32 AND 33 TAPE READER

PRINCIPLES OF OPERATION

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1. GENERAL

1.01 This section is issued to provide principles of operation for the 32 and 33 tape reader and to present the principles as a separate section.

1.02 The teletypewriter code used to transmit messages is described in the appropriate typing unit section. This tape reader section outlines in general terms the overall operation of the tape reader and explains in detail the operation of the components that make it up.

1.03 References to "left," "right," "front," "rear," etc, consider the tape reader to be viewed from a position where the feed wheel faces up and the tape lid latch handle is to the viewer's right.

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

2. BASIC UNIT OPERATION

GENERAL

2.01 The tape reader (Figure 1) attaches to the typing unit subbase at the left side of the keyboard. The distributor clutch trip mechanism (see Figure 4) is assembled into the typing unit distributor. The power pack is attached inside the typing unit stand. The tape reader is designed to sense code combinations perforated in a tape.

2.02 To initiate operation the tape lid latch handle (Figures 1 and 2) is moved to the right, releasing the tape lid, and allowing the tape lid to swing open. The tape is placed on the feed wheel in its proper position, and the tape lid is closed.

2.03 There are three basic positions for the control lever (Figures 1 and 3): START, STOP, and FREE. In the basic tape reader only, a control contact and control contact wires are used in conjunction with the control lever. When the control lever is moved to the START position, the control contact and control contact wires are closed. In the basic tape reader, the control contact and control contact wires are wired in series with the distributor clutch trip coil, which is located in the distributor area of the typing unit.

2.04 The distributor clutch trip coil (Figure 4), when energized, releases the tape reader trip lever. The tape reader trip lever, when released, performs two functions. First, the tape reader feed magnet contacts, which are held open by an insulator on the backside of the tape reader trip lever, closes. In its continued travel, a projection on the tape reader trip lever rotates the distributor clutch stop bail, releasing the distributor clutch and initiating a distributor cycle.

2.05 The tape reader feed magnet contacts (Figure 5) having closed, cause the feed magnet coil in the tape reader package to be energized. The feed magnet coil, upon energization, attracts the armature.

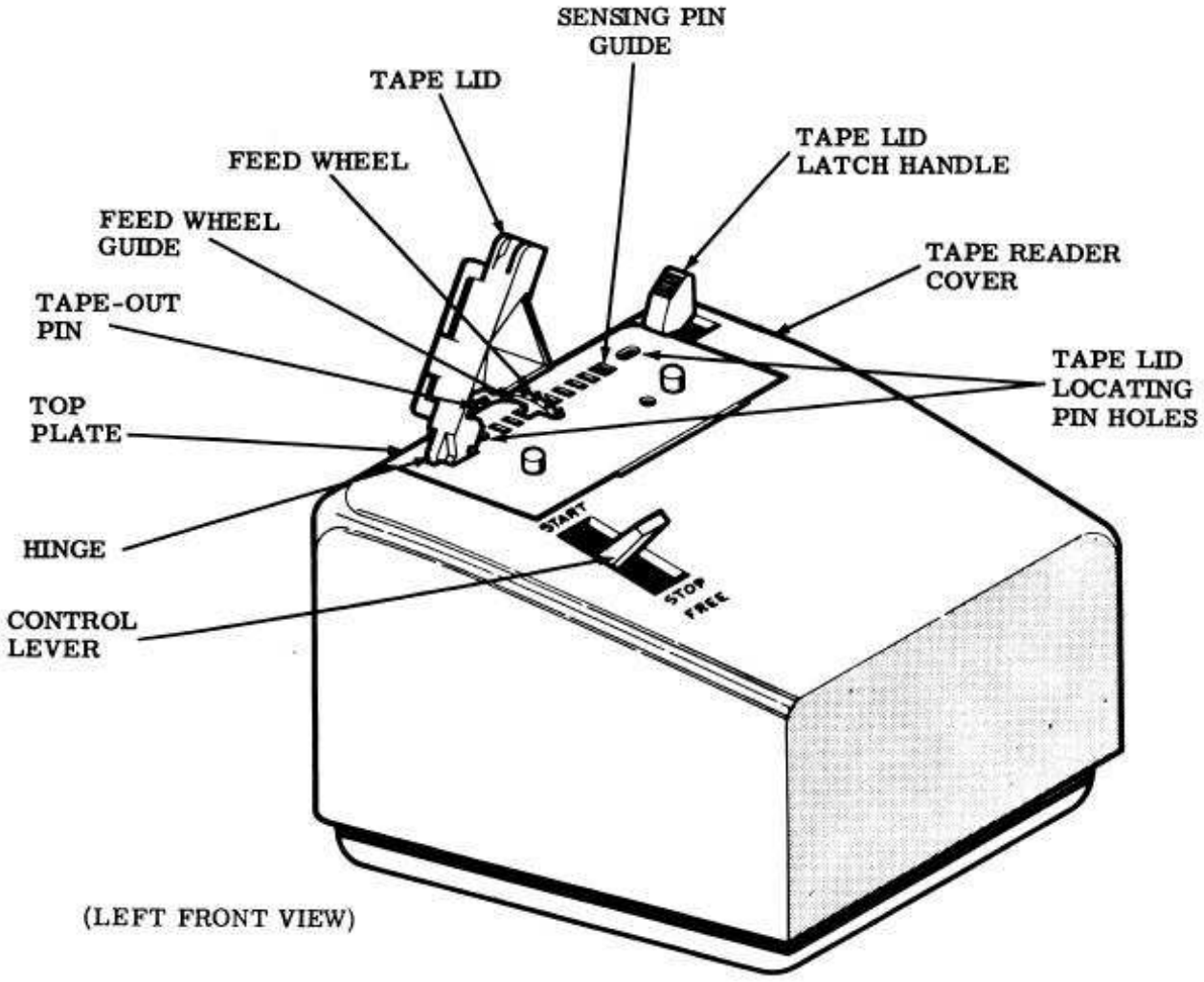

Figure 1 — Tape Reader

2.06 The armature in rotating about its pivot, raises the armature extensions. Fastened to the ends of the armature extensions is a sensing pin guide.

2.07 The sensing pins are guided, spring biased, and raised into the sensing pin position by means of this sensing pin guide. Where a hole exists in the tape (marking), the sensing pin moves with the sensing pin guide, and the spring is not stretched. Where no hole exists in the tape (spacing), the sensing pin is blocked, and the spring is stretched.

2.08 A contact block is arranged in such a way that insulators (Figure 5) on the sensing pins hold the contact springs open in the down position of the pins. These contact springs are connected as a parallel output to the individual segments of the typing unit distributor disc.

2.09 Also, as the armature extensions are raised, a feed pawl which is attached to the inner extension raises and causes it to engage a new tooth on the feed ratchet (Figures 6 and 7).

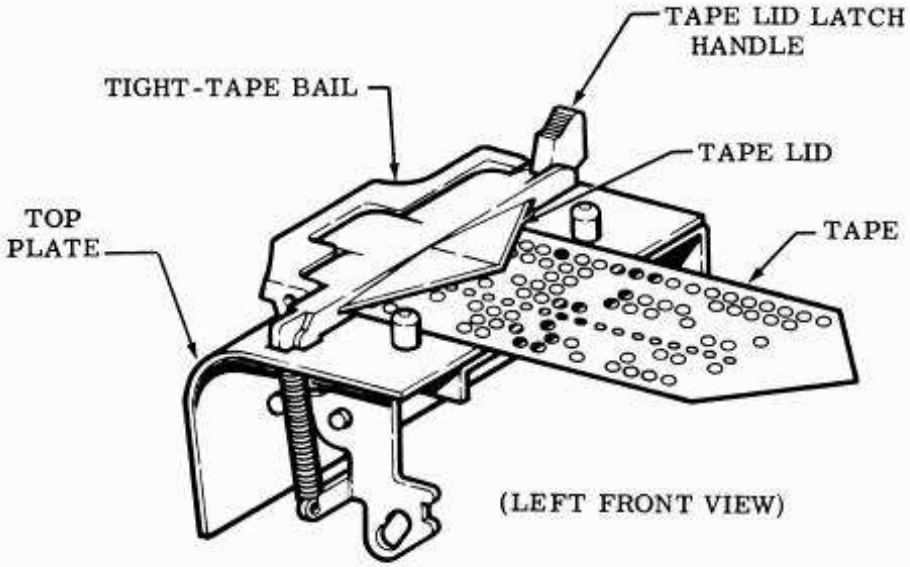

Figure 2 — Tape Lid Mechanism

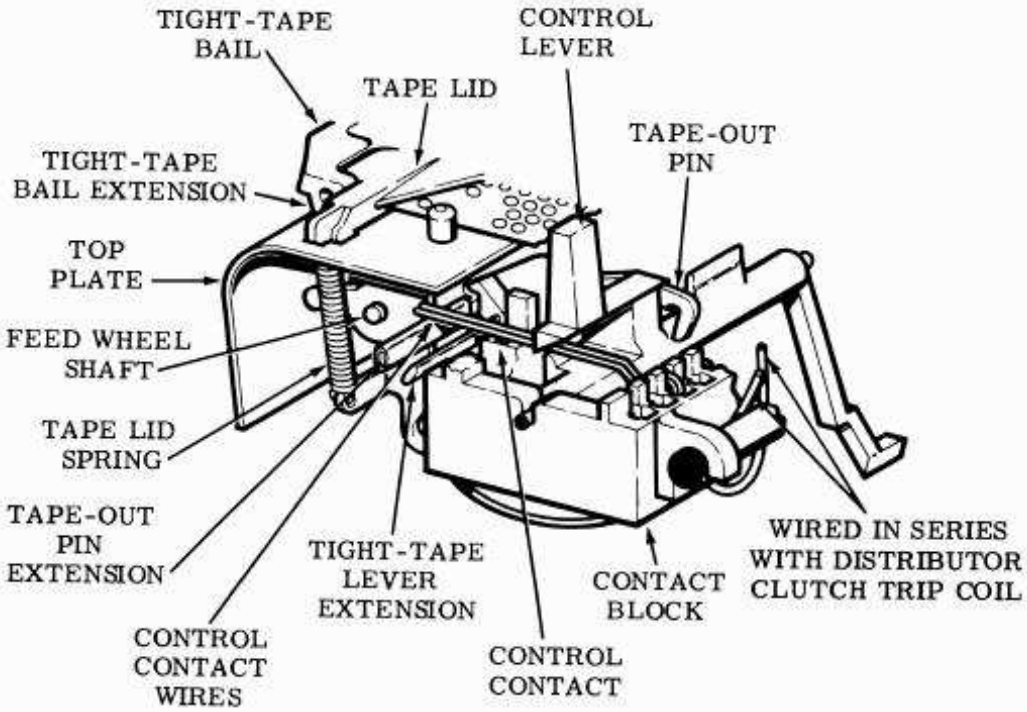

Figure 3 — Control Mechanism

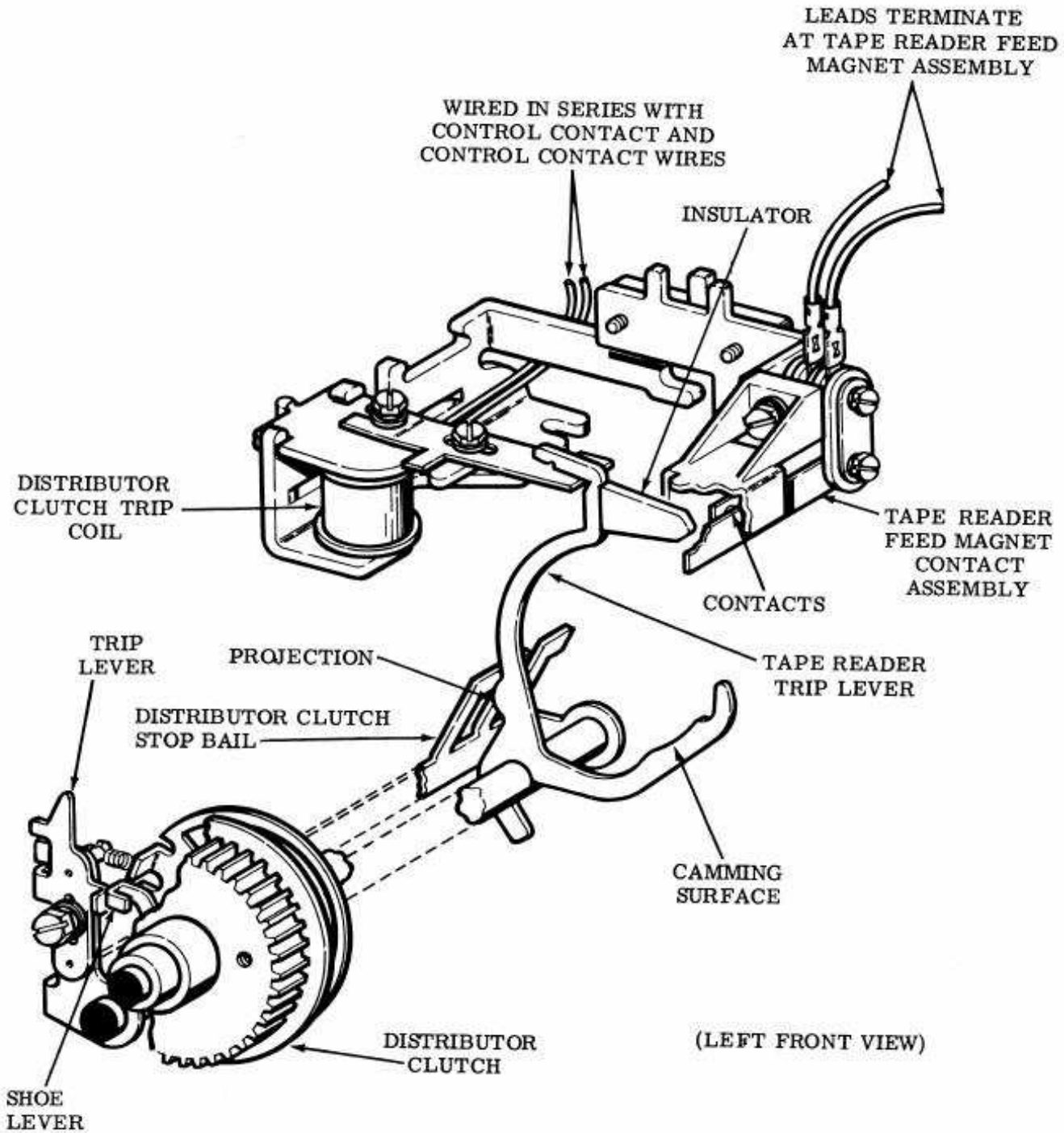

Figure 4 — Distributor Clutch Trip Mechanism

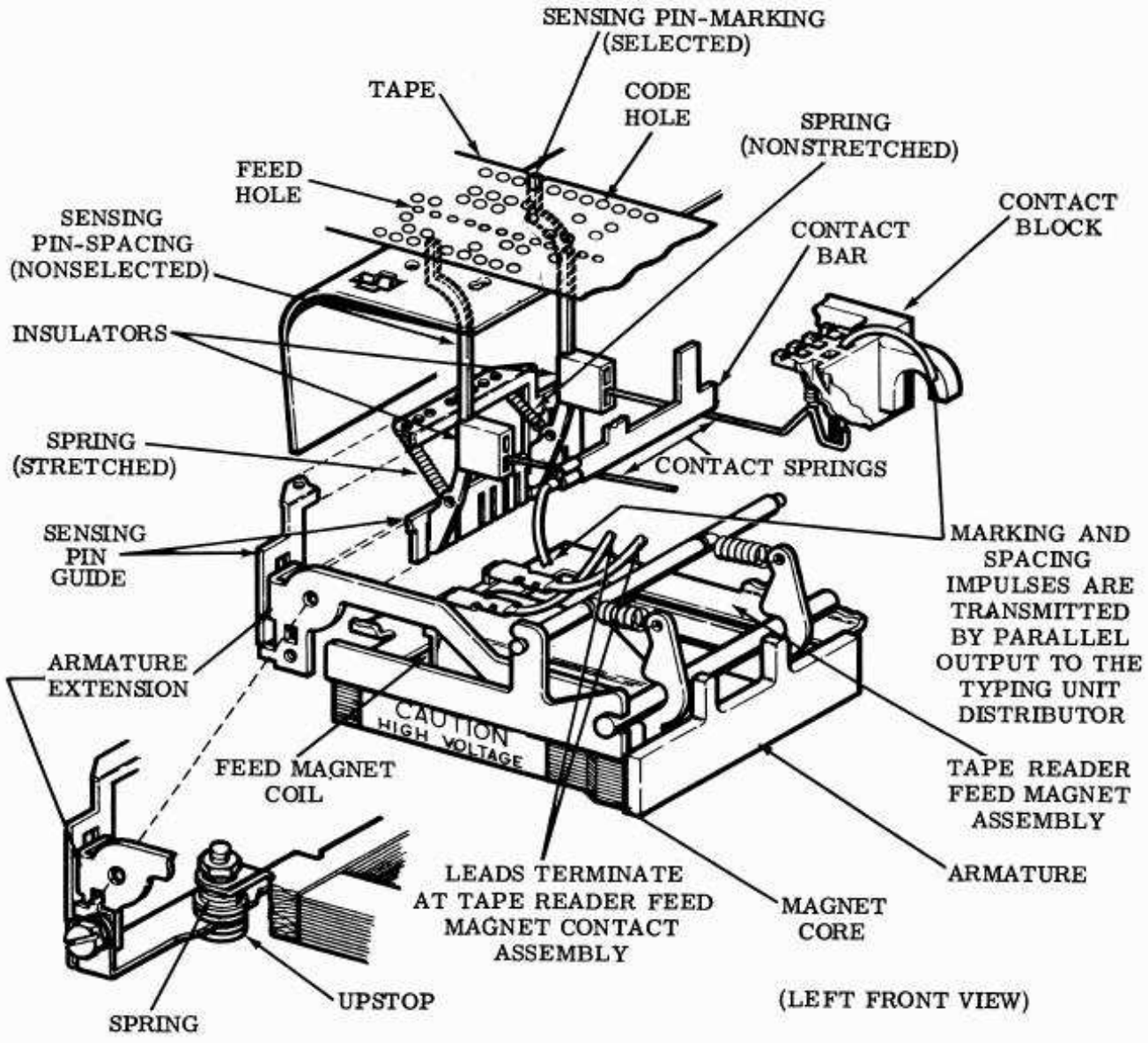

Figure 5 — Feed Magnet and Sensing Mechanism

2.10 The tape reader trip lever (Figure 4) remains in its tripped position throughout the distributor cycle. Toward the end of the distributor cycle—near the beginning of the stop pulse—a camming roller on the distributor shaft assembly engages a camming surface on the tape reader trip lever, moving it into its reset position.

2.11 If the distributor clutch trip coil remains energized, as it would where continuous tape reader operation is desired, the tape reader

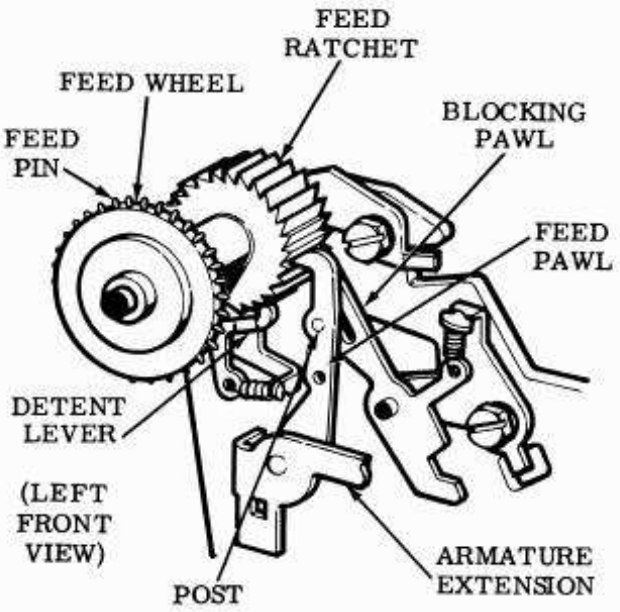

Figure 6 — START, STOP Position
(Tape Feed Mechanism)

trip lever will again fall to the tripped position in sufficient time so that the distributor clutch will not stop.

2.12 The tape reader trip lever, while being reset, opens the tape reader feed magnet contacts, causing the feed magnet coil (Figure 5) to be de-energized until the tape reader trip lever again falls into the tripped position.

2.13 The feed magnet coil, upon de-energization, releases the armature which allows the armature extensions to lower and withdraw the sensing pins from the tape. At the same time the feed pawl (Figure 6) advances the feed ratchet one step.

2.14 The feeding and withdrawing of sensing pins (Figure 5) is accomplished simultaneously, therefore, the sensing pin guides (Figure 1) in the top plate are slotted to permit the pins to travel with the tape for a distance.

2.15 Associated with the feed ratchet (Figure 6) are also a detent lever and a blocking pawl. The detent lever, with its circular surface engaging the feed ratchet teeth, serves to hold the feed ratchet and feed wheel in its correct position during sensing.

2.16 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 during feeding, without use of a heavy detent spring. It also prevents the pulling ahead of the tape, during sensing, by a tape winder, 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.

2.17 The armature (Figure 5) is provided with a spring loaded 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 downstroke 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.

2.18 The tape reader is provided with a free-wheeling feature (Figure 7). When the control lever is pushed beyond its normal detented position, an extension on the control lever near the mounting plate of the tape reader engages and detents itself on a contour on the lower end of the blocking pawl. This causes the blocking pawl to rotate and detent itself in the free-wheeling position. A track on the top end of the blocking pawl engages the post on the feed pawl, which normally drives the blocking pawl and rotates the feed pawl away from the feed ratchet.

2.19 A tight-tape feature (Figure 3) is also provided. A plastic tight-tape bail, which snaps onto the tape lid, has on it an extension which projects through the top plate. This tight-tape bail extension engages a surface on the tight-tape lever. The tight-tape lever, which is pivoted on the feed wheel shaft, has an extension which extends below the control contact in the contact block. When the tape is taut, the tight-tape bail rotates, causing the tight-tape lever to also rotate. This opens the control contact and control contact wires and stops the tape reader.

2.20 A dragging type tape-out pin (Figure 1) is also provided. This tape-out pin has an insulating extension on it which moves the control contact and control contact wires open when tape is absent from above the pin and stops the tape reader.

2.21 The tape lid (Figures 1 and 2) when closed is positioned entirely by a pair of locating pins, integrally molded in the tape lid, which project into a pair of locating holes in the top bracket which are closely related dimensionally to both sensing pin guides and feed wheel guide. The hinge, under these conditions, is not functional as no contact is made between the hinge and the top plate in this position.

2.22 The tape lid is held down by a spring biased tape lid latch handle at one end and by a tape lid return spring at the other end. This insures positive contact between the tape lid and the top plate at both ends under all conditions and insures a more reliable tape lid top plate clearance for the tape without adjustment of a hinge.

2.23 When the tape lid latch handle is moved to release the tape lid, the tape lid spring (Figure 3) exerts a torque about one end of the tape lid surface contacting the top plate. This causes the tape lid to rotate about that end until it moves down far enough to engage a pair of shear-formed tabs, which form a pivoting surface for the end. At this point, the pivoting end leaves the top plate and forms the hinge for the remainder of its travel to the open position. When open, this hinge requires only sufficient accuracy to insure that the locating pin closest to it will engage, or at least partially engage, the locating hole closest to it and be guided into the hole when the lid is closed. There are, therefore, no hinge adjustments required.

AUTOMATIC READER CONTROL

2.24 In applications where the requirement for starting and stopping the tape reader from either local or remote sources exists, automatic reader control is provided. The electrical apparatus necessary to provide automatic reader control are a relay, electrical contacts, and wiring. The relay is located in the power pack assembly. Electrical contacts, in addition to those in the relay, are located in the tape reader typing unit function area, and, for sprocket feed typing units, in the form-out mechanism area.

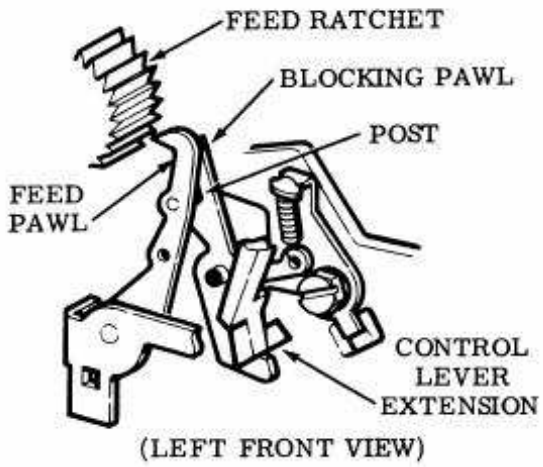

Figure 7 — FREE Position (Tape Feed Mechanism)

2.25 A schematic drawing (Figure 8) shows the type of electronic circuitry that is used to make the automatic reader control feature operate.

2.26 The starting of the tape reader locally can be explained as follows: start the tape reader by pushing the control lever (Figure 1) forward. This action causes the local start contact (B), located in the tape reader, to be closed temporarily and allows the relay to be energized and closes relay contact no. 1 (F), which completes the holding circuit.

Note: After the relay is energized, the local start contact (B) is opened automatically when the control lever returns to its neutral position which is the detented position midway between the START and STOP positions. This removes the local start contact (B) from the relay circuit.

2.27 With the energization of the relay, relay contact no. 2 (H) is also closed. If there is tape in the tape reader (Figure 2)—ie, if the tape-out contact (G) is closed—current will flow in the distributor clutch trip circuit and energize the clutch trip coil (Figure 4). This action releases the tape reader

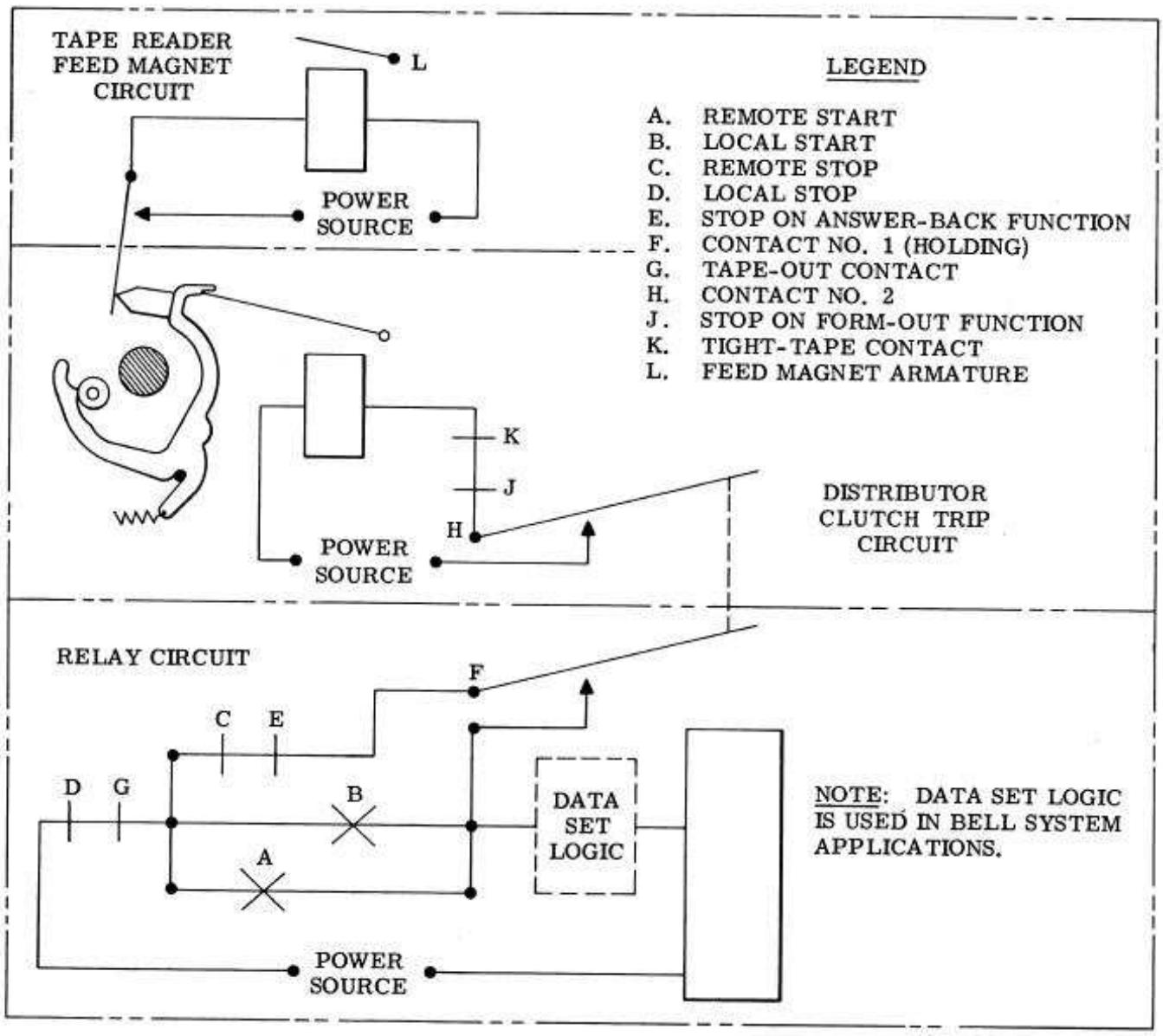

Figure 8 — Automatic Reader Control Schematic

trip lever and causes the tape reader to function in much the same manner as described in 2.04 through 2.13.

2.28 Automatic reader control permits the tape reader to be stopped in either of two basic ways—permanent stop or temporary stop. The tape reader can be permanently stopped by the control lever (Figure 1) or by remote sources which operate through the function box contacts. The tape reader can be temporarily stopped by such features as the tight-tape mechanism of the tape reader or the interlock contacts of the reader-stop contact assembly found in the form-out mechanism area of sprocket feed typing units.

2.29 Other normally open or closed contacts shown on Figure 8 operate in such a way as to give the necessary control and flexibility required for automatic reader control.