

Teletype Corporation
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DESCRIPTION, INSTALLATION AND ADJUSTMENTS
FOR THE MAGNET-CONTROLLED REPERFORATOR (ARPE)

1. GENERAL

a. The magnet-controlled reperforator provides means for the preparation of perforated tape for automatic telegraph transmission when the punch bail of the unit is connected to a power drive and when an appropriate electrical control circuit is provided for the selector mechanism. This unit is used for relaying purposes as the perforated tape may be automatically retransmitted by a tape transmitting device. The preparation of tape automatically by the ARPE eliminates the necessity for manual transmission by direct keyboard of the manual preparation of tape by a perforator at the relaying station. The basic design of this unit is such that by the substitution of the punch block the features may be varied. The code punches on these units are controlled by individual magnets on a multiple wire basis. The control cable (Figure 12) containing these wires terminates in a plug (Figure 2) for connection to associated units.

b. For Models available refer to the Teletype Magnet-Controlled Reperforator Parts Bulletin.

2. SIGNALING CODE

All reperforators operate by receiving electrical impulses in multiple. The code used consists of five, six or seven selecting impulses used in various combinations of current (marking) and no-current (spacing) impulses.

3. SELECTOR MECHANISM

a. The selector mechanism located in the center of the reperforator consists of selector magnets, magnet armatures (with armature springs), magnet brackets, terminal strips and cable assembly with plug. The selector mechanism is designed to translate the marking (current) and spacing (no-current) impulses received from the line in multiple into mechanical motion which causes the punch selector fingers to be positioned in accordance with the character or function assigned to each combination of five selecting impulses. The selector mechanism is controlled by the armature of the selector magnets which receive the code impulses from the line.

b. The maximum operating time of the selector magnets is 9 milliseconds. To provide sufficient margin, at least 13 milliseconds of operating time should be allowed. Therefore, the timing contacts should close at least 13 milliseconds before the selector fingers make contact with the magnet armatures. At 368 opm, the contacts would have to close at least 29° before this point. The magnets operate on 110 V AC or, with resistors in series (2600 ohms recommended) 110 V DC. The resistance of each magnet coil is 380 ohms (Figure 12); the current draw approximately 33 ma (DC), 40 ma (AC).

*Indicates Change

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4. TAPE PERFORATING MECHANISM

a. The tape perforating mechanism consists of the punch bail, punch selector fingers and punches (Figure 4). Operation of the punch bail actuates the punches. The magnet armatures allow the punch selector fingers to be positioned to set up a selection to be perforated in the tape.

b. The positioning of any punch selector finger to allow its punch to operate will take place when its selector finger is selected by the energization of its magnet, the armature of which allows the selector finger, pulled by its spring, to move to the right in position to engage with its punch. When the magnet is not energized, the armature blocks the movement of the selector finger to the right so that its recess will be under the punch. Shortly after the punch selector fingers have been positioned, the punch bail impelled upward by the power drive causes the punch engaging projections of the selector fingers which are in line with the punches to raise the punches causing them to perforate tape. A projection on the punch bail engages the feed punch during every operation. The reset bail adjusting screw (Figure 1), attached to the punch bail, actuates the reset bail which resets the selector fingers near the end of the cycle. The driving load, when punching five-unit chadless tape, is 12.2 ounce inches when operating at 368.2 opm. The punch will operate at speeds up to 1000 opm when AC selection is used. At speeds above this figure, beating between shaft speed and the 60 cycle selecting current occurs which appears on the tape as errors. With DC control, the punch will operate up to 1500 opm, or higher if carefully adjusted. A movement of .178" is required at the point of power application. This is sufficient for perforating two tapes. A movement of .190" is required for perforating four tapes.

c. The following is a summary of the functioning of the tape perforating mechanism.

SEQUENCE CHART FOR TAPE PERFORATING MECHANISM

- (1) Punch engaging projections positioned simultaneously under or away from their punch depending on whether magnet armatures are energized or de-energized.
- (2) Action of power drive operates punch bail.
- (3) Punch engaging projection raises punch.
- (4) Perforates tape according to code set up.

5. SPACING

a. Proper spacing between tape perforations requires the tape to be moved to the left as each selection is perforated. Tape is mechanically spaced by the rotation of the feed roll which has pins on its periphery (Figure 6) that engage the feed perforations in the tape. The tape tension lever holds the tape in engagement with the feed roll. A star wheel and detent are provided to insure equal spacing of the tape.

b. During each downward stroke of the punch bail (Figure 1), the feed pawl (attached to the punch bail and held in engagement with the feed roll ratchet

by a spring) engages a tooth of the feed roll ratchet, thus turning the feed roll. The feed roll detent insures even spacing of the perforations by applying pressure on the feed roll ratchet so that the feed pawl engages one tooth on the feed roll.

c. The following is a summary of the functioning of the spacing mechanism.

SEQUENCE CHART FOR SPACING MECHANISM

- (1) Downward stroke of punch bail.
- (2) Feed pawl engages ratchet on feed roll.
- (3) Pins on feed roll move tape one space.
- (4) Feed roll detent holds feed roll centered.

6. INSTALLATION

a. Refer to Figure 2 for the installation diagram.

CAUTION

Before installing the ARPE, the reset bail adjusting screw should be turned inward approximately two turns. When the drive link is connected to the punch bail, adjust its length so that the punch bail upstop screw comes within .002" to .006" of the bottom plate of the punch block at the extreme upper position of the punch bail. Refine if necessary to give clean perforations. Check the RESET BAIL ADJUSTING SCREW AND FEED ROLL DETENT FINAL ADJUSTMENTS; then check the other adjustments. See Figures 1 and 3.

Use three 10-32 screws (not furnished) to mount the ARPE unit.

b. Refer to Figure 12 for wiring diagram.

7. ADJUSTMENTS

For the purpose of this specification, the front refers to the side on which the feed roll star wheel is mounted (Figure 1).

a. PUNCH BAIL FRONT AND REAR PIVOT BEARING

(1) As viewed from the right, position the punch bail to meet the following requirements:

(a) With the punch selector fingers held against their respective punches, the rear edge of the rear finger and the front edge of the front finger should be within the outer edges of their respective punches. See Figure 4 for location of parts.

*(b) The front and rear selector fingers should touch their respective punches at the same time, or, if one of these two fingers touches its respective punch before the other, the finger not touching its punch should clear the punch by not more than .002". See Figure 4.

(2) To adjust, loosen the front pivot bearing screw lock nut and position the front pivot bearing plate to a horizontal position (Figure 5). Check by eye. Loosen the rear pivot bearing screw lock nut (Figure 3) and position the bail, front to rear, by means of the two pivot bearing screws to meet the first requirement. Operate the punch bail by hand until the punch selector fingers almost touch the punches and position the front pivot bearing plate vertically by means of its three positioning screws to meet the second requirement. Then tighten the front and rear pivot bearing screw lock nuts.

NOTE: Care should be taken that the feed pawl does not interfere with the main casting.

b. PUNCH BAIL END PLAY

The punch bail should have some end play, not over .005", on its pivot bearing screws. Adjust by means of the front and rear bearing screws. See Figures 1 and 3 for location of parts.

REMOVE MAGNET BRACKET ASSEMBLY

c. FEED ROLL BEARINGS (FIGURE 3)

With the feed roll detent, the feed pawl, and the tape tension lever held away from the feed roll, the feed roll should turn freely in its bearings and should have some end play, not over .004". To adjust, first position the rear bearing bracket and its mounting screws to provide freedom of rotation and then adjust the bearing bushing in this bracket to provide sufficient end play.

d. TAPE TENSION LEVER STUD (FIGURE 6)

The tape tension lever should be centrally located with respect to the feed roll pins so that the tape tension lever does not touch the pins when play in both the feed roll and the tape tension lever is taken up in opposite directions. To adjust, add or remove shims between the shoulder on the tape tension lever stud and its mounting bracket.

e. TAPE TENSION LEVER SPRING TENSION (FIGURE 8)

Hook a 32 oz. scale over the end of the slotted extension of the tape tension lever and pull at right angle to the lever. It should require a pull of 14 to 16 ozs. to start the slotted extension of the lever moving from the feed roll. To adjust, loosen the tape tension lever stud lock nut and rotate the stud in either direction. Tighten the lock nut.

f. TAPE STRIPPER PLATE

There should be some clearance, not over .010", between the upper edge of the tape stripper plate and the feed roll. Check throughout a complete revolution of the feed roll. To adjust, position the stripper plate by utilizing its elongated mounting holes. See Figure 1 for location of parts.

g. FEED ROLL DETENT - PRELIMINARY (FIGURE 7)

Feed roll "A" is intended for "advanced" feed holes, feed roll "B" is intended for "in line" feed holes. With the punch bail in its operated position,

insert the 73517 feed roll positioning gauge in the punch block guide slot so that the projection on the gauge stops against the feed hole punch. The position of the feed roll should be such that a pin on the feed roll lines up with the center hole of the gauge. To adjust, position the feed roll by means of the feed roll detent eccentric (Figure 1). Locate the eccentric so that the high part is toward the left.

h. FEED ROLL DETENT LEVER SPRING TENSION (FIGURE 8)

With a 32 oz. scale hooked to the detent lever at the roller and pulled at right angle to the detent lever, it should require 10 to 15 ozs. to start the roller moving away from the star wheel.

i. FEED PAWL ECCENTRIC - PRELIMINARY (FIGURE 1)

With the punch bail in its lowest position and the detent roller in the bottom of a star wheel notch, the feed pawl should rest in the bottom of the notch which is just below the horizontal centerline of the feed roll. To adjust, position the feed pawl eccentric with the high part of the eccentric toward the left.

REMOVE THE RESET BAIL

j. SELECTOR FINGER SPRING TENSION (FIGURE 9)

With the punch bail in the lowest position, apply the push end of an 8 oz. scale against the right end of the selector fingers and push in line with the fingers. It should require 1/2 to 1 oz. to move each selector finger against the retainer.

k. OPERATING FIXTURE PUNCH BAIL LINK

(1) Back off the punch bail upstop screw (Figure 1).

(2) For fully perforated tape: Loosen the lock nuts on the punch bail link and adjust the length of the link so that when the LETTERS combination is selected and the unit is operated under power, the LETTERS combination will be perforated and the feed holes will be just punched cleanly. Tighten the lock nuts.

(3) For chadless tape: Loosen the lock nuts on the punch bail link and adjust the length of the link so that when the LETTERS combination is selected and the unit is operated under power, the feed holes will be punched cleanly in the tape. (By cleanly is meant a well-defined hinged lid with no fibrous edges and no appreciable tear at the hinged portion of the feed hole lid. A slight tear is permissible at the hinged portion of the code perforations.)

m. PUNCH BAIL UPSTOP SCREW

With the punch bail in its extreme upper position, there should be .002" to .006" clearance between the upstop screw and the bottom plate of the punch block. To adjust, loosen the upstop screw lock nut and turn the upstop screw. Tighten the lock nut. See Figures 1 and 3 for location of parts.

REPLACE RESET BAIL ASSEMBLY

n. RESET BAIL ADJUSTING SCREW (FIGURES 1 and 3)

With the punch bail in its extreme lower position, there should be .005" to .015" clearance between the selector finger shoulder which is closest to the right selector finger retainer and the right selector finger retainer. To adjust, position the reset bail adjusting screw.

o. RESET BAIL BACKSTOP ECCENTRIC (FIGURE 1)

With the LETTERS combination selected and the punch bail at the top of its stroke, there should be a clearance of .003" to .008" between the reset bail and the right edge of the selector finger extensions. To adjust, position the reset bail backstop eccentric with its high part in the down position.

p. RESET BAIL SPRING TENSION (FIGURES 1 and 3)

With the punch bail in its extreme upper position, hold the selector fingers to their left position, hook an 8 oz. scale over the reset bail at the spring and pull in line with the spring. It should require some pull, not more than 1/2 oz., to start the bail moving.

q. MAGNET CORE (FIGURE 11)

*With the armature resting of its own weight against the cores, the operating face of the armature shall touch the outer magnet core (core farthest from the bracket) but there may be an air gap, not greater than .003", between the operating face of the armature and the inner magnet core (core closest to the bracket). To adjust, insert 72635 shims between the magnet cores and the magnet bracket.

r. MAGNET ARMATURE RETAINER (FIGURE 3)

The armature should be free with a minimum amount of play at its bearing. To adjust, position the retainer by means of its mounting screw.

s. MAGNET ARMATURE SPRING TENSION (FIGURE 3)

Remove the magnet assembly and hold it in a position so that the springs are in a horizontal plane. With the armature held operated hook an 8 oz. scale in a spring eye. It should require 3-1/2 to 4-1/2 ozs. to stretch the spring to position length.

REPLACE THE MAGNET ASSEMBLY

t. MAGNET BRACKET (FIGURE 10)

The magnet bracket should be positioned to meet the following requirements:

(1) The selector fingers should be centrally located on their respective armatures.

*(2) With the punch bail in its extreme lower position, there should be .005" to .015" (.010" to .025" for 100 WPM or more) clearance between the end of each armature and its respective selector finger.

NOTE: With BLANK selected and the punch bail in the extreme upper position, there should be at least .005" clearance between the closest selector finger and its punch.

To adjust, position the magnet bracket by means of its two mounting screws.

u. MAGNET ASSEMBLY (FIGURE 11)

With the punch bail in its extreme upper position, hold the magnet armatures operated; there should be some clearance, not more than .010", between an armature and the high part of its respective selector finger. To adjust, position the individual magnet assembly on the magnet bracket by means of its two mounting screws.

v. TAPE GUIDE SPRING (FIGURE 3)

The tape guide spring should be positioned so that the edge of the spring is parallel to the upper edge of the punch unit casting. The curved pressure tip should engage the tape at a point opposite the cutout in the tape guide and should press the tape firmly against the rear side of the guide channel in the punch block without buckling the tape. Adjust the position of the spring by means of its mounting screw; bend the spring to provide the required spring pressure.

w. FEED ROLL DETENT - FINAL (FIGURE 1)

Refine the adjustment of the feed roll detent eccentric so that the perforations in the tape meet the standard spacing of ten holes to the inch. This may be checked by perforating a length of tape consisting of a series of LETTERS combinations and checking it against the 95960 tape gauge.

NOTE: For two or more tapes, check the top and bottom tapes. Both should fall within the gauge limits.

x. FEED PAWL ECCENTRIC - FINAL (FIGURE 1)

With the punch bail in its extreme lower position and the star wheel in its detented position, the feed roll should not move when the detent lever is lifted away from the star wheel. To adjust, loosen the feed pawl eccentric bushing mounting screw and position the bushing to its stationary position. Tighten the bushing mounting screw.

NOTE: The following adjustment applies to four-tape perforation only.

y. FEED PAWL GUIDE (FIGURE 1)

Turn the motor by hand until the feed pawl tooth is opposite the second tooth above the center of the feed roll. There should be some clearance, not more than .005", between the feed pawl and the tooth. To adjust, loosen the feed pawl guide screws and position the feed pawl guide. Tighten the feed pawl guide screws.

8. LUBRICATION

a. GENERAL

(1) Unless otherwise specified, one or two drops of oil at each of the places indicated will be sufficient. Use oil for lubrication at all of the places listed in the following, except where the use of grease is specified. Avoid excessive lubrication. Do not allow lubricant to get on magnet pole faces, armature or contacts.

(2) Oil both loops of all helical springs.

(3) Lubrication is recommended every 1000 hours of operation.

b. LOCATION

(1) SELECTOR MECHANISM

(a) Selector magnets - armature bearings, very sparingly.

(b) Selector fingers

1. Selector fingers where they pass through front and rear guide combs.

2. Oil juncture of selector fingers and armatures, very sparingly.

3. Edge of reset bail where contact occurs between reset bail and selector fingers.

(2) PERFORATING MECHANISM

(a) Punch bail pivot bearings.

(b) Point of power application.

(c) Punch bail at point of contact with punches.

(d) Feed pawl bearing.

(e) Feed roll bearing - 2 places.

(f) Feed roll detent bearing and roller.

(g) Star wheel - grease.

(h) Reset bail bearings.

(i) Tape tension lever - 2 places.

(j) Code punches.

(k) Code punch retracting bail at bearings and points of contact with punches.

(m) Code punch retaining levers at pivot and point of contact with punches.

- (n) Feed pawl where it engages feed roll - grease.
- (o) Reset bail adjusting screw - grease.
- (p) Upstop screw - grease.
- (q) Reset bail backstop eccentric - grease.

* * *

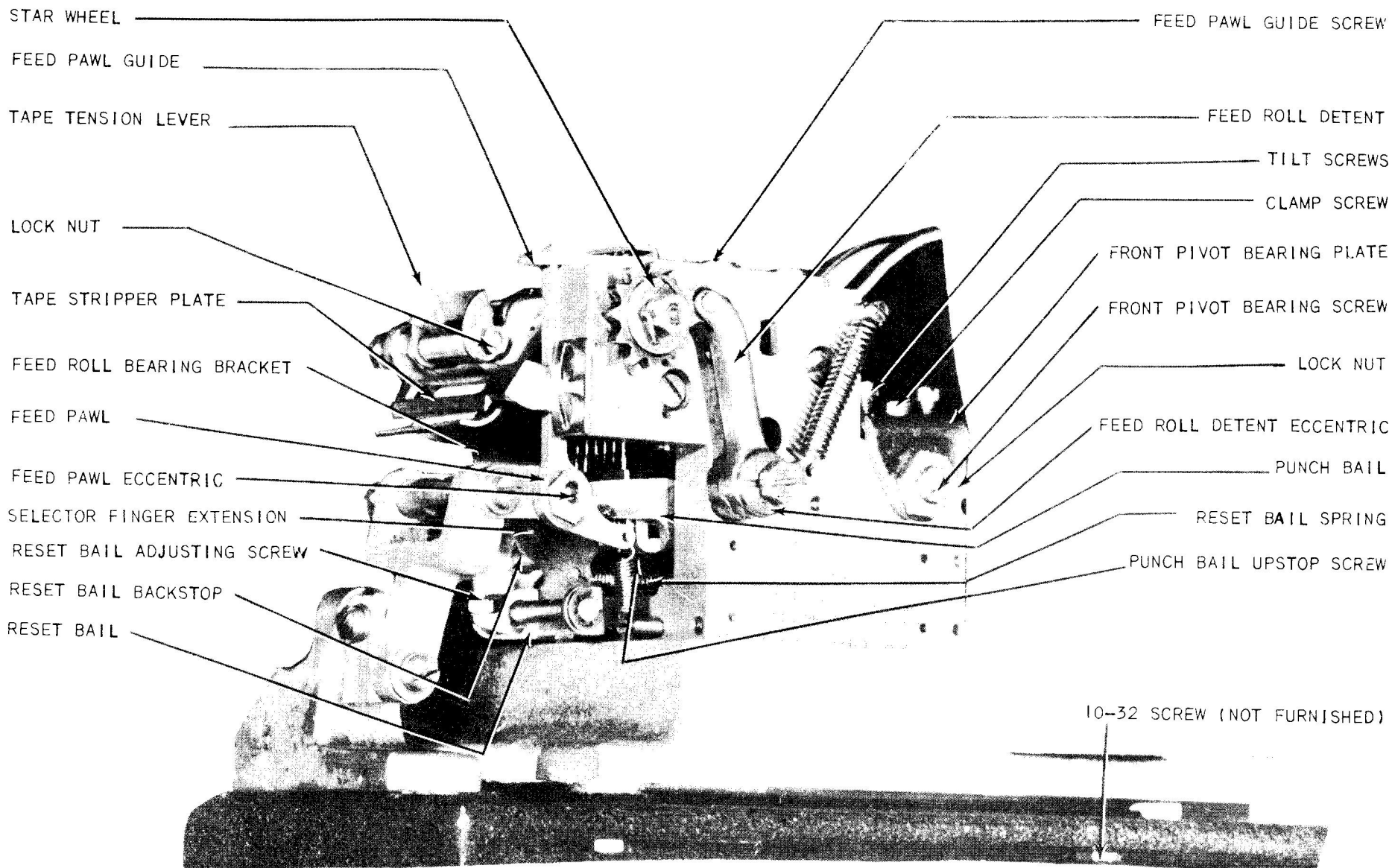


FIGURE 1

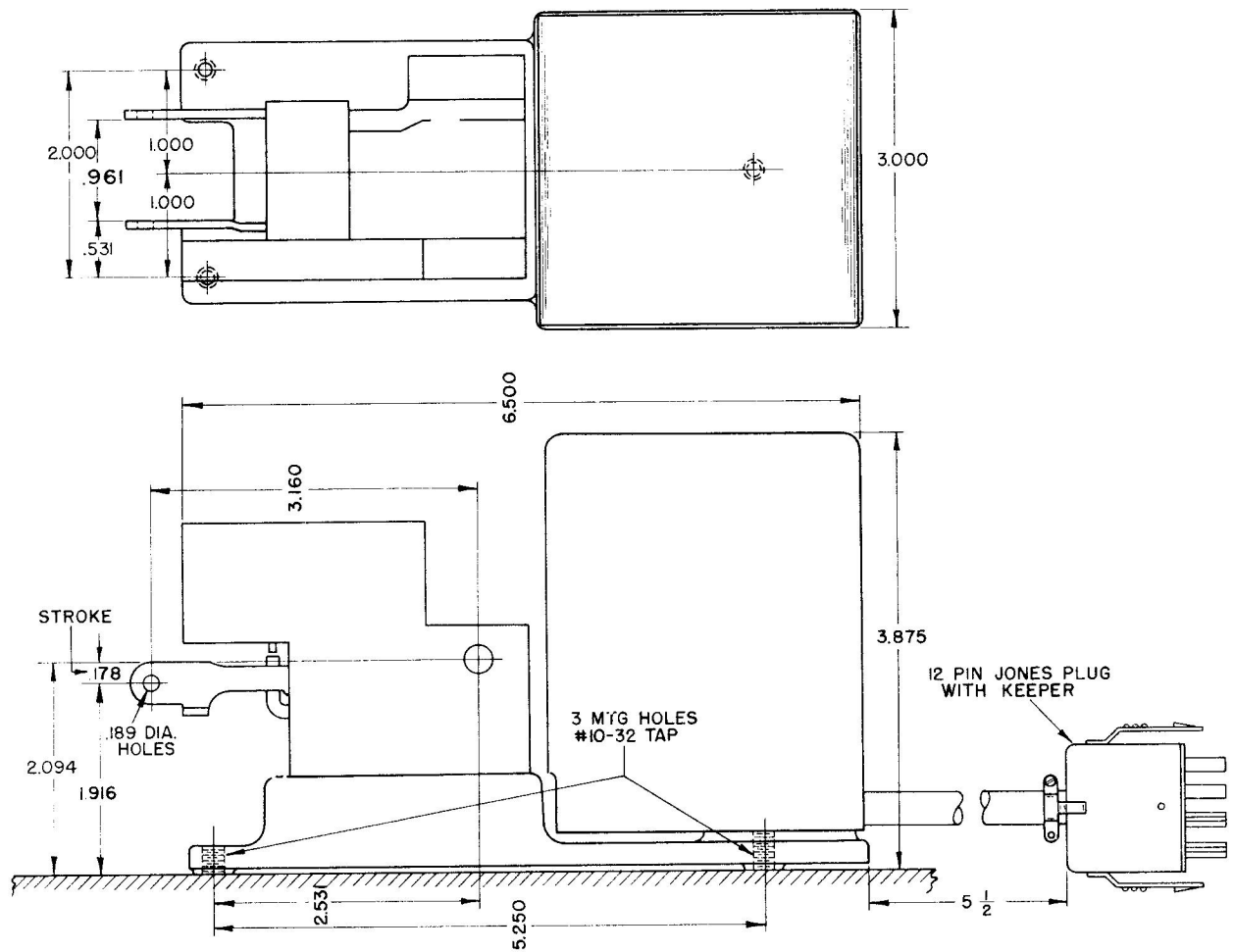


FIGURE 2

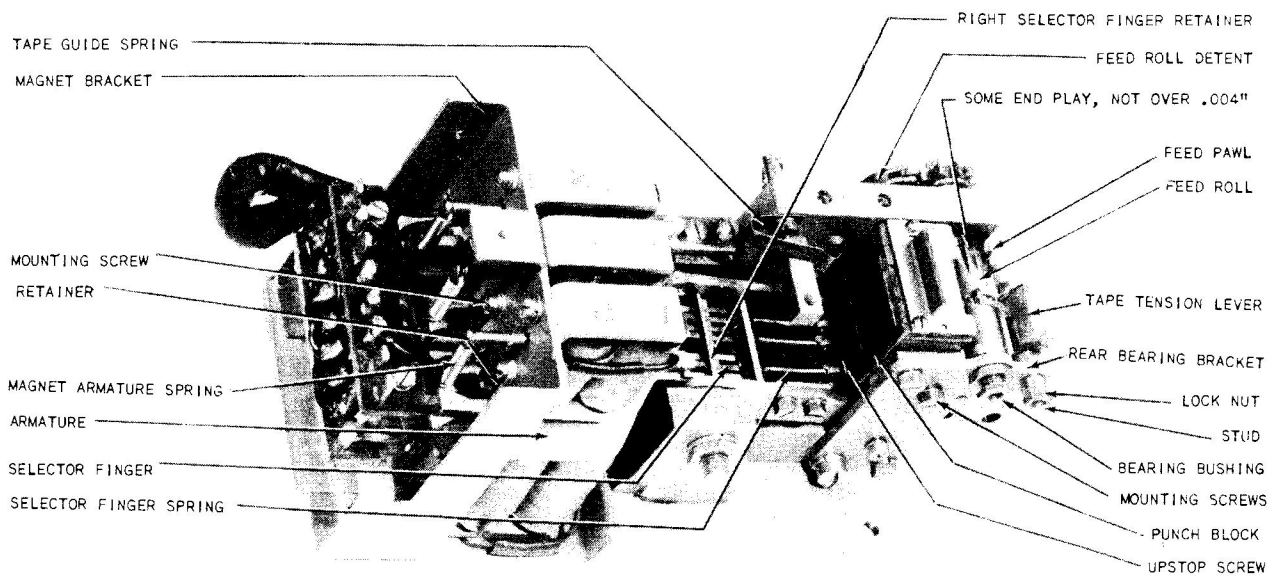


FIGURE 3

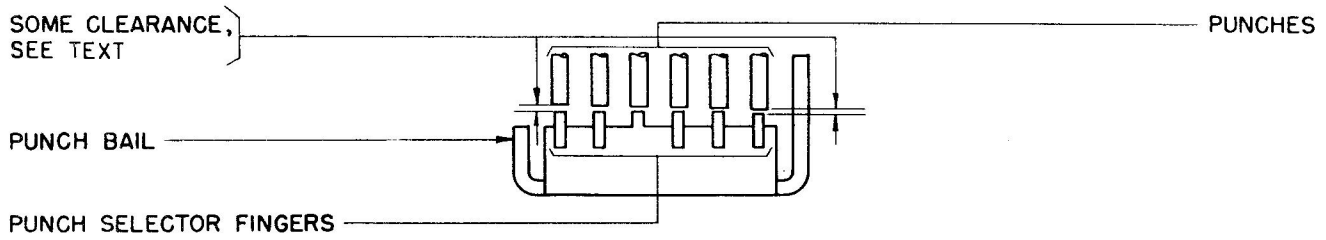


FIGURE 4

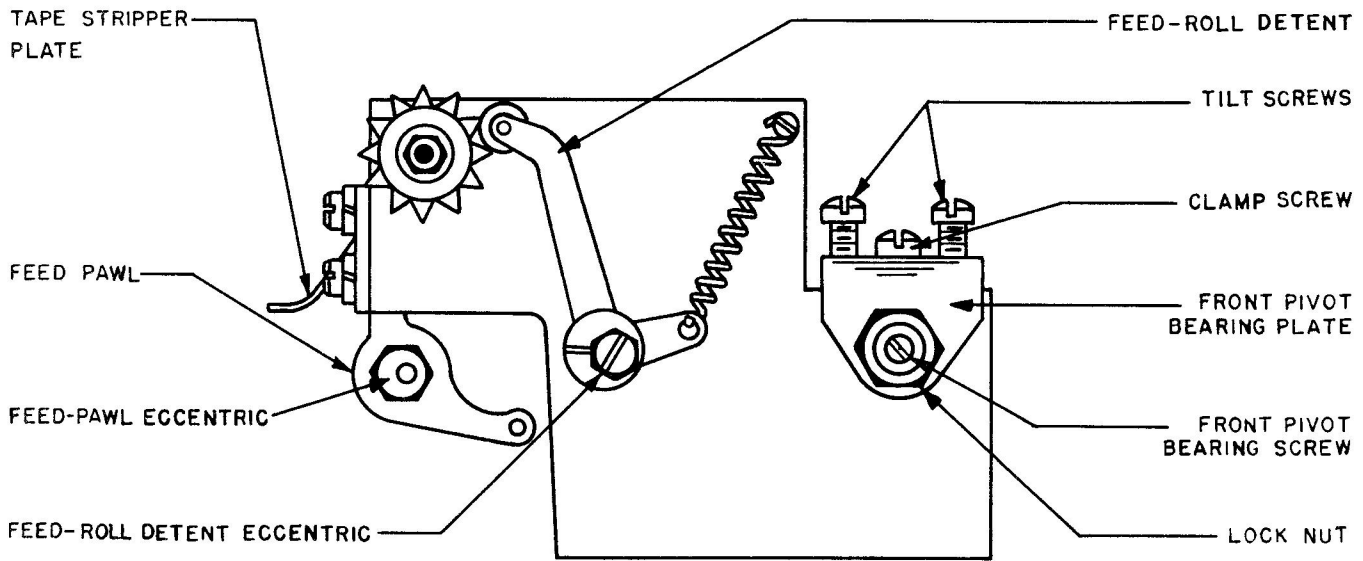


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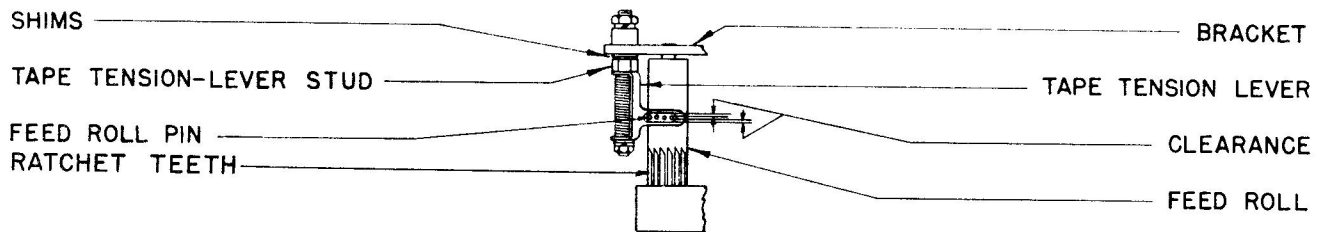


FIGURE 6

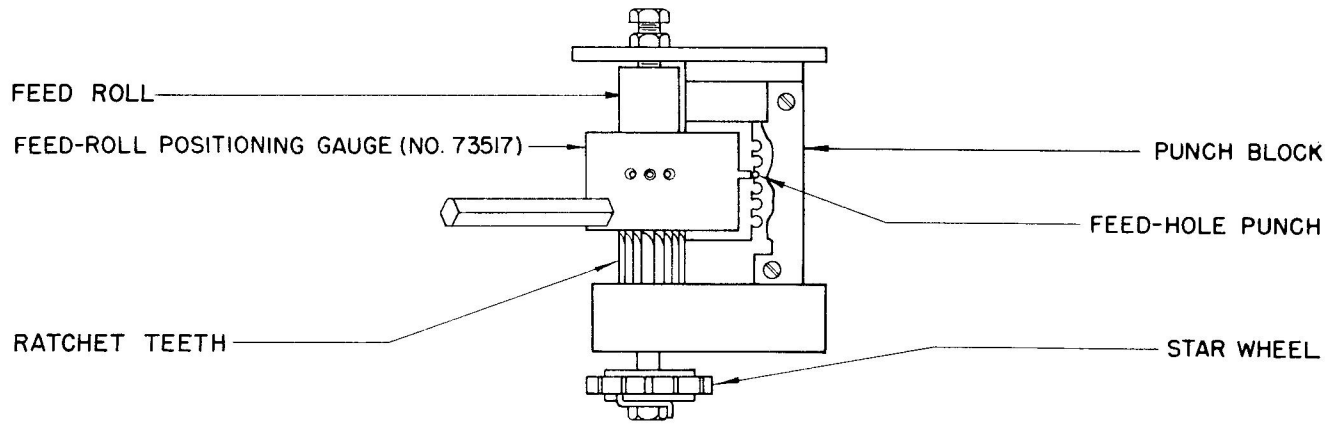


FIGURE 7

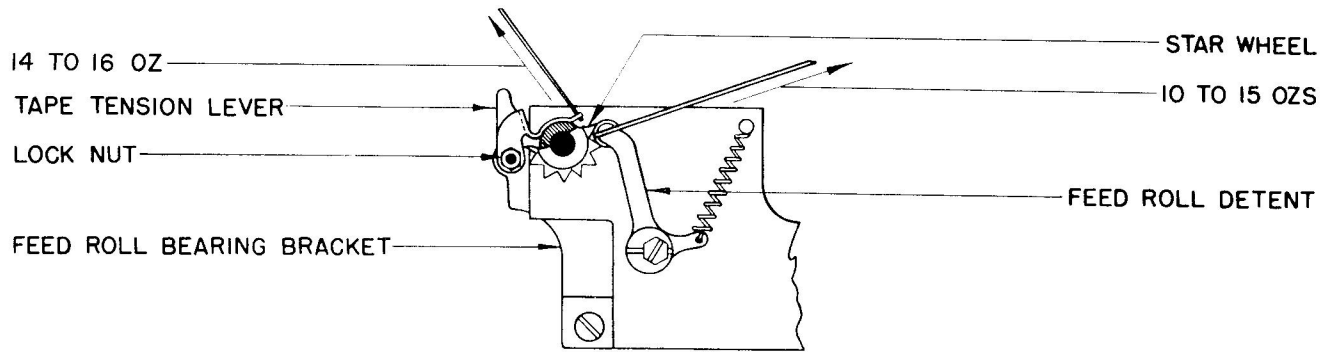


FIGURE 8

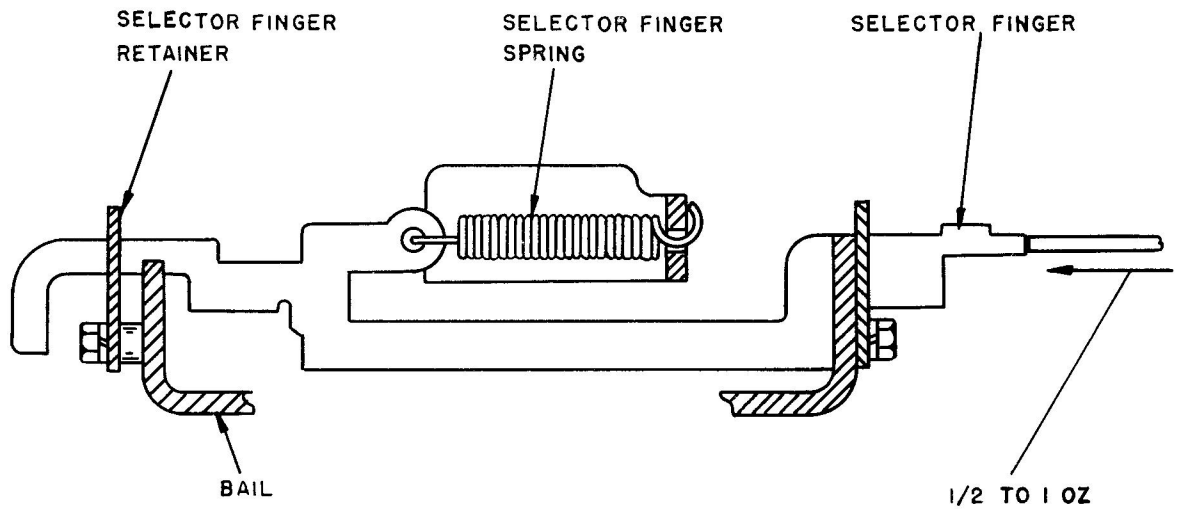


FIGURE 9

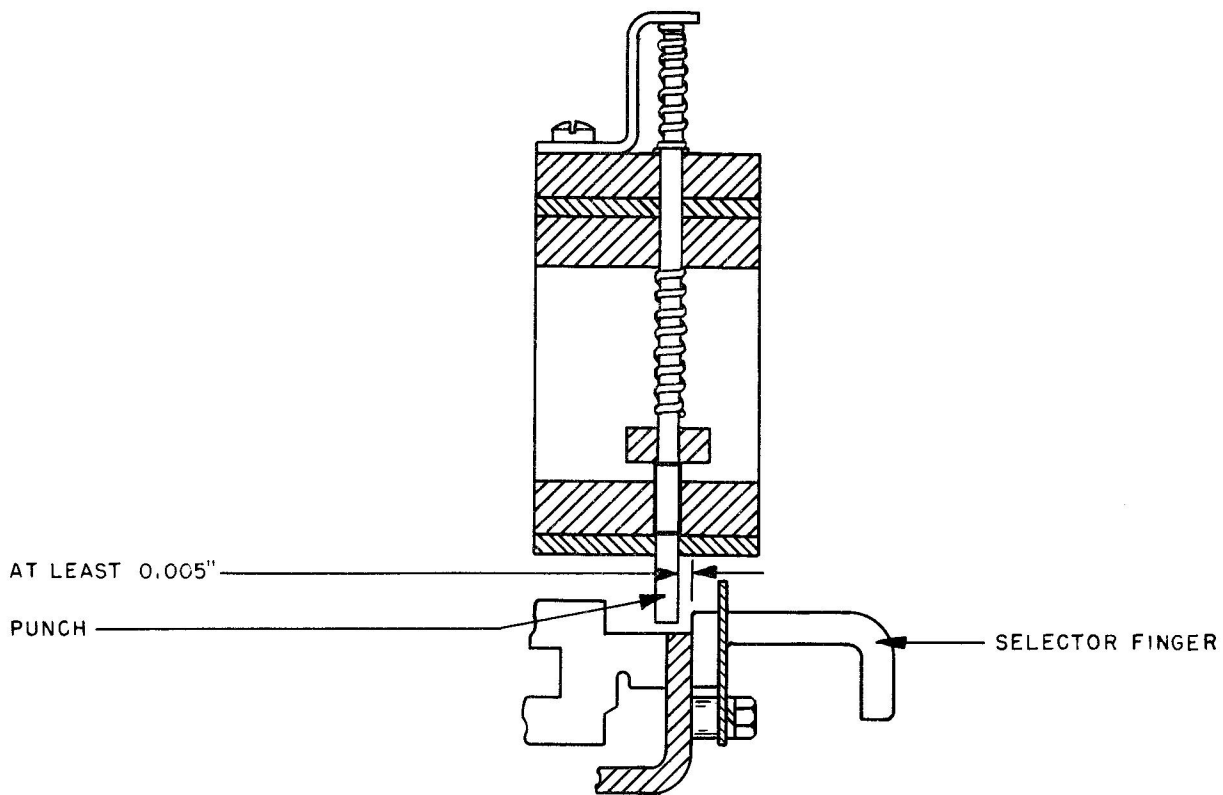
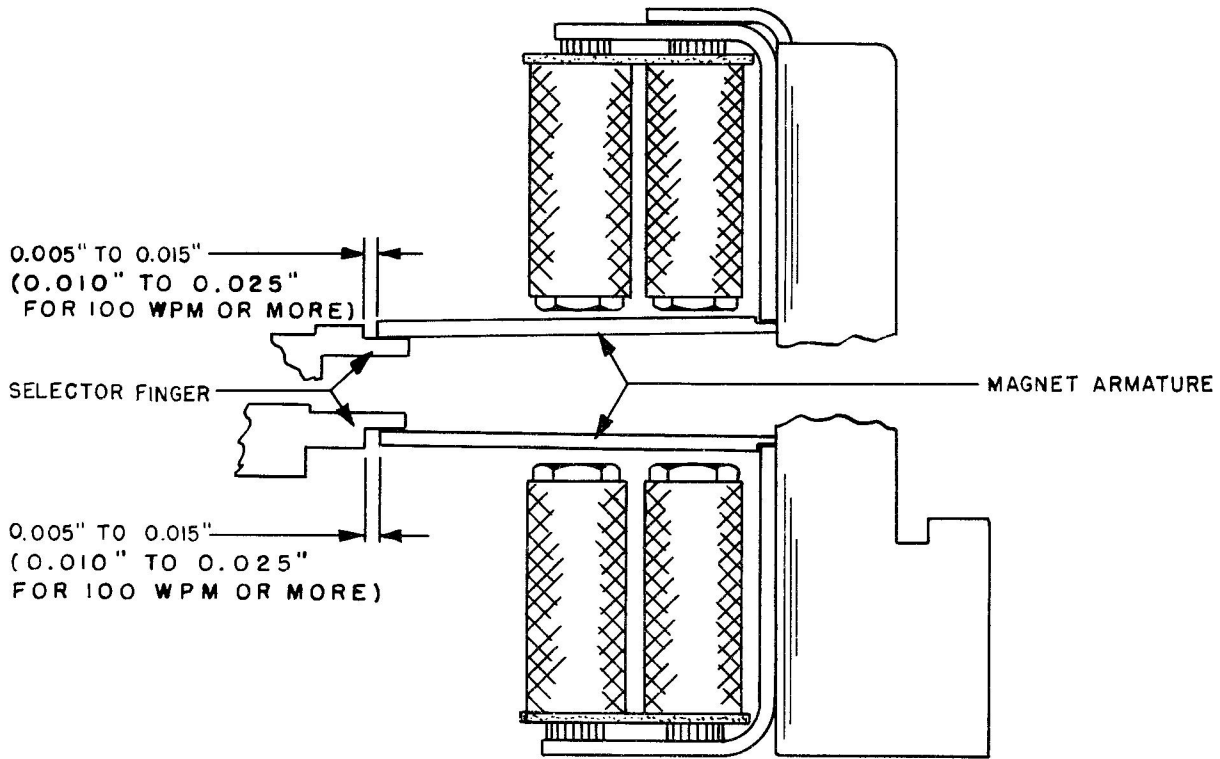


FIGURE 10

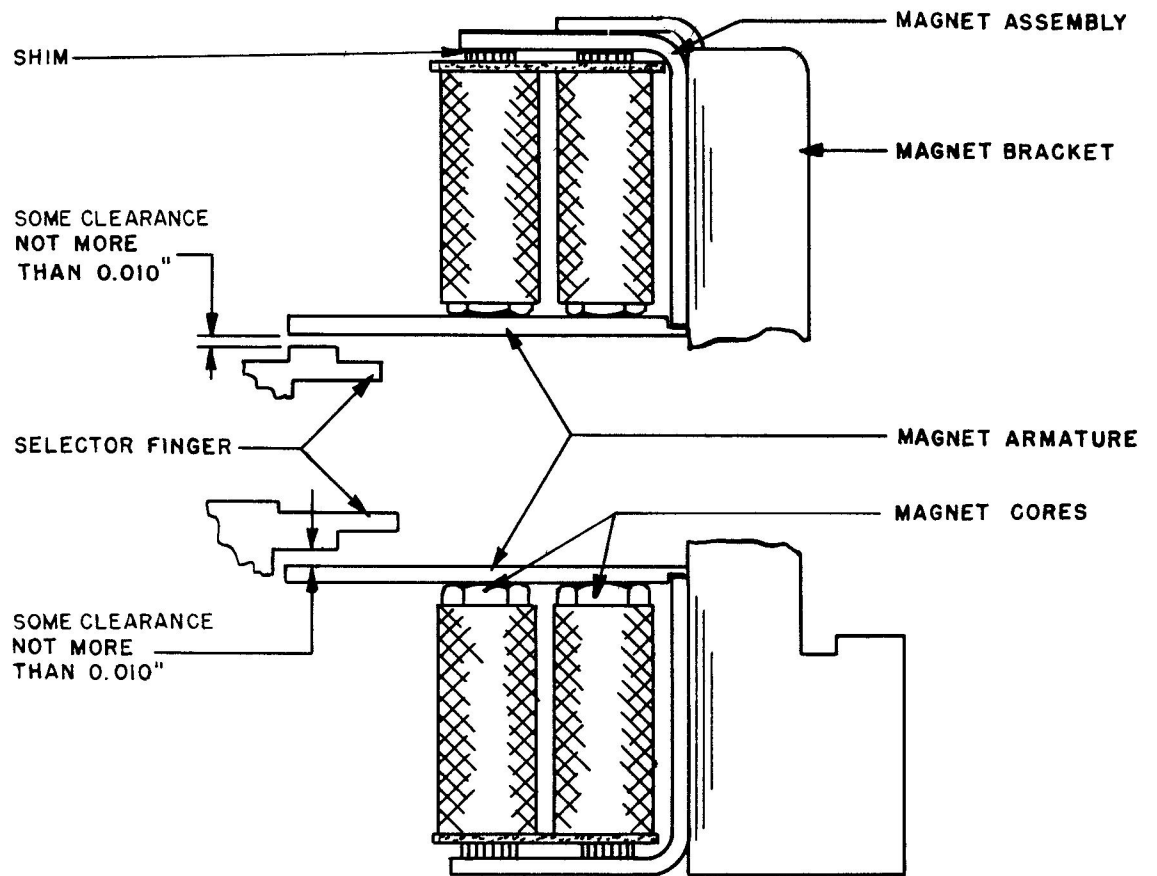
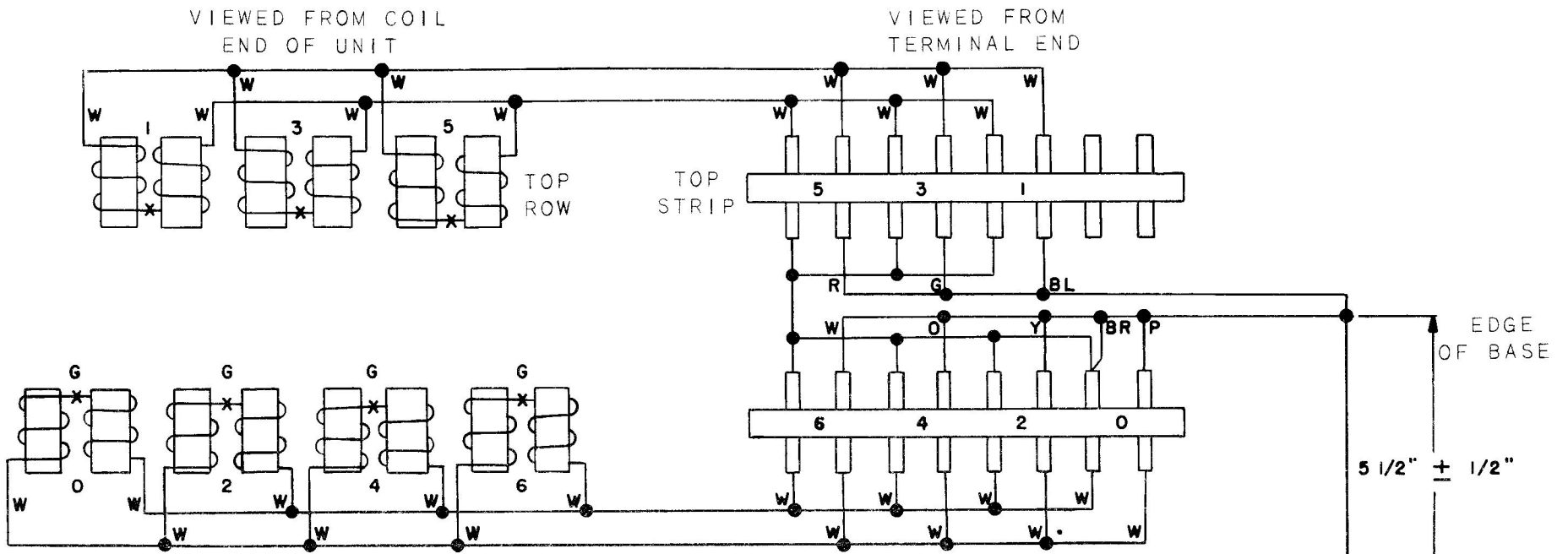


FIGURE 11



NOTES

1. "X" DENOTES SPLICE
2. ON 6 UNIT ARPE OR 5 UNIT SIDE NOTCHING ARPE, THE "6" MAGNET ASSEMBLY IS OMITTED. ON 5 UNIT ARPE, "0" AND "6" MAGNET ASSEMBLIES ARE OMITTED.
3. COLOR CODE

BL - BLUE	W - WHITE
R - RED	P - PURPLE
BR - BROWN	O - ORANGE
G - GREEN	Y - YELLOW
4. MAGNET COIL RESISTANCE 380 OHMS (EACH COIL)

CONNECTOR PLUG AS SHOWN FROM THE SOLDER TERMINAL END

I22144 CABLE ASSEMBLY (WITH CONNECTOR PLUG)

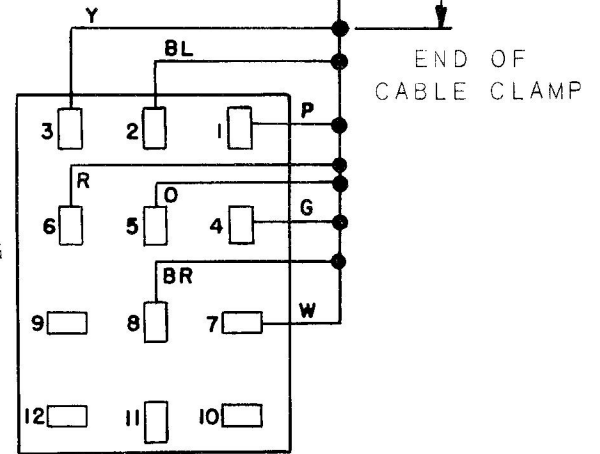


FIGURE 12