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TELETYPE

PRINTING TELEGRAPH SYSTEMS

DESCRIPTION AND ADJUSTMENTS
MULTIPLEX START-STOP
EXTENSOR SET



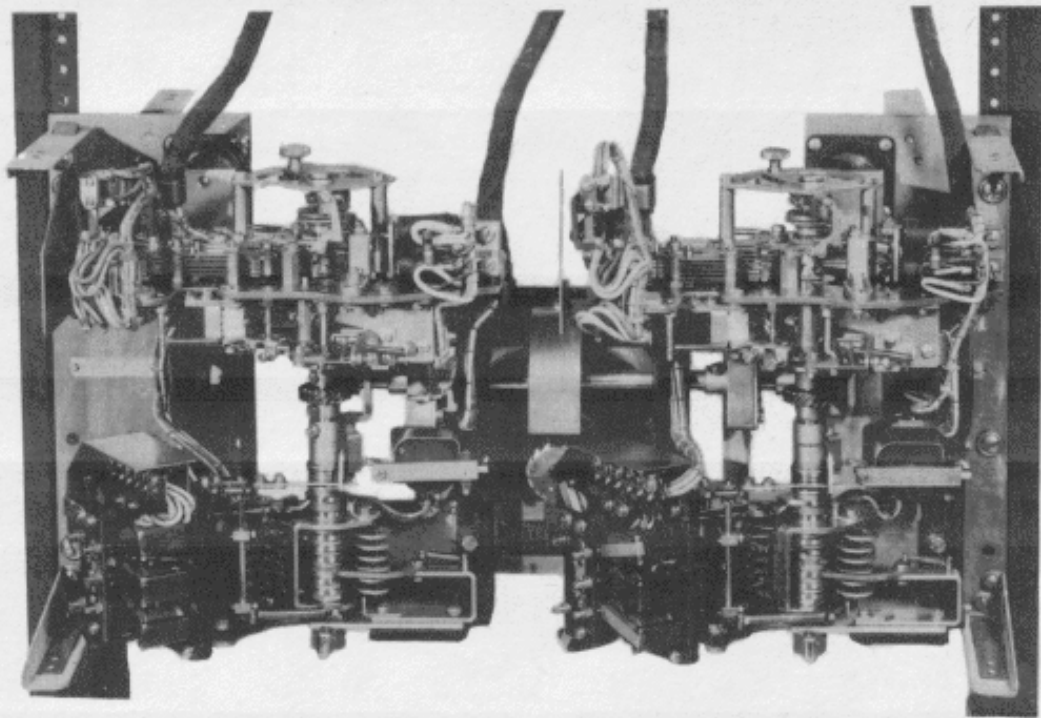
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Western Electric Company
CHICAGO, U.S.A.

TELETYPE

PRINTING TELEGRAPH SYSTEMS

DESCRIPTION AND ADJUSTMENTS
MULTIPLEX START-STOP
EXTENSOR SET





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DESCRIPTION

GENERAL

The multiplex start-stop extensor set is comprised of a mounting panel, a motor, and either one or two extensor units mounted on the panel. The function of each extensor unit is to provide a means for connecting the apparatus on a single Teletype multiplex channel directly to the sending and receiving legs of a start-stop printer circuit. (See Frontispiece)

Where regulated A.C. power is available, a synchronous motor may be used. Governed motors are available for operation on either A.C. or D.C. power.

Each extensor unit has two main sections: the upper section consists of mechanisms which convert start-stop signals to multiplex signals, and the lower section consists of mechanisms which convert multiplex signals to start-stop signals (Figure 1).

The speed requirements for the extensor units are the same as those for the start-stop apparatus except that the speed of the start-stop system MUST NOT exceed that of the multiplex system at any time. In order to meet this requirement, speeds must be set so that the speed of the multiplex system is greater than that of the start-stop system by an amount equal to the maximum overall speed variation which can be expected; a speed difference of 2 per cent has been found satisfactory under ordinary conditions.

UPPER SECTION (START-STOP TO MUX)

The upper section of the extensor unit consists principally of a holding magnet selector, T-levers, transfer slides, a locking bail, and multiplex transmitting contacts. The selector magnet receives the start-stop signals and positions five multiplex transmitting contacts to correspond with the code combinations received (Figures 1 and 2). These contacts are in turn connected to the multiplex transmitting distributor for transmission over the multiplex system.

HOLDING MAGNET SELECTOR

The holding magnet (Figure 3) controls the selector unit by utilizing the start-stop impulses received from the line. A current (marking) impulse will hold the armature against the selector magnet and the stop arm will be held against the stop lever, which is held by the trip latch. Because the stop arm of the selector cam sleeve is engaged by the stop lever, the selector cam sleeve is prevented from rotating. Release of current from the magnet, or a spacing impulse, will unlock the mechanism and permit the selector cam sleeve to rotate.

For the purpose of illustration, suppose the code signals for the letter E are to be received. Upon reception of the start impulse (a no-current impulse), the armature is moved away from the magnet by the armature lever

locking wedge and the selector arm will be free to move in response to the next impulse. The selector arm spring is provided as a necessary yield between the armature lever and the selector arm, because the armature lever cam starts to move the armature toward the selector magnet before the locking lever releases the selector arm.

TRANSFER

When the swords have been positioned to correspond to the selection received, the new selection must be transferred from the swords to the multiplex transmitting contacts.

As the selection is being received it is set up on the swords, but the T levers are locked by the T lever locking bail (Figure 5) so that the selection cannot be transferred from the swords to the T levers. After the No. 5 sword has been positioned, the T lever locking bail is withdrawn from the T levers by its cam to permit the selection which was just set up in the swords to be transferred to the T levers. Between the positioning of the No. 4 and No. 5 swords, the selector cam sleeve (Figure 2) moved the stop arm latch (Figure 7) out of engagement with the start-stop arm, to permit the transfer cam sleeve to rotate. When the transfer cam sleeve rotates approximately 30°, a lug on the transfer cam sleeve engages the rear extension of the sixth pulse magnet armature, and holds the transfer cam sleeve until the sixth pulse magnet is energized. When this occurs, the transfer bail is unlatched and is moved by its spring so that the previous selection of transfer slides (Figures 4 and 5) (held by the transfer bail extension) is released. The transfer slides which were operated will then be moved by their springs, restoring their contact operating levers to their unoperated positions, thereby releasing the previous selection stored in the multiplex transmitting contacts. The forward ends of the newly selected transfer slides will then move to the right, engaging the transfer bail extension, and the unselected transfer slides will be blocked by the forward ends of their T levers.

When the transfer bail reset arm (Figure 7) rides to the high part of its cam as the transfer cam sleeve revolves, the transfer bail will be rotated in such a manner that its extension moves forward, positioning the transfer slides which were just engaged. The associated contact operating lever of each selected transfer slide will be pivoted in a direction which will move the tongue (middle contact) of its contact assembly to the marking (M) contact (Figures 4 and 5). The unselected tongues will remain against their spacing (S) contacts. The transfer bail will continue its motion until its latching arm engages the latch bell crank. The operated contacts will remain locked in position while the selection just set up is being transmitted by the multiplex distributor. Then the sixth pulse will energize the sixth pulse magnet causing its armature to unlatch the transfer bail as previously described. At the same time, the transfer cam sleeve is permitted to rotate to transfer the new selection on the T levers to the multiplex transmitting contacts.

With the foregoing method of tripping the transfer cam sleeve, it may be seen that the cam sleeve can only rotate to transfer a selection to the multiplex transmitting contacts when the start-stop arm is released by the sixth cam on the selector cam sleeve (through the medium of the stop arm latch) between operations of the sixth pulse magnet armature. This insures the transmitting of a single character only to the multiplex transmitting contacts for

for each start-stop cycle. That is, when the multiplex system gains the equivalent of a full character over the start-stop system due to a difference in speed, a blank signal combination is transmitted to the multiplex system. Blank signals are also transmitted to the multiplex system when no transmission is being received from the start-stop circuit.

ARMATURE LATCH LEVER

The sixth pulse magnet armature latch lever (Figure 7) serves to hold the sixth pulse magnet armature in the latched position when the sixth pulse occurs between the time the transfer cam sleeve is released by the operation of the selector cam sleeve and the time the lug on the transfer cam sleeve would normally engage the sixth pulse magnet armature extension. This is accomplished in the following manner:

When the sixth pulse magnet armature is moved to its operated position it permits the armature latch lever to drop into the indent in its cam. The armature extension will move against the latch plate which, in turn, will rotate the latch bell crank, thereby releasing the transfer bail. These mechanisms will be held in the operated position until the armature latch lever rides to the high part of its cam.

LOWER SECTION (MUX TO START-STOP)

The lower section of the extensor unit consists of mechanisms for converting multiplex signals to start-stop signals (Figures 1 and 2). A five magnet selector is used to receive the multiplex signals and positions five transmitting contacts to correspond with the code combinations received. These contacts are connected to a start-stop printer circuit for transmission of the code combinations received from the multiplex system.

FIVE MAGNET SELECTOR

The five magnet selector, located at the left of the main shaft, has its magnets connected to the contacts of the receiving multiplex distributor. When these contacts are energized by corresponding code combinations sent from a multiplex transmitting distributor, the selector magnet armatures are attracted to the magnets and move the selector plungers to the right. The selector plunger strikes the rear arm of the selector lever latch, disengaging it from the selector lever (Figure 8). The forward end of the selector lever moves toward the rear and disengages the corresponding locking lever from the contact lever.

SELECTOR LEVER RESET MECHANISM

Each selector magnet is operated according to the combination of the code. When a magnet is energized, and after the first impulse has been transmitted, a projection on the rear end of its selector lever moves into the path of the reset bail (Figure 9). After the lock loop has engaged the locking levers, the reset bail cam permits the left end of the reset bail to move against the selector lever projection. The rear ends of the selector levers will move to the left and engage the notches of the selector lever latches. These latches and the selector levers are then ready for the reception of the next code combination.

LOCKING LEVER

A locking lever (Figure 9) controls the motion of each contact lever either by allowing the contact lever to close its contacts, when the cam revolves, or by restricting the motion of the contact levers.

If the forward end of the locking lever is positioned to the right, corresponding to a spacing impulse, the locking lever engages the contact lever and prevents it from rising into the indent of its cam as the cam revolves, thus holding the circuit open for that impulse. If the forward end of the locking lever is positioned to the left, (Figure 8) it does not restrict the action of the contact lever, the lever rises into the indent of its cam, allowing the contact to close, and a marking impulse is transmitted.

The lock loop, which is moved forward by the lock loop cam at the end of each revolution of the cam assembly, is used while in its rear position, to engage the forward projections of the locking levers, thus preventing a change in selection while the cam assembly is rotating (See Figures 8 and 9).

START-STOP CAM

The start-stop cam (Figure 10) controls that contact lever which actuates the start-stop contacts. These contacts are opened at the beginning of each revolution of the cam assembly to transmit the start impulse (spacing) and remain open during the transmission of the five selector impulses. After the fifth impulse has been transmitted, the start-stop contacts will close, transmitting the stop impulse (marking) to the line. At the end of the cam assembly's revolution, the clutch throwout lever cams the driven clutch member out of mesh with the driving clutch member and prevents the cam assembly from rotating farther. The start-stop contacts will remain closed until the cam assembly is again started rotating by a sixth impulse from the multiplex receiving distributor which operates the release magnet armature (See Figure 11).

CLUTCH LEVER LATCH

The receiving mechanism is equipped with a clutch lever latch (Figures 11 and 20-A) which prevents the transmitting clutch from operating when all the selector levers are latched and in their unoperated position. When a code combination is set up in the selector magnets and one or more of the selector magnets is unlatched, they, in turn, move the clutch lever latch loop to the rear, the clutch lever latch moves away from the clutch throwout lever and the receiving multiplex distributor sixth pulse is permitted to energize the clutch release magnet.

ADJUSTMENTS

This bulletin contains requirements and adjusting procedure for the maintenance of multiplex extensor units. Adjustments are arranged in a sequence which would be followed if a complete readjustment of a unit were undertaken. In following such procedure, parts or assemblies which are removed to facilitate adjustment should not be replaced until all other adjustments which would be facilitated by the removal of these parts are made. If one adjustment is changed, related adjustments should be checked because a change in one adjustment may affect related adjustments. These facts should be kept in mind when a single adjustment is to be made.

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.

In order to facilitate adjusting the multiplex extensor, the unit should be removed from the multiplex extensor panel and placed on its back. This practice is advocated because in many of the following adjustments parts are referred to as viewed with the unit in this position.

Three mounting screws, two inserted from the back of the panel and one from the front (in lower right corner of casting) must be taken out before the unit can be removed.

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

NOTE: In all figures of this bulletin, fixed pivot points are designated by solid black circles.

MAIN SHAFT BEARINGS ADJUSTMENT (Figure 12)

With the main shaft in its stop position, there should be some clearance, not more than .003", between the upper bearing and the shaft collar. To adjust, loosen the collar set screw, position the collar and tighten the screw.

When the above requirement has been met and the main shaft is in the stop position, the cams should line up with their corresponding contact levers and there should be some end play between the lower bearing and the bottom of the cam cylinder assembly. To adjust, add or remove shims.

LOWER SECTION (MUX TO START-STOP) ADJUSTMENTS

LOWER BEARING SUPPORT ADJUSTMENT

NOTE: The main shaft is adjusted during the initial assembly of the unit and should require attention only if the shaft has been damaged or dismantled. If it is necessary to check the adjustment, remove the necessary parts to free the shaft.

Under the foregoing condition, the main shaft should rotate freely without bind when turned by hand. To adjust, position the lower bearing support to secure the proper bearing alignment and tighten the mounting screws. See Figure 13 for location of parts.

LOWER SECTION PLATE ADJUSTMENT

The lower section plate should be aligned with the lower bearing support. To adjust, loosen the mounting screws, position the three stops of the lower section plate against the lower bearing support and tighten the screws. See Figure 13 for location of parts.

CLUTCH THROWOUT LEVER ADJUSTMENT (Figure 14)

NOTE: Before making this adjustment, see that the clutch throwout lever does not bind in the slot of the adjusting screw. If a binding occurs, loosen the release magnet bracket mounting screws and reposition the magnet bracket.

There should be .005" to .015" clearance between the clutch teeth when the clutch is fully disengaged and the play between the driving clutch member mounting screw and its mounting hole has been taken up toward the driven clutch member. To adjust, remove the armature and position the clutch throwout lever by means of shims placed between the throwout lever pivot and the clutch lever bracket.

DETENT LEVER ADJUSTMENT (Figure 15A)

With the cam cylinder in its stop position and the detent lever on the low part of its cam, there should be some clearance, not more than .008", between the end of the detent lever and the cam. To adjust, position the detent lever bracket. Tighten the mounting screw nuts.

DETENT LEVER SPRING TENSION (Figure 15B)

Unhook the detent lever spring from its post on the detent lever bracket, and, with the detent lever on the high part of its cam, hook an 8 oz. scale in the spring eye and pull horizontally in line with the post on the detent lever. It should require 1-1/2 to 2-1/2 ozs. to pull the spring to its normal position length.

SELECTOR LEVER LATCH SPRING TENSION (Figure 16A)

With the selector magnet assembly removed and the selector levers in their latched position, hold the selector levers away from the latch and apply an 8 oz. scale horizontally to the spring end of the latch. A push of 3 to 4 ozs. should be required to start the latch moving.

SELECTOR LEVER SPRING TENSION (Figure 16B)

With the selector magnet assembly removed and the selector levers in their unlatched position, rotate the main shaft to the stop position. Continue to rotate the main shaft until the lock loop blade just touches the locking levers. Hook an 8 oz. scale horizontally over and at right angles to the rear end of the selector lever. It should require a pull of 6 to 8 ozs. to move each selector lever to its latched position.

SELECTOR PLUNGER SPRING TENSION (Figure 17A)

With the selector magnet assembly and the stop screw plate removed, apply an 8 oz. scale horizontally to the end of each plunger. It should require a pressure of 1/2 to 3/4 oz. to move the plunger until it is flush with the selector magnet frame. Replace the stop screw plate and the selector magnet unit. (See Figure 17B for location of parts.)

SELECTOR ARMATURE SCREW ADJUSTMENT

The selector lever latches should just release their selector levers when the corresponding armatures are held firmly against the magnet cores. To adjust, back off the selector armature screws so that when each armature is brought against the selector magnet cores, the selector latch fails to release the lever. Holding the selector armature firmly against the magnet cores, advance the armature screw slowly until the corresponding selector lever is just released. Then advance the screw one-sixth of a turn additional, and tighten the lock nut. Reset the selector lever and operate the armature to make sure that the tightening of the lock nut does not disturb the adjustment. See Figures 16B and 17A for location of parts.

SELECTOR ARMATURE BACKSTOP SCREW ADJUSTMENT (Figure 17B)

There should be .004" to .006" clearance between any selector armature and its backstop screw when the corresponding selector lever is engaged with its latch and the armature is pressed lightly against its plunger to take up all the clearance between the plunger and its latch. Adjust the backstop screw to obtain this clearance.

LOCKING LEVER BRACKET ADJUSTMENTS

- (1) With the cam cylinder in the stop position and the contact levers on the high part of their cams, there should be some clearance, not more than .010", between the contact levers and the locking levers, when the locking levers are moved from the marking to the spacing position. (See Figure 18A.) There should also be some clearance when the locking levers are pressed downward by hand to make this clearance a minimum.

To adjust, tighten the left rear mounting screw friction tight on the lower section bracket and with the other two mounting screws loosen the lower section plate. (See Figures 2 and 13.) Pivot the lower section bracket around the left rear mounting screw until the correct clearance is obtained.

- (2) With the cam cylinder in its stop position and with the locking levers in their spacing position, rotate the cam cylinder until the lock loop is just off the high part of the cams. In this position there should be .015" to .030" clearance between the closest locking lever and the lock loop blade. With the contact locking levers in their marking position there should be at least .015" clearance between the lock loop blade and the closest locking lever. (See Figure 18A.)

To adjust, tighten the rear slotted mounting screw friction tight and loosen the left rear mounting screw. Pivot the lower section bracket (Figures 2 and 13) around the rear slotted mounting screw until the correct clearance is obtained. Tighten the three mounting screws and recheck paragraph (1).

RESET BAIL ADJUSTMENT (Figure 19A)

When the main shaft is rotated until the reset bail roller is on the high part of its cam, the reset bail should cause the selector levers to overtravel their corresponding latches .006" to .020". Adjust the selector lever reset bail adjusting screw to obtain this overtravel.

RESET BAIL SPRING TENSION (Figure 19B)

With the transmitting cam in its stopped position, hook an 8 oz. scale horizontally under the blade of the reset bail and pull as nearly parallel to the blade as possible. A pull of 1/2 to 2 ozs. should be required to start the bail moving.

LOWER CLUTCH RELEASE MAGNET ADJUSTMENT (Figure 14)

With the clutch throwout lever on the low part of the driven clutch member, there should be .010" to .020" clearance between the edge of the clutch throwout lever and the bottom of the groove in the adjusting screw, when the play in the armature is taken up in a direction to make the clearance a minimum. To adjust, loosen the release magnet bracket mounting screws, position the bracket and tighten the screws. (See Figure 20A for location of parts.)

CAM CYLINDER CLUTCH SPRING COMPRESSION (Figure 21)

Hook a 32 oz. scale over the projection on the driven clutch member and pull directly in line with the main shaft. It should require 9 to 12 ozs. to separate the clutch teeth.

CLUTCH THROWOUT LEVER ADJUSTING SCREW ADJUSTMENT (Figure 20B)

There should be .006" to .015" clearance between the clutch throwout lever and the high part of the driven clutch member when the clutch release

magnet is operated manually and the clutch throwout lever is held to the left to make this clearance a minimum. To adjust, loosen the adjusting screw lock nut and position the adjusting screw. Tighten the lock nut.

RELEASE MAGNET ARMATURE SPRING TENSION (Figure 20A)

With the clutch throwout lever on the low part of the driven clutch member and the clutch lever latch held away from the clutch throwout lever, apply the push end of an 8 oz. scale horizontally to the adjusting screw on the armature. It should require 2 to 3 ozs. to start the armature moving toward the magnet.

SIXTH PULSE CUTOUT BAIL ADJUSTMENT (Figure 22)

The sixth pulse cutout bail should be parallel to its shaft, as judged by eye, and it should be secured to its shaft in such a manner that the upper end of the shaft extends .030" to .060" above the bearing plate when the lower clamping block is resting on the lower section bracket. To adjust, loosen the set screws, position the cutout bail and tighten the set screws.

SIXTH PULSE CUTOUT BAIL SHAFT BEARING PLATE ADJUSTMENT

The sixth pulse cutout bail shaft should be free and appear to be parallel to the ends of the selector latches. To adjust, loosen the bearing mounting screws, position the bearing plate and tighten the mounting screws. See Figure 22 for location of parts.

CLUTCH LEVER LATCH ADJUSTMENT (Figure 20A)

With the main shaft in the stop position and the clutch fully disengaged, there should be .005" to .015" clearance between the latching surface of the clutch lever latch and the clutch throwout lever. To adjust, loosen the latch mounting screws, position the clutch lever latch and tighten the mounting screws. See Figure 22 for location of parts.

CLUTCH LEVER LATCH SUPPORT ADJUSTMENT (Figures 14 and 22)

With the cam cylinder in its stop position and the No. 1 selector lever tripped off, move the release armature to its operated position. There should be .020" to .040" clearance between the clutch throwout lever and the latch (Figure 14) and also a clearance of .005" to .015" between the latch support and the shaft's upper bearing (Figure 22). Recheck the first requirement with the No. 5 selector lever tripped off instead of the No. 1. To adjust, loosen the set screw and position the latch support on its shaft. Tighten the set screw.

CLUTCH LEVER LATCH SPRING TENSION (Figure 22)

With the main shaft in its stop position, unhook the clutch lever latch spring from the bearing plate; hook an 8 oz. scale in the spring eye and pull horizontally in line with the spring. It should require 1-1/2 to 3 ozs. to pull the spring to its normal position length.

CONTACT LEVER SHAFT ADJUSTMENT (Figure 23)

The upper end of the contact lever shaft should be approximately flush with the upper surface of the lock loop extension and the lower end of the shaft should pivot in the lower section plate. To adjust, loosen the set screws in the contact bracket and in the collar. Position the shaft and tighten the set screws. Before tightening the collar set screw, make certain that some play is left between the lower surface of the collar and the upper surface of the lock loop.

TRANSMITTING CONTACTS GAP ADJUSTMENT (Figure 18A)

The contact bracket should be positioned so that the mounting screws are approximately in the center of their holes. (See Figure 23.) Under this condition, with any contact lever on the high part of its cam, the gap between the contacts should be .020" to .025". *To obtain this clearance, bend the shorter contact spring.

(*).015" to .025" for start-stop contact only.

CONTACT SPRING PRESSURE (Figure 18B)

With any contact lever on the low part of its cam, hook the end of an 8 oz. scale over the long contact spring just above the insulator. It should require a pull of 3 to 4 ozs. to open the contacts. To adjust, bend the longer contact spring. Recheck the Transmitting Contacts Gap Adjustment.

LOCK LOOP ADJUSTMENT (Figure 24)

With the cam cylinder sleeve in its stop position, there should be a clearance of .008" to .015" between the lock loop blade and the tip of the pointed end of the locking lever having the least clearance. To adjust, loosen the locking screw in the lock loop extension and rotate the cam sleeve until the clutch teeth are fully disengaged. Position the locking levers directly below the lock loop blade to make this clearance a minimum. Position the lock loop extension to obtain the proper clearance. Tighten the locking screw.

LOCK LOOP SPRING TENSION (Figure 25)

Rotate the cam cylinder until the lock loop roller is resting on the low part of its cam. Hook an 8 oz. scale on the lock loop just behind the spring eye and pull horizontally in line with the spring. It should require 3-1/2 to 4-1/2 ozs. to start the lock loop moving.

LOCKING LEVER SPRING TENSION (Figure 26)

With the unit resting on its back, rotate the main shaft to the stop position and trip all the selector levers. Hook an 8 oz. scale over the end of the locking lever and pull at right angles to the levers. It should require 1/2 to 1-1/2 ozs. to start each locking lever moving.

LOCK LOOP STOP (Figure 25)

With the cam cylinder in the stop position, there should be .010" to .020" between the lock loop and its stop bracket. To adjust, loosen the mounting screw and position the stop bracket. Tighten the mounting screw.

UPPER SECTION (START-STOP TO MIX) ADJUSTMENTS

UPPER SECTION PLATE ADJUSTMENT

When the main shaft is rotated, the selector cams on the selector cam sleeve should line up with their respective selector levers. To adjust, add or remove shims between the upper section plate and the main casting.

REMOVE THE RANGE FINDER ASSEMBLY

ARMATURE PIVOT SCREW ADJUSTMENT (Figure 27) See Note (A)

With the armature spring and the selector arm spring unhooked, the armature should be free on its pivots with barely perceptible end play. Adjust by means of the upper pivot screw.

SELECTOR MAGNET ADJUSTMENT (Figure 28) See Note (A)

The armature, when in its operated position, should touch both magnet cores at approximately the centers of their pole-faces, and the cores should be centrally located with respect to the armature, as gauged by eye, when holding a light background behind the magnet and armature assembly. To adjust, remove the selector magnet bracket from the unit and reposition the magnet core assembly by means of its mounting screws while holding the assembly so that the cores are vertical and the armature, by its own weight, rests against the pole-faces. Replace the selector magnet bracket.

NOTE: When the cores are in proper adjustment and the push end of a 12 lb. scale is applied at right angles to the armature edge midway between the cores, it should require at least 5 lbs. to separate the armature from the cores when a current of .060 ampere is flowing through the magnet coils.

SELECTOR ARM PIVOT SCREW ADJUSTMENT (Figures 27 and 30) See Note (A)

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

* * *

(A) These requirements should be checked with the range finder assembly removed.

.008" between the selector arm and the armature, 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.

SELECTOR ARM BRACKET ADJUSTMENT (Figure 27) See Note (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:

- (1) Remove the locking lever spring, the armature spring, and the selector arm 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.
- (2) 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.
- (3) 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 screw just enough to make the bracket friction tight. Then, to equalize the clearance between the swords and the stop post, 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.

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.

* * *

- (A) These requirements should be checked with the range finder assembly removed.

To obtain the "some clearance, not more than .040," requirement between the swords and the stop posts, 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.

LOCKING WEDGE ADJUSTMENT (Figure 31) See Note (A)

With the locking lever on a high part of its cam, the right end of the locking wedge should clear the locking lever by .006" to .010" when the end of the 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.

LOCKING LEVER SPRING TENSION (Figure 31) See Note (A)

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

SELECTOR ARM STOP DETENT ADJUSTMENT (Figure 29) See Note (A)

With the locking lever on the low part of its cam, there should be an equal amount of clearance, within .003", between the sides of the locking wedge and the locking lever when the selector arm is 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.

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.

SELECTOR ARM STOP DETENT SPRING TENSION (Figure 29) See Note (A)

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

SELECTOR LEVER SPRING TENSION (Figure 31) See Note (A)

With the T-levers in the marking position, move the swords manually to the spacing position. Hook a 32 oz. 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 ozs. to start each selector lever moving.

* * *

(A) These requirements should be checked with the range finder assembly removed.

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

SELECTOR MAGNET BRACKET POSITION ADJUSTMENT (Figure 32)

With the main shaft in the stop position, rotate the selector cam sleeve until the locking lever just drops off the high part of the locking lever 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 .060" to .065" between the armature lever and the face of a tooth on the armature lever cam.

To adjust, loosen the selector magnet bracket mounting screws and the selector magnet bracket adjusting arm mounting screws just enough to make the bracket and adjusting arm friction tight. Then position the selector magnet bracket by means of the adjusting arm, using the 90783 adjusting wrench. To do this, insert the adjusting wrench in the hole above the end of the adjusting arm and rotate the wrench. Tighten the bracket and adjusting arm mounting screws.

SELECTOR MAGNET BRACKET ADJUSTMENT (Figure 28) See Note (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 lever is on a peak of its cam than when the armature lever is opposite an indent on the cam.

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

NOTE: The coil should not be energized while making the following part of this adjustment.

- (B) 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.)
- (C) 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". Then rotate the selector cam sleeve so that the armature lever 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

* * *

- (A) These requirements should be checked with the range finder assembly removed.

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.

ARMATURE SPRING TENSION ADJUSTMENT (Figure 28A) See Note (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 oz. scale hooked in its spring eye, pull the spring to its position length. It should require the following tensions:

- (A) If a distortion test set is available, the spring tension should be set at the optimum value within the limits of 13 to 24 ozs.
- (B) If no distortion test set is available, the spring tension should be 17 to 19 ozs; except when coils are connected in parallel without a 1000 ohm shunt. Under this latter condition the tension should be 13 to 15 ozs.

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

SELECTOR ARM OPERATING SCREW ADJUSTMENT (Figure 33) See Note (A)

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.

FIFTH "T" LEVER FRICTION SPRING ADJUSTMENT

Position the spring by means of its mounting screw so that the spring presses against the fifth "T" lever approximately midway between the shoulder on the "T" lever and the stop posts. Then apply a gram scale to the spring approximately in line with the "T" lever spacing stop post. It should require a force of 7 to 14 grams to move the spring away from the "T" lever. Adjust by bending the spring.

SELECTOR ARM SPRING TENSION (Figure 34) See Note (A)

Unhook the selector arm stop detent spring. With the armature lever on a high part of its cam, hook an 8 oz. 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 ozs. to start the selector arm moving. Replace the detent spring.

* * *

- (A) These requirements should be checked with the range finder assembly removed.

STOP LEVER ECCENTRIC STUD ADJUSTMENT (Figure 35) See Note (A)

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

TRIP LATCH SPRING COMPRESSION (Figure 35) See Note (A)

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

Apply the push end of an 8 oz. 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 ozs., when pushing upward, to start the trip latch moving.

STOP LEVER SPRING TENSION (Figure 36) See Note (A)

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 oz. scale on the end of the stop lever of the range finder assembly and pull horizontally at right angles to the stop lever. It should require 3/4 to 1-1/4 ozs. to start the lever moving.

REPLACE THE RANGE FINDER ASSEMBLY, TAKING CARE TO AVOID JAMMING THE TRIP LATCH PLUNGER AGAINST THE ARMATURE TRIP-OFF SCREW WHEN REMOUNTING

TRIP-OFF SCREW ADJUSTMENT (Figure 37)

There should be some clearance, not more than .002", 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.

The trip latch plunger should have at least .002" end play when the armature is held in the attracted position and with the stop lever against its eccentric stud. (See Figure 35).

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.

SIXTH PULSE ARMATURE PIVOT BRACKET ADJUSTMENT (Figure 38)

With the armature extension stop screw backed off, there should be approximately .050" between the magnet pole face and the armature at the closest point. To adjust, loosen the armature pivot bracket mounting screws, position

* * *

(A) These requirements should be checked with the range finder assembly removed.

the armature pivot bracket and tighten the mounting screws.

SIXTH PULSE ARMATURE LATCH ADJUSTMENT (Figure 38)

With the armature latch lever on the highest part of the cam, there should be a clearance of .010" to .020" between the bottom edge of the armature extension and the top edge of the sixth pulse armature latch lever. To adjust, add or remove shims between the magnet bracket and the magnet yoke. Tighten the mounting screws.

SIXTH PULSE MAGNET BRACKET ADJUSTMENT (Figure 39)

Rotate the main shaft until the sixth pulse armature latch lever is on the low part of its cam. Manually move the armature and hold it in its operated position. There should be a clearance of .005" to .015", between the latching surface of the armature extension and the latching surface of the armature latch lever.

To adjust, loosen the magnet bracket mounting screws, position the magnet bracket, and tighten the mounting screws.

SIXTH PULSE ARMATURE GAP ADJUSTMENT

With the armature in the unoperated position, the air gap between the armature and the pole face measured at the closest point should be from .040" to .050". To adjust, position the armature extension stop screw and tighten the lock nut. Refer to Figure 38 for location of parts.

ARMATURE SPRING TENSION (Figures 38 and 42)

With the armature latch lever on the high part of its cam and the sixth pulse latching plate held off, apply the push end of an 8 oz. scale horizontally to the upper latching end of the armature extension. It should require 1 oz. to 1-1/2 ozs. to start the extension moving.

ARMATURE LATCH LEVER SPRING TENSION (Figure 38)

With the armature latch lever on the high part of its cam, hook a 32 oz. scale over the armature latch lever at the spring eye and pull in line with the spring. It should require 10 to 14 ozs. to start the lever moving.

START-STOP ARM SPRING TENSION (Figure 40)

Rotate the main shaft until the start-stop arm is on the high part of its cam and unhook the spring from its post. Hook a 32 oz. scale in the spring eye and pull in line with the post. It should require 8 to 10 ozs. to pull the spring to position length.

STOP ARM LATCH ADJUSTMENT (Figures 40 and 41)

It will be necessary to meet the two following requirements by means of the same adjustment. Rotate the main shaft until the stop arm latch is on the peak of its cam. There should be .020" to .040" clearance between the high part of the stop arm latch and the end of the start-stop arm. Then rotate the

main shaft until the start-stop arm is on the high part of its cam. There should be .010" to .020" overtravel between the latching surface of the stop arm latch and the start-stop arm. To adjust, loosen the stop arm plate mounting screws and position the stop arm plate. Tighten the mounting screws.

STOP ARM LATCH SPRING TENSION (Figure 41)

Rotate the main shaft until the stop arm latch is on the high part of its cam and unhook the spring from its post. Hook an 8 oz. scale in the spring eye and pull in line with the post. It should require 5-1/2 to 6-1/2 ozs. to pull the spring to its position length.

SIXTH PULSE LATCHING PLATE ADJUSTMENT (Figure 42)

With the transfer bail reset arm on a low part of its cam and the sixth pulse magnet armature held against its pole face, there should be some clearance, not more than .010", between the face of the latch bell crank and the long (unlatched) step of the transfer bail. To adjust, loosen the mounting screw, position the latch plate, and tighten the mounting screw.

NOTE: With the transfer bail in its latched position, the transfer bail reset arm on the low part of its cam, and with the sixth pulse armature extension against its backstop screw, there should be at least .006" clearance between the shoulder of the latch plate and the left hand face of the armature extension. If necessary, refine the sixth pulse armature gap adjustment, keeping within the specified limits to meet this requirement.

SIXTH PULSE LATCHING PLATE SPRING TENSION (Figure 43)

With the armature extension against its backstop screw, hook an 8 oz. scale over the end of the latch plate and pull vertically upward. It should require 1/2 to 1-1/2 ozs. to start the lever moving.

TRANSFER BAIL ADJUSTMENT (Figure 44)

With the transfer bail reset arm on the high part of its cam, there should be .008" to .012" clearance between the short (latched) step of the transfer bail and the latching end of the latch bell crank. To adjust, loosen the locknut on the left adjusting screw on the transfer bail reset arm, position the screw, and tighten the lock nut.

LATCH PLATE ADJUSTMENT (Figure 44)

With the transfer bail reset arm on the high part of its cam, there should be .006" to .015" clearance between the top end of the armature extension and the inner step of the latch plate when the armature is held in the operated position. To adjust, loosen the right adjusting screw on the transfer bail reset arm, position the screw and tighten the lock nut.

TRANSFER BAIL RESET ARM SPRING TENSION

With the transfer bail reset arm on the low part of its cam, and with the latch bell crank in its short latch step, hook an 8 oz. scale over the

transfer bail reset arm at the spring eye and pull in line with the spring. It should require 2 to 3 ozs. to start the lever moving. See Figure 42 for location of parts.

LATCH BELL CRANK SPRING TENSION

Unhook the latch bell crank spring from its post. With the latch bell crank on the long step of the transfer arm extension, hook an 8 oz. scale in the spring eye and pull in line with the post. It should require 6-1/2 to 8 ozs. to pull the spring to its normal position length. See Figure 42 for location of parts.

TRANSFER BAIL SPRING TENSION (Figure 45)

With all the transfer slides in the spacing position and the transfer bail reset arm on the high part of its cam, hook an 8 oz. scale on the end of the transfer bail extension and pull horizontally in line with the spring. It should require 1-1/2 to 2-1/2 ozs. to start the arm moving.

NOTE: The latch bell crank should be held away from the transfer bail when making this check.

"T" LEVER LOCK SPRING TENSION (Figure 46)

With the "T" lever lock in a locked position, hook an 8 oz. scale over the end of the lever and pull horizontally in line with the spring. It should require 2 to 3 ozs. to start the lever moving.

TRANSFER BAIL EXTENSION ADJUSTMENT (Figures 46 and 47)

It will be necessary to meet the two following requirements by means of the same adjustment.

With the "T" levers in their marking position, the transfer bail reset arm on the low part of its cam and the latch bell crank in its unlatched position, there should be .030" to .040" clearance between the engaging face of the transfer bail extension and the notch of the transfer slide which is closest to the transfer bail extension face. Also, with the "T" levers in their spacing position and the transfer bail in its latched position, there should be .010" to .020" clearance between the transfer bail extension and each transfer slide. To adjust, position the transfer bail extension by means of its mounting screws.

TRANSFER SLIDE SPRING TENSION (Figure 48)

With all the "T" levers in the marking position and the transfer slide arm in the unselected position, unhook the springs from the spring bracket. Hook an 8 oz. scale in the spring eye and pull horizontally in line with the spring bracket. It should require 3 to 4-1/2 ozs. to pull the springs to position length.

CONTACT MOUNTING PLATES ADJUSTMENT (Figure 49)

NOTE: See that the contact points in each contact pile-up are in line with their associated contact points, and the contact stiffeners are straight and the short contact springs rest against their stiffeners.

The ends of the long contact springs should be approximately centered with their contact operating levers. To adjust, position the contact mounting plates. Further refinement may be obtained by positioning the contact pile-ups by means of their mounting screws.

MARKING CONTACT SPRINGS ADJUSTMENT (Figure 49)

With the transfer slides held in their marking position by the transfer bail in its latched position, there should be .004" to .010" clearance between the marking contact springs and their stiffeners. Check each contact pile-up. To adjust, bend the contact stiffeners and recheck the short contact spring tension.

CONTACT LEVERS CLEARANCE (Figure 49)

With the contact levers in the spacing position there should be at least .005" clearance between the contact lever and the long contact spring when the play in the contact levers is taken up to make this clearance a maximum. There also should be .015" to .020" clearance between each long contact and its associated marking contact. To adjust, bend the contact stiffener.

SELECTOR CLUTCH TORQUE (Figure 50)

The torque should be measured with the motor running at least ten minutes. Hook a 32 oz. scale to the selector cam sleeve stop arm. It should require a pull of 14 to 18 ozs. to hold the sleeve stationary. This clutch torque depends on the condition of the felt washers and the friction clutch spring. If any difficulty is encountered in securing the specified torque, shims may be placed at the inner end of the selector friction clutch spring. Shims are available under the following numbers:

96763	Shims	(.012")
96764	Shims	(.016")
96765	Shims	(.020")

The selector cam sleeve, its associated friction discs and compression spring must be removed from the shaft in order to insert the shims.

LONG CONTACT SPRING TENSION (Figure 49)

With the contact levers in the spacing position, apply an 8 oz. scale at the end of the long contact springs at the contact point of pile-ups Nos. 1, 3, and 4 and pull; for pile-ups Nos. 2 and 5, it will be necessary to push. It should require 1 to 2 ozs. to separate the contacts. To adjust, bend the long contact springs.

SHORT CONTACT SPRING TENSION (Figure 49)

Under each of the following conditions, it should require 1 to 2 ozs. to cause the spring to leave its stiffener.

- (1) With the contact levers in the spacing position, hook an 8 oz. scale over the short marking contact springs of pile-ups Nos. 1, 3, and 4 and pull; for pile-ups Nos. 2 and 5, it will be necessary to use the

push end of the scale. To adjust, bend the short marking contact springs.

- (2) With the contact levers in the marking position, hook an 8 oz. scale over the short spacing contact springs of pile-ups Nos. 1, 3, and 4 and pull; for pile-ups Nos. 2 and 5, it will be necessary to use the push end of the scale. To adjust, bend the short spacing contact springs.

GOVERNOR ADJUSTMENTS

GOVERNOR SHELL ADJUSTMENTS (Figure 51)

REMOVE THE GOVERNOR COVER AND SPEED ADJUSTING SPRING

The governor contact points should meet squarely and there should be at least .010" clearance between the governor spring bracket and the collector rings of the governor. 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.

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

SPEED ADJUSTING FRICTION WASHER SPRING PRESSURES (Figure 51)

To measure this requirement, rotate the speed adjusting wheel to a point where the governor contact pressure is 13 to 14 ozs., as indicated by hooking a 32 oz. 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 oz. scale over the pin at the periphery of the adjusting wheel and pull horizontally at right angles to the pin. It should require 16 to 24 ozs. to start the wheel moving. To adjust the friction, remove the friction washer and bend the large projections.

REPLACE THE GOVERNOR COVER

GOVERNOR BRUSH SPRING REQUIREMENT (Figure 52)

Remove the governor brush holder from the brush holder bracket. It should require 3 to 4 ozs. pressure, using an 8 oz. scale, to depress a brush spring to its required position, that is, to within .015" to .050" of the brush holder. Remove the governor brushes from the brush holder. The pigtails should be soldered to both the carbon brushes and the brass inserts of the brush screws. Replace the brushes and holder.

GOVERNOR BRUSH POSITION (Figure 52A)

The governor brushes should ride in the center of the collector rings

and should project .015" to .050" beyond the brush holder. To adjust, position the brush holder bracket by means of its elongated mounting holes. See Figure 52 for location of parts.

SPEED SETTING

When governed motors are used, a tuning fork is required to check the motor speed. The fork is equipped with shutters attached to the ends of the tines. The governor is equipped with a target having alternate black and white spots.

To check the speed, the target should be well illuminated. Tap the fork lightly to make it vibrate. Hold the fork so that the shutters are close to the eye, and view the target through the opening 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.

NOTE: There is a possibility of setting the speed incorrectly due to getting a speed multiple; i.e., the speed could be half the desired speed, or two thirds the speed, or some other multiple, but the spots would appear to be stationary when viewed through the fork shutters. This fact should be kept in mind if trouble due to incorrect speed is experienced.

To adjust the speed, stop the motor and turn the governor adjusting wheel in one direction or the other a little at a time, checking the speed after each adjustment until the correct speed is obtained.

PANEL GEAR ADJUSTMENTS

MOTOR POSITION ADJUSTMENT

There should be a minimum amount of backlash between the motor pinion and the panel main gear throughout a complete revolution of the panel main shaft.

To adjust, loosen the motor mounting screws and position the motor. Tighten the screws.

PANEL MAIN GEAR ADJUSTMENT

The lateral alignment of the motor pinion and the panel main gear should be such that the center line of the gear coincides with a vertical line through the center of the hole in the motor pinion.

To adjust, loosen the panel main gear hub mounting screw and position the gear. Tighten the mounting screw.

GEAR GUARD ADJUSTMENT

There should be not less than .030" between the main gear and its guard.

To adjust, loosen the gear guard mounting screws and position the guard. Tighten the mounting screws.

MAIN SHAFT GEAR ADJUSTMENT

There should be a barely perceptible amount of backlash between the main shaft gear and the highest point of the panel driven gear. The lateral alignment of the main shaft gear should be such that the center line of the gear coincides with a vertical line through the center of the hole in the panel drum.

To adjust, loosen the upper mounting screw and the lock nut. Slightly loosen the two lower mounting screws to prevent stripping of the threads while making the following adjustment:

By means of the panel plate adjusting bushing, adjust the horizontal position of the main shaft gear until there is a barely perceptible amount of backlash between the panel gear and the highest point of the main shaft gear. This high point may be found by turning the main shaft for one complete revolution. Tighten the three mounting screws and the adjusting bushing lock nut.

LUBRICATION

The grease and oil specified in the supplement furnished with this bulletin should be used to lubricate the multiplex extensor.

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 below except where the use of grease is specified.

GENERAL

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

UPPER SECTION

SELECTOR MECHANISM

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

- (1) Selector levers and swords - drop oil between separating plates of swords and levers.
- (2) Selector "T" levers - all points of contact.
- (3) "T" lever lock - all points of contact.
- (4) Armature - 2 pivot screws.
- (5) Selector arm - 2 pivot screws, 2 sword contact points, locking tip, and detent.

- (6) Locking lever - separator surface and locking tip.
- (7) Range finder assembly - trip latch, trip latch plunger, bell crank lever, and stop lever.
- (8) Selector arm operating screw head - oil sparingly.
- (9) Contact levers - oil sparingly.
Contact levers - apply grease sparingly between contact lever and long contact spring.
Selector levers - drop oil between separator plates.
- (10) Transfer arm - adjusting screws at points of contact.
- (11) Transfer arm - oil rings, saturate.
- (12) Latch bell crank - bearings.
- (13) Start-stop arm - oil ring, saturate.
- (14) Stop arm latch - oil ring, saturate.
- (15) Sixth pulse armature pivots - oil sparingly.
- (16) Transfer arm extension - (2) bearings.
- (17) Sixth pulse armature latch lever - bearing - latching surface.
- (18) Sixth pulse armature latch lever plate - latching surface - bearing.
Also grease latching surface.

MAIN SHAFT

Remove range scale left mounting screw, swing scale out of the way and oil in center of retaining disc. Replace range scale and its left mounting screw.

- (1) Locking lever cam felt oil ring - saturate.
- (2) Selector cam friction washers - saturate.
- (3) Transfer cam friction washer - saturate.
- (4) Stop-start cam friction washer - saturate.
- (5) Main bearings (2) oil hole in casting for top bearing and oil cup for lower bearing.
- (6) Lower cam sleeve assembly on upper section - drop oil through coils of spring.
- (7) Main shaft lower section clutch teeth and sliding member.

- (8) Cams - light film of grease on cams.
- (9) Main shaft - gear - apply film of grease.

LOWER SECTION

- (1) Sixth pulse armature pivot - oil sparingly.
- (2) Clutch throwout lever (2) bearings - grease end of lever.
- (3) Clutch throwout lever adjusting screw - bearing groove.
- (4) Latch loop - (2) bearings.
- (5) Reset bail - bearings and roller.
- (6) Lock levers - bearings.
- (7) Selector levers.
- (8) Lock loop - bearings and roller.
- (9) Cams - light film of grease on cams.
- (10) Detent - pivot and cam.
- (11) Contact levers - bearings - oil sparingly.
- (12) Selector magnet armature pivot screws - very sparingly - remove surplus oil.

CAUTION: The selector plungers should not be lubricated but if they are removed for any reason they should be wiped clean with an oily rag.

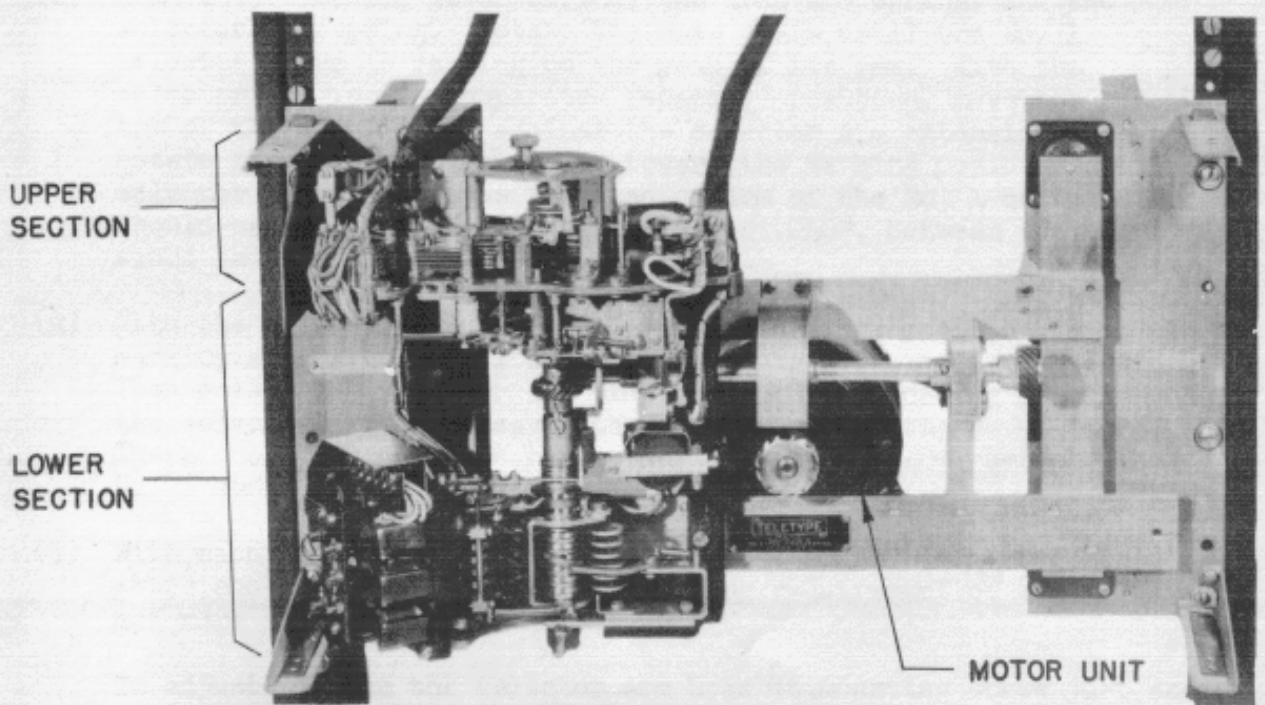


FIGURE 1

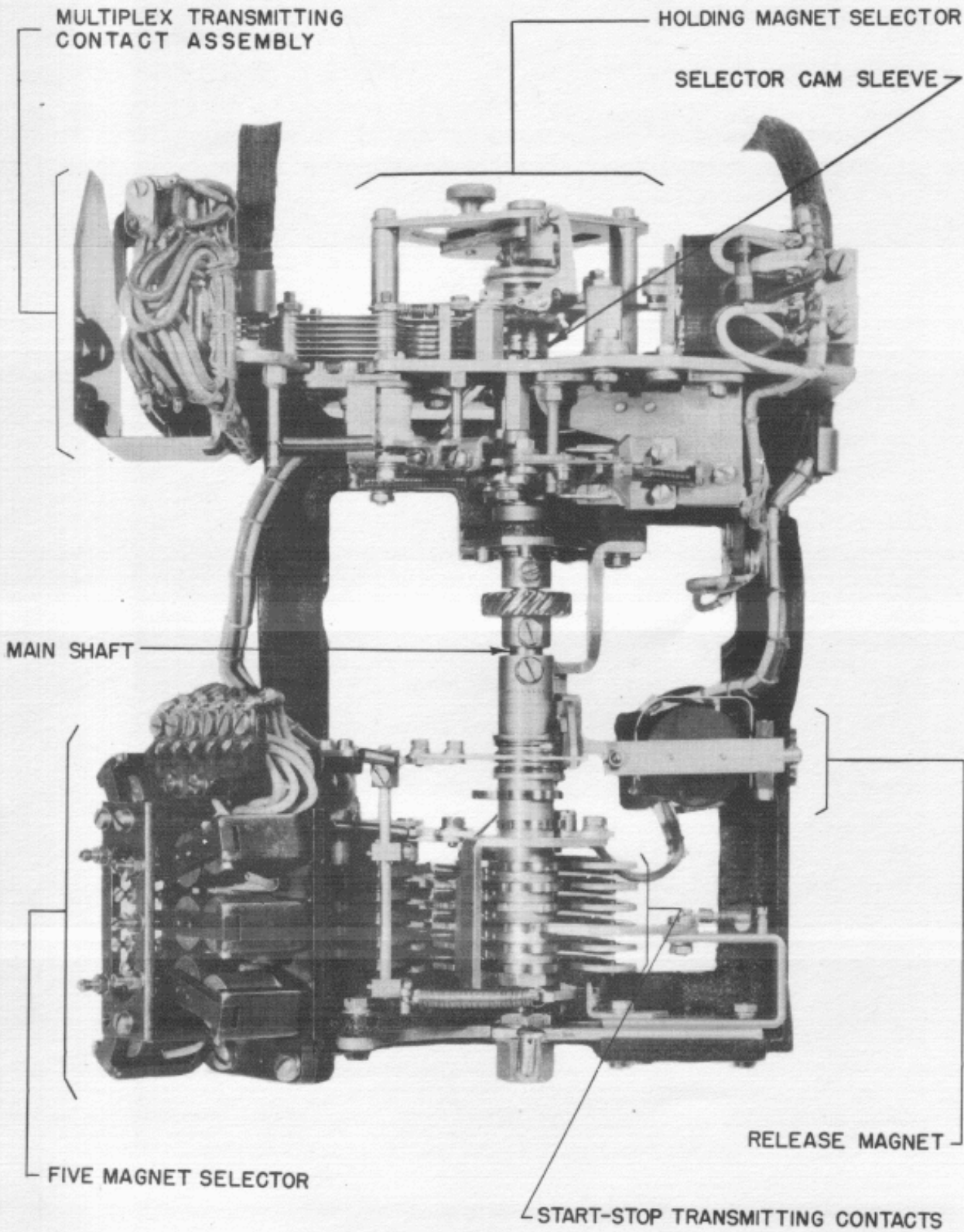


FIGURE 2

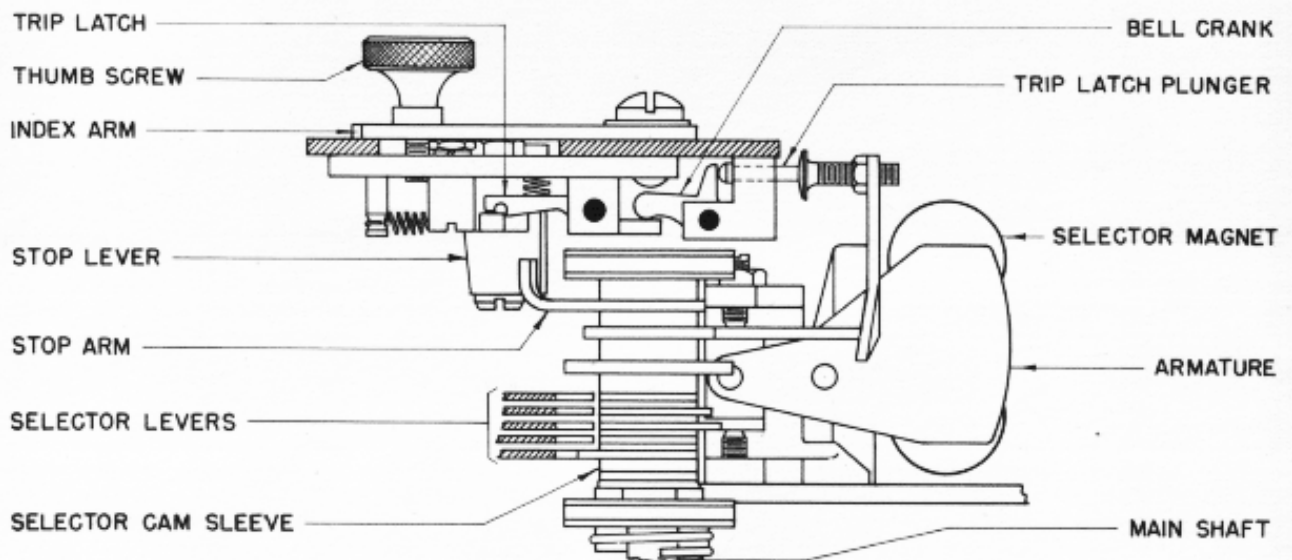


FIGURE 3

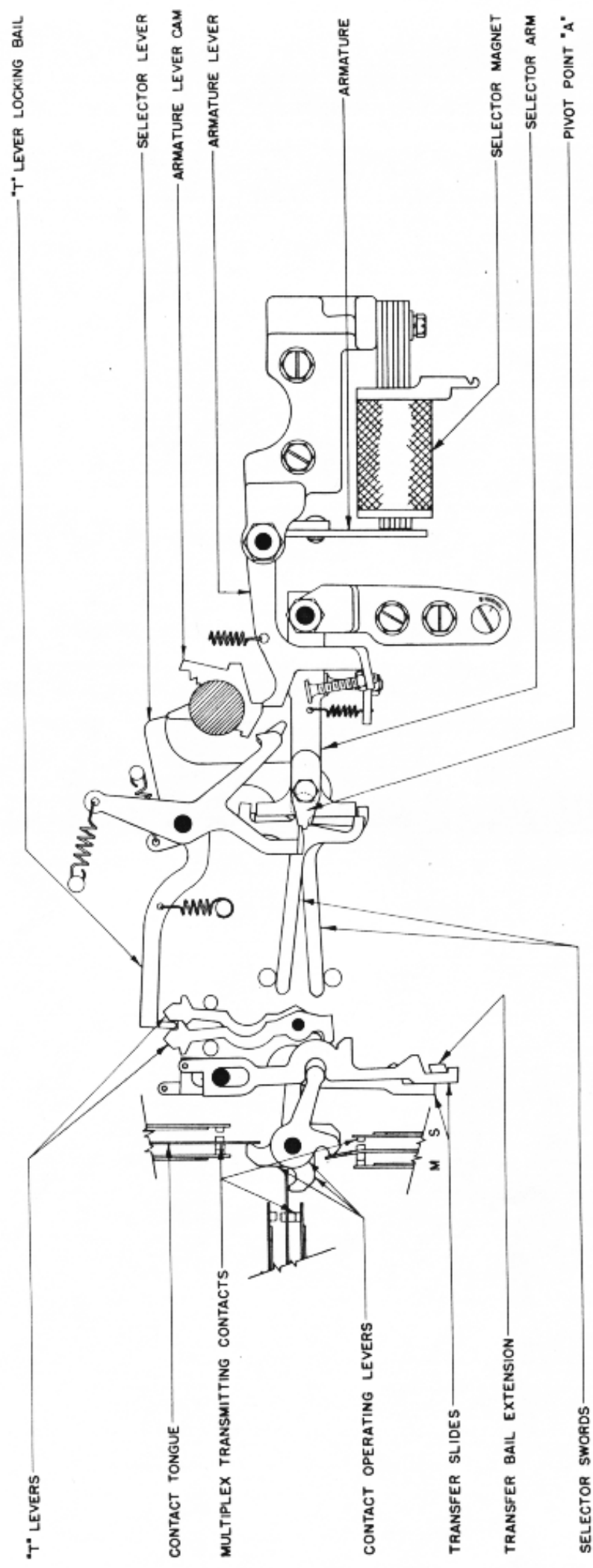


FIGURE 4

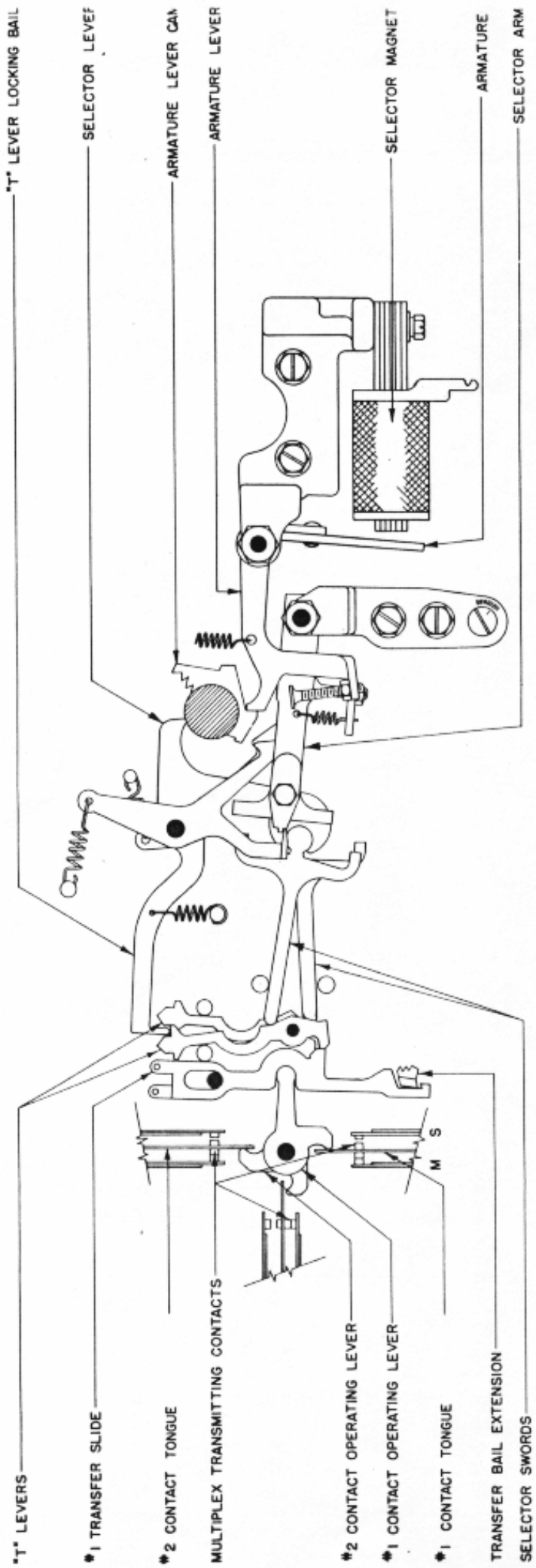


FIGURE 5

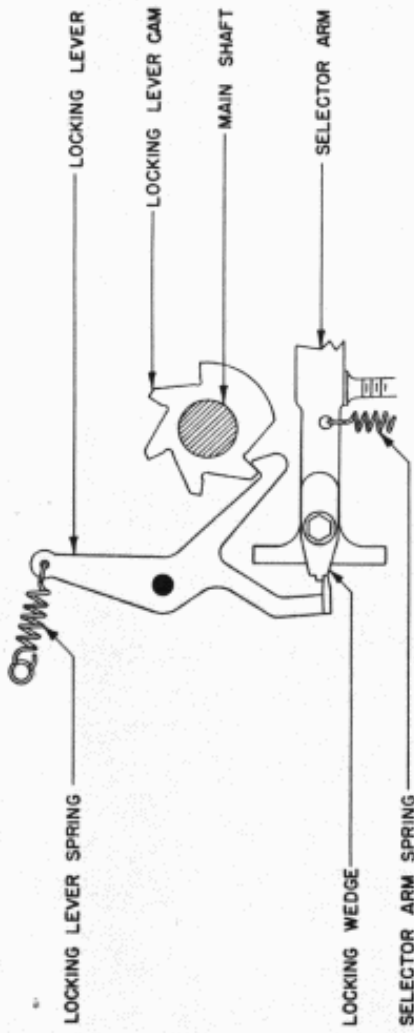


FIGURE 6

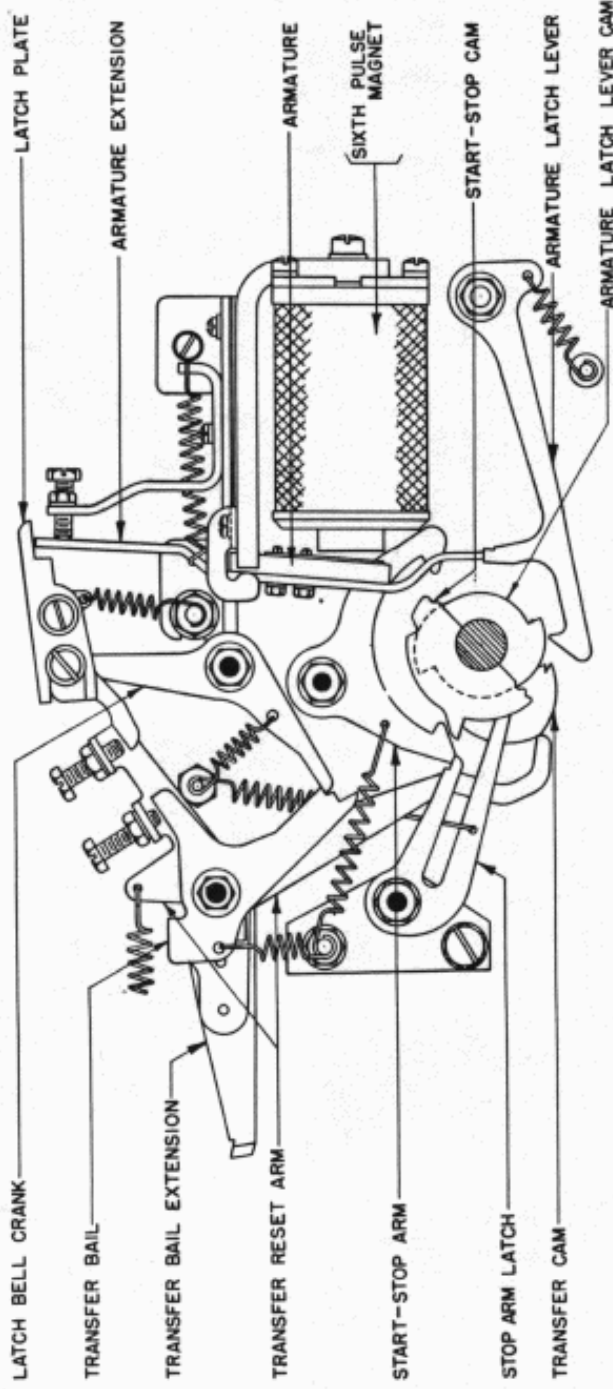


FIGURE 7

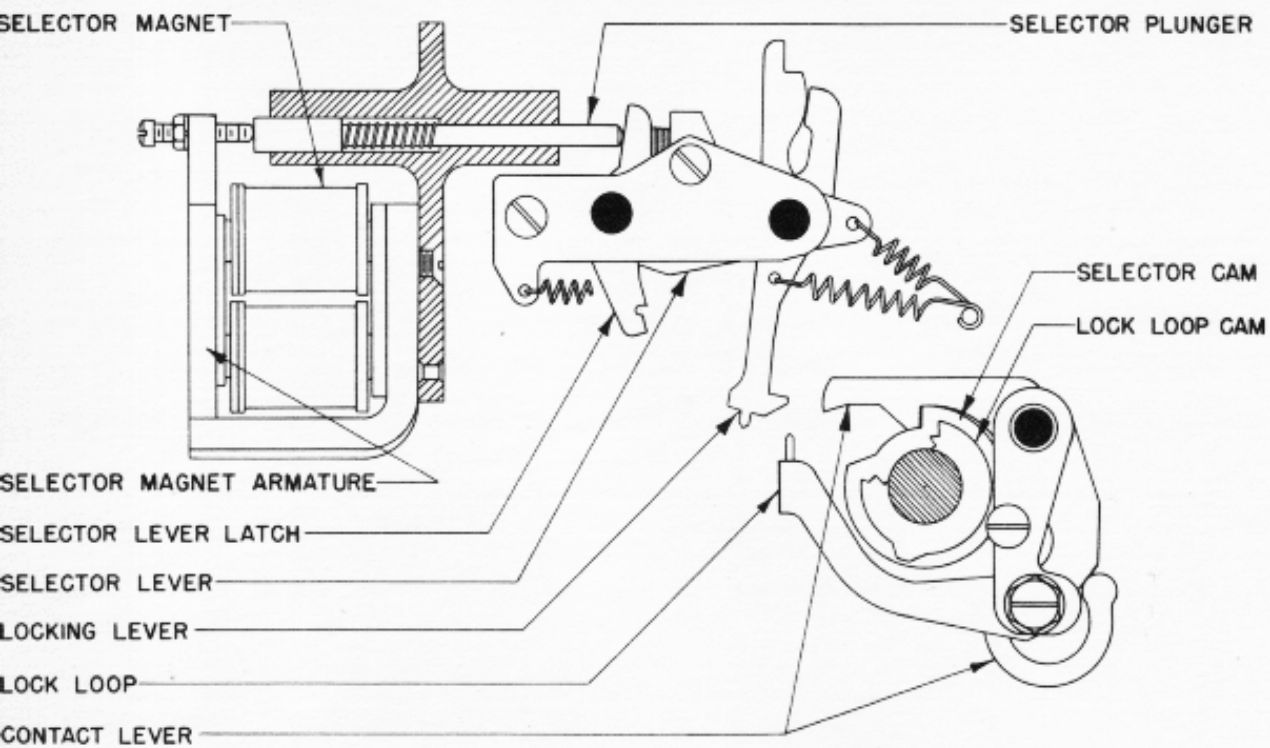


FIGURE 8

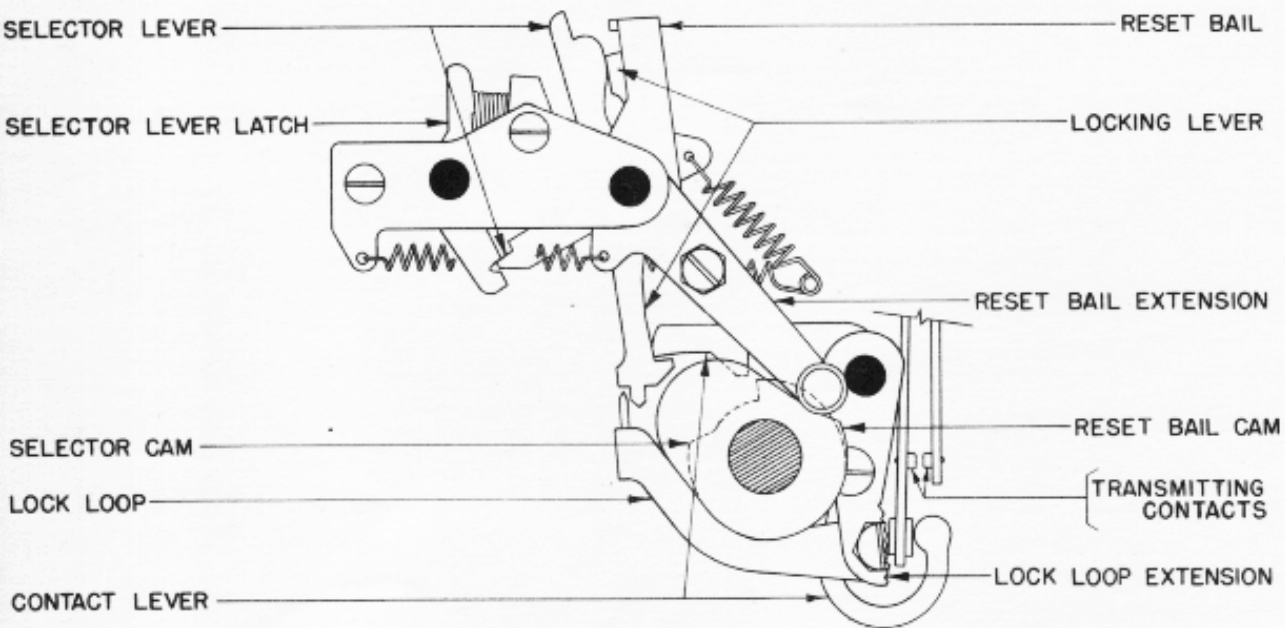


FIGURE 9

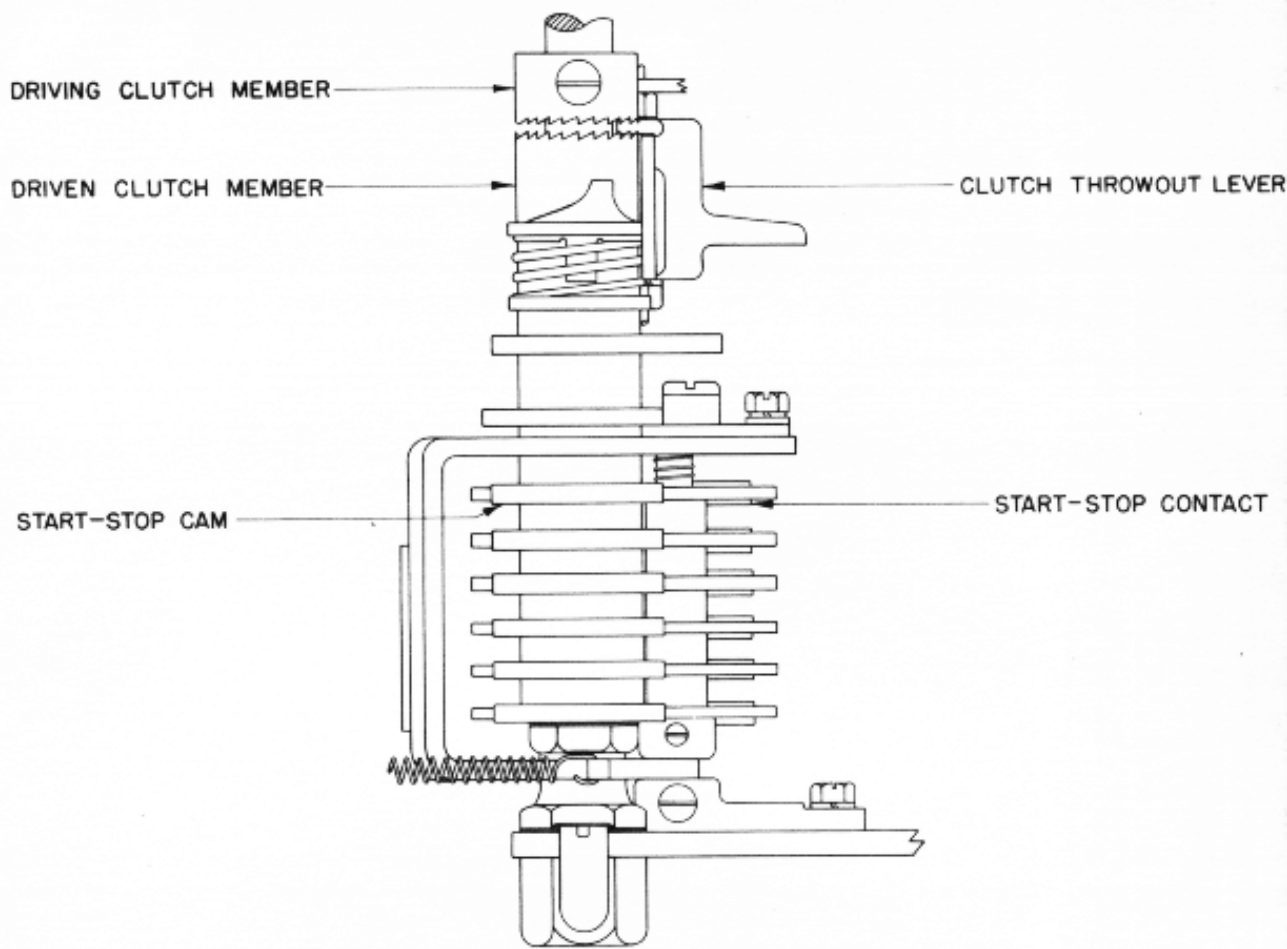


FIGURE 10

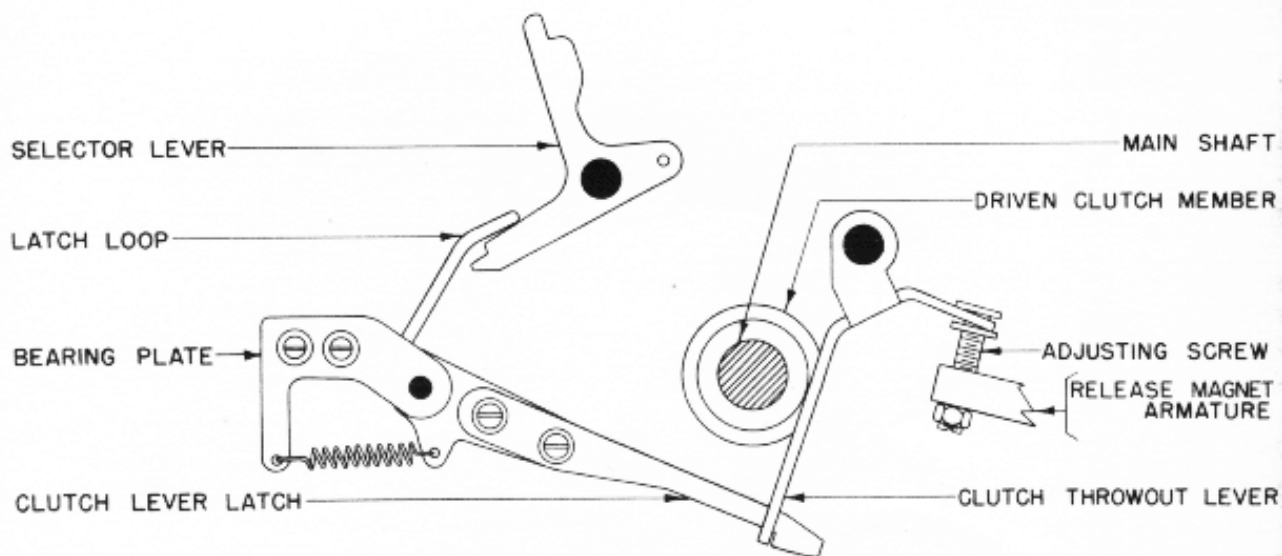


FIGURE 11

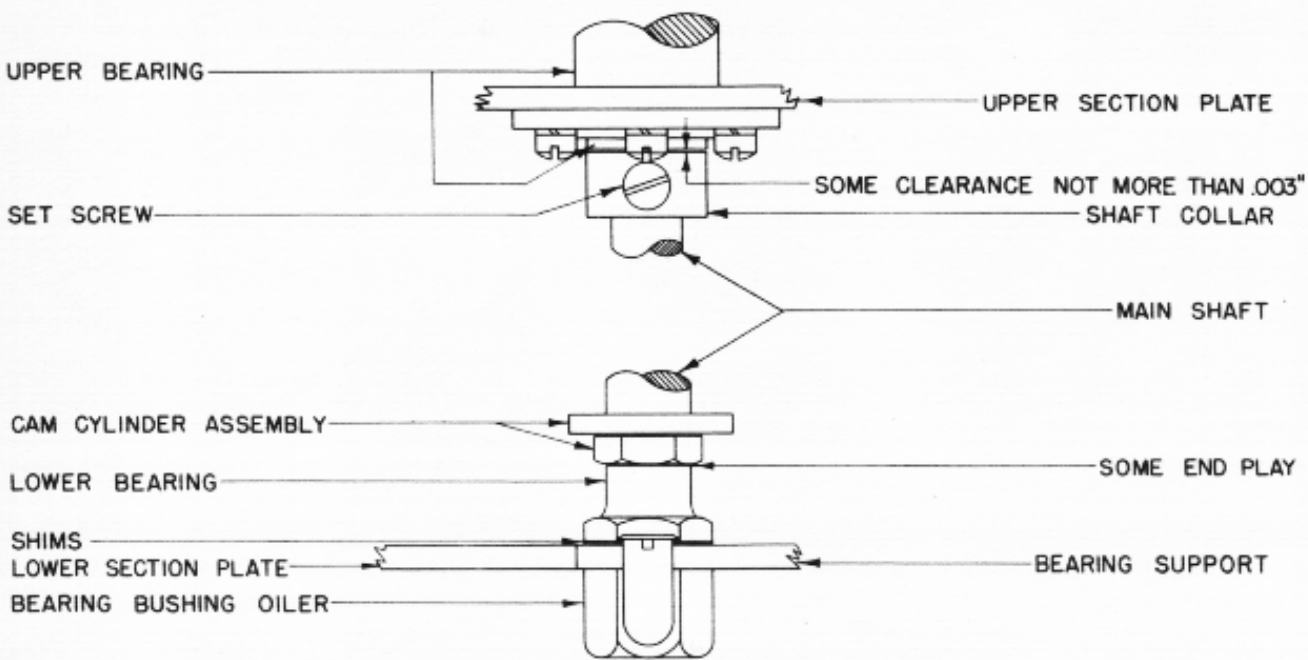


FIGURE 12

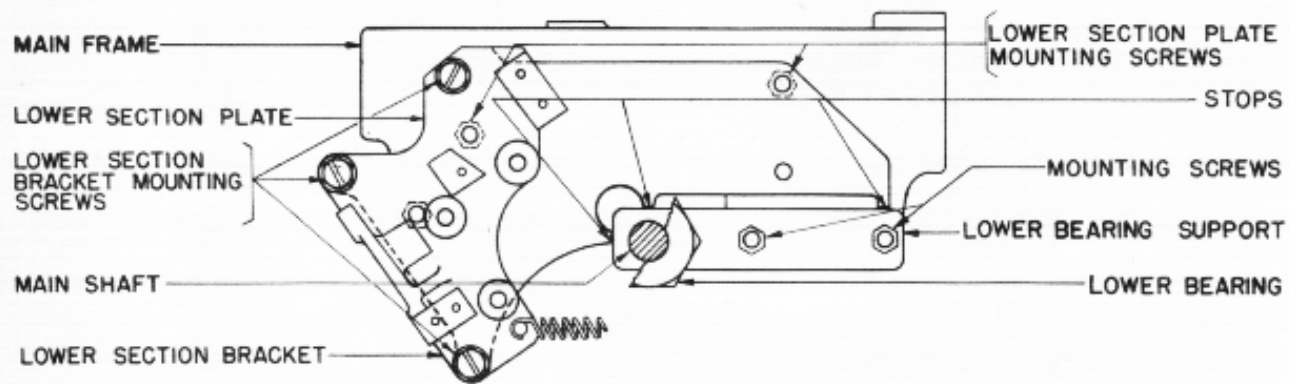


FIGURE 13

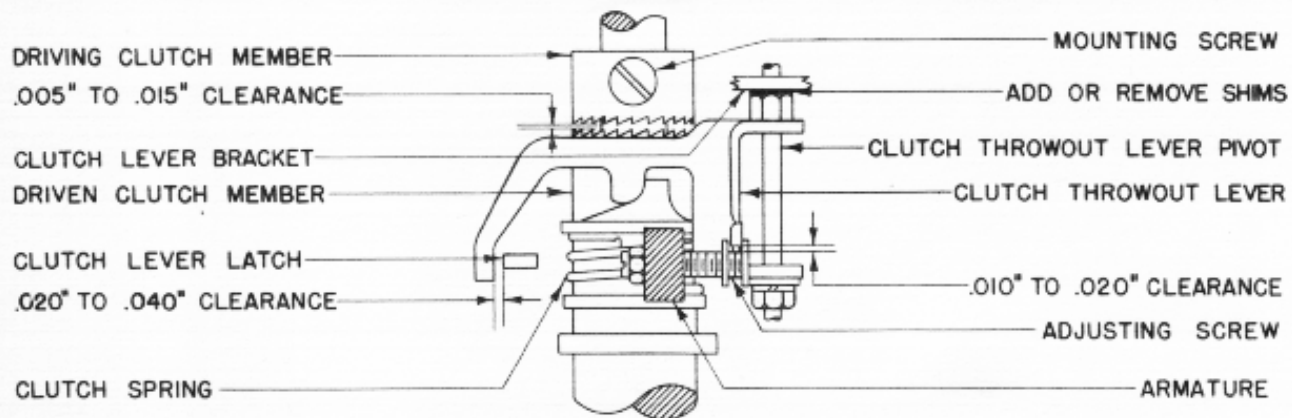
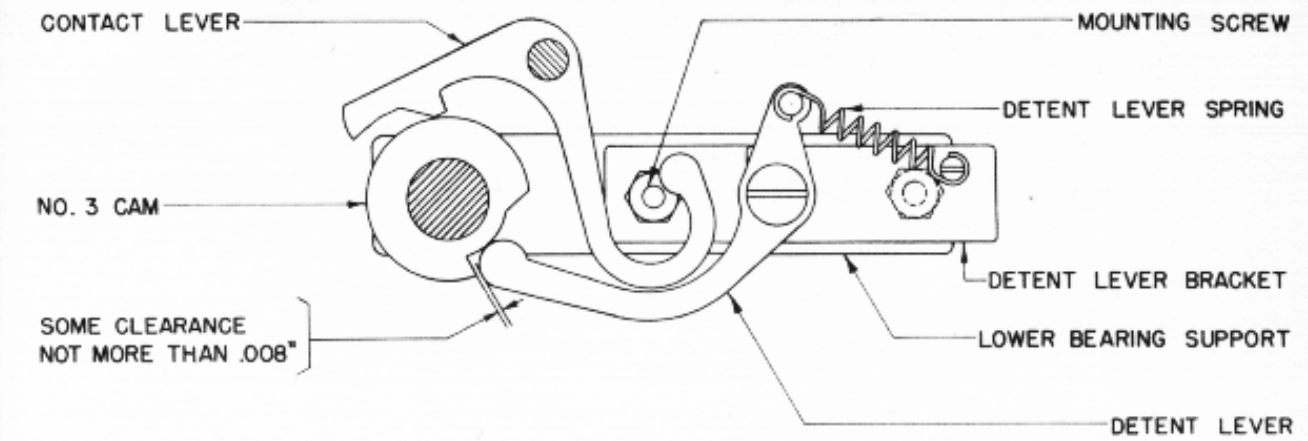
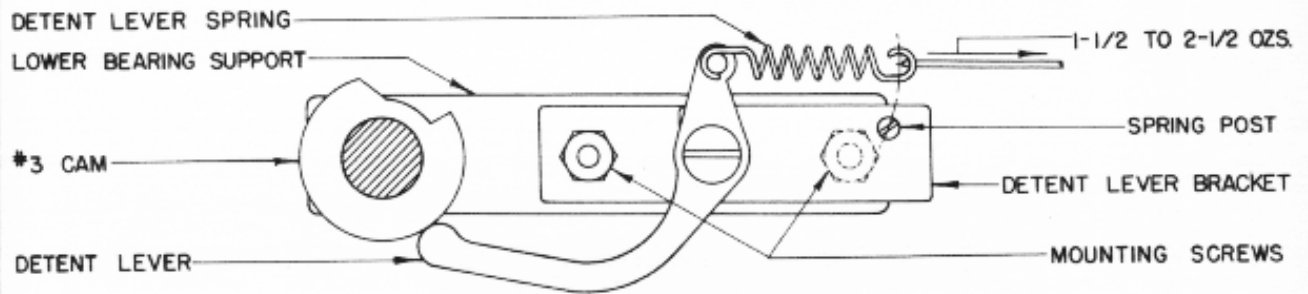


FIGURE 14

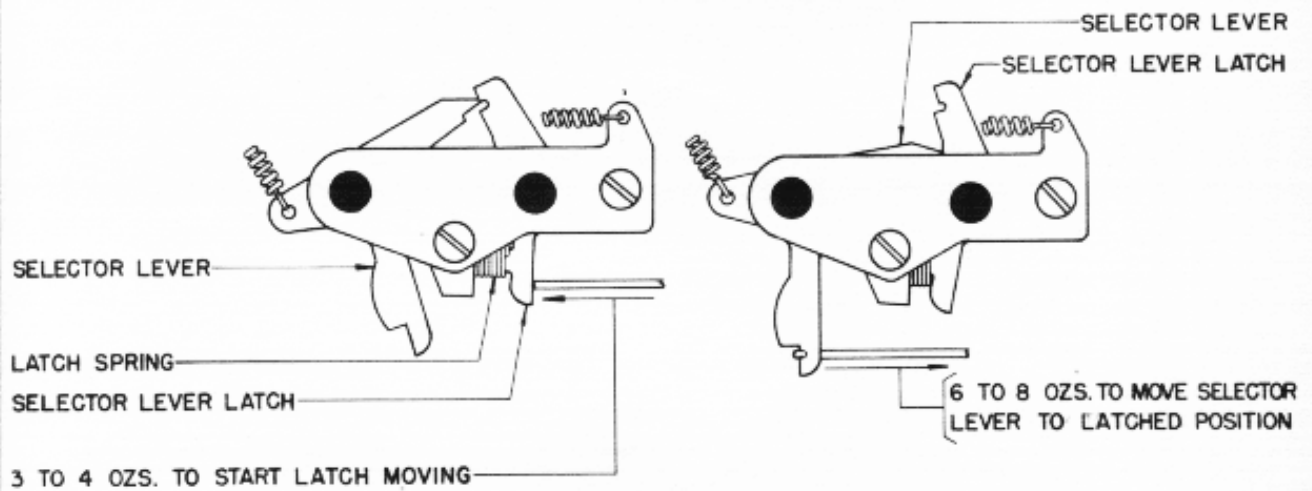


(A)



(B)

FIGURE 15



(A)

(B)

FIGURE 16

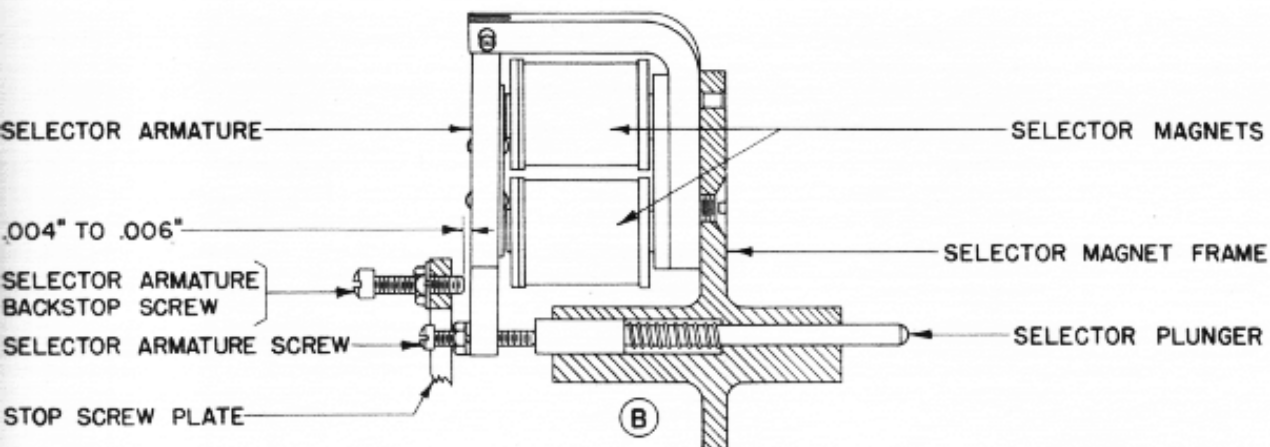
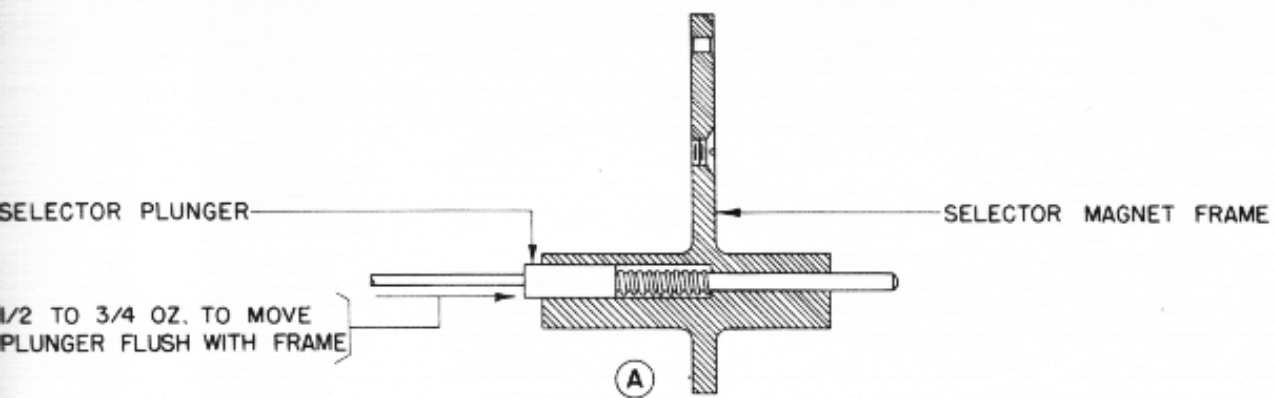
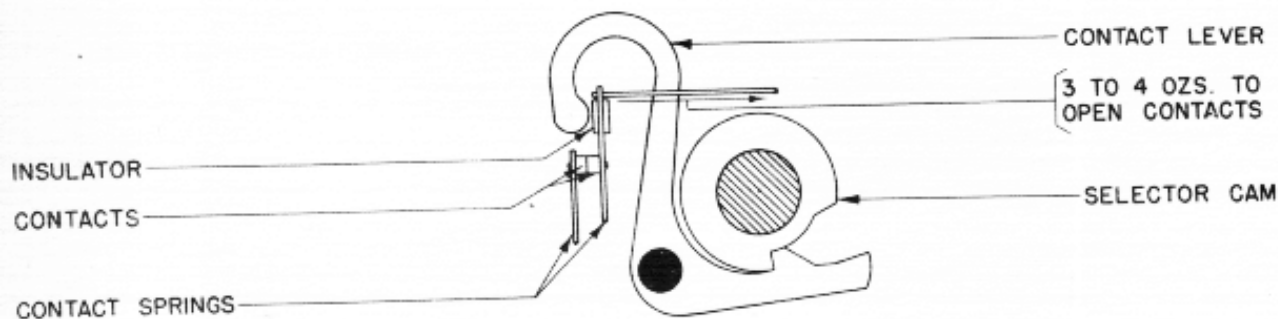
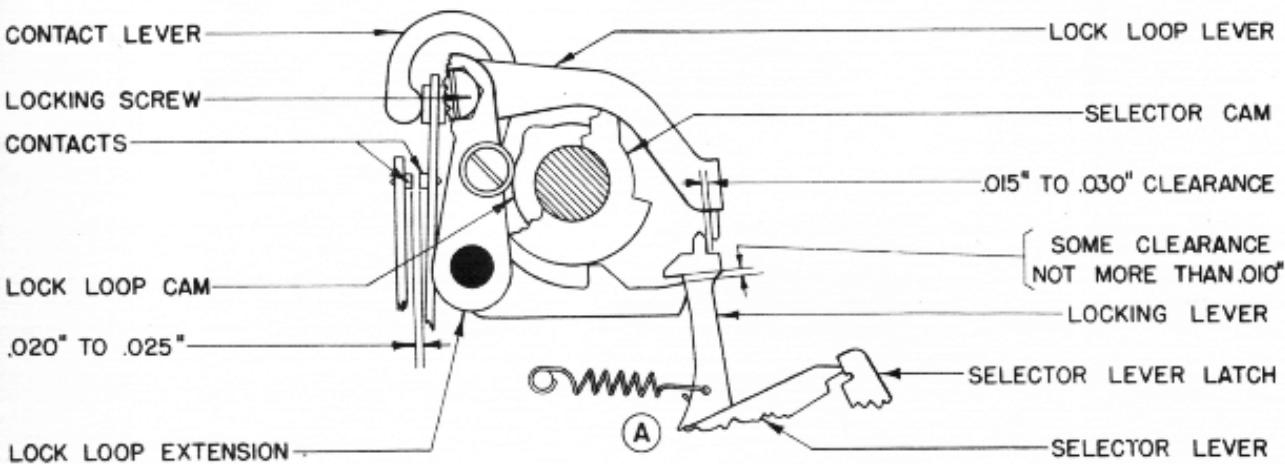
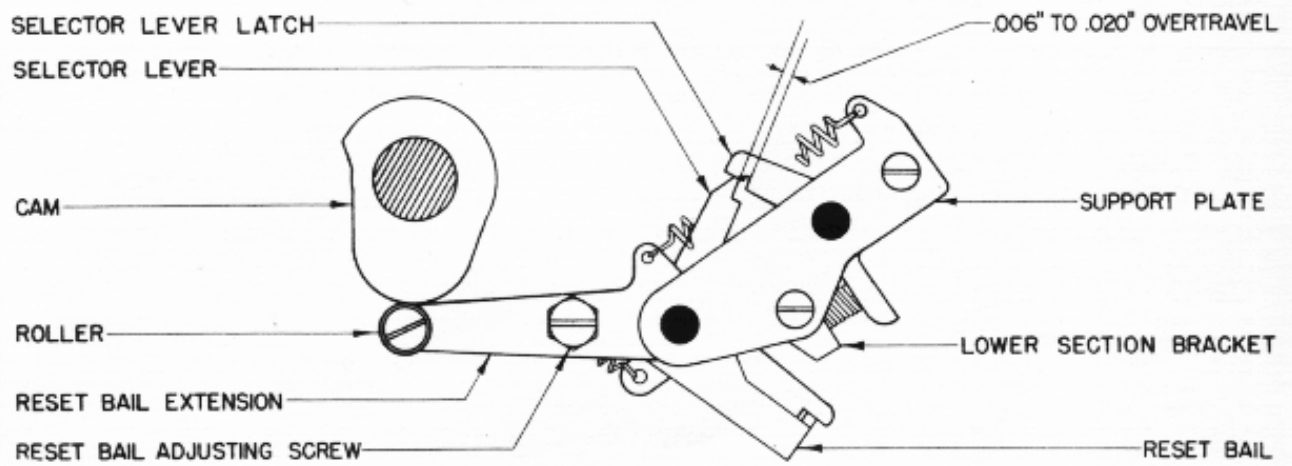


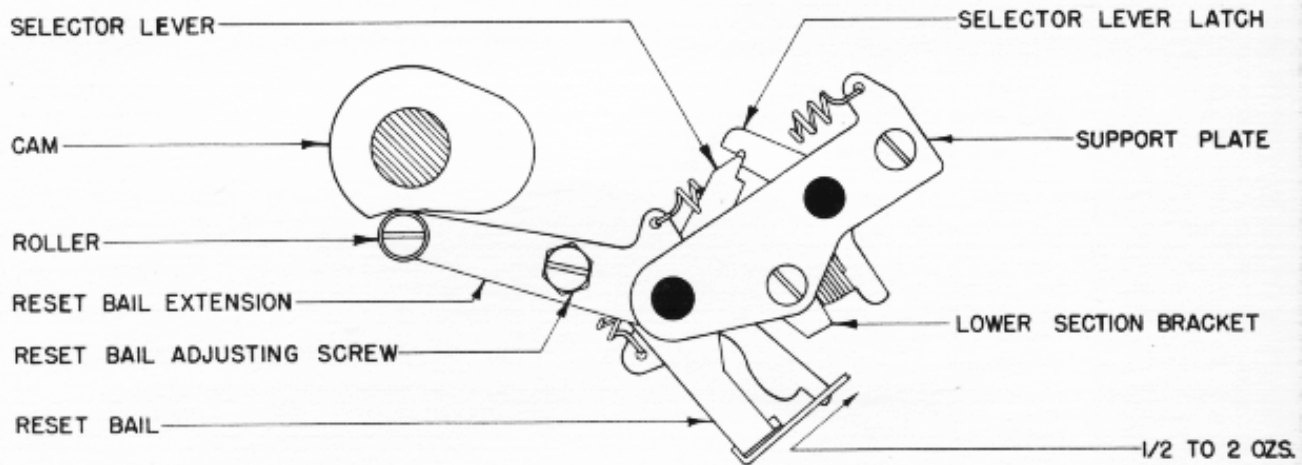
FIGURE 17



(B)
FIGURE 18



(A)



(B)

FIGURE 19

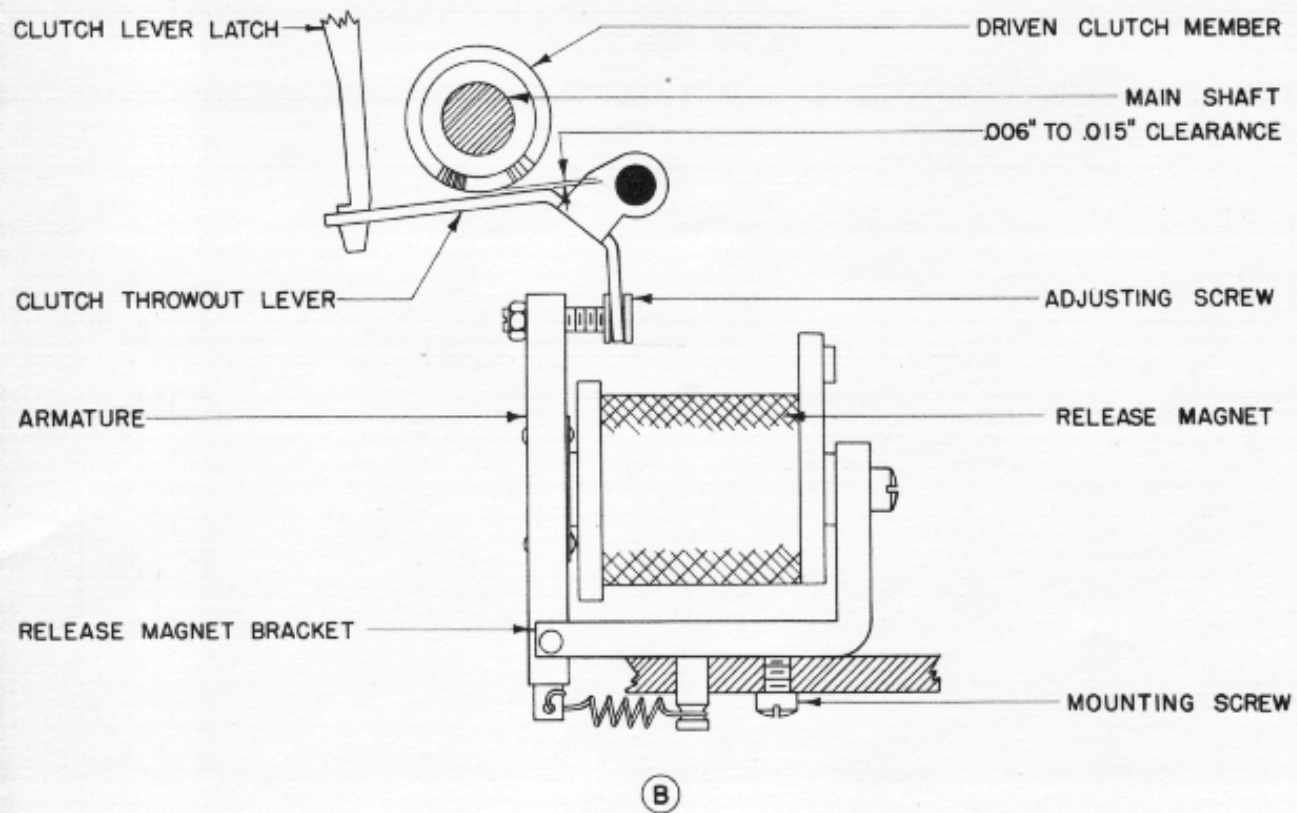
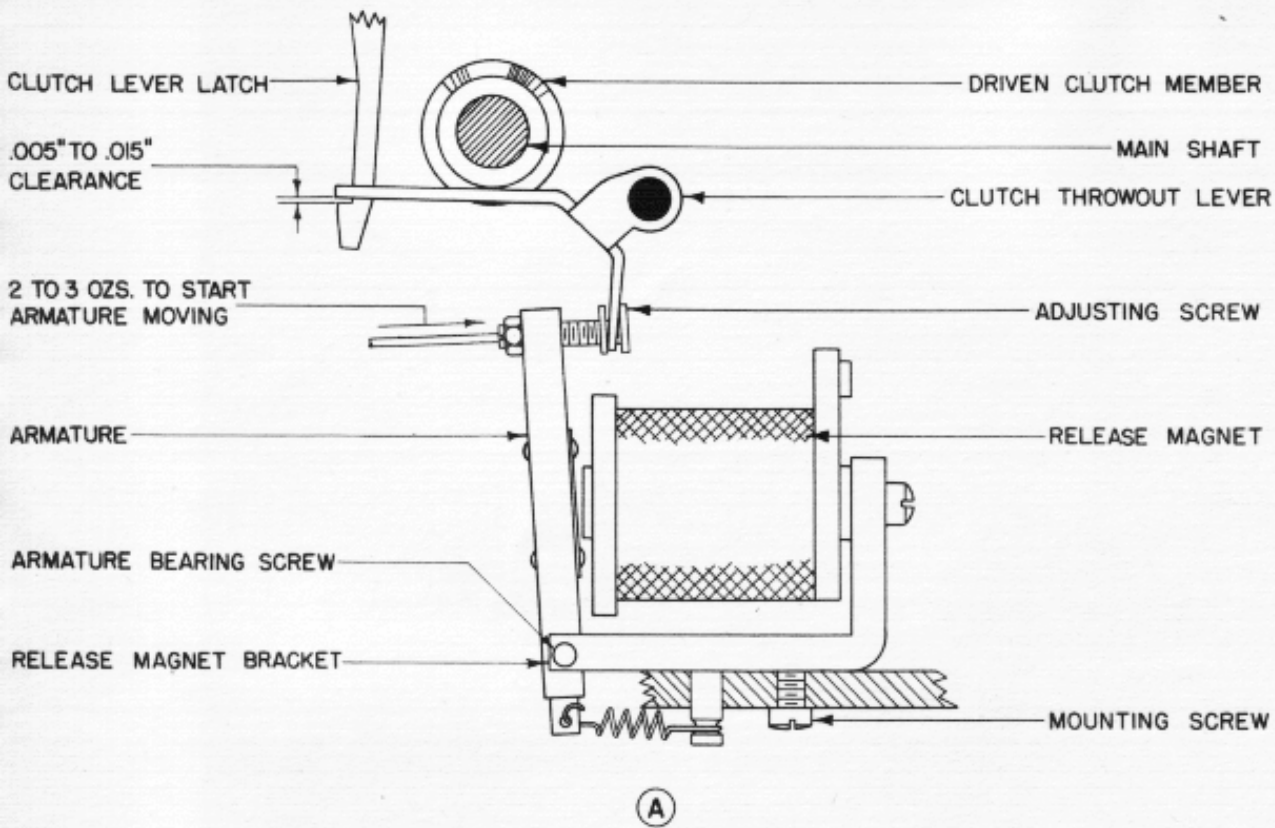


FIGURE 20

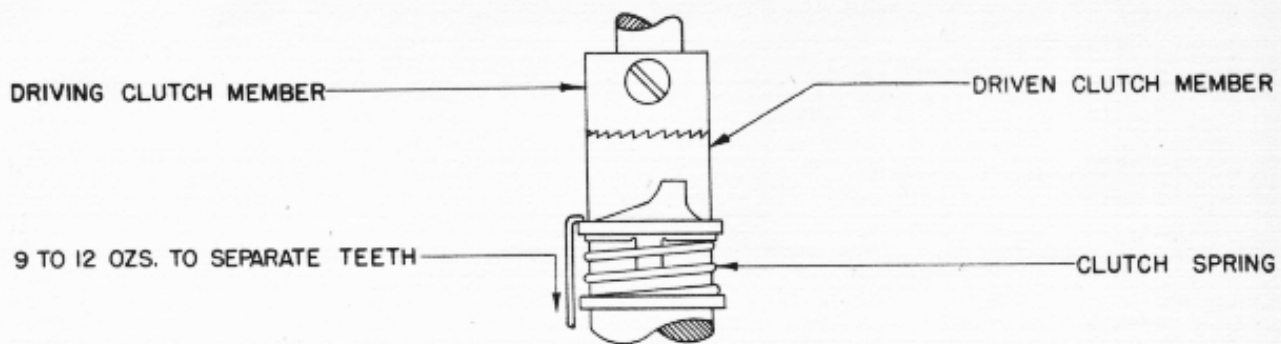


FIGURE 21

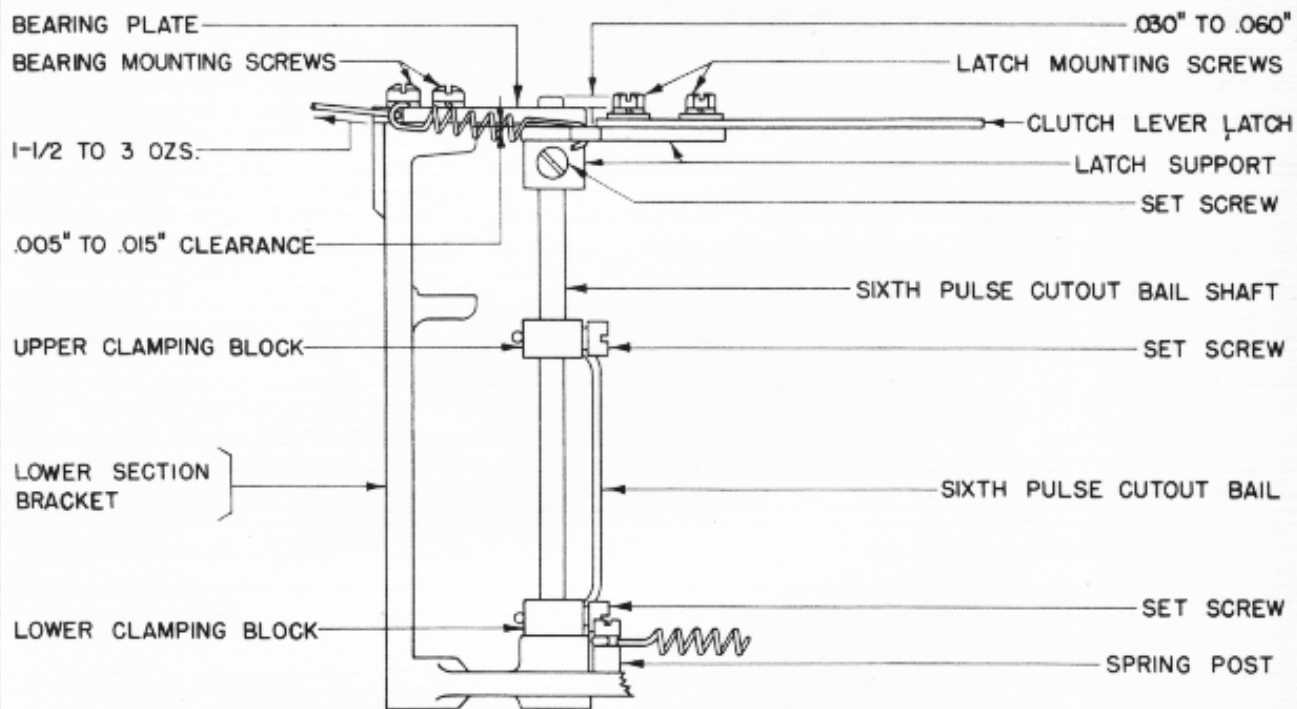


FIGURE 22

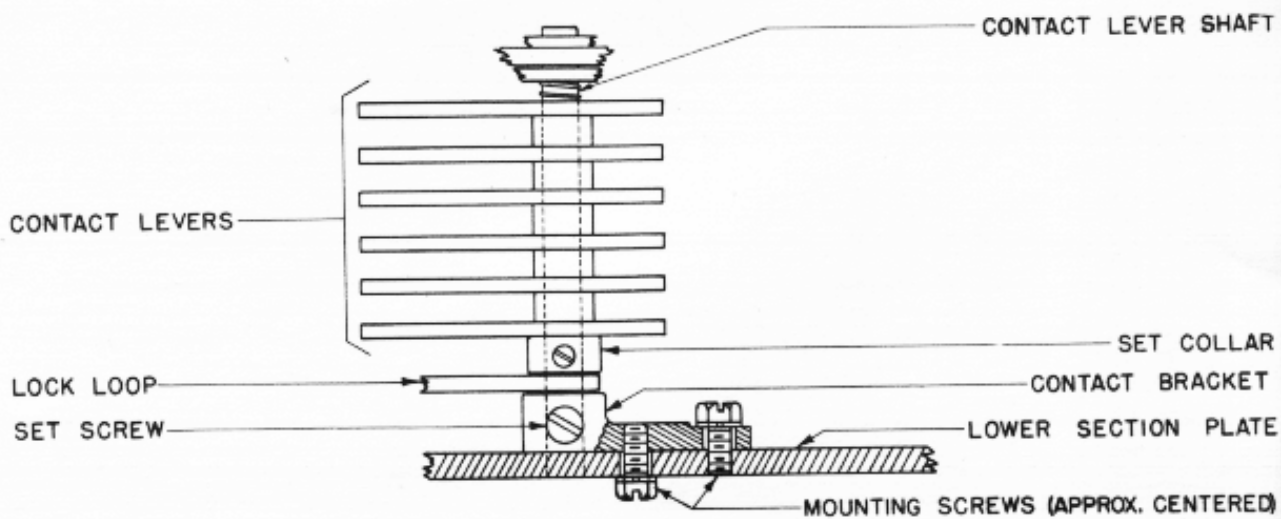


FIGURE 23

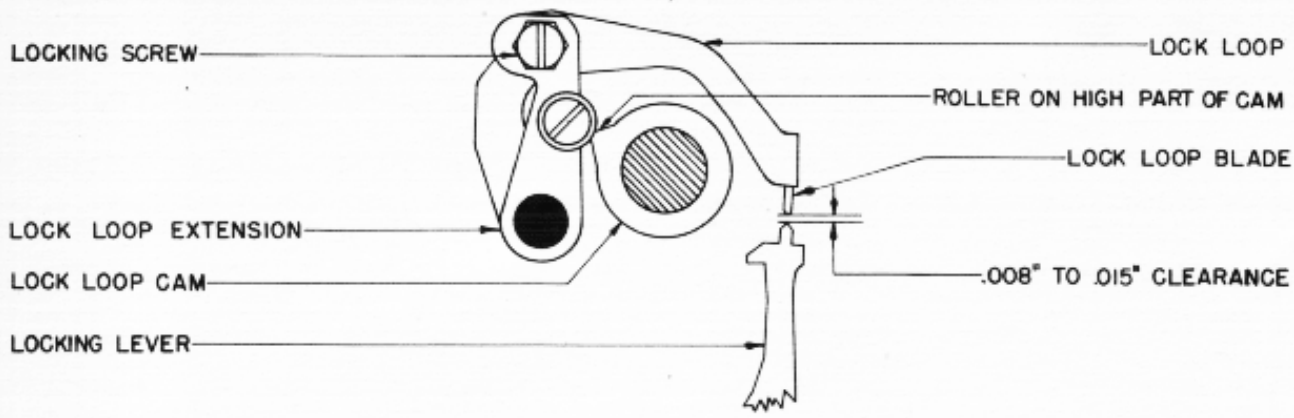


FIGURE 24

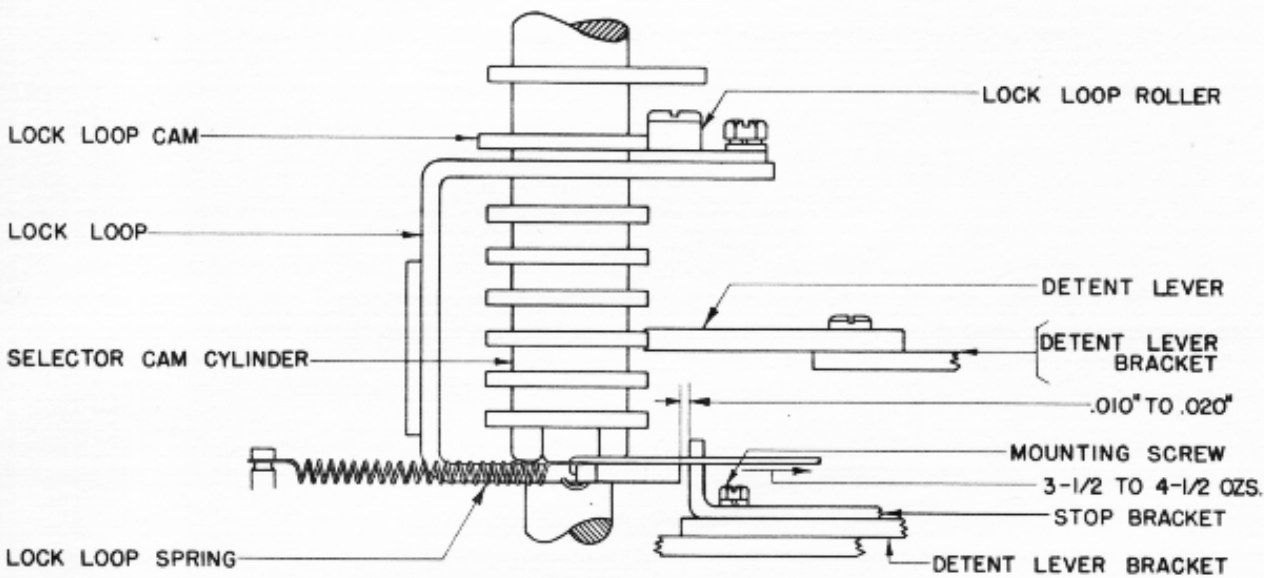


FIGURE 25

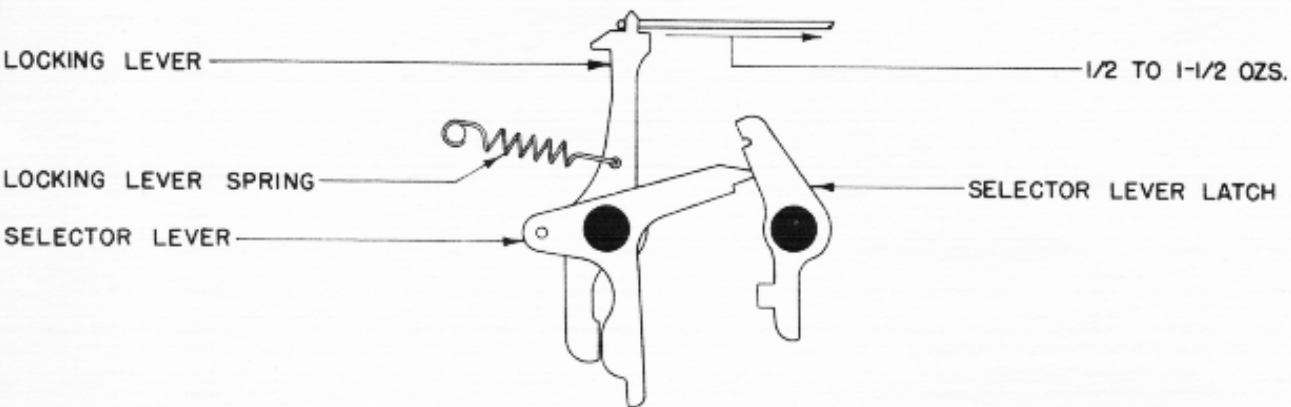


FIGURE 26

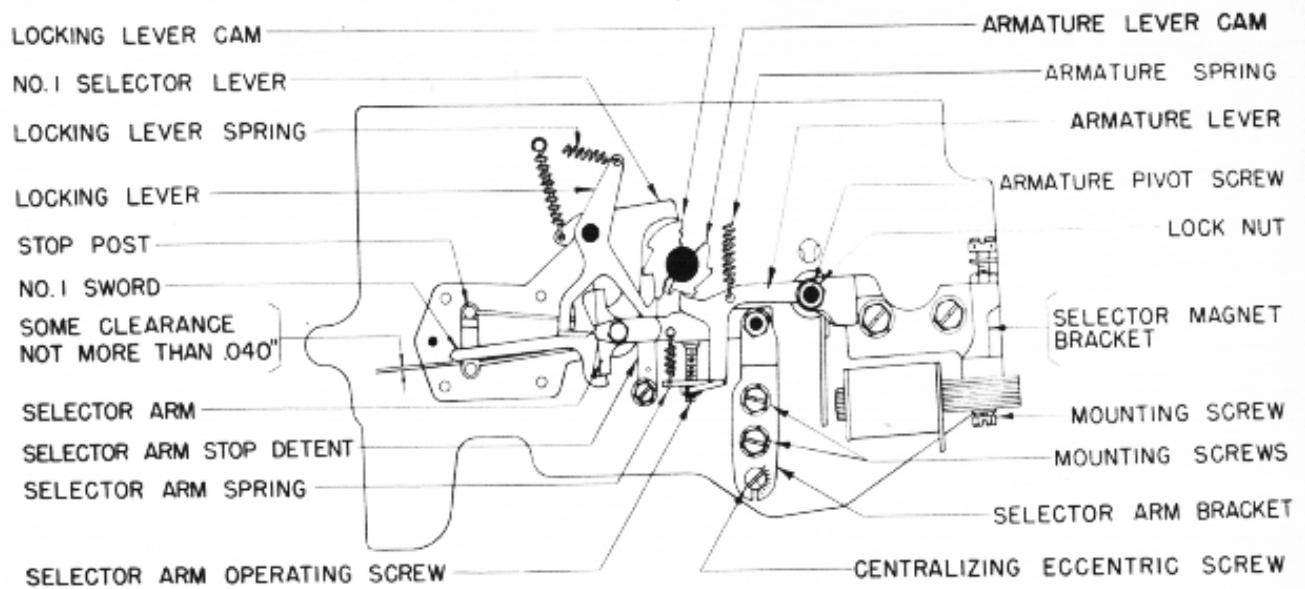


FIGURE 27

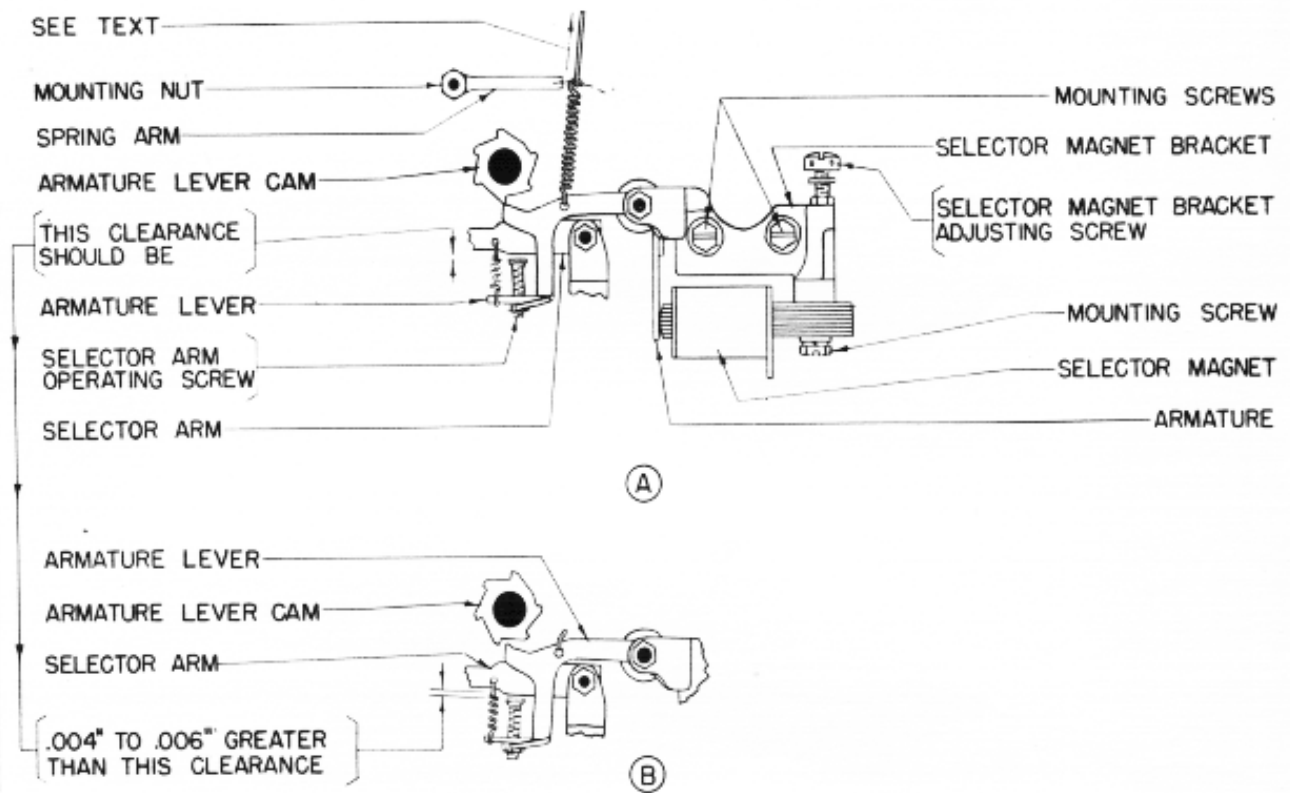


FIGURE 28

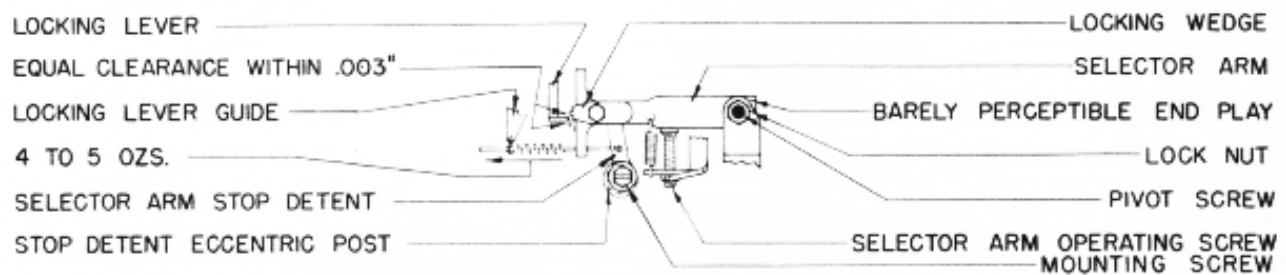
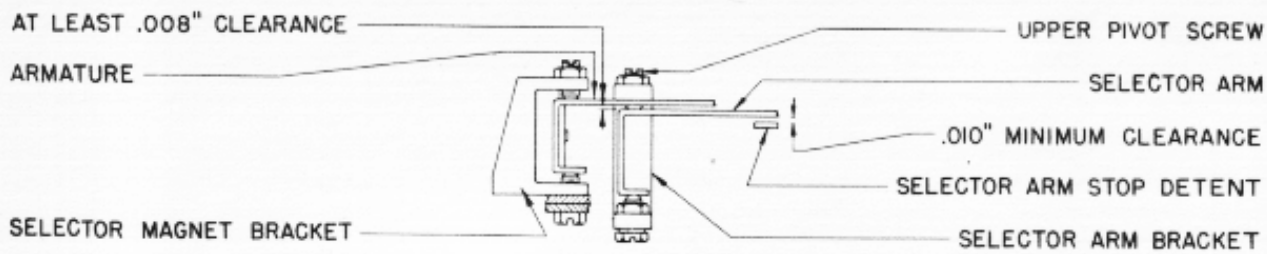


FIGURE 29



(REAR VIEW)

FIGURE 30

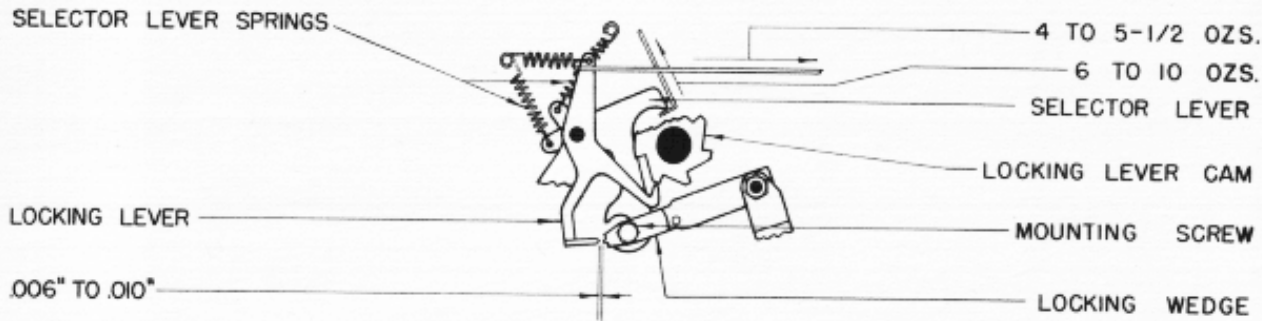


FIGURE 31

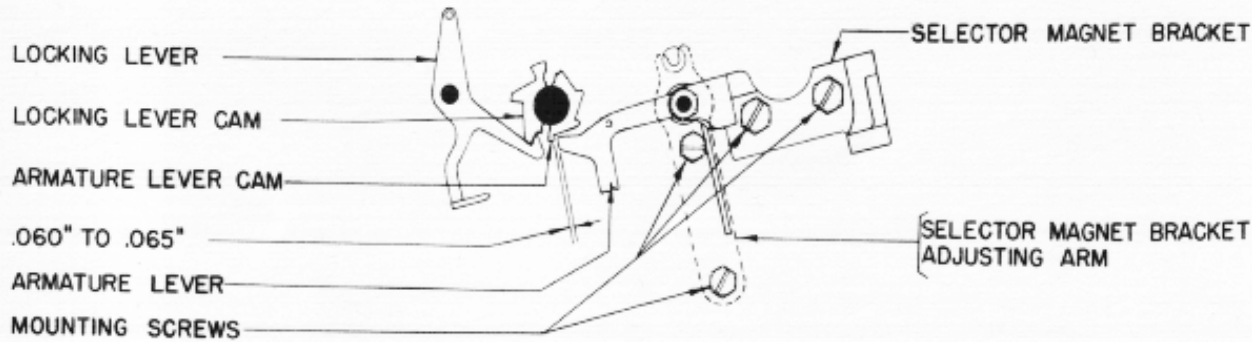


FIGURE 32

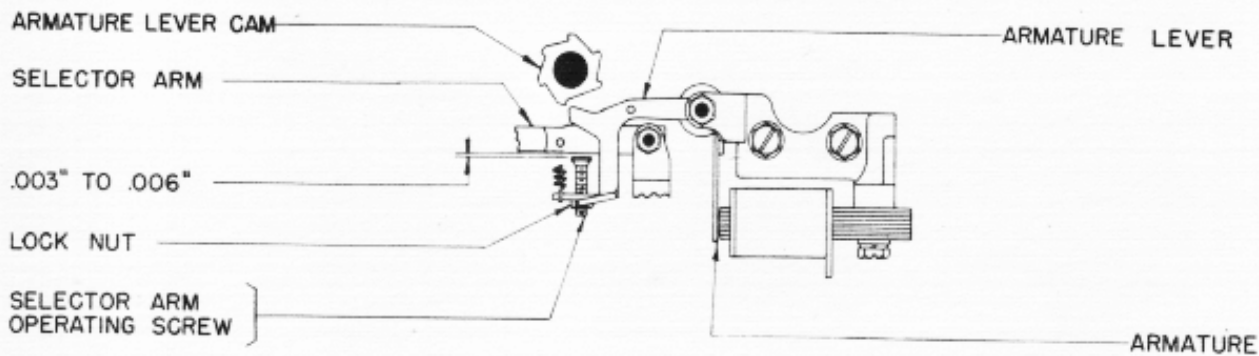


FIGURE 33

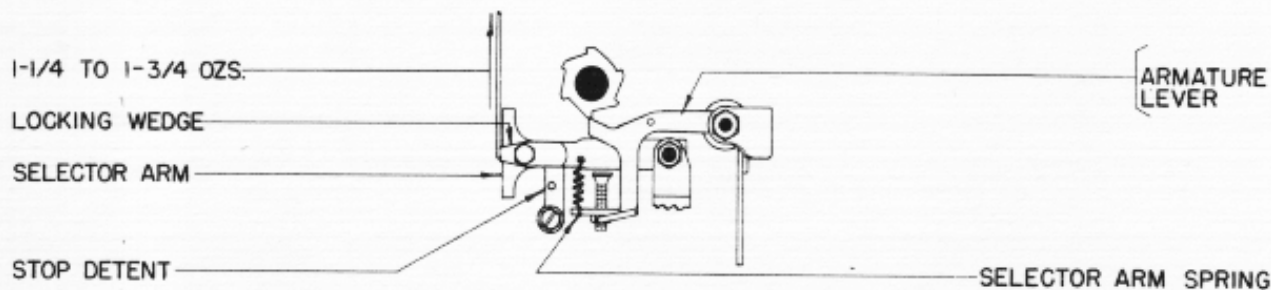


FIGURE 34

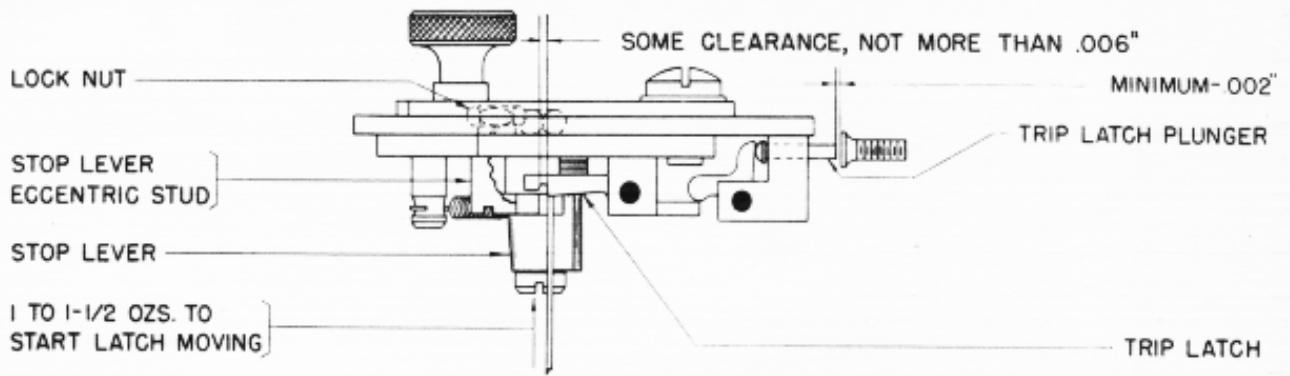


FIGURE 35

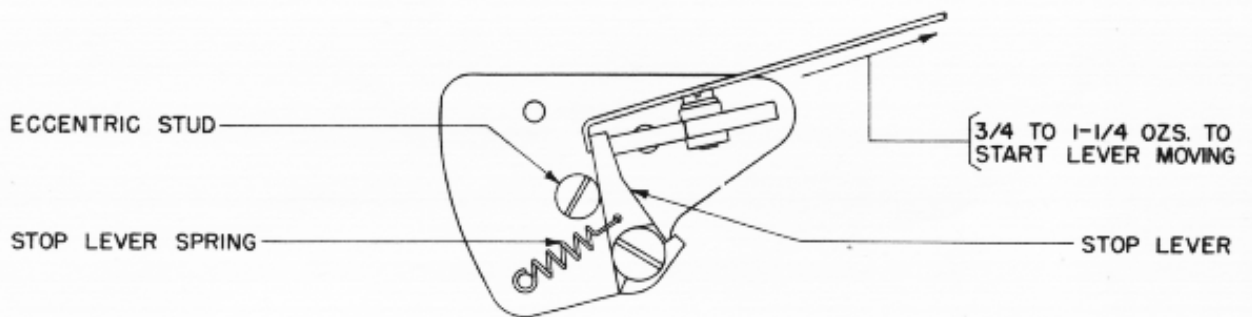


FIGURE 36

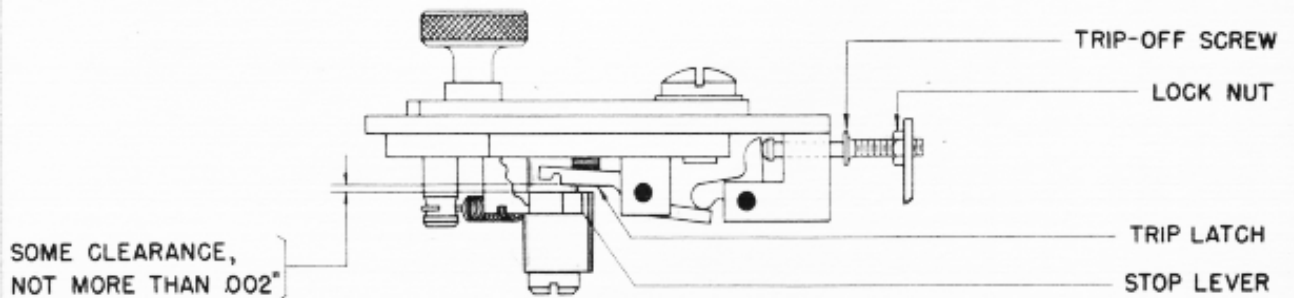
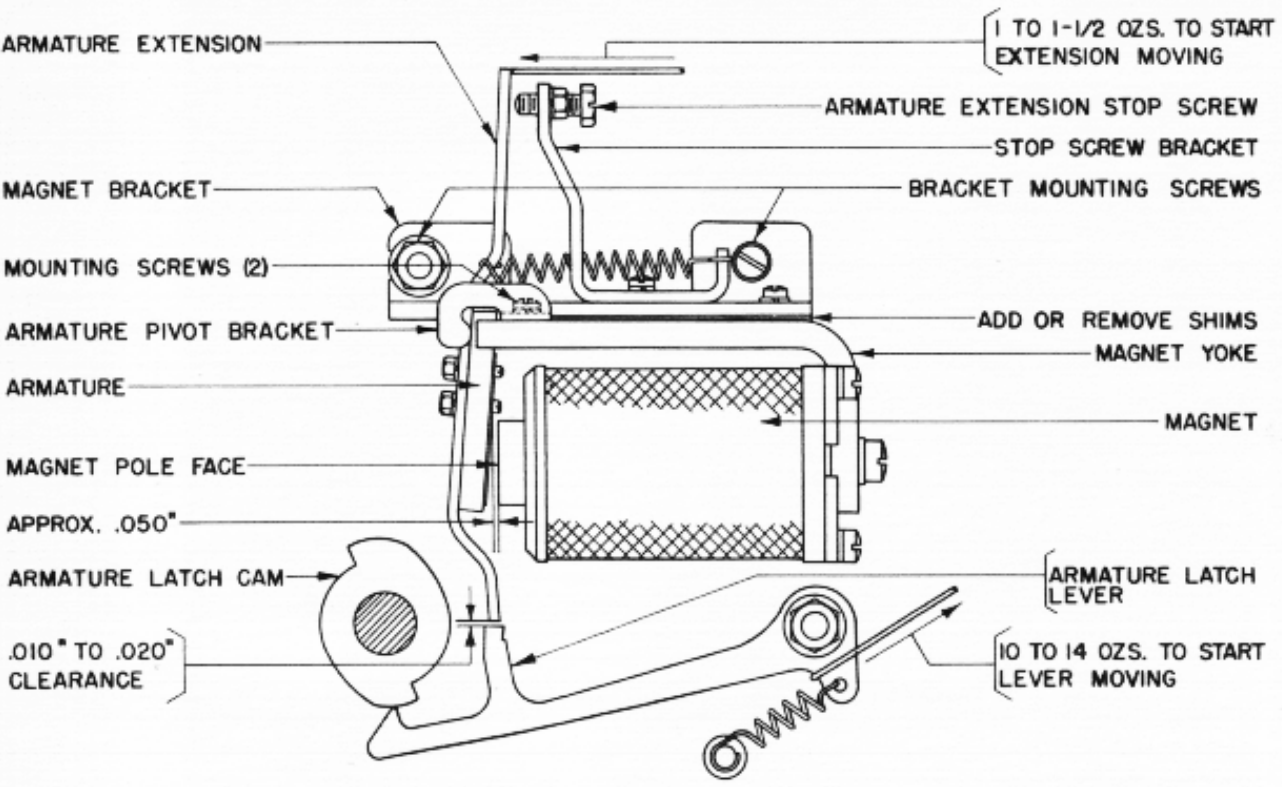
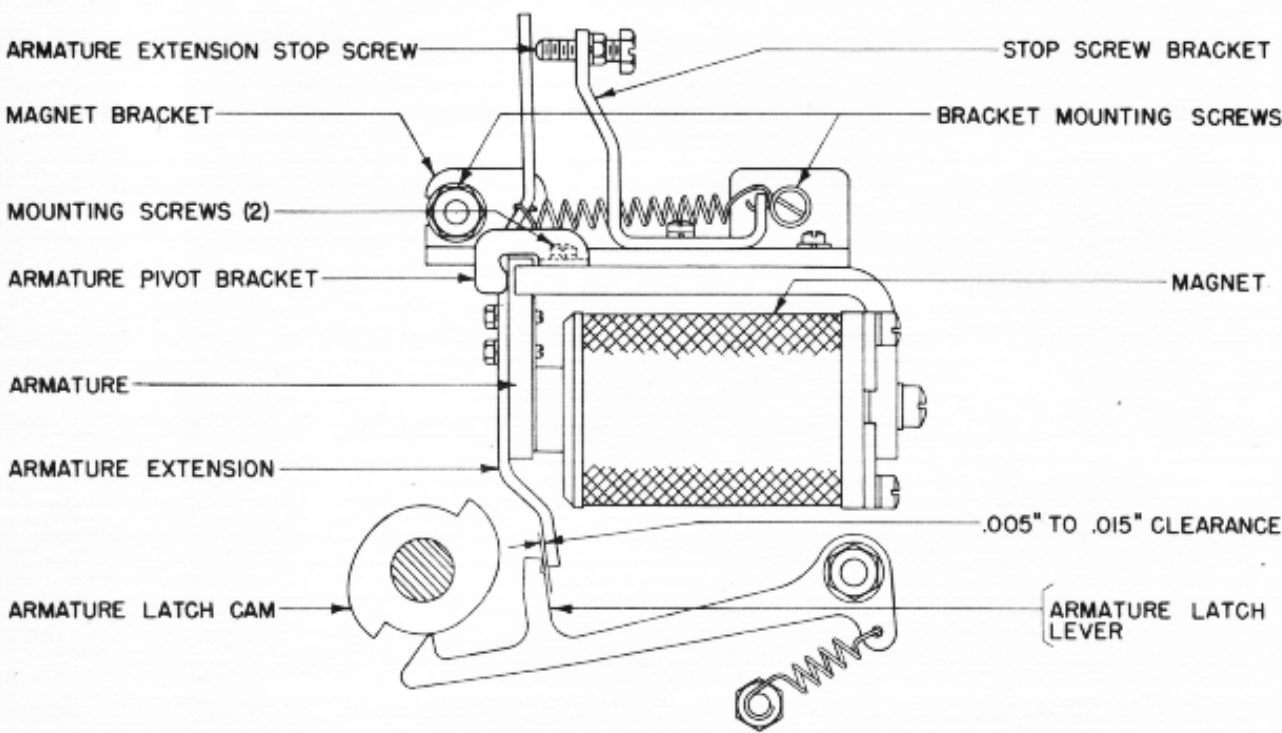


FIGURE 37



SIXTH PULSE ARMATURE ASSEMBLY
FIGURE 38



SIXTH PULSE ARMATURE ASSEMBLY
FIGURE 39

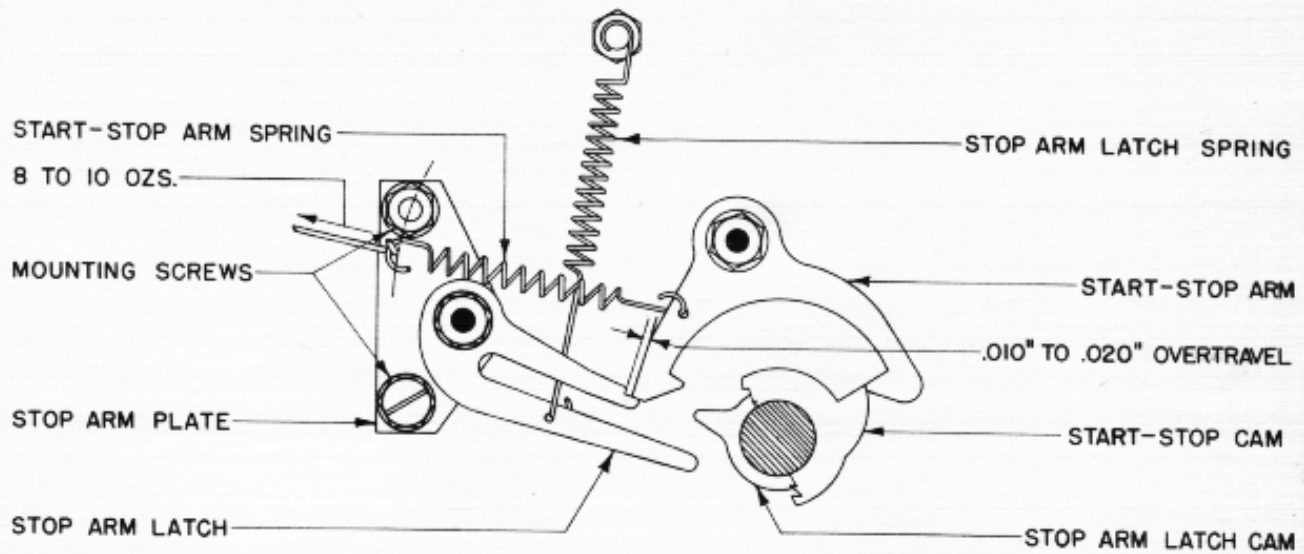


FIGURE 40

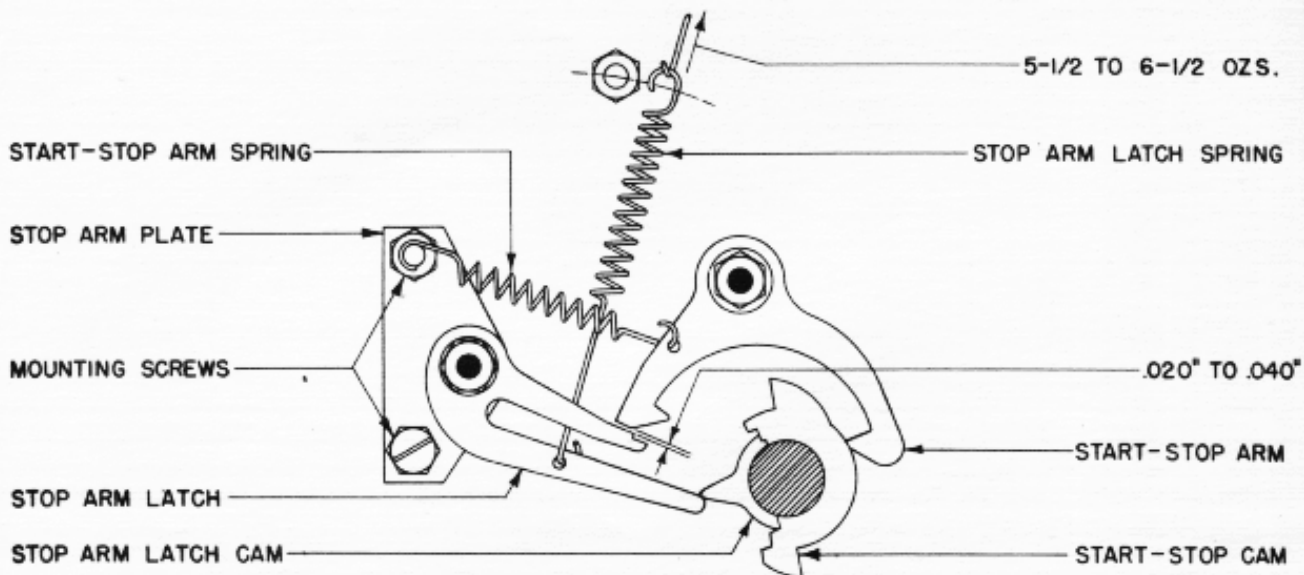
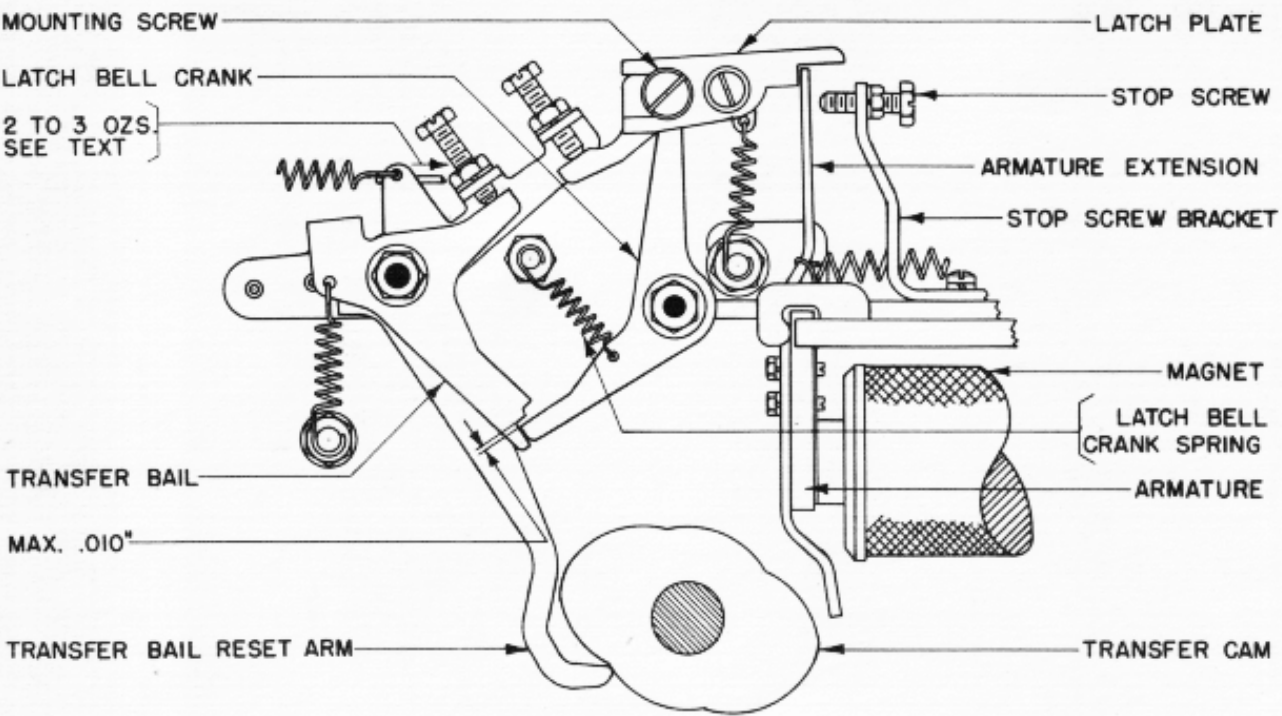


FIGURE 41



SIXTH PULSE ARMATURE ASSEMBLY
FIGURE 42

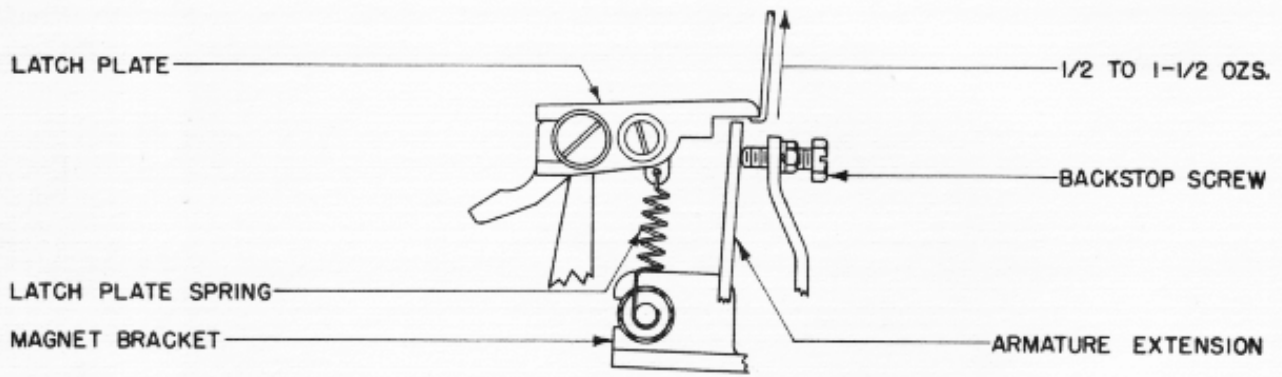
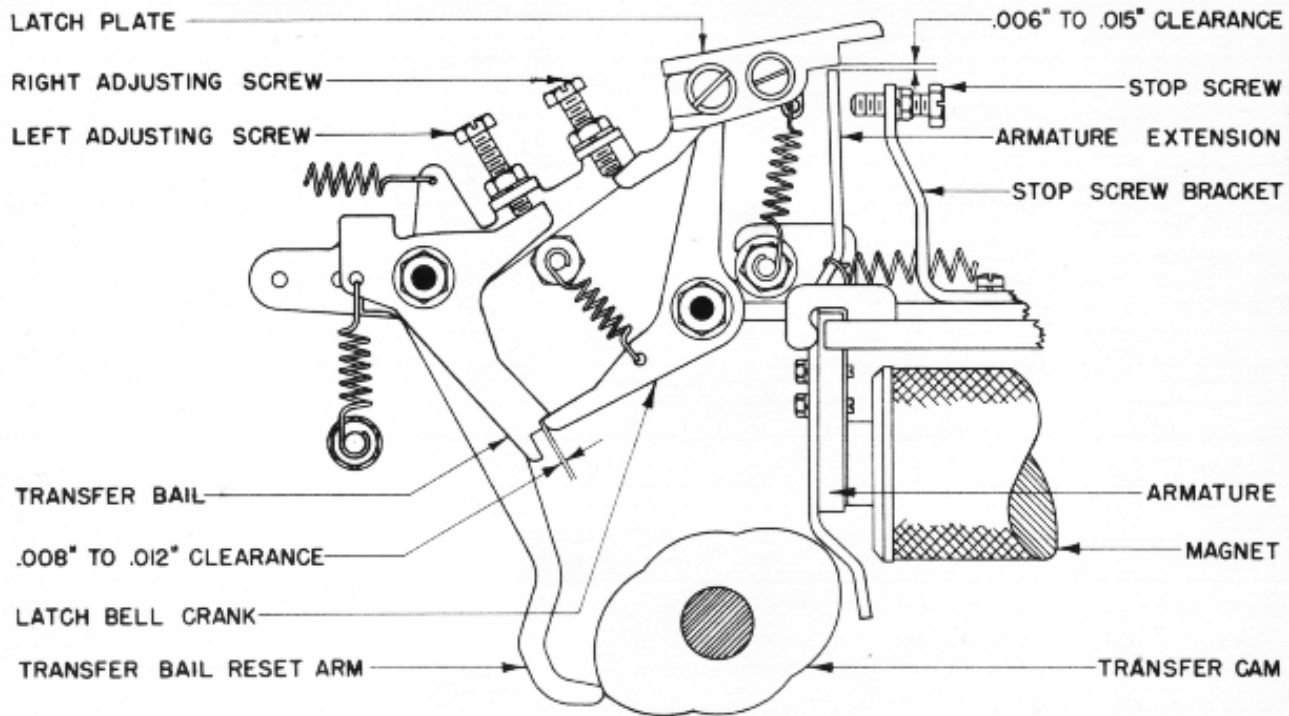


FIGURE 43



SIXTH PULSE ARMATURE ASSEMBLY
FIGURE 44

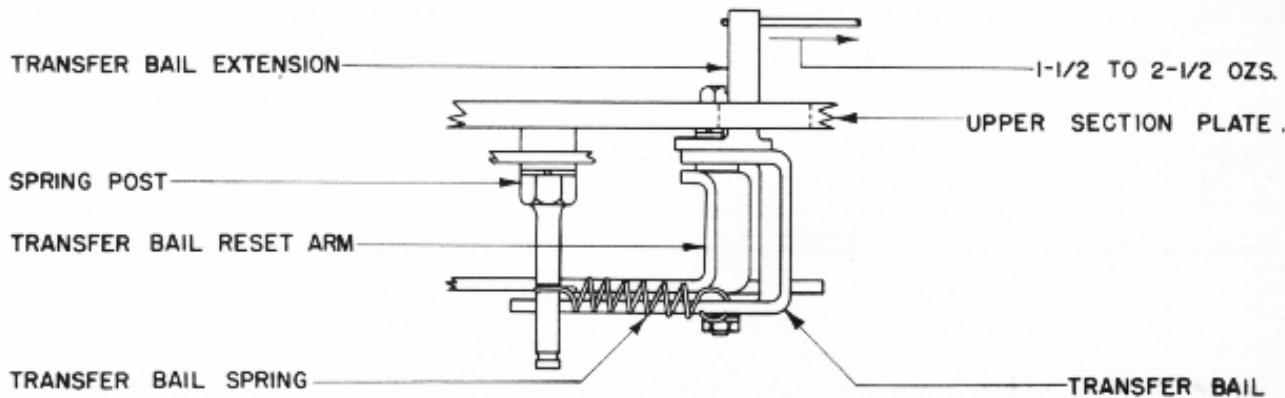


FIGURE 45

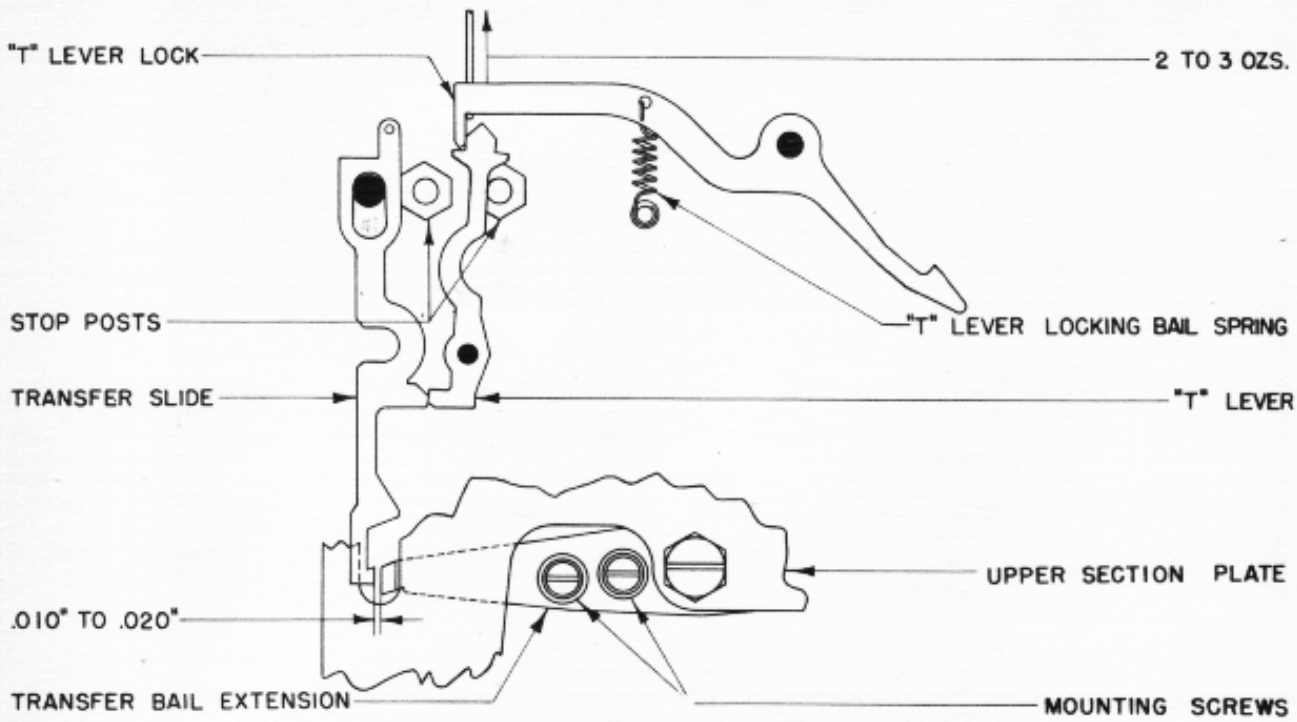


FIGURE 46

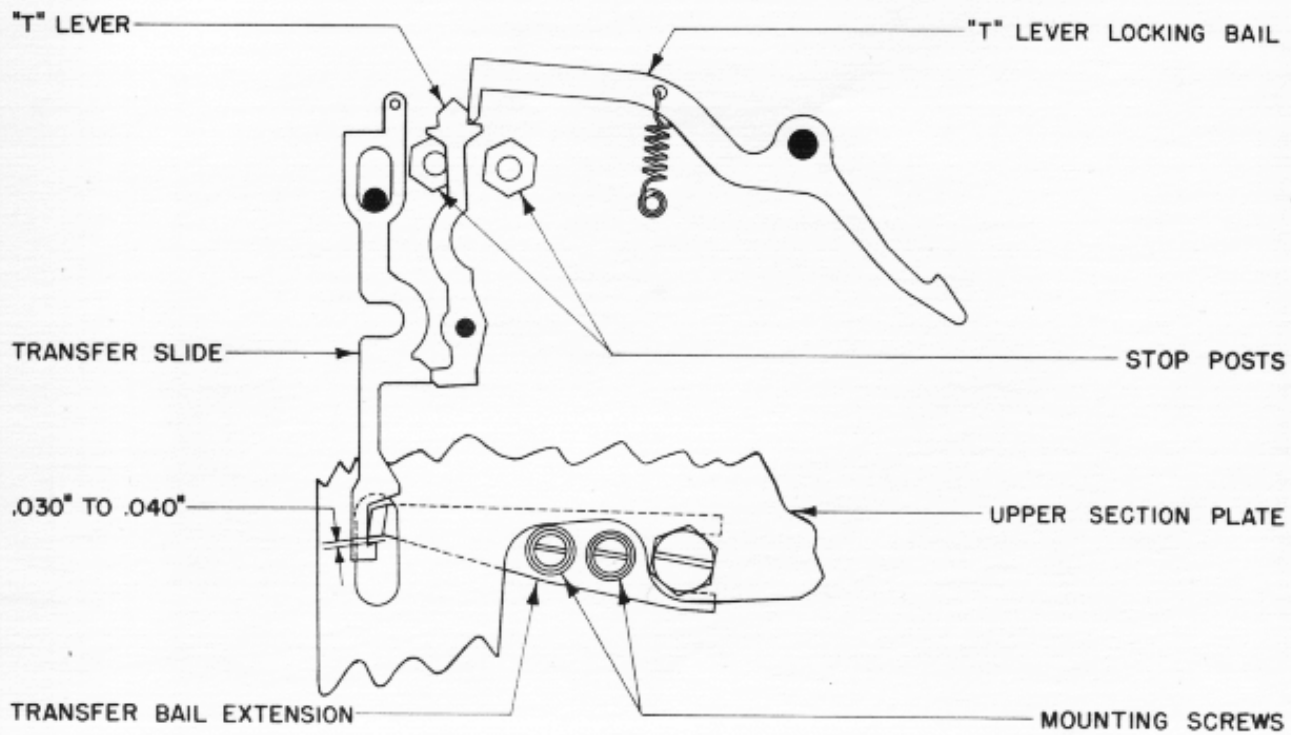


FIGURE 47

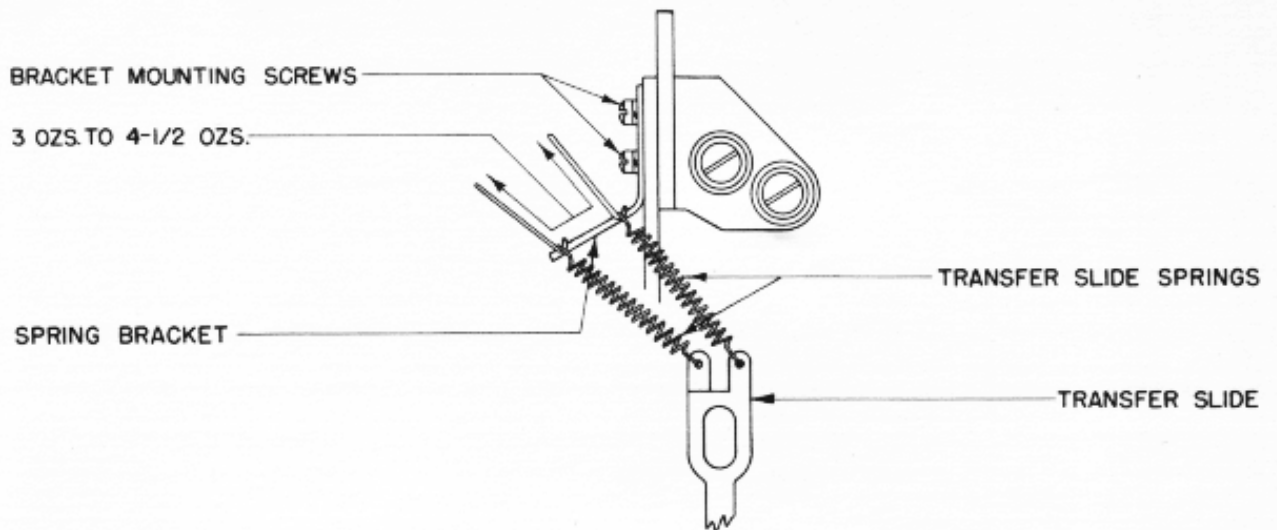


FIGURE 48

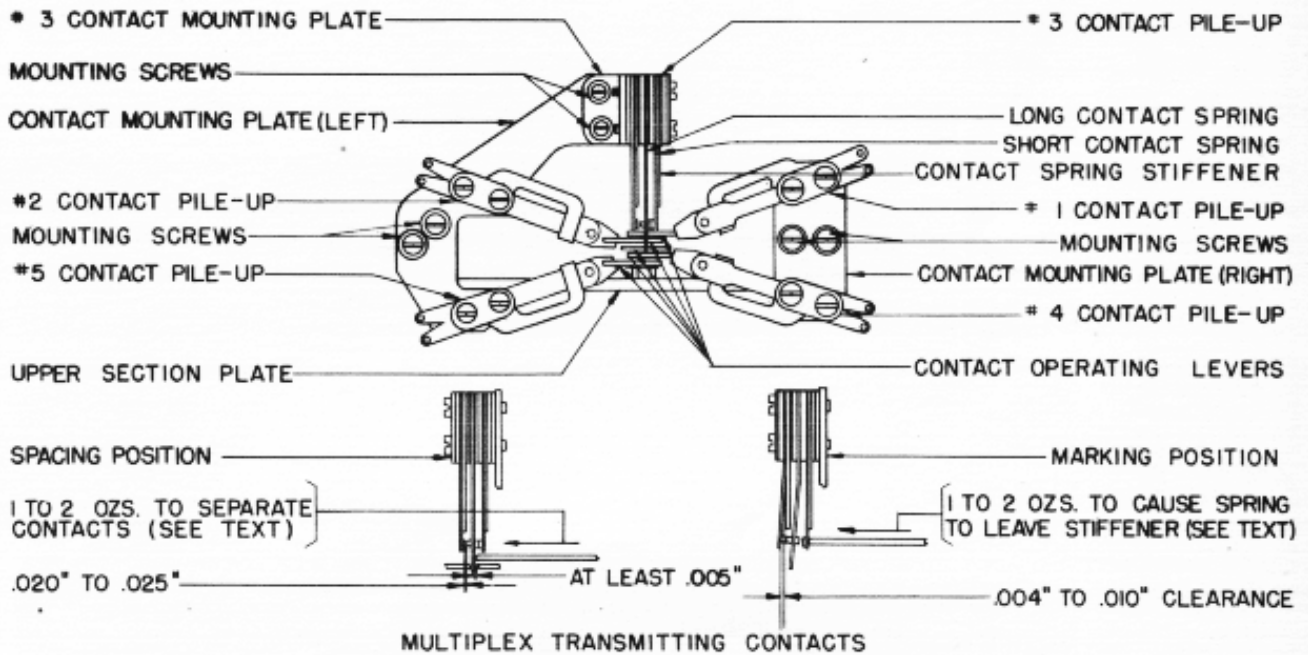


FIGURE 49

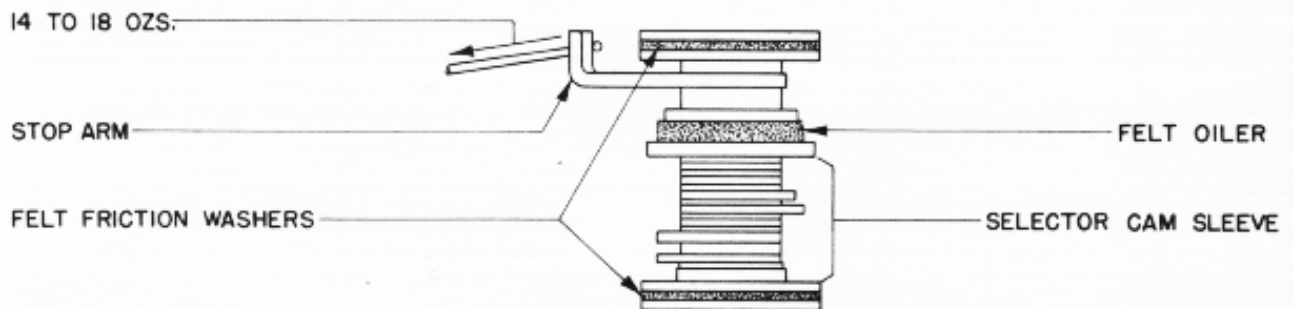


FIGURE 50

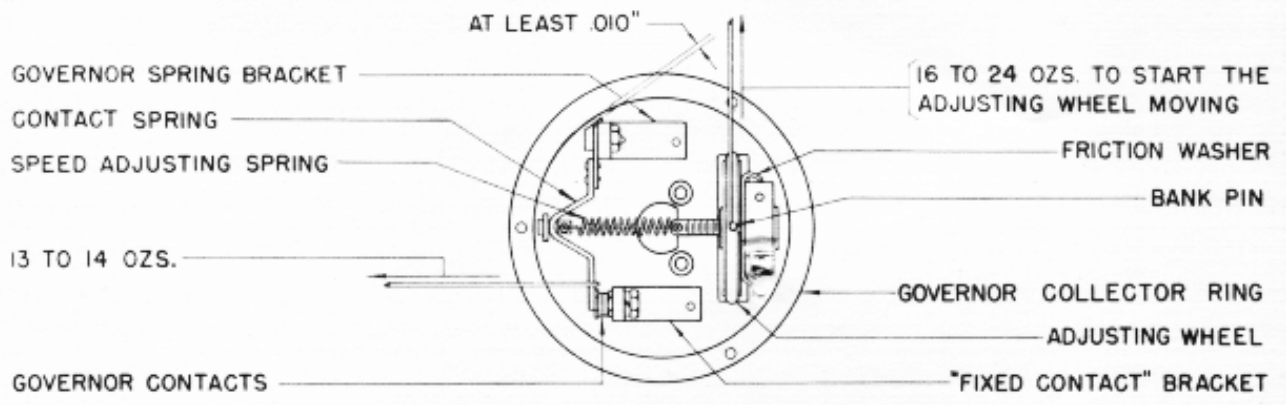


FIGURE 51

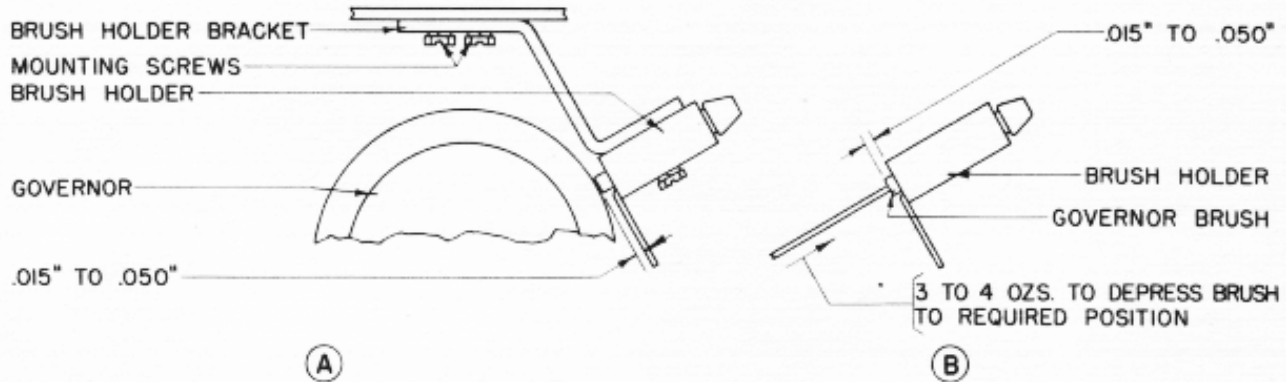


FIGURE 52

APPARATUS NOT USED BY BELL SYSTEM

ADDITIONS AND CORRECTIONS BULLETIN 182, ISSUE 1 DESCRIPTION AND ADJUSTMENTS MULTIPLEX START-STOP EXTENSOR SET

Page 7 DETENT LEVER SPRING TENSION

In the second line of this adjustment, 8 oz. scale should be changed to 32 oz. scale. The requirements 1-1/2 to 2-1/2 ozs. should be changed to 7-1/2 to 9-1/2 ozs., and Figure 15-B should be changed accordingly.

Page 11 LOCK LOOP ADJUSTMENT

The clearance requirement .008" to .015" should be changed to .015" to .025", and Figure 24 should be changed accordingly.

LOCK LOOP SPRING TENSION

The requirement 3-1/2 to 4-1/2 ozs. should be changed to 5 to 7 ozs., and Figure 25 should be changed accordingly.

Page 18 START-STOP ARM SPRING TENSION

In the second line of this adjustment, 32 oz. scale should be changed to 8 oz. scale. The requirement 8 to 10 ozs. should be changed to 4 to 5 ozs., and Figure 40 should be changed accordingly.

Page 20 LATCH BELL CRANK SPRING TENSION

- * In the second line of this adjustment, 8 oz. scale should be changed to 12 oz. scale. The requirement 6-1/2 to 8 ozs. should be changed to 10 to 12 ozs.

TRANSFER BAIL EXTENSION ADJUSTMENT

Add the following note after this adjustment:

NOTE: When checking the .010" to .020" clearance, the swords must be held off.

TRANSFER SLIDE SPRING TENSION

This adjustment should be revised to read as follows:

To measure the front spring tension, move the T levers to the MARKING position and the transfer bail extension to its unoperated position. Hook an 8 oz. scale over the front end of the slide and pull toward the left. It should require a pull of 3/4 to 1-1/4 ozs. to start the slide moving. Check each slide.

* Indicates Change

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To measure the rear spring tension, hook an 8 oz. scale over the shoulder at the front of the slide and pull in line with the slide. It should require 1-3/4 to 2-1/4 ozs. to start the slide moving. Check each slide.

Page 21 SELECTOR CLUTCH TORQUE

All text following the phrase, "to hold the sleeve stationary," should be omitted. The following note should be inserted after the adjustment:

NOTE: If the torque is measured with the cam in any position other than its stop position, the selector levers must be held off.

Figure 48 Substitute the new drawing for the original figure.

* * *

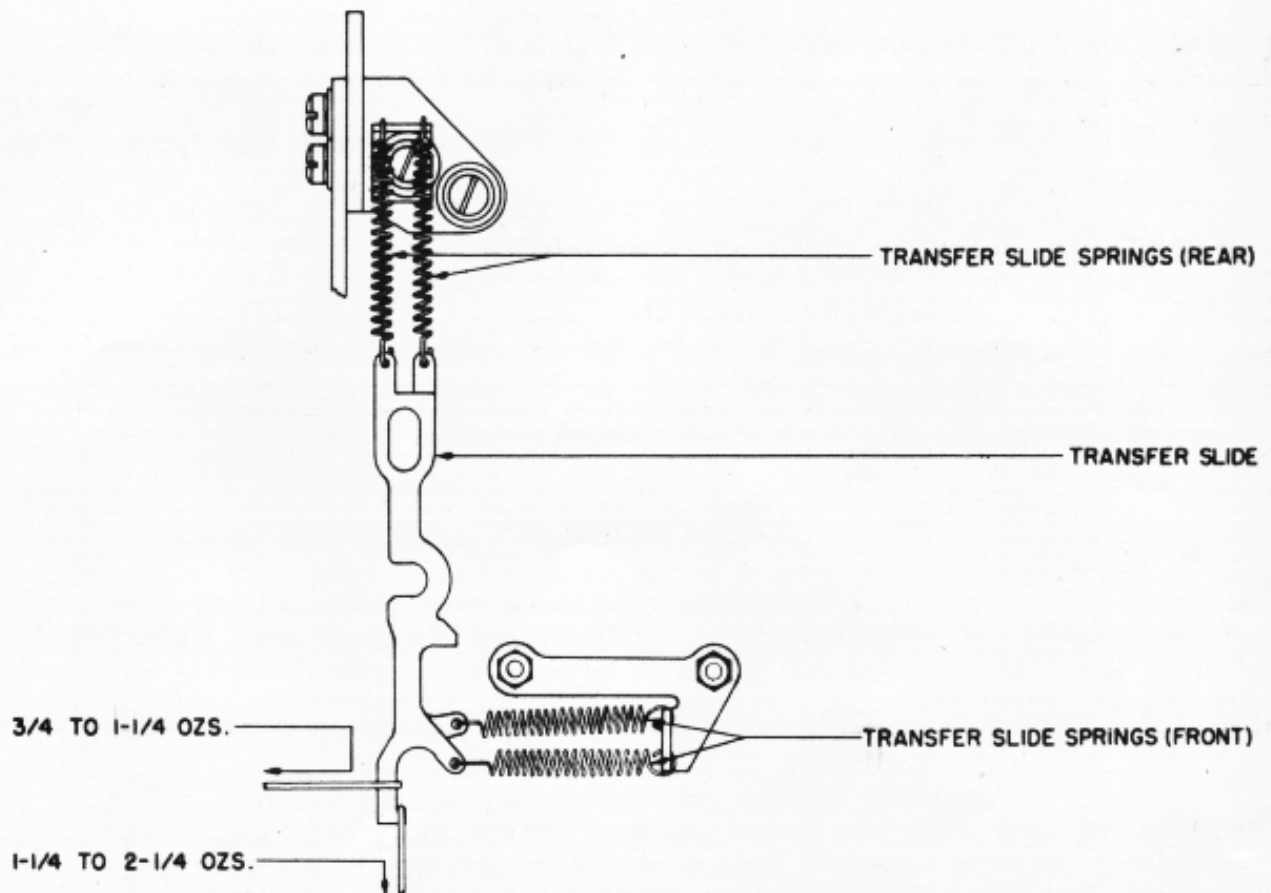


FIGURE 48

PUT THIS INFORMATION
NOT FOR GENERAL DISTRIBUTION
CHANGES IN BULLETINS

- 138, Issue 5, Model 15 Typebar Page Printer, Page 22
- 159, Issue 2, Model 26 Type Wheel Page Printer, Page 1
- ✓ 182, Issue 1, Multiplex Start-Stop Extensor Set, Page 12

SELECTOR MAGNET ADJUSTMENT

Change the note to read as follows:

"NOTE: When the cores are in proper adjustment, it should require at least 3-1/2 lbs. pull, with a 64 oz. scale applied at right angle to the armature edge on the same level as the armature extension, 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.)"

* * *

Teletype Corporation
Chicago, Illinois, U.S.A.

APPARATUS NOT USED BY
BELL SYSTEM

10/5/48 *6mel*
EE-643
Issue 1
August, 1948

CHANGES IN BULLETIN 182, ISSUE 1
DESCRIPTION AND ADJUSTMENTS
MULTIPLEX START-STOP EXTENSOR SET

In order to eliminate bounce of the "T" lever locking bail, the 78824 "T" lever locking-bail spring (19 turns) has been replaced by a 119729 spring (15 turns) which applies greater tension. The spring tension requirement is affected as follows:

PAGE 20

Under "T" LEVER LOCK LOOP SPRING TENSION, the spring tension requirement should be 3 to 4 ozs. instead of 2 to 3 ozs.

* * *

CHANGES AND ADDITIONS TO ADJUSTMENT BULLETINS

127B, Issue 3
138B, Issue 5
147B, Issue 2
155B, Issue 1
159B, Issue 2
160B, Issue 1
165B, Issue 4
171B, Issue 2
171B, Issue 2

178B, Issue 1
182B, Issue 1
197B, Issue 1
198B, Issue 1
199B, Issue 1
201B, Issue 1
203B, Issue 1
210B, Issue 1
211B, Issue 2
220B, Issue 1

FOR COPY OF THIS CORRECTION SHEET

SEE BULLETIN 138, 165 or 203

Teletype Corporation
Chicago, Illinois, U.S.A.

APPARATUS NOT USED BY
BELL SYSTEM

871EE
Issue 1
July, 1955

CHANGES IN ADJUSTING BULLETINS
182B, ISSUE 1 - MULTIPLE START-STOP EXTENSOR SET.
199B, ISSUE 1 - SIMPLEX-DIPLEX CONVERTER

Change adjusting requirements as follows:

Bulletin 182B, Page 21
Bulletin 199B, Page 2-7

MARKING CONTACT SPRINGS

Change the requirement to read .002" to .010" instead of .004" to .010". Change adjusting figures to correspond.

CONTACT LEVERS CLEARANCE

Change the requirements to read .012" to .020" instead of .015" to .020". Change adjusting figures to correspond.

* * *

Printed in U.S.A.

packaging list 7/13/55

CHANGES AND ADDITIONS
TO BULLETIN 182B, MULTIPLEX
START-STOP EXTENSOR SET

Page 21. Selector Clutch Torque (Figure 50)

The torque requirement of 14 to 18 oz. should be changed to read 18 to 22 oz.

Change applicable figure accordingly.

* * *

*app'd
BSS - 10/3/55*