

32 TAPE PUNCH  
 GENERAL DESCRIPTION AND  
 PRINCIPLES OF OPERATION

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1.03 References to left, right, front, or rear, etc, consider the type punch as viewed by the teletypewriter operator.

1.04 In the illustrations, fixed pivots are solid black and floating points - those mounted on parts that move - are cross-hatched.

2. TECHNICAL DATA

**CAUTION:** THIS EQUIPMENT IS INTENDED TO BE OPERATED IN A ROOM ENVIRONMENT WITHIN THE TEMPERATURE RANGE OF 40° F TO 110° F. SERIOUS DAMAGE TO IT COULD RESULT IF THIS RANGE IS EXCEEDED. IN THIS CONNECTION, PARTICULAR CAUTION SHOULD BE EXERCISED IN USING ACOUSTICAL OR OTHER ENCLOSURES.

2.01 Dimensions and Weight

- Width . . . . . 3-1/2 inches
- Height . . . . . 5-1/2 inches
- Depth . . . . . 6 inches
- Weight . . . . . 21 ounces

1. GENERAL

1.01 This section provides a general description and principles of operation for the 32 tape punch. It is reissued to add operating temperature requirements and the tape guide for folded tape as an optional feature. Marginal arrows indicate changes and additions.

1.02 The tape punch is a 5-level mechanical device which perforates paper tape according to a code. The tape punch does not receive pulses from a transmitting set directly but utilizes the coded arrangement of the typing unit codebars. The signaling code is described in the appropriate typing unit section.

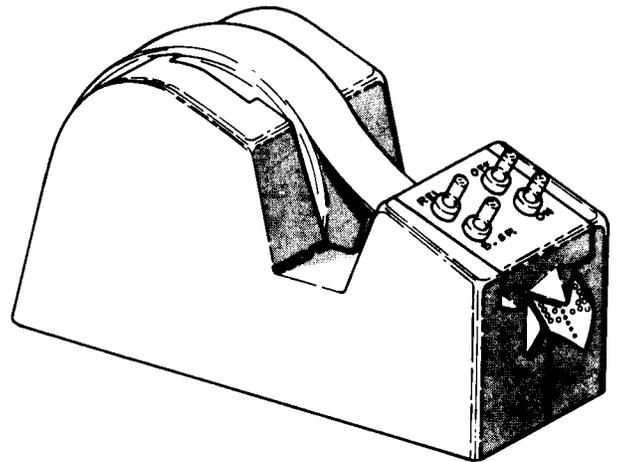


Figure 1 - 32 Tape Punch

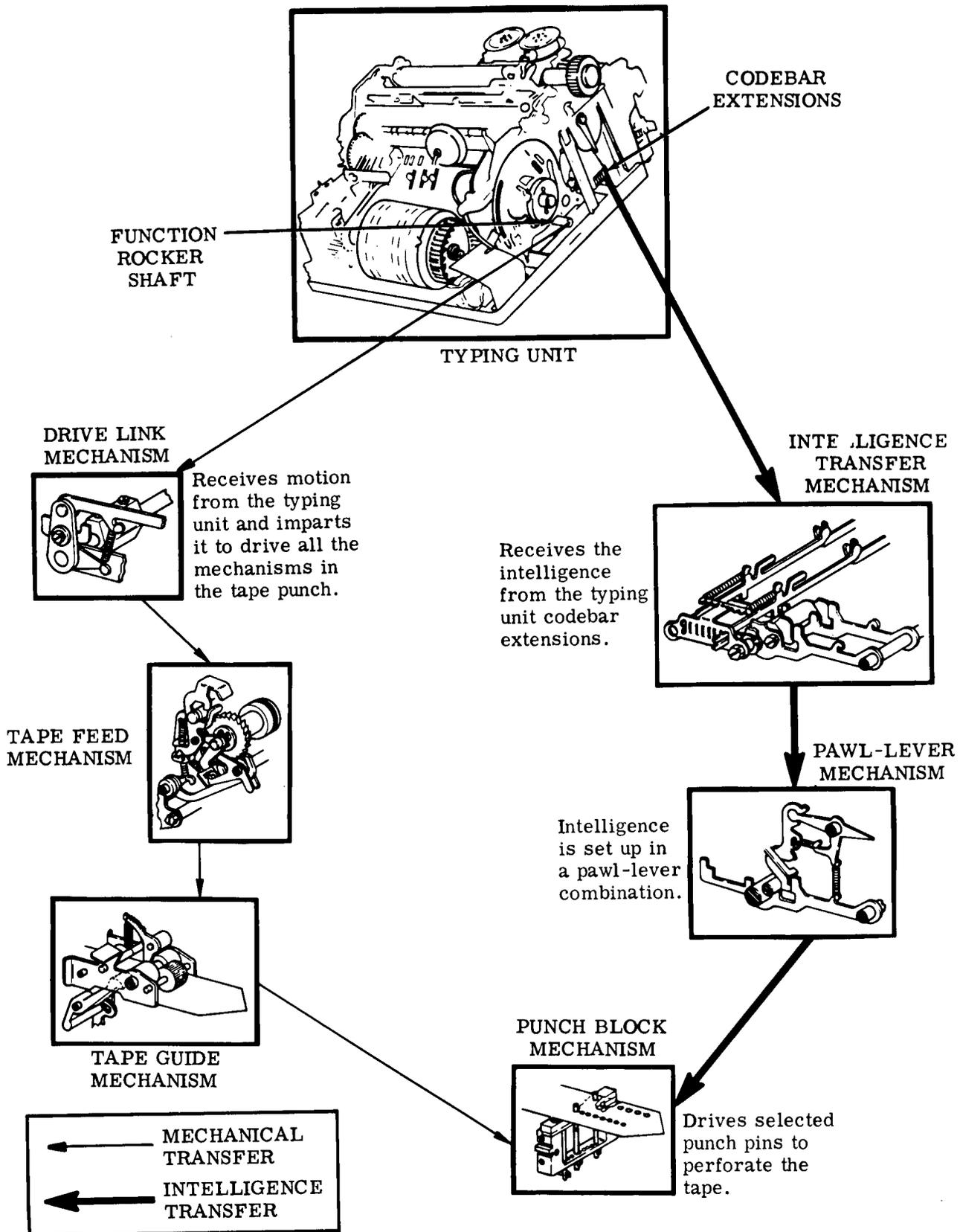


Figure 2 - Functional Diagram of the Tape Punch and Major Mechanisms

2.02 Tape Specifications

- Level . . . . . 5 level
- Width . . . . . 11/16 inch
- Code combination per inch . . . . . 10
- Feed hole diameter . . . . . 0.0465 inch

2.03 The 32 tape punch is capable of operating at 60, 66, 75, or 100 words per minute.

3. OUTLINE OF OPERATION

3.01 The tape punch receives its drive motion and intelligence from the typing unit.

3.02 The drive motion originates in the typing unit function mechanism. A cam on the function clutch imparts motion to the function rocker shaft. The motion of the function rocker shaft is then transferred to the tape punch by means of drive linkages.

3.03 The tape punch receives its intelligence from the typing unit codebars. Pulses received by the selector mechanism are converted into a mechanical arrangement of the codebars. Codebar extensions, attached to the codebars, present this arrangement to mechanisms in the tape punch which, in turn, translate it into perforations in the tape. Briefly, the drive mechanism imparts the motion received from the rocker shaft to advance, guide, punch, and backspace the tape. The intelligence transfer mechanism duplicates the coded arrangement of the typing unit codebars by setting up punch pins which will rise to perforate the tape (Figure 2).

4. DETAILED OPERATION

DRIVE MECHANISM

4.01 The rocking motion of the function rocker shaft is imparted to the tape punch by means of a sleeve which connects to a plate with

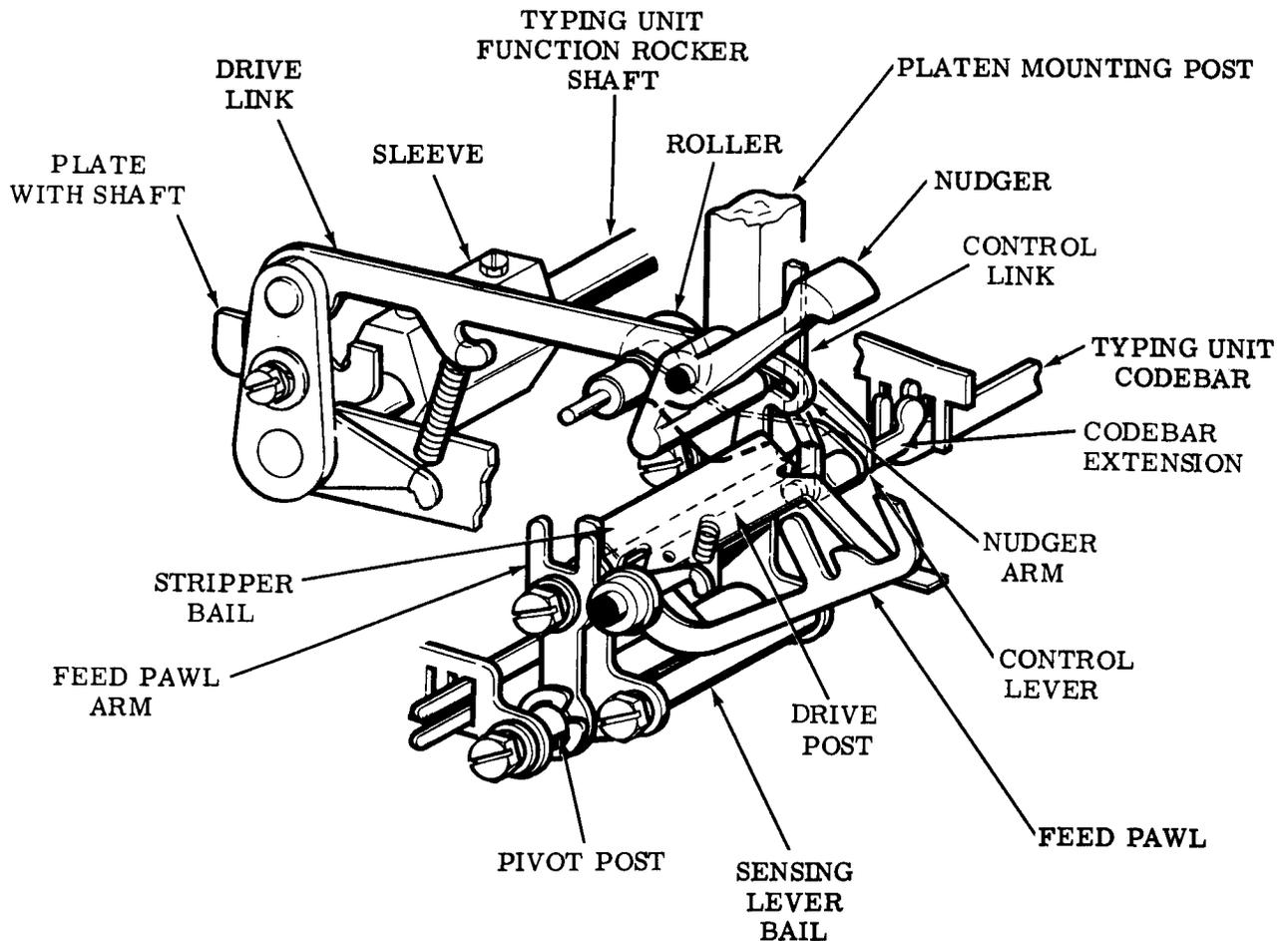


Figure 3 - Drive Link Mechanism and Drive Mechanism

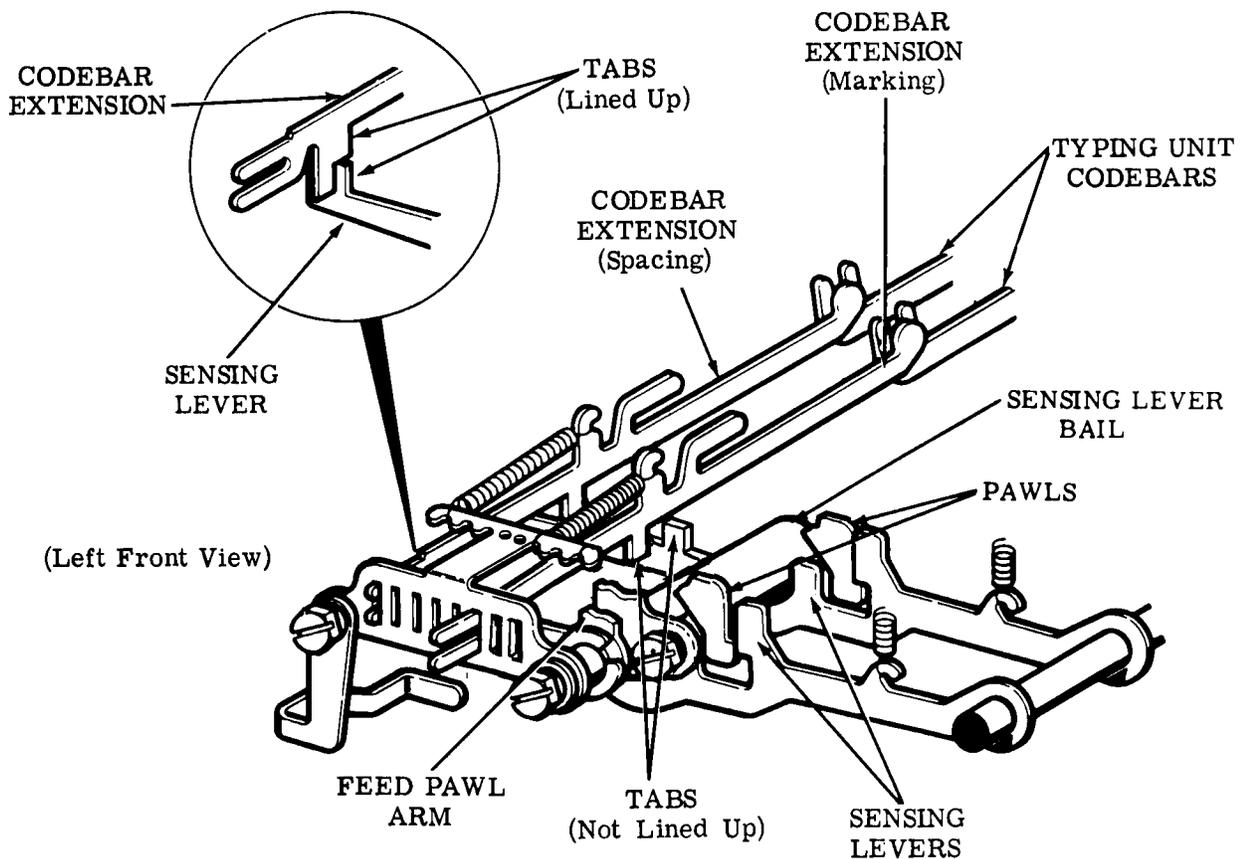


Figure 4 - Intelligence - Transfer Mechanism

shaft (Figure 3). A drive link, attached to the plate with shaft, connects to a drive post which simultaneously drives the nudger, feed pawl, and stripper bail, and supplies the downward force to pull the selected pawls by means of the sensing lever bail.

#### INTELLIGENCE TRANSFER MECHANISM

4.02 There is a codebar extension (Figure 4) for each typing unit codebar. Motion is imparted to the codebar extensions by the codebars through the typing unit reset bail. A plate mounted to the tape punch base (early design), guides the codebar extensions.

4.03 The typing unit selector blocking levers control the mark or space position of the codebars which, in turn, transfer this position to the codebar extensions. A blocked codebar represents a space; an unblocked codebar represents a mark.

4.04 Each codebar extension has a tab on its underside which lines up with its respective sensing lever, pawl, lever, and punch-pin combination.

4.05 During the drive mechanism's counterclockwise travel, each sensing lever, under spring tension, moves up and senses the codebar extensions. Each sensing lever, except the feed lever, has a tab on its top side which lines up with its respective codebar extension.

4.06 When a codebar extension is spacing, the tab, located on its underside, lines up with the tab on the sensing lever. The tabs engage each other, and the sensing lever is blocked from pivoting to its most counterclockwise position.

4.07 When a codebar extension is marking, its tab is not in line with the sensing lever tab. As a result the sensing lever pivots to its most clockwise position.

4.08 The feed sensing lever always travels to its most clockwise position, since it has no tabs. This motion is presented to the pawl, lever, and feed-punch pin combination through a latching surface on the pawl.

4.09 When the tape punch is in the OFF position, each pawl is in its highest vertical position, each lever is in its most clockwise position, and each code-punch pin is in its most downward position — below the surface of the tape.

4.10 When a sensing lever is in the spacing position, its latching surface is prevented from engaging with its associated pawl's latching surface. As a result the pawl is not selected.

4.11 When a sensing lever is in the marking position, its latching surface engages the latching surface on its associated pawl. When the two latching surfaces engage, the pawl is in the selected position.

4.12 As the drive mechanism (Figure 3) rotates clockwise, the feed pawl slides along the inclined surface of the adjacent ratchet tooth, drops behind it, and is cammed away from the feed wheel ratchet. Occurring simultaneously, the sensing levers in the marking position rotate counterclockwise and transfer their motion to the selected pawl, lever, and code-punch pin combination. At the same time, the drive mechanism transfers its motion to the sensing levers which are spacing. Since their pawl, lever and code-punch pin combinations are in the non-selected position, no motion is transferred to them. This results in no perforation of the tape, since the code-punch pins remain in their most downward position below the tape's surface. As the drive mechanism continues and reaches its most clockwise position, the code-punch pin of a selected pawl, lever, and code-punch pin combination travels upwards, perforates a hole in the tape, and continues to its most vertical position. The feed hole is always perforated in the tape since its pawl and lever are always selected.

4.13 Just prior to the end of the drive mechanism's most clockwise travel, the stripper bail, through its bias spring, engages a latching surface located under the spring hook(s) of the selected pawl(s). As the drive mechanism rotates counterclockwise to its stop position, the stripper bail strips the selected pawls from their sensing levers. The selected pawl, lever, and code-punch pin combinations return to their stop positions through their bias springs and the retractor mechanism. The sensing lever bail of the drive mechanism also acts as a part of the retractor mechanism. As the stripper bail strips the pawls, a cam surface on the pawl, which acts as the other member of the retractor mechanism, engages the sensing lever bail post and cams the pawl upwards to the stop position.

During this portion of the drive mechanism's travel, the codebar extensions are reset by the codebar reset bail.

4.14 During the drive mechanism's clockwise motion, the nudger (Figure 3) performs its function. Motion is transferred from a cam profile located on the nudger arm through a post molded as an integral part of the nudger. The nudger rotates counterclockwise, engages, and nudges the tape gently when the selected code-punch pins are engaged with the tape. This enables the tape roll to be advanced a small amount without affecting tape feed spacing, since only the weight of the paper between the tape roll is reflected to the feed wheel when the tape is being advanced.

#### TAPE FEED MECHANISM

4.15 As the stripper bail moves to the rear, the feed pawl engages a tooth on the feed wheel ratchet (Figure 5). When the stripper bail completes its travel to the rear, the feed wheel ratchet has indexed one full tooth and the tape is advanced 0.100 inch by the feed wheel.

#### TAPE GUIDE MECHANISM

4.16 The tape guide mechanism (Figure 6) consists of a bracket, two rollers, three posts, a wheel, and a compression spring held together by retainers. A tension spring biases the tape guide mechanism in a clockwise direction. The knurled roller settles against the knurled feed wheel with a predetermined force. It is the combination of force and the knurled wheels that provides adequate tape spacing. The tape guide assembly is shaped in the form of a funnel to provide easy tape threading. A push-button (Figure 8), located in the cover lid, when pushed down against a tab located on the REL bracket, disengages the tape guide assembly from the feed wheel, thereby providing easy tape removal from the tape punch.

#### PUNCH BLOCK MECHANISM

4.17 The punch block mechanism consists of code-punch pins, a feed-punch pin, holder, die plate, and a tape bias spring (Figure 7). The code-punch pin and feed-punch pin are oriented to the die plate through slots which engage levers for their respective code level. The tape bias spring always biases the tape against one edge of the holder. This results in the code hole and feed hole relation to the tape edge to be held constant.

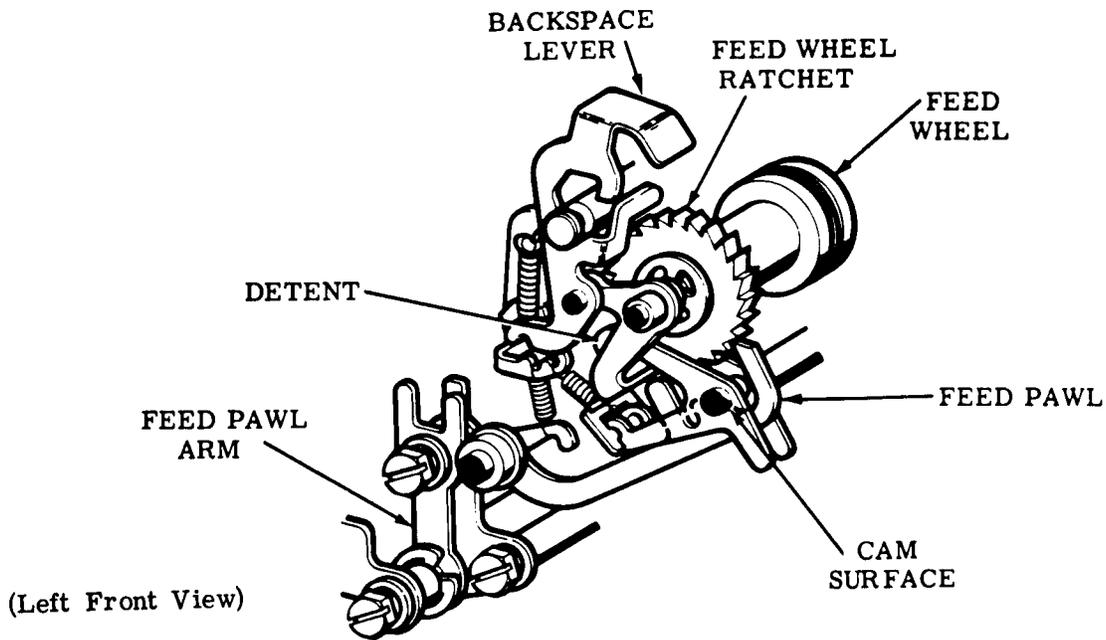


Figure 5 - Feed Wheel Mechanism (Tape Feed Mechanism)

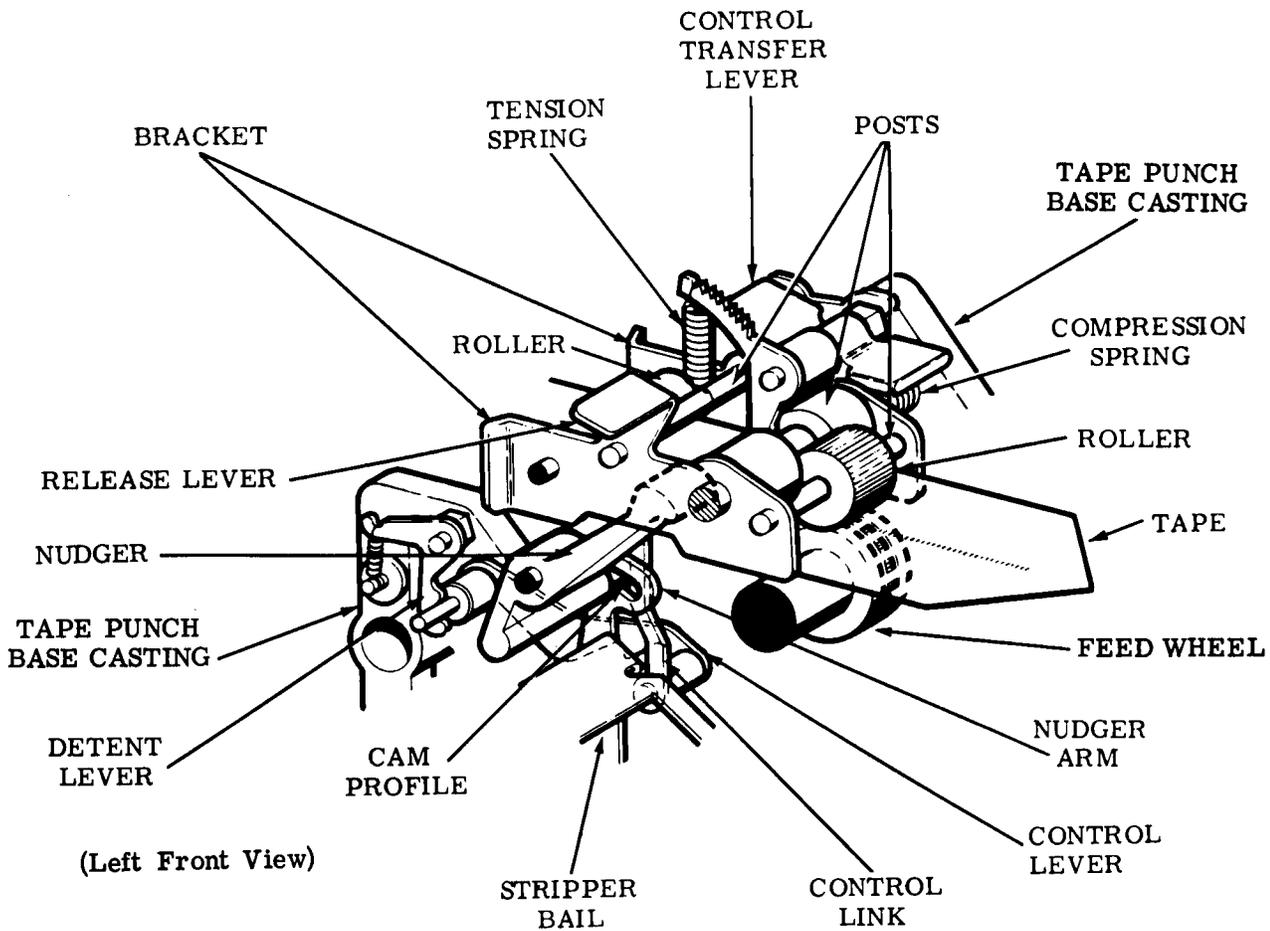


Figure 6 - Tape Guide Assembly (Tape Feed Mechanism)

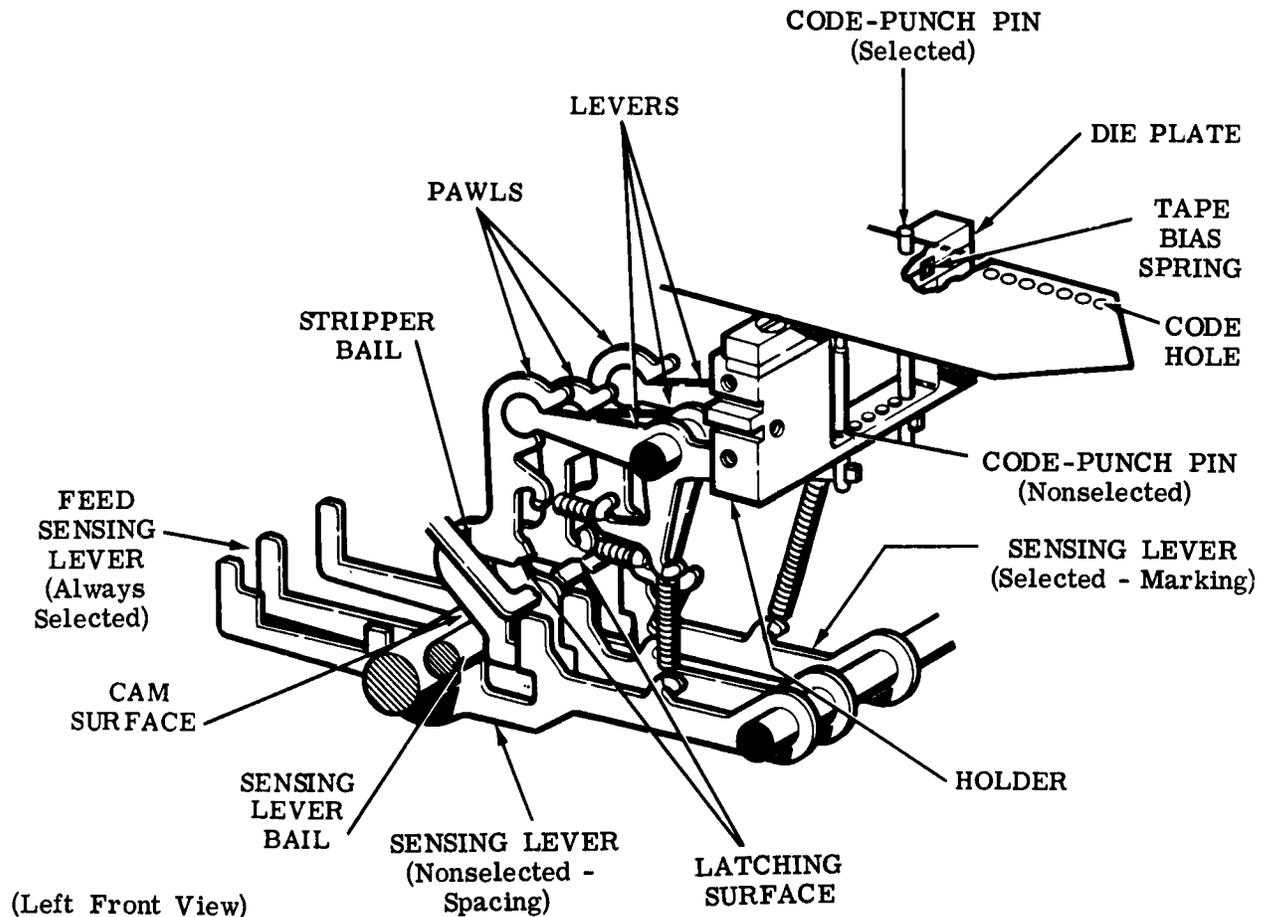


Figure 7 - Tape Punch Mechanism

## BACKSPACE MECHANISM

4.18 The backspace lever (Figure 5), when depressed manually to its most downward position, backspaces the feed wheel ratchet one tooth space. This results in the tape being backspaced one full character. The backspace lever, through another lever, cams out the feed pawl during the backspace operation. This is a safety feature to prevent a jam if the operator accidentally operates the backspace mechanism while the tape punch is running.

## 5. FIGS D

5.01 Some 5-level applications may require that the answer-back code combination (FIGS D) be converted to a "figures" code combination to prevent tripping of the answer-back mechanism when the tape is read by the tape reader. The tape punch design includes provision for adding an auxiliary drive bail for

converting FIGS D answer-back code combination to the "figures" code combination by perforating additional holes in the tape.

(a) The auxiliary drive bail consists of two sensing levers, two pawls, two levers, and a shaft, which, when assembled together, form an auxiliary drive bail that drives pre-selected sensing levers (Figure 7).

(b) Tabs (Figure 4) precoded with the FIGS D code combination on the underside of the codebar extensions are sensed by the no. A-0 and A-8 sensing levers. All code combinations, except the FIGS D code combination, block the no. A-0 and A-8 sensing levers from reaching their most clockwise position.

(c) On sensing the FIGS D code combination (no. 0, 1 and 4 codebars marking), the no. A-0 and A-8 sensing levers impart motion to the auxiliary drive bail.

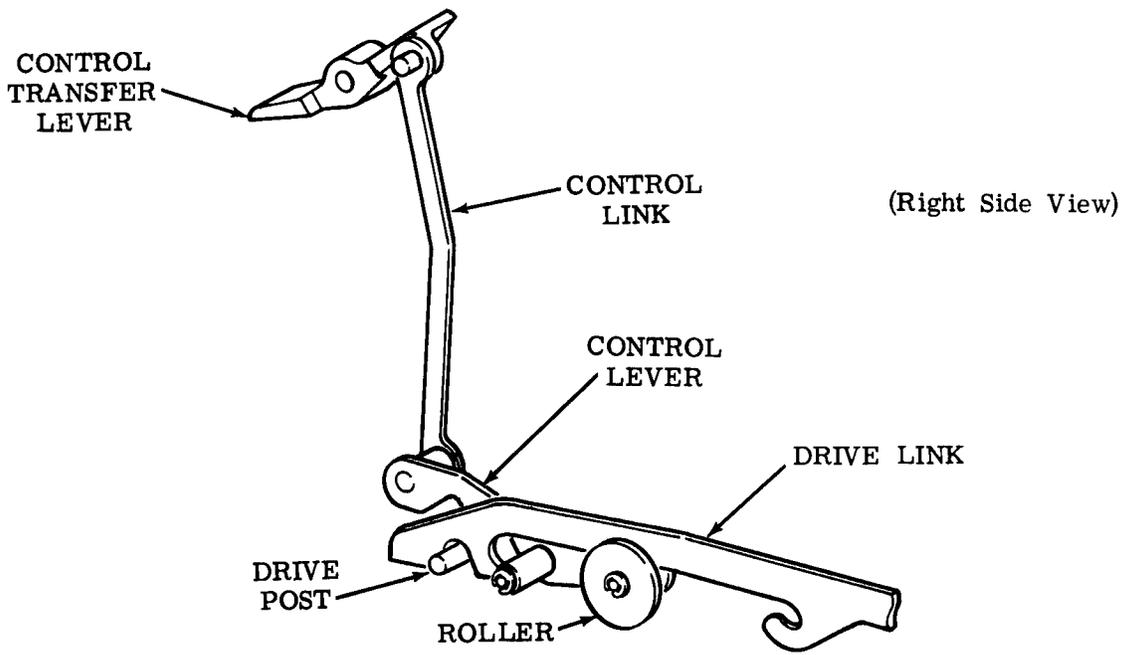


Figure 8 - ON-OFF Mechanism

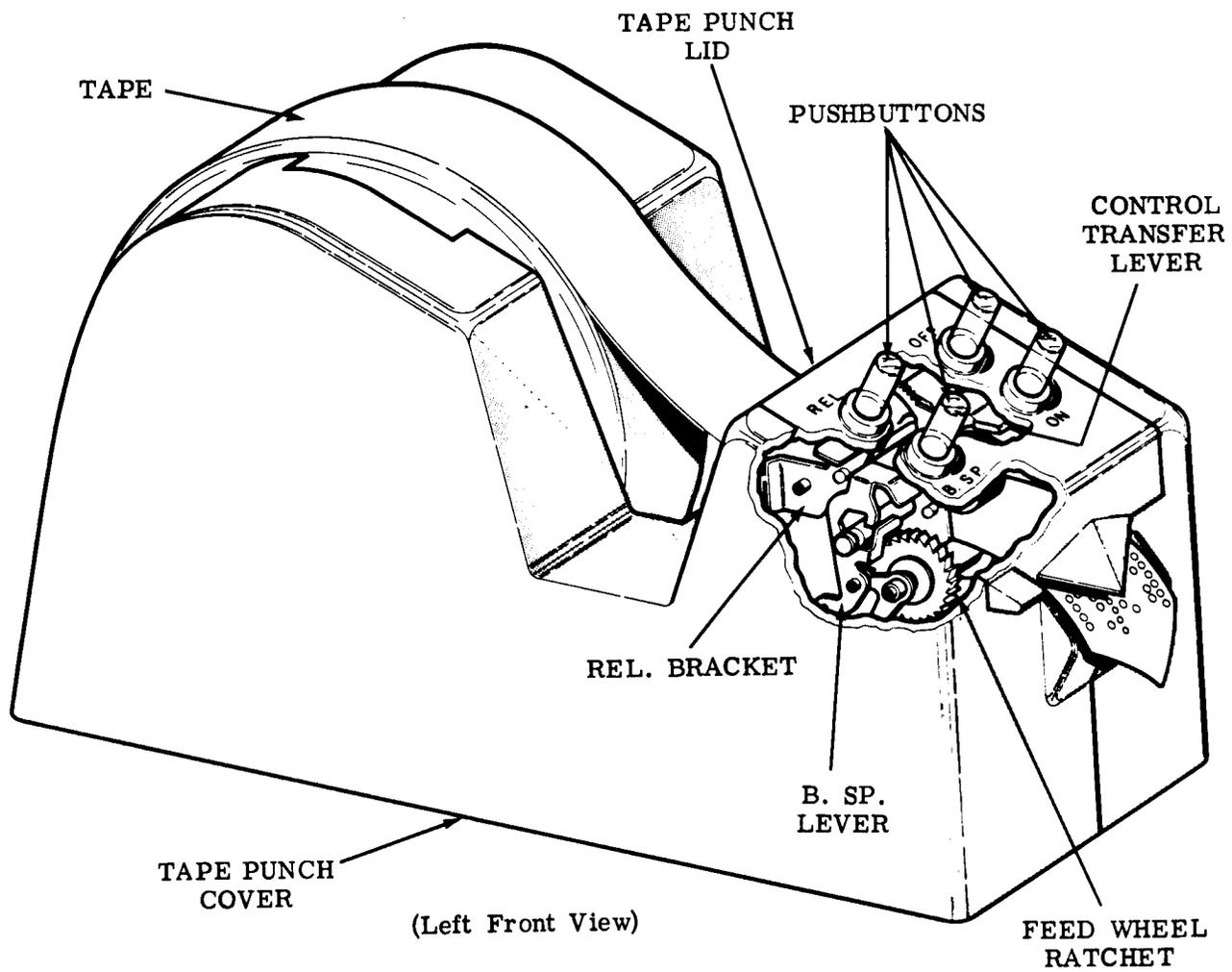


Figure 9 - Control Mechanism

(d) To convert the FIGS D code combination to the "figures" code combination, the no. 2 and 5 sensing levers have tabs located on their underside which line up with the shaft of the auxiliary drive bail.

(e) When the FIGS D code combination is received by the tape punch, the no. 0, 1, and 4 sensing levers, pawl lever, and code-punch pin combinations are actuated by the drive mechanism through their sensing levers, and the no. 2 and 5 code-punch pins are actuated by the auxiliary drive bail through the tabs located on the underside of the no. 2 and 5 sensing levers. The resulting perforations in the tape is a "figures" code combination.

(f) The auxiliary drive bail design to convert one code combination to another is based on adding perforations to the first code combination to get the desired code combination.

## 6. CONTROLS

6.01 ON-OFF - When the ON pushbutton on the cover is depressed, the control transfer lever operates a control link which in turn rotates the control lever. The control lever has a roller at one end and a detent on the other. The detent engages a drive post while the roller guides the drive link. When the control lever is rotated in the ON mode, the detent disengages from the drive post while the roller pivots downward. The drive link, under spring tension, is pulled downward to engage the drive post. When the OFF pushbutton is depressed, the process is reversed. The control transfer lever operates the control link and then the control lever is operated. The detent on the control lever travels downward to engage the drive post while the roller pivots upward, disengaging the drive link from the drive post (Figure 8).

6.02 Backspace - Depressing the backspace pushbutton causes the backspace lever (Figure 5) to engage a tooth on the back side of

the feed wheel ratchet which moves it, the feed wheel, and the tape backwards. A lever, on the backspace lever, pushes the feed pawl away from the feed wheel ratchet simultaneously (Figure 9).

6.03 Release - Depressing the REL pushbutton, causes the release lever, which is part of the tape guide mechanism, to pivot downward raising the roller away from the feed wheel. The tape can now be pulled out freely (Figure 9).

## 7. OPTIONS

### TAPE GUIDE FOR PREFOLDED TAPE (Figure 10)

7.01 This feature allows the use of prefolded tape without the tape becoming jammed in the punch block. The mechanism consists of a shelf attached to the punch block, between the roller and the punch block, and a tape depressor straddling the roller above the tape.

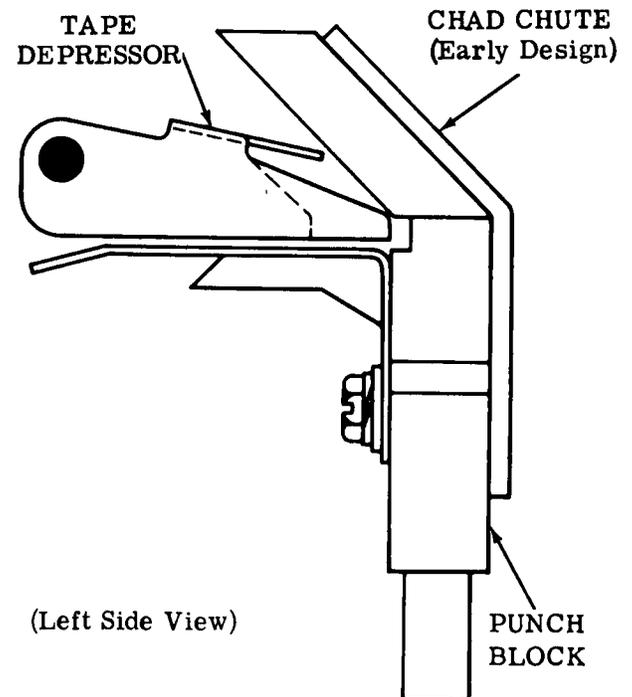


Figure 10 - Tape Guide for Prefolded Tape

