

INSTRUCTIONS FOR INSTALLING THE 174216 MODIFICATION KIT TO PROVIDE  
A SEQUENTIAL "FIGS", "C" ANSWER-BACK MECHANISM ON MODEL 28  
KEYBOARDS LK3, 4, AND 5 FOR USE IN DIAL TWX

The chart below pertains to Bell System only.

Teletype Unit	Teletype Code	Bell System Reference	Bell Code
Keyboard (Send-Receive)	LK3	Base (Send-Receive)	28A
	LK5		28C

1. GENERAL

a. The 174216 Modification Kit provides a sequential "FIGS", "C" Answer-Back Mechanism on Model 28 Keyboards LK3, 4, and 5 for use in Dial TWX. The answer-back mechanism is an electromechanical device which allows the identity of the called station to be transmitted automatically to the originating station upon receipt of the sequential selection "FIGS" - "C" from the signal line.

b. For receiving tape transmission, a delay circuit is incorporated in the answer-back mechanism which permits the receipt of a third character following the sequential "FIGS" - "C" (i. e. "LTRS" in "FIGS" - "C" - "LTRS") before transmission of the answer-back message begins.

c. A control relay actuated by the local station signal generator prevents the local station answer-back mechanism from operating when a distant station has been called. Local answer-back may be operated from the local red "HERE IS" keylever.

d. A subset actuated relay initiates answer-back operation from a Bell Telephone subset.

NOTE

\* In order to have answer-back operation with Model 28 Send-Receive Sets (LK3, 4, and 5) the 178343 and 178345 Modification Kits are necessary in addition to the 174216 Modification Kit.

e. The 174216 Kit consists of only those parts of the answer-back mechanism common to the keyboard (LK3, 4, and 5). The basic parts are a signal generator pulsing contact, basic answer-back mechanism, "HERE IS" keylever and associated contact, "non-contention" or answer-back control relay, and diode to provide direct operating current to the answer-back trip magnet. The answer-back device has a total capacity of 21 characters. The first character transmitted is always a "LETTERS" combination; the remaining 20 may be any characters desired. However, this first LTRS combination is normally followed by CARRIAGE RETURN and LINE FEED while the coding also normally ends with CARRIAGE RETURN and LINE FEED. This arrangement insures that the answer-back message will appear at the beginning of a line on the distant station and that over-printing of the message will not occur. Transmission of the LTRS combinations at the beginning of the message also returns all stations in the circuit to the unshift position. Since five of the 21 available characters are thus used to perform these functions, only 16 are available for the answer-back identification. This procedure may be altered to suit a particular application of the answer-back mechanism.

f. If the Send-Receive Set to be equipped with the answer-back mechanism does not have the double-blank keyboard lock modification kit, a station may accidentally interfere with the answer-back operation either by holding its own calling keylever depressed or by depressing any keylever during the operation of the answer-back mechanism. Warn the operator of this condition. The trip magnet circuit of the answer-back mechanism is connected to the 115 volt 60 cycle  $\pm 10\%$  A.C. supply circuit of the Send-Receive Set. Diode CR2 rectifies the A.C. supply to provide an average direct operating current of approximately 0.070 amperes when the trip magnet circuit is completed through the "Here Is" contact or the subset actuated relay contacts. Sequential "FIGS" - "C" operation completes a circuit to the answer-back trip magnet which furnishes a direct time varying operating current. Peak operating current for 60 W.P.M. operation is 60 to 100 milliamperes D.C. Peak operating current for 100 W.P.M. operation is 60 to 75 milliamperes D.C. Peak operating current variation is dependent on which portion of the A.C. supply cycle capacitor is charged. The answer-back control relay (or non-contention relay) is connected to the 115 V.A.C. 60 cycle supply circuit of the keyboard and operating current is approximately .035 amperes.

g. The 178343 Modification Kit provides only those parts of the answer-back mechanism common to the Model 28 Typing Unit and supplies the control from "FIGS" - "C" keylever. The typing unit must have stunt box slots 32, 33, and 34 available to utilize the 178343 Modification Kit. The basic parts of the 178343 Kit are: slot 32 special "FIGS" stunt box parts required for locking or breaking the non-contention control relay (part of 174216 Modification Kit) circuit; slot 33 - "FIGS" sequential selection stunt box components; slot 34 - "C" components and stunt box contact assembly and associated cable.

h. The 178345 Modification Kit is a dual purpose modification kit. This kit provides all parts of the answer-back mechanism common to the electrical service assembly (LESU); the kit also contains a motor control feature.

(1) Refer to the wiring diagram of the 178307 Relay Assembly for further information.

(2) The motor control feature is electrically independent of the answer-back mechanism and is incorporated into the 178345 Modification Kit only to conserve mounting facilities. For this reason the motor control feature comes with the 178345 Modification Kit.

#### NOTE

The electrical service assembly (LESU) to be used in conjunction with the 178345 Modification Kit must contain a motor control terminal block ("D" terminal block; refer to the appropriate electrical service assembly schematic wiring diagram). Terminals D2 and D6 on this terminal block must be available; no wires may be connected to these terminals before installation of the 178345 Kit.

i. The 174216 Modification Kit consists of:

7	2191	Washer, Lock	3.0 ft	60329RM	Nylon Lacing Tape
1	3606	Nut	2	110743	Washer, Lock
2	3640	Washer, Lock	1	121243	Cable Clamp
4	7002	Washer, Plain	1	121244	Cable Clamp

2	125011	Washer, Plain	1	163852	Keylever Assembly ("Here Is")
5	151362	Wick	1	164077	Mod. Kit, Keylever Switch
1	151631	Screw	1	164457	Keylever Assembly, W-R-U (Upper Case C)
3	151632	Screw			
2	151658	Screw	1	174210	Answer Back Parts Common
1	151692	Screw	2	179051	Disk, Locating
2	155750	Insulating Sleeve	1	179052	Plate, Cover
4	155753	Insulating Sleeve	1	179147	Contact Assem.
2	158186	Screw	1	179154	Cable Assem. Control Relay
1	162885	Cam Segment	1	179156	Cable Assem. W/Spark Suppressor
2	162886	Screw			

j. For part numbers referred to and for parts ordering information see Teletype Model 28 Page Printer Set Parts Bulletin 1149B.

## 2. INSTALLATION

### NOTE

Refer to Teletype Model 28 Page Printer Set Bulletin 217B for instructions for removal of major components and assemblies.

### NOTE

References in the text to left or right, up or down, front or rear, apply to the unit in its normal operating position as viewed from the front, unless specifically stated otherwise.

#### a. The 174216 Modification Kit

(1) Remove the keyboard from the cabinet according to standard practice.

(2) Remove the 151399 Signal Generator Guard Bracket. Temporarily replace the left bracket screw until it is finger tight. This will hold the nut plate in place for subsequent assembly of the 121243 Cable Clamp (See Figure 1).

(3) Remove the signal generator contact box from the signal generator according to standard practice.

(4) Remove the signal generator according to standard practice.

(5) In accordance with standard practice remove the keyboard code bar assembly and replace parts with those in 174216 Kit as follows:

<u>Replace</u>	<u>New Part</u>
151089 Code Bar No. 1	161599 Code Bar No. 1
151088 Code Bar No. 2	161600 Code Bar No. 2
151087 Code Bar No. 3	161601 Code Bar No. 3
151086 Code Bar No. 4	161602 Code Bar No. 4
151085 Code Bar No. 5	161603 Code Bar No. 5

Make certain that the code bars are flat before installing them. The maximum permissible edgewise or flatwise bow is .010 inch.

(6) Remove the two 151637 Screws and the 110743 Lock Washers which mount the non-repeat bellcrank assembly to the 151367 Plate. Discard the 151367 Plate with the code bar bail bumper bracket and bumper. Assemble the 151193 Bumper to the 174207 Bumper Bracket, both furnished. Assemble the 174207 Bumper Bracket with bumper to the 174208 Plate using a 156501 Screw, 2191 Lock Washer and a 3649 Washer, also furnished, see Figure 8. Do not tighten the bumper bracket screw.

(7) Insert a 151362 Wick, furnished, into each of the five 42661 Code Bar Springs if they are not already furnished.

(8) Replace the keyboard code bar assembly. Replace the 151367 Plate with the 174208 Plate, furnished. Mount the previously removed non-repeat bellcrank assembly to the 174208 Plate using the original screws and lockwashers.

(9) Install the 164077 Keyboard Switch Modification Kit in accordance with Specification 5972S.

#### NOTE

Refer to 4499WD for actual wiring diagram of the 174216 Modification Kit.

(10) Loosely route the long end of the cable of the spark suppressor - resistor-diode assembly through the hole (drilled in accordance with Specification 5972S, at the upper right end of the 151326 Sealing Plate, then down into the base and around the inside of the base as indicated in Figure 6 bring the motor terminal block branch and the long end out of the base as indicated. Assemble the 179156 Spark Suppressor-resistor-diode mounting plate to the right end of the lock ball channel as depicted in Figures 5 and 6.

(11) Pass the two connectors of the 179154 Control Relay w/Cable Assembly, from the bottom, through the rectangular hole at the right side near the rear of the keyboard base. Connect the green, the white-slate and the white-brown terminals to the terminal block on the 179160 Relay Assembly as shown on the wiring diagram (see also Figure 6).

(12) Mount the relay assembly as shown in Figure 7. Make sure the 179051 Locating Disks are located within the boundaries of their respective trapezoidal holes as shown. Form the connector cables approximately as shown before tightening the 151632 Cable Clamp Screw to avoid placing unnecessary strain on the relay mounting.

(13) Loosely route the control relay cable as shown in Figure 6.

(14) Connect the two cables to the motor terminal block according to Figure 6 and the 4499WD Wiring Diagram.

(15) Remove and discard the two 151737 Screws which secure the cam sleeve assembly to the clutch cam disk of the signal generator. Retain the lockwashers.

(16) Install the 162885 Cam Segment with the two 162886 Mounting Screws and the two lock washers previously removed. Refer to Figure 18 for proper cam orientation. The 162885 Cam Segment and the 162886 Mounting Screws can be maneuvered into place without removing parts from the signal generator assembly other than the contact box.

(17) Replace the 151835 Code Bar Bail Latch Lever with the 161607 Latch Lever, furnished. (See Teletype Bulletin 217B).

(18) Assemble the 174198 Adjusting Finger to the 174197 Operating Bail with a 156740 Screw, 2191 Lock Washer, and a 7002 Washer as shown. (See Figure 9).

(19) Remove and discard the 151207 Code Bar Bail Stud. Assemble the 151067 Code Bar Bail, the operating bail assembly, 174200 Code Bar Bail Stud along with accessory washers, spacer and springs to the 151096 Signal Generator Frame as shown in Figure 9.

(20) Mount, adjust and lubricate the 179147 Pulsing Contact Assembly at the left end of the 151140 Transmitter Plate (when viewed from the front of the keyboard) in accordance with Figures 3 and 1. Check the contact assembly adjustments with requirements given in Figure 2.

(21) Replace the signal generator in accordance with standard practice and simultaneously engage the drive link 174199 with the stud on the operating bail 174197. See Figure 9.

(22) Check the following adjustments and readjust where necessary:

- Non-repeat lever.
- Code bar bail adjusting screw.
- Code lever bail latch lever eccentric.
- Code Bar guides.
- Code bar bail bumper.

#### NOTE

When making the bumper adjustment, the 174208 Plate should be held securely in place with all three of its mounting screws.

- Code levers guide.
- Code bar bounce suppressor.
- Alignment of code lever bail and code lever bail latch lever

(23) The 174206 Mounting Plate for the answer-back mechanism has all of its projections extending upwards with guide slots on its left side and the trip magnet mounting projection on its right side. Mount the 174203 Side Plate as shown in Figure 10, using one 151692 Screw with a 2191 Lock Washer and one 110434 Screw with a 3640 Lock Washer, the 151692 Screw is inserted from the top and the 110434 screw is inserted from the bottom. The screws should be lightly friction tight.

(24) Place the 174204 Stop Lever on the 164145 Levers Pivot so that with the grooves in the pivot offset towards the rear, the lever rests on the rear 5/16" dia. and front 7/32" dia. portion of the pivot. The right angle extension of the lever should then be at the front left side while the lever encircles the pivot on the right side. Place the 164148 Spacer on the 164145 Pivot in front of the 174204 Stop Lever. Insert the 164149 Blocking Lever in the small groove of the 164145 Pivot so that the 164148 Spacer is retained between the stop lever and blocking lever. The blocking lever should then rest against the left side of the upper ear extension on the stop lever. Hold the two levers together by installing the 42661 Spring in the spring eye of the 164149 Blocking Lever and the spring extension of the 174204 Stop Lever. (Refer to Figure 10).

(25) Place the rear projection of the 164145 Levers Pivot in the 1/8" hole near the bottom of the 174203 Side Plate mounted on the 174206 Plate. Place the 164144 Side Plate towards the front of the 174206 Plate so that it engages the front projection of the 164145 Levers Pivot and is positioned similarly to the 174203 Side Plate already installed. Assemble the front side plate only friction tight with two 151692 Screws and 2191 Lock Washers. (Refer to Figure 10).

(26) Install the 174205 Spring Bracket between the 174203 Side Plate and the 164144 Side Plate at the top right side so that the projections on the spring bracket engage the slots in the side plates. Assemble the 174205 only friction tight to the side plates with two 151152 Screws and two 3540 Lock Washers (Refer to Figure 10).

(27) Firmly press the outer sides of the 174203 and 164144 Side Plates towards each other so that each side plate bears against its corresponding projection on the 174206 Mounting Plate, the 164145 Levers Pivot and the 174205 Spring Bracket, then securely fasten the six screws which mount the two side plates and the spring bracket. (Refer to Figure 10).

(28) Install five 151397 Sensing Lever Springs on the 174205 Spring Bracket in the five spring mounting holes which are towards the front side plate. Install the 151715 Detent Lever Spring on the 174205 Spring Bracket, in the spring mounting hole adjacent to the rear side plate. (Refer to Figure 10).

(29) Install five 164154 Sensing Levers on the 164145 Levers Pivot in the five grooves which are towards the front side plate. The left extension on each sensing lever should engage its corresponding guide slot on the left side of the 174206 Mounting Plate. Hook the five 151397 Sensing Lever Springs on the spring grooves of the five sensing levers. (Refer to Figure 10).

(30) Install the 164131 Detent Lever on the 164145 Levers Pivot in the groove near the rear side plate. The detent roller should be towards the top. Hook the 151715 Detent Lever Spring on the spring groove of the detent lever. (Refer to Figure 10).

(31) Install the 164155 Magnet Yoke on the right side extension of the 174206 Mounting Plate. The spring post should be towards the front with the mounting holes toward the rear. Fasten the yoke with two 153537 Screws, 2191 Lock Washers and 7002 Flat Washers. (Refer to Figure 10).

(32) Install a 119649 Retaining Ring on the 164157 Shaft in the groove located approximately 1/16" from one end. Install the 164156 Armature with its two projections extending upward between the two lower projections at the bottom of the 164155 Magnet Yoke. Retain the armature by means of the 164157 Shaft inserted from the rear through the two holes in both the yoke and armature. Install another 119649 Retaining Ring on the 164157 Shaft so that the rear projections on both the armature and yoke are retained between the two rings. (Refer to Figure 10).

(33) Install the 164158 Latch by means of its two mounting slots to the bottom of the 164156 Armature so that the latch extends in front of the yoke and to the left of the latching surface on the 174204 Stop Lever. Fasten the latch to the armature by means of two 151737 Screws, 110743 Lock Washers and 87398 Flat Washers. Install the 42661 Spring between the spring groove on the latch and the spring post on the yoke. (Refer to Figure 10).

(34) Install the 194M Magnet Coil on the 164155 Magnet Yoke between its upper projection and the 164156 Armature. The magnet coil terminals should extend upward on the right side of the yoke when properly mounted. Fasten the coil with a 153799 Screw and 3640 Lock Washer. (Refer to Figure 10).

(35) Assemble the 174202 Lug to the 174206 Mounting Plate with a 156501 Screw and a 2191 Lock Washer as depicted in Figure 11. Let the assembly be loose.

(36) Make the magnet yoke and the stop lever latch adjustments in accordance with Figure 12 and Figure 13.

(37) Assemble the 41382 Stop Lever Spring as shown on Figure 10.

(38) Remove the screw, washer and lock washer that secures the end of the 174208 Plate nearest the keyboard. Set the 174204 Stop Lever of the answer-back mechanism into its latched position. Maneuver the answer back mechanism onto the keyboard base so that the left extension of the 174204 Stop Lever is over the end of the 161607 Latch Lever (See Figure 14) and so the keyboard base plate is in clamping position between the 174206 Mounting Plate and the 174202 Lug. Screw lightly into place, through the two elongated mounting holes of the mechanism mounting plate, two 151658 Screws on each of which a 2191 Lock Washer and a 7002 Washer has been assembled. Position the answer-back mechanism according to Figure 15 and tighten the mounting screws including the clamping lug screw.

(39) Make the drive link adjustment as shown on Figure 16.

(40) Place the 164162 "O" Ring in the groove on the rim of the 164161 Message Drum which is furthest from the slot in the center portion of the drum. Install the 164163 Stop Blade in any slot position in the drum by first inserting the blade under the "O" Ring and then rotating the blade toward the center of the drum until it is fully seated. (Refer to Figure 17).

(41) Code the drum in the following manner: (Refer to Figure 17).

(a) Almost any answer-back message desired may be selected which does not contain more than 21 characters including spaces. However, the coding of the message drum always begins with a LETTERS (stop blade) and is normally followed by CARRIAGE RETURN and LINE FEED; the coding also normally ends with CARRIAGE RETURN and LINE FEED. This arrangement insures that the message will appear at the beginning of a line on the distant station and that over-printing of the message will not occur. Transmission of the LETTERS code combination at the beginning of the message also returns all station in the circuit to the unshift position. Since 5 of the 21 available characters are thus used to perform these functions, only 16 are available for the message itself. This procedure may be altered to suit a particular application of the answer-back mechanism.

(b) Code the drum in a counter-clockwise direction beginning with the No. 2 164164 Code Blade adjacent to the 164163 Stop Blade. Each 164164 Code Blade is provided with removable tines for all levels of the transmission code (1,2,3,4,5). A "O" code level tine has been provided on each blade for future usage on six level keyboards and may be currently disregarded. A blade is coded by breaking off the unwanted tines at the scored line at the base of each tine. Figure 17 indicates which tines are to be removed for a particular character. To prevent distortion of a code blade, each blade should be held securely near the score mark of the tine to be removed. Although twenty code blades are sufficient to completely code the drum, twenty-five such blades have been provided to allow for possible errors in coding. Since each slot position in the drum must be occupied by a code blade, the unused characters under the twenty permitted for customer use shall be coded either for LETTERS or BLANKS or some such tolerable character.

(c) Install each coded 164164 Blade in the proper slot position in the drum by first inserting the blade under the "O" ring and then rotating the blade toward the center of the drum until it is fully seated. After filling the code drum, encircle the code blades with another 164162 "O" Ring in the groove on the opposite rim of the 164161 Drum.

(42) Install the 164168 Stepping Pawl on the 164165 Drive Plate by means of the 164169 Eccentric Stud, 150411 Flat Washer, 3640 Lock Washer and 151880 Nut. Install the 42661 Spring between the pawl and drive plate by means of the spring eye in each part. (Refer to Figure 14).

(43) Apply a thin film of grease on the shaft of the 164165 Drive Plate. Install the message drum complete with coded blades and "O" Rings on the shaft of the drive plate. Depress the stepping pawl extension to raise the pawl sufficiently so that the drum bears against the hub on the drive plate and the pawl fully engages the projections on the code blades. Hold the assembled parts approximately as indicated in Figure 14, by means of the thumb and first two fingers of the left hand. Slide the drive plate shaft downward along the left sides of the curved slots in the 164144 Side Plates until the drum assembly is fully seated as indicated.

(44) Make the stepping pawl adjustment as shown on Figure 14.

(45) Slip one 155750 Insulating Sleeve over each wire at the keyboard switch and solder to the appropriate terminals as indicated on 4499WD. Push the insulating sleeves over the soldered terminals.



(46) Tie the cable with lacing twine, furnished, near the keyboard switch without placing strain on the switch.

(47) Tie the cable with lacing twine, furnished, to the 162876 Retainer Bar about one inch from the switch with enough slack in the cable to avoid placing an unnecessary strain on the switch. Tie once again directly below the 400 ohm resistor.

(48) Slip one 155753 Sleeve over each wire at the answer-back trip magnet and solder to the appropriate terminals as indicated on 4499WD. Push the insulating sleeves over the soldered terminals.

(49) Tie the cable to the base using the small hole directly below the trip magnet armature.

(50) Slip one 155753 Insulating Sleeve over each wire at the pulsing switch and solder to the appropriate terminals as indicated in 4499WD. Push the insulating sleeves over the soldered terminals.

(51) Secure the cable with a 121243 Clamp as indicated in Figure 1. Allow enough slack in the cable to avoid unnecessary strain on the pulsing switch assembly.

(52) Tie the two cables together at two points about three inches apart at the control relay assembly.

(53) Remove and discard the plastic plug and speed-nut from the keytop hole, sixth from the left in the top row.

(54) Replace the keytop Guide Plate.

(55) Replace the keys assembling the 163352 Key in the unplugged hole and the 164457 W.R.U. (Upper Case "C") in place of the existing "C" key. The "HERE IS" key and the W.R.U. key are both furnished.

(56) Lubricate the keyboard, in accordance with Section 3.

(57) Assemble the keyboard in accordance with standard practice.

b. The 178343 and 178345 Modification Kits.

(1) These kits are necessary for answer-back operation on Keyboards LK3, 4, and 5 in addition to the 174216 Kit; however, they do not come with kit 174216 and must be ordered separately.

(2) Specific installation, adjustment, and lubrication instructions for the 178343 and 178345 Modification Kits are contained in Specification 50060S.

### 3. ADJUSTMENTS AND LUBRICATION

a. For standard adjustments and standard lubrication procedure refer to Teletype Model 28 Page Printer Set Bulletin 217B (Bell System refer to standardized information).

b. Make the adjustments and lubrication as given in the text and the attached figures.

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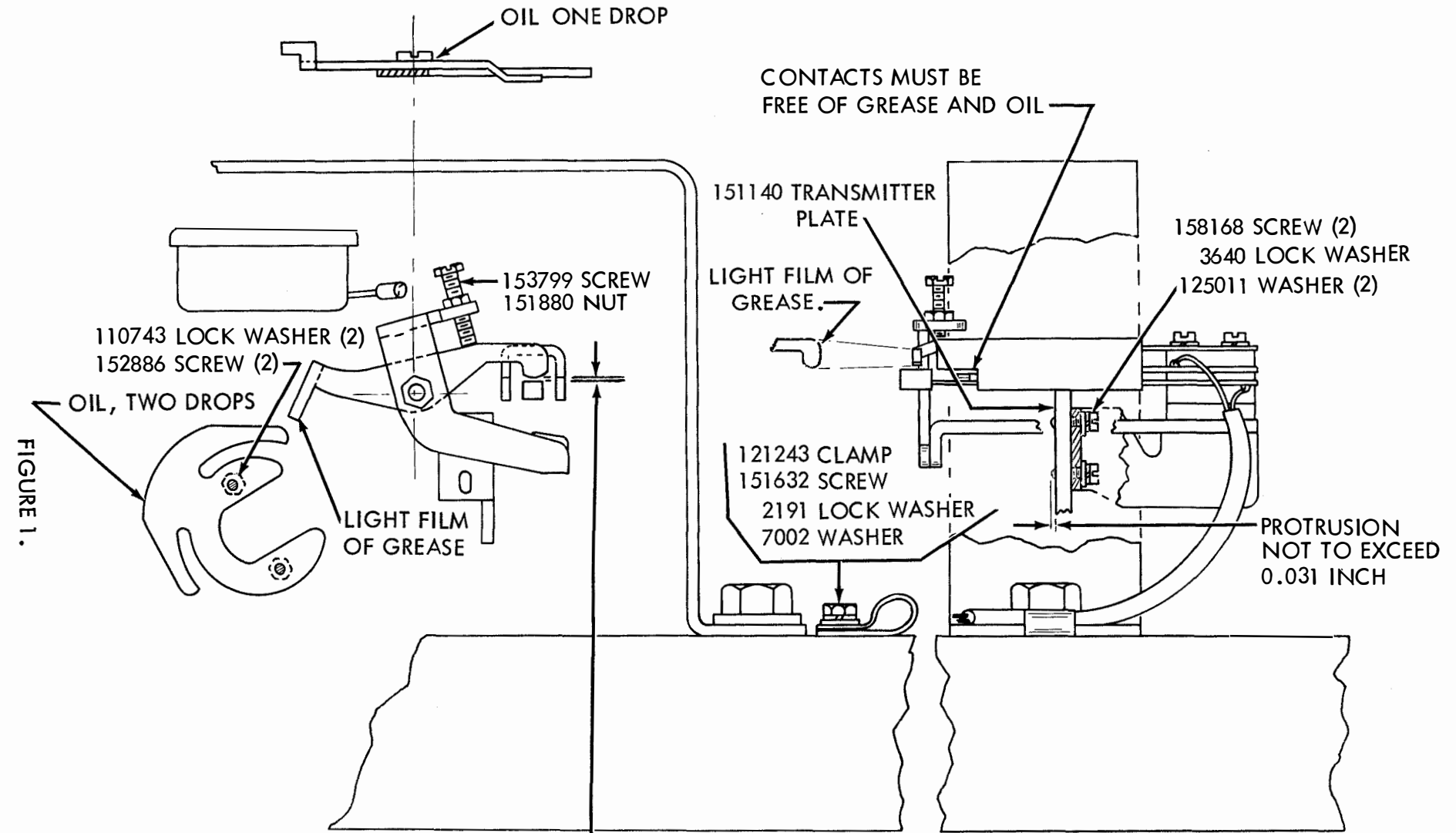
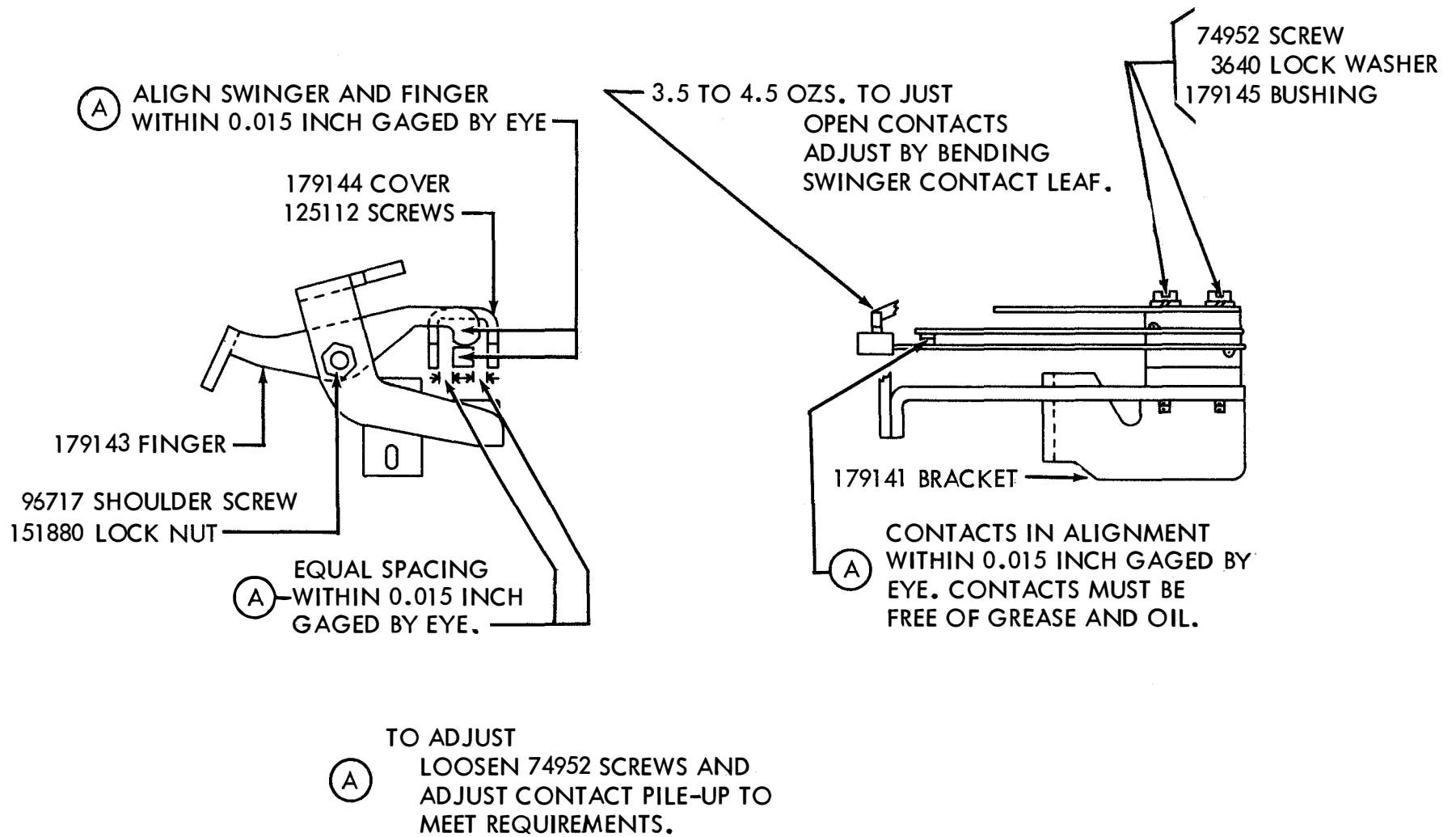


FIGURE 1.

MIN. 0.010 INCH --- MAX. 0.020 INCH CLEARANCE.  
ADJUST BY MEANS OF THE 153799 STOP SCREW.  
NOTE CAM NOT TOUCHING FINGER

FIGURE 2.



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179147 PULSING CONTACT ASSEMBLY

FIGURE 3.

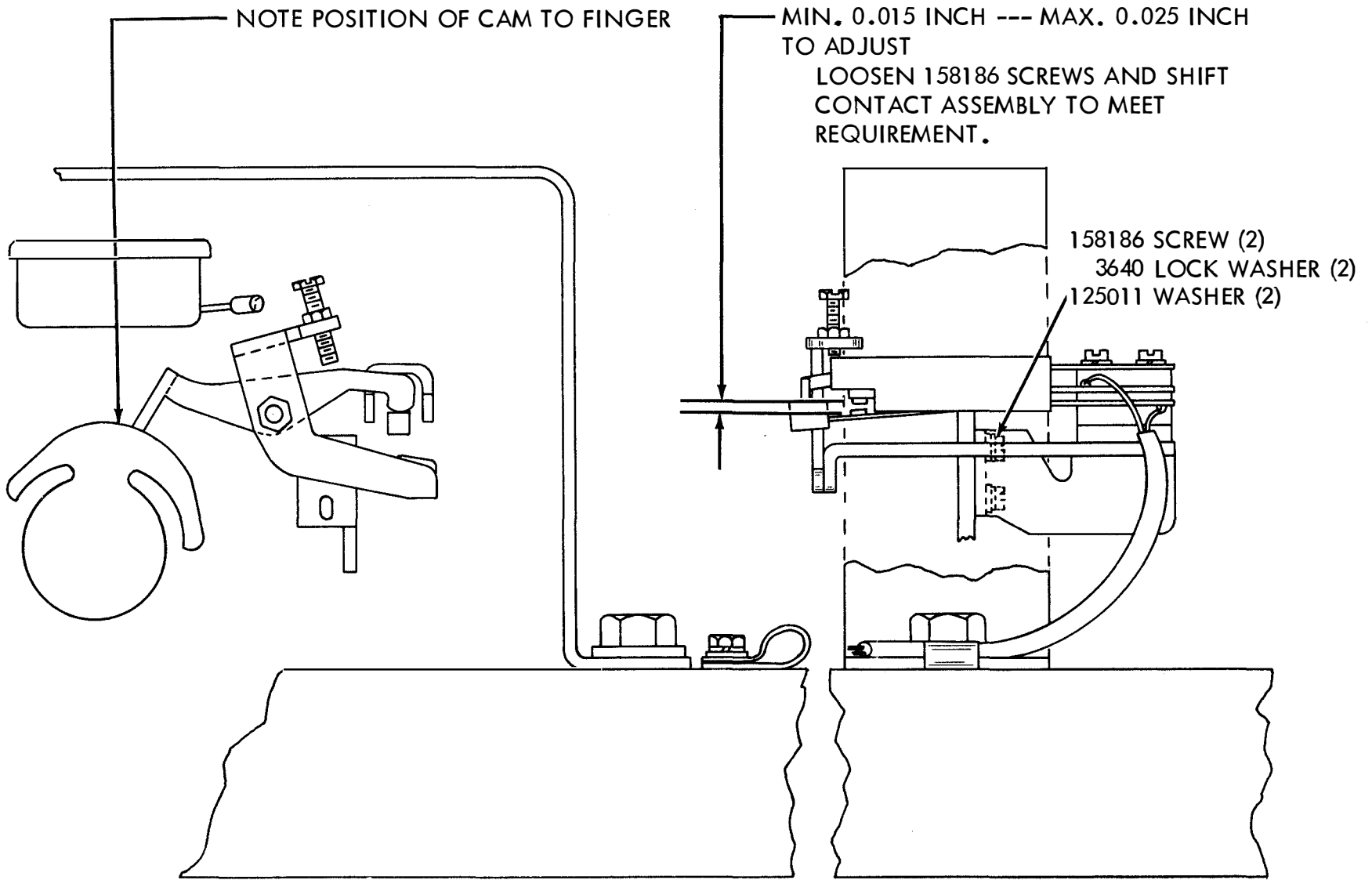
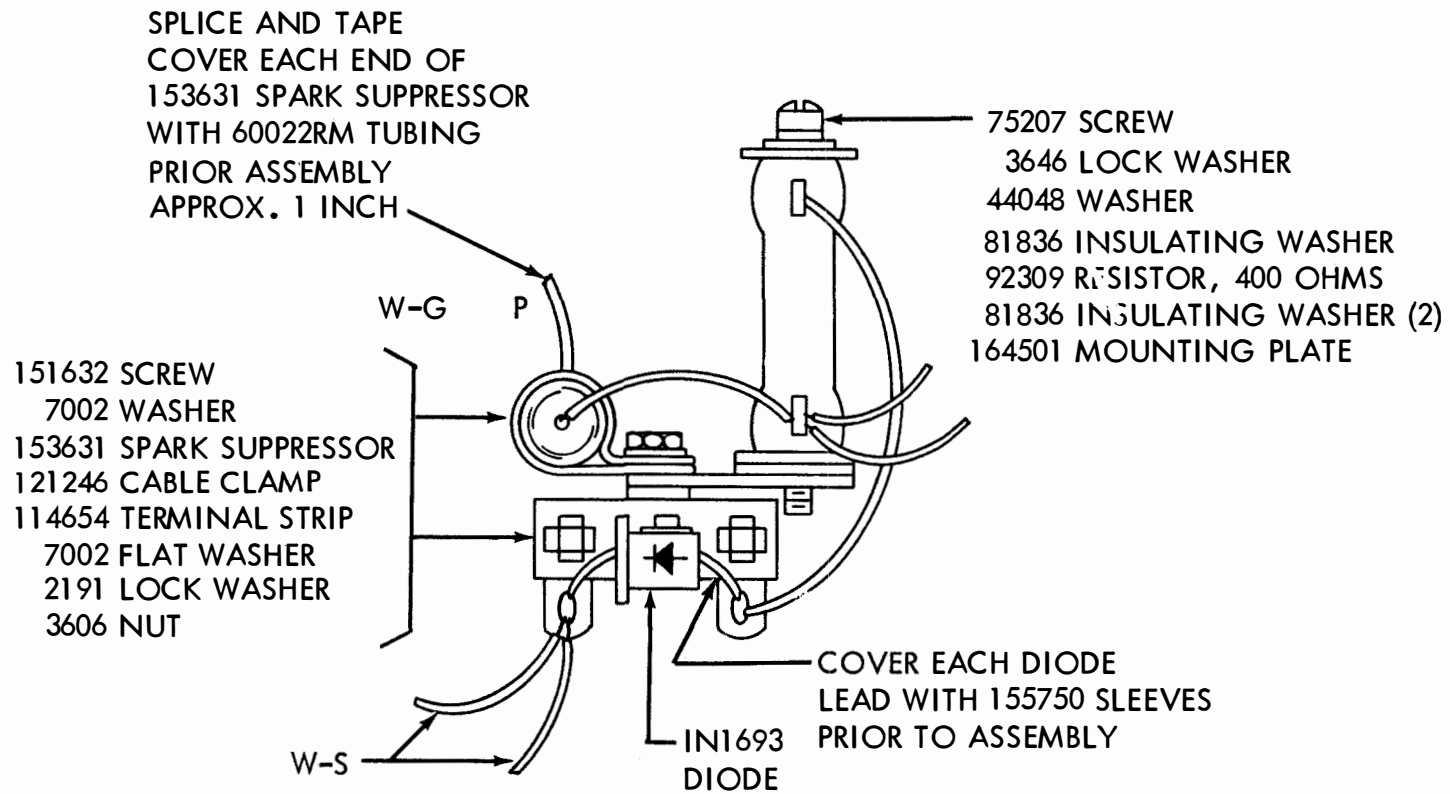


FIGURE 4.



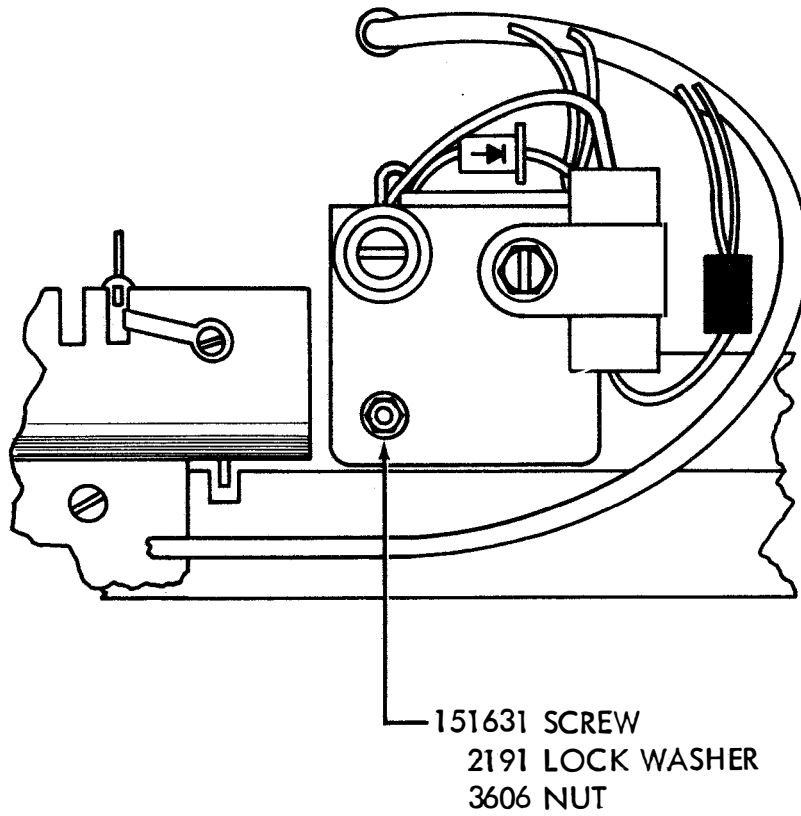
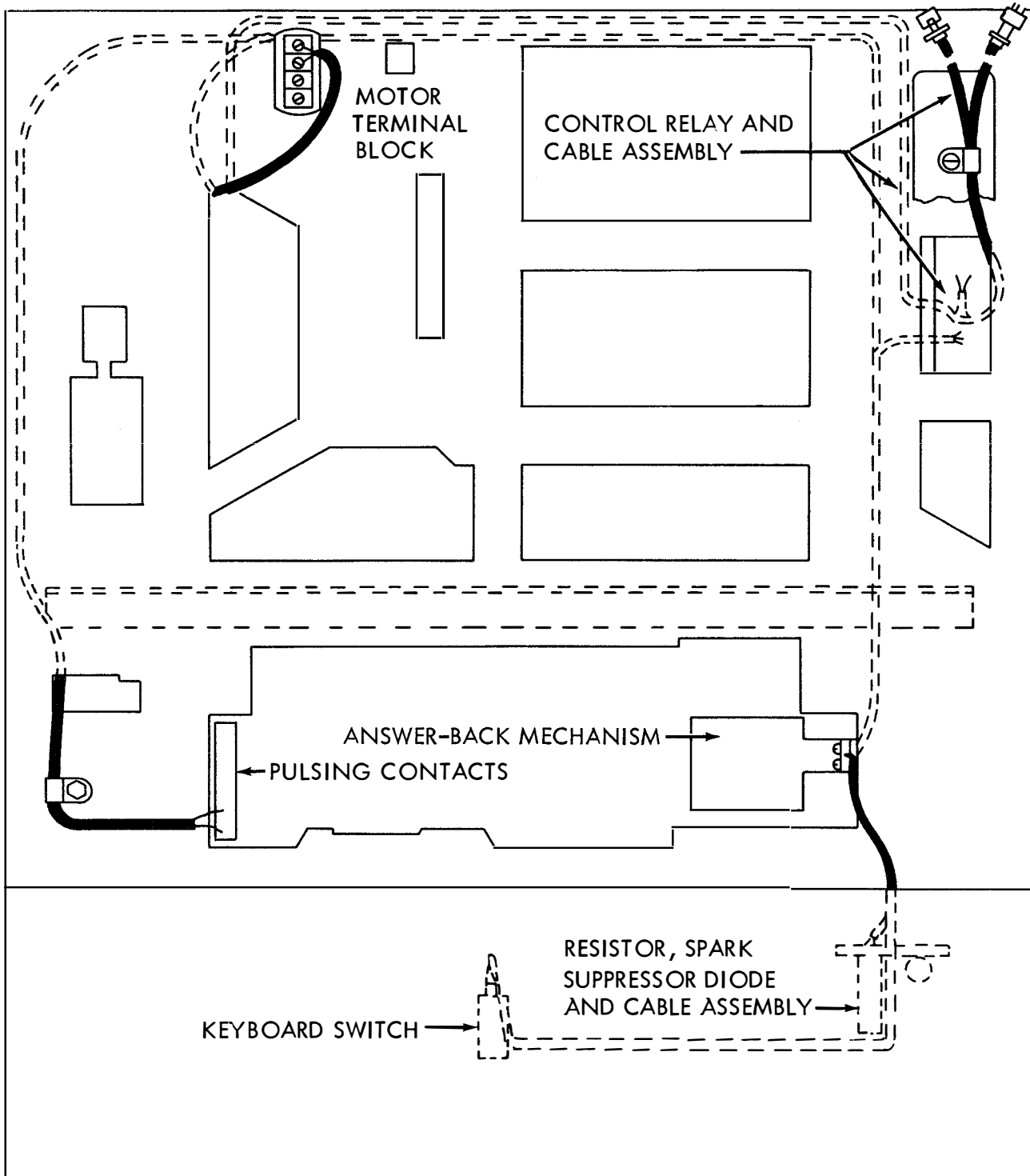


FIGURE 5

SEE 4499WD FOR COLOR TERMINATIONS



KEYBOARD BASE CABLE ROUTING FOR ANSWER-BACK MECHANISM

FIGURE 6.



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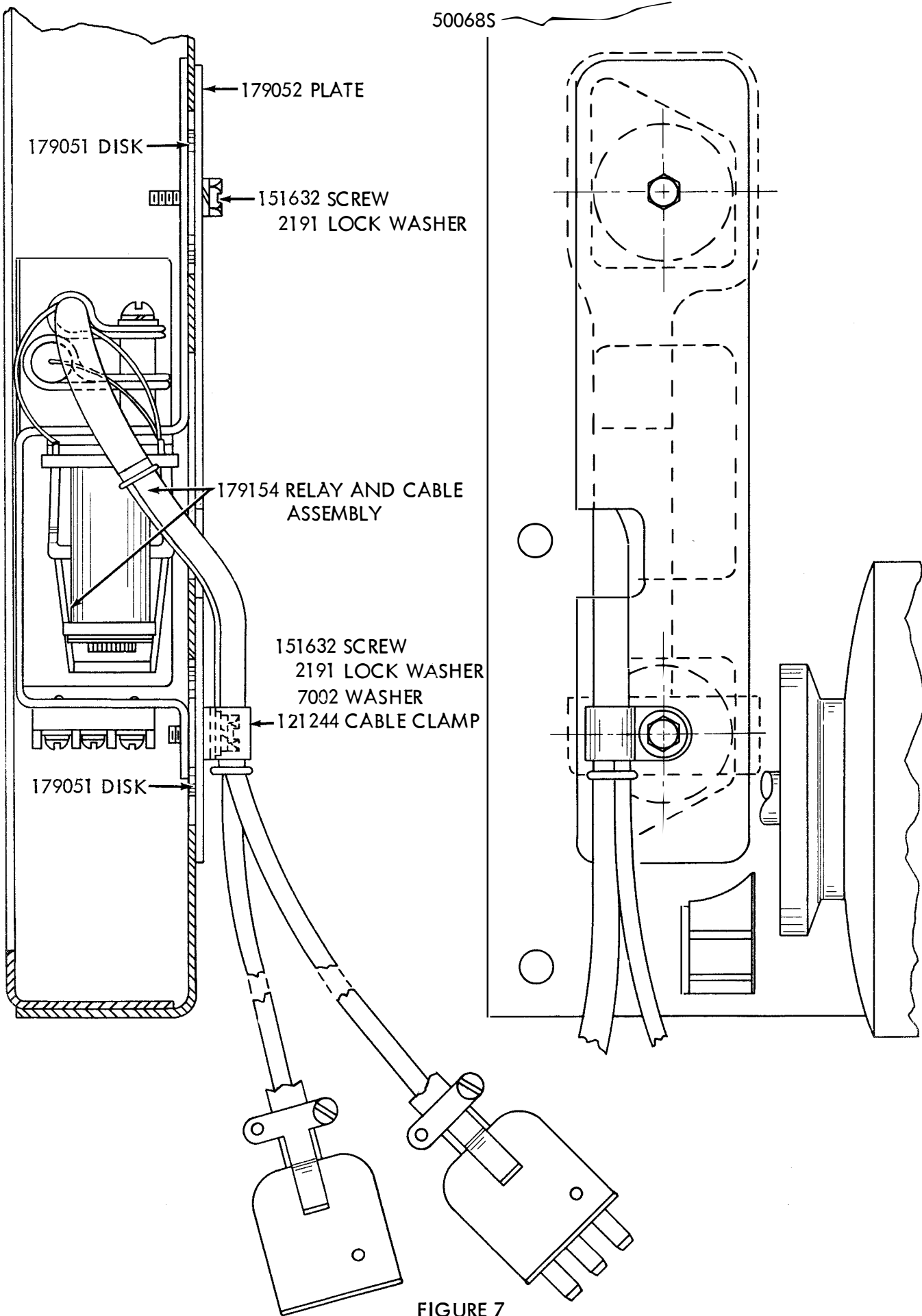


FIGURE 7

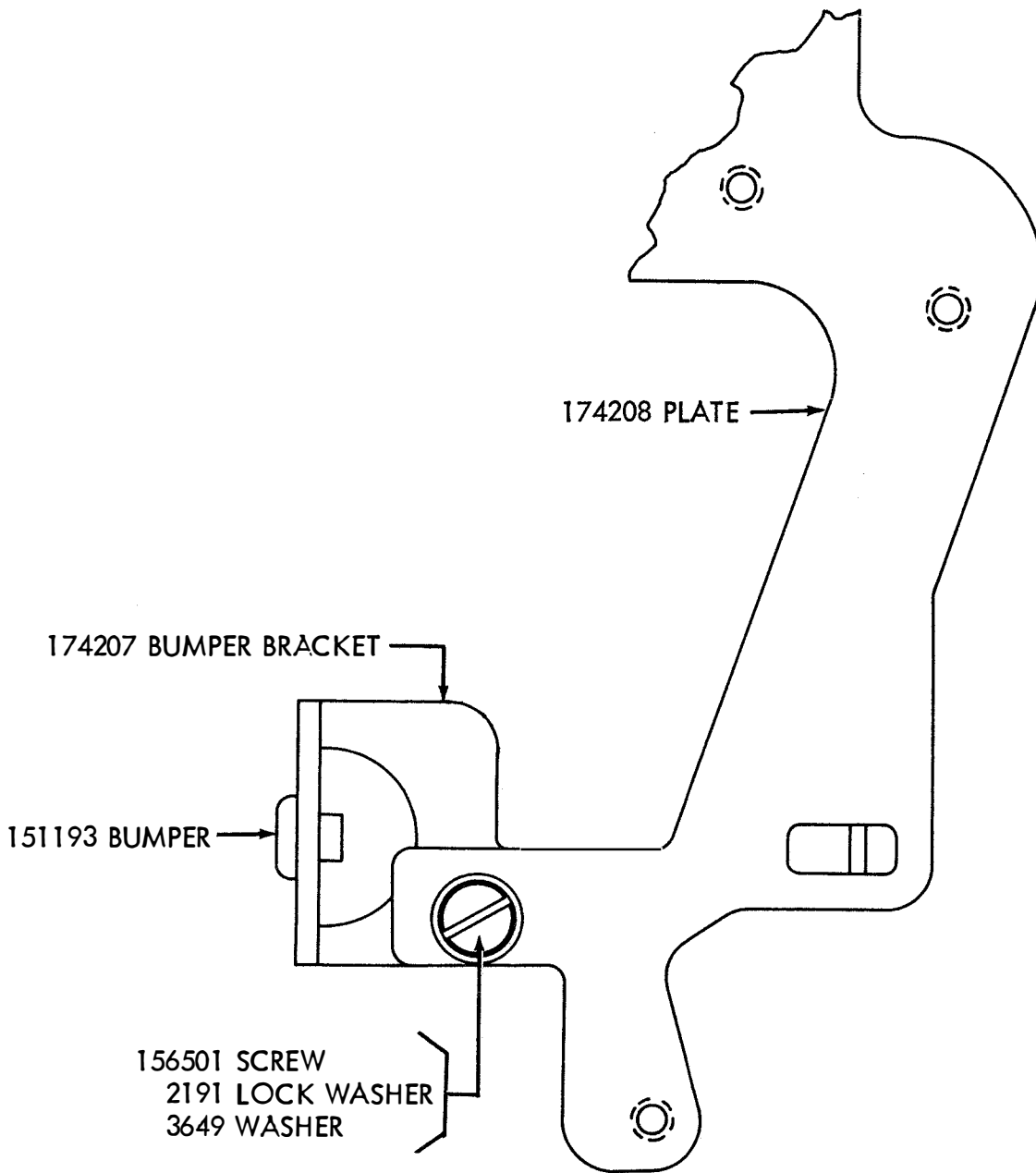


FIGURE 8.

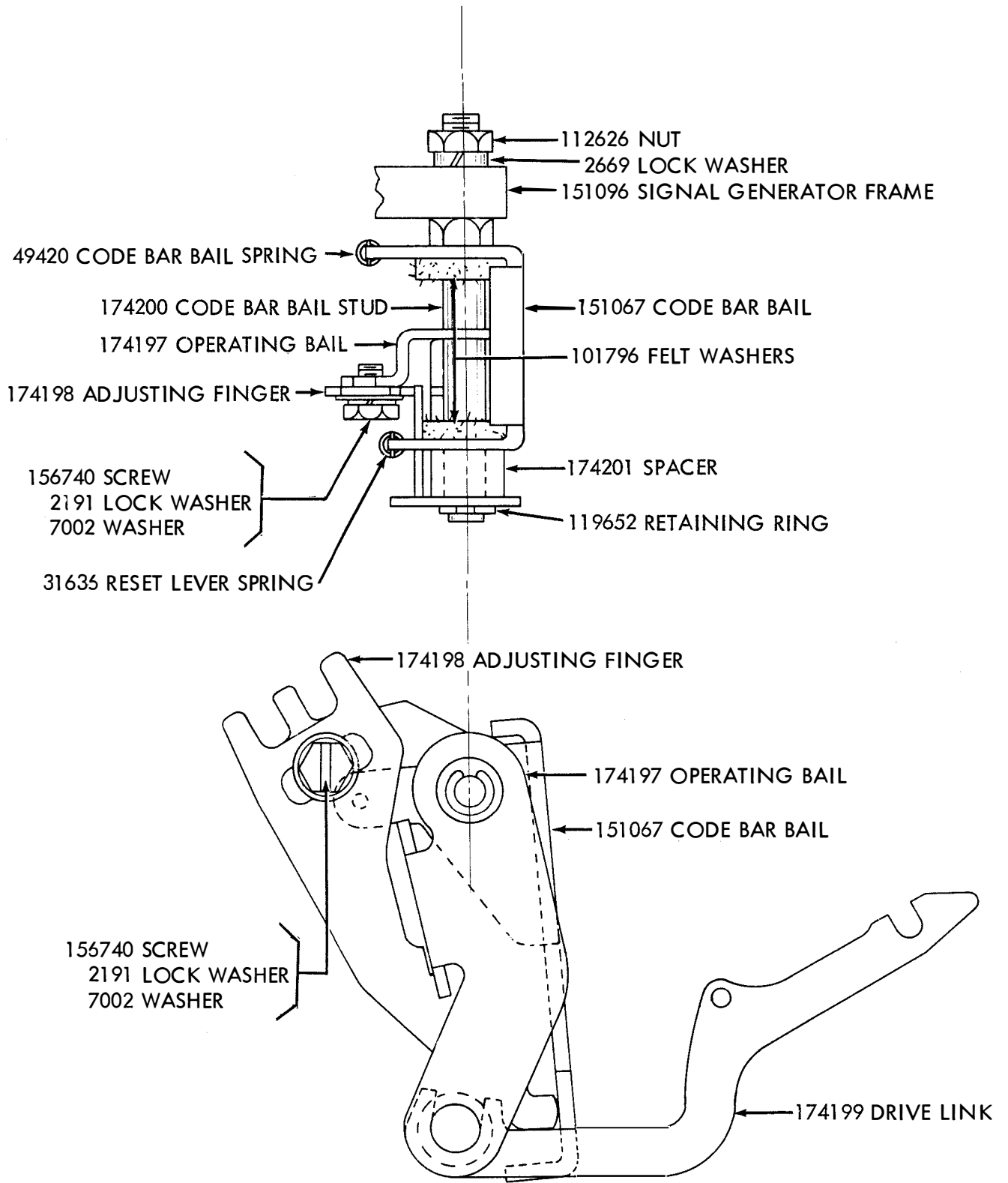


FIGURE 9

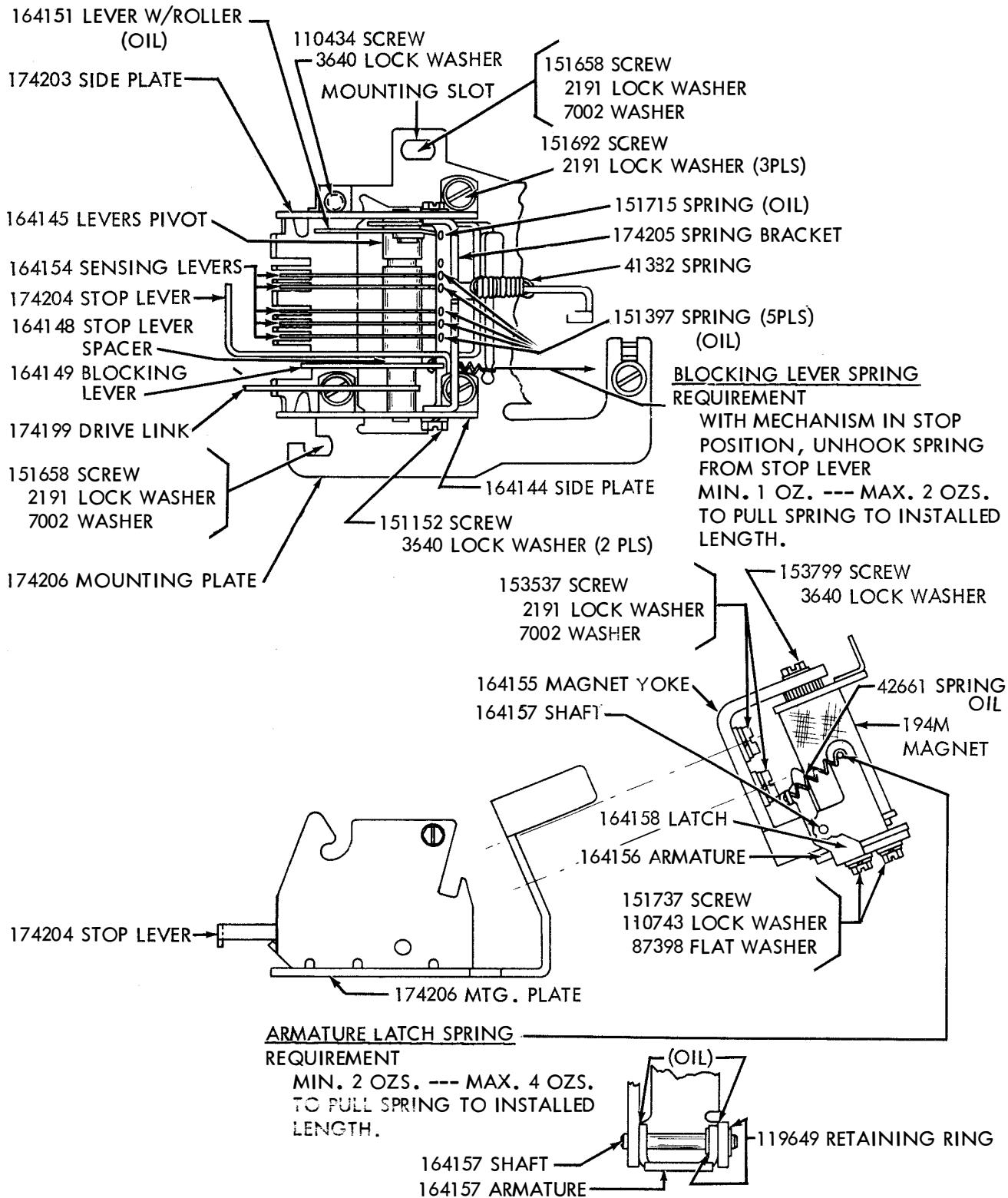
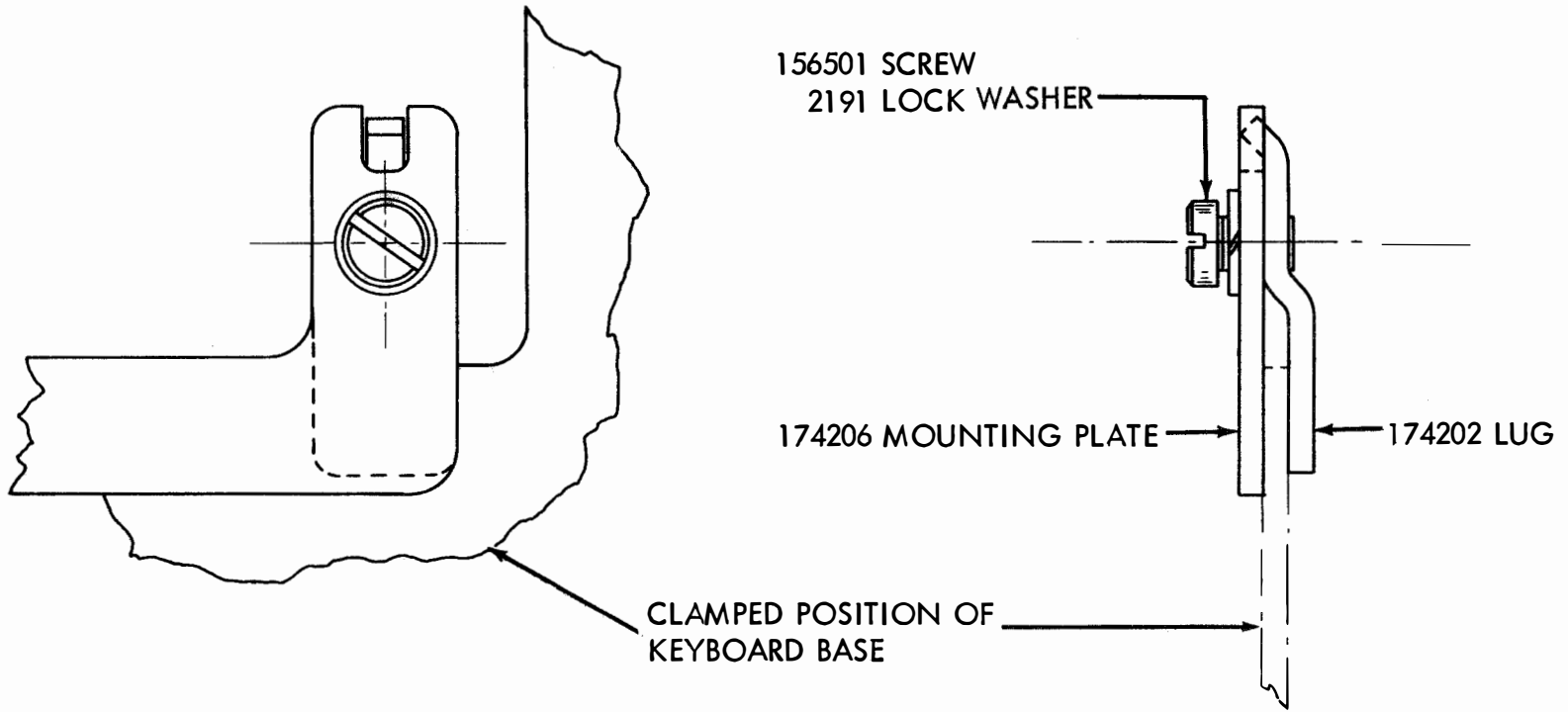
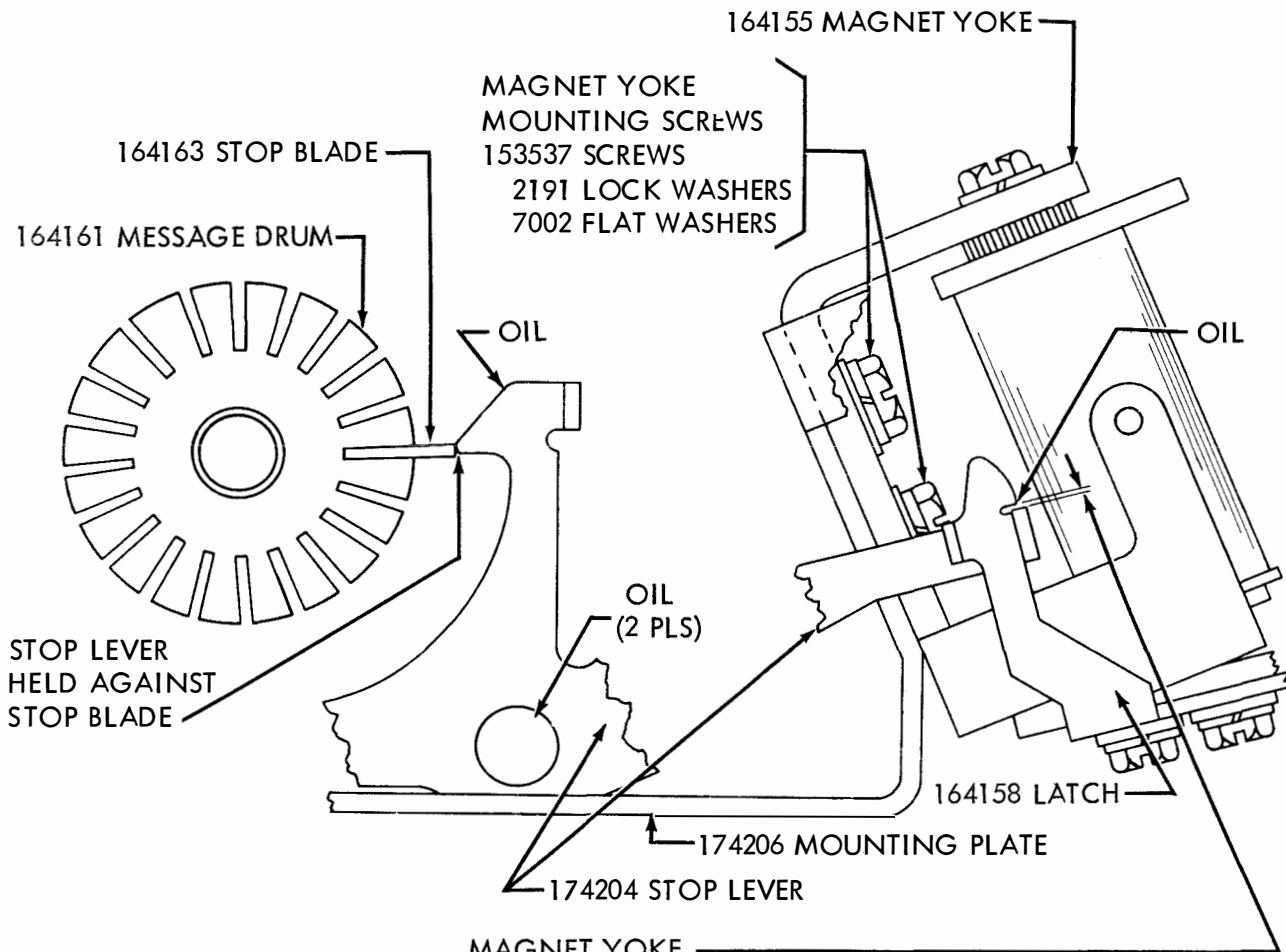


FIGURE 10.

FIGURE 11.





MAGNET YOKE  
REQUIREMENT

WITH THE TIP OF THE STOP LEVER HELD AGAINST THE STOP BLADE THERE SHOULD BE FROM .005" TO .015" CLEARANCE BETWEEN THE LATCHING SURFACES ON THE STOP LEVER EXTENSION AND ITS LATCH.

TO ADJUST

ROTATE THE MESSAGE DRUM TO MEET THE REQUIREMENT AND THEN POSITION THE MAGNET YOKE BY MEANS OF ITS TWO MOUNTING SCREWS.

FIGURE 12

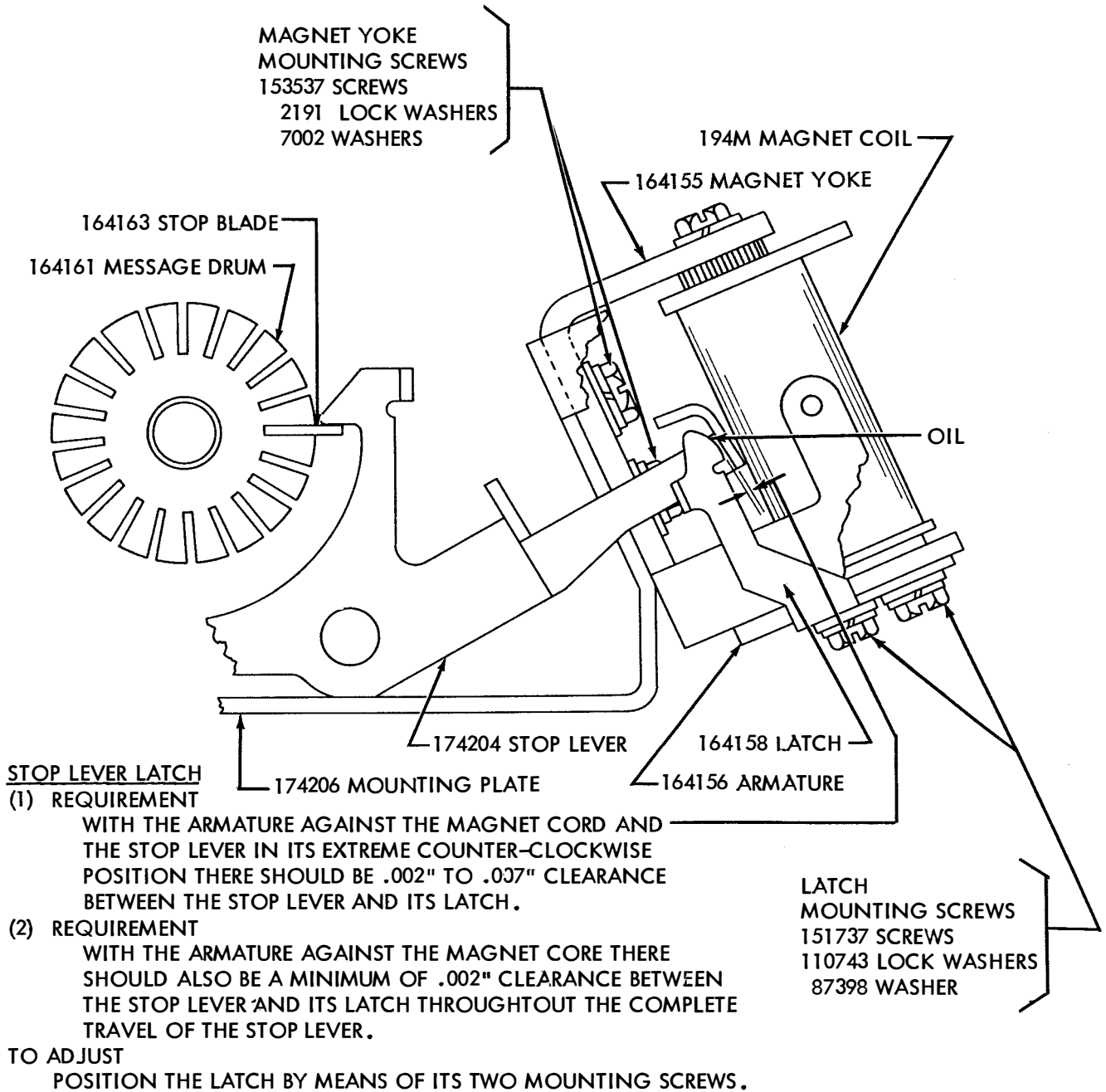
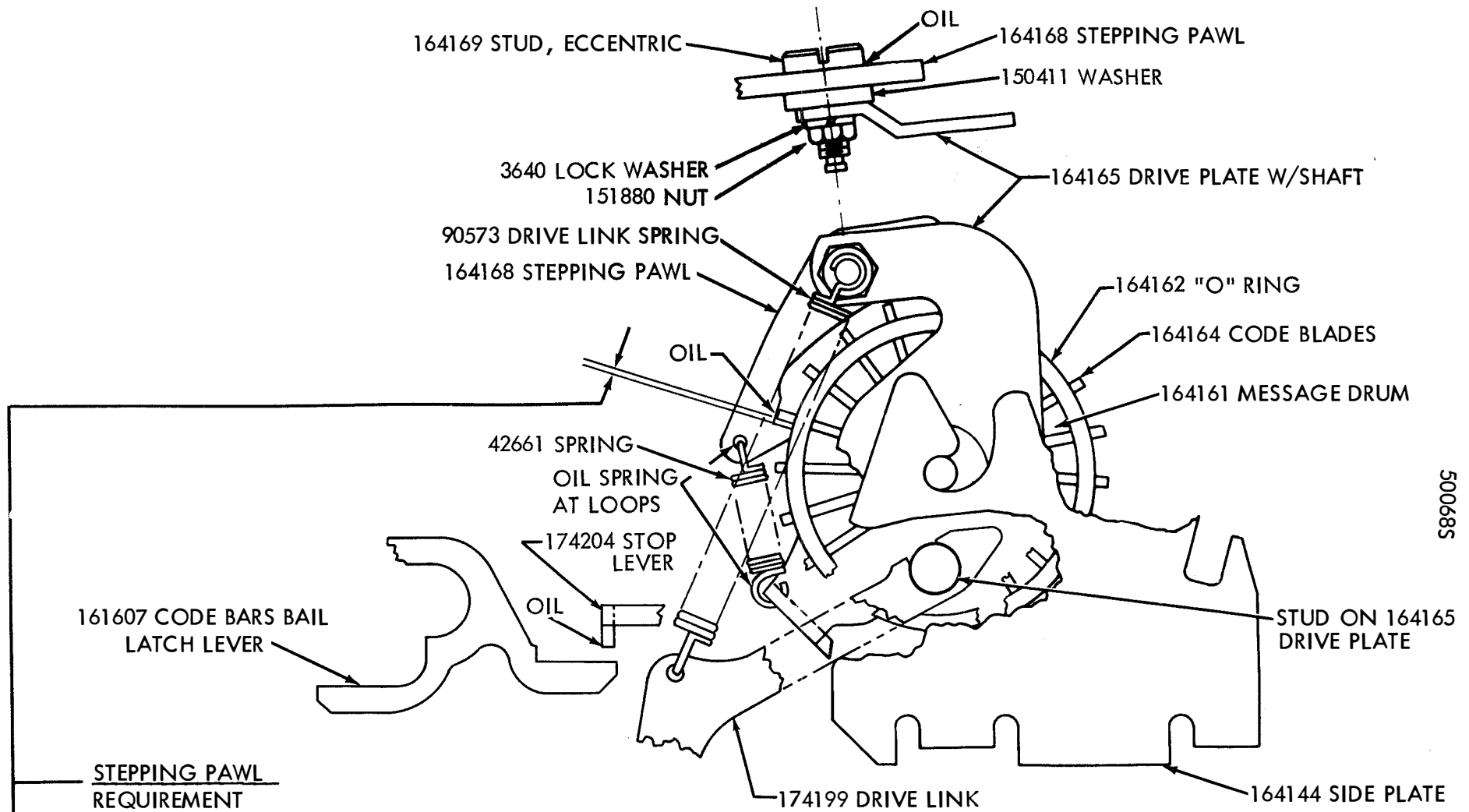


FIGURE 13.

FIGURE 14



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**STEPPING PAWL REQUIREMENT**

MESSAGE DRUM IN FULLY DETENTED POSITION.  
 MIN. 0.018" --- MAX. 0.030"  
 CLEARANCE BETWEEN STEPPING PAWL AND  
 ADJACENT CODE BLADE

**TO ADJUST**

POSITION ECCENTRIC STUD WITH ITS LOCK  
 NUT LOOSENED SO THAT ITS HIGH POINT  
 IS TOWARD THE TOP.



FIGURE 15

SENSING LEVER SPRINGS REQUIREMENT

MESSAGE DRUM REMOVED RESET LEVER IN EXTREME LEFTWARD POSITION.  
MIN. 1/4 OZ. --- MAX. 1-1/4 OZ  
TO START EACH LEVER MOVING

DETENT LEVER SPRING REQUIREMENT

MESSAGE DRUM REMOVED.  
MIN. 22 OZS. --- MAX. 26 OZS.  
TO START LEVER MOVING

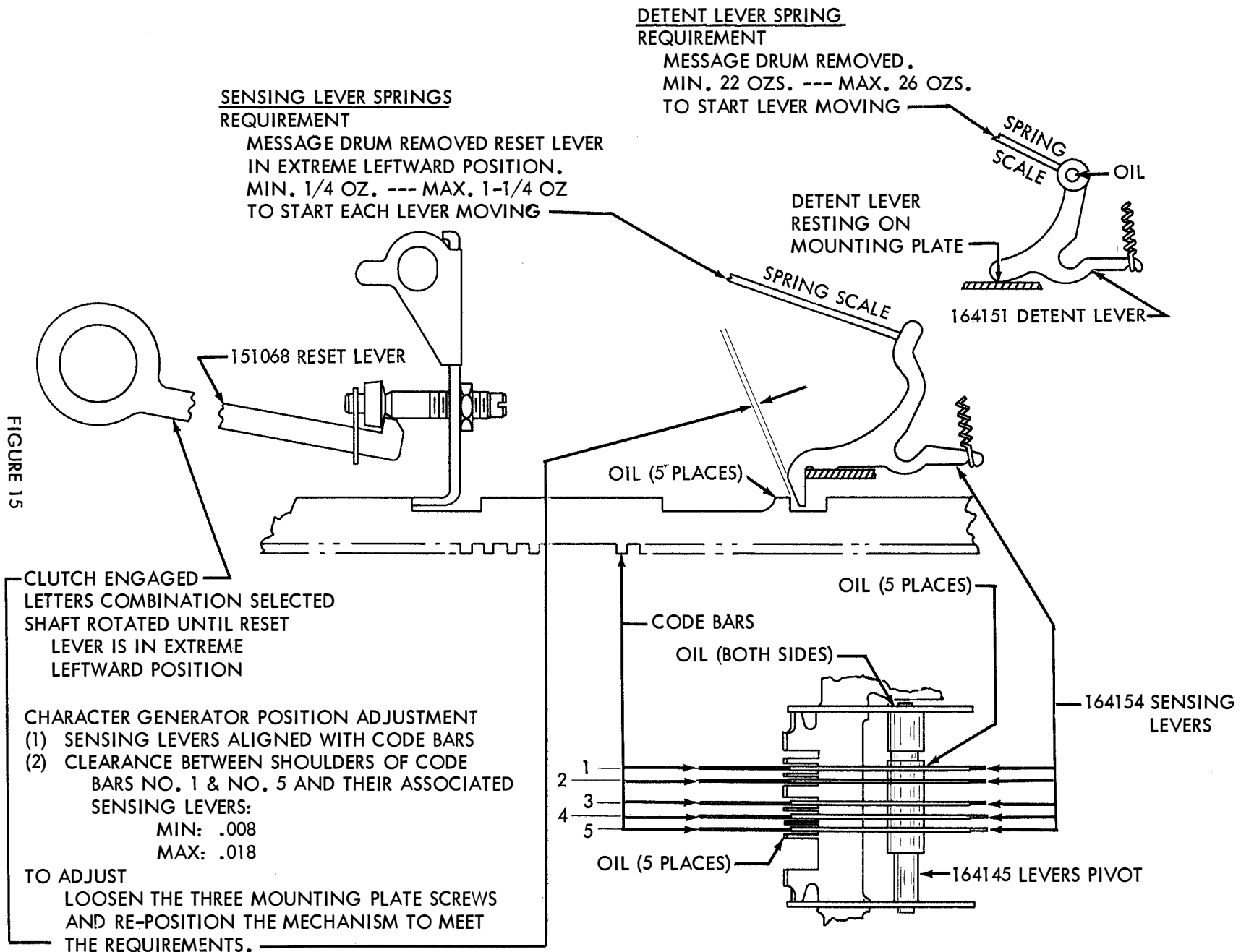
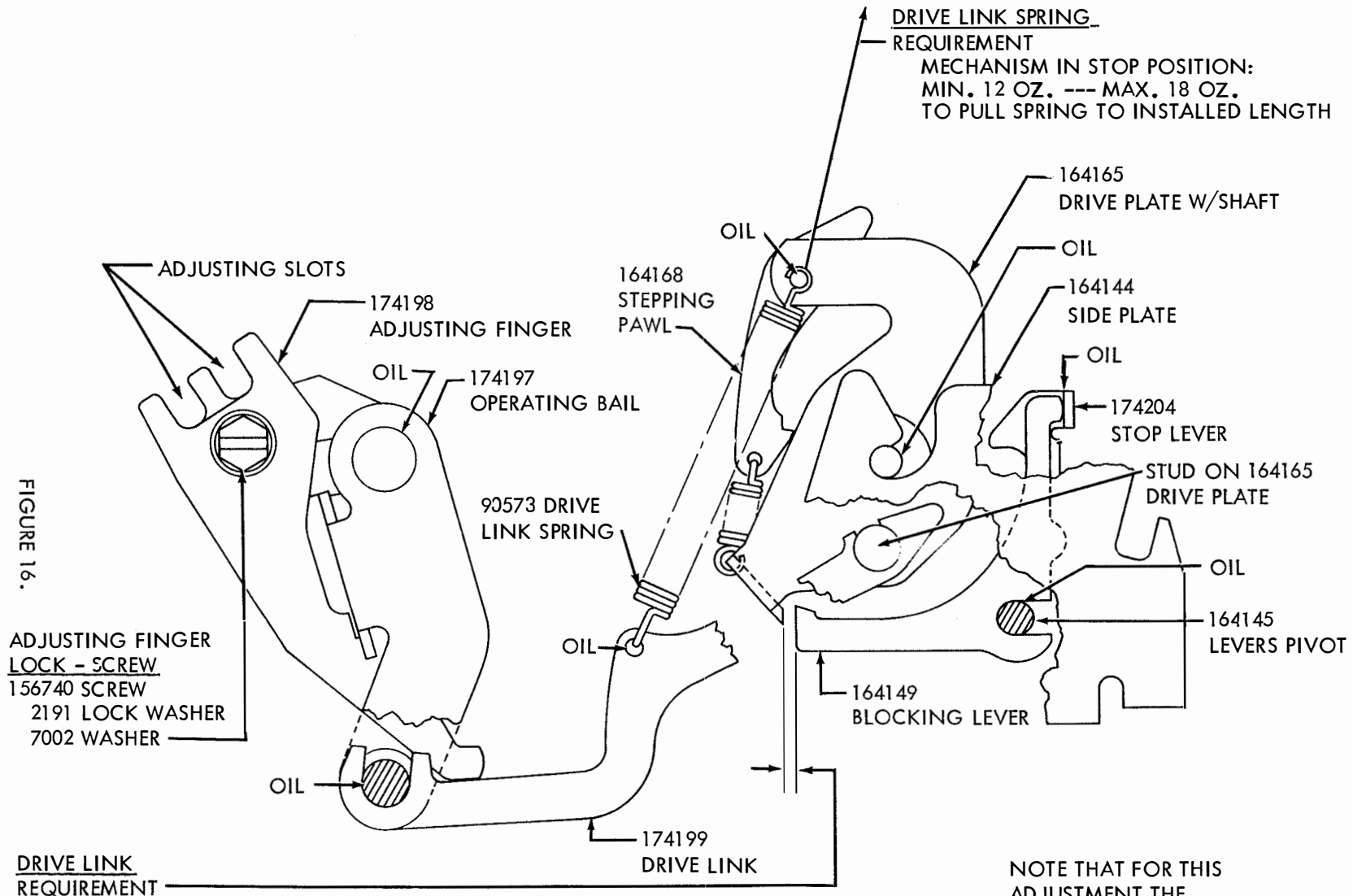
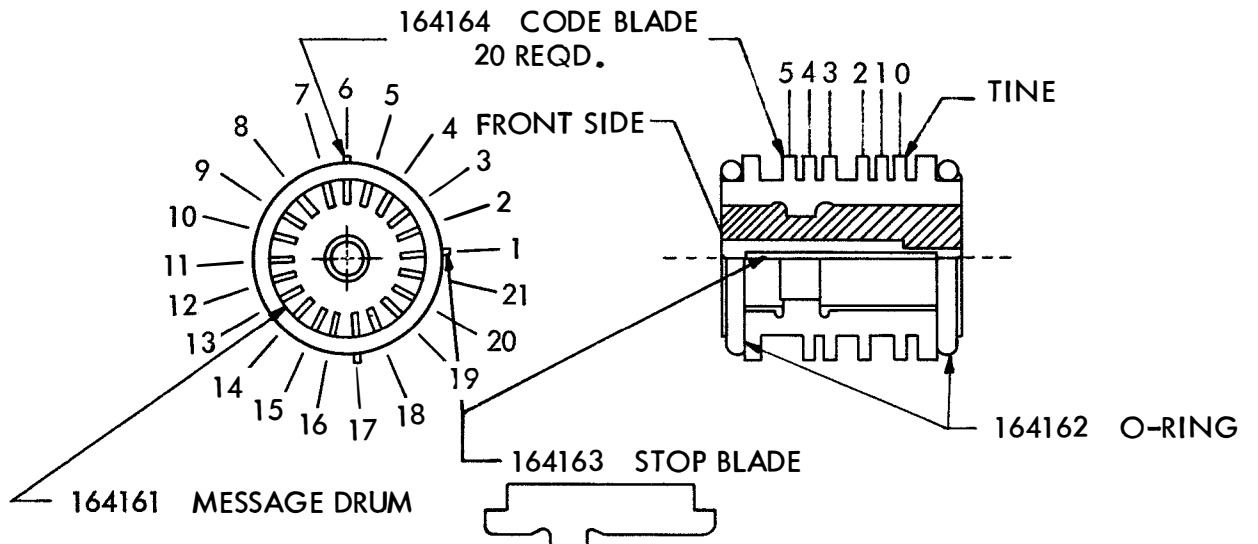


FIGURE 16.



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LETTERS	TYPICAL FIG. ARRGT.	CODE				
		1	2	3	4	5
A	—					
B	?					
C	:					
D	\$					
E	3					
F	!					
G	&					
H	#					
I	8					
J	'					
K	(					
L	)					
M	.					
N	,					
O	9					
P	0					
Q	!					
R	4					
S	BELL					
T	5					
U	7					
V	;					
W	2					
X	/					
Y	6					
Z	"					
CARRIAGE RETURN						
LINE FEED						
LETTERS SHIFT						
FIGURES SHIFT						
SPACE						
BLANK						

— LEAVE TINE  
 — REMOVE TINE

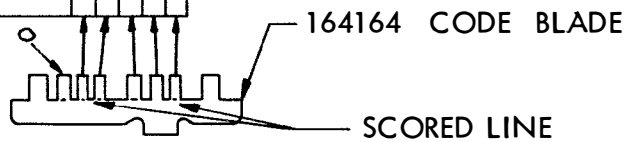


FIGURE 17.

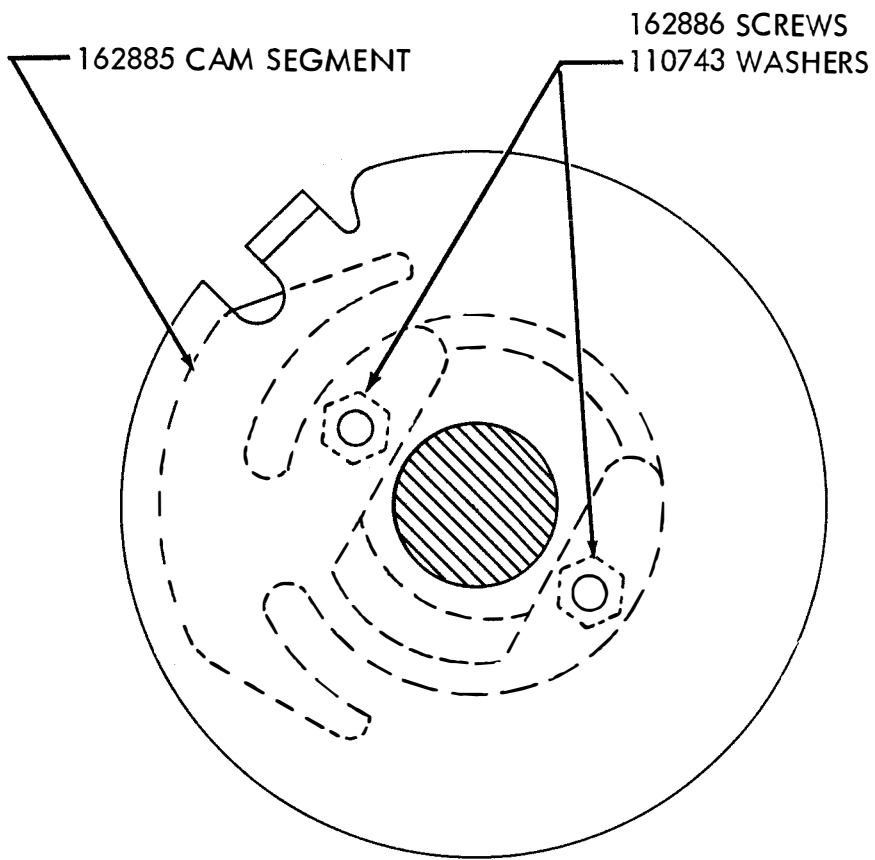


FIGURE 18

FIGURE 19

