BULLETIN 254B

ADJUSTMENTS AND LUBRICATION

MODEL 28

TRANSMITTER DISTRIBUTOR
LCXD

TELETYPE®
CORPORATION
SUBSIDIARY OF *Western Electric Company* INC.
SKOKIE, ILLINOIS, U. S. A.

Printed in U.S.A

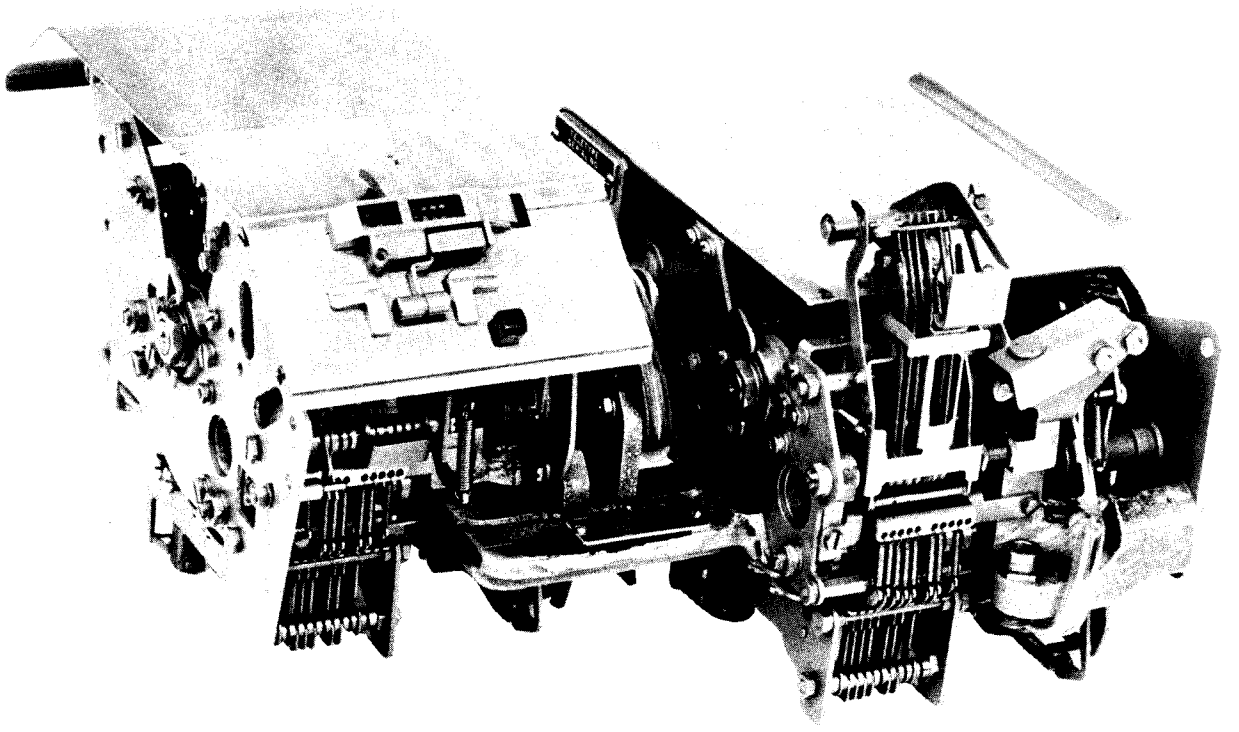
LIST OF EFFECTIVE PAGES

MAY, 1962

(Supersedes Issue of May, 1958)

PAGE NUMBER	CHANGE IN EFFECT
A to D	Change 1
1-1 to 1-40	Change 1
1-40a to 1-40b	Change 1
1-41 to 1-48	Change 1
2-1 to 2-2	Change 1
3-1 to 3-12	Change 1

The above list indicates the effective pages as of the date of issue. Upon receipt of change pages, insert them numerically and discard any superseded pages.



TRANSMITTER DISTRIBUTOR-LCXD
(PIVOTED AND FIXED HEAD, MULTI-CONTACT)

CONTENTS

CONTENTS (Cont'd.)

SECTION 1

ADJUSTMENTS

1. INTRODUCTION

a. This bulletin presents maintenance information for the Teletype Model 28 LCXD Transmitter Distributor. It is divided into three sections covering, respectively, adjustments, disassembly and reassembly, and lubrication.

b. It is assumed that the mechanisms illustrated in this bulletin are being viewed from a position in front of the equipment, unless the illustrations are specifically labeled otherwise. In the line drawings, fixed pivot points are shown by solid black circles and moveable points are shown by cross-hatched circles. References in the text to LEFT or RIGHT, UP or DOWN, FRONT or REAR apply to the unit in its normal operating position with the pivoted head to the viewer's right.

2. GENERAL

a. Section 1 contains adjustment information common to all LCXD Transmitter Distributor units. Also included in this section is the strobing procedure to be followed for proper timing of the transmitter and distributor contacts.

b. In the adjustments and spring tensions covered in this section, location of clearance, position of parts, and point and angle of scale applications are illustrated by drawings. A complete adjusting procedure should be read before making the adjustment or checking the spring tension. The adjustments are arranged in a sequence that should be followed if a complete readjustment of the unit were undertaken.

c. The spring tensions given in this bulletin are indicated values and should be checked with Teletype scales in the positions shown in the drawings. Springs which do not meet the requirements, and for which there are no adjusting procedures, should be discarded and replaced by new springs.

d. When rotating the drive shaft gear by hand, the rotation is counterclockwise as viewed from the exposed side of the drive shaft gear.

e. When the requirement calls for a clutch to be DISENGAGED, the clutch shoe lever must be fully latched between its trip lever and latch lever so that the clutch shoes release their tension on the clutch drum. When ENGAGED, the clutch shoe lever is unlatched and the clutch shoes are wedged firmly against the clutch drum.

NOTE

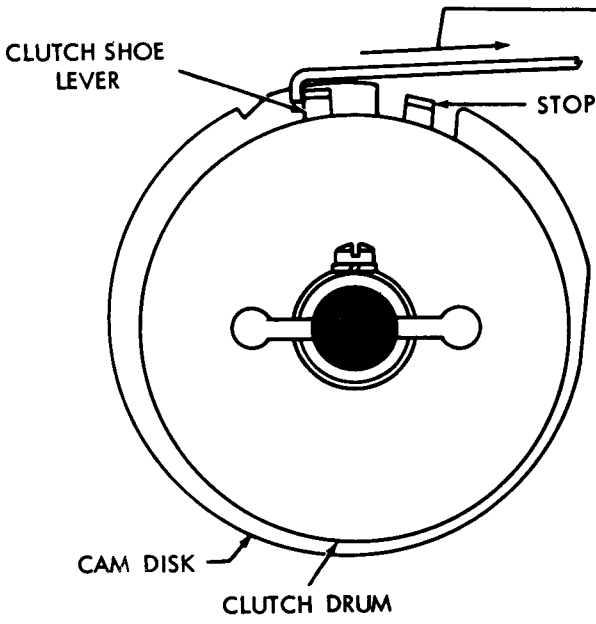
When rotating either the sensing or distributor shaft by hand, the respective clutch may not fully disengage upon reaching its stop position. To disengage the clutch, rotate the clutch to its stop position, apply a screwdriver to the cam disk stop lug, and move the disk in the normal direction of shaft rotation until the latch lever seats in its notch in the disk.

f. Tools required to make adjustments and check spring tensions are not supplied with the equipment, but are listed in Teletype Bulletin 1124B. If parts are removed, all adjustments which the removal of parts might facilitate should be made before the parts are replaced. When a part mounted on shims is removed, the number of shims at each mounting screw should be noted so that the identical shim pile-up can be made when the part is remounted. Unless stated otherwise, all nuts and screws that were loosened should be tightened after an adjustment has been made.

g. The covers may be removed for inspection and minor repair of the unit. However, when more extensive maintenance is to be undertaken, it is recommended that the unit be removed from its sub-base to disconnect the power and to permit the unit to be inverted.

3. ADJUSTMENTS AND SPRING TENSIONS

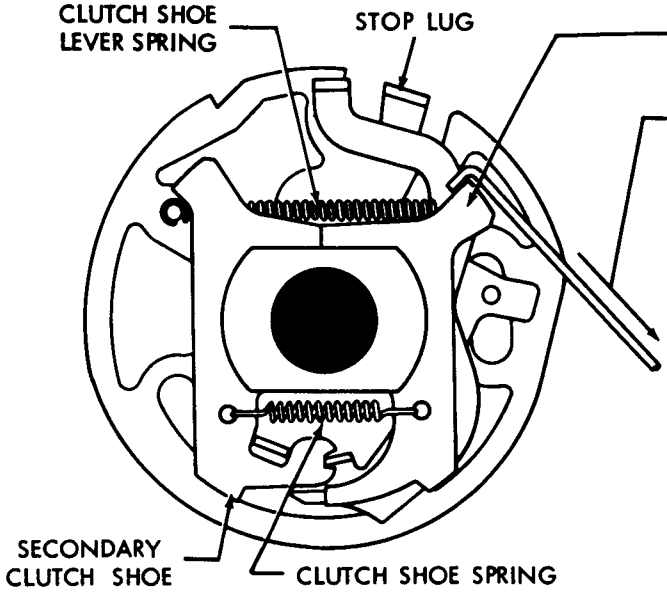
NOTE: REQUIREMENTS A AND B ARE ADJUSTED AT THE FACTORY AND SHOULD NOT BE DISTURBED UNLESS ASSOCIATED MECHANISMS HAVE BEEN REMOVED FOR SERVICING OR THERE IS REASON TO BELIEVE THAT THE REQUIREMENTS ARE NOT MET. THE FOLLOWING REQUIREMENTS APPLY TO BOTH THE SENSING CLUTCH AND DISTRIBUTOR CLUTCH.



(A) CLUTCH SHOE LEVER SPRING

REQUIREMENT

CLUTCH ENGAGED AND CAM DISK HELD TO PREVENT TURNING. SCALE PULLED AT TANGENT TO CLUTCH.
MIN. 15 OZS.
MAX. 20 OZS.
TO MOVE CLUTCH SHOE LEVER IN CONTACT WITH STOP LUG.



(B) CLUTCH SHOE SPRING

NOTE: IT IS NECESSARY TO REMOVE THE CLUTCH FROM THE MAIN SHAFT TO FACILITATE THIS CHECK.

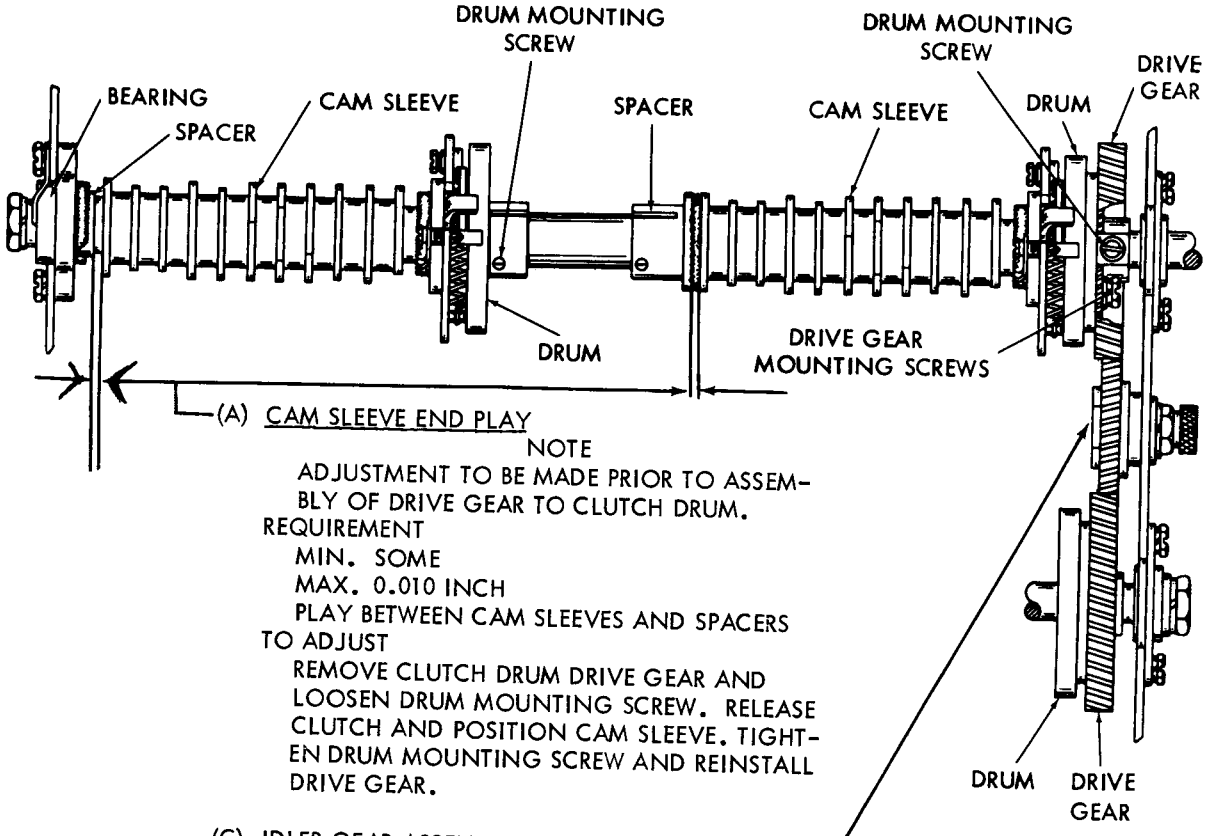
REQUIREMENT

CLUTCH DRUM REMOVED. SCALE APPLIED TO PRIMARY SHOE AT A TANGENT TO THE FRICTION SURFACE.
MIN. 3 OZS.
MAX. 5 OZS.
TO START PRIMARY SHOE MOVING AWAY FROM SECONDARY SHOE AT POINT OF CONTACT.

FIGURE 1-1. CLUTCH MECHANISM

NOTE

THE FOLLOWING REQUIREMENTS APPLY TO BOTH THE DISTRIBUTOR AND SENSING CAM SLEEVES. THESE MECHANISMS SHOULD NOT BE DISTRIBUTED UNLESS ABSOLUTELY NECESSARY.



(A) CAM SLEEVE END PLAY

NOTE

ADJUSTMENT TO BE MADE PRIOR TO ASSEMBLY OF DRIVE GEAR TO CLUTCH DRUM.

REQUIREMENT

MIN. SOME
MAX. 0.010 INCH
PLAY BETWEEN CAM SLEEVES AND SPACERS

TO ADJUST

REMOVE CLUTCH DRUM DRIVE GEAR AND LOOSEN DRUM MOUNTING SCREW. RELEASE CLUTCH AND POSITION CAM SLEEVE. TIGHTEN DRUM MOUNTING SCREW AND REINSTALL DRIVE GEAR.

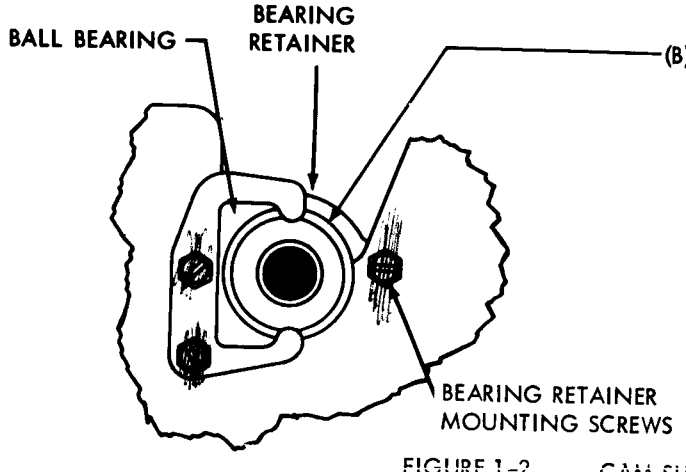
(C) IDLER GEAR ASSEMBLY

REQUIREMENT

CLEARANCE BETWEEN IDLER GEAR AND SENSING SHAFT GEAR, AND BETWEEN IDLER GEAR AND DISTRIBUTOR SHAFT GEAR AT POINT WHERE BACKLASH IS MINIMUM:
MIN. SOME
MAX. 0.003 INCH

TO ADJUST

POSITION IDLER GEAR ASSEMBLY WITH LOCK NUT LOOSENED. RECHECK GEAR PLAY THROUGH ONE REVOLUTION OF GEARS.



(B) CAM SHAFT BEARING RETAINER

REQUIREMENT

WHEN MOUNTING SHAFT ASSEMBLY, BEARING SHALL SEAT PROPERLY. (NO CLEARANCE PERMISSIBLE BETWEEN BEARING AND MOUNTING SURFACE.)

TO ADJUST

ROTATE BEARING RETAINER 180 DEGREES AND POSITION BY PUSHING DOWNWARD FIRMLY.

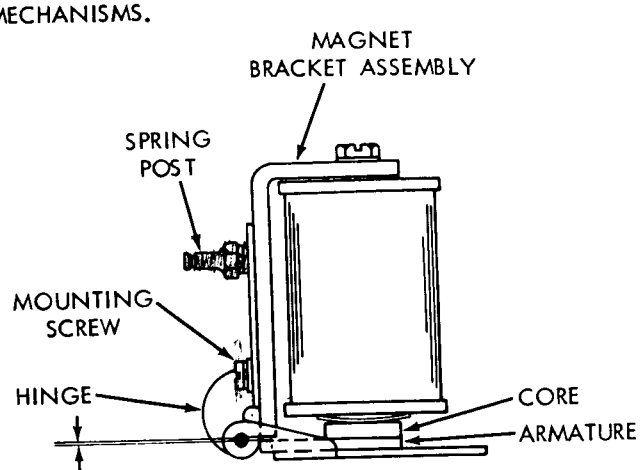
FIGURE 1-2. CAM SHAFTS

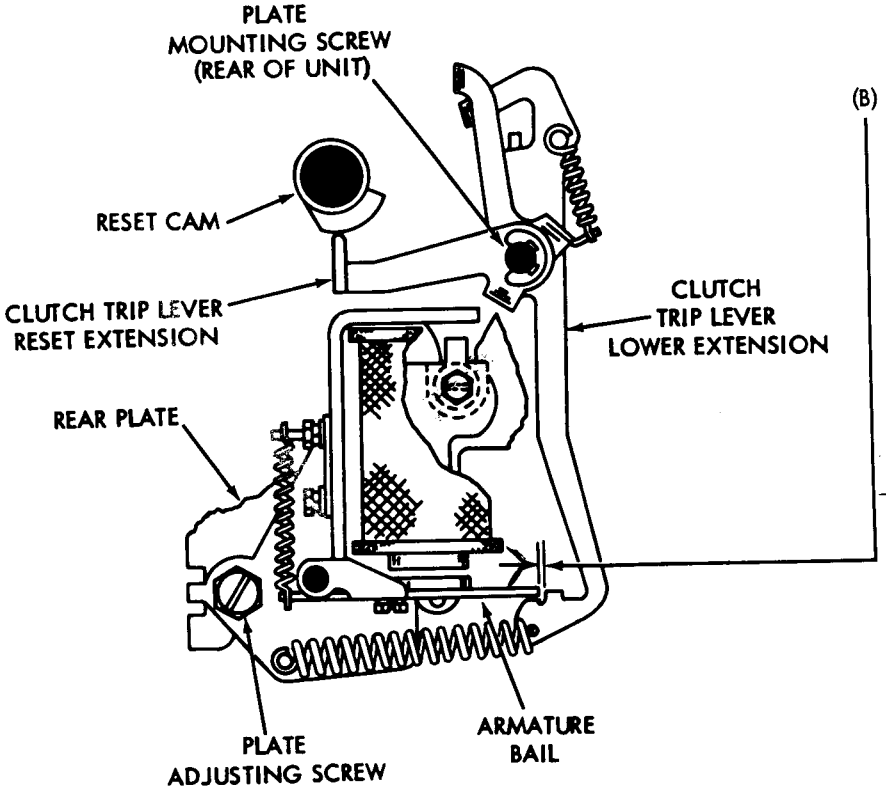
NOTE: REQUIREMENTS APPLY TO BOTH CLUTCH TRIP MECHANISMS.

(A) CLUTCH ARMATURE AIR GAP

REQUIREMENT
AIR GAP BETWEEN ARMATURE AND MAGNET ASSEMBLY BRACKET WITH ARMATURE FLUSH AGAINST MAGNET CORE.
MIN. 0.004 INCH
MAX. 0.008 INCH

TO ADJUST
REMOVE ARMATURE EXTENSION SPRING. POSITION HINGE WITH SPRING POST AND HINGE MOUNTING SCREW LOOSENED. RECHECK AIR GAP AND REPLACE SPRING.

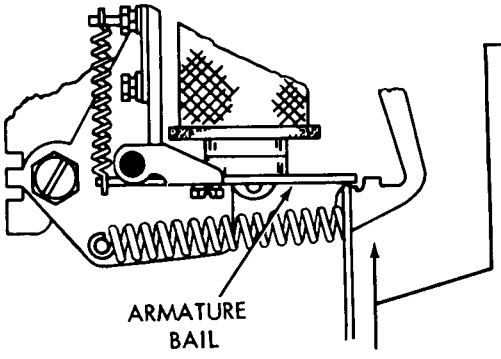




(B) CLUTCH TRIP ASSEMBLY MOUNTING PLATE

REQUIREMENT
CLEARANCE BETWEEN END OF ARMATURE BAIL AND LATCHING SURFACE OF CLUTCH TRIP LEVER LOWER EXTENSION WITH CLUTCH TRIP LEVER RESET EXTENSION ON HIGH PART OF CAM. (TAKE-UP PLAY IN PARTS FOR MINIMUM CLEARANCE.)
MIN. 0.020 INCH
MAX. 0.030 INCH

TO ADJUST
POSITION PLATE WITH SCREWDRIVER IN LOWER ADJUSTING SLOT WITH PLATE ADJUSTING SCREW AND PLATE MOUNTING SCREW LOOSENED. (TAKE-UP PLAY IN TRIP LEVER IN DIRECTION OF CAM.)



(C) ARMATURE BAIL SPRING

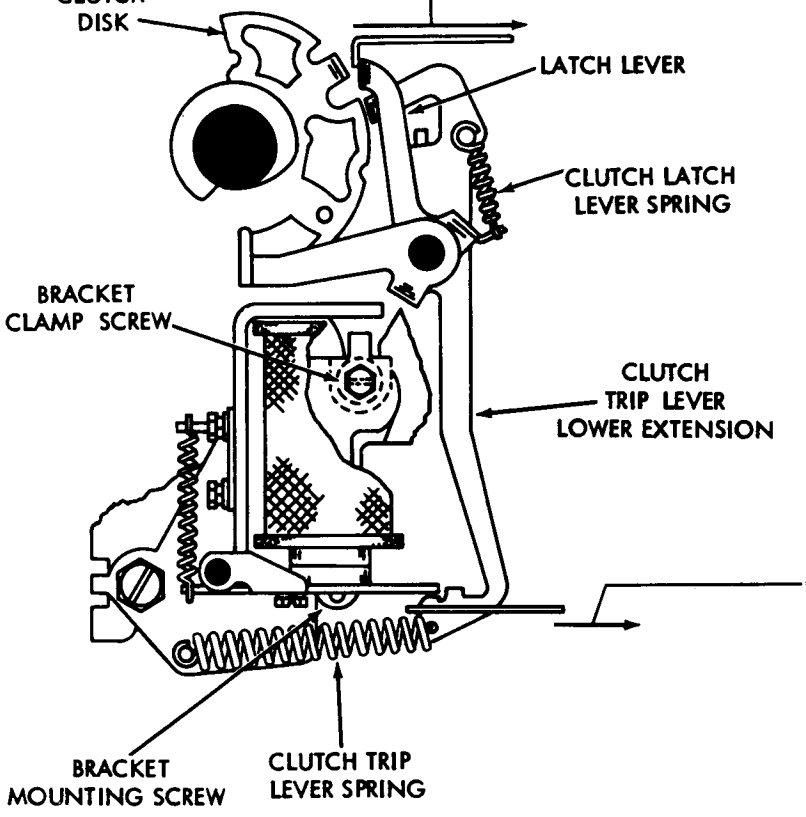
REQUIREMENT
INVERT UNIT. TRIP CLUTCH MAGNET AND ROTATE SHAFT MANUALLY UNTIL TRIP LEVER RESET EXTENSION IS ON HIGH PART OF ITS CAM.
MIN. 3 OZS.
MAX. 4-1/2 OZS.
TO START ARMATURE BAIL MOVING.

FIGURE 1-3. CLUTCH TRIP MECHANISM

NOTE
REFER TO REQUIREMENTS ON PAGE 1-4

(A) CLUTCH LATCH LEVER SPRING

REQUIREMENT
CLUTCH LATCH LEVER ON LOW PART OF CLUTCH DISK AND UNIT UPRIGHT. SCALE APPLIED TO BENT EAR OF LATCH LEVER HORIZONTALLY.
MIN. 1/2 OZ.
MAX. 1-1/2 OZS.
TO START LATCH LEVER MOVING.



(B) CLUTCH TRIP LEVER SPRING

REQUIREMENT
WITH CLUTCH JUST TRIPPED, HOLD ARMATURE AGAINST CORE. SCALE APPLIED TO TRIP LEVER LOWER EXTENSION IN LINE WITH SPRING.
MIN. 2 OZS.
MAX. 3-1/2 OZS.
TO START TRIP LEVER LOWER EXTENSION MOVING.

(C) MAGNET BRACKET

REQUIREMENT
CLEARANCE BETWEEN ARMATURE BAIL AND TOP EDGE OF TRIP LEVER LOWER EXTENSION WITH CLUTCH TRIP LEVER RESET EXTENSION ON HIGH PART OF CAM AND ARMATURE FLUSH AGAINST CORE. (TAKE-UP PLAY FOR MINIMUM CLEARANCE.)
MIN. 0.030 INCH
MAX. 0.040 INCH

TO ADJUST
INSERT SCREWDRIVER IN UPPER SLOT AND PIVOT BRACKET, WITH BRACKET MOUNTING SCREW AND CLAMP SCREW LOOSENED.

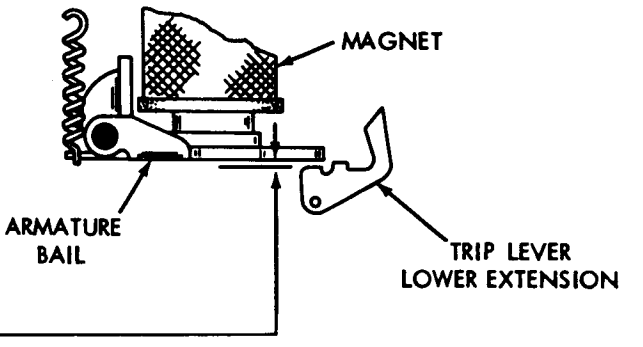


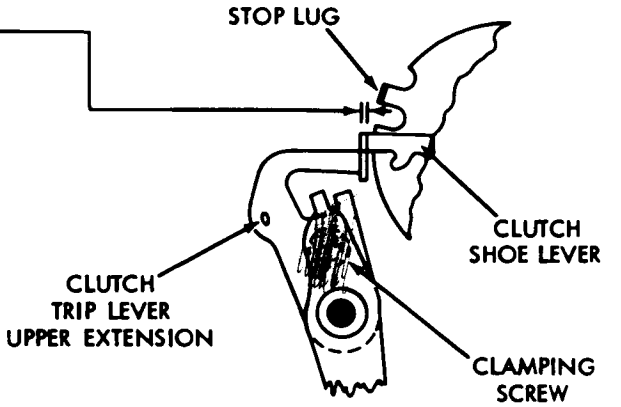
FIGURE 1-4. CLUTCH TRIP MECHANISM

NOTE
REQUIREMENTS (A) AND (B) APPLY TO ALL CLUTCHES

(A) CLUTCH TRIP LEVER UPPER EXTENSION

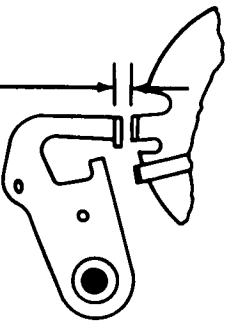
(1) REQUIREMENT
CLUTCH TRIP LEVER LATCHED (CLUTCH IN STOP POSITION). CLUTCH TRIP LEVER UPPER EXTENSION SHALL FULLY ENGAGE CLUTCH SHOE LEVER.

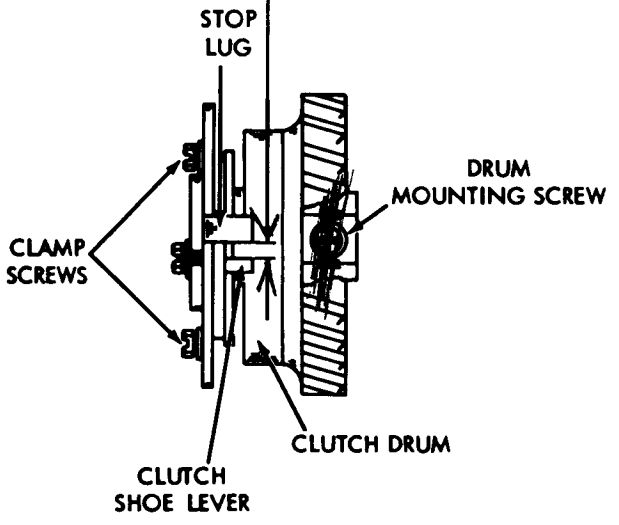
TO ADJUST
POSITION UPPER EXTENSION, WITH CLUTCH TRIP LEVER CLAMPING SCREW LOOSENED.



(2) REQUIREMENT
WITH ARMATURE IN ATTRACTED POSITION, THERE SHALL BE SOME CLEARANCE BETWEEN CLUTCH TRIP LEVER UPPER EXTENSION AND STOP LUG WHEN CLUTCH IS ROTATED TO MAKE CLEARANCE A MINIMUM.

TO ADJUST
REFINE REQUIREMENT (1), IF NECESSARY, SO THAT CLUTCH TRIP LEVER UPPER EXTENSION IS UNDER OR OVER FLUSH WITH STOP LUG BY NOT MORE THAN 0.015 INCH.





(B) CLUTCH SHOE LEVER

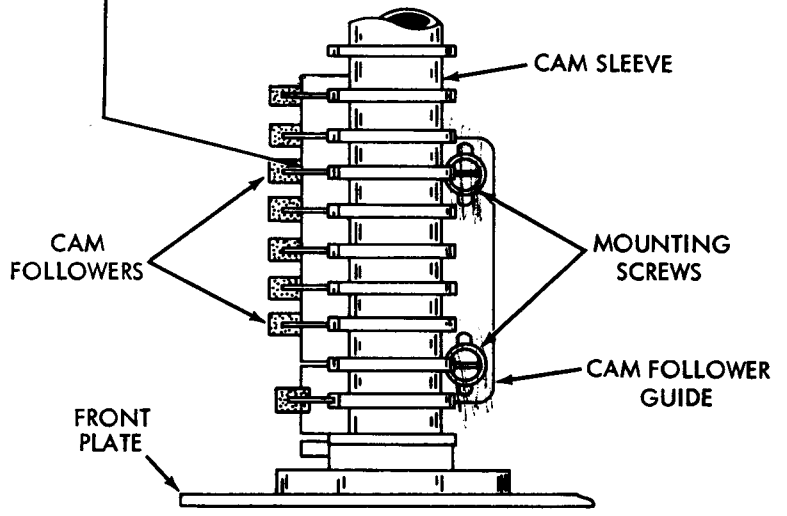
REQUIREMENT
GAP BETWEEN CLUTCH SHOE LEVER AND ITS STOP LUG SHOULD BE 0.055 INCH TO 0.085 INCH GREATER WHEN CLUTCH IS ENGAGED THAN WHEN CLUTCH IS DISENGAGED.

TO ADJUST
ENGAGE A WRENCH OR SCREWDRIVER ON A SCREW ON THE ADJUSTING DISK. ROTATE DISK WITH CLAMP SCREWS LOOSENED AND CLUTCH DISENGAGED.

NOTE
AFTER ADJUSTMENT, DISENGAGE CLUTCH, REMOVE DRUM MOUNTING SCREW AND ROTATE DRUM IN ITS NORMAL DIRECTION OF ROTATION TO MAKE CERTAIN THAT IT DOES NOT DRAG ON SHOE. IF DRUM DRAGS, REFINE ABOVE ADJUSTMENT.

FIGURE 1-5. CLUTCH MECHANISM

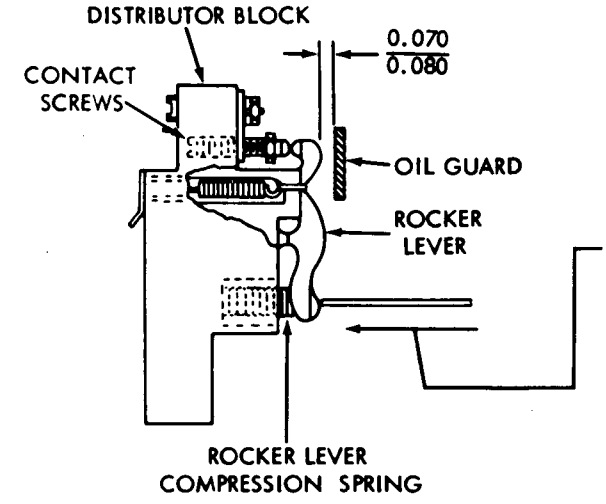
NOTE
REMOVE OIL RESERVOIR AND DISTRIBUTOR BLOCK ASSEMBLY FOR FOLLOWING ADJUSTMENTS.



(A) DISTRIBUTOR CAM FOLLOWER GUIDE

REQUIREMENT
AT LEAST ONE CAM FOLLOWER SHOULD ENGAGE CAM BY FULL THICKNESS OF THE FOLLOWER AS FOLLOWER IS MOVED FROM SIDE TO SIDE IN ITS GUIDE SLOT. OTHER CAM FOLLOWERS SHOULD ENGAGE BY 75 PER CENT IN SAME MANNER WHEN PLAY IS TAKEN UP FOR A MAXIMUM. ALL CAM FOLLOWERS SHOULD MOVE FREELY IN GUIDE SLOTS.

TO ADJUST
POSITION GUIDE WITH CAM FOLLOWER GUIDE MOUNTING SCREWS LOOSENED.
RECHECK REQUIREMENT

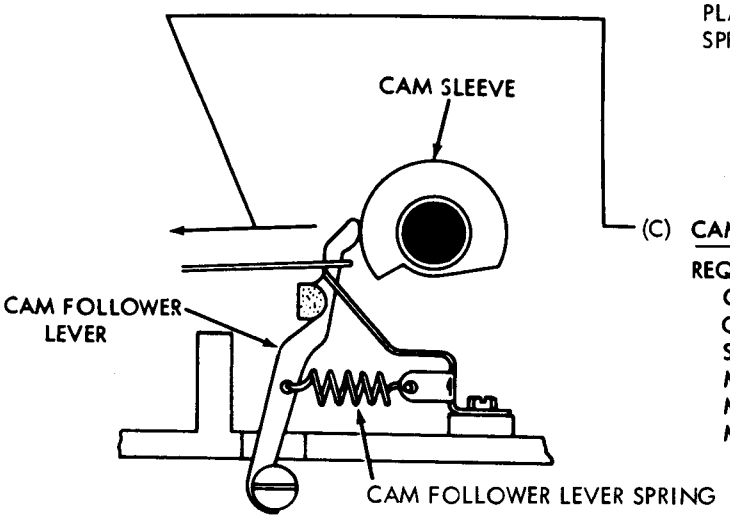


NOTE --- WITH DISTRIBUTOR BLOCK REMOVED ADJUST CONTACTS SO THAT THERE IS 0.070 TO 0.080 INCHES BETWEEN ROCKER LEVERS AND OIL GUARD.

(B) DISTRIBUTOR ROCKER COMPRESSION SPRINGS

REQUIREMENT----WITH COMPRESSION SPRINGS INSTALLED, APPLY SPRING SCALE AT LOWER END OF ROCKER AND PUSH DOWNWARD (VERTICALLY) MIN. 6-1/2 OZS. — MAX. 9-1/2 OZS. TO SEPARATE THE CONTACTS

IF THE REQUIREMENT CANNOT BE MET AFTER COMPRESSION SPRINGS ARE REPLACED, CHECK ROCKER LEVER TENSION SPRINGS.

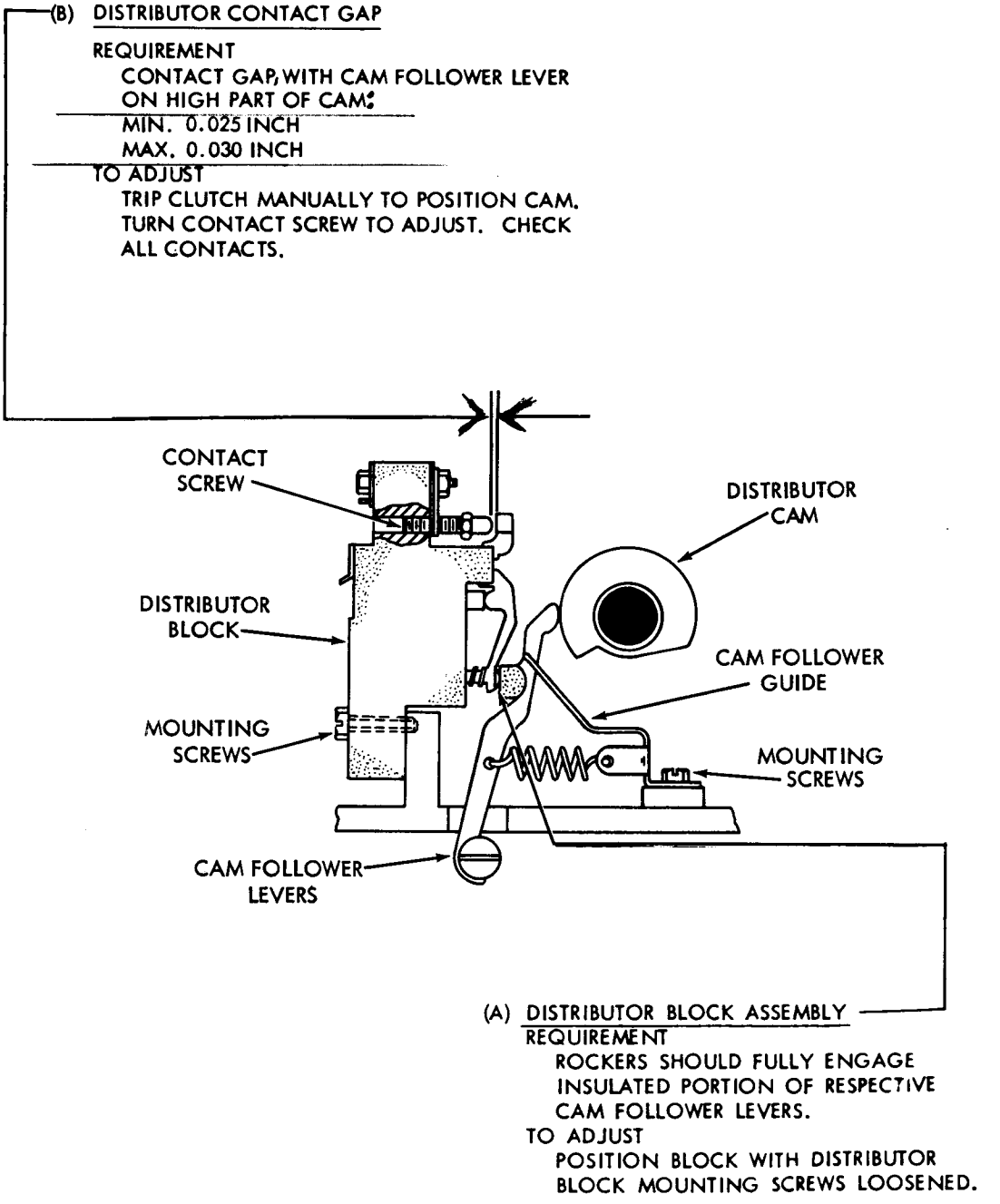


(C) CAM FOLLOWER LEVER SPRING

REQUIREMENT
CAM FOLLOWER LEVER ON HIGH PART OF CAM. SCALE APPLIED JUST BELOW SLIDING SURFACE OF LEVER HORIZONTALLY.
MIN. 1/2 OZ.
MAX. 1-1/2 OZS. TO START EACH LEVER MOVING.

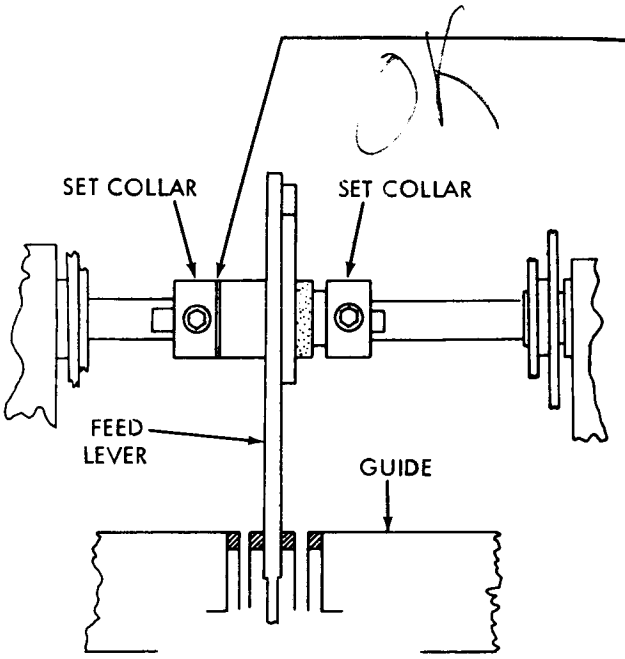
FIGURE 1-6. DISTRIBUTOR CONTACT MECHANISM

NOTE
REPLACE DISTRIBUTOR BLOCK



NOTE
FOR REFINEMENT OF DISTRIBUTOR CONTACT ADJUSTMENTS, REFER TO PARAGRAPH 4, DISTRIBUTOR AND TRANSMITTER CONTACT STROBING.

FIGURE 1-7. DISTRIBUTOR CONTACT MECHANISM

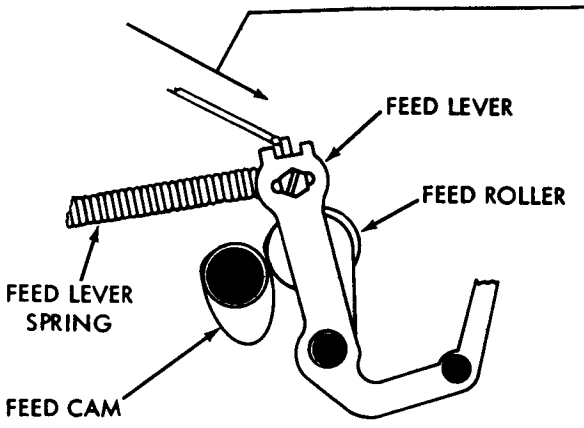


(A) FEED LEVER SET COLLAR

REQUIREMENT
MIN. SOME
MAX. 0.015 INCH
CLEARANCE BETWEEN FEED LEVER AND COLLAR WHEN FEED LEVER IS FREE IN ITS GUIDE SLOT.

TO ADJUST
POSITION FEED LEVER WITH SET COLLAR SCREWS LOOSENED. FEED LEVER SHOULD MOVE FREELY WITHOUT BINDING AT GUIDE OR COLLARS.

NOTE
AFTER TIGHTENING SET SCREWS, RECHECK ADJUSTMENT FOR BINDS BETWEEN FEED LEVER AND COLLARS, AND BETWEEN FEED LEVER AND GUIDE.



(B) FEED LEVER SPRING (PIVOTED HEAD)

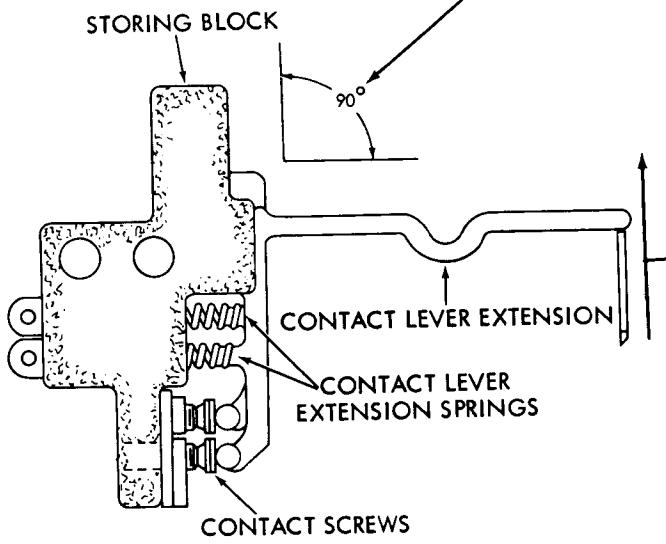
TO CHECK
TRIP SENSING CLUTCH. ROTATE SHAFT UNTIL ROLLER IS OFF FEED CAM. APPLY SCALE TO FEED LEVER.

REQUIREMENT
MIN. 30 OZS.
MAX. 40 OZS.
TO START FEED ROLLER MOVING AWAY FROM CAM.

FEED LEVER SPRING (FIXED HEAD)

REQUIREMENT
WITH SENSING CLUTCH IN STOP POSITION
MIN. 10 OZS.
MAX. 17 OZS.
TO MOVE FEED LEVER AWAY FROM ITS CAM SURFACE.

FIGURE 1-8. FEED LEVER MECHANISM



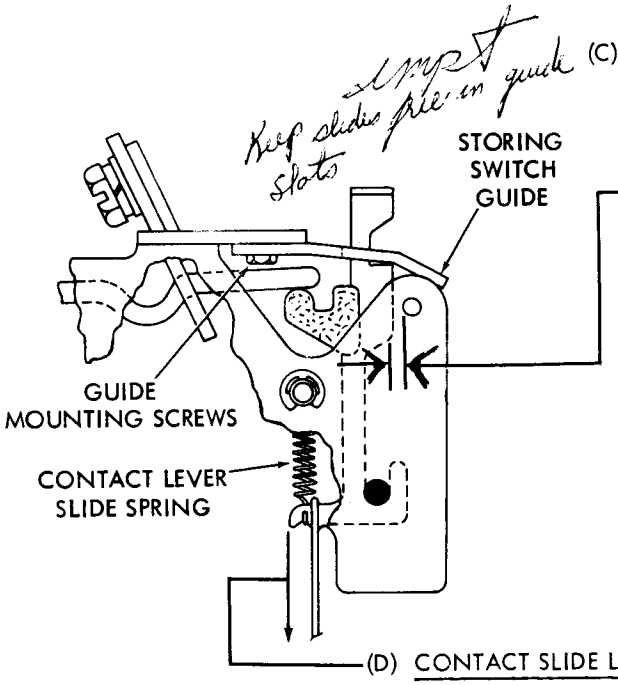
(A) STORING SWITCH CONTACTS

TO CHECK
REMOVE STORING SWITCH ASSEMBLY.
REQUIREMENT
CONTACT LEVER EXTENSIONS SHOULD BE PERPENDICULAR TO STORING BLOCK.
TO ADJUST
TURN EACH CONTACT SCREW WITH ALLEN WRENCH. GAUGE BY EYE.

(B) STORING SWITCH CONTACT LEVER EXTENSION SPRING

(1) REQUIREMENT
MIN. 1-3/4 OZS.
MAX. 3-1/2 OZS.
TO START EACH CONTACT LEVER EXTENSION MOVING.

(2) REQUIREMENT
MIN. 1/2 OZ.
MAX. 1 OZ.
TO START TAPE-OUT (6TH) CONTACT LEVER EXTENSION MOVING.



(C) STORING SWITCH GUIDES

PRELIMINARY - BEFORE SWITCH ASSEMBLY IS SECURED TO UNIT, ROTATE SLIDE ECCENTRIC TO MAKE CLEARANCE BETWEEN SLIDE STOP POST AND END CONTACT LEVER SLIDES MINIMUM.

(2) REQUIREMENT
MIN. 0.005 INCH
MAX. 0.012 INCH
CLEARANCE BETWEEN END SLIDES AND STOP POST. (HOLD SLIDES AWAY FROM STOP POST).

NOTE
AFTER CONTACT LEVER SLIDE ADJUSTMENT (FIGURE 1-22), CLEARANCE MAY BE 0.005 TO 0.015 INCH.

REQUIREMENT
CONTACT LEVER SLIDES FREE IN GUIDE SLOTS AND PARALLEL TO SIDE PLATES (GAUGE BY EYE).

TO ADJUST
POSITION GUIDE WITH ITS MOUNTING SCREWS LOOSENED.

(D) CONTACT SLIDE LEVER SPRINGS

TO CHECK
SELECT BLANK COMBINATION, TRIP SENSING CLUTCH AND ROTATE SHAFT TO STOP POSITION. HOLD EXTENSION LEVERS AWAY.

(1) REQUIREMENT
MIN. 4 OZS.
MAX. 6 OZS.
TO START EACH SLIDE LEVER SPRING MOVING.

(2) REQUIREMENT
MIN. 1-1/2 OZS.
MAX. 3 OZS.
TO START TAPE-OUT (6TH) SLIDE LEVER SPRING MOVING.

FIGURE 1-9. STORING SWITCH MECHANISM

TAPE LID

NOTE

REMOVE TOP AND TAPE GUIDE PLATES. LUBRICATE MATING SURFACES PRIOR TO ADJUSTMENT.

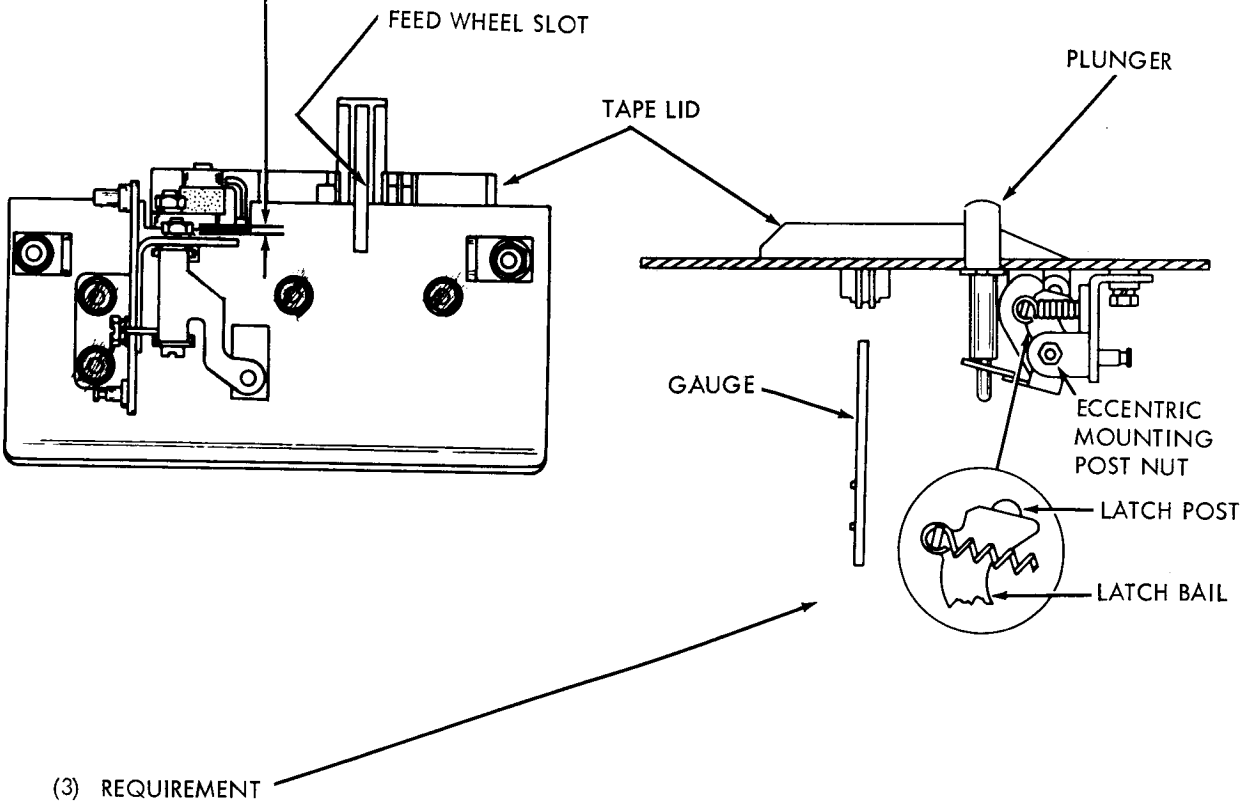
(1) REQUIREMENT

MIN. SOME
MAX. 0.010 INCH
CLEARANCE BETWEEN PIVOT SHOULDER AND TAPE LID WHEN LID IS PRESSED AGAINST NOTCH IN TAPE GUIDE PLATE, AND FEED WHEEL SLOTS AND TAPE-OUT PIN HOLES ARE LINED UP.

TO ADJUST

LOOSEN TAPE LID BRACKET MOUNTING NUTS. USING A 156743 GAUGE, LINE UP FEED WHEEL GROOVE IN TAPE LID WITH SLOT IN TAPE GUIDE PLATE. POSITION TAPE LID BRACKET TO MEET REQUIREMENT.

(2) REQUIREMENT - (SEE FIGURE 1-11).



(3) REQUIREMENT

SOME END PLAY IN RELEASE PLUNGER WHEN LID IS LATCHED AGAINST TAPE GUIDE PLATE

TO ADJUST

WITH ECCENTRIC MOUNTING POST NUT FRICTION TIGHT AND TAPE LID RAISED, ROTATE HIGH PART OF ECCENTRIC POST TOWARDS MOUNTING BRACKET. CLOSE TAPE LID. ROTATE ECCENTRIC COUNTERCLOCKWISE (AS VIEWED FROM SLOTTED END OF ECCENTRIC POST) UNTIL FLAT OF LATCH POST FULLY ENGAGES LATCH BAIL FLAT. ROTATE ECCENTRIC CLOCKWISE TO TAKE UP ALL PLAY IN PARTS, AND TO SEAT OPEN END OF TAPE LID AGAINST TAPE GUIDE PLATE.

TO CHECK

WITH TAPE LID HELD DOWN MANUALLY, LATCH TIP SHOULD CLEAR LATCH POST WHEN RELEASE BUTTON IS OPERATED. WITH TAPE LID LATCHED, TIP OF LATCH SHOULD PROJECT BEYOND FLAT OF LATCH POST, AND THERE SHOULD BE SOME END PLAY IN RELEASE BUTTON.

FIGURE 1-10. TAPE LID MECHANISM

(2) REQUIRMENT

WITH TAPE LID FRONT BEARING SURFACE TOUCHING TAPE GUIDE PLATE, CLEARANCE BETWEEN TAPE LID AND TAPE GUIDE PLATE:
MIN. 0.010 INCH
MAX. 0.018 INCH
MEASURED AT TAPE LID FIN IN LINE WITH REAR TAPE GUIDE. 2ND. FIN FROM REAR

NOTE

WHEN BOTH TOP AND TAPE GUIDE PLATES ARE ASSEMBLED ON UNIT, LEFT EDGE OF LID MAY TOUCH TOP PLATE AND SOME CHANGE IN THIS CLEARANCE MAY BE EXPECTED.

TO ADJUST

WITH TAPE LID BEARING BRACKET MOUNTING SCREWS FRICTION TIGHT, AND TAPE LID PRESSED AGAINST TAPE GUIDE PLATE, POSITION BEARING BRACKET. RECHECK REQUIREMENT (1).

(1) AND (3) REQUIREMENTS - (SEE FIGURE 1-10).

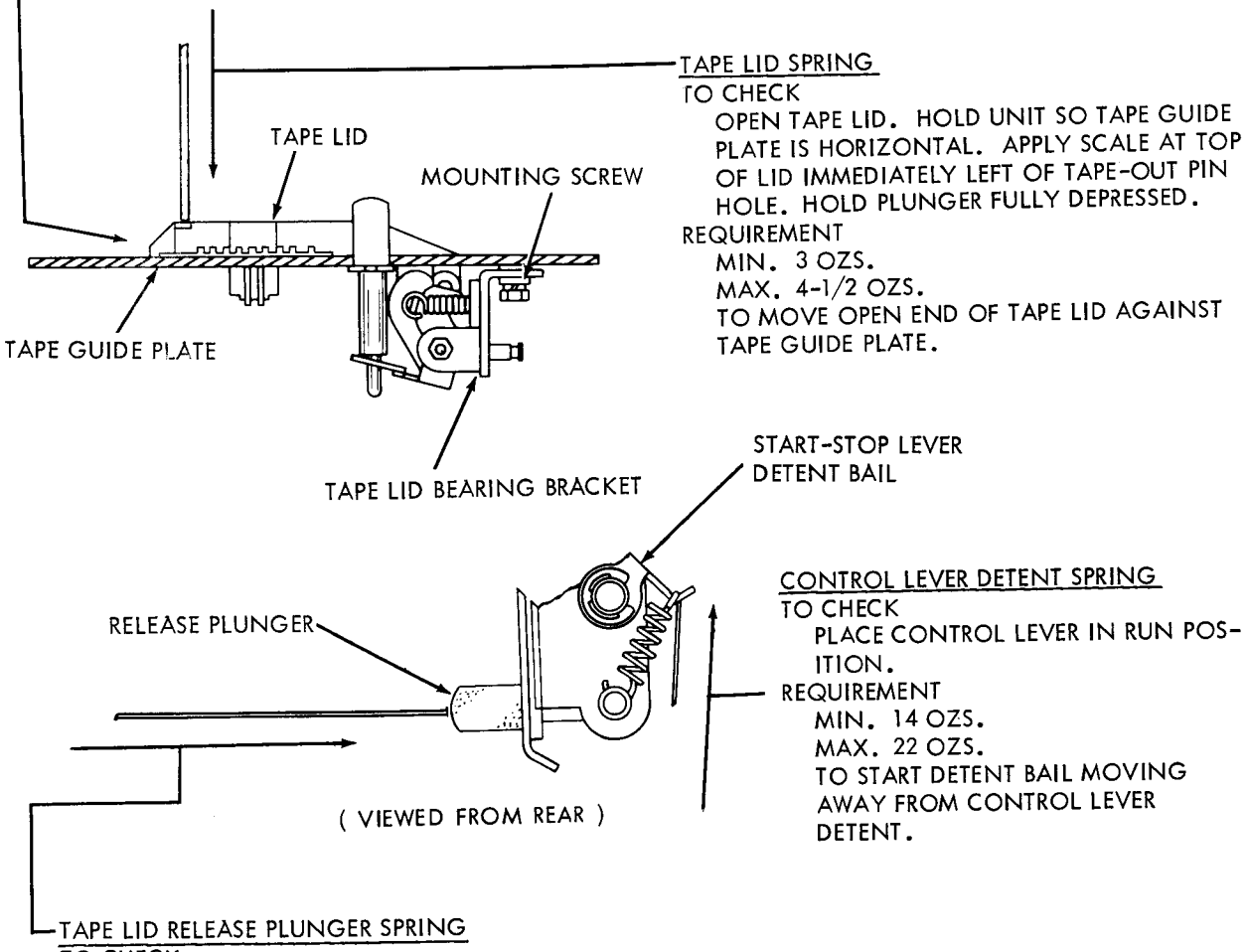
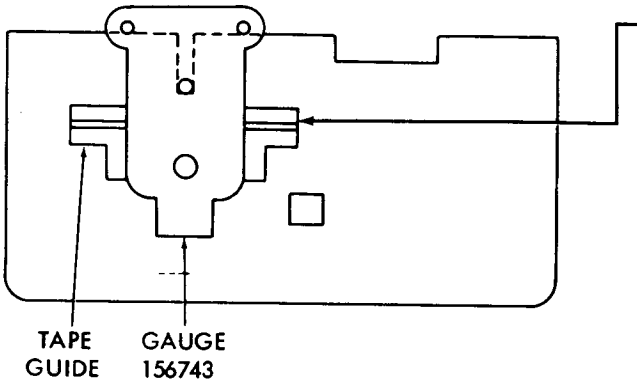


FIGURE 1-11. TAPE LID MECHANISM



TAPE GUIDE
REQUIREMENT
WITH GAUGE PROPERLY POSITIONED:
MIN. SOME
MAX. 0.003 INCH
BETWEEN GAUGE AND TAPE GUIDES
TO ADJUST
LOOSEN TAPE GUIDE MOUNTING NUTS TO FRICTION TIGHT. PROPERLY POSITION GAUGE ON TAPE GUIDE PLATE. POSITION TAPE GUIDES TO MEET REQUIREMENT.

TAPE GUIDE PLATE

(1) REQUIREMENT
SHOULDER OF FEED WHEEL POST SHOULD NOT INTERFERE WITH TOP PLATE OR TAPE GUIDE PLATE MOUNTING BRACKETS.
TO ADJUST
ROTATE FEED WHEEL POST WITH ITS MOUNTING NUT LOOSENED.

(2) REQUIREMENT
TAPE GUIDE PLATE SHOULD REST FIRMLY AGAINST AT LEAST THREE PROJECTIONS OF THE FRONT AND REAR PLATE.
TO ADJUST
WITH TAPE-OUT DOWNSTOP IN ITS LOWERMOST POSITION, AND TAPE GUIDE PLATE MOUNTING BRACKET (FRONT AND REAR) NUTS FRICTION TIGHT, TRIP CLUTCH AND ROTATE SHAFT UNTIL SENSING PINS ARE IN THEIR UPPERMOST POSITION. WITH TAPE LID RAISED AND CONTROL LEVER IN RUN POSITION, PRESS TAPE GUIDE PLATE INTO POSITION. GUIDE MOUNTING SCREWS INTO NOTCH OF FRONT AND REAR PLATE, AND PLACE SENSING PINS ADJACENT TO LEFT EDGE OF GUIDE PLATE. PLACE TAPE-OUT PIN INTO ITS HOLE. TIGHTEN EACH BRACKET MOUNTING.

(3) REQUIREMENT
OUTER EDGES OF MOUNTING BRACKETS AND OUTER EDGES OF MOUNTING STUD SHOULDERS SHOULD ALIGN AND PROJECT EQUALLY ON FRONT AND REAR BRACKETS.
TO ADJUST
MOVE TAPE GUIDE PLATE TOWARD FRONT OR REAR. TIGHTEN NUTS ONLY AFTER TOP PLATE IS ADJUSTED (SEE FIGURE 1-15).

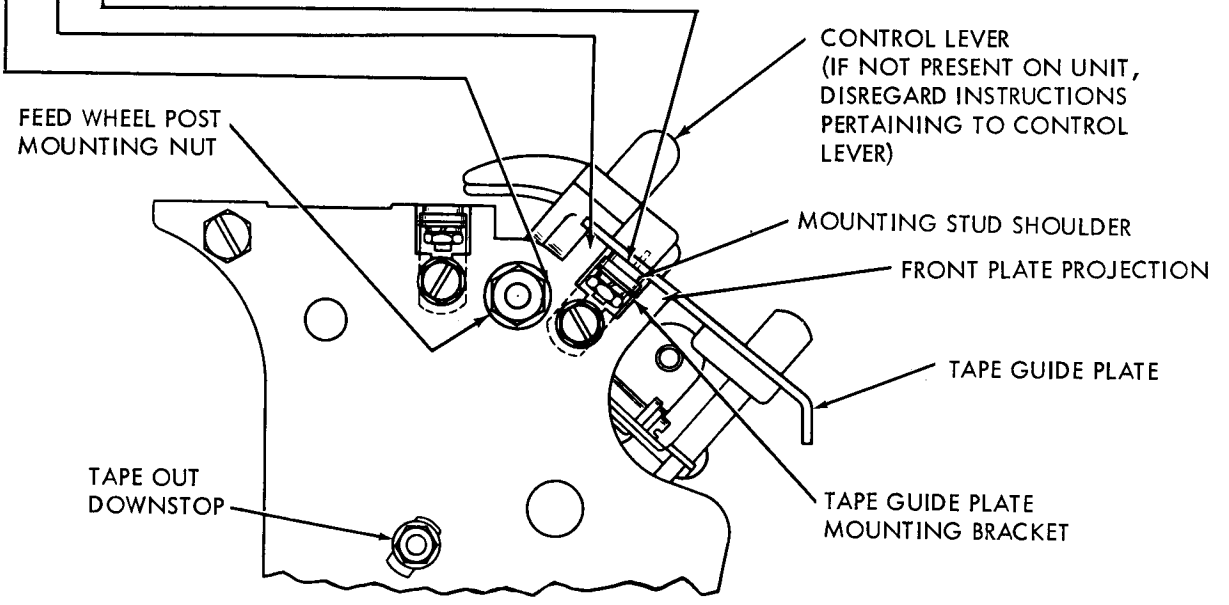
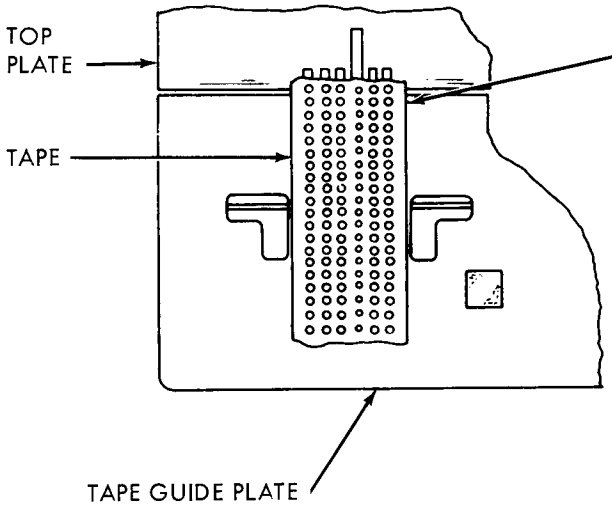


FIGURE 1-12. TAPE GUIDE PLATE



(A) FEED WHEEL DETENT

NOTE

IF UNIT IS EQUIPPED WITH A CONTROL LEVER, PLACE IT IN STOP POSITION

TO CHECK

PLACE A "LETTERS" PERFORATED TAPE OVER FEED WHEEL, TAKING UP PLAY IN FEED HOLES TOWARD THE RIGHT.

REQUIREMENT

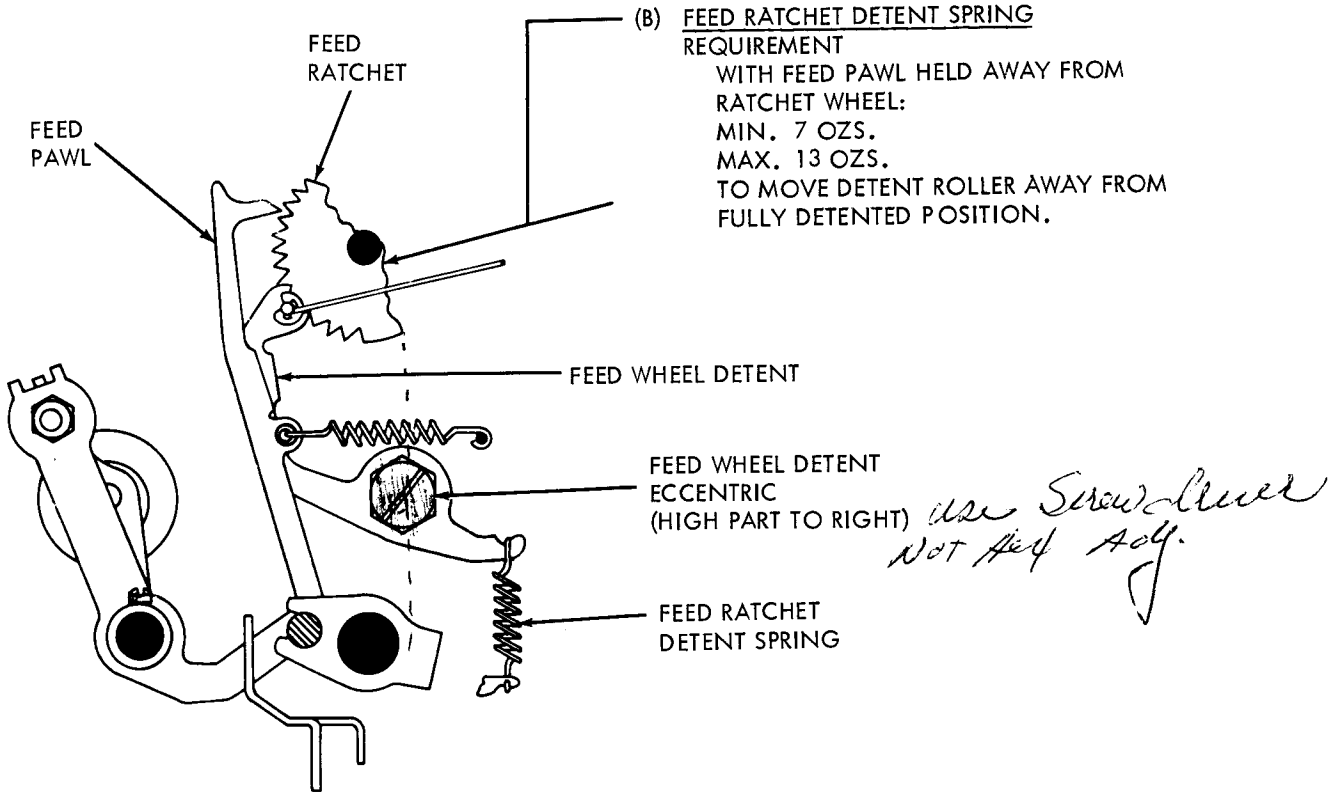
SENSING PINS SHOULD BE CENTRALLY LOCATED IN CODE HOLES.

TO ADJUST

POSITION FEED WHEEL DETENT ECCENTRIC WITH ITS LOCK SCREW FRICTION TIGHT. HIGH PART OF ECCENTRIC SHOULD BE TOWARD RIGHT. HOLD ECCENTRIC AND TIGHTEN GUIDE POST AND LOCK SCREW. RECHECK ADJUSTMENT.

NOTE

FEED PAWL SHOULD BE HELD AWAY TO FACILITATE ADJUSTMENT.



(B) FEED RATCHET DETENT SPRING

REQUIREMENT

WITH FEED PAWL HELD AWAY FROM RATCHET WHEEL:
MIN. 7 OZS.
MAX. 13 OZS.
TO MOVE DETENT ROLLER AWAY FROM FULLY DETENTED POSITION.

use Screwdriver Not Hex Adj.

FIGURE 1-13. TAPE FEED MECHANSIM

(B) FEED PAWL SPRING

TO CHECK

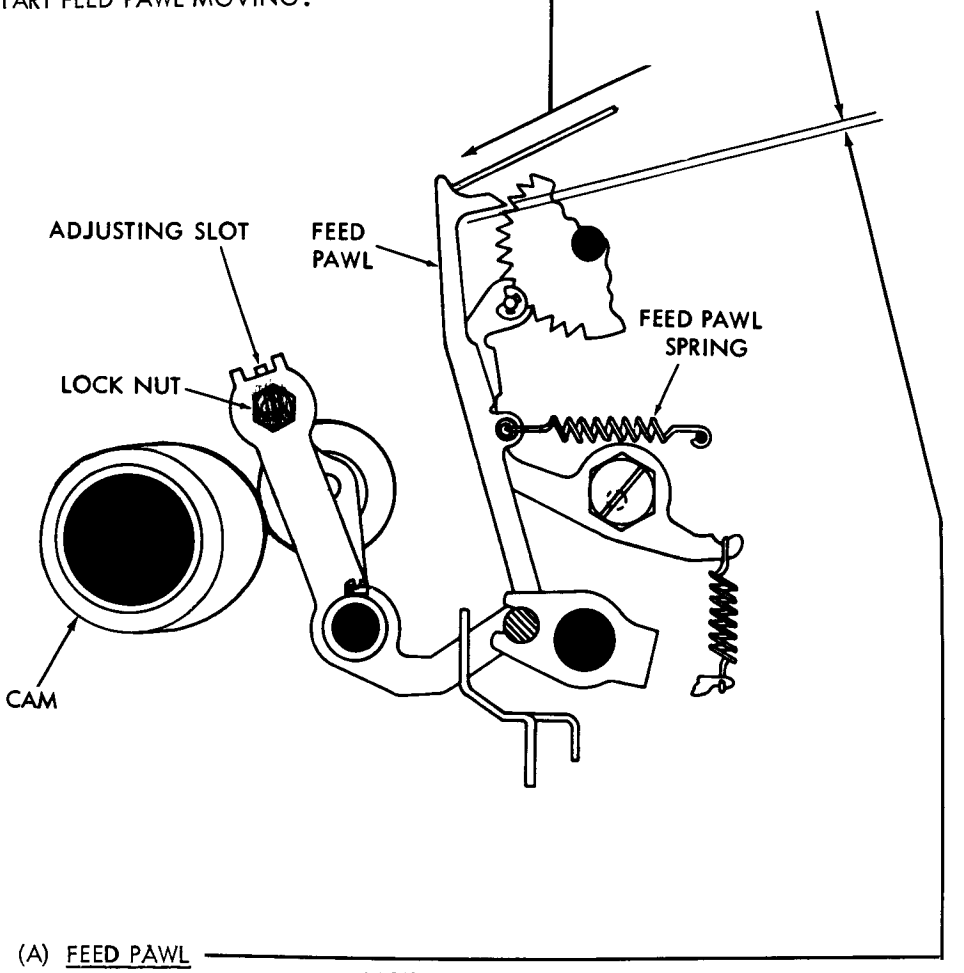
REMOVE TOP PLATE. DISENGAGE CLUTCH.

REQUIREMENT

MIN. 1/4 OZ.

MAX. 1-1/2 OZS.

TO START FEED PAWL MOVING.



(A) FEED PAWL

NOTE

IF UNIT IS EQUIPPED WITH A CONTROL LEVER, PLACE IT IN RUN POSITION.

TO CHECK

REMOVE TOP PLATE. TRIP CLUTCH, AND ROTATE CAM SHAFT UNTIL FEED ROLLER IS ON HIGH PART OF CAM. ROTATE RATCHET WHEEL UNTIL OIL HOLE IS UP. TAKE UP PLAY BY PRESSING DOWN LIGHTLY ON RIGHT END OF FEED PAWL BAIL.

REQUIREMENT

MIN. SOME

MAX. 0.003 INCH

CLEARANCE BETWEEN FEED PAWL AND RATCHET TOOTH.

TO ADJUST

POSITION FEED LEVER BY MEANS OF THE ADJUSTING SLOT WITH ITS LOCK NUT LOOSENED.

FIGURE 1-14. TAPE FEED MECHANISM

TOP PLATE (FIXED HEAD)

(1) REQUIREMENT

TOP PLATE FLUSH TO 0.003 INCH UNDER FLUSH WITH TAPE GUIDE PLATE WITHIN WIDTH OF TAPE LID.

TO ADJUST

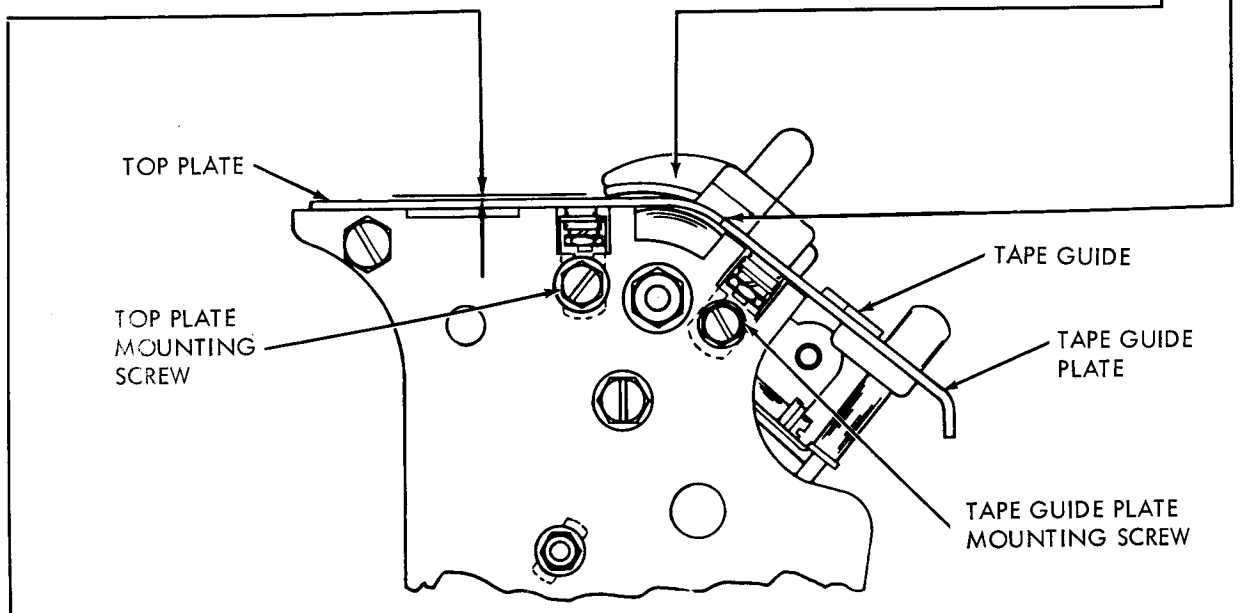
LOOSEN MOUNTING BRACKET NUTS UNTIL BRACKETS ARE FRICTION TIGHT. PRESS TOP PLATE INTO POSITION. TOP PLATE SHOULD REST ON AT LEAST THREE PROJECTIONS OF SIDE PLATES. MAKE SURE THE TIGHT-TAPE ARM EXTENSION IS UNDER THE TOP PLATE.

(2) REQUIREMENT

FEED WHEEL SLOT AND TAPE GUIDE PLATE SLOT SHOULD LINE UP

TO ADJUST

MOVE TOP PLATE TO LINE UP FEED WHEEL SLOT. DO NOT DISTURB REQUIREMENT (2) OF TAPE GUIDE PLATE ADJUSTMENT (SEE FIGURE 1-12).



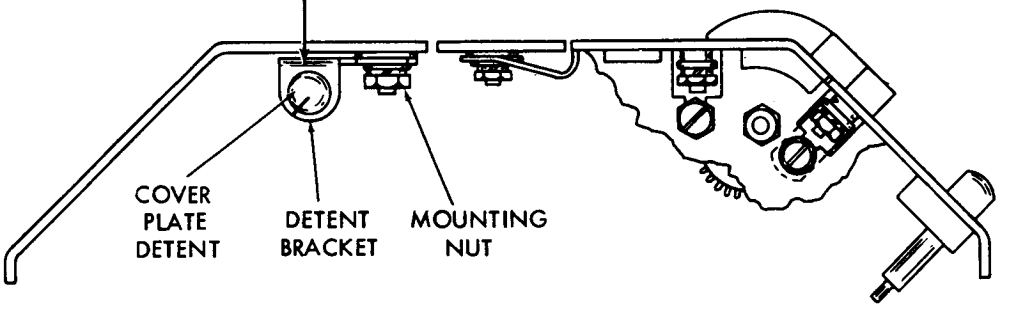
(3) REQUIREMENT

WITH TAPE LID LATCHED, CLEARANCE BETWEEN TAPE LID EXTENSION COVERING FEED WHEEL SLOT, AND TOP PLATE:
MIN. 0.010 INCH
MAX. 0.020 INCH
MEASURED AT CURVED PORTION OF TOP PLATE, AND
MIN. 0.010 INCH
MAX. 0.025 INCH
MEASURED AT FLAT PORTION OF TOP PLATE.
ALSO:
MIN. 0.010 INCH
MAX. 0.018 INCH
CLEARANCE BETWEEN TAPE LID AND TAPE GUIDE PLATE MEASURED IN AREA BETWEEN TAPE GUIDES (PLAY IN TAPE LID TAKEN TOWARD TAPE GUIDE PLATE).

TO ADJUST

LOOSEN TWO SCREWS HOLDING TAPE LID MOUNTING BRACKETS TOGETHER, AND POSITION TAPE LID. RECHECK ADJUSTMENTS (1) AND (2) OF TAPE LID ADJUSTMENT (SEE FIGURE 1-10).

FIGURE 1-15. TOP PLATE ASSEMBLY



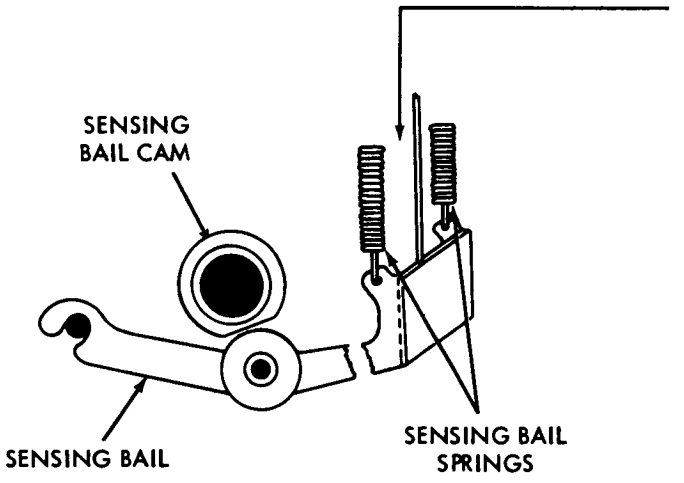
COVER PLATE

(1) REQUIREMENT
COVER PLATE HELD FLUSH AGAINST TOP PLATE BY DETENT ACTION.

(2) REQUIREMENT
COVER PLATE RESTS ON AT LEAST THREE SIDE FRAME PROJECTIONS.

(3) REQUIREMENT
FRONT EDGE OF COVER AND TOP PLATES IN LINE.

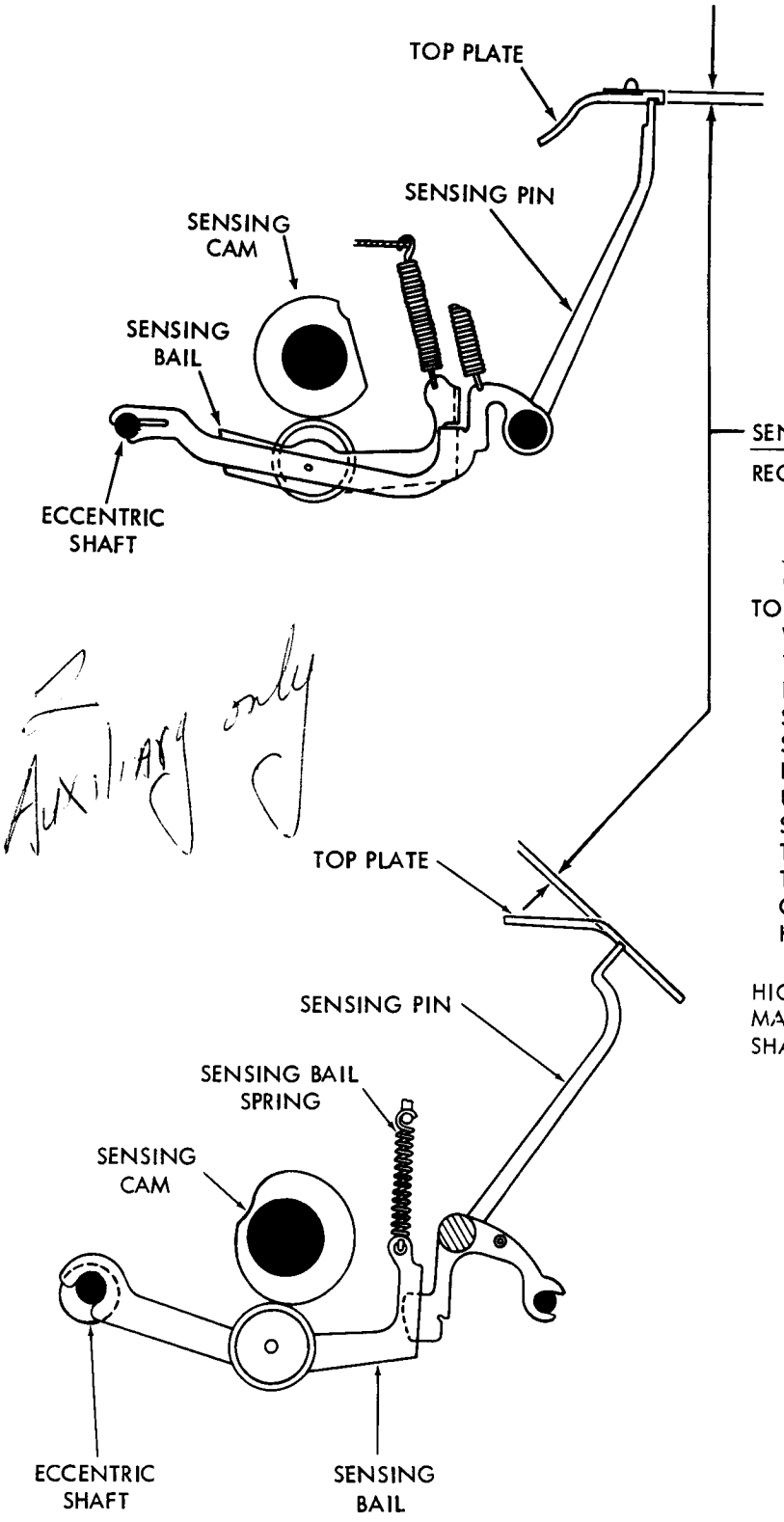
TO ADJUST
LOOSEN DETENT NUTS ON SIDE FRAMES AND MOVE THEM TO EXTREME LOWER RIGHT POSITION. TIGHTEN NUTS. LOOSEN FOUR BRACKET MOUNTING NUTS ON COVER PLATE. PLACE COVER INTO POSITION, AND POSITION TO MEET REQUIREMENTS. TIGHTEN NUTS. IF COVER PLATE DOES NOT DETENT PROPERLY (REQUIREMENT (1), REPOSITION DETENT NUTS.



SENSING BAIL SPRINGS

TO CHECK
WITH BLANK TAPE UNDER TAPE LID, TRIP CLUTCH MAGNET AND MANUALLY ROTATE SHAFT UNTIL SENSING BAIL IS IN UPPERMOST POSITION. APPLY SCALE TO BAIL BETWEEN SPRINGS.
REQUIREMENT
MIN. 1/4 OZ.
MAX. 2 OZ.
TO START SENSING BAIL MOVING.

FIGURE 1-16. SENSING MECHANISM



SENSING PINS (PIVOTED AND FIXED HEADS)

REQUIREMENT

IN STOP POSITION, HIGHEST SENSING PIN SHOULD BE FLUSH TO 0.005 INCH BELOW SURFACE OF TOP GUIDE PLATE.

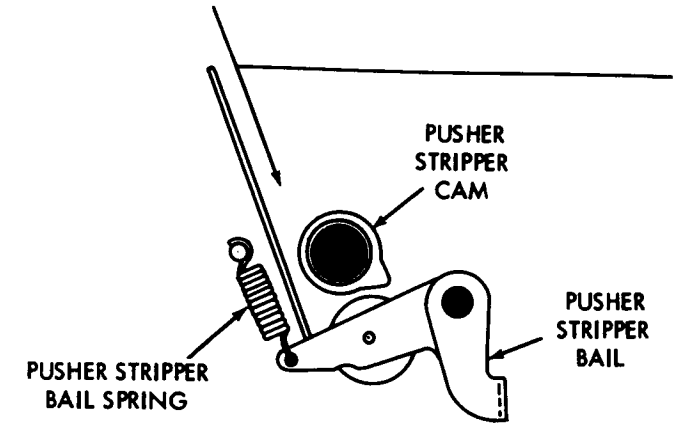
TO ADJUST

WITH CLUTCH LATCHED AND YOKE IN LOCKED POSITION, LOOSEN NUT ON ECCENTRIC SHAFT AND ADJUST ECCENTRIC SHAFT WITH HIGH PART OF ECCENTRIC TOWARD RIGHT OF UNIT. TIGHTEN NUT, ROTATE SHAFT AND RECHECK. CHECK THROUGHOUT SENSING HEAD TRAVEL. FOR TWO-CYCLE OPERATION, CHECK BOTH HALVES OF CAM SLEEVE.

NOTE

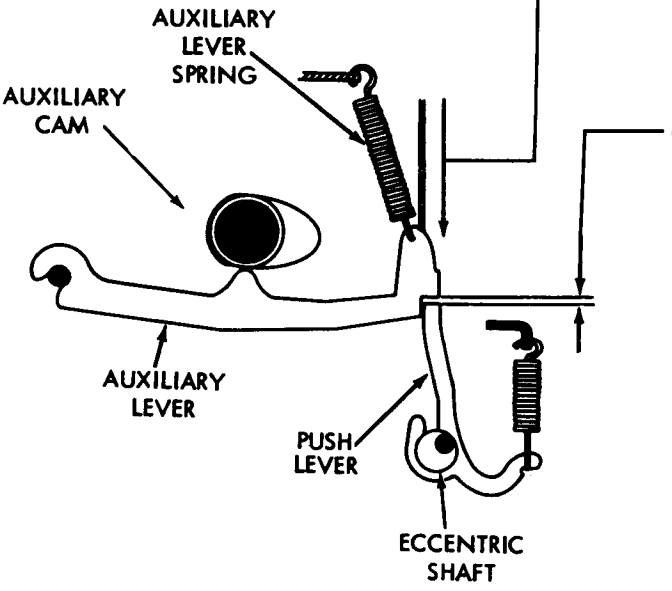
HIGH PART OF ECCENTRIC IS MARKED ON FRONT END OF SHAFT BY A SMALL INDENTATION

FIGURE 1-17. SENSING MECHANISM



(A) PUSHER STRIPPER BAIL SPRING

REQUIREMENT
WITH UNIT UPRIGHT, SELECT BLANK COMBINATION, TRIP CLUTCH AND ROTATE SHAFT TO STOP POSITION. 32 OZ SCALE APPLIED TO POINT JUST BELOW SPRING ANCHOR.
MIN. 7 OZS.
MAX. 11 OZS.
TO START BAIL MOVING AWAY FROM CAM.



(C) AUXILIARY LEVER SPRING

TO CHECK
EACH AUXILIARY LEVER ON LOW PART OF ITS CAM. SCALE APPLIED TO LEVER JUST RIGHT OF SPRING. PUSHER LEVER HELD AWAY.

REQUIREMENT
MIN. 1/2 OZ.
MAX. 3 OZS.
TO START AUXILIARY LEVER MOVING.

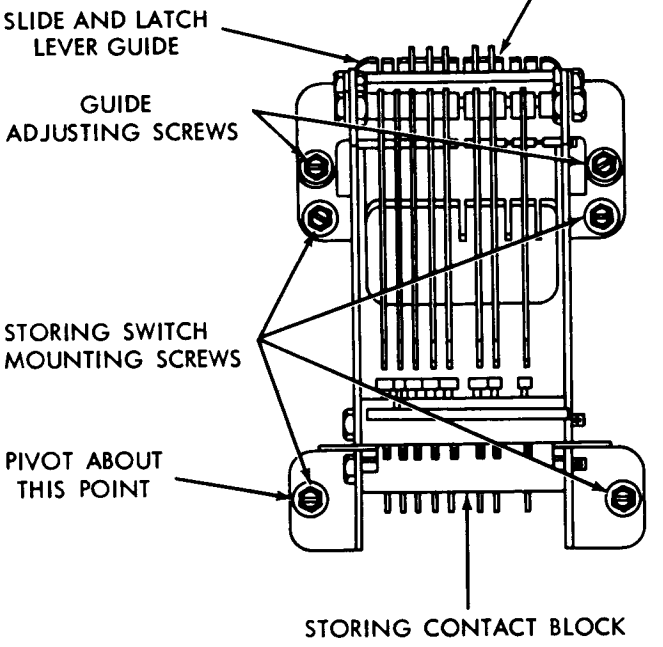
(B) PUSH LEVER

REQUIREMENT
WITH FIRST ONE AND THEN THE OTHER OF THE TWO AUXILIARY LEVERS ON THE LOW PART OF THE CAM, THE AUXILIARY LEVER WITH THE LEAST CLEARANCE SHOULD CLEAR THE TIP OF ITS PUSH LEVER BY
MIN. 0.020 INCH
MAX. 0.045 INCH

TO ADJUST
WITH PUSH LEVER ECCENTRIC SHAFT LOCK NUT (FRONT PLATE) LOOSENED AND HIGH PART OF ECCENTRIC LOCATED TOWARD THE UPPER RIGHT, ROTATE ECCENTRIC TOWARD RIGHT OR LEFT.

FIGURE 1-18. SENSING MECHANISM

NOTE: REINSTALL STORING SWITCH ASSEMBLY.



(A) STORING SWITCH ASSEMBLY REPLACEMENT

REQUIREMENT

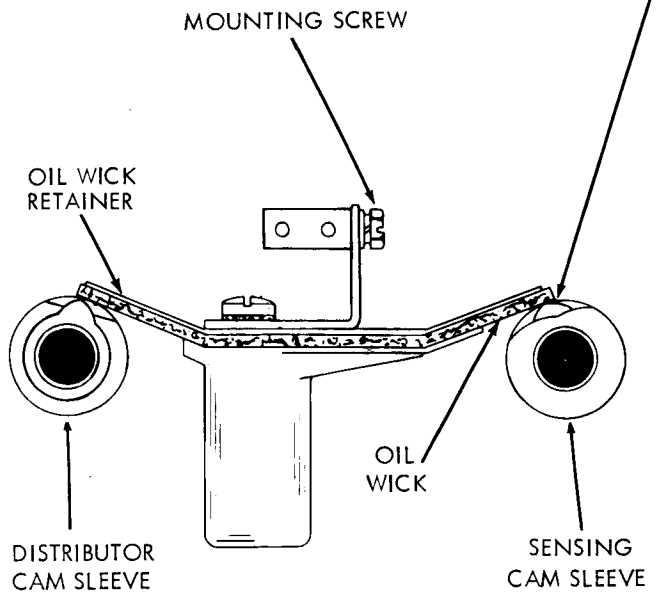
STORING SWITCH ASSEMBLY SHOULD ALIGN WITH LATCH LEVERS SO THAT LATCH LEVERS AND SLIDES FUNCTION WITHOUT BINDING.

TO CHECK

MANUALLY PUSH LATCH BAIL FOLLOWER AWAY FROM CAM UNTIL LATCHES ARE FREE FROM GUIDE. RELEASE LATCH BAIL FOLLOWER AND NOTE IF LATCHES FALL INTO THEIR RESPECTIVE SLOTS.

TO ADJUST

PIVOT STORING SWITCH WITH STORING SWITCH MOUNTING SCREWS LOOSENED. RECHECK REQUIREMENT.



(B) OIL RESERVOIR Removed

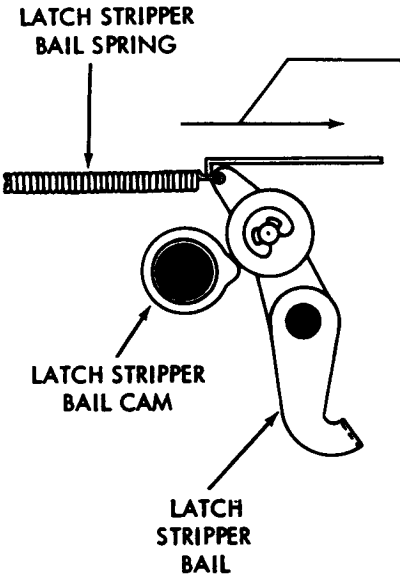
REQUIREMENT

EACH OIL WICK RESTS LIGHTLY ON HIGH PARTS OF FRONT AND REAR CAM OF EACH CAM SLEEVE.

TO ADJUST

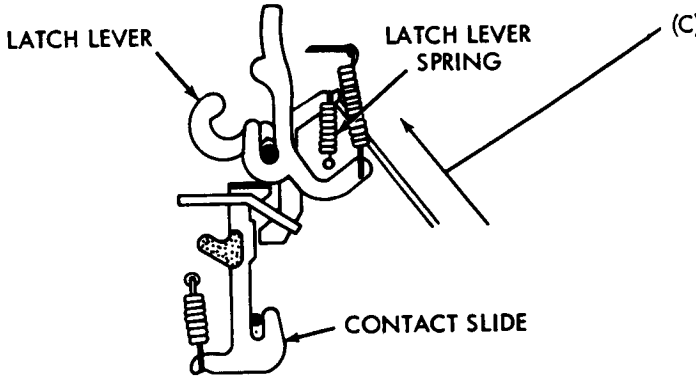
TRIP BOTH ARMATURES AND ROTATE SHAFT UNTIL HIGH PART OF FRONT AND REAR CAM OF EACH SLEEVE IS UNDER ITS WICK. POSITION OIL RESERVOIR ASSEMBLY WITH ITS MOUNTING SCREWS (2) LOOSENED. WHEN CAM SLEEVE IS ROTATED, TEETH OF WICK RETAINER SHOULD NOT DEFLECT UPWARD MORE THAN 1/32 INCH (GAUGE BY EYE). REFINE ADJUSTMENT BY SLIGHTLY BENDING TEETH ON WICK COMB SPRING.

FIGURE 1-19. STORING SWITCH MECHANISM



(A) LATCH STRIPPER BAIL SPRING

TO CHECK
TRIP CLUTCH, ROTATE SHAFT SO LATCH BAIL FOLLOWER ROLLER IS ON LOW PART OF CAM. APPLY SCALE TO TOP OF LATCH STRIPPER BAIL.
REQUIREMENT
MIN. 2-3/4 OZS.
MAX. 6 OZS.
TO START LATCH STRIPPER BAIL MOVING.

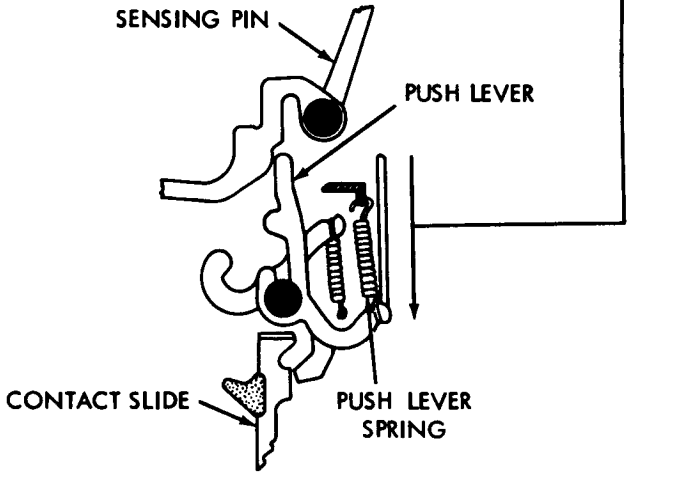


(C) LATCH LEVER SPRING

TO CHECK
SELECT BLANK COMBINATION. TRIP SENSING CLUTCH AND ROTATE SHAFT TO STOP POSITION. APPLY SCALE AT RIGHT ANGLE TO TOP OF LATCH LEVER.
REQUIREMENT
MIN. 1 OZ.
MAX. 3 OZS.
TO START LATCH LEVER MOVING.

NOTE

TAKE CARE NOT TO DAMAGE PUSH LEVER SPRINGS IN CHECKING REQUIREMENT.



(B) PUSH LEVER SPRING

TO CHECK
TRIP CLUTCH AND ROTATE SHAFT UNTIL SENSING PINS ARE IN UPPERMOST POSITION. APPLY SCALE AT RIGHT ANGLE TO EXTREME LOWER END OF PUSH LEVER (SENSING PUSH LEVERS ONLY).
REQUIREMENT
MIN. 1 OZ.
MAX. 2 OZS.
TO START PUSH LEVER MOVING.

NOTE

BE SURE CONTACT SLIDES DO NOT INTERFERE WITH MOVEMENT OF PUSH LEVERS.

FIGURE 1-20. SENSING MECHANISM

(C) TAPE-OUT (6TH) PIN SPRING

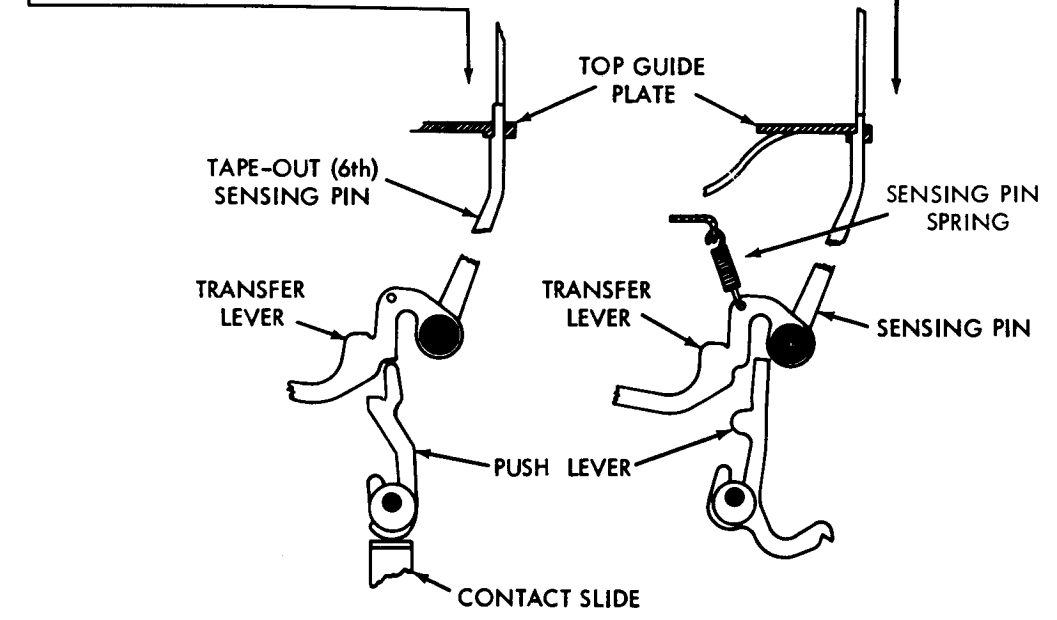
TO CHECK
SENSING HEAD IN LOCKED POSITION, AND TAPE-OUT PIN IN UPPERMOST POSITION. APPLY SCALE IN LINE WITH PIN.
REQUIREMENT
MIN. 1 OZ.
MAX. 2 OZS.
TO MOVE SENSING PIN FLUSH WITH TOP GUIDE PLATE.

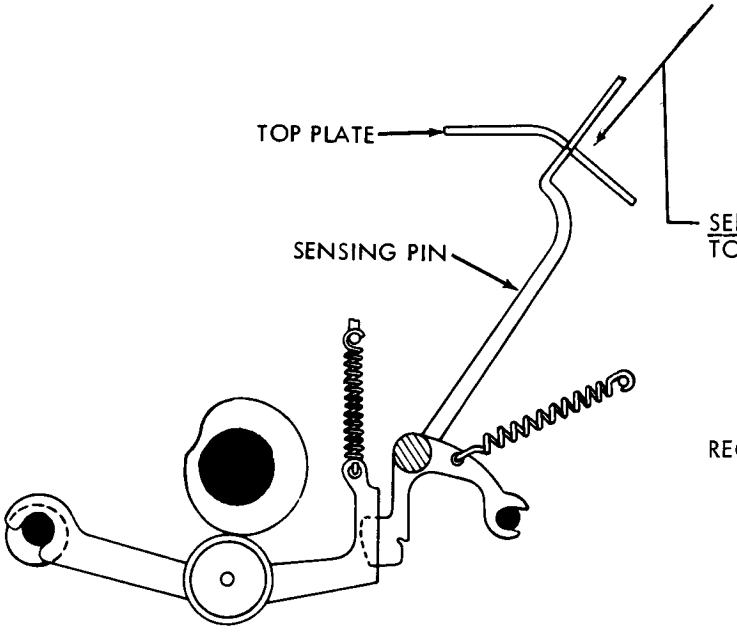
NOTE

WHEN CHECKING THIS SPRING ALLOW THE PUSH LEVER TO REMAIN UNDER THE TRANSFER LEVER.

(B) SENSING PIN SPRINGS (PIVOTED HEAD)

TO CHECK
WITH SENSING HEAD IN LOCKED POSITION, TRIP SENSING CLUTCH AND ROTATE SENSING SHAFT UNTIL SENSING PINS ARE IN UPPERMOST POSITION. WHILE HOLDING PUSH LEVERS AWAY FROM TRANSFER LEVER, APPLY SCALE IN LINE WITH PIN.
REQUIREMENT
MIN. 3 OZS.
MAX. 4 OZS.
TO MOVE SENSING PINS FLUSH WITH TOP GUIDE PLATE.





SENSING PIN SPRING (FIXED HEAD)

TO CHECK
WITH UNIT IN UPRIGHT POSITION, TRIP SENSING CLUTCH AND ROTATE SENSING SHAFT UNTIL SENSING PINS ARE IN UPPERMOST POSITION. WHILE HOLDING PUSH LEVERS AWAY FROM TRANSFER LEVER, APPLY SCALE IN LINE WITH PIN.
REQUIREMENT
MIN. 2 OZS.
MAX. 3 OZS.
TO MOVE SENSING PINS FLUSH WITH TOP GUIDE PLATE.

FIGURE 1-21. SENSING MECHANISM

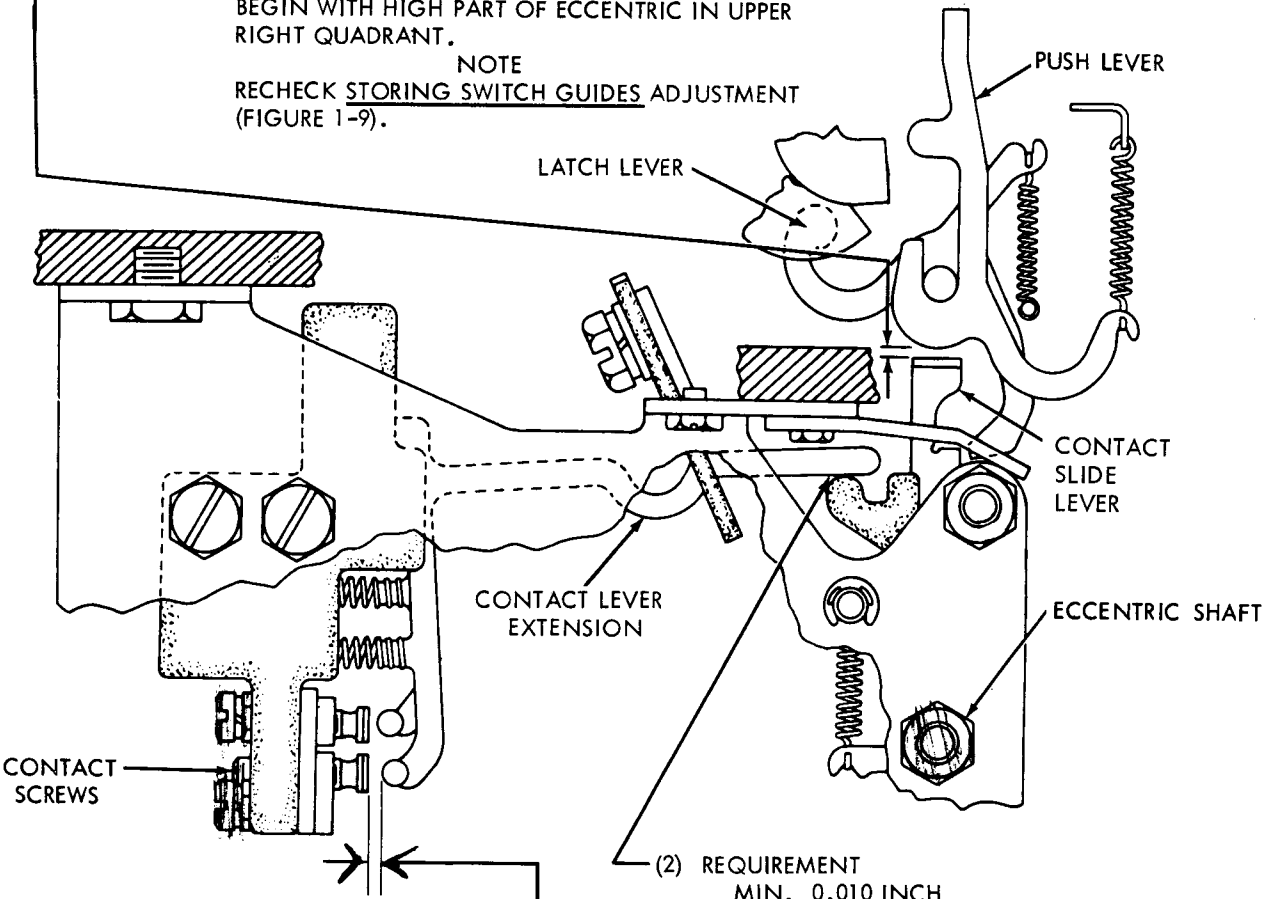
(A) CONTACT SLIDE LEVER

REQUIREMENT
CLEARANCE BETWEEN CLOSEST PUSH LEVER AND CONTACT LEVER SLIDE WHEN SENSING PINS ARE IN UPPERMOST POSITION, PUSH LEVERS ARE SELECTED AND LATCH LEVERS ARE STRIPPED.
MIN. 0.005 INCH
MAX. 0.015 INCH

TO CHECK
TRIP SENSING SHAFT CLUTCH AND ROTATE SHAFT UNTIL SENSING PINS ARE IN UPPERMOST POSITION. TRIP LATCH LEVERS MANUALLY.

TO ADJUST
POSITION ECCENTRIC SHAFT TOWARD THE RIGHT WITH LOCKING NUTS LOOSENED. BEGIN WITH HIGH PART OF ECCENTRIC IN UPPER RIGHT QUADRANT.

NOTE
RECHECK STORING SWITCH GUIDES ADJUSTMENT (FIGURE 1-9).



(B) STORING SWITCH CONTACT

(1) REQUIREMENT
BLANK COMBINATION SELECTED, CLUTCH TRIPPED, AND SHAFT ROTATED ONE REVOLUTION TO STOP POSITION.
MIN. 0.015 INCH
MAX. 0.020 INCH
GAP BETWEEN EACH CONTACT LEVER EXTENSION AND ITS CONTACT SCREW.

TO ADJUST
ROTATE INDIVIDUAL CONTACT SCREW

(2) REQUIREMENT
MIN. 0.010 INCH
CLEARANCE BETWEEN CONTACT SLIDE AND CONTACT LEVER EXTENSION (SENSING PIN CONTACTS ONLY)

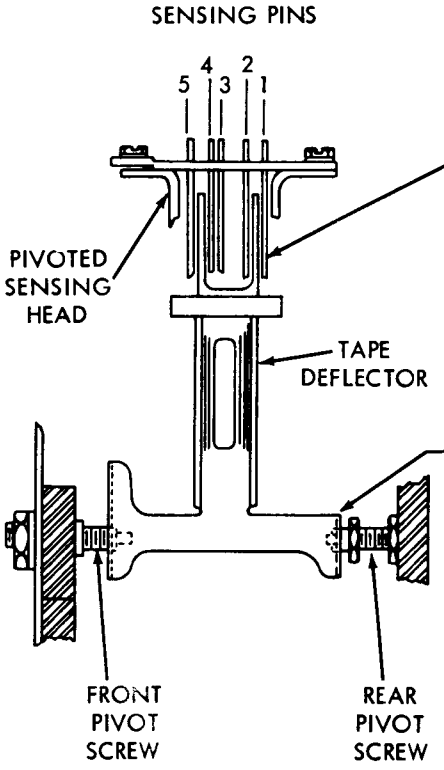
TO CHECK
ROTATE SHAFT TO STRIP PUSHERS, BUT NOT LATCH LEVERS.

TO ADJUST
REFINE REQUIREMENT (1).

NOTE
TO GAUGE TAPE-OUT (6TH) PIN, ROTATE SHAFT UNTIL SENSING PINS ARE IN UPPERMOST POSITION.

NOTE
THE ABOVE REQUIREMENTS ARE FINAL EXCEPT IN LOCATIONS WHERE A DXD OR LSS TEST SET IS AVAILABLE. SEE PARAGRAPH 4. FOR STROB INFORMATION.

FIGURE 1-22. STORING SWITCH MECHANISM



(B) TAPE DEFLECTOR

REQUIREMENT
THE TAPE DEFLECTOR VERTICAL EARS SHOULD PASS FREELY BETWEEN SENSING PINS 1-2 AND 4-5 AS PIVOTED SENSING HEAD IS MOVED AWAY FROM ITS LOCKED POSITION.

TO ADJUST
POSITION TAPE DEFLECTOR WITH FRONT PIVOT SCREW.

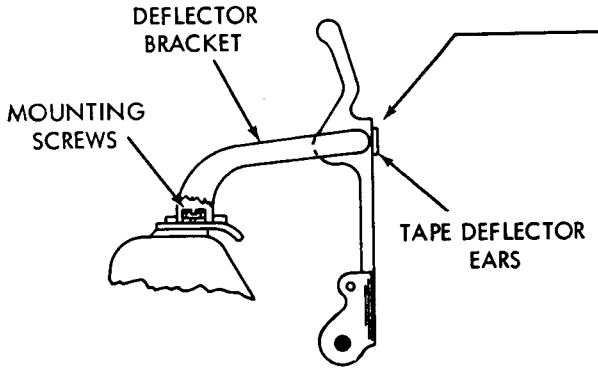
(A) SENSING HEAD PIVOT SCREWS

(1) REQUIREMENT
SENSING YOKE SHALL BE FREE OF BINDS

TO ADJUST
POSITION REAR PIVOT SCREW FOR MINIMUM END PLAY WITHOUT BINDING.

(2) REQUIREMENT
SENSING PINS SHALL MOVE FREELY IN TOP PLATE

TO ADJUST
REFINE REQUIREMENT (1)



(C) TAPE DEFLECTOR BRACKET

REQUIREMENT
ARMS OF DEFLECTOR BRACKET SHALL CONTACT EARS ON TAPE DEFLECTOR SIMULTANEOUSLY WITH SENSING YOKE IN FIXED POSITIONS.

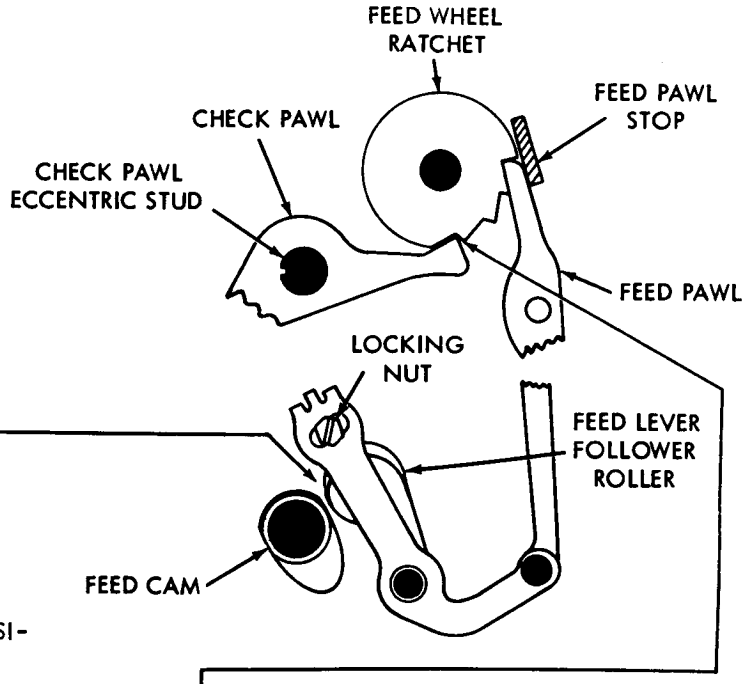
TO ADJUST
POSITION DEFLECTOR BRACKET WITH MOUNTING SCREWS LOOSENED.

FIGURE 1-23. PIVOTED SENSING HEAD

(A) FEED PAWL (PRELIMINARY)

REQUIREMENT
FEED LEVER FOLLOWER ROLLER SHALL BE OFF CAM WHEN FEED PAWL RESTS AGAINST ITS UPWARD STOP.

TO ADJUST
TRIP CLUTCH AND ROTATE SHAFT UNTIL FEED PAWL IS IN ITS UPPER POSITION AND BOTTOMED ON ITS STOP. POSITION ROLLER WITH LOCK NUT LOOSENED.



(B) CHECK PAWL

(1) REQUIREMENT
CHECK PAWL SHALL ENGAGE BOTH TEETH ON RATCHET WITH FEED PAWL IN ITS UP POSITION.

TO ADJUST
ROTATE CHECK PAWL ECCENTRIC STUD.
NOTE: GROOVE ON ECCENTRIC STUD (HIGH PART OF ECCENTRIC) MUST BE ON LEFT SIDE DURING ADJUSTMENT.

(2) REQUIREMENT
FEED WHEEL SHALL NOT MOVE WITH SENSING CLUTCH IN STOP POSITION (FEED PAWL DOWN FULLY).
NOTE: CHECK REQUIREMENT AROUND ENTIRE PERIPHERY OF RATCHET.

TO ADJUST
REFINE REQUIREMENT NO. 1
NOTE: USE SLIGHT PRESSURE ON FEED WHEEL TO PREVENT FALSE INDICATION DUE TO OVER-RIDING CHECK PAWL SPRING.

(C) FEED PAWL (FINAL)

REQUIREMENT
CLEARANCE BETWEEN FEED PAWL AND FEED RATCHET TOOTH WITH CLUTCH IN STOP POSITION.
MIN. 0.030 INCH
MAX. 0.035 INCH

TO ADJUST
REFINE FEED PAWL PRELIMINARY ADJUSTMENT (A).

(D) CHECK PAWL SPRING

REQUIREMENT
WITH SENSING CLUTCH IN STOP POSITION.
MIN. 4-1/2 OZS.
MAX. 8-1/2 OZS.
TO START CHECK PAWL MOVING.

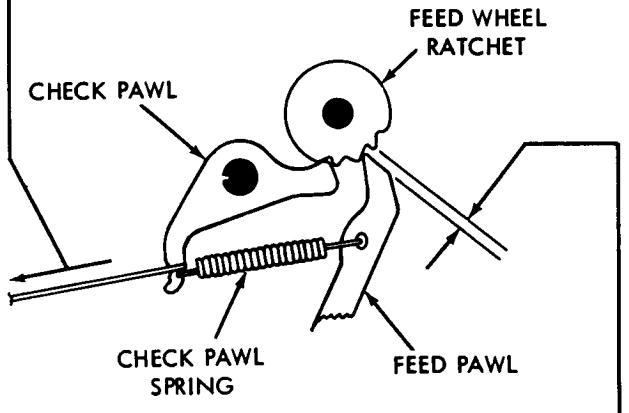


FIGURE 1-24. PIVOTED SENSING HEAD

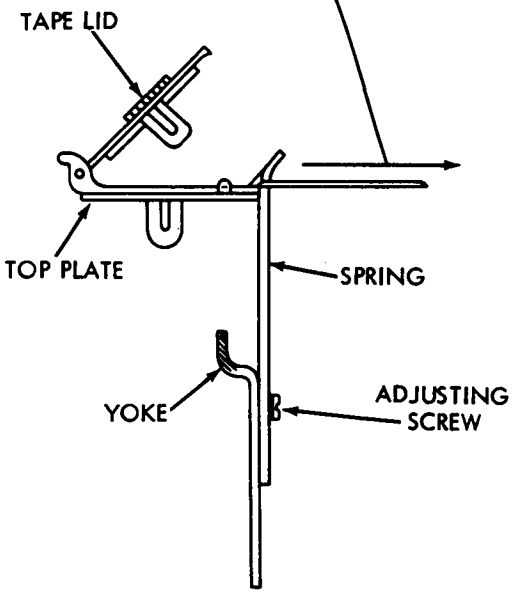
(B) TAPE RETAINING LID LATCH

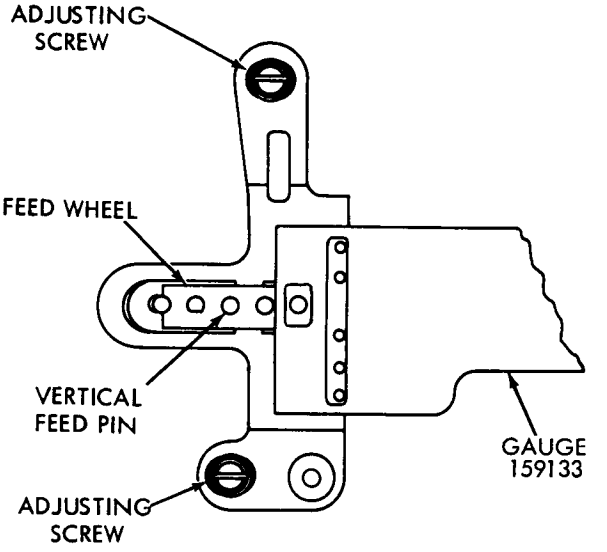
(1) REQUIREMENT
MIN. 8 OZS.
MAX. 14 OZS.
TO START TAPE RETAINING LID LATCH SPRING MOVING AWAY FROM TOP PLATE.
TO ADJUST
BOW LID LATCH SPRING WITH FINGERS. DO NOT REMOVE SPRING FROM YOKE.

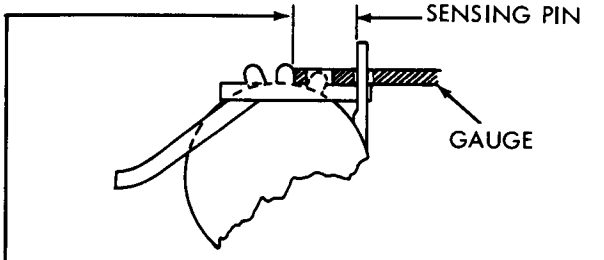
(2) REQUIREMENT
NO PLAY BETWEEN TAPE RETAINING LID AND TOP PLATE WHEN LATCHED.
TO ADJUST
POSITION LID LATCH SPRING WITH ADJUSTING SCREW LOOSENED.

NOTE

BE SURE LID LATCH SPRING ALIGNS WITH LID ON TAPE RETAINING LID.





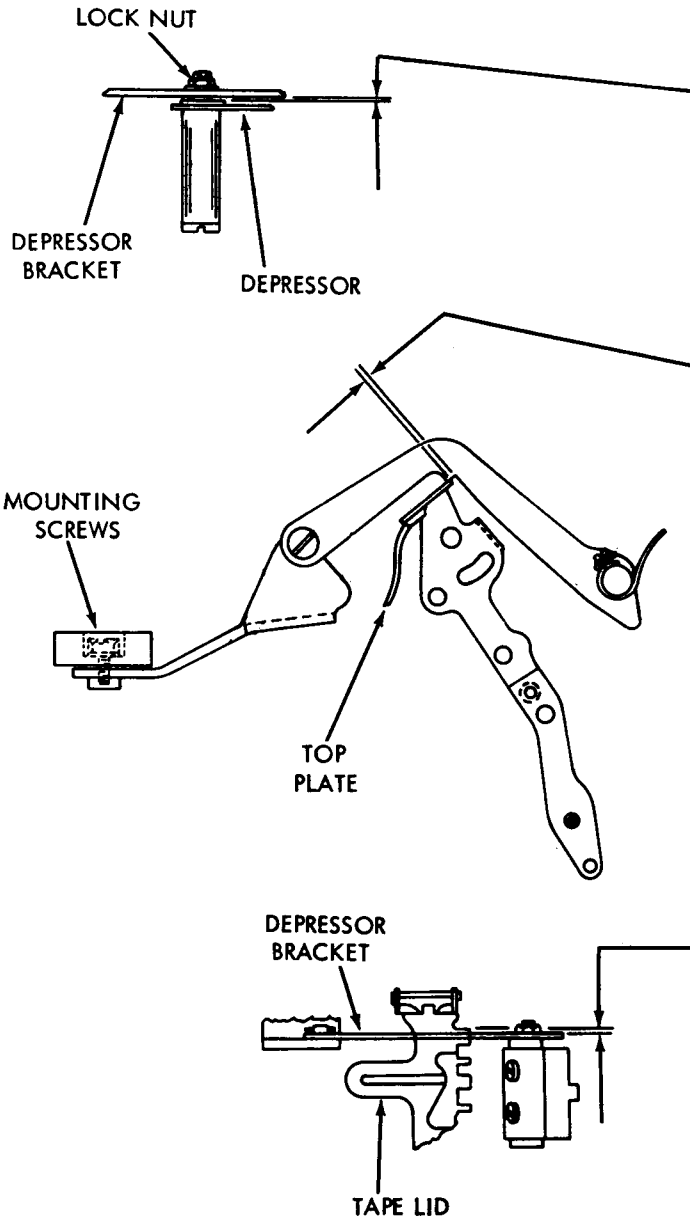


(A) TOP PLATE (PIVOTED HEAD)

(1) REQUIREMENT
SPACING BETWEEN VERTICAL FEED WHEEL PIN AND SENSING PINS. - 0.300 INCH
TO ADJUST
WITH PIVOTED SENSING HEAD AGAINST ITS BACKSTOP, TRIP CLUTCH AND ROTATE SHAFT UNTIL SENSING PINS ARE IN UPPERMOST POSITION. LOOSEN TOP PLATE MOUNTING SCREWS. PLACE GAUGE 159133 ON TOP PLATE. POSITION TOP PLATE UNTIL FRONT EDGE OF GAUGE TOUCHES VERTICAL FEED PINS, AND ALL FIVE SENSING PINS TOUCH REAR EDGE OF GAUGE. RECHECK REQUIREMENT.

(2) REQUIREMENT
TAPE RETAINING LID MUST CENTER OVER TOP PLATE (GAUGE VISUALLY).
TO ADJUST
REFINE REQUIREMENT NO. 1

FIGURE 1-25. PIVOTED SENSING HEAD



(A) TAPE DEPRESSOR

(1) REQUIREMENT
CLEARANCE BETWEEN TAPE DEPRESSOR AND DEPRESSOR BRACKET.
MIN. SOME
MAX. 0.002 INCH
TO ADJUST
POSITION ADJUSTING SCREW AND DEPRESSOR WITH LOCK NUT LOOSENED.

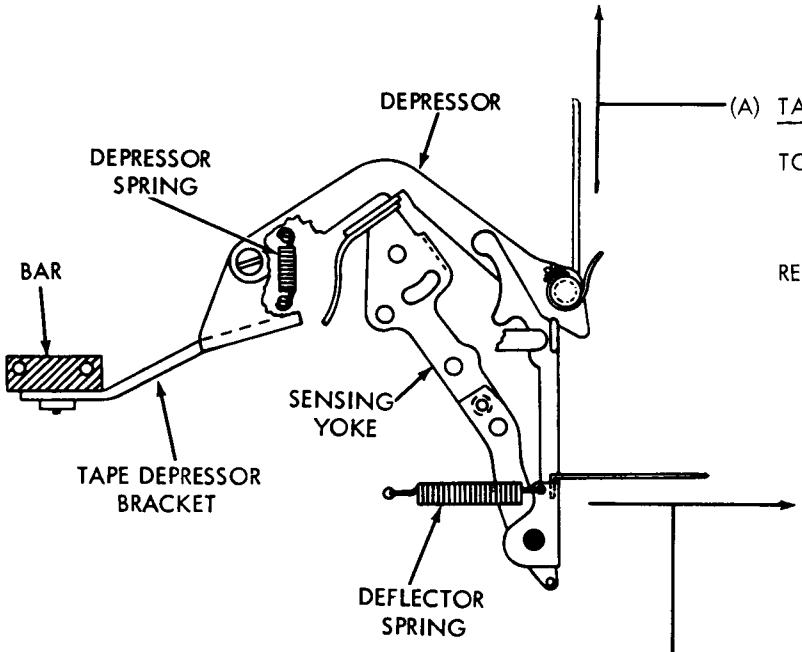
(2) REQUIREMENT
WITH TAPE DEPRESSOR LOCKED ON TOP PLATE, AND PIVOTED YOKE AGAINST ITS TOP, CLEARANCE BETWEEN TAPE DEPRESSOR AND TOP PLATE.
MIN. 0.005 INCH
MAX. 0.015 INCH
TO ADJUST
POSITION TAPE DEPRESSOR WITH MOUNTING SCREWS LOOSENED.

NOTE

WHEN INSTALLED ON REPERFORATOR TRANSMITTER BASE, 0.005 TO 0.020 INCH CLEARANCE IS ACCEPTABLE AFTER PIVOTED READ IS PROPERLY ALIGNED WITH PUNCH BLOCK.

(3) REQUIREMENT
CLEARANCE BETWEEN DEPRESSOR BRACKET AND TAPE LID
MIN. 0.010 INCH
MAX. 0.050 INCH
TO ADJUST
REFINE REQUIREMENT (2).

FIGURE 1-26. TAPE DEPRESSOR



(A) TAPE DEPRESSOR SPRING

TO CHECK
WITH TAPE DEPRESSOR IN LOCKED POSITION, APPLY SCALE TO LIP AT EXTREME RIGHT END OF DEPRESSOR.
REQUIREMENT
MIN. 1/4 OZ.
MAX. 3/4 OZ.
TO START DEPRESSOR MOVING.

(B) TAPE DEFLECTOR SPRING

REQUIREMENT
MIN. 1/4 OZ.
MAX. 1-1/4 OZS.
TO START DEFLECTOR MOVING.

LAST CHARACTER SWITCH SPRING LEAF

REQUIREMENT
MIN. 1/4 OZ.
MAX. 1/2 OZ.
TO JUST OPEN CONTACTS
TO ADJUST
WITH COVER REMOVED, BEND LONG CONTACT SPRING.

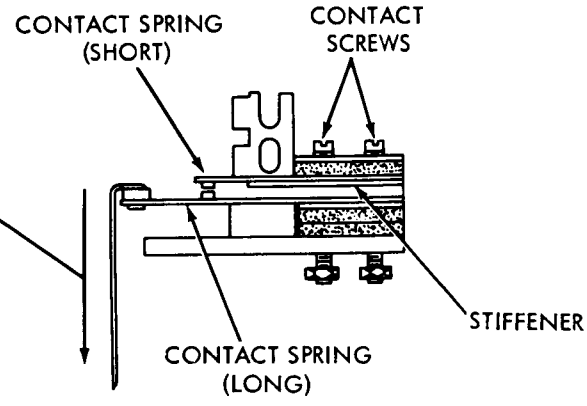


FIGURE 1-27. TAPE DEPRESSOR AND LAST CHARACTER CONTACT

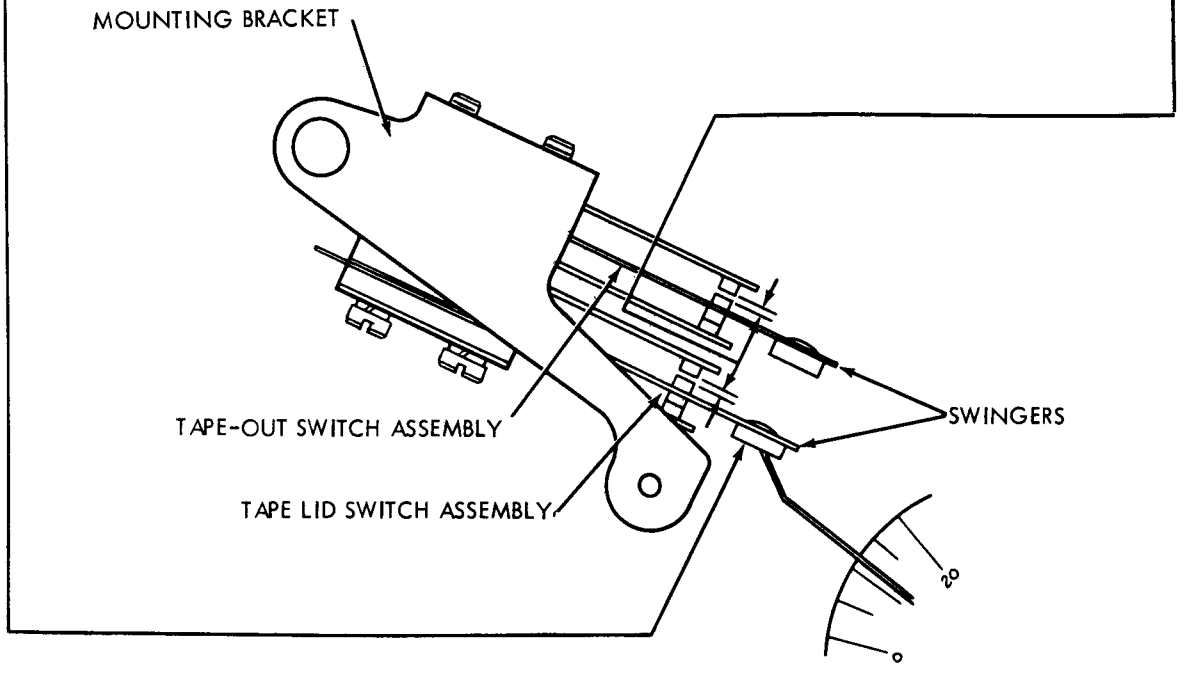
TAPE-OUT AND TAPE LID SWITCH

NOTE

MAKE THIS ADJUSTMENT BEFORE ASSEMBLING SWITCH TO UNIT.

(1) REQUIREMENT
MIN. 8 GRAMS
MAX. 15 GRAMS
TO JUST SEPARATE NORMALLY CLOSED CONTACTS (APPLY SCALE TO CENTER OF NYLON PAD).
TO ADJUST
BEND CONTACT SWINGER WITH A 110445 SPRING BENDER.

(2) REQUIREMENT
MIN. 0.008 INCH
MAX. 0.015 INCH
GAP BETWEEN NORMALLY OPEN CONTACTS.
TO ADJUST
BEND UPPER CONTACT LEAF WITH A 110445 SPRING BENDER.



TO REMOVE TAPE-OUT AND TAPE LID SWITCH ASSEMBLY

(1) REMOVE COVER AND TOP PLATES.
(2) REMOVE 111342 SPRING ATTACHED TO BRACKET ON 158535 GUIDE POST.
(3) LOOSEN SCREW SECURING GUIDE POST TO REAR PLATE.
(4) REMOVE SCREW AND LOCK WASHER FROM FRONT END OF GUIDE POST.
(5) REMOVE ADJUSTING SCREW FROM LOWER END OF SWITCH BRACKET.
(6) GUIDE POST AND SWITCH ASSEMBLY CAN NOW BE REMOVED. TAKE CARD NOT TO DISTORT SWITCH LEAF SPRINGS

TO REPLACE SWITCH ASSEMBLY

REVERSE DISASSEMBLY PROCEDURE.

NOTE

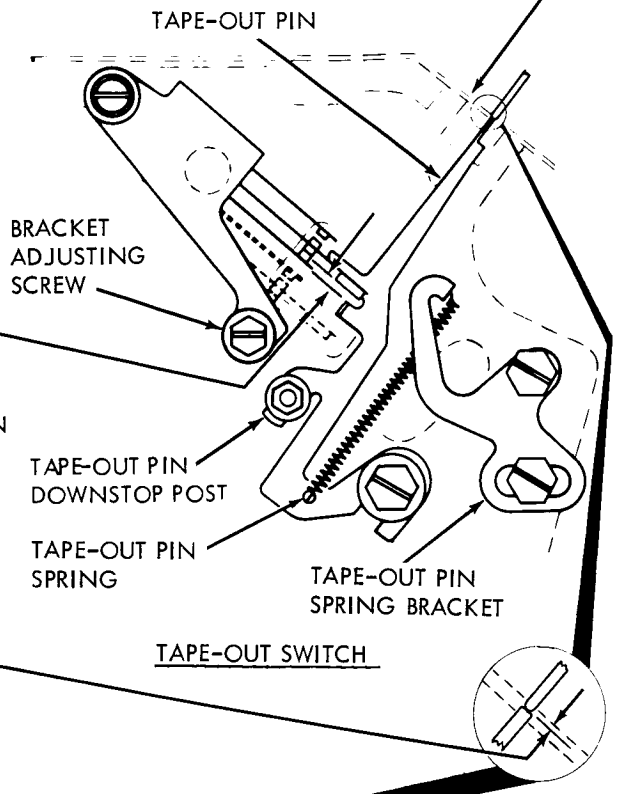
ADJUSTMENTS ON THIS PAGE AND PAGE 1-30 ARE FOR UNITS WITHOUT A CONTROL LEVER. FOR UNITS WITH A CONTROL LEVER, REFER TO PAGES 1-32 AND 1-33.

FIGURE 1-28. TAPE-OUT AND TAPE LID SWITCH.

(B) TAPE-OUT PIN SPRING BRACKET
REQUIREMENT
MIN. 38 GRAMS
MAX. 45 GRAMS
TO DEPRESS TAPE-OUT PIN UNTIL FLUSH WITH TAPE GUIDE PLATE.
TO ADJUST
POSITION TAPE-OUT PIN SPRING BRACKET WITH ITS MOUNTING SCREWS FRICTION TIGHT. TIGHTEN SCREWS AND RECHECK REQUIREMENT.

(A) TAPE-OUT AND TAPE LID SWITCH BRACKET
REQUIREMENT
MIN. 0.006 INCH
MAX. 0.020 INCH
CLEARANCE BETWEEN TAPE-OUT PIN EXTENSION AND CONTACT SWINGER INSULATOR WHEN TAPE-OUT PIN IS HELD DOWN.
TO ADJUST
INSERT A LENGTH OF UN-PERFORATED TAPE UNDER TAPE LID. ADJUST SWITCH BRACKET WITH ITS MOUNTING SCREW LOOSENED.

(C) TAPE-OUT AND TAPE LID PIN DOWNSTOP
REQUIREMENT
WHEN DEPRESSED TO THEIR LOWERMOST POSITIONS, TAPE-OUT AND TAPE LID PINS SHOULD BE FLUSH TO 0.005 INCH BELOW SURFACE OF TAPE GUIDE PLATE.
TO ADJUST
POSITION RESPECTIVE DOWNSTOP POST WITH ITS MOUNTING NUT LOOSENED.



(D) TAPE LID PIN SPRING
REQUIREMENT
MIN. 1-1/2 OZS.
MAX. 3 OZS.
TO MOVE TAPE LID PIN FLUSH WITH TOP SURFACE OF TOP PLATE.

(E) TAPE LID PIN
TO CHECK
REMOVE COVER PLATE
(2) REQUIREMENT
WITH TAPE LID OPEN, AND NORMALLY OPEN CONTACTS CLOSED BY TAPE LID PIN:
MIN. 0.010 INCH
CLEARANCE BETWEEN SHOULDER ON PIN AND BOTTOM SURFACE OF TAPE GUIDE PLATE
(1) REQUIREMENT
WITH TAPE LID CLOSED:
MIN. 0.005 INCH
CLEARANCE BETWEEN TAPE LID PIN AND SWINGER INSULATOR.
TO ADJUST
LOOSEN CLAMP SCREW TO FRICTION TIGHT AND ADJUST TAPE LID PIN BY MEANS OF ITS PRY POINT.

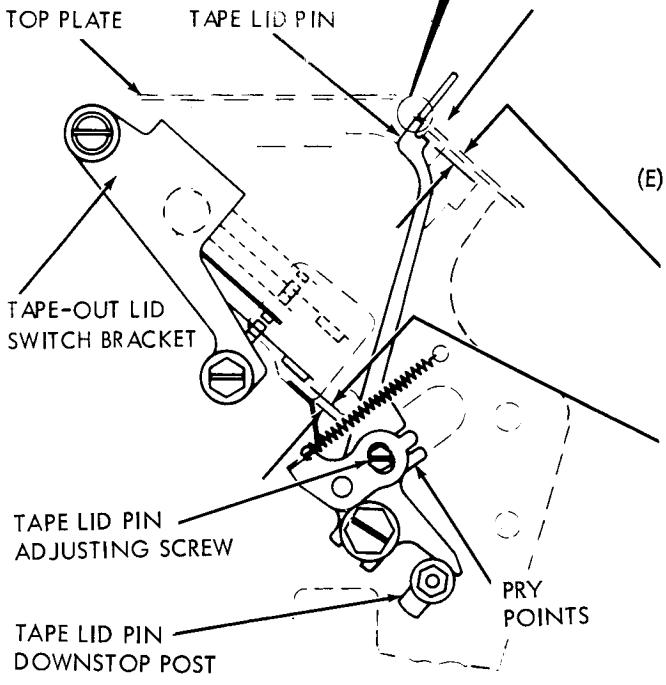


FIGURE 1-29. TAPE-OUT AND TAPE LID PIN MECHANISM

NOTE
FOR ALL ADJUSTMENTS ON THIS PAGE, CONTROL LEVER (IF PRESENT) MUST BE IN RUN POSITION

(D) TIGHT TAPE BAIL YIELD SPRING
TO CHECK
OPEN TAPE LID. HOLD SWITCH ACTUATOR IN POSITION WITH FINGERS.
REQUIREMENT
MIN. 2 OZS.
MAX. 3-1/2 OZS.
TO SEPARATE BAILS.

(C) TIGHT TAPE ARM
REQUIREMENT
TIGHT TAPE SWITCH CONTACTS SHOULD OPEN WHEN TIGHT TAPE ARM IS RAISED:
MIN. 0.045 INCH
MAX. 0.075 INCH
ABOVE TAPE GUIDE PLATE.
TO ADJUST
WITH CLAMP SCREW FRICTION TIGHT, POSITION BAILS, BY MEANS OF PRY POINT, TO MEET REQUIREMENT.

(A) TIGHT TAPE SWITCH BRACKET
TO CHECK
LOOSEN CLAMP SCREW, AND MOVE TIGHT TAPE ARM ADJUSTMENT TO CENTER OF ITS RANGE.
REQUIREMENT (PRELIMINARY)
MIN. 0.006 INCH
MAX. 0.015 INCH
CLEARANCE BETWEEN SWITCH ACTUATOR AND BAKELITE PAD ON SWINGER.
REQUIREMENT (FINAL)
AFTER COMPLETION OF TIGHT TAPE ARM ADJUSTMENT.
MIN. 0.006 INCH
CLEARANCE BETWEEN SWITCH ACTUATOR AND BAKELITE PAD.
TO ADJUST
WITH SWITCH BRACKET MOUNTING SCREWS FRICTION TIGHT, POSITION BRACKET. TIGHTEN SCREWS AND RECHECK REQUIREMENT.

(B) TIGHT TAPE SWITCH
NOTE
MAKE THIS ADJUSTMENT BEFORE ASSEMBLING SWITCH TO UNIT.
(1) REQUIREMENT
MIN. 0.050 INCH
MAX. 0.070 INCH
CLEARANCE BETWEEN SWITCH BACKSTOP AND BAKELITE PAD ON SWINGER WHEN SWITCH CONTACTS ARE CLOSED.
TO ADJUST
BEND SWITCH BACKSTOP WITH 110455 SPRING BENDER.

(2) REQUIREMENT
MIN. 3 OZS.
MAX. 4 OZS.
TO JUST SEPARATE CONTACTS.
TO ADJUST
BEND CONTACT SWINGER WITH A 110455 SPRING BENDER.

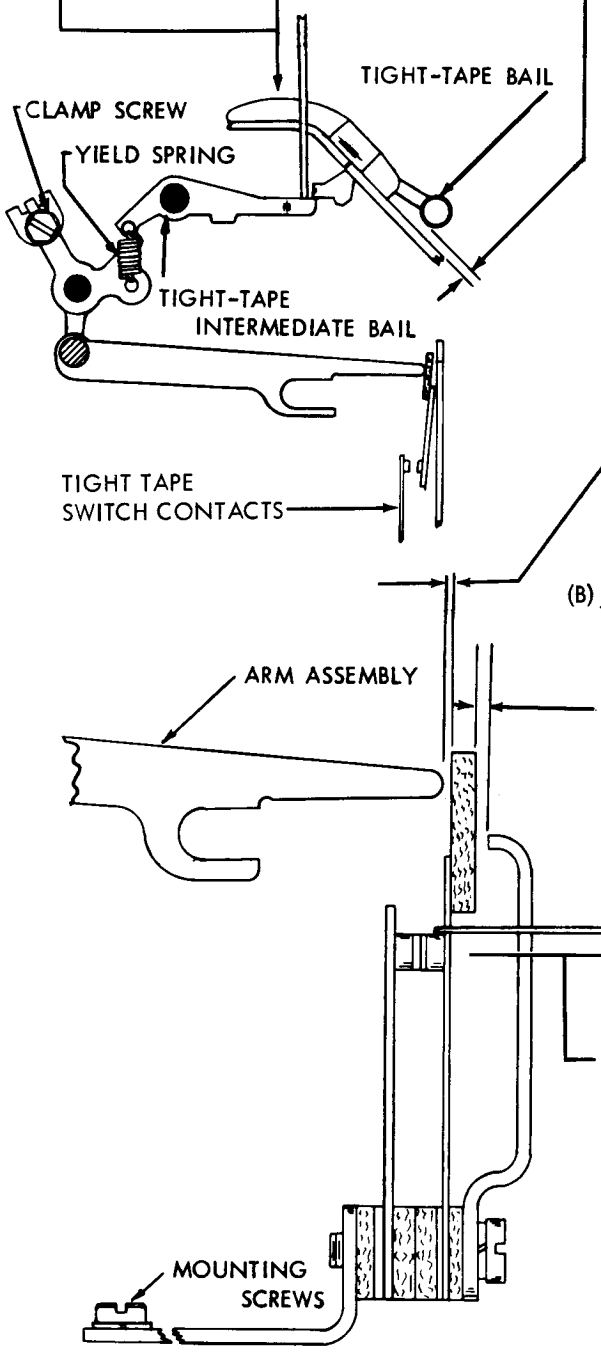
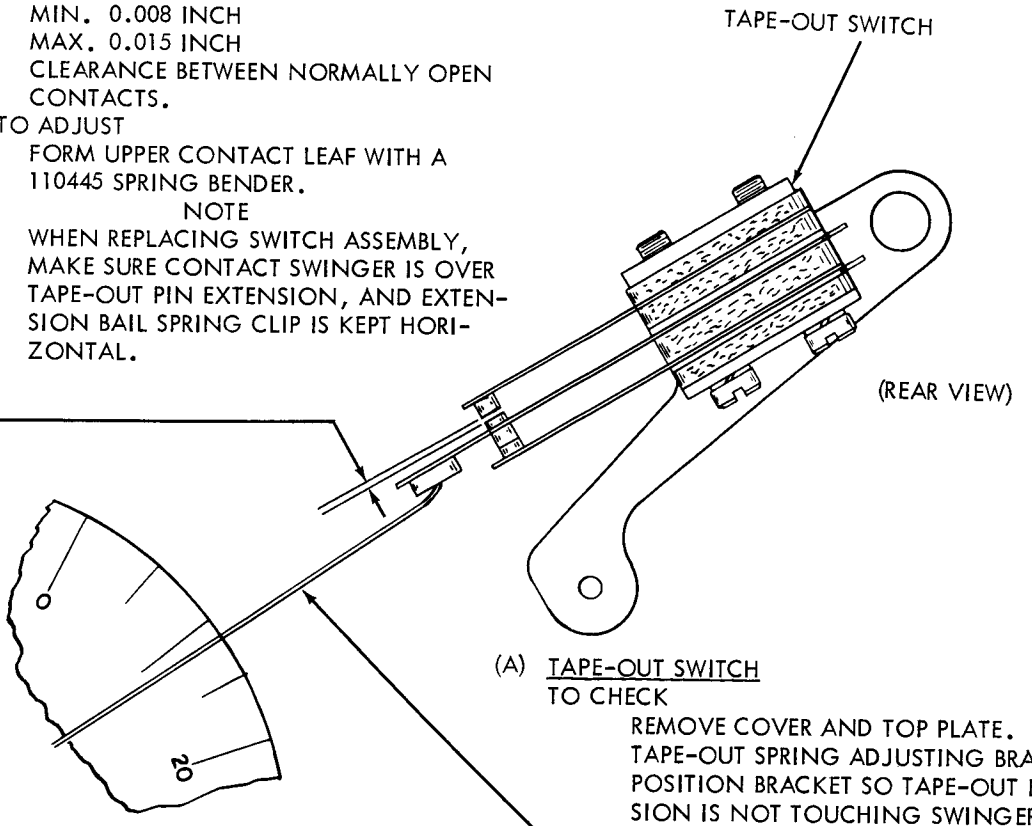


FIGURE 1-30. TIGHT TAPE SWITCH ASSEMBLY

(2) REQUIREMENT
MIN. 0.008 INCH
MAX. 0.015 INCH
CLEARANCE BETWEEN NORMALLY OPEN CONTACTS.
TO ADJUST
FORM UPPER CONTACT LEAF WITH A 110445 SPRING BENDER.
NOTE
WHEN REPLACING SWITCH ASSEMBLY, MAKE SURE CONTACT SWINGER IS OVER TAPE-OUT PIN EXTENSION, AND EXTENSION BAIL SPRING CLIP IS KEPT HORIZONTAL.



(A) TAPE-OUT SWITCH
TO CHECK
REMOVE COVER AND TOP PLATE. LOOSEN TAPE-OUT SPRING ADJUSTING BRACKET. POSITION BRACKET SO TAPE-OUT EXTENSION IS NOT TOUCHING SWINGER PAD.
(1) REQUIREMENT
MIN. 8 GRAMS
MAX. 15 GRAMS
TO JUST SEPARATE NORMALLY CLOSED CONTACTS (SCALE AT CENTER OF SWINGER PAD).
TO ADJUST
DISCONNECT TAPE-OUT EXTENSION BAIL. REMOVE SWITCH ASSEMBLY (SEE FIGURE 1-28). FORM CONTACT SWINGER WITH A 110445 SPRING BENDER.

(B) TAPE-OUT PIN
(1) REQUIREMENT
WHEN CONTROL LEVER IS IN FREE WHEEL OR STOP POSITION, TAPE-OUT PIN SHOULD BE FLUSH TO 0.010 INCH BELOW SURFACE OF TAPE GUIDE PLATE.
TO ADJUST
POSITION TAPE-OUT PIN DOWNSTOP WITH ITS MOUNTING NUT LOOSENED.
(2) REQUIREMENT
WITH CONTROL LEVER IN RUN POSITION:
MIN. 0.055 INCH
CLEARANCE BETWEEN TAPE-OUT PIN EXTENSION AND CONTROL LEVER BAIL EXTENSION.
TO ADJUST
POSITION EXTENSION BAIL WITH ITS MOUNTING SCREW LOOSENED.

(C) TAPE-OUT SWITCH BRACKET
TO CHECK
INSERT PIECE OF UN-PERFORATED TAPE UNDER TAPE LID.
REQUIREMENT
MIN. 0.006 INCH
MAX. 0.020 INCH
CLEARANCE BETWEEN TAPE-OUT PIN EXTENSION AND CONTACT SWINGER PAD.
TO ADJUST
POSITION SWITCH BRACKET WITH ITS MOUNTING SCREW LOOSENED.

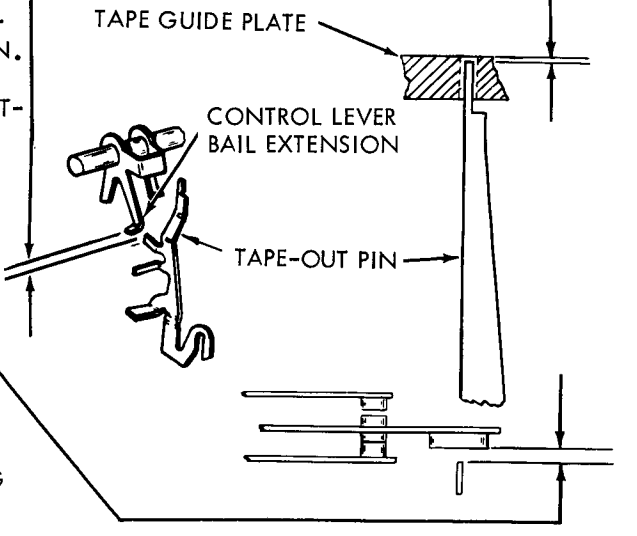


FIGURE 1-31. TAPE-OUT SWITCH ASSEMBLY

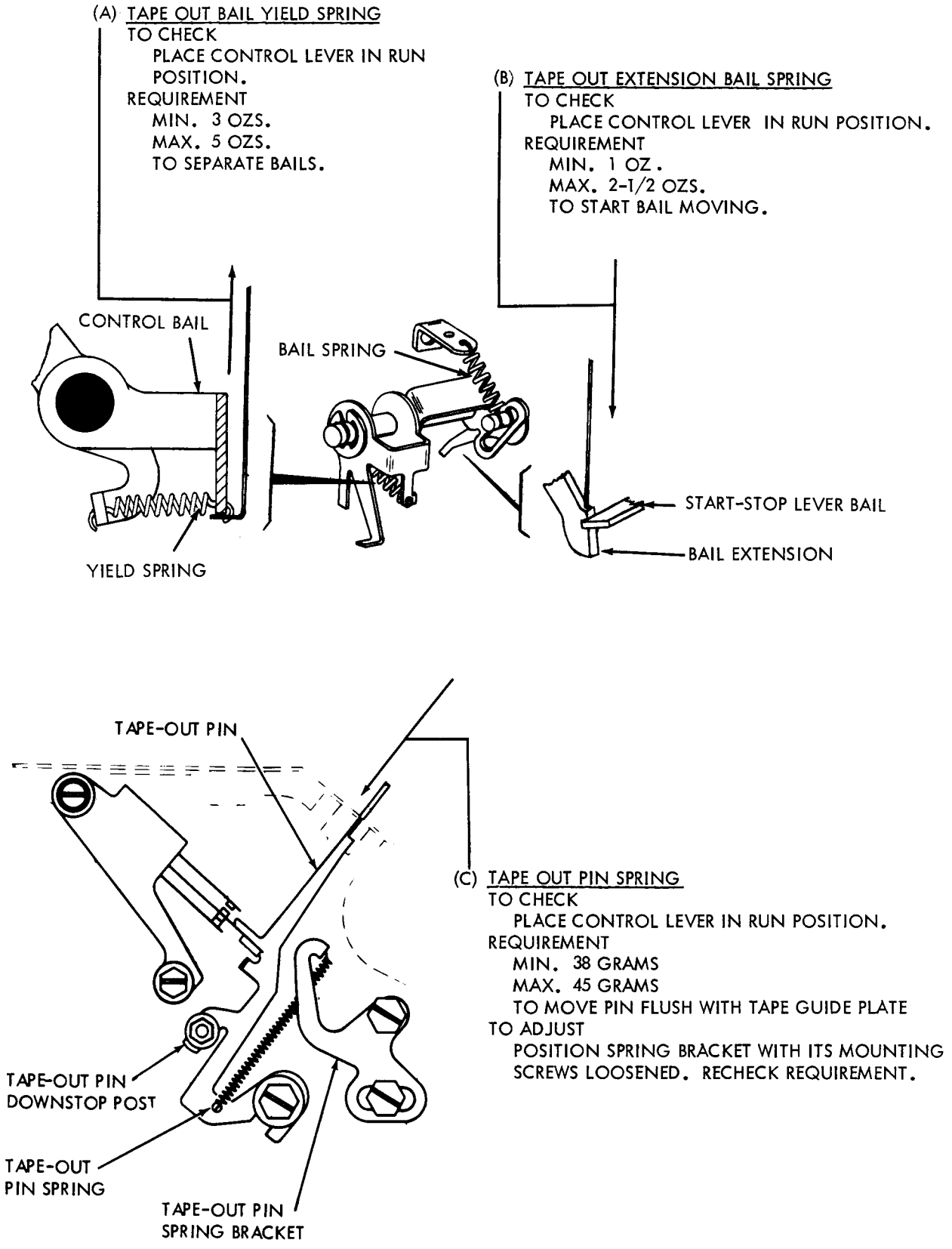
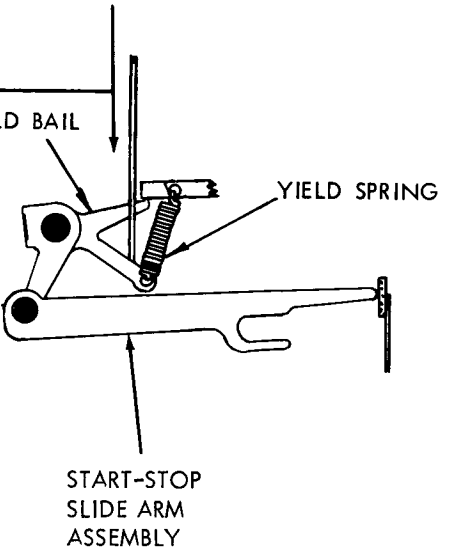


FIGURE 1-32. TAPE-OUT PIN AND BAIL ASSEMBLY

START-STOP BAIL YIELD SPRING

TO CHECK
PLACE CONTROL LEVER IN RUN POSITION

REQUIREMENT
MIN. 4 OZS.
MAX. 6 OZS.
TO SEPARATE BAILS.



CONTROL LEVER SWITCH BRACKET

(1) REQUIREMENT
WITH CONTROL LEVER IN RUN POSITION:
MIN. 0.006 INCH
MAX. 0.015 INCH
CLEARANCE BETWEEN SWITCH ACTUATOR AND BAKELITE PAD ON SWINGER.

(2) REQUIREMENT
START-STOP AND TIGHT TAPE SWITCH ACTUATORS SHOULD FULLY ENGAGE BAKELITE PAD ON SWINGER.

TO ADJUST
POSITION SWITCH BRACKET WITH ITS MOUNTING SCREWS LOOSENED.

NOTE
IF TIGHT TAPE SWITCH ACTUATOR RESTS AGAINST BAKELITE PAD, HOLD ACTUATOR AWAY.

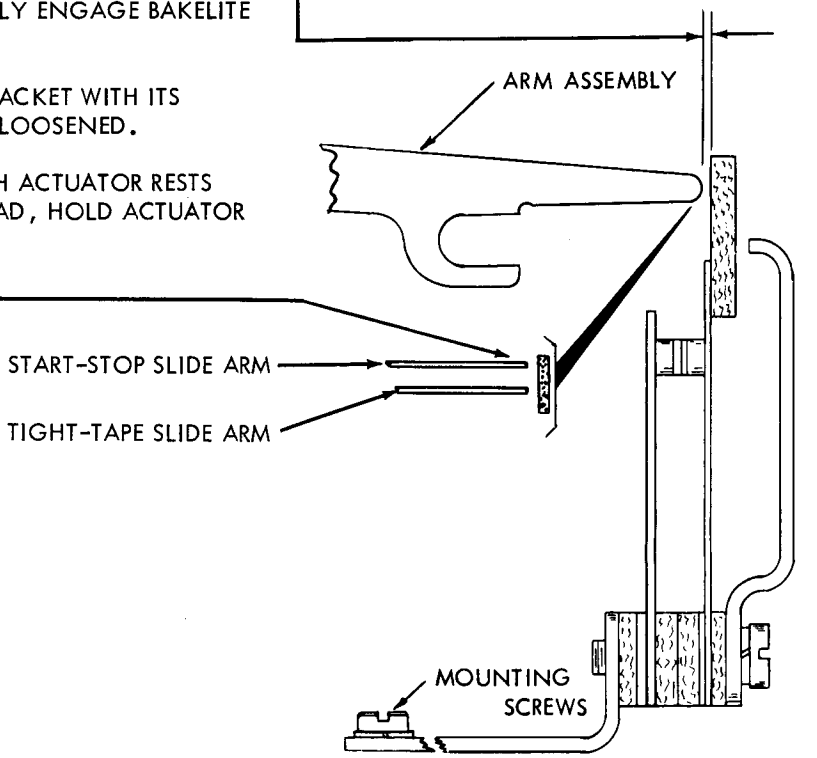


FIGURE 1-33. START-STOP SWITCH ASSEMBLY

NOTE

WHEN THIS EQUIPMENT IS USED ON THE ASR SET, THE FOLLOWING ADJUSTMENTS (FIGURES 1-34, 35, 36, 37, AND 38) COVER THE RELATIONSHIP BETWEEN THE PIVOTED HEAD TRANSMITTER DISTRIBUTOR AND THE TYPING OR NON-TYPING REPERFORATOR.

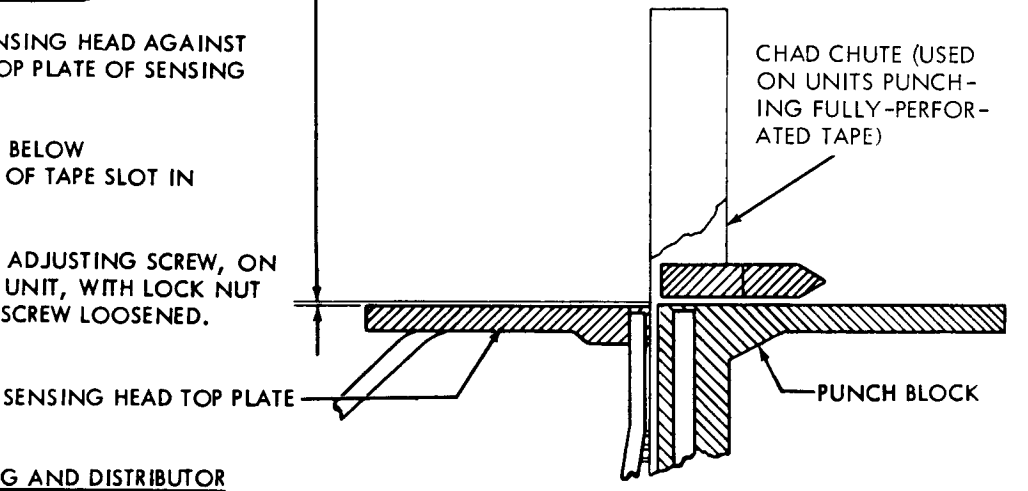
VERTICAL ALIGNMENT OF PIVOTED SENSING HEAD AND PUNCH

REQUIREMENT

WITH PIVOTED SENSING HEAD AGAINST PUNCH BLOCK, TOP PLATE OF SENSING HEAD SHOULD BE
MIN. FLUSH
MAX. 0.010 INCH BELOW
BOTTOM SURFACE OF TAPE SLOT IN PUNCH BLOCK.

TO ADJUST

POSITION HEIGHT ADJUSTING SCREW, ON SENSING END OF UNIT, WITH LOCK NUT AND MOUNTING SCREW LOOSENED.



TRANSMITTER DRIVING AND DISTRIBUTOR SHAFT DRIVEN GEAR MESH

REQUIREMENT

SOME BACKLASH
MAX. 0.003 INCH
BETWEEN DISTRIBUTOR SHAFT DRIVEN GEAR ON TRANSMITTER AND TRANSMITTER DRIVING GEAR ON BASE. CHECK THROUGHOUT ONE COMPLETE REVOLUTION OF LARGER GEAR.

TO ADJUST

POSITION TWO HEIGHT ADJUSTING SCREWS, ON DISTRIBUTOR END OF UNIT, WITH LOCK NUTS AND MOUNTING SCREWS LOOSENED. TURN SCREWS EVENLY TO MAINTAIN PARALLELISM BETWEEN UNITS. RECHECK VERTICAL ALIGNMENT OF PIVOTED SENSING HEAD AND PUNCH.

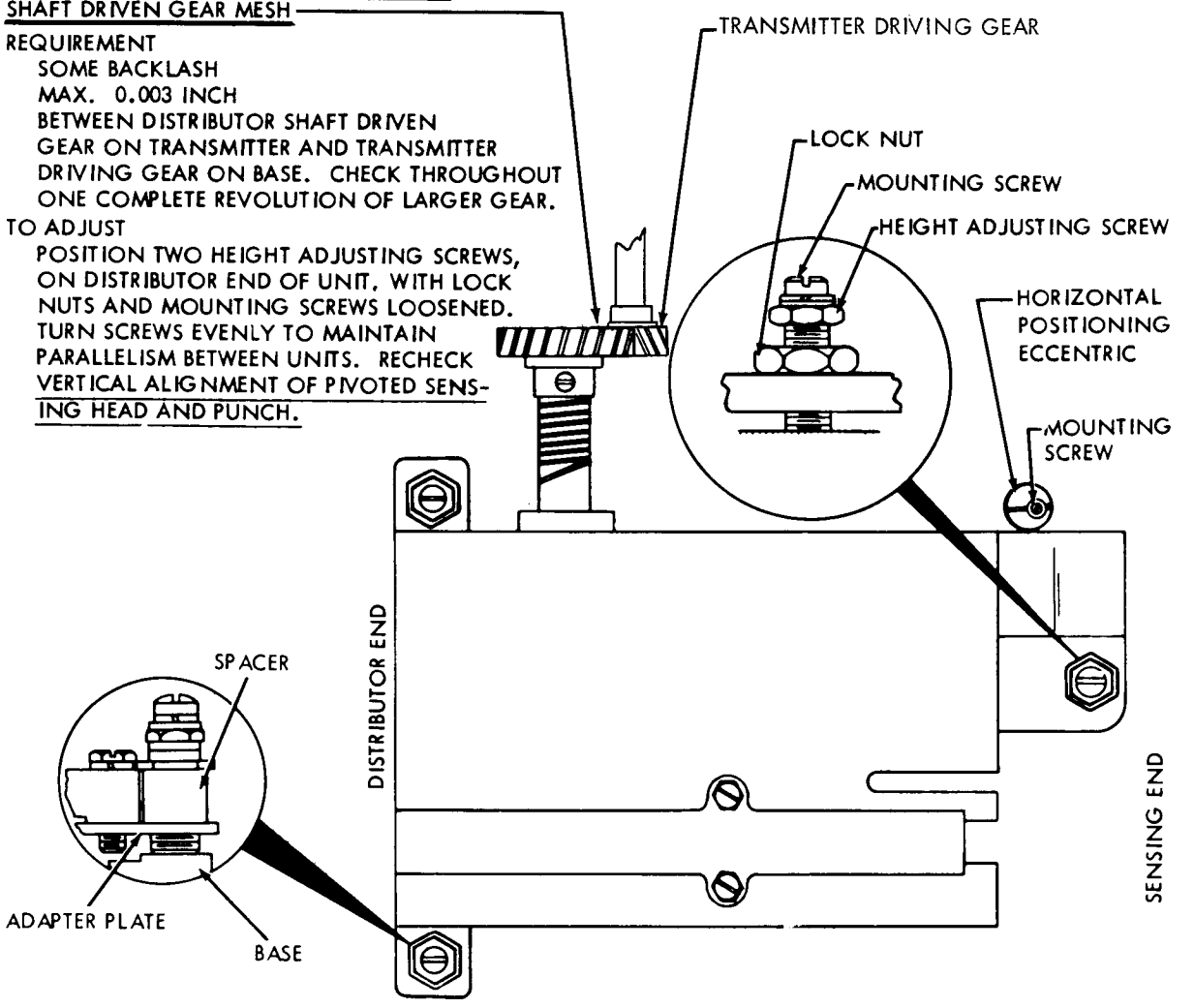
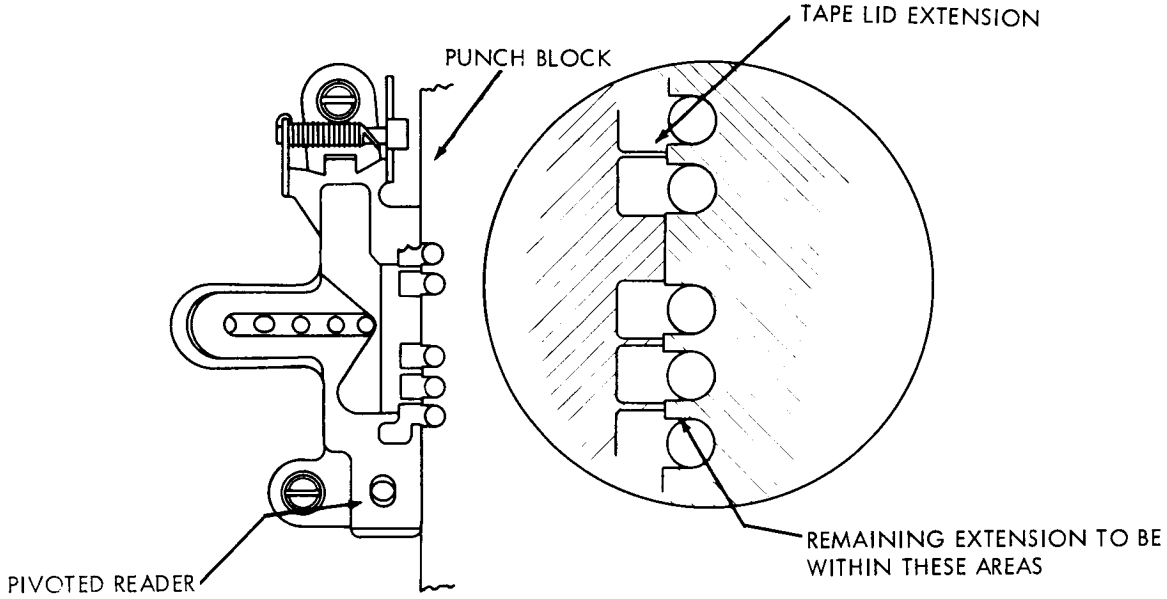


FIGURE 1-34. INTERRELATED ADJUSTMENTS



HORIZONTAL ALIGNMENT OF PIVOTED SENSING HEAD AND PUNCH

REQUIREMENT

WHEN ONE TAPE LID EXTENSION IS CENTERED ON RESPECTIVE AREA BETWEEN PUNCH PIN SLOTS, REMAINING EXTENSIONS SHOULD BE FULLY WITHIN THEIR RESPECTIVE AREAS.

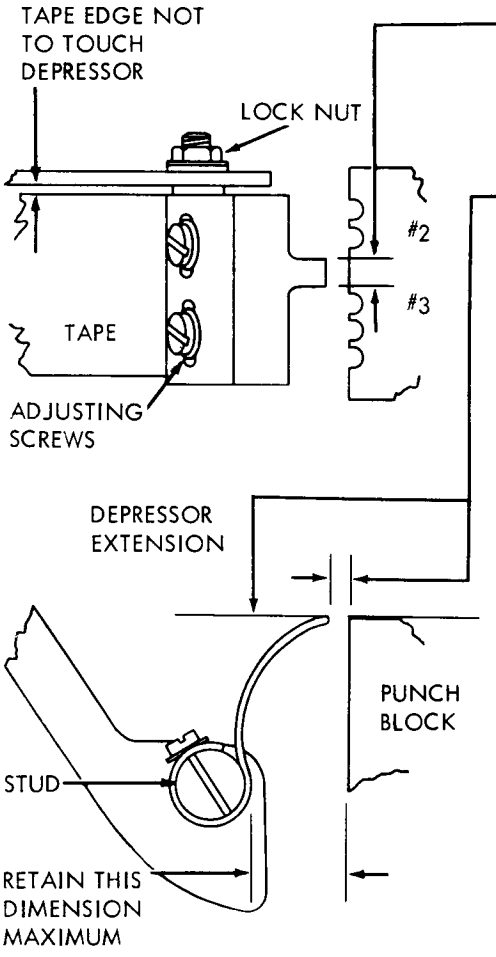
TO ADJUST

LOOSEN TRANSMITTER DISTRIBUTOR AND HORIZONTAL POSITIONING ECCENTRIC MOUNTING SCREWS. SHIFT UNIT TO MEET REQUIREMENT. TIGHTEN UNIT MOUNTING SCREWS. POSITION ECCENTRIC AGAINST REAR PLATE OF TRANSMITTER DISTRIBUTOR AND TIGHTEN ITS MOUNTING SCREW.

NOTE

IT MAY BE NECESSARY TO POSITION THE REPERFORATOR UNIT IF THE REQUIREMENT CANNOT BE MET BY THE ADJUSTMENT OF THE TRANSMITTER DISTRIBUTOR. IF NECESSARY, POSITION THE REPERFORATOR IN THE SAME MANNER AS THE TRANSMITTER DISTRIBUTOR.

FIGURE 1-35. INTERRELATED ADJUSTMENTS



TAPE DEPRESSOR (CHADLESS TAPE)

(1) REQUIREMENT
TIP OF DEPRESSOR EXTENSION CENTERED BETWEEN #2 AND #3 PUNCH PIN SLOTS IN PUNCH BLOCK.
TO ADJUST
POSITION DEPRESSOR EXTENSION WITH ITS ADJUSTING SCREWS LOOSENED.

(2) REQUIREMENT
DEPRESSOR EXTENSION POSITIONED BELOW TOP SURFACE OF PUNCH BLOCK:
MIN. FLUSH
MAX. 0.060 BELOW
AND CLEARANCE BETWEEN TAPE DEPRESSOR EXTENSION AND PUNCH BLOCK:
MIN. 0.040 INCH
MAX. 0.080 INCH
TO ADJUST
POSITION BY MOVING TAPE DEPRESSOR EXTENSION ANGULARLY AND/OR HORIZONTALLY WITH LOCK NUT ON DEPRESSOR LOOSENED.

NOTE (1)

IF REQUIREMENT (2) IS STILL NOT MET, ROTATE BAR AT TOP OF TRANSMITTER DISTRIBUTOR (TO WHICH DEPRESSOR BRACKET IS SECURED) WITH ITS MOUNTING SCREWS LOOSENED. MAKE SURE CLEARANCE BETWEEN PUNCH BLOCK AND DEPRESSOR EXTENSION (AT MOUNTING STUD) IS MAXIMUM POSSIBLE WHILE STILL MEETING REQUIREMENT. RE-CHECK OIL RESERVOIR ADJUSTMENT, FIGURE 1-19.

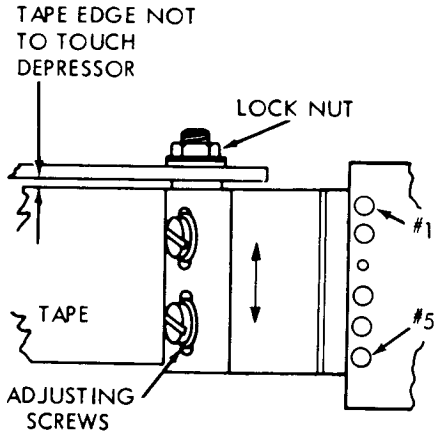
NOTE (2)

CHECK THE FOLLOWING AFTER COMPLETION OF THE ABOVE ADJUSTMENTS:

(1) WITH THE TAPE FOLLOWING ITS NORMAL PATH, AND THE PIVOTED SENSING HEAD APPROXIMATELY 15 CHARACTERS AWAY FROM THE PUNCH BLOCK, THE EDGE OF THE TAPE SHOULD NOT TOUCH THE DEPRESSOR.
TO ADJUST, REFINE THE TAPE DEPRESSOR ADJUSTMENT, FIGURE 1-27.

(2) WITH THE TAPE FOLLOWING ITS NORMAL PATH, REPERFORATOR RUNNING, AND PIVOTED TRANSMITTER IN THE IDLE LINE CONDITION, THE DEPRESSOR SHOULD GUIDE THE TAPE TO THE TAPE WEDGES TO INSURE POSITIVE STUFFING OF THE TAPE INTO THE TAPE STORAGE BIN. RE-ADJUST THE DEPRESSOR EXTENSION IF NECESSARY.

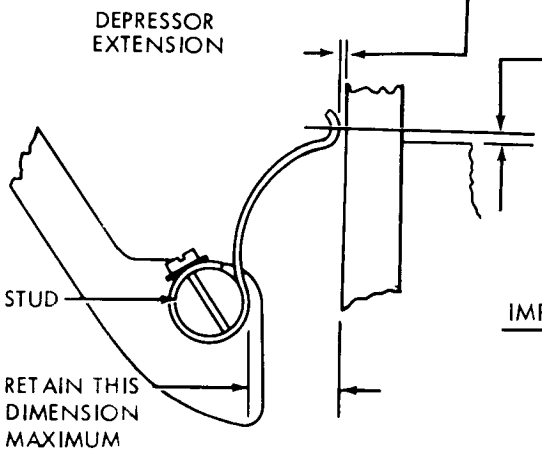
FIGURE 1-36. INTERRELATED ADJUSTMENTS



TAPE DEPRESSOR (FULLY - PERFORATED TAPE)

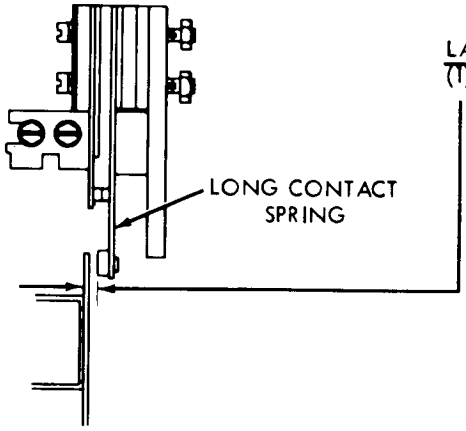
(1) REQUIREMENT (WITH CHAD CHUTE REMOVED)
DEPRESSOR EXTENSION CENTERED WITH RESPECT TO #1 AND #5 PUNCH PIN HOLES IN PUNCH BLOCK.
TO ADJUST
POSITION DEPRESSOR EXTENSION WITH ITS ADJUSTING SCREWS LOOSENED.

(2) REQUIREMENT (REPLACE CHAD CHUTE)
CLEARANCE BETWEEN TAPE DEPRESSOR EXTENSION AND CHAD CHUTE:
MIN. SOME
MAX. 0.010 INCH



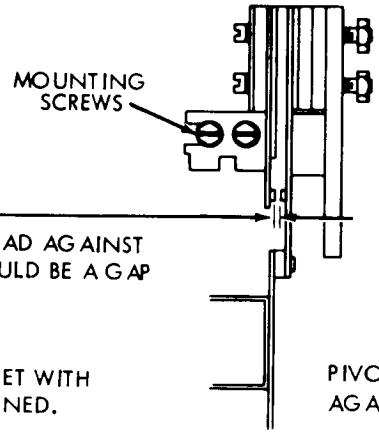
REQUIREMENT
DEPRESSOR EXTENSION CONTACTS CHAD CHUTE FRONT PLATE APPROXIMATELY 0.125 INCHES ABOVE TAPE GUIDE PLATE.
TO ADJUST
POSITION BY MOVING TAPE DEPRESSOR EXTENSION ANGULARLY AND/OR HORIZONTALLY WITH LOCK NUT ON DEPRESSOR LOOSENED.

IMPORTANT --- REFER TO NOTES (1) AND (2), FIGURE 1-36



LAST CHARACTER CONTACT SWITCH

(1) REQUIREMENT
WITH CONTACT SWITCH COVER REMOVED, TAPE INSERTED IN PUNCH UNIT AND PIVOTED SENSING HEAD, AND PIVOTED SENSING HEAD POSITIONED ONE CHARACTER AWAY FROM PUNCH BLOCK, THERE SHOULD BE A CLEARANCE BETWEEN TAPE DEFLECTOR EAR AND INSULATOR ON LONG CONTACT SPRING.
MIN. 0.010 INCH
MAX. 0.015 INCH



(2) REQUIREMENT
WITH PIVOTED SENSING HEAD AGAINST PUNCH BLOCK, THERE SHOULD BE A GAP BETWEEN THE CONTACTS.
MIN. 0.005 INCH
TO ADJUST
POSITION CONTACT BRACKET WITH MOUNTING SCREWS LOOSENED.

FIGURE 1-37. INTERRELATED ADJUSTMENTS

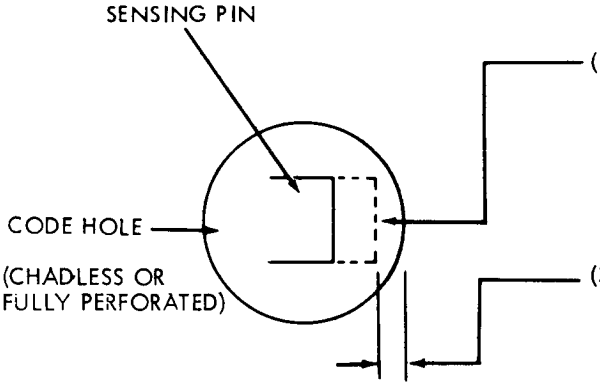
CODE HOLE-SENSING PIN ALIGNMENT

NOTE

ALL PRECEDING ADJUSTMENTS BETWEEN TRANSMITTER DISTRIBUTOR AND TYPING REPERFORATOR SHOULD BE COMPLETED AND REQUIREMENTS MET BEFORE PRECEEDING WITH FOLLOWING ADJUSTMENTS.

TO CHECK

WITH A LOOP OF LETTERS TAPE (PERFORATED UNDER POWER BY THE REPERFORATOR) BETWEEN REPERFORATOR AND TRANSMITTER DISTRIBUTOR, AND PIVOTED SENSING HEAD RESTING AGAINST ITS BACKSTOP, MANUALLY TRIP SENSING SHAFT CLUTCH AND ROTATE SHAFT UNTIL SENSING PINS ARE IN THEIR UPPERMOST POSITION.



(1) REQUIREMENT

THE SENSING PINS SHOULD BE APPROXIMATELY CENTERED LATERALLY ON CODE HOLES.

TO ADJUST

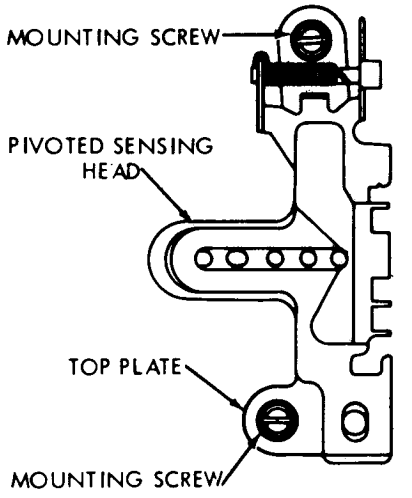
REFINE PUNCH FEED HOLE LATERAL ALIGNMENT (SEE TELETYPE BULLETIN 247B)

(2) REQUIREMENT

SENSING PINS SHOULD BE POSITIONED TOWARD REAR EDGE OF CODE HOLE MIN. 0.008 INCH CLEARANCE BETWEEN PIN AND REAR EDGE. CHECK FIVE PLACES.

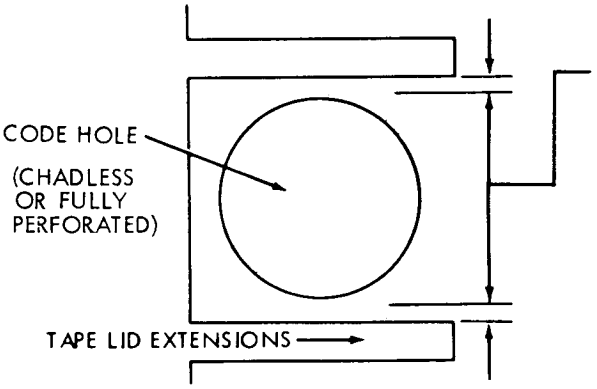
TO ADJUST

CHECK TAPE QUALITY FOR COMPLIANCE WITH 156011 TAPE GUAGE AND, IF NECESSARY, REFINE DETENT ADJUSTMENT (SEE TELETYPE BULLETIN 247B).



NOTE

IF REQUIREMENT STILL IS NOT MET, POSITION PIVOTED SENSING HEAD TOP PLATE IN REQUIRED DIRECTION WITH ITS MOUNTING SCREWS LOOSENED. RECHECK LAST CHARACTER CONTACT SWITCH ADJUSTMENT (FIGURE 1-37).



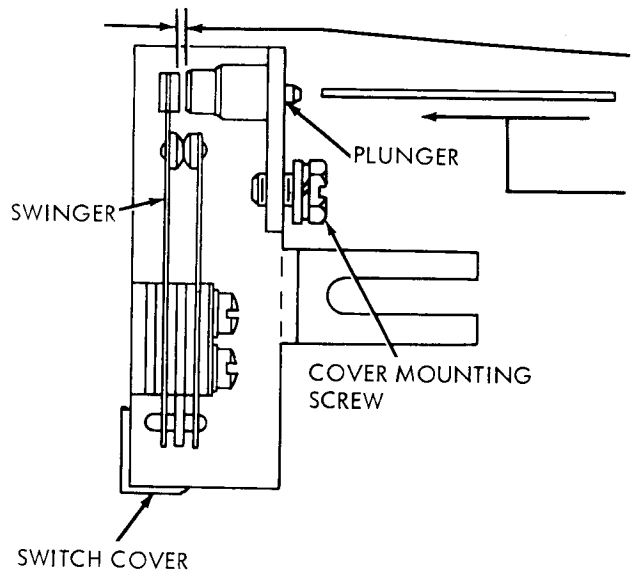
(3) REQUIREMENT

AS CODE HOLES ARE PUNCHED BY SENSING PINS, THERE SHOULD BE SOME CLEARANCE BETWEEN SIDES OF HOLES AND TAPE LID EXTENSIONS. CHECK TEN PLACES.

TO ADJUST

POSITION PIVOTED SENSING HEAD TOP PLATE LATERALLY WITH ITS MOUNTING SCREWS LOOSENED. RECHECK (2).

FIGURE 1-38. INTERRELATED ADJUSTMENTS



(A) LAST CHARACTER CONTACT LEAF SPRING (ENCLOSED)

TO CHECK

REMOVE SWITCH COVER.

(1) REQUIREMENT

MIN. SOME

MAX. 0.010 INCH

CLEARANCE BETWEEN SWINGER BUTTON AND PLUNGER WHEN CONTACTS ARE CLOSED.

(2) REQUIREMENT

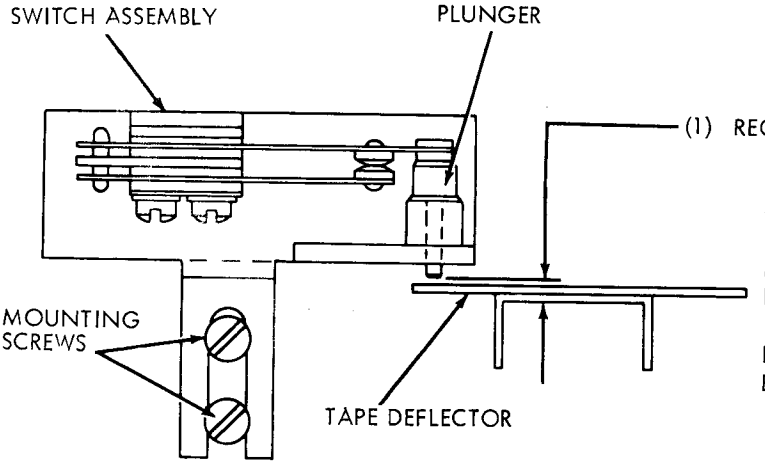
MIN. 1/4 OZ.

MAX. 1/2 OZ.

TO JUST OPEN CONTACTS

TO ADJUST

REMOVE CONTACT ASSEMBLY FROM UNIT. BEND CONTACT SPRINGS TO MEET REQUIREMENTS.



(B) LAST CHARACTER CONTACT ASSEMBLY (ENCLOSED)

TO CHECK

TRANSMITTER DISTRIBUTOR AND REPERFORATOR MOUNTED IN NORMAL OPERATING POSITION. TAPE INSERTED IN PUNCH AND PIVOTED READING HEAD.

(1) REQUIREMENT

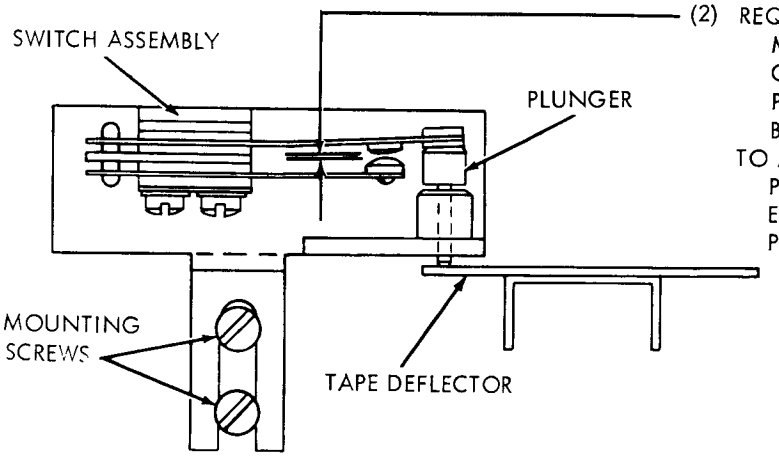
MIN. 0.010 INCH

MAX. 0.015 INCH

CLEARANCE BETWEEN TAPE DEFLECTOR EAR AND SWITCH PLUNGER WHEN PIVOTED HEAD IS ONE CHARACTER AWAY FROM PUNCH BLOCK.

NOTE

PLUNGER MUST TOUCH INSULATING BUTTON.



(2) REQUIREMENT

MIN. 0.005 INCH

CLEARANCE BETWEEN CONTACTS WHEN PIVOTED HEAD IS AGAINST PUNCH BLOCK.

TO ADJUST

POSITION SWITCH ASSEMBLY WITH BRACKET MOUNTING SCREWS LOOSENED. REPLACE SWITCH COVER.

FIGURE 1-39. FULLY ENCLOSED LAST CHARACTER CONTACT SWITCH

4. DISTRIBUTOR AND TRANSMITTER CONTACT STROBING

GENERAL INFORMATION

(1) The following adjustment procedure outlines pulse length requirements for transmitter distributor units operating at various speeds (OPM) and transmission patterns (i.e. 7.00, 7.42, or 7.50 unit code). In all cases, both the test set and the unit under test must be operating at the same speed for proper strobing. All pulse length requirements are made with respect to a 7.42 unit code test set scale, regardless of the cam arrangement of the transmitter distributor.

(2) When discussing the operating speed of a unit, a number of different terms may be used to represent the same speed. A typical teletypewriter or data channel, for example, may be described in terms of modulation rate (BAUD), or rate of transmission of information (WPM or OPM). In the following strobing procedure, reference is made to both OPM and BAUD. In other parts of this bulletin, reference is also made to WPM. These three terms, although defined differently, can be used interchangeably to represent the operating speed of any Teletype Transmitter Distributor unit.

(3) The term OPM is an abbreviation for operations per minute. OPM is defined as follows:

$$\text{Formula (1)} \quad \text{OPM} = \frac{\text{c}}{\text{sec}} \times 60 \frac{\text{sec}}{\text{min}}$$

That is, the speed of a unit, in operations per minute (OPM), is equal to the transmission rate, in characters per second (c/sec), times 60 sec/min. Since a character is transmitted each operation, this term provides a measure of the amount of information which may be transmitted by the unit.

(4) The term WPM is an abbreviation for words per minute. WPM is defined as follows:

$$\text{Formula (2)} \quad \text{WPM} = \frac{\frac{\text{c}}{\text{sec}} \times 60 \frac{\text{sec}}{\text{min}}}{6 \frac{\text{c}}{\text{word}}} \text{, or WPM} = \frac{\text{c}}{\text{sec}} \times 10$$

That is, the speed of a unit, in words per minute (WPM), is equal to the transmission rate, in characters per second (c/sec), times 60 sec/min, divided by 6 c/word. It may be noted, from observation of the defining formulas for OPM and WPM, that a close relationship exists between these terms. The only difference in the defining formulas is that equation (2) has an extra term (6 c/word) which appears as a denominator. From the above two equations, a third one may be derived. Since OPM = c/sec x 60 sec/min, we can replace the numerator of equation (2) -- which is c/sec x 60 sec/min - by OPM. The result will be:

$$\text{Formula (3)} \quad \text{WPM} = \frac{\text{OPM}}{6 \frac{\text{c}}{\text{word}}}\text{, and}$$

$$\text{OPM} = (\text{WPM})\left(6 \frac{\text{c}}{\text{word}}\right)$$

Formula (3) is a valid one to use when converting from one term to the other as long as the exact values, and not approximate values, for WPM or OPM are used. For example, one of the standard Teletype Transmitter Distributor operating speeds is generally stated as being 60 WPM. This value, however, is only an approximate one used to simplify disucssion of the unit. In all cases, units transmitting 60 WPM are actually operating at 368 OPM. By formula (3), it can readily be calculated that the unit is transmitting not 60 WPM, but 61.33 WPM:

$$\text{WPM} = \frac{\text{OPM}}{6 \frac{\text{c}}{\text{word}}}\text{;} \quad \text{WPM} = \frac{368}{6} = \underline{\underline{61.33}}$$

The following table is provided to aid in determining the operating speed of a unit when either OPM or WPM (actual or approximate) is known. It is not a complete listing of all available speeds, but is representative of the speeds most in use.

Operations Per Minute (OPM)	Words Per Minute (WPM) ACTUAL	APPROXIMATE
368	61.33	60
390	65.00	65
428.6	71.43	70
460	76.66	75
600	100.00	100
636	106.00	106
642	107.15	107

(5) The remaining term, BAUD, is defined as a unit of telegraphic speed - or modulation rate - which indicates the time duration of the shortest signal element of a transmitted character. The defining formula for BAUD is:

$$\text{Formula (4)} \quad \text{BAUD} = \frac{\text{OPM} \times \text{UNIT CODE}}{60 \ \frac{\text{sec}}{\text{min}}} \text{, or}$$

$$\text{Formula (5)} \quad \text{BAUD} = \frac{\text{c}}{\text{sec}} \times \text{UNIT CODE}$$

This term differs from the first two defined in that, while OPM and WPM provide an indication of the amount of information transmitted by a unit, the term BAUD is most correctly used when referring to the binary digital modulation rate of the information transmitted.

(6) The objective of this discussion has been to introduce the technician to the above terms, so that their usage will be better understood by him. Finally, by use of the five defining formulas, the technician should be able to convert from one type of speed terminology to another, if the need should arise.

A. CONTACT STROBING - PIVOTED HEAD TRANSMITTER DISTRIBUTOR

NOTE

To strobe the distributor and sensing contacts, a Signal Distortion Test Set (DXD) or Stroboscopic Test Set (LSS) may be used. For operation of these sets, refer to Bulletin 181B or 261B, respectively.

(1) Distributor Contacts - Stop and #1 through #5 (368, 390, 428, 460, 600, and 635 OPM)

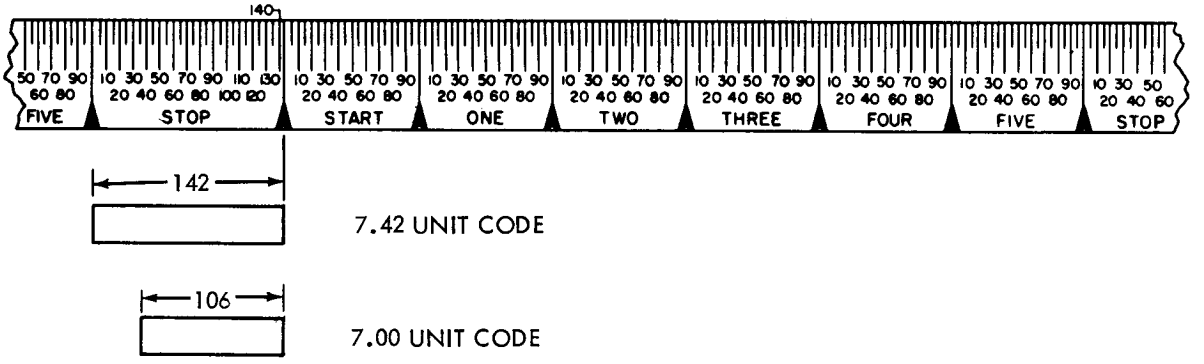
PROCEDURE

(a) Connect a test set to the output of the distributor contacts. Test set and transmitter distributor must be operating at the same speed.

(b) Insert a "blank" perforated tape into the transmitter distributor pivoted sensing head. Trip the sensing shaft clutch (on some units, the sensing shaft clutch is tripped electrically via operation of the distributor shaft.) Orient the test set scale so the 142 mark of its stop segment is aligned with the end of the stop pulse image.

Requirement
Length of stop pulse to be:
106 scale divisions (± 3%) for 7.00 unit code cam
142 scale divisions (± 4%) for 7.42 unit code cam

To Adjust
Rotate the distributor stop contact adjusting screw to meet requirement.



NOTE

3% is equivalent to 3.18 scale divisions (7.00 unit code) and
4% is equivalent to 5.68 scale divisions (7.42 unit code).

(c) Replace the "blank" perforated tape with the "R" perforated tape. Align the end of the stop pulse image with the 142 scale division on the stop segment of the test set scale.

Requirement
#2 and #4 images equal in total length within ±4% (7.42 unit code) or ±3% (7.00 unit code) of each end of the #2 and #4 pulse image transition point on the test set scale (see Table 1).

To Adjust
Rotate the #2 and #4 contact adjusting screws to meet requirement.

(d) Replace the "R" perforated tape with a "Y" perforated tape. Align the end of the stop pulse image with the 142 scale division on the stop segment of the test set scale.

Requirement
#1, #3, and #5 pulse images equal in total length within ±4% (7.42 unit code) or ±3% (7.00 unit code) of each end of the #1, #3, and #5 pulse image transition points of the test set scale (see Table 1).

To Adjust
Rotate the #1, #3, and #5 contact adjusting screws to meet requirement.

NOTE 1

3% is equivalent to 3.18 scale divisions (7.00 unit code) and
4% is equivalent to 4.00 scale divisions (7.42 unit code).

NOTE 2

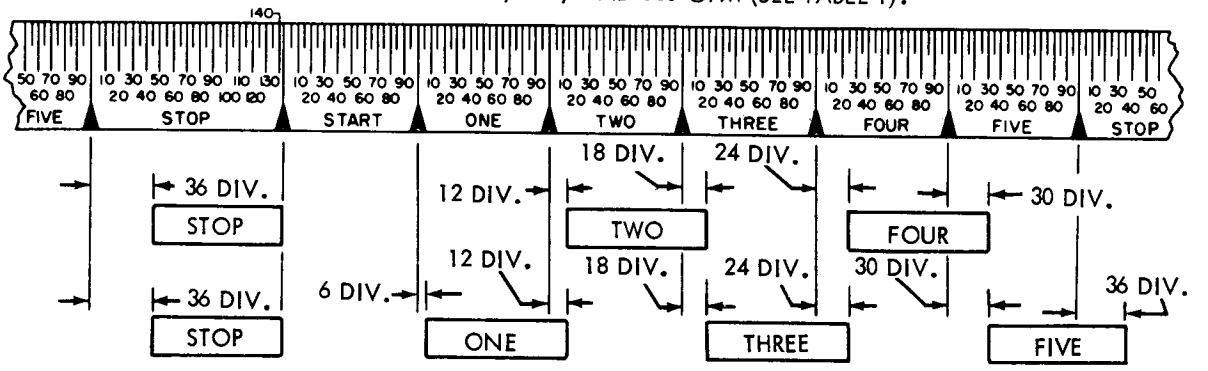
In order to determine end of #5 Pulse image, it may be necessary to hold stop contact open.

TABLE 1

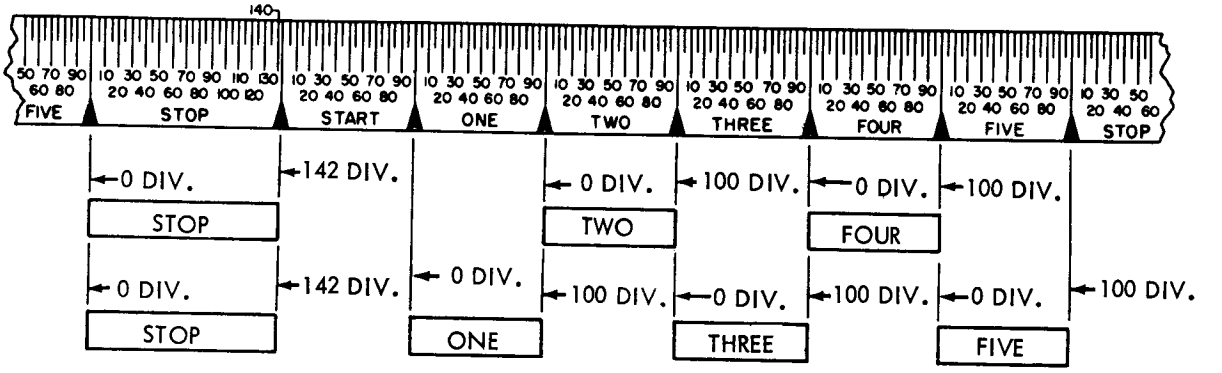
PULSE IMAGE TRANSITION POINTS ON TEST SCALE

TEST SET SEGMENT	7.00 UNIT CODE		7.42 UNIT CODE	
	BEGIN AT SCALE DIV.	END AT SCALE DIV.	BEGIN AT SCALE DIV.	END AT SCALE DIV.
STOP	36 IN STOP SEGMENT	142 IN STOP SEGMENT	0 IN STOP SEGMENT	142 IN STOP SEGMENT
1	6 IN #1 SEGMENT	12 IN #2 SEGMENT	0 IN #1 SEGMENT	100 IN #1 SEGMENT
2	12 IN #2 SEGMENT	18 IN #3 SEGMENT	0 IN #2 SEGMENT	100 IN #2 SEGMENT
3	18 IN #3 SEGMENT	24 IN #4 SEGMENT	0 IN #3 SEGMENT	100 IN #3 SEGMENT
4	24 IN #4 SEGMENT	30 IN #5 SEGMENT	0 IN #4 SEGMENT	100 IN #4 SEGMENT
5	30 IN #5 SEGMENT	36 IN STOP SEGMENT	0 IN #5 SEGMENT	100 IN #5 SEGMENT

DISTRIBUTOR CONTACTS #1 THROUGH #5 PLUSE LENGTH REQUIREMENTS FOR 7.00 UNIT CODE OPERATION AT 390, 428, AND 635 OPM (SEE TABLE 1).



DISTRIBUTOR CONTACTS #1 THROUGH #5 PULSE LENGTH REQUIREMENTS FOR 7.42 UNIT CODE OPERATION AT 368,460, AND 600 OPM (SEE TABLE 1).



(2) Distributor Auxiliary Contacts "A", "B", and "C"

(a) Following requirements applicable for units transmitting 7.42 unit code at 368, 460, or 600 OPM:

Align the end of the stop pulse image with the 142 scale division on the stop segment of the test set scale.

Requirement - Auxiliary "A" Contact
Auxiliary "A" contact should:
Close at 32 ± 15 divisions in start segment
Open at 29 ± 15 divisions in stop segment

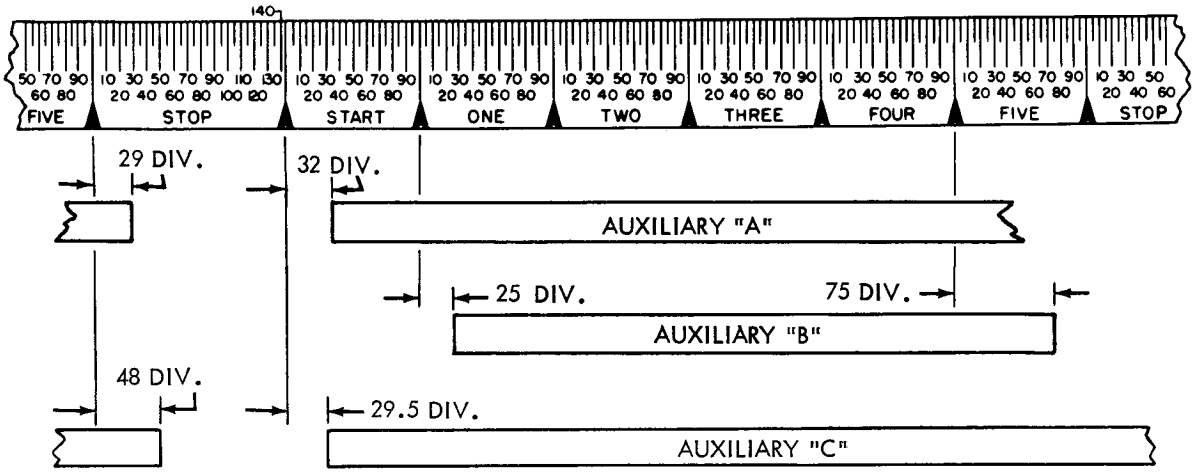
Requirement - Auxiliary "B" Contact
Auxiliary "B" contact should:
Close at 25 ± 15 divisions in #1 segment
Open at 75 ± 15 divisions in #5 segment

To Adjust
Rotate the distributor auxiliary "A" and "B" contact adjusting screws to meet requirements.

(b) Following requirements applicable for units transmitting 7.00 unit code at 390, 428, or 635 OPM:

Requirement - Auxiliary "C" Contact
Auxiliary "C" contact should
Close at 29.5 ± 5 divisions in start segment
Open at 48 ± 8 divisions in stop segment.

To Adjust
Rotate the distributor auxiliary "C" contact adjusting screw to meet requirements.



(3) Transmitter Contacts (Sensing) - #1 through #5

PROCEDURE

(a) Test set connected to the output of the distributor contacts.

(b) Insert a "Letters" perforated tape into the transmitter distributor sensing head. Align the end of the distributor stop pulse image with the 142 scale division on the stop segment of the test set scale.

(c) Connect input of test set to respective contact (#1 through #5) of the storing switch.

NOTE

7.42 Unit Code

Contacts #1 through #5 shall have no electrical breaks during the transmitted (distributor) code pulses (see Table 1 for transition points) greater than 2-1/2 scale divisions at 600 OPM, 2 scale divisions at 460 OPM, and 1-1/2 scale divisions at 368 OPM. No more than one break is permissible.

7.00 Unit Code

Contacts #1 through #5 shall have no electrical breaks during the transmitted (distributor) code pulses. (Any electrical breaks occuring within the ± 3% tolerance limits of the distributor contacts are acceptable). When reading successive marking code perforations, the time of contact opening shall not exceed 1.5 ms.

Requirement - 7.42 unit code cam

At 600 OPM
The beginning and end of each contact trace shall occur:
Before 30 divisions in start segment
After 40 divisions in stop segment

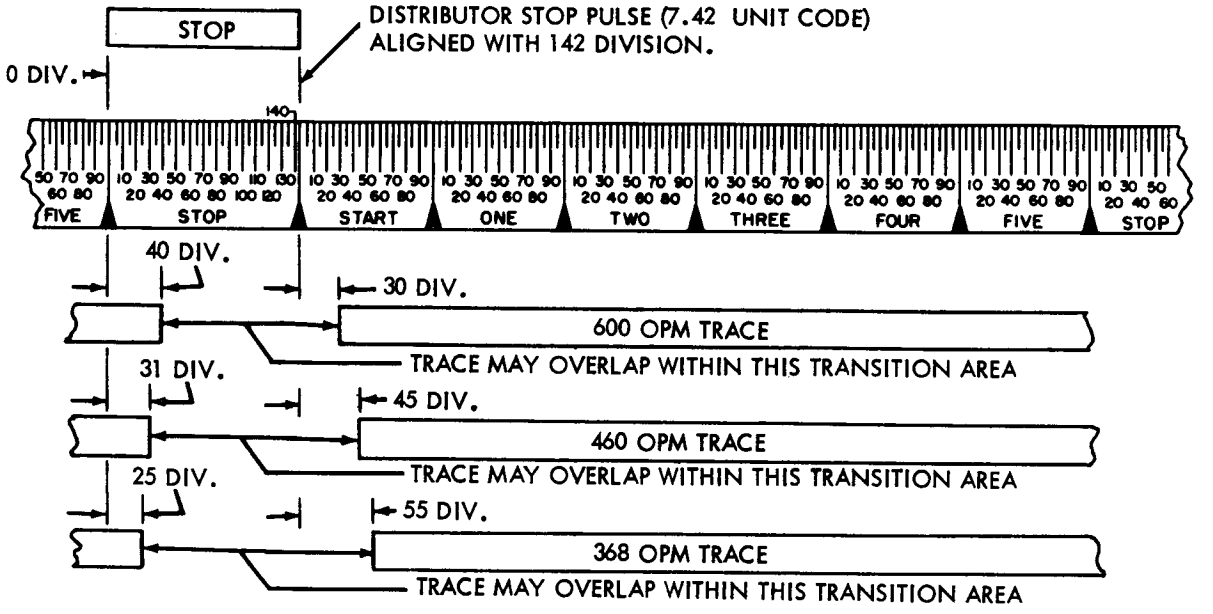
At 460 OPM
The beginning and end of each contact trace shall occur:
Before 45 divisions in start segment
After 31 divisions in stop segment

At 368 OPM
The beginning and end of each contact trace shall occur:
Before 55 divisions in start segment
After 25 divisions in stop segment

To Adjust
Position respective contact adjusting screw as necessary.

NOTE

Beginning and end of pulse image may overlap within transition area.

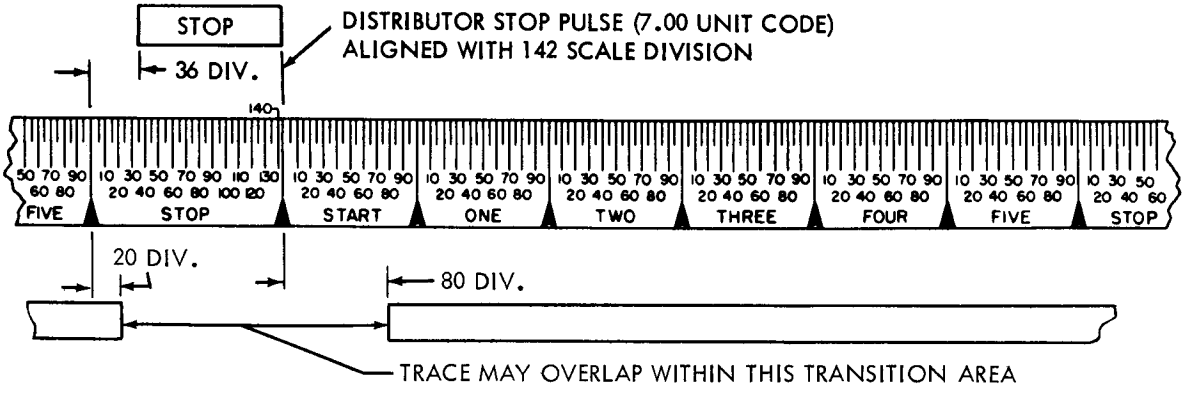


Requirement - 7.00 unit code cam
At 390, 428, or 630 OPM
The beginning and end of each contact trace shall occur:
Before 80 divisions in start segment
After 20 divisions in stop segment

To Adjust
Position respective contact adjusting screw as necessary.

NOTE

Beginning and end of pulse image may overlap within transition area.



(4) Transmitter Contacts - Auxiliary, Tape Out, and Distributor Clutch Trip

PROCEDURE

(a) Both magnets de-energized, distributor and transmitter shaft clutches latched and in the stop position. Turn motor off.

(b) Hold distributor and transmitter shaft gears against rotation. Energize both clutch trip magnets.

(c) Release gears and turn motor on.

(d) Align the end of the distributor stop pulse image with the 142 scale division on the stop segment of the test set scale.

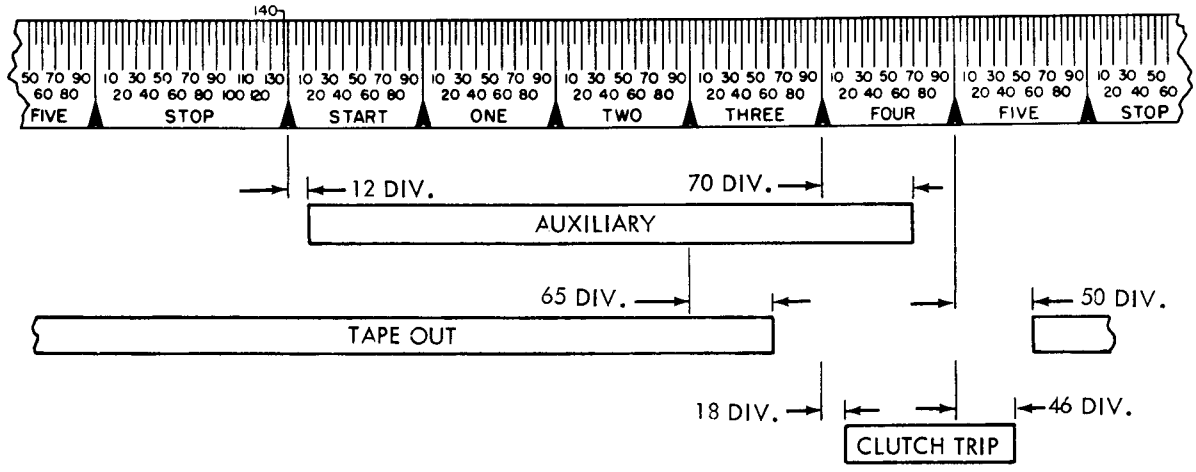
(e) Pulse length requirements for 7.42 unit code operation at 368, 460, or 600 CPM.

Requirement - Auxiliary contact
Auxiliary contact should:
Close at 12 $\pm$ 30 divisions in start segment
Open at 70 $\pm$ 30 divisions in #4 segment

Requirement - Tape Out contact
With no tape in pivoted head transmitter, Tape Out Contact should:
Close at 50 + 30 divisions in #5 segment
Open at 65 $\mp$ 30 divisions in #3 segment

Requirement - Clutch Trip Contact
With distributor clutch trip contact electrically isolated from circuit, clutch trip contact should:
Close at 18 + 30 divisions in #4 segment
Open at 46 $\mp$ 30 divisions in #5 segment

To Adjust
Position respective contact adjusting screws as necessary.



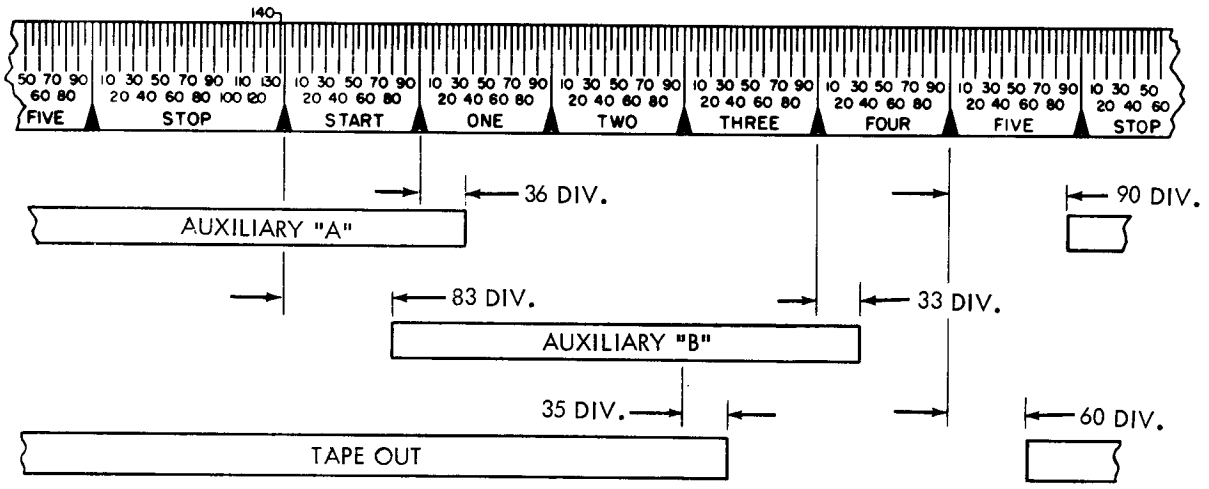
(f) Pulse length requirements for 7.00 unit code at 390, 428 or 635 OPM.

Requirement - Auxiliary "A" Contact
Auxiliary "A" contact should:
Close at 90 $\pm$ 8 divisions in #5 segment
Open at 36.5 $\pm$ 20 divisions in #1 segment

Requirement - Auxiliary "B" Contact
Auxiliary "B" contact should:
Close at 83 ± 12 divisions in start segment
Open at 33.5 ± 8 divisions in #4 segment

Requirement - Tape Out (6th Pin)
With no tape in transmitter, tape out contact should:
Close at 60 + 40 divisions in #5 pulse
Open at 35 ∓ 40 divisions in #3 pulse

To Adjust
Position respective contact adjusting screws as necessary.



B. CONTACT STROBING - FIXED HEAD TRANSMITTER DISTRIBUTOR

(1) Distributor Contacts - Stop and #1 through #5 (368, 460 and 600 CPM)

NOTE

The following is merely a check on the operation of the fixed reader storing contacts, and no readjustments should be necessary. Any signal breaks may be due to dirt or oil on the contacts, or low contact pressure.

(a) Insert a "blank" perforated tape into the transmitter distributor fixed sensing lead. Trip the fixed reader sensing shaft clutch (on some units, the sensing shaft clutch may be tripped electrically via operation of the pivoted head distributor shaft).

(b) Align the end of the stop pulse image with the 142 scale division on the stop segment of the set scale (refer to paragraph 4.a. (1) (b).

(c) Recheck the distributor contacts according to the procedure in paragraphs 4.a. (1) and (2).

(2) Transmitter Contacts (Sensing) - #1 through #5

Check the #1 through #5 transmitter contacts according to the procedure given in paragraph 4. a. (3).

(3) Transmitter Contacts - Auxiliary and Distributor Clutch Trip

PROCEDURE

(a) Both magnets de-energized, pivoted reader distributor and fixed reader transmitter clutches latched and in the stop position. Turn motor off.

(b) Hold fixed reader transmitter and pivoted reader distributor shaft gears against rotation. Energize both clutch trip magnets

(c) Release gears and turn motor on.

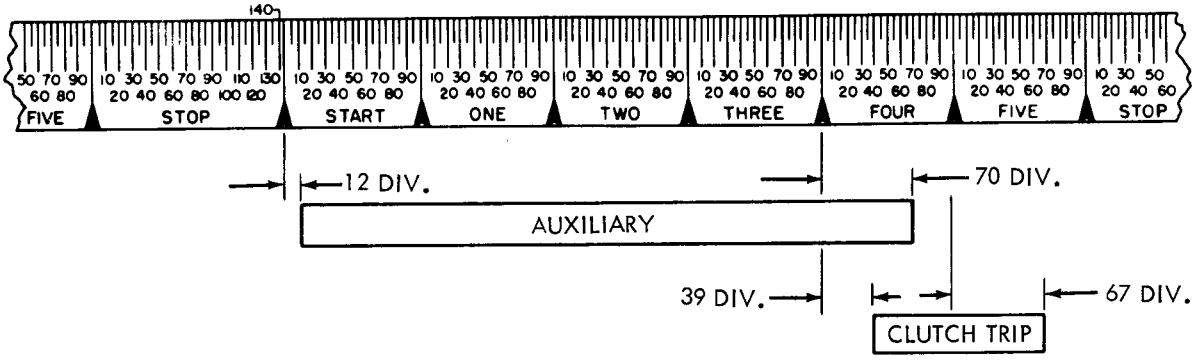
(d) Align the end of the distributor stop pulse image with the 142 scale division on the stop segment of the test set scale.

(e) Pulse length requirement for 7.42 unit code operation at 368, 460, and 600 OPM.

Requirement - Auxiliary Contact
Auxiliary contact should:
Close at 12 ± 30 divisions in start segment
Open at 70 ± 30 divisions in #4 segment

Requirement
With distributor clutch trip contact electrically isolated from circuit, clutch trip contact should:
Close at 39 ± 30 divisions in #4 segment
Open at 67 ± 30 divisions in #5 segment

To Adjust
Position respective contact adjusting screws.



(f) Pulse length requirement for 7.00 unit code operation at 390, 428, and 635 OPM. - Strobe contacts according to paragraph 4. a. (4) (f).

SECTION 2

DISASSEMBLY AND REASSEMBLY

1. GENERAL

a. This section presents disassembly and reassembly instructions necessary to break the transmitter distributor (LCXD) into its various subassemblies. The instructions are arranged in a sequence which should be followed only when a complete disassembly of the unit is required. Disassembly of a specific subassembly (for replacement or repair purposes) would normally require removal of associated subassemblies in the same area. Refer to Teletype Parts Bulletin 1171B for detailed illustrations of the parts referred to in the text.

b. Perform any necessary adjustments after reassembly of the unit.

2. DISASSEMBLY AND REASSEMBLY

a. Cover Plate Assembly (Fixed Reader)

(1) To remove the cover plate assembly, lift the left end upward and slide the plate to the left to disengage the spring clip.

(2) To install the cover plate assembly, reverse the disassembly procedure.

b. Top Plate Assembly (Fixed Reader)

(1) To remove the top plate assembly, loosen the front and rear mounting screw and lift the plate upward.

(2) To install the top plate assembly, guide the mounting screws into the notches in the front and rear plates on the unit. Align and adjust top plate position.

c. Tape Guide Plate Assembly (Fixed Reader)

(1) To remove the tape guide plate assembly, loosen the front and rear mounting screws and slide the plate upward.

(2) To install the tape guide plate assembly, guide the mounting screws into the notches in the front and rear plates in the unit. Align and adjust the tape guide plate position.

d. Cover Plate (Pivoted Reader)

(1) Loosen the captive screw on top. Loosen the two mounting screws on the left of the plate. Lift the plate up.

(2) To install the cover plate, reverse the disassembly procedure.

e. Idler Gear Assembly

(1) To remove the idler gear assembly, remove the feed lever spring (82727) and latch stripper bail spring (125252).

(2) Remove the oil reservoir bar assembly by removing the screws, lock washers, and flat washers holding the bar to its mounting bracket.

(3) Pull out the idler gear oil retainer plug (158789), and remove the leather washer (85318).

(4) Remove the idler gear bearing stud lock nut, lock washer, and flat washer.

(5) Remove the idler gear bearing stud (158790), idler gear, and spacer as a unit.

(6) To install the idler gear assembly, reverse the disassembly procedure.

f. Sensing Shaft Assembly (Pivoted Reader)

(1) To remove the sensing shaft assembly, remove the idler gear (see paragraph 2.e.)

(2) Remove the front bearing clamp (156788) by removing the three mounting screws and lock washers.

(3) Remove the rear bearing clamp (158847) by removing the two screws and lock washers.

(4) Remove the sensing shaft assembly.

(5) To install the sensing shaft assembly, reverse the disassembly procedure.

g. Distributor and Sensing Shaft Assembly (Pivoted and Fixed Reader) - Follow the sensing shaft procedure in step f. above.

h. Clutch Trip Assembly

(1) To remove the clutch trip assembly, disconnect the wires leading to the clutch magnet (252M).

(2) Remove the plate mounting screw (with lock washer and flat washer), and the plate adjusting screw, lock washer, and flat washer.

(3) Withdraw the clutch trip assembly from the bottom side of unit.

(4) To install the clutch trip assembly, reverse the disassembly procedure.

i. Pivot Shaft

(1) To remove the pivot shaft, remove the sensing shaft assembly (see paragraph 2.f.) or sensing and distributor shaft assembly (see paragraph 2.g.)

(2) Remove the two ring retainers (one is hidden under a felt washer).

(3) Loosen the collar set screws.

(4) Remove pivot shaft nut, lock washer, and flat washer.

(5) Remove the pivot shaft (158819) by pushing it toward the rear, being careful not to lose the feed lever collars and felt washers.

(6) To install pivot shaft, reverse disassembly procedure.

j. Pivoted Sensing Head (Pivoted Reader)

(1) To remove sensing head and tape deflector, remove the last character contact assembly.

(2) Remove the check pawl spring (45104).

(3) Remove the tape deflector spring (82999).

(4) Loosen the rear pivot screw lock nut (76474), and run the rear pivot screw (158801) as far as possible into the casting.

(5) Pull the sensing pins down and free from the top plate.

(6) Loosen the front pivot screw lock nut (112626).

(7) Turn front pivot screw (158800) until the deflector (159158) is free from the pivot screw.

(8) Remove the sensing head and tape deflector.

(9) To install the sensing head and tape deflector, reverse the disassembly procedure.

k. Storing Switch Assembly

(1) To remove the storing switch assembly, disconnect the cable assembly.

(2) Remove the four mounting screws, lock washers, and flat washers.

(3) Remove the storing switch assembly.

(4) To install the storing switch assembly, reverse the disassembly procedure.

l. Distributor Block Assembly

(1) To remove the distributor block assembly, disconnect the cable assembly.

(2) Remove the three mounting screws, lock washers, and flat washers.

(3) Remove the distributor block assembly.

(4) To install the distributor block assembly, reverse the disassembly procedure.

SECTION 3

LUBRICATION

1. INTRODUCTION

a. This section provides lubrication information for the Teletype Model 28 (LCXD) Transmitter Distributor.

CAUTION

The transmitter distributor is shipped with the oil reservoir empty. Remove the cover plate for access to the reservoir. Fill the oil reservoir according to the lubrication instructions on page 3-5.

b. On the following pages, the general areas of the equipment are shown by photographs. The specific points to receive lubricant are indicated by line drawings and descriptive text. The symbols in the text indicate the following directions:

O	Apply one drop of oil.
O2	Apply two drops of oil.
O3	Apply three drops of oil, etc.
G	Apply thin coat of grease.
SAT	Saturate with oil (felt washers, etc.)

Teletype KS7470 oil and KS7471 grease should be used at all lubrication points.

2. GENERAL

a. The equipment should be thoroughly lubricated, but over-lubrication which might allow oil to drip or grease to be thrown on other parts, should be avoided. Exercise special care to prevent lubricant from getting between armature and pole faces. Keep all electrical contacts free from oil or grease.

b. The following general instructions supplement the specific lubricating points illustrated in this section.

(1) Apply one drop of oil to all spring hooks.

(2) Apply a light film of oil to all cam surfaces.

(3) Apply a coat of grease to all gears.

(4) Saturate all felt washers, oilers, etc.

(5) Apply oil to all pivot points.

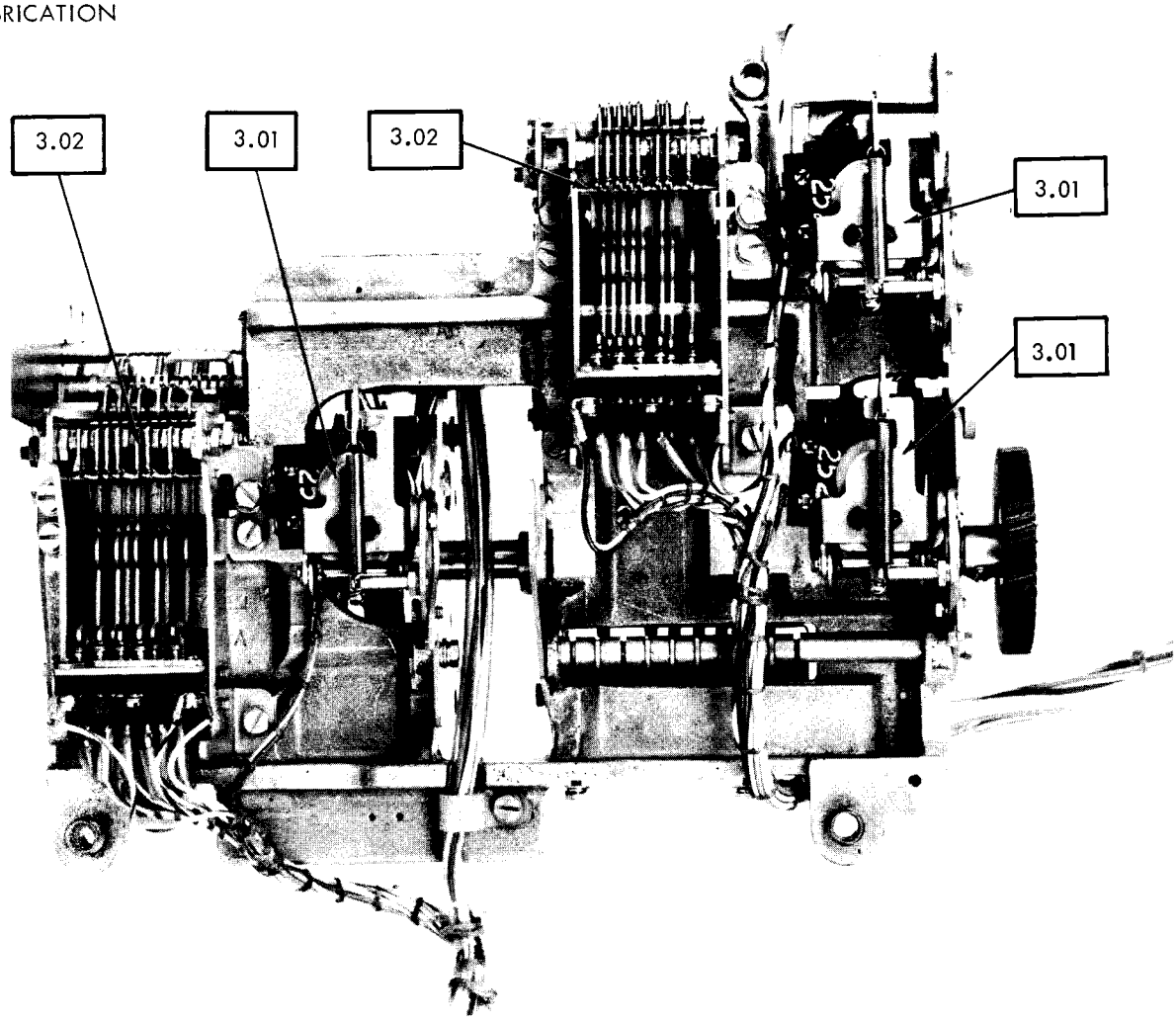
(6) Apply oil to all sliding surfaces.

c. The transmitter distributor should be lubricated before being placed in service or prior to storage. After a few weeks of service, relubricate to make certain that all specified points have received lubricant. Thereafter, the following schedule should be adhered to:

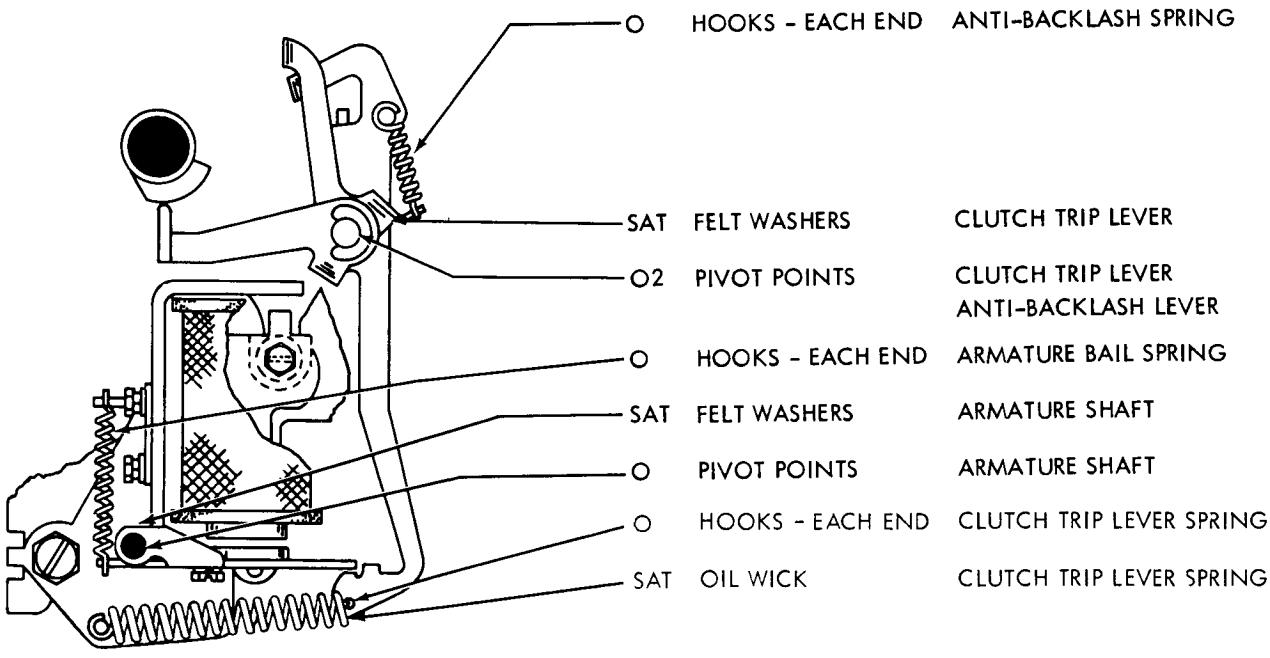
OPERATING SPEED	LUBRICATION INTERVAL
60 W. P. M.	3000 hours or 1 year *
75 W. P. M.	2400 hours or 9 months *
100 W. P. M.	1500 hours or 6 months *

*Whichever occurs first.

3. LUBRICATION

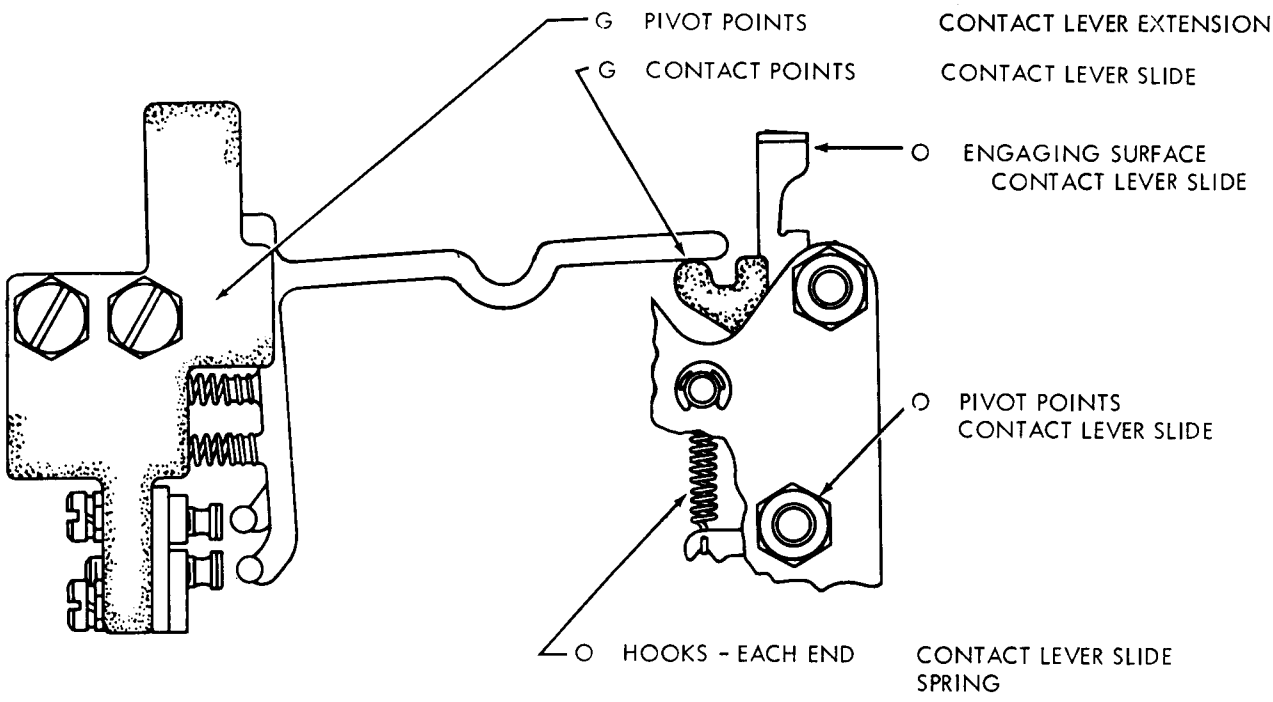


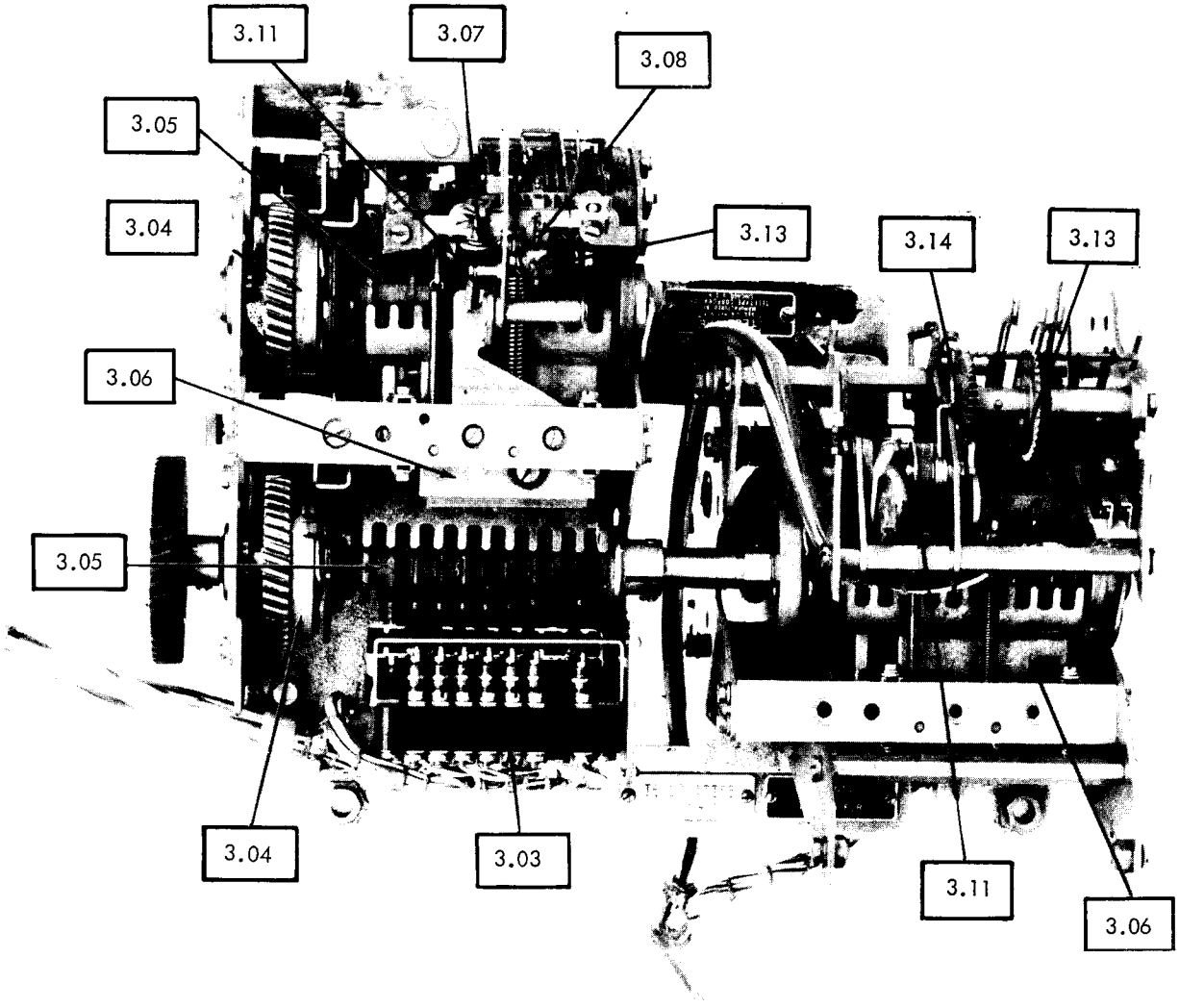
3.01 CLUTCH TRIP ASSEMBLIES



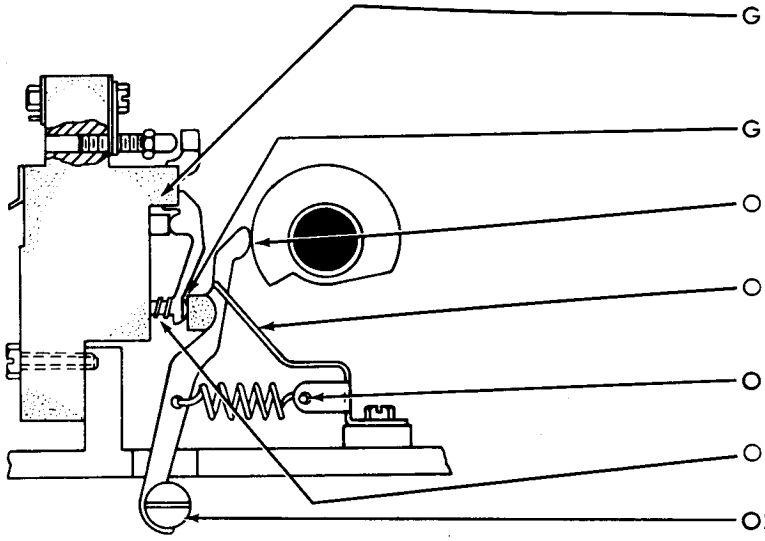
O	HOOKS - EACH END	ANTI-BACKLASH SPRING
SAT	FELT WASHERS	CLUTCH TRIP LEVER
O2	PIVOT POINTS	CLUTCH TRIP LEVER ANTI-BACKLASH LEVER
O	HOOKS - EACH END	ARMATURE BAIL SPRING
SAT	FELT WASHERS	ARMATURE SHAFT
O	PIVOT POINTS	ARMATURE SHAFT
O	HOOKS - EACH END	CLUTCH TRIP LEVER SPRING
SAT	OIL WICK	CLUTCH TRIP LEVER SPRING

3.02 STORING SWITCH ASSEMBLY



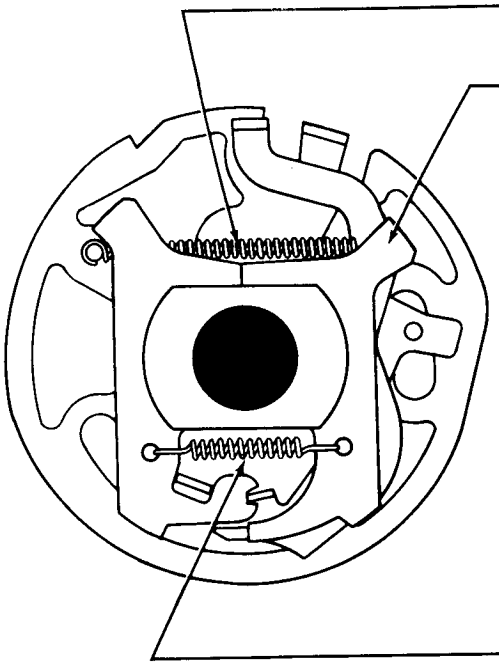


3.03 DISTRIBUTOR BLOCK ASSEMBLY



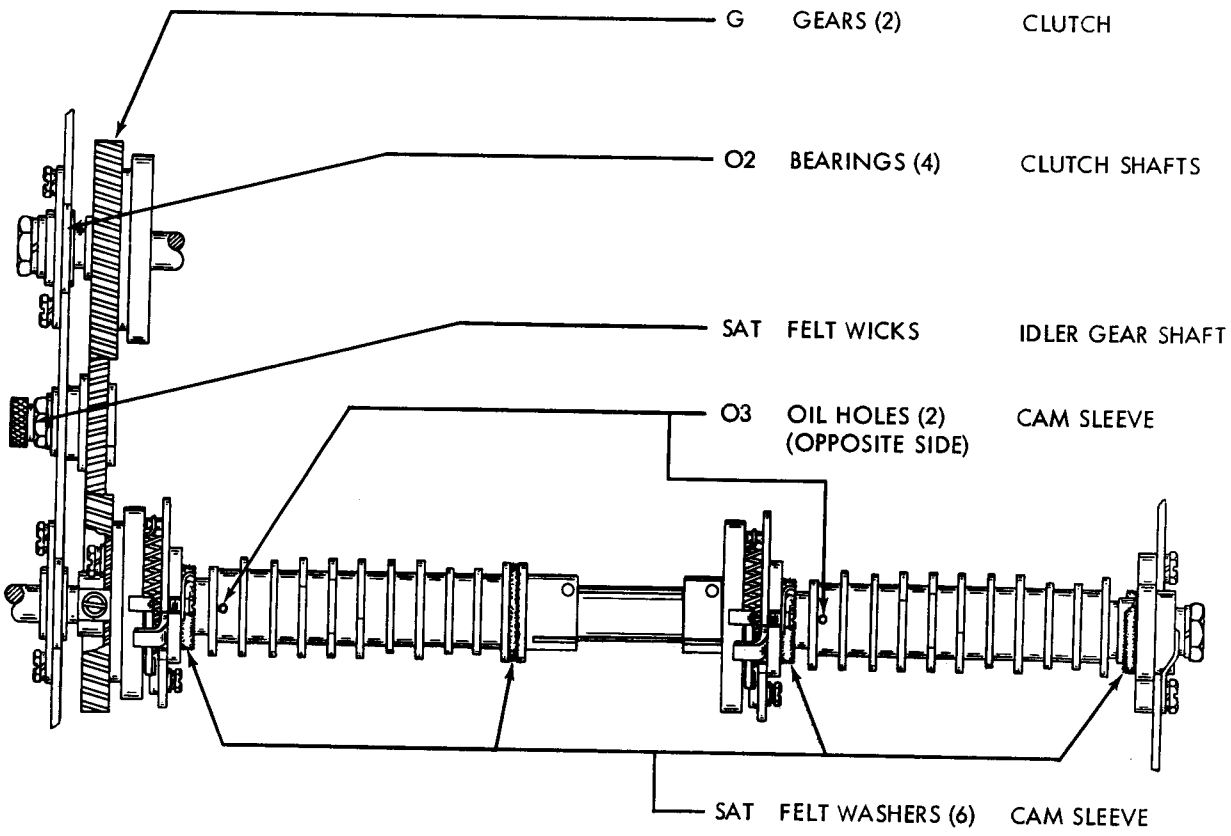
G	PIVOT POINTS	CONTACT LEVERS
G	CONTACT POINTS	CONTACT LEVERS
O	CAMMING SURFACE	CAM FOLLOWER LEVER
O	GUIDE SLOTS	CAM FOLLOWER LEVER
O	HOOKS - EACH END	CAM FOLLOWER LEVER SPRINGS
O	LOOPS	COMPRESSION SPRING
O2	PIVOT POINT	CAM FOLLOWER LEVER

3.04 CLUTCH ASSEMBLIES

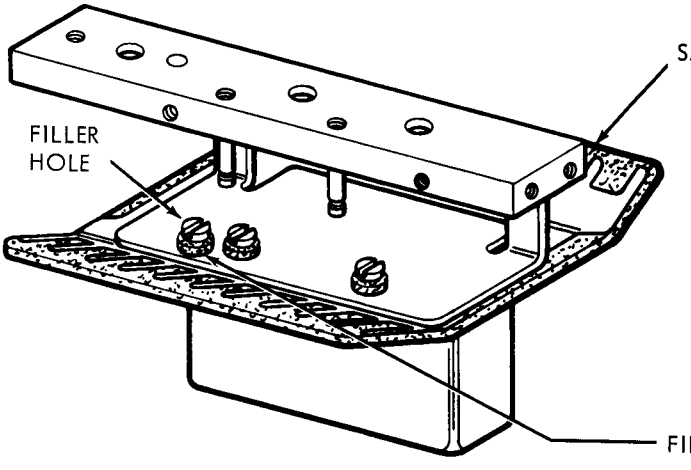


O	HOOKS - EACH END	CLUTCH SHOE LEVER SPRING
SAT	FELT WICK (2 PLACES)	CLUTCH SHOE
O	HOOKS - EACH END	CLUTCH SHOE SPRING

3.05 CAM SLEEVE ASSEMBLIES

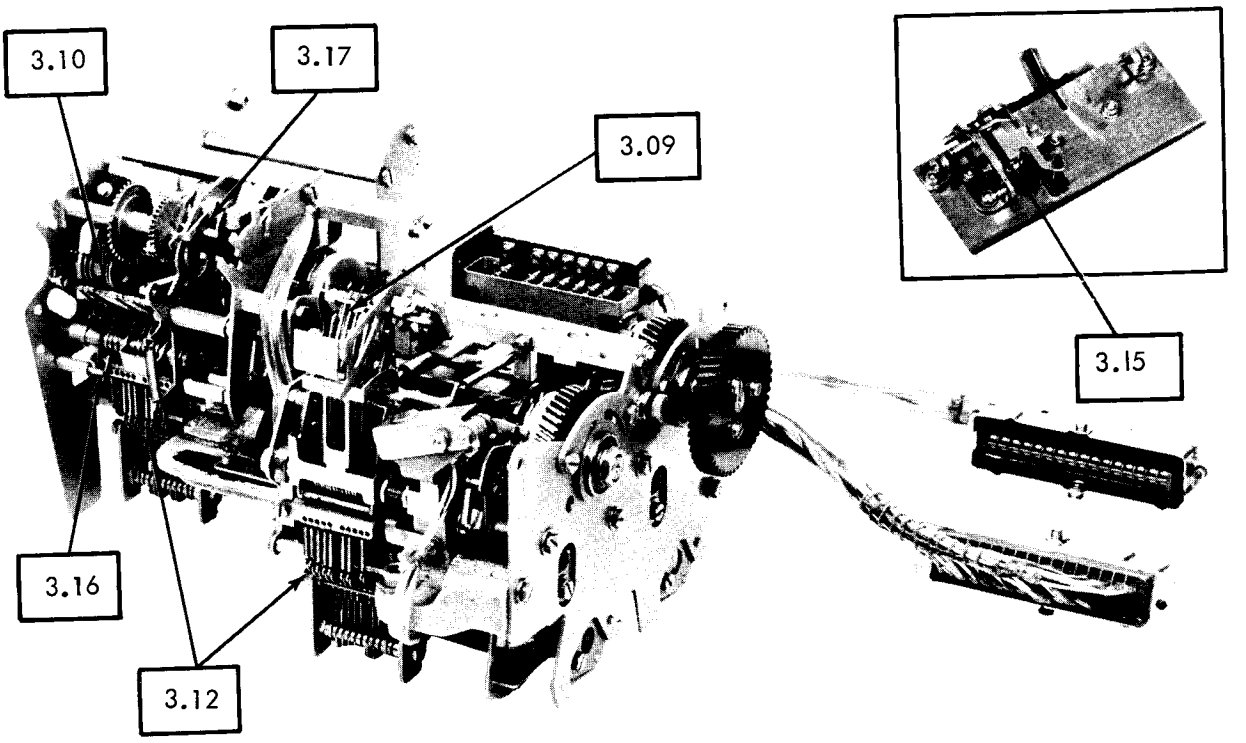


3.06 OIL RESERVOIR ASSEMBLY

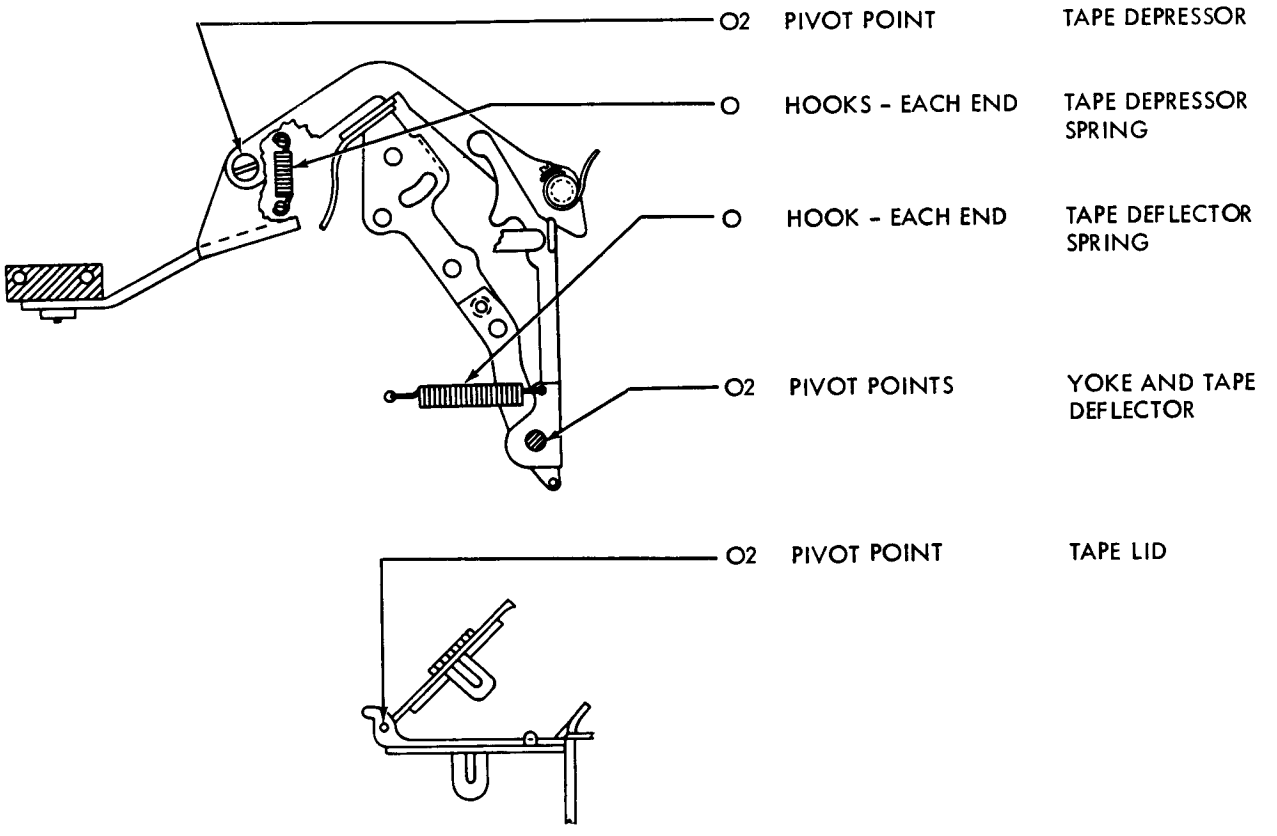


NOTE

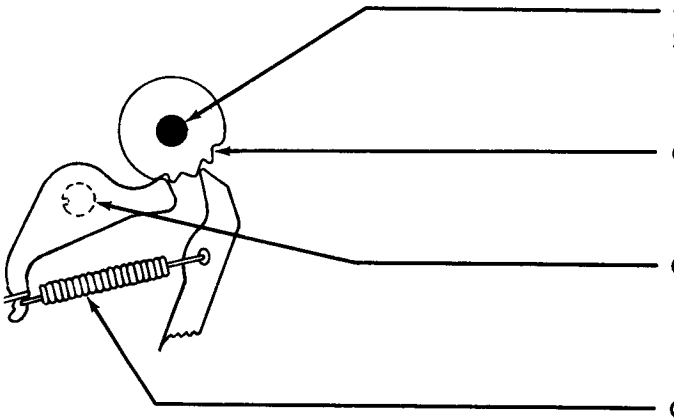
OIL DEPTH NOT TO EXCEED 7/8 INCH. USE A 0.010 INCH FLAT GAUGE FROM 117781 SET OF GAUGES AS A DIP STICK.



3.07 PIVOTED SENSING HEAD

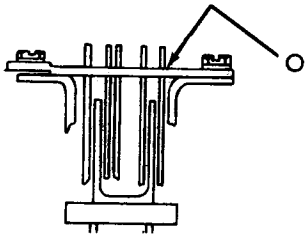


3.08 CHECK PAWL AND FEED WHEEL

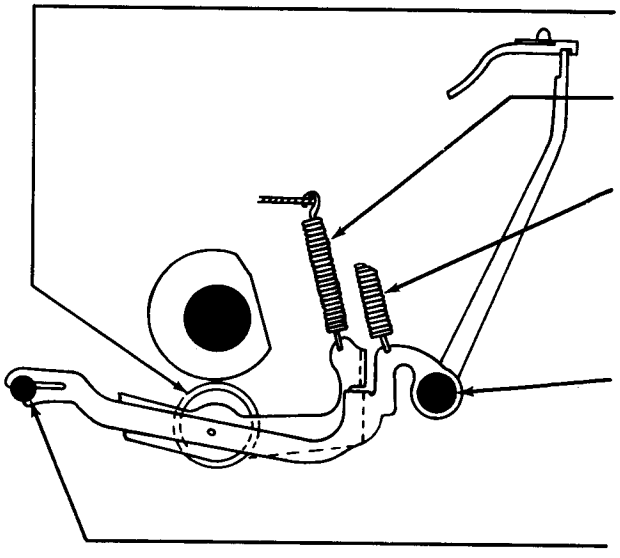


O2	PIVOT POINTS	FEED WHEEL
SAT	FELT WASHERS	FEED WHEEL
O	TEETH	FEED WHEEL RATCHET
O2	PIVOT POINT	CHECK PAWL
O	HOOKS - EACH END	CHECK PAWL SPRING

3.09 PIVOTED SENSING MECHANISM

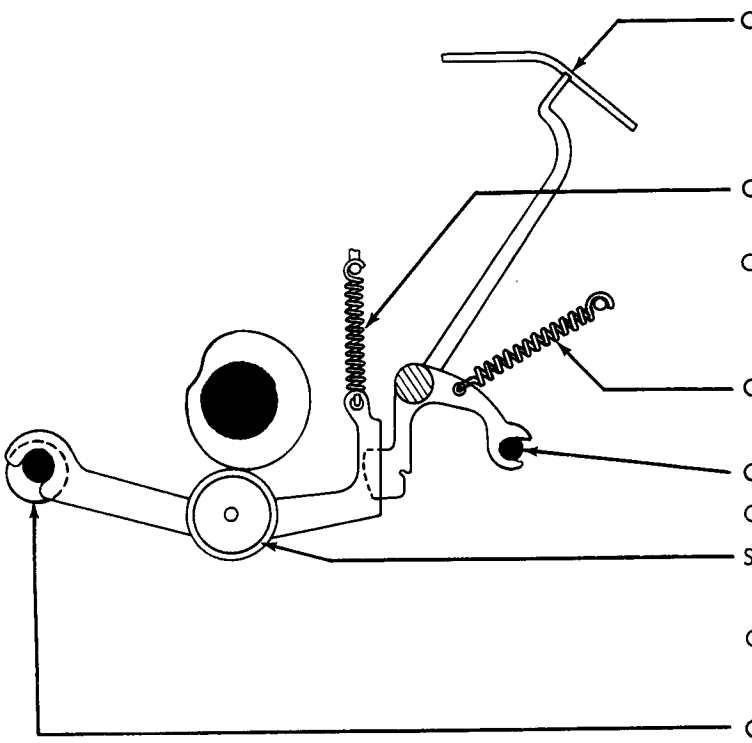


O	SLIDING SURFACES	SENSING PINS

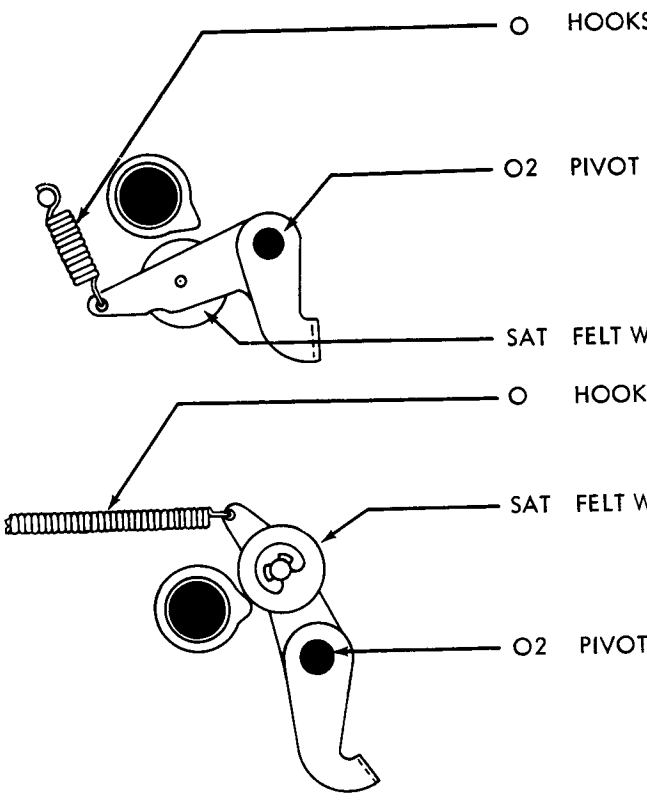


SAT	FELT WASHER	CAM FOLLOWER ROLLER
O	HOOKS - EACH END	AUXILIARY LEVER SPRING
O	HOOKS - EACH END	SENSING BAIL SPRING
O2	PIVOT POINT	SENSING PIN
O2	PIVOT POINT	SENSING BAIL SENSING PINS

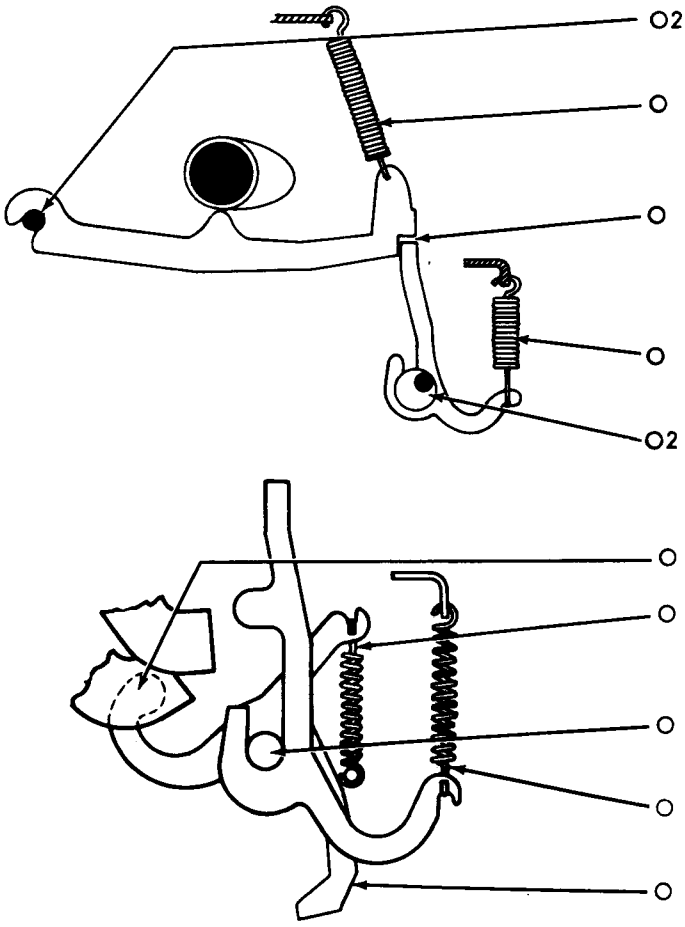
3.10 FIXED SENSING MECHANISM



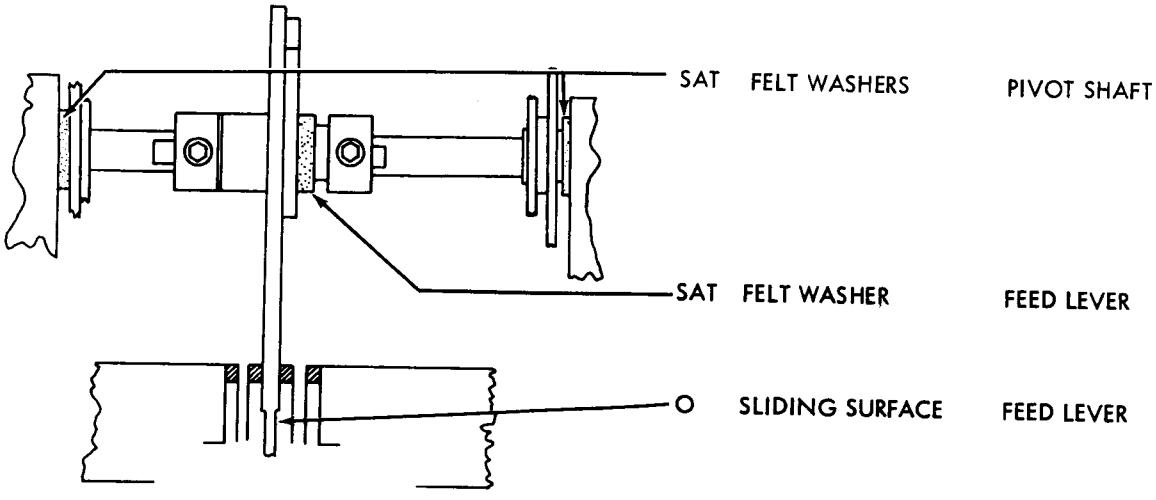
3.11 SENSING MECHANISMS



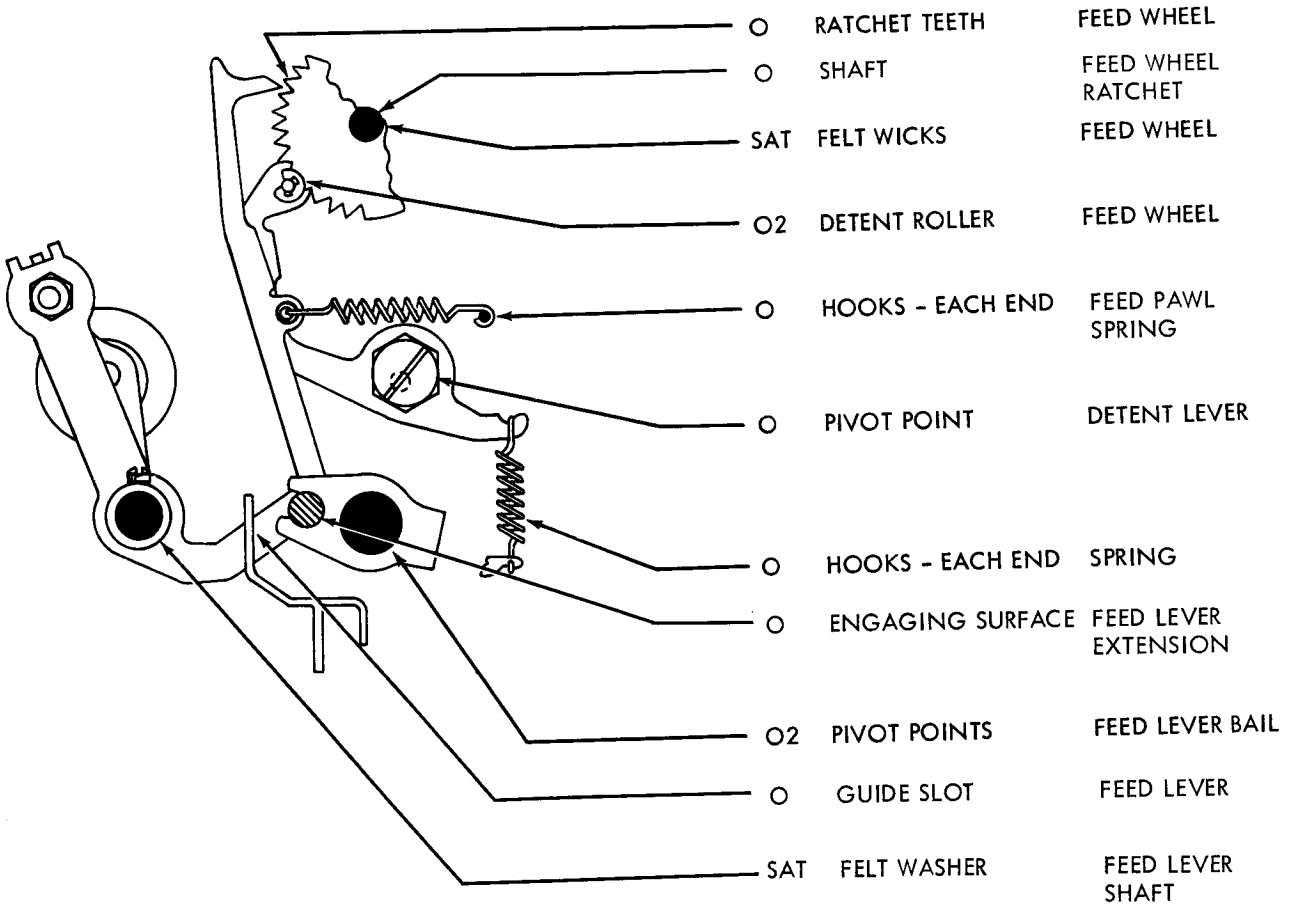
3.12 SENSING MECHANISM

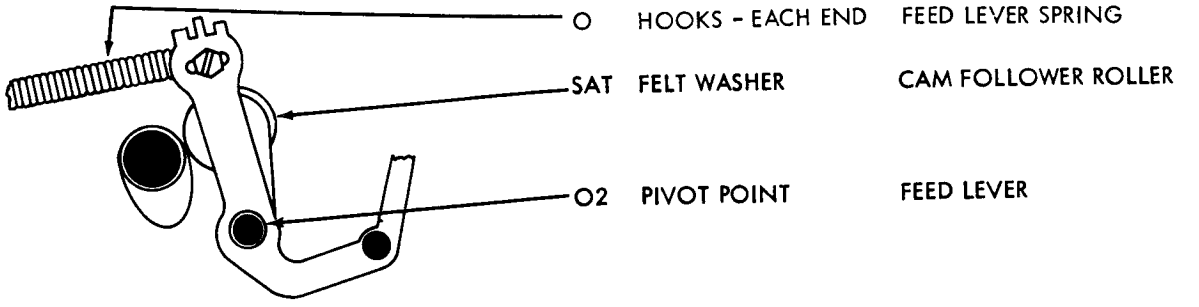


3.13 FEED MECHANISM

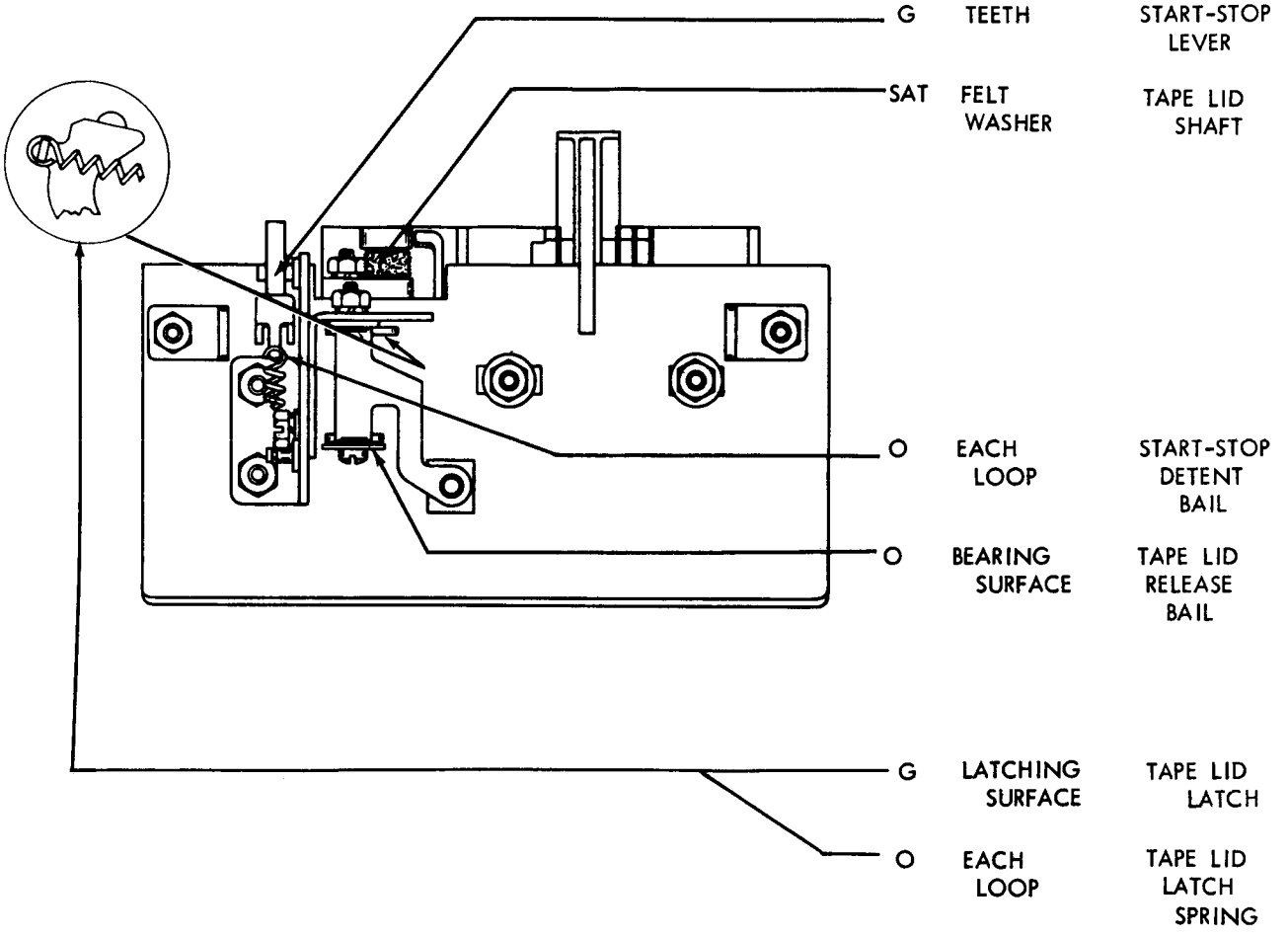


3.14 FEED MECHANISM

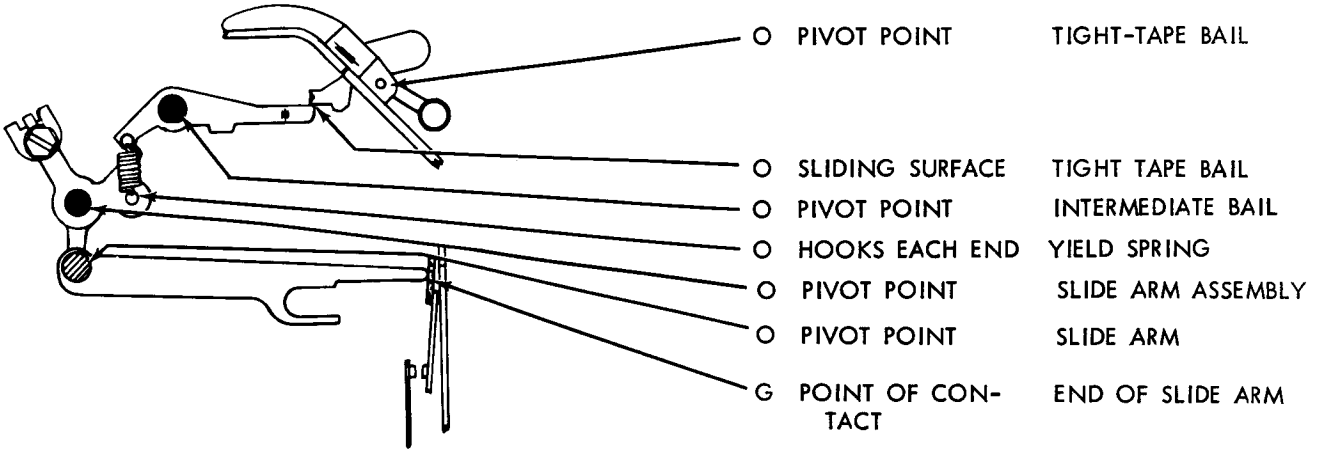




3.15 TAPE LID AND TAPE GUIDE



3.16 TIGHT TAPE SENSING MECHANISM



3.17 TAPE-OUT AND TAPE LID MECHANISM