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BULLETIN 267B

TECHNICAL MANUAL

TAPE READER SET
(CX)

SECTIONS

1. DESCRIPTION
2. INSTALLATION
3. ADJUSTMENTS
4. DISASSEMBLY
5. LUBRICATION
6. PRINCIPLES OF OPERATION

TELETYPE®
CORPORATION

SUBSIDIARY OF *Western Electric Company* INC.

SKOKIE, ILLINOIS, U. S. A.

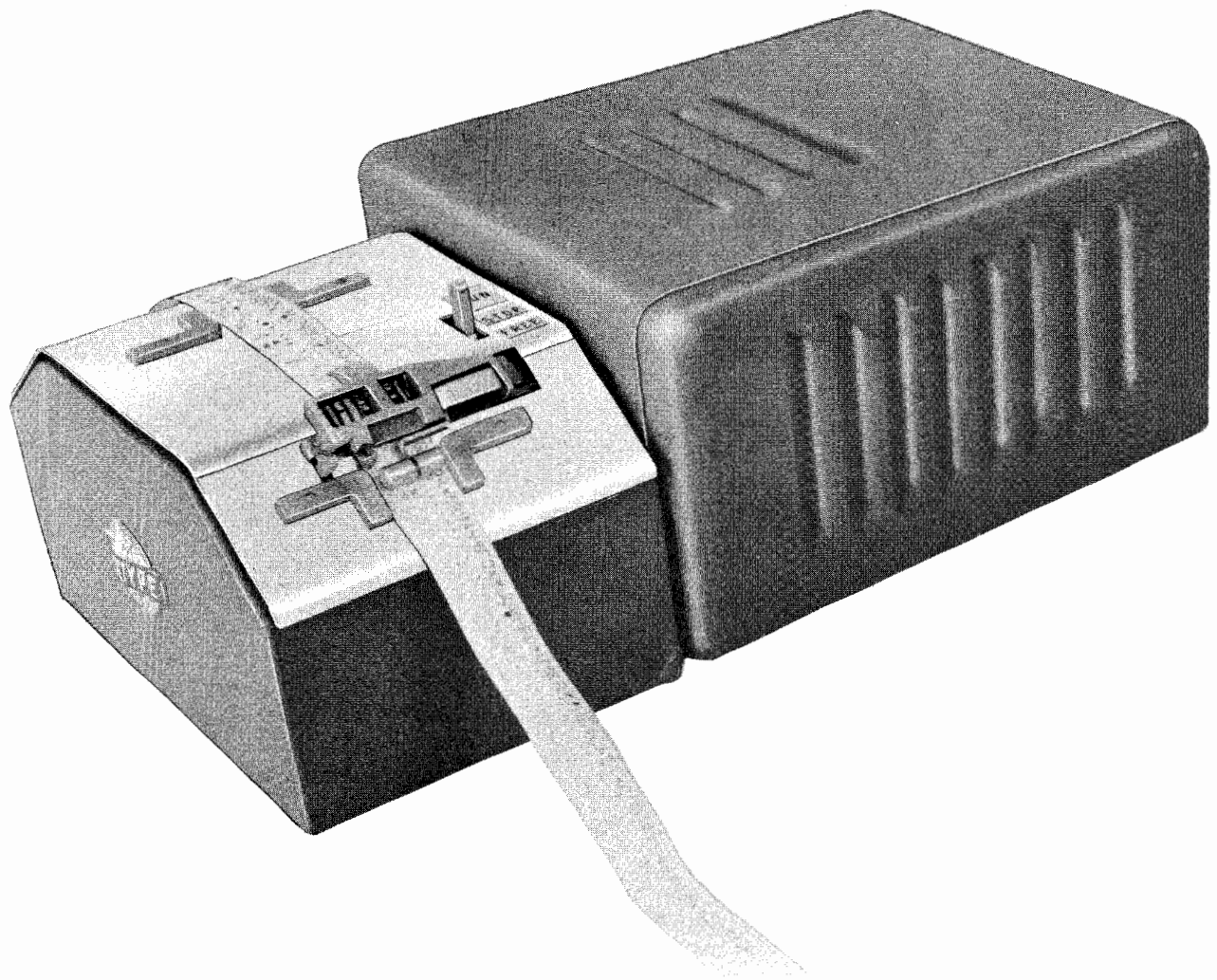
LIST OF EFFECTIVE PAGES

FEBRUARY, 1962

(Supersedes Issue of November, 1960)

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B	Original
C to E	Change 1
1-0 to 1-4	Original
1-5 to 1-8	Change 1
2-1 to 2-2	Original
3-1 to 3-2	Change 1
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3-4 to 3-10	Change 1
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3-20	Change 1
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Tape Reader Set CX (Self Contained Unit)

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INTRODUCTION

This bulletin covers description, installation, maintenance and principles of operation for the Teletype High Speed Reader Set. The High Speed Reader Set provides rapid transmission of intelligence recorded in paper tape.

Section 1 is a brief physical and functional description of the equipment and a listing of its technical data. Section 2 contains installation instructions. Sections 3 through 5 cover main-

tenance and lubrication. General maintenance and lubrication instructions appear in paragraphs 3-1 and 3-2, respectively. Section 6 explains the operation of the Reader Set to aid in performing maintenance and in locating troubles. Figure 6-7, illustrating mechanical timing, and Figure 3-20, with instructions for adjustment of the magnetic pick-up coil, are provided for use in applying the Reader and in designing associated equipment. Figure 6-10 is a schematic wiring diagram of the Reader Set.

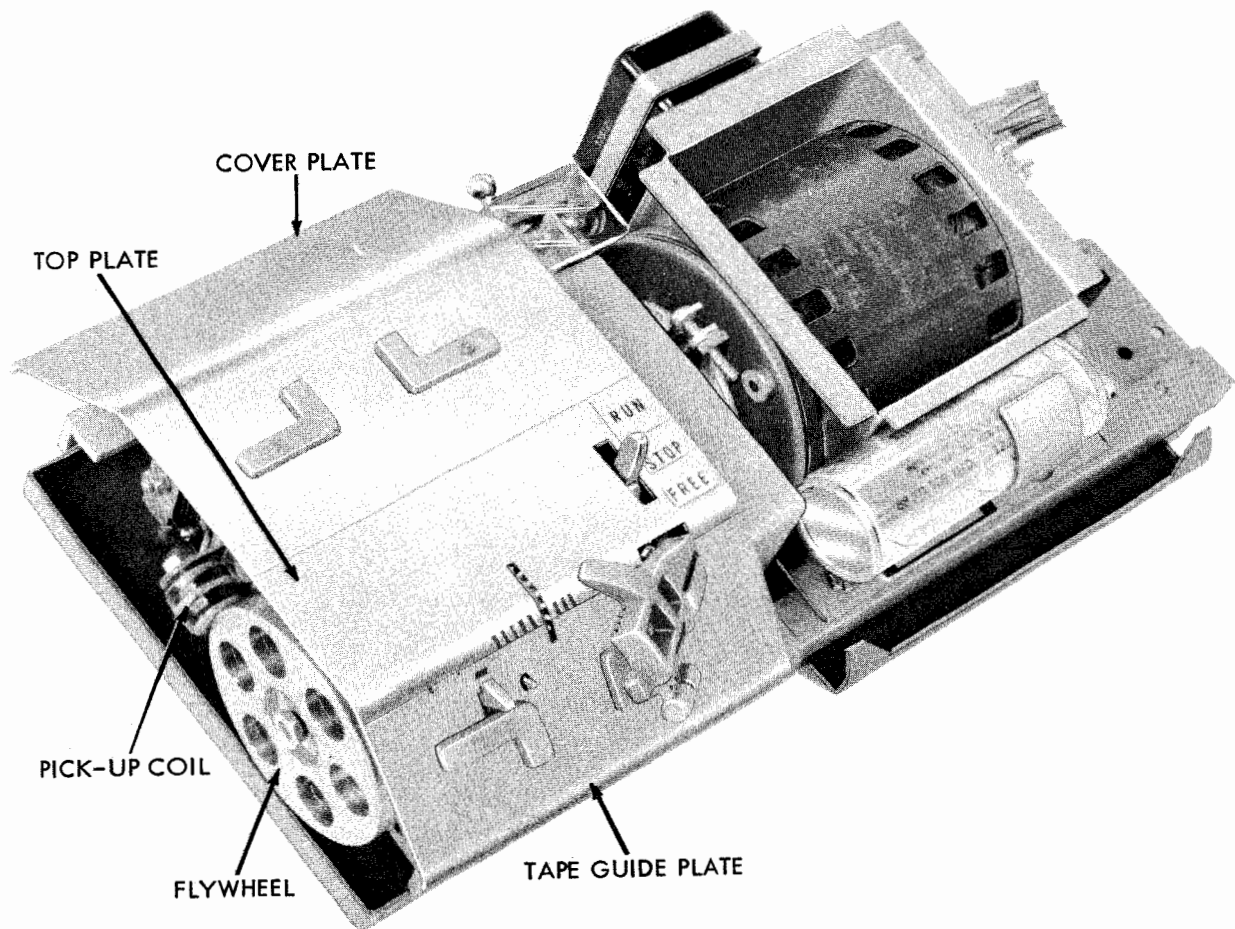


Figure 1-1. Tape Reader Set CX (Covers Removed)

SECTION 1

DESCRIPTION

1-1. GENERAL (Figure 1-1)

a. The High Speed Reader Set is an electromechanical device that provides multi-wire output corresponding to the intelligence recorded in fully perforated or chadless tape. It can be operated at speeds of approximately 1,000 words per minute or less.

b. The basic components of the Set (Figure 1-1) are a Base (CXB), a Motor Unit (MU), a Reader (CX), a Cover (CXC), and a Gear Set. The Motor Unit and the Reader are mounted on the Base and are mechanically coupled by a Gear Set.

c. Parts information, including Gear Sets which determine the Reader speed, can be found in Teletype Bulletin 1176B. All tools required for the maintenance and adjustment of the Set are listed in Teletype Bulletin 1124B.

d. A magnetic pick-up mounted on the Reader generates synchronizing pulses used only for the triggering of external transistor units. External circuits are also controlled by two timing contacts integral with the code contact assembly.

e. Variations of the Set permit the reading of five, six, seven, or eight-level tapes. It will handle spliced tape, but is not required to read the area of the splice. The electrical output is suitable for the operation of either a vacuum tube or transistorized electronic unit, provided the sensing contacts are operated within their current and voltage limits. The circuits into which the contacts operate may be resistive capacitive or inductive.

f. Reference in the text to right, left, front, or rear apply to the unit in its normal operating position as viewed from the front or flywheel. Pivot points in the drawings are indicated by cross-hatched circles.

1-2. BASE (Figure 1-2)

The Base provides a foundation and certain accessories for the Set. It includes the following features:

a. Right and left rails with tapped holes for mounting the Reader and Motor Unit.

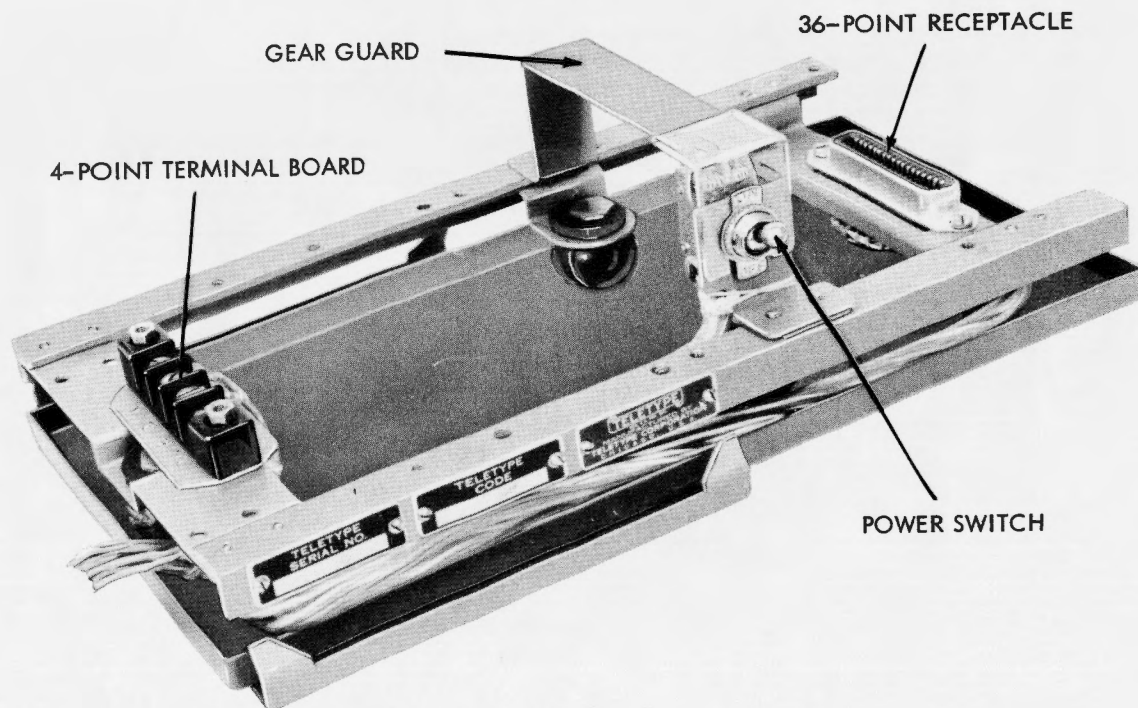


Figure 1-2. Tape Reader Set Base (CXB)

b. Power circuitry including a power switch and a 4-point terminal board for the connection of external power to the Motor Unit.

c. Control circuitry including a 36-point receptacle which mates with a 36-point plug on the bottom of the Reader.

d. A bracket which serves as a guard over the Gear Set.

e. Vibration mounts and four rubber feet.

1-3. MOTOR UNIT (Figure 1-3)

Mechanical drive to operate the Reader is produced by a two-pole synchronous Motor Unit. It develops 25 milli-horsepower at 3600 revolutions per minute.

1-4. READER UNIT (Figures 1-4 and 1-5)

The Reader Unit, by means of its electrical and mechanical assemblies, senses and transmits the information recorded in paper tape. The top of the unit is enclosed by three formed plates (Figure 1-1) --- the tape guide plate, the top plate, and the cover plate. The tape guide and

top plates are secured to the front and rear plates of the Reader by mounting brackets and screws. The cover plate rests on the Reader and is held to the top plate by a detent bracket. Sensing fingers (Figure 1-4) follow the tape while it is being advanced by a feed ratchet and feed pawl. The feed and sensing mechanisms are both driven by cams integral with the main shaft. The Reader includes the following features:

a. A tape sensing mechanism which includes sensing fingers that ride on a slotted guide post. The guide post is pivoted to the top end of the sensing bail. The sensing fingers are spring driven through the holes in the tape and are mechanically withdrawn by the sensing bail.

b. Tape feeding mechanism which feeds the tape by the interaction of a wedging feed pawl, a feed ratchet, a feed wheel, and a detent lever. These parts combine to advance the tape one step at a time as the holes are being sensed.

c. A free wheeling mechanism which is actuated when the start-stop lever (Figure 1-4) is put into the FREE position. It disengages the feed pawl from the feed ratchet and retracts the tape-out pin to permit insertion of tape without lifting the tape lid.

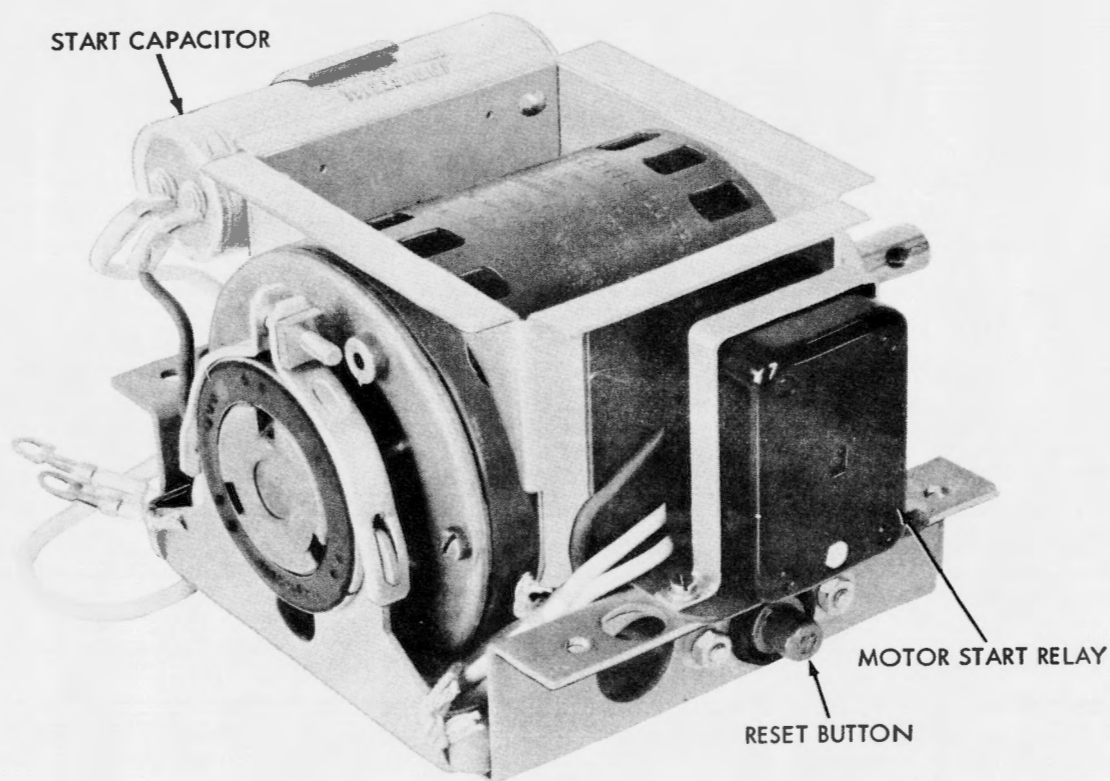


Figure 1-3. Motor Unit (MU)

d. A tight-tape mechanism which will stop Reader operation should the tape become too tight.

e. A tape-out mechanism which stops Reader operation when the end of the tape is reached.

f. A code contact mechanism which consists of leaf contacts that open or close in re-

sponse to movement of their respective sensing fingers.

g. An unlatch mechanism consisting of the operating magnet (Figure 1-5), its armature extension, blocking lever, and springs. When the magnet is energized, the sensing and feeding cam followers are unlatched from the blocking levers, permitting the Reader to operate.

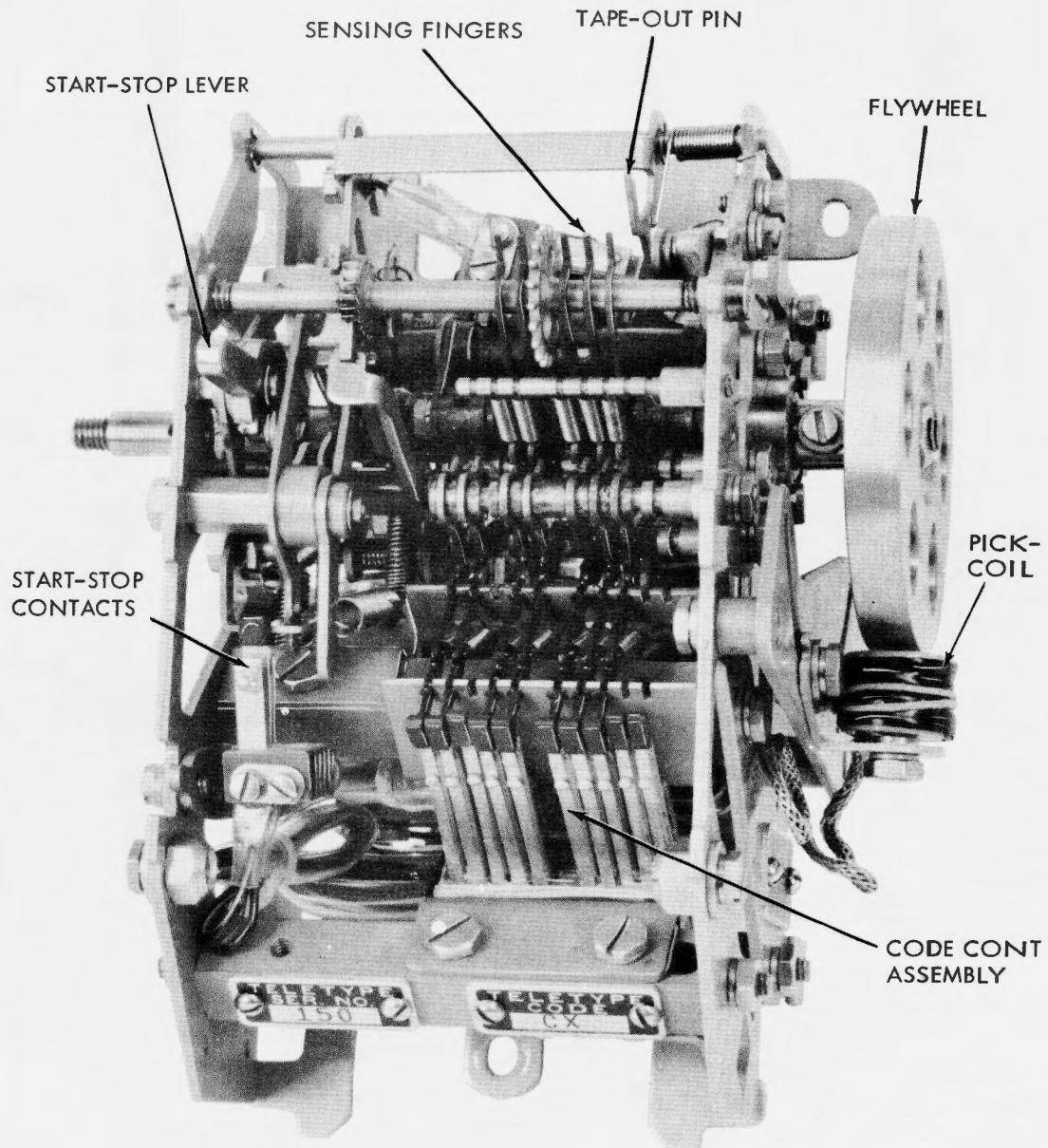


Figure 1-4. CX Reader Unit (Cover Plate, Top Plate and Tape Guide Plate Removed)

h. The main shaft assembly (Figure 1-5) which includes the main shaft with a bearing at each end. The main shaft rotates continuously while the Motor Unit is energized. The sensing and feeding cams are integral with the shaft. One end of the shaft is threaded to mount the driven gear. The other end is threaded and also provided with a hole tapped through the shaft. This end mounts the flywheel which is secured by a nut. The tapped hole is for a screw which passes through an integral shoulder on the flywheel.

1-5. COVER

The Cover consists of two parts. The larger part encloses the Motor Unit and rests on the Base. The other part encloses the Reader.

1-6. GEAR SETS

Alternate Gear Sets are available. These Gear Sets transfer rotary motion from the motor shaft to the Reader main shaft permitting the Reader to be driven at speeds as low as 450 words per minute and as high as 1071.42 words per minute.

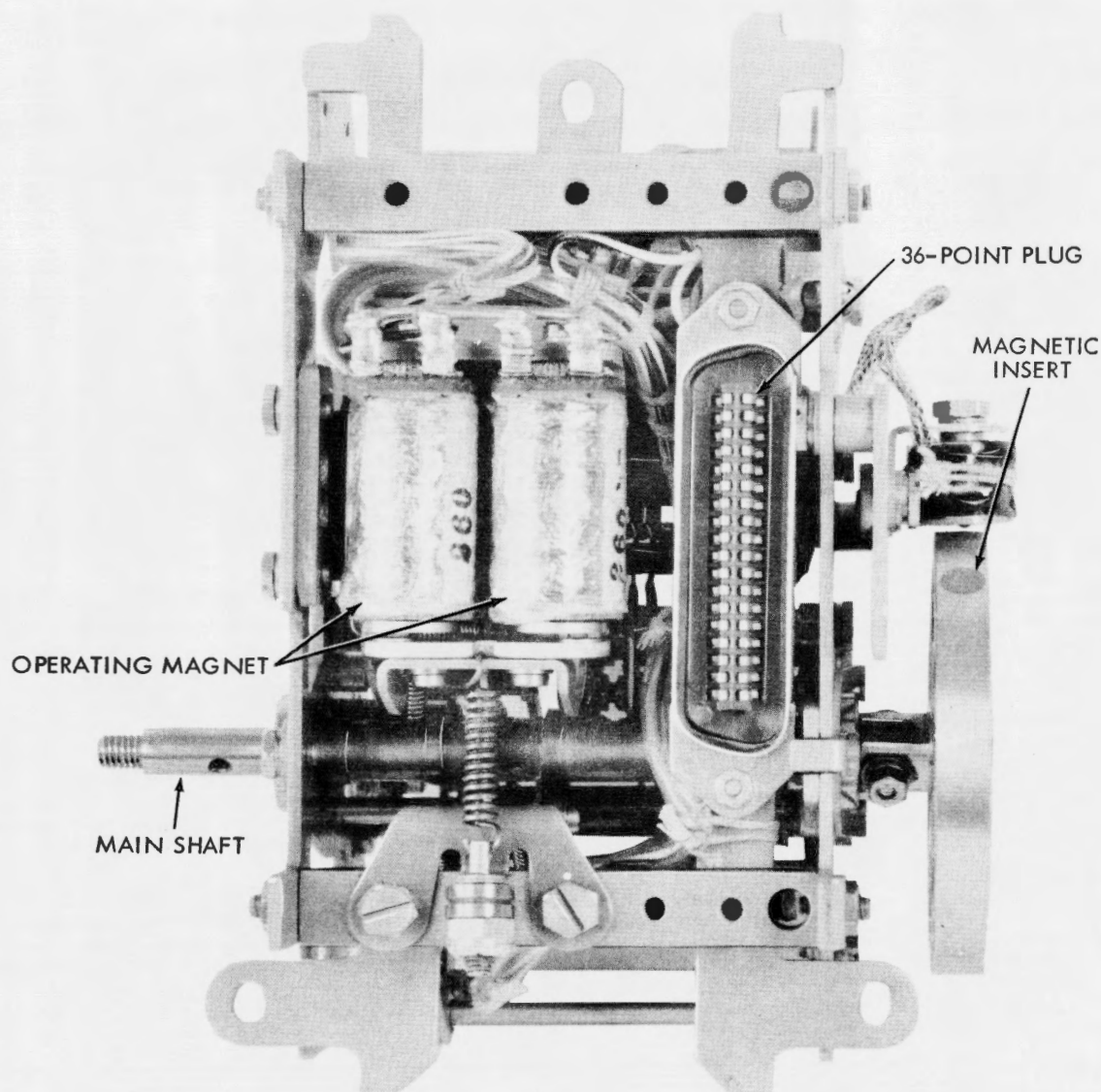


Figure 1-5. CX Reader Unit (Bottom View)

1-7. TECHNICAL DATA

a. GENERAL. Various parts of the Set can be changed or adjusted to meet individual requirements. If additional information is required contact the Teletype Product Sales Department.

b. STANDARD SPEEDS

Gear Sets provide a choice of Reader speeds from 450 words per minute to 1071.42 words per minute.

c. MAGNETIC PICKUP-COIL SPECIFICATIONS

See Figures 1-7 and 1-8. Timing of the pick-up coil pulse is adjustable through 360° of Reader operations.

d. TAPE SPECIFICATIONS

Levels: 5, 6, 7, or 8 with in-line feed hole, fully perforated or chadless.

e. CODE SENSING AND TIMING CONTACT RATING

Volts (D.C.)	Amperes
Min. 28	0.00015
Max. 130	0.100
Contact Resistance	0.2 to 0.3 Ohms

f. OPERATING MAGNET

Connection	Two coils in parallel
Type	260M
Current	1-2 amps.
Volts, DC	28
Resistance per Coil	5 ohms $\pm$ 10%
Pickup time (approximate)	2.5 milliseconds
Dropout time (approximate)	4.5 milliseconds

A typical circuit for 1 ampere operation of operating magnet with shunting of back current is shown in Figure 1-6. For other operating voltages, check with a Teletype Sales Engineer.

g. MOTOR UNIT

Type	Synchronous
Input Voltage	Single phase, 115 volts, $\pm$ 10%, A.C.
Frequency	60 cycles (only) $\pm$ 0.75%
Input Current	
-Starting	4.0 amps.
-Running (No load)	1.06 amps.
-Full load	1.25 amps.
Power Output	25 milli-horsepower
Protection	Thermal cutout
Power Consumption	75 watts
Heat Dissipation	53 watts

h. WEIGHTS AND MEASURES

	Depth (In.)	Width (In.)	Height (In.)	Weight (Lbs.)
Reader Unit	4	5	3	2-1/2
Base	10-1/2	6	3-1/2	2-1/2
Motor Unit	5-1/2	5-1/2	3-1/2	4
Set	11	6	5	12
Mounting Centers (Inches)*	8.484 by 3.250			
Mounting Hole Diameter (Inch)*	0.166			

* See Figure 2-1.

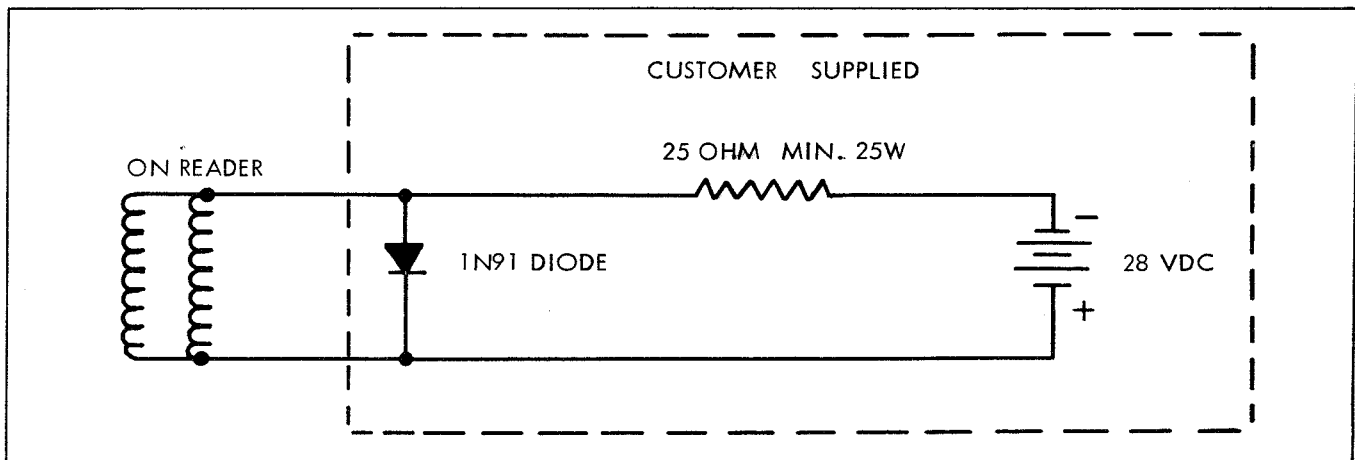


Figure 1-6. Typical Operating Magnet Circuit

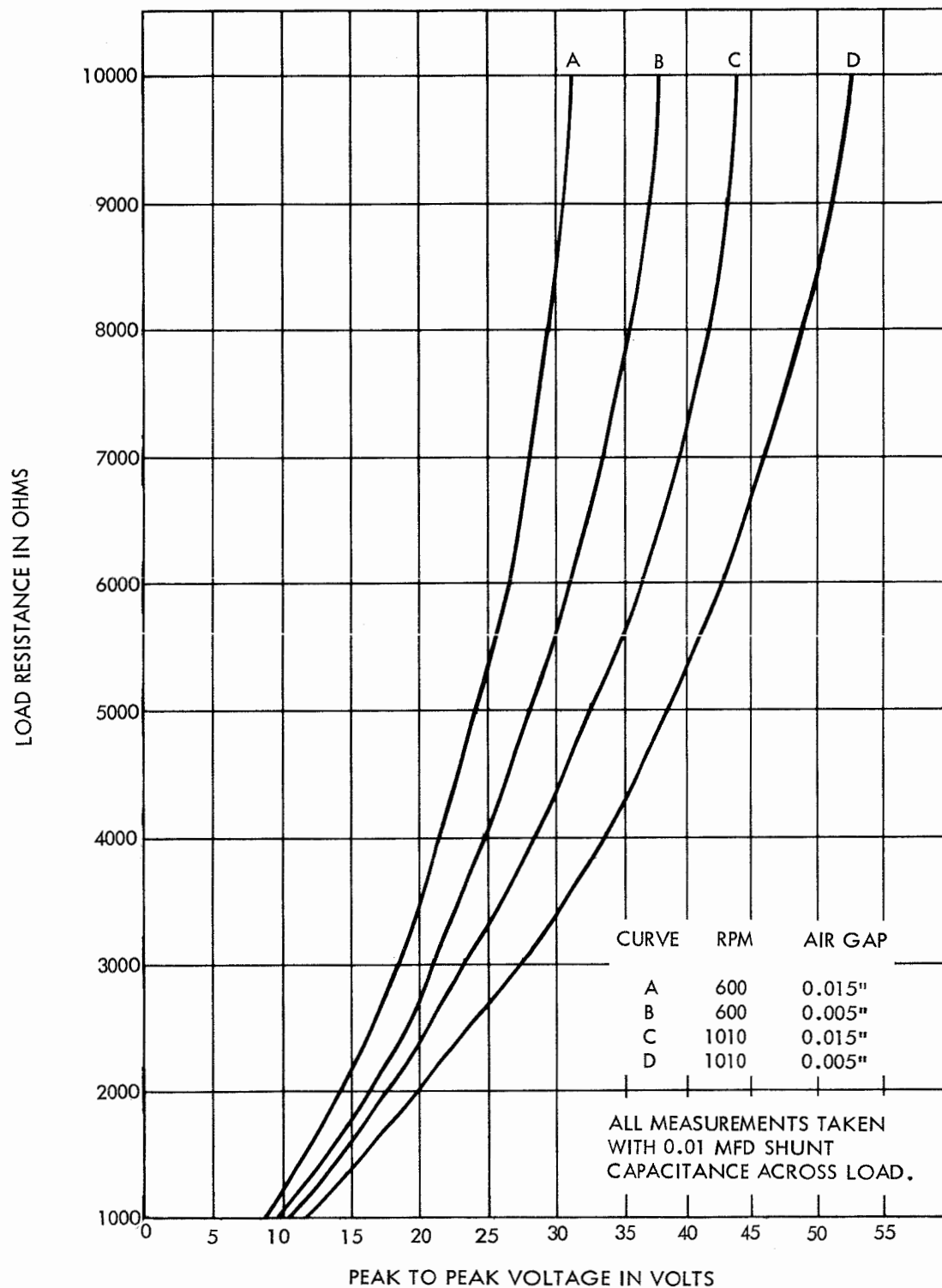


Figure 1-7. Magnetic Pick-Up Characteristics

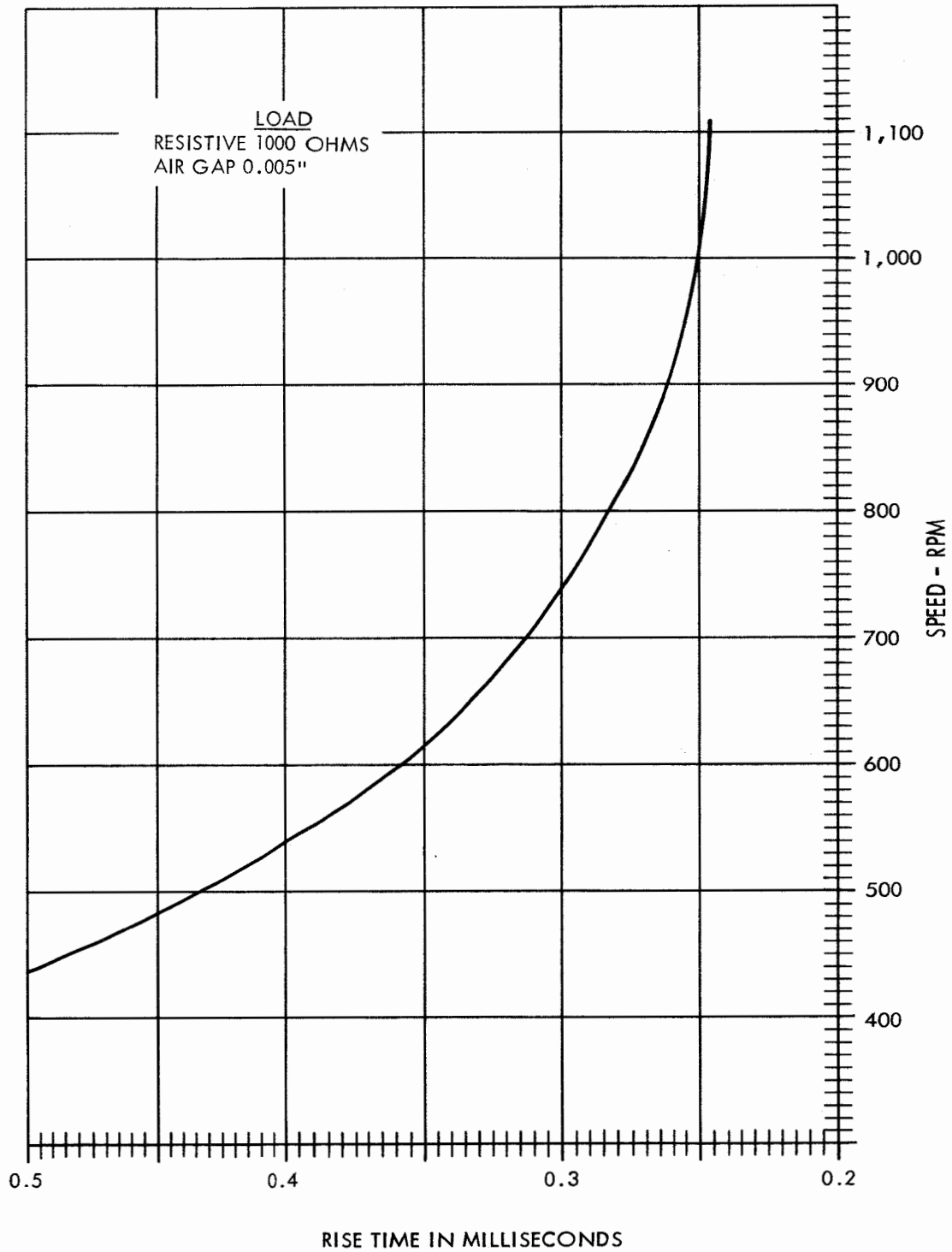


Figure 1-8. Magnetic Pick-up Characteristics.

1-8. VARIABLE FEATURES

a. GENERAL - The variable feature for the High Speed Reader Set, described below, increases the flexibility of the set and may be either factory or field installed.

b. MULTI TAPE - LEVEL READING

MECHANISM - This mechanism allows one reader to alternately sense either 5, 6, 7, or 8 level tapes as desired. When reading less than 8 level tape, the mechanism prevents the tape reader from mechanically sensing the unused levels. These unused levels are registered and transmitted as spacing signals by the code reading contact assembly.

SECTION 2

INSTALLATION

2-1. GENERAL

The High Speed Reader Set, consisting of Base (CXB), Reader (CX), Motor Unit (MU), Cover (CXC), and a Gear Set is ordinarily packed with each of these components in a separate carton. The Cover consists of two parts packed in the same carton. A wiring diagram is included in both the Reader and Base Cartons.

2-2. UNPACKING

a. BASE

Cut the seal and open the top flaps of the cardboard carton. Remove the wiring diagram which is under the metal bracket across the top of the Base. Remove the corrugated liner that holds the Base in place. Grasp the bracket mounted across the top of the Base and lift it from the carton.

b. READER

Put the carton on its side. Cut the seal at the top and bottom ends, open the flaps, and remove the wiring diagram from the top end. Hold the carton in place and gently push against the wooden pallet at the bottom end to remove the unit from the carton. Rest the unit on the plywood pallet and remove the tape from the seam of the corrugated sleeve. Remove this sleeve and the cardboard detail from the top of the Unit. Cut and remove the tape which secures the Unit to the plywood pallet. Lift the unit straight up from the pallet. Carefully remove the tape that secures the top plate and tape guide plate to the Reader.

c. MOTOR UNIT

Cut the seal and open the top flaps. A corrugated cell is fitted over the top of the unit and under the motor shaft. Bend this cell away from the top of the unit. Grasp the Unit by its housing and lift straight up, removing it and the corrugated cell from the carton. Failure to lift straight up could cause a bind on the thermal reset button which is positioned in an opening of the liners inside the carton.

d. COVER

Cut the seal at the top of the carton and open the flaps. Lift the two cover pieces from the carton and remove the tissue paper.

e. GEAR SET

Cut the seal at the top of the carton and open the flaps. Remove the Gear Set from the carton and remove the wrap.

2-3. ASSEMBLY

a. Remove the muslin bag tied to a bracket on the Base. It contains hardware for mounting the Reader, Motor Unit, and pinion gear. Mount the Reader on the Base so that the male receptacle on the Reader mates with the female receptacle on the Base. Three of the 151630 screws, each with a 45815 lockwasher, should pass through the 171289 and 171290 Reader mounting plates down into the holes tapped into the 171201 and 171203 rails on the Base. The screws should be finger tight. Secure the Reader gear to its shaft.

b. Place the 156805 pinion retainer over the pinion gear shoulder. Secure the gear to the motor shaft with the two 156806 posts. Position the Motor Unit on the Base so that the motor and Reader gears mesh. The four remaining 151630 screws, each with a 45815 lockwasher, should pass through the 171749 motor bracket down into the holes tapped into the 171201 and 171203 rails on the Base. The screws should be finger tight. Put the start-stop lever on the top of the Reader into the FREE position. From a position in front of the Reader, carefully spin the flywheel in a counterclockwise direction. Adjust the position of the Reader and Motor Unit until there is barely perceptible backlash between the gears. Tighten the Reader and Motor Unit mounting screws and recheck the backlash.

c. Put the cover in place by holding the larger part over the Set and carefully lowering it over the Motor Unit to rest on the Base. Slip the other part into place from the right side of the Reader. This part is held in place by the spring action of its sides.

2-4. MOUNTING

The base drip pan includes a rubber foot at each corner and is also provided with three vibration mounts. These parts serve to prevent scratching the mounting surface and to minimize the mechanical transmission of noise.

2-5. ELECTRICAL CONNECTIONS

See paragraphs 1-7-f and 1-7-g for pertinent electrical data. Wiring diagrams 5072 WD and 5073 WD illustrate the electrical connections to the Set (paragraph 2-1).

2-6. PREPARATION FOR OPERATION

a. ADJUSTMENTS

(1) The Reader is adjusted at the factory for use with five, six, seven, or eight-level tape, as specified.

(2) The flywheel with its magnetic insert which controls the synchronizing pulse is ordinarily adjusted at the factory as outlined under Magnet Pick-up Adjustment, Figure 3-20. This adjustment procedure may be modified to meet the requirements of individual applications.

b. LUBRICATION - The Set should be lubricated before its initial use as instructed in Section 5.

c. TAPE THREADING - The tape path is illustrated in the photograph on Page B. Push the tape lid latch to the right to open the tape lid. Lead the tape from right to left between the right tape guides, over the feedwheel, and between the left tape guides. Position the tape feed holes over the pins on the feedwheel and close the tape lid. The tape may be inserted without lifting the tape lid by placing the start-stop lever into the right (FREE) position.

d. STARTING TAPE - Place the power switch into the ON position and then place the start-stop lever into the left (RUN) position. Feeding and reading operations will now begin.

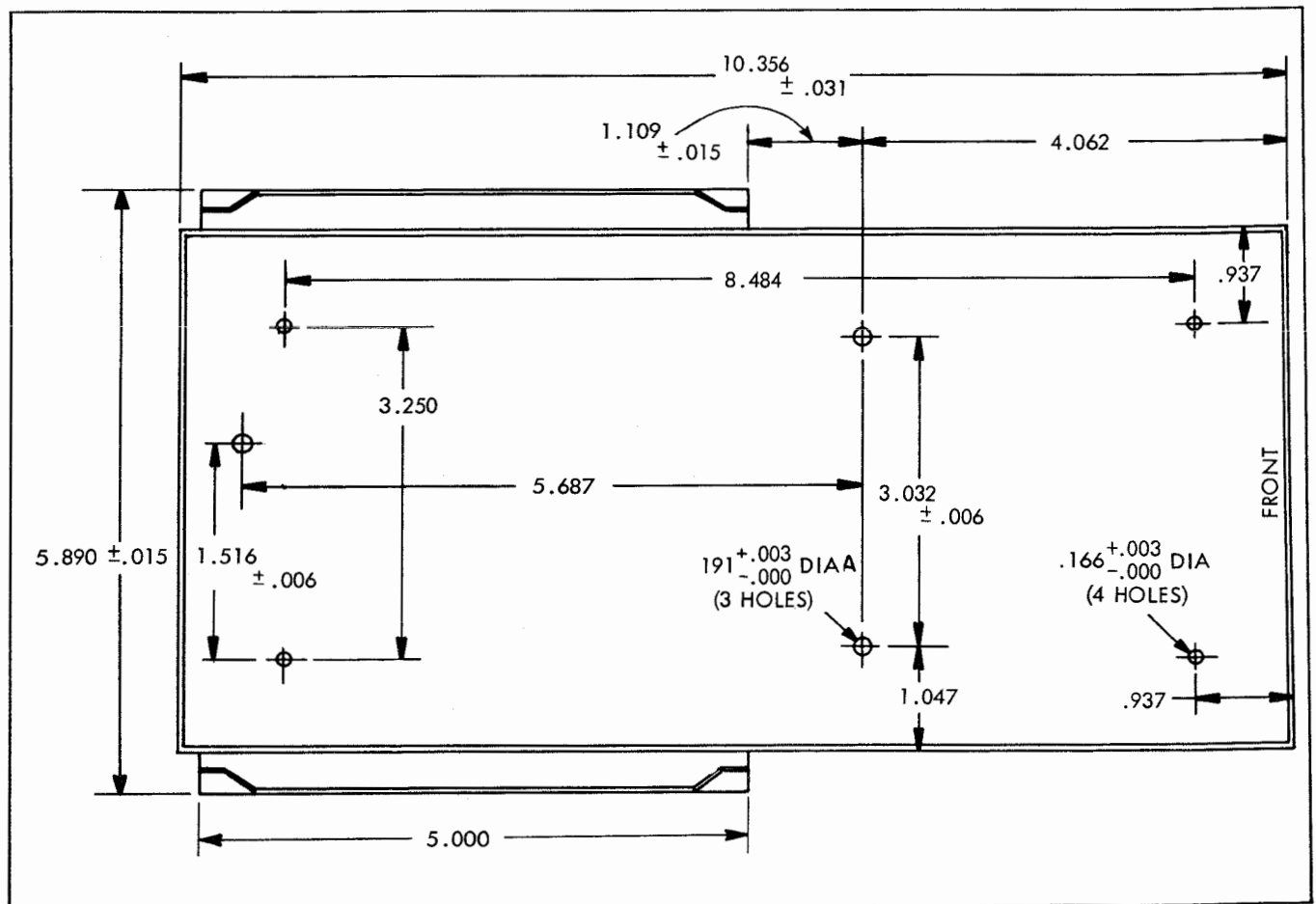


Figure 2-1. Set Mounting Dimensions

SECTION 3

ADJUSTMENTS AND SPRING TENSIONS

3-1. GENERAL MAINTENANCE

The High Speed Reader Set should be cleaned and inspected periodically to assure optimum performance and to prevent troubles that might otherwise develop. During inspection, make sure that all contacts are clean and mate properly. Wiring connections should be mechanically secure and nuts and screws that lock adjustments should be tight. Check for abrasion on wiring due to contact with moving parts. Metal dust near any moving part may indicate insufficient clearance, a condition that should be immediately rectified. While cleaning, take care to avoid damaging springs and pins. Exercise caution to avoid putting kinks in contact leaves that might require bending to meet tension requirements. Maintenance may require replacement of parts. (Disassembly instructions are included in Section 4.) It is very important that the Set be thoroughly lubricated at the intervals specified in Section 5.

3-2. GENERAL ADJUSTMENT INFORMATION

a. Illustrations in this section show the location of clearances, position of parts, and point and angle of scale application. When measuring spring tension, apply smooth gradual pressure to the scales. Text on the same page with the illustration outlines the requirements and explains the procedures that should be followed. The adjustments are arranged in the sequence that should be followed when complete adjustment of the set is undertaken. The sequence that should be followed on individual pages is indicated by letters of the alphabet. The sequence to be followed for an adjustment with several requirements is indicated by numerals. A procedure should be read all the way through before making adjustments or measuring spring tensions. If an adjustment or spring tension is changed, related adjustments and tensions should be checked. Most spring tension requirements are shown adjacent to related adjustments to make overall maintenance more convenient.

b. Tools required for the adjustments or measurements of spring tensions are not supplied with the Set, but are listed in Teletype Bulletin 1124B. Before replacing parts that have been removed, make all adjustments that removal of these parts might facilitate. When parts are removed, take careful note of their number and order of removal. This will facilitate proper replacement. Unless it is specifically stated otherwise, all nuts and screws that have been loosened should be tightened after an adjustment has been made.

c. Spring tensions should be measured with Teletype scales and the scales should be used in the positions shown in the illustrations. Springs which do not meet the requirements, and for which there are no adjustment procedures, should be replaced by new springs.

d. All contact points should meet squarely and be in line. Avoid putting kinks in contact leaves that might require bending to meet tension requirements.

e. To remove the Cover, pull the smaller part to the right to remove it from the Reader. The part that encloses the Motor Unit may be removed by lifting it from the Base.

f. Before proceeding with the adjustments, put the start-stop lever into the left (RUN) position. Manually actuate the operating magnet and slowly rotate the main shaft counterclockwise, as viewed from the flywheel. This will put the various mechanical assemblies into operation. Check for freedom of movement and binding between parts.

CAUTION

Improperly adjusted equipment may be damaged in a matter of seconds if operated under power.

3-3. ALPHABETICAL INDEX: ADJUSTMENTS AND SPRING TENSIONS

Adjustments	Pages	Adjustments	Pages
Base	3-24	Inertia Stop Lever	3-14
Backstop-Normally Closed Contact	3-17	Magnet Assembly	3-15
Code Reading and Universal Contact	3-16	Magnet Pick-up	3-22
Contact Installation	3-19	Normally Open Contact	3-18
Cover Plate	3-6	Sensing Bail	3-11
Feed Pawl	3-13	Spring Tension-Normally	
Feedwheel Detent	3-12	Closed Contact	3-17
Gear Mesh	3-22		

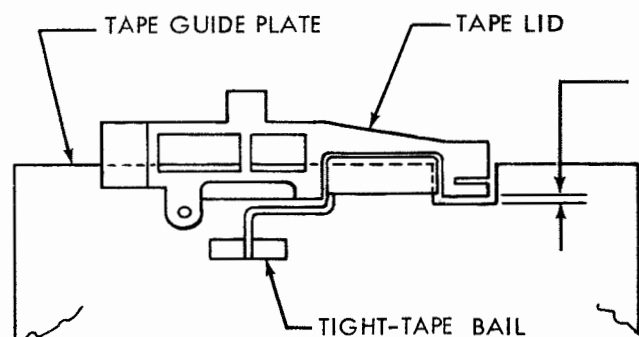
3-3. ALPHABETICAL INDEX: ADJUSTMENTS AND SPRING TENSIONS (Cont)

Adjustments	Pages	Spring Tensions	Pages
Spring Tension-Normally		Armature Spring	3-21
Closed Contact Against Backstop	3-17	Blocking Lever Spring	3-21
Spring Tension-Normally		Code Lever Spring	3-23
Open Contact	3-18	Cover Plate Plunger Spring	3-6
Start-Stop Contact Assembly	3-9	Detent Lever Spring	3-23
Start-Stop Contact Assembly Bracket	3-10	Feed and Sensing Cam Follower	
Tape Guide	3-4	Springs	3-11
Tape Guide Plate	3-5	Feed Pawl Spring	3-13
Tape Lid	3-3	Feedwheel Detent Spring	3-12
Tape Lid Latch	3-20	Inertia Stop Lever Spring	3-14
Tape-Out Contact Assembly	3-7	Sensing Finger Springs	3-8
Tape-Out Contact Assembly Bracket	3-7	Start-Stop Lever Detent	
Tape-Out Pin	3-8	Spring	3-10
Tight-Tape Arm	3-10	Tape Lid Latch Spring	3-20
Timing (Universal) Contact Actuator	3-15	Tape Lid Spring	3-3
Top Plate	3-5	Tape-Out Pin Spring	3-8
Transfer Lever	3-23	Tight-Tape Arm Spring	3-21

TAPE LID

NOTE

REMOVE TAPE GUIDE PLATE AND COVER (OR REAR) PLATE. LUBRICATE TAPE LID AND COVER PLATE PER PAR. 5-2.b. AND c.



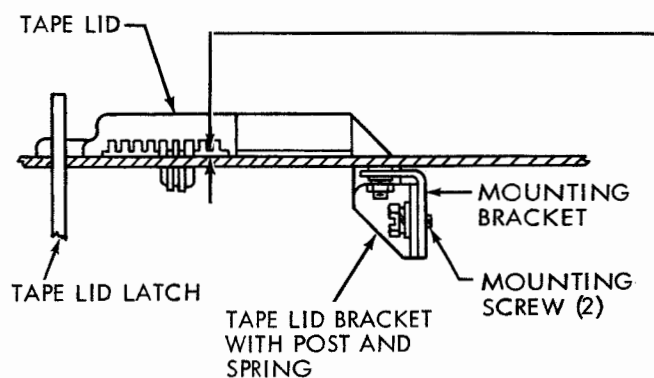
TOP VIEW

(1) REQUIREMENT

MIN. 0.012 INCH --- MAX. 0.020 INCH
CLEARANCE BETWEEN NOTCH IN TAPE GUIDE
PLATE AND TAPE LID.

TO ADJUST

LOOSEN NUTS WHICH SECURE MOUNTING BRACKET TO TAPE GUIDE PLATE. POSITION TAPE LID LOCATING PIN IN SLOT IN TAPE GUIDE PLATE. USE 156743 GAUGE TO LINE UP FEEDWHEEL SLOT IN TAPE LID WITH SLOT IN TAPE GUIDE PLATE. POSITION MOUNTING BRACKET TO MEET (1) ABOVE.



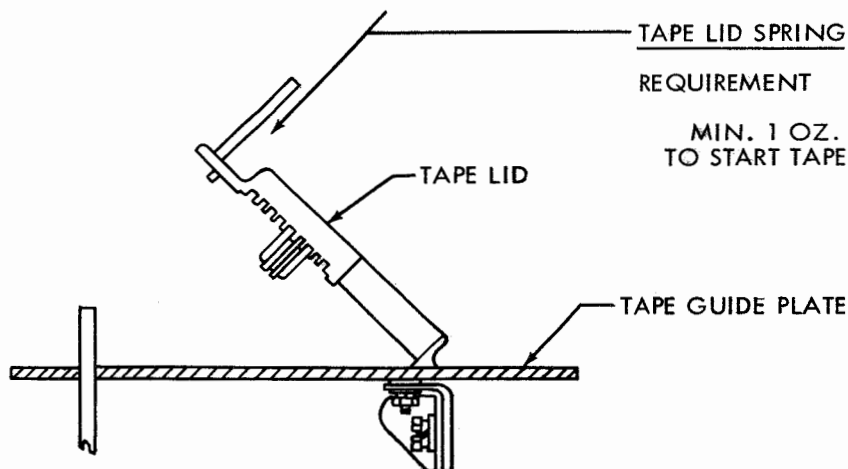
(VIEWED FROM RIGHT SIDE)

(2) REQUIREMENT

BEARING SURFACES OF TAPE LID FLUSH
AGAINST TAPE GUIDE PLATE.

TO ADJUST

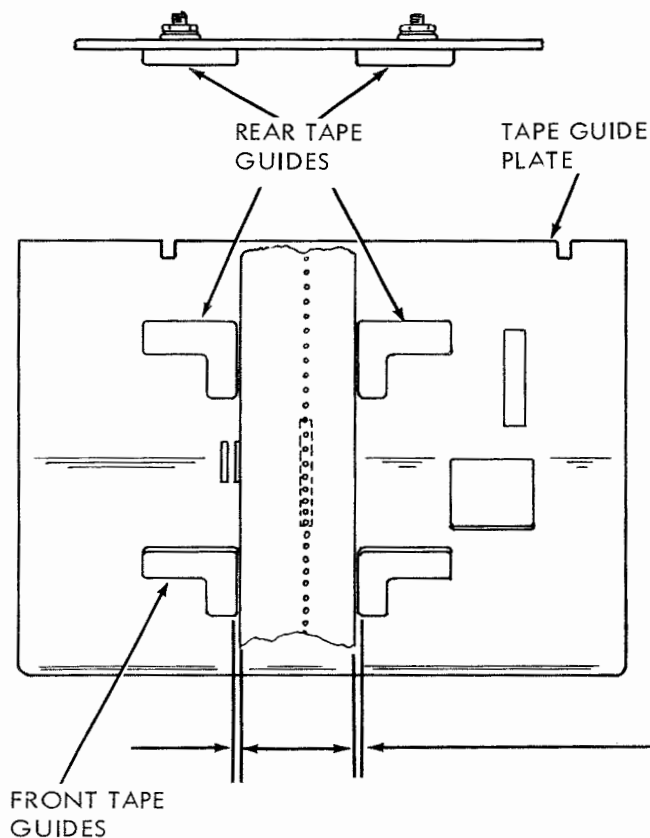
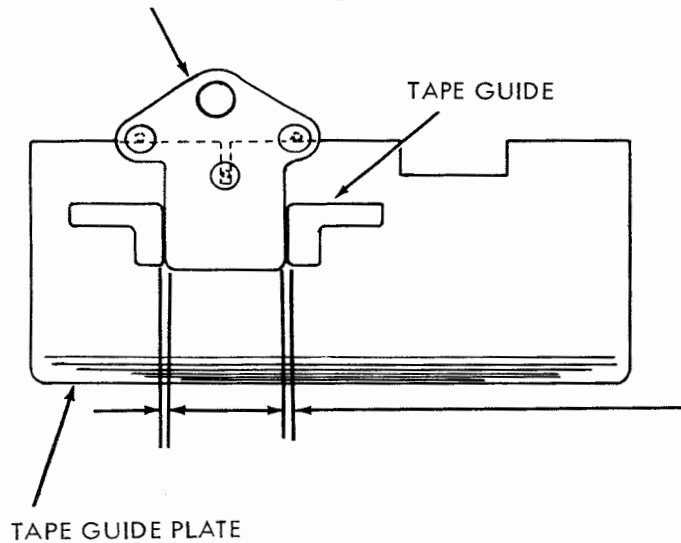
WITH BRACKET MOUNTING SCREWS FRICTION TIGHT, POSITION TAPE LID AGAINST TAPE GUIDE PLATE. GAUGE BY EYE. RECHECK (1) ABOVE.



(VIEWED FROM RIGHT SIDE)

Figure 3-1.

171666 GAUGE - 5 LEVEL
171667 GAUGE - 6 & 7 LEVEL
171668 GAUGE - 8 LEVEL



TAPE GUIDE

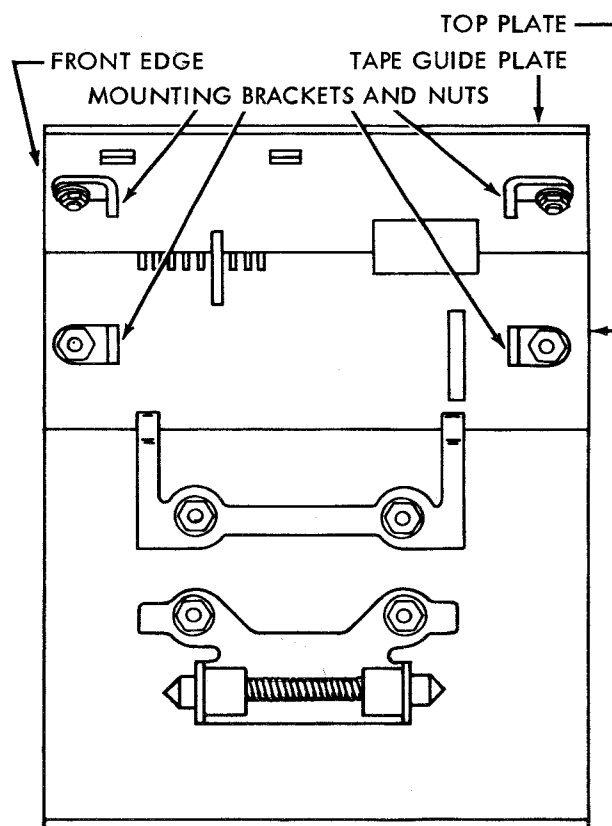
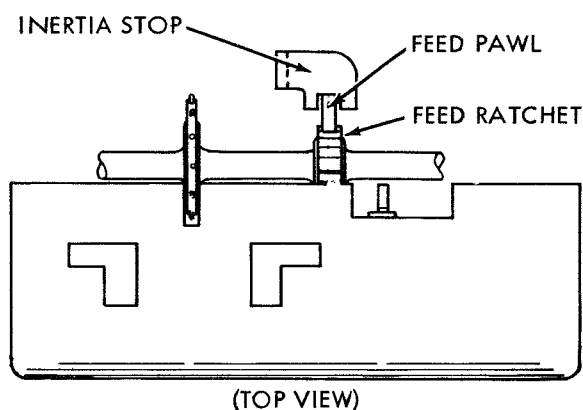
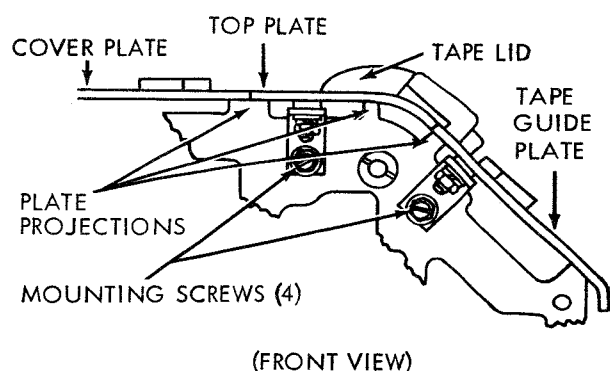
NOTE

THIS ADJUSTMENT FOR UNITS WITH BOTH A TAPE GUIDE AND TOP PLATE

- (1) REQUIREMENT
WITH GAUGE PROPERLY POSITIONED:
MIN. SOME --- MAX. 0.003 INCH
CLEARANCE BETWEEN GAUGE AND GUIDES.
- (2) REQUIREMENT
EDGE OF WEAR PLATE FLUSH WITH TAPE
GUIDE PLATE EDGE.
- (3) REQUIREMENT
TAPE SHALL NOT RIDE UP SIDES OF GUIDES.
TO ADJUST
WITH WEAR PLATE MOUNTING NUTS FRIC-
TION TIGHT, TAPE LID UNLATCHED,
MOVE WEAR PLATE TO OVERHANG TAPE
GUIDE PLATE. PLACE GAUGE BETWEEN
GUIDES WITH ITS CENTER STUD IN FEED-
WHEEL SLOT OF TAPE GUIDE PLATE AND
WEAR PLATE. PUSH GAUGE HORIZONTALLY
UNTIL ITS OTHER TWO STUDS BUTT AGAINST
EDGE OF TAPE GUIDE PLATE. KEEP GAUGE
IN POSITION, ALIGN ONE GUIDE, TIGHT-
EN NUT. REPEAT WITH OTHER GUIDE.
APPLY MEDIUM FILM OF GREASE TO EDGE
OF WEAR PLATE ADJACENT TO SENSING
FINGER SLOTS IN TOP PLATE
- (4) REQUIREMENT
COVER PLATE GUIDES IN LINE WITH TAPE
PATH.
TO ADJUST
WITH TAPE IN UNIT AND COVER PLATE
TAPE GUIDE MOUNTING NUTS FRICTION
TIGHT, DRAW TAPE TO LEFT WHILE LAYING
IT BETWEEN GUIDES. ALIGN ONE GUIDE
WITH TAPE, GAUGING BY EYE. TIGHTEN
NUT, AND POSITION OTHER GUIDE WITH
AID OF TAPE GUIDE GAUGE.

TAPE GUIDE

- (1) REQUIREMENT
MIN. 0.005 INCH --- MAX. 0.010 INCH
CLEARANCE BETWEEN TAPE EDGE AND
GUIDES. 5 LEVEL UNITS USE 5 LEVEL TAPE,
6 LEVEL UNITS USE 6 LEVEL TAPE, ETC.
TO ADJUST
LOOSEN TAPE GUIDE MOUNTING NUTS TO
FRICTION TIGHT. UNLATCH TAPE LID.
PLACE A LENGTH OF TAPE BETWEEN GUIDES
WITH TAPE FEED HOLES OVER FEED WHEEL
SLOT OF TAPE GUIDE PLATE. POSITION
TAPE GUIDES TO MEET REQUIREMENT.
- (2) REQUIREMENT
TAPE SHALL NOT RIDE UP SIDES OF GUIDES.
- (3) REQUIREMENT
GUIDES IN LINE WITH TAPE PATH AS
GAUGED BY EYE.
TO CHECK
PLACE TAPE IN UNIT AND CLOSE TAPE LID.
DRAW TAPE THROUGH TO LEFT. TAPE
SHOULD RUN PARALLEL TO EDGE OF TAPE
GUIDE PLATE WITHOUT BINDING.
TO ADJUST
REFINE ABOVE ADJUSTMENT.

(A) TAPE GUIDE PLATE(1) REQUIREMENT

TAPE GUIDE PLATE SHOULD REST FIRMLY ON AT LEAST 3 FRONT AND REAR PLATE PROJECTIONS.

(2) REQUIREMENT

FEED WHEEL TURNS FREELY WITH CONTROL LEVER IN FREE WHEEL POSITION.

(3) REQUIREMENT

WITH LETTERS TAPE IN UNIT, TAPE-OUT PIN SHOULD BE CENTERED BETWEEN CODE HOLES, OR CODE HOLES AND EDGE OF TAPE. TO ADJUST

LOOSEN TAPE GUIDE PLATE MOUNTING BRACKET NUTS TO FRICTION TIGHT. PLACE SENSING PINS IN THEIR MOST RETRACTED POSITION. POSITION TAPE GUIDE PLATE WITH TAPE LID UNLATCHED AND CONTROL LEVER IN STOP POSITION. RECHECK ALL REQUIREMENTS.

(B) TOP PLATE (IF PRESENT ON UNIT)(1) REQUIREMENT

TOP PLATE SHOULD REST FIRMLY ON AT LEAST THREE FRONT AND REAR PLATE PROJECTIONS. UPPER SURFACE OF THE TOP PLATE SHOULD BE FLASH WITH, OR BELOW (MAX. 0.003 INCH) SURFACE OF TAPE GUIDE PLATE IN AREA OF SENSING FINGERS.

(2) REQUIREMENT

FEEDWHEEL SLOT IN TOP PLATE SHOULD BE IN LINE WITH SLOT IN TAPE GUIDE PLATE. WITH UNIT IN FREE POSITION, FEEDWHEEL SHOULD ROTATE FREELY.

TO ADJUST

POSITION TOP PLATE WITH ITS MOUNTING BRACKET NUTS AND SCREWS FRICTION TIGHT. DO NOT TIGHTEN.

(3) REQUIREMENT

WITH "LETTERS" TAPE IN UNIT, TAPE-OUT PIN SHOULD BE CENTERED BETWEEN CODE HOLES, OR CODE HOLES AND EDGE OF TAPE.

TO ADJUST

POSITION TAPE GUIDE PLATE AND TOP PLATE.

(4) REQUIREMENT

WITH TAPE LID LATCHED:

MIN. 0.008" --- MAX. 0.025"

CLEARANCE UNDER TAPE LID EXTENSIONS COVERING FEED WHEEL SLOTS AND TAPE OUT PIN.

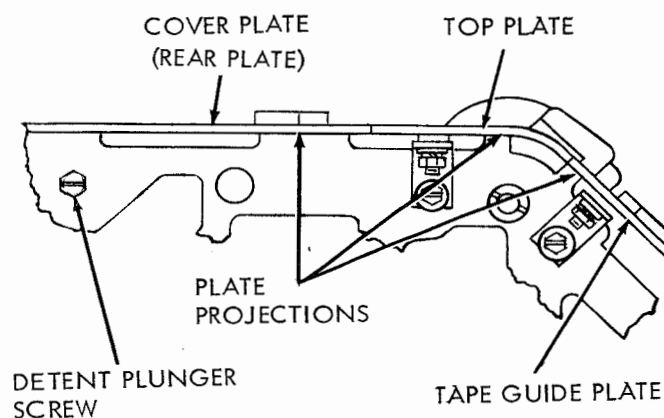
MIN. 0.008" --- MAX. 0.015"

CLEARANCE BETWEEN TAPE LID AND TOP PLATE MEASURED IN AREA OF SENSING FINGER SLOTS WHEN PLAY IN LID IS TAKEN TOWARD TAPE GUIDE PLATE.

TO ADJUST

LOOSEN SCREWS HOLDING TAPE LID MOUNTING BRACKETS TOGETHER; POSITION TAPE LID TO MEET REQUIREMENTS. RECHECK REQUIREMENTS (1) AND (2).

Figure 3-3.

COVER PLATE

(1) REQUIREMENT

COVER PLATE AND TOP PLATE SHOULD BE HELD FLUSH ALONG THEIR COMMON EDGE BY DETENT ACTION.

(2) REQUIREMENT

COVER PLATE SHOULD REST FIRMLY ON AT LEAST THREE FRONT AND REAR PLATE PROJECTIONS

(3) REQUIREMENT

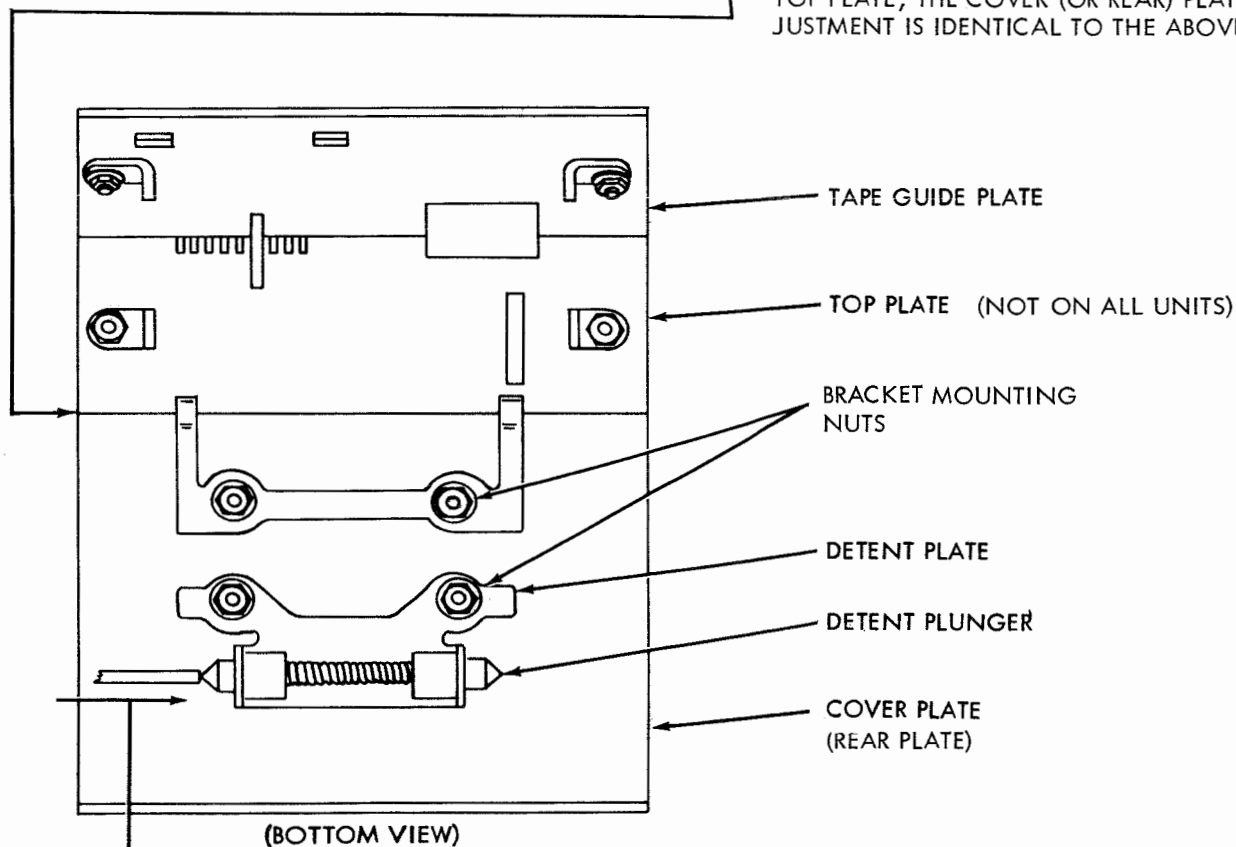
FRONT EDGE OF COVER PLATE AND TOP PLATE SHOULD BE IN LINE.

TO ADJUST

MOVE SCREWS WHICH FIX POSITION OF DETENT PLUNGER TO EXTREME LOWER RIGHT POSITION. TIGHTEN SCREWS. LOOSEN FOUR BRACKET MOUNTING NUTS ON COVER PLATE, AND POSITION PLATE. IF NECESSARY, REFINE LOCATION OF DETENT PLUNGER SCREWS TO MEET REQUIREMENT (1).

NOTE

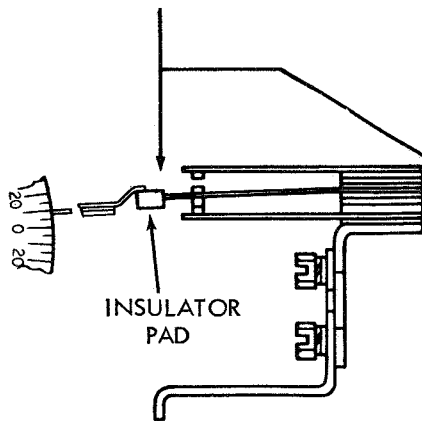
ON THOSE UNITS NOT HAVING A SEPARATE TOP PLATE, THE COVER (OR REAR) PLATE ADJUSTMENT IS IDENTICAL TO THE ABOVE.

COVER PLATE PLUNGER SPRING

REQUIREMENT

MIN. 8 OZS. --- MAX. 20 OZS.
TO START ONE OF THE PLUNGERS MOVING.

Figure 3-4.



(A)

TAPE-OUT CONTACT ASSEMBLY

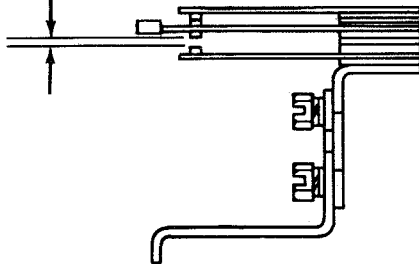
TO CHECK
REMOVE CONTACT ASSEMBLY FROM ITS MOUNT-
ING BRACKET.

(1) REQUIREMENT
MIN. 8 GRAMS --- MAX. 15 GRAMS
TO OPEN NORMALLY CLOSED CONTACTS
TO ADJUST
BEND CONTACT SWINGER

(2) REQUIREMENT
MIN. 0.008 INCH --- MAX. 0.015 INCH
CLEARANCE BETWEEN NORMALLY OPEN
CONTACTS
TO ADJUST
BEND UPPER CONTACT LEAF

NOTE

REPLACE CONTACT ASSEMBLY. MAKE SURE
CONTACT SWINGER IS UNDER TAPE-OUT PIN
EXTENSION.



(B)

TAPE-OUT CONTACT ASSEMBLY BRACKET

REQUIREMENT

WITH TAPE IN UNIT, TAPE LID LATCHED:
MIN. 0.008 INCH --- MAX. 0.015 INCH
GAP BETWEEN TOP CONTACTS. SOME MOVEMENT
OF BOTTOM CONTACTS WHEN TOP CONTACTS ARE
OPENED.

TO ADJUST

LOOSEN SCREWS WHICH HOLD CONTACT ASSEMBLY
BRACKET AND MOUNTING BRACKET TOGETHER.
POSITION BRACKET BY MEANS OF PRY POINTS.
IF NECESSARY, REFINE (A) (2) ABOVE.

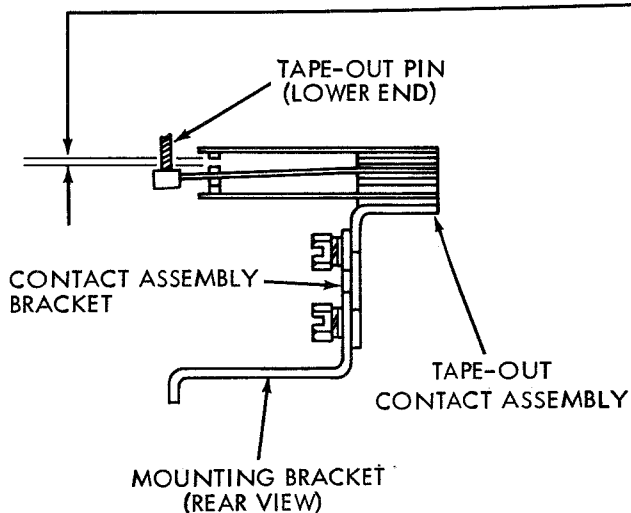
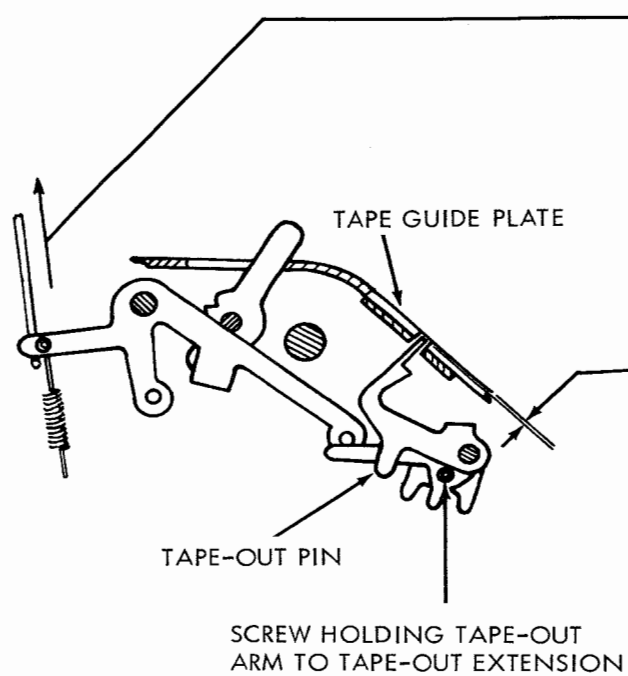


Figure 3-5.



(FRONT VIEW)

TAPE-OUT PIN

(1) REQUIREMENT

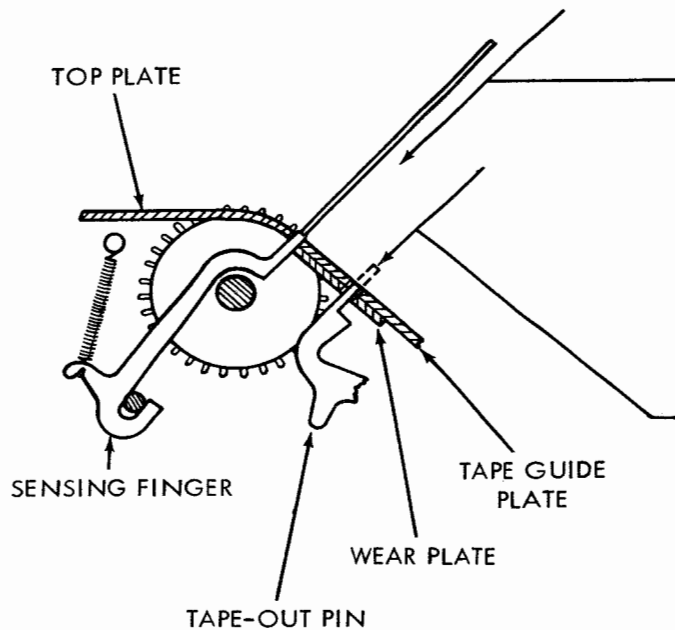
WITH UNIT IN FREE POSITION:
MIN. SOME --- MAX. 0.010 INCH.
CLEARANCE BETWEEN TAPE-OUT PIN AND
TAPE GUIDE PLATE.

(2) REQUIREMENT

WITH UNIT IN RUN POSITION AND TAPE IN
UNIT, TAPE-OUT PIN SHALL CLOSE BOTTOM
TAPE-OUT CONTACTS.

TO ADJUST

PLACE CONTROL LEVER IN STOP POSITION.
LOOSEN SCREW SECURING TAPE-OUT ARM
TO TAPE-OUT EXTENSION. POSITION
TAPE-OUT PIN BY MEANS OF PRY POINTS.



(FRONT VIEW)

SENSING FINGER SPRINGS

REQUIREMENT (EACH SPRING)

WITH SENSING FINGERS IN UPPERMOST POSITION,
CODE READING CONTACT SPRINGS HELD AWAY:
MIN. 3 OZS. --- MAX. 4 OZS.
TO MOVE SENSING FINGER FLUSH WITH TAPE
GUIDE PLATE.

TAPE-OUT PIN SPRING

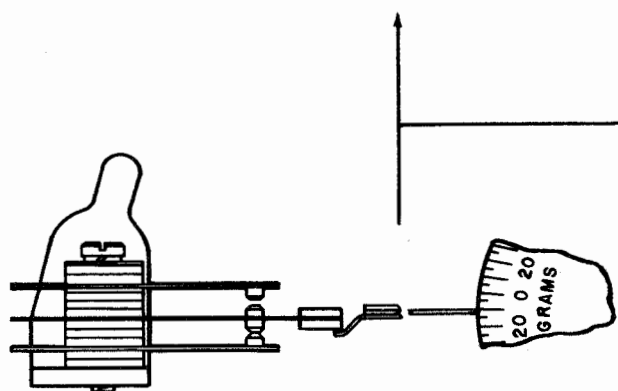
REQUIREMENT

WITH TAPE-OUT CONTACT SWINGER HELD AWAY:
MIN. 5 GRAMS --- MAX. 15 GRAMS
TO MOVE TAPE-OUT PIN FLUSH WITH TAPE GUIDE
PLATE.

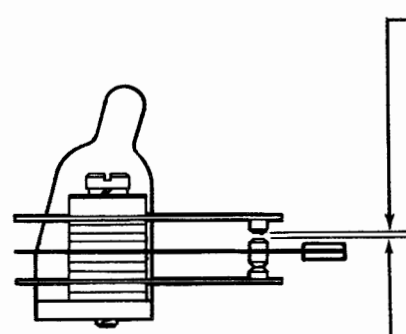
Figure 3-6.

START-STOP CONTACT ASSEMBLY

TO CHECK
REMOVE CONTACT ASSEMBLY AND ITS MOUNT-
ING BRACKET FROM UNIT.



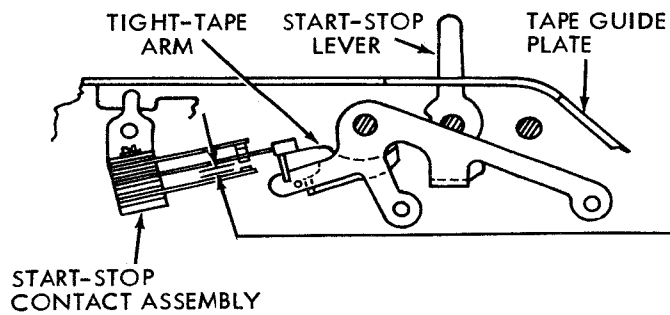
- (1) REQUIREMENT
MIN. 8 GRAMS --- MAX. 15 GRAMS
TO OPEN NORMALLY CLOSED CONTACTS
TO ADJUST
BEND CONTACT SWINGER



- (2) REQUIREMENT
MIN. 0.008 INCH --- MAX. 0.015 INCH
CLEARANCE BETWEEN NORMALLY OPEN
CONTACTS
TO ADJUST
BEND UPPER CONTACT LEAF

NOTE
REPLACE CONTACT ASSEMBLY. MAKE SURE
CONTACT SWINGER IS OVER TIGHT-TAPE ARM
EXTENSION.

Figure 3-7.



(REAR - VIEWED FROM FRONT)

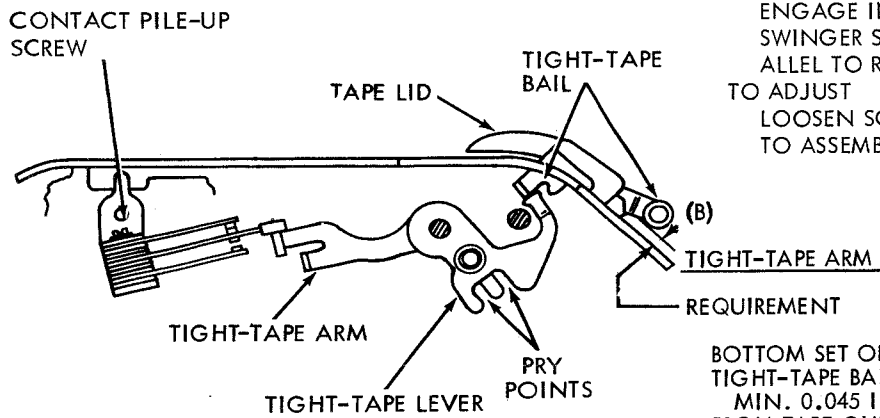
(A)
START-STOP CONTACT ASSEMBLY BRACKET

(1) REQUIREMENT

WITH UNIT IN STOP POSITION:
MIN. 0.015 INCH --- MAX. 0.020 INCH
GAP BETWEEN NORMALLY CLOSED CONTACTS.
TO ADJUST
POSITION CONTACT ASSEMBLY BRACKET WITH
ITS MOUNTING SCREWS LOOSENED.

(2) REQUIREMENT

TIGHT-TAPE ARM EXTENSION SHOULD FULLY
ENGAGE INSULATOR PAD ON SWINGER TIP.
SWINGER SHOULD BE APPROXIMATELY PAR-
ALLEL TO REAR PLATE.
TO ADJUST
LOOSEN SCREWS SECURING CONTACT PILE-UP
TO ASSEMBLY BRACKET. POSITION ASSEMBLY.

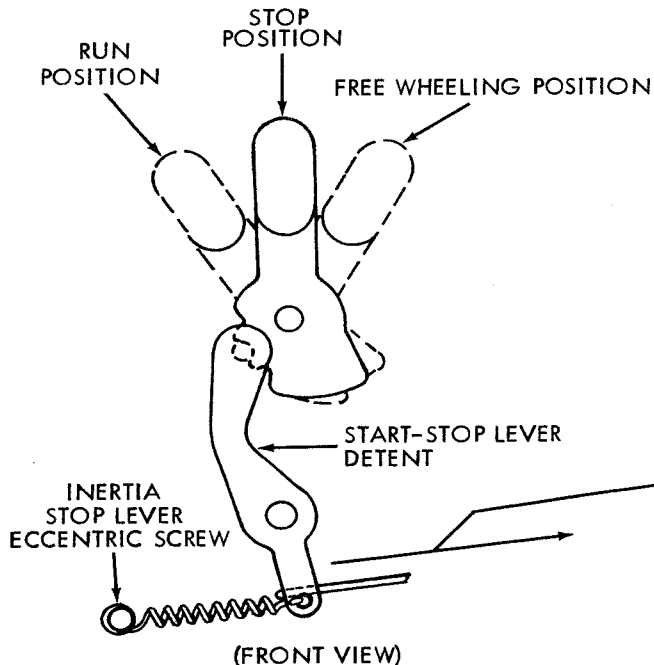


(B)
TIGHT-TAPE ARM
REQUIREMENT

BOTTOM SET OF CONTACTS SHOULD OPEN WHEN
TIGHT-TAPE BAIL IS RAISED:
MIN. 0.045 INCH --- MAX. 0.075 INCH
FROM TAPE GUIDE PLATE.

TO ADJUST

PLACE START-STOP LEVER IN RUN POSITION.
LOOSEN SCREW WHICH SECURES ARM WITH HUB TO
TIGHT-TAPE LEVER. BY MEANS OF PRY POINTS,
POSITION TIGHT-TAPE ARM TO SATISFY THE
FOLLOWING:
WITH A 0.040 INCH GAUGE BETWEEN TIGHT-TAPE
BAIL AND TAPE GUIDE PLATE, CONTACTS SHOULD
REMAIN CLOSED.
WITH A 0.060 INCH GAUGE BETWEEN TIGHT-TAPE
BAIL AND TAPE GUIDE PLATE, CONTACTS SHOULD
OPEN.



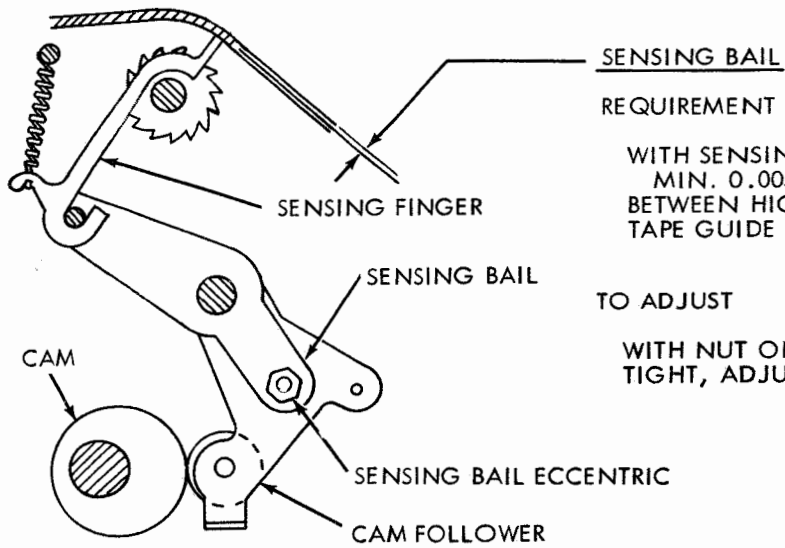
(FRONT VIEW)

START-STOP LEVER DETENT SPRING

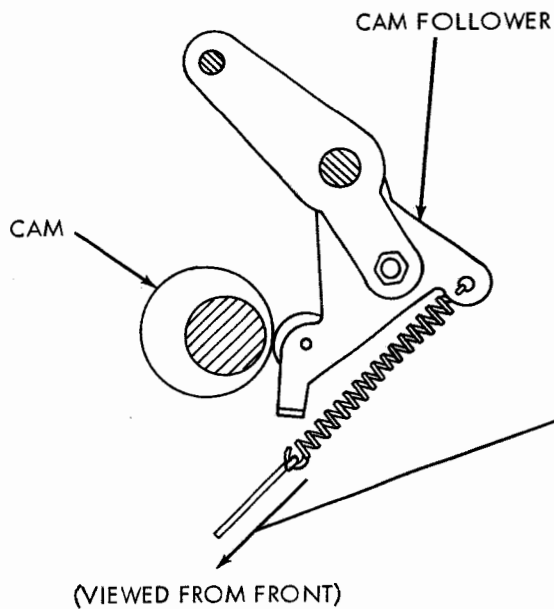
REQUIREMENT

MIN. 10 OZS. --- MAX. 16 OZS.
TO START DETENT MOVING.

Figure 3-8.

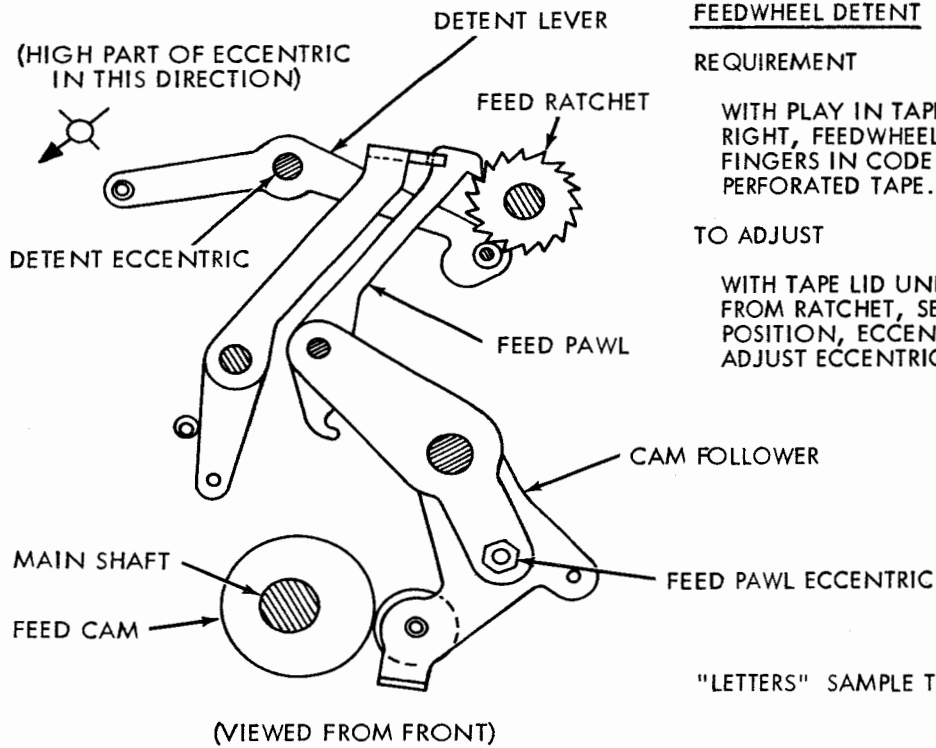


(VIEWED FROM FRONT)



(VIEWED FROM FRONT)

Figure 3-9.

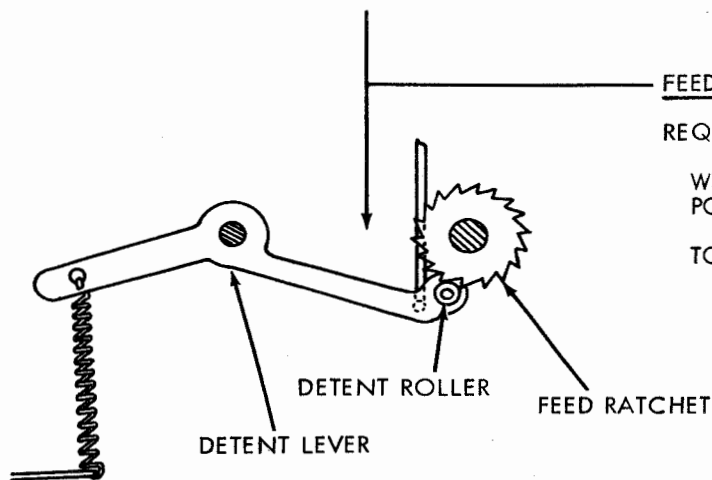
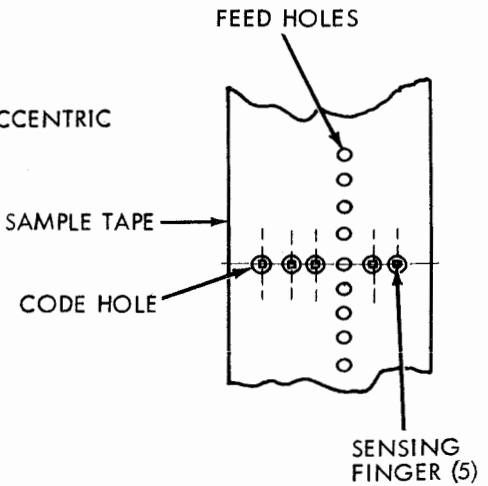
FEEDWHEEL DETENT

REQUIREMENT

WITH PLAY IN TAPE TAKEN LIGHTLY TOWARD RIGHT, FEEDWHEEL SHOULD CENTER SENSING FINGERS IN CODE HOLES OF NEW, CONFORMING, PERFORATED TAPE.

TO ADJUST

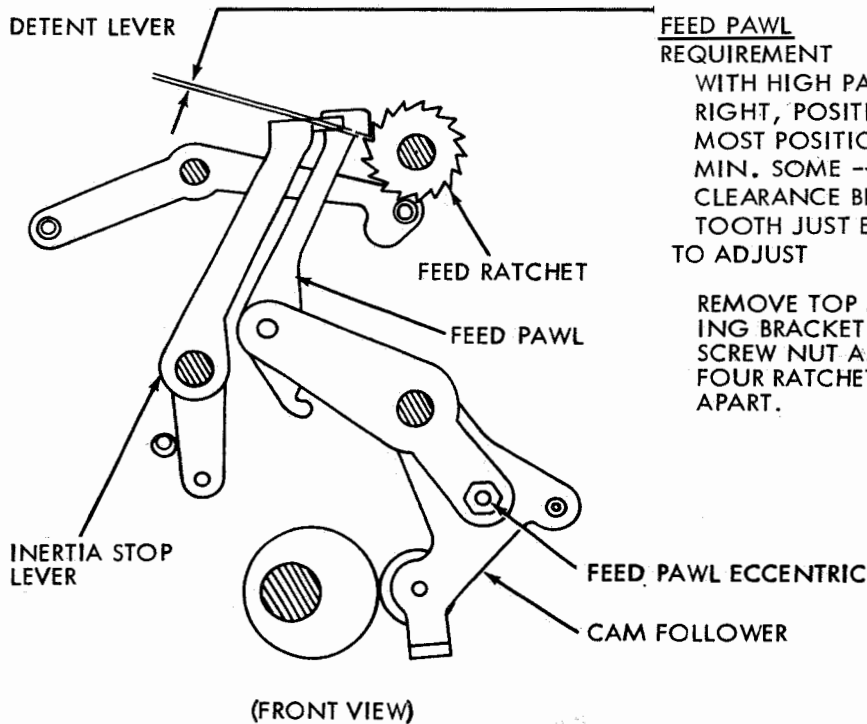
WITH TAPE LID UNLATCHED, FEED PAWL HELD AWAY FROM RATCHET, SENSING FINGERS IN LOWERMOST POSITION, ECCENTRIC SCREW FRICITION TIGHT, ADJUST ECCENTRIC.

FEEDWHEEL DETENT SPRING

REQUIREMENT

WITH TOP PLATE REMOVED, UNIT IN STOP POSITION:
MIN. 14 OZS. --- MAX. 18 OZS.
TO MOVE ROLLER AWAY FROM RATCHET.

Figure 3-10.



FEED PAWL REQUIREMENT

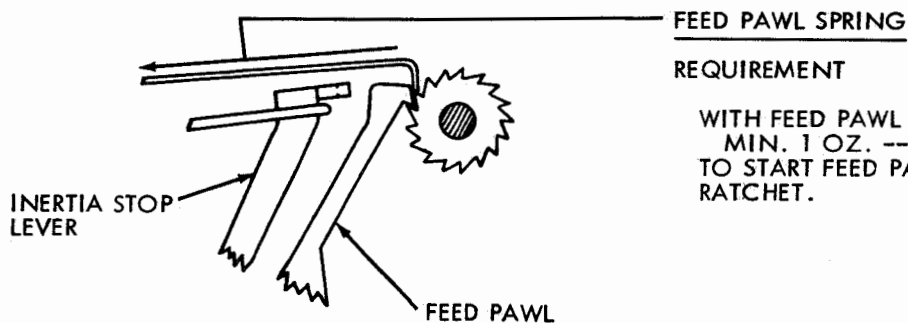
WITH HIGH PART OF FEED PAWL ECCENTRIC TO THE RIGHT, POSITION SENSING FINGERS IN LOWER-MOST POSITION.

MIN. SOME --- MAX. 0.003 INCH

CLEARANCE BETWEEN FEED PAWL AND RATCHET TOOTH JUST ENGAGED.

TO ADJUST

REMOVE TOP PLATE BY LOOSENING ITS MOUNTING BRACKET SCREWS. LOOSEN ECCENTRIC SCREW NUT AND ROTATE SCREW. RECHECK AT FOUR RATCHET TEETH APPROXIMATELY 90 DEGREES APART.



FEED PAWL SPRING

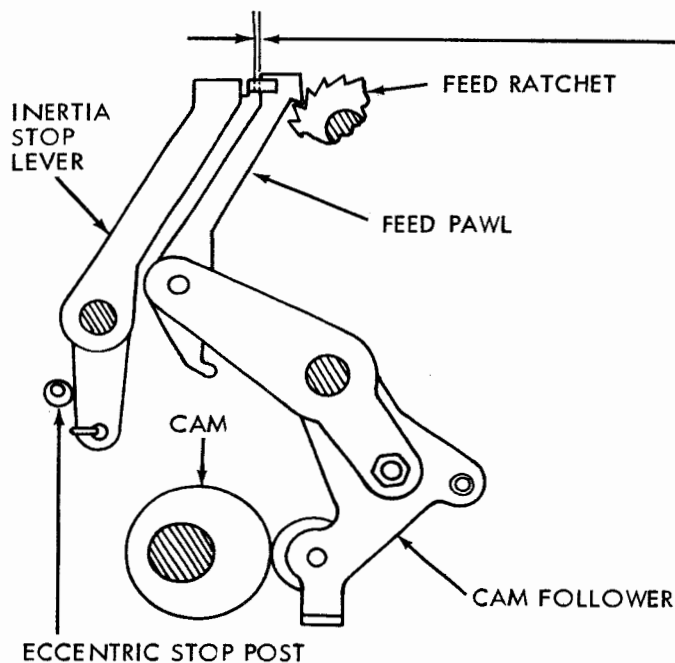
REQUIREMENT

WITH FEED PAWL IN UPPERMOST POSITION:

MIN. 1 OZ. --- MAX. 5 OZS.

TO START FEED PAWL MOVING AWAY FROM FEED RATCHET.

Figure 3-11.



(VIEWED FROM FRONT)

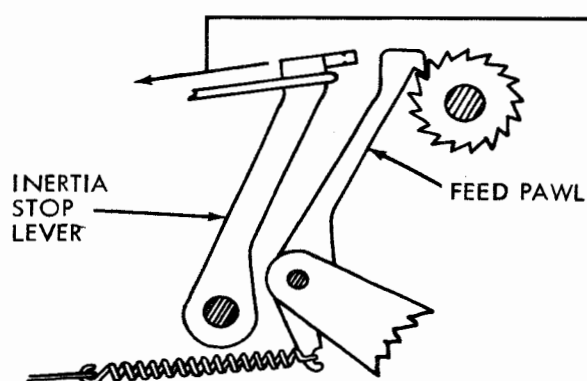
INERTIA STOP LEVER

REQUIREMENT

WITH FEED PAWL IN LOWERMOST POSITION:
MIN. SOME --- MAX. 0.003 INCH
CLEARANCE BETWEEN NOTCH IN INERTIA
STOP LEVER AND FEED PAWL.

TO ADJUST

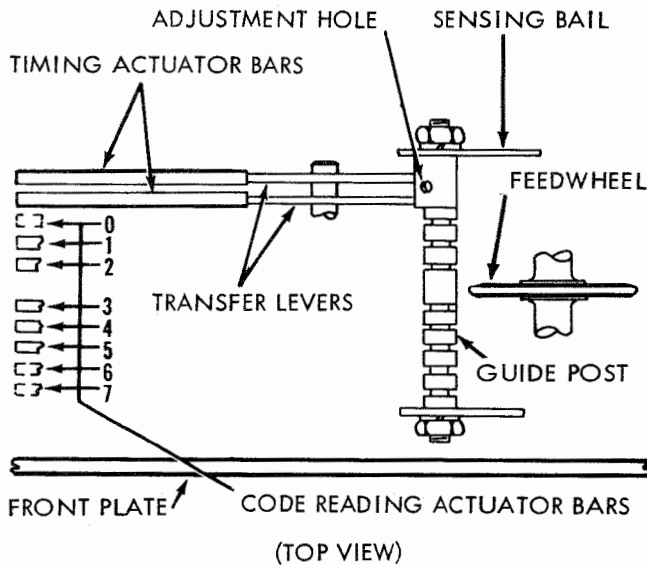
REMOVE TOP PLATE BY LOOSENING ITS
MOUNTING SCREWS. WITH ECCENTRIC
STOP POST NUT FRICTION TIGHT, ROTATE
STOP POST TO MEET REQUIREMENT.

INERTIA STOP LEVER SPRING

REQUIREMENT

WITH UNIT IN STOP POSITION:
MIN. 1 OZ. --- MAX. 5 OZS.
TO PULL INERTIA STOP LEVER AWAY FROM
FEED PAWL.

Figure 3-12.



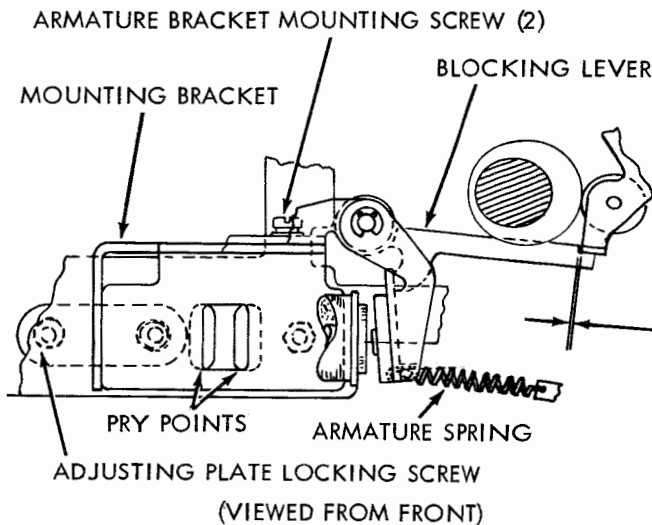
(A)

TIMING (UNIVERSAL) CONTACT ACTUATORREQUIREMENT

WITH STRAIGHT EDGE ALONG LEFT ENDS OF ACTUATOR BARS, TIMING ACTUATOR BARS SHOULD BE IN LINE WITH CODE READING ACTUATOR BARS. WHEN MAIN SHAFT IS ROTATED, TIMING ACTUATOR BARS SHOULD START TO MOVE WITH CODE READING ACTUATOR BARS.

TO ADJUST

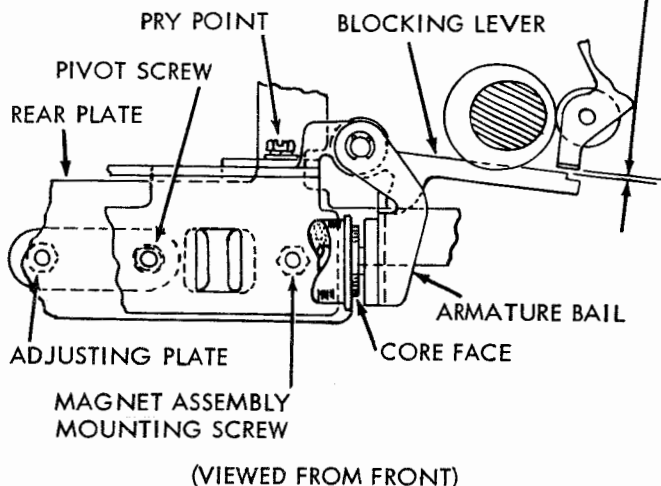
LOOSEN NUTS WHICH SECURE GUIDE POST TO SENSING BAIL. ROTATE POST TO MEET REQUIREMENT.



(B)

MAGNET ASSEMBLYREQUIREMENT

- (1) WITH MAGNET ENERGIZED, ARMATURE SHOULD CONTACT AND BE FLUSH WITH CORE FACES.
- (2) WITH MAGNET DE-ENERGIZED, FOLLOWERS ON HIGH POINT OF CAMS:
MIN. 0.005 INCH --- MAX. 0.008 INCH
CLEARANCE BETWEEN BLOCKING SURFACE OF BLOCKING LEVER AND FEED CAM FOLLOWER.
- (3) WITH MAGNET ENERGIZED, FOLLOWERS ON LOW POINT OF CAMS:
MIN. 0.005 INCH --- MAX. 0.010 INCH
CLEARANCE BETWEEN TOP SURFACE OF BLOCKING LEVER AND FEED CAM FOLLOWER AT CLOSEST POINT.

TO ADJUST

- (1) REMOVE MAGNET ASSEMBLY FROM UNIT. WITH ARMATURE BRACKET MOUNTING SCREWS LOOSENED, POSITION ARMATURE, TIGHTEN SCREWS, REPLACE ASSEMBLY.
- (2) WITH ASSEMBLY MOUNTING SCREWS AND LOCKING SCREW FRICTION TIGHT, POSITION ASSEMBLY BY MEANS OF PRY POINTS TO MEET (2) ABOVE. TIGHTEN LOCKING SCREW.
- (3) WITH PIVOT SCREW FRICTION TIGHT, POSITION ASSEMBLY BY MEANS OF PRY POINT TO MEET (3) ABOVE.

Figure 3-13.

CODE READING AND UNIVERSAL CONTACT ADJUSTMENTS

ADJUSTMENTS (D), (E) AND (F-2) APPLY TO TRANSFER TYPE CONTACT ASSEMBLIES ONLY; ALL OTHER ADJUSTMENTS APPLY TO BOTH TRANSFER TYPE AND MAKE ONLY TYPE CONTACT ASSEMBLIES. ADJUSTMENTS (A) THROUGH (E) ARE PRELIMINARY. PRELIMINARY ADJUSTMENTS SHOULD BE MADE WITH THE CONTACT ASSEMBLY REMOVED FROM THE READER. FOR EACH ADJUSTMENT, START WITH THE CONTACT PILE-UP FARTEST FROM THE BENDING TOOL HANDLE TO AVOID DISTURBING COMPLETED ADJUSTMENTS.

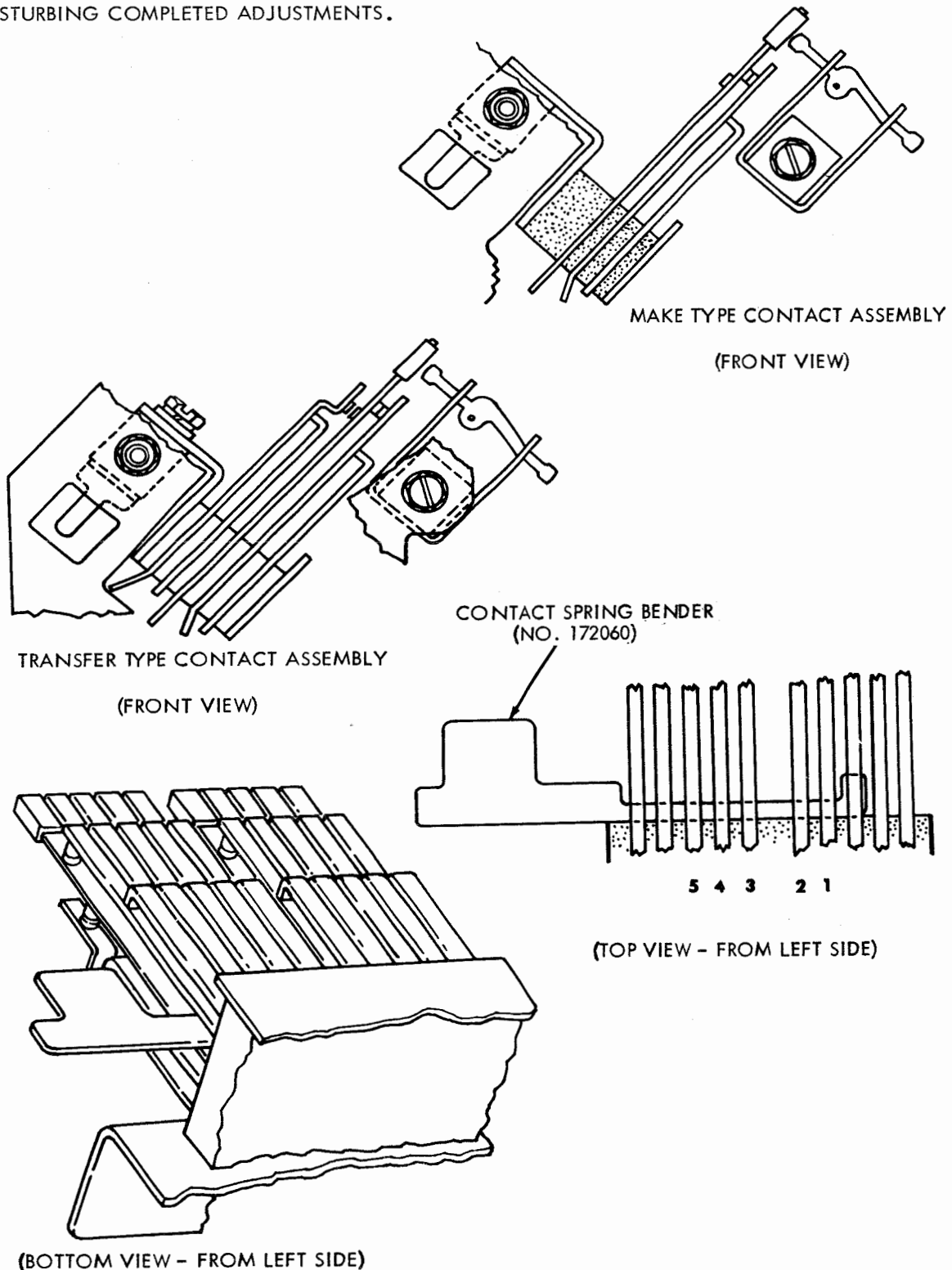
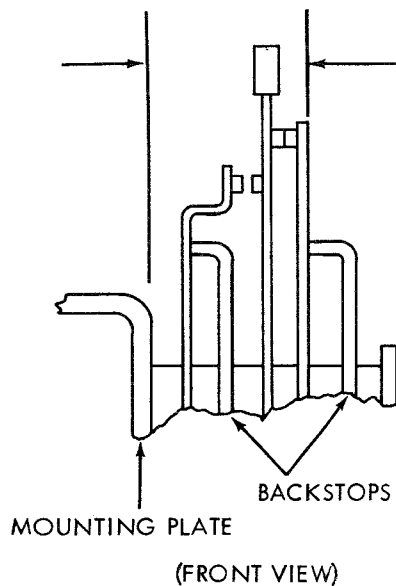


Figure 3-14.



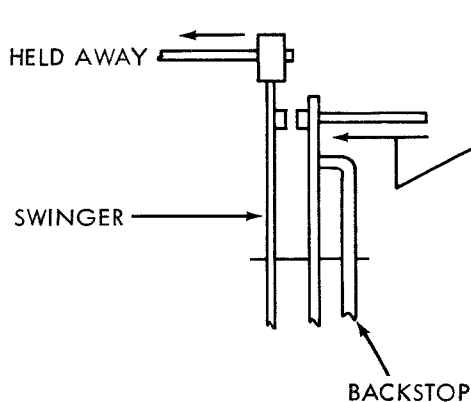
(A)
BACKSTOP - NORMALLY CLOSED CONTACT

REQUIREMENT

NORMALLY CLOSED CONTACT LEAVES SHOULD BE PARALLEL TO MOUNTING PLATE AND IN LINE WITH EACH OTHER.

TO ADJUST

BEND BACKSTOP. GAGE BY EYE.



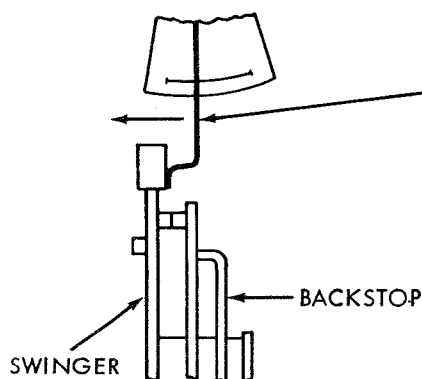
(B)
SPRING TENSION - NORMALLY CLOSED CONTACT
AGAINST BACKSTOP

REQUIREMENT

MIN. 3 OZS. --- MAX. 6 OZS.
TO MOVE STATIONARY LEAF AWAY FROM BACKSTOP.

TO ADJUST

BEND STATIONARY LEAF AND, IF NECESSARY, BEND BACKSTOP AWAY FROM LEAF AND FORM LEAF TO INCREASE TENSION. REPOSITION BACKSTOP TO MEET (A) ABOVE.



(C)
SPRING TENSION - NORMALLY CLOSED CONTACT

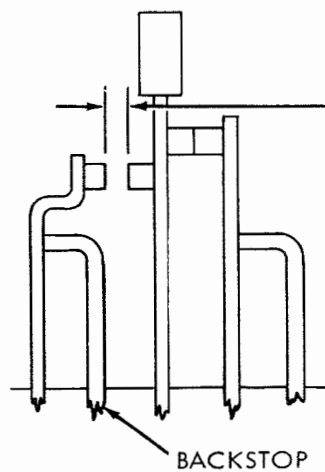
REQUIREMENT

MIN. 30 GRAMS --- MAX. 40 GRAMS
TO OPEN CONTACT.

TO ADJUST

BEND SWINGER.

Figure 3-15.



(FRONT VIEW)

(D)

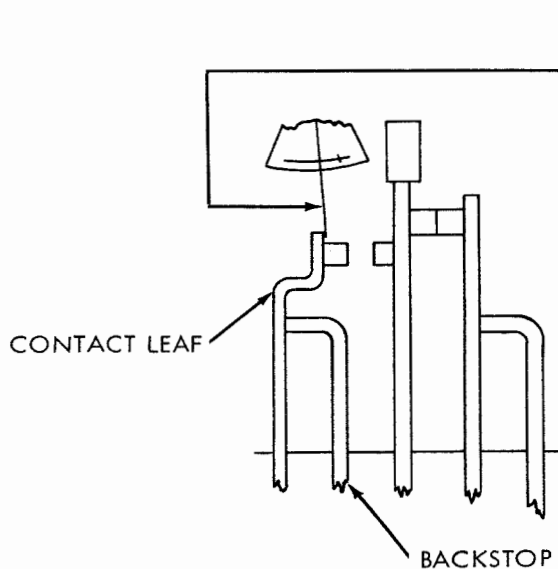
NORMALLY OPEN CONTACT

REQUIREMENT

MIN. 0.010 INCH --- MAX. 0.015 INCH
GAP BETWEEN CONTACTS.

TO ADJUST

BEND BACKSTOP.



(FRONT VIEW)

(E)

SPRING TENSION - NORMALLY OPEN CONTACT

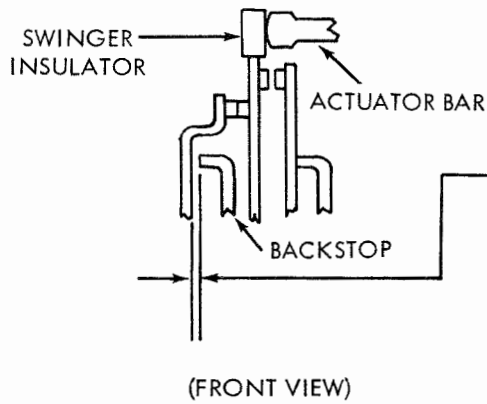
REQUIREMENT

MIN. 30 GRAMS --- MAX. 40 GRAMS
TO MOVE CONTACT FROM BACKSTOP.

TO ADJUST

BEND CONTACT LEAF. IF NECESSARY, BEND
BACKSTOP AWAY FROM LEAF TO INCREASE
TENSION; THEN REPOSITION BACKSTOP TO
MEET REQUIREMENT (D).

Figure 3-16.



NOTE
FOLLOWING ADJUSTMENTS TO BE MADE
WITH CONTACT ASSEMBLY MOUNTED
ON UNIT.

(F) CONTACT INSTALLATION

(3) REQUIREMENT

- (a) TRANSFER TYPE CONTACT ASSEMBLY
WITH BLANK TAPE IN UNIT, SENSING CAM FOLLOWER
ON LOW POINT OF CAM:
MIN. SOME --- MAX. 0.005 INCH
CLEARANCE BETWEEN NORMALLY OPEN CONTACTS
AND BACKSTOP.

TO ADJUST

BEND NORMALLY OPEN CONTACT BACKSTOPS. CHECK
EFFECTED TENSIONS (SEE FIGURES 3-15 AND 3-16).

- (b) MAKE ONLY TYPE CONTACT ASSEMBLY
MIN. 0.008 INCH

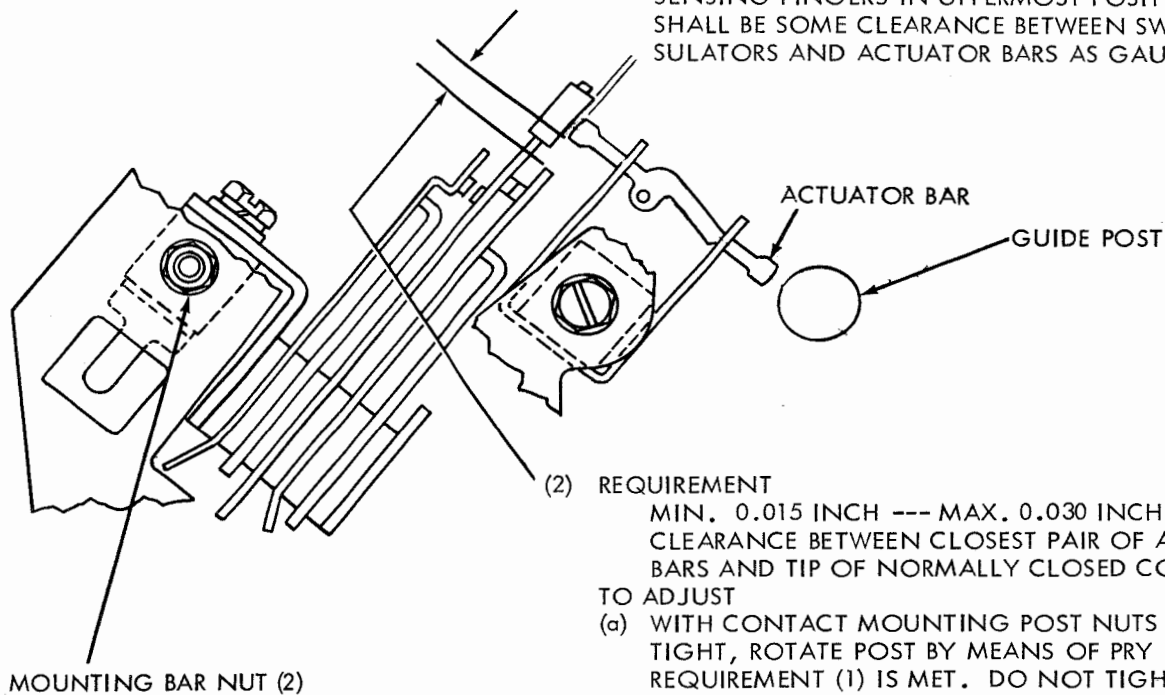
GAP BETWEEN NORMALLY CLOSED CONTACTS.

TO ADJUST

REFINE REQUIREMENT (1).

(1) REQUIREMENT

WITH MAGNET ENERGIZED, NO TAPE IN UNIT, AND
SENSING FINGERS IN UPPERMOST POSITION, THERE
SHALL BE SOME CLEARANCE BETWEEN SWINGER IN-
SULATORS AND ACTUATOR BARS AS GAUGED BY EYE.



(2) REQUIREMENT

MIN. 0.015 INCH --- MAX. 0.030 INCH
CLEARANCE BETWEEN CLOSEST PAIR OF ACTUATOR
BARS AND TIP OF NORMALLY CLOSED CONTACTS.

TO ADJUST

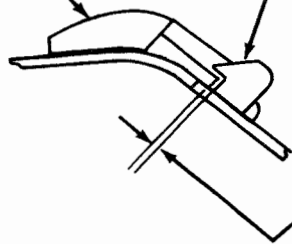
- (a) WITH CONTACT MOUNTING POST NUTS FRICTION
TIGHT, ROTATE POST BY MEANS OF PRY POINT UNTIL
REQUIREMENT (1) IS MET. DO NOT TIGHTEN NUTS.
(b) WITH ACTUATOR BAR MOUNTING POST NUTS FRICTION
TIGHT, ROTATE POST UNTIL REQUIREMENT (2) IS MET.
TIGHTEN THESE NUTS. REFINES REQUIREMENT (1), AND
TIGHTEN THE CONTACT MOUNTING POST NUTS.

NOTE

TO MEET REQUIREMENT, IT MAY BE NECESSARY TO BEND
NORMALLY CLOSED CONTACT BACKSTOPS. IF THIS IS
DONE, CHECK EFFECTED TENSIONS (SEE FIGURES 3-15 AND
3-16).

Figure 3-17.

TAPE LID TAPE LID LATCH

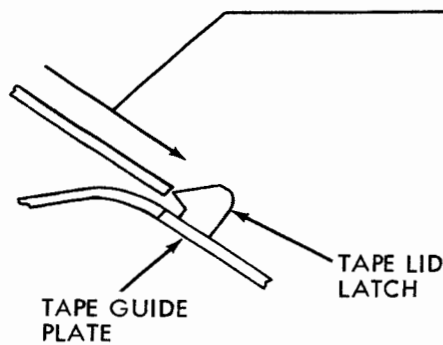


TAPE LID LATCH REQUIREMENT

WITH TAPE LID HELD CLOSED:
MIN. SOME --- MAX. 0.015 INCH
CLEARANCE BETWEEN LEFT EDGE OF LATCH
AND TAPE LID.

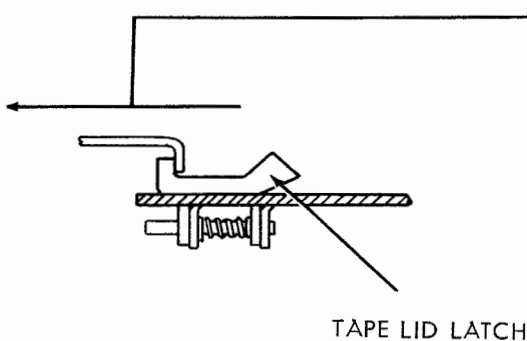
TO ADJUST
POSITION LATCH WITH ITS MOUNTING
SCREWS LOOSENED.

(FRONT VIEW)



TAPE LID LATCH SPRING TO CHECK

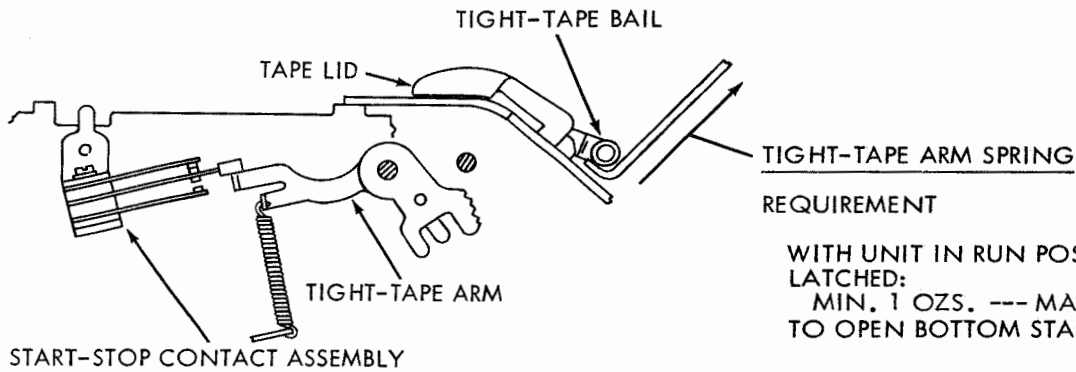
HOLD TAPE LID IN LATCHED POSITION.
REQUIREMENT
MIN. 4-1/2 OZS. --- MAX. 7-1/2 OZS.
TO START LATCH MOVING.



TAPE LID LATCH SPRING TO CHECK

OPEN TAPE LID.
REQUIREMENT
MIN. 9 OZ. --- MAX. 15 OZS.
TO START LATCH MOVING.

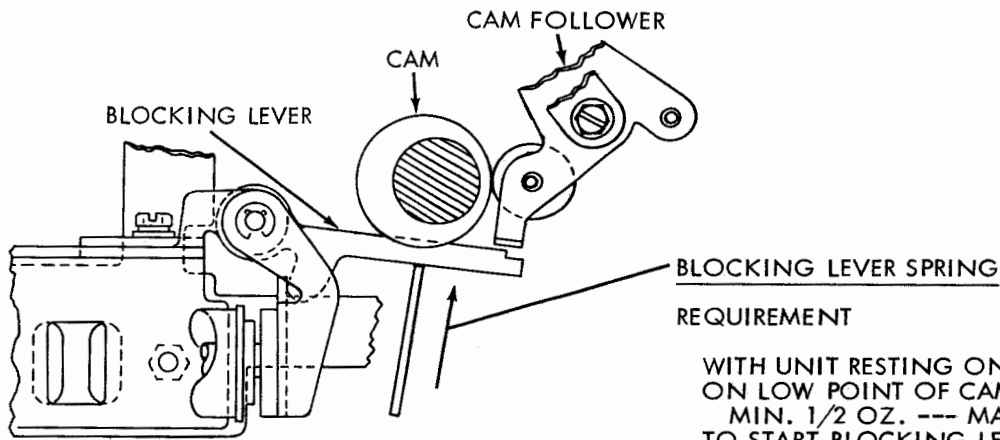
Figure 3-18.



(VIEWED FROM FRONT)

REQUIREMENT

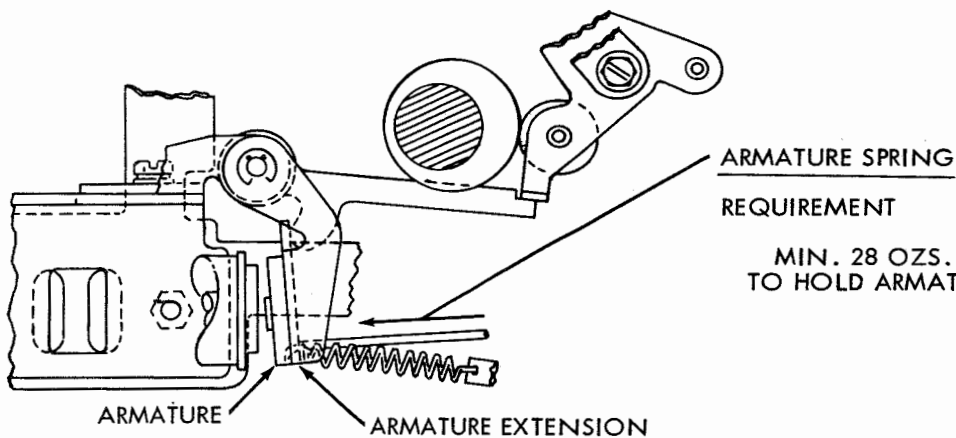
WITH UNIT IN RUN POSITION AND TAPE LID LATCHED:
 MIN. 1 OZS. --- MAX. 3 OZS.
 TO OPEN BOTTOM START-STOP CONTACTS.



(VIEWED FROM FRONT)

REQUIREMENT

WITH UNIT RESTING ON REAR PLATE, FOLLOWERS ON LOW POINT OF CAMS:
 MIN. 1/2 OZ. --- MAX. 1-1/2 OZS.
 TO START BLOCKING LEVER MOVING.

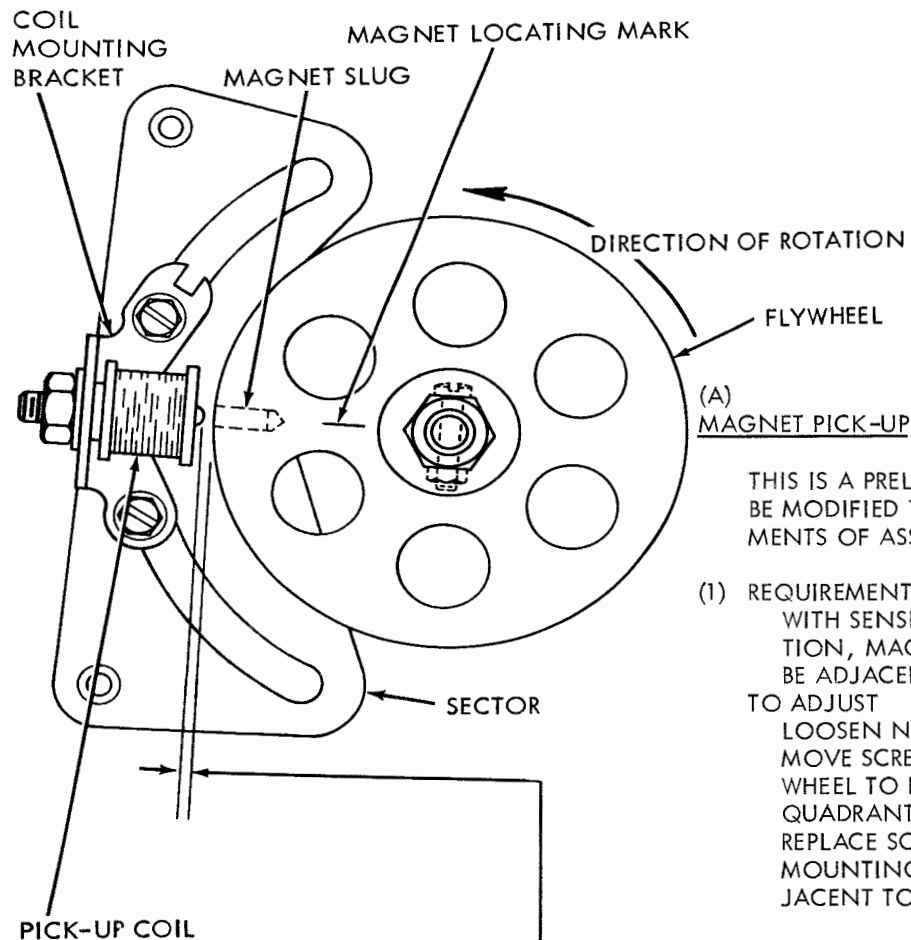


(VIEWED FROM FRONT)

REQUIREMENT

MIN. 28 OZS. --- MAX. 32 OZS.
 TO HOLD ARMATURE AGAINST CORE FACES.

Figure 3-19.



NOTE

THIS IS A PRELIMINARY ADJUSTMENT. IT SHOULD BE MODIFIED TO MEET SPECIFIC TIMING REQUIREMENTS OF ASSOCIATED APPARATUS.

(1) REQUIREMENT

WITH SENSING FINGERS IN UPPERMOST POSITION, MAGNET SLUG IN FLYWHEEL SHOULD BE ADJACENT TO PICK-UP COIL CORE.

TO ADJUST

LOOSEN NUT ON END OF MAIN SHAFT. REMOVE SCREW FROM SHAFT. POSITION FLYWHEEL TO PLACE MAGNET SLUG IN SAME QUADRANT AS COIL. TIGHTEN NUT AND REPLACE SCREW. LOOSEN COIL BRACKET MOUNTING SCREWS, POSITION COIL ADJACENT TO MAGNET SLUG.

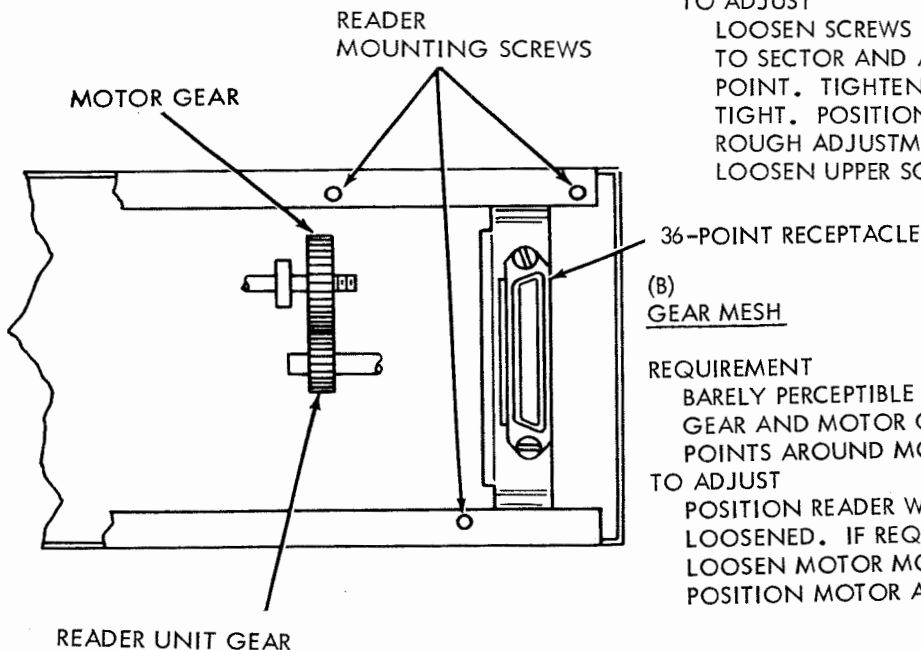
(2) REQUIREMENT

AT CLOSEST POINT BETWEEN MAGNET SLUG AND PICK-UP COIL CORE, CLEARANCE SHOULD BE:

MIN. 0.003 INCH --- MAX. 0.006 INCH

TO ADJUST

LOOSEN SCREWS HOLDING PICK-UP BRACKET TO SECTOR AND APPROXIMATELY CENTER PRY POINT. TIGHTEN UPPER SCREW FRUITION TIGHT. POSITION BRACKET TO MAKE A ROUGH ADJUSTMENT. TIGHTEN LOWER SCREW. LOOSEN UPPER SCREW AND REFINE ADJUSTMENT.

(B)
GEAR MESH

REQUIREMENT

BARELY PERCEPTIBLE BACKLASH BETWEEN READER GEAR AND MOTOR GEAR MEASURED AT FOUR POINTS AROUND MOTOR GEAR.

TO ADJUST

POSITION READER WITH ITS MOUNTING SCREWS LOOSENED. IF REQUIREMENT CANNOT BE MET, LOOSEN MOTOR MOUNTING SCREWS AND POSITION MOTOR ALSO.

Figure 3-20.

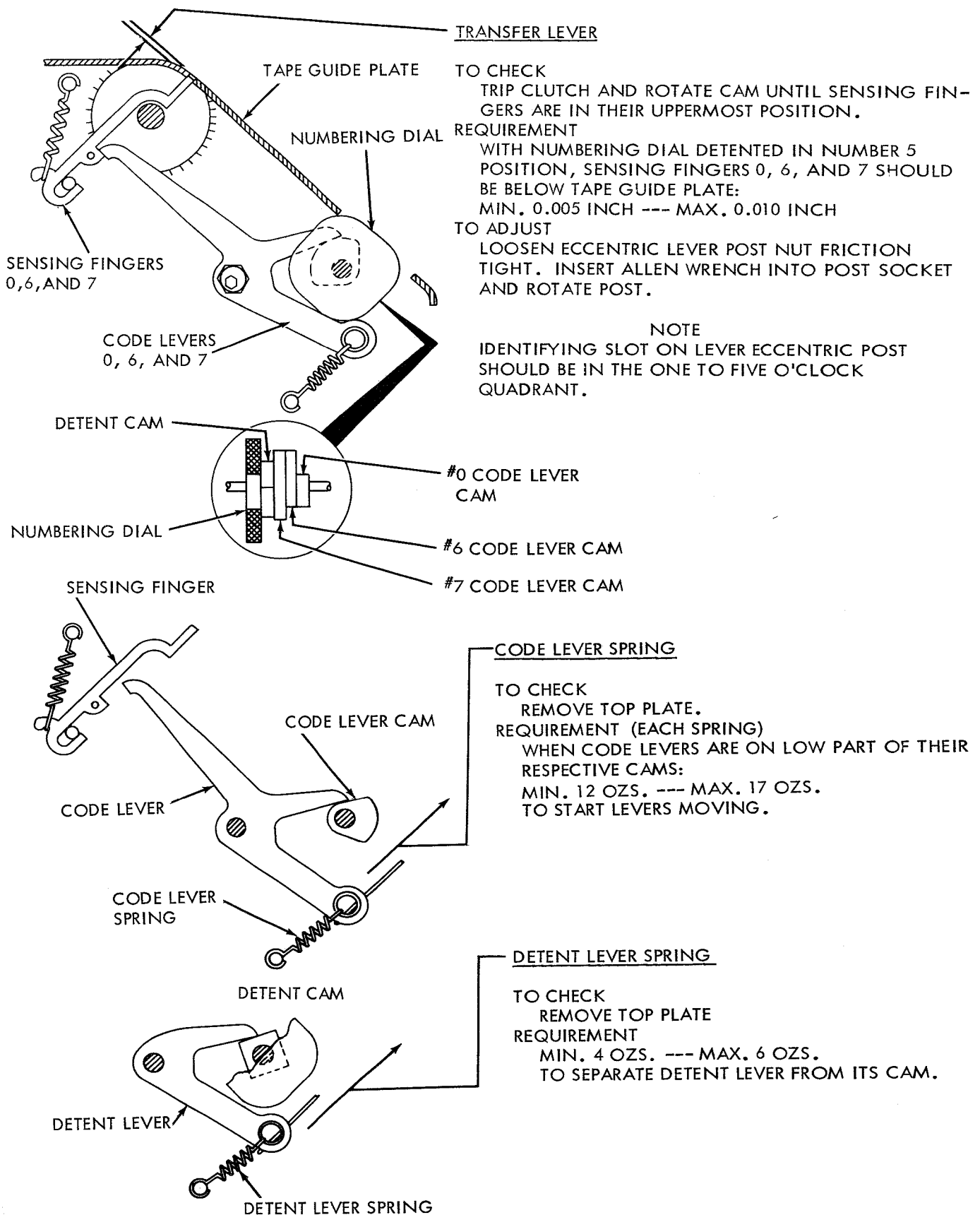
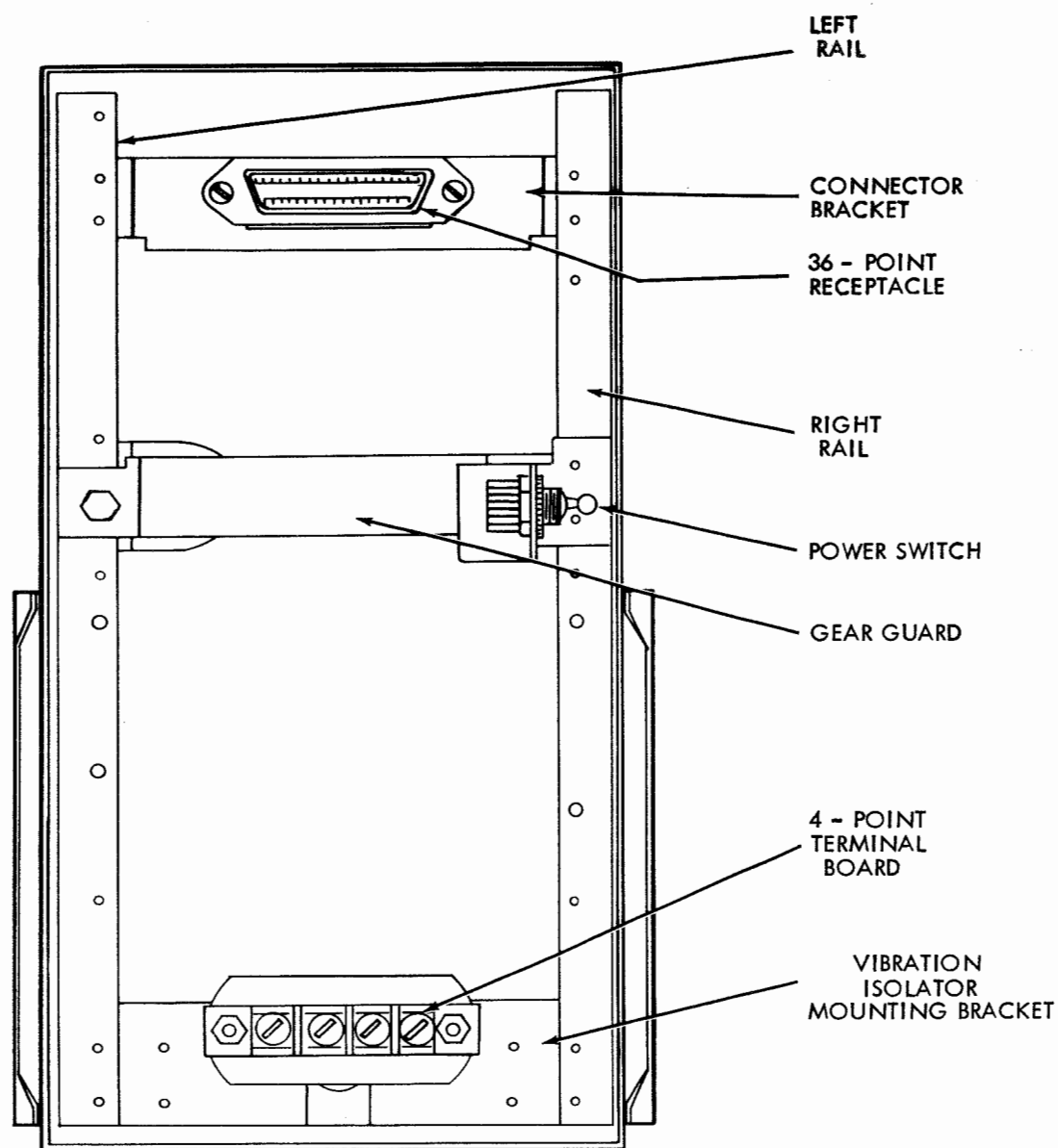


Figure 3-21.

BASE

REQUIREMENT

LEFT AND RIGHT RAILS, CONNECTOR BRACKET, AND VIBRATION ISOLATOR MOUNTING PLATE SHOULD FORM 90 DEGREE CORNERS.

TO ADJUST

WITH MOUNTING SCREWS FRICTION TIGHT, FORM CORNERS. GAGE BY EYE OR USE RIGHT ANGLE OBJECT FOR COMPARISON GAUGE.

Figure 3-22.

SECTION 4

DISASSEMBLY

4-1. GENERAL

a. The disassembly procedure covered in this section breaks the High Speed Reader Set down into its major subassemblies. Teletype Parts Bulletin 1176B illustrates the complete disassembly and includes drawings of the parts referred to below.

b. While unsoldering leads from terminals the thermoplastic tubing over the leads might be damaged. If this happens, replace the tubing. Avoid using an excessive amount of solder and take care that no solder falls and becomes wedged between moving parts.

c. In removing parts, take careful note of their position and order to facilitate assembly. Retaining rings are made of spring steel and have a tendency to release suddenly. Loss of these rings can be minimized as follows: Hold the retaining ring to prevent it from rotating. Place the blade of a screwdriver in one of the slots. Rotate the screwdriver in a direction to increase the diameter.

d. After removed parts have been replaced, carefully check for proper operation before energizing the Set. To check the Reader, place the start-stop lever in the left (RUN) position, manually actuate the operating magnet, and rotate the flywheel.

4-2. COVER

a. The CXC Cover consists of two parts. Part 171708 encloses the Motor Unit and part of the Base. It is removed by lifting it straight up from the Base. Part 171709 is removed by pulling it away from the front of the Reader.

b. To replace the Cover, fit part 171708 over the Motor Unit so that it rests on the Base. Slide part 171709 onto the Reader from the front. This part is held in place by the spring action of its sides.

4-3. MOTOR UNIT

a. To remove the Motor Unit, disconnect the 171810 motor cable leads from the 151415 terminal board on the Base. Remove the four 151630 screws and 45815 lockwashers used to secure the Motor Unit to the 171201 left and 171203 right rails on the Base. Lift the unit from the Base.

b. To replace the Motor Unit, position it on the Base so that the motor pinion gear and

Reader driven gear mesh. Line up the holes in the 171749 motor bracket with the holes tapped in the left and right rails in the Base. Replace the four mounting screws with their lockwashers, but leave these screws finger tight until a check has been made for barely perceptible backlash between the gears. Reconnect the motor cable leads to the terminal board. Tighten the mounting screws.

4-4. READER

a. REMOVAL FROM BASE

(1) To remove the Reader from the Base, remove the three 151630 screws and 45815 lockwashers used to secure the Reader to the left and right rails in the Base. Lift the unit from the Base.

(2) To replace the Reader, carefully place it on the Base so that the 161594 plug mates properly with the 161238 receptacle on the Base. Replace the three mounting screws and lockwashers but leave them finger tight until a check has been made for barely perceptible backlash between the Reader driven gear and the motor pinion gear. Tighten the mounting screws. Manually rotate the flywheel and check for proper operation and freedom from binding between parts before energizing the Set.

b. PLATE ASSEMBLIES

(1) The 171281 cover plate is removed by lifting its left side and carefully pulling it off the left side of the Reader.

(2) The 171280 top plate can be removed by removing the two nuts which secure it to the brackets on the Reader.

(3) The 171279 tape guide plate can be removed by removing the two nuts which secure it to the brackets on the Reader. Hold the 138095 tape lid latch to the right while lifting the tape guide plate from the Reader.

c. REAR PLATE ASSEMBLY

(1) Unsolder and remove the cable assembly leads at the start-stop (tight-tape) contact assembly and the cable assembly leads at the magnet assembly.

(2) Unhook the four springs from the 171735 spring bracket.

(3) Remove the three 3606 nuts and 2191 lockwashers which secure the rear plate to the three 171288 posts.

(4) Remove the 156588 clamp by removing the 151722 screw and 2191 lockwasher which secure it to the rear plate.

(5) Remove the 151630 screw which secures the rear plate to the 171707 post.

(6) Remove the 3599 nut and 3640 lockwasher which secure the 171218 sensing bail shaft to the rear plate.

(7) Remove the rear plate assembly from the remainder of the unit.

d. START-STOP CONTACT ASSEMBLY

Unsolder and disconnect the leads from the 171237 (start-stop) contact assembly. Remove the two 151630 screws, the two 93587 flat washers, and the two 2191 lockwashers that secure the 171238 bracket to the rear plate. The start-stop contact assembly, with its bracket, can now be removed from the Reader.

e. TAPE-OUT CONTACT ASSEMBLY

Unsolder and remove the 171811 cable assembly leads from the 171255 contact (tape-out) assembly. Remove the two 152893 screws with the 3640 lockwashers and 119389 flat washers from the assembly mounting bracket. This will permit removal of the tape-out contact assembly with its 171257 mounting bracket.

f. OPERATING MAGNET ASSEMBLY

Unsolder and disconnect the two color-coded leads (white-black-yellow and black-yellow)

low) from the magnet terminals. Disconnect the 171313 tension spring from the 171297 armature extension. Remove the two 156740 screws, 2191 lockwashers, and 7002 flat washers that secure the 171295 magnet assembly mounting bracket to the rear plate. The magnet assembly, with its bracket, can now be removed from the remainder of the unit.

g. CODE CONTACT ASSEMBLY

Remove the two 156740 screws, 2191 lockwashers, and 7002 flat washers which secure the assembly to the 171288 post. The assembly can now be removed approximately two inches outside the Reader. Unsolder and disconnect the 171299 cable assembly leads from the code contact assembly terminals. This will complete removal of the assembly.

h. MAIN SHAFT ASSEMBLY

Remove the driven gear from the flywheel. Hold the flywheel firmly and remove the 112626 nut, 2669 lockwasher, and 34432 flat washer. Remove the 150652 screw, two 125011 flat washers, one 3640 lockwasher, and 3599 nut. This screw passes through the main shaft at the flywheel shoulder. Remove the 156501 screw, 2191 lockwasher, and 156831 clamp from the front plate. This screw threads into a hole tapped in the 156832 plate which fits against the inside edge of the front plate. Remove the 130499 bearing from the flywheel end of the main shaft. Carefully remove the 171731 main shaft from the rear of the unit.

SECTION 5

LUBRICATION

5-1. GENERAL

a. It is very important that thorough lubrication of the Set be performed at the intervals specified and with the lubricants recommended. Avoid over-lubrication to prevent oil or grease from dripping or being thrown on other parts. Special care should be taken to prevent lubricant from getting between the magnet armature and pole faces or between electrical contact points. Lubricate the equipment before its initial service and prior to its storage.

b. In Subdivision 5-2, drawings keyed to photographs by paragraph numbers indicate specific areas to receive lubricant. The text within the drawings uses the following symbols:

0 Apply one drop of oil.

02 Apply two drops of oil.

SAT Saturate with oil.

M Apply a light film of grease.

MH Apply a medium to heavy film of grease.

Where oil is specified, use Teletype KS7470 oil; where grease is specified, use Mobilgrease No. 2 or its equivalent.

5-2. READER

a. GENERAL AREAS

c. The following general instructions supplement instructions for the lubrication of specific points illustrated in the drawings:

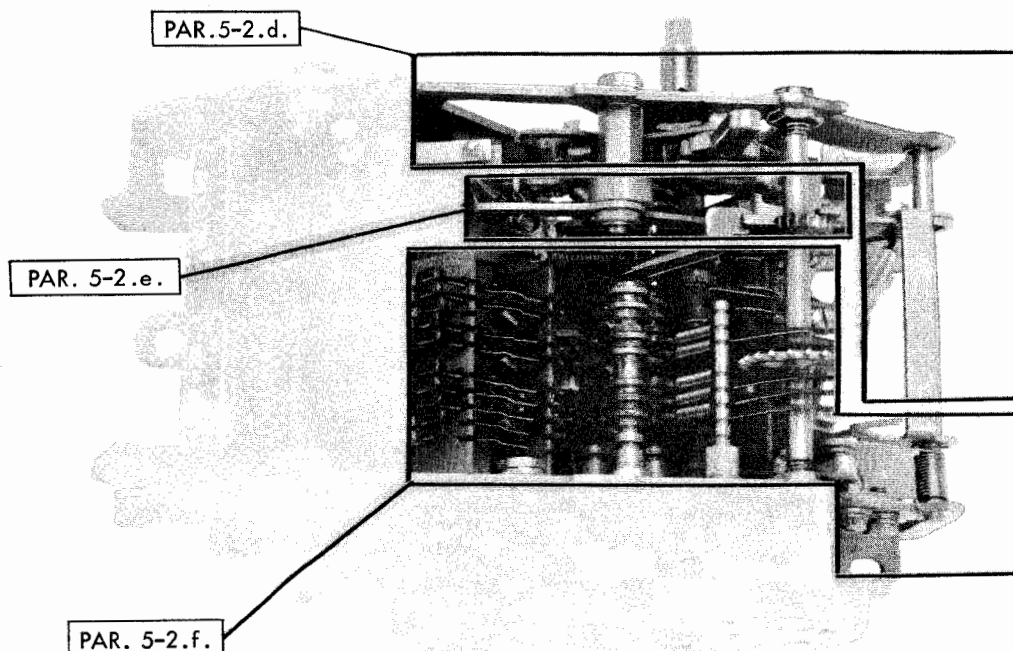
Lubricate all springs with one drop of oil at each eyelet.

Saturate all spring wicks with oil.

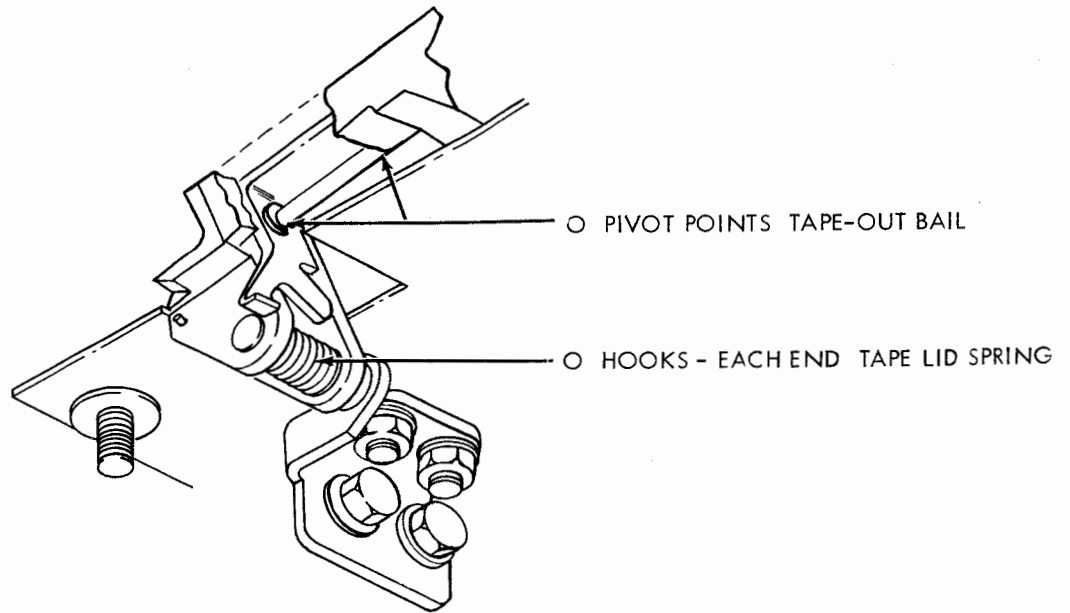
d. The motor ball bearings are packed with low temperature lubricant by the manufacturer and should require attention only at infrequent intervals. The bearings should be lubricated with two drops of oil in the oiler at each end of the shaft.

e. Lubrication of the Reader should be in accordance with the following schedule except that more frequent lubrication is permissible. Linear interpolation may be used to determine the lubrication interval for operating speeds not listed below.

Operating Speed	Operating Time (Maximum Interval - Whichever is First)
1,000 W.P.M.	250 Hours or 6 Weeks
750 W.P.M.	500 Hours or 12 Weeks
500 W.P.M.	1,000 Hours or 24 Weeks

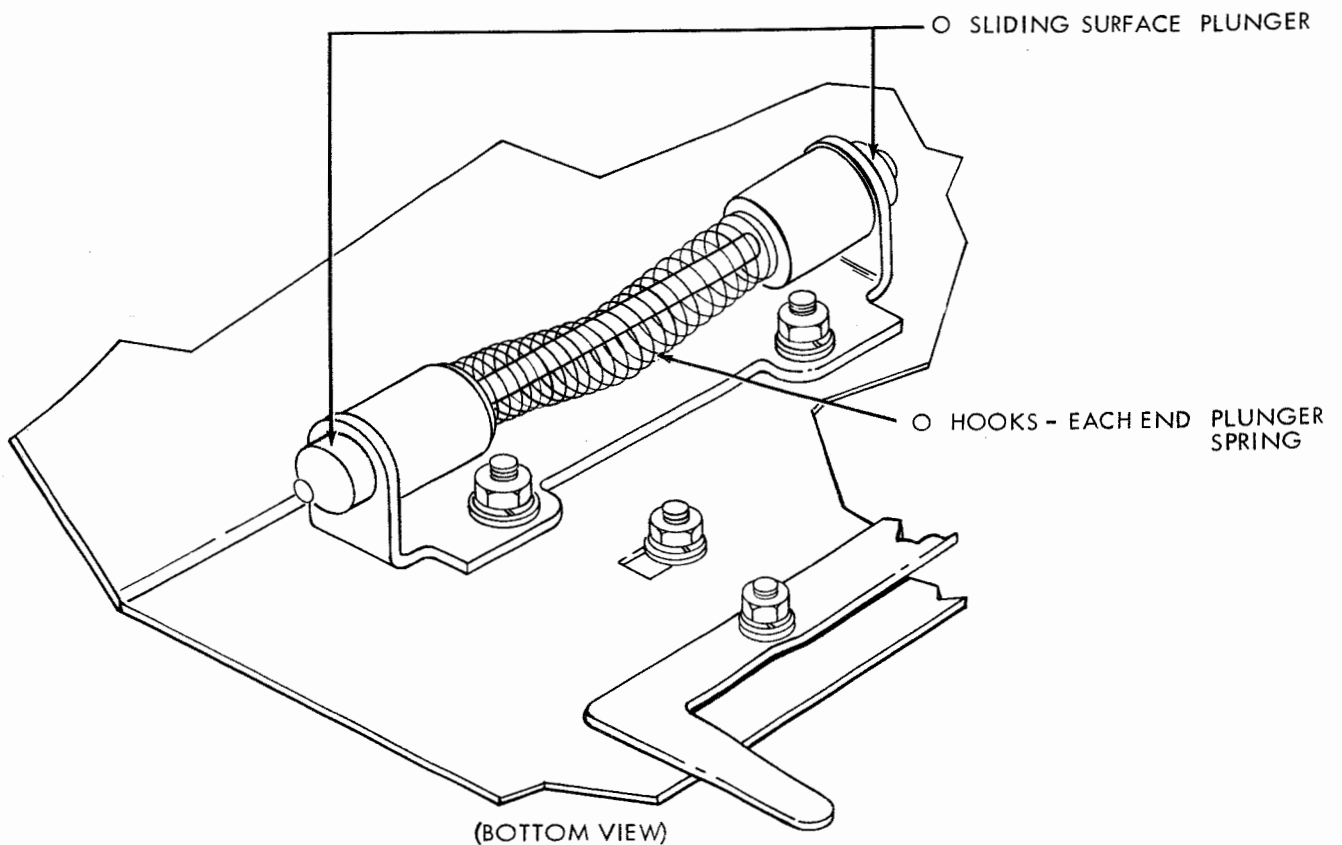


b. TAPE LID MECHANISM



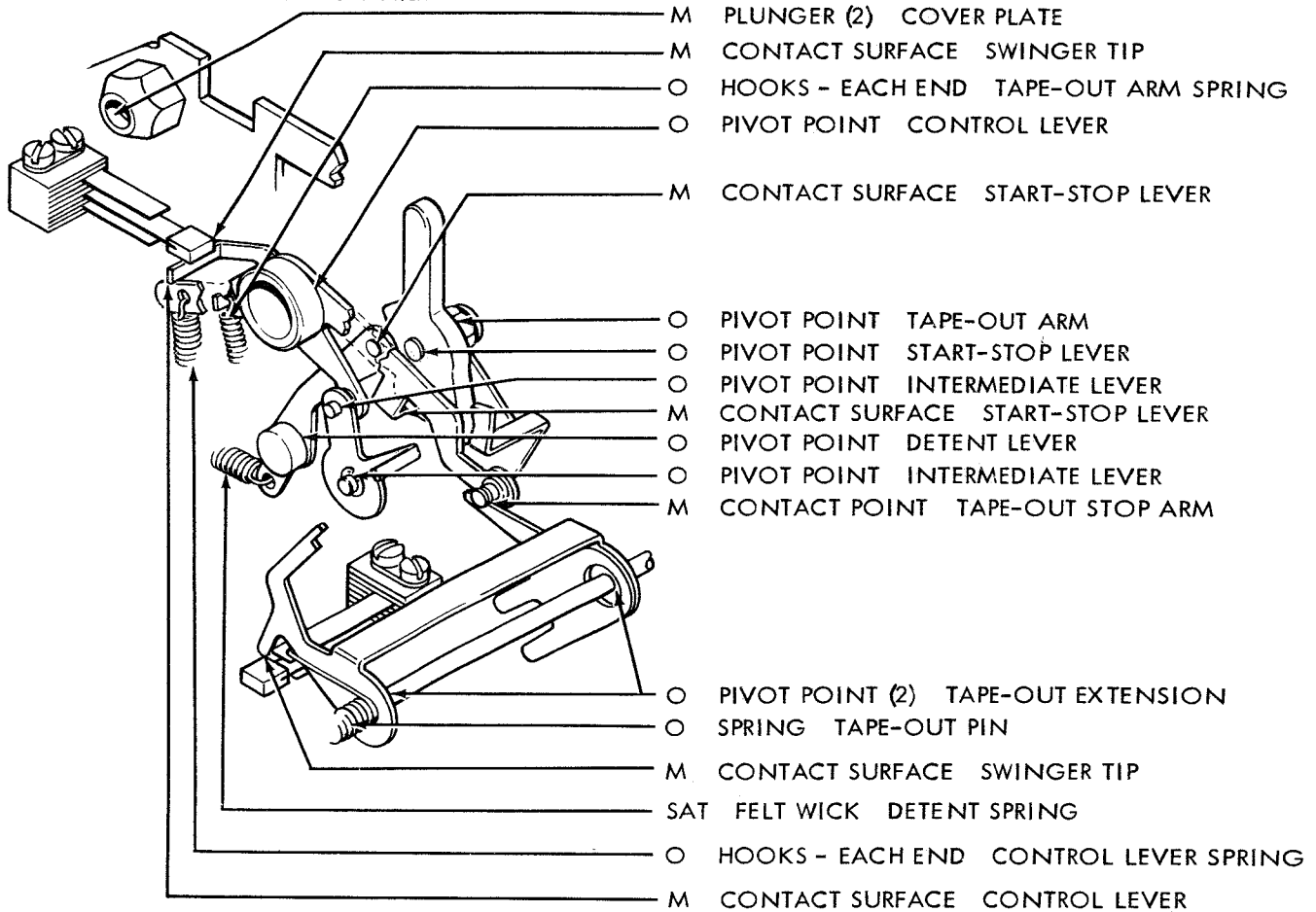
(BOTTOM VIEW)

c. COVER PLATE PLUNGER MECHANISM



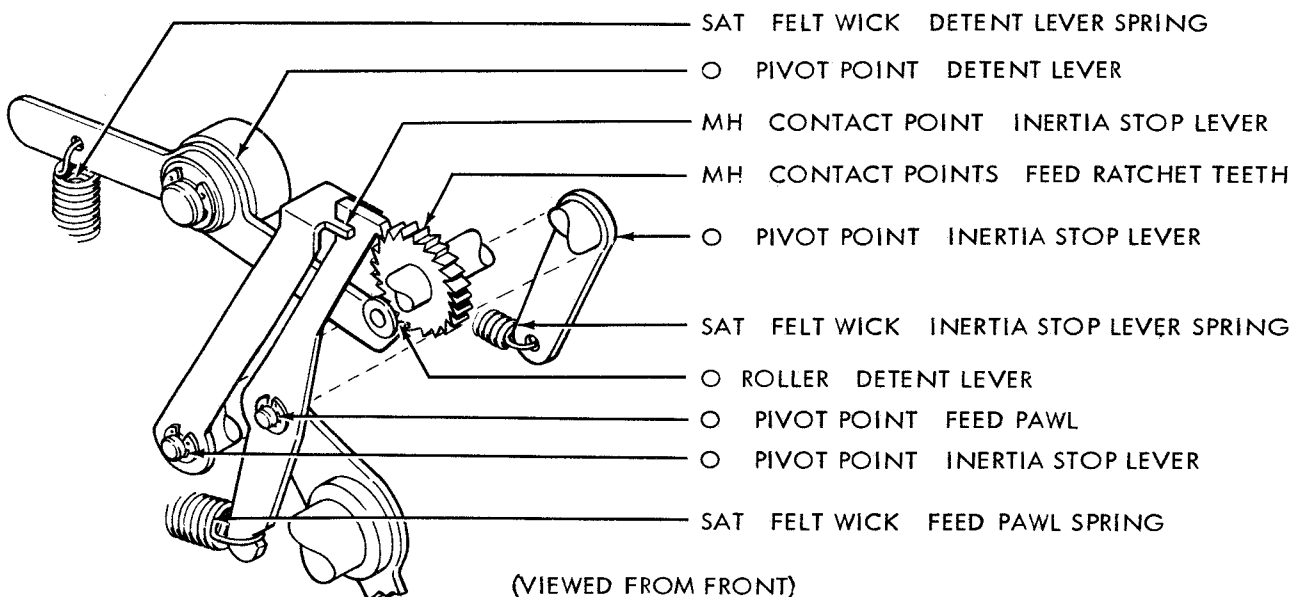
(BOTTOM VIEW)

d. OPERATION CONTROL MECHANISM



(VIEWED FROM FRONT)

e. FEED MECHANISM

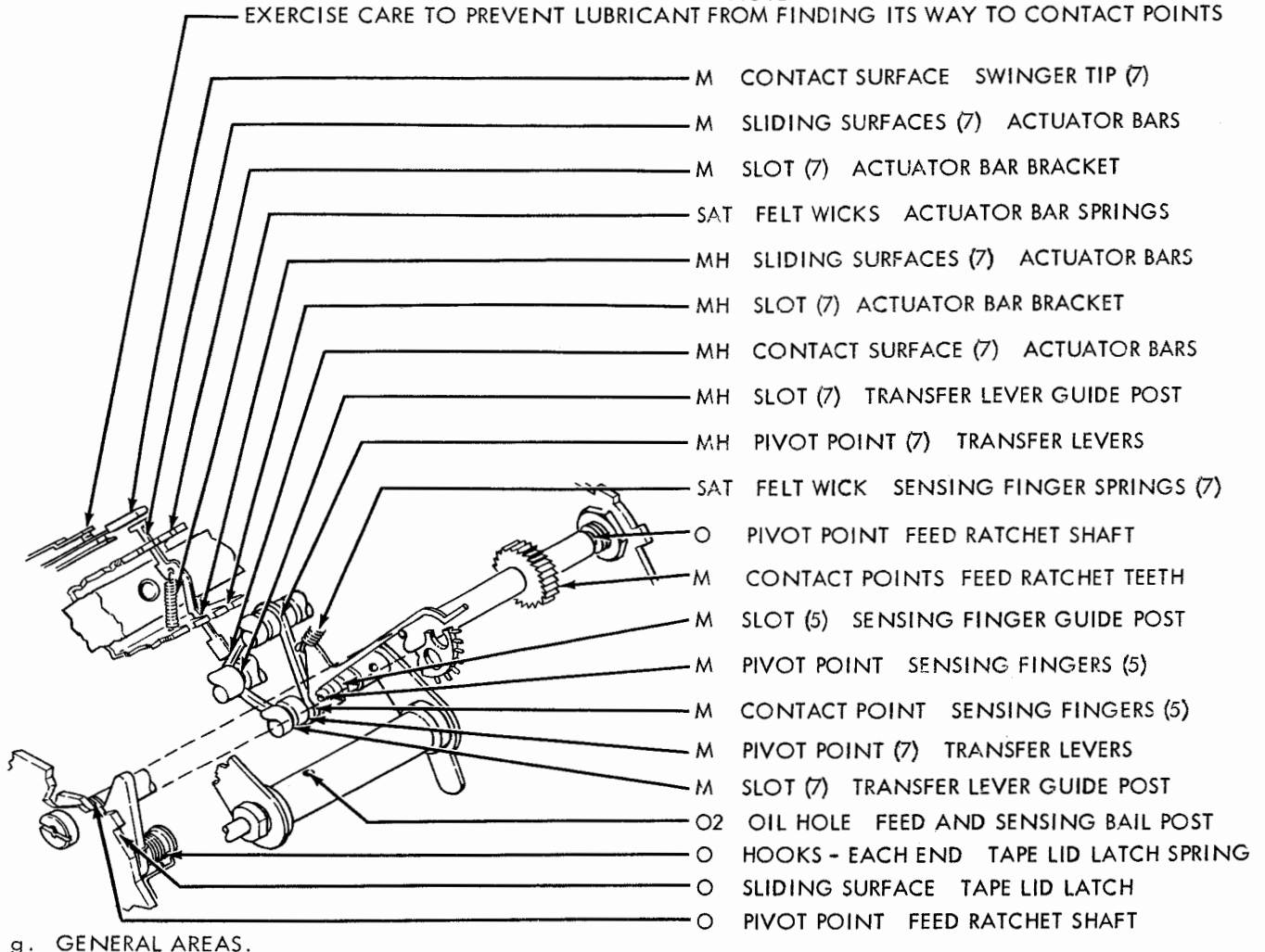


(VIEWED FROM FRONT)

F. SENSING MECHANISM

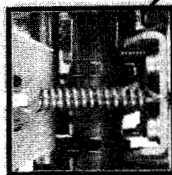
NOTE

EXERCISE CARE TO PREVENT LUBRICANT FROM FINDING ITS WAY TO CONTACT POINTS

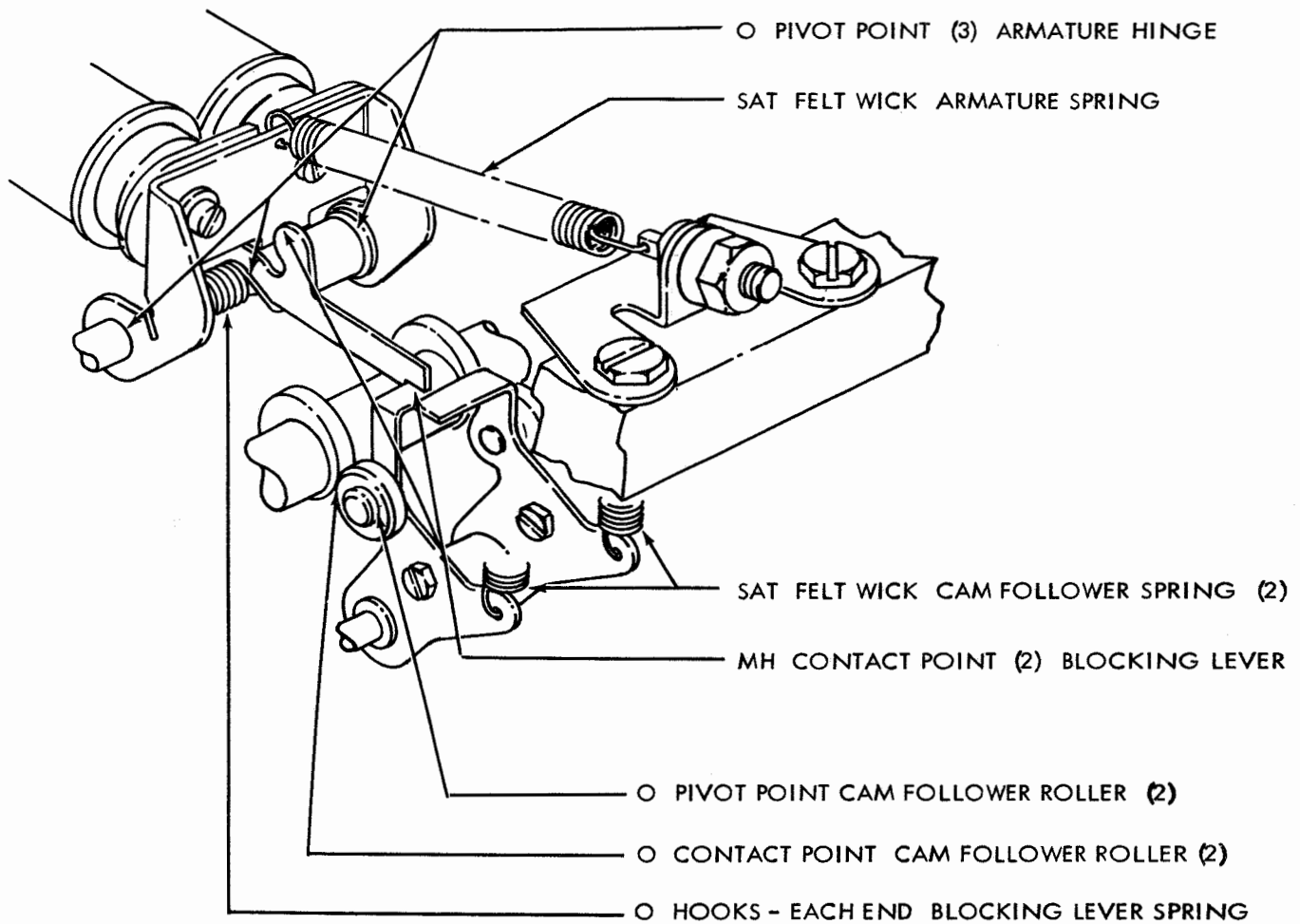


g. GENERAL AREAS.

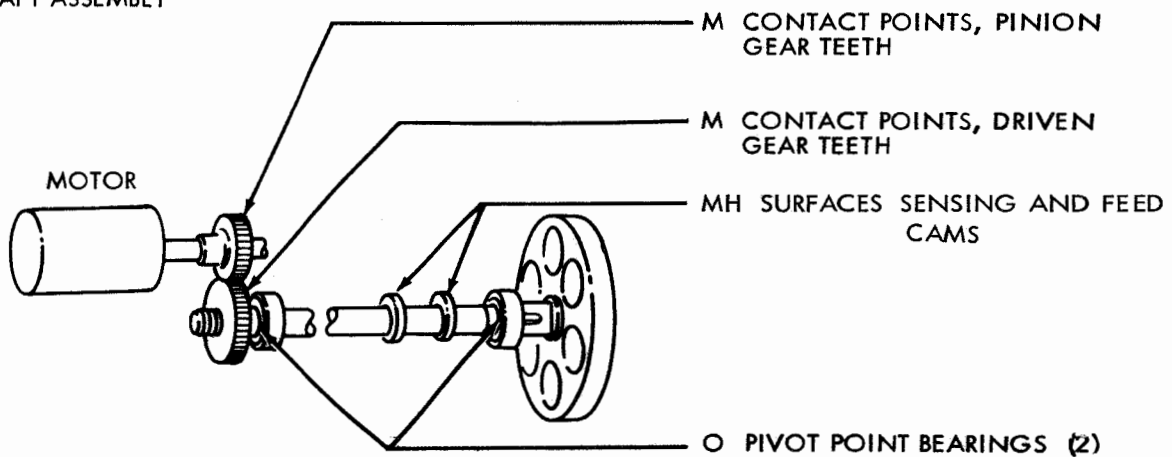
PAR. 5-2.h.



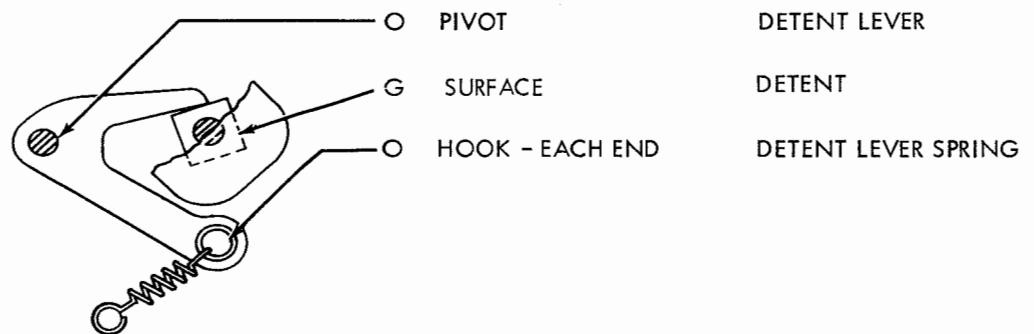
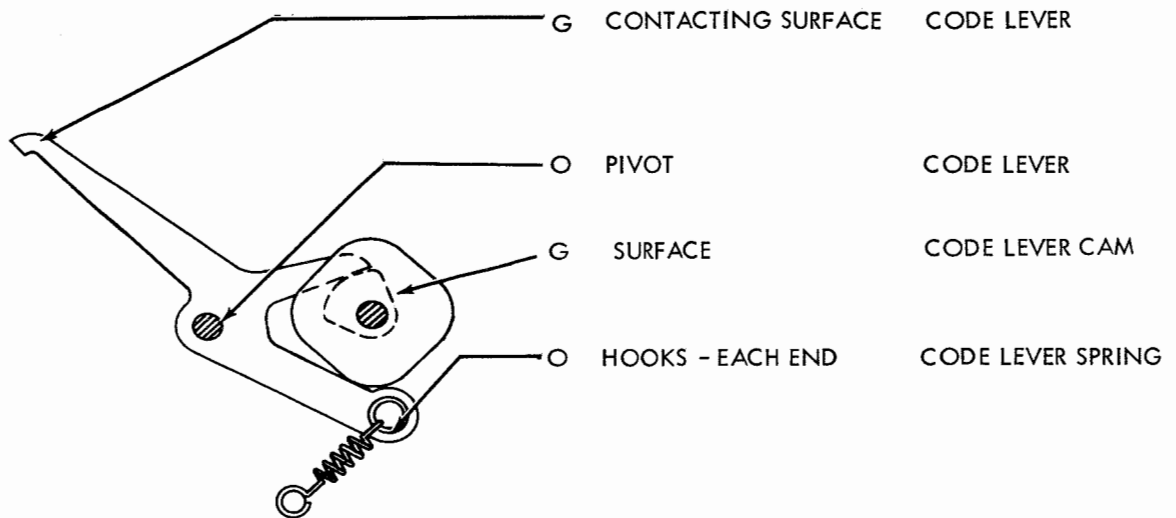
h. LATCHING MECHANISM



i. MAIN SHAFT ASSEMBLY



i. MULTI TAPE-LEVEL MECHANISM



SECTION 6

PRINCIPLES OF OPERATION

6-1. GENERAL

In the following description of the sequence of operations, the Set is assumed to be operating under normal conditions.

a. A 115 volt, 60 cycle supply is present at the Motor Unit terminal board.

b. An external D.C. voltage of an amplitude between 20 and 30 volts is present at the 36-point receptacle in the Base to energize the operating magnet.

c. The start-stop lever is in the center (OFF) position.

6-2. OPERATING SEQUENCE (Figures 6-1, 6-2 and 6-3.)

a. With the power switch in the ON position, current flows through the power switch, the thermal cutout, the motor-run winding, and the motor-start relay coil (Figure 6-1). The energized relay coil closes its contacts, com-

pleting the series circuit consisting of the motor-start coil, the start capacitor, and the relay contacts. After the motor has picked up speed, the start relay opens its contacts and the motor continues to operate on its run winding. Rotary motion of the motor is transferred through the Gear Set to the main shaft which rotates continuously while the motor is running. The motor is mounted in cradles formed in the turned ends of its mounting bracket and is held in place by a strap secured over the resilient mount on each of the end shields. The resilient mounts serve to reduce vibration.

b. When the start-stop lever (Figure 6-2) is moved to the right (FREE) position, its camming surface causes the right end of the control lever to move downward. A pin on this end of the control lever bears down on the tape-out stop arm which is secured by a screw to the tape-out extension. This action causes withdrawal of the tape-out pin. A pin on the lower center of the control lever operates an intermediate lever to disengage the feed pawl (Figure 6-3) from the feed ratchet. The left end of the control lever

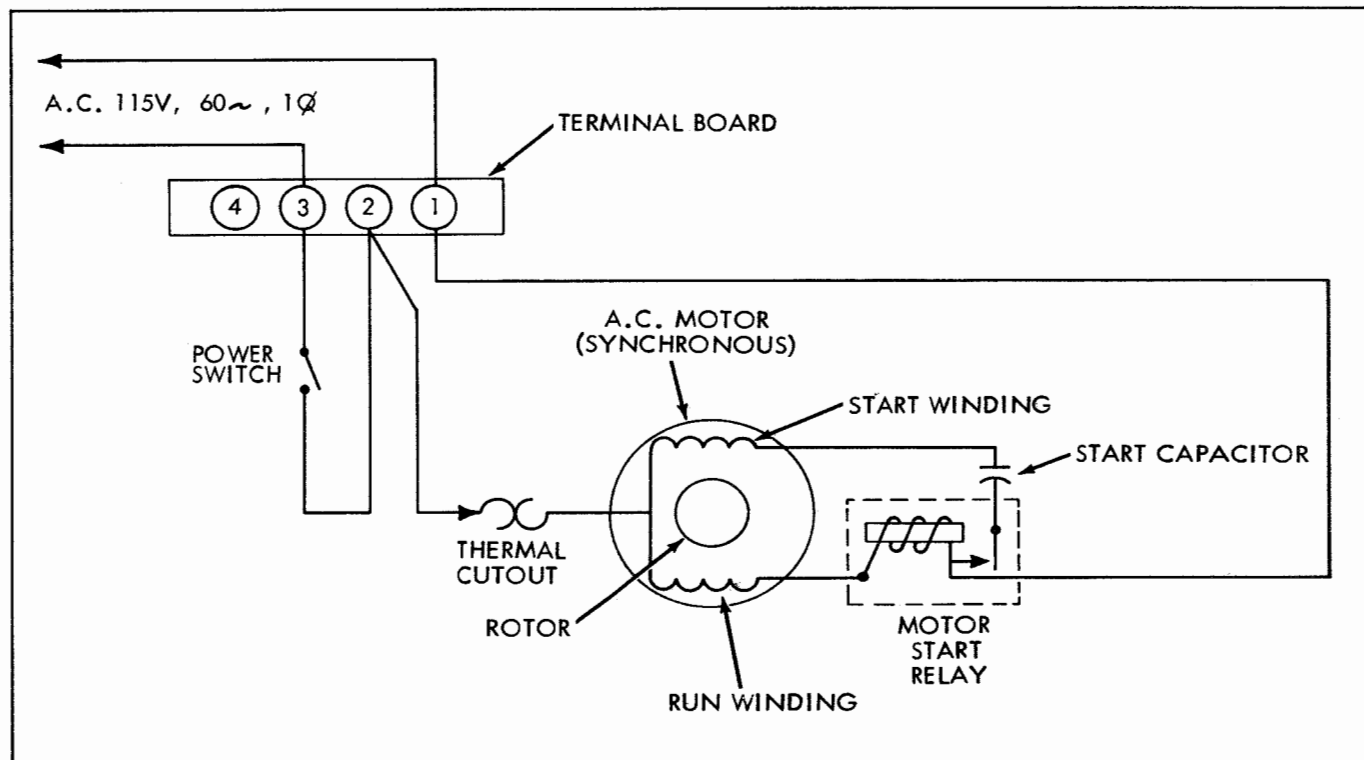


Figure 6-1. Schematic Wiring Diagram of Motor Unit (MU).

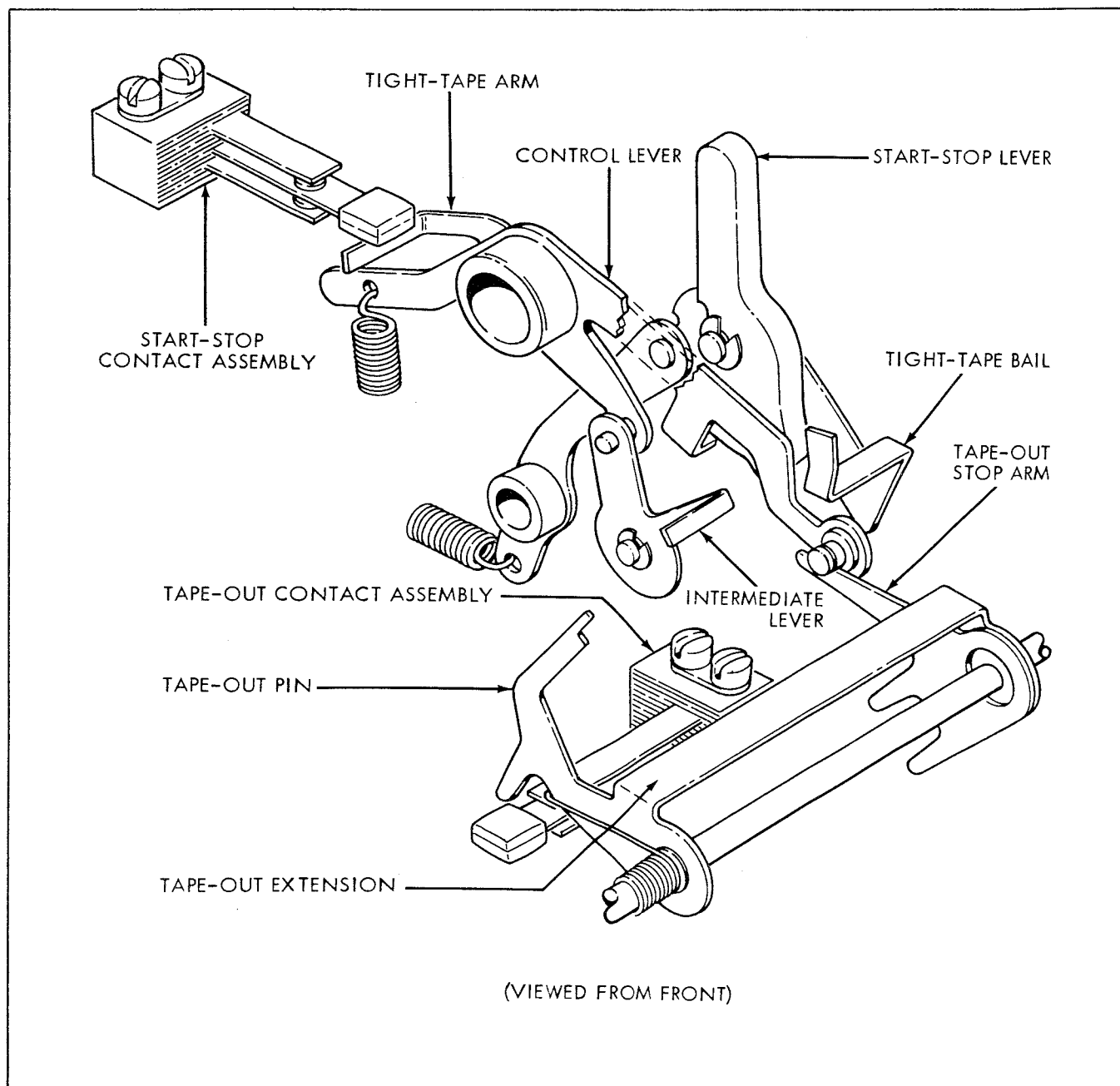


Figure 6-2. Control Mechanism

raises the tight-tape arm which opens the start-stop contacts. The tape can now be inserted without lifting the tap lid. The lid is held in place by the lid-latch mechanism which consists of a spring-controlled latch secured to a bracket on the Reader. When the latch is pushed to the front, the tape lid opens under action of its spring. The lid is closed manually by pushing it down firmly on the tape guide plate.

c. Moving the start-stop lever to the left (RUN) position will initiate the following actions: The tape-out pin will be moved upward through a hole in the tape guide plate; however, pressure

of the tape on top of the pin is sufficient to keep the tape-out contacts closed. The intermediate lever is moved away from the feed pawl (Figure 6-3) allowing it to engage the feed ratchet. The control lever, cammed away from the tape-out arm, permits the start-stop contacts to close. Closing of the tape-out and start-stop contacts completes the circuit to the operating magnet.

d. The energized operating magnet (Figure 6-4) overcomes the armature spring tension and pulls the armature into a flush position with the core faces. Thus the blocking surfaces of the armature extension are moved from contact

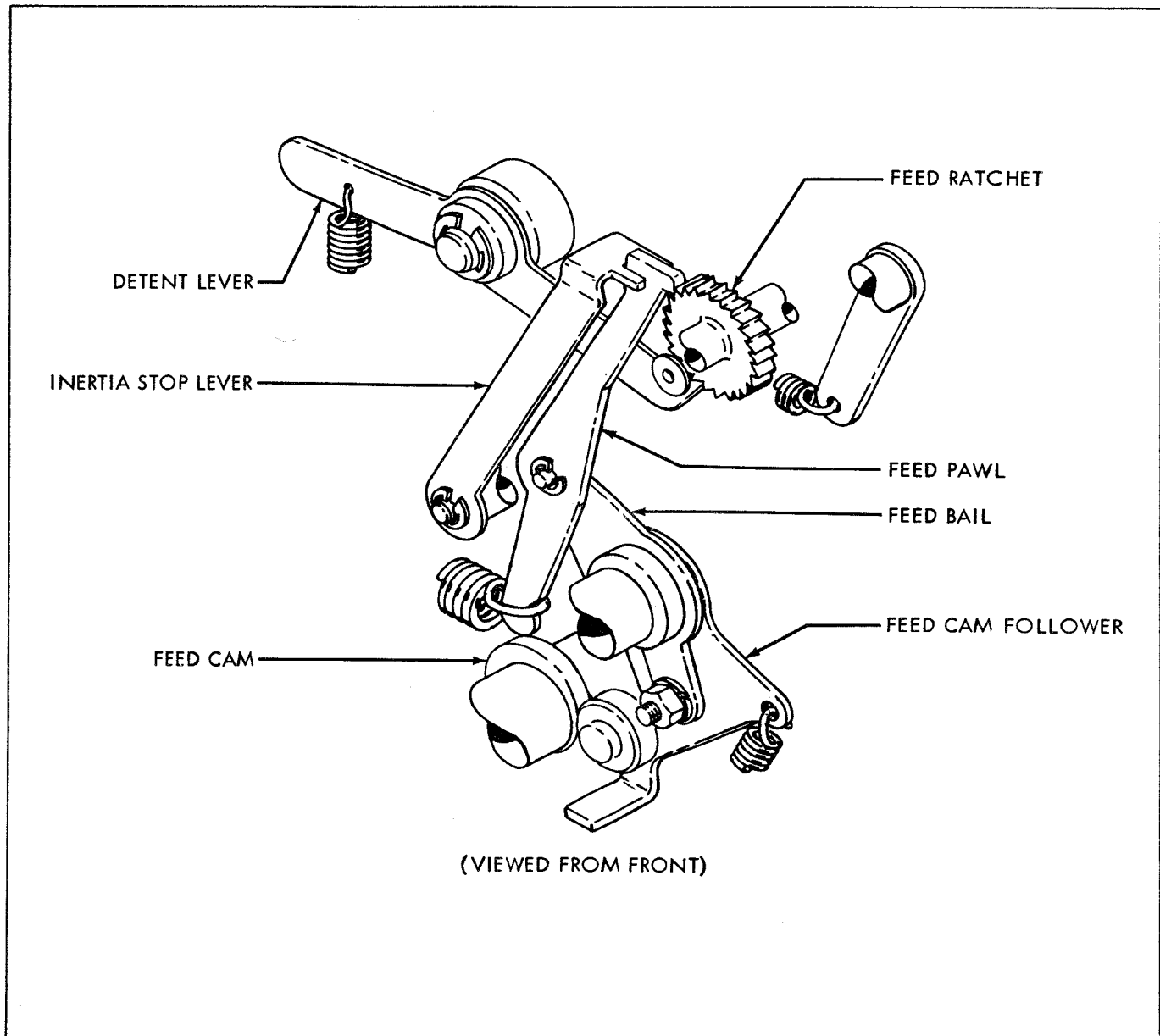


Figure 6-3. Feed Mechanism

with the blocking lever. This latching and unlatching process takes place each cycle of Reader operation. The cams on the rotating main shaft now lift the feed and sensing cam followers away from the blocking lever which are pulled out of the way by its spring. Sensing and feeding operations now begin.

e. The feed cam (Figure 6-3) moves its follower which is secured to the lower end of the feed bail. A pin on the upper end of the bail pulls the feed pawl downward causing it to rotate the feed ratchet one position. Since the feed ratchet and feed wheel are integral with the same shaft, the tape is advanced one position. The ratchet is then held in place by a roller de-

tent while the pawl moves upward preparatory to the next feeding stroke. A spring attached to the cam follower causes the upward movement of the pawl.

f. The sensing bail (Figure 6-5) has a cam follower secured to its lower end and a slotted guide post secured to its upper end. The sensing fingers, which ride on this guide post, are driven upward by the sensing finger springs and sense the tape while it is being advanced. The sensing fingers are retracted by the sensing bail. The bottom ends of the sensing fingers transmit their movement through the transfer levers to the actuator bars which actuate the code contacts. An integral shoulder on the

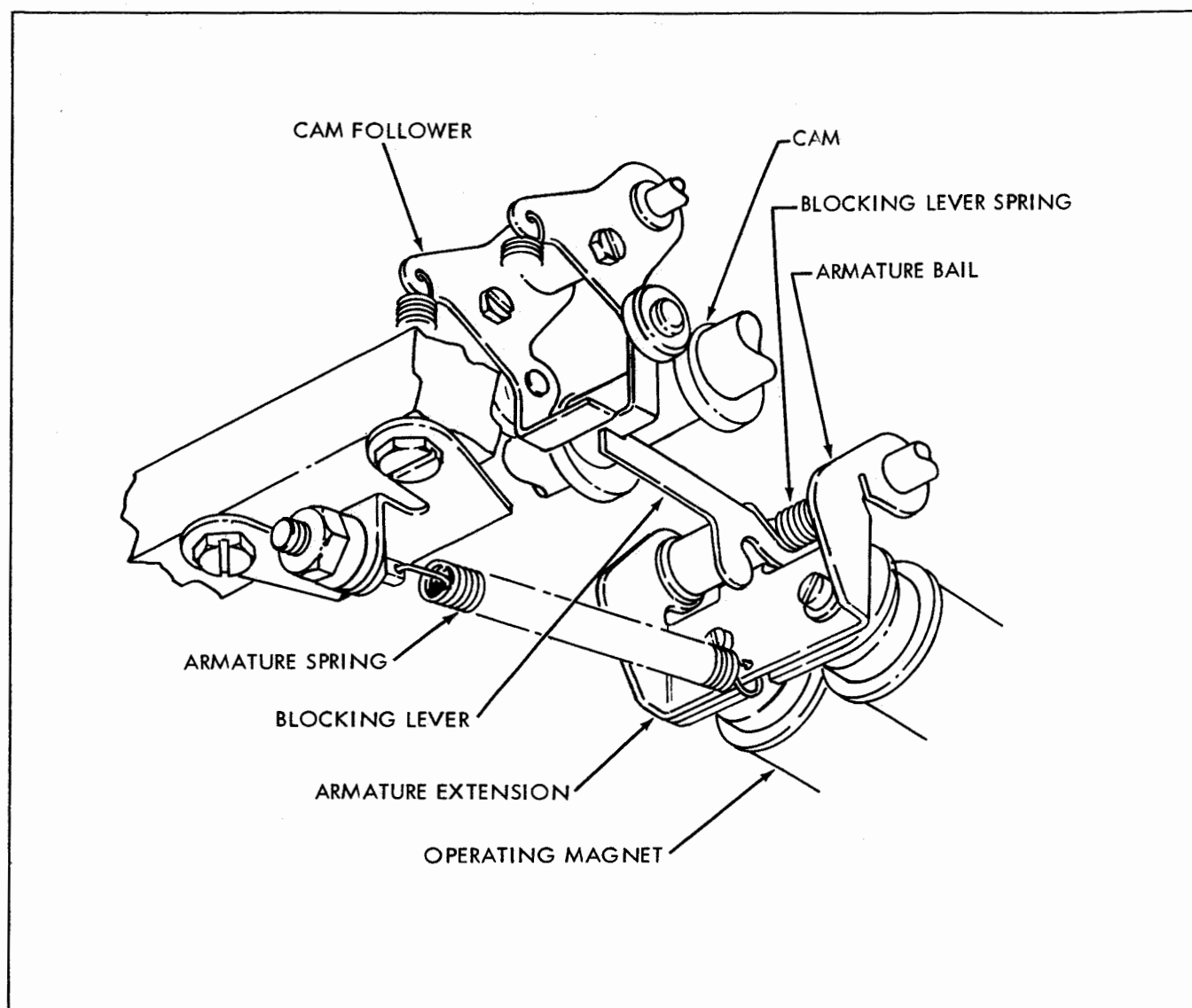


Figure 6-4. Latching Mechanism

sensing finger guide post transmits its movement through two transfer levers to two actuator bars which actuate the timing contacts.

g. Where there is no hole in the tape, upward movement of the individual sensing finger is stopped by the tape. Downward movement of the associated code contact swinger is therefore stopped and the contact remains open. Where there is a hole in the tape, the sensing finger continues through the tape to its top point of travel, determined by the sensing cam. The code contact swinger, responding to the sensing finger movement, moves downward closing the contacts.

h. During each revolution of the main shaft,

the permanent magnet imbedded in the flywheel passes the pick-up coil core introducing a rapid change in the coil's flux density. This causes the coil to generate a pulse which can be used to control an external transistor unit.

i. If the tape should become too tight, the left end of the tight-tape bail moves the tight-tape arm upward causing the start-stop contacts to open. As a result, the operating magnet is de-energized and Reader operation is stopped.

j. If the end of the tape is reached while the Reader is operating, absence of tape pressure on the tape-out pin causes the tape-out contacts to open. With the operating magnet now de-energized, operation of the Reader is stopped.

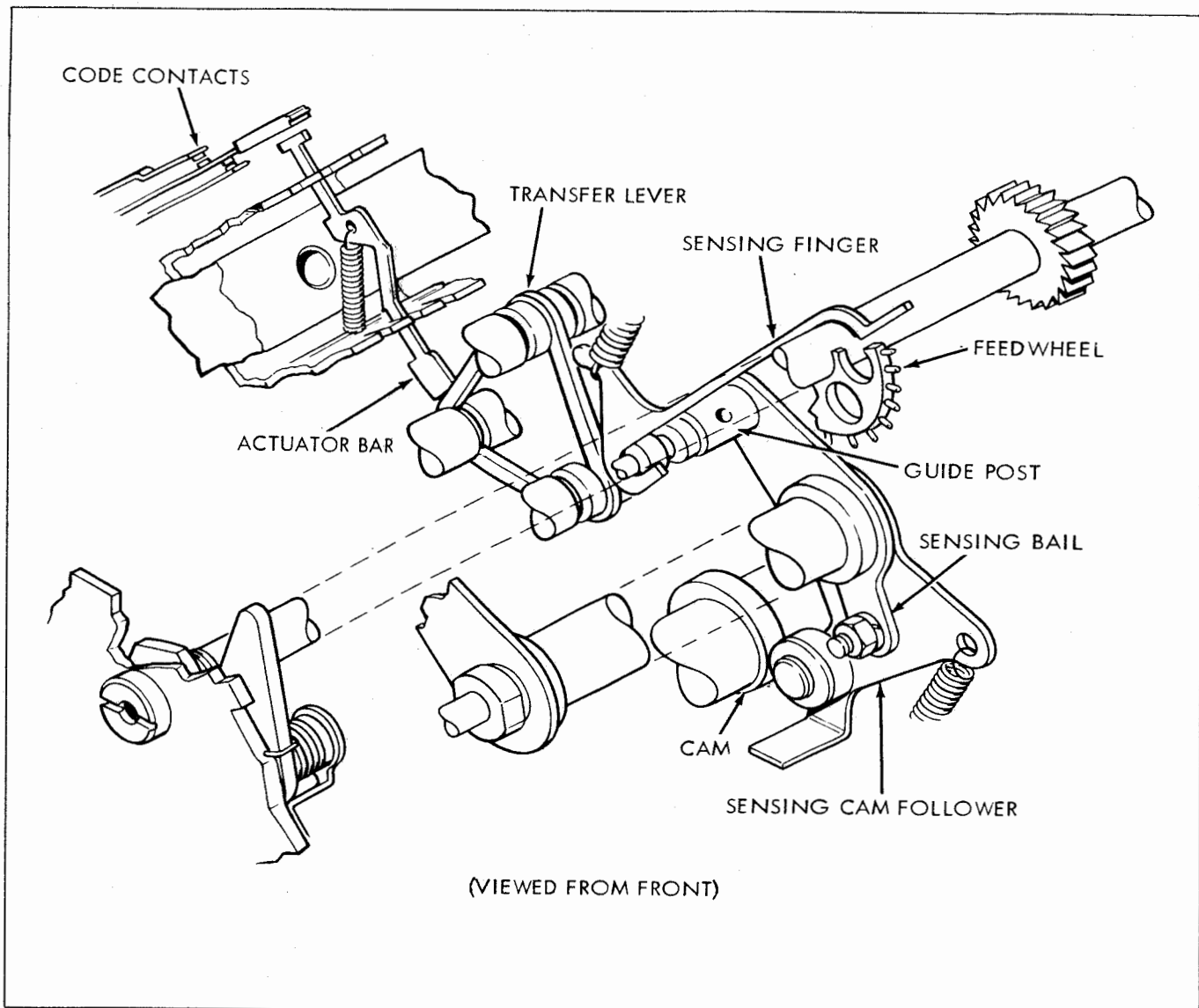


Figure 6-5. Sensing Mechanism

k. Operation of the Reader is stopped by putting the start-stop lever to the center (STOP) position. This causes the control lever to lift the tight-tape arm which opens the start-stop contacts.

6-3. VARIABLE FEATURES

a. The multi tape-level reading mechanism, when installed on an eight level reader, allows the reader to alternately sense either 5, 6, 7, or 8 level tapes. Changing from one level to another is accomplished by means of the numbering dial located at the lower left corner of the tape guide plate.

b. When the numbering dial is rotated, its integral cam assembly (see Figure 3-21) operates three code levers. These levers, in turn,

control the sensing fingers of the 0, 6th, and 7th reading levels. With the dial detented in the number 5 position, each code lever is riding the high part of its respective cam, holding an associated sensing finger from mechanically sensing an unused level (0, 6th, and 7th). As the dial is rotated to the number 6, 7, or 8 position, the code levers release, respectively, the 0, 6th, and 7th, level sensing fingers. To change reading level, therefore, the operator need only rotate the dial until the number corresponding to the tape level to be read appears in view.

c. To guide the tape over the sensing fingers, two sets of moveable tape guides are used. The guides are designed to accept the three standard tape widths (11/16", 7/8", and 1") associated with 5, 6, 7, and 8 level tape (see Figure 6-6).

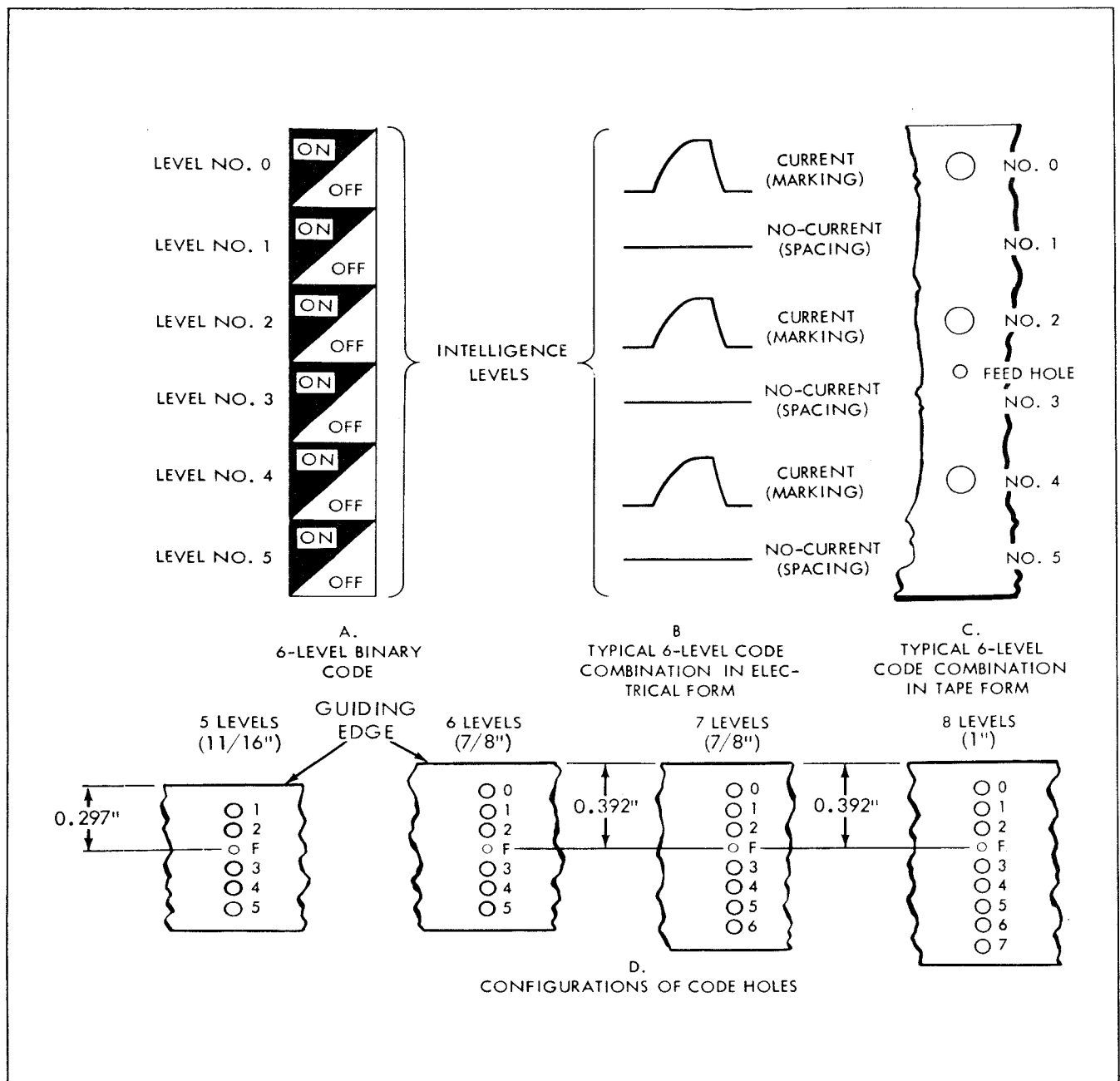


Figure 6-6. Binary Permutation Code

6-4. TIMING (Figures 6-7, 6-8, 6-9 and 3-20)

a. **GENERAL.** The electrical and mechanical conditions outlined below are recommended for normal operation. Additional information for use in applying the Reader and in designing associated equipment may be obtained from the Teletype Product Sales Department.

b. **ELECTRICAL.** Instructions for adjustment of the magnetic pick-up coil are given in Figure 3-20. This adjustment may be modified

experimentally to meet specific timing requirements of associated equipment.

c. **MECHANICAL.** Figure 6-7 illustrates feed pawl and sensing pin displacement during a 10 millisecond cycle of Reader operation. The feed pawl and sensing pin travel are plotted against the 10 millisecond cycle period and degrees of main shaft rotation. The lowermost position of the sensing pin is designated as 0 degrees of shaft rotation and 0 time in milliseconds.

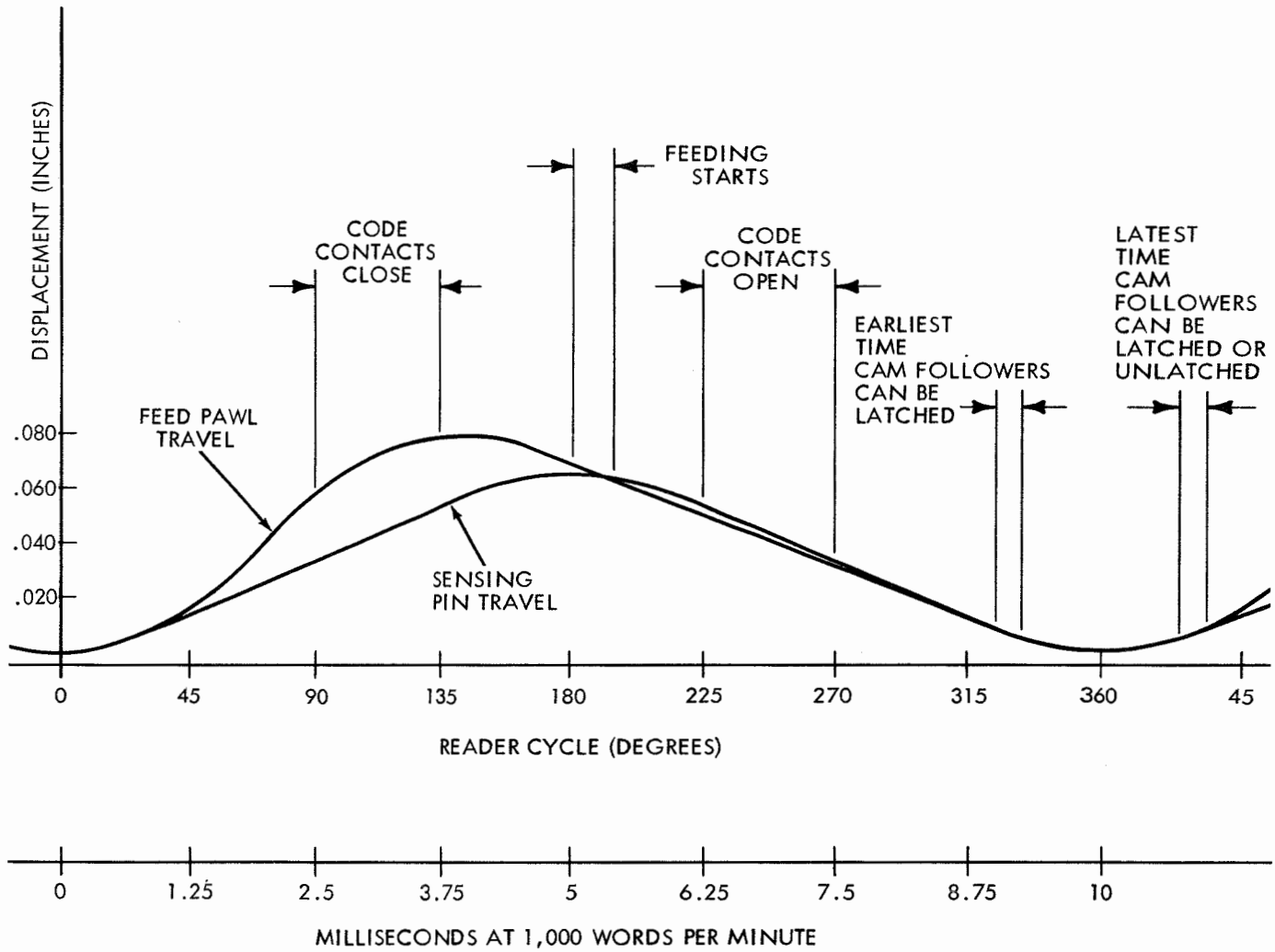


Figure 6-7. Timing Diagram

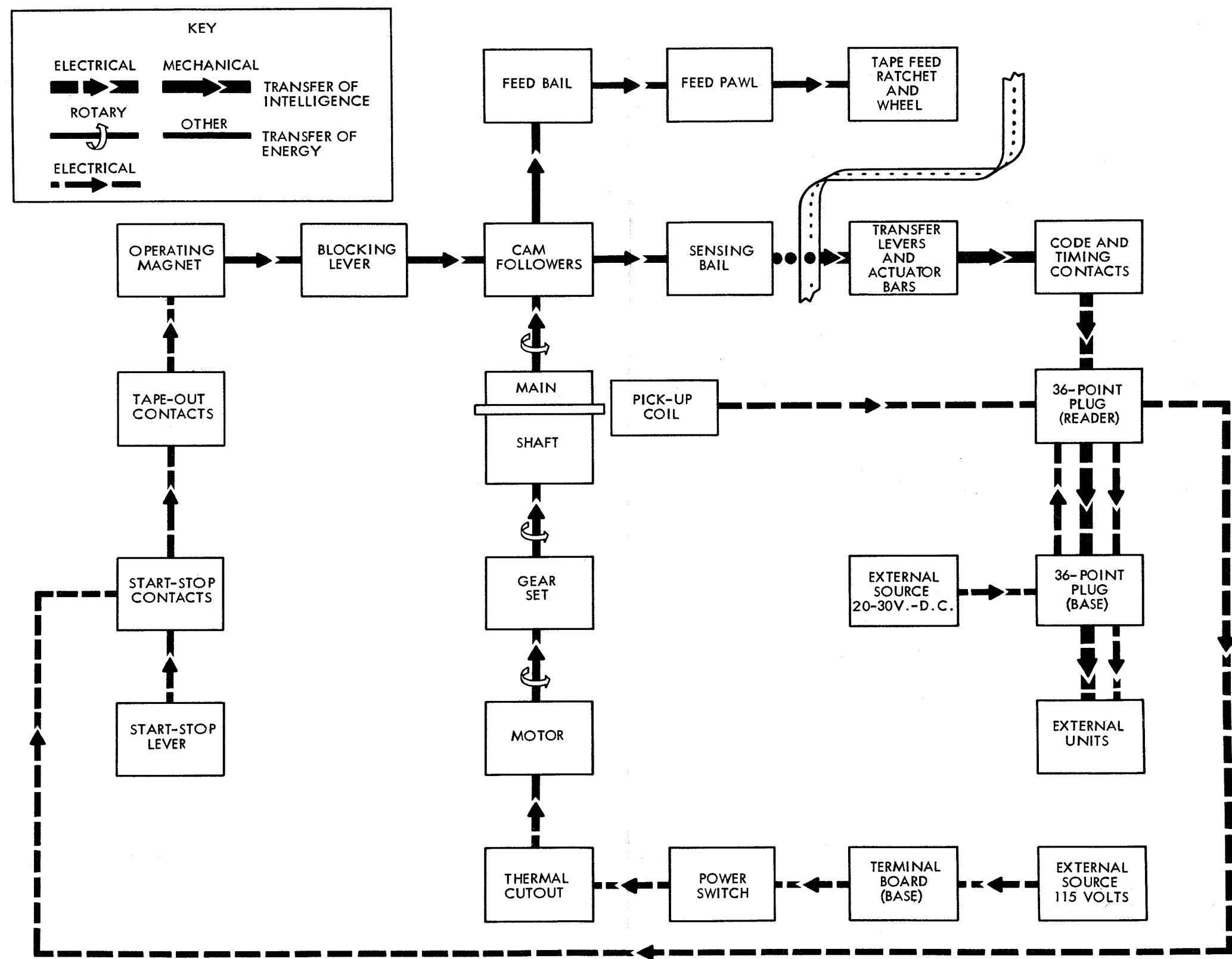


Figure 6-8. Schematic Diagram of High Speed Reader Set.

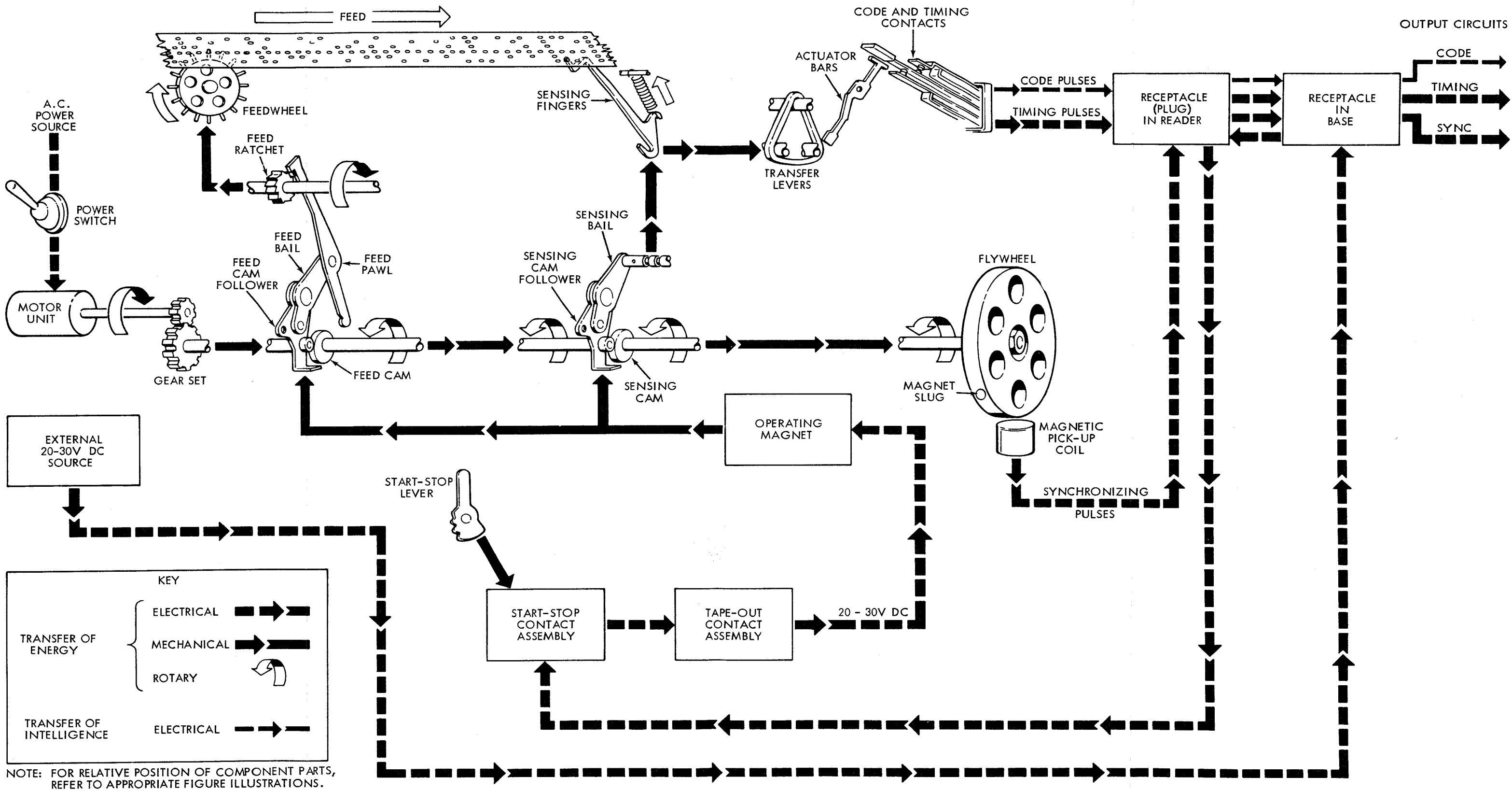
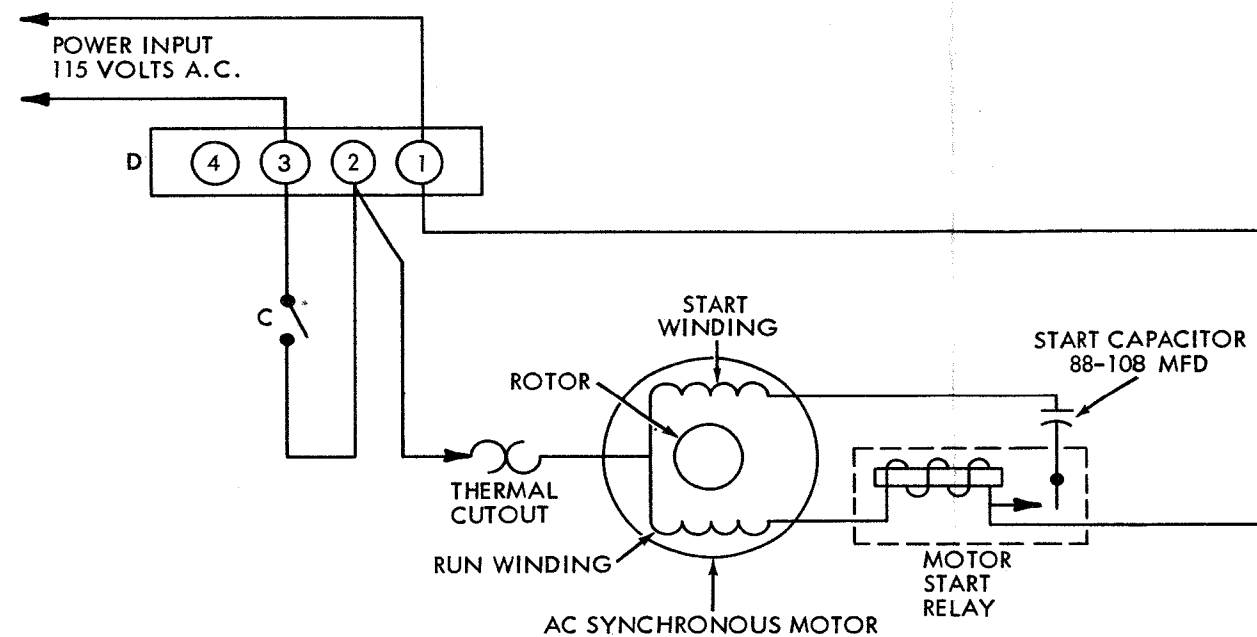


Figure 6-9. Pictorial Schematic Diagram of Reader Operation.



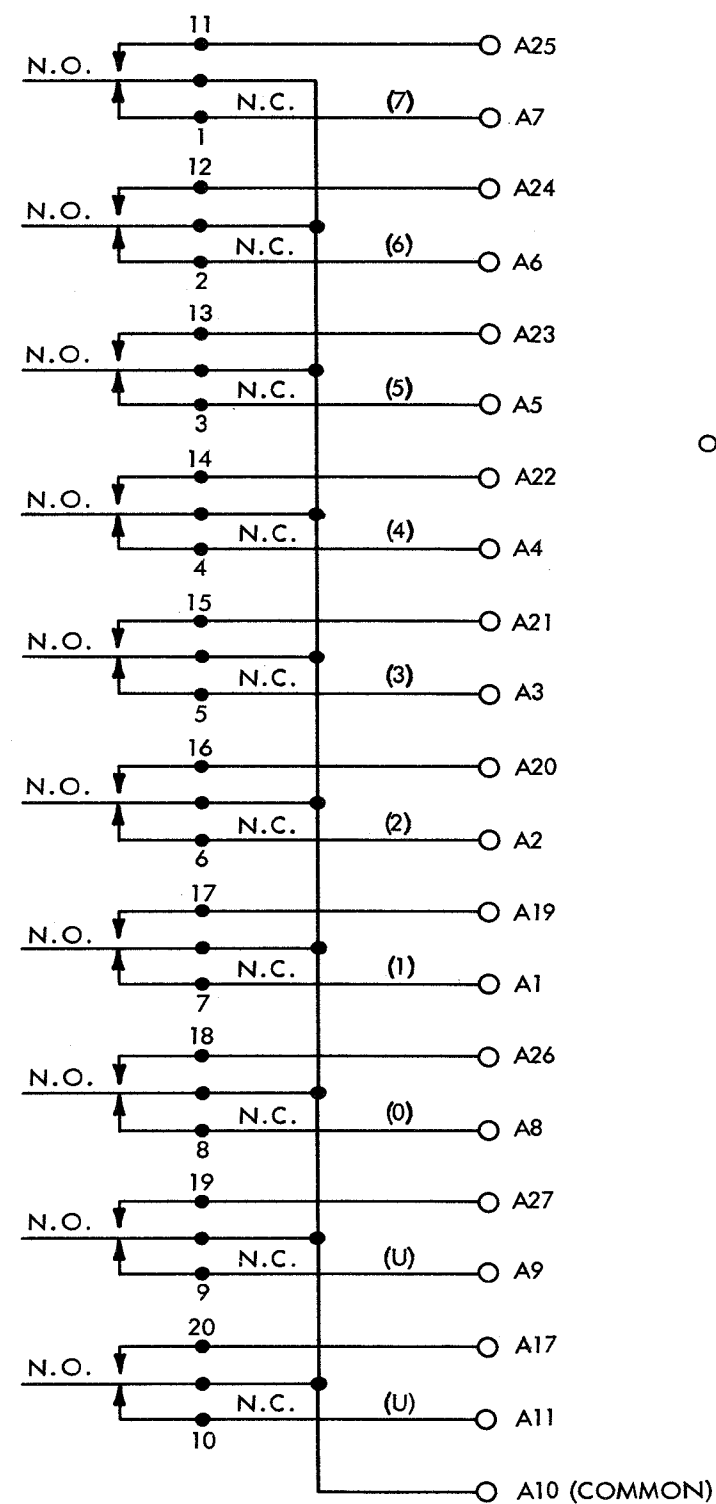
LEGEND

- A 36 - POINT CONNECTOR PLUG (ON READER - VIEWED FROM RECEPTACLE END).
 B 36 - POINT RECEPTACLE (ON BASE - VIEWED FROM PLUG END).
 C POWER SWITCH (ON BASE).
 D 4 - POINT TERMINAL BOARD (ON BASE).
 N.O. NORMALLY OPEN (SPACE).
 N.C. NORMALLY CLOSED (MARK).

NOTE:

- CODE READING CONTACT ASSEMBLY SHOWN: TRANSFER TYPE NO. 171730.
- (U) DENOTES UNIVERSAL CONTACTS; (0), (1), (2), (3), (4), (5), (6), AND (7) DENOTE CODE LEVEL.
- ALTERNATE WIRING: THE START - STOP AND TAPE - OUT CONTACTS MAY BE CONNECTED IN SERIES WITH A RELAY COIL, USING THE RELAY CONTACTS TO COMPLETE THE CIRCUIT FOR THE OPERATING MAGNET COILS.

CODE READING CONTACT ASSEMBLY



OPERATING MAGNET COILS

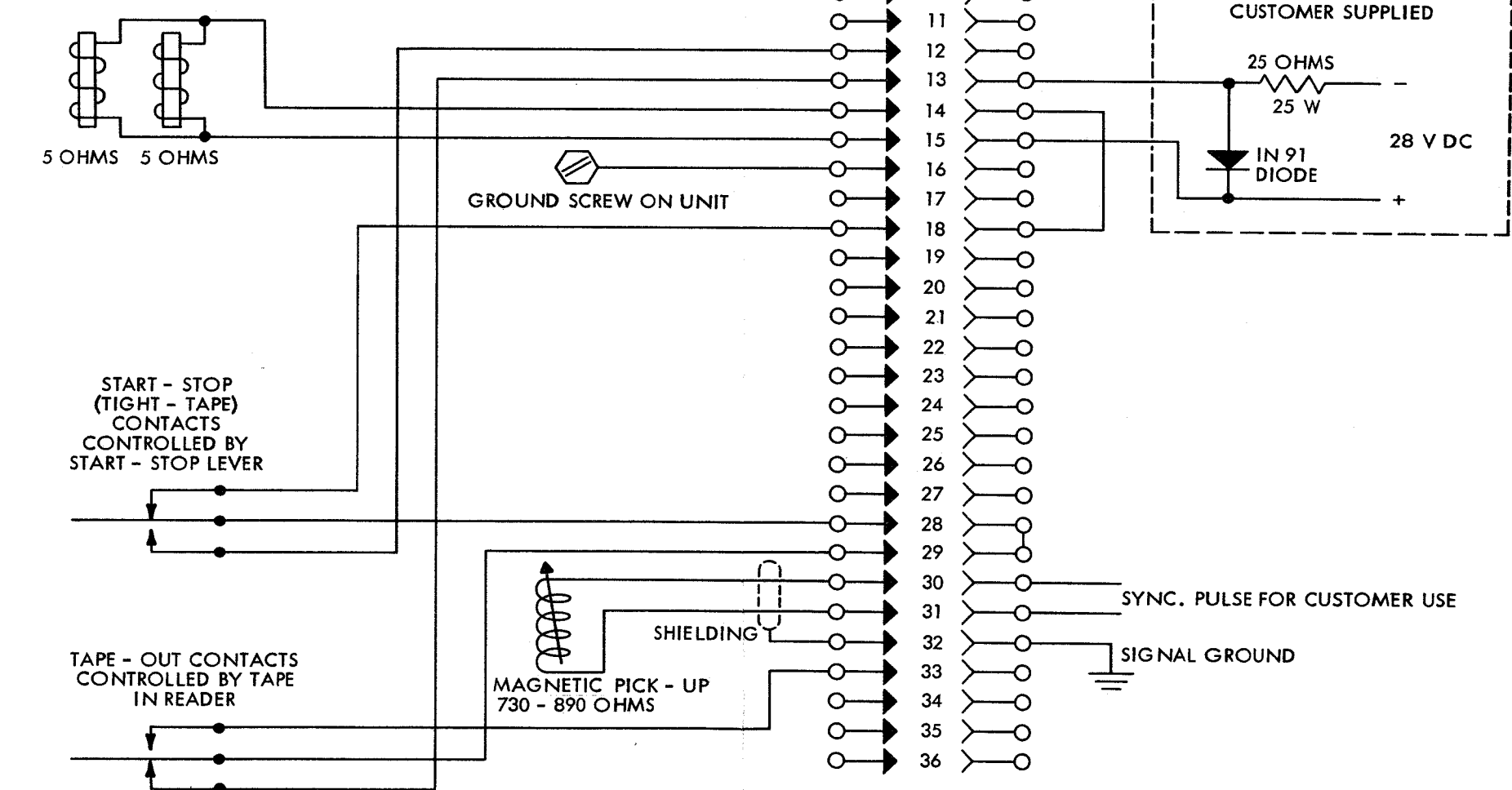


Figure 6-10 . Typical Schematic Diagram of CX Reader Set.