38 TAPE READER

DESCRIPTION AND PRINCIPLES OF OPERATION

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1. GENERAL

1.01 This section provides the description and principles of operation for the 38 tape reader. The reader is an 8-level electromechanical device which senses and transmits coded intelligence perforated in paper tape.

1.02 All references to left, right, front, and rear are with respect to the reader being viewed in its normal operating position. In the illustrations, fixed pivot points are shown in solid black; floating points, those mounted on parts that move, are crosshatched.

2. DESCRIPTION

2.01 The reader basically consists of a tape sensing and feeding mechanism driven by an electromagnet. Also included are the parallel output contacts, tight-tape, tape-out, and start-stop contacts. Current and voltage rectification is provided by the reader power pack which is mounted on the electrical service unit.

2.02 The signal set up in the parallel output contacts is distributed by the keyboard distributor which is also common to the answerback. This keyboard distributor is tripped by means of a separate electromagnet mechanism. The electromagnet in the reader is pulsed from the keyboard distributor by means of a contact which is operated by the clutch trip lever.

TECHNICAL DATA

2.03 Dimensions and Weight (approximate)

Tape Reader

Width	3-1/2 inches
Depth	4 inches
Height	3-1/2 inches
Weight	2 pounds

Reader Power Pack

Width	6-1/4 inches
Depth	2-1/2 inches
Height	2-3/4 inches
Weight	1 pound

2.04 Environmental Characteristics

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.

2.05 Electrical Characteristics — Power Pack

Input	115 volts ac
Output	Min 137 volts dc @ 0.160 ampere

2.06 Electrical Characteristics — Feed Magnet

Power dissipation	2-1/4 watts
Nominal attraction time	8 to 11 milliseconds at a nominal peak transient current of 0.220 ampere
Nominal release time	7 to 10 milliseconds

CAUTION: HIGH VOLTAGE PERSISTS 10 SECONDS AFTER POWER IS REMOVED.

2.07 Tape Specifications

Level	8-level
Width	1 inch
Code combinations per inch	10
Feed hole diameter	0.0465 inch

3. PRINCIPLES OF OPERATION

3.01 The tape reader senses coded intelligence perforated in tape and transmits this intelligence as a parallel output. The reader consists of three basic mechanisms; the reader mechanism, the power pack, and the distributor mechanism (Figure 1).

3.02 The reader mechanism senses and feeds the tape. Other submechanisms, within the reader, will convert the intelligence sensed in the tape into a parallel output.

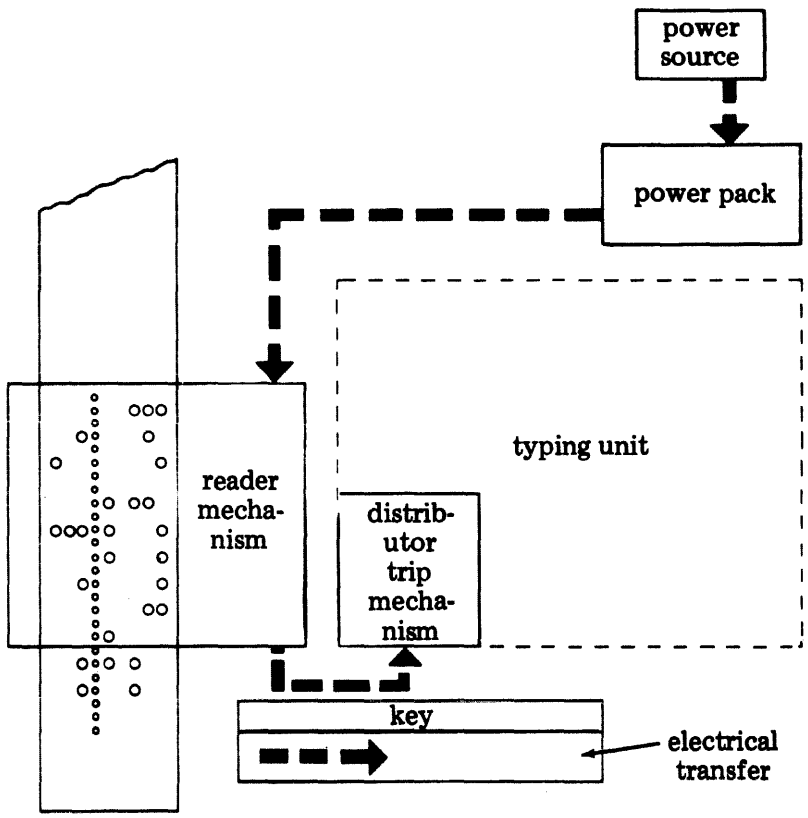


Figure 1 - Tape Reader With Major Mechanisms

3.03 The power pack provides current rectification for the reader mechanism. The power pack is mounted on the electrical service unit and is physically connected to the reader by means of a cable assembly.

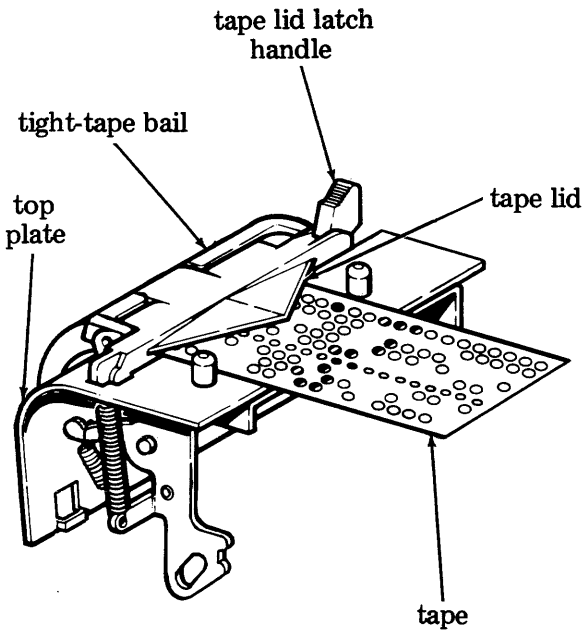
3.04 The distributor trip mechanism receives the parallel output from the reader mechanism and converts it to serial stop-start signals.

A. Tape Lid Mechanism

3.05 When the tape lid latch handle is moved to the right, the spring-biased tape lid swings open. The two locating pins guide the tape as it travels across the top of the plate (Figure 2).

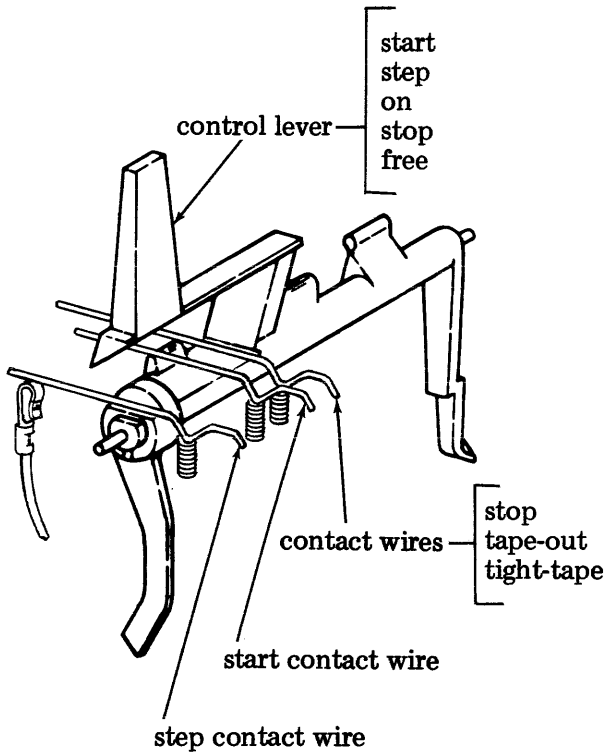
B. Control Mechanism

3.06 There are five positions in the control mechanism (Figure 3): START, STEP, ON, STOP, and FREE. When the control lever is moved to the START position, the spring-biased start contact wires will be positioned on the start contact. Since the start contact wires and the start contact are wired in series with the distributor clutch trip coil in the typing unit, the coil energizes and releases the tape reader trip lever (Figure 4).



left front view

Figure 2 - Tape Lid Mechanism



left front view

Figure 3 - Control Mechanism

C. Distributor Trip Mechanism

3.07 When the tape reader trip lever is released, it performs two functions; it closes the tape reader feed magnet contact assembly and it trips the distributor clutch (Figure 4).

3.08 The reader feed magnet assembly is closed by an insulator on the back of the tape reader trip lever. During its travel, the projection on the tape reader trip lever will rotate the distributor clutch stop bail. This motion is transferred to the distributor clutch trip lever which will move away from the shoe lever on the distributor clutch. This allows the distributor clutch to engage and begin its cycle.

D. Feed Magnet Mechanism

3.09 When the feed magnet contacts (on the distributor trip mechanism) close, the feed magnet coil in the reader mechanism is activated. The now energized feed magnet coil attracts the armature (Figure 5). As the armature is attracted to the coil it raises the armature extensions. Fastened to the ends of these armature extensions is a sensing pin guide.

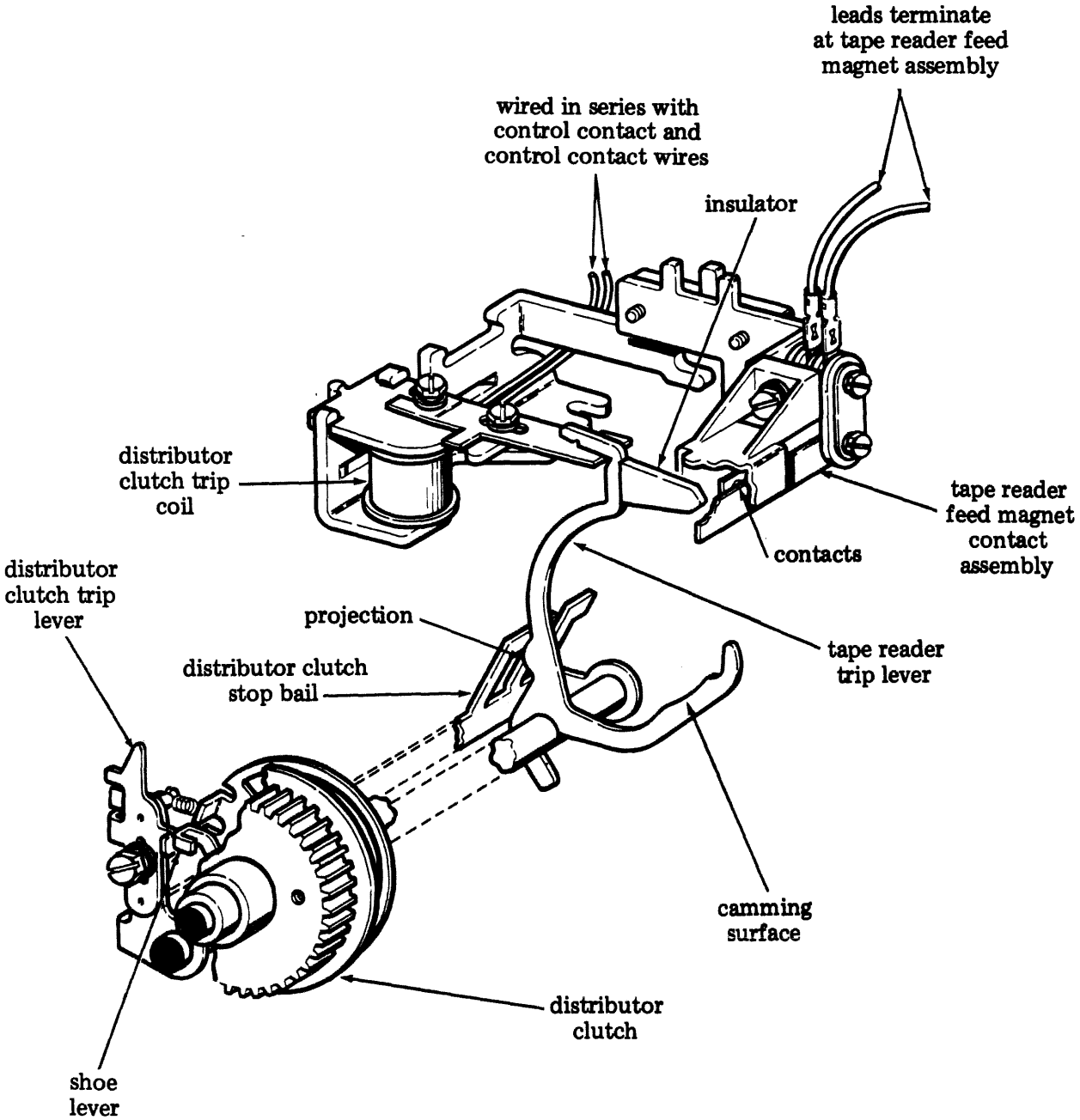


Figure 4 - Distributor Trip Mechanism

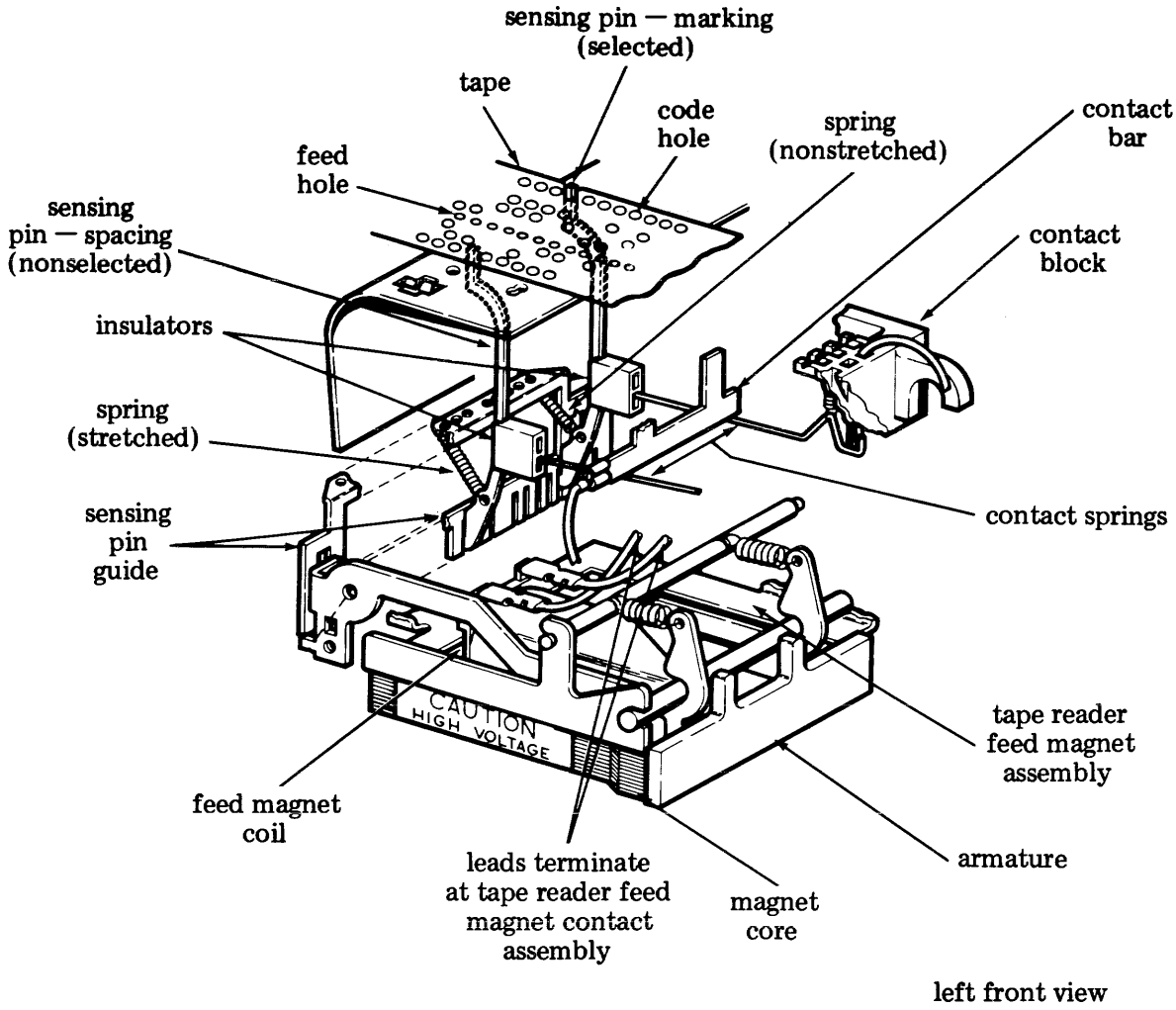


Figure 5 - Feed Magnet and Sensing Mechanisms

E. Sensing Pin Guide Mechanism

3.10 As the sensing pin guide travels upward, it carries with it eight spring-biased pins that are used to sense the perforations in the tape. Where a hole exists in the tape the sensing pin will continue to travel upward; if there is no hole in the tape the sensing pin will be blocked.

F. Contact Block Mechanism

3.11 There are insulators attached to each of the eight sensing pins which are used to hold the contact springs down and away from the contact bar (Figure 6). These contact springs are connected in parallel to corresponding segments on the distributor disc in the typing unit. If a sensing pin finds a hole in the tape its upward movement will allow its contact spring to come into contact with the contact bar (marking). If there is no hole in the tape, the sensing pin will not move upward and its contact spring will not come in contact with the contact bar (spacing).

G. Tape Feed Mechanism

3.12 The tape feeding cycle begins when the feed magnet attracts the armature as described in 3.09. The right armature extension has a feed pawl attached to it. When the armature extensions rise, the feed pawl will engage a tooth on the feed ratchet to which the feed wheel is connected (Figure 7). The feed pawl will remain in its raised position until the actions are initiated and take place.

(a) Hold the control lever in the START position to keep the distributor clutch trip coil energized.

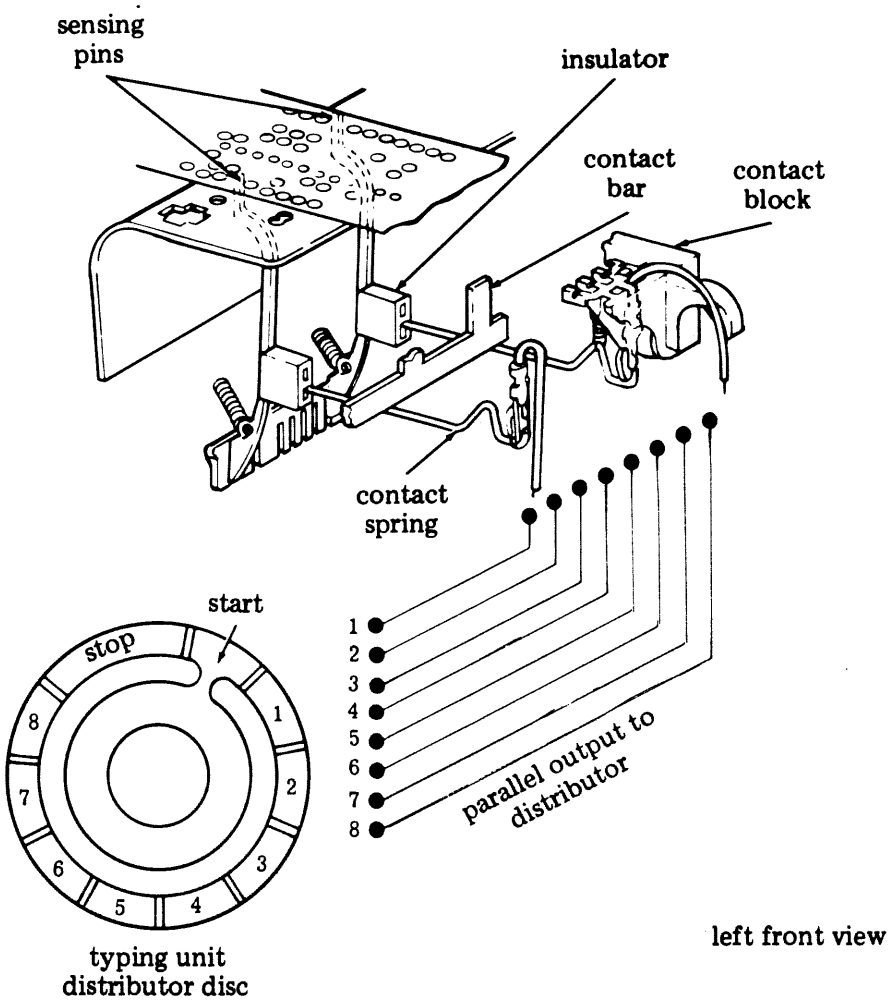


Figure 6 - Contact Block Mechanism

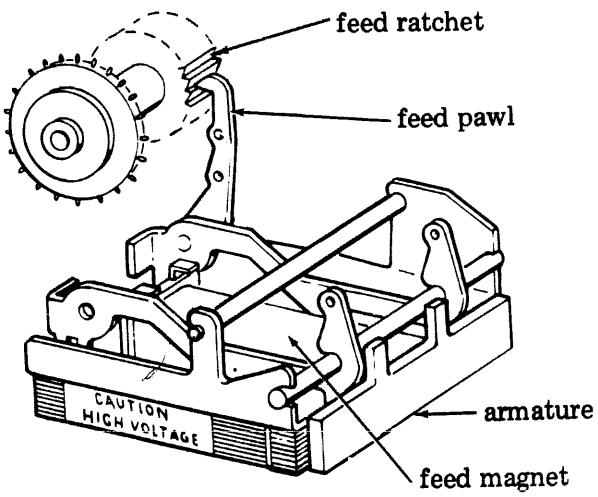


Figure 7 - Feed Pawl Engagement

(b) Near the beginning of the stop pulse, a roller on the distributor shaft assembly engages the camming surface on the reader trip lever. This action momentarily causes the reader trip lever to release the tension on the trip coil armature extension (Figure 8).

(c) As the reader trip lever moves away from the armature extension, the reader trip lever extension momentarily opens the feed magnet contacts causing the feed magnet in the reader mechanism to become de-energized (Figure 9).

(d) With the feed magnet de-energized, the armature extensions drop. The sensing pin guide and the sensing pins will start to drop (Figure 10) and clear the tape just before the feed pawl advances the feed ratchet (Figure 11).

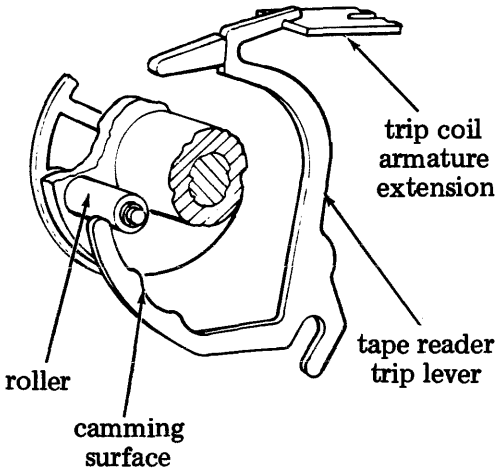


Figure 8 - Tape Reader Trip Lever

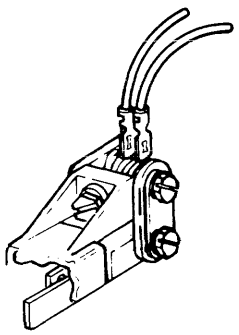


Figure 9 - Feed Magnet Contacts

3.13 Associated with the feed ratchet are a detent lever and a blocking pawl. The detent lever, with its circular surface engaging the feed ratchet teeth, holds the feed ratchet and feed wheel in its correct position during sensing (Figure 11).

3.14 The blocking pawl, which rides a post on the feed pawl, is lowered into engagement with a feed ratchet tooth during the feed stroke. This is to prevent excessive overthrow of the feed wheel, without the use of a heavy detent spring. During the upstroke of the armature extensions, the blocking pawl is rotated out of engagement with the tooth by the post on the feed pawl (Figure 11).

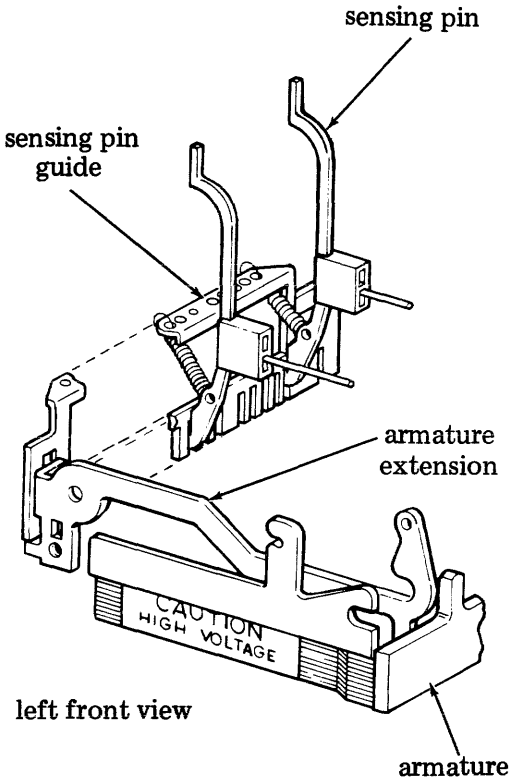


Figure 10 - Sensing Pin Guide

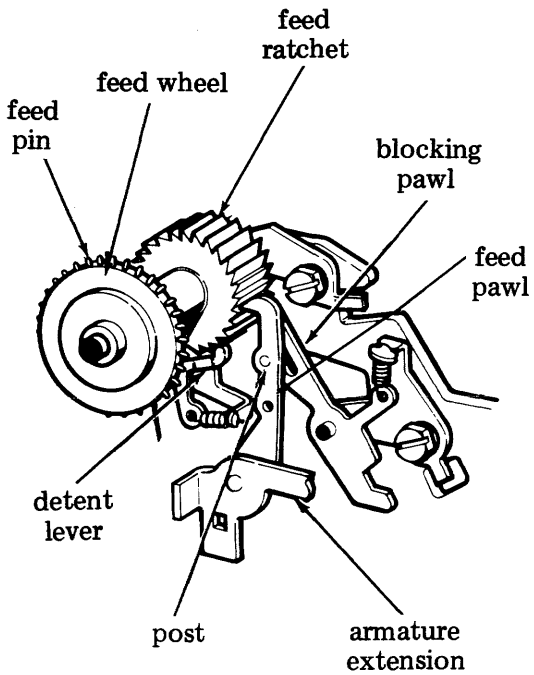


Figure 11 - Tape Feed Mechanism

H. Upstop Mechanism

3.15 The armature is provided with a spring-biased upstop which serves two purposes.

(a) A portion of the energy during the end of the stroke is stored in a spring and returned to the armature on the down stroke to give a rapid release and acceleration.

(b) A portion of the energy is dissipated through a resilient buffer to minimize noise and metallic clatter (Figure 12).

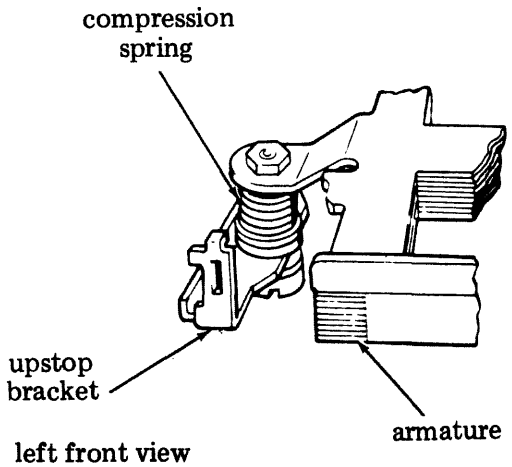


Figure 12 - Upstop Mechanism

4. FEATURES

A. Freewheeling Mechanism (Figure 13)

4.01 This mechanism allows the feed wheel to rotate freely. When the control lever is moved into the FREE position, the extension on the control lever engages the blocking pawl and pivots it clockwise. Riding in a slot on the underside of the blocking pawl is a stud which is connected to the feed pawl. As the blocking pawl is pivoted clockwise by the control lever extension, the blocking pawl moves the feed pawl away from the feed ratchet. With the feed ratchet free, the feed wheel is free to rotate.

B. Tight-Tape Mechanism (Figure 14)

4.02 This mechanism consists of a plastic tight-tape bail which snaps into the tape lid. The tight-tape bail will turn the tape reader OFF when the tape becomes taut. The bail has an extension on it which projects through the top plate. This extension rides on a spring-biased tight-tape lever. As the tape becomes taut the bail

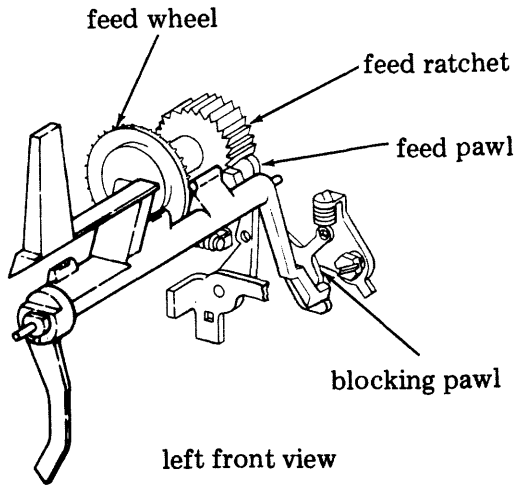


Figure 13 - Freewheeling Mechanism

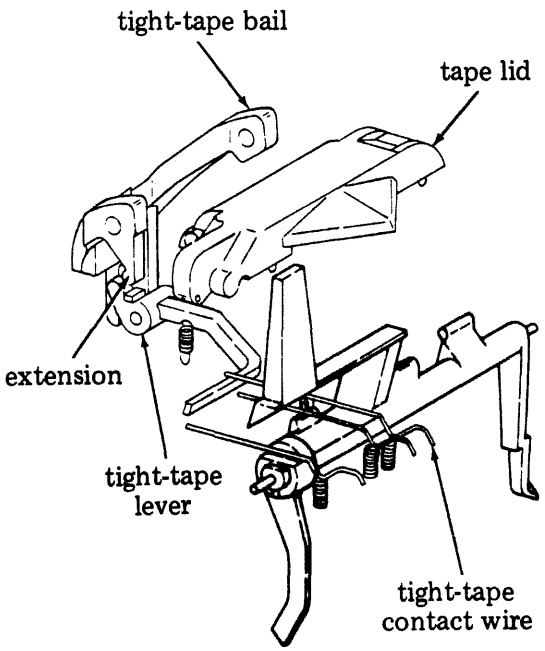


Figure 14 - Tight-Tape Mechanism

will be lifted, the bail extension will rotate causing the tight-tape lever to rotate also. As the tight-tape lever rotates, its pivoting action will lift the tight-tape contact wires away from the contact terminal, breaking the current path. With the circuit broken, the reader will stop.

C. Tape-Out Mechanism (Figure 15)

4.03 This mechanism will stop the reader when it runs out of tape. There is a tape-out pin that protrudes above the surface of the top plate. As long as there is tape in the reader, this pin will be kept depressed. When the tape runs out, the spring bias on the tape-out pin causes it to move upward. The insulated extension on the tape-out pin lifts the tape-out contact wires away from the contact terminal, breaking the current path.

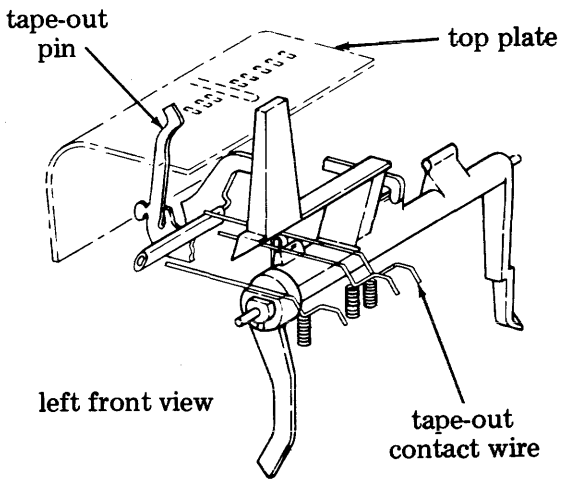


Figure 15 - Tape-Out Mechanism

D. Start Position (Figure 16)

4.04 When the control lever is placed in the START position the following will take place:

(a) The start contact wires momentarily close.

(b) After closing momentarily, the start-contact wires are lifted away from the start contact due to the detent action of the control lever.

(c) The momentarily closing of the start-contact wires energizes the relay and the two normally open contacts associated with the relay.

(d) The first relay contact closes a holding circuit.

(e) The second relay contact, if there is tape in the reader and it is not taut, closes the circuit to the distributor clutch. The distributor clutch will then be tripped as explained in 3.07.

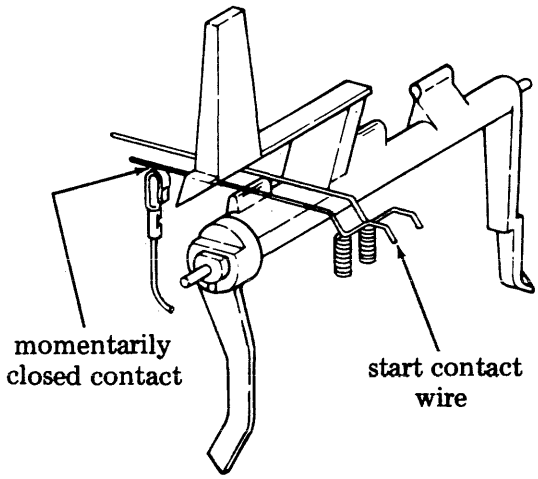


Figure 16 - Start Position

E. Step Position (Figure 17)

4.05 When the control lever is placed in the STEP position the following will happen:

(a) The control lever extension will cause the spring-biased primary latch to move away from the tie link.

(b) The spring-biased tie link will drop down between the secondary latch and the primary latch.

(c) As the tie link drops, it will cause the attached lever to also drop. This will allow the step-contact wire to touch the step contact.

(d) When the step-contact wire touches the step contact, an electrical path to the reader trip magnet is completed.

(e) When the reader trip armature attracts, the distributor clutch trips and allows a contact closure to energize the reader magnet.

(f) The upward movement of the reader armature will sense the character in the tape and then advance the tape one character position. This same movement will force the attached lever (the same lever that is attached to the tie link) upward causing the step-contact wire to move away from the step contact. This breaks the circuit to the reader trip magnet.

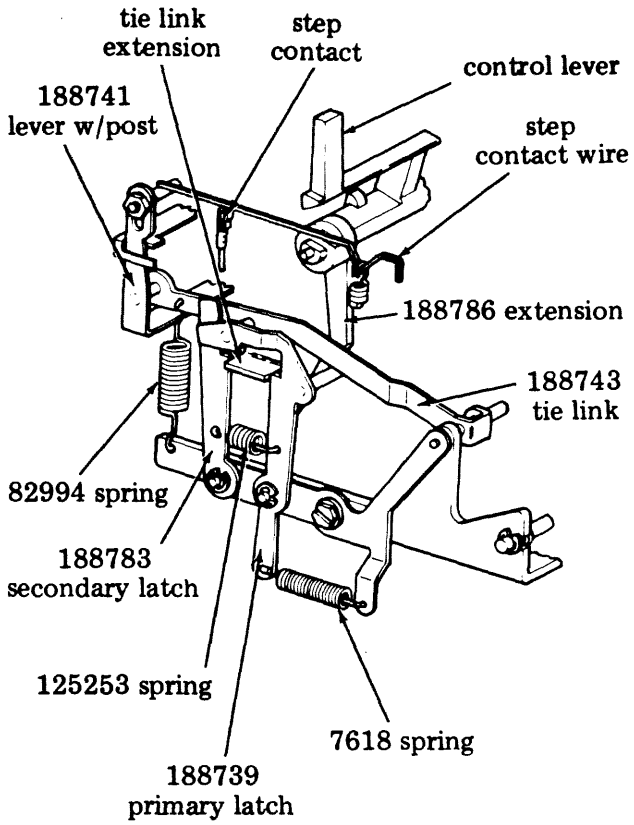


Figure 17 - Step Position

F. On Position (Figure 18)

4.06 When the control lever is placed in the ON position, the start contact is open and the stop contact is closed. The reader will respond to a remote reader start signal and turn on automatically. The remote signal will close a contact in the typing unit function area which will complete an electrical path to the distributor.

G. Stop Position (Figure 19)

4.07 When the control lever is placed in the STOP position, the stop-contact wires are momentarily removed from the stop contact. This will de-energize the reader relay, opening two relay contacts. One of these contacts will open the reader trip magnet circuit. This will de-energize the trip magnet causing the reader to stop.

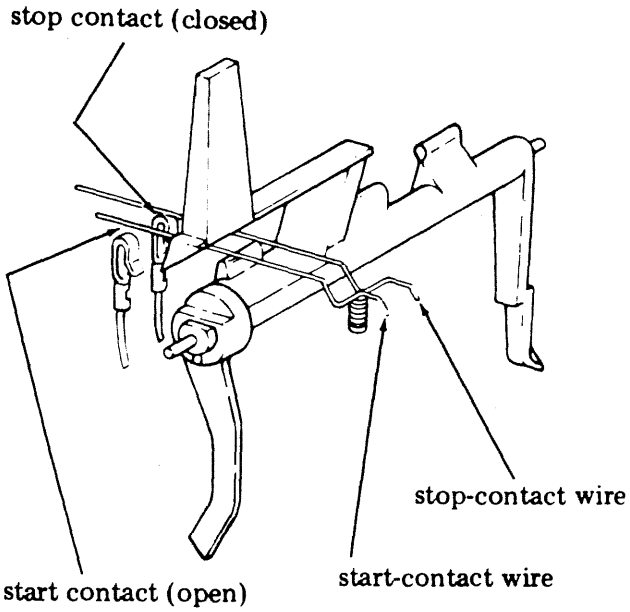


Figure 18 - On Position

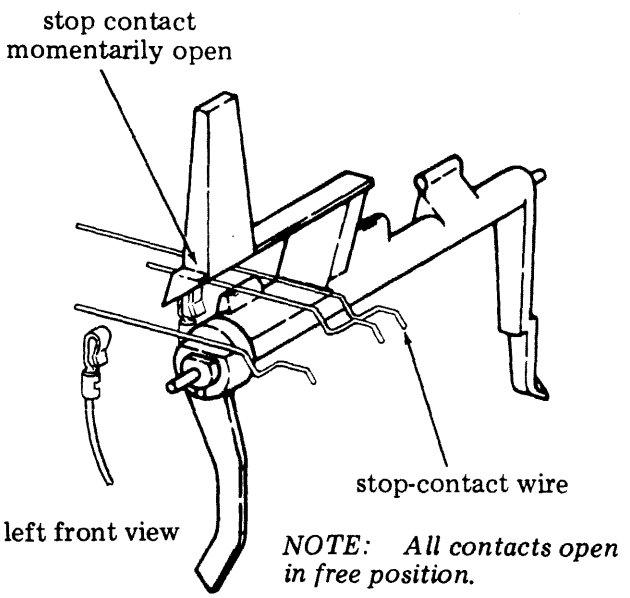


Figure 19 - Stop Position and Free Position

H. Free Position (Figure 19)

4.08 When the control lever is placed in the FREE position the start and stop contacts are open. The tape reader will not respond to a remote reader start signal.