

HIGH SPEED TAPE READERS (DX TYPE)

PDI AND PTI INTERFACE

ADJUSTMENTS AND TEST PROCEDURES

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| Power supply chassis | 4 | 1. GENERAL | |
| Operating Requirements | | 1.01 This section provides adjustments for the high speed tape readers (see figure) with PDI (Parallel Device Interface), and PTI (Parallel Terminal Interface) signaling. The adjust- ments are arranged in a sequence that would be followed if a complete readjustment were under- taken. If an adjustment is changed for any reason, related adjustments should be checked. | |
| Stepper mechanism | 19 | 1.02 Parts or assemblies that are removed to facilitate adjustments should not be replaced until all adjustments are completed. | |
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Before proceeding with any adjustment, read the applicable portion of the adjusting text carefully. After the adjustment is complete, be sure to tighten any screws or nuts which may have been loosened.

1.03 Spring tension values indicated in this section are scale readings which should be obtained when the proper scales are used. Springs that do not meet requirements specified, and for which no adjusting procedure is given, should be replaced with new springs.

1.04 Check all moving parts to make sure they are free from binds before operating the reader under power. Reference to left, right, up, down, front and rear refer to the reader in its normal operating position, as viewed by the operator in front of the reader.

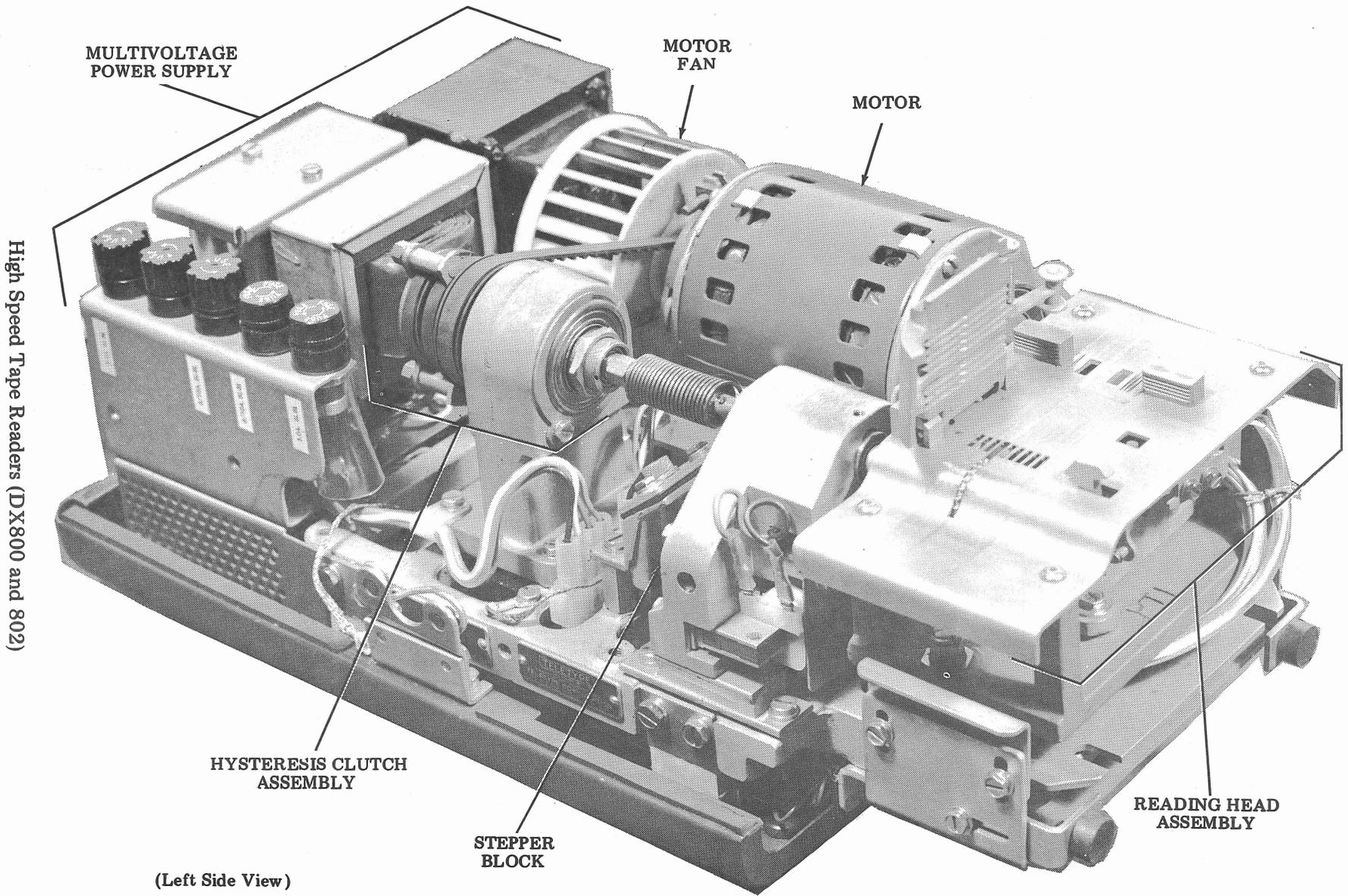
1.05 When a procedure specifies using pry points or slots to make an adjustment, place a screwdriver blade between the pry points or in the slot and pry in the proper direction. Check all moving parts to make sure they are free from binds before operating equipment under power.

CAUTION: IMPROPERLY ADJUSTED EQUIPMENT MAY BE DAMAGED IN A MATTER OF SECONDS IF OPERATED UNDER POWER.

1.06 See appropriate parts section for ordering information. Tool information can be found in Section 570-005-800.

1.07 Special tools and test equipment required to perform the adjustments are as follows:

| | |
|--------------|--|
| TP95960 | Tape gauge |
| TP317212 | Tape splicer |
| TP317325 | Tape splice — 5-level (blue) |
| TP317326 | Tape splice — 6-level (red) |
| TP317327 | Tape splice — 7-level (lavender) |
| TP317328 | Tape splice — 8-level (green) |
| TP318603 | Magnet assembly adjusting tool |
| TP318652 | Shim (0.002 inch) |
| TP318653 | Shim (0.016 inch) |
| TP318874 | Contact and feed wheel height gauge (GO-NO GO) |
| TP318875 | Contact alignment gauge |
| TP325991 | Tool holder |
| TP325992 | Removal bit (male) |
| TP325993 | Removal bit (female) |
| TP325994 | Insertion bit |
| Oscilloscope | |
| Ohmmeter | |



High Speed Tape Readers (DX800 and 802)

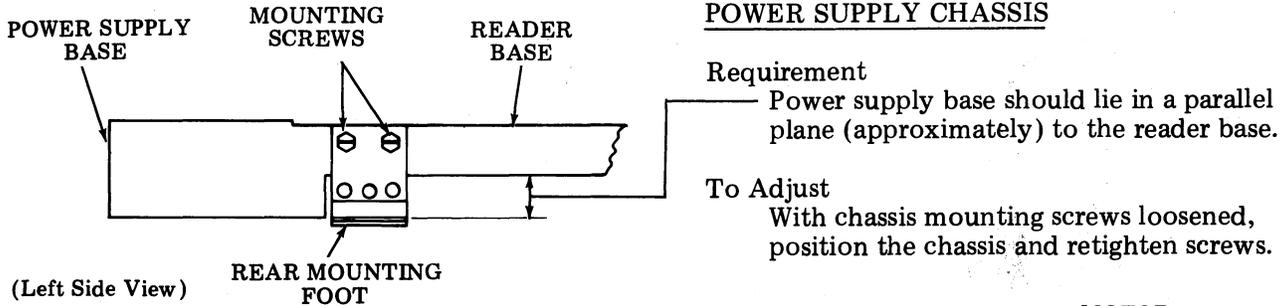
(Left Side View)

ISS 1, SECTION 592-804-710

2. BASIC UNITS

2.01 Multivoltage Power Supply

CAUTION: DISCONNECT ELECTRIC POWER FROM READER BEFORE MAKING ADJUSTMENTS

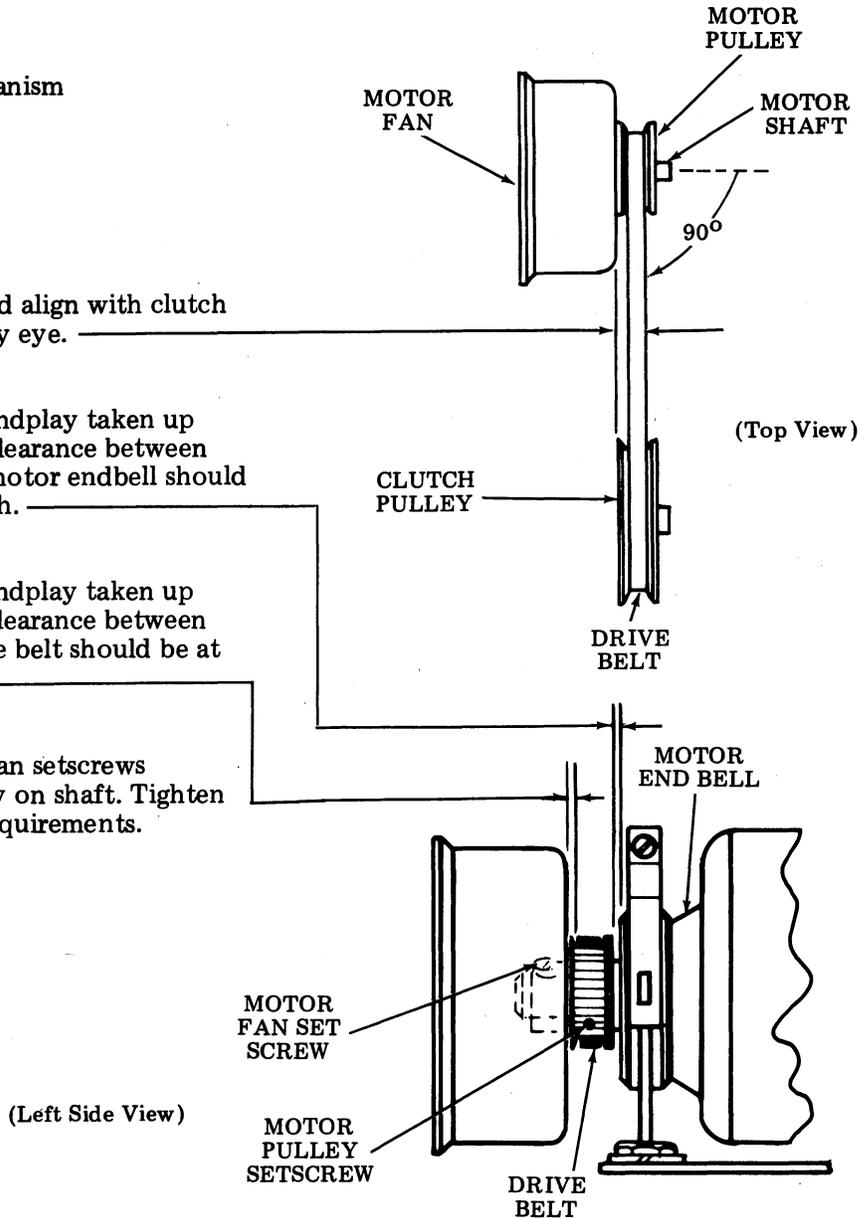


2.02 Clutch Drive Mechanism

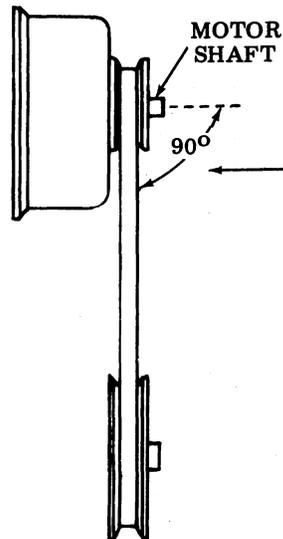
MOTOR PULLEY

- (1) Requirement
Motor pulley should align with clutch pulley, as gauged by eye.
- (2) Requirement
With motor shaft endplay taken up toward the front, clearance between motor pulley and motor endbell should be at least 1/64 inch.
- (3) Requirement
With motor shaft endplay taken up toward the front, clearance between motor fan and drive belt should be at least 1/64 inch.

To Adjust
With motor pulley and fan setscrews loosened, position pulley on shaft. Tighten setscrews and recheck requirements.



2.03 Clutch Drive Mechanism (continued)

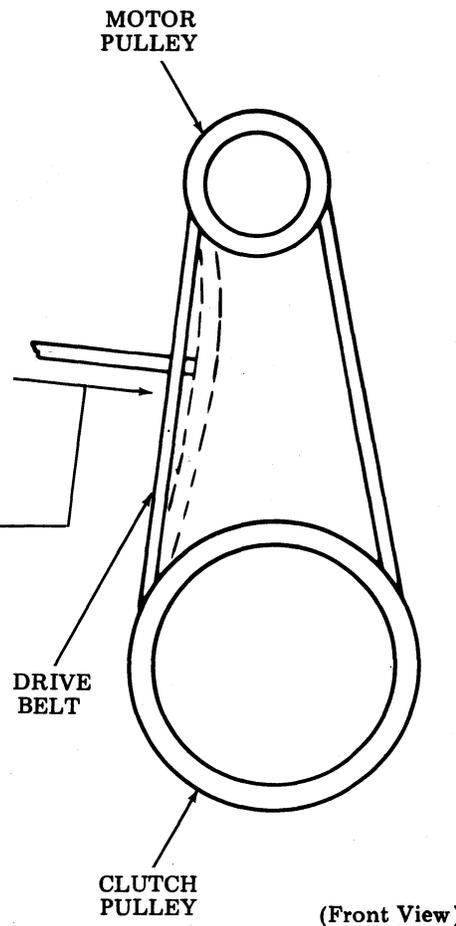


DRIVE BELT TENSION

- (1) Requirement
Motor shaft should be at right angles (approximately) to drive belt.

- (2) Requirement
With an 8 oz pressure applied to drive belt (midway between clutch and motor pulleys), deflection should be
Min 3/16 inch --- Max 1/4 inch

To Adjust
With its mounting screws friction tight, position motor bracket. Tighten screws, recheck requirements, and related adjustment MOTOR PULLEY, requirement (3).



2.04 Hysteresis Clutch Assembly

MAGNET CLUTCH TORQUE

CAUTION: DO NOT ALLOW THE CLUTCH FOLLOWER TO COME IN CONTACT WITH EITHER PERMANENT MAGNET DRIVER; DETERIORATION OF THE CLUTCH MAGNETIC PROPERTIES WILL RESULT.

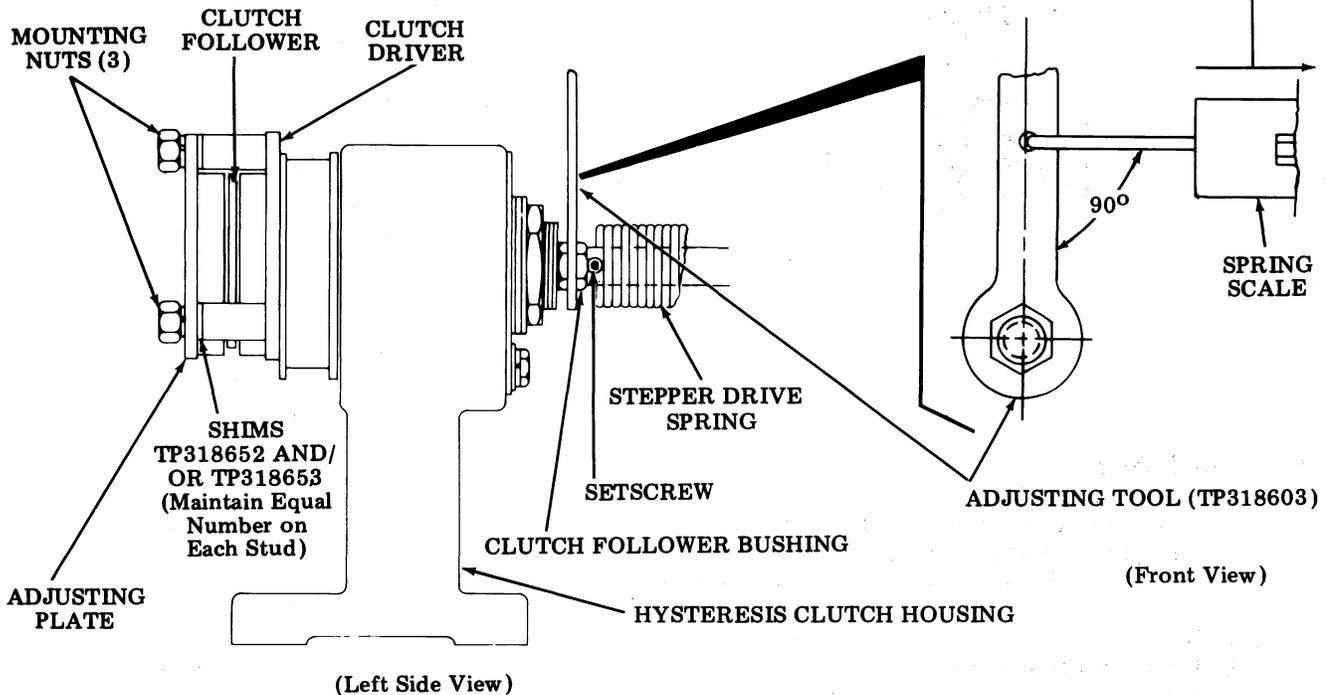
To Check

With stepper drive spring disconnected from clutch follower shaft, place a torquemeter (direct ounce inch reading) or the wrench end of adjusting tool (TP318603) over clutch follower bushing with wrench handle in vertical position (12 o'clock).

Requirement

With motor running and spring scale hooked in hole of adjusting tool, pull at right angles to axis of wrench. Torque should be

Min 6-1/2 ounces --- Max 7-1/4 ounces
 or torquemeter reading of
 Min 10-1/2 ounce inch --- Max 11-1/2 ounce inch



To Adjust (Observe Caution)

Remove nuts (3) that secure clutch adjusting plate and carefully slide plate off its studs (3). Avoid loss of shims or disturbing the equal count on each stud. Add or remove an equal number of shims on each stud (Note 1). Replace the plate and nuts and recheck torque requirement. Replace stepper drive spring and secure setscrews (Note 2).

Note 1: Use 0.002 inch shims (TP318652) or 0.016 inch shims (TP318653) to space the adjusting plate. One 0.002 inch shim added or removed from each post changes clutch torque by approximately 1/4 ounce inch. For convenience, one 0.016 inch shim may be used in place of eight 0.002 inch shims.

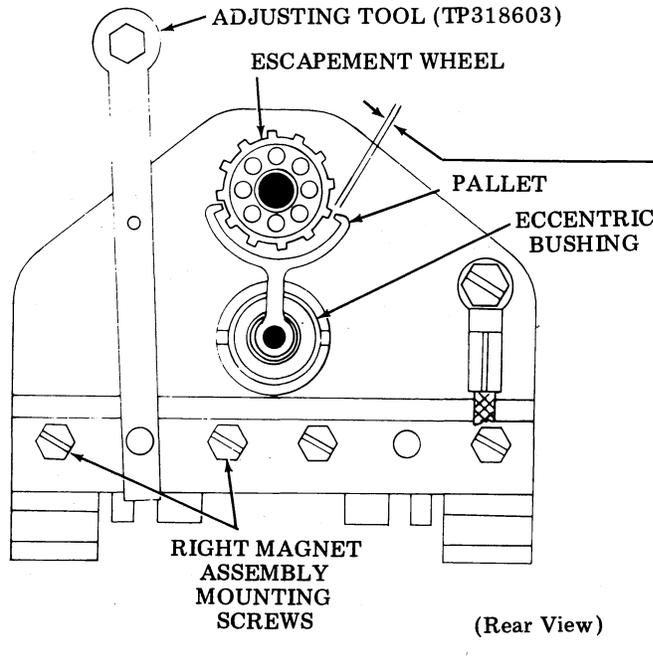
Note 2: Replace stepper drive spring and align it symmetrically to clutch and escapement shaft. Retighten setscrews.

2.05 Feed Wheel Stepper Mechanism

Note 1: Flush against core face is defined to be no more than 0.002 inch gap between armature and magnet core face at either top or bottom of core face.

Note 2: When making the following adjustment for the first time, loosen the front bearing retainer clamp screw and the pallet eccentric bushing setscrew. Position bushing with high of eccentric to extreme right, tighten setscrew.

Note 3: The following adjustment may be made with the oil reservoir and stepper block lint cover removed to facilitate using the TP318603 adjusting tool, or the magnet coils may be positioned by hand.



ESCAPEMENT WHEEL AND PALLET ALIGNMENT

To Check

With armature held against its right or left core face (attached position), align an escapement wheel tooth opposite pallet on other side. Check requirement and repeat procedure with armature against other core face.

(1) Requirement

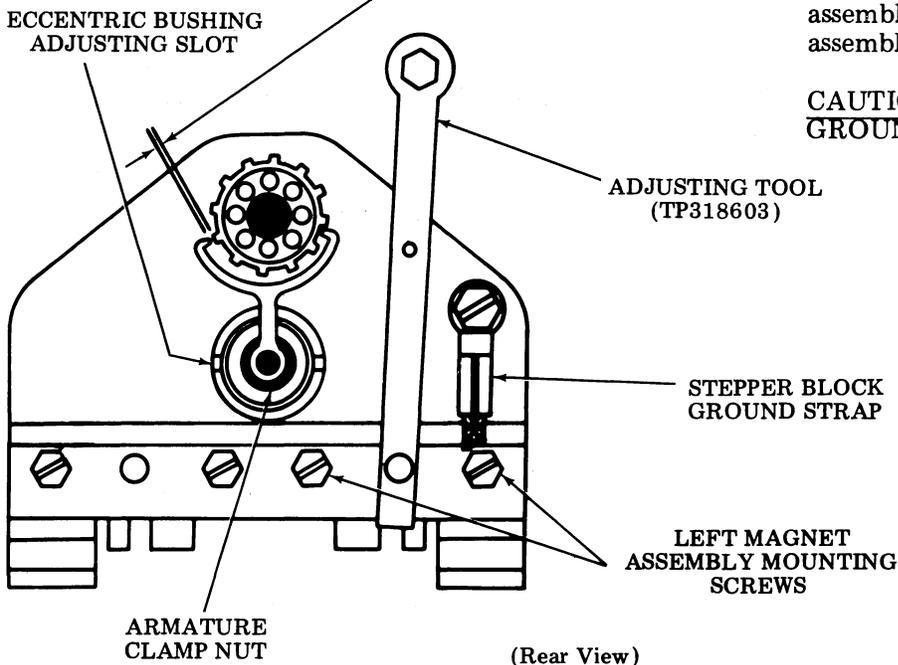
Clearance between top of selected tooth on escapement wheel and projection on end of pallet (left and right) should be

Min 0.008 inch --- Max 0.012 inch

To Adjust (Note 2)

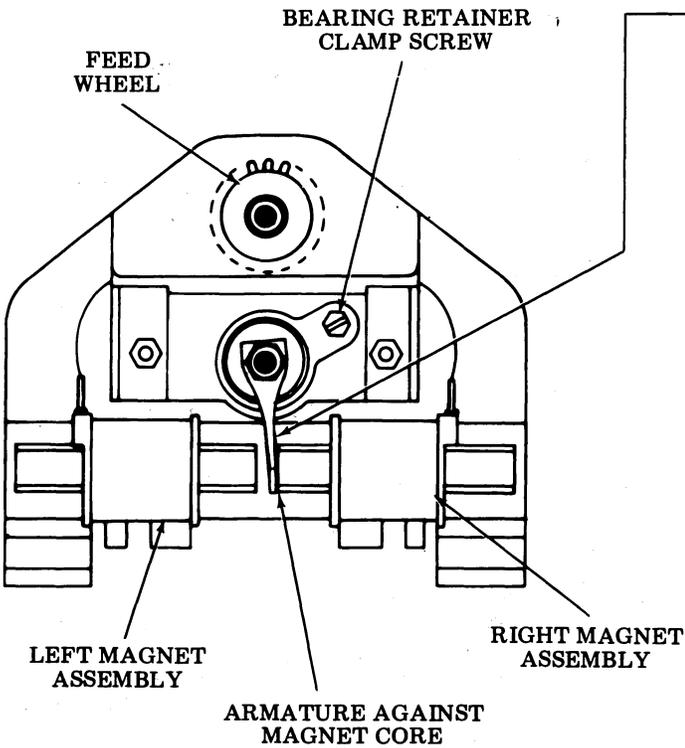
With armature retaining nut loosened, right coil assembly mounting screws loosened, and armature held against right magnet core, position right core assembly (Note 3). Tighten coil assembly mounting screws.

CAUTION: AVOID DAMAGE TO GROUND STRAP.



2.06 Feed Wheel Stepper Mechanism (continued)

**ESCAPEMENT WHEEL AND PALLET
ALIGNMENT (Continued)**



(Front View)

(2) Requirement

In its attracted position, armature should be flush (Note 1) with its respective core face.

To Adjust

Hold armature against right core, loosen left coil assembly mounting screws, position core face firmly against armature and tighten left coil assembly mounting screws. Now place a 0.015 inch feeler gauge between left pallet extension and tip of tooth. Tighten armature retaining nut, remove gauge and check 0.008 to 0.012 inch clearance (Note 1).

To Adjust

With the left core assembly mounting screws friction tight and armature held against left core face, position left core assembly (Note 3, 2.05) to obtain clearance of right pallet. Tighten left coil assembly mounting screws and recheck requirements (1) and (2). Refine adjustments if necessary, and replace oil reservoir.

Note: Feeler gauge (0.015 inch) provides the margin needed for yield in bearing mounting as armature clamp screw is tightened.

2.07 Feed Wheel Stepper Mechanism (continued)

FEED WHEEL TRAVEL (STEP-TO-STEP)

To Check

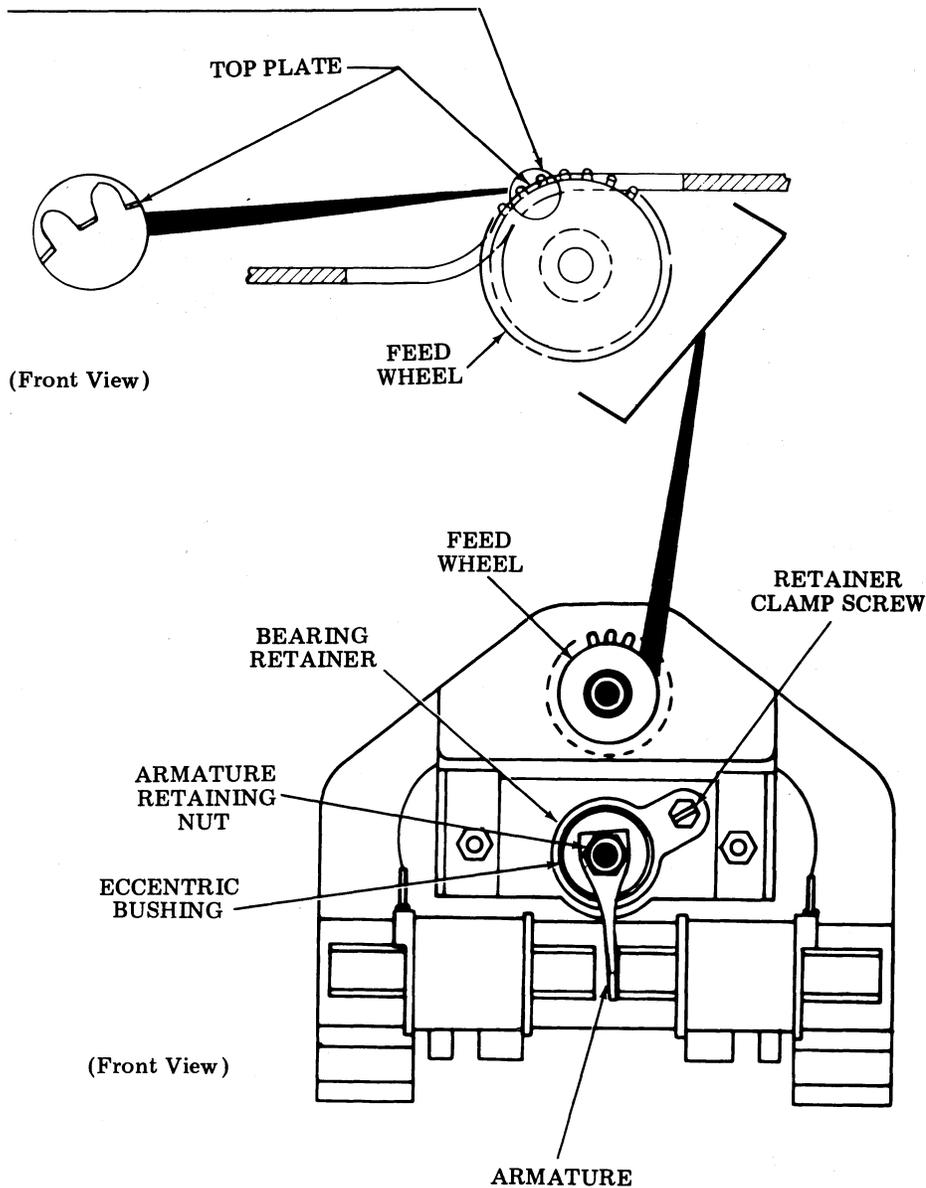
With reader stepping at 2 to 20 OPS (operations per second) observe stop position of feed wheel pins (fully extending above lid) as they come to rest. Check pin excursion of successive steps to assure equal increments of feed wheel travel. If power or slow step rate is not available, operate pallet and rotate motor by hand.

To Adjust

Loosen front bearing retainer clamp screws and setscrew that secures pallet eccentric bushing. Rotate bushing with blade of screwdriver in its rear slots until there is no perceptible variation in the feed wheel. Keep high of eccentric to the right to equalize each stop position (Note 1, 2.05). Tighten all screws. Recheck 2.05 and 2.06 ESCAPEMENT WHEEL AND PALLET ALIGNMENT, refine if necessary.

Requirement

No perceptible variation in the position of feed wheel teeth when the wheel is in stopped position.



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2.08 Feed Wheel Stepper Mechanism (continued)

STEPPER DRIVE SPRING

To Check

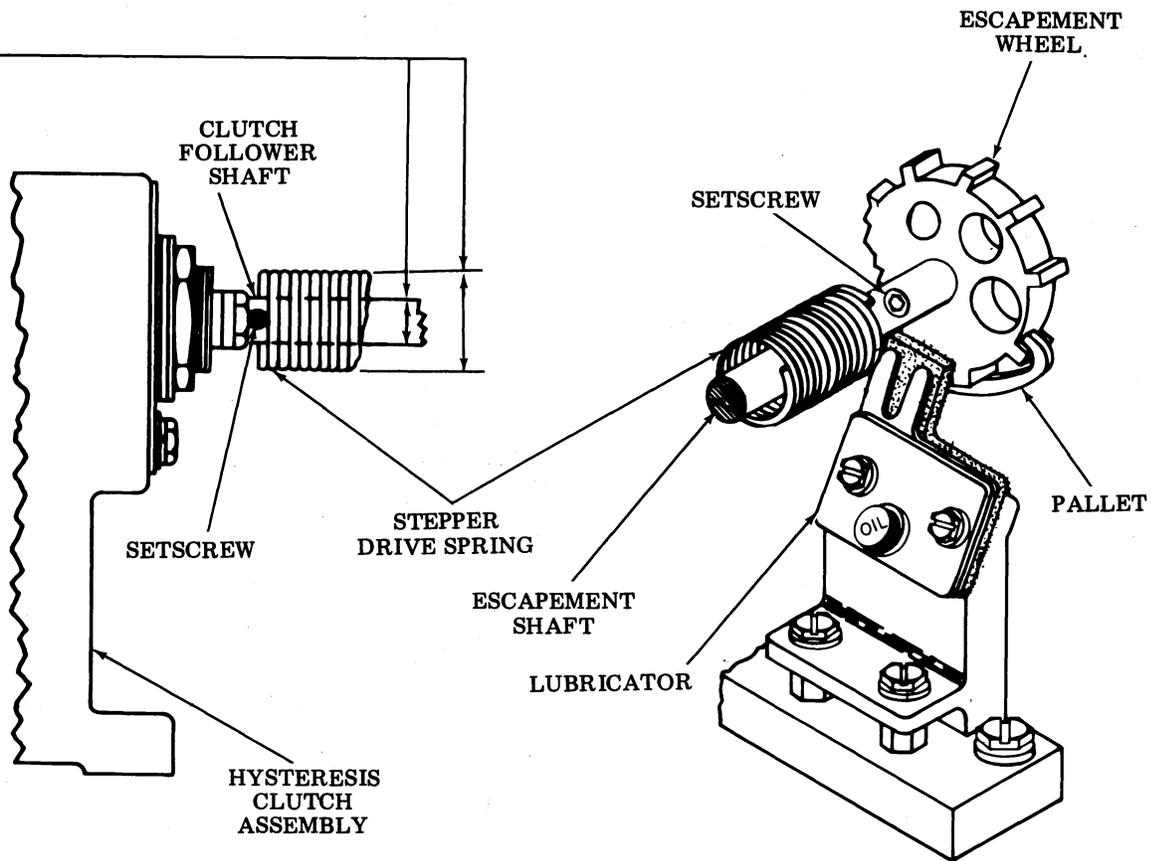
Drive spring should align with clutch and escapement shafts.

Requirement

Avoid any interference of drive spring with adjacent parts over full rotation of drive member.

To Adjust

Position spring at each end with its setscrews loosened. Tighten screws and recheck.



(Left Side View)

(Left Rear View)

2.09 Tape Sensing Mechanism

Note: Remove top plate assembly before making the following adjustments. Avoid handling tape sensing wires, they may become maladjusted or disengaged from their dampers.

TAPE LID TO TOP PLATE

To Check

Close tape lid, measure gap between curved portion of lid and top plate around area of feed wheel slot in top plate.

(1) Requirement

With tape lid closed and with all play in the tape lid taken up to the right, there should be a minimum of 0.008 inch at any point between the tape lid and top plate.

(2) Requirement

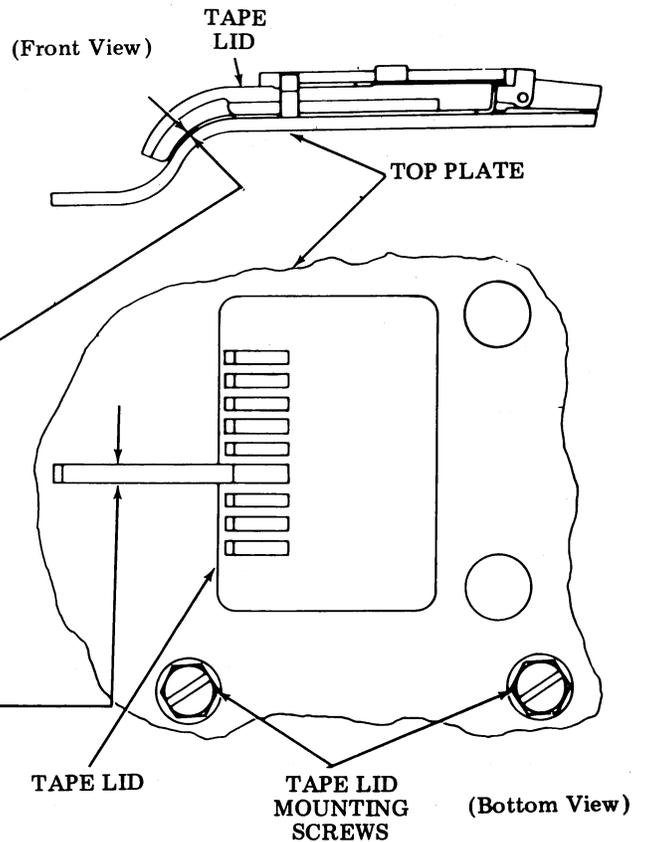
With play in the tape lid taken up to the left, clearance should be a maximum of 0.013 inch between the tape lid and top plate.

(3) Requirement

Feed wheel slot (tape lid) should be centrally located with slot in top plate, gauge by eye.

To Adjust

With tape lid mounting screws (2) friction tight, position lid. Tighten mounting screws and recheck clearance.



TAPE LID LATCH

(1) Requirement

Tape lid latch should move freely in top plate slot.

To Adjust

Position latch bracket with its mounting nuts loosened. Tighten nuts and recheck requirement.

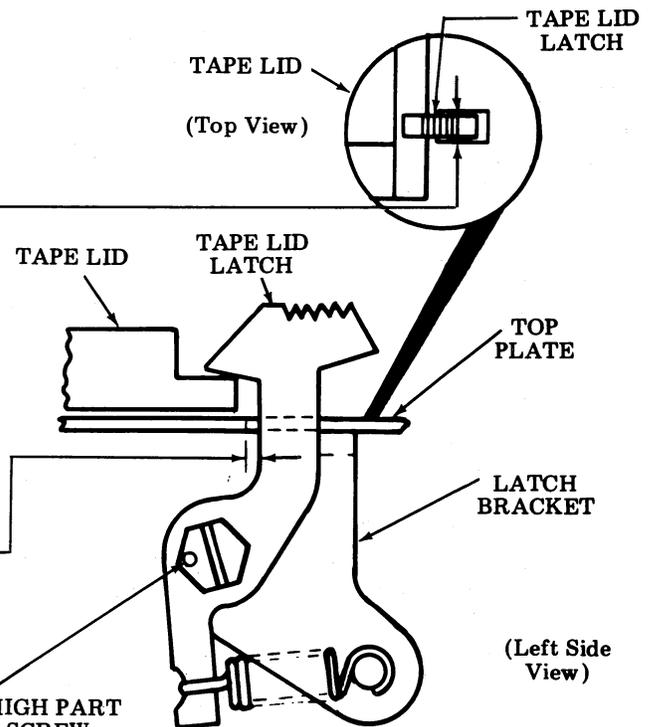
(2) Requirement

With tape lid latched and high part of eccentric toward rear, clearance between edge of latch and edge of slot in top plate should be
Min 0.010 inch --- Max 0.035 inch

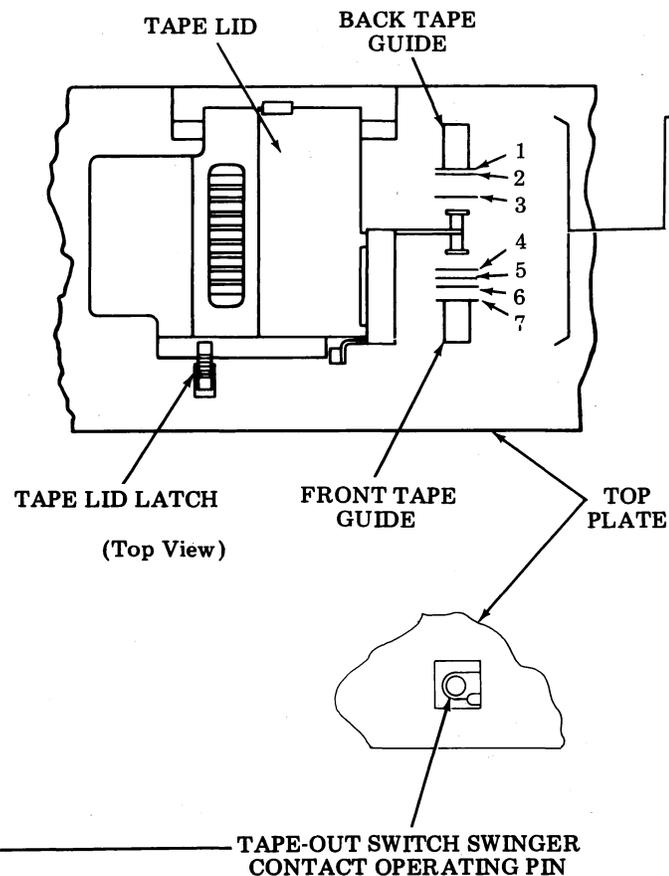
To Adjust

With eccentric screw locknut friction tight, position screw and tighten locknut.

DOT INDICATES HIGH PART OF ECCENTRIC SCREW



2.10 Tape Sensing Mechanism (continued)



TAPE GUIDES

Requirement

Front and rear tape guide should be located in slot designated by chart for the particular tape to be sensed.

To Adjust

Lift respective guide upward to disengage its latch, then slide guide to scribe line on top plate corresponding to tape in use.

| Tape | Position of Tape Guides |
|---|-------------------------|
| 8-Level — 1 inch | 2 — 7 |
| 7-Level — 1 inch | 2 — 7 |
| 6-Level — 7/8 inch | 2 — 6 |
| 6-Level — 7/8 inch Adv. feed hole | 1 — 5 |
| 5-Level — 11/16 inch | 3 — 4 |

TANGLED-TAPE AND TAPE-OUT CONTACT ASSEMBLY

(1) **Requirement**

Operating button linking tape bail with swinger of tape-out (upper) switch should be centrally located in clearance hole of top plate. Gauge by eye.

To Adjust

With nuts that secure contact assembly bracket to top plate loosened, position the bracket. Tighten the nuts and recheck requirement.

(2) **Requirement**

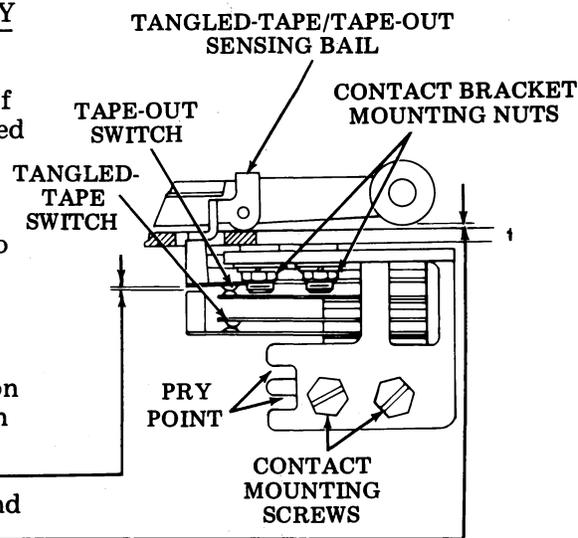
Clearance between top surface of operating button of lower swinger (tangled-tape switch) and button of upper swinger should be

Min 0.010 inch --- Max 0.020 inch

Insert 0.004 inch flat wire gauge between right end of tape bail and top plate (typical tape height).

To Adjust

With contact mounting screws friction tight, position bracket by means of its pry point. Tighten screws and recheck clearance.



(Front View)

2.11 Contact Mechanism

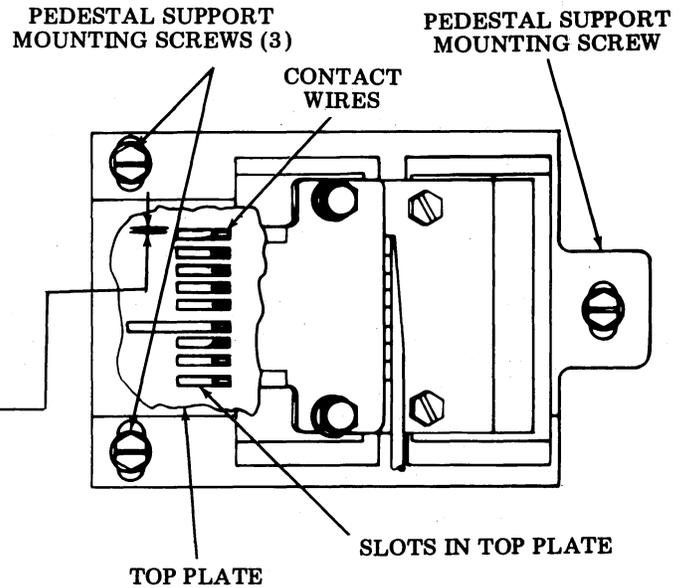
Note: The following adjustments should be made with top plate assembled to reading head.

CODE SENSING WIRES TO TOP PLATE AND TAPE LID

(1) Requirement

To keep the sensing wires from electrically shorting out, center sensing wires in the top plate and tape lid slot. Clearance between top plate slot and sensing wires should be at least 0.010 inch.

(Bottom View)



(2) Requirement

Clearance between tape lid slots and sensing wires should be at least 0.020 inch.

To Adjust

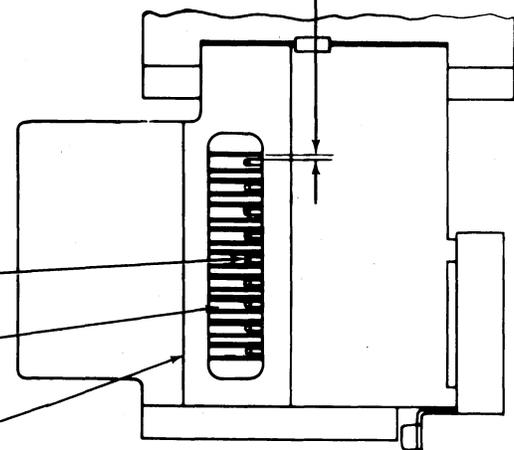
With pedestal support mounting screws loosened, position contact sensing wire assemblies to meet above requirements. Tighten screws.

TAPE SENSING WIRES

TAPE LID SLOTS

TAPE LID

(Top View)



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2.12 Contact Mechanism (continued)

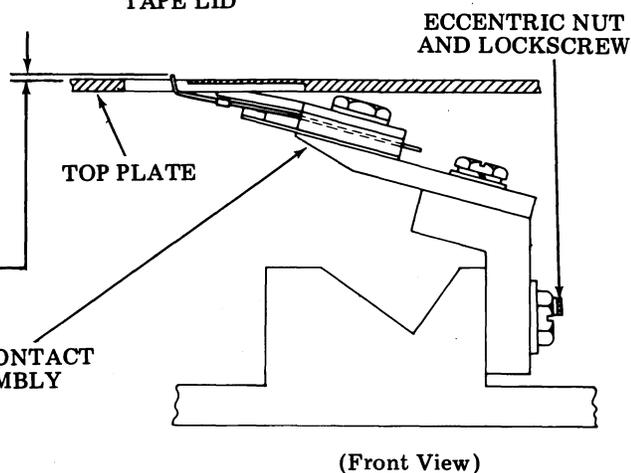
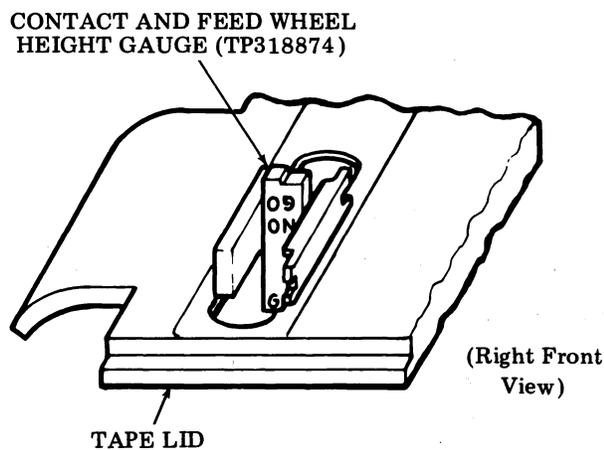
SENSING WIRE TIP HEIGHT

Note: Use of the height gauge (TP318874) in the following adjustment procedure depends on frame ground being separated from the contacts. Make sure the two potentials are not connected through external wiring.

To Check

With tape lid closed, insert GO side of sensing wire height gauge (TP318874) over opening of tape lid. The side of the gauge marked CODE should be to the right of the unit (in both GO and NO GO positions). Connect an ohmmeter between the reader frame and one of the connector pins listed in the chart. With the gauge held firmly in place against the tape lid, the ohmmeter should indicate an open circuit (infinite resistance). Repeat test by moving gauge over each sensing wire position. With the NO GO side of the gauge and the ohmmeter similarly connected, test each sensing wire in the same manner. A Closed circuit (zero resistance) condition should be indicated on the ohmmeter for each sensing wire position.

| SENSING WIRE CONTACT LEVEL | CONNECTOR P5 CHECK POINTS |
|----------------------------|---------------------------|
| 1 | 1 |
| 2 | 2 |
| 3 | 3 |
| 4 | 4 |
| 5 | 5 |
| 6 | 6 |
| 7 | 7 |
| 8 | 8 |
| F | 9 |



Requirement

Tip of each code contact sensing wire should protrude above top plate by approximately 0.028 inch.

To Adjust

With eccentric nut and lock screw loosened, position code contact assembly with eccentric nut and tighten lock screw.

Note: Turn eccentric by small and equal increments to raise or lower contacts uniformly.

CAUTION: EXERCISE CARE IN ADJUSTING HEIGHT TO AVOID SENSING WIRE TIP COMING IN CONTACT WITH TOP PLATE AND GIVING AN ERRONEOUS SIGNAL. TIGHTEN SCREWS AND RECHECK REQUIREMENTS ABOVE; ALSO, THE PREVIOUS REQUIREMENT CODE SENSING WIRES TO TOP PLATE AND TAPE LID ADJUSTMENT, 2.11.

2.13 Tape Transport to Reading Head

Note: Make the following adjustments with the reading head mounted to the reader base.

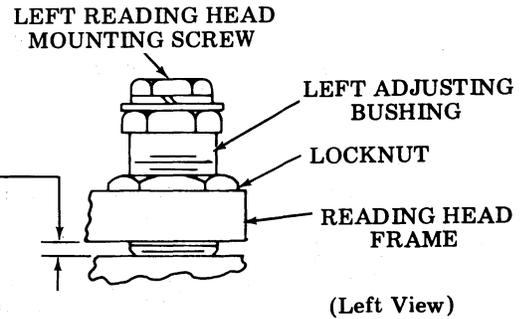
FEED WHEEL TO READING HEAD ASSEMBLY

(1) Requirement

Bottom surface of (reader frame) adjusting bushing should extend below frame by approximately 0.060 inch.

To Adjust

Loosen mounting screw locknut, position bushing to meet requirement. Tighten locknut.

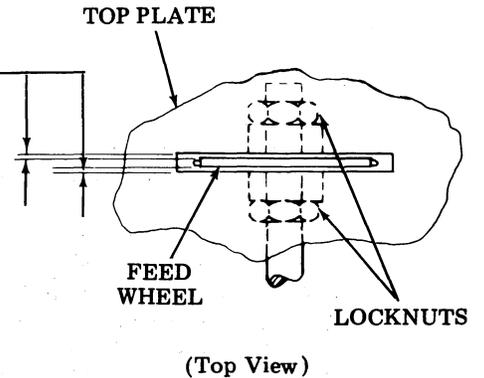


(2) Requirement

Feed wheel should be centrally located in slot of top plate (front to rear). Check through 360° rotation of feed wheel.

To Adjust

With feed wheel locknuts loosened (note left-hand thread), position sensing mechanism on its base. Locate mounting screws midway in their adjusting range. Then, position feed wheel midway (front to back) in slot of top plate. Tighten locknut (see caution note) and recheck clearance.



To Check

Place GO then NO GO slot of feed wheel height gauge (TP318874) firmly over feed wheel slot in top plate. Move gauge at right angles to plate following contour of area around feed wheel. Measurement to be made with feed wheel in its lowest position with respect to top plate and with escapement wheel against pallet.

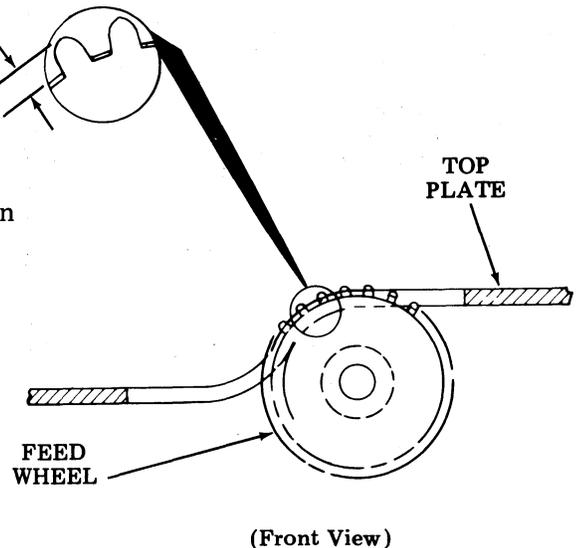
CAUTION: AVOID JAMMING ESCAPEMENT WHEEL AGAINST PALLET WHEN LOCKNUTS ARE LOOSENED OR TIGHTENED.

(3) Requirement

Tips of four feed wheel pins (top center and three at left) should extend above top plate
Min 0.040 inch --- Max 0.046 inch

To Adjust

Loosen screws (two at right; one bushing clamp screw at left) that secure tape sensing mechanism to base of unit and, with frame adjusting bushing locknut loosened, slowly turn adjusting bushing upward or downward to obtain pin height. Tighten screws and locknut and recheck requirements.

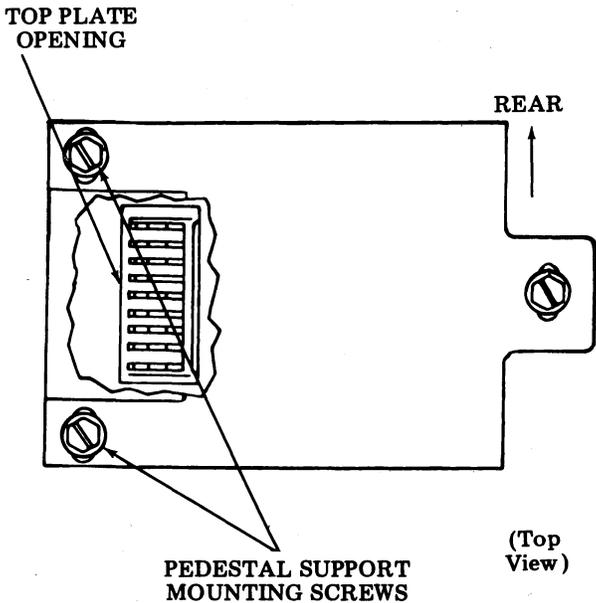
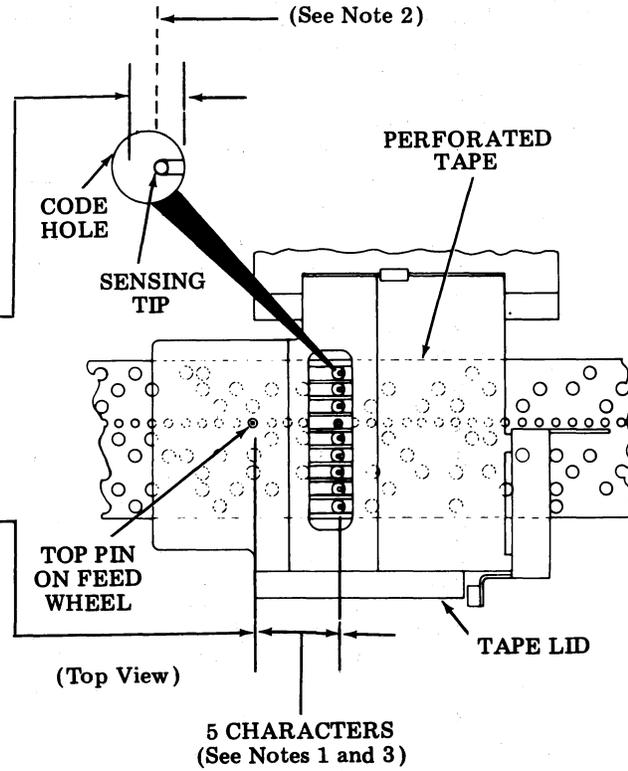


2.14 Tape Transport to Reading Head (continued)

TAPE SENSING WIRES AND FEED WHEEL ALIGNMENT

- (1) Requirement
With the escapement wheel against the pallet in forward direction, code contact sensing wire tips should be centered in the right two-thirds of the holes in TP318875 contact alignment gauge or holes of fully perforated tape.
- (2) Requirement
With the escapement wheel against the pallet in forward direction, code contact sensing wire tips should be five characters from the top pin on feed wheel.

To Adjust
Loosen pedestal support mounting screws (3) and set up adjustment as in requirement (2), position pedestal to adjust sensing wire tips. Recheck previous front-to-rear adjustment in CODE SENSING WIRES TO TOP PLATE AND TAPE LID. Tighten mounting screws.



Note 1: Orient gauge with two small feed holes at left with inner hole over top feed pin (12 o'clock) and second hole over pin directly to left of top pin.

Note 2: Use short length of chadless tape with rub out function. Make sure tape meets standards of 10 holes to the inch with proper feed hole and/or code hole alignment.

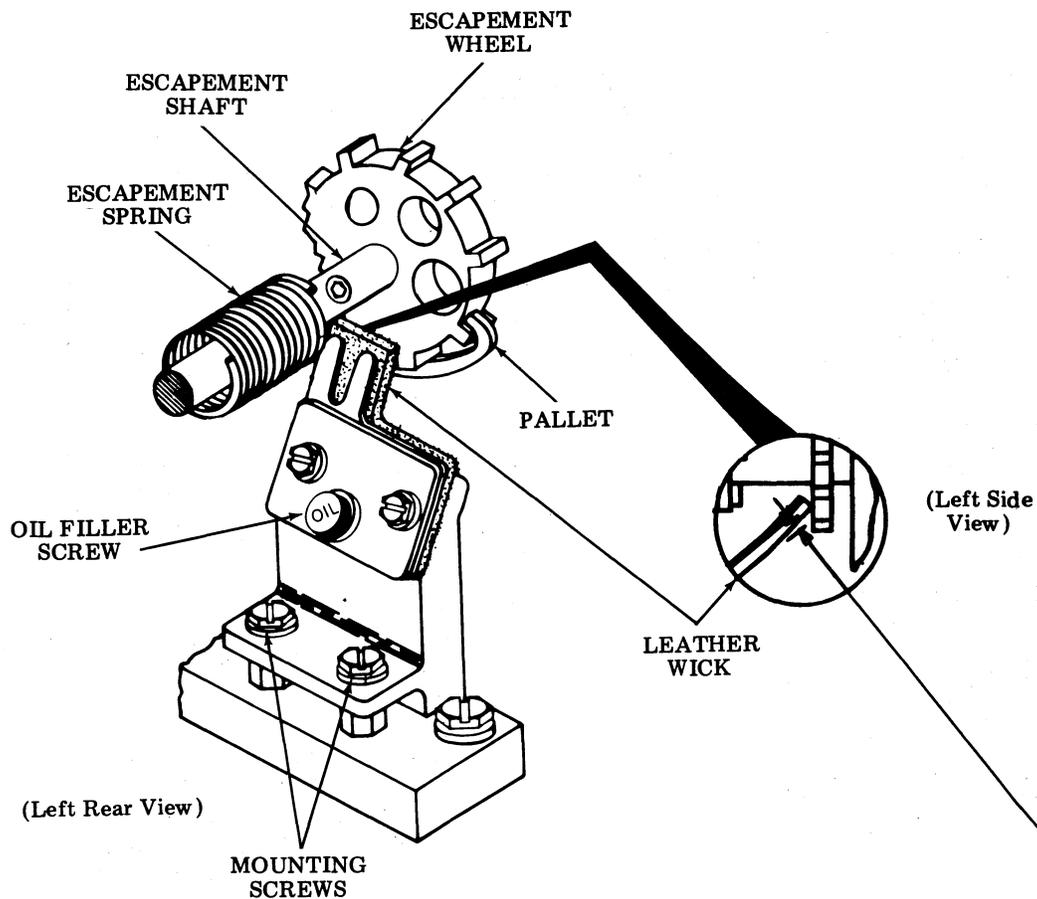
Note 3: Should 6-level tape with advance feed hole be used, disregard use of gauge (TP318875) substitute a 6-level tape having the required format.

2.15 Tape Transport to Reading Head (continued)

LUBRICATOR

To Check

The lubricator should be adjusted to dispense the correct amount of oil for the escapement mechanism and have clearance from adjacent components.



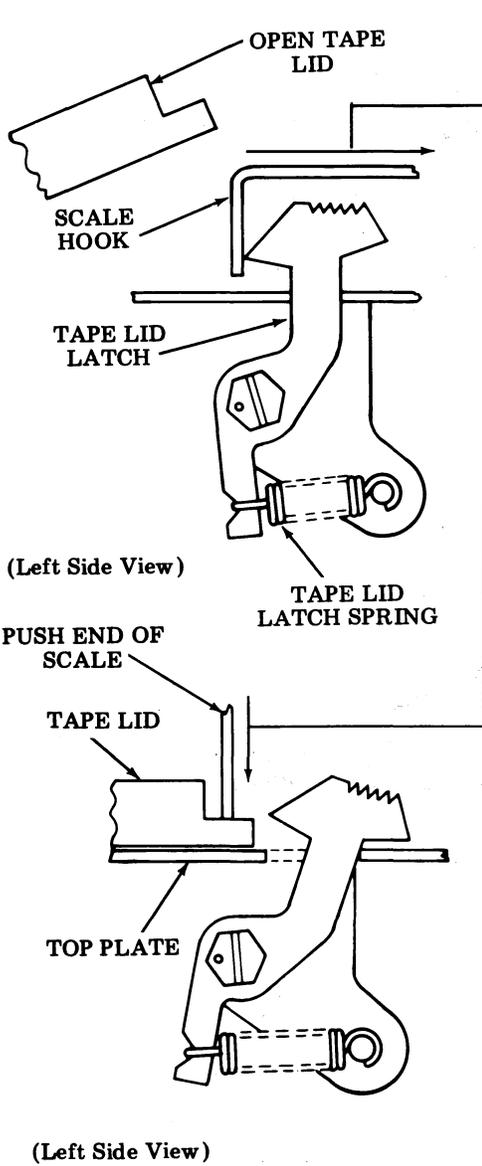
Requirement

The leather wick should be in full contact with the side of the escapement wheel, but should not be deflected more than $1/32$ of an inch as gauged by eye.

To Adjust

With the lubricator mounting screws finger tight, position lubricator to meet requirement. Tighten screws and recheck requirement.

2.16 Tape Sensing Spring Tensions



TAPE LID LATCH SPRING

Requirement
With tape lid open, it should require 5 to 7 ounces to start latch moving.

To Check
With the pull end of an 8 ounce scale over the latching corner, pull latch toward front of unit.

TAPE LID SPRING

Requirement
It should require 11 to 15 ounces of pressure to hold the tape lid down against top plate.

To Check
While holding tape lid latch clear of tape lid, use push end of a 32 ounce scale against tape lid latch slot and apply enough pressure to hold down the tape lid.

TANGLED-TAPE AND TAPE-OUT BAIL SPRING

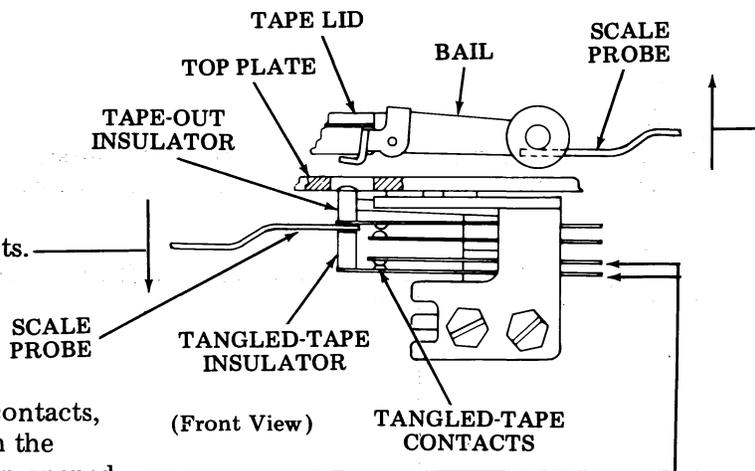
Requirement
A pull of 15 to 30 grams is required to start raising the bail.

To Check
Hold unlatched tape lid slightly off top plate so bail does not touch tape-out contact insulator. Insert gram scale under right side of bail and measure tension required to raise the bail.

TANGLED-TAPE CONTACT SPRING

Requirement
It should require 10 to 20 grams of downward pressure with gram scale inserted over insulator to open contacts.

To Check
With an ohmmeter connected across contacts, push the scale downward noting when the ohmmeter indicates contacts have been opened.



2.17 Tape Sensing Spring Tensions (continued)

CODE CONTACTS

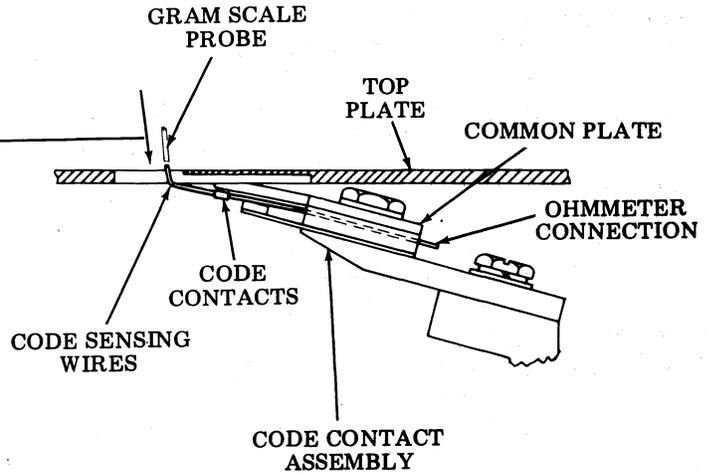
Requirement

With reading head assembled, code sensing wires require a downward pressure to open contacts

Min 15 grams --- Max 21 grams

To Check

Connect an ohmmeter across the individual contacts and the common plate of the associated contact assembly being checked. Push each sensing wire down vertically with probe end of gram scale until ohmmeter indicates contact is open.

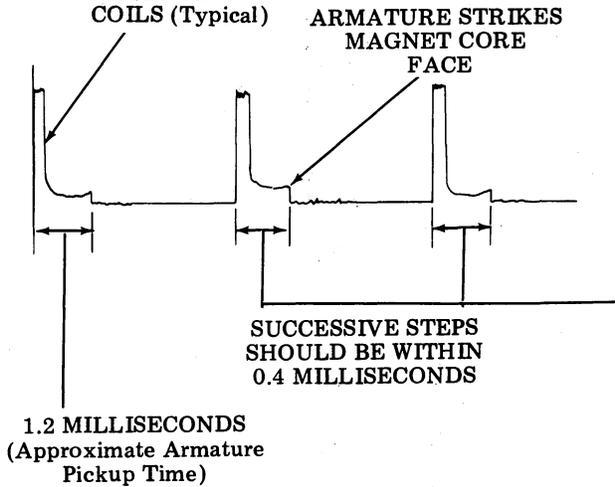


(Front View)

2.18 Operating Requirements

Note: Perform the following tests after assembly and complete adjustment of the reader.

VOLTAGE WAVEFORM TO STEPPER MAGNET COILS (Typical)



STEPPER MECHANISM

Requirement

View armature pickup time of the left and right magnets with an oscilloscope connected to terminal 6 on TB1 of the TP322447 electronic magnet driver or the rear terminal on the left magnet (terminal 2, black wire). The signal should be of equal duration within 0.4 milliseconds at any operating speed up to 360 operations per second.

To Adjust

If the requirement cannot be met, recheck escapement adjustment in 2.06 Feed Wheel Stepper Mechanism — ESCAPEMENT WHEEL AND PALLET ALIGNMENT, (2) Requirement. Refine if necessary.

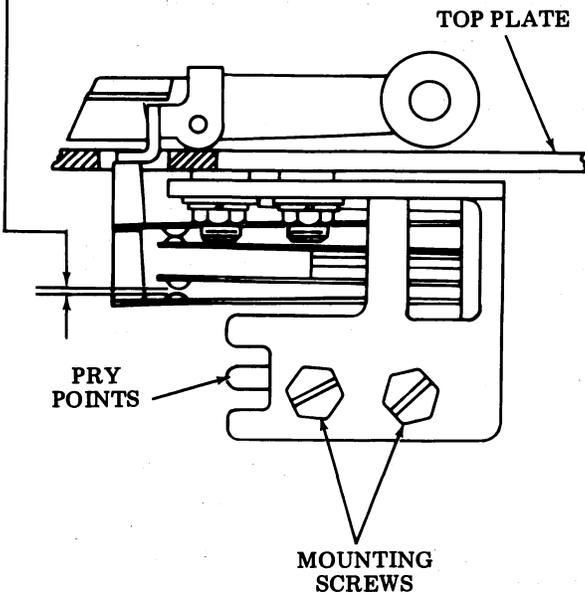
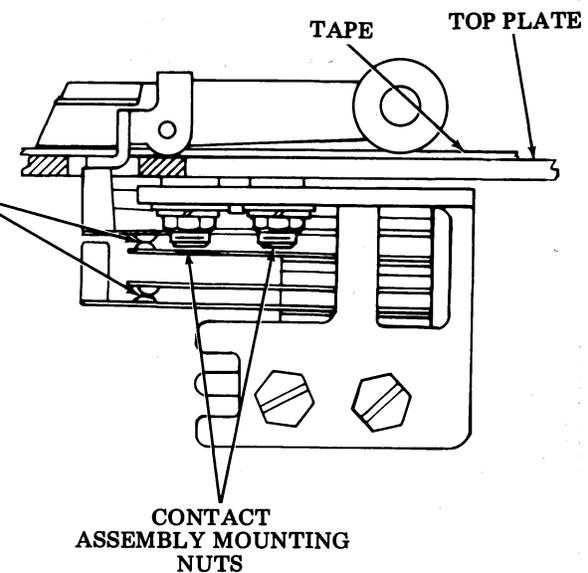
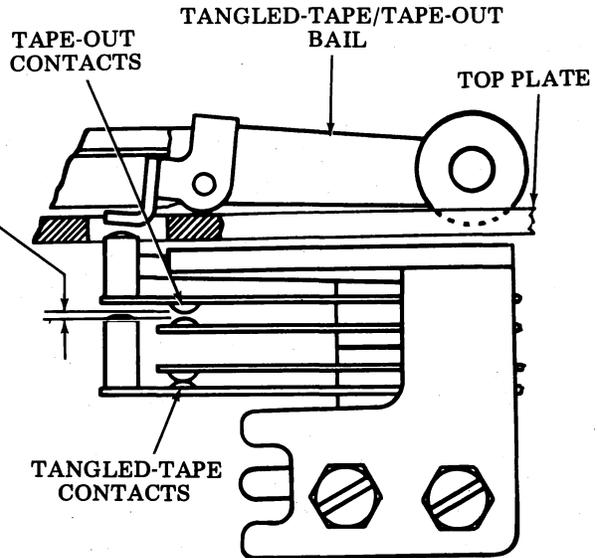
2.19 Operating Requirements (continued)

TANGLED-TAPE AND TAPE-OUT CONTACTS

- (1) Requirement
With no tape in reading head, the tangled-tape contact should be closed and tape-out contact should be open with a minimum gap of 0.003 inch.
- (2) Requirement
With tape in the reading head and tape lid closed, both contacts should be closed.
- (3) Requirement
With tape lid closed and the bail raised to its uppermost position, tangled-tape contacts should be open with minimum gap of 0.005 inch.

To Adjust

If requirements cannot be met, recheck 2.10 Tape Sensing Mechanism, TANGLED-TAPE AND TAPE-OUT CONTACT ASSEMBLY. Refine if necessary.



(Front Views)

3. TEST PROCEDURES

GENERAL

3.01 Test procedures should not be conducted until after complete assembly and adjustment of the reader is made.

3.02 Tests should be performed with the reader stepping at the desired operating speeds up to 360 OPS (Operations Per Second). Contact wave forms can be viewed on an oscilloscope while running a test tape having a repetitive marking and spacing output pattern for each level.

Note: All references to adjustments can be found in Section 592-804-710.

A. Code Contacts

3.03 Using test tape, run through test with oscilloscope attached to code contact terminals A1 through A9 of circuit cards TP322448 (PDI) or TP322449 (PTI). The contact should close sometime during the 1.1 millisecond sample pulse for a mark signal. The contact will always be open during this sample pulse for a space signal.

B. Stepper Mechanism

3.04 Left and right magnet armature pick-up time should be of equal duration within 0.4 milliseconds of each other. Terminal 1 of the TP322447 electronic magnet driver or the rear terminal of the left magnet (black wire), may be used to view the pick-up time at any operating speed up to 360 OPS.

3.05 If the previous time measurements cannot be met, check the following related adjustments; ESCAPEMENT WHEEL AND PALLET ALIGNMENT, and FEED WHEEL TRAVEL (STEP-TO-STEP). Readjust if necessary.

C. Tangled-Tape/Tape-Out Contacts

3.06 The tangled-tape contact should be closed and the tape-out contact should be open with a minimum gap of 0.003 inch when tape is not in the reading head.

3.07 With tape in the reading head and the tape lid closed, both contacts should be closed. With the bail raised to its uppermost position, the tangled-tape contact should be open with a minimum gap of 0.005 inch.

3.08 If the previous measurements cannot be met, check the following related adjustment; TANGLED-TAPE AND TAPE-OUT CONTACT ASSEMBLY. Readjust if necessary.

