

28 PERFORATOR-TRANSMITTER BASE

DESCRIPTION AND PRINCIPLES OF OPERATION

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3. PRINCIPLES OF OPERATION . . . . .	4	1.01 This section is issued as a standard publication to cover the description and principles of operation for the 28 perforator- transmitter base.	
KEYBOARD MECHANISM . . . . .	4	1.02 The 28 perforator-transmitter base is an electromechanical unit which provides means for transmitting coded electrical impulses to a signal line and/or means for mechanically operating any one of four associated perforators --- a nontyping perforator, a typing perforator, a nontyping reperforator, or a typing reperfo- rator. It also serves as a base mounting for an associated page typing unit for monitoring the message being transmitted from the keyboard.	
A. General . . . . .	4	1.03 A mode selecting mechanism is provided for switching the unit into any one of three positions (K, K-T, and T) to perform the following functions:	
B. Codebar . . . . .	4	(a) Direct keyboard transmission to a signal line with monitoring of the message by a page typing unit (K position).	
C. Signal Generator . . . . .	6	(b) Direct keyboard transmission and si- multaneous operation of a perforator or reperforator with monitoring of a message by a typing unit (K-T position).	
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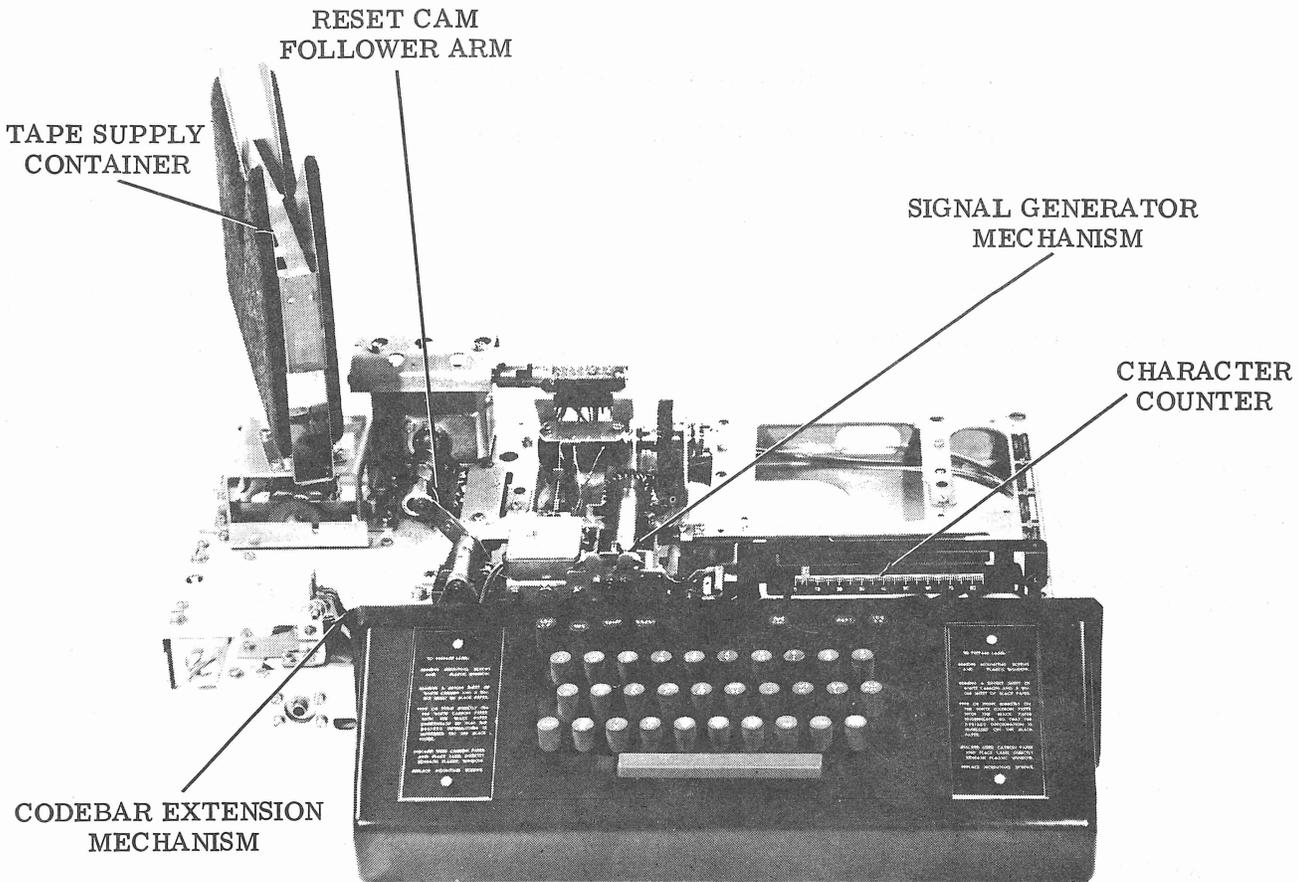


Figure 1 - 28 Perforator-Transmitter Base

(c) Operation of a perforator or reperforator only (T position).

1.04 With direct keyboard transmission, linkage to the perforating mechanism is depressed to disassociate the punching mechanism from the keyboard operation. Under this condition, if a typing or nontyping reperforator is being used, circuitry can be established to permit the reperforator to receive incoming traffic from a second line circuit.

1.05 Several variable features, such as a character counter, electrical keyboard lock, code reading contacts, timing contacts, signal line break, tape backspace, paper feed-out, and motor start are available as optional features.

1.06 Maximum keyboard speeds are 368, 460 and 600 operations per minute (opm) in the K and K-T positions. In the T position, maximum speed is 900 opm. These speeds are for a 5-unit start-stop code (7.42 unit).

Note: In the illustrative drawings, fixed pivot points are indicated as solid black circles. Movable pivot points are indicated as cross-hatched circles.

## 2. DESCRIPTION OF COMPONENTS

### BASE (Figure 1)

2.01 The base is a reinforced aluminum sheet metal box frame on which all other assemblies are mounted.

### KEYBOARD ASSEMBLY (Figure 2)

2.02 The keyboard assembly consists of a keylever guide assembly, front frame, guideplate, keylevers, and ball lock assembly.

2.03 The keylever guide assembly accommodates all code and function levers.

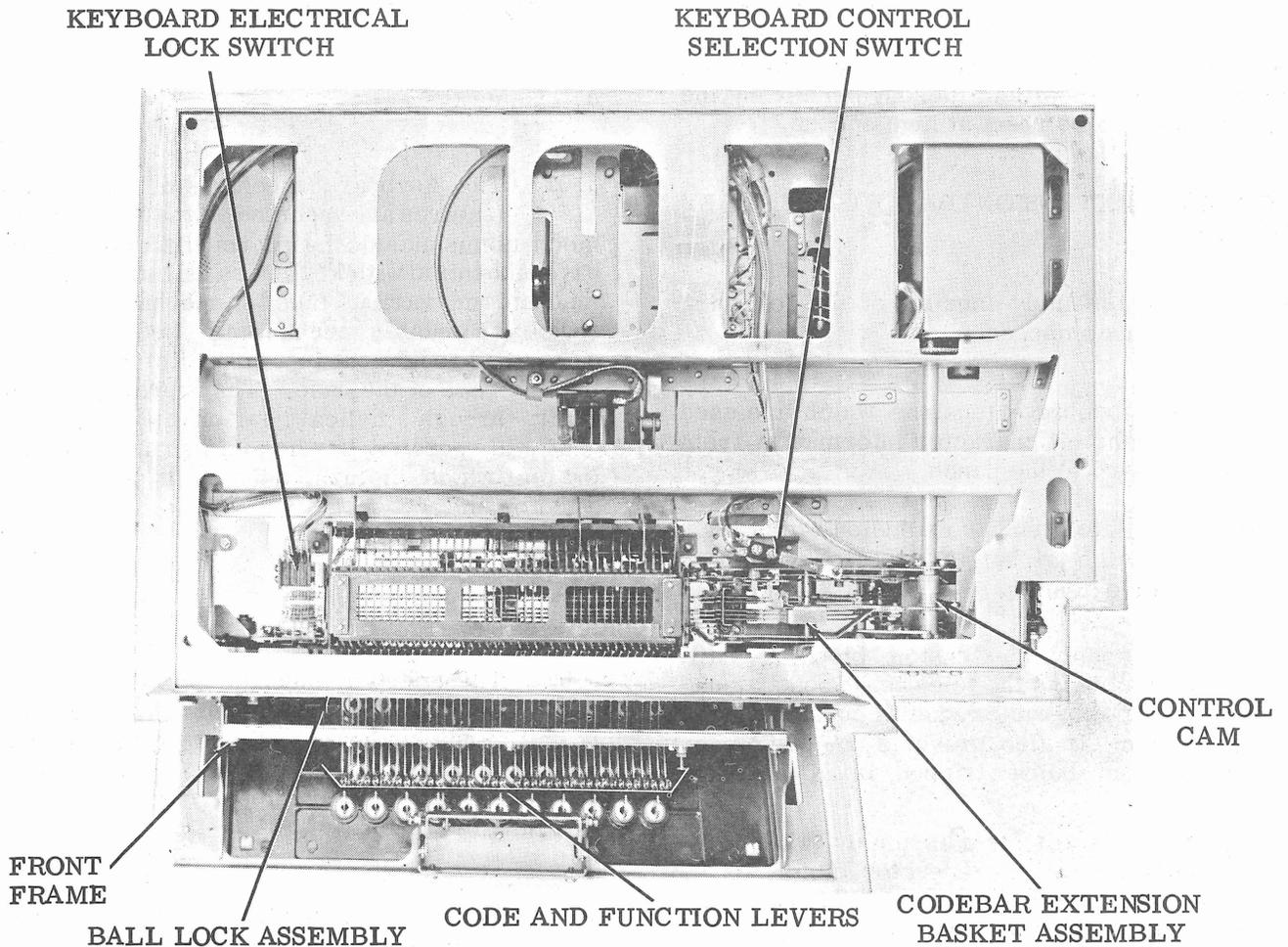


Figure 2 - Perforator-Transmitter Base (Bottom View)

#### SIGNAL GENERATOR (Figures 2 and 7)

2.04 The signal generator consists of a frame assembly; front and rear plate assemblies; gear, shaft, clutch and cam assembly; and a contact box assembly.

2.05 The clutch stop levers and latchlever are mounted on the frame. The codebar assembly and nonrepeat lever with its guide are mounted on the rear plate. The front plate acts as a mount for the detent plate assembly; transfer bail and stud; transfer levers with their guides springs, and mounting studs; and the locking bail with its stud and spring.

2.06 The cam, clutch, and shaft assembly is mounted between the front and rear plates. The cam is one piece of machined steel with eight lobes. The seven lobes which generate pulse signals, are equal in contour and are positioned at uniform angles with one another. The eighth lobe differs in contour, and is used to actuate the transfer lever locking bail.

2.07 The universal bail latchlever with its eccentric bushing is fastened to the right front of the frame. This latchlever extends to the rear over the codebar bail latch and the non-repeat lever pawl.

2.08 The contact box assembly is mounted on the front plate. It is composed of a fiber insulating strip, a contact toggle assembly and phenolic base, drive link, and an arc suppressor, or RF filter.

#### RESET CAM FOLLOWER BRACKET ASSEMBLY (Figure 1)

2.09 This assembly consists of a hollow shaft with internal oilite bearings pivoting on a fixed shaft. A hooked arm on one end of the hollow shaft connects the hollow shaft to the clutch tripart assembly. An adjustable arm and roller on the other end of the hollow shaft follows the reset cam on the perforator main shaft.

2.10 The entire assembly provides linkage between the clutch tripbar and the cam on the associated perforator when the mode selector is in T position, thereby permitting the the keyboard to be reset at high speeds.

#### CODEBAR EXTENSION BASKET ASSEMBLY (Figure 2)

2.11 This assembly consists of the following major components:

(a) The codebar extensions which are used to transmit character information from the keyboard to the punch.

(b) The clutch tripbar extension which links the clutch tripbar to the perforator clutch trip lever extension in K-T and T positions.

(c) The codebar extension blocking bail, which blocks the selection of codebar extensions and character counter codebars in the K position. It also prevents the perforator clutch from being tripped in K position.

(d) The selector lever assembly, which permits the signal generator clutch to be tripped in K and K-T positions. It also prevents the signal generator from being tripped in T position.

(e) The control cam, which drives the auxiliary electric switch and provides the K, K-T, and T operations of the perforator transmitter.

2.12 The primary purpose of the codebar extension basket assembly is to transmit character information from the keyboard codebars to a perforator, and to serve as control center for the various functions of the 28 perforator-transmitter base.

### 3. PRINCIPLES OF OPERATION

Note: Inasmuch as the mechanical operation of the perforator-transmitter and its associated perforator or reperforator are so closely related — one depending on the other functionally — it will be necessary in presenting the principles of operation to overlap certain mechanical actions within the two units for clarity.

### KEYBOARD MECHANISMS

#### A. General

3.01 The keyboard mechanism and optional features are mounted on the base. These mechanisms include the intermediate gear, codebar mechanism with keylevers, signal generator mechanism, various function mechanisms and a character counter mechanism. Necessary circuits are brought out to a connector mounted at the left rear of the base. The signal generator shaft, through a helical gear on the rear of the shaft, is operated by the main shaft of the typing unit which, in turn, derives its power from a motor unit.

#### B. Codebar

3.02 The codebar mechanism is located on the front underside portion of the keyboard. Each keylever in the lower three rows and the spacebar is connected to a code lever and each keylever in the upper row is connected to a function lever.

3.03 The code and function levers pivot about points near their midportions (Figure 3). Located above the rear half of the code levers and running parallel with the keyboard are, from rear to front, the clutch tripbar, the numbers 1, 2, 3, 4 and 5 codebars, two character counter bars (counter and carriage return), and the lockbar. The rear portion of each code lever or function lever is normally held downward by a spring so that the front end, with its attached keylever, is held upward.

3.04 A wedgelock is mounted on the projection of the lower front portion of all code levers (Figure 4). If one of these levers is operated, its wedgelock moves downward between the lock balls in the lock ball channel and crowds them together. This prevents any other lever with a wedgelock from being operated at the same time.

3.05 With the signal generator shaft in its stop position, the codebars and clutch bar are held toward the left (viewed from the front) against the tension of their springs by the latched-up codebar bail.

3.06 When any keylever in the three lower rows or the spacebar is depressed, the rear end of the associated code lever engages and rotates the code lever universal bail counterclockwise (Figure 3). The extension on the code lever universal bail disengages from the step at the rear of the universal bail latchlever. This lever then moves downward under the tension of its spring. As the lever falls, it strikes the codebar bail latch and carries it downward (Figure 5). When the corner of the codebar bail latch falls beyond the centerline of the needle bearing mounted on the codebar bail, the codebar bail is released and swings to the right.

3.07 Upon being freed, the codebar bail, the clutch tripbar, and the selected codebars are pulled to the right by their springs. Unselected codebars are stopped from moving to the right by the operated keylever or spacebar. For example, if the L lever is depressed, codebars 1, 3 and 4 will be stopped by the code lever engaging teeth on the underside of the codebars.

The teeth on codebars 2 and 5 are omitted in this area and the bars are permitted to move to their extreme right-hand position (Figure 6).

3.08 The codebars have vertical extensions that engage a curved part of the signal generator transfer levers (Figure 7). The codebars which are permitted to move to the right carry with them their respective transfer levers.

3.09 Simultaneously with the above operation, the clutch tripbar moves to the right. A keyboard control selection lever (Figure 21) is linked to and moves to the right with the clutch tripbar. When the three-position keyboard control knob is in the K or K-T position (Paragraph 3.42), a projection on the keyboard control selection lever trips the signal generator clutch stop lever. The clutch then engages and rotates the signal generator cam.

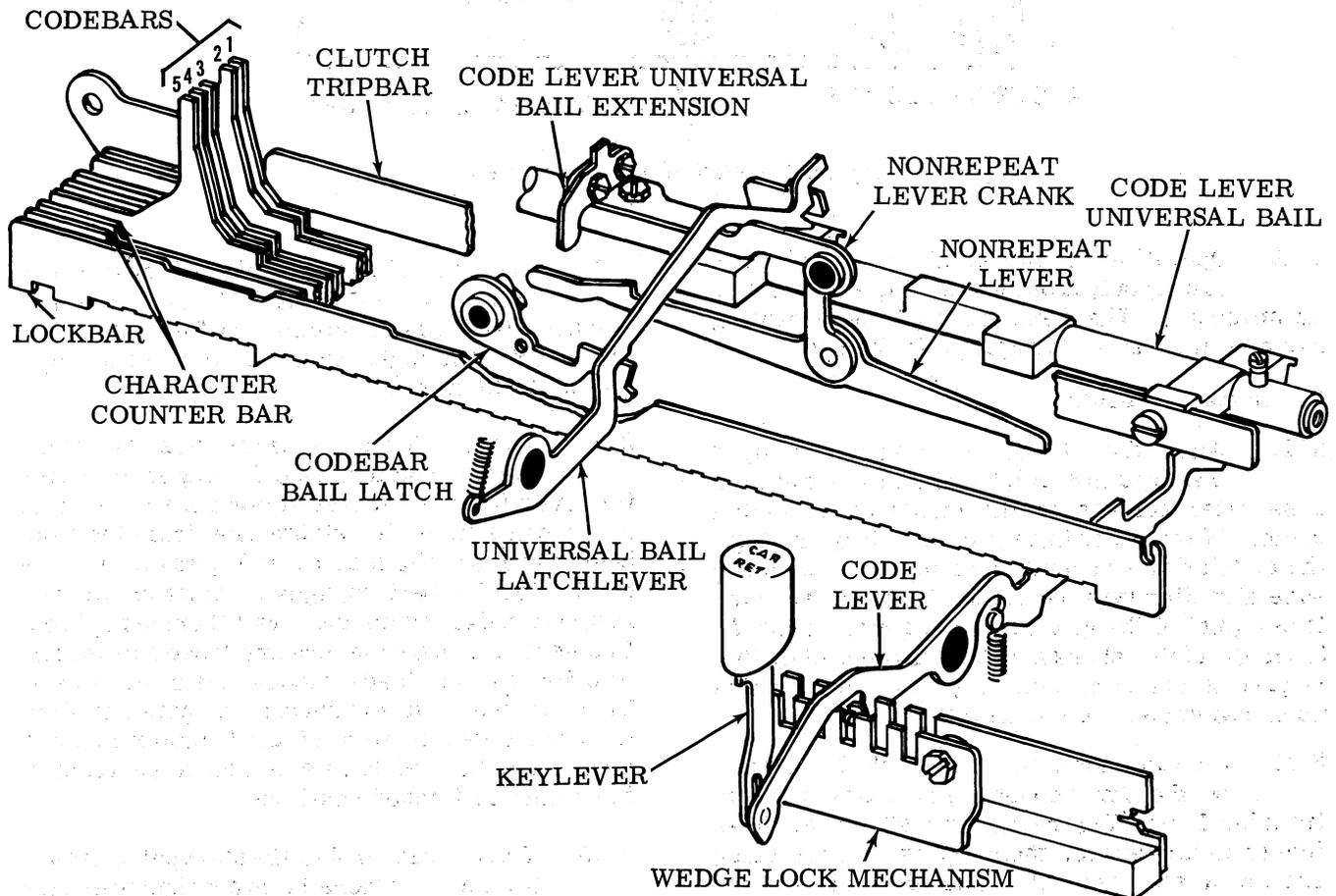


Figure 3 - Codebar and Code Lever Universal Bail Mechanism

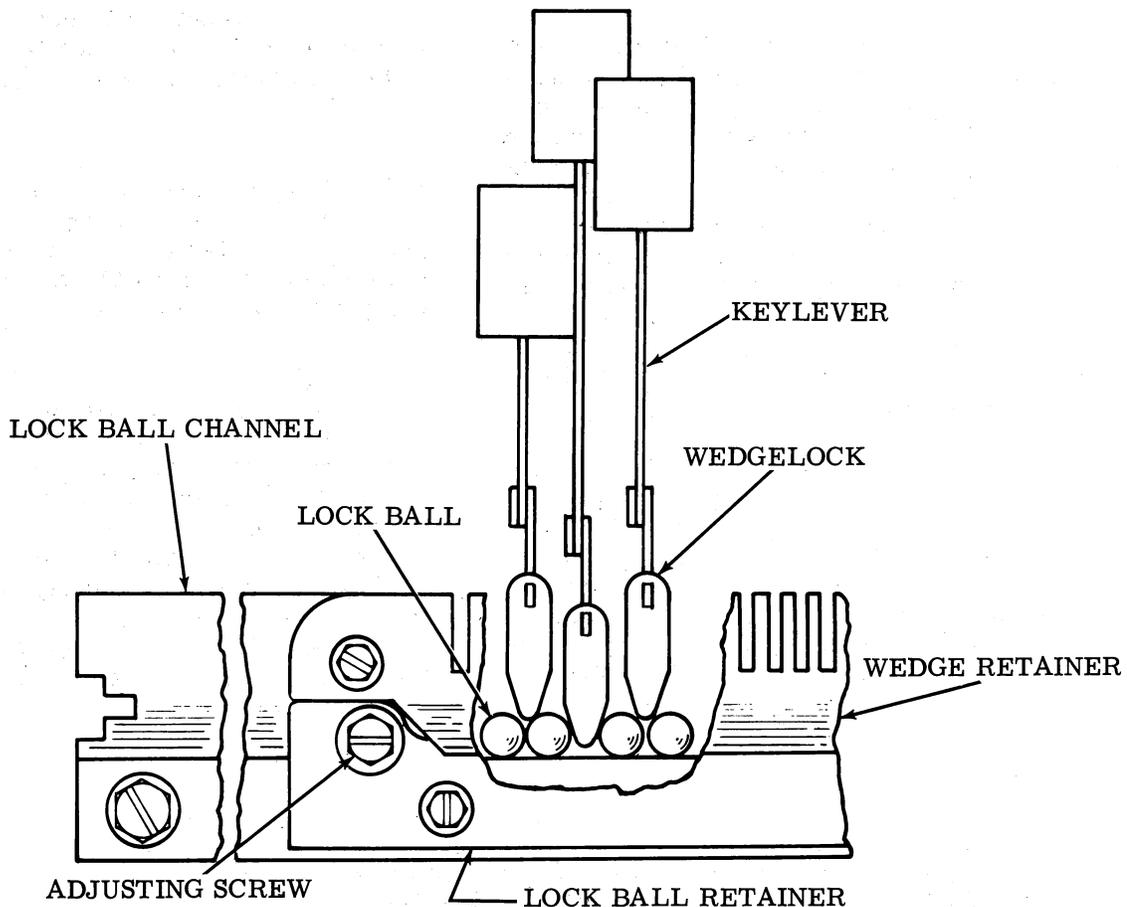


Figure 4 - Wedgeloek Mechanism

3.10 Operation to this point is manual, resulting only from depressing a code lever or spacebar. The remainder of the operating cycle is covered in Paragraph C. below.

#### C. Signal Generator

3.11 When the clutch stop lever is tripped (Paragraph 3.09), the clutch shoes engage a serrated surface on the inside of the clutch drum. When power is on (motor unit operating), the clutch drum rotates continuously in a clockwise direction (viewed from the front) because it is a part of the geared signal generator shaft. Since the clutch shoes are mounted on a plate that is part of the cam assembly, the cam rotates upon engagement of the clutch.

3.12 As was shown in Paragraph 3.08, each of the five codebars operates its own transfer lever (Figure 7). In addition to these five transfer levers, there are two others which are not associated with codebars. These are used to originate the start and stop pulses.

3.13 The cam lobes are numbered from 1 to 8 from rear to front. There are seven signal-pulse lobes on the cam (one for each transfer lever). The eighth cam lobe is used to actuate the locking bail.

3.14 The cam lobes are arranged so that when the cam rotates, lobe 3 engages its transfer lever first and moves it downward. Almost at the same time, the eighth lobe from the rear begins to move the locking bail upward. A blade on the locking bail engages in slots on the selected transfer levers and locks them in position. Unselected transfer levers are locked in the left position as the blade blocks their movement. Thus, in the first few degrees of cam rotation, the permuted position of the transfer lever is locked and the codebars are free to be reset in their normal latched positions.

3.15 Transfer lever 3 is the start pulse transfer lever. There is no codebar to engage this lever, hence it is always held to the left by

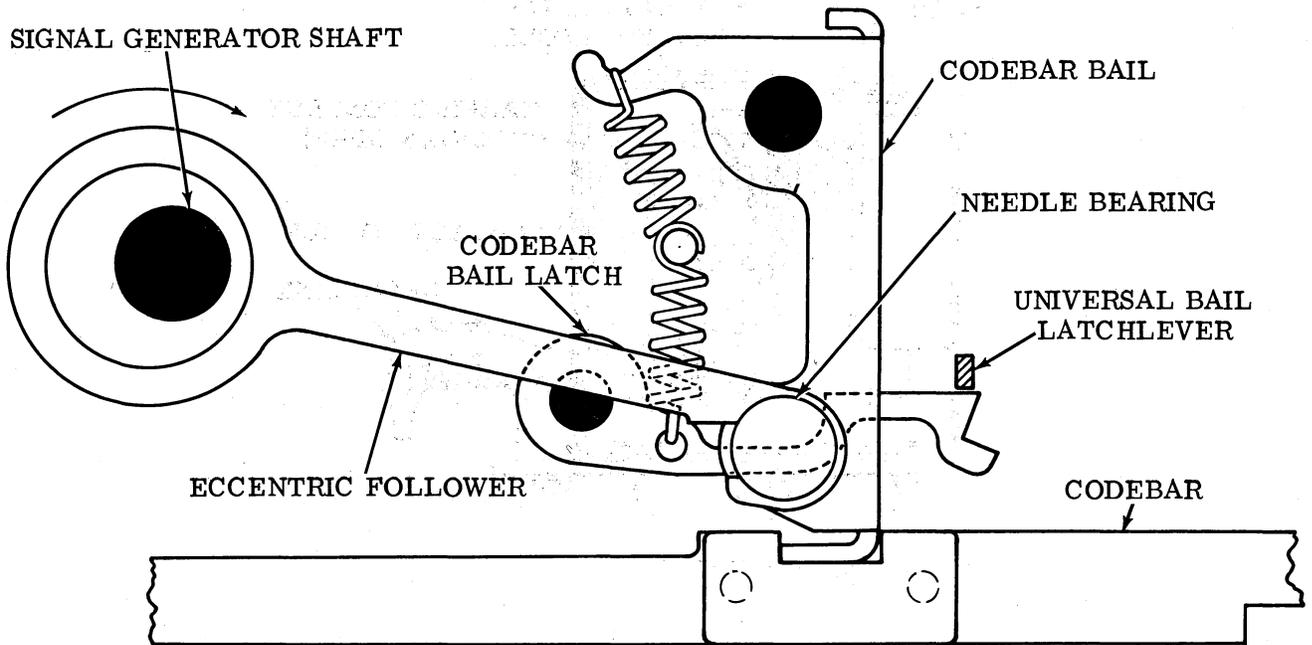


Figure 5 - Codebar Bail Mechanism

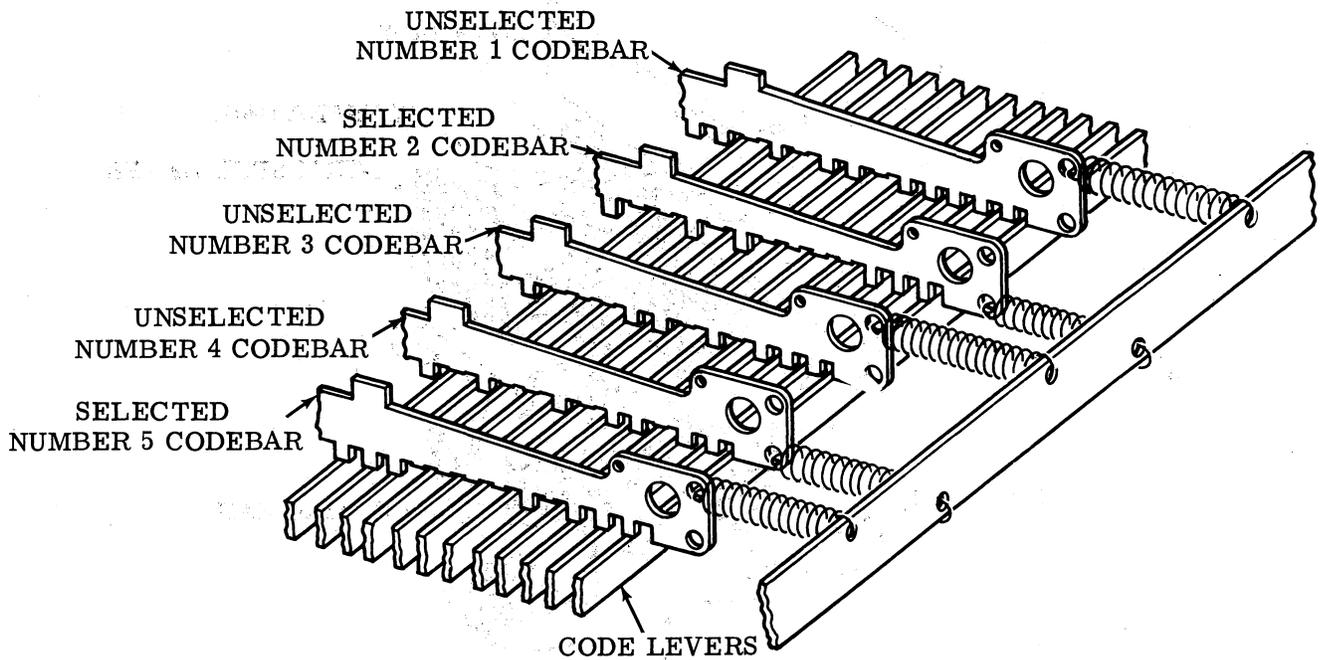


Figure 6 - Codebar Selection

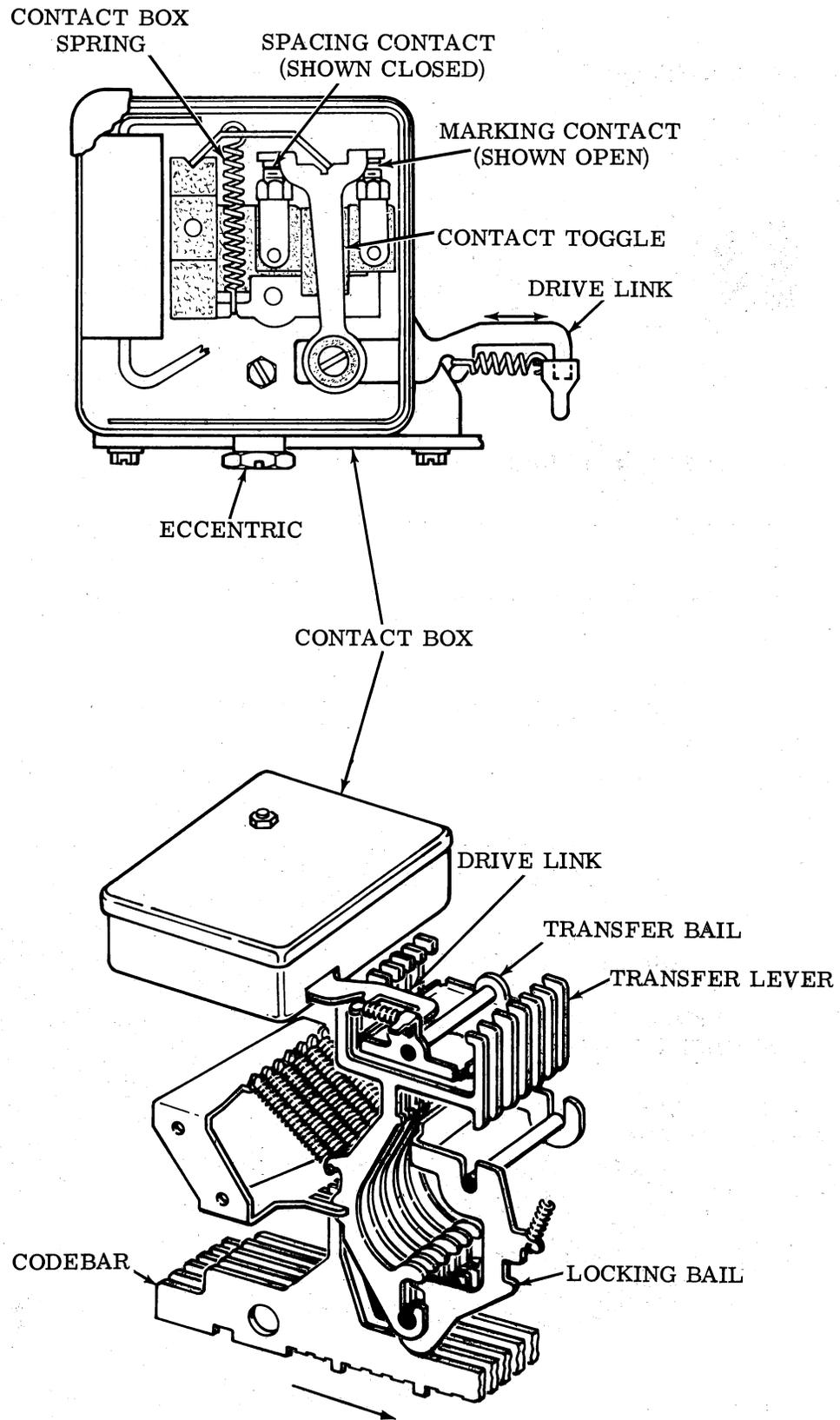


Figure 7 - Transfer Lever and Contact Box Mechanisms

its spring. As cam lobe 3 moves this lever down, the hook on the upper right of the lever engages the right-hand side of the transfer bail. This trips the transfer bail to the right and pulls the contact drive link (Figure 7) to the right. The resulting action of the contact toggle is such that the marking contacts open and the spacing contacts close. Under this condition there is "no current" in the signal circuit. This is known as a spacing pulse. Thus, the first pulse (or start pulse) of any character is a spacing (no current) pulse.

3.16 Lobe 1 and its transfer lever move downward next. For the character L it has been shown (Paragraph 3.07) that transfer lever 1 is positioned to the right. In turn, the upper left hook of this lever pulls downward on the transfer bail, tilting it back to the left. This pushes the drive link to the left, thereby closing the marking contacts and allowing a marking (current on) pulse to be transmitted.

3.17 Similarly, transfer levers 2, 4, 5, and 6 are pulled downward by their respective cam lobes. The resulting pulse will be marking if the transfer lever is to the right, or spacing if it is to the left.

3.18 Transfer lever 7 is the stop pulse transfer lever. This lever is permanently held to the right by a stop pin; therefore, the resulting pulse, the stop pulse, is always marking (current on).

3.19 The locking bail holds the transfer levers in their permutated positions until after the beginning of the fifth pulse. Then cam lobe

8 pulls the bail down out of locking position and all selected transfer levers are free to return to their left position.

3.20 Reset of the codebars is accomplished by means of an eccentric on the front of the cam, which drives an eccentric follower (Figure 5). The follower engages an eccentric stud on the side of the codebar bail and pulls the bail to the left as the cam rotates. As the codebar bail moves to the left, the codebar bail latch clears the needle bearing stud and is pulled upward into locking position under tension of the spring to latch or reset the codebar bail. As the codebar bail is moved into reset position, it engages projections on the permutated codebars, clutch tripbar, and a stop on the nonrepeat lever, thus moving all these elements to the left into latched reset position.

#### D. Repeat Keylever

3.21 Operation of the REPT keylever simultaneously with one of the keylevers in the three lower rows, or the spacebar, disables the nonrepeat mechanism and causes the character or function selected to be repeated as long as the REPT keylever is held operated. The operated REPT keylever causes its function lever to raise the right end of the nonrepeat lever (Figure 8) and rotates it about its pivot point. In this position, the nonrepeat lever cannot be engaged and operated by the codebar bail, therefore, the nonrepeat lever crank will not reset the operated codebar bail latch. The codebar bail and universal bail latch lever are thus maintained in their operated positions and the codebar bail follows the eccentric arm movement back and forth until the REPT keylever is released.

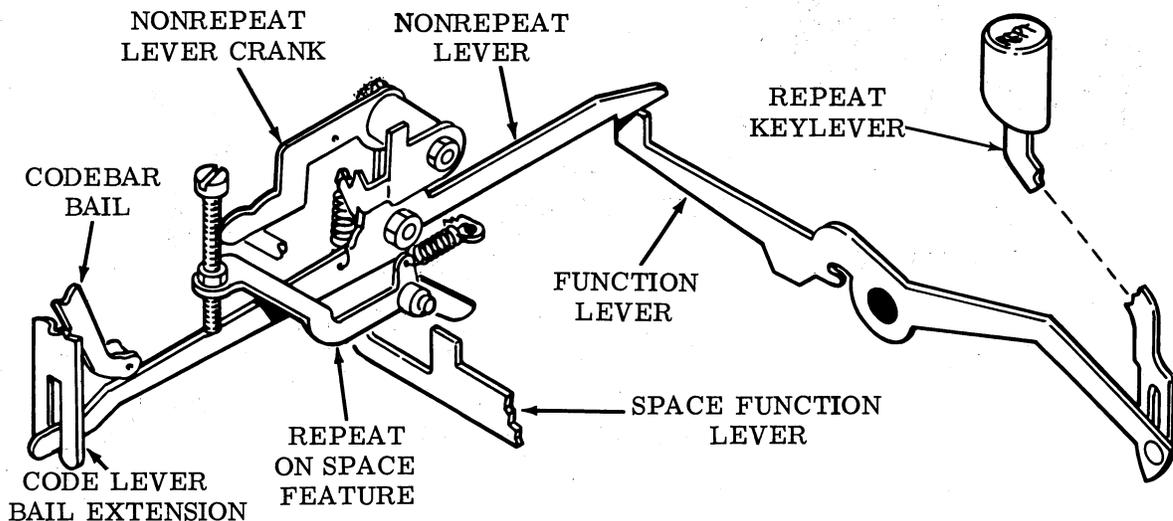


Figure 8 - Repeat Mechanism

E. Electrical Line Break (Figure 9)

3.22 The electrical line break mechanism provides a means of interrupting signal line current for use as a break signal. Interruption of the line current is effected by depressing the BREAK keylever located on the keyboard.

3.23 When the BREAK keylever is depressed, its function lever pivots and raises the front end of the break lever. The rear portion of the break lever depresses the actuator pin of the sensitive switch, which open the normally closed contacts. This action breaks the continuity of the signal line circuit, causing a break signal (no current) to be transmitted.

3.24 When the BREAK keylever is released, the tensions of the switch spring and break lever spring cause the function lever to return the keylever to its normal position and the switch contacts to their normally closed condition.

F. Local Line Feed (Figure 10)

3.25 When the LOC LF keylever on the keyboard is depressed, paper is fed out of the associated typing unit when power is on. The

mechanism operates as follows: Depressing the LOC LF keylever raises the forward end of the local line feed bail. This bail pivots and its upper end pushes the attached local line feed trip link toward the rear until the link engages the line feed clutch trip lever on the typing unit. Thus, the line feed mechanism on the local typing unit is made to operate without a signal and other typing units on the same line circuit are not disturbed.

G. Local Paper Feed-Out (Figure 11)

3.26 The local paper feed-out mechanism enables the operator to feed out copy paper by depressing the local line feed keylever, whether the printer set is on or off. The mechanism operates as follows:

- (a) Depressing the LOC LF keylever causes the local line feed trip link to move to the rear and unlatch the line feed clutch trip lever, as described in Paragraph F. above. If the set is operating, the result is that copy paper is fed out until the LOC LF keylever is released. If the set is not operating, the line feed clutch of the typing unit is conditioned to operate when the power is supplied.

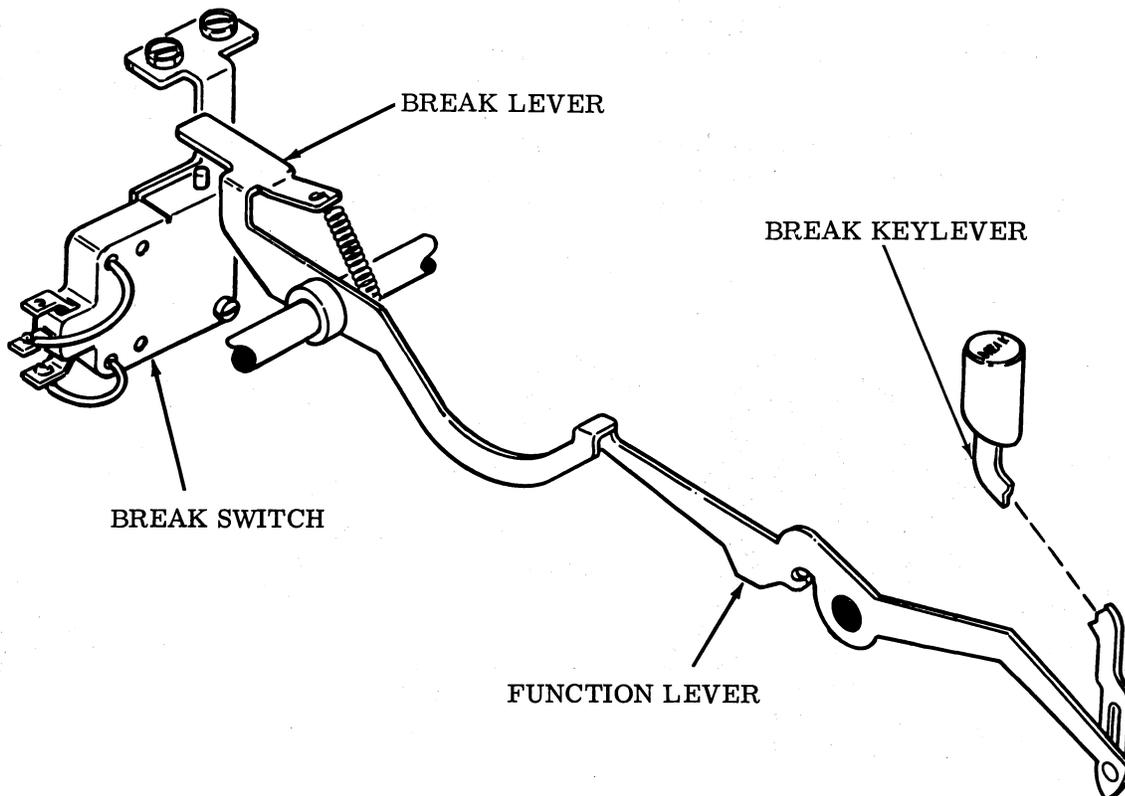


Figure 9 - Electrical Line Break Mechanism

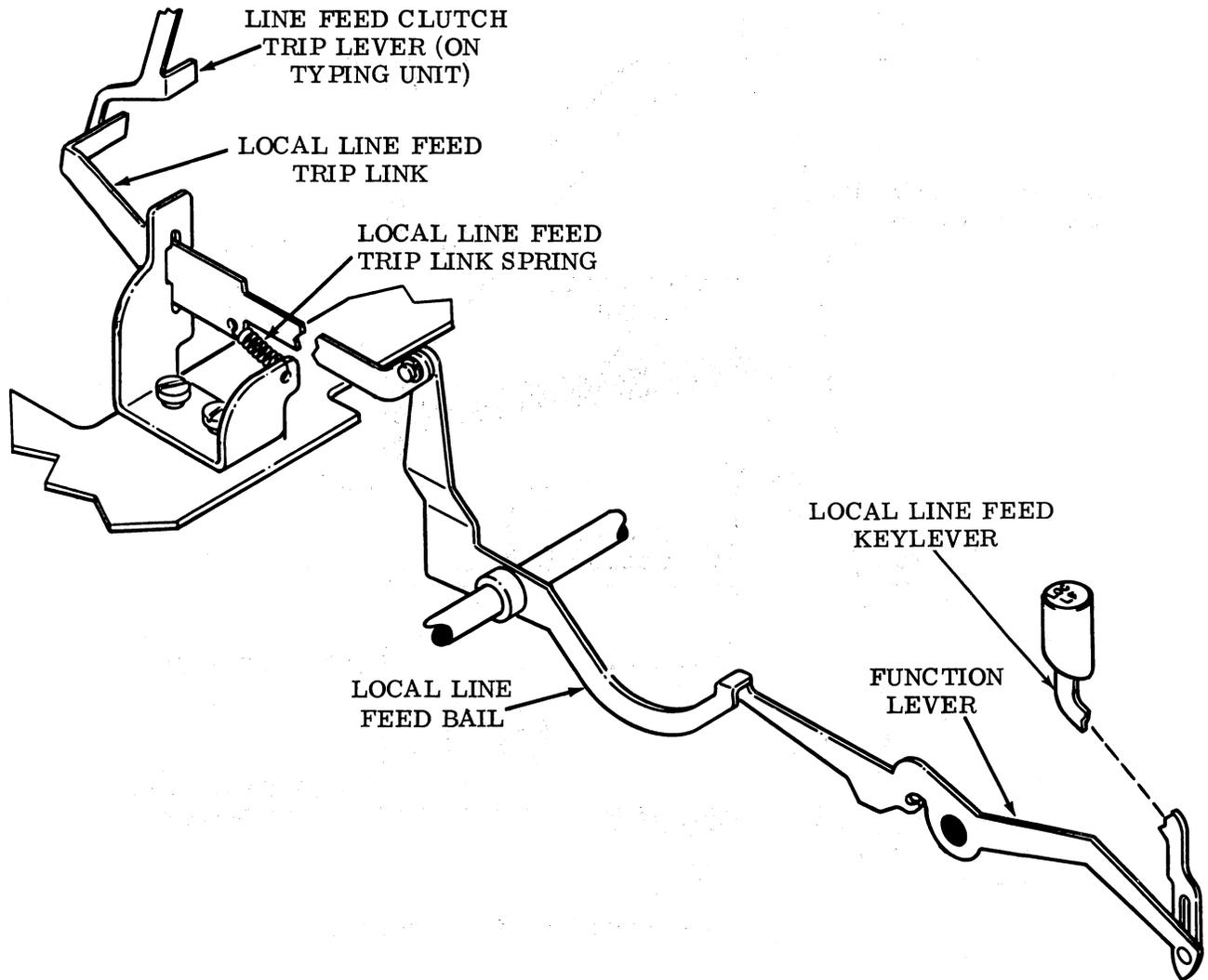


Figure 10 - Local Line Feed Mechanism

(b) When the local line feed trip link is fully actuated, it rotates the local paper feed-out switch lever, releasing the switch plunger and permitting the contacts in the magnetic blow-out switch to close.

(c) This actuates the motor circuit of the printer so that the motor will run and eject copy paper so long as the LOC LF key-lever is depressed (printer normally off).

#### H. Electrical Keyboard (Figure 12)

3.27 The electrical keyboard lock mechanism permits the signal generator contact to be electrically shunted from the keyboard or

from the associated typing unit shunt. This mechanism operates as follows:

(a) To shunt the keyboard locally, depress the REC keylever (Figure 12). This action raises the keyboard lock function lever which, in turn, raises the lockbar latch. With the lockbar latch disengaged, the lockbar is free to move to the right under spring tension of the keyboard lock switch contact on the switch lever. The switch lever then pivots, closing the contacts of the switch. The associated circuits are arranged to shunt the signal generator when the switch is closed. However, since there is no mechanical blocking of the keylevers, the perforator transmitter can still be operated as a tape perforator.

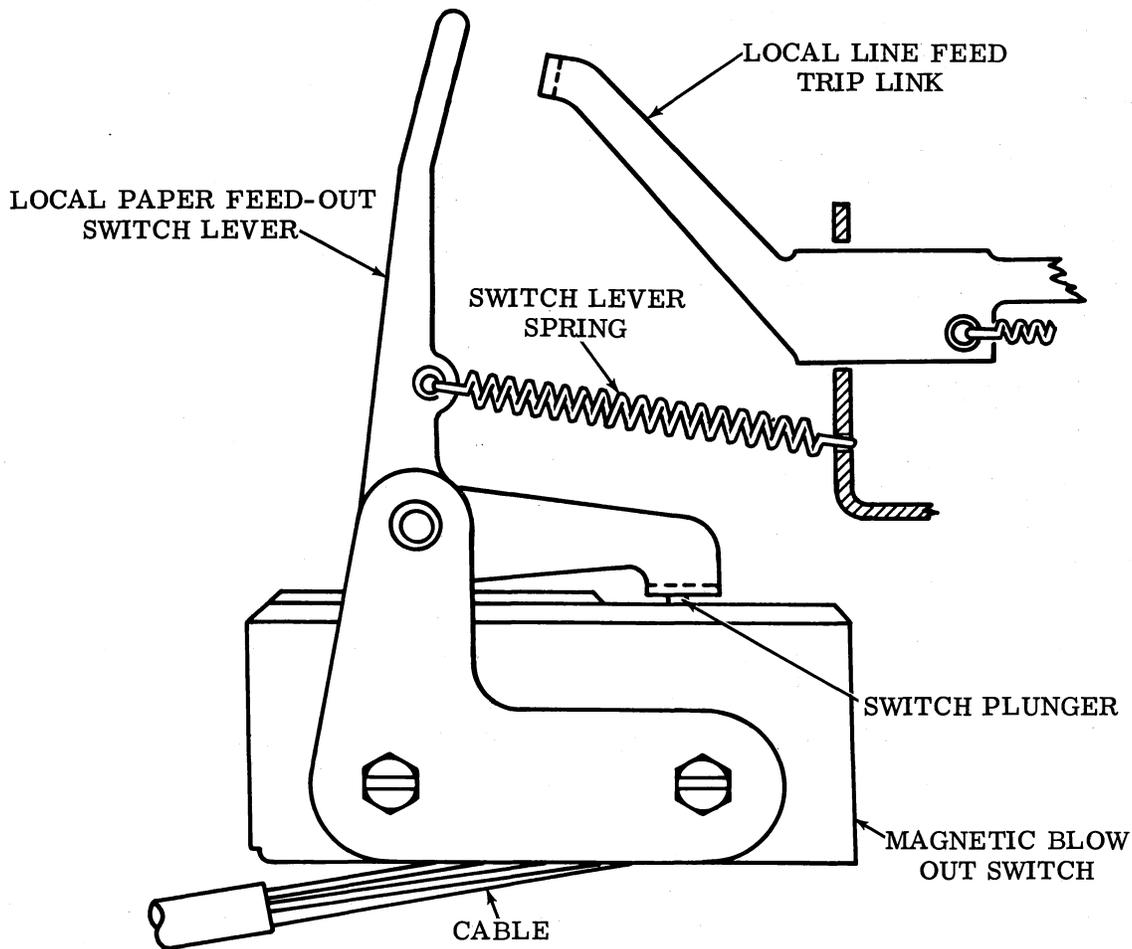


Figure 11 - Local Paper Feed-Out Mechanism

(b) The keyboard can also be shunted when two consecutive blank code signals are received by the associated typing unit. Under this condition, the keyboard locklever on the typing unit (Figure 12) moves downward and depresses the keyboard lock plunger. This movement causes the keyboard lock bail to pivot and raise the keyboard lock function lever. This disengages the lockbar latch and the keyboard is shunted as described in (a).

#### I. Keyboard Unlock (Send Key)

3.28 The keyboard unlock mechanism permits the keyboard to be unshunted. The operation of the mechanism is as follows:

(a) When the SEND keylever is depressed (Figure 13), the keyboard unlock function lever rises against a diagonal camming surface on the lockbar (Figure 12). This moves

the lockbar to the left until the lockbar latch falls into a notch on the lockbar.

(b) As the lockbar moves to the left, the switch lever (Figure 13) pivots and opens the contacts of the keyboard lock switch. The associated circuits are arranged so that, when the switch contacts open, the signal generator is no longer shunted (Paragraph 3.27) and normal signal transmission can take place.

#### J. Local Carriage Return

3.29 The local carriage return mechanism enables the operator to trip the carriage return mechanism on the associated typing unit, thereby causing the type box carriage to be fully returned to its normal position at the beginning of a line of copy. This mechanism operates as follows: When the LOC CR keylever (Figure 14) is depressed, its function lever rises and, in turn, raises the forward end of the local carriage

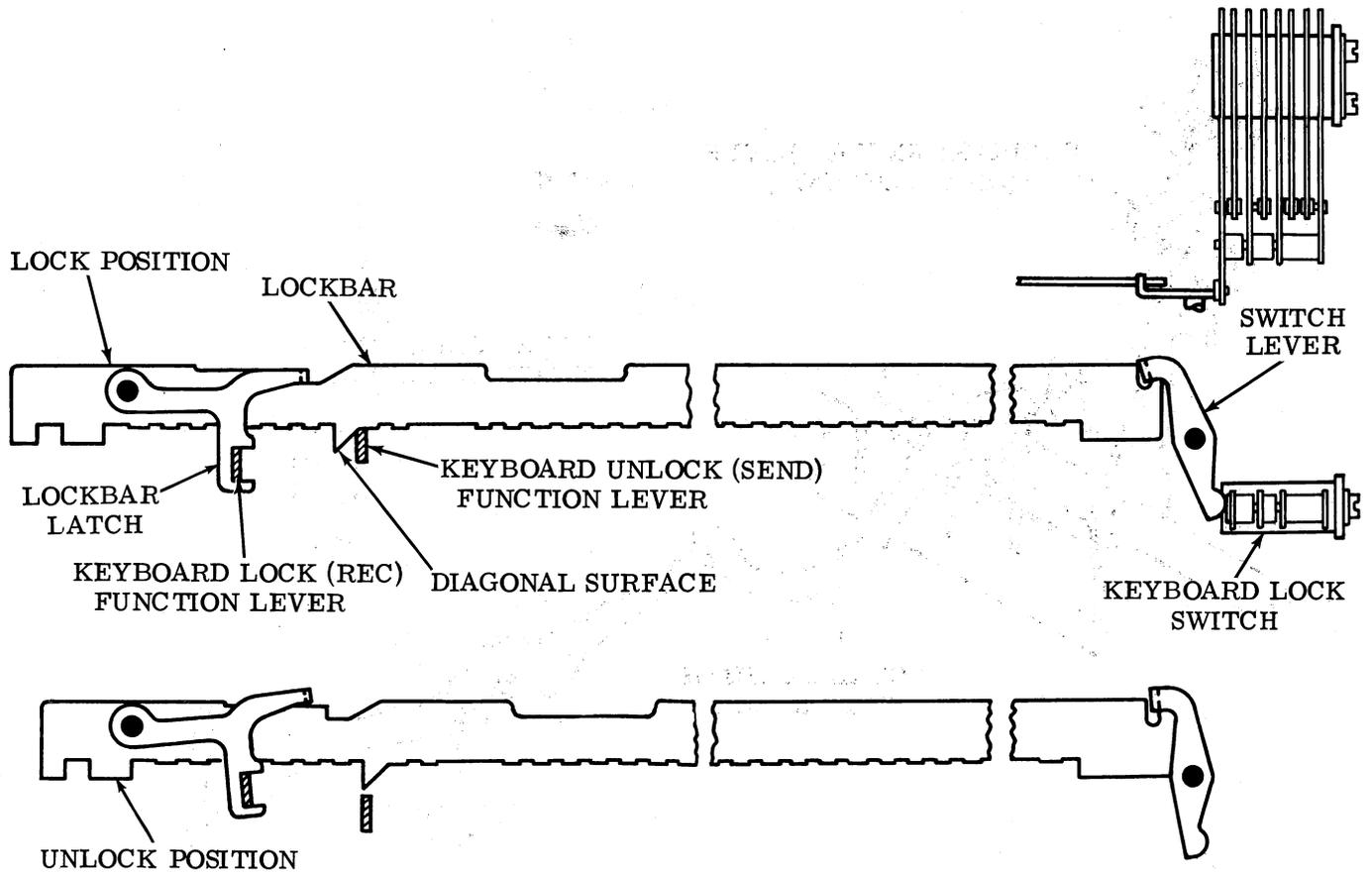
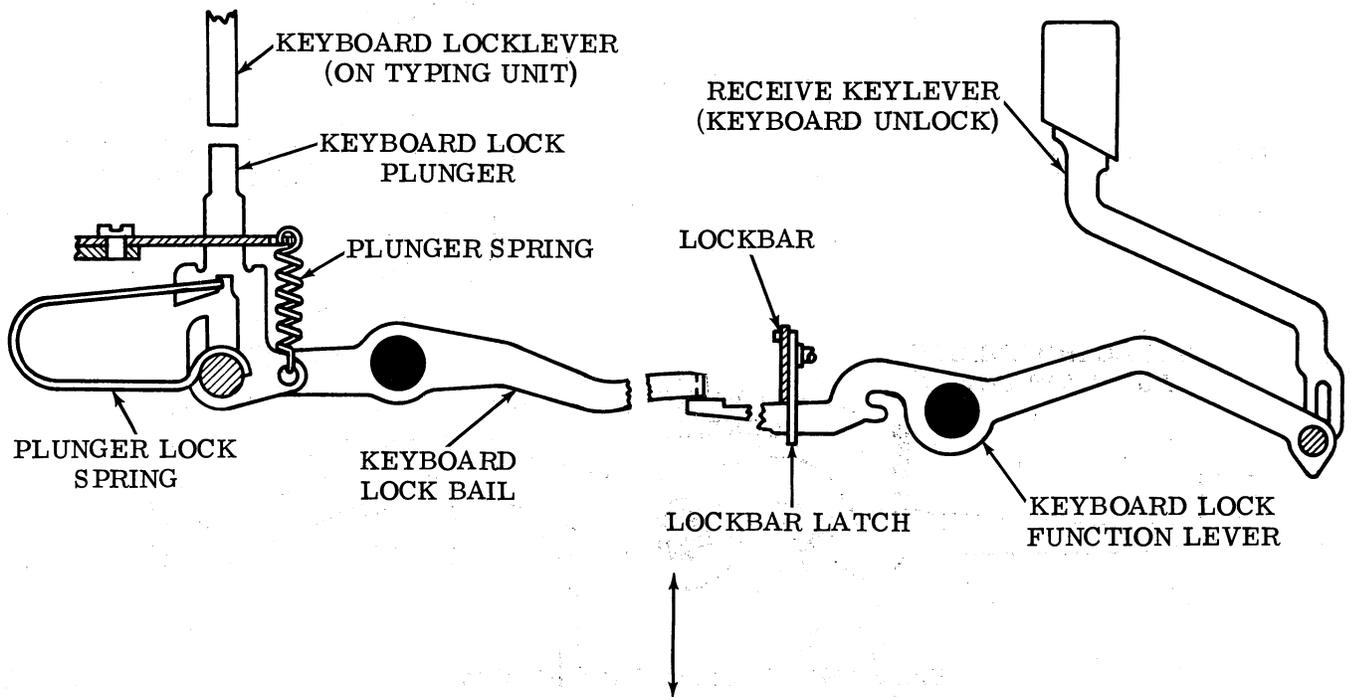


Figure 12 - Electrical Keyboard Lock Mechanism

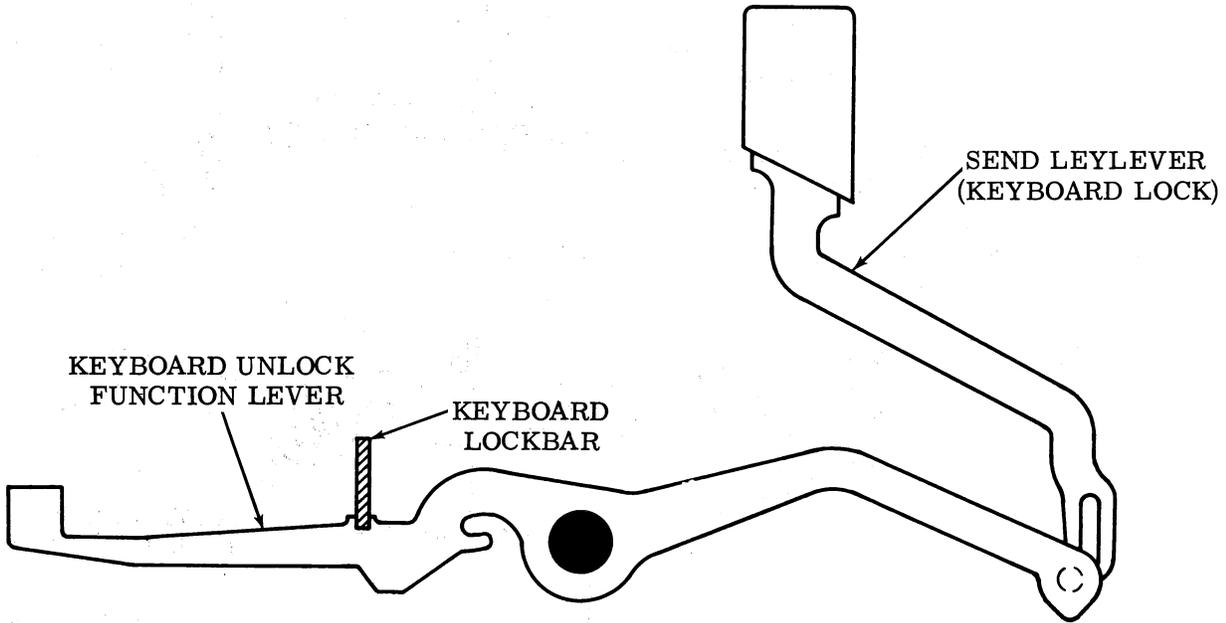


Figure 13 - Keyboard Unlock Mechanism

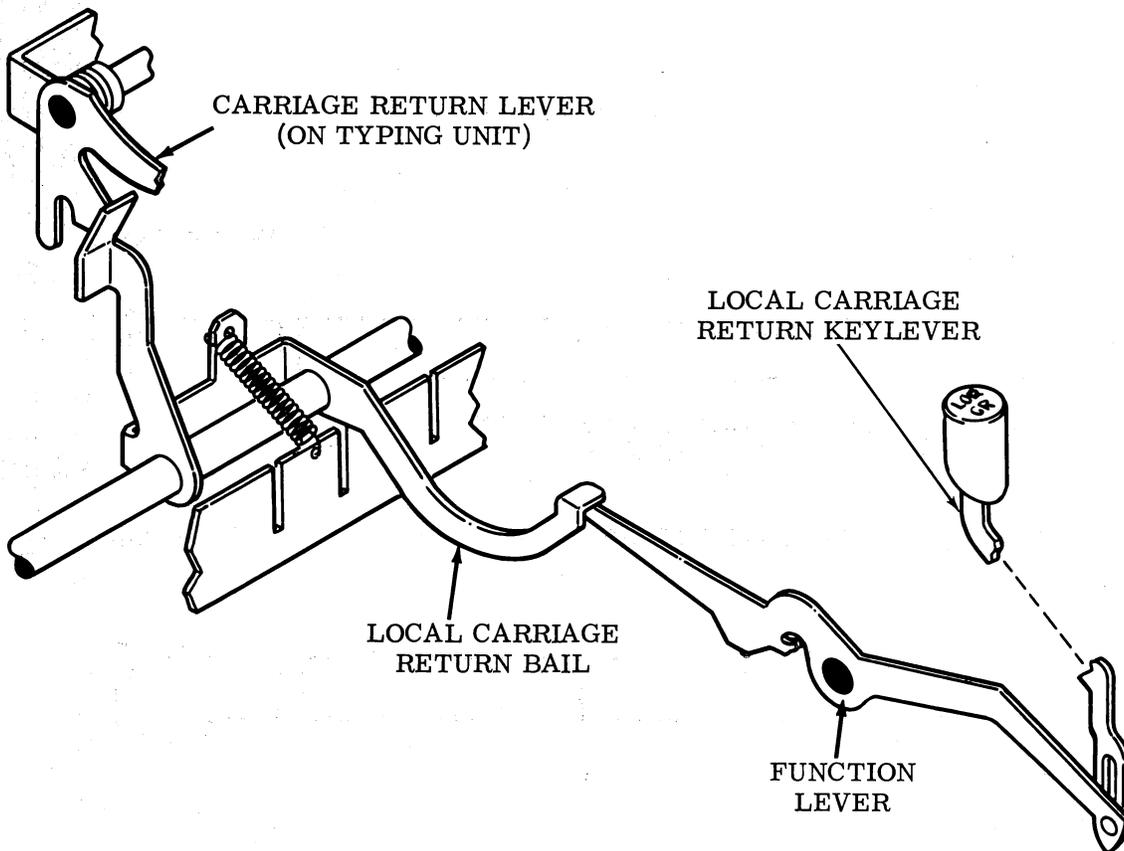


Figure 14 - Local Carriage Return Mechanism

return bail. This bail rotates about its pivot point until the upper end engages the carriage return lever on the typing unit. The carriage return mechanism operates in this manner without a signal that would cause other units in the line circuit to function.

#### K. Margin Indicator (Figure 15)

3.30 The margin indicator cam disc on the associated typing unit spring drum rotates with the drum as spacing occurs. As the end of each line is approached, the cam surface of the disc makes contact with the margin indicator contact switch lever and rotates it clockwise about its pivot point. When the lever rotates, it releases the margin indicator switch plunger. The normally open contacts are closed, completing the circuit to a margin indicator light in the cabinet. The carriage return cycle returns the cam disc to its starting position and the margin indicator switch opens. The switch is operative only when the keyboard is in the K and K-T positions.

#### L. Character Counter (Figures 16 and 17)

3.31 The character counter is driven mechanically from the perforator transmitter by the action of the counter and carriage return codebars located in the second and third slots of the codebar basket. These bars provide drive projections which engage the forks of the feed

and reset bails of the counter. As the codebars fall to the right when a key on the keyboard is struck, the counter mechanism is tripped. As the keyboard is reset under power, the counter performs its required functions. These functions may be divided into three distinct phases of operation. Figure 18 illustrates these three phases of operation, and also the normal position of the counter mechanism.

#### Stepping

3.32 Referring to sequence A, Figure 18, as a key is struck the codebars fall to the right, carrying with it feed bail 1. The drive lever, which is linked to the feed bail, moves to the left slightly more than one tooth. As the codebars are reset under power, stepping bail 1 moves clockwise, causing the drive lever to advance the ratchet drum one tooth. The drive pawl prevents the ratchet drum from rotating counterclockwise until it is again tripped for the following character. When this occurs, the ratchet drum rotates slightly counterclockwise, coming to rest against the latch lever.

#### Counter Reset

3.33 Sequence B, Figure 18, illustrates the tripped position of the counter mechanism for a reset function. Reset bail 2 moves counterclockwise as its codebar falls to the right, causing the reset lever in turn to rotate clockwise.

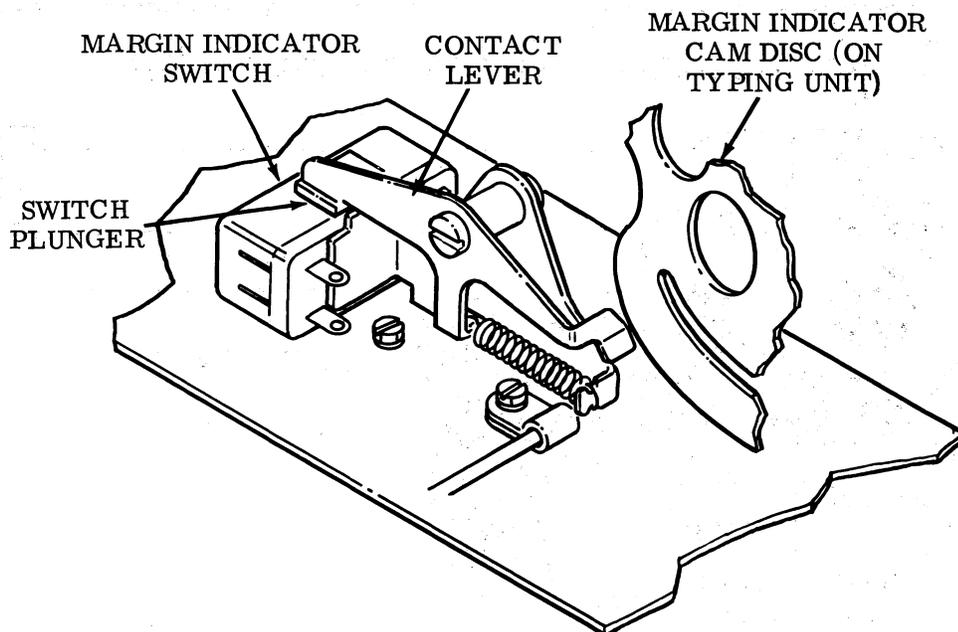


Figure 15 - Margin Indicator Mechanism

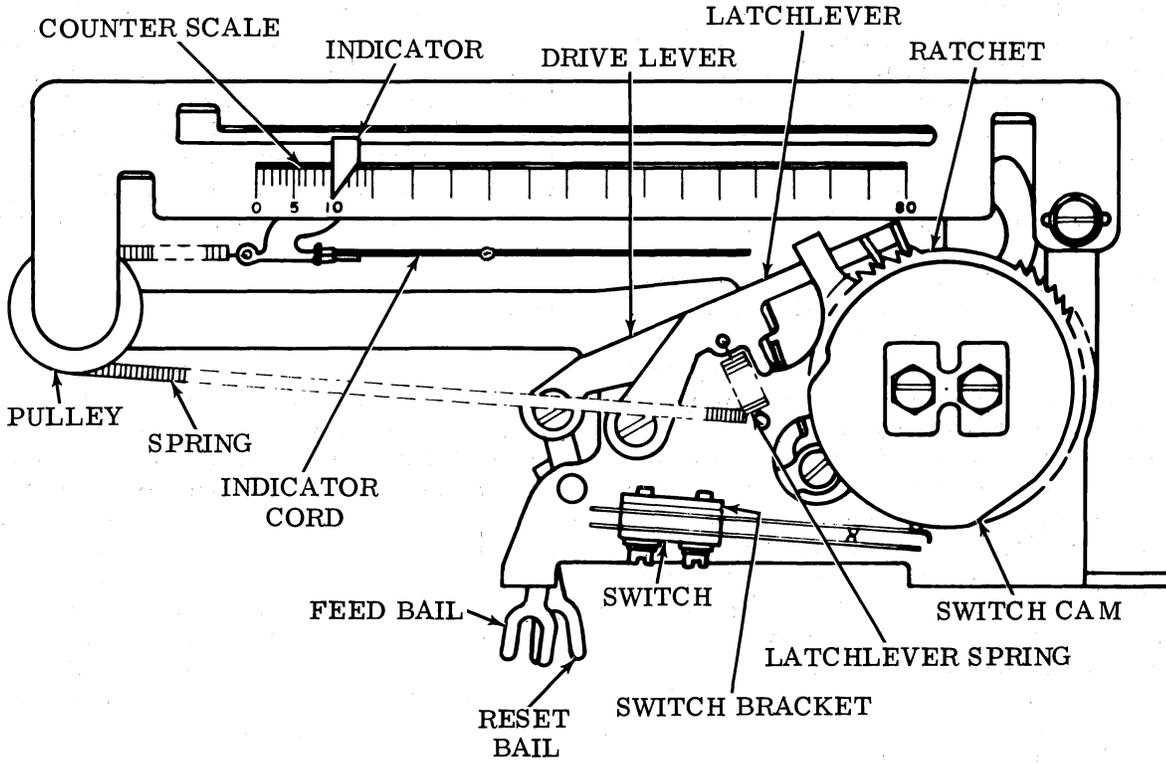


Figure 16 - Character Counter Mechanism (Front View)

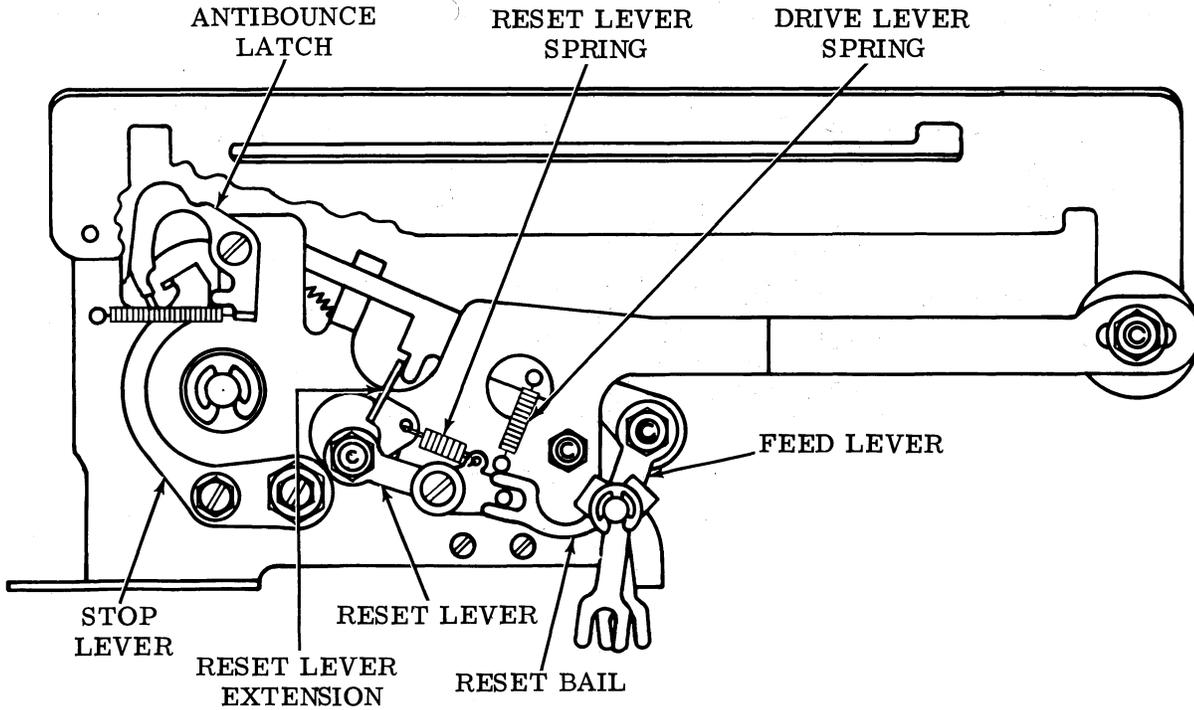


Figure 17 - Character Counter Mechanism (Rear View)

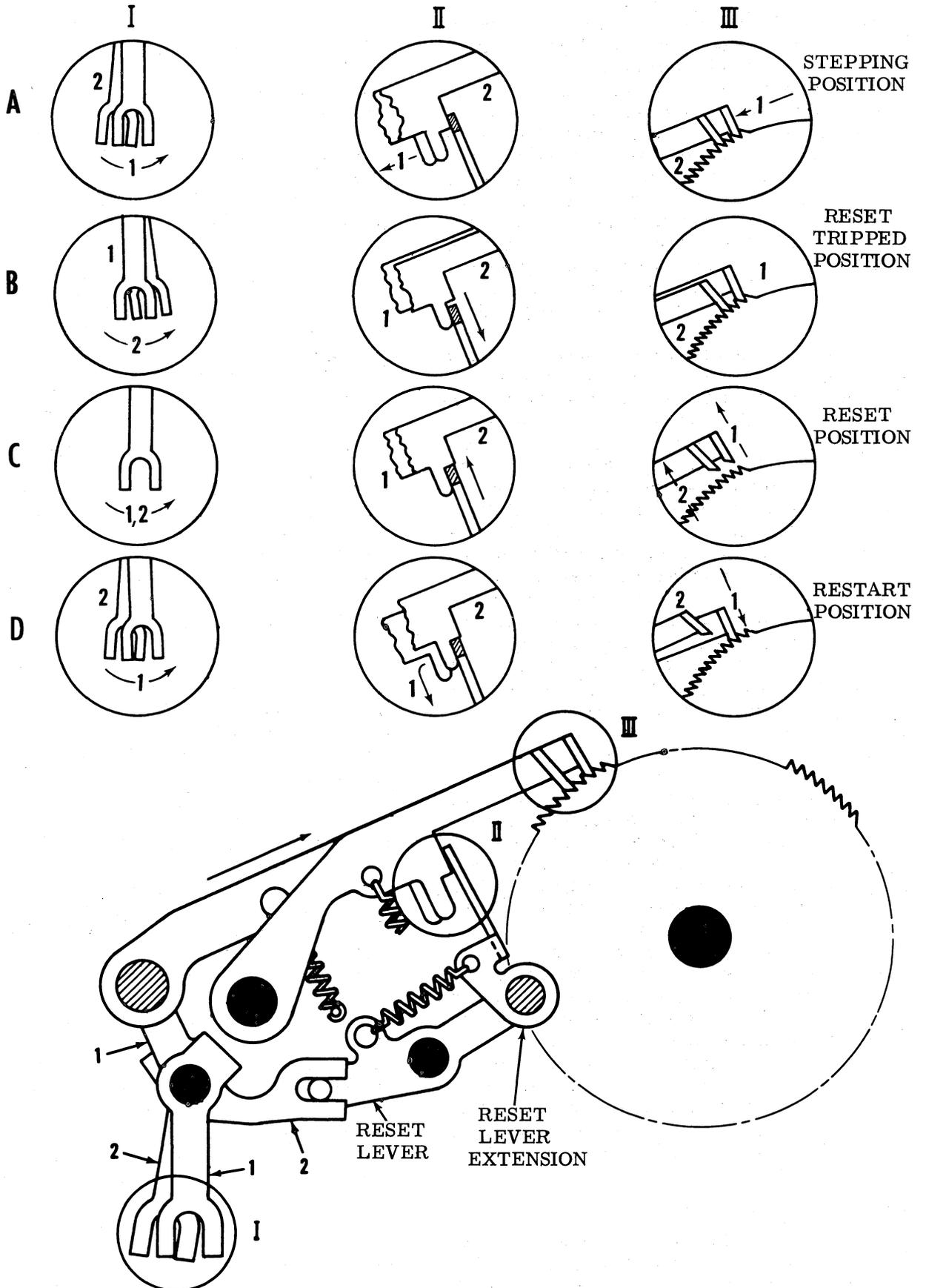


Figure 18 - Operation of Character Counter Mechanism

As the reset lever rotates clockwise, the reset lever extension moves downward until it falls under the shoulder of the projection on the drive and latchlevers under the action of its spring. When the counterbars are reset as in C, Figure 18, the reset bail is rotated clockwise to its original position, causing the reset lever to rotate counterclockwise, carrying the reset lever extension upward, and moving both the drive lever and latchlever out of engagement with the ratchet teeth. The mechanism remains in this condition and the ratchet drum assembly rotates rapidly counterclockwise (under the action of its return spring) until it reaches its zero position.

3.34 As the ratchet drum reaches its zero position, a stop on the ratchet strikes a stop lever fastened to the frame. The elastic impact is transmitted through the stop lever to the antibounce lever whose lower end is normally in contact with the stop lever. The antibounce lever rotates counterclockwise, dropping in behind the ratchet stop. As the ratchet drum rebounds from the stop lever, its stop strikes the antibounce lever, preventing further motion and maintaining the antibounce lever in its actuated position. The ratchet continues to operate between the stop lever and antibounce lever until the energy in the system has been largely dissipated. The ratchet stop then remains in contact with the stop lever, permitting the antibounce lever to return to its normal position.

#### Restart

3.35 Sequence D, Figure 18, illustrates the restarting action of the counter mechanism for the character following a carriage return. As a key on the keyboard is depressed, the counter codebar falls to the right, the feed bail moves counterclockwise and the drive lever moves to the left. As the drive lever moves to the left it is disengaged from the reset lever extension and falls into engagement with the ratchet tooth. As the codebars are reset under power, the feed bail rotates clockwise and the feed lever begins to move to the right. As it does, its projection pushes the reset lever extension to the right and out of engagement with the latchlever, which falls into engagement with the ratchet drum. As the drive lever completes its stroke, it steps the ratchet one tooth as in the normal stepping operation.

#### End-of-Line Switch

3.36 The end-of-line switch, Figure 16, operates the end-of-line indicator light located in the cabinet to signal the end of a typed

page printer line. The switch circuit is operative only when the keyboard is in the T position. In the K and K-T operating positions, the end-of-line indicator light is operated by the margin indicator switch (Paragraph 3.30). Selection of either the end-of-line indicator switch or margin indicator switch is automatically controlled by a keyboard control selection switch (Figure 21). The selection switch is, in turn, operated by the keyboard control knob.

3.37 Operation of the character counter end-of-line indicator switch is controlled by a switch cam (Figure 16). The switch cam rotates with the ratchet drum and can be adjusted to close the switch at any typed line length of from 10 to 80 characters.

#### M. Auxiliary Electric Switch (Figure 1)

3.38 This switch is of the multicircuit type. Operation of the switch is controlled by the keyboard control knob through a shaft and gears. The switch is used for various switching requirements not applicable to this section.

#### N. Tape Supply Container (Figure 1)

3.39 The tape supply container supplies the tape to the punch. The tape is guided from the container so that it traverses the punch from right to left (viewed from the front). A low-tape switch mechanism is available, as an optional feature, with the container to initiate a signal when the supply of tape is low.

#### O. Keyboard Tape Backspace

3.40 The keyboard tape backspace mechanism controls the operation of the power drive backspace mechanism on the perforator. It consists of a tape backspace (TAPE B. SP.) key-lever and a tape backspace switch.

3.41 When the TAPE B. SP. keylever is depressed, it causes its associated lever arm to contact and depress the actuating button on the backspace switch. As this happens, the circuit to the backspace magnet of the power drive backspace mechanism on the perforator is closed, and power is applied to the magnet. The power drive backspace mechanism will then move the perforated tape backward one space each time the TAPE B. SP. keylever is depressed. See appropriate sections of perforator units for operation of power backspace mechanism.

## KEYBOARD-PERFORATOR LINKAGE MECHANISM (Figure 19)

### A. General

3.42 The keyboard-perforator linkage consists principally of a codebar extension basket mechanism, and a reset cam follower bracket mechanism. The functions of the codebar extension basket mechanism are to transmit character information from the keyboard codebars to the perforator, and to control the operation of the perforator-transmitter in the K, K-T, and T positions. The reset cam follower mechanism provides the linkage between the clutch tripbar and the perforator cam in the T position to permit the keyboard to be reset at high speeds by the tape perforator.

### B. Operation in K Position

3.43 In this position, signals are generated by the keyboard as described in Paragraph 2 and the perforator is inoperative. This mode

of operation is set up by turning the keyboard control knob to the K position. This conditions the keyboard-perforator linkage as follows:

(a) When the keyboard control knob (Figure 19) is turned to the K position, the blocking bail shown in the illustration is moved to the left to the dotted position by the action of the control cam. When a codebar is selected and falls to the right, the codebar extension is prevented from moving to the right by the blocking bail and, therefore, information is not transmitted to the punch. An extension on the blocking bail also prevents selection of the character counter codebars (Paragraph 3. L.).

(b) As the blocking bail moves to the left, a second extension (Figure 20) engages a bell crank and pivots the bell crank clockwise. This disengages the latch from the clutch tripbar link so that, as the clutch tripbar falls to the right, the clutch tripbar link remains in the position shown and the perforator clutch is not tripped.

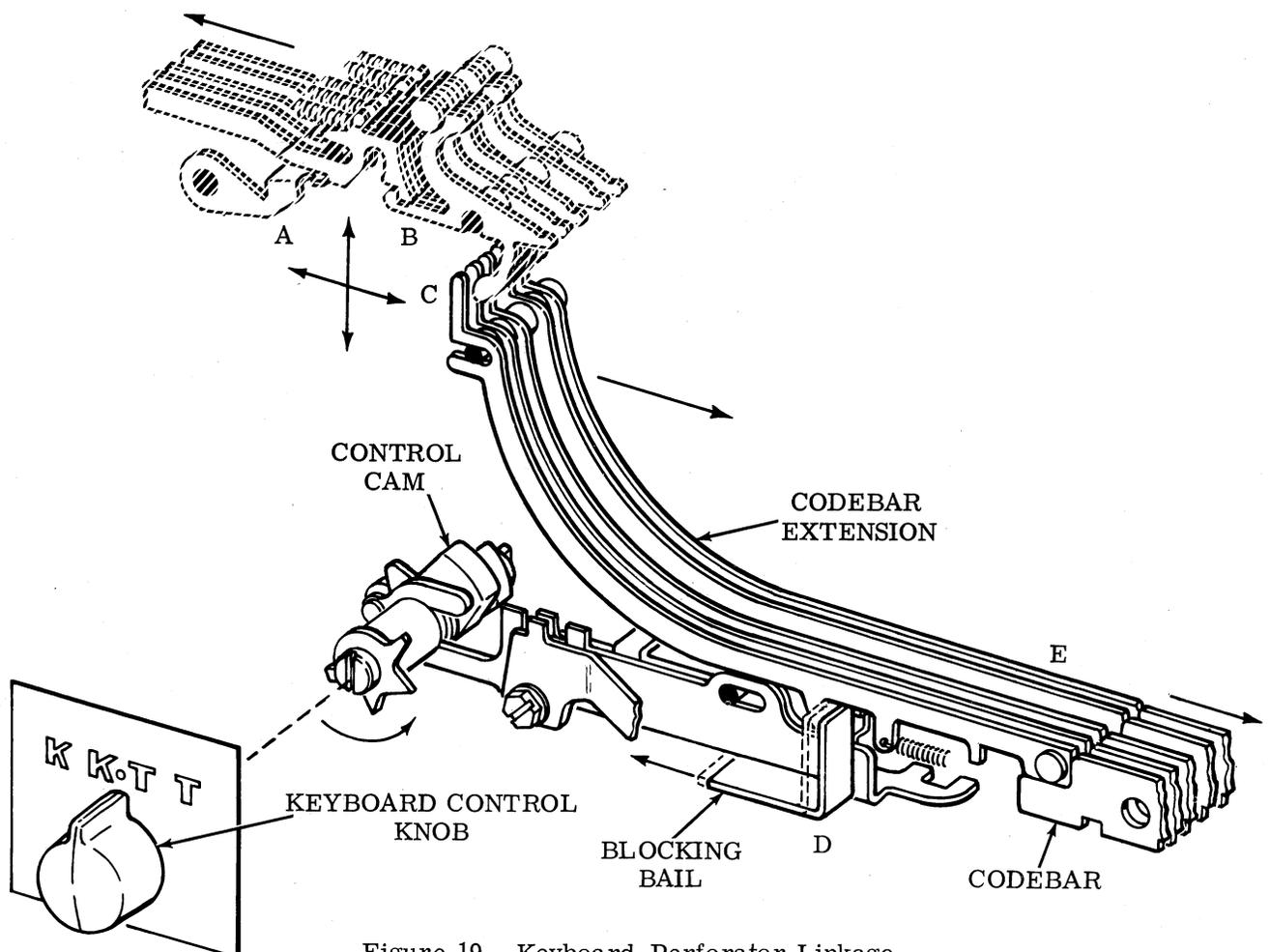


Figure 19 - Keyboard-Perforator Linkage

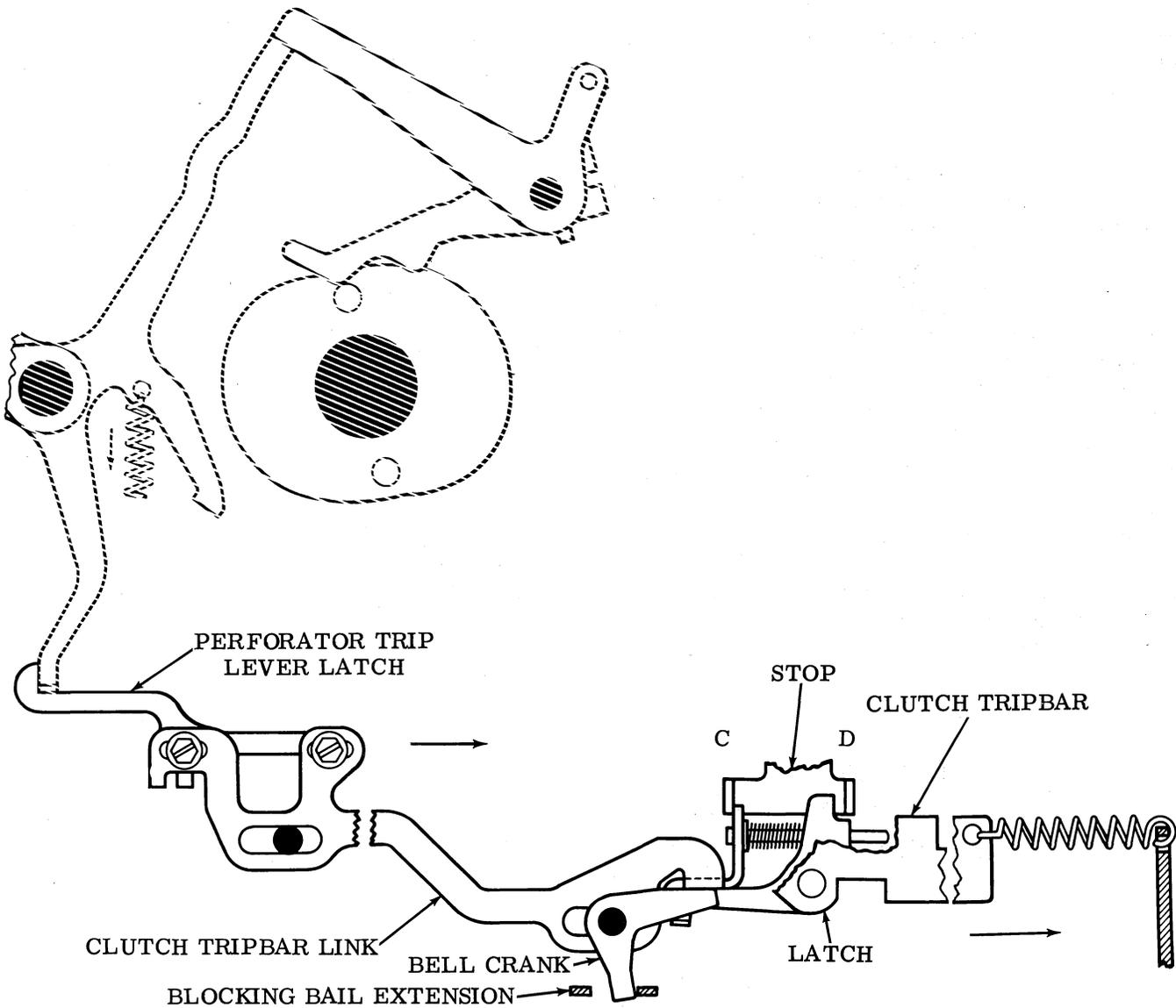


Figure 20 - Perforator Clutch Trip Linkage

(c) The keyboard control selection lever (Figure 21) is pivoted counterclockwise so that its pin at point B is free of the hook on the reset lever of the reset cam follower mechanism. At the same time, the extension on the right end of the keyboard control selection lever moves up to the dotted position shown at C so that, as the clutch tripbar falls to the right, the extension strikes the signal generator clutch trip lever, operating the signal generator mechanism.

### C. Operation in K-T Position

3.44 In this position, signals are generated by the keyboard and tape is simultaneously perforated. This mode of operation is set up by

turning the keyboard control knob to the K-T position. This conditions the keyboard-perforator linkage as follows:

- (a) When the keyboard control knob is moved to the K-T position, the blocking bail shown in Figure 19 moves to the right, releasing the codebar extensions and character countercodebars. The bell crank (Figure 20) pivots counterclockwise, allowing the latch to engage the clutch tripbar link.
- (b) The keyboard control selection lever (Figure 21) remains in its counterclockwise position so that it is not engaged by the reset lever of the reset cam follower, but is still in position to trip the signal generator clutch trip lever.

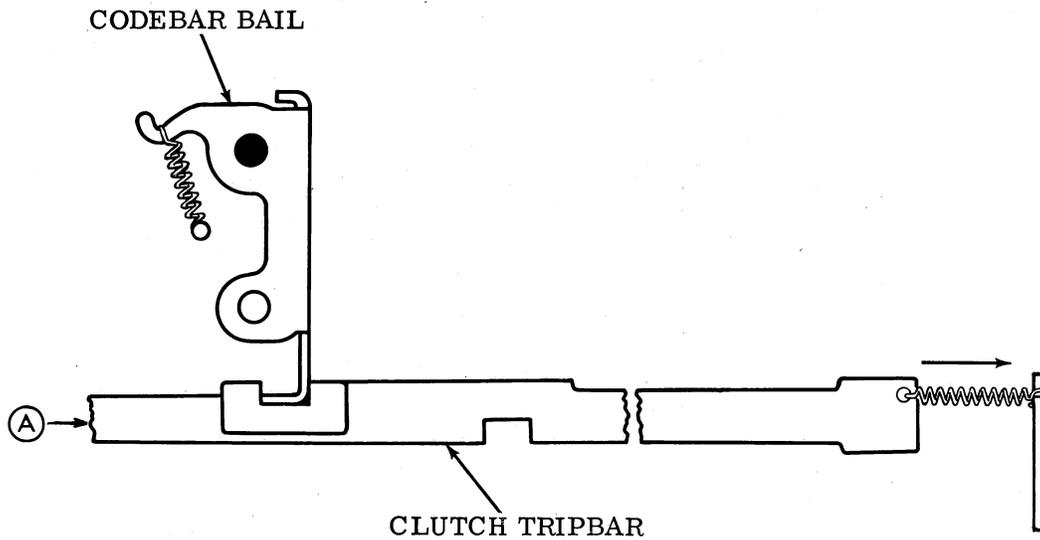
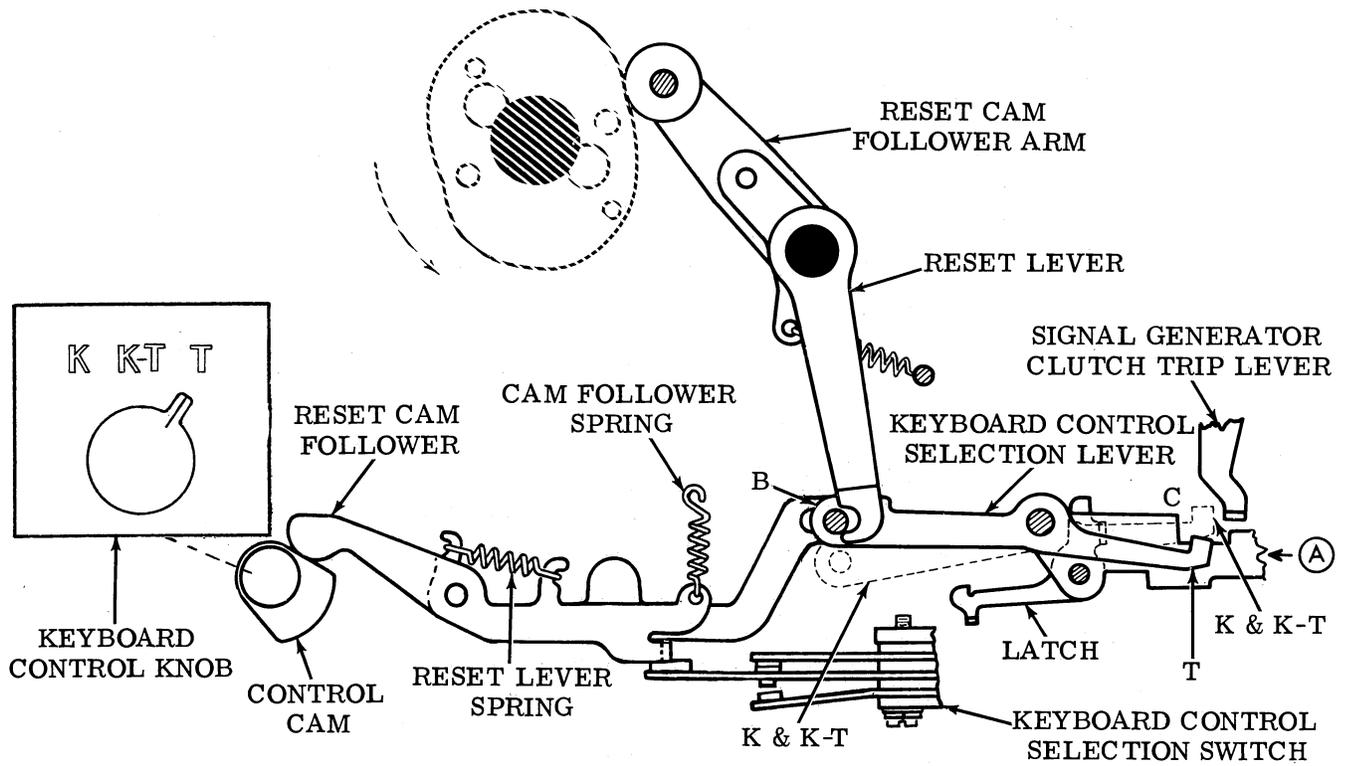


Figure 21 - Mode Selection and Keyboard Reset Mechanism

(c) The character counter codebars are released so that the character will count; however, its end-of-line switch is inoperative due to the position of the keyboard control selection switch (Figure 21). Refer to Paragraph 3.L. for a description of the control switch operation.

(d) When a code keylever is depressed, the clutch tripbar falls and the following sequence takes place:

(1) The codebar bail and clutch tripbar move to the right, thereby releasing the selected codebars. The selected codebars and associated codebar extensions (Figure 19) move to the right. As the codebar extensions move to the right, they engage their associated punch slide latches at C on the perforator, causing the punch slide latches to rotate counterclockwise and unlock the punch slides at B.

(2) The clutch tripbar link (Figure 20) is pulled to the right by the clutch tripbar. The clutch tripbar link is coupled to the perforator trip lever latch. This latch contacts the perforator trip lever at B, causing it to rotate counterclockwise. As it moves counterclockwise, the perforator trip lever is disengaged from the clutch release at A. The clutch release falls under spring tension and releases the perforator clutch trip lever which, in turn, trips the perforator clutch. The signal generator clutch is tripped as previously described.

(3) As the perforator trip lever rotates counterclockwise, the reset bail trip lever linked to it (Figure 20) pulls down an extension on the punch slide reset bail at E. The reset bail moves down, permitting the selected punch slides (Figure 19) to move to the left under action of their bias springs.

(4) As the clutch tripbar nears the end of its stroke to the right, the upper portion of the latch comes in contact with the stop at point D. The latch then pivots counterclockwise, releasing the clutch tripbar link which moves rapidly to the left under the action of the compression spring shown immediately below the stop. The clutch tripbar link is stopped in its movement to the left by its extension striking the stop at point C. The perforator

trip lever latch is to the left of and completely free of the perforator trip lever. As the clutch release pivots clockwise under the resulting action of the pin on the reset cam, the perforator trip lever is released from its counterclockwise position and allowed to rotate clockwise to its normal position as shown in Figure 20.

(5) In the meantime, the clutch tripbar (Figure 20) is being reset and is moving to the left. As the latch moves to the left away from the stop at point D, it pivots clockwise to its normal position so that when the clutch tripbar is at the extreme left of its reset travel, the latch is again allowed to hook under the clutch tripbar link. This completes the operating cycle.

#### D. Operation in T Position

3.45 In this position, tape is perforated by the perforator but no signals are generated by the keyboard. The keyboard is reset by the perforator since the signal generator mechanism is inoperative. This mode of operation is set up by turning the keyboard control knob to the T position. This conditions the keyboard-perforator linkage as follows:

(a) When the keyboard control knob is turned to the T position, the keyboard control selection lever (Figure 21) is pivoted clockwise so that its pin at point B is in position to engage the hook of the reset cam follower reset lever. The right end of the keyboard control selection lever at point C falls so that it will not engage the signal generator clutch trip lever. In the T position, therefore, the signal generator clutch is not tripped and the signal generator is inoperative.

(b) The keyboard perforator linkage and perforator clutch trip system operate as described in Paragraph C. above. The character counter is operative and controls the end-of-line indicator light as described in Paragraph 3.L.

(c) Codebar reset is effected by the reset cam follower mechanism. When a code keylever on the keyboard is depressed, the codebar bail and clutch tripbar (Figure 21) fall to the right so that the reset lever with hook is in position to engage the pin of the keyboard control selection lever at point B. When the perforator clutch is tripped, the reset cam begins to rotate counterclockwise

and, as it does, the reset cam follower arm and associated reset lever rotate clockwise. The hook on the reset lever engages the pin on the keyboard control selection lever and moves the selection lever and clutch tripart to the left. The configuration of the reset cam is such that, at a later stage of the operating cycle, the reset lever with hook moves away from the pin of the keyboard control selection lever. The clutch tripart again starts to move to the right. However, the codebar bail latch latches the codebar bail at this point, preventing further movement of the clutch tripart as the reset cam follower arm returns to its initial position.

#### 4. VARIABLE FEATURES

##### ANSWER-BACK MECHANISM (Figures 22 and 23)

4.01 The answer-back mechanism is an electromechanical device which permits the identity of a called station to be transmitted automatically to the originating station, in response to a coded, sequential message from the signal line. The HERE IS keytop provides manual operation. Transmissions are generated in the normal manner by the keyboard, which, through its codebar mechanism, reads the code combination contained in a message drum.

4.02 The mechanism is comprised basically, of a coded message drum, control relay, and keyboard contacts. The drum is coded for

the desired combination by removing code lines from the 21 code blades, as required (Figure 22). The first character transmitted is always a LTRS combination to place the called station in the unshift position; the other 20 may be any characters desired. However, the first transmission is usually followed by CR (carriage return) and LF (line feed). This sequence is also typically used to end a coded sequence, to insure that the answer-back message will appear at the beginning of a line at the distant station, and that over-printing of the message will not occur. Typically, 16 characters are available for the answer-back identification.

4.03 The following explanation of operation uses the combination FIGS - D as an example. The combination used may vary with the application.

##### A. Called Station

4.04 The answer-back message is initiated at the called station by depressing the FIGS, upper case D combination at the originating station. The operation of the FIGS function box contact at the called station will de-energize the answer-back (noncontention) control relay if this relay is in an energized condition prior to the reception of the FIGS combination. The closing of the D function box contact then completes a circuit to the answer-back trip magnet via normally closed control relay contacts. The

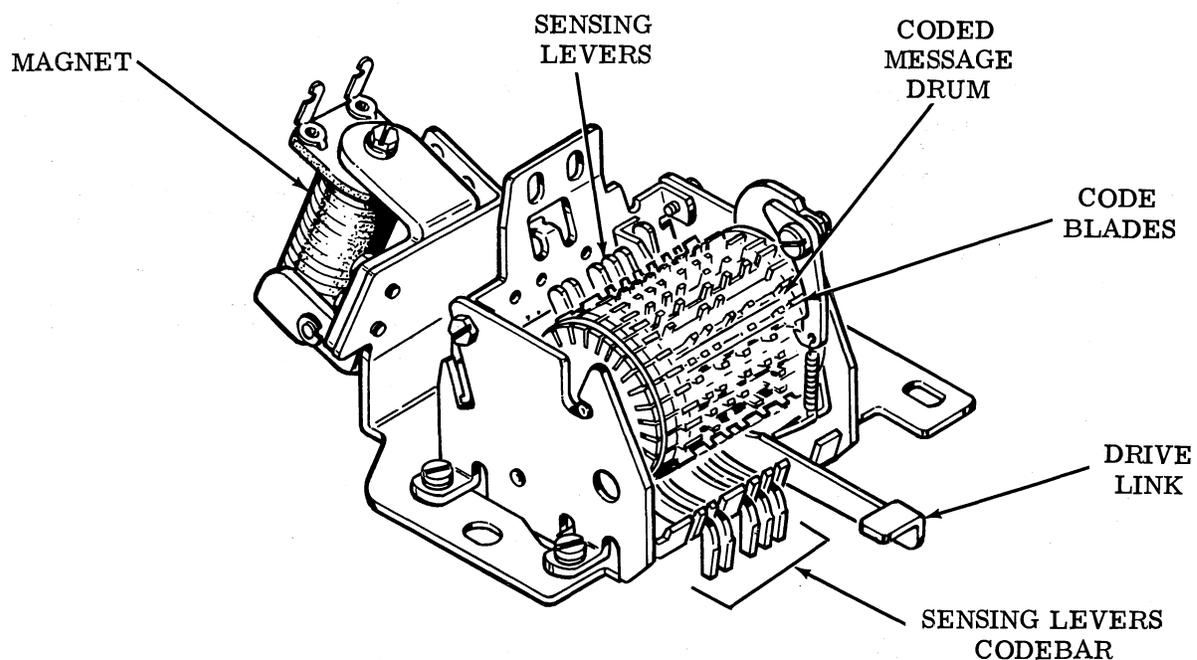


Figure 22 - Answer-Back Mechanism

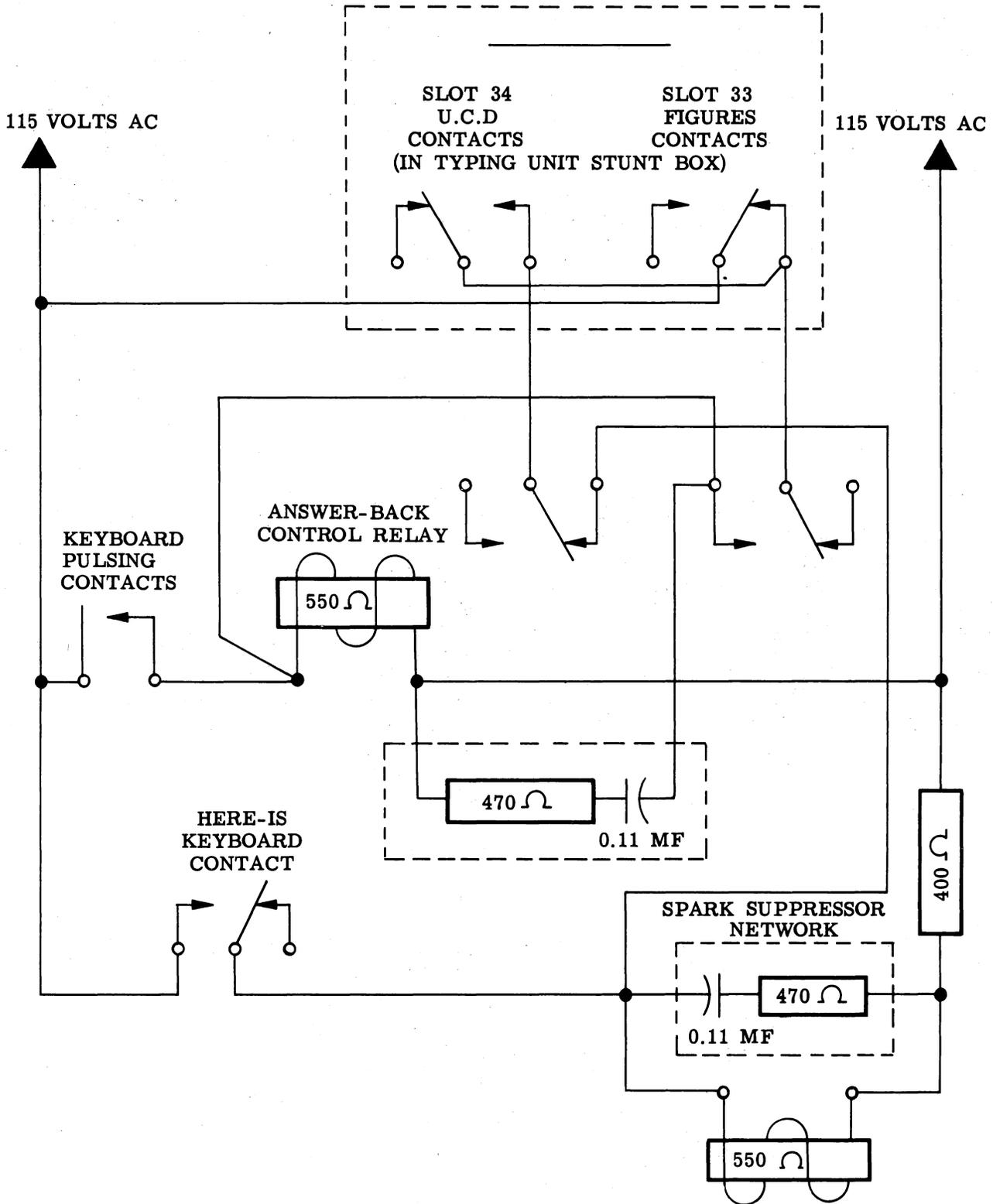


Figure 23 - Typical Answer-Back Circuit

D contact also locks the keyboard through a lever extension to the keyboard locking mechanism, if the set is so equipped. This is accomplished when the blank keylever is depressed twice in succession.

4.05 The closure of this circuit energizes the answer-back trip magnet and results in the counterclockwise rotation of the armature and associated stop-lever latch, thereby unblocking and releasing the stop lever. Under the bias of a spring attached to the codebar bail latch operating lever, the stop lever rotates counterclockwise until it comes to rest against the mechanism base plate. Before coming to rest the stop lever moves the blocking lever counterclockwise, thereby unblocking the drive plate and releasing it to its spring action. The drive plate rotates counterclockwise to a stop where the attached drive link is in a position to accept the feeding motion from the keyboard codebar bail. As the stop lever continues its counterclockwise rotation, the codebar bail latch operating lever rotates clockwise, striking the codebar bail latch. The latch rotates clockwise and releases the codebar bail. The codebar bail releases the keyboard codebars and the clutch tripbar, which move to the right under spring action. The clutch tripbar thereby trips the signal generator clutch and initiates an operating cycle.

4.06 The code combination transmitted during the first cycle must be a letters combination. The code combinations of the succeeding 20 cycles may be any arbitrary character determined by the detachable code blades fastened to the code drum. The code combination on each blade is read by five sensing levers which transfer the code selections to a vertical projection on each of the 5 codebars. Each code combination is thus transmitted in the normal manner by the keyboard signal generator mechanism. A spacing condition occurs whenever a codebar is prevented from moving to the right by its associated sensing lever; unrestricted movement of a codebar results in a marking condition. Since the sensing levers must be held away from the codebars, in order to prevent their interference during normal keyboard operation, a stop code blade having a letters combination is used. This results in a letters combination for the first character.

4.07 Once during each rotation of the signal generator cam assembly, the codebar bail is pulled to the left by a cam eccentric, causing it to rotate clockwise. The bail thereby

resets the keyboard codebars and, with the character generator drive link now in its released position, rotates the drive plate clockwise. This action causes the stepping pawl to step the code drum one position clockwise.

4.08 With the stop lever in its released position, the codebar bail latch operating lever also maintains the codebar bail latch in a released position. The signal generator mechanism will cycle continuously until it rotates the code drum one full revolution or 21 characters. The first code blade, which is the stop code blade having a letters combination, has an additional projection. When it is being rotated into the sensing position, the projection contacts the stop lever, rotating it clockwise. The left extension of the stop lever rotates the codebar bail latch operating lever counterclockwise, which in turn releases the codebar bail latch to the action of its attached spring. Continued rotation of the stop lever brings it in a position where if released to the action of the spring attached to the codebar bail latch operating lever, it will reverse rotation and become latched on the stop lever attached to the trip magnet armature. Such a position is reached when the stop code blade passes its area of contact with the stop lever, which is just prior to the complete movement of the stop code blade into the sensing position.

4.09 When the codebar bail latch is released to its spring action, it rotates counterclockwise in contact with the codebar bail latch roller until it latches the codebar bail. At this point the blocking lever is also released to its spring action, and it rotates counterclockwise until it rests against a projection on the stop lever. In this position the blocking lever holds the drive plate in its extreme clockwise position and the attached drive link is once more unable to follow the feeding motion from the codebar bail. Further operation of the signal generator and character generator is thus prevented. At this point the operator must manually unlock the keyboard to restore it to its normal operating condition if the set is equipped with a keyboard locking mechanism.

## B. Originating Station

4.10 The keyboard pulsing (or blinding) contact, mounted on the signal generator assembly, is operated every keyboard cycle by a cam which is mounted on the signal generator shaft. The pulsing contact is timed to close before the beginning of the start pulse and remain closed until after the end of the 5th pulse.

4.11 Each time it operates, the keyboard pulsing contact will energize the answer-back control relay; the control relay will remain energized via its own contacts, and the FIGS stunt box contact.

4.12 The FIGS stunt box function pawl in the typing unit is specially designed to engage the FIGS function bar at all times. The pawl is never stripped by the stripper bail. This means that the function pawl holds the function lever away from the FIGS contact. When the FIGS function bar is selected, it will permit the pawl and lever to move forward and operate the FIGS contact. (The normal stunt box operation is such that the contact does not operate until the selected function bar has first moved forward and then rearward.) This arrangement converts a normally open, momentary-operate FIGS contact to a normally closed, momentary-operate FIGS contact. At the same time, it advances the timing of the FIGS contact operation to insure that either the FIGS contact or the keyboard pulsing contact will keep the control relay energized during every signal generator cycle.

4.13 The local operator depresses the FIGS - D combination to call the remote station. The FIGS contact may or may not de-energize the control relay depending upon how long afterwards the operator depresses the D combination. In any event, the D combination will again energize the control relay, if necessary. The local answer-back will, therefore, be disabled due to the opening of the normally closed con-

trol relay contacts, which are in series with answer-back trip magnet.

**SYNCHRONOUS PULSED TRANSMISSION (Figures 1 and 24)**

4.14 Upon operation of the appropriate key-lever, the reset bail in the keyboard is moved to the right and releases the selected codebars. The universal codebar (a modified clutch tripbar) is released and moved to the right also, at which time it closes the clutch magnet conditioning contact. This action enables the clutch trip magnet to respond to an externally supplied synchronous pulse (50 or 100 milliamperes of 20 millisecond duration). When energized by the synchronous pulse, the clutch trip magnet releases and moves the clutch tripbar to the right. This movement causes the clutch tripbar extension to trip the signal generator clutch. The signal generator camshaft then rotates and transmits the selected signal.

4.15 During the single rotation of the signal generator camshaft, the reset bail is rotated clockwise and latched. The universal codebar, clutch tripbar, and the five codebars are moved and held to the left by the reset bail.

**TIME DELAY MECHANISM (Figure 25)**

4.16 The time delay mechanism operates in conjunction with the motor control mechanism in the electrical service unit. It provides automatic motor unit stop after a predetermined

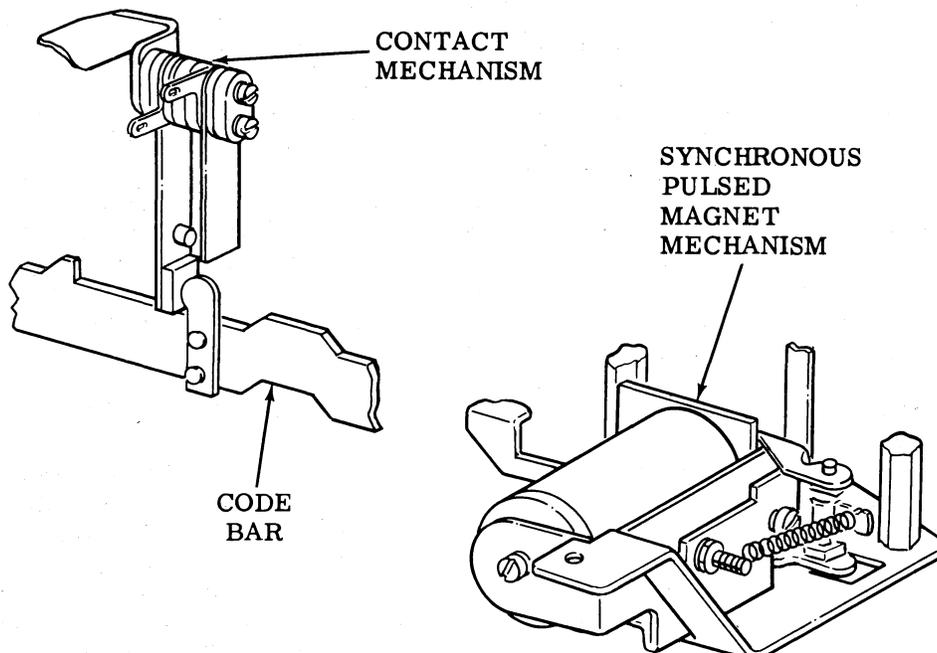


Figure 24 - Synchronous Pulsed Transmission Mechanism

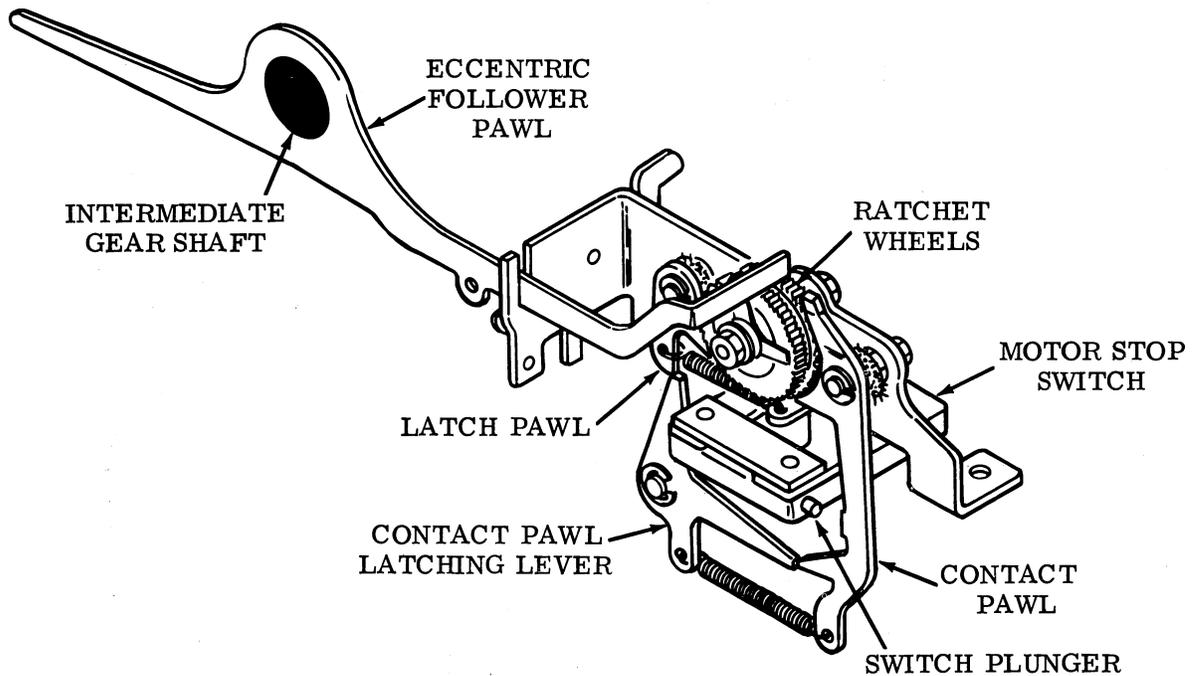


Figure 25 - Time Delay Mechanism

interval of idle signal line time has elapsed. The mechanism contains two ratchet wheels — one with 27 teeth, and one with 28 teeth. A reciprocating eccentric follower pawl, powered by the keyboard intermediate shaft, drives the ratchet wheels, one tooth at a time. The latch pawl rides the inside flanges of the ratchet wheels and controls the contact pawl latching lever, which holds the contact pawl away from the flanges. Each ratchet wheel has an indentation in its inside flange. After a maximum of 756 revolutions of the intermediate shaft, these indentations are adjacent for almost one revolution. When the adjacent indentations pass over the latch pawl, it drops into them, briefly, and then disengages the contact pawl latching lever from the contact pawl. This permits the contact pawl to ride the flanges of the ratchet wheels until either one of two events occur.

4.17 If a line signal is received before 756 revolutions of the intermediate shaft, the typing unit main bail drive extension engages the upper end of the contact pawl and causes it to again be latched by the contact pawl latching

lever. This begins a new cycle of time measurement.

4.18 If a line signal is not received before 756 revolutions of the intermediate shaft, the indentations in the flanges of the ratchet wheels again become adjacent and permit the contact pawl to drop. This action results in a pulse transmission to the motor control mechanism, which responds by switching off the motor unit.

4.19 The time elapsed between the reception of the last line signal and the stopping of the motor unit varies with the operating speed. For 60 wpm, the range is 86 to 172 seconds; 75 wpm, 60 to 120 seconds; and 100 wpm, 53 to 106 seconds.

4.20 The mechanism may be disabled by adjusting an eccentric that moves the eccentric follower pawl out of engagement with the ratchet wheels. Motor unit operation may be restored by opening the signal line circuit (eg, depressing the BREAK keylever).