

37 TYPING UNIT

DESCRIPTION AND PRINCIPLES OF OPERATION

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1. GENERAL	

1.02 Other units that support normal operation of the typing unit include a base with intermediate gear assembly, motor unit, and electrical service unit. The support units are described in their appropriate sections.

1.03 The 37 typing unit can be operated at speeds up to 150 words per minute. The selector mechanism of the typing unit can be varied to receive either 10 or 11 unit, 8-level serial code.

1.04 Of the eight levels of code information, four levels are used to position the typebox horizontally, and three levels are used to position the typebox vertically. The eighth level is not used in typebox positioning. The horizontal and vertical positioning mechanisms utilize the aggregate motion principle, and respond immediately to repositioned codebars.

1.05 All eight levels of code information can be sensed by the function mechanism. Seven levels define a character, and the eighth (parity) level verifies accuracy of transmission. When parity is used, a function cannot occur unless parity is correct.

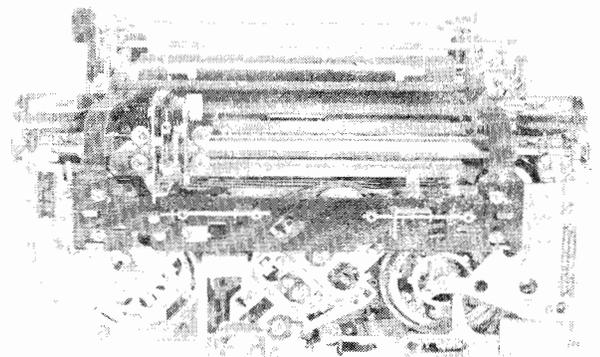


Figure 1 - 37 Typing Unit with Variable Features

1.01 This section is issued to describe the late design 37 typing unit (Figure 1). The purpose of the unit is to translate electrical code signals into printed graphics or functions.

2. DESCRIPTION

BASIC UNIT

2.01 The typing unit contains the basic mechanisms to print a graphic or perform a function. Rotational motion is applied to the main shaft assembly for distribution to all mechanisms within the unit, and is extended to the keyboard reset coupler for driving a separately mounted, keyboard reset mechanism.

2.02 The selector mechanism (Figure 2) translates a serial code input into a corresponding mechanical code output. In 8-level, serial code reception, a combination of

eight electrical code bits preceded by a start interval (always spacing) and concluded with a stop pulse (always marking) establishes a character. The nonprinting character (if assigned) is a function, and the printing character is a graphic.

2.03 The major mechanisms and variable features are described in Figures 2 through 6. Variable features are options which may be selected to increase the functions of a basic typing unit.

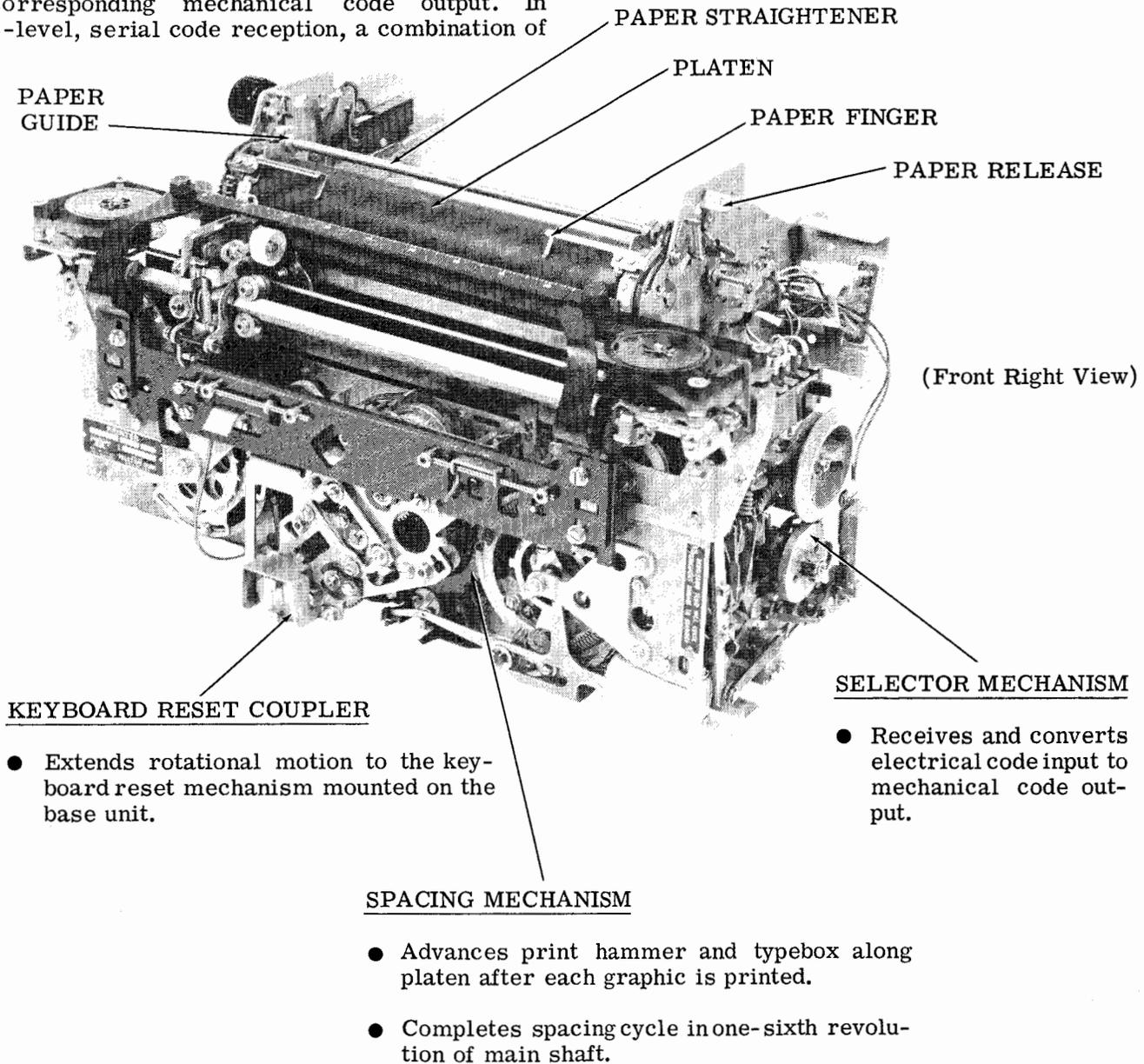


Figure 2 - 37 Typing Unit

TYPEBOX

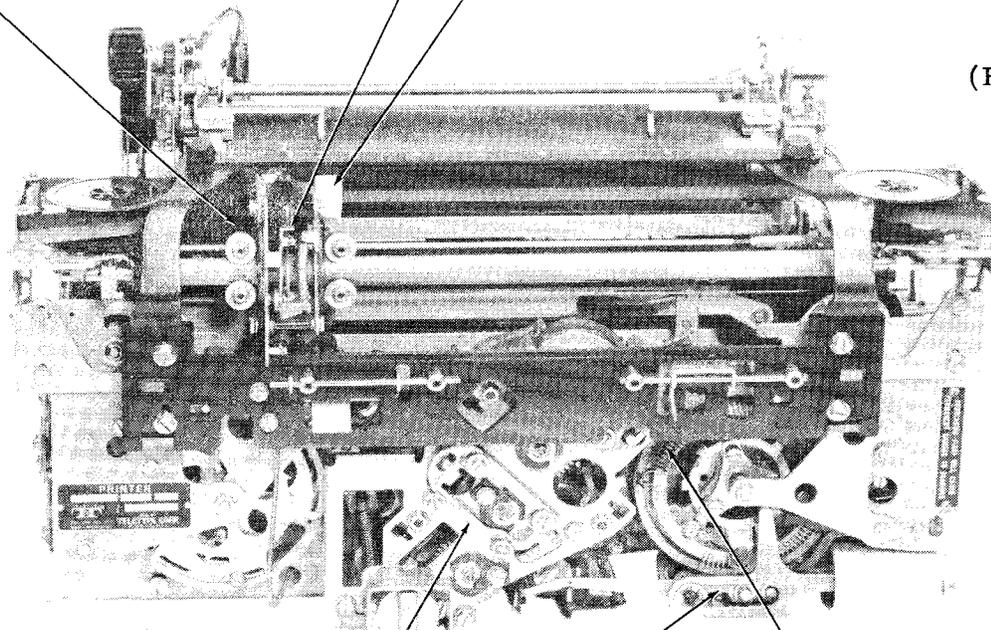
- Can contain up to 128 type pallets. Pallets omitted for nonprinting characters.
- Positioned by vertical and horizontal positioning mechanism.
- Readily removed for cleaning or replacement.

PRINT HAMMER MECHANISM

- If character is graphic, trips print hammer to print graphic.

MULTIPLE COPY KNOB

- Two position adjustable knob. One position for single copy typing. Other position for multiple copy typing.



(Front View)

HORIZONTAL POSITIONING MECHANISM

- Accepts four codebar inputs from codebar mechanism to select vertical row of type pallets.

HORIZONTAL TABULATION MECHANISM (VARIABLE FEATURE)

- Horizontally positions print hammer and typebox. Released by function bar and controlled by adjustable index tabs.

CARRIAGE RETURN MECHANISM

- Returns print hammer and typebox to left margin when CARRIAGE RETURN function character or local control key is depressed.

Figure 3 - 37 Typing Unit

RETRACTION MECHANISM

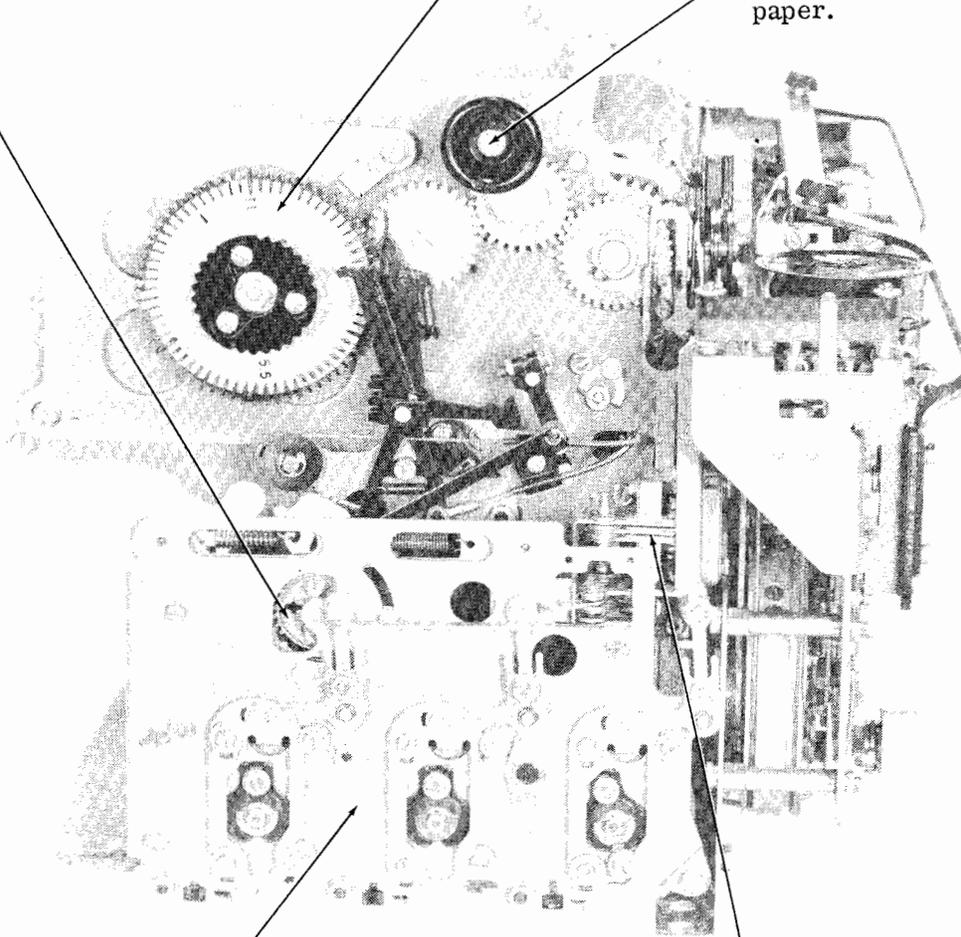
- Lowers typebox to expose printed graphic after brief idle line.
- When operated, repositions codebars.

VERTICAL TABULATION MECHANISM (VARIABLE FEATURE)

- Line feeds page or form when released by function bar. Controlled by adjustable index tabs.

PAPER FEED KNOB

- Manually operate platen to feed paper.



(Left Side View)

CODEBAR MECHANISM

- Receives inputs from either selector mechanism or retraction mechanism. Provides four outputs to horizontal positioning mechanism and three outputs to vertical positioning mechanism. Rear side of codebars provides eight outputs to function mechanism.
- Suppression codebar can be operated by stunt box to inhibit operation of certain function bars.

VERTICAL POSITIONING MECHANISM

- Accepts three codebar inputs from codebar mechanism to select horizontal row of type pallets.

Figure 4 - 37 Typing Unit

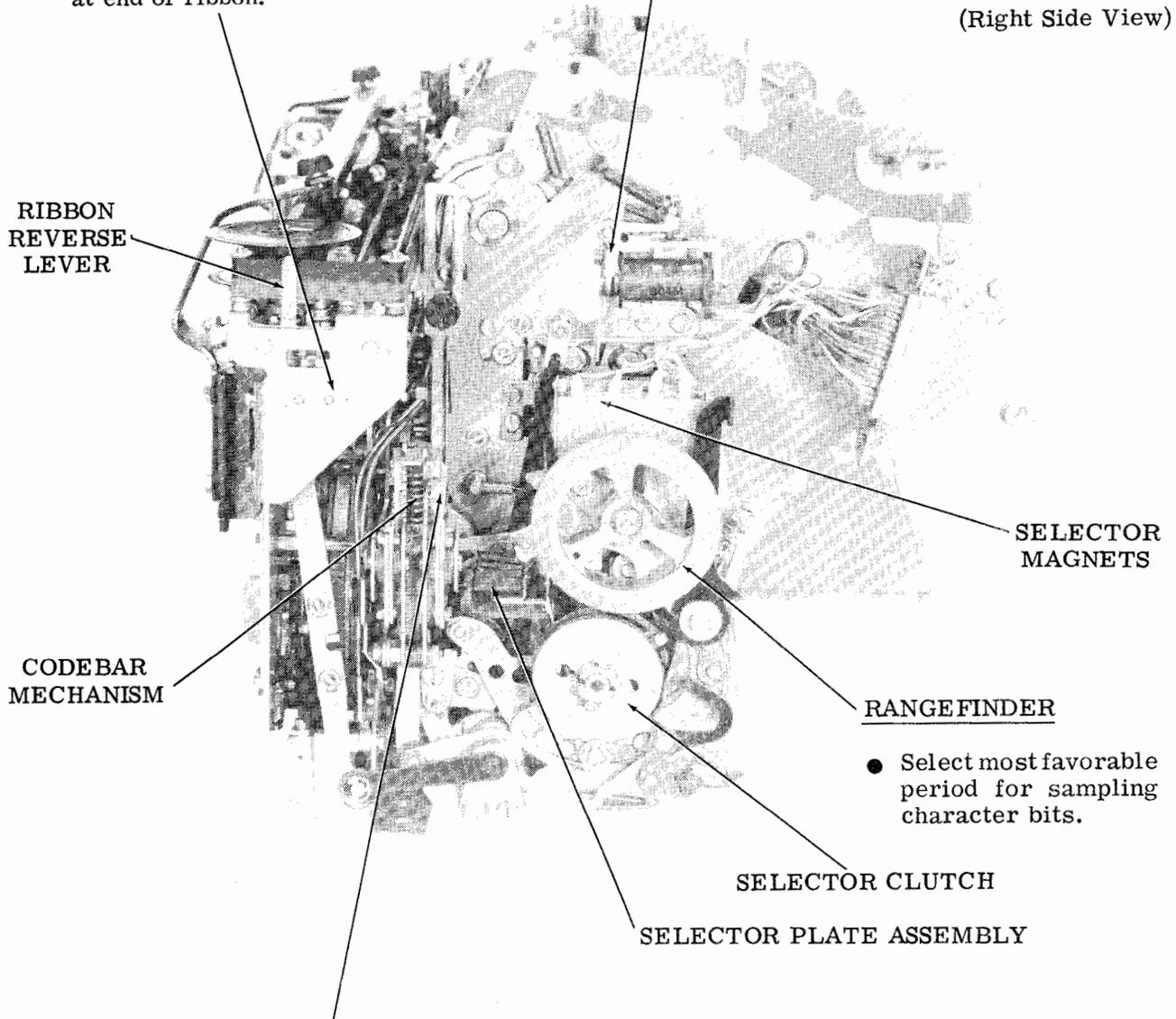
RIBBON MECHANISM

- Provides inked source for impressing graphic on paper.
- Advances ribbon after each graphic is printed.
- Automatically changes direction of ribbon feed at end of ribbon.

TWO COLOR RIBBON MECHANISM
(VARIABLE FEATURE)

- Magnet operated through function mechanism to shift vertical position of ribbon so that one of two colors is opposite of graphic to be printed.

(Right Side View)



TRANSFER MECHANISM

- Transfers output from selector mechanism to codebar mechanism.

Figure 5 - 37 Typing Unit

50-PIN CONNECTOR

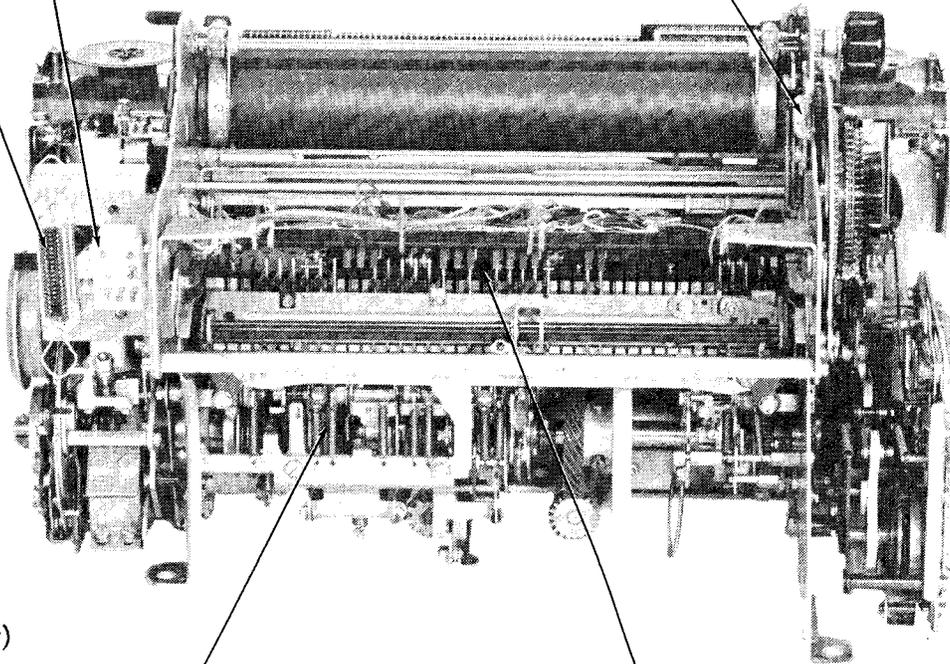
- Electrical interface from the function mechanism to the electrical service unit (transmission of control codes for the function box arrangements).

15-PIN CONNECTOR

- Provides the interface to the selector mechanism from the signal line circuits in the electrical service unit.

LINE FEED MECHANISM

- Advances platen one or two lines when LINE FEED character is received or local control key is depressed.
- Single or double line is preset manually.
- Completes line feed cycle in one-sixth revolution of main shaft.



(Rear View)

TRIP SHAFT MECHANISM

- First operation engages function mechanism.
- Second operation, if not inhibited, operates print hammer and ribbon feed mechanism.

FUNCTION MECHANISM

- Senses each new character received. Detects presence of function character and operates mechanical linkage or electrical contacts to initiate function.
- Can suppress subsequent print hammer, spacing, and ribbon feed mechanisms.
- Can sense parity (eighth) level.
- Function box contains 42 slots for function bars.

Figure 6 - 37 Typing Unit

2.04 The Model 37 can be broken down into five major subassemblies and a main frame assembly. The subassemblies are: main shaft, function box, selector, vertical position and a front plate assembly which contains the horizontal positioning. These major assemblies can be disassembled and assembled to the main frame with little or no adjustment change.

2.05 The typing unit is designed to be used with a base unit which gives the necessary rigidity to the printer frame. The typing unit should not be operated without this or a comparable supporting base plate.

2.06 The base unit supports the motor and gear units which is supported by rubber and spring vibration mounts. This feature isolates vibrations and noise originating in the typing unit, gears, or motor from the supporting pan, table and cover. The typing unit is equipped with a coupling and plastic shock disc that provides power to the keyboard reset mechanism.

OPTIONAL FEATURES

2.07 The typing unit is designed to accept a full range of options that are on-line controllable. These options are furnished in the form of modification kits listed below.

- Horizontal Tab
- Horizontal Tab Stop Control
- Vertical Tab and Form Feed
- Vertical Tab Stop Control
- Half, Forward and Reverse Line Feed
- Two-Color Ribbon
- Print (Only) Suppress
- Printed Graphics Extension
- Low Paper Alarm Switch (Friction Feed)
- Paper-Out Alarm Switch (Sprocket Feed)
- Auto Carriage Return and Line Feed
- To Convert Friction Feed to Sprocket Feed

2.08 In addition to the above features, the function box can be equipped to perform nonrepeat form feed and carriage return upon reception of line feed, vertical tab or form feed.

3. TECHNICAL DATA

Signal Input Data

3.01 By varying the assembly and choice of certain parts in the mechanism during construction of the printer, it can be made to

respond to a number of different code arrangements, of which the following are typical:

8 Level	10	Unit	up to	150	Baud
6 Level	8.5	Unit	up to	127.5	Baud
5 Level	7.42	Unit	up to	111.3	Baud

Power Input Data

3.02 Mechanical power is supplied to the printer mechanism by an electric motor operating at 3600 rpm. An intermediate gear unit is used to reduce this speed, and to provide a choice of printer main shaft speeds. Operating speeds considerably lower than 600 operations per minute (100 wpm) may require changes in the printer mechanism.

Unit Code	Levels	Bauds	O. P. M.	Main Shaft Speed
10.00	8	150	900	500 RPM
8.5	6	127.5	900	514 RPM
7.42	5	111	900	514 RPM
11.00	8	110	600	343 RPM

Output Data

3.03 The friction feed typing unit prints the message on a roll of single or multiple copy paper of 8-1/2 inches maximum width, 5 inches maximum diameter.

3.04 The sprocket feed unit prints the message on up to six copies of flat-folded form-feed paper with margin perforations spaced to fit the sprocket teeth on the typing unit platen. Platens are available for the following paper widths 3-5/8, 4, 4-1/4, 4-5/16, 4-1/2, 5, 5-1/2, 5-3/4, 6, 6-1/4, 6-3/8, 6-1/2, 7, 7-1/2, 8, 8-1/2, 9, 9-1/2 inches with the distance between holes being one-half inch less than the paper width.

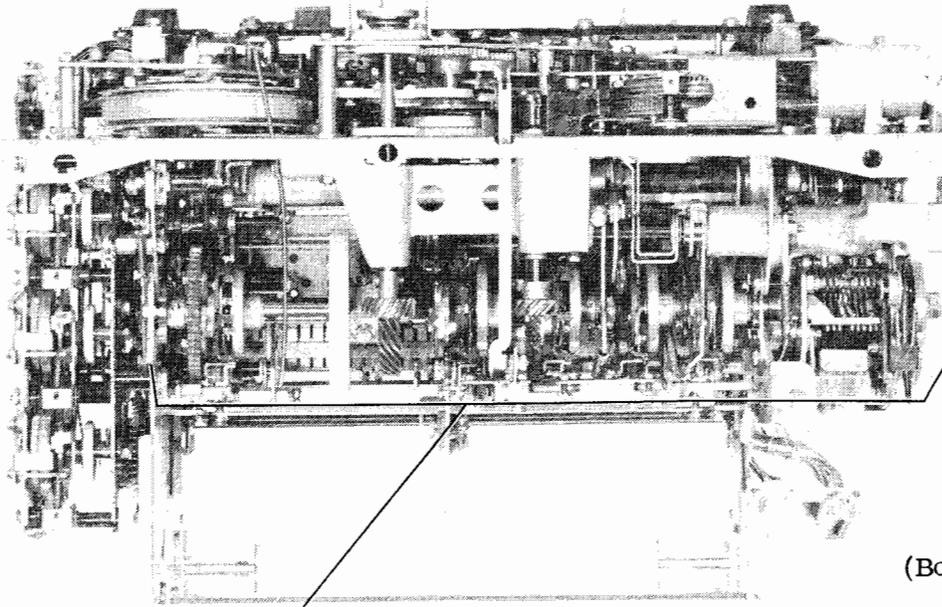
Size, Weight, Mounting

3.05 Overall dimensions of the typing unit exclusive of the base unit are:

Length	15-3/4 inches
Height	9-5/8 inches
Depth	10-7/8 inches

Operational Requirements

3.06 The typing unit is designed to operate with standard lubrication without damage in an ambient temperature between 40°F and



(Bottom View)

MAIN SHAFT ASSEMBLY

- Distributes mechanical rotational motion to various clutch-cam and clutch-gear assemblies, typebox positioning mechanisms, and spacing mechanisms.
- Two-character cycles per revolution of the main shaft.

Figure 7 - 37 Typing Unit

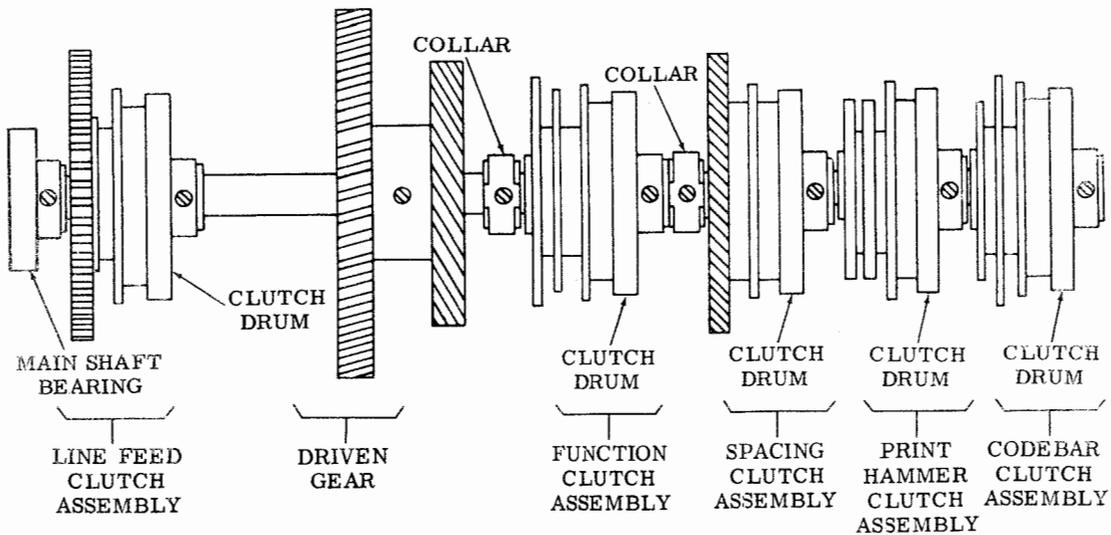


Figure 8 - Main Shaft

(Bottom View)

Note: When the typing unit is mated with the keyboard, refer to Section 574-321-703TC for the required information concerning the adjustment between the main shaft driven gear and the intermediate gear assembly.

140°F measured inside the closed cover.

- (a) Operation at temperatures down to -20°F is possible with special lubrication.
- (b) Operation is satisfactory in an environment ranging from 1% to 90% relative humidity, in an ambient temperature range of 40°F to 110°F, outside the cover.
- (c) Operation is not adversely affected by inclination of up to 45°. The timing of the machine makes possible the suppression of printing and spacing in the same cycle in which a nonprinting code is read by the function box.
- (d) Noise and vibration has been kept to a minimum. Noise and vibration isolation shall be provided in the base mounting and cover, or the cabinet where used.
- (e) No readily combustible material is used in the construction of the unit.

4. PRINCIPLES OF OPERATION

A. Main Shaft

4.01 The main shaft is located in the lower rear portion of the typing unit and extends the full length of the unit. It is supported by ball bearings mounted in each side frame. The main shaft includes six clutches, each when tripped, drives its associated mechanism. These clutches have two shoes which bear against the inside surface of a drum which, in turn, is keyed to the main shaft. Two of the clutches (namely the line feed and the spacing clutches) have six sets of lugs equally spaced about their periphery for controlling the engagement and disengagement of the clutch shoes with the drum. Thus, these clutches will turn only one-sixth of a revolution when tripped, except when the single-double line feed lever is set for double line feed in which case the line feed clutch will turn one-third of a revolution. The remaining clutches have two sets of lugs and will turn half of a complete revolution when tripped.

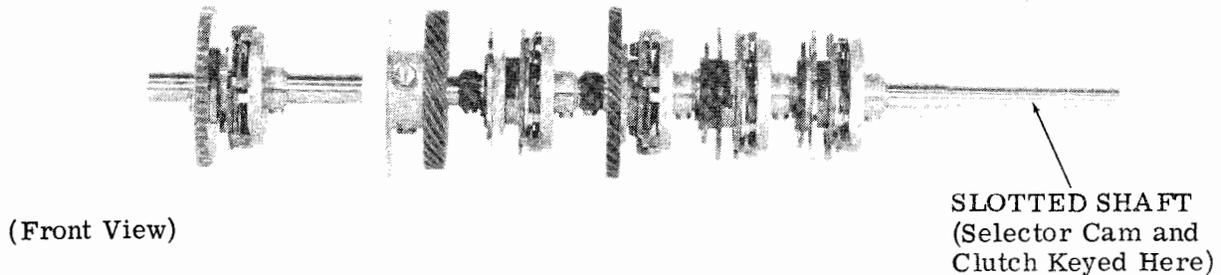


Figure 9 - Main Shaft

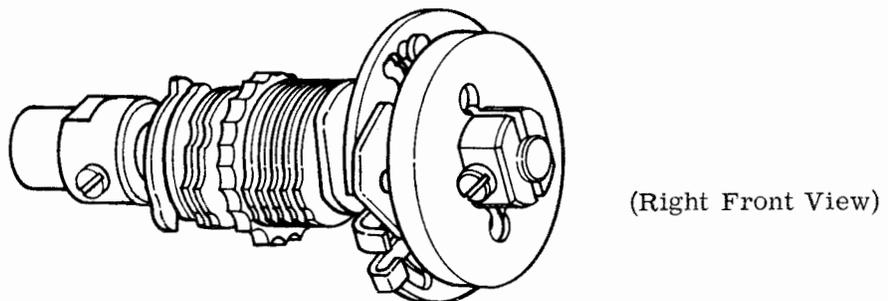


Figure 10 - Selector Cam and Clutch

4.02 The six clutches on the main shaft are, from right to left, selector clutch, codebar clutch, print hammer clutch, spacing clutch, function clutch, and line feed clutch. The selector clutch provides power for operating the selector, and also trips the codebar clutch and resets the retraction mechanism. The codebar clutch drives the codebar positioning mechanism, trips the function clutch and print hammer clutch. The print hammer clutch drives the print hammer, ribbon feed, ribbon positioning, dampener detent arms and trips the spacing clutch. The spacing clutch drives the spacing mechanism. The function clutch drives the function bar reset bail and the function pawl stripper blade. The line feed clutch drives the line feed mechanism.

B. Selector Mechanism

4.03 The selector mechanism consists of the magnet coils and armature, a selector cam and clutch, and associated levers, arms and bails necessary to convert the electrical intervals of the start-stop code to the mechanical motions which are transferred to the punch printer or code contacts.

4.04 The selector clutch and cam sleeve assembly is comprised of the two-stop clutch, the start bail and left lever cam, the eighth, seventh, sixth, fifth and fourth selector lever cams, the cam for the spacing and marking locklevers, the third, second, and the first selector lever cams, the push lever reset bail cam, and the function clutch trip cam.

Note: On 5- and 6-level cam sleeves, no cams appear in the 6, 7, and 8th or 7 and 8th positions respectively.

4.05 During the time in which a closed line circuit (marking) condition exists, the selector magnet coils are energized and hold the selector armature against the selector magnet pole pieces. In this stop position, the selector armature blocks the start lever.

4.06 At the start of a signal for any character or function, the start (spacing) interval releases the selector armature which under tension of its spring, moves away from the magnet pole piece and thus, unlatches the start lever. The start lever turns clockwise under the tension of its spring to move the start bail into the indent of its cam.

4.07 As the start bail rotates about its pivot point, the attached stop arm is moved out of engagement with the clutch shoe lever. The selector cam clutch engages and begins to rotate. By this time, the start lever tip has moved into the selector armature extension cut-out and the armature starts moving in correspondence with the signal bits. Between the second and third signal bit, the left lever is pivoted clockwise by the start bail cam and lifts the start lever above the armature extension. At this same time, the start bail rides to the high point of its cam where it remains to hold the start lever away from the selector armature until late in the character cycle. In approximately the middle of the cycle the left lever rides down its cam, thus, lowering the start lever. When the stop impulse at the end of the signal is received, the selector armature is pulled up to block the start lever. Thus, the start bail is prevented from dropping into the low part of its cam (stop position of cam sleeve, and the attached stop arm is held so as to stop the clutch shoe lever).

4.08 The selector cam clutch disc upon which the latchlever rides has an indent at each of its two stop positions. When the clutch shoe lever strikes the stop arm, the inertia of the cam disc assembly causes it to continue to turn until its lug makes contact with the lug on the clutch shoe lever. At this point, the latchlever drops into the indent in the cam disc, and the clutch is held disengaged until the next start interval is received.

4.09 The series of up to eight selecting levers and the marking and spacing locklevers ride their respective cams on the selector clutch and cam sleeve assembly. As the marking and spacing signal intervals are applied to the selector magnet, the selector cam sleeve rotates and actuates the selector levers. When a spacing interval is received, the marking locklever is blocked by the end of the armature and the spacing locklever swings toward the right above the armature and locks it in the spacing position until the next signal transition is due. Extensions on the marking locklever prevent the selector levers from following their cams. When a marking impulse of the signal is received, the spacing locklever is blocked by the end of the armature and the marking locklever swings to the right below the armature to lock it in the marking position until the next signal transition is due. During this marking condition the selector levers are not blocked by the marking locklever extensions, but are permitted to move

against their respective cams. The selecting lever that is opposite the indent in its cam, while the armature maintains a marking condition, swings to the right or selected position momentarily. Each selecting lever has an associated push lever which drops off a shelf on the top of the selecting lever when it rides into its cam indent. As the cam sleeve turns, each selecting lever together with its latched push lever is moved toward the left and held there until all eight code intervals have been received. After all the selected push levers have been positioned to the left and all unselected push levers have been positioned to the right, they are held until the next start interval is received. When the subsequent start interval again causes the cam sleeve to rotate, the push lever reset bail, in following its cam, unlatches the selected push levers. The push levers then return to the unselected (right) position under their spring tension.

4.10 The no. 1 push lever differs in that it uses an auxiliary no. 1 push lever and auxiliary strip bail. When the no. 1 selector lever is permitted to follow its cam (marking condition) the auxiliary no. 1 push lever is selected in the same manner as other push levers. At this time the strip bail is on the high part of its cam, resetting all the selected push levers above the shelves on their associated selector levers. When the no. 1 selector lever returns counter clockwise to the intermediate position on the cam, a tab on the auxiliary no. 1 push lever engages the no. 1 push lever and drives it to the left in a marking condition. At approximately midcycle the auxiliary push lever is stripped by its auxiliary strip bail, thus the auxiliary no. 1 push lever is prepared for the next incoming marking pulse. The auxiliary lever action permits normal strip operation to occur between no. 1 and no. 2 pulse selection.

4.11 The selector cam sleeve clutch has two stop positions and likewise the individual cams have two complete identical contours in 360 degrees, providing for two complete cycles of operation for each revolution of the cam sleeve.

Note: When rotating the main shaft by hand, the clutches will not fully disengage upon reaching the stop position. In order to relieve the drag on the clutch and permit the main shaft to rotate freely, apply pressure on the lug of the clutch disc to cause it to engage its latch lever. This procedure should be

followed prior to applying power to the unit.

Manual Operation of the Unit

4.12 While adjustments are being made, apply current to the selector coils, holding the selector magnet armature in the marking position. To manually select an all marking combination, push the armature downward into the spacing position momentarily to permit the selector clutch to engage. Rotate the main shaft slowly through a half revolution. Fully disengage the clutch as prescribed in the preceding note and repeat if desired.

Start-Stop Operation

4.13 Engage-disengage selector cam sleeve with main shaft; responds to start and stop bits of a character.

Operation

Engage selector cam sleeve with main shaft.

- (1) Start (spacing) bit of new character de-energizes selector magnets and releases armature.
- (2) Armature, under tension of armature spring, falls against downstop bracket.
- (3) Absence of armature extension unlatches start lever which, under tension of start lever spring, pivots inward moving the stop arm bail into the indent of its cam. As the stop arm bail pivots inward, the attached stop arm pivots out of path of clutch shoe lever.
- (4) Clutch shoe levers expand to engage disc and cam sleeve assembly with rotating clutch drum.

Raise, reset, and lower start lever. Block clutch shoe lever.

- (1) Cam sleeve starts rotating. Selector cam sleeve mechanically operates its cam followers in a prearranged sequence as code level signals (marking or spacing) operate the armature (4.15).
- (2) Between the second and third character bit, lift lever elevates start lever above opening in armature extension. Stop arm bail rides to high part of stop arm cam forcing start lever away from armature, restoring stop arm to blocking position.

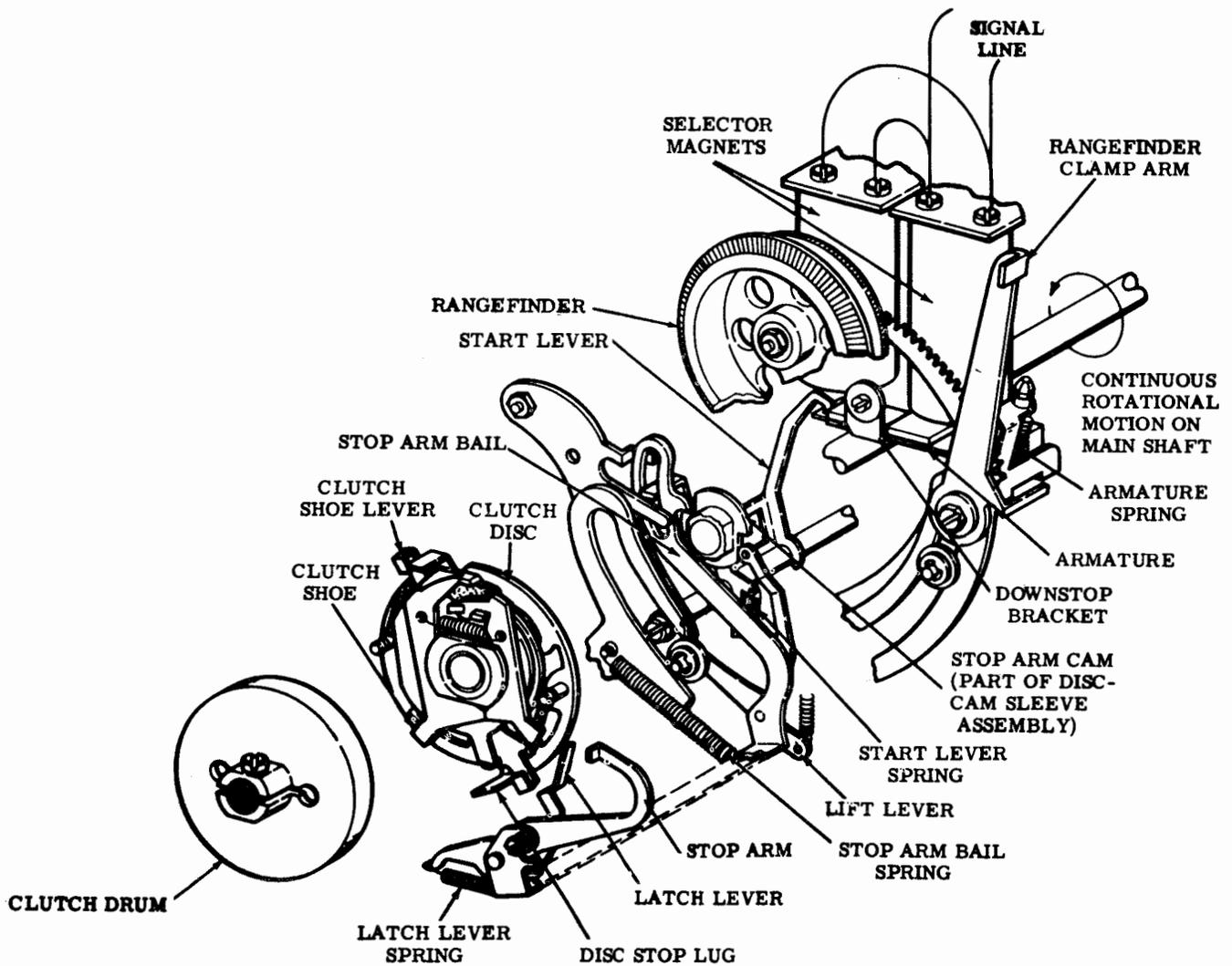
Disengage selector cam sleeve from main shaft.

- (1) Lift lever falls into indent of stop arm cam and lowers start lever.

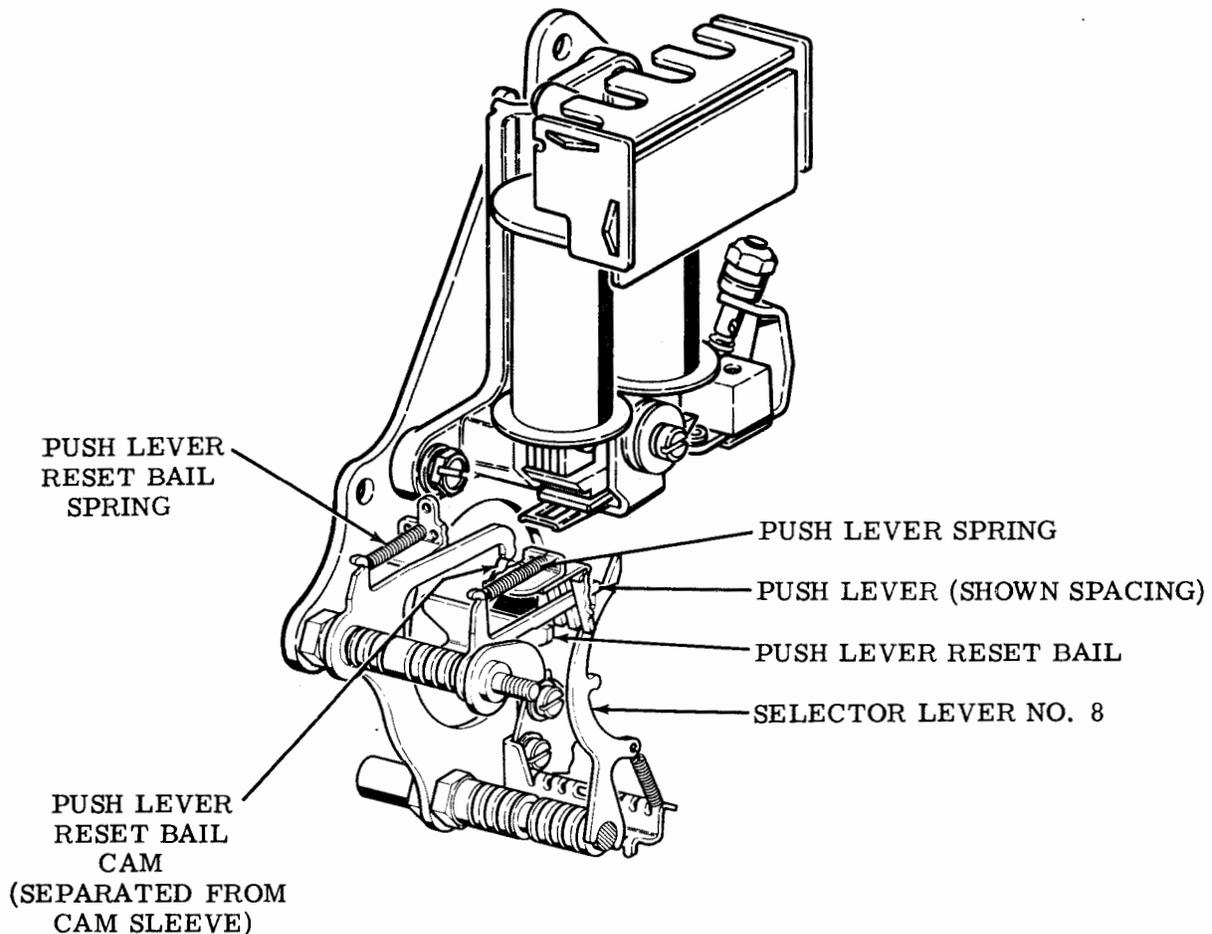
SECTION 574-320-101TC

- (2) Stop (marking) bit at end of character energizes selector magnets and attracts armature.
- (3) Stop arm cam presents indent to stop arm bail.
- (4) Stop arm bail begins to enter indent but is prevented from entering fully by start lever whose inward move-

- ment is blocked by armature extension. Stop arm engages shoe lever to disengage cam sleeve from rotating clutch drum.
- (5) Clutch disc latched by latch lever.
- (6) Selector mechanism prepared to receive start (spacing) bit of subsequent character.



Note: Mechanically adjust position of stop arm, stop arm bail, lift lever, and cam sleeve in order to select most favorable period for sampling character bits as received by selector magnets. Range finder clamp arm, when pivoted clockwise, permits range finder scale adjustment.



Push Lever Reset

4.14 Strip the previous character from push levers after a start bit causes the selector cam sleeve to engage the main shaft.

Operation

As cam sleeve begins rotating, high part of push lever reset bail cam lifts push lev-

er reset bail against tension of spring. Bail pivots, lifting and unlatching the marking push levers from behind their selector levers. The bail returns to the unoperated position when the lobe drops from the high part of the cam. All of the push levers, except the auxiliary push lever (Paragraph 3.08) will then be in the spacing condition.

Selection

4.15 Code selections are performed by sequentially positioning push levers as marking and spacing intervals are applied to selector magnets.

Operation

View (A) - Idle Condition

- (1) Selector cam sleeve shown before starting selection cycle. Marking lock lever, spacing lock lever, and eight selector levers held against cam sleeve by their individual springs; the lobes of each lever are riding on high part of selector cam sleeve.
- (2) As marking and spacing signal intervals are applied to selector magnets, selector cam sleeve rotates and actuates selector levers.

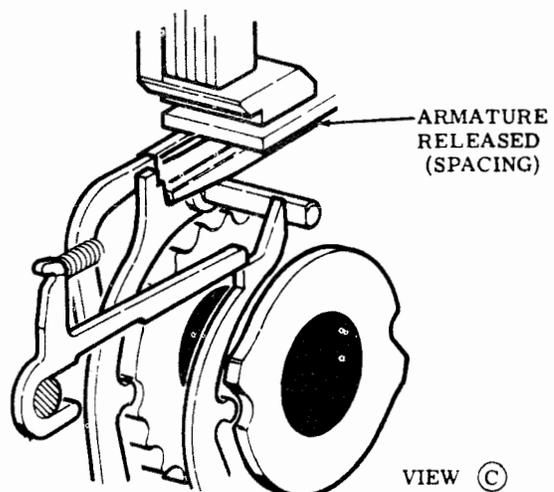
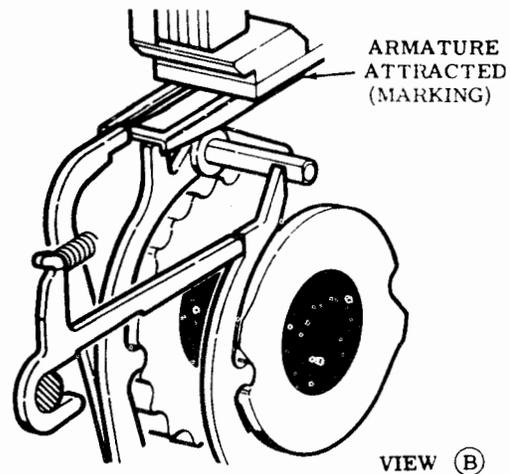
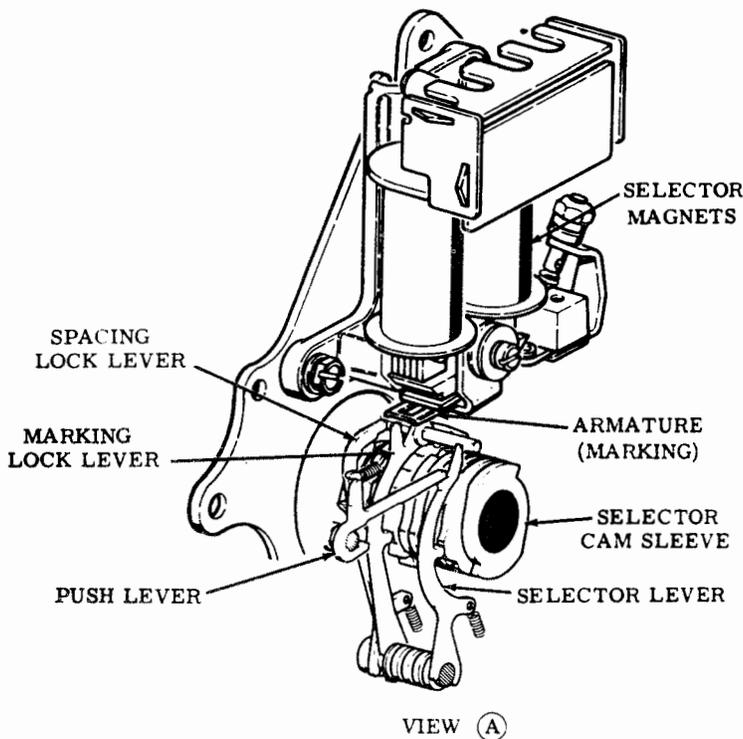
View (B) - Marking Condition

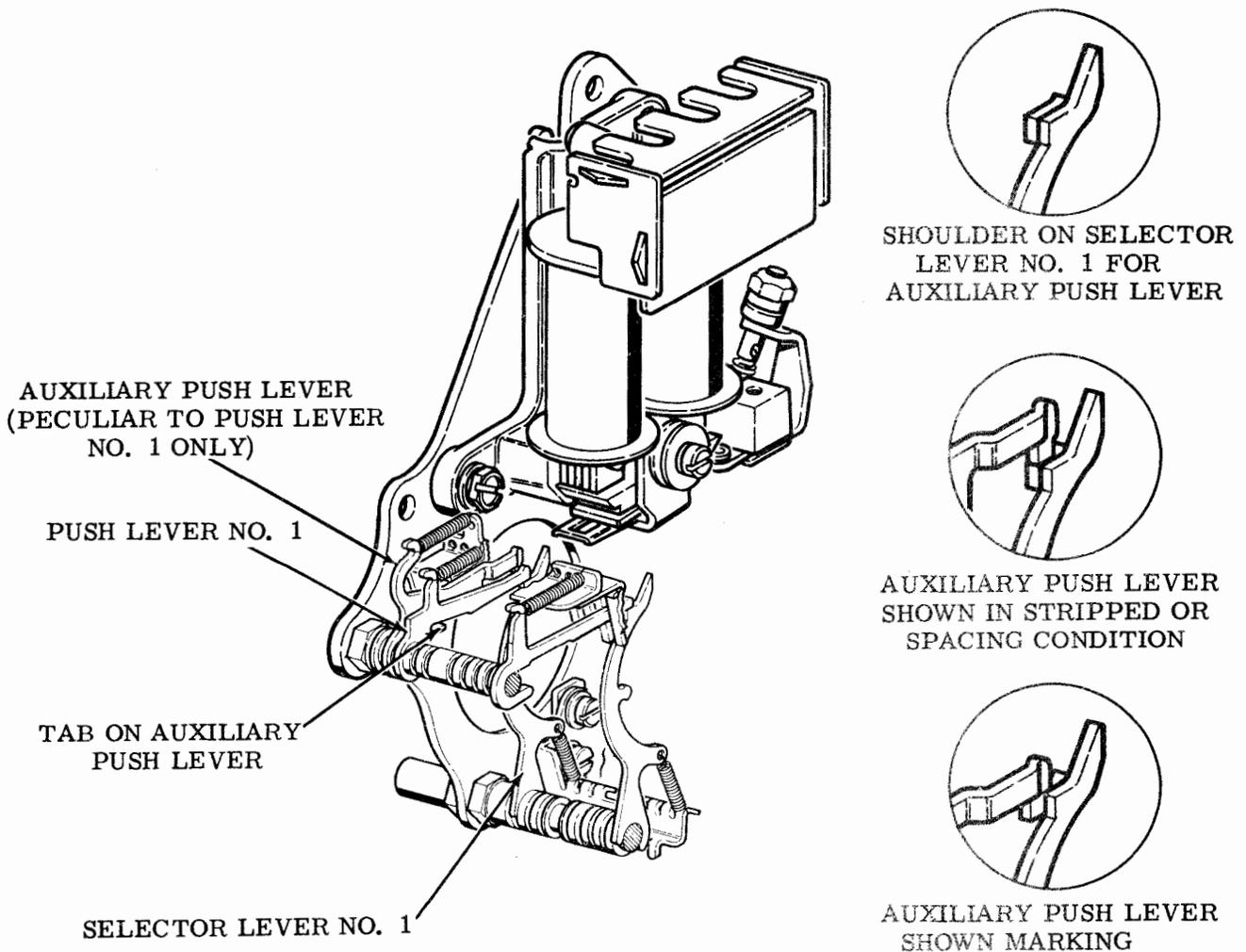
- (1) When marking impulse is received, the spacing lock lever is blocked by end of armature. Top of marking lock lever moves under armature, supporting armature in marking position until next signal transition is due.
- (2) During marking condition, selector levers are not blocked by armature extensions but are permitted to ride against their respective cams. Only that selec-

- (3) As the lobe of the selector lever is drawn into its cam indent, the push lever drops off the shelf of its selector lever. When the selector lever is forced out of its indent, the selected push lever slides to the marking position.

View (C) - Spacing Condition

- (1) When spacing interval is received, the marking lock lever is blocked by end of armature. Spacing lock lever swings above armature and locks it in the spacing position until next signal transition is due.
- (2) During spacing condition, selector levers are prevented from riding their respective cams by extensions on marking lock lever.
- (3) Lobe of selector lever opposite its cam indent cannot enter indent fully. Push lever will not latch behind selector lever but will remain on shelf.





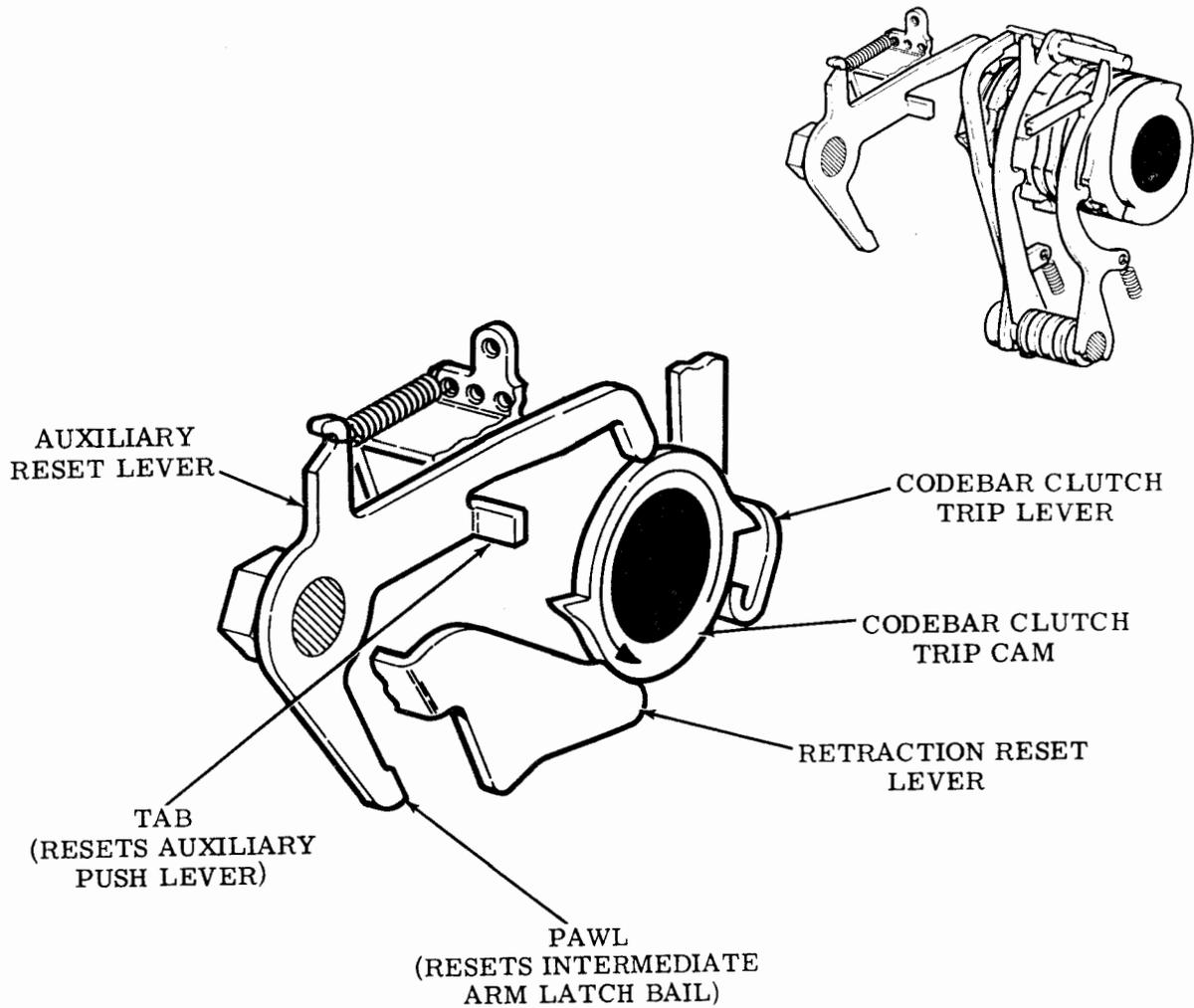
Auxiliary Push Lever

4.16 Auxiliary push levers sense marking or spacing position of selector lever number 1. Normal strip operation (push lever reset) occurs during reception of code bit number 1 and does not permit push lever number 1 to sense position of its selector lever.

Operation

Auxiliary push lever responds to marking impulse for push lever number 1. When bit

number 1 is marking, auxiliary push lever drops behind shoulder of selector lever as push lever number 1 is stripped. Tab on auxiliary push lever carries push lever number 1 to marking position. When push lever reset bail (Paragraph 3.06) returns to unoperated position, push lever number 1 is behind, but not touching, its selector lever. Approximately half way through selection cycle, auxiliary push lever is stripped by auxiliary reset lever (Paragraph 3.09). Push lever number 1 is then latched by selector lever number 1.



Trip and Reset Mechanisms

4.17 The conditions for the trip and reset mechanism are to strip the count on typebox retraction mechanism; reset auxiliary push lever and intermediate arm latch bail, and trip codebar clutch.

Operation

As cam sleeve rotates, high part of cam oper-

ates retraction reset lever. Approximately mid cycle, second high part of cam operates auxiliary reset lever. Tab on auxiliary reset lever strips auxiliary push lever, and pawl resets intermediate arm latch bail in transfer mechanism (Paragraph 3.10). About the same time, first high part of codebar clutch trip cam operates codebar clutch trip lever to initiate operation of codebar shift mechanism (Paragraph 3.11).

C. Codebar Mechanism

4.18 In the Model 37 typing unit there are 11 codebars. They are numbered 1 through 11 from the bottom up. The first seven codebars have two basic uses. First, to control the horizontal and vertical positioning clutches, and second along with the other four bars to be read by the function box to perform functions. Bar no. 8 is a parity check by the function box on function codes. Bar no. 9 is used to suppress functions in the function box. Bar no. 10 is used as a gate for "Escape" sequences and may suppress functions if required. Both bars (9 and 10) are moved by shift forks controlled through the function box when so equipped. Bar no. 11 is an auxiliary bar which may serve a variety of purposes. Automatic carriage return is one of the uses for which the no. 11 bar is intended.

D. Codebar Positioning

4.19 As the selector finishes its cycle it positions all selected (marking) push levers towards the front of the machine. As the push levers start to move they impart a motion to the intermediate levers in the codebar positioning mechanism which in turn imparts motion to the bottom of the transfer levers causing the top of the transfer levers to move toward the rear of the machine. The top portion of the selected transfer levers contacts their corresponding codebar shiftbars and move the shiftbars toward the rear of the machine; thereby placing the step in the shiftbars in the path of the shift lever. The shift lever now begins to move under power from the codebar clutch and drives all marking shiftbars and corresponding codebars to the left. A second shift lever drives all spacing (nonselected) shiftbars and corresponding codebars to the right. The codebars have now been fully positioned and the codebar shift levers return to their previous position. The selected intermediate levers are now in a latched condition and therefore are holding the transfer levers and shift levers marking (toward the rear) until midway through the next cycle of the selector where upon they will be stripped allowing the shiftbars to return to the spacing condition (toward the front of the unit). Note that the shiftbars return to spacing in their front to rear direction but retain their positions from left to right. This allows each codebar to remain in position (mark or space) until a change in code for the level occurs.

Escape Sequence

4.20 Escape - Sequences when received in the stunt box can give a mechanical or electrical output on the last character in the sequence. Sequences preferably should be two characters long, however three and more characters each starting with ESC can be implemented. The last character in the sequence should be an ESC terminating character which precludes column 2 of the ASCII code chart. The following is a list of adopted two-character ESC - Sequences:

ESC-1	—	Horizontal Tab Set
ESC-2	—	Horizontal Tab Clear
ESC-3	—	Print Red
ESC-4	—	Print Black
ESC-5	—	Vertical Tab Set
ESC-6	—	Vertical Tab Clear
ESC-7	—	Reverse Line Feed
ESC-8	—	Half Reverse Line Feed
ESC-9	—	Half Line Feed
ESC-:	—	Full Duplex (FDX)
ESC-;	—	Half Duplex (HDX)

4.21 Escape sequences are implemented in the unit in the stunt box in conjunction with a no. 10 level blocking bar.

4.22 Escape is received in the stunt box by a function bar in slot 25. Its function lever shifts the no. 10 blocking bar by way of a fork shift mechanism and latches with a stripper blade latch.

4.23 The no. 10 blocking lever is similar to a codebar and positioned above the codebar assembly acts as a gate that opens for the duration of one machine cycle.

4.24 The no. 10 blocking bar, when selected, unblocks the function bar of the second character of the sequence. These function bars are special in that they have a no. 10 blocking tine to be gated by the no. 10 blocking bar.

4.25 After second character of the sequence following escape has been selected, the escape function lever is unlatched by the stunt box stripper blade which closes the gate again for any second character sequence selection.

4.26 The second character in the sequence is always print and space suppressed.

H. Vertical Positioning

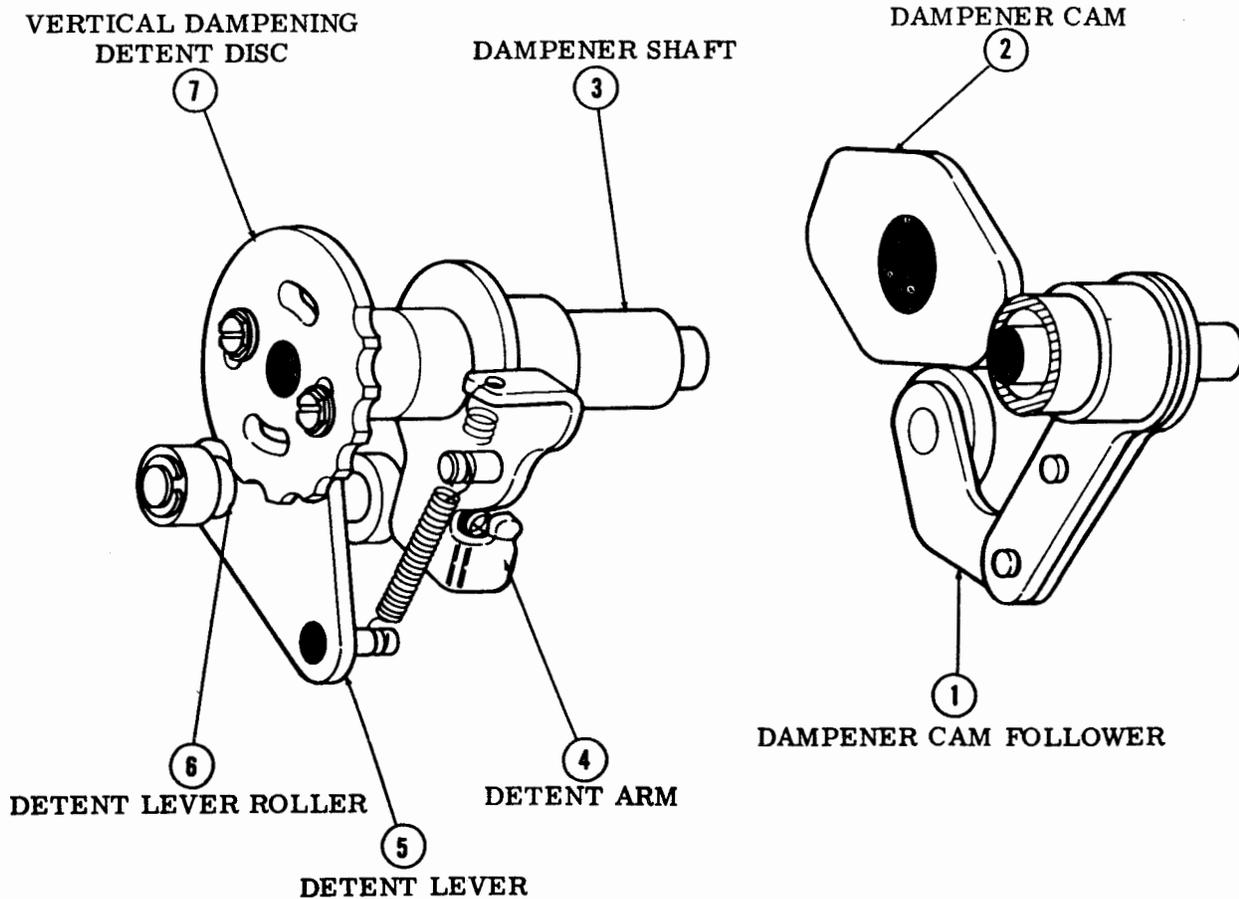
4.33 The vertical positioning (5, 6 and 7) code-bars are connected in a manner almost identical to those in the horizontal mechanism. Three clutches in turn cause movement to be applied to an aggregate motion, which gives eight output positions. The output end of this mechanism is made to drive a vertically mounted rack on the left side of the machine. This rack is connected to the rail carrying the typebox and is connected to a similar rack on the right side of the machine through a cross shaft and associated pinions. In this manner the aggregate motion mechanism causes the rail to be set in the selected vertical position, but parallelism is maintained between the rail and the machine center line.

I. Vertical Dampening

4.34 The vertical dampening mechanism is similar in principle to horizontal dampener and is located on the cross shaft mentioned above.

Operation

View as shown is in a stop condition. As printing clutch trips, the DAMPENER CAM FOLLOWER (1) rides high portion of DAMPENER CAM (2) rotating DAMPENER SHAFT (3) counterclockwise. As DAMPENER SHAFT (3) rotates, a spring connected from the DETENT ARM (4) to the DETENT LEVER (5) causes the DETENT LEVER ROLLER (6) to move into the VERTICAL DAMPENING DETENT DISC (7).

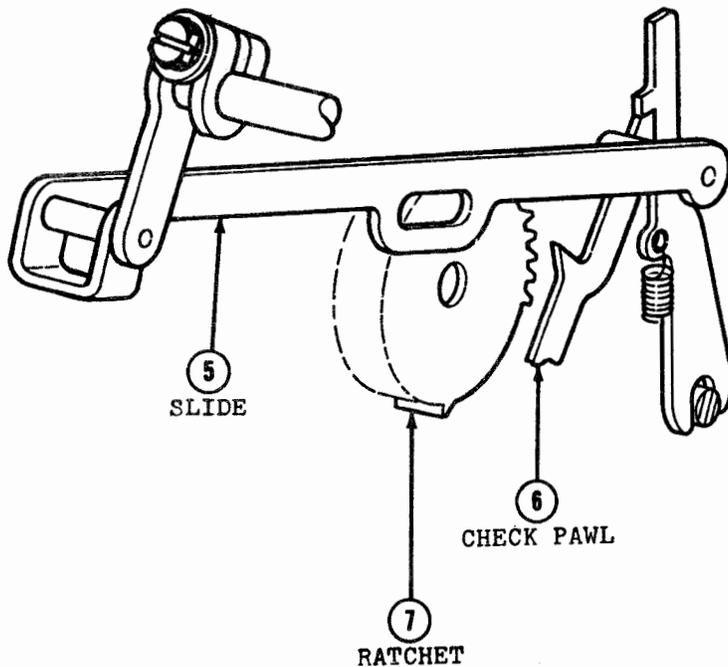


J. Retraction Mechanism

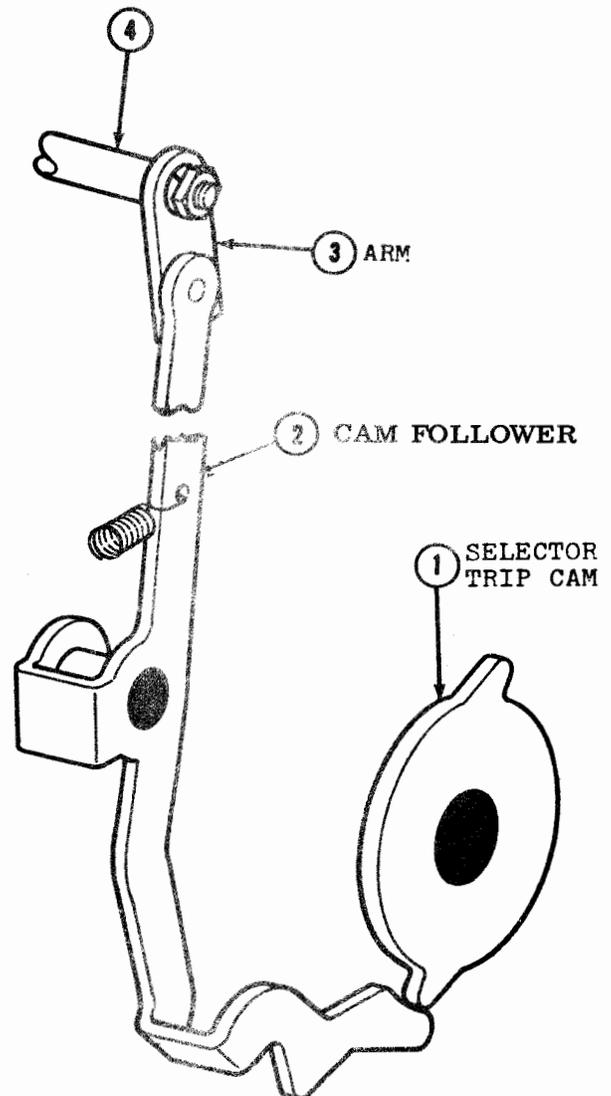
4.35 The purpose of this mechanism is to lower the typebox for viewing of the printed copy. The mechanism is designed to begin lowering the box in a minimum of 10 milliseconds after the character has been printed; but if before this time has elapsed the next character trips the selector clutch the mechanism is reset and retraction will not occur.

4.36 The retract mechanism consists basically of a ratchet driven through a feed pawl by a cam and a blocking pawl controlled by a cam on the selector cam sleeve assembly.

4.37 The ratchet is driven continuously by the feed pawl. Attached to the ratchet is an arm which contacts a slide. If no character is received by the unit in the time mentioned above the slide will have moved into contact with a set of bails in the vertical slide control linkage causing the linkage and slides to go into a spacing condition. This causes all vertical positioning clutches that were marking to go spacing thereby lowering the typebox to its lowest position. Upon the reception of a character by the selector a linkage is operated by a cam on the selector cam sleeve which moves the blocking pawl from engagement with the ratchet causing the ratchet and slide to be reset. The vertical positioning clutch control linkage and clutch remain in a spacing condition thereby leaving the typebox retracted until normal positioning of the typebox takes over.



TRANSVERSE SHAFT



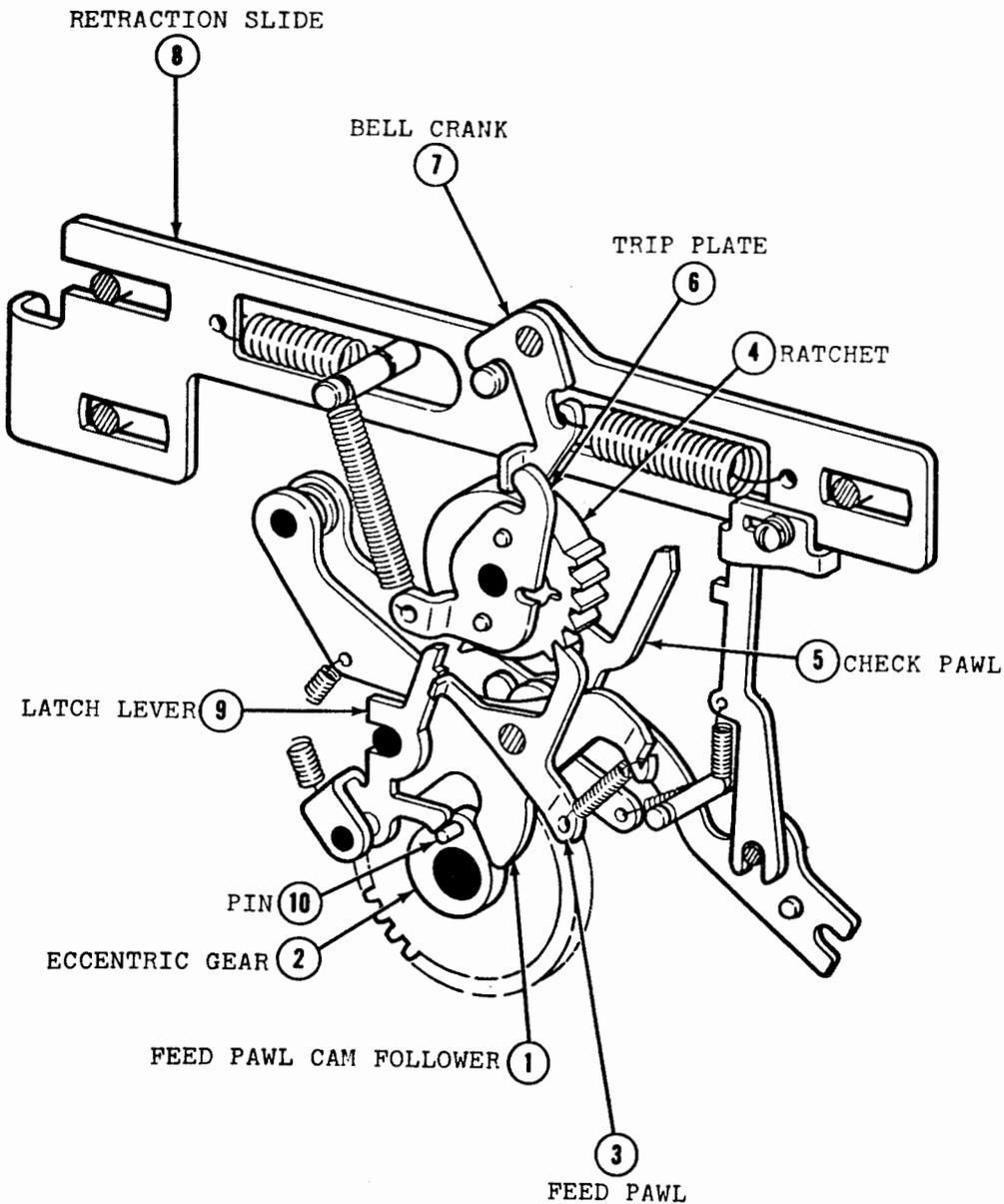
Operation

When the selector clutch is operating its SELECTOR TRIP CAM (1) will drive CAM FOLLOWER (2) clockwise allowing ARM (3) and TRANSVERSE SHAFT (4) to rotate counterclockwise. As TRANSVERSE SHAFT (4) rotates, a SLIDE (5) will be moved towards the rear moving CHECK PAWL (6) away from the RATCHET (7). This will prevent retraction slide from moving towards the front of the unit.

Operation

If unit remains in an idle condition, the FEED PAWL CAM FOLLOWER ① riding high portion of ECCENTRIC GEAR ② will cause FEED PAWL ③ to move upward, rotating the RATCHET ④ counterclockwise and allow CHECK PAWL ⑤ to override one tooth. As RATCHET ④ rotates, its TRIP PLATE ⑥ will push BELL CRANK ⑦ and RETRACTION SLIDE ⑧ forward. As FEED

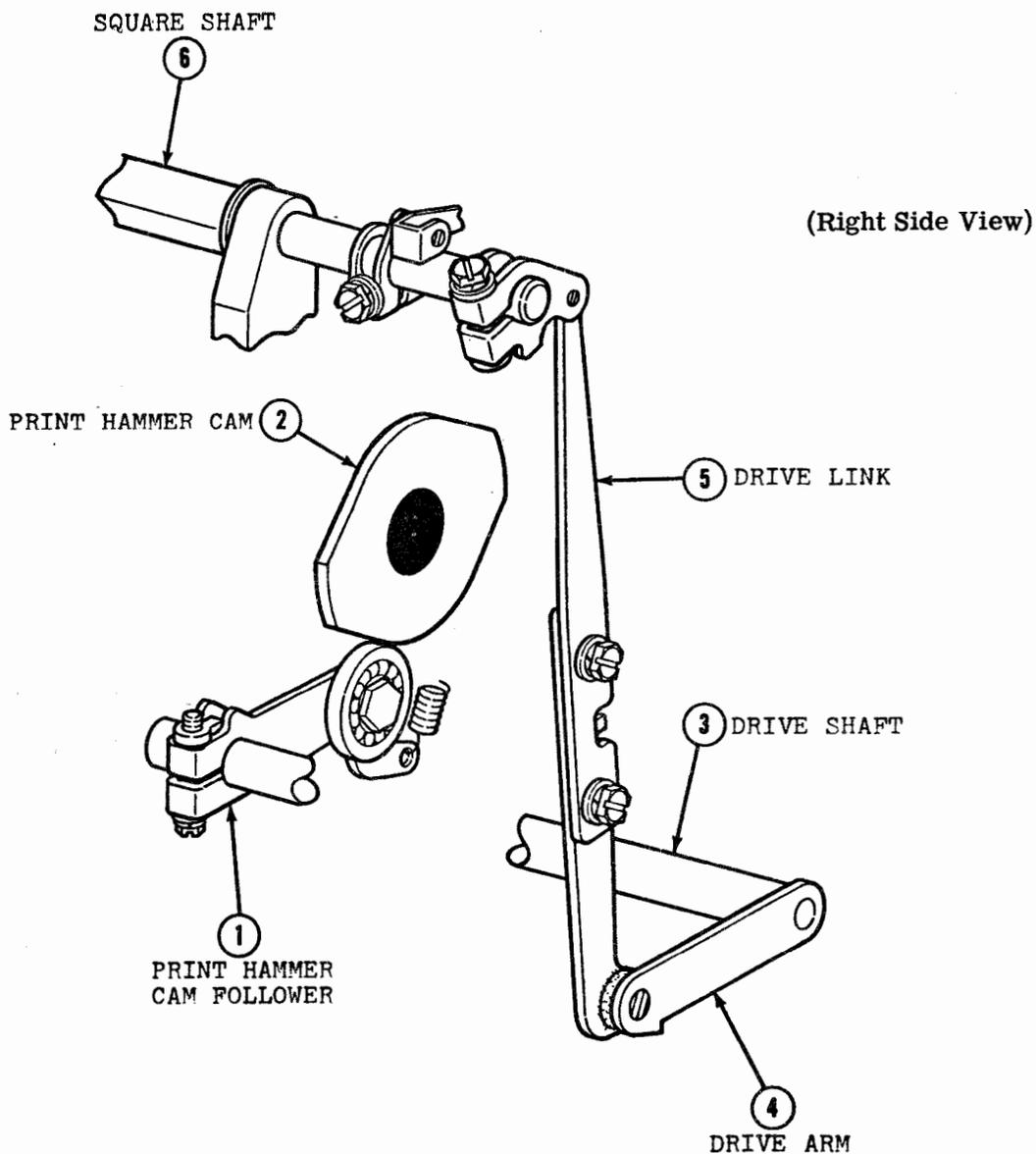
PAWL ③ moves upward the LATCH LEVER ⑨ latches it. As FEED PAWL CAM FOLLOWER ① rides low portion of ECCENTRIC GEAR ② the FEED PAWL ③ will rotate clockwise away from RATCHET ④. As ECCENTRIC GEAR ② rotates, a PIN ⑩ attached to it will cause LATCH LEVER ⑨ to rotate counterclockwise releasing FEED PAWL ③ to come back in engagement with RATCHET ④.



Printing Drive Mechanism

View as shown is in a stop condition. As printing clutch trips, the PRINT HAMMER CAM FOLLOWER (1) will ride high portion of PRINT HAMMER CAM (2). This will cause DRIVE SHAFT (3) to rotate clockwise allowing DRIVE ARM (4) to rotate clockwise. As DRIVE ARM (4) pivots, it causes DRIVE

LINK (5) to move upward rotating SQUARE SHAFT (6) counterclockwise. As SQUARE SHAFT (6) pivots counterclockwise, it loads and latches the print hammer mechanism and feeds the ribbon. As PRINT HAMMER CAM FOLLOWER (1) rides low portion of PRINT HAMMER CAM (2), it will cause SQUARE SHAFT (6) to rotate clockwise tripping print hammer mechanism.



K. Print Hammer Carriage

4.38 After the typebox has been moved so that the selected type pallet is in its proper position, it must be struck by a printing hammer in order to print. This is accomplished by the action of the printing carriage located on the printing carriage square shaft.

4.39 The printing carriage rides (on rollers) on the square shaft, which is carried in bearings mounted to the printer front plate. Rotation of the complete carriage is prevented by a tracking guide which is part of the carriage frame assembly and is arranged to follow a steel tracking plate attached to the main framework of the front plate assembly. The carriage is clamped to the front spacing cable. This moves the carriage along its track in such a manner that the hammer advances to the next printing position.

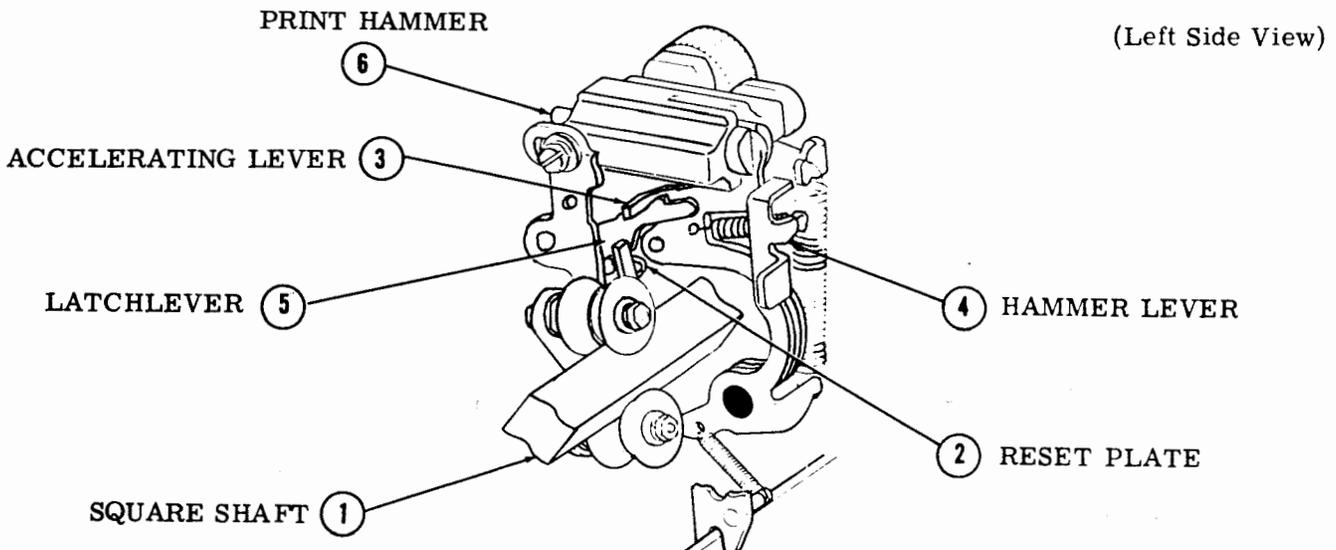
4.40 The printing movement of the hammer is provided by the oscillation of the square shaft, which is driven through a linkage on the right side of the unit by a cam on the print hammer clutch. As the printing cycle begins the square shaft rotates towards the front of the unit transmitting power through the four rollers to the reset plate. The reset plate in turn drives the accelerating lever, print hammer lever and print hammer. In this way the print hammer is driven away from the platen while extending the accelerating lever spring and allows the accelerating lever to be latched. The square shaft now begins to rotate toward the rear of the unit to a predetermined position.

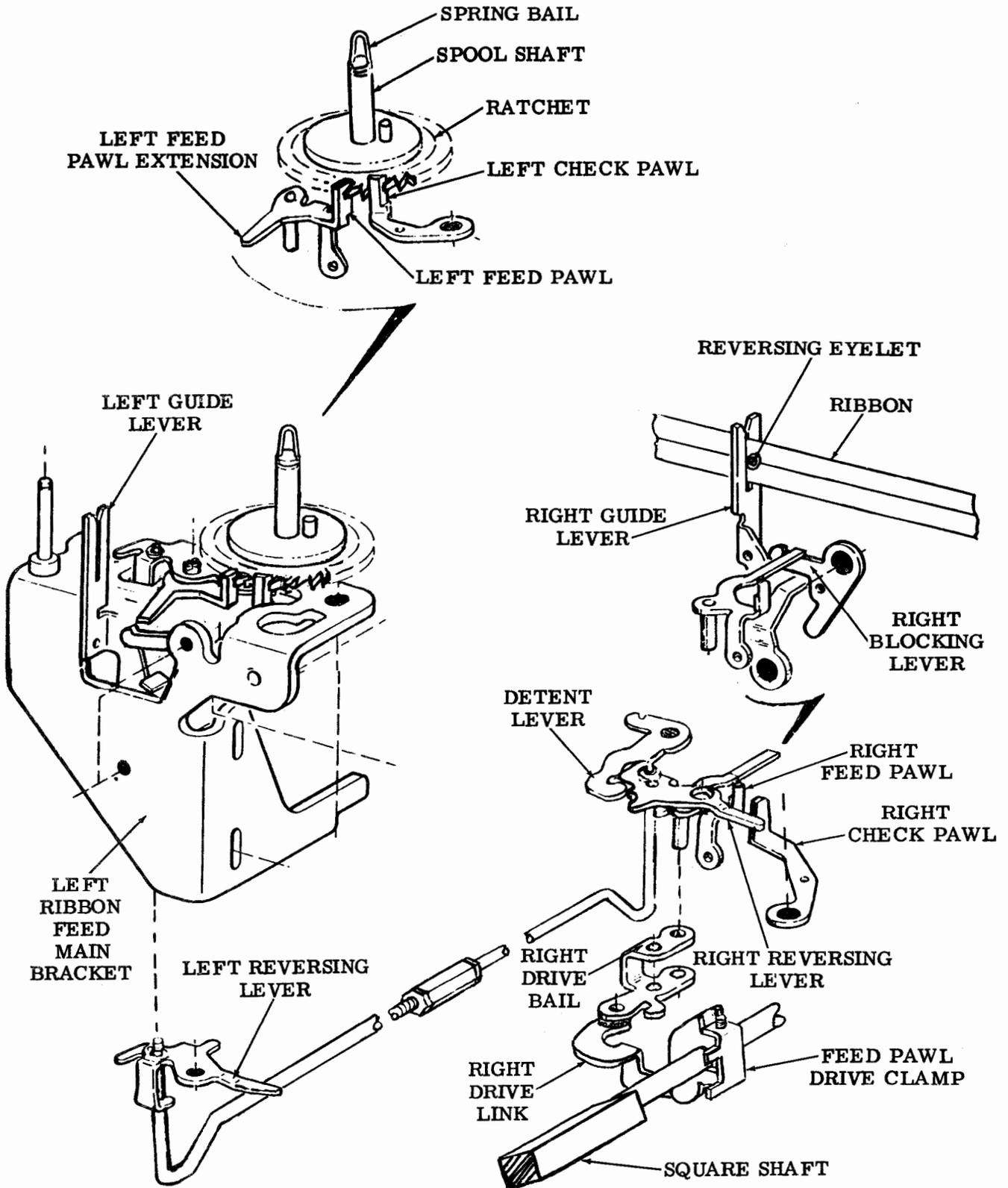
At this point the latch is released and the hammer accelerates toward the pallet carrying it into the ribbon and paper. A return spring then pulls it out of the path of the pallets where it is picked up through the accelerating lever and the reset plate by the now forward motion of the square shaft. The print hammer is then latched in a temporary latched position and the cycle is completed.

4.41 The force of the hammer blow may be varied to suit single or multiple copy printing. Clockwise rotation of the knurled knob on the carriage unit to the position where two notches are up, shifts the hammer spring anchor to give the spring higher tension. In this setting the machine will give up to six copies on normal multicopy paper. If single copy is being used, life of the ink ribbon will be prolonged and clearer copy produced by using the lower tension setting with one notch on the knob facing up.

Operation

View as shown is in a stop position. As SQUARE SHAFT ① rotates clockwise the RESET PLATE ② will rotate clockwise moving ACCELERATING LEVER ③ and HAMMER LEVER ④ clockwise allowing LATCHLEVER ⑤ to latch ACCELERATING LEVER ③. As SQUARE SHAFT ① rotates counter-clockwise the RESET PLATE ② will rotate counterclockwise pivoting the LATCHLEVER ⑤ clockwise. This releases ACCELERATING LEVER ③ and HAMMER LEVER ④ to move forward driving PRINT HAMMER ⑥ forward.



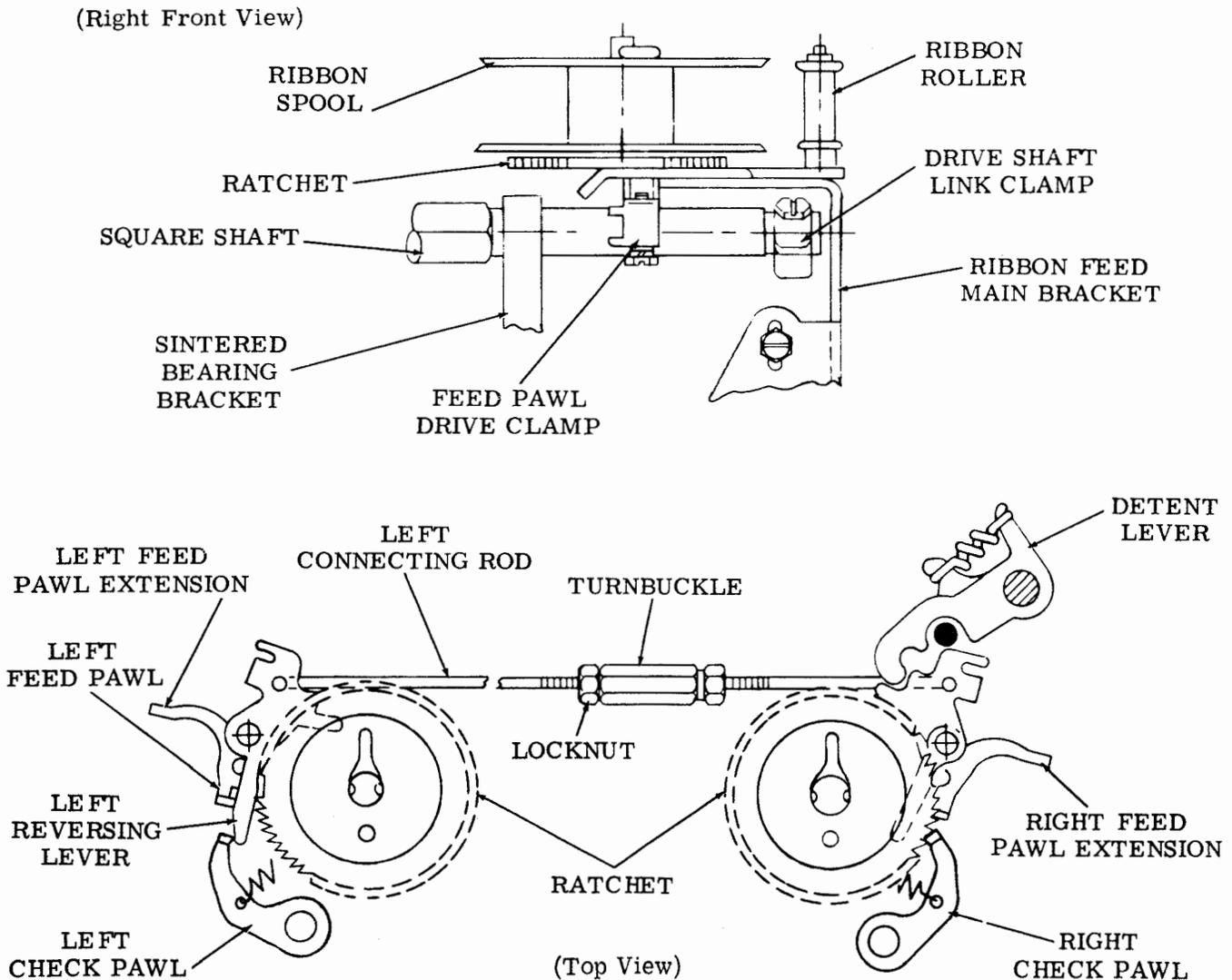


L. Ribbon Feeding and Reversing Mechanism

4.42 At each end of the square shaft on which the print hammer carriage rides is mounted a ribbon feed mechanism and ribbon spool. Each ribbon feed mechanism consists basically of a ratchet, feed pawl, check pawl and the ribbon reversing mechanism. The ratchet upon which the ribbon spool is mounted is driven by the feed pawl which in turn is powered by the oscillation of the square shaft, through a drive arm, link and bail. While one ribbon mechanism is feeding, the other is in a free running condition. A ribbon reverse mechanism controls which mechanism is feeding.

4.43 On the outside of each ribbon feed mechanism is mounted a guide lever and a blocking lever. The feed pawl and check pawl

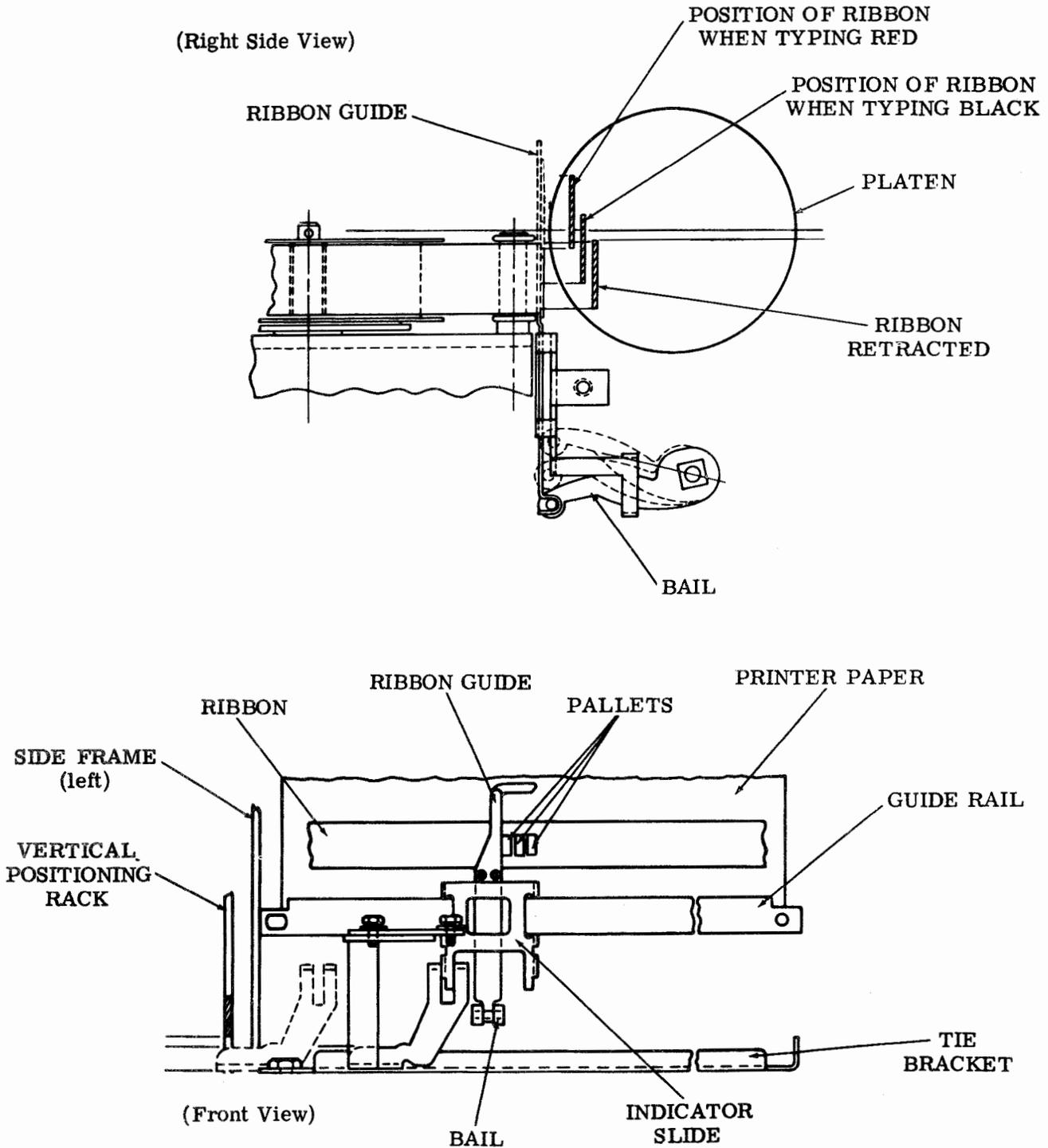
in the nonfeed condition are held away from the ratchet by a reversing lever, which is detented in one of two positions by a detent lever. The reversing action is initiated by the eyelet at the end of the ribbon as it comes off the spool and moves the guide lever to the rear, which causes the latching surface of the blocking lever to move upwards into the path of the feed pawl extension. As the motion of the feed pawl extension is being blocked during the backstroke, the feed pawl rotates into engagement with the ratchet, and moves the reversing lever over to its other detented position. Through a connecting rod the reversing lever of the other ribbon feed mechanism moves its feed pawl and check pawl out of engagement with the ratchet, and keeps this mechanism in a nonfeed condition. The feed pawl which was previously in a nonfeed condition is now driving the ratchet, and the ribbon is moving in the opposite direction.



M. Ribbon Positioning Mechanism

4.44 The normal position of the ribbon is below the printing line. That portion of the ribbon which is directly in front of the print hammer is raised by a ribbon guide to allow the pallet to strike the ribbon and print the character. The ribbon guide and guide control arm

are moved along separate shafts beneath the platen by a connection to the print hammer carriage. The shaft upon which the guide control arm rides is oscillated by a linkage controlled from the print hammer clutch. Immediately after the character has been printed the ribbon is lowered to allow full view of the entire printed line.



Black Ribbon

When the printing clutch trips the FOLLOWER ARM ① will ride low portion of CAM ② allowing FOLLOWER ARM ① to pivot clockwise. As FOLLOWER ARM ① rotates it will pull TRANSFER LINK ③ down until it hits against BLOCKING SLIDE ④. TRANSFER LINK ③ moving downward will cause PRINTING SHAFT ⑤ to rotate clockwise moving RIBBON GUIDE ⑥ up. RIBBON ⑦ will only move up far enough to put black field of RIBBON ⑦ in front of print hammer.

Red Ribbon

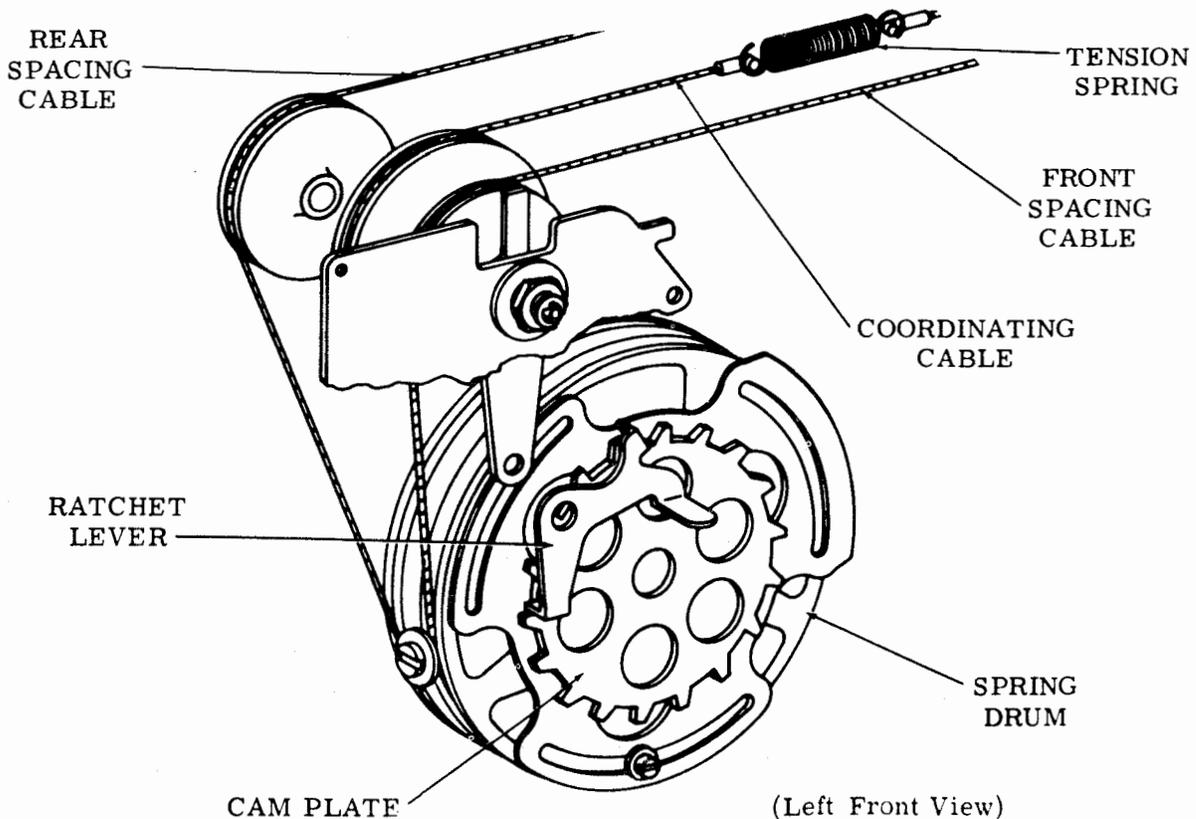
MAGNET ⑧ energizes pulling BLOCK SLIDE ④ to rear. When the printing clutch trips, the FOLLOWER ARM ① will ride low portion of CAM ② allowing FOLLOWER ARM ① to pivot clockwise. As FOLLOWER ARM ① rotates it will pull TRANSFER LINK ③ down. Since the BLOCKING SLIDE ④ is to the rear it will not block travel of TRANSFER LINK ③, therefore, it will move further down. TRANSFER LINK ③ moving further down will cause PRINTING SHAFT ⑤ to rotate more in a clockwise direction. PRINTING SHAFT ⑤ moving further in a clockwise direction will cause RIBBON GUIDE ⑥ to

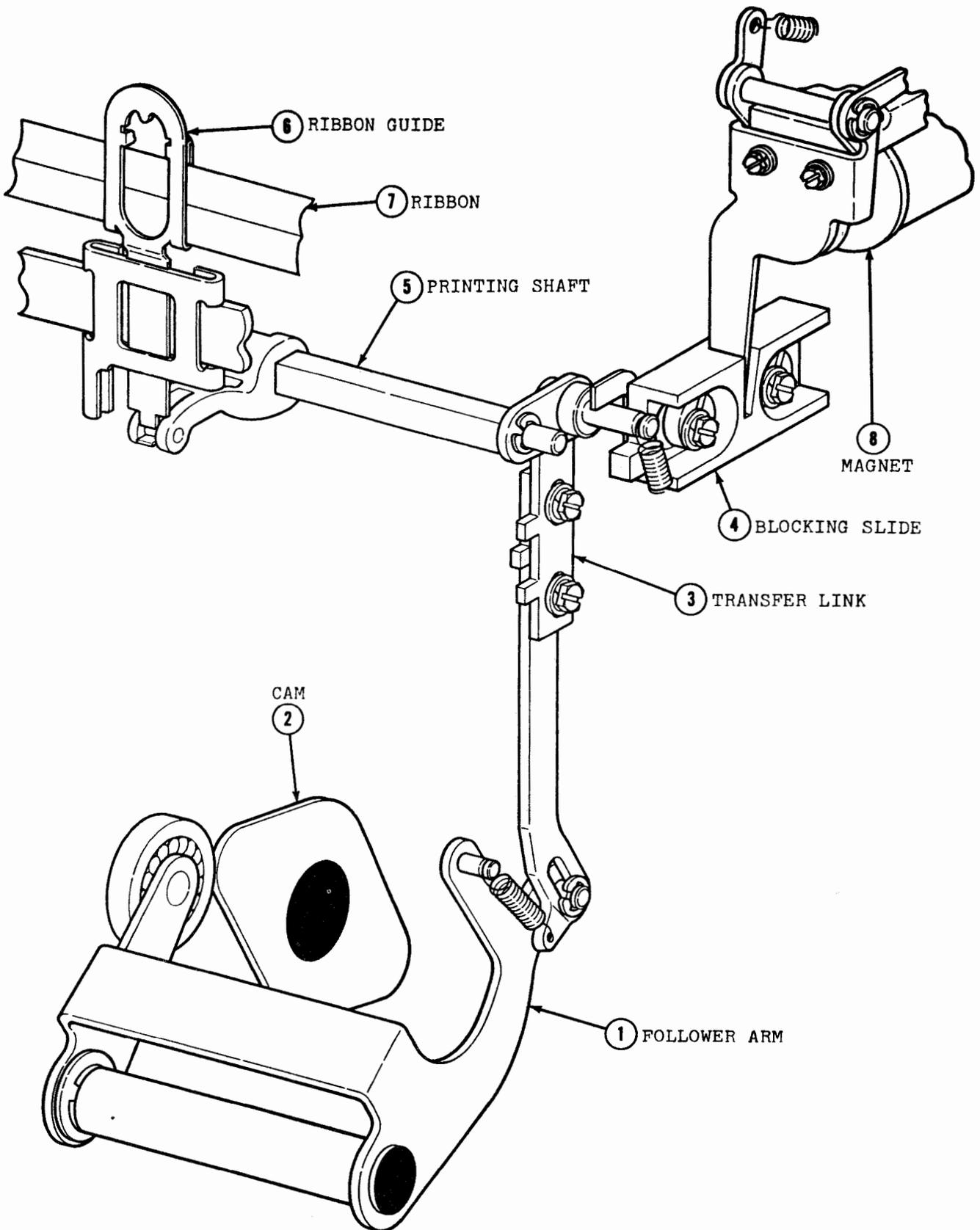
move further up. This will put red field of RIBBON ⑦ in front of print hammer.

N. Spacing Mechanism

4.45 To properly space the printed characters, the typebox and printing carriage must be advanced with each character printed. The carriages are connected to cables (see 4.31) which, in turn is fastened to the spring drum, which contains a torsion spring. The purpose of the spring drum is to tension the cable rope and the carriage to the left. The spacing drum has ratchet teeth about its periphery, which are engaged by the eccentric driven spacing drum feed pawls. The spacing shaft, on which the spacing eccentrics are mounted, is driven through its helical gear by the helical driving gear attached to the six-stop spacing clutch on the main shaft. The gear ratio of 3 to 1 causes the spacing shaft to turn one-half of a revolution each time the spacing clutch is tripped. This allows the feed pawls to advance the spacing drum by the amount of the ratchet tooth.

4.46 A cam on the print hammer clutch trips the spacing clutch through a bail which pivots on the trip shaft. This cam is designed so as to allow spacing to occur after the character has been printed.



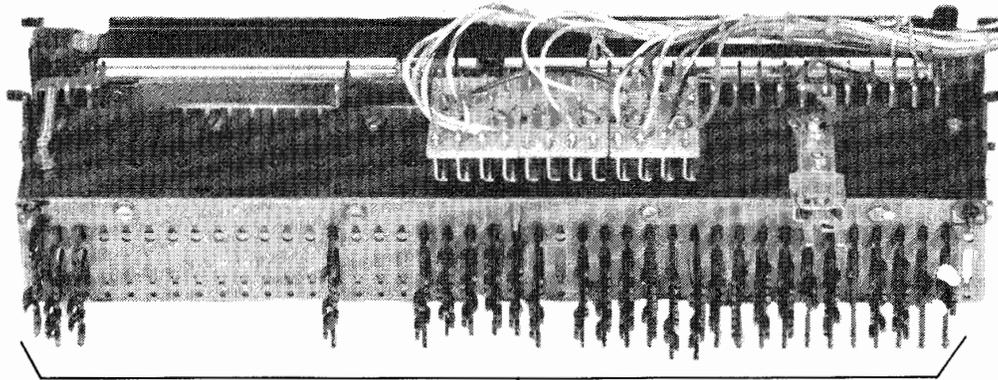


SECTION 574-320-101TC

O. Function Box and Function Box Drive Mechanism

4.47 The function box in the Model 37 is very similar to that of other teletypewriter equipment. The major difference is the coding

of the function bars. The function bar tines, are numbered 1 through 11 from the bottom to the top. This numbering corresponds to the numbering of the codebars mentioned in 4.18 of this section. Refer to Figure 13 for function bar coding.



FUNCTION BARS

Figure 11 - Function Box

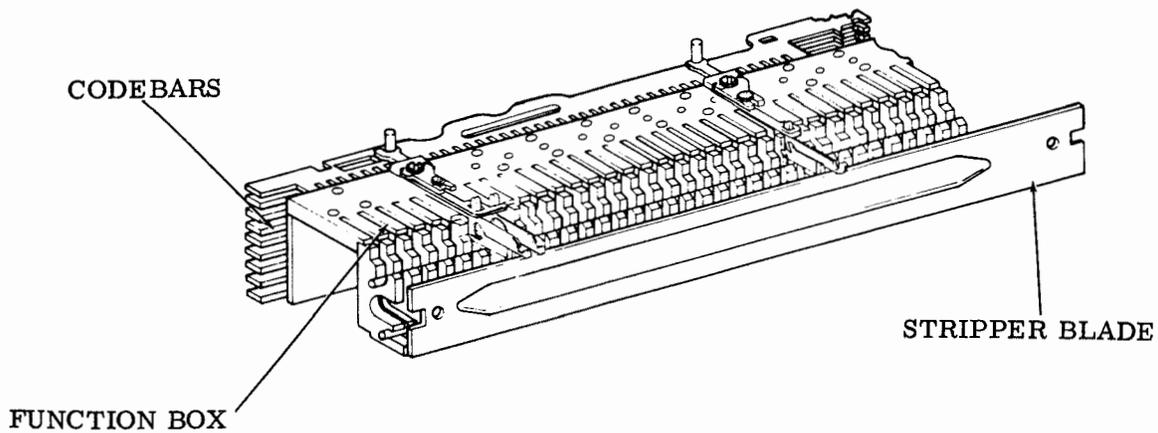
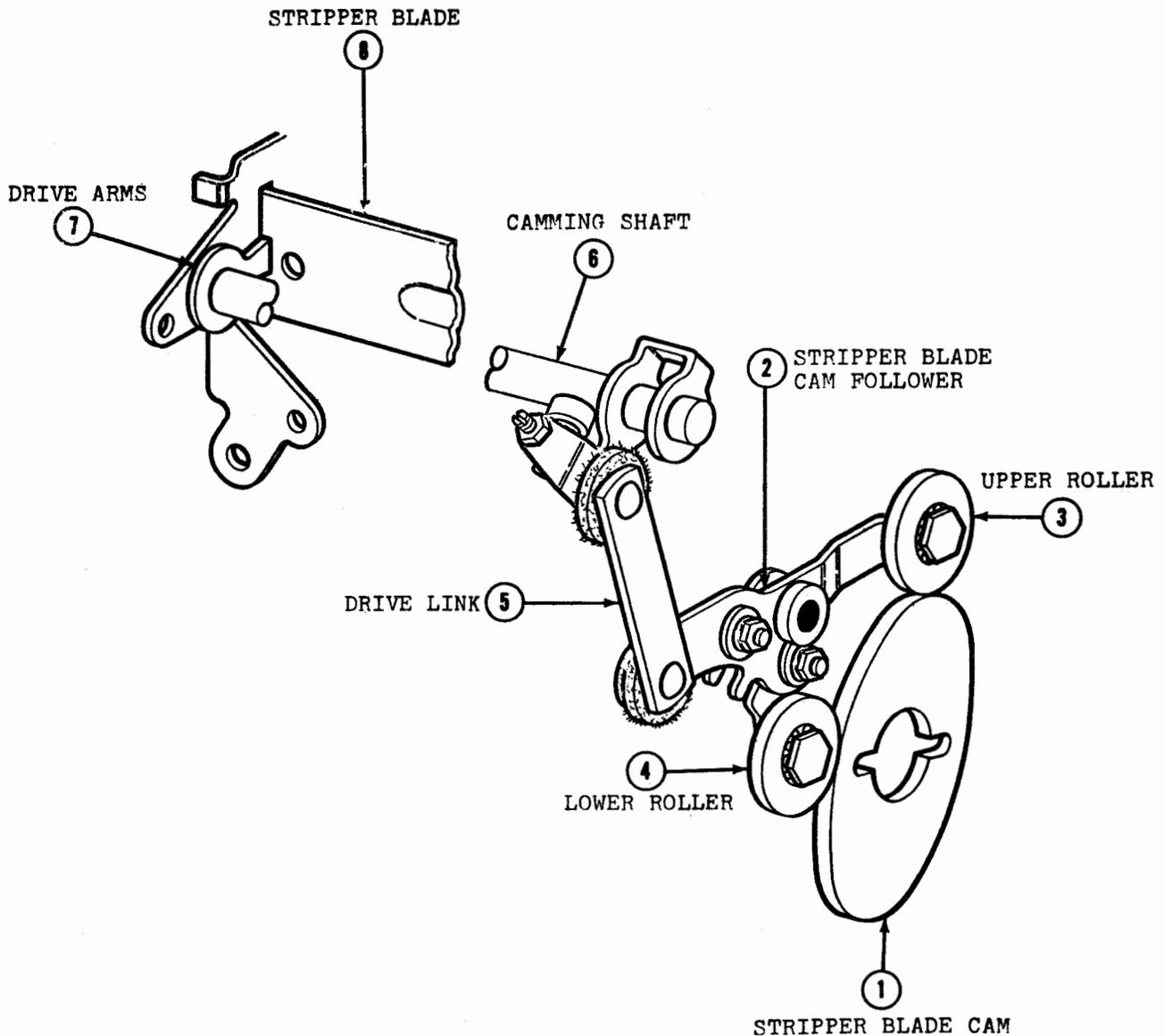


Figure 12 - Stripper Blade and Function Box



Operation

View as shown is in a stop condition. As function clutch trips the STRIPPER BLADE CAM ① will allow STRIPPER BLADE CAM FOLLOWER ② to allow its UPPER ROLLER ③ to ride low portion of cam and LOWER ROLLER ④ to ride high portion of cam. The STRIPPER BLADE CAM FOLLOWER ②

will rotate clockwise driving DRIVE LINK ⑤ upward. As DRIVE LINK ⑤ moves up the CAMMING SHAFT ⑥ will rotate clockwise. At this time the DRIVE ARMS ⑦ will rotate clockwise moving STRIPPER BLADE ⑧ down. When STRIPPER BLADE ⑧ moves up, it will "strip" selected function paws from function bars.

P. Carriage Return Mechanism

4.48 The carriage return mechanism is located to the right of center of the typing unit. Reception of the carriage return code causes the carriage return function bar, pawl and lever to operate. The lower end of the function lever engages the carriage return slide arm and pushes it forward. The slide arm, in turn, moves the carriage return bail about its pivot point. As the front portion of the bail moves downward, it takes with it the lower section of the spacing drum feed pawl release link. This causes the upper portion of the link to turn and disengage the spacing drum feed pawls from the spacing drum. When the carriage return bail reaches its lowest point, the carriage return latch bail locks it there. The disengagement of the spacing drum feed pawls from the spacing drum permits the spring drum to return the printing and typebox carriages toward the left side of the typing unit. As the spacing drum nears the end of its counterclockwise rotation, the roller on its stop arm contacts the transfer slide which, in turn, drives the dashpot piston into the dashpot cylinder.

4.49 A small passageway with an inlet from the inside of the cylinder and two outlets to the outside is incorporated in the end of the cylinder. The size of the outlets are controlled by adjustable members. The lowest outlet is controlled directly by a set screw which opens and closes the passageway. The upper outlet is controlled by a spring loaded ball. These two outlets determine the rate at which the air may escape from the cylinder.

4.50 When the spacing drum reaches its extreme counterclockwise position a post on the transfer slide contacts the carriage return latch bail and thereby allows the carriage return bail to be released permitting the feed pawls to engage the spacing drum.

Q. Line Feed Mechanism

4.51 The line feed mechanism is located at the left side of the typing unit. Upon the receipt of the line feed code, the lower end of the line feed function lever engages the line feed slide arm and pushes it forward. The slide arm, in turn, moves the line feed clutch trip arm and the trip lever about their pivoted point until the trip lever releases the six-stop line feed clutch. The line feed gearing is such that each one-sixth revolution of the clutch will advance the platen by one line. Therefore, the

length of time that the line feed clutch trip lever is held away from the clutch will determine the number of line feeds that occur. The timing relationship between the stripper blade cycle and the main shaft rotation is such that the function pawl is not stripped from a function bar until after more than one-sixth of a revolution of the clutch has occurred. When a single line feed is desired, it is necessary to strip the function pawl from the line feed function bar before the line feed clutch completes one-sixth of a revolution. This is accomplished by an auxiliary stripper which is mounted on the stripper blade, and protrudes above the blade thereby causing the function pawl to be stripped earlier in the cycle than would normally occur if stripped by the standard position of the blade. The auxiliary stripper is allowed to slide from left to right under the control of a lever which is pivoted on the side frame. Through this lever the slide can be manually positioned into or out of the path of the line feed function pawl. In this way single or double line feed is achieved by manually positioning the lever in its two-position detent.

4.52 Each one-sixth revolution of the line feed clutch causes its attached spur gear to rotate the line feed eccentric spur gear and its attached eccentrics one-half of a revolution. The eccentrics, which are offset in opposite directions, each carry a line feed bar. These bars, guided by the line feed bar bellcrank, alternately engage the line feed spur gear on the platen and advance the platen one line for each one-half turn of the eccentrics.

4.53 When it is desired to manually position the platen, this may be accomplished by turning the platen handwheel. The platen handwheel spur gear engages the platen idler spur gear which, in turn, is engaged with manual line feed knob causing the line feed bar release lever to bear on the line feed bar bellcrank and causes it to disengage the line feed bars from the line feed spur gear.

R. Print and Space Suppression

4.54 When certain functions are selected it is necessary to suppress printing and spacing. This is accomplished through the function box by the function lever moving the suppression bail which in turn moves the suppression slide forward where it will hold the suppression interposing lever in a position to prevent full movement of the trip shaft cam follower. In this way the trip shaft will not be able to rotate far

enough to trip the printing clutch, and thereby also prevent tripping of the spacing clutch.

S. Backspace Mechanism

4.55 A backspace signal is received by the printer and recognized by the function box. Motion is transferred from the function box through a slide arm and bail which passes through an opening in the front plate. This action depresses the intermediate lever which actuates the backspace bail through a link. As the backspace bail begins to rotate a spring pulls the backspace blocking pawl into engagement with the spacing ratchet on the spacing drum. Continued rotation of the backspace bail causes the spring to stretch, putting pressure on the blocking pawl and also lifting the spacing pawls clear of the spacing ratchet. The spacing drum returns approximately one-half space under carriage return spring tension until its motion is blocked by the blocking pawl. The spacing drum, spacing cables, print hammer carriage and typebox carriage maintain this position until the function pawl in the function box is stripped near the end of the machine cycle. Upon stripping of the function the entire linkage is returned to its previous state, thereby returning the spacing pawl to the ratchet and removing the blocking pawl from the ratchet. This allows the spacing drum to return an additional one-half turn thereby completing a full backspace.

T. Function Bar Coding

4.56 The chart on the last page of this section shows the coding arrangement of function bar tines one through seven for the USASCII X3.4 - 1967 code. The number eight tine is shown for even parity. If odd parity or no parity at all is required the eighth level may be altered to suit. The following are instructions for coding the 9th, 10th and 11th tines.

4.57 The number nine tine senses the condition of the number nine blocking bar. The blocking bar is in a normal mode (print mode of machine) when it is to the right and in the alternate mode (nonprinting mode) when it is to the left (as viewed from the front). The blocking bar is usually positioned in the alternate mode by the reception of an ESC code. For further discussion of the use of ESC codes see escape sequences (4.20).

4.58 When coding a function bar it must be decided if the number nine tine is to respond in the normal mode or alternate mode. If it is to respond in the normal mode the tine on the left (as viewed from the front) should be removed. If it is to respond in the alternate mode the tine on the right should be removed.

4.59 In principle, the number ten and eleven blocking bars operate similar to the number nine. The difference being that when coding a function bar to respond to the normal mode the tine on the right (as viewed from the front) must be removed and in the alternate mode the tine on the left must be removed.

4.60 On machines equipped with automatic carriage return and line feed both tines of the eleventh level must be removed unless they are the automatic carriage return line feed function bars.

4.61 Function bars which are used to control the position of the blocking bars must have both tines removed for the level that they control.

5. REFERENCES

5.01 The following sectionalized literature pertains to the late design Model 37 typing and keyboard units:

<u>TYPING UNIT</u>	<u>NUMBER</u>
Adjustments	574-320-703TC
Lubrication	574-320-704TC
Disassembly and Reassembly	574-320-705TC

KEYBOARD AND BASE ASSEMBLY

Description and Principles of Operation	574-321-101TC
Adjustments	574-321-703TC
Lubrication	574-321-705TC
Disassembly and Reassembly	574-321-705TC

