more than .040", requirement between the swords and the stop posts, insert the 90783 adjusting wrench in one of the two holes provided and turn the wrench to move the bracket closer to or farther from the swords as required. Then tighten the selector arm bracket mounting screws. Replace the locking lever spring, selector arm spring, and armature spring.

#### (5) LOCKING WEDGE ADJUSTMENT (Figure 10)

With the locking lever on a high part of its cam, the front end of the locking wedge should clear the locking lever by .005" to .012" when the end of wedge is held in line with the locking lever. To adjust, loosen the locking wedge mounting screw and position the locking wedge in its guide; then tighten the mounting screw.

#### (6) LOCKING LEVER SPRING TENSION (Figure 10)

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

#### (7) SELECTOR ARM STOP DETENT ADJUSTMENT (Figure 8)

(a) With the selector arm spring removed and the locking lever on the low part of its cam, there should be an equal amount of clearance, within .003", between the sides of the locking wedge and the locking lever when the selector arm is in the MARKING or SPACING position.

#### NOTE

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

(b) To adjust, loosen the screw that mounts the selector arm stop detent eccentric post just enough to make the post friction tight. Position

the stop detent by turning the post; then tighten the post mounting screw.

(8) SELECTOR ARM STOP DETENT SPRING TENSION (Figure 8)

Unhook the stop detent spring from the locking lever guide and hook an 8 ounce scale in the spring eye. It should require 4 to 5 ounces to pull the spring to its position length.

(9) SELECTOR LEVER SPRING TENSION (Figure 10)

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

NOTE

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

(10) SELECTOR MAGNET BRACKET POSITION ADJUSTMENT (Figure 11)

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

NOTE

When checking this requirement, the armature extension should be held approximately .045" from the bottom of the notch of its cam. The wider the clearance the more negative internal bias. Values between .058" and .062" are usually the most favorable, especially at 75 speed.

(11) SELECTOR MAGNET BRACKET ADJUSTMENT (Figure 7)

NOTE

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

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

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

2. With the selector magnet still de-energized, loosen the selector magnet bracket mounting screws and, by means of its adjusting screw, rotate the selector magnet bracket so that the armature just touches the pole faces; then turn the adjusting screw an additional one-tenth of a turn counterclockwise. This will press the armature firmly against the magnet cores. (While making the one-tenth of a turn adjustment, be careful to avoid lost motion due to loose fitting screw threads.)

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

(12) ARMATURE SPRING TENSION ADJUSTMENT (Figure 7)

(a) Unhook the armature spring from its spring arm and rotate the main shaft until the armature extension is on a high part of its cam. With a 32 ounce scale hooked in its spring eye, pull the spring to its position length. It should require the following tensions:

1. If a distortion test set is available, the armature spring tension should be set, within 13 to 24 ounces, to obtain optimum margins for the reception of biased signals.

2. If no distortion test set is available, the spring tension should be set, within 13 to 24 ounces, to obtain optimum margins for the reception of unbiased signals. A spring tension value of 16 to 19 ounces for .060 ampere line current (coils in "parallel") and of 14 to 17 ounces for .020 ampere line current (coils in "series") may serve as a guide in obtaining optimum margins.

(b) To adjust, loosen the spring arm mounting nut and position the spring arm. Then tighten the mounting nut. Rehook the armature spring.

#### (13) SELECTOR ARM OPERATING SCREW ADJUSTMENT (Figure 12)

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

#### (14) SELECTOR ARM SPRING TENSION (Figure 13)

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

#### NOTE

In reforming, do not nick, crimp, or otherwise deform the spring wire.

#### (15) STOP LEVER ECCENTRIC SCREW ADJUSTMENT (Figure 14)

The stop lever on the range finder assembly should overtravel the latching face of the trip latch by not more than .006". To adjust, loosen the stop lever eccentric screw nut and position the screw; then tighten the nut, making certain that the tightening of the nut does not disturb the adjustment.

#### (16) TRIP LATCH SPRING COMPRESSION (Figure 14)

When measuring this requirement, the range finder assembly should be held in a horizontal position. Apply the push end of an 8 ounce scale, held in a vertical position, to the trip latch, as near to the stop lever as possible. It should require 1 to 1-1/2 ounces when pushing upward to start the trip latch moving.

#### (17) STOP LEVER SPRING TENSION (Figure 15)

#### NOTE

Be sure that the stop lever eccentric has been adjusted before checking this requirement.

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

#### (18) SELECTOR STOP ARM AND STOP LEVER ENGAGEMENT ADJUSTMENT (Units equipped with Adjustable Range Scale Assembly only)

#### NOTE

Replace the range finder assembly. In replacing the assembly, avoid jamming the trip latch plunger against the armature trip off screw; also make sure that the round tip of the clutch release lever is under the trip latch plunger and between the trip latch bell crank and its bracket.

With the selector magnet armature in the spacing position, rotate the selector cam sleeve until the stop arm moves the stop lever to its maximum travel beyond the stop of the trip latch. Loosen the range scale assembly mounting screws and the positioning link mounting screw just enough to make them friction tight. Position the range scale assembly so that the overtravel of the stop lever beyond the trip latch is at least half but not more than the width of the stop lever. This should be checked with the range indicator set at 15, 60, and 105 on the range scale. Tighten the mounting screws and the positioning link screw.

#### (19) TRIP OFF SCREW ADJUSTMENT (Figures 14 and 16)

(a) There should be some clearance, not more than .004" between the stop lever and the



trip latch when the armature is in the unoperated position and the selector cam sleeve is rotated until the stopping edge of the stop lever is directly below the latching surface of the trip latch. While checking the above clearance, take up the play in the stop lever with a screwdriver applied axially adjacent to the spring hole as close to the bearing as possible with thrust in the direction of the trip latch. This clearance should be held to a minimum to favor the "at least .002" end play of the trip plunger.

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

(c) To adjust, loosen the trip off screw lock nut and position the screw to meet the first requirement. The latter requirement serves as a check on the trip off screw adjustment and also on the adjustment of the selector magnet bracket (Figure 14).

#### (20) MANUAL TAPE-OUT MECHANISM ADJUSTMENT (Figure 17)

(a) The round tip of the clutch release lever should be positioned approximately midway between the trip latch plunger and the bracket, and the clutch release lever should not limit the upper range movement of the indicator arm on the range finder scale.

(b) To adjust, loosen the set screws in the clutch release lever set collar and position the lever by means of the set collar. Tighten the set screws.

(c) The clutch release rod should slide freely on its shoulder screw. To adjust, loosen the lock nut on the front shoulder screw and position the screw. Tighten the lock nut.

(d) It should require 2-3/4 to 3-3/4 ounces to start the clutch release rod moving when the push end of an 8 ounce scale is applied to the end of the push rod and pushed parallel to the rod.

#### h. REPERFORATOR TRANSMITTER DISTRIBUTOR PROPER

##### (1) PULL BAR GUIDE ADJUSTMENT (Figure 21) - Non-typing equipment only

There should be .004" to .080" clearance between the end of the No. 1 T lever and the bottom of the slot in the code bar measured at the point of closest approach. Also, see that there is some clearance between the ends of the Nos. 2, 3, 4, and 5 T levers and their respective code bars measured at the point of closest

approach. To meet this requirement, position the pull bar guide in its elongated mounting holes by means of the mounting screws. Tighten the mounting screws.

#### NOTE

In the following adjustments, when positioning the main bail adjusting screw or removing the main bail spring, it will facilitate the adjustment or removal if the motor unit is pivoted to the left.

##### (2) MAIN BAIL ADJUSTING SCREW PRELIMINARY ADJUSTMENT - Non-typing equipment only

#### NOTE

Final adjustment in paragraph h.(39).

With the main bail roller on the high part of its cam (Figure 3) there should be a clearance of .060" to .080" between the main bail and the upper left extension of the main bail bracket at the point of closest approach. To adjust, loosen the lock nut; position the main bail adjusting screw (Figure 3). Tighten the lock nut.

##### (3) MAIN BAIL GUIDE ADJUSTMENT - Non-typing equipment only

Loosen the mounting screws on the two main bail guides (Figure 20). Position the left guide in the middle of its adjustment and tighten the mounting screws. Remove the main bail spring (Figure 3). Position the right main bail guide so that the main bail (Figure 3) will fall to its down position of its own weight when manually raised to its uppermost position and released. Tighten the mounting screws. When finally adjusted, the main bail should not bind in any position of its stroke. Replace the main bail spring.

##### (4) INSTRUCTIONS FOR REMOVING TYPE BASKET ASSEMBLY - Typing equipment only

#### NOTE

In order to measure the Pull Bar Spring Tension or adjust the function bar spring bracket, it is necessary to remove the type basket assembly.

(a) Remove the switching contact mounting plate assembly - units with switching (pull bar operated) contacts only.

(b) Unhook the code bar locking lever spring and the pull bar springs which are hooked to the left and right spring brackets of the ribbon mechanism. Set unit on its back supports.

(c) Remove the three code punch bracket assembly mounting screws.

(d) Remove the sensing and distributor clutch detent lever bracket assembly by means of its two mounting screws.

(e) Remove the three type basket assembly mounting screws.

(f) Unhook the punch bail arm spring located behind the punch arm link.

(g) Remove the ribbon spools and ribbon.

(h) Remove the code punch block assembly rear mounting screw.

(i) Remove the front mounting screw of the right ribbon spool bracket. Loosen the rear mounting screw and swing the bracket so that the ribbon spool cup will not interfere with the removal of the type basket.

(j) Lift the code punch bracket assembly and code punch block assembly out of the unit.

(k) Then, with the pull bars held out of engagement with the pull bar guide (use a piece of string or wire), slide the type bar basket assembly upward and out of the unit.

#### (5) FUNCTION PULL BAR SPRING BRACKETS ADJUSTMENT (Figure 18)

The pull bars supported by the function bar spring brackets should be free and without bind and they should have approximately equal clearance between the corresponding edges of the function bar spring brackets. Adjust both the right and the left function bar spring brackets by rotating them on their mounting screws.

#### (6) PULL BAR SPRING TENSIONS (Figure 19) — Typing equipment only

Unhook the spring from each pull bar. With an 8 ounce scale held in a vertical position, hook the scale in the spring eye. It should require 3 to 4 ounces to extend any pull bar spring (with associated type bar) to its position length and 5-1/2 to 6-3/4 ounces to extend any pull bar spring (without associated type bar) to its position length. If trouble is experienced due to switching (pull bar operated) contact bounce, it may be necessary to select other springs with tensions toward the high limit, not to exceed the applicable limit.

#### NOTE

For adjustments of pull bar springs that are attached to either the right or left function

pull bar spring bracket, see "CODE BAR LOCKING LEVER SPRING TENSION ADJUSTMENT" and "LEFT FUNCTION PULL BAR SPRING BRACKET ADJUSTMENT."

#### (7) REPLACE THE TYPE BASKET BY REVERSING THE PROCEDURE FOLLOWED IN REMOVING IT — Typing equipment only

#### NOTE

In order to make the following adjustments, it will be necessary to move the motor out of the way. Remove the two rear mounting screws of the motor plate and swing the motor out of the way. See Paragraph 1.h.

#### (8) MAIN BAIL ROLLER GUIDE ADJUSTMENT — Typing equipment only

(a) The main bail should be free throughout its travel and the roller guides (Figure 20) should be positioned so that the requirements specified in the following adjustments can be met:

PULL BAR GUIDE ADJUSTMENTS (Figure 21 and paragraph 2.h. (9))

MAIN BAIL ADJUSTING SCREW PRELIMINARY ADJUSTMENT (Figure 3 and paragraph 2.h.(10))

MAIN BAIL ADJUSTING SCREW FINAL ADJUSTMENT (Figure 3 and paragraph 2.h.(39))

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

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

1. Position the pull bar guide (code bar mounting plate) so that it is in the middle of the adjustment provided by its elongated mounting holes and loosen both mounting screws of each main bail guide. See Figure 20.

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

so that the guide is friction tight. See Figure 20A.

3. With the main bail roller on the high point of its cam, shift the main bail guides, if necessary, so that the clearance between the code bars and the LETTERS and FIGURES pull bars is approximately equal. (It may be necessary to advance the main bail adjusting screw to obtain the clearance between the pull bars and code bars.) Tighten the lower mounting screw of the right-hand main bail roller guide friction tight. See Figure 20B.

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

5. Remove the main bail spring (Figure 3) and hold the ribbon feed lever roller away from the main bail plunger. Position the left-hand bail roller guide so that the main bail is free throughout its travel. After tightening the mounting screws of the left-hand bail roller guide, check the freeness of the main bail by raising it to its uppermost position, manually, and releasing it. It should fall to its lower position of its own weight. Replace the main bail spring.

(9) PULL BAR GUIDE ADJUSTMENT (Figure 21) — Typing equipment only

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

(b) There should be .004" to .080" clearance between the end of the No. 1 T lever and the bottom of the slot in the code bar measured at the point of closest approach. Also see that there is some clearance between the ends of Nos. 2, 3, 4, and 5 T levers and their respective code bars measured at the point of closest approach.

(c) To meet these requirements, adjust the position of the pull bar guide by means of its mounting screws.

(10) MAIN BAIL ADJUSTING SCREW PRELIMINARY ADJUSTMENT (Figure 3) — Typing equipment only

#### NOTE

MAIN BAIL ADJUSTING SCREW FINAL ADJUSTMENT is paragraph 2.h.(39).

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

(11) RIBBON SPOOL CUPS ADJUSTMENT (Figure 22) — Typing equipment only

(a) The center of the left ribbon roller should be 5-7/16" to 5-9/16" from the surface of the boss on which the pivoted sensing unit mounts. To adjust, position the ribbon spool by means of its lock nut.

(b) The center of the right ribbon roller should be 4-11/16" to 4-13/16" from the surface of the boss on which the code punch assembly is mounted. To adjust, position the ribbon spool cup by means of its lock nut.

(12) LEFT AND RIGHT RIBBON SPOOL BRACKET ADJUSTMENT (Figures 23 and 24) — Typing equipment only

Both left and right ribbon spool cups should be in line and the right and left ribbon drive shaft bevel gears should have a minimum amount of play without binding when in mesh with their respective ribbon feed shaft bevel gear. Check throughout a complete revolution of the ribbon spool shaft. (See Figure 28.) To adjust, loosen the right and left ribbon spool bracket mounting screws and lock nuts. Position the brackets and tighten the mounting screws and lock nuts.

(13) LEFT RIBBON SPOOL SHAFT ADJUSTMENT (Figure 23) — Typing equipment only

The left ribbon spool shaft should have some end play, not more than .010". To adjust, position the left ribbon spool shaft gear by means of its set screw so that the set screw engages the flat on the shaft.

(14) LEFT RIBBON SPOOL DRIVE SHAFT ADJUSTMENT (Figure 23) — Typing equipment only

The left ribbon spool drive shaft should protrude approximately the same distance through the bevel gear as it does through the front of the ribbon spool bracket. Position by means of the bevel gear on the shaft.

(15) LEFT RIBBON SPOOL DRIVE SHAFT DRIVING GEAR ADJUSTMENT (Figure 23) — Typing equipment only

The left ribbon spool drive shaft gear should mesh fully with the intermediate gear. To adjust, position the drive gear by means of its set screw.

#### NOTE

The intermediate gear should have some end play and run freely in mesh with the driving gear and the ribbon spool shaft gear.

(16) LEFT RIBBON REVERSE ARM SHAFT ADJUSTMENT (Figure 23) — Typing equipment only

(a) Units not equipped with ribbon reverse arm yield spring:

1. The left ribbon reverse arm shaft should be set flush with the front of the ribbon spool bracket when the left ribbon reverse arm is held against the bracket. To adjust, loosen the left ribbon reverse arm set screw and position the shaft. Tighten the set screw.

2. The left ribbon reverse arm shaft should have some end play, not more than .010". To adjust, loosen the set screw in the collar and position the collar. Tighten the set screw after locating it so that it is easily accessible.

(b) Units with ribbon reverse arm yield spring (Figure 85):

1. The left ribbon reverse shaft should be set flush with the front of the ribbon spool bracket.

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

(17) RIBBON REVERSE ARM SHAFTS COLLAR ADJUSTMENT (Figure 85) — Typing equipment with ribbon reverse arm yield spring only

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

(18) RIGHT RIBBON SPOOL SHAFT ADJUSTMENT (Figure 24) — Typing equipment only

There should be some end play, not more than .010", in the right ribbon spool shaft. To adjust, shift the ribbon feed shaft to the left side and position the right ribbon spool shaft bevel gear. Make certain the set screw engages the flat surface on the shaft.

(19) RIGHT RIBBON REVERSE ARM SHAFT ADJUSTMENT (Figure 24) — Typing equipment only

(a) Units not equipped with ribbon reverse arm yield spring:

1. The right ribbon reverse arm shaft should be set flush with the front of the ribbon spool bracket when the right ribbon reverse arm is held against the bracket. To adjust, loosen the right ribbon reverse arm set screw and position the shaft. Tighten the set screw.

2. The right ribbon reverse arm shaft should have some end play, not more than .010". To adjust, loosen the set screw in the collar and position the collar. Tighten the set screw after locating it so that it is easily accessible.

(b) Units with ribbon reverse arm yield spring:

1. Loosen the set screw of the reverse arm operating sleeve and, if necessary, the set screws of the shaft collar and link. Slide the reverse arm shaft toward the front so that the reverse arm rests against the ribbon spool bracket. Position the reverse arm operating sleeve on the shaft so that the reverse arm engages the center (approximately) of the sleeve extension arm. With the reverse arm held against the spool cup tighten the sleeve set screw and the collar and link set screws if they were loosened.

2. Check for freeness and for the some, not more than .010", end play requirement of the right ribbon reverse arm shaft. Tighten the collar set screw; see paragraph 2.h.(17).

(20) RIBBON SPOOL SHAFTS COMPRESSION SPRING ADJUSTMENT (Figure 25) — Typing equipment only

Move the ribbon feed shaft to its left-hand position. Hook an 8 ounce scale over the pin in the right ribbon spool shaft, and pull horizontally at right angle to a line through the center of the pin and the center of the ribbon spool shaft. It should require 2-1/2 to 5 ounces to start the ribbon spool shaft moving. The proper compression of the ribbon spool shaft

spring can be obtained by means of the spring adjusting collar. Move the ribbon feed shaft to its right-hand position and adjust the left-hand compression spring in the same manner.

(21) RIBBON SPOOL SHAFTS SLOT ADJUSTMENT (Figure 23) — Typing equipment only

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

(22) RIBBON REVERSE PAWL LINK ADJUSTMENTS (Figure 26) — Typing equipment without ribbon reverse arm yield spring

There should be .015" to .040" clearance between both right and left ribbon reverse pawls and the ribbon reverse bail when the ribbon reversing arms are against the ribbon spool cups and the ribbon reverse bail is opposite each ribbon reverse pawl. The reverse pawl links should not bind on their shoulder screws. To adjust, position the ribbon reversing arms on the ribbon reverse arm shafts by means of their set screws.

(23) RIBBON REVERSE PAWL LINKS ADJUSTMENT (Figure 86) — Typing equipment with ribbon reverse arm yield spring

The ribbon reverse bail should clear both left and right-hand ribbon reverse pawls by .015" to .040" when the ribbon reverse bail is opposite the reverse pawls and the ribbon reverse arms are against the spool cups. When checking the .015" clearance, the play in the ribbon reverse bail should be taken up in a direction to make the clearance a minimum. When checking the .040" clearance, the play in the ribbon reverse bail should be taken up in a direction to make the clearance a maximum. To adjust, position the spring block on the left ribbon reverse shaft and the sleeve on the right ribbon reverse shaft. Check for the same, not more than .010", end play requirement of the ribbon reverse shafts; see paragraph 2.h.(17). Make certain that the ribbon reverse pawl links do not bind on their shoulder screws.

(24) RIBBON REVERSE ARM YIELD SPRING TENSION ADJUSTMENT (Figure 86) — Typing equipment with ribbon reverse arm yield spring only

Position the ribbon reverse bail so that it will block the full travel of the ribbon reverse arm, and with the ribbon reverse pawl resting against the ribbon reverse bail, apply the push end of an 8 ounce scale, held at a right angle to the ribbon reverse arm at the center where the ribbon is threaded. It should require 1-1/2 to 4-1/2

ounces to start the ribbon reverse arm moving. If it is necessary to increase or decrease the tension, remove the spring and adjust by bending.

(25) RIBBON FEED SHAFT SAFETY SPRING COMPRESSION (Figure 27) — Typing equipment only

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

NOTE

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

REMOVE THE RIBBON FEED PAWL AND CHECK PAWL

(26) RIBBON FEED SHAFT DETENT PLUNGER SPRING COMPRESSION (Figure 28) — Typing equipment only

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

(27) RIBBON FEED LEVER SPRING TENSION (Figure 29) — Typing equipment only

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

REPLACE THE RIBBON FEED PAWL AND CHECK PAWL

(28) RIBBON CHECK PAWL ADJUSTMENT — Typing equipment only

The upper end of the ribbon check pawl (Figure 30) should be 1/16" (plus or minus 1/64") below the lower surface of the pull bar guide. Adjust by means of the ribbon check pawl mounting screw (See Figure 20).

(29) RIBBON CHECK PAWL SPRING PRESSURE (Figure 30) — Typing equipment only

With a 32 ounce scale hooked over the extreme lower end of the ribbon check pawl and pulled at right angle to the pawl, it should require 6 to 9 ounces to start the pawl moving away from the ratchet. Make certain that the working edge of the pawl does not bind against a tooth on the ratchet when measuring this pressure. To adjust, bend the ribbon check pawl.

(30) RIBBON FEED PAWL ADJUSTMENT — Typing equipment only

With the main bail in its topmost position, locate the ribbon feed pawl (Figure 30) so that the surface engaging the ratchet is back of the vertical centerline of the ratchet and so that the ratchet is rotated one or two teeth for every revolution of the main shaft. Make this check throughout a complete revolution of the ribbon feed shaft. To adjust, position the ribbon feed pawl by means of its mounting screw.

(31) RIBBON FEED PAWL SPRING PRESSURE ADJUSTMENT (Figure 30) — Typing equipment only

With the ribbon feed shaft pushed to the right, the main shaft in its stop position and a 32 ounce scale hooked over the extreme front edge of the ribbon feed pawl and pulled at right angle to the pawl, it should require 6 to 9 ounces to start the pawl moving away from the ribbon feed ratchet. Make certain that the feeding edge of the pawl does not bind against a tooth on the ratchet when tension is being measured. To adjust, bend the ribbon feed pawl spring.

(32) RIGHT AND LEFT RIBBON REVERSE PAWLS SPRING TENSION (Figure 27) — Typing equipment only

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

(33) LEFT FUNCTION PULL BAR SPRING BRACKET ADJUSTMENT (Figure 31) — Typing equipment only

With the main bail in its extreme downward position, hook an 8 ounce scale over the space pull bar, just below the hump, and pull horizontally at right angle to the pull bar. It should

require 1 to 1-1/2 ounces to start the pull bar moving. Adjust the position of the spring bracket by means of its lock nut to meet this requirement.

(34) LOCKING LEVER BRACKET ADJUSTMENT — Non-typing equipment only

With the main bail in its lowest position and the code bars moved to the MARKING position, the blocking surface of the code bars should be approximately parallel (vertically) to the adjacent surfaces of the bell cranks when gauged by eye. To adjust, loosen the locking lever bracket mounting screws and position the bracket. Tighten the mounting screws. See Figure 43.

(35) CODE BAR LOCKING LEVER SPRING TENSION (Figure 32)

With the main bail in its extreme upward position and the code bar bell cranks held away from the code bar locking lever, hook an 8 ounce scale over the code bar locking lever in line with the No. 1 code bar and pull horizontally at right angle to the locking lever. It should require 3-1/2 to 5 ounces to start the locking lever moving. For typing equipment: to adjust, position the spring bracket with the mounting nut loosened; tighten nut. For non-typing equipment: bend the ear of the spring bracket.

(36) PULL BAR GUARD ADJUSTMENT — Typing equipment only

(a) With the main bail in its normal downward position, the 98479 pull bar guard should be adjusted to meet the following requirements for the end pull bars:

(b) With the type bar against the platen there should be some clearance, as gauged by eye, between the pull bar and the 98479 pull bar guard (Figure 33B).

(c) The same clearance should be obtained for pull bars not having type bars associated with them. To check this adjustment, raise the pull bar by hand to a point where there is a minimum clearance between the pull bar and the pull bar guard when the pull bar is in contact with the main bail. (Shift the platen to the proper position to permit raising of pull bar.)

(d) With the type bars against their back-stop it should not be possible to manually disengage the pull bars from their guide slots. If the pull bars strike the guard when the type bar is against the platen, remove washers from the side on which this difficulty occurs. If pull bars can be pulled out of their slots, add washers on the side on which difficulty occurs.

If the 7002 washers do not result in a correct adjustment, replace one of them with a number of 8896 shims. (The 7002 washer is .028" thick; the 8896 shim is .004" thick.)

(e) To adjust the 98479 pull bar guard, loosen one of its mounting screws and position the end of the guard by pushing or pulling as required so that the center pull bars meet the requirements specified under (b) and (c). Tighten the mounting screws securely. Recheck (b), (c) and (d).

(37) SWITCHING CONTACT (PULL BAR OPERATED) ADJUSTMENT (If used)

NOTE

REPLACE THE SWITCHING CONTACT MOUNTING PLATE ASSEMBLY.

(a) SWITCHING CONTACT MOUNTING PLATE ADJUSTMENT (Figure 33)

1. The switching contact mounting plate should be adjusted as near .442" below the pull bar hooks as possible. To adjust, add or remove shims between the plate and mounting posts. Use a 99391 gauge. See Figure 33A.

2. The switching contact mounting plate should be adjusted so that its front edge is as near .620" to the rear of the pull bar toe as possible when the pull bars are resting against the code bars. To adjust, position the mounting plate on its mounting posts. Use a 99391 gauge. Tighten the nuts. See Figure 33B.

(b) SWITCHING CONTACT ASSEMBLY ADJUSTMENT (Figure 34)

1. With the pull bar selected and some clearance between the pull bar and main ball, there should be approximately .020" clearance between the tip of the pull bar hook and the low flat surface of the insulator on the long contact spring. To adjust, bend the long contact spring for minimum clearance at this point; then bend the top contact spring to obtain the .020" clearance.

2. When the pull bars are fully selected there should be .004" to .015" clearance between the lower sloping surface of the contact insulator and the adjacent surface of the pull bar with the play taken up (by pressing lightly on the pull bars) to make this clearance a maximum. Adjust each contact assembly by means of its mounting screw to meet the above requirements, position the assembly so that the pull bar insulators are centrally located with respect to their pull bars, and provide adequate

clearance between adjacent assemblies. If these requirements cannot be met, refine the SWITCHING CONTACT PLATE ADJUSTMENT.

3. With the pull bar resting against the No. 1 code bar, not selected, there should be .015" to .025" clearance between the middle and upper contact points. To adjust, bend the upper contact spring stiffener. To reduce contact bounce and chatter, adjust toward the maximum clearance. It should require a pull scale reading of 1-1/2 to 2-1/2 ounces to start the upper contact spring moving away from its stiffener when measured at the contact point. To adjust, bend the upper contact spring. Recheck preceding adjustment of .004" to .015".

4. With the pull bar fully selected it should require a push scale reading of 1/2 to 1-1/2 ounces to just separate the upper and middle contacts when measured at the contact point. To adjust, bend the middle contact spring. Recheck paragraph 3. above.

5. With the pull bar resting against the No. 1 code bar, not selected, there should be a clearance of .002" to .006" between the lower contact spring and its stiffener. To adjust, bend the lower contact spring stiffener. It should also require a push scale reading of 0 to 1 ounce to just separate the middle and lower contacts when measured at the contact point. To adjust, bend the lower contact spring. Recheck the .002" to .006" clearance.

6. Check to see that when the pull bars are fully selected there is at least .010" clearance between the lower and middle contacts.

NOTE

Bending of the contact springs and stiffeners sets up stresses which tend to cause changes in the adjustments. To stabilize the adjustments, each contact pile-up should be operated at least 20 times. To do this, operate the contacts under power or lift the pull bars manually and allow them to fall to their normal position. Recheck the preceding adjustments and refine them where necessary.

The contact pressure should be measured with an 8 ounce spring scale held in a vertical position. The scale should engage the spring directly in front of the contact point.

To insure uniformity in checking adjustments, the pull bars should be blocked out of selection by the No. 1 code bar only. To do this, select the pull bar and, while manually holding it out of selection, move the No. 1 code bar into the path of the pull bar.

**(38) MAIN BAIL SPRING TENSION ADJUSTMENT (PRELIMINARY)**

With the main shaft in the stop position, hook a 25 pound scale under the adjusting lever and pull vertically upward. It should require 14 to 15 pounds to start the lever moving. To adjust, loosen the lock nut and position the main bail spring adjusting screw. Tighten the lock nut.

**(39) MAIN BAIL ADJUSTING SCREW FINAL ADJUSTMENT (Figure 43B)****NOTE**

In order to make this adjustment, it will be necessary to move the motor unit out of the way as described in paragraph 1.h.

With the code bars positioned for LETTERS selection and the main bail roller on the high part of its cam, there should be at least .010" clearance between the front edges of the code bars and the adjacent edges of the code bar bell cranks. Keeping within the previously specified limits of .010" to .050" (typing equipment only) between the pull bars and code bars, readjust the main bail adjusting screw (Figure 3) to obtain this clearance.

**NOTE**

If it is necessary to change this adjustment or any related adjustment, the following adjustments should be checked and remade, if necessary, in the order given:

MAIN BAIL ROLLER GUIDE (Paragraph 2.h.(8))

PULL BAR GUIDE (Paragraph 2.h.(9))

MAIN BAIL ADJUSTING SCREW (PRELIMINARY) (Paragraph 2.h.(10))

CODE BAR BELL CRANKS (Paragraph 2.h.(55))

VERTICAL LINK PIVOT SCREW (Paragraph 2.h.(56))

VERTICAL LINK LOWER BELL CRANK SEPARATOR PLATE (Paragraph 2.h.(58))

CODE BAR LOCKING LEVER SPRING TENSION (Paragraph 2.h.(35))

MAIN BAIL SPRING TENSION (FINAL) (Paragraph 2.h.(142))

MAIN BAIL ADJUSTING SCREW (FINAL) (Paragraph 2.h.(39))

**NOTE**

IF IT BECOMES NECESSARY TO REMOVE THE CODE PUNCH AND PREPUNCH ASSEMBLIES TO MAKE THE FOLLOWING 12 ADJUSTMENTS, THEY SHOULD BE REMOVED AS FOLLOWS:

(a) Place the main shaft in the stop position and place the unit so it is resting on its rear supports.

(b) Unhook the punch bail spring from its spring post.

(c) Remove the punch arm link shoulder screw and disengage the link from the punch bail arm and remove from the unit.

(d) Remove the prepunch mechanism by means of its two mounting screws. Exercise care to avoid damaging the cable.

(e) For typing equipment only: Remove the three punch assembly mounting screws, rear code punch block mounting screw and lift the assembly out. Do not damage or distort the bell cranks, separator plates, or code bars.

(f) For non-typing equipment only: Remove the three punch assembly mounting screws and the two code punch block bracket mounting screws and remove the assembly, being careful not to damage or distort the bell cranks, separator plates or code bars.

**(40) SHIFT LEVER ADJUSTMENT (Figure 35) — Typing equipment only**

When the platen is latched in the LETTERS position (to the rear), the T character should print centrally on the platen. To adjust, position the shift lever stud.

**(41) FIGURES STOP SCREW ADJUSTMENT (Figure 36) — Typing equipment only**

When the platen frame is resting against the FIGURES stop screw (forward), the upper case character should print in line with the impression made by the character T in the previous adjustment. To adjust, position the FIGURES stop screw.

**(42) SHIFT BAIL BRACKET ADJUSTMENT (Figure 37) — Typing equipment only**

The front surface of the shift bail bracket should be parallel to the front edge of the base. To adjust, utilize the clearance in the shift bail bracket mounting screw holes.



(43) INTERMEDIATE BAIL ALIGNMENT ADJUSTMENT (Figure 37) — Typing equipment only

The forward extension of the intermediate bail should engage the center of the ear on the shift bail. To adjust, utilize the clearance in the intermediate bail bracket mounting holes.

(44) MAIN BAIL PLUNGER EXTENSION BRACKET ADJUSTMENT (Figure 37) — Typing equipment only

The left edge of the operating surface on the main bail plunger extension should clear the side of the intermediate bail by approximately .050". To adjust, loosen the main bail plunger extension bracket lock nut and position the bracket. Tighten the lock nut.

(45) INTERMEDIATE BAIL ADJUSTING SCREW ADJUSTMENT (Figure 38) — Typing equipment only

With the main shaft in the stop position, the shift bail should overtravel the shift latch .005" to .015". When checking this clearance, play in the shift latch should be taken up in a direction to make this clearance a minimum. To adjust, position the intermediate bail adjusting screw.

(46) PLATEN FRAME EXTENSION ADJUSTMENT (Figure 39A) — Typing equipment only

Rotate the motor fan until the main bail is in its uppermost position. With the platen in the FIGURES position and the shift bail latched on the shift latch, there should be .010" to .020" clearance between the shift bail and vertical arm of the platen frame extension. To adjust, loosen the two platen frame extension mounting screws (Figure 35) and utilize the elongation of the left mounting hole to position the platen frame extension. Tighten the mounting screws.

(47) SHIFT BAIL UPSTOP SCREW ADJUSTMENT (Figure 39B) — Typing equipment only

With the main bail in its upper position, the platen in the LETTERS position, and the shift latch unlatched, there should be .004" to .010" clearance between the vertical surface of the platen frame extension and the shift bail. Adjust by means of the shift bail upstop screw.

(48) SHIFT LEVER SPRING TENSION (Figure 40A) — Typing equipment only

Hook an 8 ounce scale over the shift lever at the spring hole and pull horizontally to the right. With the platen frame held away from

the lever, it should require 1 ounce to 1-1/2 ounces to just start the lever moving.

(49) PLATEN FRAME SPRING TENSION (Figure 35) — Typing equipment only

With the main shaft in the stop position and the platen latched in the LETTERS position, place the push end of an 8 ounce scale against the front face of the platen support and push horizontally toward the rear. It should require 6 to 7 ounces to just start the platen frame moving.

(50) SHIFT BAIL SPRING TENSION (Figure 38) — Typing equipment only

With the main shaft in the stop position and the platen latched in the LETTERS position, unhook the shift bail spring. Using an 8 ounce scale, it should require 6 to 8 ounces to pull the spring to position length.

(51) SHIFT LATCH SPRING TENSION (Figure 40B) — Typing equipment only

With the main shaft in the stop position, hook an 8 ounce scale under the shift latch just above the space pull bar toe and pull vertically upward. It should require some tension not more than 1 ounce to start the latch moving. For units equipped with the 84575 spring (27 turns) instead of the 35-70 spring (37 turns), it should require 1/4 to 1 ounce to start the latch moving.

(52) PUNCH BAIL PIVOT BRACKET PRELIMINARY ADJUSTMENT (Figure 41)

The lower surface of the punch bail pivot bracket should be .080" to .090" above and parallel to the surface of the code punch bracket on which it mounts. Loosen the front punch bail pivot screw lock nut and punch bail pivot bracket clamp screw and adjust by means of the right and left tilt adjusting screws. Tighten the clamp screw and lock nut.

(53) PUNCH BAIL ADJUSTMENT (Figure 42)

(a) The No. 1 and No. 5 punch selector fingers should be centered with respect to the No. 1 and No. 5 code punches.

(b) The punch bail should have some end play, not more than .004". To adjust, position the punch bail pivot screws. See Figures 41 and 42.

(c) With the punch bail adjusted according to the foregoing adjustment and the punch retractor springs removed, the punch retractor should float freely over the bail. To adjust,

bend both legs of the punch retractor near the cross brace and in a line parallel to it.

#### (54) SELECTOR FINGERS RETAINING BRACKET ADJUSTMENT

The selector fingers should have from .006" to .015" up and down play in slots. To adjust, position the selector finger retaining bracket by means of its mounting screws. See Figure 41.

ASSEMBLE THE CODE PUNCH ASSEMBLY AND THE PREPUNCH ASSEMBLY IN PLACE ON THE BASE BY REVERSING THE PROCEDURE OUTLINED FOR THEIR REMOVAL.

#### (55) CODE BAR BELL CRANKS ADJUSTMENT (Figures 41 and 43A)

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

(b) With the code bars positioned for BLANK selection, rotate the main shaft until the right ends of the code bars and the adjacent parallel edges of the associated code bar bell cranks are at the point of closest approach. Under this condition the clearance at this point should be .010" to .050".

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

#### NOTE

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

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

#### (56) VERTICAL LINK PIVOT SCREW ADJUSTMENT (Figure 41)

(a) With the code bars positioned to the right (LETTERS combination), and the code bar bell cranks resting against the code bars, the left edge of the punch selector fingers should be in approximate alignment with the left edge of the punches. To adjust, position the vertical link pivot screw in its elongated mounting hole.

(b) With the code bars positioned to the right, the left edges of all the punch selector fingers should be approximately in a line which is at right angle to the front surface of the code punch bracket casting. To adjust, bend the vertical link bracket at the pivot screw in a plane parallel with the base plate.

#### NOTE

Care should be exercised when bending, to avoid disturbing other parts of the bracket.

(c) With the code bars positioned to the right (LETTERS combination), and the code bar bell cranks resting against the code bars, the left edge of the punch selector fingers should be parallel with the left edge of the punches. They should also have a full bite on the punches.

#### NOTE

The following checks should be made when adjustments (a), (b), and (c) have been completed.

(d) With the alternate combinations R (2-4) and Y (1-3-5) set up in the code bars, and with the punch arm roller on the high part of its cam, there should be a clearance of at least .020" between the left edge of the unselected punch selector fingers and the right edge of the punches.

(e) With the BLANK combination selected and the code bar locking lever against the code bars, the left end of the punch selector fingers should not be drawn more than halfway through their guide slots in the punch bail. If these requirements are not met, it will be necessary to refine adjustments (a) or (b) or both.

#### (57) PUNCH BAIL PIVOT BRACKET ADJUSTMENT (Figure 42)

A line across the top of the punch selector fingers should be parallel to the bottom of the code punches. To adjust, loosen the front punch bail pivot screw lock nut and the punch bail pivot bracket clamp screw and position the bracket by means of the right and left tilting

screws. Tighten the lock nut and the clamping screw and check the adjustment in paragraph 2.h.(53).

NOTE

Turn both tilting screws the same number of turns to prevent tilting the bracket.

NOTE

Four of the six 95417 separator plates have been redesigned to reduce the end play in the vertical link lower bell crank. The following new adjustment applies to reperfector transmitters equipped with the newly designed parts.

(58) VERTICAL LINK LOWER BELL CRANK SEPARATOR PLATE ADJUSTMENT

With the main bail in its lowermost position, the separator plates (without extension) should be approximately in line with each other horizontally. The separator plate with the extension should be positioned to provide from .005" to .020" clearance between the top edge of the No. 1 bell crank and the bottom side of the plate extension at the closest point, and there should be some clearance between the bottom side of the plate extension and the top edge of the other four bell cranks. Make certain that the vertical parts of the bell cranks are safely retained (by at least 1/3 the width of the bell crank) within their guide slots when the horizontal end is held against the separator plate extension. To adjust, position the separators on the bell crank stud, and if necessary, bend the plate extension to meet the requirements. Tighten the nut. Do not loosen the stud.

NOTE

Make certain that the locking pull bar does not bind against the code bar bell cranks when the main bail is in its lowermost position.

(59) PUNCH BAIL ARM STUD PRELIMINARY ADJUSTMENT (Figure 41)

With the LETTERS combination set up, all of the punches should just perforate the tape when the motor is rotated manually. To adjust, loosen the punch bail arm stud lock nut and turn the stud in or out of the punch bail arm. Tighten the lock nut.

(60) CODE PUNCH BLOCK STRIPPER SPRING TENSION (If used)

Remove the punch block from the unit. (Refer to next adjustment for removal of punch block.)

With an 8 ounce scale hooked under the shoulder of the stripper pins, pull in a horizontal direction. It should require at least 4 ounces to start the punch stripper pins moving by compressing the springs.

(61) CODE PUNCH BLOCK FEED ROLL SHIMS ADJUSTMENT (Figure 42)

(a) Place a piece of tape in which the feed holes have been perforated in the die block and engage the feed holes on the pins in the feed wheel. Select the letter I (No. 2 and No. 3 code punches operated) and perforate the tape. Remove the tape from the die block and check to see that the feed hole is centrally located between the code holes, when gauged by eye. The feed roll should be free, with some end play, not more than .002".

NOTE

The above adjustment was made at the factory and should not require readjustment unless the shim pile up has been disturbed or a new feed roll is to be installed. If it is necessary to readjust, the following procedure should be followed:

1. Unhook the code punch detent lever spring.
2. Fully perforating units only: Remove the upper tape chad chute.
3. Remove the two code punch block assembly mounting screws.
4. With the BLANK combination selected and the punch arm on the high part of its cam, hold the feed pawl out of the way and remove the code punch block assembly from the punch mechanism. Avoid damaging the punch pins when removing them from the punch retractor.
5. Hold the code punch block assembly so that the support plate is upward and remove the two shoulder screws and the two support plate mounting screws. Remove the support plate, being careful not to pull out the punch pins.
6. Place the proper number of shims on each side of the feed wheel to obtain the proper end play as per the foregoing adjustment. The shims should be slipped on the shaft by means of the slot. Avoid bending or kinking the shims.
7. Place the feed roll with the shims in the die block with the wide ends toward the die pins and the straight side toward the bottom of the die block.

8. Replace the support plate and the two mounting screws. Tighten the screws and recheck the location of the feed hole in relation to the code hole as specified, when the No. 2 and No. 3 code punches are operated manually. If it does not meet this requirement shift one or more shims from one side to the other.

9. The tape should be held in the die block so that the edges of the tape are parallel with the sides of the die block. If the feed roll is rotated so that the left edge of the die plate is midway between two feed hole perforations, the No. 2 and No. 3 punch pins will perforate their holes in line with the feed holes. This will aid in gauging the position of the feed roll.

10. With the BLANK combination selected, rotate the shaft until the punch arm roller is on the high part of its cam. Place the punches of the code punch assembly in the lowermost position, move the detent roller out of the way of the feed roll ratchet and hold the feed pawl so that it passes through its slot of the block assembly.

11. Engage the punches and the guide shoulder screws of the punch block assembly in the retractor slots and replace the front punch block mounting screw friction tight.

12. Hold the pivoted transmitter against the punch block and locate the block, within the limits of its mounting holes, parallel to the edge of the pivoted transmitter guide plate. Replace the rear screw and tighten both mounting screws.

#### NOTE

It may be necessary to move the ribbon guide out of the way.

13. Rehook the feed roll detent lever spring. Check the following adjustments:

- Code Punch Feed Pawl
- Code Punch Feed Roll Detent (Final)
- Code Punch Tape Guide
- Ribbon Guide
- Pivoted Transmitter Bracket Shims
- Pivoted Transmitter Pilot Screws
- Pivoted Transmitter Tape Guide Plate
- Tape Pin Oscillator Backstop Screw
- Tape Depressing Bail

(62) CODE PUNCH FEED ROLL DETENT PRELIMINARY ADJUSTMENT (Figure 44)

(a) When a piece of tape containing ten feed holes to the inch (check with the 95960 gauge) is placed in the code punch die block and the code punch feed roll detent is resting in an indent between two teeth on the ratchet, the left

edge of a feed hole should be visible at the left edge of the die block when the feed holes in the tape are engaged with the pins on the feed wheel. To adjust, position the detent lever mounting plate by means of its mounting screws.

#### NOTE

Standard Teletype Reperforator Transmitter Distributors are adjusted at the factory to perforate tape with the feed holes centrally aligned with the code holes. When it is required that the feed holes be in advance of center, the following adjustment modification applies:

(b) When a piece of tape having ten feed holes to the inch is placed in the code punch die block, and the code punch feed roll detent is resting in an indent between two teeth on the ratchet, the center of a feed hole should be visible at the left edge of the die block (when the feed holes in the tape are engaged with the pins on the feed wheel). To adjust, position the detent lever mounting plate (Figure 44) by means of its mounting screws.

#### NOTE

For advanced feed holes, the CODE PUNCH FEED ROLL DETENT FINAL (paragraph 2.h.(89)) and the PIVOTED TRANSMITTER TAPE GUIDE PLATE ADJUSTMENT (paragraph 2.h.(101)) must also be modified.

(63) CODE PUNCH FEED PAWL PRELIMINARY ADJUSTMENT (Figure 44)

With the punch arm roller on the low part of its cam, the feed pawl should rest in the bottom of the first notch below the horizontal center line of the feed roll. To adjust, position the feed pawl by means of its adjustable mounting plate.

(64) CLUTCH MAGNET BRACKET ADJUSTMENT (Figures 45 or 101)

#### NOTE

Adjustments (a) and (b) below need not be made unless the magnet or shims are disturbed.

(a) The clutch armature levers should have some end play, not more than .006". To adjust, add or remove shims between the levers and the bracket in which the shaft is mounted.

(b) The armatures should rest against the magnet cores evenly. Check by holding a light background behind the armature cores. For universal clutch magnets shown in Figure 101,

loosen the magnet core mounting screws and position the cores; tighten the mounting screws. For D.C. clutch magnets shown in Figure 45, add or remove shims between the magnet cores and magnet yoke.

(c) With the driving members positioned in the center of their elongated holes (preliminary) and with the armatures held in the operated position, there should be .010" to .040" clearance between the high part of the driven clutches and their respective clutch throwout levers. The armatures should be parallel to the shafts and with the armatures in the unoperated positions, the clutch throwout levers should disengage both clutches with approximately .005" clearance between the clutch teeth. To adjust, position the clutch magnet bracket by means of the mounting screws.

(d) Applies to units equipped with 120682 armature release spring on the 102113 clutch magnet bracket assemblies only:

1. The release spring should rest against the top insulators of all four magnet coils; if necessary adjust by bending the legs of the spring. With the throwout lever springs removed, adjust the two center leaves by bending so that there is from .006" to .015" clearance between the magnet cores and the armature, at the closest points. The armature to be checked should touch the leaf extension of the release spring, while the other armature is held in the unoperated position.

#### NOTE

See that the operating edges of the leaf extensions are parallel to their corresponding armatures; gauge by eye.

2. With the push end of a 32 ounce scale applied horizontally to the outer edge of each armature, approximately in the center, it should require at least 12 ounces to push the armatures until they just touch the cores.

3. Replace the clutch throwout lever springs.

#### (65) SENSING AND DISTRIBUTING DRIVING CLUTCH ADJUSTMENTS (Figure 46)

Operate the unit under power, stop the cam assemblies by releasing the clutch throwout levers, then stop the motor. There should be from .005" to .015" clearance (at the closest point) between the teeth of the driving and driven clutch members. Adjust both driving clutches by means of their mounting screws.

#### (66) SUBSHAFT BEARING BRACKET ADJUSTMENT

(a) The subshaft should be free on its bearing with a minimum amount of end play.

(b) The gears at both ends of the subshaft should have a minimum amount of gear play for a complete revolution of the subshaft.

(c) To adjust, loosen the mounting screws of the subshaft bearing bracket and position the brackets. Tighten the mounting screws.

#### (67) PUNCH ARM SHAFT OILER POSITION ADJUSTMENT

The punch arm shaft should be positioned so that the lid on the oil cup on the upper end of the shaft opens to the left. To adjust, loosen the punch arm shaft set screw and position the punch arm shaft. Tighten the set screw.

#### (68) SENSING SHAFT REAR BEARING OIL CUP POSITION ADJUSTMENT

The oil cup on the rear bearing of the sensing shaft should be positioned so that the lid hinge is toward the rear of the unit. To adjust, loosen the hexagonal lock nut and rotate the oil cup.

#### NOTE

In order to make certain that sufficient threads of the oil cup enter the shaft bearing, position the lock nut on the oil cup so that the clearance between the hexagonal portion of the oil cup and the lock nut does not exceed 1/16".

#### (69) SENSING AND DISTRIBUTOR CLUTCH SPRING TENSION (Figure 46)

With the unit resting on its rear supports and the teeth on the driving clutch member resting on the teeth of the driven clutch member, but not engaged, hook a 32 ounce scale over the driven clutch members on the high part of the cam surface and pull in line with the shaft. It should require 12 to 17 ounces to just separate the clutch teeth.

#### (70) PREPUNCH TAPE GUIDE ADJUSTMENT

The tape guide should be positioned so that tape threaded through it will not snag at the entrance to the die block and so that the rear of the slot in the guide lines up with the rear of the slot in the die block. To adjust, position the tape guide using tool 99947.

**(71) PREPUNCH TAPE GUIDE SPRING ADJUSTMENT**

The tape guide spring should be positioned so that the curved tip is centered on the tape at a point opposite the cutout portion of the tape guide and the tension of the spring should hold the tape firmly toward the rear wall of the die block slot without buckling. To adjust, position the spring by means of its mounting screw and bend the spring to obtain the pressure required. Tighten mounting screws.

**(72) PREPUNCH RETAINING BRACKET ADJUSTMENT (Figure 47)**

There should be some clearance, not more than .002", between the top of the feed hole punch and the prepunch arm, when the feed hole punch is at its point of highest travel. To adjust, loosen the retaining bracket mounting screws and position the bracket. Tighten the mounting screws.

**(73) PREPUNCH FEED ROLL BEARING ADJUSTMENT (Figure 48)**

With the feed roll detent, the feed pawl, and the tape tension lever held away from the feed roll, the feed roll should be free in its bearings with some end play, not more than .004". To adjust, position the rear bearing bracket by means of its mounting screws so that the shaft is free in its bearings and position the rear bearing bushing to obtain the correct end play. Tighten the mounting screws and lock nuts.

**(74) PREPUNCH TAPE TENSION LEVER STUD ADJUSTMENT (Figure 48)**

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

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

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

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

**(75) TAPE TENSION LEVER SPRING TORSION ADJUSTMENT (Figure 49)**

Hook a 8 ounce scale over the end of the slotted extension of the tape tension lever and pull at right angle to the lever. It should require a pull of 5 to 5-1/2 ounces to start the slotted extension of the lever moving away from the feed roll. To adjust, loosen the tape tension lever stud lock nut (Figure 48) and rotate the stud in either a clockwise or a counterclockwise direction. Tighten the lock nut.

**(76) PREPUNCH FEED ROLL DETENT PRELIMINARY ADJUSTMENT (Figure 49)**

Adjust the prepunch detent lever by rotating its eccentric so that the high part of the eccentric is positioned to the left and the slot is horizontal.

**(77) PREPUNCH FEED PAWL ECCENTRIC PRELIMINARY ADJUSTMENT (Figure 50)**

With the punch arm roller on the low part of its cam, the feed pawl should rest in the bottom of the notch which is just below the horizontal line of the feed roll. Adjust by means of the feed pawl eccentric. Locate the high part of the eccentric toward the left.

**(78) PREPUNCH OPERATING BAIL ECCENTRIC PRELIMINARY ADJUSTMENT (Figure 47)**

(a) A piece of unperforated tape should be held friction tight in the prepunch block by means of the prepunch pin when the punch arm roller is on the high part of its cam. To adjust, position the eccentric on the prepunch operating bail.

(b) There should be a clearance of .060" between the end of the punch arm gauge and the prepunch block. To adjust, loosen the punch arm gauge mounting nuts and position the gauge. Tighten the mounting nuts.

(c) Remove the tape from the prepunch block and readjust the eccentric on the prepunch operating bail so that there is .030" to .035" between the end of the prepunch arm gauge and prepunch block. (See Figure 47.) The high part of the eccentric should be positioned above the center of a horizontal line through the eccentric.

**(79) PREPUNCH FEED ROLL DETENT FINAL ADJUSTMENT**

Refine the adjustment of the feed roll detent eccentric so that the perforations in the tape meet the standard spacing of ten feed holes to the inch. This may be checked by perforating

a length of tape and checking it against the tape gauge (No. 95960). The perforating of tape should be done under power.

(80) PREPUNCH FEED PAWL ECCENTRIC FINAL ADJUSTMENT (Figure 47)

NOTE

When checking the following requirements, the tape tension lever must be held away from the feed roll.

(a) With the detent roller in engagement with the feed roll star wheel, rotate the receiving shaft until the feed pawl is in its uppermost position. Hold the detent roller away from the star wheel and continue to rotate the receiving shaft until the feed pawl is in its lowermost position. The feed roll should have rotated one full step.

(b) To check, allow the feed roll detent lever roller to come in engagement with the feed roll star wheel. The star wheel should not rotate in a clockwise direction and the clearance between the detent roller and the face of the tooth directly below the roller should not exceed .015".

(c) Check these requirements at four points on the star wheel, approximately 90° apart.

(d) To adjust, position the feed pawl eccentric.

(81) PREPUNCH OPERATING BAIL ECCENTRIC FINAL ADJUSTMENT

Rotate the receiving shaft from its stop position until the prepunch feed pawl starts its downward movement. Place a .006" flat gage in the tape slot of the prepunch block and continue to rotate the receiving shaft until the gage just slides under the prepunch pin. In this position there must be some clearance between the face of the feed pawl and the face of a tooth on the feed roll. Check for clearance of each tooth on the feed roll by rotating the feed roll in a counterclockwise direction. To adjust, rotate the receiving shaft until the feed pawl just engages a tooth on the feed roll, then readjust the prepunch bail eccentric until a .006" flat gage just slides under the punch pin.

(82) TAPE STRIPPER PLATE ADJUSTMENT (Figure 48)

There should be some clearance, not over .010", between the upper edge of the tape stripper plate and the feed roll. Check for one

complete revolution of the feed roll. To adjust, position the stripper plate by means of its elongated mounting holes.

(83) PREPUNCH OPERATING BAIL SPRING TENSION (Figure 50)

Rotate the motor fan until the punch arm roller is on the low part of its cam. With the prepunch operating bail lower extension held against the operating bail eccentric, hook a 12 pound scale over the spring post in the prepunch operating bail and pull horizontally to the right in line with the spring. It should require 3-1/2 to 5-1/2 pounds to start the prepunch arm moving.

(84) PREPUNCH FEED ROLL DETENT LEVER SPRING TENSION (Figure 49)

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

(85) PREPUNCH FEED PAWL SPRING TENSION (Figure 50)

With the main shaft in the stop position, apply the push end of an 8 ounce scale to the feed pawl just above the curved portion at the spring hole and push horizontally to the left. It should require 3 to 5 ounces to start moving the feed pawl away from the feed roll.

(86) PREPUNCH FEED PAWL RELEASE LEVER SPRING TENSION (Figure 49)

With the push end of an 8 ounce scale applied to the upper flat extension of the feed pawl release lever and pushed vertically downward, it should require 2 to 5 ounces to just start to move the feed pawl release lever.

(87) CODE PUNCH BAIL ARM STUD FINAL ADJUSTMENT — For fully perforated tape only

With the selector magnets energized and the unit operating under power, feedout a length of tape by operating the clutch release lever (Figure 17). The code punches should perforate a clean hole in the tape. To adjust, loosen the punch bail arm stud lock nut (Figure 41) and position the punch bail arm stud so that the code punch die pins just perforate the tape; turn the stud an additional 1/3 turn and tighten the lock nut.

**(88) CODE PUNCH BAIL ARM STUD FINAL ADJUSTMENT — For chadless tape only**

With the selector magnet energized and the machine operating under power, feed out a length of tape by operating the clutch release lever (Figure 17). The code punches should punch a full lid with a minimum amount of tear. Adjust the punch travel by means of the punch bail arm stud (Figure 41).

**(89) CODE PUNCH FEED ROLL DETENT AND CODE PUNCH FEED PAWL FINAL ADJUSTMENT**

(a) Operate the machine under power as described in preceding adjustment. The centers of the punch holes and the center of the feed hole should lie in a straight line. Adjust by means of the feed roll detent mounting plate. Check the code punch feed pawl adjustment and readjust to meet those requirements.

**NOTE**

For advanced feed holes modify adjustment as follows. Also see paragraph 2.h.(62) and (101).

(b) With the selector magnet energized and the unit operating under power, feed out a length of tape by operating the clutch release lever. The left edge of the code holes (hinged portion of lid on chadless tape) should align with the left edge of the feed holes. To adjust, position the feed roll detent mounting plate.

**NOTE**

Check the code punch feed pawl adjustment and readjust if necessary.

**(90) CODE PUNCH FEED ROLL DETENT SPRING TENSION (Figure 44)**

With a 32 ounce scale hooked over the detent lever at the roller and pulling at right angle to the detent lever, it should require from 6 to 9 ounces to start the roller moving away from the feed roll teeth.

**(91) CODE PUNCH FEED PAWL SPRING TENSION (Figure 51)**

With the unit in its stop position and the feed roll detent lever held away, hook an 8 ounce scale to the feed pawl at the spring hole and pull in line with the spring. It should require 3-1/2 to 6 ounces to start the pawl moving away from the ratchet wheel.

**(92) TAPE DEPRESSING BAIL SPRING TENSION (Figure 51)**

Unhook the tape depressing bail spring. With the tape depressing bail resting against the transmitter plate, it should require from 1/2 to 2 ounces to extend the spring to position length when measured with an 8 ounce scale. Rehook the spring.

**(93) SELECTOR FINGER BELL CRANK SPRING TENSION**

Remove the code punch tape guide. With the main shaft in the stop position, hook an 8 ounce scale over each selector finger bell crank between the spring holes (Figure 41) and pull vertically upward. It should require from 1-1/2 to 3 ounces to start the bell cranks moving. Replace the code punch tape guide. On units equipped with the 42661 spring (20 turns), change the spring tension requirement to 2-1/4 to 3-1/4 ounces.

**(94) CODE PUNCH TAPE GUIDE ADJUSTMENT**

The tape should enter the code punch block without buckling. A center line through the tape code holes of a LETTERS combination should be at right angle to the edges of the tape. To check, open the lids of two LETTERS perforations spaced approximately 2" apart, fold the tape back between these holes, line up the edges of the tape and see that the trailing edges of the code holes line up with each other; gage by eye. Observe that this method of checking doubles the amount of "out-of-line" condition. To adjust, loosen the code punch tape guide mounting screws and position the guide; tighten the screws.

**(95) PLATEN HEIGHT ADJUSTMENT — Typing equipment only**

With the tape inserted in the unit (from the prepunch through the tape guide and into the code punch), adjust the platen height, by means of shims in the platen support, so that the clearance between the platen and the tape is a minimum and so that the platen does not hang up on the rear edge of the tape when the shift mechanism returns from its rear-most position to which it may be moved manually after disengaging the shift lever from the platen frame.

**(96) RIBBON GUIDE ADJUSTMENT (Figure 52) — Typing equipment only**

The ribbon guide should be positioned so that the ribbon clears the platen by approximately .031" when the platen is in either the LETTERS



or FIGURES position, and so that the ribbon guide is centered over the platen. To adjust, loosen the ribbon guide mounting screws and position the guide. Tighten the mounting screws.

#### NOTE

On some units one or two 90560 washers have been added to each of the ribbon guide mounting screws and are initially assembled between the ribbon guide and the mounting screw head. When the reperforator transmitter is equipped with FRACTION type pallets, one or more of these washers may be relocated between the ribbon guide and the tape guide in order to assure printing of the entire character.

#### (97) PUNCH RETRACTOR SPRING TENSION (Figure 53)

With the punch arm roller on the low part of its cam and with the selector fingers in their spacing position (extreme right), hook a 12 pound scale under the center of the retractor - balance the position of the scale until both sides of the retractor leave their stops simultaneously (may require placing the scale under the number 3 punch pin) - and pull vertically upward. It should require 5-1/2 to 8 pounds to start the punch retractor moving away from the stops.

#### (98) PIVOTED TRANSMITTER BRACKET SHIMS ADJUSTMENT

When the pivoted transmitter is held against the code punch block, the tape channel on the pivoted transmitter should be approximately in the same horizontal plane as the tape channel in the code punch block. To adjust, increase or decrease the number of shims between the pivoted transmitter bracket and the base casting.

#### CAUTION

To avoid damaging the tape pins while following the procedures outlined herein and in paragraphs 2.h.(99) to 2.h.(105), inclusive, do not raise or lower the transmitter lid unless the sensing shaft is in its stop position.

#### (99) PIVOTED TRANSMITTER PILOT SCREWS ADJUSTMENT

The pivoted transmitter should be positioned so that the pins in the feed pin oscillator are in line with the feed holes in the tape at the point where the tape emerges from the code punch block. To adjust, position the pivoted transmitter by means of its pilot screws (Figure 54), adjusting the screws so that the as-

sembly pivots freely, with a minimum amount of end play and without binds.

#### (100) TAPE FEED PIN OSCILLATING ARM BACKSTOP SCREW ADJUSTMENT

With the sensing cam sleeve in the stop position, place a length of tape which has ten holes to the inch in the pivoted transmitter. Operate the sensing cam sleeve slowly until the tape pins leave and are just about to re-enter the tape feed holes. Under this condition the feed pins should be centered directly beneath the feed holes in the tape. To adjust, position the tape feed pin oscillating arm backstop screw. See Figure 57 for location of parts.

#### NOTE

The tape guide should not buckle the tape to front or rear.

#### (101) PIVOTED TRANSMITTER TAPE GUIDE PLATE ADJUSTMENT

(a) With a section of tape perforated with the LETTERS code combination emerging from the code punch block and the pivoted sensing unit tape guide touching the punch block, the transmitter tape-guide plate should be adjusted on the pivoted frame by means of its mounting screws (Figure 54) and the enlarged holes to meet the following requirements:

1. With the sensing cam assembly in the stop position and the tape feed holes engaged with the tape feed pins, the tape should not buckle against either the front or rear edges of the tape-guide channel. Position the tape-guide plate forward and backward to meet this requirement.

2. With the pivoted transmitter in its mid-way (between its extreme left and right) position, release the sensing shaft clutch lever and rotate the motor until the distributor clutch release contact lever drops off the high part of its cam and until the "Y" levers are about ready to drop off their cams. In this position the sensing pins should be approximately in the center between the hinged edge and the trailing edge of the code holes in the perforated tape, and the center line through each pin (parallel to the edges of the tape) should be approximately in line with the center line through its code hole. To meet these requirements, position the tape guide plate from left to right and from front to rear while rechecking the foregoing adjustment. Check to see that the sensing pins do not touch the edges of their code holes when the pivoted transmitter is:

- (a) one space away from the die block
- (b) in its midway position and
- (c) in its extreme left-hand position

To make this check, rotate the motor slowly and observe the sensing pins when they are lifting up the lids.

#### NOTE

For advanced feed holes, reposition guide plate as specified above to compensate for the change in relationship between the code and feed holes. See paragraphs 2.h.(63) and (89).

#### (102) TAPE DEPRESSING BAIL ADJUSTMENT

The arm of the tape depressing bail (Figure 51) which rides on the pivoted transmitter when the transmitter is not in its left latched position, should pass midway between the lid latch spring and the locating stud of the transmitter lid. This check should be made with the transmitter lid closed and latched. To adjust, bend the arm of the tape depressing bail.

#### (103) TAPE RETAINING LID LATCH (Figure 54)

(a) With an 8 ounce scale hooked to the latch spring, adjacent to and just above the tape guide plate and pulled at right angle to the latch spring, it should require  $3/4$  to 1-1/2 ounces to start moving the flat surface of the lid latch spring away from the tape guide plate. To adjust, bend the lid latch spring bracket.

#### NOTE

Care should be exercised to avoid bending the pivoted frame.

(b) Position the lid latch by means of its enlarged mounting holes and screws so that the pivoted transmitter lid will be latched by the latch spring with no appreciable play between the lid and the guide plate, and there will be a clearance of approximately  $3/32$ " between the left edge of the latch spring and the edge of the slot in the tape guide plate.

#### (104) TAPE HOLDING LEVER SPRING TENSION

Unlatch and raise the transmitter lid. Rotate the sensing shaft cam sleeve until the tape holding lever is in the indent of its cam. Hold the pivoted transmitter in a vertical position and apply the push end of an 8 ounce scale to

the pin in the tape holding lever (at the sensing unit guide plate) and push vertically downward. It should require 2 to 4 ounces to just start the lever moving. Rotate the sensing shaft cam sleeve to the stop position and close and latch the transmitter lid.

#### (105) Y LEVER PIVOT SHAFT ADJUSTMENT (Figure 55)

With the cam follower tip on each Y lever resting firmly on the high part of the associated cam, the tip of the sensing finger which is withdrawn the least distance into the sensing mechanism guide plate should be just flush with or not more than .005" below the surface of the tape channel in the guide plate. Check by eye. Check with pivoted transmitter in three positions; against die block, in the center, and against the left stop. To adjust, position the Y lever pivot shaft up or down in the transfer unit base casting by means of the adjusting cams at each end of the pivot shaft.

#### (106) Y LEVER GUIDE PLATE ADJUSTMENT (Figure 55)

(a) With the cam follower tips on the Y levers resting firmly on the high part of their associated cams, there should be some clearance between the top edge of the lower arm of the Y lever and the top of the associated slot. To adjust, position the Y lever guide plate on its mounting screws in the transfer assembly casting.

(b) The following requirements should be met after the above adjustment has been made:

1. With the cam follower tips on the Y levers opposite the low part of the associated cam and the Y lever springs unhooked, the Y levers and sensing pins should move freely in their guides. Reinstall springs.

2. With the cam follower tips on the Y levers opposite the low part of the associated cam, the lower edge of the upper arm of the Y lever should rest firmly in the bottom of the associated guide slot in the guide plate (Figure 56).

3. When the clearance between the top edge of the lower arm of the Y levers and the top of the associated slot is reduced to zero by hand, the sensing pins should not become disengaged from the sensing pin guide plate.

(c) If any of the foregoing requirements are not met, the Y lever guide plate adjustment should be refined.

## (107) Y LEVER SPRING TENSION (Figure 56)

With the upper arms of the Y levers resting firmly in the bottom of their associated slots, hook an 8 ounce scale on the Y lever just adjacent to the left side of the guide and pull upward. It should require 2 to 3 ounces to start the Y levers.

## (108) OSCILLATING ARM ADJUSTMENT (Figure 57)

With the cam follower tip of the oscillating arm extension riding firmly on the low part of its cam, the surface of the lever in which the feed pins mount should rise to a point of being flush with or not more than .015" below the lower surface of the tape guide channel in the sensing pin guide plate at any point during the feeding motion from right to left. To adjust, change the angular relation between the oscillating arm and the oscillating arm extension by means of the adjusting slot and a clamp screw.

## NOTE

Check to see that the tips of the feeding pins clear the tape as the lever moves from left to right on the return portion of the tape feeding cycle when the cam follower tip on the oscillating lever extension is on the high part of its cam.

## (109) FEED PIN OSCILLATOR SPRING TENSION (Figure 57)

With the sensing shaft in the stop position, hook an 8 ounce scale over the left pin in the feed pin oscillator and pull horizontally to the left. It should require 1 to 3 ounces to start the feed pin oscillator lever moving.

## (110) TAPE FEED LEVER ADJUSTMENT (Figure 59)

The feed pin oscillator should start moving to the left immediately after the tape pin feed lever extension roller starts to ride to the low part of its cam. To adjust, engage the sensing clutch and turn the motor by hand until the tape feed lever extension just starts to move. Change the angular relation between the tape feed lever and the tape feed lever extension by means of the adjusting slot and clamp screw so that the tape feed lever just starts to move to the left. Tighten the clamp screw. Recheck the requirements and refine the adjustment if necessary.

## (111) OSCILLATING ARM EXTENSION SPRING TENSION (Figure 58)

With the cam follower tip of the oscillator lever extension resting firmly on the high part of its cam, apply the push end of a 64 ounce scale to the oscillating arm extension at the spring hole and push to the right as nearly in line with the spring as possible. It should require 40 to 48 ounces to just start the oscillating arm extension moving.

## (112) TAPE FEED LEVER EXTENSION SPRING TENSION (Figure 59)

With the sensing cam sleeve in its stop position and the tape feed lever cam roller resting on its cam, it should require 44 to 60 ounces to stretch the tape feed lever extension spring to position length. To check, unhook the upper end of the spring from its bracket, hook a 64 ounce scale in the spring eye and pull upward in line with the spring mounting hole in the bracket.

## (113) PIVOTED TRANSMITTER BACKSTOP SCREW ADJUSTMENT (Figure 51)

With the pivoted transmitter rotated away from the punch mechanism against its backstop screw and the latch on the tape depressing bail engaged with the transmitter, there should be .020" to .040" clearance between the latch on the tape depressing arm and the adjacent latching edge on the transmitter plate. To adjust, position the transmitter backstop screw in the backstop bracket. Bend the bracket if necessary.

## (114) TAPE GUIDE BLADES ADJUSTMENT (Figure 51)

As the transmitter pivots from right to left, the tape guide blades should pass between the tape-out and No. 1 and between the No. 4 and No. 5 sensing fingers without touching the sensing fingers or the underside of the transmitter frame. To adjust, position the tape guide blades on the transmitter backstop bracket by means of the enlarged mounting holes and screws, and by bending the blades as required.

REMOVE THE TRANSFER T LEVER BAIL AND SLIDE BARS ASSEMBLY FROM THE BASE CASTING TO MAKE THE FOLLOWING ADJUSTMENTS:

## NOTE

There are two styles of T lever bail and slide bars assemblies: The new style assembly has the 115515 casting; the old style

assembly consists of three sheet metal parts. The contact operating bails of the new style assembly are equipped with eccentrics to facilitate adjustment. The contact operating bails activate the transmitter contacts (on units having switching control contacts, the contact operating bails activate the transmitter and switching control contacts). For clarification purposes, the operating bails will be referred to as "transmitter contact operating bails" or "contact operating bails." The sequence of adjustments for the two styles of assemblies (removed) should be as follows:

For the new style assembly:

Transmitter contact operating bails.  
Lower transfer slide bars eccentric shaft.  
Upper transfer slide bars shaft collar.  
Lower transfer slide bars eccentric shaft collar transfer T lever bail.

For the old style assembly:

Lower transfer slide bars eccentric shaft.  
Lower transfer slide bars eccentric shaft collar transfer T lever bail.  
Transmitter contact operating bails.

(115) TRANSMITTER CONTACT OPERATING BAILS ADJUSTMENT — (Units with new style transfer T lever bail and slide bars assembly only) (Figure 63)

The transmitter contact operating bails should be centrally located between the casting supports and the bails should rotate freely on their bearing shaft with some end play, not more than .005". To adjust, loosen the set screws of both set collars and centrally locate the entire assembly along its shaft and tighten the screws on one set collar. Position the other collar for the specified clearance when the play in the bails is taken up in a direction toward the collar previously adjusted. Tighten the set screws in the adjusted set collar.

(116) LOWER TRANSFER SLIDE BARS ECCENTRIC SHAFT ADJUSTMENT (Figure 60)

(a) Unhook the transfer T lever bail spring and loosen the set screws on the lower slide bars eccentric shaft collar.

(b) The lower transfer slide bar eccentric shaft should be positioned so that its high part extends downward. To adjust, position the eccentric shaft in the transfer T lever bail and slide bars mounting bracket and lock in place by means of lock nut on rear of shaft.

(117) UPPER TRANSFER SLIDE BAR SHAFT COLLAR ADJUSTMENT (Units with new style transfer T lever bail and slide bars assembly only) (Figure 63)

The transfer slides should line up with their associated transmitter contact operating bails and there should be some side play, not more than .010". To adjust, loosen the collar set screws of both set collars and position one collar so that the transfer slides each line up with their associated contact operating bail when all the slides are held towards this collar. Tighten its set screws. Position the other set collar so that the slide bars move freely and have the specified side play. Tighten its set screws.

(118) LOWER TRANSFER SLIDE BAR ECCENTRIC SHAFT COLLAR ADJUSTMENT (Figures 60 and 63)

The transfer slide bars should be perpendicular to their shafts, move freely in their guides, and there should be some end play, not more than .010", between a set collar on the lower eccentric shaft and the adjacent slide bar when the play is taken up in a direction away from the collar. To adjust, position the set collars by means of their set screws, then tighten the set screws.

(119) TRANSFER T LEVER BAIL ADJUSTMENT (Figure 60)

With the transfer T lever bail spring unhooked, the transfer T levers should line up centrally with their associated transfer slide bars and the bail should rotate freely on its bearing screws with some end play, not more than .005". To adjust, position the bearing screws in the bracket. Rehook the bail spring.

(120) TRANSMITTER CONTACT OPERATING BAILS ADJUSTMENT (Figure 61) — Units with old style transfer T lever bail and slide bars assembly only

The transmitter contact operating bails should line up centrally with the associated camming projections on the transfer slide bars and the bails should rotate freely on their bearing shaft with some end play, not more than .005". To adjust, loosen the set screw and position the one set collar against the aligned transmitter contact operating bails and tighten the set screw. Loosen the set screw in the other set collar and position this collar for the specified clearance when the play in the bails is taken up in a direction toward the collar previously adjusted. Tighten the set screw in the adjusted set collar.

REMOVE THE TRANSMITTER CONTACT (SWITCHING CONTROL CONTACT) ASSEMBLY BEFORE PROCEEDING WITH FOLLOWING ADJUSTMENTS (See NOTE 1 in paragraph 145)

(121) TRANSFER T LEVER BAIL AND SLIDE BARS ASSEMBLY PRELIMINARY ADJUSTMENT (Figure 62)

Rotate the sensing shaft to its stop position and mount the transfer T lever bail and slide bars assembly on the base casting. Position the assembly so that the T levers line up centrally with the Y levers and that there is approximately equal distance between the T and Y levers on the front and rear sets of levers.

(122) TRANSFER T LEVER ECCENTRIC SHAFT PRELIMINARY ADJUSTMENT (Figure 64)

Loosen the transfer T lever bail extension clamp screw. With a piece of tape perforated with the Y code combination inserted in the transmitter so that the Y character will be selected, trip the sensing shaft clutch and rotate the motor by hand until the bail extension roller is on the high part of its cam. With the bail extension roller held against the cam, press the bail to the right manually until the transfer slide bars are moved against their stops. Do not jam. Under this condition, at least one transfer slide bar should be moved upward against its stop and at least one which is moved downward should also be against its stop. Tighten the bail extension adjusting clamp screw. To adjust, loosen the transfer T lever eccentric shaft lock nut and position the shaft, keeping the high part of the eccentric shaft to the right; tighten the lock nut. Tighten the transfer bail extension clamp screw.

(123) TRANSFER T LEVER BAIL AND SLIDE BARS ASSEMBLY FINAL ADJUSTMENT (Figure 65A)

(a) With the R code combination set up on the Y transfer levers and the transfer T lever bail extension roller on the high part of its cam, there should be an equal clearance within .010" between the T levers and the Y levers when measured between the top prongs of the No. 4 set of levers and the bottom prongs of the No. 5 set of levers. To adjust, shim equally under the legs of the transfer T lever bail and slide bars assembly bracket.

(b) With the Y code combination set up on the Y transfer levers and with the transfer T lever bail extension roller on the high part of its cam, there should be an equal clearance, within .004", between the T and Y levers when measured between the bottom prongs of the

front and rear sets of levers (Figure 65B). To adjust, position the bracket by means of its mounting screws.

(124) TRANSFER T LEVER BAIL EXTENSION AND TRANSFER T LEVER ECCENTRIC SHAFT FINAL ADJUSTMENT (Figure 64)

(a) Insert a piece of tape perforated with the Y code combination in the pivoted transmitter, trip the sensing shaft clutch and rotate the motor by hand until the bail extension roller is on the high part of its cam and the Y code combination is set up on Y levers. With the play in the transfer slide bars taken up in a direction to make this clearance a maximum, there should be some clearance, not more than .006", between the lower prongs of the No. 1 and No. 5 T and Y levers. To adjust, loosen the bail extension clamp screw and position the bail extension by means of the adjusting hole and tighten the clamp screw.

(b) Insert a piece of tape perforated with the BLANK code combination in the pivoted transmitter, trip the sensing shaft clutch and rotate the motor by hand until the bail extension roller is on the high part of its cam. With the play in the transfer slide bars taken up in a direction to make this clearance a maximum, there should be some clearance, not more than .010", between the closest set of T and Y levers. If necessary, loosen the lock nut and refine the transfer T lever eccentric shaft adjustment, keeping the high part of the eccentric to the right. Tighten the lock nut. Recheck (a) and readjust if necessary.

(125) TRANSFER T LEVER BAIL SPRING TENSION

With the sensing shaft in the stop position and the push end of a 32 ounce scale applied to one of the spacers on the transfer T lever eccentric shaft and pushed horizontally to the right, it should require 9 to 11 ounces to just start the transfer bail moving.

#### NOTE

The transmitter contact (switching control contact) operating bails should be rotated out of the way to permit the insertion of the scale push rod.

(126) DISTRIBUTING CONTACT ADJUSTMENTS (Figure 66A)

#### NOTE 1

The rear contact (distributor auxiliary contact) is used as a transmitter clutch contact

on the FRXD16 unit. Apply standard distributing contact adjustments.

#### NOTE 2

Contact points must be centrally aligned with each other and square (as gauged by eye) when the distributor contact levers are on the low part of their respective cams and the adjusting screws are set to permit the contacts to remain in closed position. Adjust by bending the long and short contact springs as necessary. The following adjustments are to be made with the distributor contact levers on the high part of their cams. The 121550 spring bending tool is recommended for bending the contact springs.

(a) With the push end of an 8 ounce scale applied to the ends of the short contact springs and pushed horizontally to the left, it should require 1/2 to 1-1/2 ounces to start the springs moving away from the contact levers. To adjust, bend the short contact springs.

(b) There should be .015" to .020" gap between the contact points. To adjust, position the adjusting screws.

(c) With the pull end of an 8 ounce scale hooked over the end of the long contact springs and pulled horizontally to the left, it should require 4-1/2 to 5-1/2 ounces to start the contact springs moving away from the adjusting screws. To adjust, bend the long contact springs and recheck item (b).

(d) With the short contact spring held away, hook the pull end of a 32 ounce scale over the lower end of the contact levers and pull horizontally to the right. Figure 66B. It should require 8 to 10 ounces to just start the lever moving. To adjust, loosen the nut holding the spring bracket to the casting and position the bracket. Tighten the nut.

(e) If a stroboscope is available the contact gap, item (b), may be adjusted in the following manner:

1. With the light image of the STOP impulse lined up with the zero mark on the stop segment of the stroboscope test scale, adjust the stop contact gap of the unit by means of its adjusting screw so that the end of the light image lines up with the 142 mark (plus or minus one division) on the stop segment scale. Adjust the distributing contact gaps by means of the adjusting screws until their light images are equal within plus or minus one division of the length of their respective segments on the stroboscope scale.

2. With the START pulse zero indication on the stroboscope scale in line with the end of the STOP impulse light image, see that beginning and ends of the light images of all five distributing contact impulses are within five divisions of their segment length on their respective stroboscope scale lengths. If the signals do not meet these requirements, it will be necessary to refine the contact gaps adjustment.

#### NOTE

In order to meet these requirements, the contact gaps may be adjusted from .010" to .025" if necessary. (This note does not apply to the transmitter clutch contact of the FRXD16).

#### (127) TRANSMITTER AUXILIARY CONTACT ADJUSTMENT (Figures 67 and 68)

#### NOTE

Before making any of the following contact assembly adjustments, observe that the bakelite tips on the longer contact springs are centrally aligned with their respective levers and the contact points on opposing contact springs are centrally aligned with each other.

(a) With the bakelite tip of the longer contact spring resting against the transmitter auxiliary contact lever and the lever resting against the high part of its cam (Figure 68A), hook the pull end of an 8 ounce scale to the end of the short contact spring and pull at right angle to the spring. It should require 1/2 to 1-1/2 ounces to just open each contact. To adjust, bend the two short contact springs. Maintain a slight clearance between the springs and their backstops.

(b) With the bakelite tip of the longer contact spring resting against the transmitter auxiliary contact lever and the lever resting against the low part of its cam (Figure 68B), it should require 1-1/2 to 2-1/2 ounces to start moving the bakelite tip away from its lever when the scale is hooked to the long contact spring at the contact point and pulled as near right angle to it as possible. Adjust by bending the longer contact spring.

(c) With the bakelite tip of the longer contact spring resting against the transmitter auxiliary contact lever and the lever resting against the low part of its cam, there should be a gap of .015" to .020" between the two sets of contact points. (Figure 68B). To adjust, bend the shorter contact spring backstop. Recheck adjustment (a).

(128) DISTRIBUTOR CONTROL CONTACT ADJUSTMENTS (Figure 68)

This adjustment applies to the FRXD16. Make the adjustments as directed above under "TRANSMITTER AUXILIARY CONTACT ADJUSTMENT," paragraph 2.h.(127).

(129) DISTRIBUTOR CLUTCH RELEASE CONTACT ADJUSTMENT (Figures 67 and 69)

NOTE

When checking the following adjustments, the sensing shaft should be in the stop position and the bakelite tip on the long contact spring should rest against its contact lever. Contact points must be centrally aligned.

(a) With the distributor clutch release contact lever resting on the high part of its cam, unhook the distributor clutch contact lever spring from its mounting bracket and hook a 32 ounce scale in the spring eye. It should require 9 to 12 ounces to stretch the spring to its position length. Replace the spring (Figure 69).

(b) Hook the pull end of an 8 ounce scale on the long contact spring at the contact point and pull approximately at right angle to the contact spring. It should require 1 to 2 ounces to start the bakelite on the long contact spring moving away from the contact lever. To adjust, bend the long contact spring (Figure 69).

(c) There should be .020" to .025" gap between the contact points. To adjust, bend the stiffener on the short contact spring (Figure 69).

(d) Hook an 8 ounce scale over the end of each short contact spring and pull approximately at right angle to the spring. It should require 1/2 to 1-1/2 ounces to just start each short contact spring moving away from its stiffener. To adjust, bend the short contact springs (Figure 69).

(e) With the contact levers opposite the indents of their cams and the contacts closed, there should be some clearance between the short contact springs and their backstops. If there is no clearance, refine the adjustment in item (b).

(130) SYNCHRONIZING PULSE CONTACT ADJUSTMENT (Figures 67 and 69)

This adjustment applies to the FRXD16. Make the adjustment as directed under "DISTRIBUTOR

CLUTCH RELEASE CONTACT ADJUSTMENT" (paragraph 2.h.(129).)

(131) TAPE-OUT CONTACT ADJUSTMENT (Figure 70) — Units without tape-out release and tape-out levers assembly

(a) Remove the tape chute.

(b) Remove the tape-out contact assembly and mounting bracket.

(c) With the tape-out sensing lever pin in its uppermost position, hold the pivoted transmitter in its vertical position and apply an 8 ounce push scale to the tape-out sensing pin. It should require 2-3/4 to 4-1/4 ounces to start the tape-out sensing lever moving (this may be easily determined by observing the lever spring). In order to eliminate friction between the tape feed lever and the tape-out sensing lever, the tape feed lever should be positioned toward the rear of the unit, when measuring the spring tension.

(d) With the long and short contact springs parallel with each other and aligned so that they are at right angle to their mounting bracket, there should be .020" to .025" gap between the contact points on the opposing springs. The shorter contact springs should be tensioned lightly against their backstop and opposing contacts should be centrally aligned with each other (Figure 70A).

(e) Replace the tape-out contact assembly and mounting bracket.

(f) With a piece of tape, perforated with the LETTERS code combination, inserted into the pivoted transmitter, trip the sensing shaft clutch and rotate the sensing shaft until the tape-out sensing lever is opposite the low part of the cam (Figure 70B). There should be a clearance of .010" to .030" between the bakelite tip of the long contact spring and the post on the tape-out sensing lever. Also, the bakelite tip of the contact spring should be centrally aligned (gauge by eye) with the post on the lever. Adjust by means of the enlarged mounting holes and mounting screws.

(g) Replace the tape chute.

(132) TAPE-OUT CONTACTS MECHANISM ADJUSTMENTS — Units with tape-out release and tape-out levers assembly

(a) Remove the tape chute.

(b) Remove the tape-out contact assembly and mounting bracket.

(c) Remove the tape-out release and tape-out levers assembly.

(d) TAPE-OUT SENSING LEVER SPRING TENSION (Figure 91)

Rotate the sensing shaft cam sleeve until the tape-out sensing lever drops off of the high part of its cam. Place the unit so that it is resting on its rear supports. Hook an 8 ounce scale over the upper extension of the tape-out sensing lever, close to the guide, and pull parallel to the guide. It should require 4 to 5-1/2 ounces to just start the tape-out sensing lever moving.

(e) TAPE-OUT LEVER GUIDE PLATE ADJUSTMENT (Figure 93)

Position the guide plate by means of its mounting screws and elongated mounting holes so that the tape-out lever moves freely throughout its travel with a minimum amount of side play.

(f) Replace the tape-out release and tape-out levers assembly.

(g) TAPE-OUT RELEASE AND TAPE-OUT LEVERS ASSEMBLY ADJUSTMENTS (Figure 71.1)

1. With the sensing shaft in its stop position and the tape-out release lever in its unlatched (normal) position, there should be .010" to .015" clearance between the tape feed pin oscillating arm extension and the tape-out release lever. To adjust, loosen the levers assembly mounting plate mounting screws and position the levers assembly mounting plate. Tighten the mounting screws (Figure 71.1A).

2. With the tape-out release lever in its latched (operated) position, the top of the tape feed pins of the tape feed pin oscillating arm should be below, not to exceed .015", the upper surface of the pivoted transmitter tape guide plate. To adjust, add or remove shims between the base casting and the lever assembly mounting bracket (see Figure 57).

3. Recheck 1.

(h) TAPE-OUT CONTACTS ADJUSTMENT (Figure 72A and 92A).

1. The short contact spring and its stiffener should be straight. The short contact spring should be tensioned lightly against its stiffener.

2. Hook an 8 ounce scale over the end of the long contact springs and pull at right angles to the spring. It should require 3/4 to 1-1/4 ounces to just open the contacts.

3. To adjust, bend the contact springs and stiffeners.

(i) With the sensing shaft in its stop position, replace the tape-out contact assembly and its mounting bracket.

(j) TAPE-OUT CONTACT BRACKET ADJUSTMENT (Figure 92).

1. With the sensing shaft in the stop position, manually unlatch the tape-out lever by pushing the bottom section of the tape-out lever latch to the left. Manually move the long contact spring to the right until the tape-out lever blocking surface locks the bakelite tip of the spring. With the bakelite tip resting against the blocking surface, there should be .010" to .020" gap between the contact points of the tape-out contact springs. The contact springs should be approximately at right angles to the base. See Figure 92B or 71.1B).

2. With the sensing shaft in the stop position and with the tape-out lever latched, there should be .010" to .030" clearance between the end of the bakelite tip of the long contact spring and the lower surface of the blocking extension of the tape-out lever at the closest point. To check this clearance push the long contact spring to the left until the bakelite tip is underneath the blocking extension (Figure 71.1C).

3. Trip the sensing shaft clutch and rotate the sensing cam sleeve until the tape-out sensing lever rides off the high part of its cam. With the tape-out pin in its uppermost position, manually unlatch the tape-out lever so that its blocking extension rests on the bakelite tip of the long contact spring. The left side of the bakelite tip should overtravel the blocking surface of tape-out lever extension by at least .010" when the play in the tape-out lever is taken up in a direction to make this clearance a minimum (Figure 71.1D).

4. With a piece of tape inserted in the pivoted transmitter, trip the sensing shaft clutch and rotate the shaft until the tape-out sensing lever is opposite the low part of its cam. With the tape-out lever latched, there should be some clearance between the post of the lower tape-out sensing lever extension and the bakelite tip on the long contact spring of the tape-out contact assembly (Figure 71B).

5. To adjust, loosen the tape-out contact bracket mounting screws and position the bracket to meet the foregoing adjustments. Tighten the mounting screws. Recheck adjustments in paragraphs (g) 1. and 2.



(k) TAPE-OUT LEVER SPRING TENSION  
(Figure 93)

With the sensing cam shaft in the stop position, the tape-out release lever and the tape-out lever unlatched and the unit resting on its rear supports, hook an 8 ounce scale over the front edge of the formed part of the tape-out lever and pull at right angles to the lever. It should require 1-1/2 to 3 ounces to just start the lever moving.

(l) TAPE RELEASE LEVER SPRING TENSION (Figure 93)

With the sensing shaft in the stop position and the tape release and tape-out levers unoperated, place the unit so that it is resting on its rear supports. Hook an 8 ounce scale over the front edge of the formed end of the tape release lever, with the tape release latch held away from the tape release lever. Pull at right angles to the lever. It should require 2-1/2 to 3-1/2 ounces to just start the tape release lever moving.

(m) TAPE-OUT RELEASE AND TAPE-OUT LEVERS COMPRESSION SPRING TENSION

With the sensing shaft in the stop position, the tape-out release lever latched, the tape-out lever unlatched, and the unit resting on its rear supports, place the push end of an 8 ounce scale against the tip of the tape-out lever latch. See Figure 93. It should require 1 to 2-1/2 ounces to just start the latch moving.

NOTE

With the tape removed from the pivoted transmitter, make certain that the contacts are closed and centrally aligned with each other and that each short contact spring is moved away from its stiffener.

- (n) Replace the tape chute.

(133) TRANSMITTER STOP CONTACT ADJUSTMENT (Figure 72) — If used

NOTE 1

Bakelite tips should be centrally aligned with their operating levers, and opposing contacts should be centrally aligned with each other.

NOTE 2

The transmitter stop contact assembly and its mounting bracket may be removed to make this adjustment.

(a) With the short contact spring tensioned against its backstop and aligned so that it is parallel to its mounting bracket, it should require 1/4 to 1/2 ounce to just open the contacts when the scale is hooked over the end of the insulator tip of the long contact spring and pulled at right angle to it. To adjust, bend the long contact spring.

(b) With a piece of perforated tape emerging from the punch mechanism and engaged in the pivoted transmitter (1) the transmitter stop contact should be open with a minimum gap of .010" when the last character on the tape is being sensed, and (2) the contact should be closed with some clearance between the insulator tip on the long contact spring and the end of the contact pin when the second to the last character on the tape is being sensed by the selector pins. To adjust, position the contact assembly by means of the two contact tilting screws and the clamp screw.

(134) UNIVERSAL CONTACT ADJUSTMENT (Figure 73) — If used

(a) The head of the contact lever adjusting screw should line up centrally with the bakelite tip of the long contact spring, and opposing contacts should be centrally aligned with each other.

(b) In measuring the tension values specified in the following adjustments the spring scale should be hooked to the contact springs at the outer edge of the contact point and pulled horizontally.

(c) The following adjustments may be made with the universal contact assembly and its bracket removed from the base casting.

1. With the No. 4 contact spring backstop aligned parallel to the contact mounting surface on the bracket and the No. 5 contact spring held away from the No. 4 contact spring, it should require 1-1/2 to 2-1/2 ounces to just start pulling each section of the No. 4 contact spring away from the backstop. To adjust, bend the No. 4 contact spring against its backstop.

2. With the insulator tip of the No. 2 contact spring held away from the insulator tip of the No. 5 contact spring, it should require 2 to 3 ounces to just separate the contacts on the No. 5 contact spring from the opposing contact points. To adjust, bend the No. 5 contact spring.

3. With the No. 1 contact spring backstop aligned parallel to the contact mounting surface on the bracket and the No. 2 contact spring held away from the No. 1 contact spring, it should require 1-1/2 to 2-1/2 ounces to just start pulling each section of the No. 1 contact spring

away from the backstop. To adjust, bend the No. 1 contact spring against its backstop.

4. With the No. 3 contact spring held away from the No. 2 contact spring, it should require 2 to 3 ounces to just separate the contacts on the No. 2 contact spring from the opposing contact points, and there should be a clearance of .010" to .020" between the insulator tips on the No. 2 and No. 5 contact springs. To adjust, bend the No. 2 contact spring between the contact point and the bakelite tip.

5. It should require 1 to 2 ounces to just start pulling each section of the No. 3 contact spring away from the backstop, and there should be a clearance of .020" to .025" between the opposing contact points on the No. 3 and No. 2 contact springs when No. 2 contact spring is against No. 1 contact spring. To adjust, bend the No. 3 contact spring and its backstop.

#### NOTE

Reinstall the universal contact assembly on the base bracket, positioning the assembly in its elongated holes so that there is at least 1/8" clearance between the edge of the bracket and the edge of the milled section in the base casting.

6. With the universal contact lever on the high camming part of the bail plunger extension, there should be a clearance of .020" to .025" between the No. 4 and No. 5 contact spring points. Adjust by means of the universal contact lever adjusting screw and lock nut.

7. Rotate the motor by hand until the bail rises to within .020" to .080" of the notch in the pull bars. Adjust the universal contact bracket up or down in its slotted mounting holes so that the No. 4 and No. 5 contact points just make (determine with test lamp). Recheck adjustment 6.

#### 8. UNIVERSAL CONTACT LEVER SPRING TENSION (Figure 73)

With the universal contact lever on the high camming part of the bail plunger extension, it should require 2 to 2-1/2 ounces to stretch the spring to position length.

#### (135) DISTRIBUTOR START CONTACT ADJUSTMENTS — FRXD16 only (Figure 90)

#### NOTE

Before making any of the following adjustments, be sure that the contact points are centrally aligned with each other.

(a) With the distributor clutch throwout lever resting on the high part of the driven clutch and the contact bracket positioned to provide maximum clearance between the bakelite tip of the long contact spring and the magnet armature, hook the pull end of an 8 ounce scale on the end of the short contact spring and pull approximately at right angle to the contact spring. It should require 1/2 to 1-1/2 ounces to just separate the contact points on the contact springs. To adjust, bend the short contact spring (Figure 90A).

(b) With the distributor clutch throwout lever resting on the low part of the driven clutch and the bakelite tip of the long contact spring resting against the armature, there should be .015" to .030" gap between the contact points. With the distributor clutch throwout lever resting on the high part of the driven clutch, there should be at least .003" clearance between the magnet armature and the bakelite tip of the long contact spring. To adjust, loosen the contact bracket mounting screws and position the bracket.

(c) With the distributor clutch throwout lever resting on the low part of the driven clutch and the bakelite tip of the long contact spring resting against the magnet armature, apply the push end of an 8 ounce scale to the long contact spring at the contact point and push approximately at right angle to the contact spring. It should require 1-1/2 to 2-1/2 ounces to start the bakelite tip on the long contact spring moving away from the armature. To adjust, bend the long contact spring (Figure 90B).

(d) Recheck adjustments (a) and (b).

#### (136) DISTRIBUTING AND SENSING CLUTCH THROWOUT LEVER SPRING TENSION

(a) Place unit on rear supports. With the throwout levers on the low part of the clutch cam and the clutch teeth engaged, place the push end of an 8 ounce scale on the bottom edge of the lower armature and push as nearly horizontal as possible. It should require 3 to 5 ounces to start the lever moving.

(b) With the levers and clutch members in this same position, hook an 8 ounce scale over the upper lever spring arm near the spring and pull as nearly horizontal as possible. It should require 5 to 7 ounces to start the lever moving.

#### NOTE

Adjustments in the following three paragraphs (137), (138) and (139) apply to all reperforator transmitter units equipped with the adjustable detent mechanism (Figure

89) for the sensing and distributing cam sleeves.

**(137) DETENT LEVER**

The detent levers should engage their respective cams by at least 2/3 the width of the cams when the play in the detent levers is taken up in a direction to make this engagement a minimum. Position the detent bracket to meet this requirement (See Figure 89B).

**(138) DETENT LEVER PLATE**

With both clutches in their fully disengaged positions there should be a maximum and approximately equal amount of engagement (for both levers) between the detent levers and their respective cams. To adjust, position the detent lever plate on its bracket by means of the elongated mounting holes. Make certain that both spring tensions are approximately equal by extending the springs an equal amount. Gauge by eye. If the detent bracket had been repositioned for alignment of the detent levers with their cams, the tape-out contact adjustment must be rechecked and, if necessary, remade.

**(139) DETENT LEVER SPRING TENSION**

With the detent levers resting on the high part of their cam, apply a 32 ounce scale to the cam end of the lever and pull at right angle (as nearly as possible) to the levers. It shall require from 6 to 9 ounces to start the levers moving away from their cams (Figure 89B).

**(140) DISTRIBUTOR AND SENSING CLUTCH DETENT LEVERS SPRING TENSION (Units not equipped with adjustable detent mechanism)**

With the distributor and sensing cam sleeves in the "stop" position, hook an 8 ounce scale over the detent levers at their roller and pull at right angle to the levers. It should require 1-3/4 to 3 ounces to start each lever moving (Figure 89A).

**(141) PUNCH BAIL ARM SPRING TENSION**

With the punch bail arm roller resting on the low part of its cam, hook a 12 pound scale over the punch arm at the cam roller and pull at right angle. It should require from 6 to 7 pounds to start the roller moving away from the punch cam.

**(142) MAIN BAIL SPRING TENSION FINAL ADJUSTMENT — Typing equipment only**

(a) The printing blow, i.e., the force with which the type bars strike the platen, is regulated by the main bail adjusting screw.

(b) With the motor running, send alternate LETTERS and FIGURES signals to the reperforator transmitter unit. Loosen the lock nut and back off the main bail spring adjusting screw (Figure 3) until the platen fails to return to the LETTERS position. Then, turn the screw in a clockwise direction until the platen just moves to the LETTERS and FIGURES positions without any failures. Turn the screw clockwise an additional 1-1/2 turns and tighten the lock nut. With the main shaft clutch disengaged and a 25 pound scale hooked to the spring adjusting lever directly below the spring hole, it should require not more than 15-1/2 pounds to start the spring adjusting lever moving.

**(143) MAIN BAIL CAM CLUTCH TORQUE (Figure 74)**

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

**(144) SELECTOR CLUTCH TORQUE (Figure 75)**

(a) This torque should be measured after the motor has been running at least ten minutes with the selector cam sleeve stationary. Hook a 32 ounce scale to the selector cam sleeve stop arm. It should require a pull of 14 to 18 ounces to hold the selector cam sleeve stationary. This clutch torque depends on the condition of the felt friction washers and the friction clutch spring. If difficulty is encountered in securing the specified torque, shims may be placed at the lower end of the friction clutch spring. The selector cam sleeve must be removed from the shaft in order to insert the shims. Shims are available under the following numbers:

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

(b) A more convenient method of regulating the selector clutch torque has been devised by the substitution of a 119540 keyed nut, a 122974 capstan nut, and a 122838 spacer for the 72515 nut and 72517 keyed nut on the main shaft. Where these new parts are present, the torque may be regulated by positioning the capstan nut in the proper direction with a screwdriver.

## NOTE

The 122974 capstan nut is split and the open ends are offset to insure a tight fit on the 119540 slotted nut. To install the capstan nut the offset ends must be held approximately in line by using a pair of pliers or a clamp. The slotted nut can then be screwed into place. To regulate the selector torque the capstan nut may be positioned with a screwdriver. To prevent the capstan nut from being turned downward against the bearing, the 122838 spacer should be installed between the 119540 slotted nut and the bearing.

## (145) TRANSMITTER CONTACT SWITCHING CONTROL CONTACT ASSEMBLY ADJUSTMENTS

## NOTE 1

To facilitate the replacement of parts or checking of adjustment requirements, the entire switching control contact (transmitter contact) assembly may be removed from the base to the extent of the slack in the cable connected to the contact spring terminals.

## NOTE 2

The contact pile-ups of the assembly are preheated in the factory and the clamping screws are tightened with the pile-ups under pressure. If, for any reason, these screws are loosened they should be tightened with a torque of 20 inch-pounds.

## (a) GENERAL REQUIREMENTS

1. The alignment of the contacts should be within the limits indicated in Figure 76.

2. The width of each spring tang should lie entirely within the slots in the comb. Gauge by eye.

3. The tangs of the heavy contact springs (and booster springs) should be in alignment with the main body of the springs before proceeding with the adjustments.

4. The spring studs should clear the springs through which they pass in all positions of travel of the studs.

5. To adjust, loosen the contact spring mounting screws so that they are friction tight and align the contact springs. Tighten the mounting screws.

6. The springs tangs should rest in the slots of the comb so that there is approximately equal

clearance (not more than half the depth of the slot) from the free end of the tang to the bottom of the slot, gauged on the two end springs with tangs. (See Figure 77.) Adjust by means of mounting screws and enlarged holes in the comb.

7. Before applying any of the following spring tension adjustments, all the springs should be definitely tensioned toward the narrow end of the comb so that they exert some tension against contact spring, comb, etc.

8. Unless otherwise specified, the tension should be measured with the springs in the normal unoperated position.

9. Both sections of bifurcated (split) springs should be in alignment with each other so that the contacts on the bifurcated springs break or make with the contacts on associated springs approximately at the same time.

10. A spring which is tensioned against the comb or an opposing spring, or a stud, should register the required tension just as the tang leaves the comb, or just as the contacts break, or just as it leaves the stud.

11. When gauging tensions on solid springs, the gauge should be applied near the end of the spring just in front of the contacts. When checking tensions of swingers, the gauge should be applied to both parts of the bifurcated springs, just above the contact points.

12. There should be a clearance between adjacent springs, whether in the operated or unoperated position, of minimum .008". Gauge by eye.

(b) DETAILED SWITCHING CONTROL CONTACT SPRING REQUIREMENTS (for FRXD1, 5, 9, 10, 13, 20 and 21)

## NOTE

The adjustments in the following paragraphs 1. to 5., inclusive, may be made with the switching control contact assembly removed; see NOTE 1 of paragraph (145). For position and number of contact springs refer to Figure 78.

1. The heavy contact springs with tangs are No. 1, 3, 5, 6, 8, 9, 11 and 12. It should require 30 to 50 grams to just move the tangs away from the comb. On springs No. 5, 8 and 11, the opposing springs should be held clear by pressing the right-hand stud to the left. To adjust, bend the contact springs.

2. Spring No. 2 should be tensioned toward the right so that its stud is in contact with the

No. 4 spring. It should require 6 to 12 grams to move the spring so that its stud just leaves the No. 4 spring. To adjust, bend the No. 2 spring.

3. It should require 18 to 25 grams to just move the No. 4 spring contact clear of its opposing contact with the stud of the No. 2 spring resting against the No. 4 spring. To adjust, bend the No. 4 spring.

4. It should require 18 to 25 grams to just move the No. 7 spring contact clear of its opposing contact No. 8 and there should be some clearance, not more than .003", between the stud of the No. 7 spring and the No. 4 spring. To adjust, bend and bow the No. 7 spring. If further refinements are necessary, the tang on the No. 8 spring may be bent slightly; recheck the tension.

#### NOTE

In making this adjustment, some clearance should be maintained between the No. 10 spring and the stud of the No. 7 spring. Hold the No. 10 spring away by hand.

5. It should require 18 to 25 grams to just move the No. 10 spring contact clear of its opposing contact No. 11, and there should be some clearance not more than .003" between the stud of the No. 7 spring and the No. 10 spring. To adjust, bend and bow the No. 10 spring. If further refinements are necessary, the tang on the No. 11 spring may be bent slightly.

6. PRELIMINARY. With the transfer slide bars in the spacing (lower) position and the slots in all the contact operating bail eccentrics in a vertical position (high side up or down according to the position that gives the fullest engagement between the end of the plunger and the curvature of the eccentric) replace the switching control contact assembly. The gap between the stud, on No. 13 spring and the No. 10 spring should be .010" to .015" on the Number 1 and the Number 5 contact pile-up assemblies. To adjust, loosen the two eccentric stop mounting screws and rotate the eccentrics away from the brackets. Loosen the contact bracket mounting screws and position the bracket. Tighten the mounting screws. Rotate the eccentrics so they make contact with the bracket and tighten the eccentric mounting screws.

7. The right-hand stud on each pile-up should be centrally aligned with its associated contact operating bail eccentric. Align each contact pile-up by means of its mounting screws and the enlarged holes in the mounting plate.

8. The clearance between the stud of No. 13 spring and No. 10 contact spring of each pile-up

should be .005" to .015"; adjust by positioning the contact operating bail eccentrics.

9. With the transfer slide bars in their lower SPACING position, spring No. 13 in each pile-up should register 18 to 25 grams just as the stud leaves the contact operating bail eccentric. To adjust, bend and bow the No. 13 spring.

10. With the transfer slide bars in their SPACING (lower) position, adjacent contact springs Nos. 1 and 2, 3, and 4, 6 and 7, 9 and 10, 12 and 13, should "make" with a .035" gauge, and "not make" with a .025" gauge placed between the contact operating bail eccentrics and their respective studs. To adjust, bend the tangs on springs Nos. 1, 3, 6, 9, and 12, and recheck tension requirements in paragraph (145)(b).

11. Recheck contact spring tensions as outlined above in paragraphs (145)(b) 1. to 5. inclusive.

12. With the transfer slide bars in their SPACING (lower) position, there should be at least .008" clearance between the contact points of the light contact springs and those of the associated left-hand heavy springs; with the slide bars in the MARKING (upper) position, check for at least .008" clearance between the contact points of the light springs and those of the associated right-hand heavy springs.

13. With the transfer slide bars in the MARKING position, move the heavy left-hand contact springs away from their backstops (or from the light springs) and see that there is some "follow" of the light contact springs.

(c) DETAILED SWITCHING CONTROL CONTACT SPRING REQUIREMENTS (for FRXD6, 15 and 19)

#### NOTE

The adjustments in the following paragraphs 1. to 5., inclusive, may be made with the switching control contact assembly removed; see NOTE 1 of paragraph (145). For position and number of contact springs refer to Figure 87.

1. The heavy contact springs with tangs are Nos. 1, 3, 4, 6, 7, 9, 10 and 12. It should require 30 to 50 grams to just move the tangs away from the comb. On springs Nos. 3, 6, 9 and 12, the opposing springs should be held clear by pressing the right-hand stud to the left. To adjust, bend the contact springs (Figure 87).

2. It should require 18 to 25 grams to just move the No. 2 spring contact clear of its opposing contact and there should be some clearance between the No. 2 spring and the stud of the No. 5 spring. To adjust, bend the No. 2 spring.

3. It should require 18 to 25 grams to just move the No. 5 spring contact clear of its opposing contact No. 6 and there should be some clearance, not more than .003", between the stud of the No. 5 spring and the No. 2 spring. To adjust, bend and bow the No. 5 spring. If further refinements are necessary, the tang on the No. 6 spring may be bent slightly; recheck the tension.

#### NOTE

In making this adjustment, some clearance should be maintained between the No. 8 spring and the stud of the No. 5 spring. Hold the No. 8 spring away by hand.

4. It should require 18 to 25 grams to just move the No. 11 spring contact clear of its opposing contact No. 12 and there should be some clearance, not more than .003", between the stud of the No. 11 spring and the No. 8 spring. To adjust, bend and bow the No. 11 spring. If further refinements are necessary, the tang on the No. 12 spring may be bent slightly; recheck the tension.

#### NOTE

In making this adjustment, some clearance should be maintained between the No. 8 spring and the stud of the No. 11 spring. Hold the No. 8 spring away by hand.

5. It should require 18 to 25 grams to just move the No. 8 spring contact clear of its opposing contact No. 9 and there should be some clearance, not more than .003", between the stud of the No. 5 spring and the No. 8 spring. To adjust, bend and bow the No. 8 spring. If further refinements are necessary, the tang on the No. 9 spring may be bent slightly.

6. PRELIMINARY. With the transfer slide bars in the spacing (lower) position and the slots in all the contact operating bail eccentrics in a vertical position (high side up or down according to the position that gives the fullest engagement between the end of the plunger and the curvature of the eccentric) replace the switching control contact assembly. The gap between the No. 1 and No. 5 eccentrics and their associated studs should be .010" to .015". To adjust, loosen the two eccentric stop mounting screws and rotate the eccentrics away from the brackets. Loosen the contact bracket mounting screws and position the bracket. Tighten the

mounting screws. Rotate the eccentrics so they make contact with the bracket and tighten the screws which mount the eccentrics.

7. The right-hand stud on each pile-up should be centrally aligned with its associated contact operating bail eccentric. Align each contact pile-up by means of its mounting screws and the enlarged holes in the mounting plate.

8. Adjust the clearance on all contact pile-ups so that the clearances are from .010" to .015". To adjust, position the eccentrics.

9. With the transfer slide bars in their lower (spacing) position, adjacent contact springs Nos. 1 and 2, 4 and 5, 7 and 8, 10 and 11, should "make" with a .035" gauge, and "not make" with a .030" gauge placed between the contact operating bail eccentrics and their respective studs. To adjust, bend tangs on springs Nos. 1, 4, 7 and 10 and recheck tension requirements in paragraph (145)(a) 7.

#### (d) DETAILED SWITCHING CONTROL CONTACT SPRING REQUIREMENTS (for FRXD12)

#### NOTE

The adjustment in the following paragraph 1. may be made with the switching control contact assembly removed; see NOTE 1 of paragraph (145). For position and number of contact springs refer to Figure 88.

1. Bend the tang of the No. 3 contact spring so that when No. 2 contact spring rests against No. 3, there is approximately .050" between Nos. 1 and 2 contacts spring points.

2. PRELIMINARY. With the transfer slide bars in the SPACING (lower) position and the slots in all the contact operating bail eccentrics in a vertical position (high side up or down according to the position that gives the fullest engagement between the end of the plunger and the curvature of the eccentric) replace the switching control contact assembly. The gap between the booster springs (of pile-ups No. 1 and No. 5) and their studs should be .050" to .060". To adjust, loosen the two eccentric stop mounting screws and rotate the eccentrics away from the brackets. Loosen the contact bracket mounting screws and position the bracket. Tighten the mounting screws. Rotate the eccentrics so they make contact with the bracket and tighten the screws which mount the eccentrics (Figure 87).

3. The right-hand stud on each pile-up should be centrally aligned with its associated contact operating bail eccentric. Align each

contact pile-up by means of its mounting screws and the enlarged holes in the mounting plate.

4. Bend the tangs of the booster springs until there is a clearance of .030" to .040" between the booster springs and their associated studs (see Figure 77).

5. With the transfer slide bars in their SPACING (lower) position, the gap between the booster springs and their studs should be .030" to .035". To adjust, position the contact operating bail eccentrics.

6. With the transfer slide bars in their SPACING (lower) position, hook an 8 ounce scale on the end of each booster spring and pull at right angle to the spring. It should require 6-1/2 to 7-1-2 ounces to just move the tangs of the booster spring away from its associated bakelite barrier of the comb. To adjust, bend the booster spring.

7. With the transfer slide bars in their SPACING (lower) position, Nos. 1 and 2 contacts should make when a .035" gauge is placed between the contact operating bail eccentrics and their associated studs.

8. With the transfer slide bars in their SPACING (lower) position, Nos. 1 and 2 contacts remain open when a .030" gauge is placed between the contact operating bail eccentrics and their associated studs. To adjust, bend the tangs on the No. 1 contact springs.

9. With the transfer slide bars in their SPACING (lower) position, place a gram scale to the end of each No. 1 contact spring. It should require 30 to 50 grams to just move the tang away from its associated barrier. To adjust, bend the No. 1 contact springs.

10. With the transfer slide bars in their SPACING (lower) position there should be from .015" to .025" clearance between the No. 1 and No. 2 contact spring points. Adjust by bending the tang on No. 3 spring. Check to see that there is at least .005" clearance between the spring studs and eccentrics.

11. With the transfer slide bars in their MARKING (upper) position, place a gram scale to the end of each No. 3 contact spring. It should require 30 to 50 grams to just move the tang from its associated barrier. To adjust, bend the No. 3 contact springs.

12. With the transfer slide bars in their SPACING (lower) position, place a gram scale on the end of each side of the bifurcated contact spring (No. 2). It should require 18 to 25 grams to just break contact with the No. 3 contact

spring. To adjust, bend the bifurcated contact spring.

(e) TRANSMITTER CONTACT AND BOOSTER SPRING REQUIREMENTS (Figure 96)  
- For FRXD3, 4, 8, 11, 14 and 16

#### NOTE

Refer to paragraphs (145) and (145)(a) for General Requirements. For position and number of contact and booster springs refer to Figures 76 and 96.

1. PRELIMINARY. With the transfer slide bars in the SPACING (lower) position and the slots in all the contact bail eccentrics in a vertical position (high side up or down according to the position that gives the fullest engagement between the end of the plunger and the curvature of the eccentric) replace the transmitter contact assembly. The gap between the No. 1 and No. 5 contact booster springs and their studs should be .075" to .080". To adjust, loosen the two eccentric stop mounting screws and rotate the eccentrics away from the brackets. Loosen the contact bracket mounting screws and position the bracket. Tighten the mounting screws. Rotate the eccentrics so they make contact with the bracket and tighten the screws which mount the eccentrics.

2. The right-hand stud on each pile-up should be centrally aligned with its associated contact operating bail eccentric. Align each contact pile-up by means of its mounting screws and the enlarged holes in the mounting plate.

3. Bend the tangs of the booster springs until there is a clearance of .005" to .060" between the booster springs and their associated studs.

4. With the transfer slide bars in their SPACING (lower) position, the stud gap should be .030" to .035". To adjust, position the contact bail eccentrics (Figure 96).

5. With the transfer slide bars in their SPACING (lower) position, hook an 8 ounce scale on the end of each booster spring and pull at right angles to the spring. It should require 6-1/2 to 7-1-2 ounces to just move the tangs of the booster spring away from its associated bakelite barrier of the comb. To adjust, bend the booster spring (Figure 96).

6. With the transfer slide bars in their SPACING (lower) position, place a gram scale on the end of each side of the bifurcated contact spring. It should require 18 to 25 grams to just move the short studs away from their associated

contact bail eccentrics. To adjust, bend the bifurcated contact springs (Figure 96).

7. With the transfer slide bars in their SPACING (lower) position, the contacts should make when a .035" gauge is placed between the contact bail eccentrics and their associated studs.

8. With the transfer slide bars in their SPACING (lower) position, the contacts remain open when a .030" gauge is placed between the contact bail eccentrics and their associated studs. To adjust, bend the tangs on the solid contact springs.

9. With the transfer slide bars in their SPACING (lower) position, place a gram scale to the end of each solid contact spring. It should require 30 to 50 grams to just move the tang away from its associated barrier. To adjust, bend the solid contact springs (Figure 96).

(146) TAPE FEED INDICATOR CONTACT ASSEMBLY ADJUSTMENTS (Figure 79) — If used

(a) The formed portion of the tape contact lever which follows the tape loop, between the prepunch and code punch mechanisms, should be slightly to the front of the tape feed holes or approximately in the center of the tape. Gauge by eye. With the tape held against the tape guides, there should be some clearance, not more than .070" between the tape and the formed part of the tape contact lever, at the bottom of the loop.

(b) To adjust, position the collar on the tape contact lever between the ears of the contact bracket. The setscrew post in the collar acts as a backstop against the ribbon spool bracket for controlling the clearance between the lever and the tape, and also to clamp the tape contact lever in the collar. This collar also acts as a front stop against the inside of the bracket front ear to control the central position of the tape contact lever on the tape. (If necessary, bend the tape contact lever for proper clearance between the tape and the lever.)

(c) With the tape lever arm in its central position on the tape and the contact spring post (post, with the hexagon nut portion in the center, attached to the rear collar) opposite the center (between rivets) of the low part of the insulator on the long contact spring, there should be from .005" to .025" clearance between the contact spring post and the insulator. To adjust, loosen the rear collar setscrew post so that the collar will be friction tight on the tape contact lever. The collar holding the contact spring post can then be positioned to give

proper clearance between the post and the insulator. Tighten the setscrew post after the adjustment has been made.

(d) When the tape contact lever is pushed to its rearmost position and the contact spring post is on the high part of the contact insulator, there should be at least .015" gap between the contact points. To adjust, bend the short heavy contact spring. Recheck adjustment (c).

(e) With the tape contact lever in its normal operating position (central position of the tape) and the contacts closed, apply the push end of an 8 ounce scale between the rivets on the insulator on the long contact spring. It should require 2 to 3 ounces to open the contacts. To adjust, bend the long contact spring.

(147) LINE AND SELECTOR CIRCUITS CLOSING JACK ADJUSTMENT (Figure 97) — If used

In order to check the following adjustments, the line relay must be removed and the unit should be resting on its rear supports:

(a) CONTACT GAP ADJUSTMENT

1. When the jack plunger is held flush with the top surface of the base casting, there should be a gap of .010" to .015" between the contact points of the No. 3 and No. 4 contact springs. See Figure 97A. To adjust, bend the No. 3 contact spring.

2. When the jack plunger is held flush with the top surface of the base casting, there should be a gap of .020" to .025" between the contact points of the No. 1 and No. 2 contact springs. See Figure 97A. To adjust, bend the No. 2 contact spring.

In order to check the following adjustments, the LINE AND SELECTOR CLOSING JACK assembly must be removed from its mounting.

(b) CONTACT SPRING TENSION ADJUSTMENT (Figure 97).

1. When an 8 ounce scale is hooked to the contact springs No. 1 or No. 4 and pulled at right angles to the spring, it should require a pull of 5 to 7 ounces to separate the contact points of No. 1 and No. 2 or of No. 3 and No. 4 contact springs, respectively. See Figure 97B. To adjust, bend the No. 1 and No. 4 contact springs.

2. Replace the LINE AND SELECTOR CLOSING JACK assembly on the base and tighten the mounting screws. The jack plunger should move freely in its guide and the hole in the base casting. To adjust, loosen the mounting screws and



position the assembly. Tighten the mounting screws.

(148) TAPE REEL TAPE-OUT CONTACTS ADJUSTMENTS - If used

(a) TAPE REEL TAPE-OUT CONTACT LEVER ADJUSTMENT (Figure 94)

1. With the tape reel tape-out contact lever resting against the side of the tape reel container, adjust the lever by bending so that it touches or is within .050" of touching the inside radius of the container for a length of 3-1/2" from the end of the lever.

2. The contact lever should clear the indented edge of the tape reel container at all times. To adjust, loosen the nuts on the tape reel tape-out lever bracket mounting screws and position the bracket. Tighten the nuts.

(b) TAPE REEL TAPE-OUT CONTACTS ADJUSTMENT (Figure 94)

1. The stiffener of the tape reel tape-out contact should be straight. To adjust, bend the stiffener.

2. With the contact lever held away from the contact, hook an 8 ounce scale at the contact point of the short contact spring and pull in a horizontal direction. It should require 2 to 3 ounces to just move the short contact spring away from its stiffener. To adjust, bend the short contact spring.

3. With the contact lever held away from the contacts, there should be .015" to .030" gap between the contact points. To adjust, bend the long contact spring.

(c) TAPE REEL TAPE-OUT ADJUSTING SCREW ADJUSTMENT

The tape reel tape-out adjusting screw should close the tape-out contacts when the end of the tape-out contact lever is within 5/16" to 3/8" of the wood filler in the center of the tape reel. To adjust, loosen the lock nut and position the adjusting screw. Tighten the lock nut.

(d) TAPE REEL TAPE-OUT CONTACT LEVER SPRING TENSION (Figure 94)

Unhook the tape reel tape-out contact lever spring from the spring post on the lever and hook a 32 ounce scale in the eye of the spring. With the tape reel tape-out lever held so that the curved portion is touching the curved part of the tape reel container, it should require 7 to 9 ounces to stretch the spring to its position length. Replace the spring on the spring post.

(149) AUXILIARY RELAYS ADJUSTMENT - If used

(a) CONTACT SPRING AND ARMATURE HINGE POSITION

The contact springs and hinge bracket should be positioned to meet the following requirements:

1. The contacts on the relays should line up within the limits shown in Figure 76.

2. The spring tangs should rest on the spool head so that the free end of the tang extends back of the front face of the spool head. See Figure 99.

3. The width of each spring tang should lie entirely within the projection of the top and bottom edges of the slot in the spool head, but the tang should not rub on the spool head when moved from its normal position of rest on the spool head in the direction of travel of the spring. See Figure 99.

4. The hinge pins should not bind in the holes of the hinge brackets. See Figure 98.

5. With the A springs (See Figure 100) approximately equal (if not, adjust per paragraph 1. of CONTACT SPRING TENSION), both legs of the armature should bear against the hinge bracket when the relay is in the operated position and shall also bear against the hinge bracket when the relay is unoperated.

6. To adjust, loosen the contact spring mounting screws slightly and position the springs and hinge brackets. Tighten the mounting screws.

(b) ADJUSTING STUD CLEARANCE

There should be some clearance between the armature and the adjusting stud over the entire armature travel. To adjust, bend the stud with a pair of long nose pliers. See Figure 98 for location of parts.

(c) ADJUSTING NUT TIGHTNESS

The adjusting nut should be sufficiently tight on the stud to prevent it being readily turned with the thumb and forefinger. To adjust, back off the adjusting nut from the stud until its slotted portion is free of the stud, then force the slotted parts of the nut closer together, using a pair of long nose pliers. See Figure 98 for location of parts.

(d) **ARMATURE TRAVEL ADJUSTMENT**  
(Figure 98)

There should be .041" to .047" clearance between the armature stop pin and the relay core. To adjust, turn the adjusting nut.

(e) **CONTACT SPRING TENSION** (Figure 100)

1. The A springs should hold the armature against the adjusting nut. It should require a pressure of 20 to 45 grams applied to the back of the armature at a point approximately midway between the stop pins to start the armature moving away from the adjusting nut. To adjust, bend the A contact springs.

2. The C contact springs should be tensioned so that it requires a pressure of 30 to 35 grams (applied to the tip just in front of the contacts) to start the tang of each spring moving away from the side of the slot in the spool head next to the armature. (The C contact next to the A springs should be measured with the armature in the operated position.) To adjust, bend the C contact springs.

3. The B contact springs should be tensioned toward the armature so that it requires a pressure of 20 to 40 grams (applied to both prongs at the tip of the spring) to start its contacts moving away from its associated C break contacts. To adjust, bend the B contact springs.

(f) **STUD GAP ADJUSTMENT**

With the armature unoperated, there should be at least .006" clearance between the end of the armature operating stud and the B spring. To adjust, bend the associated C break contact spring tang and recheck its spring pressure. Recheck the adjustment in paragraph 3. of CONTACT SPRING TENSION.

(g) **CONTACT SEQUENCE**

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

(h) **CONTACT MAKE ADJUSTMENT**

Both contacts of the B bifurcated springs should make with their associated C BREAK contact spring when the armature is in the unoperated position. They should also make contact with their associated C MAKE contact springs when the relay is electrically energized. To adjust, bend the ends of the springs (obtain by bending only the ends of the B contact springs

if possible). Recheck adjustments in paragraphs 2. and 3. of CONTACT SPRING TENSION, and STUD GAP ADJUSTMENT.

(i) **CONTACT SPRING TESTS** (Figure 100)

Each of the A and B contact springs should meet the following requirements:

1. With the relay electrically energized against a .016" thickness gauge inserted between the armature and the core, none of the MAKE contacts should make contact with a mating contact on the associated C MAKE contact spring.

2. With the relay electrically energized against a .009" thickness gauge inserted between the armature and the core, at least one of the MAKE contacts on each B and C contact spring should make contact with its mating contact on the associated C MAKE contact spring.

3. With the relay electrically energized against a .005" thickness gauge inserted between the armature and the core, both BREAK contacts on each B spring will be separated from their mating contacts.

4. To adjust, bend the tang on the associated C contact springs and recheck adjustment in paragraph (2.) of CONTACT SPRING TENSION.

i. **GOVERNED MOTORS** – If used

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

(1) **GOVERNOR SHELL ADJUSTMENTS** (Figure 80)

REMOVE THE SPEED ADJUSTING SPRING

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

**NOTE**

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

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

## REPLACE THE SPEED ADJUSTING SPRING

### (2) ADJUSTMENTS FOR ALIGNMENT AND SQUARENESS OF GOVERNOR CONTACTS

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

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

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

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

3. To adjust from front to back, twist the floating contact hinge and apply pressure to the arm near the contact.

#### NOTE

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

### (3) SPEED ADJUSTING WHEEL FRICTION WASHER SPRING PRESSURE (Figure 80)

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

### (4) GOVERNOR SHIMS ADJUSTMENTS

There should be at least .006" clearance between the adjusting lever wearing strip and the adjusting wheel when the adjusting wheel is opposite the wearing strip and the play of the armature is taken up in a direction to make

this clearance a minimum by overcoming the armature end thrust spring. To adjust, install shims on the armature shaft between the governor hub and the end frame casting if necessary. See Figure 83 for location of parts.

### (5) SPEED ADJUSTING LEVER STOP PLATE

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

### (6) INNER AND OUTER DISC CONTACT SPRING ADJUSTMENT (Figure 81)

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

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

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

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

(b) These requirements may be obtained by bending the contact springs. Replace the governor cover, target, and brush spring plate.

### (7) GOVERNOR BRUSH SPRING PLATE BRACKET ADJUSTMENT

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

1. A line established by the center of the outer disc and the center of one of the brushes should pass through some portion of the other brush (Figure 82).

2. The surface of the brush spring plate bracket, on which the brush spring plate is mounted, should be in alignment with the outer surface of that part of the governor cover on which the target is mounted (Figure 83).

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

4. Adjust the brush spring plate bracket by utilizing its mounting slots.

(8) GOVERNOR BRUSH SPRING PRESSURE (Figure 83)

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

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

(c) To obtain the correct brush spring pressure, remove and bend the brush springs. When the springs are replaced and the pressure obtained, make certain that the contact brushes lie flat against their respective discs, and that the outer edges of the brushes are either flush with, or not more than 3/64" inside the outer edges of the discs. Replace the governor adjusting bracket.

NOTE

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

(9) GOVERNOR ADJUSTING BRACKET ADJUSTMENT (Figure 83)

The adjusting surface of the governor adjusting bracket should clear the speed adjusting wheel by .020" to .060". Bend the governor adjusting bracket if necessary to secure this clearance.

j. SYNCHRONOUS MOTORS — If used

(1) STARTING SWITCH ADJUSTMENTS

NOTE

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

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

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

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

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

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

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

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

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

(i) Replace the switch end shield screws, using the same precaution in tightening as above.

(j) Apply the push end of a 12 pound scale against the fan end of the shaft and push parallel with the shaft. It should require at least 7 pounds pressure to start the shaft moving. (Applies to A.C., D.C., and synchronous motors.)

(k) Replace the motor fan and pinion. Replace the motor unit on the base and check the motor plate adjustment.

3. LUBRICATION

a. GENERAL

(1) The following lubricants are recommended for use on the REPERFORATOR TRANSMITTER DISTRIBUTOR. They may be ordered from Teletype Corporation as follows:

88970	1 Qt. of KS-7470 Oil
88971	1 Gal. of KS-7470 Oil
88973	1 Lb. of KS-7471 Grease
88975	KS-8319 Grease Gun
97116	4-oz. Tube of KS-7471 Grease

The above grease is recommended instead of oil for lubricating motors equipped with ball bearings. The 88975 grease gun should be used

for injecting grease into the bearings of Teletype ball bearing motors. The gun may be used also for applying grease to other parts of the apparatus and no other grease container need be carried. If this grease gun is not available, the oil listed in the foregoing should be substituted for lubricating ball bearing motors.

(a) Instructions on Filling the Grease Gun

1. Unscrew the lubricant tube from the cap casting of the grease gun. Insert fresh lubricant through the open end of the tube. Apply gradually to eliminate air pockets. Tamp the lubricant down solidly in the tube by pounding the closed end solidly against the palm of the hand. Continue to add lubricant until the tube is completely filled and the metal follower rests against the perforated tube cover.

2. Fill the cap casting with lubricant flush to the bottom side of the tube threads. Screw the lubricant tube into the cap casting part way only. Then insert a pencil or rod through the perforated tube cover and exert pressure against the metal follower so as to expel any entrapped air past the tube threads. When lubricant begins to ooze through the threads, tighten the lubricant tube securely in the cap casting.

3. Operate the handle back and forth for several strokes or until lubricant is pumped from the nozzle. The gun is then ready for use. If the lubricant does not flow from the nozzle in a solid stream, it is an indication that all air has not been expelled from the lubricant tube. Invert the gun and pound the cap casting end against the palm of the hand to jar the lubricant into the pump cylinder.

(b) Instructions for Lubricating Motor Ball Bearings

The motor bearings are packed with grease before the motor leaves the factory and under ordinary operating conditions need no additional lubrication for approximately two months. At the regular lubricating intervals, one or two strokes of the plunger of the gun should apply sufficient grease to each bearing. To lubricate, press the nozzle of the gun against the ball oiler and force the grease into the hole by pushing on the plunger of the gun. Care should be taken that the bearings are not overloaded. Overloading will result in the grease oozing out of the end castings and being forced into the motor or being thrown on other parts of the mechanism. After lubricating, the motor should be run for a few minutes and then any excess grease that has been forced out of the ends of the castings

should be wiped off. Each time that the gun is used for lubricating a motor bearing, the plunger should first be depressed slightly to make sure that grease will be delivered.

(2) Unless otherwise specified, one or two drops of oil at each of the places indicated will be sufficient. Use oil for lubrication at all of the places listed, except where the use of grease or oil-grease-oil is specified.

NOTE

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

b. SELECTOR MECHANISM

NOTE

Be careful not to get oil between the pole faces of the selector magnet and the magnet armature.

- (1) Armature extension - 2 pivot screws.
- (2) Selector arm - 2 pivot screws, 2 sword contact points, locking tip, and point of contact with operating screw.
- (3) Selector arm detent - bearing, and point of contact with selector arm.
- (4) Range finder assembly.
  - (a) Trip latch plunger - bearing and 2 points of contact.
  - (b) Bell crank - bearing.
  - (c) Trip latch - bearing and points of contact.
  - (d) Stop lever - bearing and point of contact with stop arm.
- (5) Swords and selector levers - drop oil between separator plates.
- (6) Selector T levers - all points of contact.
- (7) Selector arm locking lever - at pivot.
- (8) Selector cam sleeve - each cam peak.
- (9) Code bars - at posts.
- (10) Tape feed-out lever - 4 bearings, point of contact with trip latch plunger.

## c. MAIN SHAFT

Remove the range scale rear mounting screw, swing scale out of the way and fill shaft through hole in center of retaining disc. Replace range scale and its rear mounting screw.

- (1) Locking lever cam felt oiler - saturate.
- (2) Selector cam friction washers (2) - saturate.
- (3) Main cam friction disc - saturate.
- (4) Main shaft ball bearings (2) - grease lower; oil upper.
- (5) Clutch throwout lever - 2 bearings, grease end of lever.
- (6) Clutch - oil freely.
- (7) Compression springs (3) - allow oil to flow into prongs under springs.
- (8) Main clutch bushing - saturate wick with oil; 2 oil holes.
- (9) Main shaft gear - grease.
- (10) Subshaft drive gear - grease.
- (11) Motor pinion - grease.
- (12) Main bail cam - grease.
- (13) Punch arm cam - grease.

## d. MAIN BAIL

- (1) Main bail roller - oil, grease, oil.
- (2) Main bail plunger - fill oil cup and saturate oil wick.

## NOTE

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

- (3) Main bail lever - fill oil cup just above terminal block, also oil end of lever in main bail plunger.
- (4) Main bail - fill groove with oil, 2 main bail guide rollers.
- (5) Main bail roller guides (2) - grease.

(6) Main bail adjusting screw - grease end of screw.

(7) Main bail spring anchor - grease.

(8) Main bail lever spring post - (8) 90752 felt washers - saturate.

## e. PULL BARS, TYPE BARS, AND CODE BARS

## NOTE

- (1) and (2) are for typing equipment only.
- (1) Pull bars - one drop of oil on top of each bar.
- (2) Type bar gears - pull each type bar down against platen and put drop of oil on top of type bar gear at rear of segment slot.
- (3) Code bar locking lever - grease lever at point of contact with main bail.
- (4) Code bars - slots and posts, one drop to each code bar.

f. RIBBON MECHANISM - Typing equipment only

- (1) Ribbon feed ratchet and feed gears - oil teeth.
- (2) Ribbon feed shaft detent plunger.
- (3) Ribbon feed shaft - 2 oil holes.
- (4) Ribbon feed lever - oil hole.
- (5) Ribbon feed lever roller - bearing.
- (6) Ribbon spool shaft (right) - 2 bearings.
- (7) Ribbon spool shafts (left) - 4 bearings, oil teeth on gears (3).
- (8) Ribbon reverse pawls and links - 4 bearings on each side.
- (9) Ribbon reverse shafts - 2 bearings each.
- (10) Ribbon feed shaft detent - grease.

g. PLATEN SHIFT MECHANISM - Typing equipment only

- (1) Platen shafts (2) - thin film of oil.
- (2) Shift lever - bearings (2), and point of contact with pull bar and platen frame.
- (3) Shift latch - bearing and points of contact with pull bars and shift bail.

(4) Shift bail - bearing, and at platen frame extension.

(5) Shift bail stop screw - grease.

(6) Intermediate bail - bearing, grease at points of contact with shift bail and plunger extension bracket.

#### h. PREPUNCH MECHANISM

(1) Prepunch arm - bearings (2).

(2) Feed roll - bearings (2) and feed notches.

(3) Feed pawl - bearing.

(4) "Prepunch operating bail - bearings, or saturate felt washers, if present," (2) grease at eccentric and extension.

(5) Star wheel - grease.

(6) Feed roll detent - bearing and roller.

(7) Feed hole punch - also at point of contact with prepunch arm.

#### i. REPERFORATING MECHANISM

(1) Punch arm casting roller - oil, grease, oil.

(2) Punch arm casting bearing - fill oil cup.

(3) Punch arm extension - bearing, also at adjusting screw extension.

(4) Code bar bell cranks - drop of oil between separator plates, point of contact at vertical links, and code bar locking lever.

(5) Vertical links - at pivot and comb.

(6) Vertical links bell cranks - at pivot and point of contact with vertical link, and selector finger bell cranks.

(7) Selector finger bell cranks - 2 places each.

(8) Selector fingers - guide comb and point of contact with code punches.

(9) Punch bail pilot screw - 2 bearings.

(10) Feed pawl bearing.

(11) Feed roll - 2 bearings.

(12) Feed roll detent wheel - grease.

(13) Feed roll detent - bearing and roller.

(14) Code punches.

(15) Code punch retracting bail - bearings (2), and points of contact with code punches.

(16) Code punch retaining levers - at pivot and point of contact with code punches.

(17) Tape depressing bail - bearings (2), guide studs for weighted guide (2), non-typing equipment only.

(18) Tape depressing bail - bearings (2), typing equipment only.

#### j. PIVOTED TRANSMITTER AND TRANSFER MECHANISM

(1) Transmitter lid - bearings (2).

(2) Sensing fingers - bearings and point of contact with guide plate.

(3) Transmitter yoke - bearings (2).

(4) Tape feed lever - bearings (2).

(5) Tape feed pin lever bearing.

(6) Feed pin oscillator - bearing and points of contact with feed pin lever and guide.

(7) Feed pin oscillator lever - bearing and guide comb.

(8) Selector levers - bearing, and at guide comb 2 places.

(9) Contact lever - bearing.

(10) Transmitter stop contact operating plunger.

#### k. TRANSFER AND SLIDE LEVER MECHANISM

(1) T levers - bearings and at points of contact with selector levers and transfer slide levers.

(2) T lever operating bail - bearings (2).

(3) Transfer slide levers - bearings 2 each.

(4) Contact operating levers - bearings, and grease at point of contact with transfer slide levers.

#### l. SENSING SHAFT

(1) Sensing shaft bearings - ball bearing in front, fill oil cup in rear.

(2) Sensing shaft - remove thumb screw from front end of shaft and fill shaft with oil.

(3) Sensing shaft gear - grease.

(4) Clutch assembly - oil freely.

(5) Detent lever - bearing and roller.

(6) Oscillator lever roller.

(7) T lever operating bail roller.

(8) Clutch lever - bearings (2) - grease end.

(9) Thin film of grease on bearing surface of all cams.

(10) Cam sleeve felt wicks - saturate with oil.

#### m. DISTRIBUTOR SHAFT

(1) Distributing shaft bearings - ball bearings in front, fill oil cup in rear. (Note: Oil cup should be set at a 45 degree angle with open end toward front.)

(2) Distributing shaft. Remove thumb screw from front end of shaft and fill shaft with oil.

(3) Distributing shaft gear - grease.

(4) Clutch assembly - oil freely.

(5) Detent lever - bearing and roller.

(6) Clutch contact operating levers - at bearing and thin film of grease at point of contact with contact insulator.

(7) Clutch lever - bearings (2) - grease end.

(8) Distributing contact levers - bearing, grease points of contact with cams, thin film of grease on point of contact with contact insulator.

(9) Thin film of grease on bearing surface of all cams.

(10) Cam sleeve felt wicks - saturate with oil.

(11) FRXD16 only: Distributor Start Contact - thin film of grease on bakelite tip at point of contact with armature.

#### NOTE

Remove all oil and grease from distributor contacts and excess oil from associated parts.

#### n. SUBSHAFT

(1) Subshaft gears (2) - grease.

(2) Subshaft bearings (2) - fill oil cups.

(3) Universal contact operating lever - at bearing and apply a thin film of grease to camming surface of main bail plunger.

#### o. CONTACT INSULATORS

(1) Apply a thin film of grease on the insulators of the following contacts at point of contact with their operating levers:

(a) Universal contact.

(b) Transmitter stop contact.

(c) Tape-out contact.

(d) Distributing shaft clutch magnet contact.

(e) Clutch magnet auxiliary contact.

(f) Switching contacts.

(g) Tape feed indicator contact arm - bearing points.

#### p. ADJUSTABLE DETENT MECHANISM FOR SENSING AND DISTRIBUTING CAM SLEEVES

(1) Both loops of the detent lever springs - oil (4)

(2) Clutch detent levers - oil bearings (2)

(3) Clutch detent levers - grease engaging surface with cam (2)

(4) Detent cams - thin film of grease (2)

(5) Lubricators - saturate with oil (2)



SWITCHING CONTACT CABLE

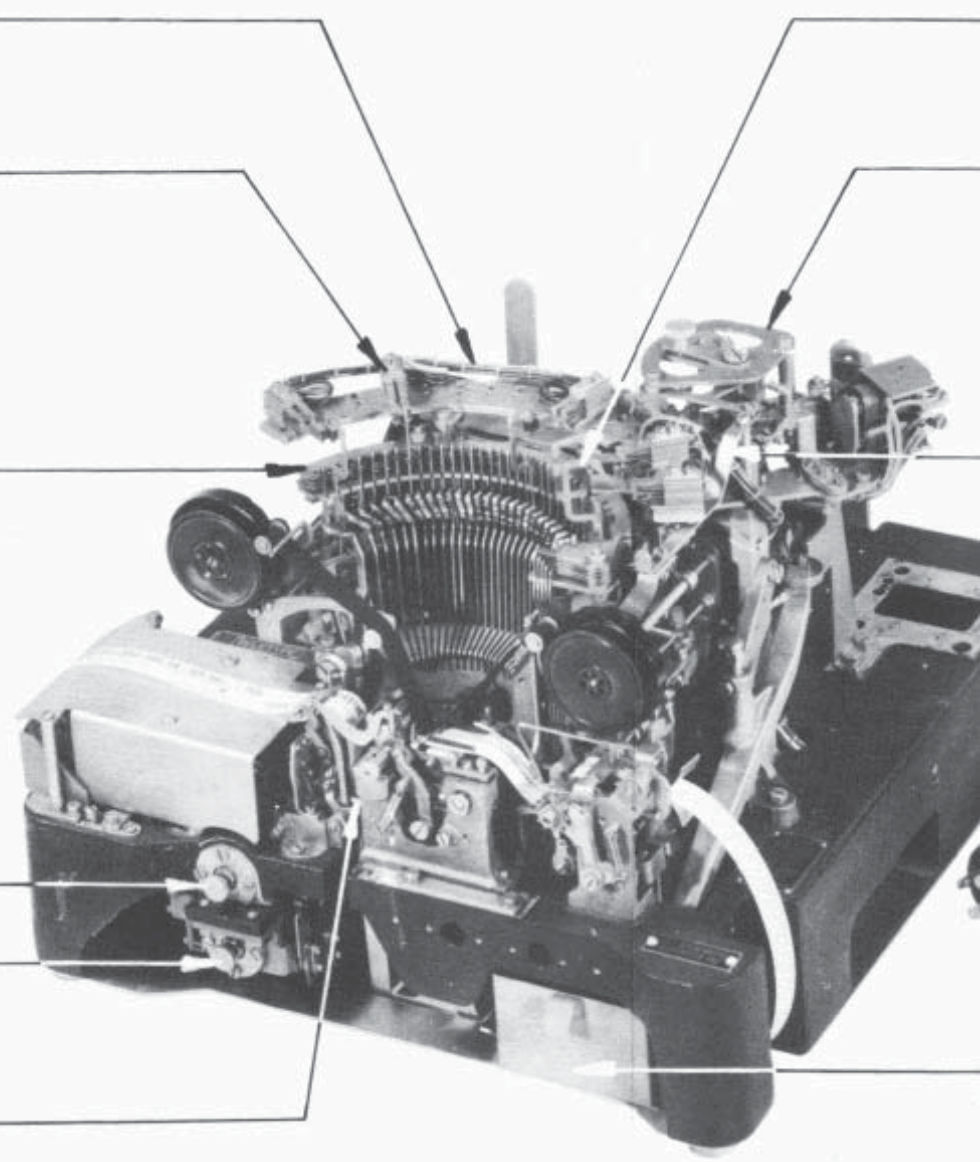
SWITCHING CONTACT ASSEMBLY

CODE BARS

SENSING SHAFT

DISTRIBUTING SHAFT

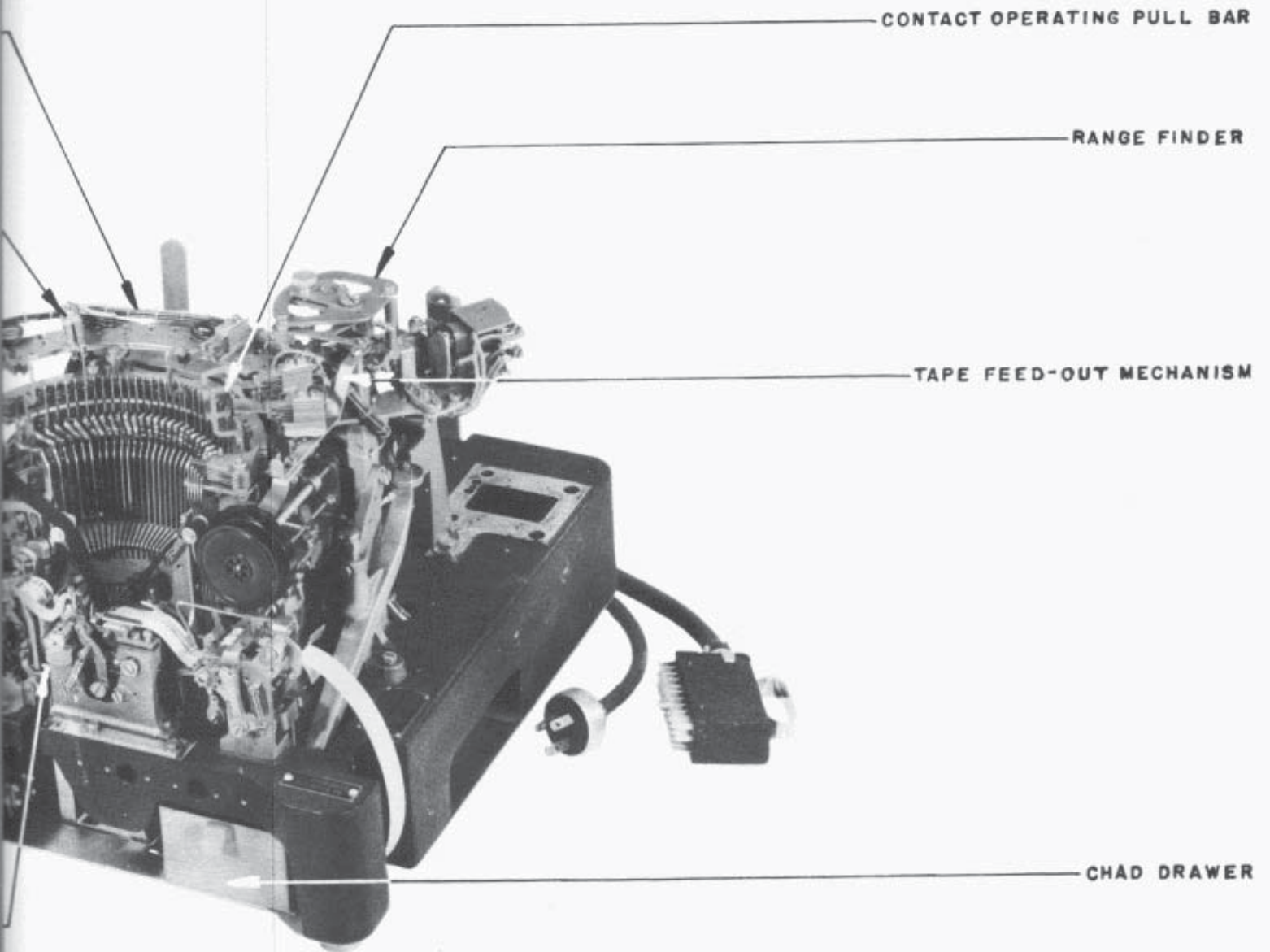
FEED-PAWL RELEASE LEVER



REPERFORATOR TRANSMITTER DISTRIBUTOR

(FRXD 9)

FIGURE I



PERFORATOR TRANSMITTER DISTRIBUTOR  
(FRXD 9)  
FIGURE I

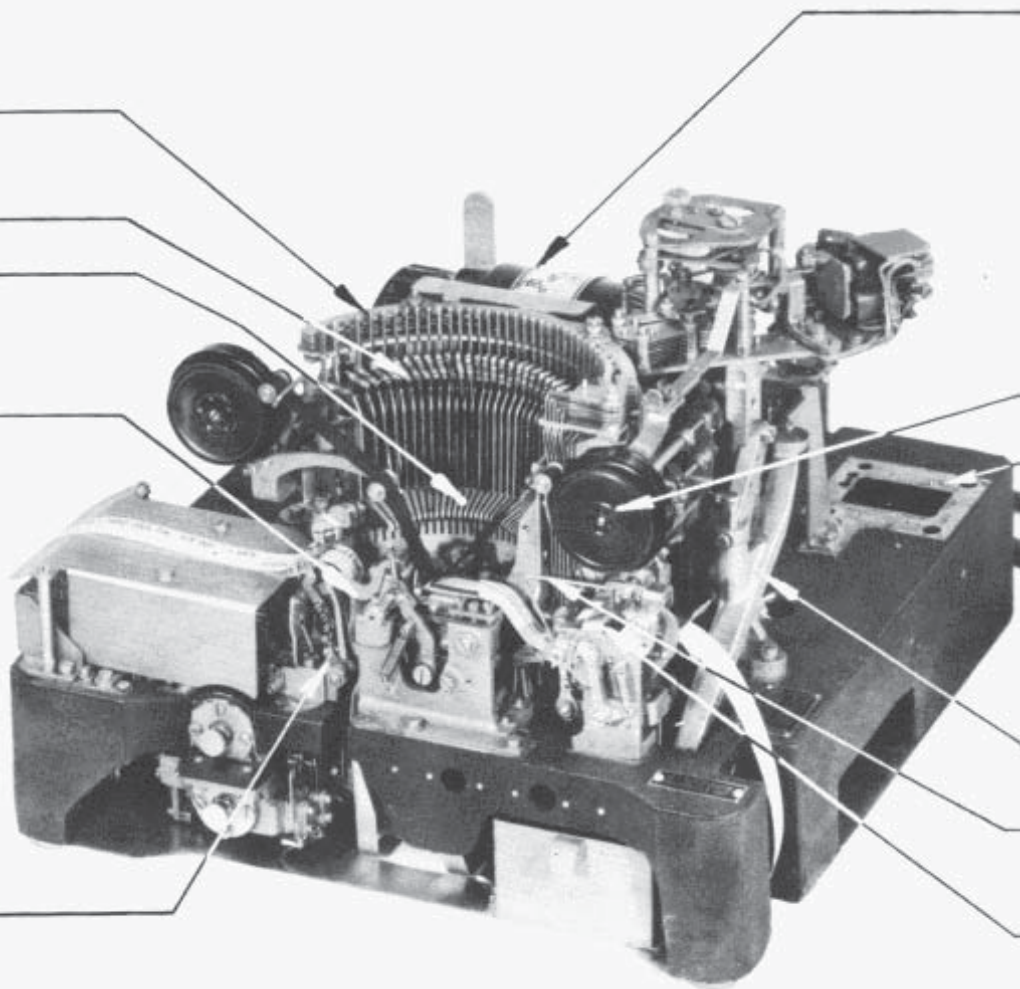
PULL BARS

TYPE BARS

TYPE BAR SEGMENT

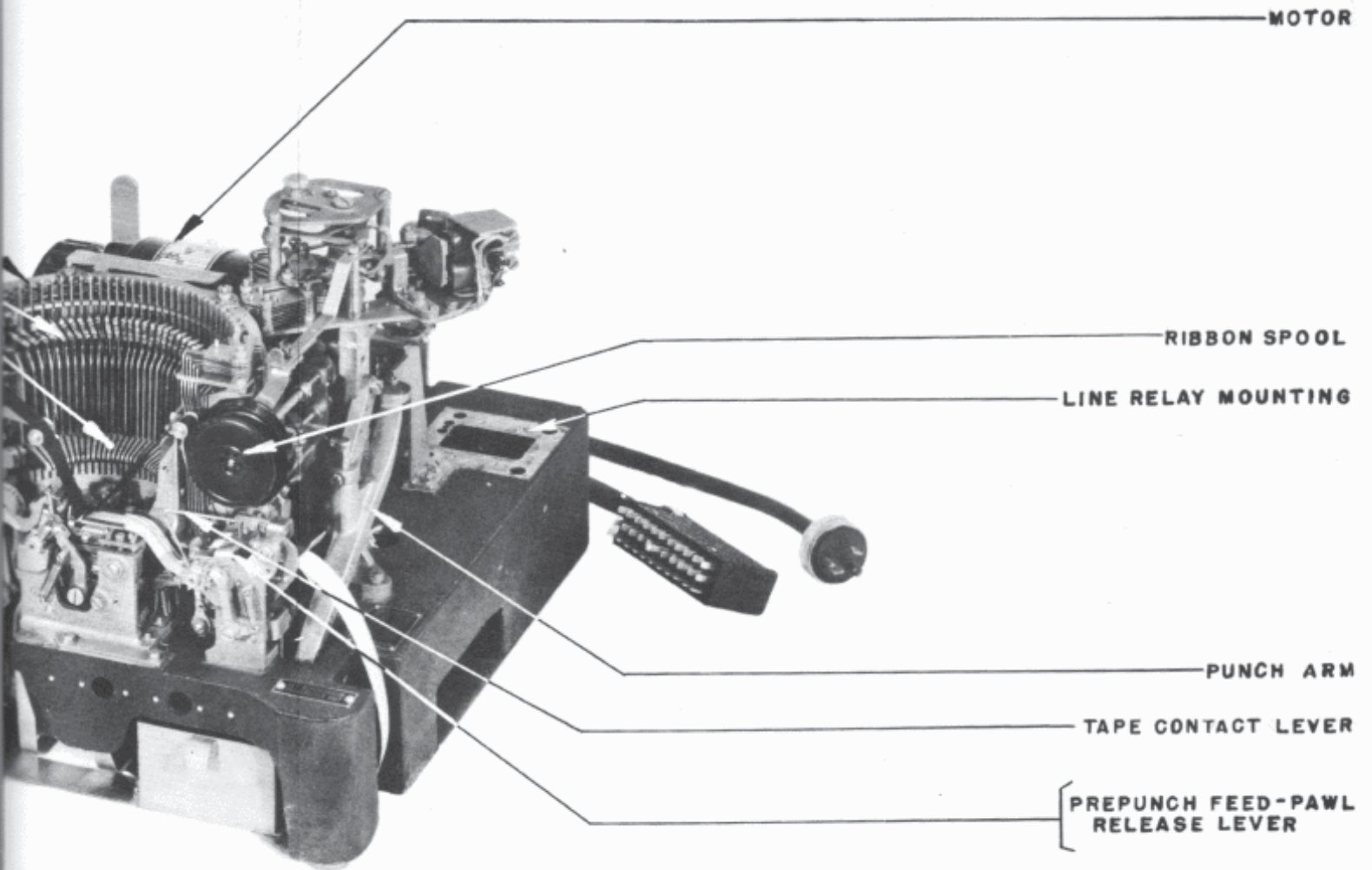
TAPE DEPRESSOR

PIVOTED TRANSMITTER



REPERFORATOR TRANSMITTER DISTRIBUTOR  
(FRXD 10)

FIGURE 2



PERFORATOR TRANSMITTER DISTRIBUTOR  
(FRXD 10)  
FIGURE 2

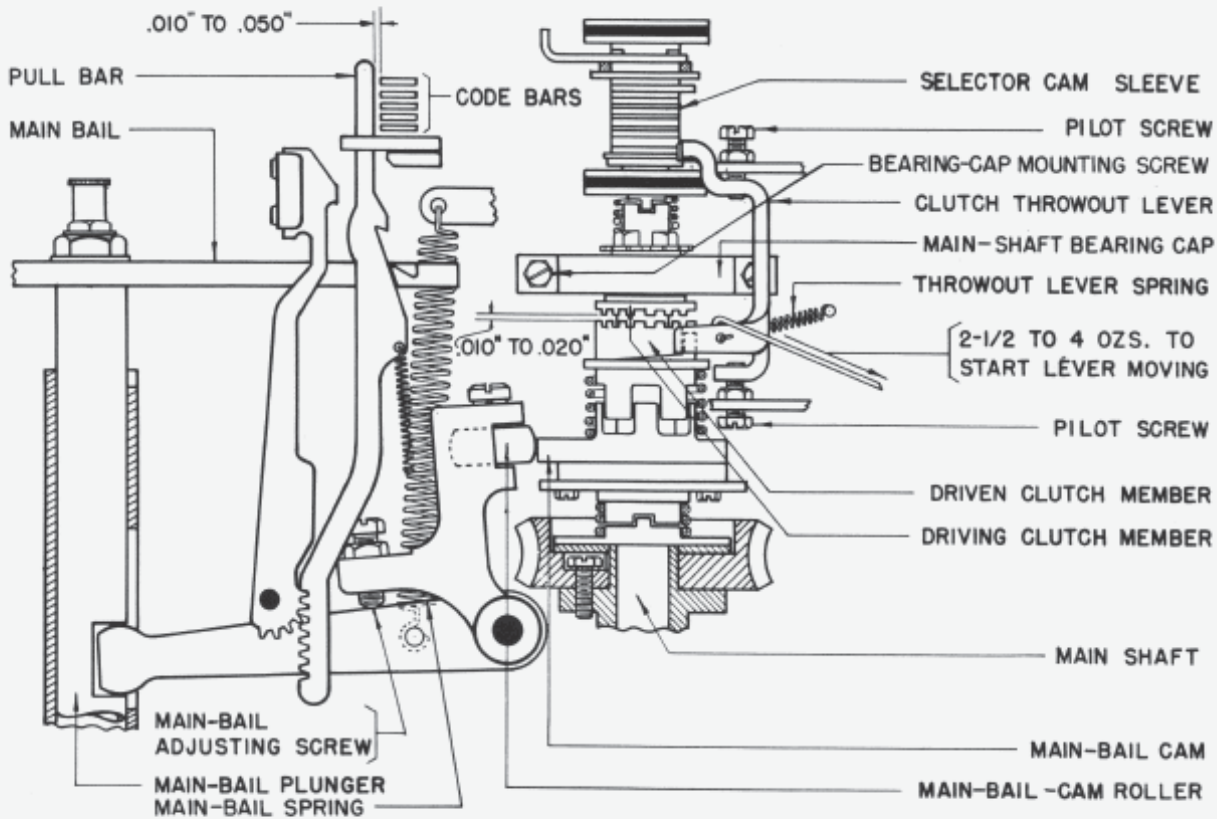


FIGURE 3

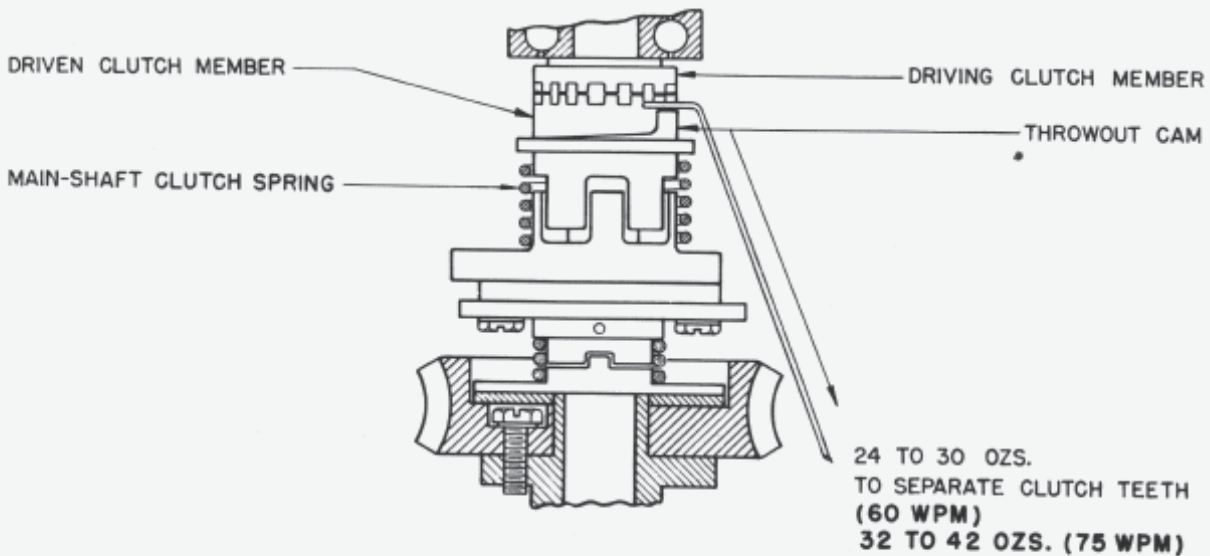


FIGURE 4

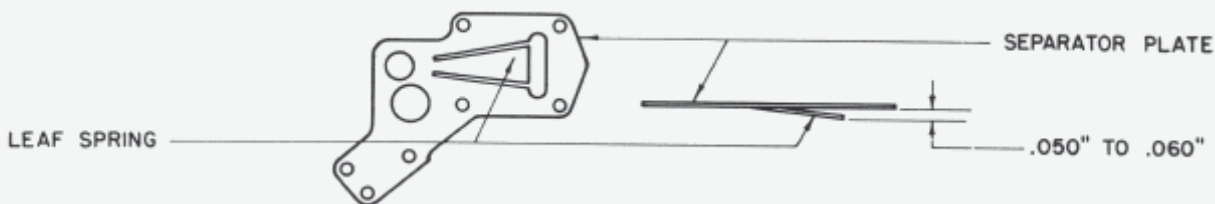


FIGURE 5

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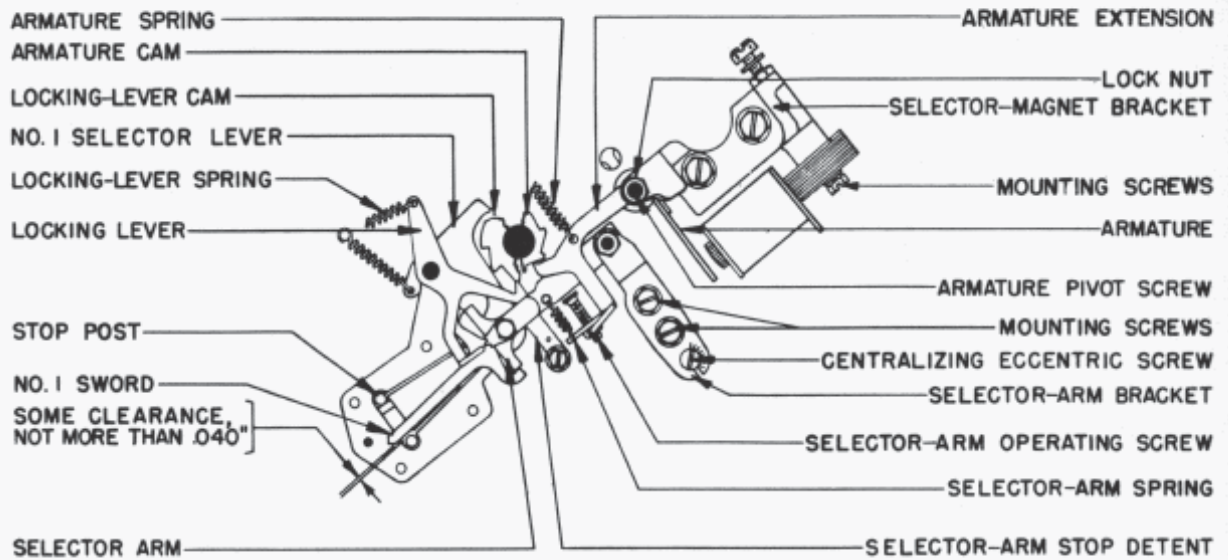


FIGURE 6

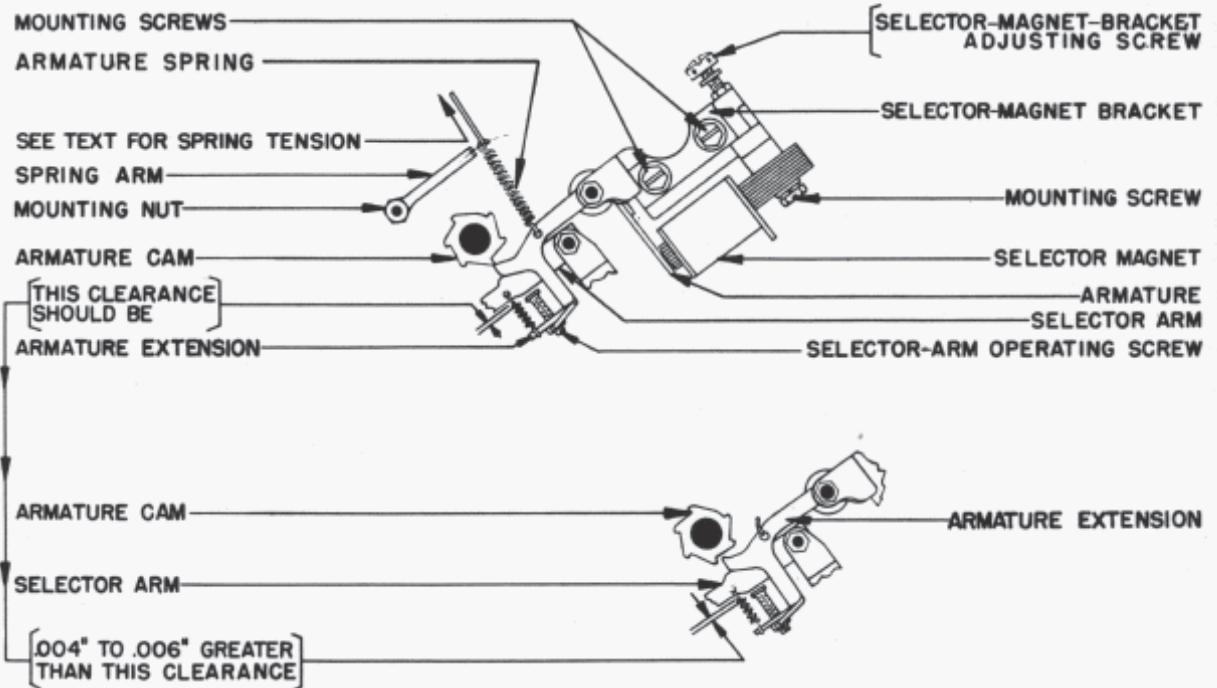


FIGURE 7

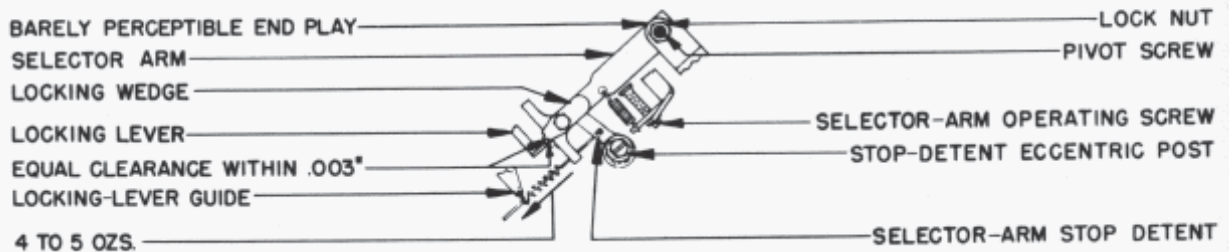


FIGURE 8

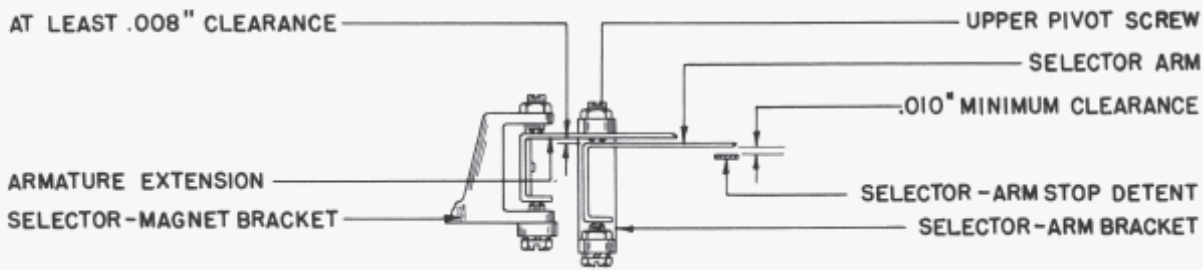


FIGURE 9

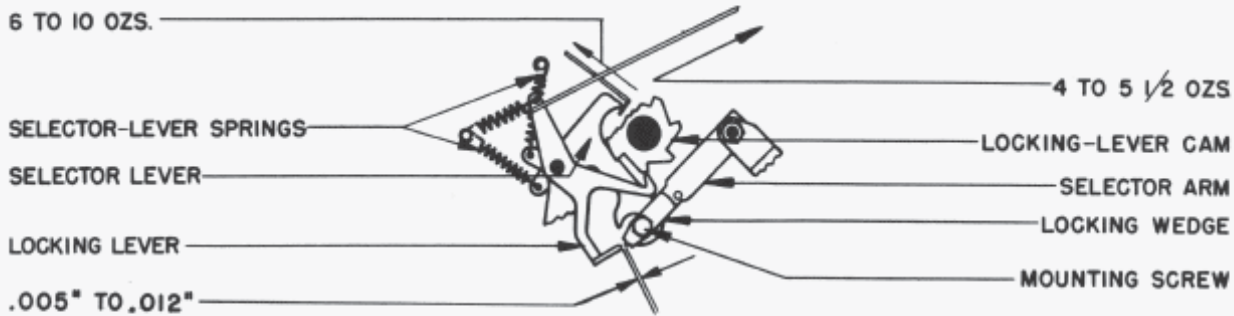


FIGURE 10

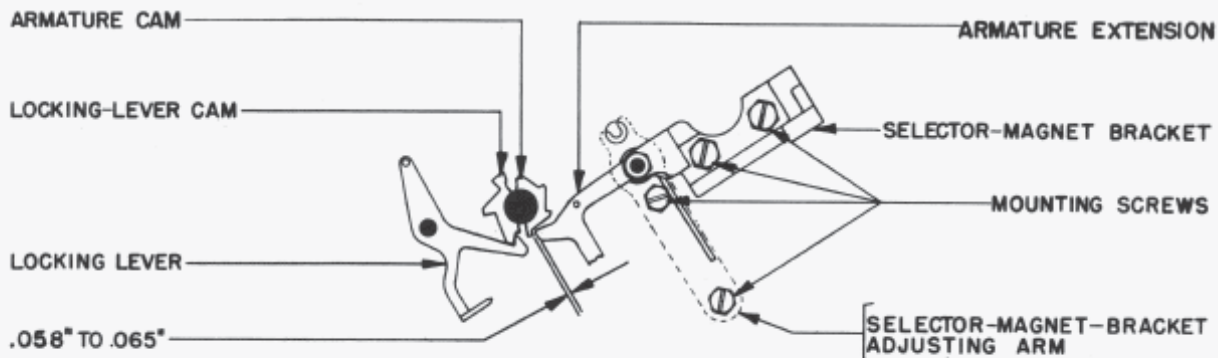


FIGURE 11

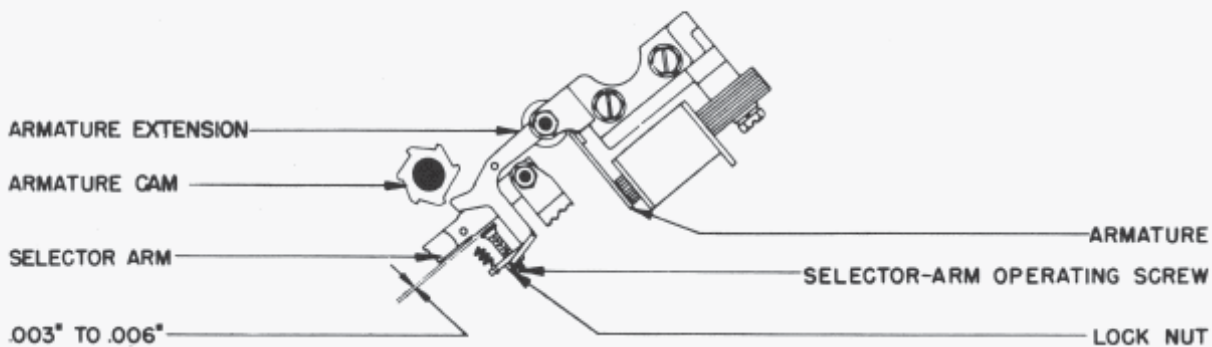


FIGURE 12

ORIGINAL

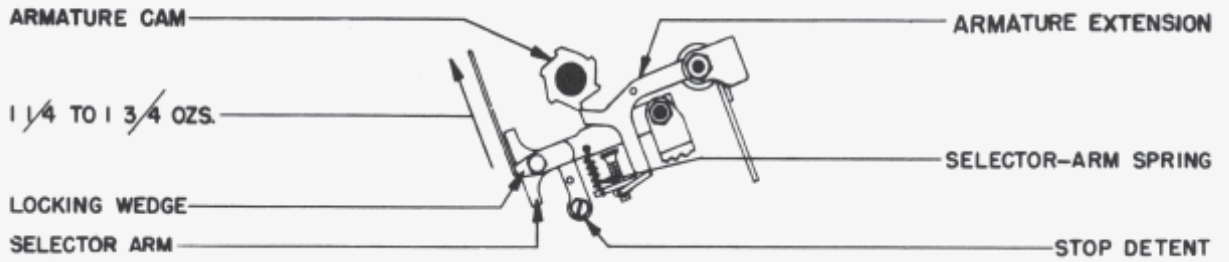


FIGURE 13

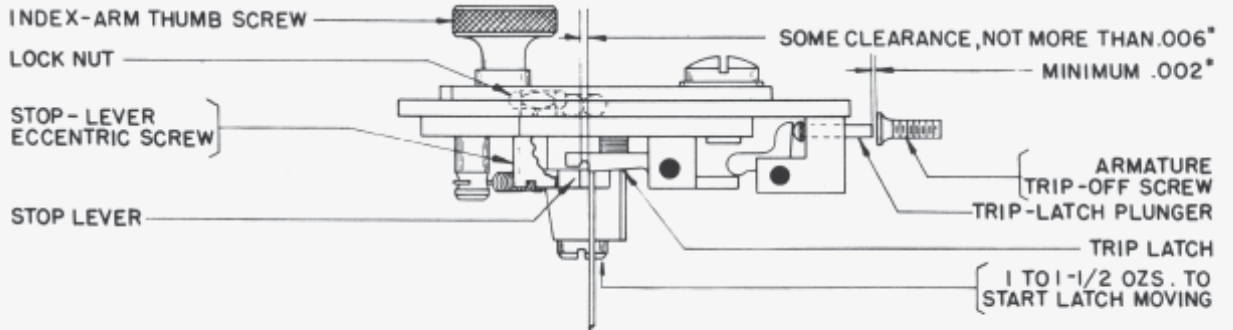


FIGURE 14

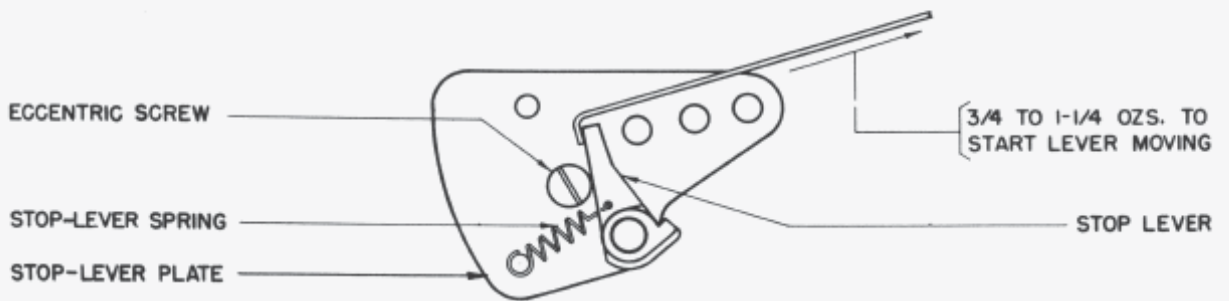


FIGURE 15

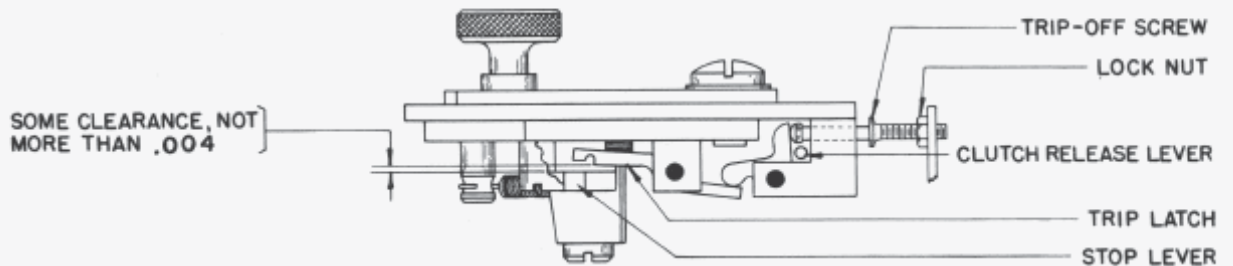


FIGURE 16



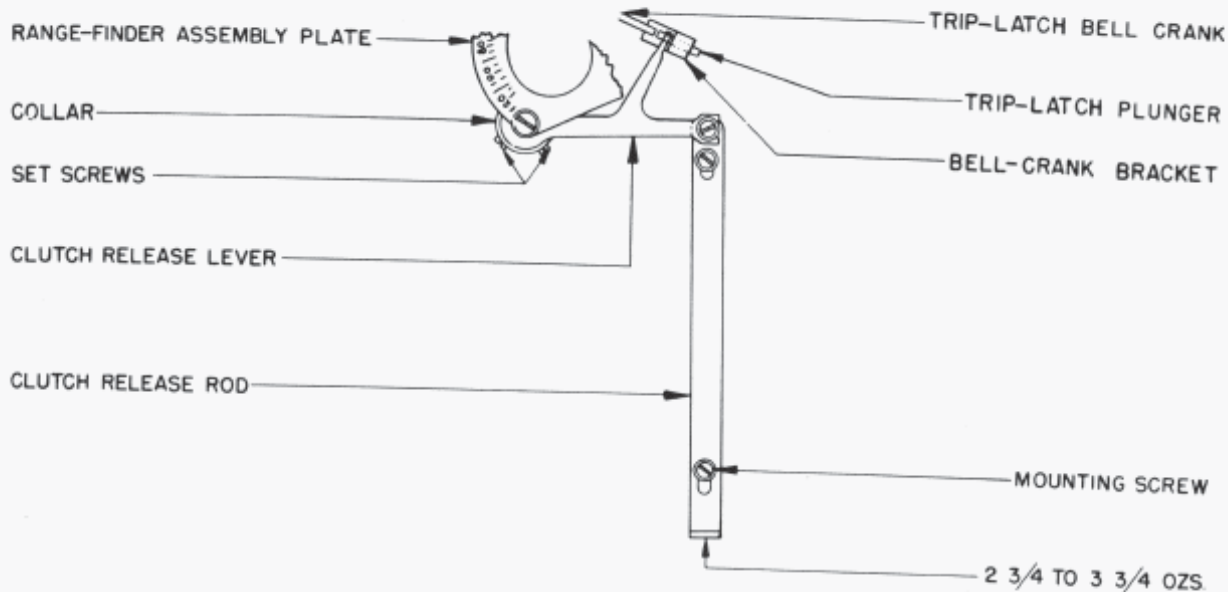


FIGURE 17



FIGURE 18

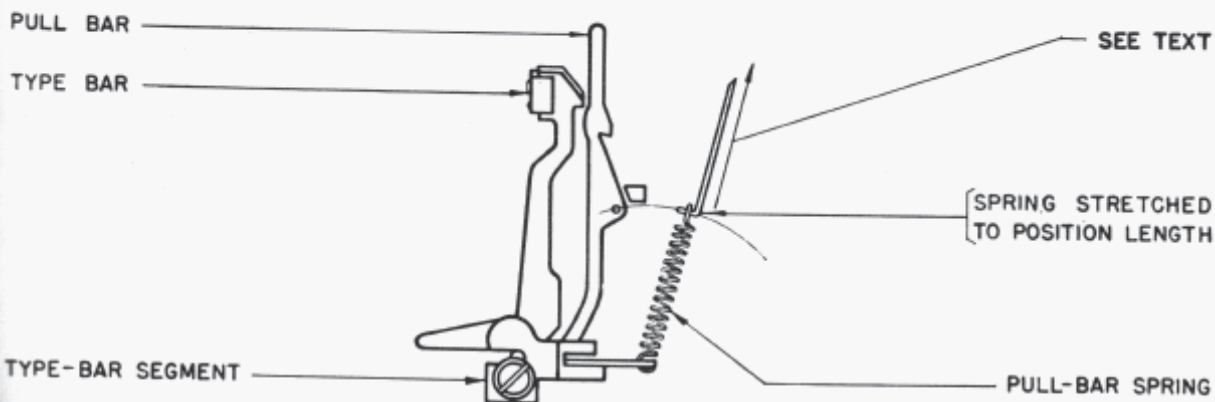


FIGURE 19

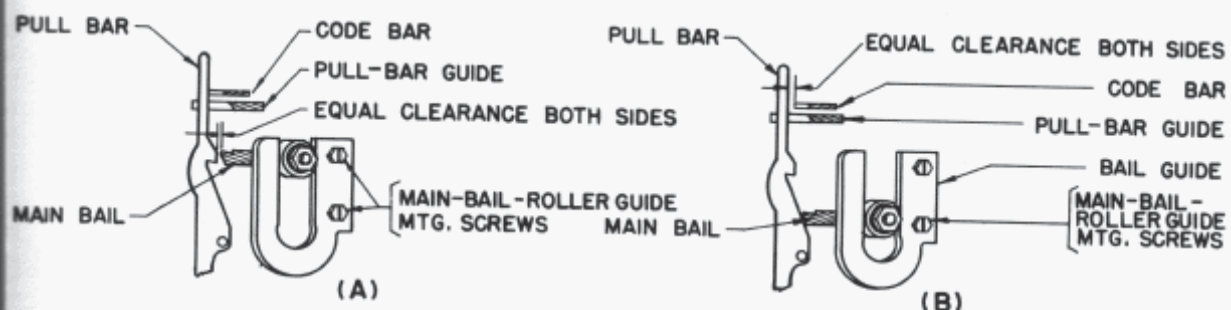


FIGURE 20

ORIGINAL

203B

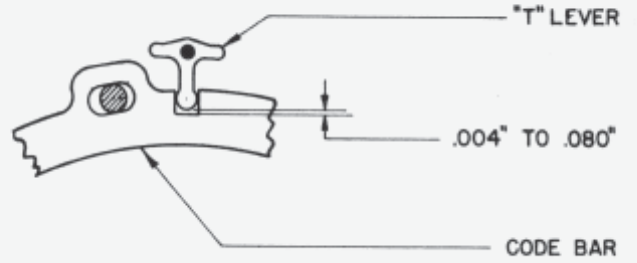
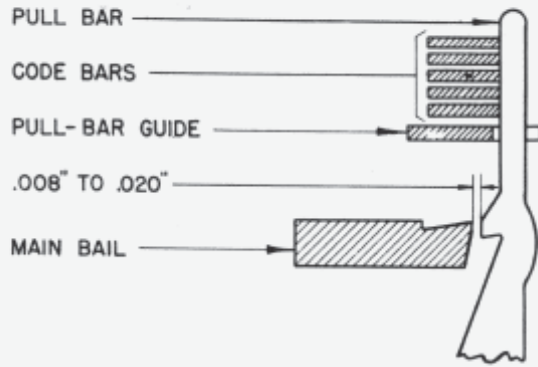


FIGURE 21

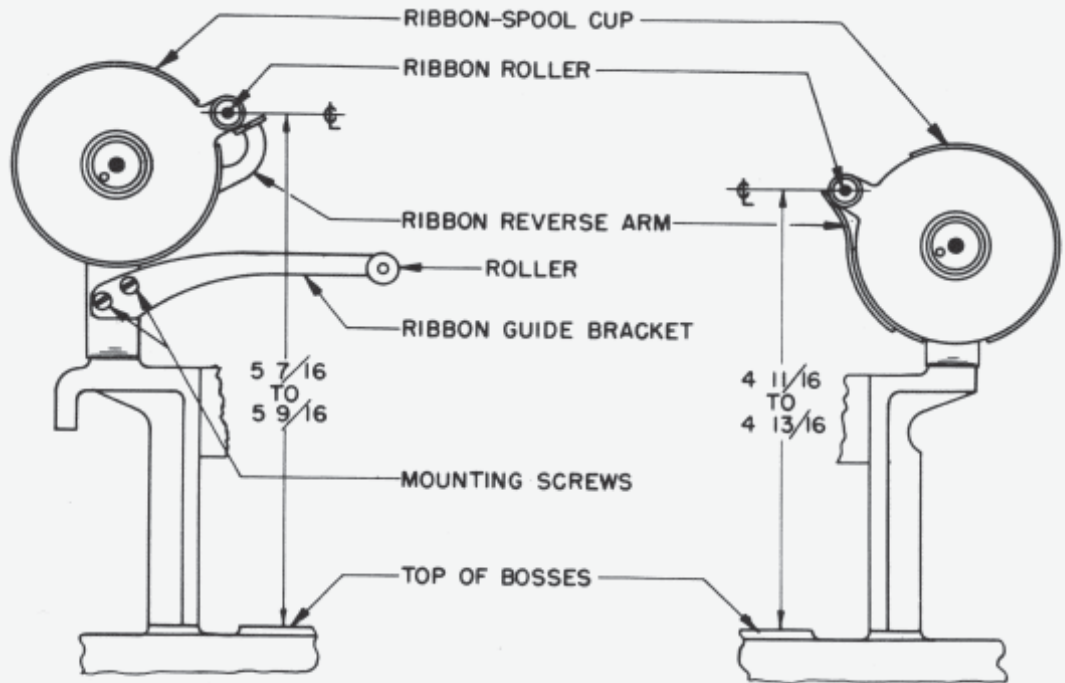


FIGURE 22

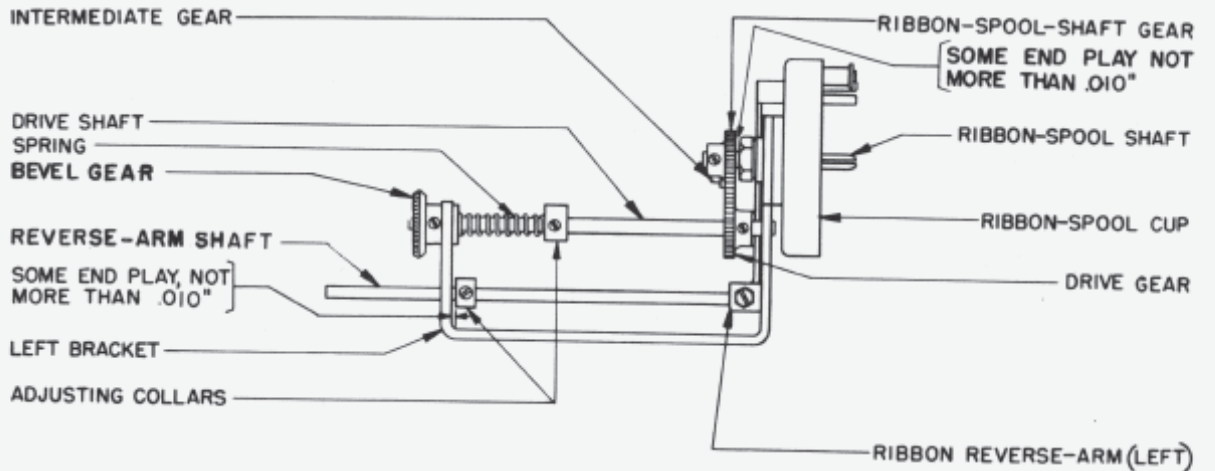


FIGURE 23

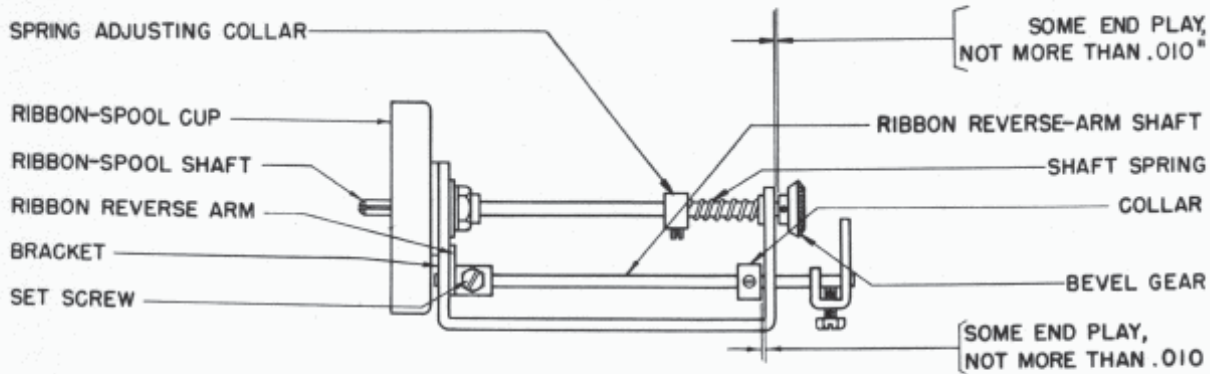


FIGURE 24

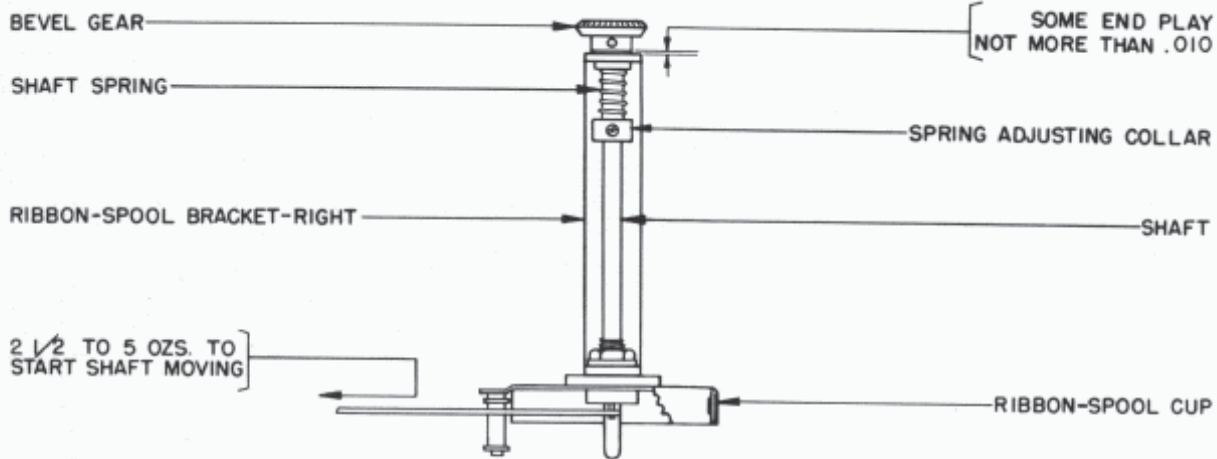


FIGURE 25

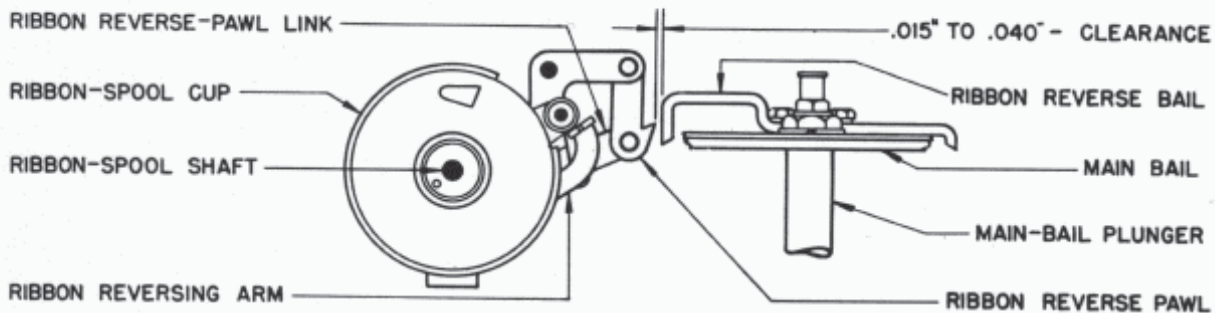


FIGURE 26

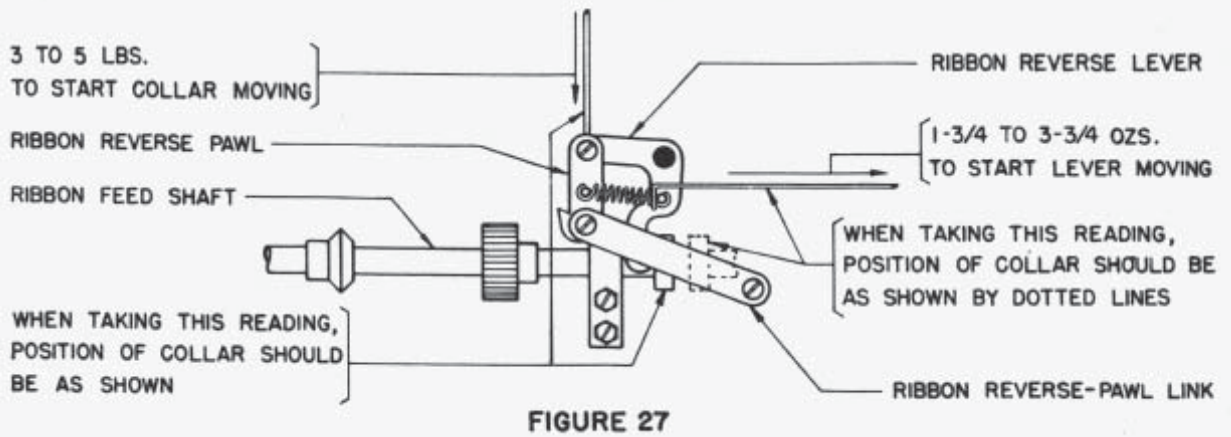


FIGURE 27

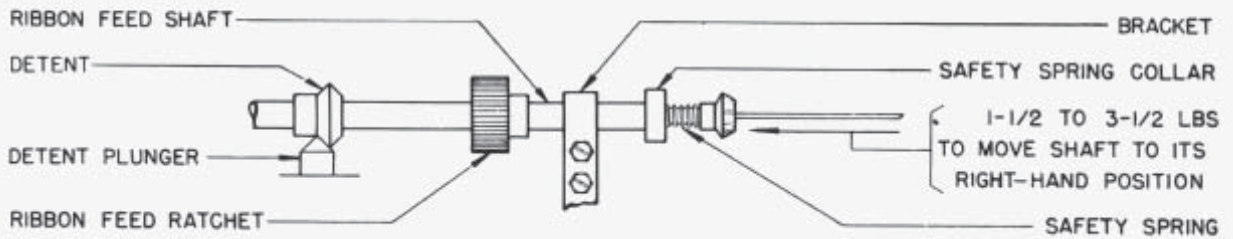


FIGURE 28

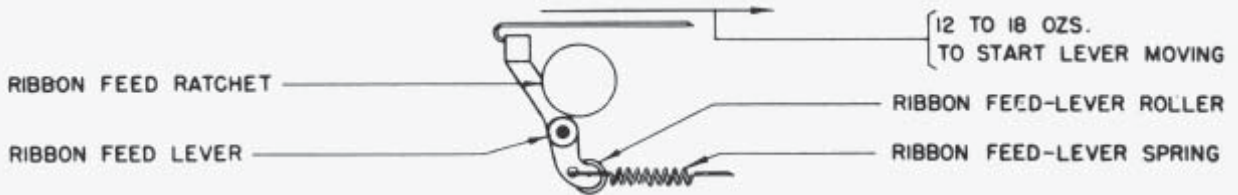


FIGURE 29

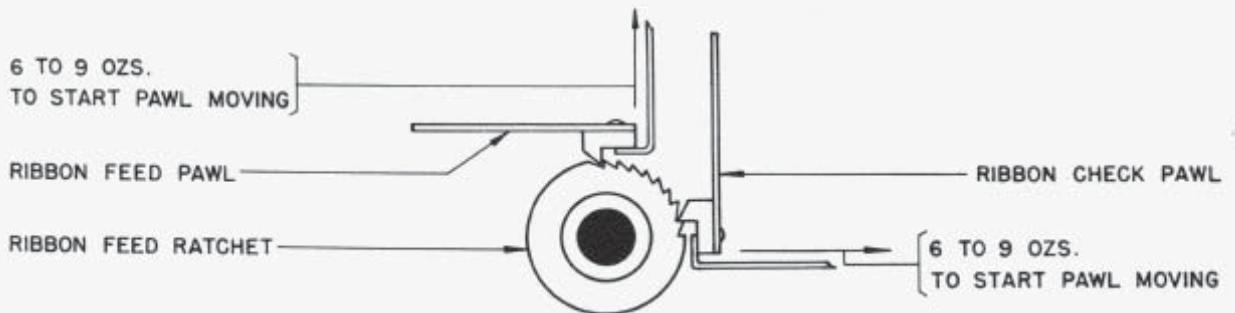


FIGURE 30

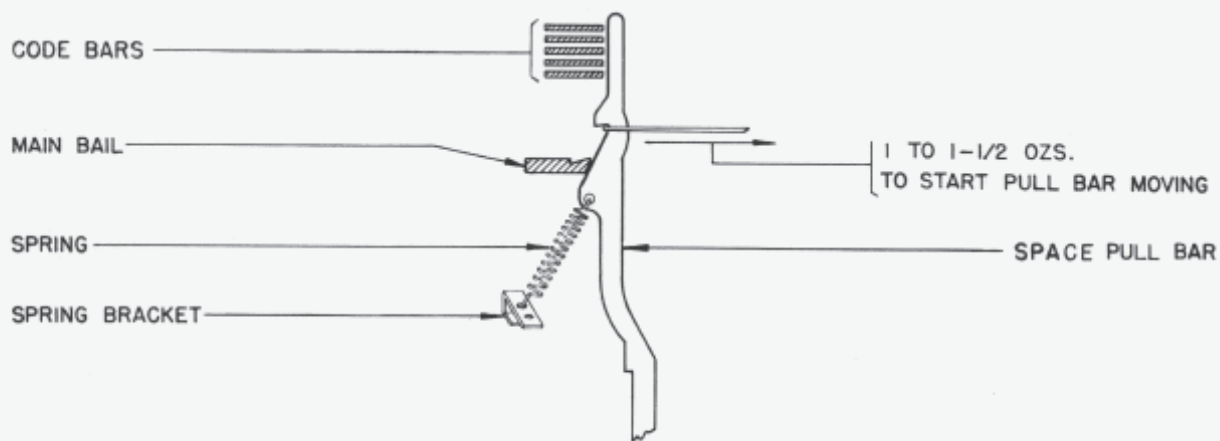


FIGURE 31

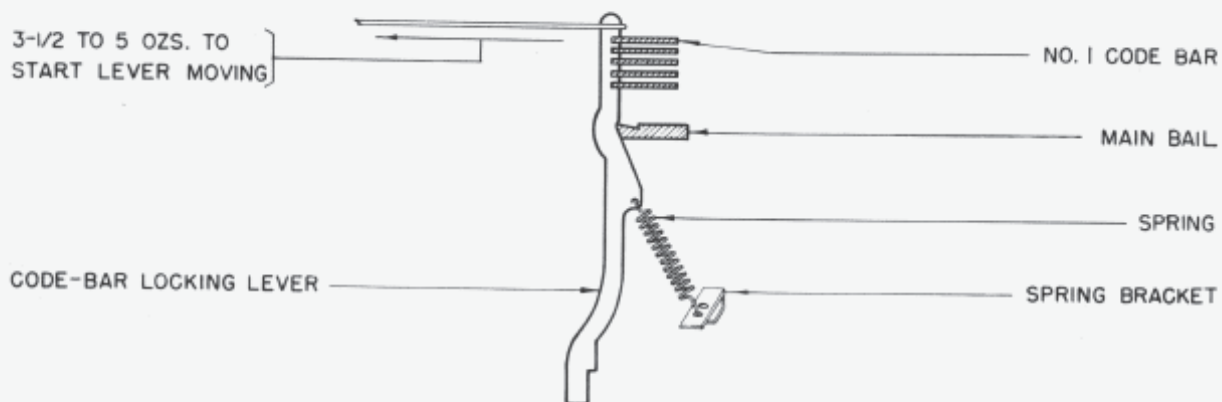


FIGURE 32

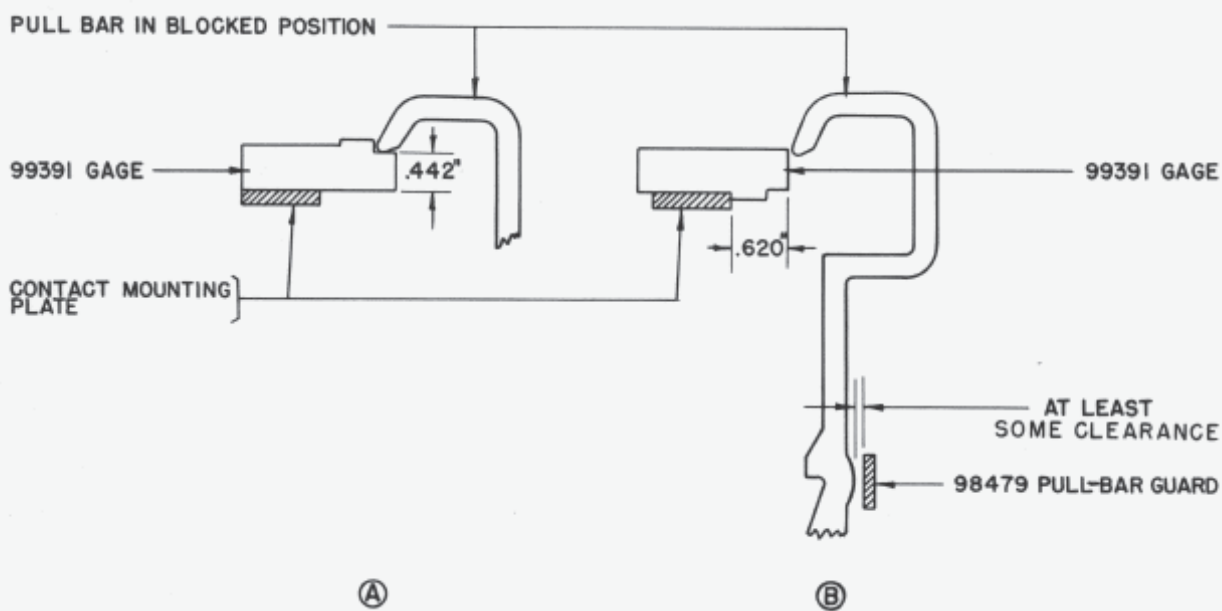


FIGURE 33

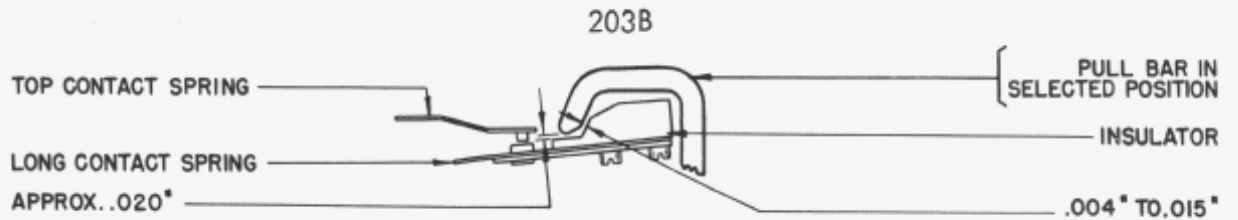


FIGURE 34

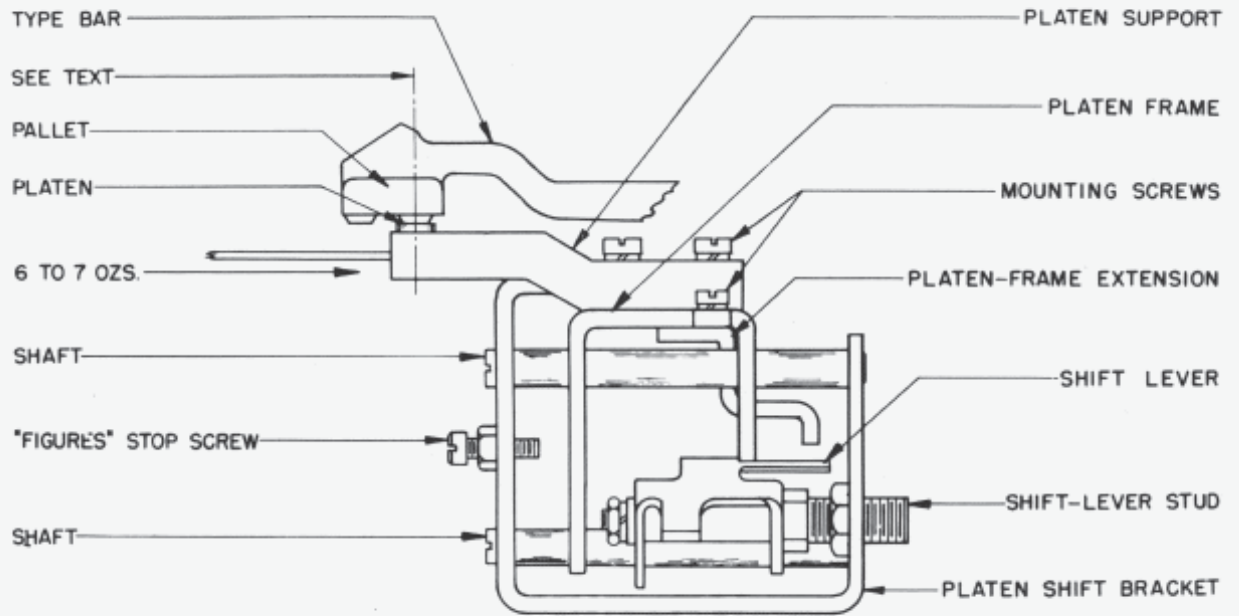


FIGURE 35

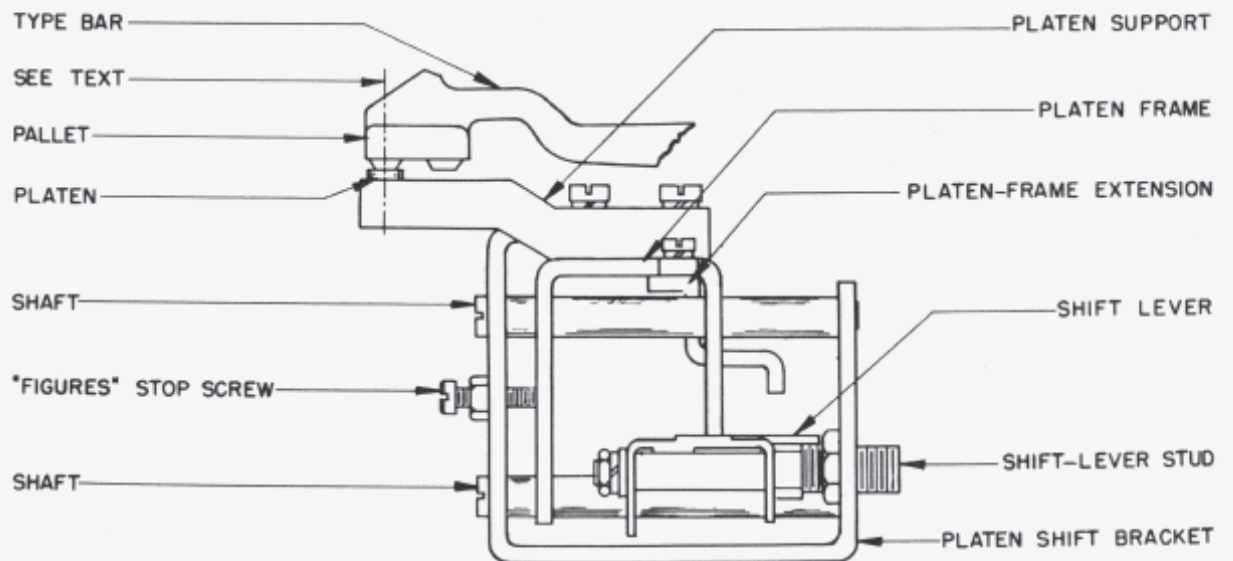


FIGURE 36

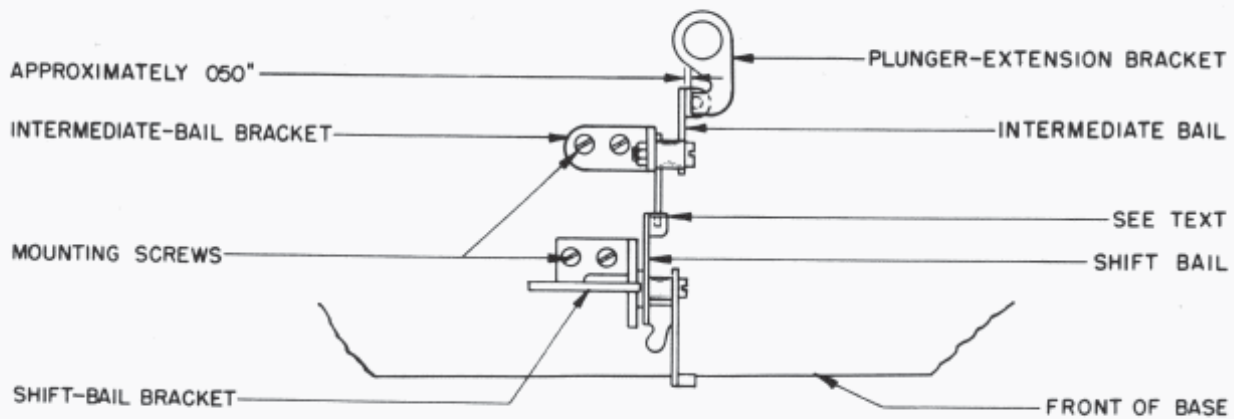


FIGURE 37

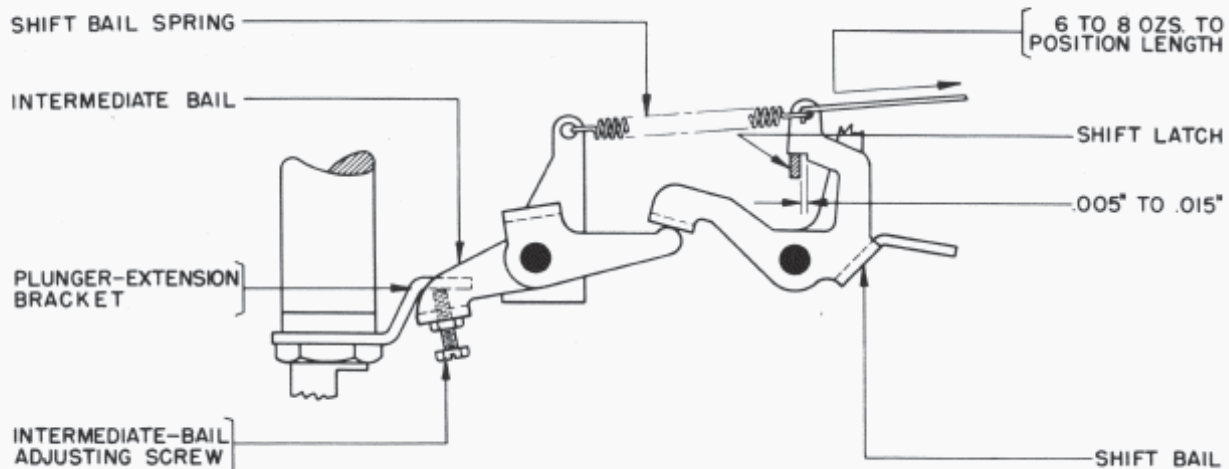


FIGURE 38

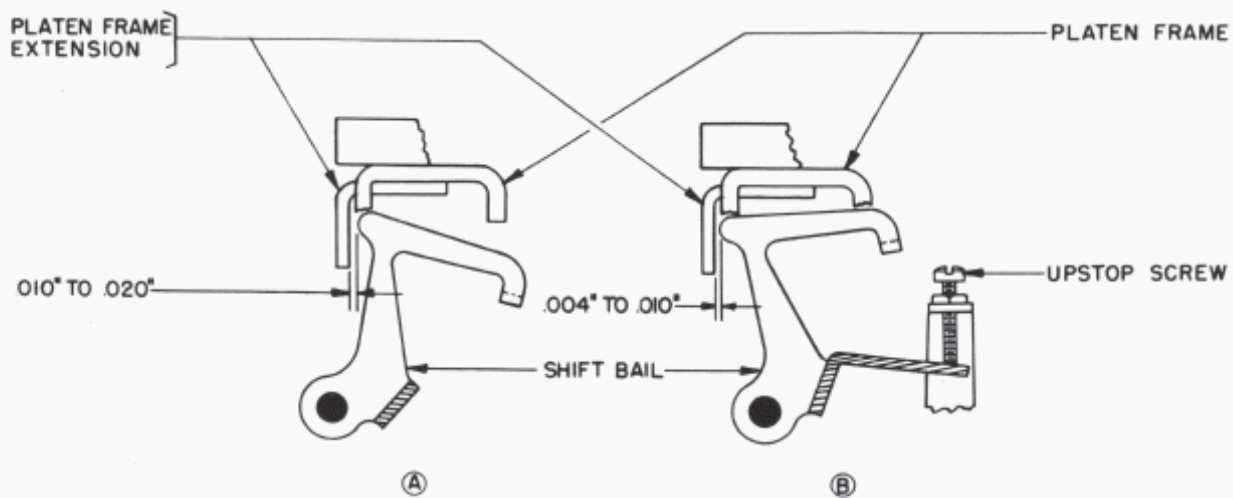


FIGURE 39

ORIGINAL

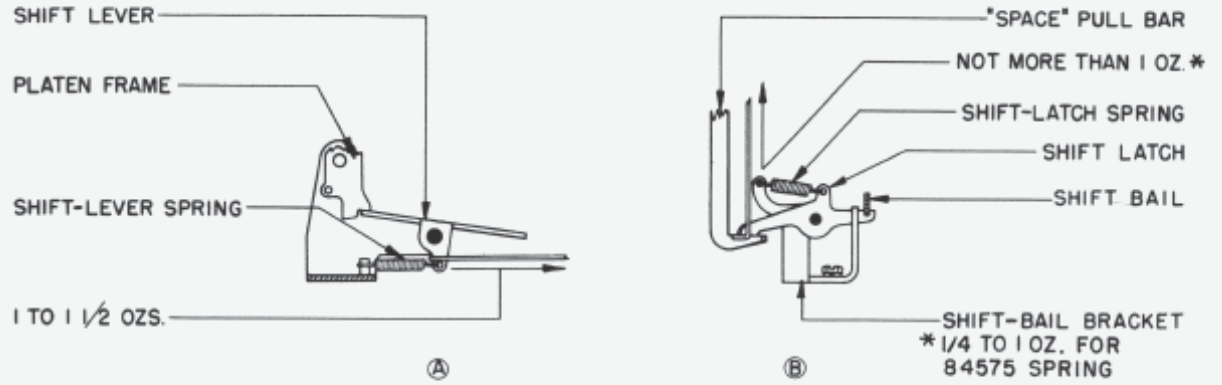


FIGURE 40

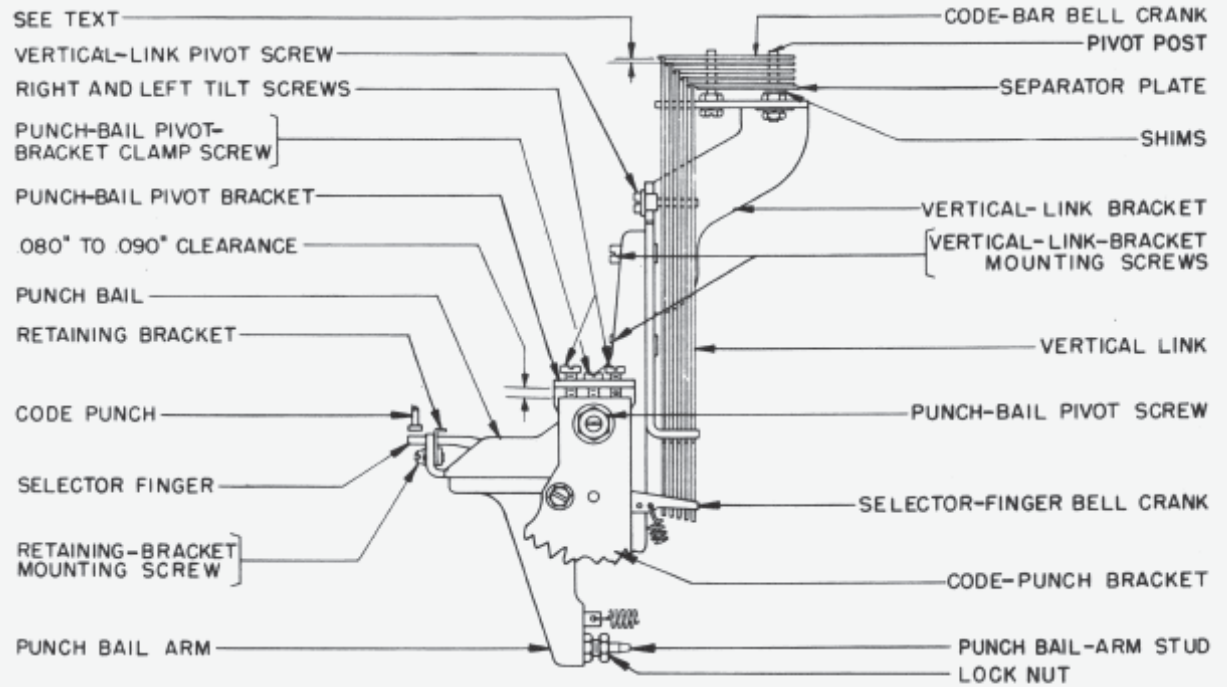


FIGURE 41

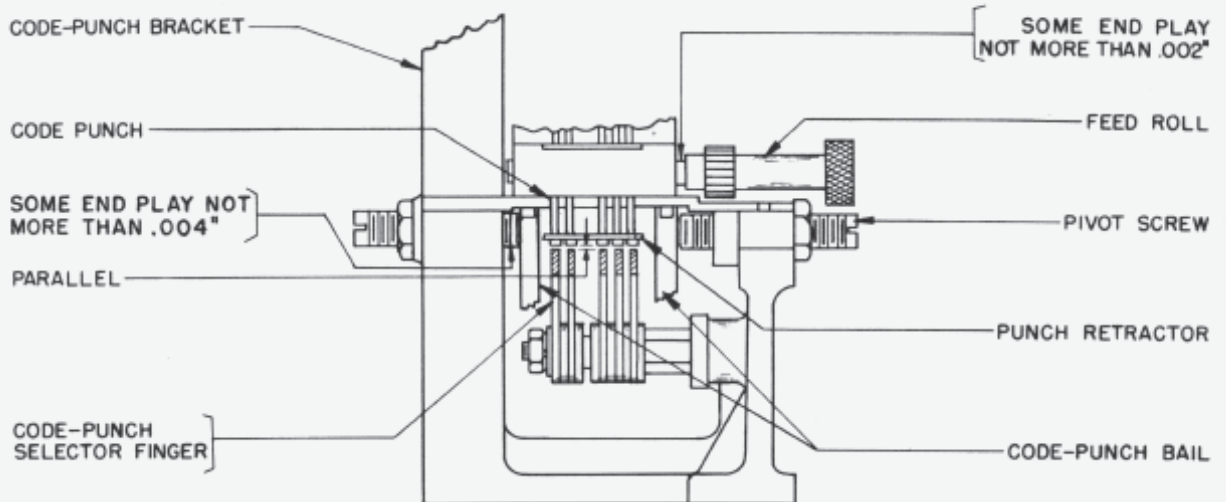


FIGURE 42



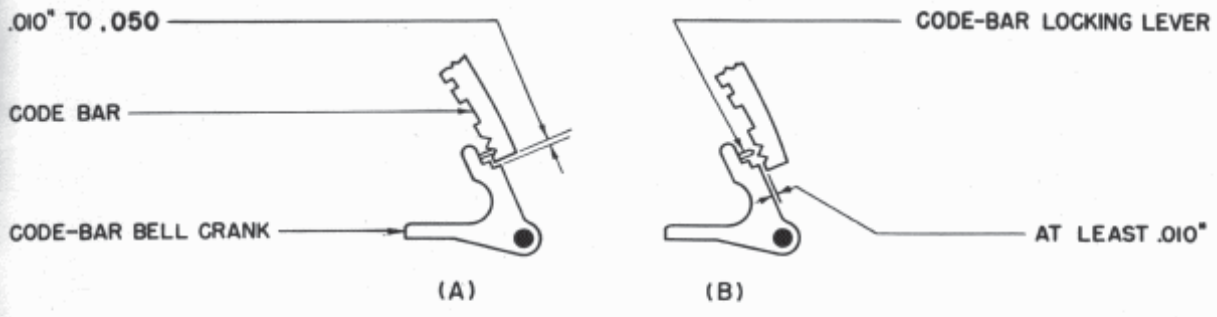


FIGURE 43

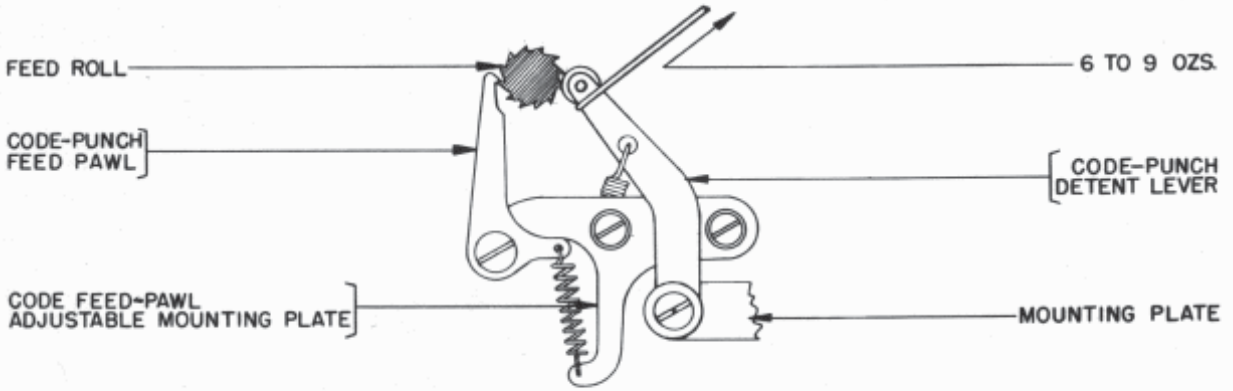


FIGURE 44

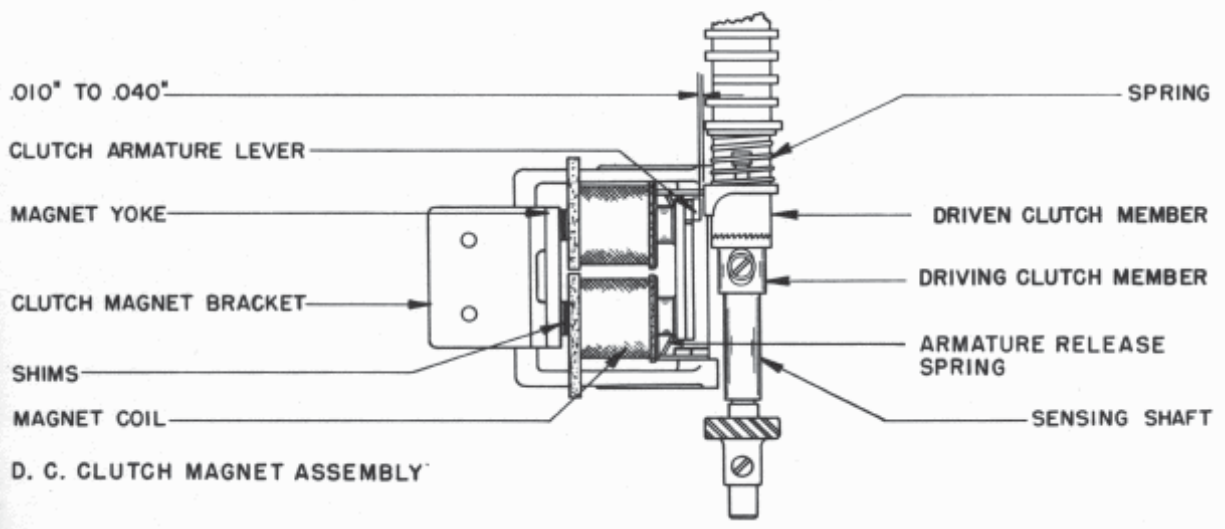


FIGURE 45

ORIGINAL

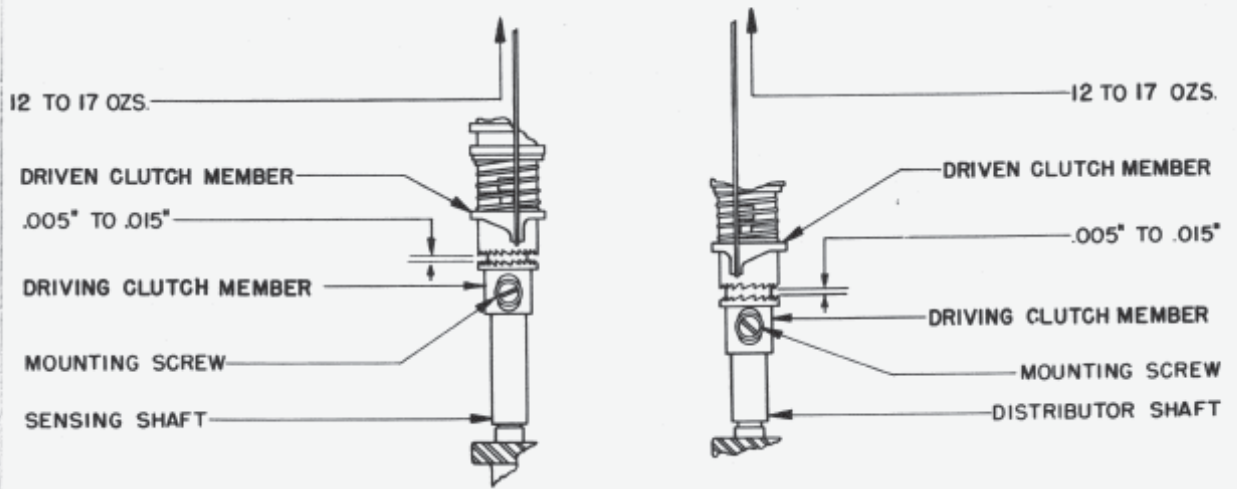


FIGURE 46

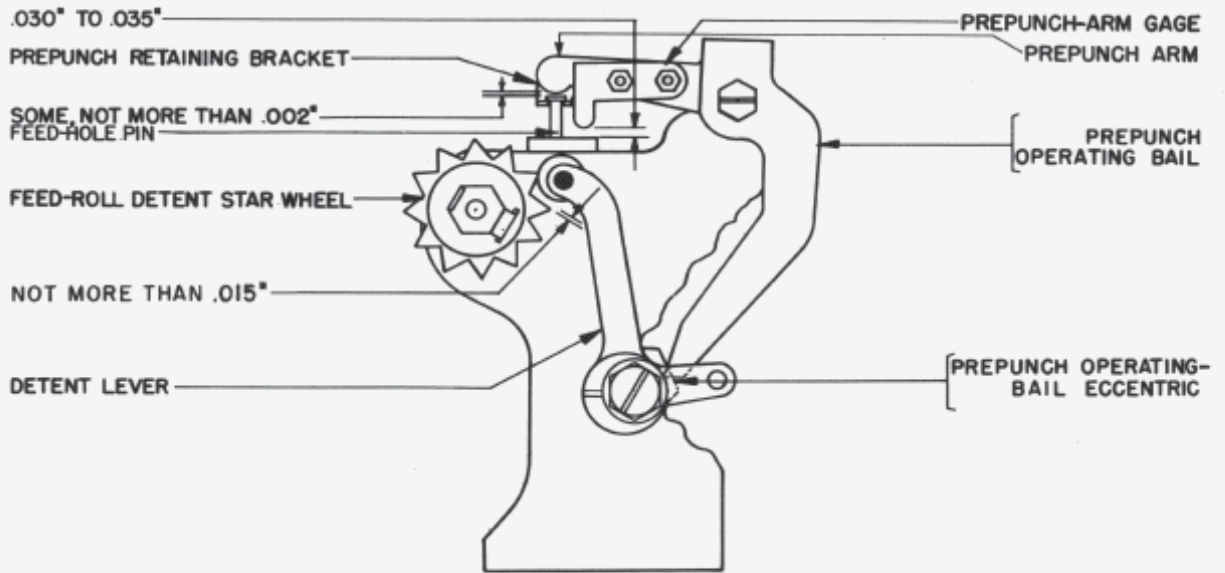


FIGURE 47

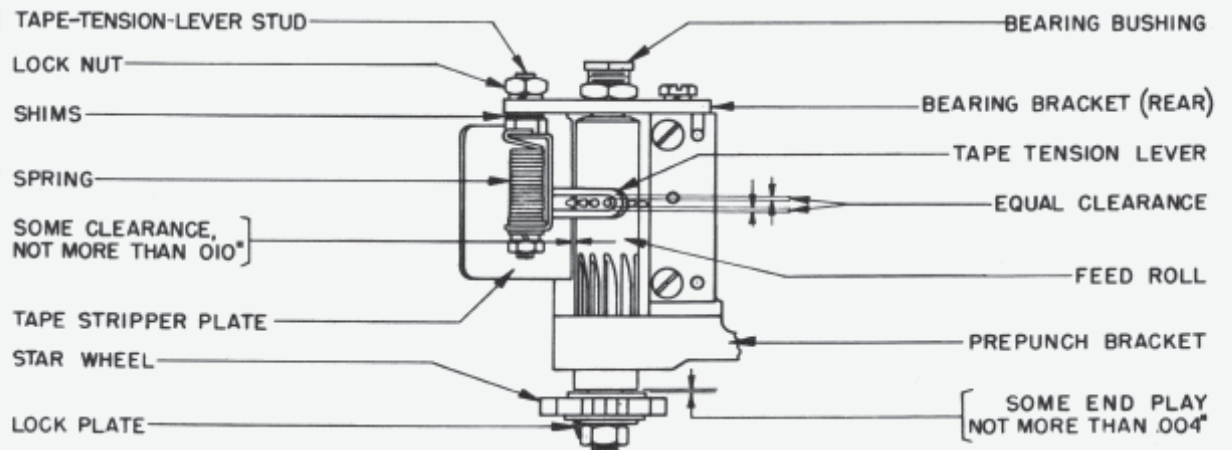


FIGURE 48

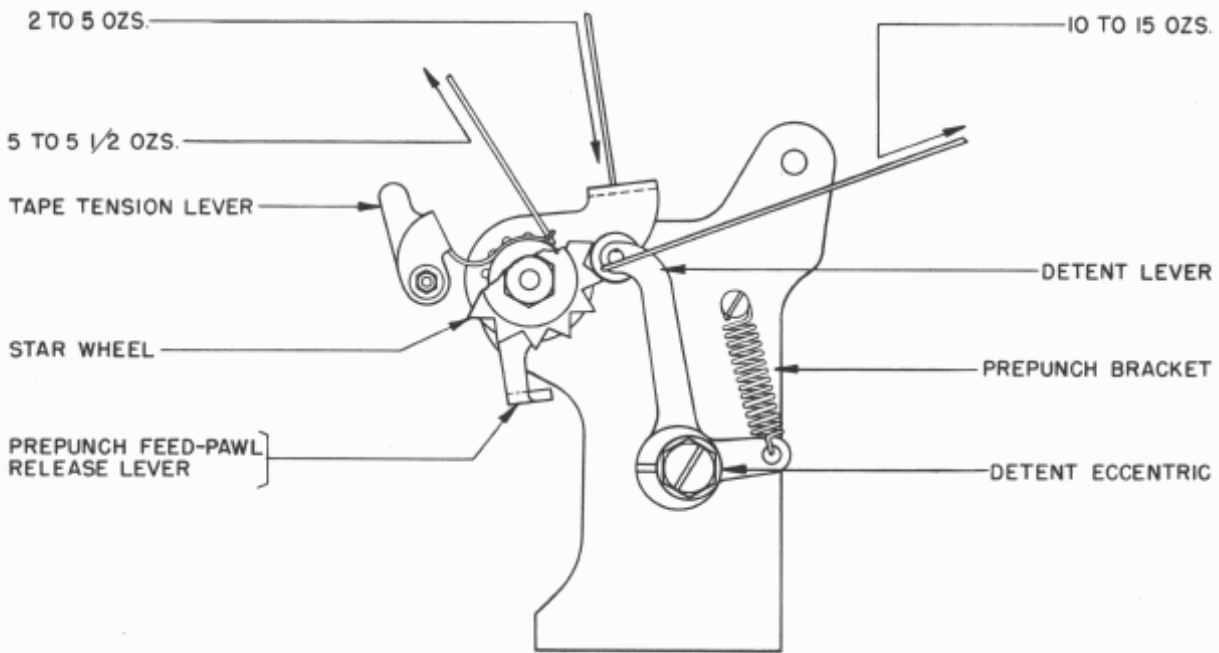


FIGURE 49

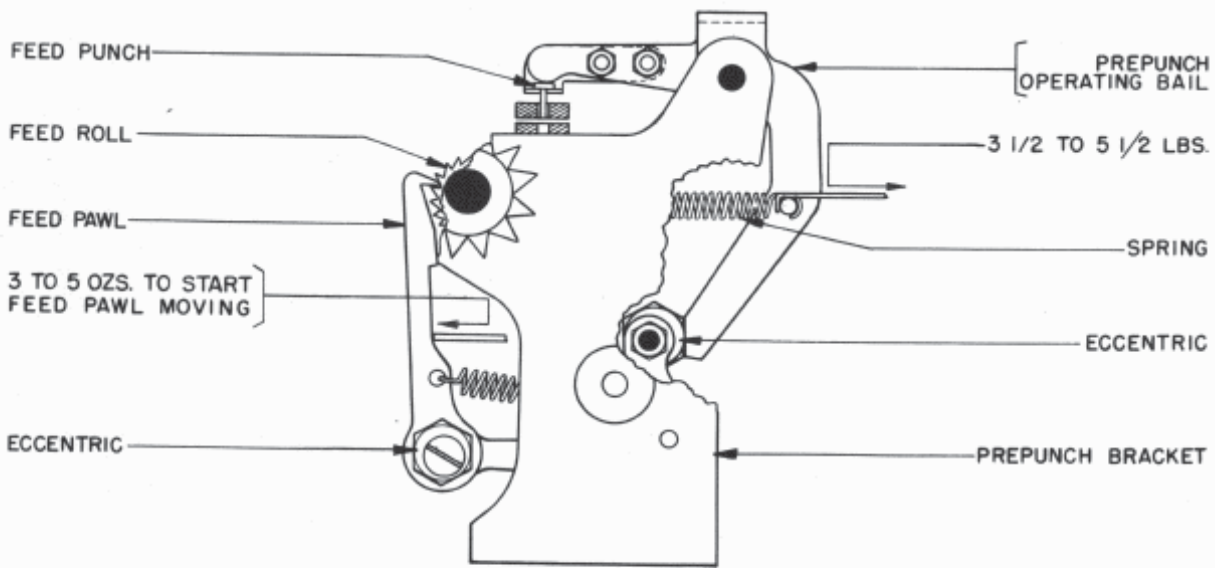


FIGURE 50

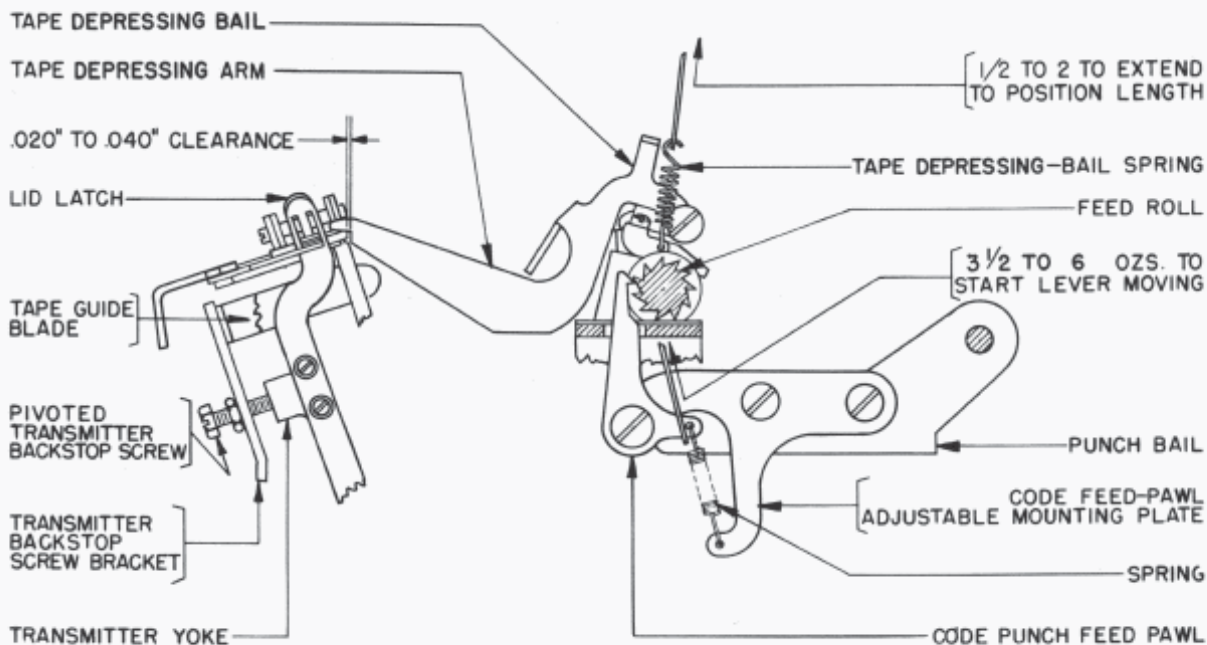


FIGURE 51

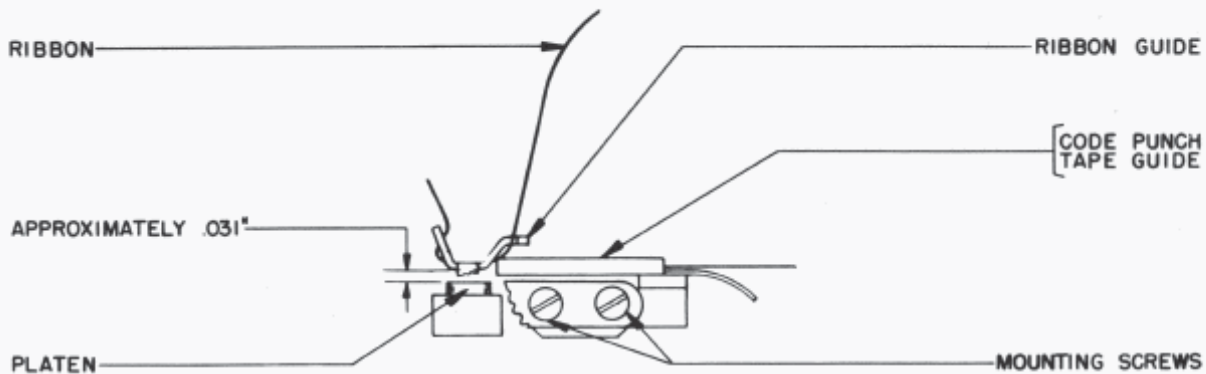


FIGURE 52

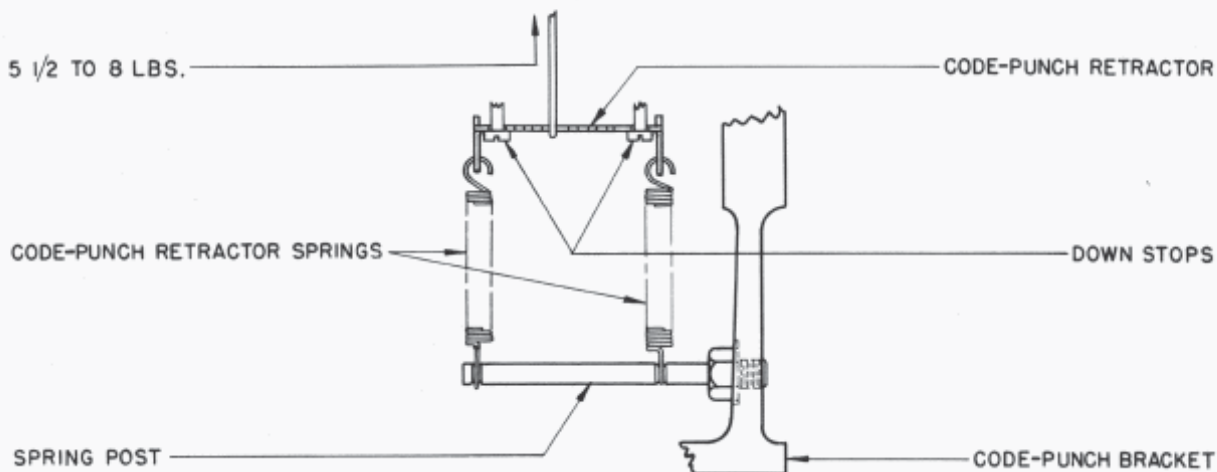


FIGURE 53

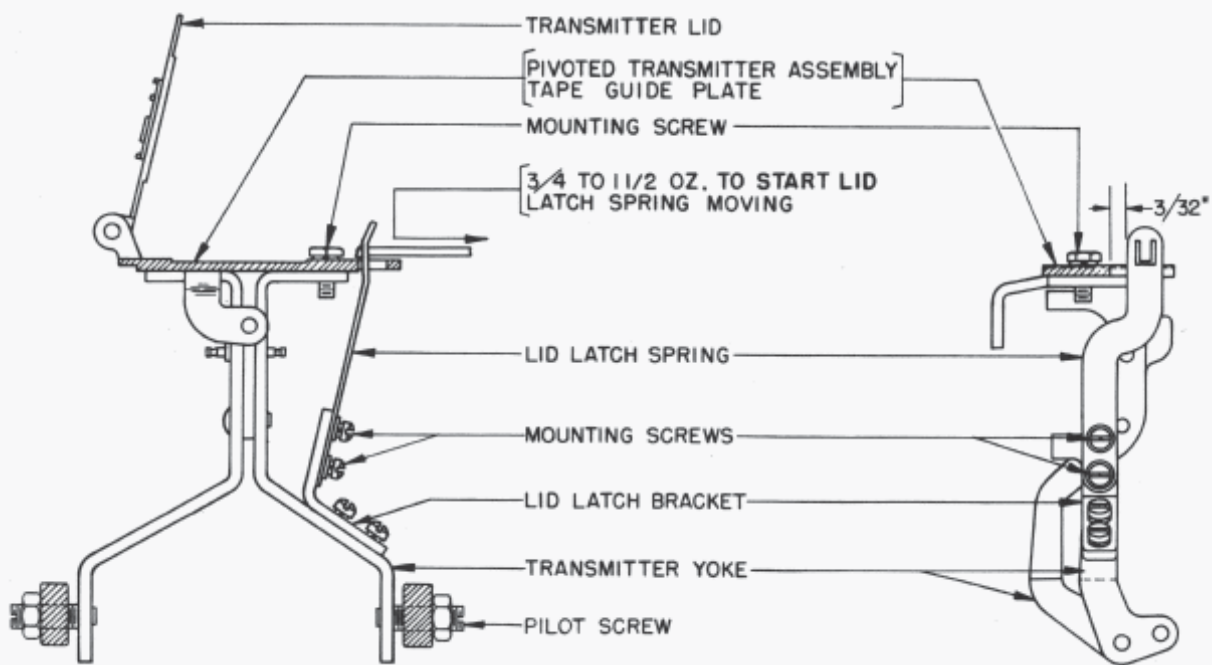
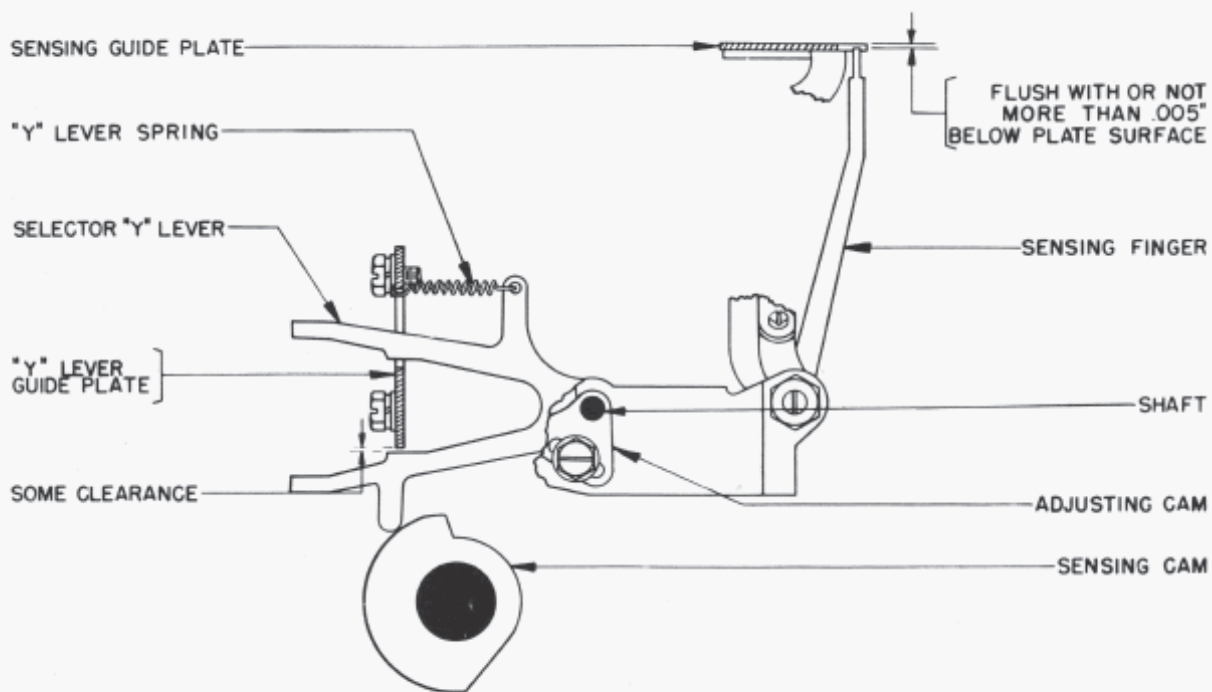
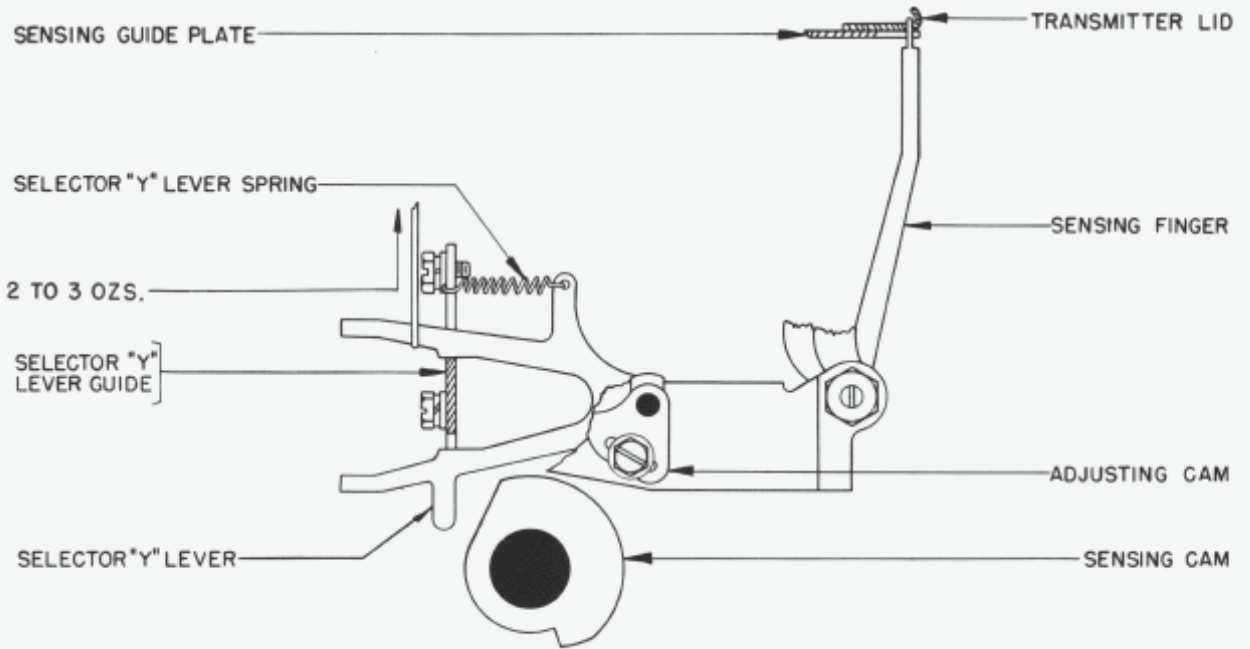


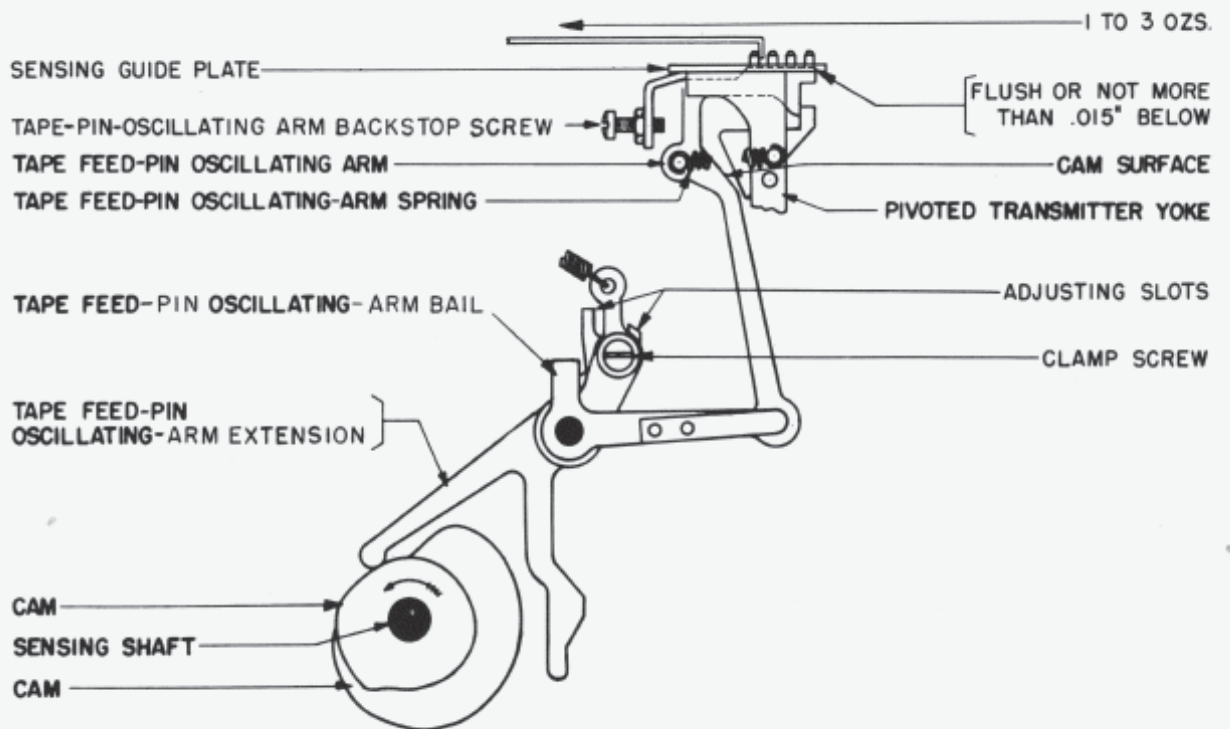
FIGURE 54



FRONT VIEW  
 FIGURE 55



FRONT VIEW  
FIGURE 56



FRONT VIEW  
FIGURE 57

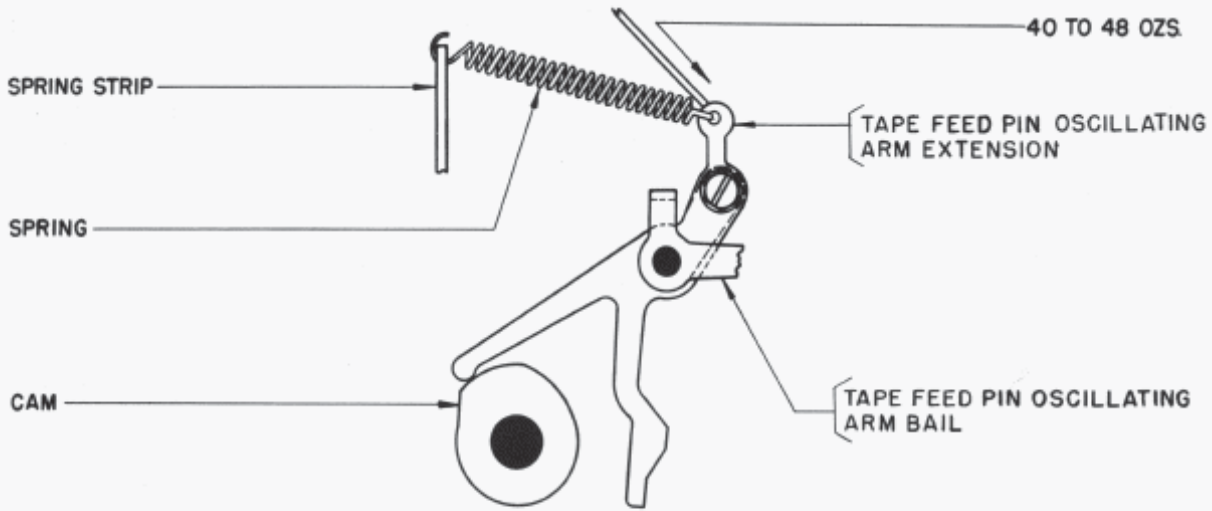


FIGURE 58

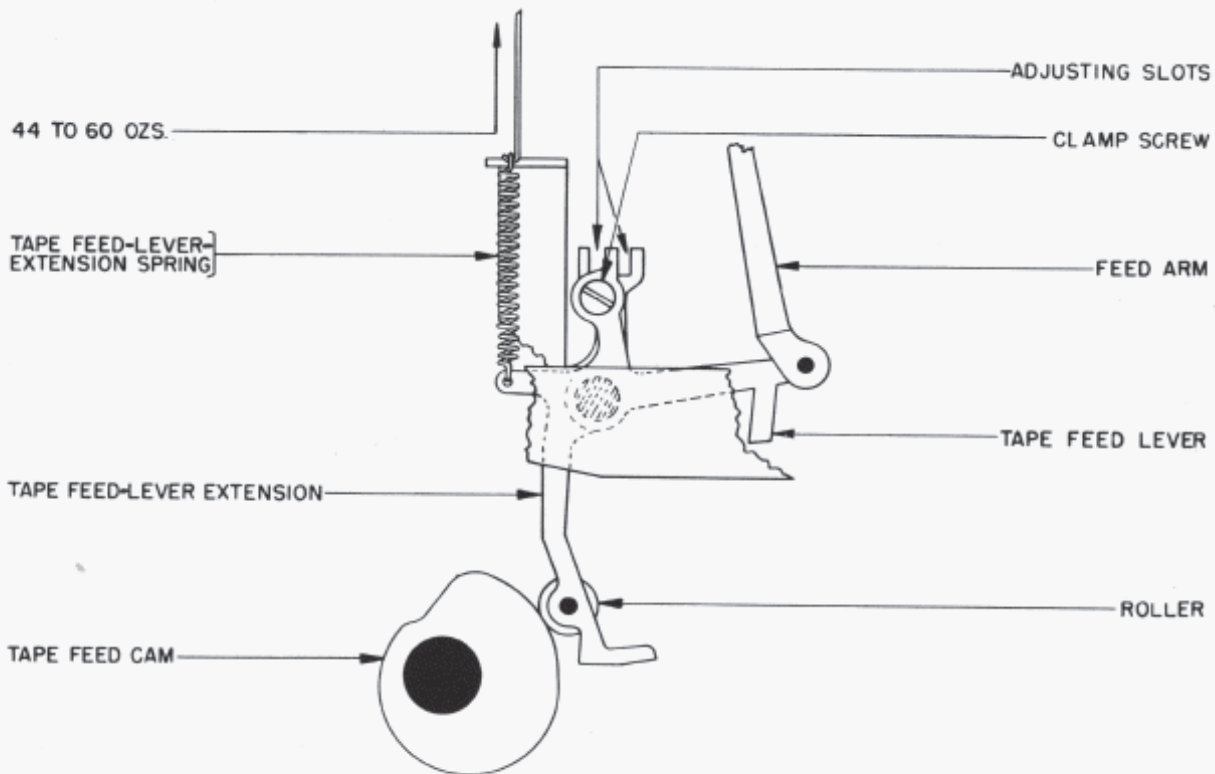
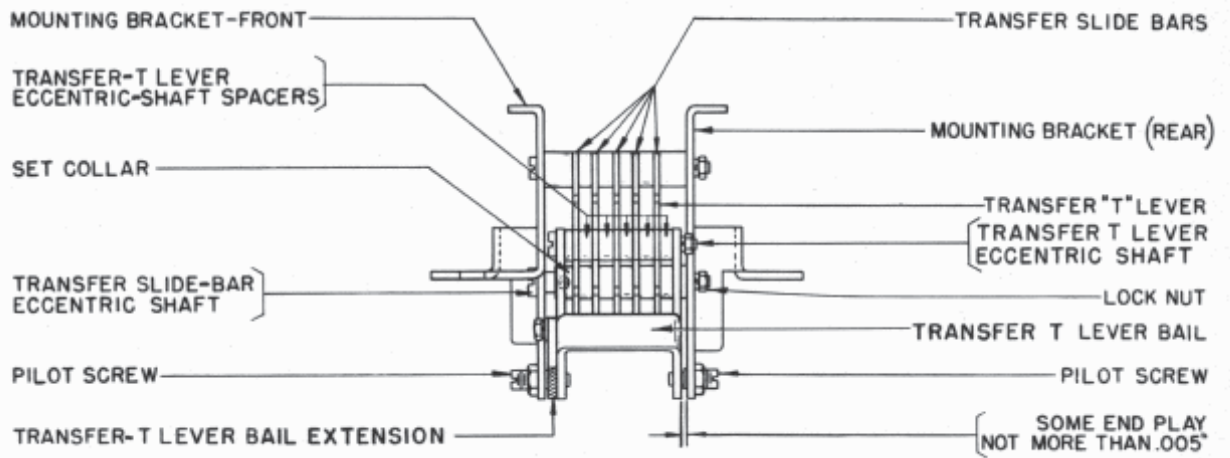
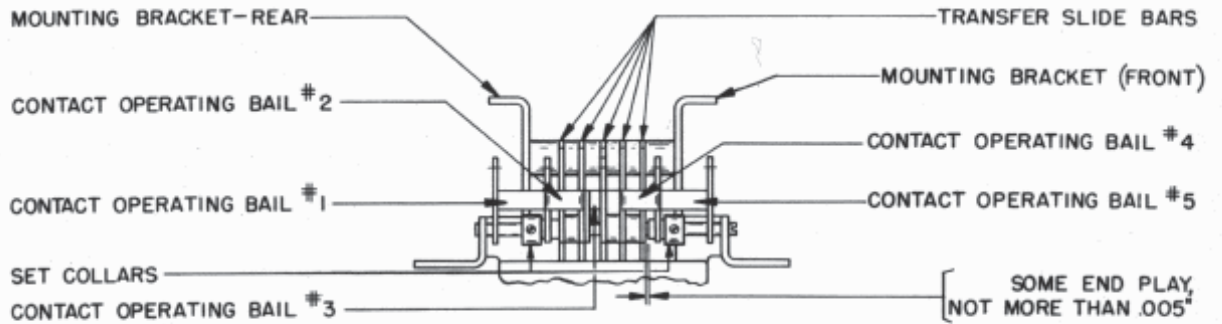


FIGURE 59



OLD STYLE ASSEMBLY  
FIGURE 60



OLD STYLE ASSEMBLY  
FIGURE 61

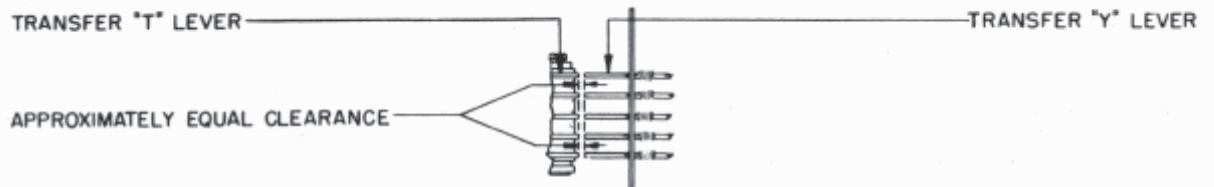


FIGURE 62



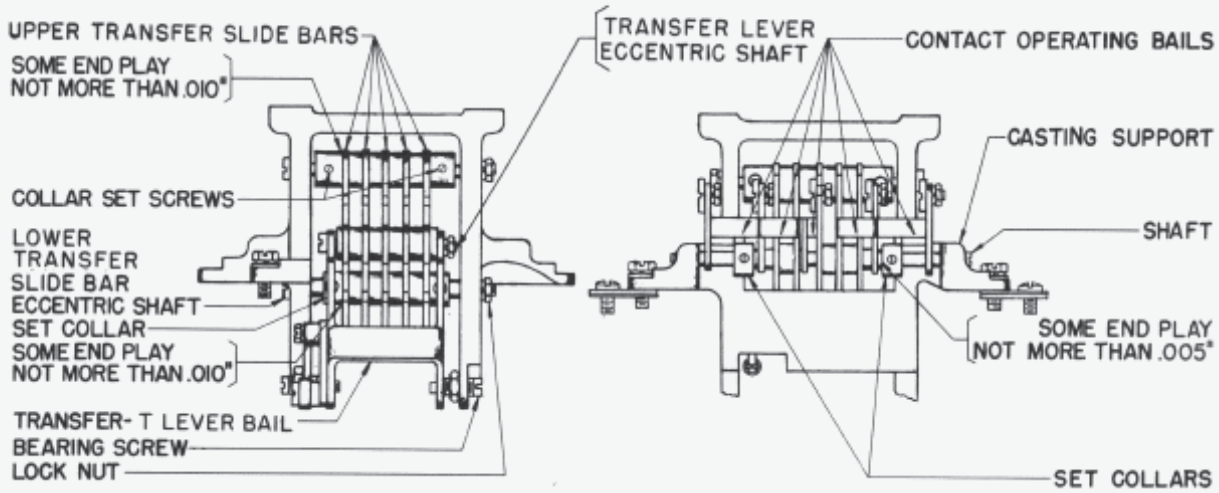


FIGURE 63  
NEW STYLE (CASTING) ASSEMBLY

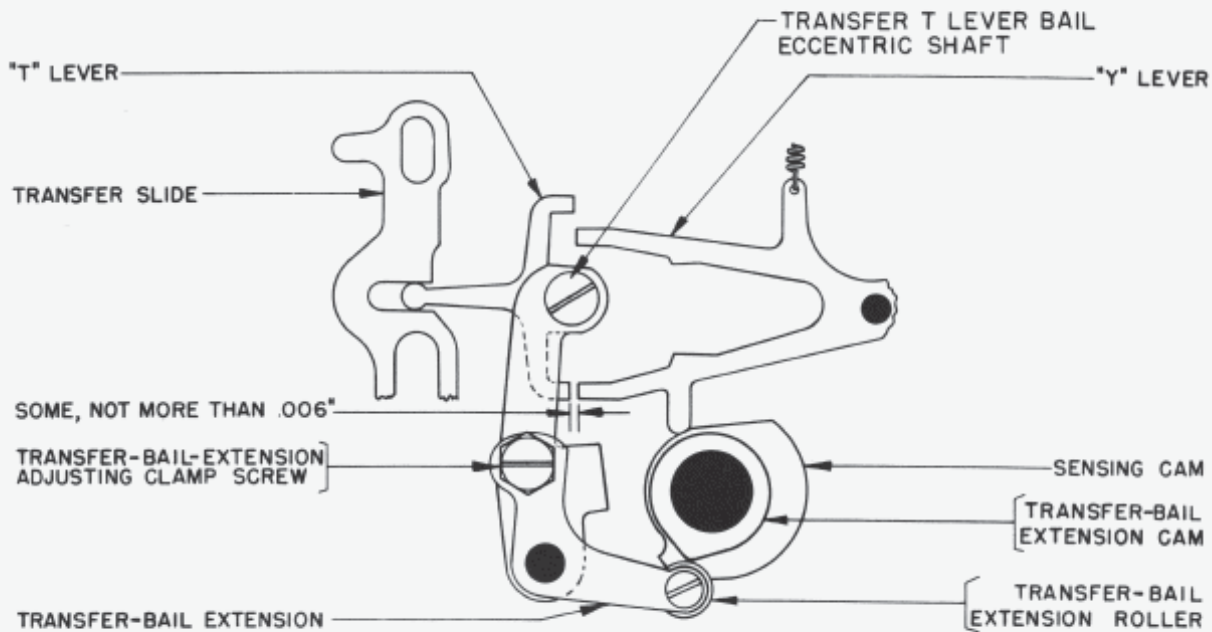


FIGURE 64

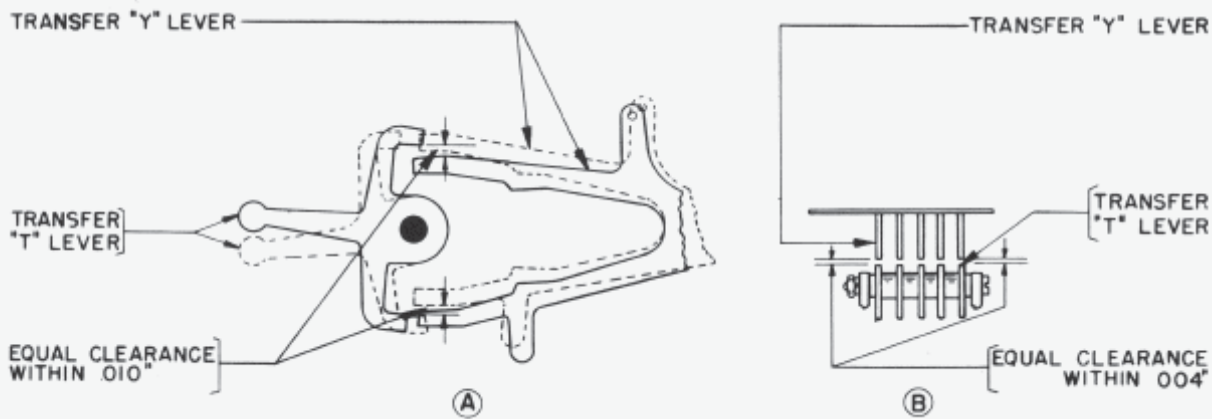


FIGURE 65

ORIGINAL

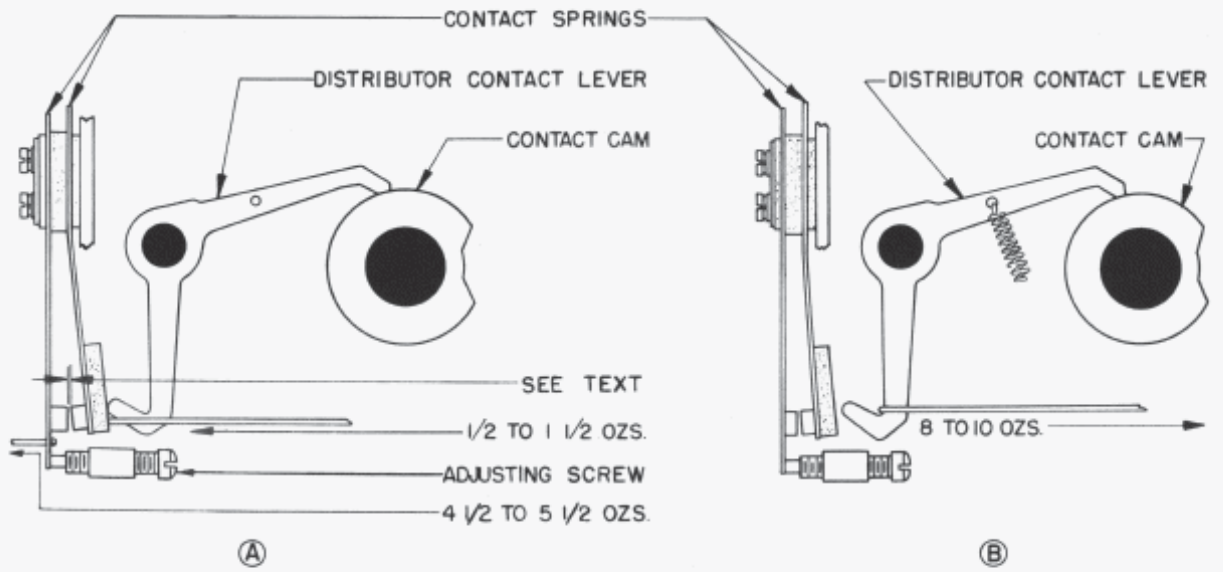


FIGURE 66

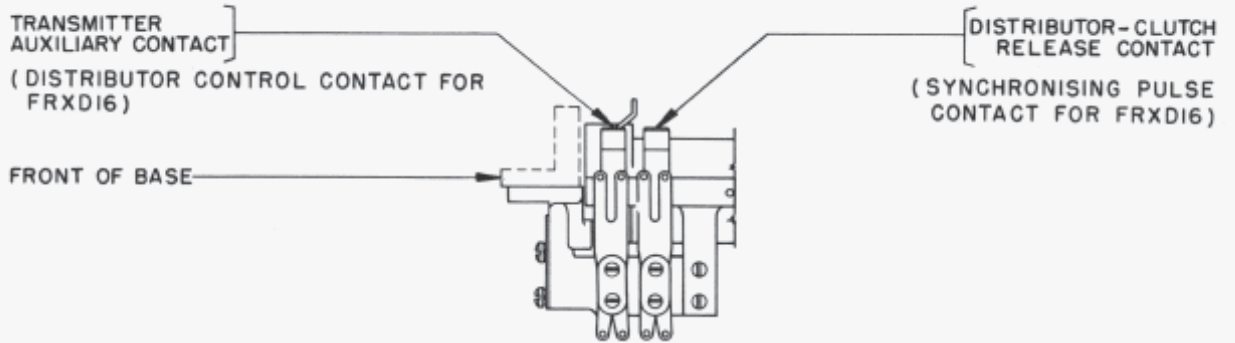


FIGURE 67

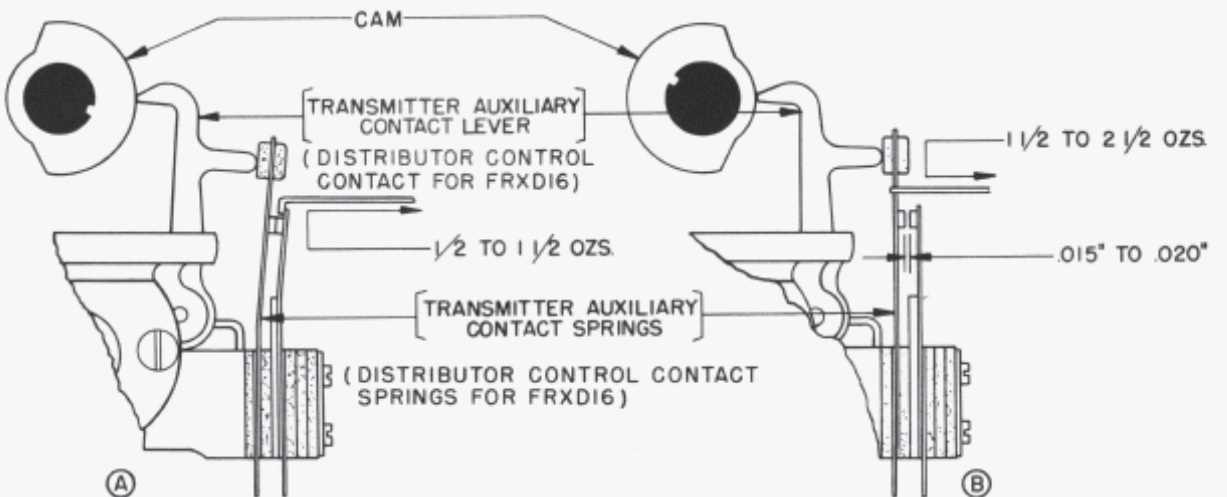


FIGURE 68

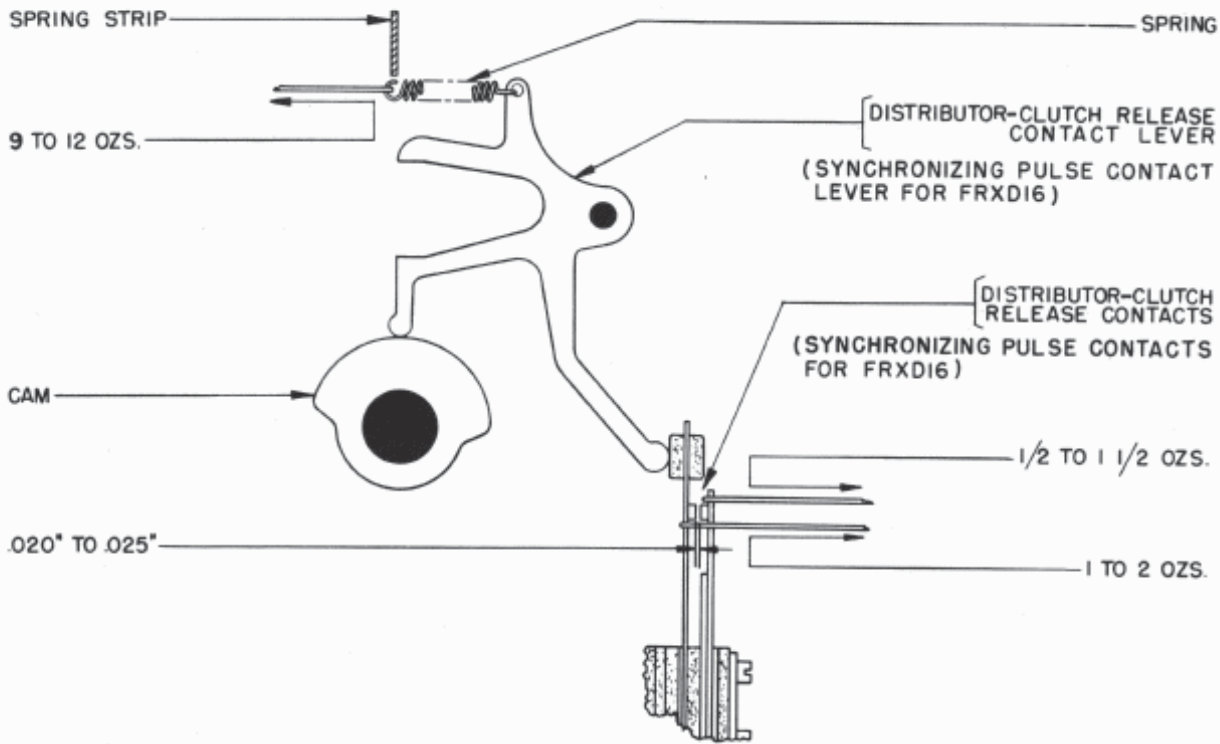
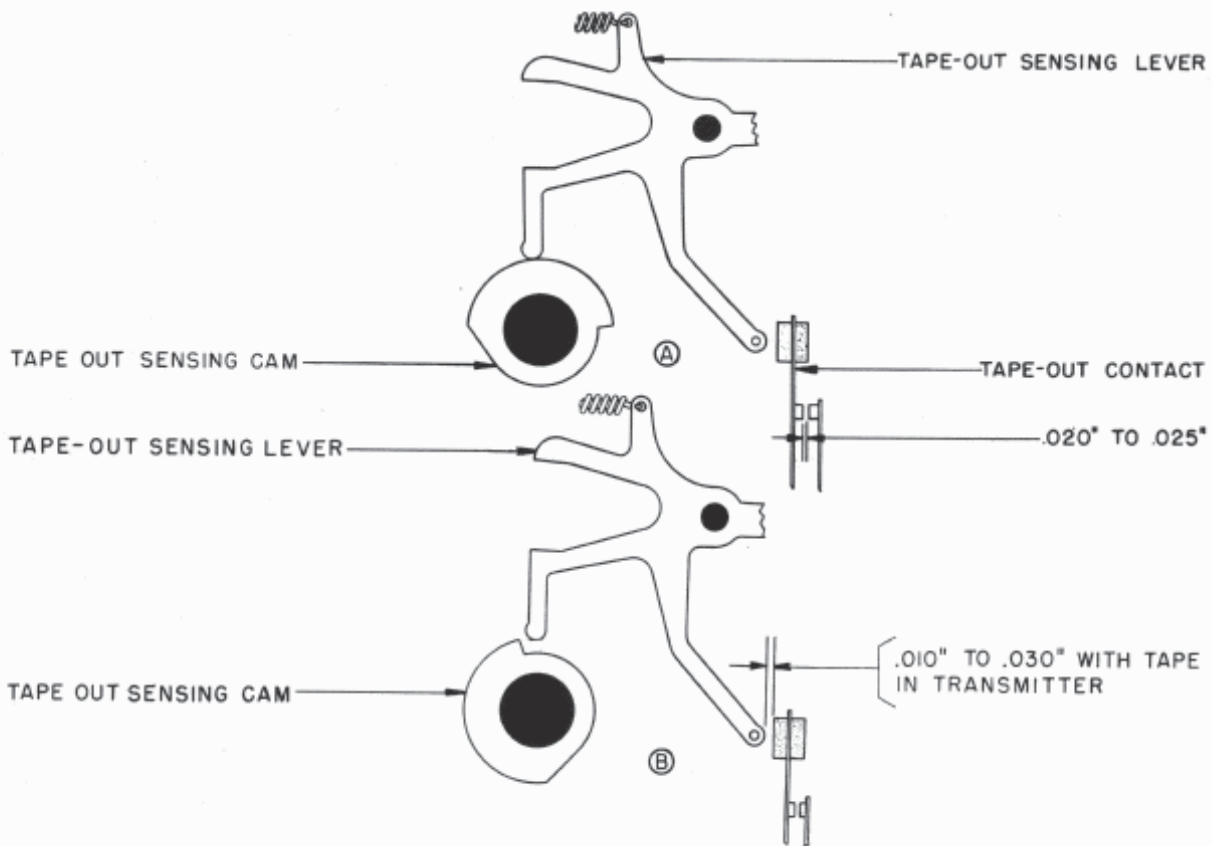


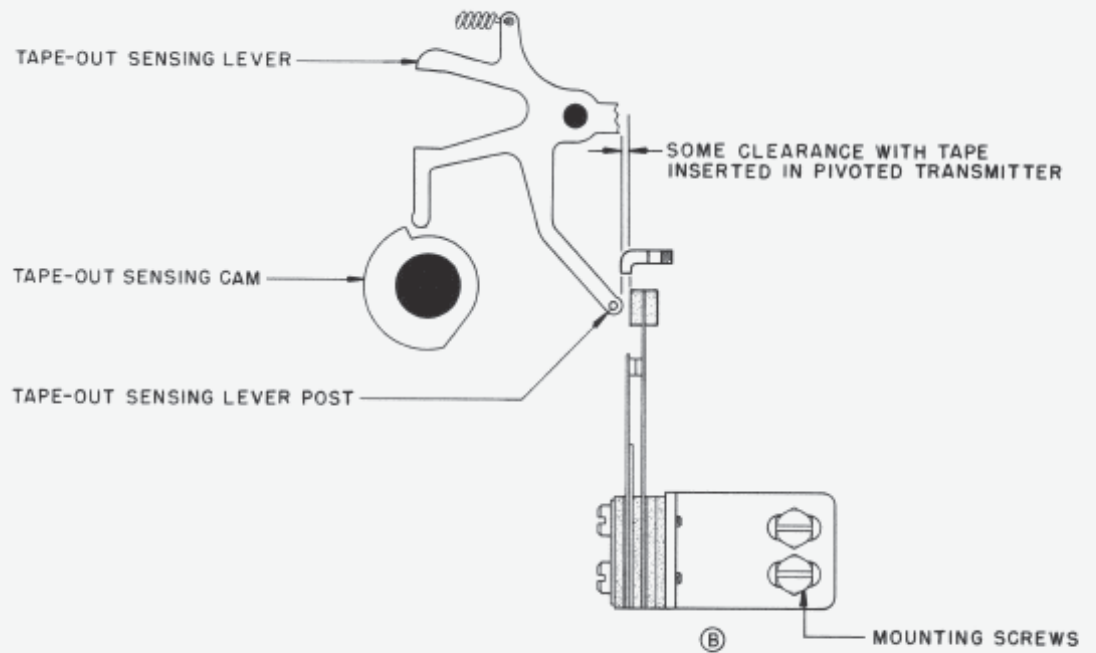
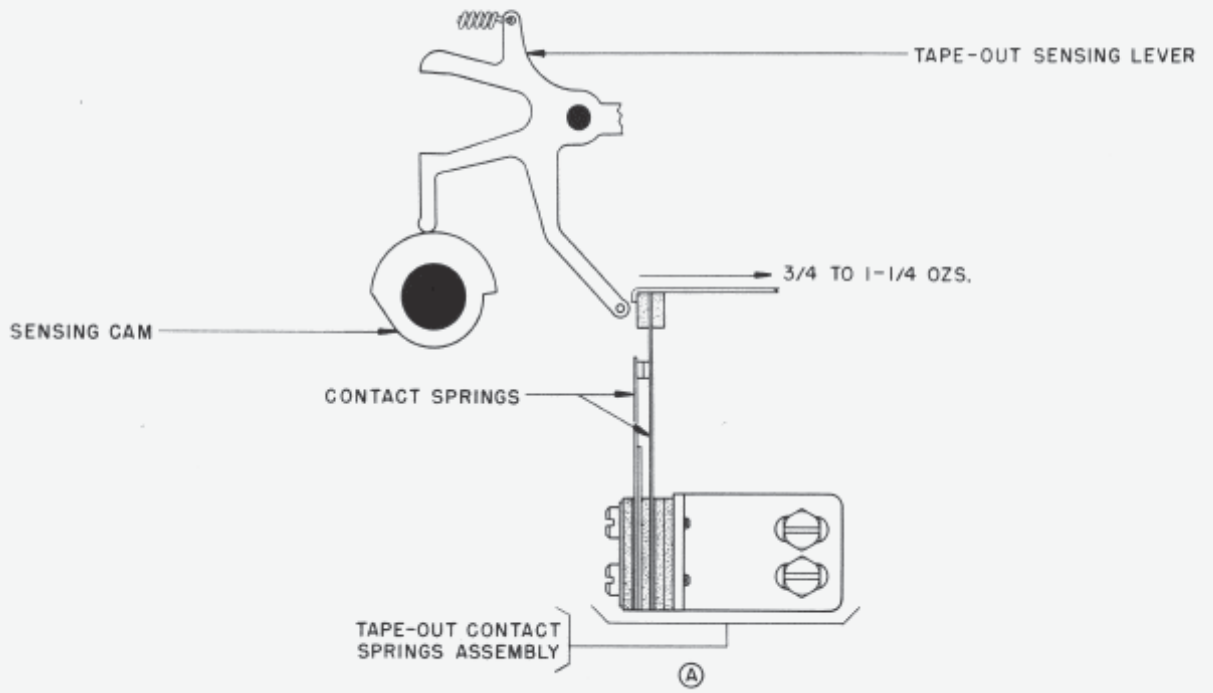
FIGURE 69



FOR UNITS WITHOUT TAPE-OUT RELEASE AND TAPE-OUT LEVERS ASSEMBLY  
FIGURE 70

ORIGINAL

203B



FOR UNITS WITH TAPE-OUT RELEASE AND TAPE-OUT LEVERS MECHANISM

FIGURE 71

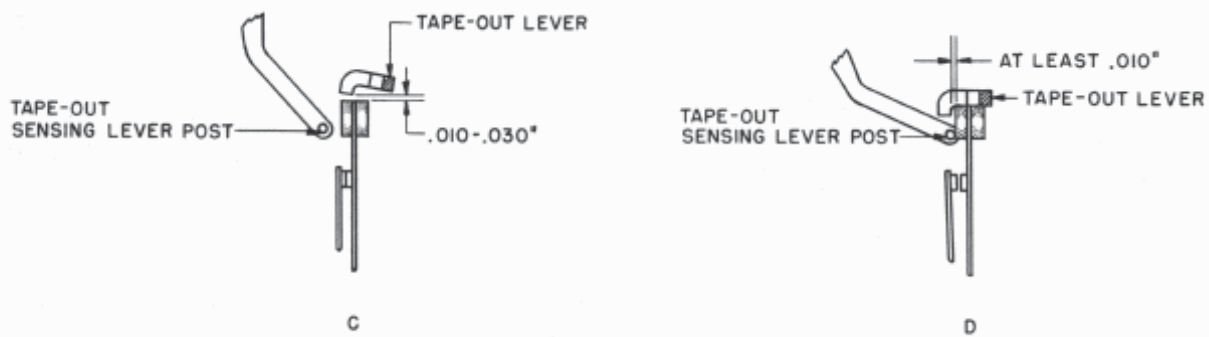
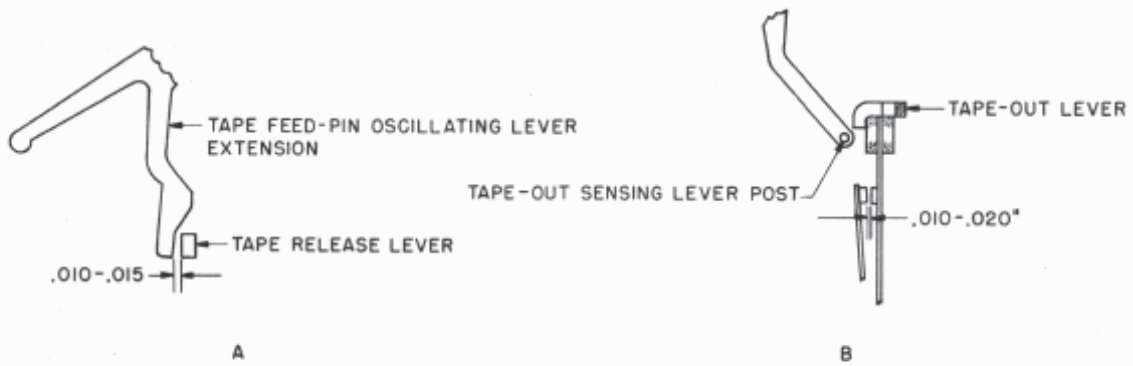
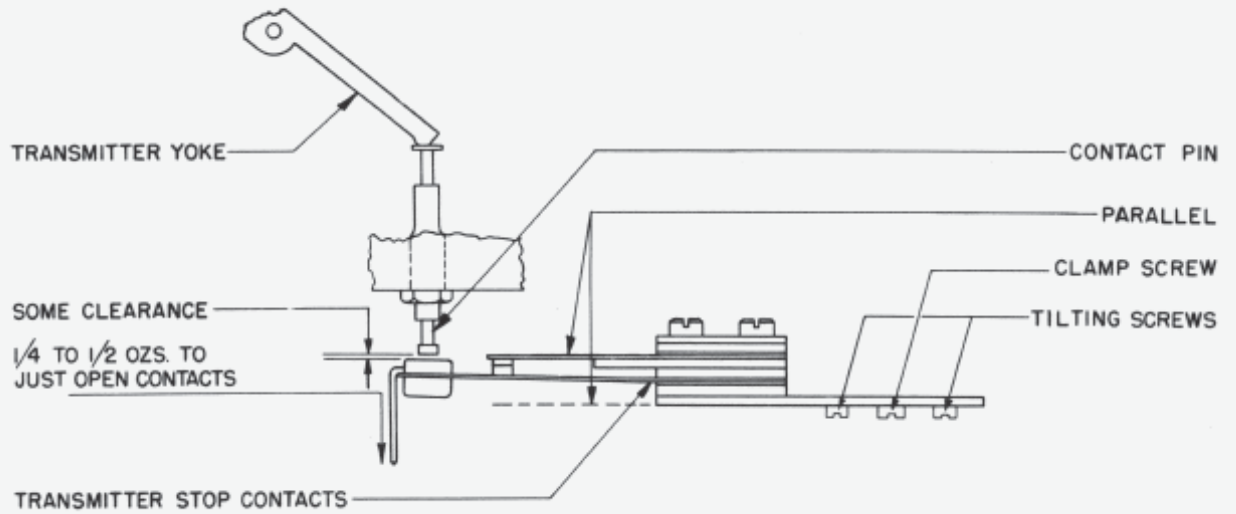
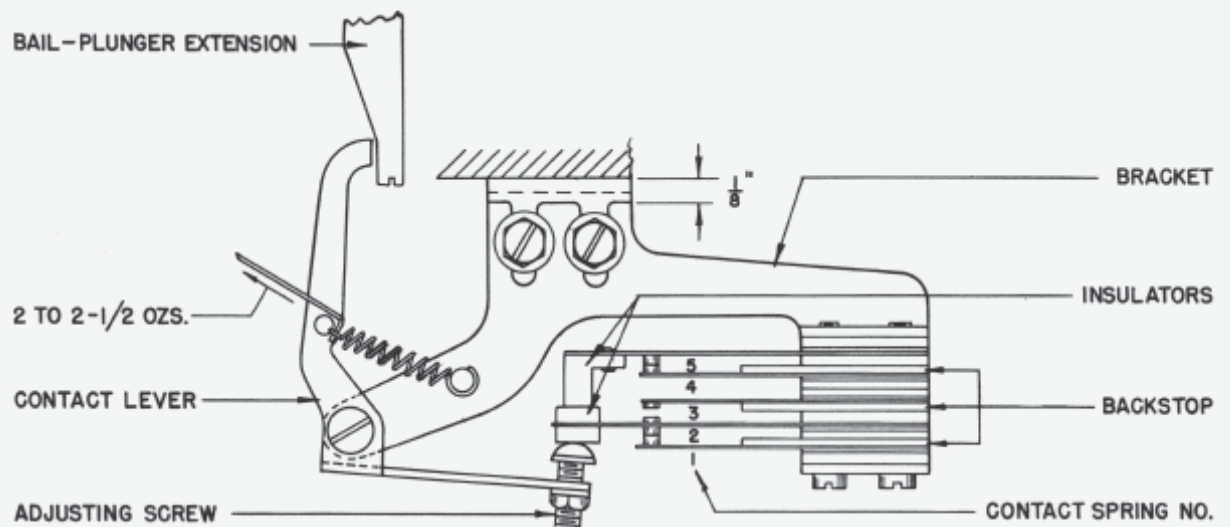


FIGURE 71.1



TRANSMITTER STOP CONTACT ASSEMBLY  
FIGURE 72



UNIVERSAL CONTACT ASSEMBLY  
FIGURE 73

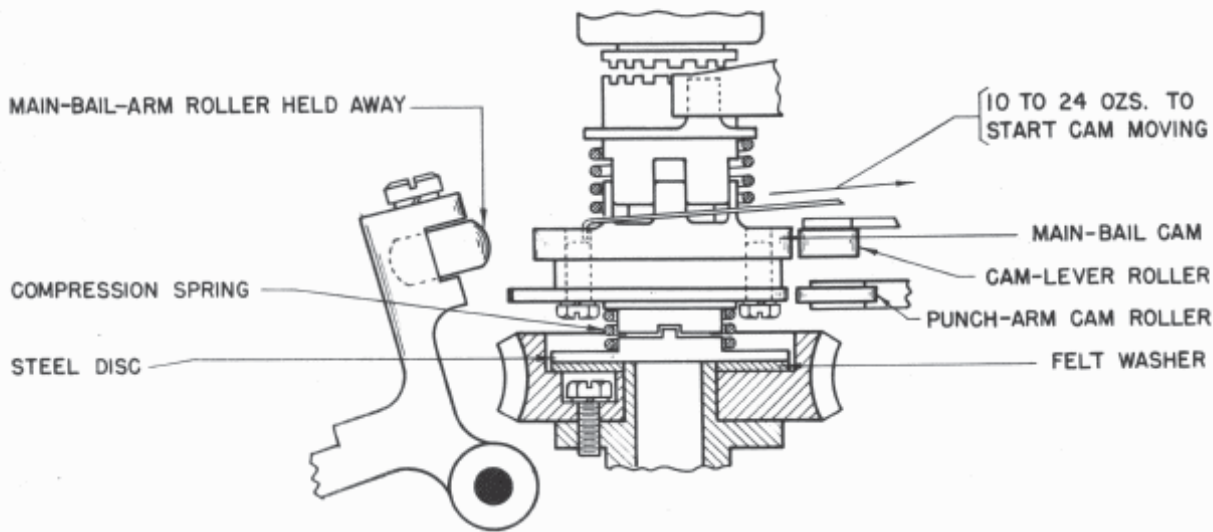


FIGURE 74

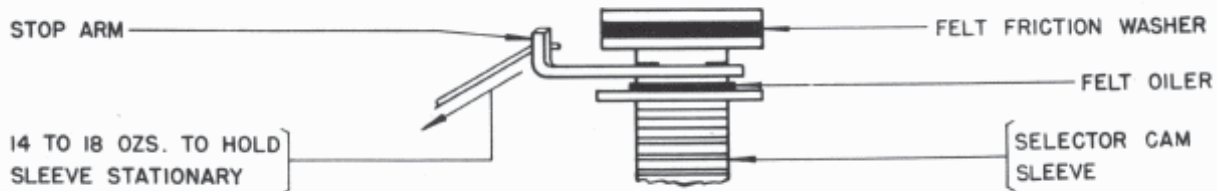


FIGURE 75



FIGURE 76

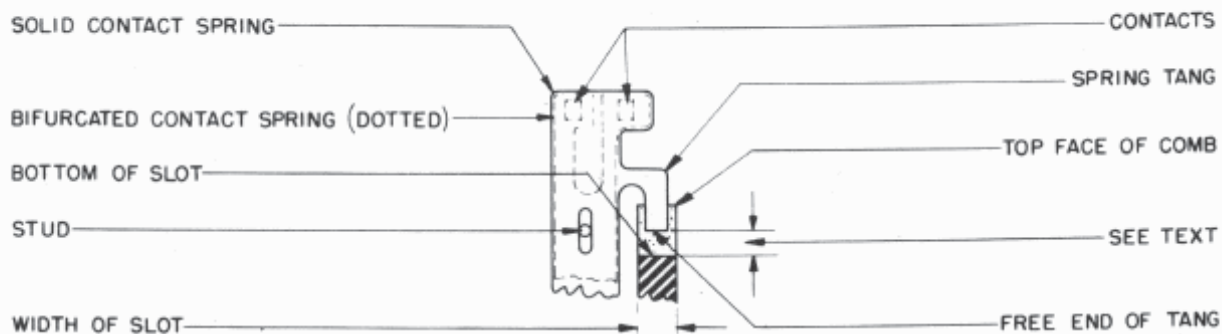


FIGURE 77

ORIGINAL

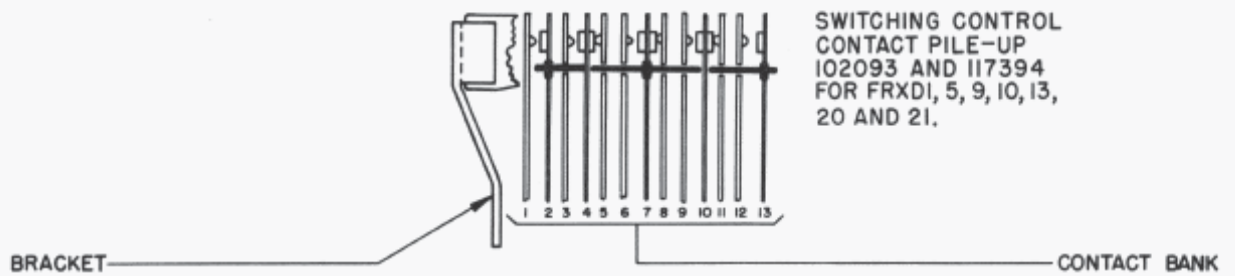


FIGURE 78  
FRONT VIEW

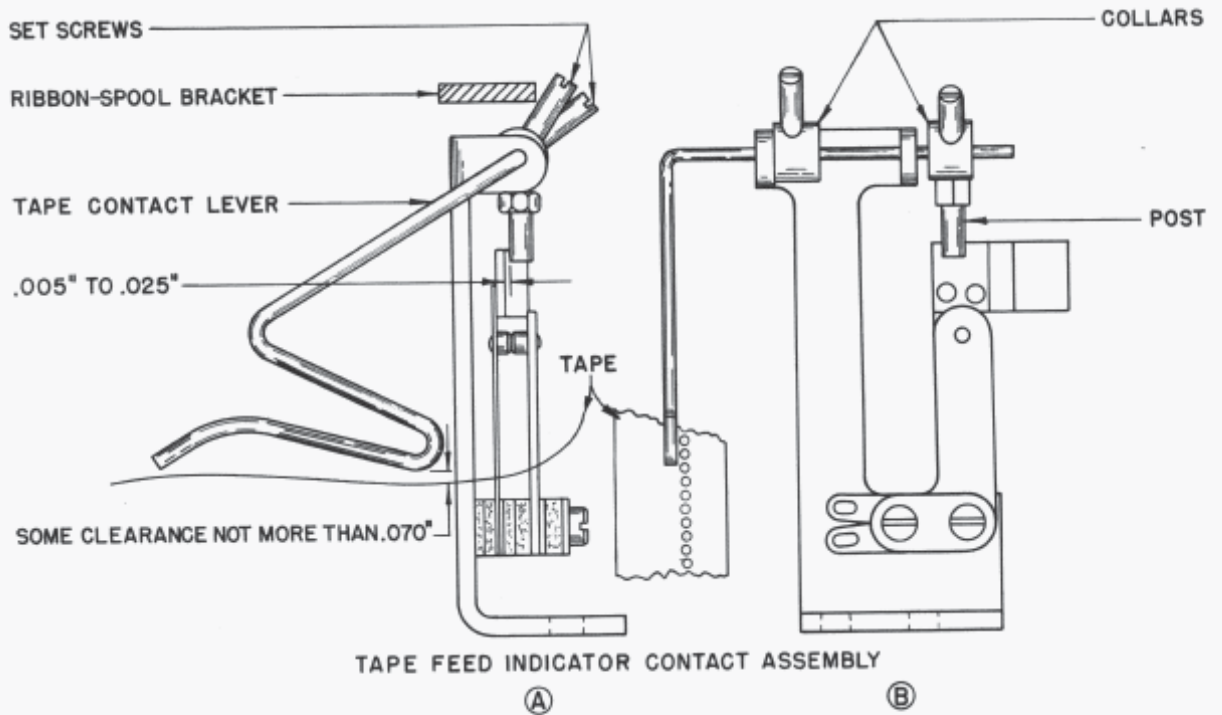


FIGURE 79

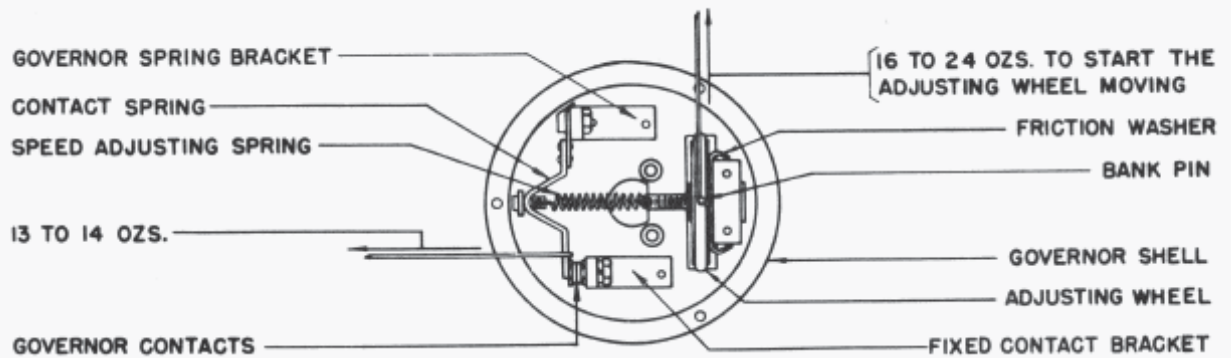


FIGURE 80



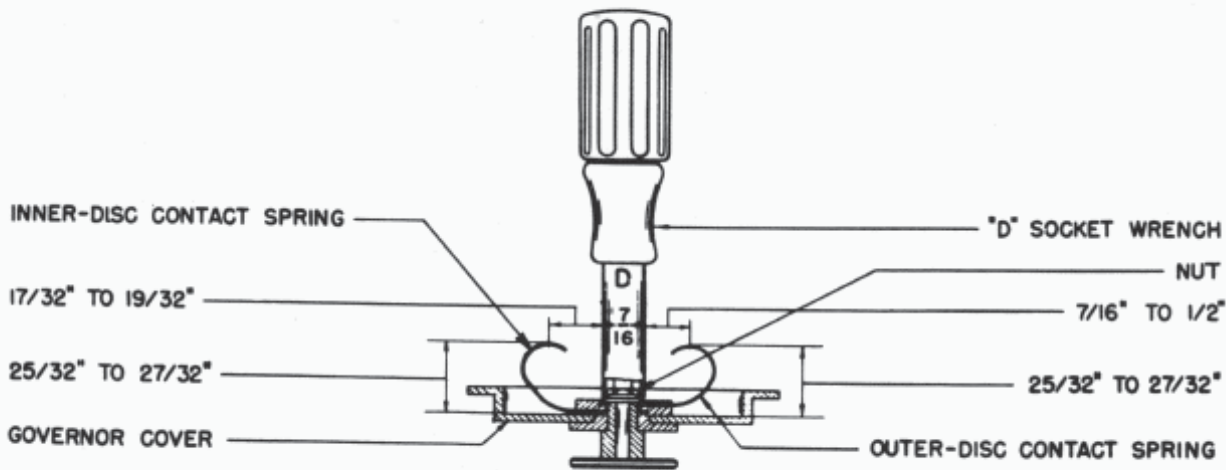


FIGURE 81

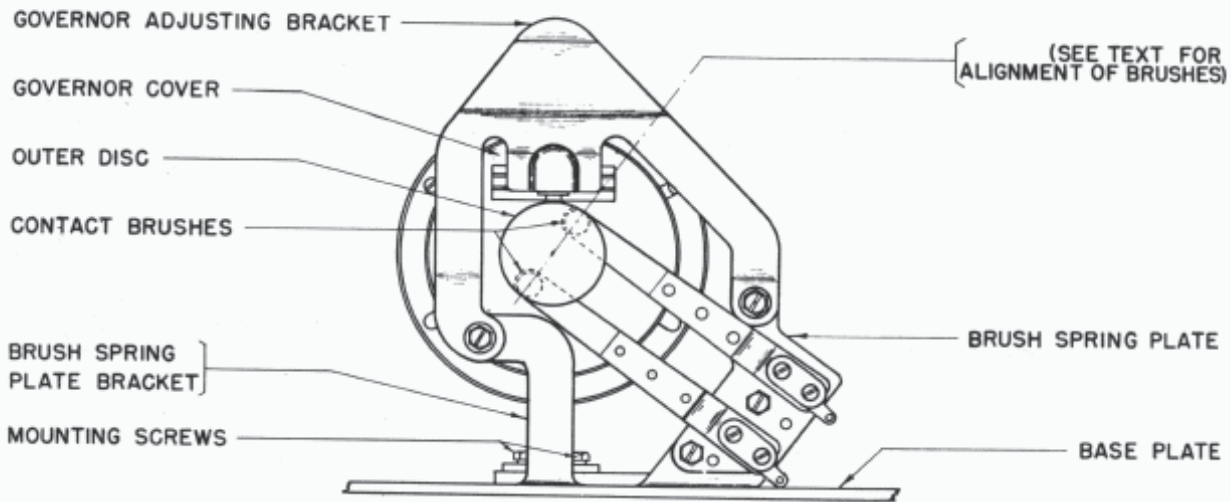


FIGURE 82

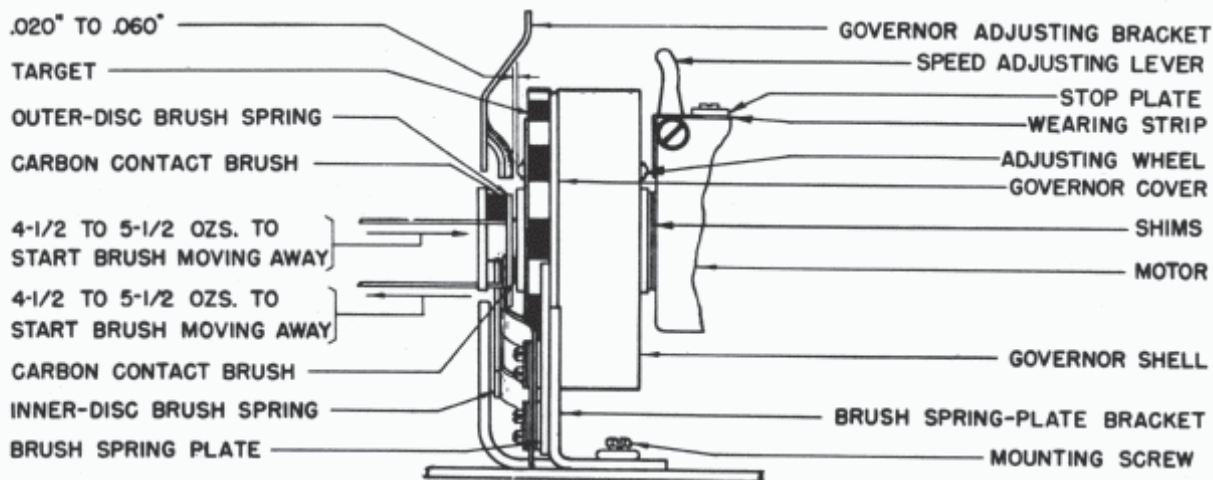


FIGURE 83

ORIGINAL

UPPER CASE																												BLANK	C.R.	L.F.	SPACE	LTR	FIG
LOWER CASE		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z		^			∇	▲
	1	●	●		●	●					●	●					●		●		●		●	●	●	●						●	●
	2	●		●				●		●	●	●					●	●	●				●	●	●						●	●	●
	FEE	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	3			●			●		●		●		●		●		●		●		●		●		●		●				●	●	●
	4		●	●	●		●		●		●		●		●		●		●		●		●		●		●				●	●	●
	5	●						●	●					●	●		●	●		●		●		●	●	●	●				●	●	●

FIGURE 84

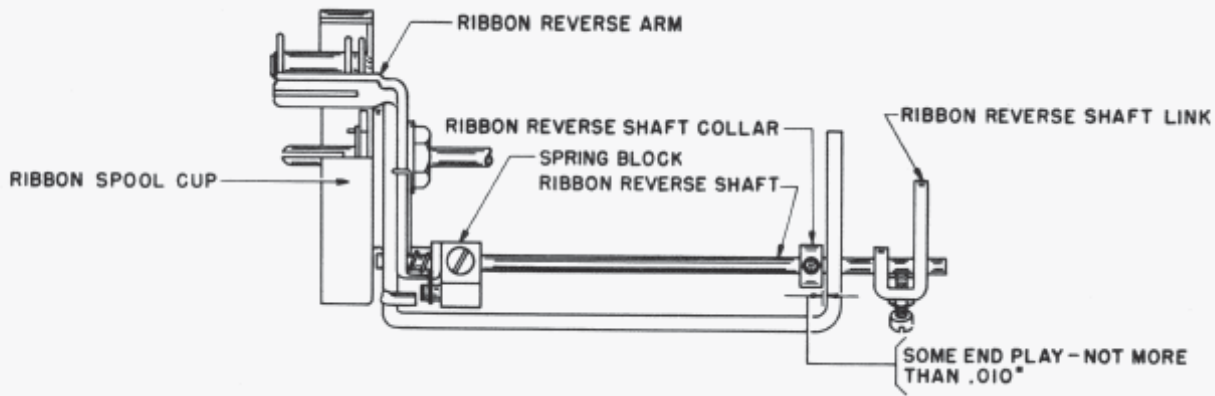


FIGURE 85

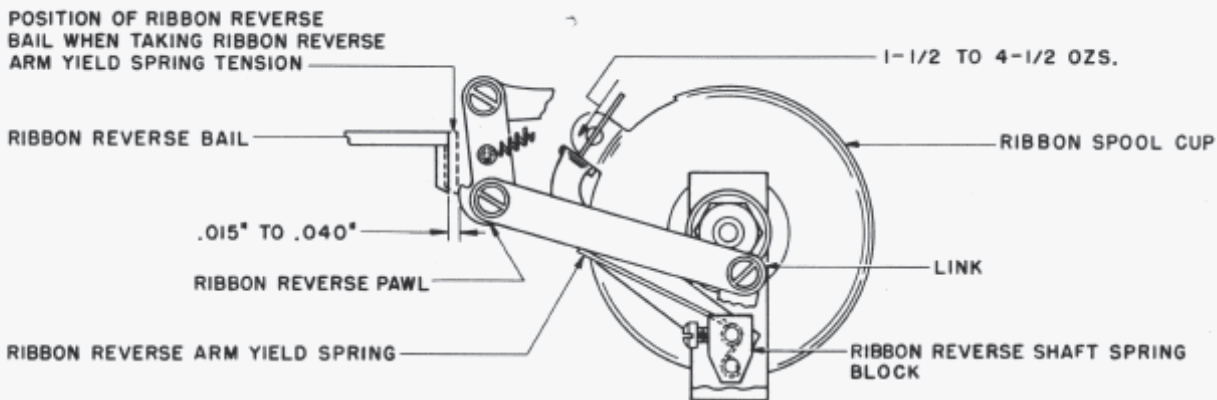
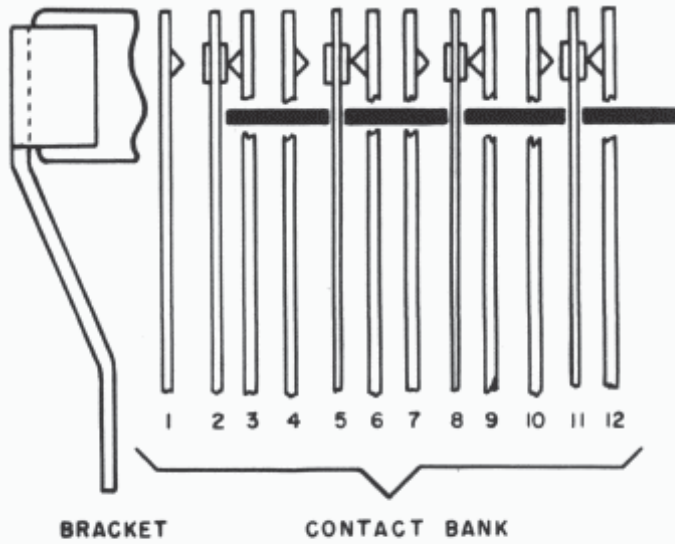
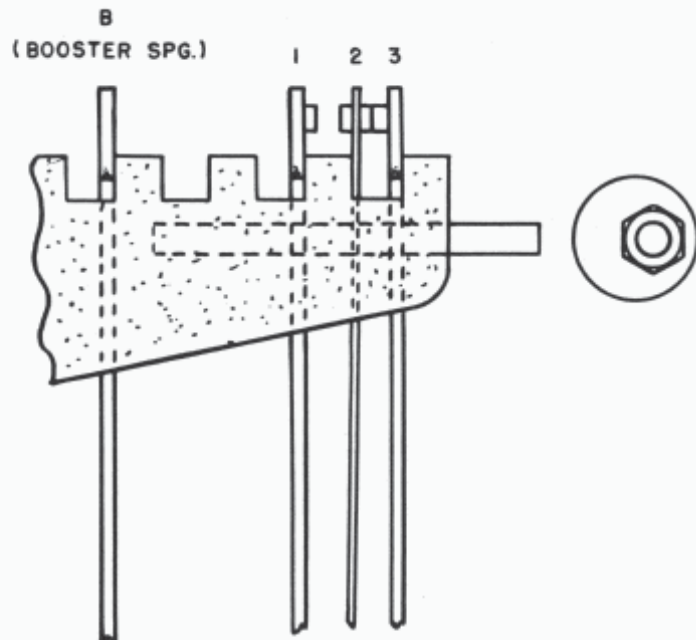


FIGURE 86



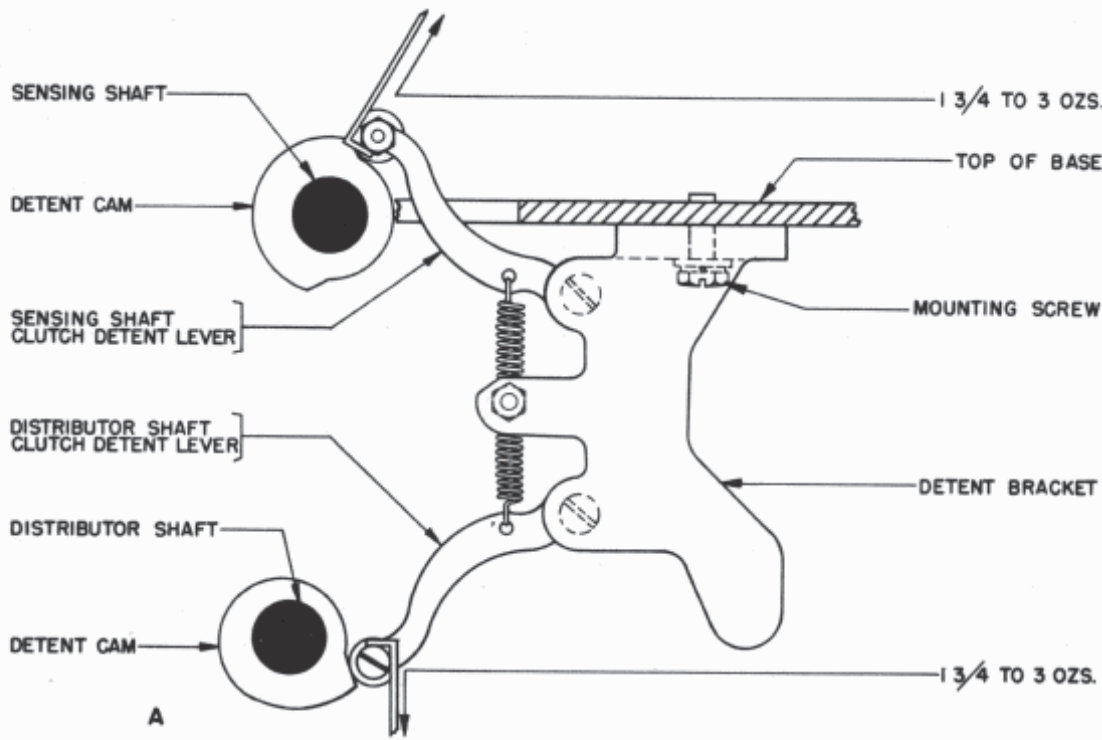
CONTACT PILE-UP 113221 FOR FRXD6, 15 AND 19

FIGURE 87

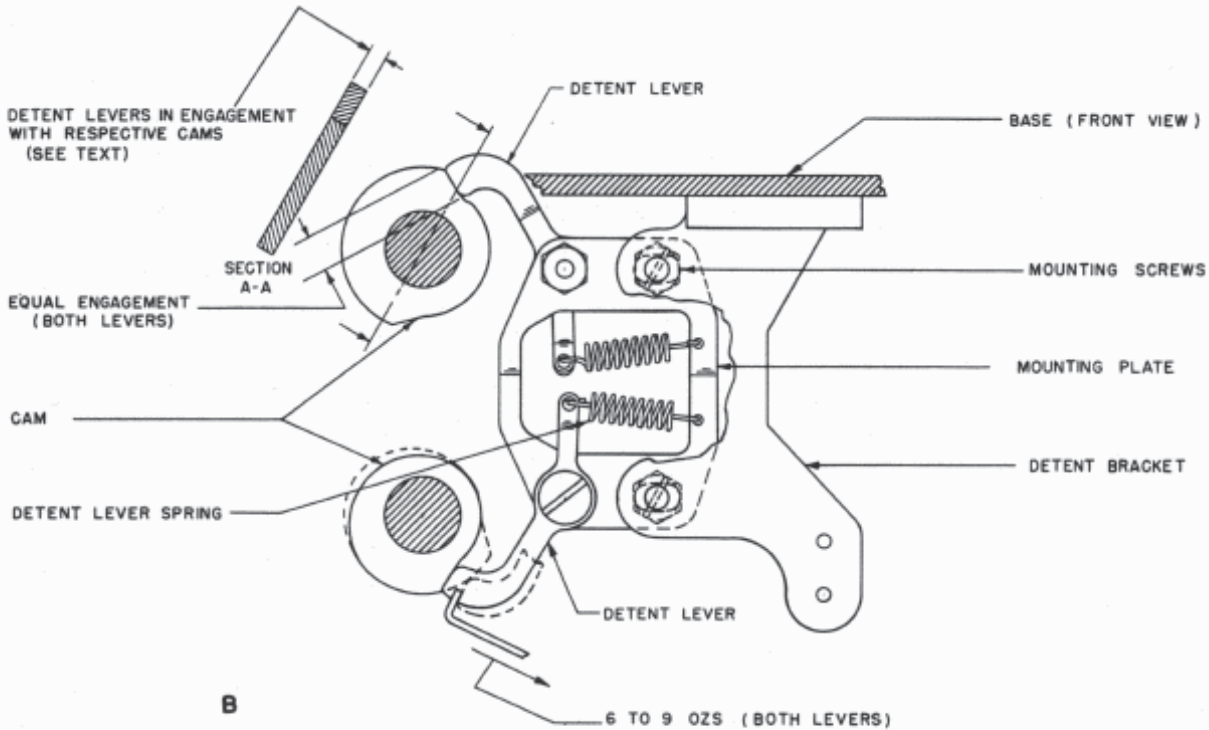


CONTACT PILE-UP 121994 FOR FRXD12

FIGURE 88

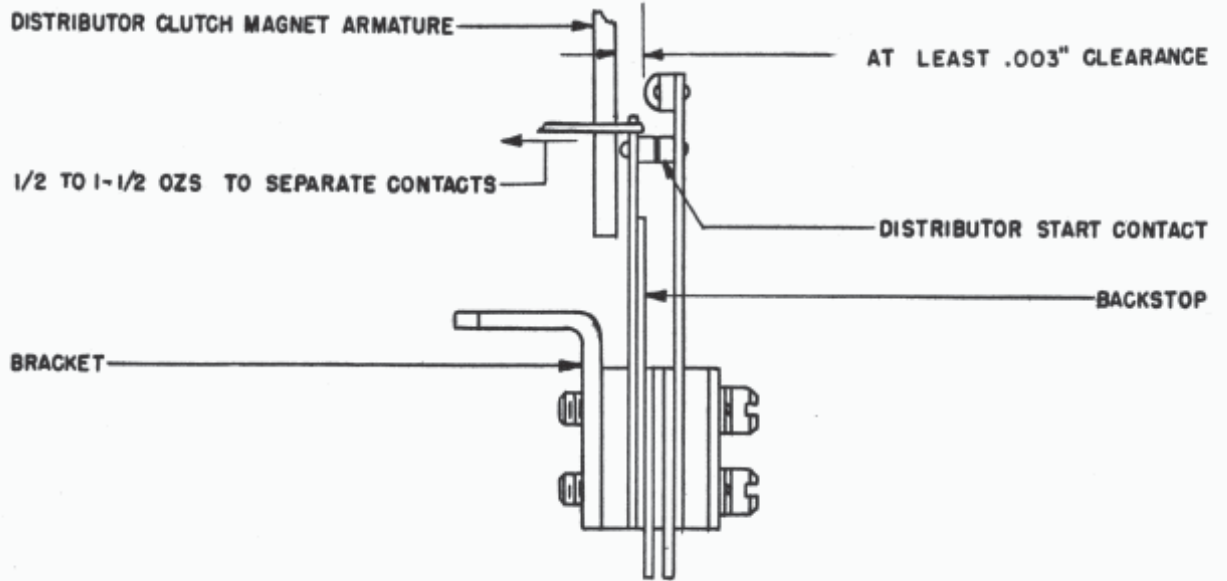


**OLD STYLE SENSING AND DISTRIBUTOR CLUTCH DETENT MECHANISM**

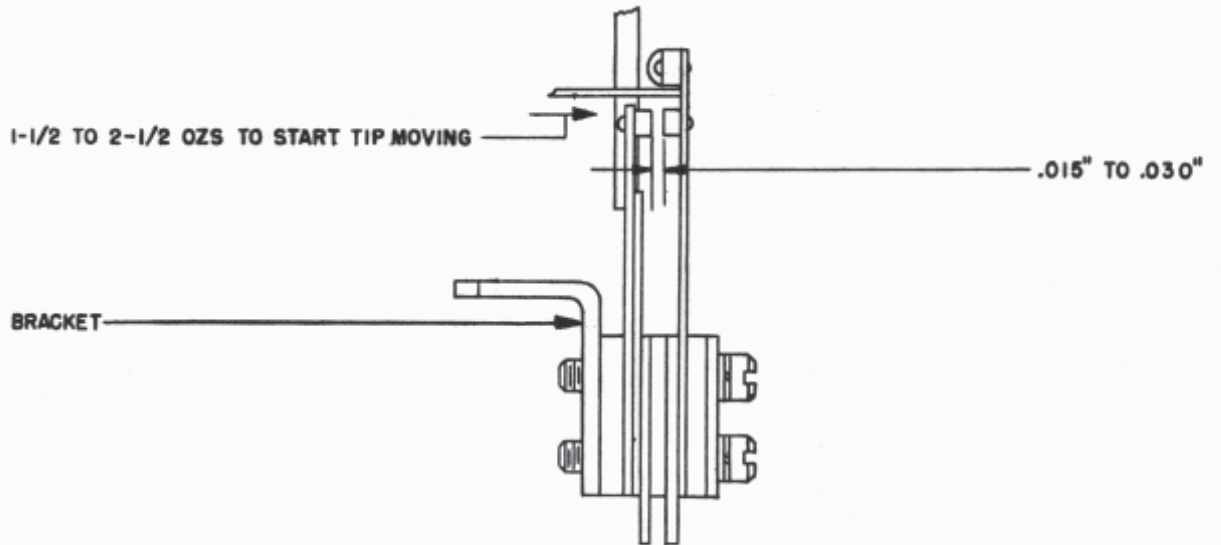


**NEW STYLE DETENT MECHANISM**

**FIGURE 89**



A



B

DISTRIBUTOR START CONTACT ASSEMBLY FOR FRXD16

FIGURE 90

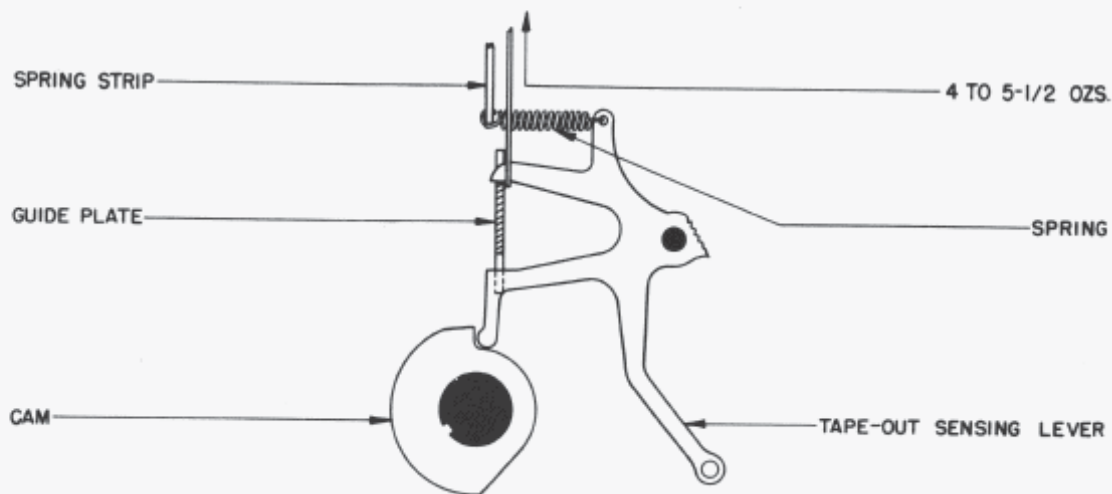


FIGURE 91

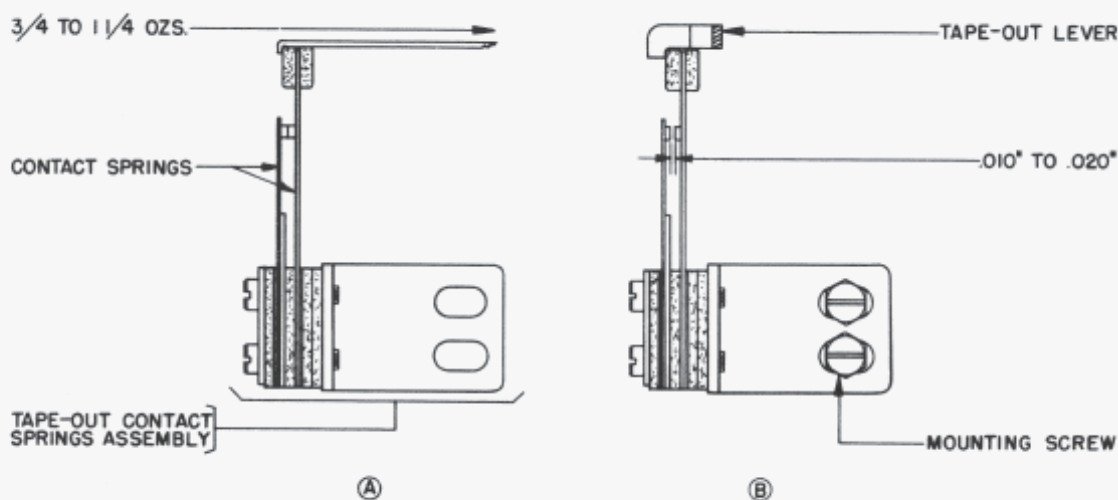
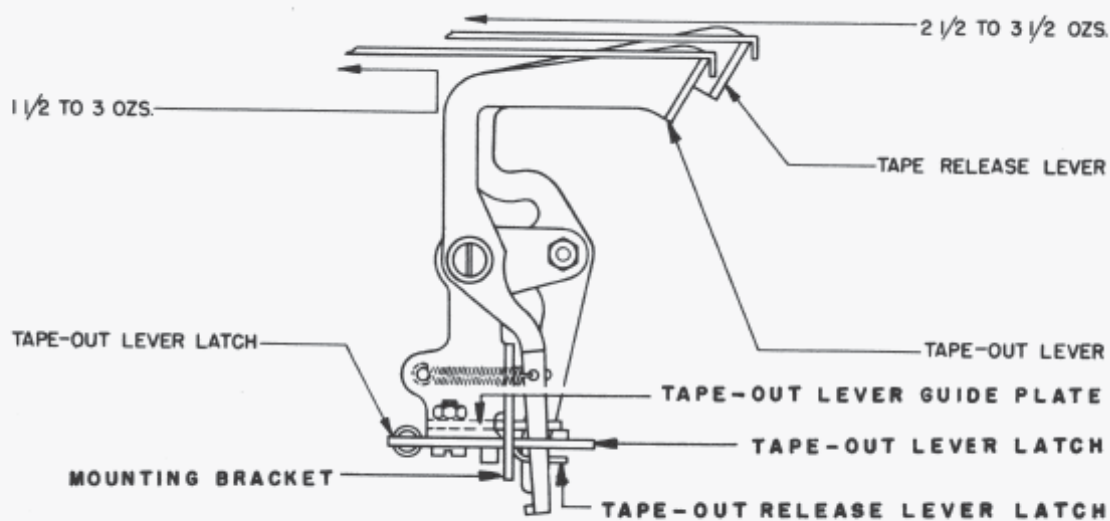


FIGURE 92



RIGHT SIDE VIEW

FIGURE 93

TAPE-OUT RELEASE AND TAPE-OUT LEVERS ASSEMBLY

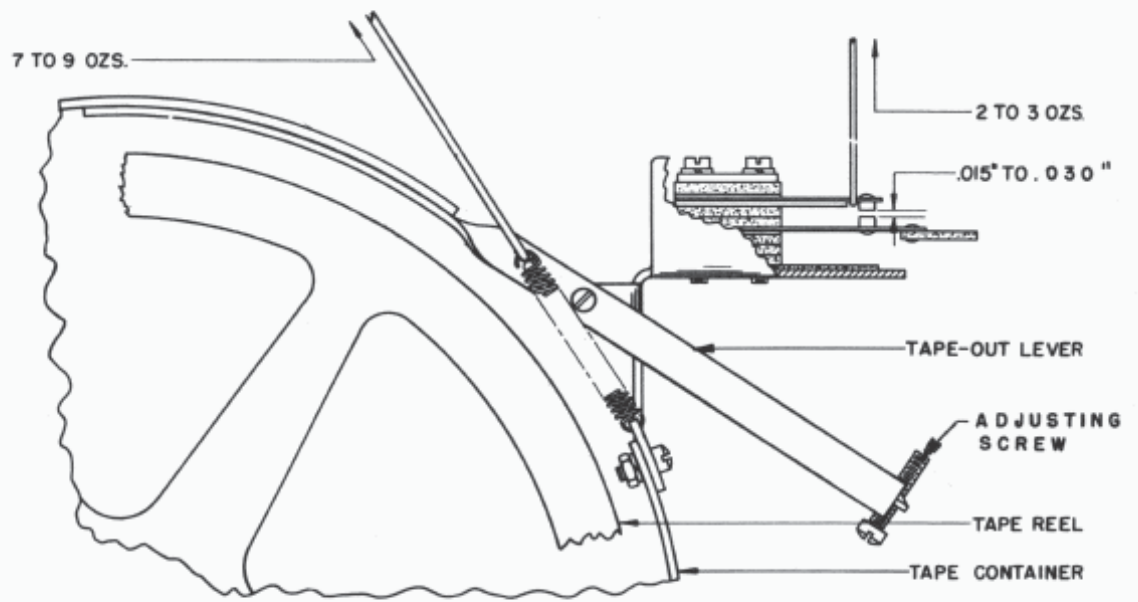
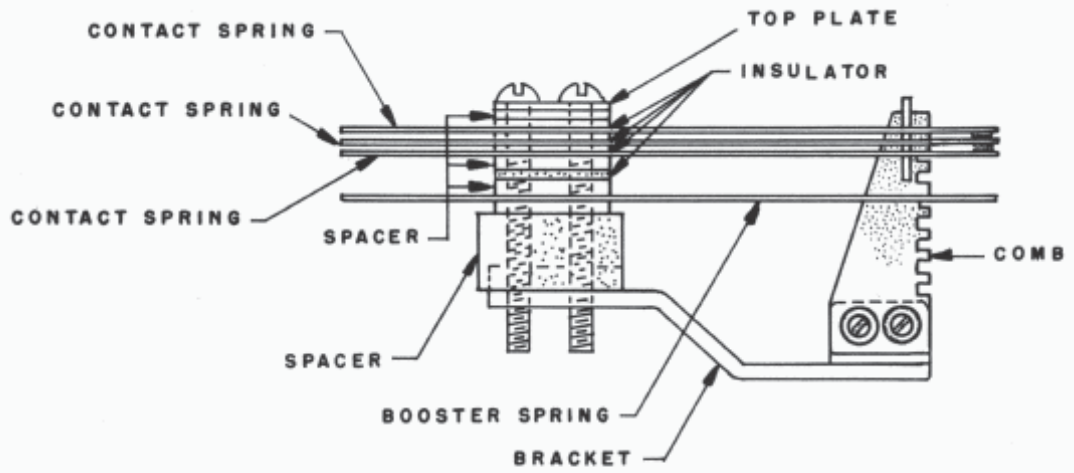


FIGURE 94



121994 CONTACT PILE-UP

FIGURE 95



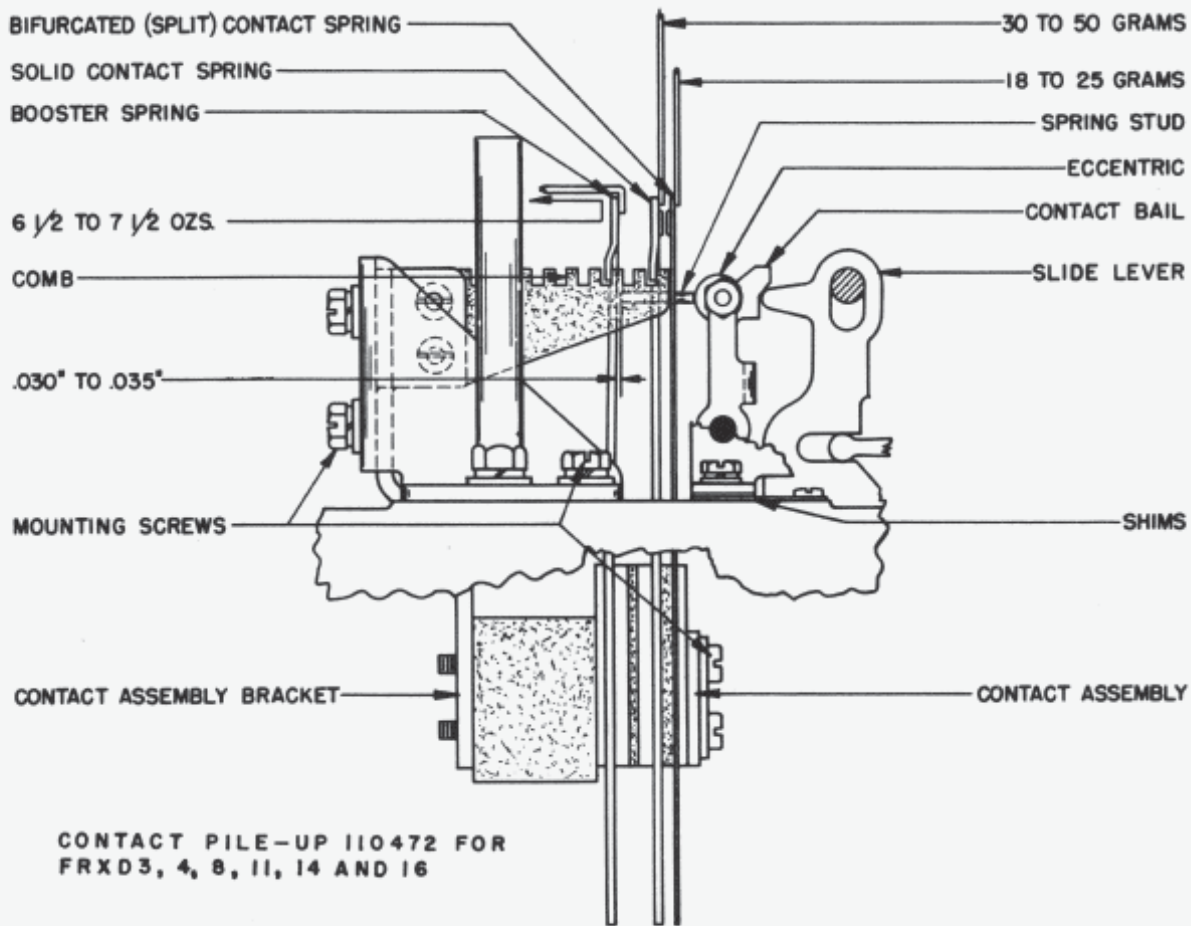


FIGURE 96

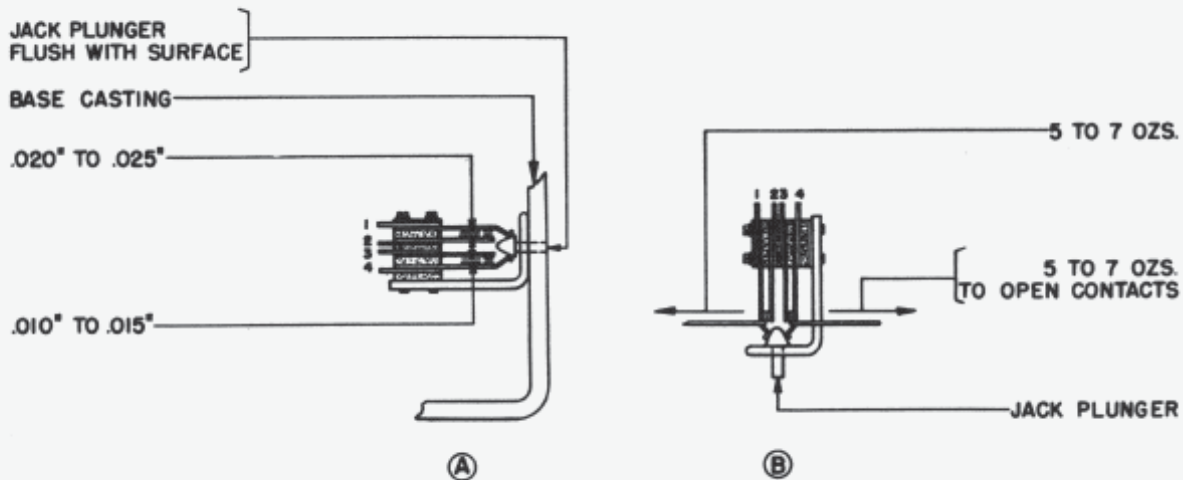


FIGURE 97

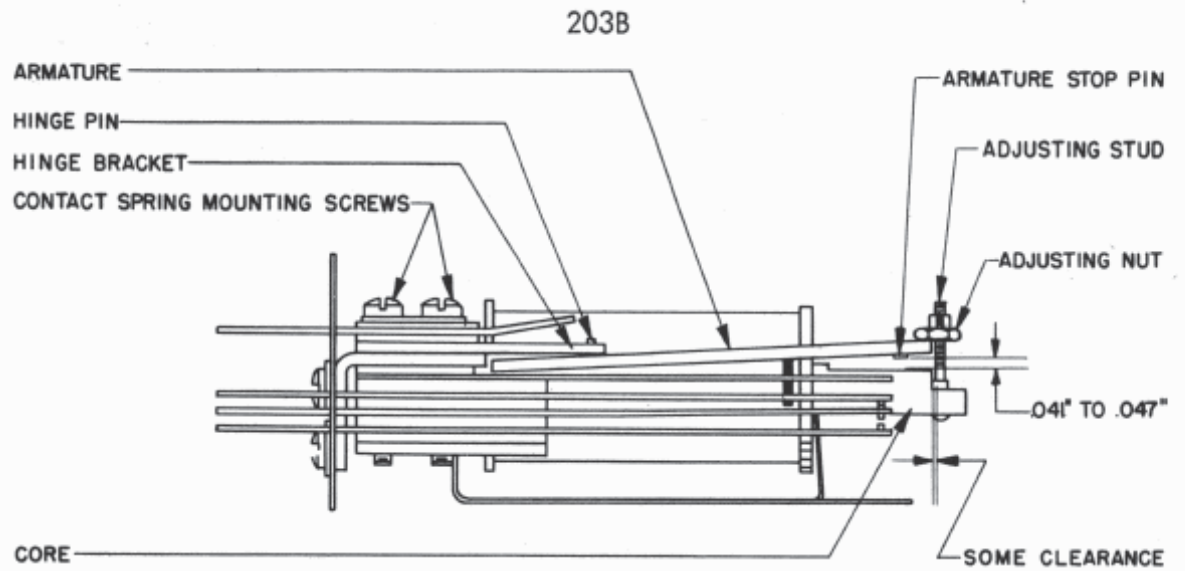


FIGURE 98

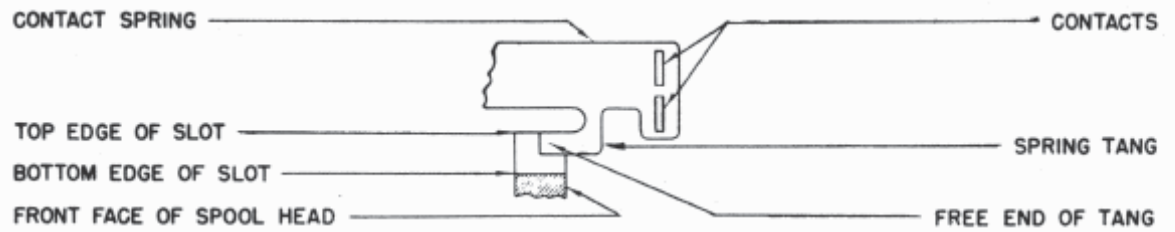


FIGURE 99

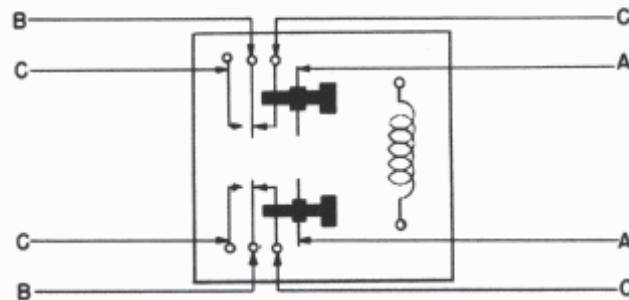
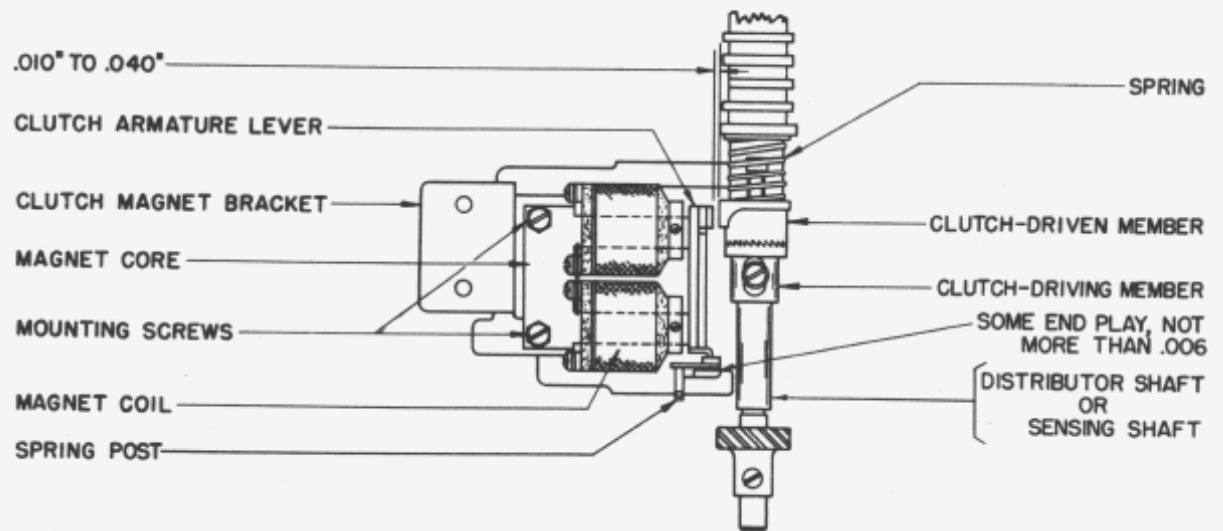


FIGURE 100



UNIVERSAL CLUTCH MAGNET ASSEMBLY

FIGURE 101