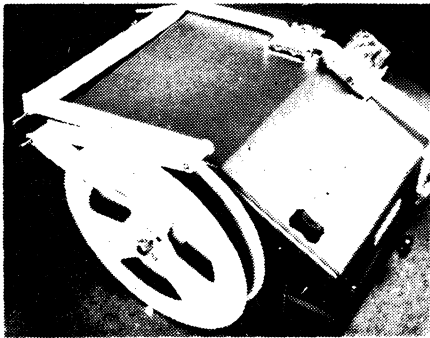
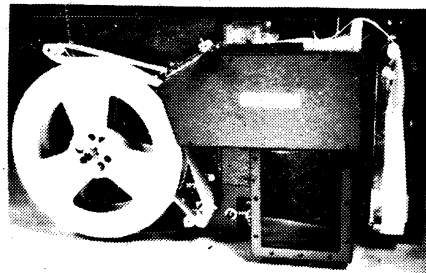


# TECHNICAL REFERENCE MANUAL



# SERIES 500 PUNCH

- BASIC
- DESK TOP
- RACK MOUNTED



OEM PRODUCTS DIVISION

**LITTON ABS**

Automated Business Systems

34 Maple Avenue, Pine Brook, N.J. 07058/(201) 575-8100

# **TECHNICAL REFERENCE MANUAL**

## **SERIES 500 PUNCH**

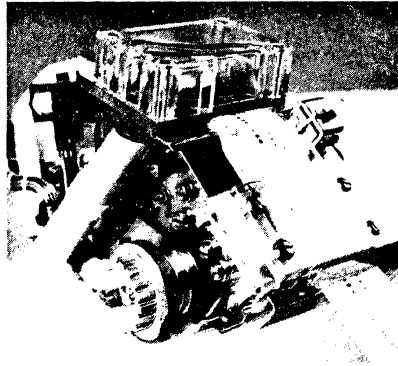
Prepared by: Technical Data Group

May 1970

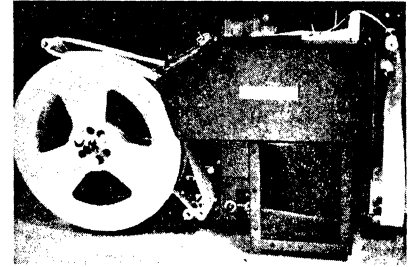
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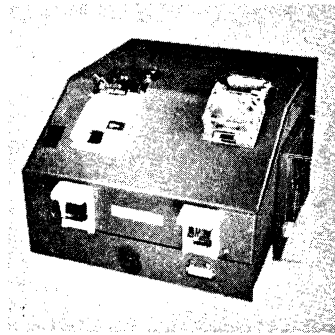
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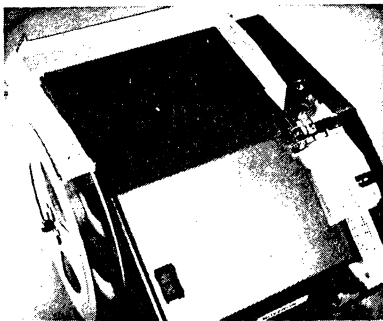
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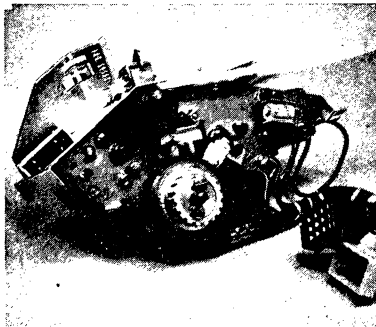
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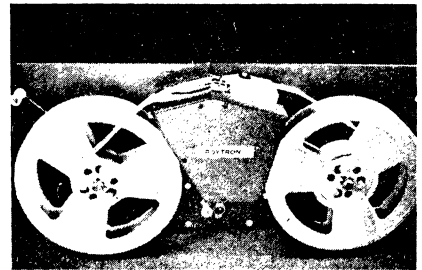
Desk Top Reader/Punch



Desk Top Reader



Basic Reader



Rack Mounted Reader



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\* These drawings are not included in the initial manual release. They will be supplied when available.

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**SECTION 1**

**INTRODUCTION**

# SERIES 500 PUNCH

## SECTION 1

### INTRODUCTION

The Series 500 punch mechanism is an output device of a data processing system which enables the user to rapidly retrieve information from a data processing system or other data source. The punch can be supplied separately without electronics and without cabinets, or mounted in either a desk top cabinet or on a rack. The latter two versions can be supplied with or without electronics. Specific models are tabulated below.

MODEL	DESCRIPTION
500	Basic Punch Mechanism; no electronics
514	Rack Mounted Punch; no electronics
524	Rack Mounted Punch with electronics *
518	Desk Top Punch; no electronics
528	Desk Top Punch with electronics *
582	Desk Top Reader/Punch; no electronics
592	Desk Top Reader/Punch with electronics *

\* May be supplied with discrete or integrated circuits.

Table 1.1 Series 500 Punch Models

The device handles tape only. The mechanism is equipped with an easily adjustable tape guide that provides a right-hand support for tape to prevent tape skewing during in-feed operations.

Tape widths from 11/16 inch to 1 inch can be used, providing 5 through 8 channels of data information. The punch accepts signals by energizing its punch solenoids to drive corresponding punch pins through the tape. Punch solenoids, which are not used if narrow tape is processed, should be electrically deenergized or disabled to prevent spurious operation.

The device handles paper or mylar-type tape. Oiled paper tape is recom-

## SERIES 500 PUNCH

mended because it affords maximum punch life. Dry paper tape or a paper/mylar laminate may be used occasionally (up to 10% of total punch operating time). Metalized-my lar tape is NOT recommended for punch operations.

COMPOSITION	PUNCH USE TIME	WIDTH (IN.)	LENGTH	THICKNESS (IN.)
Oiled Paper	100%	11/16	8 in. dia.	0.008
Dry Paper	10%	7/8	rolls	max.
My lar/Paper *	10%	or 1	max. 1000 ft. lg.	spliced

\* Vacuum deposit or metal foil type should not be used.

Table 1.2 Tape Size, Composition and Use

The basic punch mechanism is described in Sections 2 and 3. The mode of operation is identical when the mechanism is mounted in either the desk top cabinet or the rack, except for interconnections and additional tape handling devices. The punch has all connections to internal punch solenoids, and switches terminate in two connectors: one black and one white. Connector wiring and punch components are shown in Section 7, pages 7-1 through 7-4.

Desk top or rack mounted units provide a direct interconnection between the two connectors on the mechanism and the 34 pin connector at the rear of the cabinet or rack. The user must, therefore, provide the necessary signals directly to the punch mechanism for correct operation of punch solenoids, feed solenoids or pin retract solenoids. Timing pulses from the punch must be accepted from pins of the 34 pin connector for processing by the user's electronics. Maximum operating speeds of 50 characters per second are possible.

The punch input shaft must be driven from a suitable motor with gear belt and correct pulley ratio for optimum operating speed. Desk top or rack mounted units have such drive motors installed on the cabinet or rack. The punch then operates continuously as long as power is turned ON because it does not have a separate ON-OFF switch. Punching of characters depends on data supplied to the punch.

The basic mechanism has switches to sense the presence of tape, however no provisions are made to detect an out-of-tape condition before punching or a tight-tape condition during punching. The latter information is required to prevent tearing of tape or serious distortion of data characters in punched tape. An out-of-tape condition during punching can cause loss of data information without notice or recovery.

To prevent these conditions, the desk top and rack mounted punch each incorporate a tape tension switch which also serves as an out-of-tape indicator. If these switches are properly interconnected, they will stop the punch from punching if tape runs out or if it hangs up at the

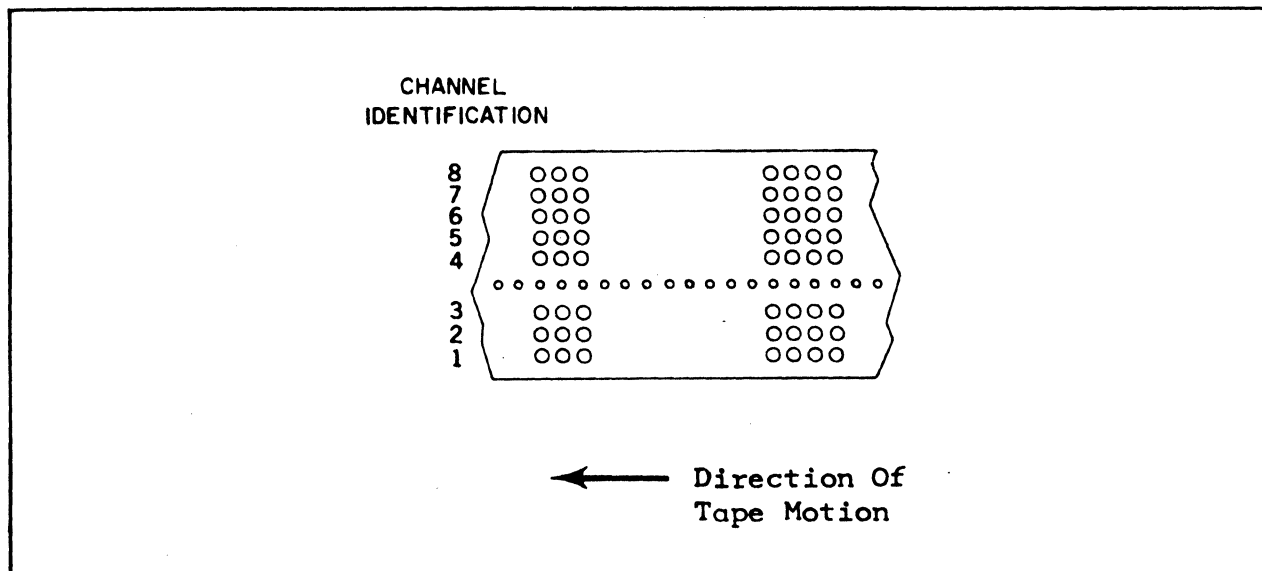
## SERIES 500 PUNCH

input to the punch. The rack mounted punch also has an optional full reel switch that can be tripped to stop punch operation before the take-up reel becomes overloaded and spills tape.

Both the desk top cabinet and the rack have take-up reels with separate drive motors and rewriter stop switches. Tape supply reels are placed into a drawer at the bottom of the desk top cabinet, while the rack mounted punch stores its supply reel in a slide on the right side of the rack. Each take-up reel spools tape up as it emerges from the punch and, to prevent pulling the tape, each rewriter has a movable tension arm that mounts a cam to transfer switch contacts. When the rewriter spools up tape at a faster rate than that at which tape emerges from the punch, the tension arm rises to a vertical position to operate the associated rewriter stop switch. Interconnection between the switch and the rewriter motor deenergizes the latter to stop rewinding until more tape emerges from the mechanism.

Electronics, if they are supplied, can be in the form of discrete components or they can consist of integrated circuits. On the desk top unit, the circuit board is mounted next to the mechanism near the center of the cabinet; on the rack mounted unit, the board is mounted to the right side behind the rack panel. Interconnections with each panel are made by means of a 44-pin connector that carries supply voltages to the board and control signals between the board and the mechanism. The circuit board connector makes contact with tabs on the board, and its harness carries interconnecting wires between the 34-pin connector at the rear of the cabinet or rack and the two 12-pin connectors with which the basic mechanism interfaces. Circuits are shown in the applicable schematics in Section 7.

Data channels and tape motion are illustrated below:



**SECTION 2**

**BASIC PUNCH DESCRIPTION**

## SERIES 500 PUNCH

### SECTION 2

## BASIC PUNCH DESCRIPTION

### 2.1 MODEL 500 PUNCH

The punch responds to signals generated by the processor to encode information on tape by perforating it. Any one of eight-code channel punches can be raised by energizing its associated amplifier and punch solenoid, and any acceptable combination of punches can be activated. The correct number of punches for either ODD or EVEN parity indication must be activated if the punch is equipped with an optional parity sensor.

If the optional parity block is installed, it is located above punch driver arms. The parity block detects the number of punches raised when a character code is punched. It transmits a signal to an associated circuit which can stop punch operation by pulling the device BUSY if a parity error has been detected.

The punch processes tape only in the forward direction. Tape is installed by opening the cover, positioning the tape over the tape guide and sprocket and through the slot in the tape tear plate and closing the cover. If the optional positioning knob is installed, tape is inserted onto the sprocket and the knob turned until tape emerges from the cover and tape tear plate.

An adjustable guide at the front end of the punch can be set to correspond to the width of the tape being processed. If tape narrower than one inch is to be used, the guide, see Figures 2.1 and 3.7, must be pre-set to maintain contact with the right-hand edge of the tape to be inserted.

The punch normally operates at a maximum speed of 50 characters per second. The actual speed of data encoding, however, depends upon the speed with which the central processor sends information to the punch.

The punch does not have an ON-OFF switch; therefore, it becomes operational when motor and operating voltages are applied.

### 2.2 SPECIAL FEATURES

#### 2.2.1 CHAD DIVERTER AND TUBE

The chad diverter is a rectangular, hollow, transparent Lucite mold which covers punch holes above the upper die plate. Chad, which is ejected by the punch pins as they rise, collects in the diverter which directs



## SERIES 500 PUNCH

it toward the large hole in the upper die plate. Chad is expelled through the chad tube, shown in Figure 2.1.

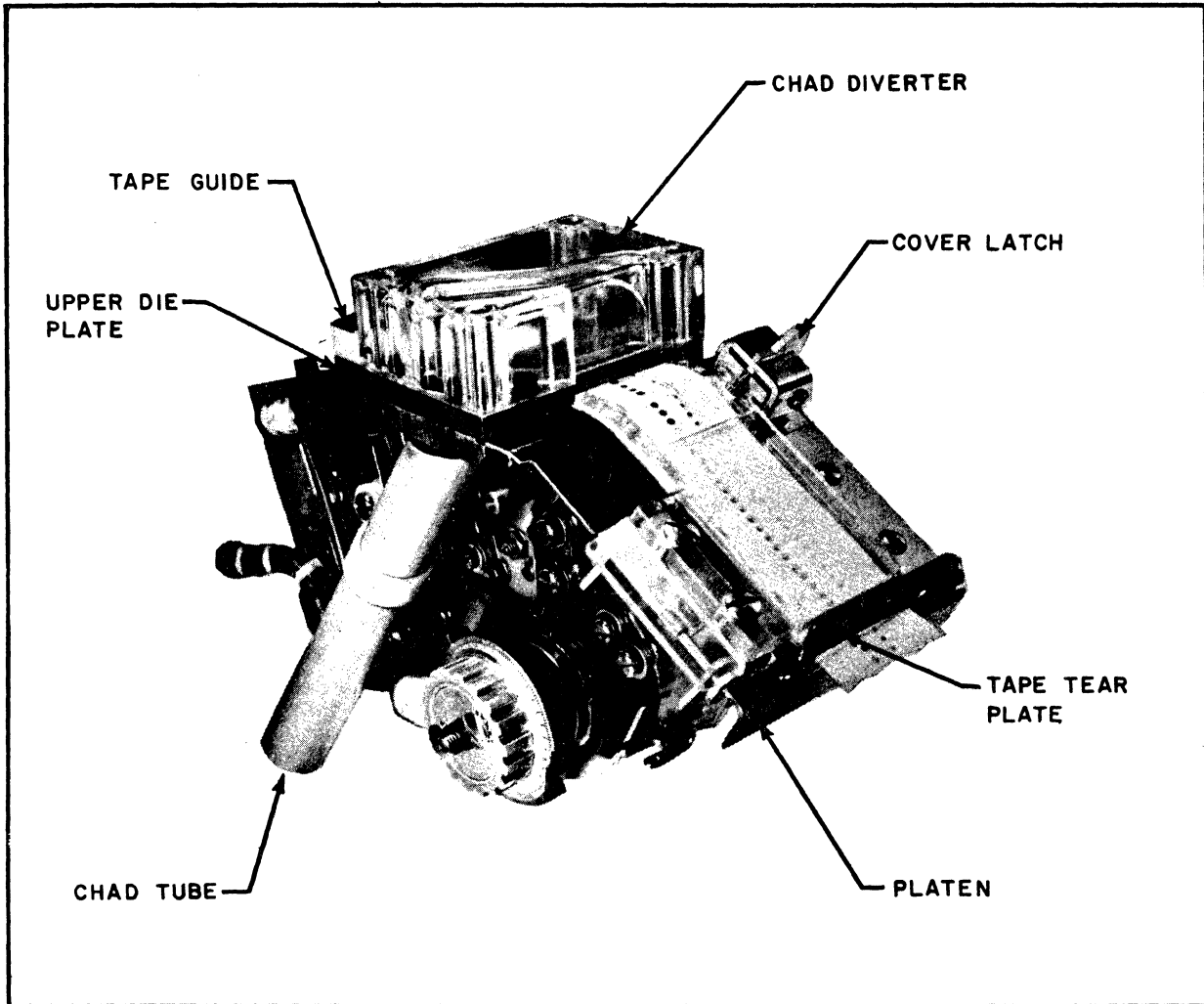


Figure 2.1 Basic Punch

### 2.2.2 TRANSPARENT COVER

The cover keeps tape in contact with the sprocket and the platen surface. Its transparency allows the operator to observe tape after it comes to rest and, if necessary, to read data codes without having to remove tape from the punch.

The cover is held down with a latch, shown in Figure 2.1, that locks it in place. The latch is released by manually moving the latch release sideways and away from the cover.

## SERIES 500 PUNCH

### 2.2.3 TAPE TEAR PLATE

The plate is mounted on the platen below the cover in such a way that its toothed, or serrated, section adjoins the edge of the cover. The serrations provide the cutting surface necessary to tear tape cleanly along a line running perpendicularly to that of normal tape motion. The plate also guides the left-hand edge of tape. Tape moves below the tape plate and, in order to tear off a section, the operator must pull the tape up and against the tear plate.

### 2.2.4 POSITIONING KNOB

The optional positioning knob (if included) may be used by the operator to position tape during tape insertion. It can be turned forward or backward.

### 2.2.5 ADJUSTABLE TAPE GUIDE

The guide is mounted to the upper die plate. It consists of a metal plate that guides the right-hand edge of the tape. The operator positions the guide to correspond to the width of tape being processed, then locks the guide in place with the screw. The guide is located at the front of the punch and is used only to correctly guide tape into the punch.

### 2.2.6 OUT-OF-TAPE SWITCH

Contacts of the optional out-of-tape switch (if included) close when tape is between the end of the actuating lever and hold-down plate (installed only when switch is installed). They open when tape is not between the lever and plate, halting punch operation.

## 2.3 PARITY ERROR DETECTION

The punch may be equipped with an optional parity sensing device which switches circuit connections depending on punch movement. Whenever a punch rises, switches within the parity sensing block open or close to provide signals for the parity error detector.

The parity sensing block is an integral part of the punch mechanism; its connections are made through the standard wire harness. The parity error detector is an associated circuit that senses the polarity of the signal emerging from the parity sensing block and that, thereby, causes its output signal to assume one of two logic states.

**SECTION 3**

**BASIC PUNCH MECHANISM**

## NOTE

The following terms are specifically identified to prevent misunderstanding of punch operation or description.

- Front : The end at which tape is inserted for normal punching.
- Rear : The end from which tape emerges after punching.
- Right Side : To the right of an observer looking at the punch from the front end.
- Left Side : To the left of an observer looking at the punch from the front end.

Components which produce forward movement of tape through the punch are mounted to or near the right-hand side plate.

## SERIES 500 PUNCH

### SECTION 3

## BASIC PUNCH MECHANISM

Punch operation and mechanical details are described in the order in which adjustments should be made if such adjustments become necessary because of punch disassembly for repair or parts replacement. This sequence may, in some instances, vary from the sequence recommended by the punch manufacturer.

1.	Input Shaft Torque Measurement	para. 3.1
2.	Timing	para. 3.2
3.	Punch Position at Rest	para. 3.4.1
4.	Pawl Limit	para. 3.4.2
5.	Punch Drive	para. 3.4.3
6.	Punch Stripper Rod	para. 3.4.4
7.	Punch Solenoid Gap Setting	para. 3.4.6
8.	Index Solenoid Armature/Interposer	para. 3.5.1
9.	Sprocket	para. 3.5.2
10.	Cover	para. 3.7.1
11.	Timing Pulse Generator - Gap & Alignment	para. 3.8.1
12.	Parity Pulse Generator	para. 3.9
13.	Tape Tear Plate	para. 3.7
14.	Parity Switch Block	para. 3.10

Table 3.1 Recommended Sequence of Punch Adjustments

#### 3.1 INPUT SHAFT TORQUE MEASUREMENT

Torque required to turn the input shaft must be measured before the punch is operated or before adjustments are made because excessive friction within the mechanism can affect such adjustments and cause them to be faulty. A high torque reading may be caused by binding of the input shaft and any of its components. Torque should also be measured after making adjustments to verify that they were made correctly. The maximum starting torque should not exceed 4 inch-ounces.

#### 3.2 TIMING

The timing disc has a scale which is graduated in degrees, where one mark represents two degrees of shaft displacement. As shown in the timing

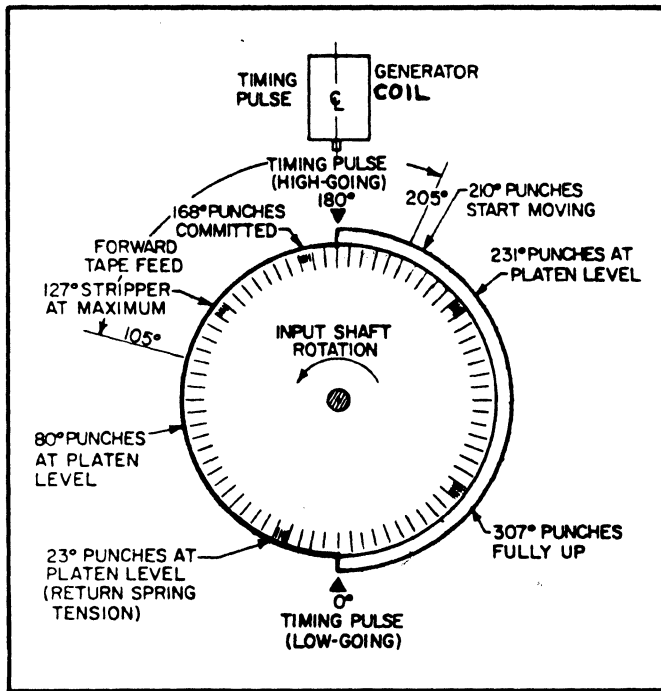
## SERIES 500 PUNCH

chart of Figure 3.1 and timing diagram of Figure 3.2, a punch should reach and be level with the upper surface of the lower die plate at 231 degrees upstroke and 23 degrees downstroke. Punch travel from this point, which is the same as that of the top surface of the platen, into the upper die plate and back should encompass 152 degrees of input shaft rotation. Therefore, after 76 degrees, a punch should be at its maximum height, and the timing dial should indicate 307 degrees. The following equation shows a correct timing disc setting:

$$\frac{(360 - 231) + 23}{2} + 231 = 307 \pm 6 \text{ degrees}$$

All dial indications are referenced to the center pole piece of the pulse generator coil.

A quick check of the timing disc setting can be made as follows:



**Figure 3.1 Timing Chart, Punch**

1. Manually latch one of the punches. Turn the input shaft counter clockwise until the rising punch pin emerges from the lower die plate. The timing dial should read approximately 231 degrees at that point.
2. Continue to turn the input shaft counter clockwise. The timing dial should be at approximately 23 degrees when the punch pin returns to the surface of the die plate.
3. The following two examples illustrate the method to determine the existing angular position of the timing disc if it is assumed that the disc has been mounted incorrectly onto the input shaft.

Example 1      First reading:      210 degrees;  
                          Second reading:      2 degrees.

$$\frac{(360 - 210) + 2}{2} + 210 = 286 \text{ degrees}$$

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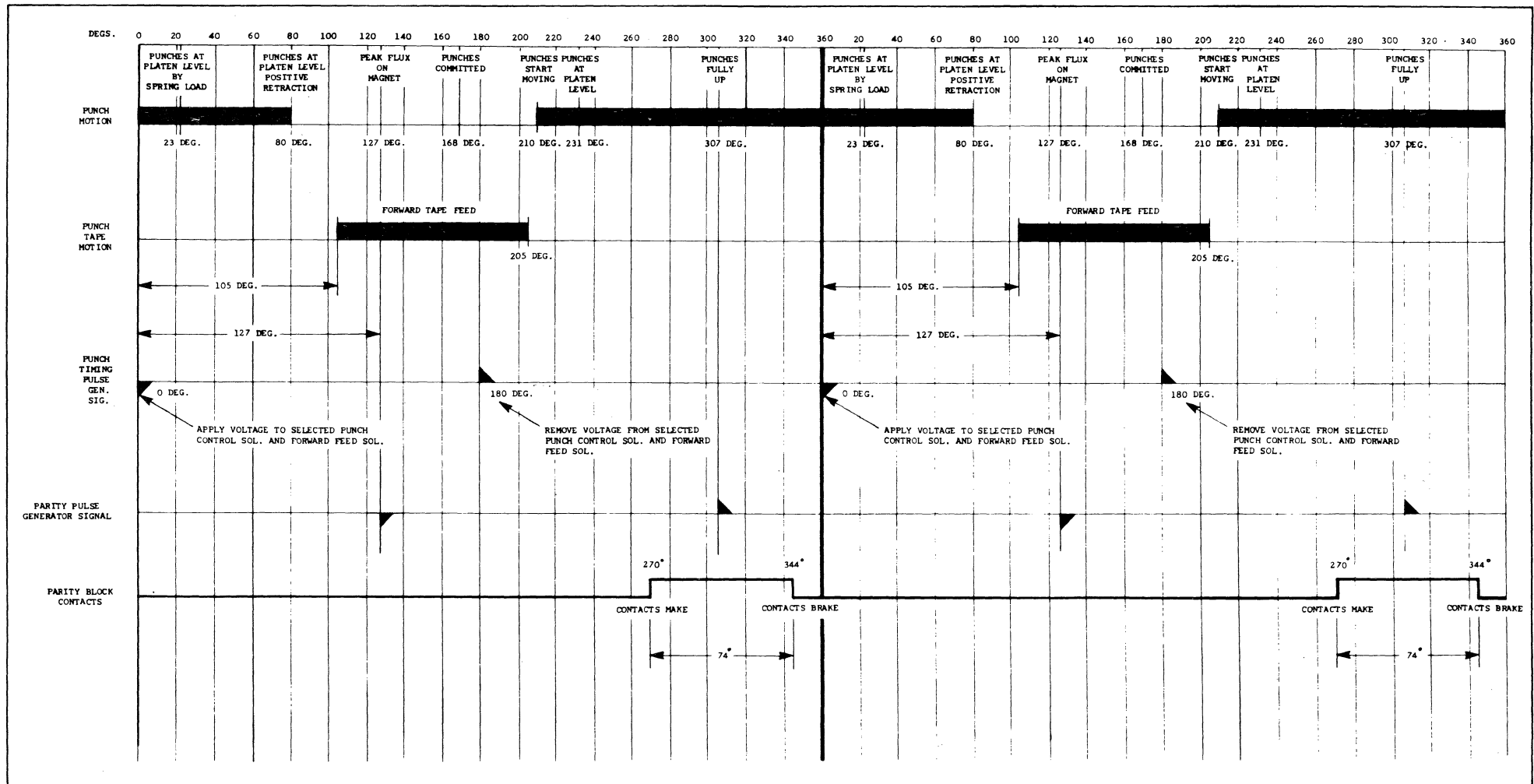


Figure 3.2 Mechanical Timing Diagram, Punch

## SERIES 500 PUNCH

286 degrees therefore is the position at which punches are fully up.

Example 2      First reading:      200 degrees;  
                  Second reading:    352 degrees.

$$\frac{352 - 200}{2} + 200 = 276 \text{ degrees}$$

276 degrees is then the present angular position at which the punches are fully up.

4. Use the result of example 2 to set the dial so that position 276 degrees lines up with the center of the coil pole piece. Hold the shaft firmly in place and loosen the nut at the timing disc side, see Figure 3.3, and the timing disc setscrew. This setscrew is located in the hub of the disc.

CAUTION:      The inner race of the ball bearing must be clamped to the input shaft before either timing disc or counterweight setscrews are tightened. If any adjustment is made, the nut at the end of the shaft is loosened. Then the setscrew is loosened. On reassembly, FIRST tighten the nut, then tighten the setscrew.

5. Keep the input shaft firmly fixed and turn the timing disc so that position 307 degrees faces the coil pole piece. First tighten the nut to clamp the inner race of the ball bearing to the input shaft; then tighten the setscrew in the timing disc hub.
6. Repeat step 1 through 3. Points of actual measurement should coincide with those in Figures 3.1 and 3.2 if the adjustment was made correctly.

### 3.2.1 COUNTERWEIGHT

The counterweight and timing disc are identical both in shape and material composition. The counterweight and associated pulse generating coil solenoid produce a parity pulse at 307 degrees of input shaft rotation. Therefore, alignment of the counterweight relative to the input shaft is extremely important.

The weight and timing disc are factory-adjusted; therefore, they should not require any attention unless the input shaft assembly has been taken apart, disc or counterweight has been moved inadvertently, or punch timing has been adjusted.

1. If the position of the timing disc is changed, that of the counterweight must be changed also. The stepped sections of disc and counterweight should be in close alignment. Place a straight-edge across the punch side frames to align the stepped sections. Keep the straight-edge at right angles to the punch side frames.



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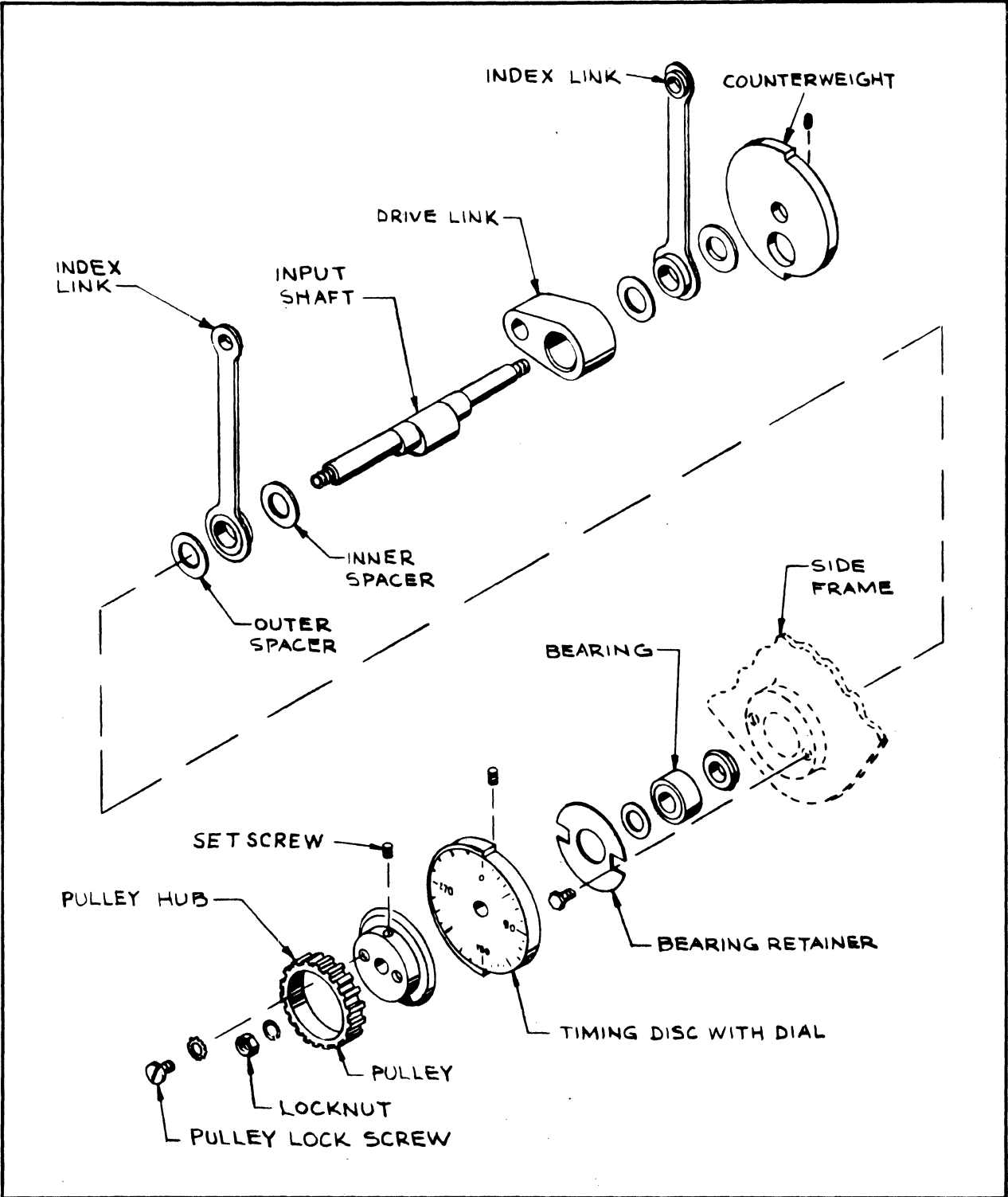


Figure 3.3 Input Shaft and Components

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CAUTION: During any adjustment, observe that FIRST the nut at the end of the input shaft must be tightened to lock the inner race of the ball bearing BEFORE the setscrew in the counterweight is tightened.

### 3.3 PUNCH PIN MOTION

The input shaft rotates continuously while the punch is in operation. The shaft and pulley which is attached to one end of the shaft is driven with a gear belt from a separately-mounted motor. The shaft is eccentric, therefore imparting a reciprocating motion to the drive link and the index link assemblies shown in Figure 3.3. These items continue to move back and forth, raising and lowering the feed mechanism, Figure 3.10, and causing the pawl yoke, Figure 3.6, to swing back and forth about its eccentric shaft.

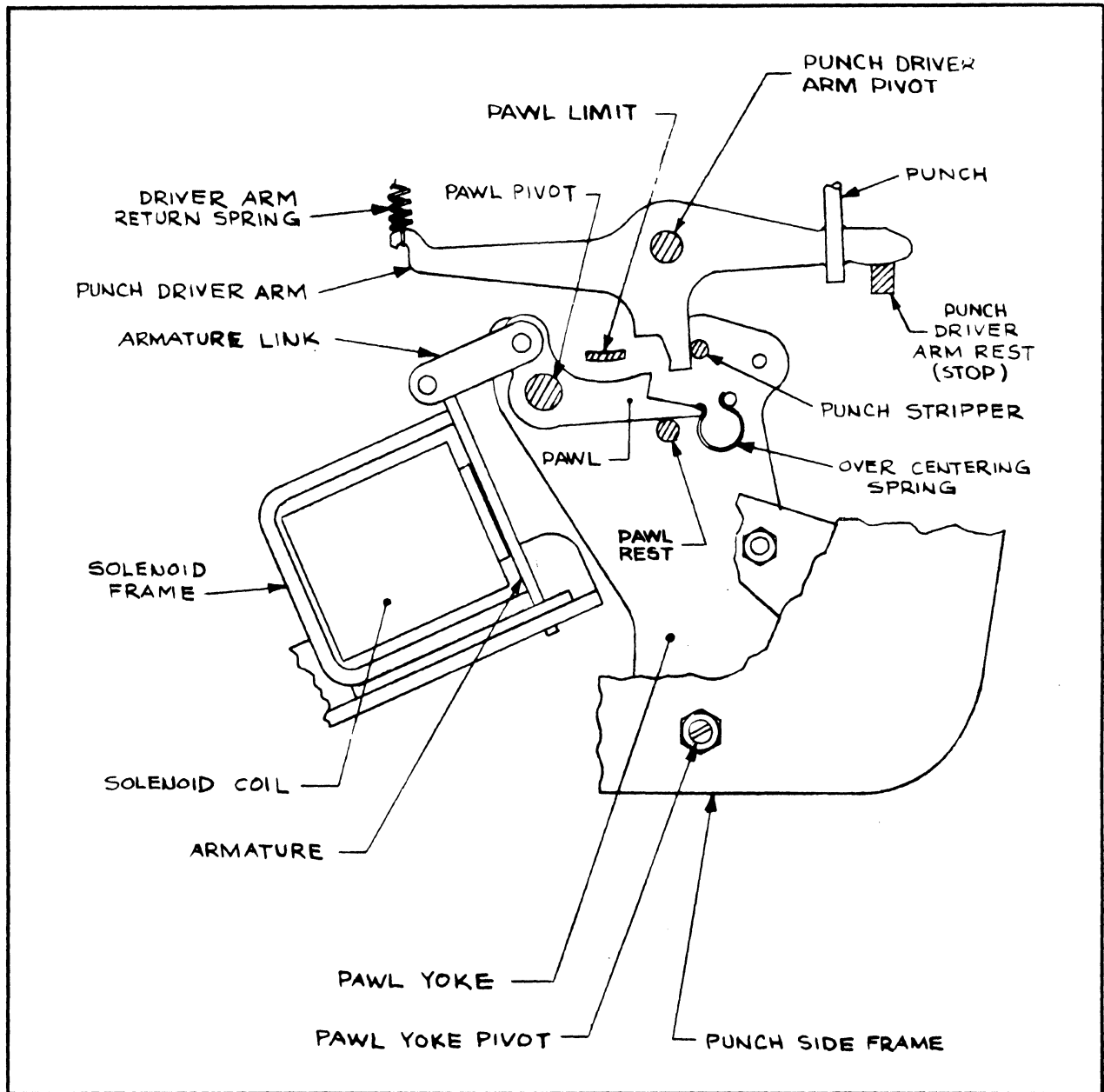
The movement is repeated during each revolution of the drive shaft without causing the punches to rise and perforate the tape unless punch solenoids have been energized. Current flow through these solenoids sets up magnetic fields to attract the armatures, thereby causing punch pins to rise.

Each punch solenoid armature is connected through the armature link with the corresponding punch pawl as shown in Figure 3.4. Pawls swivel about the common pawl pivot, which is fastened to the upper ends of the pawl yoke side plates. The pawl yoke has a reciprocating motion by being driven through the drive link from the eccentric input shaft. Therefore, the yoke moves back and forth, once toward the solenoids and then away from them for each complete cycle of input shaft rotation.

When a punch solenoid is energized at zero degrees of input shaft rotation, the yoke still moves toward the solenoids and the energized solenoid attracts and holds its armature. As the yoke then reverses its motion, the armature link pulls the top portion of the pawl toward the solenoid and causes the pawl to swing upward. This swiveling of the pawl raises its stepped end to where the end can engage the lower portion of the punch driver arm. During this upward movement of the pawl, the overcentering spring reverses the direction of applied force as soon as the pawl is past the center of its travel. This commits the associated punch at 168 degrees of shaft rotation.

The yoke continues to move away from the solenoids. At 180 degrees, the solenoid is deenergized since punch driver arm and pawl are firmly locked. Further yoke motion away from the solenoids can thus pull the armature

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**Figure 3.4 Punch Mechanism Schematic**

away from the solenoid core. At the same time, the stepped end of the pawl pushes the punch driver arm toward the rear of the punch (in a direction away from the solenoids). Punch driver arms are mounted so that they can swivel about the driver arm pivot, and the motion imparted by the pawl raises the end of the arm to which a punch is attached. The punch consequently is driven through the tape.

When the yoke is farthest away from the solenoids, the two pawl yoke return springs, shown in Figure 3.5, pull the yoke fully to the end of the stroke. The springs reduce chatter of the yoke at high-speed operation,

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with one spring each attached to either yoke side plate. At this point, in the cycle, the eccentric input shaft has reached its maximum excursion away from the solenoids and reverses direction to move the yoke back towards the solenoids. The pawl, therefore, begins to move away from the punch driver arm, and the arm return spring begins to raise the end of the driver arm opposite to that of the punch. If the spring should fail to do this, the punch stripper would return the driver arm to its normal position at the driver arm stop as the yoke moves closer to the solenoids and the stripper contacts the bottom of the driver arm.

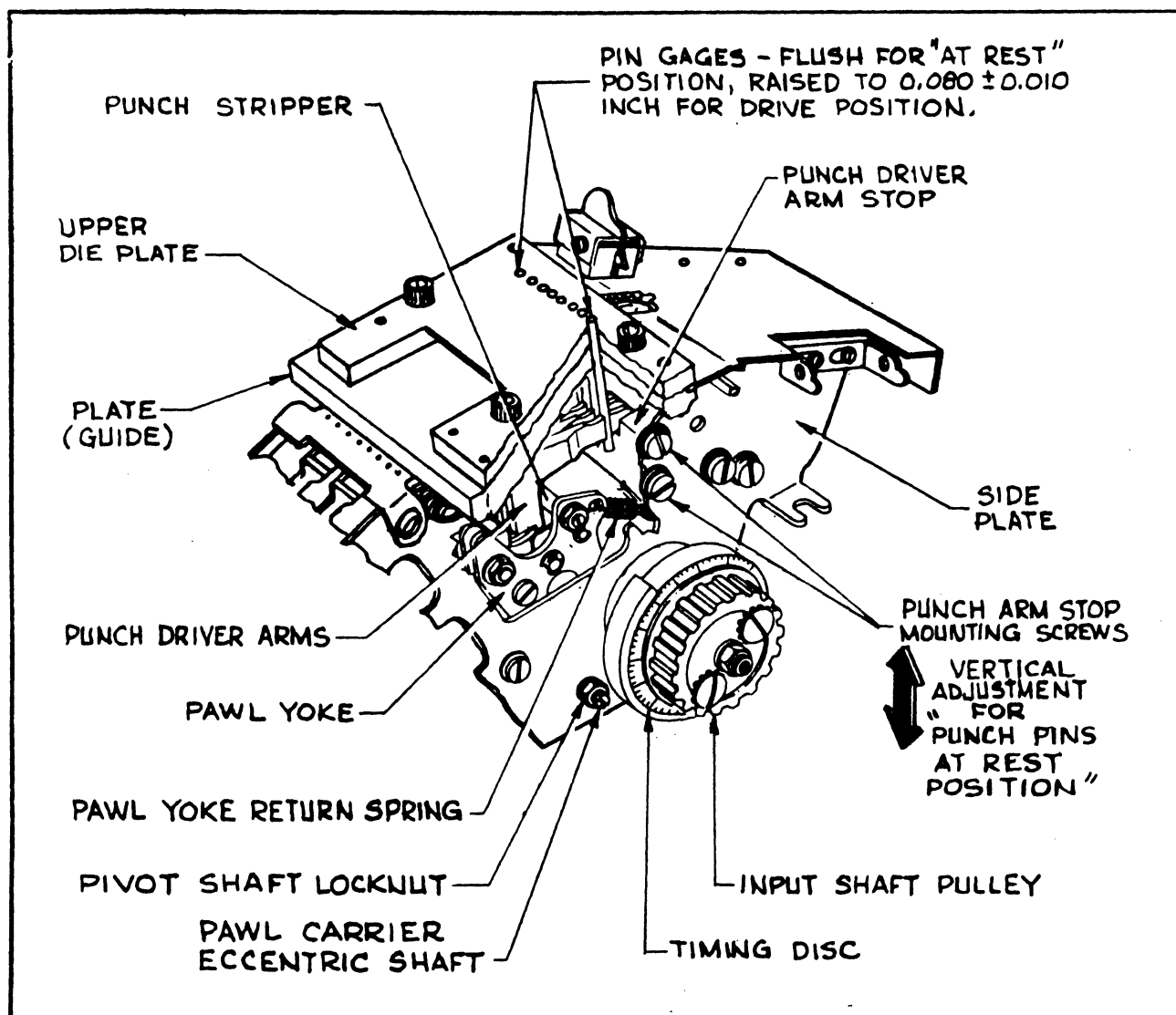


Figure 3.5 Punch Mechanism

When the punch driver arm contacts the punch driver arm stop, the pawl moves away from the bottom projection of the driver arm and transfers its motion through the armature link to the armature until the armature comes to rest against the solenoid frame. As soon as that happens, the

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armature link pivots the pawl so that the stepped end of the pawl moves downward. During this movement, the overcentering spring reverses the direction of applied force, and the pawl is pressed against the pawl rest.

This completes one cycle. If the solenoid is energized during the next cycle, the previously described process repeats. If the same hole is not to be punched during the next cycle, the solenoid is not energized, thus the armature is not held in place but, instead, moves back and forth with the motion of the yoke, pulled by the pawl and armature link. The pawl remains on the pawl rest, held there by the overcentering spring.

### 3.4 PUNCH MECHANISM ADJUSTMENTS AND PARTS REPLACEMENT

#### 3.4.1 ADJUSTMENT - PUNCH POSITION AT REST

The punch position at rest adjustment correctly adjusts the height of the punches with respect to the guide and upper die plates. It is essential that spacing on both ends of the row of punches be equal and that the overall height be maintained in order to let punches descend below the platen level (same height as guide plate) before tape moves.

1. Remove the Lucite cover and remove all chad from the die plate. Carefully push any chad in die plate holes down with a thin instrument, bent-up paper clip, etc., until the chad can be discharged through the slot.
2. If necessary, latch the #1 and #8 solenoids manually, then slowly turn the input shaft by hand until punches discharge any remaining chad from the guide plate. Unlatch punches to return them to the rest position.
3. Insert one punch pin gage (kit tool #1B9-1031) each of 0.203 inch length into punch holes #1 and #8.
4. Punch pin gages must be flush with the surface of the upper die plate when punch pins are at rest. If both sides are too high or too low, loosen mounting screws on both punch side plates. To reach those on the side on which the ball detent is mounted, first remove the detent as outlined in paragraph 3.6. Screw holes are slotted in the side plates to permit moving the punch driver arm stop UP or DOWN.
5. Raise or lower the punch driver arm stop, see Figure 3.5, until gage pins are flush with the surface of the upper die plate. Then tighten the four mounting screws. Check the punch drive adjustment; see paragraph 3.4.3.

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### 3.4.2 ADJUSTMENT - PAWL LIMIT

The pawl limit must be adjusted so that the top surfaces of pawls bear evenly against the lower surface of the pawl limit when pawls are raised.

1. Turn the input shaft to approximately 40 degrees. Manually press pawls at point A; see insert of Figure 3.6. This forces pawls to rise.

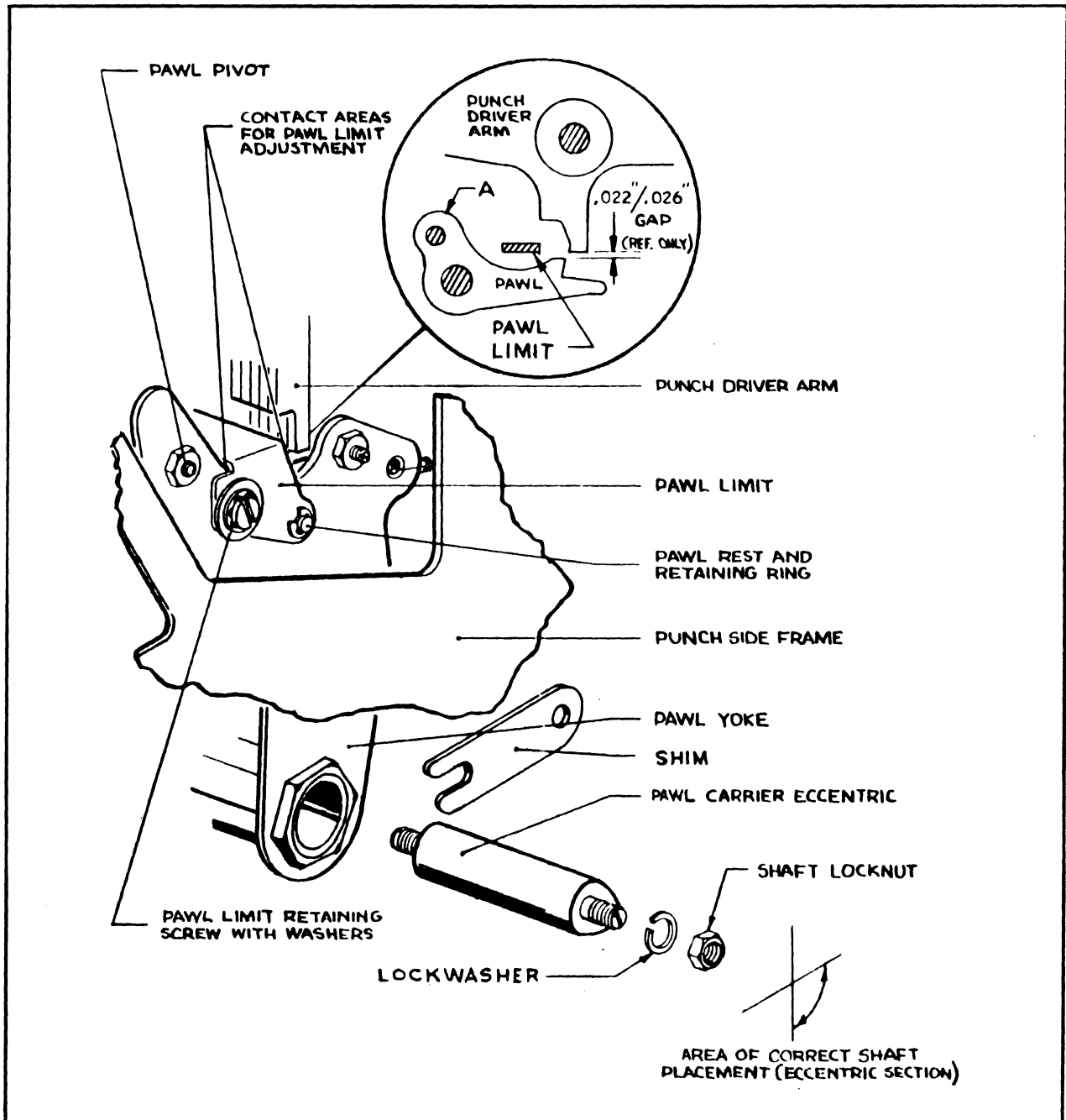


Figure 3.6 Pawl Adjustment and Pawl Limit

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2. Check the contact area between pawls and pawl limit on both sides of the limit. No gap should exist. If any gap is visible, loosen the pawl limit retaining screw on each pawl yoke side and adjust the limit so that it evenly contacts the top of all pawls.
3. Tighten the two pawl limit retaining screws. Unlatch all solenoid armatures.

### 3.4.3 ADJUSTMENT - PUNCH DRIVE

The adjustable eccentric shaft shown in Figure 3.6 is the pawl yoke pivot point. The punch drive adjustment must position this pivot point in such a way that a raised pawl moves the corresponding punch driver arm sufficiently far to lift the punch pin through the punch guide plate and into the upper die plate.

1. Perform the punch position at rest adjustment if necessary; see paragraph 3.4.1. Manually latch the #1 and #8 punch solenoids. Set the input shaft to 307 degrees. At this setting, the pawl yoke should be farthest away from the solenoids. If it is not, check timing as outlined in paragraph 3.2.
2. Insert punch pin gages in the #1 and #8 punch die holes. If the pawl yoke pivot point is correctly set, both pins must extend above the surface of the upper die plate by  $0.080 \pm 0.010$  inch; see Figure 3.5.
3. If this dimension is not correct, loosen locknuts on the threaded ends of the eccentric shaft. Turn the shaft slowly to raise or lower the pawl yoke. Maintain the setting of the input shaft at 307 degrees. After correct pawl yoke pivot point adjustment, tighten the locknuts on both ends of the eccentric shaft. Remove the punch pin gages.

### 3.4.4 ADJUSTMENT - PUNCH STRIPPER ROD

The punch stripper rod adjustment is made to bring the rod within the required distance of the driver arms. The stripper rod has a flat surface milled along one side with which it contacts the punch driver arms. If an adjustment is required, the stripper rod is turned slightly to obtain the required clearance.

1. Check correct adjustments per paragraphs 3.2, 3.4.1 and 3.4.3. Set the timing dial to 127 degrees. This brings the stripper rod closest to the driver arms; see Figure 3.5. Nominal spacing between rod and driver arms should be 0.005 inch; however, accurate measurement may be difficult because of inaccessibility. Set-up by visual means with back-lighting is recommended. As a check, press the outer punch driver arms down by applying pressure at a point close to the driver arm return spring; see Figure 3.4. The driver arm should just barely move.

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2. Turn the input shaft to 103 degrees. Depress the end of the #1 punch driver arm. Arm motion will have considerably increased over that noticed in step 1. The depressed arm must not be able to raise its punch high enough to make the tip show above the guide plate surface.
3. If the visual check of step 2 shows that the punch pin is not retracted sufficiently, loosen the locknut at each end of the stripper rod; see Figure 3.5. Hold the input shaft at 103 degrees. Slowly turn the rod toward the driver arms, then depress the #1 driver arm and check pin retraction. The punch pin must be below the platen surface.

NOTE: The end of the stripper rod at the side of the timing disc is slotted so that a small screwdriver may be inserted to turn the shaft as outlined.

4. After correct adjustment, tighten the nut on each end of the stripper rod. Recheck all settings and make sure that clearance exists between the rod and the punch driver arms at 127 degrees of shaft displacement. This is the point at which the pawl yoke is closest to the solenoids. Thus, some clearance should exist between the punch driver arms and the stripper rod. If no clearance is noted, the previous adjustment was made incorrectly, and the possibility exists that pawl yoke motion may be restricted when the stripper rod contacts the driver arms.

Such condition could result in improper punch operation and damage due to shock. Consequently, readjust the stripper rod as outlined in step 3.

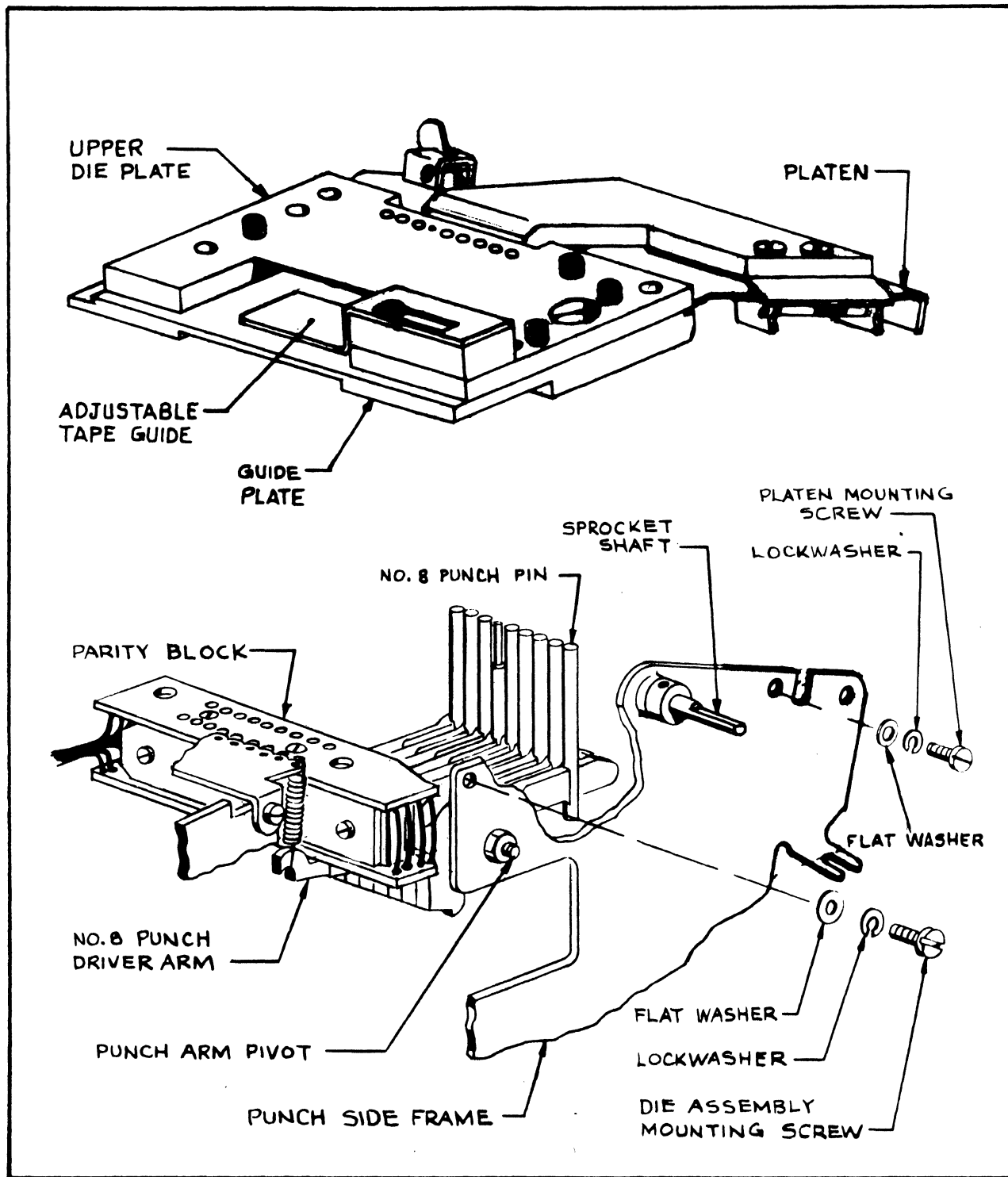
### 3.4.5 REPLACEMENT - PUNCH PINS

The following steps list procedures to be followed if a punch pin has to be replaced.

1. Remove the chad tube. Remove the ball detent mounting screws, see Figure 3.10, and remove the detent. Be careful that balls do not fall out. They are retained only by the adhesiveness of the grease within the housing.
2. Remove the two die assembly mounting screws with flat and lock-washers from each punch side plate; see Figure 3.7. Hold the punch mechanism tilted sideways to prevent losing the #8 punch pin which is not held in place because it has no adjacent arm and which, therefore, could fall out of the die as soon as the assembly is moved. Carefully pull the die assembly in the direction toward the solenoids to clear the platen and then raise the assembly to clear punch pins #1 through #7. These punch pins remain attached to their arms.



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**Figure 3.7 Punch and Die Assembly**

3. Set the input shaft to 300 degrees. To replace a worn or defective punch pin, raise the punch driver arm and pull the punch pin off

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the front of the arm. Fit the replacement punch pin onto the arm and slide it on to where it seats on the slightly wider portion of the arm. Relative alignment should be the same as that of the other punch pins.

4. Place punch pin #8 into the punch die assembly in such a way that the slot in the punch pin lines up correctly with the driver arm. Flat side of slot towards the arm. Very carefully position all other punch pins in the die holes. A pair of tweezers or other thin instrument may have to be used to align each punch pin and its hole. Carefully lower the die assembly and push punch pin #8 down from the top of the punch until the slot engages the #8 punch driver arm.
5. Press the punch die assembly down into the punch side frames. Pull the assembly toward the platen until the end of the platen engages the slot in the die assembly. Insert die assembly mounting screws but do not tighten them.
6. Check punch pin movement by raising driver arms by hand. If binding is noticed, move the die assembly within the limits of the frame mounting holes until all punch pin movement appears to be even and without friction. Carefully tighten mounting screws on both sides, one at a time. Continue to check punch pin movement while fastening screws to prevent binding the punch pins.
7. Check the punch position at rest adjustment, paragraph 3.4.1, and the punch drive adjustment, paragraph 3.4.3. Make corrections as needed.

### 3.4.6 ADJUSTMENT - PUNCH SOLENOID GAP SETTING

Setting and tolerances for gaps A and B between armature and frame are shown in Figure 3.8. Make measurements only with a non-magnetic feeler

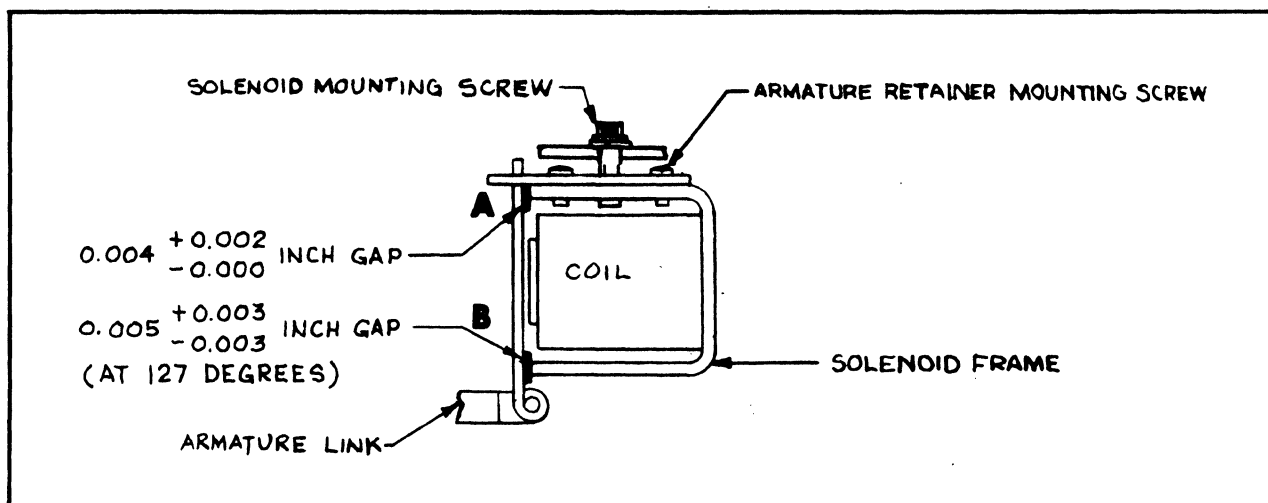


Figure 3.8 Punch Solenoid Armature Gaps

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gage. To adjust gap B, remove the solenoid from the punch and loosen the armature retainer mounting screws. Slide the retainer forward or backward to set the gap correctly, then tighten the screws. Gap A is accessible without removing the solenoid and loosening the solenoid mounting screws.

### 3.4.7 REPLACEMENT - PUNCH SOLENOID COIL

Replace open-circuited or otherwise defective punch solenoid by removing the upper or lower bracket; see Figure 3.9. Solenoids at the rear may be removed without disassembling either bracket, and inside solenoids can possibly be removed by loosening the bracket mounting screws, by removing the two screws at the outer end, and by tilting the upper or lower bracket away from the punch to gain enough clearance to pull the defective solenoid out of the punch.

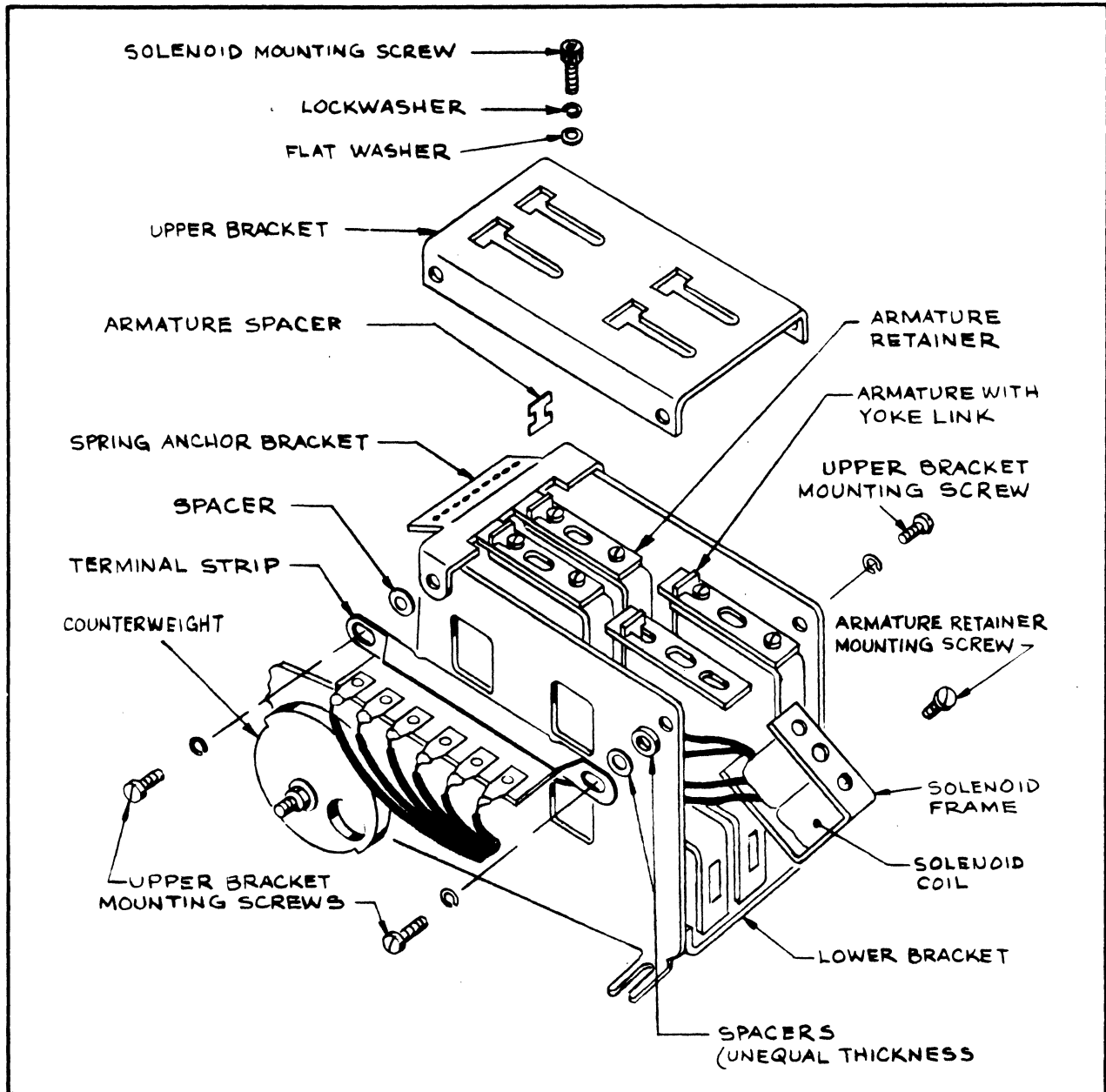
NOTE: The two forward mounting screws of the upper bracket also retain the spring anchor bracket. Observe the spacer thickness between one tab of the anchor bracket and the punch side frame. Note the number and thickness of spacers under the mounting tab on the other end of the terminal strip. Make sure that spacers are replaced correctly during reassembly.

1. During disassembly of the upper bracket, carefully slide the spring anchor bracket toward the punch assembly. Remove the mounting screw from the solenoid which is to be replaced. The solenoid now will lie loosely within the punch assembly.
2. Remove armature retainer mounting screws from the defective solenoid. Withdraw the frame with coil.
3. Disconnect coil leads from terminal strip and connector. Replace the coil and frame. If wires are to be spliced without opening the cable assembly, make sure that the connection is twisted, properly soldered, insulated and sleeved. Install the replacement coil and frame, then reassemble all parts in reverse order to that outlined previously.
4. After complete reassembly, adjust armature gaps A and B of the replaced solenoid and of all other solenoids which were loosened as specified in paragraph 3.4.6. Then tighten all solenoid mounting screws securely.

### 3.5 FEED MECHANISM

Tape is fed forward from one punch position to the next over a nominal distance of 0.100 inch when the sprocket takes one step. The sprocket has 24 teeth but only approximately four teeth drive the tape at any

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**Figure 3.9 Punch Solenoid Parts**

one time. The sprocket, Figure 3.10, is mounted on the sprocket shaft, which is held in place on one side by the ball detent gear and, on the other side, by a collar. The shaft also supports the spur gear and the optional positioning knob.

Ratchet and sprocket shaft spur gears mesh, and the ratchet gear drives the sprocket gear when the ratchet shaft is locked and the two index links fall. The index links are supported by the input drive shaft and

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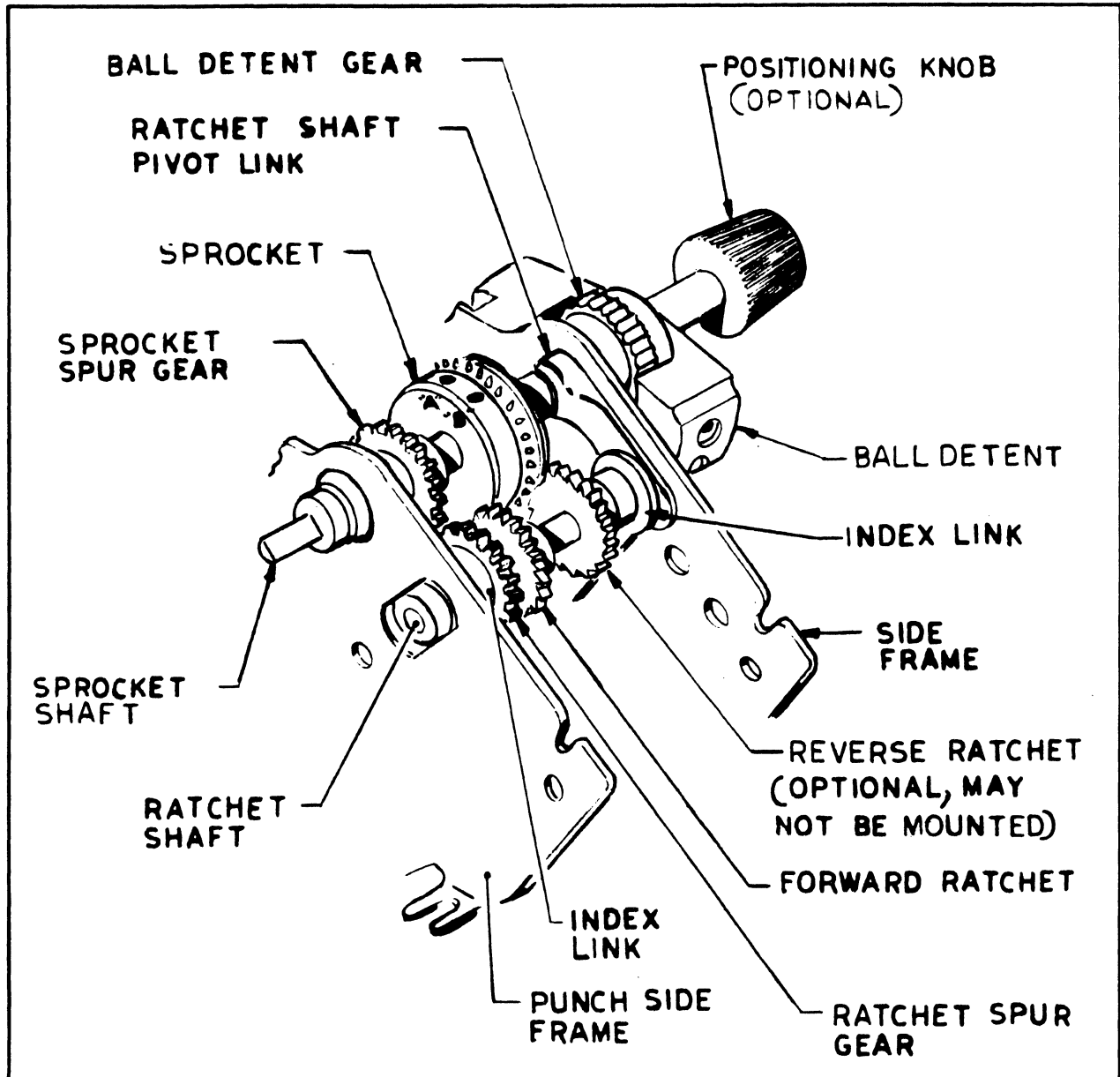


Figure 3.10 Feed Mechanism

actuated by the eccentric section of the shaft. Their motion, therefore, is nearly straight up-and-down.

Index links reach their point of maximum upward excursion at approximately 23 degrees of input shaft rotation. Punches are then at the surface level of the guide plate - which is the same as the top surface of the platen - so that no obstruction exists to tape motion.

Further input shaft rotation causes the index links and ratchet shaft assembly to move down. If the forward feed solenoid is energized at Z1

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time (zero degrees), the lower portion of the solenoid armature is pulled against the solenoid core and the interposer portion above the armature pivot point, see Figure 3.10, moves toward the ratchet gear.

The slight rotary motion of the ratchet shaft brings the ratchet gear tooth that lies immediately above the interposer into contact with it. At 105 (+10, -0) degrees, the interposer locks the ratchet gear. As the links continue to move down, the interposer causes the ratchet gear and its shaft to turn; thereby causing the ratchet spur gear to turn one tooth position in the opposite direction. The sprocket moves the tape one hole position until the ball detent locks the sprocket shaft again. In other words, with each revolution of the input shaft, the sprocket shaft moves one sprocket tooth position forward when the feed solenoid is energized.

At 180 degrees of input shaft rotation, the feed solenoid coil is de-energized and the armature return spring pulls the interposer away from the ratchet gear. This prevents drag during the next upward movement of the index links and allows the ratchet spur gear to walk slightly about the stationary sprocket gear.

Tape is directed by the tape guide plate until it reaches the punch station. Leader tape then is picked up by the sprocket and, subsequently, index holes are punched as tape is fed through the punch.

The sprocket is positioned by detenting the sprocket shaft with the ball detent. This detent locks the sprocket shaft in one of 24 positions unless the shaft is driven automatically or manually with the positioning knob.

### 3.5.1 ADJUSTMENT - INDEX SOLENOID ARMATURE/INTERPOSER

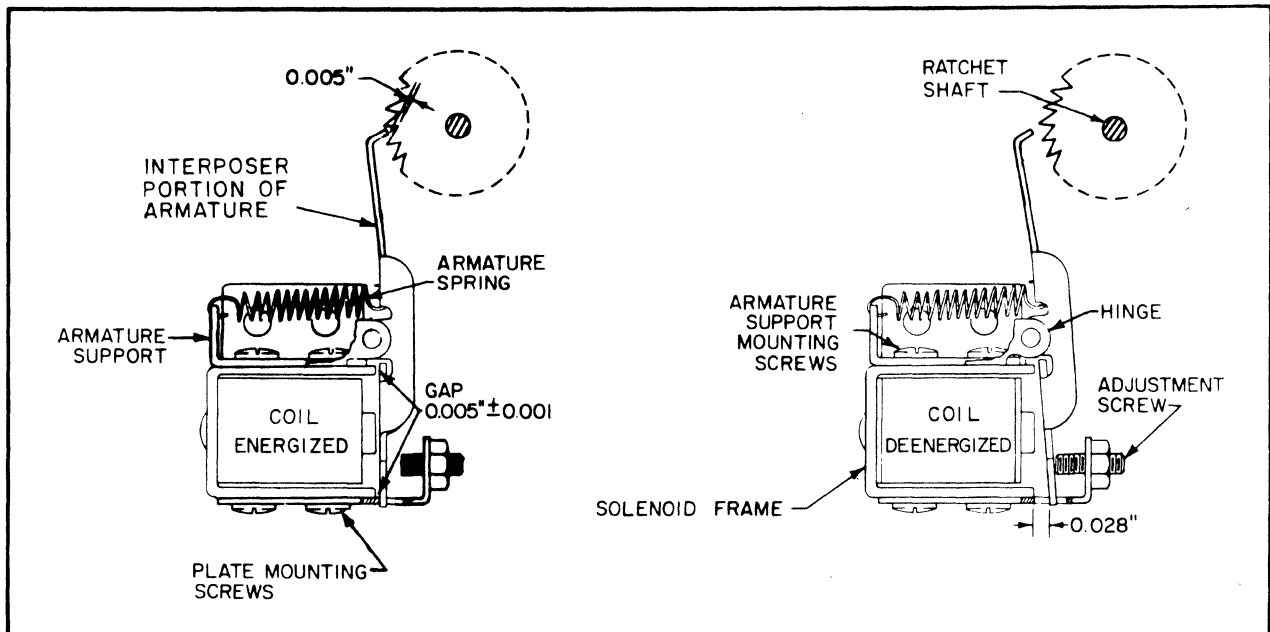
Before the solenoid armature is adjusted, the ball detent must be in place and mounting screws must be tight. Setscrews in all gears and ratchets must be tight. The sprocket shaft must not have any side play.

To check or adjust the gap between the armature and the solenoid frame, remove the solenoid from the punch because it is mounted in an area that makes measuring impossible.

1. Turn power OFF and remove the two solenoid mounting screws from the punch side frame. Withdraw the solenoid from the punch.
2. Check the gaps by electrically energizing the solenoid, or by pressing the armature against the solenoid. Do not apply any excessive force. Gap width should be  $0.005 \pm 0.001$  inch as shown in Figure 3.11. If an adjustment is required, loosen the top and/or bottom armature or plate in such a manner that the specified gap is obtained. Measure the gap only with a non-magnetic feeler gage. Tighten all screws securely.

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**NOTE:** Make sure that the gap at the bottom of the solenoid is measured between the solenoid frame and the armature and not between the inner edge of the plate and the armature. Moving the plate farther to the rear of the solenoid decreases the gap, moving it forward increases the gap.



**Figure 3.11 Forward Feed Solenoid**

3. Loosen the locknut on the adjustment screw. Deenergize the solenoid or release it to the normal rest position. Adjust the adjustment screw so that the gap between armatures and solenoid frame is 0.028 inch. Tighten the locknut.
4. Reinstall the solenoid in the punch. Tighten the mounting screws just enough to prevent solenoid movement. Make sure that timing has been adjusted as outlined in paragraph 3.2. If timing is not correct, adjust it before continuing with the following procedures.
5. Loosen the solenoid mounting screws and pull the solenoid toward the rear of the punch (away from the ratchet shaft) until the rear mounting screw rests on the edge of the enlarged rear mounting hole. Then swing the solenoid toward the ratchet until the interposer portion of the armature leaves a gap between its tip and the outer edge of the adjoining ratchet gear tooth of 0.005 inch. The gap is shown in Figure 3.11.
6. Carefully tighten the two mounting screws while maintaining the solenoid position. Recheck the gap with an offset feeler gage of 0.005 inch thickness. Correct the adjustment, if necessary, as outlined in steps 4 and 5. Then tighten mounting screws securely.

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7. Rotate the timing dial to 105 degrees and manually move the interposer toward the ratchet. The interposer must contact the ratchet without play between the top of the interposer and the ratchet tooth. If an adjustment is necessary, loosen the setscrews and reposition the ratchet. Check this adjustment for all ratchet teeth by manually latching the solenoid and by turning the input shaft. Also check after each feed step that the sprocket shaft is in its fully detented position.

### 3.5.2 ADJUSTMENT - SPROCKET

Sprocket rotation must move tape parallel to the guide edge on the upper die plate. The distance from this edge to the centerline of the sprocket teeth must be  $0.394 \pm 0.002$  inch, or from the guide edge to the outside of the sprocket teeth,  $0.371 \pm 0.002$  inch. This spacing is called zoning.

NOTE: Before measurement is made, all setscrews in sprocket shaft components must be tightened.

1. Measure zoning. If an adjustment is required, loosen screws A and B, see Figure 3.10, and move the sprocket toward or away from the guide edge to obtain a correct spacing of  $0.371 \pm 0.002$  inch to the outside of the sprocket teeth.
2. Checking zoning with a tape gage, or as accurately as possible by punching code holes (delete code) over a section of tape. Fold the tape back on itself and line up two delete codes so that their holes accurately overlap as shown in Figure 3.12. If zoning is

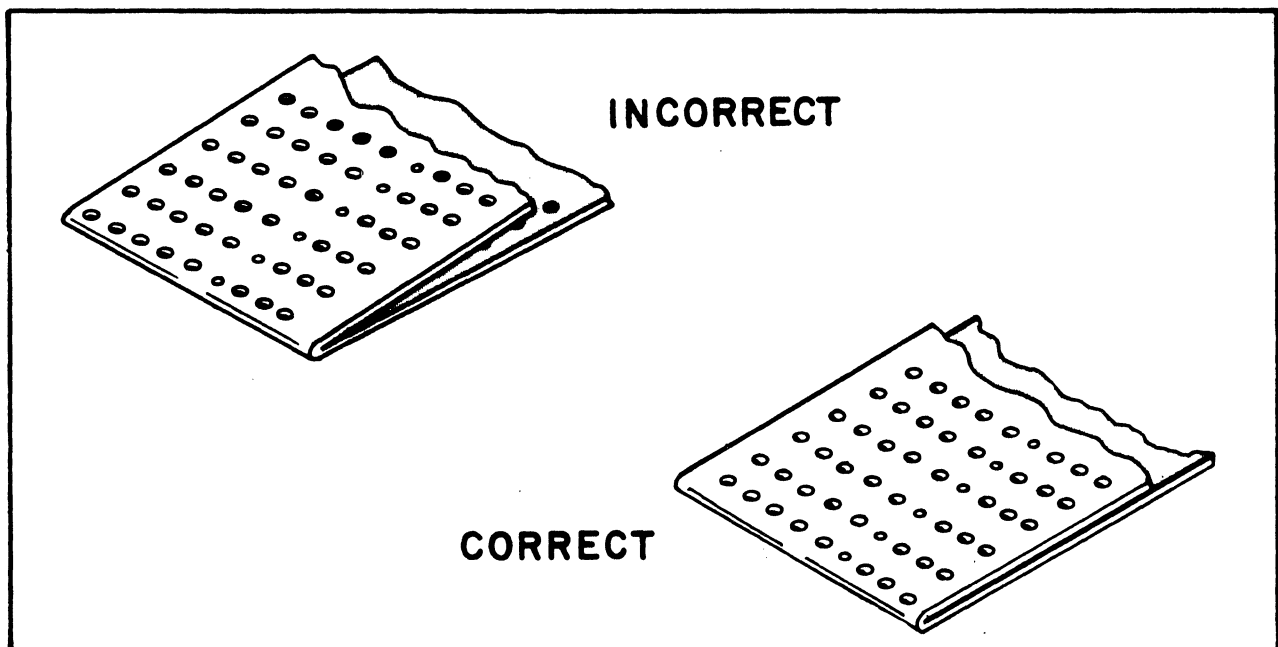


Figure 3.12 Zoning Check



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off, code holes are not punched perpendicularly to the edge of the tape and, consequently, when holes line up, the upper and lower edges of the folded tape do not. If any adjustment is required, correct the positioning of the sprocket.

### 3.6 BALL DETENT

The ball detent arrests the rotation of the sprocket shaft. It also holds the shaft fixed during upward movement of the index links. The detent is shown in Figure 3.10. It consists of an injection-molded plastic part into which six stainless steel balls have been inserted, with individual springs and setscrews. Setscrews are adjusted to provide enough spring tension so that contact between balls and detent gear keeps the shaft normally in a fixed position, except when operation calls for rotation of the sprocket shaft.

The ball detent can be removed from the punch by removing the two detent housing mounting screws, and by loosening the detent gear setscrew, so that both gear and detent housing can be removed from the shaft as a unit. The detent housing may also be removed while leaving the gear on the shaft.

CAUTION: Be very careful not to lose any of the ball and springs which are under tension.

### 3.7 COVER AND TAPE TEAR PLATE

The spring-loaded cover holds down the tape on its way through the punch. The cover is transparent; it therefore allows the operator to read the perforated code after the tape stops moving. A spring-loaded latch keeps the cover closed and in the DOWN position. To release the cover, the operator must manually retract the latch.

Tape is removed after punching by advancing the tape out of the punch so that none of the data characters are torn off. The operator then pulls the tape up against the tear plate. The plate is positioned so that its serrations cut through the center of index and character code hole(s). The leading edge of the tape should be straight and at right angles to the sides of the tape.

If adjustment is required, loosen the two mounting screws on the platen surface and align the plate so that serrations in the upper section of the tear plate fit over a line through the center of an index hole, as shown in the enlargement of Figure 3.13. After correct adjustment, tighten the two mounting screws.

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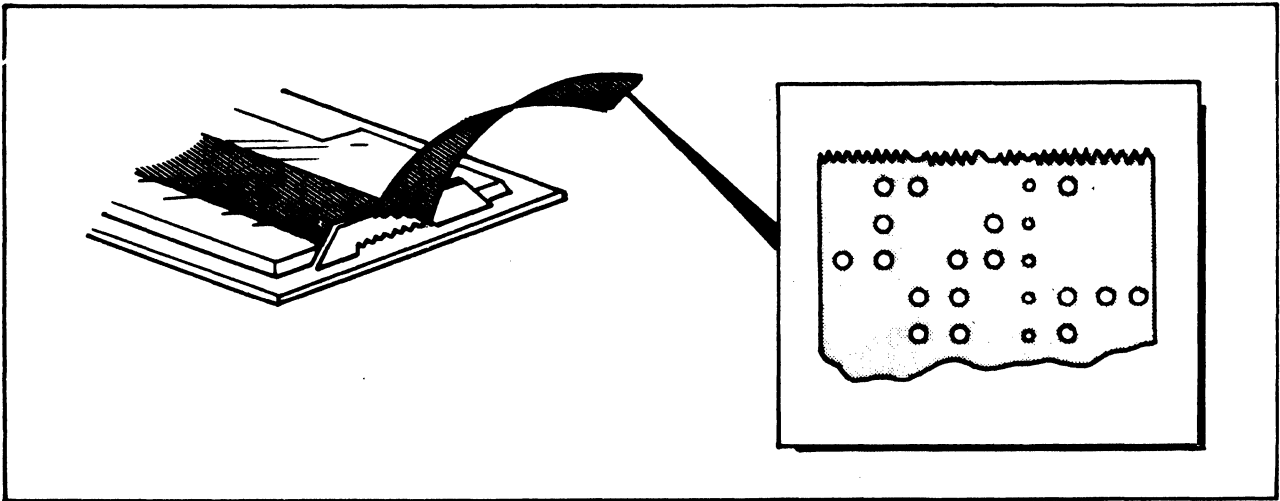


Figure 3.13 Tape Tear Plate

### 3.7.1 ADJUSTMENT - COVER

Make sure that the pivot shaft is properly secured with E-type retaining rings and that the spring is under stress so that it will tend to unwind, thereby opening the cover.

1. The cover latch must be adjusted so that the cover is spaced 0.015 (+0.000, -0.002) inch away from the sprocket. Use a feeler gage between sprocket and the lower surface of the cover. Press the cover down and loosen the two mounting screws in the latch retainer. The through-holes in the retainer are slotted so that the latch can be moved up or down as required. Adjust the latch so that the lower surface of the latch touches the upper surface of the cover. Tighten the two retainer mounting screws.

IMPORTANT: The previously specified clearance between cover and sprocket must be equal on both sides of the sprocket. Since the cover is curved at the upper end, the same clearance must be maintained at that point.

2. If the adjustment of step 1 shows that clearance is uneven, loosen the bracket mounting screws and move the bracket with cover up, down and/or sideways until 0.015 (+0.000, -0.002) inch can be measured between all points on the sprocket and the lower surface of the cover. Then tighten the bracket mounting screws. Recheck the latch adjustment of step 1.
3. Check that the slot on the underside of the cover is centered above the sprocket teeth. If it is not, loosen the cover mounting screws and move the cover sideways until teeth are perfectly centered in the slot. This adjustment is made with the cover closed. If the

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adjustment is made correctly, the clearance between the underside of the cover and any point on the platen should not be less than 0.013 inch nor more than 0.015 inch.

### 3.8 TIMING PULSE GENERATOR

When the timing disc at one end of the input shaft interrupts the magnetic flux produced by current flow through the solenoid, it generates a timing pulse. The pulse coil is mounted adjacent to the timing disc and its load coil is mounted to the same punch side frame; see Figure 3.14.

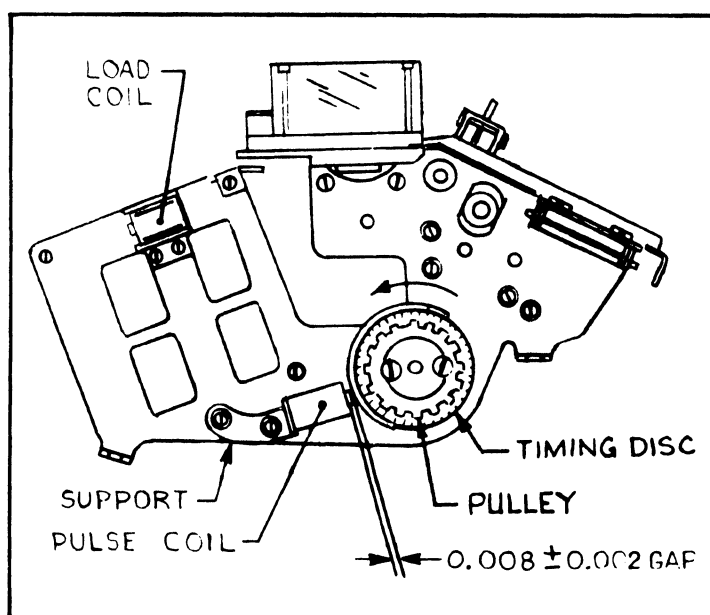


Figure 3.14 Timing Pulse Generator

Current flow through the load coil maintains the pulse generator at a nominal voltage level. Induction establishes a magnetic field whose flux lines pass through the timing disc, the input shaft and the punch frame to form a complete loop. Any interruption of the flux path changes the intensity of the magnetic field and produces a transient voltage level shift in the form of a positive or negative-going spike.

The edge of the timing disc comes closer to the pulse coil at an input shaft setting of 180 to 360 degrees than it does between zero and 180 degrees. At zero, the gap increases and the resultant collapse of the magnetic field induces a voltage in the pulse generator which tends to maintain the direction of current flow; thus, a negative-going spike results. When the timing disc reaches 180 degrees, the disc surface suddenly increases, the gap between the disc and pulse generator decreases, and the magnetic field builds up rapidly, thereby producing a positive-going spike.

#### 3.8.1 ADJUSTMENT - GAP AND ALIGNMENT

1. The gap between the timing disc and pulse coil shall be  $0.008 \pm 0.002$  inch; see Figure 3.14. The gap shall be measured with a feeler gage while the punch is not in operation. Measurements shall be made between pulse coil pole piece and several spots along the edge of the disc at input shaft settings between 180 degrees and 360 degrees.

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2. If the gap is not correct, loosen the mounting screws for the pulse coil support and adjust the coil to obtain the correct gap. Then tighten the mounting screws.

**CAUTION:** Holes in the coil support plate shown in Figure 3.14 are slotted so that the support may move toward or away from the timing disc with only a minimum amount of side play. This is required because the center of the solenoid core is the reference point for timing disc markings.

Any adjustment of the pulse coil, therefore, should be made as carefully as possible. Attempt to leave the coil in its relative position to the timing disc, while moving it straight back or forth to correctly set the gap.

If the pulse coil is removed for replacement or for other reasons, its position should be accurately inscribed on the punch side plate before removal. It should be adjusted at installation to split the possible total 4 degrees of side motion obtainable because of excess clearance in mounting holes. The series-connected load coil, mounted near the upper edge of the punch side frame, requires no adjustment.

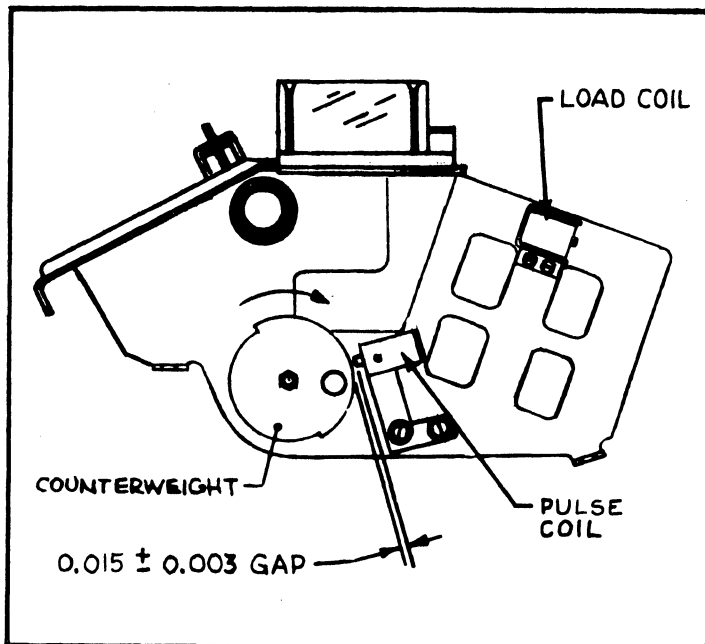


Figure 3.15 Parity Pulse Generator

### 3.9 PARITY PULSE GENERATOR (OPTIONAL)

The gap between the pulse coil and the counterweight must be adjusted to produce a pulse height depending on voltage levels used in the associated parity error circuit. The gap should be  $0.008 \pm 0.002$  inch; see Figure 3.15.

**IMPORTANT:** The counterweight must be mounted in precisely the same relative attitude to the input shaft as the timing disc; refer to paragraph 3.2.1.

1. Turn power OFF and measure the gap between pulse coil and counterweight with a non-magnetic feeler gage. The gap should be approximately 0.008 inch.

## SERIES 500 PUNCH

2. If the gap is not correct, loosen the coil bracket retaining screws. Move the coil toward the timing disc or away from it. A gap change of 0.003 inch will produce a voltage change of approximately one volt; thus, if the gap is 0.009 inch and the pulse is four volts, decrease the gap to 0.006 inch to obtain a pulse of five volts. Then tighten the bracket retaining screws. f

### 3.10 PARITY SWITCH BLOCK

The optional parity switch block consists of 15 switches of the double-throw type which are contained within the block. The block is a molded assembly mounted to the underside of the punch die plate as shown in Figure 3.7. A cutaway view through the block is shown in Figure 3.16.

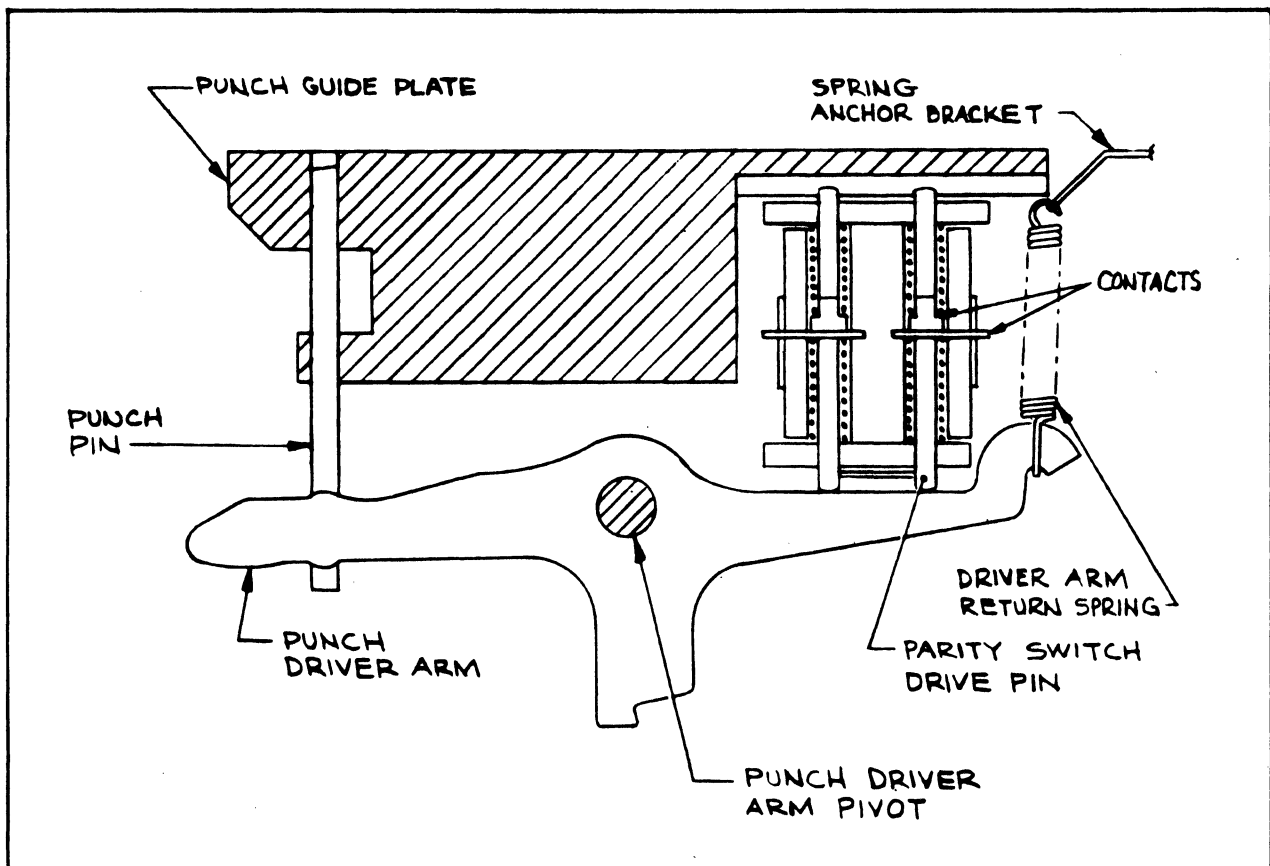


Figure 3.16 Cutaway through Punch and Parity Block

Switches are arranged in two rows so that two switch drive pins rest on the rear top edge of a punch driver arm, except for the arm of punch #1, which has only one pin. Movement of any driver arm results in simultaneous displacement of both parity switch drive pins, with consequent switch transfer. Refer to Section 7, page 7-11, for electronic description and interconnections.

## SERIES 500 PUNCH

Switches are connected in a series-parallel set-up. The parity block is supplied as a unit assembly which is factory-installed. Adjustment, if necessary, is listed in the following steps.

1. Disconnect the punch from circuits by removing punch connectors. Check the spacing between the underside of the parity block and the rear extensions of driver arms on both sides of the punch. The nominal distance should be 0.062 inch.
2. Use an ohmmeter and set it to the Rx1 range. Connect one ohmmeter lead to pin #10 of connector JP5 (ODD) and the other lead to pin #12 of the same connector (IN). Manually latch the #1 punch solenoid. Turn the input shaft slowly by hand until the meter reading goes from infinity to full scale. The timing disc setting should be less than 307 degrees. Continue to turn the input shaft until the 307 degree mark on the timing disc lines up with the center of the pulse solenoid.

NOTE: Punches are fully up at 307 degrees. Parity switch drive pins should move between 0.010 and 0.020 inch and contact transfer within the parity block should occur before 307 degrees. The mid-point of parity switch contact transfer should be around 307 degrees, and some clearance should exist at that point between the bottom of the parity switch drive pins and the top of the punch driver arms.

3. Check to determine that such clearance exists and then repeat step 2 but this time check continuity by latching solenoid #8. If no continuity can be obtained at all - and assuming that the parity block is not otherwise defective - it indicates that the block is too close to the punch driver arms so that parity switches are held OPEN constantly. The reverse is true if continuity is present continuously.
4. If no clearance exists between the bottom of the drive pins and the top of the driver arms, loosen the parity block mounting screws and remove shims from between the block and the punch frame to raise the parity block and move it farther away from the punch driver arms. Repeat steps 2 and 3 to make sure that the adjustment was made correctly. Note that the row of parity switch drive pins farther away from the driver arm return springs will show less clearance than pins closer to the return springs.

### 3.11 OUT-OF-TAPE SWITCH

The optional out-of-tape switch is mounted at the rear of the punch. When the microswitch mounting screws with washers are loosened, enough play exists between mounting holes and through holes in the switch to move the switch to a position at which contact transfer occurs. The normally-closed contact and the common contact are used for test (the two outside microswitch terminals).

## SERIES 500 PUNCH

The switch actuator pivots on a shaft in the switch mounting bracket. The ends of the shaft are secured with retaining rings. The actuating lever protrudes through a cutout in the hold-down plate. Hence, tape, when inserted between the hold-down plate and actuating lever, depresses the lever. The movement of the lever is transferred by the pivoting actuator to a plate which depresses the microswitch contact plunger.

1. Check to make sure that the actuating lever moves without binding.
2. Check the switch by using the normally-closed and the common contacts. Without tape in the punch, the meter must read full scale.
3. Insert tape between the hold-down plate and actuating lever. The switch must transfer contacts and the meter must now read infinity.
4. Remove and re-insert tape to make sure that the switch transfers contact each time. If tape does not provide correct switch operation, loosen the switch mounting screws and reposition the switch to obtain correct operation. Make sure that the actuator does not bottom on the switch to prevent binding of tape.

### 3.12 ROUTINE INSPECTION, CLEANING AND LUBRICATION

The punch must be periodically inspected and cleaned. If necessary, and in accordance with manufacturer's recommendations, the punch must be lubricated at specified intervals. If the punch has to be disassembled to accomplish this, follow procedures outlined previously.

#### 3.12.1 CLEANING

Turn all power OFF and disconnect all plugs. Remove all dirt, paper, dust, lint and old lubricant. Use a lint-free cloth to remove excessive and/or dried lubricants from any and all parts during disassembly. It may be necessary to use a cleaning solvent to insure that all parts are properly cleaned. It is recommended that a non-toxic, non-flammable cleaning fluid be used.

IMPORTANT:      Do not immerse the unit in cleaning solvents or ultrasonic cleaners.

#### 3.12.2 LUBRICATION

After cleaning, lubricate the punch. Do not apply lubricants excessively. If specified lubricants are not available, use only acceptable substitutes of a quality and grade equal to, or better than, that of the original lubricants.

## SERIES 500 PUNCH

Lubrication points of parts are identified in the following figures by callouts. The numeral identifies the lubricant listed in Table 3.2. The area to be lubricated is called out for such item in a tabulation that accompanies each figure. Some parts are labeled to facilitate correlation of representative views shown in the figures contained in this section.

Item Number	Type Lubricant
1	Custom Lube 700
2	Gulflex "A" Grease
3	Custom Lube 700 Mixed With Gulflex "A" Grease

Table 3.2 Lubricants

Reference Figure 3.17

- A. Lubricate upper bearing surfaces in both index links.  
 B. Lubricate both sides of each washer and spacer shown.

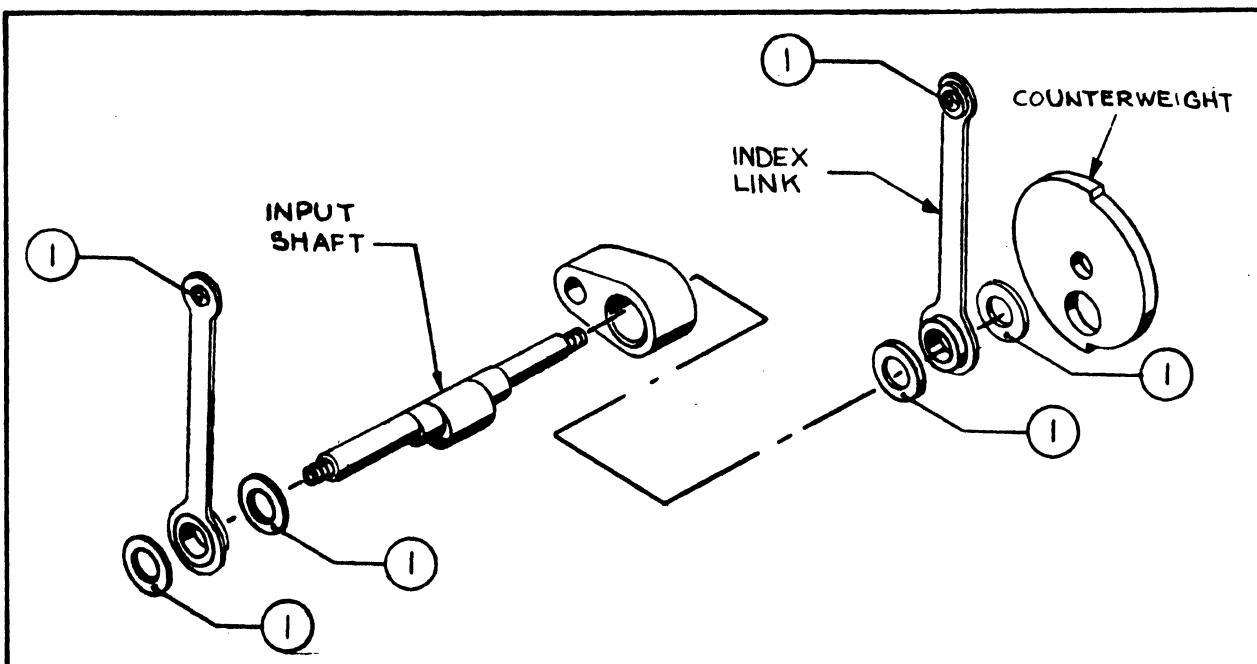


Figure 3.17 Lubrication Points: Shaft & Index Link

Reference Figure 3.18

- A. Lubricate the inside bearing surfaces for the sprocket shafts in both punch side frames.  
 B. Lubricate both holes in each ratchet shaft pivot link.



## SERIES 500 PUNCH

### Reference Figure 3.18 (continued)

- C. Grease tooth surfaces of both the ratchet and sprocket shaft spur gears.
- E. Grease tooth surfaces of the detent gear WITH THE BALL DETENT IN PLACE. Latch the forward feed solenoid by hand or electrically energize it to rotate the sprocket shaft. Pack the entire inside area of the detent.

- D. Grease tooth surfaces of the forward ratchet.

CAUTION: Do NOT remove the ball detent from the shaft.

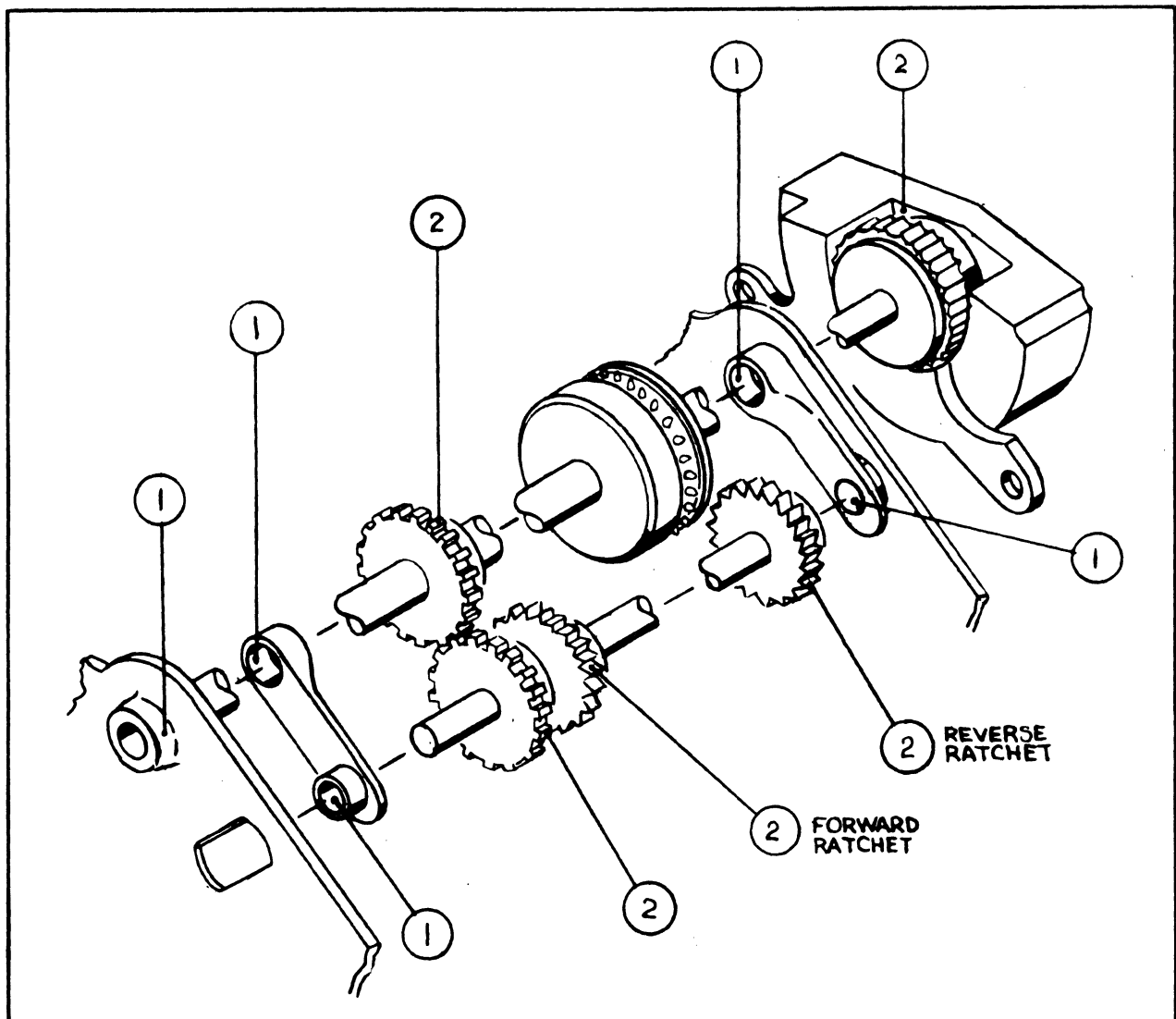


Figure 3.18 Lubrication Points: Ratchets, Gears & Pawl

## SERIES 500 PUNCH

### Reference Figure 3.19

- A. Lubricate the surface of the pawl carrier eccentric shaft.
- B. Lubricate the pivot hole of each one of the nine pawls.
- C. Lubricate the tip of each pawl.
- D. Grease the contact points of each one of the nine punch driver arms.
- E. Grease the pawl contact notch on each one of the punch driver arms.
- F. Grease the ends of the pawl yoke return springs and their attachment holes in the pawl yoke and spring anchor bracket.

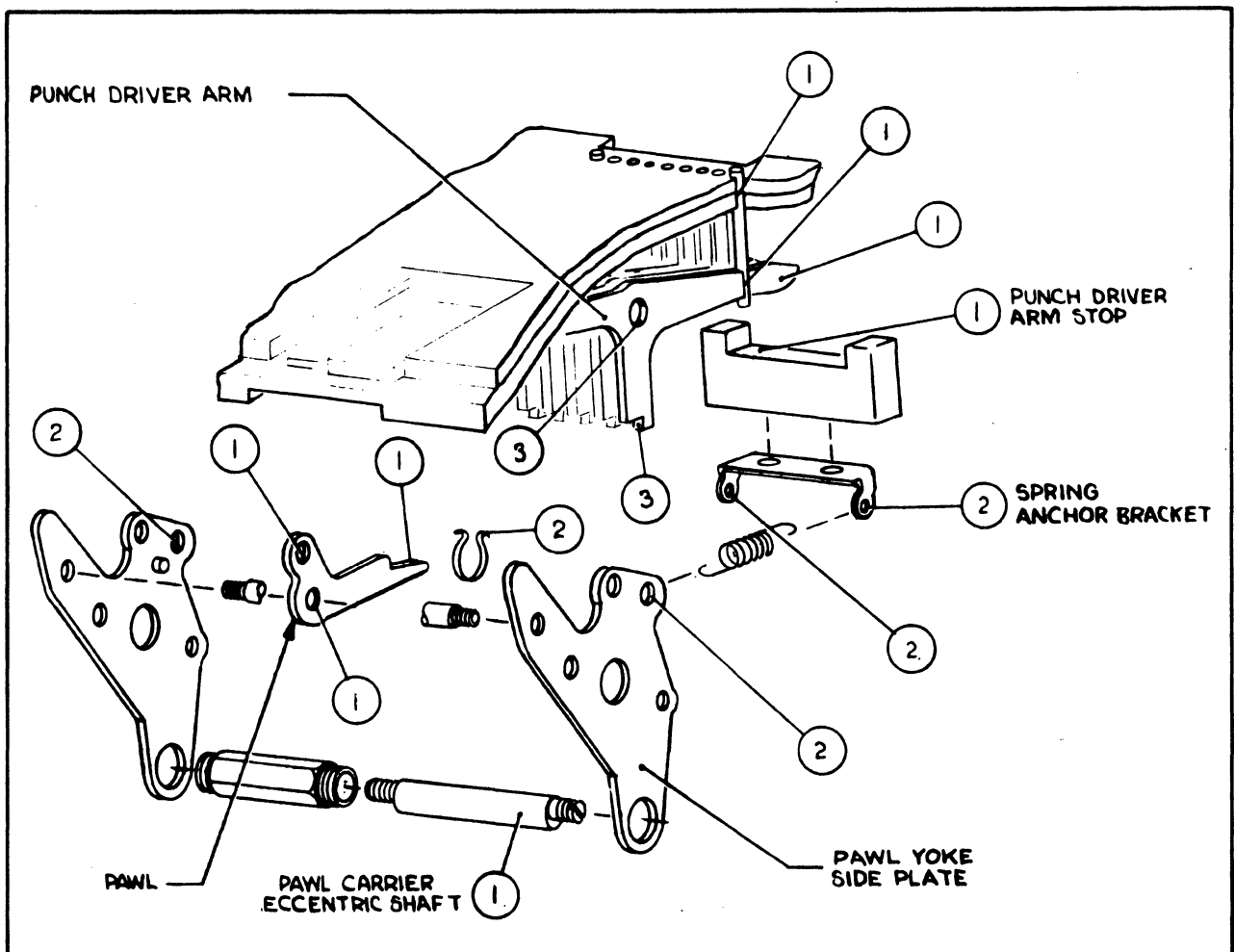


Figure 3.19 Lubrication Points: Pawl & Punch Assembly

## SERIES 500 PUNCH

### Reference Figure 3.19 (continued)

- G. Lubricate the upper surface of the punch driver arm stop that contacts the tip of each punch driver arm.
- H. Lubricate the contact surface at the end of each one of the punch driver arms.
- I. Lubricate the top and bottom of each slot for the index punch and all eight code hole punches.
- J. Lubricate the punch guide holes for all nine punches in the lower die plate.

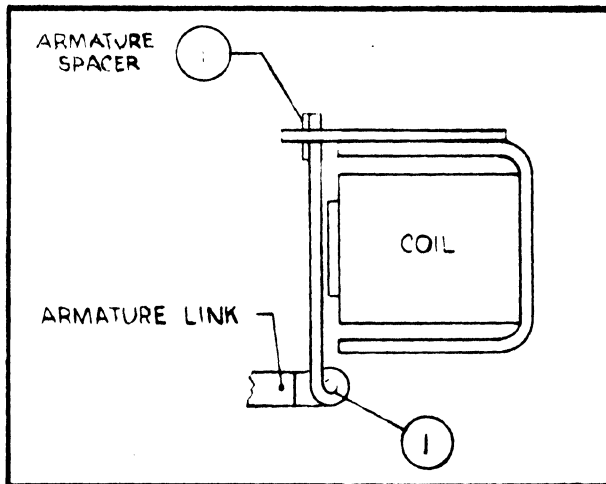


Figure 3.20 Lubrication Points:  
Solenoid Armatures

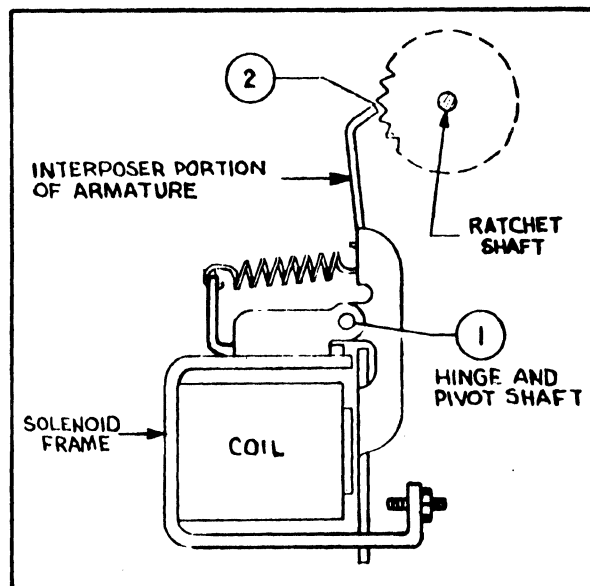


Figure 3.21 Lubrication Points:  
Feed Solenoid & Ratchet

### Reference Figure 3.20

- A. Lubricate both sides of each armature spacer. This must be done on all nine punch solenoid armatures.
- B. Lubricate the armature points and link pivot points on all nine solenoids.

**CAUTION:** Do not get lubricant on armature surfaces, solenoid cores or solenoid frames.

### Reference Figure 3.21

- A. Lubricate the inside surfaces of armature pivot holes.

**CAUTION:** Do not get lubricant on armature surfaces, solenoid cores or solenoid frames.

- B. Grease the interposer armature tip.

**SECTION 4**

**DESK TOP PUNCH**

## SERIES 500 PUNCH

### SECTION 4

## DESK TOP PUNCH

### 4.1 GENERAL DESCRIPTION

The desk top punch, Figure 4.1, is a self-contained device that uses a Model 500 punch and contains the necessary accessories for tape handling. It can be supplied with or without electronic logic.

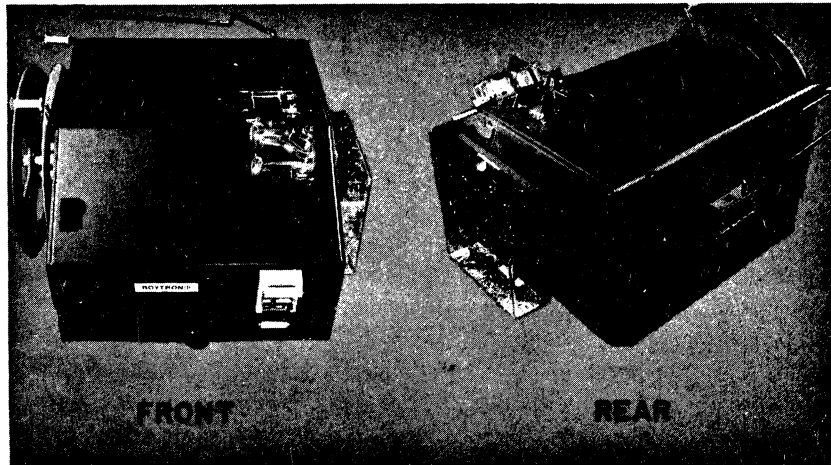


Figure 4.1 Desk Top Punch

The desk top unit can fit on furniture, an associated device or the processor. The front of the unit slants forward with space provided for the punch section and a cutout for the tape feed/tape rewind switch.

The drawer has storage space for a tape roll. A tape rewinder is mounted to the left side of the unit. A tape tension and out-of-tape switch at the right front allows tape to be monitored so that punch operation can be stopped before tape tears if a tight tape condition should occur. The cover encloses the entire unit except for the top section of the punch, the bottom drawer, the tape tension switch, the tape rewinder and a connector and fuse at the rear of the unit. The cover can be removed by loosening the two screws at the front and the two at the rear of the unit.

During normal operation, tape unspools from within the drawer, passes through the tape tension and out-of-tape switch and into the punch. When it emerges from the punch, it slips over a guide bar supported by the cover and winds around the idler arm of the rewinder, back over the idler roller of the guide bar and onto the tape reel.

## SERIES 500 PUNCH

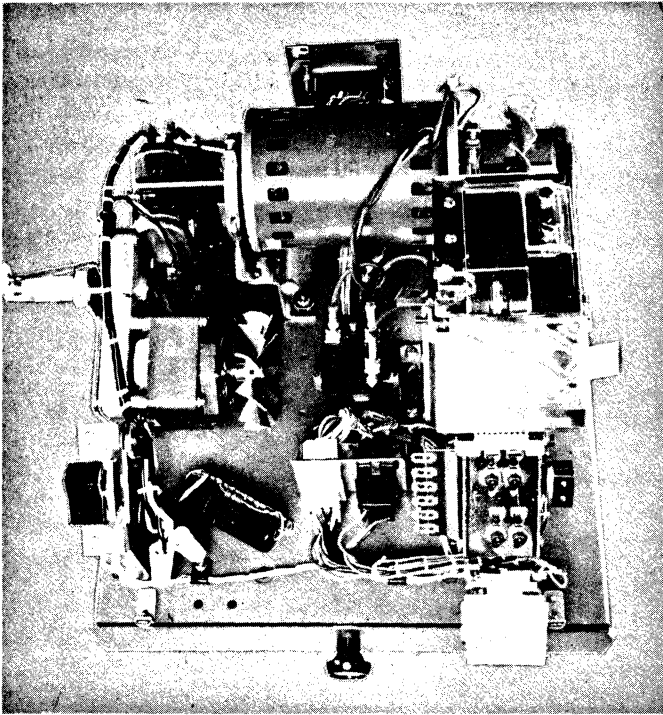


Figure 4.2 Top View of Cabinet with Cover Removed and Connectors Disengaged

net. This provides a direct path to the punch for interfacing with customer equipment, except that the tape tension switch can be used to stop punch operation if tape begins to hang up at the supply reel drawer. Supply voltages to power the punch drive motor and that of the tape re-winder also enter through the receptacle at the rear of the cabinet.

Models with electronic logic circuits contain these circuits on a board at the center of the interior cabinet. The board is mounted on two brackets, which support the board above some of the other components on the top of the cabinet. The discrete component or integrated circuit board is then interfaced with the punch and the connector at the rear of the desk top unit. Signals received from the central processor are thereby transmitted to the circuit logic and from there to the punch.

Parts of the desk top unit with the punch in place but without the electronic circuit board are shown in Figure 4.2.

### 4.2 OPERATION - PUNCH

The motor that drives the punch input shaft rotates continuously when power is applied from an external source such as the central pro-

The interior of the desk top unit, Figure 4.2, contains the essential parts for operation of the punch drive motor, re-winder drive and re-winder tension stop switch. Parts consist primarily of capacitors, resistors, a microswitch and the required switch actuating linkages. The punch itself is mounted on vibration isolators, two of which are supported by a bracket at the rear. The punch can be removed by loosening the four nuts above its four slotted feet. For ease in removal, nuts and lockwashers should be taken off.

Two connectors, attached to the punch cable, plug into receptacles at the center of the desk top unit. In units without electronics, the receptacles connect directly with that at the rear of the cabi-

## SERIES 500 PUNCH

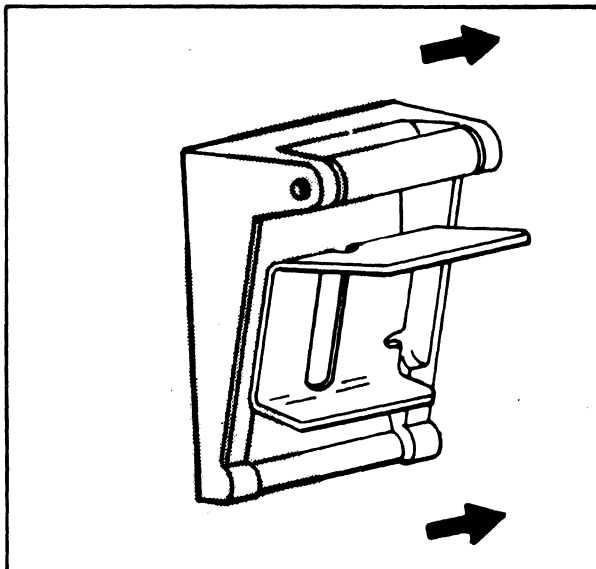
cessor. The punch can be set up to operate at speeds of up to 50 characters per second. The operation of the punch as a basic unit is described previously in this manual and reference to basic operation should be made in the applicable section.

### 4.3 OPERATION - TAPE TENSION AND OUT-OF-TAPE SWITCH

The tape tension and out-of-tape switch is mounted to the front of the desk top unit in order to allow tape to be controlled while it is being fed into the punch. If tape hangs up in the tape supply drawer, binds for some other reason before it enters the punch or if tape runs out, the switch will close. The switch must be adjusted so that tape depresses the actuating lever to produce microswitch contact transfer. An out-of-tape condition must release tension on the contact plunger so that contacts transfer. The switch must be adjusted to let the tension release plate drop out when a given value of tape tension is exceeded.

Adjust the switch as follows:

1. Tape tension must not exceed 4 to 6 ounces before the tension release plate drops out. To check this adjustment, insert a piece of tape into the switch as shown in Figure 4.3. Pull the tension release plate forward, insert tape sideways from the left and press the release plate back. Let the tape protrude from the switch at the top and bottom. Doublefold the lower end and pierce a hole through it. Insert a spring gage with a range of 0 to 10 ounces in the hole and hold it while pulling the upper end of the tape in its normal direction of travel. Measure the force required to cause the tape tension plate to drop out.



2. If the scale reads above or below the nominal 4 to 6 ounces, make adjustments by changing the setting of the tension adjustment screw; see Figure 4.4. Turning the screw clockwise lowers the upper pressure roller and increases the force required to drop out the tension release plate. Turning the screw counterclockwise reduces the amount of force required to make the plate drop out.

Figure 4.3 Tape Tension Switch

## SERIES 500 PUNCH

3. To check switch operation, shut off all power. Connect ohmmeter leads to the common and the normally-open terminals of the microswitch. Remove all tape from the switch. Set the meter to the Rxl range. The meter should indicate full scale.

NOTE: The switch actuating lever is spring-loaded to keep the microswitch contact plunger depressed when tape is NOT present. This keeps the normally-open contact closed when tape is absent or when the switch opens because of excessive tape tension.

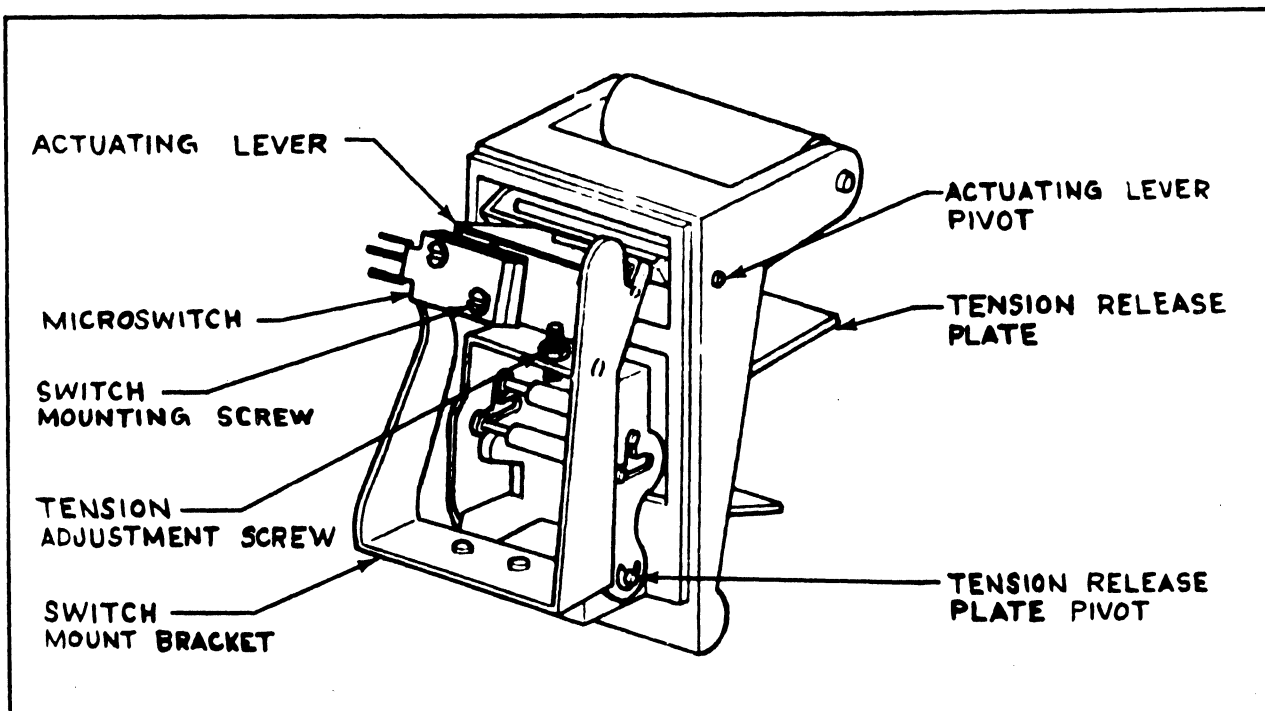


Figure 4.4 Tape Tension Switch Adjustment

4. Insert a piece of tape into the switch and close the tension release plate. The normally-open contact must then open as shown by an infinity reading on the ohmmeter.
5. If the meter readings for steps 3 or 4 do not correspond to those listed, loosen the microswitch mounting screws and carefully adjust the switch until a repeat of the two steps indicates that the switch is set correctly. Then tighten the microswitch mounting screws.
6. Apply power, insert tape, and operate the punch. Check that tape moves freely through the switch without binding. If it binds, check switch installation, tape insertion and the switch adjustment. Make necessary corrections.

NOTE: During normal operation the tension release plate may be pulled forward to halt punch operation.



## SERIES 500 PUNCH

### 4.4 ON-OFF-FEED SWITCH

Tape rewinding is controlled with a switch on the left-hand side of the forward cover section. The switch has three positions: ON, OFF and FORWARD FEED. This third position is spring-loaded. Turning the switch from OFF to ON starts the rotation of the rewinder motor and that of the tape reel, provided that tape is slack and ready for spooling.

The switch must be held down in the third position to override the normal spring loading. As long as the switch is held down it will cause the punch to advance tape while, simultaneously, punching sprocket holes into - as yet - unperforated tape. Releasing the switch from this position causes punch operation to stop but it keeps the rewinder motor energized for tape take-up.

CAUTION: The feed switch should be used only to prepare tape leaders or trailers. If the switch is depressed while the punch is operating under processor control, valuable data information may be lost by overriding the processor signal.

### 4.5 OPERATION - TAPE REWINDER

Rewinding under normal operating conditions begins as soon as enough tape has been fed out of the punch to let the tension arm on the rewind mechanism reach a slack-tape position. This state is obtained when the tension arm, which is spring loaded, moves toward the front of the desk top unit. The rewind operation continues as long as tape is being fed out of the tape supply drawer, through the punch and toward the rewinder.

Under a tight-tape condition or when the punch stops, tape tension begins to increase and the tension arm moves from the front of the unit toward the rear. As it reaches the approximate mid-point of its travel, that is, when it is approximately perpendicular to the base of the desk top unit, it causes microswitch tension contacts to transfer, thereby shutting the rewind drive motor off. The tension arm remains in this position until the punch starts to release more tape or until the operator turns the control switch to OFF.

### 4.6 ADJUSTMENT - TAPE REWINDER

1. Lift the tension arm to its perpendicular position; Figure 4.5. If the microswitch is transferred before this position is reached or does not transfer when this position is reached, loosen the cam setscrew. With the arm in the perpendicular position, adjust the cam so the microswitch transfers and tighten the setscrew.

## SERIES 500 PUNCH

2. Using a spring scale, determine that tension on the idler roller at the point the microswitch is transferred is one to two ounces. If it is not, loosen the spring stud and hold the tension arm at the switch transfer position with the spring scale. Turn the return-spring collar until the required tension is read and tighten the stud.
3. Torque on the spindle must be nine to twelve inch-ounces. To adjust this torque, loosen the setscrew on the torque collar, move the collar, as necessary, until the required torque is provided, and tighten the setscrew.

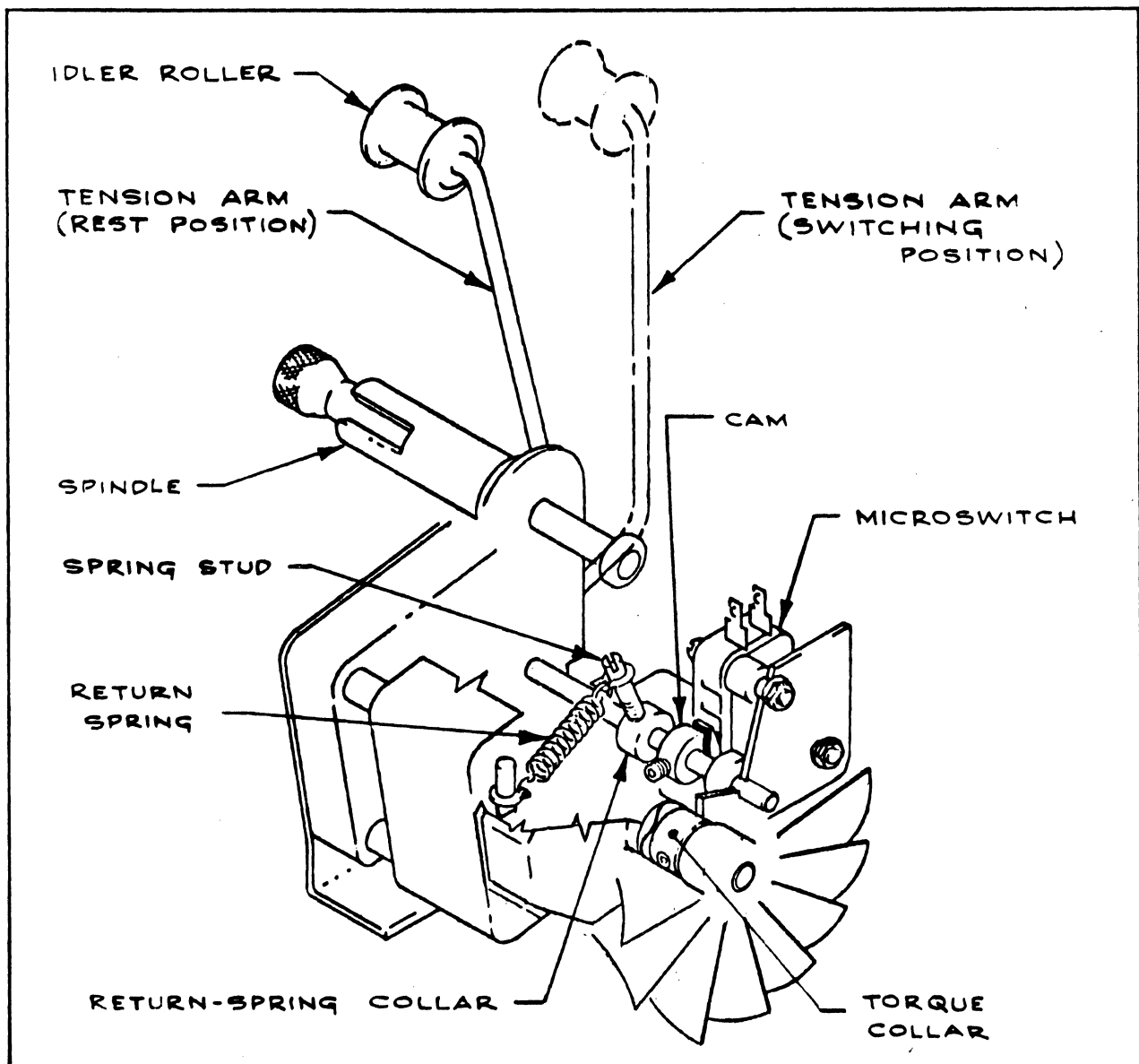


Figure 4.5 Tape Rewinder

## SERIES 500 PUNCH

### 4.7 DRIVE-BELT TENSION

Tension of the drive belt is correct when it can be depressed 1/4 inch with light finger pressure midway between motor and punch drive pulleys.

To adjust, loosen the four motor-mounting screws and nuts, move the motor in the required direction and tighten the nuts.

### 4.8 LUBRICATION

Turn all power OFF, remove the cover, disconnect all plugs and remove the Model 500 punch from the unit. Refer to paragraph 3.12, page 3-28, for cleaning and lubricating the basic punch.

Lubrication points of components of the desk top punch, other than the basic punch, are shown in the following figures. Numerals identify the lubricants listed in Table 3.2, page 3-29.

#### Reference Figure 4.6

- |  |   |
|--|---|
| A. Lubricate the rewinder spindle at the points it enters and leaves the rewinder motor gearbox. | B. Lubricate the ends of the ON-OFF switch pivot shaft. |
|  | C. Lubricate the tension arm pivot points.              |

#### Reference Figure 4.7

- |   |   |
|---|---|
| A. Lubricate the two pivot holes in the actuating lever.  | B. Grease the four contact areas on the overcentering spring. |
| C. Grease the upper and lower contact surfaces in the two slots on the tension release plate side frames. | D. Grease the two pivot holes in the tension release plate.   |

SERIES 500 PUNCH

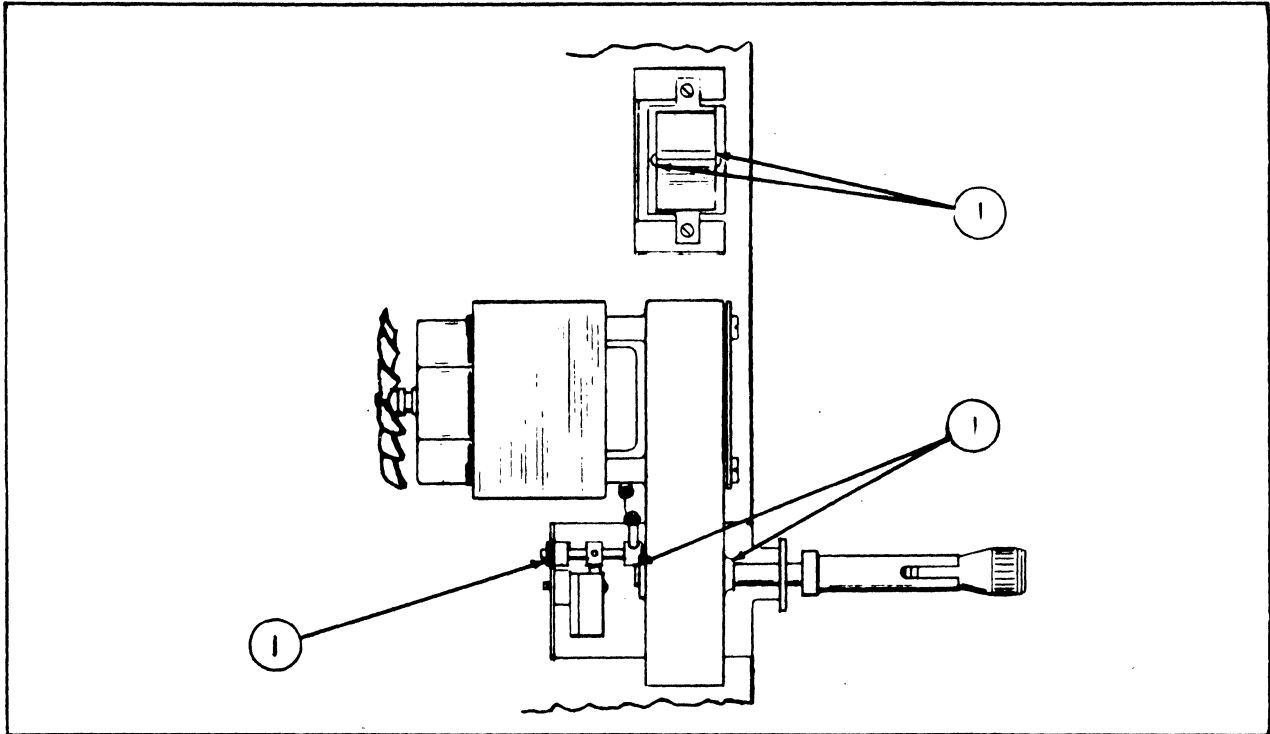


Figure 4.6 Lubrication Points: Tape Rewinder

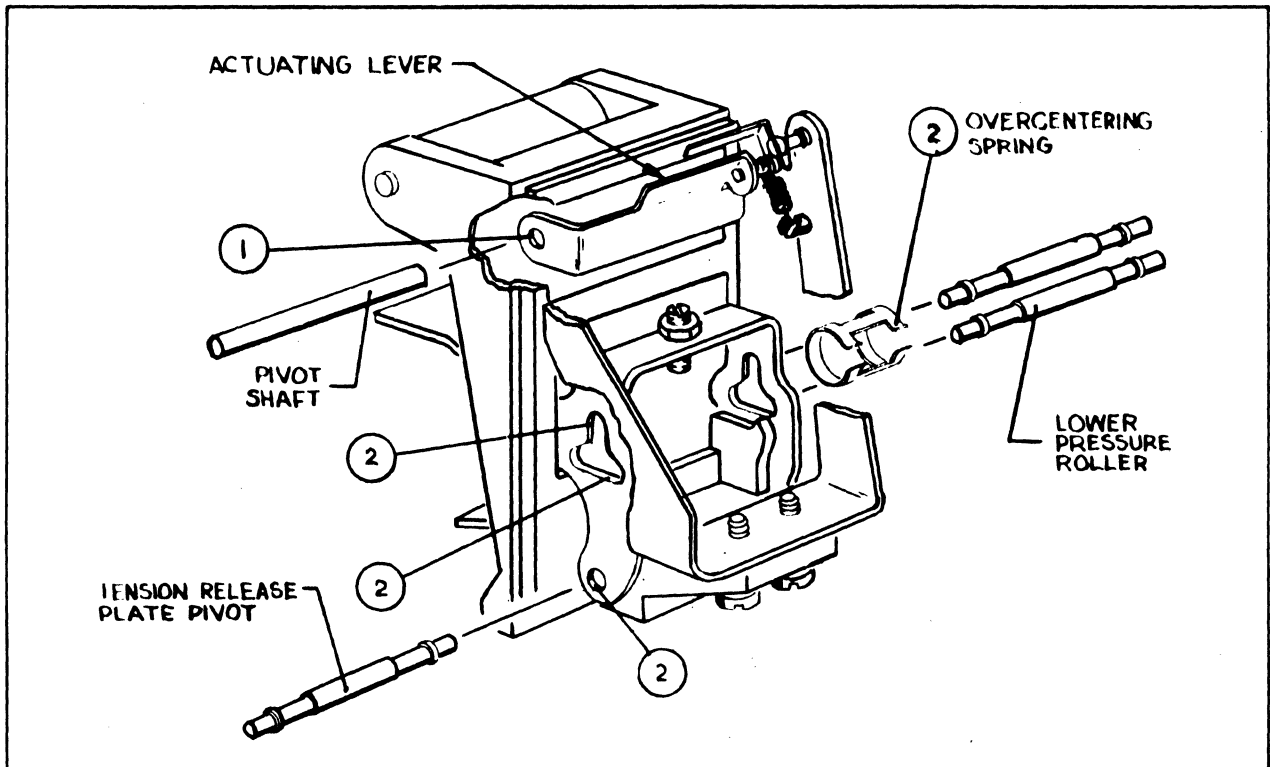


Figure 4.7 Lubrication Points: Tape Tension Switch

**SECTION 5**

**RACK MOUNTED PUNCH**

## SERIES 500 PUNCH

### SECTION 5

## RACK MOUNTED PUNCH

### 5.1 GENERAL DESCRIPTION

The rack mounted punch, Figure 5.1, is a self-contained device using a Model 500 basic punch. The panel contains the necessary accessories for tape handling and is designed for mounting in any standard 19-inch rack. It can be supplied with or without electronic logic.

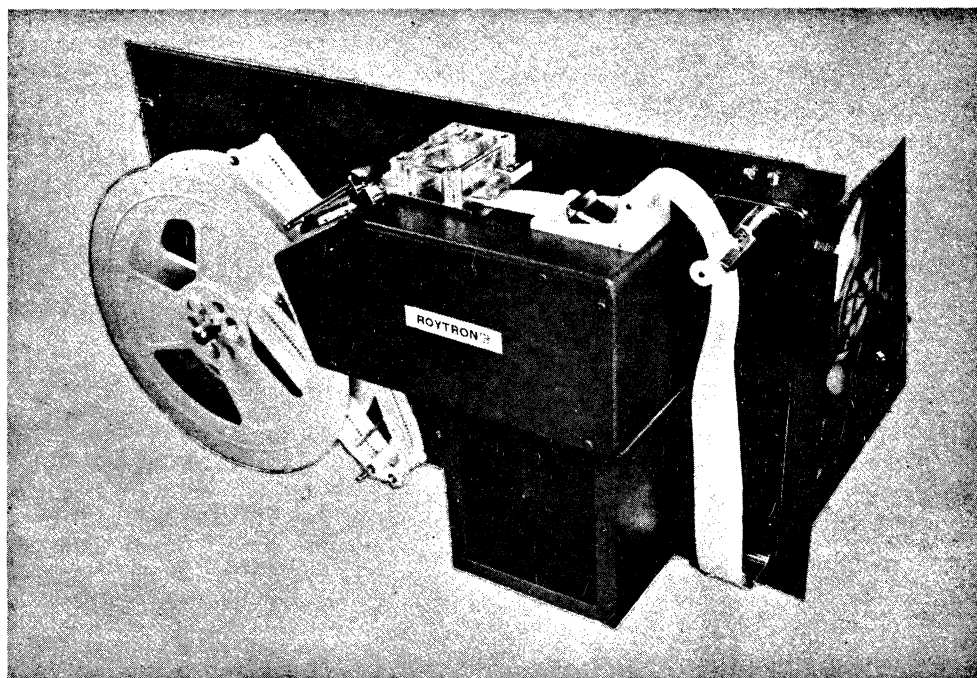


Figure 5.1 Rack Mounted Punch

A tape supply reel is mounted to a slide on the right side of the panel. The basic punch, chad box, tape rewriter, and the tape tension and out-of-tape, tape feed, full reel (optional) and OFF-UNIT-PUNCH switches are on the front of the panel. The chad box may easily be removed by pulling it forward. The punch cover can be removed by removing the positioning knob and by loosening (not removing) three screws; one on each side and one on the bottom of the cover. The basic punch can be removed, after the punch cover has been removed, by loosening the four screws below its slotted feet.

NOTE: Hold the nuts above the punch feet to keep the nuts from turning.

## SERIES 500 PUNCH

The essential parts for operation of the punch, its drive motor, the re-winder drive and the re-winder tension stop switch are mounted to the back of the panel as shown in Figure 5.2. Parts consist primarily of capacitors, resistors, a microswitch and the required switch actuating linkages.

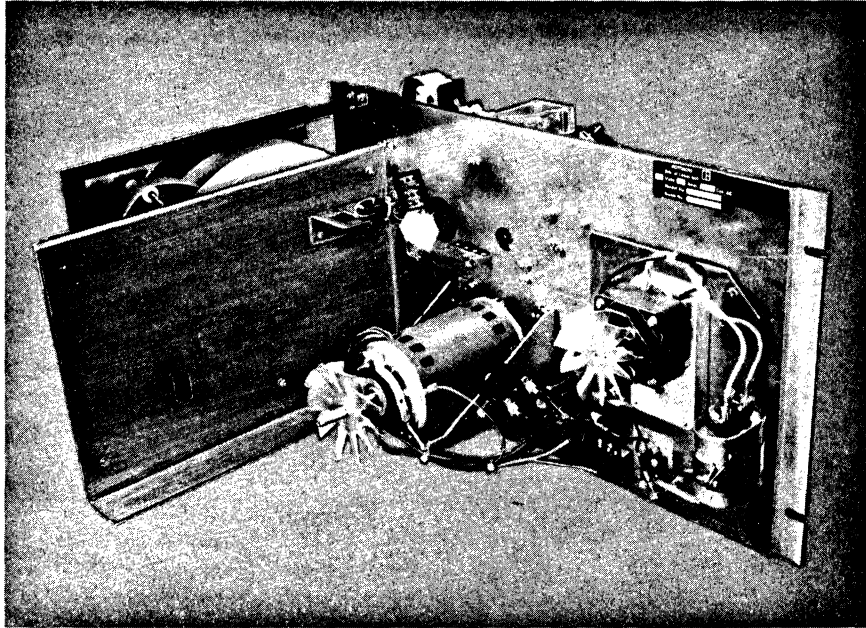


Figure 5.2 Rear View - Rack Mounted Punch

Two connectors, attached to the punch harness, plug into receptacles mounted on the tape supply slide panel. This provides a direct path to interface the punch with customer equipment via another 34-pin connector. Supply voltages to power the punch drive motor and tape re-winder also enter through this connector.

Models with electronic logic circuits contain these circuits on a board attached to the rear of the front panel. The discrete component or integrated circuit board is interfaced with the 34-pin connector via a 44-pin connector. Signals received from the central processor are thereby transmitted to the circuit logic and from there to the punch.

During normal operation, tape unspools from the tape supply reel, passes through the tape tension and out-of-tape switch and into the punch. When it emerges from the punch, the tape winds around the idler roller of the tension arm, a set of stationary rollers at the bottom of the front panel and into the take-up reel.

## SERIES 500 PUNCH

### 5.2 OPERATION - PUNCH

The motor that drives the punch input shaft rotates continuously when power is applied from an external source such as the central processor. The punch can be set up to operate at speeds of up to 50 characters per second. The operation of the punch as a basic unit is described in Section 3 and reference to basic operation should be made to that section.

If electronics have been included in the unit, begin the punching operation by flipping the PUNCH-OFF-UNIT switch to UNIT. To operate the punch without the rewind mechanism, flip the switch to PUNCH.

### 5.3 TAPE TENSION AND OUT-OF-TAPE SWITCH

The tape tension and out-of-tape switch is mounted at the input to the punch in order to allow tape to be controlled while it is being feed into the punch. If tape hangs up in the tape supply slide, binds for some other reason before it enters the punch or tape runs out, the switch contacts will close. The switch must be adjusted so that tape depresses the actuating lever to produce microswitch contact transfer. An out-of-tape condition must release tension on the contact plunger so that contacts reverse. The switch must be adjusted to let the tension release plate drop out when a given value of tape tension is exceeded.

Before the switch can be adjusted, the punch cover must be removed. Refer to paragraph 4-3, page 4-3, for adjustment, except, in step 1, press the tension release plate to the left and slide tape under it. Let tape protrude from the left and right of the switch. The right end must be long enough to go over the roller. Doublefold the left end and pierce a hole through it. After inserting the spring gage, pull the right tape end over the roller.

### 5.4 FULL REEL SWITCH (OPTIONAL)

The sensing lever of the full reel switch is located next to the take-up reel. As the reel fills with tape, the angle of the tape changes as it approaches the reel. When the reel becomes full, the approaching tape presses against the sensing lever, tripping the switch actuator. The actuator releases the microswitch button, opening switch contacts.

To adjust the switch, refer to Figure 5.3 and proceed as follows:

1. Loosen the microswitch mounting screws and move the switch so the contacts will transfer when the switch actuator is released from the latching position and transfer again when the actuator is re-latched. Tighten the screws.



## SERIES 500 PUNCH

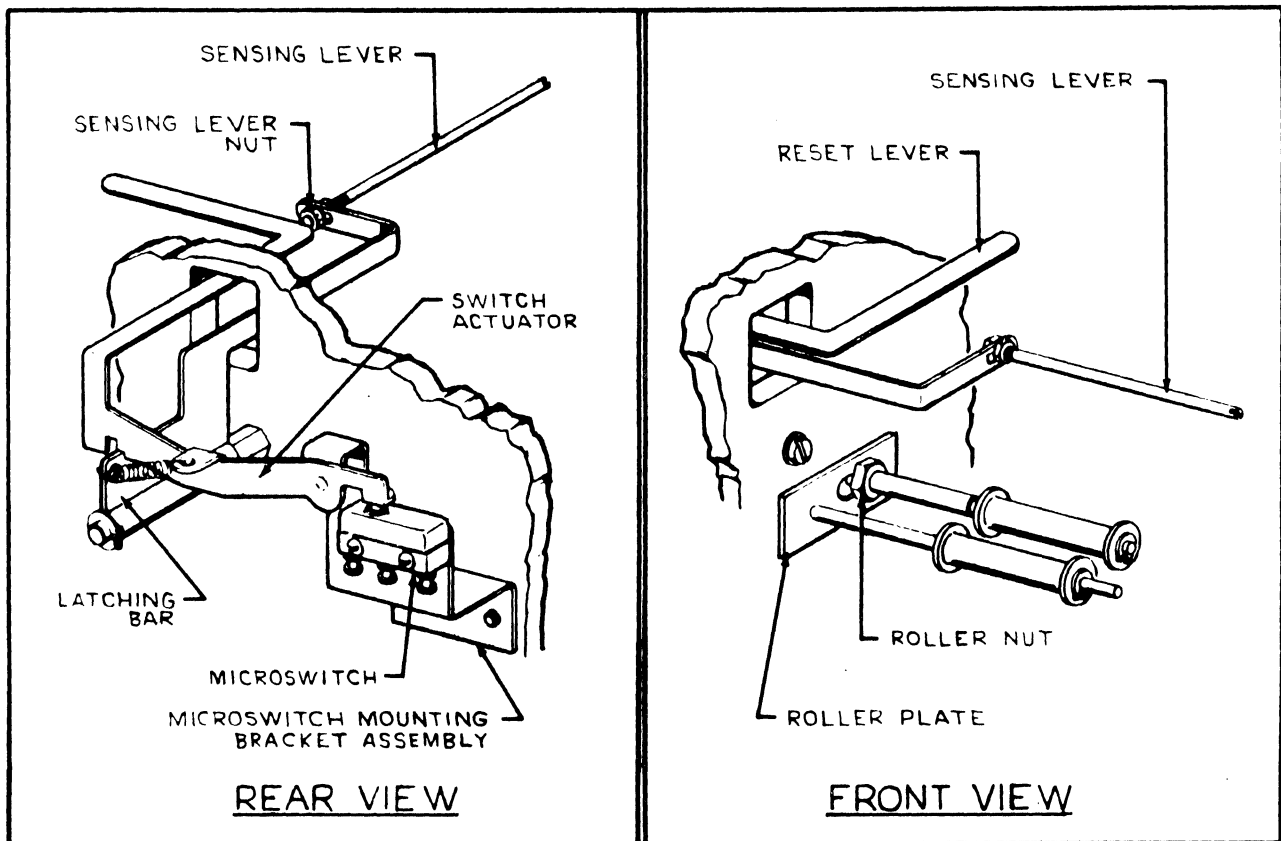


Figure 5.3 Full Reel Switch

2. Adjust the microswitch mounting bracket assembly by loosening its mounting screws and by moving it so the latching bar leans slightly to the right of its pivot point, when looking at it from the rear of the panel. This will insure movement of the latching bar with minimum resistance. Tighten the screws.
3. With the actuator in a latched position, loosen the sensing lever nut and move the lever to where it will be pushed far enough to unlatch the actuator by the tape about to be wound on a properly threaded 7-1/2 inch reel filled within 1/8 inch of maximum capacity. Tighten the nut.
4. Install an 8-1/2 inch reel on the unit with properly threaded tape. Loosen the roller nut and rotate the roller plate so tape operates the switch when the reel is filled to 1/8 inch of capacity (about 800 feet of tape). Tighten the nut.

## SERIES 500 PUNCH

### 5.5 TAPE REWINDER

The tape rewriter is the same as the one on the desk top punch. Refer to paragraph 4.5, page 4-5, for operation and paragraph 4.6, page 4-5, for adjustment.

### 5.6 DRIVE-BELT TENSION

To check drive-belt tension, first remove the drive-belt cover next to the chad box. Tension of the drive belt is correct when it can be depressed 1/4 inch with light finger pressure midway between motor and punch drive pulleys. To adjust, loosen the four motor mounting screws and nuts, move the motor in the required direction and tighten the nuts. Replace the cover.

### 5.7 LUBRICATION

Refer to paragraph 4.8, page 4-7, for lubrication of all components of the rack mounted punch. Also, lubricate as follows:

1. Place Gulflex "A" grease, or equivalent, on the tracks of the tape supply slide.
2. Lubricate the two pivot points of the full reel switch (if installed) with Custom Lube 700 oil.

**SECTION 6**

**LOGIC & TIMING**

## SERIES 500 PUNCH

### SECTION 6

## LOGIC & TIMING

### 6.1 PUNCH LOGIC DESCRIPTION (DISCRETE LOGIC)

Input signals for correct punch operation are the eight character code bits, the feed direction control signal and the start process signal. The output signal from the punch is the in-process signal.

The START PROCESS signal sets the feed control flipflop to initiate a feed and punch cycle. The feed control flipflop generates the IN-PROCESS signal, which is also used as an input signal to two AND gates. The FEED CONTROL signal supplies the second input signal to the same AND gates.

The FEED CONTROL signal is either HIGH (ground) or LOW (-6vdc). It passes unchanged to the forward feed flipflop gate, but it is inverted before it goes to the reverse feed flipflop gate. Consequently, a HIGH FEED CONTROL signal will enable the forward feed flipflop, but will inhibit the reverse feed flipflop. Conversely, a LOW will inhibit the forward feed flipflop while enabling the reverse feed flipflop. The FEED CONTROL signal must be applied before the START PROCESS signal to ensure correct direction of feed.

The trigger to set either the forward or reverse feed flipflops is provided by a high or low-going pulse generated by Z1. The low-going pulse at zero degrees sets the forward feed flipflop, while the high-going pulse at 180 degrees sets the reverse feed flipflop. Z1 is a pulse generator attached to the input shaft of the punch.

Characters can be punched only when the FEED CONTROL signal is HIGH to produce forward tape travel. Character bit or data line signals must be HIGH for any selected punch solenoid, and this signal must be present during the time that the forward feed and punch control flipflop is set. The output of this flipflop is applied to the index punch and forward feed solenoids and to all of the eight punch solenoid gates. The signal is ANDED with a DATA LINE signal to energize any selected punch solenoid.

At 180° forward feed and punch control flipflop is reset to remove the drive from any punch and feed solenoid. The reset signal of this flipflop is ANDED with the output of the reverse feed flipflop to reset the feed control flipflop, which removes the IN-PROCESS signal. At an optimum operating speed of 50 characters per second, the next START PROCESS signal and any selected DATA LINE signal must be applied within 10 milliseconds following 180°, or before the next low-going Z1 pulse at zero degrees.

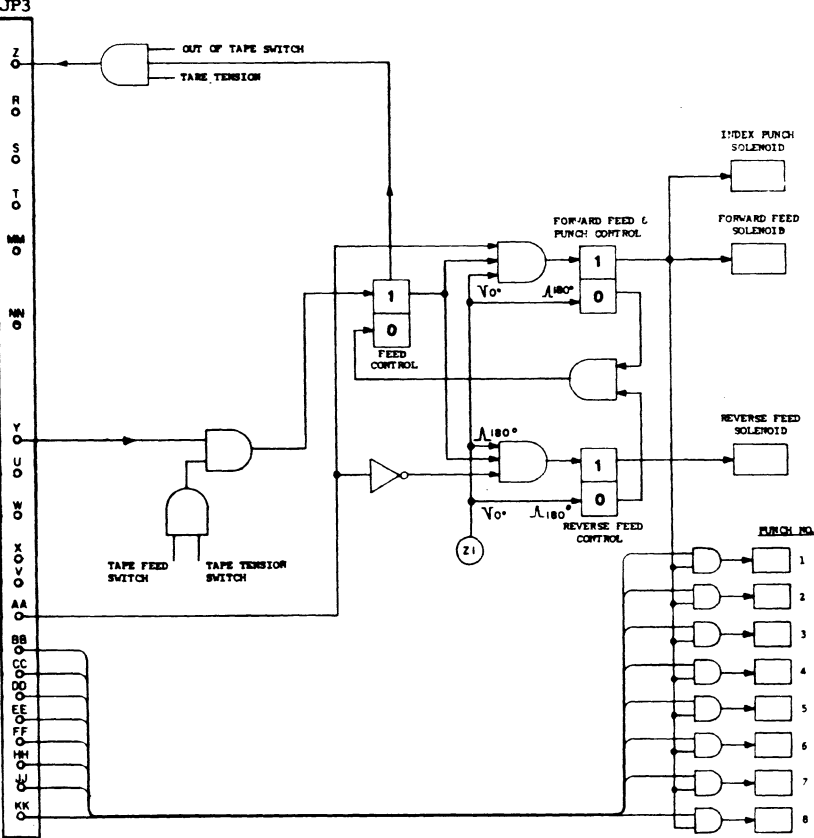
## SERIES 500 PUNCH

The TAPE TENSION and OUT-OF-TAPE signals are provided to indicate that either tape is under too much tension or that there is no tape available for punching. In such case, the IN-PROCESS signal is pulled HIGH to stop punch operation. When tape is not under tension, the corresponding TAPE TENSION signal is ANDED with the TAPE FEED signal from the manual tape feed switch. Consequently, the feed control flipflop is set to initiate a tape feed operation with simultaneous punching of index holes if the FEED CONTROL signal is HIGH. Reverse feeding without index hole punching takes place if the FEED CONTROL signal is LOW.

6.2 LOGIC DIAGRAM FOR PUNCH MODELS 524 & 528 (DISCRETE LOGIC)

The drawing on the right, represents a functional logic diagram of the circuitry which is found on the 524/528 printed circuit board, using discrete components. Its primary purpose is to indicate signal inputs into the printed circuit board, via the 34 pin connector (JP3) from a functional viewpoint, and does not represent actual circuit connections.

FUNCTION/SIGNAL	VOLTAGE	CURRENT IN AMPS	I/O	REMARKS
In Process Ground	Ground		Out	High when punch busy or tight tape .....
+6v supply line	+6 ±10%	0.06	In	DC supply .....
-18v supply line	-18 ±10%	0.325	In	Neg. DC supply 325ma including Delayed -18v .....
-18v (delayed)	-18 ±10%		In	Delayed 1ms minimum .....
Start Process	Ground/-6		In	Input to Feed Control flip-flop .....
Punch Solenoid Common	-24 (1)	0.75 max	In	Supply line through AC relay contacts .....
AC Input	115 (nominal)	4.0	In	AC power line .....
AC Input	115 (nominal)	4.0	In	AC power line (fused) .....
Ground	Ground		In	Chassis ground .....
Feed Direction Control	Ground/-6		In	-6v for reverse, ground for forward .....
Punch #1	Ground/-6		In	Bit is -6vdc, no bit is ground .....
Punch #2	Ground/-6		In	Bit is -6vdc, no bit is ground .....
Punch #3	Ground/-6		In	Bit is -6vdc, no bit is ground .....
Punch #4	Ground/-6		In	Bit is -6vdc, no bit is ground .....
Punch #5	Ground/-6		In	Bit is -6vdc, no bit is ground .....
Punch #6	Ground/-6		In	Bit is -6vdc, no bit is ground .....
Punch #7	Ground/-6		In	Bit is -6vdc, no bit is ground .....
Punch #8	Ground/-6		In	Bit is -6vdc, no bit is ground .....



Notes:

(1) Optional 48V coils available.

Figure 6.1 Logic Diagram for Punch Models 524 & 528 (discrete logic)

## SERIES 500 PUNCH

### 6.3 TIMING DIAGRAM FOR PUNCH MODELS (DISCRETE LOGIC)

The timing diagram and pulse shapes are representative for punch operation using discrete electronics in either the rack mounted punch, Model 524, or the desk mounted punch, Model 528. Signals are underlined and circuit components refer to the applicable schematic in Section 11.

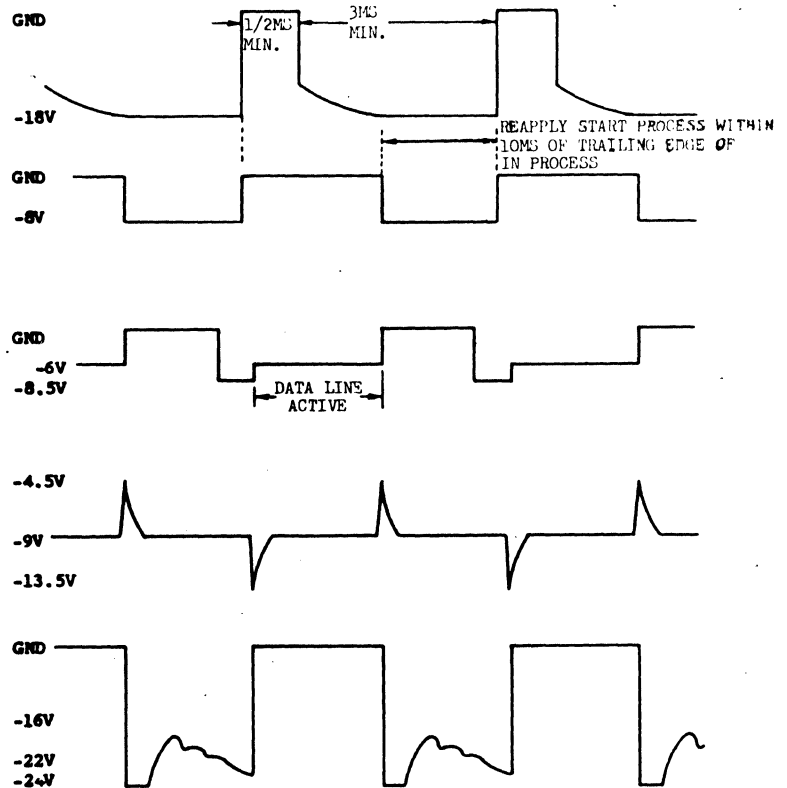
Start Process  
(Capacitor C5)

In Process  
(Diode CR21)

Data Line

Timing Pulse  
(Base of TR11)

Forward Feed  
(Collector of TR10)



NOTE: Timing is shown for punch operation at 50 characters per second.

Figure 6.2 Timing Diagram for Punch Models (discrete logic)

**SECTION 7**

**CIRCUITS**



# SERIES 500 PUNCH

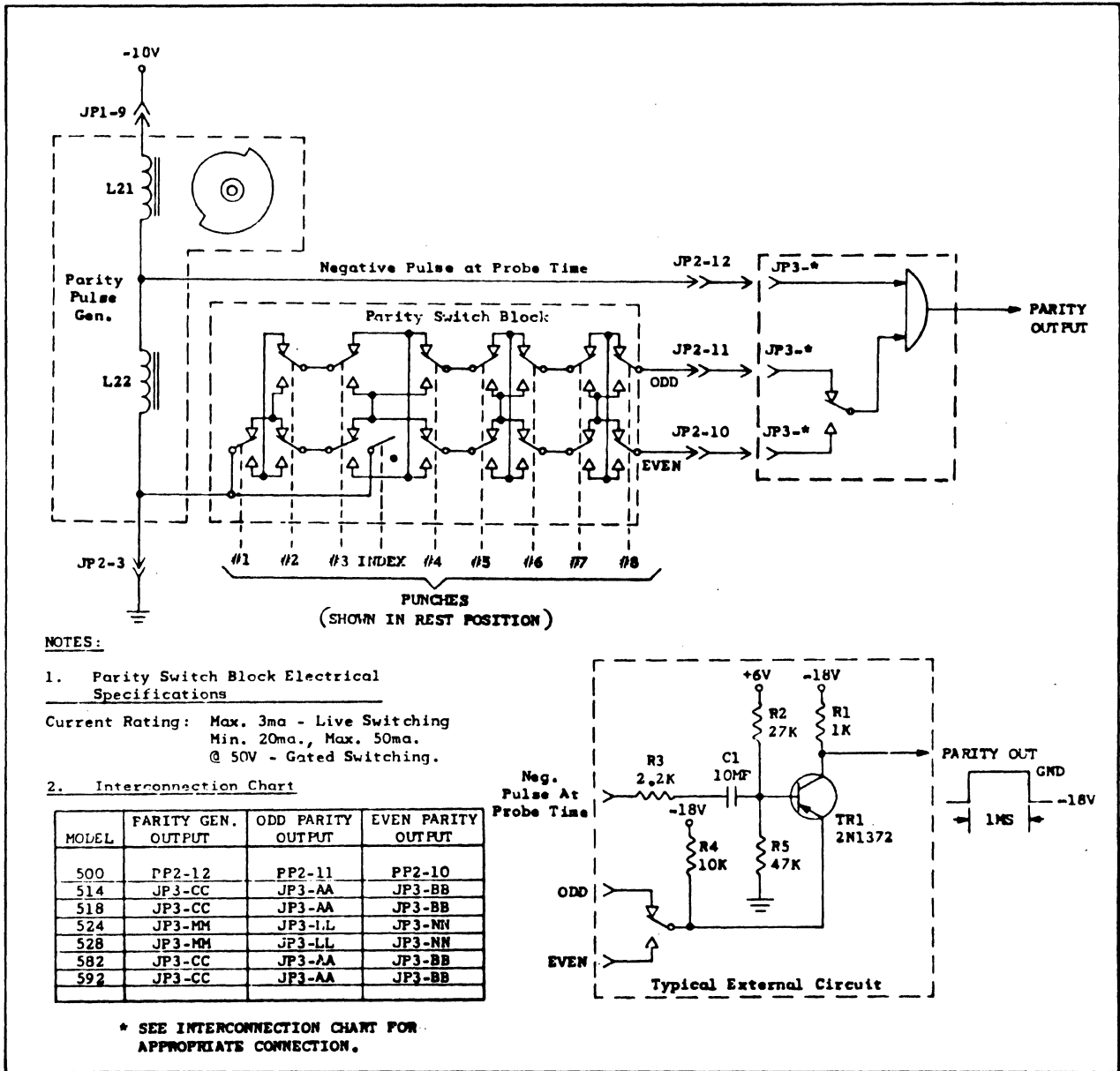


Figure 7.10 Parity Switch Block Interconnections and Typical Circuit

## 7.10 PARITY PULSE GENERATOR ELECTRONIC DESCRIPTION (OPTIONAL)

The parity pulse generator is connected through JP1-pin 9 to -18 volts. The pulse generator load coil is connected through JP2-pin 3 to ground.

Rotation of the pulse generator disc produces alternate negative and positive pulses that appear at JP3 (see applicable wiring diagram or Figure 7.10 for pin number) via JP2-pin 12.

## SERIES 500 PUNCH

The even parity signal appears at connector JP3 (see applicable wiring diagram or Figure 7.10 for pin number) via connector JP2-pin 10. Odd parity appears at JP3 via JP2-pin 11.

The parity interconnections and a typical parity circuit are shown in Figure 7.10.

MODELS 582 AND 583 READER/PUNCH  
INTERCONNECTIONS AND SCHEMATIC

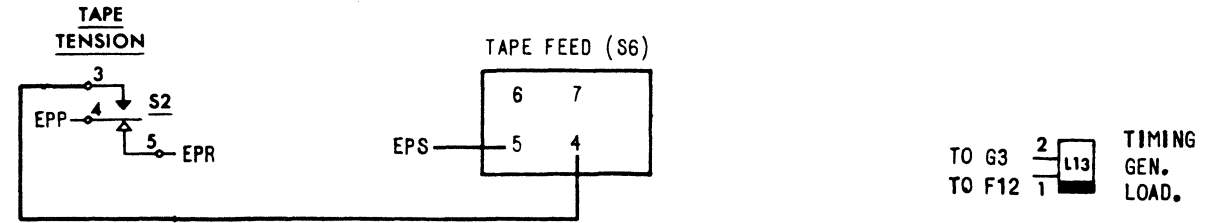
CONNECTORS C,D,F,G  
PIN IDENTIFICATION

10	7	4	1	1	4	7	10
11	8	5	2	2	5	8	11
12	9	6	3	3	6	9	12

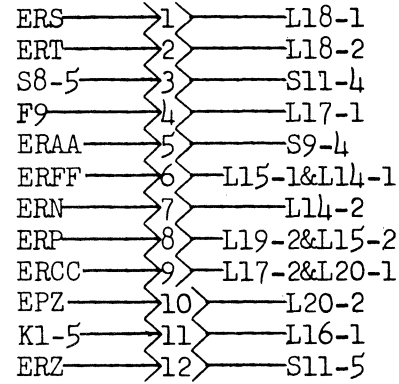
CONNECTOR  
IDENTIFICATION

- C 12 PIN CONNECTOR READER (BLACK)
- D 12 PIN CONNECTOR READER (WHITE)
- ER 34 PIN CONNECTOR (READER)
- EP 34 PIN CONNECTOR (PUNCH)
- F 12 PIN CONNECTOR PUNCH (WHITE)
- G 12 PIN CONNECTOR PUNCH (BLACK)
- H TERMINAL STRIP ON PUNCH

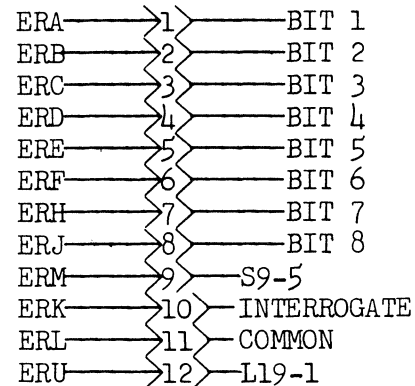
MODELS 582 AND 583 READER/PUNCH



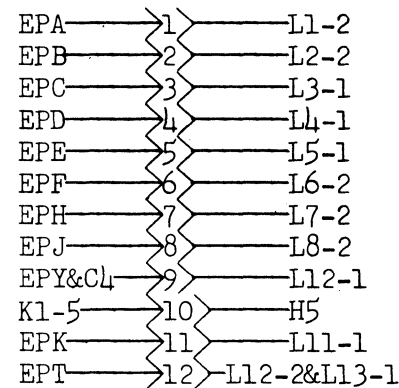
CONNECTOR C



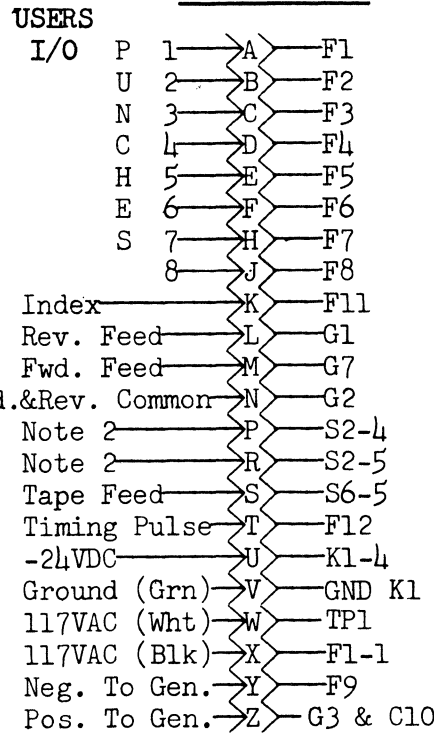
CONNECTOR D



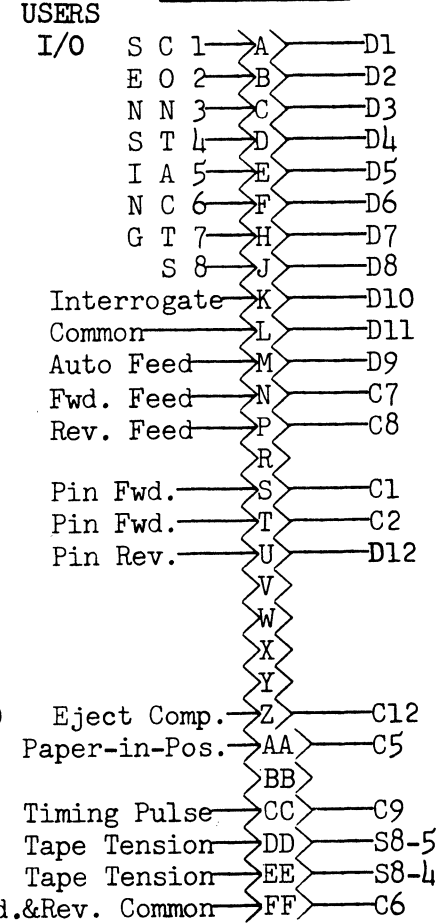
CONNECTOR F



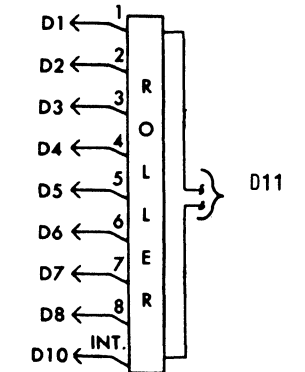
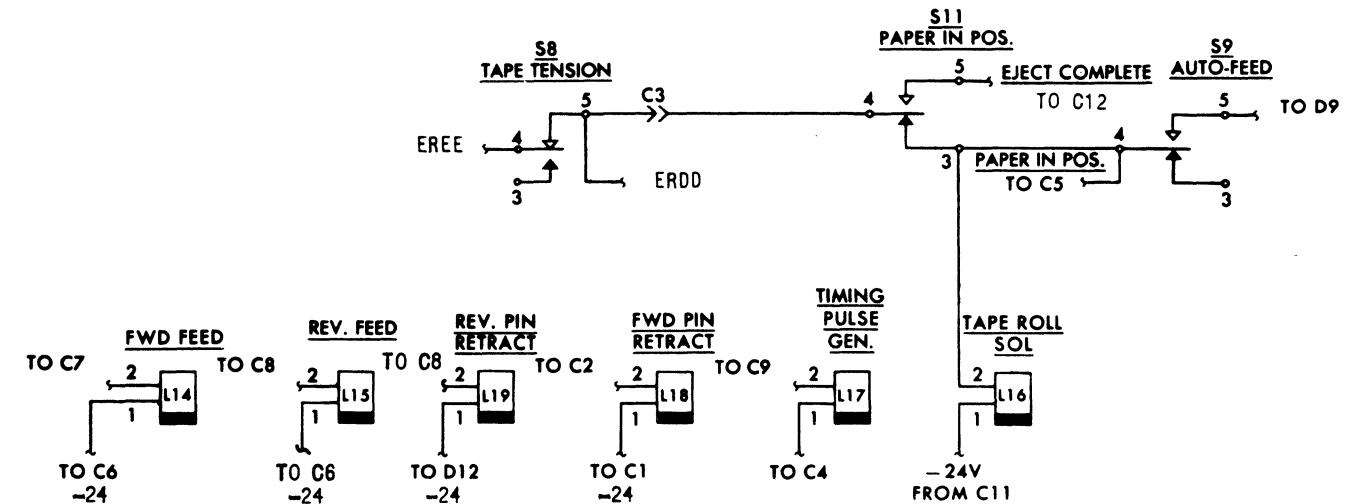
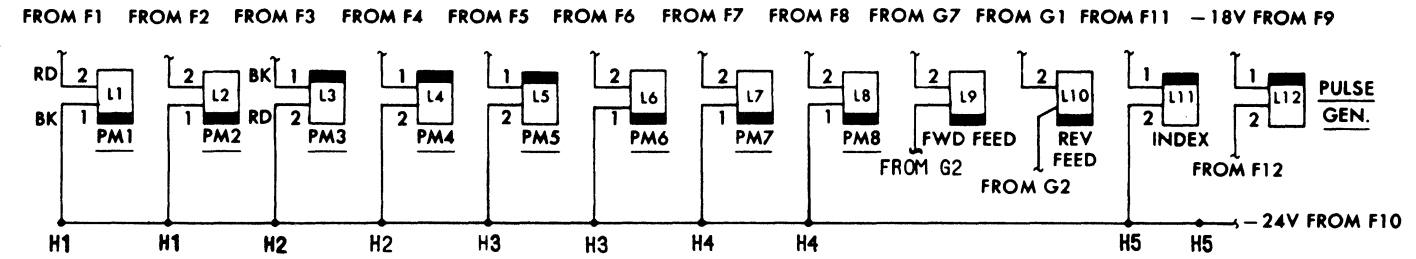
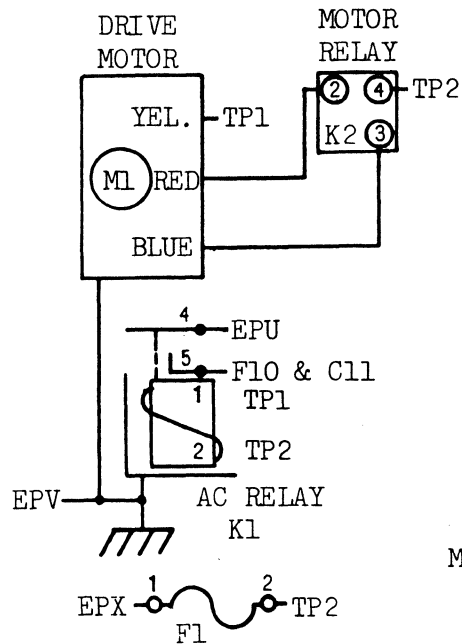
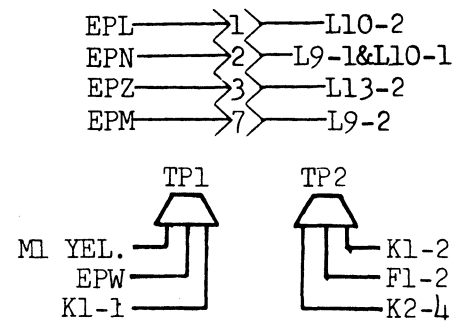
CONNECTOR EP



CONNECTOR ER



CONNECTOR G



NOTE:  
PULSE GENERATOR BIAS REQUIREMENTS  
-18 VDC (OR 15MA) PER SET OF (2) COILS.  
POLARITY MUST BE AS SHOWN TO GENERATE  
A TIMING PULSE OF POLARITY AND AMPLITUDE  
AS PER MECHANICAL TIMING CHART. REVERSE  
POLARITY TIMING MAY BE GENERATED BY RE-  
VERSING BIAS POLARITY.

NOTES:

1. Bit is Ground, No Bit is open circuit.
2. Tape Tension and Punch out of Tape Switch.

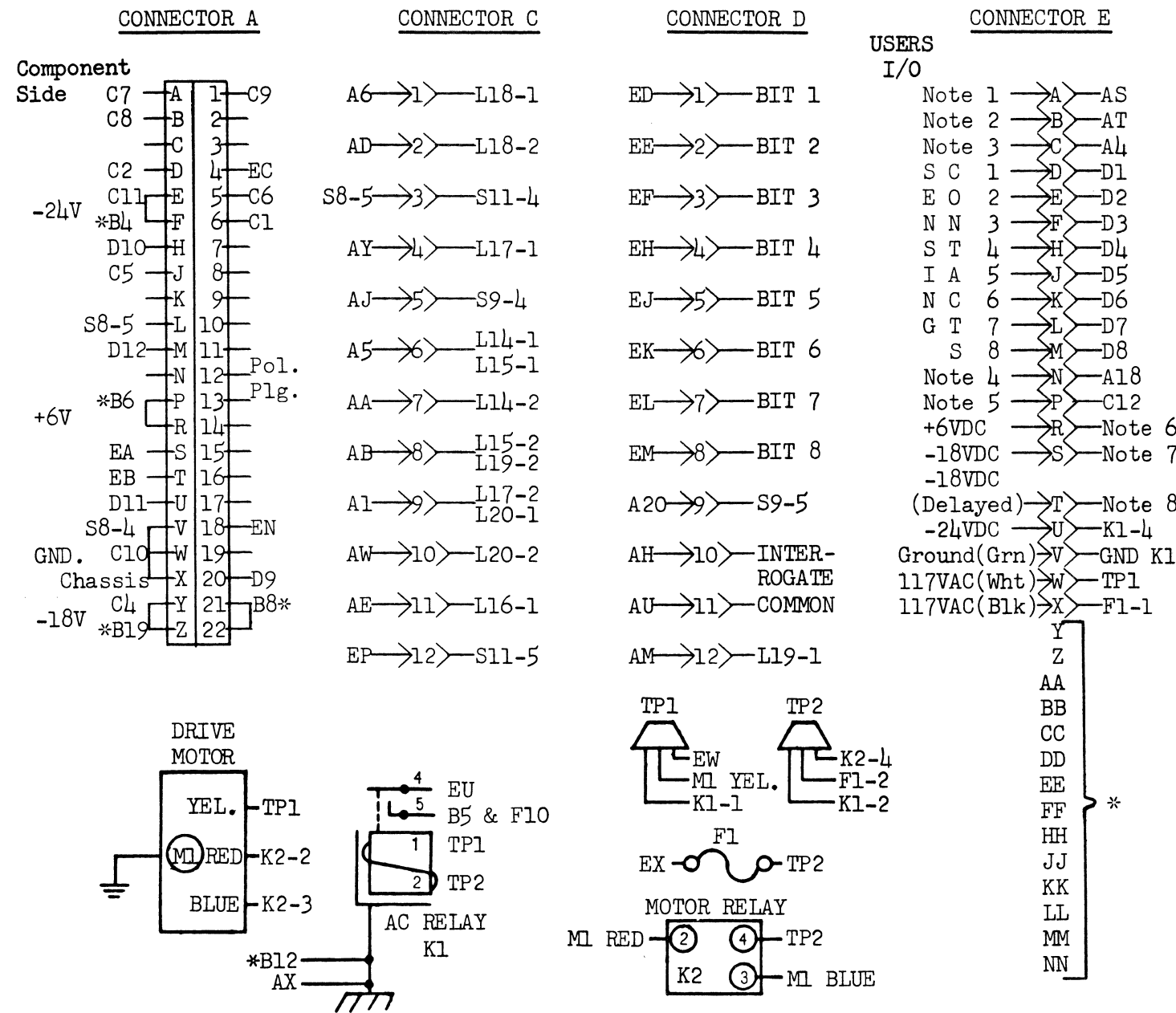
MODELS 592 AND 593 READER  
INTERCONNECTIONS AND SCHEMATIC

CONNECTORS C & D  
PIN IDENTIFICATION

10	7	4	1	1	4	7	10
11	8	5	2	2	5	8	11
12	9	6	3	3	6	9	12

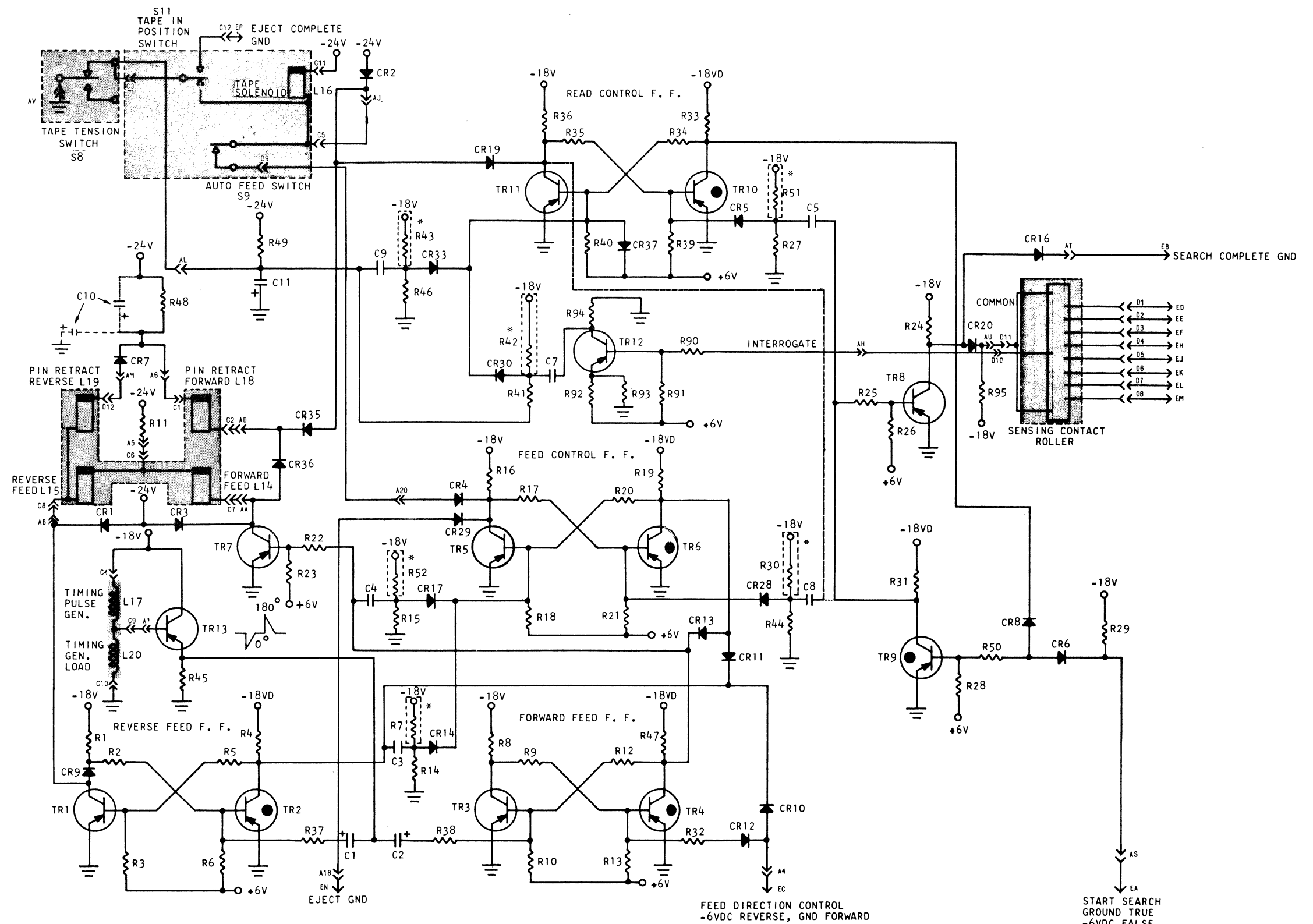
CONNECTOR  
IDENTIFICATION

- A-44 PIN READER CIRCUIT CARD CONNECTOR
- C-12 PIN CONNECTOR (BLACK)
- D-12 PIN CONNECTOR (WHITE)
- E-34 PIN CONNECTOR



1. Start Search Signal (Ground referenced from -6VDC)
2. Search Complete (Ground)
3. Feed Direction Control (Ground Fwd.) (-6VDC Rev.)
4. Eject (Ground)
5. Eject Complete
6. +6VDC to Connector B7\* and B6\* then to AP
7. -18VDC to Connector B20\*, B19\* and B18\* then to AZ
8. -18VDC (Delayed) to Connector B9\*, B8\* then to A21

\* See Punch Schematic Drawing



△ DENOTES NORMALLY OPEN CONTACT  
▲ DENOTES NORMALLY CLOSED CONTACT

CONNECTOR IDENTIFICATION  
A 44 PIN PRINTED CIRCUIT CARD CONNECTOR  
C 12 PIN CONNECTOR BLACK  
D 12 PIN CONNECTOR WHITE  
E 34 PIN CONNECTOR AT REAR OF UNIT

NOTE  
SEE INTERCONNECTIONS DIAGRAM FOR MOTOR CONNECTIONS AND VOLTAGE INPUT PIN LOCATIONS.

VALUES AND PART NUMBER OF COMPONENTS ARE FOUND IN THE ELECTRICAL PARTS LIST.

SHADED AREAS ARE LOCATED EXTERNAL TO THE PRINTED CIRCUIT CARD.

DASHED LINE INDICATES CIRCUITRY FOR PRINTED CIRCUIT CARDS WITH RED NUMERAL 1 IDENTIFICATION, DISREGARD DOTTED LINE.

DOTTED LINE INDICATES CIRCUITRY FOR PRINTED CIRCUIT CARDS WITHOUT RED NUMERAL 1 IDENTIFICATION, DISREGARD DASHED LINE.

\* COMPONENT AND CONNECTION TO -18V IS ONLY ON PRINTED CIRCUIT CARDS IDENTIFIED WITH RED NUMERAL 1.

MODELS 592 AND 593 PUNCH  
INTERCONNECTIONS AND SCHEMATIC

CONNECTORS F & G  
PIN IDENTIFICATION

10	7	4	1	1	4	7	10
11	8	5	2	2	5	8	11
12	9	6	3	3	6	9	12

See 592 and 593 Reader Interconnections and Schematic for Motor connections.

CONNECTOR IDENTIFICATION

B-44 PIN PUNCH CIRCUIT CARD CONNECTOR  
E-34 PIN CONNECTOR  
F-12 PIN CONNECTOR (WHITE)  
G-12 PIN CONNECTOR (BLACK)  
H TERMINAL STRIP ON PUNCH

CONNECTOR B

Component Side	Connector B	Terminal
G7	A	1
F1	B	2
F8	C	3
F7	D	4
F6	E	5
F5	F	6
F4	H	7
EKK	J	8
F3	K	9
EJJ	L	10
F2	M	11
EHH	N	12
EFF	P	13
R	Pol. Plg.	14
EEE	S	15
EDD	T	16
ECC	U	17
EBE	V	18
F12	W	19
S2-5	X	20
EAA	Y	21
EZ	Z	22

CONNECTOR F

BB	1	L1-2
BM	2	L2-2
BK	3	L3-1
BH	4	L4-1
BF	5	L5-1
BE	6	L6-2
BD	7	L7-2
BC	8	L8-2
B18	9	L12-1
B13	11	L11-1
BW	12	L12-2
		L13-1

CONNECTOR G

B15	1	L10-2
B21	2	L9-1
		L10-1
B11	3	L13-2
BA	7	L9-2

CONNECTOR E

A	
B	
C	
D	
E	
F	
H	
J	
K	
L	
M	
N	
P	
S	
T	
U	
V	
W	
X	
Y	B22
Z	BZ
AA	BY
P	1
U	2
N	3
C	4
H	5
E	6
S	7
	8

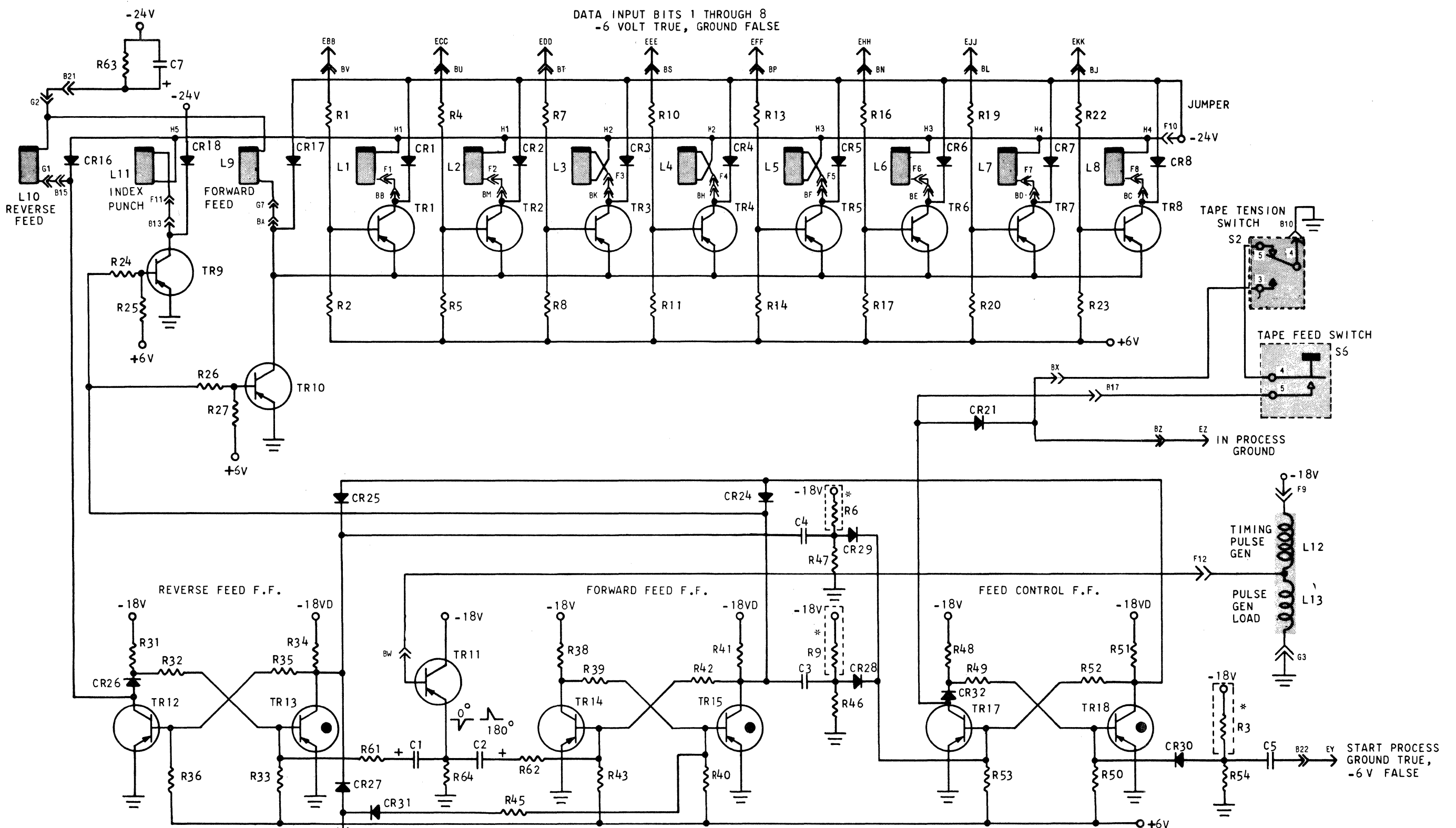
TERMINAL H

1	L1-1
	L2-1
2	L3-2
	L4-2
3	L5-2
	L6-1
4	L7-1
	L8-1
5	L11-2
	F10

NOTES:

1. Start Process
2. In Process
3. Feed Direction Control
4. Punch out of Tape Switch
5. Bit is -6VDC, No Bit is Ground

\* See Reader Schematic



▲ DENOTES NORMALLY OPEN CONTACT  
▲ DENOTES NORMALLY CLOSED CONTACT

CONNECTOR IDENTIFICATION

B 44 PIN PRINTED CIRCUIT CARD CONNECTOR  
E 34 PIN CONNECTOR AT REAR OF UNIT  
F 12 PIN CONNECTOR WHITE  
G 12 PIN CONNECTOR BLACK  
H TERMINAL STRIP ON SIDE OF PUNCH UNIT

FEED DIRECTION CONTROL  
-6 V SOLID FOR REVERSE FEED  
GROUND FOR FORWARD FEED

NOTE  
SEE INTERCONNECTIONS DIAGRAM FOR MOTOR CONNECTIONS  
AND VOLTAGE INPUT PIN LOCATIONS.

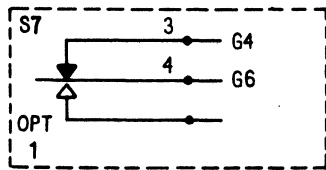
VALUES AND PART NUMBER F COMPONENTS ARE FOUND IN  
THE ELECTRICAL PARTS LIST

SHADED AREAS ARE LOCATED EXTERNAL TO THE PRINTED CIRCUIT CARD

\* COMPONENT AND CONNECTION TO -18V IS ONLY ON PRINTED  
CIRCUIT CARDS IDENTIFIED WITH RED NUMERAL 1.

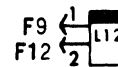


MODELS 500 AND 501 PUNCH  
INTERCONNECTIONS AND SCHEMATIC

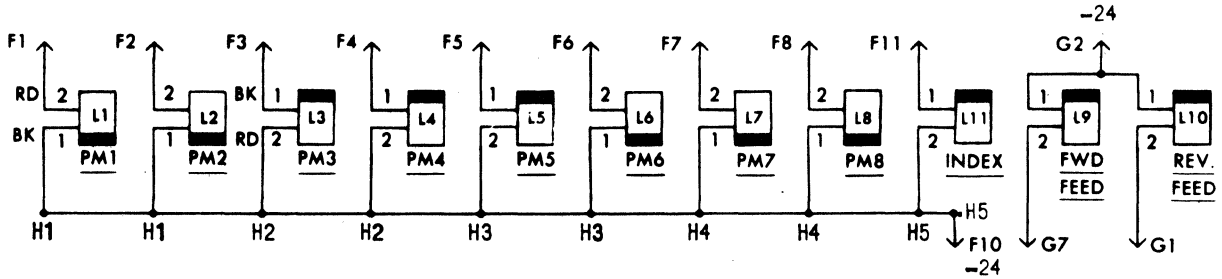
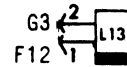


PUNCH OUT OF TAPE

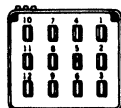
TIMING  
PULSE  
GEN.



TIMING  
GEN.  
LOAD



CONNECTORS F AND G  
PIN IDENTIFICATION



NOTE:

PULSE GENERATOR BIAS REQUIREMENTS:

-18 VDC (OR 15MA) PER SET OF (2) COILS.  
POLARITY MUST BE AS SHOWN TO GENERATE  
A TIMING PULSE OF POLARITY AND AMPLITUDE  
AS PER MECHANICAL TIMING CHART. REVERSE  
POLARITY TIMING MAY BE GENERATED BY RE-  
VERSING BIAS POLARITY.

H-TERMINAL STRIP ON PUNCH

MODELS 528 AND 529 PUNCH  
INTERCONNECTIONS AND SCHEMATIC

**NOTES:**

1. Start Process
2. In Process
3. Feed Direction Control
4. Bit is -6VDC, No Bit is Ground

**CONNECTORS F AND G  
PIN IDENTIFICATION**

10	7	4	1	1	4	7	10
11	8	5	2	2	5	8	11
12	9	6	3	3	6	9	12

**CONNECTOR IDENTIFICATION**

- B-44 PIN PUNCH CIRCUIT CARD CONNECTOR
- E-34 PIN CONNECTOR
- F-12 PIN CONNECTOR (WHITE)
- G-12 PIN CONNECTOR (BLACK)
- H TERMINAL STRIP ON PUNCH

**CONNECTOR E**

- A
- B
- C
- D
- E
- F
- H
- J
- K
- L
- M
- N
- P

**USERS I/O**

- +6VDC → R → B7
- 18VDC → S → B20
- 18VDC → T → B9
- (Delayed) → U → K1-4
- GND (Grn) → V → GND K1
- 117VAC (Wht) → W → TP1
- 117VAC (Blk) → X → F1-1
- Note 1 → Y → B22
- Note 2 → Z → BZ
- Note 3 → AA → BY
- Note 4 → P → 1 → BB → BV
- U → 2 → CC → BU
- N → 3 → DD → BT
- C → 4 → EE → BS
- H → 5 → FF → BP
- E → 6 → HH → BN
- S → 7 → JJ → BL
- 8 → KK → BJ

**TERMINAL H**

- L1-1
- L2-1
- L3-2
- L4-2
- L5-2
- L6-1
- L7-1
- L8-1
- L11-2
- F10

**CONNECTOR B**

- Component Side
- G7 → A → 1
  - F1 → B → 2
  - F8 → C → 3
  - F7 → D → 4
  - F6 → E → 5 → K1-5
  - F5 → F → 6
  - F4 → G → 7 → ER
  - EKK → J → 8
  - F3 → K → 9 → ET
  - EJJ → L → 10 → S2-4
  - F2 → M → 11 → G3
  - EHH → N → 12 → Chassis
  - EFF → P → 13 → F11
  - R → 14 → Pol. Plg.
  - EEE → S → 15 → G1
  - EDD → T → 16
  - ECC → U → 17 → S6-5
  - EBB → V → 18 → F9
  - F12 → W → 19
  - S2-5 → X → 20 → ES
  - EAA → Y → 21 → G2
  - EZ → Z → 22 → EY

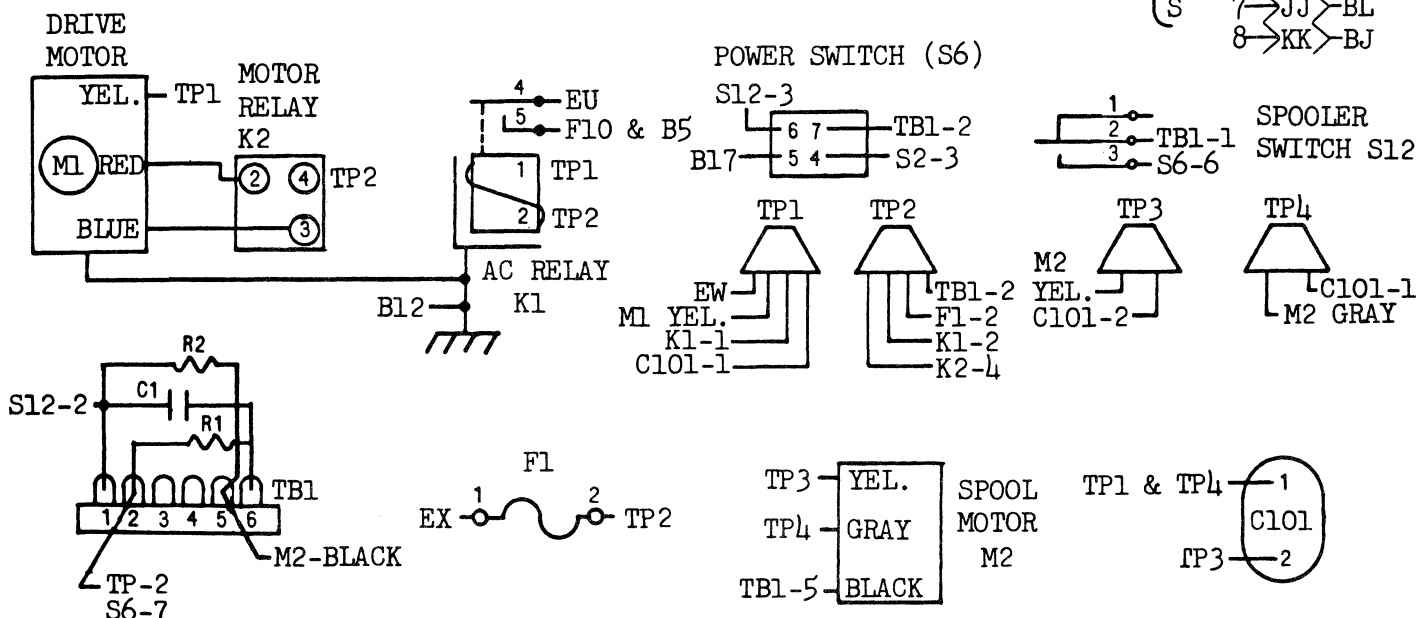
**CONNECTOR F**

- BB → 1 → L1-2
- BM → 2 → L2-2
- BK → 3 → L3-1
- BH → 4 → L4-1
- BF → 5 → L5-1
- BE → 6 → L6-2
- BD → 7 → L7-2
- BC → 8 → L8-2
- B18 → 9 → L12-1
- K1-5 → 10 → H5
- B13 → 11 → L11-1
- BW → 12 → L12-2
- L13-1

**CONNECTOR G**

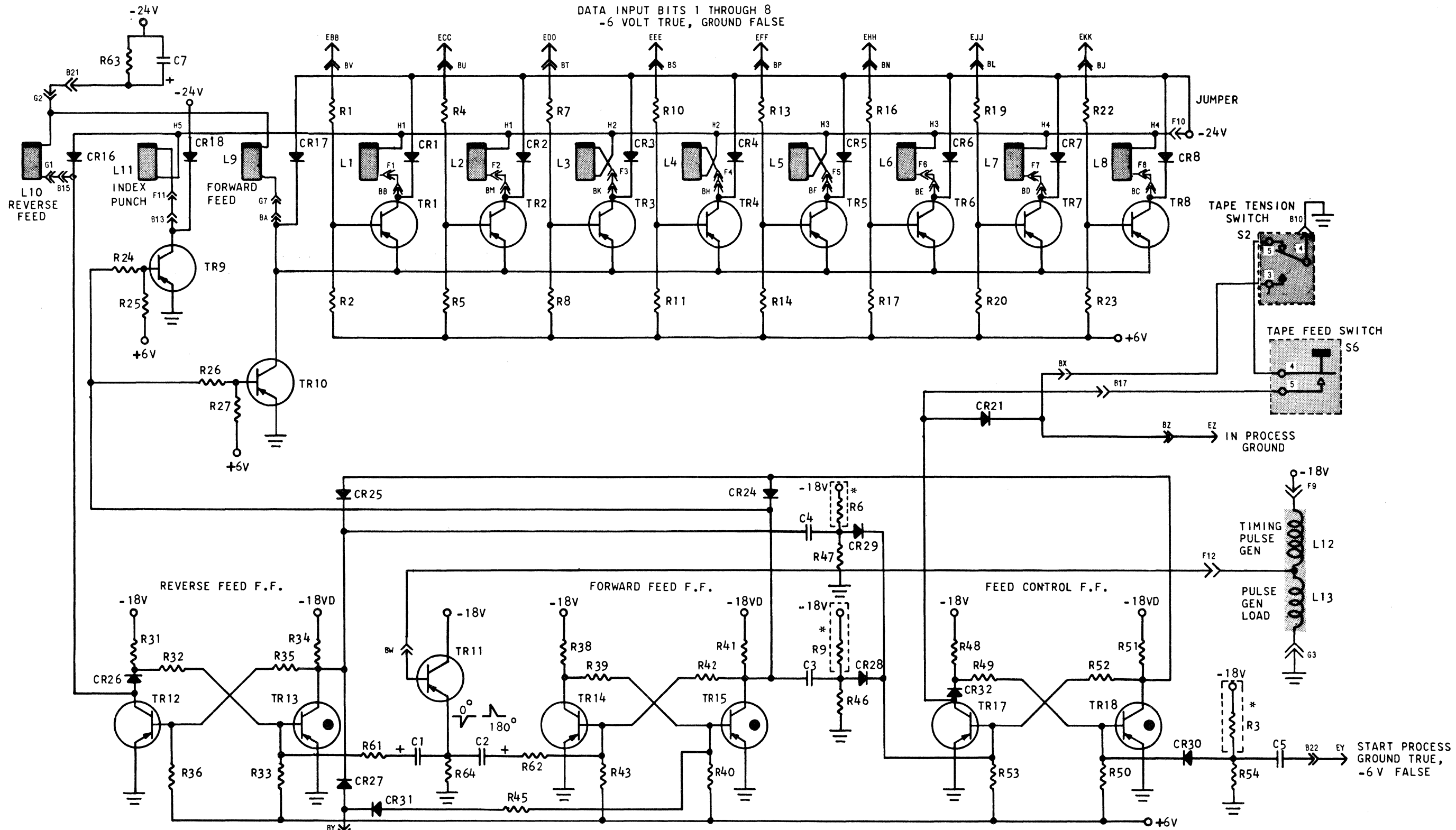
- B15 → 1 → L10-2
- B21 → 2 → L9-1
- L10-1
- B11 → 3 → L13-2
- S2-3 → 4 → S7-3
- BA → 7 → L9-2

- R1 68 OHM 1/2W
- R2 100 OHM 12W
- C1 .5 MFD 400 VDC



**MODELS 528 AND 529 PUNCH**

DATA INPUT BITS 1 THROUGH 8  
-6 VOLT TRUE, GROUND FALSE



▲ DENOTES NORMALLY OPEN CONTACT  
▲ DENOTES NORMALLY CLOSED CONTACT

**CONNECTOR IDENTIFICATION**

- B 44 PIN PRINTED CIRCUIT CARD CONNECTOR
- E 34 PIN CONNECTOR AT REAR OF UNIT
- F 12 PIN CONNECTOR WHITE
- G 12 PIN CONNECTOR BLACK
- H TERMINAL STRIP ON SIDE OF PUNCH UNIT

FEED DIRECTION CONTROL  
-6 V SOLID FOR REVERSE FEED  
GROUND FOR FORWARD FEED

NOTE  
SEE INTERCONNECTIONS DIAGRAM FOR MOTOR CONNECTIONS  
AND VOLTAGE INPUT PIN LOCATIONS.

VALUES AND PART NUMBER OF COMPONENTS ARE FOUND IN  
THE ELECTRICAL PARTS LIST  
SHADED AREAS ARE LOCATED EXTERNAL TO THE PRINTED CIRCUIT CARD

\* COMPONENT AND CONNECTION TO -18V IS ONLY ON PRINTED  
CIRCUIT CARDS IDENTIFIED WITH RED NUMERAL 1.

MODELS 524 AND 525 PUNCH  
INTERCONNECTIONS AND SCHEMATIC

NOTES:

1. Start Process
2. In Process
3. Feed Direction Control
4. Bit is -6VDC, No Bit is Ground

CONNECTORS F AND G  
PIN IDENTIFICATION

10	7	4	1	1	4	7	10
11	8	5	2	2	5	8	11
12	9	6	3	3	6	9	12

CONNECTOR IDENTIFICATION

- B-44 PIN PUNCH CIRCUIT CARD CONNECTOR
- E-34 PIN CONNECTOR
- F-12 PIN CONNECTOR (WHITE)
- G-12 PIN CONNECTOR (BLACK)
- H TERMINAL STRIP ON PUNCH

CONNECTOR B

Component Side	Terminal
G7	A 1
F1	B 2
F8	C 3
F7	D 4
F6	E 5
F5	F 6
FL	H 7
EKK	J 8
F3	K 9
EJJ	L 10
F2	M 11
EHH	N 12
EFF	P 13
R	14 Pol. Plg.
EEE	S 15
EDD	T 16
ECC	U 17
EBB	V 18
F12	W 19
S2-5	X 20
EAA	Y 21
EZ	Z 22

CONNECTOR F

BB	1	L1-2
EM	2	L2-2
BK	3	L3-1
BH	4	L4-1
BF	5	L5-1
BE	6	L6-2
BD	7	L7-2
BC	8	L8-2
B18	9	L12-1
K1-5	10	H5
B13	11	L11-1
EW	12	L12-2
		L13-1

CONNECTOR G

B15	1	L10-2
B21	2	L9-1
B11	3	L13-2
S2-5	4	S7-3
S2-4	6	S7-4
BA	7	L9-2
1		L11-1
2		L12-1
3		L13-2
4		L4-2
5		L5-2
		L6-1
		L7-1
		L8-1
		L11-2
		F10

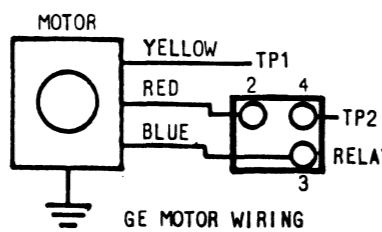
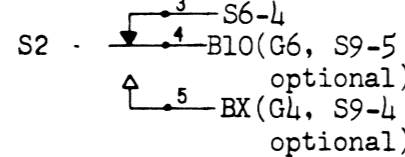
CONNECTOR E

USERS I/O	
+6VDC	R B7
-18VDC	S B20
(Delayed)	T B9
-24VDC	U K1-4
GROUND (Grn)	V M2
117VAC (Wht)	W S1-7
117VAC (Blk)	X S1-6
Note 1	Y B22
Note 2	Z BZ
Note 3	AA BY
P 1	BB BV
U 2	CC BU
N 3	DD BT
L 4	EE BS
H 5	FF BP
E 6	HH BN
S 7	JJ BL
8	KK BJ

TERMINAL H

1	L1-1
	L2-1
2	L3-2
	L4-2
3	L5-2
	L6-1
4	L7-1
	L8-1
	L11-2
	F10

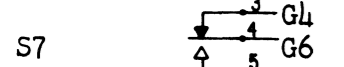
TAPE TENSION SWITCH



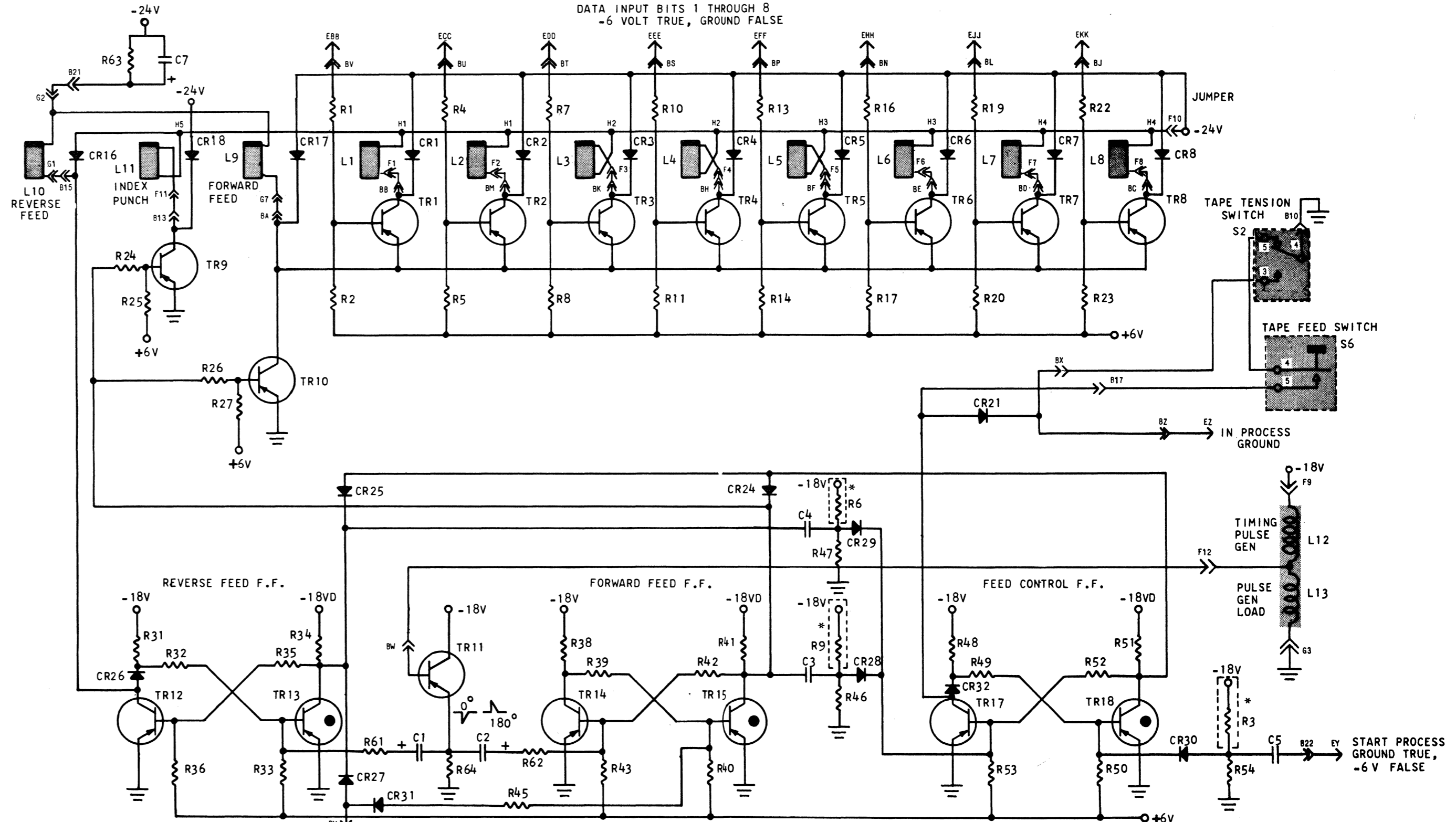
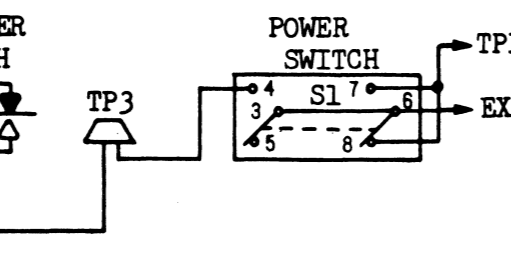
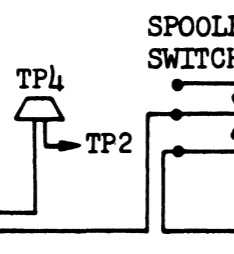
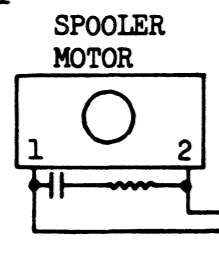
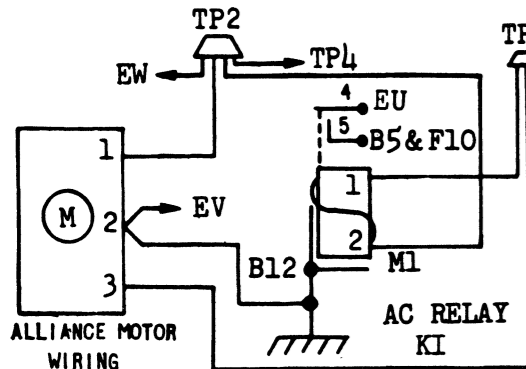
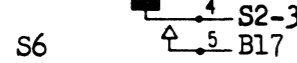
FULL REEL SWITCH (OPTIONAL)



PUNCH OUT OF TAPE SWITCH (OPTIONAL)



TAPE FEED SWITCH



▲ DENOTES NORMALLY OPEN CONTACT  
 ▲ DENOTES NORMALLY CLOSED CONTACT

CONNECTOR IDENTIFICATION  
 B 44 PIN PRINTED CIRCUIT CARD CONNECTOR  
 E 34 PIN CONNECTOR AT REAR OF UNIT  
 F 12 PIN CONNECTOR WHITE  
 G 12 PIN CONNECTOR BLACK  
 H TERMINAL STRIP ON SIDE OF PUNCH UNIT

FEED DIRECTION CONTROL  
 -6 V SOLID FOR REVERSE FEED  
 GROUND FOR FORWARD FEED

NOTE  
 SEE INTERCONNECTIONS DIAGRAM FOR MOTOR CONNECTIONS AND VOLTAGE INPUT PIN LOCATIONS.

VALUES AND PART NUMBER F COMPONENTS ARE FOUND IN THE ELECTRICAL PARTS LIST

SHADED AREAS ARE LOCATED EXTERNAL TO THE PRINTED CIRCUIT CARD

\* COMPONENT AND CONNECTION TO -18V IS ONLY ON PRINTED CIRCUIT CARDS IDENTIFIED WITH RED NUMERAL 1.

MODELS 518 AND 519 PUNCH  
INTERCONNECTIONS AND SCHEMATIC

CONNECTORS F AND G  
PIN IDENTIFICATION

10	7	4	1	1	4	7	10
11	8	5	2	2	5	8	11
12	9	6	3	3	6	9	12

CONNECTOR  
IDENTIFICATION

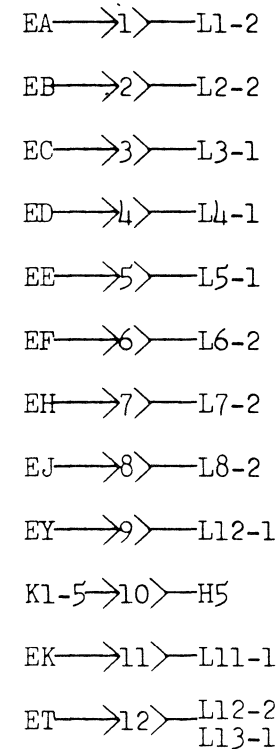
E-34 PIN CONNECTOR  
F-12 PIN CONNECTOR (WHITE)  
G-12 PIN CONNECTOR (BLACK)  
H TERMINAL STRIP ON PUNCH

TO G3 2  
TO F12 1

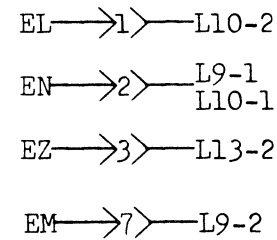
L13

TIMING  
GEN.  
LOAD

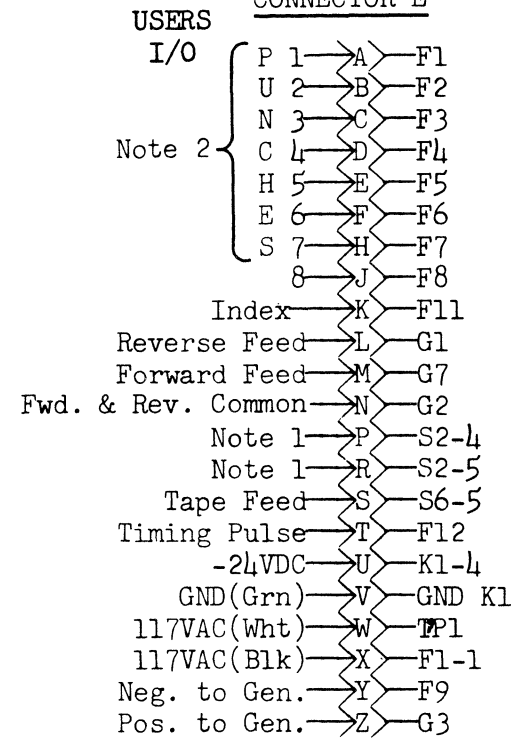
CONNECTOR F



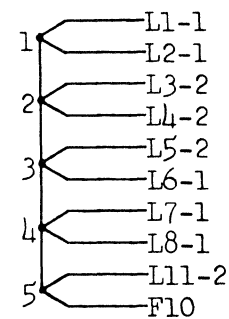
CONNECTOR G



CONNECTOR E

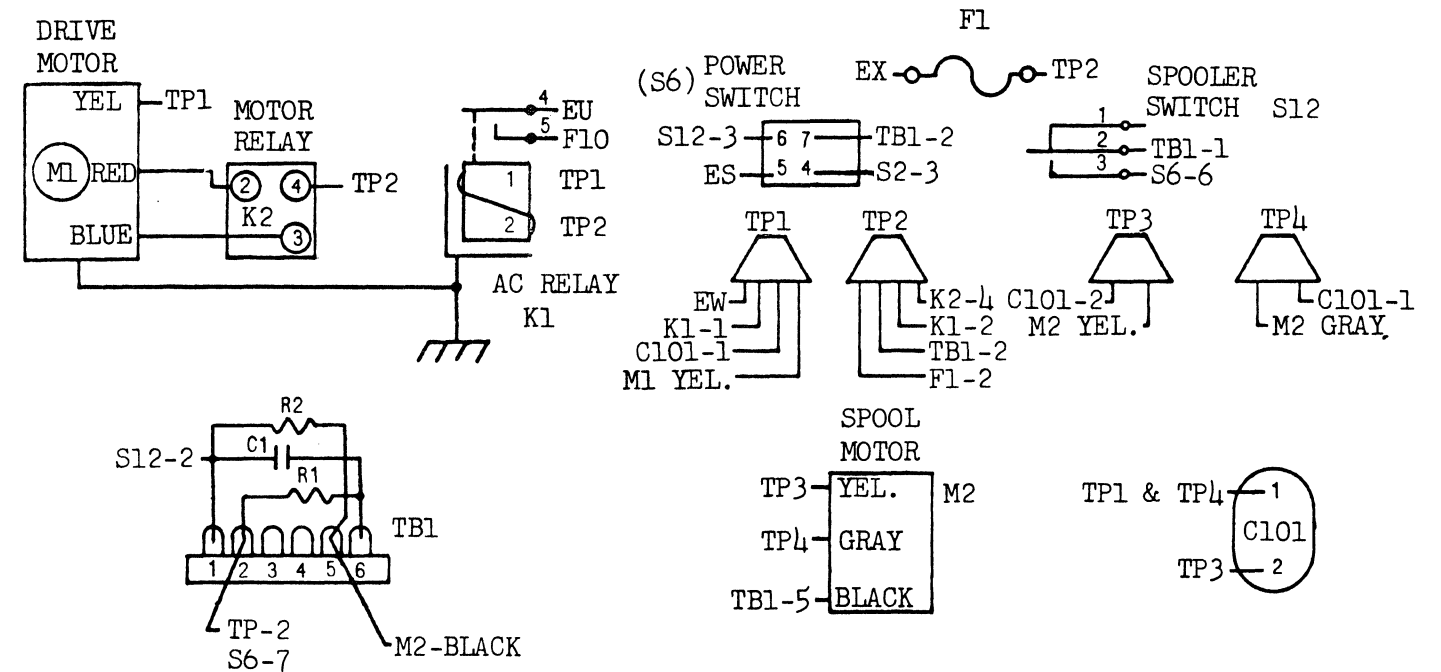
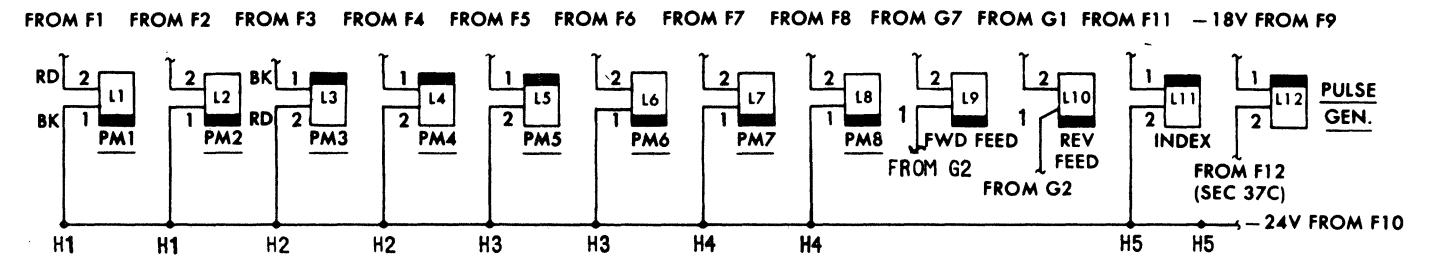
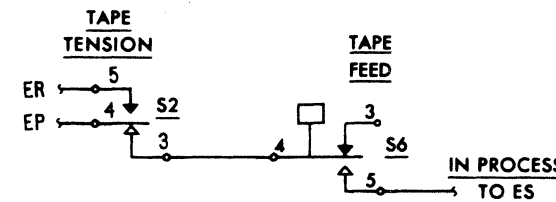


TERMINAL H



NOTES:

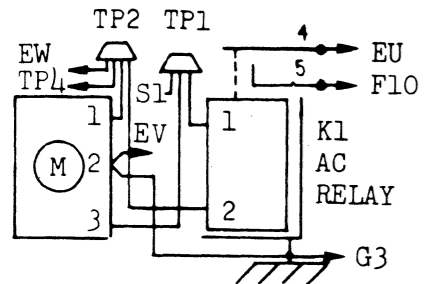
1. Tape Tension and Optional Punch Out-of-Tape Switch.
2. Bit is Ground, No Bit is open circuit



R1 68 OHM 1/2W  
R2 100 OHM 12W  
C1 .5 MFD 400 VDC

MODELS 514 AND 515 PUNCH  
INTERCONNECTIONS AND SCHEMATIC





ALLIANCE MOTOR WIRING

CONNECTORS F AND G  
PIN IDENTIFICATION

m				m			
10	7	4	1	1	4	7	10
11	8	5	2	2	5	8	11
12	9	6	3	3	6	9	12

CONNECTOR  
IDENTIFICATION

- E-34 PIN CONNECTOR
- F-12 PIN CONNECTOR (WHITE)
- G-12 PIN CONNECTOR (BLACK)
- H TERMINAL STRIP ON PUNCH

CONNECTOR F

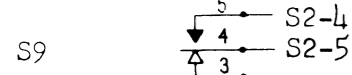
- EA → 1 → L1-2
- EB → 2 → L2-2
- EC → 3 → L3-1
- ED → 4 → L4-1
- EE → 5 → L5-1
- EF → 6 → L6-2
- EH → 7 → L7-2
- EJ → 8 → L8-2
- EY → 9 → L12-1

- K1-5 → 10 → H5

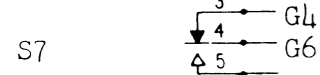
- EK → 11 → L11-1

- ET → 12 → L12-2
- L13-1

FULL REEL SWITCH (OPTIONAL)



PUNCH OUT OF TAPE SWITCH (OPTIONAL)



CONNECTOR G

- EL → 1 → L10-2
- EN → 2 → L9-1
- L10-1
- Chassis
- EZ → 3 → L13-2
- S2-5 → 4 → S7-3
- S2-4 → 6 → S7-4
- EM → 7 → L9-2

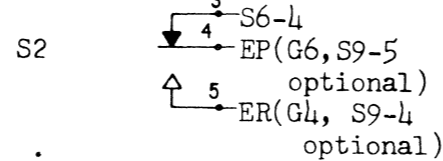
TERMINAL H

- 1 → L1-1
- L2-1
- 2 → L3-2
- L4-2
- 3 → L5-2
- L6-1
- 4 → L7-1
- L8-1
- 5 → L11-2
- F10

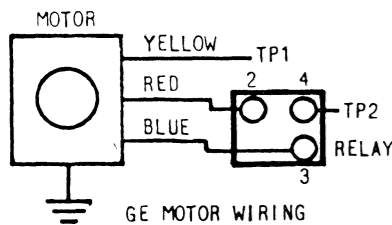
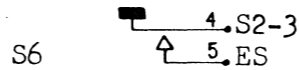
CONNECTOR E

- USERS P 1 → A → F1
- I/O U 2 → B → F2
- N 3 → C → F3
- C 4 → D → F4
- H 5 → E → F5
- E 6 → F → F6
- S 7 → H → F7
- 8 → J → F8
- Index → K → F11
- Reverse Feed → L → G1
- Forward Feed → M → G7
- Fwd. & Rev. Common → N → G2
- Note 1 → P → S2-4
- Note 1 → R → S2-5
- Tape Feed → S → S6-5
- Timing Pulse → T → F12
- 24VDC → U → K1-4
- GROUND (Grn) → V → M2
- 117VAC (Wht) → W → S1-4
- 117VAC (Blk) → X → S1-6
- Neg. to Gen. → Y → F9
- Pos. to Gen. → Z → G3

TAPE TENSION SWITCH

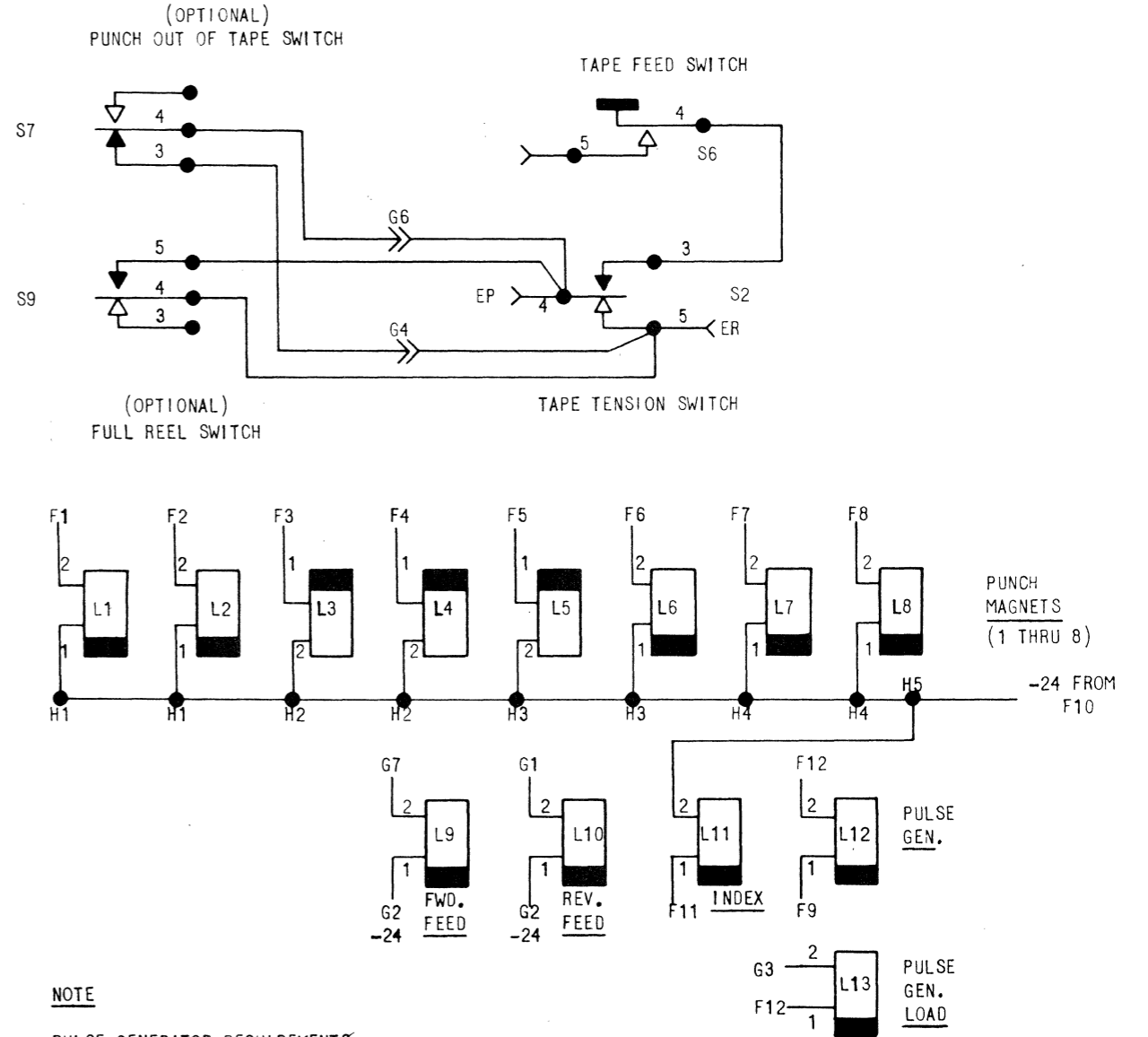
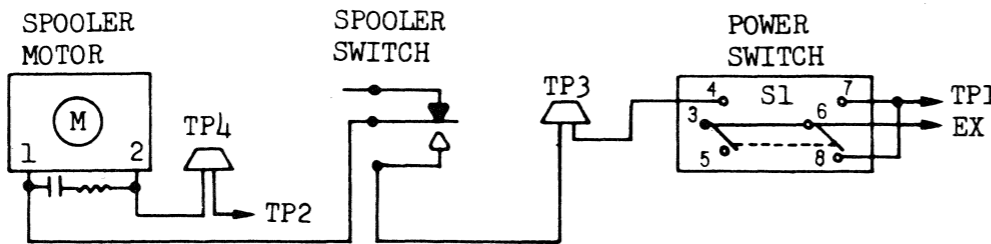


TAPE FEED SWITCH



NOTES:

1. Tape Tension and Optional Out of Tape Switch and/or Full Reel Switch.
2. Bit is Ground, No Bit is open circuit



NOTE

PULSE GENERATOR REQUIREMENTS  
-18VDC (OR 15MA) PER SET OF (2) COILS.  
POLARITY MUST BE AS SHOWN TO GENERATE  
A TIMING PULSE OF POLARITY AND AMPLITUDE  
AS PER MECHANICAL TIMING CHART. REVERSE  
POLARITY TIMING MAY BE GENERATED BY RE-  
VERSING BIAS POLARITY.

## SECTION 8

### PARTS-BASIC PUNCH

USEABLE ON CODE COLUMN:

The Useable On Code column is used to indicate useability per model when more than one model is covered in the parts sections of this manual.

When the Useable On Code column is blank, the part is used on all models covered. When one or more Useable On Codes appear, the part is used only on those models associated with the particular Useable On Code(s).

Listed below are the five models covered in Section 8 of this manual, along with their individually assigned Useable On Codes.

USEABLE ON CODE	PART NUMBER	NOMENCLATURE
I	809211	24 Volt Basic 500 Punch Assembly
II	809234	48 Volt 500 Punch Assembly
III	809231	6 Channel Advance Feed Hole 500 Punch Assembly
IV	809242	8 Channel Advance Feed Hole 500 Punch Assembly
V	809211-037	Parity 500 Punch Assembly

Group Assembly Parts List

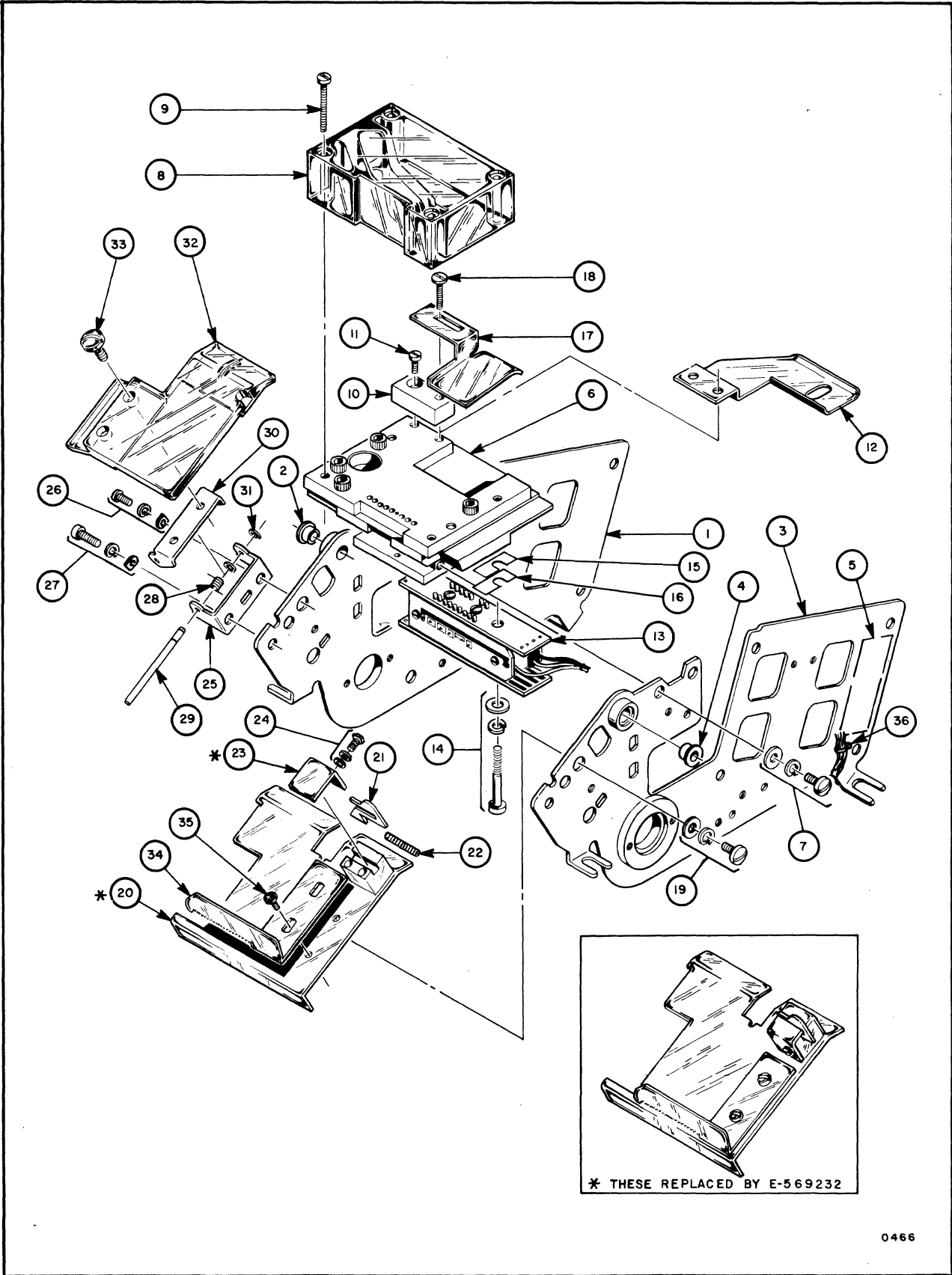
FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	USEABLE
				ON CODE
24 VOLT BASIC 500 PUNCH ASSEMBLY				
8-1-	809211	PUNCH ASSEMBLY, 500, Basic, 24 volt..	1	I
	809234	PUNCH ASSEMBLY, 500, 48 volt.....	1	II
	809231	PUNCH ASSEMBLY, 500, 6 channel.....	1	III
		advance feed hole		
	809242	PUNCH ASSEMBLY, 500, 8 channel.....	1	IV
		advance feed hole		
	809211-037	PUNCH ASSEMBLY, 500, with parity.....	1	V
-1	809251	. PLATE, Side, RH.....	1	
		(replaces 1601-00620)		
-2	895004	. . BEARING (replaces 1B1-1025).....	1	
-3	809252	. PLATE, Side, LH.....	1	
		(replaces 1601-00485)		
-4	895004	. . BEARING (replaces 1B1-1025).....	1	
-5	1B3-1005	. LABEL, Patent Number.....	1	I
-6	1601-00035	. PUNCH AND DIE ASSEMBLY.....	1	I,II,V
	1661-00015	. DIE BLOCK AND GUIDE ASSEMBLY.....	1	III
	809244	. PUNCH AND DIE GUIDE ASSEMBLY.....	1	IV
		(ATTACHING PARTS)		
-7	E-596103-4	. SCREW, Pan Hd, #6-40 x 0.250.....	4	
		(replaces Z4240)		
	E-595055-6	. LOCKWASHER, Ext Tooth, #6.....	4	
		(replaces P11064)		
	E-595050-61	. WASHER, Flat, #6.....	4	
		(replaces 2972-01200)		
		----*----		
-8	801048	. COVER, Punch (replaces 1601-10251).	1	
		(ATTACHING PARTS)		
-9	E-594278-13	. SCREW, Pan Hd, #3-56 x 0.812.....	4	
		(replaces 1A1-1270)		
		----*----		
-10	* 1601-10800	. SPACER, Tape chute.....	1	
	1601-10662	. SPACER, Tape chute.....	1	
		(ATTACHING PARTS)		
-11	E-594313-4	. SCREW, Fil Hd, #3-56 x 0.250.....	1	
		(replaces 4295)		
		----*----		
-12	* 1601-10790	. HOLD DOWN, Out of tape switch.....	1	
-13	1601-00546	. BLOCK ASSEMBLY, Parity.....	1	V
		(ATTACHING PARTS)		
8-1-14	1A1-1311	. SCREW, Special, #6-40 x 0.846.....	2	V
	E-595051-62	. LOCKWASHER, Split, #6.....	2	V
		(replaces P11064)		
	1A6-1338	. WASHER, Flat, #6.....	2	V
		----*----		
	* optional - use with out of tape switch			

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS	USEABLE
			PER ASSY	ON CODE
		1 2 3		
24 VOLT BASIC 500 PUNCH ASSEMBLY (continued)				
8-1-15	1611-11050	. SHIM, 0.006 in. thk.....	A/R	V
-16	1611-11001	. SHIM, 0.002 in. thk.....	A/R	V
-17	801503	. CHUTE, Tape.....	1	I, II, IV, V
	1661-10050	. CHUTE, Tape.....	1	III
		(ATTACHING PARTS)		
-18	E-594278-7	. SCREW, #3-56 x 0.438.....	1	I, II, IV, V
		(replaces 1A1-1051)		
	E-594278-3	. SCREW, Pan Hd, #3-56 x 0.188.....	1	III
		(replaces 1A1-1051)		
		----*----		
8-1-	E-569232	. PLATEN ASSEMBLY.....	1	
		(replaces 1601-00310)		
		(ATTACHING PARTS)		
-19	E-596103-4	. SCREW, Pan Hd, #6-40 x 0.250.....	1	
		(replaces Z4240)		
	E-595051-62	. LOCKWASHER, Split, #6.....	1	
		(replaces P11064)		
	E-595050-61	. WASHER, Flat, #6.....	1	
		----*----		
-20	E-569229	. . PLATEN.....	1	
-21	1631-10721	. . LATCH, Tape Deflector.....	1	
-22	1A7-1063	. . SPRING.....	1	
-23	E-551244	. . COVER (replaces 1631-10735).....	1	
		(ATTACHING PARTS)		
-24	E-594284-4	. . SCREW, Hex Hd, #6-40 x 0.375)...	1	
		(replaces 1A1-1307)		
	E-595802-6	. . LOCKWASHER, Split, #6.....	1	
		(replaces P11064)		
	E-595801-6	. . WASHER, Flat, #6.....	1	
		----*----		
-25	1631-10715	. BRACKET, Deflector Hinge.....	1	
		(ATTACHING PARTS)		
-26	E-596103-5	. SCREW, Pan Hd, #6-40 x 0.312.....	1	
		(replaces Z4138)		
	E-595051-62	. LOCKWASHER, Split, #6.....	1	
		(replaces P11064)		
-27	E-594312-5	. SCREW, Fil Hd, #8-36 x 0.312.....	1	
		(replaces Y4144)		
	E-595051-81	. LOCKWASHER, Split, #8.....	1	
		(replaces 1A6-1041)		
		----*----		
-28	1A7-1060	. SPRING, Torsion, deflector.....	1	
8-1-29	1631-10755	. ROD, Tape deflector.....	1	

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3	UNITS PER ASSY	USEABLE ON CODE
24 VOLT BASIC 500 PUNCH ASSEMBLY (continued)				
8-1-30	1631-10800	. HINGE, Deflector..... (ATTACHING PARTS)	1	
-31	E-596865-6	. RING, Retaining, E type..... (replaces 8612) ----*----	2	
-32	1601-11200	. DEFLECTOR, Tape..... (ATTACHING PARTS)	1	
-33	E-596103-5	. SCREW, Pan Hd, #6-40 x 0.312..... (replaces Z4038) ----*----	2	
-34	1601-11210	. CUTTER, Tape..... (ATTACHING PARTS)	1	
-35	E-594278-3	. SCREW, Pan Hd, #3-56 x 0.188..... (replaces Y4071) ----*----	2	
8-1-36	1A8-1929	. TIE, Cable.....	2	V



0466

Figure 8-1 24 Volt Basic 500 Punch Assembly  
(Sheet 1 of 6) (Index Nos. 1 thru 36)

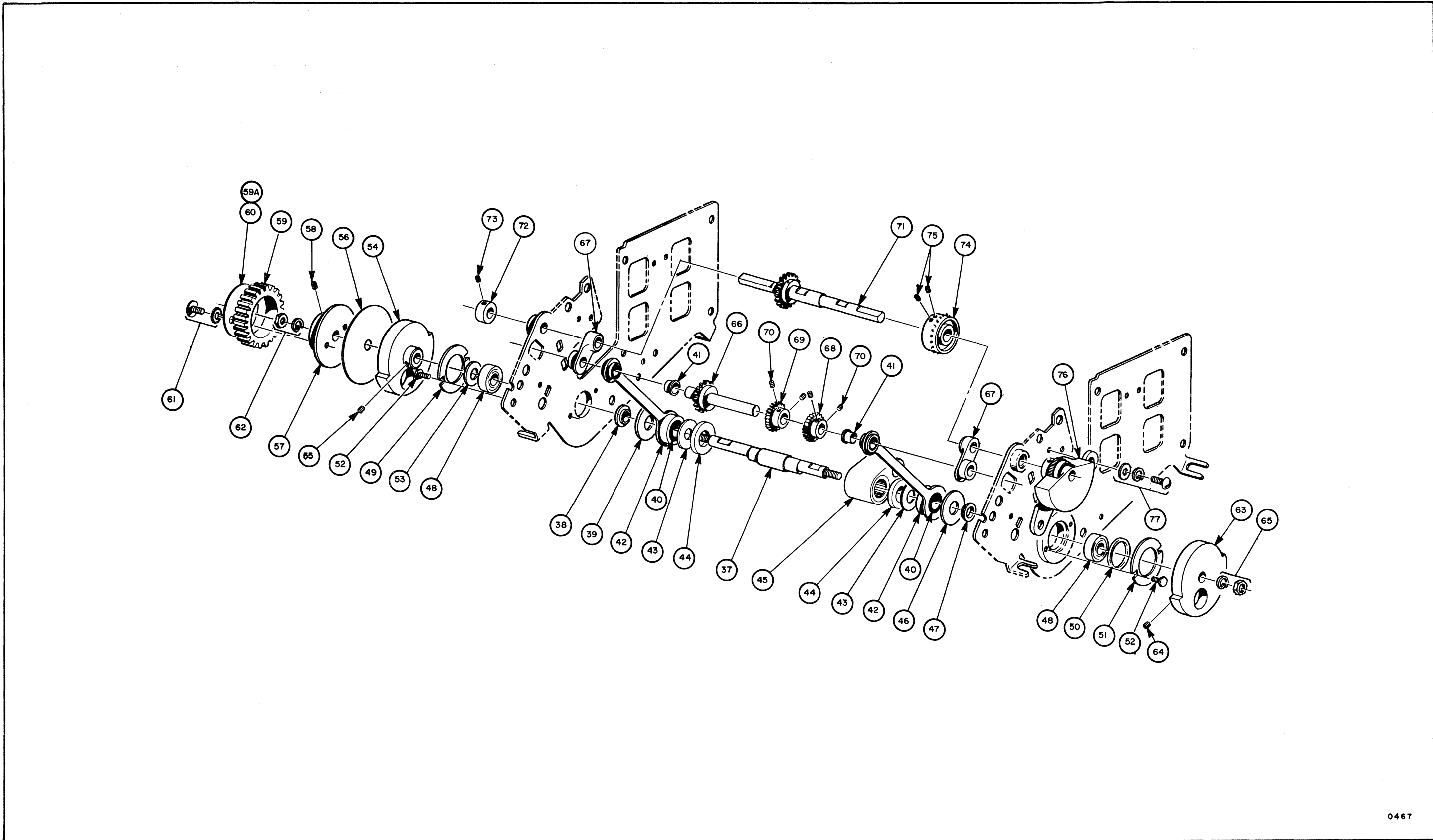


FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS	USEABLE
			PER ASSY	ON CODE
24 VOLT BASIC 500 PUNCH ASSEMBLY (continued)				
8-1-37	1601-10405	. SHAFT, Eccentric, punch input.....	1	
-38	1A6-1260	. SPACER, Input Shaft, RH.....	1	
-39	1A6-1267	. SPACER, Input Shaft, RH.....	1	
8-1-	1637-00050	. LINK ASSEMBLY, Index.....	2	
-40	1B1-1032	. . BEARING.....	1	
-41	** E-595004	. . BEARING (replaces 1B1-1025A)....	1	
-42	1637-00060	. . LINK, Index.....	1	
-43	1A6-1272	. WASHER.....	2	
-44	*** 801049	. SPACER.....	2	
-45	1601-00365	. LINK ASSEMBLY, Punch Drive.....	1	
-46	1A6-1292	. SPACER, Input Shaft, inner, LH....	1	
-47	1A6-1291	. SPACER, Input Shaft, LH.....	1	
-48	1B1-1024	. BEARING, Main Shaft.....	2	
-49	1A6-1278	. WASHER, Retaining.....	1	
-50	1A6-1274	. O RING, Bearing, input shaft.....	1	
-51	1A6-1263	. WASHER, Retaining.....	1	
-52	E-594279-3	. SCREW, Pan Hd, #4-48 x 0.188..... (replaces 4504)	4	
-53	1A6-1135	. WASHER.....	1	
-54	1601-11120	. DISC, Punch Generator.....	1	
-55	E-594287-2	. SETSCREW, Cup Point,..... #4-48 x 0.125 (replaces 3071-06300)	2	
-56	1B9-1026	. LABEL, Timing Dial.....	1	
-57	1631-10210	. HUB, Pulley, input shaft..... (ATTACHING PARTS)	1	
-58	E-594283-2	. SETSCREW, Cup Point,..... #6-40 x 0.125 (replaces 1A1-1031) ---*---	1	
-59	1631-10180	. PULLEY, Input Shaft..... (ATTACHING PARTS)	1	
-59A	E-596103-4	. SCREW, Pan Hd, #6-40 x 0.250..... (replaces Z4262) (do not use w/pulley flange)	2	
	E-595055-6	. LOCKWASHER, Ext Tooth, #6..... (replaces 1A6-1106) (do not use w/pulley flange) ---*---	2	
-60	* 560013	. FLANGE, Pulley..... (ATTACHING PARTS)	1	
8-1-61	* E-596103-6	. SCREW, Pan Hd, #6-40 x 0.375..... (replaces Z4262)	2	
	* E-595051-62	. LOCKWASHER, Split, #6..... ---*---	2	
<p>* optional - use in place of 8-1-59A when 8-1-60 is used.  ** must be reamed to shaft size before assembling.  *** spacers sometimes supplied with item 45. Not necessary for operation and will not affect machine performance.</p>				



Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS	USEABLE
			PER ASSY	ON CODE
		1 2 3		
24 VOLT BASIC 500 PUNCH ASSEMBLY (continued)				
8-1-62	Z-4453	. NUT, Hex, binding, #8-36.....	1	
	E-595051-82	. LOCKWASHER, Split, #8..... (replaces 1A6-1041)	1	
-63	1601-10515	. DISC, Counterweight.....	1	
-64	E-594287-2	. SETSCREW, Cup Point,..... #4-48 x 0.125 (replaces 3071-06300)	2	
-65	Z-4453	. NUT, Hex, binding, #8-36.....	1	
	E-595051-82	. LOCKWASHER, Split, #8..... (replaces 1A6-1041)	1	
-66	1631-00062	. SHAFT AND GEAR ASSEMBLY, Ratchet..	1	
-67	1631-10550	. LINK, Pivot, ratchet shaft.....	2	
-68	1631-10171	. RATCHET, Tape Feed, reverse.....	1	
-69	1631-10161	. RATCHET, Feed, forward tape..... (ATTACHING PARTS)	1	
-70	E-594311-2	. SETSCREW, Cup Point,..... #3-56 x 0.125 (replaces 1A1-1234) ---*---	4	
-71	1631-00241	. SHAFT ASSEMBLY, Sprocket.....	1	
-72	894016	. COLLAR (replaces 2951-51500)..... (ATTACHING PARTS)	1	
-73	E-594287-2	. SETSCREW, Cup Point, #4-48 x 0.125. (replaces 3071-09000) ---*---	1	
-74	1631-10120	. SPROCKET, Tape Feed..... (ATTACHING PARTS)	1	
-75	E-594057-4	. SETSCREW, #4-40 x 0.250..... (replaces 1A1-1303) ---*---	2	
-76	1631-00370	. BALL ASSEMBLY, Detent..... (ATTACHING PARTS)	1	
8-1-77	E-596103-5	. SCREW, Pan Hd, #6-40 x 0.250..... (replaces 4273)	2	
	E-595051-62	. LOCKWASHER, Split, #6..... (replaces P11064)	2	
	E-595050-61	. WASHER, Flat, #6..... (replaces 2972-01200) ---*---	2	



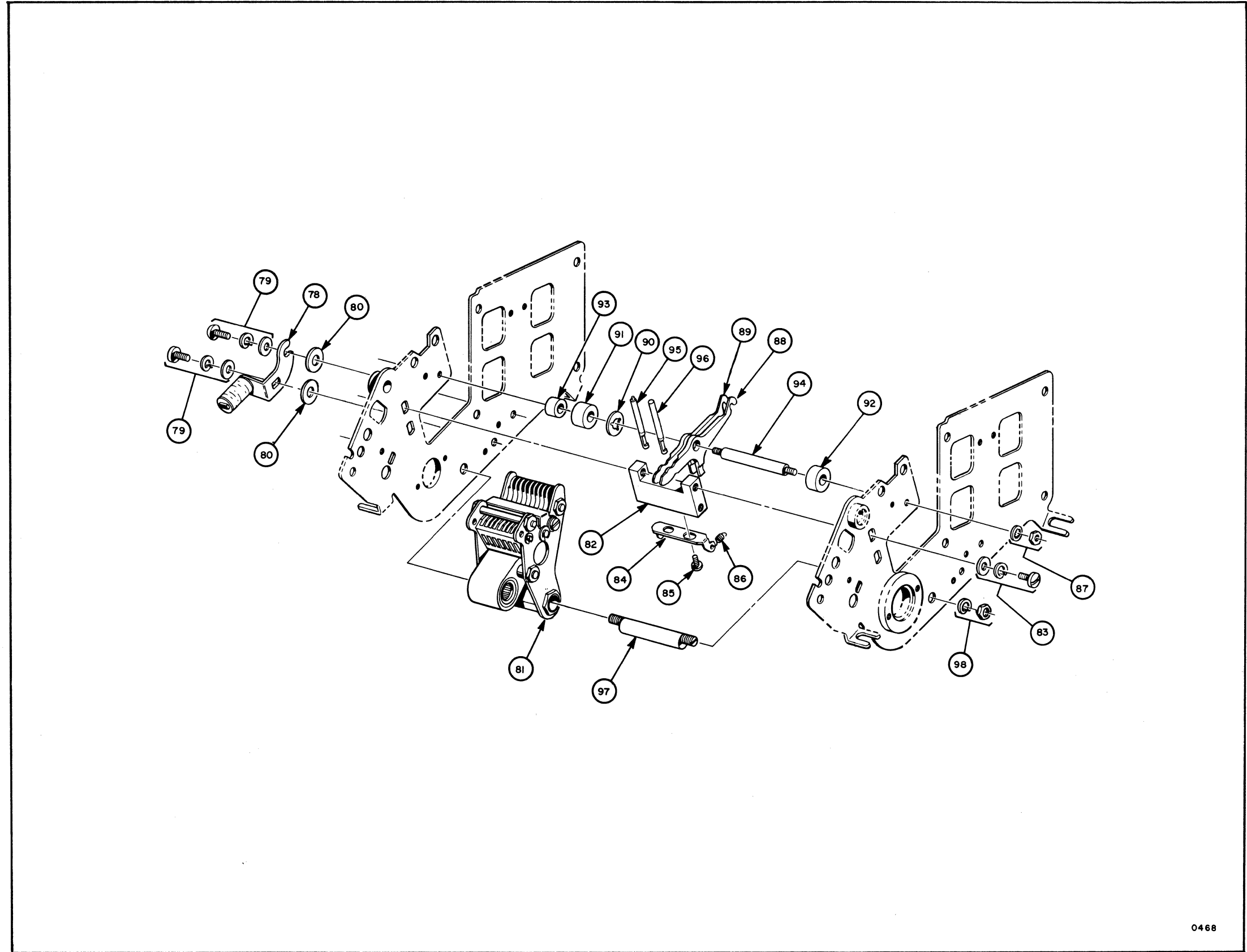
0467

Figure 8-1 24 Volt Basic 500 Punch  
Assembly (Sheet 2 of 6)  
(Index Nos. 37 thru 77)

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY			USEABLE ON CODE
			1	2	3	
24 VOLT BASIC 500 PUNCH ASSEMBLY (continued)						
8-1-78	809002	. COIL ASSEMBLY, Pulse Generator.... (replaces 809002) (ATTACHING PARTS)	1			
-79	E-596103-5	. SCREW, Pan Hd, #6-40 x 0.312..... (replaces 4273 and 4277)	2			
	E-595051-62	. LOCKWASHER, Split, #6..... (replaces P11064)	2			
	E-595050-61	. WASHER, Flat, #6..... (replaces 2972-01200)	2			
-80	E-595049-6	. WASHER, Flat, #6..... (replaces 2193) ----*----	2			
-81	No Number	. PARTS, Miscellaneous..... (Shown here for orientation purposes - see sheet 6, Figure 8-1 for exploded view)	REF			
-82	1601-10232	. STOP, Punch Arm..... (ATTACHING PARTS)	1			
-83	E-596103-4	. SCREW, Pan Hd, #6-40 x 0.250..... (replaces Z4240)	4			
	E-595051-62	. LOCKWASHER, Split, #6..... (replaces P11064)	4			
	E-595050-61	. WASHER, Flat, #6..... (replaces 2972-01200) ----*----	4			
-84	1601-10695	. ANCHOR, Spring, punch pawl yoke... (ATTACHING PARTS)	1			
-85	E-594278-3	. SCREW, Pan Hd, #3-56 x 0.188)..... (replaces 3300-06440) ----*----	2			
-86	1A7-1042	. SPRING, Punch Pawl Yoke.....	2			
8-1-	809013	. PUNCH ARM SUBASSEMBLY.....	1			I, II, V
	809015	. PUNCH ARM SUBASSEMBLY.....	1			III
	809014	. PUNCH ARM SUBASSEMBLY..... (ATTACHING PARTS)	1			IV
-87	E-595057-42	. NUT, Hex, #4-40..... (replaces 1A5-1027)	2			
	E-595054-4	. LOCKWASHER, Int Tooth, #4..... (replaces 1812) ----*----	2			
-88	1601-11290	. . ARM, Punch.....	9			I, II, V
	1601-11290	. . ARM, Punch.....	6			III
	1601-11290	. . ARM, Punch.....	8			IV
-89	* 1661-10016	. . ARM, Punch.....	1			III, IV
-90	1601-10435	. . SPACER, Punch Arm.....	A/R			
-91	1A6-1242	. . SPACER, Punch Arm, RH.....	1			
8-1-92	1A6-1243	. . SPACER, Punch Arm, LH.....	1			
	* advance feed hole punch arm.					

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY			USEABLE ON CODE
			1	2	3	
24 VOLT BASIC 500 PUNCH ASSEMBLY (continued)						
8-1-93	1A6-1300	. . SPACER, Punch Pawl, RH.....	1			III
-94	1601-10440	. . PIVOT, Punch Arm.....	1			
-95	1601-10563	. PUNCH, Index.....	1			
-96	E-551252	. PUNCH (replaces 1601-10572).....	8			I, II, IV, V
	E-551252	. PUNCH (replaces 1601-10572).....	6			III
-97	1601-10240	. YOKE, Eccentric, punch pawl..... (ATTACHING PARTS)	1			
8-1-98	E-595057-81	. NUT, Hex, #8-36..... (replaces Z-4453)	2			
	E-595051-82	. LOCKWASHER, Split, #8..... (replaces 1A6-1041) ----*----	2			



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Figure 8-1 24 Volt Basic 500 Punch  
Assembly (Sheet 3 of 6)  
(Index Nos. 78 thru 98)

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY			USEABLE ON CODE
			1	2	3	
24 VOLT BASIC 500 PUNCH ASSEMBLY (continued)						
8-1-99	892035	. LABEL, Identification.....	1			III
-100	1601-10860	. BRACKET, Chad Tube..... (ATTACHING PARTS)	1			
-101	E-596103-6	. SCREW, Pan Hd, #6-40 x 0.375..... (replaces 3071-12500)	1			
	E-595051-62	. LOCKWASHER, Split, #6..... (replaces P11064) ---*---	1			
-102	* 1601-10830	. TUBE, Chad, rear disposal.....	1			
-103	* 800013	. TUBE, Chad (rack mounted units)...	1			
-104	* 1601-11160	. TUBE, Chad (side disposal).....	1			
-105	* 1601-10530	. TUBE, Chad.....	1			
-106	1A8-1641	. CLAMP, Chad Tube..... (ATTACHING PARTS)	1			
-107	E-596103-4	. SCREW, Pan Hd, #6-40 x 0.250..... (replaces Z4240)	1			
-108	E-595050-61	. WASHER, Flat, #6..... (replaces 2972-01200) ---*---	1			
-109	* 1601-10520	. CLAMP, Chad Tube..... (use with 1601-10530) (ATTACHING PARTS)	1			
-110	* 9E-4098	. SCREW, Bind. Hd, #6-40..... (use with 1601-10530)	1			
	P11064	. LOCKWASHER, Split, #6..... (use with 1601-10530) ---*---	1			
-111	809502	. CHOKE BRACKET ASSEMBLY, Pulse..... Generator (24 volt) (ATTACHING PARTS)	1			
-112	E-594026-3	. SCREW, Pan Hd, #4-40 x 0.188..... (replaces 4132) ---*---	2			
-113	1A8-1237	. CLAMP, Cable..... (ATTACHING PARTS)	1			
-114	E-596103-5	. SCREW, Pan Hd, #6-40 x 0.312..... (replaces Z4129)	1			
	E-595051-62	. LOCKWASHER, Split, #6..... (replaces P11064)	1			
-115	1A8-1381	. WASHER, Cable Clamp, D shaped.... ---*---	1			
8-1-116	* 1631-00321	. ACTUATOR ASSEMBLY, Index Pawl,... reverse (24 volt)	1			I, II, IV, V
	* Optional					

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY			USEABLE ON CODE
			1	2	3	
24 VOLT BASIC 500 PUNCH ASSEMBLY (continued)						
8-1-116	* 1682-00110	. ACTUATOR ASSEMBLY, Index Pawl,.... reverse (48 volt)	1			III
-117	1631-00271	. ACTUATOR ASSEMBLY, Index Pawl,.... forward (24 volt)	1			I, II, IV, V
	1682-00120	. ACTUATOR ASSEMBLY, Index Pawl,.... forward (48 volt) (ATTACHING PARTS)	1			III
-118	E-596103-4	. SCREW, Pan Hd, #6-40 x 0.250..... (replaces Z4240)	2			
	E-595051-62	. LOCKWASHER, Split, #6..... (replaces P11064)	2			
	814031	. PLATE, Washer..... (replaces 2972-01200) ---*---	1			
-119	* 1631-00350	. . MAGNET ASSEMBLY, LH..... (use only on 1631-00321)	1			I, III, IV, V
	* 1682-00100	. . MAGNET ASSEMBLY, LH..... (use only on 1682-00110)	1			II
	1631-00300	. . MAGNET ASSEMBLY, RH..... (use only on 1631-00271)	1			I, III, IV, V
	1682-00090	. . MAGNET ASSEMBLY, RH..... (use only on 1682-00120)	1			II
-120	* 1631-00330	. . ACTUATOR, Index Pawl, reverse... (use only on 1631-00321 and 1682-00110)	1			
	1631-00280	. . ACTUATOR, Index Pawl, forward... (use only on 1631-00271 and 1682-00120) (ATTACHING PARTS)	1			
-121	895005	. . SCREW, Pan Hd, #4-40 x 0.100.... (replaces 1A4-1296) ---*---	2			
-122	1631-10660	. . LIMIT, Interposer..... (ATTACHING PARTS)	1			
-123	895005	. . SCREW, Pan Hd, #4-48 x 0.100.... (replaces 1A4-1296) ---*---	2			
-124	1A1-1317	. . SETSCREW, #3-56.....	1			
-125	1A5-1066	. . NUT, Hex, binding.....	1			
8-1-126	21261	. . SPRING, Extension.....	1			
	* Optional					

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION			UNITS PER ASSY	USEABLE ON CODE
		1	2	3		
24 VOLT BASIC 500 PUNCH ASSEMBLY (continued)						
8-1-127	No Number	. UPPER AND LOWER MAGNET ASSEMBLIES. (shown here for orientation purposes - see sheet 5 Figure 8-1 for breakdown) (ATTACHING PARTS)			REF	
-128	E-596103-3	. SCREW, Pan Hd, #6-40 x 0.188..... (replaces Z4129)			4	
	E-595051-62	. LOCKWASHER, Split, #6..... (replaces P11064) ----*----			4	
-129	1A8-1569	. STRIP, Terminal..... (ATTACHING PARTS)			1	
-130	E-596103-5	. SCREW, Pan Hd, #6-40 x 0.312..... (replaces 3071-12500)			2	
	E-595051-62	. LOCKWASHER, Split, #6..... (replaces P11064) ----*----			2	
-131	1601-10490	. SPACER, Punch Pawl..... (replaces 1A6-1334)			1	
-132	809005	. COIL ASSEMBLY, Pulse Generator, ... parity (ATTACHING PARTS)			1	V
-133	E-596103-4	. SCREW, Pan Hd, #6-40 x 0.250..... (replaces Z4240)			2	V
	E-595051-62	. LOCKWASHER, Split, #6..... (replaces P11064)			2	V
	E-595050-61	. WASHER, Flat, #6..... (replaces 2972-01200) ----*----			2	V
-134	809502	. CHOKE ASSEMBLY, Pulse Generator... (ATTACHING PARTS)			1	V
-135	E-594026-3	. SCREW, Pan Hd, #4-40 x 0.188..... (replaces 4132) ----*----			2	V
8-1-	* 809304	. SWITCH ASSEMBLY, Out of tape.....			1	
-136	* 1601-00470	. . BRACKET ASSEMBLY, Out of tape... Switch			1	
	* Optional					

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS	USEABLE
			PER ASSY	ON CODE
1 2 3				
24 VOLT BASIC 500 PUNCH ASSEMBLY (continued)				
8-1-137	* 1A8-1566	. . MICROSWITCH, Out of Tape..... (ATTACHING PARTS)	1	
-138	* 1A8-1555	. . PACKAGE, Hardware, microswitch.. (consists of 2 screws, 2 flat washers, 2 int. tooth lock-washers, 2 hex nuts and 1 insulator) ---*---	1	
-139	* 1601-10770	. . BLADE, Out of Tape switch..... (ATTACHING PARTS)	1	
-140	* E-596865-12	. . RING, Retaining..... (replaces Z2740) ---*---	1	
-141	1601-10971	. BRACKET, Spring Anchor.....	1	
-142	1A7-1044	. SPRING, Extension, punch arm.....	9	I,II,IV,V
	1A7-1044	. SPRING, Extension, punch arm.....	7	III
-143	1A6-1335	. SPACER (remove these spacers when. out of tape switch is used)	2	
-144	1A8-1398	. PLUG, Amp Lok, wht (J6).....	1	
-145	1A8-1617	. PLUG, Amp Lok, blk (J7).....	1	
-146	1A8-1568	. TERMINATION, Amp Lok Pins.....	16	
-147	1A8-1929	. TIE, Cable.....	8	
-148	1A8-1616	. CONNECTOR (mate to 1A8-1398)..... (NHA is 892063-1)	1	
-149	1A8-1397	. CONNECTOR (mate to 1A8-1617)..... (NHA is 892063-1)	1	
-150	1A8-1568	. PIN, Contact (NHA is 892063-1)....	24	I,II,IV,V
	1A8-1568	. PIN, Contact (NHA is 892063-1)....	22	III
-151	892070-2	. CUSHION, Packing Box..... (NHA is 892071)	1	
-152	892070-1	. CUSHION, Packing Box..... (NHA is 892071)	1	
8-1-153	892069	. BOX, Packing (NHA is 892071).....	2	
	* Optional			

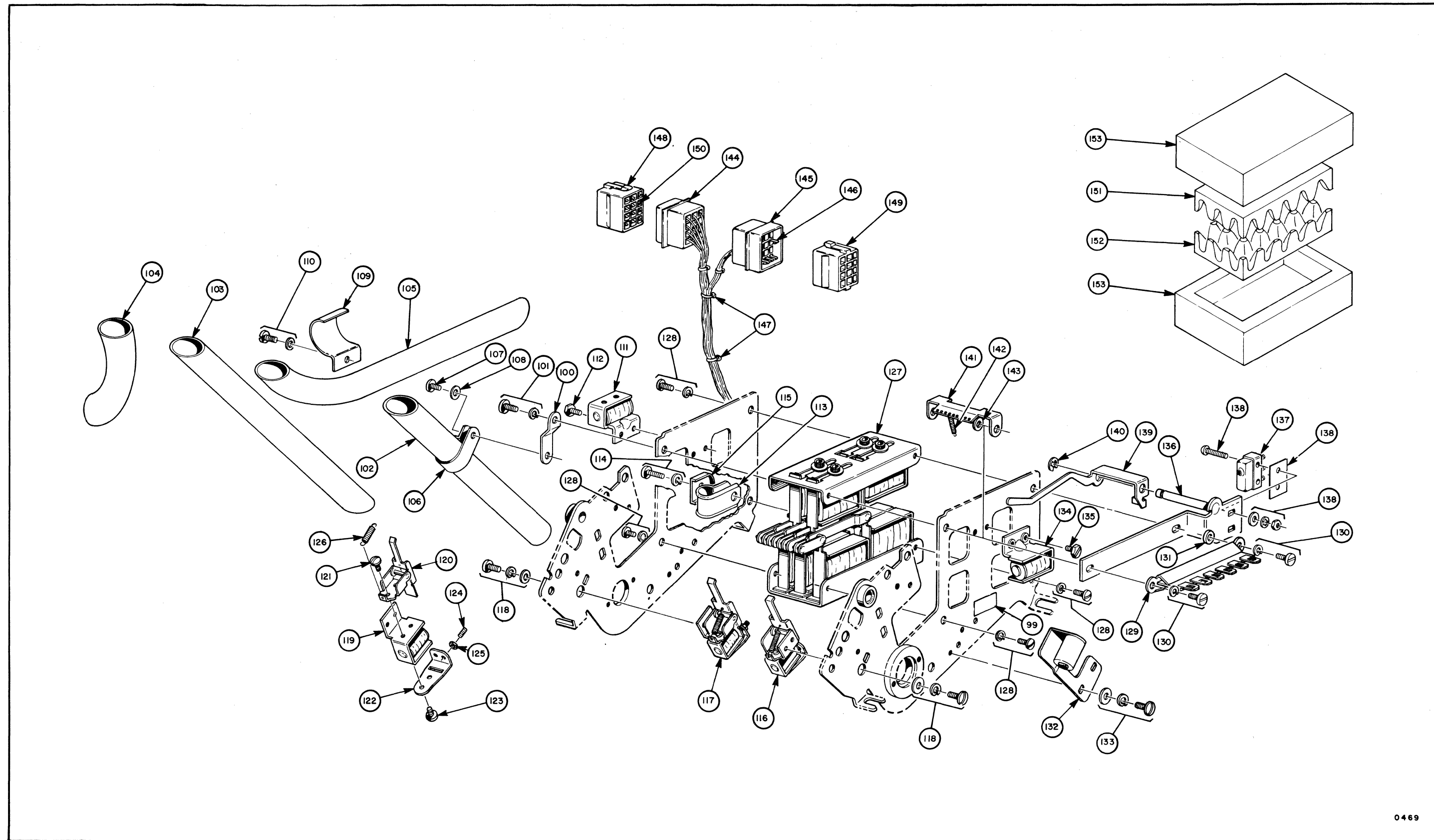


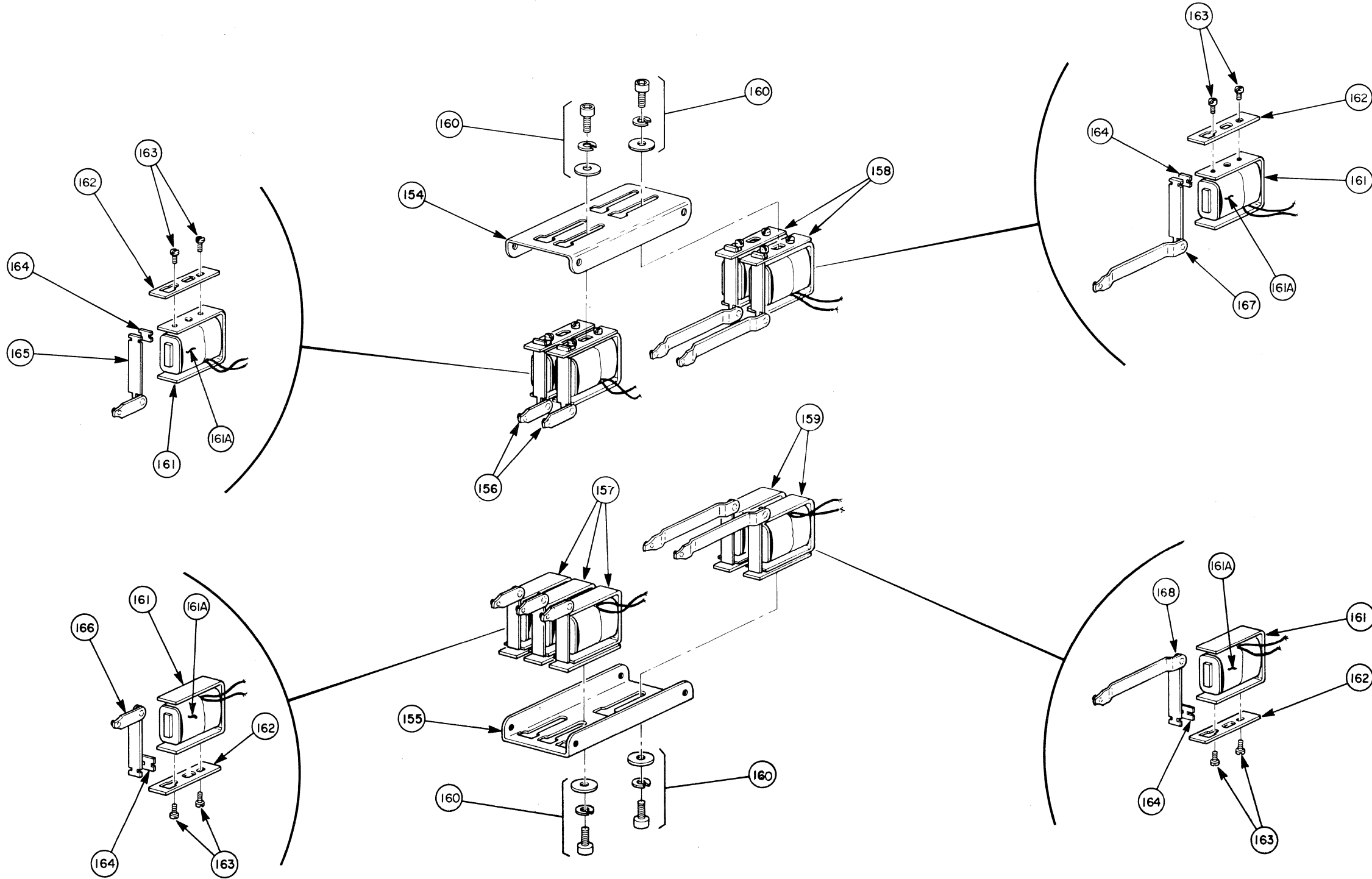
Figure 8-1 24 Volt Basic 500  
Punch Assembly (Sheet 4 of 6)  
(Index Nos. 99 thru 153)



Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY			USEABLE ON CODE
			1	2	3	
24 VOLT BASIC 500 PUNCH ASSEMBLY (continued)						
8-1-154	1601-10261	. BRACKET, Punch Magnet, upper.....		1		
-155	1601-10270	. BRACKET, Punch Magnet, lower.....		1		
-156	1601-00053	. MAGNET ASSEMBLY, Upper, w/short... link (24 volts)		2		I,III,IV,V
	1682-00011	. MAGNET ASSEMBLY, Upper, w/short... link (48 volts)		2		II
-157	1601-00063	. MAGNET ASSEMBLY, Lower, w/short... link (24 volts)		3		I, IV, V
	1682-00021	. MAGNET ASSEMBLY, Lower, w/short... link (48 volts)		3		II
	1601-00063	. MAGNET ASSEMBLY, Lower, w/short... link (24 volts)		2		III
-158	1601-00073	. MAGNET ASSEMBLY, Upper, w/long.... link (24 volts)		2		I, IV, V
	1682-00031	. MAGNET ASSEMBLY, Upper, w/long.... link (48 volts)		2		II
	1601-00073	. MAGNET ASSEMBLY, Upper, w/long.... link (24 volts)		1		III
-159	1601-00083	. MAGNET ASSEMBLY, Lower, w/long.... link (24 volts)		2		I,III,IV,V
	1682-00041	. MAGNET ASSEMBLY, Lower, w/long.... link (48 volts) (ATTACHING PARTS)		2		II
-160	894001-5	. SCREW, Cap Hd, #6-40 x 0.312.....		9		I,II, IV, V
	894001-5	. SCREW, Cap Hd, #6-40 x 0.312.....		7		III
	E-595051-62	. LOCKWASHER, Split, #6..... (replaces P11064)		9		I,II,IV,V
	E-595051-62	. LOCKWASHER, Split, #6..... (replaces P11064)		7		III
	E-595049-6	. WASHER, Flat, #6..... (replaces 2193)		9		I,II,IV,V
	E-595049-6	. WASHER, Flat, #6..... (replaces 2193) -----*		7		III
-161	1601-00450	. . SHELL, Magnet, punch		1		
-161A	1A8-1435	. . COIL, Punch (24 volts).....		1		I,III,IV,V
	1A8-1903	. . COIL, Punch (48 volts).....		1		II
-162	1601-10080	. . RETAINER, Armature, punch..... (ATTACHING PARTS)		1		
-163	1A1-1002	. . SCREW, Bind. Hd, #3-56 x 0.156.. -----*		2		
-164	1601-10130	. . SPACER, Armature, punch magnet..		1		
8-1-165	1601-00093	. . LINK ASSEMBLY, Punch Magnet,.... short upper (use only on 1601-00053)		1		I,III,IV,V

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY			USEABLE ON CODE
			1	2	3	
24 VOLT BASIC 500 PUNCH ASSEMBLY (continued)						
8-1-166	1601-00103	. . LINK ASSEMBLY, Punch Magnet,.... short lower (use only on 1601-00063 and 1682-00021)		1		
	1601-00093	. . LINK ASSEMBLY, Punch Magnet,.... short lower (use only on 1682-00011) (replaces 1601-00103)		1		II
-167	1601-00113	. . LINK ASSEMBLY, Punch Magnet,.... long upper (use only on 1601-00073 and 1682-00031)		1		
8-1-168	1601-00123	. . LINK ASSEMBLY, Punch Magnet,.... long lower (use only on 1601-00083 and 1682-00041)		1		



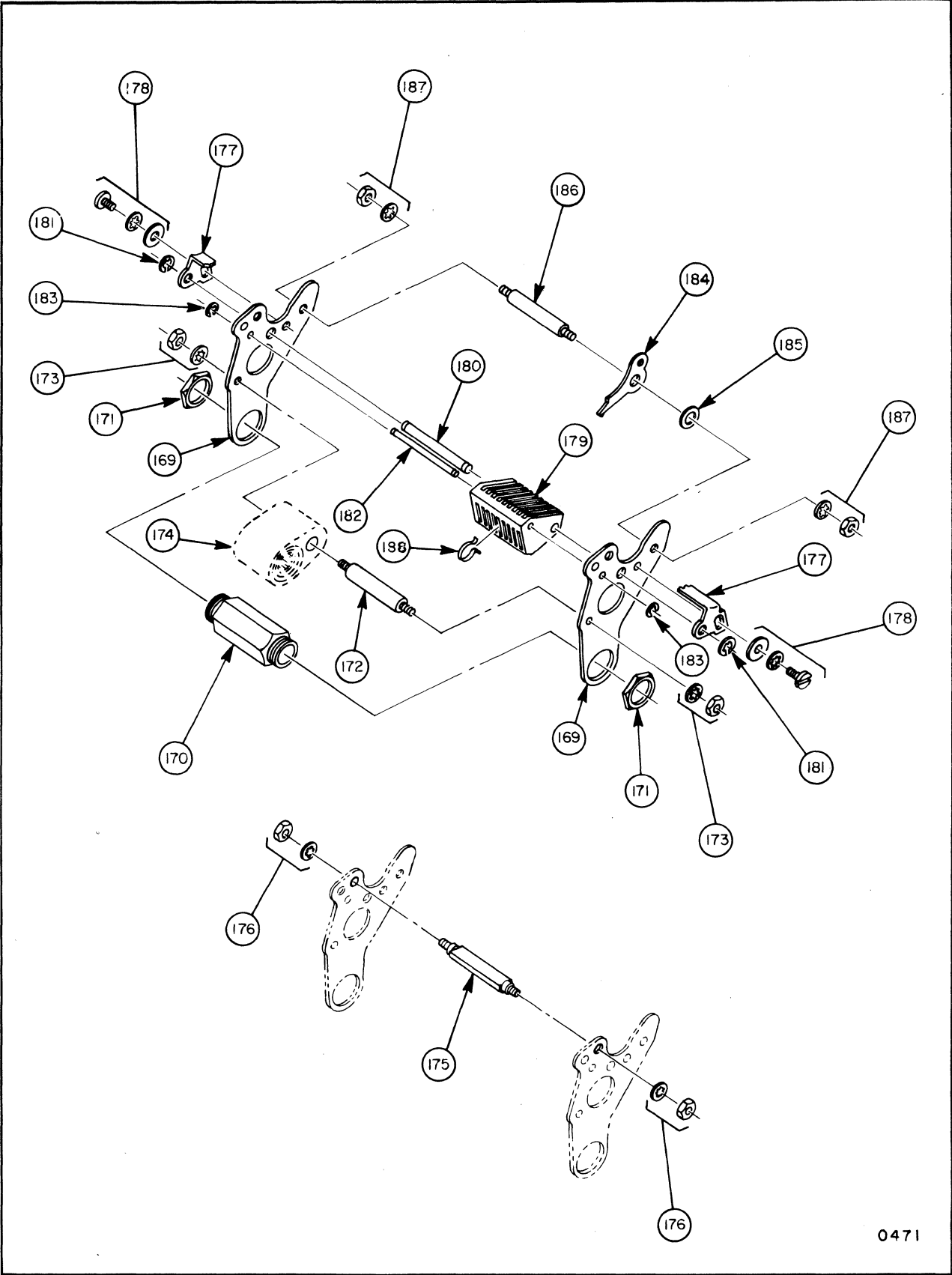
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Figure 8-1 24 Volt Basic 500  
Punch Assembly (Sheet 5 of 6)  
(Index Nos. 154 thru 168)

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS			USEABLE ON CODE
			1	2	3	
24 VOLT BASIC 500 PUNCH ASSEMBLY (continued)						
8-1-169	1601-11091	. PLATE, Side, Punch Pawl Yoke.....		2		
-170	1601-10092	. BUSHING, Punch Pawl Yoke..... (ATTACHING PARTS)		1		
-171	1A5-1009	. NUT, Hex, Special 0.375 - 24 thd.. ---*---		2		
-172	1601-10475	. PIN, Link, punch drive..... (ATTACHING PARTS)		1		
-173	1A5-1027	. NUT, Hex, binding, #4-40.....		2		
	E-595054-4	. LOCKWASHER, Int Tooth, #4..... (replaces 1812) ---*---		2		
-174	1601-00365	. LINK ASSEMBLY, Drive, punch..... (shown here for orientation purposes, see fig. 8-1-45)		REF		
-175	1601-10682	. STRIPPER, Punch..... (ATTACHING PARTS)		1		
-176	1A5-1027	. NUT, Hex, binding, #4-40.....		2		
	E-595054-4	. LOCKWASHER, Int Tooth, #4..... (replaces 1812) ---*---		2		
-177	1601-11310	. STOP, Upper, punch pawl..... (ATTACHING PARTS)		1		
-178	E-594279-3	. SCREW, Pan Hd, #4-48 x 0.188..... (replaces 4710)		2		
	E-594050-41	. WASHER, Flat (replaces 1912).....		2		
	E-595054-4	. LOCKWASHER, Int Tooth, #4..... (replaces 1812) ---*---		2		
-179	1601-10325	. GUIDE, Punch Pawl.....		1		
-180	1601-11340	. STOP, Punch, lower..... (ATTACHING PARTS)		1		
-181	E-596865-8	. RING, Retaining, E type..... (replaces 3075-0200) ---*---		2		
-182	1601-10391	. ROD, Spring, punch pawl..... (ATTACHING PARTS)		1		
-183	E-596865-4	. RING, Retaining, E type..... (replaces 1A6-1246) ---*---		2		
-184	1601-11300	. PAWL, Punch.....		9	I, II, IV, V	
	1601-11300	. PAWL, Punch.....		7	III	
8-1-185	1601-10490	. SPACER, Punch Pawl.....		1		

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS			USEABLE ON CODE
			1	2	3	
24 VOLT BASIC 500 PUNCH ASSEMBLY (continued)						
8-1-186	1601-10480	. ROD, Pivot, punch pawl..... (ATTACHING PARTS)		1		
-187	1A5-1027	. NUT, Hex, binding, #4-40.....		2		
	E-595054-4	. LOCKWASHER, Int Tooth, #4..... (replaces 1812) ---*---		2		
8-1-188	1601-10354	. SPRING, Punch Pawl, over-..... centering		9	I, II, IV, V	
	1601-10354	. SPRING, Punch Pawl, over-..... centering		7	III	



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Figure 8-1 24 Volt Basic 500 Punch Assembly  
(Sheet 6 of 6) (Index Nos. 169 thru 188)



## SECTION 9

### PARTS-DESK TOP UNITS

USEABLE ON CODE COLUMN:

Listed below are the four models covered in Section 9 of this manual, along with their individually assigned Useable On Codes.

USEABLE ON CODE	PART NUMBER	NOMENCLATURE
VI	809217	518 Housed Unit Punch Assembly
VII	809243	528 Housed Unit Punch Assembly
VIII	819039	582 Housed Unit Punch and Reader Assembly
IX	819070	592 Housed Unit Punch and Reader Assembly

Group Assembly Parts List

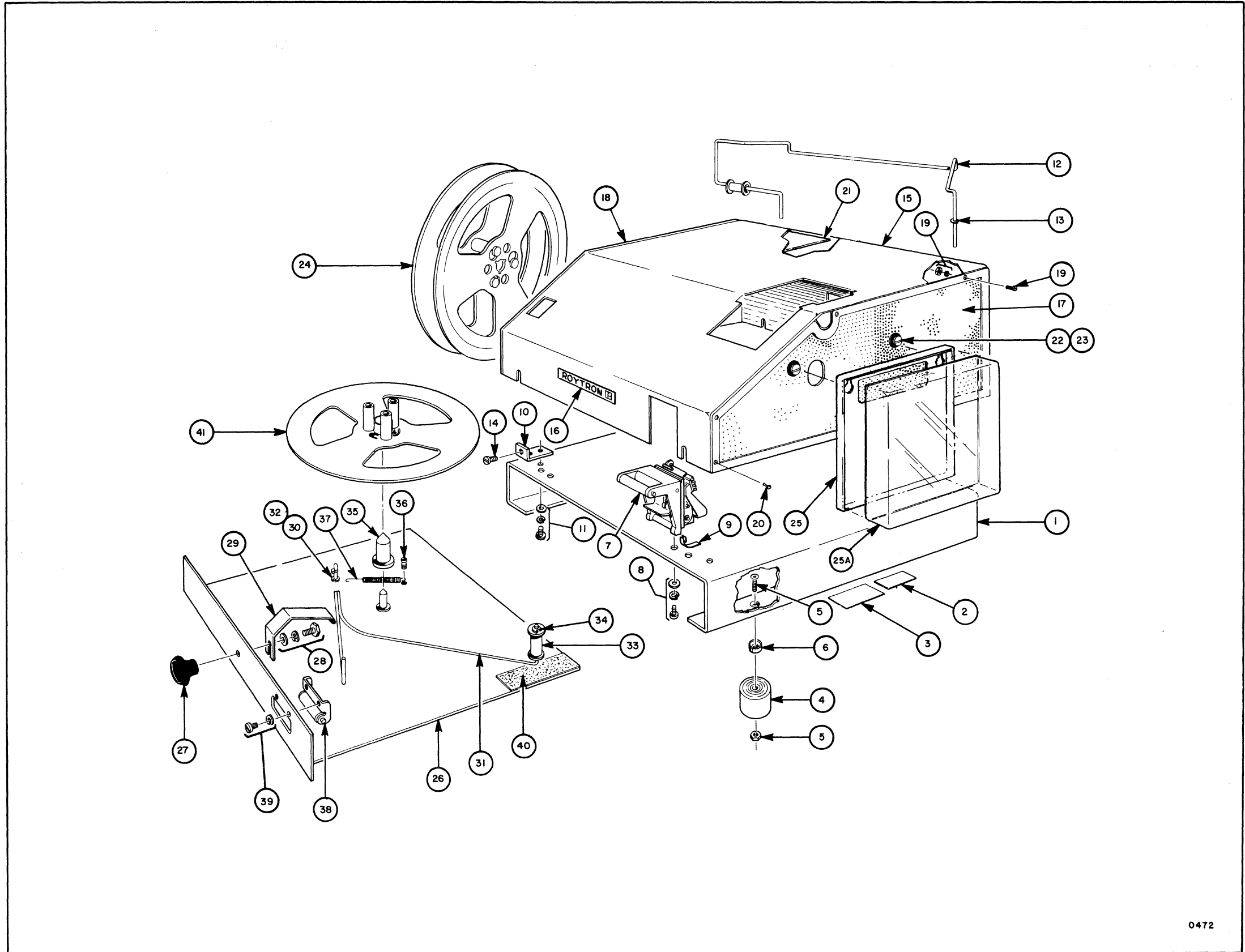
FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	USEABLE ON CODE
518/528 HOUSED UNIT PUNCH ASSEMBLY				
9-1-	809217	PUNCH ASSEMBLY, Housed Unit, 518....	1	VI
	809243	PUNCH ASSEMBLY, Housed Unit, 528....	1	VII
-1	1634-10232	. BASE (replaces 1621-00141).....	1	
-2	1B3-1005	. LABEL, Patent.....	1	
-3	1B3-1008	. PLATE, Specification.....	1	
-4	1634-10012	. FOOT.....	4	
		(ATTACHING PARTS)		
-5	1A1-1315	. SCREW, Flat Hd, #6-32 x 0.750....	4	
	E-595800-6	. NUT, Hex, #6-32.....	4	
		----*----		
-6	1A6-1341	. SPACER.....	4	
-7	819026	. SWITCH ASSEMBLY, Out of tape/....	1	
		Tape-Tension (S2) (See fig. 9-2 for breakdown)		
		(ATTACHING PARTS)		
-8	E-594267-6	. SCREW, Self-tapping, #6.....	2	
		(replaces 3071-12500)		
	2972-01200	. WASHER, Flat, #6.....	2	
		----*----		
-9	E-588347	. SPRING, Grounding.....	1	
-10	1675-10800	. BRACKET, Cover.....	4	
		(replaces 1634-10200)		
		(ATTACHING PARTS)		
-11	Z4240	. SCREW, Pan Hd, #6-40 x 0.250.....	4	
	E-595802-6	. LOCKWASHER, Split, #6.....	4	
	2972-01200	. WASHER, Flat, #6.....	4	
		----*----		
-12	1634-00110	. GUIDE ASSEMBLY, Take-up.....	1	
		(ATTACHING PARTS)		
-13	E-596413	. RING, Retaining.....	1	
		(replaces 3075-00200)		
		----*----		
9-1-	E-559767-0	. COVER ASSEMBLY.....	1	VI
		(replaces 1652-00050)		
	1652-00050	. COVER ASSEMBLY.....	1	VII
		(ATTACHING PARTS)		
-14	Z4262	. SCREW, Bind. Hd, #6-40 x 0.187....	4	
		----*----		
-15	E-569253	. . COVER, Punch.....	1	VI
	1652-00030	. . COVER, Punch.....	1	VII
-16	1634-10360	. . PLATE, Designation.....	1	
9-1-17	E-551214	. . COVER, Side, RH.....	1	VI
	1634-10500	. . COVER, Side, RH.....	1	VII

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION			UNITS PER ASSY	USEABLE ON CODE
		1	2	3		
518/528 HOUSED UNIT PUNCH ASSEMBLY (continued)						
9-1-18	1634-10490	. .	COVER, Side, LH.....	1		
			(ATTACHING PARTS)			
-19	E-560007-4	. .	SCREW, Pan Hd, #3-48 x 0.250.....	2		VI
			(replaces Z4291)			
	E-560005-3	. .	LOCKWASHER, Ext Tooth, #3.....	2		VI
			(replaces 3272-00500)			
	E-560008	. .	NUT, Hex, #3-48.....	2		VI
			(replaces E-4451)			
-20	1A4-1061	. .	RIVET, Pop.....	8		VI
	1A4-1061	. .	RIVET, Pop.....	10		VII
			----*----			
-21	801035	. .	PAD, Damping.....	1		VI
	1633-10210	. .	PAD, Damping.....	1		VII
-22	E-551213	. .	SPRING, Chad Box.....	1		VI
			(ATTACHING PARTS)			
-23	E-551212	. .	SCREW, Shouldered, #6-32.....	2		VI
			(replaces Z4291)			
	E-595801-6	. .	WASHER, Flat, #6.....	4		VI
			(replaces 3272-00500)			
	E-595802-6	. .	LOCKWASHER, Split, #6.....	2		VI
	E-595800-6	. .	NUT, Hex, #6-32.....	2		VI
			(replaces 4451)			
			----*----			
-24	1671-10341	. .	REEL, Supply, 8.500 in. dia.....	1		
9-1-	1633-00080	. .	BOX ASSEMBLY, Chad.....	1		
-25	1634-10560	. .	COVER, Chad Box.....	1		
-25A	1634-10550	. .	BOX, Chad.....	1		
9-1-	809301	. .	DRAWER ASSEMBLY, Supply.....	1		
-26	1633-00025	. .	DRAWER ASSEMBLY, Tape.....	1		
			(replaces 1633-00065)			
-27	1634-10480	. .	KNOB, Drawer.....	1		
			(ATTACHING PARTS)			
-28	1A1-1158	. .	SCREW.....	1		
	1A6-1041	. .	LOCKWASHER.....	1		
	Z-134	. .	WASHER, Flat.....	1		
			----*----			
-29	1634-10390	. .	SPRING.....	1		
-30	1B1-1031	. .	BEARING.....	1		
-31	1633-00110	. .	ARM ASSEMBLY, Tape Supply.....	1		
			(ATTACHING PARTS)			
-32	1A6-1031	. .	RING, Retaining.....	1		
			----*----			
-33	1671-10220	. .	ROLLER.....	1		
			(ATTACHING PARTS)			
-34	1A6-1031	. .	RING, Retaining.....	2		
			----*----			
9-1-35	1633-10310	. .	SPINDLE, Tape.....	1		



Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION			UNITS PER ASSY	USEABLE ON CODE
		1	2	3		
518/528 HOUSED UNIT PUNCH ASSEMBLY (continued)						
9-1-36	2971-07900	. .	STUD, Spring.....		1	
-37	40E-313	. .	SPRING.....		1	
-38	1633-00100	. .	ROLLER ASSEMBLY.....		1	
			(ATTACHING PARTS)			
-39	Z4240	. .	SCREW.....		2	
	P11064	. .	LOCKWASHER, Split, #6.....		2	
			----*----			
-40	1634-10470	. .	TAPE, Cork.....		1	
9-1-41	1671-10341	. .	REEL, Supply, 8.500 in. dia.....		1	VI
	E-520761-1	. .	FLANGE, Tape Reel, male.....		1	VII



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Figure 9-1 518/528 Housed Unit  
Punch Assembly (Sheet 1 of 5)  
(Index Nos. 1 thru 41)

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	USEABLE
				ON CODE
518/528 HOUSED UNIT PUNCH ASSEMBLY (continued)				
9-1-42	809209	. BRACKET ASSEMBLY, Capacitor..... (replaces 3260-01900) (ATTACHING PARTS)	1	
-43	Z-4240	. SCREW, Pan Hd, #6-40 x 0.250.....	1	
	E-595802-6	. LOCKWASHER, Split, #6..... (replaces P11064)	1	
	2972-01200	. WASHER, Flat, #6..... ---*---	1	
-44	3260-05205	. CAPACITOR, 3mfd, 370vdcw (C101)... (ATTACHING PARTS)	1	
-45	3071-01501	. SCREW, Hex Hd, #6-40 x 0.562.....	1	
	E-595802-6	. LOCKWASHER, Split, #6..... (replaces P11064)	1	
	2972-01200	. WASHER, Flat, #6.....	1	
	4451	. NUT, Hex, #6-40..... ---*---	1	
-46	1634-10221	. BRACKET, Switch..... (ATTACHING PARTS)	1	
-47	4541	. SCREW, Hex Hd, #6-40 x 0.250..... (replaces 9E-4138)	2	VI
	9E-4138	. SCREW, Hex Hd, #6-40 x 0.265.....	2	VII
	E-595802-6	. LOCKWASHER, Split, #6..... (replaces P11064)	2	
	2972-01200	. WASHER, Flat, #6..... ---*---	2	
-48	1A8-1948	. SWITCH, Rocker (S6)..... (ATTACHING PARTS)	1	
-49	Z-4240	. SCREW, Pan Hd, #6-40 x 0.250.....	2	
	E-595802-1	. LOCKWASHER, Split, #6..... (replaces P11064) ---*---	2	
-50	1A8-1382	. CLAMP, Cable, 0.312 dia..... (replaces 1A8-1237) (ATTACHING PARTS)	1	
-51	Z-4240	. SCREW, Pan Hd, #6-40 x 0.250.....	1	
-52	1A8-1381	. WASHER, D shaped..... ---*---	1	
9-1-53	1A8-1993	. TERMINAL, Lug (use only on..... 120 volts, 60 hz)	1	VII

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	USEABLE
				ON CODE
518/528 HOUSED UNIT PUNCH ASSEMBLY (continued)				
9-1-54	819020	. STRIP, Terminal (TBI)..... (replaces 1A8-1569) (ATTACHING PARTS)	1	
-55	Z4240	. SCREW, Pan Hd, #6-40 x 0.250.....	2	
	E-595802-6	. LOCKWASHER, Split, #6..... (replaces P11064) ---*---	2	
-56	809211	. PUNCH ASSEMBLY, 500, Basic,..... 24 volt (See figure 8-1 for breakdown) (ATTACHING PARTS)	1	
-57	E-596438	. SCREW, Fil Hd, shouldered, #6-40... (replaces 9E4008)	2	
	3072-00700	. WASHER, Flat, #6.....	4	
	E-595802-6	. LOCKWASHER, Split, #6..... (replaces P11064)	2	
	4451	. NUT, Hex, #6-40..... ---*---	2	
-58	1634-10330	. GROMMET.....	2	
-59	1601-11160	. TUBE, Chad (replaces 1662-11160)...	1	
-60	No Number	. CLAMP, Chad Tube..... (replaces 1A8-1641) (part of index 9-1-56) (ATTACHING PARTS)	REF	
9-1-61	E-596103-6	. SCREW, Pan Hd, #6-40 x 0.375..... (replaces 3071-12500) (part of index 9-1-56)	REF	
	E-595051-62	. LOCKWASHER, Split, #6..... (replaces P11064) (part of index 9-1-56) ---*---	REF	
9-1-	* E-551197-16	. KIT, Accessory.....	1	
-61A	1603-00050	. . KNOB ASSEMBLY..... (ATTACHING PARTS)	1	
-61B	3071-06300	. . SETSCREW, Socket Hd, cup point... ---*---	2	
9-1-61C	551205	. . POLYETHYLENE BAG.....	1	
* Optional.				

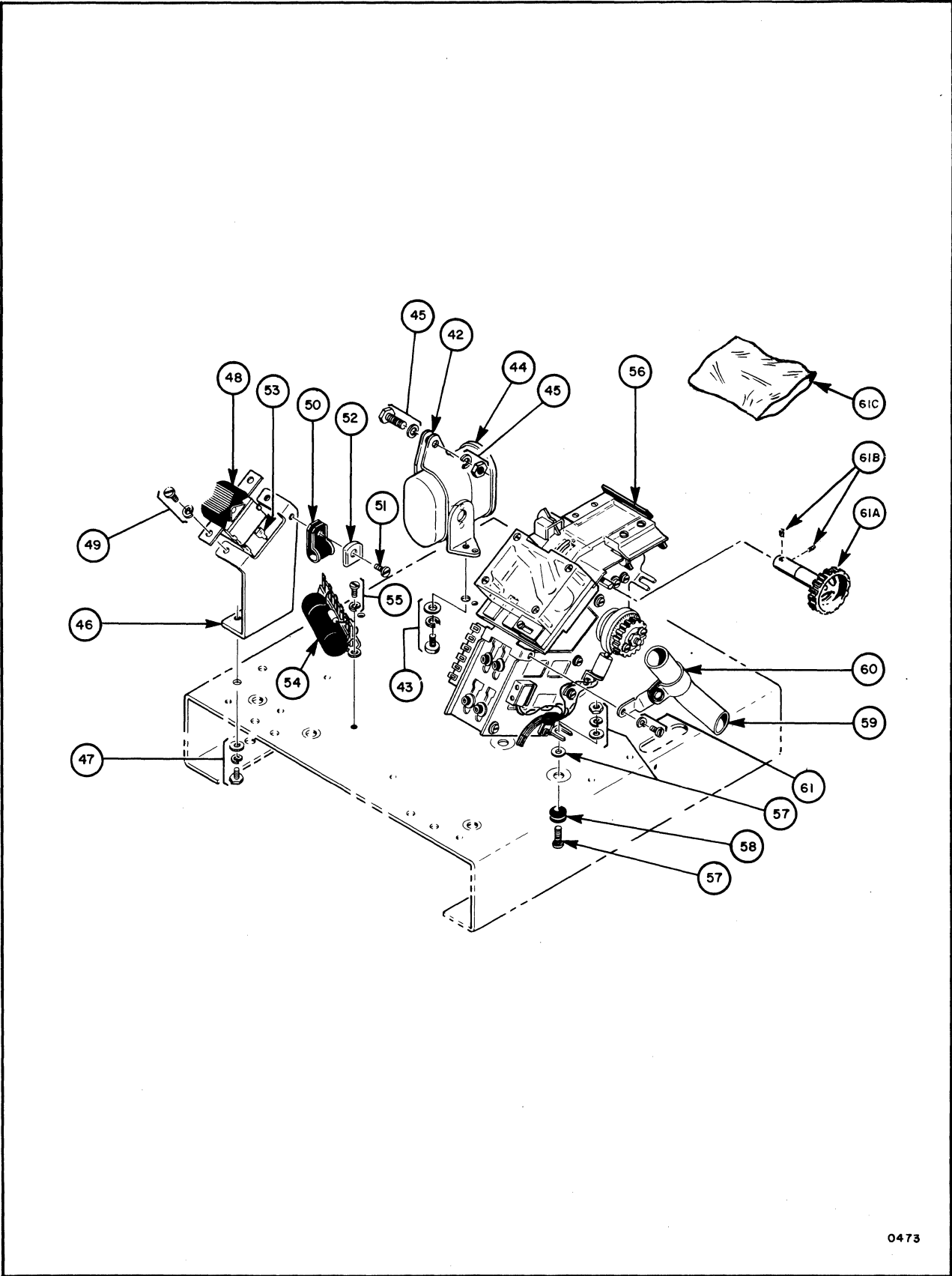


Figure 9-1 518/528 Housed Unit Punch Assembly  
(Sheet 2 of 5) (Index Nos. 42 thru 61)

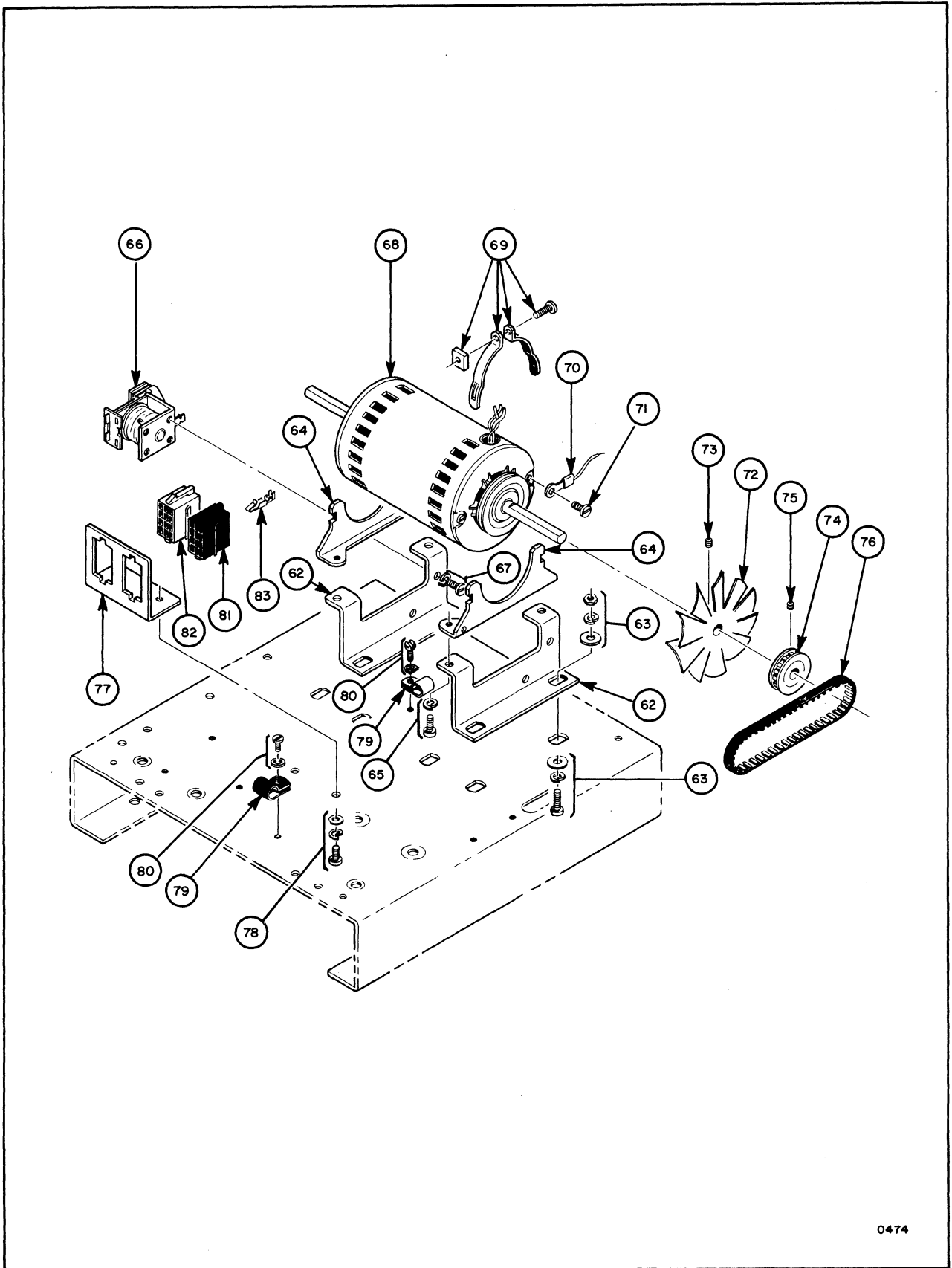
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Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION			UNITS PER ASSY	USEABLE ON CODE
		1	2	3		
518/528 HOUSED UNIT PUNCH ASSEMBLY (continued)						
9-1-62	1634-10250	.	BRACKET, Motor.....	2		
			(ATTACHING PARTS)			
-63	3271-00300	.	SCREW, Fil Hd, #8-36 x 0.562.....	4		
	1A6-1041	.	LOCKWASHER, Split, #8.....	4		
	2972-00300	.	WASHER, Flat, #8.....	8		
			(replaces 9E1003 and Z134)			
	Z4453	.	NUT, Hex, #8-36.....	4		
			---*---			
-64	2E814	.	BRACKET, Motor.....	2		
			(ATTACHING PARTS)			
-65	Z4144	.	SCREW, Fil Hd, #8-40 x 0.343.....	4		
	1A6-1041	.	LOCKWASHER, Split, #8.....	4		
			---*---			
-66	E-590239	.	RELAY, Punch Enable (K1).....	1	VI	
			(replaces 1A8-1580)			
	1A8-1580	.	RELAY, Punch Enable (K1).....	1	VII	
-67	E-594028-6	.	SCREW, Pan Hd, #6-32 x 0.375.....	2		
			(replaces 1A1-1116)			
	E-595802-6	.	LOCKWASHER, Split, #6.....	2		
			---*---			
-68	1A8-1951	.	MOTOR, Drive (M1).....	1		
			(replaces E-590235-4)			
-69	1A8-1622	.	CLAMP, Motor (screw and nut.....	2		
			supplied with clamp)			
-70	819033	.	GROUND WIRE ASSEMBLY.....	1		
			(ATTACHING PARTS)			
-71	No Number	.	SCREW (supplied with motor).....	1		
			(replaces Z4240)			
			---*---			
-72	1634-10190	.	FAN.....	1		
			(ATTACHING PARTS)			
-73	1A1-1149	.	SETSCREW, #8-32 x 0.250.....	1		
			---*---			
-74	E-569278	.	PULLEY, 50 Hz.....	1	VI	
	* E-569228	.	PULLEY, 120 volts, 50 hz.....	1	VII	
	* E-569279	.	PULLEY, 120 volts, 60 hz.....	1	VII	
-75	E-569732	.	SETSCREW, Nylok, #6-32 x 0.250....	1		
9-1-76	1B2-1010	.	BELT, Timing (use only with.....	1		
			50 hz units)			
	* E-596208-6	.	BELT, Timing, pulley 19 tooth,....	1	VII	
			120 volts, 60 hz			
			* Optional			

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION			UNITS PER ASSY	USEABLE ON CODE
		1	2	3		
518/528 HOUSED UNIT PUNCH ASSEMBLY (continued)						
9-1-77	1675-10681	.	BRACKET, Connector.....		1	
			(ATTACHING PARTS)			
-78	Z4240	.	SCREW, Pan Hd, #6-40 x 0.250.....		2	
	E-595802-6	.	LOCKWASHER, Split, #6.....		2	
			(replaces P11064)			
	2972-01200	.	WASHER, Flat, #6.....		2	
			---*---			
-79	1A8-1636	.	CLAMP, Cable (replaces 1A8-1382)..		1	VI
	1A8-1237	.	CLAMP, Cable.....		1	VII
			(ATTACHING PARTS)			
-80	Z-4240	.	SCREW, Pan Hd, #6-40 x 0.250.....		1	VI
	Z4038	.	SCREW, Pan Hd, #6-40 x 0.218.....		1	VII
	2972-01200	.	WASHER, Flat, #6.....		1	VI
	1A8-1381	.	WASHER, D shaped.....		1	VII
			---*---			
9-1-	879003	.	HARNESS ASSEMBLY, 518.....		1	VI
	809233	.	HARNESS ASSEMBLY, 528.....		1	VII
-81	1A8-1616	.	PLUG, Amp-lok, blk.....		1	
-82	1A8-1397	.	PLUG, Amp-lok, wht.....		1	
9-1-83	1A8-1568	.	CONTACTS, Amp-lok.....		19	



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Figure 9-1 518/528 Housed Unit Punch Assembly  
(Sheet 3 of 5) (Index Nos. 62 thru 83)

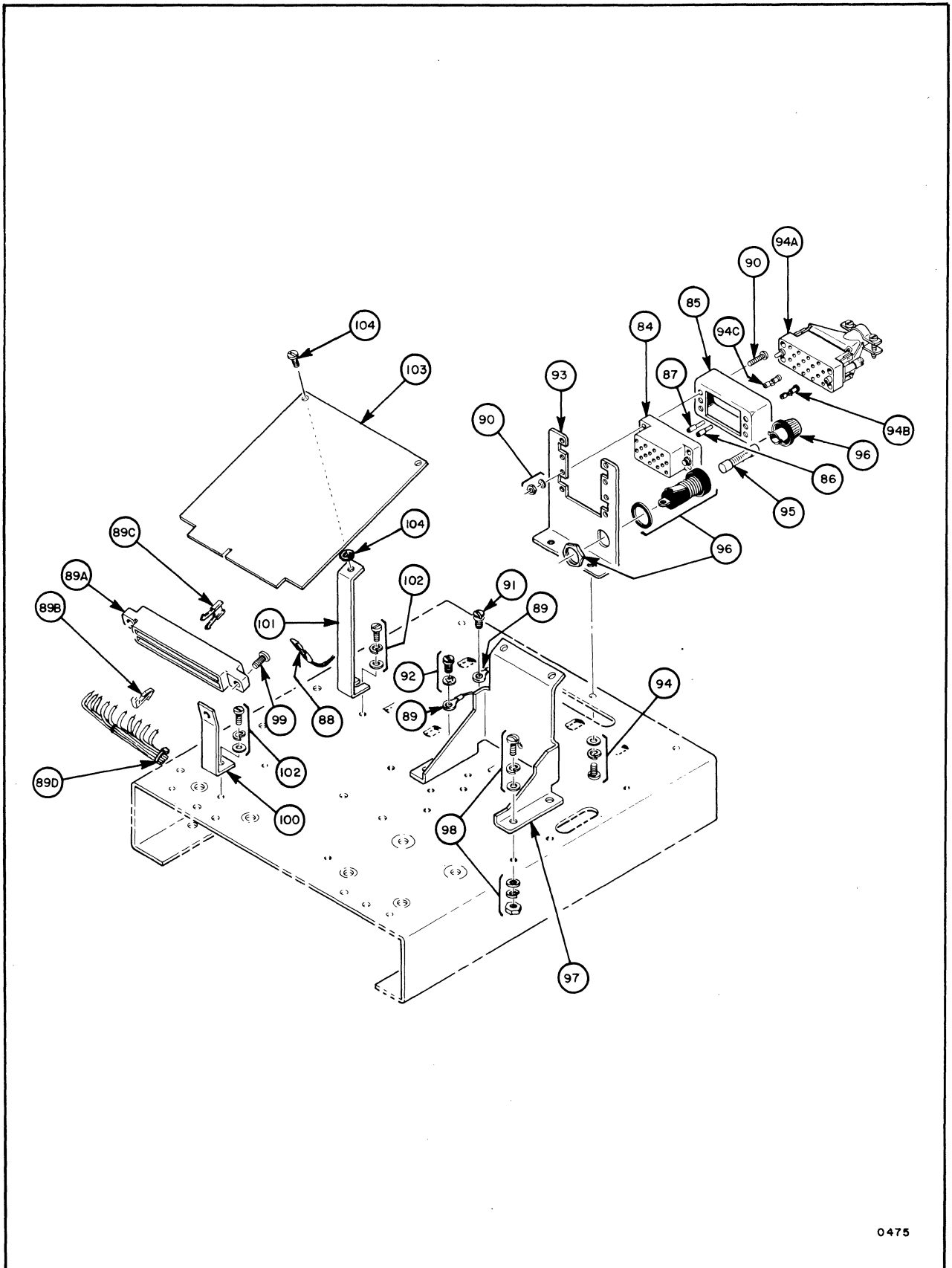




Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION			UNITS PER ASSY	USEABLE ON CODE
		1	2	3		
518/528 HOUSED UNIT PUNCH ASSEMBLY (continued)						
9-1-84	1A8-1956	. .	BLOCK, Contact (J5).....		1	
-85	1A8-1955	. .	SHELL.....		1	
-86	894002	. .	PIN, Contact.....		3	
-87	1A8-1990	. .	PIN, Contact.....		22	VI
	1A8-1990	. .	PIN, Contact.....		18	VII
-88	E-590133-3	. .	TERMINAL LUG.....		2	VI
			(replaces 1A8-1993)			
	1A8-1993	. .	TERMINAL LUG.....		2	VII
-89	1A8-1654	. .	TERMINAL.....		2	VI
	1A8-1654	. .	TERMINAL.....		3	VII
-89A	1A8-1582	. .	CONNECTOR, Amp (J2).....		1	VII
-89B	1A8-1583	. .	CONTACTS, Connector.....		34	VII
-89C	1A8-1584	. .	KEY, Polarizing.....		1	VII
-89D	E-592693	. .	TIE, Cable.....		39	VII
-90	E-594001-7	. .	SCREW, Rd. Hd, #2-56 x 0.427.....		2	
			(replaces 1A8-1582)			
	E-595802-2	. .	LOCKWASHER, Split, #2.....		2	
			(replaces 1812)			
	E-595800-2	. .	NUT, Hex, #2-56.....		2	
			(replaces 4402)			
-91	1A1-1116	. .	SCREW, Bind. Hd, #6-32 x 0.187....		1	
			(replaces 1A1-1311)			
-92	Z4038	. .	SCREW, Pan Hd, #6-40 x 0.228.....		1	
	1A6-1103	. .	LOCKWASHER, Int Tooth, #6.....		1	
-93	1634-10211	. .	BRACKET, Connector.....		1	
			(replaces 1634-10210)			
			(ATTACHING PARTS)			
-94	Z4240	. .	SCREW, Pan Hd, #6-40 x 0.250.....		2	
	E-595802-6	. .	LOCKWASHER, Split, #6.....		2	
			(replaces P11064)			
	2972-01200	. .	WASHER, Flat, #6.....		2	
			----*----			
9-1-	E-551197-6	. .	KIT, Accessory.....		1	
-94A	1A8-1957	. .	RECEPTACLE.....		1	
-94B	1A8-1958	. .	CONTACT.....		3	
-94C	1A8-1945	. .	SOCKET.....		22	
-95	1A8-1910	. .	FUSE 4 amp, 125 volt, slo-blow....		1	
			(F1)			
9-1-96	1A8-1211	. .	POST, Fuse.....		1	

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION			UNITS PER ASSY	USEABLE ON CODE
		1	2	3		
518/528 HOUSED UNIT PUNCH ASSEMBLY (continued)						
9-1-97	1634-10346	.	BRACKET, Punch.....		1	
			(replaces 1634-10345)			
			(ATTACHING PARTS)			
-98	3271-00300	.	SCREW, Fil Hd, #8-36 x 0.562.....		4	
			(replaces Z4240)			
	2972-00300	.	WASHER, Flat, #8.....		8	
			(replaces 2972-01200)			
	1A6-1041	.	LOCKWASHER, Split, #8.....		4	
			(replaces P11064)			
	Z4453	.	NUT, Hex, #8-36.....		4	
			---*---			
-99	4309	.	SCREW, Fil Hd, #6-40 x 0.437.....		2	
-100	1633-10252	.	BRACKET, Card Mounting, front.....		2	VII
-101	1633-10261	.	BRACKET, Card Mounting, rear.....		2	VII
			(ATTACHING PARTS)			
-102	Y4277	.	SCREW, #6-40.....		4	VII
			(replaces Z4240)			
	E-595802-6	.	LOCKWASHER, Split, #6.....		4	VII
			(replaces P11064)			
	2972-01200	.	WASHER, Flat, #6.....		4	VII
			---*---			
-103	E-569344-6	.	BOARD ASSEMBLY, Punch.....		1	VII
			(See fig. 9-3 for breakdown)			
			(ATTACHING PARTS)			
9-1-104	Z4240	.	SCREW, Pan Hd, #6-40 x 0.250.....		2	VII
	1A6-1349	.	WASHER, Thrust.....		2	VII
			---*---			



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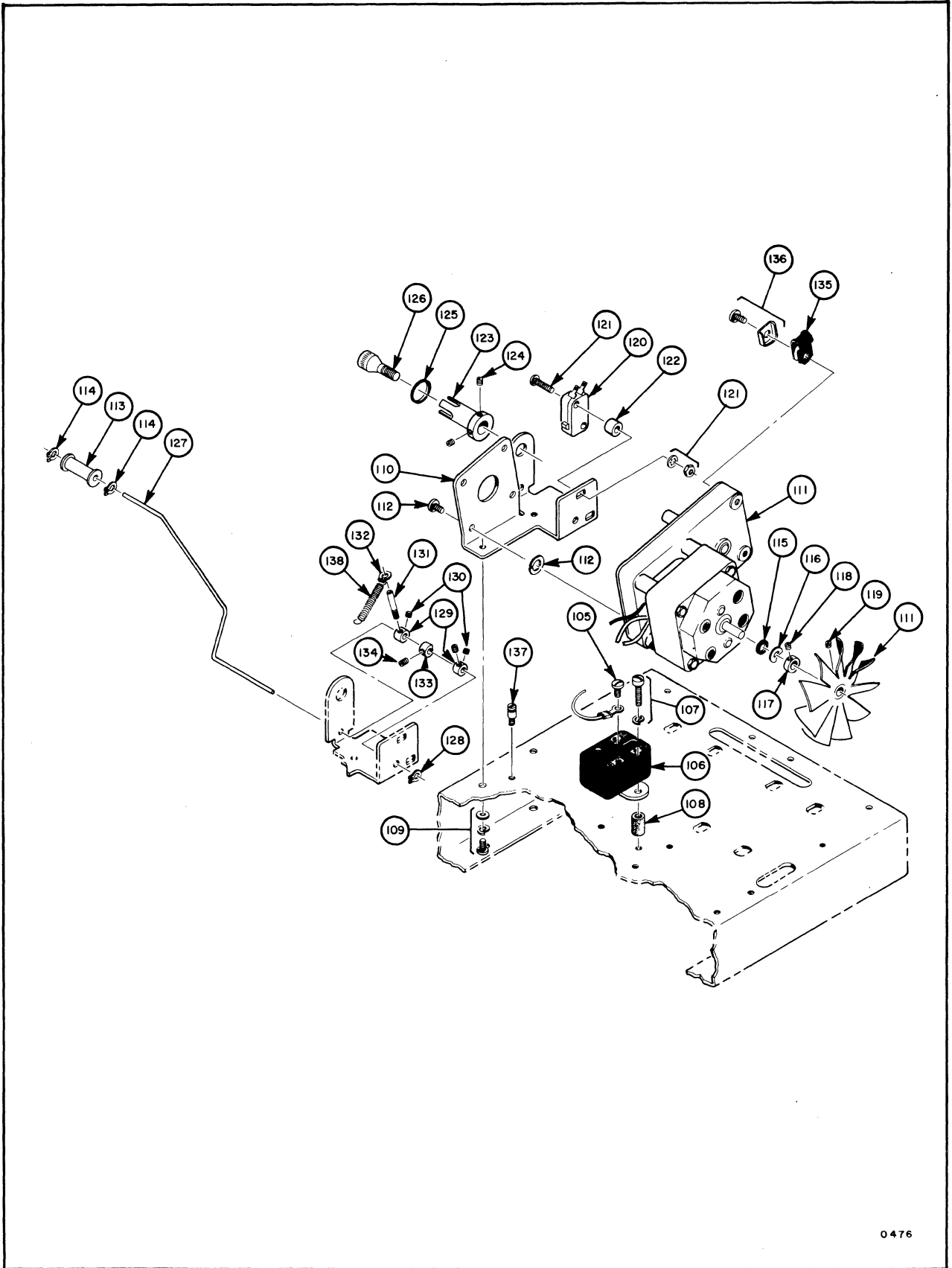
Figure 9-1 518/528 Housed Unit Punch Assembly  
(Sheet 4 of 5) (Index Nos. 84 thru 104)



FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	USEABLE ON CODE
518/528 HOUSED UNIT PUNCH ASSEMBLY (continued)				
9-1-105	1A1-1116	. SCREW, Bind. Hd, #6-32 x 0.187....	3	
-106	1A8-1952	. RELAY (K2)..... (ATTACHING PARTS)	1	
-107	1A1-1311	. SCREW, Fil Hd, #6-40 x 0.843.....	2	
	E-595802-6	. LOCKWASHER, Split, #6..... (replaces P11064) ----*----	2	
-108	1A6-1371	. SPACER.....	2	
9-1-	829001	. SPOOLER ASSEMBLY, Take-up (M2).... (ATTACHING PARTS)	1	
-109	Z4240	. SCREW, Pan Hd, #6-40 x 0.250.....	2	VII
	9E-4138	. SCREW, Hex Hd, #6-40 x 0.265.....	2	VI
	E-595802-6	. LOCKWASHER, Split, #6..... (replaces P11064)	2	
	2972-01200	. WASHER, Flat, #6..... ----*----	2	
-110	1633-10241	. . BRACKET.....	1	
-111	1A8-1950	. . MOTOR ASSEMBLY (with fan)..... (ATTACHING PARTS)	1	
-112	E-594029-10	. . SCREW, Pan Hd, #8-32 x 0.625.... (replaces 4502)	4	
	1A6-1041	. . LOCKWASHER, Split, #10..... ----*----	4	
-113	1671-10220	. . ROLLER..... (ATTACHING PARTS)	1	
-114	1A6-1031	. . RING, Retaining..... ----*----	2	
-115	1A6-1349	. . WASHER, Thrust.....	1	
-116	2165	. . WASHER, Spring (replaces 2903)..	1	
-117	1A6-1348	. . COLLAR..... (ATTACHING PARTS)	1	
-118	9E4017	. . SETSCREW..... ----*----	1	
-119	1A1-1149	. . SETSCREW.....	1	
-120	3061-53000	. . MICROSWITCH..... (ATTACHING PARTS)	1	
-121	1A1-1324	. . SCREW.....	2	
	1A6-1103	. . LOCKWASHER.....	2	
	9E4515	. . NUT..... ----*----	2	
9-1-122	1A6-1374	. . SPACER.....	2	

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION			UNITS PER ASSY	USEABLE ON CODE
		1	2	3		
518/528 HOUSED UNIT PUNCH ASSEMBLY (continued)						
9-1-123	1633-10230	. .	HOLDER, Reel.....	1		
			(replaces 1632-10230)			
			(ATTACHING PARTS)			
-124	3071-06300	. .	SETSCREW.....	2		
			---*---			
-125	1A6-1311	. .	O RING.....	1		
-126	1A1-1288	. .	SCREW, Reel.....	1		
-127	1633-10270	. .	ARM, Actuator.....	1		
			(ATTACHING PARTS)			
-128	1A6-1031	. .	RING, Retaining.....	1		
			---*---			
-129	1A6-1312	. .	COLLAR.....	2		
			(ATTACHING PARTS)			
-130	3071-06300	. .	SETSCREW.....	2		
			---*---			
-131	1A1-1284	. .	ARM, Spring.....	1		
-132	1A6-1031	. .	RING, Retaining.....	1		
-133	1633-10280	. .	CAM.....	1		
			(ATTACHING PARTS)			
-134	1A1-1294	. .	SCREW, Limit.....	1		
			---*---			
-135	1A8-1383	. .	CLAMP, Cable (replaces 1A8-1382)..	1		
			(ATTACHING PARTS)			
-136	E-594029-6	. .	SCREW, Pan Hd, #8-32 x 0.375.....	1		VI
			(replaces Z4240)			
	E-594029-10	. .	SCREW, Pan Hd, #8-32 x 0.625.....	1		VII
			(replaces Z4240)			
	1A8-1381	. .	WASHER, D shaped.....	1		
			---*---			
-137	9E4220	. .	STUD, Spring Anchor.....	1		
9-1-138	2608	. .	SPRING.....	1		



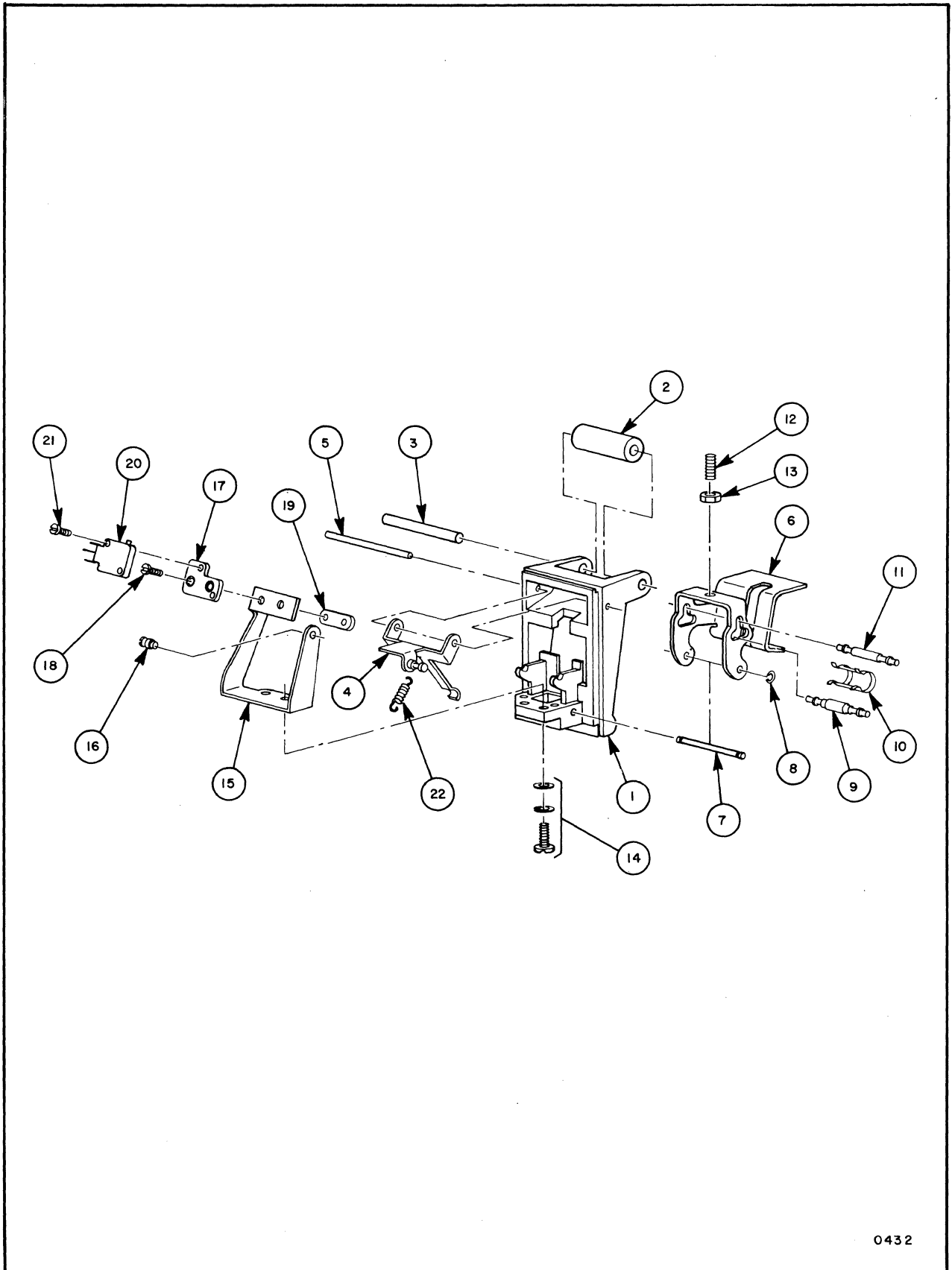
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Figure 9-1 518/528 Housed Unit Punch Assembly  
(Sheet 5 of 5) (Index Nos. 105 thru 138)

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS	USEABLE
			PER ASSY	ON CODE
		2 3 4		
OUT OF TAPE/TAPE-TENSION SWITCH ASSEMBLY				
9-2-	819026	SWITCH ASSEMBLY, Out of Tape/Tape-.. Tension (S2) (See fig. 9-1-7 and 9-4-8 for NHA)	REF	
-1	1634-10570	. BRACKET, Tape Tension..... (replaces 1634-00080)	1	
-2	1632-10400	. ROLLER, Tape Tension.....	1	
-3	1A3-1035	. PIVOT, Roller Shaft, tape tension.	1	
	1634-00090	. LEVER, Control.....	1	
-5	1634-10370	. ROD, Fulcrum.....	1	
-6	1634-10590	. LEVER, Switch.....	1	
-7	1632-10070	. PIVOT, Actuator..... (ATTACHING PARTS)	1	
-8	8612	. RING, Retaining..... ---*---	2	
-9	E-560025	. ROD, Spring, OC.....	1	
-10	1632-10061	. SPRING, OC.....	1	
-11	1632-10110	. ROD, Spring, OC.....	1	
-12	P4150	. SETSCREW, Adjusting, #6-40.....	1	
-13	4470	. NUT, Hex, lock.....	1	
9-2-	1634-00100	. BRACKET ASSEMBLY, Switch Detent... (replaces 1675-00320) (ATTACHING PARTS)	1	
-14	4038	. SCREW, #6-40 x 0.344.....	2	
	E-595802-6	. LOCKWASHER, Split, #6..... (replaces P11064)	2	
	1A6-1338	. WASHER, Flat, #6..... ---*---	2	
-15	810029	. BRACKET, Switch and Detent.....	1	
-16	2971-07900	. STUD, Anchor, spring.....	1	
-17	810501	. ADAPTER, Switch..... (ATTACHING PARTS)	1	
-18	E-594025-4	. SCREW, Pan Hd, #2-56 x 0.250..... (replaces E-594001-4)	2	
-19	1A5-1059	. PLATE, Nut..... ---*---	1	
-20	892007	. SWITCH, Subminiature..... (ATTACHING PARTS)	1	
-21	E-594025-4	. SCREW, Pan Hd, #2-56 x 0.250..... (replaces 594001-4) ---*---	2	
9-2-22	1642	. SPRING, Extension.....	1	





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Figure 9-2 Out of Tape/Tape-Tension Switch Assembly

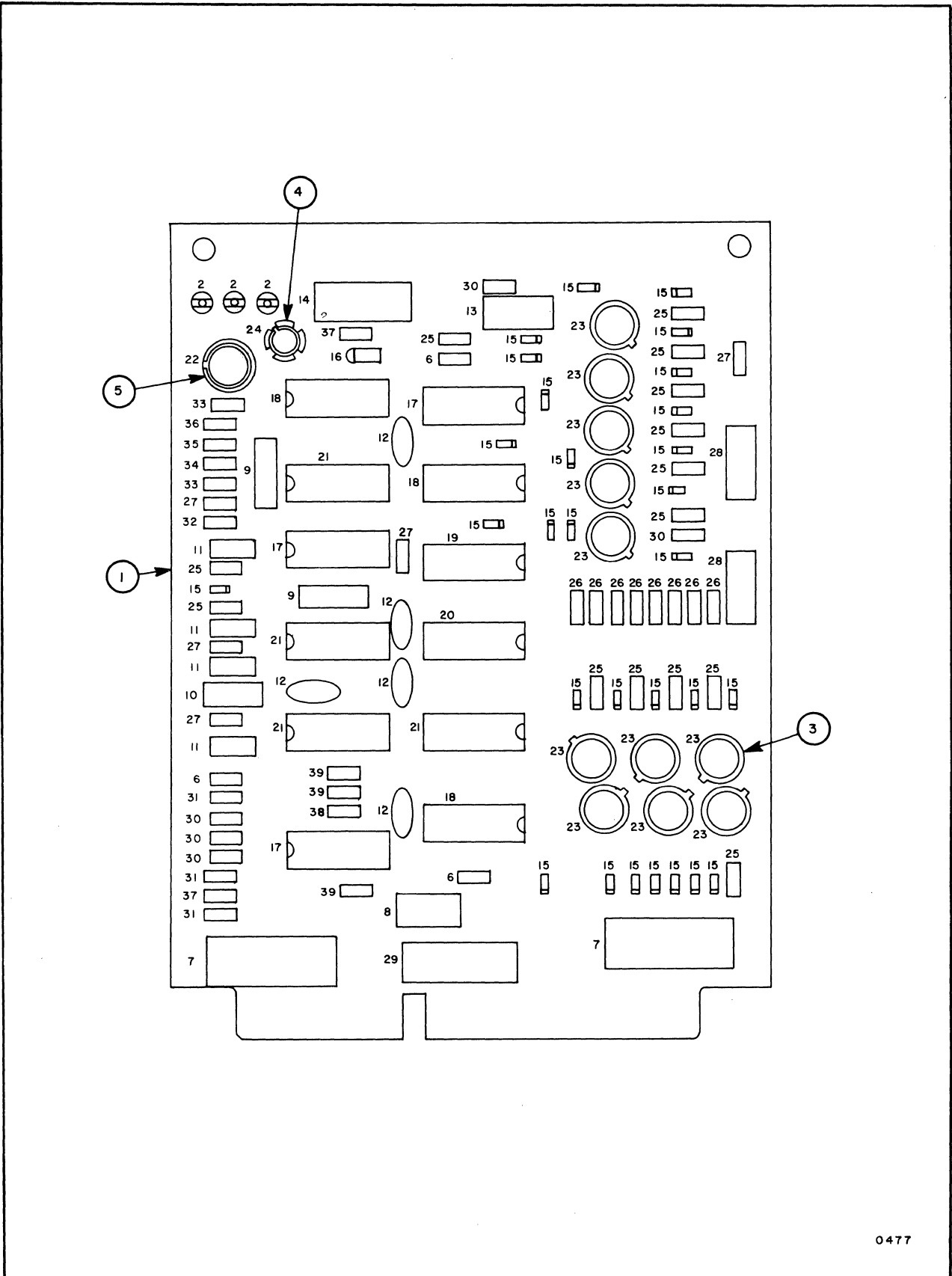


FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	USEABLE ON CODE
PUNCH BOARD ASSEMBLY				
9-3-	E-569344-6	BOARD ASSEMBLY, Punch (see fig..... 9-1-103 for NHA)	REF	VII
-1	E-560051	. BOARD, Punch, marking.....	1	VII
<del>-2</del>	<del>E-588420</del>	<del>. TERMINAL, Solder.....</del>	<del>3</del>	<del>VII</del>
-3	E-596291	. TRANSIPAD.....	11	VII
-4	E-596459	. TRANSIPAD.....	1	VII
-5	E-596460	. TRANSIPAD.....	1	VII
-6	E-592252	. JUMPER.....	3	VII
-7	E-586221-13	. CAPACITOR, Fixed, Elect, 50uf,.... 50vdcw (C1, C2)	2	VII
-8	E-586219-1	. CAPACITOR, Fixed, Elect, 50uf,.... 50vdcw (C3)	1	VII
-9	E-586217-13	. CAPACITOR, Fixed, Elect, luf,..... 12vdcw (C4, C10)	2	VII
(-10)	E-586217-10	. CAPACITOR, Fixed, film, 0.0056uf,.. 200vdcw (C6)	1	VII
-11	E-586217-1	. CAPACITOR, Fixed, film, 0.001uf,.. 200vdcw (C7, C11, C12, C13)	4	VII
-12	E-586190	. CAPACITOR, Fixed, disc, 0.1uf,.... 12vdcw (C8, C9, C16, C17, C18)	5	VII
-13	E-586219-8	. CAPACITOR, Fixed, Elect, 10uf,.... 12vdcw (C14)	1	VII
-14	E-586219-13	. CAPACITOR, Fixed, elect, 50uf,.... 12vdcw (C15)	1	VII
-15	E-580077	. DIODE, Switching (CR1 thru CR23,.. CR25 thru CR30)	29	VII
(-16)	E-580043	. DIODE, Zener (CR24).....	1	VII
-17	E-585060	. INTEGRATED CIRCUIT, Hex Inverter.. (M1, M9, M12)	3	VII
-18	E-585007	. INTEGRATED CIRCUIT, Quad two-in-.. put, positive nand gate (M2, M6, M7)	3	VII
-19	E-585047	. INTEGRATED CIRCUIT, Hex Inverter,.. open collector (M3)	1	VII
-20	E-585061	. INTEGRATED CIRCUIT, Hex Inverter,.. (M4)	1	VII
-21	E-585008-0	. INTEGRATED CIRCUIT, Triple 3..... nand (M5, M8, M10, M11)	4	VII
-22	E-585058	. INTEGRATED CIRCUIT, Operational... Amplifier (M13)	1	VII
-23	E-581093	. TRANSISTOR (Q1 thru Q11).....	11	VII
-24	E-581089	. TRANSISTOR (Q12).....	1	VII
9-3-25	E-582711-472	. RESISTOR, Fixed, film, 4.7K ± 5%,.. 0.25W (R1, R3, R5, R7, R9, R11, R13, R15, R17, R19, R22, R38, R45, R46)	14	VII

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FOR SECRET

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION 2 3	UNITS PER ASSY	USEABLE ON CODE
PUNCH BOARD ASSEMBLY (continued)				
9-3-26	E-582711-431	. RESISTOR, Fixed, film, (R2,..... R4, R6, R8, R10, R12, R14, R16)	8	VII
-27	E-582711-331	. RESISTOR, Fixed, film, 330 ohms... ± 5%, 0.25W (R18, R31, R44, R47, R48)	5	VII
-28	E-582713-151	. RESISTOR, Fixed, film, 150 ohms... ± 5%, 1W (R20, R23)	2	VII
-29	E-582716-054	. RESISTOR, Fixed, WW, 1.5K ± 5%,... 6.5W (R21)	1	VII
-30	E-582711-102	. RESISTOR, Fixed, film, 1K ± 5%,... 0.25W (R24, R26, R27, R29, R50)	5	VII
-31	E-582711-362	. RESISTOR, Fixed, film, 3.6K ± 5%,.. 0.25W (R25, R28, R49)	3	VII
-32	E-582711-302	. RESISTOR, Fixed, film, 3K ± 5%,... 0.25W (R30)	1	VII
-33	E-582711-103	. RESISTOR, Fixed, film, 10K ± 5%,.. 0.25W (R32, R37)	2	VII
-34	E-582711-471	. RESISTOR, Fixed, film, 470 ohms... ± 5%, 0.25W (R33)	1	VII
-35	E-582711-512	. RESISTOR, Fixed, film, 5.1K..... ± 5%, 0.25W (R34)	1	VII
-36	E-582711-113	. RESISTOR, Fixed, film, 11K..... ± 5%, 0.25W (R35)	1	VII
-37	E-582711-202	. RESISTOR, Fixed, film, 2K ± 5%,... 0.25W (R36, R39)	2	VII
-38	E-582711-101	. RESISTOR, Fixed, film, 100 ohms... ± 5%, 0.25W (R40)	1	VII
9-3-39	E-582711-201	. RESISTOR, Fixed, film, 200 ohms... ± 5%, 0.25W (R41, R42, R43)	3	VII



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Figure 9-3 I/C Punch Board Assembly

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	USEABLE ON CODE
582/592 HOUSED UNIT PUNCH AND READER ASSEMBLY				
9-4-	819039	PUNCH AND READER ASSEMBLY, Housed... Unit, 582	1	VIII
	819070	PUNCH AND READER ASSEMBLY, Housed... Unit, 592	1	IX
-1	1634-10232	. BASE.....	1	
-2	1B3-1005	. LABEL, Patent.....	1	
-3	1B3-1008	. PLATE, Specification.....	1	
-4	1634-10012	. FOOT..... (ATTACHING PARTS)	4	
-5	1A1-1315	. SCREW, Flat Hd, #6-32 x 0.750.....	4	
	E-595800-6	. NUT, Hex, #6-32..... ----*----	4	
-6	1A6-1341	. SPACER.....	4	
-7	819027	. SWITCH ASSEMBLY, Tape Tension..... (S8)	1	
-8	819026	. SWITCH ASSEMBLY, Out of Tape/..... Tape-Tension (S2) (See fig. 9-2 for breakdown) (ATTACHING PARTS)	1	
-9	E-594267-6	. SCREW, Self-tapping..... (replaces 3071-12500)	4	
	2972-01200	. WASHER, Flat, #6..... ----*----	4	
-10	1675-10800	. BRACKET, Cover..... (replaces 1634-10200) (ATTACHING PARTS)	4	
-11	Z4240	. SCREW, Pan Hd, #6-40 x 0.250.....	4	
	P11064	. LOCKWASHER, Split, #6.....	4	
	2972-01200	. WASHER, Flat, #8..... ----*----	4	
9-4-	819082-0	. COVER ASSEMBLY, Punch and Reader.. (replaces 1622-00035) (ATTACHING PARTS)	1	
-12	Z4262	. SCREW, Bind. Hd, #6-40 x 0.187.... ----*----	4	
-13	801515-2	. . PAD, Damping..... (replaces 1675-10630)	1	
-14	E-559768	. . COVER ASSEMBLY, Side, LH.....	1	
-15	E-551214	. . COVER ASSEMBLY, Side, RH..... (ATTACHING PARTS)	1	
9-4-16	E-560007-4	. . SCREW, Pan Hd, #3-48 x 0.250....	2	
	E-560005-3	. . LOCKWASHER, Ext tooth, #3.....	2	
	E-560008	. . NUT, Hex, #3-48..... ----*----	2	

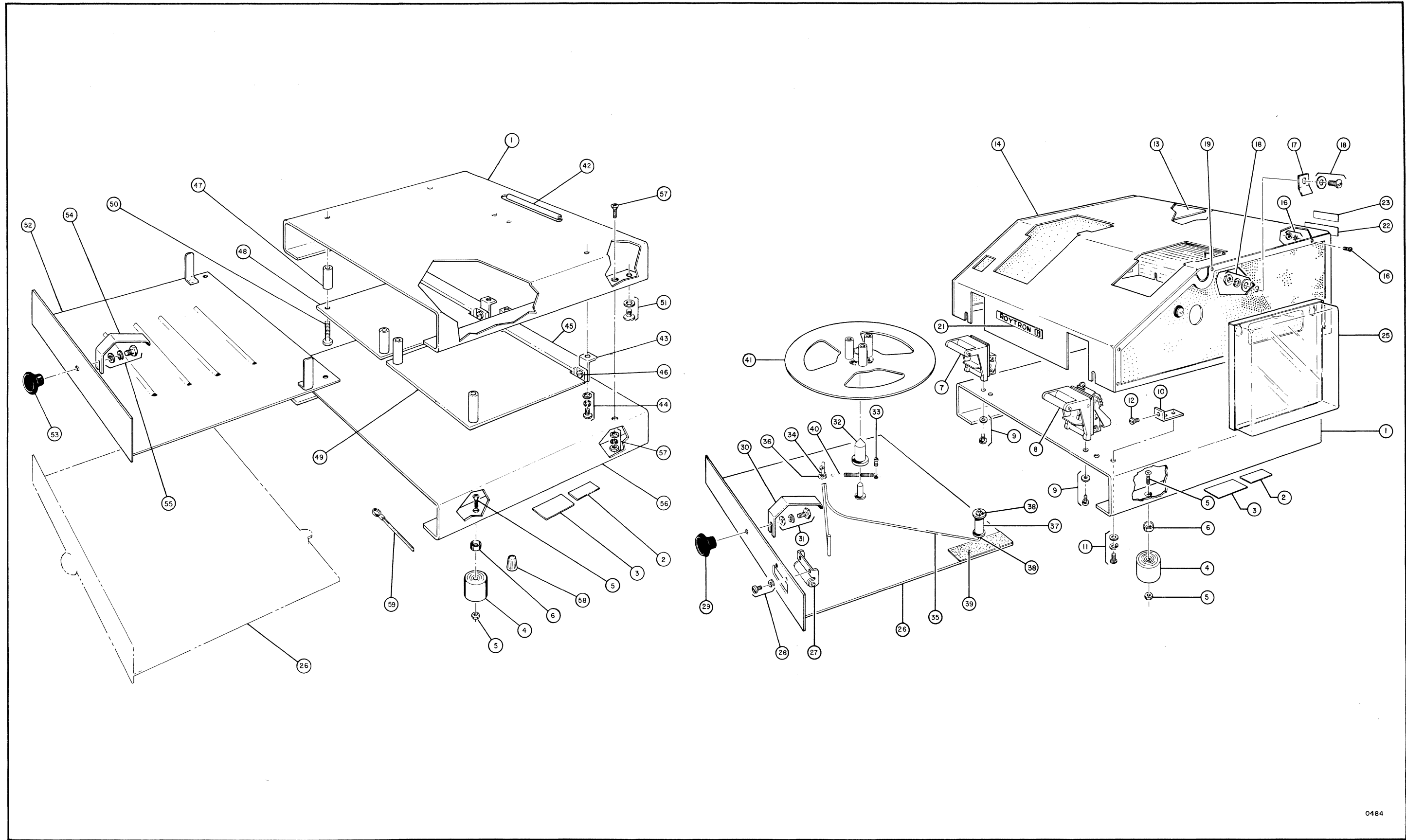
Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION			UNITS PER ASSY	USEABLE ON CODE
		1	2	3		
582/592 HOUSED UNIT PUNCH AND READER ASSEMBLY (continued)						
9-4-17	E-551213	. .	SPRING, Ground, chad box.....	2		
			(ATTACHING PARTS)			
-18	E-551212	. .	SCREW, #6-32.....	2		
	E-595801-6	. .	WASHER, Flat, #6.....	4		
	E-595802-6	. .	LOCKWASHER, Split, #6.....	2		
	E-595800-6	. .	NUT, Hex, #6-32.....	2		
			---*---			
-19	1A4-1061	. .	RIVET, Pop.....	8		
-20	819062	. .	GUIDE, Paper, housed units.....	2		
-21	1634-10360	. .	LABEL, Roytron.....	1		
-22	1622-10040	. .	LABEL, Rear, reader.....	1		
-23	1622-10050	. .	LABEL, Rear, punch.....	1		
-24	1622-10065	. .	COVER, Punch and Reader.....	1		
-25	1633-00080	. .	BOX ASSEMBLY, Chad.....	1		
9-4-	809301	. .	DRAWER ASSEMBLY, Supply.....	1		
-26	1633-00065	. .	DRAWER ASSEMBLY, Tape.....	1		
-27	1633-00100	. .	ROLLER ASSEMBLY.....	1		
			(ATTACHING PARTS)			
-28	Z4240	. .	SCREW, Pan Hd, #6-40 x 0.250....	2		
			(replaces 3071-12500)			
	P11064	. .	LOCKWASHER, Split, #6.....	2		
			---*---			
-29	1634-10480	. .	KNOB, Drawer.....	1		
-30	1634-10390	. .	SPRING.....	1		
			(ATTACHING PARTS)			
-31	1A1-1158	. .	SCREW.....	1		
	1A6-1041	. .	LOCKWASHER.....	1		
	Z134	. .	WASHER.....	1		
			---*---			
-32	1633-10310	. .	SPINDLE, Tape.....	1		
-33	2971-07900	. .	STUD, Spring.....	1		
-34	1B1-1031	. .	BEARING.....	1		
-35	1633-00110	. .	ARM ASSEMBLY, Tape Supply.....	1		
			(ATTACHING PARTS)			
-36	1A6-1031	. .	RING, Retaining.....	1		
			---*---			
-37	1671-10220	. .	ROLLER.....	1		
			(ATTACHING PARTS)			
-38	1A6-1031	. .	RING, Retaining.....	2		
			---*---			
-39	1634-10470	. .	TAPE, Cork.....	2		
-40	40E313	. .	SPRING.....	1		
-41	1671-10341	. .	REEL, Supply, 8-1/2 in.....	1		
			(replaces 1671-10340)			
9-4-42	1632-10570	. .	INSULATOR, Cable.....	A/R		IX

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS	USEABLE
			PER ASSY	ON CODE
		1 2 3		
582/592 HOUSED UNIT PUNCH AND READER ASSEMBLY (continued)				
9-4-43	1621-10290	. BRACKET, Mounting.....	4	IX
		(ATTACHING PARTS)		
-44	Z4240	. SCREW.....	4	IX
	P11064	. LOCKWASHER, Split, #6.....	4	IX
	2972-01200	. WASHER, Flat, #6.....	4	IX
		---*---		
-45	1A8-1582	. CONNECTOR, AMP (J1 J2).....	REF	IX
		(shown here for reference only - see fig. 9-8-5)		
		(ATTACHING PARTS)		
-46	4309	. SCREW.....	4	IX
		---*---		
-47	1621-10320	. SPACER, Phenolic.....	4	IX
-48	1632-00053	. PUNCH CARD ASSEMBLY (see fig. 9-5. for breakdown)	1	IX
-49	1632-00063	. COMPONENT ASSEMBLY, Reader Card... (See fig. 9-6 for breakdown)	1	IX
		(ATTACHING PARTS)		
-50	1A1-1318	. SCREW.....	4	IX
		---*---		
9-4-	E-569384	. DRAWER ASSEMBLY.....	1	IX
		(ATTACHING PARTS)		
-51	Z4038	. SCREW.....	2	IX
	Z134	. WASHER, Flat.....	2	IX
		---*---		
-52	1621-00131	. . DRAWER.....	1	IX
-53	892018	. . KNOB.....	1	IX
-54	1634-10990	. . SPRING.....	1	IX
		(ATTACHING PARTS)		
-55	34713	. . SCREW, #8-32.....	1	IX
	1A6-1041	. . LOCKWASHER, Split, #8.....	1	IX
	Z134	. . WASHER, Flat, #8.....	1	IX
		---*---		
-56	E-551383	. BASE, Dummy.....	1	IX
		(ATTACHING PARTS)		
-57	E-594012-6	. SCREW, Flat Hd, #6-32 x 0.375.....	4	IX
	P11064	. LOCKWASHER, Split, #6.....	4	IX
	2972-01200	. WASHER, Flat, #6.....	4	IX
		---*---		
-58	2E649	. NUT, Wire (replaces ZE649).....	2	IX
9-4-59	1A8-1929	. TIE, Cable.....	1	IX





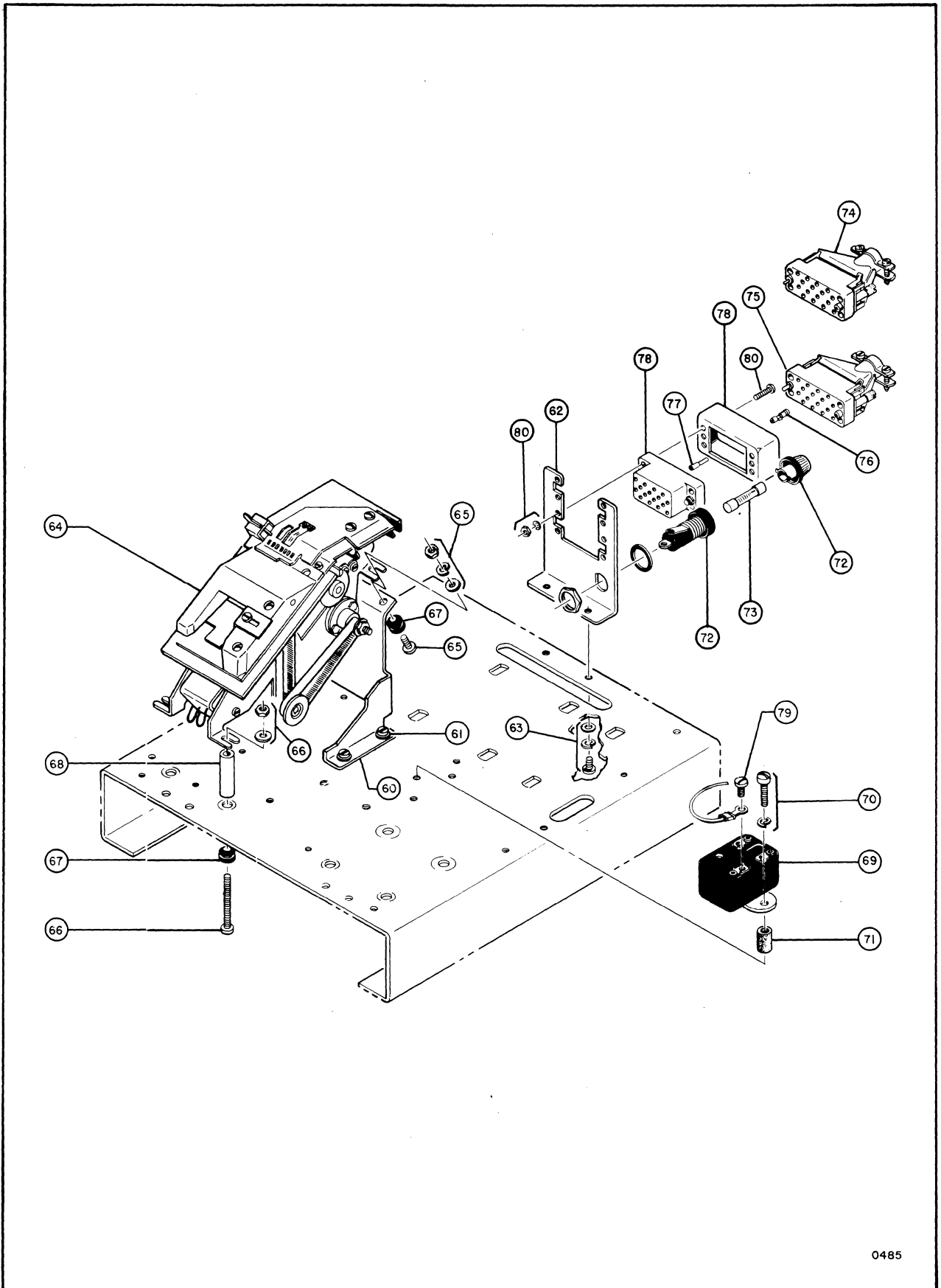
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Figure 9-4 582/592 Housed Unit Punch and Reader Assembly (Sheet 1 of 4)  
 (Index Nos. 1 thru 59) 9-27

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	USEABLE
				ON CODE
582/592 HOUSED UNIT PUNCH AND READER ASSEMBLY (continued)				
9-4-60	1634-10346	. BRACKET, Mechanism.....	1	
		(ATTACHING PARTS)		
-61	Z4240	. SCREW, Pan Hd, #6-40 x 0.250.....	4	
	P11064	. LOCKWASHER, Split, #6.....	4	
	2972-01200	. WASHER, Flat, #6.....	4	
		----*----		
-62	1634-10211	. BRACKET, Connector.....	1	
		(ATTACHING PARTS)		
-63	Z4240	. SCREW, Pan Hd, #6-40 x 0.250.....	2	
	P11064	. LOCKWASHER, Split, #6.....	2	
	2972-01200	. WASHER, Flat, #6.....	2	
		----*----		
-64	809702	. READER ASSEMBLY, 500 (See TDG-324. for breakdown)	1	
		(ATTACHING PARTS)		
-65	E-596438	. SCREW, Shouldered, Special,..... #6-40 x 0.462 (replaces 9E4008)	2	
	3072-00700	. WASHER, Flat, #6.....	2	
	P11064	. LOCKWASHER, Split, #6.....	2	
	4451	. NUT, Hex, #6-40.....	2	
-66	1A1-1176	. SCREW, Truss Hd, #6-40 x 1.687.... (replaces 4541)	2	
	2972-01200	. WASHER, Flat, #6..... (replaces 3072-00700)	2	
	4490	. NUT, Hex, #6-40.....	2	
		----*----		
-67	1634-10330	. GROMMET, Rubber.....	4	
-68	1A6-1253	. SPACER.....	2	
-69	1A8-1952	. RELAY, Drive Motor (K2)..... (ATTACHING PARTS)	1	
-70	1A1-1311	. SCREW, Fil Hd, #6-40 x 0.843.....	2	
	P11064	. LOCKWASHER, Split, #6.....	2	
		----*----		
-71	1A6-1371	. SPACER.....	2	
-72	1A8-1211	. POST, Fuse.....	1	
-73	1A8-1910	. FUSE, Cartridge (F1).....	1	
9-4-	E-551197-10	. KIT, Accessory.....	1	
-74	1A8-1957	. . CONNECTOR, Receptacle.....	1	
-75	894013	. . CONNECTOR, Receptacle..... (replaces 1A8-1955)	1	
-76	1A8-1958	. . CONTACT, Electrical.....	3	
9-4-77	1A8-1945	. . SOCKET (replaces 1A8-1990).....	44	VIII

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	USEABLE
				ON CODE
582/592 HOUSED UNIT PUNCH AND READER ASSEMBLY (continued)				
9-4-78	819080	. HARNESS ASSEMBLY, Model 582..... (See fig. 9-7 for breakdown)	1	VIII
	819071	. HARNESS ASSEMBLY, Model 592..... (See fig. 9-8 for breakdown)	1	IX
		(ATTACHING PARTS)		
-79	1A1-1116	. SCREW, Bind Hd, #6-32 x 0.187.....	3	
9-4-80	E-594001-7	. SCREW, Round Hd, #2-56 x 0.250.... (replaces 1A8-1955)	4	
	E-595802-2	. LOCKWASHER, Split, #2..... (replaces 1A8-1955)	4	
	E-595800-2	. NUT, Hex, #2-56..... (replaces 1A8-1955)	4	
		----*----		



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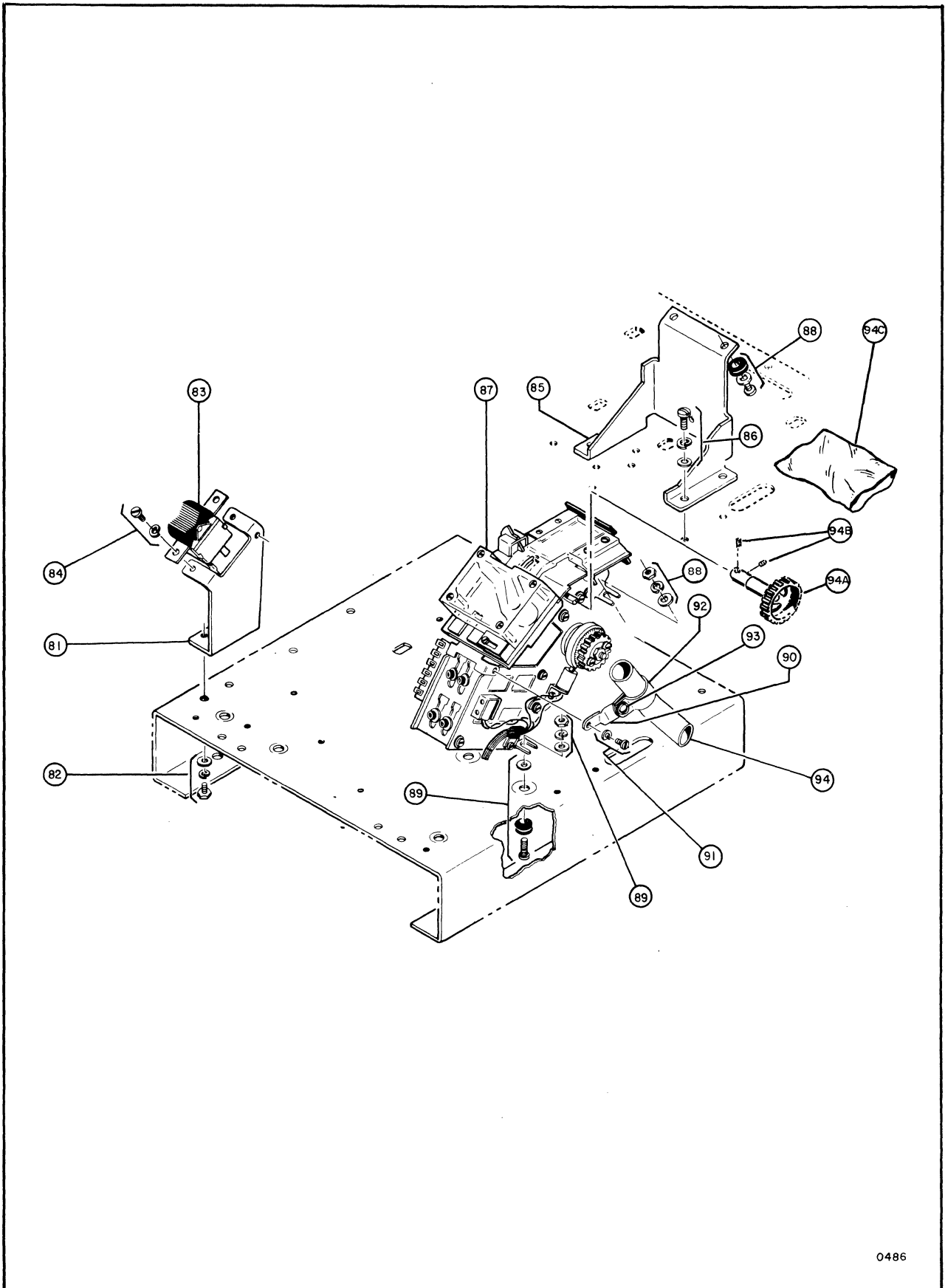
Figure 9-4 582/592 Housed Unit Punch and Reader Assembly  
(Sheet 2 of 4) (Index Nos. 60 thru 80)



FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS	USEABLE
			PER ASSY	ON CODE
1 2 3				
582/592 HOUSED UNIT PUNCH AND READER ASSEMBLY (continued)				
9-4-81	1634-10221	. BRACKET, Switch.....	1	
		(ATTACHING PARTS)		
-82	9E4138	. SCREW, Hex Hd, #6-40 x 0.265.....	2	
	2972-01200	. WASHER, Flat, #3.....	2	
	P11064	. LOCKWASHER, Split, #6.....	2	
		----*----		
-83	1A8-1948	. SWITCH, Rocker (S6).....	1	
		ATTACHING PARTS		
-84	Z4240	. SCREW, Pan Hd, #6-40 x 0.250.....	2	
	P11064	. LOCKWASHER, Split, #6.....	2	
		----*----		
-85	1634-10346	. BRACKET, Mechanism.....	1	
		(ATTACHING PARTS)		
-86	Z4240	. SCREW, Pan Hd, #6-40 x 0.250.....	4	
	2972-01200	. WASHER, Flat, #6.....	4	
	P11064	. LOCKWASHER, Split, #3.....	4	
		----*----		
-87	809211	. PUNCH ASSEMBLY, Basic, 500,.....	1	
		24 volt (See fig. 8-1 for breakdown)		
		(ATTACHING PARTS)		
-88	E-596438	. SCREW, Shouldered, special,.....	2	
		#6-40 x 0.562 (replaces 9E4008)		
	P11064	. LOCKWASHER, Split, #6.....	2	
	3072-00700	. WASHER, Flat, #6.....	4	
	4451	. NUT, Hex, #6-40.....	2	
	1634-10330	. GROMMET, Rubber.....	2	
-89	E-596438	. SCREW, Shouldered, special,.....	2	
		#6-40 x 0.562 (replaces 9E4008)		
	3072-00700	. WASHER, Flat, #6.....	4	
	P11064	. LOCKWASHER, Split, #6.....	2	
	4451	. NUT, Hex, #6-40.....	2	
	1634-10330	. GROMMET.....	2	
		----*----		
-90	1601-11280	. BRACKET, Chad Tube.....	1	
		(replaces 1662-10010)		
		(ATTACHING PARTS)		
9-4-91	E-596103-6	. SCREW, Pan Hd, #6-40 x 0.375.....	REF	
		(replaces 3071-12500)		
		(See fig. 8-1-101)		
	E-595051-62	. LOCKWASHER, Split, #6.....	REF	
		(replaces P11064)		
		(See fig. 8-1-101)		
		----*----		

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3	UNITS PER ASSY	USEABLE ON CODE
582/592 HOUSED UNIT PUNCH AND READER ASSEMBLY (continued)				
9-4-92	1A8-1641	. CLAMP, Chad Tube.....	REF	
		(See fig. 8-1-106)		
		(ATTACHING PARTS)		
-93	E-596103-4	. SCREW, Pan Hd, #6-40 x 0.250.....	REF	
		(replaces Z4240)		
		(See fig. 8-1-107)		
	E-595050-61	. WASHER, Flat, #6.....	REF	
		(replaces 2972-01200)		
		(See fig. 8-1-108)		
		----*----		
-94	1601-11160	. TUBE, Chad (replaces 1662-11160)..	1	
9-4-	* E-551197-16	. KIT, Accessory.....	1	
-94A	1603-00050	. . KNOB ASSEMBLY.....	1	
		(ATTACHING PARTS)		
-94B	3071-06300	. . SETSCREW, Socket Hd, cup point..	2	
		----*----		
9-4-94C	551205	. . POLYETHYLENE BAG.....	1	
* Optional.				



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Figure 9-4 582/592 Housed Unit Punch and Reader Assembly  
(Sheet 3 of 4) (Index Nos. 81 thru 94)



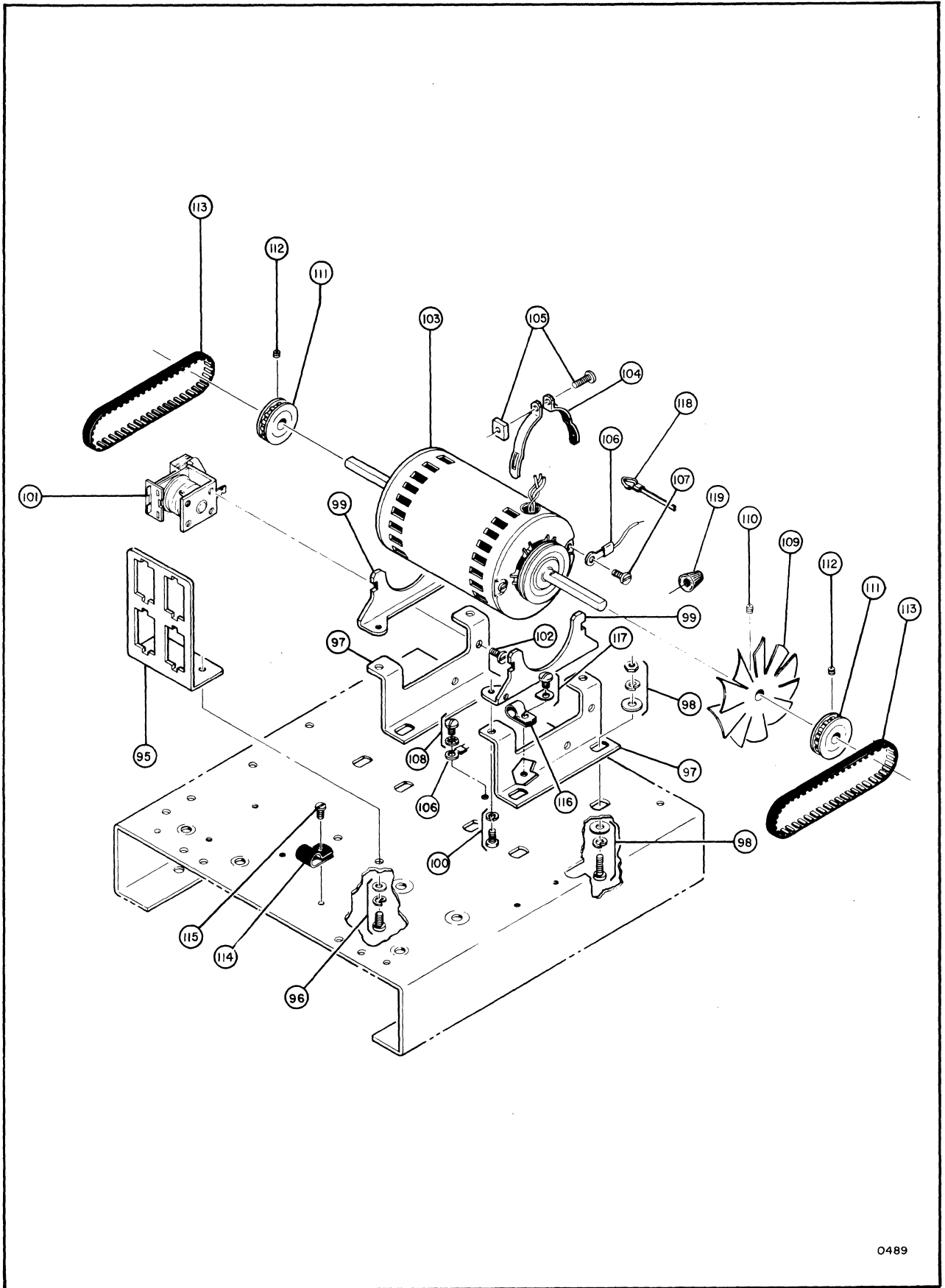


Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS	USEABLE
			PER ASSY	ON CODE
582/592 HOUSED UNIT PUNCH AND READER ASSEMBLY (continued)				
9-4-95	1621-10340	. CONNECTOR, Bracket.....	1	
		(ATTACHING PARTS)		
-96	Z4240	. SCREW, Pan Hd, #6-40 x 0.250.....	2	
	P11064	. LOCKWASHER, Split, #6.....	2	
	2972-01200	. WASHER, Flat, #6.....	2	
		---*---		
-97	1634-10250	. BRACKET, Motor.....	2	
		(ATTACHING PARTS)		
-98	3271-00300	. SCREW, Fil Hd, #8-32 x 0.562.....	4	
	1A6-1041	. LOCKWASHER, Split, #8.....	4	
	2972-00300	. WASHER, Flat, #8.....	8	
		(replaces Z134)		
	Z4453	. NUT, Hex, #8-36.....	4	
		---*---		
-99	2E814	. BRACKET, Motor.....	2	
		(ATTACHING PARTS)		
-100	Z4144	. SCREW, Fil Hd, #8-40 x 0.343.....	4	
	1A6-1041	. LOCKWASHER, Split, #8.....	4	
		---*---		
-101	1A8-1580	. RELAY (K1).....	1	
		(ATTACHING PARTS)		
-102	1A1-1116	. SCREW, Bind Hd, #6-32 x 0.187.....	2	
		---*---		
-103	819075	. MOTOR ASSEMBLY (M1).....	1	
		(replaces 1A8-1951)		
-104	1A8-1622	. CLAMP, Motor.....	2	
		(ATTACHING PARTS)		
-105	No Number	. SCREW (Supplied with motor clamp).	2	
	No Number	. NUT (Supplied with motor clamp)...	2	
		---*---		
9-4-	819033	. WIRE ASSEMBLY, Ground.....	1	
-106	1A8-1654	. . TERMINAL.....	2	
-107	No Number	. SCREW (Supplied with motor clamp).	1	
-108	Z4240	. SCREW, Pan Hd, #6-40 x 0.250.....	1	
	1A6-1103	. LOCKWASHER, Int Tooth, #6.....	1	
-109	1634-10190	. FAN.....	1	
		(ATTACHING PARTS)		
-110	1A1-1149	. SETSCREW, #8-32 x 0.250.....	1	
		---*---		
-111	1634-00020	. PULLEY ASSEMBLY (50 Hz).....	2	
		(ATTACHING PARTS)		
-112	1A1-1294	. SETSCREW, #4-40 x 0.250.....	2	
		---*---		
9-4-113	1B2-1010	. BELT.....	2	

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION			UNITS PER ASSY	USEABLE ON CODE
		1	2	3		
582/592 HOUSED UNIT PUNCH AND READER ASSEMBLY (continued)						
9-4-114	1A8-1636	.	CLAMP, Cable.....		1	
			(replaces 1A8-1382)			
			(ATTACHING PARTS)			
-115	Z4240	.	SCREW, Pan Hd, #6-40 x 0.250.....		1	
	2972-01200	.	WASHER, Flat, #6.....		1	
			---*---			
-116	1A8-1335	.	CLAMP, Cable.....		1	
			(ATTACHING PARTS)			
-117	Z4240	.	SCREW, Pan Hd, #6-40 x 0.250.....		1	
	1A8-1381	.	WASHER, D shaped.....		1	
			---*---			
-118	1A8-1929	.	STRAP, Tie.....		3	
9-4-119	2E649	.	NUT, Wire.....		2	



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Figure 9-4 582/592 Housed Unit Punch and Reader Assembly  
 (Sheet 4 of 4) (Index Nos. 95 thru 119)

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS	USEABLE
			PER ASSY	ON CODE
		2 3		
		PUNCH CARD ASSEMBLY		
9-5-	1632-00053	PUNCH CARD ASSEMBLY (see fig..... 9-4-48 and 10-1-169for NHA)	REF	IX, XI
-1	1632-10322	. PRINTED CIRCUIT BOARD.....	1	IX, XI
-2	E-592252	. JUMPER.....	1	IX, XI
-3	1A8-1575	. CAPACITOR, 10uf, 50vdcw (C1, C2)..	2	IX, XI
-4	1A8-1538	. CAPACITOR, 0.1uf, 50vdcw..... (C3, C4)	2	IX, XI
-5	1A8-1513	. CAPACITOR, 0.33uf, 50vdcw (C5)....	1	IX, XI
-6	1A8-1630	. CAPACITOR, 50uf, 25vdcw (C7).....	1	IX, XI
-7	1A8-1577	. DIODE (CR1 thru CR8, CR16 thru.... CR18)	11	IX, XI
-8	E-580013	. DIODE (CR21, CR24 thru CR32).....	10	IX, XI
-9	1A8-1476	. RESISTOR, 820 ohms (R1, R4, R7,... R10, R13, R16, R19, R22)	8	IX, XI
-10	1A8-1344	. RESISTOR, 33K (R2, R5, R8, R11,... R14, R17, R20, R23, R40, R50, R53)	11	IX, XI
-11	1A8-1036	. RESISTOR, 56K (R3, R6, R9).....	3	IX, XI
-12	1A8-1295	. RESISTOR, 1K (R24, R36, R38, R39,.. R42, R45, R48, R49, R51)	9	IX, XI
-13	1A8-1343	. RESISTOR, 4.7K (R25, R33, R43)....	3	IX, XI
-14	1A8-1452	. RESISTOR, 82 ohms (R26).....	1	IX, XI
-15	1A8-1977	. RESISTOR, 390 ohms (R27).....	1	IX, XI
-16	1A8-1457	. RESISTOR, 1.5K (R31, R52).....	2	IX, XI
-17	1A8-1508	. RESISTOR, 1.8K (R32).....	1	IX, XI
-18	1A8-1287	. RESISTOR, 330 ohms, 2W (R34).....	1	IX, XI
-19	1A8-1536	. RESISTOR, 180 ohms (R35).....	1	IX, XI
-20	1A8-1596	. RESISTOR, 180 ohms, 3W (R41).....	1	IX, XI
-21	1A8-1363	. RESISTOR, 8.2K (R46, R47, R54)....	3	IX, XI
-22	1A8-1507	. RESISTOR, 470 ohms (R61).....	1	IX, XI
-23	1A8-1286	. RESISTOR, 680 ohms (R62).....	1	IX, XI
-24	1A8-1629	. RESISTOR, 680 ohms, 1W (R63).....	1	IX, XI
-25	1A8-1570	. RESISTOR, 470 ohms, 1W (R64).....	1	IX, XI
-26	1A8-1579	. TRANSISTOR (TR1 thru TR9).....	9	IX, XI
-27	1A8-1551	. TRANSISTOR (TR10 thru TR12).....	3	IX, XI
-28	892019-1	. HEAT SINK.....	3	IX, XI
9-5-29	1A8-1577	. TRANSISTOR (TR13 thru TR15,..... TR17, TR18)	5	IX, XI

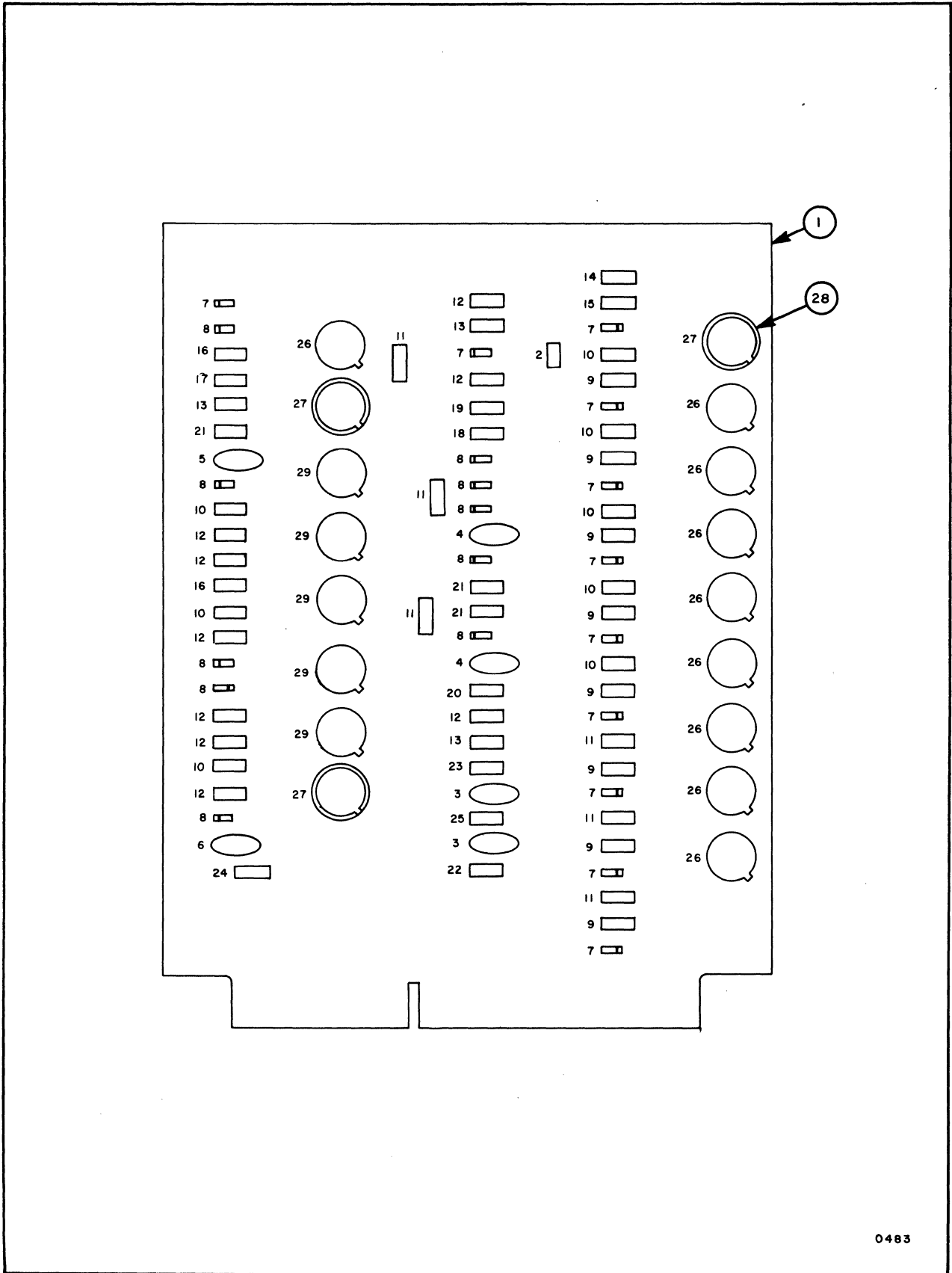


Figure 9-5 Punch Card Assembly

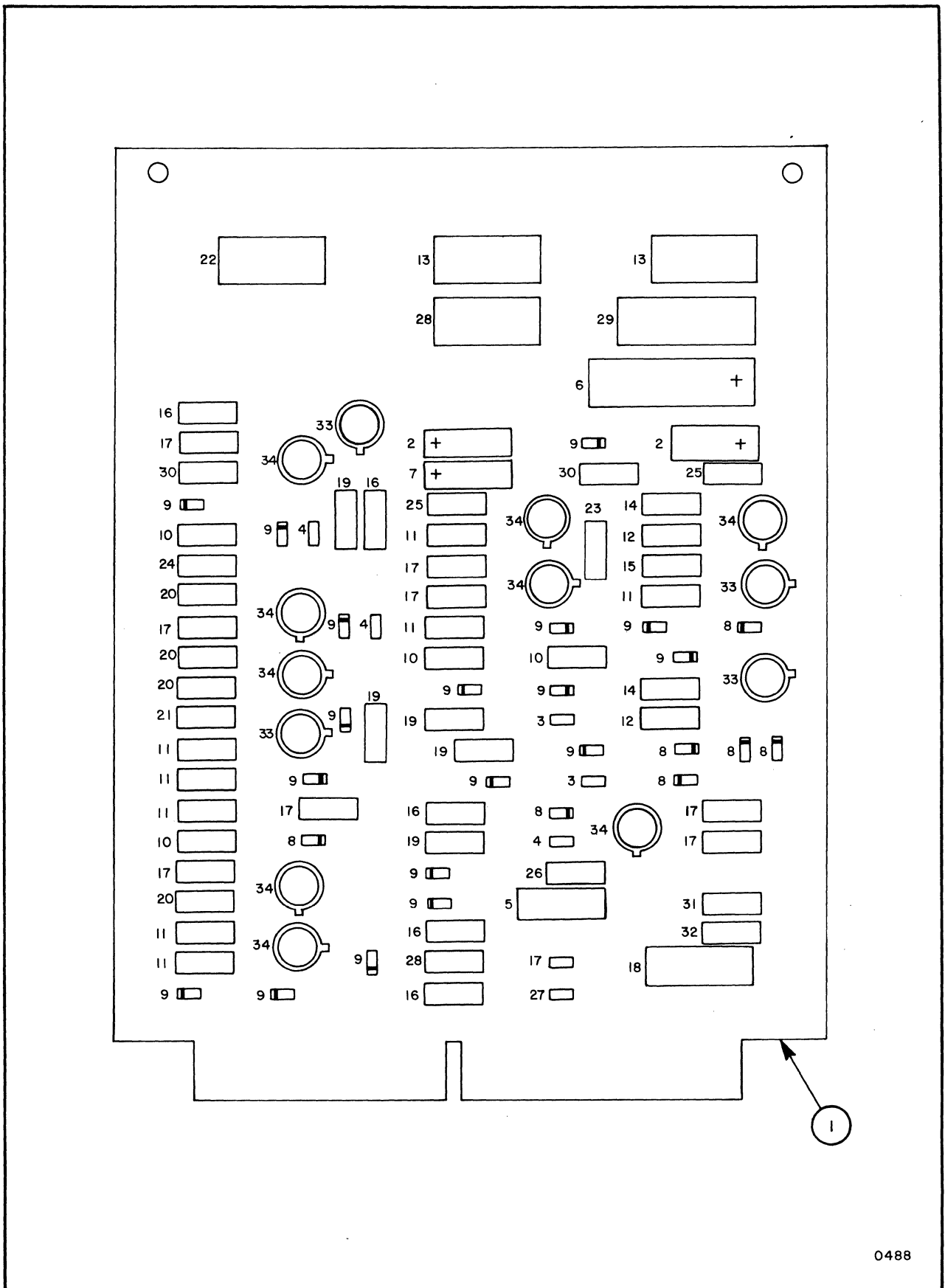


FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	USEABLE ON CODE
		2 3		
		READER CARD COMPONENT ASSEMBLY		
9-6-	1632-00063	COMPONENTS ASSEMBLY, Reader Card.... (See fig. 9-4-49 for NHA)	REF	IX
-1	1632-10332	. PRINTED CIRCUIT BOARD.....	1	IX
-2	1A8-1575	. CAPACITOR, 10ufd, 50vdcw..... (C1, C2)	2	IX
-3	1A8-1513	. CAPACITOR, 0.33ufd, 50vdcw..... (C3, C4)	2	IX
-4	1A8-1502	. CAPACITOR, 0.05ufd, 100vdcw..... (C5, C8, C9)	3	IX
-5	1A8-1538	. CAPACITOR, 0.1ufd, 50vdcw.(C7)....	1	IX
-6	1A8-1988	. CAPACITOR, 50ufd, 50vdcw (C10)....	1	IX
-7	1A8-1467	. CAPACITOR, 2ufd, 50vdcw (C11)....	1	IX
-8	1A8-1317	. DIODE (CR1 thru CR3, CR7, CR20,... CR35, CR36)	7	IX
-9	E-580013	. DIODE (CR4 thru CR6, CR8 thru..... CR14, CR16, CR17, CR19, CR28 thru CR30, CR33, CR37)	18	IX
-10	1A8-1457	. RESISTOR, Fixed, 1.5K $\pm$ 10%,..... 1/2W (R1, R8, R20, R33)	4	IX
-11	1A8-1295	. RESISTOR, Fixed, 1K $\pm$ 10%, 1/2W... (R2, R9, R12, R16, R17, R19, R24, R26)	8	IX
-12	1A8-1479	. RESISTOR, Fixed, 560 ohms, 10W.... (R3, R23)	2	IX
-13	1A8-1596	. RESISTOR, Fixed, 180 ohms, 3W..... (R4, R47)	2	IX
-14	1A8-1477	. RESISTOR, Fixed, 100 ohms $\pm$ 10%,... 1/2W (R5, R22)	2	IX
-15	1A8-1516	. RESISTOR, Fixed, 2.7K $\pm$ 10%, 1/2W. (R6)	1	IX
-16	1A8-1036	. RESISTOR, Fixed, 56K $\pm$ 10%, 1/2W.. (R7, R30, R43, R51, R52)	5	IX
-17	1A8-1343	. RESISTOR, Fixed, 4.7K $\pm$ 10%, 1/2W. (R10, R13, R18, R28, R29, R39, R90, R91, R94)	9	IX
-18	1A8-1595	. RESISTOR, Fixed, 68 ohms $\pm$ 10%,... 3W (R11)	1	IX
-19	1A8-1363	. RESISTOR, Fixed, 8.2K $\pm$ 10%, 1/2W. (R14, R15, R27, R44, R46)	5	IX
-20	1A8-1344	. RESISTOR, Fixed, 3.3K $\pm$ 10%, 1/2W. (R21, R35, R36, R40)	4	IX
-21	1A8-1540	. RESISTOR, Fixed, 220 ohms, 10W.... (R25)	1	IX
9-6-22	1A8-1287	. RESISTOR, Fixed, 330 ohms $\pm$ 10%,... 2W (R31)	1	IX

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION 2 3	UNITS PER ASSY	USEABLE ON CODE
READER CARD COMPONENT ASSEMBLY (continued)				
9-6-23	1A8-1475	. RESISTOR, Fixed, 1.2K $\pm$ 10%, 1/2W. (R32)	1	IX
-24	1A8-1360	. RESISTOR, Fixed, 2.2K $\pm$ 10%, 1/2W. (R34)	1	IX
-25	1A8-1507	. RESISTOR, Fixed, 470 ohms $\pm$ 10%, 1/2W (R37, R38)	2	IX
-26	1A8-1044	. RESISTOR, Fixed, 10K $\pm$ 10%, 1/2W.. (R41)	1	IX
-27	1A8-1035	. RESISTOR, Fixed, 68K $\pm$ 10%, 1/2W.. (R42)	1	IX
-28	1A8-1570	. RESISTOR, Fixed, 4700 ohms $\pm$ 10%, 1W (R45, R95)	2	IX
-29	1A8-1629	. RESISTOR, Fixed, 68 ohms, 10W..... (R48)	1	IX
-30	1A8-1508	. RESISTOR, Fixed, 1.8K $\pm$ 10%, 1/2W. (R49, R50)	2	IX
-31	1A8-1436	. RESISTOR, Fixed, 30 ohms $\pm$ 10%, 1/2W (R92)	1	IX
-32	1A8-1621	. RESISTOR, Fixed, 150 ohms $\pm$ 10%, 1/2W (R93)	1	IX
-33	1A8-1551	. TRANSISTOR (TR1, TR7, TR8, TR13)..	4	IX
9-6-34	1A8-1577	. TRANSISTOR (TR2 thru TR6, TR9..... thru TR12)	9	IX



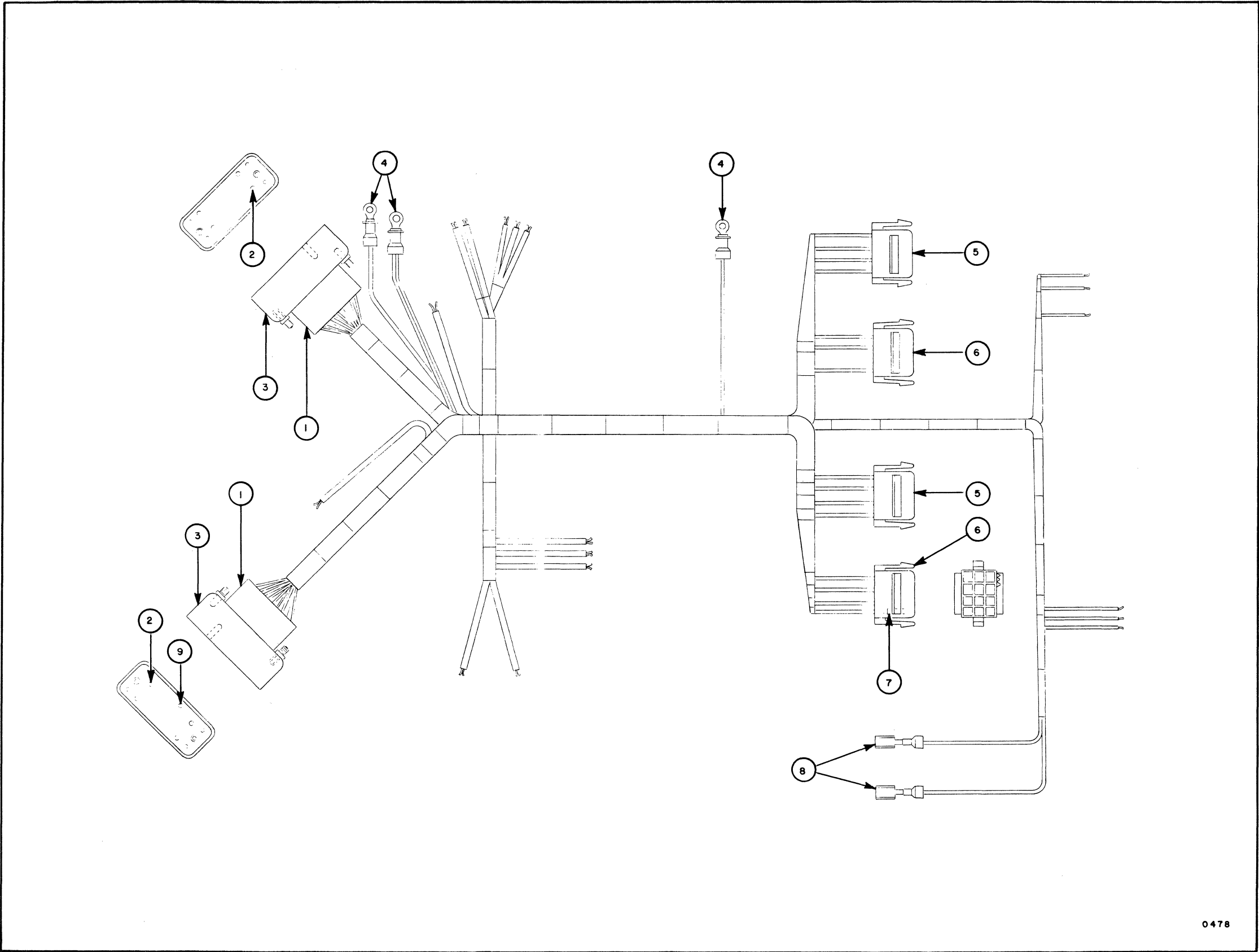


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Figure 9-6 Reader Card Component Assembly

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	USEABLE ON CODE
MODEL 582 HARNESS ASSEMBLY				
9-7-	819080	HARNESS ASSEMBLY, Model 582..... (See fig. 9-4-78 for NHA)	REF	VIII
-1	1A8-1956	. CONNECTOR, Plug, 34 pin (J5, J9)..	2	VIII
-2	1A8-1990	. PIN, Contact.....	44	VIII
-3	1A8-1955	. SHELL.....	2	VIII
-4	E-588044	. TERMINAL LUG, Solderless.....	3	VIII
-5	1A8-1397	. PLUG, Amp Lok, (White) (P4, P6)...	2	VIII
-6	1A8-1616	. PLUG, Amp Lok, (Black) (P3, P7)...	2	VIII
-7	1A8-1568	. CONTACTS, Amp Lok.....	43	VIII
-8	E-590133-3	. RECEPTACLE, Faston.....	2	VIII
9-7-9	894002	. PIN, Contact.....	3	VIII

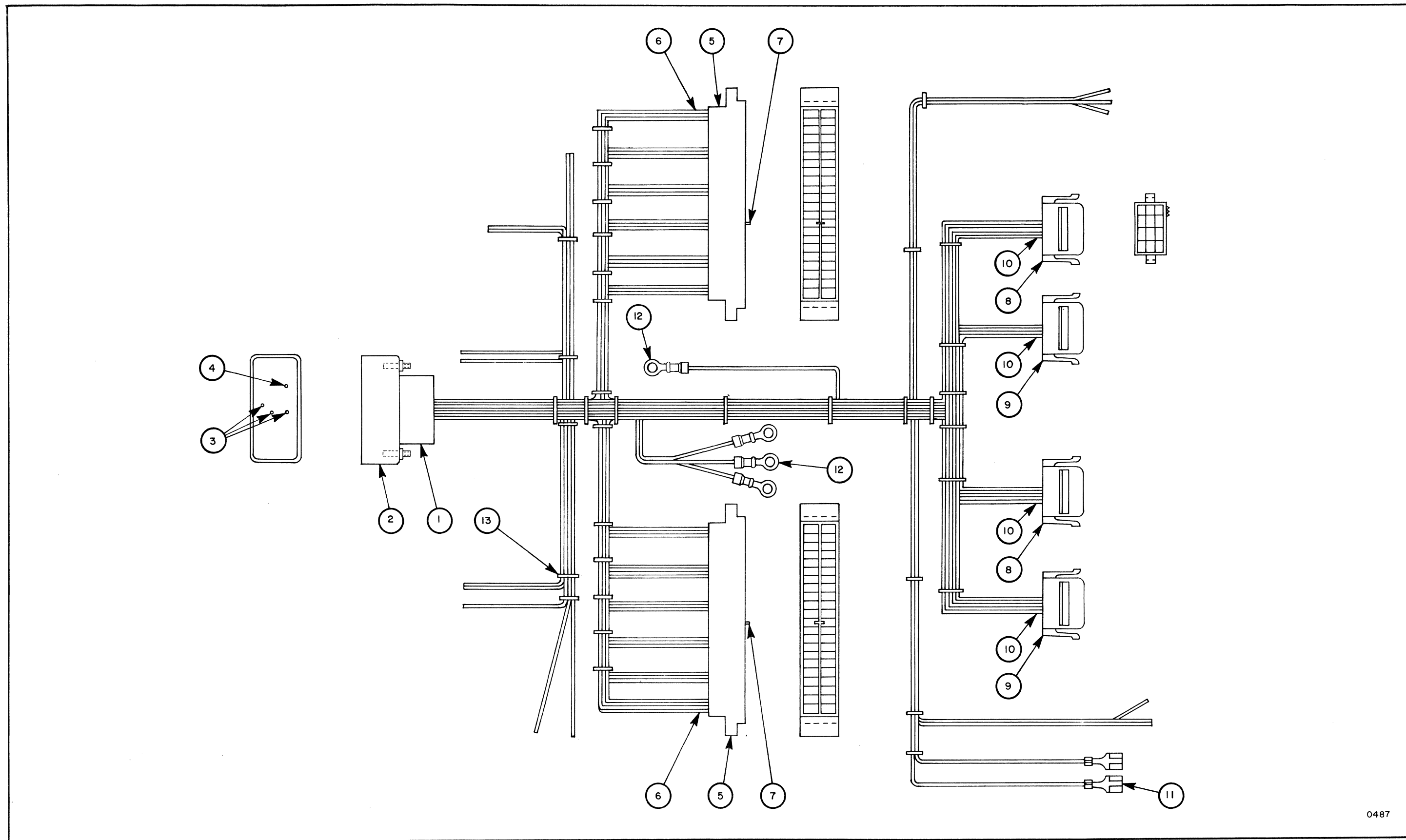


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Figure 9-7 Model 582 Harness Assembly

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	USEABLE ON CODE
		2 3		
		MODEL 592 HARNESS ASSEMBLY		
9-8-	819071	HARNESS ASSEMBLY, Model 592..... (See fig. 9-4-78 for NHA)	REF	IX
-1	1A8-1956	. BLOCK, Contact (J5).....	1	IX
-2	1A8-1955	. SHELL.....	1	IX
-3	894002	. PIN, Contact.....	3	IX
-4	1A8-1990	. PIN, Contact.....	31	IX
-5	1A8-1582	. CONNECTOR, Amp (J1, J2).....	2	
-6	1A8-1583	. CONTACT, Amp.....	63	
-7	1A8-1584	. KEY, Polarizing.....	2	IX
-8	1A8-1397	. PLUG, Amp, wht (P4, P6).....	2	IX
-9	1A8-1616	. PLUG, -Amp, blk (P3, P7).....	2	IX
-10	1A8-1568	. CONTACT, Amp.....	43	IX
-11	E-590133-3	. LUG, Terminal.....	2	IX
-12	E-588045	. LUG, Amp, red.....	4	IX
9-8-13	E-592693	. TIE, Cable.....	46	IX



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Figure 9-8 Model 592 Harness Assembly

## SECTION 10

### PARTS-RACK MOUNTED UNITS

USEABLE ON CODE COLUMN:

Listed below are the models covered in Section 10 of this manual, along with their individually assigned Useable On Codes.

USEABLE ON CODE	PART NUMBER	NOMENCLATURE
X	809216-1	514 Rack Punch Assembly
XI	809235	524 Rack Punch Assembly

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION			UNITS PER ASSY	USEABLE ON CODE
		1	2	3		
514/524 RACK PUNCH ASSEMBLY						
10-1-	809216-1	PUNCH ASSEMBLY, Rack, 514.....			1	X
	809235	PUNCH ASSEMBLY, Rack, 524.....			1	XI
-1	1675-10306	. PANEL, Front..... (replaces 1675-10846)			1	X
	1675-10846	. PANEL, Front..... (replaces 1675-00062)			1	XI
-1A	1B3-1005	. LABEL, Patent.....			1	
-1B	1B3-1008	. PLATE, Specification.....			1	
-2	1675-10800	. BRACKET, Cover..... (ATTACHING PARTS)			2	
-3	4236	. SCREW, Hex Hd, #6-40 x 0.437.....			4	
	P-11064	. LOCKWASHER, Split, #6.....			4	
	2972-01200	. WASHER, Flat, #6.....			4	
		---*---				
-4	1675-10510	. STRIP, Cover,..... (ATTACHING PARTS)			1	
-5	4236	. SCREW, Hex Hd, #6-40 x 0.437.....			2	
	P11064	. LOCKWASHER, Split, #6.....			2	
	2972-01200	. WASHER, Flat, #6.....			2	X
		---*---				
-6	1675-10120	. BRACKET, Punch, RH.....			1	
-7	1675-10110	. BRACKET, Punch, LH..... (ATTACHING PARTS)			1	
-8	2971-01600	. SCREW, Bind Hd, #8-36 x 0.500.....			4	
	1A6-1041	. LOCKWASHER, Split, #8.....			4	
	Z-134	. WASHER, Flat, #8.....			4	
		---*---				
-9	809211	. PUNCH ASSEMBLY, 500..... (See fig. 8-1 for breakdown) (ATTACHING PARTS)			1	
-10	4309	. SCREW, Fil Hd, #6-40 x 0.406.....			4	
	Z-134	. WASHER, Flat, #8.....			4	
	P11064	. LOCKWASHER, Split, #6.....			4	
	4451	. NUT, Hex, #6-40.....			4	
		---*---				
-11	1675-00170	. POST ASSEMBLY, Adjustable.....			1	
-12	1675-10050	. STUD, Tape Guide..... (ATTACHING PARTS)			1	
-13	4425	. NUT, Hex, #10-32..... (ATTACHING PARTS)			1	
		---*---				
-14	1675-00170	. POST ASSEMBLY, Adjustable.....			1	X
-15	1675-10760	. STUD, Tape Guide.....			1	X
	1675-10050	. STUD, Tape Guide..... (ATTACHING PARTS)			1	XI
10-1-16	4425	. NUT, Hex, #10-32..... (ATTACHING PARTS)			1	
		---*---				

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION			UNITS PER ASSY	USEABLE ON CODE
		1	2	3		
514/524 RACK PUNCH ASSEMBLY (continued)						
10-1-17	1671-10220	.	ROLLER, Tape.....		2	X
			(ATTACHING PARTS)			
-18	1A6-1031	.	RING, Retaining.....		4	X
			---*---			
-19	819501	.	SWITCH ASSEMBLY, Out of Tape.....		1	
			(ATTACHING PARTS)			
-20	4236	.	SCREW, Hex Hd, #6-40 x 0.437.....		2	
	P11064	.	LOCKWASHER, Split, #6.....		2	
	2972-01200	.	WASHER, Flat, #6.....		2	
			---*---			
-21	1634-10620	.	PLATE, Top right.....		1	
-22	1B2-1010	.	BELT.....		1	
-23	1634-00040	.	PULLEY.....		1	X
	* 1634-00040	.	PULLEY, 50 Hz.....		1	XI
	* 1634-00020	.	PULLEY, 60 Hz.....		1	XI
-24	1A1-1294	.	SETSCREW.....		1	
-25	1675-10430	.	COVER, Pulley.....		1	
			(ATTACHING PARTS)			
-26	2971-00700	.	SCREW, Button Hd, #3-56 x 0.218...		4	
			---*---			
-27	E-569250-0	.	COVER ASSEMBLY.....		1	
			(replaces 1675-00105)			
			(ATTACHING PARTS)			
-28	4262	.	SCREW, Bind Hd, #6-40 x 0.187.....		3	
			---*---			
-29 **	1675-00180	.	KNOB.....		1	X
			(ATTACHING PARTS)			
-30 **	3071-06300	.	SETSCREW.....		2	X
			---*---			
-31	1675-00120	.	BOX, Chad.....		1	
-32	1677-10580	.	BRACKET, Motor Mounting.....		1	
-33	1677-10570	.	BRACKET, Motor Mounting.....		1	
			(ATTACHING PARTS)			
10-1-34	1A1-1306	.	SCREW, Flat Hd, #8-32 x 0.562.....		4	
	Z134	.	WASHER, Flat, #8.....		4	
	1A6-1041	.	LOCKWASHER, Split, #8.....		4	
	3072-50300	.	NUT, Hex, #8-36.....		4	
			---*---			

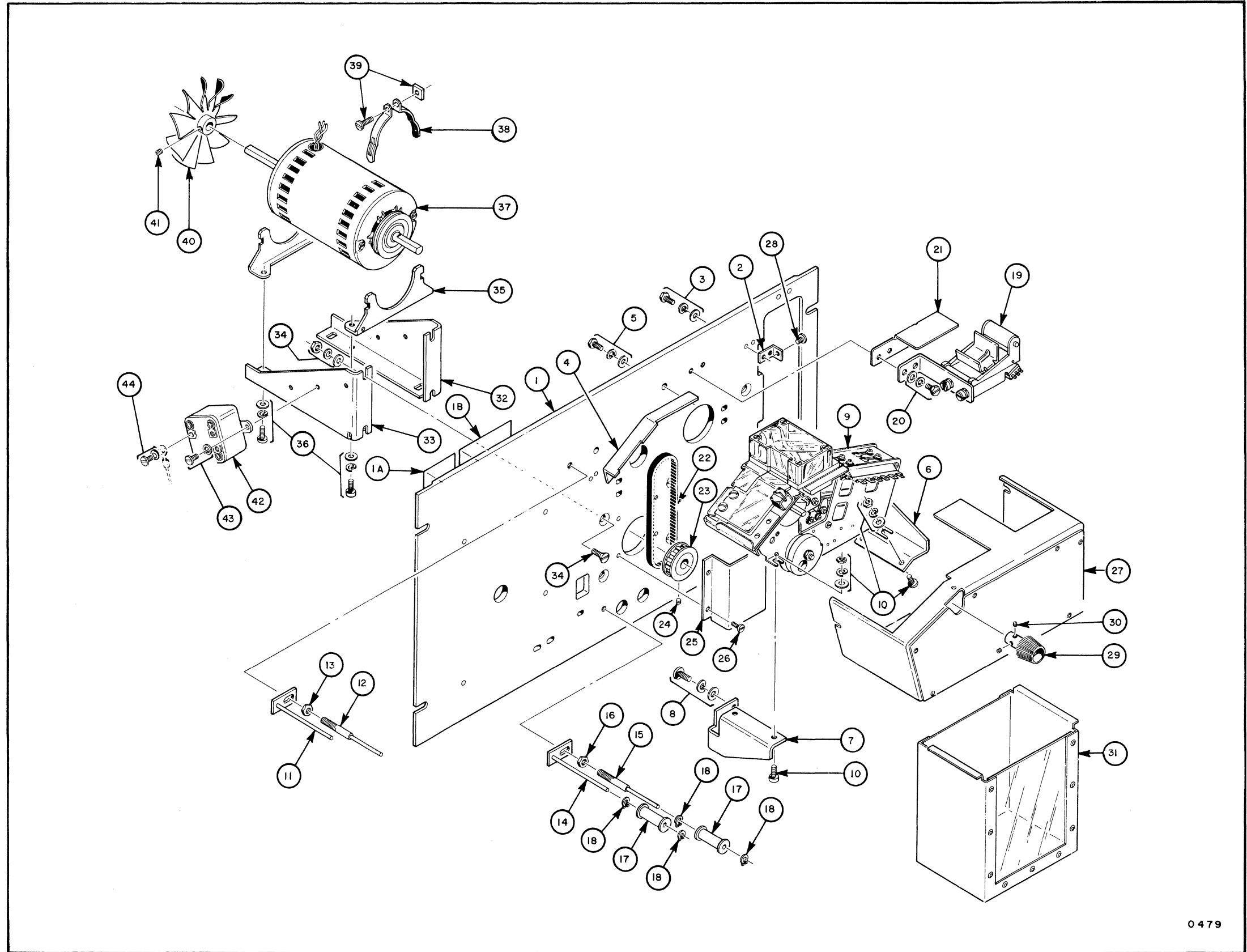
\* Optional

\*\* Part of accessory kit 551197-7 when used on Model XI.



Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS	USEABLE
			PER ASSY	ON CODE
		1 2 3		
514/524 RACK PUNCH ASSEMBLY (continued)				
10-1-35	2E-814	. BRACKET, Motor.....	2	
		(ATTACHING PARTS)		
-36	Z4144	. SCREW, Fil Hd, #8-40 x 0.343.....	4	
	1A6-1041	. LOCKWASHER, Split, #8.....	4	
	Z134	. WASHER, Flat, #8.....	4	
		---*---		
-37	809250	. MOTOR ASSEMBLY (replaces.....	1	
		1A8-1953, 1A8-1967 or E-590235-4)		
-38	1A8-1622	. CLAMP, Motor.....	2	
		(ATTACHING PARTS)		
-39	No Number	. SCREW (Supplied with motor clamp).	2	
	No Number	. NUT (supplied with motor clamp)...	2	
		---*---		
-40	1634-10190	. FAN.....	1	
		(ATTACHING PARTS)		
-41	1A1-1149	. SETSCREW, Cup Point,.....	1	
		#8-32 x 0.250		
		---*---		
-42	1A8-1952	. RELAY, Start, motor.....	1	
		(replaces 810024-1)		
		(ATTACHING PARTS)		
-43	Z4240	. SCREW, Pan Hd, #6-40 x 0.250.....	2	
	P11064	. LOCKWASHER, Split, #6.....	2	
		---*---		
10-1-44	1A1-1116	. SCREW, #6-32 x 0.187.....	3	
	2972-01200	. WASHER, Flat, #6.....	3	



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Figure 10-1 514/524 Rack Punch  
Assembly (Sheet 1 of 4)  
(Index Nos. 1 thru 44)

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS	USEABLE
			PER ASSY	ON CODE
514/524 RACK PUNCH ASSEMBLY (continued)				
10-1-45	1A8-1943	. SWITCH, Toggle (S1)..... (ATTACHING PARTS)	1	
-46	No Number	. NUT, Switch Mounting..... (supplied with switch)	1	
	1A6-1325	. LOCKWASHER..... ----*----	1	
-47	E-560010-1	. PLATE, Switch.....	1	X
	1675-11110-2	. PLATE, Legend, punch.....	1	XI
-48	1A8-1642	. SWITCH, Push-button (S6)..... (ATTACHING PARTS)	1	
-49	No Number	. NUT (supplied with switch)..... ----*----	1	
-50	1675-10800	. BRACKET, Cover.....	1	
-51	892013	. TERMINAL..... (ATTACHING PARTS)	1	
-52	4236	. SCREW, Hex Hd, #6-40 x 0.437.....	2	
	P11064	. LOCKWASHER, Split, #6.....	2	
	2972-01200	. WASHER, Flat, #6..... ----*----	2	
-53	1675-10880	. BRACKET, Mounting..... (ATTACHING PARTS)	1	X
-54	1671-12500	. SCREW (replaces 3071-12500).....	2	X
	3072-00700	. WASHER..... ----*----	2	X
-55	1A8-1947	. SWITCH (replaces 1A8-1566)..... (ATTACHING PARTS)	1	X
-56	1A1-1275	. SCREW.....	2	X
	1A5-1059	. PLATE, Nut..... ----*----	1	X
-57	892032	. STRIP, Insulation.....	1	X
-58	1A2-1225	. STUD, ARM..... (ATTACHING PARTS)	1	X
-59	1671-12500	. SCREW (replaces 3071-12500).....	1	X
	3072-00700	. WASHER, Flat..... ----*----	1	X
-60	1675-10900	. ARM, Pivot..... (ATTACHING PARTS)	1	X
-61	1A6-1039	. RING, Retaining..... ----*----	1	X
-62	1671-10020	. ROD, Trip, switch..... (ATTACHING PARTS)	1	X
10-1-63	9E-4515	. NUT, Hex.....	2	X
	3072-00200	. WASHER, Flat..... ----*----	1	X

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS	USEABLE
			PER ASSY	ON CODE
1 2 3				
514/524 RACK PUNCH ASSEMBLY (continued)				
10-1-64	1675-00250	. ARM ASSEMBLY..... (ATTACHING PARTS)	1	X
-65	1A6-1031	. RING, Retaining..... ---*---	1	X
-66	1642	. SPRING, Extension..... (replaces P7086)	1	X
-67	1675-10780	. COVER, Supply Reel..... (ATTACHING PARTS)	1	
-68	4236	. SCREW.....	2	
	P11064	. LOCKWASHER, Split, #6.....	2	
	4451	. NUT, Hex.....	2	
-69	4024	. SCREW, #3-56 x 0.171.....	2	
	1812	. LOCKWASHER, Int Tooth, #4..... ---*---	2	
10-1-	E-569261	. SLIDE MOUNTING BRACKET AND..... SUPPLY REEL ASSEMBLY	1	X
	E-569254	. SUPPLY REEL AND SLIDE MOUNTING.... BRACKET ASSEMBLY (ATTACHING PARTS)	1	XI
-70	1A1-1306	. SCREW, Flat Hd, #8-32 x 0.562.....	3	
	Z134	. WASHER, Flat, #8.....	3	
	1A6-1041	. LOCKWASHER, Split, #8.....	3	
	3072-50300	. NUT, Hex, #8-36..... ---*---	4	
-71	1675-10315	. . BRACKET, Slide Holder.....	1	
-72	1675-10681	. . BRACKET, Connector..... (ATTACHING PARTS)	1	
-73	Z4240	. . SCREW, #6-32.....	2	
	Z134	. . WASHER, Flat, #6.....	2	
	P11064	. . LOCKWASHER, Split, #6..... ---*---	2	
-74	1675-10340	. . BRACKET, Switch Mounting.....	1	X
	1675-10581	. . BRACKET, Connector, 34 pin..... (ATTACHING PARTS)	1	XI
-75	Z4240	. . SCREW, #6-32..... (replaces Y4138)	2	
	Z134	. . WASHER, Flat, #6.....	2	X
	P11064	. . LOCKWASHER, Split, #6..... ---*---	2	
-76	1A8-1634	. . SWITCH..... (ATTACHING PARTS)	1	X
10-1-77	1A1-1292	. . SCREW.....	2	X
	1A6-1140	. . LOCKWASHER..... ---*---	2	X

Group Assembly Parts List

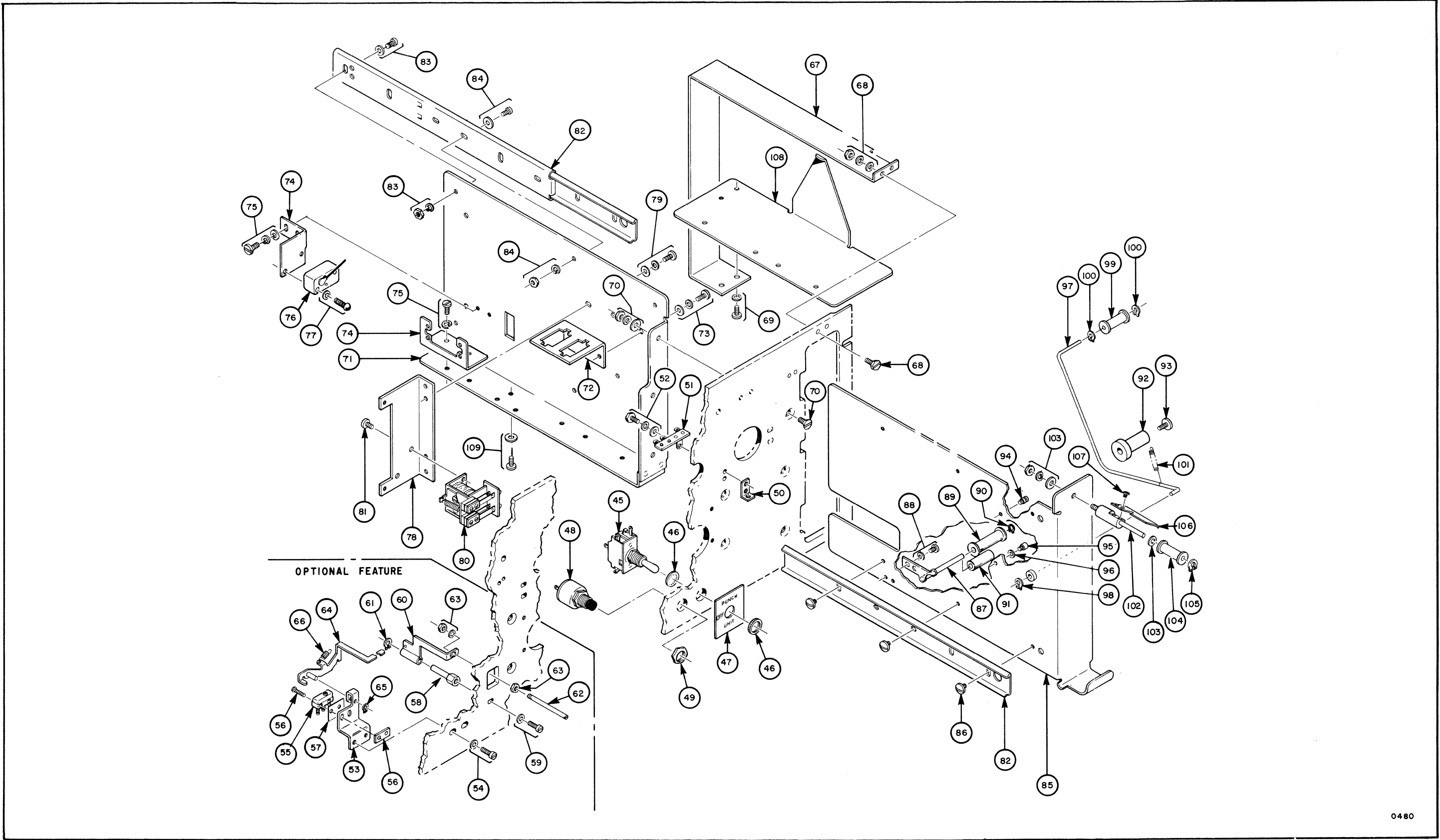
FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	USEABLE ON CODE
514/524 RACK PUNCH ASSEMBLY (continued)				
10-1-78	1675-10490	. . BRACKET, Card Connector..... (ATTACHING PARTS)	1	XI
-79	Z4038	. . SCREW.....	2	XI
	Z134	. . WASHER, Flat.....	2	XI
	P11064	. . LOCKWASHER, Split, #6..... ----*----	2	XI
-80	1A8-1580	. . RELAY, AC..... (ATTACHING PARTS)	1	XI
-81	1A1-1125	. . SCREW..... ----*----	2	XI
-82	1673-10080	. . SLIDE ASSEMBLY..... (ATTACHING PARTS)	2	
-83	Y4277	. . SCREW.....	2	X
	Y4277	. . SCREW.....	4	XI
	Z134	. . WASHER, Flat, #6.....	2	X
	Z134	. . WASHER, Flat, #6.....	4	XI
	P11064	. . LOCKWASHER, Split, #6.....	2	X
	P11064	. . LOCKWASHER, Split, #6.....	4	XI
	4451	. . NUT.....	2	X
	4451	. . NUT.....	4	XI
-84	Y4277	. . SCREW.....	4	X
	Y4277	. . SCREW.....	2	XI
	2972-01200	. . WASHER, Flat, #6..... (replaces Z134)	4	X
	2972-01200	. . WASHER, Flat, #6..... (replaces Z134)	2	XI
	P11064	. . LOCKWASHER, Split, #6.....	4	X
	P11064	. . LOCKWASHER, Split, #6.....	2	XI
	4451	. . NUT.....	4	X
	4451	. . NUT..... ----*----	2	XI
-85	1675-00090	. . PLATE ASSEMBLY..... (ATTACHING PARTS)	1	
-86	2971-01800	. . SCREW..... ----*----	6	
-87	1675-00080	. . BRACKET, Tape Holder.....	1	X
	E-559846	. . BRACKET ASSEMBLY..... (ATTACHING PARTS)	1	XI
10-1-88	Z4263	. . SCREW.....	2	
	P11064	. . LOCKWASHER, Split, #6..... ----*----	2	

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY	USEABLE ON CODE
514/524 RACK PUNCH ASSEMBLY (continued)				
10-1-89	E-551236	. . ROLLER, Tape..... (ATTACHING PARTS)	1	XI
-90	1A6-1031	. . RING, Retaining..... ----*----	1	XI
-91	E-551238	. . ROLLER, Tape Retainer.....	1	XI
-92	1675-10390	. . HUB.....	1	X
	E-551234	. . HUB..... (ATTACHING PARTS)	1	XI
-93	E-4011	. . SCREW..... ----*----	1	
-94	2971-07900	. . SCREW, Spring Anchor.....	1	
-95	1675-10790	. . STOP, Arm.....	1	
-96	1A6-1134	. . WASHER, Flat.....	1	
-97	1675-10480	. . ARM, Tape Supply..... (ATTACHING PARTS)	1	
-98	1A6-1031	. . RING, Retaining..... ----*----	1	
-99	1671-10220	. . ROLLER, Tape.....	1	X
	E-551236	. . ROLLER, Tape..... (ATTACHING PARTS)	1	XI
-100	1A6-1031	. . RING, Retaining..... ----*----	2	
-101	40E-313	. . SPRING, Extension.....	1	
-102	1675-10401	. . STUD, Tape Roller.....	1	X
	E-551235	. . STUD, Tape Roller..... (ATTACHING PARTS)	1	XI
-103	3072-50300	. . NUT, Hex.....	1	
	1A6-1041	. . LOCKWASHER.....	1	
	2972-01200	. . WASHER, Flat, #6.....	1	X
	Z134	. . WASHER, Flat..... ----*----	1	
-104	1671-10220	. . ROLLER, Tape.....	1	X
	E-551236	. . ROLLER, Tape..... (ATTACHING PARTS)	1	XI
-105	1A6-1031	. . RING, Retaining..... ----*----	1	
-106	1675-10410	. . PLATE, Tape Guiding.....	1	X
	E-551233	. . PLATE, Tape Guiding..... (ATTACHING PARTS)	1	XI
10-1-107	2971-08500	. . SCREW, #3-56 x 0.125..... ----*----	2	

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3	UNITS PER ASSY	USEABLE ON CODE
514/524 RACK PUNCH ASSEMBLY (continued)				
10-1-108	1675-10330	. . BRACKET, Reel Stop..... (ATTACHING PARTS)	1	
10-1-109	Z4240 P11064 Z134	. . SCREW..... . . LOCKWASHER, Split, #6..... . . WASHER, Flat, #6..... ---*---	4 4 4	



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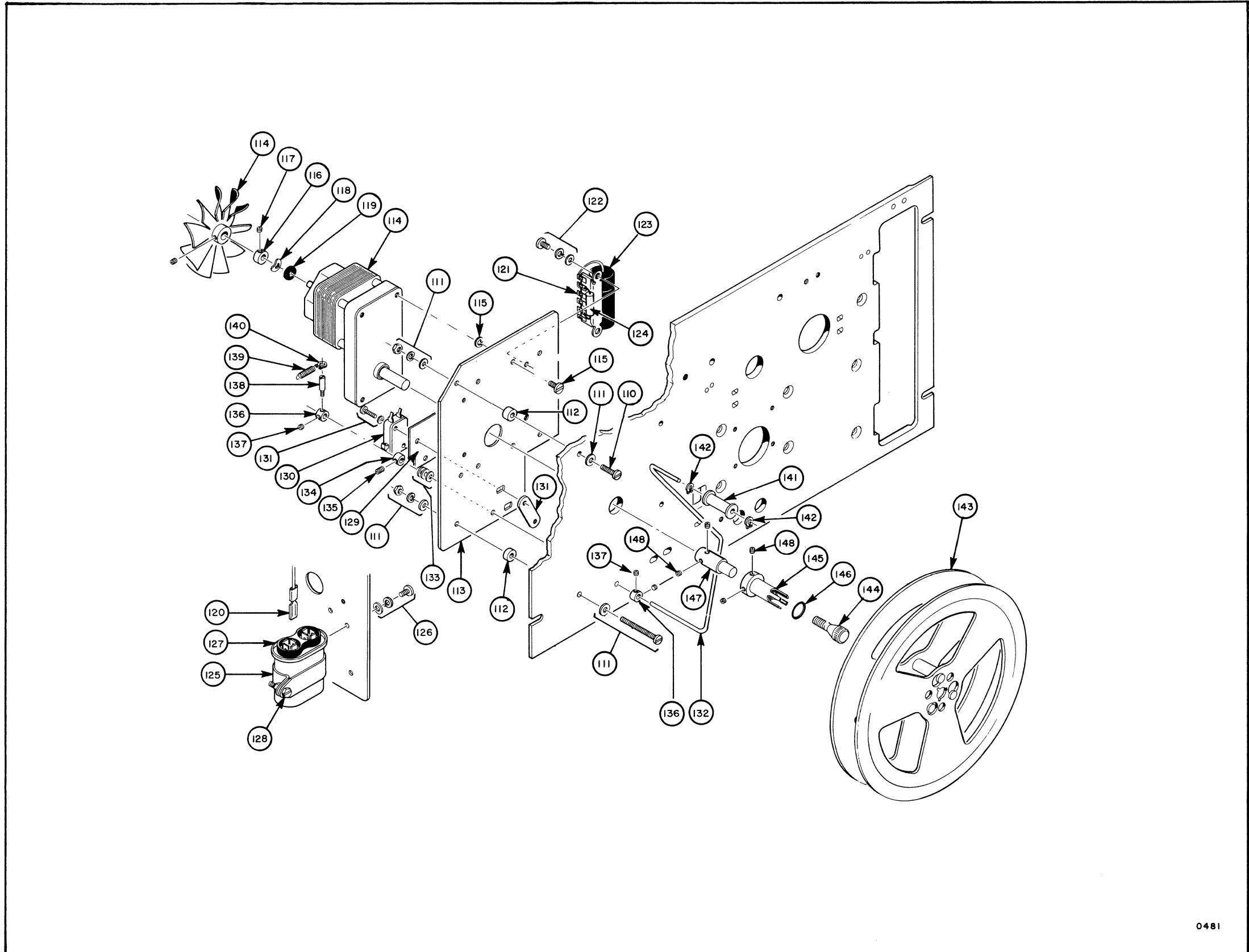
Figure 10-1 514/524 Rack Punch Assembly (Sheet 2 of 4) (Index Nos. 45 thru 109)



Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY			USEABLE ON CODE
			1	2	3	
514/524 RACK PUNCH ASSEMBLY (continued)						
10-1-	809214	. REEL ASSEMBLY, Take-up.....				1
		(ATTACHING PARTS)				
-110	1A1-1325	. SCREW, Pan Hd, #6-40 x 0.750.....				3
-111	1A1-1323	. SCREW, Pan Hd, #6-40 x 1.562.....				1
	2972-01200	. WASHER, Flat, #6.....				4
	3072-00700	. WASHER, Flat, #6.....				4
		(replaces 2972-01200)				
	P11064	. LOCKWASHER, Split, #6.....				4
	4451	. NUT, Hex, #6-40.....				4
		----*----				
-112	1A6-1341	. SPACER.....				4
-113	1675-11180	. . PLATE, Mounting.....				1
-114	1A8-1950	. . MOTOR, Spooler, with fan.....				1
		(ATTACHING PARTS)				
-115	4502	. . SCREW.....				4
	1A6-1041	. . LOCKWASHER.....				4
		----*----				
-116	1A6-1348	. . COLLAR.....				1
		(ATTACHING PARTS)				
-117	9E4017	. . SETSCREW.....				1
		----*----				
-118	2165	. . WASHER, Spring.....				1
-119	1A6-1349	. . WASHER.....				1
-120	1A8-1993	. . TERMINAL, Lug.....				2
-121	1A8-1569	. . TERMINAL BOARD.....				1
		(ATTACHING PARTS)				
-122	Z-4240	. . SCREW.....				2
	P11064	. . LOCKWASHER, Split, #6.....				2
	2972-01200	. . WASHER, Flat, #6.....				2
		----*----				
-123	1A8-1649	. . CAPACITOR.....				1
-124	1A8-1647	. . RESISTOR.....				1
-125	809209	. . BRACKET, Capacitor.....				1
		(ATTACHING PARTS)				
-126	Z4240	. . SCREW.....				1
	P11064	. . LOCKWASHER, Split, #6.....				1
	2972-01200	. . WASHER, Flat, #6.....				1
		----*----				
-127	3260-05205	. . CAPACITOR.....				1
		(ATTACHING PARTS)				
10-1-128	3071-01501	. . SCREW.....				1
	2972-01200	. . WASHER, Flat, #6.....				1
	P11064	. . LOCKWASHER, Split, #6.....				1
	4451	. . NUT.....				1
		----*----				

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY			USEABLE ON CODE
			1	2	3	
514/524 RACK PUNCH ASSEMBLY (continued)						
10-1-129	1A8-2004	. . INSULATION.....				1
		(replaces 3061-53000)				
-130	3061-53000	. . SWITCH.....				1
		(ATTACHING PARTS)				
-131	E-594026-10	. . SCREW, Pan Hd, 0.625 in. lg.....				2
	1A6-1140	. . LOCKWASHER.....				2
	800006	. . PLATE, Nut.....				1
		----*----				
-132	1675-11200	. ROD, Switch.....				1
-133	2972-01200	. WASHER, Flat, #6.....				3
		(replaces Z134)				
-134	1633-10280	. CAM, Switch Actuator.....				1
		(ATTACHING PARTS)				
-135	1A1-1294	. SETSCREW.....				1
		----*----				
-136	1A6-1312	. COLLAR.....				2
		(ATTACHING PARTS)				
-137	3071-06300	. SETSCREW, Cup Point,.....				3
		#4-48 x 0.125				
		----*----				
-138	1A1-1284	. ROD, Screw.....				1
-139	1429	. SPRING, Extension.....				1
		(ATTACHING PARTS)				
-140	1A6-1031	. RING, Retaining.....				2
		----*----				
-141	1671-10220	. ROLLER, Tape.....				1
		(ATTACHING PARTS)				
-142	1A6-1031	. RING, Retaining.....				2
		----*----				
-143	1671-10091	. REEL, 7.500 inch.....				1
	1671-10341	. REEL, 8.500 inch.....				2
		(replaces 1671-10341)				
-144	1A1-1288	. SCREW, Reel.....				1
-145	1633-10230	. HOLDER, Reel.....				1
-146	1A6-1311	. O RING, Reel.....				1
-147	1675-11170	. EXTENSION, Shaft.....				1
		(ATTACHING PARTS)				
10-1-148	3071-06300	. SETSCREW.....				4
		----*----				



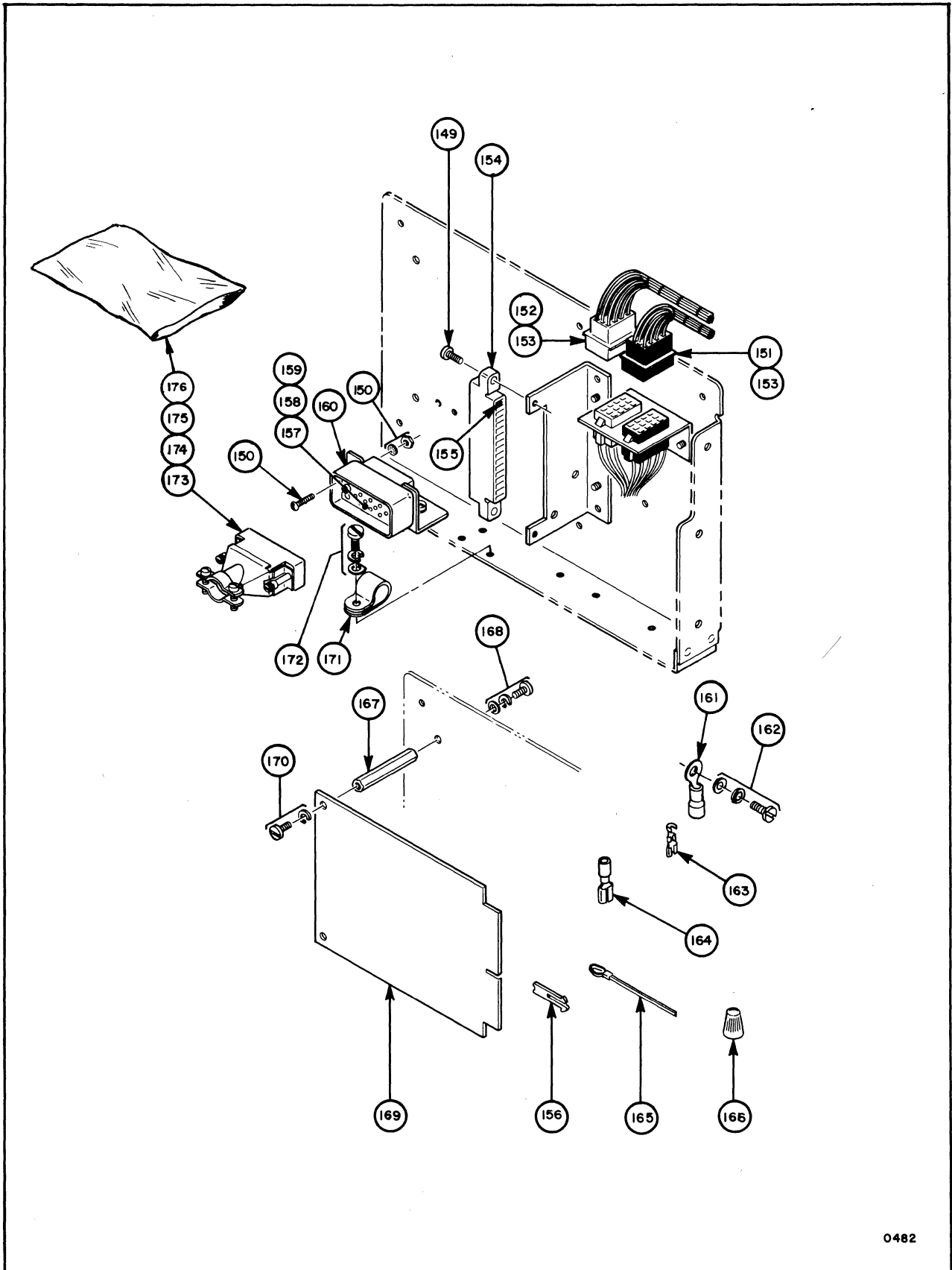
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Figure 10-1 514/524 Rack Punch  
Assembly (Sheet 3 of 4)  
(Index Nos. 110 thru 148)

Group Assembly Parts List

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY			USEABLE ON CODE
			1	2	3	
514/524 RACK PUNCH ASSEMBLY (continued)						
10-1-	809236	. HARNESS ASSEMBLY, 524 rack..... mounted punch (ATTACHING PARTS)	1			XI
-149	4309	. SCREW (replaces 1A1-1277).....	2			XI
-150	E-594001-4	. SCREW, Round Hd, #2-56 x 0.250....	2			XI
	E-592802-2	. LOCKWASHER, Split, #2.....	2			XI
	E-595800-2	. NUT, Hex, #2-56.....	2			XI
		----*----				
-151	1A8-1616	. . CONNECTOR, Black (P7).....	1			XI
-152	1A8-1397	. . CONNECTOR, White (P6).....	1			XI
-153	1A8-1568	. . CONTACTS, Amp lock.....	21			XI
-154	1A8-1582	. . CONNECTOR, Amp leaf (J2).....	1			XI
-155	1A8-1583	. . CONTACTS, Amp leaf.....	34			XI
-156	1A8-1584	. . KEY, Polarizing.....	1			XI
-157	1A8-1956	. . BLOCK, Contact.....	1			XI
-158	1A8-1990	. . PINS, Contact, small.....	17			XI
-159	894002	. . PINS, Contact, large.....	3			XI
-160	1A8-1955	. . SHELL.....	1			XI
-161	1A8-1654	. . TERMINALS.....	5			XI
		(ATTACHING PARTS)				
-162	Y4277	. SCREW, Fil Hd, #6-40 x 0.343.....	1			
	P11064	. LOCKWASHER, Split, #6.....	1			
	2972-01200	. WASHER, Flat, #6.....	1			
		----*----				
-163	E-590133-1	. . CONNECTOR.....	2			XI
-164	1A8-1993	. . CONNECTOR.....	1			XI
-165	1A8-1929	. STRAP, Tie.....	3			X
	1A8-1929	. STRAP, Tie.....	2			XI
-166	2E649	. NUT, Wire.....	2			XI
-167	1675-10640	. SPACER, Hex.....	2			XI
		(ATTACHING PARTS)				
-168	Z4240	. SCREW, Pan Hd, #6-40 x 0.250.....	2			XI
	P11064	. LOCKWASHER, Split, #6.....	2			XI
	2972-01200	. WASHER, Flat, #6.....	2			XI
		----*----				
-169	1632-00053	. PUNCH CARD ASSEMBLY..... (See fig. 9-5 for breakdown) (ATTACHING PARTS)	1			XI
10-1-170	Z4240	. SCREW, Pan Hd, #6-40 x 0.250.....	2			XI
	P11064	. LOCKWASHER, Split, #6.....	2			XI
		----*----				

FIG. AND INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY			USEABLE ON CODE
			1	2	3	
514/524 RACK PUNCH ASSEMBLY (continued)						
10-1-171	1A8-1237	. CLAMP, Cable..... (ATTACHING PARTS)	1			
-172	Z4240	. SCREW, Pan Hd, #6-40 x 0.250.....	1			
	1A8-1381	. WASHER, D shaped.....	1			
	P11064	. LOCKWASHER, Split, #6.....	1			
		----*----				
10-1-	551197-7	. ACCESSORY KIT .....	1			XI
-173	1A8-1957	. . CONNECTOR, Electrical.....	1			XI
-174	1A8-1958	. . CONTACT, Electrical.....	3			XI
-175	1A8-1945	. . SOCKET.....	17			XI
-176	551205	. . POLYETHYLENE BAG.....	1			XI
10-1-	1675-00180	. . KNOB.....(This item listed... here for reference. See 10-1-29 for 1st appearance.) (ATTACHING PARTS)	REF			XI
10-1-	3071-06300	. . SETSCREW, Socket, Cup Point..... ----*----	REF			XI



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Figure 10-1 514/524 Rack Punch Assembly  
(Sheet 4 of 4) (Index Nos. 149 thru 175)



**SECTION 11**

**DESK TOP READER/PUNCH**

## SERIES 500 PUNCH

### SECTION 11

## DESK TOP READER/PUNCH

### 11.1 GENERAL DESCRIPTION

The desk top reader/punch, Figure 11.1, is a self-contained device that uses a Model 500 basic punch and Model 550 basic reader. It does not contain all necessary tape-handling accessories. It can be supplied without electronic logic (Model 582) or with electronic logic (Model 592).

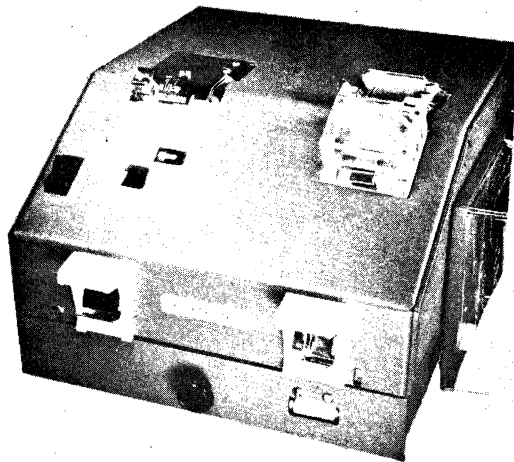


Figure 11.1 Desk Top Reader/Punch

The unit can fit on furniture, an associated device or the processor. The front of the unit slants forward with space provided for the punch and reader sections and a cutout for a rocker switch (feed switch).

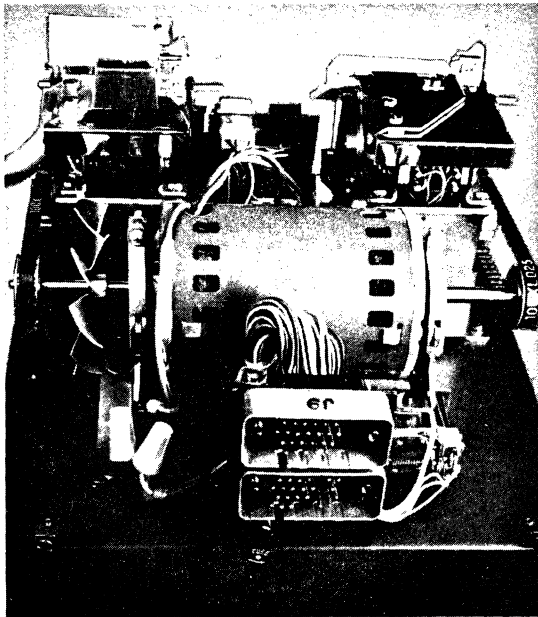
The drawer of the Model 582 has storage space for a tape roll. A tape tension switch on the left in front of the reader and a tape tension and out-of-tape switch on the right in front of the punch allow tape to be monitored so that reader or punch operation can be stopped before tape tears if a tight-tape condition should occur. The cover encloses the entire unit except for the top section of the punch and reader, the bottom drawer, the two tape tension switches and two connectors and a fuse at the rear of the unit. The cover can be removed by loosening the two screws at the front and two at the rear of the unit.

During normal punch operation, tape unspools from within the drawer (Model 582 only), passes through the tape tension and out-of-tape switch

## SERIES 500 PUNCH

and into the punch. Unpunched tape cannot be stored in the drawer of the Model 592 unit and must be placed in front and below the reader/punch cabinet.

For both models, tape to be read cannot be stored in the drawer but must be placed in front and below the reader/punch cabinet. During normal reader operation, tape passes through the tape tension switch and into the reader.



The interior of the unit, Figure 11.2, contains the essential parts for operation of the drive motor. Parts consist primarily of capacitors and resistors. The basic punch and basic reader are mounted on vibration isolators. The backs of the punch and reader are attached to brackets. The punch or reader can be removed by loosening the nuts above their feet. For ease in removal, nuts and lockwashers should be taken off.

Four connectors, two attached to the punch cable and two attached to the reader cable, plug into receptacles at the center of the unit. In units without electronics, the receptacles connect directly with the two at the rear of the cabinet. This provides a direct path to the punch and/or reader for interfacing with customer equipment, except that the tape tension switches can be used to stop operation if tape begins to hang up. Supply voltage to

power the drive motor also enters through the receptacles at the rear of the cabinet.

Models with electronic logic circuits contain these circuits on boards attached on the bottom of the cabinet. The boards are mounted on brackets which support the boards side by side. The discrete component or integrated circuit boards are then interfaced with the punch or reader and the related connector at the rear of the unit. Signals received from the central processor are thereby transmitted to the circuit logic and from there to the punch and/or reader.

Parts of the unit with the punch and reader in place are shown in Figure 11.2.



## SERIES 500 PUNCH

### 11.2 OPERATION

The motor that drives the punch and reader input shafts rotates continuously when power is applied from an external source such as the central processor. The punch and/or reader can be set up to operate at speeds up to 50 characters per second. The operation and lubrication of the basic punch is described in Section 3 of this manual. The operation and lubrication of the basic reader is described in Section 3 of the Series 500 Reader manual.

Operation, adjustment and lubrication of the punch tape tension and out-of-tape switch is described in Section 4 of this manual. Operation, adjustment and lubrication of the reader tape tension switch is described in Section 4 of the Series 500 Reader manual.

### 11.3 FEED SWITCH

The switch on the left side of the unit has three positions. However, only the third one is connected.

The switch must be held down in the third position to override the normal spring loading. As long as the switch is held down, it will cause the punch to advance tape while, simultaneously, allowing sprocket holes to be punched into - as yet - unperforated tape. Releasing the switch from this position causes punch operation to stop.

CAUTION: The feed switch should be used only to prepare tape leaders or trailers. If the switch is depressed while the punch is operating under processor control, valuable data information may be lost by overriding the processor signal.

### 11.4 DRIVE-BELT TENSION

Tension of the drive belts is correct when they can be depressed 1/4 inch with light finger pressure midway between motor and drive pulleys.

To adjust, loosen the four motor-mounting screws and nuts, move the motor in the required direction and tighten the nuts.

NOTE: The motor pulleys must be carefully aligned with the reader and punch pulleys. All pulleys must rotate in the same plane to prevent drive belts from "walking" off the pulleys.



## SECTION 12

# NUMERICAL INDEX

### USE OF NUMERICAL INDEX

All part numbers are listed in numerical order whether new or old.

When an old part is listed, it is followed by the new part number in parenthesis.

- NOTE:
1. Old parts may not have been replaced by new parts in all locations.
  2. Old parts may not have been replaced by the same new part in every location.

Therefore, the index is structured as follows:

New parts are listed in numerical order, the figure and index number for each location is listed, and the maximum total quantity per unit used for all locations is given on the first line.

Old parts are also listed in numerical order. When an old part has been replaced at all locations, no location data or quantity is listed on that line.

The new part number is listed directly below in parenthesis. Each location is given and REF is listed for quantity at the first location. When more than one new part replaces the same old part, each new part is listed in parenthesis. The order is determined by the location data.

When an old part has not been replaced at all locations, the locations where the part is used is listed in order and the maximum total quantity per unit is listed on the first line. Locations where the old part has been replaced are then listed as above.

Numerical Index

PART NUMBER	FIG. AND INDEX NO.	QTY. PER ART.
CLAMP	9-1-60	REF
E-520761-1	9-1-41	1
E-551197-10	9-4-	1
E-551197-6	9-1-	1
E-551197-7	10-1-	1
551205	9-1-61C	3
	9-4-94C	
	10-1-176	
E-551212	9-1-23	2
	9-4-18	
E-551213	9-1-22	2
	9-4-17	
E-551214	9-1-17	1
	9-4-15	
E-551233	10-1-106	1
E-551234	10-1-92	1
E-551235	10-1-102	1
E-551236	10-1-89	3
	10-1-99	
	10-1-104	
E-551238	10-1-91	1
E-551244	8-1-23	1
E-551252	8-1-96	8
E-551383	9-4-56	1
E-559767-0	9-1-	1
E-559768	9-4-14	1
E-559846	10-1-87	1
E-560005-3	9-1-19	2
	9-4-16	
E-560007-4	9-1-19	2
	9-4-16	
E-560008	9-1-19	2
	9-4-16	
E-560010-1	10-1-47	1
E-560013	8-1-60	1
E-560025	9-2-9	1
E-560051	9-3-1	1
E-569228	9-1-74	1
E-569229	8-1-20	1
E-569232	B 8-1-	1
E-569250-0	10-1-27	1
E-569253	9-1-15	1
E-569254	10-1-	1
E-569261	A 10-1-	1
E-569278	9-1-74	1
E-569279	9-1-74	1
E-569344-6	9-1-103	1
	9-3-	
E-569384	9-4-	1

PART NUMBER	FIG. AND INDEX NO.	QTY. PER ART.
E-569732	9-1-75	1
E-580013	9-5-8	28
	9-6-9	
E-580043	9-3-16	1
E-580077	9-3-15	29
E-581089	9-3-24	1
E-581093	9-3-23	11
E-582711-101	9-3-38	1
E-582711-102	9-3-30	5
E-582711-103	9-3-33	2
E-582711-113	9-3-36	1
E-582711-201	9-3-39	3
E-582711-202	9-3-37	2
E-582711-302	9-3-32	1
E-582711-331	9-3-27	5
E-582711-362	9-3-31	3
E-582711-431	9-3-26	8
E-582711-471	9-3-34	1
E-582711-472	9-3-25	14
E-582711-512	9-3-35	1
E-582713-151	9-3-28	2
E-582716-054	9-3-29	1
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1A8-1956	9-1-84	2
	9-7-1	
	9-8-1	
	10-1-157	
1A8-1957	9-1-94A	1
	9-4-74	
	10-1-173	
1A8-1958	9-1-94B	3
	9-4-76	
	10-1-174	
1A8-1967		
(809250)	10-1-37	REF
1A8-1977	9-5-15	1
1A8-1988	9-6-6	1
1A8-1990	9-1-87	44
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	10-1-158	
1A8-1993	9-1-53	3
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1A8-2004	10-1-129	1
1B1-1025A (895004)	8-1-2 8-1-4 8-1-41	REF
1B1-1031	9-1-30 9-4-34	1
1B1-1032	8-1-40	1
1B2-1010	9-1-76 9-4-113 10-1-122	2
1B3-1005	8-1-5 9-1-2 9-4-2 10-1-1A	1
1B3-1008	9-1-3 9-4-3 10-1-1B	1
1B9-1026	8-1-56	1
1429	10-1-139	1
1601-00035	8-1-6	1
1601-00053	8-1-156	2
1601-00063	A 8-1-157	3
1601-00073	A 8-1-158	2
1601-00083	A 8-1-159	2
1601-00093	8-1-165 8-1-166	1
1601-00103	8-1-166	1
1601-00113	8-1-167	1
1601-00123	8-1-168	1
1601-00310 (E-569232)	8-1-	REF
1601-00365	8-1-45 8-1-174	1
1601-00470	8-1-136	1
1601-00485 (809252)	8-1-3	REF
1601-00546	8-1-13	1
1601-00620 (809251)	8-1-1	REF
1601-10080	8-1-162	1
1601-10092	8-1-170	1
1601-10130	8-1-164	1
1601-10232	8-1-82	1

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1601-10251 (801048)	8-1-8	REF
1601-10261	8-1-154	1
1601-10270	8-1-155	1
1601-10325	8-1-179	1
1601-10354	8-1-188	9
1601-10391	8-1-182	1
1601-10405	8-1-37	1
1601-10435	8-1-90	A/R
1601-10440	8-1-94	1
1601-10475	8-1-172	1
1601-10480	8-1-186	1
1601-10490	8-1-131 8-1-185	2
1601-10515	8-1-63	1
1601-10520	8-1-109	1
1601-10530	8-1-105	1
1601-10563	8-1-95	1
1601-10572 (E-551252)	8-1-96	REF
1601-10662	8-1-10	1
1601-10682	8-1-175	1
1601-10695	8-1-84	1
1601-10770	8-1-139	1
1601-10790	8-1-12	1
1601-10800	8-1-10	1
1601-10830	8-1-102	1
1601-10860	8-1-100	1
1601-10971	8-1-141	1
1601-11091	8-1-169	2
1601-11120	8-1-54	1
1601-11160	8-1-104 9-1-59 9-4-94	1
1601-11200	8-1-32	1
1601-11210	8-1-34	1
1601-11280	9-4-90	1
1601-11290	8-1-88	9
1601-11300	8-1-184	9
1601-11310	8-1-177	1
1601-11340	8-1-180	1
1603-00050	9-1-61A 9-4-94A	1
1611-11001	B 8-1-16	A/R
1611-11050	B 8-1-15	A/R
1621-00131	9-4-52	1
1621-10290	9-4-43	4
1621-10320	9-4-47	4

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1622-00035 (819082-0)	9-4-	REF
1622-10040	9-4-22	1
1622-10050	9-4-23	1
1622-10065	9-4-24	1
1631-00062	8-1-66	1
1631-00241	8-1-71	1
1631-00271	C 8-1-117	1
1631-00280	8-1-120	1
1631-00300	8-1-119	1
1631-00321	C 8-1-116	1
1631-00330	8-1-120	1
1631-00350	8-1-119	1
1631-00370	A 8-1-76	1
1631-10120	8-1-74	1
1631-10161	8-1-69	1
1631-10171	8-1-68	1
1631-10180	8-1-59	1
1631-10210	8-1-57	1
1631-10550	8-1-67	2
1631-10660	8-1-122	1
1631-10715	8-1-25	1
1631-10721	8-1-21	1
1631-10755	8-1-29	1
1631-10800	8-1-30	1
1632-00053	B 9-4-48	1
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1632-00063	9-4-49	1
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1632-10061	9-2-10	1
1632-10070	9-2-7	1
1632-10110	9-2-11	1
1632-10230 (1633-10230)	9-1-123	REF
1632-10322	9-5-1	2
	9-6-1	
1632-10400	9-2-2	1
1632-10570	9-4-42	A/R
1633-00025	9-1-26	1
1633-00065 (1633-00025)	9-4-26	1
1633-00080	B 9-1-26	REF
	9-1-25	1
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(1634-10570)	9-2-1	REF
1633-00100	9-1-38	1

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1633-10210	9-1-21	1
1633-10230	9-1-123	1
	10-1-145	
1633-10241	9-1-110	1
1633-10252	9-1-100	2
1633-10261	9-1-101	2
1633-10270	9-1-127	1
1633-10280	9-1-133	1
	10-1-134	
1633-10310	9-1-35	1
	9-4-32	
1634-00020	9-4-111	2
	10-1-23	
1634-00040	10-1-23	1
1634-00090	9-2-4	1
1634-00100	9-2-	1
1634-00110	9-1-12	1
1634-10012	9-1-4	4
	9-4-4	
1634-10190	9-1-72	1
	9-4-109	
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1634-10200 (1675-10800)	9-1-10	REF
	9-4-10	
1634-10210 (1634-10211)	9-1-93	REF
1634-10211	9-1-93	1
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1634-10221	A 9-1-46	1
	9-4-81	
1634-10232	9-1-1	1
	9-4-1	
1634-10250	9-1-62	2
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1634-10330	9-1-58	8
	9-4-67	
	9-4-88	
	9-4-89	
1634-10345 (1634-10346)	9-1-97	REF
1634-10346	9-1-97	2
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1634-10370	9-2-5	1
1634-10390	9-1-29	1
	9-4-30	
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	9-4-29	
1634-10490	9-1-18	1
1634-10500	9-1-17	1
1634-10570	A 9-2-1	1
1634-10590	9-2-6	1
1634-10620	10-1-21	1
1634-10990	9-4-54	1
1637-00050	C 8-1-	2
1637-00060	8-1-42	1
1642	9-2-22	1
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1652-00030	9-1-15	1
1652-00050	9-1-	1
(E-559767-0)	9-1-	REF
1661-00015	8-1-	1
1661-10016	8-1-89	1
1661-10050	8-1-17	1
1662-10010		
(1601-11280)	9-4-90	REF
1662-11160		
(1601-11160)	9-1-59	REF
	9-4-94	
1671-10020	10-1-62	1
1671-10091	10-1-143	1
1671-10220	9-1-33	5
	9-1-113	
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	10-1-141	
1671-10340		
(1671-10341)	9-4-41	REF
1671-10341	9-1-24	2
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	10-1-143	
1671-10735		
(E-551244)	8-1-23	REF

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1671-12500	10-1-54	3
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1673-10080	10-1-82	2
1675-00080	10-1-87	1
1675-00090	A 10-1-85	1
1675-00105		
(E-569250-0)	10-1-27	REF
1675-00120	10-1-31	1
1675-00170	10-1-11	2
	10-1-14	
1675-00180	10-1-29	1
1675-00250	10-1-64	1
1675-00320		
(1634-00100)	9-2-	REF
1675-10050	10-1-12	2
	10-1-15	
1675-10110	10-1-7	1
1675-10120	10-1-6	1
1675-10306	A 10-1-1	1
1675-10315	10-1-71	1
1675-10330	10-1-108	1
1675-10340	10-1-74	1
1675-10390	10-1-92	1
1675-10401	10-1-102	1
1675-10410	10-1-106	1
1675-10430	10-1-25	1
1675-10480	10-1-97	1
1675-10490	A 10-1-78	1
1675-10510	10-1-4	1
1675-10581	10-1-74	1
1675-10630		
(801515-2)	9-4-13	REF
1675-10640	10-1-167	2
1675-10681	9-1-77	1
	10-1-72	
1675-10760	A 10-1-15	1
1675-10780	10-1-67	1
1675-10790	10-1-95	1
1675-10800	9-1-10	4
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	10-1-2	
	10-1-50	
1675-10846	10-1-1	1
1675-10880	10-1-53	1
1675-10900	10-1-60	1
1675-11110-2	10-1-47	1
1675-11170	10-1-147	1

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1675-11200	10-1-132	1
1677-10570	10-1-33	1
1677-10580	10-1-32	1
1682-00011	A 8-1-156	2
1682-00021	A 8-1-157	3
1682-00031	A 8-1-158	2
1682-00041	A 8-1-159	2
1682-00090	B 8-1-119	1
1682-00100	8-1-119	1
1682-00110	8-1-116	1
1682-00120	A 8-1-117	1
1812	10-1-69	2
(E-595054-4)	8-1-87	REF
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	8-1-187	
(E-595802-2)	9-1-90	
1912		
(E-594050-41)	8-1-178	REF
2E649	9-4-58	4
	9-4-119	
	10-1-166	
2E814	9-1-64	2
	9-4-99	
	10-1-35	
21261	8-1-126	1
2165	9-1-116	1
	10-1-118	
2193		
(E-595049-6)	8-1-80	REF
	8-1-160	
2608	9-1-138	1
2903		
(2165)	9-1-116	REF
2971-00700	10-1-26	4
2971-01600	10-1-8	4
2971-01800	10-1-86	6
2971-07900	9-1-36	2
	9-2-16	
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2971-08500	10-1-107	2
2972-00300	9-1-63	16
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	10-1-162	
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(E-595050-61)	8-1-7	REF
	8-1-77	
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(814030)	8-1-118	
(E-595050-61)	8-1-133	
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(3072-00700)	10-1-11	
3061-53000	9-1-120	1
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3071-01501	9-1-45	1
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	10-1-30	
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(E-594287-2)	8-1-55	REF
3071-09000		
(E-594287-2)	8-1-73	REF
3071-12500		
(E-596103-6)	8-1-101	REF
(E-596103-5)	8-1-130	
(E-594267-6)	9-1-8	
(E-596103-6)	9-1-61	
(E-594267-6)	9-4-9	
(Z4240)	9-4-28	
(E-596103-6)	9-4-91	
3072-00200	10-1-63	1
3072-00700	9-1-57	10
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	10-1-59	
	10-1-111	
(2972-01200)	9-4-66	REF
3072-50300	10-1-34	9
	10-1-70	
	10-1-103	
3075-00200		
(E-596865-8)	8-1-181	REF
(E-596413)	9-1-13	
3260-01900		
(809209)	9-1-42	REF
3260-05205	9-1-44	1
	10-1-127	
3271-00300	9-1-63	8
	9-1-98	
	9-4-98	
3272-00500		
(E-560005-3)	9-1-19	REF
(E-595801-6)	9-1-23	
3300-06440		
(E-594278-3)	8-1-85	REF
34713	9-4-55	1
40E313	9-1-37	1
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4024	10-1-69	2
4038	9-2-14	2
4132		
(E-594026-3)	8-1-112	REF
4236	10-1-3	12
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4262		
4273		
(E-596103-5)	8-1-77	REF
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4277		
(E-596103-5)	8-1-79	REF
4295		
(E-594313-4)	8-1-11	REF
4309	9-1-99	6
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4402		
(E-595800-2)	9-1-90	REF
4425	10-1-13	2
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4451	9-1-45	17
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	10-1-84	
	10-1-111	
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(E-560008)	9-1-19	REF
(E-595800-6)	9-1-23	
4470	9-2-13	1
4490	9-4-66	2
4502	10-1-115	4
(E-594029-10)	9-1-112	REF
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4504		
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800006	10-1-131	1
800013	8-1-103	1
801035	9-1-21	1
801048	8-1-8	1
801049	8-1-44	2
801503	8-1-17	1
801515-2	9-4-13	1
809002	A 8-1-78	1
809005	8-1-132	1
809013	8-1-	1
809014	8-1-	1
809015	8-1-	1
809209	9-1-42	1
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809211	M 8-1-	1
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809211-037	A 8-1-	1
809214	10-1-	1
809216-1	10-1-	1
809217	A 9-1-	1
809231	B 8-1-	1
809233	B 9-1-	1
809234	8-1-	1
809235	10-1-	1
809236	10-1-	1
809242	C 8-1-	1
809243	9-1-	1
809244	8-1-	1
809250	10-1-37	1
809251	8-1-1	1
809252	A 8-1-3	1
809301	9-1-	1
	9-4-	
809304	A 8-1-	1
809502	8-1-111	2
	8-1-134	
809702	L 9-4-64	1
810024-1 (1A8-1952)	10-1-42	REF
810029	9-2-15	1
810501	9-2-17	1

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819027	9-4-7	1
819033	C 9-1-70	1
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819039	9-4-	1
819062	9-4-20	2
819070	9-4-	1
819071	A 9-4-78	1
	9-8-	
819075	9-4-103	1
819080	9-4-78	1
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819082-0	9-4-	1
819501	C 10-1-19	1
829001	9-1-	1
892013	10-1-51	1
8612	9-2-8	2
(E-596865-6)	8-1-31	REF
879003	9-1-	1
892007	9-2-20	1
892018	9-4-53	1
892019-1	9-5-28	3
892032	10-1-57	1
892035	8-1-99	1
892069	8-1-153	2
892070-1	8-1-152	1
892070-2	8-1-151	1
894001-5	8-1-160	9
894002	9-1-86	3
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	10-1-159	
894002	10-1-159	3
894013	B 9-4-75	1
894016	8-1-72	1
895004	8-1-2	2
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895005	8-1-121	8
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9E4008 (E-596438)	9-1-57	REF
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9E4098	8-1-110	1
9E4138	9-1-47	2

PART NUMBER	FIG. AND INDEX NO.	QTY. PER ART.
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(4151)	9-1-47	REF
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9E4515	9-1-121	2
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**AUTOMATED BUSINESS SYSTEMS**



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