

35 TRANSMITTER-DISTRIBUTOR UNIT (MULTICONTACT)

DESCRIPTION AND PRINCIPLES OF OPERATION

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1. GENERAL

1.01 This section provides description and principles of operation for the 35 transmitter-distributor unit (multicontact). It is reissued to generally bring the section up to date. Since it is a general revision, marginal arrows ordinarily used to indicate changes and additions are omitted.

1.02 The transmitter-distributor is an electromechanical device that converts information from code holes in paper tape to corresponding electrical signals. It accommodates 8-level, fully perforated tape, and can produce both multiwire (parallel) and sequential signals.

1.03 All references to left or right, front or rear, up or down are made from a position in front of the unit (Figure 1).

2. FUNCTION AND CONFIGURATION

FUNCTION

2.01 The transmitter-distributor (Figures 1 through 4) has the combined capability of a tape reader and a multiwire distributor. The tape reader (or transmitter) senses the punched code combinations and transfers the data electrically to the distributor. The distributor converts these parallel signals into sequential, start-stop signals for distribution on line.

2.02 Some units are equipped with code reading contacts (read storing switch - Figure 1) to provide parallel outputs.

2.03 The unit may be used with a base and a motor unit in self-contained Transmitter-Distributor Sets, or it may be a component of larger equipment groupings such as Torn Tape Relay Systems or Automatic Send-Receive Sets.

COMPONENTS

2.04 The following mechanisms are mounted on a main casting and mounting plates (Figures 1 through 4):

- (a) A tape sensing mechanism consisting of sensing pins, transfer, and latchlevers, arranged in the following left to right order as viewed from the left side



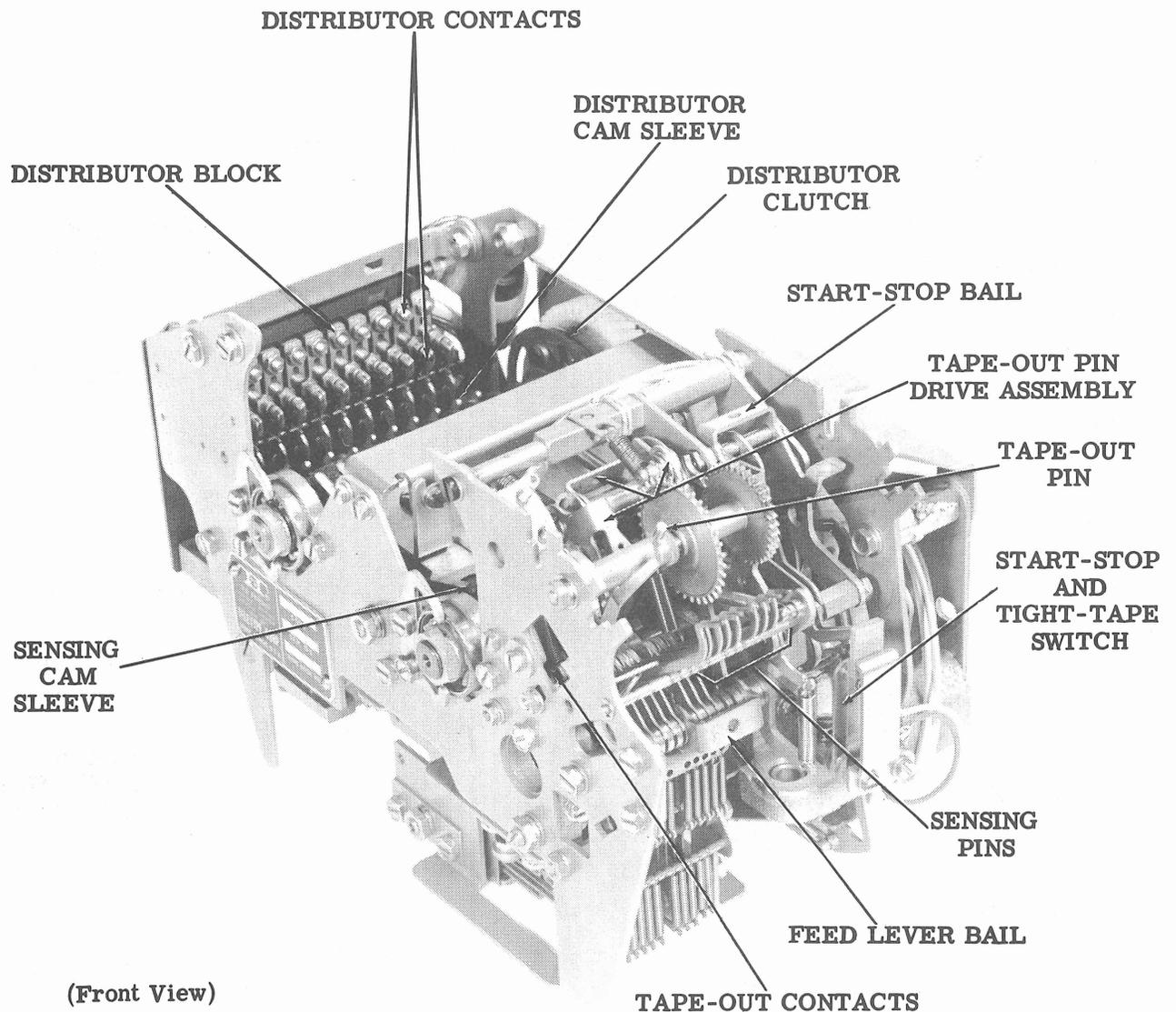


Figure 2 - Typical 35 Transmitter-Distributor Unit, Top, Cover, and Tape Guideplate Removed

- (2) Two clutch trip magnets for control of the cam sleeves (Figure 4).
- (3) Two shafts for driving the cam sleeves. A gear on each shaft and an idler gear provide a constant speed (Figure 4).
- (d) A sense storing switch for storage of the last character sensed. The switch applies a parallel output to the distributor (Figures 1 and 4).
- (e) A read storing switch (on some units) for parallel outputs (not shown in photographs).
- (f) A tape feed mechanism (Figure 1).
- (g) A tape lid mechanism (Figure 1).
- (h) A three-position start-stop lever for manual control of the unit. The lever positions are RUN, STOP, and FREE (Figure 1).

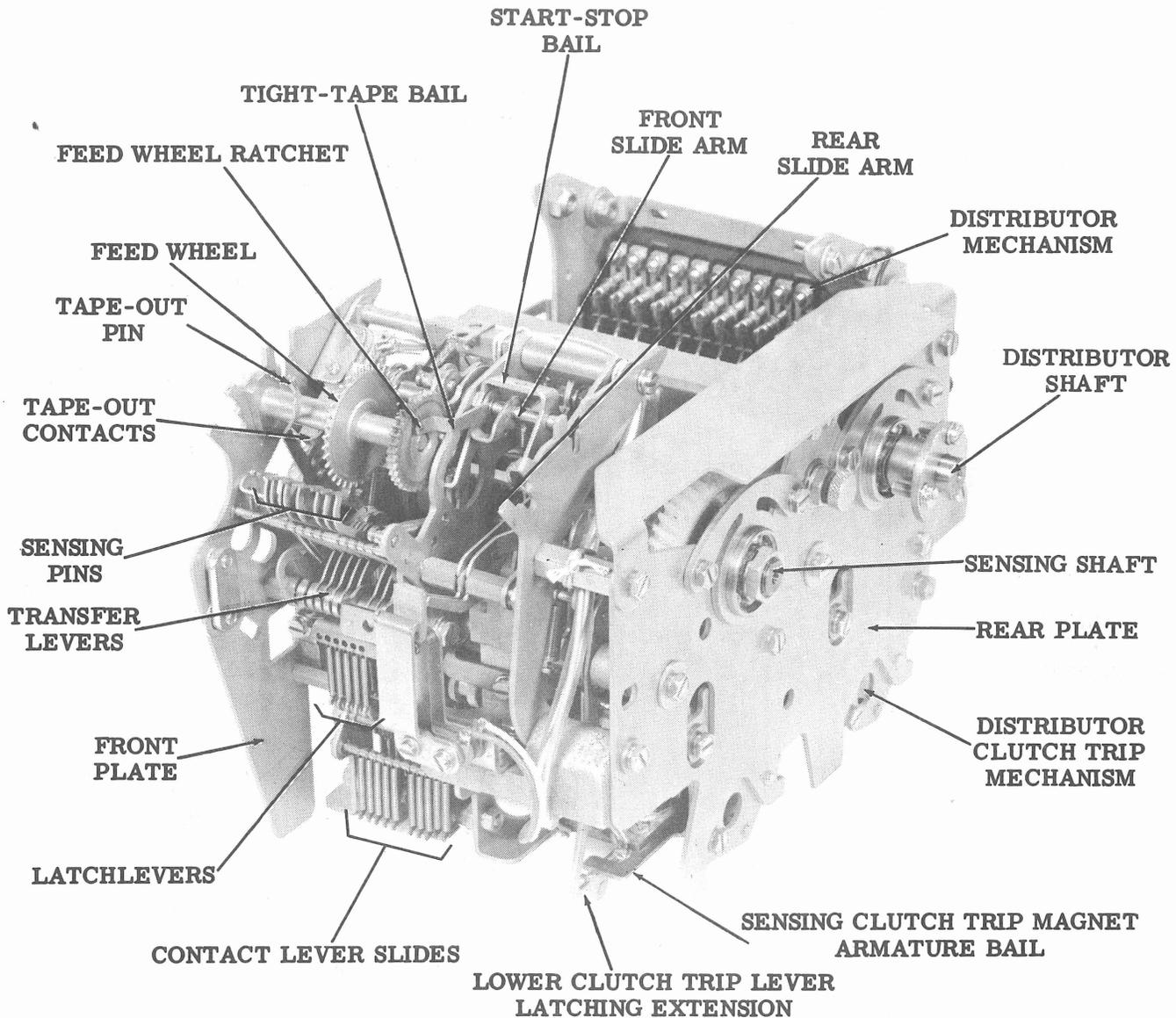


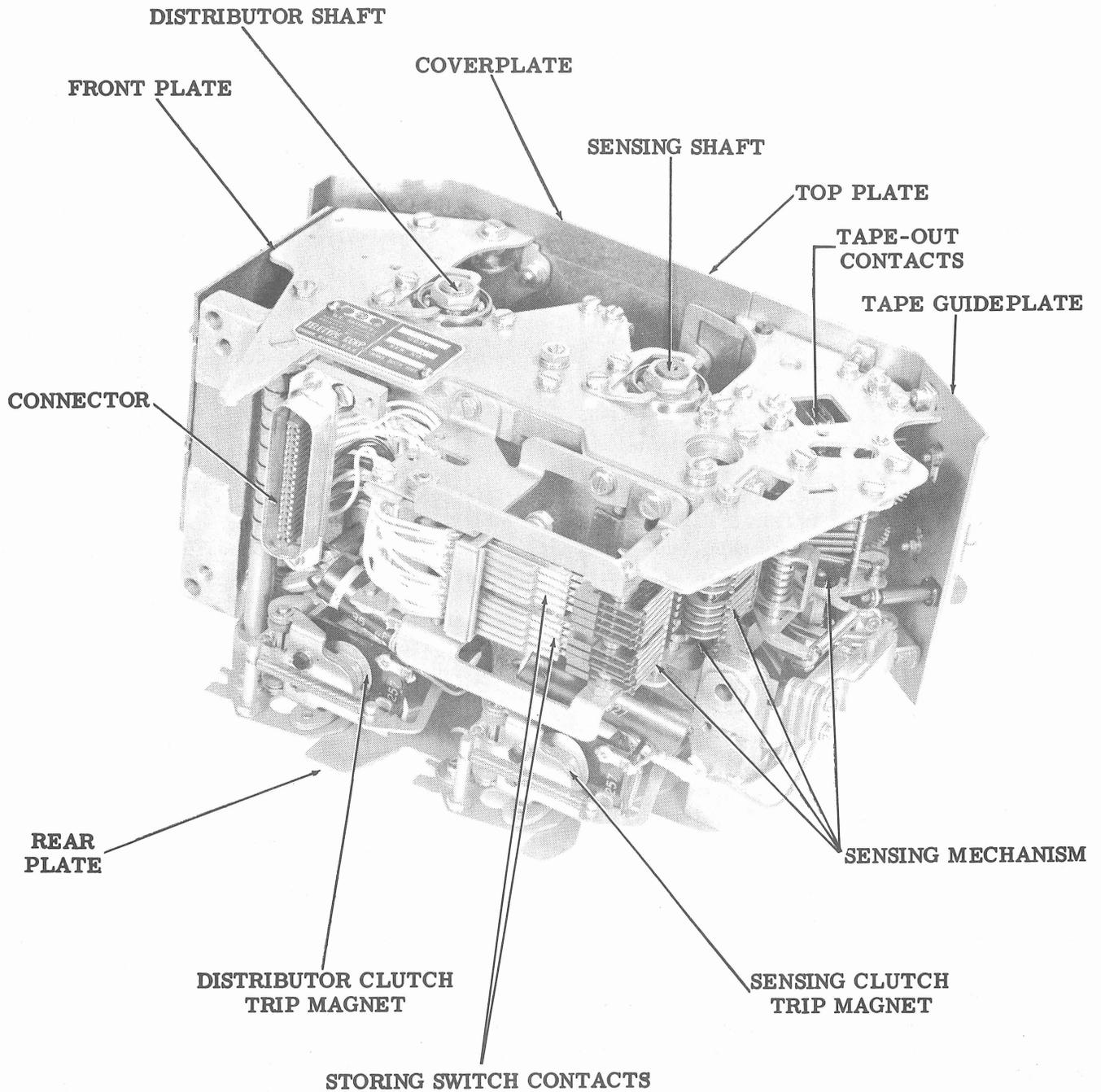
Figure 3 - Typical 35 Transmitter-Distributor, Top, Cover, and Tape Guideplates Removed

- (i) Tape-out and tight-tape contacts (Figure 3).
- (j) An adjustable tape guide (Figure 1).
- (k) A top plate and cover (Figure 1).
- (l) An electrical connector for terminating all wiring including the signal circuits. An additional connector is used for the read storing switch on units so equipped (Figure 4).

**ELECTRICAL CIRCUITS**

2.05 There are two separate electrical circuits associated with the transmitter-distributor; the clutch trip magnet circuit and the signal circuit. The clutch trip magnet circuit consists of the clutch trip magnet coils in series with both the start-stop and tape-out contacts (Figure 8).

2.06 The signal circuit consists of the sense and distributor contacts in series. This connection must be made externally (Figure 16).



(Bottom Right Side View)

Figure 4 - Typical 35 Transmitter-Distributor Unit

3. TECHNICAL DATA

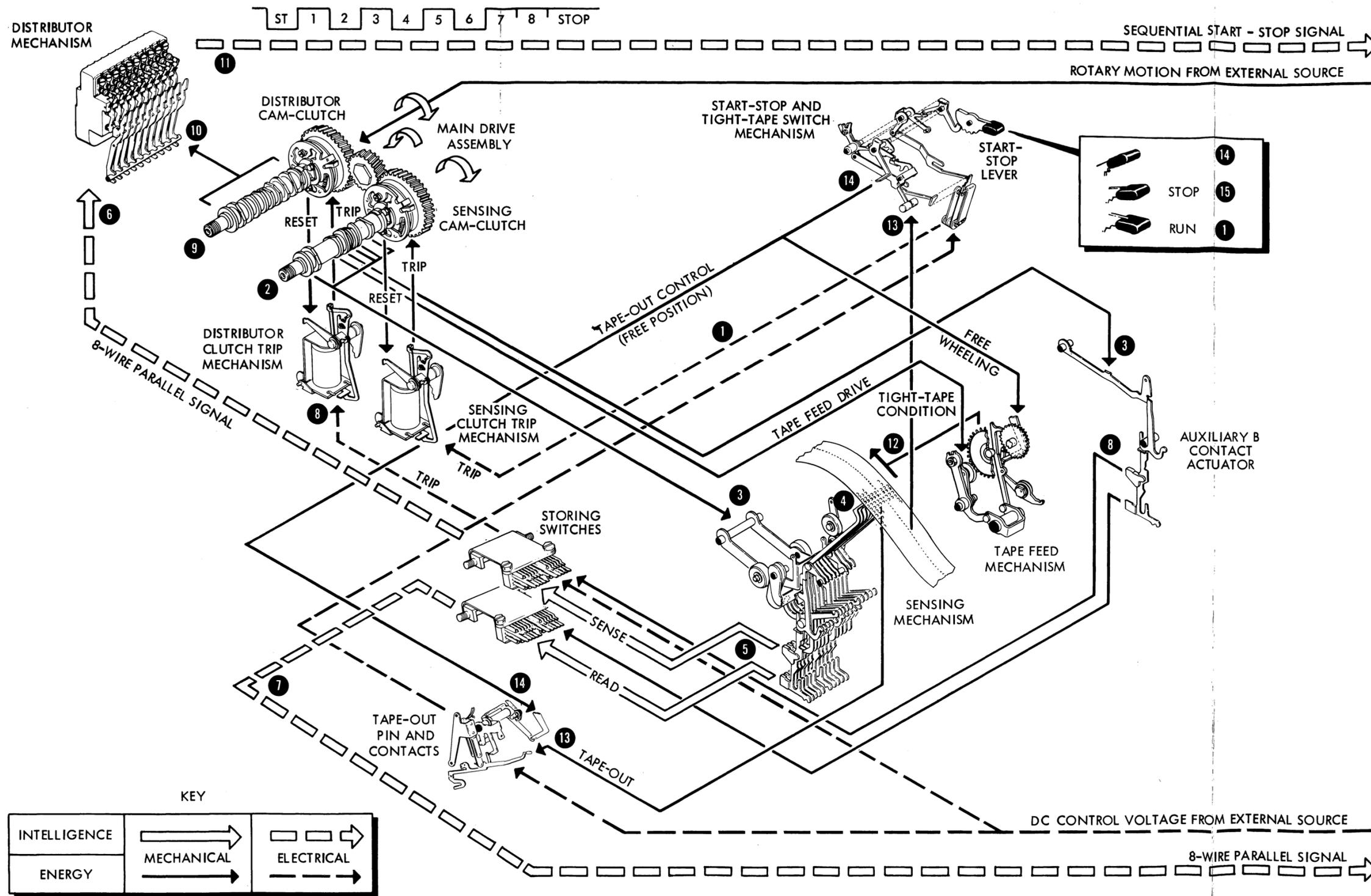
Signals

- Code . . . . . ASCII (United States of America Standard Code for Information Interchange)
- Distributor Contacts . . . . . 11-unit sequential start-stop code
- Read Storing Switch Contacts (if so equipped) . . . . . 8-level parallel code
- Operating Speed . . . . . Various speeds up to 100 wpm. Speed is varied by making external gear changes
- Tape . . . . . 8-level fully perforated tape
- Clutch Trip Magnets . . . . . Operate from external 110-120 v dc or with external current limiting resistor at 45-55 v dc. May be operated remotely.
- Motive Power . . . . . From external motor unit
- Dimensions (approximate) . . . . . 5-1/2 inches high, 9 inches wide, 5-1/2 inches deep

4. GENERAL OPERATION

- 4.01 The following paragraphs describe the general operation of the transmitter-distributor unit. Refer to Figure 5 which illustrates the functional relationship of the operating mechanisms.
- 4.02 With an idle signal line, drive motor operating, and tape in the unit, moving the start-stop lever from the STOP position to the RUN position energizes the sensing clutch trip magnet through the tape-out contacts and the start-stop and tight-tape switch.
- 4.03 The sensing clutch trip mechanism trips the sensing clutch which rotates the sensing cam sleeve.
- 4.04 The rotating sensing cam sleeve actuates the sensing mechanism and the auxiliary B contact actuator, and resets the sensing clutch trip mechanism.

- 4.05 The sensing pins in the sensing mechanism rise to read the perforations in the tape. Each character sensed (or read) is first setup mechanically in the sensing mechanism which then transfers this data to the sense and read storing switches.
- 4.06 The sense storing switch connects the character sensed to the contacts on the distributor mechanism in 8-level form.
- 4.07 The read storing switch connects the character sensed to external circuits in 8-level form.
- 4.08 The auxiliary B contact actuator operates the auxiliary B contact in the sense storing switch, which energizes the distributor clutch trip mechanism.
- 4.09 The trip mechanism trips the distributor clutch which rotates the distributor cam sleeve.
- 4.10 The rotating distributor cam sleeve sequentially actuates the contacts on the distributor mechanism. The actuated contacts, connected to the signal line, thus generate a sequential signal consisting of a start bit, eight intelligence bits corresponding to the sensed character, and a stop bit. The rotating cam sleeve also resets the distributor clutch trip mechanism.
- 4.11 The tape feed mechanism actuated by the sensing cam sleeve advances the tape to the next character.
- 4.12 The tape-out contacts (held closed by the tape-out pin when there is tape in the unit) and the tight-tape switch (controlled by the tight-tape bail positioned by the tape) are in series with the sensing clutch trip magnet circuit. If either a tape-out or a tight-tape condition occur, the sensing clutch trip magnet will de-energize and tape sensing will stop.
- 4.13 Placing the start-stop lever in the STOP position stops tape sensing and tape feeding by opening the start-stop and tight-tape switch.
- 4.14 Placing the start-stop lever in the FREE position stops tape sensing and tape feeding by opening the start-stop and tight-tape switch and by disengaging the feed pawl, permits the tape feed mechanism to free wheel to facilitate tape loading.



OUTLINE OF OPERATION

- 1 When operator places START-STOP lever in RUN position, start-stop and tight-tape contacts energize magnet in sensing clutch trip mechanism which trips clutch.
- 2 Sensing cam sleeve rotates with its shaft.
- 3 Sensing cam sleeve actuates sensing mechanism and auxiliary B contact actuator.
- 4 Sensing pins rise and sense tape.
- 5 Character in the tape is set up in sense and read storing switches.
- 6 Sense storing switch connects character to distributor mechanism in multiwire form.
- 7 Read storing switch applies character to external circuits in multiwire form.
- 8 Actuated auxiliary B contact in sense storing switch energizes magnet in distributor clutch trip mechanism which trips clutch.
- 9 Distributor cam sleeve rotates with its shaft.
- 10 Distributor cam sleeve actuates distributor mechanism contacts.
- 11 Distributor mechanism converts signals to sequential form, adds start and stop elements, and applies character to signal line.
- 12 Tape feed mechanism, actuated by sensing cam, advances tape to next character.
- 13 A tape-out or tight-tape condition will de-energize the sensing clutch trip magnet and stop tape sensing and feeding by disengaging the sensing clutch.
- 14 In a similar manner, placing the START-STOP lever in the FREE position stops tape sensing and feeding but permits tape feed mechanism to free wheel.
- 15 Placing the START-STOP lever in the STOP position stops tape sensing and feeding.

Figure 5 - 35 Transmitter-Distributor Unit, Pictorial Schematic Diagram

## 5. SIGNAL CODE

5.01 The signal code transmitted is ASCII. The pattern for a complete character transmitted sequentially consists of a start bit (always spacing), eight intelligence bits (any one of which may be marking or spacing) and a stop (two units always marking). See Figure 6.

In applications using an error detection technique called even parity, the eighth intelligence bit is made marking or spacing as required to make the total number of marking intelligence bits even. Refer to the appropriate section for additional data on this code.

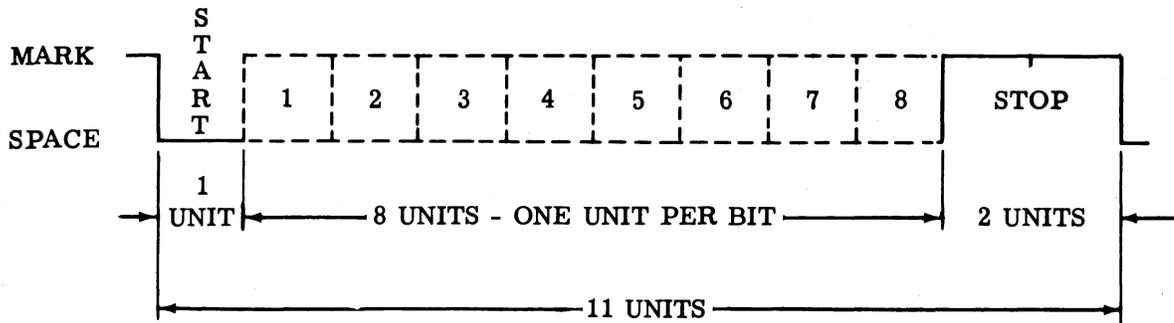
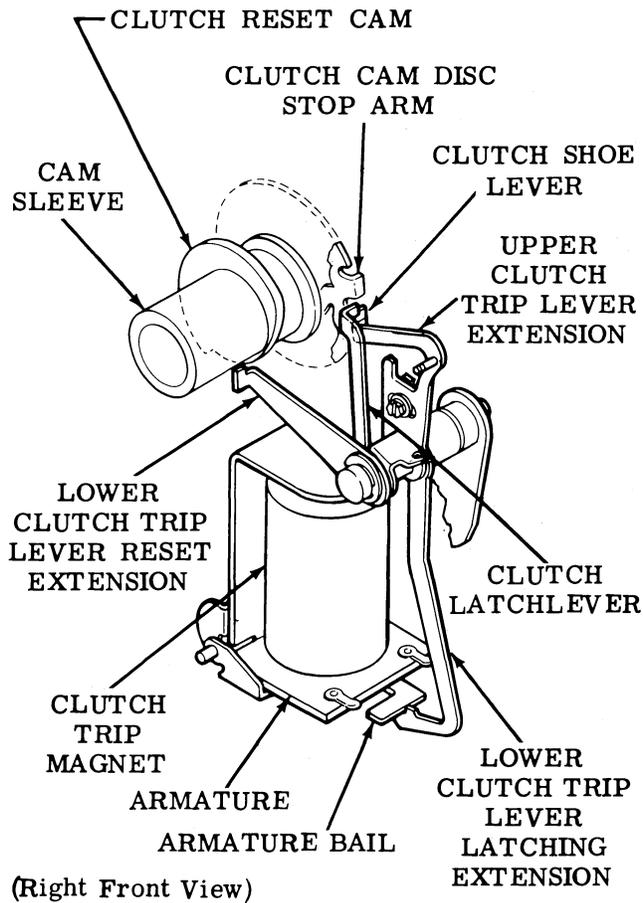


Figure 6 - Eleven Unit Transmission Pattern



(Right Front View)

Figure 7 - Clutch Trip Mechanism

## 6. CLUTCH OPERATION

### CLUTCH TRIPPING

6.01 The distributor and sensing clutch trip mechanisms are identical (Figure 7). Clutch tripping is accomplished by closing the electrical contacts of the respective clutch trip magnet circuit (Figure 8).

6.02 The armature of the clutch trip magnet, fastened to the armature bail, is pulled to the magnet core releasing the lower latching extension of the clutch trip lever. The moving clutch trip lever lower reset extension engages the clutch reset cam of the cam sleeve and the clutch trip lever upper extension disengages from the clutch shoe lever and disengages the clutch latchlever from the clutch cam disc stop arm. This permits engagement of the clutch with the shaft which starts rotation of the cam sleeve (Figure 9).

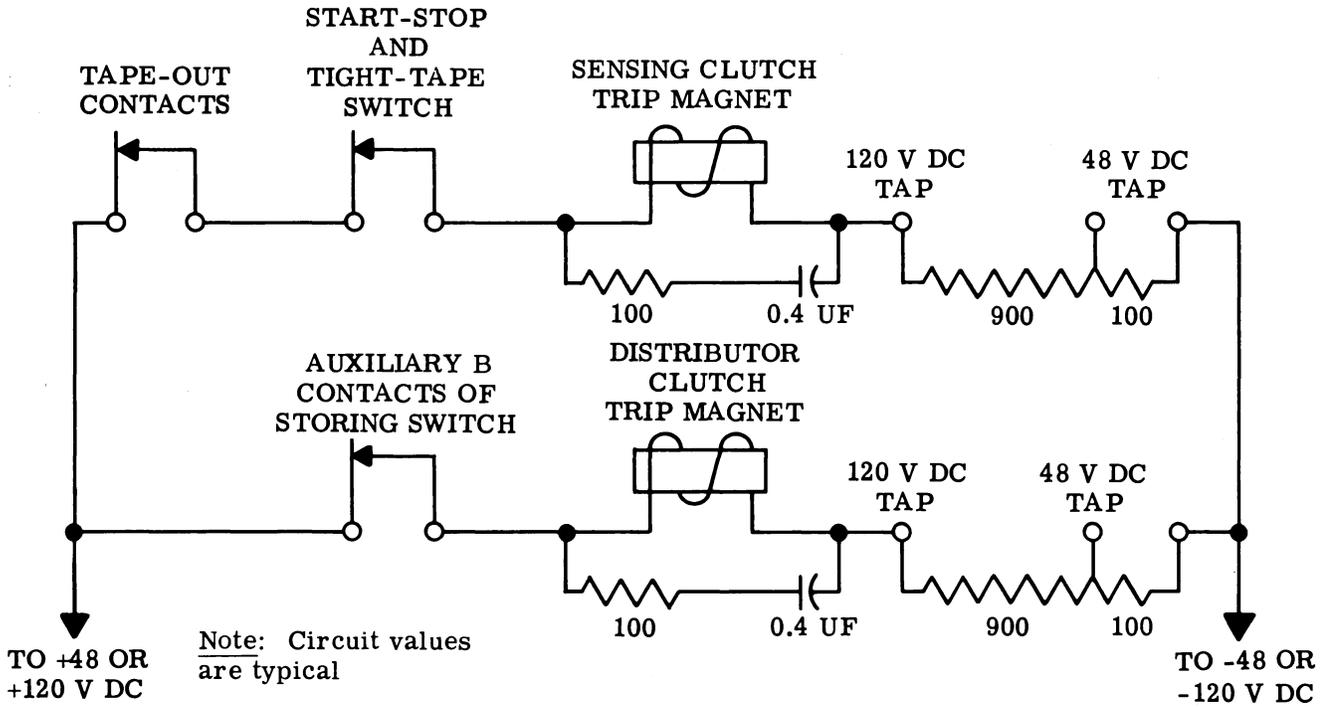
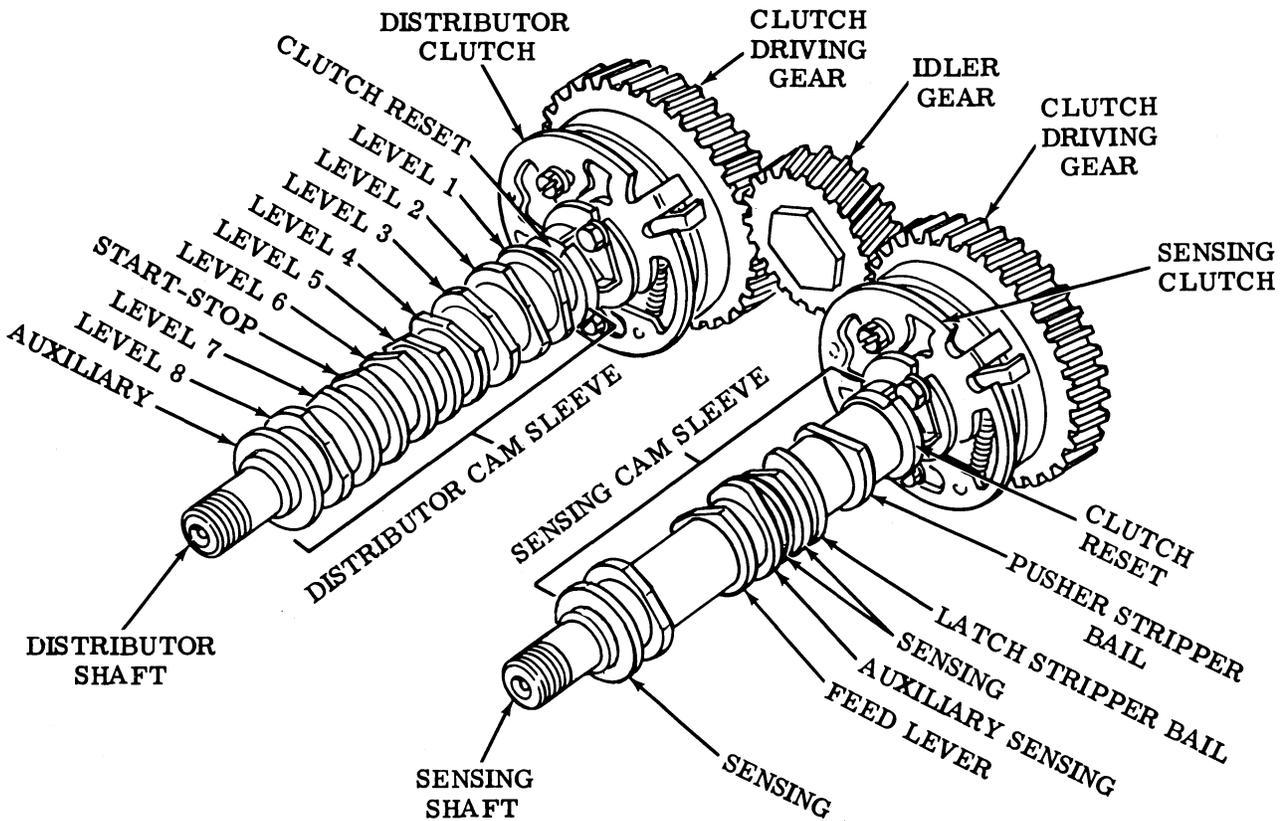


Figure 8 - Clutch Trip Magnet Circuits



(Top and Right Side View)

Figure 9 - Main Drive Assembly

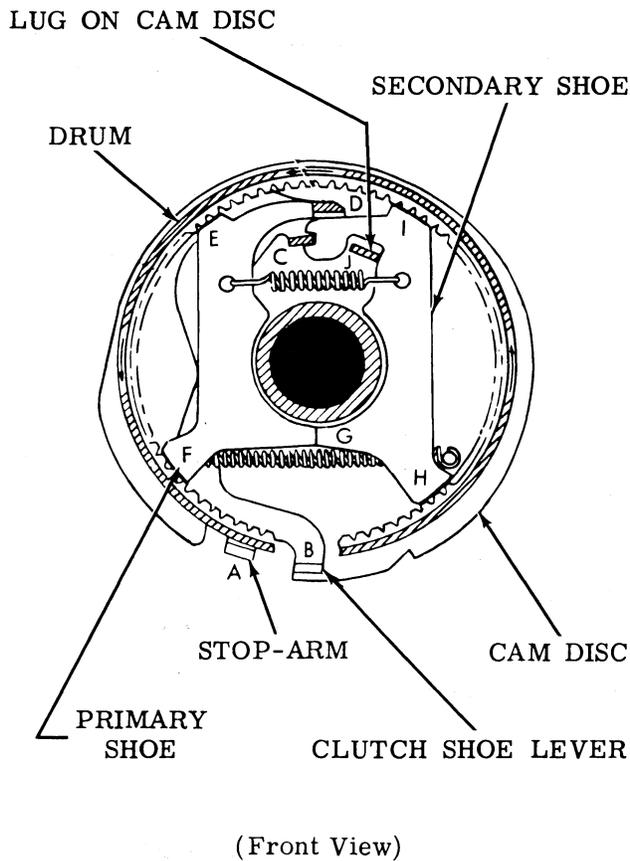


Figure 10 - Clutch — Engaged

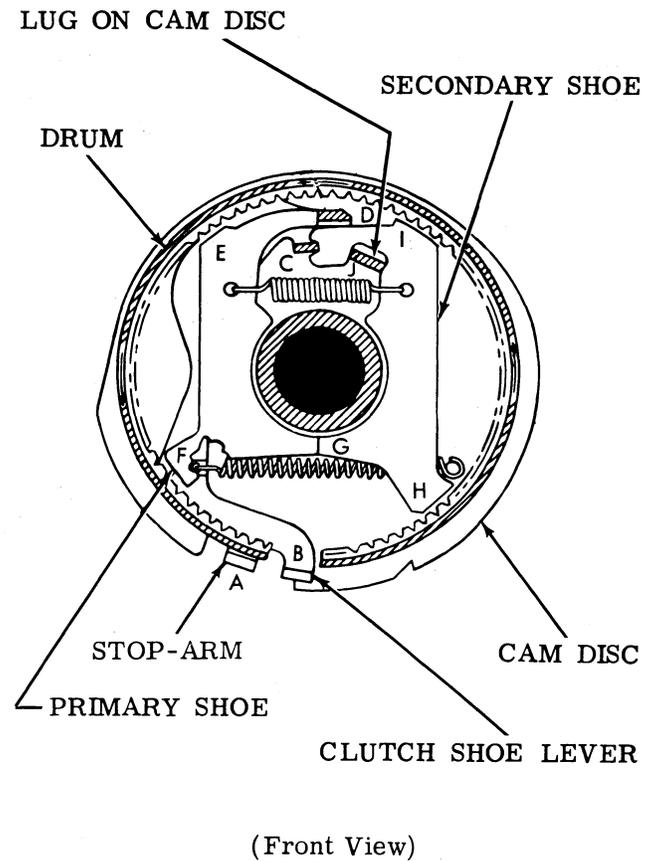


Figure 11 - Clutch — Disengaged

6.03 The sensing clutch trip magnet is controlled by the start-stop and tight-tape switch mechanism (Figure 12) and the tape-out pin and contacts (Figure 18), which are in series with the magnet coil.

6.04 The distributor clutch trip magnet is controlled by the auxiliary B contact actuator mechanism (Figure 14) which depends on the rotation of the sensing cam sleeve.

#### CLUTCH RESET

6.05 The respective clutch is reset (disengaged) if the corresponding clutch trip magnet circuit is opened. The clutch reset cam of the cam sleeve cams the lower reset extension of the clutch trip lever. The moving lower clutch trip lever latching extension is latched in the reset position by the armature bail as shown in Figure 7. The moving upper

clutch trip lever extension engages the clutch shoe lever disengaging the clutch. The clutch latchlever, attached to the upper clutch trip lever extension by a spring, also moves to engage the clutch cam disc stop arm which stops the disc and cam sleeve.

#### CLUTCH INTERNAL OPERATION

##### A. Clutch Engagement

6.06 Clutch engagement (Figure 10) is accomplished by releasing the lower end of lever B. The upper end of lever B pivots about its ear C (which bears against the upper end of the secondary shoe) and moves its ear D, and the upper end of the primary shoe, toward the left until the shoe makes contact with the drum at point E. As the drum turns counterclockwise, it drives the primary shoe downward, so that it again makes contact with the drum, this time at

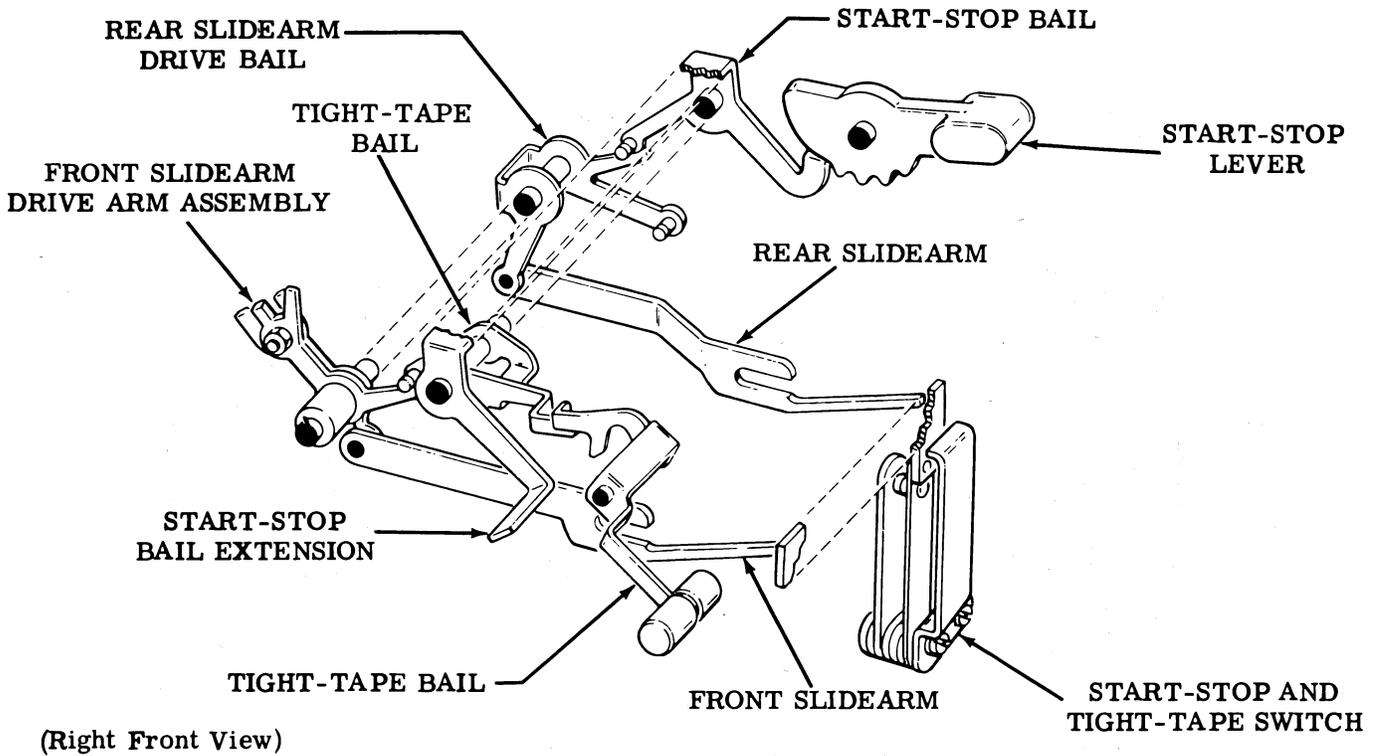


Figure 12 - Start-Stop and Tight-Tape Switch Mechanism

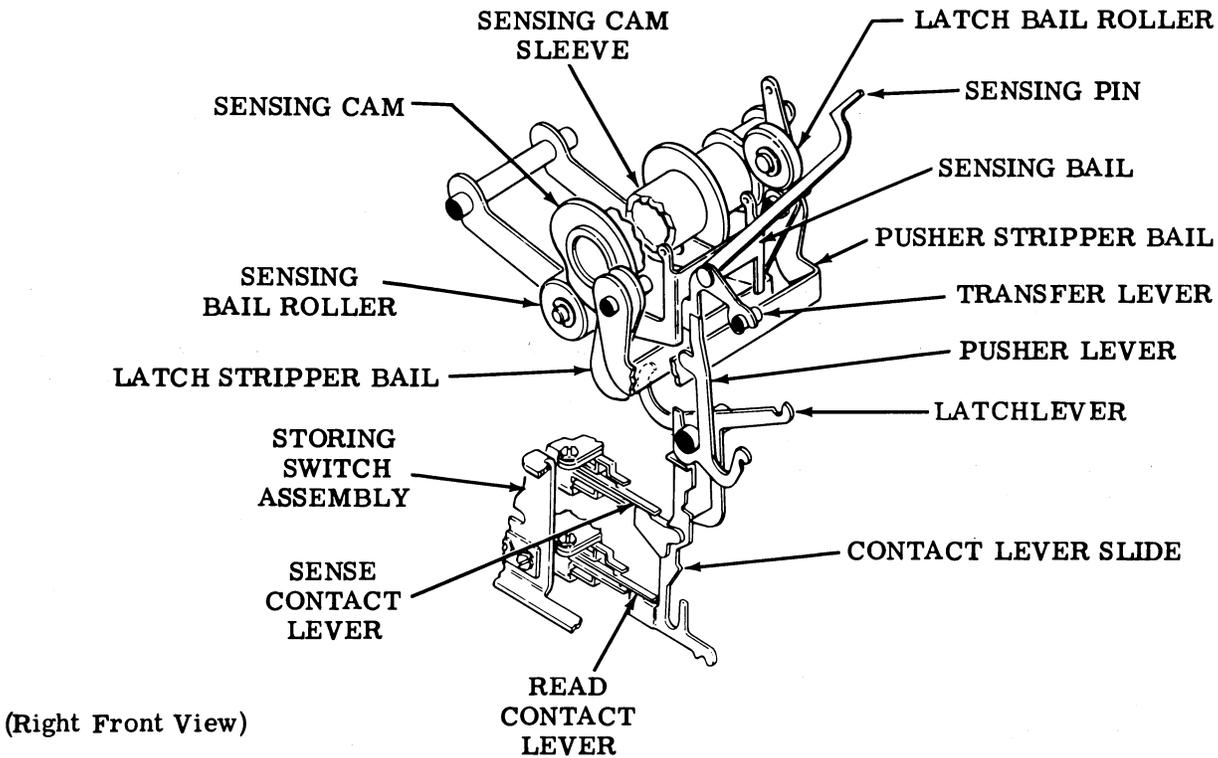


Figure 13 - Tape Sensing Mechanism

point F. There, the combined forces acting on the primary shoe cause it to push against the secondary shoe at point G. The lower end of the secondary shoe then bears against the drum at point H. The revolving drum acts to drive this shoe upward so that it again makes contact with the drum at point I. Since the forces involved are multiplied at each succeeding step, the final force developed at point I is very great. This force is applied to the lug J on the clutch cam disc to cause it to turn in step with the drum. The cam disc on the clutch is connected to the cam shaft imparting rotary motion to the cam sleeve.

## B. Clutch Disengagement

6.07 Clutch disengagement (Figure 11) is accomplished by bringing together lug A on the clutch cam disc, and the lower end of the clutch shoe lever B. The upper end of lever B pivots about its ear C and allows its other ear D to move toward the right. The upper spring then pulls the two shoes together and away from the drum.

## 7. TAPE SENSING

7.01 With the start-stop lever in the RUN position, the cam surface of the lever causes the start-stop bail to pivot on its axis (Figure 12). The pivoted start-stop bail causes the rear slidearm drive bail to pivot and release the rear slidearm. This permits the start-stop and tight-tape switch to close and energize the sensing clutch trip magnet (Part 6).

7.02 The engaged sensing clutch starts the sensing cam sleeve rotating. The sensing cam, through the sensing bail roller, causes the sensing bail to pivot and the transfer levers and sensing pins to rise (Figure 13).

7.03 If a sensing pin is free to move though a perforation in the tape it continues to follow the sensing bail upward to its fully extended position. A blank in the tape will prevent a sensing pin from reaching its fully extended position. Each sensing pin which moves to its fully extended position allows a pusher lever to fall in behind the recess on the transfer lever through action of its spring. The pusher levers remain stationary until the transfer levers begin their downward rotation with the sensing bail return stroke.

7.04 After approximately 43 degrees of sensing cam sleeve rotation, the clutch reset cam disengages the clutch trip lever (Part 6). After approximately 133 degrees of sensing cam sleeve rotation, the auxiliary B contact (on the sense storing switch) is actuated by the auxiliary B contact actuator (Figure 14).

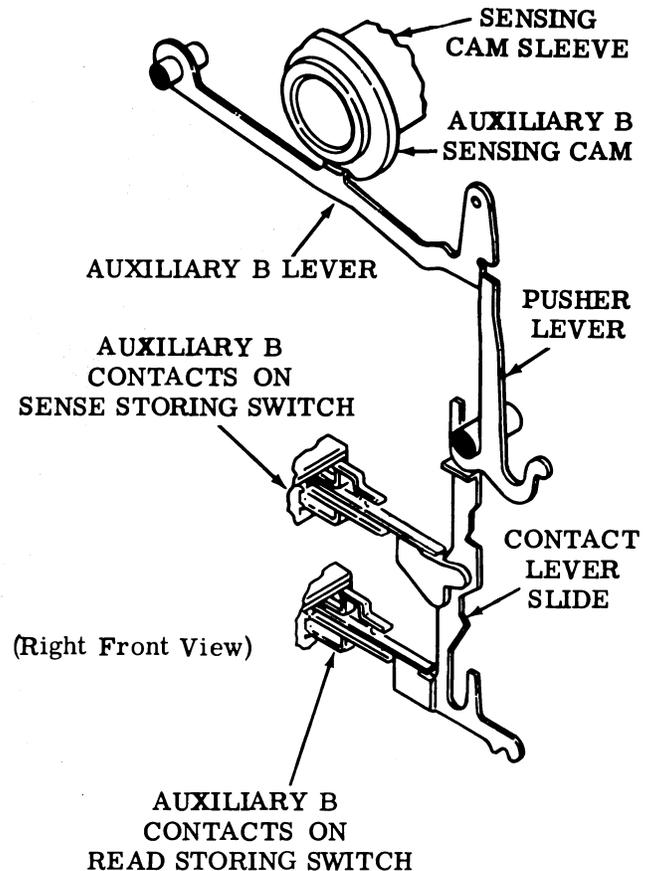


Figure 14 - Auxiliary B Contact Actuator

7.05 The pusher levers (Figure 13) associated with the fully extended sensing pins begin to move downward, engage their associated contact lever slides, and close contacts in the read and sense storing switches. Before contact is made, the latch stripper bail strips the latchlevers which held the contact lever slides during the previous cycle. Before completion of this cycle, the latchlevers are allowed to reset so that the contact lever slides which were pushed down through the pusher levers are again latched. The unselected pusher levers remain in their upper positions through action of their springs.

7.06 The contacts on the sense storing switch are connected electrically to the contacts on the distributor mechanism contact block (Figures 15, and 16). The read storing switch contacts are connected to external circuits. At this time, the electrical equivalent of the character sensed is set up in the sense and read storing switches.

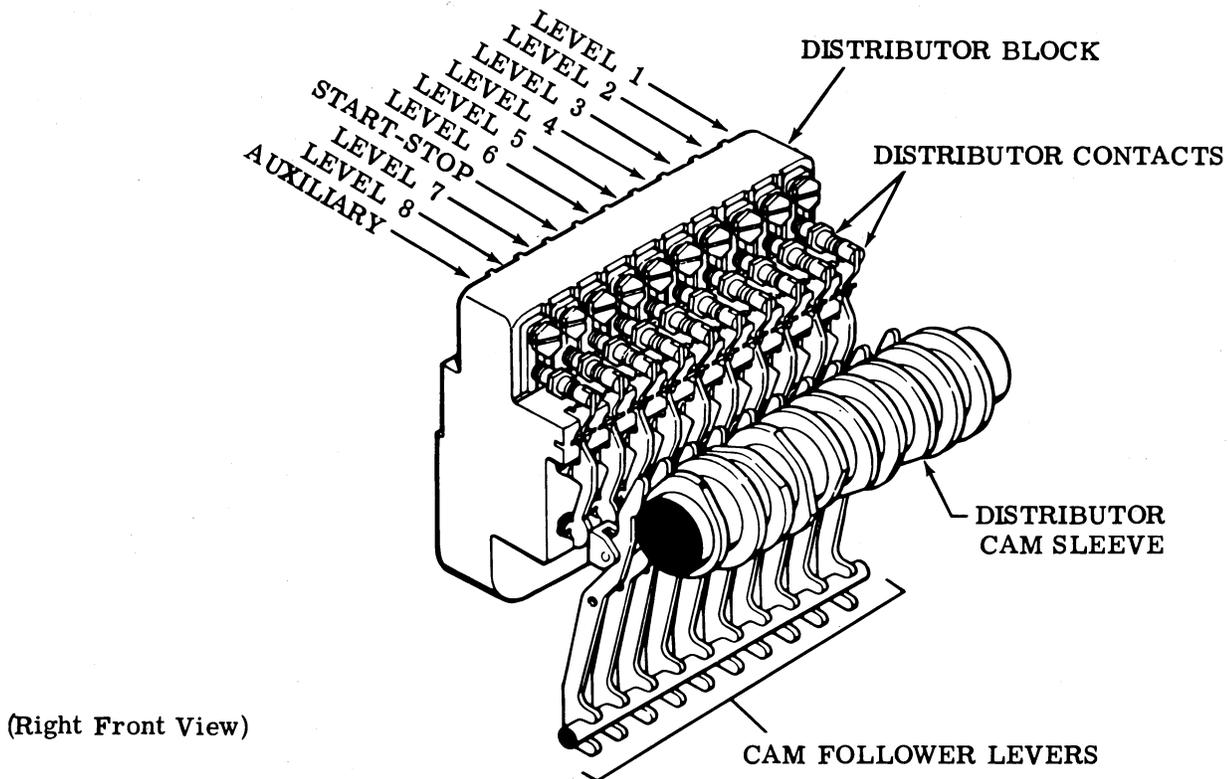


Figure 15 - Distributor Mechanism

## 8. SIGNAL DISTRIBUTION

8.01 The distributor cam sleeve begins its rotation after the auxiliary B contact actuator closes the auxiliary B contact in the sense storing switch. This action energizes the distributor clutch trip magnet (Figure 8). As the distributor cam sleeve rotates, the cams open and close contacts on the distributor mechanism distributor block for a predetermined interval. A sequential signal is distributed on the signal line corresponding to the character set up in the sense storing switch but also including a start and a stop bit. This cycle is repeated if the sensing clutch magnet remains energized.

8.02 At approximately 250 degrees of sensing cam sleeve rotation, the pusher levers are stripped. As the sensing cam sleeve approaches the end of the cycle, the auxiliary A contact (on the sense storing switch) opens (Figure 16).

## 9. TAPE FEEDING

9.01 At approximately 250 degrees of sensing cam rotation, the sensing cam sleeve through a mechanical linkage (Figure 17), causes the feed pawl to engage the feed wheel ratchet and rotate the feed wheel. Pins on the feed wheel engage the feed holes and advance the tape one character. A detent lever engages the ratchet and holds the feed wheel and the tape in position for the next sensing cycle.

## 10. STOPPING THE ACTION

10.01 Positioning the start-stop lever in the STOP position rotates the start-stop bail enough to actuate the start-stop and tight-tape switch, causing a break in the sensing clutch trip magnet circuit (Figures 8 and 12).

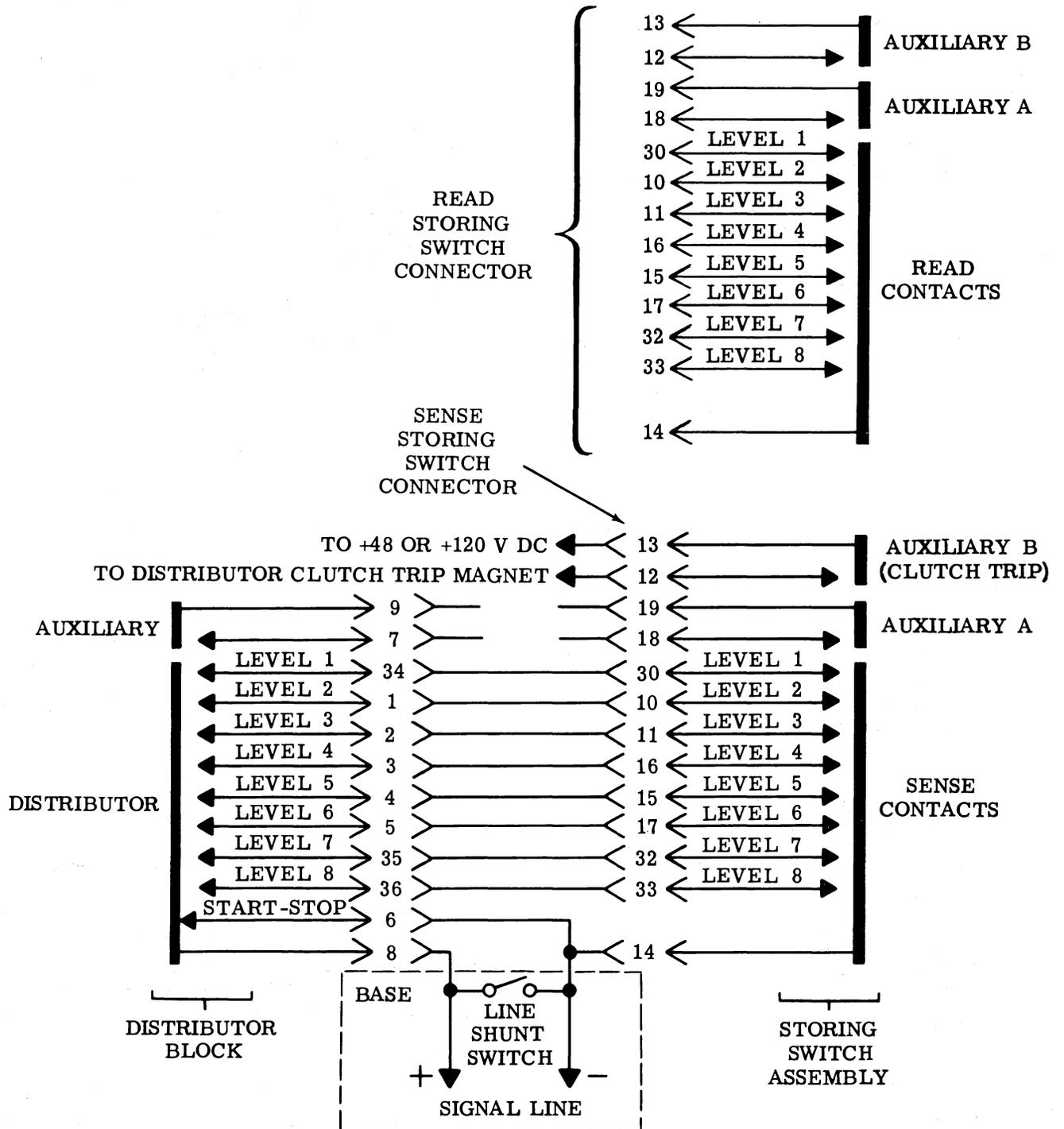


Figure 16 - Signal Circuit

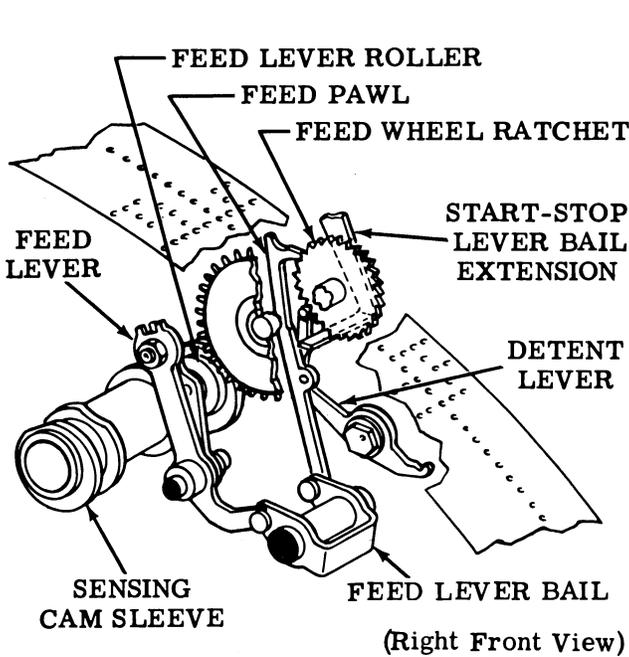


Figure 17 - Tape Feed Mechanism

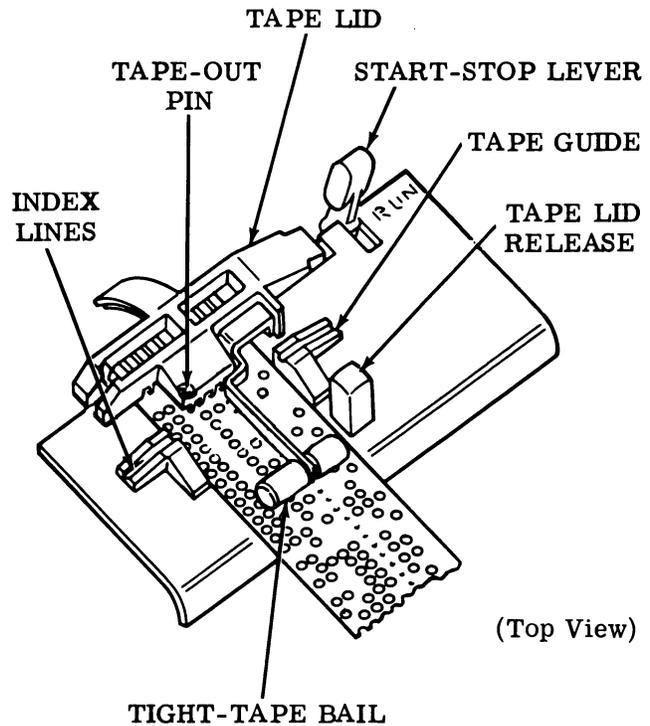


Figure 19 - Tape Guideplate

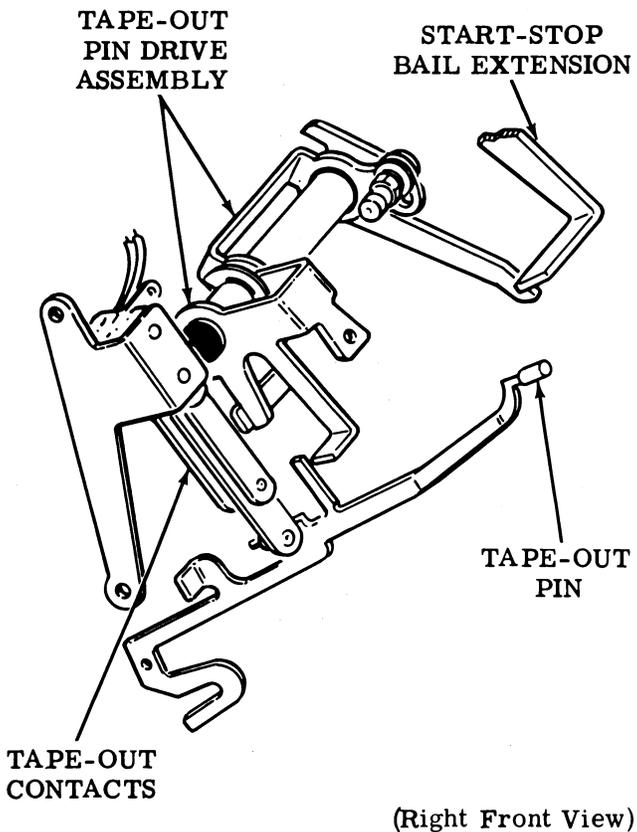


Figure 18 - Tape-Out Pin and Contacts

10.02 Positioning the start-stop lever in the FREE position causes the sensing clutch trip magnet circuit to open (as in 10.01) and also, by moving the tape feed pawl away from the feed wheel ratchet, permits the tape feed wheel to rotate freely (Figure 17).

11. TAPE CONDITIONS

TAPE-OUT

11.01 When the unit is loaded with tape, the pressure of the tape causes the tape-out pin (Figure 18) to hold the tape-out contacts closed. These contacts are in series with the sensing clutch trip magnet circuit. If a tape-out condition occurs, pressure on the pin is removed and, through the tape-out pin drive assembly, the contacts open the sensing clutch trip magnet circuit, stopping transmission.

TIGHT-TAPE

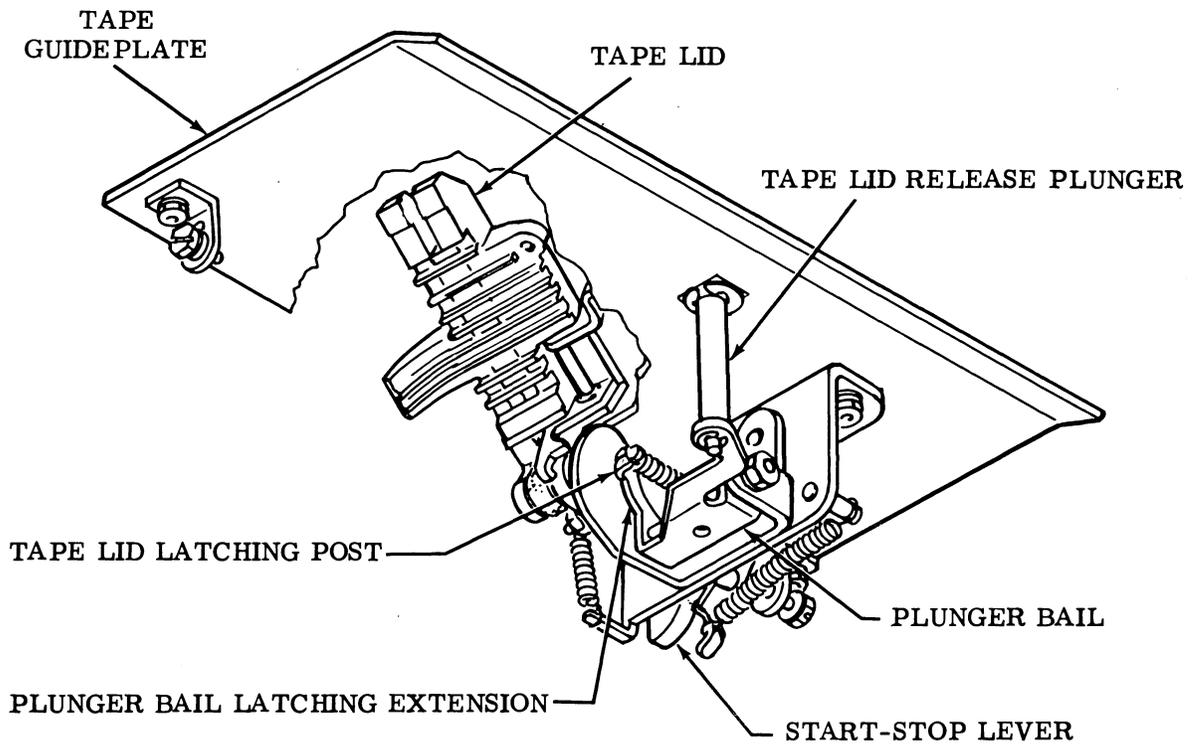
11.02 The start-stop and tight-tape switch is in series with the sensing clutch trip magnet circuit. The tight-tape bail (Figure 19) through the front slidearm, actuates the start-stop and tight-tape switch (Figure 12) opening the sensing clutch trip magnet circuit and stopping transmission, if the tape in the unit becomes tight.

## 12. TAPE LID OPERATION

12.01 When the tape lid release button (Figures 19 and 20) is pressed, the plunger portion of the button presses against the tape lid plunger bail extension causing the bail to pivot. The bail, in pivoting, moves its latching extension from under the tape lid latching post to swing downward under action of its spring. Since the latching post is mounted on the tape lid behind the pivot point and below

the tape guideplate it causes the main part of the tape lid to swing upward (open) when the post swings downward (Figure 20).

12.02 The tape lid is closed manually by pressing it downward against the tape guideplate. As the tape lid is closed, the latching post swings up and cams the latching extension out of its way until it passes the end of the extension which then is pulled under the post, by spring action, latching the post and tape lid.



(Bottom View)

Figure 20 - Tape Lid Mechanism