

## 37 NON-TYPING REPERFORATOR

### DESCRIPTION AND PRINCIPLES OF OPERATION

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#### 1. GENERAL

1.01 This section provides description and principles of operation for the 37 non-typing reperforator (Figure 1).

1.02 The reperforator is an electromechanical unit which records information in tape as combinations of perforations representative of the presence or absence of a signal pulse in each of the eight levels of intelligence applied to the unit electrically. The information is received in a form corresponding to the USA Standard Code for Information Interchange (ASCII) and is translated into the necessary mechanical motions to perforate the code holes and feed the tape. Motive power is supplied through an external motor unit and drive mechanism. The reperforator can operate at speeds up to 150 wpm.

1.03 Character representations, or graphics, are the alphabetic, numeral or symbol intelligence representations. Function representations are the coded equivalent of operations auxiliary to transmission or reception of the graphics, such as carriage return, line feed, or signal bell. Both character and function representations are perforated into the tape, so it can be used in conjunction with typing equipment.

1.04 The unit is referred to as being in the idling condition when the main shaft is turning and the signal circuit is closed so that no message is being received. The unit is running open when the main shaft is turning and no signal is applied to the selector magnets.

1.05 References in the text to left or right, front or rear, up or down, etc refer to the reperforator in a normal operating position and viewed by an operator facing the punch block.

#### 2. DESCRIPTION

2.01 The basic reperforator consists of the selector, transfer, function, perforator and backspace mechanisms. The selector mechanism includes a 2-coil magnet, selecting cam sleeve and a rangefinder. The rangefinder permits adjusting the selector mechanism in relation to the signal code.

2.02 Information received by the selector mechanism is transferred to the perforator mechanism by the transfer mechanism. The function mechanism, consisting of a trip

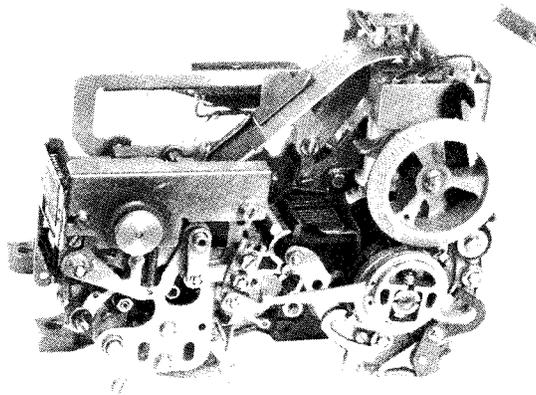


Figure 1 - Non-Typing Reperforator

HANDWHEEL

- Permits normal tape feeding.

TAPE FEED MECHANISM

- Single tape threading procedure.
- Ten characters per inch feeding.

TAPE DEPRESSOR

- Prevents excess slack in tape.

TAPE CHUTE

TAPE ROLLER

SELECTOR MAGNETS

RANGE FINDER

- Selects most favorable period for sampling character bits.

SELECTOR MECHANISM

- Receives and converts electrical code input to mechanical code output.

SELECTOR CLUTCH

(Right Side View)

PERFORATOR MECHANISM

- Produces fully perforated code holes and feed holes.
- Produces advanced feed holes — 0.013 inch ahead of code holes.
- Perforated code holes correspond to marking bits in the signal input. Nonperforated portions of the tape correspond to spacing bits in the original input.

TRANSFER MECHANISM

- Transfers data sensed by selector mechanism to perforator mechanism

BACKSPACE MECHANISM

- Retracts tape one character each time mechanism is actuated.
- Permits eliminating errors in the tape by overpunching.
- Power operated.

Figure 2 - 37 Non-Typing Reperforator (Basic Unit)

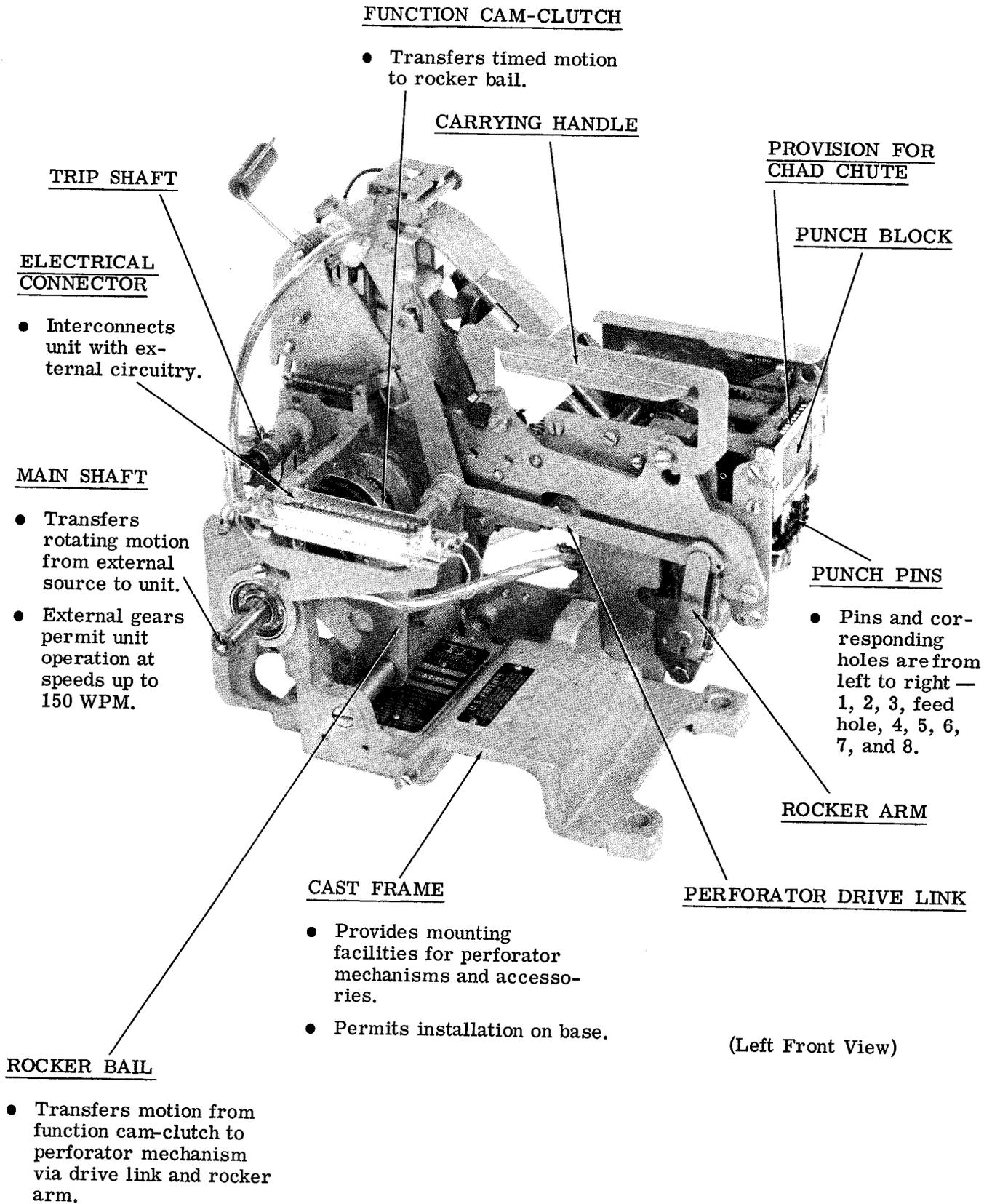


Figure 3 - 37 Non-Typing Reperforator (Basic Unit)

assembly, cam clutch, and rocker bail, transfers timed motion to the perforator mechanism. The function cam clutch is tripped by the selector mechanism. It drives the rocker bail which transmits power to the perforator mechanism through the perforator drive link and rocker arm.

2.03 The perforator mechanism includes punch pins, punch slides and punch slide latches which are positioned according to the signal input by the transfer mechanism. The position of the punch slides determines the operation of the various punch pins.

2.04 The tape is fed by a feed wheel and die wheel which indents but does not perforate the tape. The feed hole is perforated in the punch block.

2.05 The features of the reperforator are illustrated and described in Figures 2 and 3.

2.06 Variable features available with the reperforator include manual interfering tape feedout, which permits preparing a continuous length of delete characters in the tape. Signal inputs are not recorded during the operation of this feature. Other variable features include code reading contacts, operated by the punch slides, for electrical distribution of the perforated information, and auxiliary timing contacts.

TECHNICAL DATA

Dimensions (approximate)

Width . . . . . 7-1/2 inches  
 Depth . . . . . 6-1/2 inches  
 Height . . . . . 6 inches  
 Weight . . . . . 5-1/2 pounds

Signal

Code . . . . . USA Standard Code for Information Interchange (ASCII)  
 Current . . . . . 0.500 amperes

Tape

Type . . . . . Standard communications  
 Width . . . . . 1 inch  
 Perforations . . . . . 8-level, fully perforated  
 Holes/inch . . . . . 10  
 Advanced feed hole . . . . . 0.013 inch

Operating Speed

Up to 150 wpm

3. PRINCIPLES OF OPERATION

3.01 The principles of operation are presented in a block diagram, explanatory text covering the general operation of basic unit, and in a series of mechanism drawings. In each mechanism drawing, the illustrations are supported with text describing the purpose and operation of the mechanism. Where possible, the mechanism drawings are arranged in the order in which the mechanism operates.

3.02 The contents of this part are listed alphabetically in the following mechanism index.

MECHANISM INDEX

ITEM	PAGE
<b>BASIC UNIT</b>	
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VARIABLE FEATURES

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Manual interfering tape feedout mechanism . . . . .	20

## BASIC UNIT

## 3.03 Unit Operation

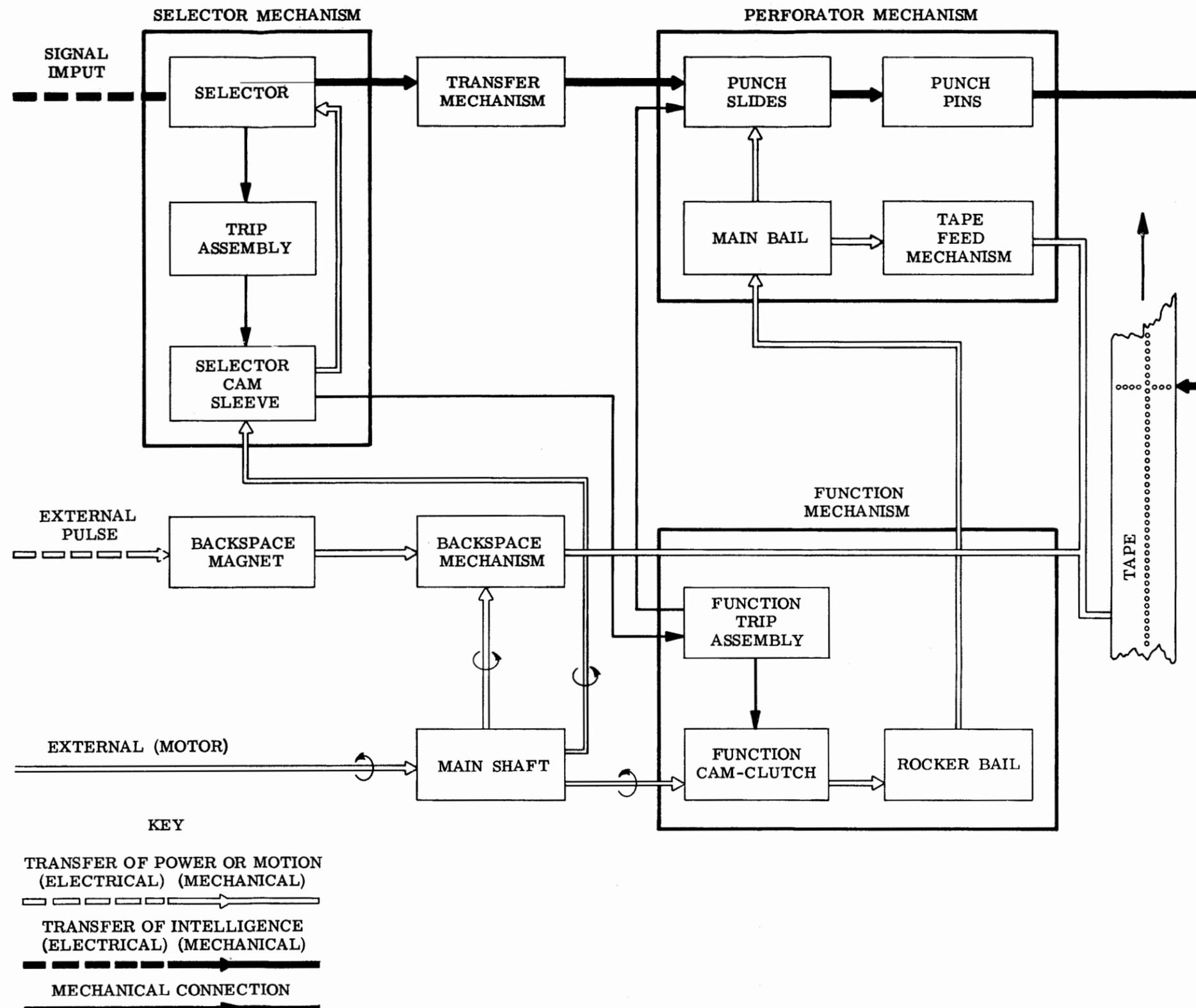
GENERAL OUTLINE OF OPERATION

Rotary motion from an external source is applied to the main shaft which turns constantly as long as the unit is under power.

The serial signal code input is applied electrically to the selector mechanism. The start pulse of each code combination causes the selector, through a trip assembly, to trip the selector cam sleeve. The main shaft then imparts motion to the cam sleeve throughout the selecting cycle. The selector cam sleeve, in turn, transfers timed motion to the selector, which converts the intelligence bits of the code combination into a corresponding mechanical arrangement. Near the end of the selecting cycle, the cam sleeve actuates the function trip assembly which trips the function cam-clutch and releases the punch slides of the perforating mechanism so they can receive the code arrangement from the selector via the transfer mechanism. The selector cam sleeve is then disengaged and remains inoperative until the next code combination is received.

The function cam-clutch, driven by the main shaft, imparts motion to the rocker bail through-out the function cycle. The rocker bail transfers the motion to the perforator main bail which, in turn, distributes it to the punch slides and the tape feed mechanism. The punch slides, having received the arrangement from the selector mechanism, cause the punch pins to perforate code holes in the tape corresponding to the code pulses received by the selector mechanism. Late in the function cycle, the tape feed mechanism advances the tape one character space. The function cam-clutch is then disengaged and remains stationary until again tripped by the selector cam sleeve. The operations of the re-perforator may overlap if the code combinations are being received fast enough. For example, while the perforating mechanism is punching the code combination and advancing the tape, the selector mechanism may be processing the next code combination.

Pulsing the backspace magnet actuates the backspace mechanism which retracts the tape through the punch block.



## 3.04 Selector Mechanism

START-STOPPurpose

Engage-disengage selector cam sleeve with main shaft. Responds to start and stop bits of 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 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.

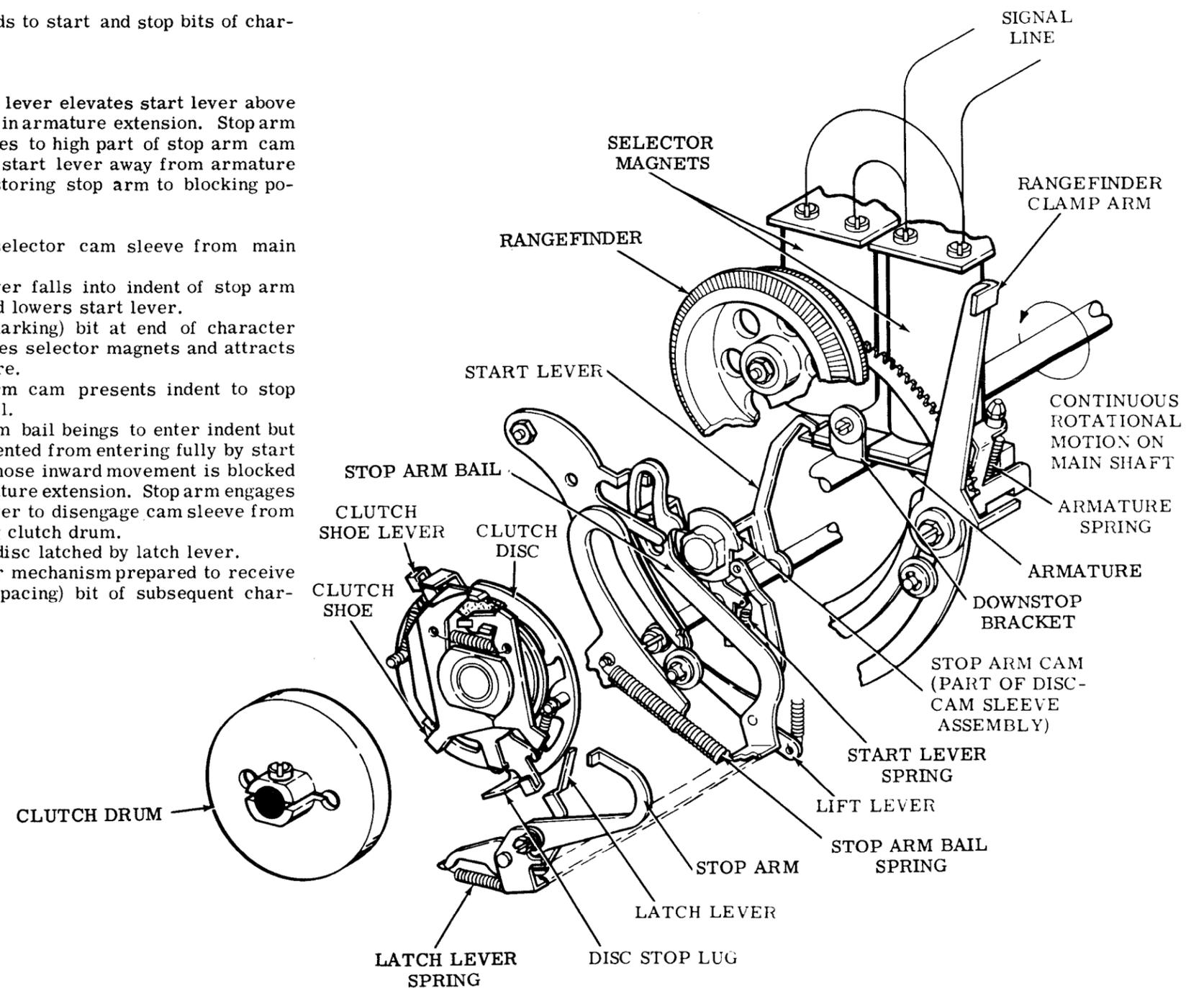
Raise, reset, and lower start lever. Block clutch shoe lever.

- (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 (3.06).
- (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 and restoring stop arm to blocking position.

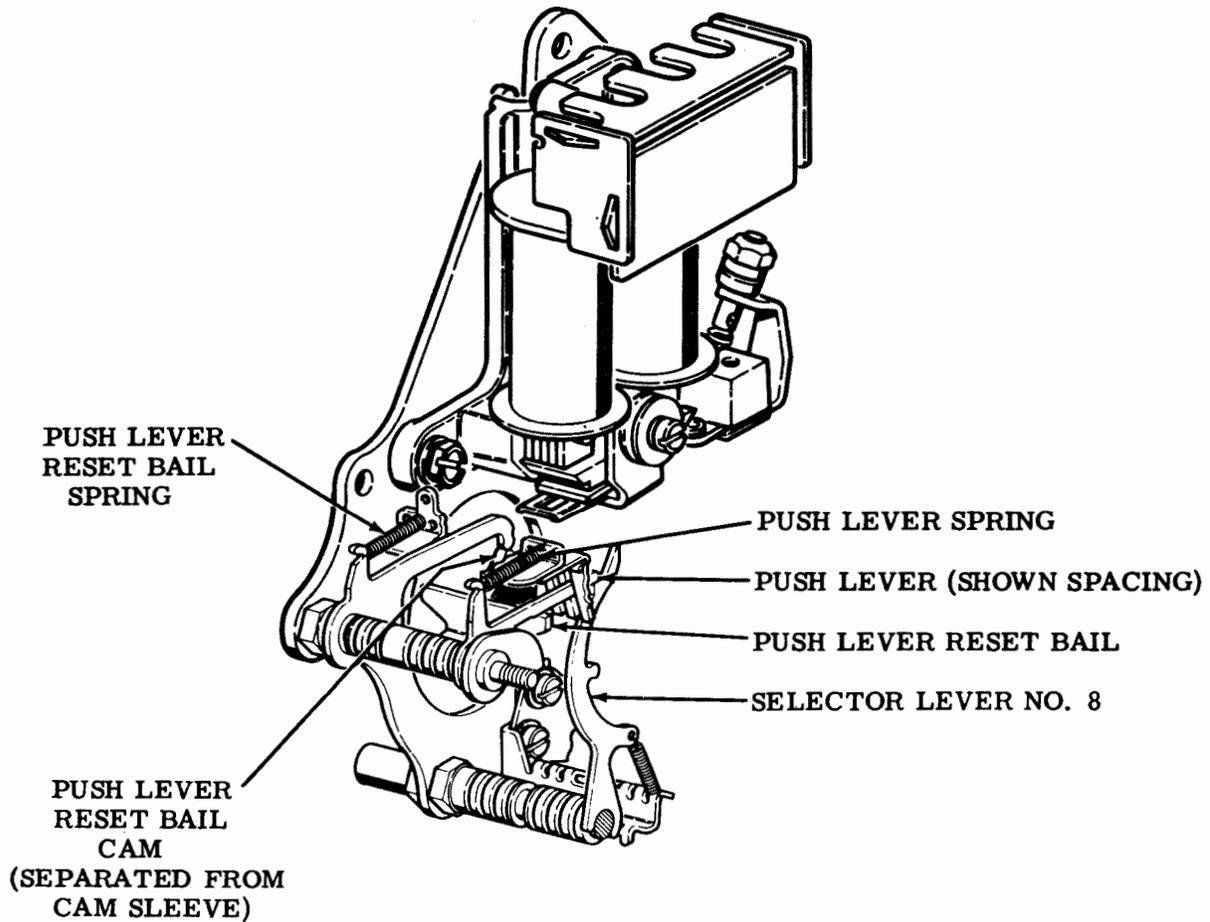
Disengage selector cam sleeve from main shaft.

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

RANGEFINDERPurpose

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 rangefinder scale adjustment.

## 3.05 Selector Mechanism (continued)

PUSH LEVER RESET**Purpose**

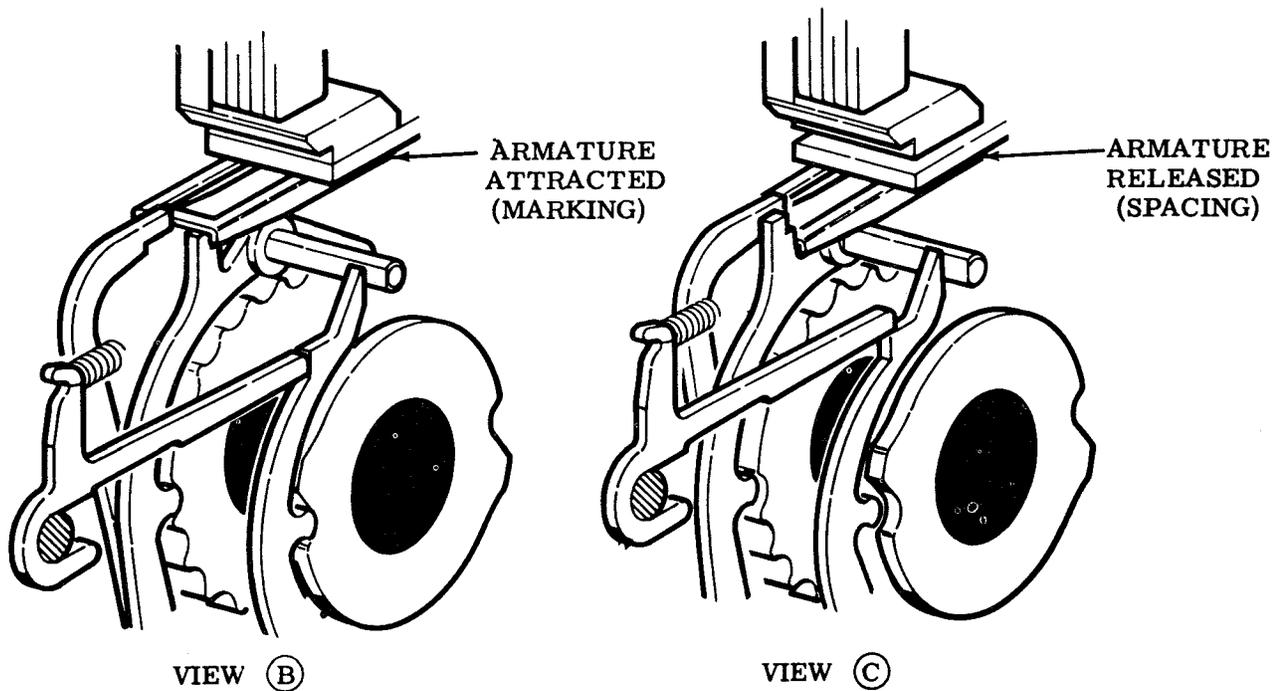
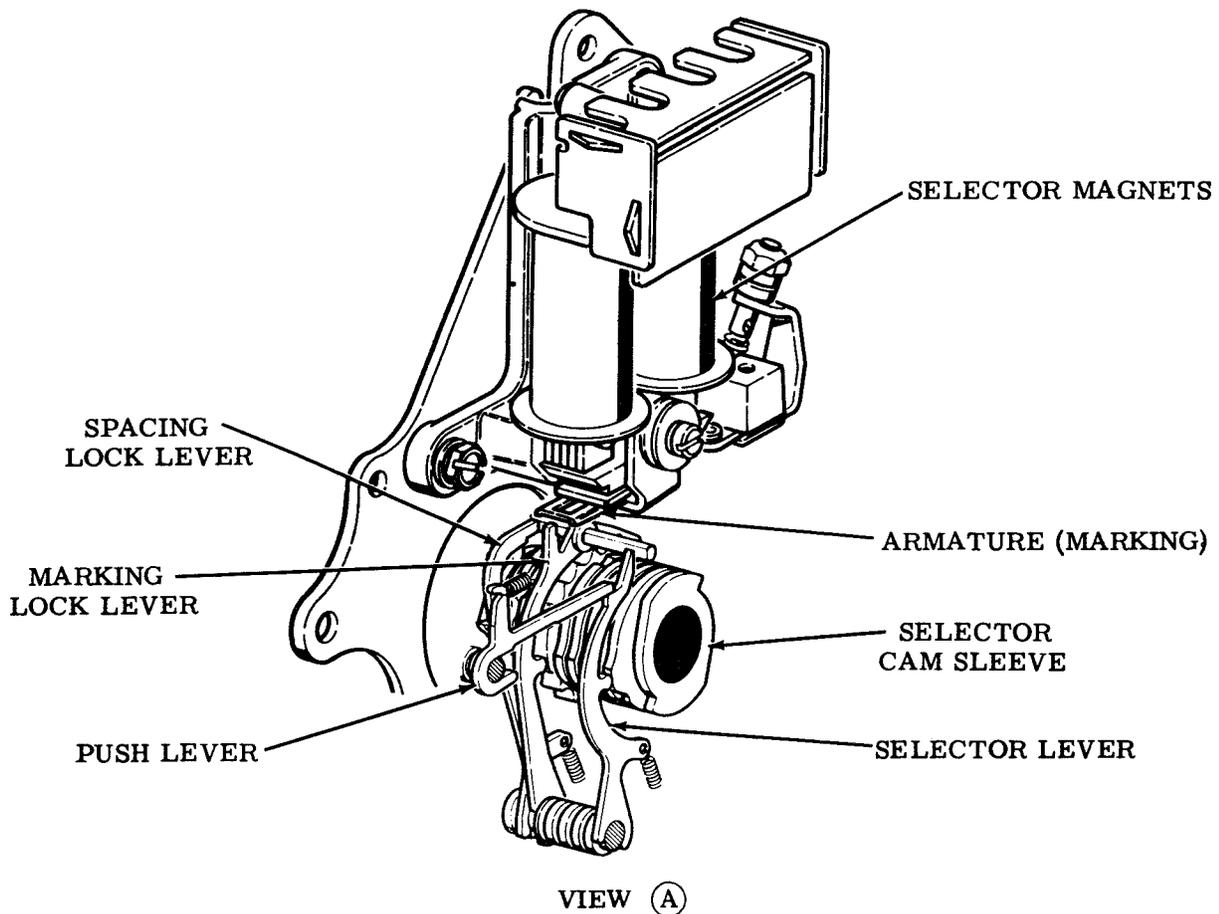
Strip previous character from push levers after start bit causes selector cam sleeve to engage main shaft.

**Operation**

As cam sleeve begins rotating, high part of push lever reset bail cam lifts push lever reset bail against tension of spring. Bail pivots, lifting and unlatching the marking push levers from behind their selector

levers. Bail returns to unoperated position when lobe drops from high part of cam. All push levers, except auxiliary push lever (3.07) will then be in spacing condition.

3.06 Selector Mechanism (continued)



SELECTION**Purpose**

Sequentially position 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-

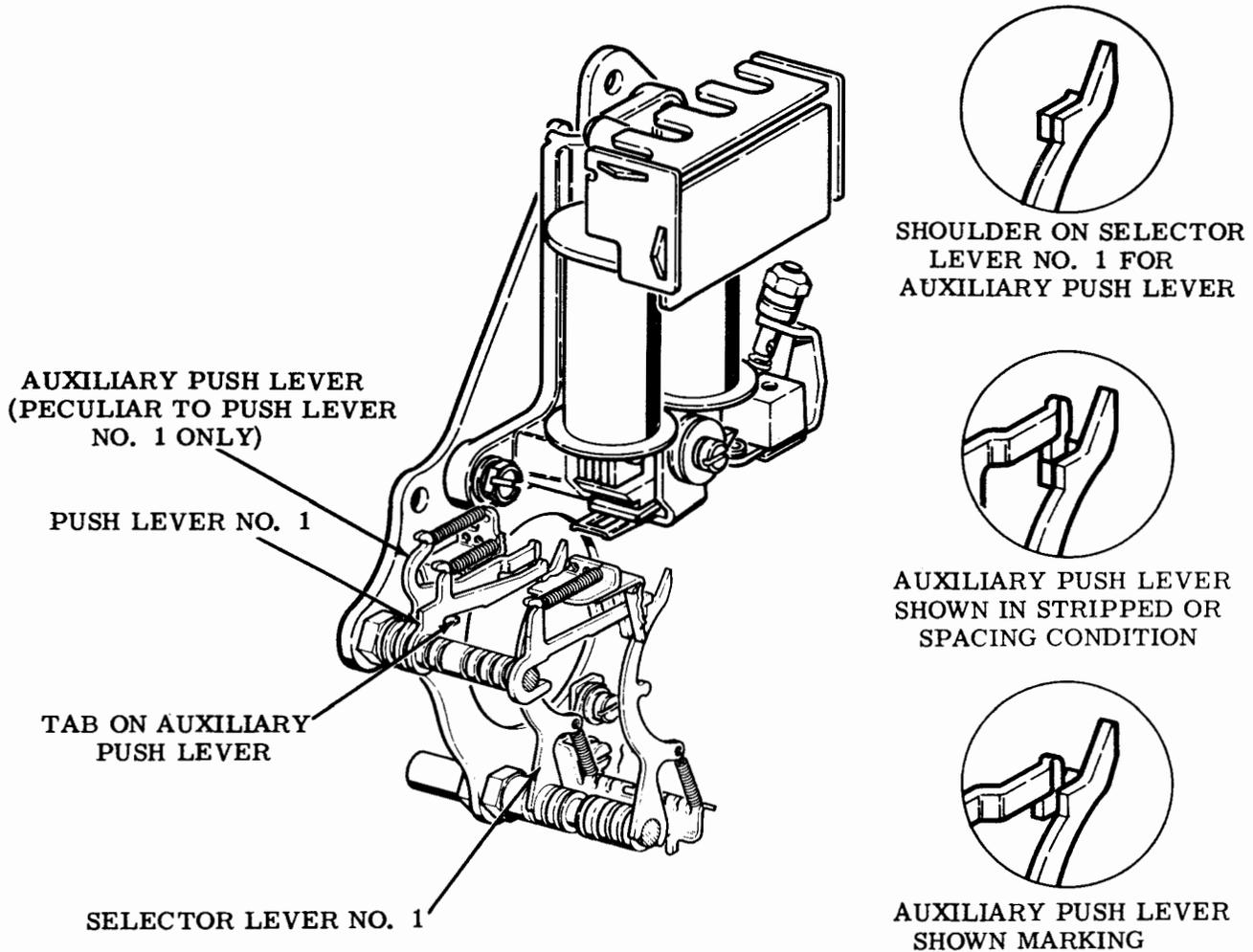
tor lever which is opposite the indent in its cam, can affect its push lever.

- (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.

3.07 Selector Mechanism (continued)



AUXILIARY PUSH LEVER

**Purpose**

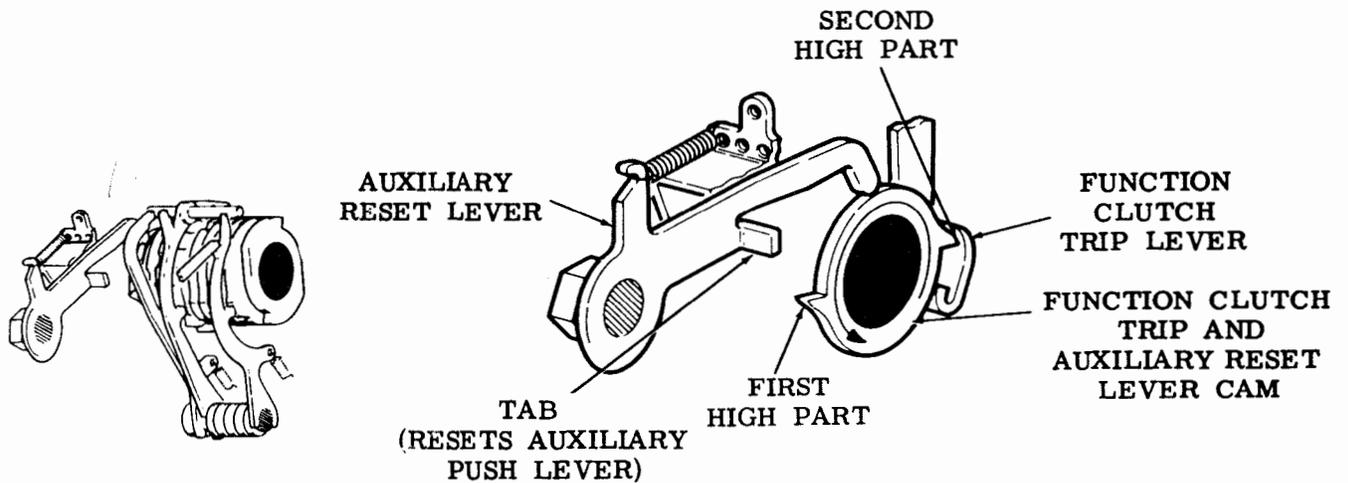
Senses marking or spacing position of selector lever number 1. Normal strip operation (push lever reset) occurs during reception of code bit number 1 and does not permit push lever number 1 to sense position of its selector lever.

**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 ball (3.05) 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 (3.08). Push lever number 1 is then latched by selector lever number 1.

3.08 Selector and Main Shaft Mechanisms (continued)



TRIP AND RESET OTHER MECHANISMS

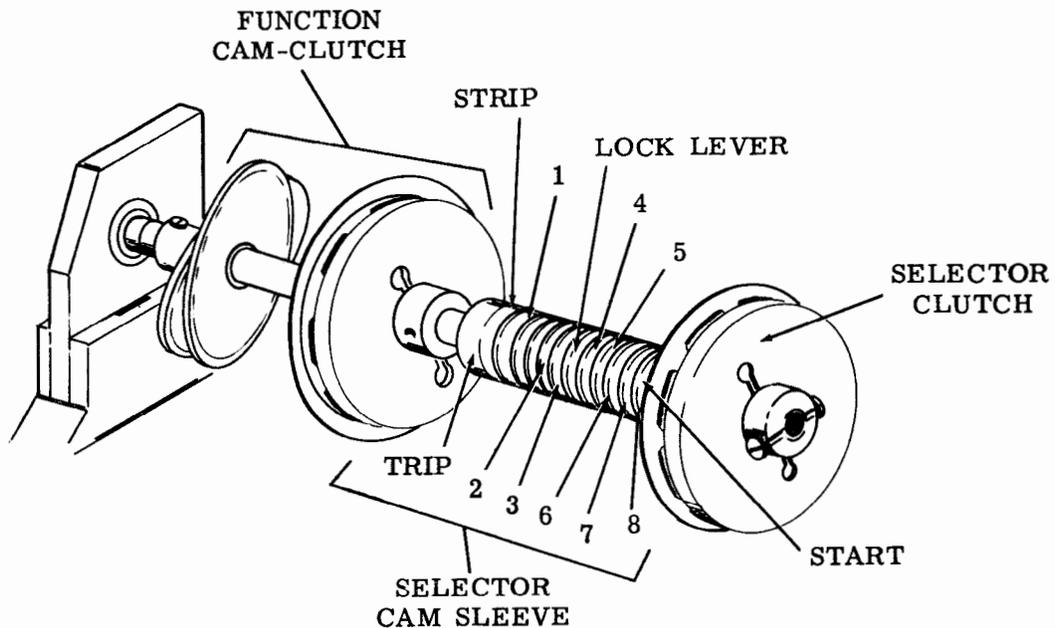
**Purpose**

Reset auxiliary push lever.

**Operation**

Consider that selector clutch is engaged and cam sleeve is rotating in direction illustrated. Approximately mid cycle the second high part of cam operates auxiliary reset lever. Tab

on auxiliary reset lever strips auxiliary push lever. About the same time, first high part of the cam operates the function clutch trip lever to initiate the function cycle (3.10).



MAIN SHAFT

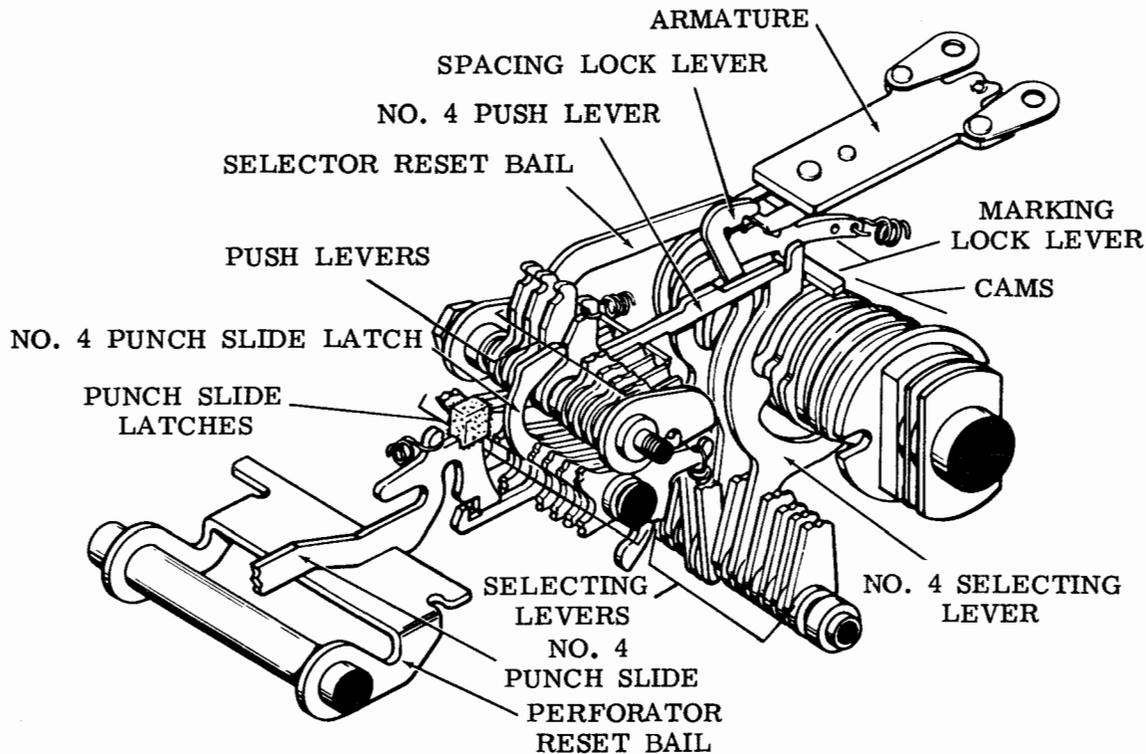
**Purpose**

Transfer motor electro-mechanical rotating motion (power) and drive the reperforator mechanisms.

**Operation**

Rotary motion from an external source is received by the main shaft which rotates continuously as long as the unit is under

power. Selecting and function cam-clutches distribute this motion to the selector and function mechanisms.



TRANSFER OF SELECTED DATA

**Purpose**

To provide a path for transferring the signal intelligence from the selector mechanism to the punch slides in the perforator mechanism.

**Operation**

Selected push levers, in moving to the left as determined by their respective cams, rotate associated punch slide latches counterclockwise. Just before the eighth push lever is selected, the selecting cam through the function trip assembly carries the perforator reset bail to release the punch slides. Unselected latches retain their associated slides to the right while the selected latches

permit their slides to move to the left under spring tension. During the latter part of the function cycle, the reset bail returns the punch slides to their unselected position. The latches return under spring tension to their unselected position when the push levers are repositioned at the start of the next selection cycle.

## 3.10 Function Mechanism

TRANSFER OF CONTROLLED MOTION FOR PERFORATION**Purpose**

To convey timed and controlled motion to the perforator mechanism.

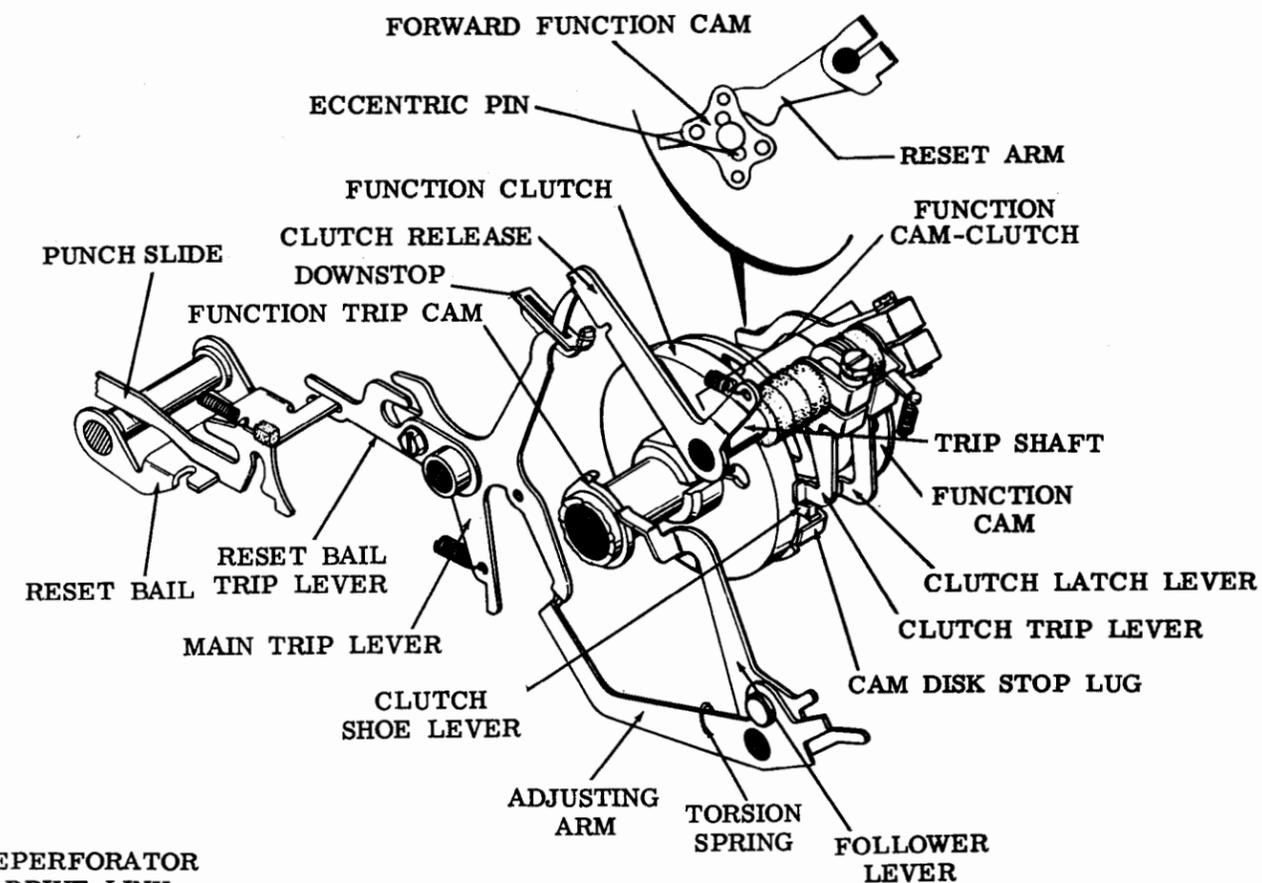
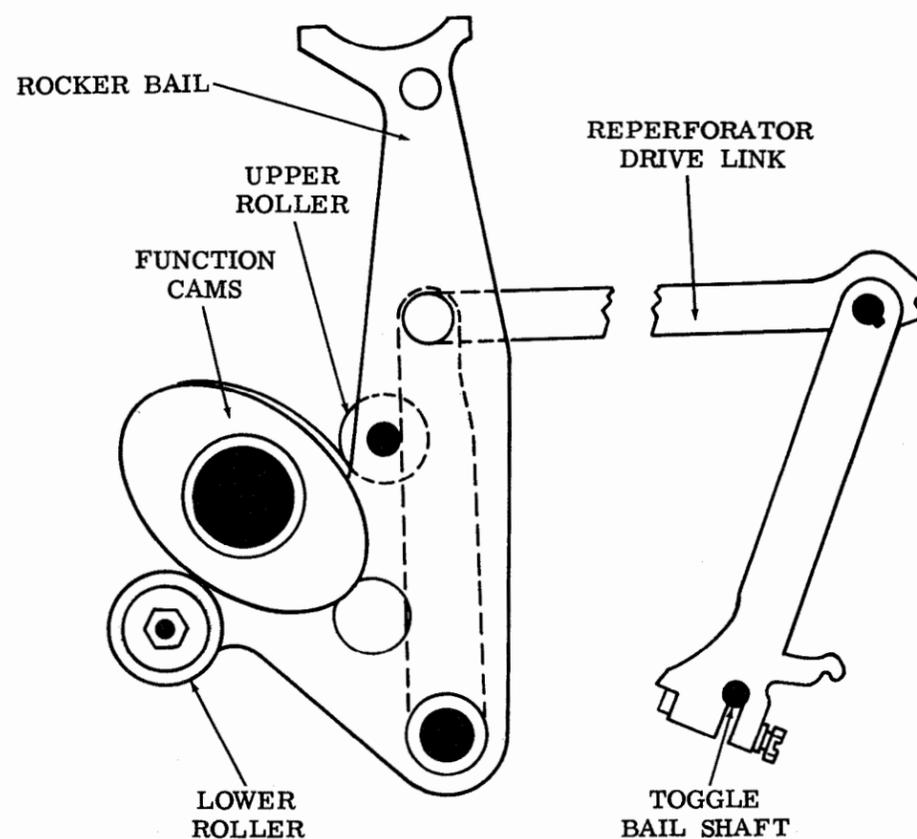
**Operation**

Main shaft motion is conveyed to the perforator mechanism by the function mechanism, comprised of the cam-clutch, rocker bail and a clutch trip assembly. A follower lever rides on the function clutch trip cam which is part of the selector cam sleeve (3.08). Near the end of the selecting cycle, as the main shaft rotates counterclockwise, the high part of the cam pivots the follower lever which, through an attached adjusting arm, rotates the main trip lever counterclockwise. The reset bail trip lever attached to the main trip lever lowers the perforator reset bail and releases the punch slides (3.11), and the upper arm of the main trip lever moves away from the clutch release, which falls against the down-stop and rotates the trip shaft counterclockwise. Immediately, the low part of the trip cam allows the follower lever to return to its unoperated position, and the upper arm of the main trip lever moves down against the release. When the trip shaft is rotated by the release, it moves an attached clutch trip lever out of engagement with the clutch shoe lever. The clutch engages, and the cam-clutch begins its cycle.

The function cam and the rocker bail translate the rotation of the shaft into simple harmonic motion which the rocker bail transfers to the perforator mechanism (3.11).

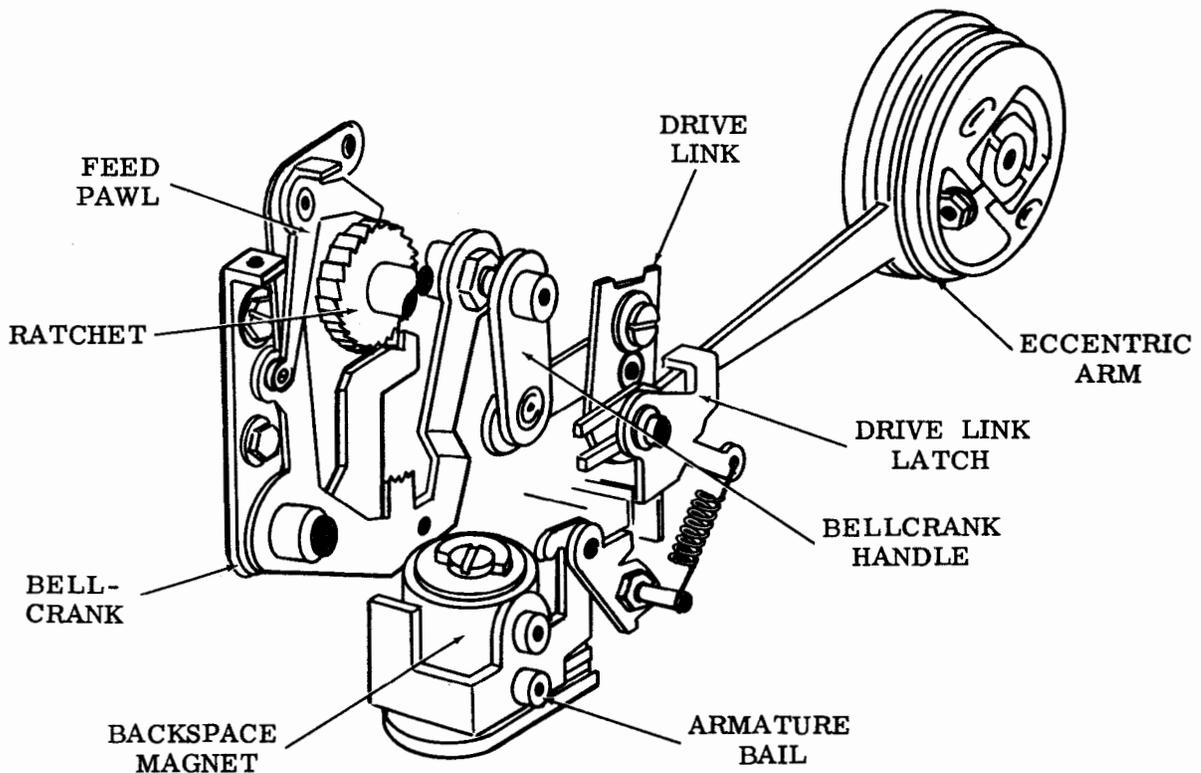
Each function cycle, the function cams bear against the upper and lower rollers and causes the rocker bail to rock to the left during the first part of the cycle and then back to its home position during the latter part of the cycle.

About midway through the function cycle, an eccentric pin on the function cam lifts the reset arm, which rotates the trip shaft clockwise. The release is moved up and allows the main trip lever to fall against the adjusting arm and raise the reset bail. The eccentric pin then moves out from under the reset arm, and the release is permitted to return to its unoperated position against the main trip lever. When the cam-clutch assembly completes its cycle, the clutch shoe lever strikes the trip lever, and the clutch is disengaged.





## 3.12 Backspace Mechanism

POWER DRIVE BACKSPACING**Purpose**

To retract the tape in the punch block so that errors in the tape can be deleted by overpunching.

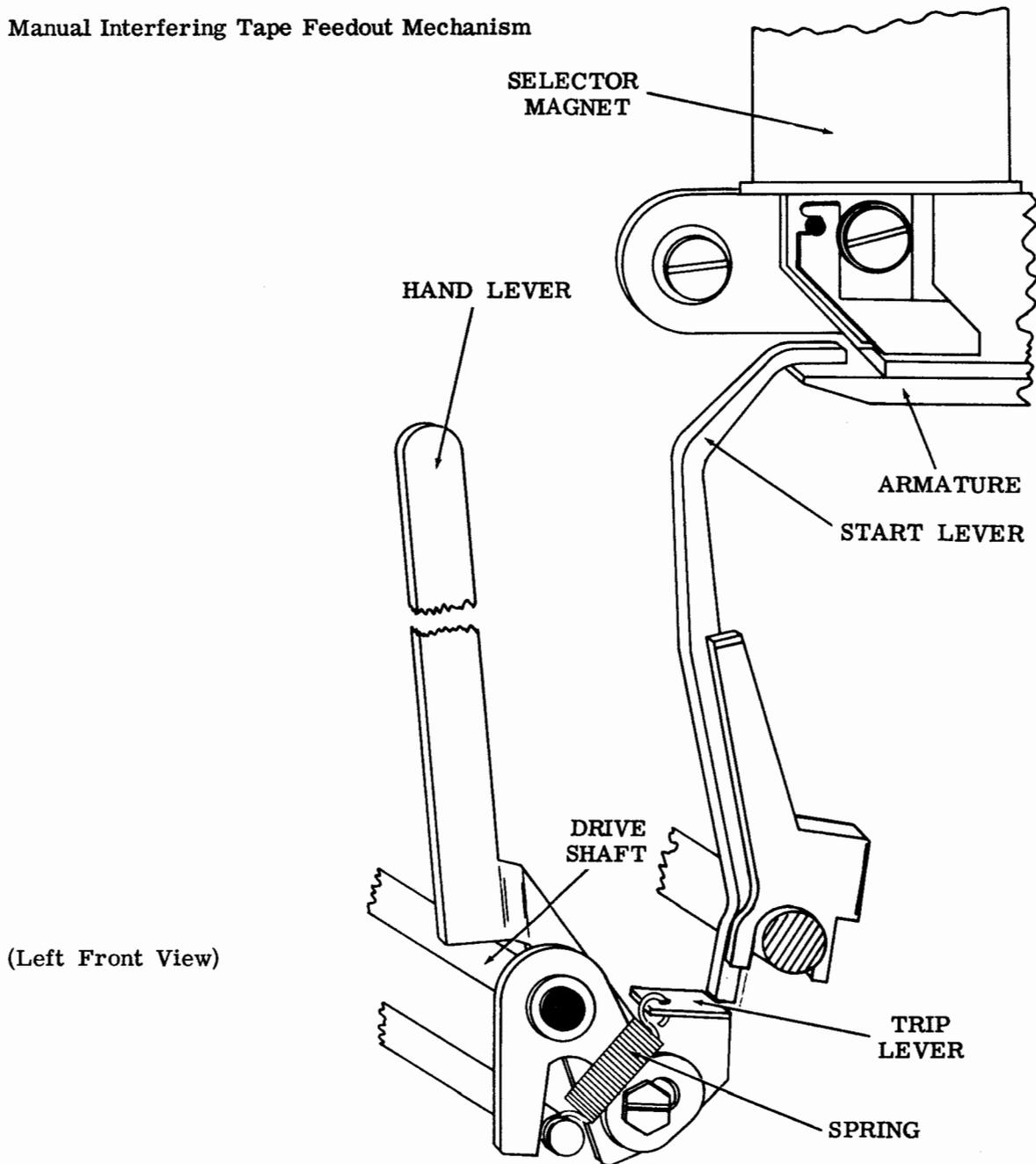
**Operation**

The application of an external pulse (initiated by a backspace key on an associated keyboard unit) retracts the perforated tape one code space with each pulse. When the backspace magnet is energized, the armature bail is pulled downward. An extension on the bail disengages a drive link latch, which drops, engaging a notch on the eccentric arm. As the main shaft moves the eccentric arm to

the left, the bellcrank is depressed, contacting the perforator feed pawl and disengaging it. The backspace feed pawl engages the feed wheel ratchet and rotates the feed mechanism counterclockwise. When the magnet is de-energized, the drive link is disengaged from the eccentric arm, which slides freely along the pivot post of the drive link.

VARIABLE FEATURES

3.13 Manual Interfering Tape Feedout Mechanism



MANUAL INTERFERING TAPE FEEDOUT

**Purpose**

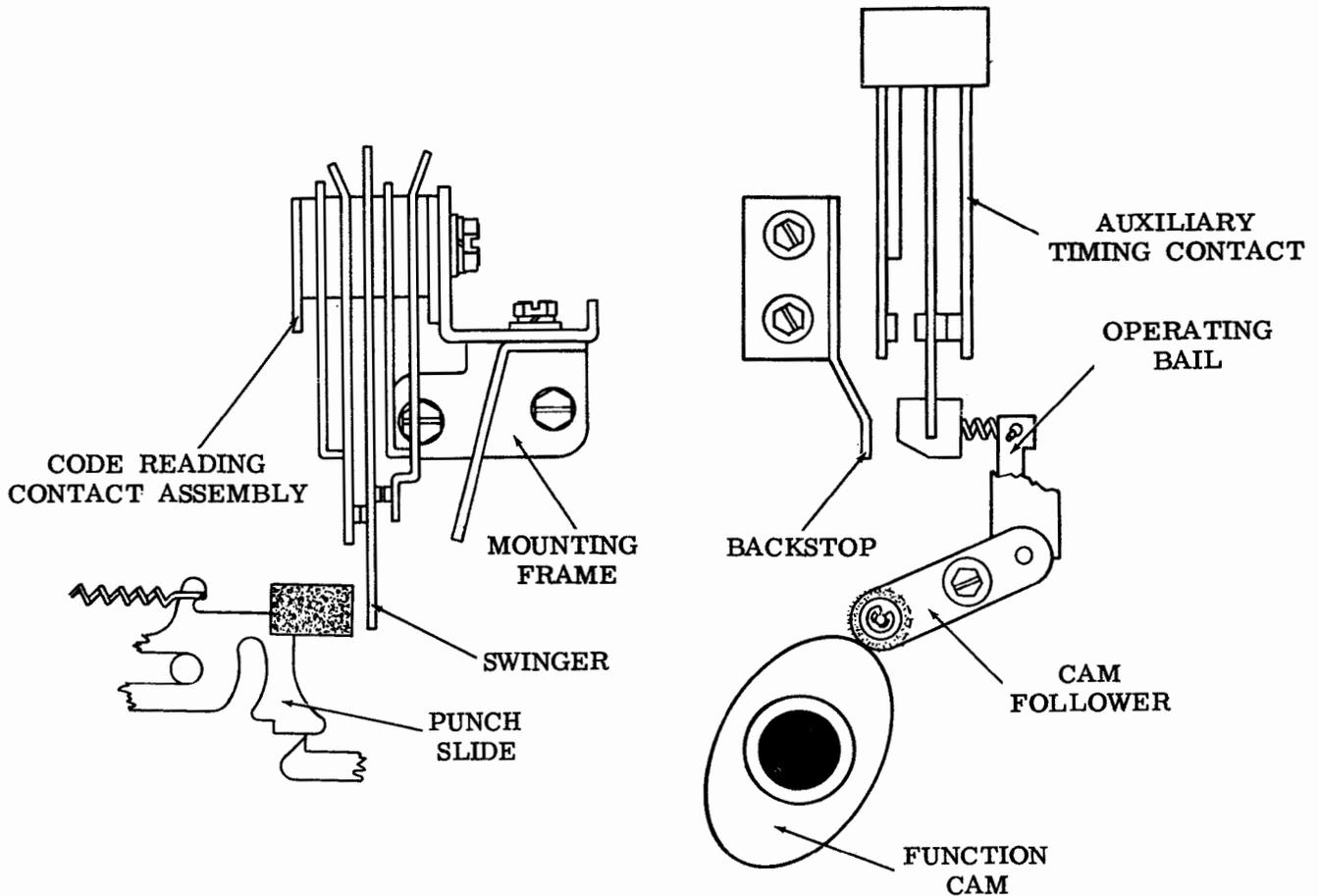
To provide means for manually producing delete characters in the tape.

**Operation**

When the hand lever is operated, the manual interfering tape feedout mechanism causes the reperforator to run open and generate delete characters and, therefore, signal inputs received during this time are not reproduced in the tape (operation interferes

with signal input). The projection on the hand lever engages the lower projection on the selector start lever tripping the selector clutch. This causes the reperforator to run open and perforate delete characters in the tape until the hand lever is released.

## 3.14 Code Reading and Auxiliary Timing Contacts

CODE READING AND TIMING**Purpose**

Code reading contacts provide an electrical output corresponding to the information perforated. The auxiliary timing contact provides an electrical output for control of external equipment.

**Operation**

The code reading contacts are arranged in a bank of eight break-before-make transfer type contacts operated by the corresponding punch slides. The electrical circuit for the code reading contacts is completed externally. When the reperforator is idling, the spacing position of the code reading contacts is held closed by the punch slides and the marking position held open. When the selected punch slides move into their selected position (toward the punch block) near the end of the selection cycle, the punch slides permit the contact positions to reverse. Code reading contacts associated with unselected punch slides remain in the spacing condition. In this way an electrical output is produced corresponding to the perforated information. The auxiliary timing contact is composed of a break-before-make transfer contact operated by a spring-operated bail in one direc-

tion and a function cam in the other direction. When the reperforator is idling, the contact closest to the mounting bracket is closed, the contact swinger is away from the backstop, and the cam follower is resting on the high part of the function cam. As the function cam rotates, the rear contact operating bail engages its swinger and operates the contact. The contact operating bail engages its swinger insulator and operates its associated contact. The swinger insulator comes to rest against its backstop and the cam follower leaves the cam.

During the second half of the function cycle, the function cam engages the cam follower and restores the contact to its idle position. These operations of the auxiliary timing contact produce electrical outputs relative to reperforator timing.