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TELETYPE

PRINTING TELEGRAPH SYSTEMS

M 21
(MTP)

DESCRIPTION AND ADJUSTMENTS

MULTIPLEX TAPE PRINTER

(MTP)



REG. U.S. PAT. OFF.
CORPORATION

SUBSIDIARY OF

Western Electric Company

CHICAGO, U.S.A.

TELETYPE

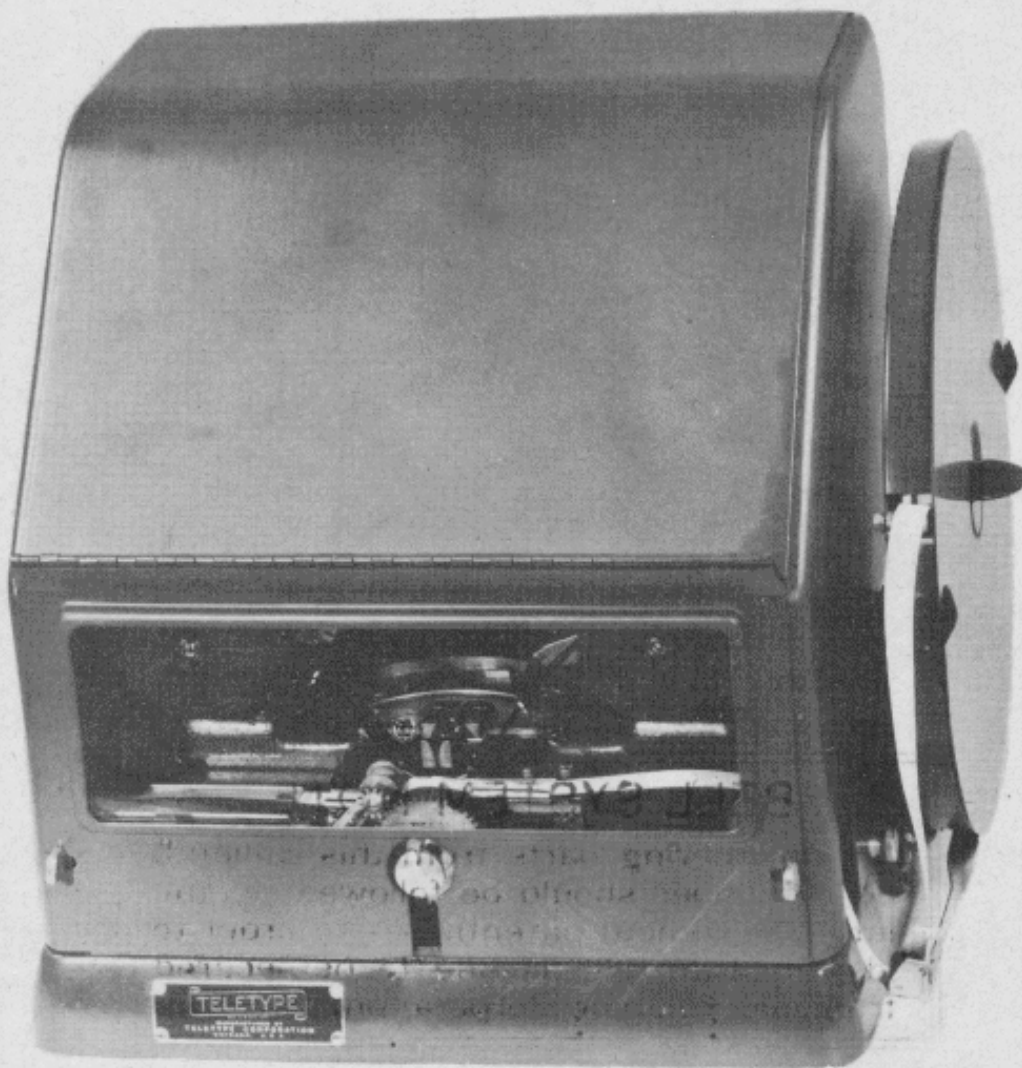
PRINTING TELEGRAPH SYSTEMS

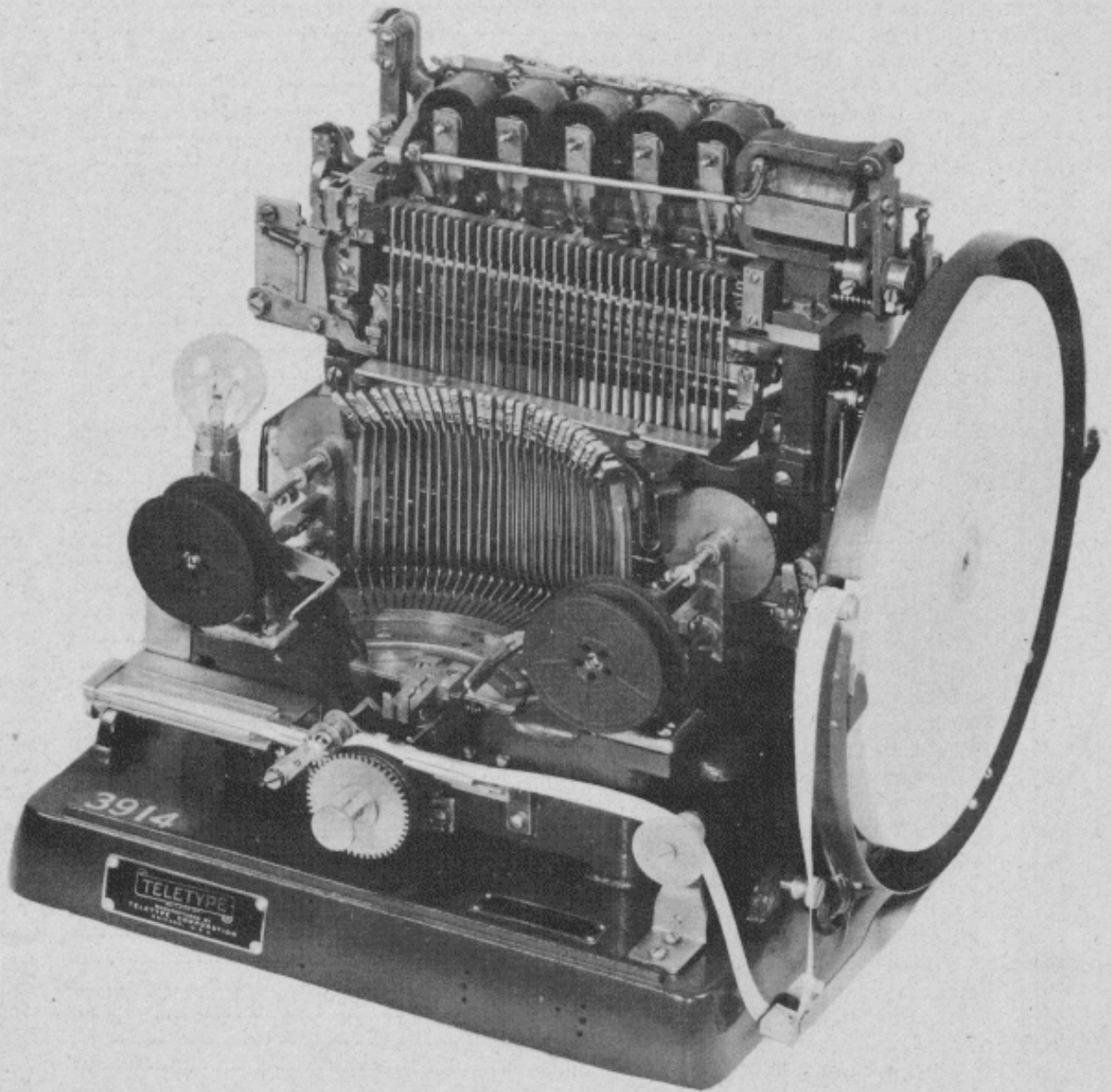
DESCRIPTION AND ADJUSTMENTS MULTIPLEX TAPE PRINTER

BELL SYSTEM NOTE:

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3914

TELETYPE
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SECTION I

GENERAL DESCRIPTION

1. GENERAL

a. The five-unit multiplex tape printer is a receiving-only magnet-operated unit arranged for use in conjunction with a multiplex receiving distributor for printing, on standard 3/8" or 5/16" tape, messages received from a multiplex channel. The impulses conveyed from the receiving distributor to the printer consist of five selecting impulses and a sixth pulse. Printing speed varies with the operating speed of the multiplex system. The message may be typed on either gummed or ungummed tape which is fed from a tape container attached to the right side of the unit. Gummed tape may be cut to the required lengths and attached to message blanks.

b. The unit consists essentially of a selecting mechanism, a mechanism which prints in both LETTERS and FIGURES positions, a spacing mechanism, ribbon feeding and reversing mechanism.

2. THEORY OF OPERATION

a. SELECTING MECHANISM

(1) The selecting mechanism (Figure 5) is made up of five selector magnets, five selector bars, a selector carriage, a sixth-pulse magnet, and a sixth-pulse relay. The five selector magnets receive the electrical impulses from the receiving distributor and are energized according to the individual impulse received. If a selector magnet receives a marking impulse, it attracts its armature; whereas during a spacing interval, the armature remains unoperated. The selector-carriage assembly, located immediately in front of the lower end of the selector-magnet armatures, consists of a selector carriage, five selector-bar pawls, and five selector-bar-pawl latches and springs.

(2) When a selector magnet is energized by a marking impulse, its armature moves a selector-bar pawl (Figure 5) into a notch of an adjacent selector bar. The associated selector-bar-pawl latch engages the selector-bar pawl and holds it in its operated position. After the impulses of any code combination have been distributed to the selector magnets,

a sixth pulse from the multiplex distributor operates a sixth-pulse relay associated with a sixth-pulse magnet (Figure 6). The sixth-pulse relay locks through a locking circuit and its contacts close a local circuit which energizes the sixth-pulse magnet. When the sixth-pulse magnet is energized, the selector-bar carriage moves to the left and carries with it the selector bars that are engaged by the operated selector-bar pawls. As the selector carriage reaches the end of its travel, selector-bar detent springs (Figure 5) drop into the right-hand notches of the operated selector bars and hold them in the operated position. Simultaneously, trip latches cause the selector-bar-pawl latches to release the operated selector-bar pawls, while the sixth-pulse cutout lever, (Figure 2) located near the left end of the selector-bar carriage, opens the sixth-pulse contact. The opening of this contact breaks the locking circuit to the sixth pulse relay and allows the selector carriage to be pulled by its spring to its unoperated position.

(3) When no selection is received, operation of the sixth-pulse magnet is suppressed by means of a cutout shaft with five fingers and a cutout-shaft lever, located to the front of the selector magnets (Figure 6). When the sixth-pulse cutout lever is operated by the selector carriage, the cutout-shaft lever engages the cutout lever and holds the sixth-pulse contact open. The sixth-pulse contact remains open until a selector-magnet armature is operated. When a selector-magnet armature is operated, in response to a marking code impulse, its lower extension strikes its associated finger on the cutout shaft and causes the cutout-shaft lever to release the sixth-pulse cutout lever. The sixth-pulse contact is then permitted to close.

b. PRINTING MECHANISM

(1) After the selector bars have been positioned by the carriage in accordance with code combinations received, the notches in the bars will align for the selection of a single pull bar.

(2) The selector carriage, in moving to its operated position (left), rotates the selector-bar return lever (Figure 6) to the

left. The return lever becomes latched in its operated position by the lock arm. An extension of the return lever permits the printing contacts to close and complete the circuit to the printing relay (Figure 3) through the printing break contacts located to the rear of the selector magnets. When the printing relay pulls up, it locks through a relay locking circuit and closes a circuit to the printing solenoid through the printing break contacts.

(3) Energizing the printing solenoid causes its plunger to move downward. The downward movement of the solenoid plunger rotates the printing bail by means of a linkage and moves the printing-bail roller upward (Figure 7). The upward movement of this roller permits the pull bars to move toward the selector bars.

(4) The selected pull bar moves into the path provided for it by the alignment of the notches in the selector bars, and also into the path of the printing bail. The unselected pull bars come to rest against the edge of the selector bars and, therefore, do not move into the path of the printing bail. As the printing bail continues on its upward stroke, it comes in contact with a notch on the selected pull bar and moves the pull bar upward. The lower end of the pull bar is linked to a type bar through a horizontal lever. Through this linkage the upward movement of the pull bar causes the type bar to rotate on its pivot. See Figure 7. As the type bar rotates on its pivot, a type pallet, mounted on the upper end of the type bar, moves through a circular path and strikes the platen. Through this chain of linkage the selected character, corresponding to the code combination received, is printed.

(5) When the printing bail completes its stroke, the contact break arm opens the printing-break contacts thereby breaking the circuit to the printing relay and solenoid.

(6) After the printing solenoid is de-energized, the printing bail is pulled downward to its unoperated position by action of the printing-shaft spring which is attached to the ribbon-feed-unit operating arm. As the printing bail returns to its unoperated position, the printing-bail roller moves the pull bars away from the selector bars, and the contact-lock operating screw, on the left end of the printing bail, moves the restoring arm downward (Figure 6). At the same time, the lock-arm trip latch, connected to the lock-restoring arm, unlatches the lock arm. This permits the selector-bar return lever to restore the selector bars to their unoperated position, and open the printing contacts.

c. SPACING MECHANISM

(1) When any character is printed, the selected type bar depresses the universal bar located to the front of the lower end of the type-bar segment (Figure 7). The downward movement of the universal bar causes the reset arm to rotate the spacing beam against its right stop screw, and advance the spacing pawl one tooth on the spacing ratchet. As the printing bail returns to its unoperated position, the space operating arm (Figure 7), which is clamped to the printing shaft, moves the spacing beam against its left stop screw by means of the space connecting rod, and the spacing pawl advances the spacing ratchet one tooth. Since the platen shaft is fastened to the spacing ratchet by a sliding clamp, the platen rotates with the spacing ratchet one character space.

(2) In order to space the platen without printing, the SPACE selection must be applied. When the space pull bar (extreme right-hand pull bar) is selected, it operates in the same manner as other pull bars; but since its type bar does not have a type pallet, no printing takes place.

d. FIGURES AND LETTERS SHIFT

(1) The lower character on most type pallets is a letter and the upper character is a figure or punctuation mark. The platen assembly is arranged so that the position of the platen may be shifted forward or backward to line up with either the upper or lower case type pallets.

(2) When the platen is in the LETTERS position and the FIGURES pull bar is selected, the lower end of the pull bar engages the shift cross-arm roller and cams the entire platen assembly toward the front of the printer. See Figure 32. The carriage jockey arm operates against the shift cross-arm roller and detents the platen assembly to the FIGURES position.

(3) The LETTERS shift operation is similar in action to the FIGURES shift operation except that the LETTERS pull bar is selected. When the LETTERS pull bar is raised by the printing bail, it shifts the platen toward the rear of the printer in the same manner that the FIGURES pull bar shifted it forward.

e. SIGNAL BELL

While the platen is being moved to the FIGURES position, the bell adjusting lever on the shift cross arm engages the hooked extension of the J pull bar and moves it forward. This movement disengages the pull bar from its

horizontal bar and engages it with the rear of the bell hammer arm. Thus, when the bell combination is received (J combination, with the platen in the FIGURES position) the bell pull bar rotates the bell hammer arm on its pivot causing it to strike the bell. See Figure 32.

f. RIBBON FEED MECHANISM

The ribbon-feed mechanism is operated by the ribbon-feed-unit operating arm which is attached to the printing shaft (Figure 8). This operating arm imparts a vertical motion to the ribbon-feed pawl through the medium of the ribbon-feed-unit connecting link, ribbon-feed operating lever, and the ribbon-feed shaft. The vertical motion of the ribbon-feed pawl moves the ribbon-feed ratchet forward on the downward stroke of the ribbon-feed-unit connecting link. The retaining pawl holds the ribbon-feed ratchet while the feed pawl moves into engagement with another tooth on the upward stroke of the ribbon-feed-unit connecting link.

g. RIBBON REVERSING MECHANISM

Assuming that the ribbon is being wound on the left-hand spool and is almost unwound from the right-hand spool, an eyelet, fastened to the ribbon a short distance from the end, engages the right-hand ribbon reverse arm. The feeding of the ribbon pulls the ribbon reverse arm downward and rotates its shaft. As the shaft rotates, the connecting rod and ribbon reverse pawl are shifted to the left.

The next operation of the printing solenoid will cause the left end of the ribbon-feed reversing arm to move downward (Figure 8), and bring the ribbon reverse pawl into contact with the left lug of the reverse-rod arm. The reverse-rod arm and the feed-pawl reverse rod move to the right where they are held by the reverse-rod detent spring. In moving the feed-pawl reverse rod to the right, the left-hand ribbon-feed pawl and the retaining pawl are disengaged from the left-hand ribbon feed ratchet, and the right-hand ribbon-feed pawl and retaining pawl are engaged with the right-hand ribbon-feed ratchet.

h. TIE-UP LAMP

A tie-up lamp, located on the left side of the printer, is provided to indicate that signals are being received. If the printer is not operating and the lamp is flickering, it is an indication that the printer is not functioning as it should.

i. TAPE-OUT BUZZER

A tape-out buzzer is provided to warn the attendant that the supply of tape is almost depleted. The tape lever, located on the tape reel bracket is held against the periphery of the roll of tape by its spring. When the supply of tape is almost depleted, the insulator, attached to the tape lever, engages the contact spring and closes the circuit to the tape-out buzzer.

SECTION II

ADJUSTMENTS

1. PRINTER ADJUSTMENTS

a. GENERAL

(1) This paragraph covers requirements and adjusting procedures for the maintenance of the Multiplex Tape Printer. Adjustments are arranged in a sequence that would be followed if a complete readjustment of a unit were undertaken. In following such a procedure, parts or assemblies which are removed to facilitate adjustment should not be replaced until all other adjustments are made which would be facilitated by the removal of these parts. If any adjustment is changed, related adjustments should be checked. This fact should be kept in mind when a single adjustment is to be made.

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

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

b. ADJUSTING PROCEDURE

(1) SELECTOR-BAR-PAWL AND LATCH SPRING TENSIONS

NOTE

In order to check the tension of these springs it is necessary to lift out the selector carriage (Figure 10). To do this, take out the three selector-magnet base mounting screws (Figure 3) and remove the magnets. Remove the left selector-carriage retaining plate (Figure 11)

and loosen the right retaining-plate screw. Lift the selector carriage out.

(a) With the selector-bar-pawl latch held away, it should require $3/4$ to 1 oz. to just start the selector-bar-pawl spring moving when an 8 oz. scale is hooked over the rear edge of the pawl close to the selector-bar-pawl latch (Figure 9A) and pulled at right angle to the pawl.

(b) With the selector-bar-pawl held away, it should require $3/4$ to 1 oz. to just start the fifth selector-bar latch moving when an 8 oz. scale is hooked over the front notch of the fifth selector-bar-pawl latch and pulled in a line parallel with the carriage frame (Figure 9B).

(c) Replace the selector carriage, and retaining plates, by reversing the procedure followed in removing them.

(2) SELECTOR CARRIAGE ADJUSTMENT

With the selector-carriage return spring unhooked, and the selector-bar return lever held away, the carriage should be free from binds and have some up and down play, not more than .002". To adjust, add or remove shims under the selector-carriage retaining plates. Replace the selector-carriage return spring. See Figure 1. Replace the selector magnets.

(3) SELECTOR-BAR DETENT SPRING ADJUSTMENT (Figure 11)

The fingers of the selector-bar detent spring should travel equally into the right and left-hand detent notches, when the selector bars are shifted from left to right. The selector-bar detent spring should also hold the selector bars firmly against their stop plates. To adjust, loosen the two selector-bar detent-spring mounting screws and position the spring. Tighten the screws.

(4) SELECTOR-BAR DETENT-SPRING TENSION (Figure 11)

With the selector bars moved to the left, hook an 8 oz. scale in the last notch of each selector bar and pull in line with the bar. It should require 5 to 6 ozs. to move each se-

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lector bar from its right-hand notch to its left-hand notch. To adjust, bend the fingers of the detent spring to obtain the correct tension.

(5) PULL-BAR SPRING TENSION (Figures 3 and 24)

Place the printer on its rear side. Hook an 8 oz. scale under the end of the pull bar and pull vertically upward. It should require 3/4 to 1-3/4 ozs. to start each pull bar moving.

REPLACE THE PRINTER IN ITS UPRIGHT POSITION.

(6) SIXTH-PULSE MAGNET ADJUSTMENT

The pole face of the sixth pulse magnet should line up (within .002") with the pole faces of the magnet yoke. To adjust, add or remove shims between the magnet core and the yoke.

(7) SIXTH-PULSE ARMATURE-ARM LEFT STOP ADJUSTMENT (Figure 12)

With the sixth-pulse magnet operated under power and with the sixth-pulse relay contacts held operated, there should be .002" to .008" between the sixth-pulse armature and the poles of the sixth-pulse magnet yoke at the closest point and not more than .015" at any other point. To adjust, position the armature-arm left stop.

(8) SELECTOR-CARRIAGE PUSH-ROD NUT ADJUSTMENT (Figure 12)

Fasten all the selector-bar pawls in the operated position (Figure 13), that is, in the position for engaging the selector bars. This may be done by inserting a turn of wire between each selector armature and its stop nut (Figure 15). With the sixth-pulse armature arm held against its left stop, there should be some clearance not more than .004" between the selector-carriage push-rod nut and the push-rod spring collar. To adjust, position the nut. Lock the push-rod nut in place by means of its lock nut.

(9) SIXTH-PULSE ARMATURE-ARM RIGHT STOP ADJUSTMENT (Figure 13)

With the selector bars in the spacing (right-hand) position and with all the selector-bar pawls in the operated position (forward), there should be .030" to .060" between the left-hand operating edge of each selector-bar pawl and the left side of the notch in the corresponding selector bar. To adjust, position the sixth-pulse armature-arm right stop (Figure 14).

(10) TRIP STRIP POSITION (Figure 13)

With all the selector bar pawls in the operated position (forward), there should be some clearance, not more than .008", between the side of each trip latch and its corresponding selector-bar-pawl latch. To adjust, loosen the trip-strip mounting screws and slide the trip strip to the best position for all five selector-bar pawl latches. Refine the adjustment by bending the trip latch.

REMOVE THE WIRES FROM BETWEEN THE SELECTOR ARMATURES AND THEIR STOP NUTS.

(11) CARRIAGE-RETURN SPRING TENSION (Figure 14)

It should require 3 to 4 ozs. to just start the selector-carriage push rod moving when an 8 oz. scale is applied to the end and pushed in line with the rod.

(12) SELECTOR-CARRIAGE PUSH-ROD SPRING TENSION (Figure 14)

With the selector-bar return lever (Figures 2 and 5) held to the right so as to keep the selector carriage (Figure 10) from moving, apply a 12 lb. push scale to the lower end of the sixth-pulse armature arm (Figure 14) and push to the left. It should require 5 to 7 lbs. to just start the armature arm moving.

(13) SELECTOR-MAGNET BASE POSITION (Figure 15)

The ball points on the lower ends of the selector armatures should be in line with their respective selector-bar pawls. To adjust, loosen the three selector-magnet-base mounting screws (Figure 3) and position the base. Tighten the mounting screws.

(14) SELECTOR ARMATURE TRAVEL (Figure 16)

When the selector armature is resting against its selector magnet core, the selector-bar pawl should be tripped off the selector-bar pawl latch by not more than .006" overtravel. To adjust, bend the lower end of the armature.

(15) SELECTOR-ARMATURE STOP NUT ADJUSTMENT (Figure 15)

When the selector armature is in its normal unoperated position away from the magnet core, there should be .004" to .008" clearance between the ball point and the corresponding selector-bar pawl. To adjust, position the selector-armature stop nut.

(16) SELECTOR-ARMATURE SPRING TENSION
(Figure 15)

It should require 1/2 to 1 oz. to just start the armature moving when an 8 oz. push scale is applied to the selector armature directly below its stop nut and pushed in line with the magnet core.

(17) SELECTOR-ARMATURE BRACKET ADJUSTMENT
(Figure 17)

With the selector-bar pawls unlatched and the selector carriage in the operated (left) position, there should be approximately the same clearance between the side of each armature and its selector-bar pawl, as there is between the selector-bar-pawl latch and its selector armature, when the selector-bar pawl is unlatched and the selector carriage is in the unoperated (right) position. To adjust, loosen the selector-armature-bracket mounting screws (Figure 15) and position the armature bracket. Tighten the mounting screws.

NOTE

When making this adjustment on No. 5 selector-magnet bracket, see that the sixth-pulse contact bracket is positioned correctly. See the following adjustment.

(18) SIXTH-PULSE CONTACT BRACKET ADJUSTMENT

The cutout shaft pivot screw should be approximately in line with the cutout shaft (Figure 18) and there should be at least .010" clearance between the selector carriage and the end of any cutout shaft finger. To adjust, loosen the sixth-pulse contact-bracket mounting screws and position the bracket. Tighten the screws.

(19) CUTOUT-SHAFT PIVOT SCREW ADJUSTMENT
(Figure 18)

There should be the least possible amount of end play in the cutout shaft to permit it to move freely. To adjust, unhook the cutout-shaft spring, loosen the cutout-shaft-lever clamp screw and the cutout-shaft-pivot-screw lock nut. Set the cutout-shaft pivot screw to meet the foregoing requirement. Tighten the lock nut and the cutout-shaft-lever clamping screw. Replace the cutout-shaft spring.

(20) SIXTH-PULSE CONTACT SCREW ADJUSTMENT

With the printer connected to a source of power, turn the sixth-pulse contact screw in until the contacts just close and energize the sixth-pulse magnet (Figure 8). Now back the

contact screw out until the contacts just break contact. Back off the screw an additional one quarter turn and lock the contact screw by means of its lock nut.

(21) SIXTH-PULSE CONTACT SPRING TENSION
(Figure 19)

It should require 2 to 4 ozs. to separate the sixth-pulse contacts when an 8 oz. scale is hooked to the contact spring just below the contact point and pulled at right angle to the spring. To adjust, bend the contact spring.

(22) CUTOUT-SHAFT FINGER ADJUSTMENT

The cutout-shaft fingers should line up with their respective armature buttons and there should be some clearance, not more than .006", between the end of any finger and its corresponding armature button when the selector armatures are in their unoperated position. To adjust, bend the cutout shaft fingers. Make certain the cutout-shaft lever does not interfere with the cutout lever. See Figure 18.

(23) CUTOUT-SHAFT LEVER ADJUSTMENT (Figure 18)

(a) With the sixth-pulse magnet energized there should be a clearance of .006" to .015" between the extreme right edge of the sixth-pulse cutout lever and the left edge of the cutout-shaft lever, when the play in the cutout shaft is taken up to make this clearance a minimum. At the same time, with the sixth-pulse magnet de-energized, rotate the cutout-shaft lever on the cutout-shaft so that it overtravels the latching surface of the cutout lever by not more than .006" (Figure 18B) when any selector magnet is energized. Measure at closest point. To adjust, loosen the clamping screw and position the cutout-shaft lever. Tighten the clamping screw. With the cutout lever in its latched position, make certain that there is at least .006" contact gap between the sixth-pulse contacts. Recheck the contact spring tension.

NOTE

A readjustment of the cutout-shaft fingers will facilitate this adjustment.

(b) Operate the sixth-pulse armature manually several times to make sure the cutout-shaft lever latches the sixth-pulse cutout lever each time.

(c) Operate each selector-magnet armature manually to make sure the sixth-pulse cutout-

lever unlatches each time.

(24) PRINTING-CONTACT LOCK-BRACKET ADJUSTMENT (Figure 20)

With the selector bars operated to their extreme left-hand position and the sixth-pulse armature arm (Figure 14) in the unoperated position (to the right), the lock arm should hold the selector-bar return lever so as to provide a clearance of .010" to .020" between the return lever and the left ends of the selector bars. To adjust, loosen the two printing-contact lock-bracket mounting screws and position the bracket. Tighten the mounting screws. The contact-lock operating screw should rest fully on the lock restoring arm in both the latched and unlatched positions of the return lever.

(25) LOCK-ARM SPRING TENSION (Figure 21)

With the sixth-pulse armature arm held against its left stop (Figure 12), apply an 8 oz. push scale to the right-hand end of the lock arm and push vertically downward. It should require 1-1/2 to 2 ozs. to just start the lock arm moving.

(26) LOCK-ARM TRIP SPRING TENSION (Figure 21)

Operate the printing solenoid (Figure 3) by hand so that the printing bail (Figure 20) is in its extreme upward position. Hook an 8 oz. scale to the upper end of the lock-arm trip latch and pull to the left. It should require 3/4 to 1-1/2 ozs. to just start the lock-arm trip moving.

(27) PRINTING CONTACT SCREW ADJUSTMENT (Figure 22A)

With the selector-bar return lever in the locked position (to the left), there should be a gap of .003" to .006" between the printing contact screw and its opposing contact point. To adjust, loosen the lock nut and set the contact screw. Tighten the lock nut.

(28) PRINTING CONTACT SPRING TENSION (Figure 22B)

Move the selector-bar return lever to the left so that the contacts close. Hook an 8 oz. scale to the contact spring just below the fiber insulator and pull at right angle to the contact spring. It should require 3-1/2 to 4 ozs. to just break contact. To adjust, bend the contact spring. Recheck the printing contact screw adjustment.

(29) SELECTOR-BAR RETURN-LEVER ADJUSTING SCREW ADJUSTMENT

With the sixth-pulse armature arm held against its right stop (Figure 14), the selector bars moved to their unselected position, the selector-bar return lever in the unlatched position and held against the ends of the selector bars, there should be from .004" to .008" clearance (measured at closest point) between the sixth-pulse armature arm and the selector-carriage push-rod nut, when the play in the push rod is taken up in a direction to make this clearance a minimum. To adjust, loosen the lock nut and rotate the adjusting screw. Tighten the nut.

(30) SELECTOR-BAR RETURN-LEVER SPRING ADJUSTMENT

To adjust the selector-bar return-lever spring (Figure 20), move all the selector bars to the left and adjust the selector-bar return-lever spring by means of its adjusting screw to provide just enough tension to return the selector-bars when the selector-bar return lever is released from its locked position by the operation of the printing solenoid (Figure 3). Turn the adjusting screw an additional one quarter of a turn. Recheck "SELECTOR-CARRIAGE PUSH-ROD NUT ADJUSTMENT" and "CUTOFF-SHAFT LEVER ADJUSTMENT."

(31) PRINTING-SOLENOID-PLUNGER LOWER STOP-NUT ADJUSTMENT (Figure 23)

The printing solenoid plunger should project above the solenoid frame 1-7/32" to 1-9/32". Measure from the machined surface of the solenoid frame against which the leather washer stops to the center of the link bearing screw. To adjust, remove the ribbon-feed-unit connecting-link screw from the ribbon-feed-unit operating arm (Figure 36). Loosen the lower stop-nut lock nut. Position the lower stop nut and tighten its lock nut.

(32) PRINTING-BAIL FRAME ADJUSTMENT (Figures 24 and 25)

When the printing-solenoid plunger is in the unoperated position, the printing-bail roller should rest just past the rise on the pull-bar humps. The printing-bail roller arms should be equidistant (within .010") from the two end pull bars. To adjust, loosen the printing-bail-frame clamping screws and rotate the printing-bail frame on the printing shaft. Tighten the clamping screws (Figure 23).

(33) PULL-BAR COMB POSITION (Figure 24)

When selected, the pull-bars should rest in their notches with equal clearance on either side. To adjust, loosen the pull-bar-comb mounting screws and position the comb. Tighten the screws.

(34) PRINTING BAIL ADJUSTMENT (Figure 25)

When the pull bars are resting against the selector bars, there should be some clearance, not more than .020", between the front edge of the bail and the operating edge of the unoperated pull bars. To adjust, loosen the two printing-bail mounting screws and position the bail. Tighten the screws.

NOTE

Make certain that the printing bail fully engages each pull bar when selected.

(35) PRINTING-BAIL ROLLER ARMS ADJUSTMENT (Figure 24)

When the printing-solenoid plunger is in its unoperated position (Figure 23) there should be a clearance of .020" to .045" between the selector bars and the upper ends of the pull bars. There should also be a clearance of at least .004" between the selector bars and the upper end of the BELL pull bar with the platen in the FIGURES position, and not more than .060" with the platen in the LETTERS position. To adjust, loosen the printing-bail roller-arm mounting screws at each end and position the arm. Tighten the screws.

NOTE

Make certain that there is some clearance between the "J" pull bar and the bell adjusting lever when checking the .004" clearance.

(37) PULL-BAR RETAINING BAR ADJUSTMENT (Figure 24)

With the platen in the LETTERS position and the solenoid plunger in its unoperated position, there should be .025" to .050" clearance between the pull bars and retaining bar. There should be some clearance between the retaining bar and the BELL pull bar when the platen is in FIGURES position. To adjust, loosen the retaining-bar mounting screws and position the bar. Tighten the mounting screws.

(38) TYPE-BAR BACKSTOP ADJUSTMENT

All type bars should rest against their backstop. There should be at least .008" clearance between the lower end of the center type bars and the platen carriage frame. See Figures 7 and 29 for location of parts. To adjust, loosen the backstop mounting screws and position the backstop. Tighten the backstop mounting screws. Check to see that the universal bar is free in its segment slot.

(39) PRINTING-SOLENOID-PLUNGER UPPER STOP NUT ADJUSTMENT

The leather washer on the solenoid plunger should just bear against the solenoid frame when the printing bail (Figure 27) has drawn the type pallet (Figure 28), on a selected type bar, to within 1/16" to 1/2" from the platen (Figure 1). To adjust, loosen the upper stop-nut lock nut and position the upper stop nut. Try each type bar for this travel and set the stop nut in the best average position. Tighten the lock nut. See Figure 23.

(40) LOCK RESTORING-ARM STOP SCREW ADJUSTMENT (Figure 26)

With the selector-bar return lever in the latched position and the lock restoring arm against its stop screw, there should be .050" to .070" clearance between the operating surface of the lock-arm trip and the notched surface of the lock arm, when the play in the selector return lever is taken up in a direction to make this clearance a minimum. To adjust, loosen the lock nut on the lock restoring-arm stop screw and set the screw. Tighten the lock nut.

(41) CONTACT-LOCK OPERATING SCREW ADJUSTMENT (Figure 27)

With the printing bail at the end of its downward stroke, there should be .025" to .035" clearance between the right-hand end of the lock arm and the bottom edge of the return lever. To adjust, rotate the contact lock operating screw. Tighten the lock nut.

NOTE

After completing the two previous adjustments, select the pull bar which clears the selector bars by the least amount and move the main bail slowly downward to make certain that this pull bar clears all selector bars before the lock arm unlatches the selector-bar return lever.

PLACE THE PRINTER ON ITS REAR SIDE.

(42) UNIVERSAL-BAR STOP SCREW ADJUSTMENT
(Figure 28)

When the T typebar is lowered manually, its lower edge should strike the universal bar, when the type pallet is 1-7/16" to 1-9/16" from the platen. The lower edges of the end type bars should strike the edge of the universal bar, when their respective type pallets are 1-1/4" plus or minus 1/4" from the platen. To adjust, loosen the lock nut of the universal-bar stop screw and rotate the screw. Tighten the lock nut.

(43) PLATEN-SHAFT RETAINER (Figure 29)

With the drive dog (Figure 3) removed from the rear of the platen shaft, and the tape pressure roller held away from the platen, the platen shaft should rotate freely with some end play, not more than .002". To adjust, loosen the platen-shaft-retainer mounting screw and position the retainer. Tighten the mounting screw. Replace the drive dog and position it flush with the end of the platen shaft. Tighten the clamp screw.

(44) UNIVERSAL-BAR SUPPORT SPRING TENSION
(Figure 28)

Unhook the universal-bar support spring at its forward end and hook a 32 oz. scale in the spring loop. It should require from 20 to 24 ozs. to pull the spring to its position length. Rehook the spring.

PLACE THE PRINTER IN ITS NORMAL UP-RIGHT POSITION.

(45) BEAM RESET-ARM SPRING TENSION (Figure 28)

Hook an 8 oz. scale under the end of the beam reset arm and pull vertically upward. It should require from 5 to 7 ozs. to just start the arm moving.

(46) SPACING DETENT SPRING TENSION (Figure 31)

Hook a 32 oz. scale under the head of the spacing detent-roller screw and pull vertically upward. It should require from 24 to 28 ozs. to just start the detent moving.

(47) BEAM RESET ARM ADJUSTMENT (Figure 30)

When each of the two end type bars is selected and held against the platen, the spacing pawl should overtravel a tooth on the ratchet

by at least .004". When the T type bar is selected and held against the platen, the spacing pawl should overtravel a tooth on the ratchet by .025" to .045". To adjust, back off the left and right spacing-beam stop screws. Shift the printing-shaft spring to the hole in the rear of the ribbon-feed-unit operating arm to hold the solenoid plunger in the operated position. Loosen the beam reset-arm mounting screws and position the beam reset-arm adjusting block. Tighten the mounting screws and rehook the printing shaft spring.

(48) SPACING-BEAM RIGHT STOP SCREW ADJUSTMENT (Figure 31)

The spacing pawl should overtravel a tooth on the spacing ratchet .015" to .025". Hold the spacing beam in contact with its right stop screw when measuring this overtravel. To adjust, position the right stop screw. Lock the screw by means of its lock nut.

(49) SPACING-BEAM LEFT STOP SCREW ADJUSTMENT

When the spacing detent roller is resting in the hollow between two teeth, the left stop screw should just touch the spacing beam. To adjust, position the left stop screw. Lock the screw by means of its lock nut.

(50) SPACER RATCHET-SHAFT COLLAR ADJUSTMENT

The spacer shaft should have some end play not more than .004". To adjust, position the collar on the spacer ratchet shaft by means of its set screw.

(51) SPACE OPERATING ARM POSITION (Figure 23)

With the solenoid plunger in the unoperated position, and the space connecting-rod shoulder screw resting in the bottom of its slot, there should be some clearance, not more than .010", between the spacing beam and the left stop screw. To adjust, position the space operating arm by means of its clamping screw.

NOTE

While making the above adjustment, locate the arm on the printing shaft so that the space connecting rod is approximately vertical as viewed from the rear of the printer.

PLACE THE PRINTER ON ITS REAR SIDE.

(52) CARRIAGE TRACK ADJUSTMENT

There should not be any side play or binds between the carriage frame and the tracks. Hold the carriage jockey arm off when checking for binds. Adjust the carriage track by means of their mounting screws. See Figure 32 for location of parts.

NOTE

Before proceeding with the following adjustments, loosen the shift cross arm and bell adjusting lever by means of their mounting screws. (See Figure 32.)

(53) LETTERS ADJUSTING SCREW ADJUSTMENT

The letter characters should print in the center of the tape. Adjust by means of the letters adjusting screw. (See Figure 29.)

(54) FIGURES ADJUSTING SCREW ADJUSTMENT

The figure characters should print in line with the letter characters. Adjust by means of the figures adjusting screw. (See Figure 29.)

(55) BELL-HAMMER SPRING TENSION (Figure 33)

It should require from 2 to 4 ozs. to just start the hammer moving when an 8 oz. push scale is applied to the end of the bell hammer and pushed horizontally toward the top of the printer.

(56) SHIFT CROSS ARM ADJUSTMENT

When the platen is in either LETTERS or FIGURES position, the carriage jockey arm should fall equally on either side of the figures roller. There should be .006" to .015" clearance between the letters pull bar and the letters roller when the platen is in the figures position, and .006" to .015" clearance between the figures pull bar and the figures roller when the platen is in the letters position. (See Figure 32.) To adjust, loosen the shift cross-arm mounting screws and position the cross arm. Tighten the mounting screws.

(57) CARRIAGE JOCKEY-ARM SPRING TENSION (Figure 34)

Hook a 32 oz. scale to the free end of the jockey arm and pull backward. It should require from 11 to 13 ozs. to just start the arm moving.

(58) BELL ADJUSTING LEVER POSITION

With the platen in the FIGURES position, there should be some clearance, not more than

.010", between the bell pull bar and the bell adjusting lever, when the play in the bell pull bar is taken up to make this clearance a maximum. Adjust by means of the bell adjusting lever mounting screw (see Figure 32). Check for .004" clearance between the BELL pull bar and the selector bars when the platen is in the FIGURES position. See PRINTING BAIL ROLLER ARM ADJUSTMENT.

(59) LETTERS PULL-BAR BRACKET ADJUSTMENT (BELL HAMMER BRACKET)

The top end of the letters pull bar should be approximately in line with the top ends of the other pull bars; gauge by eye. To adjust, loosen the letters pull-bar bracket mounting screws and position the bracket (Figure 32). Tighten the mounting screws.

(60) FIGURES PULL BAR BRACKET ADJUSTMENT

The top end of the figures pull bar should be approximately in line with the top ends of the other pull bars; gauged by eye. To adjust, loosen the figures pull-bar bracket mounting screws and position the bracket. Tighten the mounting screws.

(61) SIGNAL BELL ADJUSTMENT

With the platen in the FIGURES position, the bell should ring each time the bell pull bar is operated. Adjust by means of the bell mounting screw.

NOTE

See that the bell does not touch the condenser or the printer bracket.

(62) SIXTH-PULSE RELAY AND PRINTING RELAY ADJUSTMENT (Figure 35)

(a) The sixth-pulse relay and the printing relay should be adjusted as follows:

1. With the contacts closed, there should be from .002" to .004" between the armature and the magnet core. Adjust by means of the contact screw.

2. With the armature resting against its backstop nut, there should be .010" to .015" gap between the contacts. Adjust by means of the armature backstop nut.

3. When an 8 oz. push scale is applied vertically at a point on the armature just back of the stop nut, it should require from 1 to 1-1/2 ozs. to just start the armature moving. The proper tension may be obtained

by positioning the armature spring bracket.

NOTE

It will be necessary to remove the printing relay from the frame in order to make the last adjustment properly.

(63) RIBBON-FEED-UNIT OPERATING ARM POSITION (Figure 36)

The ribbon-feed-unit operating arm on the printing shaft should be positioned so that when a spring is unhooked and a 12 lb. spring scale is hooked in the upper spring eye, it will require from 4 to 5 lbs. to pull the spring to its unoperated position length. To adjust, loosen the operating-arm clamping screw and position the arm. Hold the printing bail in its unoperated position and tighten the clamping screw.

(64) RIBBON-FEED OPERATING-LEVER SPRING TENSION (Figure 36)

It should require from 18 to 22 ozs. to pull the ribbon feed operating lever spring to its unoperated position length, when a 32 oz. scale is hooked in the upper end and pulled vertically upward.

(65) FEED-PAWL REVERSE-ROD DETENT SPRING ADJUSTMENT (Figure 37)

When the feed-pawl reverse-rod detent spring is in the left-hand notch of the feed-pawl reverse rod (Figure 40), the distance from the reverse-arm pin to the top edge of the left lug on the reverse rod should equal the distance from the same pin to the right-hand lug when the reverse rod is moved so that the spring is in the right-hand notch. To adjust, position the spring by means of its mounting screws.

(66) FEED-PAWL REVERSE-ROD DETENT SPRING TENSION (Figure 40)

With the feed-pawl reverse-rod detent spring in the right-hand reverse-rod notch, hook a 32 oz. scale to the reverse-rod connecting-link-screw nut and pull horizontally to the right. It should require from 12 to 16 ozs. to move the reverse rod from the right-hand notch to the left-hand notch position. To adjust, bend the detent spring.

(67) RIBBON-FEED OPERATING LEVER ADJUSTMENT (Figure 38)

With the printing solenoid in its unoperated

position (Figure 3) the feed ratchet retaining pawl and the ribbon-feed pawl should be separated by five teeth plus approximately one-half tooth overtravel. To adjust, loosen the ribbon-feed operating lever clamping screw (Figure 40) and rotate the ribbon feed shaft. Tighten the clamping screw.

(68) RIBBON-FEED REVERSING ARM ADJUSTMENT (Figure 36)

(a) With the printing solenoid in its operated position and the feed-pawl reverse-rod detent spring (Figure 40) resting in the left-hand notch of the reverse rod, the hooked end of the reverse pawl should just touch the left-hand lug on the reverse-rod arm. To adjust, hold the ribbon-feed operating arm so that its stud rests against the upper end of the slot in the ribbon-feed-unit connecting link, and position the reversing arm by means of its clamping screw.

(b) This adjustment should also be checked with the feed pawl reverse rod detent spring in the right-hand notch of the reverse rod and the reverse pawl engaged with the right-hand lug on the reverse-rod arm.

NOTE

There may be some clearance between the hooked end of the reverse pawl and its corresponding reverse-rod-arm lug, provided the feed-pawl reverse-rod detent spring rests firmly in its respective notch when the main bail is manually operated.

(69) RIGHT RIBBON-REVERSE ARM ADJUSTMENT

With the right-hand ribbon-reverse arm resting against its spool head and the feed-pawl reverse-rod detent spring resting in the left-hand notch, the right edge of the ribbon-reverse pawl should line up with the outer edge of the right-hand lug on the reverse-rod arm when the play in the reverse pawl is taken up toward the left. To adjust, position the right-hand ribbon-reverse arm by means of its set screw (Figures 39 and 40).

(70) LEFT RIBBON-REVERSE ARM ADJUSTMENT (Figures 39 and 40)

With the left-hand reverse arm resting against its spool head and the feed-pawl reverse-rod detent spring resting in the right-hand notch, the left edge of the ribbon-reverse pawl should line up with the outer edge of the left-hand lug on the reverse-rod arm, when the play in the reverse pawl is taken up toward the right.

To adjust, position the left-hand ribbon-reverse arm by means of its set screw.

(71) RIBBON-SPOOL SHAFT ADJUSTMENT (Figure 36)

Both ribbon-spool shafts should be positioned so that their ends, toward the rear of the printer, are flush with the rear surface of their respective ribbon-feed-ratchet hubs. Adjust by means of the ribbon-feed-ratchet set screws.

(72) RIBBON-SPOOL-SHAFT COLLAR ADJUSTMENT (Figure 40)

With the feed pawl and retaining pawl disengaged from the ratchet, hook an 8 oz. scale over the ribbon-spool-head post and pull at right angle to the radius. It should require from 2 to 4 ozs. to start the shaft turning. To adjust, position the collar (Figure 36) by means of its set screw. Adjust both collars in the same manner.

(73) RIBBON SPOOL HEAD ADJUSTMENT

The ribbon spool heads should be centrally located with respect to the LETTERS and FIGURES position of the platen; gauged by eye, and so that its set screw clears the ribbon reverse arm by at least .010 when the spool head is rotated. To adjust, position the ribbon spool heads by means of their set screws. See Figure 36.

(74) RIBBON-REVERSE-SHAFT DETENT COLLAR ADJUSTMENT

When the ribbon-reverse arm is swung from one position to the other, the V notches in the collar should have approximately equal rotation on either side of the indent in the detent spring. See Figure 40. To adjust, position the ribbon-reverse-shaft detent collar by means of its set screw.

(75) RIBBON-REVERSE-SHAFT DETENT SPRING TENSION (Figure 40)

With the right-hand ribbon-reverse arm in the downward position, hook a 32 oz. scale directly above the indent on the detent spring and pull toward the right-hand side of the printer. It should require from 16 to 20 ozs. to just start the detent spring moving.

(76) RIBBON-FEED STOP SCREW ADJUSTMENT

The feed pawls should move over 1-1/2 to 2-1/2 teeth of their respective ribbon-feed-ratchets each time the printing-solenoid plunger is

operated. See Figure 38. To adjust, set the ribbon-feed stop screw (Figure 40).

NOTE

After completing this adjustment, make certain that the stud of the ribbon-feed operating arm rests against the upper end of the connecting-link slot when the solenoid plunger is in the operated position.

(77) RIBBON-FEED-PAWL AND RETAINING-PAWL SPRING TENSION (Figure 38)

To measure the feed-pawl spring tension or the retaining-pawl spring tension, place the push end of an 8 oz. scale directly above the pawl support and push horizontally toward the center of the printer. It should require from 1 to 2-1/2 ozs. to just start the pawl moving.

(78) PRINTING-BREAK CONTACT SCREW ADJUSTMENT (Figure 41)

With the printing-solenoid plunger in the operated position (down), there should be a .010" to .020" gap between the contact points of the printing-break contact. To adjust, set the printing-break contact screw.

(79) PRINTING-BREAK CONTACT SPRING TENSION (Figure 42)

With the printing solenoid plunger in the unoperated position (up), hook an 8 oz. scale over the contact spring directly back of the fiber end piece and pull vertically downward. It should require from 3 to 4 ozs. to just break contact. To adjust, bend the contact spring. Recheck the "printing break contact screw adjustment."

(80) CONTACT BREAK-ARM SPRING TENSION (Figure 42)

With the printing solenoid plunger in its unoperated position, hook an 8 oz. scale over the end of the contact arm (the end toward the rear of the printer) in line with the rear edge of its bracket, and pull vertically downward. It should require from 1-1/2 to 2-1/2 ozs. to just start the arm moving.

(81) PRINTING-BAIL SPRING TENSION

The printing-bail springs should be adjusted so that all characters are printed distinctly without embossing the tape. Adjust by means of the spring adjusting screws so that the tension on the springs is approximately equal. See Figure 23.

(B-139)

(82) TAPE-OUT CONTACT ADJUSTMENT (Figure 43)

(a) With the tape lever insulator resting against the tape-out contact spring and the contacts closed, there should be $3/4$ " plus or minus $1/32$ " clearance between the tape roller and the tape lever roller. To adjust, set the tape-out contact screw. Tighten the lock nut.

(b) There should be $.015$ " to $.025$ " gap between the tape-out contact points when the tape lever is held away from the contact spring. To adjust, bend the light tape-out contact spring. See Figure 43 for location of parts.

(83) TAPE-LEVER SPRING TENSION (Figure 43)

Hook an 8 oz. scale over the tape lever just

below the insulator and pull horizontally. It should require from 3 to 4 ozs. to start the insulator moving away from the contact spring.

(84) TAPE PRESSURE-ROLLER SPRING TENSION
(See Figure 1)

Hook a 32 oz. scale over the center of the tape pressure roller and pull up at right angle to the roller arm. It should require from 7 to 9 ozs. to start the roller moving away from the platen.

2. PRINTER CIRCUIT

For information regarding the electrical circuit of the Model 21A printer refer to Wiring Diagram 1249 in back of this bulletin.

SECTION III

LUBRICATION

1. GENERAL

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

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

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

d. An excessive amount of oil is undesirable. After lubricating the printer, wipe off any excessive oil from the magnet coils and cores, armatures, all contact points, type bars, the type bar segment, platen, and the printer base.

2. PRINTER

a. LOCATION - The printer should be lubricated at the following places while in its upright position:

- (1) Selector armature - at bearing points.
- (2) Selector-bar pawls and latches - at pivots.
- (3) Selector bars - both ends.
- (4) Cutout shaft - at pivot points.
- (5) Sixth-pulse cutout lever - at bearing end.
- (6) Sixth-pulse armature arm - at bearing point.
- (7) Selector-carriage push rod - sliding surface.
- (8) Selector-bar return lever - at pivot.
- (9) Lock arm - at shoulder screw.

- (10) Lock-arm trip - at shoulder screw.
- (11) Lock restoring arm - at shoulder screw.
- (12) Bail roller - two ends - also a little on surface.
- (13) Ribbon-spool shafts - two bearing ends.
- (14) Ribbon-feed shaft - two bearing ends.
- (15) Feed-pawl reverse rod - two bearing ends.
- (16) Ribbon-reverse shafts - at bearing surface.
- (17) Ribbon guide - at sliding surface.
- (18) Tape pressure rollers - at bearing surfaces.
- (19) Carriage frame - front end sliding surface.
- (20) Platen shaft - at front end of platen shaft retainer.
- (21) Type bars - at segment slot.
- (22) Printing shaft - two oil holes at either end.
- (23) Ribbon-feed-unit connecting link - at both ends.
- (24) Sixth-pulse relay armature - pivot point.
- (25) Printing relay armature - pivot point.
- (26) Printing-solenoid plunger - sliding surface.
- (27) Plunger link - two bearing ends.
- (28) Space connecting rod - upper and lower ends.
- (29) Spacing detent roller.
- (30) Spacing detent - at pivot.

(31) Spacing pawl - at pivot.

and at link.

(32) Spacing beam - at bearing surface.

(3) Carriage tracks.

b. LOCATION - The printer should be lubricated in the following places while resting on its rear side:

(4) Carriage cross arm - LETTERS and FIGURES rollers.

(1) Beam reset arm - at pivot point and at link.

(5) LETTERS and FIGURES pull bars - at bottom ends in slot.

(2) Universal-bar support - at pivot point

(6) Bell hammer - at pivot point.

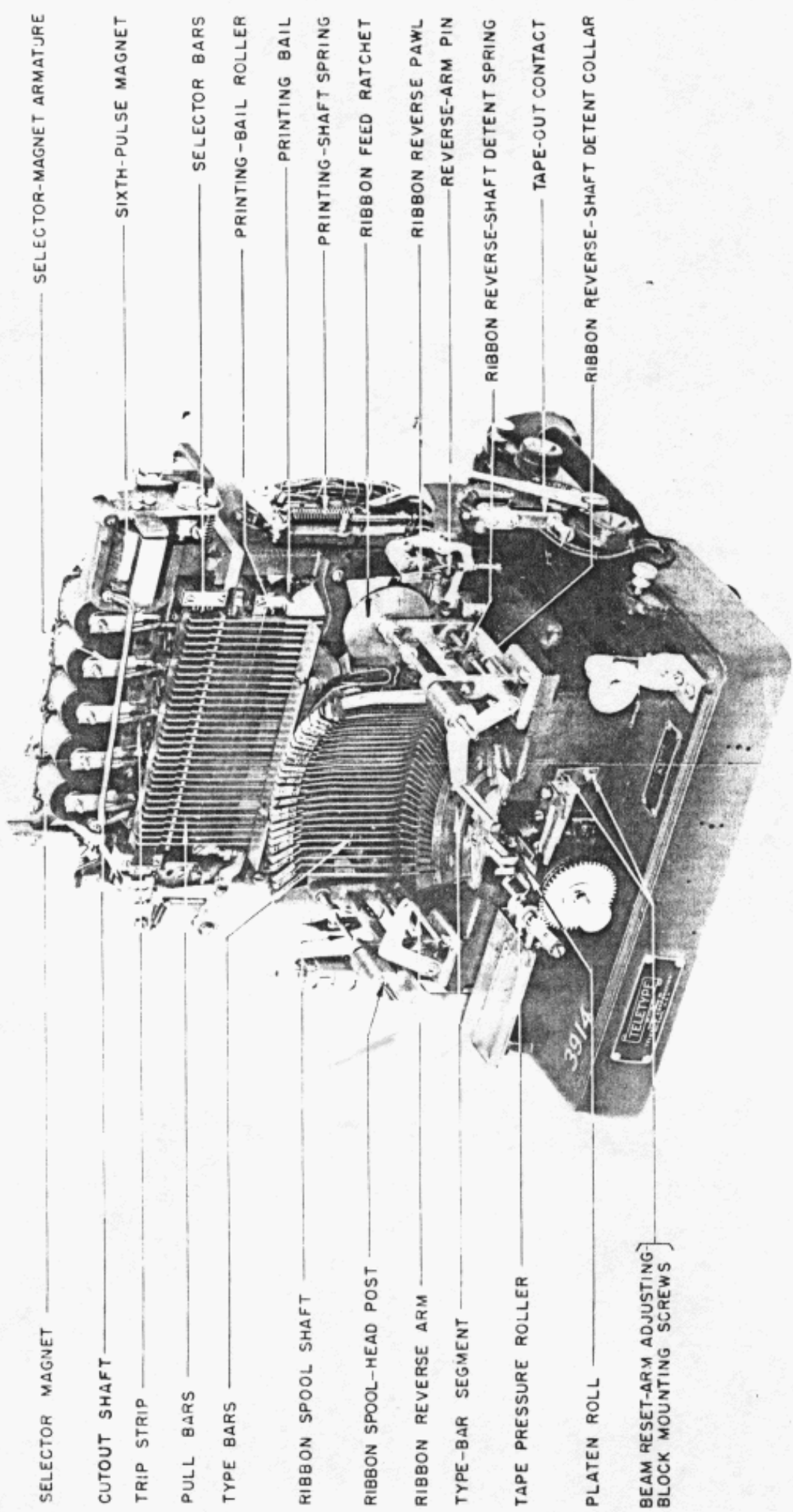


FIGURE 1

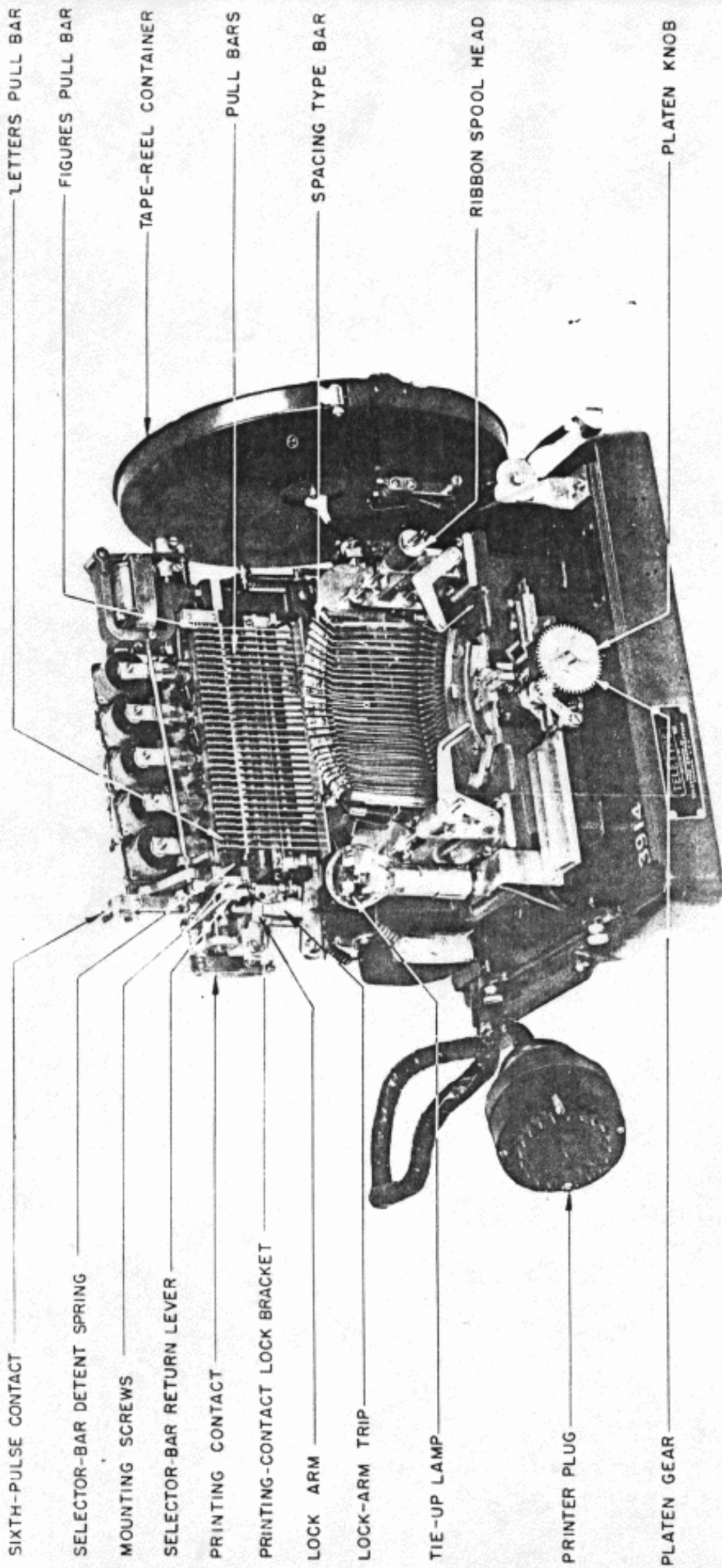


FIGURE 2

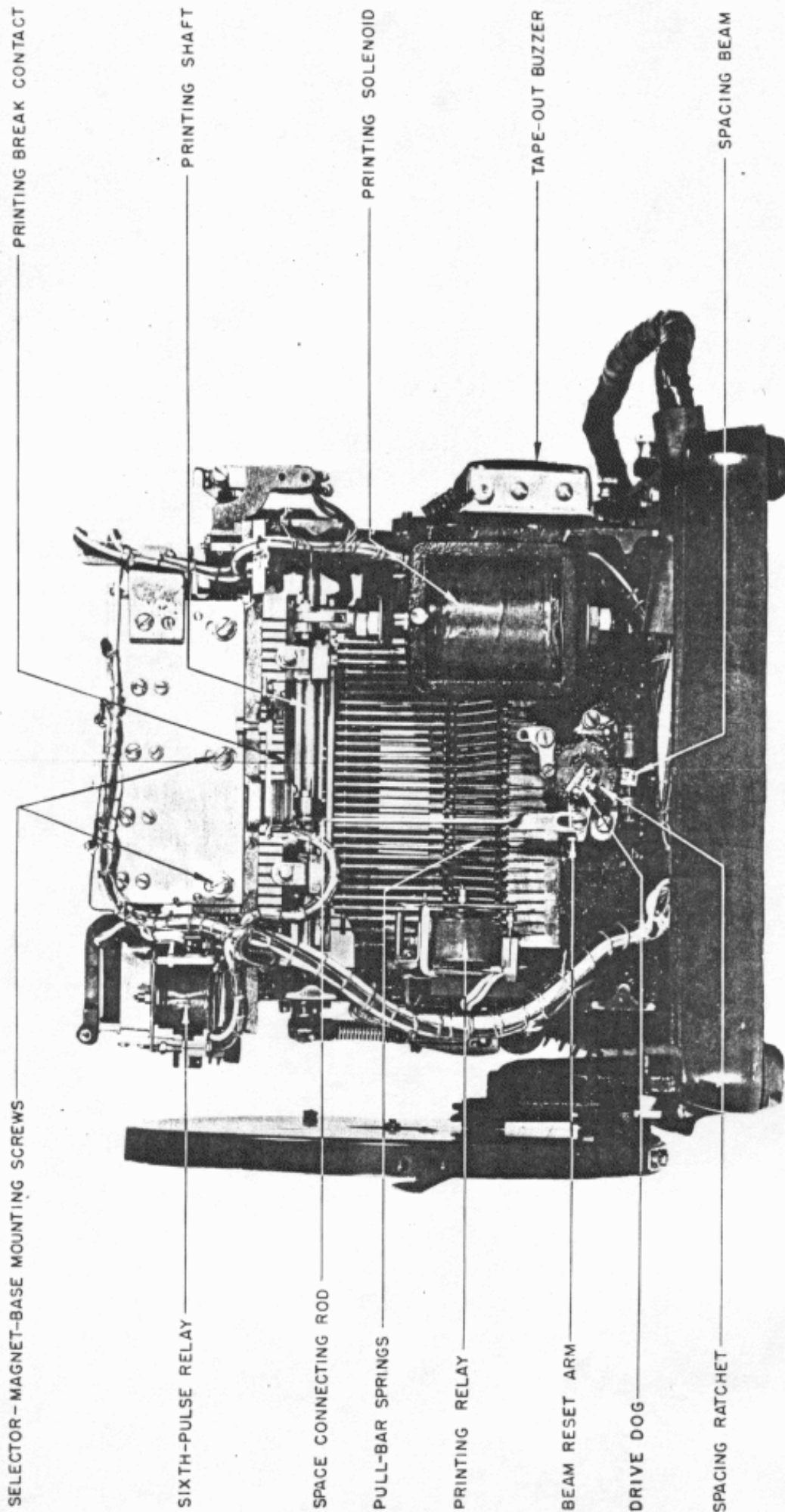
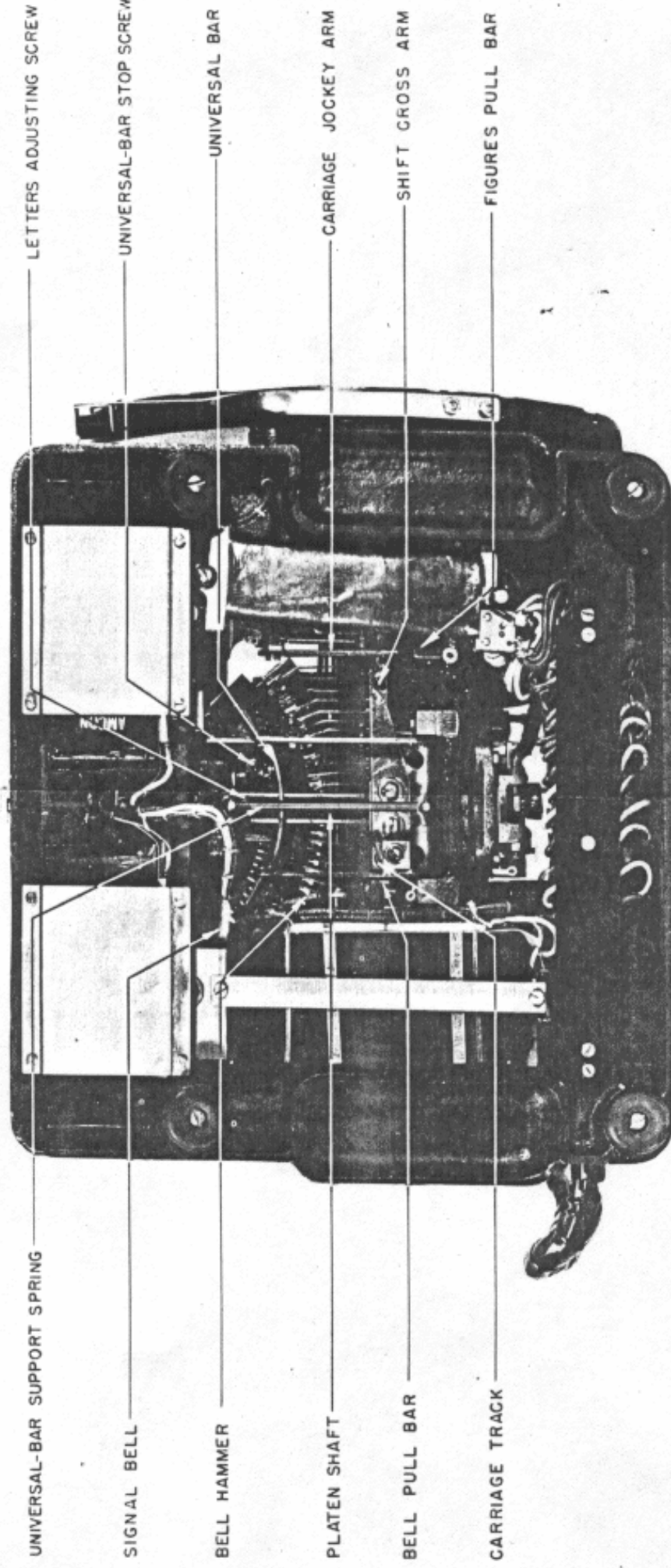


FIGURE 3



UNIVERSAL-BAR SUPPORT SPRING

SIGNAL BELL

BELL HAMMER

PLATEN SHAFT

BELL PULL BAR

CARRIAGE TRACK

LETTERS ADJUSTING SCREW

UNIVERSAL-BAR STOP SCREW

UNIVERSAL BAR

CARRIAGE JOCKEY ARM

SHIFT CROSS ARM

FIGURES PULL BAR

FIGURE 4

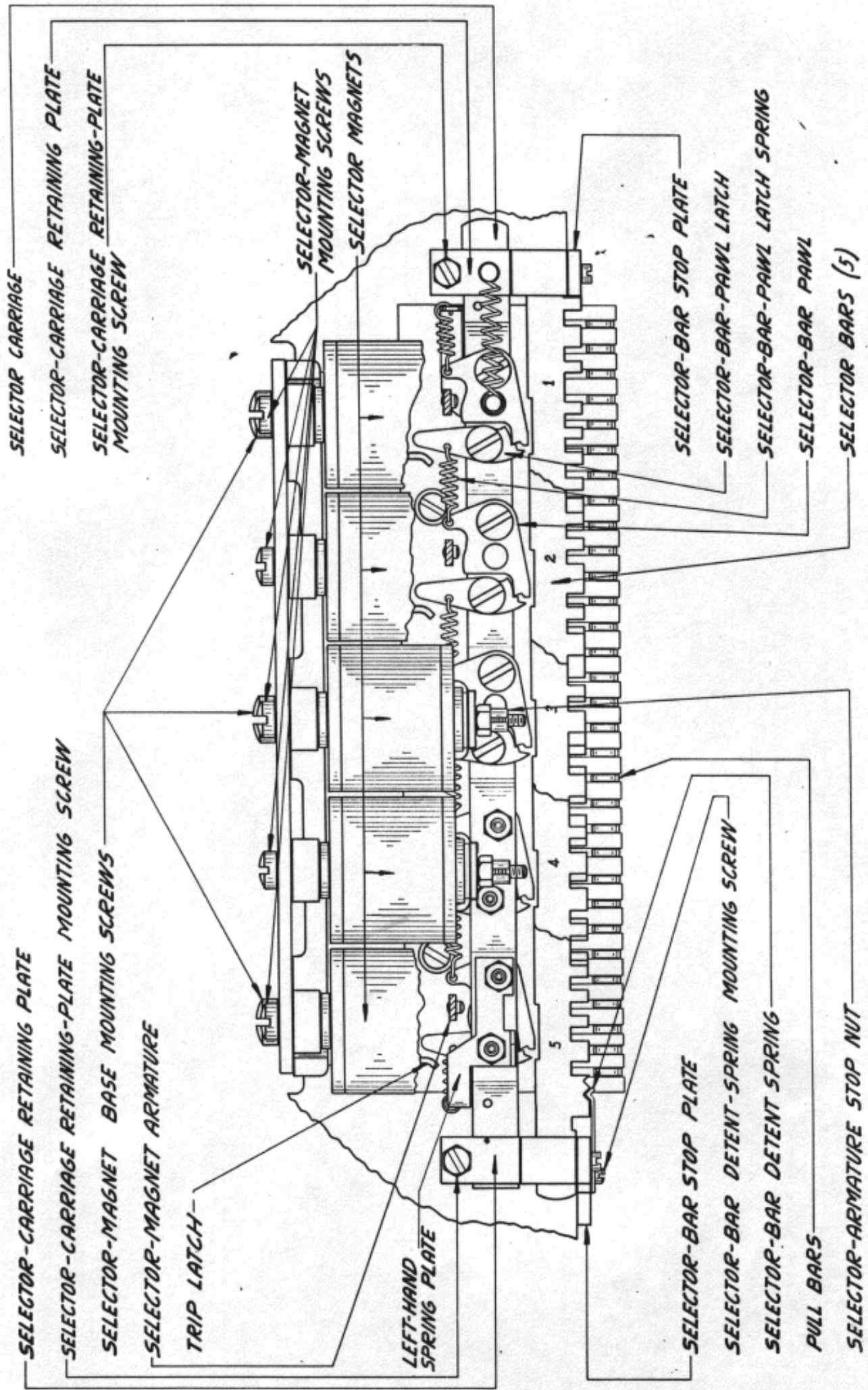


FIGURE 5

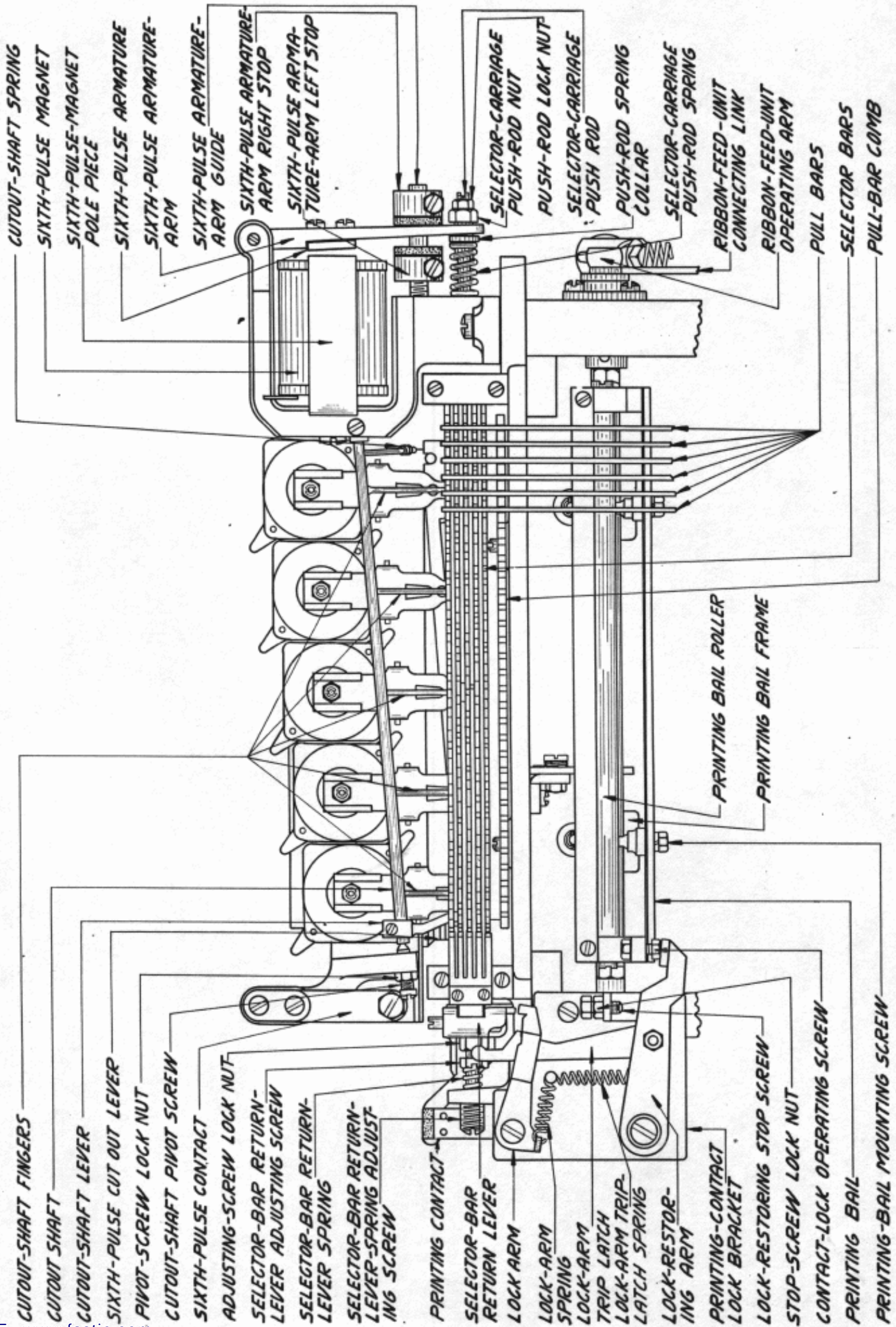


FIGURE 6

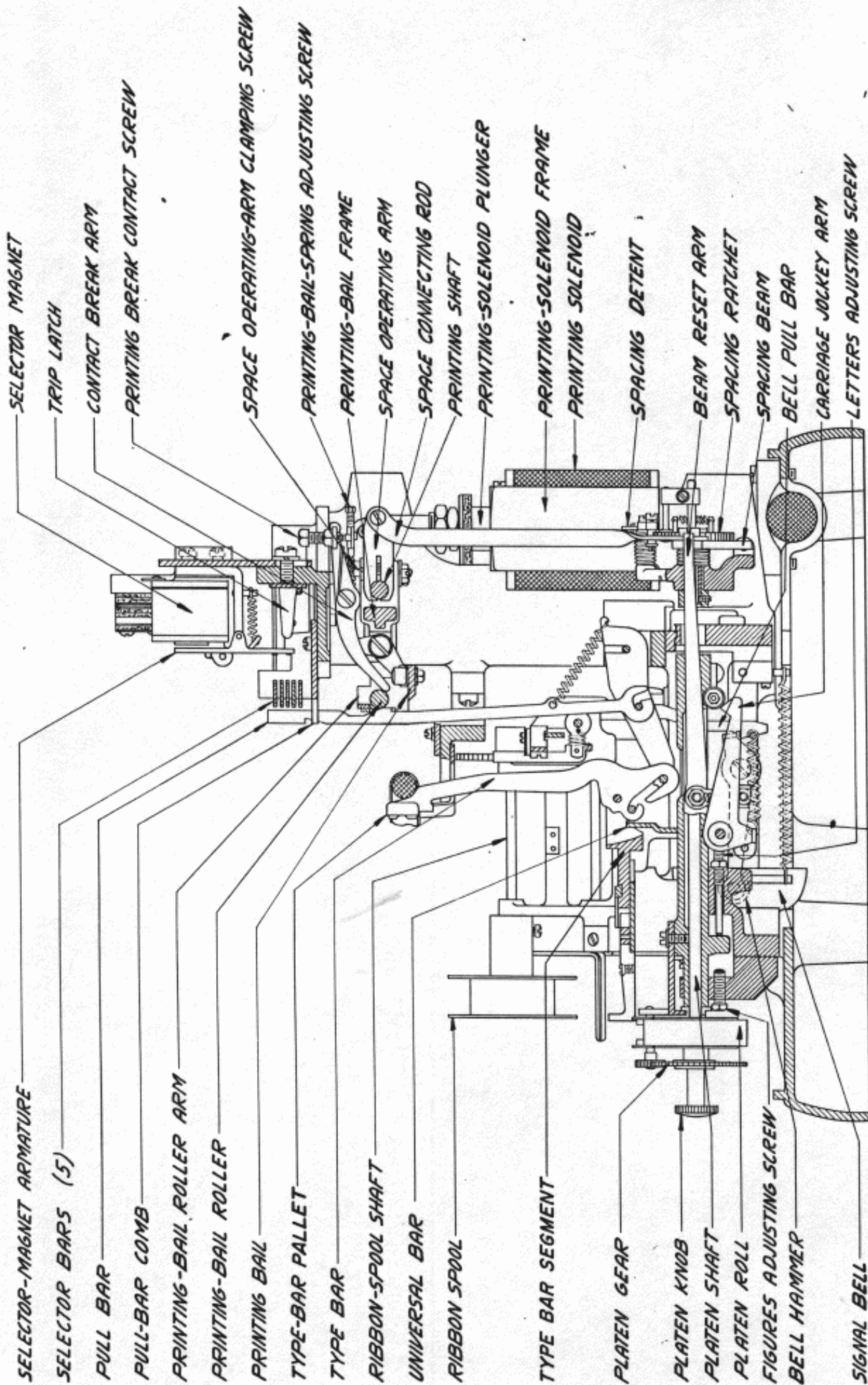


FIGURE 7

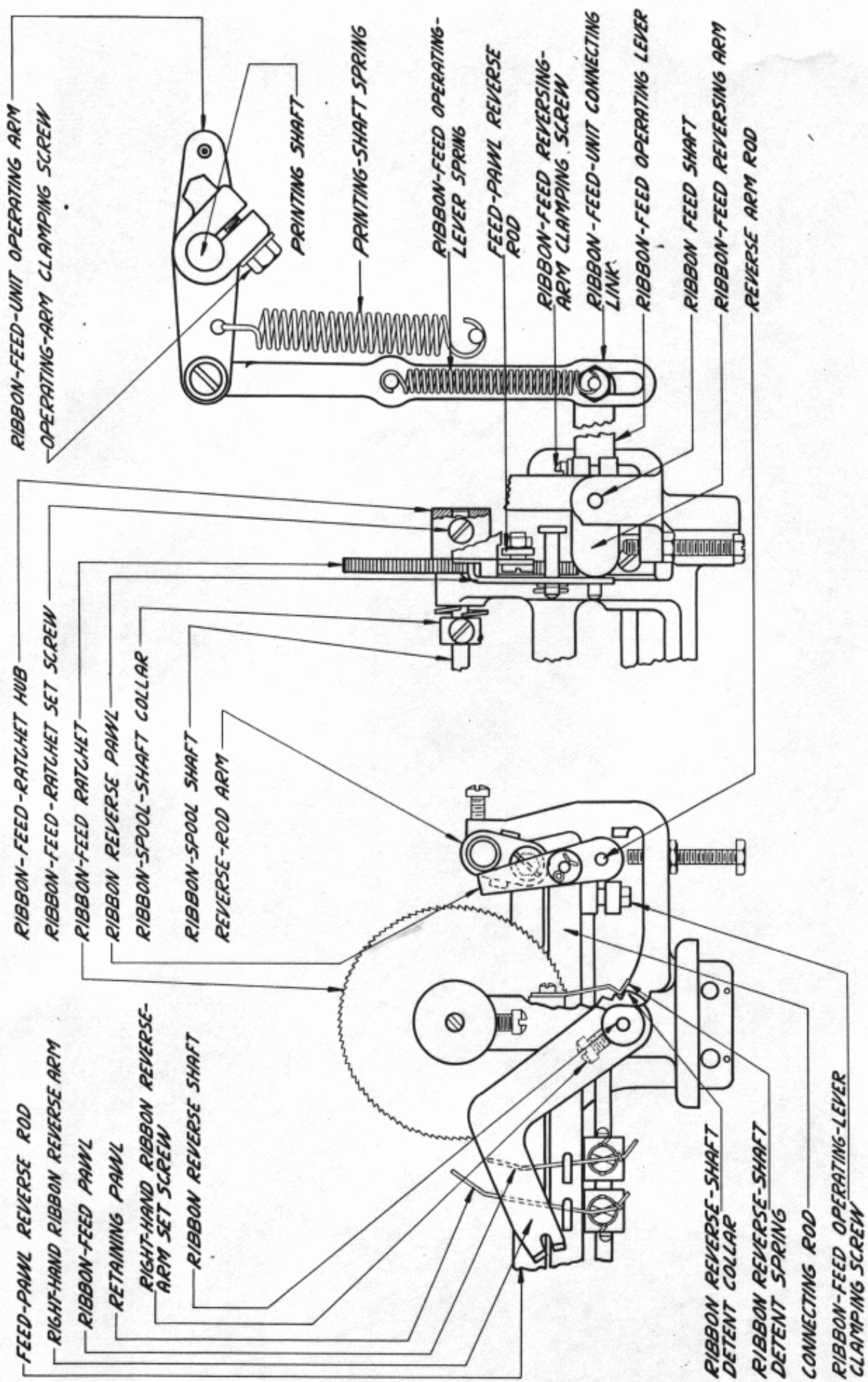


FIGURE 8

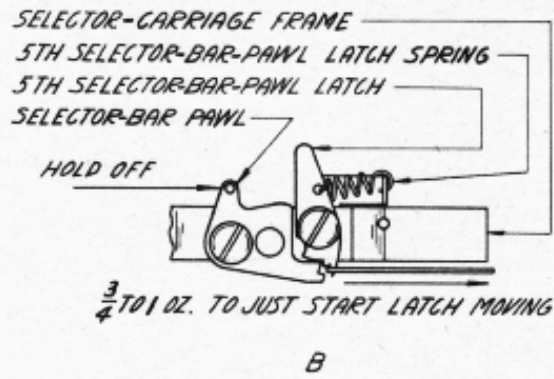
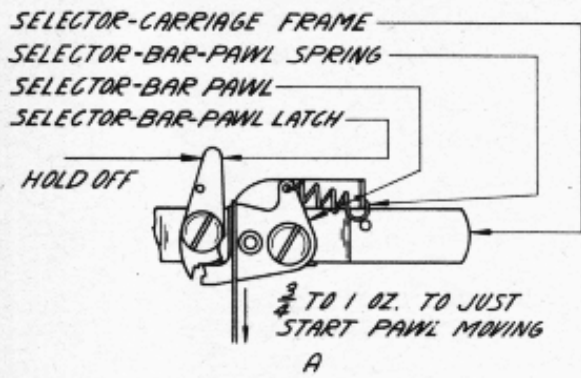


FIGURE 9

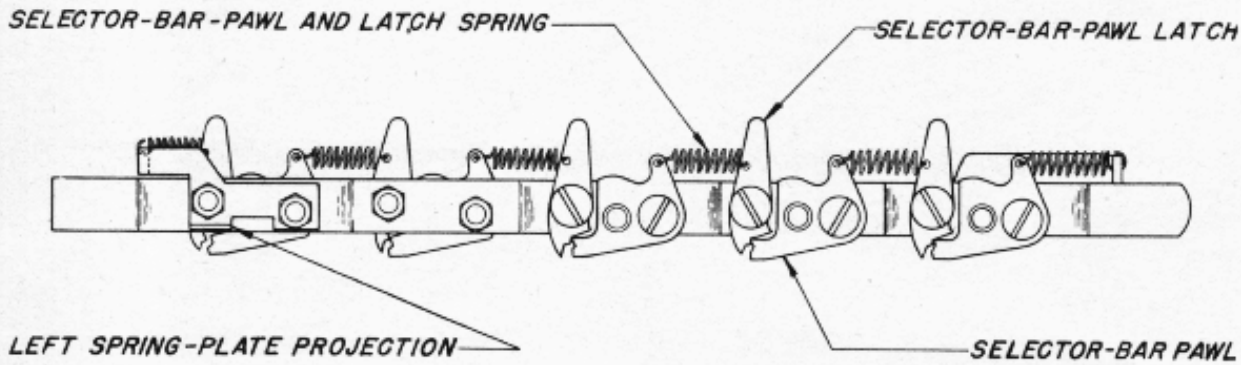


FIGURE 10

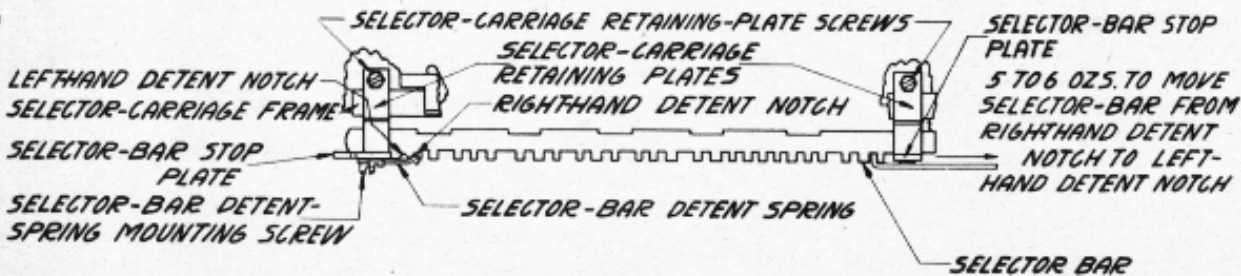


FIGURE 11

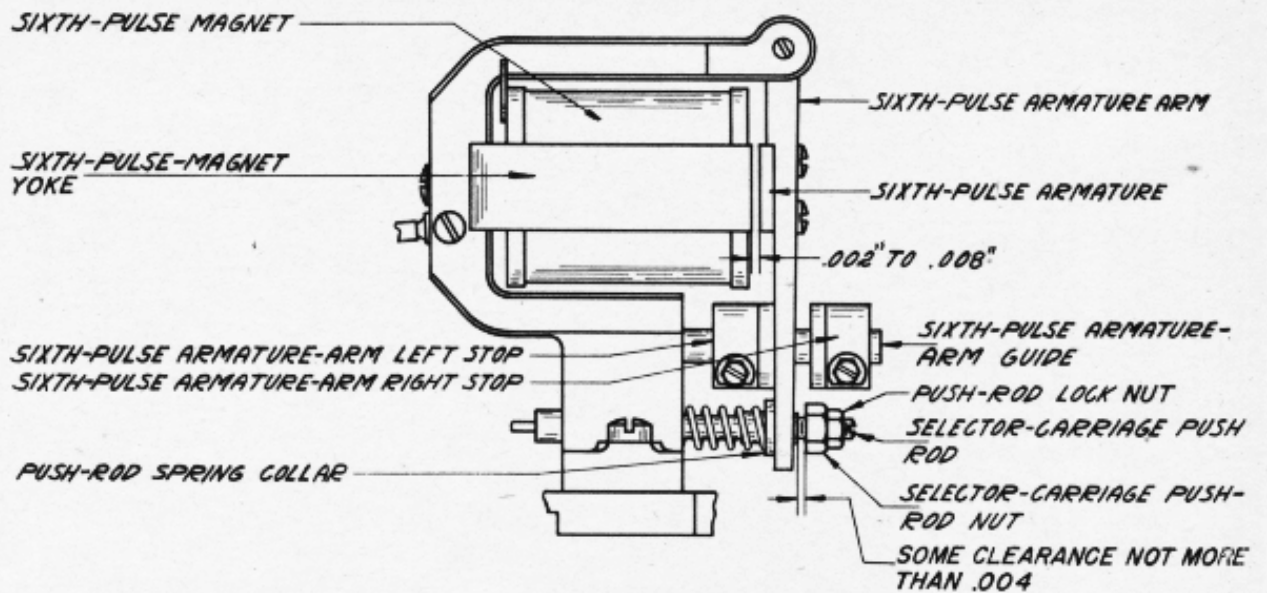


FIGURE 12

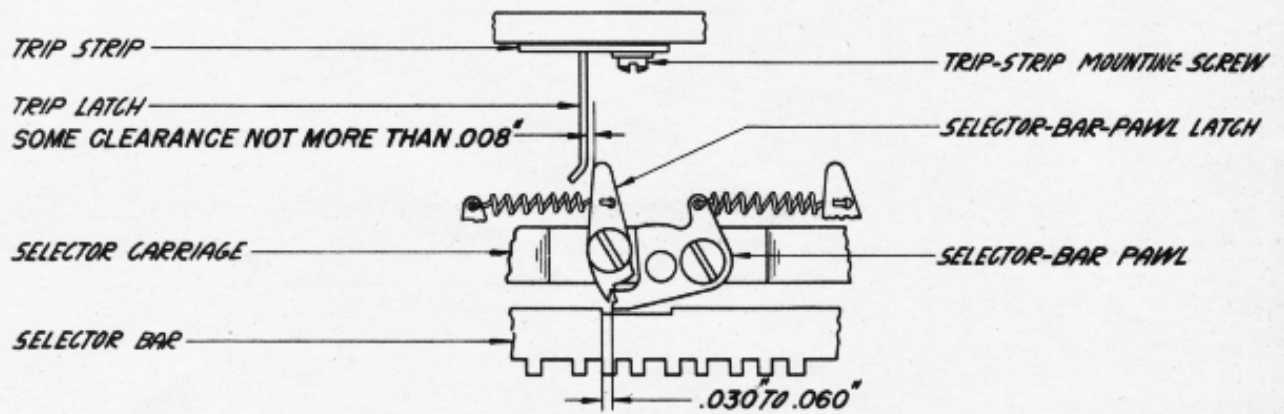


FIGURE 13

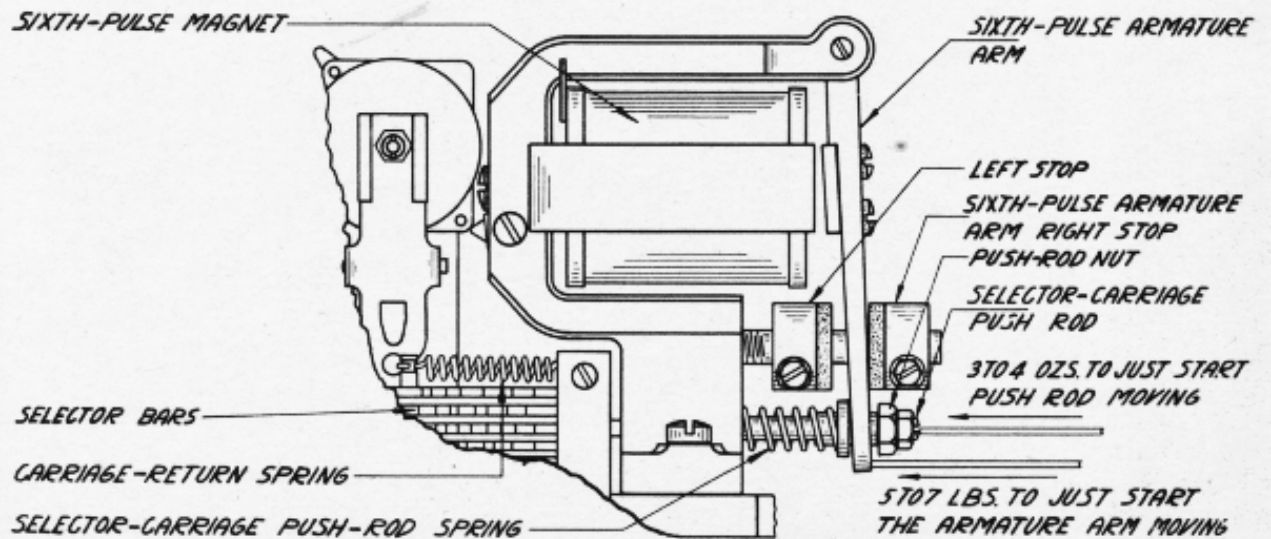


FIGURE 14

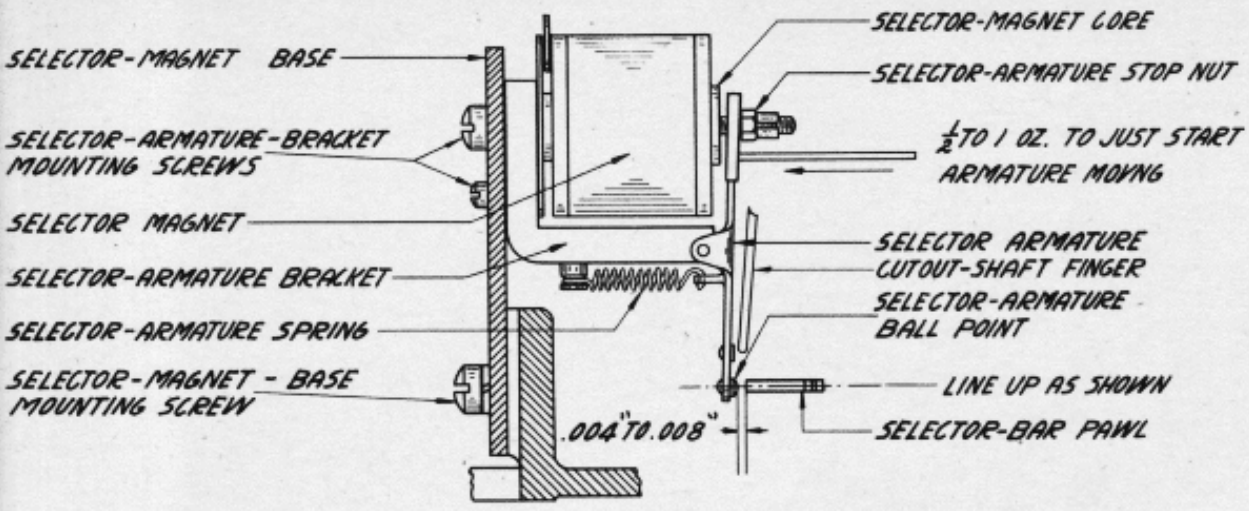


FIGURE 15

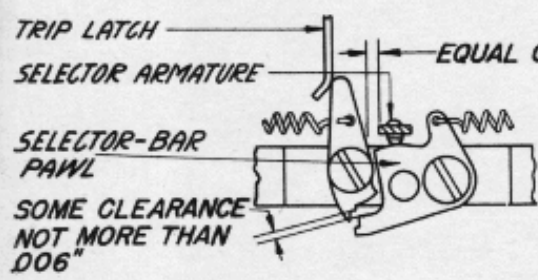


FIGURE 16

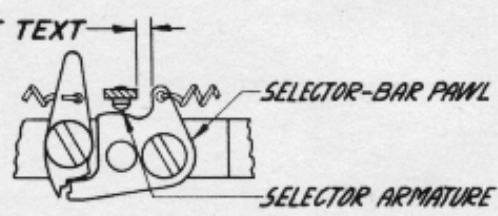


FIGURE 17

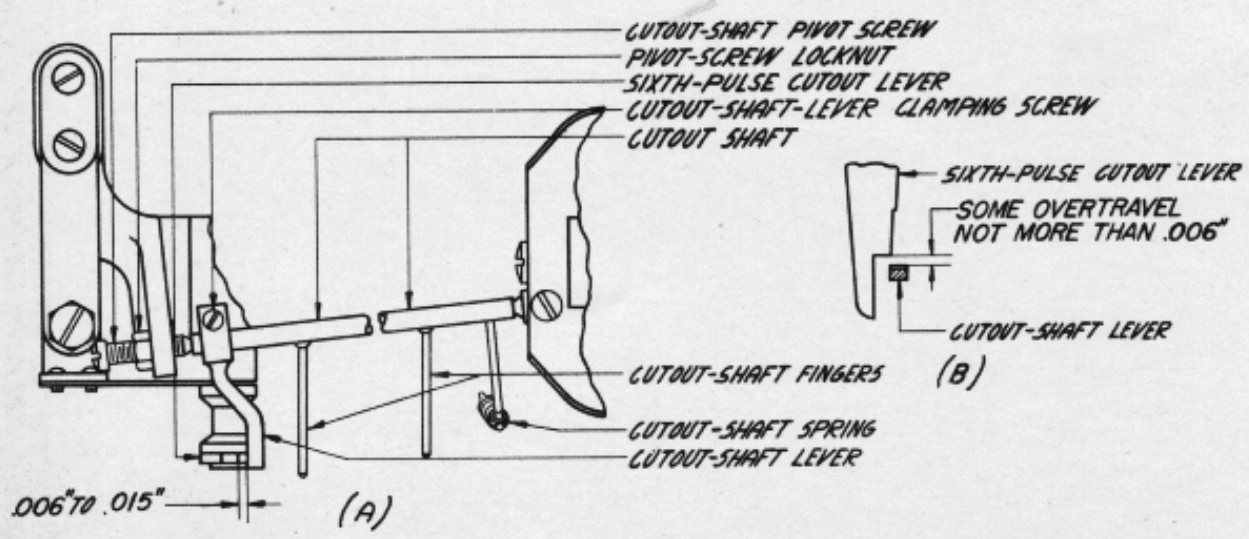


FIGURE 18

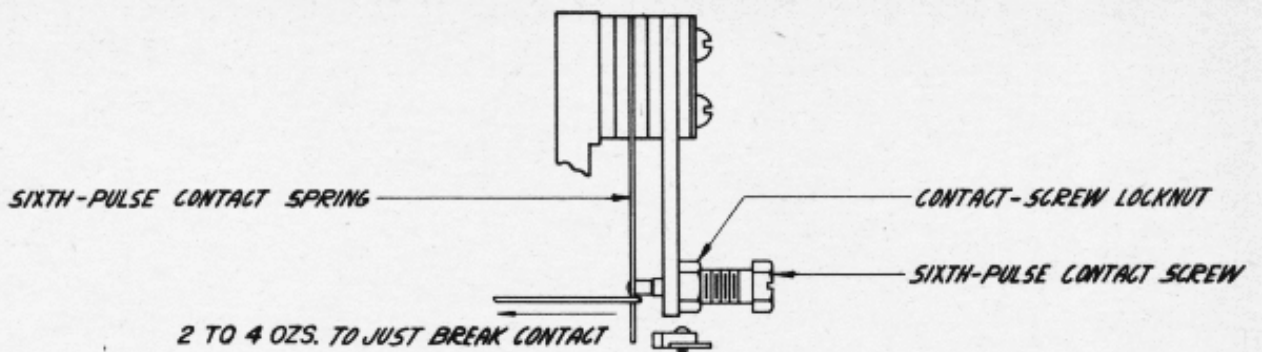


FIGURE 19

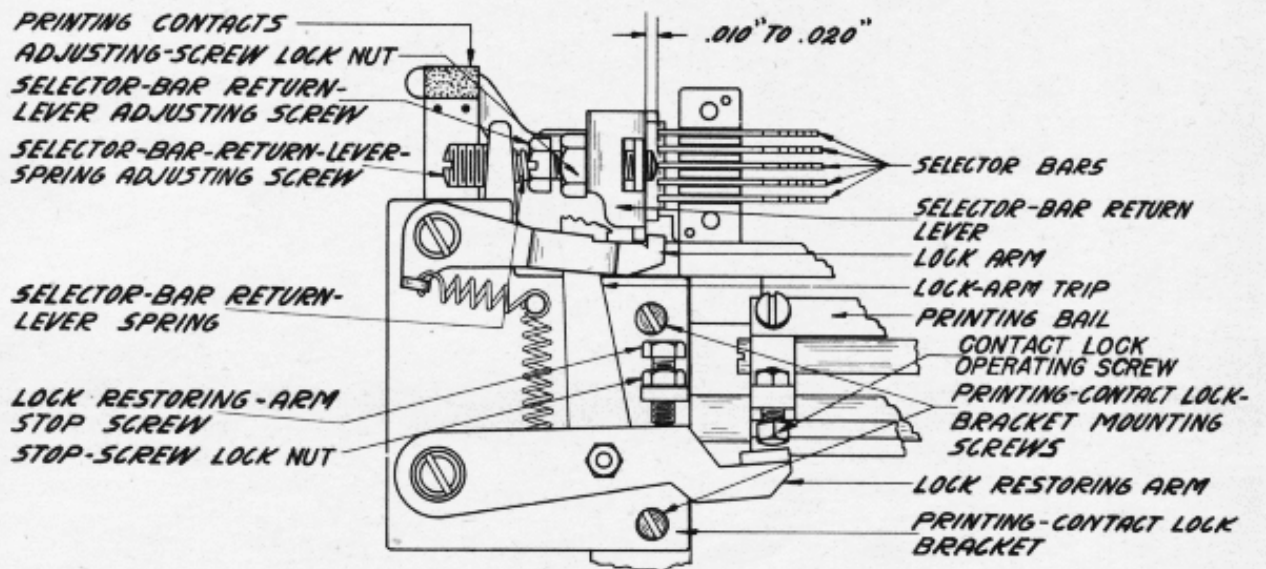


FIGURE 20

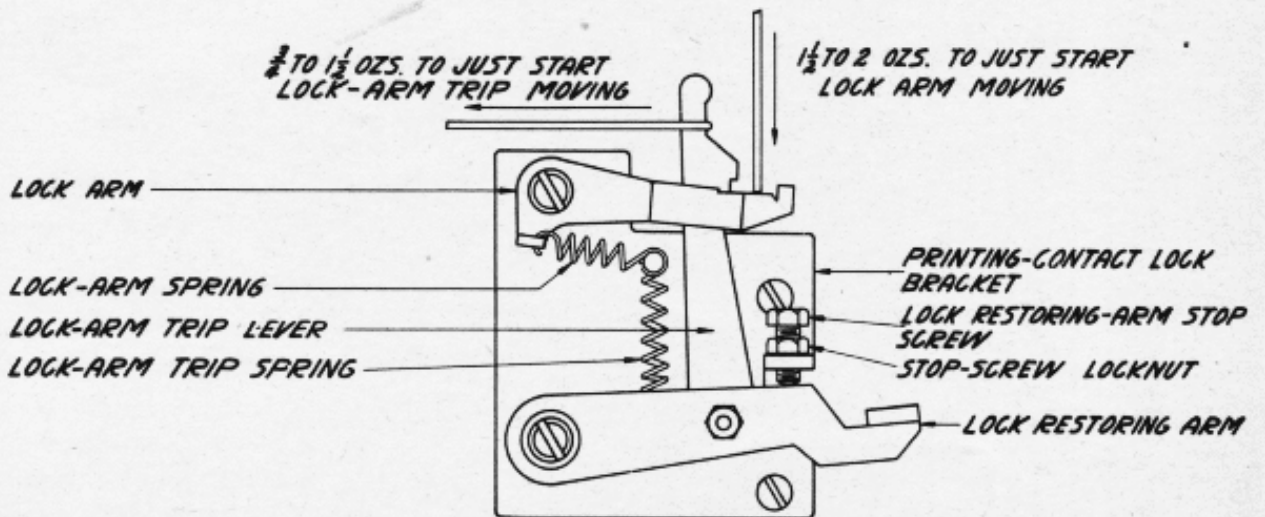


FIGURE 21

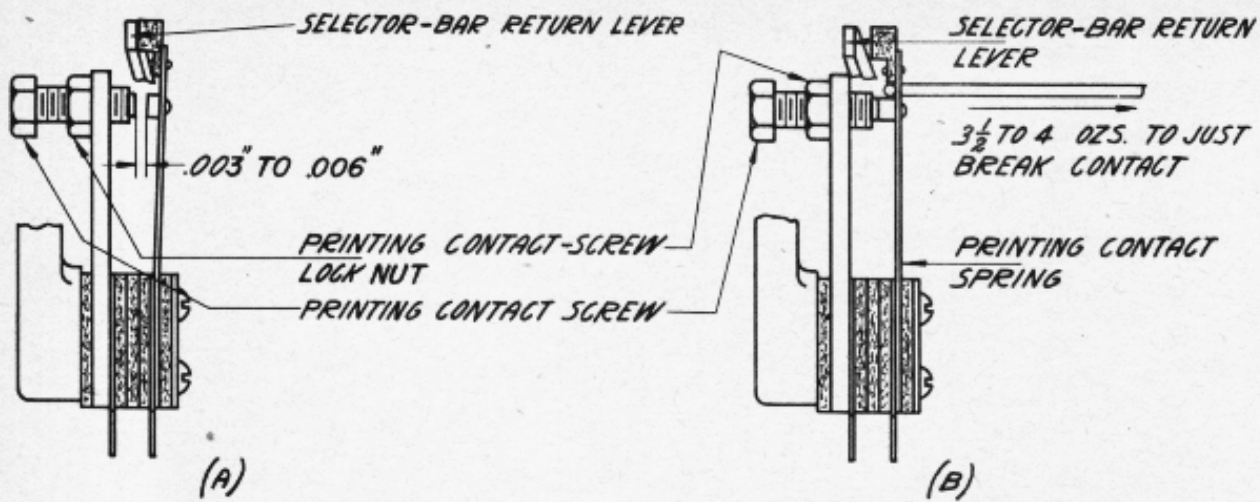


FIGURE 22

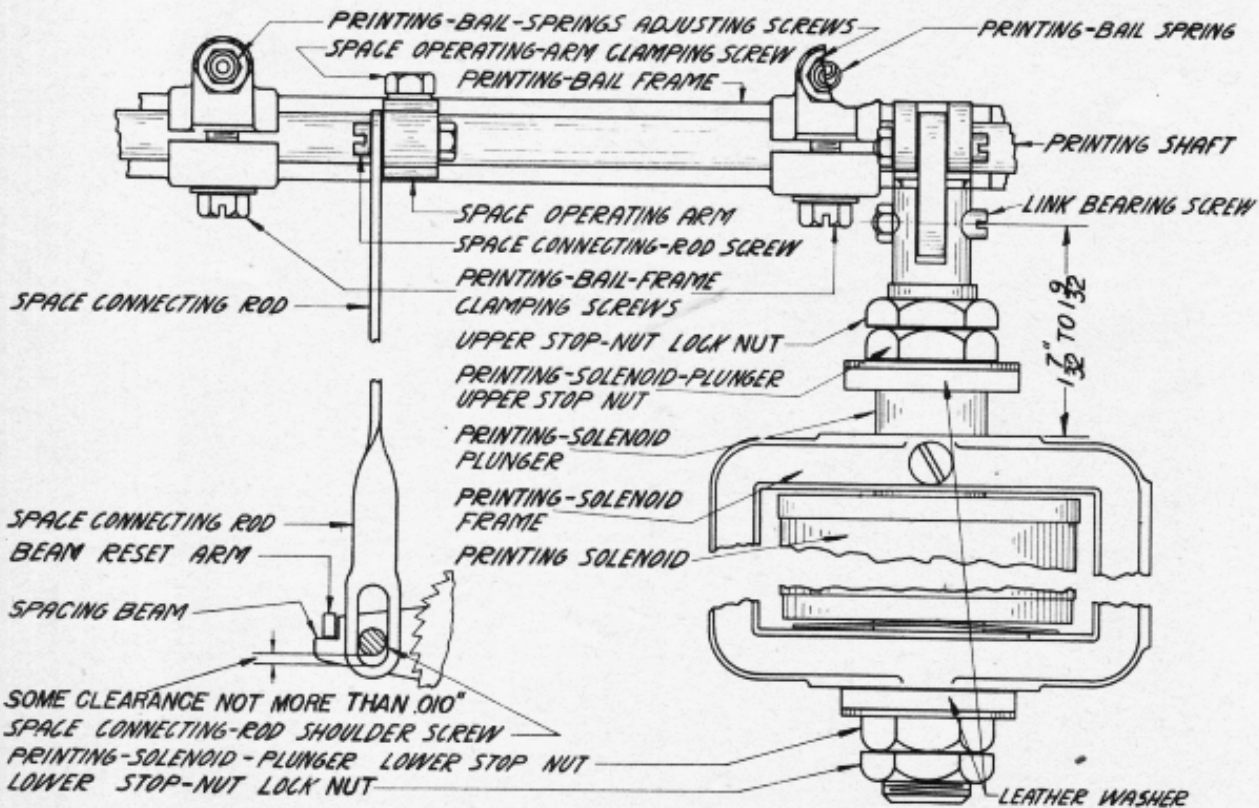


FIGURE 23

$\frac{3}{8}$ TO $1\frac{1}{2}$ OZS. TO JUST
START BAR MOVING

BARS TO BE IN
HORIZONTAL
POSITION

PRINTING-BAIL
ROLLER

ROLLER SHOULD BE
IN POSITION
INDICATED
PULL BAR
RETAINING BAR
 $.025$ " TO $.050$ "

PULL-BAR
SPRING

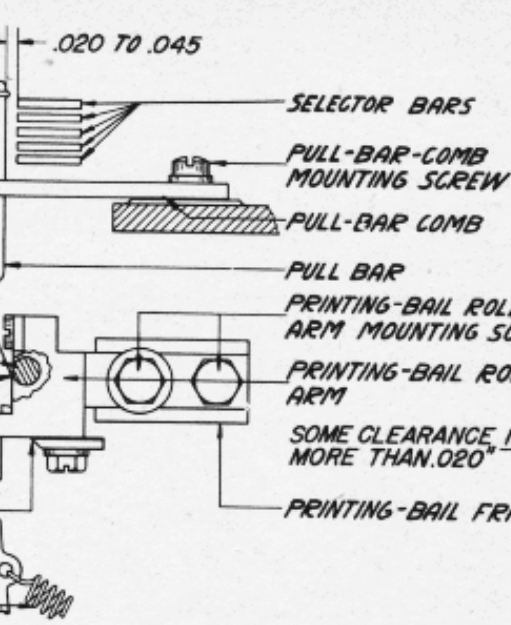


FIGURE 24

SELECTOR BARS
PULL-BAR-COMB
MOUNTING SCREW
PULL-BAR COMB

PULL BAR
PRINTING-BAIL ROLLER-
ARM MOUNTING SCREWS
PRINTING-BAIL ROLLER
ARM
SOME CLEARANCE NOT
MORE THAN $.020$ "

PRINTING-BAIL FRAME

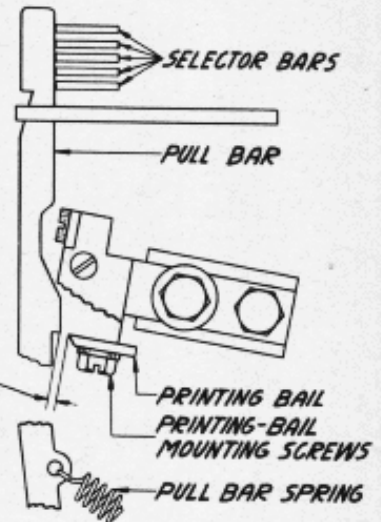


FIGURE 25

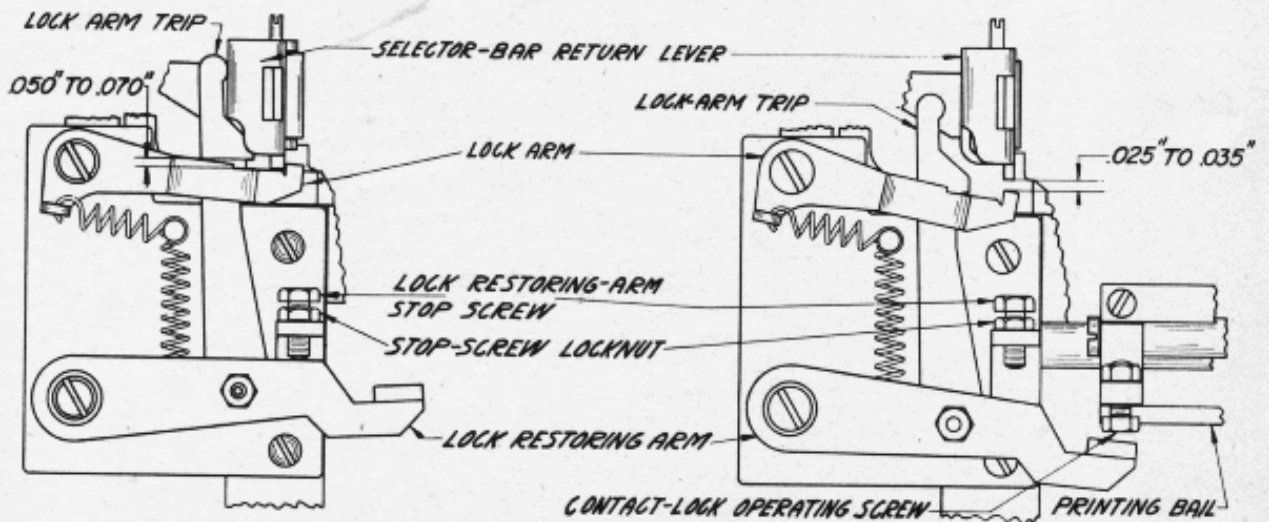


FIGURE 26

FIGURE 27

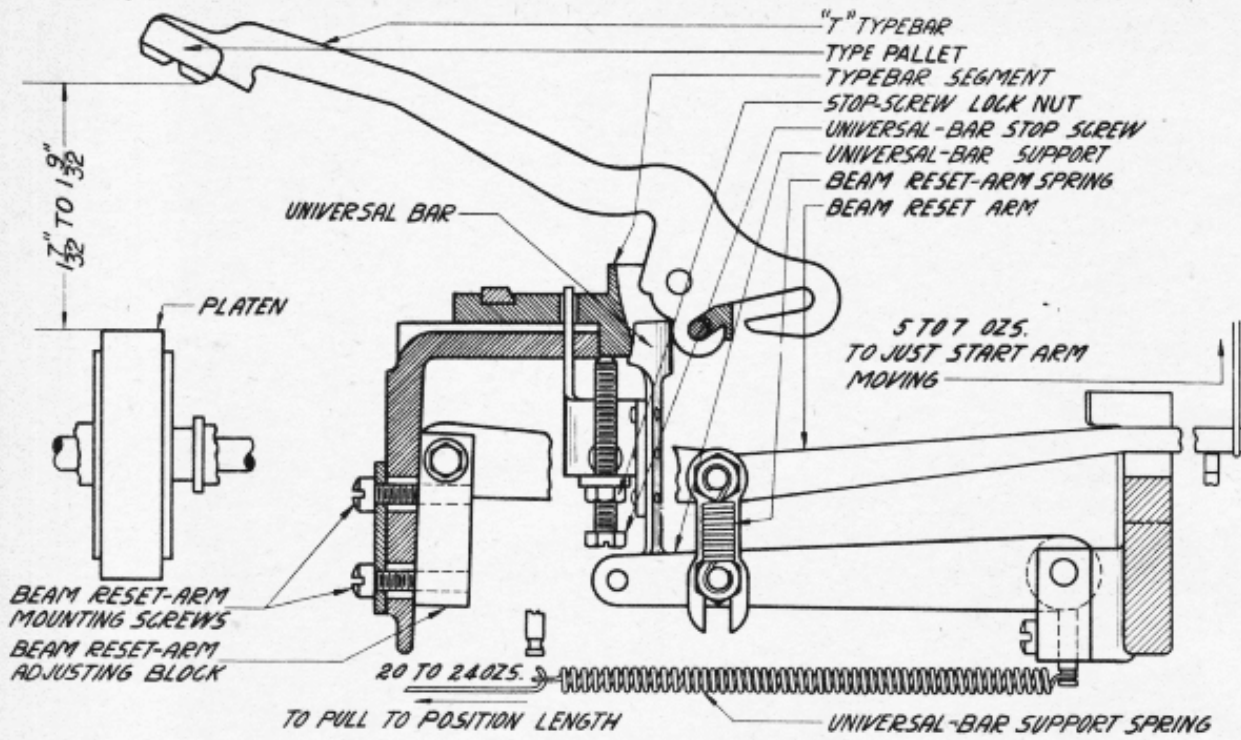


FIGURE 28

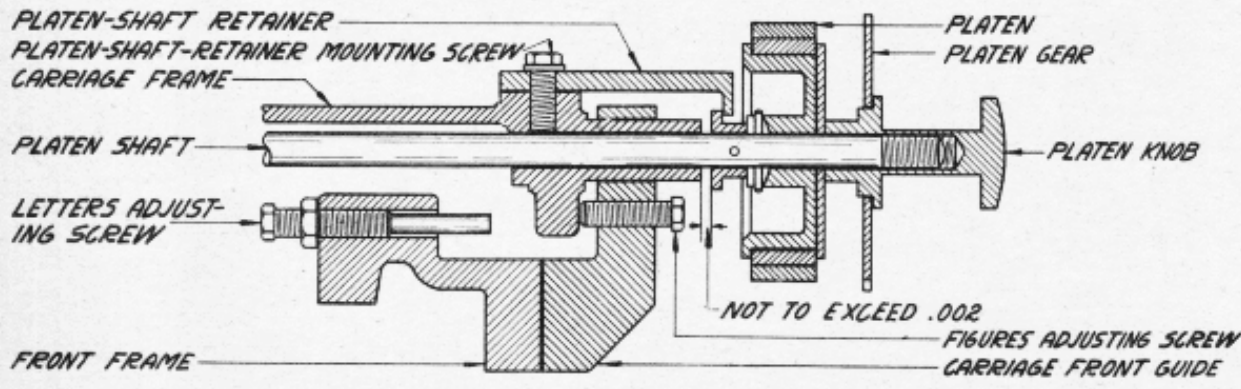


FIGURE 29

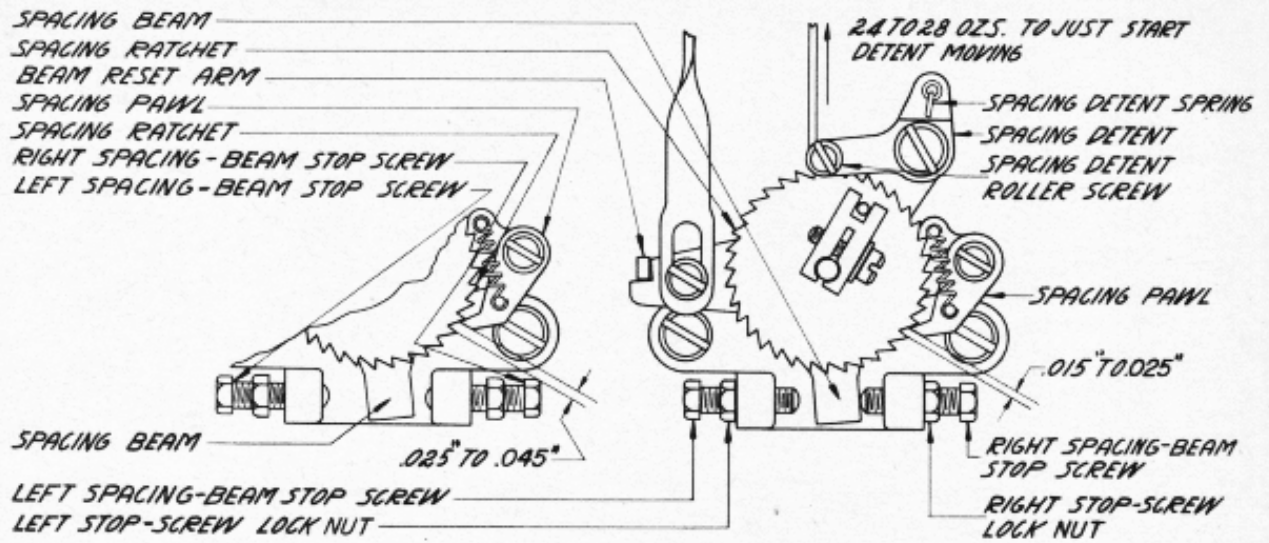


FIGURE 30

FIGURE 31

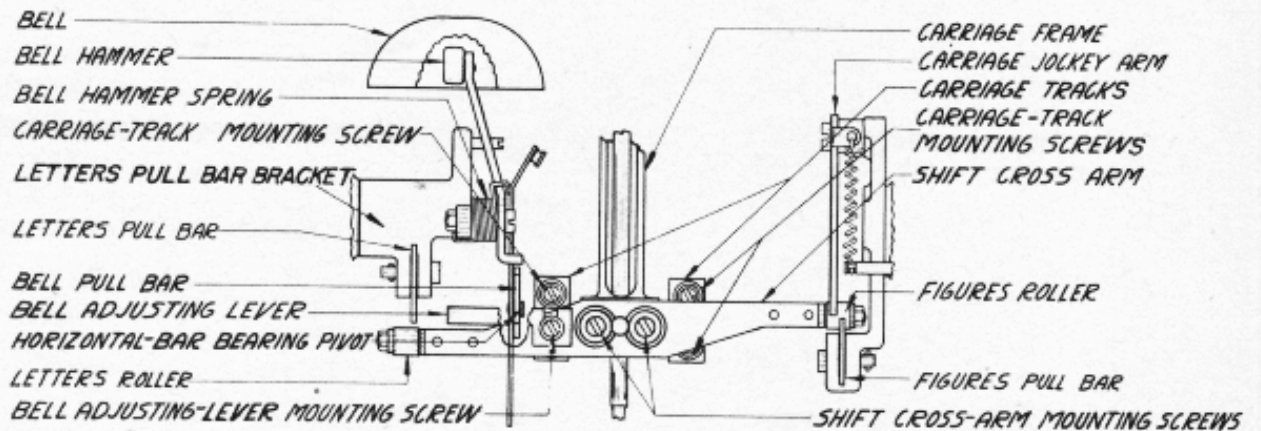


FIGURE 32

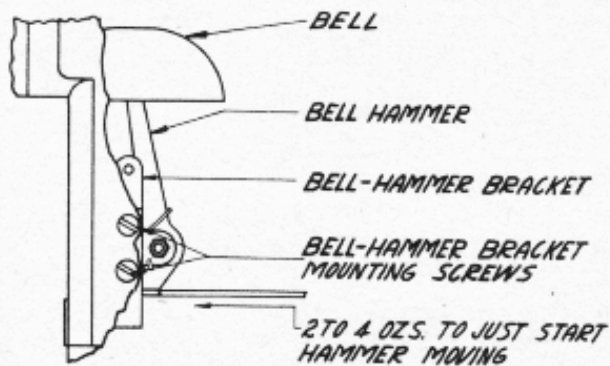


FIGURE 33

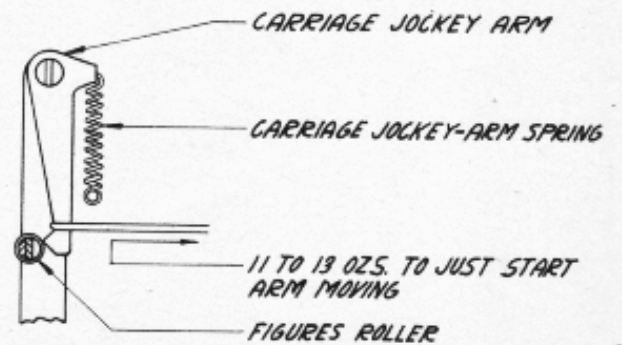


FIGURE 34

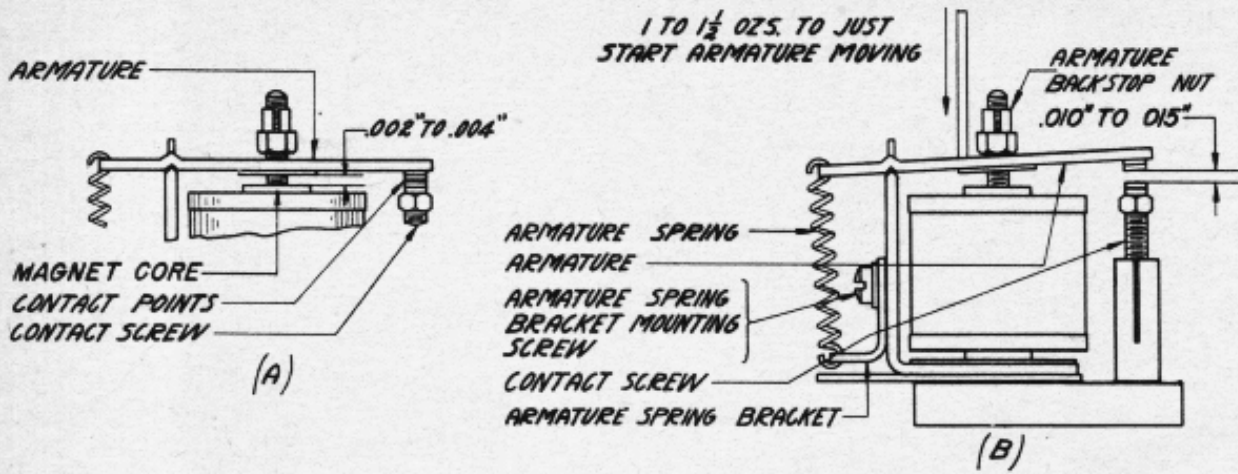


FIGURE 35

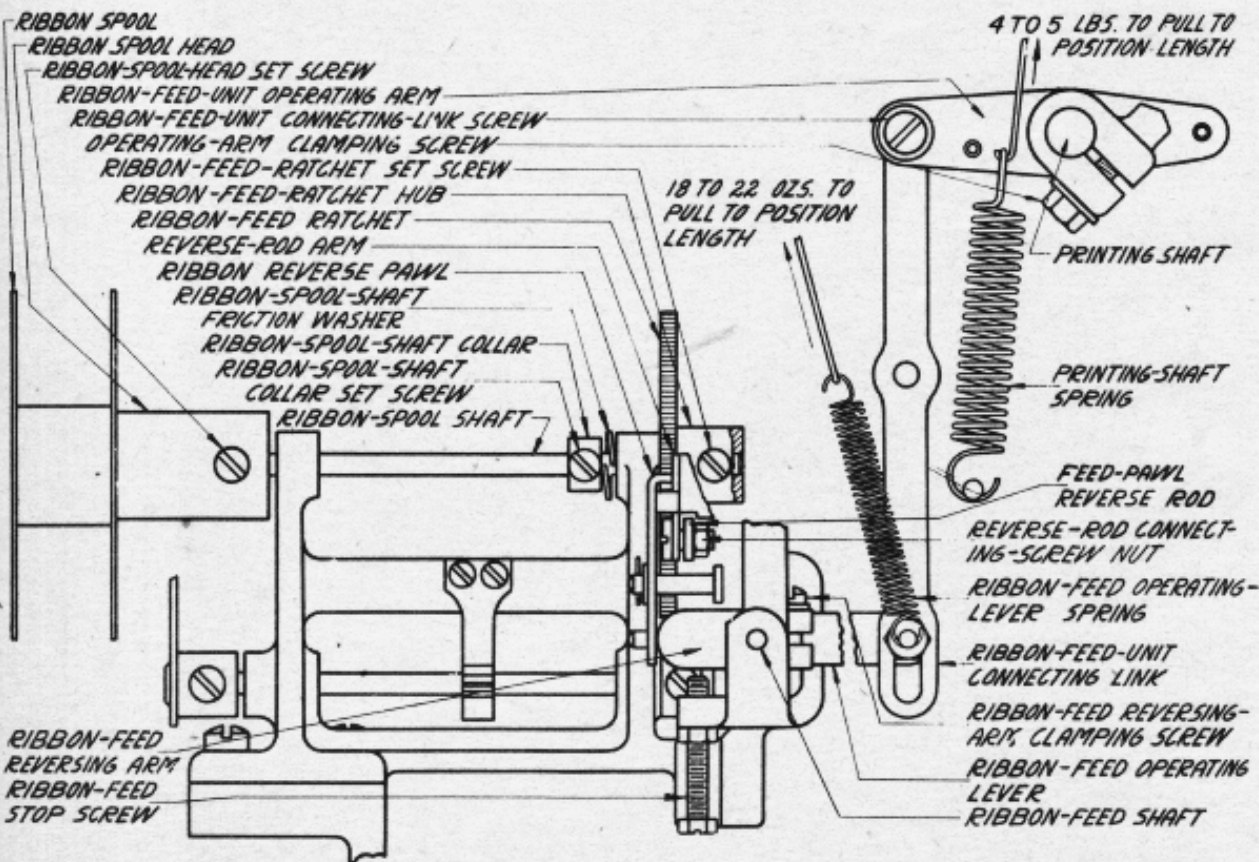


FIGURE 36

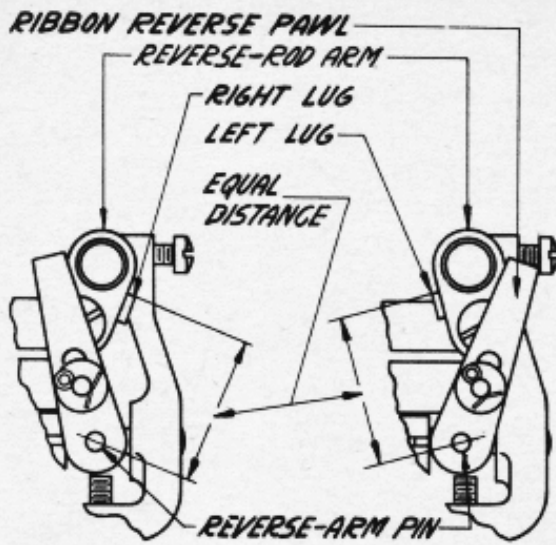


FIGURE 37

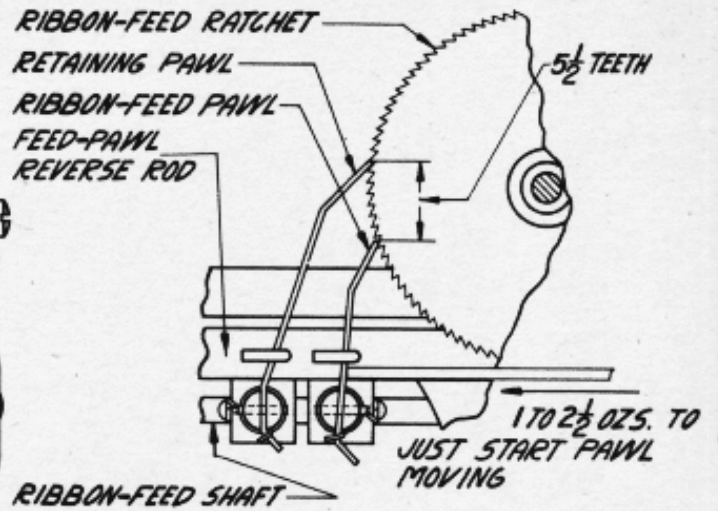


FIGURE 38

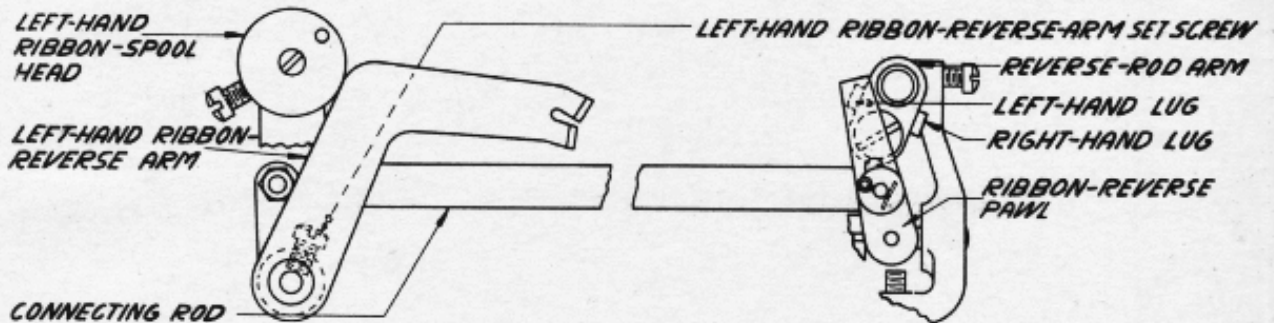


FIGURE 39

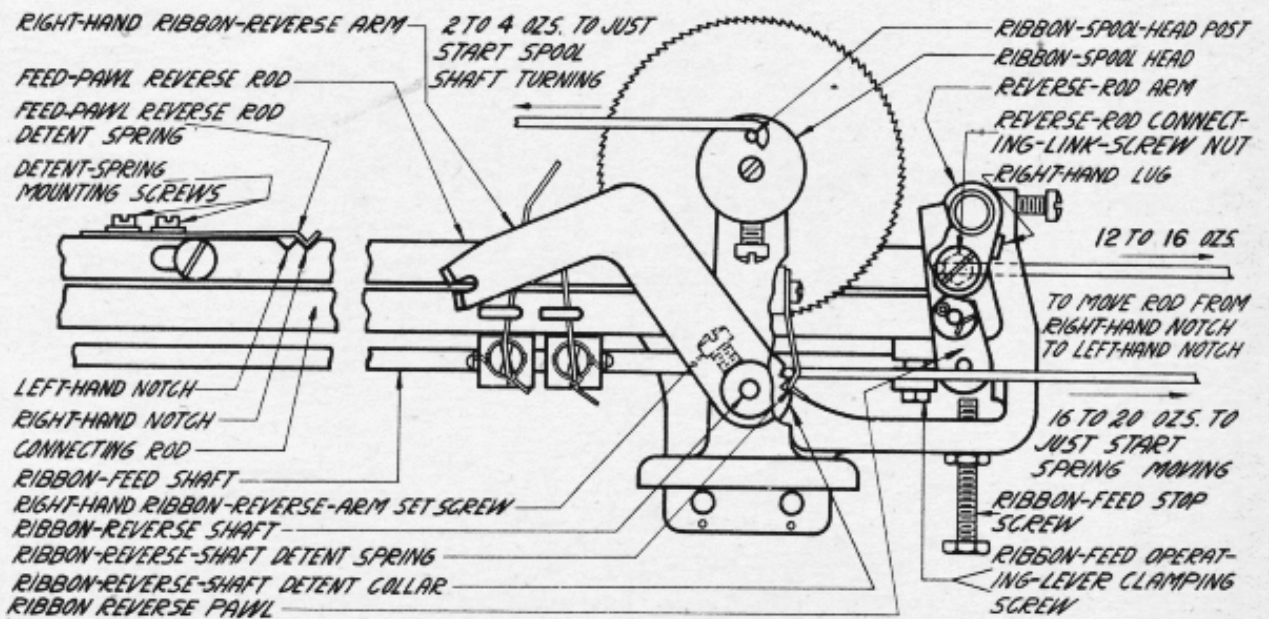


FIGURE 40

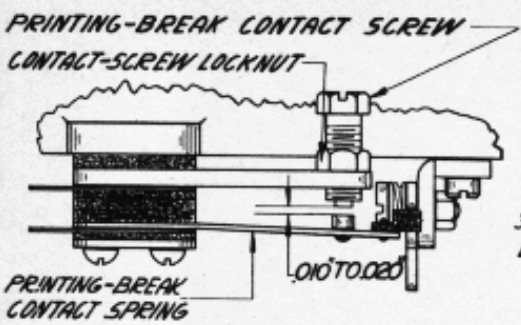


FIGURE 41

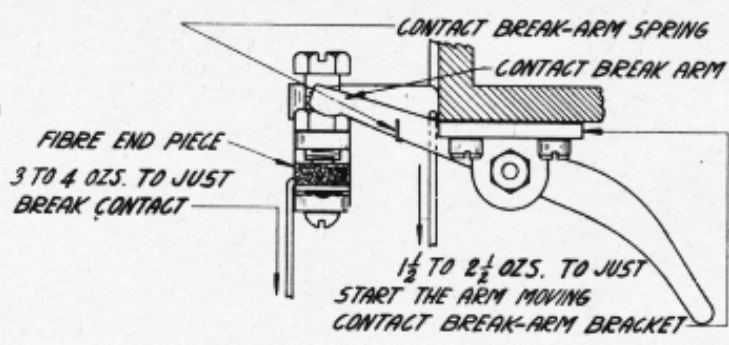


FIGURE 42

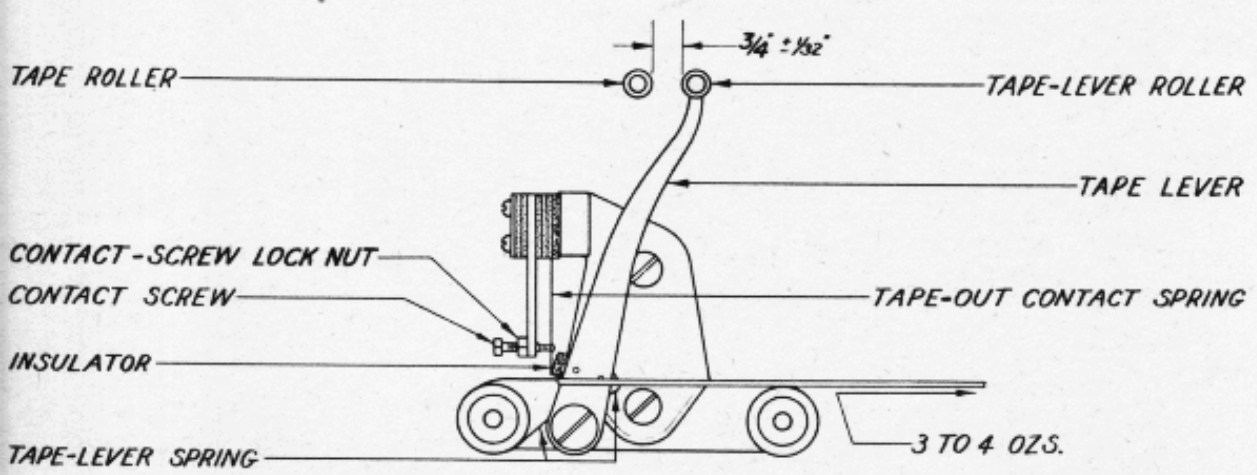
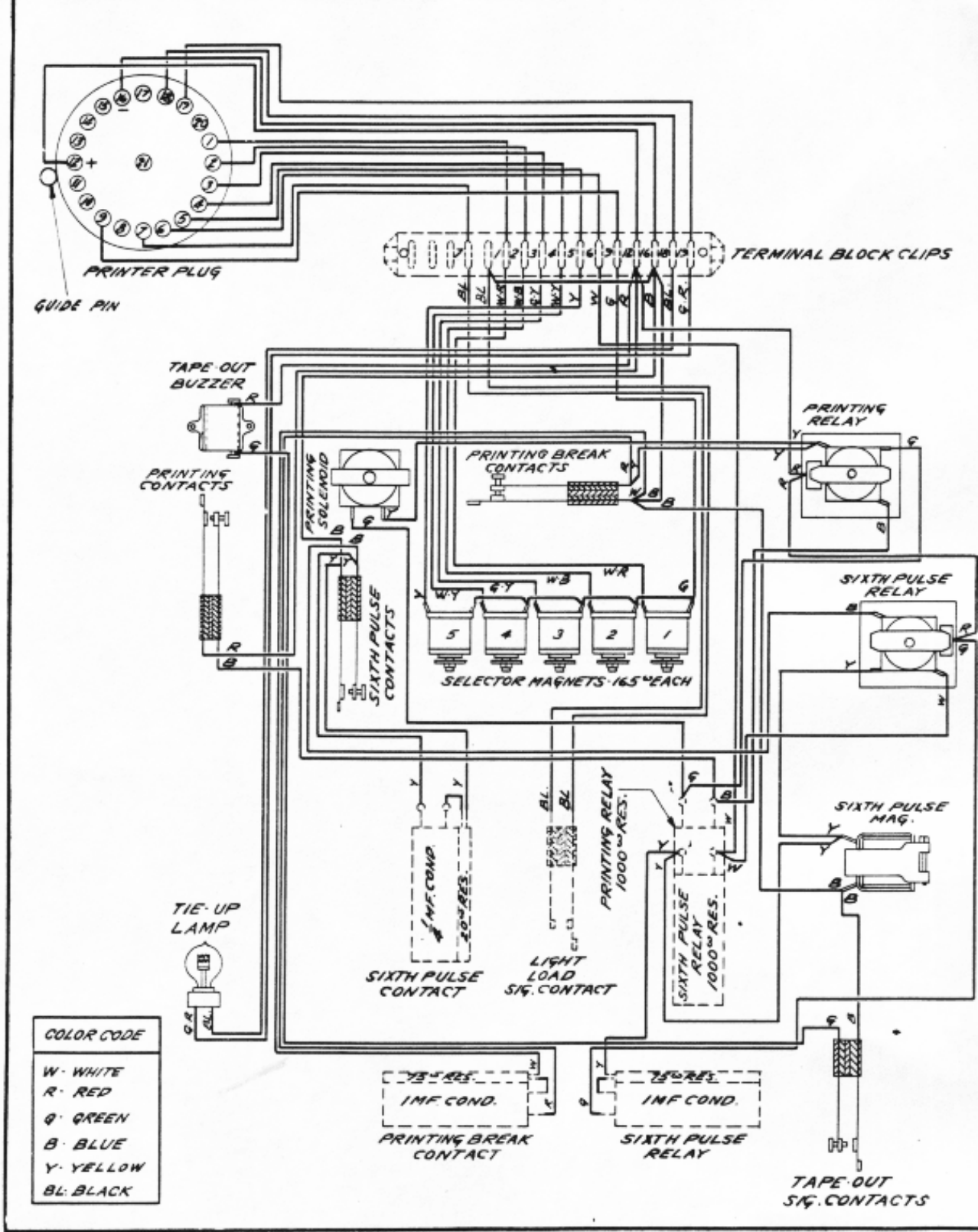
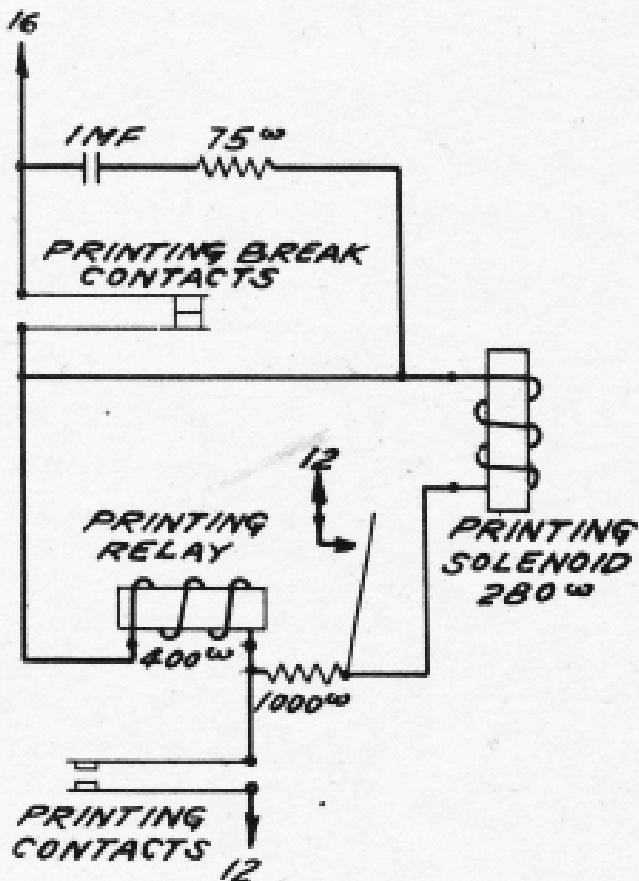
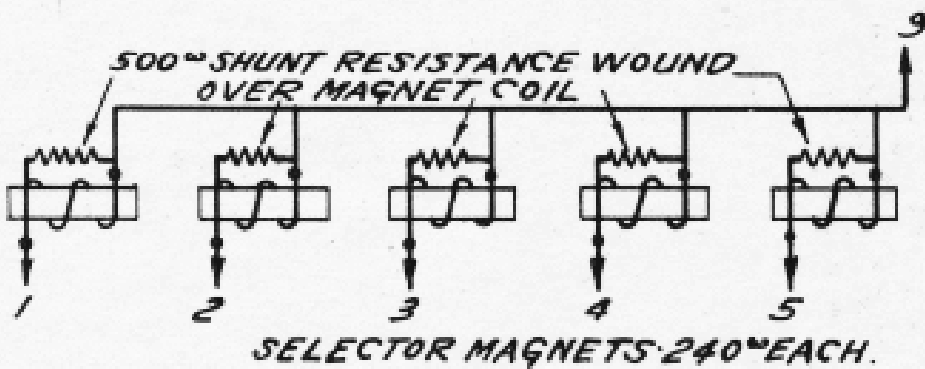
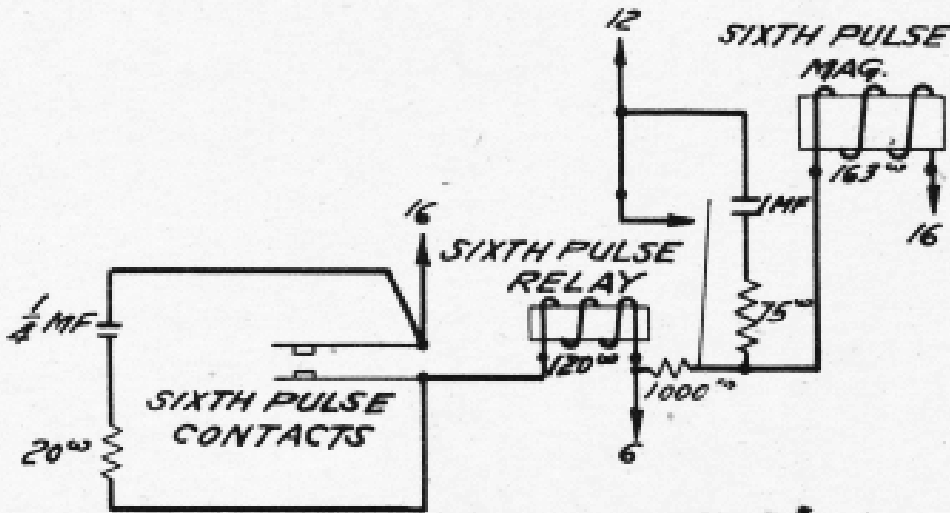


FIGURE 43



THEORETICAL DIAGRAMS



NOTES:-

BASE COLOR OF WIRE IS BLACK COLOR CODED WITH TRACERS AS DESIGNATED FOR EACH WIRE.
EQUIPMENT SHOWN DOTTED IS UNDER BASE.

- REVISIONS**
- ① LIGHT LOAD SIG. CONT. ADDED.
 - ② REDRAWN TO SMALLER SIZE
 - ③ ADD MTP 10 AND CHANGE COLOR CODE. ALSO REWIRE G SEL. WIRE AND ADD PLUG GUIDE PIN. 11-19-35 J.L.F.

TELETYPE CORPORATION

1249

MARCH 27, 1930

1249-A

① MAY 7, 1930

1249-B

② MAY 1930

1249-C

③ NOV. 19, 1935

WIRING DIAGRAM
MTP-B, 10

DRAWN A.P.
TRACED A.P.
CHECKED A.E.
ENG'R'D.
APPROVED *[Signature]*