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DESCRIPTION AND ADJUSTMENTS
PERFORATOR TRANSMITTER
(MODEL 15)



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DESCRIPTION OF THE MODEL 15 PERFORATOR TRANSMITTER

General

The Model 15 perforator transmitter is a combination keyboard transmitter and perforator with an electrically operated character counter. It fits into the base cavity of the Model 15 printer in place of the keyboard transmitter.

The perforator transmitter is furnished with character counter and dial indicator mounted to left or to right of the unit as illustrated in Figures 1 and 3. When the counter is mounted to the right of the unit, a separate cover is provided for the counter, but the counter mounted to the left of the unit is covered by an extension of the printer cover. Two models of complete printer sets with Model 15 perforator transmitters and covers are illustrated in Figures 2 and 4.

A manually operated, three position, keyboard control operating lever, mounted on the right-hand side of the unit (Figure 1 or 3), permits the operator to select any of the following methods of operation:

1. Operating Lever in Upper or "Keyboard" Position and Line Test Key in "Line" Position

Direct keyboard transmission to the line with a printed record being produced at the transmitting point. The maximum speed of the keyboard is limited to the predetermined speed of the set.

2. Operating Lever in Middle or "Keyboard and Tape" Position and Line Test Key in "Line" Position

Simultaneous direct keyboard transmission to the line and perforation of tape with a printed record being produced at the transmitting point. The maximum speed of the keyboard is limited to the predetermined speed of the set.

3. Operating Lever in Lower or "Tape" Position and Line Test Key in "Line" Position

Perforation of tape only, with the associated printer either receiving messages from a distant station, or monitoring the message perforated in the tape as it is being transmitted to the line by a transmitter distributor.

The character counter registers each time a character or space key is depressed and returns to its zero position when the "Carriage Return" key is depressed. Operation of the "Letters", "Figures", or "Line Feed" keylevers does not cause the character counter to register. The counter is provided with a signal lamp to indicate when the end of a line is being approached. The maximum speed of the keyboard in this case is not limited to the predetermined speed of the set and the operator may, therefore, perforate tape at speeds much higher than the speed at which a tape transmitter would send to the line.

4. Operating Lever in Middle or "Keyboard and Tape" Position and Line Test Key in "Test" Position

It is also possible to perforate tape and print a home record without transmitting directly to the line when the line test key (located near the center of the keyboard) is in the "Test" position. This method is

helpful in preparing perforated tape for use in connection with printed forms. The maximum speed of the keyboard is limited to the predetermined speed of the set.

Signaling Code

The signaling code used to transmit characters is the "Start-stop" five-unit code, which consists of five selecting impulses used in various combinations of current and no-current intervals. Each group of five selecting impulses is preceded by a start impulse and followed by a stop impulse, which are used to maintain synchronism between stations on the circuit. Impulses which energize the selector magnets on the printer are known as marking, and those which do not are known as spacing. Figure 10 shows the five-unit code chart.

Direct Keyboard Mechanism

The direct keyboard mechanism (Figures 5 and 6) is mounted on the keyboard casting, and consists essentially of a set of key levers, selector bars, "Y" levers, "Y" lever connecting links, and locking levers used in selecting the code combination to be transmitted; a transmitting cam sleeve assembly, contact levers and contact springs for transmitting the selected code; a universal bar, trip-off pawl, intermediate pawl, clutch throwout lever, and clutch used in starting and stopping transmission. The transmitting cam sleeve and its controlling clutch are supported by a transmitting shaft, which derives its motive force from a gear mounted on the main shaft of the typing unit. This gear engages a drive gear on the rear end of the transmitting shaft of the perforator transmitter. The transmitting cam sleeve assembly is normally held stationary due to disengagement of the clutch teeth by the clutch throwout lever.

Beneath the key levers are five pairs of parallel motion selector bars, a counter control contact operating mechanism, and a universal bar, which extends across the width of the keyboard. The selector bars are guided at both ends so that they may be moved upward or downward. They are provided with rectangular notches on their upper edges according to the requirements of the code. The notches in the front and rear selector bars of each pair are staggered so that there will always be a high portion on one of the pair in the path of each key lever. The ends of each pair of selector bars rest on the arms of "Y" levers; the front bar of each pair resting on the left arms of the "Y" levers and the rear bar of each pair resting on the right arms.

When a key lever is depressed, those selector bars having their high portions in line with that key lever are moved downward. This causes the "Y" levers to move the other bar of each pair upward. Should the rear bar of any pair be moved downward, the lower extensions of the corresponding "Y" levers will be moved to the left; similarly, they will be moved to the right when the corresponding front selector bars are moved downward. Thus, it may be seen that the "Y" lever connecting links which are attached to the ends of the lower extensions of the "Y" levers will be moved to the left when the rear selector bar is moved downward, and to the right when the front selector bar is moved downward. Each of the first five "Y" lever connecting links engages a locking lever and positions it to correspond with the signal impulse to be transmitted. Each locking lever controls the motion of a contact lever by either allowing the contact lever to rotate on its pivot due to the pressure exerted by the contact spring upon the contact lever, thereby permitting the contact to close, or by engaging the contact lever and preventing closure of the contacts. If the upper end of the locking lever is positioned to the left, corresponding to a spacing

impulse, it engages the contact lever and prevents it from rising into the indent of its corresponding cam as the cam sleeve rotates, thus holding the circuit open for that interval. If the upper end of the locking lever is positioned to the right, corresponding to a marking impulse, it does not interfere with the movement of the contact lever. Then, as the cam sleeve revolves, the contact lever riding on the cam surface rises into the indent of the cam, permitting its contact to close and to send out a marking impulse.

The universal bar, which is connected to the trip-off pawl, controls the starting of the transmitting cam sleeve. It is pivoted at both ends in such a manner that the depressing of any key lever rotates it downward, and moves the trip-off pawl forward. This action releases the clutch throwout lever from the driven member of the clutch by means of the intermediate pawl, permitting the transmitting cams to start rotating. As the cams rotate, the impulses are transmitted in succession.

The start-stop cam (Figure 6) controls an additional contact lever which, in turn, actuates the start-stop contacts. These contacts are opened at the beginning of each revolution of the cam sleeve assembly to transmit the start impulse (spacing or no-current interval), and remain open during the transmission of the five code impulses. After the last code impulse has been transmitted, the start-stop contacts will again close, sending the stop impulse (marking or current impulse) to the line. At the end of the revolution of the cam sleeve assembly, the clutch driven member is cammed out of mesh with the driving member by the clutch throwout lever, which prevents the cams from rotating until the next key-lever is depressed.

The keyboard is equipped with a space repeat device which permits the continuous transmission of "space" signals when the keyboard control operating lever is in the upper or middle positions. When the space bar is held depressed, the repeat space rod, (Figure 6) attached to the space bar loop extension, will move the intermediate pawl forward, in turn, holding the clutch throwout lever out of engagement with the projection on the driven clutch. Thus the transmitting cam sleeve will be permitted to revolve continuously until the space bar is released.

Perforator Mechanism

Attached to the left side of the keyboard casting is a bracket which mounts the perforator mechanism consisting, essentially, of a set of punches for perforating the tape; a punch magnet and armature lever for operating the punches; a set of selector fingers, selector levers and "Y" lever connecting link extensions used in selecting the punches; and a tape feed mechanism (Figure 5).

The selector fingers rest in a slotted guide mounted to the armature lever just below the punches and in line with them. The right end of each selector finger is attached to a selector lever that pivots on a mounting bracket at its lower end. A "Y" lever connecting link extension connects the left end of each "Y" lever connecting link to the central portion of its corresponding selector lever in such a manner that each selector finger will move to the right or left in accordance with the movements of the "Y" lever connecting links. It should be noted that both the selector fingers and the locking levers respond to the code selection whenever a key lever is depressed.

The magnet armature is mounted on a centrally pivoted armature lever. When the armature is attracted, the right end of the armature lever moves downward and the left end of the armature lever rises, carrying the left ends of the selector fingers upward. If a selector finger is in its left or operated position when the armature lever rises, the corresponding punch will be pushed through the tape. If a selector finger is in its right or unoperated position, it will clear the corresponding punch as it moves upward, and that punch will not perforate the tape.

When any key lever is depressed, the punch magnet is operated either by means of a pair of punch contacts, mounted on the perforator bracket (Figure 1 or 3), or by means of a set of cam pulsing contacts, located above the transmitting cam sleeve (Figure 1), or it may remain unoperated, depending on the setting of the keyboard control operating lever and its associated keyboard control contacts (Figures 1, 3, and 9.)

With the keyboard control operating lever in its upper "Keyboard" position, all circuits controlled by the keyboard control contacts will be open. With these contacts open, the punch magnet cannot be energized. Only direct keyboard transmission is possible with the lever in its upper position.

With the keyboard control operating lever in the middle or "Keyboard and Tape" position, only the lower pair of keyboard control contacts are closed. This permits the punch magnet to be energized by means of the cam pulsing contacts. These contacts, of which there are two pairs, are wired in parallel and close as a result of their operating springs riding into the indents on two of the transmitting cams (Figure 8). The sequence of this operation is such that the first pair of cam pulsing contacts closes the circuit through the punch magnet just as the start-stop contact is opened to transmit the start impulse. Just before the first pair of contacts open, the second pair closes. Through this overlapping action of the contacts, the magnet is energized long enough to insure proper operation. With the keyboard control operating lever in this position, it is possible to transmit from the keyboard directly to the line and simultaneously to perforate tape.

With the keyboard control operating lever in the lower or "Tape" position, all of the keyboard control contacts are closed and the universal bar is held depressed; thus, no direct keyboard transmission is possible. The trip-off pawl is depressed by an extension of the keyboard control operating lever to prevent it from engaging the intermediate pawl when the operating lever is moved to its lower position. Also, the repeat space rod is cammed outward so that it will not strike the intermediate pawl when the space bar is depressed. The operation of any key lever, in addition to setting up combinations on the selector fingers, moves the punch contact operating bar downward. This causes the "Y" lever connecting link and "Y" lever connecting link extension to move the upper end of the punch contact operating lever to the left, against the tension of its retracting spring, which will permit the punch contacts to close (Figure 7). It is to be noted that the operation of the punch contact operating lever is similar to the operation of the selector levers, except that a single punch contact operating bar is used, which is returned to normal by the operating lever retracting spring.

To insure a complete perforation of the code combinations in the tape when the punch contacts are closed, an anti-chatter mechanism is used. The latest design of this mechanism is shown in Figure 7. When the punch contacts are closed by depressing a key lever, the punch contact operating lever becomes latched in the operated position, energizing the punch magnet. The initial movement of the armature lever causes the anti-chatter lever to hold the left-hand punch contact firmly in contact with the right-hand contact. When the armature lever reaches the end of its travel, the latch screw disengages the latch allowing the contacts to separate.

Tape Feed Mechanism

The tape feed roll is located to the left of the punches (Figure 5). Spaced at equal intervals around the feed roll is a series of projecting pins which mesh with the feed holes punched in the tape. A tape tension lever holds the tape against the feed roll, keeping the feed holes in the tape in constant mesh with the tape feed pins.

During the upward movement of the armature lever, the feed pawl engages the next tooth on the feed roll. When the armature lever moves downward, the tape feed roll will revolve, advancing the tape one character space. A star wheel and detent insure equal spacing of the tape perforations.

Back Space Lever

The back space lever (Figures 1 and 3) is provided so that any error made by the operator may be corrected in the tape before it is used for transmission. The back space lever moves the tape backwards. The "Letters" key may then be depressed, causing five holes to be perforated in place of the erroneous combination.

Character Counter

The character counter (Figures 1, 3, and 11) consists, essentially, of a ratchet; a counter magnet and feed pawl for advancing the ratchet; a latch pawl used to retain the ratchet in its advanced position; a release magnet for disengaging both the feed and latch pawls from the ratchet; signal lamp operating contact springs; and a dial and indicator, when required.

The electrical circuit for the perforator transmitter is so arranged, that the closing of the punch contacts may operate the character counter in addition to operating the punch magnet. The counter control contacts are located on top of the keyboard casting at the left, and consist of three springs which control two circuits (Figure 13). In early models these contacts were mounted on the perforator casting (Figure 12). The left pair (counter contacts) are normally closed, and the right pair (release contacts) are normally open. Battery from the punch contacts is applied to the center counter control contact, which carries it to either the left or right control contact. The left contact is connected to the counter magnets, while the right contact is connected to the release magnets. Since the left pair of counter control contacts are normally closed, the counter magnets will be energized (advancing the counter ratchet one tooth) with each character or space operation of the perforator.

The operation of the counter magnet armature causes the feed pawl, which is pivoted to it, to engage the next tooth on the ratchet (Figure 11). As the armature is released, the feed pawl spring rotates the ratchet one tooth. The latch pawl then engages the ratchet and holds it in its advanced position. As previously described, the punch contacts are effective in their operation only when the keyboard control operating lever is in the lower or "Tape" position.

When any "Function" key lever is depressed, other than "Carriage Return," the movement of the counter control mechanism opens the left pair of counter control contacts. With both right and left counter control contacts open, no current reaches the counter unit, so the counter ratchet remains stationary.

When the "Carriage Return" key lever is depressed, the movement of the counter control mechanism opens the left pair of counter control contacts and closes the right pair. This connects the release magnet circuit in series with the punch contacts so that the magnet will operate when these contacts close. The operation of the release magnet armature causes the release lever, which is attached to it, to disengage both the feed and latch pawls from the ratchet. The ratchet spring then returns the ratchet to its starting position. A release latch holds the release lever operated and holds the pawls disengaged until the start of the next counting operation. A dash pot cylinder and piston are provided to act as a buffer for the return of the ratchet.

A signal lamp is used in connection with the character counter to indicate when a predetermined number of characters are perforated in the tape. The signal lamp operating contacts are controlled by a contact lever which rides upon a cam attached to the ratchet shaft. The cam may be positioned on the shaft so as to close the lamp contacts when the desired number of combinations have been perforated in the tape.

Line-Test Key

Mounted on the keyboard to the left of the transmitting contact assembly is the "Line-Test" key (Figures 1 and 3). It is provided for the purpose of testing and operating the printer independently of the line circuit. When the knob on the line test key is pulled outward, the line circuit is shunted and a local circuit established for printer operation.

Key Pressure Adjusting Mechanism

The key pressure adjusting mechanism (Figure 1), located on the perforator unit, provides a means for adjusting the pressure required to depress the key levers to suit the preference of the operator. When the unit is covered the adjusting screw is accessible by raising the hinged lid on the perforator cover.

ADJUSTMENTS

General

The following adjustments are arranged in a sequence that would be followed if a complete readjustment of the unit were undertaken. This fact should be kept in mind when a single adjustment is to be made because a change in one adjustment may affect other adjustments. If one adjustment is changed, related adjustments should be checked.

Adjustments which do not apply to all types of perforator transmitters are preceded by notes of explanation. Adjustments which have different requirements for various types of units are arranged with the requirements for the latest type of unit specified first.

The spring tension values given in this bulletin were derived from measurements made with Teletype spring scales. These scales are calibrated for use in an upright position. When used in any other position, the reading is an indicated value. Therefore, in order to obtain the specified scale readings, the spring scales which are included in the Teletype parts bulletin tool list should be used. Springs which do not meet the requirements specified and for which no adjusting procedure is given should be replaced with new springs. Ordering information may be obtained from the Teletype parts bulletin.

When an adjustment requires that the mechanism be operated electrically, rotate the transmitting cam to the stop position and connect a source of 110 volts D.C. to terminals No. 52 and No. 53, the second and third slip connection terminals from the perforator unit looking at the front of the keyboard. (See Figure 12 or 13). As a protective measure it is recommended that this source of current be provided with fuses of 2 or 3 ampere capacity. Use care to guard against shock or short circuit when handling the unit with power applied to it in this manner.

Transmitting Shaft Bearing Adjustment (Figure 14)

The transmitting cam sleeve should have some end play, not over .002". To adjust, loosen the adjusting nuts of the bearing in the rear bearing bracket and position the bearing. Tighten the adjusting nuts.

Lock Loop Spring Tension (Figure 15)

With the lock loop roller resting on the low part of its cam, it should require 4 to 5 ozs. to start the lock loop roller moving away from the cam. To measure, hook an 8 oz. scale in the lock loop spring hole and pull in line with the spring.

Locking Lever Bracket Shim Adjustment (Figure 15)

NOTE: This is a factory adjustment which should not require attention. However, should it be found necessary to change the adjustment, it will be necessary to remove the filters (if present) and the pulsing

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NOTE: Before making any adjustments, see "General," page 7.

contact assembly by removing the two screws which mount them to the transmitter front bracket (Figure 1). Without disconnecting any wires, place the filters and the contact assembly to one side so that access to the locking lever bearing is unobstructed.

With the contact levers on the high parts of their cams, there should be some clearance, not over .010", between the contact levers and the locking levers, when the locking levers are pressed downward by hand to make this clearance a minimum. Adjust by means of shims placed between the locking lever bracket and the keyboard casting. Position the bracket toward the front or rear so that the locking levers line up with the contact levers and tighten the mounting screws. Remount the filters and the pulsing contact assembly on the transmitter front bracket.

Selector Bar Assembly Shim Adjustment (Figure 16)

NOTE: The following adjustment is made at the factory and should require readjusting only when the shim pile-up has been changed or a new selector bar assembly is being installed. When adjusting units having the counter control contacts mounted on the punch unit (Figure 12) paragraph C should be substituted for paragraph B.

- A. When the "Q" key lever is fully depressed, all other key levers should have some play between the leather upstop and the selector bars and there should be some clearance, not over .030", between the high portions of the first selector bar from the front (A-1) and the unoperated key levers in line with the high portions. These conditions should also exist when the "P" or "B" key levers are depressed.
- B. When the "T" key lever is fully depressed, there should be some clearance, not over .020", between the rearmost code selector bar (E-2) and the unoperated key lever having the least clearance.
- C. There should be not less than .150" longitudinal movement of the counter control "Y" lever connecting link when the "Carriage Return" and "Figures" key levers are alternately depressed. Check this movement again while depressing "Carriage Return" and "Line Feed" key levers alternately, and also while depressing "Carriage Return" and "Letters" key levers alternately.

In the event that it is found necessary to change this adjustment, proceed as follows: Remove the left and right keyboard slide plates. Disconnect the "Y" lever connecting link extensions (Figure 5) from the "Y" lever connecting links, and remove the selector bar assembly.

CAUTION: Care must be exercised in handling the unit to avoid damaging the connecting link extensions when they are disconnected from their connecting links.

Adjust to meet the conditions in paragraph A, by increasing or decreasing the number of shims mounted to the selector bar assembly bracket at the front corners. To adjust for the conditions in paragraph B or C, add (or remove) an equal number of shims to the bracket at each of the rear corners. Tighten the mounting screws. Replace the "Y" lever connecting link extensions and the left and right keyboard slide plates.

* * *

NOTE: Before making any adjustments, see "General," page 7.

Selector Bar Assembly Bracket Adjustment

The selector bar assembly should be parallel to the rear key lever guide (Figure 16) and the locking levers should be fully engaged by the locking lever forks (Figure 5). Also, there should be no interference between the sides of the locking levers and the selector bars. To adjust, remove the left and right keyboard slide plates, loosen the selector bar assembly mounting screws, and position the assembly. Tighten the mounting screws. Replace the keyboard slide plates.

Locking Lever Bracket Position Adjustment (Figure 15)

When lock loop roller is on the high part of the cam and the "Ltrs" and "Blank" (or "R" and "Y") key levers are alternately depressed, the locking levers should travel equally to either side of the lock loop blade.

NOTE: If the left-hand travel of the locking levers is limited by the contact levers, it will be satisfactory if the right-hand travel is greater than the left-hand travel.

When any of the above-mentioned key levers are held depressed and the cam is rotated so that the lock loop roller is on the low part of its cam, there should be at least .010" clearance between the side of any lock lever and the side of the lock loop blade. To adjust, loosen the bracket mounting screws and position the bracket being careful to keep the locking levers in alignment with the contact levers. Tighten the mounting screws.

Clutch Throwout Lever Adjustment (Figure 16)

When the clutch is fully disengaged, there should be .005" to .015" clearance between the clutch teeth. To adjust, increase or decrease the number of shims installed between the clutch throwout lever post and the mounting bracket.

Clutch Spring Compression (Figure 17)

With the clutch teeth engaged, hook a 32 oz. scale over the projection on the clutch driven member and pull in line with the transmitting shaft. It should require 9 to 12 ozs. to separate the clutch teeth.

Lock Loop Roller Adjustment (Figure 18)

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

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

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NOTE: Before making any adjustments, see "General," page 7.

Keyboard Control Operating Lever Bracket Adjustment (Figure 16)
(Trip-Off Pawl Stop Plate Adjustment)

NOTE: In early models of the perforator transmitter, the trip-off pawl stop plate was separate from the keyboard control operating lever bracket. The two parts were combined in later models. In either case the adjustment requirement is the same.

With the screw driver slot of the intermediate pawl eccentric in a horizontal position and the high part of the eccentric screw head toward the front of the unit, there should be .070" to .080" clearance between the trip-off pawl and the intermediate pawl when the trip-off pawl is resting against the operating lever bracket (or trip-off pawl stop plate) and the intermediate pawl is against its eccentric. To adjust, loosen the operating lever bracket (or trip-off pawl stop plate) mounting screws and position it. Tighten the screws.

Universal Bar Bracket Adjustments (Figure 16)

- A. There should be .060" to .080" clearance between the universal bar and the key levers when the trip-off pawl is resting against the operating lever bracket (or trip-off pawl stop plate) and the key levers are resting against their upstop.
- B. The trip-off pawl extension of the universal bar should be approximately equidistant from the sides of the key levers.
- C. The universal bar brackets should be parallel to the selector bar assembly and as close to it as possible. The universal bar should be free from binds, and should not have over .008" end play.

Adjust the height of the universal bar by means of shims placed between the universal bar brackets and the casting. Conditions "B" and "C" may be obtained by loosening the mounting screws and utilizing the enlarged mounting holes in the brackets. Tighten the screws. After making adjustments "B" and "C", recheck adjustment "A" and refine adjustments if necessary.

Intermediate Pawl Eccentric Adjustment (Figure 19)

There should be .050" to .060" clearance between the trip-off pawl and the intermediate pawl when the trip-off pawl is resting against the operating lever bracket (or trip-off pawl stop plate) and the intermediate pawl is resting against its eccentric. To adjust, loosen the intermediate pawl eccentric lock nut and position the eccentric. Tighten the lock nut.

Clutch Throwout Lever Eccentric Adjustment

The intermediate pawl should be held firmly between the intermediate pawl eccentric and the clutch throwout lever when the clutch throwout lever is resting on the low part of the clutch driven member. To adjust, loosen the clutch throwout lever eccentric lock nut and position the eccentric. Tighten the lock nut. See Figure 21 for location of parts.

Trip-Off Pawl Eccentric Adjustment (Figure 20)

With the clutch throwout lever resting against the high part of the cam on the driven clutch member and the clutch throwout lever eccentric in contact with the clutch throwout lever, the point on the trip-off pawl should clear

* * *

NOTE: Before making any adjustments, see "General," page 7.

the point on the intermediate pawl by not over .004" when a key lever is depressed. To adjust, loosen the lock nut on the trip-off pawl eccentric screw and position the screw, keeping the center of the eccentric head to the rear of the center of the screw. Recheck "Universal Bar Bracket Adjustments." Tighten the lock nut.

Trip-Off Pawl Spring Tension (Figure 21)

Unhook the trip-off pawl spring from the bracket and hook an 8 oz. scale in the spring eye. With the trip-off pawl resting against the operating lever bracket (or trip-off pawl stop plate), it should require 3-1/2 to 4-1/2 ozs. to extend the spring to its installed length.

Clutch Throwout Lever Spring Tension

With the clutch teeth engaged and the throwout lever resting on the low part of the clutch driven member, hook an 8 oz. scale over the throwout lever just above the spring hole, and pull in line with the spring. It should require 1-1/2 to 2-1/2 ozs. to start the lever moving.

Transmitting Contact Spring Adjustments (Figure 15)

With any contact lever on the high part of its cam, there should be a contact gap of .020" to .025". To adjust, bend the shorter contact springs.

Transmitting Contact Spring Pressure (Figure 22)

With the contact levers in the indent of their respective cams, it should require 4-1/2 to 5-1/2 ozs. to separate the contacts. To measure, apply the push end of an 8 oz. scale to the longer spring just above the contact point and push toward the right. To adjust, bend the longer contact springs. Recheck the contact gap after adjusting the contact spring pressure.

Key Lever Spring Tension Adjustments

The following paragraphs identify the key lever springs used in various models of the perforator transmitter. To check a spring, remove it from the keyboard. If necessary, bend the spring to make it conform to the specification. Measure the opening as shown in Figure 23.

- A. All perforator transmitters use the same spring on character key levers and the blank key lever. This spring is made of wire .035" in diameter and should have an opening of 1-3/16". Perforator transmitters with the counter control contacts mounted on the punch unit, as shown in Figure 12, also employ character key lever springs on the function key levers (Carriage Return, Line Feed, Letters, and Figures).
- B. Perforator transmitters with the counter control contacts located on the forward left-hand portion of the keyboard base, as shown in Figure 13, employ function key lever springs made of .035" wire with an opening of 1-9/16". (Carriage Return, Line Feed, Letters, and Figures).
- C. Units equipped with a 3 inch space bar employ a space key lever spring made of .039" wire with an opening of 1-3/4".

* * *

NOTE: Before making any adjustments, see "General," page 7.

- D. Units equipped with an 8-1/2 inch space bar and a centrally located space key lever employ a space key lever spring made of .049" wire with an opening of 1-5/8".
- E. Units equipped with an 8-1/2 inch space bar and a space key lever located in a key lever slot near the left-hand end of the keyboard employ a space key lever spring made of .049" wire with an opening of 1-15/16".

Repeat Space Rod Bracket Adjustment

- A. Adjust the two-piece bracket illustrated in Figure 24 to meet the following requirement: With the keyboard control operating lever in the upper position, and the space bar fully depressed, there should be some clearance, not over .008", between the repeat space rod and the transmitter rear bracket. When checking this adjustment the repeat space rod slotted guide should be resting against its backstop screw and the play of the rod in the slot should be taken up in a direction to make the clearance a minimum. To adjust, loosen the repeat space rod bracket mounting screw and position the bracket. Hold the repeat space rod bracket so that it is approximately parallel to the transmitter rear bracket when tightening the mounting screw. Check the repeat space rod for freeness after tightening the bracket mounting screw.
- B. Adjust the one-piece bracket illustrated in Figure 25 to meet the following requirement: With the keyboard control operating lever in the upper position, and the space bar depressed until the space key lever bottoms lightly on the A-1 and A-2 code selector bars, there should be some clearance, not over .008", between the repeat space rod and the transmitter rear bracket, when the upper portion of the repeat space rod is resting against the repeat space rod bracket. Check this clearance along the entire flat surface of the transmitter rear bracket where the repeat space rod travels. To adjust, loosen the repeat space rod bracket mounting screw and position the bracket. When tightening the mounting screw, make certain that the front face of the repeat space rod bracket is parallel to the rear surface of the transmitter rear bracket.

Repeat Space Rod Adjustment (Figure 26)

With the keyboard control operating lever in the upper position, and the space bar depressed until the space key lever rests lightly against the A-1 and A-2 code bars, there should be .010" to .020" clearance between the clutch throwout lever and the high part of the throwout cam. Adjust by means of the repeat space rod adjusting nuts.

Repeat Space Rod Spring Tension

With the keyboard control operating lever in the upper position, hook an 8 oz. scale over the upper portion of the repeat space rod near its spring and pull in line with the spring. It should require at least 1 oz. to start elongating the spring.

* * *

NOTE: Before making any adjustments, see "General," page 7.

Repeat Space Rod Cutout Adjustment

NOTE: The repeat space rod cutout is a small formed part which is mounted to the keyboard control operating lever to the rear of the operating lever mounting screw. There are two designs of this part in use.

- A. The cutout used with the two-piece repeat space rod bracket should be adjusted to meet the following requirements (Figure 28):
 1. With the keyboard control operating lever in the lower position and the space bar fully depressed, there should be at least .010" clearance between the repeat space rod and the intermediate pawl.
 2. With the keyboard control operating lever in the center position of the detent bracket, the cutout should not engage the repeat space rod slotted guide. To adjust, position the cutout in its slot, utilizing the elongated mounting hole.
- B. The cutout used with the one-piece repeat space rod bracket should be adjusted to meet the following requirement (Figure 29): With the keyboard control operating lever in the lower position and the space bar depressed until it rests lightly on its rubber downstops, there should be a clearance of .010" to .020" between the repeat space rod and the side of the intermediate pawl. To adjust, position the cutout in its slot utilizing the elongated mounting hole.

Keyboard Control Contact Assembly Adjustments (Figures 30, 31, and 32)

NOTE: All the contact tensions specified in this section should be measured with an 8 oz. scale applied to the spring at the contact point and at a right angle to the contact spring. The contact springs are numbered from top to bottom of the contact assembly. To facilitate checking or adjusting, remove the keyboard control contact assembly cover.

- A. The contact points should be in alignment with one another. To adjust, loosen the contact spring mounting screws and position the contact springs. Tighten the mounting screws.
- B. Place the keyboard control operating lever in the upper position to make the following adjustments (See Figure 30):
 1. Both prongs of the keyboard control operating lever should engage the insulating tips of contact springs No. 3 and No. 5 approximately centrally. Make certain that neither prong touches the contact spring nor insulator rivets. To adjust, loosen the contact assembly bracket mounting screws and position the bracket. Tighten the screws.
 2. There should be not less than .010" clearance between the keyboard casting and the insulating tip on contact spring No. 5. If necessary, a slight adjustment may be made by bending the spring between the contact point and the insulating tip.
 3. There should be .015" to .040" clearance between the contact points on springs No. 4 and No. 5. To adjust, bend contact spring No. 4.
- C. Place the keyboard control operating lever in the center position to make the following adjustments (See Figure 31):

* * *

NOTE: Before making any adjustments, see "General," page 7.

1. There should be not less than .015" clearance between the lower prong on the keyboard control operating lever and the insulating tip on contact spring No. 5. If necessary to adjust for this clearance, bend contact spring No. 4. Recheck the contact gap specified in Section B-3.
 2. With the insulating tip on contact spring No. 3 resting against the upper prong of the keyboard control operating lever, there should be .015" to .040" clearance between the contact points on springs No. 2 and No. 3. To adjust, bend the backstop of contact spring No. 2.
 3. There should be .015" to .025" clearance between the contact points of springs No. 1 and No. 2. To adjust, bend contact spring No. 1.
 4. It should require a pull of not more than 1-1/2 ozs. to raise contact spring No. 2 so that the points of springs No. 1 and No. 2 make contact. To adjust, bend contact spring No. 2. Recheck the contact gap specified in Section C-2.
- D. Place the keyboard control operating lever in the lower position to make the following adjustments (See Figure 32):
1. It should require a push of 2 to 3 ozs. to separate the contact points of springs No. 4 and No. 5. To adjust, bend contact spring No. 5. Recheck the contact gap specified in Section B-3.
 2. It should require a push of 3 to 3-1/2 ozs. to separate the contact points of springs No. 2 and No. 3 when spring No. 2 is held to prevent follow. To adjust, bend contact spring No. 3. Recheck the contact gap specified in Section C-2.
 3. It should require a pressure of at least 1/4 oz. to separate the contact points of springs No. 1 and No. 2. To measure this pressure, allow contact spring No. 3 to bear against contact spring No. 2, apply the push end of an 8 oz. scale to contact spring No. 2 at the contact point and push vertically downward. If it is necessary to readjust to meet this requirement, remake the adjustments specified in Sections C-4 and D-2, within limits, in a direction to increase the pressure between the contacts of springs No. 1 and No. 2.

Replace the keyboard control contact assembly cover.

Keyboard Control Contact Assembly Cover Adjustment

The rear extremity of the cover should not project beyond the rear of the transmitting shaft rear bracket. To adjust, position the cover, utilizing its elongated mounting holes.

Keyboard Control Operating Lever Detent Bracket Adjustment (Figure 27)

With the keyboard control operating lever in its upper position, hook a 32 oz. scale under the rear extension of the operating lever just in front of the lobes and pull vertically upward. It should require a pull of at least 20 ozs. to move the operating lever from the upper (keyboard) position to the center (Keyboard and Tape) position. To adjust, loosen the detent bracket mounting screws and position the bracket. Tighten the screws.

* * *

NOTE: Before making any adjustments, see "General," page 7.

Universal Bar Cutout Mechanism Adjustments (Figures 34 and 35)

NOTE: These two adjustments apply only to units equipped with a universal bar cutout lever, as illustrated in Figures 34 and 35.

- A. With the keyboard control operating lever in the lower position, there should be some clearance, not over .025", between the universal bar and any key lever when the key lever is fully depressed. Check all key levers. (See Figure 34.) Adjust by means of the eccentric stud on the universal bar cutout lever.
- B. With the keyboard control operating lever in the middle position, and all keylevers in the unoperated position, there should be some clearance, not over 1/16", between the universal bar and the cutout lever. To adjust, bend the universal bar cutout lever return spring. (See Figure 35.)

Trip-Off Pawl Cutout Adjustment

- A. Adjust the trip-off pawl cutout illustrated in Figure 34 to meet the following requirement: When the clutch throwout lever is resting against the low part of its cam and the keyboard control operating lever is moved slowly from the center position to the lower position, there should be .015" to .030" clearance between the trip-off pawl and the intermediate pawl at the point where the clearance is a minimum. To adjust, bend the trip-off pawl cutout. When the operating lever is in its lower position there should be clearance between the trip-off pawl cutout and the repeat space rod and between the trip-off pawl and the keyboard casting. If there is no clearance at these points, bend the cutout or refine the adjustment, within the specified tolerances, to obtain clearance.
- B. Adjust the trip-off pawl cutout screw illustrated in Figure 36 to meet the following requirement: With the keyboard control operating lever in the lower position and the clutch throwout lever on the low part of its cam, the point of the trip-off pawl should clear the point of the intermediate pawl by at least .010" when a key lever is slowly depressed. To adjust, turn the cutout screw downward until the point of the trip-off pawl just clears the point of the intermediate pawl when a key lever is slowly depressed. Then turn the cutout screw downward an additional quarter turn and tighten the lock nut.

Cam Pulsing Contact Assembly Adjustments (Figure 33)

NOTE: The cam operated pulsing contact assembly consists of two similar pairs of contact springs which require like adjustments. Apply the following adjustments to each pair independently.

- A. Rotate the transmitting cam assembly until the tip on the contact operating spring, which bears on the cam, is on the high part of the cam to make the following measurements or adjustments (See Figure 33A):
 1. The tip of the contact operating spring should ride centrally on the cam, and the contact points should be in alignment. To adjust, loosen the contact spring assembly mounting screws and position the assembly. Tighten the mounting screws.

* * *

NOTE: Before making any adjustments, see "General," page 7.

2. There should be .010" to .020" clearance between the contact points. To adjust, bend the lower contact spring.
 3. There should be at least .015" clearance between the lower contact spring and the contact operating spring at the closest point. To adjust, bend the left end of the contact operating spring upward and remake the preceding adjustment.
- B. In order to make the following adjustments, rotate the transmitting cam assembly until the tip on the contact operating spring, which bears on the cam, falls into the cam indent. If the unit is equipped with filters which are mounted over the pulsing contact assembly, it will be necessary to remove the filters from their mounting bracket in order to make the measurements specified in Sections B-1 and B-3.
1. Hook an 8 oz. scale over the upper contact spring at the contact point and pull vertically upward. It should require a pull of 3-1/2 to 4-1/2 ozs. to separate the contact points. Also, the contact surfaces should meet squarely. To adjust, bend the contact springs. Recheck the clearance specified in Sections A-2 and A-3.
 2. There should be .010" to .025" clearance between the curved tip on the contact operating spring and the insulating tip on the upper contact spring. To adjust, bend the backstop for the contact operating spring.
 3. Hook an 8 oz. scale under the curved tip of the contact operating spring and pull vertically upward. It should require a pull of 2 to 3 ozs. to start the spring moving away from the end of the backstop. To adjust, bend the contact operating spring.
 4. There should be at least .020" clearance between the wearing tip on the contact operating spring and the low part of the cam surface. If necessary to adjust, remake adjustment B-2 within the limits specified in order to obtain the required clearance.

Tape Feed Roll Adjustment

The tape feed roll should be free from binds and should not have over .003" end play. To check for binds, hold off the tape tension lever, the feed pawl, and detent lever. To adjust, increase or decrease the number of shims installed between the feed roll bracket and the casting. Utilize the play in the bracket mounting holes to position it so that the feed roll is free. Tighten the screws. See Figure 37 for location of parts.

Tape Tension Lever Stud Adjustment (Figure 37)

The feed pins on the feed roll should not touch either side of the slot in the tape tension lever when the play in both the feed roll and tape tension lever is taken up in opposite directions. To adjust, increase or decrease the number of shims installed between the tape tension lever stud and the feed roll bracket.

* * *

NOTE: Before making any adjustments, see "General," page 7.

Tape Tension Lever Spring Tension Adjustment

Hook an 8 oz. scale over the end of the slotted extension of the tape tension lever and pull at a right angle to the lever. It should require a pull of 5 to 5-1/2 ozs. to start the slotted extension of the lever moving away from the feed roll. To adjust, loosen the tape tension lever stud lock nut and rotate the stud in either a clockwise or counterclockwise direction. Tighten the lock nut. See Figure 37 for location of parts.

Backspace Mechanism Spring Tension Requirements

- A. The type shown in Figure 38 should meet the following requirements:
1. Apply the push end of an 8 oz. scale to the upper end of the backspace lever and push vertically downward. It should require 4 to 6 ozs. to start the backspace lever moving.
 2. Hook an 8 oz. scale under the pawl below the spring hole and pull vertically upward. It should require 1 to 2 ozs. to start the feed pawl moving.
- B. The type shown in Figure 39 should meet the following requirements:
1. Unhook the spring from the feed pawl release cam and hold the backspace lever in its unoperated position. With an 8 oz. scale hooked in the spring eye, it should require 3-1/2 to 4-1/2 ozs. to stretch the spring to its installed length.
 2. Hook an 8 oz. scale under the pawl below the spring hole and pull vertically upward. It should require 1 to 2 ozs. to start the feed pawl moving.

Feed Roll Detent Preliminary Adjustment (Figure 40)

With the detent lever roller resting between two teeth of the star wheel and the armature lever in the operated position, insert the feed roll positioning gauge (No. 73517) in the punch block guide slot so that the projection of the gauge stops against the feed hole punch. Under these conditions, a pin on the feed roll should line up with the center hole of the gauge.

To adjust, loosen the detent eccentric bushing mounting screw and position the bushing keeping the center of the eccentric bushing below the center of the mounting screw. Tighten the mounting screw.

Feed Roll Detent Spring Tension Requirement

- A. Springs with an adjustable spring post, mounted as shown in Figure 40-A should be measured as follows: Hook a 32 oz. scale over the detent lever at the roller and pull downward at a right angle to the lever. It should require 15 to 17 ozs. to start the roller moving away from the star wheel. To adjust, hold the adjusting thumb nut and loosen the lock nut. Then turn the thumb nut to obtain the proper tension. Hold the thumb nut when tightening the lock nut.

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Note: Before making any adjustments, see "General," page 7.

- B. Springs mounted as shown in Figure 40-B should be measured as follows: Hook a 12 lb. scale over the end of the detent at the spring hole and pull in line with the spring. It should require 3 to 4 lbs. to start the roller moving away from the star wheel.

REMOVE THE TAPE STRIPPER PLATE AND THE TAPE KNIFE (FIGURE 3) TO FACILITATE MAKING OR CHECKING THE FOLLOWING ADJUSTMENTS

Selector Lever Bracket Adjustment

With the code bars in their neutral position, the engaging tips of all the movable selector fingers should be under the punches by not more than half the diameter of the punches, gauged by eye. To move the code bars to a neutral position, depress the Ltrs., Line Feed, and Blank key levers or the R, T, and Y key levers equally until they are stopped by the code bars. To facilitate this procedure, place an "R" wrench across the keytops and depress the key levers by applying pressure to the wrench. When checking this adjustment, hold the three key levers depressed and take up the play of the selector levers and fingers in a direction to make the engagement with the punches a maximum. To adjust, loosen the selector lever bracket mounting screws and position the bracket. Tighten the mounting screws. See Figure 41 for location of parts.

Feed Punch Selector Lever Adjustment

NOTE: This requirement applies only to units with an adjustable feed punch selector lever, as illustrated in Figure 41.

The left end of the uppermost section of the feed punch selector finger should line up with the left edge of the feed punch pin. Gauge by eye. See Figure 41 for location of parts. To adjust, position the feed punch selector lever by increasing or decreasing the number of shims between the formed-over ear and the selector lever bracket.

Armature Lever Left Stop Screw Adjustment (Figure 42)

With the armature lever held firmly against its left stop and the left end of the uppermost section of the feed punch selector finger in line with the left edge of the feed punch pin, the clearance between the feed punch selector finger and the feed punch should be as follows:

- (A) In units where the feed pawl is mounted separate from the armature lever the clearance should be .025" to .030".
- (B) In units where the feed pawl is mounted directly to the armature lever the clearance should be .020" to .025".

Armature Lever Right Stop Screw Adjustment

In order to check this adjustment, it is necessary to remake it. To adjust, proceed as follows: Place all of the punch selector fingers under the punch pins so that the left end of each selector finger lines up with the left end of the feed punch selector finger. Adjust the armature lever right stop screw so that the punches fail to punch through the tape when the punch

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Note: Before making any adjustments, see "General," page 7.

magnets are energized by closing the punch contacts by hand. Then back off the stop screw until all of the punches just punch through the tape when the punch magnet contacts are operated by hand. All of the punches should also perforate the tape when the selector fingers are positioned as far to the left as possible. Back off the right stop screw farther if necessary. Then back off the stop screw 1/4 turn more for margin. Make certain that there is some clearance between the armature and the magnet core when the armature lever is held firmly against its right stop. Tighten the lock nut.

Selector Finger Retainer Adjustment

- A. The retainer illustrated in Figure 41 should meet the following requirement: There should be some clearance, not over .005" between the retainer and the top of the feed punch selector lever when the armature lever is held in its operated position by the magnet. Also, the selector finger retainer should be equidistant (within .005") from the No. 1 and No. 5 selector fingers when the ends of all the selector fingers are in line. To adjust, loosen the retainer mounting screws and adjust the retainer. Tighten the screws.
- B. The retainer illustrated in Figure 39 should meet the following requirement: Hook an 8 oz. scale under the roller as shown and pull vertically upward. It should require 3 to 3-1/2 ozs. to start the roller moving away from the selector fingers. To adjust, loosen the retaining bearing shaft lock nut and rotate the shaft. Tighten the lock nut.

Tape Guide Spring Adjustment

- A. The edge of the spring should be parallel to the edge of the casting on which it is mounted.
- B. The spring should hold the tape securely against the side of the guide in the die block adjacent to No. 1 punch without buckling the tape.

To adjust for requirement No. 1, position the spring. To check the latter requirement, take up the play of the tape in the die block toward the spring and observe whether the spring returns the tape to the far side when the tape is released. To adjust, bend the spring.

Punch Contact Bracket Adjustment

NOTE: This adjustment applies only to units with anti-chatter mechanisms like those illustrated in Figures 50 and 52.

In units which have an adjustable link connected to the contact operating lever, as shown in Figure 50, the punch contact bracket should be positioned so that its mounting screws are in the center of the elongated holes in the bracket. Remove one mounting screw at a time in order to determine whether the bracket is properly adjusted. To adjust, loosen both mounting screws, position the bracket, and tighten the mounting screws.

In units not provided with an adjustable link, the position of the bracket is determined by depressing the key lever which imparts the least movement to the punch contact operating lever and adjusting the bracket so that there is .015" to .030" clearance between the insulator on the contact operating lever and the right-hand contact spring. (See Figure 47.)

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Note: Before making any adjustments, see "General," page 7.

Punch Contact Adjustments

- A. The punch contacts of units having an anti-chatter lever which follows the punch magnet armature as illustrated in Figure 44 should meet the following requirements:
1. The contact spring stiffener should be approximately parallel to that part of the contact bracket on which it is mounted. Gauge by eye. To adjust, bend the stiffener.
 2. It should require 2 to 3 ozs. to start the left-hand contact spring moving away from its stiffener when an 8 oz. scale is hooked over the spring insulator, alongside of the anti-chatter lever, and pulled at a right angle to the spring (Figure 44.) The right-hand contact spring and the anti-chatter lever should not interfere with the left-hand contact spring when this tension is measured. To adjust, bend the left-hand contact spring.
 3. With the contacts resting against each other, it should require 3 to 4 ozs. to separate the contact points when an 8 oz. scale is hooked over the right-hand contact spring at the contact point and pulled at a right angle to the contact spring (Figure 47.) The contact operating lever and anti-chatter lever should not interfere with the contact springs when this tension is measured. To adjust, bend the right-hand contact spring.
- B. The punch contacts of units having an anti-chatter lever which is driven downward by the magnet armature as illustrated in Figures 50 and 52 should meet the following requirements:
1. With the anti-chatter contact lever resting against its adjusting screw, the armature lever against its left-hand stop, and the right-hand punch contact held away from the left-hand punch contact by the contact operating lever, hook an 8 oz. scale over the left-hand contact spring at the contact point and pull at a right angle to the spring. It should require 2 to 3 ozs. to separate the insulator from the anti-chatter lever (Figures 51 and 52.) To adjust, bend the left-hand contact spring.
 2. With any key lever depressed, hook an 8 oz. scale over the right-hand contact spring at the contact point and pull at a right angle to the spring. It should require 2 to 3 ozs. to separate the contacts on units having anti-chatter contact levers like the one illustrated in Figure 50. On units with anti-chatter contact levers like the one illustrated in Figure 53, the requirement is 3-1/2 to 4 ozs. with the armature in the operated position. To adjust, bend the right-hand contact spring.
 3. Recheck the Punch Contact Bracket Adjustment.

Key Pressure Adjusting Mechanism Adjustment

The contact operating lever return spring adjusting assembly should be free from binds over the entire range of the adjusting screw, and the punch con-

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Note: Before making any adjustments, see "General," page 7.

tact operating lever backstop screw should line up centrally (approximately) with the contact operating lever. To adjust, position the key pressure adjusting mechanism by means of its mounting screws. See Figure 48 for location of parts.

Anti-Chatter Mechanism Adjustments

A. The type illustrated in Figure 44 should meet the following requirements:

1. With the punch contact operating lever in its latched position there should be .002" to .004" clearance between the punch contact points. The anti-chatter lever should not interfere with the left-hand contact spring when this measurement is made. To adjust, position the latch mounting plate.
2. With the punch contact operating lever in its latched position and the anti-chatter lever resting against its backstop screw, there should be some clearance, not over .004", between the insulator on the punch contact operating lever and the right-hand contact spring. (See Figure 45.) To adjust, position the anti-chatter lever backstop screw.
3. With the armature lever held in the operated position by energizing the magnets, and the punch contact operating lever extension under the latching tip of the latch, there should be some clearance, not over .005", between the latch and the extension. (See Figure 46.) To adjust, position the latch operating screw in the armature.
4. With the punch contact operating lever in the unlatched position and the latch resting against the operating lever extension, hook an 8 oz. scale under the tip of the latch and pull upward in line with the spring. It should require 1/2 to 1-1/2 ozs. to lift the latch from the extension.
5. With the armature lever resting firmly against its left-hand stop and the anti-chatter lever in contact with its operating screw in the armature, there should be some clearance, not over .005", between the lever and the insulator on the left-hand contact spring (Figure 44.) To adjust, position the anti-chatter lever operating screw in the armature.
6. With the armature lever resting firmly against its left-hand stop and the anti-chatter lever resting against its operating screw, hook a 32 oz. scale under the anti-chatter lever below the spring hole and pull vertically upward (Figure 44.) It should require 11 to 14 ozs. to just lift the anti-chatter lever from its operating screw.

B. The type illustrated in Figure 49 should meet the following requirements:

1. With the armature lever resting firmly against its left-hand stop and the anti-chatter lever in contact with the adjusting screw in the armature, the edge of the uppermost portion of the anti-chatter contact lever should be approximately horizontal. (See Figure 50.) To adjust, Position the adjusting screw.

NOTE: When adjusted in accordance with the foregoing requirement,

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Note: Before making any adjustments, see "General," page 7.

the following conditions should also prevail:

- (a) With the armature lever resting firmly against its right-hand stop and the anti-chatter lever held against the magnet spool head, there should be at least .005" clearance between the anti-chatter lever and its operating screw (Figure 49.)
 - (b) With the armature lever resting firmly against its left-hand stop, the end of the anti-chatter lever should extend at least 1/32" to the left of the center of its operating screw. If necessary, refine the operating screw adjustment between these limits so that both conditions are met.
2. Unhook the anti-chatter contact lever spring from the bracket and hook an 8 oz. scale in the spring eye. It should require 2 to 3 ozs. to pull the spring to position length (Figure 50.)
- C. The type illustrated in Figure 52 should meet the following requirements:
1. With the armature lever in its unoperated position, the anti-chatter contact lever should be approximately horizontal. To adjust, loosen the adjusting screw lock nut and position the screw. Tighten the lock nut.
 2. With the left punch magnet contact spring held away from the anti-chatter contact lever, apply the push end of an 8 oz. scale vertically to the upper surface of the lever just to the left of the spring hole. It should require a pressure of 1/4 to 1-1/4 ozs. to start the lever moving away from the adjusting screw.

Punch Contact Operating Lever Link Adjustment (Figures 47 and 50)

NOTE: This adjustment applies only to units with an adjustable link, as illustrated in Figures 47 and 50.

Determine the key lever (including the space key lever) which moves the punch magnet contact operating lever the least amount when fully depressed.

With this key lever (or space bar) completely depressed, there should be .015" to .030" clearance between the right-hand contact spring and the insulator on the contact operating lever. To adjust, loosen the two screws which clamp the adjustable link together and shorten or lengthen the link. Tighten the screws.

NOTE: With the foregoing adjustment, the punch contacts will not close until the key levers nearly reach the bottom of their travel. It is permissible to adjust the link so that the punch contacts will close on a shorter key lever stroke provided that all of the punch selector fingers engage their associated punch pins by the full diameter of the pin at the time the punch contacts close. To check this adjustment, position all of the punch selector fingers toward the right and then depress the "Letters" key lever slowly until the punch contacts close. Connect a test lamp across the contacts to determine when they close. To adjust for a shorter key lever stroke, lengthen the punch contact operating lever link.

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Note: Before making any adjustments, see "General," page 7.

Punch Contact Operating Lever Backstop Adjustment

With the unit connected to a source of 110 volts D.C., operate any key lever and then release the pressure on the keytop slowly until the contact points on the two punch operating contact springs are just separated by the contact operating lever as it is pulled toward the right by the contact operating lever return spring. With the key lever held in this position, there should be .010" to .020" clearance between the contact operating lever backstop and the right-hand edge of the contact operating lever.

To adjust units equipped with the backstop screw illustrated in Figure 49, loosen the backstop screw lock nut and position the screw. Tighten the lock nut.

To adjust units equipped with the backstop bracket illustrated in Figure 53, loosen the backstop bracket mounting screws and position the bracket. Tighten the screws.

Disconnect the power supply from the perforator.

Punch Contact Operating Lever Spring Tension

- A. Units with a spring adjusting lever as illustrated in Figure 48 should be adjusted as follows: In making this measurement, the right contact spring should be allowed to bear freely against the fibre on the contact operating lever. Apply the push end of an 8 oz. scale to the right contact spring at the contact point and push in a horizontal direction. It should require 1/2 to 1 oz. to just start the contact operating lever moving away from the backstop screw. To adjust, turn the spring adjusting screw to its highest position. Then position the extension on the adjusting lever by means of the elongated slot in the extension to meet the requirement.
- B. The springs of units not provided with spring adjusting levers should meet the following requirement: Unhook the punch contact operating lever spring from the backstop bracket. Hook an 8 oz. scale in the end of the spring and pull toward the right. It should require a pull of 7 to 8 ozs. to stretch the spring to its installed length when the operating lever is resting against the bracket at the bottom of the guide slot. (See Figure 53.)

Feed Pawl Eccentric Adjustment - See Note (A)

The feed pawl should just engage a tooth on the feed roll, without overtravel, when the armature lever is raised slowly by hand until the feed punch selector finger just touches the feed punch. To adjust, loosen the feed pawl eccentric bushing mounting screw, and position the bushing. Tighten the bushing mounting screw. See Figure 41 for location of parts.

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- (A) In order to facilitate adjustment of units having the counter mounted on the left-hand side of the keyboard, remove the counter unit from its bracket by loosening its two mounting screws and sliding the unit from its mounting slots.

Note: Before making any adjustments, see "General," page 7.

Feed Pawl Spring Tension (Figure 41)

With the armature lever resting against its left stop, it should require 3 to 4 lbs. to extend the spring to its installed length. To measure, unhook the spring from its spring post, hook a 12 lb. scale in the spring eye, and pull downward.

Feed Pawl Throwout Bracket Adjustment (Figure 41)

NOTE: This adjustment applies only to units in which the feed pawl is mounted separately from the armature lever as illustrated in Figure 41.

With the armature lever resting against its left-hand stop, there should be .005" to .015" clearance between the tip of the tooth on the feed pawl and the tips of the teeth on the feed roll throughout a complete revolution of the feed roll. To adjust, loosen the bracket mounting screw and the adjusting screw lock nut and set them both friction tight. Then, with the adjusting screw in contact with the punch block, advance or withdraw the screw until the desired clearance is obtained. Tighten the lock nut and the mounting screw.

Feed Pawl Guide Adjustment (Figure 43)

NOTE: This adjustment applies only to units in which the feed pawl is mounted separately from the armature lever as illustrated in Figure 41.

When the armature lever is held in its operated position by energizing the punch magnet, and the feed roll is rotated, there should be some clearance, not more than .005", between the feed pawl and the closest feed roll tooth. To adjust, position the feed pawl guide.

Punch Magnet Adjustment

With the punch magnet energized and the armature lever resting against its right-hand stop, there should be .004" to .008" clearance between the magnet cores and the armature.

NOTE: In order to change this adjustment on units with counters mounted on the right-hand side, it will be necessary to remove the chad chute cover plate or punch contact filter unit (if the unit is so equipped). On units with counters mounted on the left-hand side, it will also be necessary to remove the counter unit and counter mounting bracket. Replace the parts after making the adjustment.

To adjust, loosen the two eccentric stop mounting screws and rotate the eccentrics away from the core. Loosen the magnet core mounting screws and position the core. Tighten the mounting screws. Rotate the eccentrics so they make contact with the core and tighten the screws which mount the eccentrics.

REPLACE THE TAPE STRIPPER PLATE AND TAPE KNIFE IF THESE PARTS WERE PREVIOUSLY REMOVED (FIGURE 3).

Tape Stripper Plate Adjustment

There should be some clearance, not over .010", between the tape stripper plate and the feed roll throughout a complete revolution of the feed roll. To adjust, loosen the mounting screws and position the plate. Tighten the mounting screws.

* * *

Note: Before making any adjustments, see "General," page 7.

Tape Knife Adjustment

The tape knife should be approximately horizontal and there should be at least .015" clearance between the tape knife and the tape stripper at their closest point. To adjust, loosen the tape knife mounting screws and position the knife. Tighten the mounting screws.

Feed Roll Detent Final Adjustment - See Note (A)

The perforations in the tape should conform to the standard spacing of 10 holes to the inch. Check the tape against the tape gauge (#2215). To adjust, loosen the detent lever eccentric bushing mounting screw and position the bushing using the lower semi-circle of its adjusting range. Tighten the mounting screw.

NOTE: If it is found necessary to refine this adjustment, recheck the Feed Pawl Eccentric Adjustment, and the Feed Pawl Throwout Bracket Adjustment.

Counter Control Contact Operating Mechanism Adjustments (Figures 55 and 56)

NOTE: These adjustments apply only to units with counter control contacts mounted on the forward part of the keyboard casting as illustrated in Figure 13.

- A. With the "figures" key lever and any two other key levers depressed until they are stopped by the code selector bars, the relation between the key levers and the cam levers on the contact operating mechanism should be such that the cam levers are just completely displaced. To check this adjustment, depress the "figures" and any two other key levers until they are stopped by the code selector bars. Then, observing the counter control contact operating fibre extension, there should be very little or no further displacement as the "figures" key lever is depressed to its full depth of stroke. In a similar manner repeat this check, using the "carriage return" key lever. It is important that the full displacement of the cam lever is not reached until the function key lever just reaches its neutral position. Adjust by means of shims located between the contact operating mechanism and the two rear mounting ears of the condenser cover.
- B. When the cam levers are held away from the key levers against their backstops, there should be approximately equal clearance between the "carriage return" and "line feed" key levers and the tips of their respective cam levers. To adjust, position the counter control contact operating mechanism laterally by means of the elongated holes in the mounting ears.

* * *

- (A) In order to facilitate adjustment of units having the counter mounted on the left-hand side of the keyboard, remove the counter unit from its bracket by loosening its two mounting screws and sliding the unit from its mounting slots.

Note: Before making any adjustments, see "General," page 7.

Counter Control Contact Assembly Adjustments

- A. Units with the counter control contact assembly mounted on the keyboard casting as illustrated in Figure 13 should be adjusted as follows:

NOTE: Remove the contact cover by loosening its mounting nuts. The contact springs are numbered from left to right, with contact spring No. 3 nearest to the resistor. In measuring the spring tensions specified, apply an 8 oz. scale to the contact spring at the contact point and pull (or push) at right angles to the spring without power on the perforator circuit: (See Figure 57 for location of parts.)

1. Contact springs No. 1 and No. 2 should be approximately at right angles to the insulator pile-up in the assembly, and each contact point should have a follow of .005" to .010" when the other spring is moved away from it. Adjust by bending the stiffeners for contact springs No. 1 and No. 2.
2. It should require a force of 1 to 1-1/2 ozs. to just separate the contact points on contact springs No. 1 and No. 2. To adjust, bend contact spring No. 1 or No. 2 and recheck requirement No. 1.
3. The contact operating fibre extensions of the counter control contact mechanism should move freely in their guide slots, and there should be not more than .005" clearance between the contact spring No. 2 and the right edge of the fibre tip, when the rear contact operating fibre extension is held to the right against the backstop. To adjust, position the counter control contact assembly by means of the elongated mounting holes in the bracket.
4. Contact spring No. 3 should be held by its backstop so that when the "carriage return" key lever is depressed slowly, contact spring No. 3 will be moved .005" to .010" by the action of the contact point on contact spring No. 2. To adjust, bend the stiffener for contact spring No. 3.
5. With the "carriage return" key lever fully depressed, it should require a force of 3/4 to 1 oz., applied to contact spring No. 3, to just separate the contact points on contact springs No. 2 and No. 3. To adjust, bend the contact spring No. 3 and recheck requirement No. 4.
6. With the contact operating fibre extensions on the counter contact operating mechanism not touching contact springs No. 1 and No. 2, there should be at least .015" clearance between the contact points on contact springs No. 2 and No. 3. If this clearance does not exist, refine the preceding adjustments to obtain proper clearance.
7. When the "carriage return" key lever is depressed, contact spring No. 2 should move toward the right and should break contact with the contact point on contact spring No. 1 before it makes contact with the contact point on contact spring No. 3. If adjustment is necessary refine the preceding adjustments to meet the break before make requirement.

* * *

Note: Before making any adjustments, see "General," page 7.

8. Replace the contact cover. Hold the mounting screws with a screwdriver when tightening the nuts to avoid loosening the contact pile-up mounting screws.

B. Units with the counter control contact assembly mounted on the perforator casting as illustrated in Figure 12 should be adjusted as follows:

NOTE: The three counter control contact springs are numbered from left to right. In measuring spring tensions, apply an 8 oz. scale to the contact spring at the contact point and pull (or push) at a right angle to the spring. The adjustments immediately following should be made with power disconnected from the unit. (See Figure 54 for location of parts.)

1. Springs No. 1 and No. 2 should make contact but should have not more than .005" follow gauged by eye. To adjust, bend the stiffeners for springs No. 1 and No. 2.
2. It should require a force of 1-1/2 to 2-1/2 ozs. to separate contacts on springs No. 1 and No. 2 when applied to either spring at the contact point. To adjust, bend springs No. 1 and No. 2.
3. There should be some clearance, not over .010", between the engaging surfaces of the insulator on the contact operating lever and the ends of contact springs No. 1 and No. 2. To adjust, bend the tips of contact springs No. 1 and No. 2.
4. There should be a clearance of .010" to .020" between the contact points on springs No. 2 and No. 3. To adjust, bend the stiffener for contact spring No. 3.
5. Spring No. 3 should rest against its stiffener with a pressure of 1 to 2 ozs. To adjust, bend spring No. 3. Recheck requirement No. 4.
6. When the "Carriage Return" and "Figures" key levers are fully depressed alternately, the counter control contact operating lever should move contact springs No. 1 and No. 2 equal distances to left and right respectively. Equal movement (in the same direction) of contact springs No. 1 and No. 2 should also be obtained when the "Letters" and "Line Feed" key levers are alternately depressed. To adjust, loosen the screws which mount the counter control contact assembly bracket and position the bracket. Tighten the screws.
7. With power connected to the perforator, depress the "Carriage Return" key lever slowly. The contacts on springs No. 1 and No. 2 must open before contacts on springs No. 2 and No. 3 close, and contacts No. 2 and No. 3 must close before the punch contacts close. Gauge by eye. If necessary, modify the preceding adjustments to obtain the desired sequence.
8. Completely depress the "Carriage Return" key lever and release it slowly. As the key lever is being released, contacts No. 2 and No. 3 should remain closed until the punch magnet contacts open. Gauge by eye. If necessary, modify the preceding adjustments to obtain the desired sequence.

* * *

Note: Before making any adjustments, see "General," page 7.

9. As the "Figures" key lever is slowly depressed, contact No. 1 should be separated from contact No. 2 before the punch magnet contacts close. As the key lever is slowly released, contacts No. 1 and No. 2 must not make contact until the punch magnet contacts open. These contacts should make and break in the same sequence when the "Letters" and "Line Feed" key levers are operated. If necessary, modify the preceding adjustments to obtain the desired sequence.

COUNTER ADJUSTMENTS

REMOVE THE COUNTER UNIT FROM ITS MOUNTING BRACKET

When the counter is mounted in front of the perforator it may be removed by loosening the two screws just below the counter unit and sliding the counter unit from its mounting bracket. If the counter is mounted at the right-hand side of the keyboard, remove the counter cover by removing the two cover mounting screws from the under side of the mounting plate. Place the counter unit face down to one side of the keyboard without disconnecting the wires.

Feed Pawl Bracket Adjustment

With the counting magnet armature play taken up in an outward direction, the outer edge of the pawl should not extend more than .035" outside the outer surface of the ratchet. With the play taken up in the opposite direction, the outer surface of the pawl should not be more than .015" within the outer surface of the ratchet. To adjust, remove the armature assembly from the unit. Set the screws which hold the bracket to the armature so that the bracket is friction tight, and replace the armature assembly on the unit. Adjust the bracket for the correct position of the pawl, remove the armature assembly, and tighten the bracket mounting screw. Replace the armature assembly. See Figure 58 for location of parts.

Ratchet Return Spring Adjustment (Figure 58)

The ratchet should be free throughout a complete revolution in a counterclockwise direction. To adjust, proceed as follows: Remove the dashpot. When removing the dashpot, care should be taken to permit the ratchet spring to unwind slowly so as to avoid breaking the spring. Wind up the ratchet spring by turning the ratchet in a counterclockwise direction until the spring is tight. Then return the ratchet in a clockwise direction not less than one, nor more than two complete revolutions. Position the ratchet so that the stop lug is in the approximate location of 45° in the lower left-hand quadrant as the ratchet is viewed from the rear. Engage the latch pawl to hold the ratchet in place. Replace the dashpot and position it so that the stop lug is in full engagement with the plunger throughout the stroke of the plunger.

Ratchet Spring Tension (Figure 58)

Operate the release magnet armature and hold the dashpot plunger depressed. Hook an 8 oz. scale over the spoke of the ratchet that carries the stop lug at the point on the spoke nearest the periphery of the ratchet and pull in a counterclockwise direction at a right angle to the radius. It should require 1-1/2 to 3 ozs. to move the stop lug away from the end of the plunger.

* * *

Note: Before making any adjustments, see "General," page 7.

Release Magnet Armature Eccentric Stop Adjustment (Figure 59)

With the feed pawl in full engagement with the teeth on the ratchet, there should be .010" to .020" clearance between the release lever extension and the feed pawl when the release magnet armature is against its stop. To adjust, loosen the eccentric stop mounting screw and position the eccentric. Tighten the mounting screw.

Check Latch Pawl Bracket Adjustment (Figure 60)

With the counting magnet armature against the magnet cores, the teeth on the feed pawl should overtravel the ratchet teeth .008" to .020". To adjust, loosen the check latch pawl bracket mounting screws and position the bracket. Tighten the mounting screws.

NOTE: When making this adjustment, back off the release lever extension adjusting screw and hold the check latch pawl in full engagement with a tooth on the ratchet.

Release Lever Extension Adjusting Screw Adjustment (Figure 58)

Hold the ratchet so that the teeth on the check latch pawl are not opposite the place on the ratchet where the teeth are missing. There should be .015" to .025" clearance between the check latch pawl and the ratchet. To adjust, loosen the release lever extension adjustment screw lock nut and position the screw. Tighten the lock nut.

Counting Magnet Armature Eccentric Stop Adjustment (Figure 61)

When the counting magnet armature is operated, its feed pawl should rotate the ratchet one tooth and the check latch pawl should be in full engagement with a tooth on the ratchet, with slight overtravel not over .010", when the counting magnet armature is against its eccentric stop. Check this overtravel throughout a complete revolution of the ratchet. To adjust, loosen the eccentric stop mounting screw and position the eccentric. Tighten the mounting screw.

Release Latch Bracket Adjustment (Figure 62)

With the release magnet armature against the magnet cores, the release lever extension should overtravel the notch in the release latch by .004" to .015". To adjust, loosen the release latch bracket mounting screws and position the bracket. Tighten the screws.

Check Latch Pawl Spring Tension (Figure 58)

With the release magnet armature against the magnet cores, hook an 8 oz. scale in the spring hole of the check latch pawl and pull in line with the spring. It should require 1-1/2 to 2-1/2 ounces to start the pawl moving.

Release Latch Spring Tension (Figure 60)

With the release latch in its unlatched position, hook an 8 oz. scale in the notch in the release latch and pull in a direction so that the scale wire passes over the spring post. It should require 3/4 to 1-3/4 ozs. to start the latch moving.

* * *

Note: Before making any adjustments, see "General," page 7.

Dashpot Position Adjustment (Figure 61)

With the plunger completely depressed into the dashpot cylinder, the stop on the ratchet resting firmly against the end of the plunger shaft, and the check latch pawl in engagement with the ratchet, there should be some clearance, not over .004", between the engaging faces of the first tooth on the ratchet and the first (outer) tooth on the check pawl. Under the foregoing conditions the indicator should point to zero on the scale. Also, the point of contact of the plunger against the ratchet stop lug should be at least .040" from the edge of the stop lug throughout the stroke of the plunger. To adjust the dashpot, loosen the dashpot mounting screws and position the dashpot. Tighten the mounting screws. Then loosen the indicator set screws and position the indicator. Locate it so that the outer edge of the hub is flush with the end of the shaft before tightening the set screws.

Feed Pawl Spring Tension (Figure 58)

Hold the release magnet armature against the magnet cores, hook an 8 oz. scale over the feed pawl bearing screw, and pull as nearly parallel as possible to the feed pawl. It should require 5 to 7 ozs. to start the pawl moving.

Contact Bracket Adjustment (Figure 63)

With the contact lever on the low part of the contact cam, there should be some clearance, not over .015", between the contact lever and the insulator. To adjust, loosen the contact bracket mounting screws and position the bracket. Tighten the screws.

Contact Spring Adjustment (Figure 63)

With the contact operating lever on the low part of its cam, there should be .010" to .015" clearance between the contact points. To adjust, bend the short contact spring stiffener. The contact spring should make contact with the stiffener throughout its length.

Signal Lamp Contact Pressure (Figure 64)

With the contact lever on the high part of the cam, hook an 8 oz. scale over the short contact spring between the contact and the stiffener and pull at a right angle to the spring. It should require 2 to 3 ozs. to separate the contacts. To adjust, bend the short contact spring.

Contact Cam Adjustment

Operate the release magnet armature and then operate the counting magnet armature sixty-four times. The contacts should close on the sixty-fifth operation. To adjust, loosen the contact cam set screw and position the cam, simultaneously locating it so that the ratchet shaft has some end play, not over .004". Tighten the set screw.

* * *

Note: Before making any adjustments, see "General," page 7.

CONNECT THE UNIT TO 110 VOLT D.C. POWER SUPPLY AND PLACE THE KEYBOARD CONTROL OPERATING LEVER IN THE LOWER (TAPE) POSITION.

Dashpot Air Vent Screw Adjustment

When the ratchet is spaced to its farthest travel and released, it should return to its "zero" position without bouncing, and when it is returned from the eighth space, it should return quickly enough to prevent feeding of more than one tooth when a character key lever is depressed immediately after the ratchet has been released. To adjust, loosen the dashpot vent screw lock nut and position the vent screw. Tighten the lock nut.

* * *

Note: Before making any adjustments, see "General," page 7.

LUBRICATION

Proper attention to lubrication is of the utmost importance. Use the lubricants listed in the supplement furnished with this bulletin. Unless otherwise specified, one or two drops of oil at each of the places listed will be sufficient. Use oil unless the use of grease is specified.

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

Locations on the bottom side of the perforator transmitter

1. Key levers - key lever shaft and rear comb slots.
2. Selector bar guide slots.
3. "Y" levers - bearing slots and arms.
4. "Y" lever connecting links - connections with extensions and "Y" levers.
5. Selector levers and contact operating levers - bearing shaft.
6. Universal bar bearings.
7. Locking levers - at point of engagement with "Y" lever links.
8. Counter control cam levers - at pivot points and at points of engagement with key levers.

Locations on the top side of the perforator transmitter

1. Key lever front comb slots.
2. Space bar loop - bearings and at point of engagement with its key lever.
3. Transmitting shaft - fill two oil cups (grease on the gear).
4. Transmitting cam sleeve - a light film of grease on all cams.
5. Transmitting clutch - on sliding members, between teeth, and on cam surface.
6. Locking loop - bearings and roller.
7. Contact levers - bearing shaft and guide slots.
8. Locking levers - bearing slots and at points of engagement with the contact levers.
9. Clutch throwout lever bearings.
10. Intermediate pawl - pivot and lower extension.
11. Trip off pawl - joint and camming surface.
12. Keyboard control operating lever - pivot and detent.
13. Keyboard control operating lever extension - at point of engagement with repeat space rod or cutout.
14. Repeat space rod - at point of engagement with space bar loop extension and at the bracket.
15. "Y" lever connecting link extensions - left end connections.
16. Selector fingers - at selector lever connections, guide slots, and at points of engagement with punches and armature lever.
17. Armature lever - oil holes, two.
18. Selector finger retaining fork - bearings and roller.
19. Anti-chatter contact lever - pivot and point of engagement with the adjusting screw.
20. Anti-chatter lever latch (if unit is so provided) - at bearing and at point of engagement with latch screw and punch contact operating lever.
21. Punch contact operating lever back stop bracket slot (in units with slotted backstop bracket).
22. Punch block - rear oil hole, punches, guide pins.

23. Feed roll - bearings, ratchet teeth, star wheel.
24. Tape tension lever bearings.
25. Back space lever - shoulder screw bearings and point of engagement with release cam (in units equipped with a feed pawl release cam).
26. Back space pawl bearing screw.
27. Feed pawl release cam - bearing, cam surface (in units with a feed pawl release cam).
28. Feed roll detent - roller and pivot.
29. Feed pawl bearing.

Locations on the Counter Unit

NOTE: Care should be exercised to prevent oil from getting between the pole faces of the magnets and the armatures.

1. Counter and release magnet armature bearings.
2. Feed pawl bearing screw.
3. Check latch pawl - bearing screw and at point of engagement with the adjusting screw.
4. Latch pawl - bearing screw and on latching surface.
5. Ratchet wheel - on teeth, outer bearings, and in drum.
6. Contact lever bearing and cam.
7. Dashpot plunger.



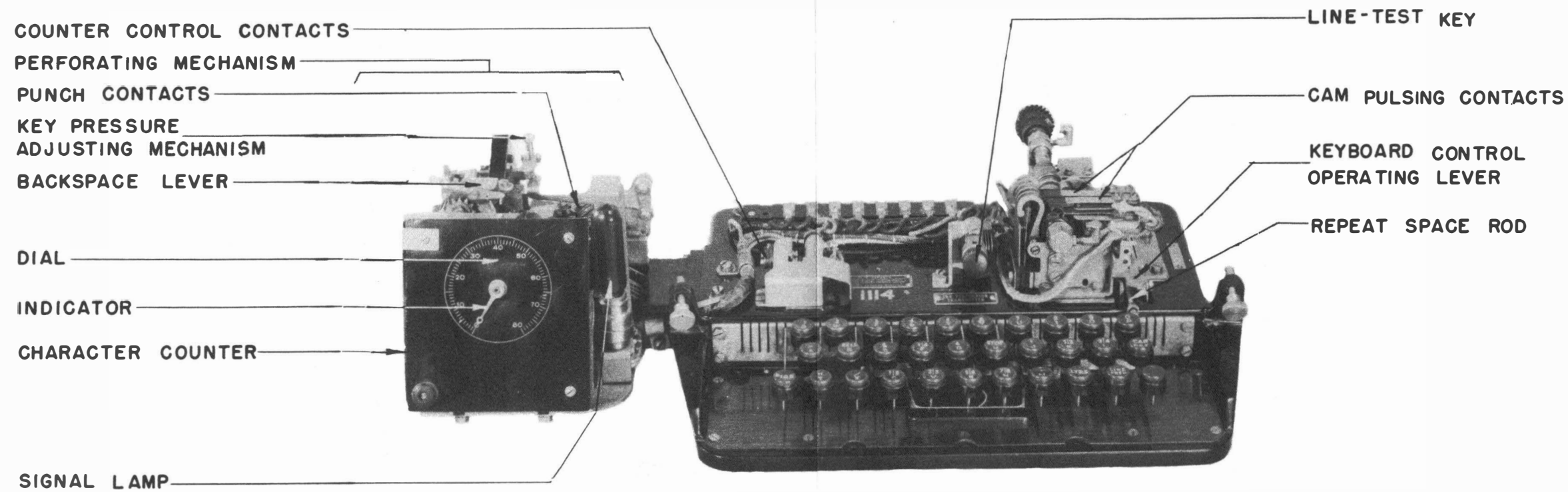


FIGURE 1

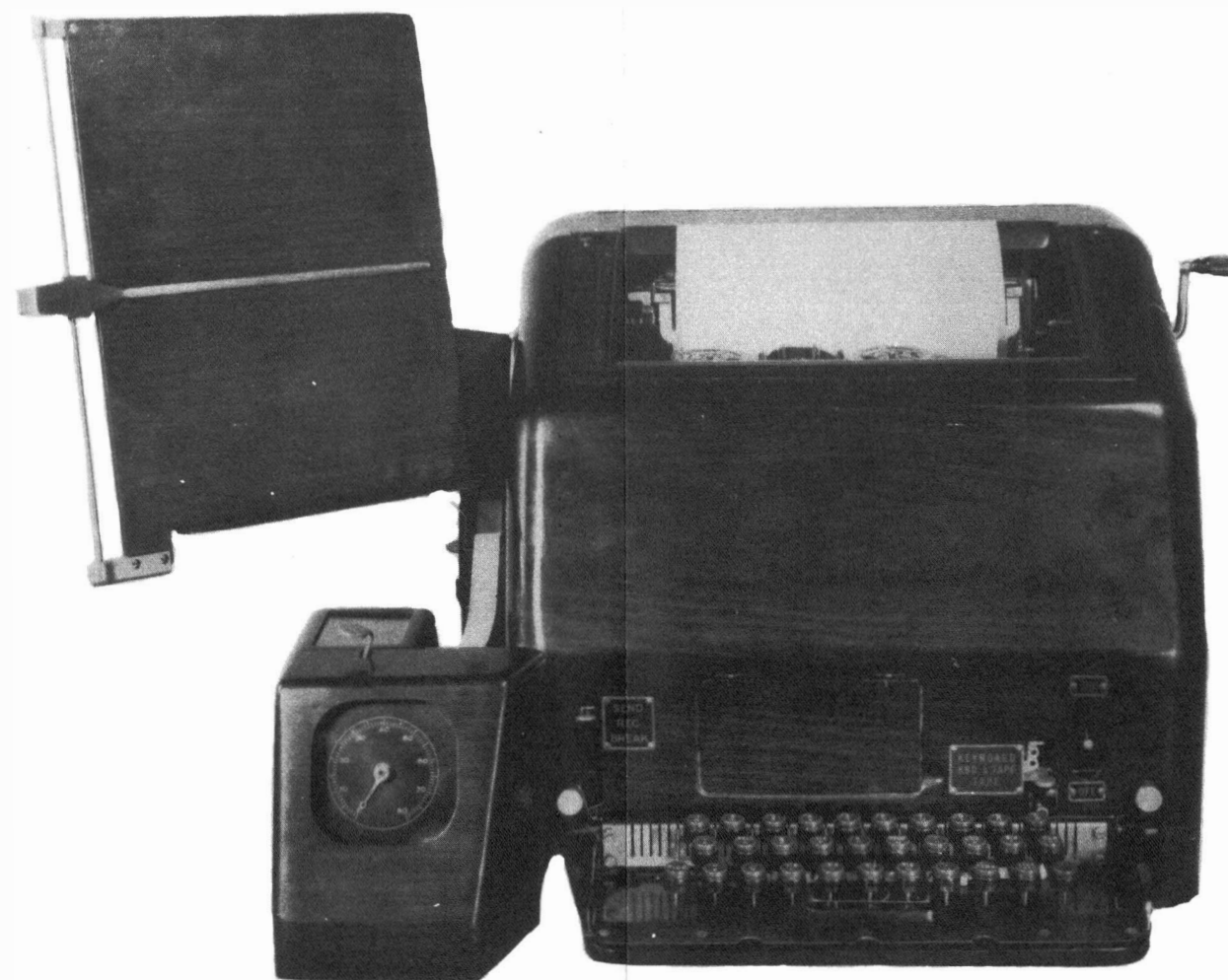


FIGURE 2

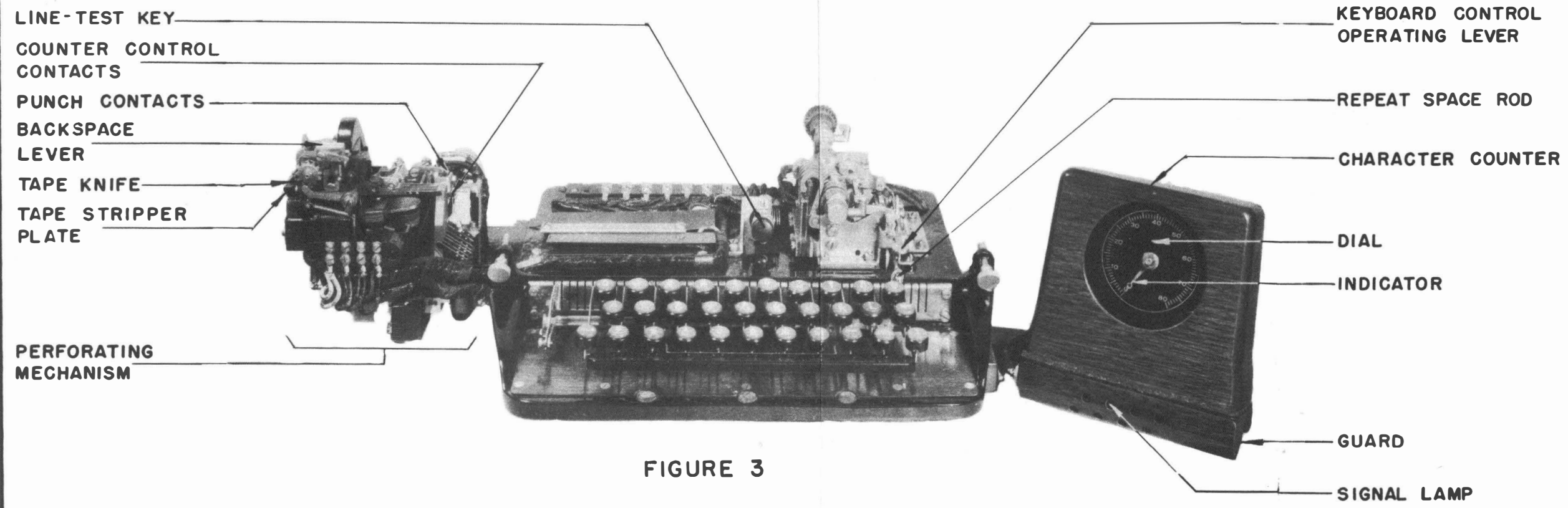


FIGURE 3

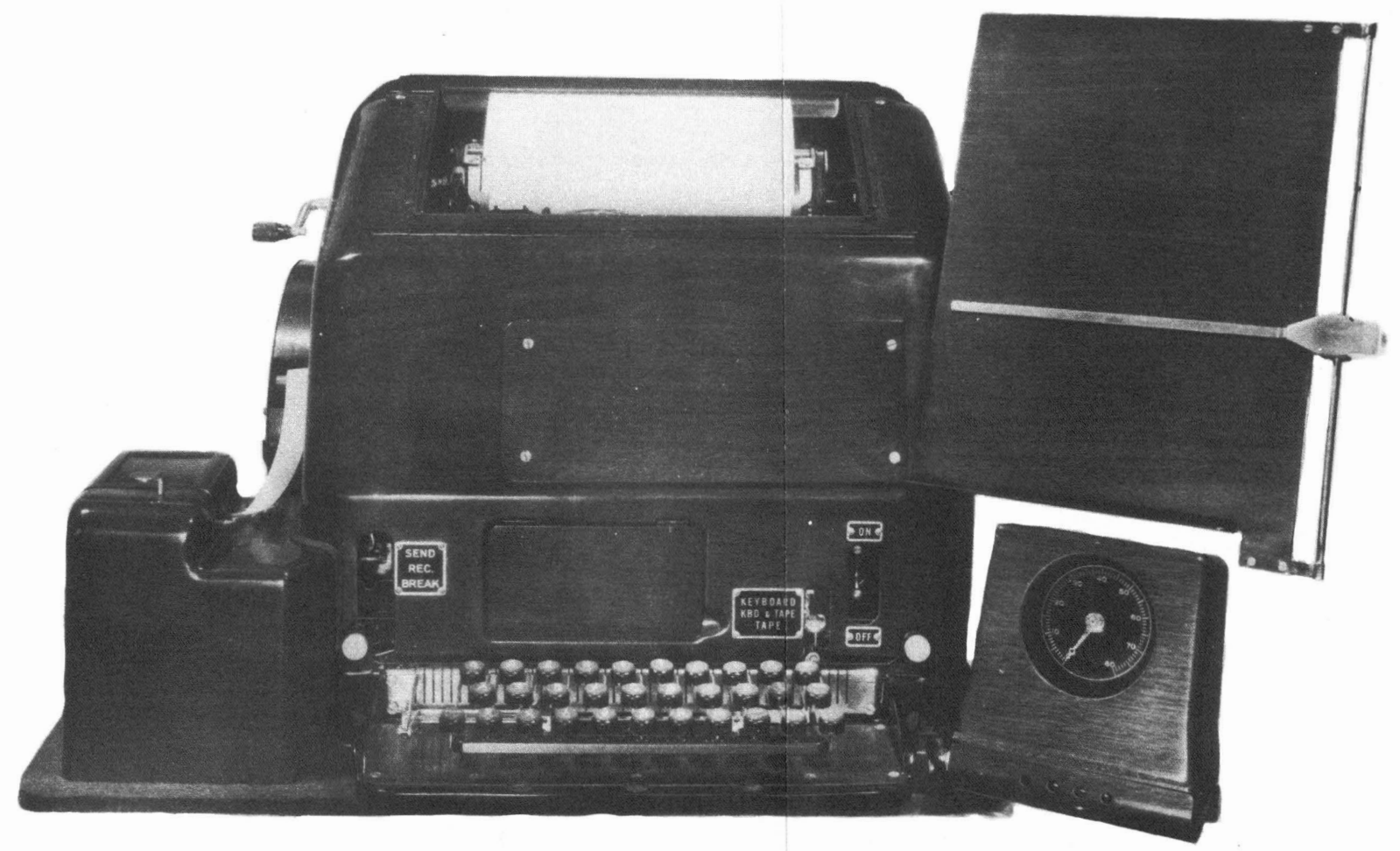


FIGURE 4

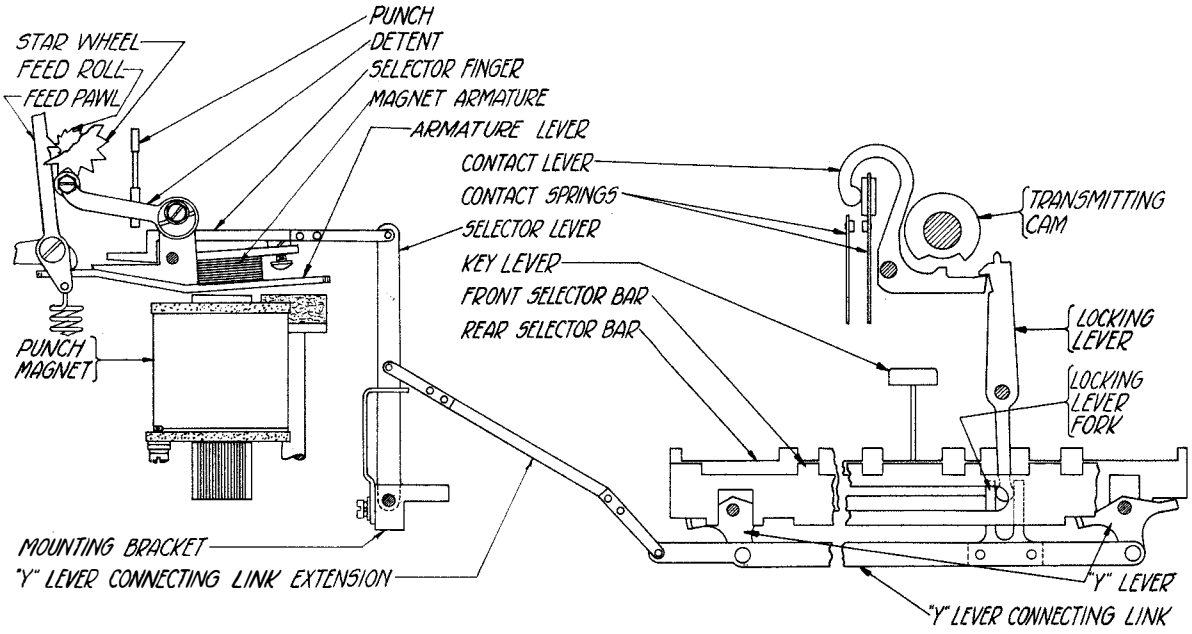


FIGURE 5

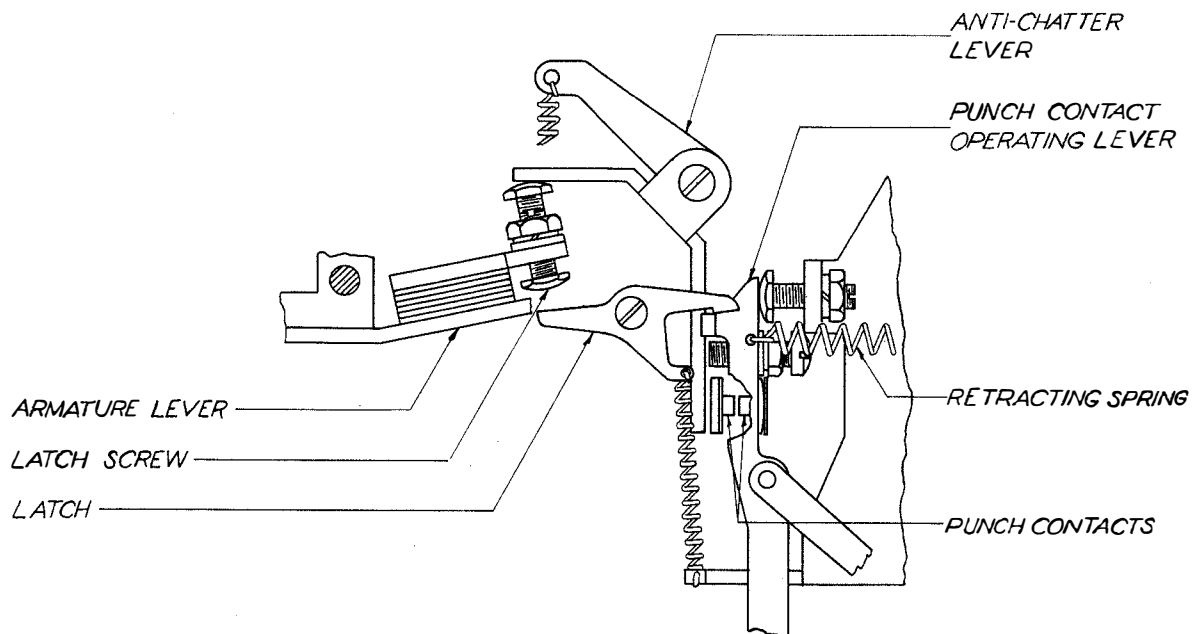


FIGURE 7

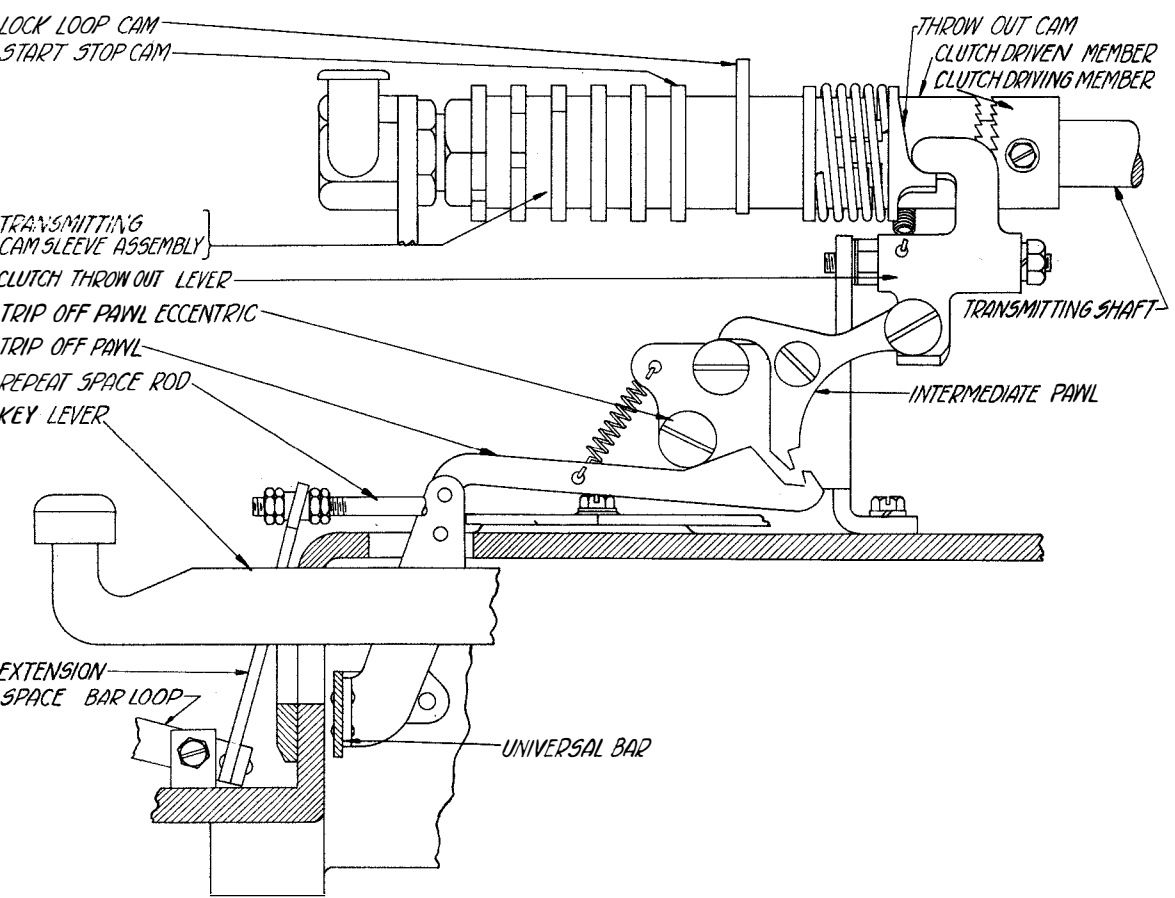


FIGURE 6

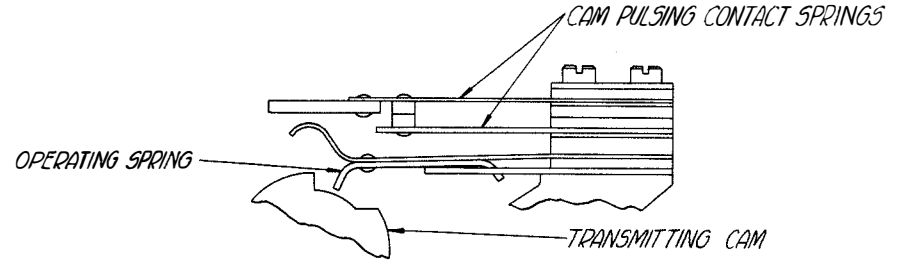


FIGURE 8

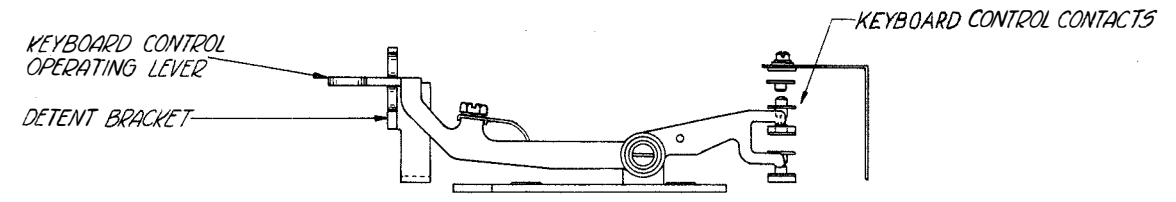


FIGURE 9

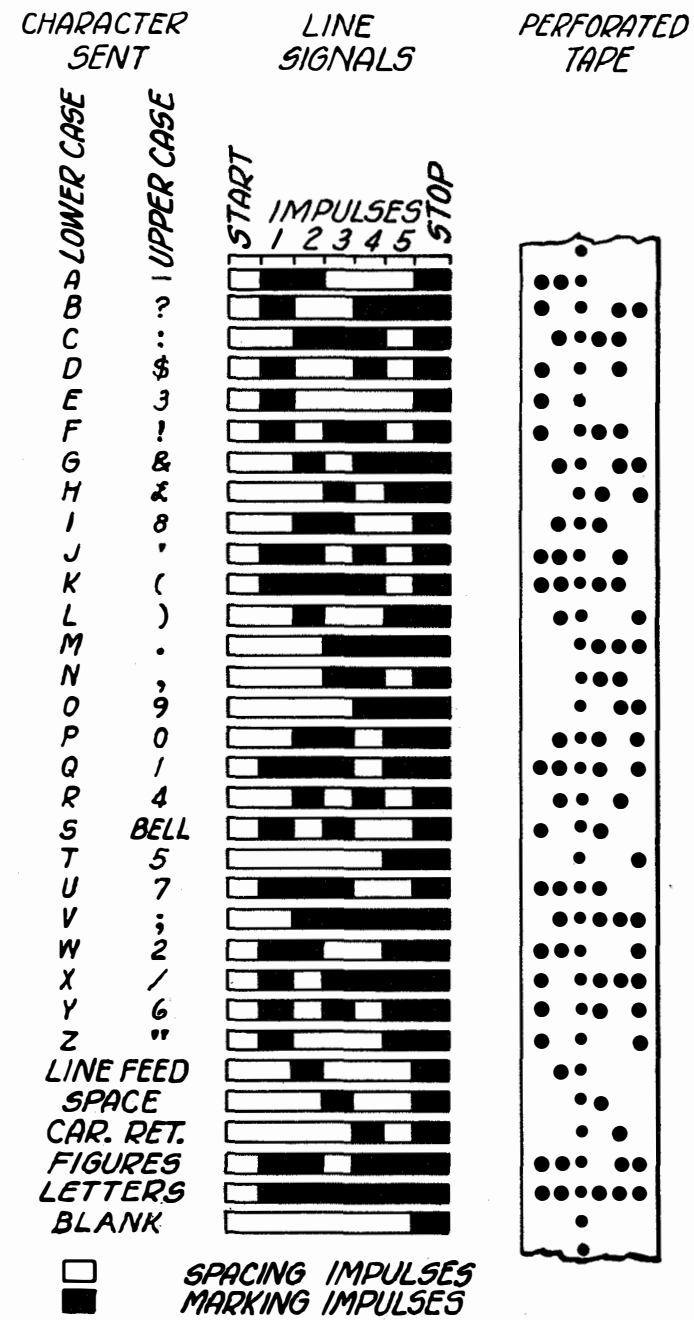


FIGURE 10

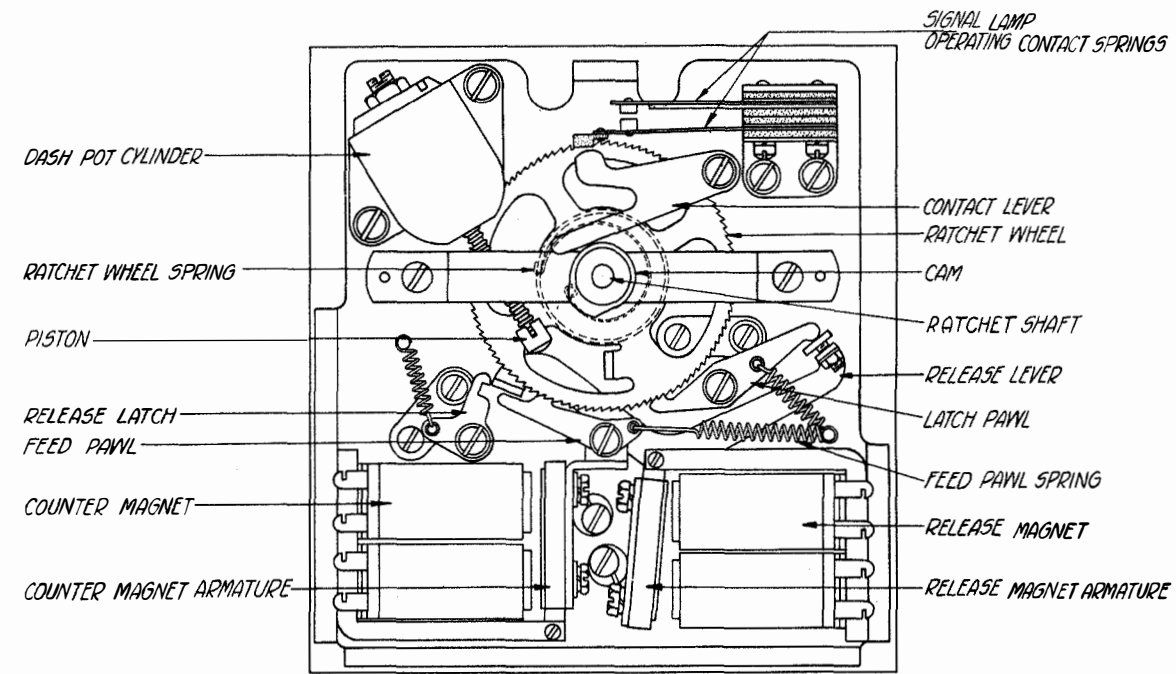


FIGURE 11

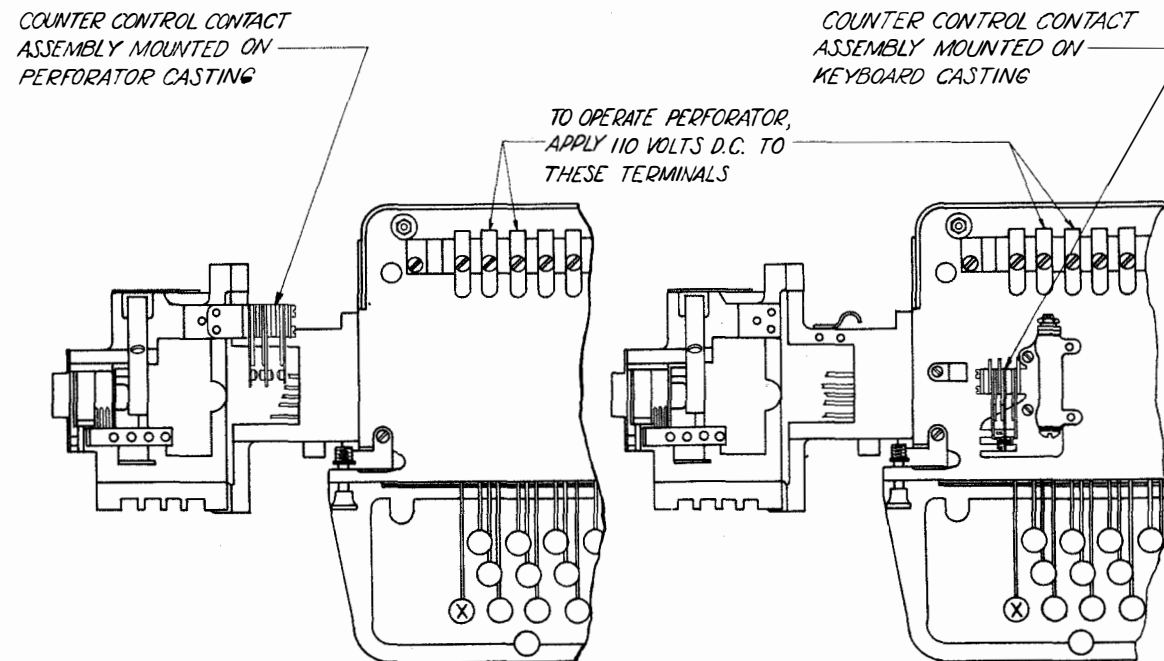


FIGURE 12

FIGURE 13

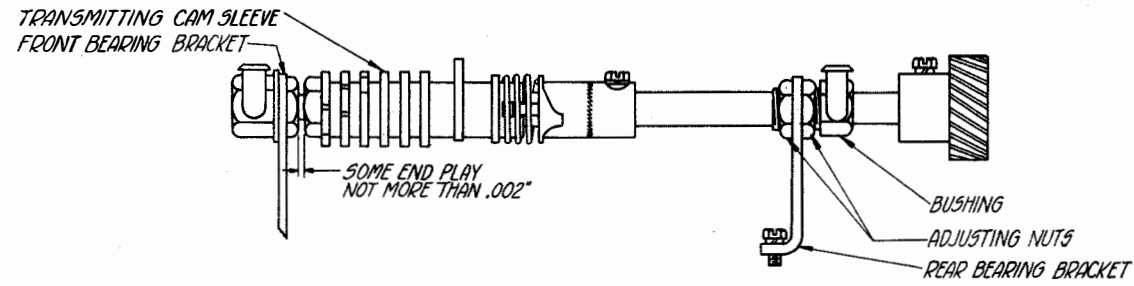


FIGURE 14

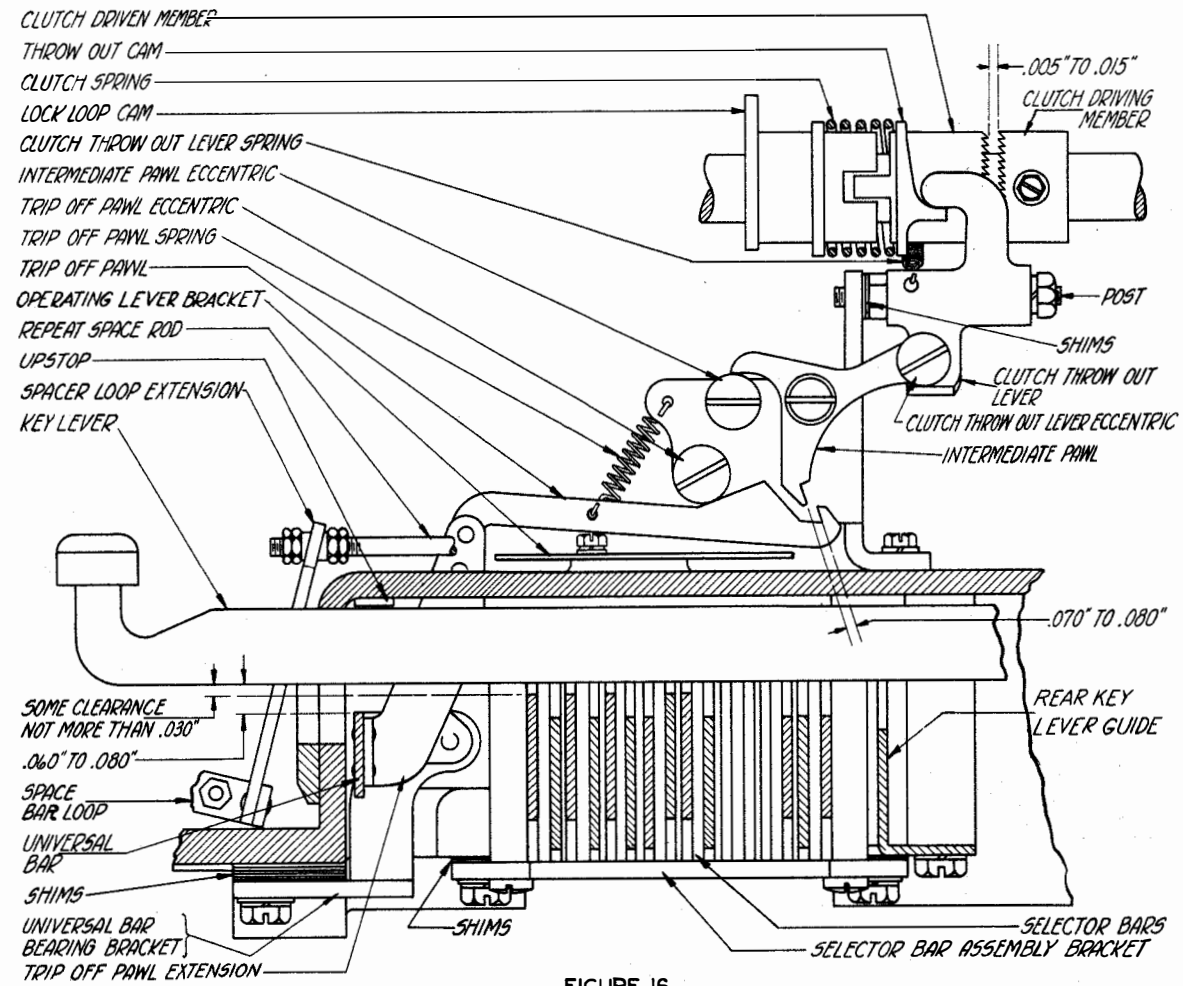


FIGURE 16

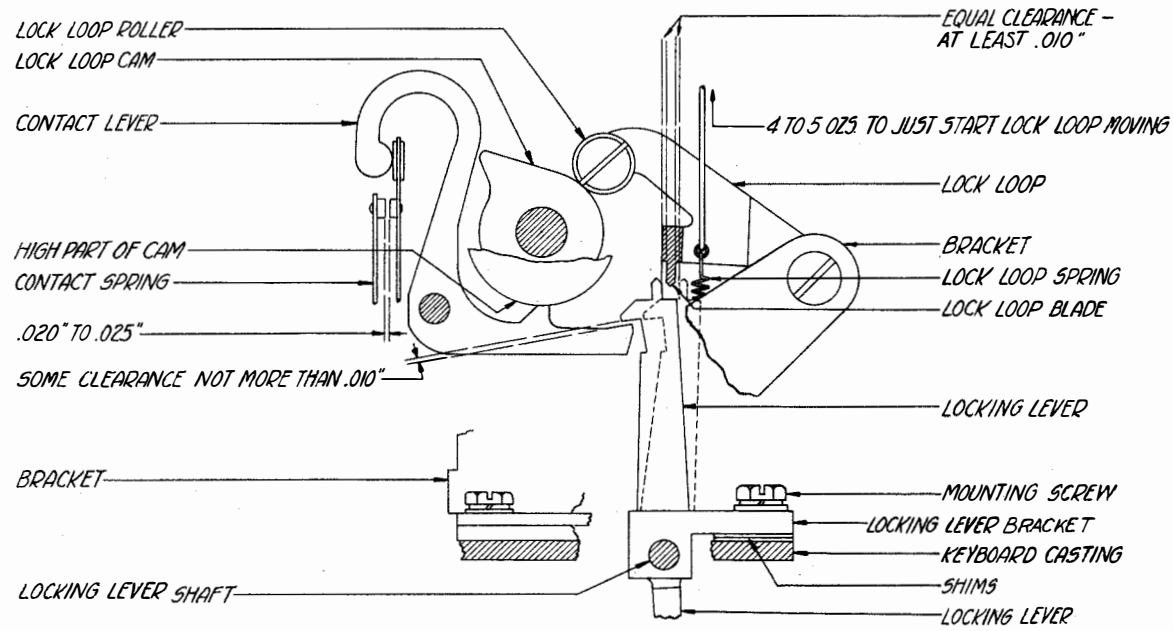


FIGURE 15

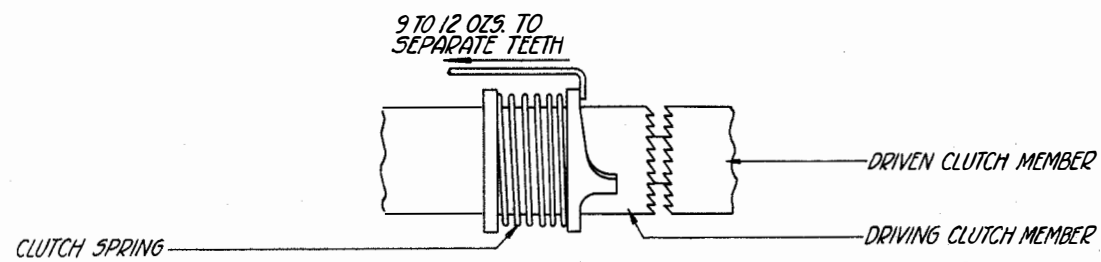


FIGURE 17

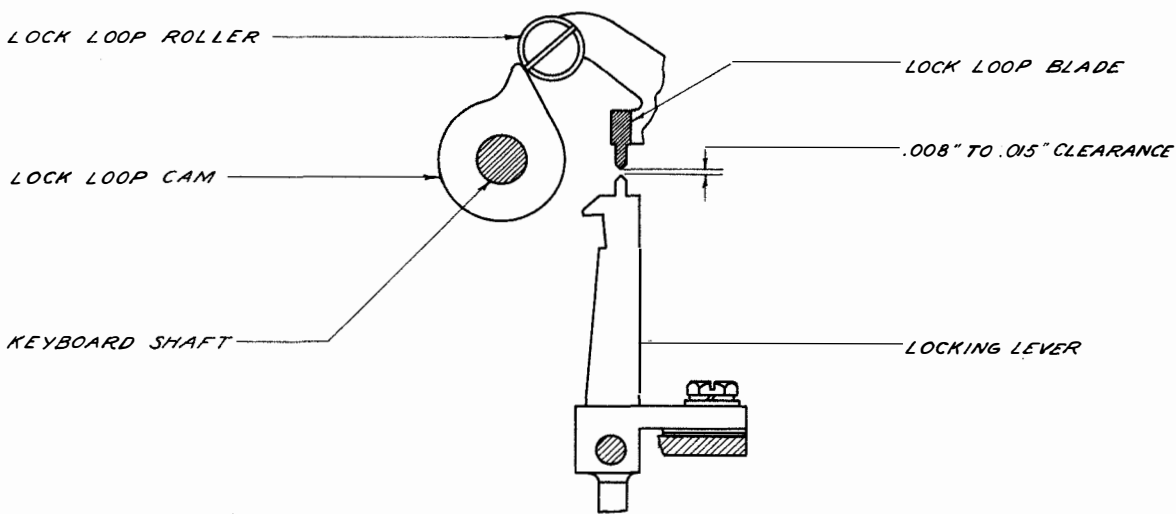


FIGURE 18

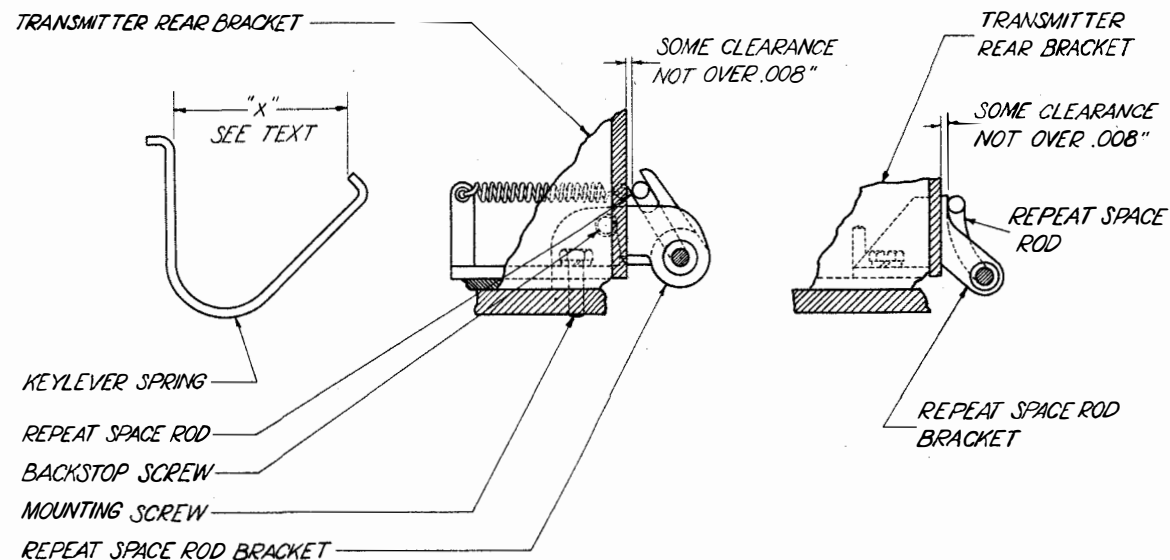


FIGURE 23

FIGURE 24

FIGURE 25

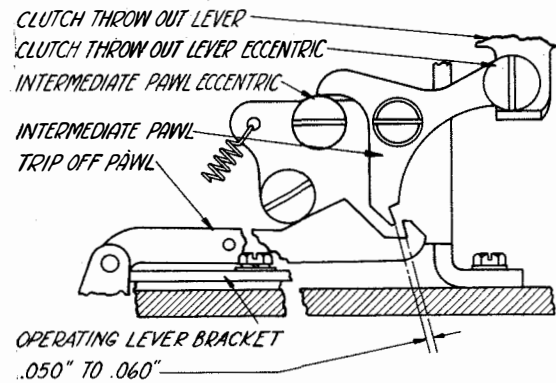


FIGURE 19

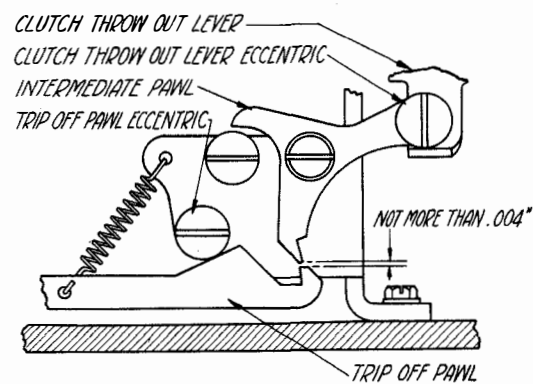


FIGURE 20

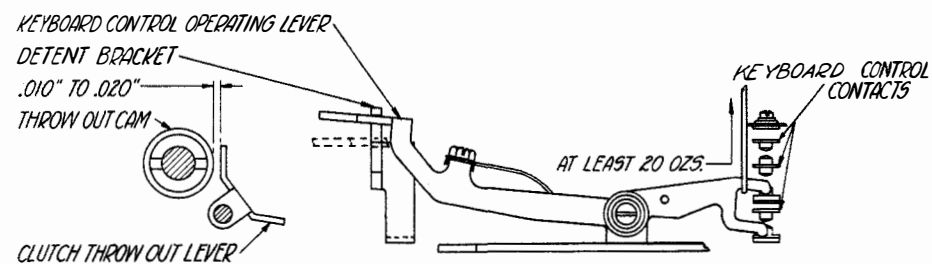


FIGURE 26

FIGURE 27

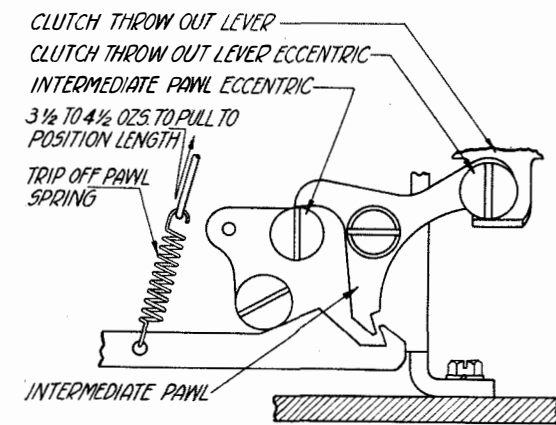


FIGURE 21

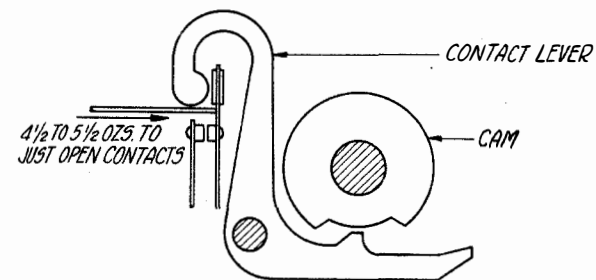


FIGURE 22

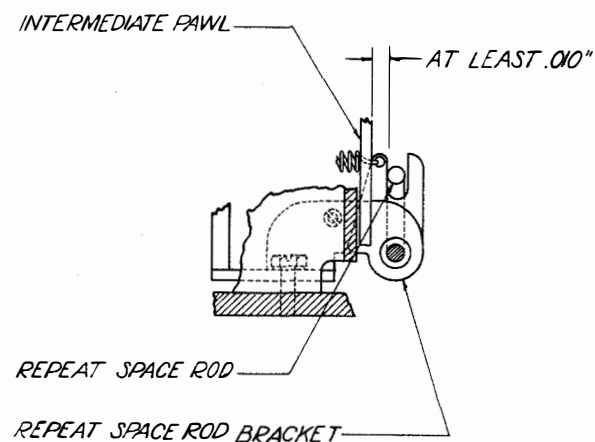


FIGURE 28

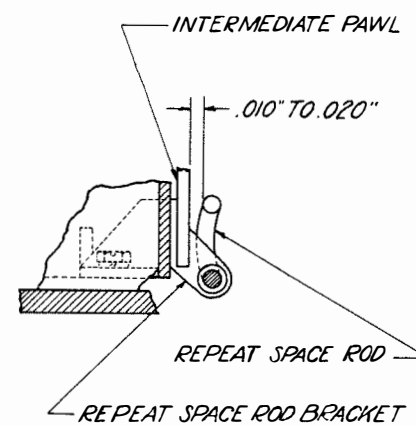


FIGURE 29

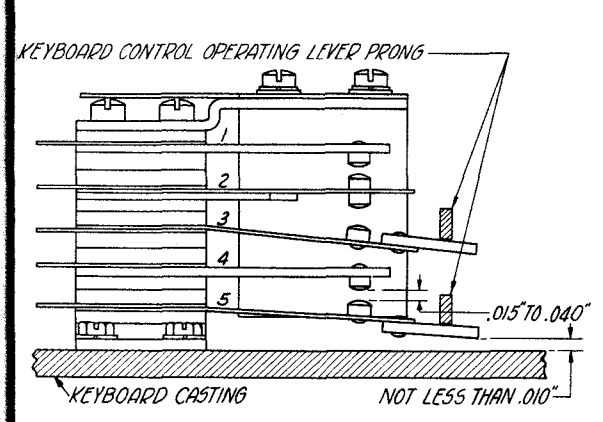


FIGURE 30

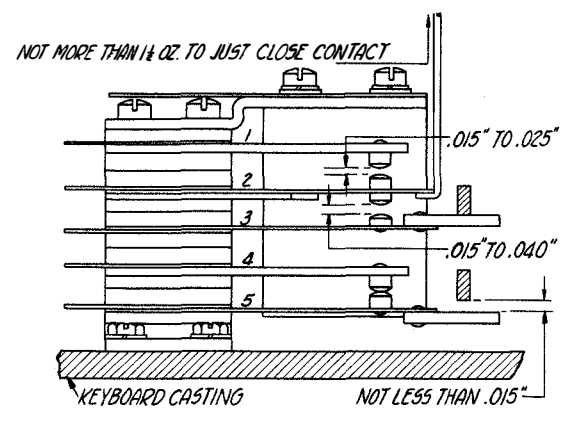


FIGURE 31

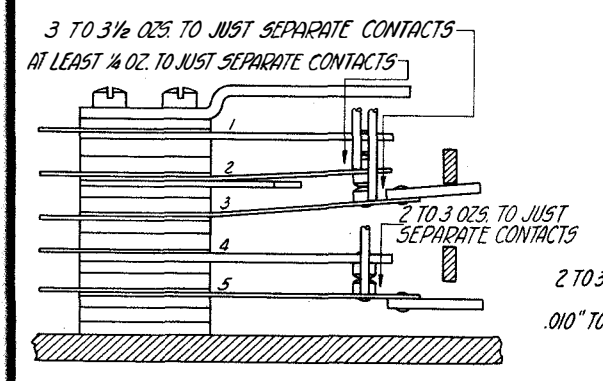


FIGURE 32

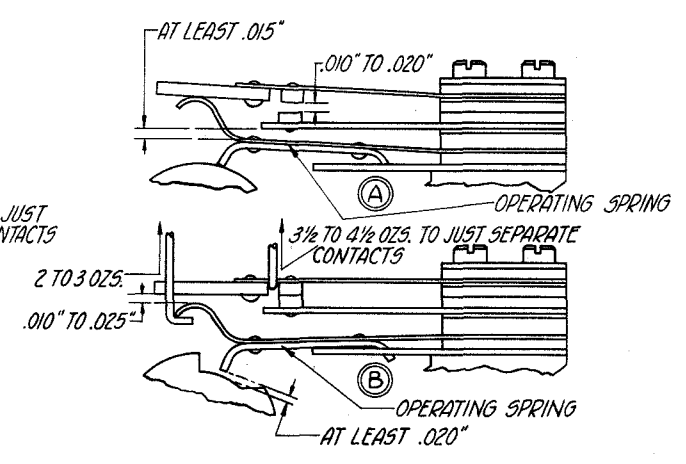


FIGURE 33

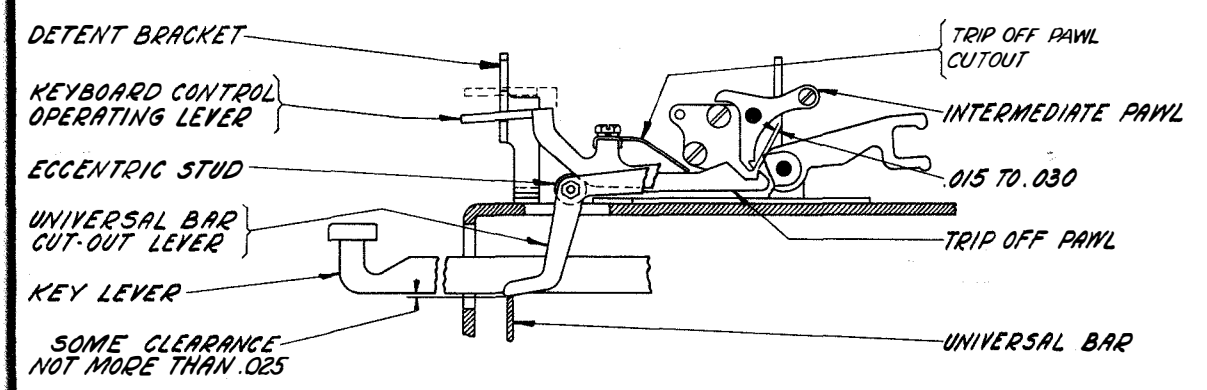


FIGURE 34

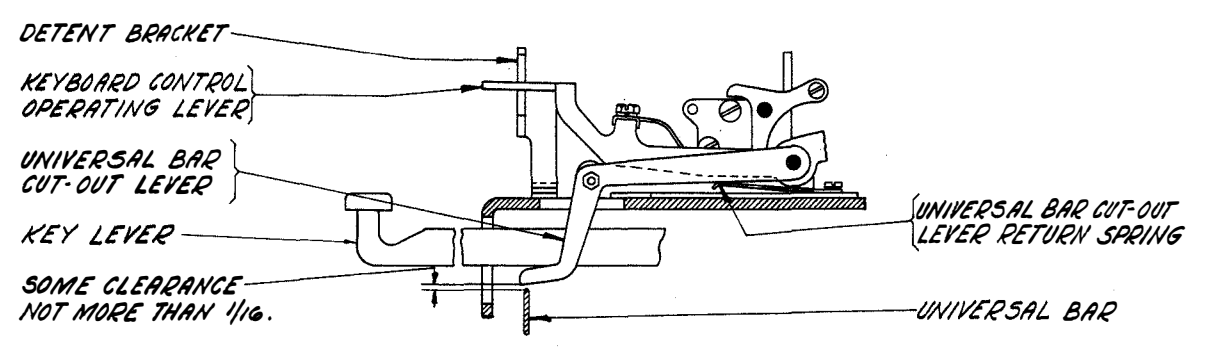


FIGURE 35

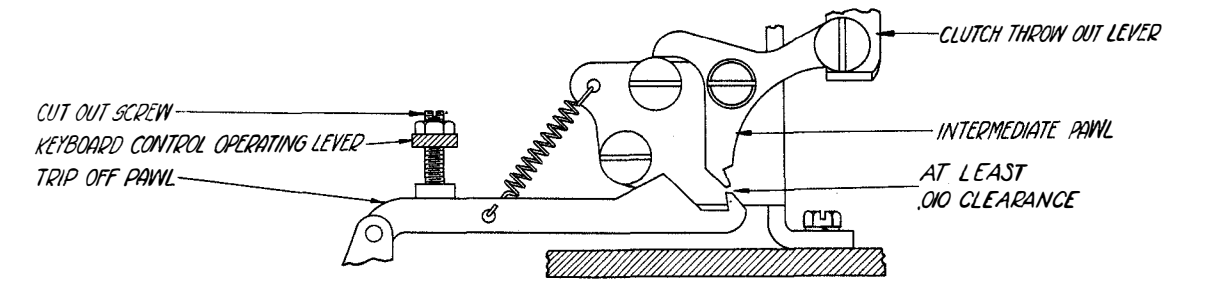


FIGURE 36

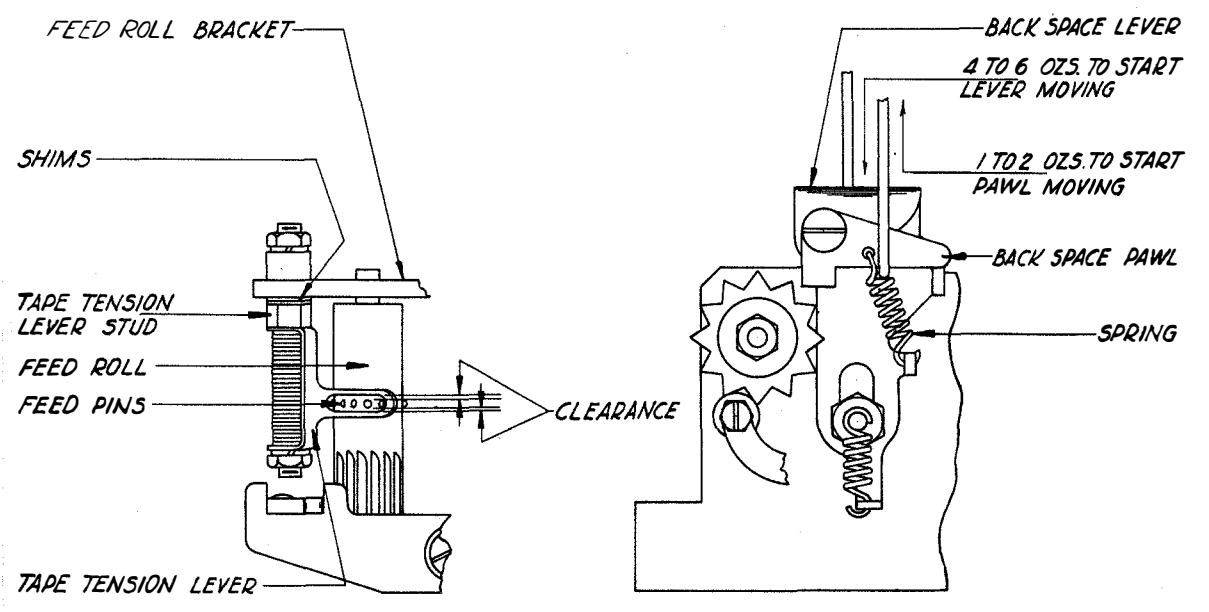


FIGURE 37

FIGURE 38

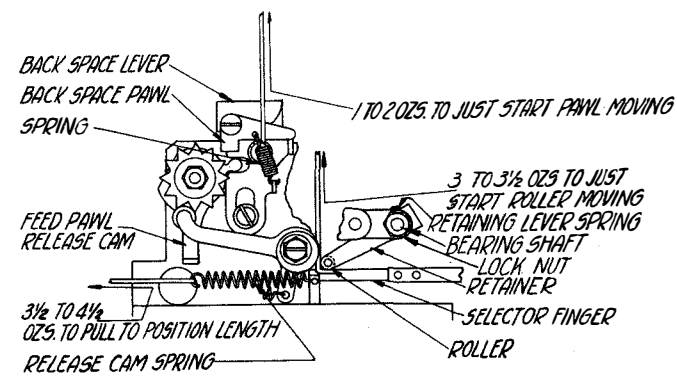


FIGURE 39

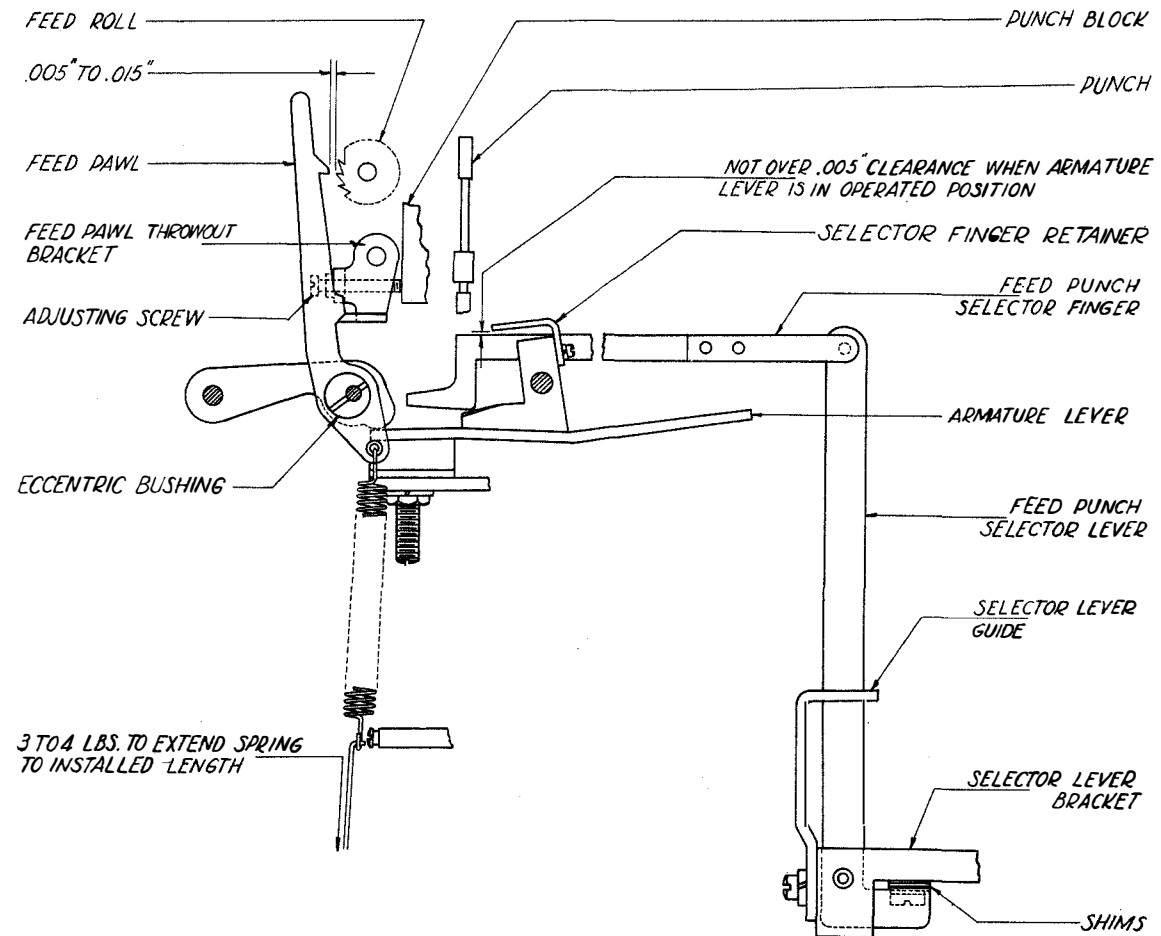


FIGURE 41

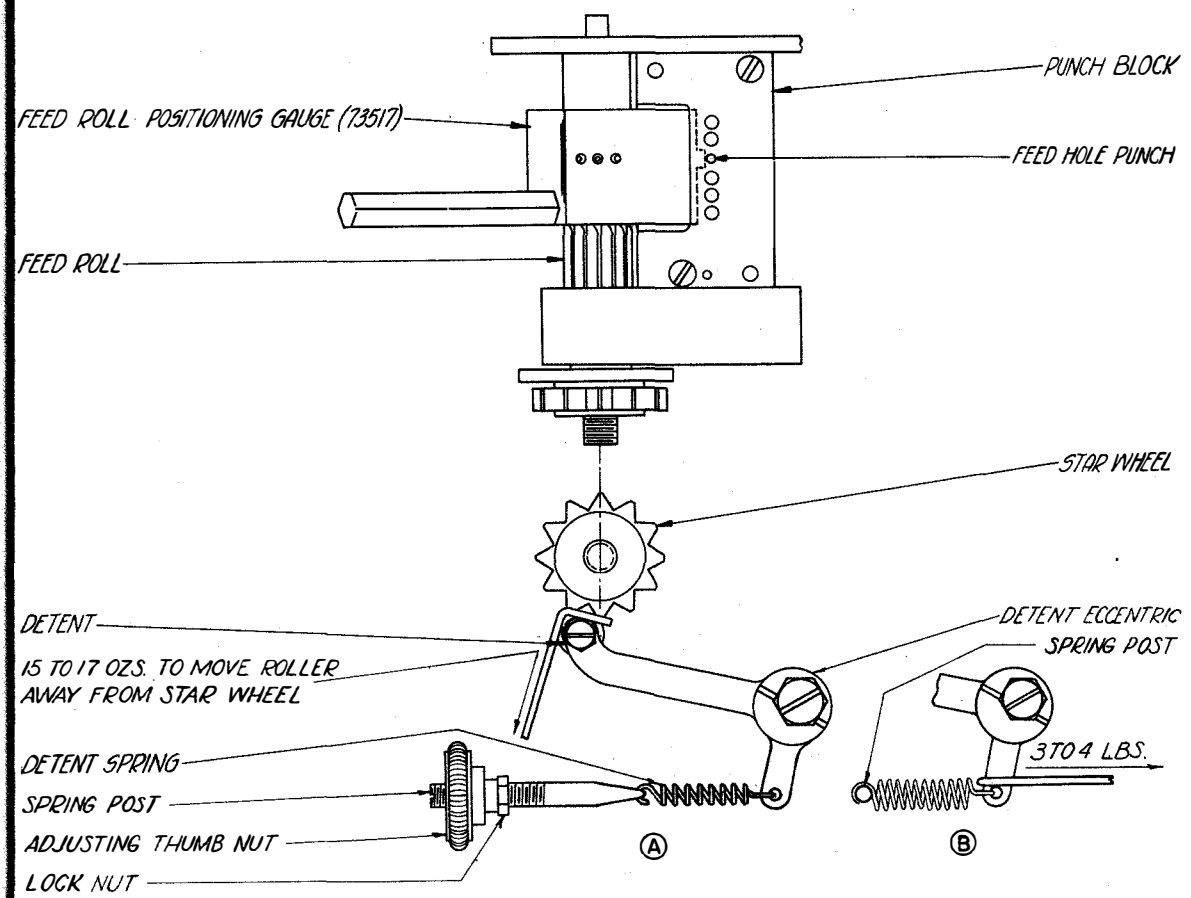


FIGURE 40

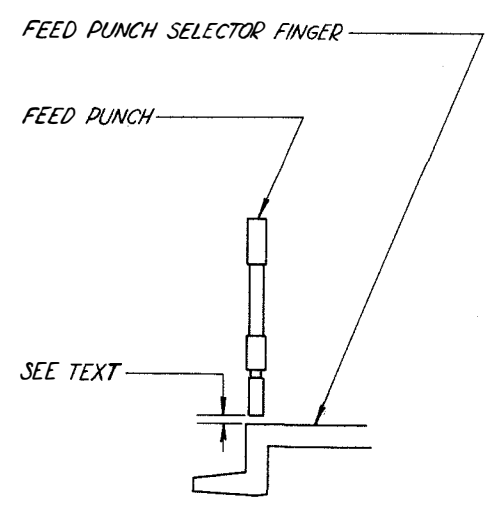


FIGURE 42

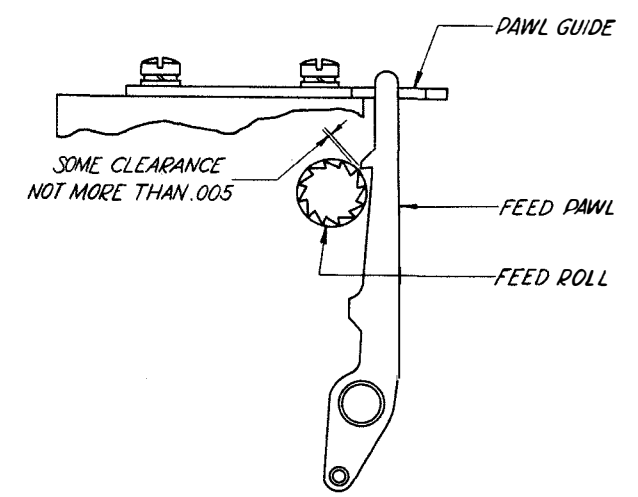


FIGURE 43

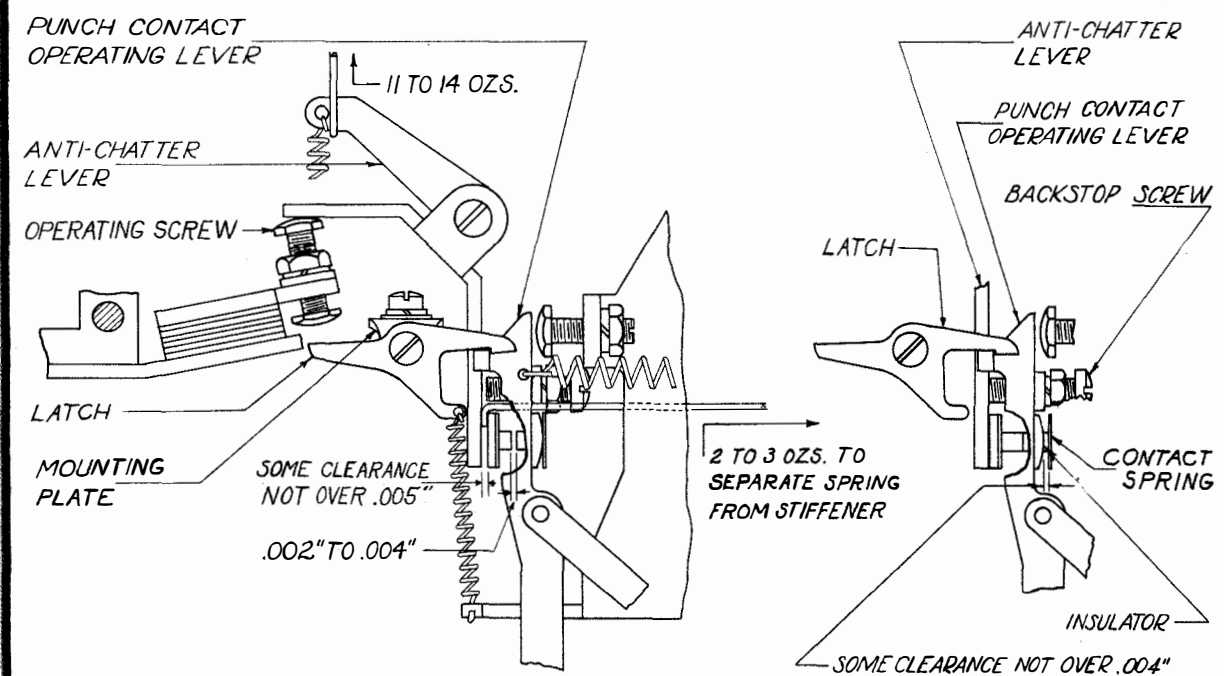


FIGURE 44

FIGURE 45

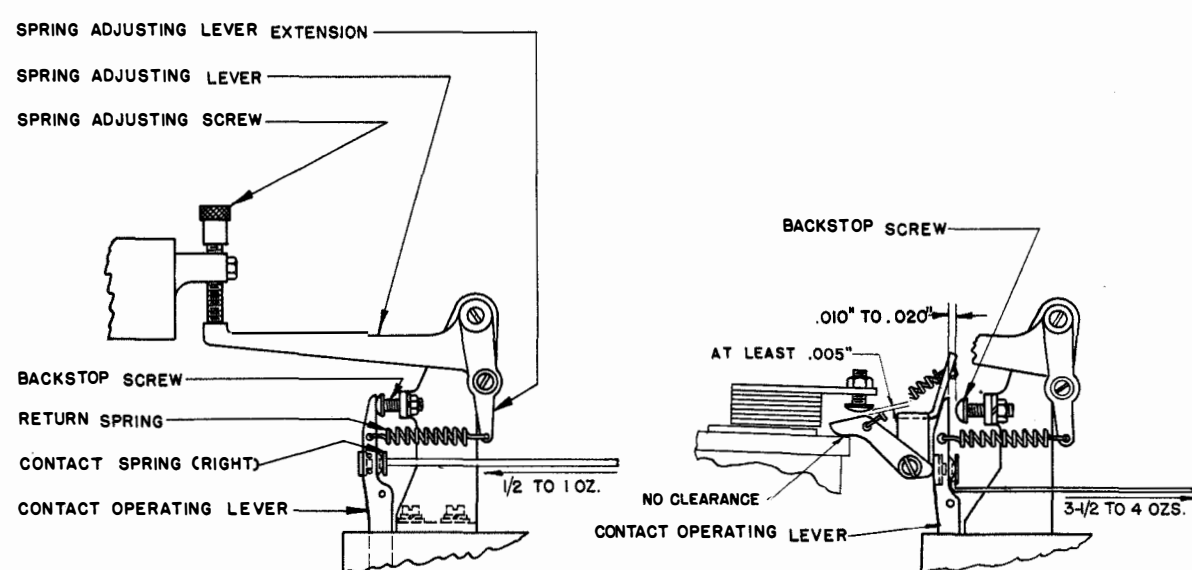


FIGURE 48

FIGURE 49

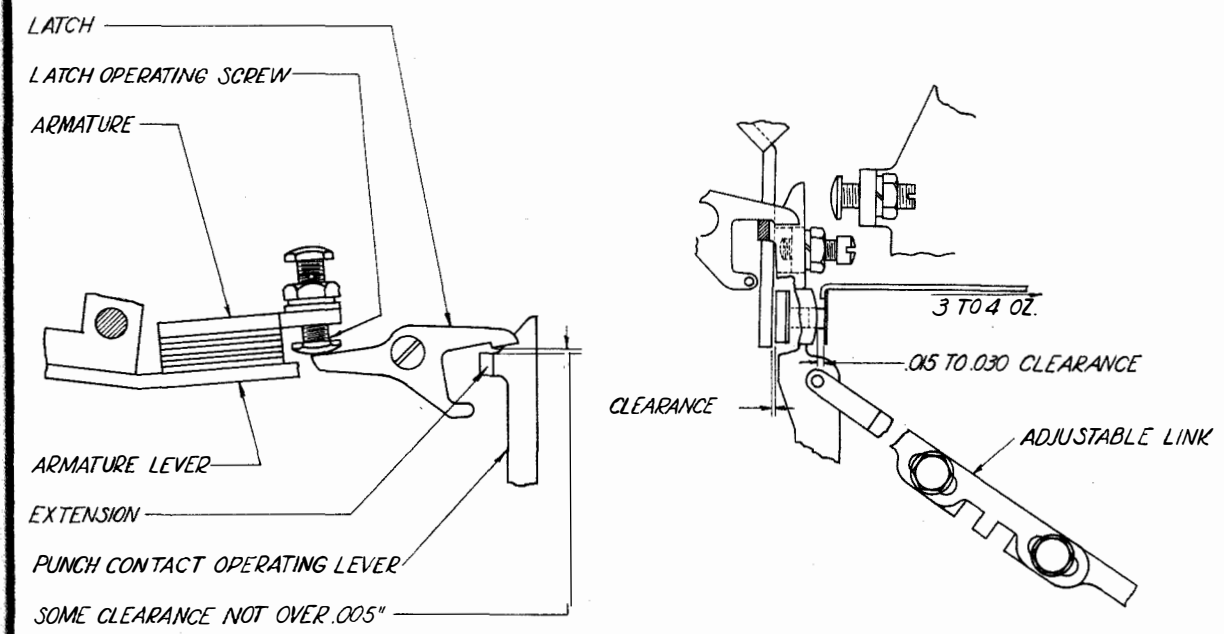


FIGURE 46

FIGURE 47

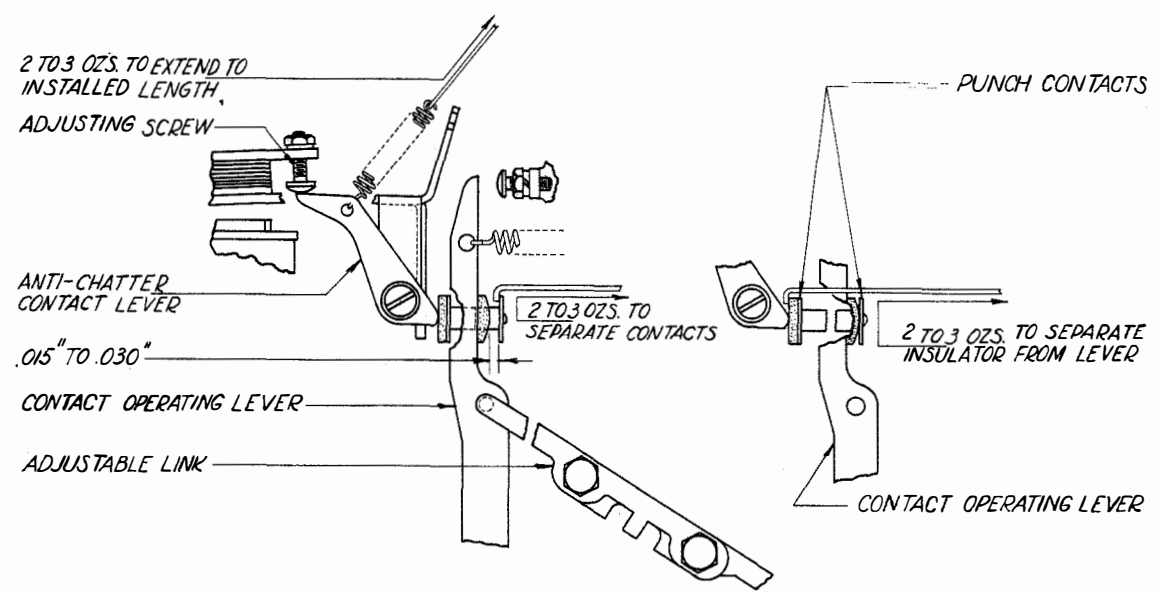


FIGURE 50

FIGURE 51

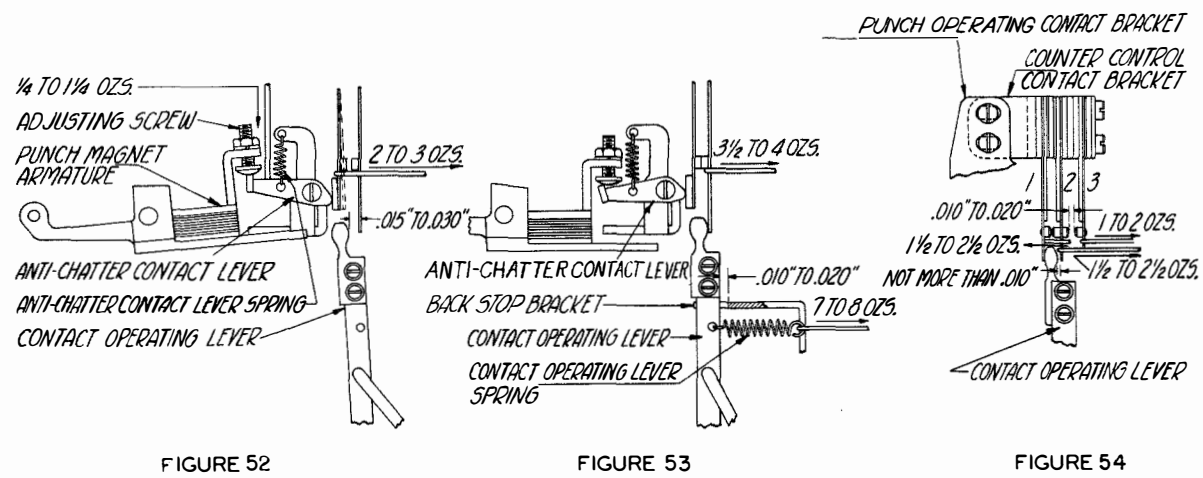


FIGURE 52

FIGURE 53

FIGURE 54

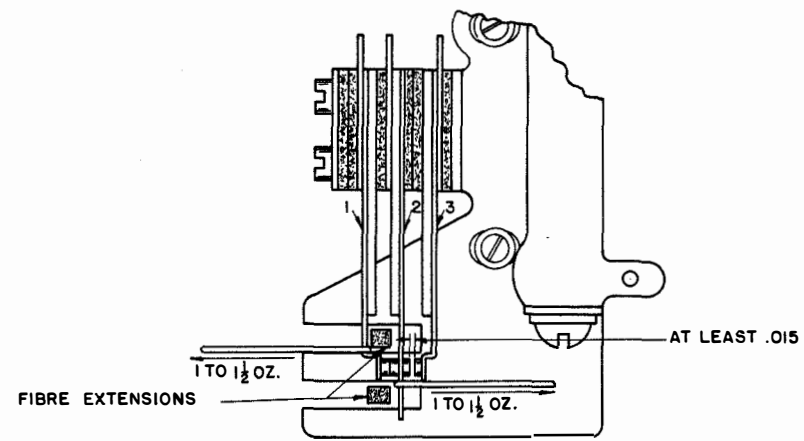


FIGURE 57

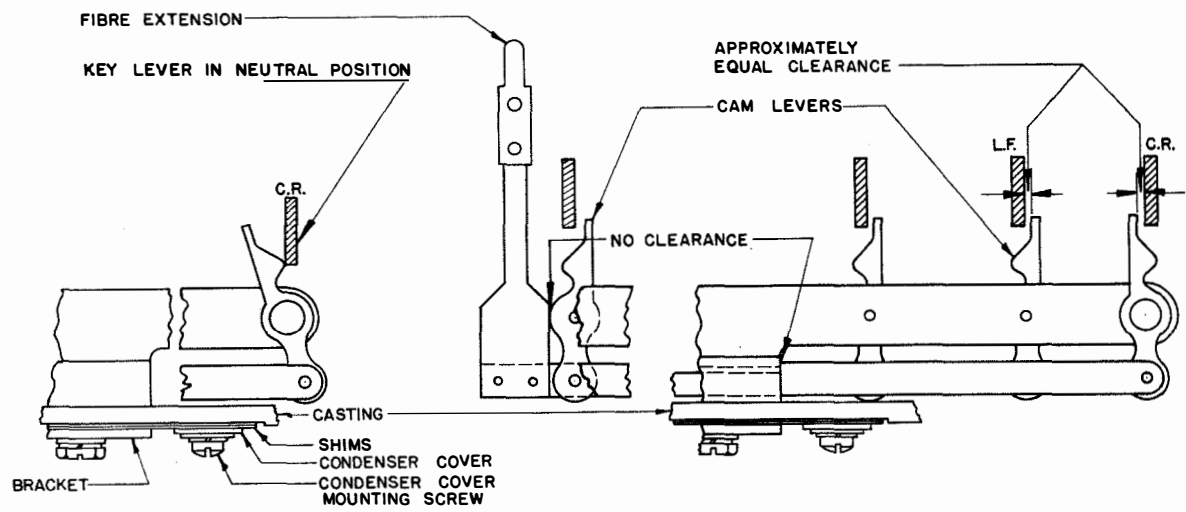


FIGURE 55

FIGURE 56

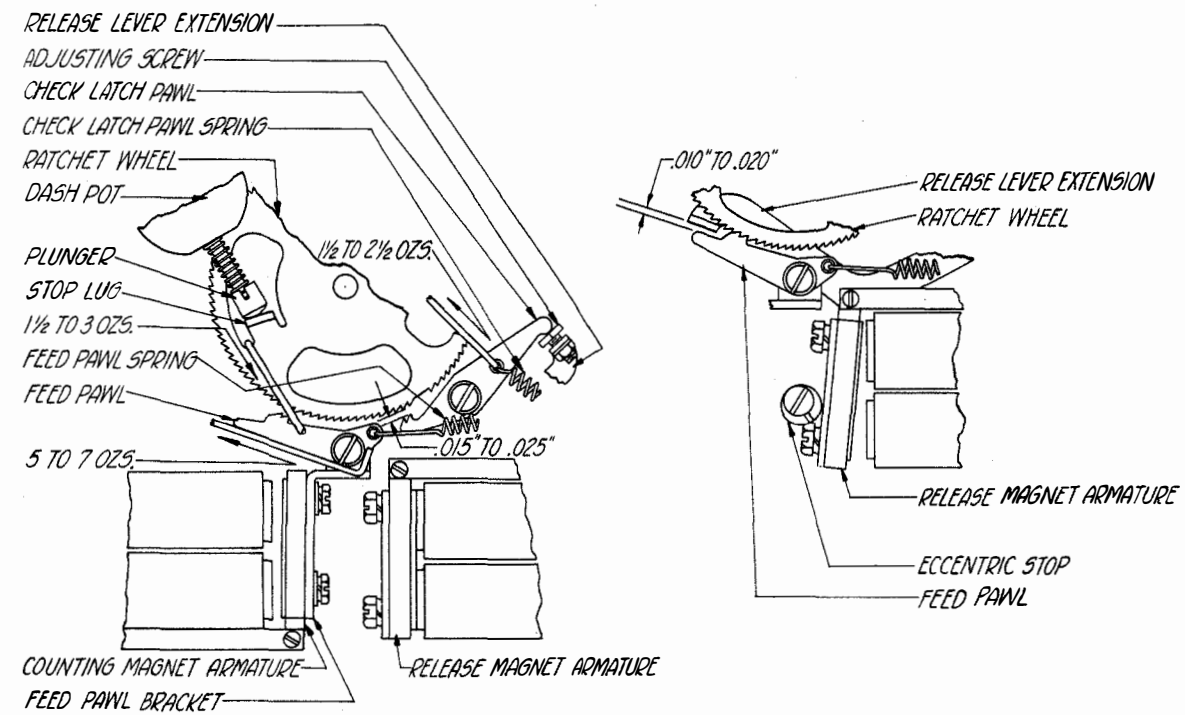


FIGURE 58

FIGURE 59

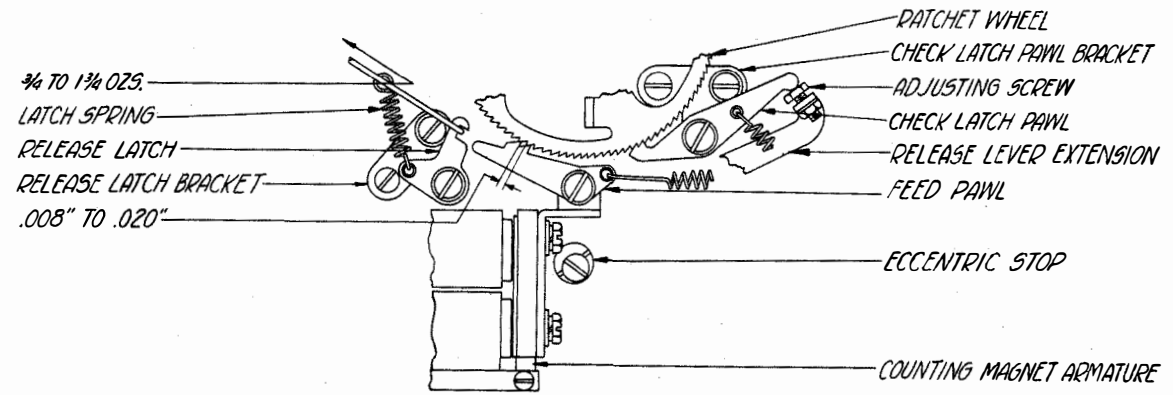


FIGURE 60

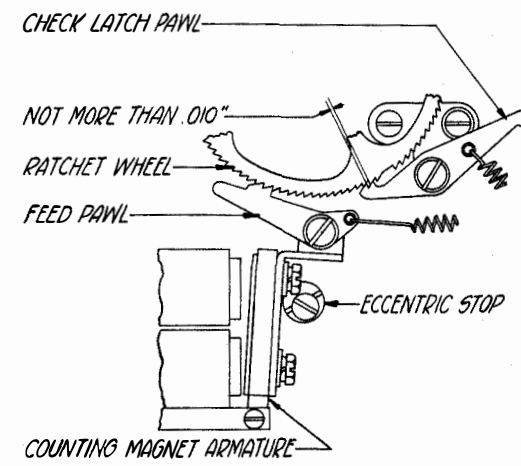


FIGURE 61

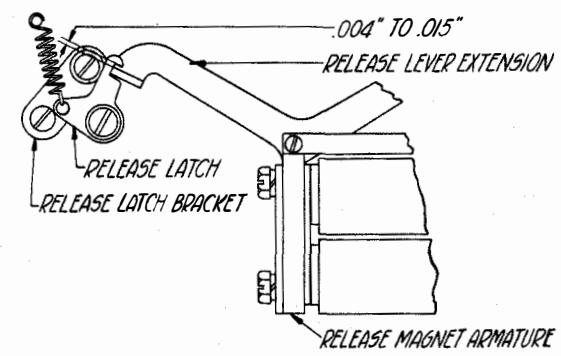


FIGURE 62

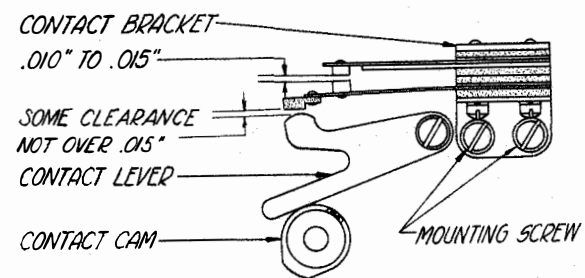


FIGURE 63

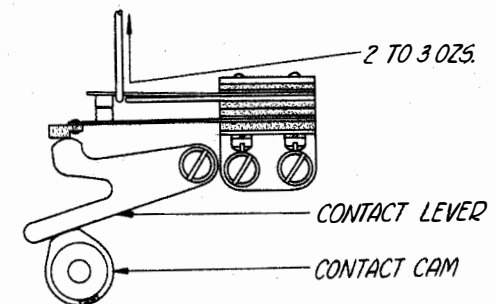


FIGURE 64

CHANGE IN BULLETIN 148, ISSUE 2
DESCRIPTION AND ADJUSTMENTS - PERFORATOR TRANSMITTER
(MODEL 15)

Page 18

Armature Lever Left Stop Screw Adjustment (Figure 42)

Change this adjustment to read as follows:

With the armature lever held firmly against its left stop and the left end of the uppermost section of the feed and code punch selector fingers in line with the left edge of the feed and code punch pins respectively, the clearances between the feed or code punch selector fingers and their respective feed or code punches should be as follows:

- (A) In units where the feed pawl is mounted separate from the armature lever the clearance between the feed punch selector finger and the feed punch should be .025" to .030".
- (B) In units where the feed pawl is mounted directly to the armature lever the clearance between the code punch selector finger and the code punch having the least clearance should be .020" to .025".

To adjust, loosen the armature lever left stop screw lock nut and position the screw. Tighten the lock nut.

* * *

CHANGES IN LUBRICATION SPECIFICATIONS
WHICH APPLY TO ALL TELETYPE APPARATUS

The following lubricants have been standardized for use on all types of Teletype apparatus. These lubricants supersede those referred to in preceding Teletype specifications. The lubricants can be ordered from Teletype as follows:

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

The above grease is recommended instead of oil for lubricating motors equipped with ball bearings. The 88975 grease gun should be used for injecting grease into the bearings of Teletype ball bearing motors. The gun may be used also for applying grease to other parts of the apparatus and no other grease container need be carried. If this grease gun is not available, the oil listed in the foregoing should be substituted for lubricating ball bearing motors.

*Instructions for Filling the Grease Gun

1. Unscrew the lubricant tube from the cap casting of the grease gun.
2. Insert fresh lubricant through the open end of the tube with the fingers. Apply gradually to eliminate air pockets.
3. Tamp the lubricant down solidly in the tube by pounding the closed end solidly against the palm of the hand. Continue to add lubricant until the tube is completely filled and the metal follower rests against the perforated tube cover.
4. Fill the cap casting with lubricant flush to the bottom side of the tube threads.
5. Screw the lubricant tube into the cap casting part way only. Then insert a pencil or rod through the perforated tube cover and exert pressure against the metal follower so as to expel any entrapped air past the tube threads. When lubricant begins to ooze through the threads, tighten the lubricant tube securely in the cap casting.
6. Operate the handle back and forth for several strokes or until lubricant is pumped from the nozzle. The gun is then ready for use. If the lubricant does not flow from the nozzle in a solid stream, it is an indication that all air has not been expelled from the lubricant tube. Invert the gun and pound the cap casting end against the palm of the hand to jar the lubricant into the pump cylinder.

*Instructions for Lubricating Motor Ball Bearings

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

*Indicates change

Printed in U.S.A.

CHANGES IN BULLETIN 141 (ISSUE 3)
DESCRIPTION AND ADJUSTMENTS
TRANSMITTER-DISTRIBUTOR

The following changes apply to the Model 14 Transmitter-Distributor equipped with the 77079 tape stop assembly.

Page 10

Tight-Tape-Stop or Auto-Stop Mechanism

Add the following note below "a".

Note: For installations where the transmitter-distributor operates at a faster speed than the unit preparing the tape, adjust as follows:

When the contacts are held closed by the contact operating post the bottom of the tight-tape stop lever should be approximately one inch below the normal horizontal position and the tight tape stop shaft should protrude approximately 1/16" beyond the clamp (Fig. 24A). Make the adjustments simultaneously by positioning the clamp.

* * *

CHANGES IN BULLETIN 141 (ISSUE 3)
DESCRIPTION AND ADJUSTMENTS
TRANSMITTER-DISTRIBUTOR (MODEL 14)

The following changes apply to the Model 14 Transmitter-Distributor equipped with the 105721 tape rod.

Page 10

Tight-Tape Stop or Auto-Stop Mechanism

Change the second sentence to read as follows: There are four types of this mechanism in use, however.

Page 11

Add the following item after fourth paragraph of Item C:

Item D: Adjust the Type Shown in Figure 24-C to Meet the Following Requirements:

- (a) The loop of the tape stop rod should be positioned to the right and down (when viewing the machine from the transmitter end) so that it will make an angle of approximately 45 degrees with the horizontal plane. (Figure 24-C.) Adjust by means of the set screw and lock nut in the tape rod clamp.
- (b) When the contacts are held closed by the contact operating post, the distance between the top surface of the tape transmitter top plate and the middle of the bend in the tape stop rod should be 1-3/4" plus or minus 1/16". (Figure 24-D.) The tight-tape stop shaft should protrude approximately 1/16" beyond the tape rod clamp.
- (c) For adjustments of clearances between contact points and between the right contact spring insulator and the tight-tape stop mechanism bracket, refer to paragraph (b) of Item A.

* * *

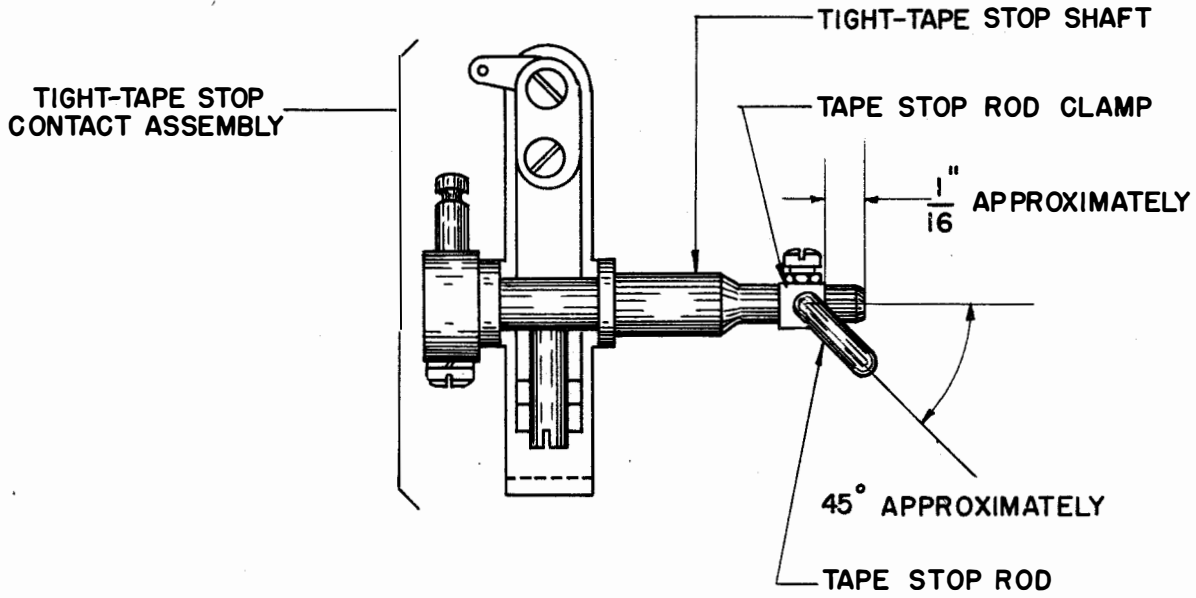


FIGURE 24 C

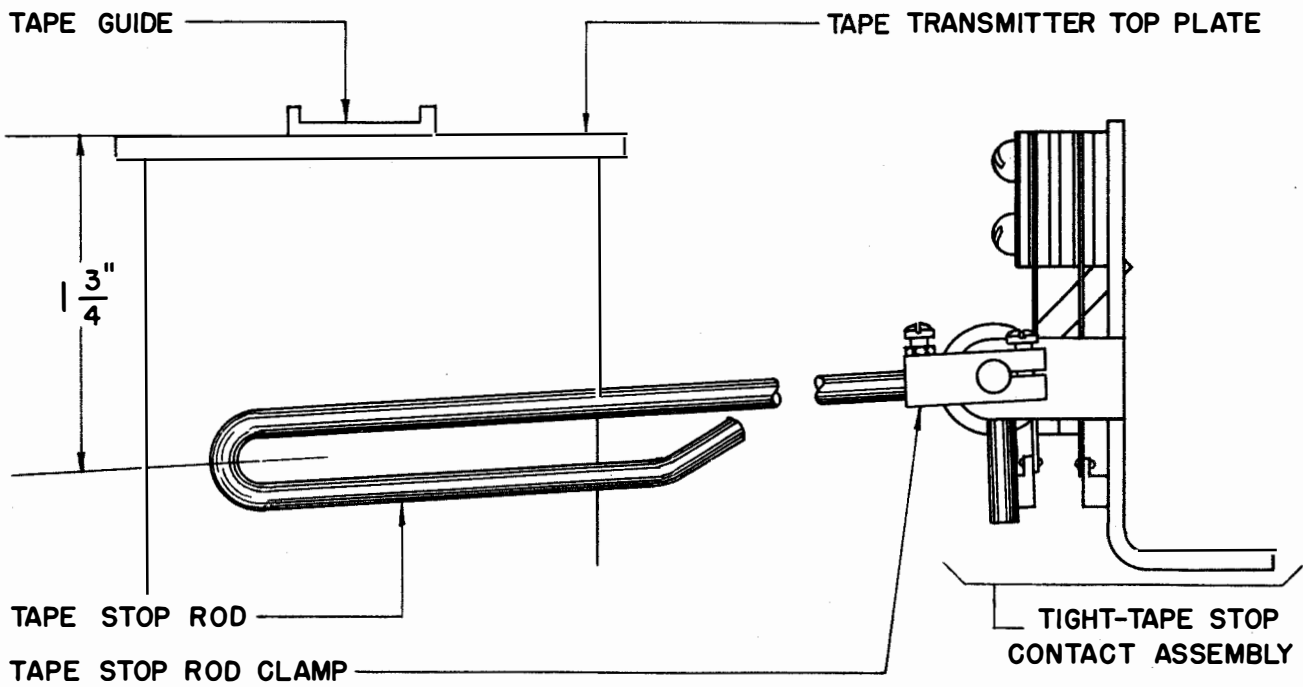


FIGURE 24 D

CHANGES IN LUBRICATION SPECIFICATIONS
WHICH APPLY TO ALL TELETYPE APPARATUS

The following lubricants have been standardized for use on all types of Teletype apparatus. These lubricants supersede those referred to in preceding Teletype specifications. The lubricants can be ordered from Teletype as follows:

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*88975	KS-8319 Grease Gun
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3. Tamp the lubricant down solidly in the tube by pounding the closed end solidly against the palm of the hand. Continue to add lubricant until the tube is completely filled and the metal follower rests against the perforated tube cover.
4. Fill the cap casting with lubricant flush to the bottom side of the tube threads.
5. Screw the lubricant tube into the cap casting part way only. Then insert a pencil or rod through the perforated tube cover and exert pressure against the metal follower so as to expel any entrapped air past the tube threads. When lubricant begins to ooze through the threads, tighten the lubricant tube securely in the cap casting.
6. Operate the handle back and forth for several strokes or until lubricant is pumped from the nozzle. The gun is then ready for use. If the lubricant does not flow from the nozzle in a solid stream, it is an indication that all air has not been expelled from the lubricant tube. Invert the gun and pound the cap casting end against the palm of the hand to jar the lubricant into the pump cylinder.

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*Indicates change