BULLETIN 270B, VOL. 1

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TELETYPE model 28 THE LEADERSHIP LINE

TECHNICAL MANUAL

MODEL 28

PAGE PRINTER SETS

AND

AUTOMATIC SEND-RECEIVE SET

SECTIONS

TELETYPE® CORPORATION

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LIST OF EFFECTIVE PAGES

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CROSS REFERENCE

TELETYPE CODES TO AN NOMENCLATURE

AN NOMENCLATURE		TELETYPE* CODES	TELETYPEWRITER TT-306/UG	TELETYPEWRITER TT-306A/UG	TELETYPEWRITER TT-307/UG	TELETYPEWRITER TT-307A/UG	TELETYPEWRITER SET AN/FGC-97	TELETYPEWRITER SET AN/UGC-13	TELETYPEWRITER SET AN/UGC-13AX	TELETYPEWRITER SET AN/UGC-32	TELETYPEWRITER SET AN/FGC-96
Cabinet, Electrical Equipment	CY-4701/FG	LBAC255BR									1
Cabinet, Electrical Equipment	CY-3062/UG	LAAC229BR						1	1	1	
Cabinet, Electrical Equipment	CY-4703/FG	LAC214BR255					1				
Cover, Teletypewriter	CW-568/UG	LPC206BR	1	1	1	1					
Base Unit, Teletypewriter	MT-2419/UG	LB10/000	1	1							
Base Unit, Teletypewriter	MT-2422/UG	LRB32						1	1	1	
Base Unit, Teletypewriter	MT-2452/UG	LCXB13						1	1	1	
Keyboard-Transmitter, Teletypewriter	MX-3310/UG	LK25BRW			1	1					
Keyboard-Transmitter, Teletypewriter	MX-6936/FG	LK52BRW									1
	MX-6937/FG	LK53BRW					1				
Keyboard-Transmitter, Teletypewriter	MX-3312/UG	LAK21BRW						1	1		
Keyboard-Transmitter, Teletypewriter	MX-6934/UG	LAK47BRW								1	
Motor, Alternating Current	PD-17A/U	LMU3	1	1	1	1	1	1		1	1
Motor, Alternating Current	PD-67/U	LMU12						1		1	
Motor, Alternating Current	PD-96/UG	LMU21									2
Motor, Alternating Current	PD-77A/U	LMU39							1		

*Teletype Nomenclature. See Table 1-1. Page 1-24.

Above figures are the quantities per set.

(Continued on the following page)

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AN NOMENCLATURE		TELETYPE* CODES	TELETYPEWRITER TT-306/UG	TELETYPEWRITER TT-306A/UG	TELETYPEWRITER TT-307/UG	TELETYPEWRITER TT-307A/UG	TELETYPEWRITER SET AN/FGC-97	TELETYPEWRITER SET AN/UGC-13	TELETYPEWRITER SET AN/UGC-13AX	TELETYPEWRITER SET AN/UGC-32	TELETYPEWRITER SET AN/FGC-96
Motor, Alternating Current	PD-18A/U	LMU41							1		
Panel, Power Distribution	SB-1226/UG	173395BR	1	1	1	1					
Panel, Power Distribution	-	304206					1				
Panel, Power Distribution	SB-1227/UG	173824						1	1		
Panel, Power Distribution	-	304203								1	
Reeling Machine, Paper, Motor Driven	RL-235/UG	LPW300BR		1		1					
Reeling Machine, Paper, Motor Driven	RL-215/UG	PW201BR	1		1						
Reperforator, Teletypewriter	TT-315/UG	LPR35BWA						1	1		
Reperforator, Teletypewriter	TT-494/GG	LPR35BRP								1	
Reperforator, Teletypewriter	TT-316/UG	LPR36BWA						1	1		
Reperforator, Teletypewriter	TT-492/UG	LPR57BRP								1	
Typing Unit, Teletypewriter	MX-3311/UG	LP77YD/AGM	1	1	1	1		1	1		
Typing Unit, Teletypewriter	MX-6933/UG	LP77YD/AJV					1			1	
Typing Unit, Teletypewriter	MX-6935/FG	LP124YD/AJU									3
Distributor-Transmitter, Teletypewriter	TT-311/UG	LXD11						1	1		
	TT-496/GG	LXD31								1	
Cable	-	173780	1	1	1	1					
Cable	-	173851	1	1	1	1					
Cable	-	173852			1	1					
Display Rack	-	193950		1		1					

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AN NOMENCLATURE		TELETYPE* CODES	TELETYPEWRITER TT-306/UG	TELETYPEWRITER TT-306A/UG	TELETYPEWRITER TT-307/UG	TELETYPEWRITER TT-307A/UG	TELETYPEWRITER SET AN/FGC-97	TELETYPEWRITER SET AN/UGC-13	TELETYPEWRITER SET AN/UGC-13AX	TELETYPEWRITER SET AN/UGC-32	TELETYPEWRITER SET AN/FGC-96
Modification Kit for LMU3 (PD-17A/U Motor	-	173705					1				
Dolly	-	173861					1				
Sub-Base	-	154754BR					1	1	1	1	
Modification Kit for LMU12 (PD-67U) Motor	-	173706						1	1	1	
Modification Kit for LMU3 (PD-17A/U) Motor	-	173707						1	1	1	
Modification Kit for Mounting LRB32 (MT-2422 /UG to LCXB13 (MT-2452/UG)	-	176287						1	1	1	
Modification Kit for Control Panel Assembly	-	173778						1	1	1	
Transmitter-Distributor Housing	-	160887BR						1	1	1	
Immobilization Set of Parts -	-	179473						1	1		
	-										

(Continued on the following page)

NOTE: The 199915 Modification Kit is used to modify the Teletypewriter Set (AN/UGC-13) to 7.42 unit code and 45.5, 50, or 74.2 Baud speed non-polar operation. (See Page 2-22.)

(Continued from preceding page)

AN NOMENCLATURE			TELETYPE* CODES	TELETYPEWRITER TT-306/UG	TELETYPEWRITER TT-306A/UG	TELETYPEWRITER TT-307/UG	TELETYPEWRITER TT-307A/UG	TELETYPEWRITER SET AN/FGC-97	TELETYPEWRITER SET AN/UGC-13	TELETYPEWRITER SET AN/UGC-13AX	TELETYPEWRITER SET AN/UGC-32	TELETYPEWRITER SET AN/FGC-96
GEAR SET NO.		SPEED										
	UNIT CODE	WORDS PER MINUTE	BAUDS									
163502 (LPR)	7.00	107	75.0						1	1	1	
163505 (LP)	7.00	107	75.0	1	1	1	1	1	1	1	1	2
173795 (LP)	7.00	65	45.5		1		1	1	1	1	1	2
163454 (LXD)	7.00	107	75.0						1	1	1	
163451 (AUX. LPR)	7.00	107	75.0						1	1	1	
173776 (LXD)	7.00	65	45.5						1	1	1	
173992 (LPR)	7.00	65	45.5						1	1	1	
173820 (AUX. LPR)	7.00	65	45.5						1	1	1	

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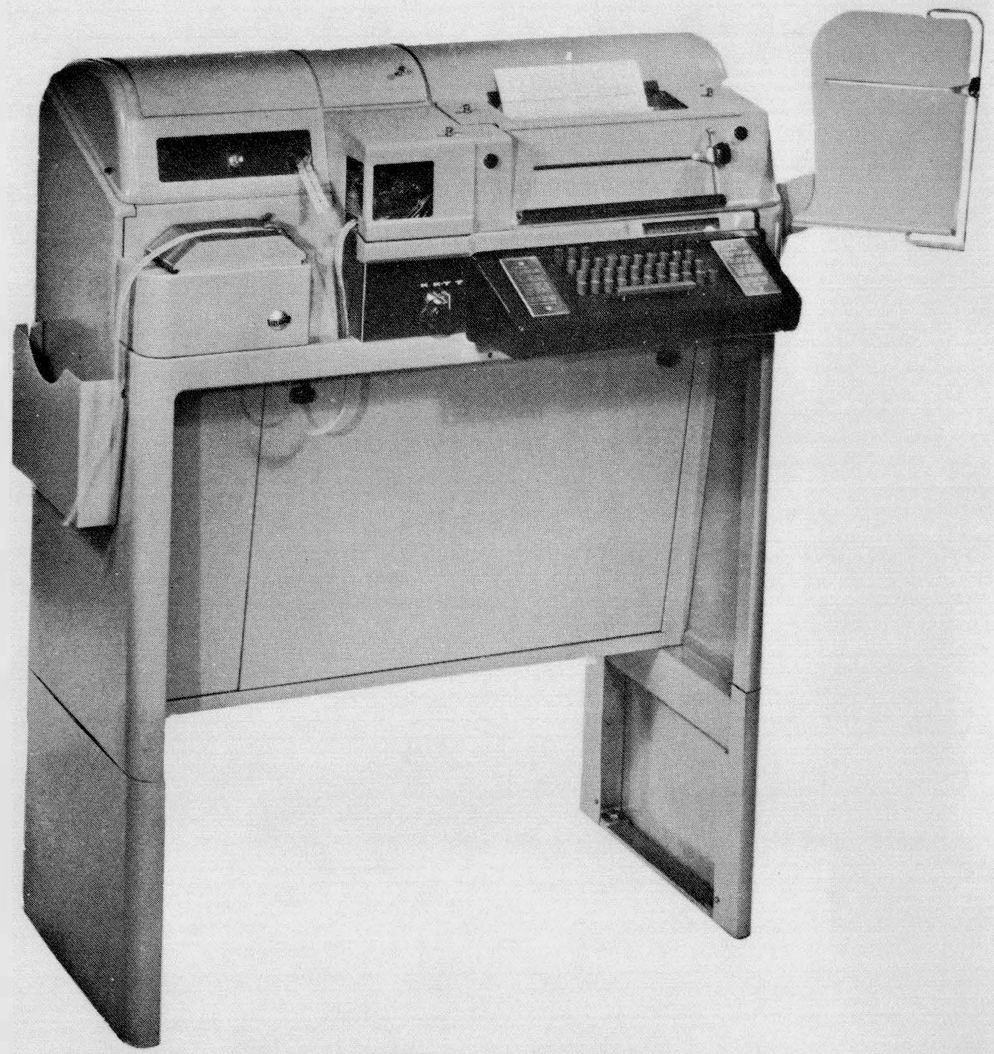
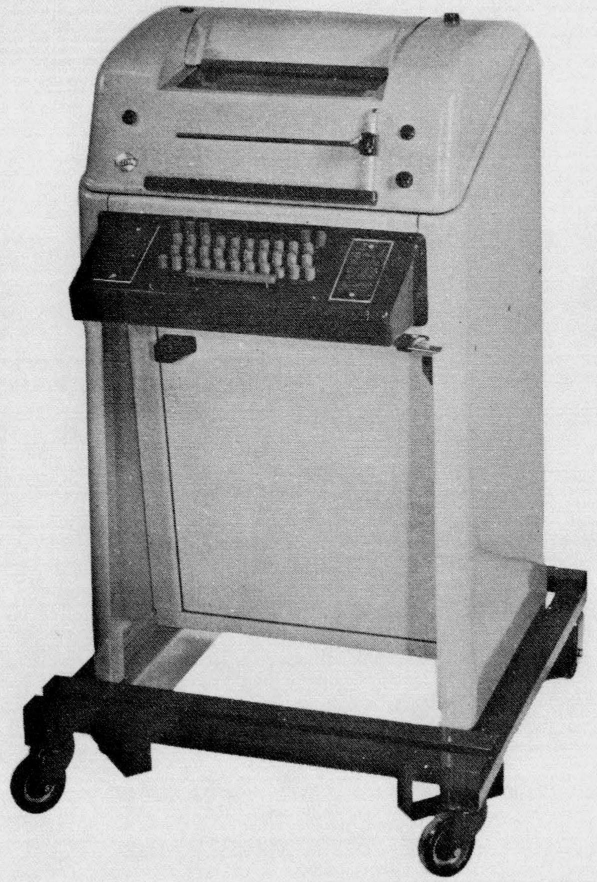


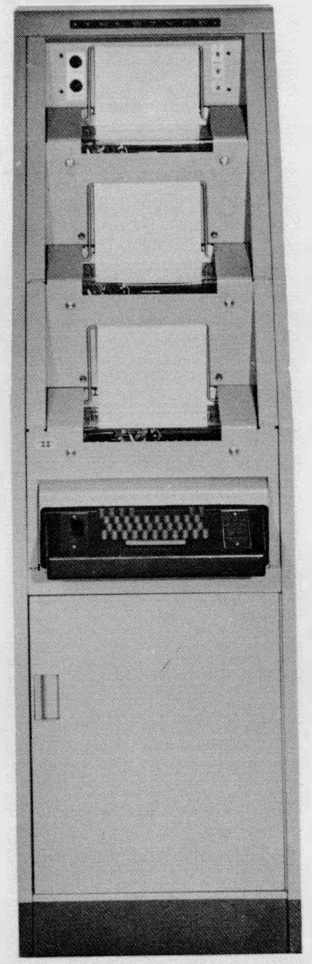
AUTOMATIC SEND-RECEIVE (ASR) SET
(On Sub-base)



KEYBOARD SEND-RECEIVE (KSR) SET
(On Dolly)

KEYBOARD SEND-RECEIVE (KSR) SET
(Rack Mounting)

RECEIVE-ONLY (RO) SET
(Rack Mounting)



MULTIPLE KEYBOARD SEND-RECEIVE (KSR)
AND RECEIVE ONLY (RO) SET

Figure 1-1. Model 28 Teletypewriter Sets

SECTION I
DESCRIPTION

1-1. INTRODUCTION

This instruction book describes the following Teletypewriter Sets: The Automatic Send-Receive Set (ASR), the Keyboard Send-Receive Set (KSR), Receive-Only Set (RO), and the Multiple Keyboard Send-Receive KSR and Receive Only (RO) Teletypewriter Set, illustrated in Figure 1-1. Volume 1 includes information concerning their installation, adjustment, operation, and maintenance. Volume 2 contains exploded views of the components of the sets along with parts ordering information. Volume 3 contains wiring diagrams and schematics of the components of which the sets are comprised.

1-2. GENERAL

a. The teletypewriters described herein are electromechanical apparatus which serve as self-contained message originating and/or receiving centers. They are used to exchange printed and tape-perforated messages between two or more stations connected by a wire telegraph channel.

b. The ASR Teletypewriter Set will receive messages electrically from the telegraph channel and print them on page-size copy paper. With page-printed monitoring, it will electrically transmit on the channel messages which are originated either by perforated tape or keyboard operation. It will mechanically prepare perforated and printed tape for separate transmission with or without simultaneous electrical transmission and page-printed monitoring. In addition to these functions it will receive messages electrically from the channel and record them on tape in both perforated and printed form.

c. The KSR Teletypewriter Set will receive messages electrically from the telegraph channel and print them on page-size copy paper. It will electrically transmit on the channel messages which are originated by keyboard operation and monitor the message on page-size copy paper. The KSR Set may be housed in either the LAC floor model cabinet or in the LPC cabinet for rack mounting.

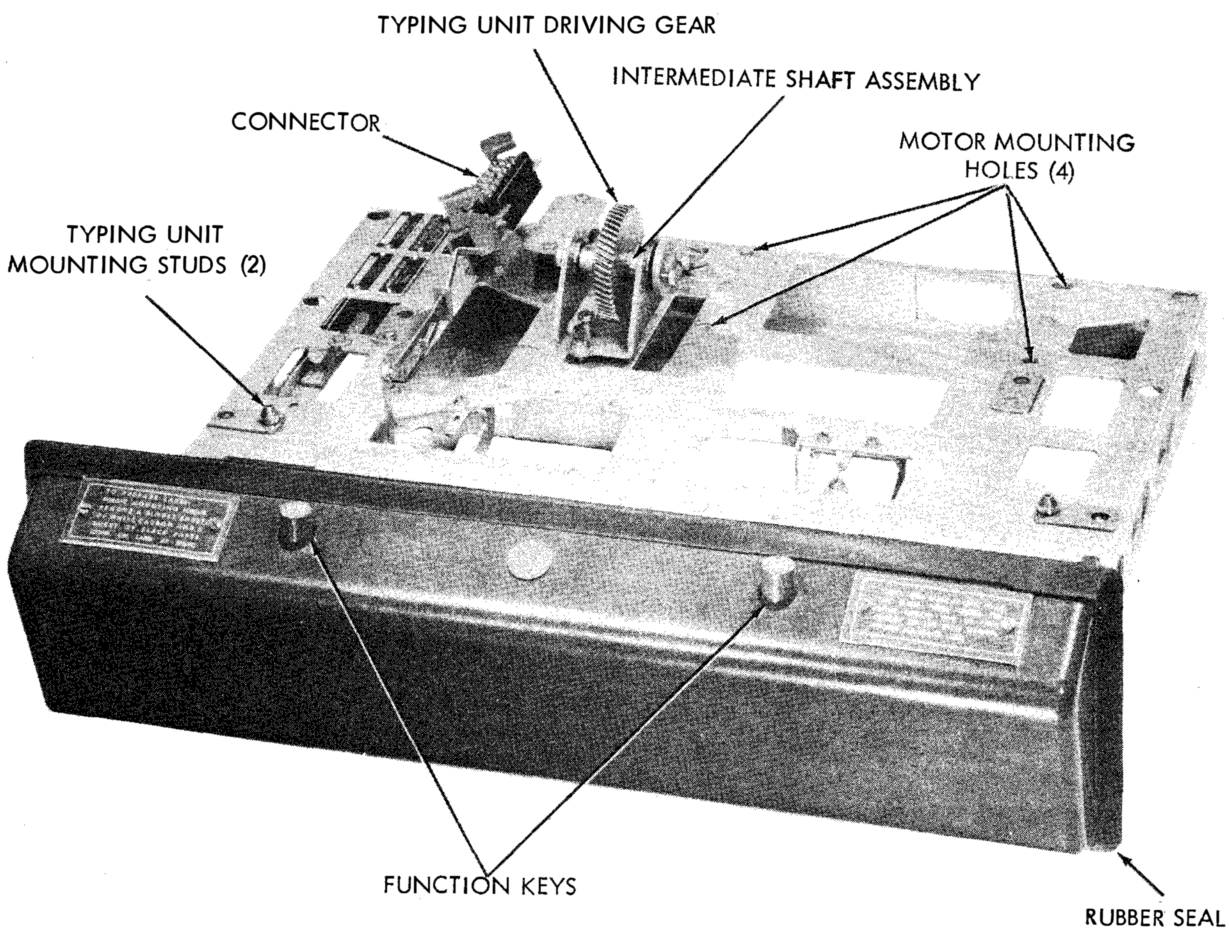


Figure 1-2. Base LB10/000

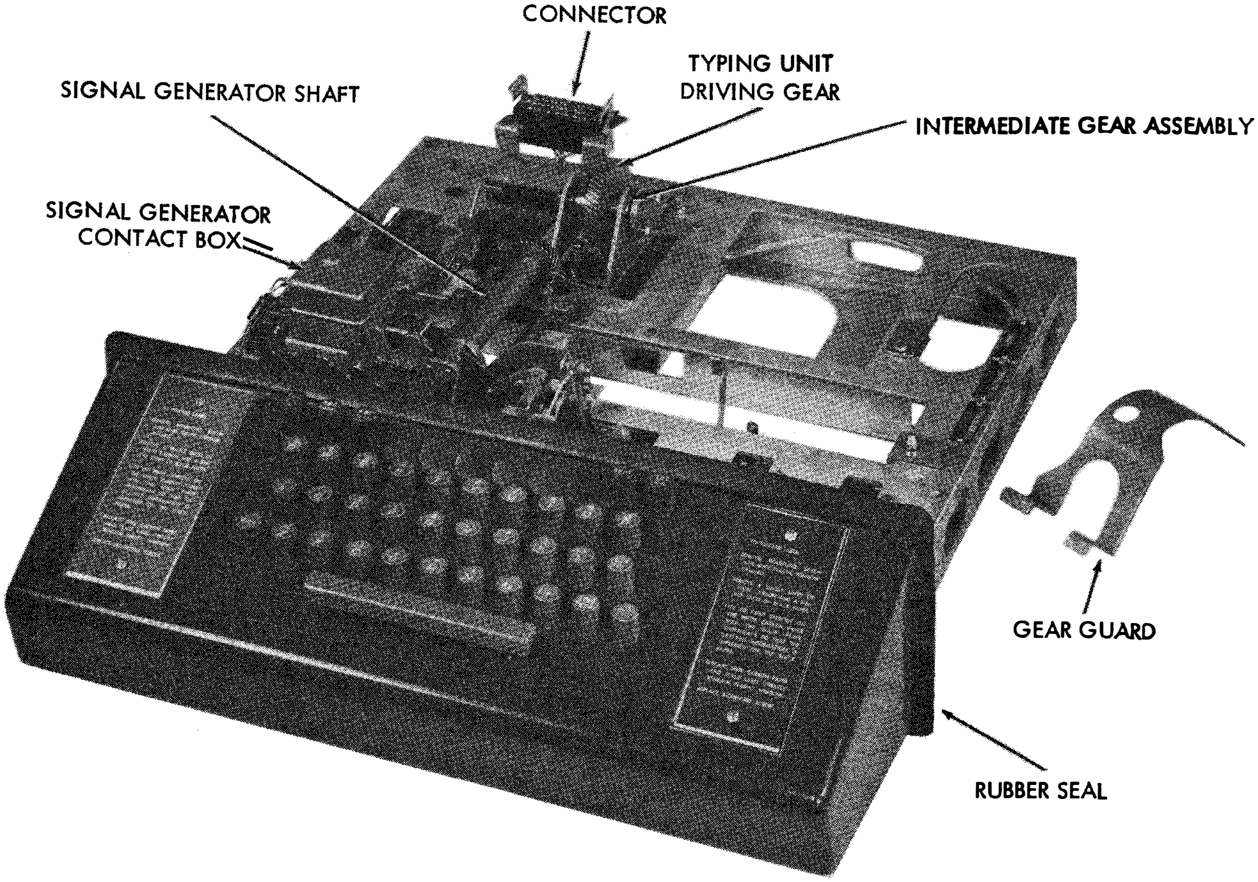


Figure 1-3. Keyboard LK25BRW

d. The RO Teletypewriter Set will receive messages electrically from the telegraph channel and print them on page-size copy paper. The RO Set is housed in the LPC cabinet for rack mounting.

(1) The Multiple KSR and RO Set can be used for recorded communication either cross office or cross country. With the proper modifications, they will function in dial or other switched-line networks. Utilizing the capabilities of a built-in switching device, the stunt box, the sets will operate in selective calling systems and provide local or remote control of external equipment or operations.

e. The typing units used in these Sets are arranged to handle rolled single copy or multi-copy paper, eight and one-half inches wide. A paper winder (PW) is used, where needed, to automatically wind the printed copy on a cylinder as it emerges from the cabinet.

f. Tape used for either perforating and printing messages for transmission or for recording incoming messages is 11/16 inch wide and is supplied in 8 inch rolls on a two inch spool.

g. Transmission between stations is accomplished electrically by use of the five-unit start-stop signaling code, which utilizes a 7.00 unit transmission pattern. The equipment is wired for 0.035 ampere polar operation.

h. The equipment may be geared to operate at 75 baud (approximately 106 words per minute) or 45.5 baud (approximately 65 words per minute) as determined by the requirements of the set.

i. The basic Teletypewriter Sets are made up of the following components:

(1) The RO Set consists of a cabinet (LPC) for rack mounting, an electrical service assembly (ESA) and a base (LB) on which is

mounted the typing unit (LP) and a motor unit (LMU).

(2) The KSR Set may be contained in a cabinet for rack mounting (LPC) or in a floor-type console cabinet, (LAC). Its basic components are: electrical service assembly (ESA) and keyboard base (LK) on which is mounted the typing unit (LP) and motor unit (LMU). A sub-base may be added to the console which will increase the height of the cabinet for more convenient "stand-up operation." A dolly is supplied in which the KSR console can be placed for mobility where needed.

(3) The ASR Set consists of a cabinet (LAAC), an electric service assembly (ESA), a keyboard (LAK) and transmitter distributor base (LCXB) on which in turn are mounted a motor (LMU), a typing unit (LP), a typing reperforator (LPR) and a transmitter distributor (LXD). An auxiliary typing reperforator (LPR) is mounted on a auxiliary typing reperforator base (LRB) along with the auxiliary motor and is located in the left side of the compartment in the console. The ASR console, like the KSR console, may be modified by addition of a sub-base to increase the height of the cabinet.

(4) The Multiple KSR and RO Set consists of a cabinet (LBAC), three typing units (LP), a keyboard (LK), and three motor units (LMU). A paper winding arrangement is also provided for each typing unit. The two RO Sets are mounted one above the other and above the keyboard and are offset rearward to provide for copy display. The electrical service assembly is mounted in the lower compartment of the cabinet. Access to the lower part of the cabinet is through a hinged door.

j. In operation, the components of the sets are linked together by electrical or mechanical means to offer a wide range of possibilities for sending, receiving and storing teletypewriter messages. The equipment is housed in its par-

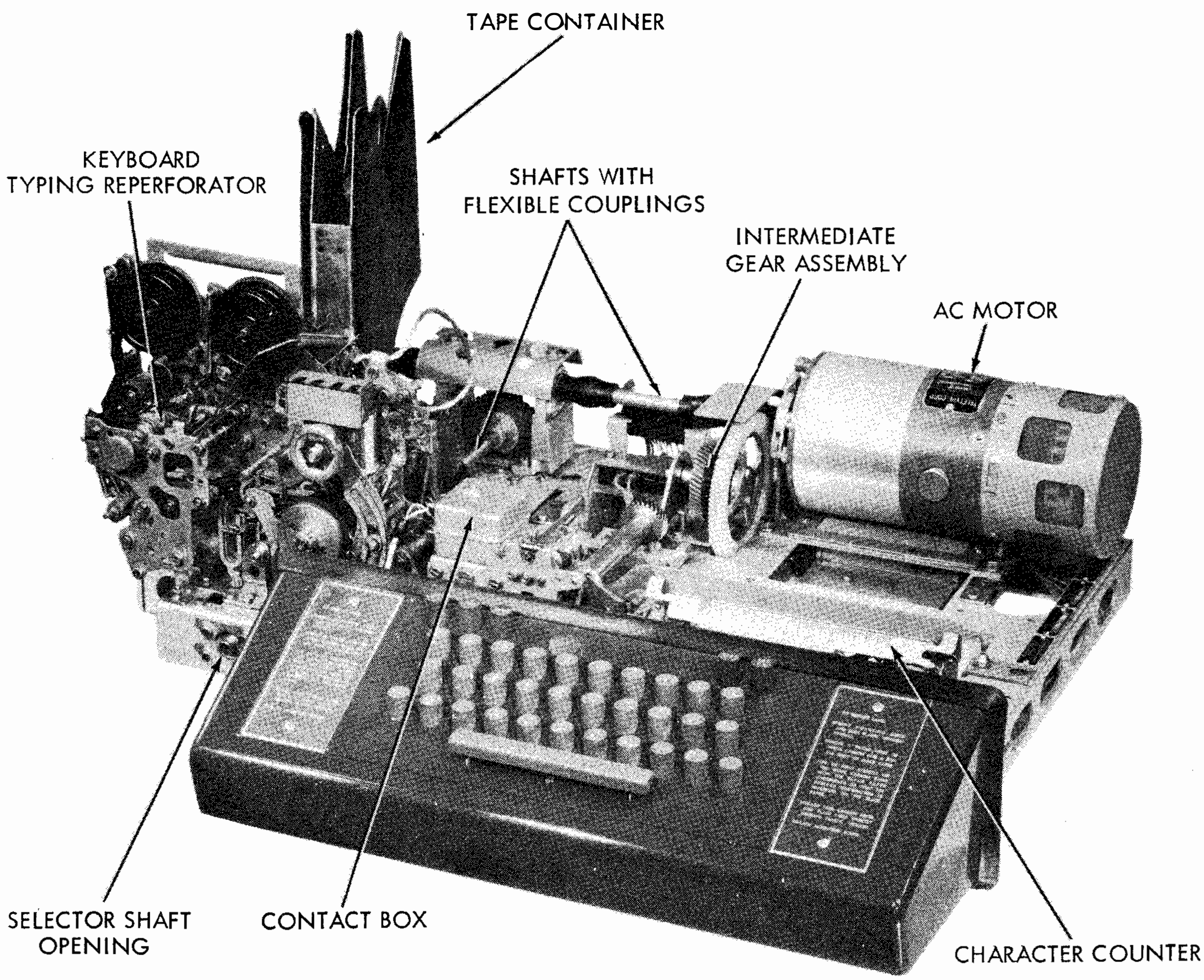


Figure 1-4. Keyboard and Typing Reperforator LAK21BRW/LPR36BWA

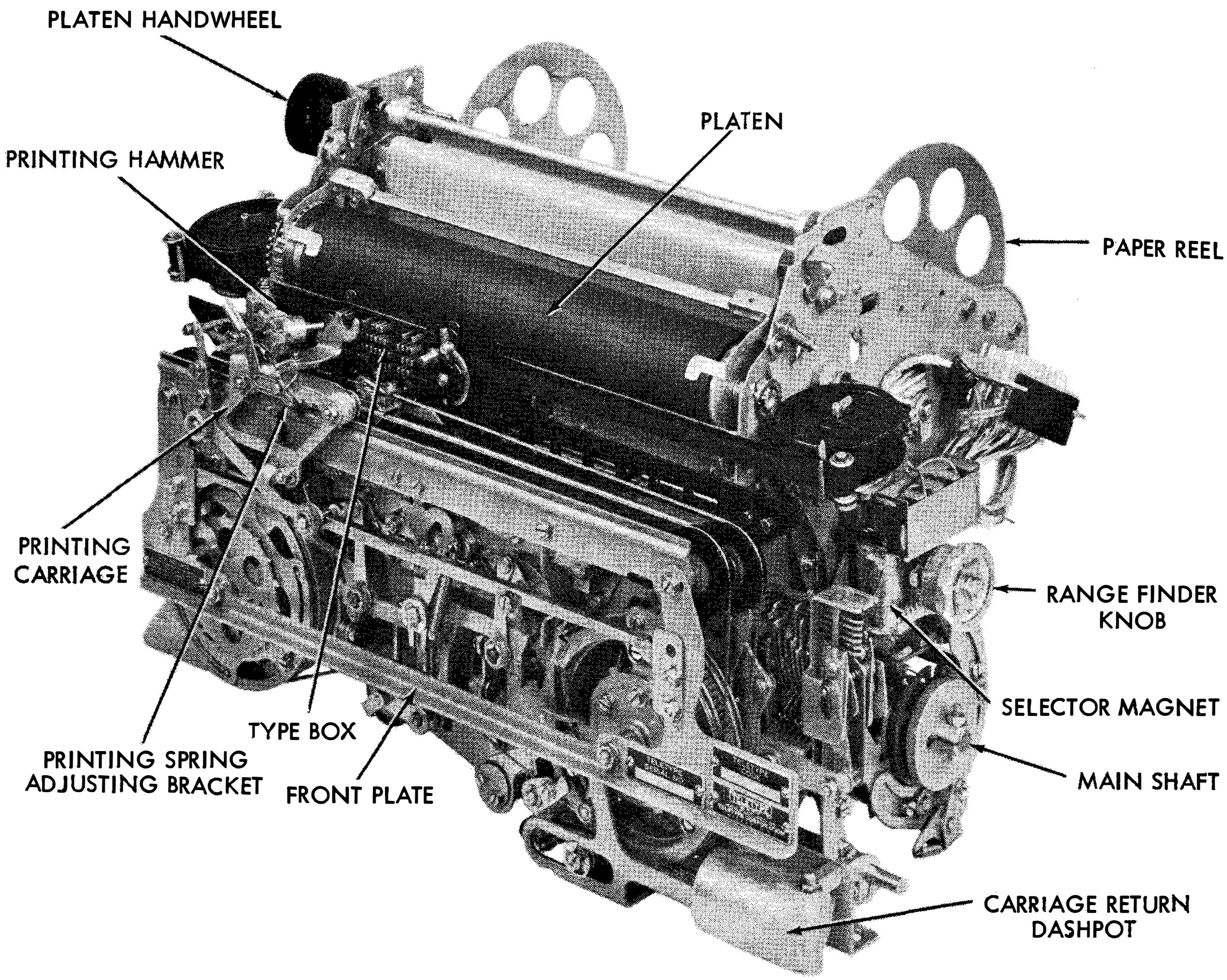


Figure 1-5. Typing Unit LP77YD/AGM

ticular cabinet and electrical connections between components are routed to the terminal block on the rear wall of the cabinet compartment. Incoming signals can be received on the typing unit of all sets. In addition, the signals may be received by the auxiliary typing reperforator of the ASR Set. Transmission signals are initiated through the keyboard of the KSR Set, or the keyboard or transmitter distributor of the ASR Set. Local transmission can be monitored on the typing unit of the KSR Set, and the typing unit and typing reperforator of the ASR Set. The typing reperforator and auxiliary typing reperforator are devices for preparing tapes on which locally initiated or incoming Teletype messages can be recorded for future transmission through the transmitter distributor.

k. Motive force for the components is derived from the LMU motor unit. In the RO Set the motor operates only a typing unit; a switch is located at the front of the electrical service assembly cabinet to energize the motor. In the KSR Set, the motor operates the keyboard mechanism as well as the typing unit. This motor is energized by a switch operated from the front of the console cabinet or the front of the ESA cabinet, if rack-mounted. In the ASR Set, the motor mounted on the keyboard operates the keyboard, typing reperforator, typing unit and transmitter distributor. Selection of these components for either individual or simultaneous operation is by means of a selector switch, the knob of which is located at the front of the cabinet, to the left of the keyboard. A signal line connects these components in series but the selector switch is wired to shunt various components from the line. A knob located to the right side of the front of the cabinet operates the switch that energizes the motor. The auxiliary typing reperforator is operated by a separate motor that is energized by a switch located on the auxiliary typing reperforator base. Two types of motors are used in the Multiple KSR and RO Set. These motors are basically the same, however, use different mounting arrangements. The motor used on the keyboard is designated LMU3 and the motors used on the two receive-only bases are designated LMU21. Each of the three paper winder assemblies is equipped with a motor (198062).

1-3. DESCRIPTION OF MAJOR COMPONENTS

a. BASE LB10/000, KEYBOARD LK25BRW, LK52BRW, LK53BRW, LAK21BRW, LAK33BRW AND LAK47BRW

(1) GENERAL - The keyboard or base supports the ac motor, the typing unit and also, in the case of the ASR, the typing reperforator. The keyboard or base is mounted in the cabinet on the rails of a shock mounted cradle. The front of the keyboard or base protrudes beyond the cabinet and is fitted with a rubber gasket that seals the edges of the aperture for silencing effect.

(2) BASE LB10/000 (Figure 1-2) - The base is used in the Receive-Only Set. It is provided with two green keys to control the local carriage return and line feed off-line functions.

(3) KEYBOARD (LK25BRW, Figure 1-3) or (LK52BRW) or (LK53BRW) - The keyboards are used in the Keyboard Send-Receive Sets and may be installed in either the rack mounted cabinet (LPC), the floor mounted cabinets (LAC) or (LBAC). It incorporates code selecting and signal generating mechanisms with synchronous pulsed transmission. Signal line and power line circuits are included. The keys are positioned in the conventional three bank arrangement with numerals, punctuation marks and special symbols available in upper case positions. Special keys (red) for keyboard lock and unlock, repeat operation, and local carriage return and line feed are located directly above the standard keys (green) for convenience of operation. A space bar is located below the keys.

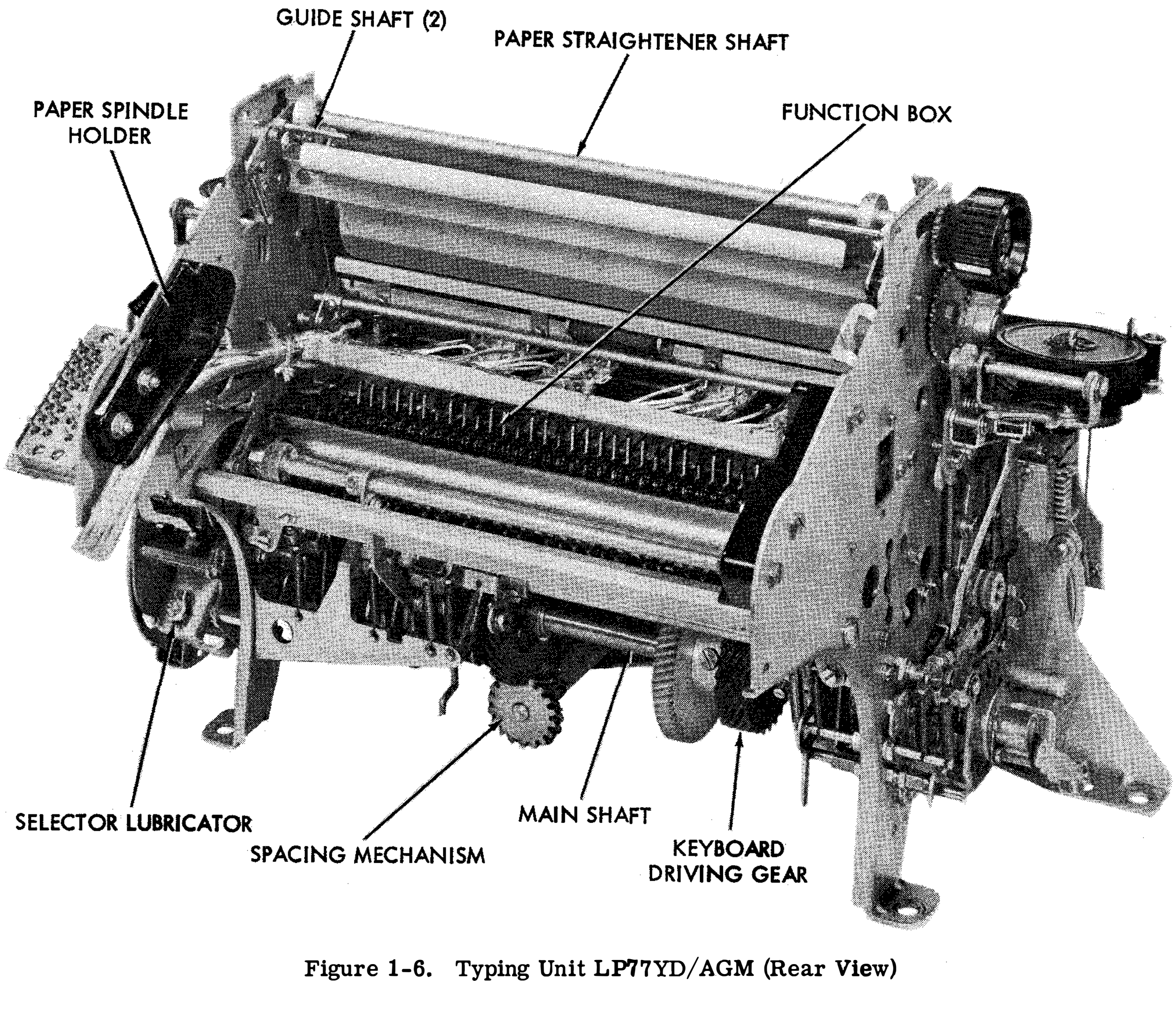


Figure 1-6. Typing Unit LP77YD/AGM (Rear View)

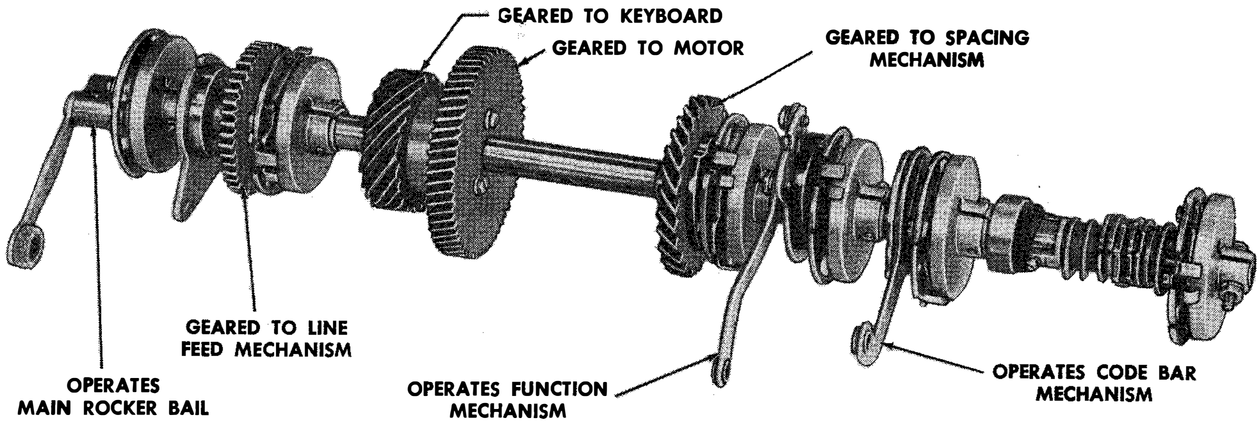


Figure 1-7. Typing Unit Main Shaft

(4) KEYBOARD LK25BRW (Figure 1-3) - This keyboard is used in the Keyboard Send-Receive Sets and may be installed in either the rack mounted cabinet (LPC) or in the floor model cabinet (LAC). It incorporates code selecting and signal generating mechanisms with synchronous pulsed transmission. Signal line and power line circuits are included. The keys are positioned in the conventional three bank arrangement with numerals, punctuation marks and special symbols available in upper case positions. Special keys (red) for keyboard lock and unlock, repeat operation, and local carriage return and line feed are located directly above the standard keys (green) for convenience of operation. A space bar is located below the keys.

(5) KEYBOARD LK52BRW (Figure 1-23A)- This keyboard is used in the Multiple KSR and RO Set. It is similar to the keyboard described in Paragraph (3) except that it mounts in the Multiple KSR and RO Cabinet (LBAC). It is equipped with an operator controlled gear shifting mechanism which replaces the usual intermediate gear assembly. The gear shifting mechanism provides operating speeds of 45.45, 50.00, and 75.00 bauds which are 65, 71, and 107 words per minute.

(6) KEYBOARD LAK21BRW (Figure 1-4), LAK33BRW and LAK47BRW - The keyboard for the Automatic Send-Receive Set, except for the special (red) keys, has the same features discussed in Paragraph (3) above. The special

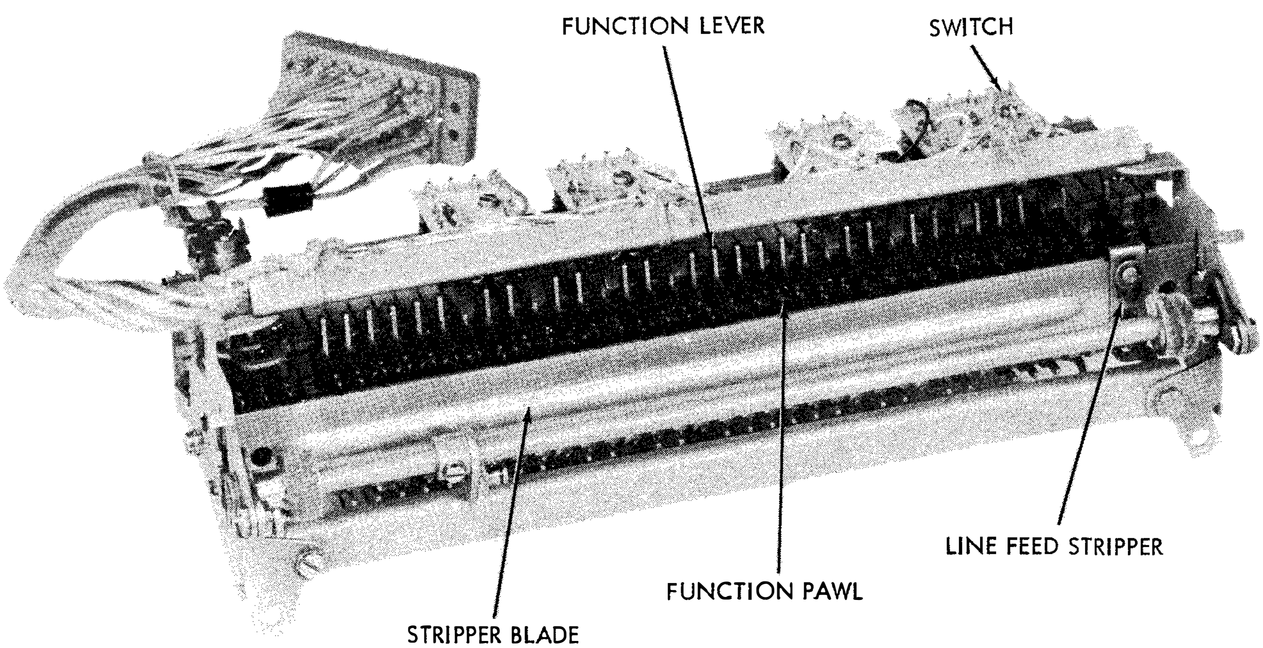


Figure 1-8. Typing Unit Function Box (Rear View)

keys are for local line feed and carriage return, receive, send and repeat operations. In addition it has all the necessary elements for the mechanical printing and perforating of tape. It supports a tape container, a character counter used in connection with the typing reperforator, flexible connections by way of which rotary motion is imparted to the typing reperforator and transmitter distributor, and a three-position selector switch for determining the mode of operation. The LAK33BRW and LAK47BRW are equipped with backspace mechanism. The LAK47BRW signal generator is wired for negative ground.

b. TYPING UNIT LP77YD/AGM (Figures 1-5 and 1-6) LP77YD/AJV and LP124YD/AJU

(1) The typing unit is a component of each of the sets and incorporates the necessary electrical and mechanical elements to translate the signalling code combinations into mechanical actions which print the messages and perform functions incidental thereto.

(2) Code signals are applied to a two - coil magnet associated with a selecting mechanism which interprets the signals and controls the motion involved in typing a character or per - forming a required function. Means are pro - vided for orienting the selector to the received signal. The ac motor is geared to the main shaft of the typing unit (figure 1 - 7), which in turn, extends motion to the keyboard mecha - nism. The typing and various functional sec - tions of the typing unit are activated by individual clutches that completely disengage at the termination of each operating cycle and thus reduce the motor load to the minimum during idling.

(3) Paper (single or multi - copy) feeds from a five - inch (maximum) diameter roll mounted on the typing unit, and passes around a platen which rotates but which does not move horizontally. Type pallets are arranged in a small type box which may be detached for cleaning or replacement by another type box. In operation, the type box moves across the paper and presents the proper type pallets to the printing hammer, which drives the pallets and inked ribbon against the paper to print the characters.

(4) In addition to these functions, built - in facilities in the function box (figure 1-8) permit the addition of selective station call or recognition functions with electrical circuits associ - ated therewith available for remote extension. In such applications, the typing unit may be stripped of all typing and paper feeding mechanisms and utilized for circuit switching or similar applications.

(5) The LP124YD/AJU has in addition to the above mentioned mechanism an Off-Line Stunt Shift Control and On-Line Stunt Shift Control.

(a) The Off-Line Stunt Shift Control provides means of shifting the suppression codebar so that a selective calling typing unit may be shifted from a non-print to a print condition by means of a local switch.

(b) The On-Line Stunt Shift Control provides facilities for suppression of printing and suppression of Line Feed, Figs Shift, and Ltrs Shift from a remote station on the signal line.

c. TYPING TAPE REPERFORATORS

(1) GENERAL - Tape perforation is accomplished by typing reperforators. Typing reperforators LPR36BWA or LPR57BRP and Auxiliary Typing Reperforators LPR35BWA or LPR35BRP are part of the Automatic Send-Receive Set. The LPR36BWA or LPR57BRP are shipped mounted on its base which is the LAK21BRW, LAK33BRW or LAK47BRW Keyboards. It can be controlled by its mechanical linkages on the keyboard or, as in the case of the auxiliary reperforator it can be controlled by the signalling code combinations received from the sending station. The product of the report is identical: A transmissable, five-level, fully perforated tape with printed characters corresponding to the perforated code. The reperforators are similar in appearance, design and operation with identical sub-assemblies for the typing and perforating mechanisms. The LPR36BRW or LPR57BRP typing reperforator is mounted on the left front corner of the keyboard, is powered, through shafts with flexible couplings by the ac motor which is mounted on the right rear corner of the keyboard. The LPR57BRP typing reperforator is equipped with a power-back-space mechanisms. The auxiliary typing reperforator is powered by a separate driving motor. This reperforator and motor are mounted on a special base (LRB32) located above the transmitter distributor base at the left of the cabinet (LAAC229BR). It has a power switch, a power line fuse, low tape switch and a non-interferring letters tape feed-out mechanism.

(2) TYPING REPERFORATOR LPR36BWA (Figures 1-9 and 1-10) LPR57BRP - Mounted upon and operated through the ASR teletypewriter keyboard, the typing reperforator records messages on paper tape, both as printed characters and combinations of fully perforated code holes. The messages are received from the keyboard in the form of mechanical arrangements which are set up

by operation of the keys and are translated by the reperforator into the necessary mechanical motions to type and perforate the information. With the keyboard selector switch in the K (keyboard) position, the typing reperforator is inoperative. In K-T (keyboard-tape) position, the selector switch connects the selector magnet on the keyboard typing reperforator into the signal line circuit of the keyboard signal generator, at the cabinet terminal board, to permit preparation of perforated and typed tape simultaneously with signal line transmission. In T (tape) position, the selector switch mechanically engages linkages between the keyboard and the keyboard typing reperforator resulting in manual typing reperforator operation independent of the signal line. A jack shaft directly under the typing reperforator main shaft, flexibly coupled to the keyboard bearing bracket mechanism, transmits power required to operate both perforating and typing mechanisms. A function cam-clutch mechanism keyed to the main shaft and geared to the jack shaft has three cams, two for operation of the rocker bail in K-T and T positions, and the third for resetting the keyboard in T position only. The characters used in printing are embossed on a typewheel which may be replaced to obtain different type faces and character arrangements. Controlled by mechanical arrangements in the keyboard, axial and rotary positioning mechanisms in conjunction with a correcting mechanism select the proper characters by moving the typewheel. A printing mechanism utilizes a hammer to drive the tape and inked ribbon against the typewheel and imprint the selected characters. The ribbon is advanced by a ribbon-feed mechanism. A perforating mechanism steps the tape, rolls in feed holes, and perforates code holes corresponding to the code per-

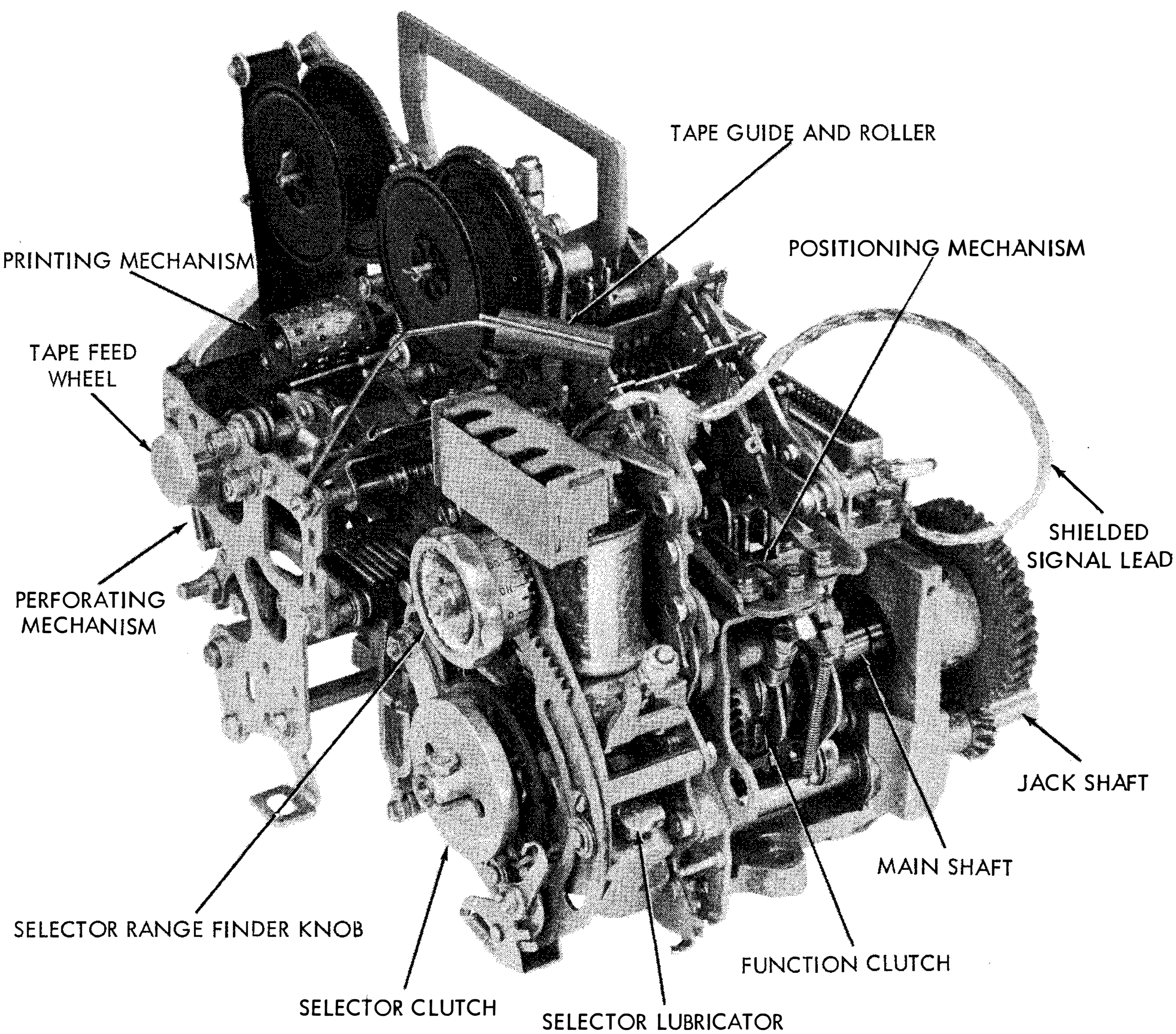


Figure 1-9. Typing Reperforator LPR36BWA (Front Right View)

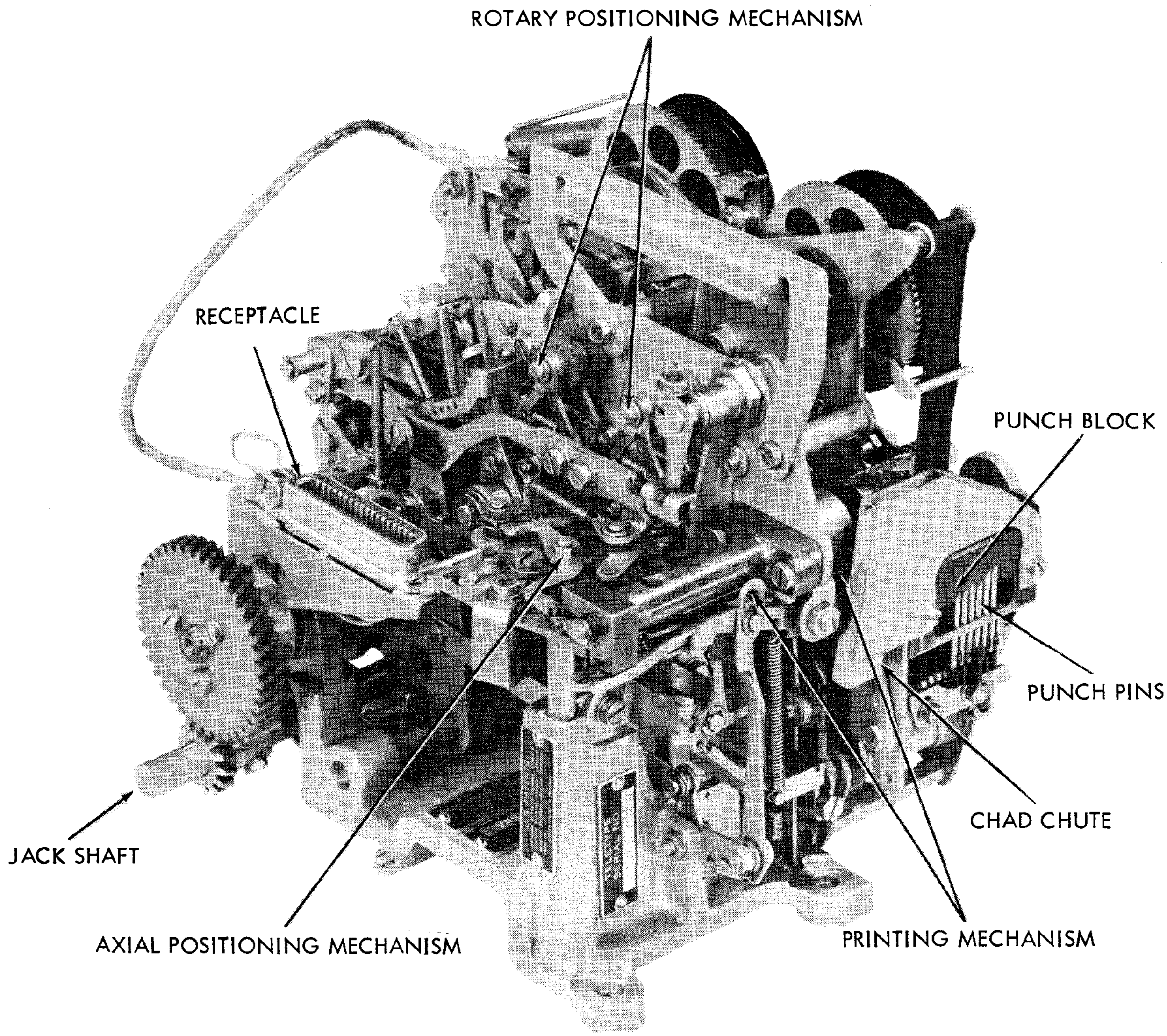


Figure 1-10. Typing Reperforator LPR36BWA (Rear Left View)

mutations established in the keyboard. Printing and perforating occur simultaneously, but the characters are printed six spaces to the right of the corresponding code combinations. The typewheel is retracted at the end of each operation so that the last printed character is visible. In addition to the above features, the typing reperforator is also equipped with a selector assembly. Messages can be received from the channel in the form of signaling code combinations which are translated into mechanical arrangements to control printing and perforation of tape when the control knob of the ASR keyboard is in the K position. This feature of the unit generates from the signal line in essentially the same manner described in the following paragraph. The LPR57BRP is equipped with a power backspace mechanism.

(3) TYPING REPERFORATOR LPR35BWA (Auxiliary) (Figures 1-11 and 1-12) LPR35BRP - The LPR35 like the LPR36 and LPR57, records messages on tape in both perforated and printed form in the ASR Set. However, it receives its messages only from the channel in the form of signaling code combinations which it translates into mechanical arrangements that control perforation and printing. This typing reperforator is mounted on a special auxiliary base (Paragraph 1-3d) and is powered by an ac motor and a separate keyer located in the electrical service assembly. The power switch is located on the auxiliary base. Energizing the power switch starts the motor, which through an intermediate speed drive mechanism and timing belt, rotates the main shaft. Two clutch mechanisms, the function cam-clutch, and the selector cam-

clutch are driven by the continuously rotating main shaft. The function cam-clutch mechanism operates both the perforator and the typing mechanisms. These are identical to corresponding features of the LPR36 or LPR57 typing reperforator. The selector cam-clutch operates a selector, which, in response to signal code combinations, set up mechanical arrangements that control the perforator and the typing mechanisms. The typing reperforator selector coils are wiredin series and operates on 0.035 ampere current when used with the electronic keyer. When used with the selector magnet driver the coils are wired in parallel for operation on 0.060 ampere current. The typing reperforators are equipped with a tape threading hand wheel. Both reperforators are provided with a chad chute which discharges the chad from the perforated tape by way of chad chute extensions into a common chad container located under the dome compartment of the LAAC229 cabinet. It is important that the container is emptied frequently to prevent chad from backing up and jamming the perforating mechanism. In addition, the LPR35 is equipped with a non-interfering letters tape feed out mechanism (figure 1-12) which provides a suitable length of "letters" tape at the end of each message by operation of the Tape Feed-Out Switch on the dome of the ASR cabinet (see figure 1-1).

d. TYPING REPERFORATOR BASE LRB32 (Figure 1-13) - This base provides mounting facilities for the auxiliary typing reperforator and its ac motor and incorporates a number of electrical and mechanical accessories. It is located above and behind the transmitter distributor and is fastened to the transmitter distributor base and to the rear rail of the cradle

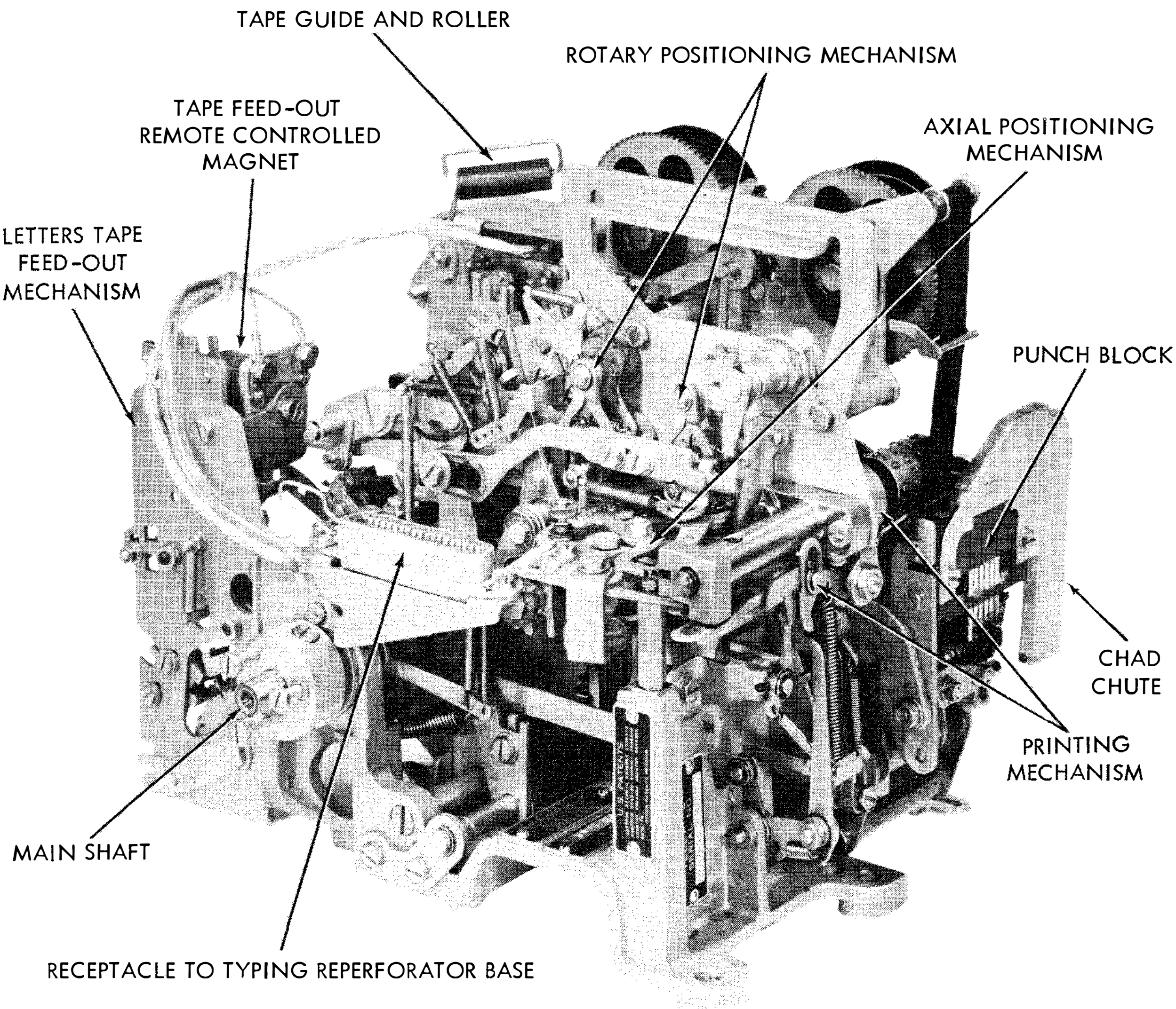


Figure 1-11. Typing Reperforator LPR35BWA (Front Left View)

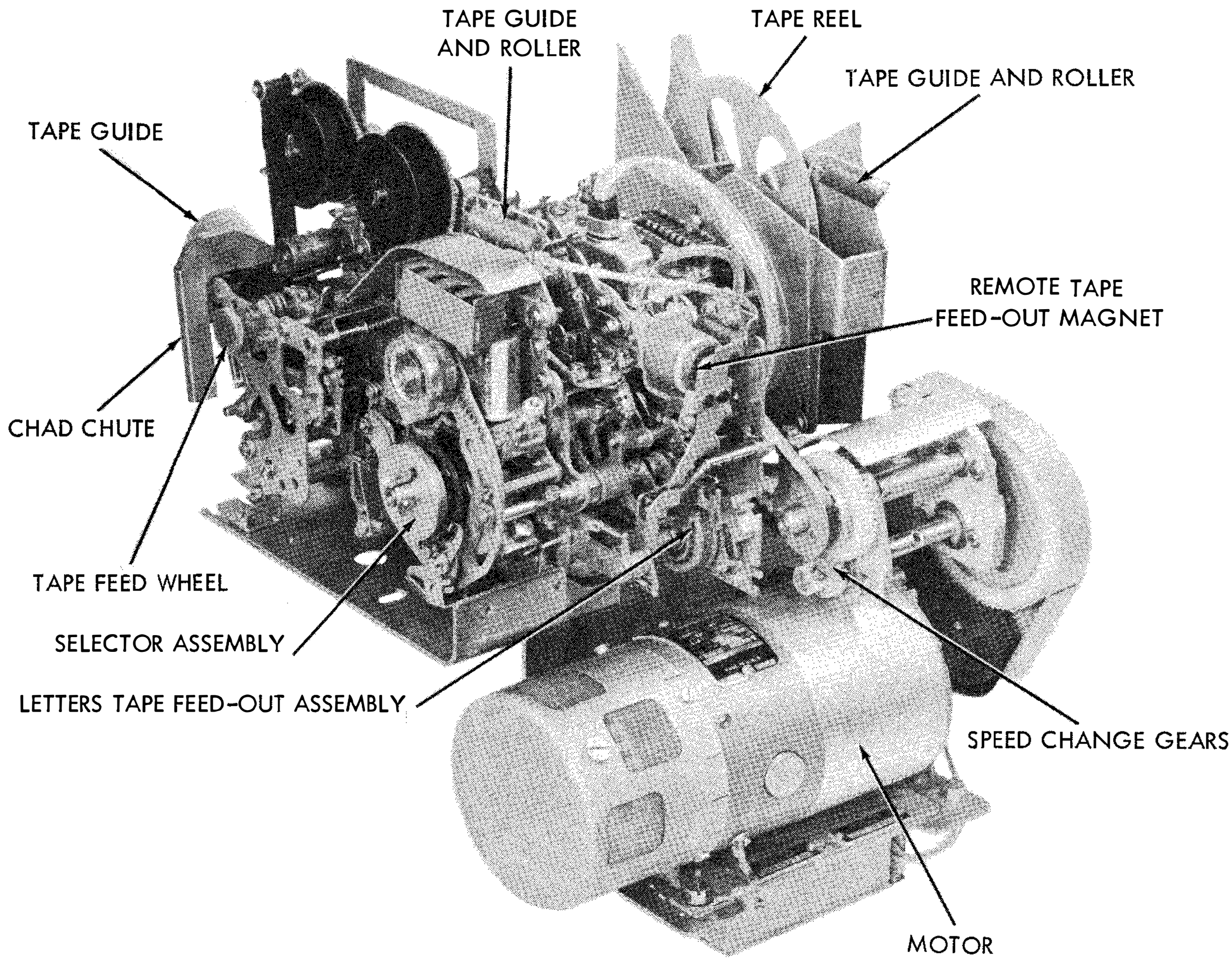


Figure 1-12. Typing Reperforator LPR35BWA on Base LRB32 with Motor LMU4 (Rear View)

at the left side in the cabinet dome compartment of the ASR Set. The base provides a power line fuse and electrical facilities for interconnection of a typing reperforator with the terminal board in the cabinet. An intermediate drive mechanism is geared for 45.5 or 75 baud operation and connects the motor to the typing reperforator through a timing belt. A tape container equipped with a low tape switch is attached to the base.

e. TRANSMITTER DISTRIBUTOR LXD11 and LXD31 (Figures 1-14 and 1-15) - The transmitter distributor, mounted on its own base in front of the ASR cabinet dome and to the left, is a mechanical tape reader designed to convert coded messages stored on standard five-level perforated tapes to signaling code combinations for transmission in a telegraph channel. A main shaft powered by flexible shaft connections from the ac motor on the keyboard through an intermediate gear and shaft on the transmitter distributor base (paragraph 1-3f) operates a cam-clutch assembly. The cam-clutch, through a main bail, drives a transfer and signal generating mechanism and a tape feed wheel. The clutch is released by a clutch trip magnet. The unit includes a start-stop switch in which are incorporated tight-tape, shut-off, and free-wheeling tape feed features. A second switch shuts off the equipment automatically when tape runs out. Electrical requirements of the transmitter distributor are supplied by way of the terminal blocks in the ASR cabinet through a connector on the transmitter distributor base. Transmission speed can be at 45.5 or 75 baud depending upon the gear ratios used.

f. TRANSMITTER DISTRIBUTOR BASE LC-XB13 (Figure 1-16) - The Transmitter Distributor Base provides mounting facilities for the transmitter distributor. It is a casting mounted on rubber silencing bushings on the left side of the cradle in the ASR cabinet. An intermediate gear assembly connected by flexible shaft couplings to the keyboard mounted ac motor is located on the rear of the base. An electrical connector and cable are assembled on the right side of the base. A ground strap is provided for connection between the LCXB Base and the cradle of the cabinet, since the base is electrically isolated from the cradle by the rubber silencing bushing. The transmitter distributor is mounted at the front of the base, projecting beyond the cabinet dome.

g. ELECTRICAL SERVICE ASSEMBLIES, 173816BR, 173395BR (Figure 1-17), 173783 (Figure 1-18), 173824 (Figure 1-19), 304203, 304206 and 304230 - The electrical service assemblies are units that incorporate the motor switch, fuse, transformer, rectifier, electronic keyer, selector magnet driver and other elements which are associated with the power and signal line circuits. These units interconnect with other components of the Teletypewriter Set by way of the terminal blocks located in the cabinet of the set.

(1) The Electrical Service Assembly ESA-173816BR and ESA173395BR, used with the rack-mounted Receive-Only (RO) or Send-Receive (KSR) Set is housed in a rectangular con-

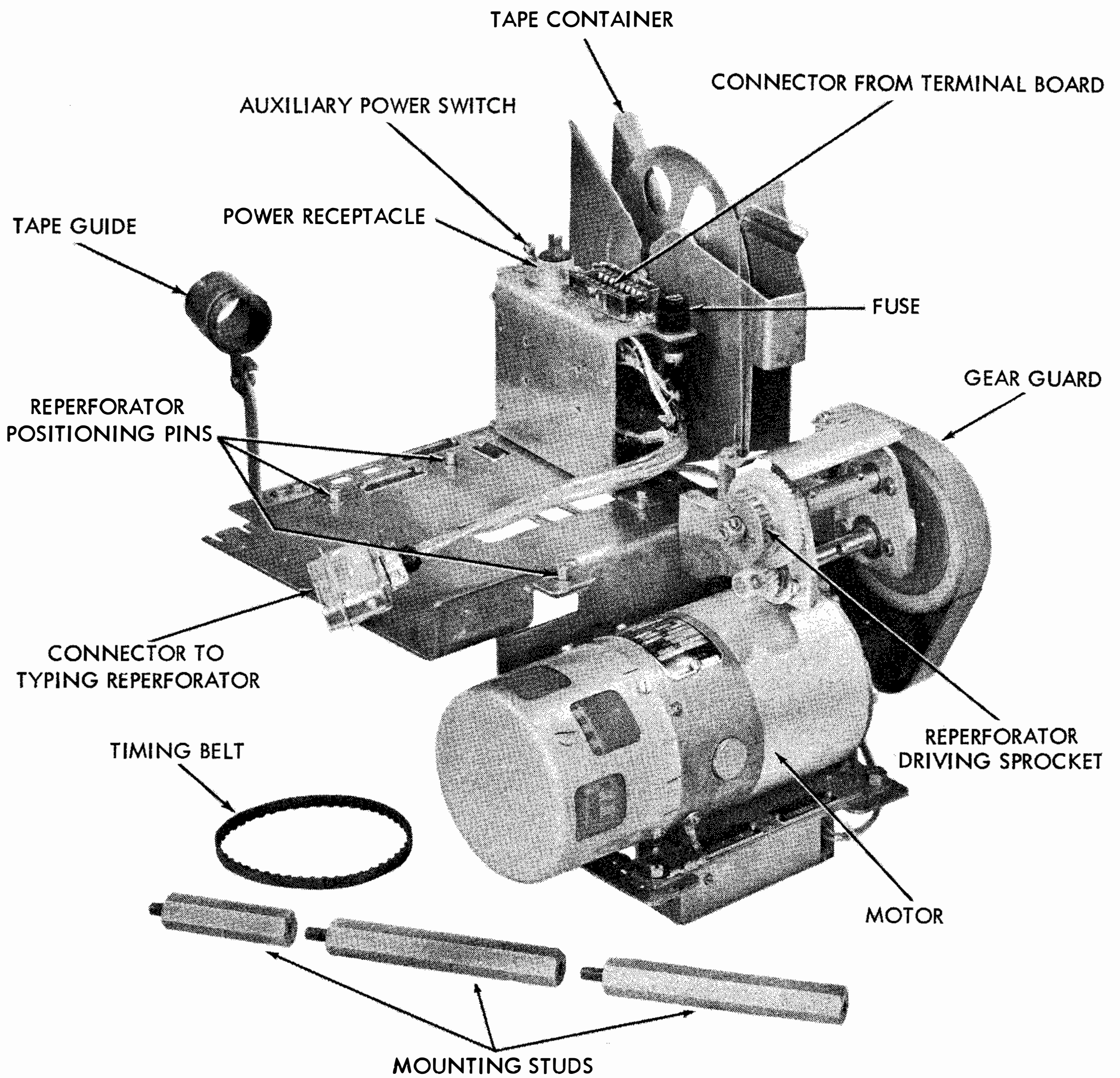


Figure 1-13. Auxiliary Typing Reperforator Base LRB32 with Motor LMU4 (Rear View)

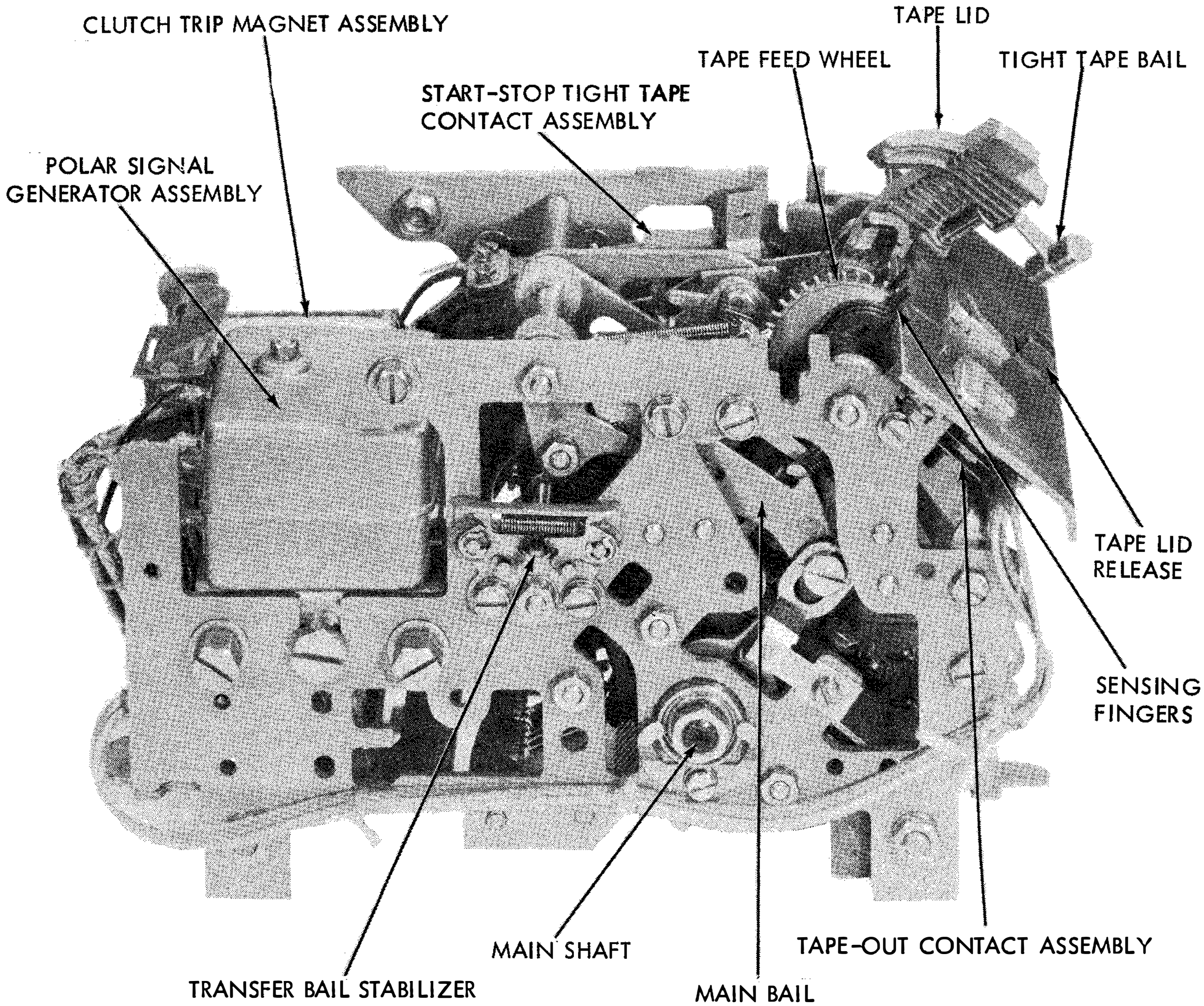


Figure 1-14. Transmitter Distributor LXD11
(Top Plate and Cover Plate Removed)

tainer for rack mounting and is painted the same color as the cabinet. It mounts a power switch, fuse holders and monitor jacks on the front and contains a transformer, rectifier and electronic keyer assembly. The keyer assembly function is to repeat polar line signals in a neutral local loop to the selector coils of the typing unit. Power factor correction capacitors, when required, are also mounted in this container.

(2) The Electrical Service Assembly 173783, 173824, 304203 and 304206, used with the console mounted Send-Receive (KSR) or Automatic Send-Receive (ASR) Set consists of a rectangular sheet metal box, with a leg at each of the four corners. It is mounted in the cabinet behind the keyboard with the open side down. The legs serve as supports when the unit is inverted for servicing. It contains the main power line switch, which is operated remotely by mechanical linkage from the front of the cabinet, fuse holders, appropriate transformer, a rectifier and one or three electronic keyers, or selector magnet drivers, depending upon the needs of the set. A cable from each end of the electrical service assembly connects to the terminal boards at the rear of the cabinet.

(3) The 304230 electrical service assembly is used with the Multiple KSR and RO Set.

h. MOTORS - The motors are self-contained components mounted on the base, keyboard or on the auxiliary typing reperforator base. The

LMU3 and 4 motors are used to supply mechanical energy for the auxiliary typing reperforator in the ASR Set or for the typing unit in the KSR or RO Sets. The LMU12 and 14 motors are heavy duty motors used to drive the typing unit, keyboard, typing reperforator and transmitter distributor in the ASR Set. Both the light duty and heavy duty motors are furnished for ac synchronous or ac governed operation. The LMU3 and LMU21 motors are used on the Multiple KSR and RO Set and are similar except for the mountings.

(1) AC Synchronous Motor LMU3 (Figure 4-95) - This motor is mounted at the rear of the base or keyboard in the RO and KSR Sets and under the auxiliary typing reperforator base in the ASR Set. It supplies rotary mechanical motion to the main shaft of the typing unit or to the main shaft of the auxiliary typing reperforator through intermediate gears.

(a) The unit is a 1/20 hp, 115 volt, 60 cycle ac, single phase, capacitor start synchronous motor which runs at 3600 rpm. The motor has a two pole wound stator and a squirrel cage type rotor which is mounted on ball bearings.

(b) The stator has a starting winding and a running winding. The starting capacitor and relay and a thermal cutout switch are mounted in a compartment under the motor.

(c) The motor is supported by a cradle to which it is held by straps at each end. Resilient mounts on the hubs of the motor end bells reduce transmission of vibration. A combination handwheel and fan is mounted on one end of the motor shaft. The motor shaft turns in a counterclockwise direction as viewed from the fan end.

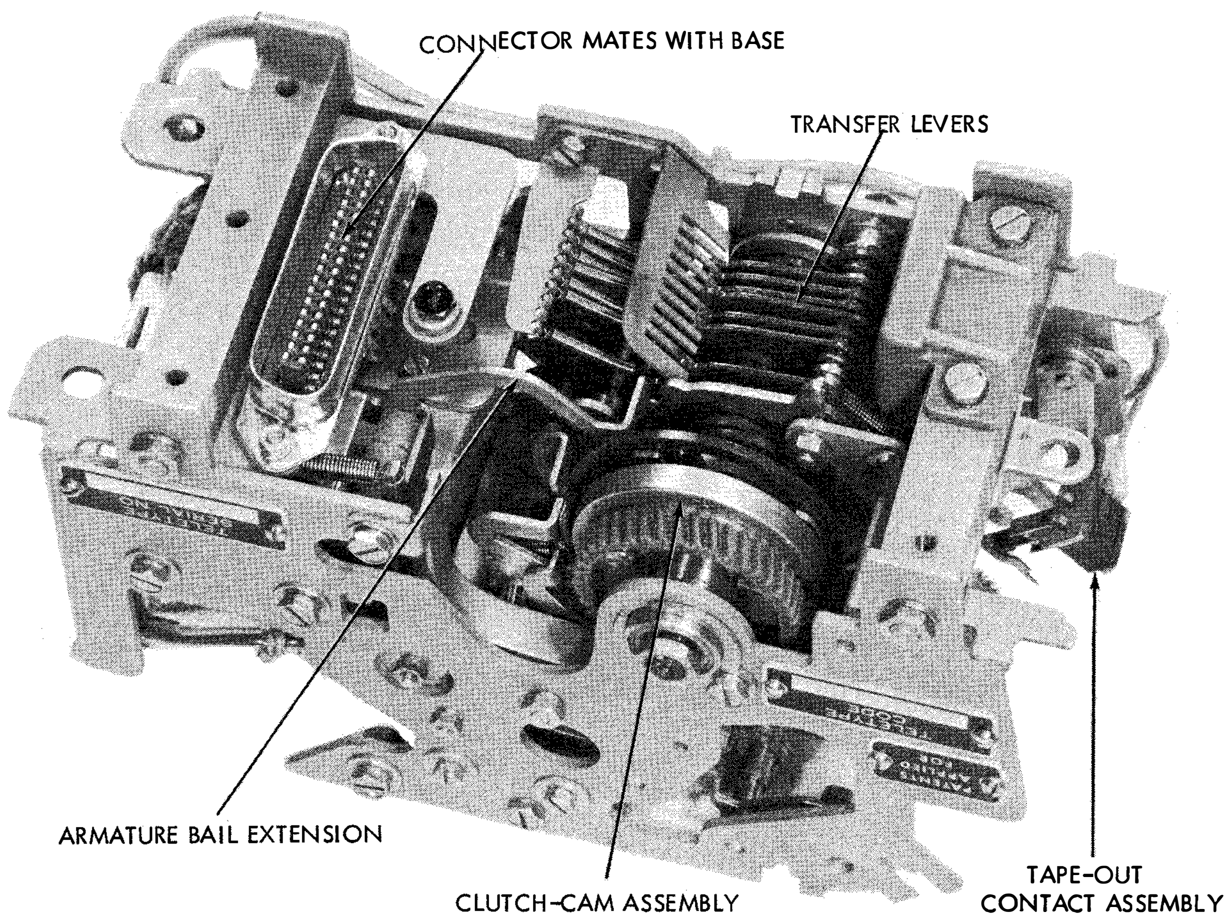


Figure 1-15. Transmitter Distributor LXD11 (Bottom View)

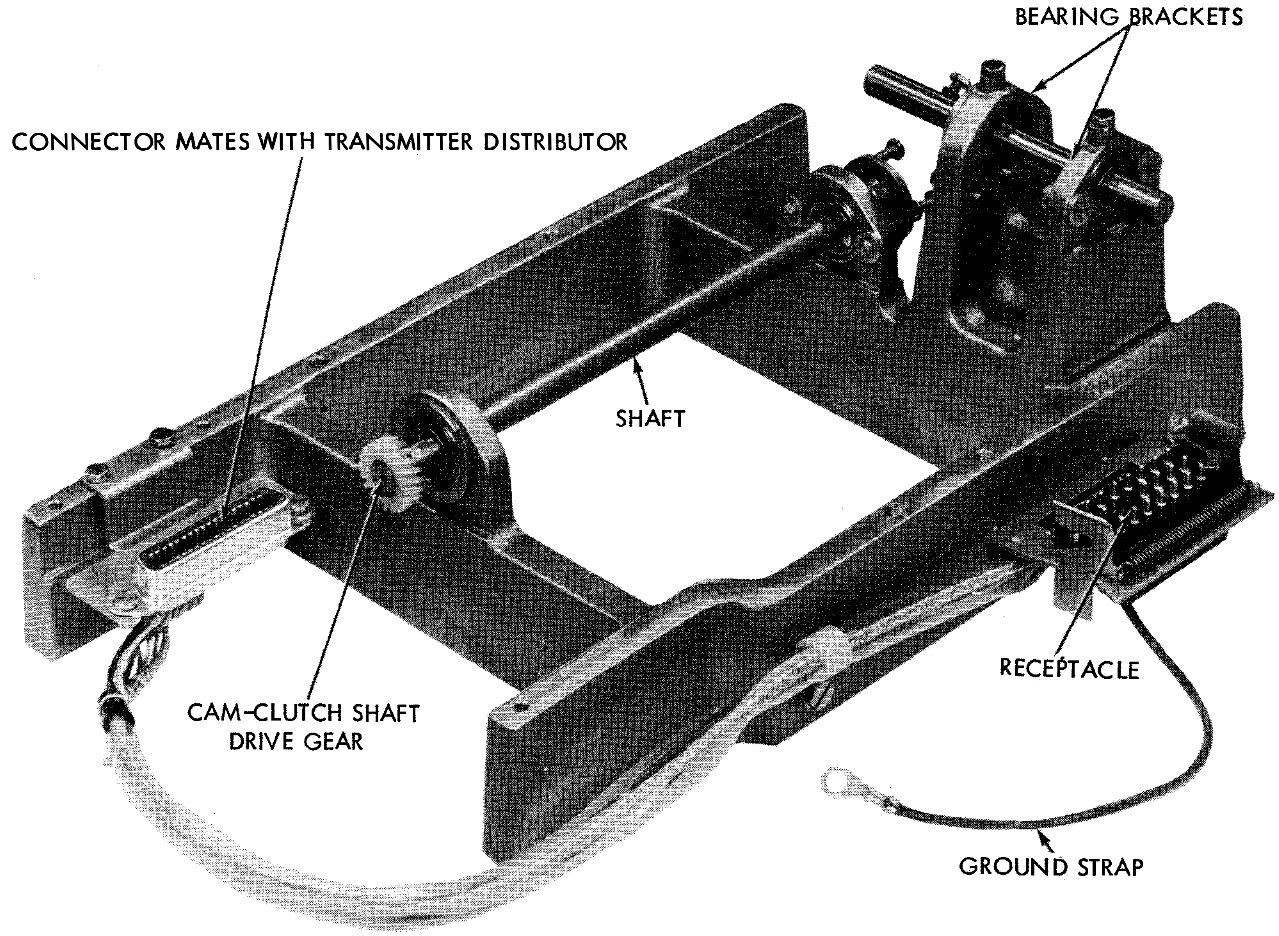


Figure 1-16. Transmitter Distributor Base LCXB13

(2) AC GOVERNED MOTOR LMU4 (Figure 4-96) - The LMU4 governed motor is similar to the synchronous motor in location, mounting and function.

(a) The unit is a 1/20 hp, 115 volt, 50-60 cycle ac governed motor which runs at a governed 3600 rpm. A combined governor and fan are mounted on a motor shaft, which is supported on ball bearings.

(b) An electro-mechanical governor is wired in series with the armature and two field windings. Targets for speed checking are marked on the governor cover.

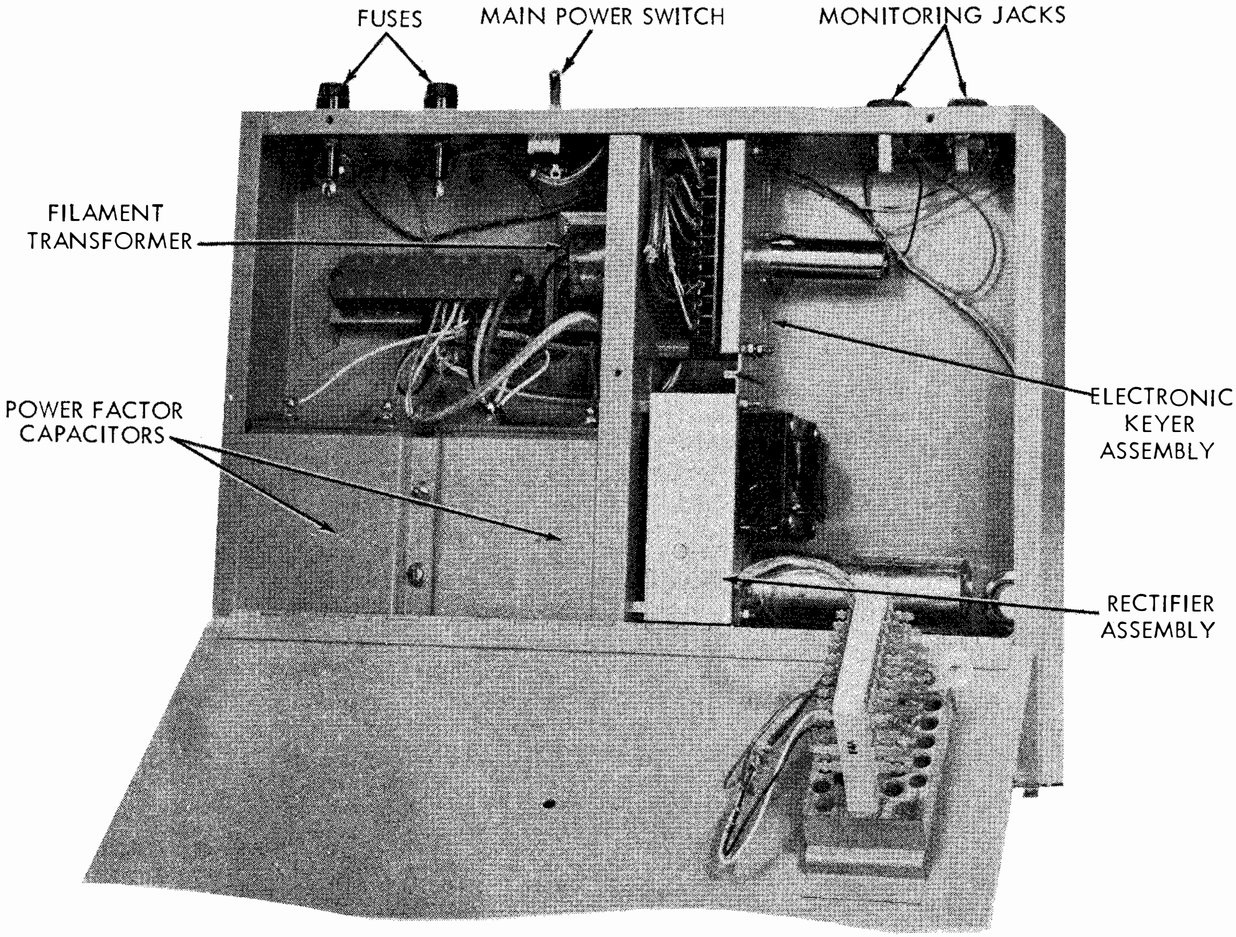
(c) The entire motor is shielded to minimize radio interference. A shielded compartment on the underside of the motor houses the governor resistor and capacitor, as well as an electrical noise suppressor across the power leads.

(3) AC SYNCHRONOUS MOTOR LMU12 (Figure 4-95) - This is a heavy duty motor used to supply rotary motion to the main shafts of the typing unit, keyboard, typing reperforator and transmitter distributor in the ASR Set. It is a 1/12 hp, 115 volt, 60 cycle ac, single phase, capacitor start synchronous motor which runs at 3600 rpm. It is identical in appearance and mounting requirements to the LMU3 motor.

(4) AC GOVERNED MOTOR LMU14 - (Figure 4-96) - This unit is a 1/15 hp, 115 volt, 50 - 60 cycle ac governed motor which runs at 3600 rpm. It is identical in appearance and mounting requirements to the LMU4 motor. Since it is a heavy duty motor its application is the same as the LMU12.

(5) AC GOVERNED MOTOR LMU41 - The LMU41 governed motor is similar to the LMU4 governed motor in location, mounting and function.

(a) The unit is a 1/20 hp., 115 volt, 60-50-25 cycles ac, or dc governed motor which runs at a governed speed of 3600 rpm. A combined governor and fan are mounted on a motor shaft, which is supported on ball bearings.



BOTTOM VIEW (OPEN)

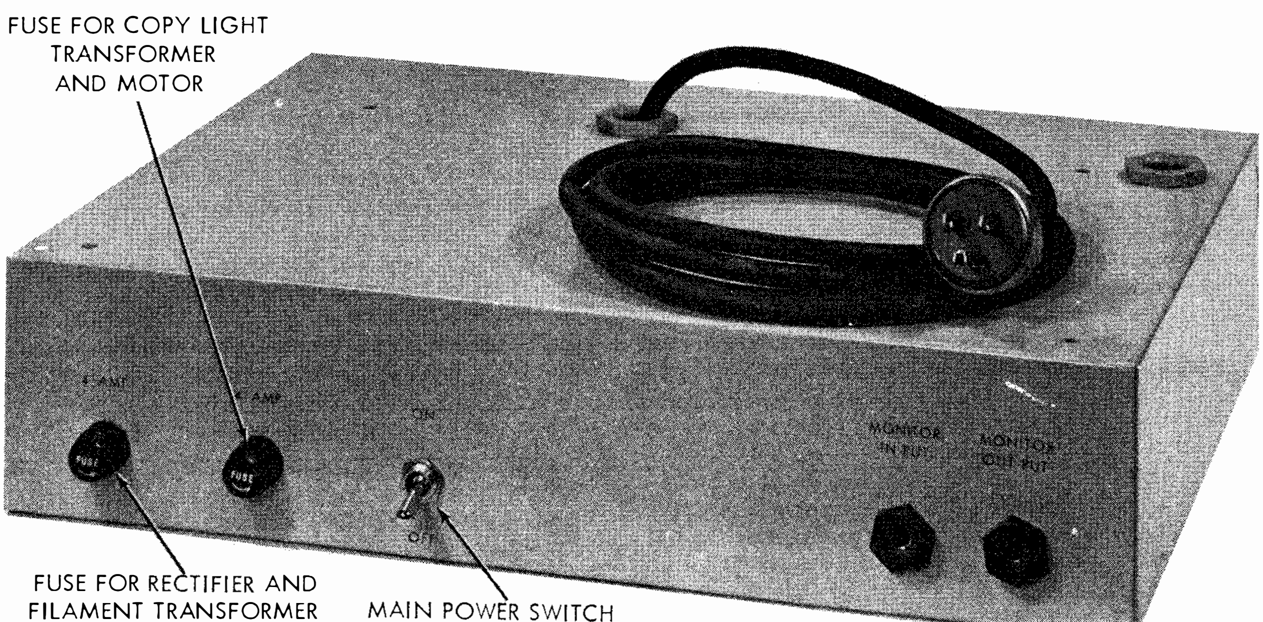


Figure 1-17. Electrical Service Assembly 173395BR or 173816BR

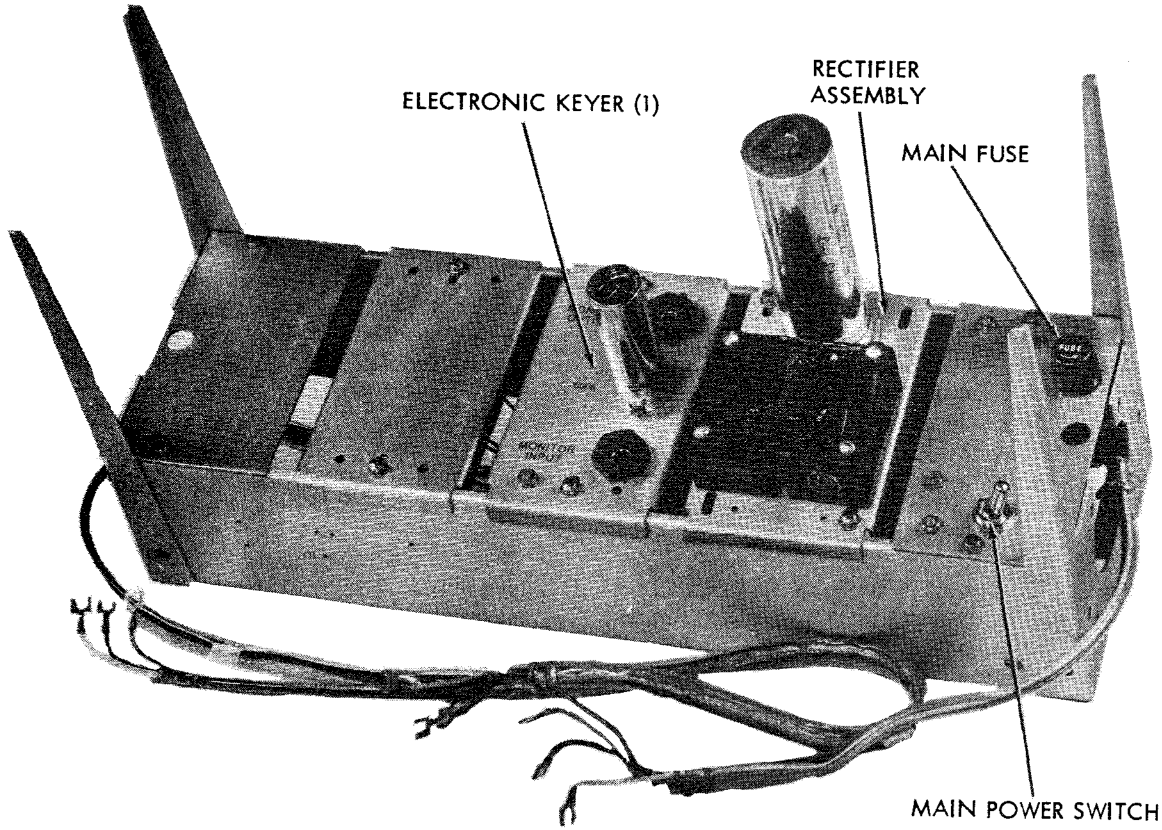


Figure 1-18. Electrical Service Assembly 173783

(b) An electro-mechanical governor is wired in series with the armature and two field windings. Targets for speed checking are marked on the governor cover.

(c) The entire motor is shielded to minimize radio interference. The cradle compartment mounts the governor resistor, governor capacitor, radio frequency suppression filter and the improved method for dissipating the heat generated by the governor resistor. This motor unit is an improved version of the LMU4 Motor Unit.

(6) AC GOVERNED MOTOR LMU39 - The LMU39 governed motor is similar to the LMU14 governed motor in location, mounting and function.

(a) The unit is a 1/15 hp., 115 volt, 60-50-25 cycle ac, or dc governed motor which runs at a governed speed of 3600 rpm.

(b) Reference Paragraph (5) (b) and (5) (c) above since the same information applies to the LMU39 motor unit. The LMU39 is an improved version of the LMU14.

i. CABINETS - These enclosures are designed to house the components of a Teletypewriter Set. They are of sheet metal construction, finished, inside as well as outside, in baked enamel. There are three different types.

(1) CABINET LPC206BR (Figure 1-20) - This is a skin tight cover that includes a special base suitable for rack mounting. It houses the base and typing unit of the Receive-Only Set or the keyboard and typing unit of the Send-Receive Set. It does not have facilities for mounting the required electrical service assembly within its cover. The ESA for these sets is housed within its own container for rack mounting (see paragraph 1-3g(1)). The LPC206 has sound absorbing pads and shock mounted cradle rails to reduce transmission of noise. It is equipped with copy lights and a margin indicator lamp. A cover glass in the small lid enables the operator to observe copy as it is printed. The printed copy emerges from the cabinet between the two lids so that the cover glass provides a tearing edge for the paper. The top of the cabinet is opened by pulling up on the small right and left hand knobs on the small lid, then lift the main lid until it is latch-

ed by the lid stop arm. With the lids open the typing unit is accessible for replenishing paper or replacing the ribbon. A small copy holder and line guide are provided on the front of the cabinet. Telegraph and power lines enter the cabinet through a hole in the rear wall.

(2) CABINET LAC214BR (Figure 1-21) - The LAC214BR is a floor model cabinet that houses the Send-Receive (KSR) Set. The upper portion forms a compartment for housing the mechanical units and electrical service assembly. The top of the cabinet is enclosed by a dome that is hinged at the rear. The dome is unlatched by a push button and is counter-balanced by a mechanism that aids in raising it and then supports it in the open position. A copyholder is attached to the front of the dome. A window through which the message may be read while printed is located in the upper portion of the dome. This window is positioned horizontally to avoid reflection from ceiling lights. A hinged door in the dome is unlatched by a push button to permit access to the printed copy. The copy is illuminated by incandescent lamps located under the dome. Rubber sealing strips are applied to the edges of both the dome and the door for silencing purposes. The cradle includes a tilting arrangement which permits the assembled units to be tilted forward and supported when the dome is open (figure 1-22). This provides maximum accessibility to the mechanism while servicing. Terminal boards for power and signal line connections are located on the inner rear wall. The electrical service unit is mounted behind the keyboard. Its power switch is operated by a switch lever at the lower right front of the cabinet just below the keyboard. Some cabinets are equipped with a sub-base set of parts which when attached to the bottom of the cabinet increases the height of the cabinet some ten inches for convenient "stand-up" operation. A dolly is also included with some sets which affords mobility and can be used with the LAC-214 cabinet alone or with LAC214 cabinets modified with a sub-base.

(3) CABINET LAAC229BR (Figures 1-23 and 1-24) - Sheet metal cabinet LAAC229BR is designed to house all the components of the Automatic Send-Receive (ASR) Set. The upper portion contains the keyboard, typing unit, typing reperforator, transmitter distributor, transmitter distributor base, electrical service assembly and motor, also the auxiliary typ-

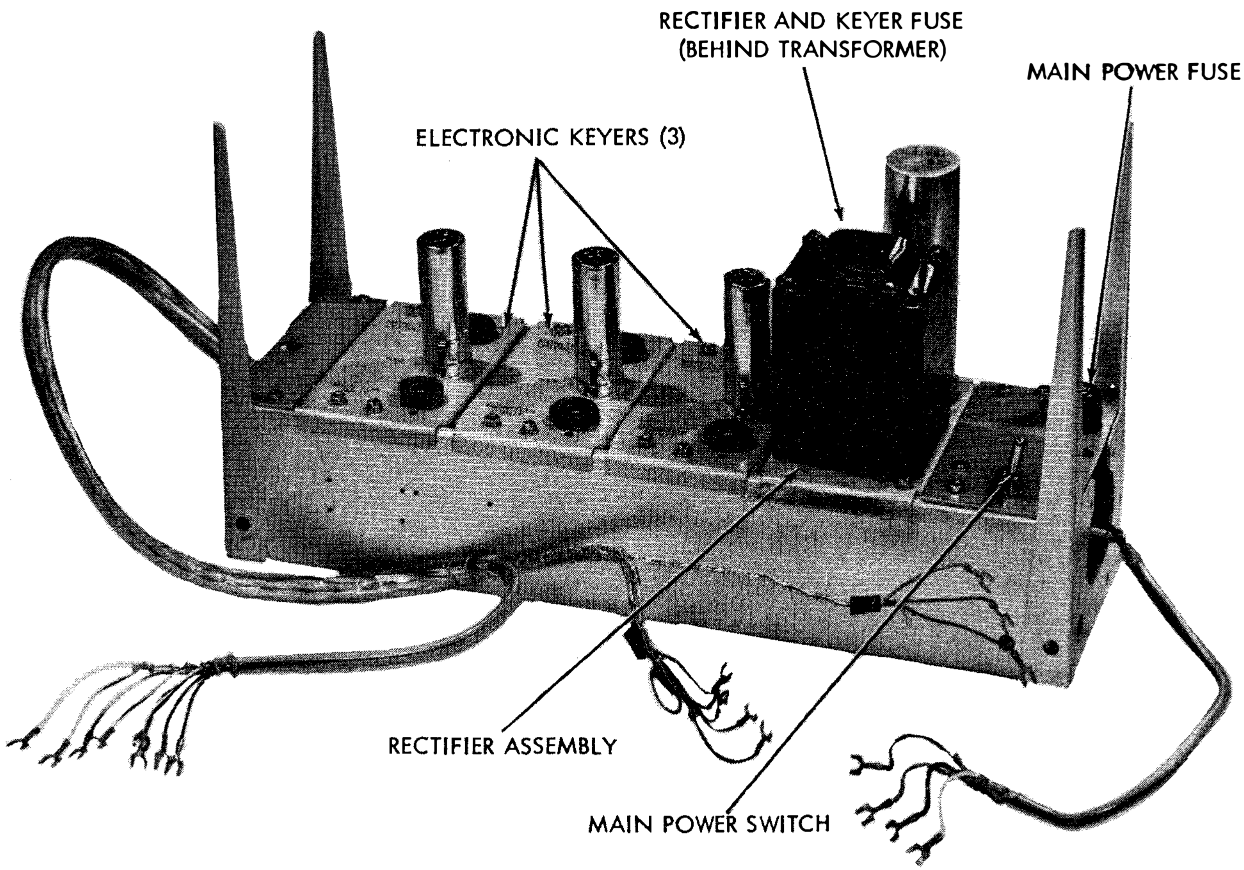


Figure 1-19. Electrical Service Assembly 173824

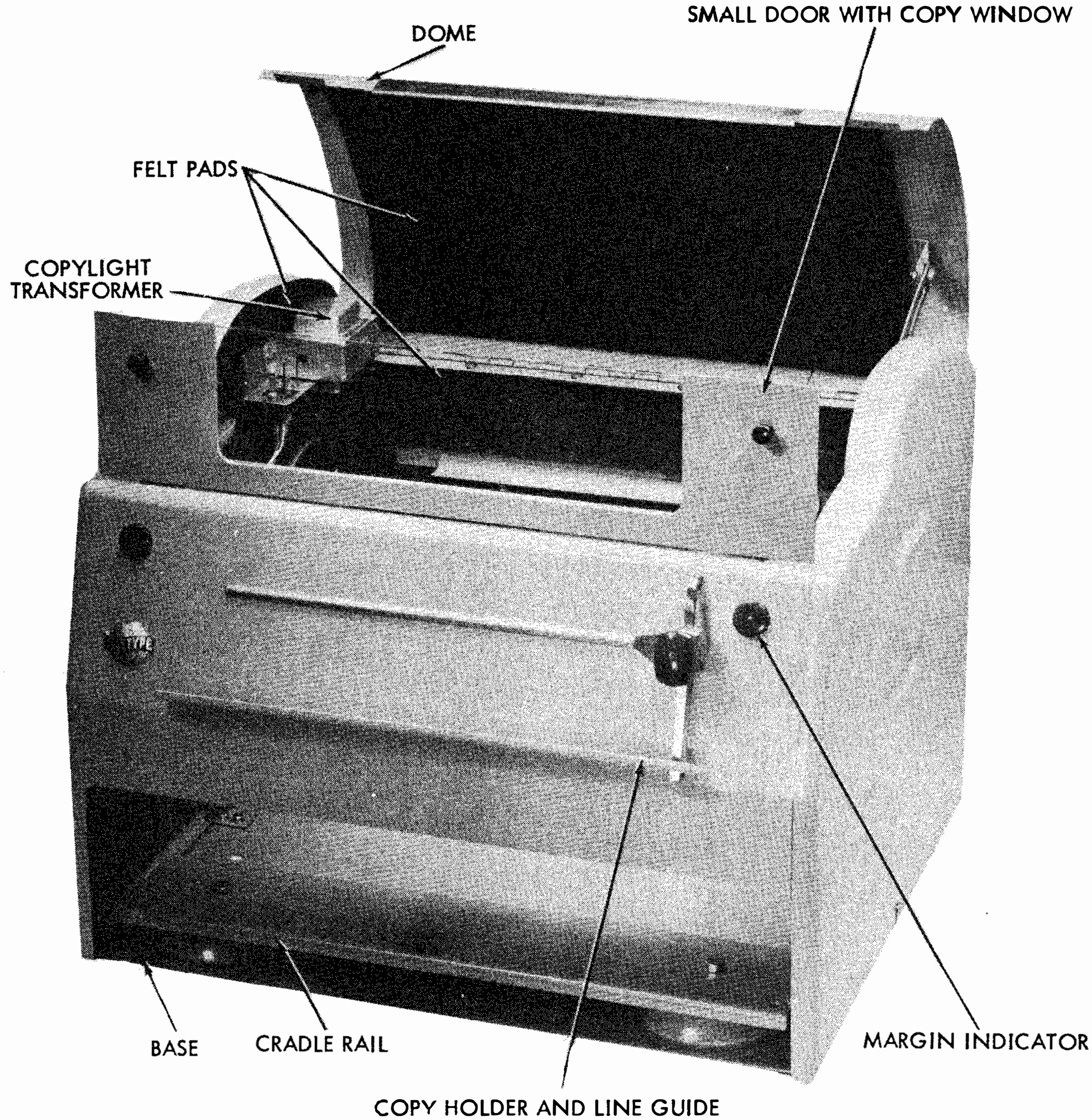


Figure 1-20. Cabinet LPC206BR (Dome and Door Open)

ing reperforator, typing reperforator base and motor. Where power factor capacitors are necessary for the motor units they are mounted on the rear wall of the lower compartment, accessible by opening the front panel.

(a) A dome extending completely across the cabinet is hinged at the rear and latched at both sides. It is partially raised by two torsion bars when the latches are released. Small doors in the dome provide access to components without raising the dome. At the top right end of the dome, a door provides access to the rear of the typing unit for changing copy paper. A window in front of that door affords a view of the platen, type box, and line being typed. The rear of the window is a straight edge for tearing off printed copy. The window may be opened for straightening paper or changing ribbon. A dome door in the center of the cabinet can be opened for reloading the typing reperforator tape container. A hinged segment of the front of the cabinet can be raised for access to the typing reperforator. When closed, this segment has two windows for viewing the perforated tape with the window at the left serving as a tape cutoff guide. A door at the left of the dome provides access to the auxiliary typing reperforator.

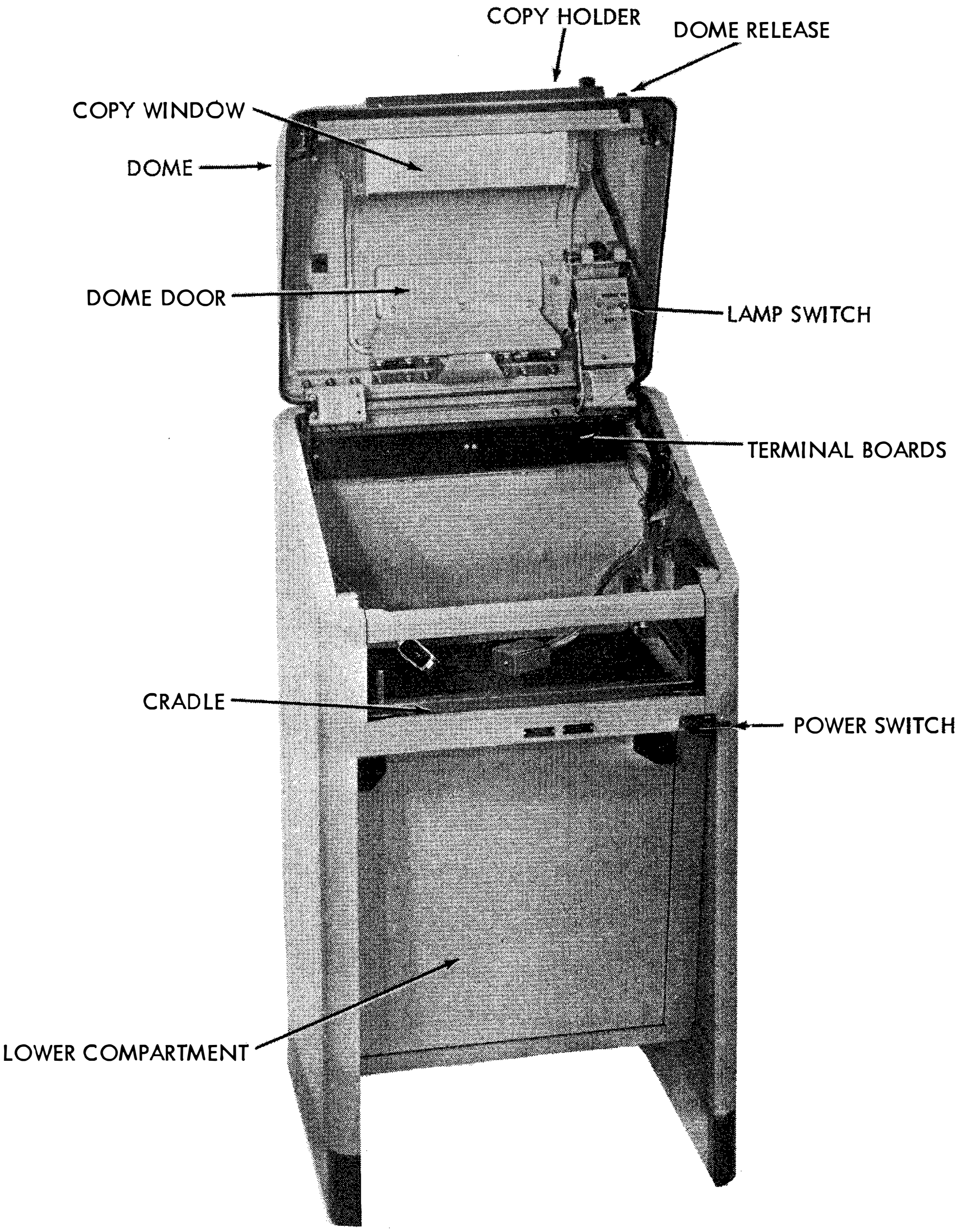


Figure 1-21. Cabinet LAC214BR (Dome Open)

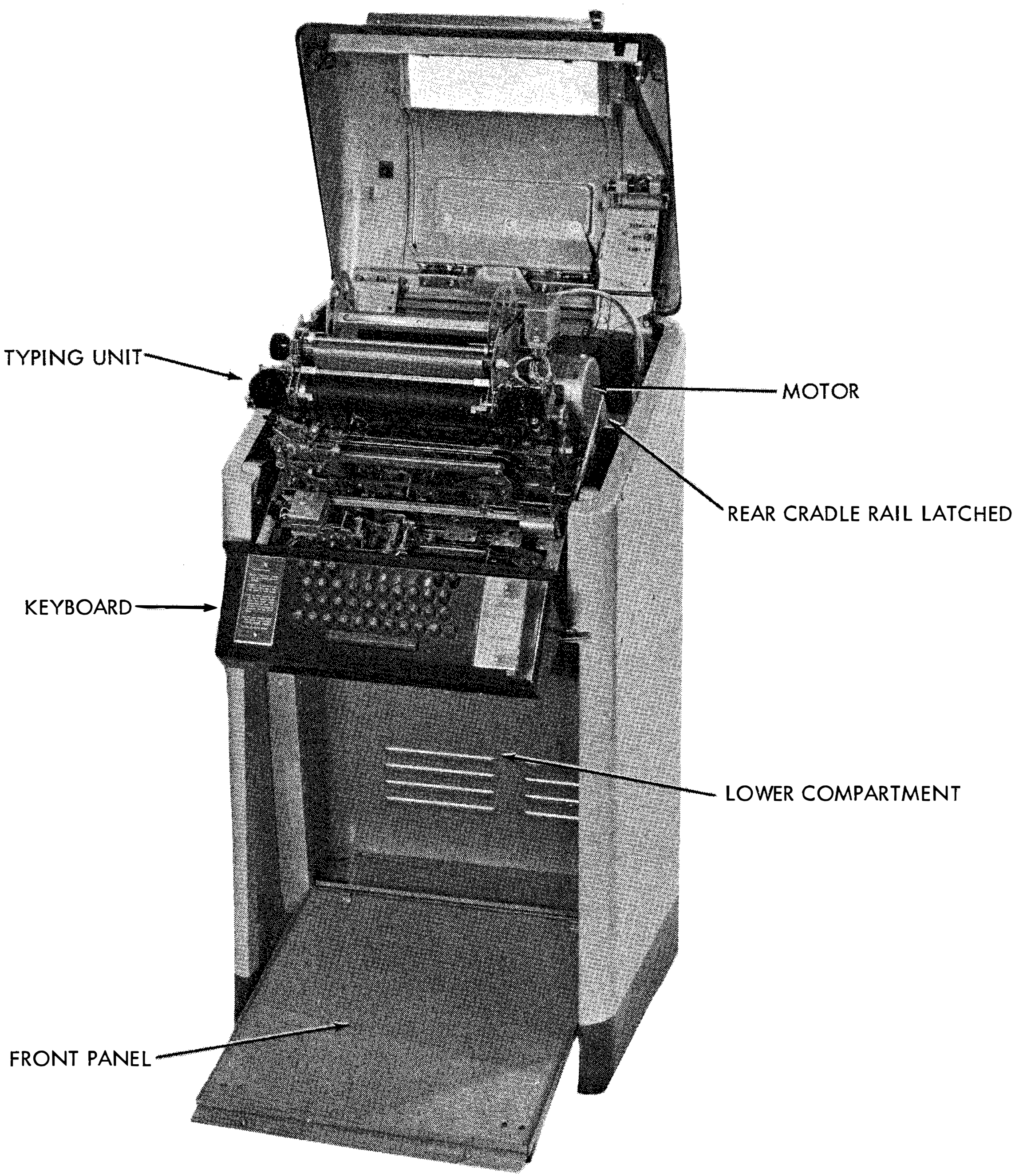


Figure 1-22. Keyboard Send-Receive Set with Keyboard Assembly Tilted

(b) The dome is wired to include a 6 volt copy and indicator lamp circuit. Associated with this circuit is a transformer and a three-position toggle switch which is accessible in the center of the cabinet dome when the right dome door is open. Also mounted on the dome are a lamp for illuminating copy in the typing reperforator, two lamps for the typing unit copy paper, and a margin indicator or end-of-line lamp.

(c) Terminal boards on which all apparatus wiring terminates are located across the back panel of the cabinet.

(d) A shelf separates the upper portion from the lower portion of the cabinet and serves as a mount for most of the components. Incoming signal and power lines, and a cradle assembly are mounted on the top side of the shelf. The cradle rests on vibration mounts. A switch

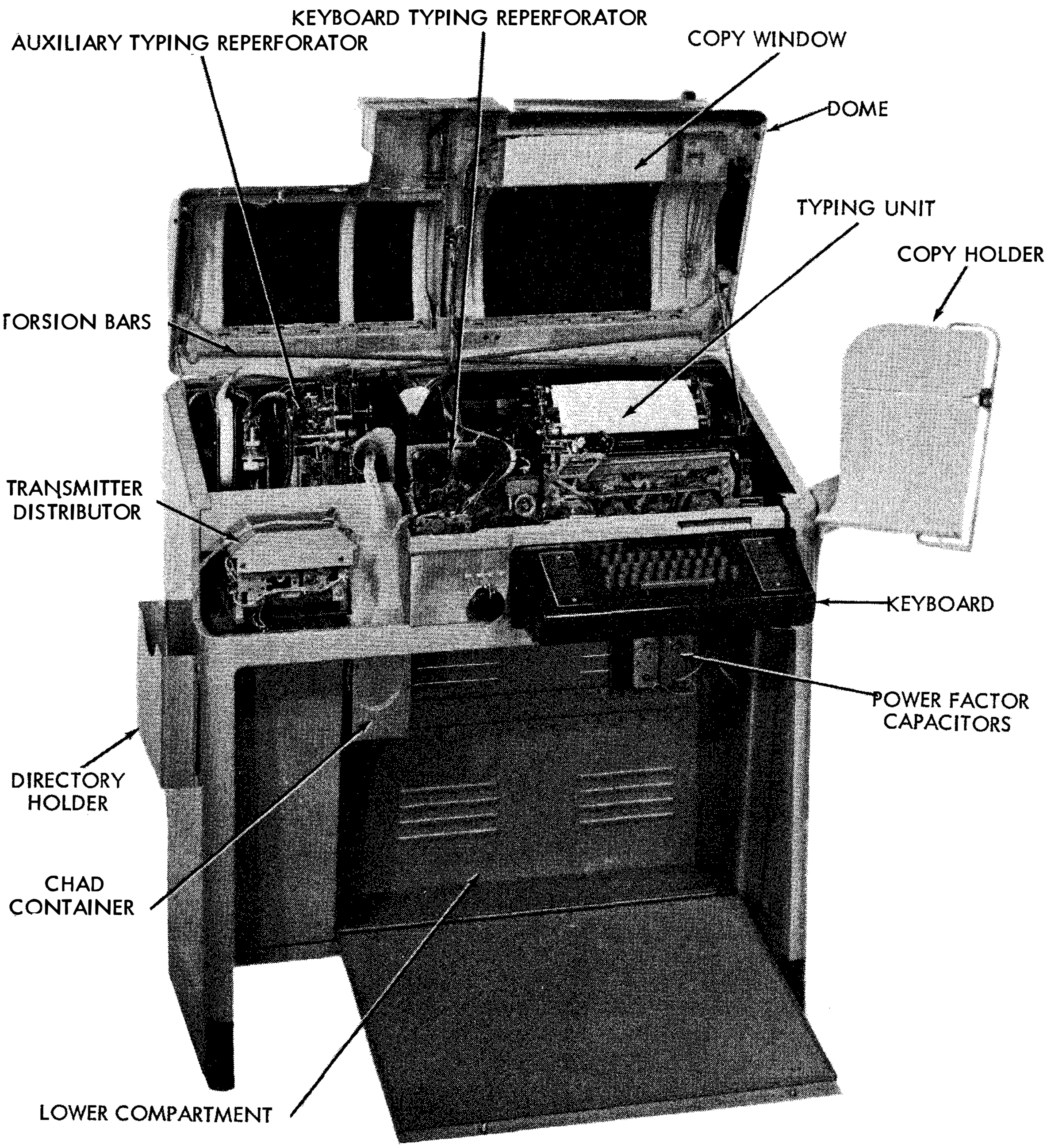


Figure 1-23. Automatic Send-Receive Set (Dome Opened)

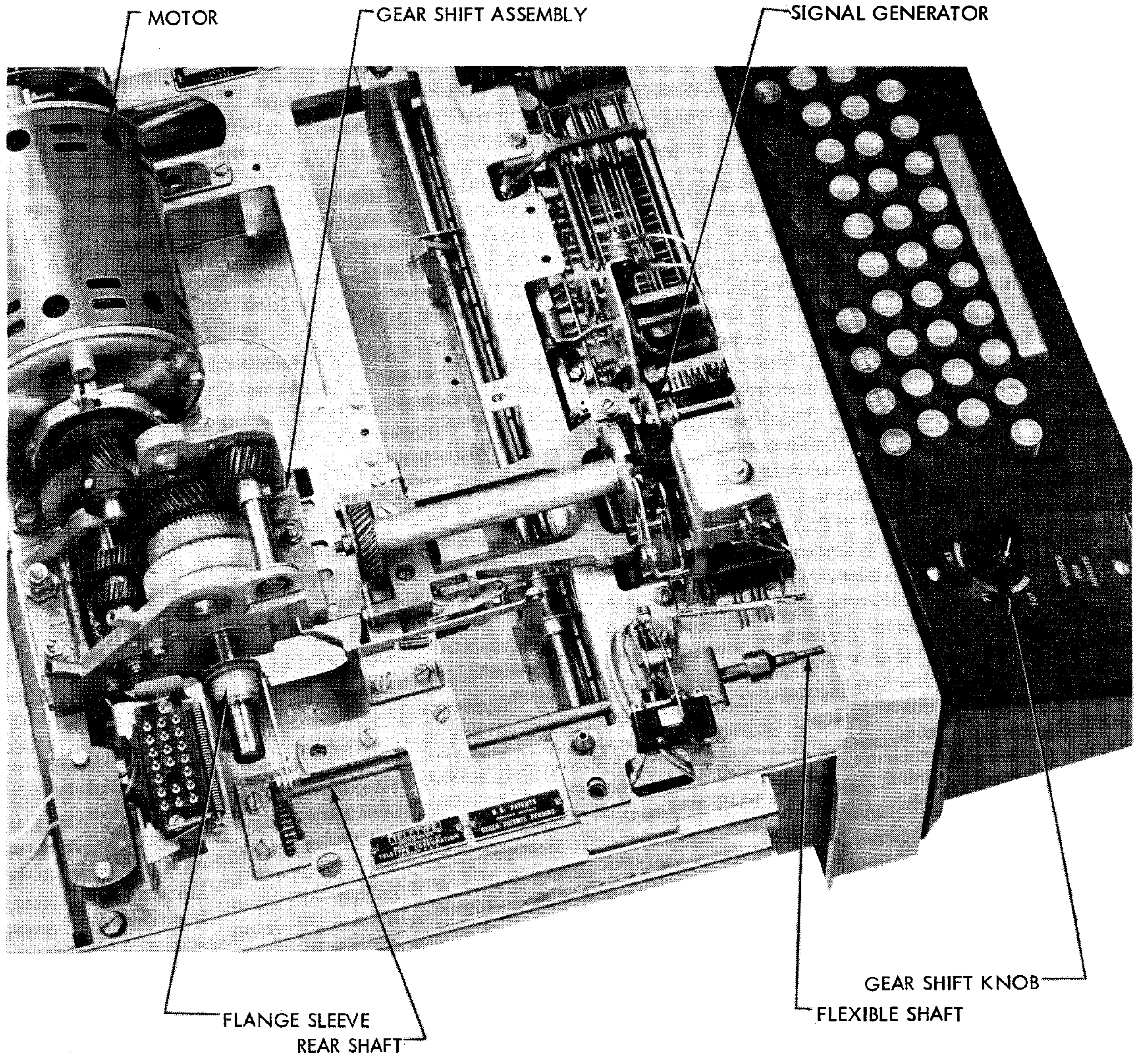


Figure 1-23A. Keyboard LK52BRW

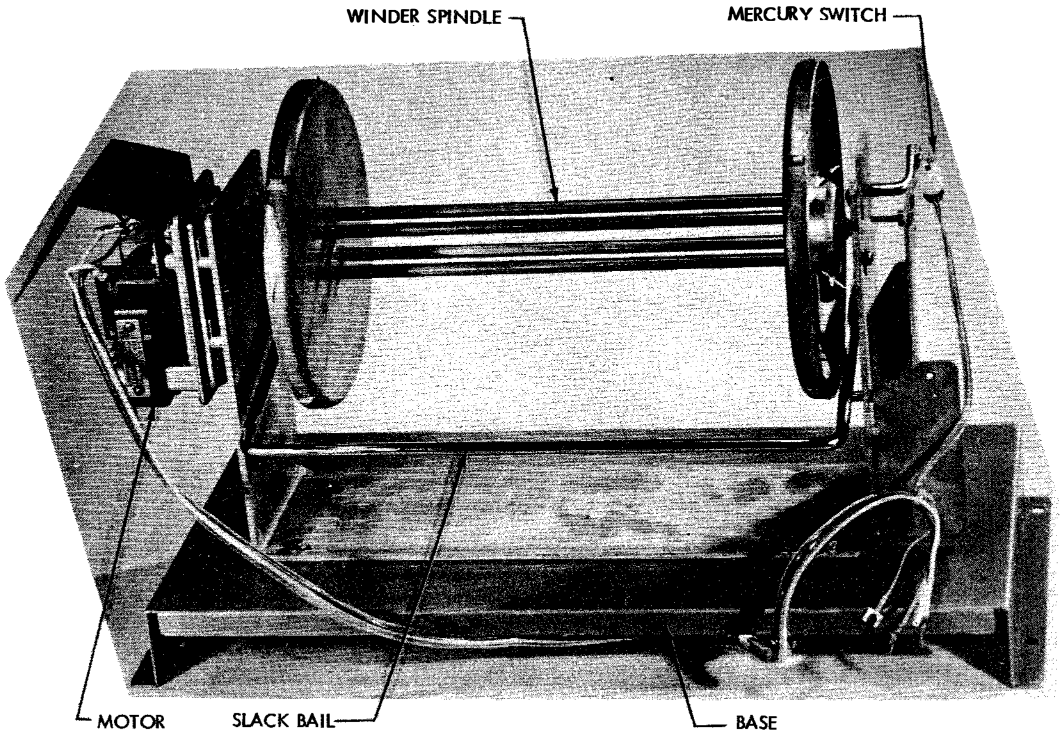


Figure 1-23B. Paper Winder (195922)

lever for controlling the power switch on the electrical service assembly extends under the cradle and protrudes at the right of the key-board. The LAAC229 Cabinet may also be modified for "stand-up" operation by addition of the sub-base as in the case of the LAC214 cabinet.

(4) Cabinet LBAC255BR (Figure 1-23A). The LBAC255BR Cabinet is designed to house all the components of the Multiple KSR and RO Set.

(a) The outer shell consists of a base assembly, right and left side panel assembly, rear panel assembly, top assembly, door for the lower section of the cabinet, and three hinged covers for the typing units. Each cover contains a window which permits viewing of copy being printed and also provides a tearing edge. The upper two covers are equipped with push buttons which will operate the line feed and carriage return functions of the typing unit. The line feed and carriage return functions of the bottom typing unit are operated through its keyboard base. A top fixed cover mounts the switch and lamp panel. A switch and lamp panel which mounts 3 power switches and two indicator lamps.

(b) The inner frame assembly consists of a frame assembly, a plate floor at the base of the frame assembly which mounts the mounting panel assembly, a mounting panel assembly which mounts the electrical service assembly.

(c) The electrical service assembly provides three selector magnet drivers (one for each typing unit). Three copy light transformers. One transformer for the copy light system for each level. The copy light transformer for each level is under control of the power switch for that level. Three fuses and fuse holders. One for each AC circuit for each level. One main power switch for the AC power to the cabinet. Four control relays. One to control each typing unit and one to control output from keyboard signal generator. Three adjustable resistors. One for each incoming line to trim the current. Two 120 point terminal blocks, three 10 point terminal boards for making connections between the electrical service assembly and cabinet wiring.

(d) Three sets of slides. The upper two sets of slides mount two plate base assemblies. The lower set of slides provide mountings for a keyboard and paper winder (Figure 1-23B). The two plate base provide mountings for the

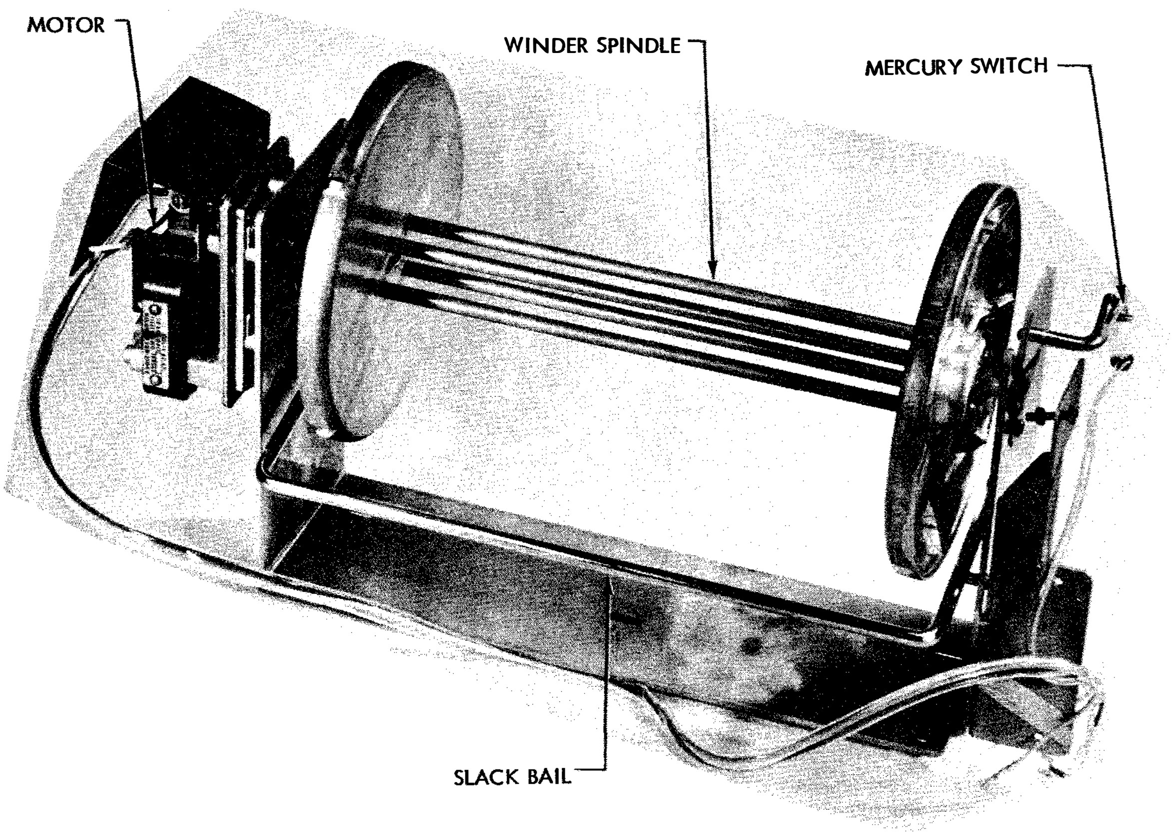


Figure 1-23C. Paper Winder (195921)

typing unit, motor, paper winder (Figure 1-23C), intermediate gear shaft assembly, necessary connectors and wiring.

(e) The cabinet accommodates the following methods of paper handling. Single copy paper, fed out and torn off. Single copy paper, displayed on a copy display rack and wound on a motor driven paper winder. Two-ply paper with the first copy torn off and the second copy displayed wound on a motor driven paper winder.

j. PAPER WINDER PW201BR (Figure 1-25) - The paper winder consists of a frame, mounting a motor and a removable cylinder. The cylinder is driven by the motor through a friction clutch. The winder is mounted at the rear of Teletypewriter Sets that use two copy paper with interleaved carbon. The original copy is torn off while the carbon copy is wound up on the revolving cylinder, and the carbon passes over the top of the winder to accumulate in a basket at the rear.

k. ELECTRONIC SELECTOR-MAGNET DRIVER (Figure 1-23D.) The 177010 selector magnet driver is a solid-state device which couples a signal line to a receiving teletypewriter and repeats the line signals in a form that will effectively operate the teletypewriter's selector mechanism. It is designed specifically to drive a single selector magnet. When used in place of a line relay or electronic keyer to drive the selector magnets, it will provide improved operation, greater reliability and reduced maintenance. However, it is not intended as a general purpose driver for all types of selectors, nor as a replacement for relays in general. The Driver includes a dc power supply and an etched circuit card which are mounted on a small chassis. The power supply consists of an isolation transformer, a full wave rectifier and a single - capacitor filter. Various electrical components including five transistors are mounted on the circuit card which is supported by three posts. Power and signal cables equipped with spade lugs provide for electrical connections to the Driver.

(1) With different strapping arrangements, the Driver will accept neutral signals of either 0.020 or 0.060 ampere or polar signals of up to

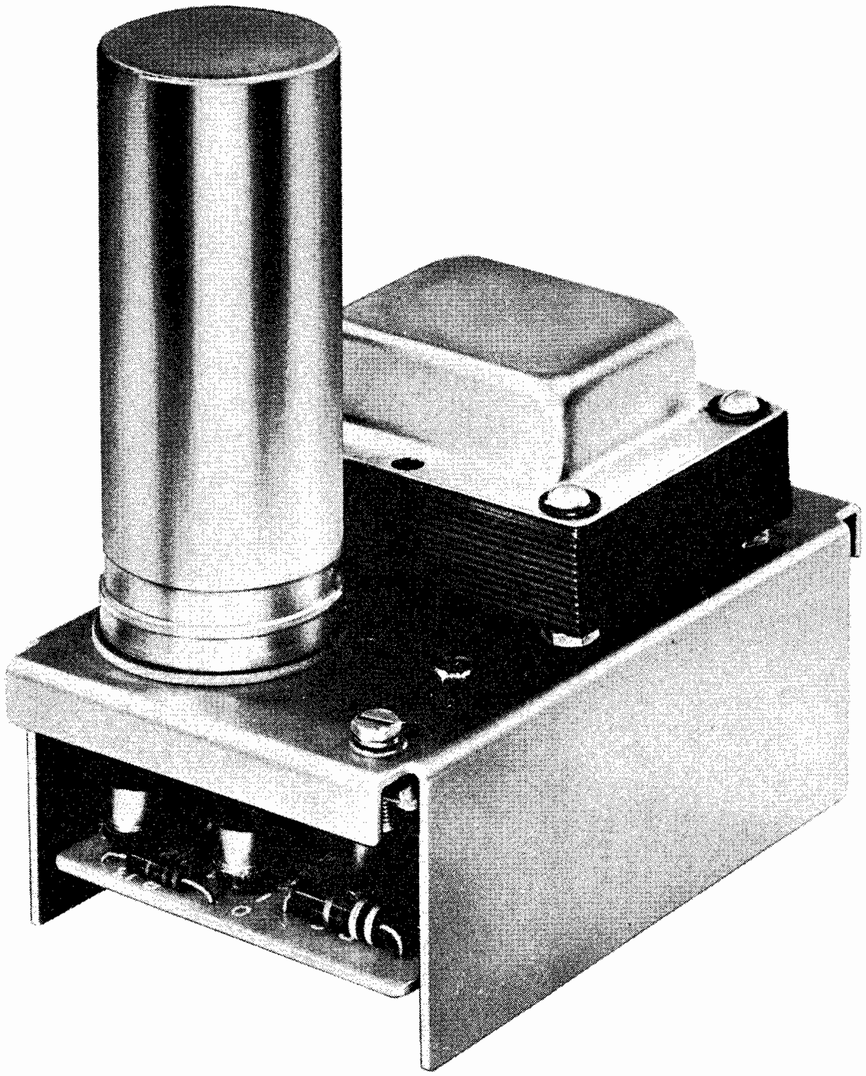


Figure 1-23D. Electronic Selector Magnet Driver

0.030 ampere. The output is 0.060 ampere regardless of input.

(2) The Driver may be strapped so that, when used in conjunction with external contacts, the selector does not receive (is blinded to) certain incoming messages and does receive (is unblinded to) others.

(3) Strapping arrangements can be changed by removing and/or soldering bare wire between terminal posts on the circuit card. The posts are accessible so that the card need not be removed for this procedure.

(4) Since its input is essentially resistive rather than inductive, the Driver permits the inclusion of additional receiving units on a teletypewriter loop without introducing signal distortion.

(5) The Driver can be mounted in any vacant position on the electrical service assembly.

(6) Technical Data as follows:

Dimensions (Overall)

Length - 4-3/4 inches
Width - 2-7/8 inches
Height - 5-1/4 inches

Electrical

Power source - 117v ac $\pm$ 10%
50 - 60 cps

Max. Power Consumption - 12 watts

Input Signal - 0.020 or 0.060 ampere ± 10% neutral or up to 0.030 ampere polar

Output Signals - 0.060 ampere

Signalling Speed - Up to 200 wpm

Wiring Diagram - 4445WD

Environmental Requirements
Operating Temperatures - 0°C (+32°F) to +65° C (+149°F) at specified power and input requirements.

Storage Temperature - Max. +85°C (+185°F)

1-4. ELECTRICAL CHARACTERISTICS

a. SIGNAL - The telegraph signal applied to the selector magnets from the electronic keyer must be on-off direct current, nominally 0.035 ampere, or 0.060 ampere from the selector magnet driver, when the signal line is "marking". The electronic keyer, or the selector magnet driver, in the electrical service assembly repeats the incoming polar line signals in a neutral local loop to the selector coils of the receiving unit. A rectifier in the electrical service assemblies supplies operating current to the local loop. The input telegraph signal to the keyer, or selector magnet driver, is a direct current polar signal of 60 volts. Transmission signal line current must be furnished from an external rectifier.

b. POWER SUPPLY REQUIREMENTS

(1) AC SYNCHRONOUS MOTORS LMU3 AND LMU21

Input voltage .... 115 volts ± 10% ac
Phase ....single
Frequency .... 60 cycles ± 0.5 cycle
Input current, starting ....9 amperes
running, no load ....1.85 amperes
Watts 65
Power factor, no load 23.7%
full load 38.5%
Heat dissipation ....50 watts

(2) AC GOVERNED MOTOR LMU4

Input voltage ....115 volts ± 10% ac
Phase ....single
Frequency ....50/60 cycles
Input current, starting ....1.75 amperes
running .... 1 ampere
Power Factor, no load 71%
full load 66.8%
Wattage 95
Heat dissipation ....75 watts

(3) AC SYNCHRONOUS MOTOR LMU12

Input voltage ....115 volts ± 10% ac
Phase .... single
Frequency ....60 cycles ± 0.5 cycle
Input current, starting .... 12.25 amperes
running, no load .... 2.48 amperes
full load .... 2.58 amperes
Watts input, no load 66.3
full load 132.9
Power factor, no load 23%
full load................. 45%
Heat dissipation ....73 watts
Horsepower 1/12

(4) AC GOVERNED MOTOR LMU14

Input voltage .... 115 volts ± 10% ac
Phase .... single
Frequency .... 50/60 cycles
Input current, starting .... 4.0 amperes
running, no load .... 0.75 ampere
full load .... 2.05 amperes
Watts, no load 73
full load 145
Power factor, no load 87%
full load 62%
Heat dissipation.................... 96 watts

(5) AC GOVERNED MOTOR LMU39

Input voltage.....115 volts plus or minus 10% ac
Phase.............................. single
Frequency............60, 50, 25 cycles and dc

	Power Source Frequencies			
	60 Cycle	50 Cycle	25 Cycle	D.C.
Input Current (Amperes)				
Starting	2.8A	4.0A	4.5A	3.4A
Running (Full load)	1.8A	2.3A	2.1A	1.7A
Watts input	190	200	235	195
Power factor	79%	87%	96.8%	—
Heat dissipation (Watts)	94.2	97.2	130	111
Series resistor	—	—	12 ohms	20 ohms

(a) When the LMU39 motor unit is to be operated on single phase, 115 volts plus or minus 10 per cent, 25 cycle AC power, there must be furnished two 75 watt, 24 ohm, current

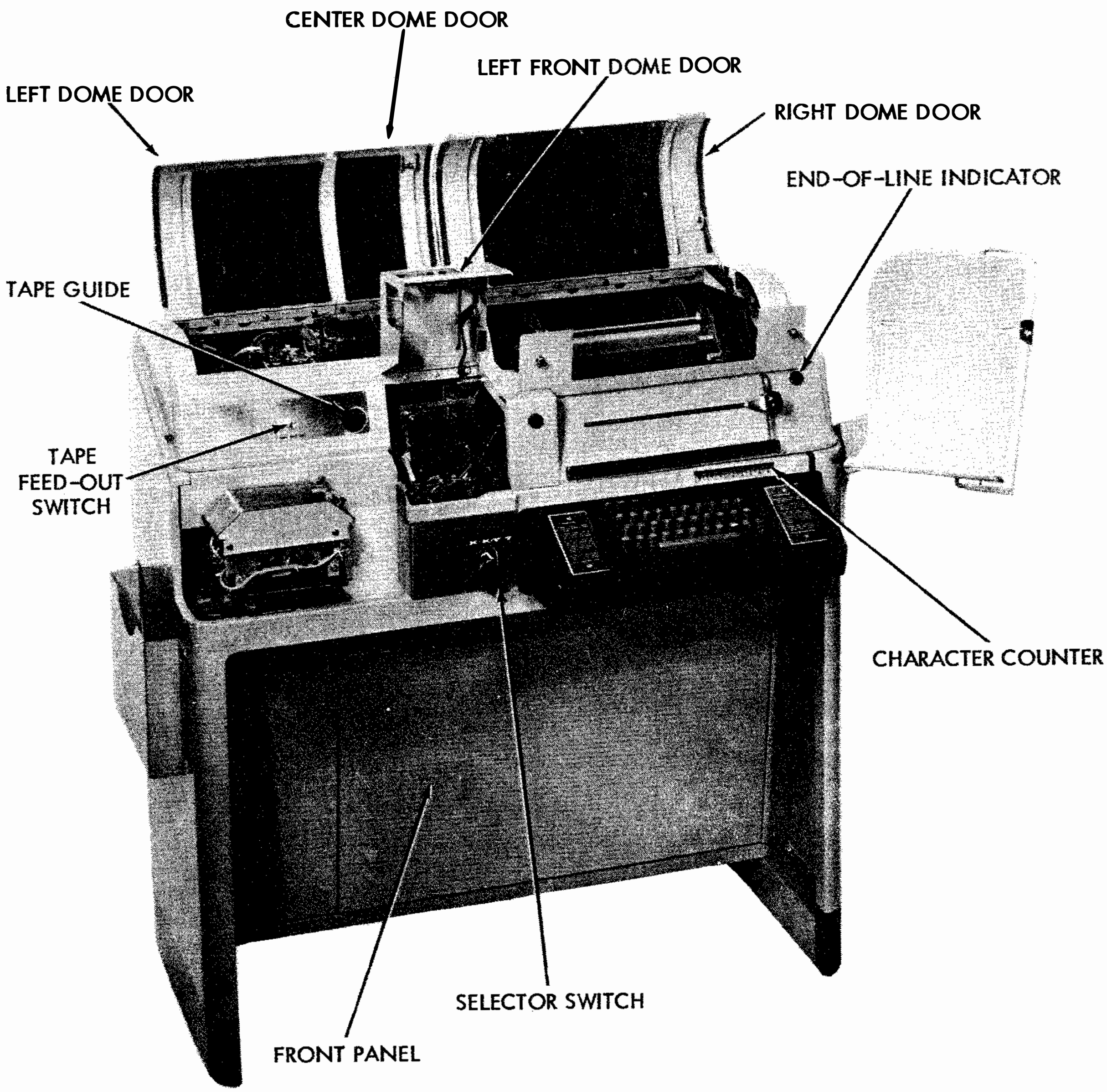


Figure 1-24. Automatic Send-Receive Set (Dome Doors Opened)

limiting resistors connected in parallel (total 12 ohms) and in series with one side of the motor line.

1. A more appropriate method would be to use a REC29 Rectifier which has a tapped primary winding for 25 cycle line input and furnishes additional taps for connecting the series governed motor (recommending the use of the 40 cycle tap which provides 87 volts AC to the motor) instead of using a series resistance of 12 ohms (75 watt) stated above. A total of 4 amperes is the maximum amount of current that can be connected to the primary of this transformer. This value should not be exceeded.

(b) When the LMU39 Motor Unit is to be operated on 115 Volts plus or minus 10 percent, DIRECT CURRENT power, there must be furnished two 75 watt, 40 ohm, current limiting resistors connected in parallel (total 20 ohms) and in series with one side of the motor line.

CAUTION

These resistors must be caged and mounted somewhere that affords plenty of ventilation in order to safeguard against personal and property damage from excessive heat generated.

(c) The governed speed is 3600 revolutions per minute, plus or minus 1%, counterclockwise rotation (as viewed from the commutator end) and the horsepower is 1/15.

(6) AC GOVERNED MOTOR LMU41

Input voltage . . . . .115 volts plus or minus 10% ac
Phase . . . . single
Frequency . . . . 60, 50, 25 cycles and dc

	Power Source Frequencies			
	60 Cycle	50 Cycle	25 Cycle	D.C.
Input Current (Amperes)				
Starting	1.9A	2.7A	2.4A	1.8A
Running	1.12A	1.34A	1.18A	.93A
Watts input	92	114	123	107
Power factor	71%	74%	90%	—
Heat dissipation (Watts)	55	87	86	70
Series resistor	—	—	25 ohms	50 ohms

(a) When the LMU41 motor unit is to be operated on singlephase 115 volt plus or minus 10 per cent 25 cycle A.C. power, there are two methods of accomplishing operation:

1. Use a single 75 watt, 25 ohm, current limiting resistor in series with one side of the motor line. However, this resistor must be caged and mounted somewhere that affords plenty of ventilation in order to prevent personal and property damage from excessive heat generated.

2. A more appropriate method would be to use a REC29 Rectifier which has a tapped primary winding for 25 cycle line input and furnished additional taps for connecting the series governed motor, (recommending the use of the 40 cycle tap which provides 87 volts A.C. to the motor) instead of using a series resistance of 25 ohms (75 watt).

(b) When the LMU41 motor unit is to be operated from 115 volts plus or minus 10 per cent DIRECT CURRENT power, a capacitor - resistor assembly is required which is mounted in the associated electrical service assembly,

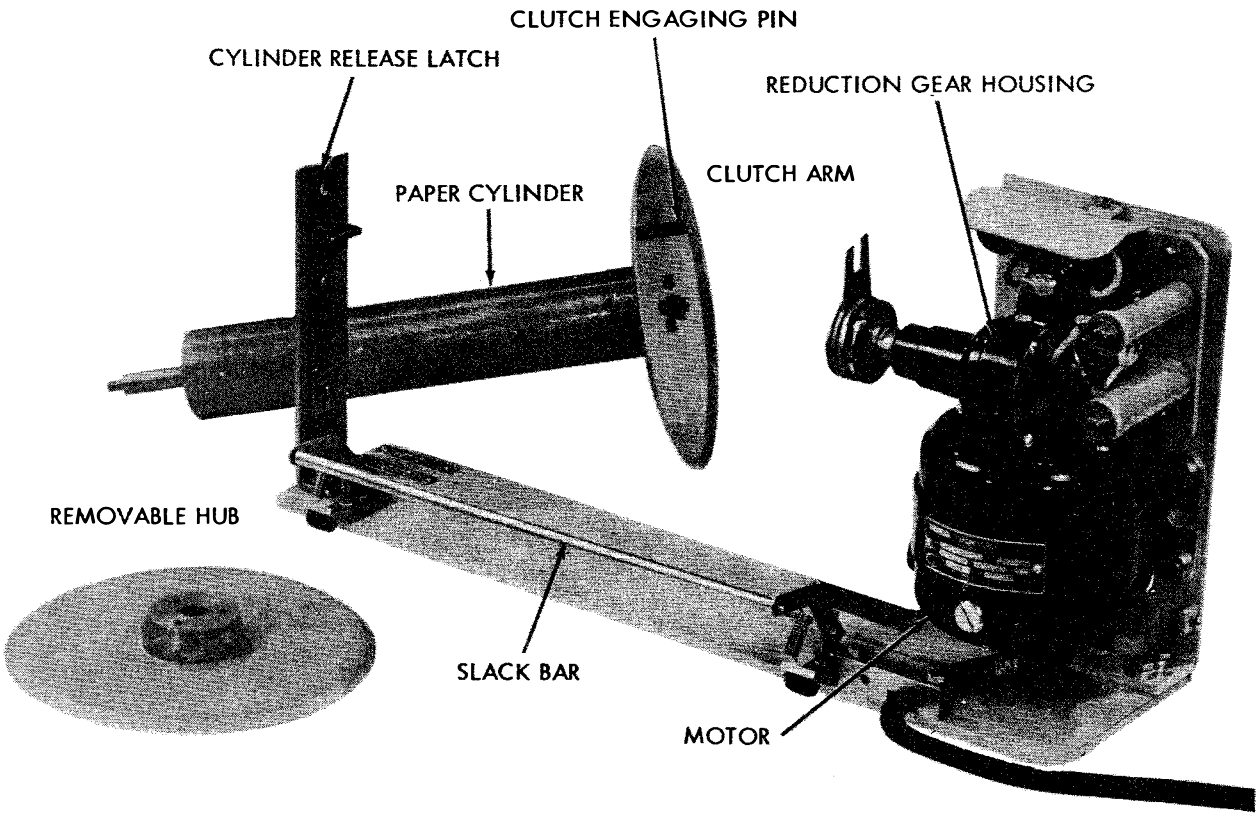


Figure 1-25. Paper Winder PW201BR (Cover Removed)

contains two 75 watt 25 ohm current limiting resistors (107427) which shall be connected in series with one side of the motor line.

(c) Governed speed plus or minus one per cent, 1/20 horsepower and counterclockwise rotation (as viewed from the commutator end).

(7) AC SHADED POLE REDUCTION GEAR MOTOR (198062) (193958)

(a) This is a 115 volts, 50/60 cycle AC shaded pole reduction gear motor, with output shaft speeds of 95/110 revolution per minute and designed for continuous duty. The gearing is enclosed in a cast zinc alloy gear box. The rotor shaft is mounted with a self-aligning oilite bearing at each end. The direction of rotation is clockwise as viewed from the end of the drive shaft.

(8) AC/DC MOTOR, GEAR REDUCER (114684)

(a) This is a 115 volts, 60 cycles AC/DC series wound motor, .15 ampere, with a 60 to 1 ratio gear reduction head (enclosed type), designed for continuous duty. The horsepower is 1/1800, armature speed is 2000 revolutions per minute, shaft speed is 60 revolutions per minute, rotation is counterclockwise (as viewed from gear shaft extension).

1-5. PERMISSIBLE TEMPERATURES

a. Ambient - 20°C (-4°F) to + 50°C (+122°F).

b. Temperature rise: Not in excess of + 40°C (+104°F) above ambient temperature.

TABLE 1-1. TELETYPEWRITER SET COMPONENTS

Component	Teletype Code	Rack Mounted Sets		Console Mounted Sets				Multiple Printer Sets
		RO	KSR	KSR	KSR	ASR	ASR	
Cabinet	LPC206BR	X	X					
Cabinet	LBAC255BR							X
Cabinet	LAC214BR255			X	X			
Cabinet	LAAC229BR					X	X	
Transmitter-Distributor Housing	160887BR						X	
Electrical Service Assembly	173395BR	X	X					
Electrical Service Assembly	304203						X	
Electrical Service Assembly	173816BR	X	X					
Electrical Service Assembly	173783			X				
Electrical Service Assembly	173824					X		
Electrical Service Assembly	304206				X			
Base	LB10/000	X						
Keyboard	LK25BRW		X	X				
Keyboard	LK52BRW							X
	LK53BRW				X			
Keyboard	LAK21BRW					X		
+Keyboard	LAK33BRW					X		
	LAK47BRW						X	
Typing Unit	LP124YD/AJU							X
Typing Unit	LP77YD/AGM	X	X	X		X		
Typing Unit	LP77YD/AJV				X		X	
Typing Reperforator	LPR36BWA					X		
+Typing Reperforator	LPR57BWA					X		

(Continued on following page)

TABLE 1-1 (Cont'd). TELETYPEWRITER SET COMPONENTS

Component	Teletype Code	Rack Mounted Sets		Console Mounted Sets				Multiple Printer Sets
		RO	KSR	KSR	KSR	ASR	ASR	
+Typing Reperforator	LPR57BRP						X	
Auxiliary Typing Reperforator	LPR35BWA					X		
Auxiliary Typing Reperforator	LP35BRP						X	
Typing Reperforator Base	LRB32					X	X	
Modification Kit for Mounting LRB32 (Base) to LCXB13 (Base)	176287						X	
Transmitter Distributor	LXD11					X		
	LXD31						X	
Transmitter Distributor Base	LCXB13					X	X	
Motor, Synchronous	LMU3	X	X	X	X	X	X	X
Modification Kit for LMU3 Motor, Synchronous	173705				X			
Modification Kit for LMU3 Motor, Synchronous	173707						X	
Motor, Series	LMU4	X	X	X		X		
Motor, Synchronous	LMU21							X
Motor, Synchronous	LMU12					X	X	
Modification Kit for LMU12 Motor, Synchronous	173706						X	
Motor, Series	LMU14					X		
Motor, Series	LMU39					X		
Motor, Series	LMU41					X		
Paper Winder	LPW300BR	X	X					
Paper Winder	PW201BR	X	X					
Dolly	173861			X	X			
Sub-Base	154754BR			X	X	X	X	

\+ Combination incorporates power backspace mechanism for typing reperforator.

(Continued on the following page)

TABLE 1-1. (Cont'd). Teletypewriter Set Components

Component	Teletype Code	Rack Mounted Sets		Console Mounted Sets				Multiple Printer Sets
		RO	KSR	KSR	KSR	ASR	ASR	
Copy Display Rack	193950	X	X					
Modification Kit for Control Panel Assembly	173778						X	
Tuning Fork	104986	Required with Sets using Series Motors.						

NOTE: The 199915 Modification Kit is used to modify the ASR Set (AN/UGC-13 to 7.42 unit code and 45.5, 50, or 74.2 Baud speed non-polar operation. (See Page 2-22.)

NOTE: The LMU3 or LMU4 Motor is used with the auxiliary typing reperforator in the ASR Sets.

TABLE 1-2. GEAR SETS

Teletype Number	Speed of Operation (Baud)	Used on
173776	45.5	LXD11
173795	45.5	LP77YD/AGM LP77YD/AJV LP77YD/AJU
173820	45.5	LPR35BWA LPR35BRP
173992	45.5	LPR36BWA LPR57BRP
163451	75.0	LPR35BWA LPR35BRP
163454	75.0	LXD11
163502	75.0	LPR36BWA LPR36BRP
163505	75.0	LP77YD/AGM LP77YD/AJV LP77YD/AJU

Figure 2-1. Space Requirement Dimensions

SECTION 2
INSTALLATION

2-1. GENERAL

a. This section covers the installation of the RO, KSR, ASR and Multiple KSR and RO Teletypewriter Equipment Sets. Since each Set is complete, installation instructions are given for each individually. All cartons are clearly marked as to their contents, and Figure 2-1, shows the overall dimensions of each set to give an idea of space requirements. For parts referred to or for parts ordering information see Volume 2, of this manual.

b. The Teletype Rack Mounted Send-Receive or Receive-Only Model 28 Page Printer Set consists of a Cover (LPC206BR) an Electrical Service Assembly (173395BR or 173816BR), a Motor Unit (LMU3 or 4), 75 Baud Gears (163505) a Base or Keyboard (LB10/000 or LK25BRW) and a Page Typing Unit (LP77YD/AGM). The 173816BR is the same as the 173395BR except that the 173816BR does not include power factor correctors.

c. The Teletype Model 28 Send-Receive console Page Printer Set (KSR) consists of a Cabinet (LAC214BR255), an Electrical Service Assembly (173783 or 304206), a Motor Unit (LMU3 or 4), modification kit for LMU3 motor unit (173705), a Page Typing Unit (LP77YD/AGM) or (LP77YD/AJV), a Keyboard (LK25BRW) or (LK53BRW), a Power Factor Corrector (173705) where required, and 75 Baud Gears (163505). In some instances, a Sub-Base (154754BR) and Rerun Cart or Dolly (173861) are also included as part of the equipment.

d. The Teletype Model 28 Automatic Send-Receive Set (ASR) consists of a Cabinet (LAAC-229BR) an Electrical Service Assembly 173824 or 304203, a Keyboard and Typing Reperforator (LAK21BRW/LPR36), or (LAK33BRW/LPR57BWA) or (LAK47BRW/LPR57BRP), a Typing Unit (LP77YD/AGM) or (LP77YD/AJV), a motor unit (LMU12 or LMU14), a Transmitter Distributor Unit (LXD11) or (LXD31), Base for Transmitter Distributor Unit (LCXB13), Gears as required, Auxiliary Typing Reperforator (LPR35BWA) or (LPR35BRP), Auxiliary Typing Reperforator Base (LRB32) and Motor Unit (LMU3 or LMU4). Modification Kit for LMU3 (173707) and for LMU12 (173706) Motor Units. On some of the installations the LMU39 Motor Unit is used in place of the LMU14, and the LMU41 Motor Unit, in place of the LMU4.

2-2. UNPACKING THE RACK MOUNTED RO AND KSR

a. GENERAL - All equipment is packed for maximum protection during shipment. However, due caution must be taken in unpacking and handling to prevent damage and to insure personal safety. In unpacking, observe all caution labels as well as any special instructions on the cartons. All small bags and loose parts should be kept with their associated apparatus until used in the installation. Applicable schematic and actual wiring diagrams are packed with each component of the equipment requiring diagrams. Duplicate diagrams are also contained in Volume 3 of this Manual.

b. Open and unpack all the cartons of the set. Keep associated parts and diagrams with their respective components. Properly identify components or parts so that installation can proceed in an orderly manner. Handle components with great care to avoid damage to the equipment or possible misalignment of their adjustments.

2-3. INSTALLING THE RACK MOUNTED EQUIPMENT (RO or KSR) IN THE LPC206BR CABINET (Figure 2-2).

a. CABINET BASE AND ELECTRICAL SERVICE ASSEMBLY

(1) Remove the cover from the cabinet base.

(2) The cabinet base has four 5/16 inch mounting holes and two 5/8 inch holes for cords and cables. This base can be used as a template to locate the similar six holes required in the mounting plate (not provided).

(3) Remove two each of the 173714 bushings and 91742 nuts from the bag attached to the electrical service assembly. Insert a 173714 bushing (threaded portion up) into each of the two 7/8 inch holes in the top of the service assembly. Secure each bushing using a 91742 nut.

(4) Remove six 174417 flat washers, two 91742 nuts, four each 74805 screws, 2669 lock washers and 41663 flat washers from the bag attached to the electrical service assembly. Place three 174417 washers on each of the bushings. Place the mounting plate on the electrical service assembly (with the bushings

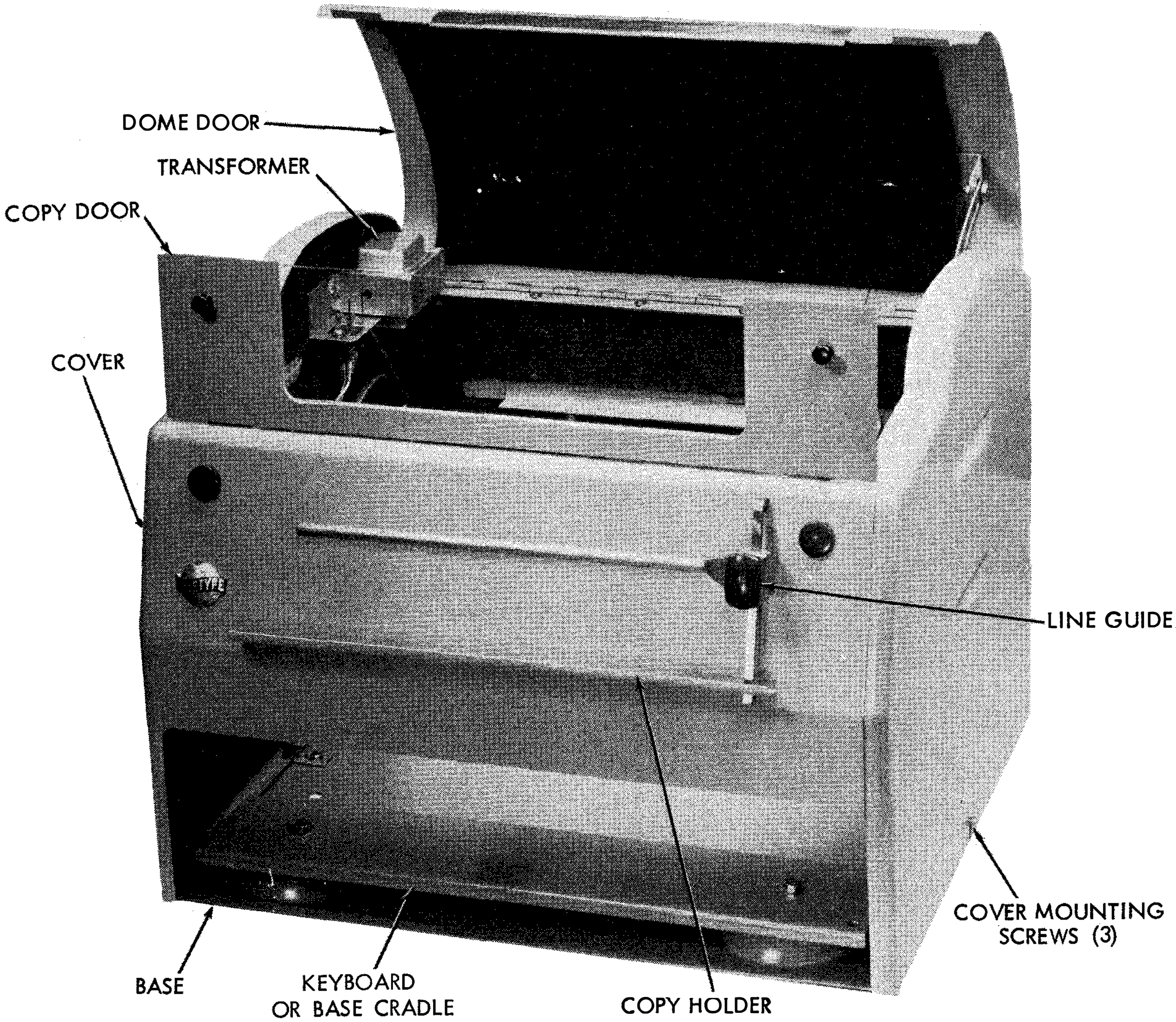


Figure 2-2. Cabinet LPC206BR

on the service assembly going through the appropriate holes in the mounting plate) then place the cabinet base on the mounting plate. Secure the cabinet base and the mounting plate to the service assembly using the tapped mounting holes in the service assembly and inserting the four 74805 screws, 2669 lockwashers and 41663 flat washers down from the cabinet base side. Install a 91742 nut on each of the bushings.

b. CABLES AND WIRING

(1) Send - Receive Set - Route the cables into the electrical service assembly as follows: the 173780 cable (motor) through the left bushing; the 173851 cable (typing unit) and 173852 cable (keyboard) through the right bushing.

(2) Receive - Only Set - Route the cables into the electrical service assembly as follows: the 173780 cable (motor) through the left bushing; the 173851 cable (typing unit) through the right bushing.

(3) Solder the wires to the terminal block lugs in accordance with the applicable wiring diagram.

(4) A cover ground screw is provided to the right of the transformer inside the LPC cover. A wire, connected to the common station ground should be attached to the ground screw in each cover at the time of installation.

c. MOTOR UNIT

(1) Remove the gear guard tied to the keyboard or base, and remove four of the 1/4 - 32 hex head screws with captive lock washers from the bag tied to the gear guard. Secure the motor unit to the keyboard or base (handwheel or fan to the right) with the four screws and lock washers just removed (connecting the ground strap on the LMU4 motor unit to the right rear motor mounting screw).

(2) Remove the insulator cover from the terminal block on the keyboard or base, just to the left of the motor. Connect the motor leads to terminals 1 and 2 of this terminal block. Reinstall the insulator cover.

d. SET OF GEARS

(1) Remove the motor pinion gear and the intermediate driven gear from the small box stamped 173795 (65 wpm - 45.5 baud) or 163505 (106 wpm - 75 baud).

(2) Remove the screw and lock washer in the left end of the motor shaft. Position the 159287 isolator over the hub of the nylon gear, pressing the extensions of the isolator down into the holes of the gear hub. Slide the assembled gear and isolator over the motor shaft with the teeth toward the motor. Insert the two 161301 posts into the holes in the isolator, aligning them with the tapped hole in the motor shaft. Screw the posts down tight.

(3) Remove the two screws and lock washers from the hub on the right end of the intermediate gear shaft. Mount the intermediate driven gear on the shaft hub, with the flat side of the gear to the right. Secure the gear with the two screws and lock washers removed and make certain that the motor pinion gear and intermediate driven gear mesh together properly.

(4) To install the gear guard, mount it in position over the motor pinion and intermediate gear mechanism and secure it with the rear left motor unit screw.

e. KEYBOARD OR BASE - Place the keyboard or base (with its previously installed motor unit) on the cabinet base and secure it by means of the four studs provided on the base. Make electrical connection to base per appropriate wiring diagrams.

f. TYPING UNIT

(1) Install the type box on the typing unit if not previously installed.

CAUTION

The type box must be firmly seated on the bearing studs and the point of the latch toggle must be placed in the notch of the type box plate before moving the toggle to its latched position, to avoid springing the latch.

(2) Place the page typing unit on the keyboard or base. The front feet of the typing unit must be placed over the locating studs provided on the keyboard or base. Rotate the motor shaft by hand until the gears mesh properly. Secure the typing unit with the four remaining screws, with captive lock washers, from the bag attached to the keyboard or base.

NOTE

Insert a piece of bond paper between the selector magnet pole faces and the armature to soak up any lubricant which may have accumulated. When removing the paper, make sure no lint or bits of paper remain.

(3) For adjusting procedure, refer to Section 5 of this manual. The following adjustments should be made during initial installation of the set. They should also be checked on substitution of either a keyboard or base or typing unit at a later date.

(a) Mounting Typing Unit on Base

(b) Intermediate Gear Bracket

(c) Motor Speed (Governed Motor)

(d) Motor (Synchronous)

NOTE

When necessary to reset the thermal cut-out switch, wait at least five minutes before resetting.

g. COVER - Plug in the cable connectors and temporarily place the cable with the four-point receptacle over the typing unit platen. Install the cover, and position it by means of the three shoulder screws located at the sides of the cover mounting plate. Plug the four-point receptacle onto the connector located on the left side of the cover.

h. MECHANICAL CHECKING OF EQUIPMENT

(1) A visual check of all fuses, plugs, screw terminal connections, and lamps for looseness or breakage should be made before putting the equipment into operation. Also, position or secure all cords, cables and wires where necessary to keep them away from moving parts.

(2) Make certain that the power switch is in its OFF position before applying the main power to the equipment.

NOTE

For installation of paper and ribbons, refer to Section 3, Operator's Section.

i. PAPER WINDER PW201BR - The winder should be installed at this time, if one is required. It should be located to the rear of the set and securely mounted as per customer requirements. Refer to Section 4, paragraph 9f and figures 1-25 and 3-12 for further information.

2-4. OPERATING CHECKS

a. Type several lines of a sentence such as "The quick brown fox, etc." and check for accuracy.

b. The local line feed key (LOC LF), when depressed, should cause paper to be fed out of the machine approximately three times faster than when the line feed key is repeatedly operated.

c. The keyboard lock key (KBD LOCK), when depressed, should prevent operation of any other key except the local line feed, keyboard unlock and local carriage return keys. It should remain depressed until released by the keyboard unlock key.

d. The keyboard unlock key (KBD UNLK), when depressed, should unlock the keyboard.

e. The repeat key (REPT), when depressed with any other key lever except the local keys, should cause repeated transmission of the signal.

f. The local carriage return key (LOC CR), when depressed, should cause the carriage to return.

g. Determine that the operation of the FIGS key conditions the machine for the typing of upper case characters, and that the operation of the LTRS key conditions it for the typing of lower case characters.

h. Operate the FIGS key, and determine that operation of the space bar conditions the machine for the typing of lower case characters where this feature is desired. If this feature is not desired, disable the unshift-on-space mechanism by adjusting the unshift-on-space function pawl disabling screw as described in the Adjustment Section of this manual. (This feature is disabled on the LP77YD/AGM as shipped).

2-5. UNPACKING THE KSR EQUIPMENT

a. GENERAL - Refer to paragraph 2-2a for general unpacking instructions.

b. UNPACKING THE CABINET (LAC214-BR255) - Turn the cabinet carton upside down, and cut open the bottom sealed edges. Fold the carton flaps back. Remove the shipping pallet from the base of the cabinet by removing the four bolts, and lifting the pallet out of the carton. Turn the cabinet right side up and lift the carton up and off the cabinet. Remove the paper wrapping and any other packing material.

c. UNPACKING THE REMAINING CARTONS - Open the cardboard cartons, and carefully remove the remaining units, keeping associated parts and wiring instructions with their respective components.

2-6. INSTALLING THE KSR EQUIPMENT

a. CABINET (LAC214BR255)

(1) The cabinet has four adjustable mounting feet which permit a variation of up to one inch in height at each corner for the purpose of leveling the cabinet. Use a 3/4 inch open end wrench to make this adjustment. However, for permanent mounting, the four mounting feet can be removed and the tapped bushing can be used for securing the cabinet directly to a mounting surface. In selecting the mounting bolts to be used, be certain each bolt will engage all the threads in the tapped bushing. The proper bolt thread, and spacing between bolts is shown in figure 2-3.

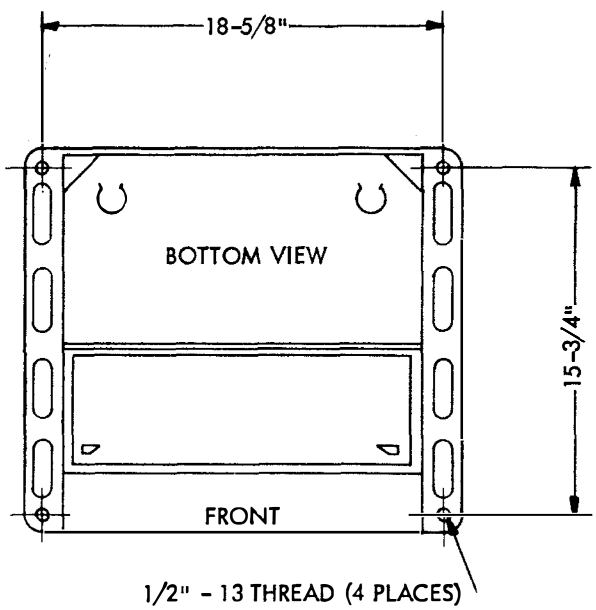


Figure 2-3. Cabinet (LAC214BR) Mounting Hole Spacing

NOTE

If the cabinet is to be fitted with the sub-base (154754BR), for stand-up operation, proceed in accordance with paragraphs a(2) through a(7) below. If no sub-base is to be used, disregard paragraphs a(2) through a(7) and start with paragraph a(8).

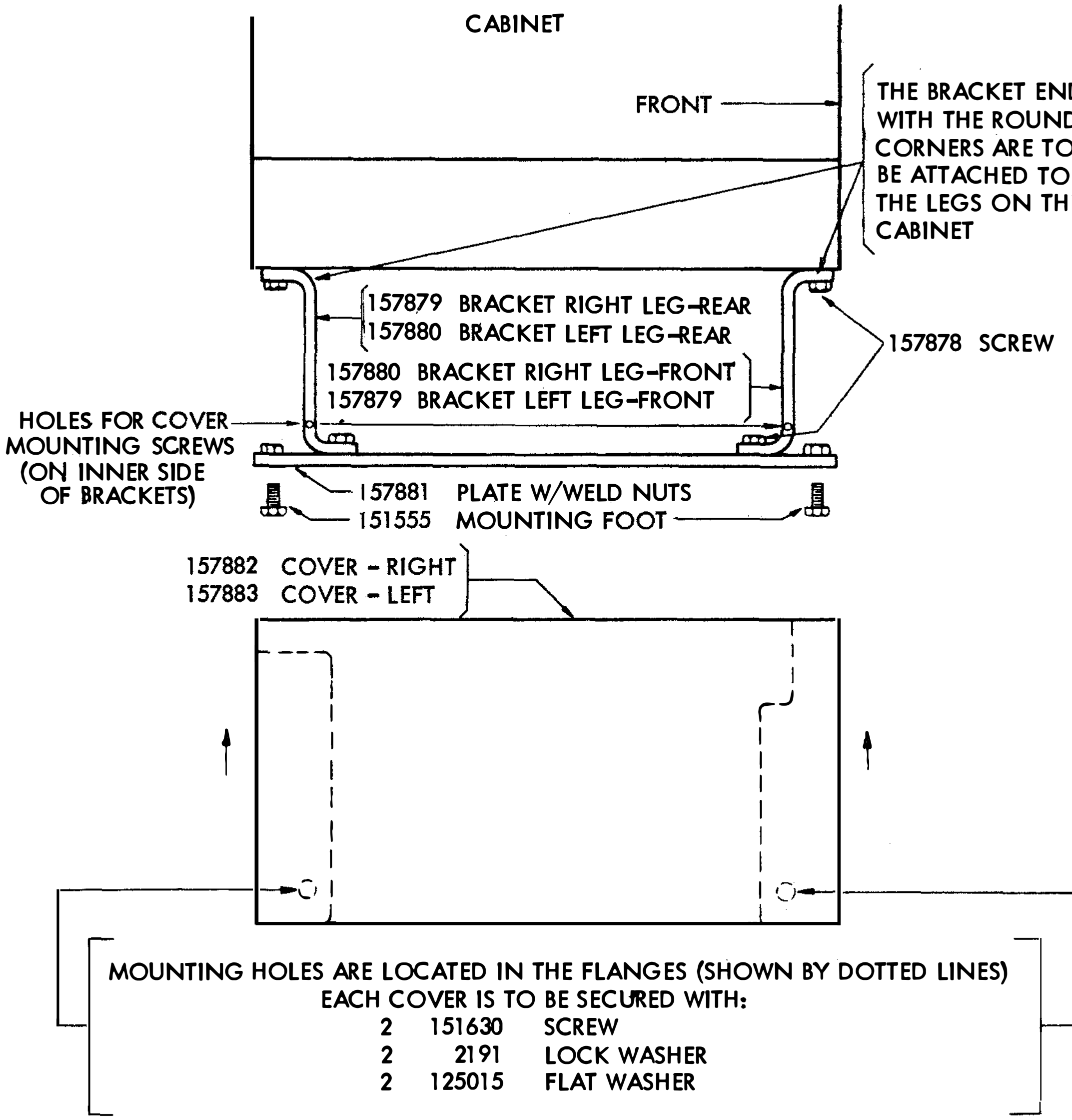


Figure 2-4. Sub-Base Installation

(2) Unpack the carton containing the sub-base (154754BR).

(3) Set the cabinet on its right side, on a support, so that both legs are accessible. Be careful not to dent the shell or mar the finish. Remove the four 151555 mounting feet. Refer to figure 2-4.

(4) Using the mounting holes from which the mounting feet were removed, assemble one 157879 bracket to the rear of the right leg (looking at the front of the cabinet) and one 157879 bracket to the front of the right leg, using the 157878 screws. Assemble one 157-881 plate (with the weldnuts toward the cabinet and the rounded corners outward) to the brackets using two 157878 screws.

(5) Using the mounting holes from which the 151555 mounting feet were removed, assemble one 157880 bracket to the rear of the left leg (looking at the front of the cabinet) and one 157879 bracket to the front of the left leg, using the 157878 screws. Assemble one 157881 plate (with the weldnuts toward the cabinet and the rounded corners outward) to the brackets using two 157878 screws.

(6) Carefully slip the 157882 cover over the brackets on the right side, and the 157883 cover over the brackets on the left side (with the rounded corners of both covers outward). Secure the covers to the brackets using the four 151630 screws, 2191 lock washers and 125015 flat washers.

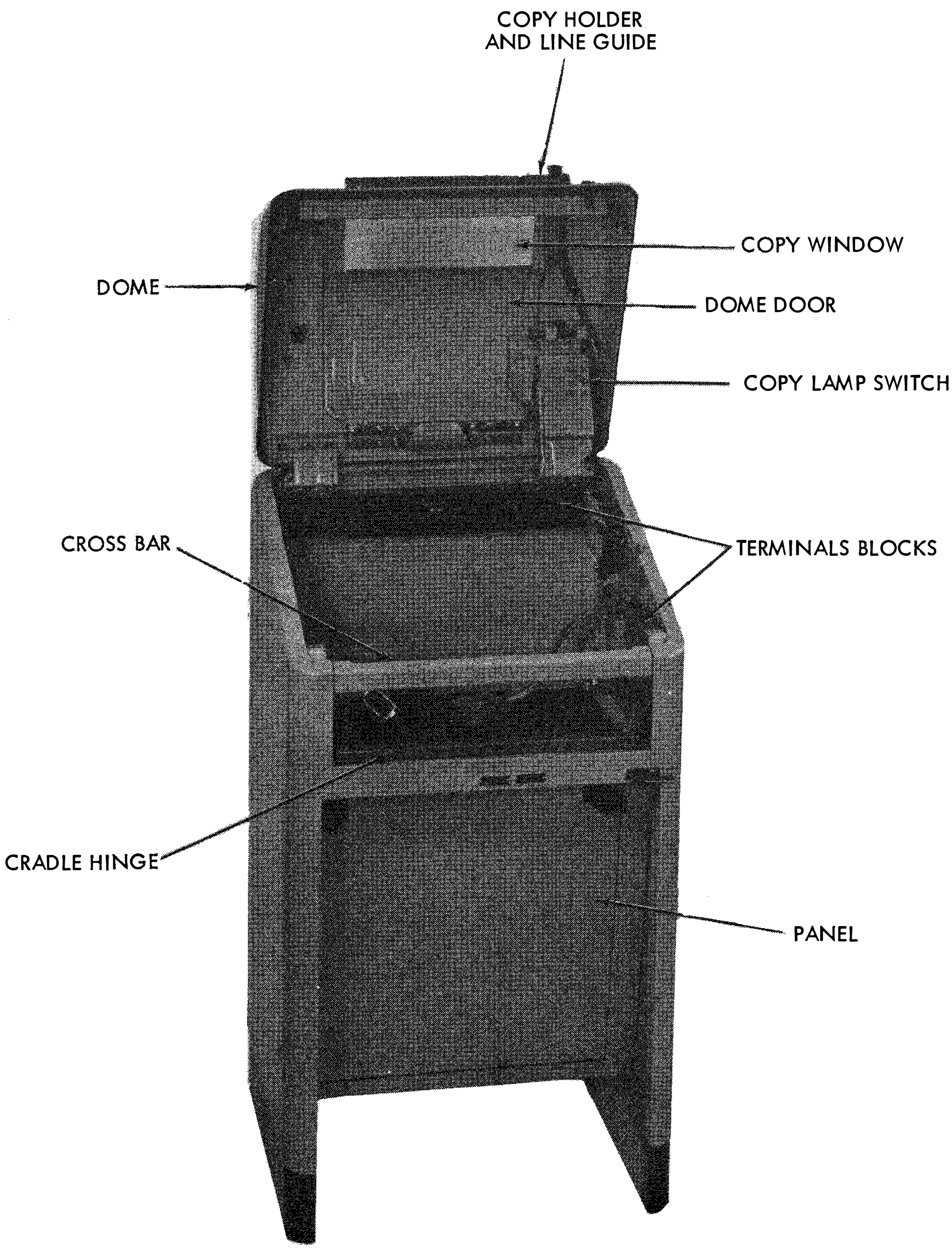


Figure 2-5. Cabinet LAC214BR

(7) Screw the four 151555 mounting feet, previously removed, into the weldnuts provided on the 157881 plates.

(8) Electrical Connection (Figure 2-5)

(a) Two holes, containing filler plugs, are provided in the rear corners of the floor of the printer compartment. Two additional holes, containing knockouts, are provided in the rear corners of the floor of the lower compartment. Electrical connections are made by opening these holes and feeding cables up from the bottom through the holes. These lines may enter through either the left or right hole.

(b) Connectors are provided for securing the cables at the input point to the cabinet, providing for strain relief. Electrical tape may be wound around the wires, at the clamping point, if additional thickness is required. The connectors are contained in a bag which is tied inside the lower compartment.

(c) A horizontal wiring channel with two terminal blocks extends across the upper rear panel of the printer compartment of the cabinet. The terminals are protected by insulating covers which are secured to posts in the channel by means of screws and lock washers. Remove the covers to expose the terminals so that set connections can be made.

(d) Make circuit connections to the cabinet and attach the various units comprising the Printer Set, in accordance with the applicable wiring diagram.

(e) A cabinet ground stud is provided above the right terminal block on the lid hinge mounting flange. A wire connected to the common station ground should be attached to the ground studs in each cabinet at the time of installation.

(9) Power Factor Correction - Install the power factor capacitors, if required, on the floor of the printer compartment. Use the existing holes and the four mounting screws, lock washers and flat washers provided. Wire in accordance with the applicable wiring diagram.

(10) The lower compartment door may be used as a maintenance tray, after the electrical service assembly is installed (see paragraph 2-66 for electrical service assembly installation).

(a) Loosen the two captive fasteners holding the top of the door in place, and open door. Remove the rod type hinge at the bottom of the door by sliding the rod to the right (compressing the spring), and removing the rod from the left slot. Remove the door.

(b) In initial use, remove the two 151-726 rubber bumpers which are in a bag tied to the hinge rod, and push them onto the front two upright projections of the electrical service assembly. The bumpers may be left permanently in place.

(c) With the printer out of the cabinet, insert the door (with the inside up and the hinge end to the rear) under the terminal block mounting strip. Lower the front (top) of the door until the handles of the door rest on the cross bar assembly. The rear of the door will then rest on the rubber bumpers mounted on the electrical service assembly. (See figure 2-6). The tray is now ready for use.

(d) Reverse the above procedure to put the door back in the lower section of the cabinet.

b. ELECTRICAL SERVICE ASSEMBLY

(1) With the cabinet dome raised, place the electrical service assembly in the rear of the cabinet, with the legs extending upward and the toggle switch toward the front of the cabinet. Secure the assembly in position with the two 151437 studs furnished. The fuse holder and power switch should be on the right side of the assembly when installed in the cabinet.

(2) Route the cabinet terminal block cables (coming from either side of the service assembly) behind their respective 74546 cable guides and connect them to the lower row of terminals on the cabinet terminal blocks. Make connections as shown on the applicable wiring diagram, allowing sufficient slack near the terminals.

(3) Connect the cabinet lighting, margin indicator, signal line and power line cables to the terminals as shown on the applicable wiring diagram.

(4) Remove the rear cross bar of the cradle assembly in the cabinet by removing its two mounting screws, lock washers and flat washers.

c. MANUAL SWITCH

(1) Untie the 151541 power switch shaft from the hinge bar and bracket. Remove the 151556 knob by loosening the two set screws.

(2) Insert the end of the 151541 shaft (from which the knob was removed) into the hole on the right front of the cabinet from the inside. Slide the shaft toward the rear so that the

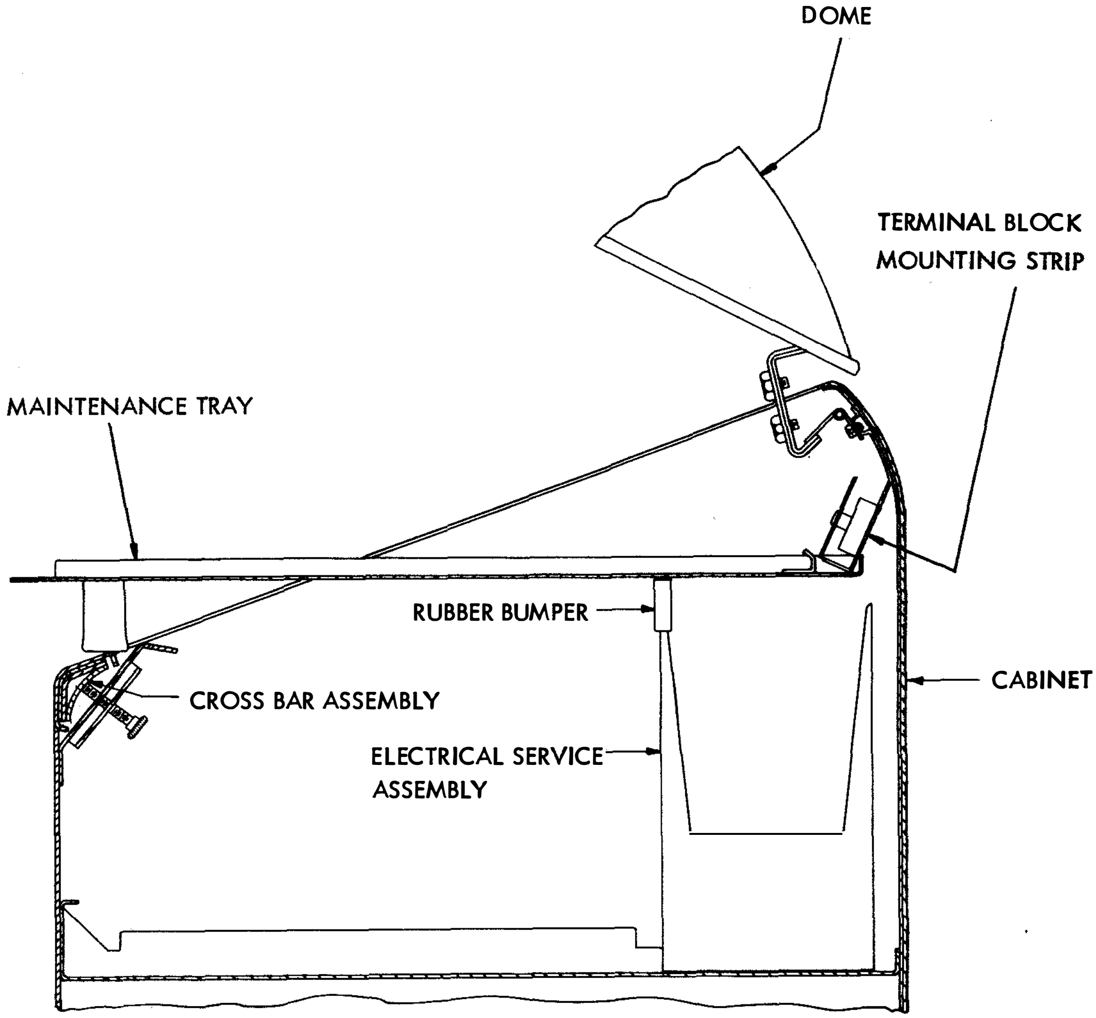


Figure 2-6. Maintenance Tray Arrangement of LAC214

bracket on the end of the shaft engages the power switch lever on the electrical service assembly, and the groove at the end of the shaft engages the edges of the pivot hole in the front right corner of the electrical service assembly chassis.

(3) Place the 151559 power switch shaft spring on the power switch shaft. Hook it in the side cradle rail of the cradle assembly.

(4) Replace the 151556 power switch knob on the shaft which protrudes through the cabinet, and keep the narrow portion of the knob to the right. Tighten the set screws. If the shaft is properly seated in the pivot hole, in the electrical service assembly, the shaft will not pull out.

(5) If servicing becomes necessary, the electrical service assembly may be turned upside down for servicing without removing any of the cabinet terminal block wiring and without removing the keyboard or typing unit from the cabinet. Tilt the keyboard forward so the base is latched, then remove the two 151437 studs holding the electrical service assembly in place. The assembly can be inverted by tilting it forward after removing the power switch shaft.

d. MOTOR UNIT - For installation instructions refer to paragraph 2-3c.

e. SET OF GEARS - For installation instructions refer to paragraph 2-3d.

f. KEYBOARD LK25BRW OR LK53BRW

(1) Remove the cross bar from the front of the cabinet by loosening the two thumb screws that secure it.

(2) Remove the two studs from the rear cross bar previously removed from the cradle assembly. (See paragraph 2-6b(4). Turn the rear cross bar so that its channel is down and the two tapped mounting holes are nearest the rear edge of the bar. Place the bar under the rear mounting holes of the keyboard, with the motor unit, and secure it with the two studs just removed.

(3) Remove the two studs from the front cross bar hinge. Place the keyboard on the cradle assembly in the cabinet. Loosen the two front cross bar mounting screws and position the bar in its elongated mounting holes so that the holes in the keyboard and tapped holes in the hinge are in alignment. Secure the keyboard to the front cross bar hinge by means of the two studs just removed.

(4) Replace the front cross bar in its mounting slots in the cabinet, with the wider side of the bar downward. Be careful not to jam the bar against the keyboard contact box. Tighten the two thumb screws.

(5) To seal the keyboard rubber sealing plate against the cabinet, push the keyboard toward the rear of the cabinet as far as possible. Hold it in this position and tighten the two front cross bar mounting screws. Check the seal fit-up to the cabinet. It should be snug all the way around with no curl-under points.

(6) Secure the rear cross bar to the cradle assembly by means of the two screws, lock washers and flat washers previously removed.

(7) Connect cable to keyboard terminal block for motor unit power.

(8) Insert the plug on the cable from the left end of the cabinet terminal board into the receptacle on the left rear corner of the keyboard until it is latched in position.

g. TYPING UNIT LP77YD/AGM OR LP77YD/AJV

(1) Install the type box on the typing unit if not previously installed. Observe caution noted in paragraph 3f(1).

(2) Install typing unit on keyboard as outlined in paragraph 3f(2). See NOTE also.

(3) For adjusting procedure, refer to Section 5 of this manual. Perform adjustments given in paragraph 3f(3) following initial installation.

h. COPY LAMP - Make certain the copy light shield does not interfere with the print hammer. If necessary, loosen the cabinet cross bar mounting screws and push the keyboard toward the rear for clearance.

i. MECHANICAL CHECKING OF EQUIPMENT

(1) A visual check of all fuses, plugs, screw terminal connections and lamps for looseness or breakage should be made before putting the equipment into operation. Position or secure all cords, cables and wires where necessary to keep them away from moving parts.

(2) Make certain that the power knob is downward to its OFF position before applying main power to the equipment.

j. LIGHTING FACILITIES - The light switch is located on a bracket attached to the right dome hinge and should be in the NORMAL ON position.

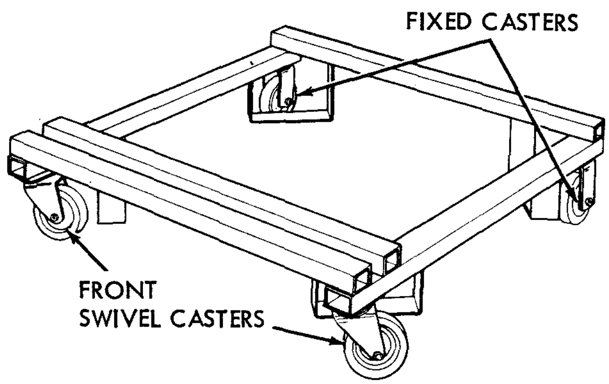


Figure 2-7. Dolly 173861

k. DOLLY (173861) - The dolly (figure 2-7), used with the KSR Console Set, is a simple tubular frame having casters, in which the cabinet can be placed for mobility of the equipment. It can be used with either the standard LAC214 or with the LAC214 modified with the sub-base for stand-up operation.

NOTE

For installation of paper and ribbons, refer to Section 3, Operator's Section.

2-7. OPERATING CHECKS - For instructions on checking the operation of the equipment, refer to paragraph 2-4.

2-8. UNPACKING THE ASR EQUIPMENT - Refer to paragraphs 2-2 and 2-5 for unpacking instructions. See figure 2-1 for overall dimensions of the ASR equipment.

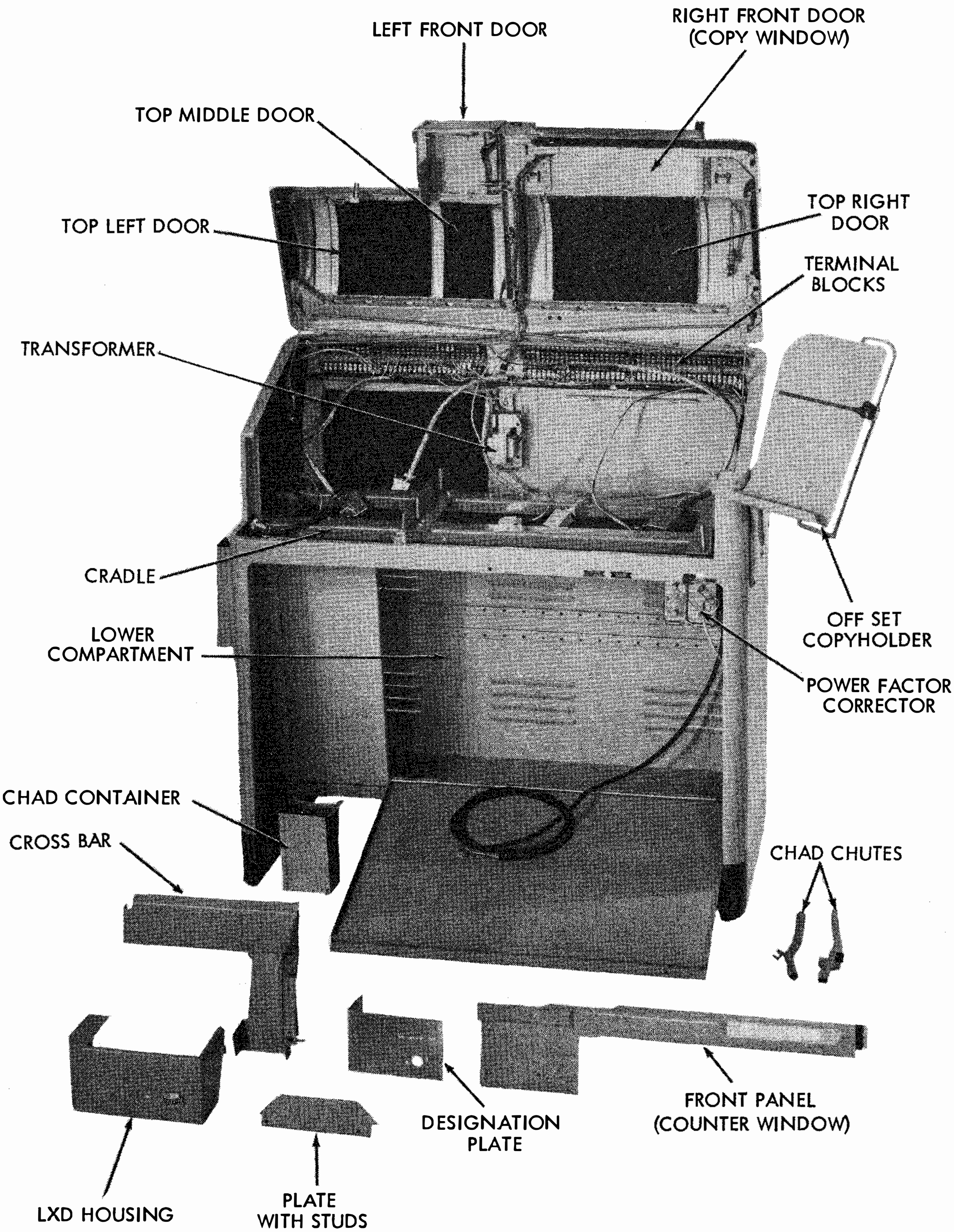


Figure 2-8. Cabinet LAAC229BR

2-9. INSTALLING THE ASR EQUIPMENT (Figure 2-8)

a. CABINET

(1) Refer to paragraph 2-6a(1) for mounting instructions, and figure 2-9. If the cabinet is to be modified for "stand-up" operation follow instructions of paragraphs 2-6a(2) through 2-6a(7) and figure 2-4.

(2) Chad Container

(a) Cut a rectangular hole in the felt insulation above the chad chute cutout in the cabinet upper compartment floor.

(b) Mount the 164277 right slide plate and 164593 left slide plate to the underside of the cabinet compartment on the shelf brace below the chad chute cutout. Use the 151631 screws, 2191 flat washer, 7002 lock washers and 3598 nuts to secure the plates.

(c) Using the slack in the mounting screw body holes position the left and right slide plates to allow the cabinet door to close without interfering with the chad container.

(3) Power Factor Corrector - Install the 173706 power factor corrector (for the printer motor) and the 173707 power factor corrector (for the auxiliary reperforator motor) in convenient locations on the mounting bracket provided on the back panel in the lower portion of the cabinet. Use the mounting parts furnished with the correctors for installation.

(4) Electrical Connections

(a) Two holes (remove filler plugs if present) are provided in the rear corners of the shelf of the apparatus compartment. Two additional holes, with cover plates containing knockouts, are provided in the rear of the shelf and the floor of the lower cabinet compartment. Electrical connections are made by opening these holes and feeding cords up from the bottom through the holes. The various circuits may enter through either the left or the right hole.

(b) Cable clamps are provided where necessary (in the bag tied inside the lower compartment) for securing the cords at the input point to the cabinet. Friction or electrical tape may be wound around the wires, at the clamping point, if additional thickness is required.

(c) A horizontal wiring channel with terminal blocks extends across the upper rear position of the printer compartment of the cabinet. These terminals are protected with insulating covers that are secured to posts in the channel by means of screws and lock washers.

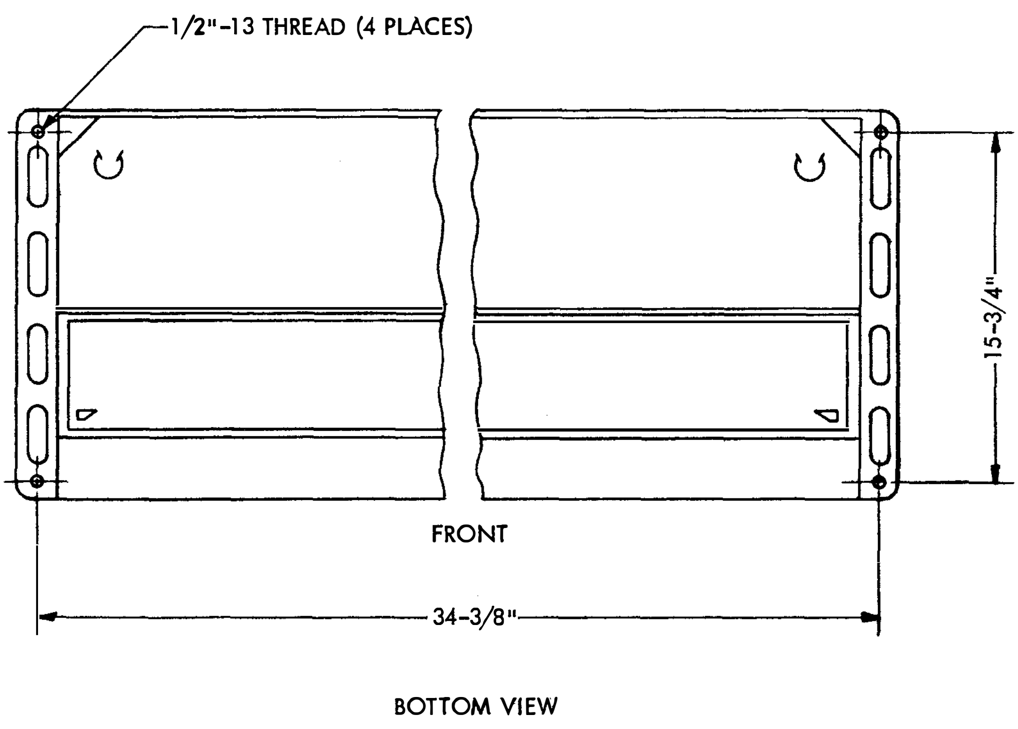


Figure 2-9. Cabinet (LAAC229BR) Mounting Hole Spacing

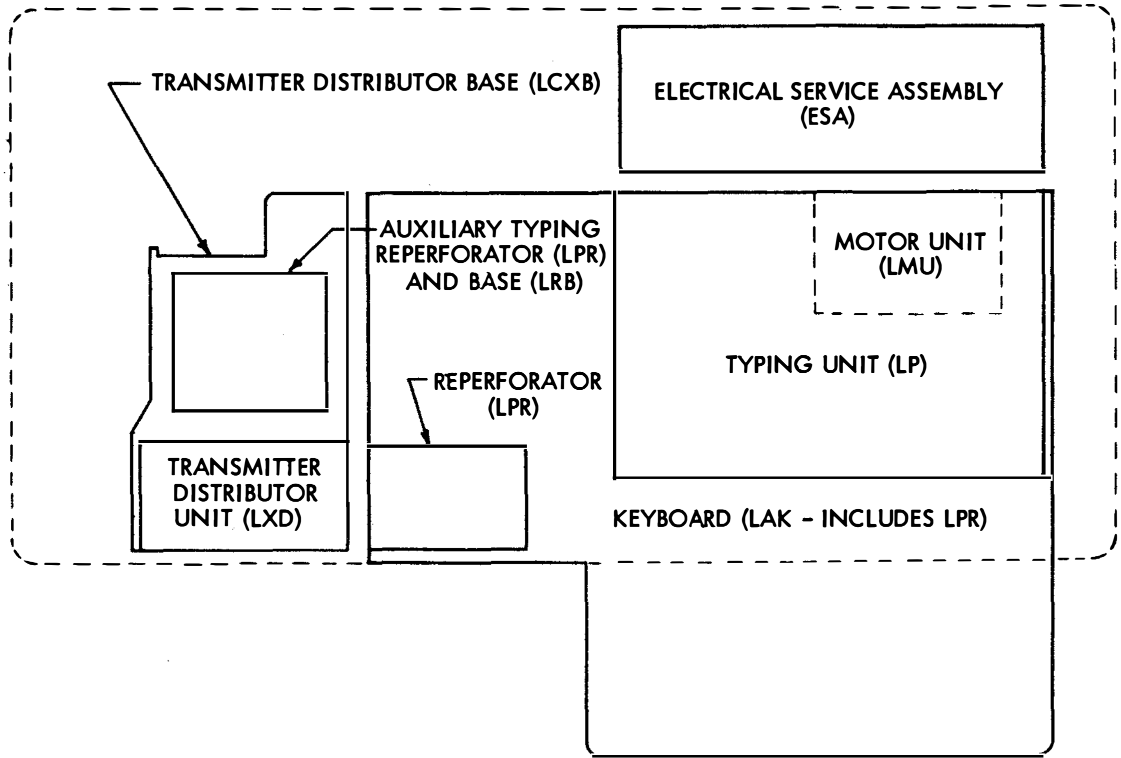


Figure 2-10. Location of Components of ASR Set

(d) Connect cables to cabinet terminal blocks in accordance with the applicable wiring diagrams.

(e) A wire connecting to the common station ground should be attached to one of the knockout cover mounting screws on the lower shelf of the cabinet.

b. ELECTRICAL SERVICE ASSEMBLY

NOTE

The electrical service assembly should be installed in the cabinet before the keyboard with typing reperforator are installed.

(1) Locate the power switch shaft under the right side of the cradle, so that the knob end protrudes through the hole provided in the right front of the cabinet. The shaft must rest in the spring clip provided (mounted on the rear channel of the cradle), and the bracket must be to the rear of, but just touching, the rear channel of the cradle.

(2) Place the electrical service assembly in the rear of the cabinet, with the legs extending upward and the name plates toward the front. Fasten with two 151437 studs, furnished with the assembly.

(3) Route and connect the cabinet terminal block cables in accordance with the appropriate wiring diagram.

(4) Route the page printer, keyboard with typing reperforator and transmitter distributor unit cables to the approximate location of the connectors on their respective units.

(5) Fasten the 154444 fork to the bracket end of the power switch shaft with the screws, lockwashers and washers provided. Place the fork end over the power switch on the electrical service assembly, and locate the shaft in the hole on the right side of the service assembly container. Be certain that the groove in the end of the shaft engages the side of the hole in the container. Fasten the knob to the shaft by means of its set screw so that the narrow end is to the right.

c. KEYBOARD WITH TYPING REPERFORATOR (LAK21BRW/LPR36BWA), or (LAK33BRW/LPR57BWA), or (LAK47BRW/LPR57BRP), Motor Unit (LMU12, or 14, or 39), Typing Unit (LP77YD/AGM or LP77YD/AJV), (Figures 2-8, 2-10 and 2-11).

(1) Initial assembly and adjustment before installation in the cabinet.

(a) Remove the gear guard tied to the keyboard, then remove four 151678 screws (with captive lock washers) from the bag also

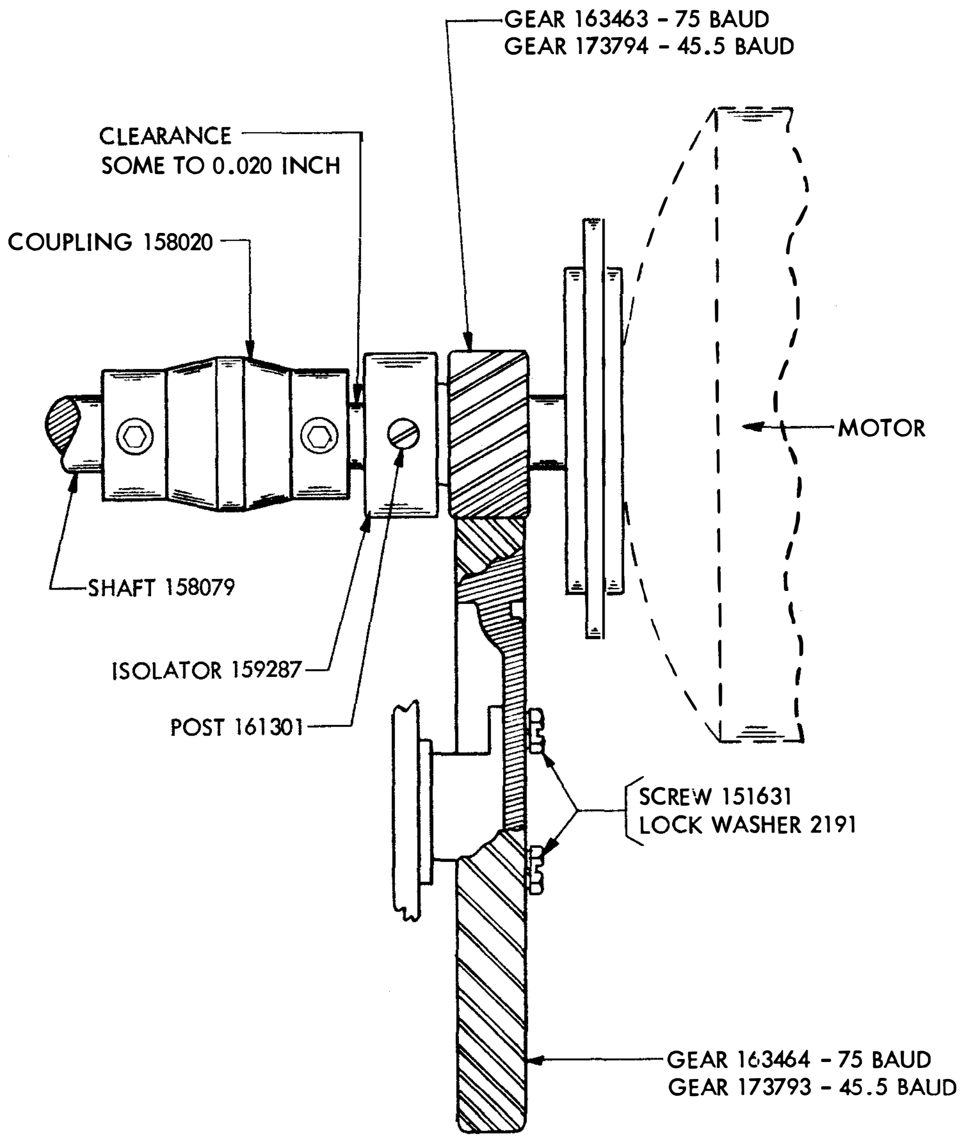


Figure 2-11. Keyboard Intermediate Gear Assembly

tied to the unit. Secure the motor unit to the keyboard base with three of the four screws with lock washers. At this time, omit the left rear screw holding the motor to the base.

(b) Remove the insulator cover from the terminal block on the keyboard reperforator transmitter base, just to the left of the motor. Connect the motor leads to terminals 1 and 2 of this terminal block.

(c) Assemble the speed change gear set for the desired speed of operation to the shafts of the motor and intermediate gear bracket as follows and as shown in figure 2-11. Nylon gear set 163505 provides 75 baud (106 wpm - 7 unit code) operation, and nylon gear set 173795 provides 45.5 baud (65 wpm - 7 unit code) operation.

1. Install the 159287 isolator in position over the hub of the pinion. Press the extensions of the isolator down into the holes in the gear hub. Remove and discard the screw and lock washer in the motor shaft. Apply a light film of grease to the motor shaft. With the teeth toward the motor, slide the assembled gear and isolator over the motor shaft. Insert the two 161301 posts into the holes in the isolator, align with the tapped hole in the motor shaft, and screw them down tight.

2. Remove the two 151631 screws and 2191 lock washers from the hub on the right end of the intermediate gear shaft. Place the driven gear (flat side toward the right) on the shaft, mesh with the pinion, and secure to the hub using the two screws and lock washers.

3. Apply a light film of KS7471 grease to the gear teeth. Reinstall the gear guard (removed in paragraph 2-9c(1)(a) above) using the remaining 151678 screw (with captive lock washer).

4. Remove the 158020 flexible coupling and 159079 shaft from the bag attached to the keyboard. Place the coupling on the shaft. Slide the other end of the shaft into the coupling on the bearing bracket assembly. Position the couplings (maintain some to 0.020" clearance between the coupling and the motor pinion to decrease transmission of sound) and tighten the set screws (figure 2-11).

NOTE

A straight edge applied to the center of the rear bearing bracket cross-shaft should also extend through the center of the intermediate and motor shafts. If necessary, refine the rear bearing alignment of the reperforator shaft alignment adjustment to meet this requirement.

(d) Typing Unit to Keyboard Base - Place the typing unit on the keyboard base and make certain that the front feet of the typing unit are placed over the locating studs provided on the base. Rotate the motor shaft by hand to get the gear teeth to mesh. Secure the typing unit to the base using four 151678 screws (with captive lock washers) found in the bag tied to the keyboard unit.

(e) Typing Unit to Signal Generator - There should be a perceptible amount of backlash between the signal generator gear and the typing unit main shaft gear. To adjust, remove the signal generator and add or remove shims at the rear generator mount. Replace the signal generator and tighten the screws.

(f) Intermediate Gear to Typing Unit Gear - There should be a barely perceptible amount of backlash between the typing unit main shaft gear and the intermediate gear at the highest point of the intermediate gear. To adjust, loosen the three hex head mounting screws so that the bracket is held friction tight. Position the complete intermediate gear assembly by utilizing the adjusting slot to the rear of the bracket. Tighten the screws.

(g) Motor Pinion to Intermediate Gear - There should be a barely perceptible amount of backlash between the motor pinion and the intermediate gear at the highest point of the intermediate gear. To adjust, raise or lower the front end of the intermediate gear bracket by means of the adjusting and clamping screws located at the front end of the bracket. Refine this adjustment and the typing unit gear adjustment, if necessary, in order to obtain quiet operation. Tighten the screws.

(h) Assemble the speed change gear set for the desired speed of operation to the keyboard reperforator. Gear set 163502 provides 75 baud (106 wpm - 7 unit code) operation, and gear set 173992 provides 45.5 baud (65 wpm - 7 unit code) operation. Apply a light film of KS7471 grease to the gear teeth.

(2) Keyboard Assembly Installation into Cabinet. (See figures 2-8, 2-10 and 2-11)

(a) Remove the typing unit from the keyboard base.

(b) Using the 151152 screws, 3640 lock washers, 90560 shims and 104807 flat washers, mount the 164279 chad chute to the keyboard reperforator punch block.

1. Mount the 90560 shims under the 104807 flat washers.

2. The 164278 chad chute with bracket is then mounted to the keyboard base with the existing screw, lock washer and flat washer.

(c) Remove the 154496 front panel from the cabinet by removing two 111017 screws, lock washers and washers at the left end of the panel and loosening the thumb screw (inside cabinet) at the right end of the panel. Slide panel out to the left.

(d) Remove the four 105029 flat washers from the bag attached to the LCXB base. Place one of these washers over each of the keyboard mounting holes in the cradle rails.

CAUTION

The 105029 flat washers are used as spacers to raise the keyboard perforator transmitter an equal amount with the LCXB base, which is to be installed subsequently. Failure to install these washers will result in serious misalignment in the LCXB shafting, leading to early fatigue of the flexible coupling at this point. Conversely, the same condition will result if a "shimmed up" keyboard unit is used with an LCXB base which has not been raised by the isolation bushings.

(e) Using the four studs provided (in the bag attached to the keyboard unit), fasten the keyboard to the cradle assembly. Make certain that the mounting studs have secured the 105029 flat washers.

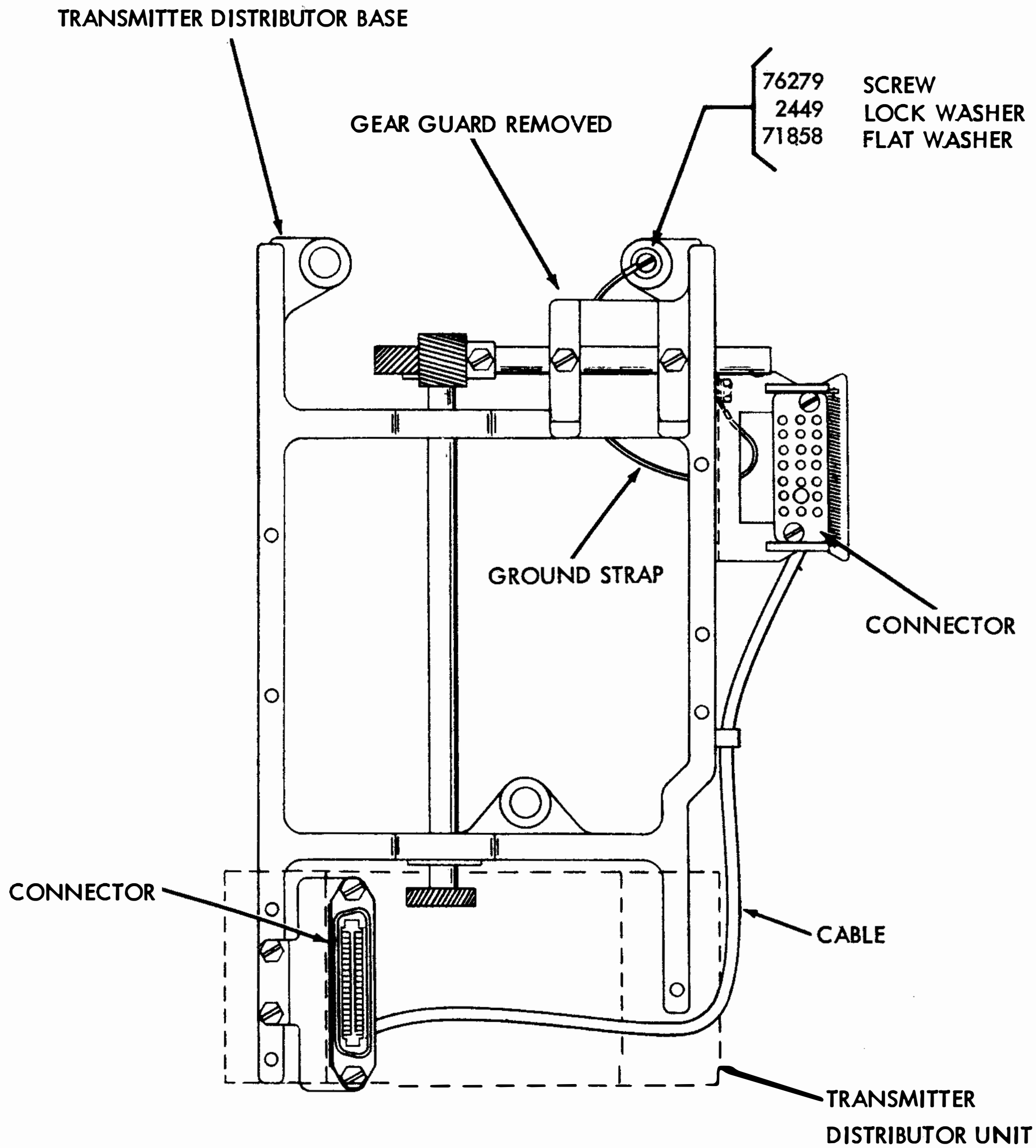


Figure 2-12. Transmitter Distributor Unit and Base Arrangement

NOTE

Before reinstalling the typing unit, insert a piece of bond paper between the selector magnet pole faces and the armature to soak up any lubricant which may have accumulated. When removing the paper, make sure no lint or bits of paper remain.

(f) Reinstall the typing unit on the keyboard base in accordance with paragraph 2-9c-(1)(d).

(3) Electrical Connection - The electrical service to the keyboard comes through the cable from the terminal blocks at the rear of the cabinet. Insert the plug that terminates this cable into the connector at the middle rear of the keyboard. Push down until plug is latched into position in the receptacle.

d. **TRANSMITTER DISTRIBUTOR UNIT (LXD11 or LXD31) and BASE (LCXB13) - Figures 2-8, 2-10, 2-12, 2-13, 2-14)**

(1) Assemble the speed change gear set for the desired speed of operation to the transmitter distributor base. Gear set 163454 provides 75 baud (106 wpm - 7 unit code) operation, and gear set 173776 provides 45.5 baud (65 wpm - 7 unit code) operation. Apply a light film of KS7471 grease to the gear teeth.

(2) Remove the three 164101 shoulder studs and 163517 rubber bushings from the bag attached to the LCXB base. Insert and tighten

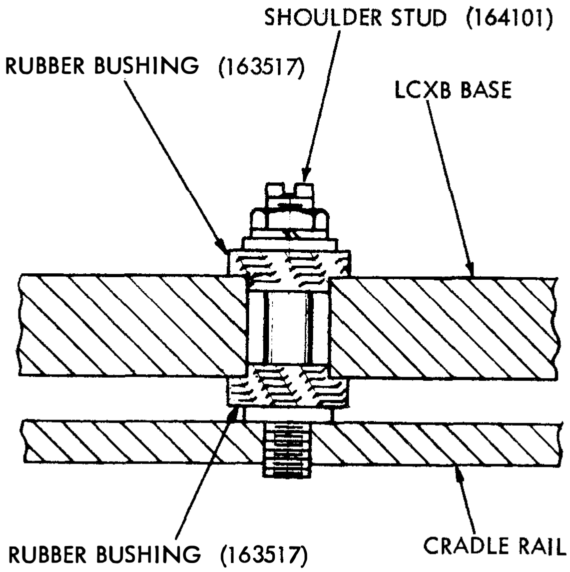


Figure 2-13. Mounting Transmitter Distributor Base

the three 164101 shoulder studs in the LCXB base mounting holes in the cradle rails. Install one 163517 rubber bushing (smaller diameter up) over each stud. (See figure 2-13.)

(3) Position the LCXB base over the three studs so that the smaller diameter of the bushings extend into the mounting holes of the base, and the base rests on the shoulders of the bushings. Route the ground strap which is connected at one end to the LCXB base connector mounting screw, forward and under the base, then to the rear under the rear cradle rail where it will connect to the rear base mounting stud (see CAUTION under paragraph 2-9d(5).

(4) Remove the remaining three 163517 rubber bushings from the bag attached to the LCXB base. Install these three bushings (smaller diameter down) on the three studs so that the smaller diameter of each extends downward into the base mounting holes (figure 2-13).

(5) Remove the 158024 coupling assembly and three each of 103305 flat washer, 2669 lock washer and 74807 nut from the bag attached to the LCXB base. Place a 103305 flat washer, 2669 lock washer and 74807 nut on each stud.

CAUTION

Connect the terminal of the 117366 ground strap to the right rear shoulder stud, above the 103305 flat washer, then add the 2669 lock washer and 74807 nut. (Figure 2-14.)

Do not tighten the nuts. In order to prevent transmission of vibration, the terminal or wire should not touch the LCXB base casting, and the wire should be slack. If necessary, bend the terminal upward for clearance. See figures 2-13 and 2-14. Install the 158024 coupling assembly to the keyboard shafting.

(6) Three 151632 screws, 2191 lock washers and 125015 washers are provided in the bag attached to the LCXB base for mounting the transmitter distributor unit on the base. Mount the transmitter distributor unit and tighten the mounting screws to friction tightness. No vertical adjustment of the unit is needed. Be sure to properly seat the mating connectors on the transmitter distributor and its base before installing the mounting screws.

(7) Mount the two 154486 springs on the four studs in the 154485 cover using two 7002 washers, 2191 lock washers and 3598 nuts.

(a) Place the 154485 housing in position by sliding the tongue under the bracket held loosely on the front bar. Snap the housing in place by manipulating the two detents on the sides of the housing. Isolate the housing from the unit (0.062" to 0.125") when the rear edges of the housing are secured by the detents against the left front cross bar. If the cover is not held securely, remove and readjust the spring detents in or out the required amount to satisfy the adjustment. Tighten the nuts and recheck. Tighten all screws.

(b) Install the 160291 plate on the left cross bar using the slotted hole opposite the reperforator with two 7002 washers, 2191 lock washers and 3598 nuts.

(8) Utilize the play in the transmitter distributor base mounting holes to line up the driving shaft, coupling shaft and keyboard power shafting. Check with a straightedge. Tighten the transmitter distributor base mounting screws and coupling screws.

(9) Adjust the lateral position of the transmitter distributor unit on the base so that the gears are in alignment and there is a minimum amount of backlash between the gear teeth at the closest point. Tighten the screws.

(10) Reinstall the 154496 front panel (being careful not to damage the counter) removed in paragraph 2-9c(2)(c). There should be a minimum of 1/32" clearance between the transmitter distributor unit and the cabinet. A minimum clearance of 1/32" is also required between the transmitter distributor unit side and top plates and the housing. To obtain these clearances (required for reducing noise level),

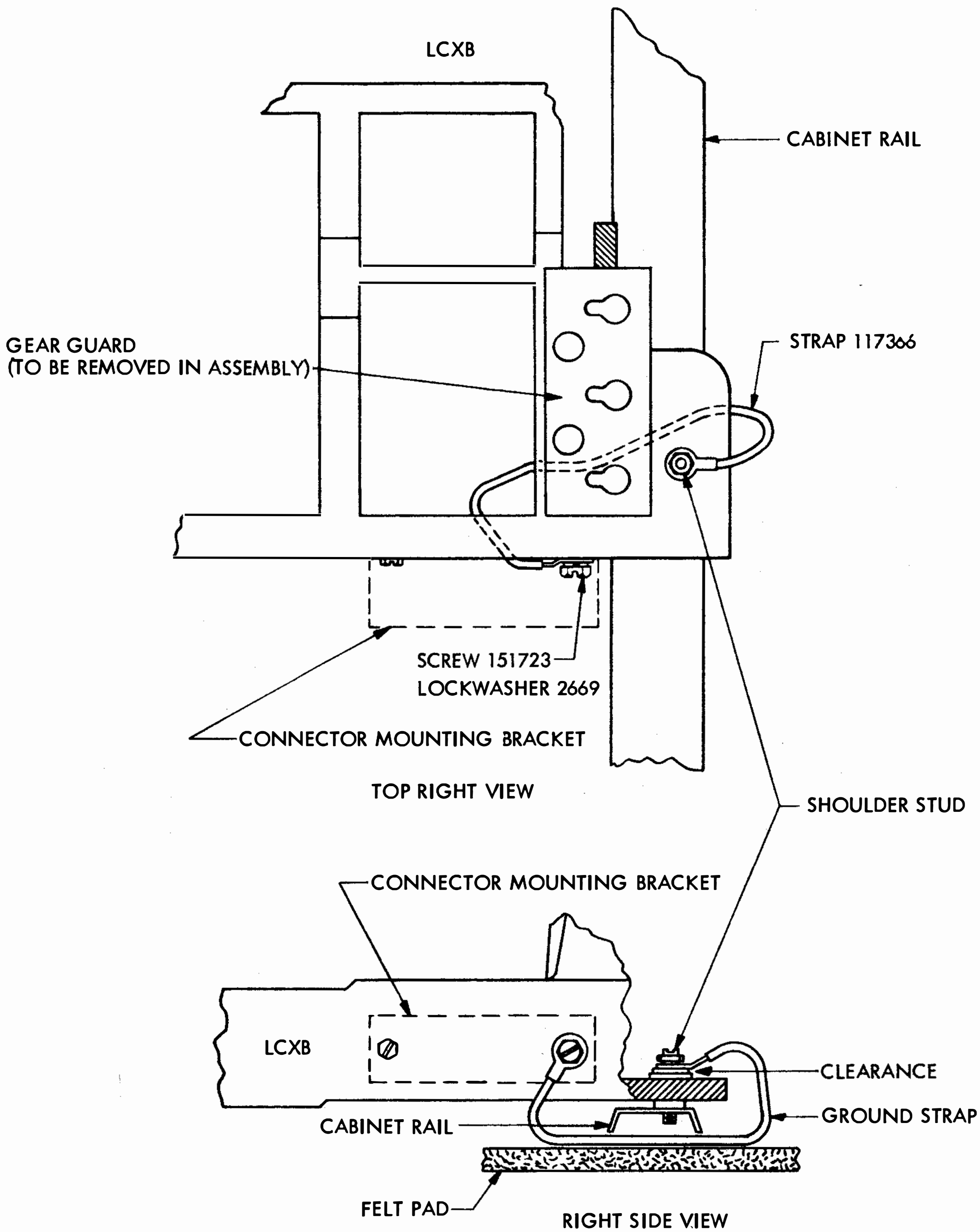


Figure 2-14. Transmitter Distributor Base Ground Strap Arrangement

adjust the housing detent springs and/or reposition the cradle. See Section 5, Adjustments.

NOTE

To aid in the reduction of the noise level, the units must not touch the cabinet at any point, thereby preventing transmission of vibrations to the cabinet.

(11) Install the 158695 designation plate (to the left of the keyboard) using two 6344 screws and 2191 lock washers. All of these parts are furnished with the cabinet.

e. **AUXILIARY TYPING REPERFORATOR (LPR35BWA) or (LPR35BRP) and BASE (LRB32) (Figures 2-15 and 2-16)**

(1) Mounting Typing Reperforator on base.

(a) Screw the two 161777 mounting studs into the rear rail of the cabinet cradle assembly.

(b) Screw the one 161778 mounting stud into the transmitter distributor base casting. Assemble the 84354 washer to the 161778 stud before threading it into the base casting.

(c) Fasten the 176288 tape guide, with bracket, to the 161800 bracket and place the 151572 star washer between them. Use the 151632 screw, 2191 lock washer, 125015 flat washer and 154076 nut plate. Tighten friction tight.

(d) Mount the 161800 bracket with its assembled parts to the base plate of the LRB unit using the two 151631 screws, two 2191 lock washers and two 125015 flat washers. Tighten friction tight.

(2) Remove and discard the 158271 gear guard on the transmitter distributor base.

(3) Assemble the speed change gear set for the desired speed of operation to the shafts of the gear bracket assembly on the reperforator base as shown in figure 2-15. The mounting hardware is provided in a bag tied to the LRB base. Nylon gear set 163451 provides 75 baud (106 wpm - 7 unit code) operation, and nylon gear set 173820 provides 45.5 baud (65 wpm - 7 unit code) operation. Apply a light film of KS7471 grease to the gear teeth.

(4) Remove the gear bracket assembly.

NOTE

Before installing the motor unit - if the leads on the motor unit, as received, are threaded through the hole in the motor mount bracket, pull them out as they should not be routed through the hole when the unit is installed.

(5) Mount the 161783 gear (found in bag tied to base) on the motor shaft using the 159-287 isolator and two 161301 posts also found in the bag tied to the base.

(6) Install the motor unit LMU3 or 4 on the auxiliary reperforator base using the following parts found in a bag tied to the base: four 162730 screws, three 2449 lock washers, four 3226 washers, four 92146 nuts and two 82832 star lock washers. Place one star lock washer against the anodized aluminum surface of the motor bracket and one against the painted surface on the bottom of the base so as to ground the motor bracket to the base. Connect the motor leads to the terminal block as indicated in the appropriate wiring diagram. It is necessary to remove the tape container to reach these terminals with a screw driver. Replace the tape container leaving the screws friction tight for later adjustment.

(7) Replace the gear bracket assembly mounting screws friction tight and position the assembly up or down until there is a barely perceptible amount of backlash between the motor pinion and the driven gear at the closest point. Tighten the screws.

(8) Mount the 161804 tape guide on the auxiliary typing reperforator as follows: remove and discard the screw in the location shown in figure 2 - 16 and mount the tape guide using the 151442 screw and 7002 washer furnished (in bag tied to base) and the existing mounting parts as shown in figure 2-16.

(9) Mount the 156400 sprocket (found in bag tied to base) on the typing reperforator using the mounting hardware on the hub. The screw heads and lock washers should be on the side of the deeper inset of the sprocket.

(10) Mount the 170837 chad chute to punch block using the 151152 screws, 3640 lock washers, 90560 shims and 104807 flat washers. Mount the 90560 shims under the 104807 flat washers.

(11) Mount the auxiliary typing reperforator on the base as follows:

(a) Remove, from the bag tied to the base, three 153537 screws, three 76461 washers, four 2191 lock washers, one 151631 screw and one 125015 washer.

(b) Position the reperforator over its mounting studs in the base.

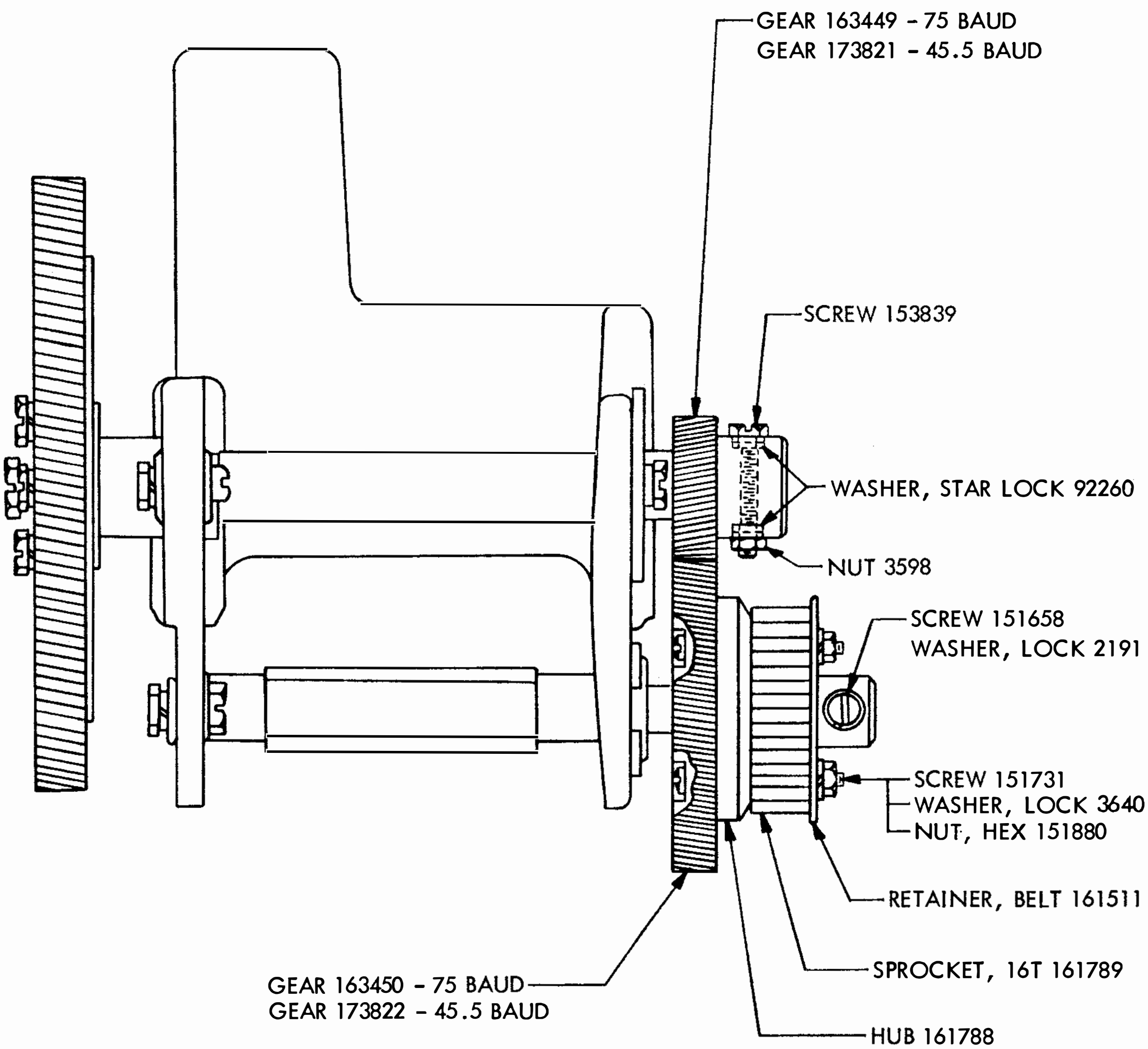


Figure 2-15. Speed Change Gears on Auxiliary Reperforator Base

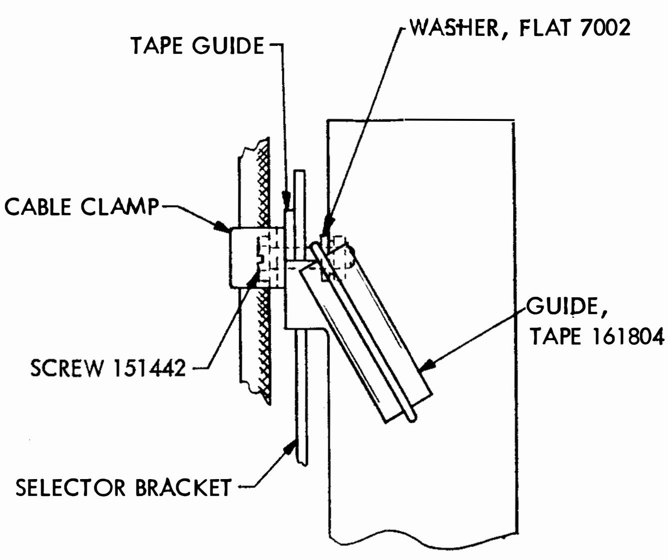


Figure 2-16. Tape Guide Mounting for Auxiliary Reperforator

(c) Loosen the screw holding the small "L" shaped anchor bracket to the right front of the punch.

(d) Start the 151631 screw with 2191 lock washer and 125015 washer through the "L" shaped anchor bracket into the proper tapped hole in the base plate. Do not tighten the screw.

(e) To allow for maximum accessibility for a screw driver to the rear 153537 mounting screw, position the push bar bail of the reperforator to its rearmost position. Start the three 153537 screws with 2191 lock washers and 76461 washers through the holes in the reperforator casting and into the proper tapped studs in the base "T" shaped plate. Do not tighten the screws.

(f) Remove the timing belt from the bag tied to the base and place it over the sprockets. Take up the slack in the belt by moving the reperforator away from the motor. The belt should have just enough slack so that a light pressure (8 oz.) applied midway between the sprockets will cause the belt to deflect approximately 1/8". Tighten the three 153537 mounting screws. Check timing belt deflection.

(g) Hold the "L" shaped anchor bracket so that it rests squarely against the reperforator and base plate and tighten the screw that secures the anchor bracket to the base plate. Tighten the screw that secures the anchor bracket to the reperforator.

(12) Place the base (with reperforator and motor) on its mounting posts and secure with three 162730 screws, two 2449 lock washers, three 3226 washers and one 82832 star lock washer. Place the star lock washer next to the upper painted surface of the base under the left front mounting screw.

(13) Mount the 164273 chad chute, with bracket, and the 164275 chad chute, with bracket, respectively above and below the LRB base plate. Use the 151631 screws, 2191 lock washers, 7002 flat washers and 158215 nut plate to secure the assembly.

(14) Route and connect the 161886 cable (found in bag tied to base) as follows: place the 161818 receptacle connector over the 161817 plug connector and tighten the associated knurled lock nut. Route the cable forward and down, past the right side of the transmitter distributor unit drive shaft, to the right, under the right side of the transmitter distributor base casting and left and right keyboard cradle rails, then up to the cabinet terminal block. Connect in accordance with appropriate wiring diagram.

(15) Install the 173778 control panel assembly in place of the blank panel in the cabinet dome using existing mounting parts.

(16) Adjust the tape guide so that it is in alignment with the hole in the control panel when the dome is closed. If the tape snags on the edge of the hole, loosen the three adjusting screws and readjust the tape guide. Tighten the three adjusting screws.

(17) Position the tape container so that a full roll of tape may be inserted through the access door in the dome of the cabinet. Tighten the screws.

f. MISCELLANEOUS INSTALLATION INSTRUCTIONS

(1) Cradle

(a) The cradle in the cabinet is factory adjusted (no load) for nominal squareness and parallelism with respect to the cabinet. Two locating eccentrics are positioned against the rear rail. The cradle may have to be repositioned after the units are installed in order to level the equipment and obtain a flush fit with respect to the cabinet. Be careful not to damage the counter on the keyboard.

NOTE

To aid in the reduction of the noise level, the units must not touch the cabinet at any point, thereby preventing transmission of vibrations to the cabinet.

(b) Should it be necessary to raise or lower the cradle after the units are installed, loosen the lock nuts on the right front and the two rear vibration mounts, and the lock nut on the lower end of the stud in the left front vibration mount. Raise or lower the cradle by turning the studs. Tighten the lock nuts while holding the studs in position.

(c) Should it be necessary to move the cradle forward or backward after the units are installed, loosen the four screws holding the front and rear rails and the two screws securing the eccentrics. Move the cradle as necessary; tighten the four rail mounting screws; position the eccentrics against the rear rail and tighten their mounting screws.

(2) Apply a thin film of grease to all newly installed gears. Use standard KS7471 lubricant.

(3) Make a visual check of all fuses, plugs, screw terminal connections and lamps for looseness or breakage. Also position, or secure all cords, cables and wires where necessary to keep them away from moving parts.

(4) Make certain that the power switch is in its "OFF" position before applying main power to the equipment.

(5) Refer to Operator's Section for instructions for installing paper and ribbon in the page printer.

(6) A thumb wheel is provided on the tape feed wheel shaft for starting or advancing the tape manually. Turn the thumb wheel to the left.

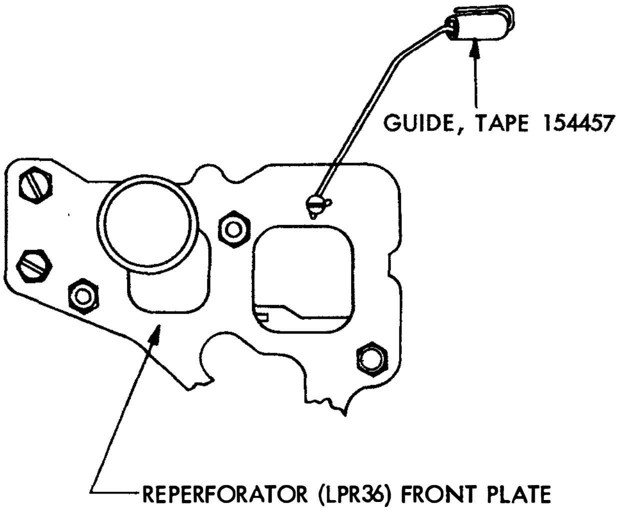


Figure 2-17. Tape Guide Mounting for Keyboard Reperforator

(7) Mount (friction tight) the 154457 tape guide (with roller to the right) on the front of the keyboard typing reperforator unit using the screw, lock washer and washer on the hex shaft which holds the tape entry chute as shown in figure 2 - 17. Position the 154457 tape guide (by means of its mounting screw) in approximately a 60 degree angle. Thread the tape from the top of the roll of tape, over the roller of the tape guide and into the tape entry chute. Refine the adjustment and reform the tape guide, as necessary, so that the tape flows freely. Tighten the screw.

(8) For auxiliary typing reperforator, thread the tape from the bottom of the roll of tape, over the roller of the tape guide on the tape container, over the roller of the 161804 tape guide and into the tape entry chute. Position and/or reform the tape guides, as necessary, so that the tape flows freely. Tighten the screws.

g. LIGHTING FACILITIES - The incoming power is controlled by a three - position switch located inside the cover and tucked away just to the left of the lid opening for the printer.

(1) "OFF" - Lights off.

(2) "NORMAL ON" - Lights on, excluding end-of-line lamp when printer set is operating.

(3) "MAINTENANCE ON" - Lights continuously on, except end-of-line lamp.

2-10. OPERATING TESTS

a. KEYBOARD POSITION (K)

(1) Manually depress each key and determine that the proper character is printed or proper function is performed.

(2) The "LOC LF" (local line feed) key, when depressed, should cause paper to be fed out of the machine at approximately three times the speed obtained when the "LINE FEED" and "REPT" (repeat) keys are continuously depressed.

(3) The "REC" (keyboard lock) key, when depressed, should cause the signal generator to be shunted, preventing signal generation (check this action on the page printer). It should remain depressed until released by the "SEND" (keyboard unlock) key.

(4) The "SEND" (keyboard unlock) key, when depressed, should remove the shunt from the signal generator.

(5) The "REPT" (repeat) key, when depressed together with any other key except the local function keys, should cause repeat transmission of the associated code combination.

(6) The "LOC CR" (local carriage return) key, when depressed, should cause the carriage to be returned.

(7) The "Blank" key, when alternately depressed with any other key except the local function keys, should not lock the keyboard. Depression of the "Blank" key twice in succession should operate the keyboard lock; making it necessary to depress the "SEND" (keyboard unlock) key to resume keyboard transmission.

b. KEYBOARD - TAPE POSITION (K-T)

(1) Manually depress each key and determine that the correct character is printed on the page printer and perforated in the tape.

(2) When the "Blank" and "REPT" (repeat) keys are depressed simultaneously, the tape should feed-out without interruption.

(3) When the "E" and "REPT" keys are depressed simultaneously, the character counter should count without missing. The end-of-line indicator should light at its preset count. When the "CAR RET" (carriage return) key is depressed, the counter should return to zero. When the "E" key is again depressed, the counter should count one character.

(4) The electrical keyboard lock should be operative.

(5) The transmitter distributor unit should be operative. Accuracy of transmission should be tested using tape and monitoring the transmission on the page printer.

c. TAPE POSITION (T)

(1) Depress the "Blank" and "REPT" keys simultaneously. The tape should feed out of the punch at high speed without interruption.

(2) Depress the "E" and "REPT" keys simultaneously. The character counter should count without missing, and the end-of-line indicator should light at its preset count. Depressing the "CAR RET" key should cause the counter to return to zero, and the end-of-line indicator to shut off. When the "E" key is again depressed, the counter should count one character.

2-11. INSTALLING THE 199915 MODIFICATION KIT TO MODIFY TELETYPEWRITER AN/UGC-13 TO 7.42 UNIT CODE AND 45.5, 50, OR 74.2 BAUD SPEED NON-POLAR OPERATION.

a. THE 199915 MODIFICATION KIT CONSISTS OF:

2	50138S	Specification
1	150441	Gear
1	152766	Gear Set
1	154032	Sleeve, Gear
1	154154	Cam
1	156836	Cam Shaft
1	158027	Gear Set
1	158029	Gear Set
1	158712	Gear, Helical (26T)
1	158716	Gear, Helical (39T)
1	161293	Gear Set
1	161295	Gear Set
1	161356	Gear Set
1	163023	Gear Set
1	163025	Gear Set
1	163440	Gear
1	163457	Gear Set
1	163590	Gear
1	178885	Plate, Index
1	199912	Plate, Identification

b. INSTALL THE MODIFICATION KIT AS FOLLOWS:

(1) On Keyboard LAK21BRW (MX-3312/UG) replace:

(a) 163519 gear sleeve with 154032 gear sleeve.

(b) 163368 cam with 154154 cam.

(c) 163460 gear with 163440 gear.

(d) Present gear set with 161293 (60 wpm), 152766 (67 wpm), or 161295 (100 wpm) gear set.

(2) On Automatic Typer LP77YD/AGM (MX-3311/UG) replace:

(a) 163503 gear with 150441 gear.

(b) 163459 gear and 150440 hub (if present) with 163590 gear.

(3) On Typing Reperforator LPR36BWA (TT-316/UG) replace the present gear set with the 163023 (60 wpm), 163457 (67 wpm), or 163025 (100 wpm) gear set.

(4) On Reperforator Base (Aux.) LRB32 (MT-2422/UG) replace:

(a) 179963 gear with 158712 gear.

(b) 179962 gear with 158716 gear.

(c) 192680 index plate with 178885 plate.

(5) On Distributor-Transmitter LXD11 (TT-311/UG), replace the 164285 cam shaft with the 156836 cam shaft.

(6) On Base LCXB13 (MT-2452/UG), replace the present gear set with the 158027 (100 wpm), 161356 (67 wpm), or 158029 (60 wpm) gear set.

(7) Remove backing from the 199912 identification plate and apply plate (on clean surface) below the existing overall set plate.

2-12. UNPACKING THE MULTIPLE KSR AND RO SET EQUIPMENT - Refer to Paragraph 2-2 for unpacking instructions. See Figure 2-1 for overall dimensions of the set.

2-13. INSTALLING THE MULTIPLE KSR AND RO SET EQUIPMENT

a. CABINET

(1) On the upper two bases an LMU21 Motor Unit is installed on each of the base plate assemblies. The LMU21 Motor Unit is secured to the base assembly by four 104124 screws and four 2449 lockwashers, which are found in the muslin bag tied to the base assembly.

(2) Select the proper gear set for the desired operating speed. Gear sets are listed below:

SPEED	7.42 UNIT CODE GEAR SET NO.	7.00 UNIT CODE GEAR SET NO.
60 wpm	161293	173795
75 wpm	161294	163504
100 wpm	161295	163505

Install the 159287 isolator on the motor pinion. Place the pinion on the motor shaft so that the isolator is away from the motor. Secure the pinion to the motor shaft with two 161301 posts. Remove the two 151631 screws and two 2191 lockwashers from the intermediate gear assembly. Mount the driven gear on the intermediate gear assembly and secure it with the two 151631 screws and two 2191 lockwashers. Adjust the gear mesh so that there is between 0.004 inch and 0.008 inch backlash between the motor pinion and the driven gear. To adjust gear mesh loosen the four screws which mount the intermediate gear assembly to the base plate. Position the gear assembly to meet the requirements. Re-tighten mounting screws. Connect power leads of the motor to terminals 1 and 2 of the motor terminal block as shown on associated wiring diagrams.

NOTE

Before installing typing unit on base, untie copy display rack from printer front plate assembly. Loosen the paper display rack clamp screws. Rotate rack to approximately a vertical position and tighten clamp screws.

(3) Mount the typing unit on the base assembly, being sure the locating studs on the base are through the locating holes in the front legs of the typing unit. Rotate the motor hand wheel to insure the typing unit and intermediate gears are meshed. Secure the typing unit to the base plate assembly by four 25123 screws, four 2449 lockwashers and four 2864 flat washers. Adjust the gear mesh between the typing unit and intermediate gear shaft assembly so that there is barely perceptible backlash between the driven gear of the typing unit and the driving gear of the intermediate gear assembly. To adjust, loosen the clamp screw in the front of the intermediate gear. Adjust gear mesh by raising or lowering intermediate gear shaft assembly by means of the adjusting screw. Retighten clamp screw. Check motor gear mesh adjustment. Loosen the five screws which mount the paper winder assembly. Center the paper winder reel behind the typing unit supply reel. Tighten the mounting screws.

NOTE

On the upper typing unit, it may be necessary to readjust the vertical position of the copy display set of parts to obtain the correct clearance to the top fixed cover.

The preliminary adjustment is made with the top set of slides in their closed position, loosen the eight mounting screws for the slides. Position the closed slides to the forward-most position in their mounting slots. Loosen the two screws and two nuts which mount the copy display assembly to the typing unit side frames. Position the copy display assembly to its uppermost position. The final adjustment of the copy display assembly of the top typing unit to the top fixed panel so there is a clearance of approximately 1/16 inch between the top roller of the copy display assembly and the return of the top fixed panel. Adjust by positioning the closed slides toward the rear and the copy display assembly down as needed; however, be sure there is a clearance of at least 0.030 inch between the leading edge of the paper fingers of the copy display assembly and the ribbon guides of the type box on the typing unit when the type box is in its uppermost position. Tighten all mounting screws and nuts.

(4) To install the keyboard it will be necessary to install the 179294 brackets on the 179293 Keyboard Panel using four 151631 screws, four 7002 flat washers, four 2191 lockwashers and the two 179304 nut plates. Leave screws friction tight.

(a) Remove the outer two screws which mount the rubber keyboard seal. Mount the 179293 Keyboard Panel and brackets on the keyboard using two 80342 shoulder screws, two 2669 lockwashers and two 84579 flat washers. Leave screws friction tight.

(b) Mount the 179298 Mounting Bracket on the left side of the keyboard so that the leading edge of the bracket is inside the returns of the keyboard panel using two 179303 screws, two 2449 lockwashers, two 2846 flat washers, and two 3598 nuts. Leave screws friction tight.

(c) Mount the 179297 Mounting Bracket on the right side of the keyboard so that the leading edge of the bracket is inside the returns of the keyboard panel using two 179303 screws, two 2449 lockwashers, two 2846 flat washers and two 3595 nuts. Tighten these screws.

(d) Mount paper winder assembly on the 179297 and 179298 Mounting Brackets behind the keyboard, using four 153442 screws, six 111516 flat washers, four 45815 lockwashers and four 125231 nuts.

(e) Mount the keyboard and paper winder on the lower set of slides. Position the left mounting bracket so that the slide does not bind when it is pulled out or pushed in. Tighten the mounting screws on the left side.

(f) Refer to the adjustment section for adjustments of the keyboard panel and bottom cover.

(g) Install the LMU3 Motor Unit on the keyboard. Secure the motor unit to the base using four 151678 screws and four 2449 lockwashers.

(h) Mount the typing unit using four 151678 screws and four 2449 lockwashers.

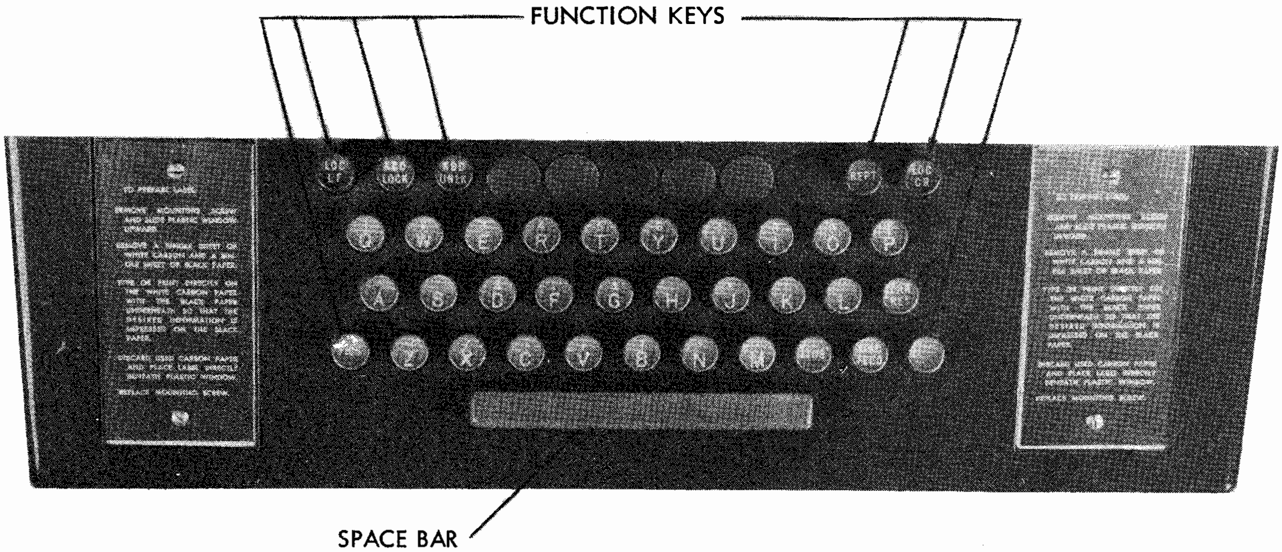
(5) To bolt cabinet to the floor, remove mounting panel and plate floor. Bolt cabinet to the floor (customer is to supply mounting hardware), replace floor in cabinet and replace mounting panel.

CAUTION

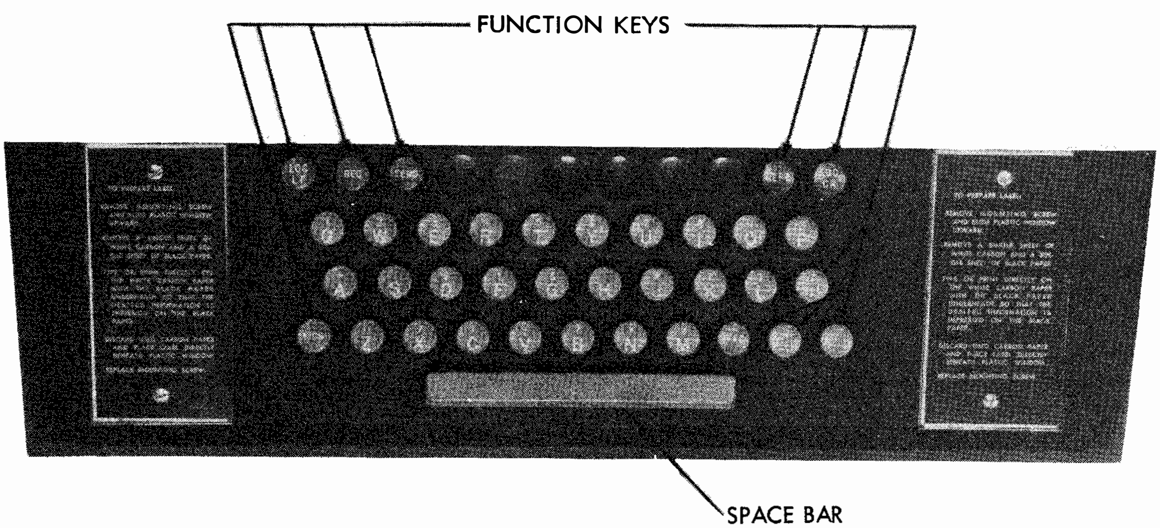
This cabinet must be bolted on a level floor.

(a) Remove shipping bolts which tie inner frame to outer shell.

(b) Refer to adjustment section for associated adjustments.



KSR KEYBOARD



ASR KEYBOARD

Figure 3-1. Keyboard Keys

SECTION 3
OPERATOR'S SECTION

3-1. INTRODUCTION

The Model 28 Teletypewriter Sets are designed to serve as complete, self-contained receiving centers, or as receiving and originating centers for use in electrically exchanging intelligence between two or more points.

a. The Automatic Send-Receive (ASR) Sets, floor model or rack mounted Send-Receive (KSR) Sets and Multiple Keyboard Send-Receive (KSR) and Receive Only (RO) Sets provide means for receiving typewritten page messages and manually originating messages between two or more stations which are similarly equipped, and connected by a telegraph or radio channel. The ASR Set, in addition, provides facilities for automatic transmission at maximum available line speed through a transmitter distributor, and manual preparation of fully perforated, typed tape either at line speed using the LP Typing Unit as a monitor, or at an unmonitored off-line maximum speed of up to 106 words per minute A keyboard selector switch determines the mode of operation. In addition to these functions, the ASR Set utilizes an auxiliary typing reperforator to record incoming standard communications symbols in the form of perforated, typed tape, independent of either on-line or off-line functions of the keyboard, typing unit, keyboard typing reperforator, or transmitter distributor The ASR keyboard typing reperforator can also receive and record incoming messages in the form of perforated, typed tape, independent of the other components of the set, with appropriate wiring of its selector magnet.

b. The keyboards of the ASR and KSR Sets are similar to that of a conventional typewriter, the teletypewriter keyboard, however, having only three rows of conventional keys. A fourth row of keys (red) and several of the standard keys (green) are intended for non-typing functions (see figure 3-1) either in on-line or off-line service. The left hand key in the upper row (LOC LF) is an example of a key for a non-typing function (line feed) used only to operate local equipment (off-line). The left hand key in the bottom row (FIGS) is an example of a standard key intended for a non-typing function (shift to figures or upper case characters) used to operate all equipment on the signal line, including local equipment (on-line).

c. The teletypewriter is arranged for operation on five level start-stop permutation code signals electrically transmitted at 75 or 45.5 Baud (see figure 4-1). Conversion from one speed to another requires gearing changes.

d. The platen is held stationary, except for rotation for paper feeding, while the type box carriage and printing carriage advance from left to right during the typing process (See figure 3-2.). Non-typing functions such as the return of the carriage for starting a new line, the case shifting operations, and line feed are performed automatically as a result of signals that originate either at a distant station or at the local keyboard. The keyboard must be operated with a uniform rhythm in order to prevent omission errors in the copy due to speed in excess of that for which the machine is adjusted.

e. In addition to being used for preparation of page printed copy, the keyboard, on the ASR Set only, is also used to operate the keyboard typing reperforator in order to prepare fully perforated typed tape. The tape is prepared by mechanical linkage between the keyboard and a keyboard typing reperforator when the selector switch (figure 3-3) is in the (T) mode of operation. Typing is done by a printing hammer which impresses tape and inked ribbon against a selected character on a cylindrical type wheel embossed with standard communications symbols comparable to those in the type box carriage. The printed character occurs six units after the point at which the five-level code for the character is punched into the tape by the perforator. Speeds in excess of the maximum line speed are possible for tape preparation only in the tape (T) mode of operation of the keyboard, but a uniform rhythm is required at any speed to minimize operator induced error in tape perforation. The perforated tape, when fed through the transmitter distributor, will initiate a line signal identical to any signals stored in the tape, for transmission in full or in part at any time after tape preparation.

f. The Receive Only (RO) Set is similar to the KSR Set, except that parts required for transmitting messages are not provided. Typewritten page messages, therefore, can only be received. In contrast to the number of functions that can be performed by a sending and receiving teletypewriter, only two off-line functions can be performed by an RO Set. These non-typing functions (Carriage Return and Line Feed) are provided so that they can be operated locally when required.

3-2. AUTOMATIC SEND-RECEIVE (ASR) SET OPERATION

a. ON-LINE FUNCTIONS

(1) GENERAL - Turning the main power switch, at the right of the keyboard, to its up-

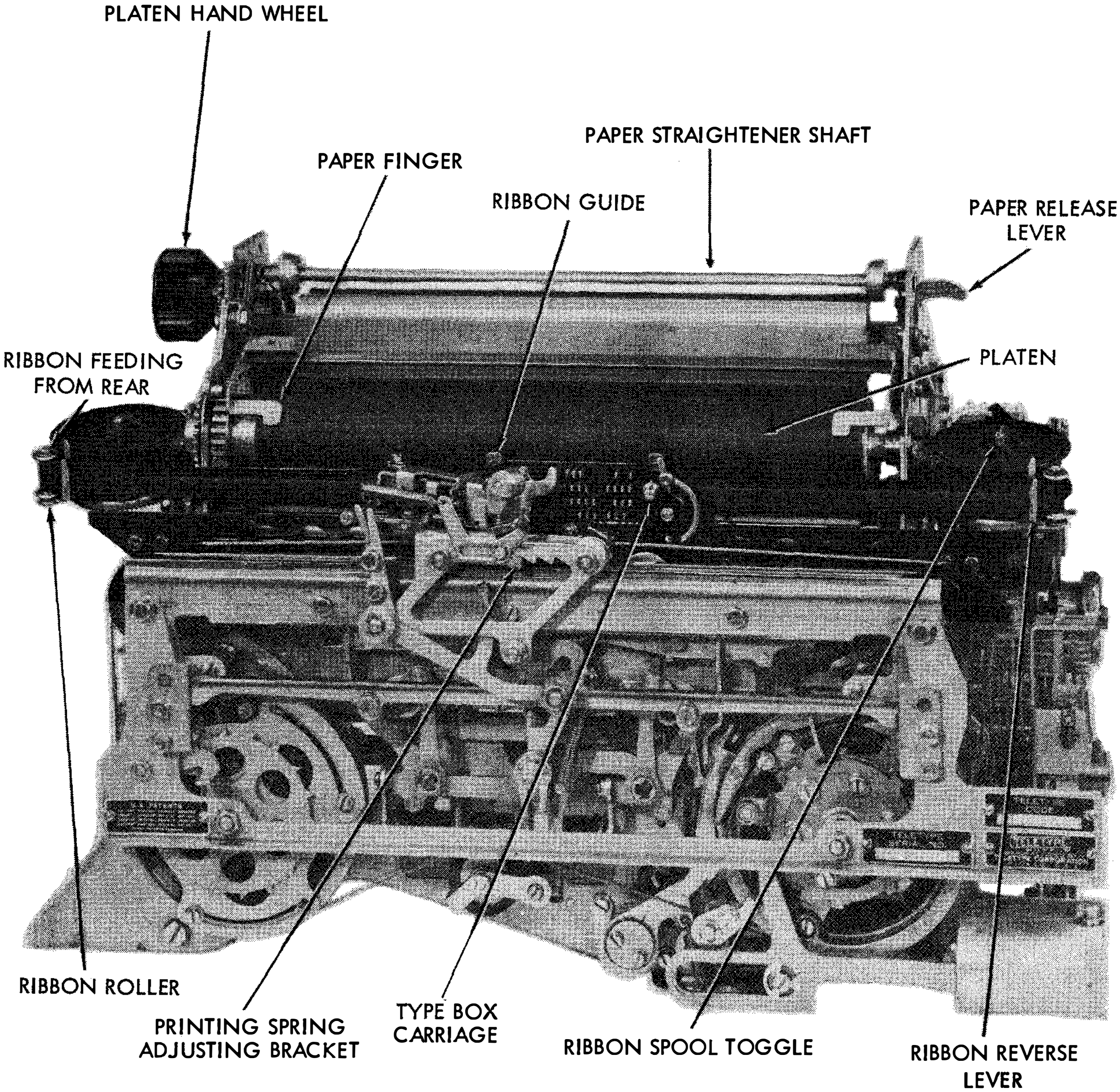


Figure 3-2. Typing Unit Paper and Ribbon Mechanisms

per position, "ON," fully conditions the teletypewriter for on-line service in one of the three modes of operation determined by the selector switch at the left of the keyboard. In the keyboard (K) mode of operation, service of the basic equipment is confined to sending or receiving messages through the keyboard and typing unit, with transmission monitored by the typing unit. In the keyboard-tape (K-T) mode, in addition to on-line service through the keyboard and typing unit, the transmitter distributor can initiate transmission signals monitored by the typing unit when the SEND key on the keyboard is depressed. Tape preparation in this mode of operation is an on-line function with simultaneous transmission of the message. In the tape (T) mode, on-line service is limited to transmission through the transmitter distributor, monitored by the typing unit. Tape preparation is an off-line function (see paragraph 3-2b). Tape preparation in the auxiliary typing reperforator, however, is an on-line operation (See paragraph 3-2a(3).

(2) KEYBOARD, TYPING UNIT, AND TRANSMITTER DISTRIBUTOR - The on-line functions operable through the basic teletypewriter equipment are initiated by operation of the keyboard, by transmitter distributor generation of a signal from coded information stored in a perforated tape, or from a signal received from a distant station.

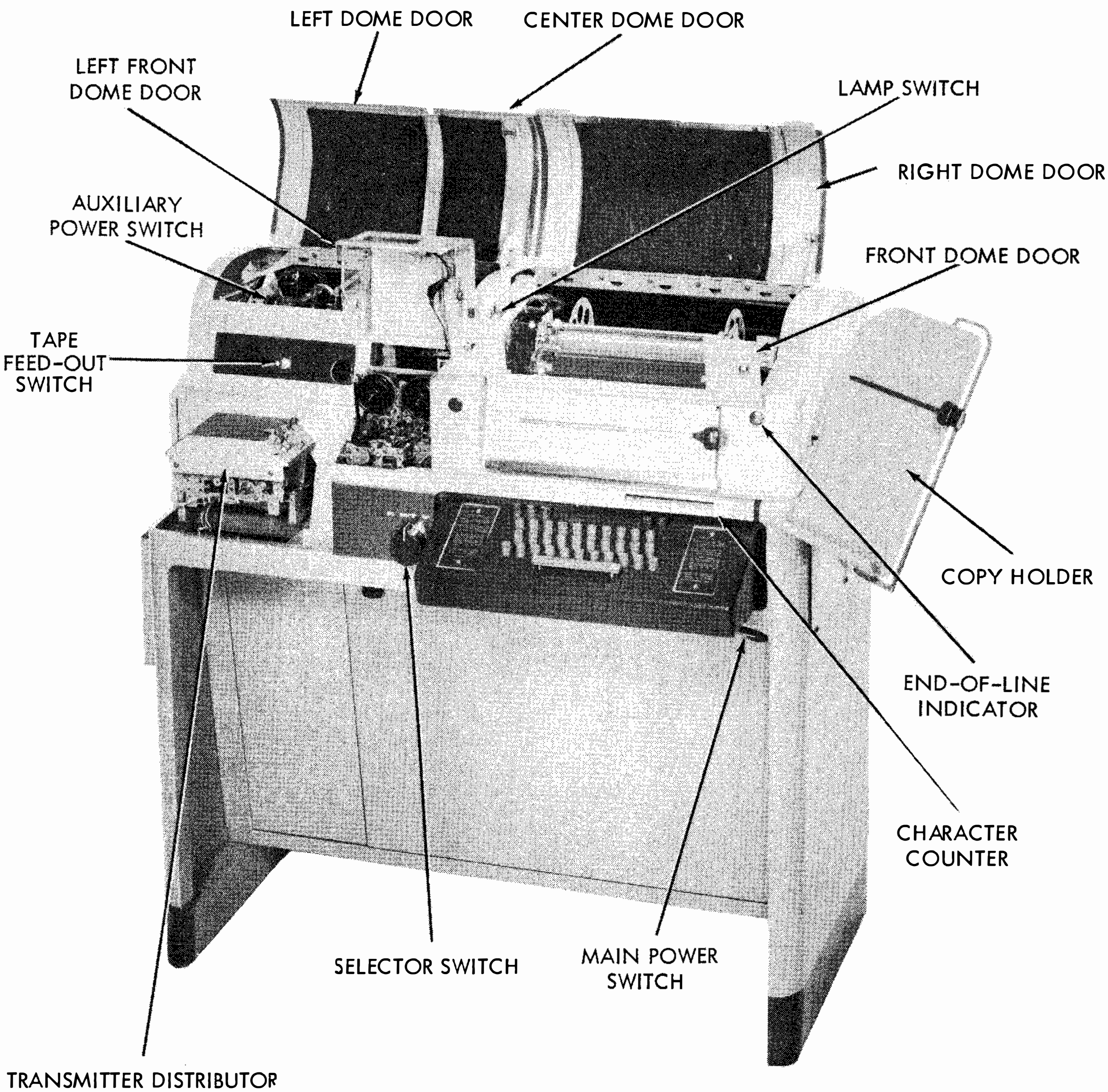


Figure 3-3. Automatic Send-Receive Set (Dome Doors Opened)

(a) SPACE BAR - The space bar, located across the front of the keyboard below the bottom row of keys, is used to initiate the electrical signal for subsequent mechanical allowance for a space (as between words) in the page-printed message, or a space symbol on tape.

(b) CARRIAGE RETURN - The carriage return (CAR RET) key is used to initiate the signal for the return of both the type box carriage and the printing carriage to the left. Followed with the line feed signal to the typing unit, these functions condition the typing unit for the start of a new line on a page-printed message, or imprint carriage return and line feed symbols on tape.

(c) LINE FEED - The LINE FEED key is depressed to initiate the signal for advancing copy paper upward one or two lines, depending on the adjustment of the typing unit receiving the signal.

(d) FIGURES - The FIGS key is used to condition equipment on the line for printing characters indicated on the upper part of the keytops, figures, punctuation marks, or other upper case symbols.

(e) LETTERS - The LTRS key is used to condition equipment on the line for printing characters indicated on the lower part of the keytops.

(f) REPEAT - The REPT key, when pressed simultaneously with any other character key or on-line function key will permit repetition of the signal initiated originally as long as the REPT key is depressed.

(g) SEQUENTIAL SWITCHING - The ASR and KSR Sets are equipped for sequential switching for controlling optional auxiliary features in response to signal line impulses. The feature is a part of the function box of the typing unit. The signals necessary to initiate the sequence switching are:

1. LF. LF. N N N N
2. Z Y H
3. Z Y I
4. Z Y E
5. X C R I T I C
6. Z R J
7. Z E M
8. Z C Z C

The effect of the sequence switching on teletypewriter components depends on the optional wiring of the function box switches, or the switches can be wired to external auxiliary equipment and have no effect on teletypewriter components whatsoever.

(3) AUXILIARY TYPING REPERFORATOR - No additional on-line functions are available in teletypewriters equipped with auxiliary typing reperforator equipment. Incoming functions are recognizable as special function symbols on the perforated, typed tape.

b. OFF-LINE FUNCTIONS

(1) When in the keyboard-tape or tape (K-T or T) modes of operation, operation of the keyboard will result in off-line preparation of fully perforated, typed tape suitable for subsequent transmission. In the K-T mode off-line preparation of tape is performed simultaneously with on-line signal transmission. Transmitted function signals are recognizable as special function symbols on the tape.

(2) When it is desirable to apply certain functions to the local equipment only, without affecting distant stations on the signal circuit, the operator may utilize special local function (red) keys in the top row of the keyboard.

(a) LOCAL LINE FEED - Depressing the LOC LF key will feed copy paper through the typing unit continuously at a rate approximately three times as fast as on-line function line feeding as long as the key is held down.

(b) LOCAL CARRIAGE RETURN - The LOC CR key is used to return the type box and printing carriages to the left hand position.

(c) RECEIVE - A keyboard locking function operated by the REC key conditions the local keyboard for receiving only when in the keyboard or keyboard-tape (K or K-T) modes of operation.

(d) SEND - A keyboard unlocking function operated by the SEND key conditions the local keyboard for transmission in the keyboard or keyboard-tape (K or K-T) modes of operation.

(e) TAPE BACKSPACE - Depressing the TAPE B. SP. keylever directly activates a switch which controls the backspace function.

c. CHARACTERS PER LINE - The margin indicator lamp located at the right of the cabinet dome is illuminated six characters before the end of a page-printed line or six characters before the counted end-of-line position in the tape (T) mode of operation. Care should be taken to avoid overtyping the last character.

CAUTION

The left and right margins of teletypewriters are adjusted as directed in Section 5. The operator should not attempt to make these adjustments.

d. PAPER, RIBBON, AND TAPE

(1) TYPING UNIT COPY PAPER - Both standard copy paper and multi-copy paper can be used in the typing unit. Paper is available in 5-inch diameter rolls, 8 1/2 inches wide. To replace the paper, open both of the right cabinet dome doors (see figure 3-3) and remove the empty paper spindle. Pull off the removable paper spindle flange, discard the cardboard tube, and replace with a fresh roll of paper. Replace the flange and remount the paper spindle so that the paper unwinds from the bottom. Feed the paper under the right and left guide shafts behind the paper straightener and over the paper straightener shaft. Fold the end of the paper to square it off. With the paper release lever toward the rear, feed paper around the platen (see figures 3-2 and 3-4), and then restore the paper release lever to its forward position. Depress the platen handwheel and continue to feed the paper upward. Do not dis-

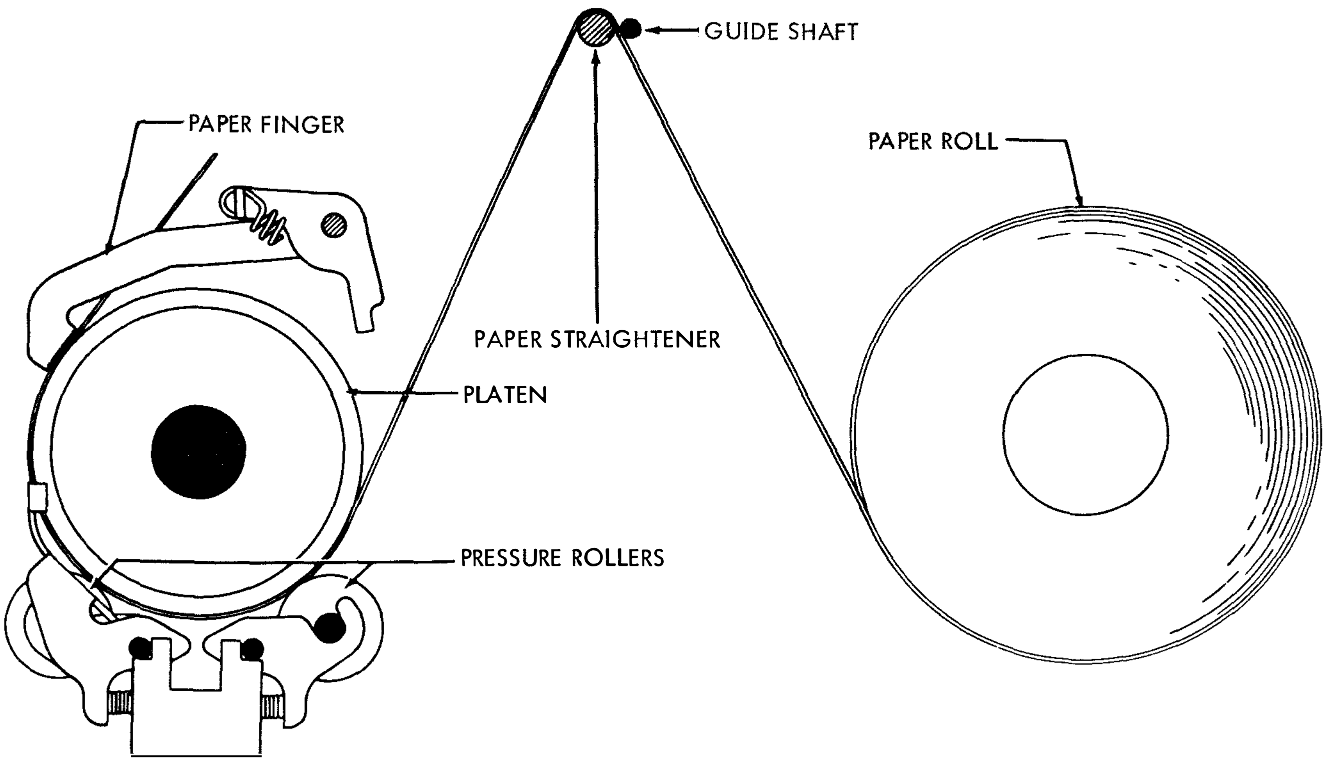


Figure 3-4. Path of Paper in Typing Unit

turb the ribbon. Make certain that the paper passes under the paper fingers, which may be raised temporarily to facilitate the operation. Momentary operation of the paper release lever may be necessary when finally straightening the paper. Close the dome door with the paper outside its front edge. Close the front dome door.

(2) RIBBON - Three typewriter ribbons are required for each ASR Set; one for the typing unit, one for the keyboard typing reperforator, and one for the auxiliary typing reperforator. The ribbons are interchangeable. Installation procedures are identical for the typing reperforators, and similar in principle for the typing unit. Ribbon is threaded from a fresh ribbon spool around a ribbon roller, through a ribbon reverse lever, through a ribbon guide to pass between the type face and the paper or tape, through a second reverse lever, and around a roller to an empty ribbon spool.

(a) TYPING UNIT RIBBON - Open the right cabinet dome doors for access to the two shafts which mount the ribbon spools in a horizontal position on each side of the typer. Raise the ribbon spool toggles (figure 3-2) and remove the old ribbon, retaining one empty spool. Engage the hook that is on the end of the new ribbon in the hub of the empty spool. Wind a few turns of the ribbon onto the empty spool to make sure that the reversing eyelet has been wound upon the spool. Place the spools on the ribbon spool shafts in such a manner that the ribbon feeds from the rear of each spool without twisting (see figure 3-5). Turn each spool shaft slightly until the driving pins on the spool shafts engage the holes in the spools. Thread the ribbon forward around both ribbon rollers, through the slots in the ribbon reverse levers, and through the ribbon guide on the type box carriage. Make certain that the ribbon remains in the guide slots and that both reversing eyelets are between the ribbon spools and the reverse levers. Roll up any slack in the ribbon.

(b) TYPING REPERFORATOR RIBBONS - Procedure for installing the keyboard typing reperforator or auxiliary typing reperforator ribbon is the same. Open the cabinet dome door required for access to the component. The ribbons are mounted in a vertical position at the top of each reperforator. Open the ribbon spool toggles. Thread a new ribbon to an empty spool (see paragraph 3-2d(2)(a)), and insert the spools on the shafts (see figure 3-6). The path of the ribbon is down to the left off the top of the right spool, under the right roller, to the left through pins on a rear reversing arm, through the ribbon guide under the typewheel, up through pins on a front reversing arm, over a left roller, and down to

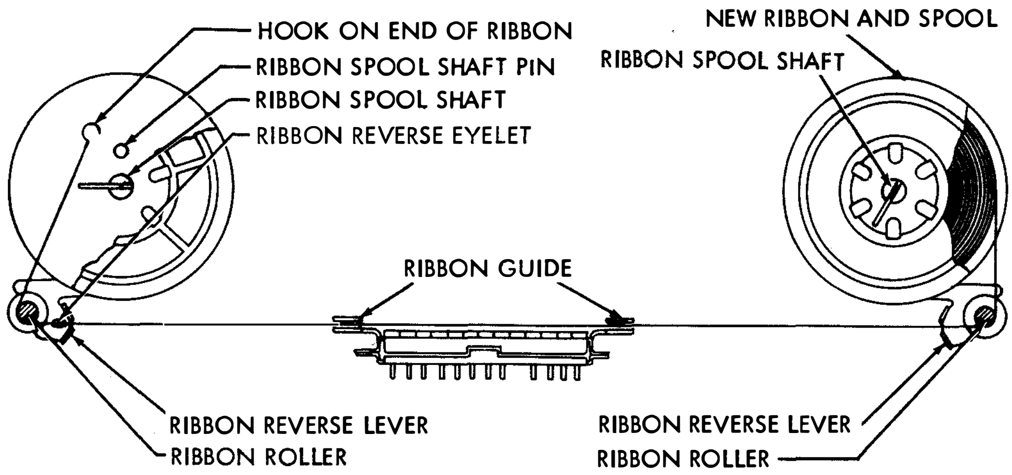


Figure 3-5. Path of Ribbon in Typing Unit

the right on the bottom of the left spool. Make certain that the ribbon remains in the guide slots and that both reversing eyelets are between the ribbon spools and the reverse levers. Roll up any slack in the ribbon on the spool on which ribbon is being wound.

(3) TAPE - An 8-inch roll of standard 11/16-inch perforator tape is required for the typing reperforators. Signal coded perforated five-level tape, 11/16-inch wide, is required for transmitter distributor operation. A low tape warning device is utilized to warn the attendant when the tape supply for the auxiliary typing reperforator is down to the last 1/2 to 1/4 inch on the tape reel. A tape-out switch and a tight-tape switch are wired in series on the transmitter distributor to stop transmission automatically when the tape requires operator attention. The teletypewriter should be visually inspected by opening the center dome door of the cabinet to determine the amount of available tape prior to operation in the K-T or T modes.

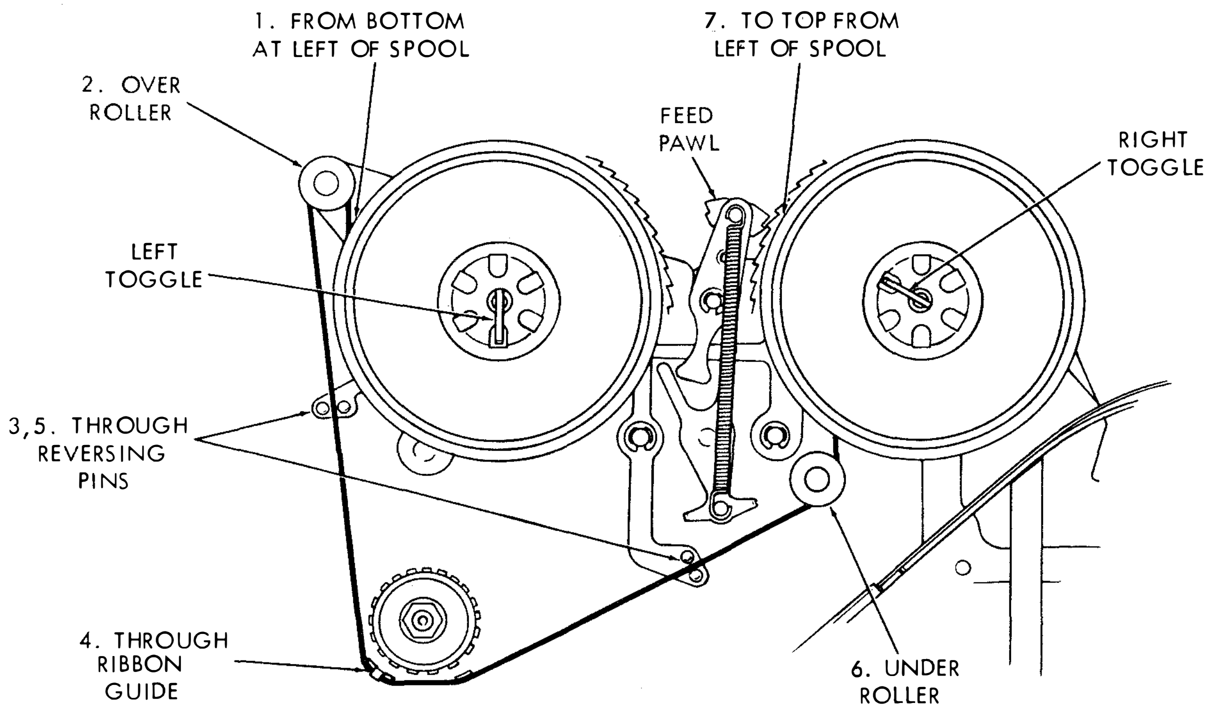


Figure 3-6. Path of Ribbon in Typing Reperforators

NOTE

The chad container should be emptied regularly. Failure to do so can result in chad backing up in the chutes and fouling the punch mechanism.

(a) KEYBOARD TYPING REPERFORATOR TAPE - Set the keyboard selector switch to the T mode of operation. Open the center dome door of the cabinet and insert a fresh roll of tape on the tape reel, positioning the reel in the tape container so that the tape feeds from the front of the container and off the bottom of the reel. Open the left front cabinet door and thread the tape over the tape roller (figure 3-7) and into the tape chute on the punch mechanism. Turn the main power switch at the right of the keyboard upward to "ON" position, and depress the REPT key and any character for automatic feeding. While this operation is taking place, push the tape downward firmly through the tape chute until the tape feed wheel and die wheel engage the tape and the desired length of tape has emerged from the punch at the left side of the keyboard typing reperforator. The tape may also be advanced manually by turning the knurled thumb screw (figure 3-7) located on the front end of the tape feed shaft and rotating the shaft in a counterclockwise direction.

(b) AUXILIARY TYPING REPERFORATOR TAPE - Open the left dome door on the cabinet and insert a fresh roll of tape on the tape reel, positioning the reel in the tape container at the far left of the cabinet so that the

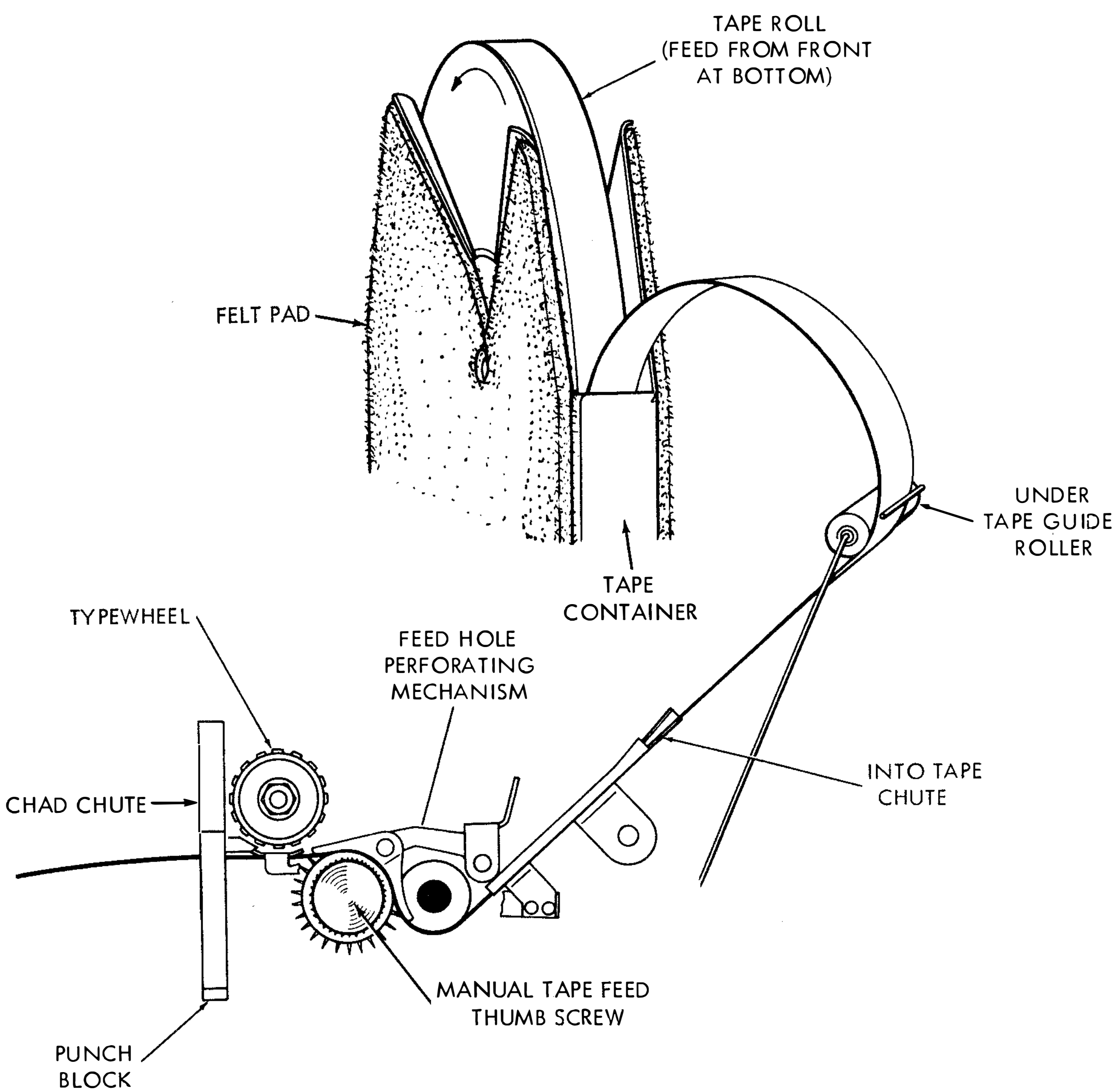


Figure 3-7. Path of Tape in Keyboard Typing Reperforator

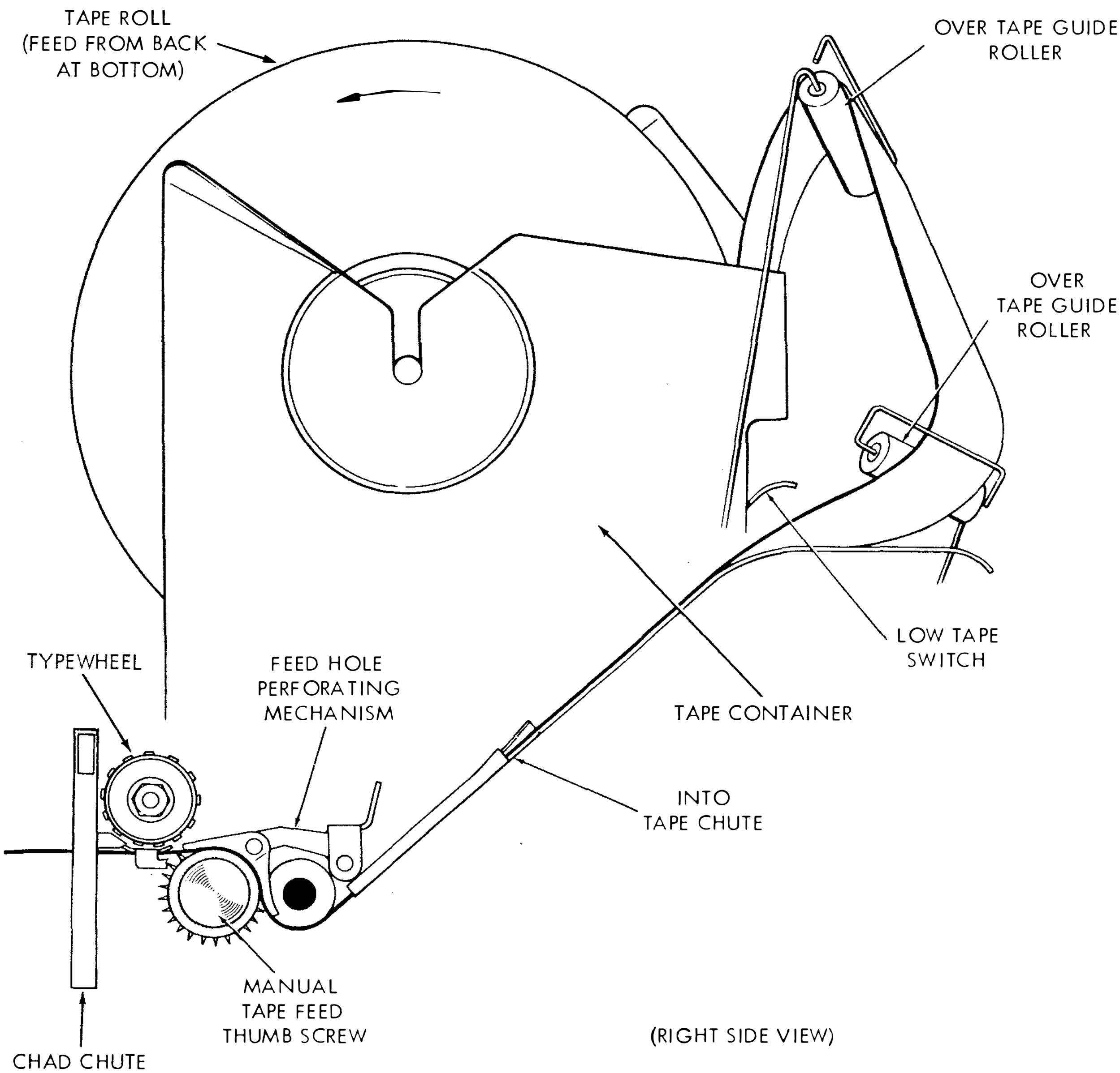


Figure 3-8. Path of Tape in Auxiliary Typing Reperforator

tape feeds from the rear of the container and off the bottom of the reel. The position of the tape lever on the tape out switch assembly should be toward the rear of the cabinet and under the roll of tape. Feed the tape over the tape roller at the rear of the tape container (figure 3-8), to the right and over the roller mounted on the auxiliary typing reperforator, and into the tape chute. Slide the tape into the tape chute and rotate the knurled tape feed wheel thumb screw, at the right of the punch unit, counterclockwise until the tape has emerged from the punch and through the tape chute.

(c) TRANSMITTER DISTRIBUTOR - Any five-level tape 11/16 inch wide and 10-hole per inch feed, chadless or fully perforated, typed or blank, can be fed into the transmitter distributor. The tape may be fed directly from the keyboard typing reperforator, when maximum speed typing of a message immediately prior to transmission is desired, or when the operator wishes to type a message during the interval that a distant station signal is being received. The transmission tape may be a roll of previously perforated stored messages, in which case, the inner end of the tape rolled as it comes out of the punch goes into the transmitter distributor first. Tape winders and reels for storage of tape under the cabinet shelf are available as accessory equipment but are not furnished with the teletypewriter.

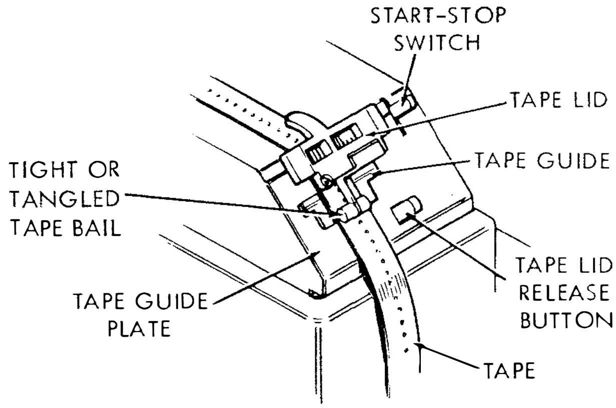


Figure 3-9. Path of Tape in Transmitter Distributor

1. Make certain that the transmitter switch (figure 3-9) is in the "OFF" position. Depress the red button to raise the spring loaded tape lid. Place the tape feed perforations on the teeth of the tape feed wheel with the first code to be transmitted directly over the sensing pins. Two code perforations appear above and three below the tape feed perforations. When the tape is placed in the transmitter, the two code perforations should be toward the back of the transmitter. Hold the tape down flat and close the tape lid. The tape feed will be responsive to the transmitter distributor switch (green) only when the keyboard selector switch is in T mode or K-T mode with the SEND key depressed. In either of these modes of operation, a leader of tape with feed holes perforated can be fed into transmitting position manually by raising the switch to its upper, free wheeling, position.

2. To interrupt transmission of a message to insert an addition, correction, or new message, raise the transmitter distributor switch to its intermediate position to stop transmission and tape feed. Note the exact position of the tape with reference to the index line scored in the tape guides. Release the tape lid. Remove the tape, close tape lid, raise the switch to its proper free wheeling position, and insert the new tape. When the inserted addition, correction, or change has been transmitted, replace the original tape either at the point at which it was removed or at the desired point following a deletion.

e. MULTIPLE COPIES - Where the typing unit is operated to produce multiple copies, the printing hammer blow should not be heavier than required to produce satisfactory copies. Move the printing spring adjusting bracket (figure 3-2) to notch "1" for printing one to three copies, with paper of usual weight, to notch "2" for four or five copies and to notch "3" for six or more copies.

f. STARTING PROCEDURE

(1) CONTROLS AND INDICATORS - Check external power and signal line sources to be sure switches, fuses, and connectors are supplying the electrical requirements of the cabinet. Check the external ground.

(a) MAIN POWER SWITCH (See figure 3-3) - The switch at the right of the keyboard on the front of the cabinet controls all ac electrical service to the equipment. The switch knob points to the right. In down position, the power is "OFF." Switch the knob to its upper, "ON", position. The keyboard motor and mechanical features of all basic components, excepting auxiliary equipment, should operate. Depending on the position of the cabinet lamp switch, copy lamps should illuminate (see paragraph 3-2f(1)(d)). If the equipment fails to operate, check the main power fuse in the electrical service assembly, the connections of cables from the electrical service assembly to the cabinet terminal board, the position of the cabinet lamp switch, and the lamp bulbs in their sockets.

(b) SELECTOR SWITCH (See figure 3-3) - A three position selector switch located to the left of the keyboard adapts the equipment for separate or simultaneous operation of the keyboard, typing unit, keyboard typing reperforator, or transmitter distributor. The pointer on the switch faces upward. Move to the left position for keyboard (K) mode of operation, to the center position for keyboard-tape (K-T) mode of operation, or to the right for tape (T) mode.

(c) TRANSMITTER DISTRIBUTOR SWITCH (See figure 3-9) - The green switch at the rear of the right side of the transmitter distributor is a three position switch operable only when the selector switch (paragraph 3-2-f(2)(a)) is in the T or K-T position, and in these two positions when the keyboard SEND key has been depressed. Under these conditions, move the transmitter distributor switch to the right to "ON" position for automatic transmission, or to the left to "FREE" position, to advance or back up tape rapidly through the tape guide, without transmission. The center position is "OFF."

(d) CABINET LAMP SWITCH (See figure 3-3) - A three position switch located under the cabinet dome at the left of the right dome door controls the circuits to the illumination supplied for copy paper and keyboard typing reperforator tape. In the rear position, "NORMAL ON," the main power switch controls cabinet illumination. In the forward position, "MAINTENANCE ON," cabinet lamps remain on when the main power control switch is in "OFF" position. In the center position, "OFF," cabinet lamps will not light even when the equipment is operating.

(e) MARGIN OR END-OF-LINE LAMP (See figure 3-3) - A red plastic indicator on the right side of the cabinet dome is illuminated by the margin indicator (also identifiable in tape (T) mode of operation as end-of-line indicator) lamp. Automatically illuminated on signal from either the typing unit or the keyboard, depending on the mode of operation, the indicator warns the operator to depress the CAR RET key within approximately six characters. This will automatically extinguish the lamp.

NOTE

A plastic signal button similar to the margin indicator is located in the center of the cabinet dome. This is available for local application and is not wired for operation in the teletypewriter equipment furnished.

(f) CHARACTER COUNTER (See figure 3-3) - A mechanical indicator located immediately above the right side of the keyboard advises the operator of the number of characters typed on the perforated tape prepared in the keyboard typing reperforator when the equipment is in the tape (T) mode of operation. The counter is not operative in the keyboard - tape (K-T) mode, but the operator can use the monitored page printed copy as a position indicator under those circumstances. The counter indicator moves from left to right across a scale beginning at zero characters. The scale is graduated in single character units, with every tenth character numbered. The character counter automatically illuminates the end-of-line indicator lamp (paragraph 3-2f(1)(e)) in the tape (T) mode of operation. The counter indicator resets to zero position automatically when the CAR RET key is depressed.

(g) AUXILIARY CONTROLS AND INDICATORS (See figure 3-3) - The ASR Set is equipped with auxiliary equipment controlled by a switch reached by raising the left dome door. These controls operate independently of those supplied for the basic teletypewriter equipment.

1. AUXILIARY POWER SWITCH - The toggle switch for the auxiliary typing reperforator controls all ac electrical service to the auxiliary equipment independent of the main power switch for the teletypewriter. It is a two position switch. Move the toggle to its right "ON" position, and the auxiliary motor should operate. If it fails to operate, check the auxiliary power fuse on the auxiliary typing reperforator base, and check the connection of the cable from the cabinet terminal board to the typing reperforator base terminal board bracket.

2. TAPE FEED-OUT SWITCH - A push button switch is utilized to control circuits for noninterfering letters tape feed-out in the auxiliary typing reperforator. The push button is located on the control panel above the transmitter distributor. Depressing this switch initiates automatic feed-out of a pre-set length of tape. If a signal line message is received when the switch is depressed or while the tape feed-out cycle is in operation, the tape feed-out will stop in favor of the signal line message, which will be recorded in the tape without error. The tape feed-out mechanism resets to its normal unoperated condition.

3. LOW TAPE ALARM - A warning device is activated by the low tape switch on the tape container attached to the auxiliary typing reperforator base. No alarm is furnished with the equipment, the choice of alarm (visual or audible) being left to the user.

NOTE

Move the main power switch (paragraph 3-2f-(1)(a)) to "ON" position to operate any teletypewriter component except the auxiliary equipment.

(2) KEYBOARD - The keyboard is operable in any mode of operation established by the selector switch, except that the REC key mechanism, when depressed locally or when activated by line signal received through the typing unit will electrically shunt the keyboard by closing a pair of contacts. Depressing the SEND key removes this shunt by opening the contacts. Manual operation of the keys sets up mechanical or electrical requirements for all keyboard functions, depending on the mode of operation. An automatic keylever locking mechanism prevents simultaneous depression of two keys. With practice, operators will develop a uniform, rhythmic operation of the keys.

(a) SELECTOR SWITCH (See figure 3-3) - The three position selector switch mounted in the center of the cabinet front panel operates electrical and mechanical features which determine the mode of operation of the various components of the teletypewriter. From left to right, turned clockwise, the switch establishes the keyboard (K), keyboard-tape (K-T) or tape (T) mode of operation. The keyboard typing reperforator, typing unit, and the transmitter distributor, as well as the keyboard, are controlled in on-line and off-line functions as described in paragraphs 3-2a and 3-2b.

(b) KEYBOARD (K) MODE - To transmit a message, an external clocking pulse must be received and lock out of all other keyboards in the signal circuit achieved. When any green key on the keyboard is depressed, conditioning contacts are closed setting up the teletypewriter to receive the synchronizing pulse. The usual procedure in transmitting is to depress the SEND key to unlock the local keyboard. Depress CR, LF and either the FIGS or LTRS key, depending on the first character of the message to be transmitted. Type the message as on a standard typewriter, keeping in mind that letters or figures character signals will be transmitted continuously when selected until the opposite function key is depressed. Typing speed may not exceed the gear set speed of the equipment, 65, or 106 w. p. m. (45.5 or 75 Baud). The keyboard typing reperforator is mechanically isolated from the keyboard in this mode of operation, and the character counter mechanism will not function. The transmitter distributor circuits are also inoperable.

(c) KEYBOARD - TAPE (K-T) MODE - Keyboard operation in the K - T mode is as described in paragraph 3 - 2 f (2) (b), except that typed, perforated tape is simultaneously prepared through electrical connection of the keyboard typing reperforator selector coils to the keyboard signal generator. The character counter will not operate in K - T position (see paragraph 3-2f(1)(f)). The transmitter distributor can be operated (see paragraph 3-2 f (5)).

(d) TAPE (T) MODE - Keyboard operation in the T mode is mechanically linked to the keyboard typing reperforator. When the REC key is down, the signal line current is shunted around the signal generator so that keyboard transmission does not occur. The typing unit is inoperative (except for incoming signals) while typed, fully perforated tape is being prepared. Since tape preparation is by direct mechanical linkage, typing may be at speeds up to 106 w. p. m. The keyboard typing reperforator will not be interrupted by incoming signals. The SEND key must be depressed during tape preparation to condition the transmitter distributor control circuit.

(3) TYPING UNIT - Operation is entirely automatic, dependent upon selector unit response to signal line impulses, either locally generated in the keyboard or transmitter distributor or generated at a distant station. The page printed copy paper supply may be controlled on the local typing unit without affecting the signal line by depressing the LOC LF or LOC CR keys on the keyboard.

(4) KEYBOARD TYPING REPERFORATOR - Operation of the typing reperforator is mechanically controlled through the keyboard in T mode of operation. The component is mechanically isolated from the keyboard in the K and K - T modes of operation. In the K - T mode, the keyboard typing reperforator will operate simultaneously with keyboard signal line transmission. In the (T) mode its operation is independent of the signal line. To advance tape through the punch block, simultaneously depress the LTRS key and the REPT key on the keyboard until the desired tape length has been fed out.

(5) TRANSMITTER DISTRIBUTOR - Because of a tape - out pin under the tape guide plate, the transmitter distributor will operate only after tape has been inserted properly. If anything prevents tape from feeding freely through the tape guide, a tight-tape feature disables the transmitter distributor control circuit.

(a) TAPE (T) MODE - Move the transmitter distributor start-stop (green) switch to the left for freewheeling advance of tape through the tape guide. When the message desired for transmission has been fed up to, but not through, the tape guide, move the switch to the right position to transmit automatically. Transmission will be monitored on the local typing unit. Move the switch to its center position to stop transmission.

(b) KEYBOARD-TAPE (K-T) MODE - Operation is the same as in the tape (T) mode, except that the keyboard is available to supplement the taped message transmission and prepare additional tape when the transmitter distributor main switch is "OFF".

(c) KEYBOARD (K) MODE - The transmitter distributor is electrically isolated in this mode and is inoperative. Items (a), (b) and (c) above assume the normal method of operation.

(6) AUXILIARY TYPING REPERFORATOR - Turn the power switch of the auxiliary typing reperforator and the main power switch to the "ON" position to operate the auxiliary typing reperforator. Operation is automatic, depending upon selector unit response to signal line impulses from a distant station. A predetermined length of letters perforated tape may be fed out at any time when no incoming signal is present, by pushing the TAPE FEED-OUT button which is located on the control panel of the cabinet dome. Automatic tape feed - out will stop if a line signal is received during the feed-out operation cycle.

g. MOTOR SPEED SETTING - Motor speed requires attention only when a governed motor is used. Notify authorized maintenance per -

sonnel if adjustment is required. Motor speed adjustment procedures are described in Section 5. As an aid in checking the speed of the keyboard motor, hold the repeat key and a character key simultaneously operated. 65 characters should be typed in 10 seconds at 45.5 Baud, and 53 characters in 5 seconds at 75 Baud.

h. ORIENTATION RANGE - In order to use the receiving margin of the typing unit or typing reperforators selector mechanisms to best advantage, the starting position of the selector cam-clutch must be located at the most favorable angle. This is accomplished by positioning the selector clutch stop arm with the range finder knob. The adjustment will be made by authorized maintenance personnel following procedures outlined in Section 5.

i. SUMMARY OF OPERATION

(1) Move the power switch at the right of the keyboard to "ON" (up) position. Allow several seconds to elapse in order for the motor to attain running speed and for the rectifier to deliver current.

(2) Rotate the selector switch knob (figure 3-3) at the left of the keyboard to the left, center or right positions for keyboard (K), keyboard-tape (K-T), or tape (T) mode of operation.

(3) Press the SEND key to unlock the local keyboard or to energize the transmitter distributor circuit. Send message after receiving the external synchronizing pulse as follows.

(4) Press the CAR RET and LF key to bring the carriages on all machines on the circuit to the beginning of a new line.

(5) For tape transmission, turn the transmitter distributor switch to "ON" position.

(6) For receipt of messages on the auxiliary typing reperforator, turn the auxiliary power switch to "ON" position.

(7) For sequence switching, operate the required keylevers (see paragraph 3-2a(2)(h)) in consecutive order to open the "normally closed" switches on the function box. Equipment affected by the sequential switching function is optional.

(8) To shut down the equipment, turn the auxiliary power switch and the main power switch to the "OFF" positions.

j. OVERLOAD CUTOUT - Synchronous Motor LMU12 and LMU3 are equipped with thermal circuit breakers to protect the motors against excessively high temperature which might develop in case of a prolonged overload that would be insufficient to stall the motors and blow the protecting fuses. Once operated, these cutout devices must be reset manually by pressing a reset button (figure 4-96) on the motor plate at the rear of the motor before the equipment can be restarted. Allow the motor to cool at least 5 minutes before manually depressing the red button.

CAUTION

If the motor stops and does not restart in response to regularly operated controls, check the fuse on the electrical service assembly or on the auxiliary typing reperforator base. If the fuse has not blown, check the motor for excessive temperature. Where excessive temperature is indicated, rotate the motor by hand to determine whether any abnormal mechanical condition is present. If the load appears normal, leave the cabinet dome raised and permit the temperature to drop before resetting the cutout feature. If the motor continues to cutout, or if any abnormal load conditions cannot be readily corrected, notify authorized maintenance personnel.

k. ROUTINE CHECKS - During normal operations, observe the page printed copy and the typed, perforated tape from time to time for recurrent errors or garbling not readily traceable to operator error. Note, in particular, differences between the monitored page printed message and the typed message on tape transmitted in the transmitter distributor. Notify authorized maintenance personnel promptly of any indications of equipment failure. Additional, routine, periodic operator checks are indicated in Table 3-1.

TABLE 3-1. ROUTINE CHECK CHART

WHAT TO CHECK	HOW TO CHECK	REMARKS
DAILY ROUTINE		
1. General operation ASR, KSR, RO	Apply operating tests as detailed in Section 2.	If irregularities occur, notify authorized maintenance personnel.
2. Paper supply ASR, KSR, RO	Replace roll if only a few turns remain on the spindle.	Be sure that paper is straight under paper fingers, and that the release lever is forward.

TABLE 3-1. ROUTINE CHECK CHART (CONTINUED)

WHAT TO CHECK	HOW TO CHECK	REMARKS
3. Tape supply ASR	Replace if less than 1/2-inch of tape remains on spool in tape container.	Install in container to feed from bottom of roll, toward front of cabinet for keyboard typing reperforator, toward rear for auxiliary typing reperforator.
4. Chad container ASR	Empty each time tape supply is replenished.	Failure to empty chad container can result in equipment failure due to chad backing up in the chutes and fouling the punch mechanism.
5. Condition of ribbon ASR, KSR, RO	Change if copy is too light, or ribbon frayed.	Be sure ribbon is in guides and ribbon eyelets are on spool side of reversing levers.
6. Condition of type on typing unit ASR, KSR, RO	If smudging is evident, remove type box and clean the type with a stiff brush.	Be sure type box is securely attached and ribbon is not disturbed. See Section 6.
7. Condition of type on type wheel ASR	Manually position the typewheel for letters or figures by sliding the letters push bar back and forth; clean the typewheel with a soft cloth dipped in type cleaning solvent or with a mastic type cleaner.	Power switches should be "OFF." Be sure ribbon is not disturbed.
8. Condition of cover glasses ASR, KSR, RO	Clean if required by means of soft cloth.	Be sure paper, ribbon or tape are not disturbed.
9. Lamps and Lenses ASR, KSR, RO	Tighten or replace loose or burned out illumination or indicator lamps; clean lenses by means of a soft cloth.	Be sure replacement is of same type and size removed.
10. Flexible couplings ASR	If play develops at ends of any of flexible couplings, tighten hex head socket set screw.	Be sure set screws are on the flat portion of both shafts.
11. Timing belt (on auxiliary typing reperforator) ASR	Move typing reperforator forward slightly by loosening three mounting screws.	Some slack in belt is required.
QUARTERLY ROUTINE 12. Orientation range ASR, KSR, RO	Note should be made of the pointer setting on the range scale so that if it is disturbed for any reason it can be repositioned conveniently. If a further check is necessary, see Section 6.	Abnormal signal line conditions may require changes in the setting as an expediency. When normal line conditions are restored, normal setting should be re-established.
13. Motor speed ASR, KSR, RO	With REPT key and any character key depressed simultaneously, 65 characters should be typed in 10 seconds when operating at 45.5 baud, and 53 characters in 5 seconds at 75 baud. For RO sets, transmit these characters from a unit known to be in proper operating order.	Applies to governed motors only. To adjust, turn the governor adjusting screw (figure 4-97) in the direction indicated by the stamping on the governor cover. (See Section 5.)

NOTICE TO OPERATORS

Operators should not perform any of the following emergency procedures without proper authorization.

1. EMERGENCY MAINTENANCE

(1) FUSE LOCATION AND SYMPTOMS OF FAILURE - Symptoms of fuse failure and location of the fuses can be found in table 3-2. The power circuits of the ASR Set are protected by two fuses, one located on the electrical service assembly and the other on the auxiliary typing reperforator base. An additional fuse on the electrical service assembly protects the rectifier and its associated components.

WARNING

Never replace a fuse with one of higher rating unless continued operation of the equipment is more important than probable damage. If a fuse burns out immediately after replacement, do not replace a second fuse until the cause has been corrected.

(2) LAMP REPLACEMENT - Four bayonet type lamps are located beneath the cabinet dome. Maintenance and copy illumination lamps are located on either side of the right front dome door and above the keyboard typing reperforator (three lamps). The margin indicator or end-of-line lamp (one lamp) is located at the extreme right of the dome. All are 6-volt lamps in a circuit supplied by a transformer at the rear of the cabinet. All lamps are accessible when the dome is raised. Refer to Table 3-3 for lamp location and electrical characteristics.

3-3. SEND-RECEIVE (KSR) SET OPERATION- in Console Cabinet LAC214BR

a. ON-LINE FUNCTIONS

(1) GENERAL - Turning the main power switch, at the right of the keyboard, to its upper position, "ON," fully conditions the teletypewriter for on-line service. When energized, transmission and reception of typewritten page messages is possible through operation of the keyboard and typing unit.

(2) KEYBOARD AND TYPING UNIT - The on-line functions operable through the basic teletypewriter equipment are initiated by operation of the keyboard (figure 3-1), or from a signal received from a distant station.

(a) SPACE BAR - The space bar, located across the front of the keyboard below the bottom row of keys, is used to initiate the electrical signal for subsequent mechanical allowance for a space (as between words) in a page printed message.

(b) CARRIAGE RETURN - The carriage return key is used to return both the type box carriage and the printing carriage to the left to start a new line of typing.

(c) LINE FEED - This key, when depressed, causes the paper to feed upward one or two spaces depending upon the position of a single-double line feed lever located on the typing unit (figure 3-1).

(d) FIGURES - The figures key is used to condition the machine for printing of figures, punctuation marks or other upper-case symbols.

TABLE 3-2. FUSE FAILURE

MAINTENANCE LAMPS	KEYBOARD MOTOR	AUXILIARY MOTOR	FUSE LOCATION	PROTECTS	AMPS.	VOLTS
Out	Off	Operating	On electrical service assembly switch panel	Main ac supply	6.25	125
On	Operating	Off	On auxiliary typing reperforator base	Auxiliary ac supply	4.0	125
On	Operating and typing unit running open	Operating	On electrical service assembly rectifier plate	Rectifier and Keyer	0.8	250

TABLE 3-3. LAMP REPLACEMENT DATA

FUNCTION	LOCATION	VOLTS	WATTS	AMPS.	BASE
Maintenance and copy illumination	Left of right front cabinet dome door	6-8	6	1.14	Bayonet, double contact
Maintenance and copy illumination	Right of right front cabinet dome door	6-8	6	1.14	Bayonet, double contact
Maintenance and copy illumination	Left front door of cabinet dome	6-8	6	1.14	Bayonet, double contact
Margin indicator or end-of-line indicator	Right front end of cabinet dome	6-8	6	1.14	Bayonet, double contact

(e) LETTERS - The letters key is used to condition the machine for printing of letters characters.

(f) REPEAT (REPT) - This key is used in conjunction with other keys or the space bar to accomplish repeat transmission while the two keys are held depressed.

b. OFF-LINE FUNCTIONS - When it is desirable to apply certain functions to the local equipment only, the operator may utilize special keys, which are identified as follows:

(1) LOCAL LINE FEED (LOC LF) - This key is used to feed the paper upward on the local machine only.

(2) LOCAL CARRIAGE RETURN (LOC CR) - This key is used to return the carriage to the beginning of the line on the local machine only.

(3) KEYBOARD LOCK (KBD LOCK) - Operation of this key conditions local equipment for receiving only by locking the keyboard.

(4) KEYBOARD UNLOCK (KBD UNLK) - This key is used to condition the local Keyboard prior to starting transmission.

c. CHARACTERS PER LINE - The margin indicator lamp, located to the right of the copyholder, is illuminated six characters before the end of the line. Care should be exercised not to overtype the last character. The margin lamp illuminates on the 66th printed character (spaces included) for lines of 72 character length (standard communications practice).

CAUTION

The left and right margins of teletypewriters are adjusted as directed in Section 5. The operator is not authorized to make these adjustments.

d. PAPER AND RIBBON (See figures 3-2, 3-4, 3-5 and 3-10.)

(1) To replenish the supply of paper, open the dome of the cabinet (see paragraph 4-9c(2)). Refer to paragraph 3-2d(1) for removal and replacement procedures.

(2) To replace the ribbon, open the hinged dome (see paragraph 4-9c(2)). Refer to paragraph 3-2d(2)(a) for removal and replacement procedure.

e. MULTIPLE COPIES - The printing blow should not be heavier than that required to produce satisfactory copies. The printing spring adjusting bracket (figure 3-2) may be readily moved to any one of three notches. Use notch "1" for printing one to three copies with paper of usual weight, notch "2" for four or five copies, and notch "3" for six or more copies.

f. STARTING PROCEDURE - The switch at the right of the keyboard on the front of the cabinet controls all ac electrical service to the equipment. The switch knob points to the right. In down position, the power is "OFF." Switch the knob to its upper, "ON," position. The keyboard motor should operate and, depending on the position of the cabinet lamp switch, copy lamps should illuminate (see paragraph 3-3g).

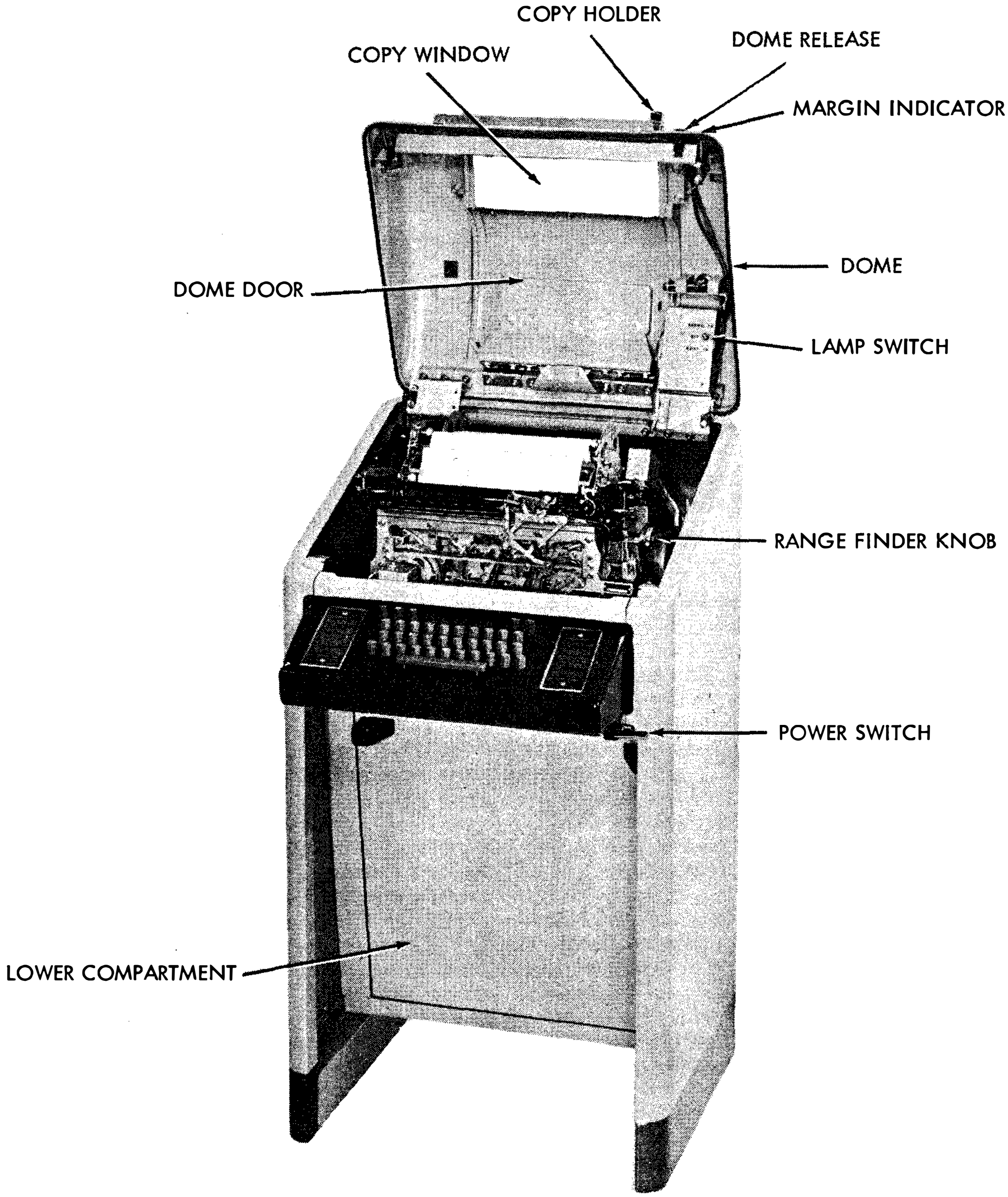


Figure 3-10. Keyboard Send-Receive Set in LAC214BR Cabinet (Dome Opened)

g. CABINET LAMP SWITCH (See figure 3-10) - A three position switch located under the dome on the right controls the illumination lamps. In the "MAINTENANCE ON" position, cabinet lamps remain on when the main power switch is "OFF." In the "NORMAL ON" position, the main power switch controls the lamp circuit. In the "OFF" position, cabinet lamps will not operate regardless of the position of the main power switch.

h. SPEED SETTING - Motor speed requires attention only when a governed motor (LMU14 or LMU4) is used. Notify authorized maintenance personnel if adjustment is required. Motor speed adjustment procedures are described in Section 5. As an aid in checking motor speed, hold the repeat key and a character key simultaneously operated. 65 characters should be typed in 10 seconds at 45.5 Baud, and 53 characters in 5 seconds at 75 Baud.

i. ORIENTATION RANGE - In order to utilize the receiving margin of the selecting mechanism to the best advantage, the starting position of the selector cam-clutch must be located at the most favorable angle. This is accomplished by positioning the clutch stop arm (figure 3-10) by means of the range finder knob. The adjustment will be made by authorized maintenance personnel following procedures outlined in Section 5.

j. SUMMARY OF OPERATION

(1) Place the power switch on the front of the cabinet in the "ON" position (upward). Allow several seconds to elapse in order for the motor to attain running speed and for the rectifier on the electrical service assembly to deliver current.

(2) Assuming that the set has been conditioned and the external synchronizing pulse received, press the KEYBOARD UNLOCK key to unlock the local keyboard.

(3) Press the CAR RET and LF key to bring the carriages on all machines to the beginning of a new line.

(4) For sequence switching, operate the required keylevers in consecutive order to operate the switches in the function box (see paragraph 3-2a(2)(h)).

(5) Type message to be transmitted.

(6) To shut down the equipment throw the power switch to the "OFF" position (downward).

k. OVERLOAD CUTOUT - Synchronous motors LMU12 and LMU3 are equipped with a thermal cutout element to protect them against any excessively high temperature which might develop in case of a prolonged overload that would be insufficient to stall the motors and blow the protecting fuses. Once operated, this cutout device must be reset manually by pressing a reset button (figure 4-96) on the motor plate at the rear of the motor, before it can be restarted. Allow the motor to cool at least 5 minutes before depressing the red button.

CAUTION

If the motor stops and does not restart in response to regularly operated controls, check the fuse on the electrical service assembly. If the fuse has not blown, check the motor for excessive temperature. Where excessive temperature is indicated, rotate the motor by hand to determine whether any abnormal mechanical condition is present. If the load appears normal, leave the cabinet dome raised and permit the temperature to drop before resetting the cutout feature. If the motor continues to cutout or if any abnormal load conditions cannot be readily corrected, notify authorized maintenance personnel.

l. ROUTINE CHECKS - During normal operation, the printed copy of the message should be observed from time to time for indications of failure in the communication system. Additional checks should be made as indicated in Table 3-1.

NOTICE TO OPERATORS

Operators should not perform any of the following emergency procedures without proper authorization.

m. EMERGENCY MAINTENANCE

(1) FUSE LOCATION AND SYMPTOMS OF FAILURE - A cartridge-type fuse is located on the electrical service assembly and is accessible when the cabinet dome is raised. The fuse designation, current rating, symptoms of failure, and location appear in Table 3-4.

WARNING

Never replace a fuse with one of higher rating unless continued operation of the equipment is more important than probable damage. If a fuse burns out immediately after replacement, do not replace it a second time until the cause has been corrected.

(2) REPLACEMENT OF LAMPS - The end-of-line indicator lamp and the two lamps in the copy light assembly, all of which are mounted in the front of the cabinet dome, have the conventional miniature bayonet type base. All are accessible when the dome is raised.

n. ROUTINE CHECKING OF KSR SET - See Routine Check Chart 3-1 for applicable items.

TABLE 3-4. FUSE FAILURE

MOTOR	MAINTENANCE LIGHT	FUSE LOCATION	PROTECTS	AMPS.	VOLTS
OFF	OUT	On electrical service assembly switch panel	AC Supply	4	125

3-4. SEND-RECEIVE (KSR) AND RECEIVE ONLY (RO) SET OPERATION - in Rack Mounted Cabinet LPC206BR (See Figure 3-11)

a. OPERATION OF KSR SETS - Operation of KSR Sets mounted in LPC206BR cabinets is identical with operation of KSR sets described in paragraph 3-3 except for location of power switch, electrical service assembly, fuses etc. which are the same as in the following description of the RO set.

b. OPERATION OF RO SETS (See Figure 1-1)

(1) ON-LINE FUNCTIONS

(a) GENERAL - Turning the main power switch located on the electrical service assembly enclosure, "ON", fully conditions the teletypewriter for on-line service. When energized, reception only of typewritten page messages is possible through operation of the typing unit.

(b) TYPING UNIT - The on-line functions operable through the typing unit (Space, Carriage Return, Line Feed, Figures, Letters, and Repeat) are initiated on reception of a signal from a distant station.

(2) OFF-LINE FUNCTIONS - Only two off-line functions are available to the operator on the RO Set. The first, LINE FEED, is operated by the key located on the left of the base, and is used to feed paper upward on the local typing unit. The second, CARRIAGE RETURN, is operated by the key located on the right of the base, and is used to return the carriage to the beginning of the line on the local typing unit. These functions have no effect on any distant station, but control the local unit only.

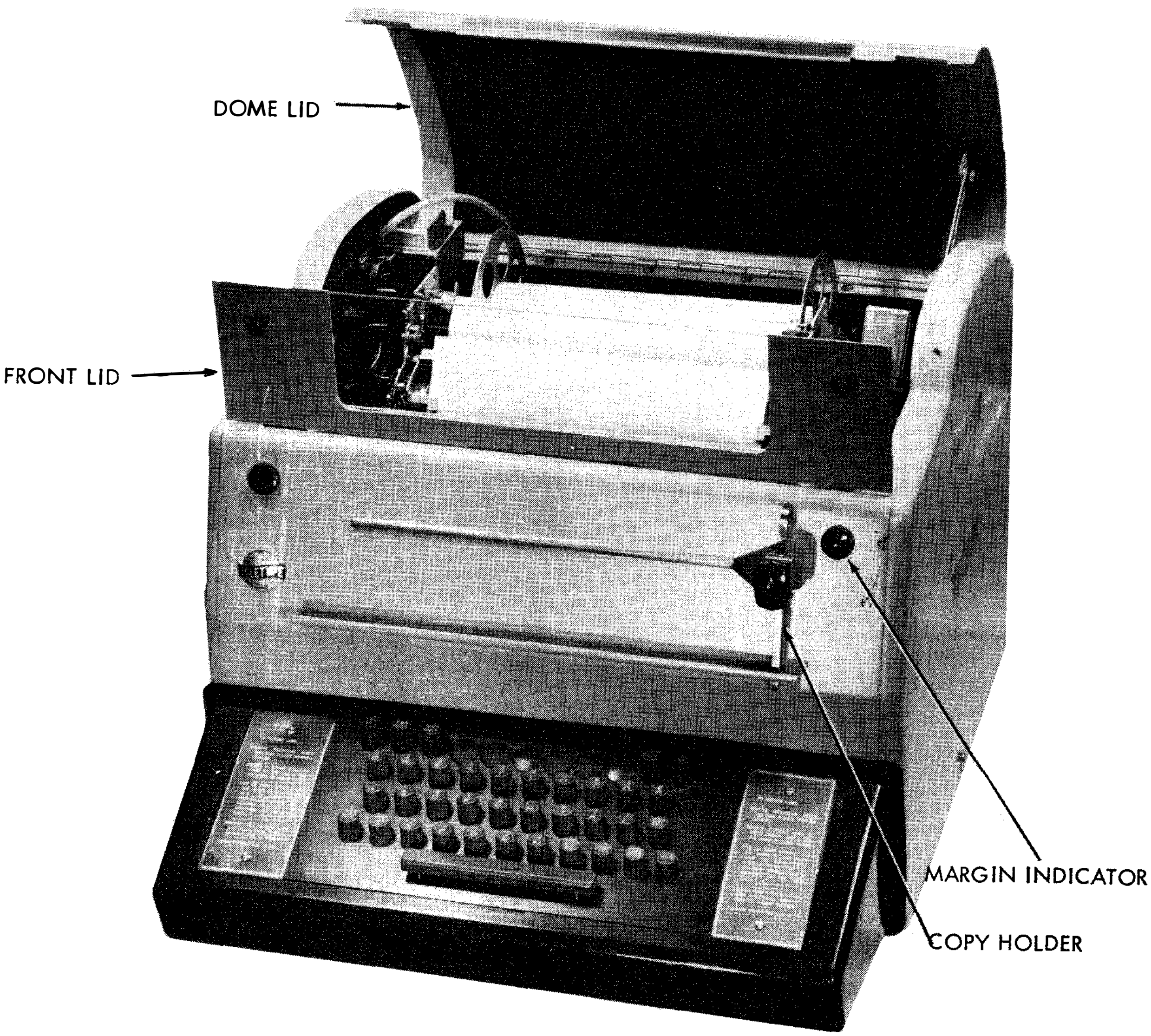


Figure 3-11. Keyboard Send-Receive Set in LPC206BR Cabinet (Dome Opened)

(3) CHARACTERS PER LINE - The margin indicator lamp, located to the right of the copyholder, is illuminated six characters before the end of a line. The margin lamp illuminates on the 66th printed character (spaces included) for lines of 72 character length.

(4) PAPER AND RIBBON - To replenish the supply of paper, or replace the ribbon, open the dome of the cabinet (see paragraph 4-9d (2)). Refer to paragraphs 3-2d(1) and (2) for removal and replacement procedure.

(5) MULTIPLE COPIES - See paragraph 3-3e.

(6) STARTING PROCEDURE - The main power switch is located on the separate electric service assembly enclosure. Place the switch in the "ON" position. The typing unit motor and copy illumination lights should operate.

(7) SPEED SETTING - Motor speed requires attention only when a governed motor (LMU14 or LMU4) is used. Notify authorized maintenance personnel if adjustment is required. Motor speed adjustment procedures are described in Section 5. As an aid in checking motor speed, transmit to the RO Set (from a unit known to be in proper operating order) a continuous series of characters (see paragraph 3-3h). 65 characters should be typed in 10 seconds when operating at 45.5 Baud, and 53 characters in 5 seconds at 75 Baud.

(8) ORIENTATION RANGE - See paragraph 3-3i.

(9) SUMMARY OF OPERATION

(a) Place power switch (on electrical service assembly enclosure) in the "ON" position. Allow several seconds to elapse in order for the motor to attain running speed, and for the rectifier on the electrical service assembly to deliver current.

(b) To shut down the equipment, place the power switch to the "OFF" position.

(10) OVERLOAD CUTOUT - See paragraph 3-3k.

(11) ROUTINE CHECKS - During normal operation, the printed copy of the message should be observed from time to time for indications of failure in the communication system. Additional checks on applicable items should be made as indicated in Table 3-1.

NOTICE TO OPERATORS

Operators should not perform any of the following emergency procedures without proper authorization.

(12) EMERGENCY MAINTENANCE

(a) FUSE LOCATION AND SYMPTOMS OF FAILURE - Two cartridge-type fuses are located on the front panel of the electrical service assembly enclosure. The fuse designation, current rating, symptoms of failure, and location appear in Table 3-5.

WARNING

Never replace a fuse with one of higher rating unless continued operation of the equipment is more important than probable damage. If a fuse burns out immediately after replacement, do not replace it a second time until the cause has been corrected.

(b) REPLACEMENT OF LAMPS - See paragraph 3-3m(2).

3-5. PAPER WINDER OPERATION

a. GENERAL - The PW201BR Paper Winder (figure 3-12) is mounted at the rear of the teletypewriter set with which it is used. It automatically winds printed copy on a cylinder as it is fed from the teletypewriter set and is normally used where multi-copy paper is employed. The original of the printed copy is generally torn off at the set and the carbon copy along with the carbon paper passes to the rear where the carbon paper is accumulated in a container and the carbon copy wound on the cylinder of the winder.

b. OPERATION - The winder is driven by a self-contained motor which runs continuously, when energized, to wind the copy on the cylinder that is coupled to it by a friction clutch. A switch, located on the motor housing, controls the winder motor. This switch can remain in the on position if the winder receives its power from the set with which it is used. In this case, the winder will be turned on when the set itself is energized.

c. WINDING COPY - Feed out enough copy paper so that it can be routed to the rear, under the slack rod and up to the cylinder. Operating the cylinder by hand, wind 4 or 5 turns of copy paper onto the cylinder in its direction of rotation. Energize the winder motor and take up the slack in the copy. By means of the friction clutch on the motor drive shaft the paper will be drawn taut and held tensioned to wind the typed copy as it is fed out by the typing unit.

d. REMOVING TYPED COPY - When the cylinder has been filled with copy it is removed as follows:

TABLE 3-5. FUSE FAILURE

MOTOR	TYPING UNIT	COPY AND MARGIN INDICATOR LAMPS	FUSE LOCATION	PROTECTS	AMPS.	VOLTS
Off	Inoperative	Off	Right fuse on front panel of electrical service assembly	Copy light transformer and motor	4.0	125
On	Running but with open signal line	On	Left fuse on front panel of electrical service assembly	Rectifier and filament transformer	4.0	125

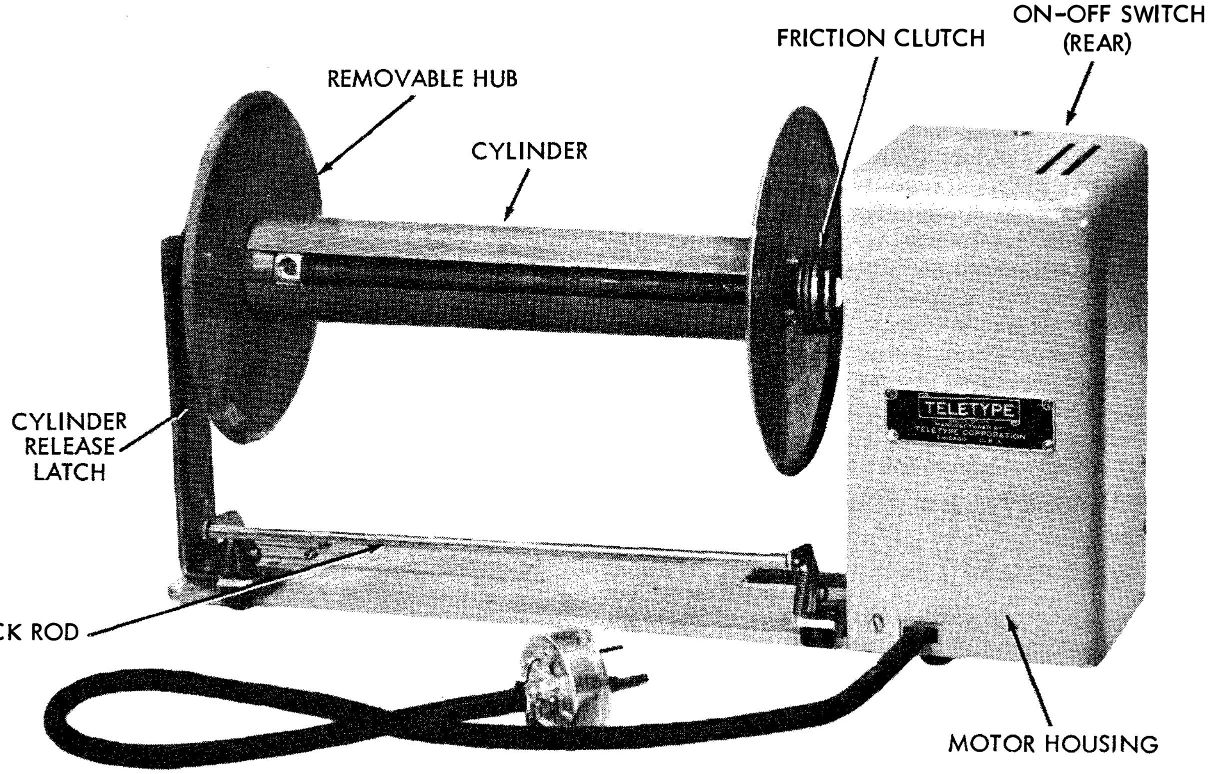


Figure 3-12. Paper Winder PW201BR

(1) Tear off the copy at some convenient point between the winder and teletypewriter set and wind up the loose end.

(2) Remove the cylinder from the winder frame.

(a) Hold the latch operated on the support bracket to release the cylinder shaft.

(b) Lift the assembly up and away from engagement with the clutch arm.

(3) Remove the hub on the left end of the cylinder.

(4) Hold the roll of copy while turning the cylinder in a counter-rotation direction. This will loosen the copy sufficiently to permit the cylinder to be pulled out of the roll.

(5) Replace the hub on the cylinder and the cylinder into the winder frame, again holding the latch operated on the support bracket. While engaging the pin on the opposite hub with the clutch arm, lower the shaft on the left end into engagement with its bearing bracket and release the latch.

3-6. MULTIPLE KEYBOARD SEND-RECEIVE (KSR) AND RECEIVE ONLY (RO) SET OPERATION

a. FUNCTIONS

(1) GENERAL - Turning the power switches to the "ON" position. These switches apply power to the motors and copy lights.

(2) Select the mode of operation desired by positioning the switch on the front of the cabinet.

(3) LOCAL LINE FEED - The local line feed key (LOC LF) when depressed, shall cause paper to feed out of the machine at approximately three times the speed obtained when the line feed key is repeatedly operated.

(4) The keyboard lock key (KBD LOCK), when depressed, shall prevent operation of any other key except the local line feed, keyboard unlock, and local carriage return keys. It shall remain depressed until released by the keyboard unlock key.

(5) The keyboard unlock key (KBD UNLK), when depressed shall unlock the keyboard.

(6) The repeat key (REPT) when depressed together with any other key except the local keys, shall cause repeat transmission of the signal.

(7) The local carriage return key (LOC CR) when depressed shall cause the carriage to be returned.

(8) The operation of the FIGS key conditions the machine for the typing of upper case characters and that operation of the LTRS key conditions it for the typing of lower case characters.

(9) The operation of the SPACE BAR conditions the machine for the typing of lower case characters where this feature is desirable. If not desirable, disable by adjusting the function pawl disabling screw.

b. ON-LINE FUNCTIONS

(1) SPACE BAR - This bar located at the front of the keyboard, is used to send spaces (as between words).

(2) CARRIAGE RETURN - The carriage return key is used to return both the type box carriage and printing carriage to the left to start a new line of typing.

(3) LINE FEED - This key when depressed, causes the paper to feed upward one or two spaces depending upon the position of a single - double line feed lever located on the typing unit.

(4) FIGURES - The figure key is used to condition the machine for printing of figures, punctuation marks or other upper case symbols.

(5) LETTERS - The letters key is used to condition the machine for printing of letters characters.

(6) REPEAT (REPT) - This key is used in conjunction with other keys or the space bar to accomplish repeat transmission while the two keys are held depressed.

c. OFF-LINE FUNCTIONS - When it is desirable to apply certain functions to the local equipment only, the operator may utilize special keys, which are identified as follows:

(1) LOCAL LINE FEED (LOC LF) - This key is used to feed paper upward on the local machine only.

(2) LOCAL CARRIAGE RETURN (LOC CR). This key is used to return the carriage to the beginning of the line on the local machine only.

(3) KEYBOARD LOCK (KBD LOCK) - Operation of this key conditions local equipment for receiving only by locking the keyboard.

(4) KEYBOARD UNLOCK (KBD UNLK) - This key is used to condition the local keyboard prior to starting transmission.

(5) CHARACTERS PER LINE - Care should be exercised not to overtype the last character. In case overtyping should occur, the machine is arranged to carriage return and line feed automatically when it reaches an adjustable setting somewhere between the 66th and 73rd character.

(6) PAPER AND RIBBON (See Figure 3-5, and 3-13)

(a) To replenish the supply paper open the cabinet door and pull the unit to be serviced out on its slide rails. Remove the paper spindle and insert it in a fresh roll of paper. Remount the spindle so that the paper unwinds from the back and over the top of the roll. Feed the paper over the paper straightener shaft and fold the end of the paper backward to square it off. Press the paper release lever down and start the paper feeding around the platen and then raise the paper release lever. Depress

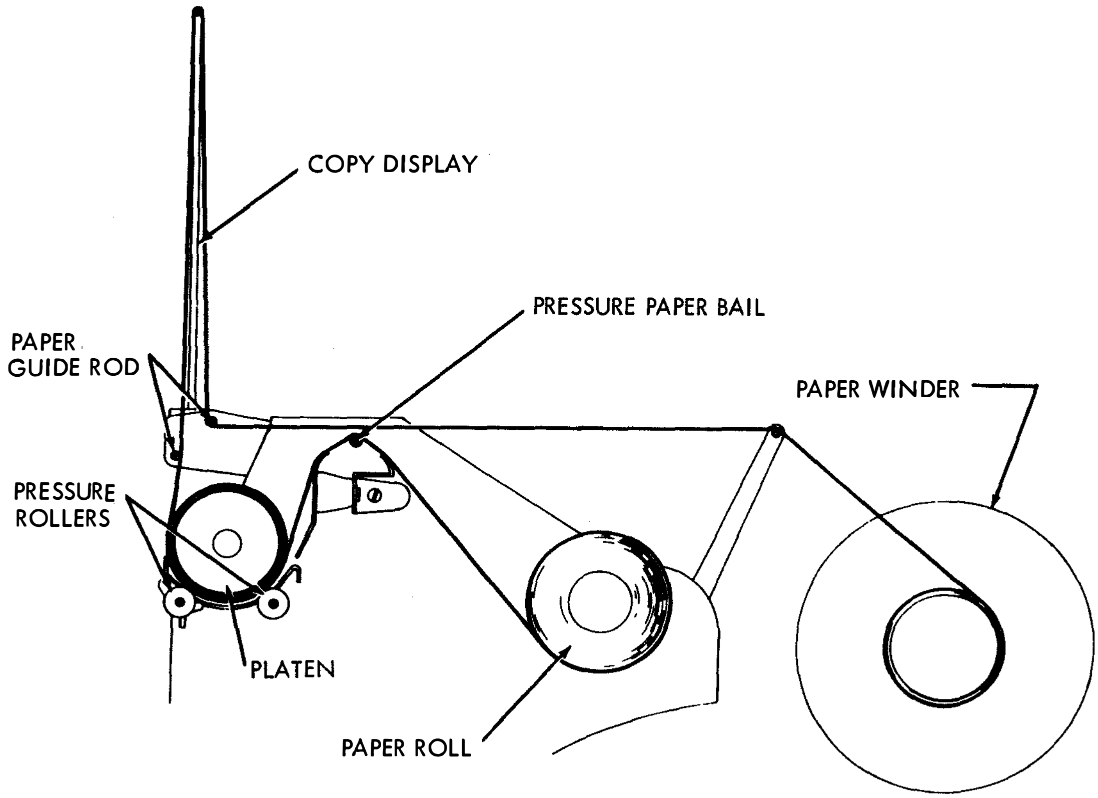


Figure 3-13. Path of Paper

the platen handwheel and continue to feed the paper upward. Thread the paper over the rod located in front of the platen; over the copy display paper holder from front to back; under the rod located directly over the platen; over the rod located above the paper roll; onto the paper winder spindle, with the paper threaded over the top of the spindle.

(b) To replace the ribbon, open the cabinet door, raise the ribbon spool toggles to the vertical position and remove both spools. Engage the hook that is on the end of the new ribbon in the hub of the empty spool. Wind a few turns of the ribbon onto the empty spool to make sure that the reversing eyelet has been wound upon the spool. Place the spools on the ribbon spool shafts in such a manner that the ribbon feeds from the rear of each spool without twisting. Turn each spool shaft slightly until the driving pins on the spool shaft engage the holes in the spools. Thread the ribbon forward around both ribbon rollers, through the slots in the ribbon reverse levers, and through the ribbon guide on the type box carriage. Make certain that the ribbon remains in the guide slots and that both reversing eyelets are between the ribbon spools and the reverse lever. Eliminate any slack in the ribbon.

(c) Multiple Copies - The printing blow should not be heavier than required to produce satisfactory copies. The printing spring adjusting bracket may be readily moved to any one of three notches. Use notch "1" for printing one to three copies with paper of usual weight, notch "2" for four or five copies, and notch "3" for six or more copies.

(7) The 195921 and the 195922 Paper Winders (Figures 1-23B and 1-23C) are mounted on the sliding shelves in the LBAC255BR cabinet. They are designed to rewind a 4-1/2 inch diameter roll of paper.

(a) The 195921 Paper Winder provides winding facilities for the upper and middle shelves.

(b) The 195922 Paper Winder provides winding facilities for the bottom shelf. The 195922 Paper Winder is the same as the 195921 Paper Winder with the addition of a mounting base plus mounting hardware.

(c) The Paper Winders consist of a main mounting bracket, motor, motor insulator, paper spindle assembly, mercury switch and resistor with associated paper slack bail and miscellaneous hardware.

(d) The paper is guided over the printer platen, underneath the paper slack bail to the spindle assembly. The slack bail will be in the lowermost position. Consequently the mercury switch mounted on the paper slack bail will be "ON" and the motor will be rotating. The drive pin on the motor will hit the flange rod, thus winding the paper. As the paper winds the slack bail will be raised and the mercury switch will tilt to the "OFF" position. Current will then flow thru a resistor connected across the mercury switch. Motor rotation will be greatly reduced, thus minimizing any pull on the printer paper feeding mechanism. Approximately ten lines will have to be fed out before the slack bail is again in position to provide rotation of the winder motor thru the action of the mercury switch.

(8) SUMMARY OF OPERATION -

(a) Throw the POWER switch on the front of the cabinet to the "ON" position. Allow several seconds to elapse in order for the motors to attain running speeds.

(b) Position the switch for mode of operation. (Figure 1-1)

(c) Press the KEYBOARD UNLOCK key to unlock the local keyboard.

(d) Press the CARRIAGE RETURN key to bring the carriages on all machines connected to the keyboard circuit to the beginning of the line.

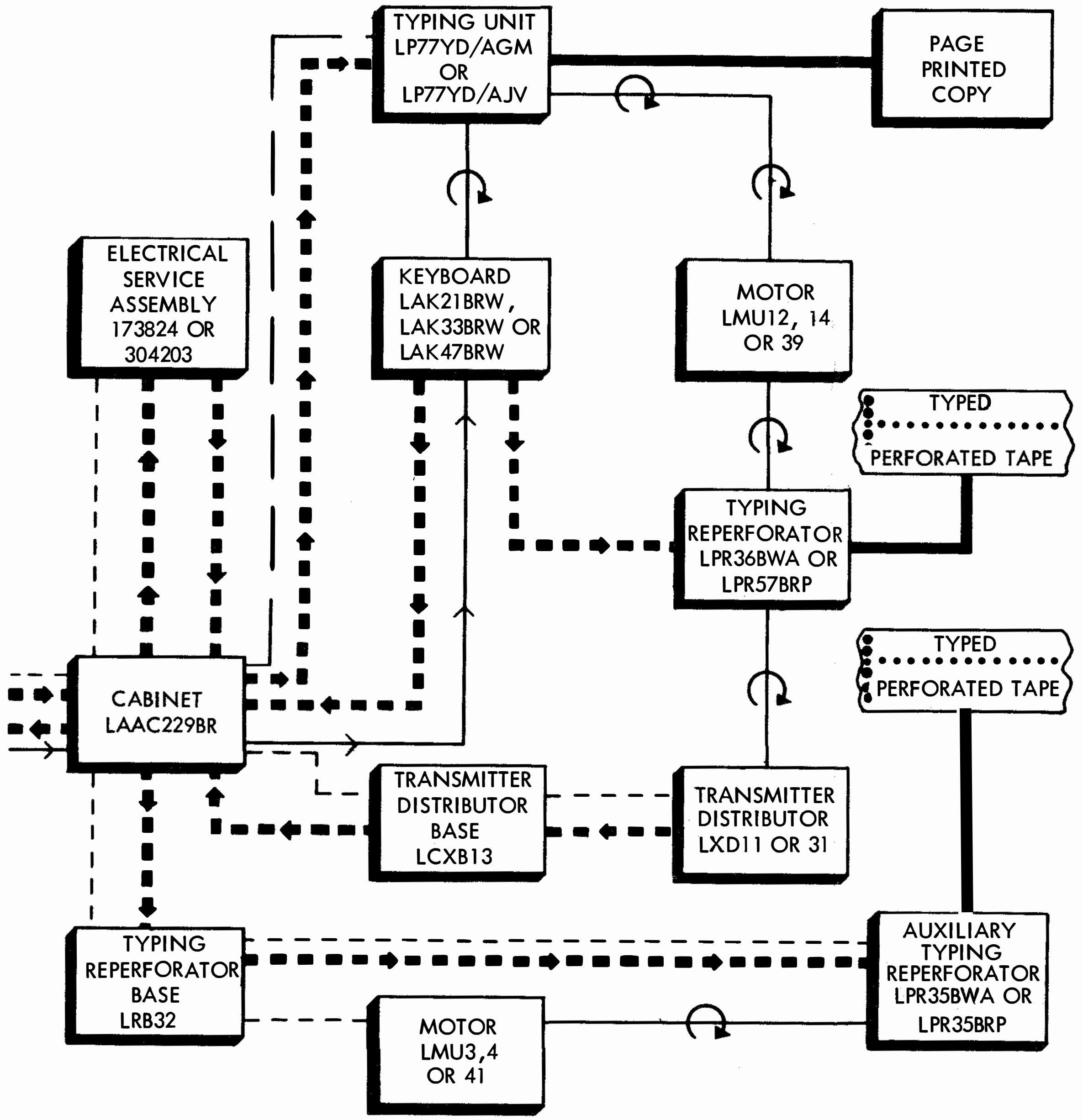
(e) To shut down the equipment throw the POWER switch to the "OFF" position.

(9) OVERLOAD CUTOUT -

(a) The Synchronous motor is equipped with a thermal cutout element to protect the motor against any excessively high temperature which might develop in case of a prolonged overload that would be insufficient to stall the motor and blow the protecting fuses. Once operated, this cutout device must be reset manually by pressing a reset button.

CAUTION

(b) If the motor stops and does not restart in responses to regularly operated controls, check fuse. If the fuse has not been blown, check motor for excessive temperature. Where excessive temperature is indicated, rotate the motor by hand to determine whether any abnormal mechanical condition is present. If the load appears normal leave the cabinet door raised and permit the temperature to drop before resetting the cutout feature. If the motor continues to cutout or if any abnormal load conditions cannot be readily corrected turn the equipment over to authorized maintenance personnel.



AUTOMATIC SEND-RECEIVE SET IN LAAC229BR CABINET

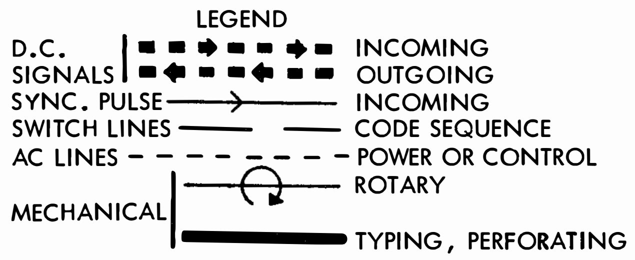
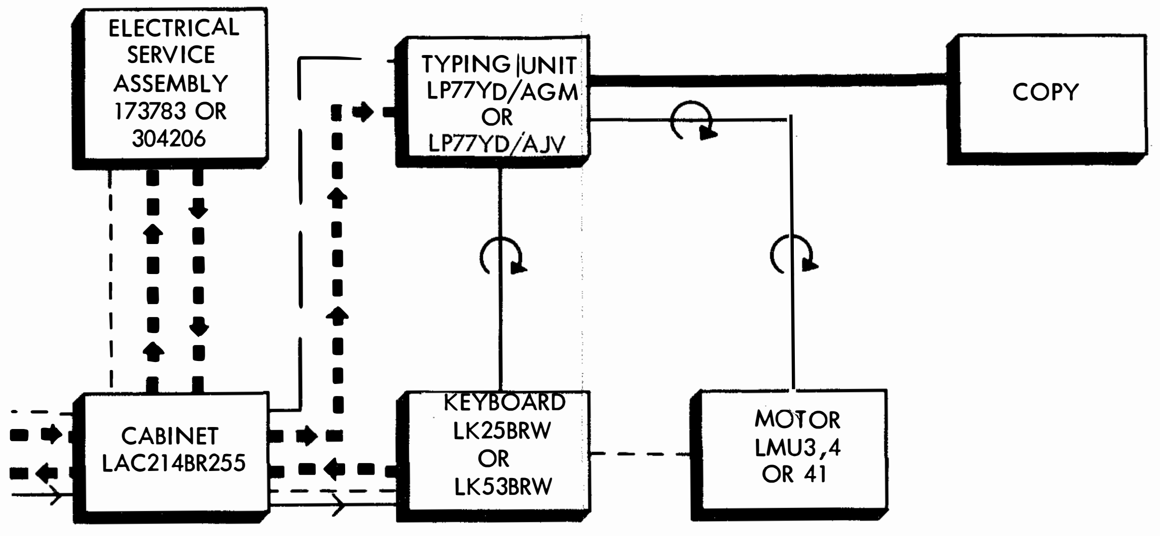
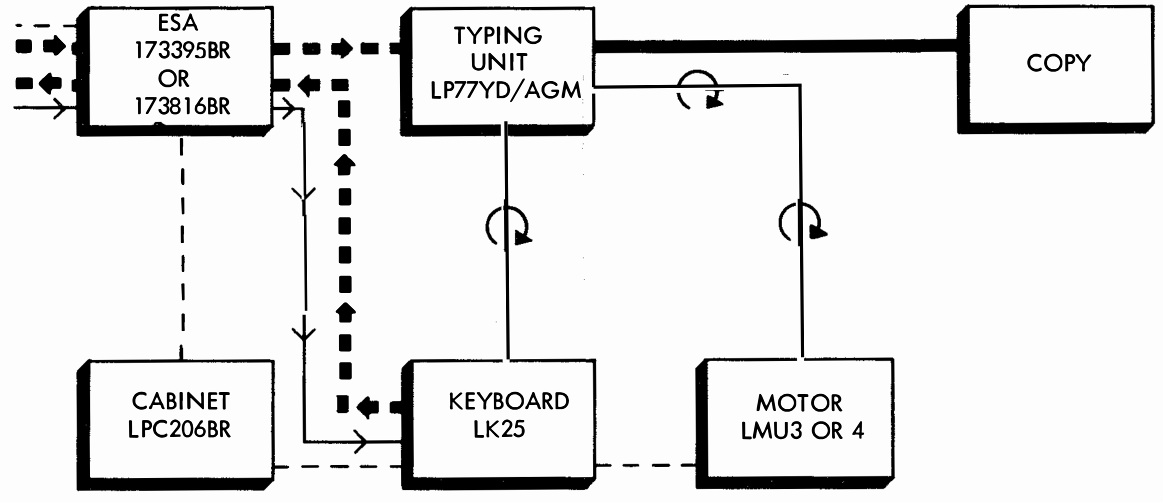


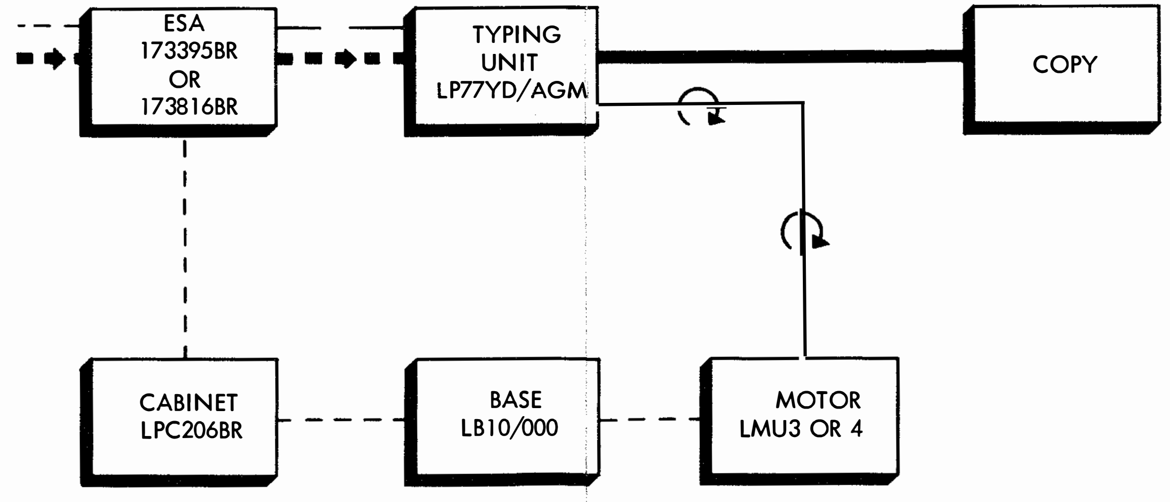
Figure 4-1. System Block Diagrams



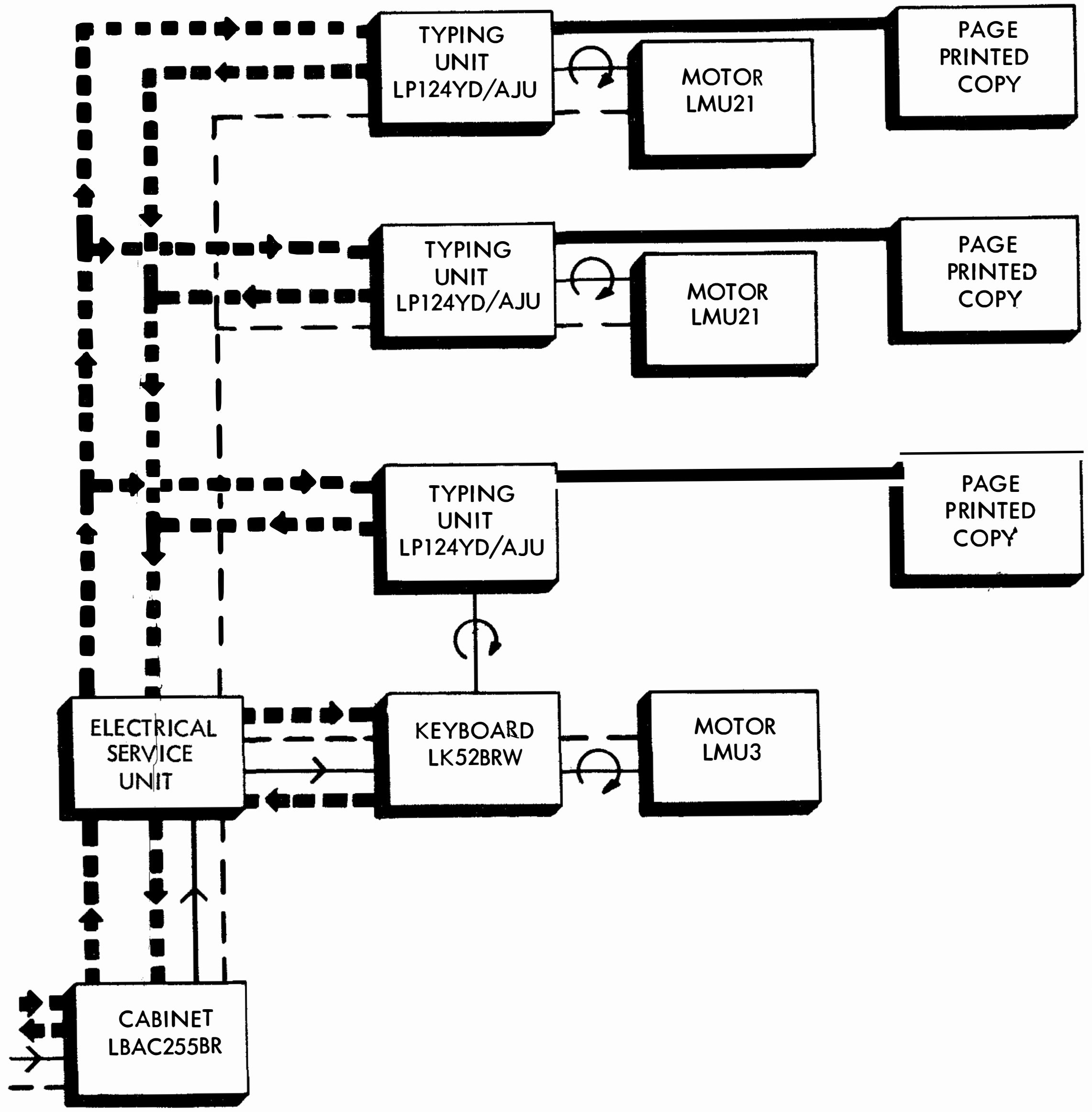
KEYBOARD SEND-RECEIVE SET IN LAC214BR255 CABINET



KEYBOARD SEND-RECEIVE SET IN LPC206BR CABINET



RECEIVE-ONLY SET IN LPC206BR CABINET



MULTIPLE KSR AND RO SET IN LBAC255BR CABINET

SECTION 4
PRINCIPLES OF OPERATION

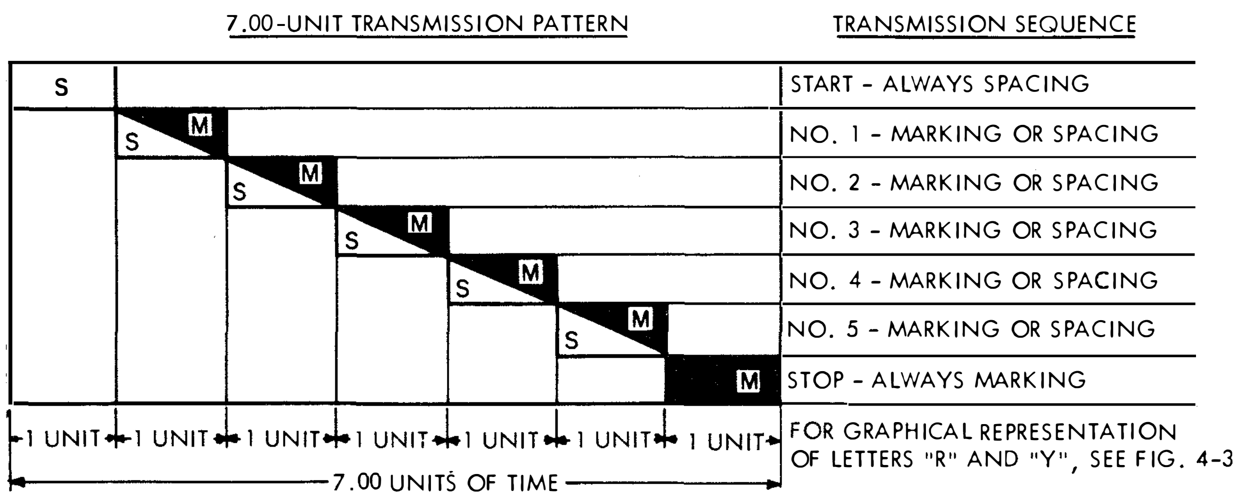
4-1. GENERAL

a. This section covers the operating principles and circuit descriptions of the Receive-Only (RO), Send-Receive (KSR) Automatic Send-Receive (ASR), and Multiple KSR and RO Teletypewriter Sets. The sets provide complete facilities for the reception, origination, storage or transmission of messages over radio or wire channels connecting two or more stations equipped with compatible units. A manually operated keyboard selector switch determines the relationship of the components to the signal line circuit in the ASR Set. An auxiliary signal receiving unit, for simultaneous use of the multiple signal line facilities, is included in this set.

b. The signals transmitted and received by these teletypewriters are polar type direct current, 7.00 unit start-stop pattern. Gearing changes can adapt the equipment to 390 operations per minute (45.5 baud) or 643 operations per minute (75 baud). The equipment is wired for operation on 0.035 ampere line current. A transformer and rectifier in the electrical service assembly furnishes current for operation of the selector unit magnets through an electronic keyer. The selector magnet circuits are closed loops with a separate electronic keyer or selector magnet driver required for each unit in the set equipped with a selector magnet.

c. The sets are driven by synchronous or governed motors depending upon the source of power. Synchronous motors require a power supply of 115 volts (plus or minus 10 per cent) 60 cycles, single phase alternating current. To avoid loss in receiving margin with this type motor, the frequency regulation must be within plus or minus one-half cycle. Governed motors require a like power supply, except that the frequency may be from 50 to 60 cycles.

d. The general electrical and mechanical relationships of the components of the teletypewriters are shown in figure 4-1.



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LETTERS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	BLANK	C.R.	L.F.	SPACE	LTR.	FIG.
1	●	●		●	●	●				●	●						●		●		●		●	●	●	●					●	●
2	●		●				●		●	●	●	●				●	●	●			●	●	●						●		●	●
FEED HOLES	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
3			●			●		●	●		●		●	●		●	●		●		●	●		●	●					●	●	
4		●	●	●		●	●			●	●		●	●	●			●				●		●				●			●	●
5		●					●	●				●	●		●	●	●			●		●	●	●	●	●					●	●

*THESE PRINTED CHARACTERS APPEAR ON TYPED TAPE ONLY

Figure 4-2. Signal Code

4-2. SIGNALING CODE

a. The various components of the teletypewriter operate on the principle of electro-mechanical conversion of message characters (see figure 4-2), in terms of a signal code. Teletypewriter equipment utilizes the Baudot code, a five unit start-stop signaling code in which each character or function is represented by a combination of equal "marking" and "spacing" current time intervals. In a polar teletype circuit intervals during which current flows in a "positive direction" in the signal circuit are referred to as "marking" elements, and intervals during which current flows in the opposite direction as "spacing" elements. Every combination includes five elements that carry the intelligence, each of which may be either marking or spacing. The intelligence elements are preceded by a start element (always spacing) and are followed by a stop element (always marking). Thus each combination consists of 7.00 units of time (referred to as a 7.00 unit transmission pattern). The start and stop elements provide for mechanical synchronization between the transmitting and receiving equipment. A graphic illustration of the marking and spacing element in each sequence may be found in figure 4-3, code representation of the letters R and Y. All five elements are marked in the LETTERS code. The BLANK code is comprised of five spacing elements.

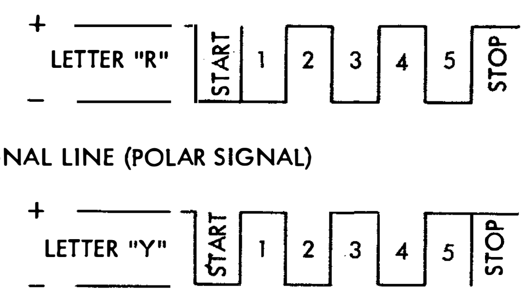


Figure 4-3. Code Representation of the Letters "R" and "Y"

b. The total number of permutations of a five unit code is two to the fifth power, or 32. In order to transmit more than 32 characters and functions, a letters-figures shift operation is designed into the equipment, permitting each permutation, excluding those used to shift and unshift the apparatus, to represent two characters or functions.

c. These sets employ the 7.00 unit transmission pattern in which the stop element is equal to each of the other elements (see figure 4-2). The signaling frequency is expressed in dot cycles per second. One cycle consists of one positive current pulse followed by a negative current pulse. The equipment speed in baud is equal to twice the frequency. Speed in words per minute is roughly equivalent to one-sixth the operations per minute.

4-3. KEYBOARDS (LAK21BRW/LPR36BWA), or (LAK33BRW/LPR36BWA), or (LAK47BRW/LPR57BRP), (LK25BRW), or (LK52BRW) or (LK53BRW) and BASE LB10/000

a. GENERAL

(1) All Automatic Send-Receive Sets (ASR) are equipped with an LAK type keyboard. Send-Receive Sets (KSR), floor model, rack mounted, or cabinet use an LK type keyboard. The LB type base is furnished with all Receive-Only Sets (RO). The keyboards and base provide mounting facilities for the typing unit and motor unit. The motor unit furnishes power to the typing unit which operates at 75 or 45.5 baud depending on the intermediate gear set used. Electrical service to components and assemblies on the keyboard or base is through a 20 point male plug mounted near the rear left corner of the keyboard or base. All signal leads are shielded, and all shielding is insulated from the equipment frame.

(2) The LB10/000 base is not equipped with a keyboard. However, keys are provided to control local carriage return and line feed functions. No code selecting or signal generator mechanism is provided on the base.

(3) The LK type keyboard (Figure 4-4) in addition to the features mentioned in Paragraph (1), is equipped with a code bar mechanism, keylevers, and signal generators. The unit utilizes polar line operation and is equipped with both radio frequency (RF) filtering and arc suppression on the mark and space contacts of the signal generator. A synchronous pulsed transmission mechanism is furnished to control character transmission. The keyboard is mechanically equipped to initiate the following functions:

(a) Mechanical Keyboard Lock Mechanism
(b) Keyboard Unlock Mechanism
(c) Repeat Mechanism
(d) Margin Indicator Mechanism
(e) Local Carriage Return Mechanism
(f) Local Line Feed Mechanism
(g) Speed Changing Mechanism (LK52BRW Only)

(4) In addition to those features listed for the LK Type Keyboards, the LAK Keyboard (Figure 4-5) provides mounting facilities for a typing reperforator (LPR36BWA or LPR57BWA or LPR57BRP), and is also equipped with the following:

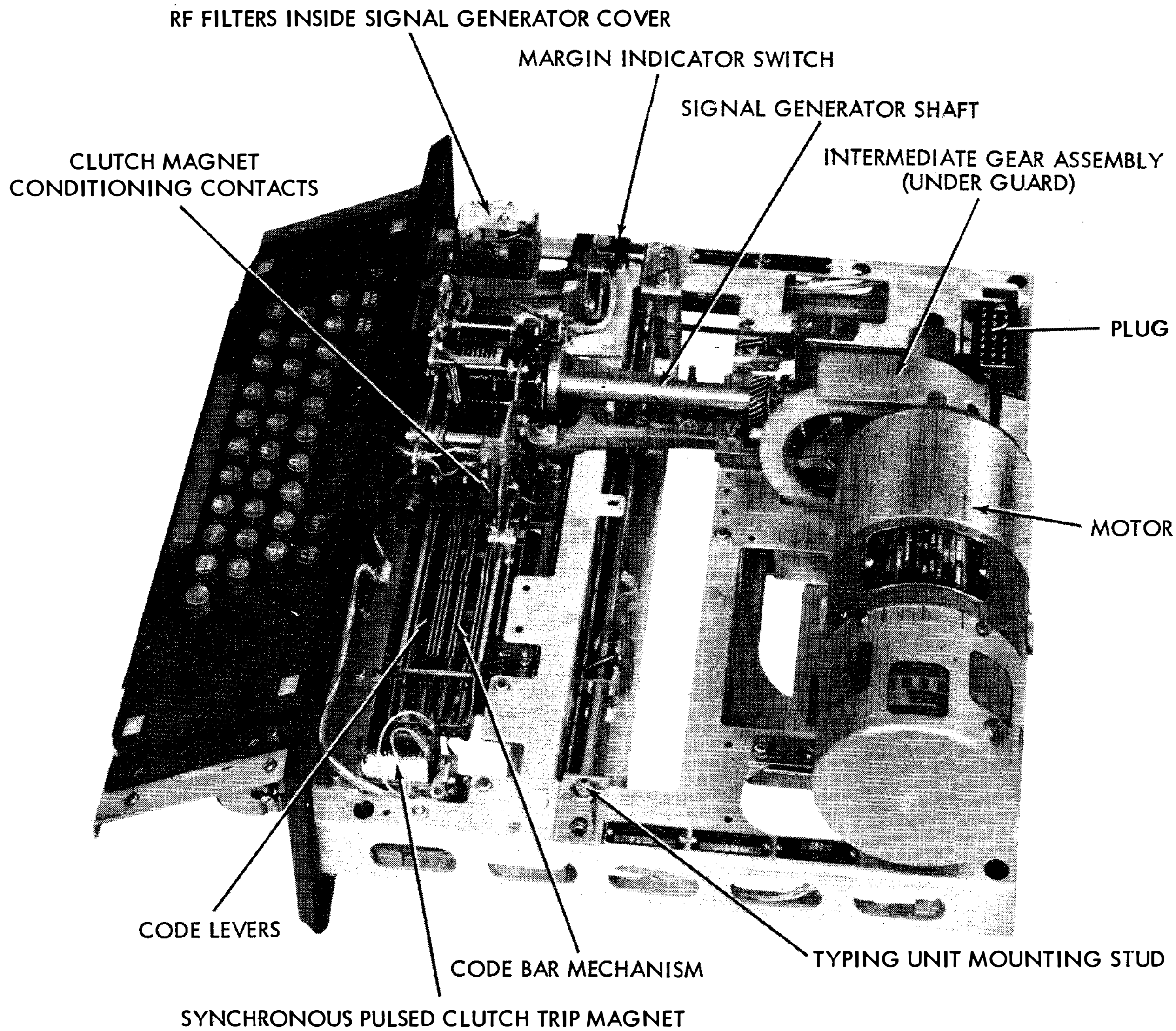


Figure 4-4. Keyboard LK25BRW (Right View)

(a) A selector switch mechanism for determining the mode of operation of the various components of the Automatic Send-Receive Set.

(b) A container to hold the tape supply for the typing reperforator (LPR).

(c) An intermediate gear set to drive the typing reperforator.

(d) A character counter to aid in determining the printed page line equivalent for perforated tape production.

(e) An electrical keyboard lock mechanism in place of a mechanical keyboard lock mechanism.

(f) A tape backspace mechanism to permit eradication of an erroneous character code, or codes, by reperforating such codes, using the five-hole perforated letters code.

b. INTERMEDIATE GEARS

(1) The typing unit intermediate gears (figures 4-4 and 4-5) are located near the center of the base. Two helical gears are mounted in this assembly, the larger gear engaging the motor shaft pinion. The gear ratio between the pinion and the helical driven gear on the intermediate shaft determines the maximum speed (75 baud) at which the equipment will operate. These gears are readily replaceable with gears which will furnish 45.5 baud operation. The smaller gear, on the left in the intermediate gear assembly, engages the helical driving gear on the main shaft of the automatic typer, which is on a common hub with the keyboard driving gear. The latter, on the LK and LAK keyboards, engages the geared end of the signal generator

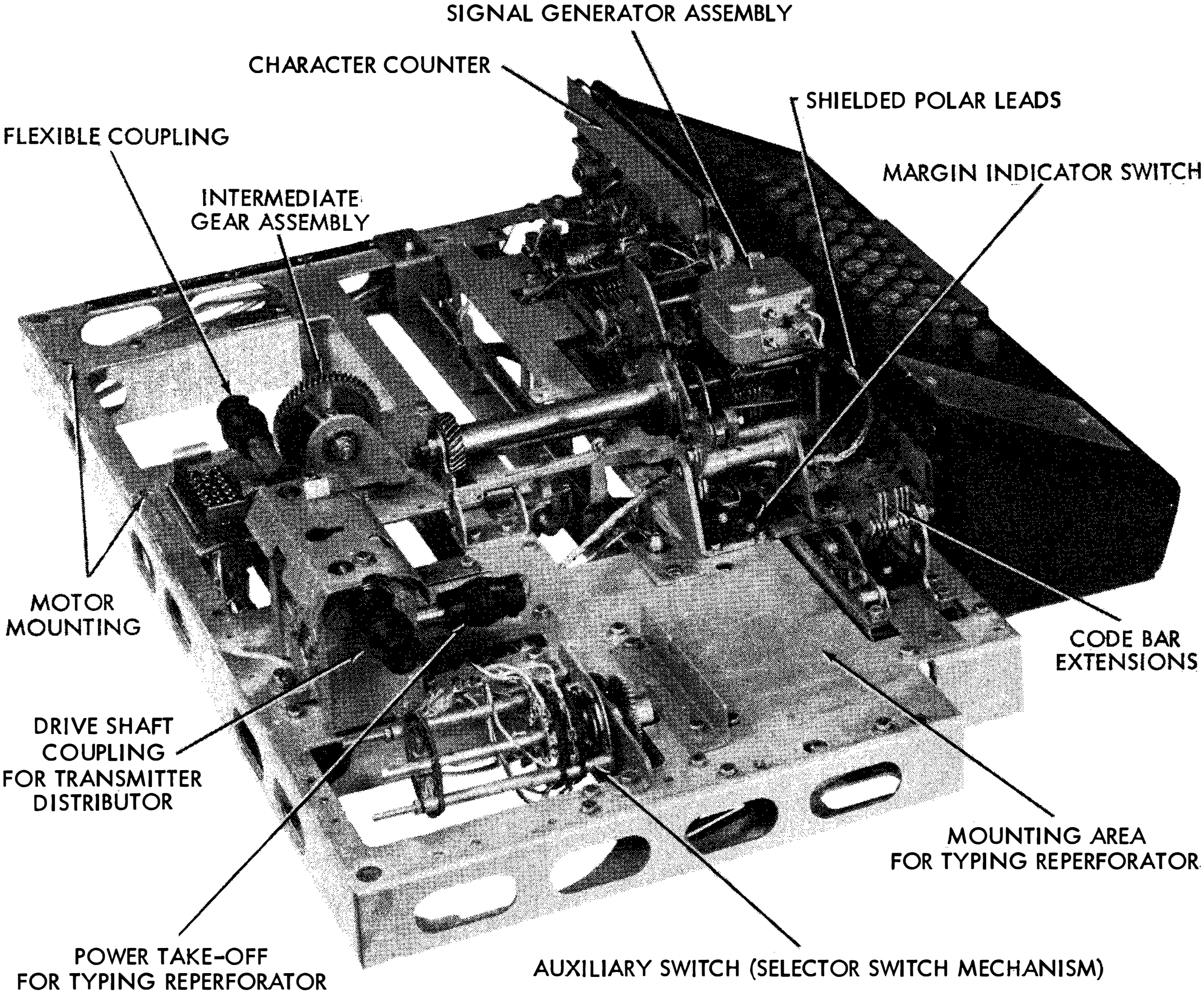


Figure 4-5. Keyboard LAK21BRW (Left View)

drive shaft, which is a part of the keyboard.

(2) The typing reperforator intermediate gears, mounted in the rear bearing bracket (figure 4-5), are located at the left side of the base in line with the motor (LAK keyboards only). A ball bearing mounted shaft and pinion gear are designed for connection to other components by flexible couplings and shaft. The driven gear is mounted in a bearing bracket at the rear, with provision for flexible coupling and shaft connection to the typing reperforator.

c. CODE BAR MECHANISM - The code bar mechanism is located on the front underside portion of the keyboard. Each keylever in the lower three rows and the space bar is connected to a code lever, and each keylever in the upper row is connected to a function lever.

(1) The code and function levers pivot about points near their midportions (figure 4-6). Located above the rear half of the code levers and running parallel with the keyboard are, from rear to front: the code lever upstop; the clutch trip bar; the numbers 1, 2, 3, 4, and 5 code bars; two character counter bars (counter and carriage return), and the lock bar. The rear portion of each code lever or function lever is normally held downward by a spring so that the front end, with its attached keylever, is held upward.

(2) A wedgelock is mounted on the projection of the lower front portion of all code levers (figure 4-7). If one of these levers is operated, the wedgelock moves downward between the lock balls in the lock ball channel and crowds them together. This prevents any other lever with a wedgelock from being operated at the same time.

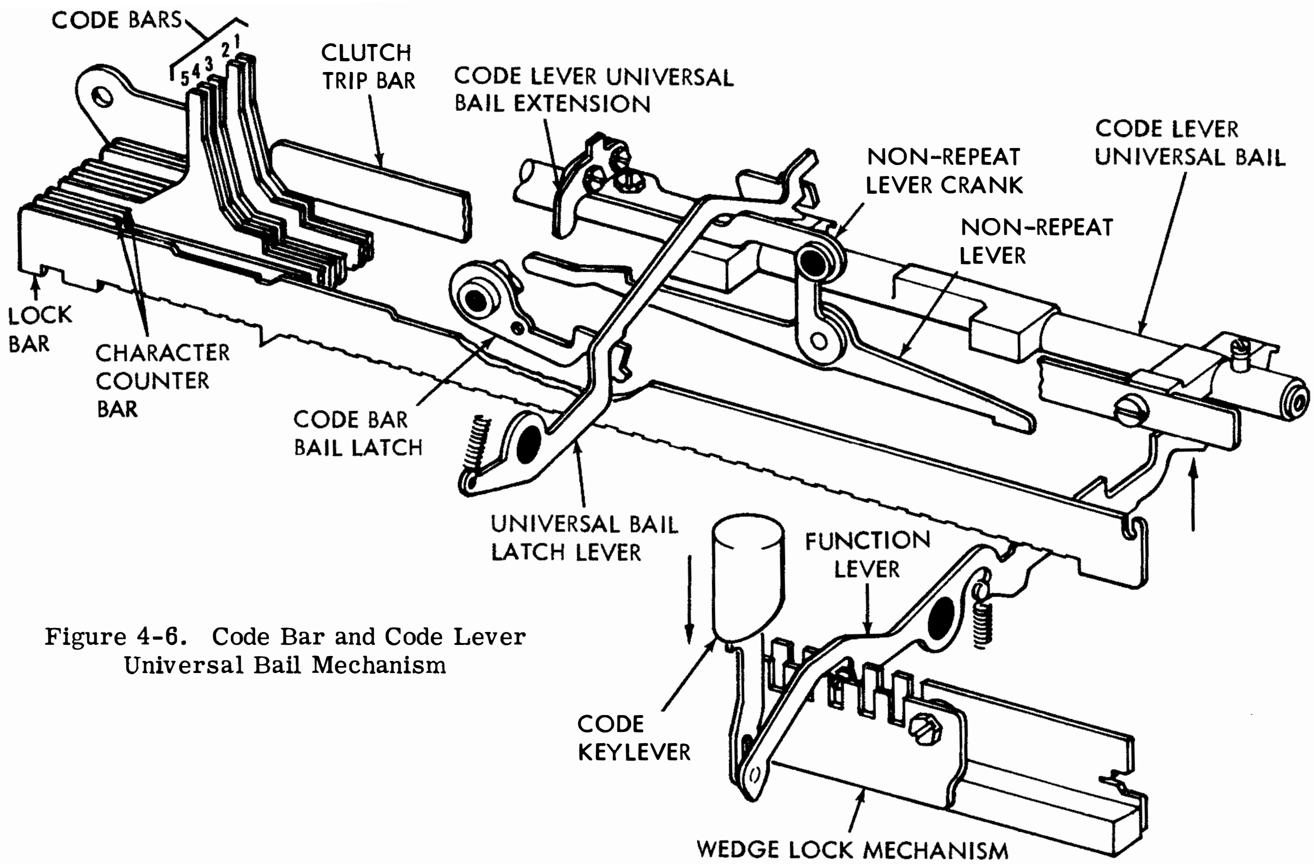


Figure 4-6. Code Bar and Code Lever Universal Bail Mechanism

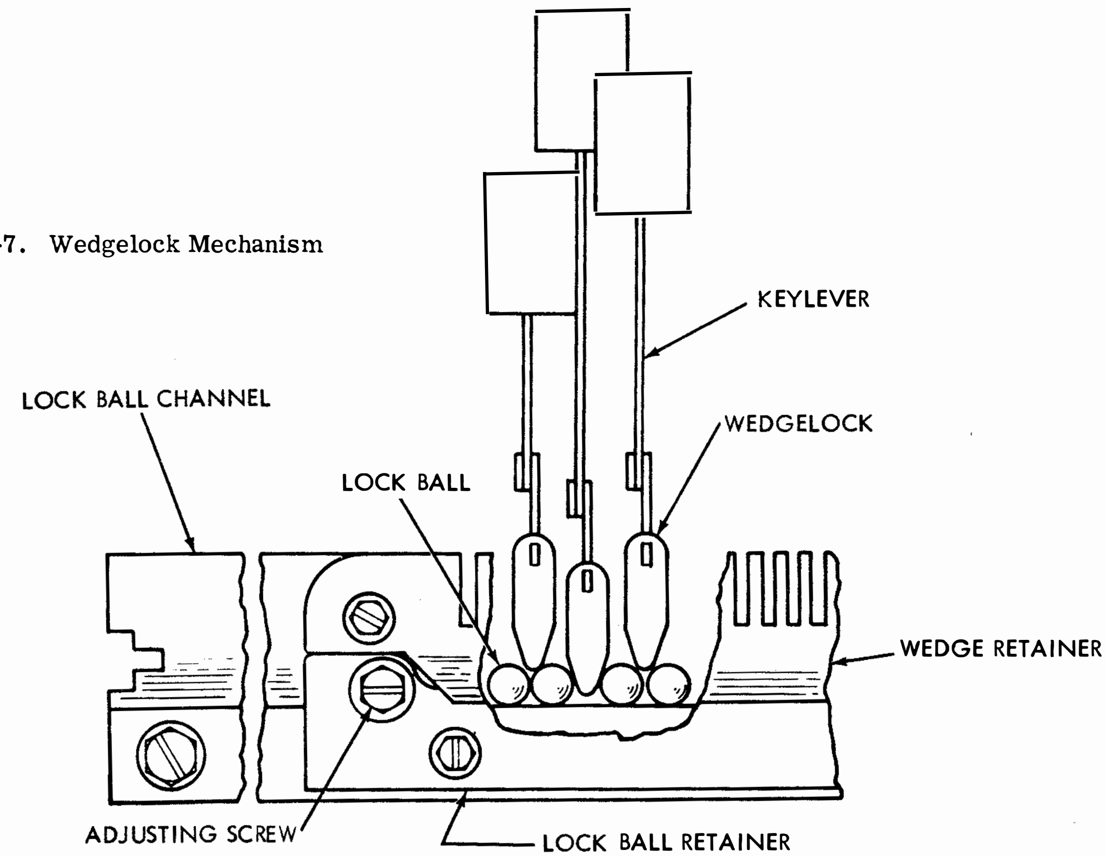


Figure 4-7. Wedgelock Mechanism

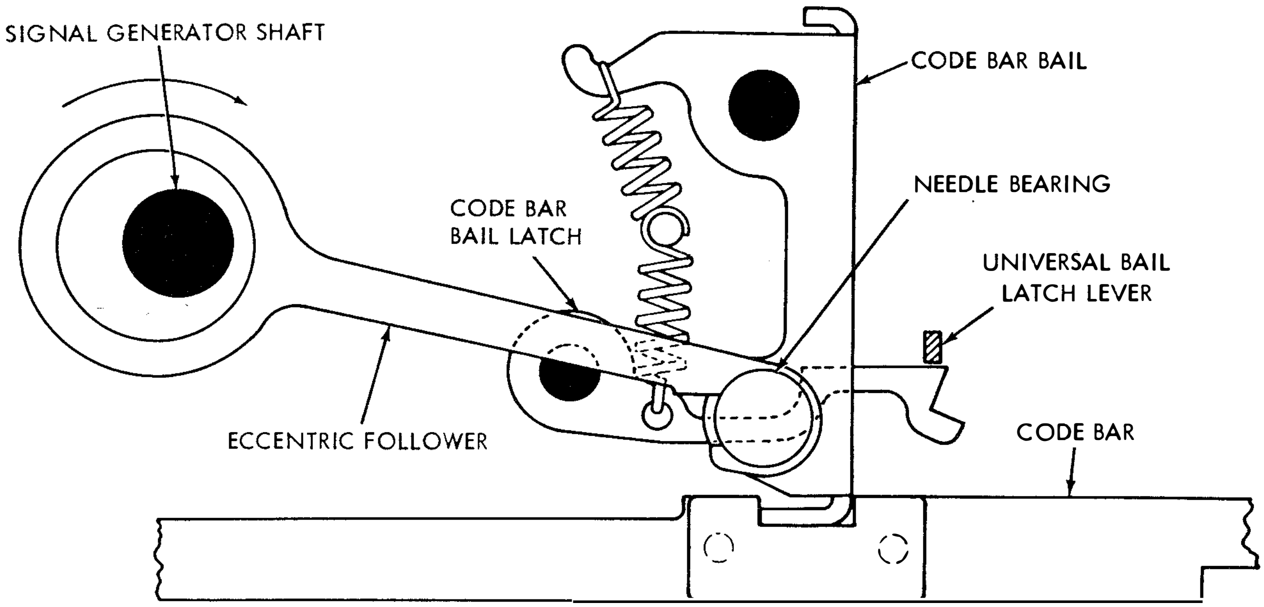


Figure 4-8. Code Bar Bail Mechanism

(3) With the signal generator shaft in its stop position, the code bars and clutch bar are held toward the left (viewed from the front) against the tension of their springs by the latched-up code bar bail.

(4) When any keylever of the three lower rows or the space bar is depressed, the rear end of the associated code lever engages and rotates the code lever universal bail counterclockwise (see figure 4-6). The extension on the code lever universal bail disengages from the stop at the rear of the universal bail latch lever. This lever then moves downward under the tension of its spring. As the lever falls, it strikes the code bar bail latch and carries it downward (figure 4-8). When the corner of the code bar bail latch falls beyond the centerline of the needle bearing mounted on the code bar bail, the code bar bail is released and swings to the right.

(5) Upon being freed, the code bar bail, clutch trip bar, and the selected code bars are pulled to the right by their springs. Unselected code bars are stopped from moving to the right

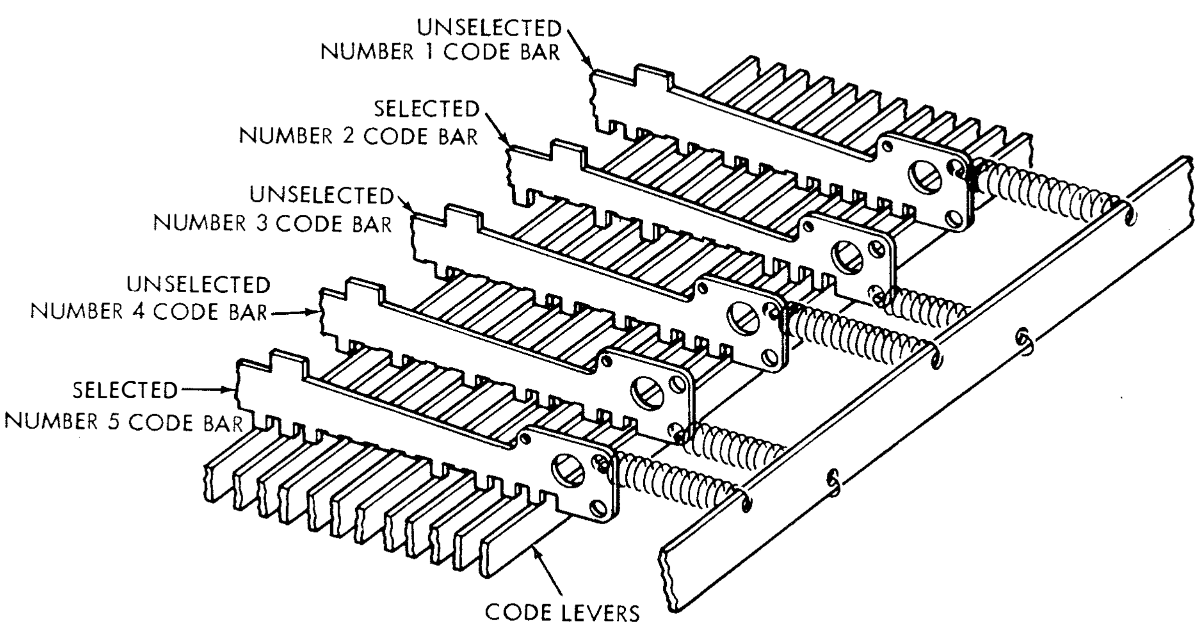


Figure 4-9. Code Bar Selection

by the operated keylever or space bar. For example, if the L lever is depressed, code bars 1, 3, and 4 will be stopped by the code lever engaging teeth on the underside of the code bars. The teeth on code bars 2 and 5 are omitted in this area, and the bars are permitted to move to their extreme right hand position (figure 4-9).

(6) The code bars have vertical extensions that engage a curved part of the signal generator transfer levers (figure 4-10). The code bars which are permitted to move to the right carry with them their respective transfer levers.

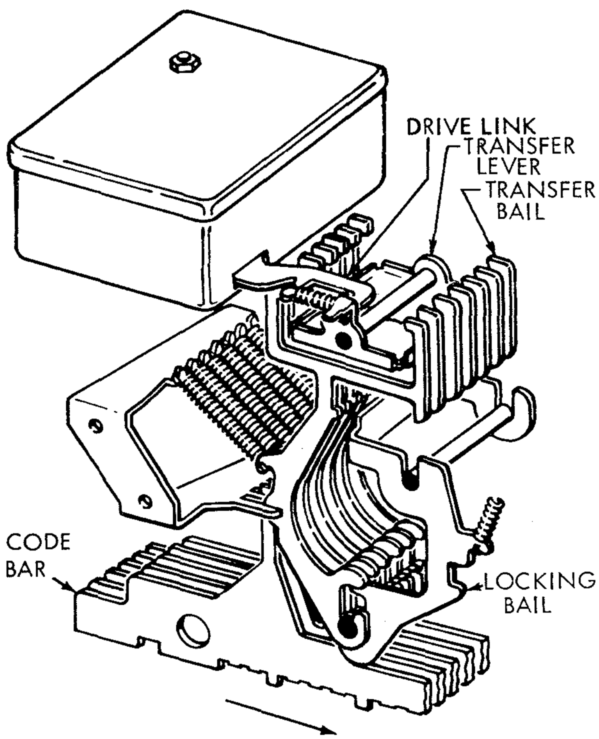


Figure 4-10. Transfer Lever Mechanism

(a) On the LK keyboard, upon reception of an external clocking pulse (see paragraph 4-3f), the clutch trip bar moves to the right tripping the signal generator clutch stop lever (figure 4-11). This allows the clutch to engage and rotate the signal generator cam.

(b) LAK keyboard operation is similar to the LK. After the code bars move to the right, a keyboard control selection lever (figure 4-12) is linked to and moves right, with the clutch trip bar upon reception of the external clocking pulse (paragraph 4-3f). When the three positioned keyboard selector switch knob is in the (K) or (K-T) position, a projection on the keyboard control selection lever trips the signal generator stop clutch lever. The clutch then engages and rotates the signal generator cam.

d. SIGNAL GENERATOR CLUTCH - When the clutch stop lever is tripped, the clutch shoes engage a serrated surface on the inside of the clutch drum. When power is on (motor unit operating), the clutch drum rotates continuously in a clockwise direction (viewed from the front) because it is a part of the geared signal generator shaft. Since the clutch shoes are mounted on a plate that is part of the cam assembly, the cam rotates upon engagement of the clutch.

(1) Figure 4-13 shows a clutch disengaged. Disengagement is caused by bringing together lug A on the cam-clutch disk and the lower end of clutch shoe lever B. The upper end of lever B pivots about its ear C and allows its other ear D to move toward the right. The upper spring then pulls the two shoes together and away from the drum.

(2) Figure 4-14 shows the same clutch engaged. This is accomplished by releasing the lower end of lever B. The upper end of lever B pivots about its ear C (which bears against the upper end of the secondary shoe) and moves its ear D, and the upper end of the primary shoe, toward the left until the shoe makes contact with the drum at point E. As the drum turns counterclockwise, it drives the primary shoe downward so that it again makes contact with the drum, this time at point F. There, the combined forces acting on the primary shoe cause it to push against the secondary shoe at point G. The lower end of the secondary shoe then bears against the drum at point H. The revolving drum acts to drive this shoe upward so that it again makes contact with the drum at point I. Since the forces involved are multiplied at each of the preceding steps, the final force developed at point I is very great. This force is applied to the lug J on the clutch-cam disk to cause it to turn in step with the drum. The cam disk is a part of the signal generator cam assembly, which rotates upon engagement of the clutch.

e. SIGNAL GENERATOR MECHANISM - The signal generator mechanism is located on the top front part of the keyboard. A drive shaft geared at the rear to the main shaft of the automatic typer, a cam-clutch assembly mounted on the forward end of the shaft, an eccentric follower to operate the code bar bail mechanism from the cam shaft, a transfer mechanism, and a contact box mechanism are the essential features of the signal generator. Its purpose is to convert the mechanical input of the keyboard to the electrical signal sequence corresponding to that input. To the point of tripping the clutch-cam mechanism, operation in response to keyboard input is manual through leverage and piv-

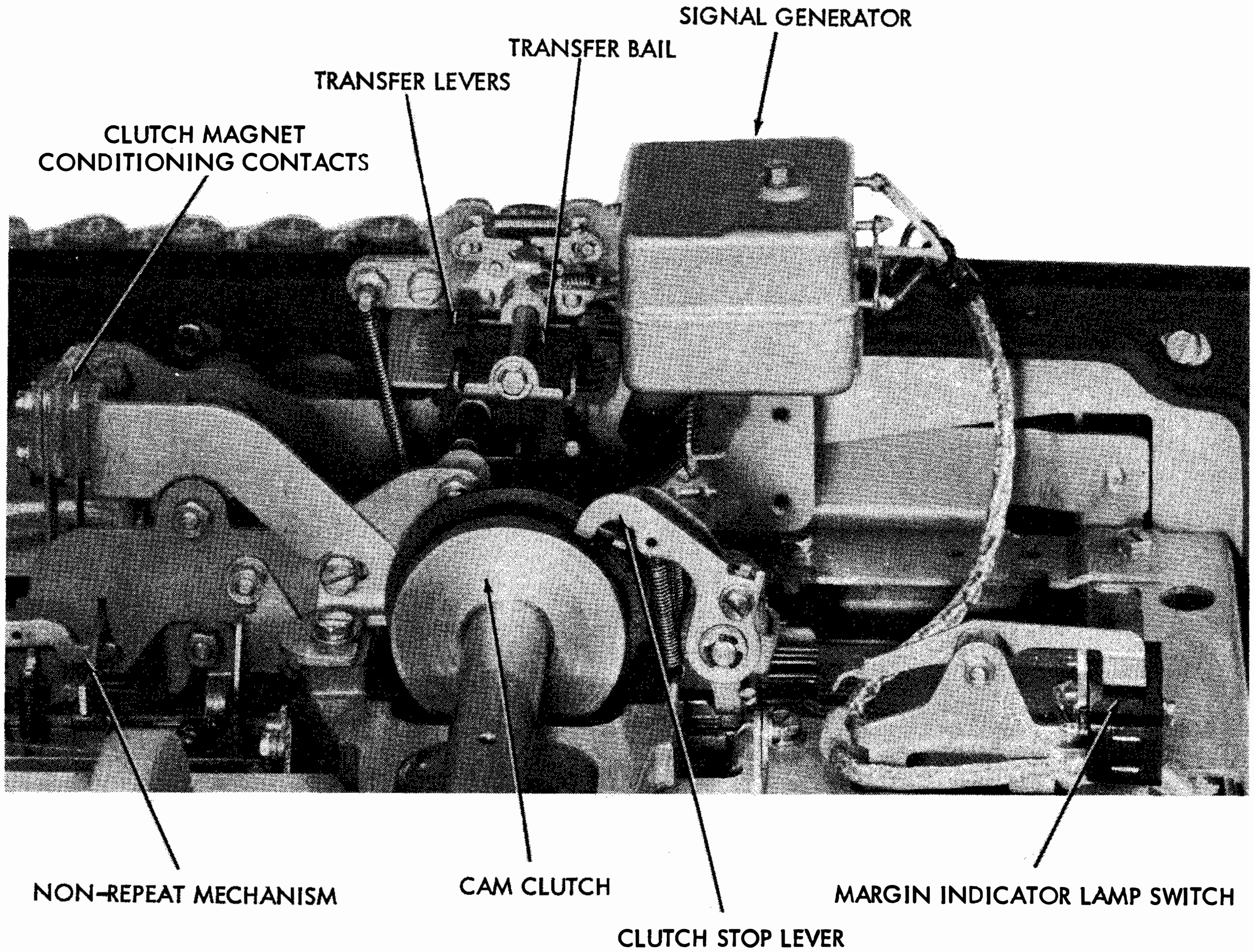


Figure 4-11. Keyboard Signal Generator (Rear View)

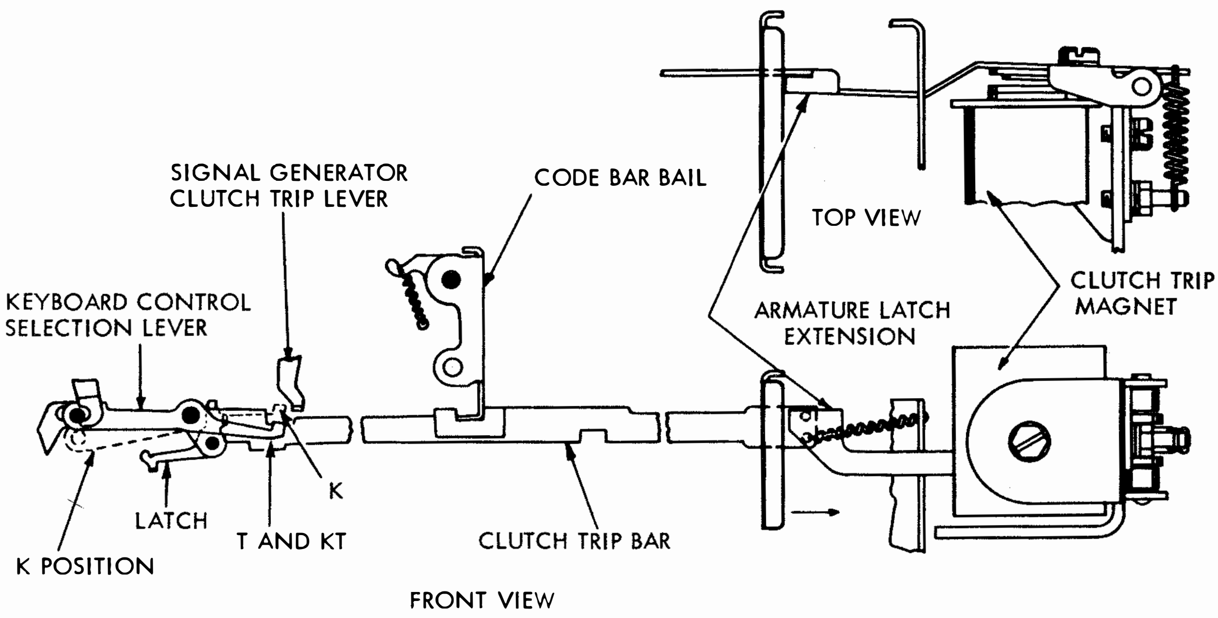


Figure 4-12. Signal Generator Clutch Trip Bar and Synchronous Pulsed Magnet

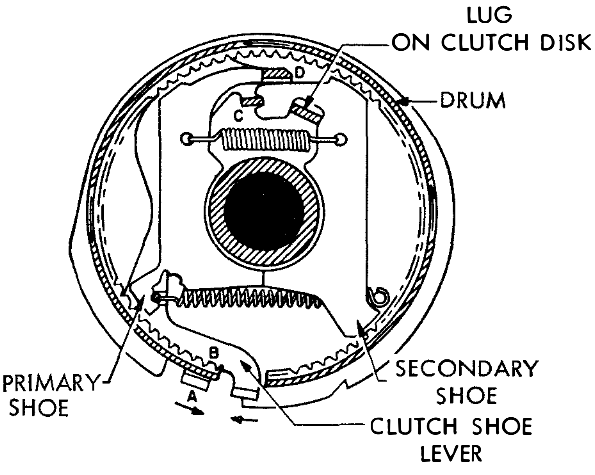


Figure 4-13. Clutch Disengaged

ot points and detents. The clutch - cam applies the power of the motor to the operation. The signal generator originates an electrical signal pattern (marking or spacing) on the signal line, corresponding to the manual keyboard input.

(1) As stated in paragraph 4-3c(6), each of the five code bars operates its own transfer lever (figure 4-10). In addition to these five transfer levers, there are two others which are not associated with code bars. These originate the start and stop pulses.

(2) The cam lobes are numbered 1 through 8 from rear to front. There are seven signal pulse lobes on the cam (one for each transfer lever). The eighth cam lobe is used to actuate the locking bail.

(3) The cam lobes are so arranged that when the cam rotates, lobe 3 engages its transfer lever first and moves it downward. Almost at the same time, the eighth lobe from the rear begins to move the locking bail upward. A blade on the locking bail engages in slots on the selected transfer levers and locks them in position. Unselected transfer levers are locked in the left position as the blade blocks their movement. Thus, in the first few degrees of cam rotation, the position of the transfer levers is locked and the code bars are free to be reset in their normal latched positions.

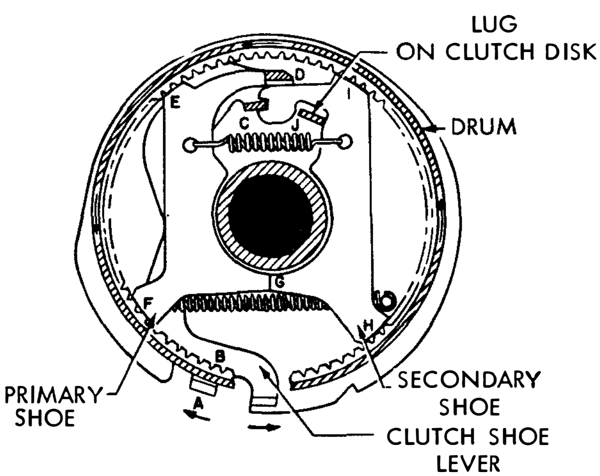


Figure 4-14. Clutch Engaged

(4) Transfer lever 3 is the start pulse transfer lever. There is no code bar to engage this lever, hence, it is always held to the left by its own spring. As cam lobe 3 moves this lever down, the hook on the upper right of the lever engages the right hand side of the transfer bail. This trips the transfer bail to the right and pulls the contact drive link (figure 4-10) to the right. The resulting action of the contact toggle is such that the marking contacts open and the spacing contacts close. This is known as a spacing pulse. Thus, the first pulse (or start pulse) of any character is a spacing pulse.

(5) Lobe 1 and its transfer lever move downward next. For the character L it has been shown (paragraph 4-3c(5) that transfer lever 1 is positioned to the left. In turn, the upper right hook of this lever pulls downward on the transfer bail, rotating it clockwise. This pushes the drive link (figure 4-15) to the right,

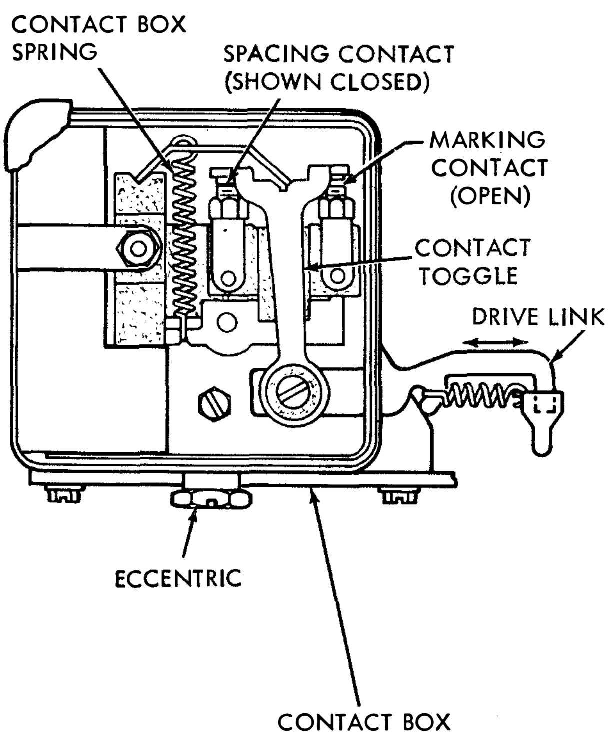


Figure 4-15. Contact Box Mechanism

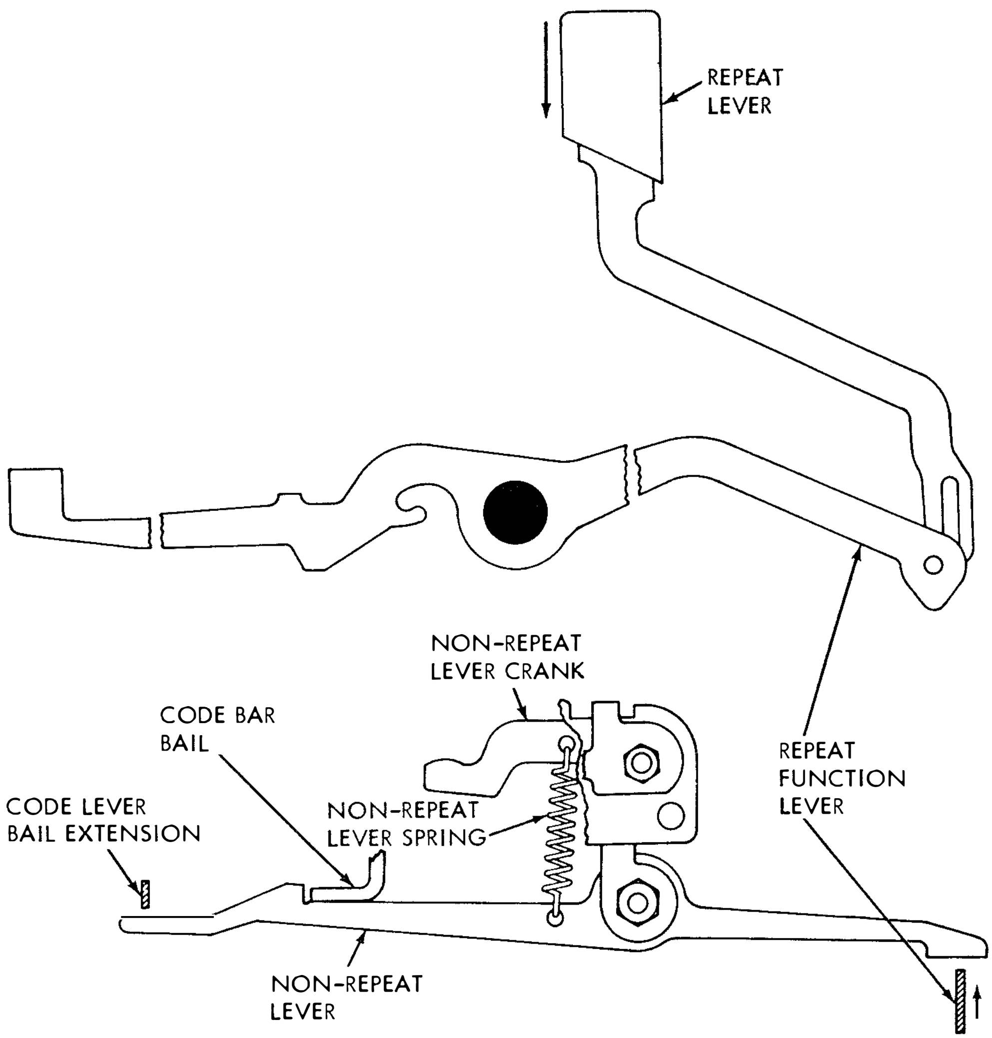


Figure 4-16. Repeat Mechanism

opening the marking contacts and allowing a spacing pulse to be transmitted.

(6) When lobe 2 and its transfer lever move downward, transfer lever 2 is positioned to the right. The upper right hook pulls downward on the bail, rotating it clockwise and pushing the drive link to the left. This closes the marking contacts, and allows a marking pulse to be transmitted.

(7) Similarly, transfer levers 4, 5, and 6 are pulled down by their respective cam lobes. The resulting pulse will be marking if the transfer lever is to the right, or spacing if it is to the left.

(8) Transfer lever 7 is the stop pulse transfer lever. This lever is permanently held to the right by a stop pin; therefore, the resulting pulse, the stop pulse, is always marking.

(9) The locking bail holds the transfer levers in their changed positions until after the beginning of the fifth pulse. Then cam lobe 8 pulls the bail down out of locking position and all selected transfer levers are free to return to their left position.

(10) Reset of the code bars is accomplished by means of an eccentric on the front of the cam which drives an eccentric follower (figure 4-8). The follower engages an eccentric stud on the side of the code bar bail and pulls the bail to the left as the cam rotates. As the code bar bail moves to the left, the code bar bail latch clears the needle bearing stud and is pulled upward into locking position under tension of the spring to latch or reset the code bar bail. As the code bar bail is moved into reset position, it engages projections on the unlatched code bars, clutch trip bar, and a stop on the non-repeat lever, moving all these elements to the left into latched reset position.

f. SYNCHRONOUS PULSED TRANSMISSION MECHANISM - The synchronous pulsed transmission mechanism provides a means of initiating signal transmission from the keyboard, at a predetermined rate, upon reception of a 0.050 ampere external clocking pulse of 20 millisecond duration.

(1) When any green key on the keyboard is depressed, the reset bail moves right and releases all selected code bars as described in paragraph 4-3c(4). Also released is the universal code bar which moves right and closes the clutch magnet conditioning contacts setting up the clutch trip magnet to receive the external clocking pulse (see figure 4-4).

(2) Upon reception of the external clocking pulse, the clutch trip magnet energizes and unblocks the clutch trip bar. As the clutch trip bar moves to the right it engages the clutch trip bail extension and trips the signal generator clutch allowing the signal generator cam shaft to rotate and transmit the proper sequential signal. After one complete revolution of the signal generator cam shaft, the reset bail returns to its starting position resetting all code bars and the clutch trip bar as explained in paragraph 4-3e(10).

(3) When the LAK keyboard is in the (K) or (K-T) position, the signal generator clutch must wait for the clutch trip magnet to receive the external clocking pulse. In the (T) position the signal generator can still be tripped by the external clocking pulse unless the clutch trip magnet is blinded by appropriate wiring of the selector switch.

g. REPEAT MECHANISM - Operation of the REPT keylever, simultaneously with one of the keylevers in the three lower rows or the space bar, disables the non-repeat mechanism and causes the character or function selected to be

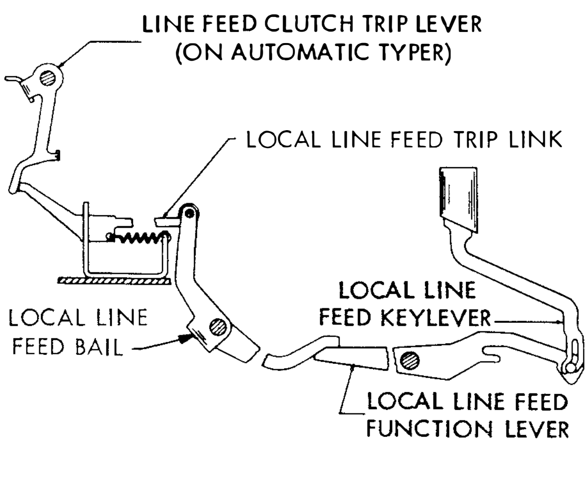


Figure 4-17. Local Line Feed Mechanism

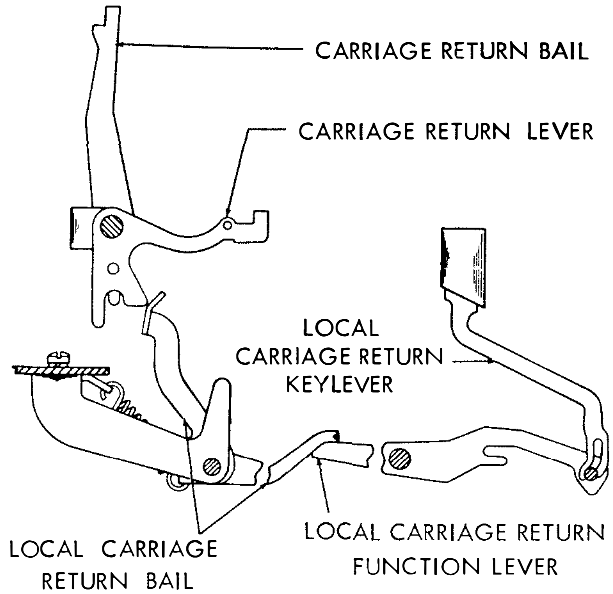


Figure 4-18. Local Carriage Return Mechanism

repeated as long as the REPT keylever is held operated. The operated REPT keylever causes its function lever to raise the right end of the non-repeat lever (figures 4-11 and 4-16), rotating it about its pivot point. In this position, the non-repeat lever cannot be engaged and operated by the code bar bail; therefore, the non-repeat lever crank will not reset the operated code bar bail latch. The code bar bail and universal bail latch lever are thus maintained in their operated positions and the code bar bail follows the eccentric arm movement back and forth until the REPT keylever is released.

h. LOCAL LINE FEED MECHANISM (Figure 4-17) - When the LOC LF keylever on the keyboard is depressed, paper is fed out of the local typing unit. The mechanism operates as follows: depressing the LOC LF keylever raises the forward end of the local line feed bail. This bail pivots and its upper end pushes the attached local line feed trip link toward the rear until the link engages the line feed clutch trip lever on the automatic typer. Thus the line feed mechanism on the local typer is made to operate without a signal and other typers on the same line circuit are not disturbed.

i. LOCAL CARRIAGE RETURN MECHANISM - The local carriage return mechanism enables the operator to trip the carriage return mechanism on the local typing unit only, thereby causing the type box carriage to be fully returned to its normal position at the beginning of a line of copy. This mechanism operates as follows (see figure 4-18): when the LOC CR keylever is depressed, its function lever rises

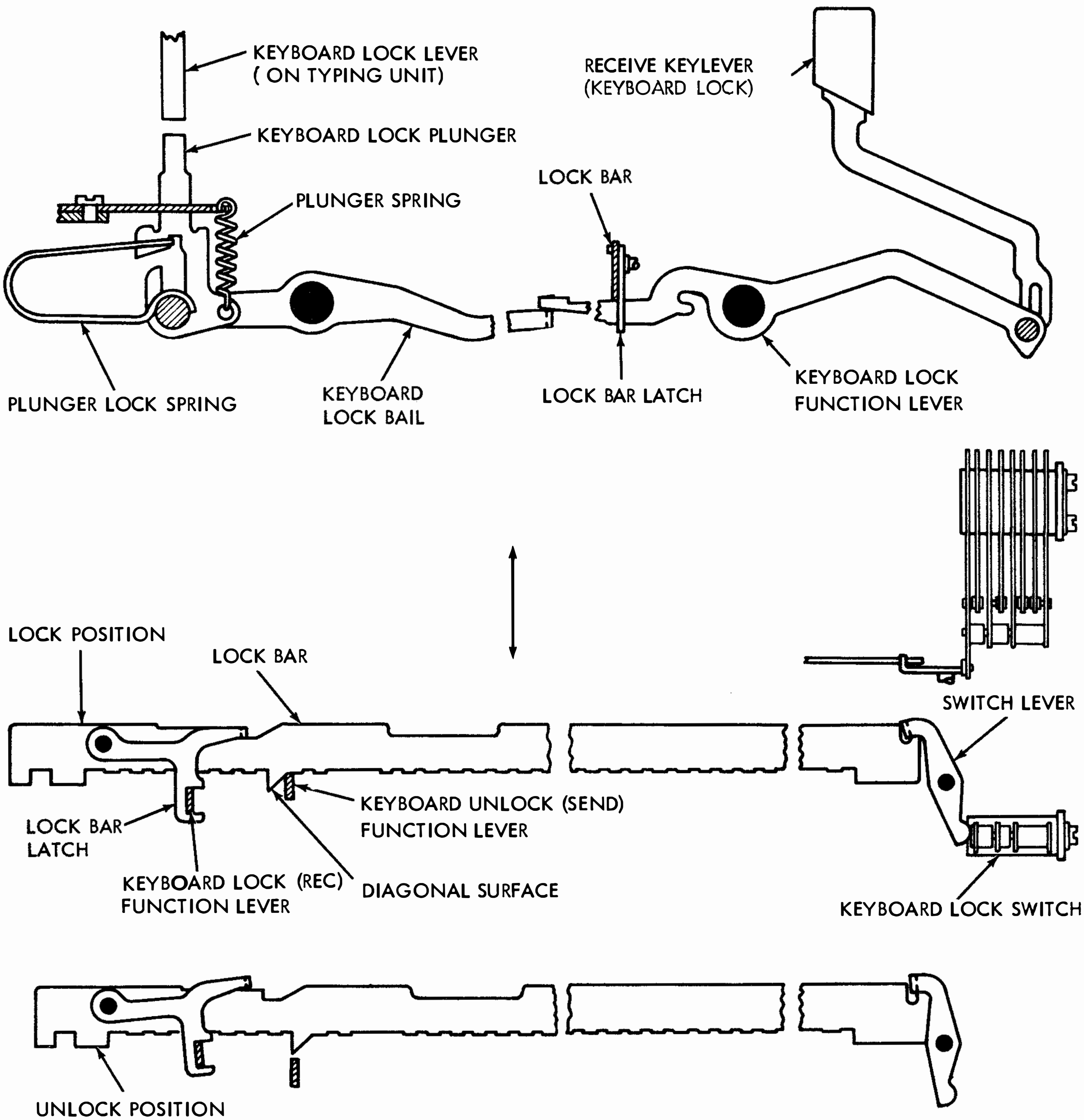


Figure 4-19. Electrical Keyboard Lock Mechanism

and, in turn, raises the forward end of the carriage return bail. This bail rotates about its pivot point until the upper end engages the carriage return lever on the typer. The carriage return mechanism operates in this manner without a signal that would cause other typing units in the line circuit to function.

j. KEYBOARD LOCK MECHANISM (LK Keyboard only) - Operation of the keyboard lock keylever (red) causes its function lever to raise the keyboard lock bar pawl (figure 4-6). The pawl releases the keyboard lock bar and a spring pulls the bar toward the right. In this position, projections on the lower side of the bar block the upward movement of any code lever and the repeat function lever.

k. KEYBOARD UNLOCK MECHANISM (LK Keyboard only) - Operation of the keyboard unlock keylever (red) causes its function lever to rise against a camming surface on the keyboard lock bar and drive the bar toward the left until the lock bar pawl drops into a notch in the lock bar (figure 4 - 6). In this position, the projections on the lock bar lie between the code levers and offer no interference with their operation.

l. ELECTRICAL KEYBOARD LOCK MECHANISM (LAK Keyboard only) - The electrical keyboard lock mechanism permits the signal generator contact to be electrically shunted from the keyboard by depressing the REC keylever (see figure 4-19). This action raises the keyboard lock function lever which, in turn, raises the lock bar latch. With the lock bar latch disengaged, the lock bar is free to move to the right under spring tension of the keyboard lock switch contact on the switch lever. The switch lever then pivots, closing the contacts of the switch. The associated circuitry is arranged to shunt the signal generator when the switch is closed. However, since there is no mechanical blocking of the keylevers, the typing reperforator can still be operated. (See figure 4-20.)

m. ELECTRICAL KEYBOARD UNLOCK MECHANISM (LAK Keyboard only) - The keyboard unlock mechanism permits the keyboard to be unshunted. The operation of the mechanism is as follows:

(1) When the SEND keylever is depressed (figure 4-21), the keyboard unlock function lever rises against a diagonal camming surface on the lock bar (see figure 4 - 19). This moves

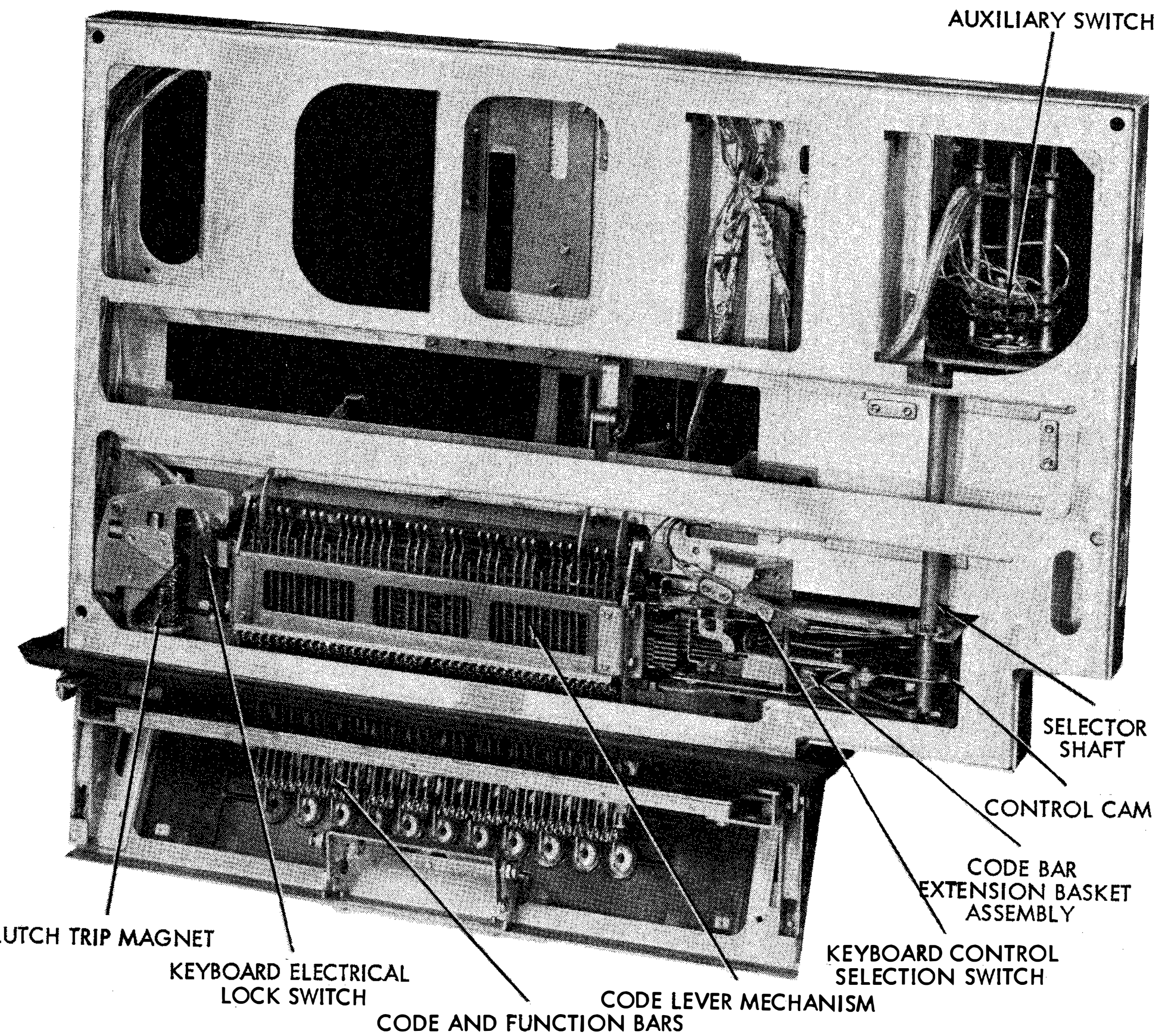


Figure 4-20. Keyboard LAK21BRW (Bottom View)

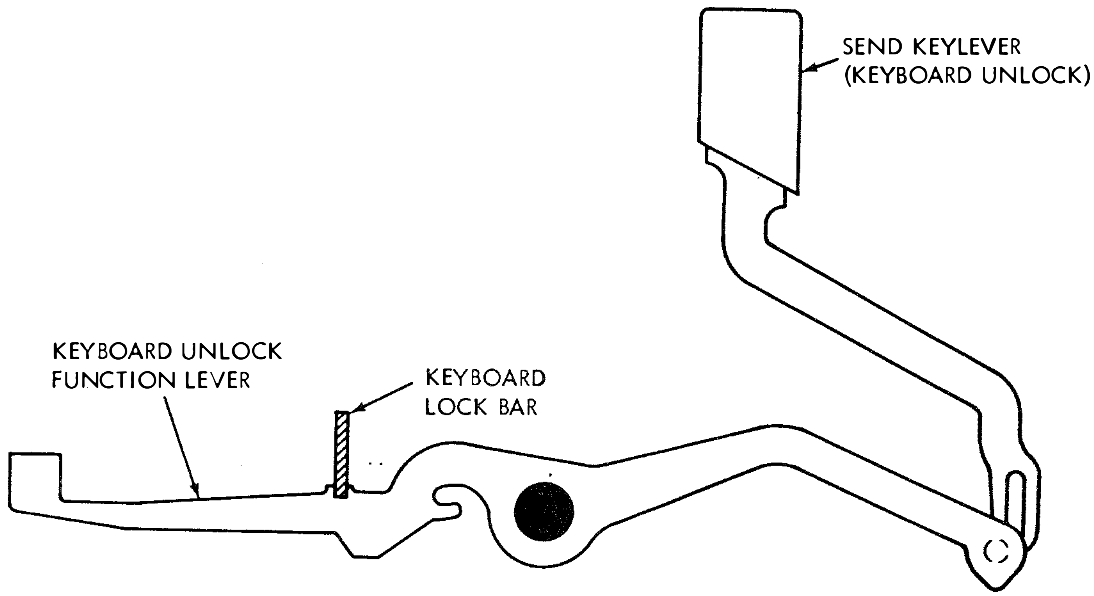


Figure 4-21. Keyboard Unlock Mechanism

the lock bar to the left until the lock bar latch falls into a notch on the lock bar.

(2) As the lock bar moves to the left, the switch lever (see figure 4-19) pivots and opens the contacts of the keyboard lock switch. The associated circuitry is so arranged that when the switch contacts open, the signal generator is no longer shunted (paragraph 4-31) and normal transmission can take place.

n. MARGIN INDICATOR MECHANISM (Figure 4-22) - The margin indicator cam disk on the associated typing unit spring rotates with the drum as spacing occurs. As the end of each line is approached, the cam surface of the disk makes contact with the margin indicator contact switch lever and rotates it about its pivot point. When the lever rotates, it releases the margin indicator switch plunger. The normally open contacts are closed, completing the cir-

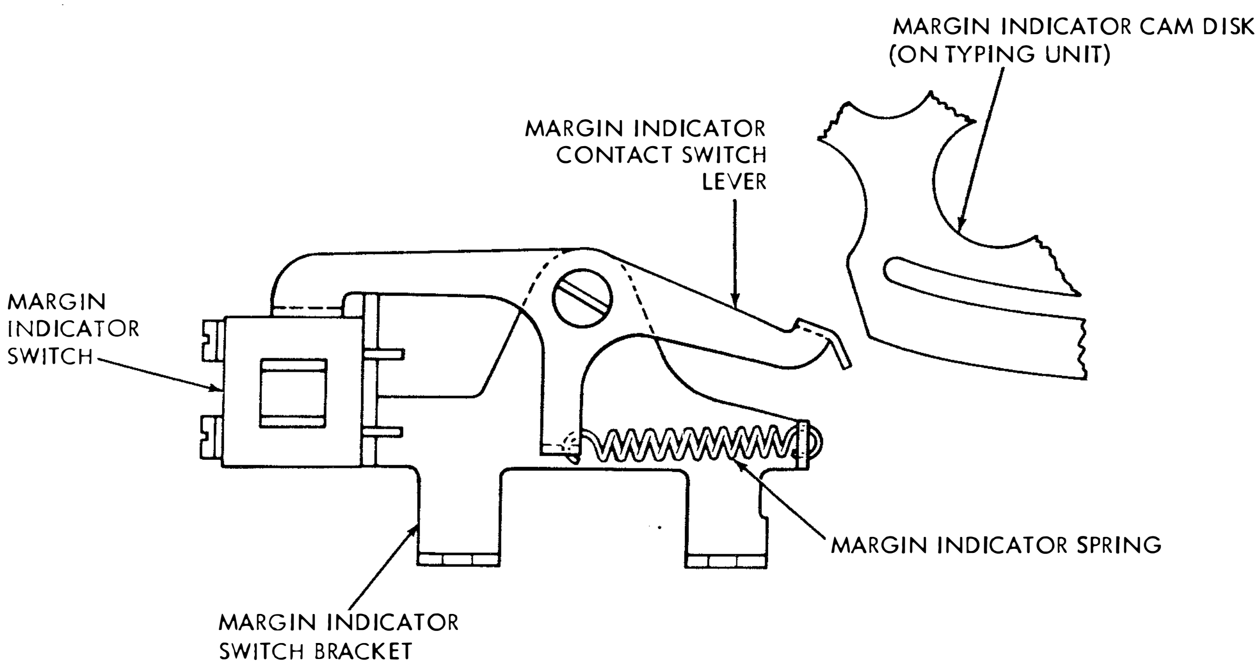


Figure 4-22. Margin Indicator Mechanism

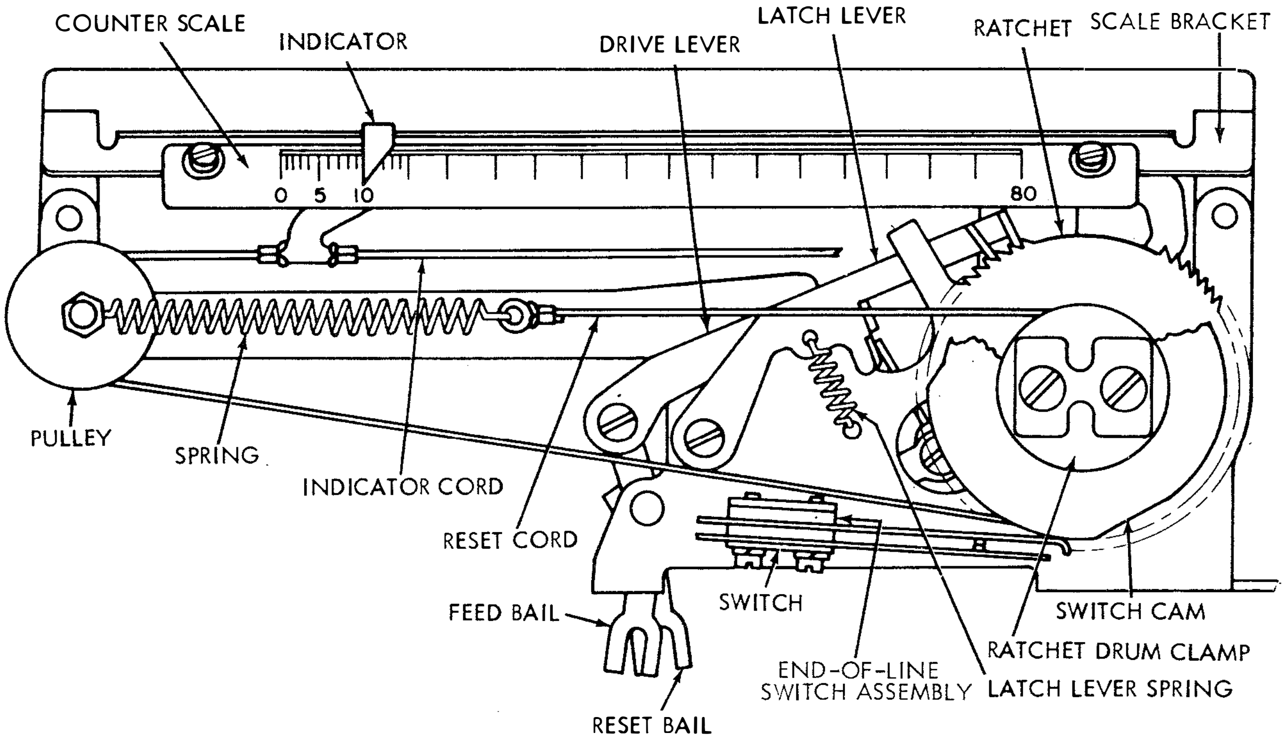


Figure 4-23. Character Counter Mechanism (Front View)

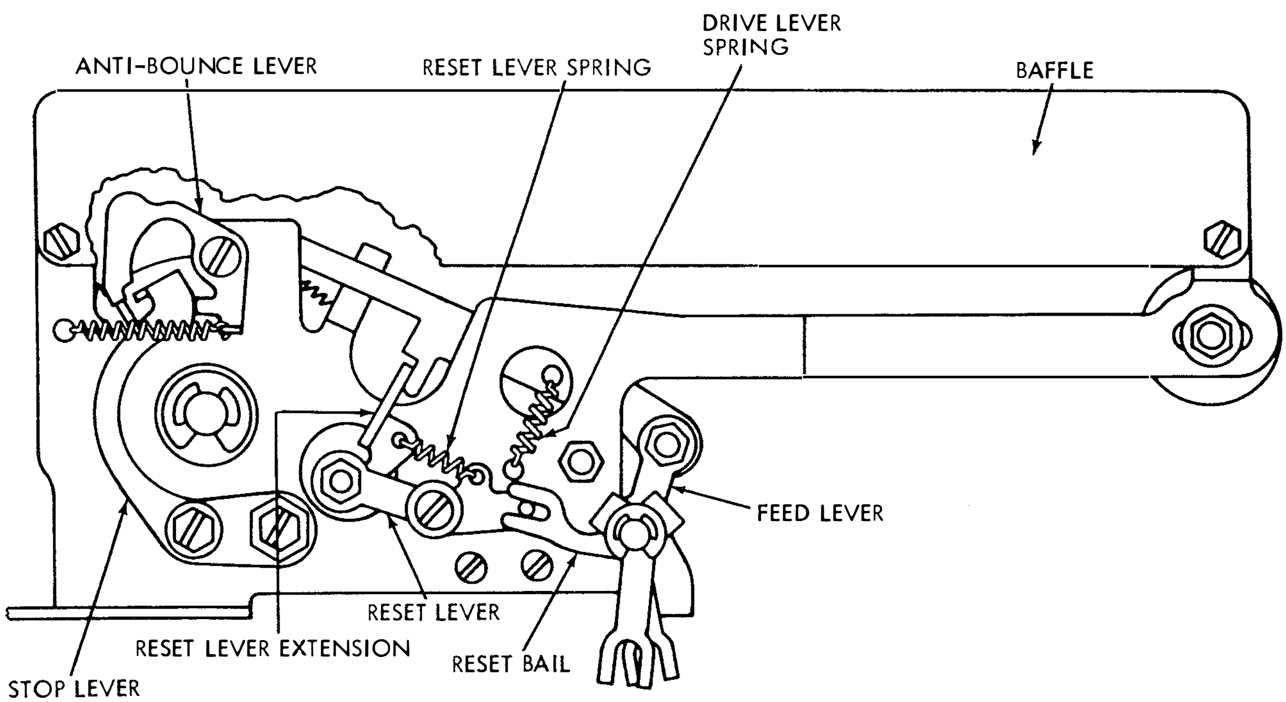


Figure 4-24. Character Counter Mechanism (Rear View)

cuit to a margin indicator light in the cabinet. The carriage return cycle returns the cam disk to its starting position opening the margin indicator switch. On LAK keyboards the switch is operative only when the keyboard selector switch is in the (K) or (K-T) positions. (See End-of-Line Switch, paragraph 4-3o(4).

o. CHARACTER COUNTER MECHANISM (See figures 4-23 and 4-24) - The character counter is driven mechanically from the mechanism linking the LAK keyboard and the typing reperforator through the counter and counter reset code bars located in the second and third slots of the code bar basket. The mechanism is mechanically disabled in the (K) and (K-T) modes of operation. The code bars drive projections which engage the forks of the feed and reset bails of the counter. As the code bars fall to the right, when a key on the keyboard is struck, the counter mechanism is tripped.

(1) STEPPING - Referring to sequence A, figure 4-25, as a key is struck, the code bars fall to the right, carrying with them feed bail 1. The drive lever, which is linked to the feed bail, moves to the left slightly more than one tooth. As the code bars are reset, stepping bail 1 moves clockwise, causing the drive lever to advance the ratchet drum one tooth. The drive pawl prevents the ratchet drum from rotating counterclockwise until it is again tripped for the following character. When this occurs, the ratchet drum rotates slightly counterclockwise, coming to rest against the latch lever.

(2) COUNTER RESET

(a) Sequence B, figure 4-25, illustrates the tripped position of the counter mechanism for a reset function. Reset bail 2 moves counterclockwise, as its code bar falls to the right, causing the reset lever in turn to rotate clockwise. As the reset lever rotates clockwise, the reset lever extension moves downward until it falls under the shoulder of the projection on the drive and latch levers under the action of its spring. When the counter bars are reset as in C, figure 4-25, the reset bail is rotated clockwise to its original position. This causes the reset lever to rotate counterclockwise, carrying the reset lever extension upward, and moving both the drive and latch levers out of engagement with the ratchet teeth. The mechanism remains in this condition, and the ratchet drum assembly rotates rapidly counterclockwise (under the action of its return spring) until it reaches its zero position.

(b) As the ratchet drum reaches its zero position, a stop on the ratchet strikes a stop lever fastened to the frame. The elastic impact is transmitted through the stop lever to the anti-bounce lever, whose lower end is normally in contact with the stop lever. The anti-bounce lever rotates counterclockwise, dropping in behind the ratchet stop. As the ratchet drum rebounds from the stop lever, its stop strikes the anti-bounce lever, preventing further motion and maintaining the anti-bounce lever in its actuated position. The ratchet continues to operate between the stop lever and anti-bounce lever until the energy in the system has been largely dissipated. The ratchet stop then remains in contact with the stop lever, permitting the anti-bounce lever to return to its normal position.

(3) RESTART - Sequence D, figure 4-25, illustrates the restarting action of the counter mechanism for the character following a carriage return. Depressing a key on the keyboard causes the counter code bar to fall to the right, the feed bail to move counterclockwise, and the drive lever to move to the left. As the drive lever moves to the left, it is disengaged from the reset lever extension and falls into engagement with the ratchet tooth. As the code bars are reset, the feed bail rotates clockwise, and the feed lever begins to move to the right. As it does, its projection pushes the reset lever extension to the right and out of engagement with the latch lever which falls into engagement with the ratchet drum. The drive lever, upon completion of its stroke, steps the ratchet one tooth, as in the normal stepping operation.

(4) END-OF-LINE SWITCH (See figure 4-23) - In the keyboard (K) and keyboard-tape (K-T) modes of operation, the function of this switch is performed by the margin indicator switch. (See paragraph 4-3n.)

(a) The end-of-line switch operates the margin indicator lamp in the cabinet to signal the end of a typed page printed line. The switch circuit is operative only in the tape (T) mode of operation.

(b) Operation of the character counter end-of-line switch is controlled by a switch cam (figure 4-23). The switch cam rotates with the ratchet drum and can be adjusted to close the switch at any typed line length of from 10 to 80 characters.

p. KEYBOARD SELECTOR SWITCH (See figure 3-3) - Three modes of operation of the basic teletypewriter equipment are provided through the LAK keyboard. Selection of the desired mode is made by a three-position selector switch mounted on the keyboard base. The knob controlling the selector switch is located on the front of the cabinet to the left, and in line with, the keyboard. The operating positions of the switch are:

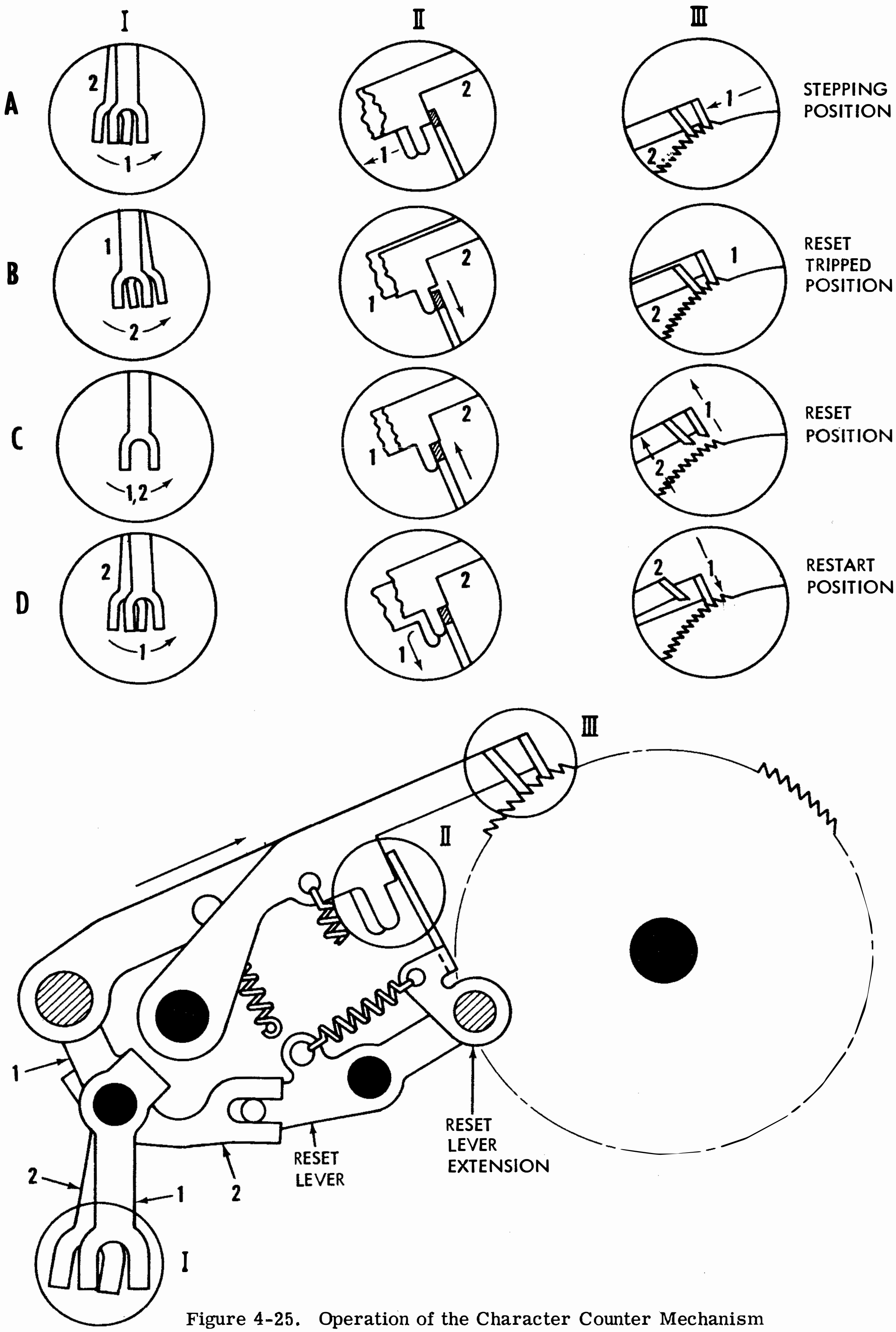


Figure 4-25. Operation of the Character Counter Mechanism

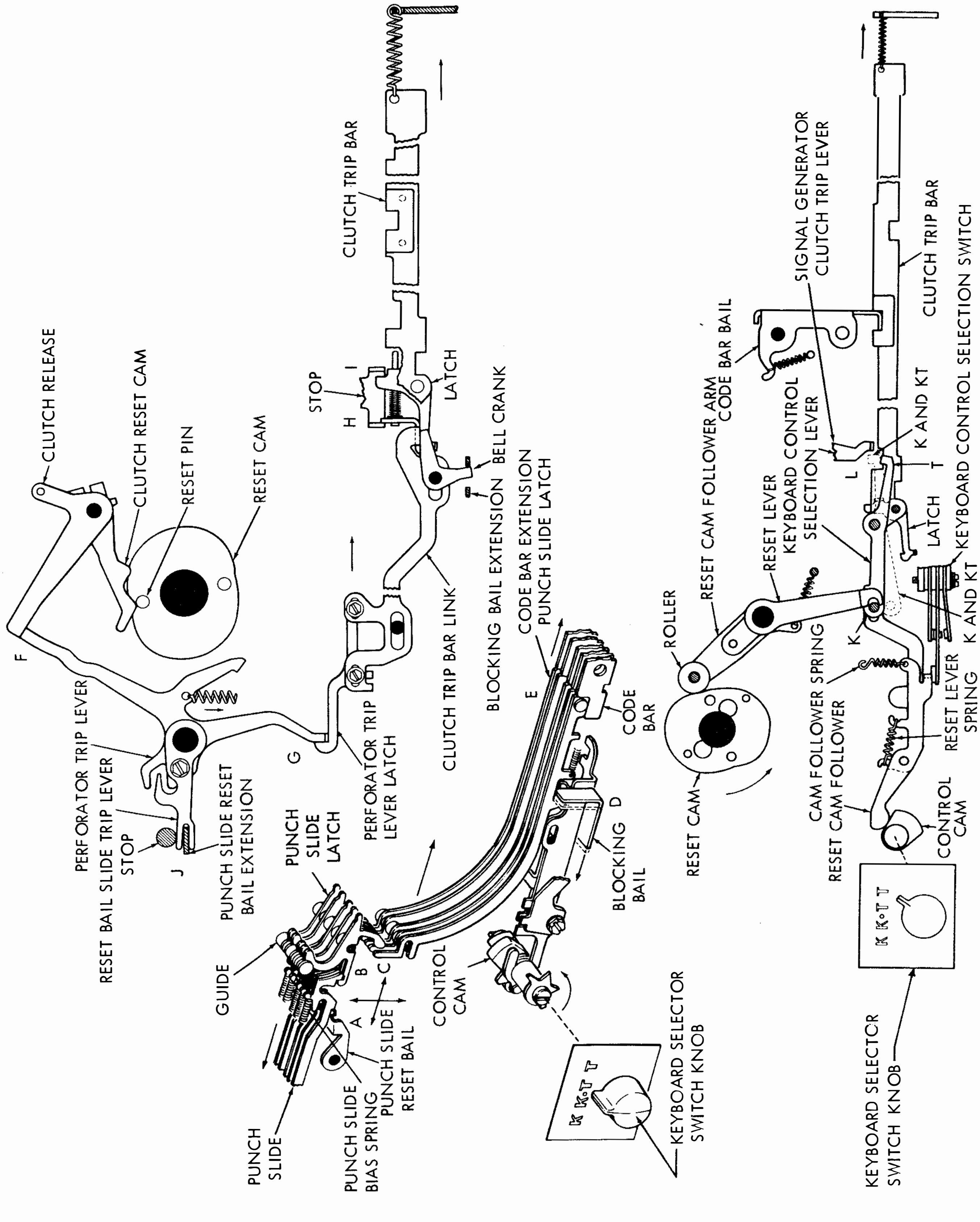


Figure 4-26. Keyboard - Typing Reperforator Linkage

(1) KEYBOARD (K) - In this position, signals are generated only by the keyboard. The typing reperforator and transmitter distributor circuits are inoperative.

(2) KEYBOARD-TAPE (K-T) - In this position, tape is perforated by the typing reperforator simultaneously with operation of the keyboard signal generator. Signals can also be generated through the transmitter distributor, but such signals are not recorded on the tape prepared through the keyboard.

(3) TAPE (T) - In this position, tape is perforated at high speed by the typing reperforator, with no signal generation. The transmitter distributor can be utilized simultaneously for signal generation, or the automatic typer can be utilized to monitor incoming signals.

q. KEYBOARD - TYPING REPERFORATOR LINKAGE MECHANISM (See figure 4-26) - The LAK keyboard-typing reperforator linkage consists principally of a code bar extension basket mechanism and reset cam follower bracket mechanism. The functions of the code bar extension basket mechanism are to transmit character information from the keyboard code bars to the typing reperforator, and to control the operation of the typing reperforator and keyboard in the (T) mode of operation. The reset cam follower mechanism provides the linkage between the clutch trip bar and the reperforator cam in the (T) mode, permitting the keyboard to be reset at high speeds by the typing reperforator.

(1) OPERATION IN (K) MODE - In this position, signals are generated by the keyboard, and the typing reperforator is inoperative. This mode of operation is set up by turning the keyboard selector switch knob to the left to the (K) position. The keyboard - typing reperforator linkage is conditioned as follows in both (K) and (K-T) positions:

(a) When the keyboard selector switch knob (figure 4 - 26) is turned to the (K) position (left), or (K-T) position (center), the blocking bail, shown in the illustration, is moved left to the dotted position by the action of the control cam. When a code bar is selected and moves to the right, the code bar extension is prevented from moving to the right by the blocking bail and, therefore, information is not transmitted to the punch. An extension on the blocking bail also prevents selection of the character counter code bars (paragraph 4-3o).

(b) As the blocking bail moves to the left, a second extension (figure 4 - 26) engages a bell crank, pivots the bell crank clockwise, and disengages the latch from the clutch trip bar link. As the clutch trip bar moves to the right, the clutch trip bar link remains in the position shown, and the typing reperforator clutch is not tripped.

(c) The keyboard control selection lever (figure 4 - 26) is pivoted counterclockwise so that its pin at point K is free of the hook on the reset lever of the reset cam follower mechanism. At the same time, the extension on the right end of the keyboard control selection lever moves up to the dotted position shown at L so that, as the clutch trip bar falls to the right, the extension strikes the signal generator clutch trip lever and operates the signal generator mechanism.

(2) OPERATION IN (K - T) MODE - In this mode, signals are generated by the keyboard, and tape is simultaneously perforated. This mode of operation is set up by turning the selector switch knob to the (K - T) position (center), conditioning the keyboard-typing reperforator as follows:

(a) When the keyboard selector switch knob is moved to the (K - T) position (center), the linkage between the keyboard and typing reperforator is as described above in paragraph 4-3q(1)(a), (b) and (c).

(b) As the keyboard selector switch knob is moved to the (K-T) position, the selector keyer circuit of the keyboard typing reperforator is connected to terminals on the LAAC-229BR cabinet terminal board, and there, by wiring supplied by the customer, to the terminals of the keyboard signal generator circuit. In this way, signals generated by the keyboard may be stored in perforated tape by action of the keyboard typing reperforator selector mechanism.

(c) The character counter is inoperative as described in 4-3q(1)(a). The end-of-line switch is also inoperative, due to position of the keyboard selector switch.

(3) OPERATION IN (T) MODE - In this mode, tape is perforated by the typing reperforator, but no signals are generated by the keyboard. Transmission circuits are conditioned for signal generation through the transmitter distributor. The keyboard is reset by the typing reperforator, since the signal generator mechanism is inoperative. This mode of operation is set up by turning the keyboard selector switch knob to the (T) position (right). This conditions the keyboard - typing reperforator linkage as follows:

(a) When the keyboard selector switch knob is turned to the (T) position (right) the keyboard control selection lever (figure 4-26) is pivoted clockwise so that its pin at point K is in position to engage the hook of the reset cam follower reset lever. The right end of the keyboard control selection lever at point L falls so that it will not engage the signal generator clutch trip lever. In the (T) position, therefore, the signal generator clutch is not tripped by the keyboard control selection lever, and the signal generator is inoperative. However, the signal generator can still be tripped by an incoming external clocking pulse unless the auxiliary switch on the selector is re-wired to prevent this.

(b) The blocking bail (D, figure 4-26) moves to the right, releasing the code bar extensions and character counter code bars. The bell crank pivots counterclockwise, allowing the latch to engage the clutch trip bar link.

(c) The keyboard control selection lever (K, figure 4-26) remains in its counterclockwise position so that it is not engaged by the reset lever of the reset cam follower, but is still in position to trip the signal generator clutch trip lever.

(d) The character counter is operative and controls the end-of-line indicator lamp. (Refer to paragraph 4-3n and 4-3o(4) for a description of control switch operation.)

(e) When a code keylever is depressed, the clutch trip bar moves right and the following sequence takes place:

1. The code bar bail and clutch trip bar move to the right, releasing the selected code bars. The selected code bars and associated code bar extensions (E, figure 4-26) move to the right. As the code bar extensions move to the right, they engage their associated punch slide latches at C, causing the punch slide latches to rotate counterclockwise and unlock the punch slides at B.

2. The clutch trip bar link (figure 4-26) is pulled to the right by the clutch trip bar. The clutch trip bar is coupled to the reperforator trip lever latch. This latch contacts the reperforator trip lever at G, causing it to rotate counterclockwise. As it moves counterclockwise, the reperforator trip lever is disengaged from the clutch release at F. The clutch release falls under spring tension and releases the reperforator clutch trip lever, which, in turn, trips the reperforator clutch. The signal generator clutch is tripped as previously described.

3. As the reperforator trip lever rotates counterclockwise, the reset bail trip lever linked to it (figure 4-26) pulls down an extension on the punch slide reset bail at J. The reset bail moves downward permitting the selected punch slides (A) to move to the left under the action of their bias springs.

4. As the clutch trip bar nears the end of its stroke to the right, the upper portion of the latch comes in contact with the stop at point I. The latch then pivots counterclockwise, releasing the clutch trip bar link, which moves rapidly to the left under the action of the compression spring shown immediately below the stop. The clutch trip bar link is stopped in its movement to the left by its extension striking the stop at point H. The reperforator trip lever latch is to the left of and completely free of the reperforator trip lever. As the clutch release pivots clockwise under the resulting action of the pin on the reset cam, the reperforator trip lever is released from its counterclockwise position and allowed to rotate clockwise to its normal position (G, figure 4-26).

5. Simultaneously, the clutch trip bar (figure 4-26) is being reset and is moving to the left. As the latch moves to the left, away from the stop at point D, it pivots clockwise to its normal position, so that when the clutch trip bar is at the extreme left of its reset travel, the latch is again allowed to hook under the clutch trip bar link. This completes the operating cycle.

(f) Code bar reset is accomplished by the reset cam follower mechanism. When a code keylever on the keyboard is depressed, the code bar bail and clutch trip bar (figure 4-26) fall to the right so that the reset lever with hook is in position to engage the pin of the keyboard control selection lever at K. When the reperforator clutch is tripped, the reset cam begins to rotate counterclockwise, and, as it does, the reset cam follower arm and associated reset lever rotate clockwise. The hook on the reset lever engages the pin on the keyboard control selection lever and moves the selection lever and clutch trip bar to the left. The configuration of the reset cam is such that, at a later stage of the operating cycle, the reset lever with hook moves away from the pin of the keyboard control selection lever. The clutch trip bar again starts to move to the right. However, the code bar bail latch latches the code bar bail at this point, preventing further movement of the clutch trip bar as the reset cam follower arm returns to its initial position.

r. SPEED CHANGING MECHANISM (Figure 4-26A and 4-26B) -

(1) The speed changing mechanism consists of a gear assembly and a control linkage from the front of the keyboard allowing the operator to select one of three speeds.

(2) The gear assembly is shown schematically in Figure 4-26A. The assembly contains three sets of constantly meshed gears, D with E, C with F and B with G. The pinions, B, C and D are pinned to a common drive shaft geared to the motor. The driven gears may be selectively keyed to the driven shaft and thus to the load through an idler gear, H. The key, which is fitted into a keyway in the driven shaft, may be moved left or right as illustrated in Figure 4-22B. The right end of the key (as viewed from the front of the keyboard) is spring biased radially outward from the shaft center. Action in selecting different operating speeds is as follows, starting with the key engaged in the center gear as shown in Figure 4-26B. As the key is moved left or right, the key is cammed radially inward toward the center of the shaft against its spring by the action of the cam surface against the inner shoulder of the gear. This action disengages the key from the center gear. The key remains in the disengaged position until it is moved past the shoulder of the adjacent gear. As this adjacent gear rotates on the keyed driven shaft, the slot on the inner bearing surface of the gear will align itself with the right end of the key, which has been positioned approximately at the center of the gear. When this occurs, the key will snap radially outward into engagement with the gear, under the action of the spring.

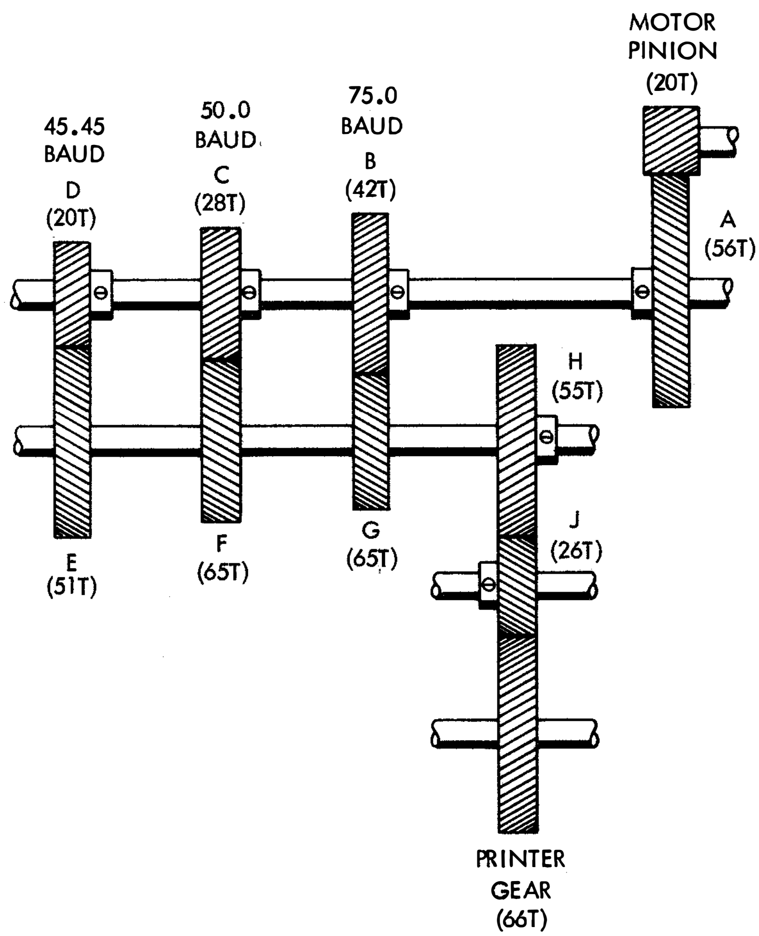


Figure 4-26A. Speed Changing Mechanism

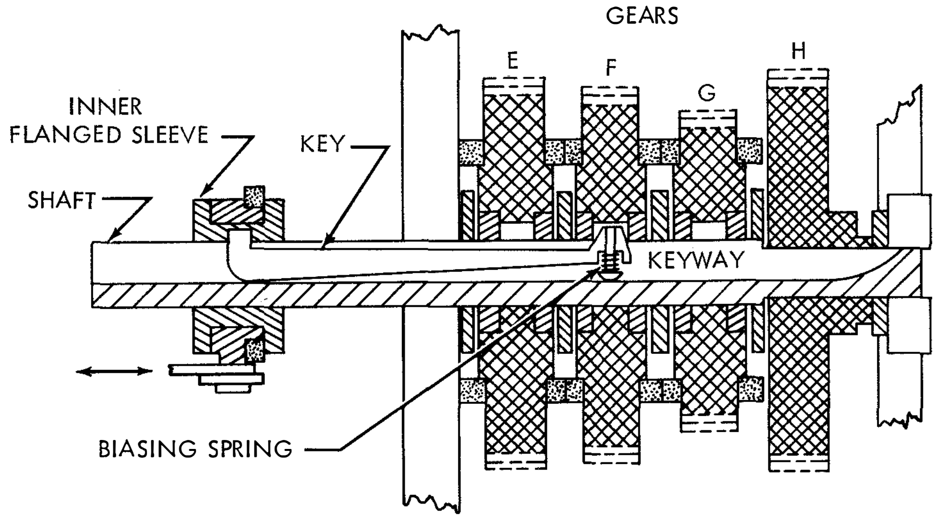


Figure 4-26B. Speed Changing Mechanism

(3) The key is coupled to the inner flanged sleeve by means of an extension into a hole in the sleeve. The inner flanged sleeve and key rotate with the shaft. See Figure 4-26B.

(4) The inner flanged sleeve rotates within the non-rotating outer bearing sleeve, which is coupled to the operating linkage. The outer bearing acts against the flanges of the inner flanged sleeve to move the inner flanged sleeve and key axially along the shaft during operation of the control linkage.

(5) The control linkage consists of geared shafts coupling a knob on the front of the keyboard to the flanged sleeve on the gear assembly.

(6) The speed chosen is indicated to the operator by the position of the knob with respect to markings on the front of the keyboard.

s. TAPE BACKSPACE - Depressing the TAPE B.SP. keylever directly activates a switch which controls the back space function on the typing reperforator. The keylever is spring loaded to return to its unoperated position after each operation. There is no associated function lever for this keylever, and the code bar mechanism is not affected by its operation. The operation is isolated from the signal generator mechanism and does not affect other units in the line circuit. The purpose of the backspace function is to permit eradication of an erroneous character code, or codes, by reperforating such codes, using the five-hole perforated letters code.

4-4. TYPING UNIT LP77YD/AGM, LP77YD/AJV OR LP124YD/AJU

a. GENERAL

(1) The LP77YD/AGM, LP77YD/AJV or LP124YD/AJU, typing units are furnished with Automatic Send-Receive Sets (ASR), Send-Receive Sets (KSR), Receive Only Sets (RO), and Multiple Send-Receive (KSR) and Receive Only (RO) Sets. In the RO Set the typing unit is positioned by two locating studs on the LB-10/000 base. Power is furnished to the unit through the gearing arrangement between the main shaft driving gear and the intermediate shaft driving gear on the base. Although the LB10/000 is not equipped with a keyboard, keys are provided to control local functions. The ASR base (LAK21BRW, LAK33BRW or LAK47BRW), and KSR base (LK25BRW, LK52BRW or LK53BRW), are equipped with keyboards. The typing unit is positioned as on LB10/000, and is geared to the base intermediate gear or speed changing mechanism. In addition the main shaft also furnishes power to the signal generator mechanism on the keyboard.

LETTERS

	LEFT				RIGHT			
	4 & 5 MARKING	4 MARKING 5 SPACING	4 SPACING 5 MARKING	4 & 5 SPACING	4 & 5 SPACING	4 SPACING 5 MARKING	4 MARKING 5 SPACING	4 & 5 MARKING
TOP ROW	M --345	N --34-	H --3-5	SPACE --3--	BLANK -----	T ----5	C. R. ---4-	O ---45
2ND ROW	X 1-345	F 1-34-	Y 1-3-5	S 1-3--	E 1----	Z 1---5	D 1--4-	B 1--45
3RD ROW	V -2345	C -234-	P -23-5	I -23--	L.F. -2---	L -2--5	R -2-4-	G -2-45
BOTTOM ROW	LETTERS 12345	K 1234-	Q 123-5	U 123--	A 12---	W 12--5	J 12-4-	FIGURES 12-45
	3 MARKING				3 SPACING			
	4TH ROW	3RD ROW	2ND ROW	1ST ROW	1ST ROW	2ND ROW	3RD ROW	4TH ROW

FIGURES

LEFT				RIGHT				
4 & 5 MARKING	4 MARKING 5 SPACING	4 SPACING 5 MARKING	4 & 5 SPACING	4 & 5 SPACING	4 SPACING 5 MARKING	4 MARKING 5 SPACING	4 & 5 MARKING	
. --345	, --34-	 --3-5	SPACE --3--	BLANK -----	5 ----5	C. R. ---4-	9 ---45	1 & 2 SPACING
/ 1-345	! 1-34-	6 1-3-5	 1-3--	3 1----	" 1---5	$ 1--4-	? 1--45	1 MARKING 2 SPACING
; -2345	: -234-	Ø -23-5	8 -23--	L.F. -2---	) -2--5	4 -2-4-	& -2-45	1 SPACING 2 MARKING
LETTERS 12345	(1234-	1 123-5	7 123--	– 12---	2 12--5	▼ 12-4-	FIGURES 12-45	1 & 2 MARKING
3 MARKING				3 SPACING				
4TH ROW	3RD ROW	2ND ROW	1ST ROW	1ST ROW	2ND ROW	3RD ROW	4TH ROW	

Figure 4-27. Type Box Arrangement, Viewed From the Front of the Typing Unit

(2) Operation of the unit is identical in all instances. A cam on the typing unit carriage return mechanism operates the margin indicator switch. Except for limited local functions, the typing unit operates in response to signal line code impulses (marking or spacing), electro-mechanically converting the electrical signal representations to page printed character form (see figure 4-27). Operation at either 75 baud or 45.5 baud is possible, depending on the gear set used. The unit is equipped with Gothic style standard communications symbols, and is capable of handling multicopy paper.

(3) The receiving circuit for the typing unit (see applicable wiring diagram in Vol. 3) consists of two 132 ohm selector magnet coils series connected for 0.030 to 0.035 ampere line current operation. The required operating current is supplied by a rectifier assembly through an electronic keyer on the electrical service assembly located behind the keyboard. The coils are wired to a 35 point connector mounted on the unit's right frame. All signal carrying leads are shielded, and all shielding is insulated from the equipment frame.

b. MAIN SHAFT (See figure 4-28)

(1) The main shaft is located in the lower rear portion of the typing unit and extends the full length of the unit. It is supported by ball type bearings mounted in each side frame.

(2) When the typing unit is mounted on a keyboard the keyboard helical driving gear on its main shaft meshes with the signal generator helical driven gear. The main shaft helical driven gear meshes with the main shaft helical driving gear on the motor driven intermediate shaft on the keyboard. Thus, motive force is extended from the motor to the main shaft which in turn drives the keyboard mechanism.

(3) The main shaft supports six clutches, each of which when tripped, drives its associated mechanism. These clutches have two shoes which bear against the inside surface of a drum, which in turn is keyed to the main shaft. The operation of the clutches is as described in paragraph 4-3d. Two of the clutches (namely, the line feed and the spacing clutches) have three sets of lugs equally spaced about their periphery, for controlling the engagement and disengagement of the clutch shoes with the drum. Thus, these clutches may turn only one-third of a revolution when tripped. The remaining clutches have one set of lugs, and turn a complete revolution when tripped.

c. SELECTING MECHANISM

(1) The selecting mechanism consists of the selector magnet coils and armature, a selector cam-clutch, and the associated levers, arms, bails, and slides necessary to convert the electrical elements of the start-stop code to the mechanical arrangements which govern the characters to be printed and the functions to be performed.

(2) The selector cam-clutch comprises,

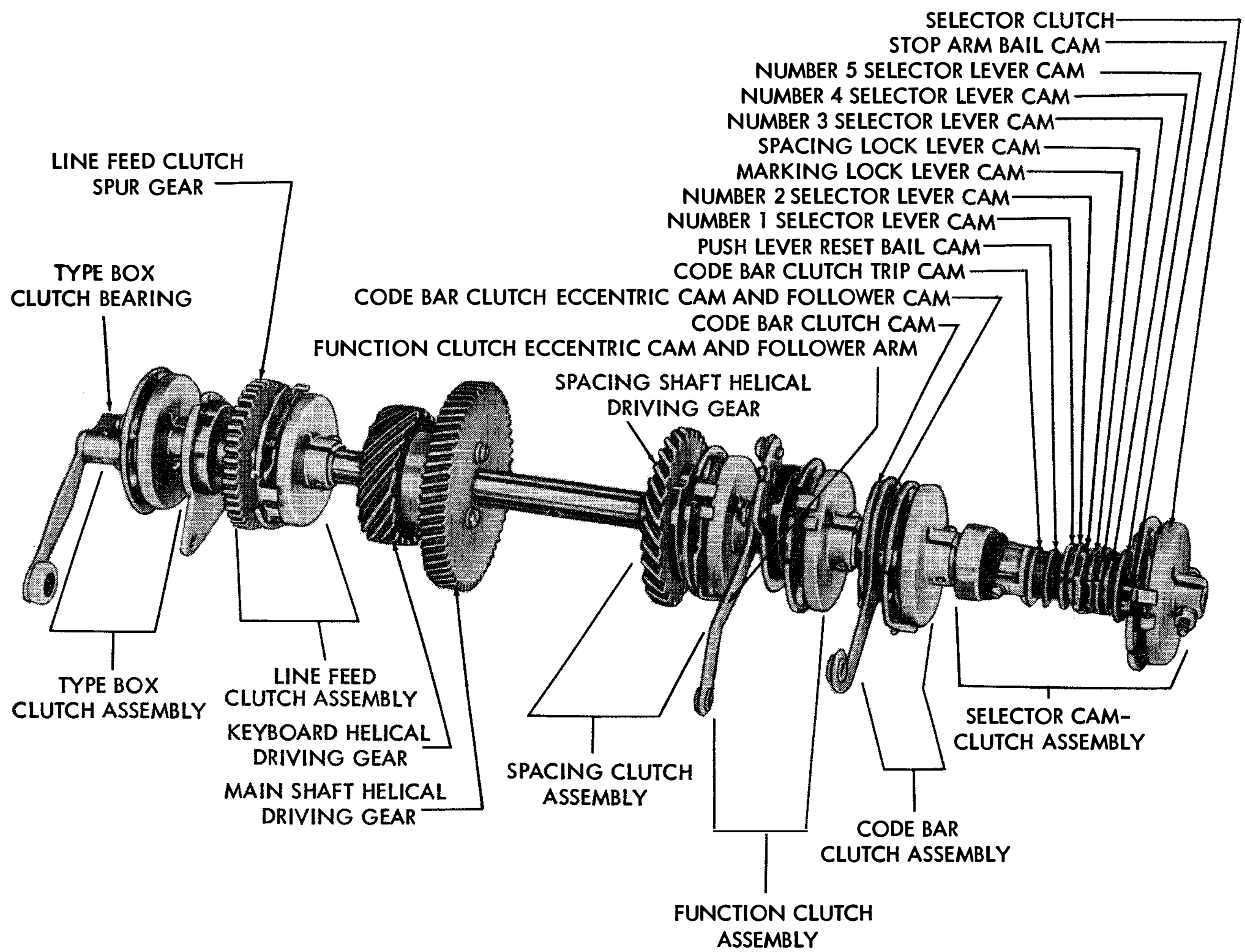


Figure 4-28. Typing Unit Main Shaft

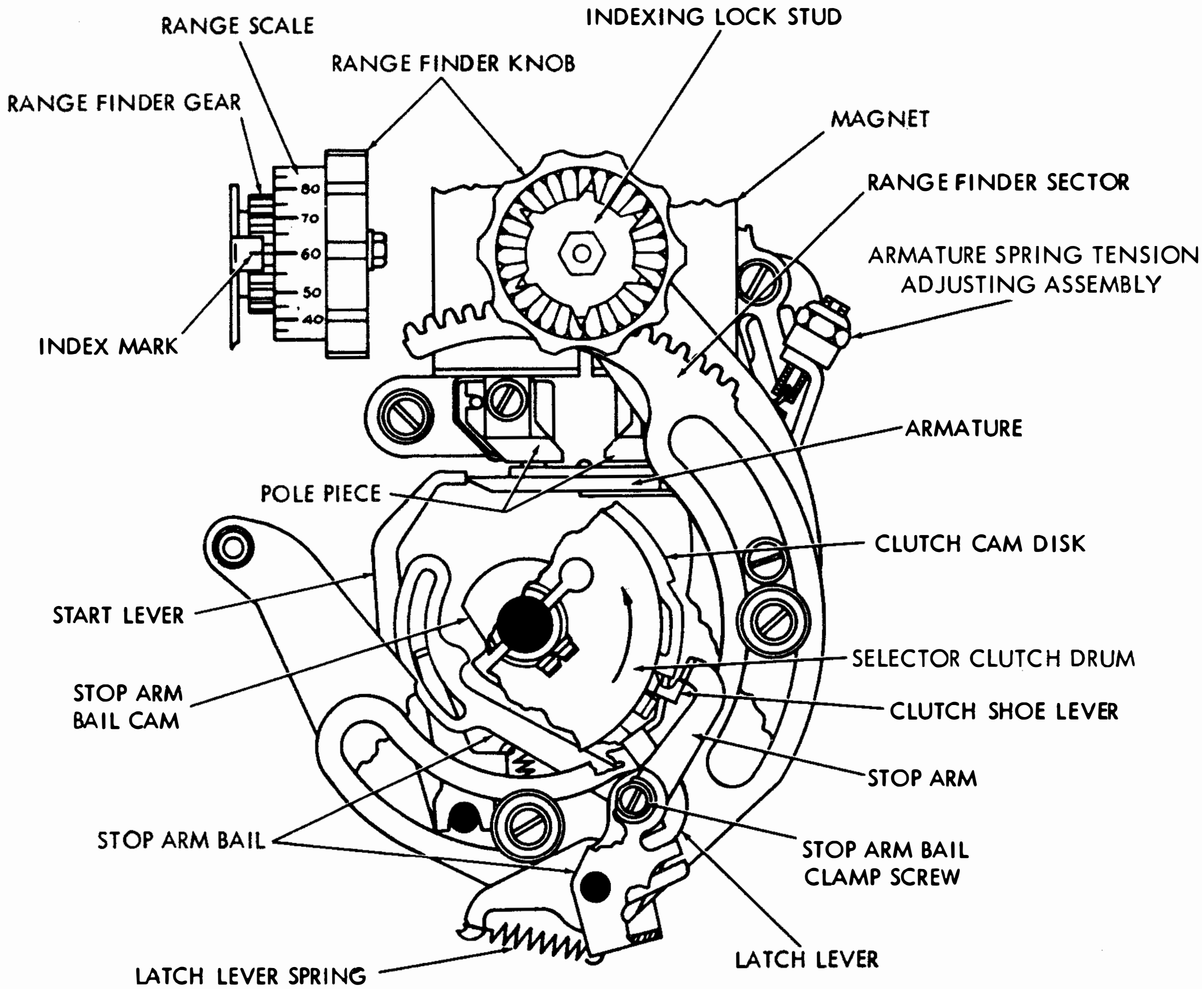


Figure 4-29. Selector Cam-Clutch Trip Mechanism

from right to left (figure 4-28): the clutch, stop arm bail cam, the fifth, fourth, and third selector lever cams, the cam for the spacing and marking lock levers, the second and first selector lever cams, the push lever reset bail cam, and the code bar clutch trip cam.

(3) During the time in which a closed line circuit (marking) condition exists, the selector magnet coils are energized and hold the selector armature against the selector magnet pole pieces. In this stop position, the selector armature blocks the start lever (figure 4-29). While the signal for any character or function is being received, the start (spacing) element releases the selector armature which, under the tension of its spring, moves away from the magnet cores and thus unlatches the start lever. The start lever turns clockwise under the tension of its spring, to move the stop arm bail into the indent of its cam. As the stop arm bail rotates about its pivot point, the attached stop arm is moved out of engagement with the clutch shoe lever. The selector cam-clutch engages and begins to rotate. The stop arm bail immediately rides to the high point of its cam where it remains to hold the start lever away from the selector armature during the signaling time. When the stop element at the end of signal is received, the selector armature is pulled up to block the start lever. Thus, the stop arm bail is prevented from dropping onto the low part of its cam (stop position of cam-clutch), and the attached stop arm is held so as to stop the clutch shoe lever. The selector clutch one-stop cam disk, upon which the latch lever rides, has an indent at its stop position. When the clutch shoe lever strikes the stop arm, the inertia of the cam disk assembly causes it to continue to turn until its lug makes contact with the lug on the clutch shoe lever. At this point, the latch lever drops into the indent in the cam disk, and the clutch is held disengaged until the next start element is received.

(4) The series of five selecting levers, a marking lock lever, and a spacing lock lever ride their respective cams on the selector cam-clutch. As the marking and spacing signal elements are applied to the selector magnet, the selector cam-clutch rotates and actuates the selector levers. When a spacing impulse is received, the marking lock lever is blocked by the end of the armature and the spacing lock lever swings toward the right (right end view) above the armature and locks it in the spacing position until the next signal transition is due. Extensions on the marking lock lever prevent the selector levers from following their cams (figure 4-30). When a marking element of the signal is received, the spacing lock lever is blocked by the end of the armature and the marking lock lever swings to the right below the armature to lock it in the marking position until the next signal transition is due. During this marking condition, the selector levers are not blocked by the marking lock lever extensions but are permitted to move against their respective cams. The selecting lever that is opposite the indent in its cam, while the armature maintains a marking condition, swings to the right or selected position momentarily. Each selecting lever has an associated push lever which drops into a notch on the top of the selecting lever when it falls into its cam indent. As the selector cam-clutch turns, each selecting lever together with its latched push lever is moved toward the left and held there until all five code impulses have been received. At that time, all selected push levers are positioned to the left and all unselected push levers are positioned to the right, in which positions they are held until the next start element is received. When the subsequent start element again causes the selector cam-clutch to rotate, the push lever reset bail, in following its cam, unlatches the selected push levers. The push levers then return to the unselected (right) position under their spring tension.

d. ORIENTATION

(1) In order to establish the operating margins for the typing unit, it is necessary that the sampling of the signal by the selecting mechanism occur at the most favorable portion of the signal elements. This is referred to as orientation.

(2) When the range finder knob (figure 4-29) is pushed inward and rotated, its attached range finder gear moves the range finder sector (which mounts the stop arm bail, stop arm and latch lever), either clockwise or counterclockwise about the selector cam-clutch. This changes the angular position at which the selector cam-clutch stops with respect to the selecting levers. When an optimum setting is obtained, the range finder knob is released. Its inner teeth engage the teeth of the indexing lock stud to lock the range finder mechanism in position. The setting may be read on the range scale opposite the fixed index mark.

e. PRINTING MECHANISM

(1) CODE BAR MECHANISM

(a) GENERAL - The character which is to be printed is determined basically by the combination set up on the six code bars which are operated by the code bar positioning mechanism. In order to position the code bars, their associated shift bars must first be individually thrown toward the front or rear of the typing unit by transfer levers which respond to action of the selecting mechanism. While held

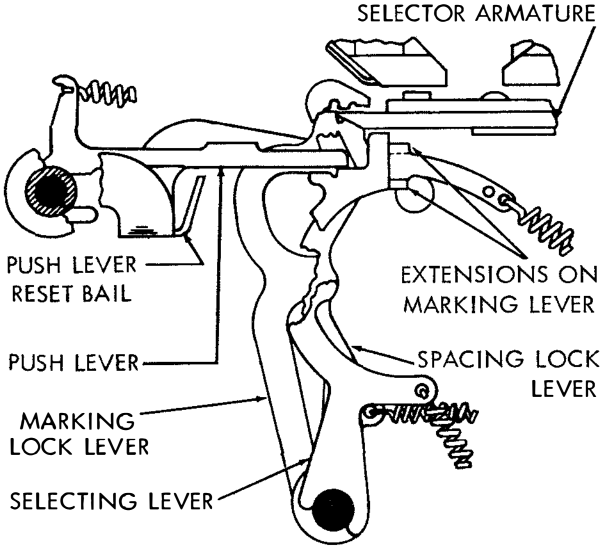


Figure 4-30. Selector Mechanism
(Right End View)

in these positions, the code bar shift bars are acted upon by code bar shift levers to which motion is extended from the code bar clutch when activated by the code bar clutch trip cam. Detailed functioning of the coordinated mechanism follows.

(b) CODE BAR POSITIONING - Each push lever (paragraph 4-4c(4) of this section) has an associated intermediate arm, transfer lever, and code bar shift bar (figure 4-31). In addition, there is a "common" transfer lever with its code bar shift bar. When a push lever is toward the right (spacing position) its associated intermediate arm and transfer lever are pulled toward each other by spring. This causes the transfer lever to turn counterclockwise about its pivot point (right end view) and position its code bar shift bar toward the front of the typing unit (spacing position). When a push lever is to the left (marking position), it moves the intermediate arm toward the left. This causes the transfer lever to turn clockwise about its pivot point and position its code bar shift bar toward the rear of the typing unit (marking position). The common transfer lever (front view-third from the left) has an extension which passes behind the number 1 and number 2 transfer levers (figures 4-32 and 4-33). When either or both of these transfer levers are moved to the rear (marking position), they move the common transfer lever to the rear. This in turn moves the common code bar shift bar toward the rear of the typing unit (marking position). As the selector cam-clutch completes its revolution, the trip shaft operating lever (fastened to the code bar clutch trip shaft) rides to the peak of the code bar clutch trip cam (figure 4-28) and causes the shaft to turn slightly. Its attached code bar clutch trip lever

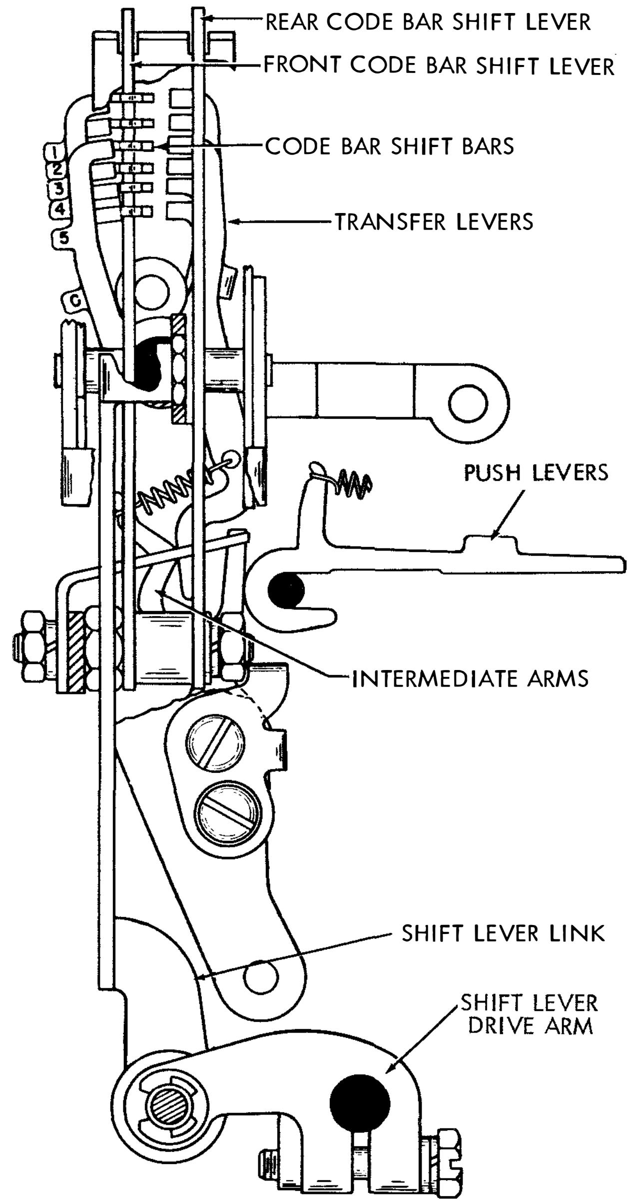


Figure 4-31. Code Bar Postioning Mechanism

releases the code bar clutch. Rotation of the clutch actuates the code bar shift levers through the intervening shift lever drive shaft, drive arm and shift lever link (figure 4-32). Code bar shift bars which have been moved toward the rear position by their transfer levers are engaged by the rear code bar shift lever and are shifted to the left. Code bar shift bars which have been moved toward the front position are engaged by the front code bar shift lever and are shifted toward the right (figure 4-33). Thus, the six code bar shift bars shift their respective code bars toward the right or left, where they are retained by a detenting mechanism. The code bar clutch one-stop cam disk, upon which the latch lever rides, has an indent at its stop position. When the clutch

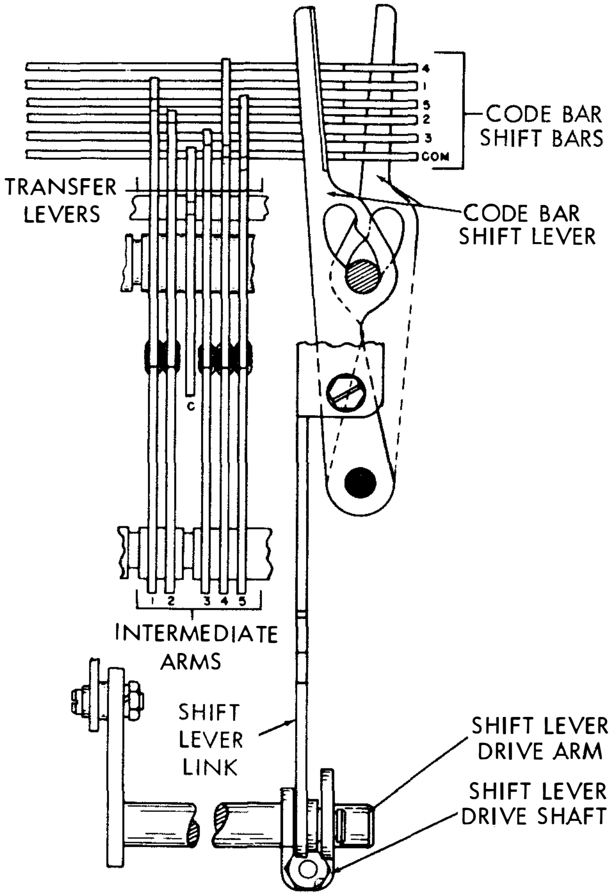


Figure 4-32. Code Bar Positioning Mechanism (Front View)

shoe lever strikes the code bar clutch trip lever, the inertia of the cam disk assembly causes it to continue to turn until its lug makes contact with the lug on the clutch shoe lever. At this point the latch lever drops into the indent in the cam disk and the clutch is held disengaged until the trip lever is again operated.

(c) ARRANGEMENT OF CODE BARS - Three additional code bars bring the total number of code bars to nine. They are arranged from top to bottom as follows: suppression, number 4, number 1, number 5, number 2, number 3, common, automatic carriage return and line feed, and shift-unshift (figure 4-34). In the equipment as furnished, the suppression code bar has no connection with a shifting mechanism.

(2) TYPE BOX AND TYPE BOX CARRIAGE (Figure 4-35)

(a) GENERAL - All of the characters that may be printed by the typing unit are formed by type pallets which are arranged in a type box. The type box is mounted in a carriage from which it may be removed for cleaning or replacement. In order to print any selected character, the type box carriage is so positioned that the character on the pallet is directly over the required location on the paper. Since the pallets are arranged in four horizontal rows and sixteen vertical rows, it is necessary to position the type box carriage both horizontally and vertically (see figure 4-27 for character arrangement). The type box carriage rides on rollers over a track which is moved vertically for positioning in that plane. The carriage is positioned horizontally on its track by the oscillating rail slide and type box carriage link. The slide rides the oscillating rail and is clamped to the rear section of the upper draw wire rope. The link provides a flexible connection to permit the type box carriage to follow both the vertical movement of the type box carriage track and the horizontal movement of the oscillating rail slide. The lower right rear end of the upper draw wire rope is fastened to the spacing drum. From this point, it passes part way around the spacing drum, upward and around the right oscillating rail

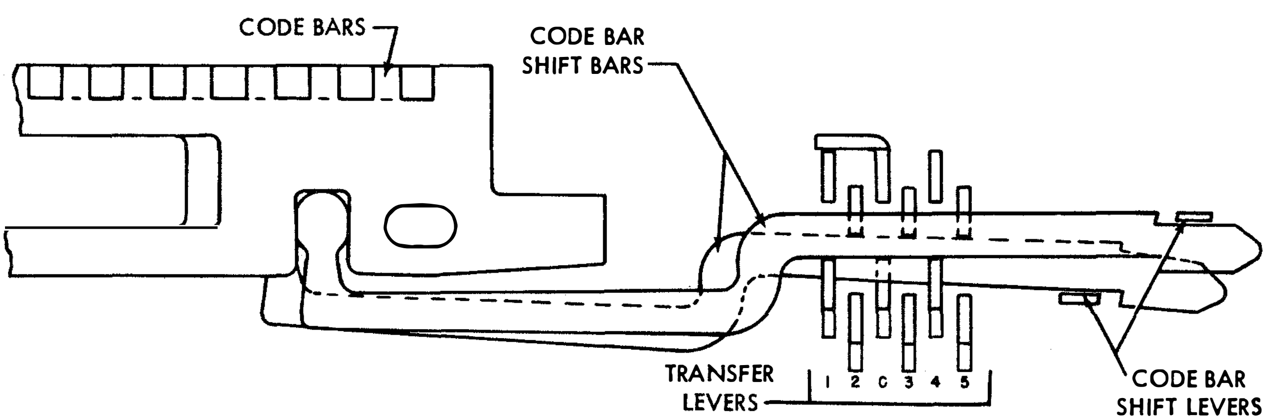


Figure 4-33. Code Bar Positioning Mechanism (Top View)

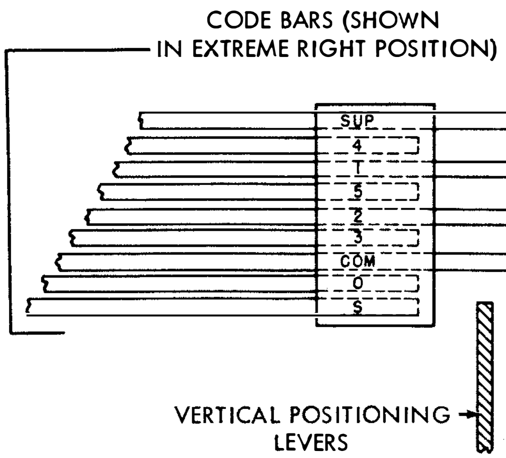


Figure 4-34. Code Bar Arrangement

pulley, over to the left oscillating rail pulley, and downward to the spring drum. After passing part way around the spring drum, the upper draw wire rope is doubled backward around it and passes upward to the left printing carriage rail pulley over to the right printing carriage rail pulley, and downward to the spacing drum to which it is again fastened. The lower draw wire rope is fastened at its left end to the spring drum and at its right end to the spacing drum. It acts in opposition to the upper draw wire rope and holds the two drums in phase (figure 4-36). A tensioning pulley rides the under side of the lower draw wire rope, to take up any slack which may occur due to stretching of the upper and lower draw wire ropes. The oscillating rail is supported by pivoted arms at each end. These arms which extend downward are pivoted

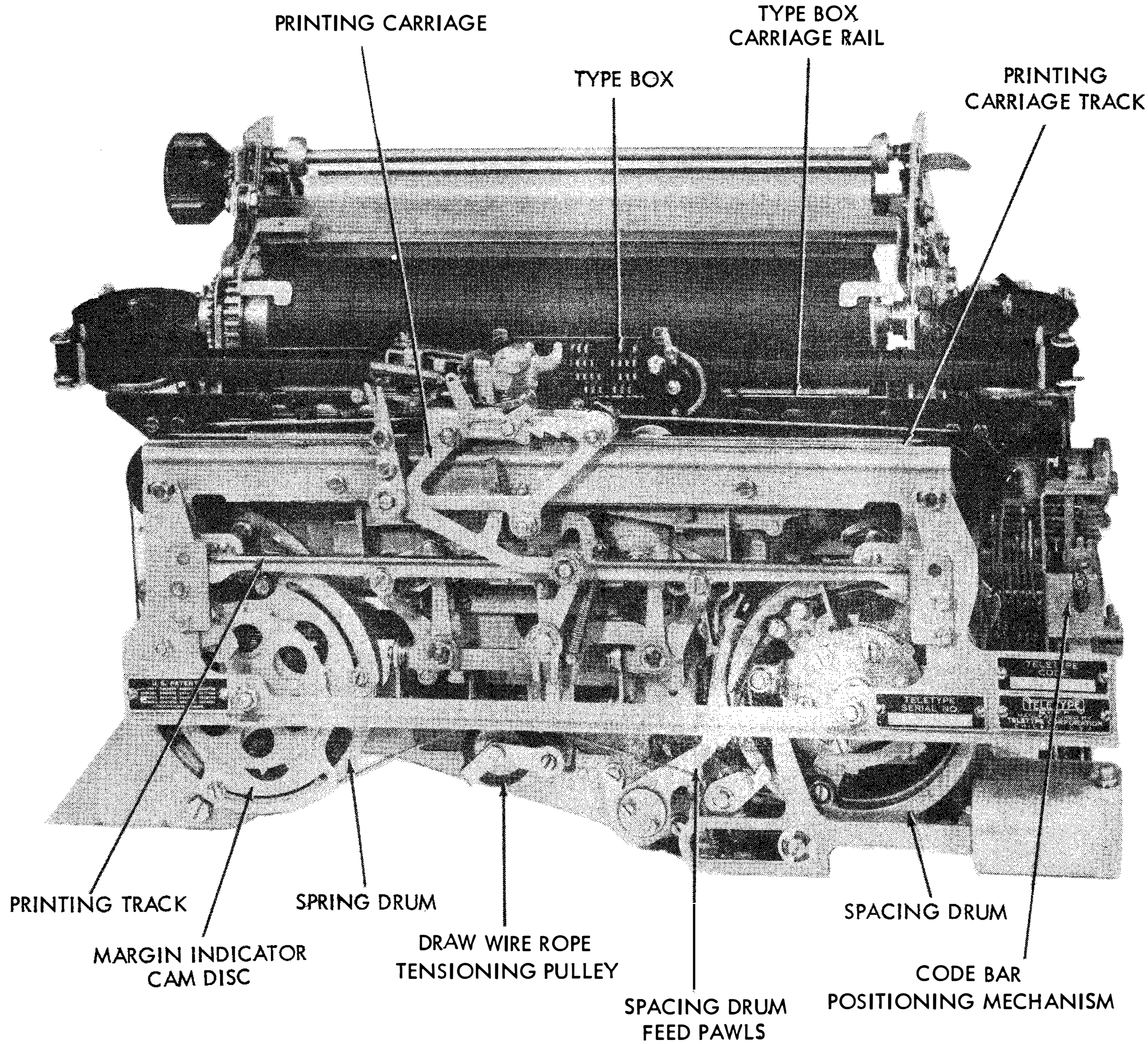


Figure 4-35. Typing Unit LP77YD/AGM (Front View)

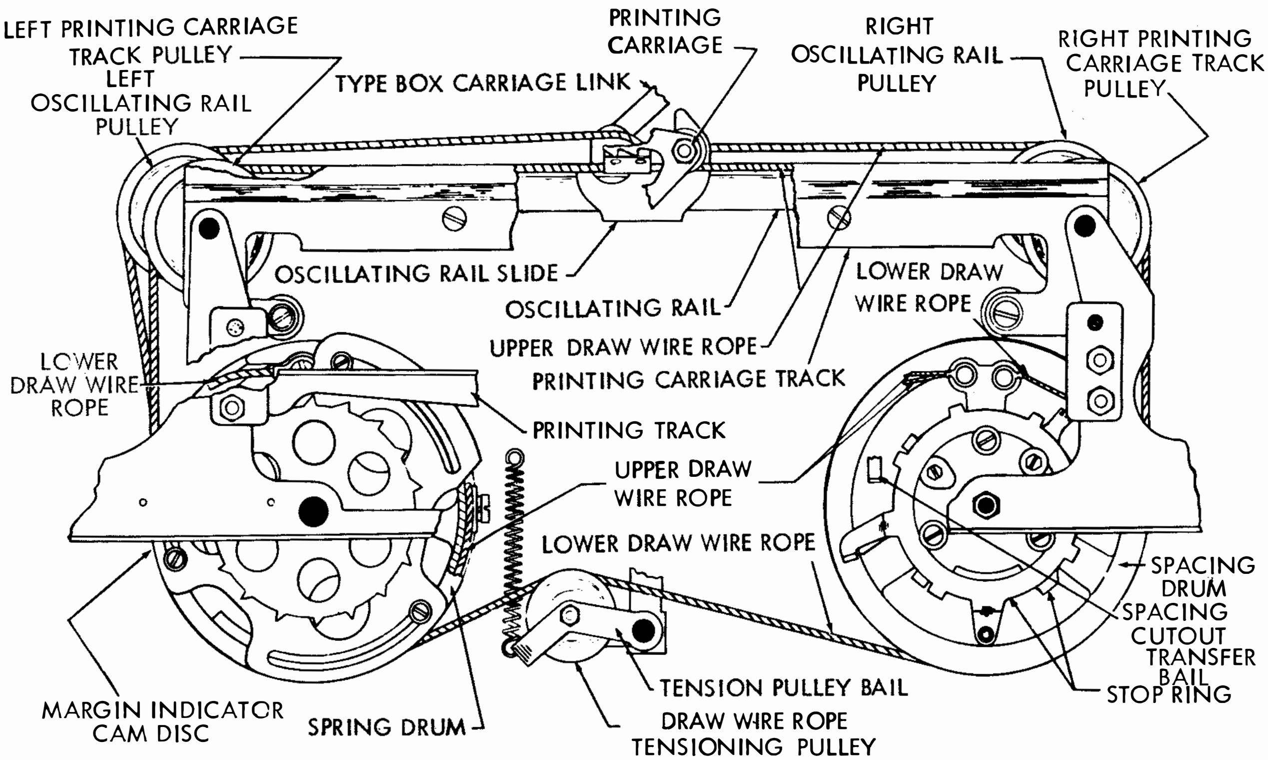


Figure 4-36. Draw Wire Rope Mechanism

on the typing unit frame at their lower ends. Thus, the oscillating rail and draw wire rope that it carries may be shifted to the left or right with no change in position relative to each other. The oscillating rail shift slide and the two oscillating rail shift links are used to accomplish the horizontal positioning of the oscillating rail and also connect it with the oscillating rail shift slide. The links are pivoted and are of such a length that only one at a time may be fully extended. As will be shown later under FUNCTIONS (paragraph 4-4i), the oscillating rail

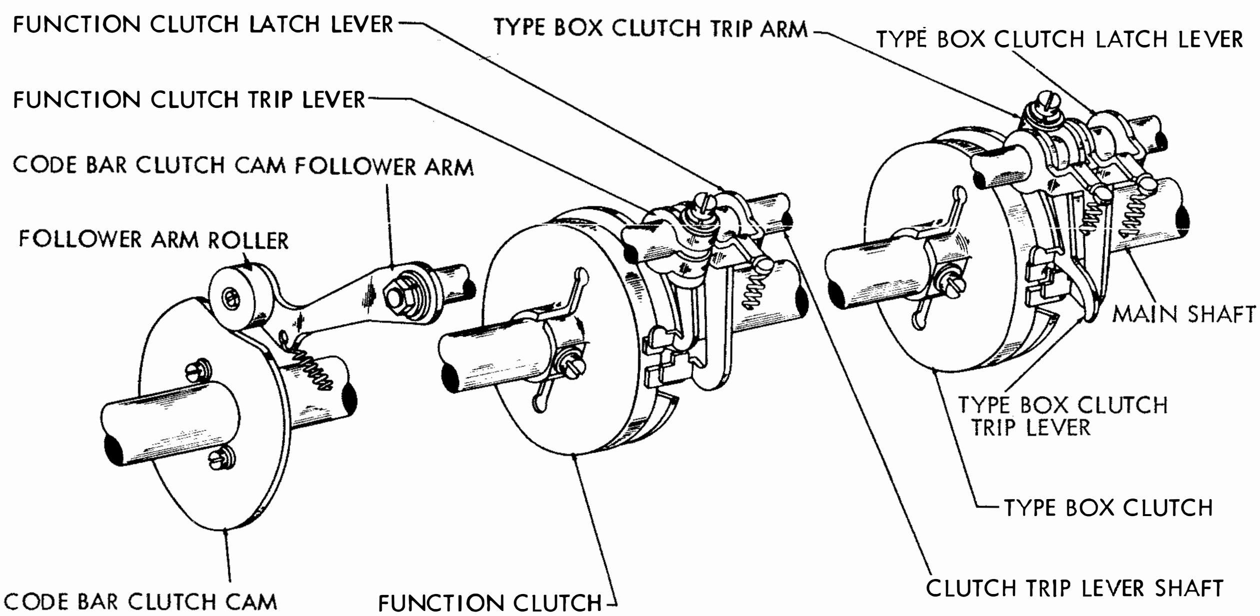


Figure 4-37. Trip Mechanism for Function and Type Box Clutches

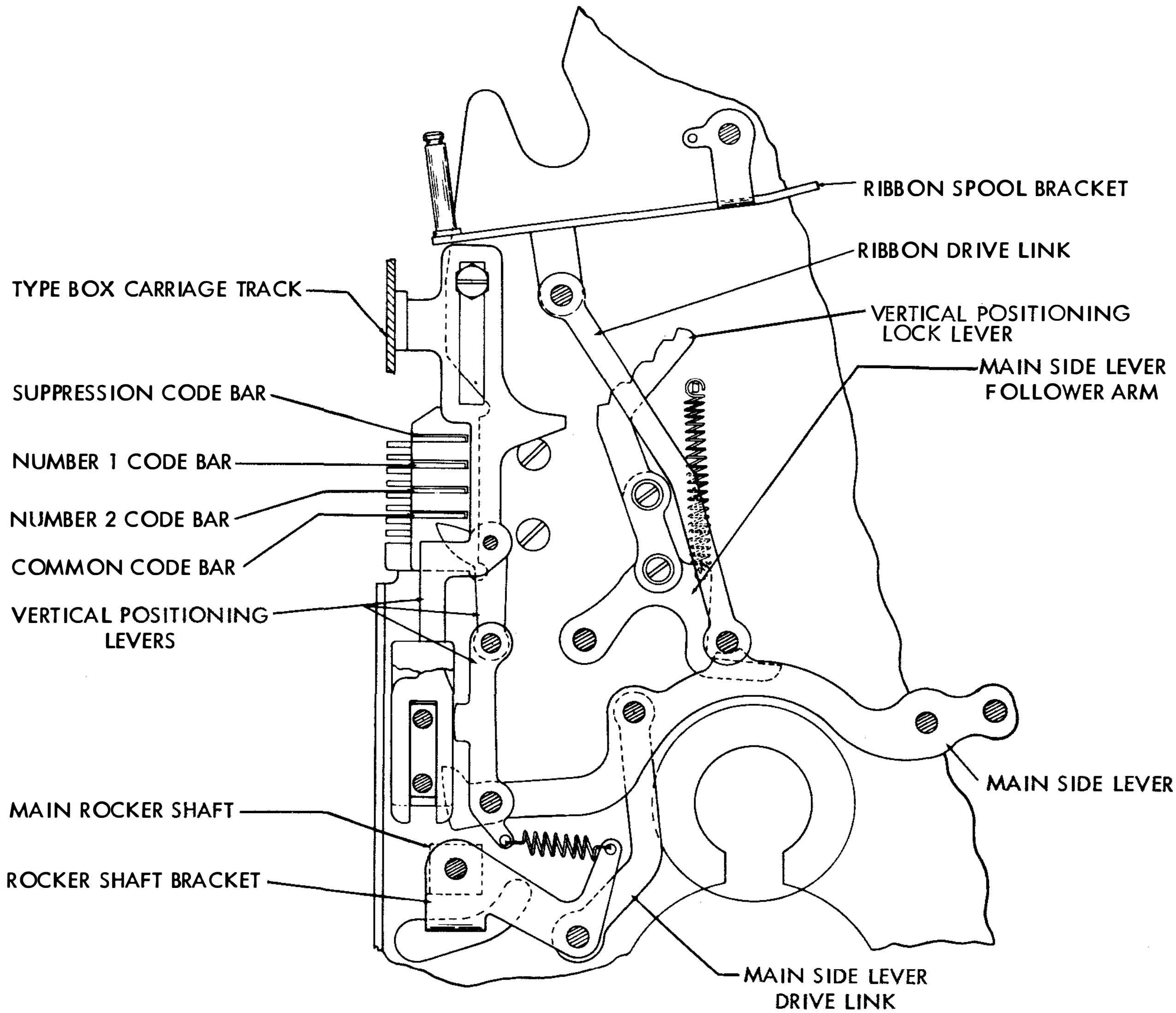


Figure 4-38. Right Side Mechanism

shift links are used to position the oscillating rail, and thus the type box, so that either the left side (letters characters) or the right side (figures characters) of the type box is selected.

(b) POSITIONING - The selection of the various characters from the four horizontal rows and the eight vertical rows in either the left (LTRS) side or the right (FIGS) side of the type box, and the printing of those characters takes place as follows:

1. Briefly, the number 1 and number 2 code bars determine the selection of the horizontal row. The number 3 code bar determines whether the selection is to be made from the left four vertical rows or right four vertical rows (in either the letters or figures side). The number 4 and number 5 code bars determine the selection of one row from the four vertical rows predetermined by the number 3 code bar.

2. Four code bars (longer than the others), extend through the right code bar bracket and serve as stops for the right "knee action" vertical positioning levers. They are (from top to bottom), suppression, number 1, number 2, and common (figure 4-34). Notches are arranged in the left ends of the code bars so that the left side "knee action" vertical positioning levers are stopped, in each case, by the same code bar that blocks the right side levers. After all code bars have been positioned by the code bar positioning mechanism, the code bar clutch-cam follower arm and its roller, in traversing the sloping indent on the code bar clutch-cam, rotates the clutch trip lever shaft. As the shaft turns, it first causes the function clutch trip lever to release the function clutch (figure 4-37) and then causes the type box clutch

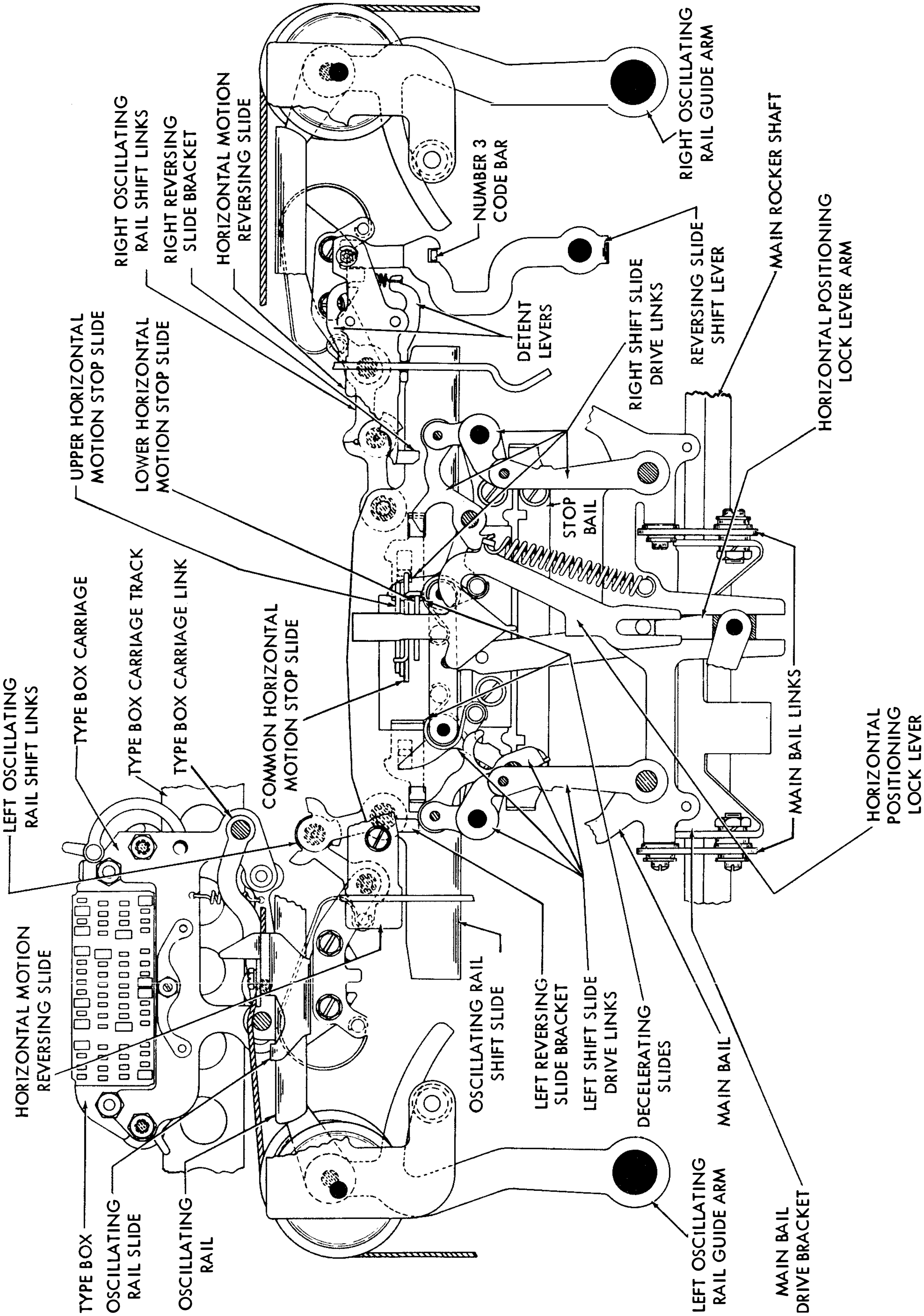


Figure 4-39. Front Plate Horizontal Positioning Mechanism

trip arm to engage its trip lever and release the type box clutch. When the type box clutch completes its revolution, it is disengaged by its trip lever and latch lever in the same manner as was the code bar clutch, described in paragraph 4-4e(1)(b). During its rotation, the type box clutch operates a drive link and a bracket to cause the main rocker shaft to oscillate. This in turn, through its left and right brackets and the main side drive links, extends the motion to the main side lever to operate the "knee action" vertical positioning levers (figure 4-38). These levers are driven upward until they strike a projecting code bar which causes them to buckle. The type box carriage track is mounted between the vertical positioning levers, and its vertical motion is controlled by them. When the number 1 and number 2 code bars are toward the right (spacing), the common code bar is also toward the right and blocks the vertical positioning levers. The top row of pallets in the type box are then in line for printing. When the number 1 code bar is toward the left (marking), and the number 2 code bar is toward the right (spacing), the common code bar is toward the left. The number 2 code bar then blocks the vertical positioning levers, and the second row of pallets in the type box is in line for printing. When the number 1 code bar is toward the right (spacing), and the number 2 code bar is toward the left (marking), the common code bar is again toward the left. Now the number 1 code bar blocks the vertical positioning levers and the third row of pallets in the type box is in line for printing. When the number 1 and number 2 code bars are toward the left (marking), the common code bar is also toward the left. The suppression code bar blocks the vertical positioning levers, and the fourth, or bottom, row of pallets in the type box is then in line for printing. At each of the four levels at which the vertical positioning levers may be stopped, they are momentarily locked by locklevers, which are controlled by the main side lever follower arms.

3. A bracket attached to the main rocker shaft applies vertical motion to the main bail by means of two main bail links (figure 4-39). Attached to each end of the oscillating rail shift slide are pivoted "buckling" type drive links, which extend downward to each end of the main bail. As the main bail moves downward, the left shift slide drive links, if not buckled, will try to shift the oscillating rail shift slide toward the right, while the right shift slide drive links, if not buckled, will try to shift the oscillating rail shift slide toward the left. When the number 3 code bar is shifted toward the left (marking), the horizontal motion reversing slide is shifted toward the left by the reversing slide shift lever, and is held there by detent levers. A bracket near the right end of the reversing slide will then make contact with the right shift slide drive links and cause them to buckle. As the main bail is driven downward, the unbuckled left shift slide drive links will start to shift the oscillating rail slide toward the right. This positions the type box so that the character to be printed will be found in the left half of the LTRS or FIGS side. In a similar manner, when the number 3 code bar is shifted toward the right (spacing) the horizontal motion reversing slide is also shifted toward the right, and is held there by the detent levers. A bracket near the left end of the horizontal motion reversing slide then makes contact with the left shift slide drive links and causes them to buckle. As the main bail is driven downward, the unbuckled right shift slide drive links will start to shift the oscillating rail shift slide toward the left. This positions the type box so that the character to be printed will be found in the right half of the LTRS or FIGS side.

4. After it has been determined in which group of four vertical rows the character to be printed is located, the number 4 and number 5 code bars operate three horizontal motion stop slides. These determine the row in that group in which the character is to be found (figure 4-39). A wedge shaped horizontal positioning lock lever, which is pulled downward by the main bail through a yield spring, bears against the horizontal positioning lock lever arm. This arm drives the oscillating rail shift slide in the direction in which it was started (by the number 3 code bar selection) until one of the two decelerating slides, which are mounted on the oscillating rail shift slide, strikes an unselected horizontal motion stop slide. A camming surface on the unbuckled shift slide drive links makes contact with and rolls down the face of the decelerating slide and causes the drive links to buckle. The oscillating rail shift slide finally comes to rest when it strikes the blocked decelerating slide. This ends the downward excursion of the lock lever, the yield spring extending until the main bail reaches the lowest point of its oscillation. As the main bail returns upward, it centers the oscillating rail shift slide. It is during this time that the horizontal motion stop slides are positioned for the selection of the next character. The number 4 and number 5 code bars each operate a code bar bell crank. Each in turn, moves a horizontal motion stop slide toward the front (marking), or toward the rear (spacing) (figure 4-40). A third (common) stop slide (spring tensioned toward the rear) is located between the upper and lower stop slides and has projections which pass across the front edges of these slides (figure 4-39). Each stop slide is of a different length. The common stop slide, which is the longest stop, has an additional stop on its shank which serves as the shortest stop when all the slides are moved forward. The upper slide (operated

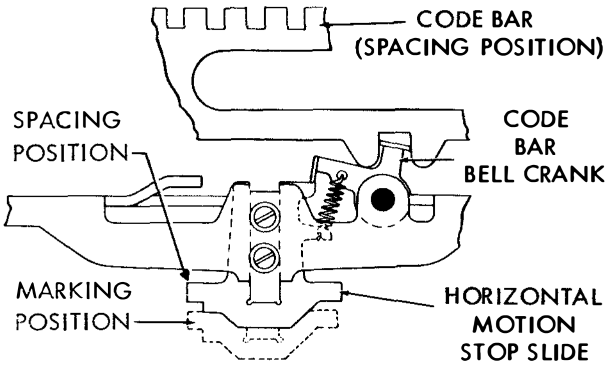


Figure 4-40. Stop Slide Positioning

from the number 4 code bar) is the second longest stop, and the lower slide (operated by the number 5 code bar) is the third longest stop.

5. When both the number 4 and number 5 code bars are toward the right (spacing), their respective horizontal motion stop slides and the common stop slide are toward the rear. The oscillating rail shift slide is moved to the right or left of its central position (determined by the number 3 code bar) until it is stopped by one end of the common vertical row (right or left of FIGS center or LTRS center) in line for printing. When the number 4 code bar is toward the right (spacing) and the number 5 code bar is toward the left (marking), the lower and the common stop slides are toward the front, and the upper stop slide is toward the rear. The oscillating rail shift slide is moved to the right or left of its central position until it is stopped by one end of the upper stop slide. This positions the second vertical row (right or left of FIGS center or LTRS center) in line for printing. When the number 4 code bar is toward the left (marking) and the number 5 code bar is toward the right (spacing), the upper and the common stop slides are toward the front and the

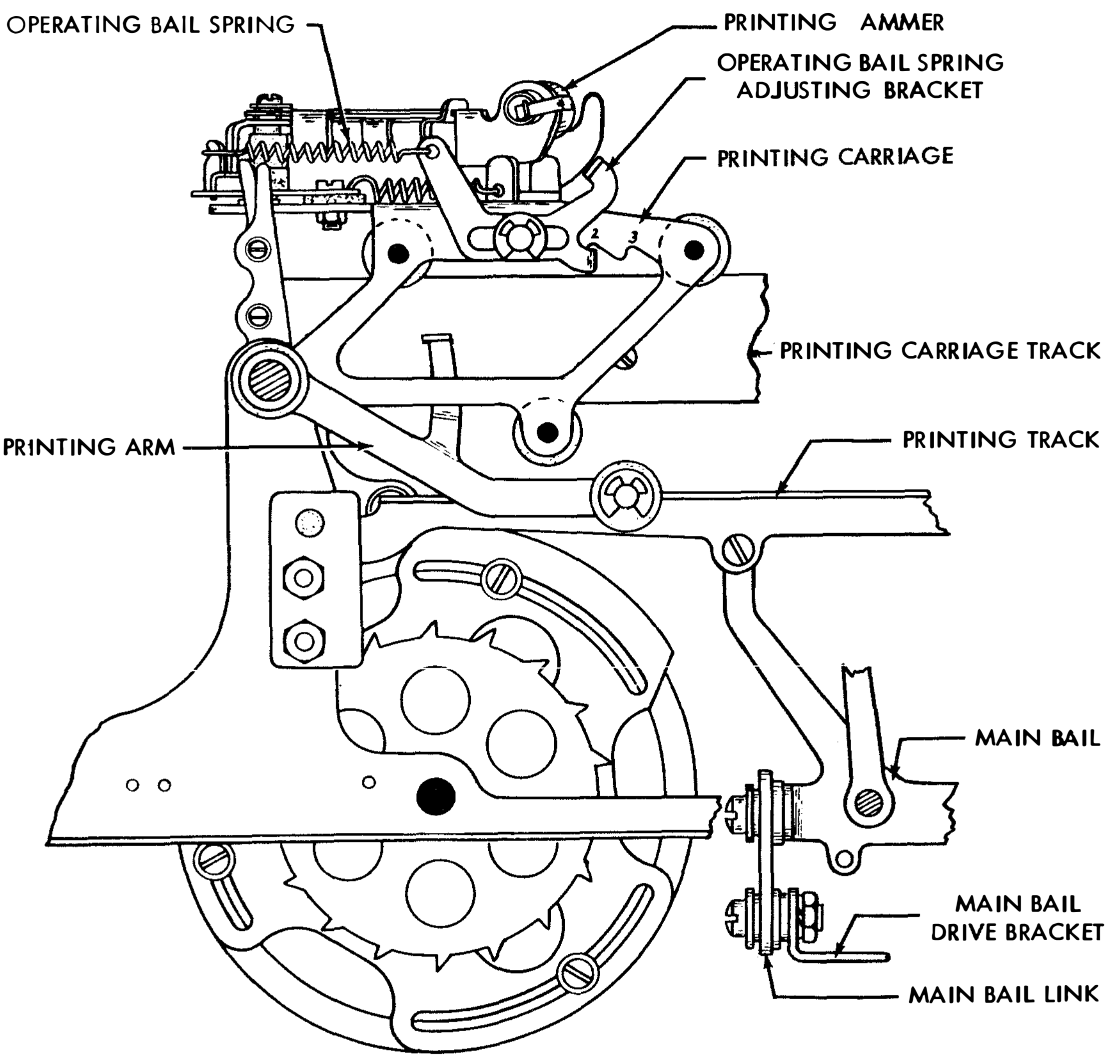


Figure 4-41. Printing Hammer Mechanism (Front View)

lower stop slide is toward the rear. The oscillating rail shift slide is moved toward the right or left of its central position until it is stopped by one end of the lower stop slide. This positions the third vertical row (right or left of FIGS center or LTRS center) in line for printing. When both the number 4 and number 5 code bars are toward the left (marking), their respective horizontal motion stop slides and the common stop slide are toward the front. The oscillating rail shift slide is moved toward the right or left of its central position until it is stopped by one side of the shank of the common stop slide. This positions the fourth vertical row (right or left of FIGS center or LTRS center) in line for printing.

(3) PRINTING HAMMER AND PRINTING CARRIAGE

(a) GENERAL - After the type box has been moved so that the selected type pallet is in its proper position, it must be struck by a printing hammer in order to print. This is accomplished by the action of the printing carriage located on the printing carriage track.

(b) POSITIONING - The printing carriage rides (on rollers) on the printing carriage track which is rigidly attached to the typing unit front plate. The carriage is clamped to the forward section of the upper draw wire rope. This moves the carriage along its track in such a manner that the hammer advances to the next printing position.

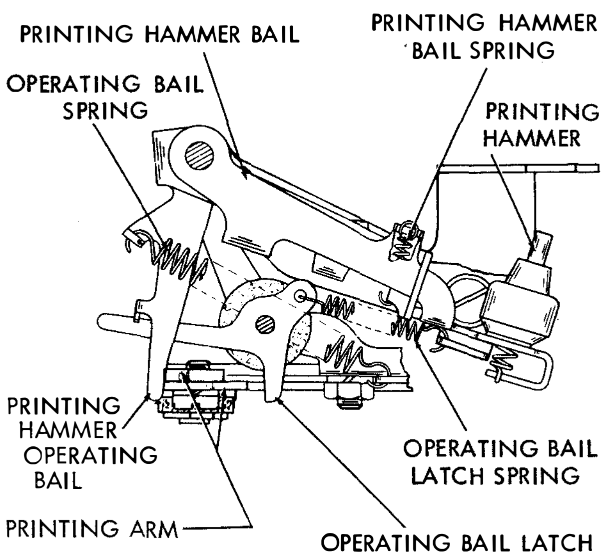


Figure 4-42. Printing Hammer Mechanism (Top View)

(c) PRINTING - The printing track, which is located on the front of the typing unit (figure 4-41), is fastened to an extension at each end of the main bail. As the main bail reciprocates vertically, it extends the motion through the printing track which travels in guides located at each end of the track. The printing arm, which extends downward from the printing carriage, rides the printing track. As the arm follows the reciprocating motion of the track, its upper end moves first toward the left and then toward the right. When the upper end of the arm moves toward the left, it rotates the printing hammer operating bail clockwise against its spring tension until it becomes latched by the operating bail latch (figure 4-42). The printing hammer operating bail draws the printing hammer bail away from the type box by means of the printing hammer bail spring. When the upper end of the printing arm moves to its extreme right position, it makes contact with the latch and causes it to release the printing hammer operating bail. The operating bail is swung in a counterclockwise direction by the operating bail spring until it strikes its stop. The printing hammer bail, in being driven by the operating bail, is swung toward the type box. When the operating bail is stopped, momentum causes the printing hammer to continue its travel against the tension of the printing hammer bail spring until the printing hammer strikes the selected type pallet.

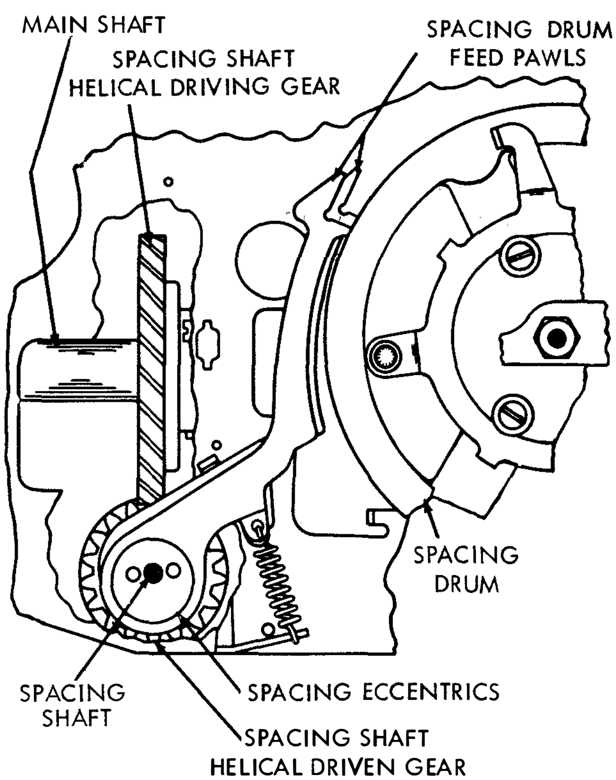


Figure 4-43. Spacing Drum Drive Mechanism

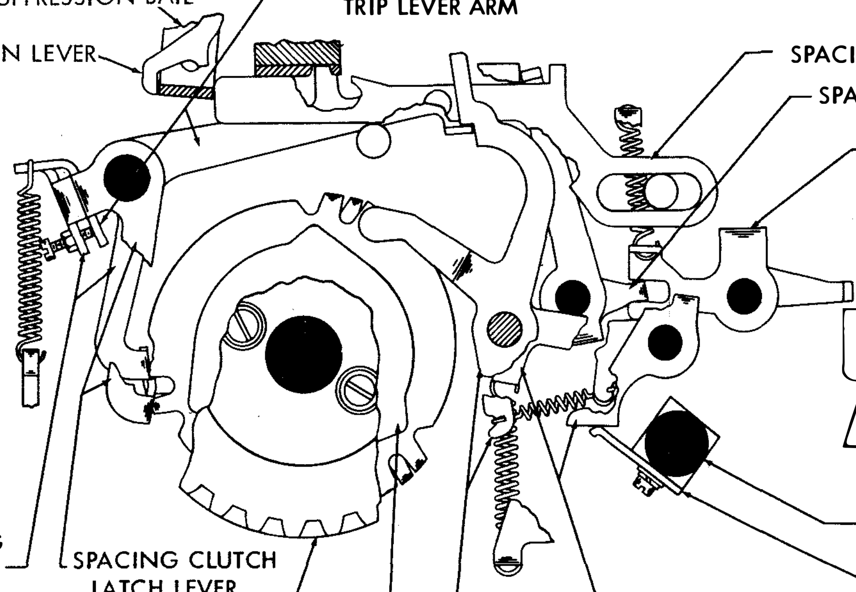


Figure 4-44. Spacing and Spacing Suppression Mechanisms

f. SPACING

(1) GENERAL - To space the printed character properly, the type box and printing carriages must be advanced with each character printed. As was shown in paragraph 4-4e(2)(a) of this section and in figure 4-36, the carriages are connected to a draw wire rope which is fastened to the spring drum and the spacing drum. The purpose of the spring drum, which contains a torsion spring, is to tension the draw wire rope, and thus the carriages, to the left. The spacing drum has ratchet teeth about its perimeter which are engaged by the eccentric driven spacing drum feed pawls (figure 4-43). The spacing shaft, which mounts the spacing eccentrics, is driven through its helical gear by the helical driving gear attached to the three-stop spacing clutch on the main shaft. The gear ratio of 1-1/2 to 1 causes the spacing shaft to turn one-half a revolution each time the spacing clutch is tripped. This allows the feed pawls to advance the spacing drum by the amount of one ratchet tooth. As shown earlier, each time the typing unit operates the main rocker shaft is made to oscillate about its center. A cam plate, which is fastened to the lower side of the rocker shaft, is in its lowest position during the rest time. During the time that printing is to take place, the cam plate is moved upward by the shaft and operates the spacing trip lever bail. As this bail is rotated about its pivot point, it raises the spacing trip lever arm (figure 4-44). As the rocker shaft reverses its direction of rotation, the spacing trip lever bail and the trip lever move downward, causing the latched up spacing clutch trip lever arm to operate the spacing clutch trip lever and release the spacing clutch. Before the spacing clutch completes one-third of a revolution, its restoring cam moves the spacing trip lever about its pivot point until it releases the spacing clutch trip lever arm. This in turn, releases the spacing clutch trip lever, which returns to its normal position in time to stop the spacing clutch after one-third of a revolution. The spacing clutch three-stop cam disk, upon which the latch lever rides, has an indent at each stop position. When one of the three lugs on the clutch shoe lever disk strikes the spacing clutch trip lever, the inertia of the cam disk assembly causes it to continue to turn until its lugs make contact with the lugs on the clutch shoe lever disk. The latch lever drops into an indent in the cam disk, and the clutch is held disengaged until the trip lever is again operated.

(2) SPACING SUPPRESSION - When certain functions are selected, or when the carriages reach their extreme right position, it is necessary to suppress spacing. This is accomplished by moving the spacing suppression slide forward. In this position it will hold the upper end of the spacing trip lever forward, preventing it from engaging the spacing clutch trip lever arm. In the case of spacing suppression of

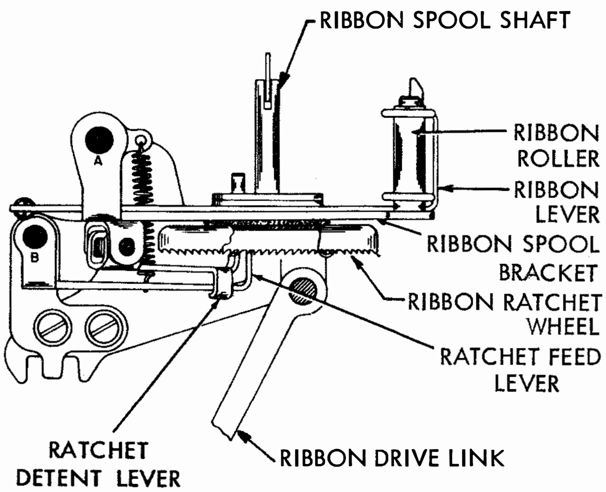


Figure 4-45. Ribbon Mechanism (Left Side)

functions, the spacing suppression slide is shifted by means of the spacing suppression bail. The manner in which this bail is operated will be discussed under FUNCTIONS (paragraph 4-4i). When the carriages are near their extreme right position, an adjustable cut-out ring on the spacing drum engages the spacing cut-out transfer bail which operates the spacing cut-out bail. The adjustable ring and the end of the spacing cut-out transfer bail are shown in figure 4-36. The spacing cut-out bail shifts the spacing suppression slide and prevents spacing until the carriages are returned. The maximum number of characters which the typing unit may print is eighty-five (10 per inch). In order to prevent spacing beyond this point, with subsequent damage to the machine, several teeth are omitted from the spacing drum ratchet wheel.

g. MARGIN INDICATOR - Before the type

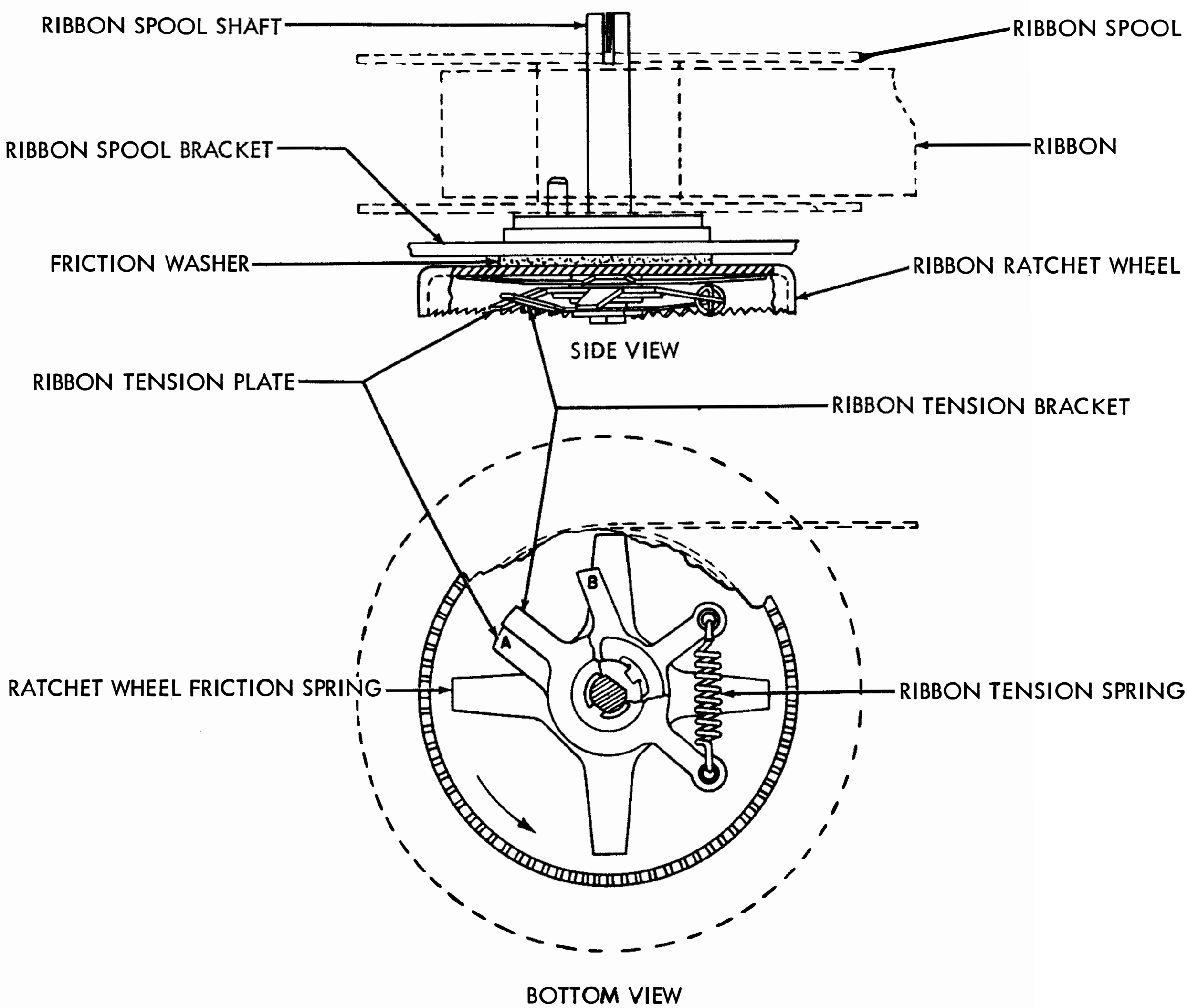


Figure 4-46. Ribbon Tension Mechanism

box carriage and the printing carriage reach the end of their travel, the margin indicator lamp in the cabinet is illuminated. The contact mechanism which controls the lamp circuit is mounted on the keyboard (see paragraph 4-3n), and is actuated by a disk mounted on the spring drum of the typing unit (figure 4-36). The angular position of the cam disk with respect to the spring drum may be adjusted to change the point at which the indicator will light.

h. RIBBON MECHANISM

(1) POSITIONING - The left and right ribbon feed mechanisms oscillate in a vertical plane with each revolution of the type box clutch. They are driven by ribbon drive links which are attached to the main side levers (figure 4-45). At their uppermost position, the ribbon mechanisms position the ribbon relative to the line which is being printed. After each character is printed, the ribbon mechanisms are dropped downward, together with the type box, in order that the last character printed may be viewed. The ribbon is held in place at the point of printing by a ribbon guide fastened to the rear of the type box carriage.

(2) FEEDING - Each of the ribbon mechanisms consists of a bracket, hinged at its rear end, upon which is mounted a ribbon spool shaft (figures 4-45 and 4-46). A ribbon tension bracket is keyed to the lower end of the ribbon spool shaft. A ribbon ratchet wheel is mounted freely on the ribbon spool shaft just below the ribbon spool bracket, from which it is separated by a friction washer. The ratchet wheel friction spring, on the under side of the ribbon ratchet wheel, causes the ratchet wheel to bear against the felt friction washer applying a constant drag to the ratchet wheel. A ribbon tension plate, which is keyed to the hub of the ribbon ratchet wheel, has two projecting lugs (A and B in figure 4-46) that straddle the lug on the ribbon tension bracket. A ribbon tension spring tends to maintain the ribbon tension bracket against lug A of the ribbon tension plate. In operation, the ribbon spool bracket, driven by the ribbon drive link, pivots about point A in figure 4-45. The ratchet feed and ratchet detent levers pivot about points B and C respectively, and are held against the teeth on the ribbon ratchet wheel by their springs. As the ribbon spool bracket is moved upward, the ratchet wheel feed lever skips over one tooth, while the ratchet detent lever holds the ribbon ratchet wheel from turning backward. When the ribbon spool bracket is moved downward, the ratchet feed lever engages a ratchet tooth and pushes the ratchet wheel. A tooth on the ribbon ratchet wheel then skips over the ratchet detent lever. The teeth on the left and right ratchet wheels face in opposite directions, so that, when their feed levers are engaged, the left ribbon ratchet wheel turns clockwise, and the right ribbon ratchet wheel turns counterclockwise (viewed from the top). In order for the ribbon to be pulled from one ribbon spool to the other, only one of the ribbon mechanisms can have its ratchet feed and ratchet detent levers engaged with its ribbon ratchet wheel at a time. As the ribbon ratchet wheel turns (figure 4-46), the ribbon tension plate also turns, and extends the ribbon tension spring. When the lug B of the ribbon tension plate makes contact with the ribbon tension bracket, the ribbon spool shaft is made to turn, and the ribbon is thus wound on the ribbon spool. When the ribbon is almost completely unwound from one spool, it is necessary to reverse its direction so it can rewind. This is accomplished automatically by disengaging one set of ratchet feed and ratchet detent levers and engaging the other set. While the ribbon is passing from the left spool to the right spool, the right set of levers is engaged. The left set is held disengaged against the tension of its springs by the left ribbon feed reverse lever, which is in its downward position (figure 4-47).

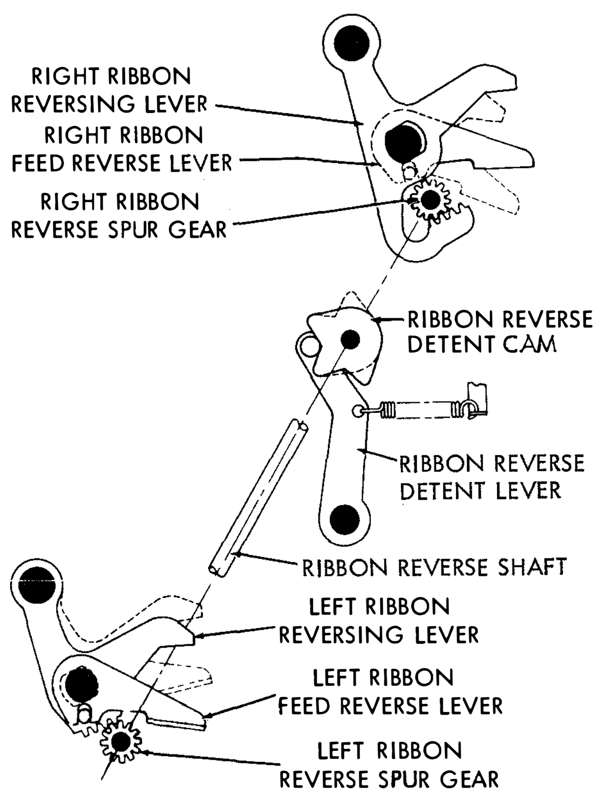


Figure 4-47. Ribbon Reversing Mechanism

The lever is held in this position by means of the ribbon reverse detent lever through the intervening ribbon reverse detent cam, ribbon reverse shaft and ribbon reverse spur gear. As

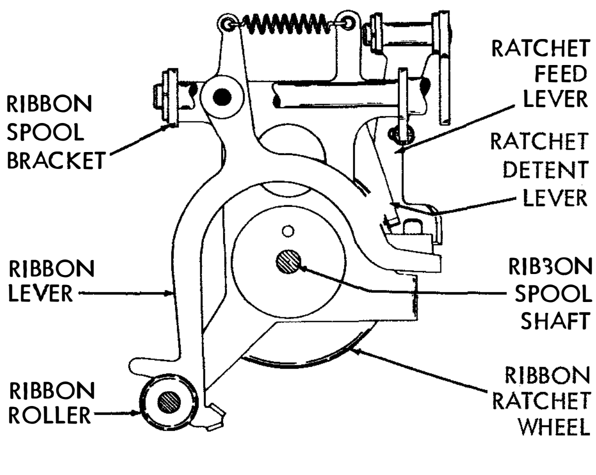


Figure 4-48. Ribbon Mechanism
(Left, Top View)

the ribbon unwinds from the ribbon spool, it passes around the ribbon roller (figure 4-48) and through the slot in the end of the ribbon lever. When the ribbon nears its end, an eyelet fastened to the ribbon catches in the ribbon lever slot and pulls the lever toward the right. The next time the ribbon mechanism is moved upward, the displaced ribbon lever engages the end of the left ribbon reversing lever and causes it to move to the dashed position shown in figure 4-47. As the lever moves, its teeth rotate the left spur gear which, through the ribbon reverse shaft, turns the detent cam and the right spur gear. As the right spur gear moves the right ribbon reversing lever downward, a pin on the lever drives the right ribbon reverse lever downward, to disengage the ratchet feed and ratchet detent levers from the right ribbon ratchet wheel. At the same time, a pin on the left ribbon feed reversing lever moves the left ribbon feed reverse lever upward to permit the left ratchet feed and detent levers to engage the left ribbon ratchet wheel. Thus, the ribbon mechanisms are positioned to rewind the ribbon spool. When it nears its end on the right ribbon spool, the ribbon is again reversed in a manner similar to that just described. During the reversing cycle, the ribbon is maintained taut by the previously extended ribbon tension spring (figure 4-46).

i. FUNCTIONS

(1) GENERAL

(a) There are two types of operations which can be performed by the typing unit. The

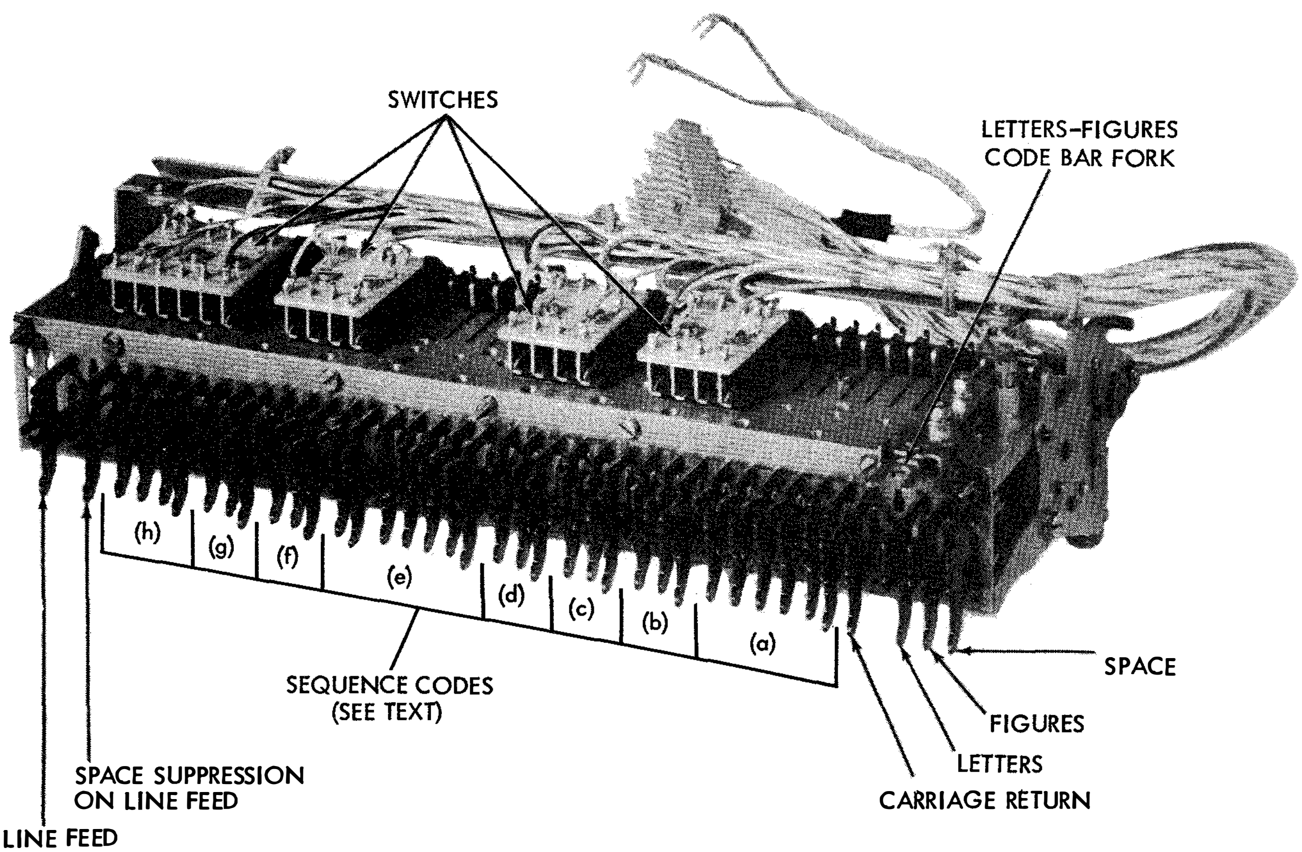


Figure 4-49. Typing Unit Function Box (Front View) Showing Function Bars

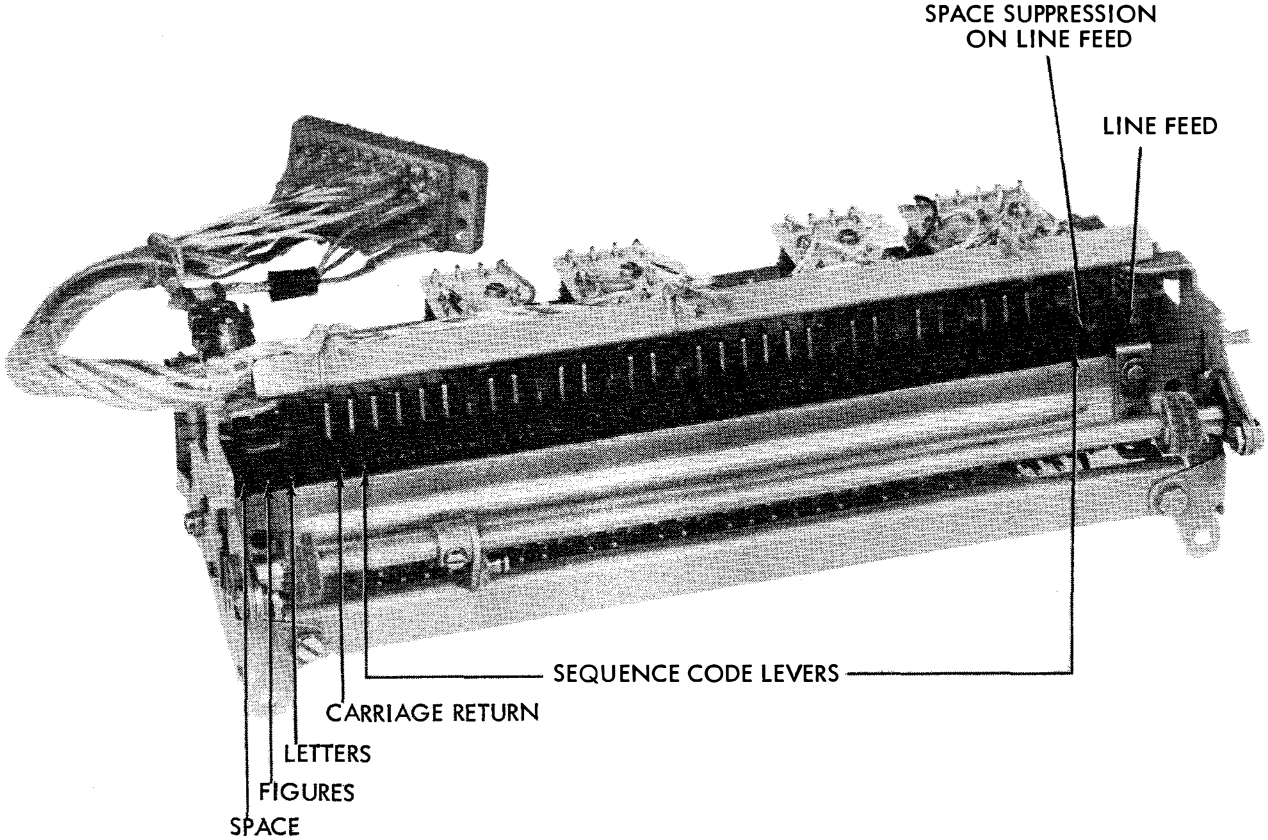


Figure 4-50. Typing Unit Function Box (Rear View)
Showing Function Levers

first embodies those mechanical actions which are directly necessary to the actual printing of a character. The second embodies mechanical action which is supplementary to the printing of a character, or which alters the positions of the various mechanisms, and is described as a "function".

(b) As in printing, the reception of function codes results in the positioning of the code bars. The back edges of the code bars are notched. Positioned directly behind the code bars is a function box containing the function bars for the various functions (figures 4-49 and 4 - 50). Each function bar has a series of tines on its end, offset to one side or the other, to correspond with the marking and spacing elements of the particular code to which it is to respond. When the function clutch is tripped (paragraph 4-4e(2)(b)2, and figure 4-37), it rotates and extends motion to the function bar reset bail through the intervening cam and follower arm and function rocker shaft. This causes the function bar reset bail, with its attached reset bail blade, to release the function bars momentarily (figure 4 - 51). As the spring tensioned function bars are released, they move forward to bear against the code bars. If the code bars are positioned for a function, each tine on the function bar for that function will be opposite a notch in a code bar. This will permit the selected function bar to move forward into the code bars, while the other function bars are blocked by one or more code bars (figure 4-52).

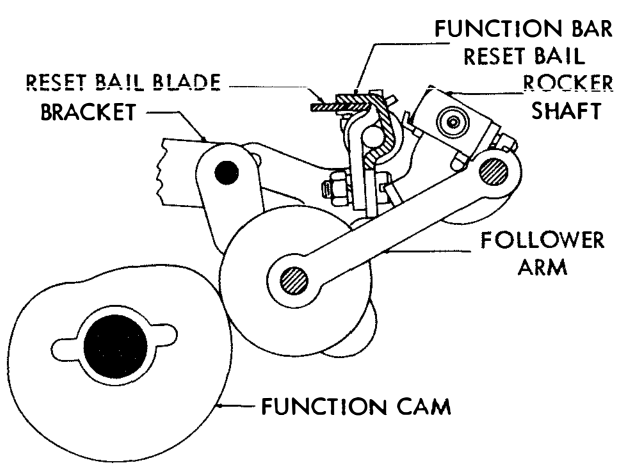


Figure 4-51. Function Reset Bail Mechanism

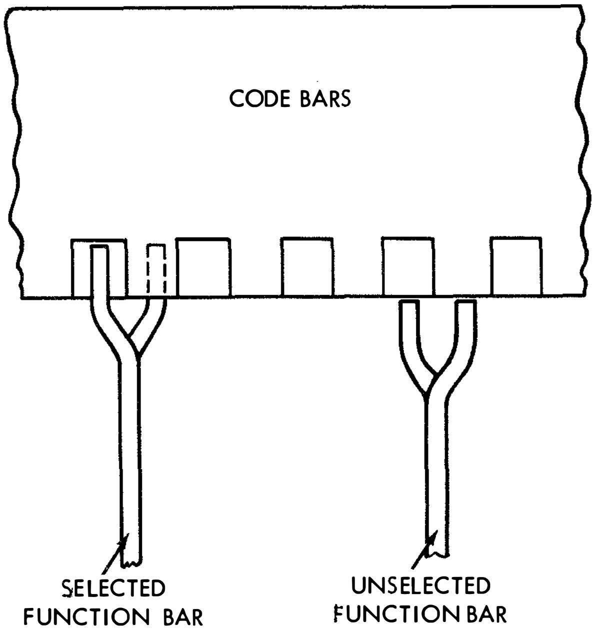


Figure 4-52. Function Selection (Top View)

Associated with each function bar in the function box is a function pawl and a function lever. In the unselected position, the function bar is not latched with its function pawl (figure 4-53). When the function bar reset bail blade releases the function bars, any bar which is selected will move sufficiently far forward (to the left in the figure) to permit it to engage its function pawl. Then, as the reset bail blade returns the function bar to its initial position, the function bar carries the function pawl to the rear (to the right in figure 4-54). The function pawl, in turn, moves the function lever clockwise about its pivot point. A projection at the lower end of most function levers operates the spacing suppression bail (paragraph 4-4f(2), and either the upper or lower ends of the levers operate the various functions. Near the completion of the function cycle, a stripper blade, operated by a cam on the function clutch assembly, rises to engage any selected function pawl and strip it from its function bar (figure 4-55). Springs return the released function pawl and the func-

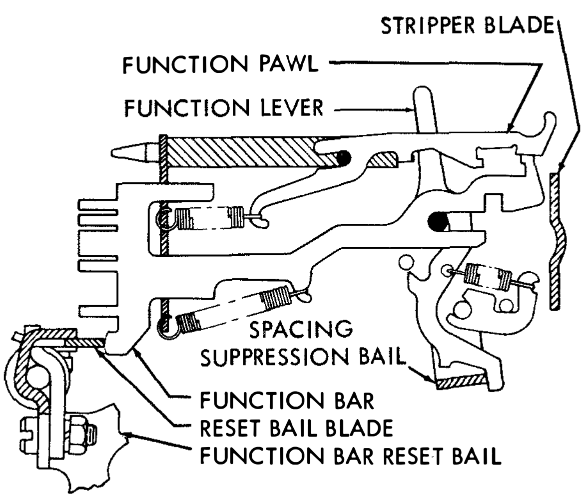


Figure 4-53. Typical Function Box Mechanism, Unselected

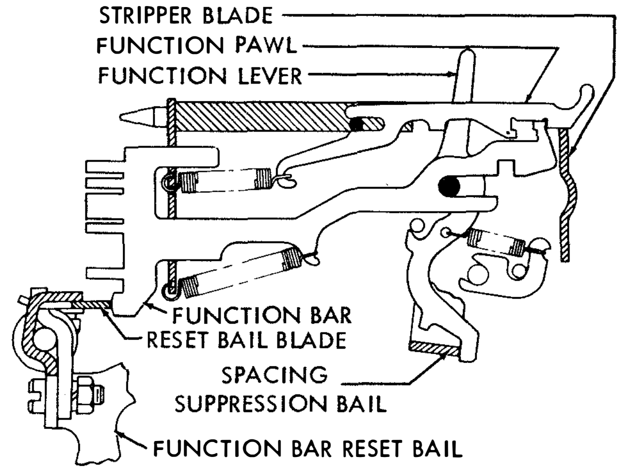


Figure 4-54. Typical Function Box Mechanism, Selected

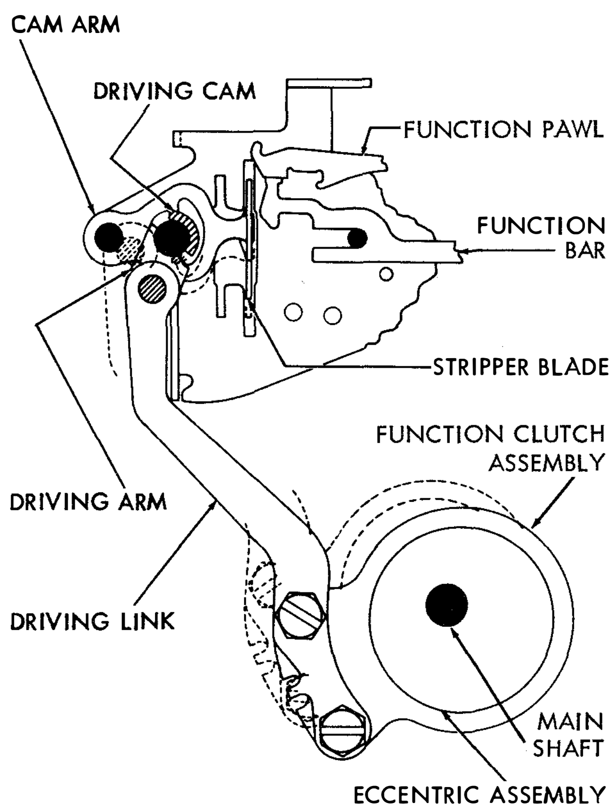


Figure 4-55. Stripper Blade Mechanism

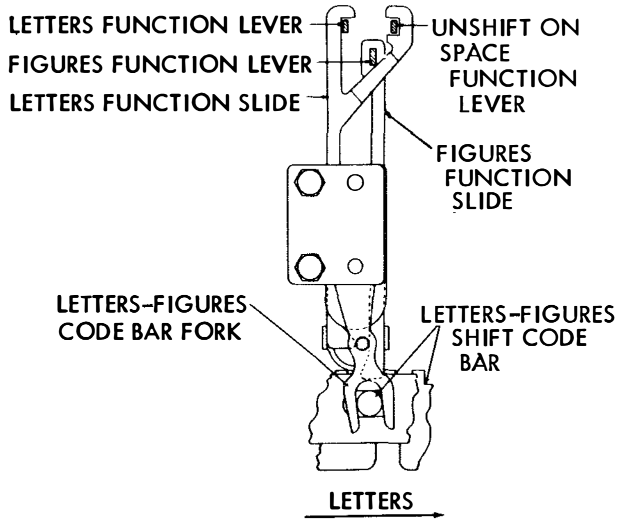


Figure 4-56. Letters-Figures Function Slide, Letters Position

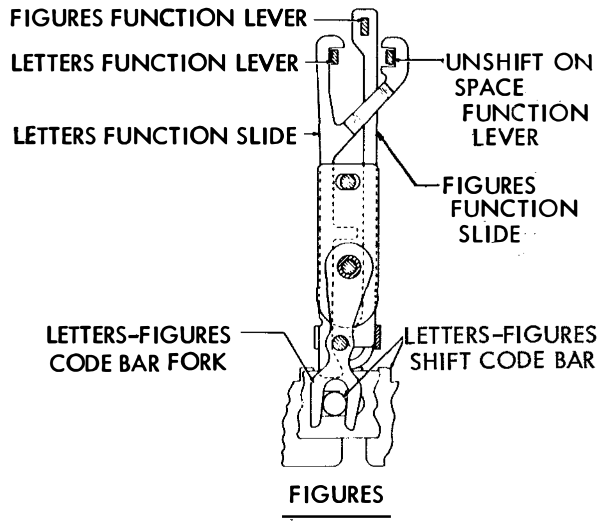


Figure 4-57. Letters-Figures Function Slide, Figures Position

tion lever to their original position. To prevent printing during the function cycle (when a function is selected) the type box is positioned so that the hammer will strike where there is no type pallet. The function clutch is disengaged upon completion of one revolution, as described in paragraph 4-4e(1)(b).

(2) LETTERS AND FIGURES SHIFT FUNCTION - The letters and figures function bars, pawls and levers, which are located near the right end of the function box, operate on letters and figures codes respectively. The upper ends of the function levers engage the letters and figures function slides (figures 4-56 and 4-57). The front ends of these function slides have camming surfaces which, when a slide is shifted to the rear by its function lever, move the letters-figures code bar fork to the right (letters position, figure 4-56) or to the left (figures position, figure 4-57). The letters-figures code bar fork engages a pin on the bracket fastened to the letters-figures shift code bar, and positions the code bar toward the right for let-

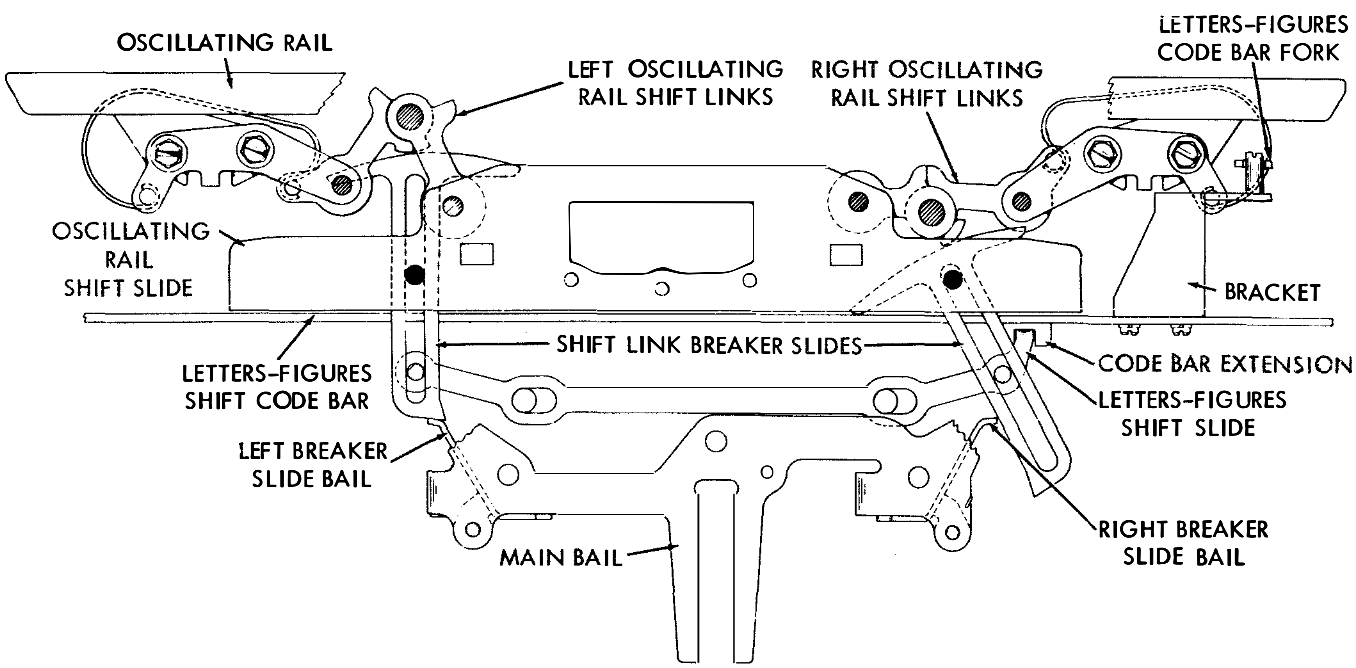


Figure 4-58. Letters-Figures Shift Mechanism, Letters Position

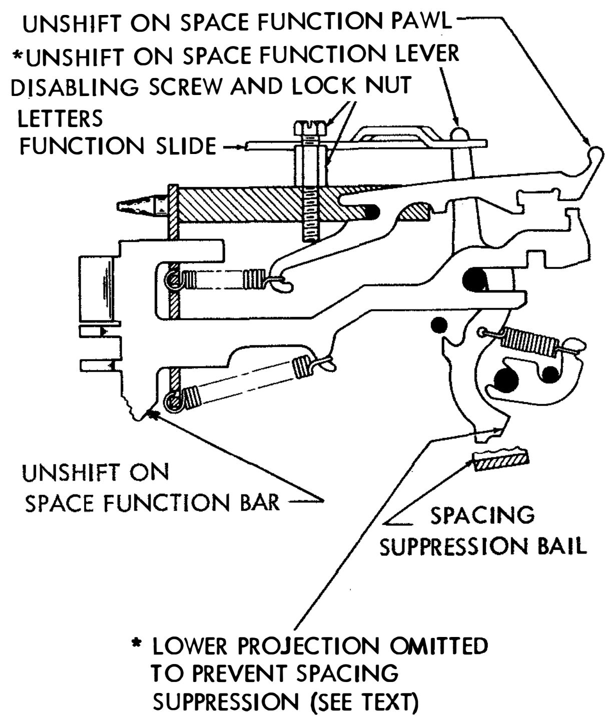


Figure 4-59. Unshift-On-Space Function Mechanism, Disabled Position

ters function or toward the left for figures function (figure 4-58). A slotted extension of the code bar engages a tongue from the right end of the letters-figures shift slide and causes the shift slide to follow the movements of the code bar. Pins at the end of the shift slide serve as lower guides for the right and left shift link breaker slides. Pins which project from the front plate serve as upper guides and pivot points. Mounted on the ends of the main bail are the left and right breaker slide bails. When letters function code is received, the shift slide is shifted to the right as shown. This places the left shift link breaker slide in a vertical position with its lower end over the left breaker slide bail. The right breaker slide is positioned such that its lower end is to the right of the right breaker slide bail. As the main bail moves upward, the right breaker slide bail clears the right breaker slide, while the left breaker slide bail engages the left breaker slide and moves it upward. This action causes the left oscillating rail shift links to break and shift the oscillating rail to the right for printing of LTRS characters. In a similar manner, when figures function code is received, the right oscillating rail shift links are broken, and the rail is shifted to the left for the printing of FIGS characters.

(3) SPACING FUNCTION

(a) SPACING - For spacing between words, or any spacing other than that which accompanies printing, the operator uses the space bar attached to the space keylever on the keyboard. The function operates in the manner described under Spacing, paragraph 4-4f(1) of this section. However, as in all the functions, printing does not occur.

(b) UNSHIFT ON SPACE - As furnished with the typing unit, this function is normally disabled. To activate the mechanism (if it becomes desirable to use the unshift on space feature) back off the screw located over the front end of the function pawl until the rear end of the pawl is lowered enough to engage the function bar. When activated, the function bar, located at the right end of the function box, operates on spacing code. Its associated function lever engages an extension of the letters function slide (figure 4-59). Thus, when a spacing function occurs, letters shift will take place in the manner described in paragraph 4-4i(2). The projection at the lower end of the spacing function lever is removed in order not to operate the spacing suppression bail which would suppress spacing.

NOTE

When disabling the unshift on space function, the function bar must be in its rearmost position as the screw is advanced.

(4) CARRIAGE RETURN FUNCTION

(a) The carriage return function mechanism is located in the right end of the typing unit. Reception of the carriage return code causes the carriage return function bar and the latching type function lever to operate (figure 4-60). The lower end of the function lever engages the carriage return slide arm and pushes it forward (toward the left in the figure). The slide arm, in turn, moves the carriage return bail and its lever about their pivot point. As the front portion of the lever moves downward, it takes with it the lower section of the spacing drum feed pawl release link. This causes the upper portion of the link to turn and disengage the spacing drum feed pawls from the spacing drum (figure 4-61). When the carriage return lever reaches the lowest point, the carriage return latch bail locks it there. The disengagement of the spacing drum feed pawls from the spacing drum permits the spring drum to return the printing and type box carriages toward the left side of the typing unit. The latching type function lever allows the feed pawls to remain out for an extra cycle giving the type box carriage time to settle at the start of a new line. As the spacing drum nears the end of its counterclockwise rotation, the roller on its stop arm contacts the transfer slide, which, in turn, drives the dashpot piston into the dashpot cylinder. A small passageway, with an inlet from the inside of the cylinder and three outlets to the outside, is closed by a steel ball held in its seat by means of a compression spring. A set screw, which may be locked in place with a nut, is used to regulate the spring pressure on the ball. The rate of deceleration provided by the cushioning effect of the trapped air is automatically regulated for various lengths of lines by means of the ball valve. This, together with the direct opening to the outside, determines the rate at which the air may escape from the cylinder. When the spacing drum reaches its extreme counterclockwise position, an extension of the stop arm trips the carriage return latch bail plate, which is fastened to the carriage return latch bail. The latch bail disengages the carriage return lever and on the next operation the lower edge of the stripper blade will trip the carriage return function lever latch. The feed pawls are again permitted to engage the spacing drum.

(b) Local (off-line) operation of the carriage return mechanism may be obtained from the keyboard (see paragraph 4-3i). The keyboard mechanism engages a projection on the carriage return lever and causes the operations described in the preceding paragraph to take place.

(5) LINE FEED FUNCTION

(a) The line feed function mechanism is located in the left end of the typing unit. Reception of the line feed code causes the line feed function bar, pawl, and lever to operate (figure 4-62). The lower end of the line feed function lever engages the line feed slide arm and pushes it forward (to the left of the figure). The slide arm, in turn, moves the line feed clutch trip arm and the trip lever about their pivot point until the trip lever releases the three stop line feed clutch. The line feed gearing is such that

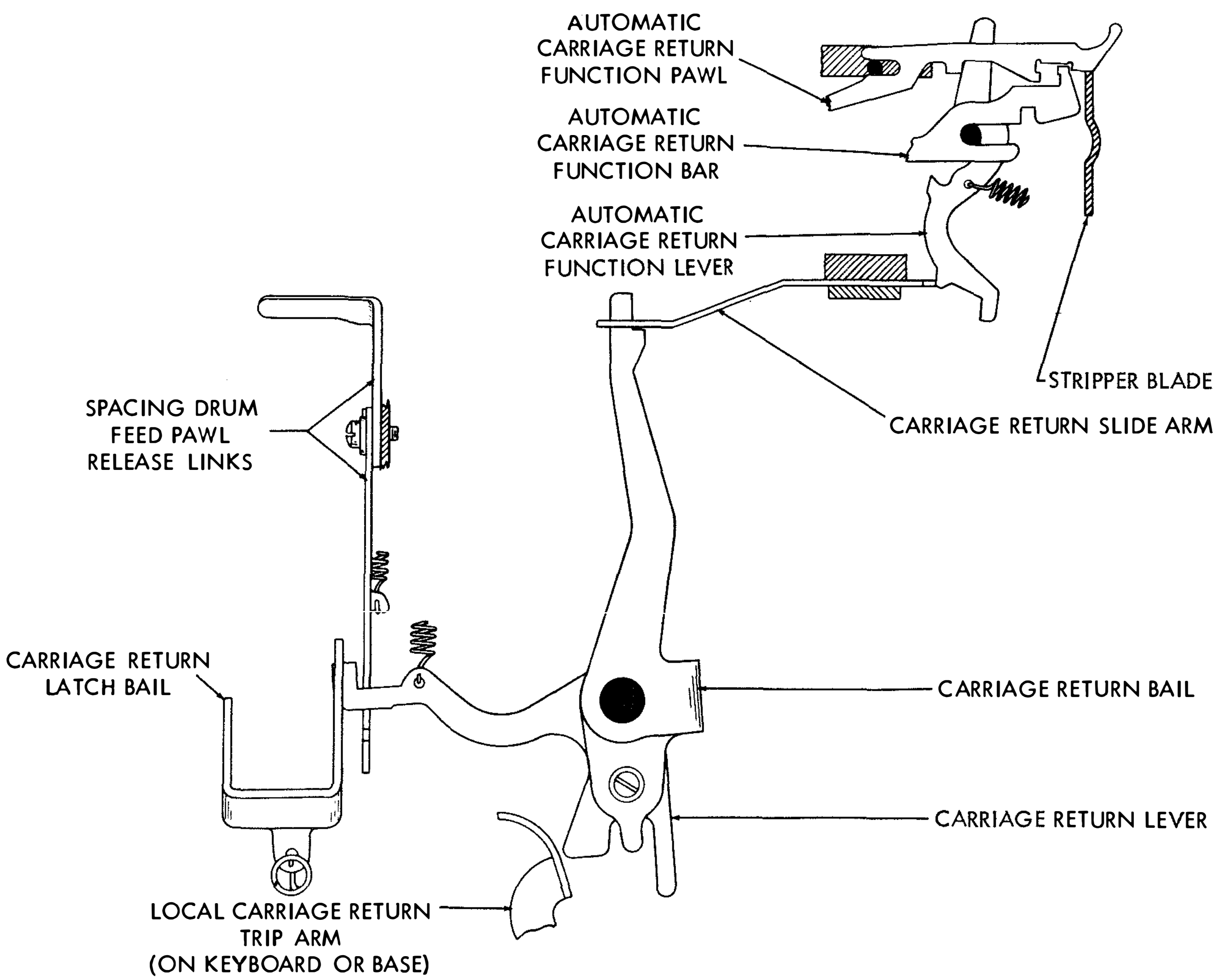


Figure 4-60. Carriage Return Function Mechanism

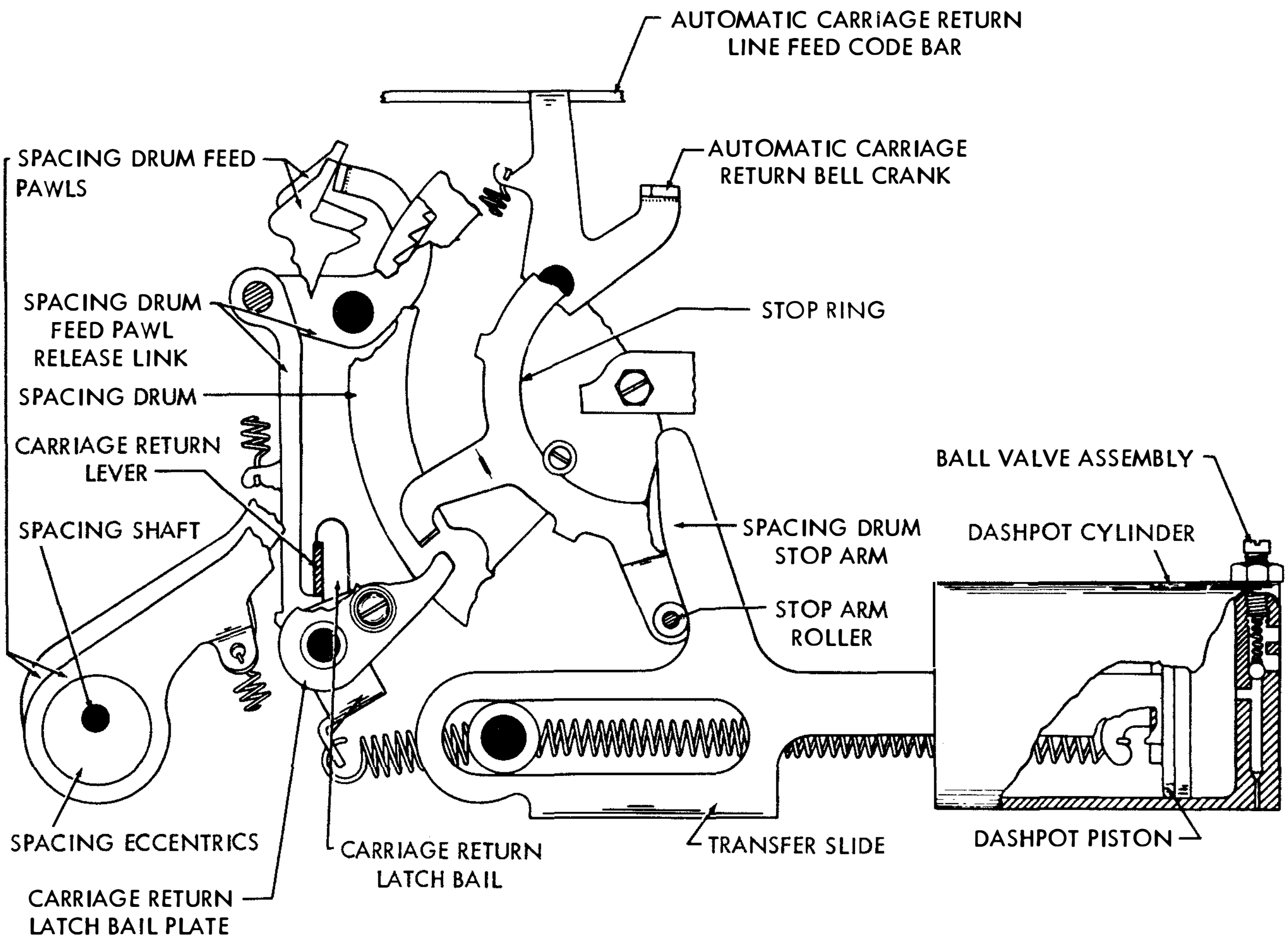


Figure 4-61. Carriage Return Mechanism

each one-third revolution of the clutch will advance the platen by one line. Therefore, the length of time that the line feed clutch trip lever is held away from the clutch will determine the number of line feeds that occur. The timing relationship between the stripper blade cycle and the main shaft rotation is such that the function pawl is not stripped from a function bar until after more than one-third of a revolution of the clutch has occurred. Thus, the line feed clutch trip lever will stop the clutch after two-thirds of a revolution, or double line feed, has occurred. When single line feed is desired, it is necessary to strip the function pawl from the line feed function bar before the line feed clutch completes one-third of a revolution. This is accomplished by the use of an auxiliary line feed function pawl stripper attached to the stripper bail. The cam disk on the three-stop line feed clutch furnishes the motive force to operate the stripper bail once each one-third revolution of the line feed clutch. The stripper blade, on which the slotted line feed function pawl stripper rides, may be shifted toward the right or left by the camming action of the single or double line feed lever (figure 4-63). The upper end of the pivoted single or double line feed lever protrudes from the upper left rear portion of the typing unit where it rides in the two position side frame detent extension. When the lever is in position 1 (toward the front of the typing unit) the stripper blade is positioned such that the two ears at the upper end of the line feed function pawl stripper are under the line feed and automatic line feed function pawls. When the lever is in position 2 (toward the rear of the typing unit) the stripper blade is positioned such that the ears on the line feed function pawl stripper are between the function pawls. All the other function pawls are stripped with the stripper blade in either position. When single line feed is being used, the line feed function lever is released too soon (by the line feed function pawl stripper) to prevent spacing. Therefore, an additional line feed function bar, pawl, and lever are installed in the extreme left end of the function box for the sole purpose of suppressing spacing on single line feed function (figure 4-49). This mechanism, which always operates on the line feed function code, is released only by the stripper blade and, therefore, holds the spacing suppression bail op-

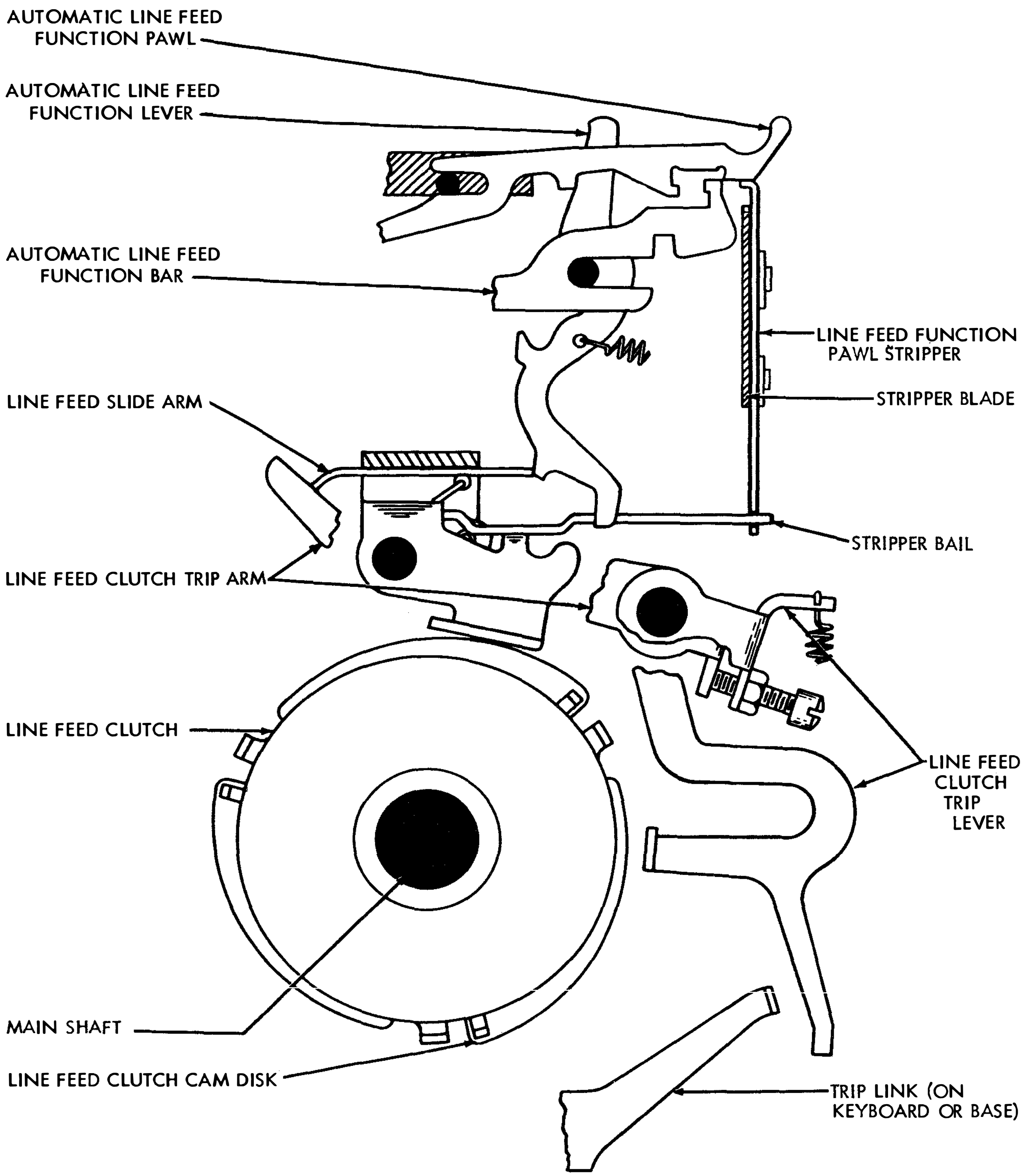


Figure 4-62. Line Feed Function and Clutch Mechanism

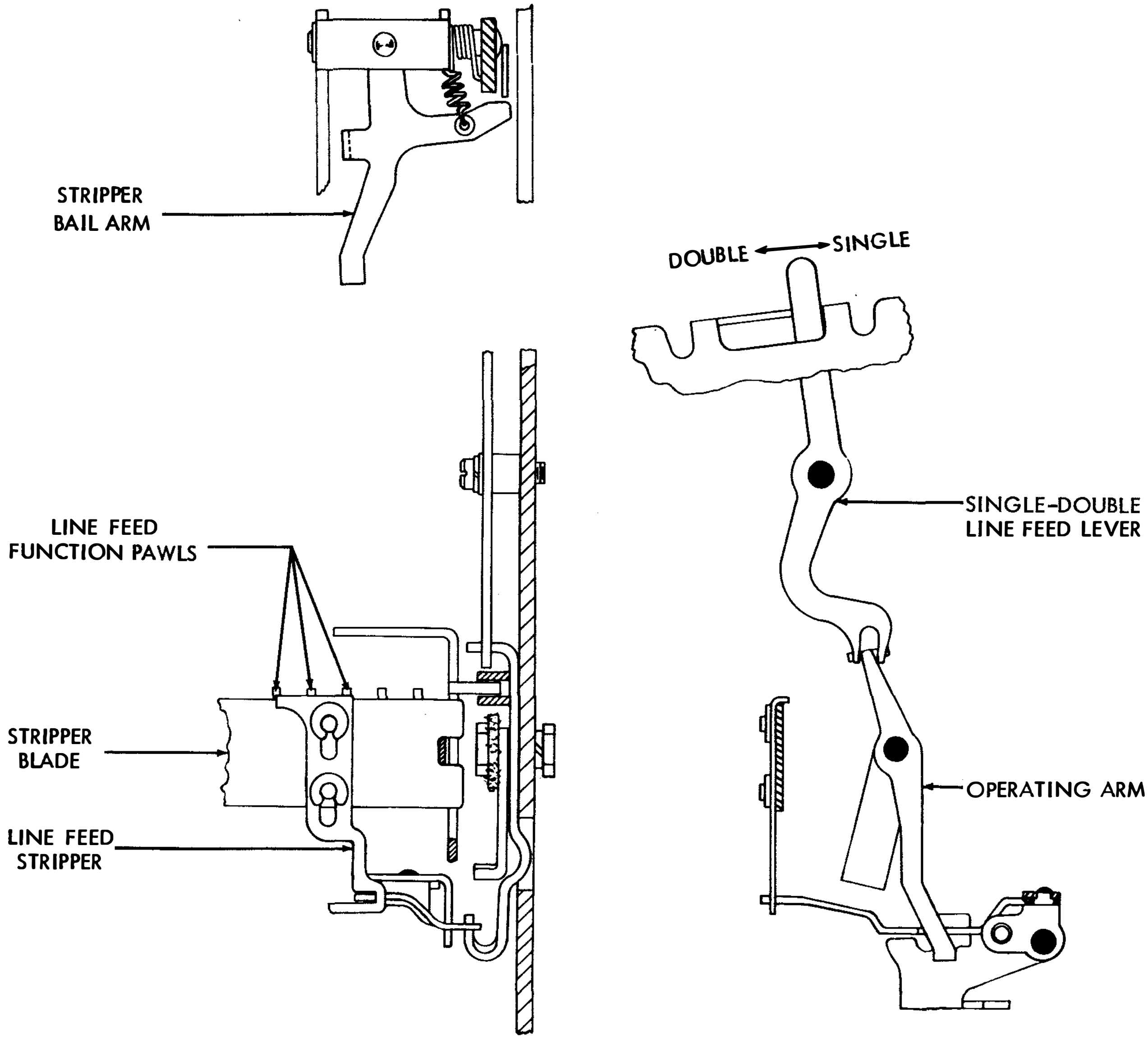


Figure 4-63. Positioning Mechanism for Single or Double Line Feed

erated until the spacing cycle is completed. After the line feed clutch is stopped by its trip lever, it is disengaged by the trip lever and latch lever in the same manner as the three-stop spacing clutch.

(b) Each one-third revolution of the line feed clutch causes its attached spur gear to rotate the line feed eccentric spur gear and its attached eccentrics one-half of a revolution (figure 4-64). The eccentrics, which are offset in opposite directions, each carry a line feed bar. These bars, guided by the line feed bar bell crank, alternately engage the line feed spur gear on the platen and advance the platen one line for each one-half turn of the eccentrics. A platen detent bail engages the line feed spur gear to retain the platen at each setting.

(c) Manual positioning of the platen may be accomplished by bearing down on and turning the platen handwheel. This causes the platen handwheel spur gear to engage the platen idler spur gear, which in turn is engaged with the platen spur gear on the platen shaft. At the same time, the line feed bar release lever bears on the line feed bar bell crank and causes it to disengage the line feed bars from the line feed spur gear.

(d) Local (off-line) operation of the line feed mechanism may be obtained from the keyboard (see paragraph 4-3h). A keyboard mechanism engages a projection on the line feed clutch trip lever and holds the clutch engaged to provide continuous line feeding while the LOC LF key is held depressed (figure 4-62).

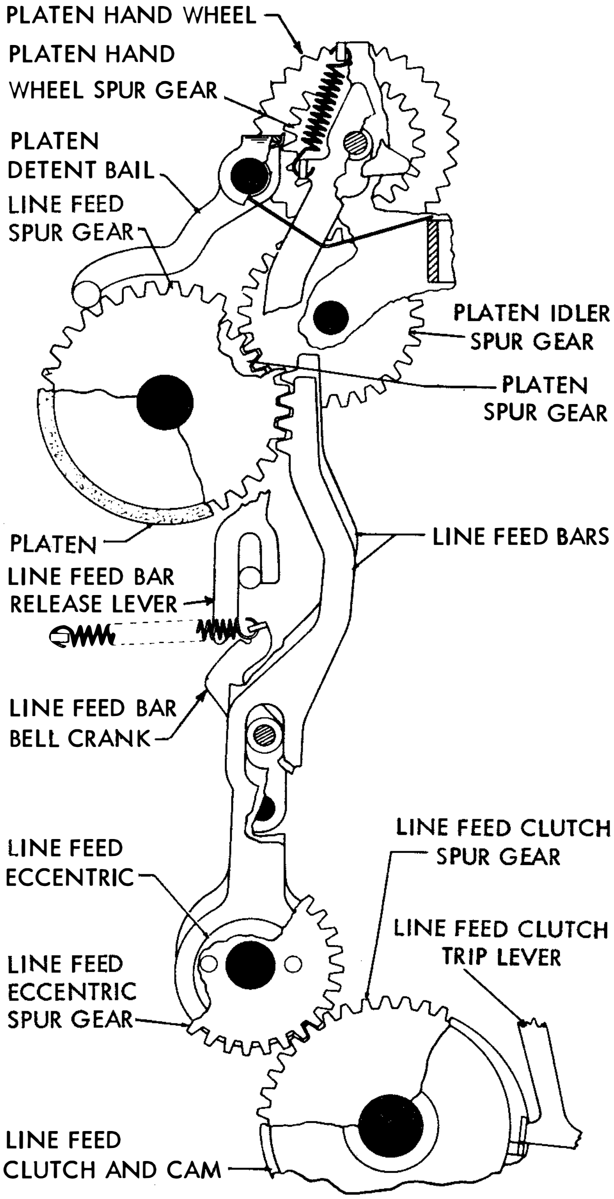


Figure 4-64. Line Feed Mechanism

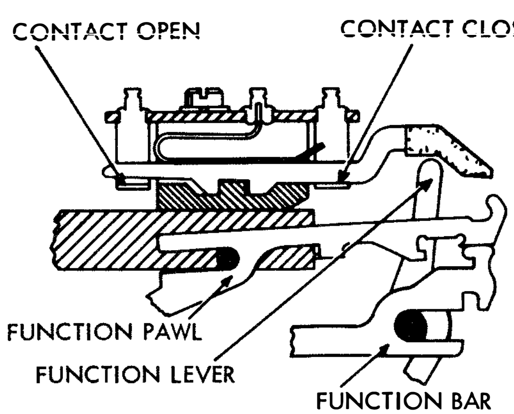


Figure 4-65. Contact Mechanism (Unselected)

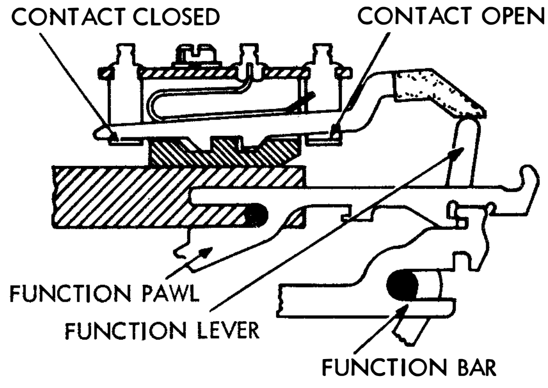


Figure 4-66. Contact Mechanism (Selected)

(6) SEQUENTIAL SIGNALING - The LP-77YD/AGM typing unit is equipped with thirty-two additional function bars so arranged that reception of a proper code sequence will operate a given series of function bars. Selection and latching of the function bars is as described in paragraph 4-4i(1)(b), except that the function is not performed until the required sequence is received in consecutive order. The typing unit uses the following eight sequences:

(a) LF. LF. N N N N

(b) Z Y H

(c) Z Y I

(d) Z Y E

(e) X C R I T I C

(f) Z R J

(g) Z E M

(h) Z C Z C

Associated with each sequence is a switch, with transfer type contacts, mounted on the function box (figure 4-49). When a sequence is properly received, the selected function lever will open the normally closed switch contacts, and close the normally open contacts, holding them until the stripper blade strips the function pawl and releases the function lever (figures 4-65 and 4-66). Equipment affected by the sequential switching function is optional.

(7) On-Line Stunt Shift Control LP124YD/AJU - Provides facilities for suppression of printing and suppression of Line Feed, Figs Shift, and Ltrs Shift from a remote station on the signal line.

(8) Off-Line Stunt Shift Control LP124YD/AJU - Provides a means of shifting the suppression code bar so that a selective calling typing unit may be shifted from a non-print to a print condition manually by means of a local switch.

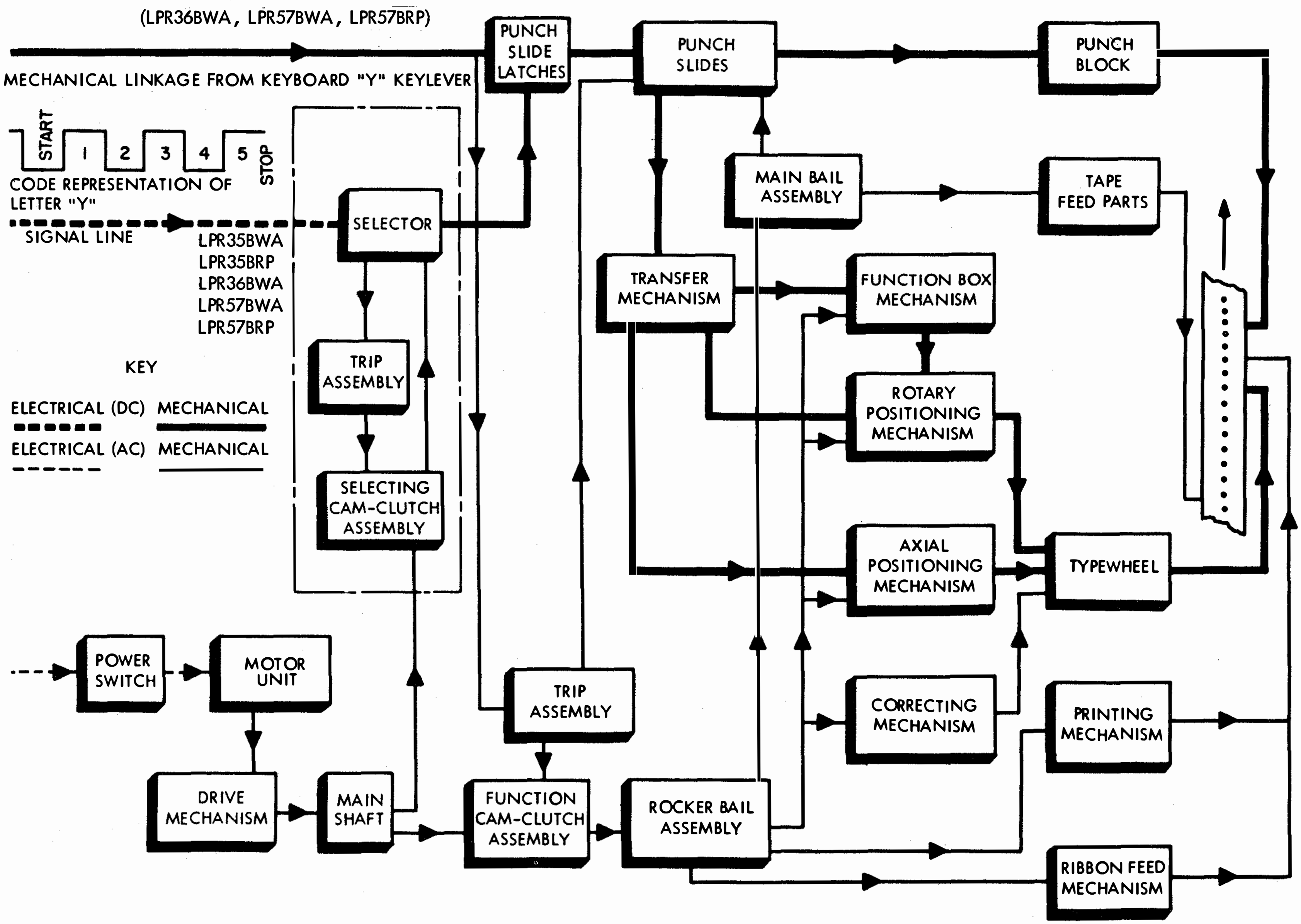


Figure 4-67. Block Diagram of Typing Reperforators

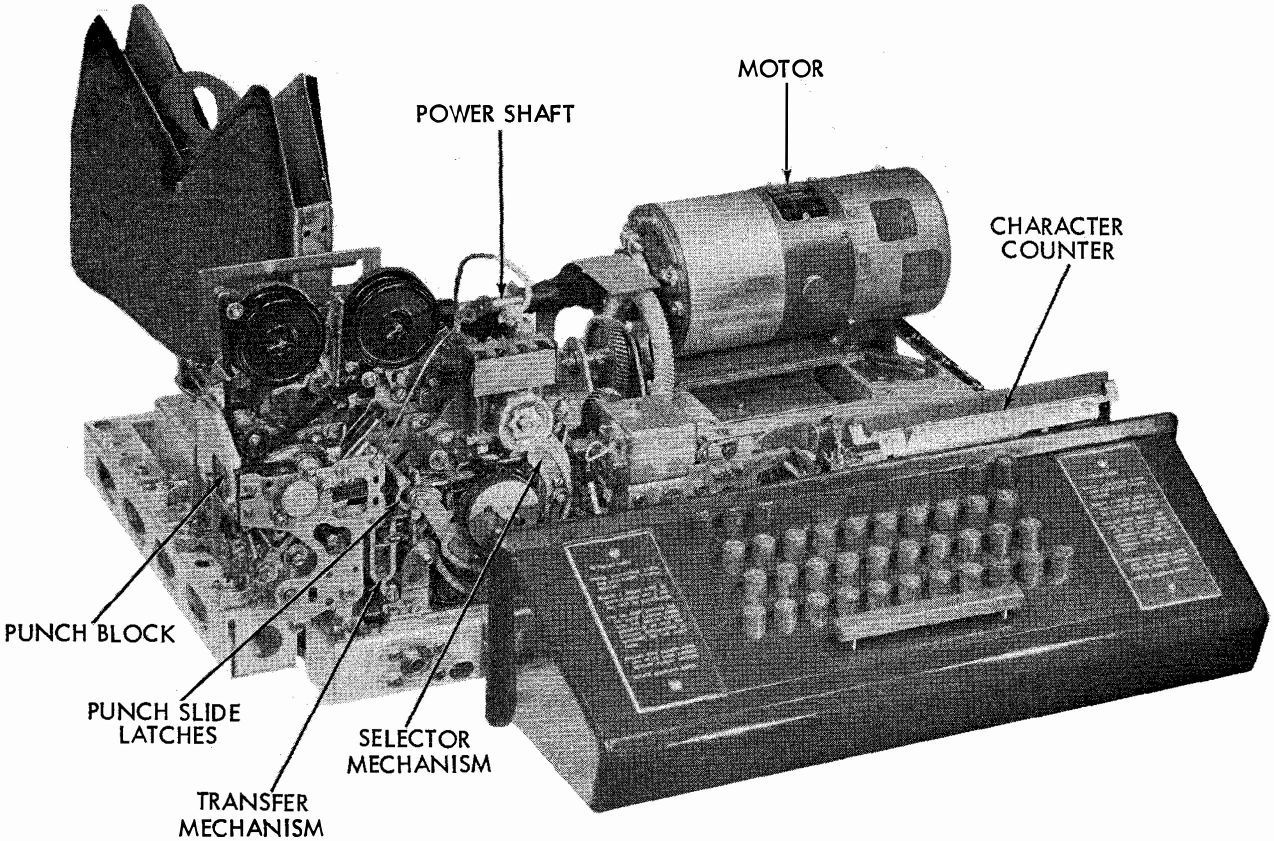


Figure 4-68. Keyboard and Typing Reperforator LAK21BRW/LPR36BWA

4-5. TYPING REPERFORATORS LPR36BWA, LPR57BWA, or LPR57BRP, LPR35BWA or LPR35BRP and BASE LRB32 - All automatic send-receive (ASR) sets are equipped with a LPR36BWA, LPR57BWA, or LPR57BRP, keyboard typing reperforator and a LPR35BWA or LPR35BRP auxiliary typing reperforator. The units are designed to produce a fully perforated tape having a typed record of the coded message printed between and in line with the feed holes. Each unit is equipped with a selector mechanism, and can operate in response to a line signal. In addition, the keyboard reperforator can be operated by electrical linkage with the keyboard simultaneously with line transmission or by mechanical linkage independent of line transmission. The auxiliary reperforator is mechanically similar to the keyboard reperforator. The keyboard reperforator mounts on the keyboard, and is factory installed prior to shipment. It is removable for servicing. The auxiliary reperforator is mounted on the LRB-32 base which, in turn, is mounted beneath the cabinet dome above the left end of the cradle. Mechanical power to operate either unit is supplied by an ac motor mounted on the associated keyboard or base. Perforation and typing operations for the two units are identical, as outlined in the accompanying block diagram (figure 4-67).

a. LPR36BWA KEYBOARD TYPING REPERFORATOR

(1) GENERAL OUTLINE OF OPERATION (See figures 4-68 and 4-69) - Operation of the keyboard typing reperforator is by electrical or direct mechanical linkage to the keyboard when the keyboard is in the (K-T) or (T) modes of operation. The keyboard selector switch mechanically disables the keyboard reperforator in the (K-T) and (K) mode of operation (see paragraph 4-3q(1)(a). In the (T) mode of operation, the keyboard reperforator clutch cam initiates the reset function of the keyboard code bars through a reset cam follower mechanism (see paragraph 4-3q(3)(c). Power for the keyboard reperforator is supplied by the keyboard motor through an intermediate gear mechanism, flexible couplings and shafts, to a jack shaft geared to the keyboard reperforator main shaft. Standard type communications symbols are used on the typing wheel.

(a) In (T) mode of operation, the punch slides are set in signal code permutations determined by manual operation of the keylevers through the keyboard-typing reperforator linkage, or "basket" mechanism. A clutch trip mechanism operated from the code bar clutch trip bar applies power to the reperforator and typing mechanisms.

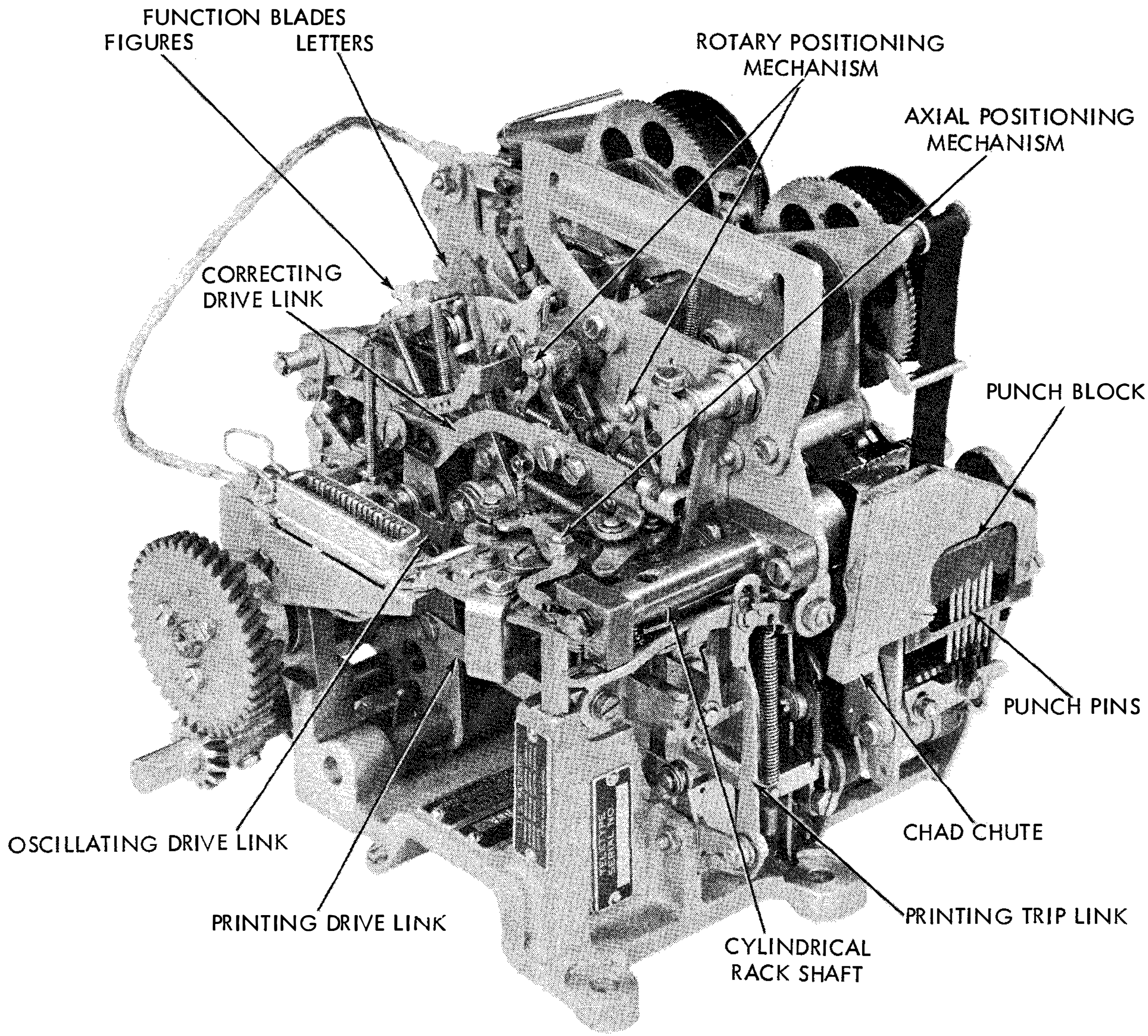


Figure 4-69. Typing Reperforator LPR36BWA (Rear View)

(b) The keyboard typing reperforator also operates in response to a line signal. The signal is normally received on a different line than that servicing the basic equipment, although the signal may be wired in series with the basic equipment. The signaling code combinations are applied to the selecting mechanism. The start pulse of each code combination causes the selector magnet armature to trip the selecting cam-clutch. Driven by the main shaft, the cam-clutch begins its cycle and imparts timed motion to the selector, which converts the code combinations into corresponding mechanical arrangements. Near the end of each selecting cycle, the selecting cam-clutch trips the function cam-clutch and permits the punch slides of the perforator to receive the arrangements from the selector. The selecting cam-clutch is then disengaged by the stop pulse of the code and remains inoperative until the next start pulse is received. The electrical input to this point corresponds to the mechanical keyboard input supplied to operate the typing reperforator.

(c) The punch slides distribute intelligence from the keyboard in the form of mechanical arrangements to the punch block and to the transfer mechanism. The mechanism, in turn, carries the information to the function box and the axial and rotary positioning mechanisms. At the receipt of the letters or figures code combination, the function box causes the rotary

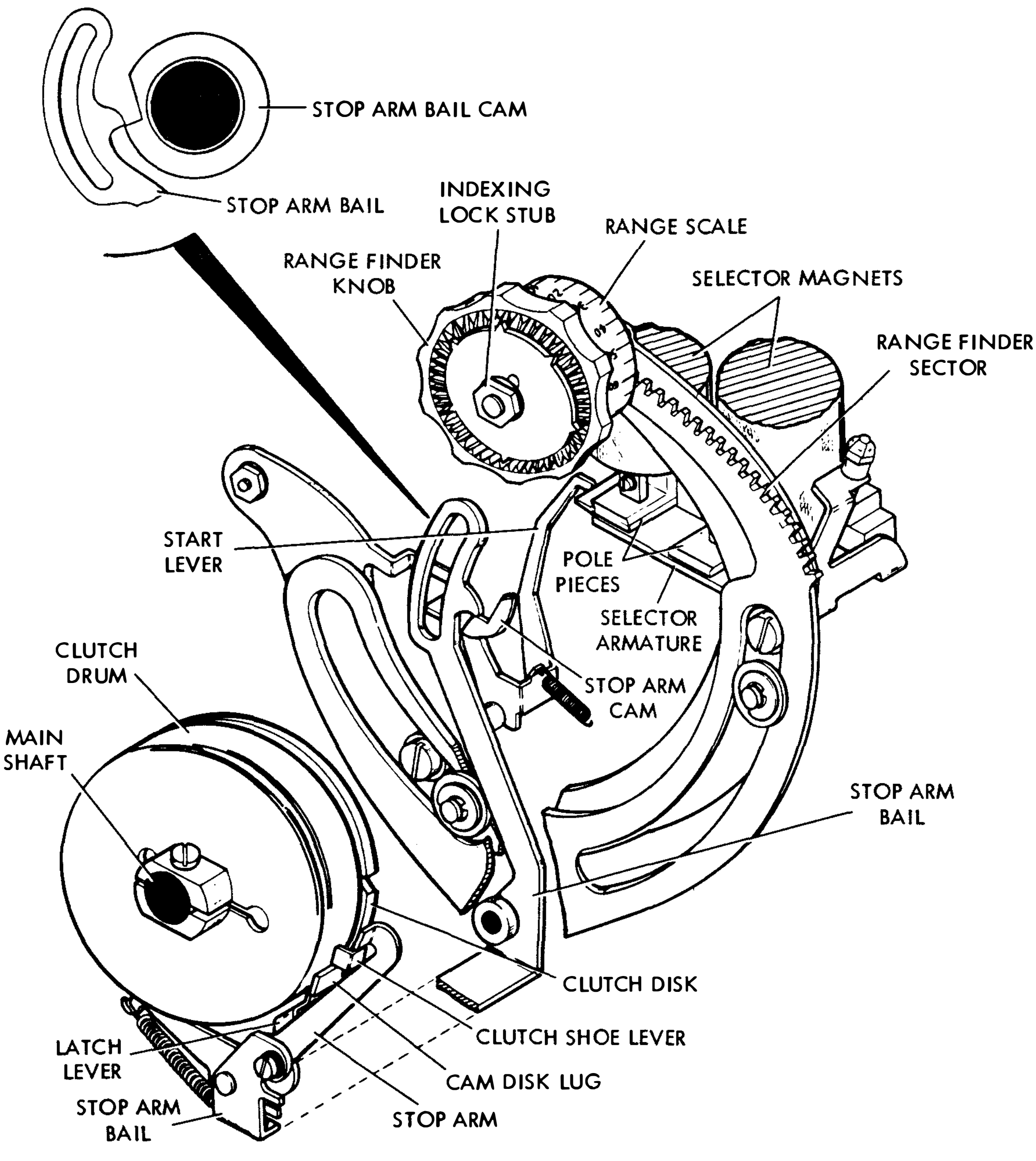


Figure 4-70. Range Finder and Selector Cam-Clutch Assembly

mechanism to shift the typewheel. The positioning mechanisms, in conjunction with the correcting mechanism, position the typewheel so that the proper characters are selected. The ribbon feed mechanism supplies the ink, and the printing mechanism provides the impact to print the selected characters.

(d) The reperforator main bail assembly, driven by the rocker bail, imparts motion to the tape feed parts, which advance the tape and the punch slides. The punch slides, having received the intelligence from the keyboard, cause pins in the punch block to perforate combinations of holes corresponding to the code combinations, and to perforate a feed hole.

(2) SELECTION

(a) GENERAL - The selecting mechanism, made up primarily of a selector (figure 4-70) and a cam-clutch (figure 4-71), translates the signaling code into mechanical arrangements which govern printing and perforation of the tape. The operation of the selecting mechanism is as described in paragraph 4-4c.

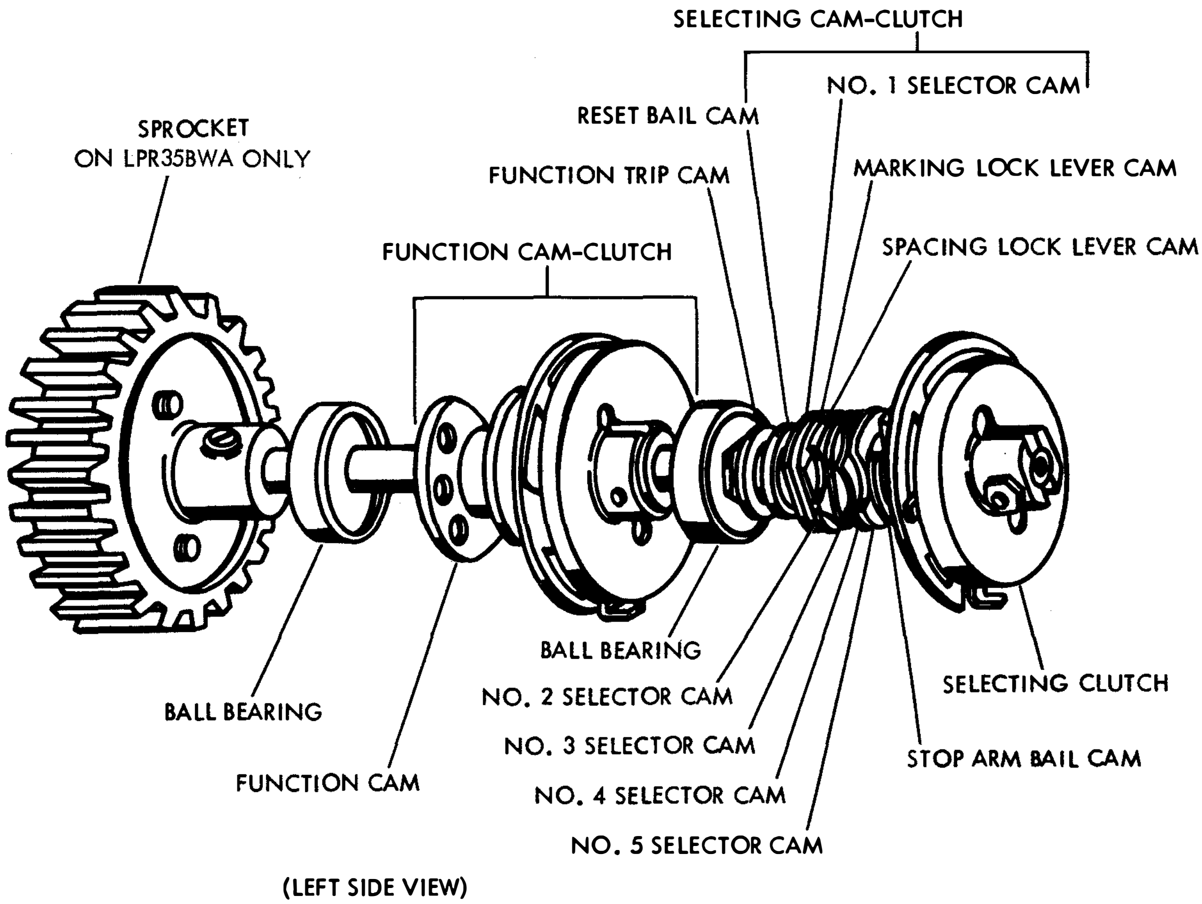


Figure 4-71. Typing Reperforator Main Shaft

(b) RECEPTION AND TRANSLATION - The selecting cam-clutch assembly differs from the previously described selecting cam - clutch (paragraph 4 - 4c(2) only in that the last cam operates as a function clutch trip cam (figure 4 - 71). Operation of the selector clutch is as described in paragraph 4 - 3d. The selector (figure 4-72) linkages are similar to those described in paragraph 4-4c(4) through the positioning of the selected push levers. The selected push levers, in moving to the left, rotate associated punch slide latches counterclockwise (figure 4 - 72). Just before the fifth push lever is selected, the selecting cam, through the function trip assembly, causes the perforator reset bail to release the punch slides. The unselected latches retain their associated slides to the right, while the selected latches permit their slides to move to the left under spring tension. During the latter part of the function cycle, the reset bail returns the punch slides to their unselected position (paragraph 4-5a(5)(b)-2). The latches, under spring tension, return to their unselected position when the selected push levers are repositioned at the beginning of the next cycle.

(c) ORIENTATION - For optimum performance, the selecting mechanism should be adjusted to sample the signaling code elements at the most favorable time. To determine this adjustment, the operating margins are established through the range finder (figure 4 - 70), which provides a means of varying the time of sampling. This is referred to as orientation, and is accomplished as described in paragraph 4-4d.

(3) MOTION FOR TYPING AND PERFORATING

(a) GENERAL - The main shaft rotates at a constant speed in a fixed gear ratio which will accommodate keyboard input at operating speeds of 390 o.p.m. or 643 o.p.m. or direct input from the keyboard (in T mode of operation) at speeds of up to 900 o.p.m. (150 words per minute). The motion is distributed to the mechanism concerned with typing and perforation by the function mechanism, which is comprised of a cam-clutch (figure 4-71), a clutch trip assembly (figure 4-73) and a rocker bail (figure 4-74).

(b) FUNCTION CAM - CLUTCH AND CLUTCH TRIP ASSEMBLY (See figure 4-73)

1. The trip assembly is shown in its unoperated condition in figure 4-73. A trip lever latch and trip bar link in the keyboard-typing reperforator linkage (figure 4-26) transmit the motion of the clutch trip bar (in the keyboard code bar mechanism) to rotate the main trip lever counterclockwise. A reset bail trip lever attached to the main trip lever lowers the reperforator reset bail and releases the punch slides. An upper arm of the main trip lever moves out of the way of the clutch release, which falls against a downstop and rotates a trip shaft counterclockwise. Immediately the trip lever latch allows the main trip lever to return toward its unoperated position, the upper arm moving down against the clutch release. When the trip shaft is rotated by the release, it moves the clutch trip lever out of engagement with the clutch shoe lever. The clutch engages (see paragraph 4-3d) to begin the function cycle.

2. About midway through the function cycle, an eccentric pin on the function cam lifts a reset arm, which rotates the trip shaft clockwise. The clutch release is moved upward, allowing the main trip lever to rotate fully clockwise, raising the reset bail. The eccentric pin then moves out from under the reset arm, and the clutch release is permitted to return to its unoperated position against the main trip lever. When the cam-clutch assembly completes its cycle, the clutch shoe lever strikes the trip lever, and the clutch is disengaged.

(c) THE ROCKER BAIL ASSEMBLY (See figure 4-74) - The rocker bail distributes motion received from the function cam-clutch to the following:

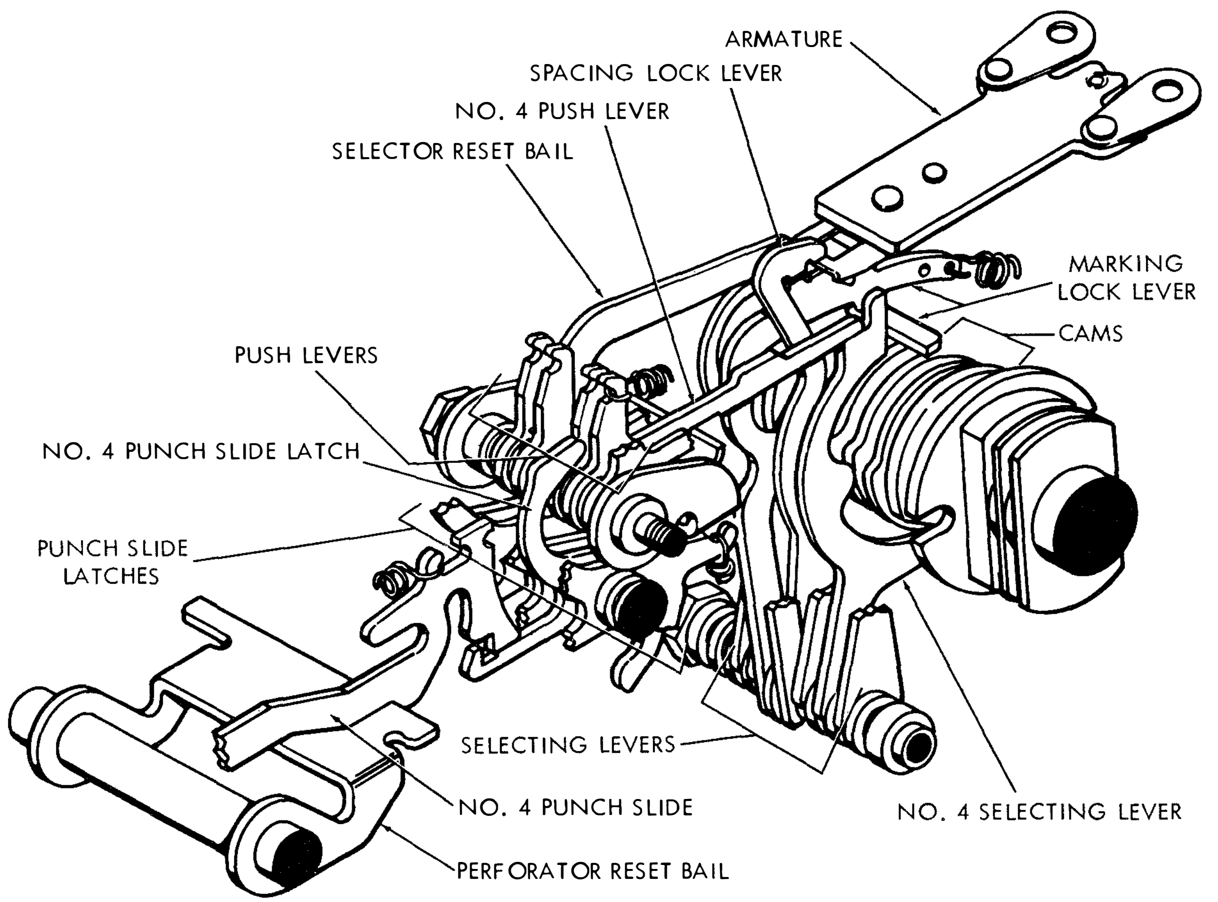


Figure 4-72. Selecting Mechanism

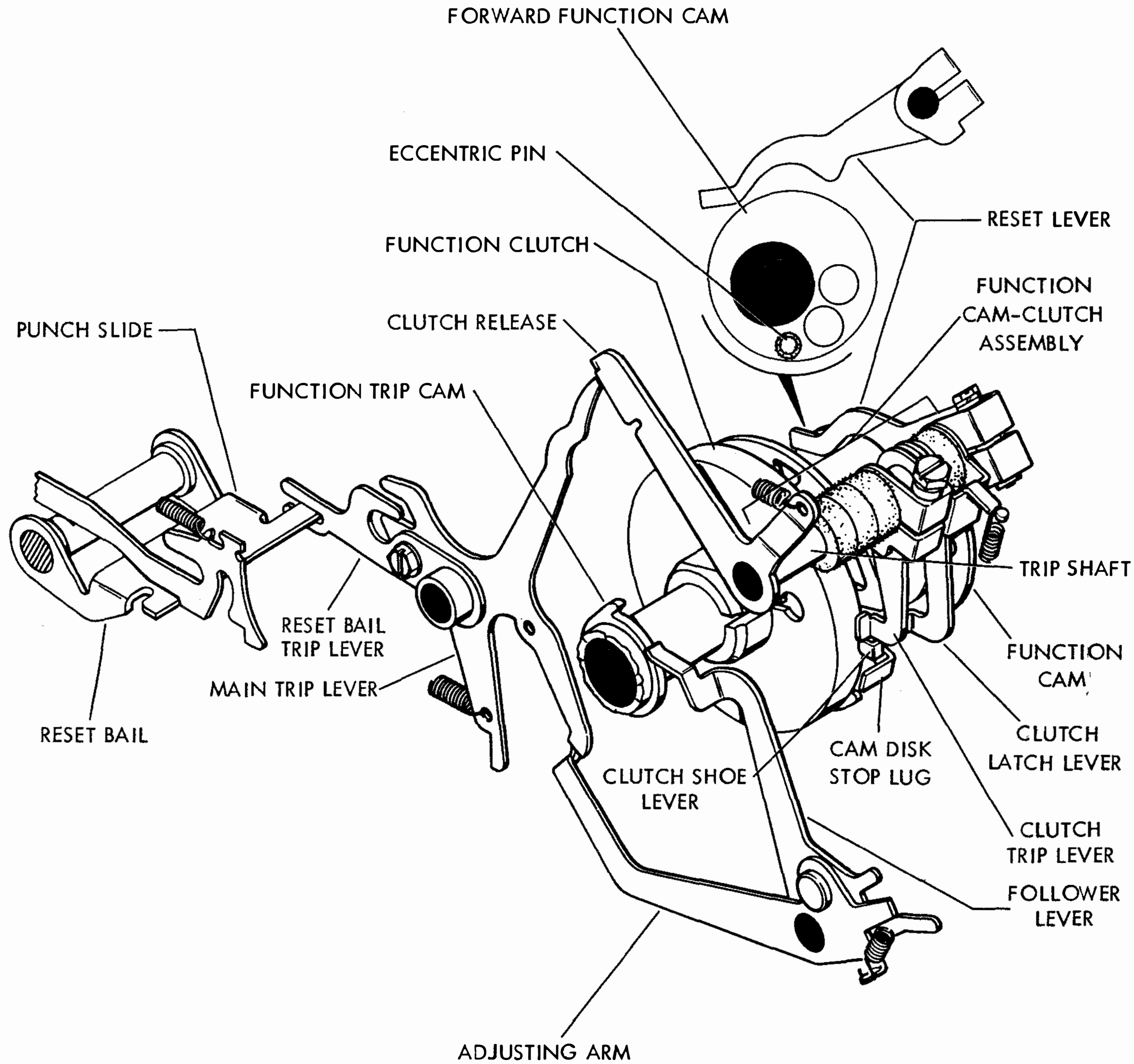


Figure 4-73. Typing Reperforator Function Cam-Clutch and Clutch Trip Assembly

1. Perforator.

2. Function box.

3. Push bars of the axial and rotary positioning mechanisms.

4. Oscillating assembly.

5. Corrector mechanism.

6. Printing mechanism.

7. Ribbon feed mechanism.

The bail is shown in its home position in figure 4-74. Each function cycle, the function cams bear against rollers and cause the bail to rock to the left (as viewed from the front of figure 4-74) during the first part of the cycle and then back to the home position during the latter part of the cycle.

(4) TRANSFER (See figure 4-75) - Near the end of each keyboard selecting cycle, the transfer mechanism moves the input intelligence in the form of a mechanical arrangement from the punch slides to the function box and positioning mechanisms. Included in the mechanism are five linkages, each of which is associated with a punch slide. A linkage consists of a transfer lever, a pulse beam and a bell crank. Since the linkages are similar, the No. 4 linkage shown in its entirety in figure 4-75 is typical.

(a) The linkages associated with the unselected punch slides (see paragraph 4-3q) remain in their unselected position as shown in figure 4-75. However, the selected slides, in moving to the left, pivot the associated transfer levers, which in turn move corresponding pulse beams clockwise (as viewed from above). The selected beams allow associated bell cranks under spring tension to pivot counterclockwise,

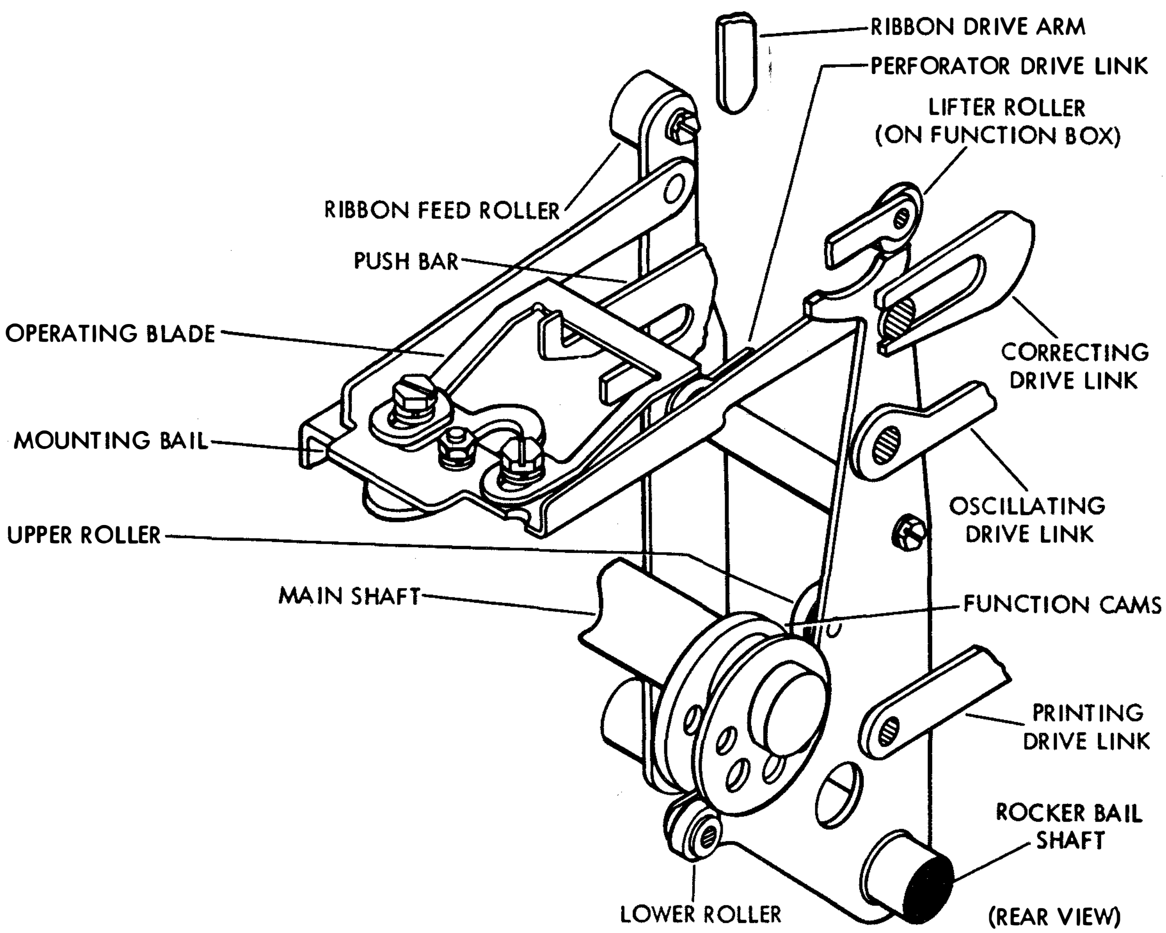


Figure 4-74. Rocker Bail Assembly

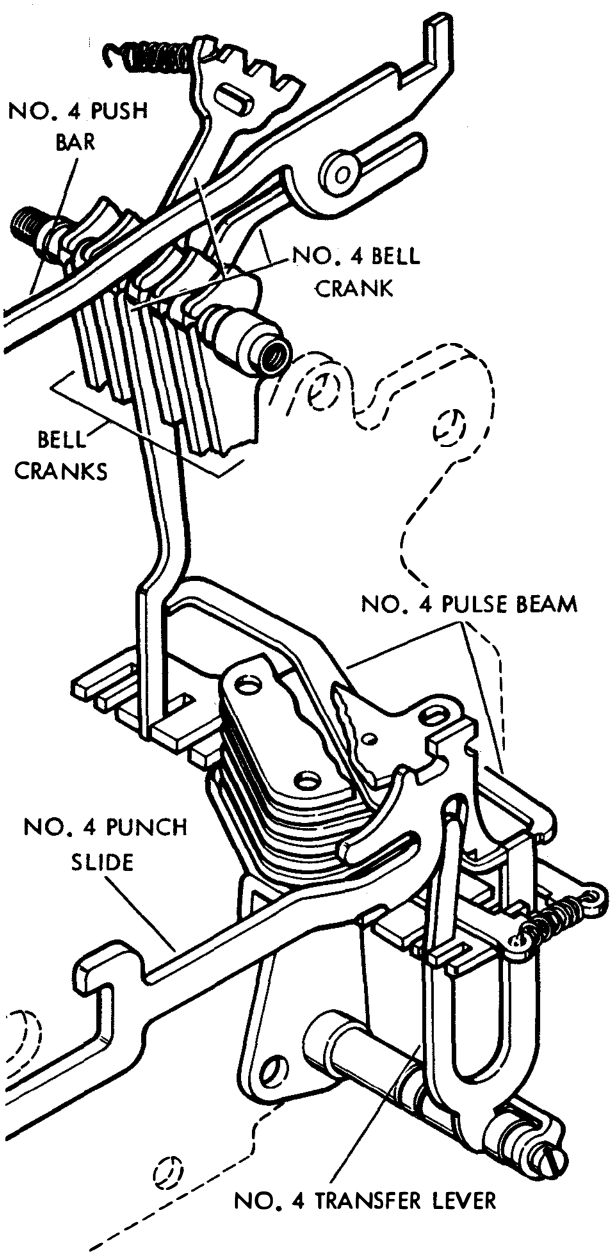


Figure 4-75. Transfer Mechanism

and lift attached push bars. The push bars control the positioning mechanism. In the period of the last half of the function cycle, the selected slides are moved back to the right and return the linkages to their unselected positions.

(b) Slotted upper arms of the bell cranks extend up into the function box, but are not operative in the typing reperforator. An additional bell crank, not associated with a transfer linkage, is specifically concerned with the letters-figures shift.

(5) TAPE PERFORATING AND FEEDING

(a) GENERAL - The perforator mechanism punches feed holes, advances the tape and perforates combinations of code holes corresponding to the code combinations received from the keyboard. Intelligence is received from the keyboard-typing reperforator linkage by the punch slides, which select proper pins in a punch block assembly (figure 4-76). Motion from the rocker bail is distributed to the pins and the tape feeding parts by a main bail assembly, which includes a toggle bail, a toggle shaft, a slide post, toggle links, drag links, and the punch slide reset bail.

(b) PERFORATING

1. As described in paragraph 4-5a(3)(b)1, near the end of the keyboard selecting cycle, the reset bail is lowered and releases the five punch slides (figure 4-76). The selected slides move to the left, and the unselected slides are retained to the right by their latches. In the selected position, a projection of each slide extends over the slide post. Since a feed hole is perforated every operation, the punchslide associated with the feed-hole punch pin is designed so that it is always in a selected position. During the first part of the function cycle, the rocker bail moves to the left and, by means of a drive link and rocker arm, rotates the toggle shaft and bail counterclockwise. Toggle links attached to the front and rear of the bail lift the slide post and move the reset bail to the left. The selected slides are carried upward by the post and force the associated pins through the tape. The slides pivot about the same point as the drag links, and thus become an integral part of the main bail assembly during the perforating stroke. Approximately midway through the function cycle, the function trip assembly lifts the reset bail.

2. During the last half of the cycle, the toggle bail is rotated clockwise pulling the slide post down and lowering the selected punch slides. The punch slides, which engage notches in their respective punch pins, pull the punch pins down below the tape. The main bail assembly and the selected punch slides and their associated punch pins move as a unit during the perforating stroke. The openings in the die block above the tape, through which the pins protrude, are circular so that the entire hole is punched.

3. Mounted to the left side of the punch block, as viewed from the front of the cabinet, and resting over the punch pin openings in the top of the die block is the chad chute (figure 4-69). On the LPR36BWA typing reperforator, the chad chute extends downward to the rear of the punch block where it empties into an extension chute. The extension chute is

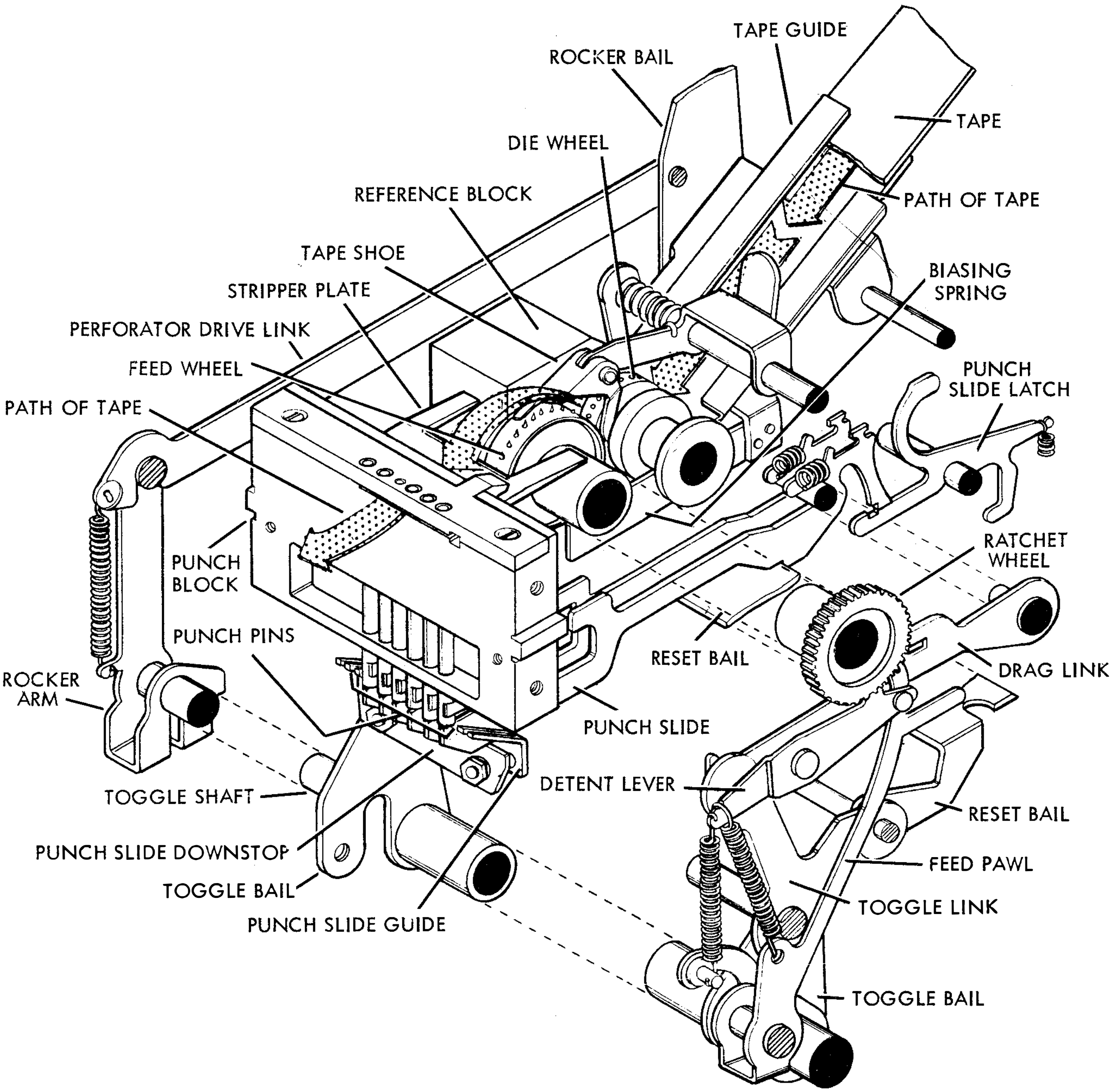


Figure 4-76. Perforating Mechanism

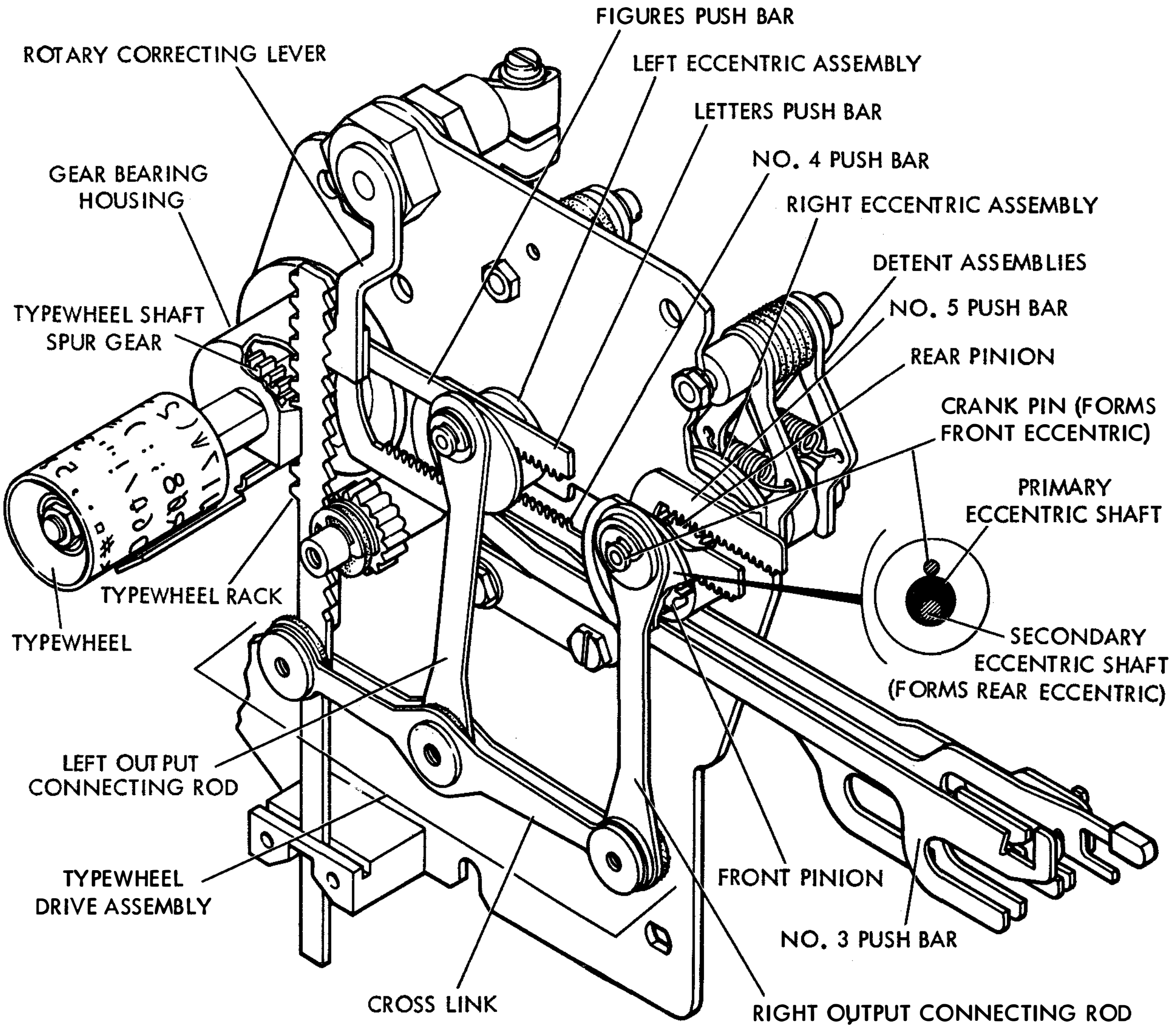


Figure 4-77. Rotary Positioning Mechanism

mounted to the keyboard base and directs the flow of chad down and rearward through an opening in the bottom of the cabinet compartment where it empties into a container. The chad, or tape punchings, should be emptied from the container at frequent intervals. Failure to do so may result in equipment failure due to chad backing up in the chutes and fouling the punch mechanism.

(c) FEEDING - Tape feeding is accomplished after perforation, during the last half of each function cycle. The tape is threaded down through a tape guide and then up between a feed wheel and die wheel (figure 4-76). A feed pawl driven by the toggle bail acts upon a ratchet and rotates the feed wheel, which, by means of sharp pins and a slot in the die wheel, advances the tape one character at a time. A detent with a roller that rides on the ratchet holds the feed wheel and tape in position during perforation. The detent and feed pawl springs are so positioned that the pressure of the detent on the ratchet is high during the first half of the cycle, so as to hold the tape in position during perforation, but is low during idling and the last half of the cycle, to facilitate tape threading and feeding. A tape shoe retains the tape on the feed wheel, and a guide spring holds it back against a reference block so that the feed holes are punched a uniform distance from the edge. The tape is stripped from the feed wheel by a stripper plate, passes into the punch block where it is printed and perforated, and finally emerges at the left. A guide spring, by holding the tape back against a reference surface on the block, maintains a uniform relationship between the code perforations and the edge of the tape.

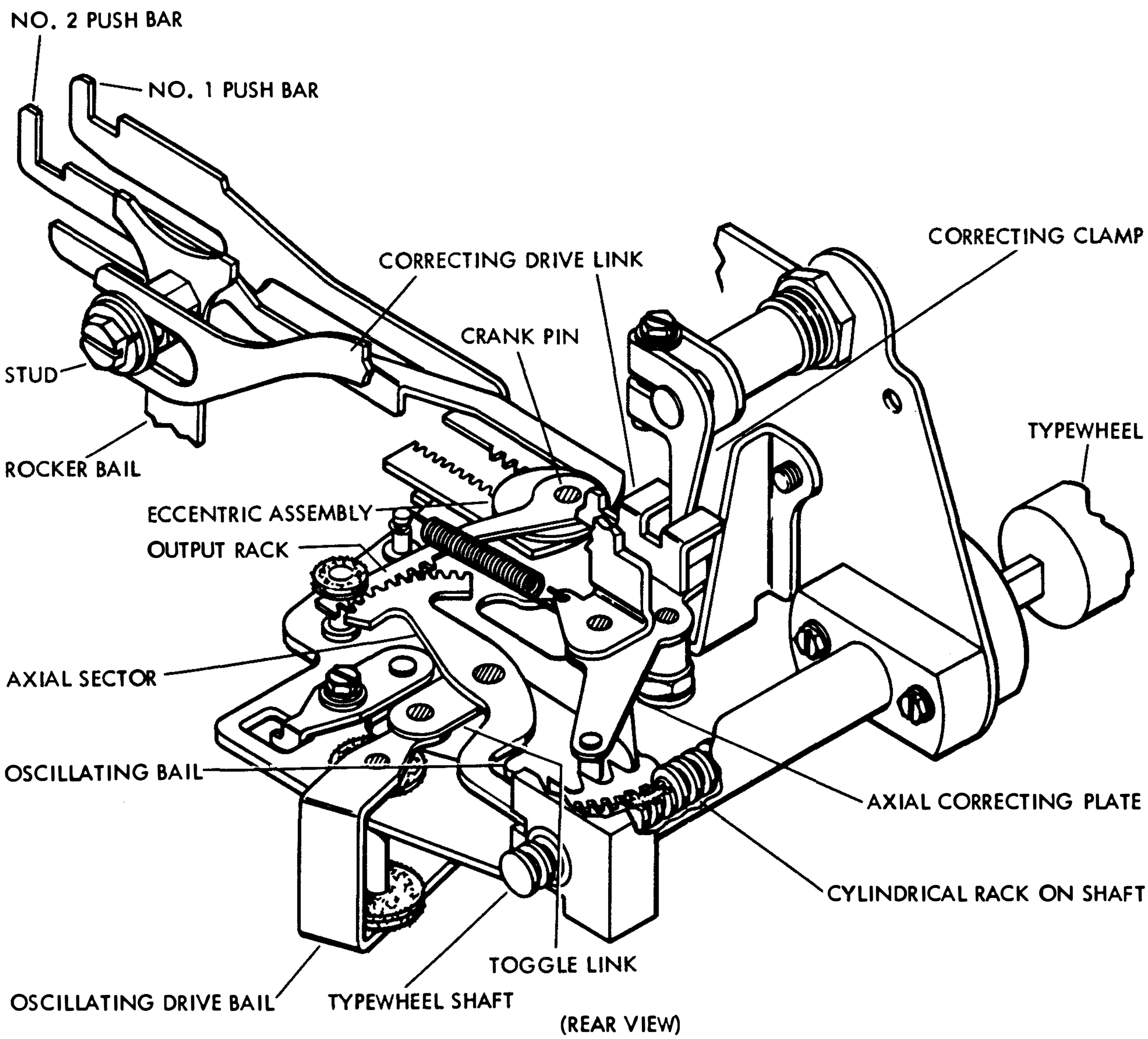


Figure 4-78. Axial Positioning Mechanism

(6) TYPING

(a) GENERAL - The characters used to type the keyboard input intelligence (letters, figures and symbols representing various functions) are embossed on the cylindrical surface of the metal typewheel. The typewheel furnished with the typing reperforator will print standard communications symbols. During the function cycle, the rotary and axial positioning mechanisms (figures 4-77 and 4-78), having received the intelligence from the transfer mechanism, position the wheel so that the character represented by the input code permutation is selected. Following typewheel positioning, the correcting mechanism accurately aligns the selected character. Then the printing mechanism (figure 4-79), by means of a printing hammer, drives the tape and inked ribbon against the wheel and imprints the character. A ribbon feed mechanism (figure 4-80) advances the ribbon and reverses its direction of feed when one of two ribbon spools is depleted. Near the end of the function cycle, the axial positioning mechanism retracts the typewheel and ribbon guide so that the last printed character is visible. The letters or figures code combination sets up an arrangement in the transfer mechanism which permits the function box (figure 4-81) to operate and cause the rotary positioning mechanism to shift the typewheel through 180 degrees of rotation.

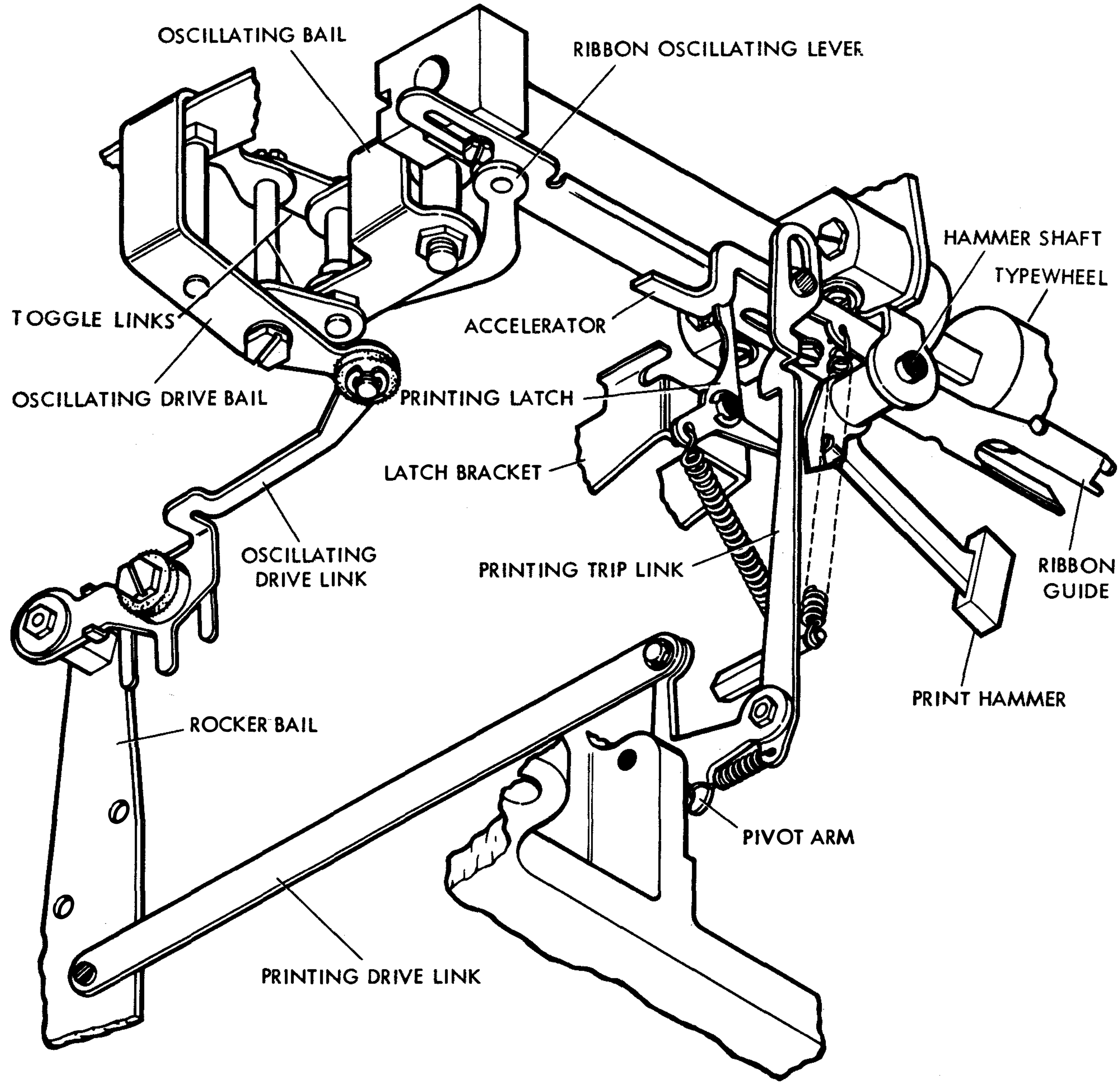


Figure 4-79. Printing Mechanism

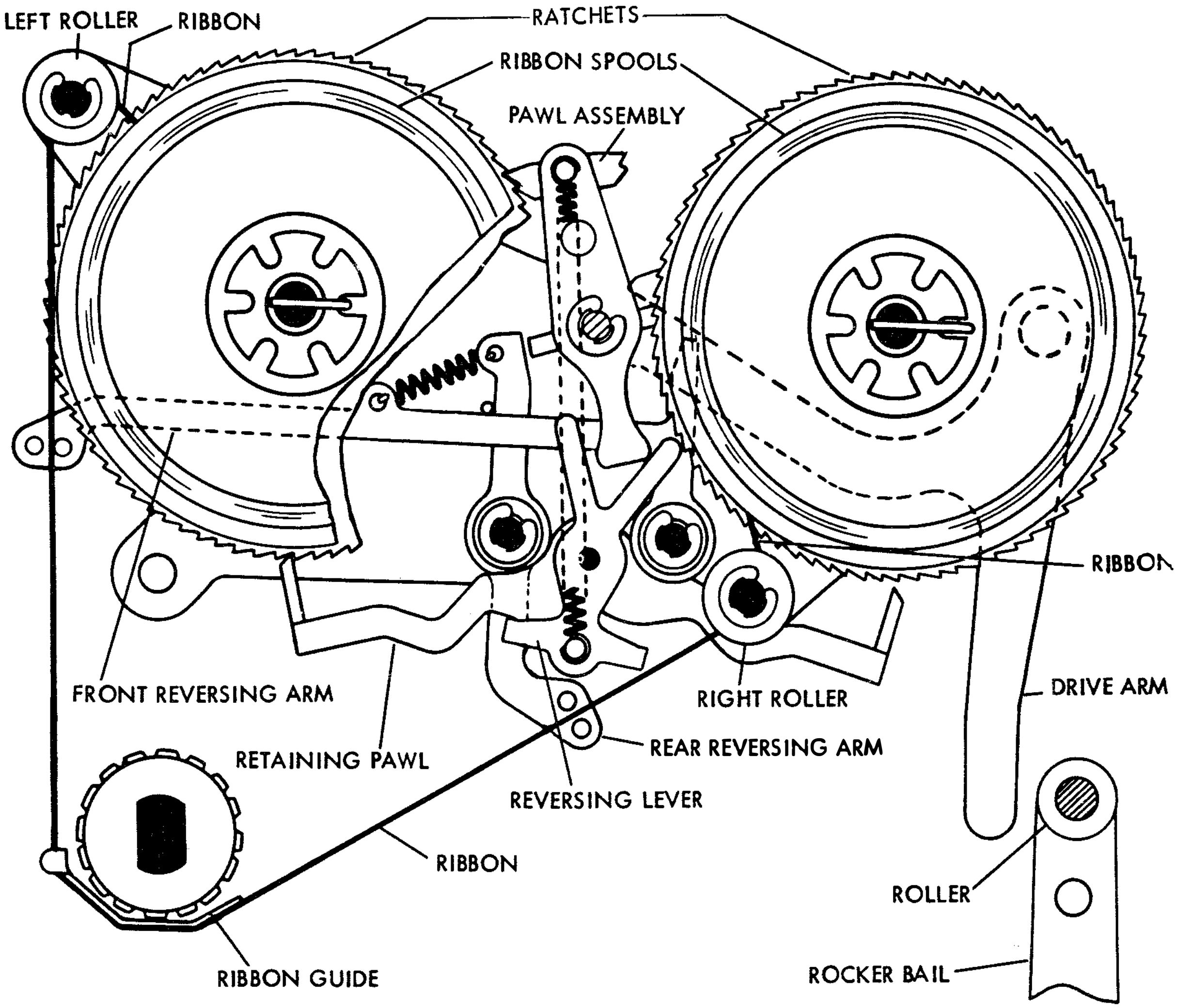


Figure 4-80. Ribbon Feed Mechanism

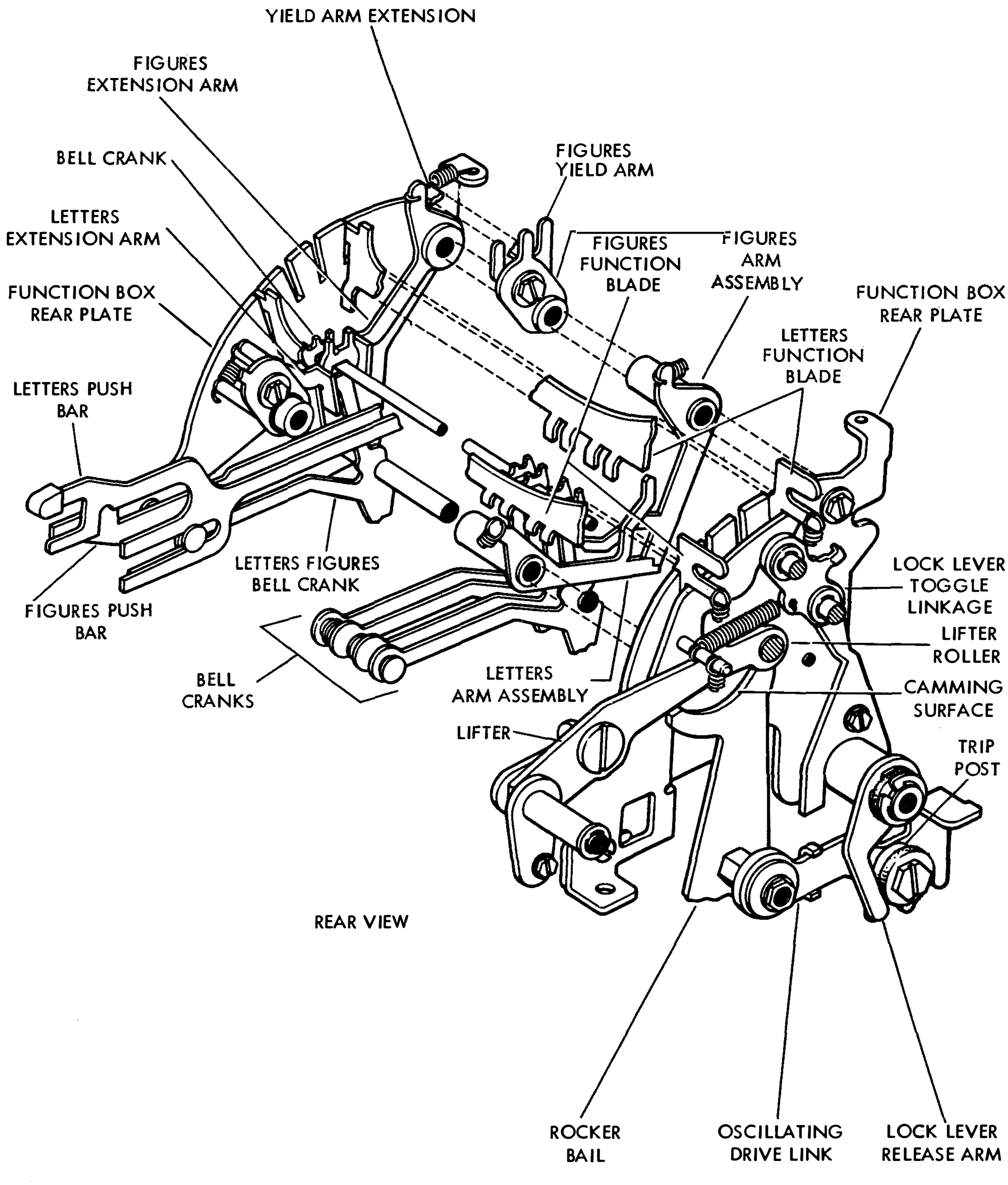


Figure 4-81. Function Box

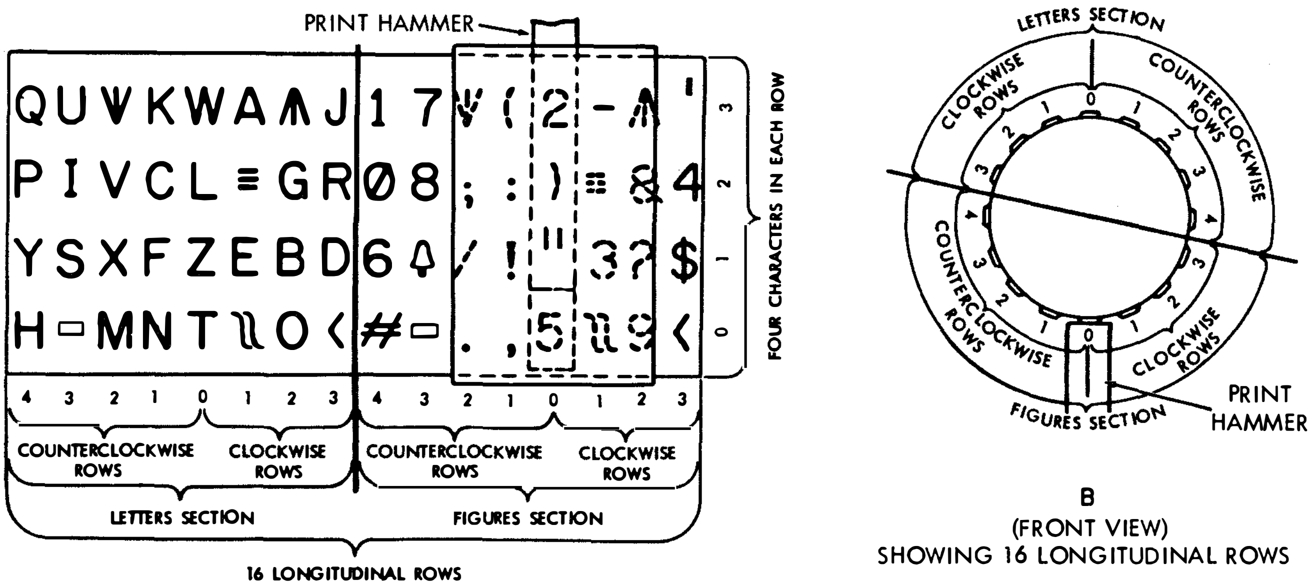
(b) TYPEWHEEL POSITIONING

1. GENERAL

a. Typewheel character arrangement is shown in figure 4-82, in which the wheel's cylindrical surface is shown rolled out into a plane. There are 16 longitudinal rows, each of which is made up of four characters numbered 0 to 4 from front to rear. The surface is divided into two sections, a letters and a figures section, each containing eight rows. The fifth row counterclockwise from the division line in both sections is numbered 0, and there are four rows in one direction from 0, numbered 1 to 4 and designated as counterclockwise rows, and three rows in the other, numbered 1 to 3 and designated as clockwise rows. It should be noted that the clockwise and counterclockwise modifiers refer to the direction of rotation of the wheel to select the rows, and not to their position on the wheel.

b. Each printing operation (excluding those devoted to the letters-figures shift) begins and ends with the typewheel in the home position of the section containing the character to be printed, for example, with the No. 0 character of the No. 0 row in the figures or letters section at the point of contact. Actually, inasmuch as the wheel is retracted to show the last printed character, the No. 0 character is slightly to the rear, but for this discussion it will be assumed that it is at the point of contact. During the printing operation, the axial and rotary positioning mechanisms, transferring separate but simultaneous motions to the wheel, position it so that the character represented by the keyboard input code combination is at the point of contact of the hammer at the time of printing. The rotary mechanism, which is controlled by the No. 3, 4, and 5 selecting elements of the code, revolves the wheel, so as to select the proper row. The axial mechanism, which is governed by the No. 1 and 2 elements, moves it forward and rearward along its axis so as to select the proper character in the row. The letters-figures shift, which consists of rotating the wheel eight rows from the home position of one section to that of the other, requires a separate operation of the equipment and results in the printing of the letters or figures symbol.

c. To illustrate the above, if the typewheel is in the figures condition, as shown in figure 4-82, and the numeral "5" is to be printed, there is no movement of the wheel during the printing operation, because "5" is already at the point of contact of the hammer. If, however, the letter "I" is to be printed, the keyboard code for letters must first be received to shift the typewheel eight rows to the letters home position. Then, during the next operation, the typewheel is rotated three rows counterclockwise and moved forward two characters, so the "I" is at the point of contact with the hammer. Printing takes place, and the typewheel is then returned to the letters home position.



A
(TOP VIEW)
SHOWING CYLINDRICAL SURFACE IN A PLANE

B
(FRONT VIEW)
SHOWING 16 LONGITUDINAL ROWS

Figure 4-82. Typewheel Character Arrangement

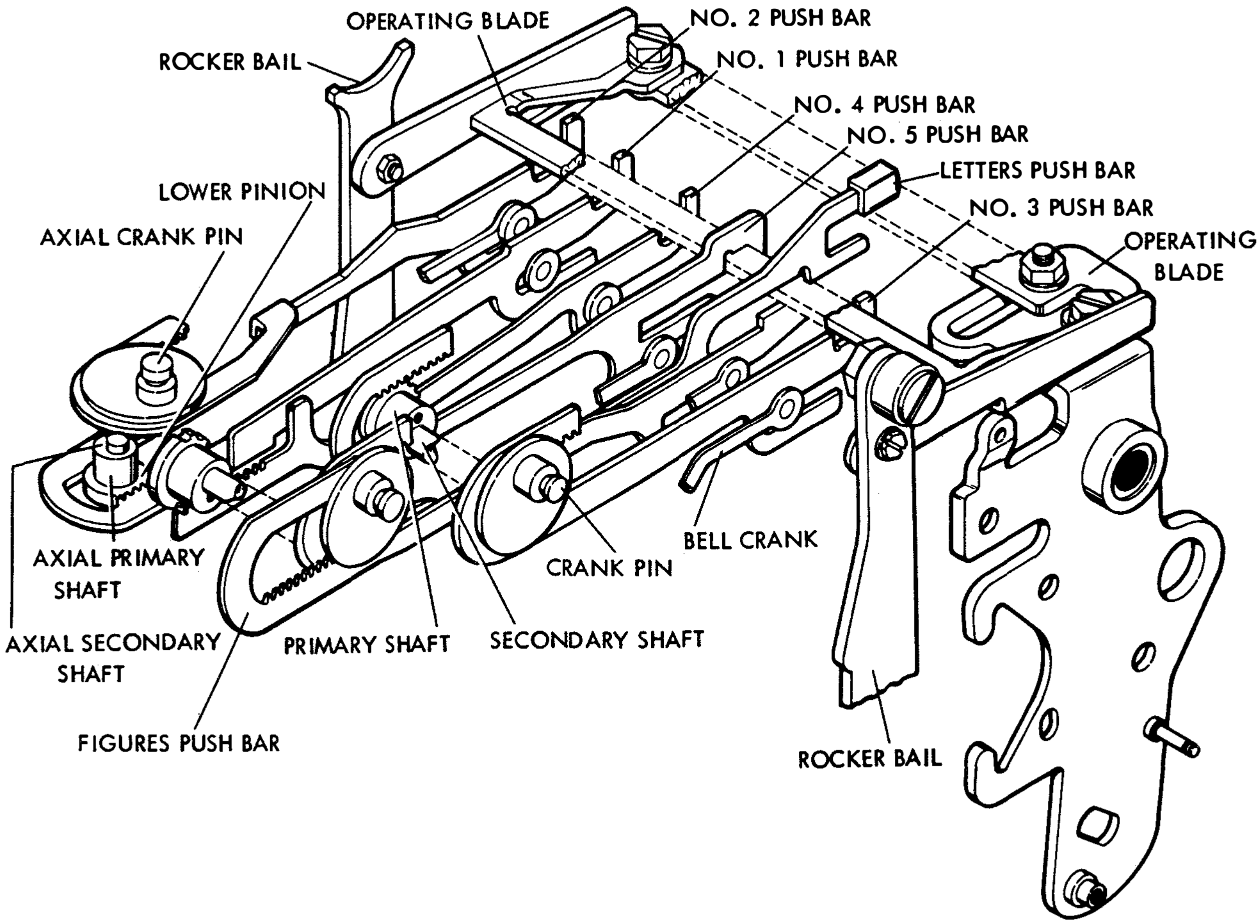


Figure 4-83. Push Bars and Eccentric Assemblies

2. ROTARY POSITIONING (See figures 4-77 and 4-83) - The rotary positioning mechanism revolves the typewheel so that the row containing the character to be printed is aligned with the print hammer at the time of printing.

a. Mounted on the front plate, the rotary positioning mechanism includes two eccentric assemblies as shown in figures 4-77 and 4-83. Each assembly includes a primary shaft, a section of which is formed into a pinion. A secondary shaft, mounted in the primary and offset from its center, forms an eccentric, referred to as the rear eccentric. A portion of the secondary shaft is also a pinion, and a crank pin mounted on its disk-like forward surface forms a secondary, or front, eccentric. Each of the four pinions of the two eccentric assemblies is engaged by the rack of a push bar; the No. 3 bar engages the rear pinion, and the No. 5 engages the right pinion. The left front pinion is engaged by both the letters and figures push bar.

b. The eccentric assemblies are linked to a typewheel shaft by a drive assembly as shown in figure 4-77. The typewheel is secured to the front of the shaft, which is supported by a bearing housing mounted at the left rear of the front plate (figure 4-78). A spur gear which meshes with the typewheel rack rides on the shaft in a bearing housing. The shaft is free to move axially in the housing and through the spur gear, but flats in the shaft circumference which bear against flats in the gear ensure its rotating when the gear rotates in response to movements of the typewheel rack.

c. When, in response to a marking pulse, a push bar is lifted by its bell crank (paragraph 4-5a(4)(a), the rocker bail operating blade (see figures 4-74 and 4-83) engages a slot in the bar and moves it to the left during the first part of the function cycle. The bar, by means of its rack and mating pinion, rotates the associated eccentric one half revolution where it is locked in position by a detent assembly while printing takes place. When the bail rocks back to the right during the latter part of the cycle, it returns the bar and eccentric to their home positions, where the eccentric is again detented. The preceding does not apply to the No. 5 push bar, which is designed so that it is selected (moved to the left) on spacing rather than marking, nor to the left-front eccentric, which affects the letters-figures shift, and whose operation is covered in paragraph 4-5a(6)(b)5. In both assemblies, one half revolution of the rear eccentric results in its maximum vertical displacement, which is transferred through the front eccentric to a crank pin. Similarly, one half revolution of the front eccentric results in its maximum displacement being transferred to the crank pin. If both eccentrics are rotated, the displacement of the crank pin is equal to the algebraic sum of the two displacements, which may be in either the same or opposite directions. Both assemblies are so designed that, taking the displacement of the front eccentric to be one unit, the displacement of the rear eccentric is four units. Four permutations are thus available: zero (neither eccentric displaced), one (rear eccentric displaced), four (front eccentric displaced), and three or five units, depending on how the assembly is set up (both eccentrics displaced).

d. In the right assembly, the home position of the rear eccentric is down, and the home position of the front eccentric is up (figure 4-83). Thus, their displacements are in opposite directions (up for the rear and down for the front), and their aggregate displacement is three units downward. Any displacement occurring in the right assembly is imparted to the typewheel rack in equal quantity, but opposite direction. For example, if the No. 5 push bar is selected, it causes the right rear eccentric to be displaced, and one unit of upward motion is transferred through a right output connecting rod to the right end of a cross link (figure 4-77). The cross link pivots about a left output connecting rod, and at its left end imparts one unit of downward displacement to the typewheel rack. The rack rotates the spur gear, shaft, and typewheel one row of characters clockwise from the home position, and the No. 1 clockwise row (figure 4-82) is presented to the print hammer at the time of printing. On its right stroke, the No. 5 push bar returns the eccentric and the typewheel to their home positions. In a similar manner, selection of the No. 3 push bar results in a four unit downward displacement of the right front eccentric, and displacement of the right front eccentric and a four-row counterclockwise rotation of the typewheel. Selection of both the three and five type bars results in a three-row counterclockwise rotation of the typewheel.

e. The home position of the left rear eccentric is up, and any displacement appearing in the left assembly is transferred to the typewheel rack in double quantity in the same direction. When the No. 4 push bar is selected, the left rear eccentric is displaced one unit downward. This movement is conveyed through the left output connecting rod to the approximate mid-point of the cross link. The cross link pivots about the right output connecting rod, and its left end imparts two units of downward movement to the typewheel rack, which rotates the typewheel two rows clockwise from its home position.

f. When both eccentric assemblies are displaced, the motion occurring in the typewheel rack is equal to the algebraic sum of the motions resulting from each assembly. For example, three units of upward displacement from the right assembly and two units of downward displacement from the left assembly occur as one unit (3-2 = 1) of upward displacement in the rack, and a counterclockwise rotation of one row in the typewheel. If neither the No. 3, 4, nor 5 push bar is selected, the mechanism remains inactive, and printing takes place in the No. 0 row. Excluding the left front eccentric, which is used only for the letters-figures shift, there are eight permutations available in the other three eccentrics, making it possible to select any of the eight rows in a given section (figure 4-82).

3. AXIAL POSITIONING (See figures 4-78, 4-79, and 4-83) - The function of the axial positioning mechanism is to position the typewheel so that the proper character in the selected row is aligned with the hammer at the time of printing, and to retract the typewheel and ribbon guide at the end of the function cycle, so that the last typed character is visible.

a. The axial positioning mechanism mounts on an axial bracket supported by the frame and the front plate and includes an eccentric assembly similar to those of the rotary positioning mechanism (figures 4-77 and 4-83). Two eccentrics, the lower of which has a pinion driven by the No. 2 push bar, rotate in a horizontal plane in bearings attached to the bracket. The eccentric assembly is linked to the typewheel shaft by an axial output rack and sector, as shown in figure 4-78.

b. The selection of either the No. 1 or No. 2 push bar results in the maximum displacement toward the rear of the associated eccentric, and the eccentrics are so designed that, taking the displacement of the lower to be one unit, that of the upper is two units. Again, four permutations are available at the crank pin: zero (neither eccentric displaced), one (lower eccentric displaced), two (upper eccentric displaced) and three (both eccentrics displaced).

c. If during a function cycle neither push bar is selected, no motion occurs in the axial positioning mechanism, with the exception of that resulting from the oscillating assembly (paragraph 4-5a(6)(b)3, d below), and the No. 0 character of the selected row is aligned with the hammer at the time of printing (figure 4-82). On the other hand, if the No. 1 push bar is selected, it causes the lower eccentric to revolve, and one unit of displacement to be transferred by the crank pin to the axial output rack. The rack moves to the rear and passes the motion to the axial sector, which pivots counterclockwise (as viewed from above). The right end of the sector, by means of a cylindrical rack in the typewheel shaft, moves the typewheel one character forward from its home position. The No. 1 character is printed, and, when the push bar reverts to its unselected position, it returns the axial linkage and typewheel to their home positions. If the No. 2 push bar is selected, the No. 2 character is printed, and if both push bars are selected, the No. 3 character is printed. The cylindrical rack has no lead, and the shaft can thus be rotated while being moved axially.

d. With each cycle of the function clutch, an oscillating drive link transfers from the rocker bail an unselected motion to an oscillating drive bail (figures 4-78 and 4-79). This movement is passed by toggle links to the oscillating bail and the sector pivot. The effect of this action is to introduce a separate motion to the sector, tending to cause it to pivot about the teeth on the output rack. During the fore part of the function cycle, if no axial push bar is selected, the end of the sector is moved forward slightly and positions the No. 0 character for printing. At the end of any cycle, the sector retracts the typewheel slightly, so that the last printed character is visible. Concurrent with the above operation, a ribbon oscillating lever is made to pivot about its left end, and with each cycle project and retract the ribbon guide, which would obstruct the view of the character (figure 4-79).

4. CORRECTION (See figures 4-77 and 4-78)

a. After the typewheel has been positioned by the axial and rotary positioning mechanisms, the selected character is more accurately aligned for printing by the correcting mechanism, which compensates for any play and backlash in the positioning linkages. Each function cycle, the rocker bail transfers motion through a correcting drive link to a correcting clamp and shaft (figure 4-78). The shaft pivots a rotary correcting lever (figure 4-77), which is equipped with an indention that engages a tooth in a typewheel rack. There is a tooth in the rack for each row of characters (16 in all), and they are so correlated with the typewheel that when a tooth is engaged by the corrector, its row is accurately aligned with the print hammer. Axial correction, which is accomplished simultaneously, is similar to rotary correction. The drive link rotates an axial correcting plate counterclockwise (as viewed from the top), and a roller mounted on the plate engages a notch in the axial sector (figure 4-78). Thus, the typewheel is accurately aligned in both fields of motion just before printing takes place. During the latter part of the function cycle, a correcting drive link spring returns the correcting mechanism to its home position.

b. Since the rocker bail is the source of motion for both the push bars and the positioning mechanisms, corrections must take place at a point near enough to the extreme travel of the bail that it does not interfere with the movement of the typewheel rack or axial sector. In addition, because the rocker bail controls the tripping of the print hammer, which occurs very late in the bail's stroke, it becomes necessary to utilize the time between the tripping of the hammer and its striking the paper to accomplish correction. The delay in actuating the correcting mechanism is effected by allowing a drive stud on the rocker bail to slide in an elongated slot in the correcting drive link during the early part of the cycle.

5. LETTERS-FIGURES SHIFT (See figures 4-77 and 4-81) - The purpose of the letters-figures shift is to rotate the typewheel from the home position in one section to that of the other section (figure 4-82). It is accomplished through a function box mechanism, which is made up of a number of parts assemblies mounted on two plates located at the upper rear of the typing reperforator unit (figures 4-71 and 4-81).

a. When the unit is in the letters condition, as shown in figures 4-77 and 4-81, and the figures code combination (1M, 2M, 3S, 4M, 5M) is received, the transfer mechanism sets up the figures arrangement in the bell cranks during the keyboard input cycle. Then, as the rocker bail moves from its home position during the first part of the function cycle, a lifter roller under spring pressure follows a camming surface on the rear arm of the bail (figure 4-81), and the lifter allows letters and figures function blades to move down and, by means of tines on their lower surface, feel for an opening in the slotted upper arms of the bell cranks.

b. The slot arrangement of the bell cranks No. 1, 2, 4, and 5 are identical and permit the entry of both function blades, when all are selected. However, on receipt of the figures code combination, the No. 3 bell crank permits entry of the figures blade, while blocking the letters blade. In moving all the way down, the figures blade encounters a projection of a figures arm assembly, and causes the arm assemblies to shift from their letters to figures position. A yield arm extension attached to the figures arm assembly pivots a figures extension arm away from the letters - figures bell crank. A letters extension arm, under spring tension, rotates the bell crank clockwise (figure 4 - 81), and the bell crank lifts the letters and figures push bars. As the bail reaches its extreme position, the lifter is cammed up and raises the function blades.

c. While the letters-figures bell crank is being positioned by the function box, the No. 1, 2, and 4 push bars are selected, the typewheel is moved forward two rows clockwise and three characters forward and the figures symbol is printed. On its return stroke, the rocker bail operating blade encounters a shoulder on the figures push bar (which was lifted as described above) and moves the bar to the right, as viewed from the front in figures 4-77 and 4-83. The common pinion moves the letters push bar to the left, and the left front eccentric shifts from its up to down position. Since the typewheel has been displaced two rows clockwise during the first part of the cycle, it is rotated six more rows to the figures home position (see paragraph 4-5a(6)(b)2e). As the bail returns to its home position during the last half of the cycle, a lock lever toggle linkage (figure 4-81) prevents the lifter roller from following its camming surface, and the lifter holds the function blades up, so they do not drop onto the bell cranks. As the bail nears its home position, a trip post riding on the oscillating drive link strikes a lock release arm, buckling the toggle linkage and permitting the lifter roller to again fall on the bail camming surface.

d. In a manner similar to that described above, when the letters code combination (1M, 2M, 3M, 4M, 5M) is received, the function box causes the letters - figures bell crank to lower the letters and figures push bars. The typewheel is rotated two rows counterclockwise during the first part of the cycle, and six more rows to the letters home position during the last part of the cycle, and the letters push bar is moved to the right. The preliminary two - row rotation of the typewheel, which is made possible by selecting the No. 5 push bar on spacing rather than marking, provides less throw and smoother operation than would be possible if the complete eight-row displacement were made during the latter part of the cycle. Each operation, the lifter permits the function blades to move down and feel for an opening, but, except for the shift operations, they are blocked by slotted arms of the bell cranks.

(c) PRINTING (See figure 4-79)

1. After the typewheel has been positioned and corrected, the printing mechanism supplies the impact which drives the paper and ribbon against the selected character. It accomplishes this operation by means of a print hammer, which is mounted on a shaft supported by a bracket attached to the typewheel bearing housing. In its unoperated condition, as illustrated in figure 4 - 79, the hammer is held against an accelerator by a relatively weak spring. The accelerator is mounted on the hammer shaft, and is retained by a printing latch in its upper position, against the tension of a relatively strong spring.

2. The rocker bail, during the fore part of the function cycle, moves a printing drive link to the right (as viewed from the rear in figure 4-79) and causes a pivot arm to rotate clockwise. The arm lowers a trip link, which slides in an elongated slot. Near the end of the rocker bail's travel, the trip link pivots the latch, which releases the accelerator. Under the spring tension, the accelerator snaps down and impels the hammer upward. The face of the hammer drives the tape and inked ribbon up against the typewheel and imprints the selected character on the tape. The accelerator does not follow the hammer through the complete printing stroke. Near the end of its travel, the accelerator encounters a projection on a latch bracket, and inertia carries the hammer the rest of the way. As the rocker bail returns to its home position, it causes the trip link to move up, release the latch, and return the accelerator to its latched position.

(d) RIBBON FEEDING (See figure 4-80)

1. The characters are typed in ink supplied by an inked ribbon, which is held between the tape and the typewheel by a guide and advanced by the ribbon feed mechanism (figure 4-80). The path of the ribbon is down to the left off the top of a right spool, under a right roller, to the left through pins on a reversing arm, through the guide, up through pins on a front reversing arm, over a left roller and down to the right on the bottom of a left spool.

2. Each function cycle, as the rocker bail nears the end of its left travel, a roller mounted on its forward arm pivots a drive arm clockwise. The drive arm lifts a feed pawl, which advances the ribbon by rotating a ratchet and ribbon spool one tooth. A retaining pawl, under spring tension, detents the ratchet, while the feed pawl, during the latter part of the function cycle, is lowered so as to engage the next tooth. Each operation, the ribbon is advanced in this manner until the ribbon feed mechanism is reversed.

3. When a spool is almost depleted, an eyelet in the ribbon encounters pins on a reversing arm. The stress applied through the ribbon as it is rolled on the other spool pivots the arm. As the pawl assembly is lowered at the end of the next operation, an extension strikes the reversing arm, and the pawl is shifted to the other ratchet. The pawl's rounded lower extension pivots a reversing lever, which shifts the retaining pawl, so that it engages the opposite ratchet. The ribbon will then feed in the opposite direction until again reversed.

(e) TAPE BACKSPACE (Figure 4-83A)

1. The tape backspace mechanism steps the tape back through the punch block in order to delete perforated errors. The erroneously perforated code combination in the retracted tape is then obliterated by perforating the letters code combination in its place.

2. The backspace mechanism may be operated manually or it may include power drive.

3. The mechanism used with chadless tape differs from that used with fully perforated tape in that it contains a tape rake for depressing the chad.

(f) Manual Backspace (Fully Perforated Tape) - Depressing the handle of the back spacing bell crank disengages the perforated feed pawl from the feed wheel ratchet. The back spacing feed pawl then engages the feed wheel ratchet and rotates the feed wheel clockwise, back spacing the tape to the next row of perforations (figure 5-122).

(g) Manual Backspace (Chadless Tape) - Depressing the handle of the back spacing bell crank disengages the perforator feed pawl from the speed wheel ratchet and simultaneously rotates the rake to depress the chads. The back spacing feed pawl then engages the feed wheel ratchet and rotates the feed wheel clockwise, back spacing the tape to the next row of perforations (figure 4-83A).

(h) Power Drive Backspace - A start magnet in the power drive mechanism is energized by a remote source. When energized, the armature bail is pulled downward. An extension of the bail disengages the drive link latch, which drops and engages a notch in the eccentric arm. The eccentric arm, driven by the perforator main shaft, moves to the right. This action causes the bell crank handle to be depressed through a system of linkages between the drive link latch and the bell crank. The subsequent operation is as described previously (figure 5-122A to 5-122D).

b. AUXILIARY TYPING REPERFORATOR BASE LRB32 (See figure 4-84)

(1) GENERAL - The auxiliary reperforating equipment is mounted on the typing reperforator base, located above the transmitter distributor base in the left side of the cabinet. Circuitry of the base permits operation of the auxiliary equipment independent of the basic teletypewriter components. A two point plug connector on the base is the terminal for a cable, furnished with the base, connecting to power line terminals in the teletypewriter cabinet. Power is controlled by a toggle ON-OFF switch on the typing reperforator base. A fuse on the base protects the ac power circuit. A 16-point receptacle connects to a cable leading to the terminal blocks on the left side of the rear wall of the cabinet compartment. The auxiliary ac motor transmits power to the typing reperforator through a gear set. The base mounts both the motor and the gear set (figure 4-84). An adjustable T-plate, attached to the bottom of the typing reperforator base, projects three tapped studs through the base into which the reperforator mounting screws are fastened. Tightening the mounting screws tightens the adjusting plate to the bottom of the base and locks the reperforator in the position most suitable for operation through the timing belt. A tape container, equipped with a low tape switch for controlling an indicator lamp, audible alarm, or an external alarm circuit, and a tape chute are also base mounted. Three studs mount the base into the cabinet. The longer studs mount in the rear rail of the cabinet cradle, and the short stud mounts to the transmitter distributor base.

NOTE:
FOR FULLY PERFORATED TAPE
SEE FIGURE 5-122, 5-122A
TO 5-122E

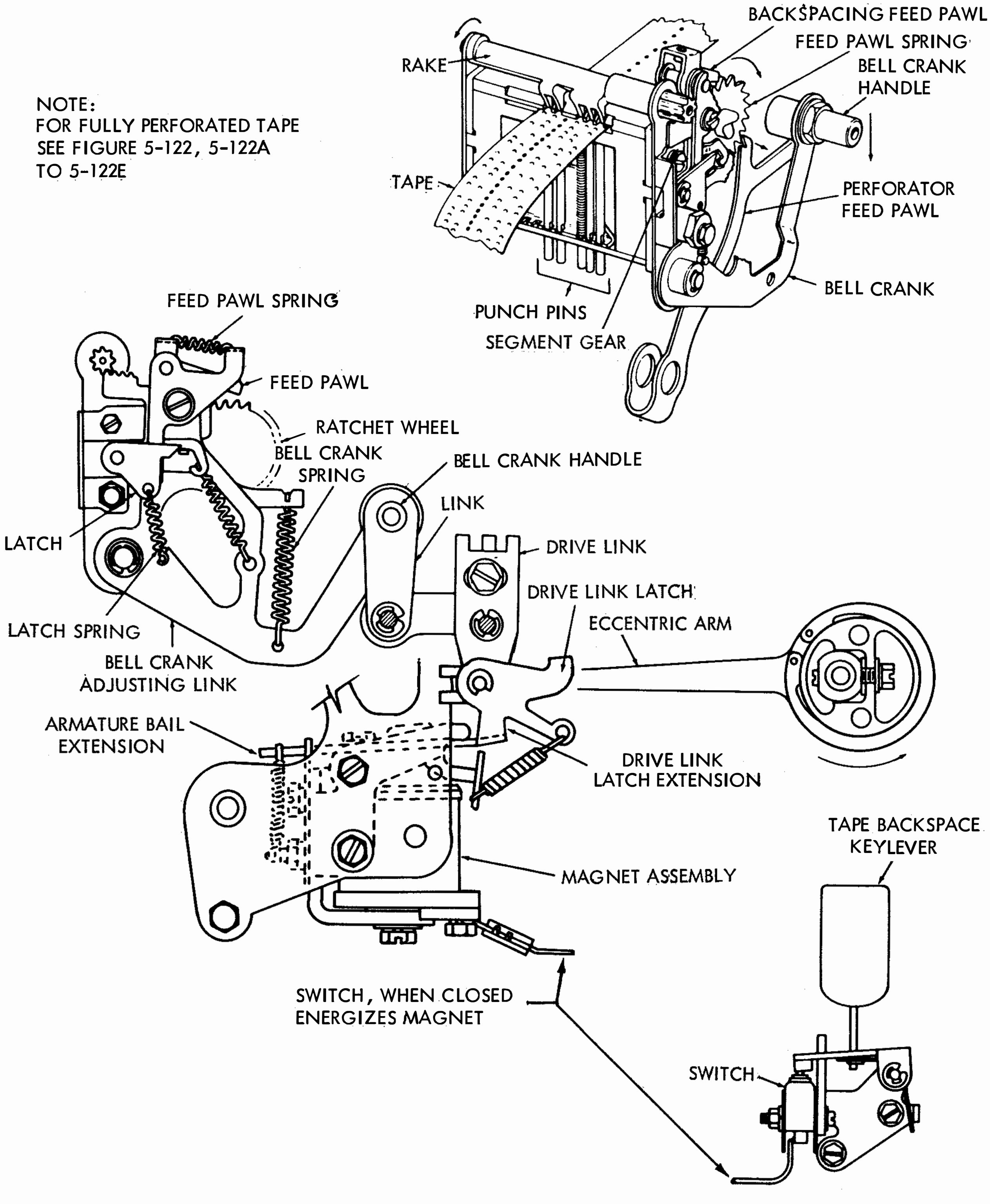


Figure 4-83A. Tape Backspace Mechanism (Chadless Tape)

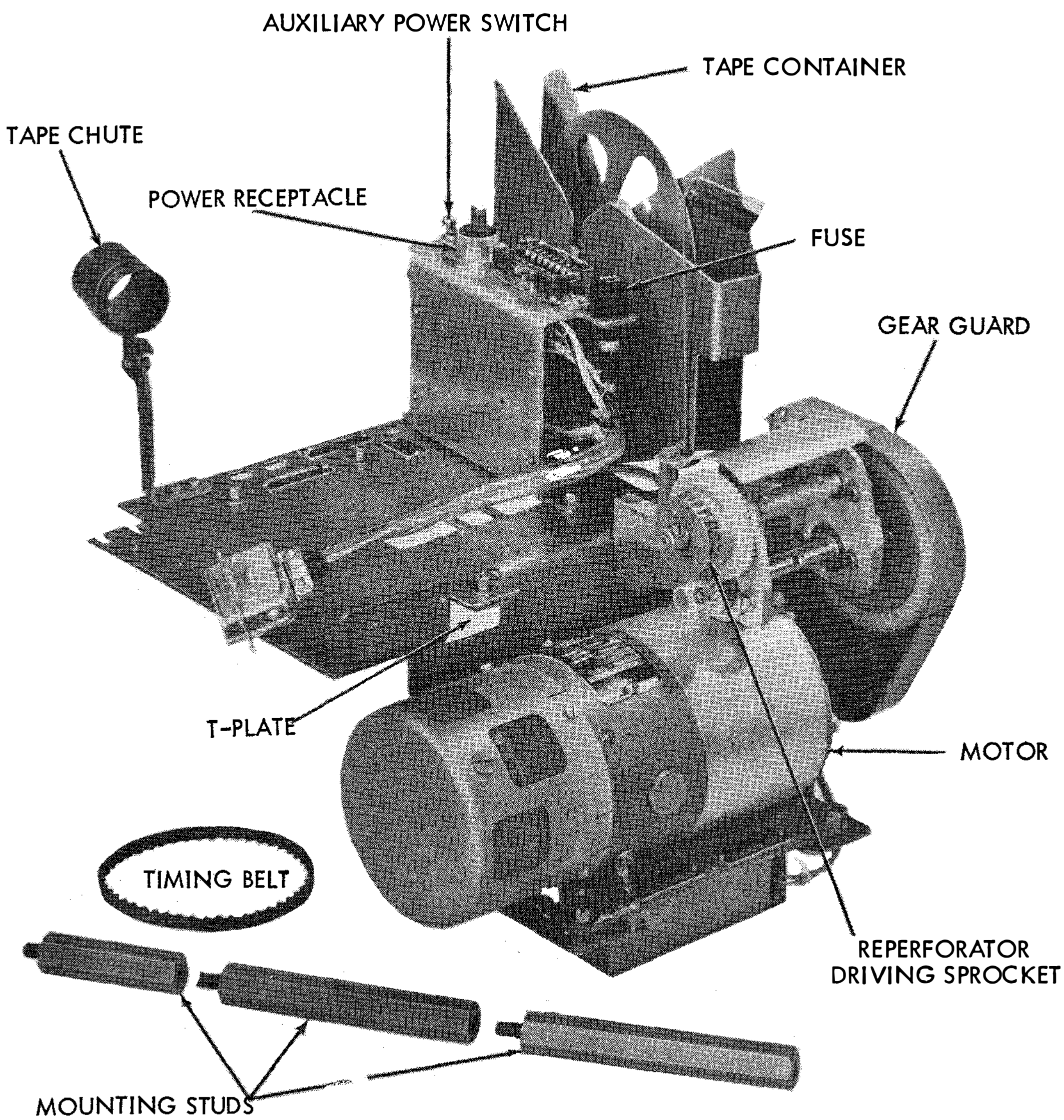


Figure 4-84. Auxiliary Typing Reperforator Base LRB32
With Motor LMU4

(2) TAPE CONTAINER (See figure 4-84) - The tape container is mounted on the left side of the base, to supply tape for the auxiliary typing reperforator. Tape feed is from the bottom of the rear of the tape roll, over a tape guide roller on the back of the container, to a second guide roller on the typing reperforator and into the tape guide. A low tape switch (figure 4-85) is mounted at the bottom of the tape container. The low tape lever rides under tension of its spring against the bottom of the tape roll, holding the switch lever away from the normally open sensitive switch. When the diameter of the tape roll is reduced to between 5/8 to 3/4 inches of tape remaining on the roll, the switch lever, under tension of its spring is released to activate the switch.

(3) TAPE CHUTE - A bracket mounted cylindrical tape chute on the front of the base (figure 4-84) guides the typed, perforated tape from the punch block through an aperture in the auxiliary control panel in the cabinet. The chute is adjustable to deflect the tape as required.

c. AUXILIARY TYPING REPERFORATOR LPR35BWA (See figures 4-86 and 4-87, also 1-11 and 1-12) - The auxiliary typing reperforator is identical to the keyboard typing reperforator in perforation, tape feed and typing functions (see figure 4-67 and paragraph 4-5a), and ref-

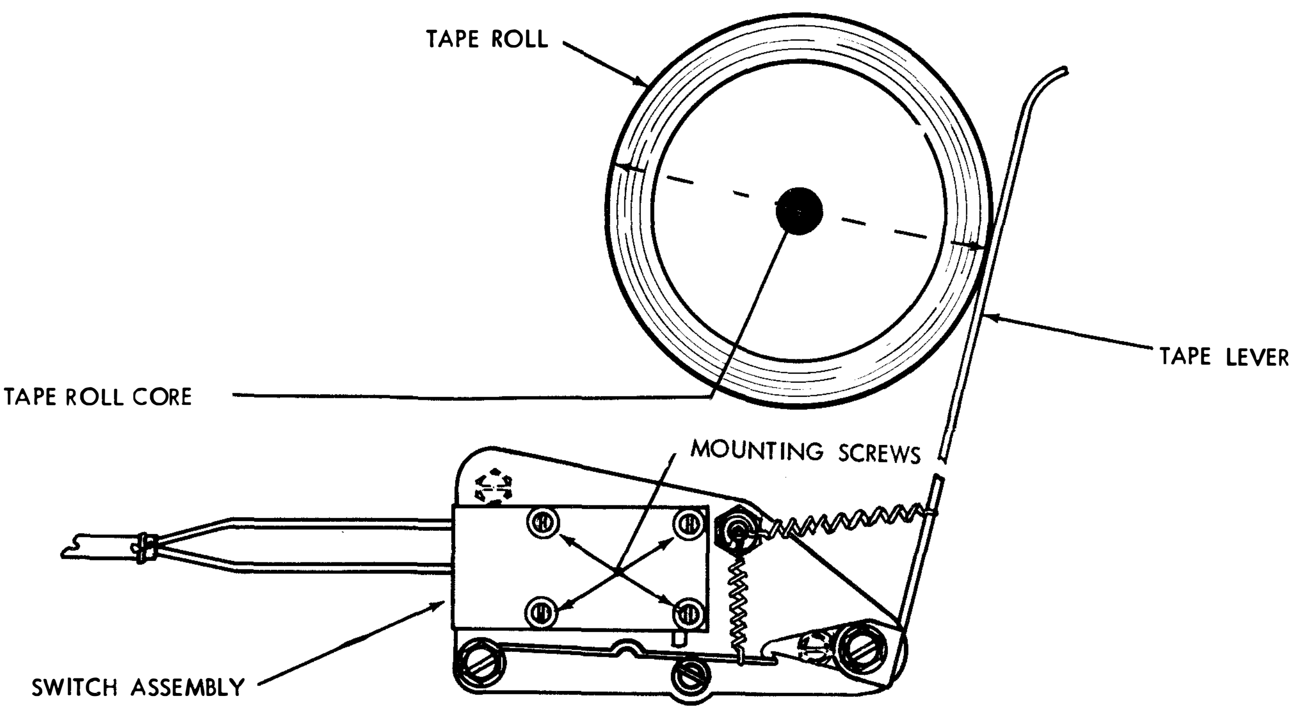


Figure 4-85. Low Tape Switch

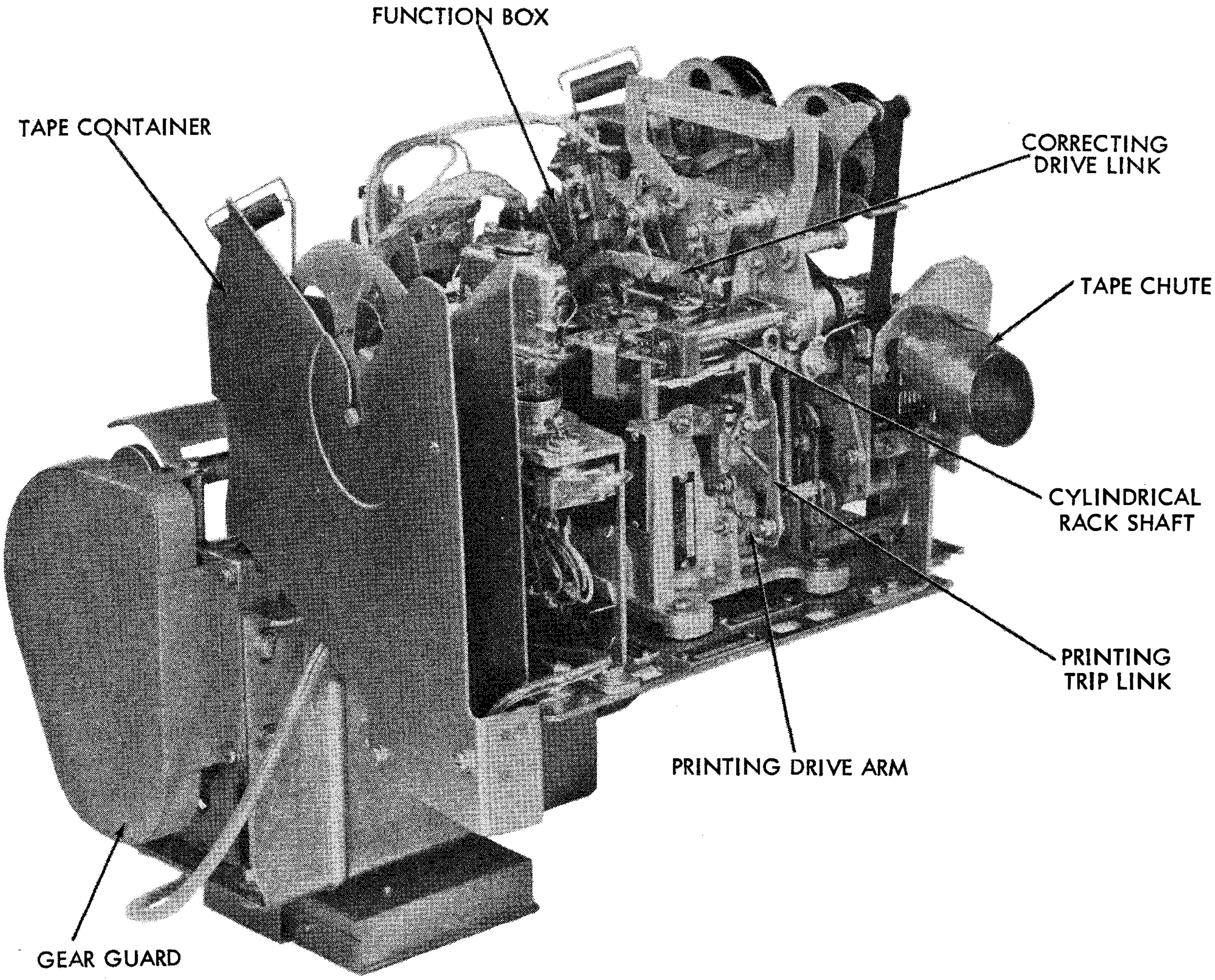


Figure 4-86. Auxiliary Typing Reperforator LPR35BWA On Base LRB32
(Front View)

erence will be made to the preceding text and illustrations insofar as they cover the auxiliary typing reperforator adequately.

(1) GENERAL - The LPR35BWA is supplied with Automatic Send-Receive (ASR) Sets. The unit operates independently of the basic teletypewriter equipment. It is mounted on the LRB32 auxiliary base (paragraph 4-5b) in the left side of the cabinet. An auxiliary ac motor and an electronic keyer are required for its operation. Operation is controlled from a switch on the auxiliary base unit.

(a) The auxiliary typing reperforator operates from a single main drive shaft, belt driven from a drive sprocket on the gear set mechanism on the base. The jack shaft used for power transfer in the keyboard typing reperforator is omitted. The LPR35BWA is equipped to type standard communications symbols.

(b) The auxiliary typing reperforator is operative only in response to a line signal. The signal is normally received on a line different from that which services the basic equipment, although the signal may be wired in series with the basic equipment, if desirable, primarily for testing purposes. The unit is a receiving only component, therefore operable only under on-line conditions. Its only off-line function is a non-interfering, letters tape feed-out mechanism (paragraph 4-5c(6)(b), which is built into the equipment.

(c) AC power is fed to the auxiliary motor unit on the typing reperforator base through the power switch and fuse on the auxiliary base. The motor drives the gear set mechanism, at which point an operating speed corresponding to the incoming transmission speed must be duplicated by use of 45.5 or 75 baud gears. A timing belt drives the typing reperforator main shaft, which rotates at the selected speed as

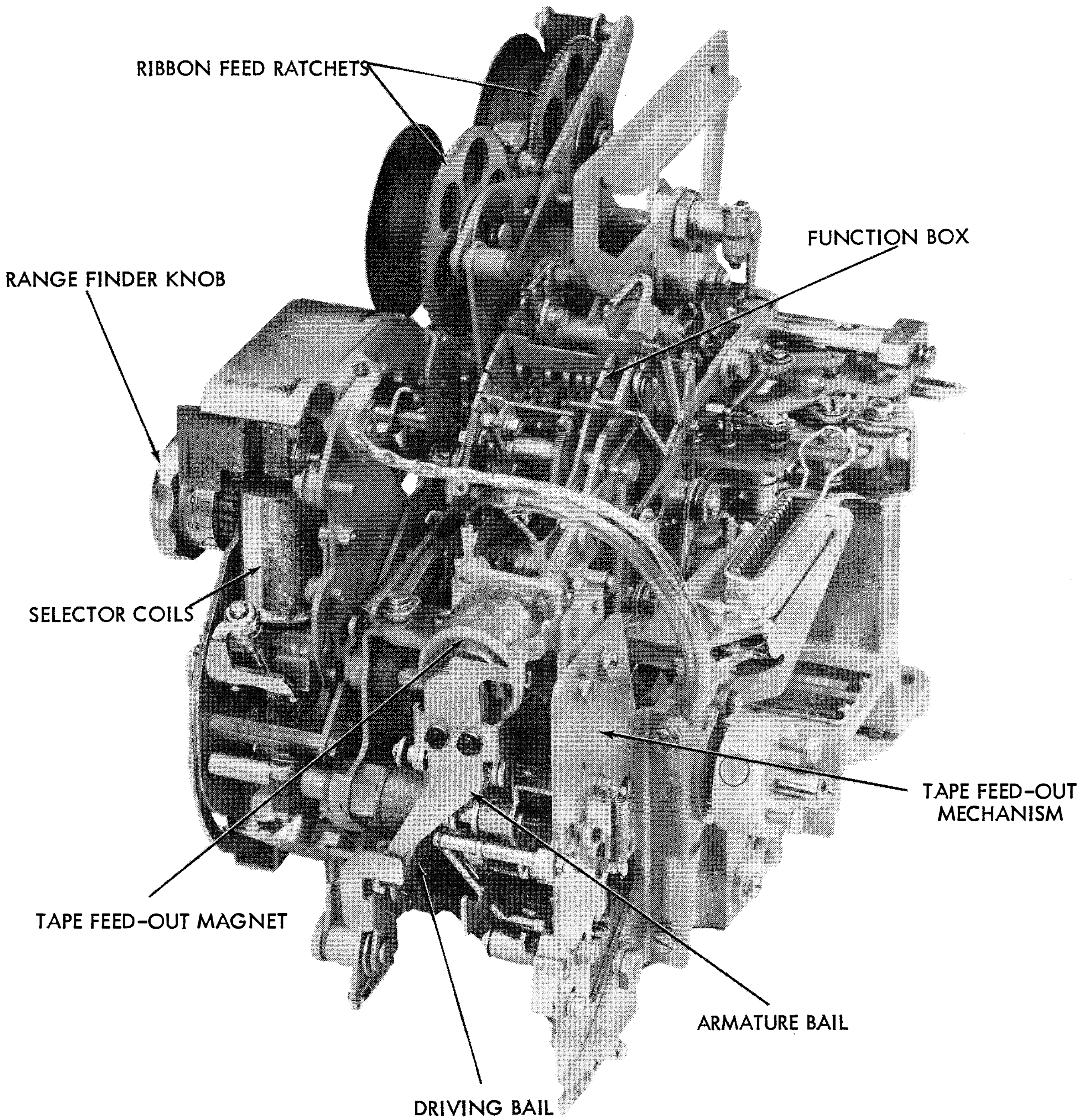


Figure 4-87. Auxiliary Typing Reperforator LPR35BWA (Rear View)

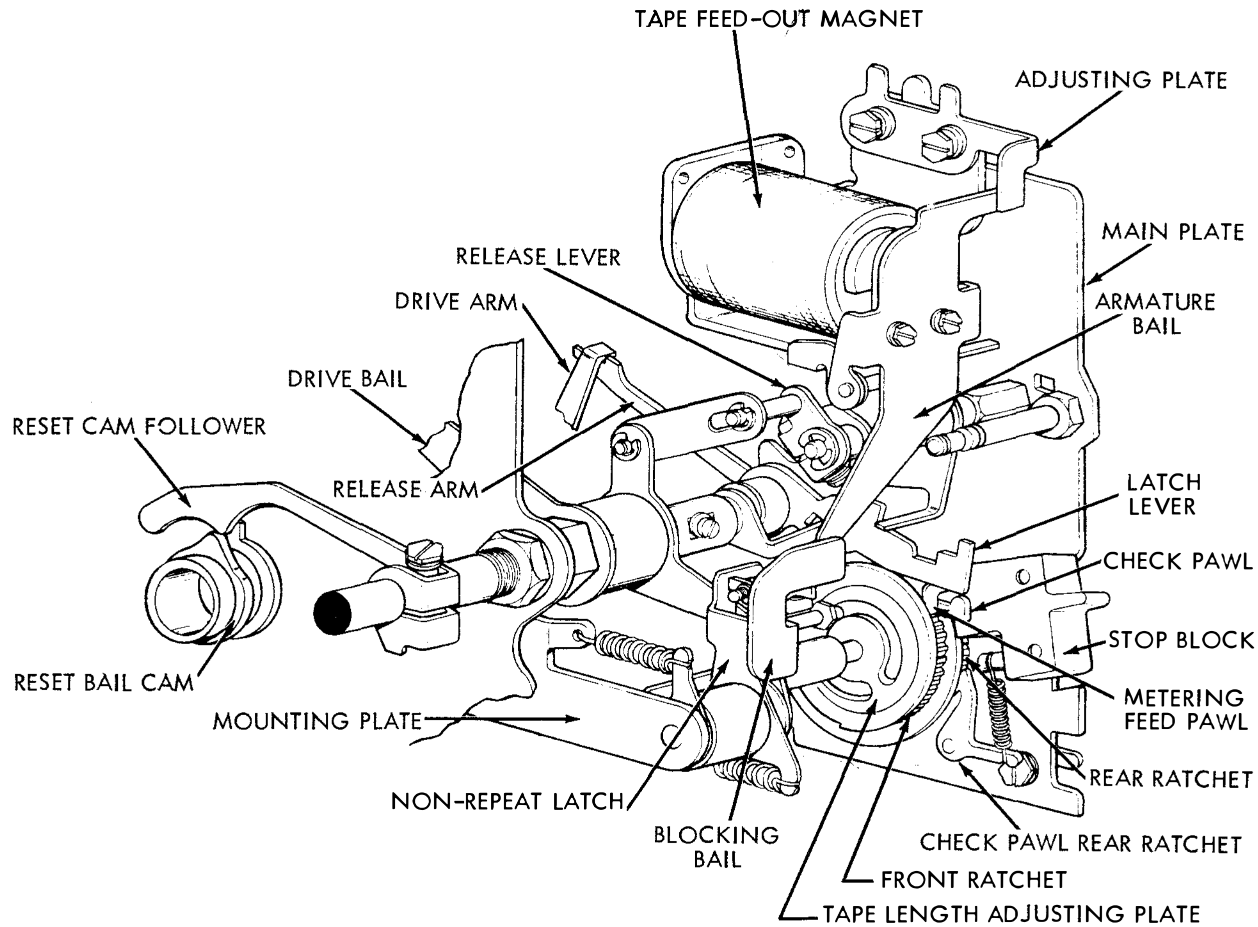


Figure 4-88. Remote Non-Interfering Letters Tape Feed-Out Mechanism

long as the power is on at the auxiliary base unit.

(d) The function cam-clutch operates approximately one cycle behind the selecting cam-clutch. Except that the function clutch trip shaft is operated by a cam on the selector cam assembly and reset by an eccentric pin on the function cam, the operation is as described in paragraph 4-5a(2)(b) and illustrated in figures 4-73 and 4-74.

(2) SELECTION - The selector mechanism operation is identical to that of the keyboard typing reperforator, and is described in paragraph 4-5a(2).

(3) FUNCTION CAM-CLUTCH AND CLUTCH TRIP ASSEMBLY (See figure 4-73) - This mechanism is operated as described in paragraph 4-5a(3)(b), except that the main trip lever is rotated counterclockwise by the selector cam-clutch (paragraph 4-5c(1)(d), when the function trip cam raises the follower lever near the end of the selecting cycle. Immediately, the lower part of the function trip cam allows the follower lever to return to its unoperated position, and the main trip lever is free to move under the clutch release when the trip shaft raises the release.

(4) ROCKER BAIL ASSEMBLY - The rocker bail assembly distributes motion from the function cam-clutch for perforating and printing functions as described in paragraph 4-5a(3)(c) and figure 4-74.

(5) TRANSFER - Near the end of each selecting cycle, the transfer mechanism moves the intelligence in the form of a mechanical arrangement from the punch slides to the function box and positioning mechanisms as described in paragraph 4-5a(4) and figure 4-75. The linkages are identical in both typing reperforators.

(6) TAPE PERFORATING AND FEEDING

(a) GENERAL - The perforator mechanism punches feed holes, advances the tape, and perforates combinations of code holes corresponding to the code combinations received from the signal line. Intelligence is received from the selecting mechanism by the punch slides and perforated as described in paragraphs 4-5a(5)-

(a) through (c) and figure 4-76.

(b) NON - INTERFERING LETTERS TAPE FEED-OUT (Figure 4-88) - The non-interfering letters tape feed-out mechanism provides a means of feeding a predetermined length (up to 18 inches) of "letters" perforated tape at the end of each message by remote control. The letters feed-out operation can be initiated by means of the "Tape Feed Out" button on the dome of the ASR cabinet following a one second time delay at the end of a message. The feed out is adjustable in steps of 0.6 inch. If a message is received during any part of a tape feed-out cycle, the mechanism will stop and the incoming message will be received without interference. A non-repeat latch prevents successive tape feed-out operations from being initiated until the first feed-out sequence has been completed. At the end of a feed-out cycle the mechanism stops and remains inactive until the operator starts another cycle.

1. INITIATION MECHANISM - The feed-out operation is initiated by a pulse (115v ac ± 10%, 120v dc ± 10% with 1350 ohms series resistance or 48v dc ± 10% with 350 ohms series resistance) from a tape feed-out button. The pulse is applied to a feed-out magnet when the auxiliary typing reperforator is in an idling condition. When the magnet is energized, the armature bail moves the blocking bail out of engagement with the drive bail assembly. The drive bail, which is spring loaded, falls into the indent of its cam and the connecting link positions the release lever on the lower step of the latch lever. If the start magnet is held energized longer than one cycle the non-repeat latch prevents the drive bail from again falling into the indent of its cam. The non-repeat latch is delayed one cycle by the spring loaded blocking latch on the drive bail. As the drive bail reaches the indent of its cam the blocking latch rides over the non-repeat latch. The drive bail then reaches the high part of its cam and the non-repeat latch falls into engagement with the drive bail. When the start magnet is de-energized the spring loaded blocking bail again engages the drive bail and simultaneously disengages the non-repeat latch.

2. METERING MECHANISM - When the drive bail positions the release levers on the lower step of the latch lever as described above, metering takes place. The release lever has now permitted the check pawl and feed pawl to engage two adjacent ratchets. One of the ratchets is fed continually by the feed pawl. This ratchet has a deeper notch at every sixth tooth so that the pawl engages the second ratchet on every sixth feed cycle. After the second ratchet has rotated an amount equivalent to two teeth, a follower riding a cam attached to the ratchet drops off its peak unblocking the tripping mechanism. After a predetermined length of tape has been fed as measured by the second ratchet, the latch lever is actuated as it would be by the selector cam on receipt of a message, and the tripping mechanism is blocked preventing further feeding. Simultaneously, the feed pawls are lifted off the ratchets and the ratchets return to their zero position.

3. TRIPPING MECHANISM - A bail that follows a cam attached to the reperforator main shaft engages the clutch trip lever and punch slide latches. When the bail cam follower enters the detent of its cam the bail operates the function clutch trip lever and punch slide latches initiating a "letters" cycle of the punch. Each time the reperforator main shaft rotates one revolution a letter cycle is initiated, provided the bail is not blocked by the latch lever (see paragraph 2. above). If an incoming message trips the latch lever, the letters punching cycle is immediately blocked from any further operation.

4. STORAGE MECHANISM - The purpose of the storage mechanism is to hold the reset bail in engagement with the slides until the slides are fully reset so that they may recognize the first character set up in the punch slide latches by the selector. This mechanism consists of a latch that is operated by a link attached to the punch slide reset bail toggle. During reception of an incoming message the toggle mechanism pushes the latch out of the way of the reset bail prior to its being stripped by the clutch trip lever.

(c) The chad chute on the LPR35BWA auxiliary reperforator is mounted on the front of the punch block, as viewed from the front of the cabinet, rests over the punch pin openings in the top of the die block and extends downward to the right of the punch block (figure 4-86). By means of an extension chute, tape punchings are directed away from the punch block into a common container below the cabinet shelf along with the chad from the keyboard reperforator. Empty the container frequently to prevent the chad from backing up the chutes and possibly fouling the punch mechanism.

(7) TYPING

(a) GENERAL - Typing, printing and ribbon feed mechanisms are identical to those of the typing reperforator described in paragraph 4-5a(6) and as illustrated in figures 4-77 through 4-83.

(b) TYPEWHEEL POSITIONING, PRINTING AND RIBBON FEEDING - The characters used to type the received intelligence (letters, figures and symbols representing var-

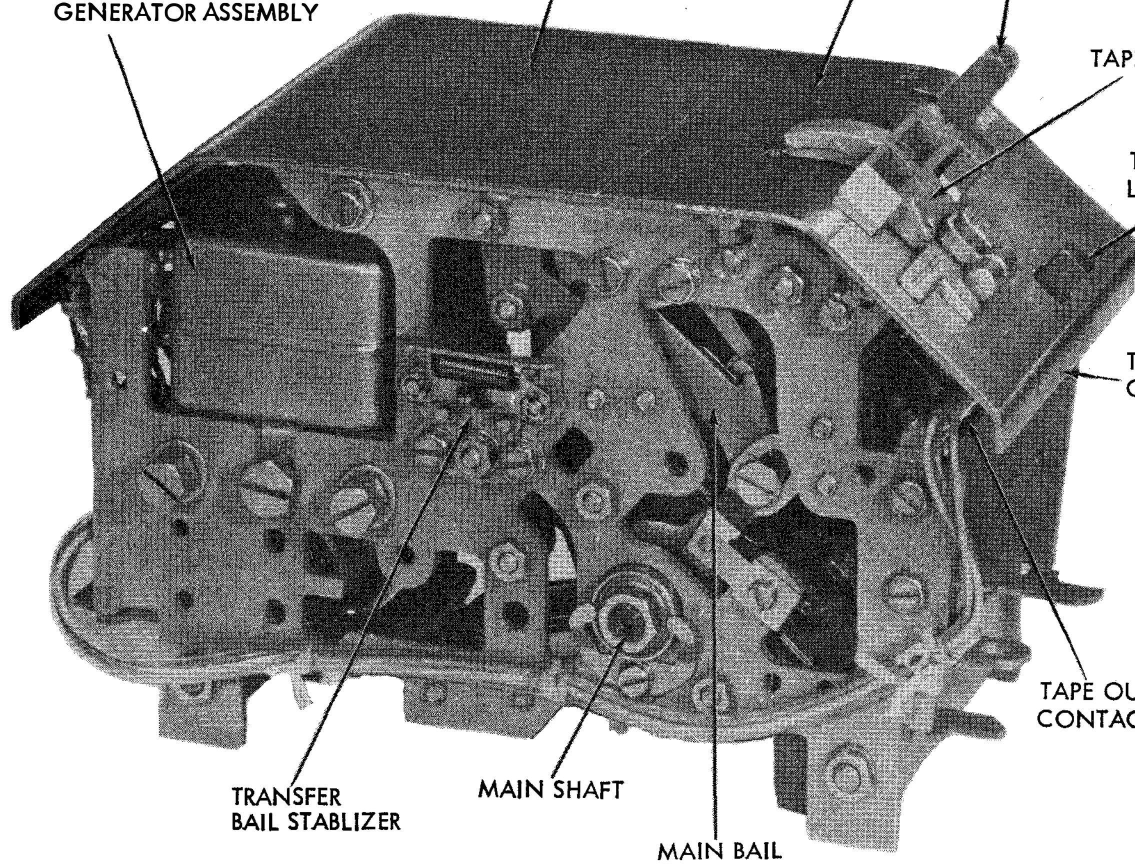


Figure 4-89. Transmitter Distributor LXD11 (Front View)

ious functions) are embossed on the cylindrical surface of the typewheel. The typewheel furnished with Typing Reperforator LPR35BWA will print standard communications symbols. During the function cycle, the operation of the rotary and axial positioning mechanisms (figures 4-77 and 4-73), the oscillating and correcting mechanisms, the printing mechanism (figure 4-79) and the ribbon feed mechanism (figure 4-80) are as previously described in paragraph 4-5a(6). The operation of the function box (figure 4-81) is as previously described with respect to letters-figures shift.

4-6. TRANSMITTER DISTRIBUTOR LXD11 OR LXD31 AND BASE LCXB13

a. GENERAL (See figure 4-89) - The purpose of the transmitter distributor is to decode the intelligence stored on the perforated tape, and to transmit that intelligence through a radio or wire telegraph channel. Intelligence is transmitted in the form of sequential marking or spacing signal pulses, in a 7.00 unit transmission pattern. Mounted on its base, the transmitter distributor protrudes from the left side of the ASR cabinet. A main shaft and cam clutch assembly operate a sensing mechanism, transfer mechanism, and a signal generator (figure 4-90). The unit utilizes polar line operation and is equipped with both radio frequency (RF) filtering and arc suppression on mark and space contacts of the signal generator. All signal leads are shielded, and all shielding is insulated from the equipment frame. The main shaft is geared to an intermediate shaft and gear assembly on the base, which is connected by shafts and flexible couplings to the

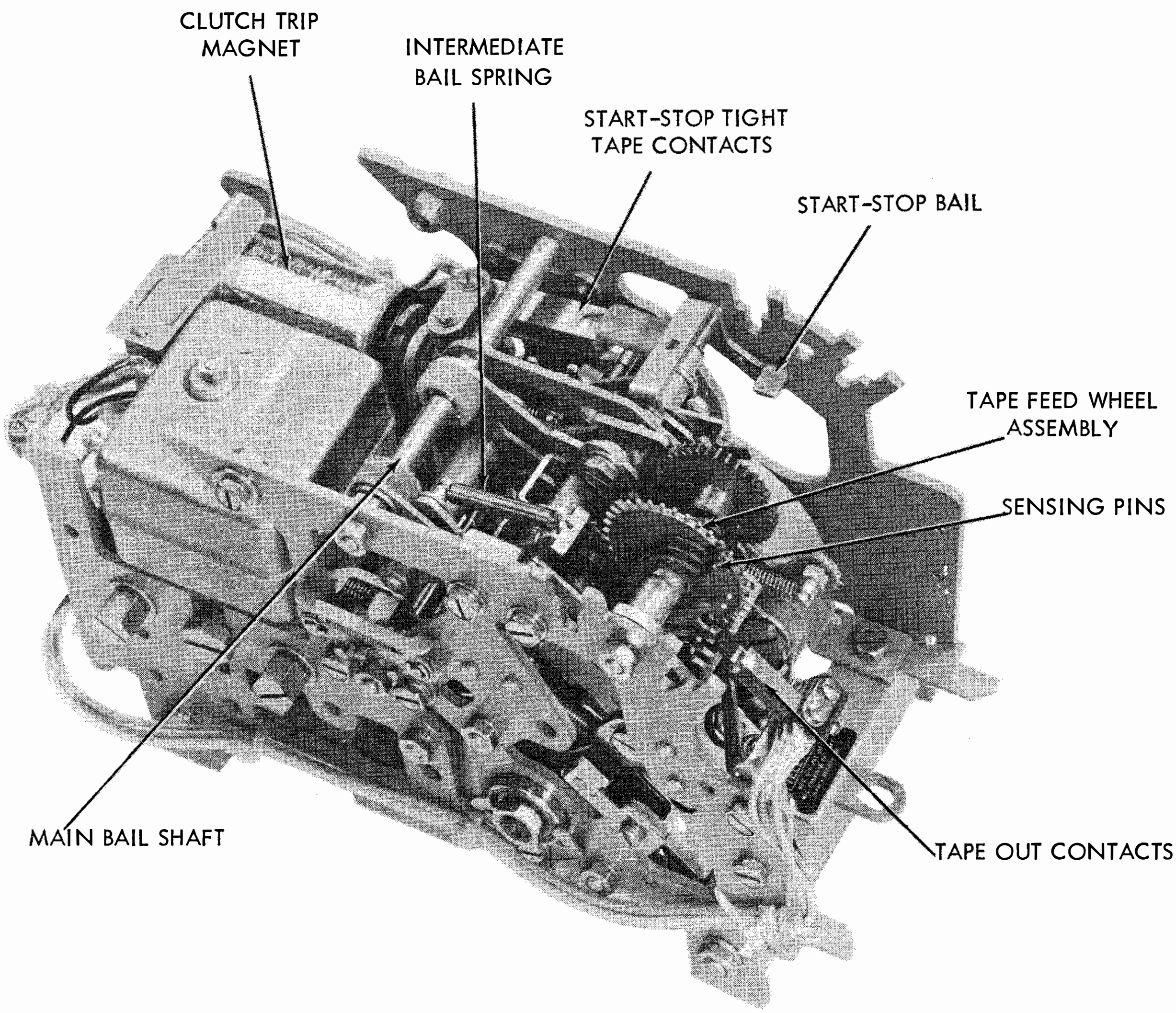


Figure 4-90. Transmitter Distributor LXD11
(Top, Cover and Tape Guide Plates Removed)

keyboard motor. Power is constantly supplied, when the teletypewriter main power switch is on, at the speed (75 or 45.5 baud) determined by the gear set selected for the intermediate gear assembly. AC power for operation of the cam-clutch, and dc signal supply for the signal generator are furnished through a 19-point connector on the base. (See figure 4-90.) The transmitter distributor is electrically isolated from the basic teletypewriter circuits in the (K) mode of operation. In the (K-T) and (T) modes, it is operative only when the SEND keylever on the keyboard has been depressed, and the transmitter distributor tape-out, start-stop and tight tape contacts are all closed. Transmitting from previously perforated tape, the component is exclusively for on-line service; there are no off-line functions. The typing unit monitors the transmitter distributor transmission in line operation.

b. TRANSMITTER DISTRIBUTOR BASE LCXB13 (See figure 1-16) - The Transmitter Distributor Base is mounted on the left side of the cradle under the dome of the ASR cabinet. A ball bearing supported shaft transmits power from an intermediate gear assembly at the rear of the base to the main shaft of the transmitter distributor which is mounted on the front part of the base, protruding from the cabinet proper. The intermediate pinion and driven gear are interchangeable sets, providing 75 or 45.5 baud operation depending upon the selection. Shafts with flexible couplings connect the intermediate gears to the keyboard motor through the keyboard typing reperforator bearing bracket and intermediate gears at the rear of the keyboard base. A bracket for the transmitter distributor electrical connector is secured to the right side of the base. Since the LCXB13 base is mounted on rubber bushings for noise reduction, a ground

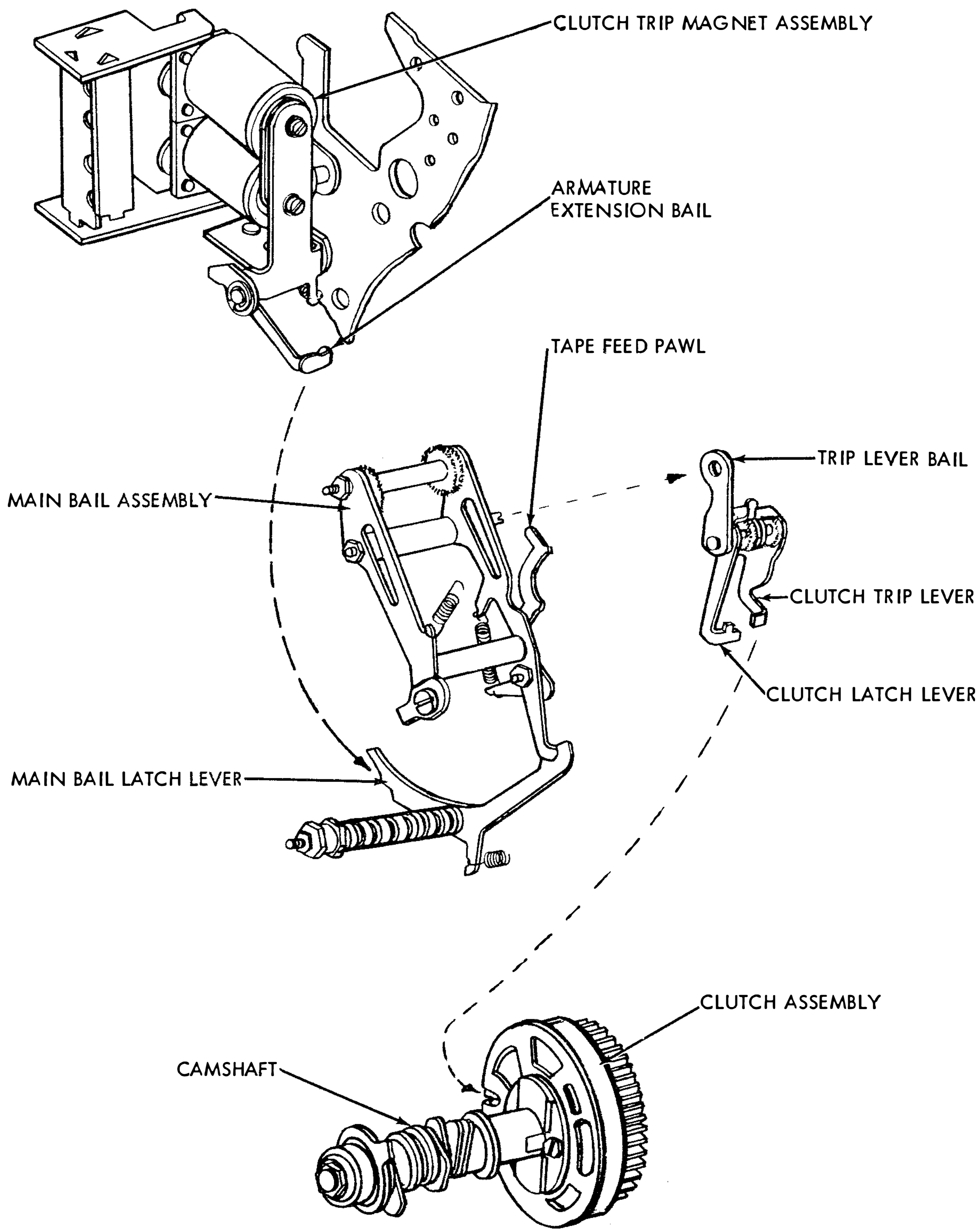


Figure 4-91. Transmitter Distributor Control Mechanism

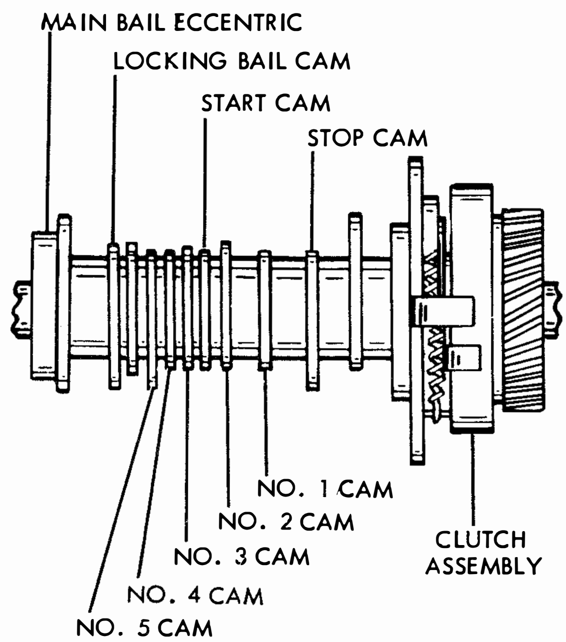


Figure 4-92. Cam-Clutch Main Shaft

strap is required between it and the cradle. See Section 2 on Installation.

c. TRANSMITTER DISTRIBUTOR LXD11 (See figures 4-89 and 4-90) - In the following description of the sequence of operations of the transmitter distributor, the equipment is assumed to be operating under normal conditions. The keyboard selector switch is in either (K-T) or (T) mode, with the SEND key lever depressed. The main power switch is in "ON" position, and the keyboard motor linkages supply power to the main shaft. The start-stop lever is assumed to be in "OFF" (center) position, and perforated tape has been placed over the sensing pins, and the tape lid is closed. The equipment remains in an idling condition, the clutch drum rotating with the attached driven gear on the main shaft, until manual operation of the green start-stop switch to its right "RUN" position completes the magnet circuit and energizes the magnets which operate on 0.050 ampere current at 120v dc. The armature then moves to the left to trip the spring-loaded main bail (figure 4-91). The main bail trips the clutch latch lever bail, releasing the clutch to drive the main shaft and cam-clutch, furnishing power to the sensing, transfer, and signal generating functions of the transmitter distributor. The operations are then responsive to the coded input of the perforated tape until the start-stop switch is returned to its center "OFF" position.

(1) CAM - CLUTCH MAIN SHAFT (See figure 4-92) - The cam-clutch is an integral part of the main shaft, attached, by a hub at the rear of the shaft, to the disk of the clutch. The drum rotates freely about the shaft with the helical driven gear, to which it is attached. The

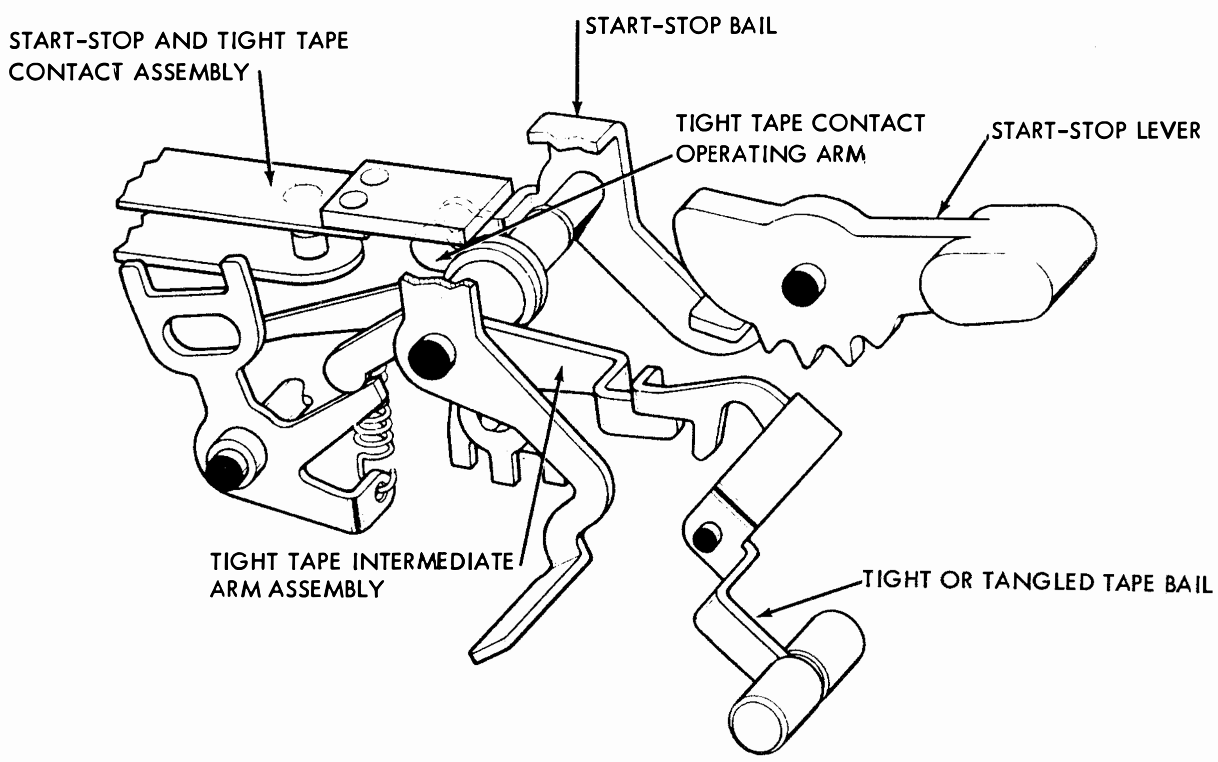


Figure 4-93. Start-Stop Lever and Tight Tape Switch Mechanism

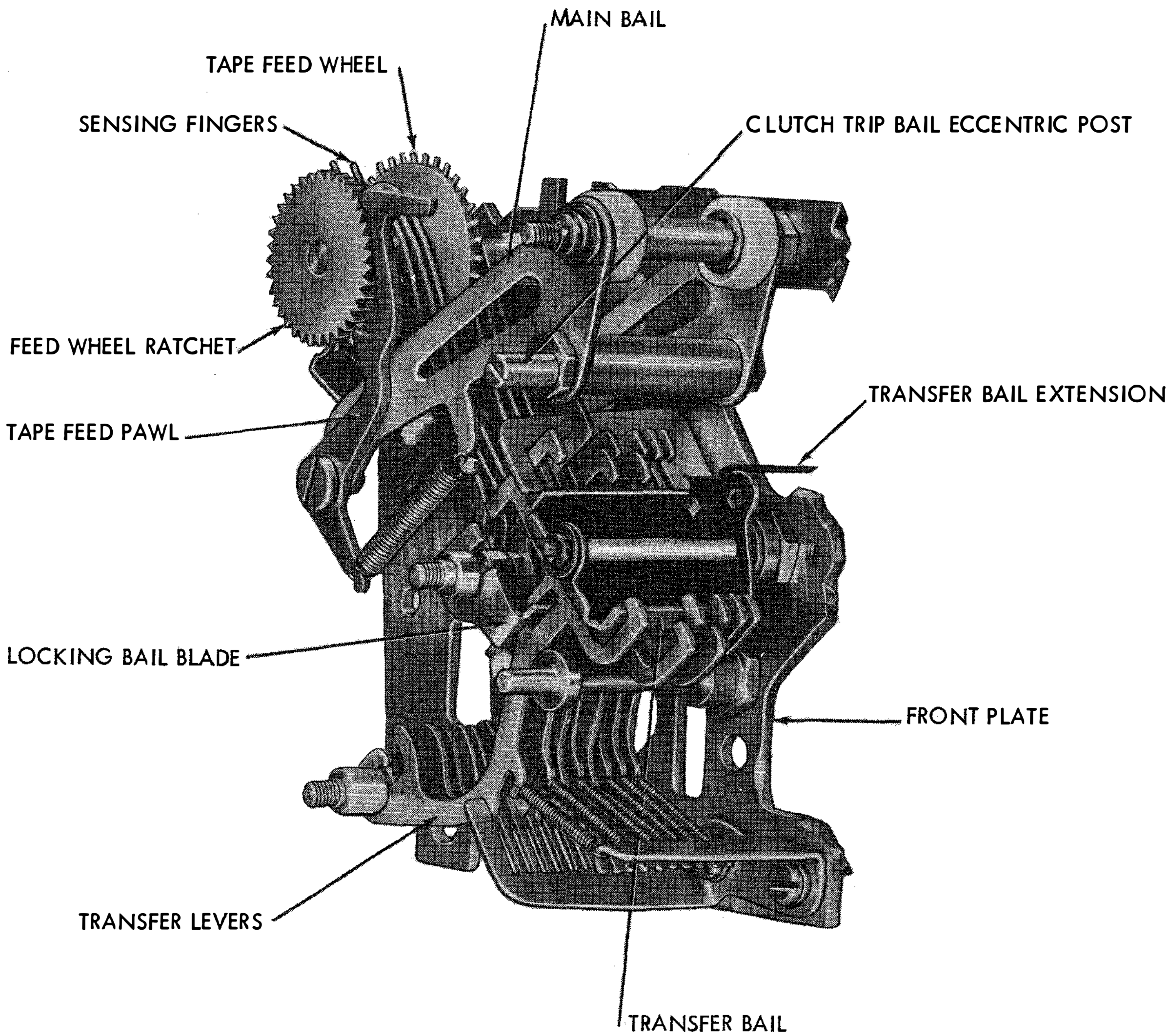


Figure 4-94. Transmitter Distributor Front Plate Mechanism (Rear View)

cam-clutch has five sensing pin transfer lever cams, a start cam, a stop cam and a locking bail cam. The cams are positioned to trip their associated mechanisms in the order required for the sequential electrical transmission of the marking and spacing code elements of the simultaneous character code perforations of the tape input. The shaft also has an eccentric cam to operate a main bail drive arm during the function cycle.

(a) When the start-stop lever is moved to the right, the camming surface of the lever (figure 4-93) allows the start-stop bail to move upward. As the bail pivots on its mounting, the left extension of the bail moves away from the swinger of the start-stop tight tape contact assembly and closes the contact to complete the clutch magnet circuit. As the armature is pulled up (figure 4-91), it rotates the main bail latch lever, which frees the spring loaded main bail to rotate counterclockwise. The movement is transmitted through an eccentric post (figure 4-94) to the clutch trip bail. The trip

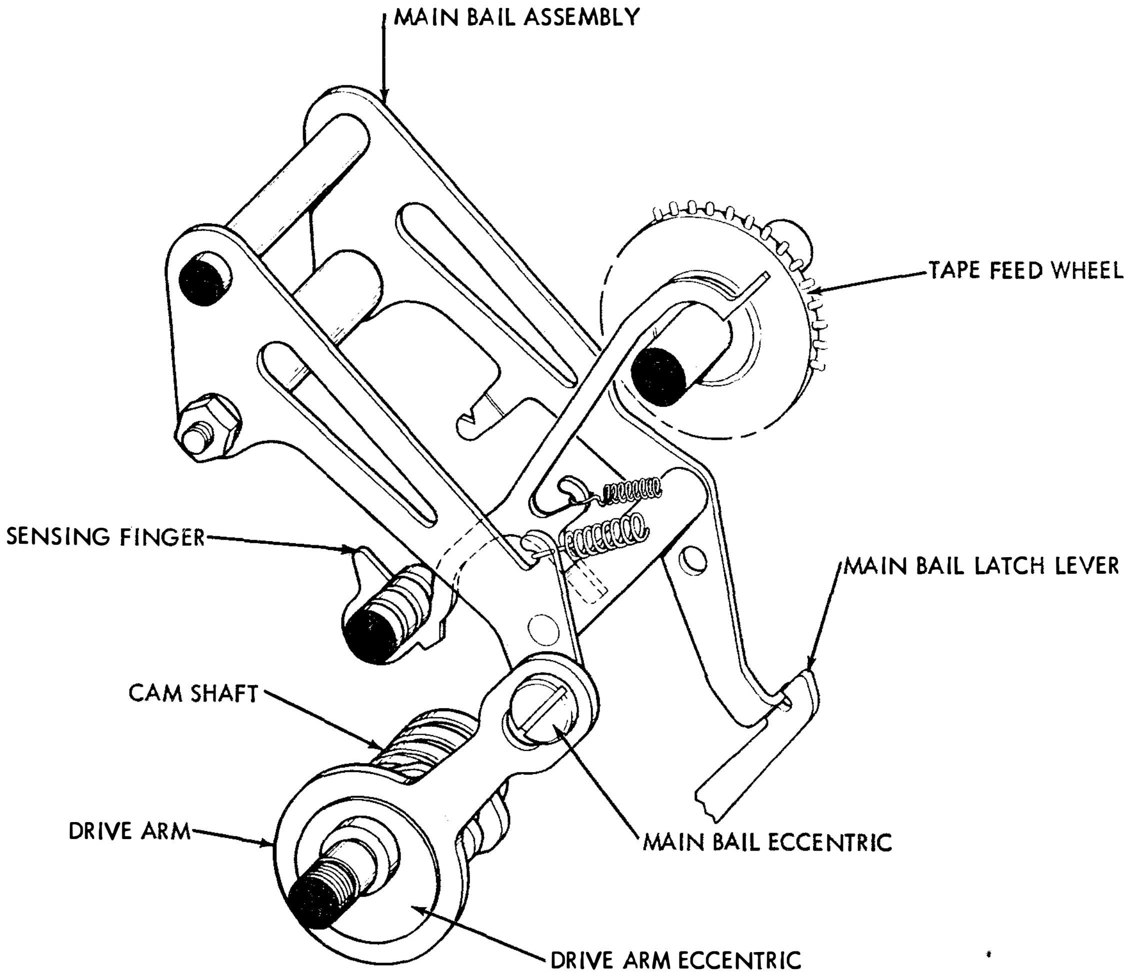


Figure 4-95. Main Bail and Drive Arm Mechanism

bail moves the clutch trip lever out of engagement with the clutch shoe, releasing the clutch to start the main shaft rotating.

(b) Operation of the clutch is as described in paragraph 4 - 3d, except that the clutch drum in this case is the driving member, and the main shaft and cam are driven by the clutch drum when the clutch is engaged.

(c) As the shaft rotates, the drive arm eccentric (figure 4-95) revolves to pull the drive arm downward, causing the main bail to pivot back to its home position. So long as the magnet circuit is not interrupted, the armature continues to hold the main bail latch lever away from the main bail. As the shaft continues to rotate, the drive arm is moved upward by its eccentric, and the spring loaded bail again rotates counterclockwise. The clutch trip lever is held away from the clutch shoe, and the cam-clutch cycling continues.

(d) When the start-stop lever is pushed to its center "OFF" position, the start-stop bail (figure 4 - 94) is rotated clockwise, and its left extension raises the swinger of the start - stop tight tape contact, interrupting the magnet circuit. The magnet armature falls away from the pole pieces, under spring tension, and the main bail lever is latched when the drive arm lowers the main bail.

(e) As the main bail is latched, the clutch trip lever blocks the clutch shoe lever. When the clutch is blocked, the inertia of the mechanism causes the clutch to rotate far enough to permit its latch to fall into the notch on the clutch cam disk, stopping rotation of the main shaft and cams. The clutch drum continues to rotate with the driven gear.

(2) SIGNAL INTELLIGENCE INPUT - Operation of the transmitter distributor, when the electro - mechanical requirements for cam-clutch and main shaft operation have been established, is in response to the signal intelligence data stored in five-unit code perforations on tape. These are fed in simultaneous arrangement, character by character order as

they appear in the tape, to the sensing mechanism. The signal intelligence input must conform to the signal requirements of the equipment (paragraph 4-2).

(a) TAPE LID OPERATION (See figure 4-96) - When the red lid button is depressed, the tape lid release plunger under the tape guide plate depresses the plunger bail extension, causing the bail to pivot counterclockwise. The plunger bail latching extension swings downward, away from the tape lid latching post. Under spring tension, the lower portion of the tape lid rotates counterclockwise, raising the tape lid.

1. With the tape lid open, the perforated message input tape can be placed in the tape guide so that its feed holes engage the teeth of the feed wheel. The tape is inserted with the typed side up. The position of the feed wheel insures correct positioning of the tape.

2. The perforations of the first character to be transmitted must be located over the apertures for the sensing pins. The position of the tape can, however, be adjusted after the tape guide lid is closed as described in paragraph 4-6c(2)(b).

3. The tape lid is closed manually by pressing it down over the positioned tape. When the tape lid is closed, the latching post rotates counterclockwise over the end of the plunger bail latching extension. Under spring tension, the latching extension is pulled under the post to latch the tape lid.

(b) FREE-WHEELING FEED WHEEL (See figure 4-97) - When the start-stop lever (figure 4-93) is pushed to the extreme left position, the start-stop bail is rotated clockwise. The bail extension pushes the feed pawl and the ratchet detent roller out of engagement with the feed ratchet, and allows the feed wheel to rotate freely (figure 4-96). The bail extension also contacts the intermediate bail, which rotates clockwise, permitting the torsion spring loaded depressor bail to rotate, moving the tape-out pin depressor bail extension to depress the tape-out pin flush with or below the tape guide plate. This permits free passage of the tape under the tape lid. Since the start-stop tight-tape contacts are opened in establishing conditions for free-wheeling tape feed, the clutch magnets are de-energized, and the transmitter distributor is in an idling condition. Positioning of the tape must be done manually. Release of the start-stop lever to its "OFF" position returns the tape feed pawl and detent roller into contact with the ratchet and releases the tape-out sensing pin, conditioning the equipment for operation when the start-stop lever is again moved to the right.

(c) TAPE-OUT SWITCH MECHANISM (See figure 4-96) - A tape-out sensing pin is located on the tape guide plate to the right and slightly forward of the five tape sensing fingers. An extension near the top of the sensing pin

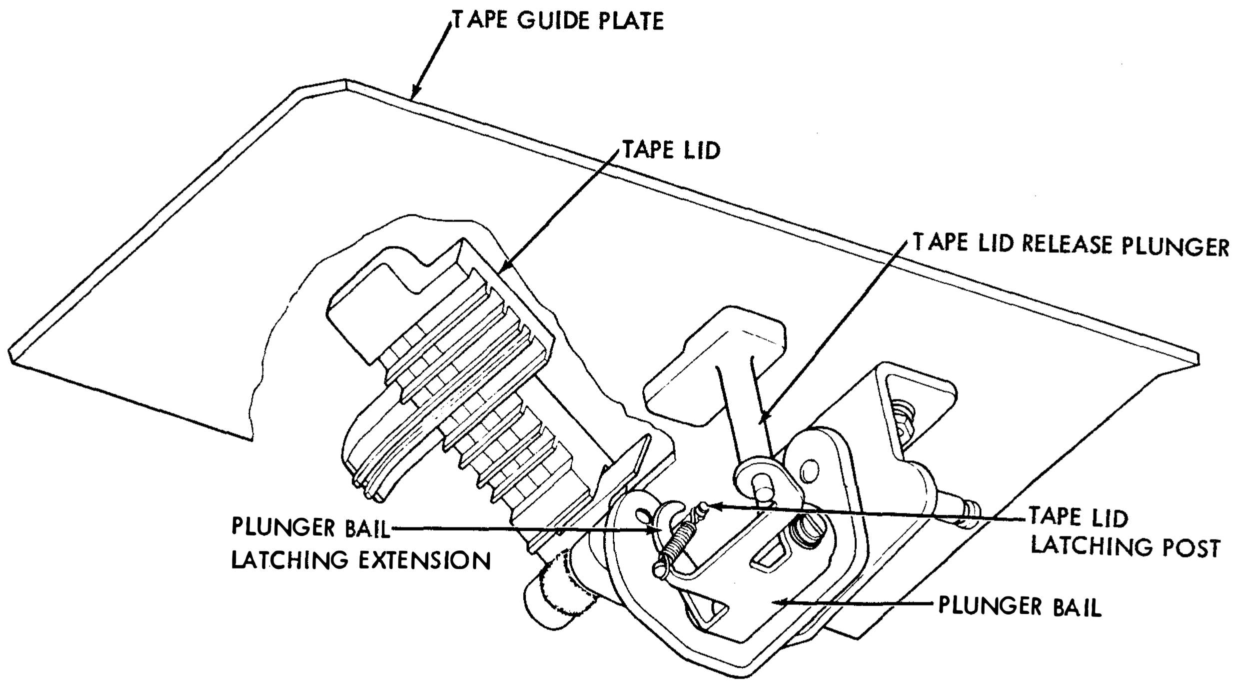


Figure 4-96. Tape Lid Mechanism (Bottom View)

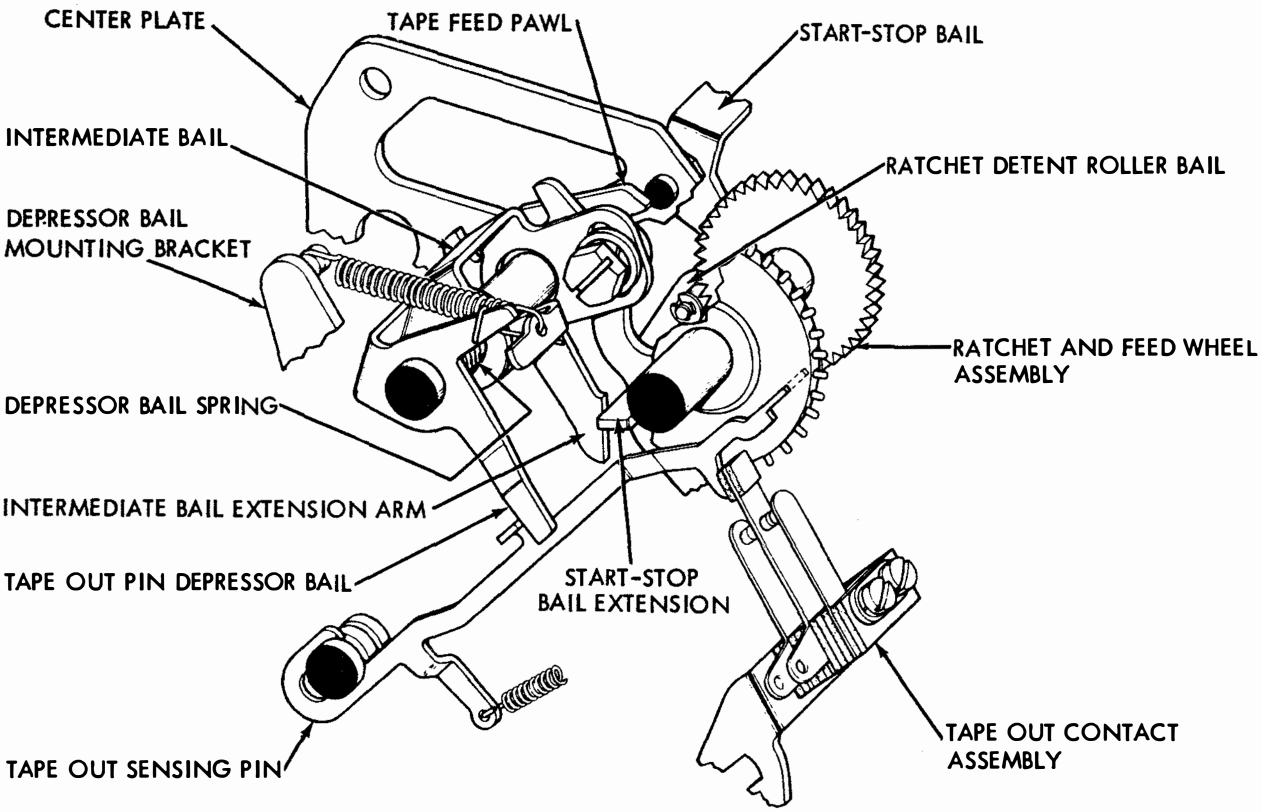


Figure 4-97. Free Wheeling and Tape-Out Mechanism

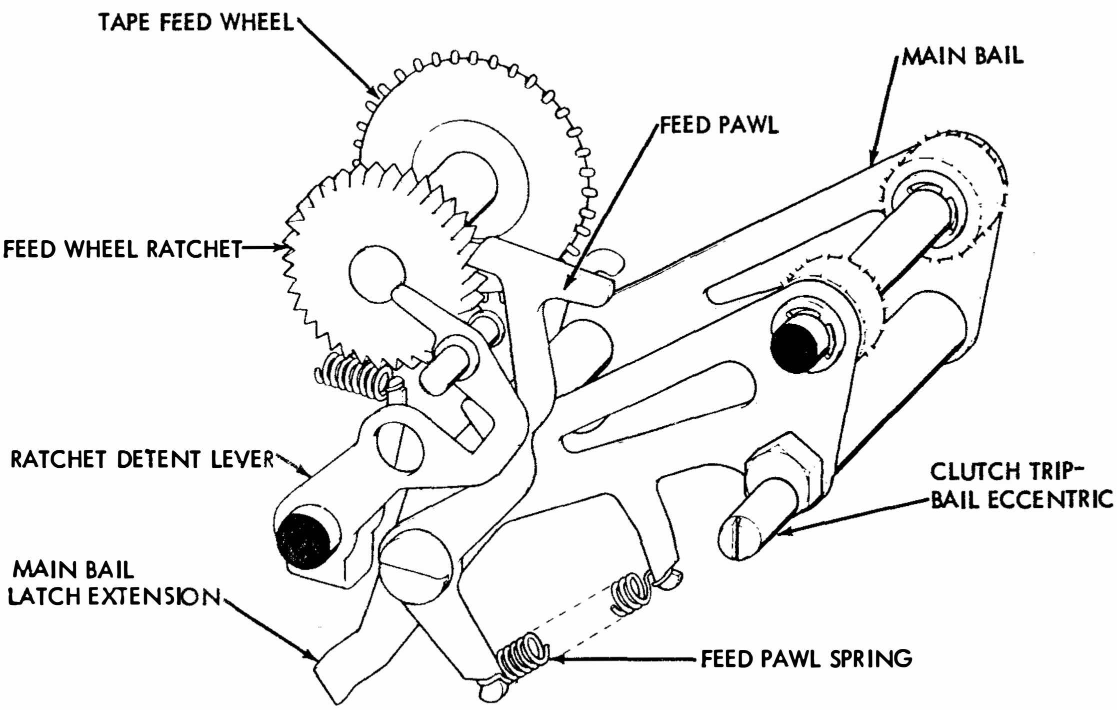


Figure 4-98. Tape Feed Mechanism

raises the swinger of the normally open tape–out contact when the spring loaded pin protrudes above the guide plate. When the pin is depressed, the swinger is released to close the contacts and close the clutch magnet circuit at this point. When tape is in the unit and the tape guide lid is closed, the tape holds the sensing pin in the depressed position, closing the contacts and permitting transmission when related elements of the series wired clutch magnet circuit are closed. During transmission, the code sensing fingers cannot differentiate between a no-tape condition and a LETTERS code (five marking units) and would tend to continue transmission of a false letters signal. The tape-out sensing pin, however, moves upward under tension of its spring, opening the magnetic circuit and interrupting transmission. The de-energized magnets release the armature, permit the armature extension to pivot out of its blocking position, and allow the main bail latch to be moved by its spring. The clutch latch lever contacts the clutch shoe lever and blocks rotation of the cam-clutch mechanism and shaft (figure 4-91).

(d) TIGHT TAPE SWITCH MECHANISM (See figure 4-93) - Tight or tangled tape raises the tight tape lever on the tape guide lid, rotating the tight tape bail counterclockwise. The bail arm pivots the intermediate arm clockwise, raising the contact arm up. The contact arm lifts the swinger of the start-stop tight tape contact up and opens the clutch trip circuit to stop transmission. Transmission will be resumed automatically when the condition is remedied, since the start-stop switch remains in operating condition through the interruption in transmission.

(e) TAPE FEED MECHANISM (see figure 4-98) - As the armature released main bail swings upward (figure 4-91) the tape feed pawl is raised one tooth on the feed wheel ratchet (figure 4-98). When the drive arm brings the main bail downward (paragraph 4-6c-(1)(c), the tape feed pawl advances the tape feed ratchet one tooth against the action of the ratchet detent roller. The tape feed wheel advances the tape one character. The ratchet detent roller bears between two teeth on the ratchet and serves to hold the feed wheel and tape in position during the sensing portion of the operating cycle. As the drive arm moves the bail up, the tape feed cycle is resumed.

(3) SENSING MECHANISM (See figure 4-94) - Five sensing pins, which alternately protrude from and retract beneath the tape guide plate under the tape guide lid, are the upper ends of five sensing fingers. The lower end of the fingers (figure 4-99) slide freely on a positioning stud, their lower extensions under their associated transfer levers. A spring

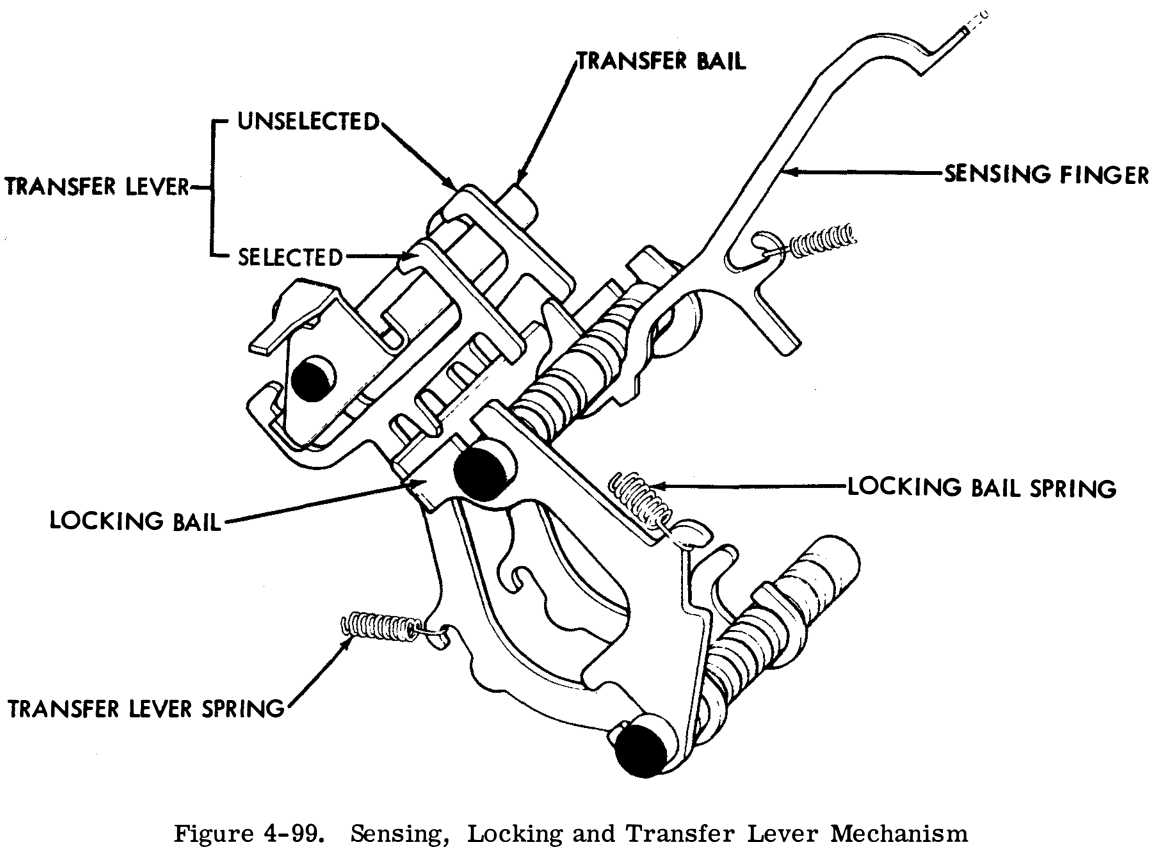


Figure 4-99. Sensing, Locking and Transfer Lever Mechanism

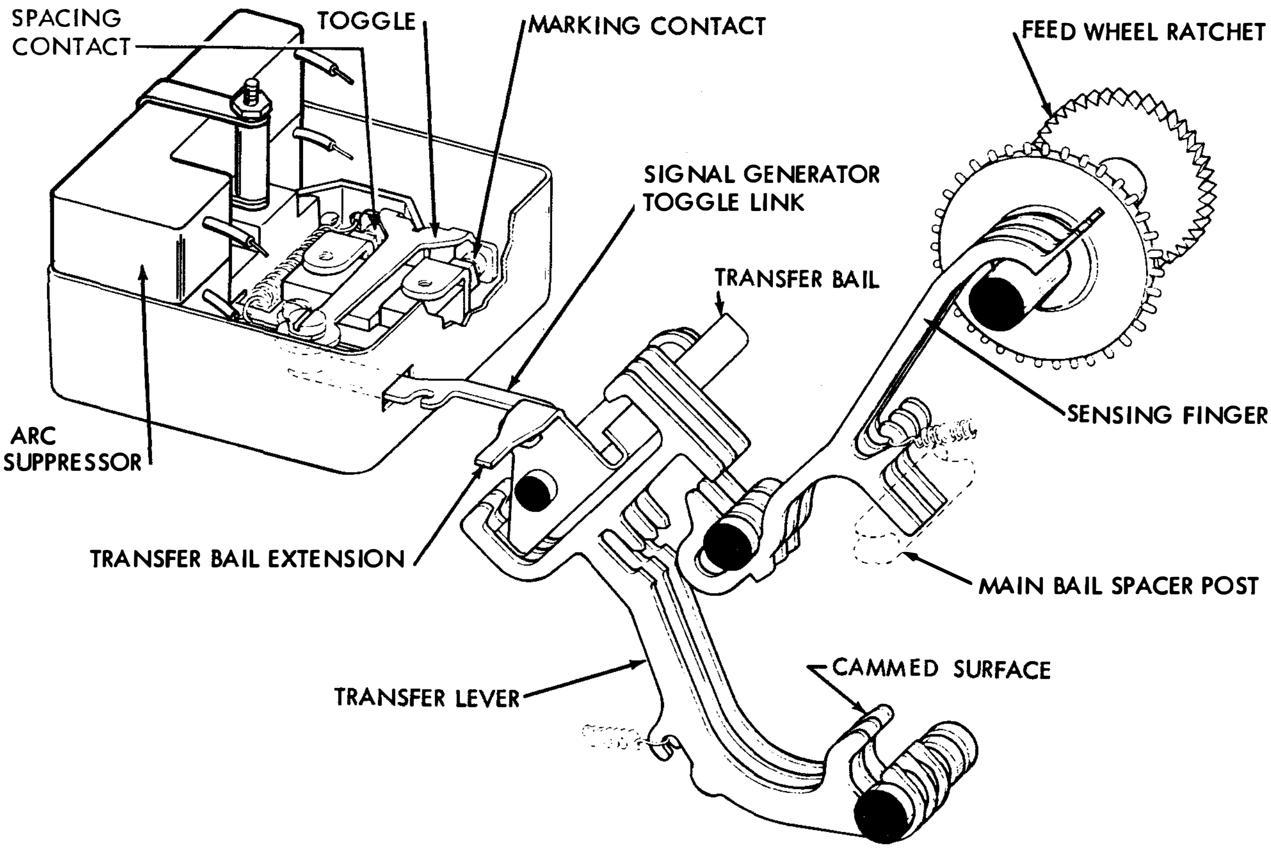


Figure 4-100. Transfer Lever and Signal Generator Mechanism

hook and extension arm about midway on each sensing finger depresses the fingers beneath the main bail when the main bail is in its lower position and releases them, under tension of their springs, to protrude through the guide plate when the main bail is raised. If one or more of the sensing pins encounter a perforation in the tape, the fingers will extend through the perforation. The sensing fingers that extend through the tape move their associated transfer levers upward so that they are brought above the line of action of the locking bail. If any of the sensing fingers do not sense a perforation in the tape, the associated transfer levers remain stationary, and their extensions remain below the line of action of the locking blade on the locking bail. When the main bail drive arm shaft impels the bail downward, the bail pulls the sensing fingers downward, to permit the tape to advance without interference.

(4) LOCKING BAIL AND TRANSFER MECHANISMS (See figure 4-100) - All transfer levers, except the start and stop transfer levers, are arranged to move in two directions. The forked end can be moved from the selected (marking) position to the unselected (spacing) position by the associated sensing pins, depending on the character code intelligence at the head of the tape guide. The transfer levers are also moved downward and to the right in a sequence actuated by the cam-clutch mechanism. They, in turn, rotate the transfer bail into marking or spacing position in a sequential pattern to conform to the 7.00 unit transmission pattern. It is at this point that the simultaneously sensed elements of the tape perforated character code is converted to a sequence of marking or spacing pulses required for signal line transmission.

(a) Selection of the transfer levers in spacing or marking position is instantaneous in response to the movement of the sensing fingers when the main bail is driven upward either by spring action, to start transmission, or by the drive arm, in continuous transmission. As the cam-clutch rotates, the locking bail cam positions the locking bail upward between the lower extensions of the selected transfer levers, locking them in position.

(b) Further rotation of the main shaft moves the lobe of the start cam into position and shifts its transfer lever downward. Since the start transfer lever has no sensing finger, the lever is always in the spacing position. The start transfer lever upper finger always hooks the upper side of the transfer bail and causes it to move clockwise (spacing).

(c) As the shaft rotates further, the cam for the first pulse moves its transfer lever downward and toward the right. Depending on the position of the transfer lever finger (upper fork engaging bail, spacing; lower fork engaging bail, marking), the transfer bail is rotated if the pulse to be transmitted is not the same as the preceding pulse. If the preceding pulse is the same, no action occurs, because the bail has been previously rotated. If the preceding pulse was different, the extension on the transfer bail is moved to the right to spacing position or to the left to marking position (figure 4-100).

(d) The second, third, fourth, and fifth pulses are generated in the same manner as described for the first pulse.

(e) The stop cam pulse follows the fifth cam pulse as the main shaft completes a cycle. Again, the action is the same as that for the first pulse. Since the stop pulse transfer lever has no sensing finger, and its transfer lever is blocked by the locking bar, its lower finger always hooks the transfer bail, resulting in positioning the transfer bail extension to the left (marking).

(5) SIGNAL GENERATOR MECHANISM (See figure 4-100) - The transfer bail extension, moving to the right (spacing) or left (marking) as the bail rotates under the impulse of the selected or unselected transfer levers, clears the left (spacing) or right (marking) latch in the stabilizer mechanisms (figure 4-101) permitting the latch to drop and hold the bail, through the

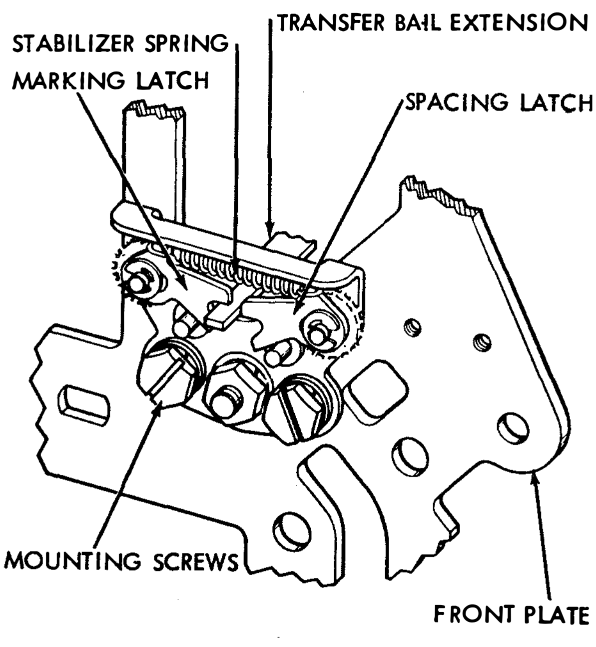


Figure 4-101. Transfer Bail Stabilizer

extension, until an opposite pulse is transmitted. The transfer bail is linked to the signal generator toggle. Rotation of the bail moves the toggle to the right to open the marking contact and close the spacing contact in the signal generator, or to the left to close the marking contact and open the spacing contact. The successive spacing and marking pulses thus generated impress upon the signal lines the code for the character represented on the perforated tape at the head of the tape guide.

4-7. AC MOTOR UNITS LMU12, LMU3, LMU14, LMU4, LMU39 AND LMU41

a. SYNCHRONOUS MOTOR LMU12 AND LMU3 (See figure 4-102) - The synchronous motors are for use with single phase, 115 volt (plus or minus 10 per cent) alternating current, at a frequency of 60 cycles per second (plus or minus 0.75 per cent).

(1) Motor Unit LMU12 is a 1/12 horsepower, 3600 rpm, two pole, wound stator ball bearing motor with a squirrel cage type rotor. The stator has two windings, a main operating winding and an auxiliary starting winding. The auxiliary winding is wired in series with a 170 mfd electrolytic capacitor and a current operated motor starting relay (figure 4-103). Normal starting current is 12.0 amperes, running current 2.7 amperes, and rated torque 23.4 ounce inches.

(2) The LMU3 motor unit is similar in electrical and mechanical design to the LMU12. The motor is rated at 1/20 horsepower, and has a 43 mfd electrolytic capacitor wired in series with the starting winding. Normal starting current is 8.0 amperes, running current 2.0 amperes, and rated torque 14.0 ounce inches. The two motors are similar in appearance, and should be examined carefully for the part number and electrical capacity data on the identification plate for distinguishing characteristics.

(3) The initial starting current causes the relay to pull up, and its contacts to close the auxiliary winding circuit. As the rotor gains speed, the current flowing through the motor, and through the relay coil, decreases. When a predetermined current value is reached, the relay armature is released, the relay contacts are opened, and the auxiliary winding circuit is disconnected from the line. The rotor continues to accelerate until it reaches synchronous speed (3600 rpm). The motor is wired in such a manner that the rotor revolves counterclockwise when viewed from the fan end.

(4) The starting relay and capacitor, together with a thermal cut-out switch, are

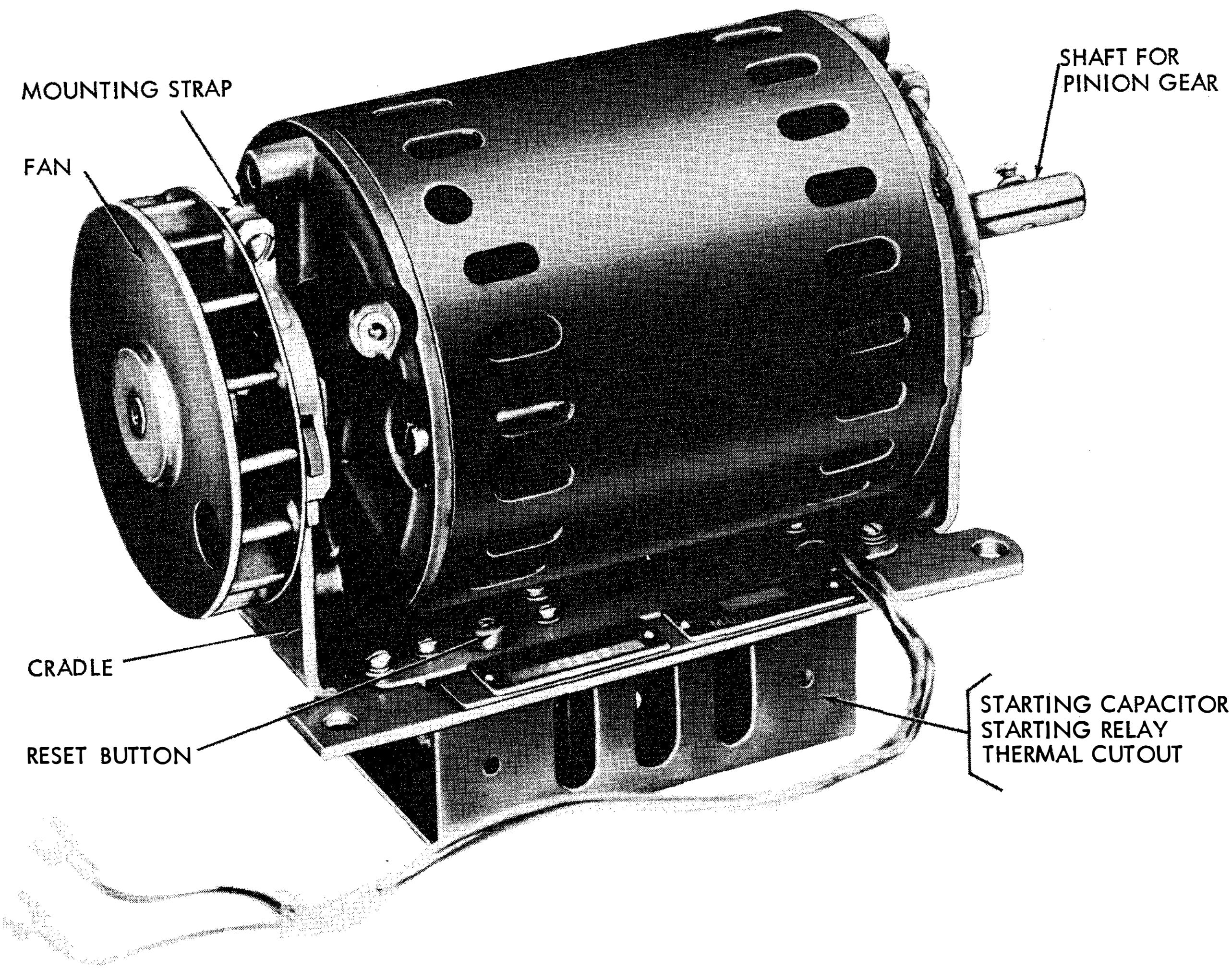


Figure 4-102. AC Synchronous Motors

mounted in a compartment on the underside of the motor. The thermal cutout switch is in series with both the main and the auxiliary motor windings. If excessive current is drawn by the motor for any reason, the thermal cutout switch will open the circuit preventing overheating and possible damage to the motor. The switch may be manually reset, if tripped, by depressing the red button which projects upward through the motor mounting plate. Allow the motor to cool at least 5 minutes before manually depressing the red button.

(5) There are two fans located within the motor housing, one at each end of the rotor. These draw cooling air through the slots in the end bells and exhaust it through the slots in the motor housing. The end bells have rubber vibration mounts by means of which the motor sets in the ends of its mounting bracket. The rubber mounts are held in the bracket by mounting straps. The motor shaft has a tapped hole for use in fastening the intermediate shaft driving helical gear. All end play is taken up by a conical shaped spring, which bears against the outer race of one of the ball bearings. The motor mounting bracket is fastened to the keyboard by four screws and lock washers.

b. **GOVERNED MOTOR LMU14, LMU4, LMU39, AND LMU41 (See figure 4-104) - The series governed motors are for use with single phase, 115 volt (plus or minus 10 per cent) alternating current at a frequency of 50 to 60 cycle per second.**

(1) Motor unit LMU14 is a 1/15 horsepower, 3600 rpm ball bearing motor which depends on an electro-mechanical governor for its speed regulation. The armature is wired in series with two field windings and the governor contacts. A 250 ohm, 40 watt resistor and a 0.5 mfd capacitor are connected in parallel with the governor contacts. When the contacts are closed, the resistor is shorted out. When the

contacts are open, the resistor is in series with the motor to limit its operating current and reduce its speed. The capacitor serves as a spark suppressor for the governor contacts. Normal starting current is 4.0 amperes, running current 2.9 amperes, and rated torque 18.7 ounce inches.

(2) The LMU4 motor unit is similar in electrical and mechanical design to the LMU14, but is rated at 1/20 horsepower. Normal starting current is 2.0 amperes, running current 1.6 amperes, and rated torque 14.0 ounce inches. The motors should be examined carefully for the part number and electrical capacity data on the identification plate for distinguishing characteristics.

(3) The combination fan and governor is mounted on one end of the motor shaft. The fan draws cooling air through the motor housing and also serves as a mounting plate for the governor slip rings and for the governor contact mechanism (mounted on opposite sides of the fan). Connections to the two slip rings, which are wired to the governor contacts, are made by means of two brushes mounted on the ends of the motor housing. Normally the governor contact spring holds the governor contact against the contact screw (figure 4-105). When the motor shaft exceeds a predetermined speed, the centrifugal force developed on the governor contact briefly overcomes the pull of the governor spring, and the governor contact leaves the contact screw until the motor slows down. The tension on the contact spring may be adjusted to maintain the motor speed at 3600 rpm.

(4) Means are provided to compare the motor speed with a standard in making the contact spring tension adjustment. An aluminum cover fits against the side of the fan and encloses the governor contact mechanism. The outside of the cover is finished in white, with four black stripes equally spaced about its periphery. This serves as a target which should appear to stand almost still at 3600 rpm, when viewed through the moving shutter of a 120 vibrations per second tuning fork.

NOTE

The six spot and thirty-five spot rows serve as targets when using an 87.6 cps tuning fork. The six spot target is used to approach an on-speed setting, and the thirty-five spot is used to arrive at an accurate setting.

(5) The two motor brushes are protected by 0.5 mfd capacitors connected between the brushes and the grounded frame of the motor (figure 4-106). These tend to by-pass any electrical noise created by the brushes as they make

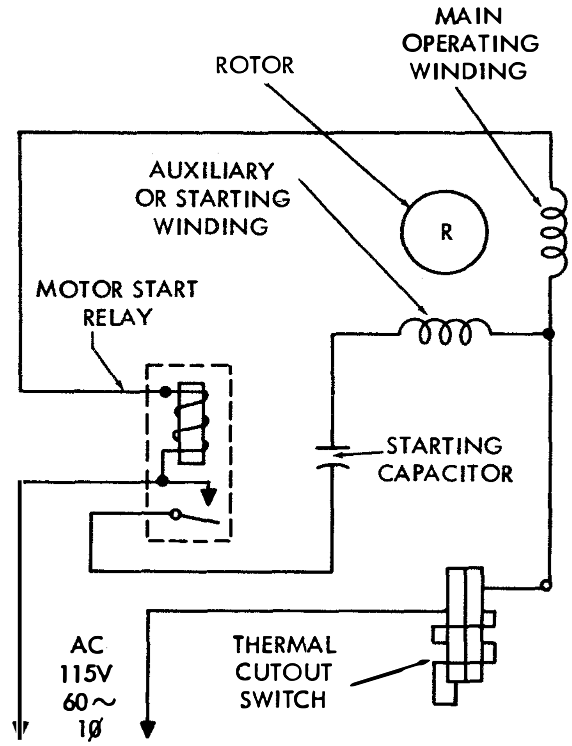


Figure 4-103. AC Synchronous Motor Schematic Wiring Diagram

and break contact with the various segments of the armature commutator. The motor is wired in such a manner that the armature rotates counterclockwise when viewed from the governor end.

(6) The method of mounting the series motor is similar to the method of mounting the synchronous motor (paragraph 4-7a(5). The housing provided on the underside of the mounting bracket contains both the 250 ohm resistor and 0.5 mfd capacitor in the governor circuit, as well as an electrical noise suppressor. The purpose of the electrical noise suppressor in the motor input circuit is to prevent any radio interference which may be generated by the motor from being radiated by the motor power leads. To prevent this disturbance from being radiated directly from any of the motor components or wiring, the entire ac motor is enclosed by grounded metal housings with screened openings. The screening is to permit the circulation of cooling air through the motor and across the governor resistor, and also to permit the target to be viewed when checking the motor speed. A threaded plug provided in the governor shield housing may be removed to permit the insertion of a screwdriver when necessary to adjust the motor speed. Access to the compartment on the underside of the motor may be gained by removing a screw and lock washer and sliding the bottom cover plate aside.

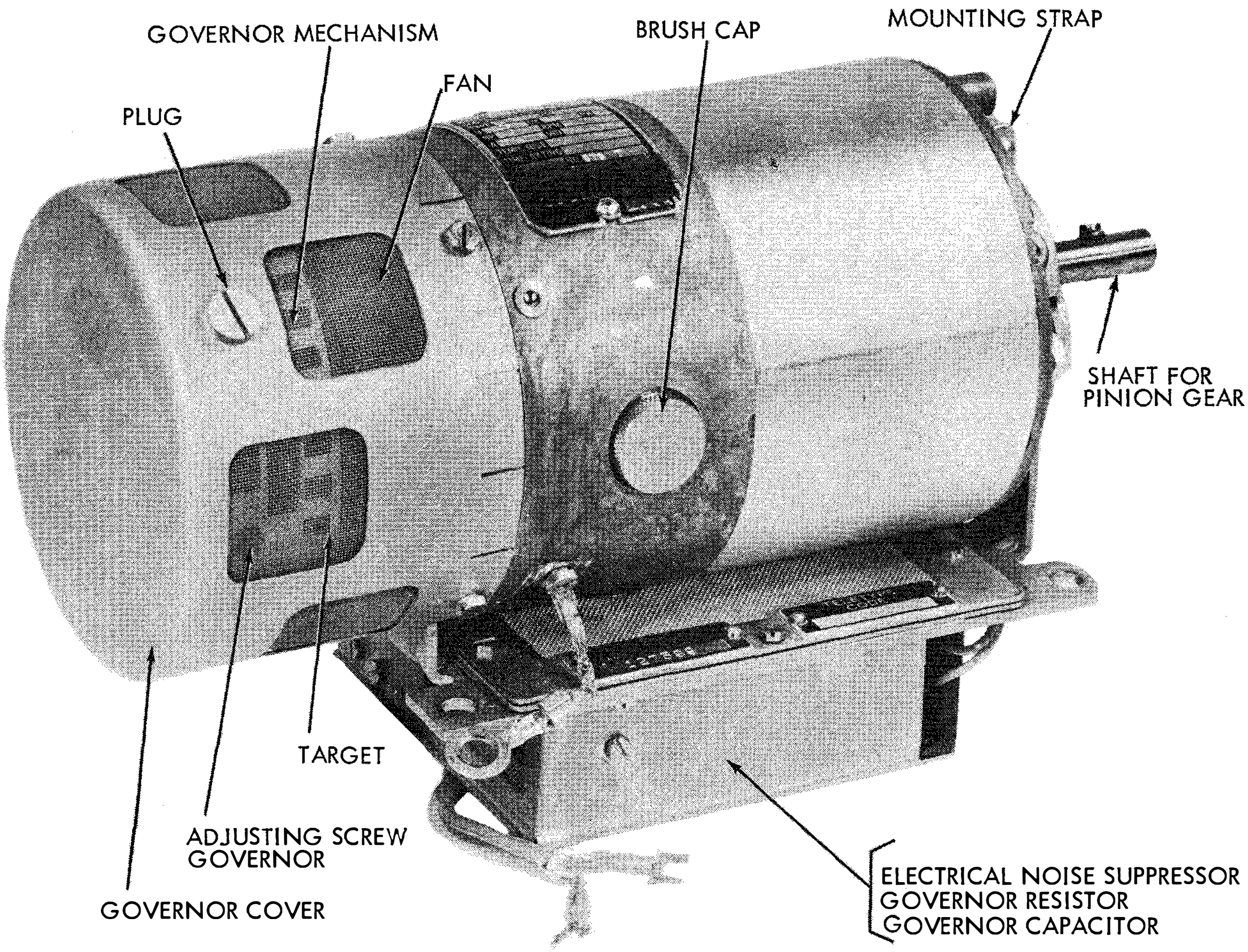


Figure 4-104. AC Governed Motors

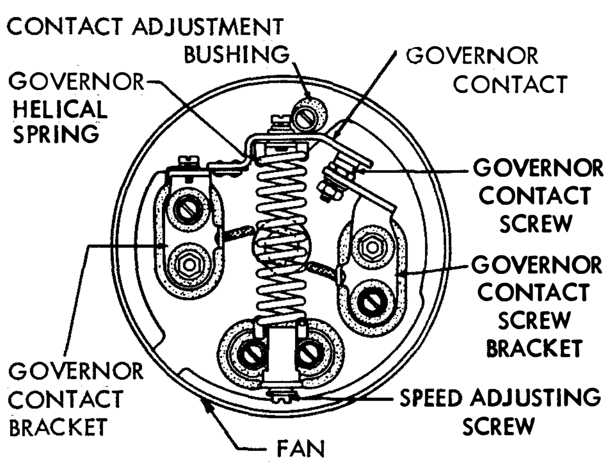


Figure 4-105. Governor for Governed Motor

(7) Motor Unit LMU39 is similar to the LMU14. Motor unit LMU41 is similar to the LMU4. Except the motor cradle has been redesigned on both the motor units to improve heat transfer from the governor resistor to associated mounting base. The governor resistor is mounted to an aluminum plate with bracket which acts as a heat sink to dissipate the heat generated. Some of this heat is transferred into the base to which the motor is mounted for further dissipation.

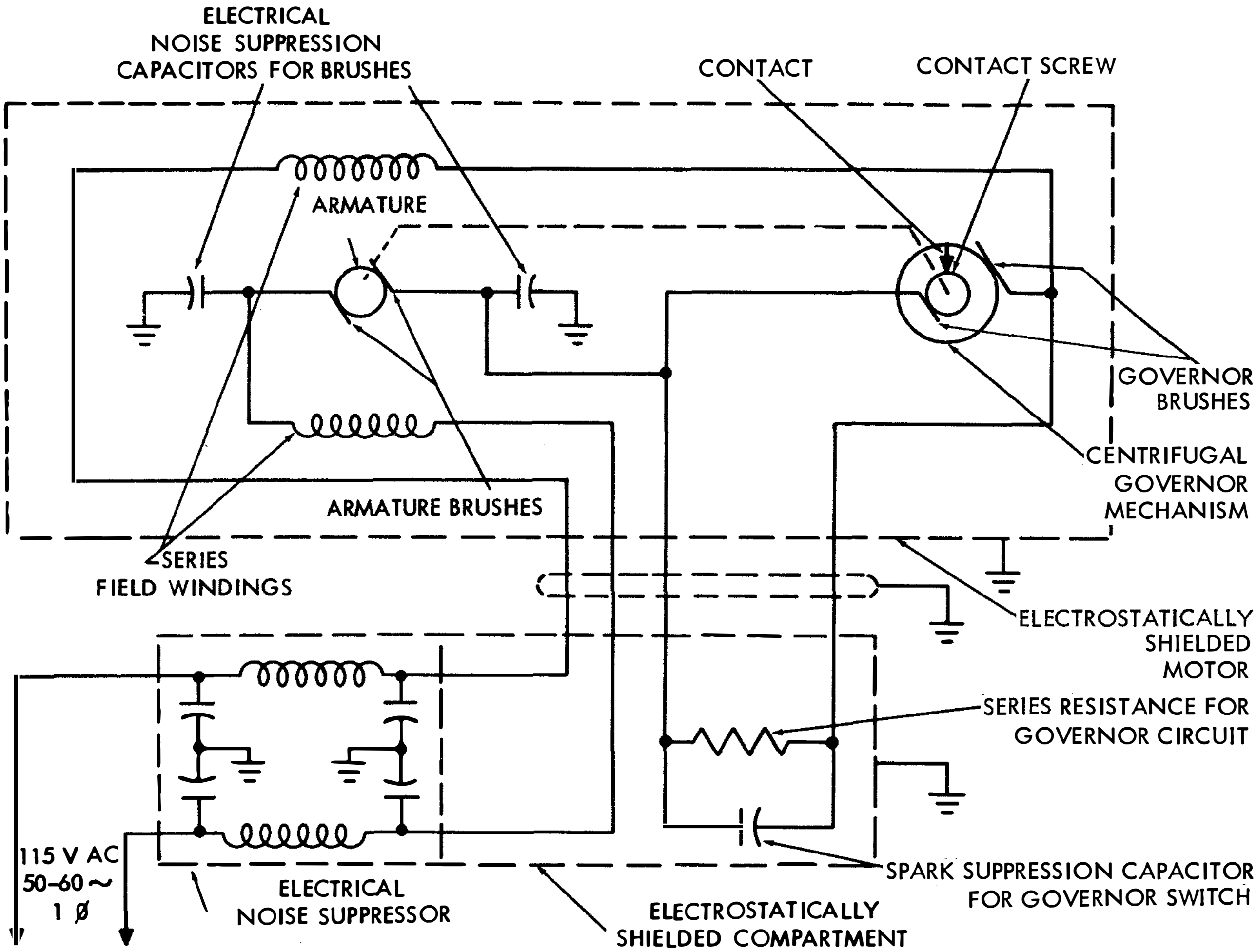


Figure 4-106. AC Governed Motor Schematic Wiring Diagram

4-8. ELECTRICAL SERVICE ASSEMBLIES 173395BR, 173783, 173816BR, 173824, 304203, 304206 AND 304230

a. GENERAL

(1) Each unit is equipped with a selector magnet assembly for signal reception (typing unit LP and typing reperforator LPR) requires an Electrical Service Assembly (ESA) for operation. In automatic send-receive sets (ASR) and floor model send-receive sets (KSR) the electrical service assembly (173783, 173824, 304203 or 304206) mounts inside the cabinet behind the keyboard, and is accessible for servicing without disturbing any of the permanent wiring to the cabinet terminal boards (see figure 4-107). In the rack mounted Receive Only (RO) and Send-Receive (KSR) sets the electrical service assembly (173395BR or 173816BR) is mounted in a separate covered container with the power switch, fuse holder, and monitor jacks brought out to a common panel of the container for accessibility (figure 1-17).

(2) The electrical service assemblies require 115 volt, 50/60 cycle alternating current for proper operation. Power and signal line leads connect to the unit by way of the cabinet terminal blocks. All signal leads are shielded, and all shielding is insulated from the equipment frame. Open lug terminals are used on the ESA cables.

(3) Table 4-1 lists the major differences between the electrical service assemblies. More detailed information can be derived from an inspection of the schematic wiring diagrams contained in Volume 3 of the 270B Manual.

b. RECTIFIER ASSEMBLY - Each Electrical Service Assembly is equipped with a full-wave rectifier, capacitor input type power supply (see figures 4-108 and 4-109). The primary purpose of the power supply is to provide the necessary operating potentials for the electronic keyer circuit and the required current to operate the selector magnets on the typing or reperforator units. All rectifier assemblies, except the 173824, develop 120 milliamperes current at

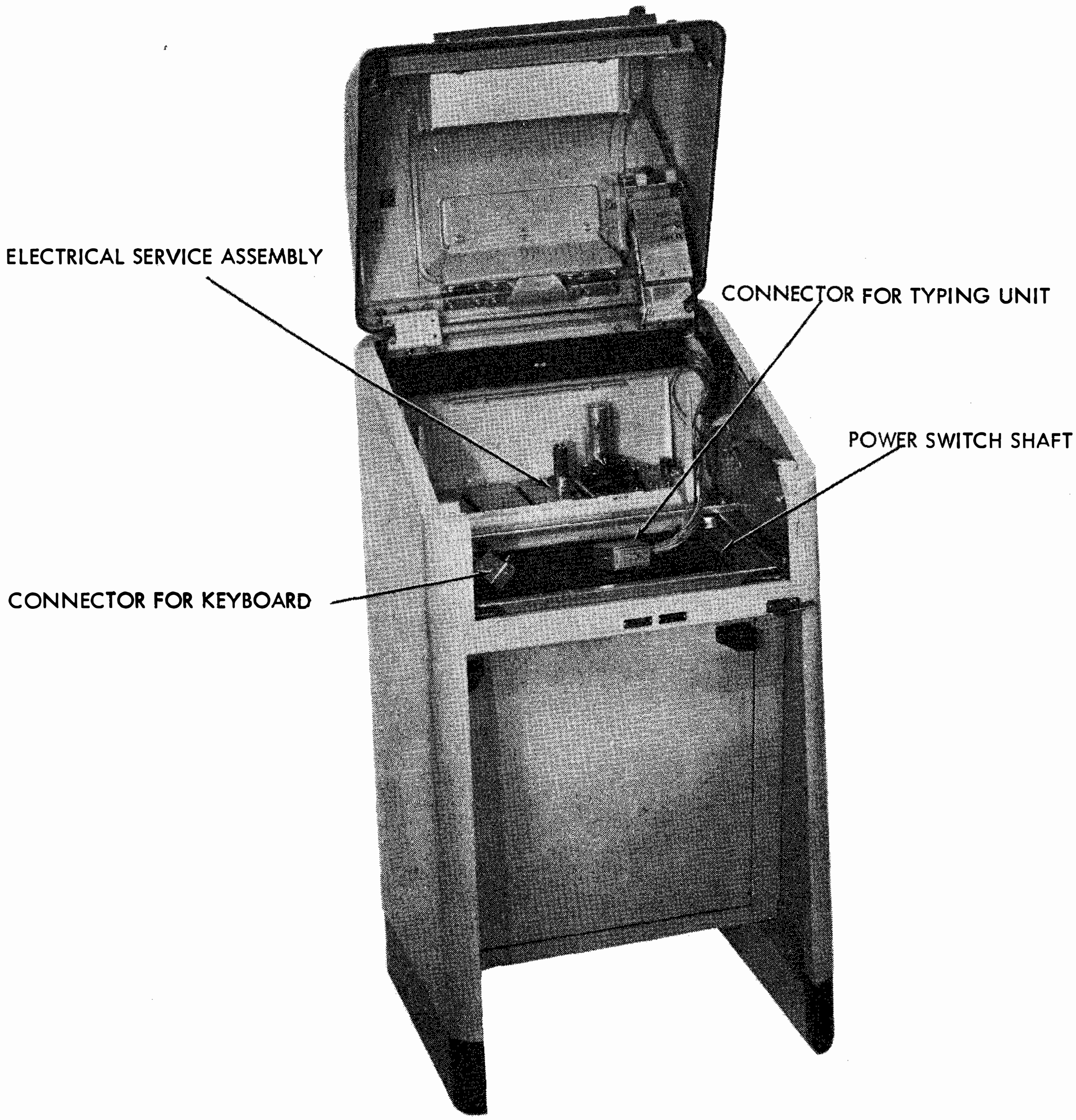


Figure 4-107. Cabinet LAC214BR With Electrical Service Assembly

TABLE 4-1. ELECTRICAL SERVICE ASSEMBLIES

FEATURES	ASSEMBLY			
	173395BR	173816BR	173783	173824
Equipped with cabling for operation of a "normal on-off-maintenance on" switch			X	X
Equipped with cabling to operate "end-of-line" and selector switches				X
Equipped with cabling to operate "margin indicator" switch	X	X	X	X
Mounted in a grey colored metal enclosure	X	X		
Mounted in an open chassis for use in a KSR or ASR set			KSR	ASR
Number of electronic keyers	1	1	1	3
120 MA rectifier supply	X	X	X	
500 MA rectifier supply				X
Power factor condensers		X		

115v dc. Because the 173824 is equipped with three electronic keyers, a rectifier assembly capable of developing 500 milliamperes current at 115v dc is required.

c. ELECTRONIC KEYER ASSEMBLY (Figure 4-110)

(1) The function of the electronic keyer is to repeat signals from a 60 volt dc polar signal line, to selector magnets of the receiving unit in a local neutral loop. The electronic keyer utilizes a 6005 tetrode vacuum tube (or equivalent) and presents a high impedance load to the keying circuit.

(2) When in the "mark" condition, a positive pulse arriving from the signal line is applied directly to the 6005 control grid. The pulse overcomes the bias on the grid and allows current to flow in the plate circuit energizing the selector magnets and attracting the selector armature. The keyer is designed to supply 30 to 35 milliamperes current to the selector coils wired in series with the plate.

(3) When in the "space" condition, a negative pulse arriving from the signal line is applied directly to the 6005 control grid driving the tube into cutoff. With no current flow through the tube, the selector magnets de-energize and release the selector armature.

d. POWER, MOTOR, AND LIGHT CIRCUITS (Refer to Volume 3) - All electrical service assemblies receive power at the cabinet terminal blocks. The grounded side of the power line is not fused or switched, so consequently one side of all the power circuit branches is grounded. The ungrounded side is fused with a slow-blow fuse, which supplies the "on" terminal of the power switch. In ASR and floor model KSR sets the power switch is operated by a fork and shaft linkage connected to the knob at the right of the keyboard. Rack mounted KSR and RO set power switches, on the other hand, mount on a separate enclosure and are operated directly. The power switch supplies power to the motor circuit, rectifier circuit and filament transformer, and to the 5.5 volt ac copy and margin lamp transformer (in the KSR and ASR sets a "normal on-off-maintenance on" switch is located, electrically, between the fuse and the lamp transformer primary). The filament transformer supplies 6.3 volts ac for the electronic keyer 6005 heater circuit.

e. Selector Magnet Driver (Figure 1-23D) - The following description is based on schematic Wiring Diagram 4445 WD and explains the operation of the Selector Magnet Driver.

(1) Basically the Driver operates as follows: Neutral or Polar teletypewriter signals

are applied at its input. These signals are repeated at its output in a form that will effectively operate the selector of a receiving teletypewriter. Direct current for the Drivers circuits is provided by an internal power supply. The transistors are used in the Driver either do not conduct or conduct into saturation. They do not operate at intermediate stages. Thus throughout this discussion they are referred to as being either "ON" (conducting) or "OFF" (not conducting).

(2) The Driver is specifically designed to receive teletypewriter, start-stop signals. These signals are explained in detail in Paragraph 4-1.

(3) BIAS VARISTORS - The elements referred to as "bias varistors" (CR1 through CR5) are used in the circuit to develop transistor bias voltages and low-voltage references that set the input switching level. They consist of two diffused-junction, silicon diodes mounted in opposite directions side by side. They have a forward diode characteristic in either direction and thus their voltage drop varies slightly with the current. At 0.10 a. the drop is 0.8 v. Stabistors CR6, CR7 and CR13 have characteristics similar to varistors, but pass current in only one direction.

(4) INPUT CIRCUIT - The input circuit receives the teletypewriter signals and determines when the Driver shifts from marking to spacing. It includes R1 through R3, bias varistors CR1 through CR5, and transistor Q1. In neutral operation, it keeps the Driver spacing or marking until the line current rises above or drops below the switching value. In polar operation it does the same until the current rises above or drops below zero.

(5) Resistor R1 protects transistor Q1 from high current surges that might damage it. It samples the current flowing into Q1's base, and, if the current exceeds a value of approximately 0.100 a., the voltage developed across R1 and the base-emitter junction exceeds the forward drop of CR1 and CR2, and most of the excess current is shunted around Q1. Since the bias varistors are bi-directional, Q1 is protected for inputs of either polarity.

(6) For 0.020 ampere neutral operation, R2 is disconnected by removing the strap at terminals 1 and 2, and R3, CR3, CR4 and CR5 are left in the circuit. For 0.060 ampere neutral operation, R2, R3, CR3, CR4 and CR5 are all left in the circuit. For polar operation up to 0.030 a., R2 is disconnected by removing the strap at terminals 1 and 2; CR3, CR4, and CR5 are shunted out by placing a strap across points 3 and 4; and R3 alone is left in circuit.

(7) SWITCHING CIRCUIT - Transistors Q2, Q3 and associated components form a snap-action trigger circuit. In the marking condition, Q2 is off and Q3 is on. The opposite exists for the spacing condition. The change from one state to the other occurs at the midpoint value of the input current and is very rapid regardless of the slope of the input wave form.

(8) OUTPUT CIRCUIT - The output circuit, which includes Q4, Q5 and associated components, controls the current in the selector magnet coils. During the space to mark transition, it places essentially the full supply potential across the coils and causes the current to rise rapidly to the operating value of 0.060 a. This rapid rise provides quick selector armature pick-up. Once the operating value is reached, the circuit adds resistance to maintain the operating current. During the mark to space transition, a controlled discharge circuit, which includes CR9 and Q2, rapidly dissipates the coil's energy without developing any high reverse voltage transients that might cause transistor damage.

(9) POWER SUPPLY - The power supply provides d. c. for the Driver's circuits. It includes an isolation transformer, a full-wave rectifier, and single capacitor filter. It operates from a 117 v., 50-60 cps, a. c. source, and provides a nominal d. c. voltage of -40 v. This value provides a safety factor against transistor breakdown under the most unfavorable circumstances of high temperature, high line voltage and maximum line signaling frequency.

NOTE

The actual potential of the negative side of the power supply relative to ground depends on where the signal line is grounded. Relative to the local earth ground, it can have almost any value in the range of +120 v. to -120 v.

(10) SPACING CONDITION - In the spacing condition transistors Q1, Q3 and Q5 are off; Q2 and Q4 are on; and no current flows in the selector magnet coils.

(a) In neutral operation, no current flows in the signal line during spacing. Thus, the base of Q1 is connected to the positive side of the power supply either through R3 alone (for 0.020 a. operation) or through R3 and R2 in parallel (for 0.060 a. operation). Internal current through varistors CR3, CR4 and CR5 places a -2.4 v. bias on the emitter of Q1 and keeps it off. In polar operation (R3 alone in circuit and CR3, CR4 and CR5 shunted), TP1 is positive and TP6 is negative during spacing. Thus the signal line through R1 drives the base of Q1 positive and keeps it off.

(b) The base of Q2 is driven negative with respect to its emitter through resistors R4 and R5 and resistors R7 and R8. Thus Q2 is on, and the voltage drop from its emitter to collector is very small---less than 0.1 v.

(c) The output of Q2 is applied to the base of Q3 through germanium diode CR11. The current flow through CR11 and R6 to the negative side of the power supply causes a maximum drop of 0.4 v. across CR11. Thus the base of Q3 is at most -0.5 v. with respect to the emitter of Q2. Resistor R12 permits sufficient current to flow through CR7 that the latter's voltage drop is at least 0.6 v. Q3's emitter is more negative than its base; thus Q3 is off.

(d) CR10 prevents current from flowing from the collector of Q2 through the selector coils, CR8 and R4 to the negative side of the power supply. Therefore, the selector magnet is not energized in the spacing condition.

(e) The collector of Q2 is connected to the emitter of Q4 and to one side of CR13. The negative side of the power supply through R9 makes the base of Q4 negative in relation to its emitter and keeps it on. A 0.1 v. drop across Q4 is applied to the base of Q5. Because of the voltage drop across CR13 caused by the current flow through CR13 and R13, the emitter of Q5 is at least 0.55 v. more negative than the emitter of Q4. Thus there is a 0.45 volt back bias across Q5 which remains off.

(11) MARKING CONDITION - In the marking condition, Q1, Q3 and Q4 are on; Q2 and Q5 are off; and a current of 0.060 a. flows in the selector magnet.

(a) In both neutral and polar operation, the marking signal places a negative potential on the base of Q1 and keeps it on. Current flows from its collector to the negative side of the power supply through R5 and R4 and through R8 and R7. Current also flows through CR6, CR7 and R12 to the negative side of the supply. A drop of at least 0.65 v. across CR6 is applied to the emitter of Q2. The base of Q2, which is connected directly to the collector of Q1, is about -0.1 v. with respect to the emitter of Q1. Therefore, Q2 has a back bias of 0.55 v and is off.

(b) Since Q2 is cut off, it does not back bias Q3 as it did in the spacing condition (paragraph 4-8.e.(10)(c). The negative side of the supply through R6 puts a negative potential on the base of Q3 and keeps Q3 on. Current flows from the collector of Q3 through CR8 and R4 to the negative side of the supply, and through CR10 and the selector coils to the junction of Q4's emitter and CR13. Since the base of Q3 is only about -0.4 v. with respect to its emitter, the drop of almost 5 v. across Q3, CR10, and the selector coils back biases diode CR11. Q2 is unaffected since it is off and its collector is negative with respect to its base.

(c) Q4 is on and Q5 is off as described in paragraph 4-8.e.(10)(e) above.

(12) SPACE TO MARK TRANSITION - In neutral operation, varistors CR3, CR4 and CR5 places -2.4 v. on Q1 keeping it turned off during spacing (paragraphs 4-8.e.(10)(a)). As the signal line changes from spacing to marking, current begins to flow in the input line and a negative potential is developed across the input resistor(s) (R3, or R3 and R2). Q1 remains off until this current exceeds its mid-point value of 0.010 a. for 0.020 a. or 0.030 a. for 0.060 a. operation. This mid-current value is detected when a voltage slightly greater than -2.4 v. is developed at the base of Q1 turning it on.

(a) In polar operation R3 alone is in circuit and CR3, CR4 and CR5 are shunted. As soon as the current moves slightly beyond zero in the marking direction, it places a negative voltage on the base of Q1 and turns it on.

(b) Q3 turns on, and Q2 turns off under the conditions described in paragraphs 4-8.e.(11)(a) and (b) above. Q2 and Q3 form a trigger circuit which utilizes positive feed back. The collector of Q2 is connected to the base of Q3, and the collector of Q3 is connected to the base of Q2. Q2 through CR11 switches Q3, and Q3 then feeds back to Q2 through CR8 controlling the resistor network of R4 and R5. As the signal changes from spacing to marking, Q1 turns on and causes Q2 to begin to turn off. Q2 in turn causes Q3 to begin to turn on. The collector of Q3 drives the junction of R4 and R5 positive. Less base current is supplied to Q2 which turns off even more. This trigger action removes any point of uncertainty and prevents the Driver from being damaged by locking up on an intermediate point or going into oscillation as the input switching level is crossed.

(c) Initially, the induced voltage of the magnet coil opposes the current flow from the collector of Q3 through the coils to the negative side of the supply. This prevents current from flowing through CR13 and Q4 (which was on during spacing). The collector of Q4 and the base of Q5 move toward the negative supply potential. Q5 is off and its collector is at the negative supply potential. Since its base and collector are negative, the emitter of Q5 also moves toward the negative supply potential.

(d) A short time later, the voltage drop across the coils decreases, and current begins to flow in the coils, increasing nearly linearly with time. The negative terminal of the coils begins to move toward the positive supply potential. The emitters of Q4 and Q5 begin to go positive. Since the negative potential on the collector of Q4 is applied to the base of Q5, the latter turns on as its emitter goes positive and Q4 turns off.

(e) Since R11 is small and Q5 is on, essentially the full supply potential is placed across the coils. The coils' current, limited only by R11 and the small resistance of the coil, increases rapidly. (It aims at point much higher than the desired 0.060 a. operating current.) Thus the operating current is reached very quickly, and effects a fast pickup of the selector magnet armature.

(f) During the spacing condition, Q4 was on and its base was no more than -0.6 v. with respect to its emitter. As described above, during the space to mark transition, the current flow through Q4 drops to almost zero, and its emitter goes toward the negative supply potential. Capacitor C1 holds Q4's base at the conducting potential which is positive with respect to the emitter, and Q4 turns off. Q5 is still on. The base potential of Q4 drops exponentially toward the negative supply as C1 discharges through R9.

(g) Normally the voltage divider network of R7 and R8 places a potential of +10 v. with respect to the negative supply on the anode of CR12 which is back biased. However, during the space to mark transition period, the base potential of Q4 drops exponentially toward the negative supply. When it gets just below the divider's voltage, CR12 becomes forward biased and clamps the base to this value.

(h) As the current begins to flow through the coils, Q4's emitter drops from the negative supply potential until it is more positive than its base, and Q4 turns on. Its collector potential becomes nearly the same as its emitter and is applied to the base of Q5 which turns off. CR12 is again back biased, and the current to Q4's base is supplied through R9 as before. The current flow from the coil to the negative supply is now through Q4 and R10 which limits it to the operating value of 0.060 a. R9 and R13 are essentially in parallel with R10 and help to determine the current's value.

(i) The voltage divider network of R7 and R8 determines the current value at which Q5 turns off and Q4 turns on. The closer the potential on the anode of CR12 approaches the negative supply, the sooner Q5 turns off. Current through the divider network always flows to the positive side of the supply either through the collector of Q1 or the base of Q2. CR12 remains back-biased except for the brief period described above during the space to mark transition.

(13) MARK TO SPACE TRANSITION - As the signal changes from marking to spacing, Q1 and Q3 turn off and Q2 turns on under the conditions described in paragraph 4-8.e.(10)(a). through e. above. The operation of the trigger circuit of Q2 and Q3 is the opposite of that described in paragraph 4-8.e.(12)(b). Q4 remains on and Q5 remains off as described in paragraph 4-8.e.(10)(e).

(a) When Q3 turns off, it no longer supplies current to the selector coils. The coils resist a drop in their current by developing a negative voltage transient at their normally positive end. This transient is passed by CR10, blocked by CR8 and blocked by CR9 until it exceeds the negative supply potential at which time CR9 conducts. CR9 insures that the voltage rating of Q3 is not exceeded by clamping it at about -40 v.

(b) Q2 holds the normally negative end of the coil at near positive supply potential when Q3 turns off. A constant potential of about 35 v. is thus placed across the coils. The rate at which the current through the coil decreases is constant.

(14) BLINDING - A receiving teletypewriter is "blinded" when it does not respond to the line signals, i.e. it does not print or perforate the information being transmitted on the line. To effect blinding, the selector is kept steadily marking regardless of the line signals. Blinding can be accomplished in a number of ways depending on the specific application, but may be considered in two categories based on whether or not it is necessary to monitor the signal line while the equipment is blinded.

(a) MONITORED SIGNALS - If it is necessary to monitor the line signals, the Driver can be blinded as follows. The collector of Q1 is disconnected from the base of Q2 by removing the strap between terminals 5 and 6. Terminal 6 is then connected (by relay contacts etc.) to the positive side of the power supply at terminal 4 through a 50 OHM resistor. Because of the drop across CR3, CR4, CR5, CR6 and CR7, a back bias of about 3.2 v. is placed on Q2. Thus Q2 is off, Q3 is on, and the Driver is locked in the marking condition regardless of the line signals (see paragraph 4-8.e.(11). By auxiliary circuits not part of the Driver, the line signals can still be monitored at terminal 5. Normal operation of the Driver can be restored by externally reconnecting terminals 5 and 6 and disconnecting the 50 OHM resistor between terminal 6 and the positive side of the power supply.

(b) Blinding can be accomplished either manually or automatically. For example, the stunt box of a Page Printer (which would be receiving the line signals through its own selector) could be arranged so that its contacts would blind the Driver of a Reperforator at the receipt of a certain character sequence, and would unblind it at the receipt of another sequence. Thus the Reperforator could be made to ignore certain traffic.

(c) UNMONITORED SIGNALS - If it is not necessary to monitor the line signals, a simpler method of blinding may be used. Terminal 6 is connected to the power supply (signal line) at terminal 4 through a 50 OHM resistor and the strap between 5 and 6 is not removed.

(d) This approach is feasible providing that the reduced input resistance will not disturb external circuits that operate into the Driver.

(e) PURPOSE OF 50 OHM RESISTOR - The 50 OHM 1 watt resistor connected between terminals 6 and 4 prevents damage to Q1 in the event the signal line current exceeds the value for which the input resistors are strapped.

(15) VARIATIONS - SELECTOR MAGNET CONNECTIONS - The circuits of the Driver are designed for connecting the two selector coils in parallel to reduce required d.c. voltage and to reduce the overall self-induced voltage when the coils' current is increasing or decreasing. Operation with the coils in series will not harm the Driver, but will reduce signal margins. It is not recommended.

(a) INPUT RESISTANCE - For the signal line, the input resistance of the Driver varies in accordance with the polarity and magnitude of the input current. For example, the input resistors of 124 and 249 ohms are in parallel for 0.060 a. operation and have an effective measured value of 83 ohms. This is the input resistance for the signal line as long as the line current is below the switching level, i.e. the level where Q1 turns on (0.030 a.)

(b) When Q1 does turn on, however, the voltage across the 83 ohms is held at approximately 2.9 v. by the clamping action of Q1, CR3, CR4 and CR5 even though the current is increasing. Thus the resistance is decreasing: e.g. at 0.060 a. the actual effective value is 48 ohms, or about one half of the measured value of 83 (2.9 v./0.060 a. = 48 ohms). The corresponding effective resistance for 0.020 a. operation is 145 ohms.

(c) This variation in input resistance can lead to discrepancies between the computed and actually required values of signal line series resistance. For example, assume a ten-station teletypewriter loop, 0.060 a. operation, 120 v. line battery, and ignore the resistance of the signal line itself. Basing the values on ohmmeter or bridge measurement, the total resistance in the circuit would thus be 83 x 10 or 830 ohms. The total required resistance would be 120/0.060 or 2000 ohms. The battery station would thus require 2000-830 or 1170 ohms of series resistance. However, in light of paragraph 4-8.e.(15)(b) above, actually the effective value of the input resistance at the marking current value is approximately one-half of the measured value, or 480 ohms. If 1170 ohms, as computed above, is used at the battery station, the total effective line resistance will be 1170 + 480 of 1650 ohms, and the resulting line current will be 120/1650 or 0.073 a. Thus the series resistance actually required at the battery station to give 0.060 a. of line current is 2000-480 or 1520 ohms.

(d) If line resistance is checked with line current of reversed polarity as in polar operation, a similar discrepancy appears. Since Q1 does not conduct when the polarity is reversed, the input resistance seems to be higher. Consequently, it is difficult to obtain equal current for marking and spacing on polar circuits, unless each is set independently of the other.

(e) With the Driver strapped for polar operation, the computed input resistance for marking is R1 + (0.4 v.)/0.030 a. or 10 + 13.3 = 23.3 ohms. (0.4 v. is the Q1 emitter to base drop). For spacing, the computed input resistance is 1.6 v., the drop across CR1 and CR2, divided by 0.030 a. or 53 ohms.

4-9. EQUIPMENT ENCLOSURES LAAC229BR, LAC214BR, LPC206BR AND LBAC255BR

a. GENERAL - The principal purpose of the equipment enclosures is to house the teletypewriter components. The enclosures have been

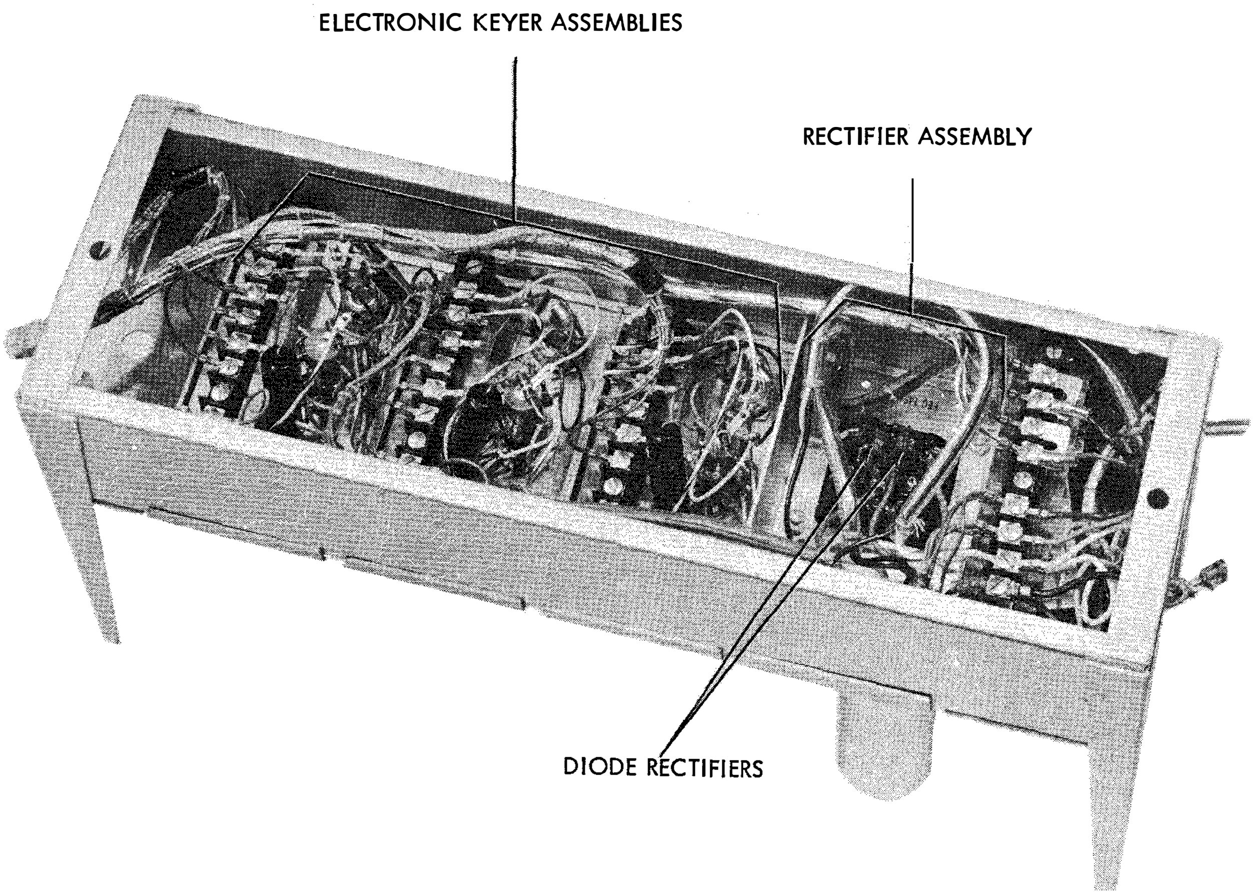


Figure 4-108. Electrical Service Assembly 173824 (Bottom View)

engineered to provide convenient access to areas requiring attention in operation or maintenance. Operating noises are reduced to a minimum by use of sound absorbent materials as cabinet lining and by shock-mounting components. All equipment signal leads are shielded, and all shielding is insulated from equipment frames. Because all of the teletypewriter components are grounded to the cabinets, a good external ground connection with the cabinets is essential to proper operation.

b. CABINET LAAC229BR

(1) GENERAL - The LAAC229BR Cabinet is used for all Automatic Send-Receive (ASR) sets. The cabinet houses a keyboard, typing unit, two motor units, two typing reperforators, a transmitter distributor, and an electrical service assembly in the upper compartment (figure 3-3). The keyboard and transmitter base are located on a cradle which mounts on the upper shelf. Behind and to the right of the cradle is the electrical service assembly. Where necessary, a modification kit is supplied for raising the level of the cabinet ten inches, positioning the keyboard and transmitter distributor at a convenient height for stand-up operation (see figure 1-1). The cabinet is equipped with four leveling feet for mounting purposes. Power factor correction capacitors, when used, are located in the lower compartment of the cabinet.

(2) DOME - A hinged dome attaches across the full length of the back of the cabinet shell. The weight of the dome is supported by adjustable torsion bars crossing from one corner of the dome to the opposite corner of the shell, and adjusted by an eyebolt and nut on the side walls of the cabinet. There are four access doors and a hinged copy window on the dome. The right door provides access to the typing unit paper supply and paper feed mechanism. The window at the right opens for access to the type box and ribbon mechanism. The left front dome door, with two windows for inspection of tape preparation, opens for access to the typing reperforator. The center door provides access for typing reperforator tape container service. The left rear dome door, which opens only when the center door is raised, provides access to the transmitter distributor base and to the auxiliary typing reperforator equipment. Spring latches, moved either to the left or right, release the dome doors. A small black button on

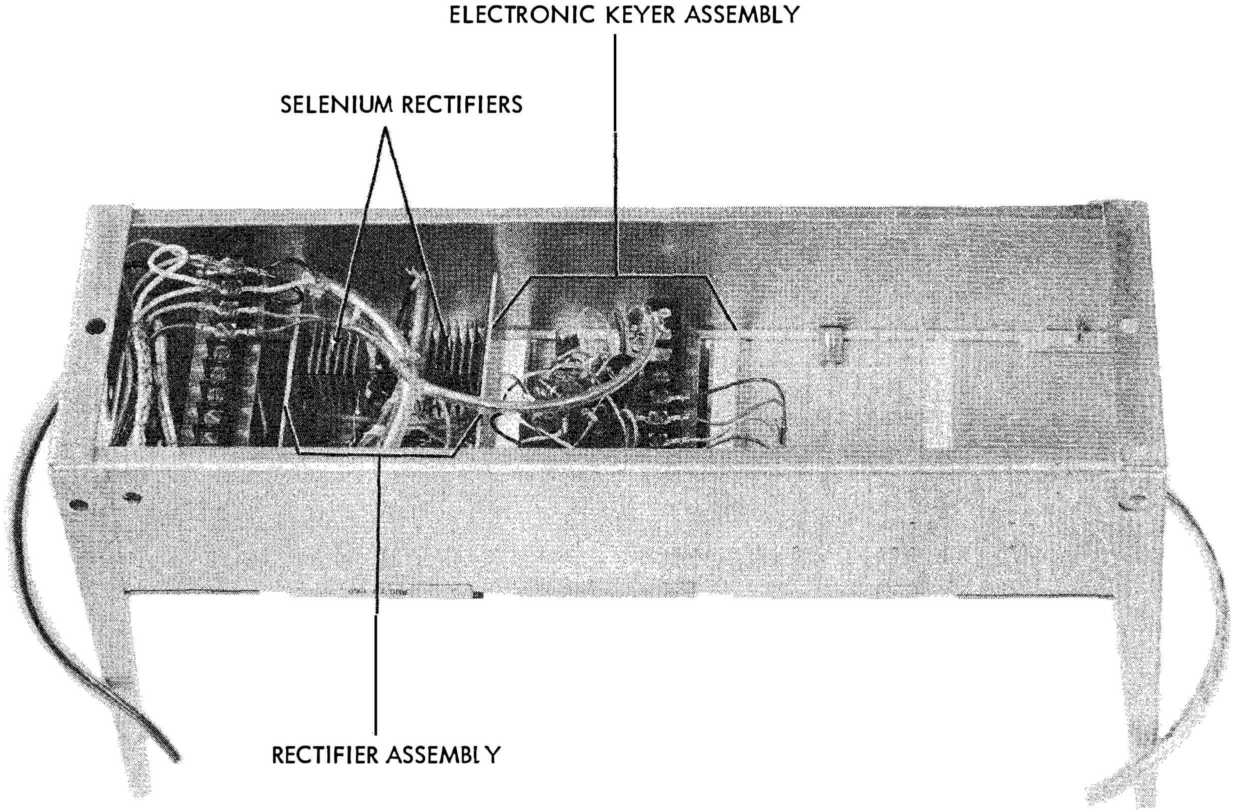


Figure 4-109. Electrical Service Assembly 173783 (Bottom View)

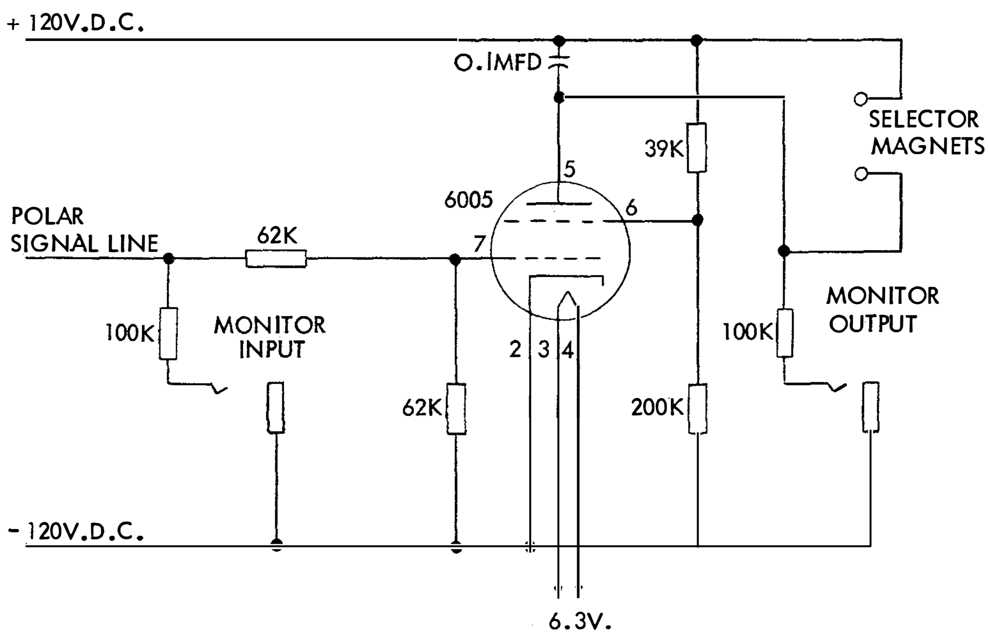


Figure 4-110. Electronic Keyer Schematic

either side of the dome releases the dome latches for opening the dome. At the left side of the dome is an auxiliary control panel containing an access hole for tape feed from the tape chute, and a "tape feed-out button".

(3) FRONT PANEL - The front panel encloses the transmitter distributor, which protrudes from the left of the cabinet on its base. A sliding housing covers the front of the transmitter distributor, latching at the sides of the front panel. A cross bar encloses the keyboard and character counter at the right of the cabinet.

(4) CRADLE - The two short side rails of the cradle are shock mounted to the shelf of the cabinet. Front and rear cross rails are mounted in elongated mounting screw slots to the side rails. Loosening the four screws which fasten the cross rails permits sliding the equipment mounted on the cradle forward slightly for servicing, when the cabinet front panel and cross bar have been removed. An eccentric detent on each side rail establishes the correct repositioning of the cross rails when they are pushed back into the cabinet. Two positioning rails, installed on the cross rails, establish the location for the keyboard and typing reperforator at the right of the cradle. The transmitter distributor base mounts in three tapped screw holes in the front and rear cross rails at the left of the cradle. The auxiliary base is held above the transmitter distributor base on two studs positioned in the rear cross rail and a shorter stud mounted on the transmitter distributor base.

(5) ELECTRICAL SERVICE CONNECTIONS (See figure 2-7) - Eight terminal blocks mounted on four terminal boards, at the rear of the cabinet, provide connections for incoming power and signal lines and for cable terminals from the electrical service assembly.

(6) LAMPS AND INDICATORS - Connection for three copy illumination lamps, two for the page printed copy and one for the typed perforated tape in the typing reperforator, are factory wired to the step-down transformer at the back of the cabinet.

(a) A three position switch under the dome at the left side of the right dome door controls the copy illumination lamps. In the "OFF" position, the lamps are disconnected from the power circuit. In the "MAINTENANCE ON" position they are on continuously, regardless of the condition of the main power switch, and illuminate the equipment for maintenance purposes. In the "NORMAL ON" position, the lamps are on only when the main power switch is "ON".

(b) A margin indicator or end-of-line indicator lamp in the right side of the cabinet dome is actuated either by the margin indicator switch or by the end-of-line switch, depending on the mode of operation. It is wired to the transformer in the cabinet.

(7) COPY AND DIRECTORY HOLDERS - An adjustable copy holder line guide is located immediately above the keyboard on the cabinet dome. The line guide is spring loaded to maintain the manually set position on the page and to hold the page to the dome. An additional copyholder, with a similar line guide, is furnished on a bracket mounted to the right side of the cabinet. A directory holder is located on the left side of the cabinet.

(8) CHAD DISPOSAL - Provision is made for the disposal of chad from the tape perforated by the keyboard and auxiliary reperforators. Chad chutes, extending from the reperforator punch blocks, guide the chad into a common container mounted below the cabinet upper shelf. The chad container is accessible by opening the lower compartment door panel, and should be emptied whenever a roll of tape is replaced in either reperforator tape container.

NOTE

Failure to empty the chad container when replenishing the tape supply can result in equipment failure due to chad backing up in the chutes and fouling the punch mechanism.

c. CABINET LAC214BR

(1) GENERAL - The LAC214BR is used for all floor model Send-Receive (KSR) sets (figure 2-5). The cabinet houses a keyboard, motor unit, typing unit, and electrical service assembly in the upper compartment. Where necessary, a sub-base modification kit is available for raising the level of the cabinet ten inches positioning the keyboard at a convenient height for stand-up operation. Four leveling feet are supplied with the cabinet for mounting purposes. Power factor capacitors, when used, are located on the floor of the upper compartment of the cabinet under the keyboard.

(2) DOME - A hinged dome attaches across the full length of the back of the cabinet shell. The weight of the dome is supported by two counter-balanced arms, one on each side of the cabinet. The dome is latched in the closed position, and may be opened by operating the push button located on the right front surface of the dome (see figure 2-5). Access to the typing unit paper supply and paper feed mechanism is provided by the door on top of the dome. Op-

erating the push button located on the right top surface of the dome unlatches the access door. A copy window, for viewing the printed copy, is located on a slightly tilted surface directly in front of the access door. The rear edge of the window serves as a tearing-off edge for the copy. A copyholder tray, on the front surface of the cabinet above the keyboard, is equipped with an adjustable combination line guide and paper retainer.

(3) ELECTRICAL SERVICE CONNECTIONS - Three terminal boards provide connections for incoming power and signal lines, and for cable terminals from the electrical service assembly. Two terminal boards are located at the rear of the cabinet, and the third board is mounted on the right wall near the front.

(4) LAMPS AND INDICATORS - Connections for two copy illumination lamps and a margin indicator lamp are factory wired to the step-down transformer in the cabinet. The margin indicator lamp is actuated by the margin indicator switch on the keyboard. The three position switch under the dome on the right controls the copy illumination lamps. In "MAINTENANCE ON" position, the lamps are continuously lighted, regardless of the condition of the main power switch, illuminating the equipment for maintenance purposes. In the "NORMAL ON" position the lamps are lighted only when the main power switch is "ON". The center "OFF" position disconnects the lamps from the power circuit.

(5) LOWER COMPARTMENT DOOR (Figure 2-5)

(a) The lower compartment door of the cabinet can be used as a maintenance tray when necessary. The door is removed by loosening the top fasteners holding the door closed, and removing the spring loaded rod which acts as the door hinge. Removing the hinge is accomplished by pushing the rod to the right against the spring until the left end of the rod clears its retaining hole. The rod can then be freed from the right retaining hole and the door removed.

(b) With the printer out of the cabinet, the bottom edge of the door is inserted under the terminal block mounting strip (inside door surface up). Lower the top of the door until its handles rest on the cross bar assembly. The rear of the door will then rest on the rubber bumpers mounted on the electrical service assembly front legs. The rubber bumpers are furnished with the cabinet, and are located in the cloth bag tied to the hinge rod.

d. CABINET LPC206BR (Figure 2-2)

(1) GENERAL - The LPC206BR cabinet is used for all rack-mounted Send-Receive (KSR) and Receive - Only (RO) sets. The cabinet houses only a typing unit, keyboard or base, and a motor unit. Two holes are provided in the rear of the cabinet base for entrance of signal and power line circuits. The base is equipped with rubber feet and mounting facilities suitable for table top or mounting plate installation. A cradle is provided for mounting the teletypewriter units, and attaches to the cabinet base by means of four resilient shock mounts. Power factor correction capacitors (when used) and the electrical service assembly are housed in a separate covered container.

(2) DOME - The dome of the cabinet is latched in the closed position, and may be opened by pulling upward on the small knobs mounted at either side of the copy window. The rear edge of the window serves as a tearing-off edge for the paper. A copy holder tray, on the front surface of the cabinet, is equipped with an adjustable combination line guide and paper retainer.

(3) LAMPS AND INDICATORS - Two copy illumination lamps and a margin indicator lamp are factory wired to a step-down transformer located on the left wall of the cabinet cover. The margin indicator lamp is actuated by the margin indicator switch on the keyboard or base. Power is supplied to the lamp circuit only when the main power switch is "ON".

e. DOLLY 173861 (See Figure 4-111) - The Dolly is a frame of welded rectangular steel tube construction. It mounts a rubber wheeled caster at each of its four corners and has four brackets, one welded diagonally across each corner behind the casters, to support the LAC-214 cabinet. The cabinet recesses down into the frame where it rests on the brackets. The rear casters on the frame are fixed while those at the front swivel 360 degrees for maneuverability. The frame is approximately 23-3/4 inches wide across the front, 24 inches deep and 5-5/8 inches high. The cabinet, when resting in the frame, is raised about 1-1/4 inches off the floor.

f. PAPER WINDER PW201BR (See Figures 1-25 and 3-12) - The Paper Winder is used to automatically wind printed copy on a cylinder as it emerges from the cover of the teletypewriter set. The paper winder mounts at the rear of the teletypewriter set where the winder cylinder, driven by a motor by way of a friction clutch, keeps a constant tension on the paper and rolls it up as the copy is fed out by the typing unit. The motor is a universal type,

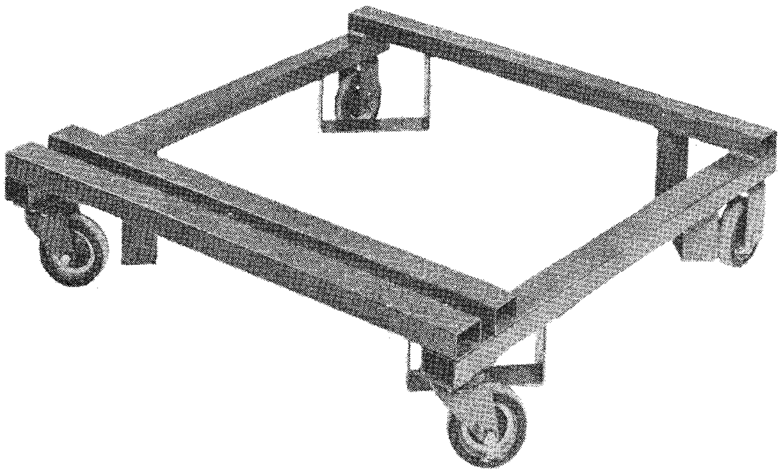


Figure 4-111. Dolly 173861

series wound, with gear reduction for 60 rpm. operation on 115 volts 60 cycles or 115 volts dc at 0.15 amperes. The cylinder can be removed from the winder frame by operating the latch on the support bracket and lifting the assembly up and away from engagement with the clutch arm. The hub on the left end of the cylinder can be pulled off to permit easy re - moval of the roll of typed copy. A slack rod, positioned below and in front of the cylinder and around which the typed copy is routed, serves to keep the copy tensioned properly and winding evenly. A power switch to control the winder motor is located on the motor mounting plate.

g. CABINET LBAC255BR

(1) GENERAL - The LBAC255BR Cabinet is designed to house all the components of the Multiple KSR and RO Set.

(2) The outer shell consists of a base assembly, right and left side panel assembly, a rear panel assembly, top assembly, door for the lower section of the cabinet, and three hinged covers for the typing units. Each cover contains a window which permits viewing of copy being printed and also provides a tearing edge. The upper two covers are equipped with push buttons which will operate the line feed and carriage return functions of the typing unit. The line feed and carriage return functions of the bottom typing unit are operated through its keyboard base. A top fixed cover mounts the switch and lamp panel. A switch and lamp panel which mounts 3 power switches and two indicator lamps.

(3) The inner frame assembly consists of a frame assembly, a plate floor at the base of the frame assembly which mounts the mounting panel assembly, a mounting panel assembly which mounts the electrical service assembly.

(4) The electrical service assembly provides three selector magnet drivers (one for each typing unit). Three copy light transformers. One transformer for the copy light system for each level. The copy light transformer for each level is under control of the power switch for that level. Three fuses and fuse holders. One for each AC circuit for each level. One main power switch for the AC power to the cabinet. Four control relays. One to control each typing unit and one to control output from keyboard signal generator. Three adjustable resistors. One for each incoming line to trim the current. Two 120 point terminal blocks, three 10 point terminal boards for making connections between the electrical service assembly and cabinet wiring.

(5) Three sets of slides. The upper two sets of slides mount two plate base assemblies. The lower set of slides provide mountings for a keyboard and paper winder. The two plate base provide mountings for the typing unit, motor, paper winder, intermediate gear shaft assembly, necessary connectors and wiring.

(6) The cabinet accommodates the following methods of paper handling. Single copy paper, fed out and torn off. Single copy paper, displayed on a copy display rack and wound on a motor driven paper winder. Two-ply paper with the first copy torn off and the second copy displayed wound on a motor driven paper winder.

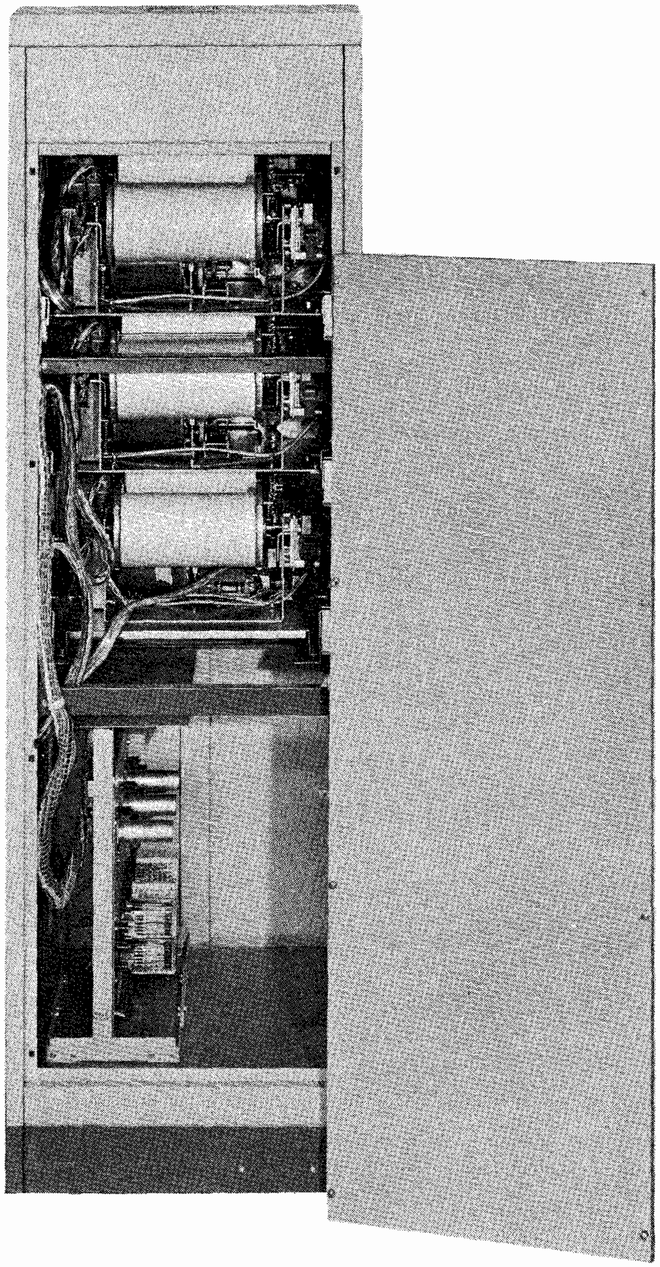
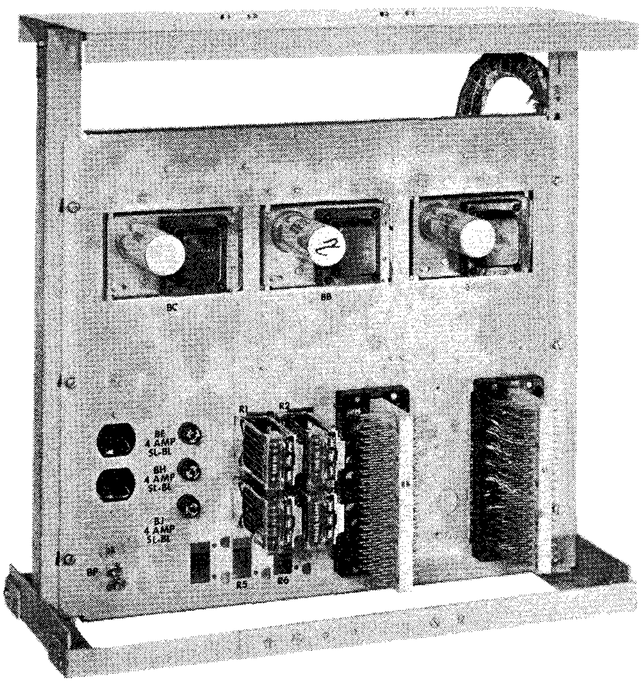
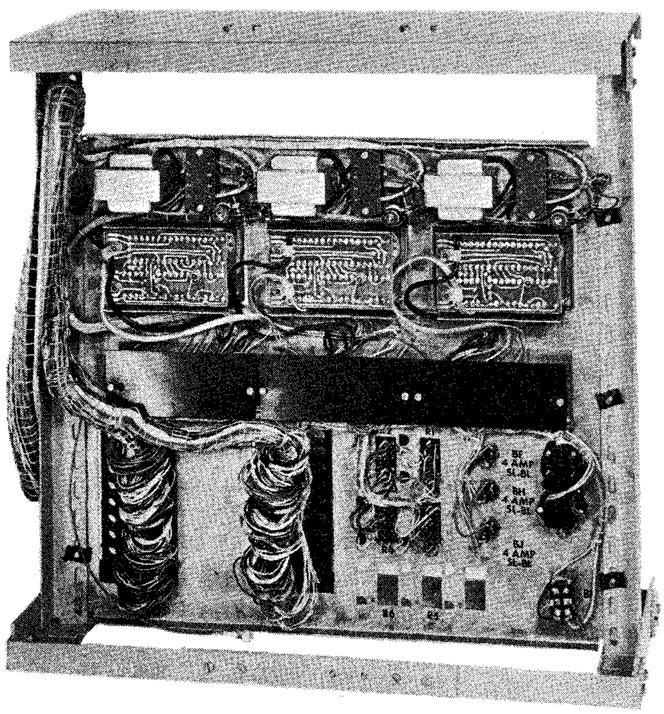


Figure 4-112. Multiple Keyboard Send-Receive (KSR) and Receive Only (RO) Set (Rear View)



(LEFT SIDE VIEW)



(RIGHT SIDE VIEW)

Figure 4-113. Electrical Service Assembly (304230)
(Left and Right Side Views)

SECTION 5
ADJUSTMENTS AND LUBRICATION

5-1. GENERAL - This section provides the adjustment and lubrication information for the operation of the Receive-Only (RO), Send-Receive (KSR), and Automatic Send-Receive (ASR) Teletypewriter Sets. The section also makes reference to and is directly related to Section 6 of this manual, Service and Repair, for the proper maintenance and repair of the equipment.

5-2. ADJUSTMENTS AND SPRING TENSIONS

a. GENERAL

(1) In the adjustment and spring tensions covered in this section, location of clearances, position of parts, and point and angle of scale applications are illustrated by drawings. Requirements and procedures are set forth in the texts that accompany the drawings. The adjustments are arranged in a sequence that should be followed if a complete readjustment of the unit were undertaken. A complete adjusting procedure should be read before making the adjustment or testing spring tension.

(2) Tools required to make the adjustments and check the spring tensions are not supplied with the equipment, but are listed in Teletype Bulletin 1124B.

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

(4) REMOVAL OF MECHANISMS - Where adjustment instructions call for removal of components, assemblies, sub-assemblies or parts refer to Section 6, Service and Repair. If parts are removed, all adjustments which the removal of these parts might facilitate should be made before the parts are replaced, or as the equipment is reassembled. When a part mounted on shims is removed, the number of shims at each mounting screw should be noted, so that the identical pile-up can be made when the part is replaced. Unless it is specifically stated to the contrary, after an adjustment has been made, all nuts and screws that were loosened should be tightened.

(5) ELECTRICAL CONTACTS - All contact points should meet squarely. Contacts with the same diameter should not be out of alignment more than 25 per cent of the contact diameter. Always check contacts for pitting or corrosion and clean or burnish contacts before making a specified adjustment or tolerance measurement. Avoid sharp kinks or bends in the contact springs.

NOTE

Keep all contacts free of oil and grease.

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

NOTE

When clutch shafts are rotated manually, clutch will not fully disengage. Where a procedure calls for disengagement, rotate clutch to its stop position, apply a screw driver to cam disk stop lug, and turn disk in the normal direction of shaft rotation until latch lever seats in its notch in disk.

(7) MANUAL OPERATION - When an adjustment requirement calls for setting up a static equivalent of any operational cycle, the components may be operated manually. Rotate the input shaft in the direction it would move under power. This may be determined by tracing shafts and gear trains to the applicable motor. The direction of movement of the motor shaft is counterclockwise, as viewed from the fan end of the motor.

(a) TYPING UNIT - To operate the typing unit manually while removed from the keyboard, hold the selector magnet armature operated by means of an armature clip (described in Teletype Bulletin 1124B), and rotate the main shaft in a counterclockwise direction (by means of a handwheel described in Teletype Bulletin 1124B and not furnished with this equipment) to bring all clutches to their stop positions. Fully disengage all clutches, as described in paragraph 5-2a(6). Release the armature momentarily, to permit the selector clutch to engage. Turn the main shaft slowly until the No. 5 selector lever has just moved to the peak of its cam. Strip from the selector levers the push levers which are spacing in the code combination to be selected. The selector levers move in succession, starting with the inner lever (number one). Continue to rotate the main shaft until all operations initiated by the selector action clear through the unit.

NOTE

The armature clip is attached to the armature by carefully inserting the flat-formed end of the clip over the top of the pole pieces and hooking the extruded projection under the edge of the armature. The top end of the clip should then be hooked over the top of the selector coil terminal bakelite guard. The spring tension of the clip will hold the armature in the marking (attracted) position.

(b) KEYBOARD - Set up desired conditions by depressing the appropriate keylever. In the (K) and (K-T) mode of operation, determined by the keyboard selector switch, the operating cycle is completed by rotation of the signal generator shaft. Check in the (T) position without removing the typing reperforator from the keyboard. In the (T) position the operating cycle is completed by rotating the typing reperforator jack shaft.

(c) TYPING REPERFORATOR (LPR36 AND LPR57) - Rotate the jack shaft clockwise until the clutch disengages. Trip clutch by pivoting main trip lever counterclockwise (see figure 5-77). Unlatch punch slides corresponding to the marking elements of the code combination to be selected (see figure 5-88). The slides are numbered 1 to 5, from rear to front. Rotate the jack shaft until the required condition is set up, or the code combination selected is processed through the unit.

(d) AUXILIARY TYPING REPERFORATOR (LPR35) - Set the code combination to be selected as described in paragraph 5-2a(7)(a); rotate the main shaft counterclockwise.

(e) TRANSMITTER DISTRIBUTOR - Rotate the main shaft in a clockwise direction. Hold the clutch magnet armature attracted to the core. Depress code sensing pins corresponding to the marking elements in the code to be selected, and continue rotation of the main shaft, noting the marking or spacing response transmitted to the signal generator toggle link.

CAUTION

The covers may be removed for inspection and minor repairs of the teletypewriter components if the utmost care is exerted to avoid contact with moving shafts, gears or mechanisms. Avoid loose fitting clothing or neckties, which could become entangled in moving apparatus. If more extensive maintenance is to be undertaken, it is recommended that the equipment be disconnected from its power source as a safety precaution.

(f) THERMAL CUT-OUT SWITCH (SYNCHRONOUS MOTORS) - Should the rotor of the synchronous motor (keyboard or auxiliary) become blocked for several seconds, due to an overload, the thermal cut-out switch will interrupt power to the motor until the manual reset button is depressed. Allow at least 5 minutes for the motor to cool before attempting to reset the switch and start the motor.

b. COMPONENT ADJUSTMENT SEQUENCES

(1) TYPING UNIT - The following typing unit adjustments, figures 5-1 through 5-58, are common to all the sets covered by this manual. When making a complete adjustment of the typing unit perform the following conditioning operations first to prevent damage to the unit.

(a) Loosen the shift lever drive arm clamp screw (figure 5-10).

(b) Move the right and left vertical positioning lever eccentric studs (figures 5-23 and 5-24) in the rocker shaft brackets to their lowest position.

(c) Loosen the two bearing stud mounting screws and the two connecting strip clamp screws in the horizontal drive linkage (figure 5-30).

(d) Loosen the clamp screws and move the reversing slide brackets to their uppermost position (figure 5-29).

(e) Loosen the function reset bail blade mounting screws (figure 5-28).

(f) Loosen the carriage return lever clamp screw (figure 5-35).

(g) Loosen the clamp screws on the oscillating rail slide (figure 5-25).

(h) Loosen the reversing slide adjusting stud (figure 5-29).

(i) Loosen the shift code bar guide plate mounting nuts (figure 5-27).

(2) BASE AND/OR KEYBOARDS - The standard base and keyboard adjustments are described in figures 5-59 through 5-81A.

(3) TYPING REPERFORATORS LPR36 AND LPR57 AND AUXILIARY TYPING REPERFORATOR LPR35.

(a) TYPING REPERFORATOR LPR36 AND LPR57 - The standard adjustments of typing reperforator are described in figures 5-82 through 5-119A. In addition, adjustments in figures 5-75 through 5-81A are related to the keyboard, when the equipment is operated in (T) position. Recheck these adjustments after installation of typing reperforator on the keyboard. Figures 5-119B through 5-121D are related to the character counter adjustments, both early and latest designs, for LAK21BRW/ LPR36BWA and LAK33BRW/LPR57BWA combinations. The power backspace mechanism associated with LAK33BRW/LPR57BWA and LAK47BRW/LPR57BRP, is covered in adjustment figures 5-81A and 5-122B through 5-122E.

(b) AUXILIARY TYPING REPERFORATOR LPR35 - Standard adjustments for typing reperforator are described in figures 5-82 through 5-119A. Figures 5-123 through 5-133 cover LPR35 Remote Control Non-Interfering Letters Tape Feed-Out Mechanism. Adjustments in figures 5-134 through 5-136 are related to typing reperforator base and should be rechecked after installation of typing reperforator on the base.

(4) TYPING REPERFORATOR BASE - Standard adjustments for typing reperforator base are described in figures 5-134 through 5-136. These adjustments should be rechecked after installation of typing reperforator on the base.

(5) TRANSMITTER DISTRIBUTOR - Standard adjustments for transmitter distributor are described in figures 5-137 through 5-153. Transmitter distributor base is a rigidly mounted component without adjustable features.

(6) ELECTRICAL SERVICE ASSEMBLIES - The electrical service assemblies have components without adjustable features.

(7) CABINETS - Standard adjustments for cabinets are described in figures 5-156 through 5-164G.

(8) PAPER WINDERS - PW201BR AND LPW300BR - Standard adjustments for paper winder are shown in figures 5-164 and 5-164A, respectively.

(9) SYNCHRONOUS MOTOR - Standard synchronous motor adjustment is covered in figure 5-154.

(10) GOVERNED MOTOR

(a) The standard governed or series motor adjustments are covered in figure 5-154 and 5-155.

(b) Motor speed requires attention only when governed motors are used, in which case adjustments described in figure 5-155 may be required. A speed indicator (120 VPS) is used for checking the motor speed. The rotating spots on the governor target appear stationary when viewed through the shutters of the vibrating tuning fork, if the motor is on speed.

1. If the motor is not on speed, it may be adjusted as follows:

a. Stop the motor and remove the plug from the governor cover.

b. Rotate the motor shaft until the opening in the target lines up with the opening in the governor cover.

c. Turn the adjusting screw clockwise to increase the speed, or counterclockwise to decrease the speed.

d. Recheck, and readjust as required.

2. The motor may be considered on speed if not more than 12 spots pass a given point in ten seconds.

(11) TILT OPERATION - If the equipment is located where operation in a tilted position may be required, recheck and refine the following adjustments with the equipment tilted at 30 degrees from vertical in four directions.

(a) Transfer lever eccentric, see figure 5-8.

(b) Intermediate arm backstop bracket, see figure 5-9.

(c) Code bar shift lever drive arm, see figure 5-10.

(d) Code bar shift lever link guide, see figure 5-11.

(e) Spacing clutch trip lever, see figure 5-15.

(f) Dashpot vent screw, see figure 5-36.

(g) Left margin, see figure 5-38.

(h) Right margin, see figure 5-38.

(i) Code bar detent, see figure 5-57.

(12) FINAL TEST - After all adjustments have been made and the equipment is assembled, apply the operating tests given in Section 2-4.

(13) ORIENTATION - When a signal distortion test set is used for determining the receiving margins of the typing unit and typing reperforator selector mechanisms, and where the condition of the components is equivalent to that of new equipment, the range and distortion tolerances shown on Figure 5-7 should be met. To adjust, refine the selector armature spring tension (figure 5-3).

(a) When a signal distortion test set is not available, the orientation range can be best determined while receiving the characters RY from a distant station. Rotate the range finder knob (Figure 5 - 6) in one direction until errors appear in the typed copy. Then, retract it slowly until the errors disappear. Note this position. Rotate the range finder knob in the opposite direction, and determine the other limit in the same manner. The final setting should be midway between the determined limits.

(b) When it is not feasible to determine the range scale setting by either the use of a distortion test set or signals received from a distant station, use the keyboard and typing reperforator to prepare an accurate tape of repetitive RY codes. A tape of approximately 18 inches in length can be carefully spliced by overlapping identical code holes on the leading and trailing edges and fed through the transmitter distributor in a continuous cycle. Connect the typing reperforator selector magnets in series with the typing unit selector magnets, and transmit through the two components. Check both selector unit range finder mechanisms as outlined in paragraph 5-2b(13).

(14) WIRING DIAGRAMS - The necessary wiring diagram information is contained in Volume 3 of this manual.

c. ALPHABETICAL INDEX: ADJUSTMENTS AND SPRING TENSIONS

SPRING TENSIONS

5-2e. BASE LB10/000

ADJUSTMENTS

SPRING TENSIONS

5-2f. KEYBOARD LK25BRW, LK52BRW, LK53BRW, LAK21BRW, LAK33BRW AND LAK47BRW. (Common to ALL Keyboards Except as Indicated.)

ADJUSTMENTS

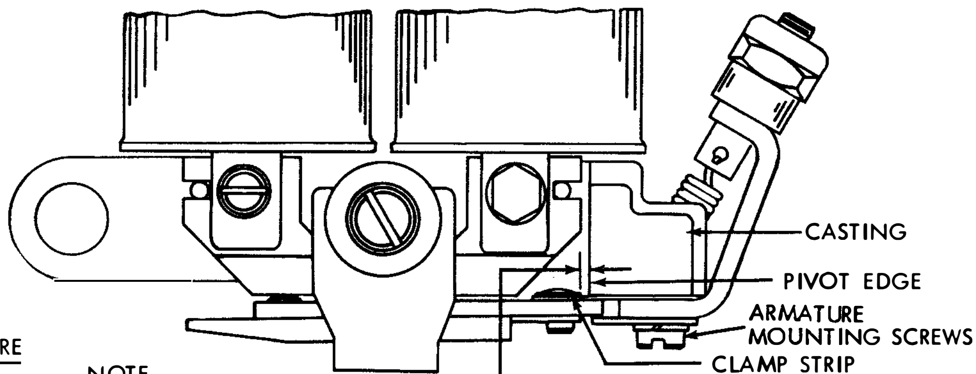
SPRING TENSIONS

5-2g. TYPING REPERFORATOR LPR35, LPR36, AND LPR57 (Common to all Typing Reperforators Except as Indicated)

ADJUSTMENTS

d. <u>TYPING UNIT - LP77YD/AGM, LP77YD/AJV AND LP124YD/AJU</u>

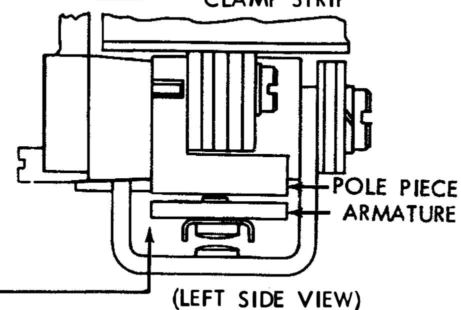
NOTE: TO FACILITATE MAKING THE FOLLOWING ADJUSTMENTS, REMOVE THE RANGE FINDER AND SELECTOR MAGNET ASSEMBLIES. TO INSURE BETTER OPERATION, PULL A PIECE OF BOND PAPER BETWEEN THE ARMATURE AND THE POLE PIECES TO REMOVE ANY OIL OR FOREIGN MATTER THAT MAY BE PRESENT. MAKE CERTAIN THAT NO LINT OR PIECES OF PAPER REMAIN BETWEEN THE POLE PIECES AND ARMATURE.



<u>SELECTOR ARMATURE</u>

NOTE

THESE REQUIREMENTS NEED NOT BE MADE NOR CHECKED IF THE SELECTOR MAGNET BRACKET AND RECEIVING MARGIN REQUIREMENTS ARE MET.

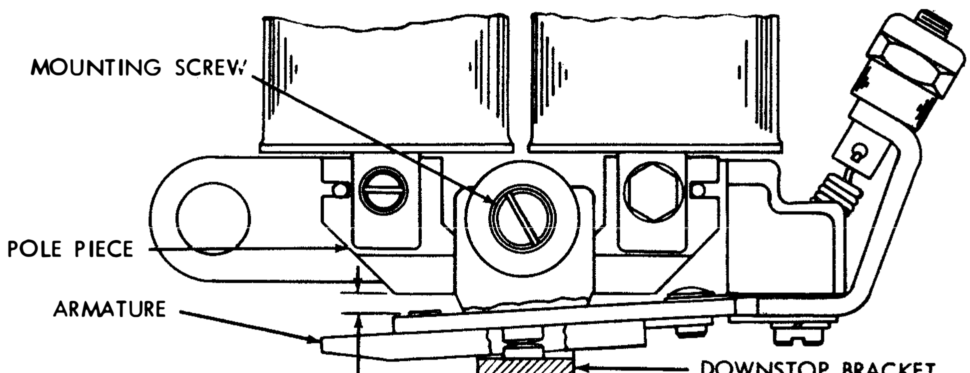


(1) REQUIREMENT
  CLEARANCE
    MIN. 0.025 INCH
    MAX. 0.045 INCH
  BETWEEN ARMATURE CLAMP STRIP AND MAGNET BRACKET CASTING.

(2) REQUIREMENT
  OUTER EDGE OF ARMATURE SHOULD BE FLUSH WITHIN 0.015 INCH WITH OUTER EDGE OF POLE PIECES.

(3) REQUIREMENT
  START LEVER SHALL DROP FREELY INTO ARMATURE EXTENSION SLOT.

TO ADJUST
  POSITION ARMATURE SPRING ADJUSTING NUT TO HOLD ARMATURE FIRMLY AGAINST PIVOT EDGE OF CASTING. POSITION ARMATURE WITH MOUNTING SCREWS LOOSENED.



<u>SELECTOR ARMATURE DOWNSTOP BRACKET</u>

REQUIREMENT
  REMOVE OIL SHIELD. WITH MAGNET DE-ENERGIZED, LOCK LEVERS ON HIGH PART OF THEIR CAM, AND ARMATURE RESTING AGAINST ITS DOWNSTOP, CLEARANCE BETWEEN END OF ARMATURE AND LEFT EDGE OF LEFT POLE PIECE.
    MIN. 0.025 INCH
    MAX. 0.030 INCH

TO ADJUST
  POSITION DOWNSTOP BRACKET WITH MOUNTING SCREW LOOSENED.

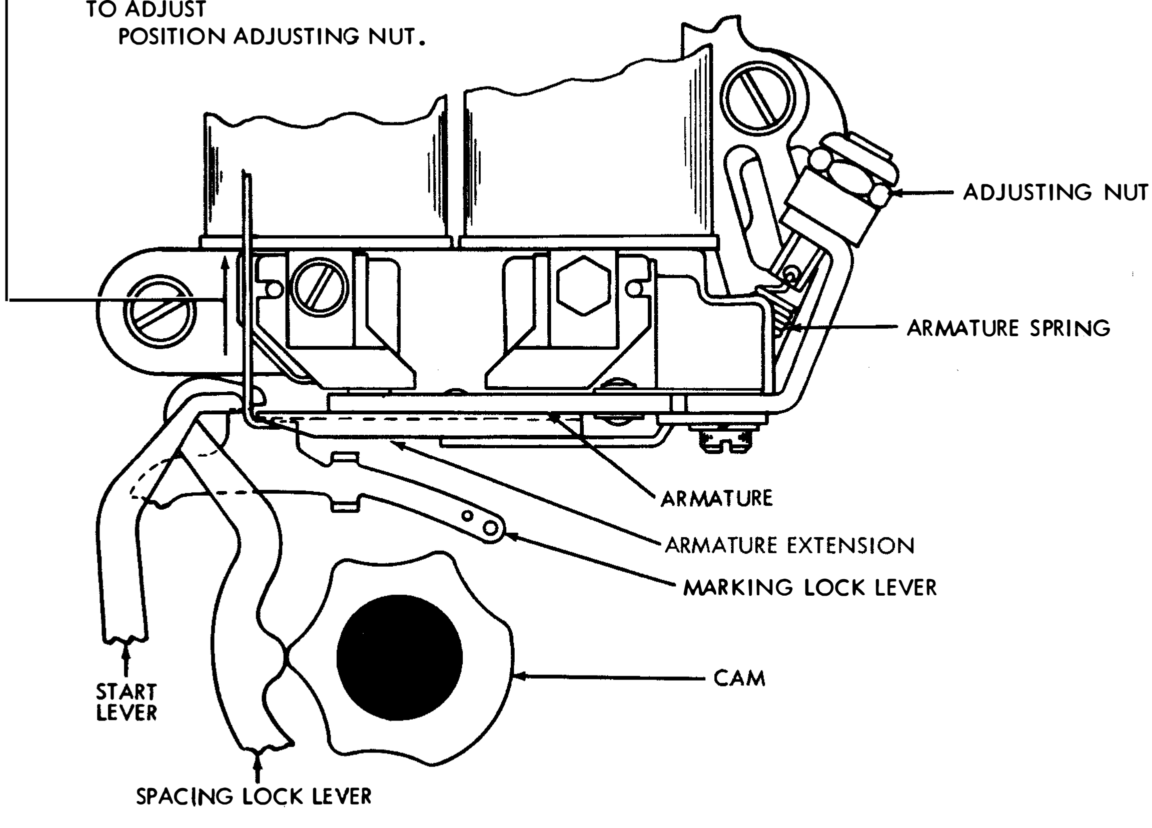
Figure 5-1. Typing Unit, Selector Magnet and Armature Mechanism

SELECTOR ARMATURE SPRING
(FOR UNITS EMPLOYING SELECTOR ARMATURE WITH SINGLE ANTI-FREEZE BUTTON ONLY).
REQUIREMENT (PRELIMINARY)
WITH LOCKING LEVERS AND START LEVER ON HIGH PART OF THEIR CAMS, SCALE APPLIED AS NEARLY VERTICAL AS POSSIBLE UNDER END OF ARMATURE EXTENSION. IT SHALL REQUIRE THE FOLLOWING TENSIONS TO MOVE ARMATURE TO MARKING POSITION:

0.035 AMPERES
MIN. 1-1/2 OZS. --- MAX. 2 OZS.

NOTE
THIS SPRING CAN BE ADJUSTED FOR MAXIMUM SELECTOR PERFORMANCE ONLY WHEN PRINTER IS CONNECTED TO THE SPECIFIC CIRCUIT OVER WHICH IT IS TO OPERATE UNDER SERVICE CONDITIONS. SINCE THERE ARE SEVERAL OPERATING SPEEDS AND SINCE CIRCUITS VARY WIDELY, IT IS IMPOSSIBLE TO ADJUST SPRING FOR MAXIMUM PERFORMANCE AT THE FACTORY. THE FOREGOING SPRING TENSION REQUIREMENT IS GIVEN TO PERMIT OPERATION PRIOR TO MEASUREMENT OF RECEIVING MARGINS. READJUSTMENT MADE TO OBTAIN SATISFACTORY RECEIVING MARGIN SHOULD NOT BE DISTURBED IN ORDER TO MEET REQUIREMENTS OF THIS ADJUSTMENT.

TO ADJUST
POSITION ADJUSTING NUT.



REQUIREMENT (FINAL)
SEE SELECTOR RECEIVING MARGIN ADJUSTMENT
FIGURE 5-9.

Figure 5-2. Typing Unit, Selector Spring Tension

SELECTOR ARMATURE SPRING

(FOR UNITS EMPLOYING SELECTOR ARMATURE WITH TWO ANTI-FREEZE BUTTONS ONLY).

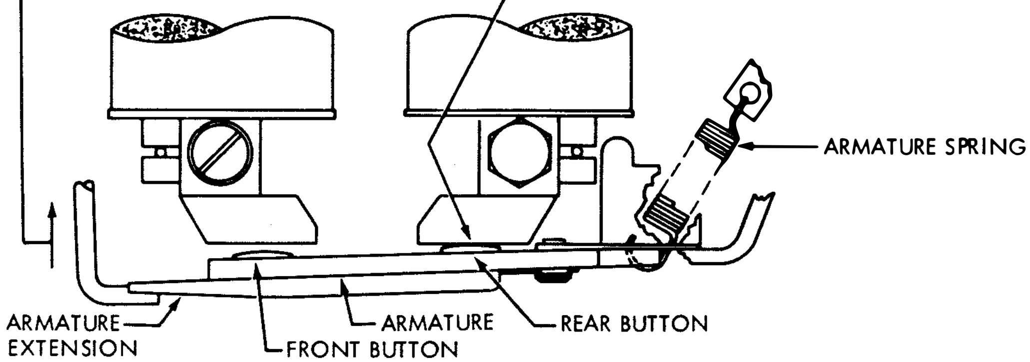
REQUIREMENT (PRELIMINARY)

WITH LOCKING LEVERS AND START LEVER ON HIGH PART OF THEIR CAMS, SCALE APPLIED AS NEARLY VERTICAL AS POSSIBLE UNDER END OF ARMATURE EXTENSION. IT SHALL REQUIRE APPROXIMATELY THE FOLLOWING TENSIONS TO MOVE THE REAR ANTI-FREEZE BUTTON AGAINST THE MAGNET CORE:

0.035 AMPERES
APPROXIMATELY 5/8 OZ.

TO ADJUST

POSITION ADJUSTING NUT.



SELECTOR ARMATURE SPRING

REQUIREMENT (FINAL)

WHEN A DISTORTION TEST SET IS AVAILABLE, THE SELECTOR ARMATURE SPRING TENSION SHOULD BE REFINED, IF NECESSARY, TO OBTAIN SATISFACTORY RECEIVING MARGINS. THE FRONT ANTI-FREEZE BUTTON MUST CONTACT THE MAGNET CORE WHEN THE MAGNET COILS ARE ENERGIZED.

(SEE SELECTOR RECEIVING MARGIN ADJUSTMENT FIGURE 5-9)

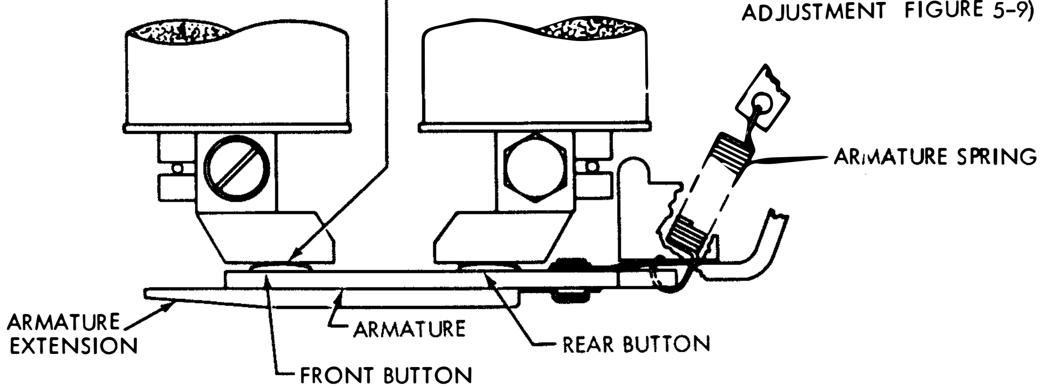
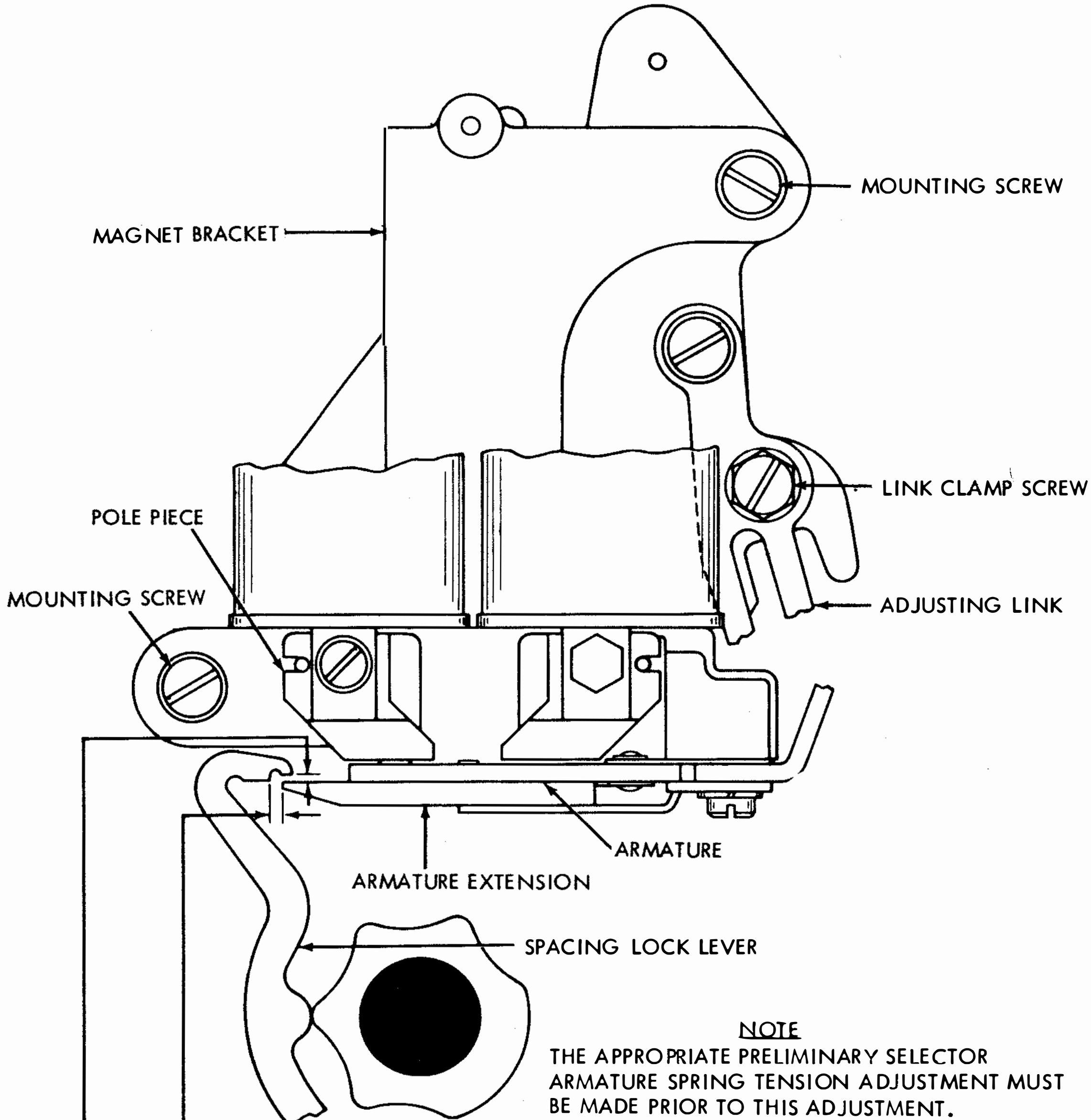


Figure 5-3. Typing Unit, Selector Spring Tensions



NOTE
THE APPROPRIATE PRELIMINARY SELECTOR ARMATURE SPRING TENSION ADJUSTMENT MUST BE MADE PRIOR TO THIS ADJUSTMENT.

SELECTOR MAGNET BRACKET

(1) REQUIREMENT
SPACING LOCK LEVER ON HIGH PART OF CAM.
ARMATURE IN CONTACT WITH POLE PIECE.
CLEARANCE BETWEEN END OF ARMATURE EXTENSION AND SHOULDER ON SPACING LOCK LEVER.
MIN. 0.020 INCH
MAX. 0.035 INCH

TO ADJUST
LOOSEN TWO MAGNET BRACKET MOUNTING SCREWS AND ADJUSTING LINK CLAMP SCREW. POSITION MAGNET BRACKET BY MEANS OF ADJUSTING LINK AND TIGHTEN LINK CLAMP SCREW ONLY.

(2) REQUIREMENT
SPACING LOCK LEVER ON HIGH PART OF CAM. ARMATURE IN CONTACT WITH POLE PIECE. SOME CLEARANCE BETWEEN UPPER SURFACE OF ARMATURE EXTENSION AND LOWER SURFACE OF SPACING LOCK LEVER WHEN LOCK LEVER IS HELD DOWNWARD.
MAX. 0.003 INCH

TO ADJUST
POSITION UPPER END OF MAGNET BRACKET. TIGHTEN TWO MAGNET BRACKET MOUNTING SCREWS. RECHECK REQUIREMENT (1).

Figure 5-4. Typing Unit, Selector Magnet Bracket

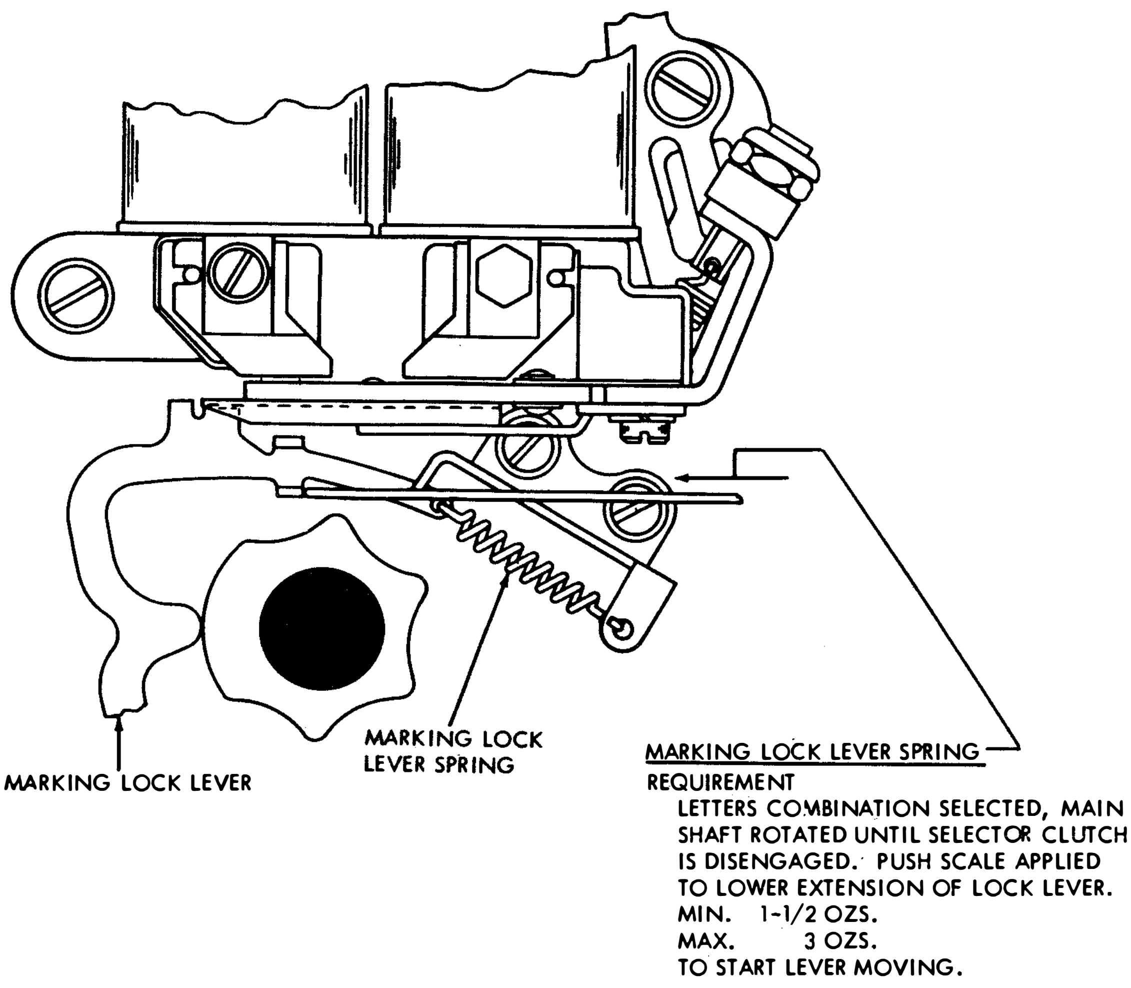
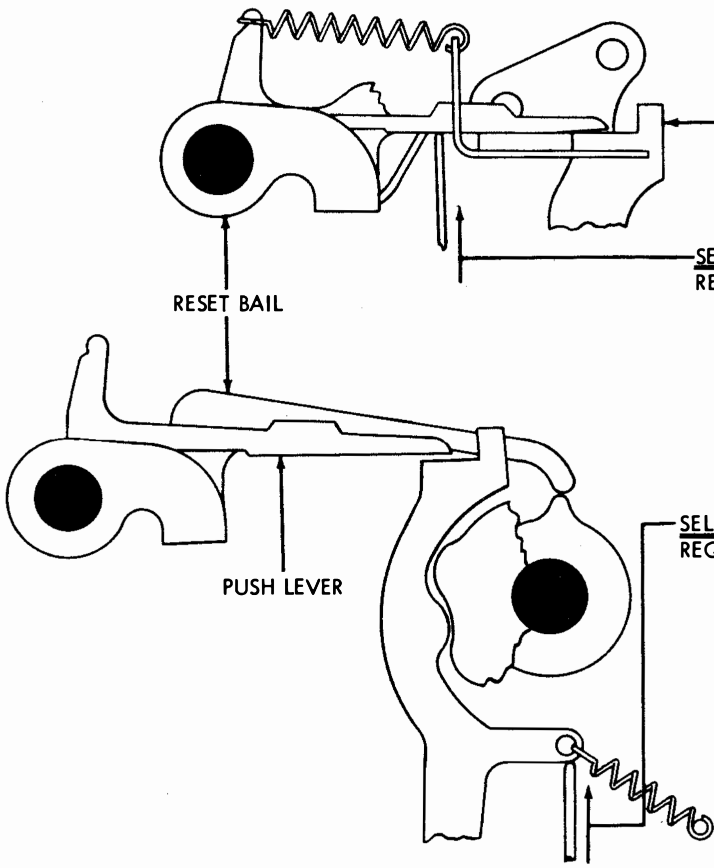
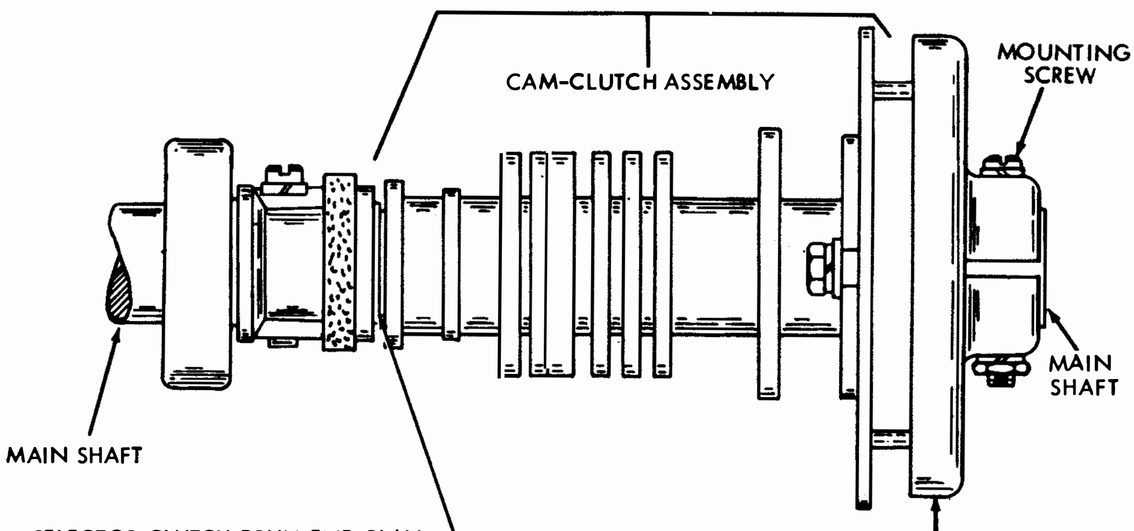


Figure 5-4A. Typing Unit, Selector Spring Tension



SELECTOR PUSH LEVER SPRING
REQUIREMENT
PUSH LEVER IN SPACING POSITION
MIN. 3/4 OZ.
MAX. 1-1/2 OZS.
TO MOVE PUSH LEVER FROM SELECTOR LEVER. CHECK FIVE SPRINGS.

SELECTOR LEVER SPRING
REQUIREMENT
TYPING UNIT UPSIDE DOWN.
RESET BAIL ON PEAK OF ITS CAM.
MIN. 1-1/4 OZS.
MAX. 2-1/2 OZS.
TO START EACH LEVER MOVING.
CHECK FIVE SPRINGS. IF NECESSARY, UNHOOK START LEVER SPRING TO CHECK NO. 4 SELECTOR LEVER SPRING.



SELECTOR CLUTCH DRUM END PLAY
REQUIREMENT
CLUTCH LATCHED IN STOP POSITION. CLUTCH DRUM SHOULD BE AGAINST SHOULDER ON MAIN SHAFT.
MIN. SOME --- MAX. 0.010 INCH
TO ADJUST
POSITION CLUTCH DRUM WITH MOUNTING SCREW LOOSENED.

Figure 5-4B. Typing Unit, Selector Cam Clutch

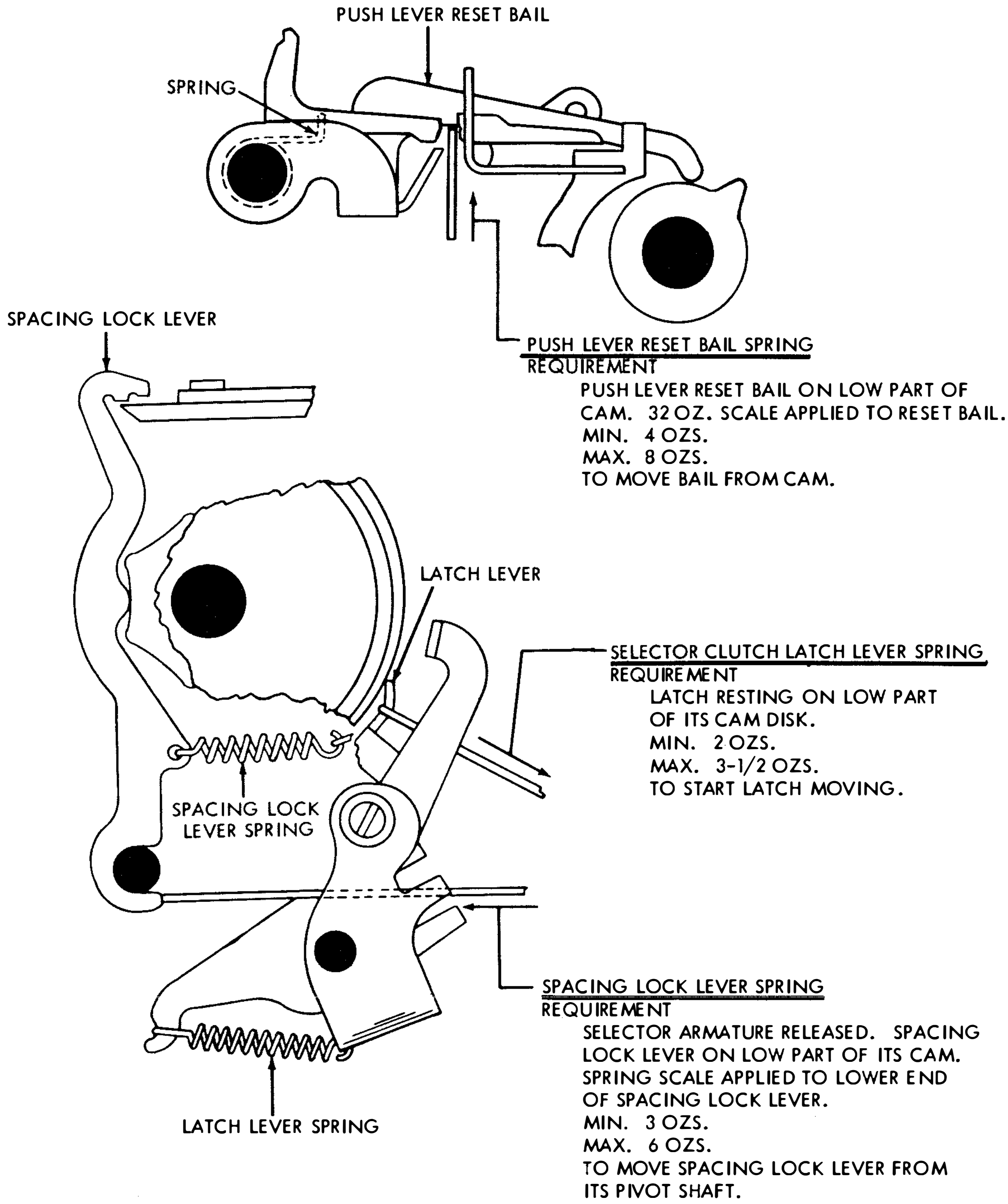
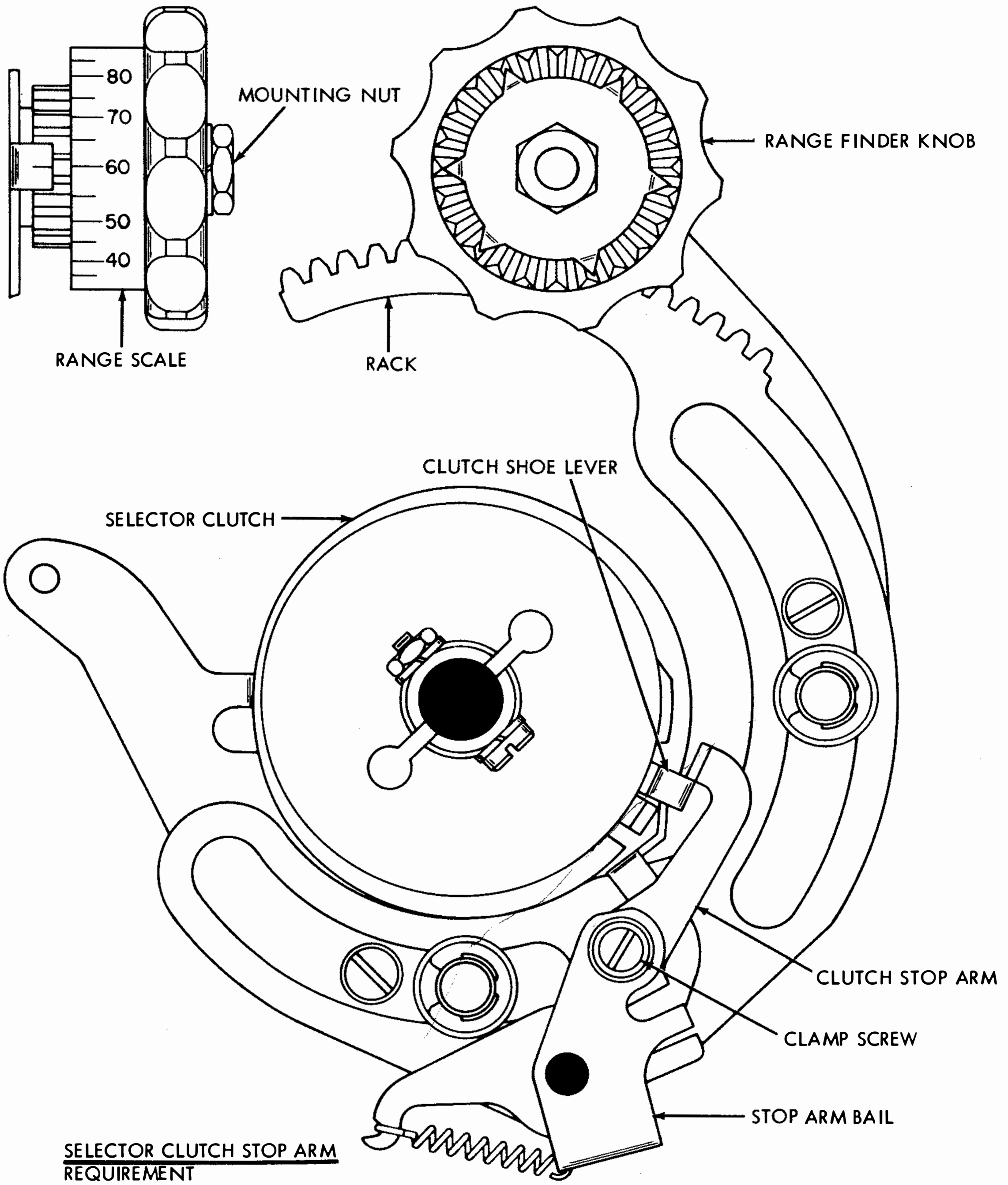


Figure 5-5. Typing Unit, Selector Clutch Spring Tension

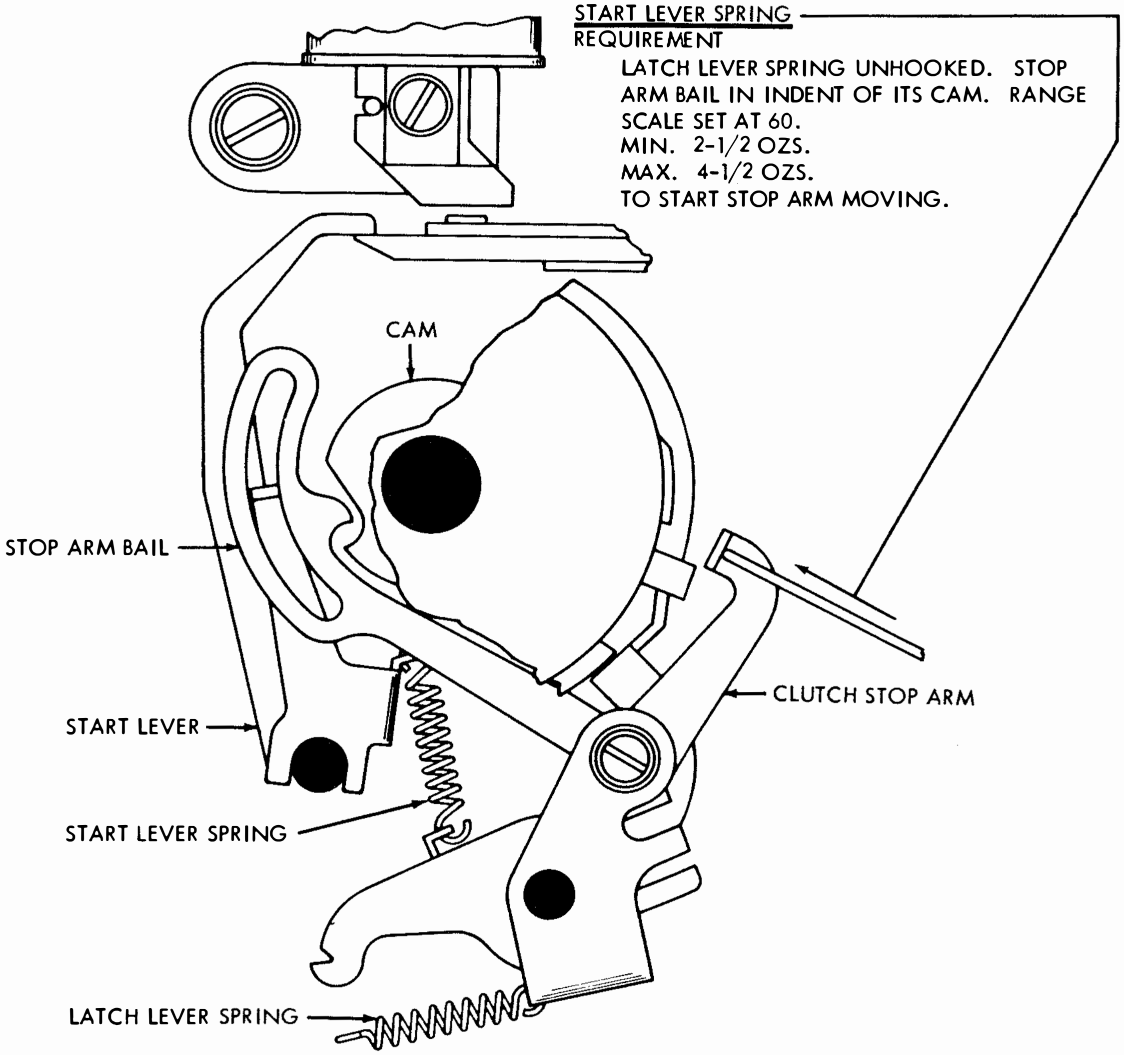
NOTE: REPLACE RANGE FINDER AND SELECTOR MAGNET ASSEMBLY.

RANGE FINDER KNOB PHASING
REQUIREMENT
WITH RANGE FINDER KNOB TURNED TO EITHER END OF RACK, ZERO MARK ON SCALE SHOULD BE WITHIN 3 POINTS OF SCRIBED LINE ON RANGE FINDER PLATE.
TO ADJUST
REMOVE MOUNTING NUT, DISENGAGE KNOB FROM RACK AND POSITION KNOB. RE-ENGAGE KNOB WITH RACK AND REPLACE MOUNTING NUT.



SELECTOR CLUTCH STOP ARM
REQUIREMENT
RANGE SCALE SET AT 60. SELECTOR CLUTCH DISENGAGED. ARMATURE IN MARKING POSITION. CLUTCH STOP ARM SHOULD ENGAGE CLUTCH SHOE LEVER BY APPROXIMATELY FULL THICKNESS OF SHOE LEVER.
TO ADJUST
POSITION STOP ARM ON STOP ARM BAIL WITH CLAMP SCREW LOOSENED.

Figure 5-6. Typing Unit, Range Finder Mechanism



SELECTOR RECEIVING MARGIN
REQUIREMENT (FOR UNITS EMPLOYING ARMATURE WITH ONE ANTI-FREEZE BUTTON)
WHEN A SIGNAL DISTORTION TEST SET IS USED FOR DETERMINING THE RECEIVING MARGINS OF THE SELECTOR, AND WHERE THE CONDITION OF THE COMPONENTS IS EQUIVALENT TO THAT OF NEW EQUIPMENT, THE RANGE AND DISTORTION TOLERANCES BELOW SHOULD BE MET.
REQUIREMENT (FOR UNITS EMPLOYING ARMATURE WITH TWO ANTI-FREEZE BUTTONS)
WHEN A DISTORTION TEST SET IS AVAILABLE, THE SELECTOR ARMATURE SPRING TENSION SHOULD BE REFINED, IF NECESSARY, TO OBTAIN SATISFACTORY RECEIVING MARGINS. THE FRONT ANTI-FREEZE BUTTON MUST CONTACT THE MAGNET CORE WHEN THE MAGNET COILS ARE ENERGIZED.

SELECTOR RECEIVING MARGIN MINIMUM REQUIREMENTS

CURRENT	SPEED IN BAUDS	POINTS RANGE WITH ZERO DISTORTION	PERCENTAGE OF MARKING AND SPACING BIAS TOLERATED	END DISTORTION TOLERATED WITH SCALE AT BIAS OPTIMUM SETTING
0.035 AMP. (WINDINGS SERIES)	45.5 (65 W.P.M.) 75.0 (106 W.P.M.)	72	40	35

TO ADJUST: REFINE THE SELECTOR ARMATURE SPRING (SEE FIGURES 5-2 AND 5-3)

Figure 5-7. Typing Unit, Selector Clutch Mechanism

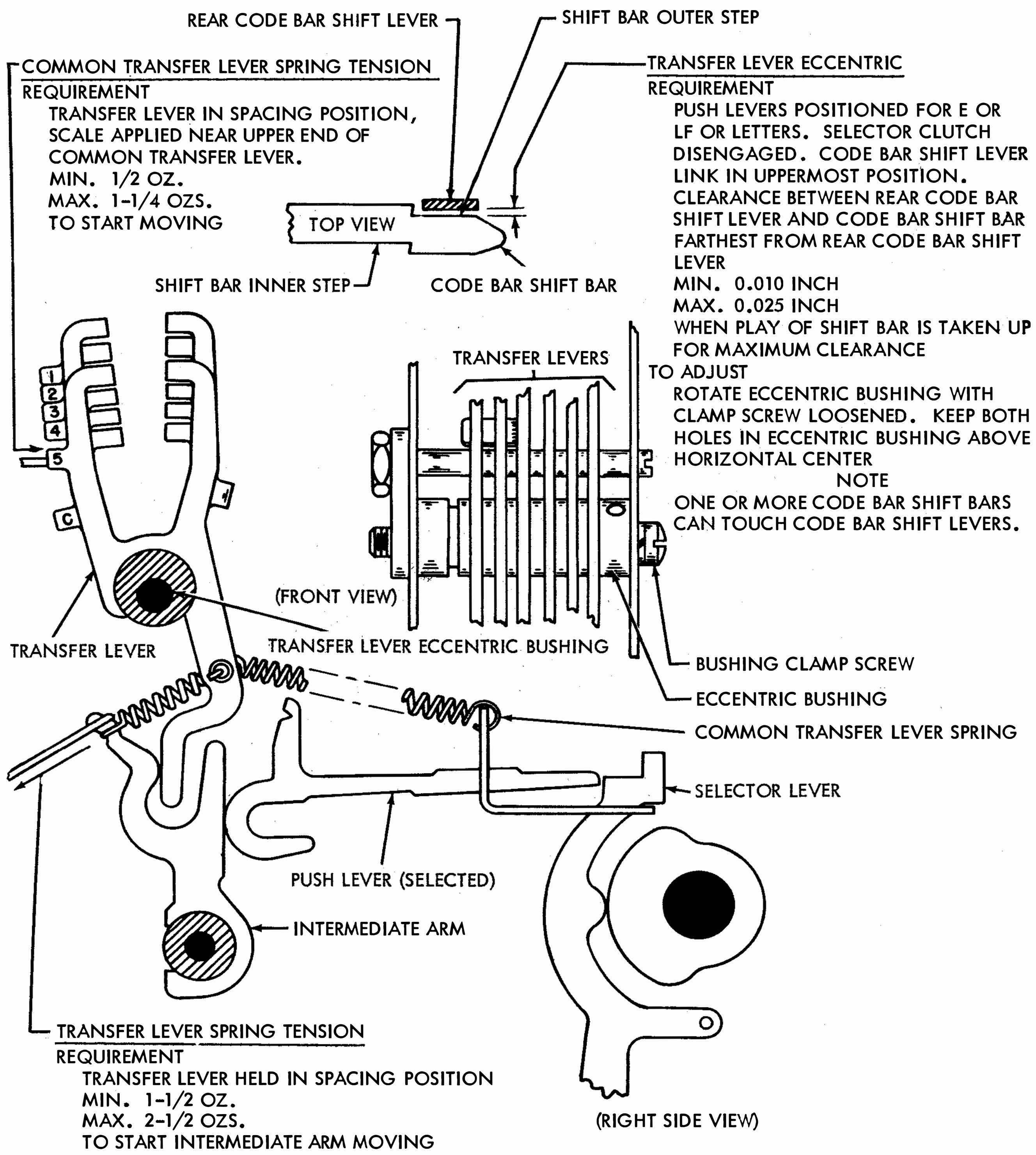
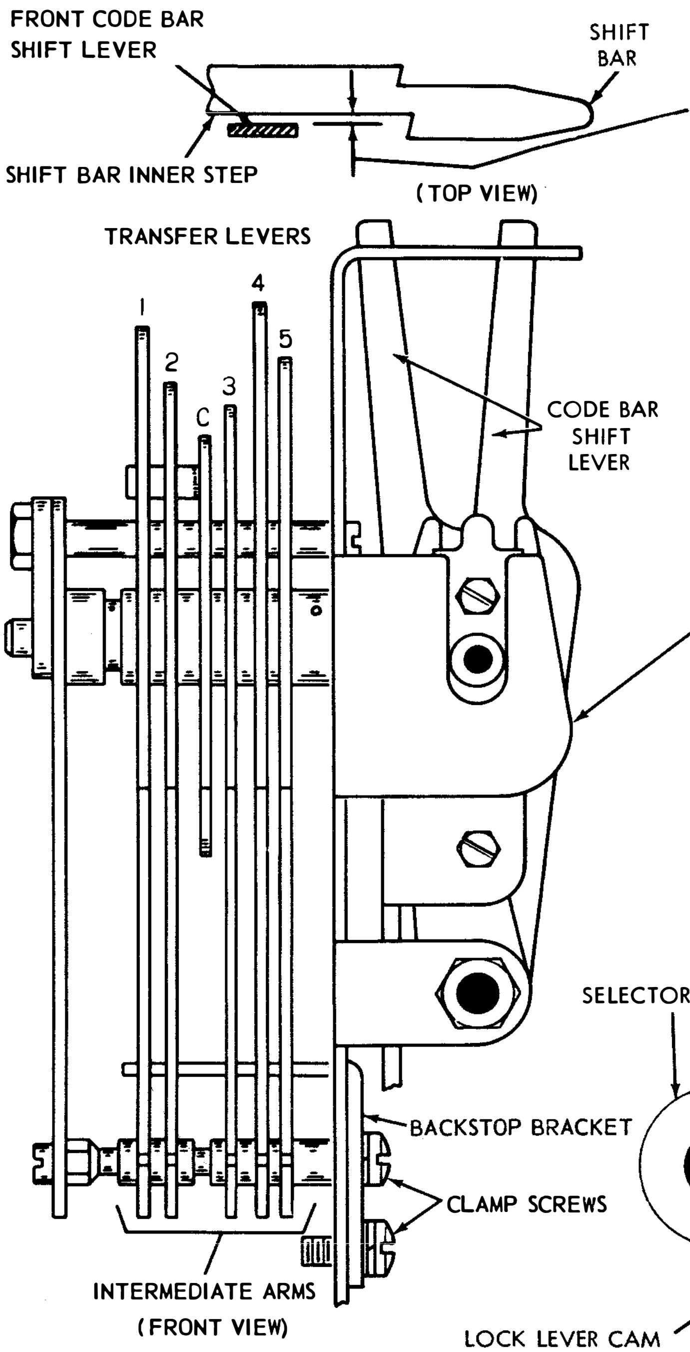


Figure 5-8. Typing Unit, Code Bar Shift Mechanism



INTERMEDIATE ARM BACKSTOP BRACKET

REQUIREMENT

PUSH LEVERS NOT SELECTED. ALL CODE BAR SHIFT BARS TO THE RIGHT. SELECTOR CLUTCH DISENGAGED. CODE BAR SHIFT LEVER LINK IN LOWERMOST POSITION. CLEARANCE BETWEEN FRONT CODE BAR SHIFT LEVER AND INNER STEP OF CODE BAR SHIFT BAR FARTHEST FROM FRONT CODE BAR SHIFT LEVER

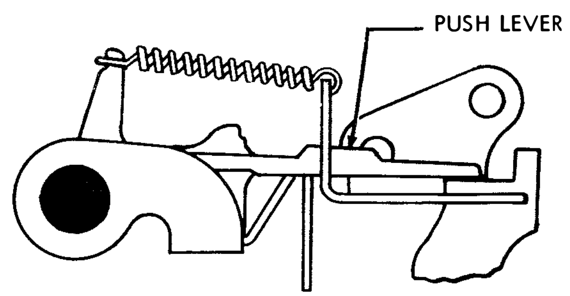
MIN. 0.010 INCH
MAX. 0.025 INCH

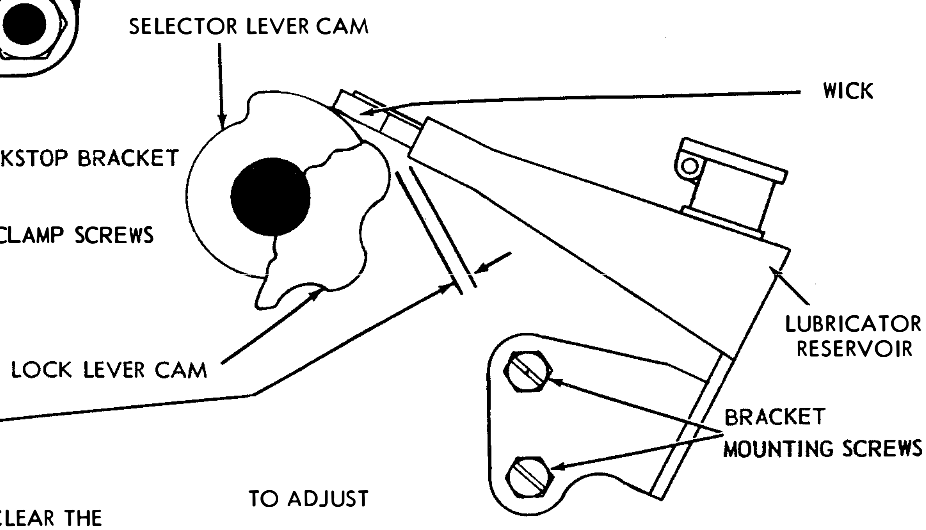
WHEN PLAY IN PARTS IS TAKEN UP FOR MAXIMUM CLEARANCE.

TO ADJUST

POSITION BACKSTOP BRACKET WITH ITS TWO CLAMP SCREWS LOOSENED.

CODE BAR SHIFT LEVER LINK BRACKET





SELECTOR CAM LUBRICATOR

REQUIREMENT

THE LUBRICATOR TUBE SHOULD CLEAR THE HIGH PART OF THE LOCK LEVER CAM

MIN. 0.020 INCH

THE HIGH PART OF THE SELECTOR LEVER CAMS SHOULD TOUCH THE LUBRICATOR WICK, BUT SHOULD NOT RAISE IT MORE THAN 1/32 INCH.

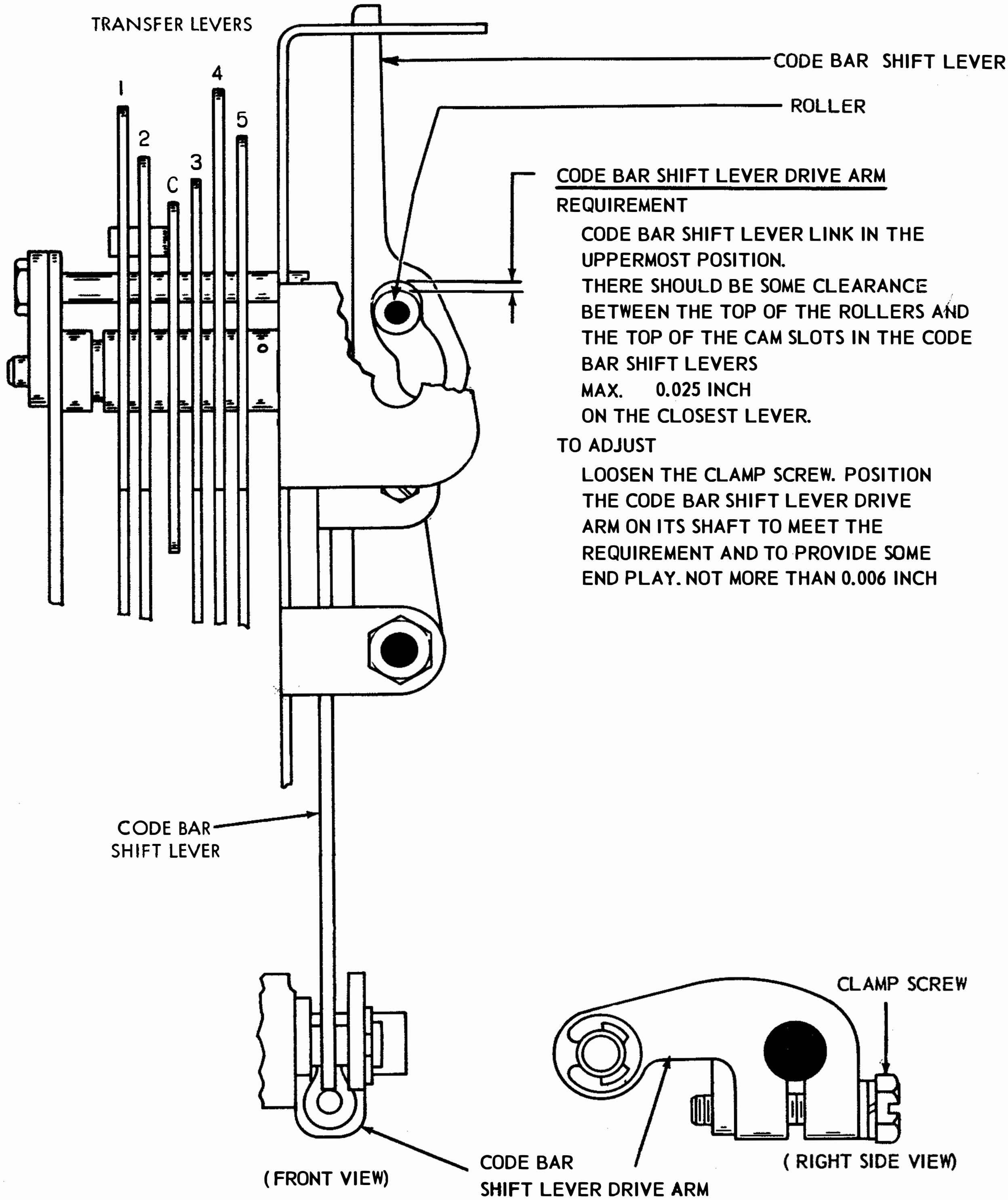
TO ADJUST

POSITION THE LUBRICATOR BRACKET WITH ITS MOUNTING SCREWS LOOSENED.

NOTE

THERE SHOULD BE SOME CLEARANCE BETWEEN THE MARKING LOCK LEVFR SPRING AND THE OIL RESERVOIR.

Figure 5-9. Typing Unit, Code Bar Shift Mechanism



CODE BAR SHIFT LEVER DRIVE ARM

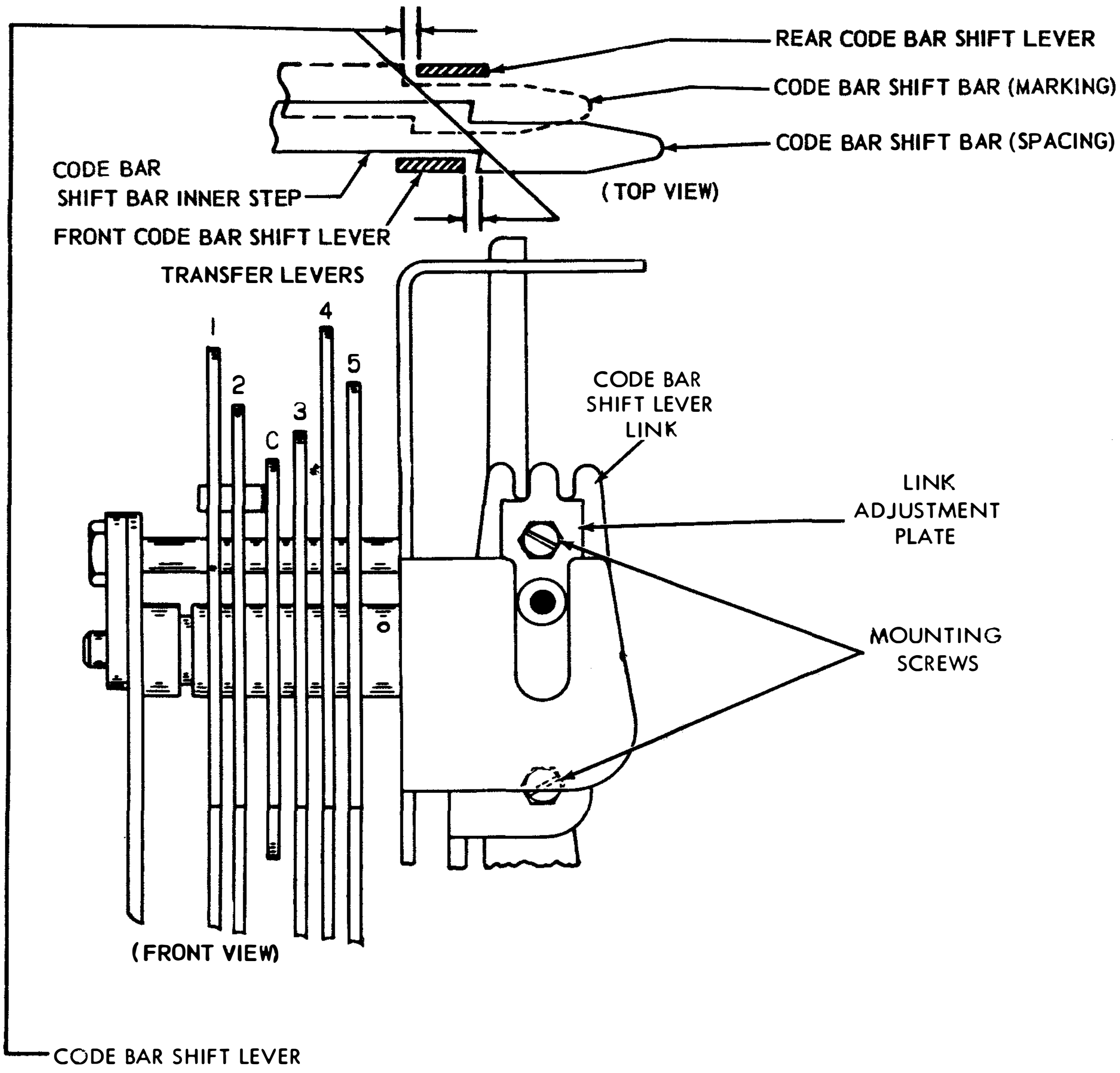
REQUIREMENT

CODE BAR SHIFT LEVER LINK IN THE UPPERMOST POSITION.
THERE SHOULD BE SOME CLEARANCE BETWEEN THE TOP OF THE ROLLERS AND THE TOP OF THE CAM SLOTS IN THE CODE BAR SHIFT LEVERS
MAX. 0.025 INCH
ON THE CLOSEST LEVER.

TO ADJUST

LOOSEN THE CLAMP SCREW. POSITION THE CODE BAR SHIFT LEVER DRIVE ARM ON ITS SHAFT TO MEET THE REQUIREMENT AND TO PROVIDE SOME END PLAY. NOT MORE THAN 0.006 INCH

Figure 5-10. Typing Unit, Code Bar Shift Lever Drive Arm



REQUIREMENT

MOTION OF FRONT AND REAR CODE BAR SHIFT LEVERS SHOULD BE EQUALIZED WITH RESPECT TO CODE BAR TRAVEL.

TO CHECK (FRONT)

SELECT BLANK COMBINATION AND ROTATE MAIN SHAFT UNTIL CODE BAR SHIFT LEVER LINK REACHES HIGHEST TRAVEL. TAKE UP PLAY FOR MAXIMUM CLEARANCE. CLEARANCE BETWEEN FRONT CODE BAR SHIFT LEVER AND SHOULDER ON NEAREST CODE BAR SHIFT BAR.

MIN. 0.002 INCH
MAX. 0.025 INCH

TO CHECK (REAR)

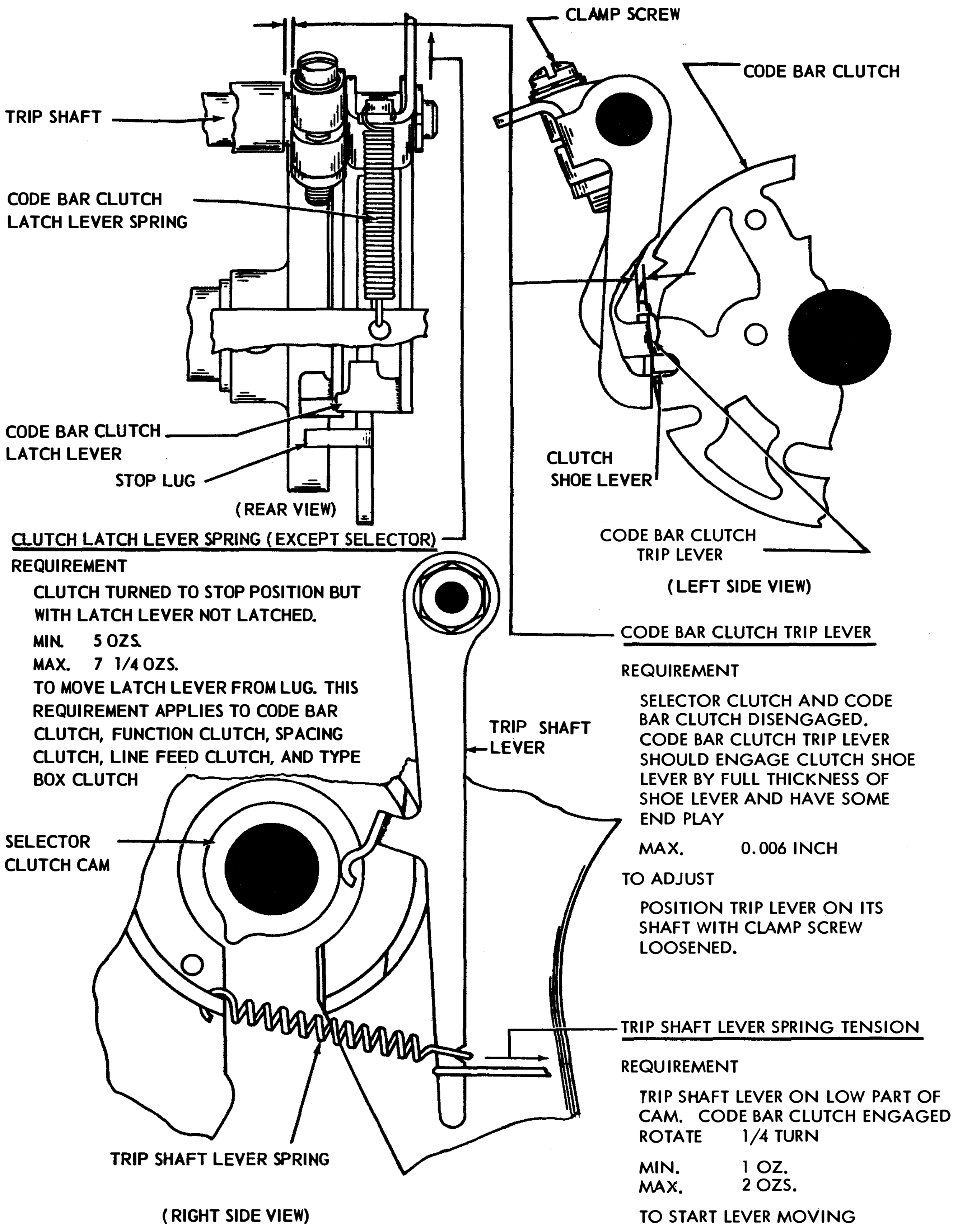
SELECT LETTERS COMBINATION. CHECK CLEARANCE BETWEEN REAR CODE BAR SHIFT LEVER AND SHOULDER OF CODE BAR SHIFT BAR IN SAME WAY.

MIN. 0.002 IN.
MAX. 0.025 IN.

TO ADJUST

POSITION ADJUSTING PLATES (FRONT AND REAR) WITH CLAMP SCREWS LOOSENED.

Figure 5-11. Typing Unit, Code Bar Shift Lever



CLUTCH LATCH LEVER SPRING (EXCEPT SELECTOR)

REQUIREMENT

CLUTCH TURNED TO STOP POSITION BUT WITH LATCH LEVER NOT LATCHED.

MIN. 5 OZS.

MAX. 7 1/4 OZS.

TO MOVE LATCH LEVER FROM LUG. THIS REQUIREMENT APPLIES TO CODE BAR CLUTCH, FUNCTION CLUTCH, SPACING CLUTCH, LINE FEED CLUTCH, AND TYPE BOX CLUTCH

CODE BAR CLUTCH TRIP LEVER

REQUIREMENT

SELECTOR CLUTCH AND CODE BAR CLUTCH DISENGAGED. CODE BAR CLUTCH TRIP LEVER SHOULD ENGAGE CLUTCH SHOE LEVER BY FULL THICKNESS OF SHOE LEVER AND HAVE SOME END PLAY

MAX. 0.006 INCH

TO ADJUST

POSITION TRIP LEVER ON ITS SHAFT WITH CLAMP SCREW LOOSENED.

TRIP SHAFT LEVER SPRING TENSION

REQUIREMENT

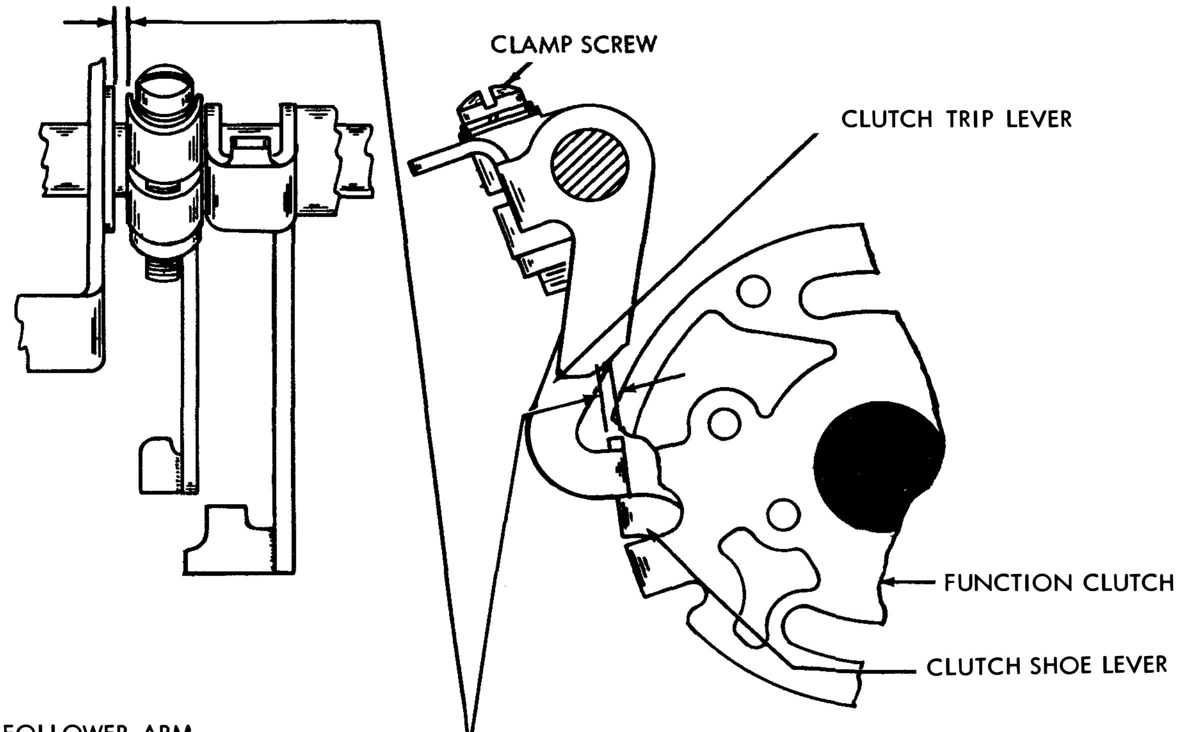
TRIP SHAFT LEVER ON LOW PART OF CAM. CODE BAR CLUTCH ENGAGED. ROTATE 1/4 TURN

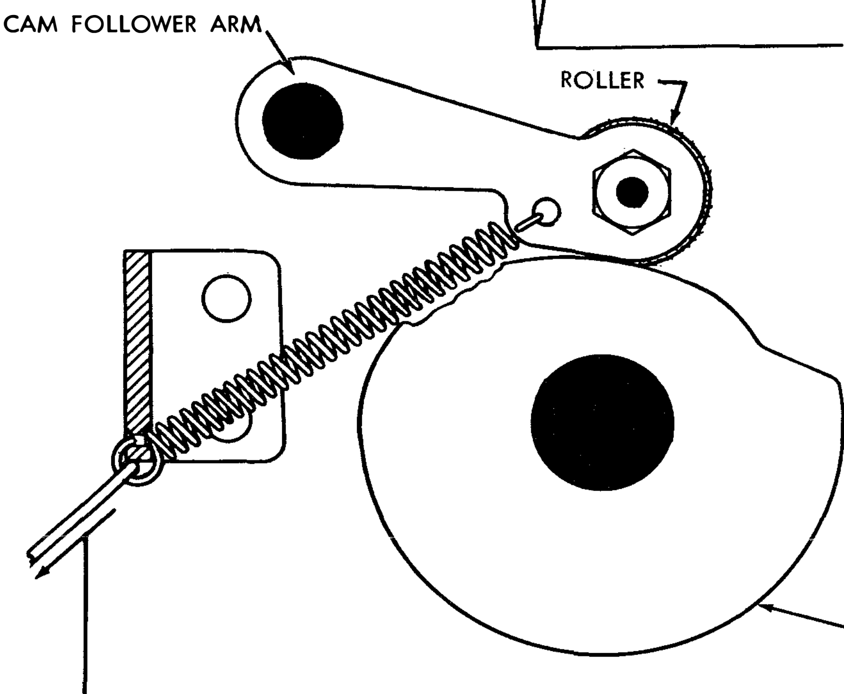
MIN. 1 OZ.

MAX. 2 OZS.

TO START LEVER MOVING

Figure 5-12. Typing Unit, Code Bar Clutch Trip Shaft Mechanism





FUNCTION CLUTCH TRIP LEVER

REQUIREMENT

CODE BAR CLUTCH AND FUNCTION CLUTCH DISENGAGED. FUNCTION CLUTCH TRIP LEVER SHOULD ENGAGE CLUTCH SHOE LEVER BY FULL THICKNESS OF SHOE LEVER.

TO ADJUST

POSITION TRIP LEVER ON ITS SHAFT WITH CLAMP SCREW LOOSENED, LETTING SHAFT HAVE END PLAY

MIN.	SOME
MAX.	0.006 INCH

CODE BAR CLUTCH CAM FOLLOWER SPRING TENSION

REQUIREMENT

CAM FOLLOWER ROLLER ON THE LOW PART OF CAM. THE SPRING UNHOOKED FROM SPRING BRACKET.

MIN.	20 OZS.
MAX.	24 OZS.

TO PULL SPRING TO INSTALLED LENGTH.

Figure 5-13. Typing Unit, Function Clutch Mechanism

(A) CLUTCH TRIP SHAFT SET COLLARS

(1) REQUIREMENT

SPACING CUT-OUT LEVER SHOULD HAVE SIDE PLAY

MIN. SOME
MAX. 0.008 INCH

TO ADJUST

POSITION SPACING CUT-OUT LEVER SET COLLAR

(2) REQUIREMENT

APPROXIMATE ALIGNMENT OF RIGHT END OF STOP EXTENSIONS ON TRIP LEVER AND SHOE LEVER.

TO ADJUST

POSITION LINE FEED CLUTCH TRIP LEVER SET COLLAR.

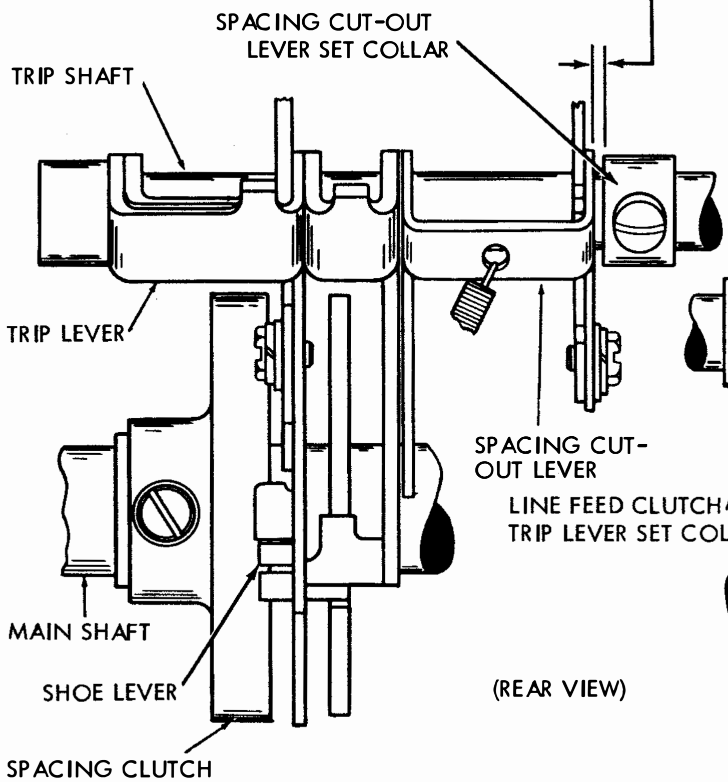
(3) REQUIREMENT

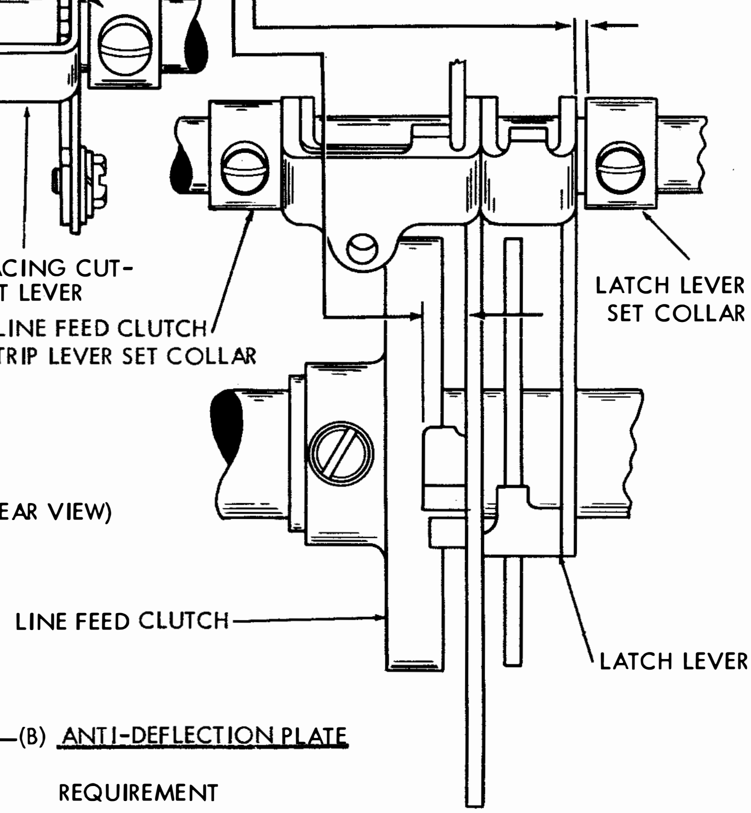
LINE FEED CLUTCH LATCH LEVER SHOULD HAVE SIDE PLAY.

MIN. SOME
MAX. 0.008 INCH

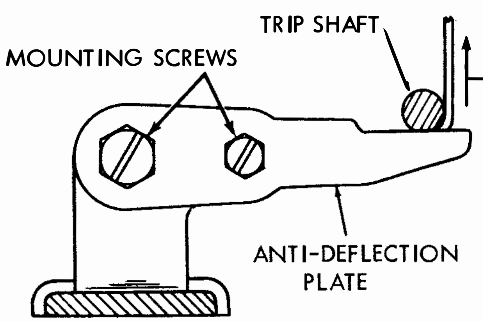
TO ADJUST

POSITION LINE FEED CLUTCH LATCH LEVER SET COLLAR.





(REAR VIEW)



(LEFT SIDE VIEW, UPSIDE DOWN)

(B) ANTI-DEFLECTION PLATE

REQUIREMENT

WITH TYPING UNIT UPSIDE DOWN AND FUNCTION, SPACING, LINE FEED, AND TYPE BOX CLUTCHES DISENGAGED AND LATCHED

MIN. 1 LB. MAX. 5 LBS.

TO PULL TRIP SHAFT AWAY FROM ANTI-DEFLECTION PLATE

TO ADJUST

POSITION PLATE WITH MOUNTING SCREWS LOOSENED.

Figure 5-14. Typing Unit, Trip Latch Mechanism

SPACING CLUTCH TRIP LEVER

REQUIREMENT

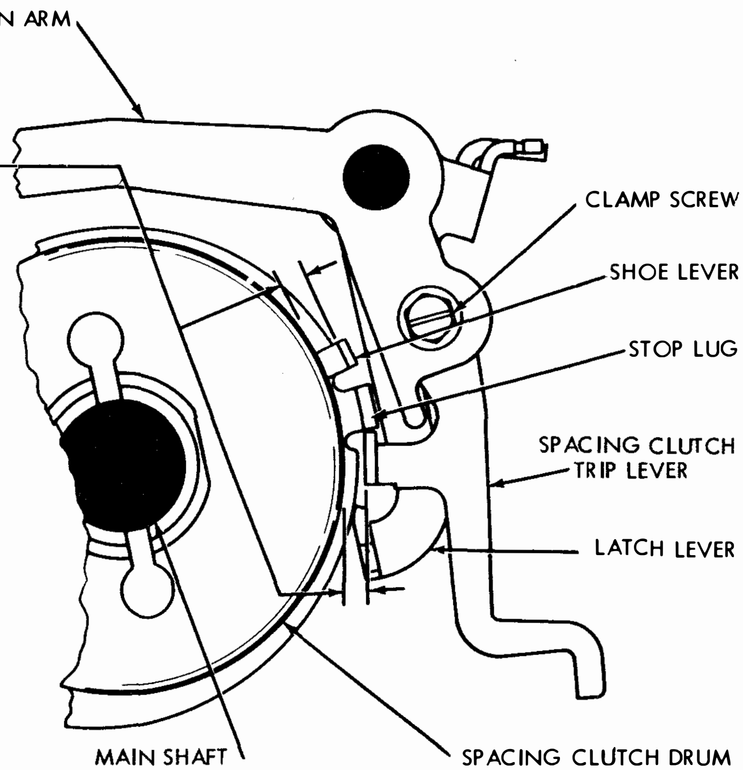
CLEARANCE BETWEEN TRIP LEVER AND CLUTCH DRUM SHOULD BE 0.018 TO 0.035 INCH LESS THAN CLEARANCE BETWEEN SHOE LEVER AND DRUM AT STOP SHOWING GREATEST CLEARANCE. THERE SHOULD BE SOME OVERBITE ON ALL STOP LUGS. GAUGE BY EYE.

TO CHECK

DISENGAGE THE CLUTCH. TRIP CLUTCH TRIP LEVER AND ROTATE MAIN SHAFT UNTIL TRIP LEVER IS OVER THE SHOE LEVER. TAKE UP PLAY OF SHOE LEVER INWARD BY SNAPPING THE TRIP LEVER OVER THE SHOE LEVER. CHECK CLEARANCE BETWEEN SHOE LEVER AND DRUM AT EACH STOP POSITION. WITH THE TRIP LEVER AT THE STOP POSITION WHICH YIELDS GREATEST CLEARANCE, ROTATE MAIN SHAFT SLOWLY UNTIL THE TRIP LEVER JUST FALLS OFF THE STOP LUG. CHECK CLEARANCE BETWEEN TRIP LEVER AND DRUM.

TO ADJUST

POSITION THE TRIP LEVER BY MEANS OF ITS CLAMP SCREW



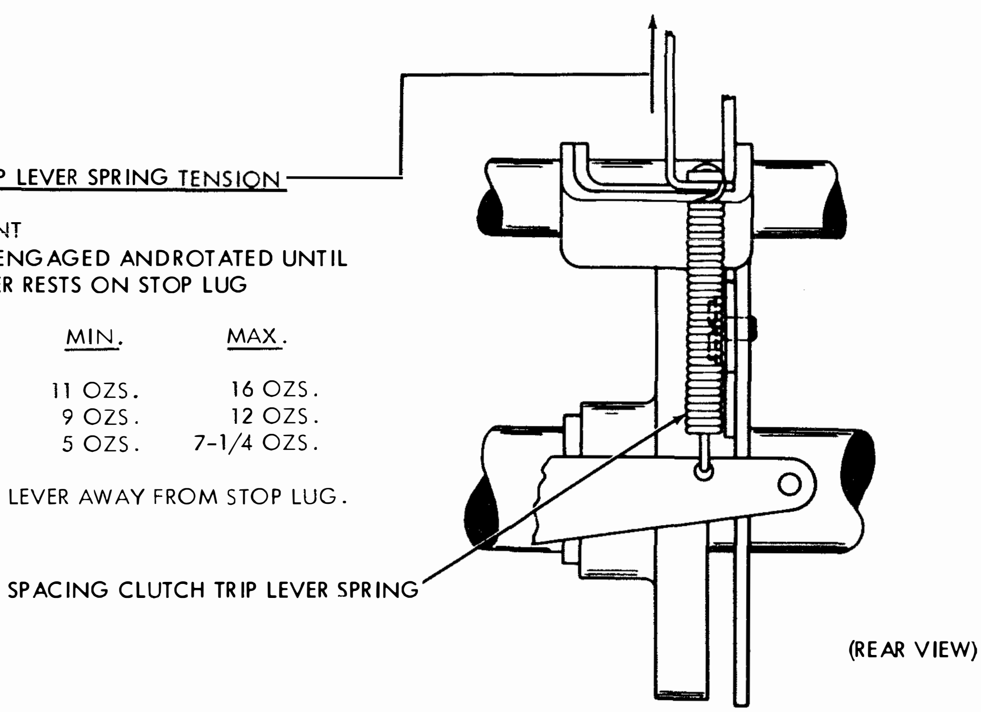
(RIGHT SIDE VIEW)

CLUTCH TRIP LEVER SPRING TENSION

REQUIREMENT
CLUTCH ENGAGED ANDROTATED UNTIL TRIP LEVER RESTS ON STOP LUG

CLUTCH	MIN.	MAX.
SPACING	11 OZS.	16 OZS.
LINE FEED	9 OZS.	12 OZS.
TYPE BOX	5 OZS.	7-1/4 OZS.

TO MOVE LEVER AWAY FROM STOP LUG.



(REAR VIEW)

Figure 5-15. Typing Unit, Spacing Clutch Mechanism

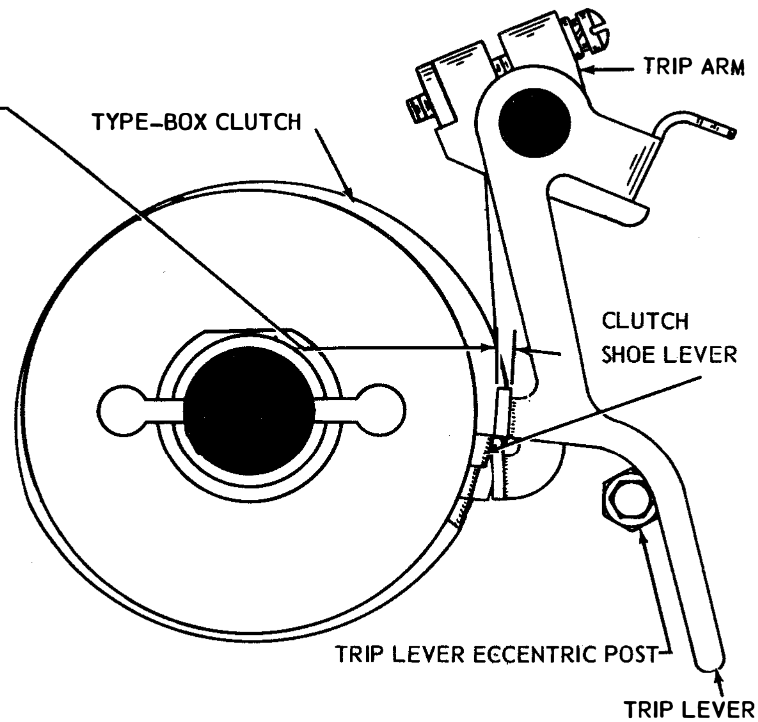
(A) TYPE BOX CLUTCH TRIP LEVER ECCENTRIC POST

REQUIREMENT

TYPE BOX CLUTCH DISENGAGED. TRIP LEVER SHOULD ENGAGE THE CLUTCH SHOE LEVER BY THE FULL THICKNESS OF THE SHOE LEVER.

TO ADJUST

POSITION THE TRIP LEVER ECCENTRIC POST.



(C) LINE FEED CLUTCH TRIP LEVER ADJUSTING SCREW

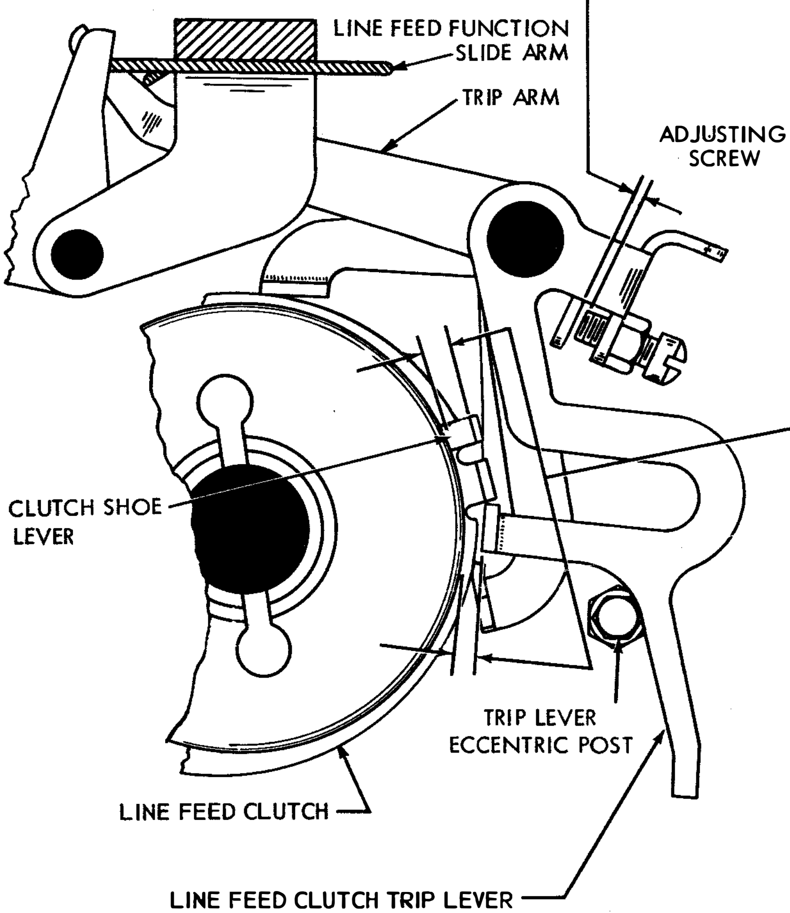
REQUIREMENT

LINE FEED FUNCTION SLIDE ARM IN REAR POSITION.
CLUTCH TRIP LEVER AGAINST ITS ECCENTRIC POST.
TRIP ARM HELD AGAINST ITS FUNCTION SLIDE ARM.
SOME CLEARANCE BETWEEN THE END OF THE TRIP LEVER ADJUSTING SCREW AND THE TRIP ARM.

MAX. 0.006 INCH

TO ADJUST

POSITION THE ADJUSTING SCREW.



(B) LINE FEED CLUTCH TRIP LEVER ECCENTRIC POST

REQUIREMENT

CLEARANCE BETWEEN TRIP LEVER AND CLUTCH DRUM SHOULD BE 0.018 TO 0.035 INCH LESS THAN CLEARANCE BETWEEN SHOE LEVER AND DRUM AT STOP WHICH SHOWS GREATEST CLEARANCE. THERE SHOULD BE SOME OVERBITE ON ALL THREE STOP LUGS AS GAUGED BY EYE.

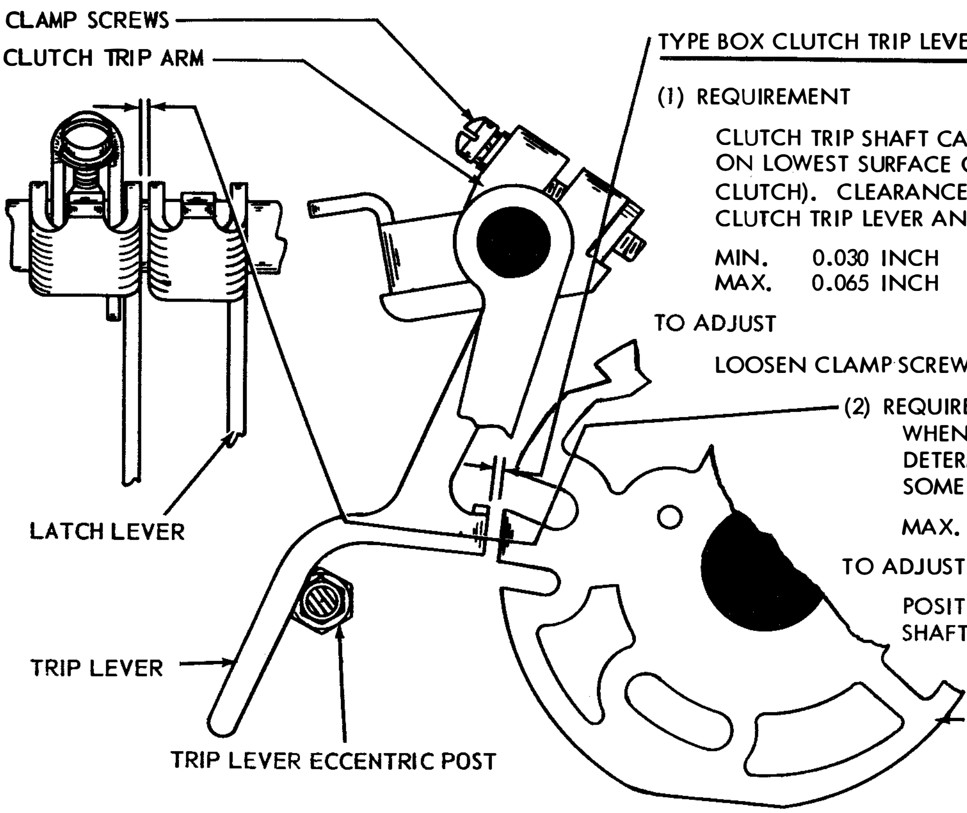
TO CHECK

DISENGAGE THE CLUTCH. TRIP CLUTCH TRIP LEVER AND ROTATE MAIN SHAFT UNTIL TRIP LEVER IS OVER THE SHOE LEVER. TAKE UP PLAY OF SHOE LEVER INWARD BY SNAPPING THE TRIP LEVER OVER THE SHOE LEVER. CHECK CLEARANCE BETWEEN SHOE LEVER AND DRUM AT EACH STOP POSITION. WITH THE TRIP LEVER AT THE STOP POSITION WHICH YIELDS GREATEST CLEARANCE, ROTATE MAIN SHAFT SLOWLY UNTIL THE TRIP LEVER JUST FALLS OFF THE STOP LUG. CHECK CLEARANCE BETWEEN TRIP LEVER AND DRUM.

TO ADJUST

BACK OFF TRIP LEVER ADJUSTING SCREW AND POSITION TRIP LEVER ECCENTRIC STOP POST.

Figure 5-16. Typing Unit, Type Box Clutch and Line Feed Clutch Mechanism



TYPE BOX CLUTCH TRIP LEVER

(1) REQUIREMENT

CLUTCH TRIP SHAFT CAM FOLLOWER ROLLER ON LOWEST SURFACE OF CAM (LOCATED ON CODE BAR CLUTCH). CLEARANCE BETWEEN INNER FACE OF TYPE BOX CLUTCH TRIP LEVER AND THE CLUTCH DISK STOP LUG.

MIN. 0.030 INCH
MAX. 0.065 INCH

TO ADJUST

LOOSEN CLAMP SCREW AND POSITION STOP.

(2) REQUIREMENT

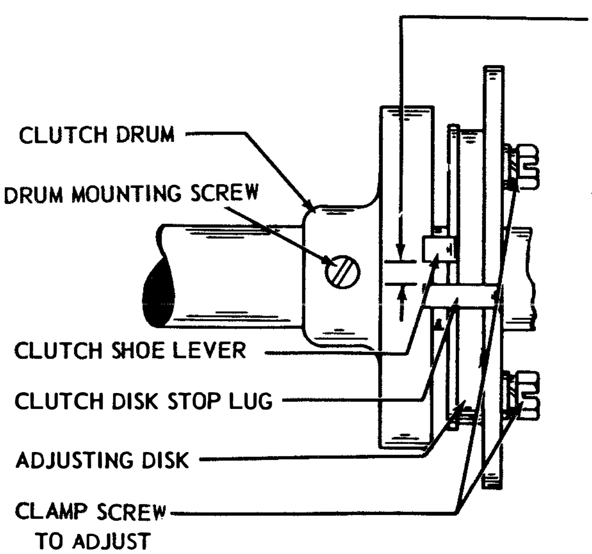
WHEN POSITIONING THE TRIP ARM DETERMINE THAT THE LATCH LEVER HAS SOME SIDE PLAY

MAX. 0.008 INCH

TO ADJUST

POSITION THE CLUTCH TRIP ARM ON ITS SHAFT WITH THE CLAMP SCREW LOOSENED

Figure 5-17. Typing Unit, Type Box Clutch Trip Lever



CLUTCH SHOE LEVER (ALL CLUTCHES)

REQUIREMENT

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

TO CHECK

DISENGAGE THE CLUTCH AND MEASURE THE GAP. TRIP THE CLUTCH AND ROTATE IT UNTIL THE CLUTCH SHOE LEVER IS TOWARD THE BOTTOM OF THE UNIT. AGAIN MEASURE THE GAP WITH THE CLUTCH THUS ENGAGED.

NOTE

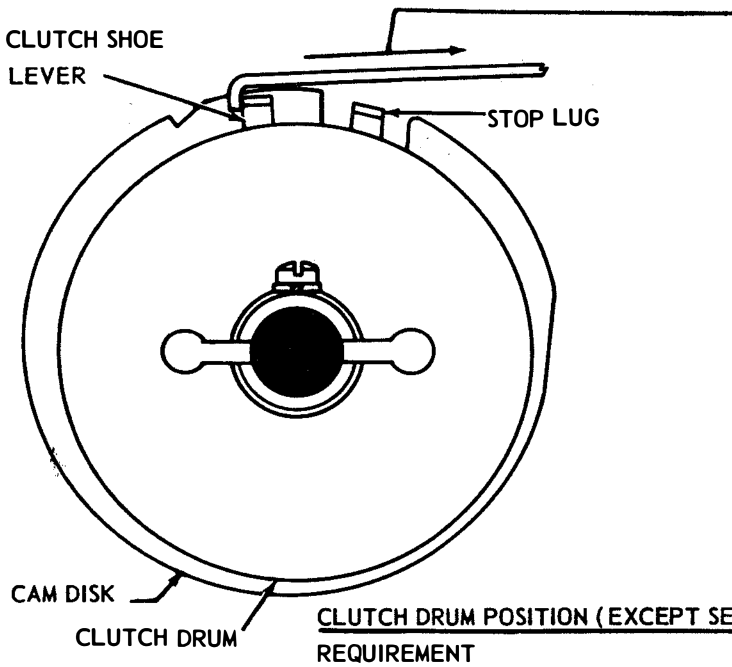
ON MULTIPLE STOP CLUTCHES CHECK THE CLEARANCE AT THE STOP LUG THAT IS ADJACENT TO THE FORM IN THE CLUTCH ADJUSTING DISK.

TO ADJUST LOOSEN THE TWO CLAMP SCREWS ON THE CLUTCH DISK. ENGAGE A WRENCH OR SCREWDRIVER ON THE LUG OF THE ADJUSTING DISK AND ROTATE THE DISK.

NOTE

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

Figure 5-18. Typing Unit, Clutch Shoe Lever



CLUTCH SHOE LEVER SPRING TENSIONS

REQUIREMENT

CLUTCH ENGAGED. HOLD CAM DISK TO PREVENT TURNING. SPRING SCALE PULLED AT TANGENT TO CLUTCH.

MIN. 15 OZS.
MAX. 20 OZS. ONE-STOP CLUTCHES

MIN. 16 OZS.
MAX. 22 OZS. MULTIPLE-STOP CLUTCHES

TO MOVE THE SHOE LEVER IN CONTACT WITH THE STOP LUG.

CLUTCH DRUM POSITION (EXCEPT SELECTOR)

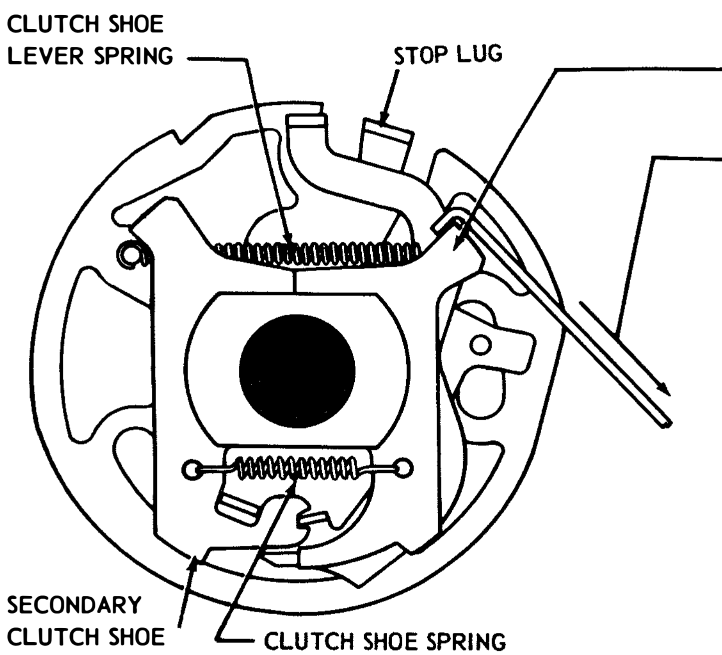
REQUIREMENT

CLUTCH SHOE LEVER HELD DISENGAGED. CLUTCH SHOULD HAVE SOME END PLAY

MAX. 0.015 INCH

TO ADJUST

POSITION EACH DRUM AND SPACING CLUTCH SET COLLAR WITH MOUNTING SCREWS LOOSENED.



CLUTCH SHOE SPRING TENSION

NOTE

IN ORDER TO CHECK THIS SPRING TENSION, IT IS NECESSARY TO REMOVE THE CLUTCH FROM THE MAIN SHAFT. THEREFORE, IT SHOULD NOT BE CHECKED UNLESS THERE IS GOOD REASON TO BELIEVE THAT IT DOES NOT MEET ITS REQUIREMENT.

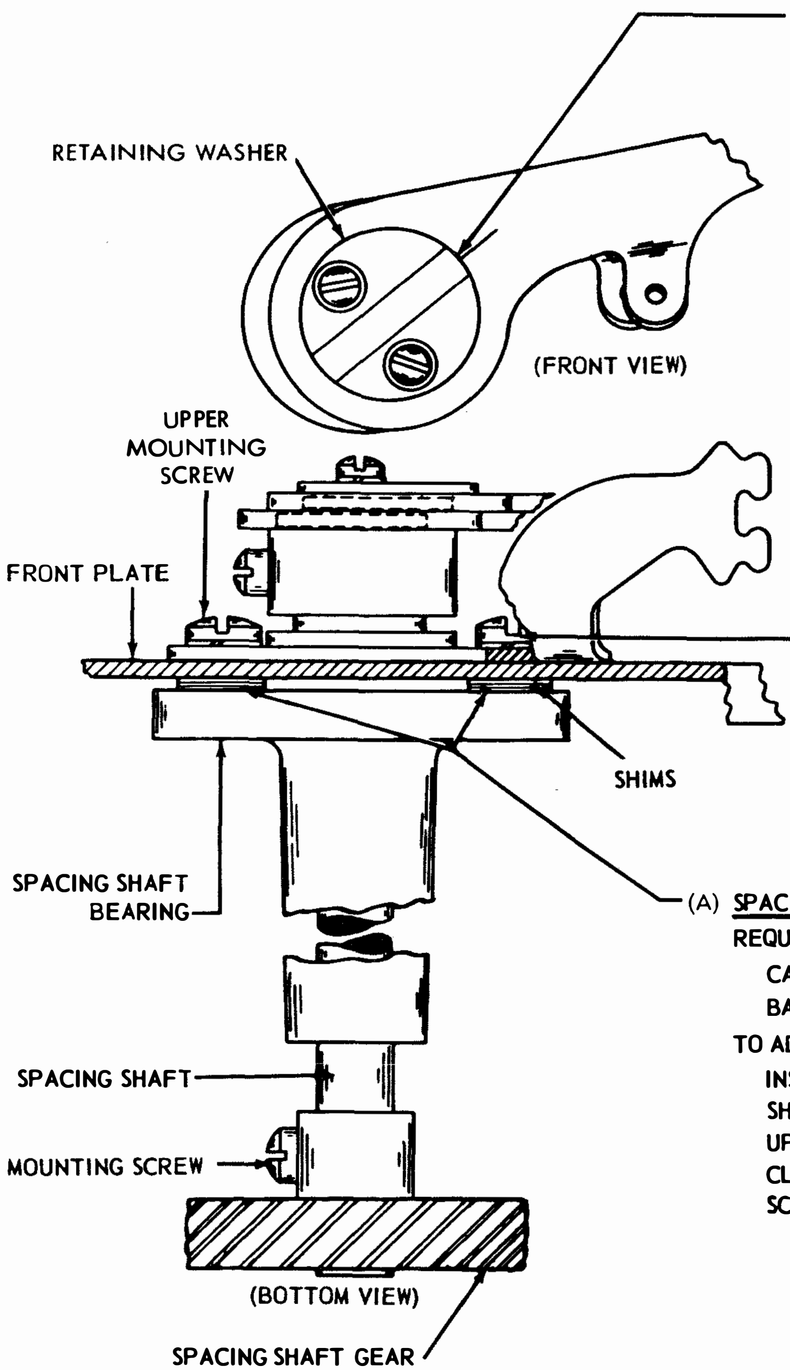
REQUIREMENT

CLUTCH DRUM REMOVED. SPRING SCALE APPLIED TO PRIMARY SHOE AT A TANGENT TO THE FRICTION SURFACE.

MIN. 3 OZS.
MAX. 5 OZS.

TO START THE PRIMARY SHOE MOVING AWAY FROM SECONDARY SHOE AT POINT OF CONTACT.

Figure 5-19. Typing Unit, Clutch Mechanism



(B) SPACING GEAR PHASING

REQUIREMENT

SPACING CLUTCH DISENGAGED. INDEX LINE ON THE SPACING PAWL SHOULD BE BETWEEN THE TWO LINES ON THE PAWL RETAINING WASHER.

TO ADJUST

REMOVE THE MOUNTING SCREW FROM THE SPACING SHAFT GEAR. HOLD THE PAWLS IN ALIGNMENT AND ENGAGE THE SPACING SHAFT GEAR WITH THE CLUTCH GEAR AT A POINT WHERE THE SPACING SHAFT GEAR MOUNTING SCREW HOLE IS IN LINE WITH THE TAPPED HOLE IN THE SPACING SHAFT AND INSERT THE MOUNTING SCREW

(A) SPACING GEAR CLEARANCE

REQUIREMENT

CARRIAGE FULLY RETURNED. MINIMUM BACKLASH OF SPACING GEARS WITHOUT BIND.

TO ADJUST

INSERT SHIMS BETWEEN THE SPACING SHAFT BEARING AND FRONT PLATE AT UPPER MOUNTING SCREW TO INCREASE CLEARANCE AND AT LOWER MOUNTING SCREW TO DECREASE BACKLASH.

Figure 5-20. Typing Unit, Spacing Mechanism

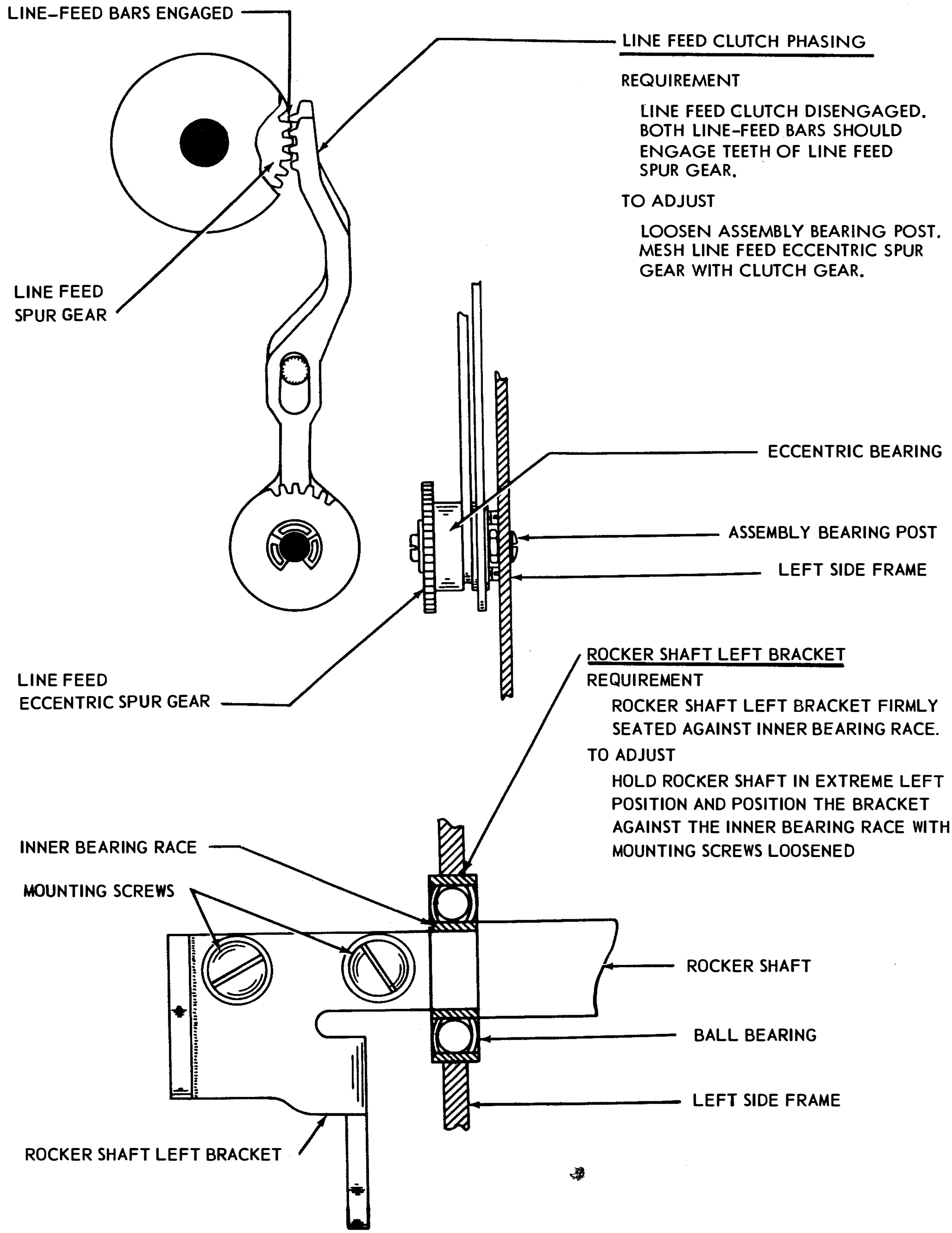


Figure 5-21. Typing Unit, Line Feed and Rocker Shaft Mechanisms

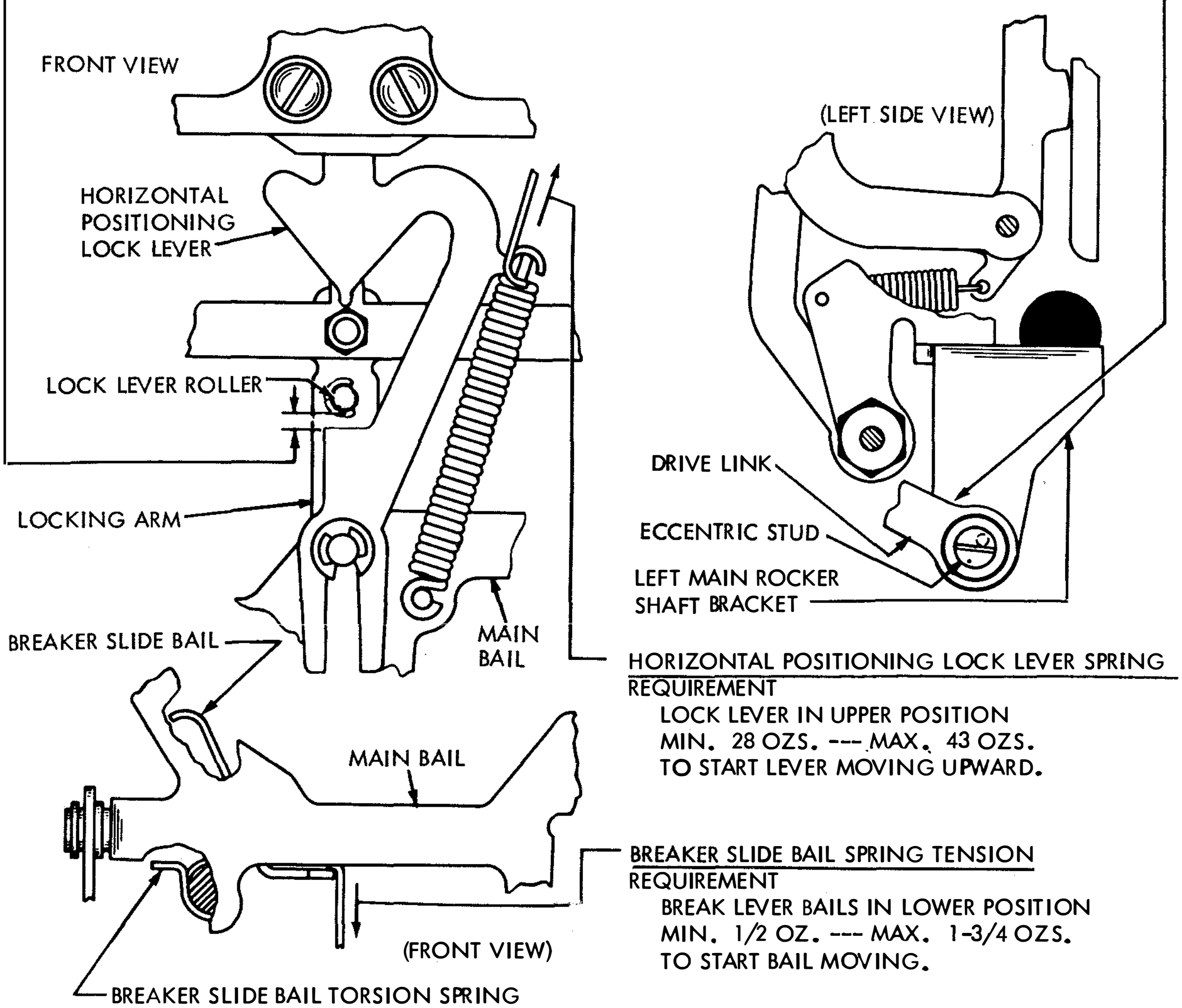
ROCKER SHAFT BRACKET ECCENTRIC STUD

(1) REQUIREMENT --- WITH TYPE BOX CLUTCH DISENGAGED AND PLAY IN LOCKING ARM TAKEN UP TOWARD FRONT, GAP BETWEEN LOWER SIDE OF LOCK LEVER ROLLER AND TOP EDGE OF SHOULDER ON HORIZONTAL POSITIONING LOCK LEVER SHOULD BE:
MIN. 0.055 INCH -- MAX. 0.090 INCH

(2) REQUIREMENT --- MAKE SURE THAT ROCKER SHAFT DRIVE LINK IS FREE IN ITS BEARINGS (NOT UNDER LOAD) WHEN CLUTCH IS IN (a) ITS STOP POSITION; (b) WHEN IT IS ROTATED 180 DEGREES FROM STOP POSITION.

TO ADJUST --- (1) POSITION ECCENTRIC STUD IN LOWER END OF ROCKER-SHAFT LEFT BRACKET. KEEP HIGH PART OF ECCENTRIC (MARKED WITH DOT) BELOW CENTER LINE OF DRIVE LINK. (2) MAKE SURE THAT STUD IS FREE IN TYPE BOX CLUTCH BEARING AT POSITIONS (a) AND (b) ABOVE (NO PUSHING OR PULLING FORCE ON DRIVE LINK). CHECK MANUALLY BY MOVING LINK TOWARD LEFT SIDE FRAME AND THEN IN REVERSE DIRECTION.

NOTE --- ANY CHANGE IN THIS ADJUSTMENT WILL REQUIRE THAT THE FOLLOWING RELATED ADJUSTMENTS BE RECHECKED: HORIZONTAL POSITIONING DRIVE LINKAGE (FIGURE 5-30, RIGHT VERTICAL POSITIONING LEVER ECCENTRIC STUD (FIGURE 5-23), LEVER ECCENTRIC STUD (FIGURE 5-24) VERTICAL POSITIONING LOCK LEVER (FIGURE 5-32), RIBBON FEED LEVER BRACKET (FIGURE 5-46), SPACING TRIP LEVER BAIL CAM PLATE (FIGURE 5-26). REVERSING SLIDE BRACKETS (FIGURE 5-29) AND RIBBON REVERSE SPUR GEAR (FIGURE 5-45). PRINTING TRACK (FIGURE 5-42) AND PRINTING ARM (FIGURE 5-43).



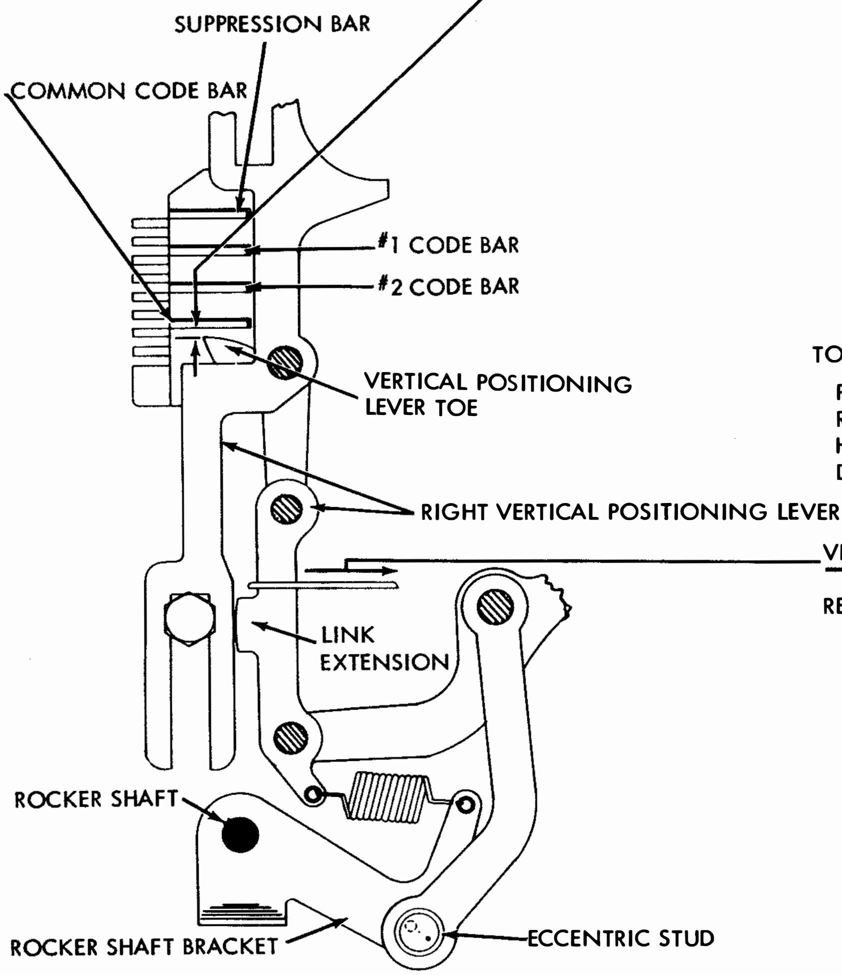
HORIZONTAL POSITIONING LOCK LEVER SPRING

REQUIREMENT
LOCK LEVER IN UPPER POSITION
MIN. 28 OZS. --- MAX. 43 OZS.
TO START LEVER MOVING UPWARD.

BREAKER SLIDE BAIL SPRING TENSION

REQUIREMENT
BREAK LEVER BAILS IN LOWER POSITION
MIN. 1/2 OZ. --- MAX. 1-3/4 OZS.
TO START BAIL MOVING.

Figure 5-22. Typing Unit, Shift and Positioning Mechanisms



RIGHT VERTICAL POSITIONING LEVER
ECCENTRIC STUD

REQUIREMENT

TYPE BOX CLUTCH DISENGAGED, COMMON CODE BAR IN SPACING POSITION. PLAY TAKEN UP BY PRESSING DOWNWARD ON COMMON CODE BAR AT GUIDE BLOCK.

MIN. 0.030 INCH
MAX. 0.050 INCH

CLEARANCE BETWEEN THE TOE OF VERTICAL POSITIONING LEVER AND THE BOTTOM OF THE COMMON CODE BAR WHEN PLAY IS TAKEN UP TO MAKE CLEARANCE A MINIMUM.

TO ADJUST

POSITION THE ECCENTRIC STUD IN THE RIGHT ROCKER SHAFT BRACKET. POSITION HIGH PART OF ECCENTRIC (MARKED WITH DOT) TOWARD THE REAR.

VERTICAL POSITIONING LEVER SPRING TENSION

REQUIREMENT

VERTICAL POSITIONING LEVER TOES (RIGHT AND LEFT) IN CONTACT WITH THE SUPPRESSION CODE BAR. LEVERS NOT BUCKLED.

MIN. 4 OZS.
MAX. 12 OZS.

TO MOVE THE LINK EXTENSION AWAY FROM THE VERTICAL POSITIONING LEVER. CHECK BOTH RIGHT AND LEFT SPRINGS.

Figure 5-23. Typing Unit, Vertical Positioning Mechanism (Right Side)

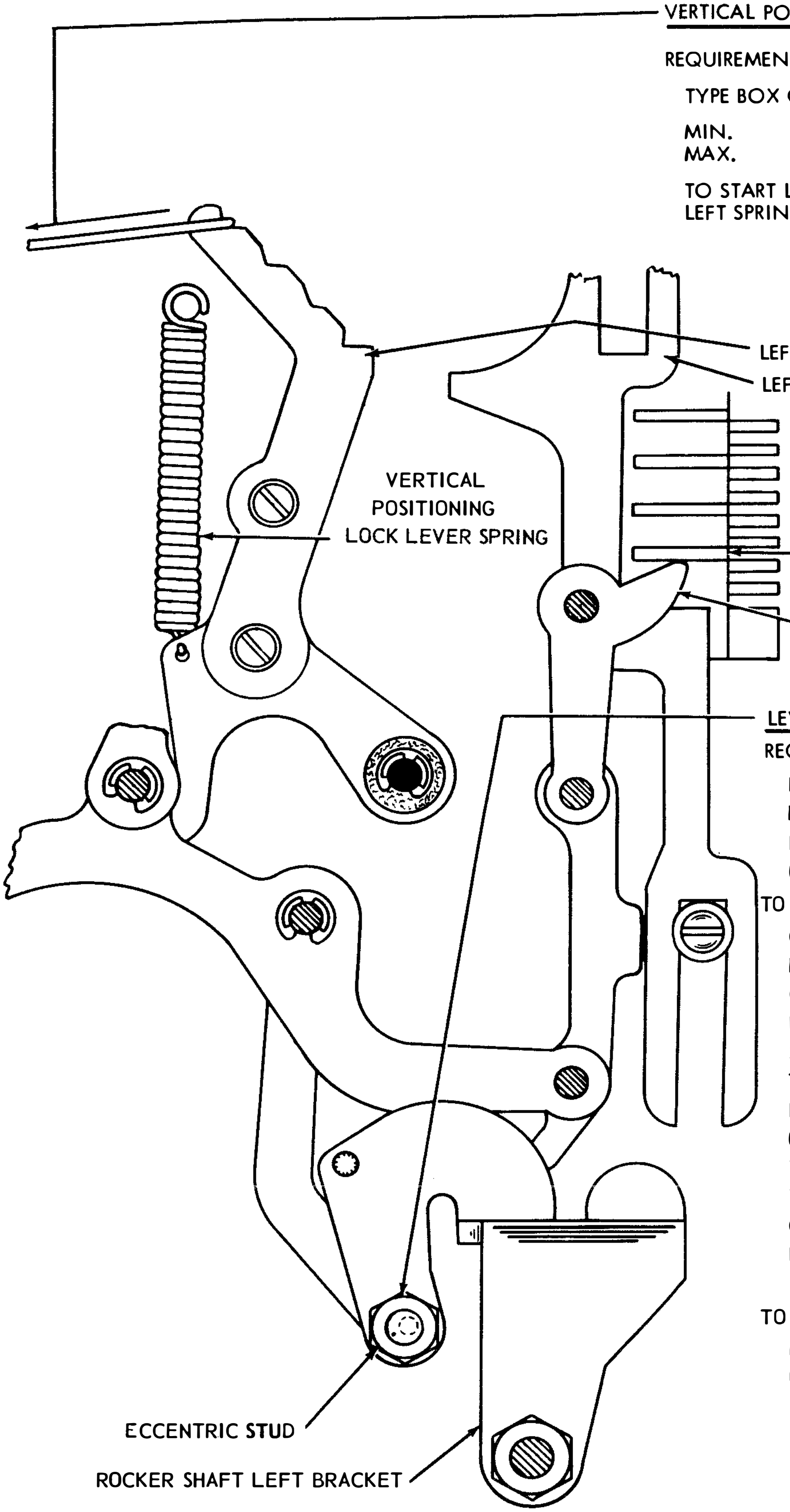
VERTICAL POSITIONING LOCK LEVER SPRING TENSION

REQUIREMENT

TYPE BOX CLUTCH DISENGAGED

MIN. 5 OZS.
MAX. 8 OZS.

TO START LOCK LEVER MOVING. CHECK RIGHT AND LEFT SPRINGS.



LEVER ECCENTRIC STUD

REQUIREMENT

RIGHT AND LEFT VERTICAL POSITIONING LEVERS SHOULD BUCKLE EQUALLY WITHIN 0.006 INCH

TO CHECK

COMMON CODE BAR IN SPACING POSITION, TRIP TYPE BOX CLUTCH. ROTATE MAIN SHAFT UNTIL RIGHT VERTICAL POSITIONING LEVER TOE TOUCHES COMMON CODE BAR, BUCKLING ITS LOWER LINK 0.008 INCH (MAXIMUM). LEFT VERTICAL POSITIONING LEVER TOE SHOULD TOUCH COMMON CODE BAR, BUCKLING ITS LOWER LINK EQUALLY WITHIN 0.006 INCH.

TO ADJUST

POSITION ECCENTRIC STUD ON ROCKER SHAFT LEFT BRACKET INNER ARM. POSITION HIGH PART OF CAM (MARKED WITH DOT) TOWARD REAR.

Figure 5-24. Typing Unit, Vertical Positioning Mechanism (Left Side)

NOTE: CHECK RELATED ADJUSTMENTS FIGURES 5-37, 5-38, AND 5-40 IF THE FOLLOWING ADJUSTMENTS ARE MADE.

OSCILLATING RAIL SLIDE

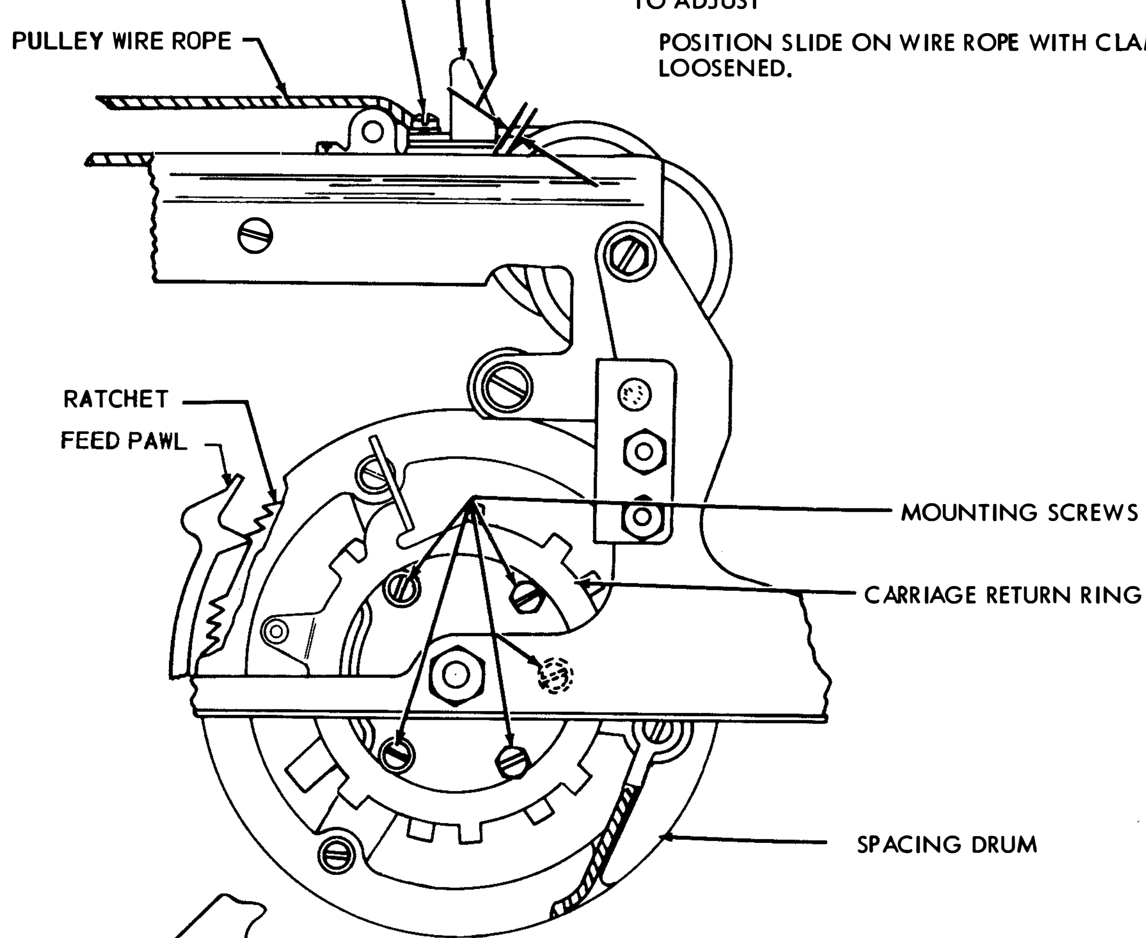
REQUIREMENT

CARRIAGE RETURN RING FREE TO ROTATE ON SPACING DRUM (FIVE MOUNTING SCREWS LOOSENED). SPACING CLUTCH DISENGAGED. FEED PAWL WHICH IS FARTHEST ADVANCED ENGAGING TOOTH IMMEDIATELY ABOVE CUT-AWAY SECTION OF RATCHET. CLEARANCE BETWEEN SLIDE AND PULLEY.

MIN. 0.025 INCH
MAX. 0.050 INCH

TO ADJUST

POSITION SLIDE ON WIRE ROPE WITH CLAMP SCREWS LOOSENED.



SPACING FEED PAWL SPRING TENSION

REQUIREMENT

EACH SPACING PAWL IN LEAST ADVANCED POSITION, RESTING AGAINST RATCHET WHEEL.
EACH SPRING UNHOOKED FROM BRACKET
MIN. 2 1/2 OZS.
MAX. 4 OZS.
TO PULL SPRINGS TO INSTALLED LENGTH.

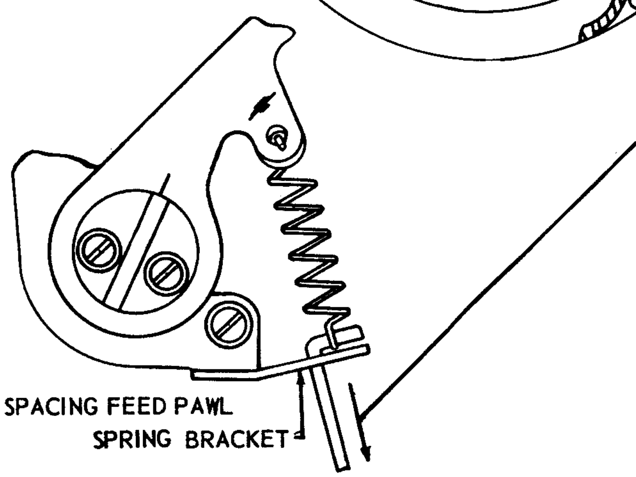


Figure 5-25. Typing Unit, Spacing Mechanism

SPACING TRIP LEVER BAIL CAM PLATE

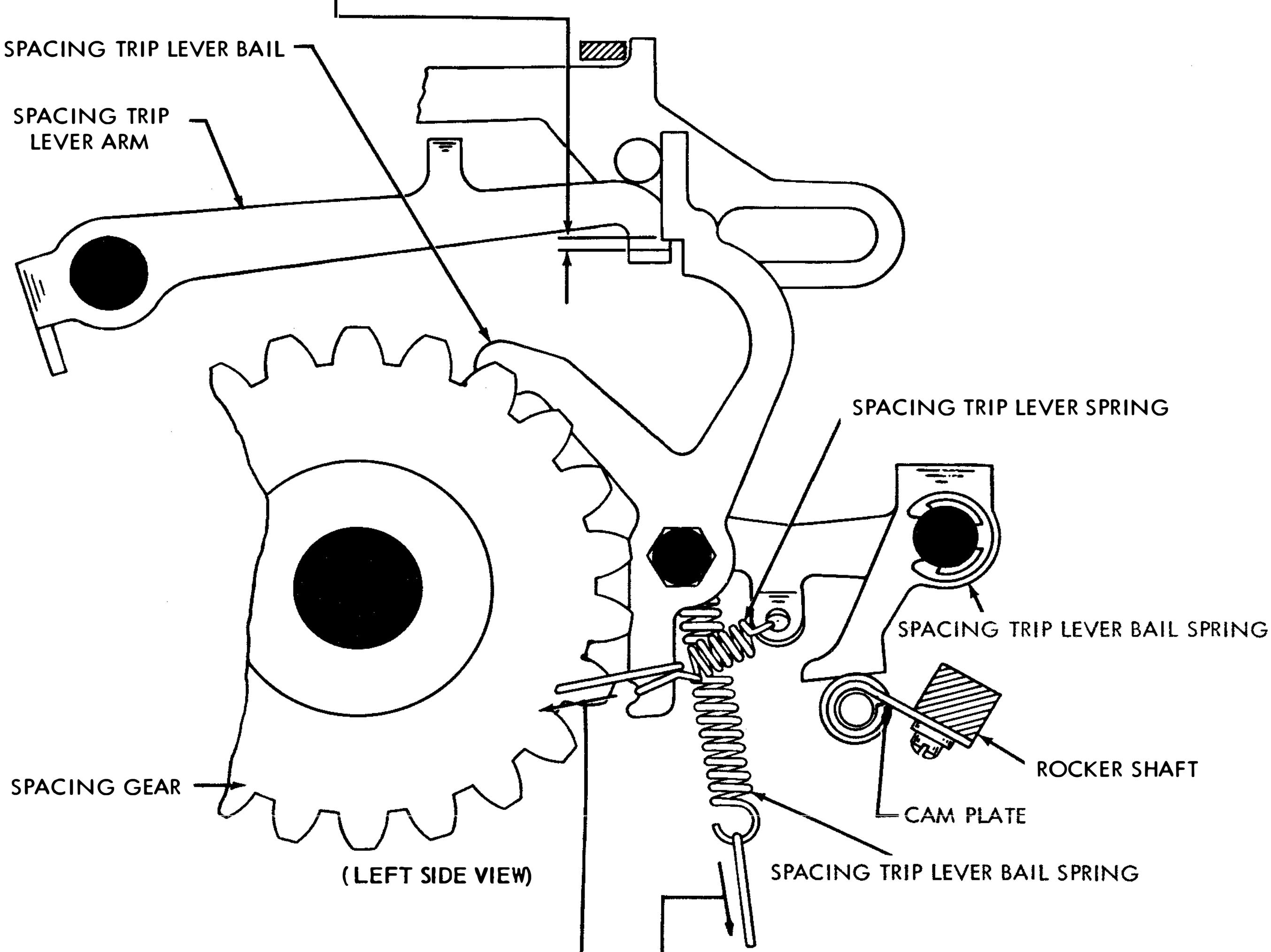
REQUIREMENT

SPACING TRIP LEVER ARM IN UPWARD POSITION. TYPE BOX CLUTCH ROTATED THROUGH APPROXIMATELY ONE-HALF OF ITS CYCLE. ALL FUNCTION PAWLS DISENGAGED FROM FUNCTION BAR. CLEARANCE BETWEEN TOP SURFACE OF TRIP LEVER ARM EXTENSION AND SPACING TRIP LEVER SHOULDER.

MIN. 0.010 INCH
MAX. 0.040 INCH

TO ADJUST

POSITION CAM PLATE ON ROCKER SHAFT WITH MOUNTING SCREWS LOOSENED. POSITION FORWARD EDGE OF CAM PLATE PARALLEL TO SHAFT.



SPACING TRIP LEVER SPRING TENSION

REQUIREMENT

TYPE BOX CLUTCH DISENGAGED.

MIN. 2-1/2 OZS.
MAX. 5 OZS.

TO START LEVER MOVING.

SPACING TRIP LEVER BAIL SPRING TENSION

REQUIREMENT

SPACING TRIP LEVER BAIL AGAINST STOP.
SPACING TRIP LEVER BAIL SPRING UNHOOKED.

MIN. 8 OZS.
MAX. 12 OZS.

TO PULL SPRING TO INSTALLED LENGTH.

Figure 5-26. Typing Unit, Spacing Trip Lever

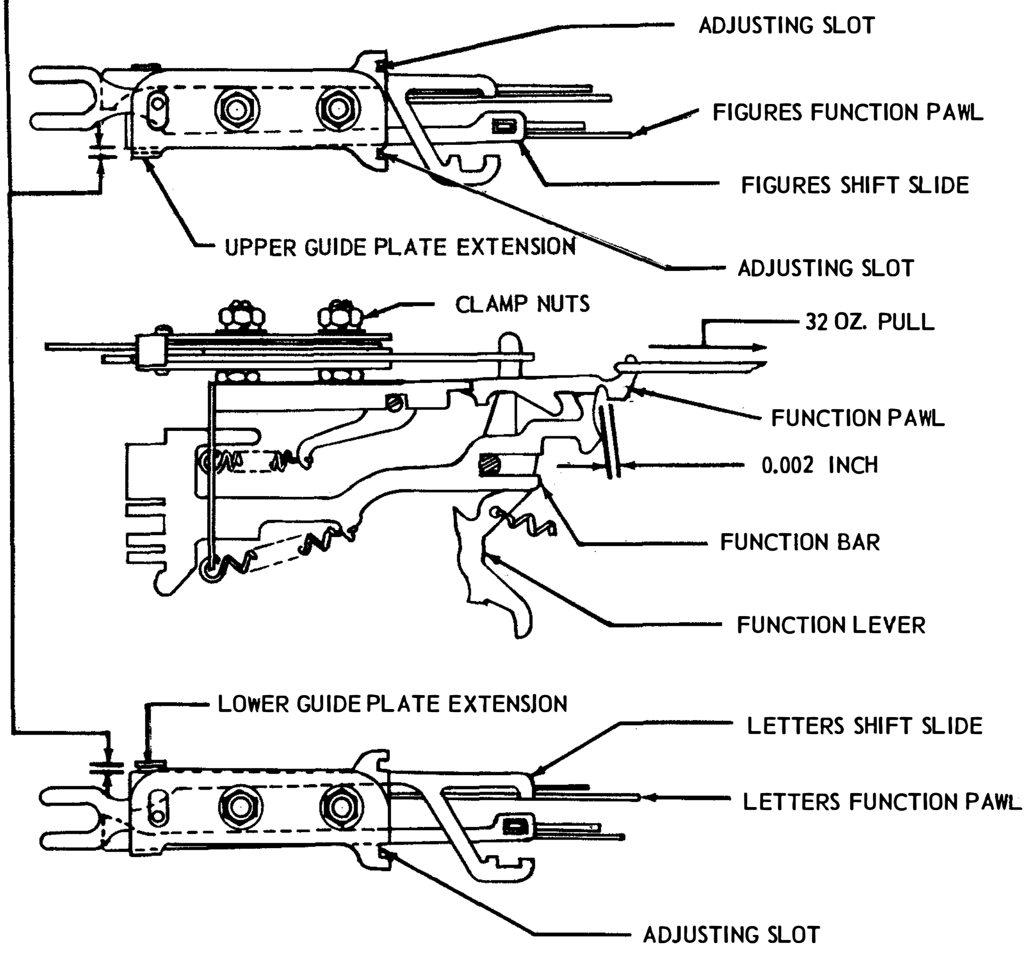
FIGS - LTRS SHIFT CODE BAR OPERATING MECHANISM

(1) REQUIREMENT
WITH FUNCTION CLUTCH ROTATED UNTIL CLUTCH DISK STOP LUG IS TOWARD BOTTOM OF UNIT, HOOK FIGURES FUNCTION PAWL OVER THE END OF THE FUNCTION BAR. CLEARANCE BETWEEN UPPER GUIDE PLATE EXTENSION AND SHIFT SLIDE.
MAX. 0.020 WHEN PLAY IS TAKEN UP FOR MAXIMUM.

(2) REQUIREMENT
WITH 32 OZ. PULL APPLIED TO FUNCTION PAWL THERE SHOULD BE
MIN. 0.002 INCH
BETWEEN SHOULDER OF FIGURES FUNCTION PAWL AND FACE OF FUNCTION BAR.

(3) REQUIREMENT
REPEAT REQUIREMENT (1) & (2) FOR THE LETTERS FUNCTION PAWL. CHECK MAX. CLEARANCE BETWEEN LOWER GUIDE PLATE EXTENSION AND SHIFT SLIDE. CHECK MIN. CLEARANCE BETWEEN SHOULDER OF LETTER FUNCTION PAWL AND FACE OF FUNCTION BAR.

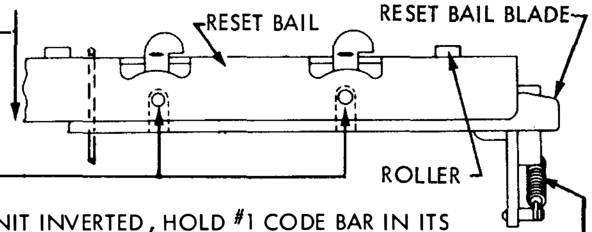
TO ADJUST
POSITION UPPER AND/OR LOWER GUIDE PLATE BY THE ADJUSTING SLOT WITH THE CLAMP NUTS LOOSENED.



NOTE: FOR EARLIER DESIGN SEE FIGURE 4-28

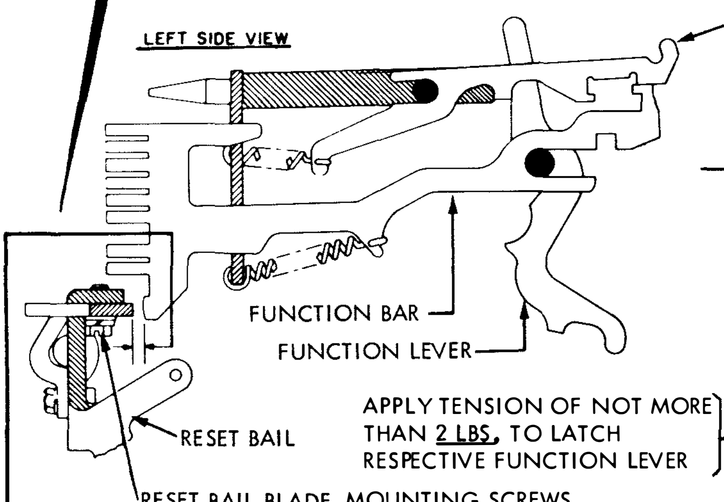
Figure 5-27. Typing Unit, Letters-Figures Shift Code Bar Operating Mechanism

TOP VIEW

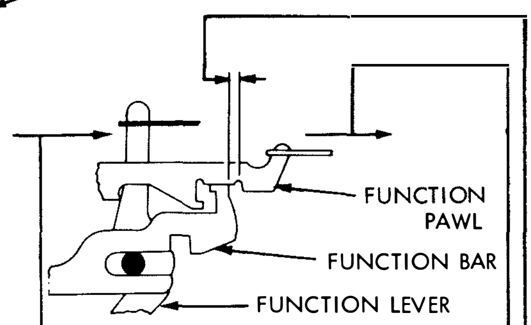


(B) FUNCTION RESET BAIL SPRING --- WITH TYPING UNIT INVERTED, HOLD #1 CODE BAR IN ITS MARKING POSITION SO THAT NO FUNCTION BAR IS SELECTED. ROTATE MAIN SHAFT UNTIL FUNCTION RESET BAIL SPRINGS ARE IN THEIR MINIMUM LENGTH POSITION. HOOK A 32 OZ. SCALE (BETWEEN CLUTCH TRIP SHAFT AND SPACE SUPPRESSOR BAIL) ON FRONT EDGE OF RESET BAIL (AT MIDDLE OF BAIL) AND PULL REARWARD.
MIN. 10 OZS. ---------------------------- MAX. 22 OZS. (TO START BAIL MOVING).

LEFT SIDE VIEW



APPLY TENSION OF NOT MORE THAN 2 LBS. TO LATCH RESPECTIVE FUNCTION LEVER



LEFT SIDE PARTIAL VIEW

APPLY TENSION OF NOT MORE THAN 32 OZS. TO MOVE FUNCTION PAWL REARWARD.

(A) FUNCTION RESET BAIL BLADE

(1) REQUIREMENT --- WITH ALL CLUTCHES DISENGAGED, TRIP CODE BAR CLUTCH AND TURN MAIN SHAFT UNTIL CODE-BAR CLUTCH SHOE-RELEASE LEVER JUST TOUCHES ITS STOP LEVER. UNLATCH ALL FUNCTION PAWLS FROM THEIR FUNCTION BARS. HOLD RESPECTIVE FUNCTION BAR IN ITS EXTREME REARWARD POSITION WITH SPRING HOOK; CLEARANCE BETWEEN FUNCTION BAR AND RESET BAIL BLADE SHOULD BE
MIN. 0.018 INCH -- MAX. 0.035 INCH

TO CHECK --- MEASURE CLEARANCE AT BARS IN STUNT BOX SLOTS, NO'S 1, 4, 11, 18, 23, 33, 38 AND 41. IF A DESIGNATED SLOT IS VACANT, USE NEAREST BAR OR SELECT BAR WITH HIGHEST NUMBERED SLOT WHEN A BAR IS LOCATED ON BOTH SIDES OF VACANT SLOT. (VIEW SLOTS FROM REAR, NUMBERING FROM LEFT TO RIGHT).

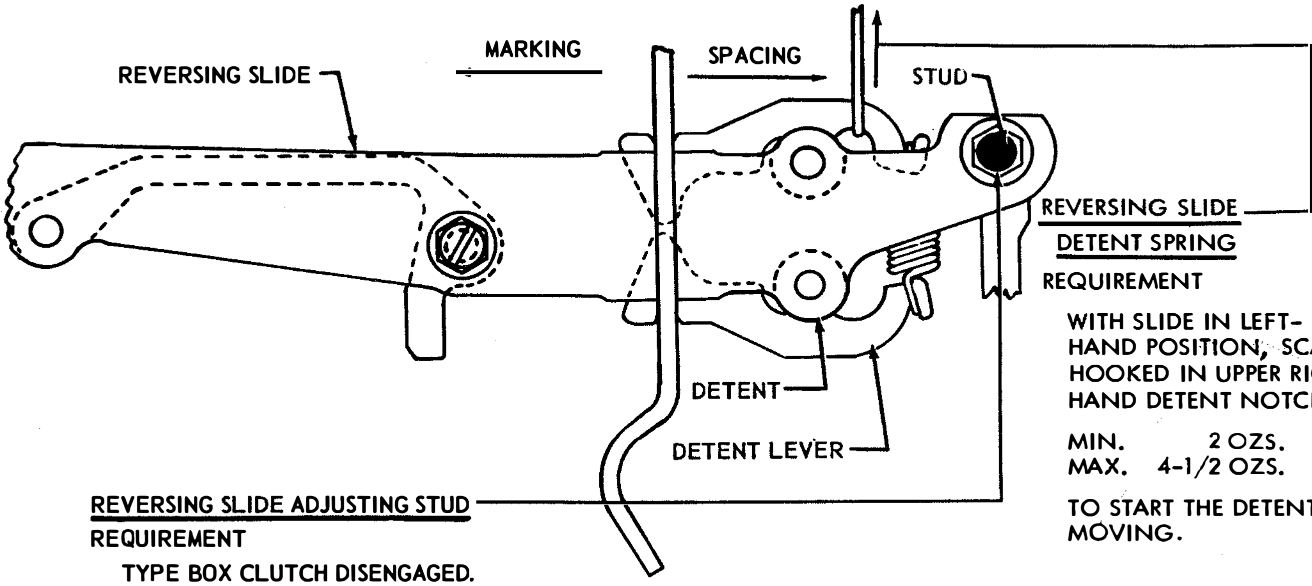
TO ADJUST --- POSITION BLADE ON RESET BAIL WITH ITS MOUNTING SCREWS FRICTION TIGHT.

(2) REQUIREMENT --- EACH FUNCTION PAWL SHOULD OVER TRAVEL ITS FUNCTION BAR BY AT LEAST 0.002 INCH WITH INDICATED TENSIONS APPLIED. CHECK PAWLS ONE AT-A-TIME AT SLOT NO'S. USED ABOVE.

TO CHECK --- IF CARRIAGE RETURN LEVER ADJUSTMENT HAS NOT BEEN MADE, LOOSEN ITS CLAMP SCREW. LATCH FUNCTION PAWLS BY LOWERING STRIPPER BLADE; TRIP CODE BAR CLUTCH AND POSITION ITS RELEASE LEVER AS IN (1) ABOVE. STRIP OFF ANY FUNCTIONS WHICH MAY HAVE BEEN SELECTED.

TO ADJUST --- REFINE REQUIREMENT (1) ABOVE, HOLDING THE READJUSTMENT WITHIN LIMITS
MIN. 0.018 INCH -- MAX. 0.035 INCH

Figure 5-28. Typing Unit, Function Bar Reset Mechanism



REVERSING SLIDE DETENT SPRING

REQUIREMENT

WITH SLIDE IN LEFT-HAND POSITION, SCALE HOOKED IN UPPER RIGHT-HAND DETENT NOTCH.

MIN. 2 OZS.
MAX. 4-1/2 OZS.

TO START THE DETENT MOVING.

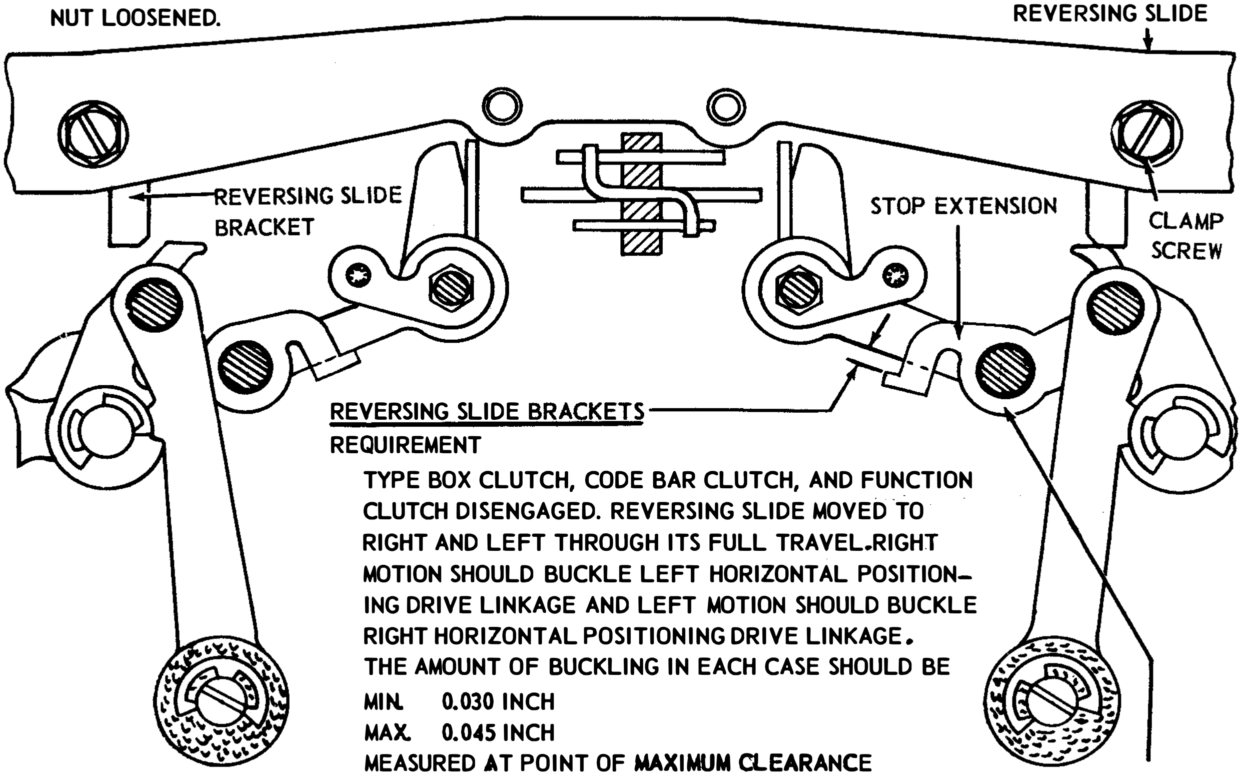
REVERSING SLIDE ADJUSTING STUD

REQUIREMENT

TYPE BOX CLUTCH DISENGAGED.
WITH NO. 3 CODE BAR IN SPACING POSITION (RIGHT), THE REVERSING SLIDE DETENT ROLLERS SHOULD BE FULLY SEATED IN THE RIGHT-HAND NOTCHES OF THE DETENT LEVER.
WITH NO. 3 CODE BAR IN MARKING POSITION (LEFT), THE REVERSING SLIDE DETENT ROLLERS SHOULD BE FULLY SEATED IN THE LEFT-HAND NOTCHES OF THE DETENT LEVER.

TO ADJUST

POSITION THE REVERSING SLIDE STUD IN ITS ELONGATED HOLE WITH ITS MOUNTING NUT LOOSENED.



REVERSING SLIDE BRACKETS

REQUIREMENT

TYPE BOX CLUTCH, CODE BAR CLUTCH, AND FUNCTION CLUTCH DISENGAGED. REVERSING SLIDE MOVED TO RIGHT AND LEFT THROUGH ITS FULL TRAVEL. RIGHT MOTION SHOULD BUCKLE LEFT HORIZONTAL POSITIONING DRIVE LINKAGE AND LEFT MOTION SHOULD BUCKLE RIGHT HORIZONTAL POSITIONING DRIVE LINKAGE.
THE AMOUNT OF BUCKLING IN EACH CASE SHOULD BE

MIN. 0.030 INCH
MAX. 0.045 INCH

MEASURED AT POINT OF MAXIMUM CLEARANCE

TO ADJUST

POSITION EACH REVERSING SLIDE BRACKET WITH THEIR CLAMP SCREWS LOOSENED.

Figure 5-29. Typing Unit, Horizontal Motion Reversing Mechanism

HORIZONTAL POSITIONING DRIVE LINKAGE

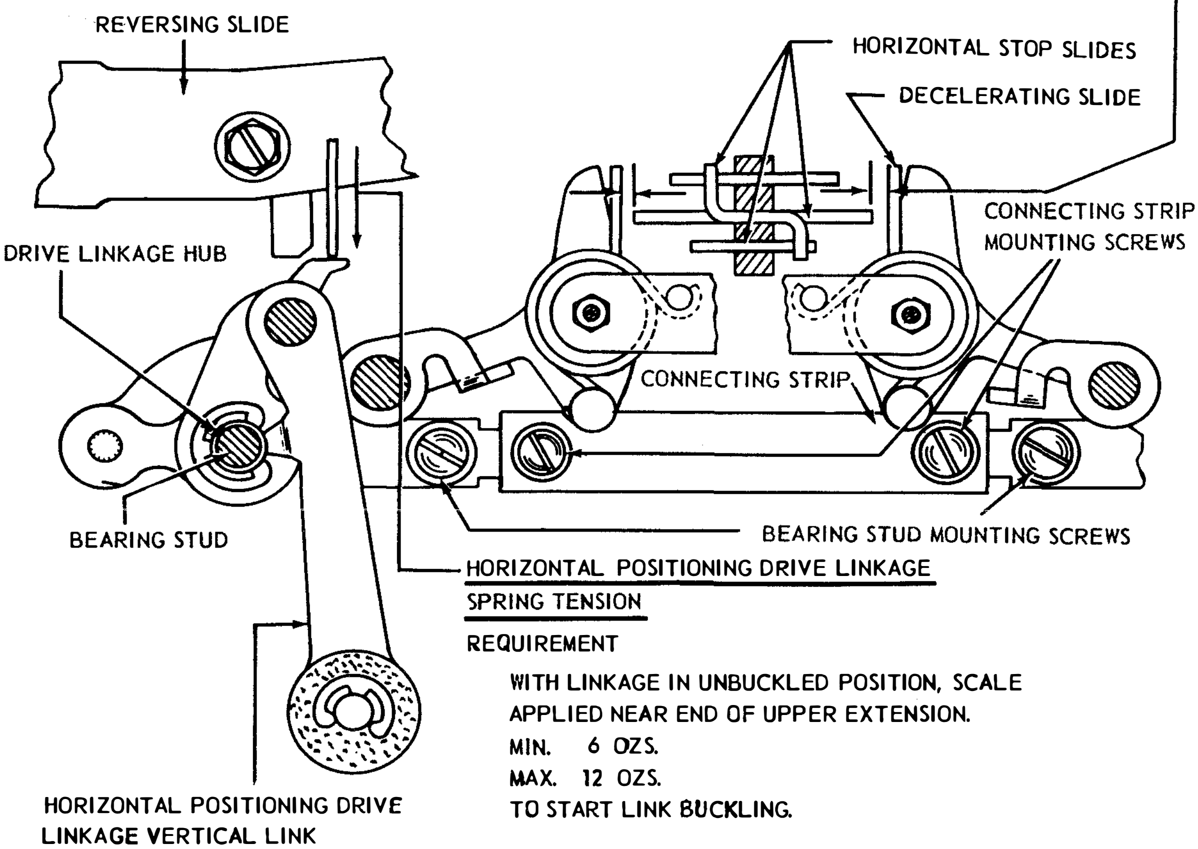
REQUIREMENT

TYPE BOX CLUTCH DISENGAGED.
CODE BARS 4 AND 5 TO SPACING (RIGHT).
CLEARANCE BETWEEN EACH SIDE OF CENTER HORIZONTAL STOP SLIDE AND DECELERATING SLIDES, ON SIDE WHERE KNEE LINK IS STRAIGHT SHOULD BE EQUAL (WITHIN 0.008 INCH)

MIN. 0.015 INCH
MAX. 0.040 INCH

TO ADJUST

LOOSEN BEARING STUD MOUNTING SCREWS AND CONNECTING STRIP MOUNTING SCREWS FRICTION TIGHT. POSITION ONE OR BOTH BEARING STUDS ON THE CONNECTING STRIP TO PROVIDE 0.025 INCH TO 0.035 INCH BETWEEN THE CENTER HORIZONTAL SLIDE AND THE DECELERATING SLIDE ON THE SIDE WHERE THE LINKAGE IS NOT BUCKLED. TIGHTEN THE TWO INNER MOUNTING SCREWS. CHANGE POSITION OF REVERSING SLIDE AND CHECK OPPOSITE CLEARANCE. EQUALIZE BY SHIFTING BOTH STUDS AND CONNECTING STRIP AS A UNIT. HOLD THE DRIVE LINKAGE HUB AGAINST THE LOWER VERTICAL LINK OF THE DRIVE LINKAGE. TIGHTEN THE TWO OUTER BEARING STUD MOUNTING SCREWS. CHECK THE LINKAGE FOR FREENESS THROUGHOUT A COMPLETE CYCLE. THE TYPE BOX CLUTCH DISK SHOULD HAVE SOME MOVEMENT IN THE NORMAL DIRECTION OF ROTATION IN THE STOP POSITION.



HORIZONTAL POSITIONING DRIVE LINKAGE

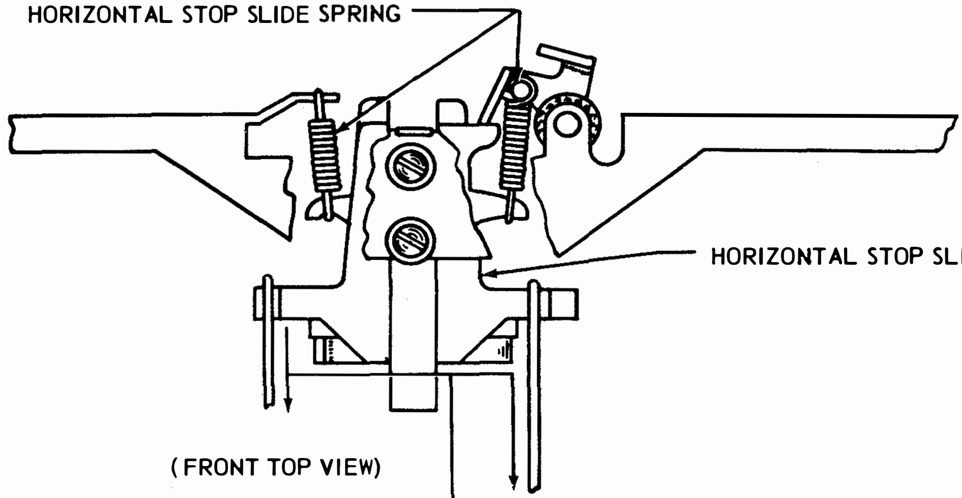
SPRING TENSION

REQUIREMENT

WITH LINKAGE IN UNBUCKLED POSITION, SCALE APPLIED NEAR END OF UPPER EXTENSION.

MIN. 6 OZS.
MAX. 12 OZS.
TO START LINK BUCKLING.

Figure 5-30. Typing Unit, Horizontal Drive Linkage



HORIZONTAL STOP SLIDE SPRING TENSION

REQUIREMENT

CODE BARS IN MARKING POSITION (LEFT).
TYPE BOX CLUTCH ROTATED 1/4 TURN FROM ITS STOP POSITION.
HORIZONTAL MOTION DECELERATING SLIDES HELD AWAY FROM HORIZONTAL STOP SLIDES.

MIN. 1/2 OZ. MAX. 1 1/2 OZS. FOR UPPER AND LOWER SLIDES
MIN. 1 3/4 OZS. MAX. 3 OZS. FOR MIDDLE SLIDE
TO START SLIDE MOVING.

NOTE: WHEN CHECKING UPPER AND LOWER SLIDES, HOLD MIDDLE SLIDE 1/32 INCH FORWARD.

DECELERATING SLIDE SPRING TENSION

REQUIREMENT

PRINTING BAIL IN DOWNWARD POSITION. PRINTING CARRIAGE AND DECELERATING SLIDE ASSEMBLY IN RIGHT HAND POSITION.

MIN. 1/2 OZ.
MAX. 1-1/2 OZS.

TO START THE SLIDE MOVING.
WITH THE PRINTING CARRIAGE AND DECELERATING SLIDE IN THEIR LEFT HAND POSITION CHECK THE LEFT HAND DECELERATING SLIDE

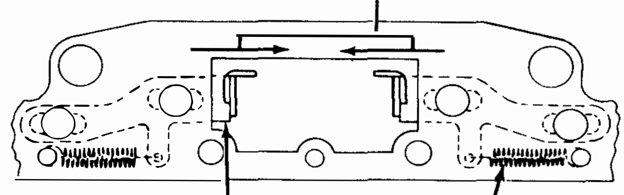


Figure 5-31. Typing Unit, Horizontal Stop and Decelerating Slide Spring Tension

VERTICAL POSITIONING LOCK LEVER

(1) REQUIREMENT

LETTERS COMBINATION SET UP ON CODE BARS. MAIN SIDE OPERATING LEVERS AT UPPER END OF TRAVEL. UPPER NOTCH OF VERTICAL POSITIONING LOCK LEVER FULLY ENGAGED (MANUALLY IF NECESSARY) WITH VERTICAL SLIDE PROJECTION. UPPER SURFACE OF FOLLOWER ARM REAR EXTENSION SHOULD BE

MIN. IN CONTACT WITH
MAX. 0.004 INCH AWAY FROM

INNER EXTENSION OF MAIN SLIDE LEVER.

(2) REQUIREMENT

WITH PLAY TAKEN UP BY PULLING UPWARD WITH 8 OZS. TENSION ON TYPE BOX CARRIAGE TRACK, VERTICAL SURFACES

MIN. IN CONTACT WITH OR
MAX. 0.012 INCH AWAY FROM EACH OTHER

TO ADJUST

POSITION RIGHT AND LEFT VERTICAL POSITIONING LOCK LEVERS WITH CLAMP SCREWS LOOSENED.

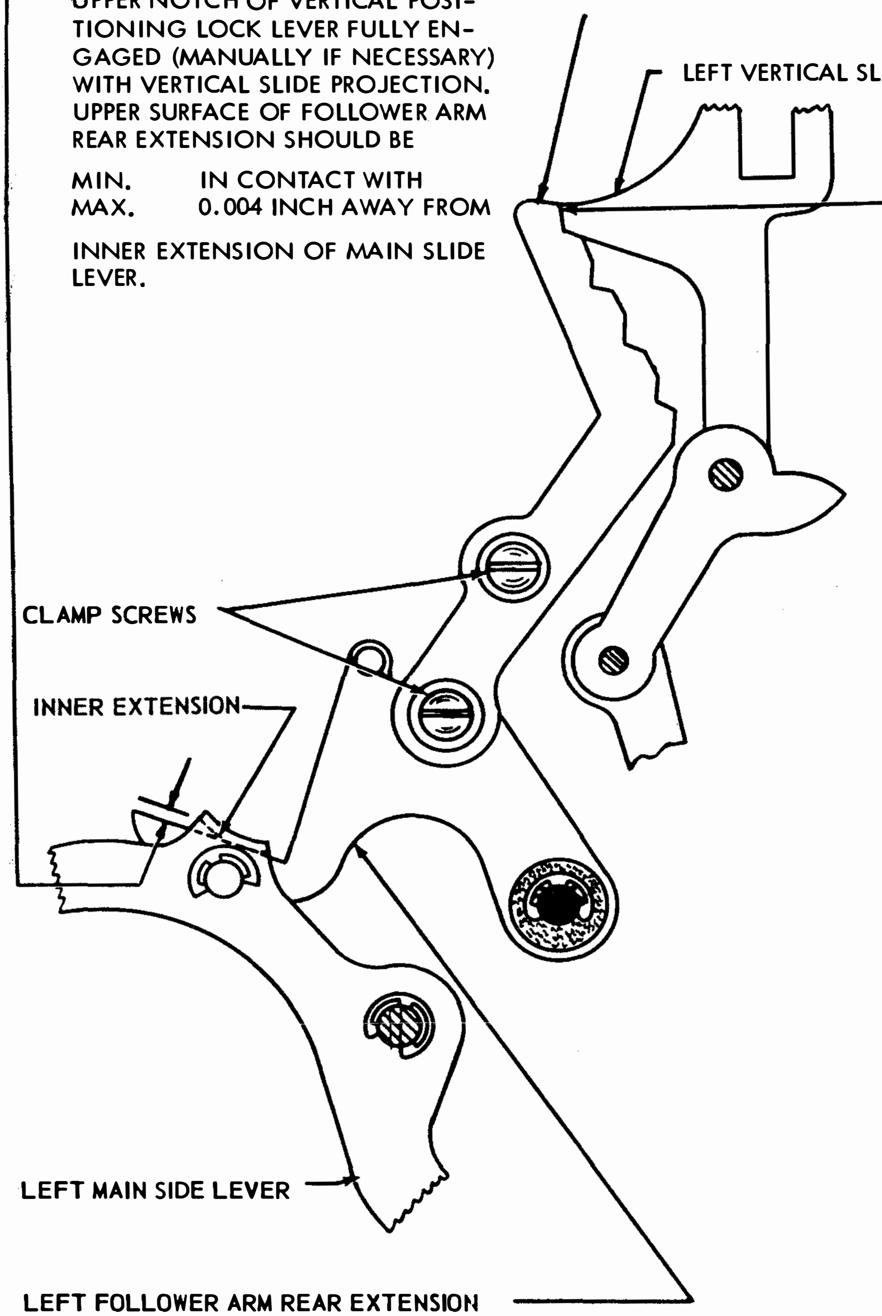
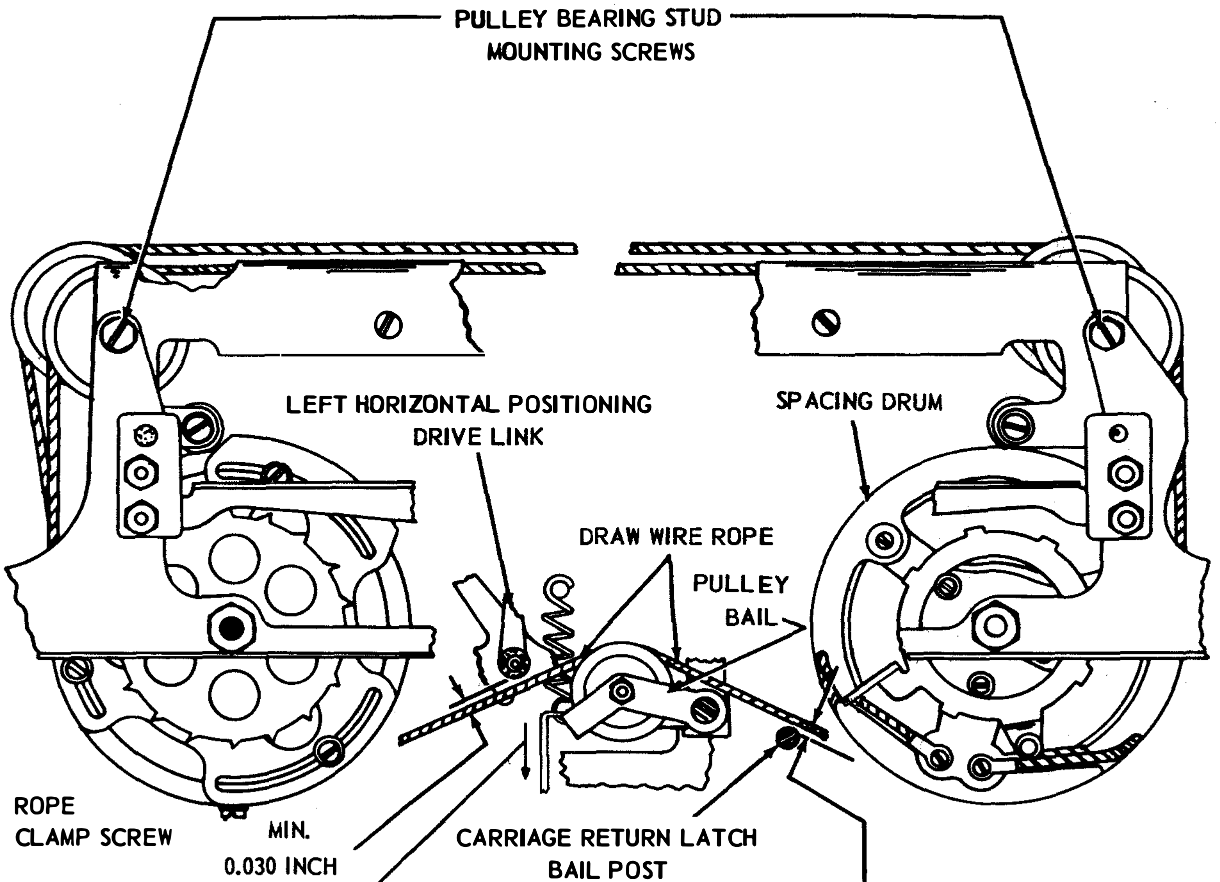


Figure 5-32. Typing Unit, Vertical Positioning Lock Lever



LOWER WIRE ROPE PULLEY BAIL SPRING

REQUIREMENT

SPRING UNHOOKED FROM PULLEY BAIL. BAIL EXTENSION RESTING ON OPENING IN FRONT PLATE.

MIN. 18 OZS. MAX. 22 OZS.

TO PULL SPRING POSITION LINK.

DRAW WIRE ROPE

(1) REQUIREMENT

AT LEAST 0.006 INCH CLEARANCE BETWEEN ROPE AND CARRIAGE RETURN LATCH BAIL POST.

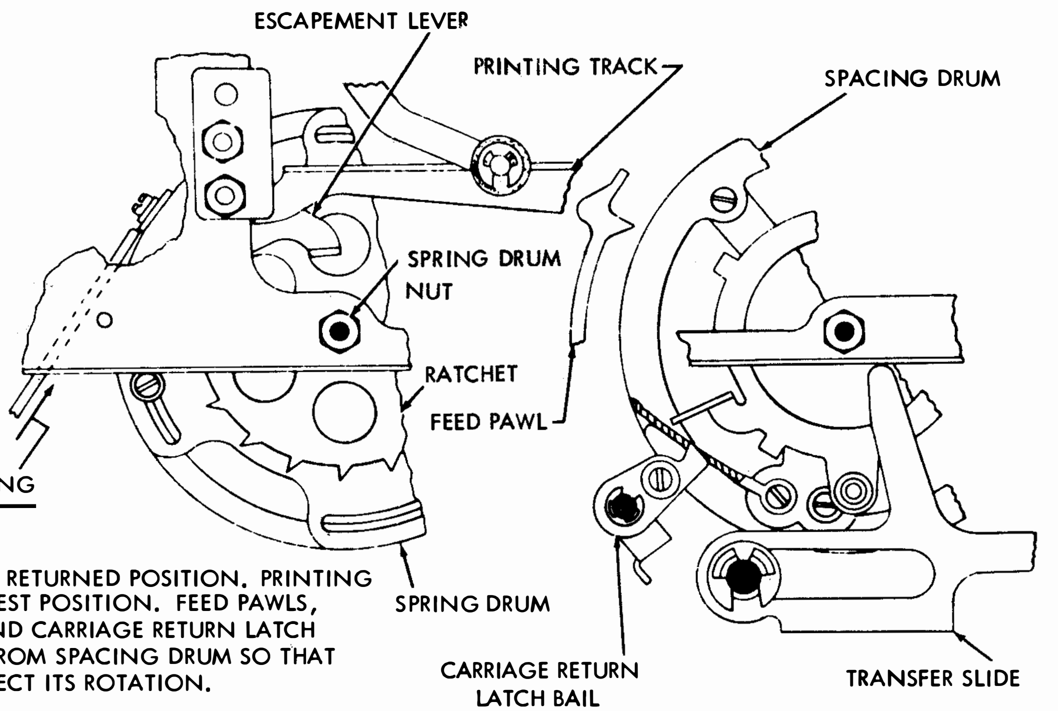
(2) REQUIREMENT

HORIZONTAL POSITIONING MECHANISM IN ITS LOWEST POSITION. AT LEAST 0.030 INCH CLEARANCE BETWEEN ROPE AND LEFT HORIZONTAL POSITIONING DRIVE LINK.

TO ADJUST

ADVANCE PRINTING CARRIAGE TO ITS EXTREME RIGHT HAND POSITION. ROTATE TYPE BOX CLUTCH 1/2 REVOLUTION. LOOSEN THE ROPE CLAMP SCREW ONE TURN ONLY. POSITION THE PULLEY BEARING STUDS, WITH THEIR MOUNTING SCREWS LOOSENED, TO MEET REQUIREMENT. MAKE CERTAIN THAT THE ROPE MOVES AROUND ITS CLAMP SCREW. TIGHTEN BOTH FRONT AND REAR CABLES WITH SLIGHTLY GREATER TENSION ON REAR CABLE. TIGHTEN THE CLAMP SCREW.

Figure 5-33. Typing Unit, Draw Wire Rope



CARRIAGE RETURN SPRING

REQUIREMENT

SPACING DRUM IN RETURNED POSITION. PRINTING TRACK IN ITS LOWEST POSITION. FEED PAWLS, TRANSFER SLIDE AND CARRIAGE RETURN LATCH BAIL HELD AWAY FROM SPACING DRUM SO THAT THEY DO NOT AFFECT ITS ROTATION.

MIN. 3 LBS. MAX. 3-3/4 LBS.

TO START SPRING DRUM MOVING.

TO ADJUST

LOOSEN SPRING DRUM NUT. TO INCREASE TENSION, ROTATE RATCHET COUNTERCLOCKWISE ON SPRING DRUM. TO DECREASE TENSION, OPERATE ESCAPEMENT LEVER WHICH ALLOWS RATCHET TO ROTATE CLOCKWISE ON DRUM.

CARRIAGE RETURN LATCH BAIL

REQUIREMENT

CARRIAGE FULLY RETURNED.
PLAY IN CARRIAGE RETURN BAIL TAKEN UP TO RIGHT BY HOLDING RIGHT SIDE OF BAIL AGAINST ITS RETAINER. CLEARANCE BETWEEN CARRIAGE RETURN LATCH BAIL AND CARRIAGE RETURN LEVER.

MIN. 0.004 INCH
MAX. 0.040 INCH

TO ADJUST

POSITION LATCH BAIL PLATE WITH CLAMP SCREW LOOSENED.

CARRIAGE RETURN LATCH BAIL SPRING TENSION

REQUIREMENT

SPACING DRUM FULLY RETURNED

MIN. 3 OZS.
MAX. 4-1/2 OZS.

TO START LATCH BAIL MOVING.

SPACING FEED PAWL RELEASE LINK SPRING

REQUIREMENT

MIN. 1/2 OZ.
MAX. 2-1/2 OZS.

TO START SPRING STRETCHING

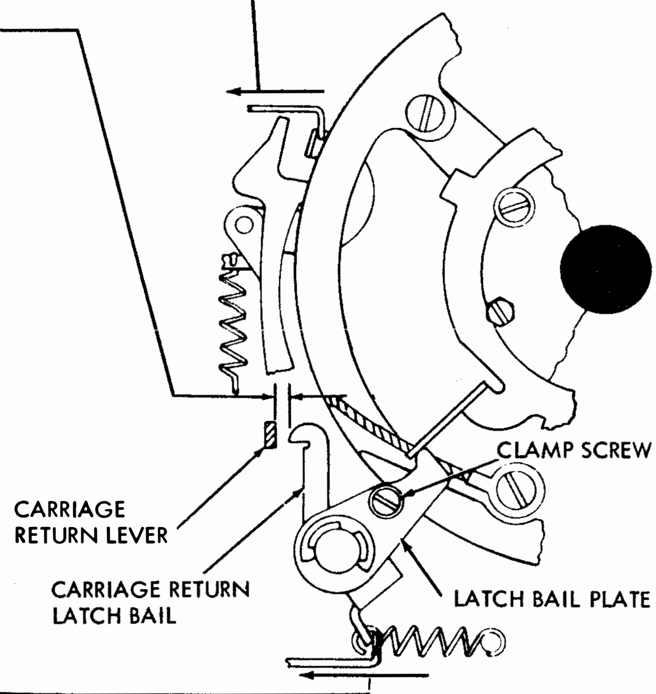


Figure 5-34. Typing Unit, Carriage Return Mechanism, Front View

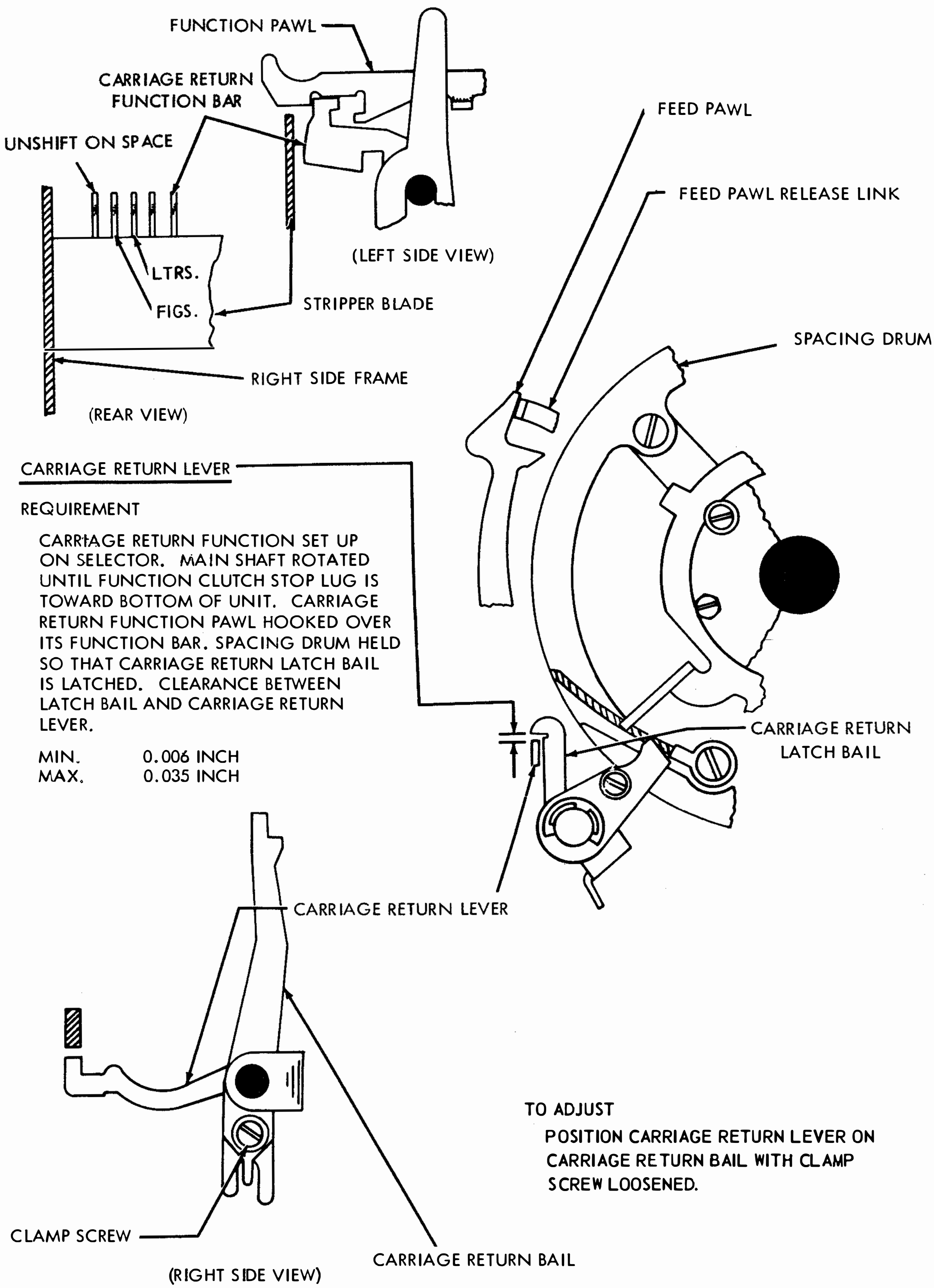
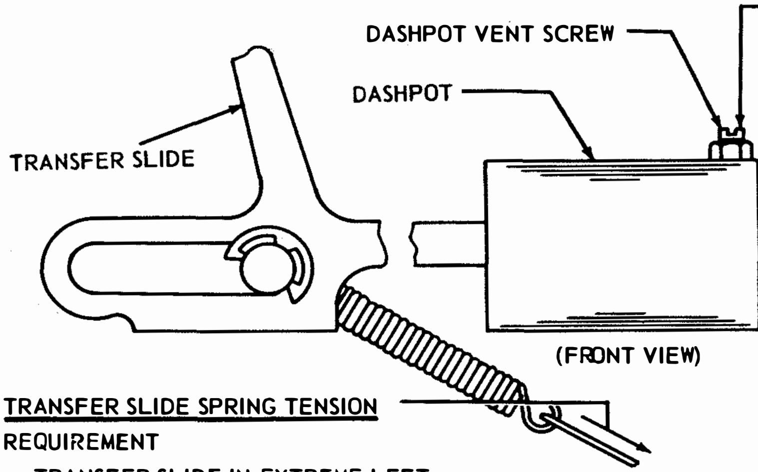


Figure 5-35. Typing Unit, Carriage Return Mechanism



DASH POT VENT SCREW

REQUIREMENT

TYPE BOX CARRIAGE SHOULD RETURN FROM ANY LENGTH OF LINE WITHOUT BOUNCING.

TO CHECK

PRINTER OPERATED AT ANY SPEED. FROM AUTOMATIC TRANSMISSION WITH ONE CR AND ONE LF SIGNAL BETWEEN LINES. FIRST CHARACTER OF EACH LINE SHOULD BE PRINTED IN SAME LOCATION AS IF UNIT WAS MANUALLY OPERATED SLOWLY.

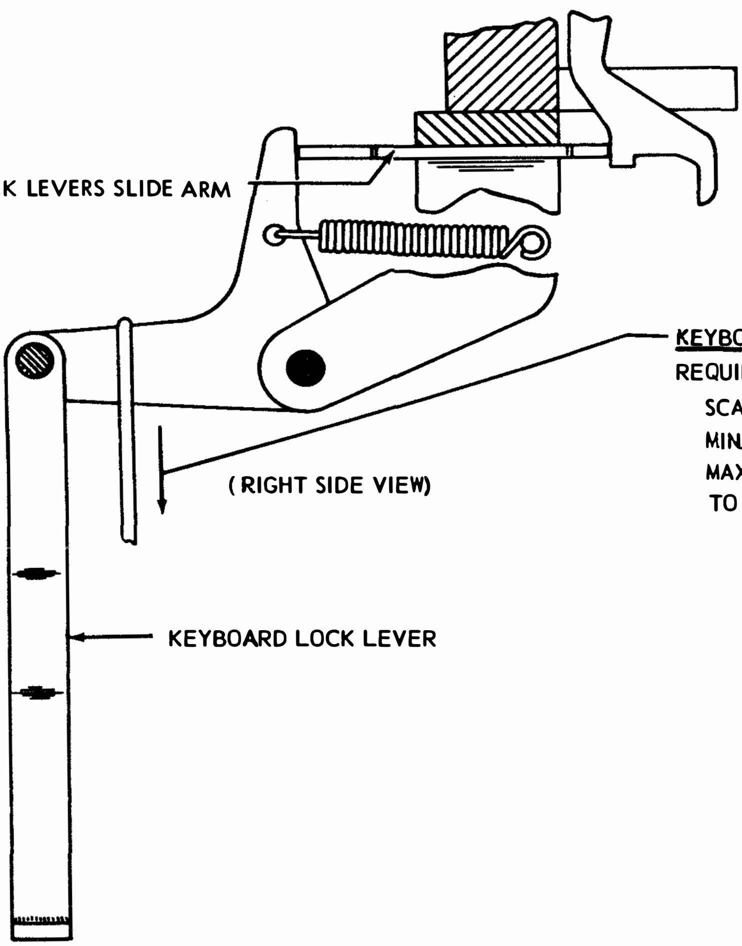
TO ADJUST

TURN DOWN VENT SCREW UNTIL SLIGHT PNEUMATIC BOUNCE IS PERCEPTIBLE. BACK OFF SCREW UNTIL EFFECT DISAPPEARS. THEN BACK SCREW OFF AN ADDITIONAL 1/4 TURN. TIGHTEN NUT.

TRANSFER SLIDE SPRING TENSION

REQUIREMENT

TRANSFER SLIDE IN EXTREME LEFT POSITION.
SPRING UNHOOKED.
MIN. 3-1/2 OZS.
MAX. 4-1/2 OZS.
TO PULL SPRING TO INSTALLED LENGTH.



KEYBOARD LOCK LEVER SPRING TENSION

REQUIREMENT(UNIT UPSIDE DOWN)

SCALE APPLIED TO BELL CRANK.
MIN. 1/2 OZ.
MAX. 1-1/2 OZS.
TO START KEYBOARD LOCK LEVER MOVING

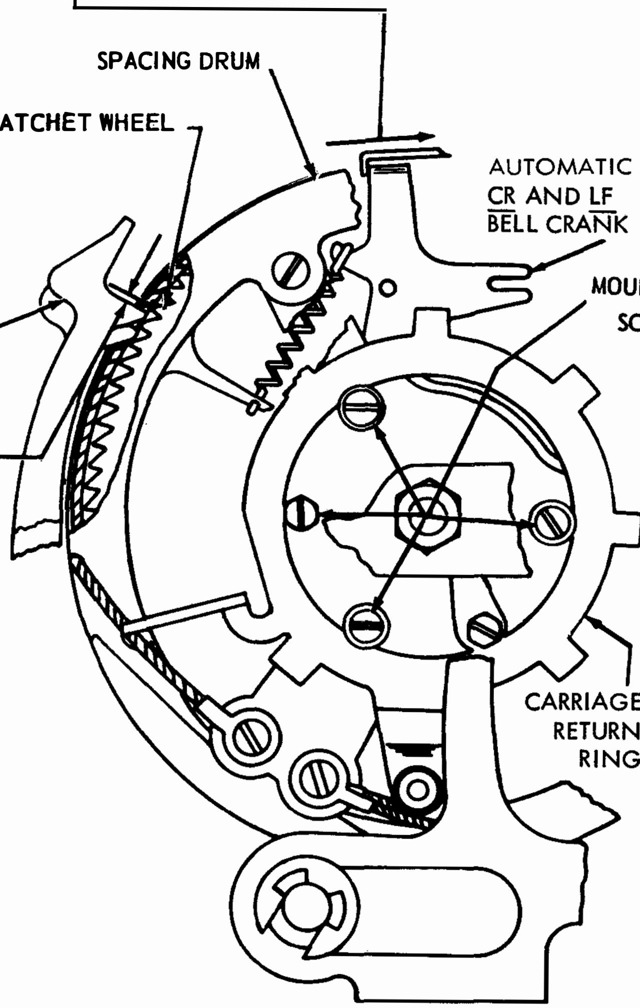
Figure 5-36. Typing Unit, Dashpot and Keyboard Lock Mechanisms

NOTE: CHECK RELATED ADJUSTMENTS, FIGURES 5-25, 5-38, AND 5-40, IF THE FOLLOWING ADJUSTMENTS ARE MADE.

AUTOMATIC CR/LF BELL CRANK SPRING

REQUIREMENT --- (FOR UNITS SO EQUIPPED).

WITH FUNCTION CLUTCH DISENGAGED.
MIN. 2-1/2 OZS. --- MAX. 7 OZS.
TO MOVE THE BELL CRANK.



SPACING DRUM MECHANISM

REQUIREMENT

SPACING CLUTCH DISENGAGED. FRONT SPACING FEED PAWL FARTHEST ADVANCED. SPACING DRUM FULLY RETURNED. PLAY IN SPACING SHAFT GEAR (FIG. 5-20) TAKEN UP CLOCKWISE. CLEARANCE BETWEEN PAWL AND SHOULDER OF RATCHET WHEEL TOOTH IMMEDIATELY AHEAD

MIN. SOME
MAX. 0.008 INCH

REQUIREMENT

REAR PAWL, WHEN FARTHEST ADVANCED, SHOULD REST AT BOTTOM OF INDENTATION BETWEEN RATCHET WHEEL TEETH.

TO ADJUST

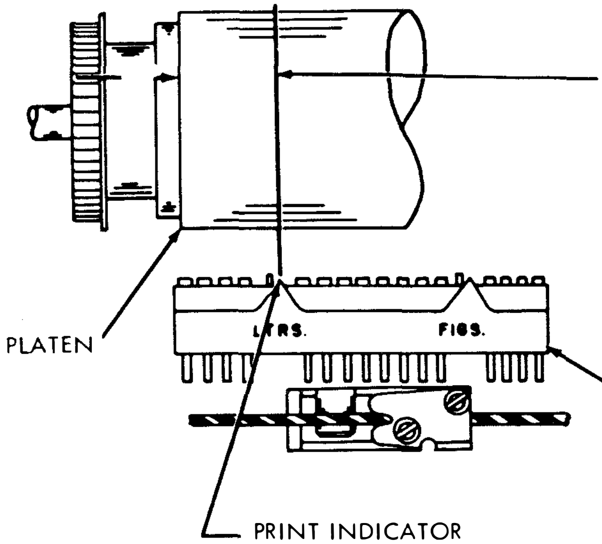
POSITION CARRIAGE RETURN RING WITH FOUR MOUNTING SCREWS LOOSENED.

NOTE

FOR LINES OTHER THAN 72 CHARACTERS IN LENGTH, THE MARGIN MAY BE VARIED AS REQUIRED. RANGE OF ADJUSTMENT IS 0 TO 85 CHARACTERS.

Figure 5-37. Typing Unit, Spacing Drum Mechanism

NOTE: CHECK RELATED ADJUSTMENTS, FIGURES 5-25, 5-37, AND 5-40, IF THE FOLLOWING ADJUSTMENTS ARE REMADE.

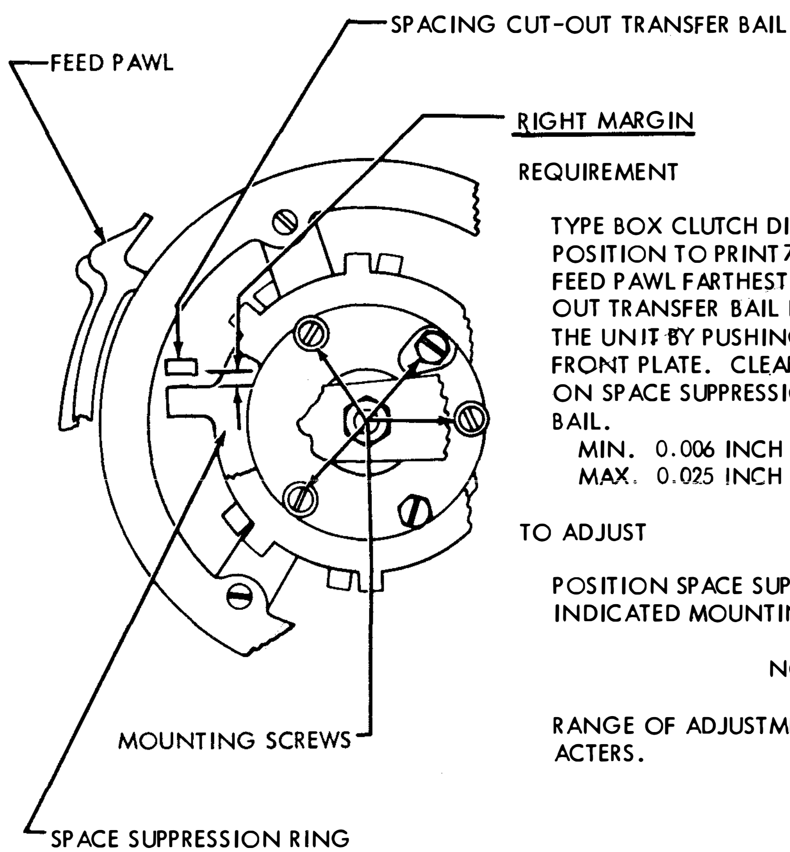


LEFT MARGIN

REQUIREMENT

TYPE BOX CLUTCH DISENGAGED. SPACING DRUM IN RETURNED POSITION. TYPE BOX SHIFTED TO LETTERS POSITION.
CLEARANCE BETWEEN LEFT EDGE OF PLATEN AND LETTER PRINT INDICATOR.

MIN. 15/16 INCH
MAX. 1-1/16 INCH



RIGHT MARGIN

REQUIREMENT

TYPE BOX CLUTCH DISENGAGED. CARRIAGE IN POSITION TO PRINT 72ND CHARACTER. FRONT FEED PAWL FARTHEST ADVANCED. SPACING CUT-OUT TRANSFER BAIL HELD TOWARDS THE REAR OF THE UNIT BY PUSHING THROUGH THE HOLE IN THE FRONT PLATE. CLEARANCE BETWEEN EXTENSION ON SPACE SUPPRESSION RING AND TRANSFER BAIL.

MIN. 0.006 INCH
MAX. 0.025 INCH

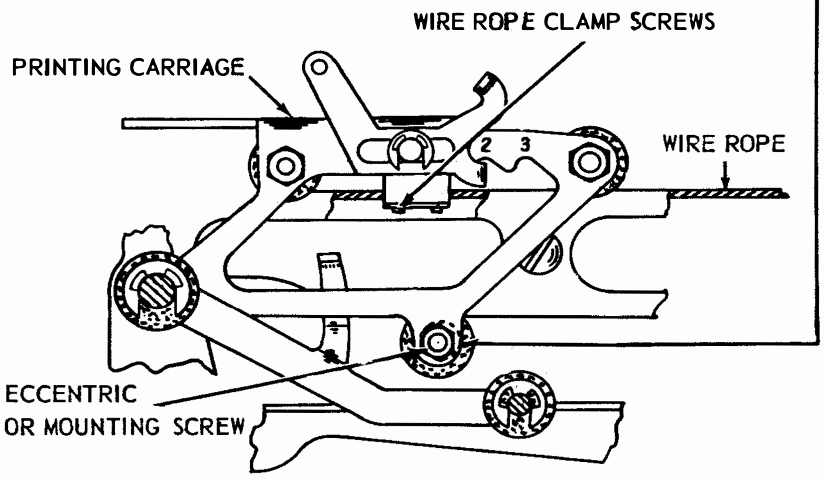
TO ADJUST

POSITION SPACE SUPPRESSION RING WITH FOUR INDICATED MOUNTING SCREWS LOOSENED.

NOTE

RANGE OF ADJUSTMENT IS FROM 0 TO 85 CHARACTERS.

Figure 5-38. Typing Unit, Space Suppression



PRINTING CARRIAGE LOWER ROLLER

REQUIREMENT

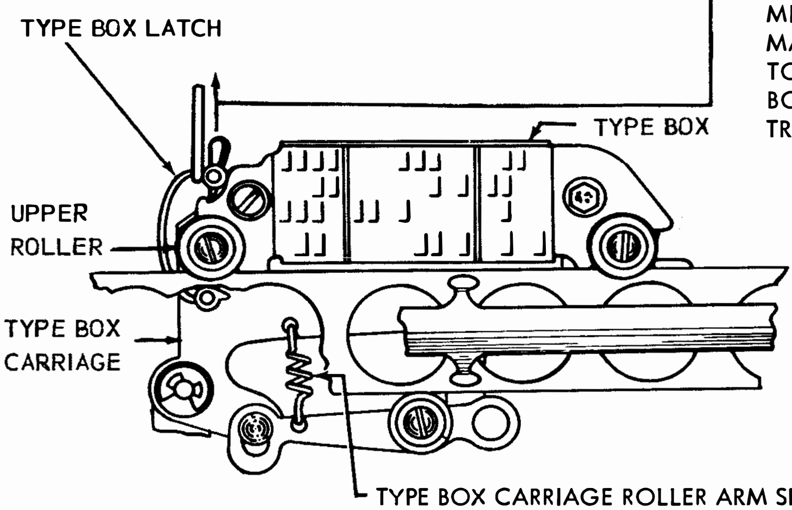
CARRIAGE WIRE ROPE CLAMP SCREWS LOOSENED. PLAY OF CARRIAGE ON TRACK-MIN. WITHOUT BIND, THROUGHOUT TRACKS FULL LENGTH.

TO ADJUST (ECCENTRIC BUSHING)

POSITION LOWER ROLLER WITH SCREW NUT LOOSENED. KEEP HIGH PART OF ECCENTRIC (CHAMFERED CORNER) TOWARD THE RIGHT.

TO ADJUST (SLIDING SCREW)

POSITION LOWER ROLLER WITH MOUNTING SCREW LOOSENED.

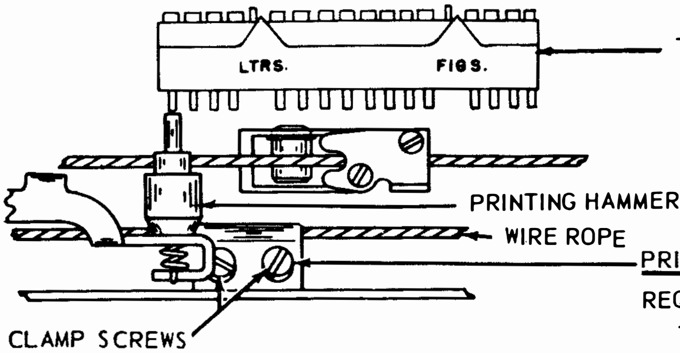


TYPE BOX CARRIAGE ROLLER ARM SPRING

REQUIREMENT

MIN. 28 OZS.
MAX. 36 OZS.
TO START UPPER ROLLER, NEAREST TYPE BOX LATCH, MOVING AWAY FROM CARRIAGE TRACK

Figure 5-39. Typing Unit, Printing Carriage and Decelerating Slide Mechanism



(TOP VIEW)

NOTE: CHECK RELATED ADJUSTMENTS, FIGURES 5-25, 5-37, AND 5-38, IF THE FOLLOWING ADJUSTMENTS ARE REMADE.

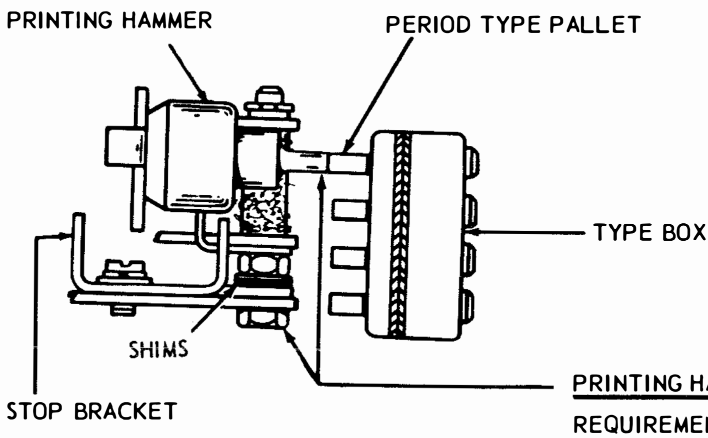
PRINTING CARRIAGE POSITION

REQUIREMENT

TYPE BOX IN LETTERS POSTION.M TYPE PALLET SELECTED. TYPE BOX IN PRINTING POSITION. M TYPE PALLET SHOULD BE APPROXIMATELY IN CENTER OF PRINTING HAMMER WHEN HAMMER IS JUST TOUCHING M TYPE PALLET. TAKE UP PLAY IN TYPE BOX CARRIAGE IN EACH DIRECTION AND SET HAMMER IN CENTER OF PLAY

TO ADJUST

POSITION PRINTING CARRIAGE ON WIRE ROPE WITH CLAMP SCREWS LOOSENED.



(RIGHT SIDE VIEW)

PRINTING HAMMER BEARING STUD

REQUIREMENT

TYPE BOX AT MIDPOINT OF PLATEN AND IN POSITION TO PRINT PERIOD. PRINTING HAMMER IN CONTACT WITH TYPE PALLET AND PRESSED DOWNWARD AT BEARING POST. FACE OF HAMMER SHOULD BE FULLY ON END OF TYPE PALLET.

TO ADJUST

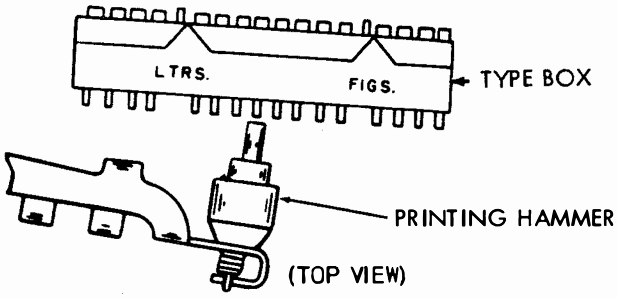
ADD OR REMOVE SHIMS BETWEEN SHOULDER ON BEARING POST AND STOP BRACKET.

Figure 5-40. Typing Unit, Printing Carriage

SHIFT LINKAGE

REQUIREMENT

CARRIAGE NEAR MIDPOINT OF PLATEN. TYPE BOX IN POSITION TO PRINT LETTER "O". MANUALLY BUCKLE RIGHT SHIFT LINKAGE. SHIFT TYPE BOX TO LEFT. FIGURE "9" TYPE PALLET SHOULD BE APPROXIMATELY IN CENTER OF PRINT HAMMER WHEN HAMMER IS JUST TOUCHING "9" TYPE PALLET.



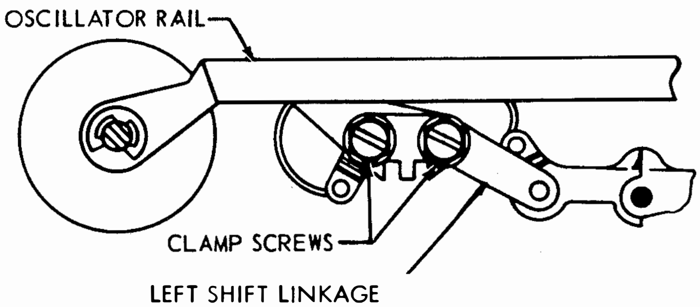
(TOP VIEW)

TO ADJUST

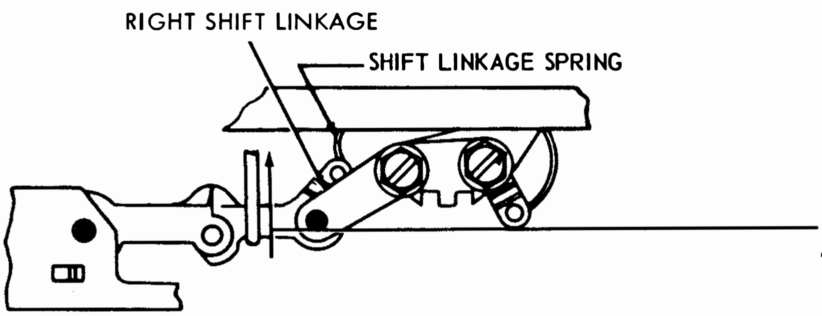
POSITION LEFT SHIFT LINKAGE ON OSCILLATOR RAIL WITH TWO CLAMP SCREWS LOOSENED

TO RECHECK

SHIFT ALTERNATELY FROM "O" TO "9". TAKE UP PLAY IN EACH DIRECTION. REFINE ADJUSTMENT IF NECESSARY.



(FRONT VIEW)



SHIFT LINKAGE SPRING TENSION

REQUIREMENT

LINK IN STRAIGHT POSITION

MIN. 6 OZS.
MAX. 14 OZS.

TO START EACH LINK MOVING.

Figure 5-41. Typing Unit, Shift Mechanism

(A) PRINTING TRACK

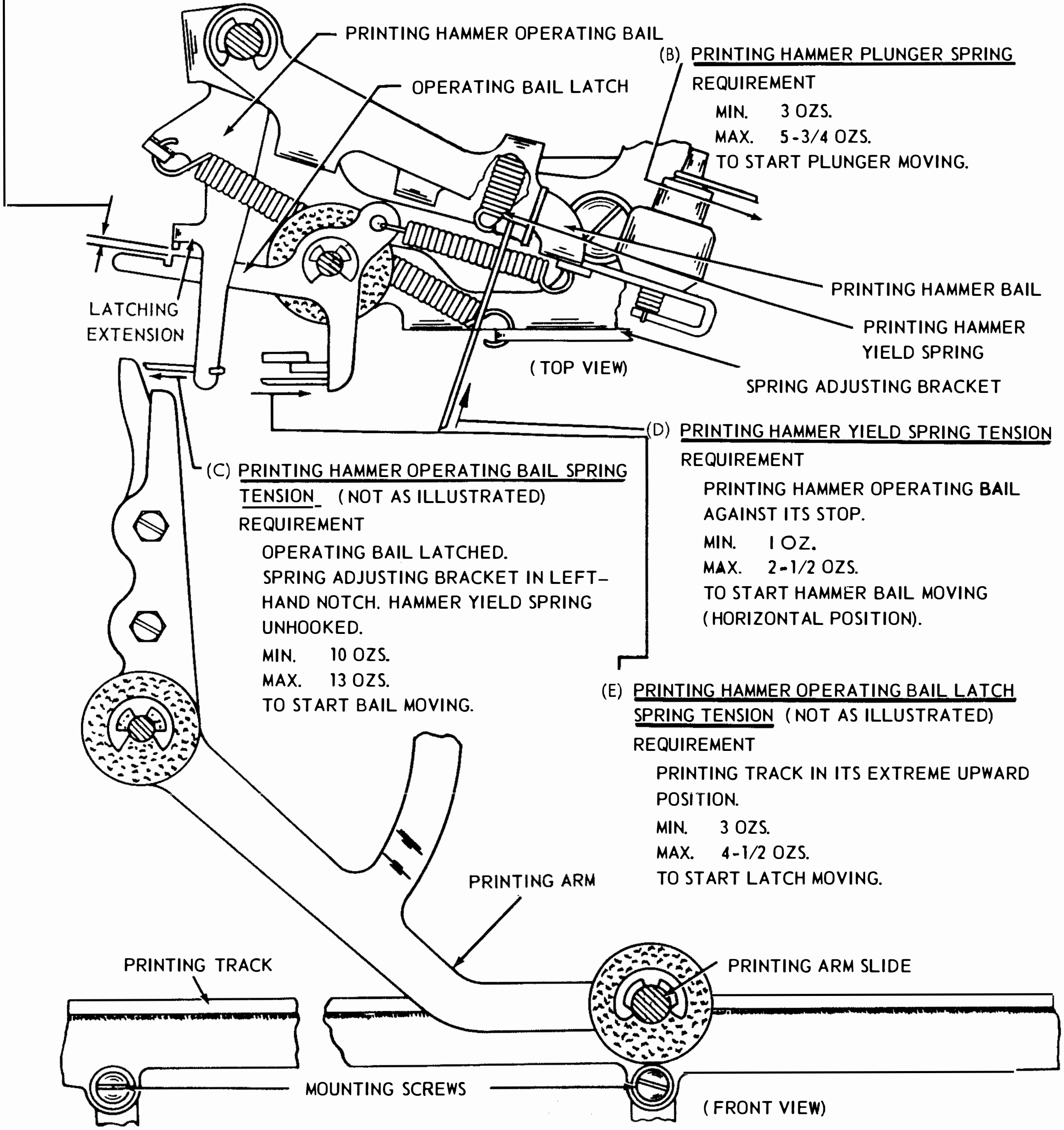
REQUIREMENT

PRINTING TRACK IN ITS EXTREME DOWNWARD POSITION. BLANK SELECTION IN FIGURES. PRINTING HAMMER OPERATING BAIL LATCHING EXTENSION HELD WITH LEFT FACE IN LINE WITH THE LATCH SHOULDER. PRINTING ARM SLIDE POSITIONED ALTERNATELY OVER EACH TRACK MOUNTING SCREW. PRINTING BAIL RESET EACH TIME. CLEARANCE BETWEEN LATCHING EXTENSION AND OPERATING BAIL LATCH SHOULD BE

MIN. 0.015 INCH MAX. 0.040 INCH

TO ADJUST

POSITION THE PRINTING TRACK UP OR DOWN WITH ITS MOUNTING SCREWS LOOSENED.



(B) PRINTING HAMMER PLUNGER SPRING

REQUIREMENT

MIN. 3 OZS.
MAX. 5-3/4 OZS.
TO START PLUNGER MOVING.

(C) PRINTING HAMMER OPERATING BAIL SPRING TENSION (NOT AS ILLUSTRATED)

REQUIREMENT

OPERATING BAIL LATCHED. SPRING ADJUSTING BRACKET IN LEFT-HAND NOTCH. HAMMER YIELD SPRING UNHOOKED.

MIN. 10 OZS.
MAX. 13 OZS.
TO START BAIL MOVING.

(D) PRINTING HAMMER YIELD SPRING TENSION

REQUIREMENT

PRINTING HAMMER OPERATING BAIL AGAINST ITS STOP.

MIN. 1 OZ.
MAX. 2-1/2 OZS.
TO START HAMMER BAIL MOVING (HORIZONTAL POSITION).

(E) PRINTING HAMMER OPERATING BAIL LATCH SPRING TENSION (NOT AS ILLUSTRATED)

REQUIREMENT

PRINTING TRACK IN ITS EXTREME UPWARD POSITION.

MIN. 3 OZS.
MAX. 4-1/2 OZS.
TO START LATCH MOVING.

Figure 5-42. Typing Unit, Printing Mechanism

PRINTING HAMMER STOP BRACKET

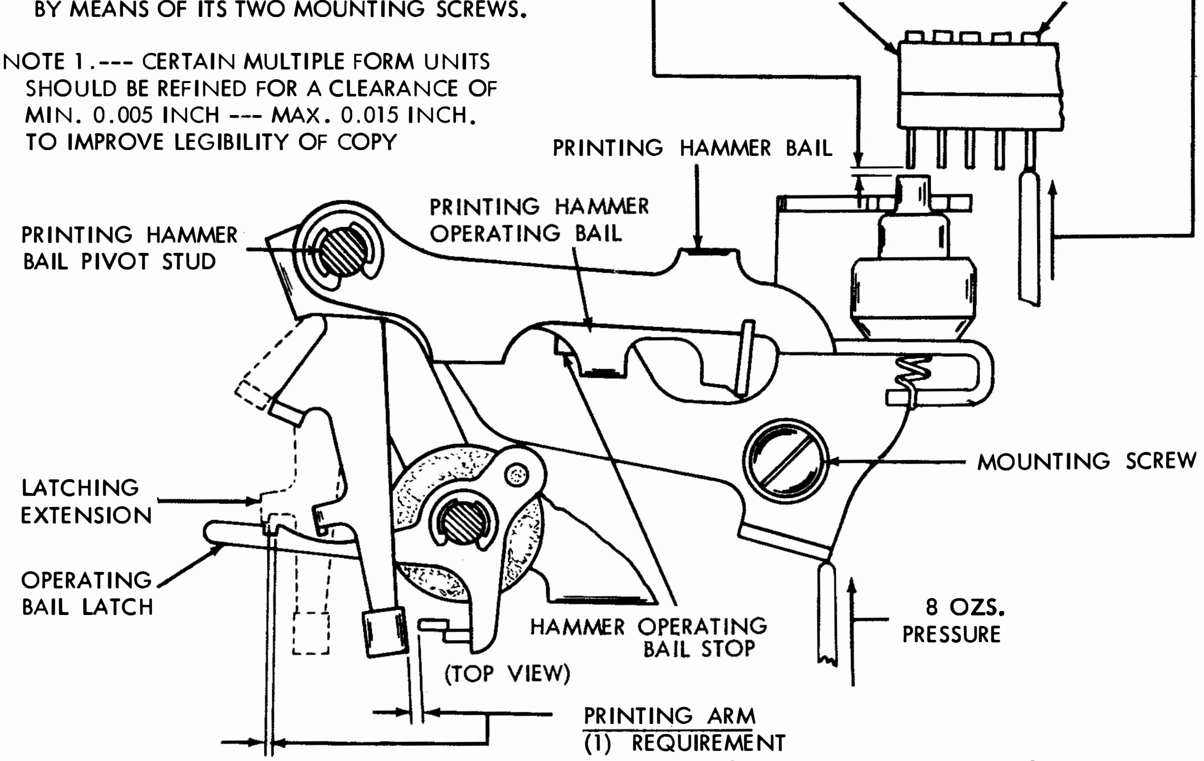
REQUIREMENT --- WITH TYPE BOX IN POSITION TO PRINT CHARACTER " M ", PRINTING TRACK IN ITS MAXIMUM DOWNWARD POSITION, AND PRINTING HAMMER STOP BRACKET HELD TOWARD THE PLATEN WITH PRESSURE OF 8 OZS; CLEARANCE BETWEEN PRINTING HAMMER AND "M" TYPE PALLET. (NOTE 1.)
MIN. 0.005 INCH --- MAX. 0.020 INCH
AT END OF PLATEN WITH LEAST CLEARANCE

TO ADJUST --- POSITION STOP BRACKET BY MEANS OF ITS TWO MOUNTING SCREWS.

NOTE 1.--- CERTAIN MULTIPLE FORM UNITS SHOULD BE REFINED FOR A CLEARANCE OF MIN. 0.005 INCH --- MAX. 0.015 INCH. TO IMPROVE LEGIBILITY OF COPY

TYPE PALLET SPRING TENSION

REQUIREMENT
TYPE BOX REMOVED FROM THE UNIT. 8 OZS. SCALE APPLIED VERTICALLY TO THE END OF THE PALLET SHANK.
MIN. 1/4 OZS.
MAX. 3/4 OZS.
TO START PALLET MOVING.

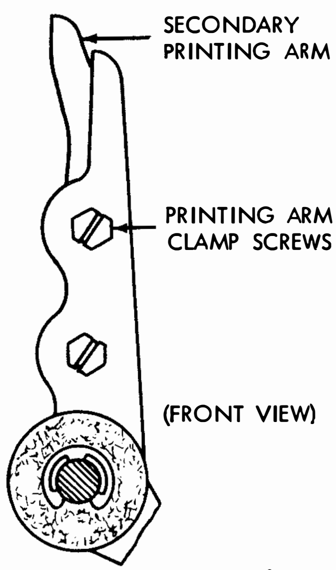


PRINTING ARM

(1) REQUIREMENT
PRINTING TRACK IN MAXIMUM DOWNWARD POSITION.
PRINTING HAMMER OPERATING BAIL AGAINST ITS STOP.
SOME CLEARANCE BETWEEN SECONDARY PRINTING ARM AND FORWARD EXTENSION OF HAMMER OPERATING BAIL.
MAX. 0.015 INCH
WHEN PRINTING ARM SLIDE IS HELD DOWNWARD OVER EACH PRINTING TRACK MOUNTING SCREW FOR MAXIMUM CLEARANCE.

(2) REQUIREMENT
PRINTING TRACK IN UPPERMOST POSITION. LATCHING EXTENSION OF PRINTING HAMMER OPERATING BAIL SHOULD OVERTRAVEL LATCHING SURFACE OF OPERATING BAIL LATCH BY
MIN. 0.006 INCH
CHECK RIGHT AND LEFT POSITIONS

TO ADJUST
POSITION SECONDARY PRINTING ARM WITH CLAMP SCREWS LOOSENED.



NOTE 2

THE PRINTING ARM ADJUSTMENT SHOULD ALWAYS BE MADE WITH THE PRINTING HAMMER OPERATING BAIL SPRING BRACKET IN THE NO. 1 POSITION. POSITIONS NO. 2 AND 3 ARE TO BE USED ONLY FOR MAKING MULTIPLE COPIES.

Figure 5-43. Typing Unit, Printing Mechanism

NOTE: THIS ADJUSTMENT SHOULD BE MADE
WITH THE TYPE BOX IN ITS UPPER POSITION.

NOTE: RECHECK PRINT HAMMER STOP BRACKET ADJUSTMENT, FIGURE 5-43 AND READJUST IF NECESSARY

TYPE BOX ALIGNMENT

REQUIREMENT

PRINTED IMPRESSION OF CHARACTERS AT TOP AND AT BOTTOM SHOULD BE EQUAL. (GAUGE VISUALLY)

TO ADJUST

LOOSEN NUT. OPERATE PRINTER UNDER POWER. REPEAT CHARACTERS E AND Z. TURN ADJUSTING SCREW IN OR OUT (IN STEPS OF 1/4 TURN) TO MEET REQUIREMENT. TIGHTEN NUT.

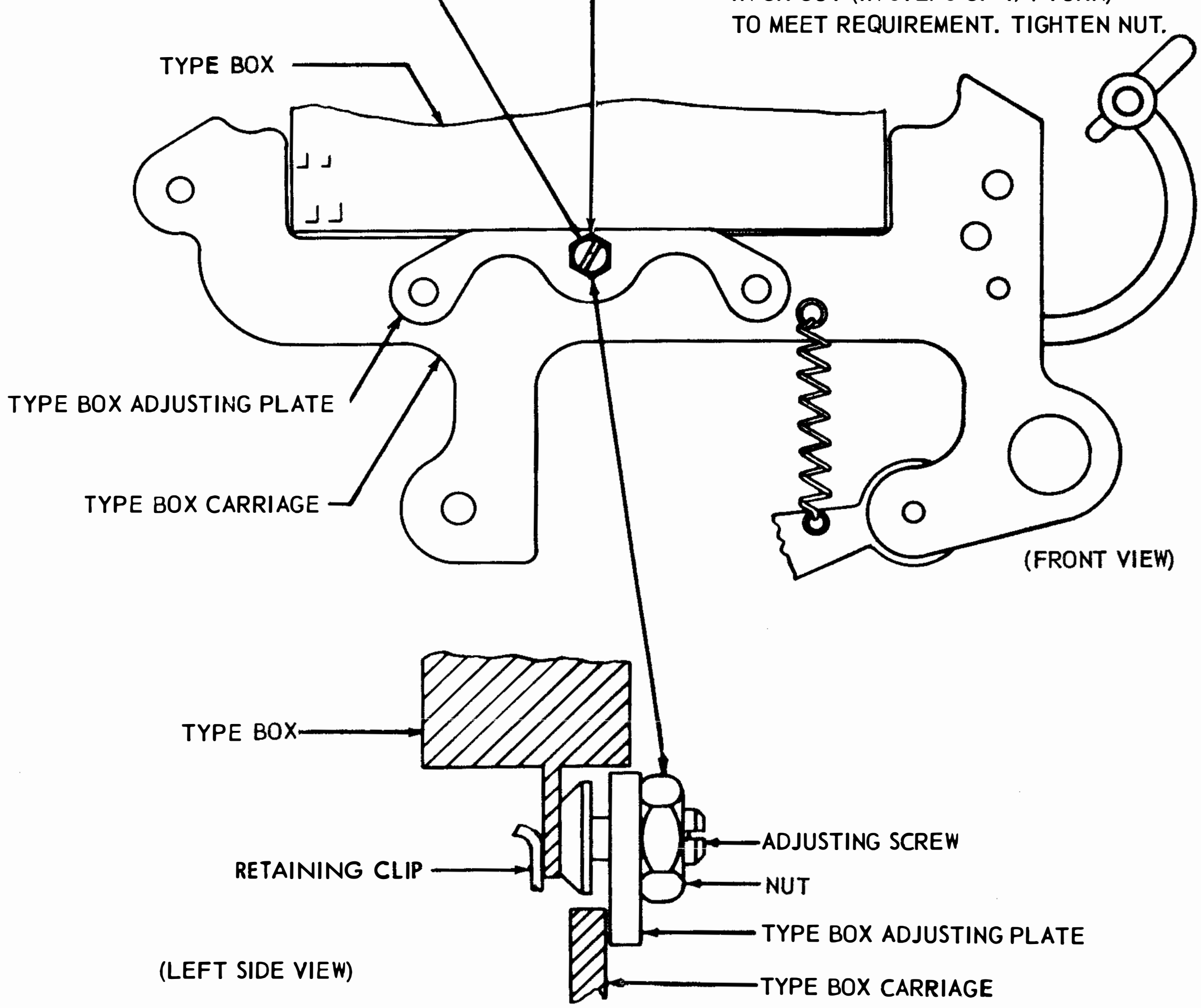
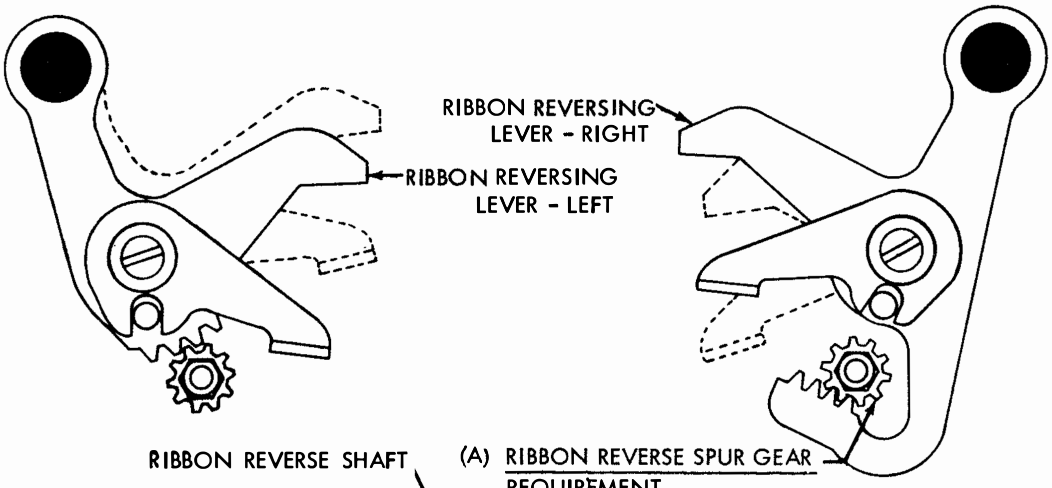
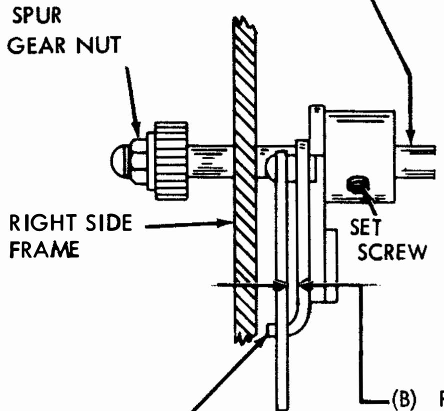


Figure 5-44. Typing Unit, Type Box and Printing Mechanism





(A) RIBBON REVERSE SPUR GEAR

REQUIREMENT

WHEN RIGHT REVERSING LEVER IS IN MAXIMUM DOWNWARD POSITION, THE LEFT REVERSING LEVER SHOULD BE IN ITS MAXIMUM UPWARD POSITION.

TO ADJUST

LOOSEN THE SET SCREWS IN THE DETENT CAM. LOOSEN THE LEFT SPUR GEAR NUT. SECURELY TIGHTEN THE RIGHT SPUR GEAR NUT. MOVE THE RIGHT REVERSING LEVER TO ITS MAXIMUM DOWNWARD POSITIION AND HOLD LEFT REVERSING LEVER IN ITS MAXIMUM UPWARD POSITION. THEN TIGHTEN THE LEFT SPUR GEAR NUT.

NOTE: ROTATE TYPE BOX CLUTCH 1/2 TURN AND MOVE RIGHT REVERSING LEVER UNDER THE SEGMENT. THERE SHOULD BE SOME CLEARANCE BETWEEN SEGMENT AND THE LEVER. REFINE ADJ. IF NECESSARY

(B) RIBBON REVERSE DETENT

REQUIREMENT

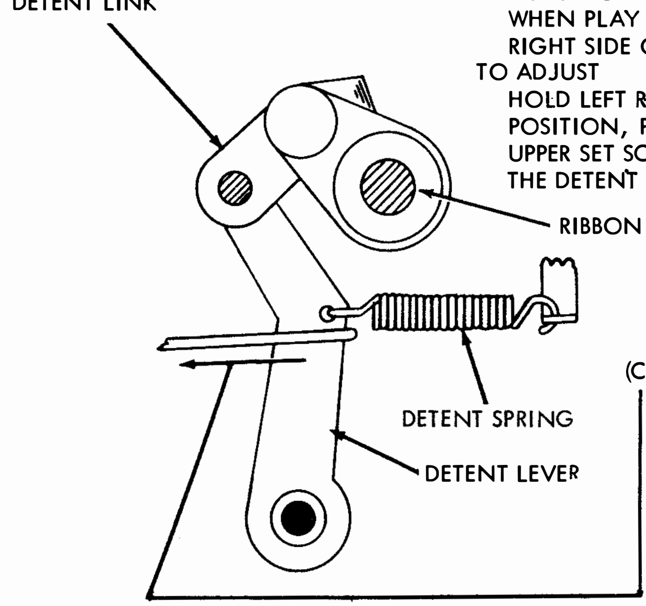
RIBBON REVERSE DETENT LINK BUCKLED IN ITS DOWNWARD POSITION, CLEARANCE BETWEEN DETENT LINK AND DETENT LEVER

MIN. SOME --- MAX. 0.055 INCH

WHEN PLAY IN THE LEVER IS TAKEN UP LIGHTLY TOWARD THE RIGHT SIDE OF THE PRINTER.

TO ADJUST

HOLD LEFT RIBBON REVERSING LEVER IN ITS DOWNWARD POSITION, POSITION DETENT LINK, AND TIGHTEN THE UPPER SET SCREW IN THE HUB OF THE DETENT LINK. BUCKLE THE DETENT LINK UPWARD AND TIGHTEN LOWER SET SCREW.



(C) RIBBON REVERSE DETENT LEVER SPRING TENSION
(IF UNIT IS EQUIPPED)

REQUIREMENT

DETENT LINK BUCKLED IN UPWARD POSITION

MIN. 10 OZS.

MAX. 18 OZS.

TO START DETENT LEVER MOVING TOWARD REAR.

Figure 5-45. Typing Unit, Ribbon Reverse Mechanism

RIBBON FEED LEVER BRACKET

(1) REQUIREMENT (LEFT-HAND MECHANISM)

LEFT REVERSING LEVER IN UPWARD POSITION.
RIBBON MECHANISM IN UPPER POSITION.
RATCHET WHEEL HELD AGAINST THE DETENT LEVER.
CLEARANCE BETWEEN THE FRONT FACE OF THE FEED LEVER AND THE SHOULDER OF A TOOTH ON THE RATCHET WHEEL

MIN. 0.015 INCH
MAX. 0.035 INCH

TO ADJUST

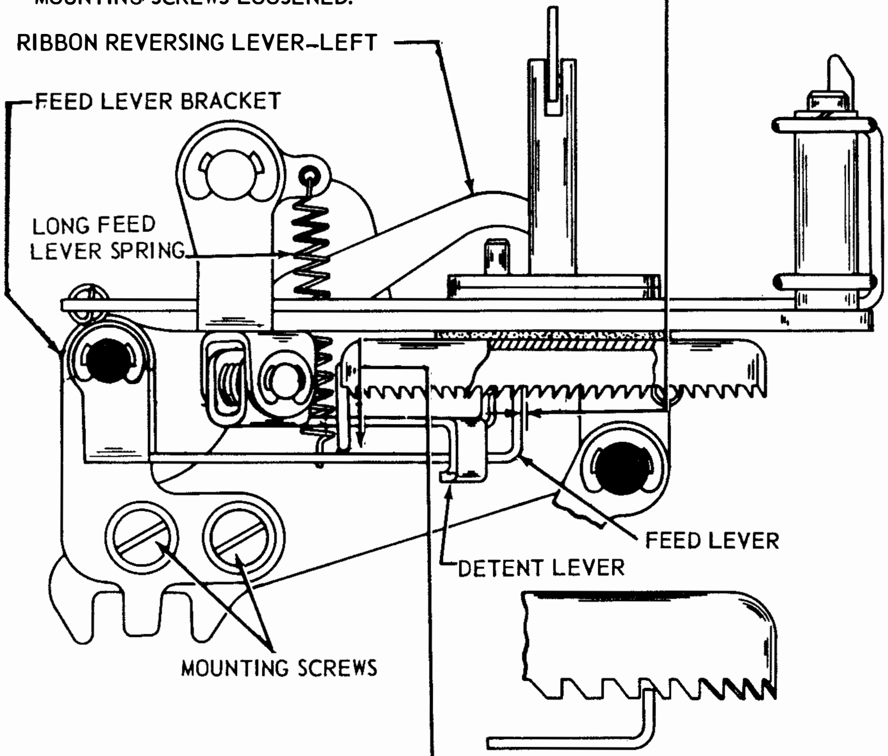
POSITION THE FEED LEVER BRACKET WITH ITS MOUNTING SCREWS LOOSENED.

(2) REQUIREMENT (RIGHT-HAND MECHANISM)

RIGHT REVERSING LEVER AND RIBBON MECHANISM IN UPWARD POSITION.
ADJUST FEED LEVER BRACKET IN THE SAME MANNER

NOTE

ROTATE THE MAIN SHAFT. THE RATCHET WHEEL SHOULD STEP ONE TOOTH ONLY WITH EACH OPERATION



RIBBON FEED LEVER SPRING TENSION

REQUIREMENT

RIBBON FEED LEVERS IN UPPERMOST POSITION.
FOR LONG LEVER: PUSH DOWNWARD NEAR ITS SPRING.
FOR SHORT LEVER: PUSH DOWNWARD AT POINT NEAR LONG LEVER SPRING.
MIN. 3/4 OZ.
MAX. 2 OZS.
TO START FEED LEVERS MOVING.
MEASURE ALL FOUR PAWLS.

NOTE: IF MINIMUM REQUIREMENT OF SHORT LEVER IS NOT MET, PULL LOWER END OF TORSION SPRING TO REAR.

RIBBON RATCHET WHEEL FRICTION SPRING TENSION

REQUIREMENT

FEED LEVERS DISENGAGED.
MIN. 3 OZS.
MAX. 7 1/2 OZS.
TO START THE RATCHET WHEEL MOVING.

Figure 5-46. Typing Unit, Ribbon Feed Mechanism

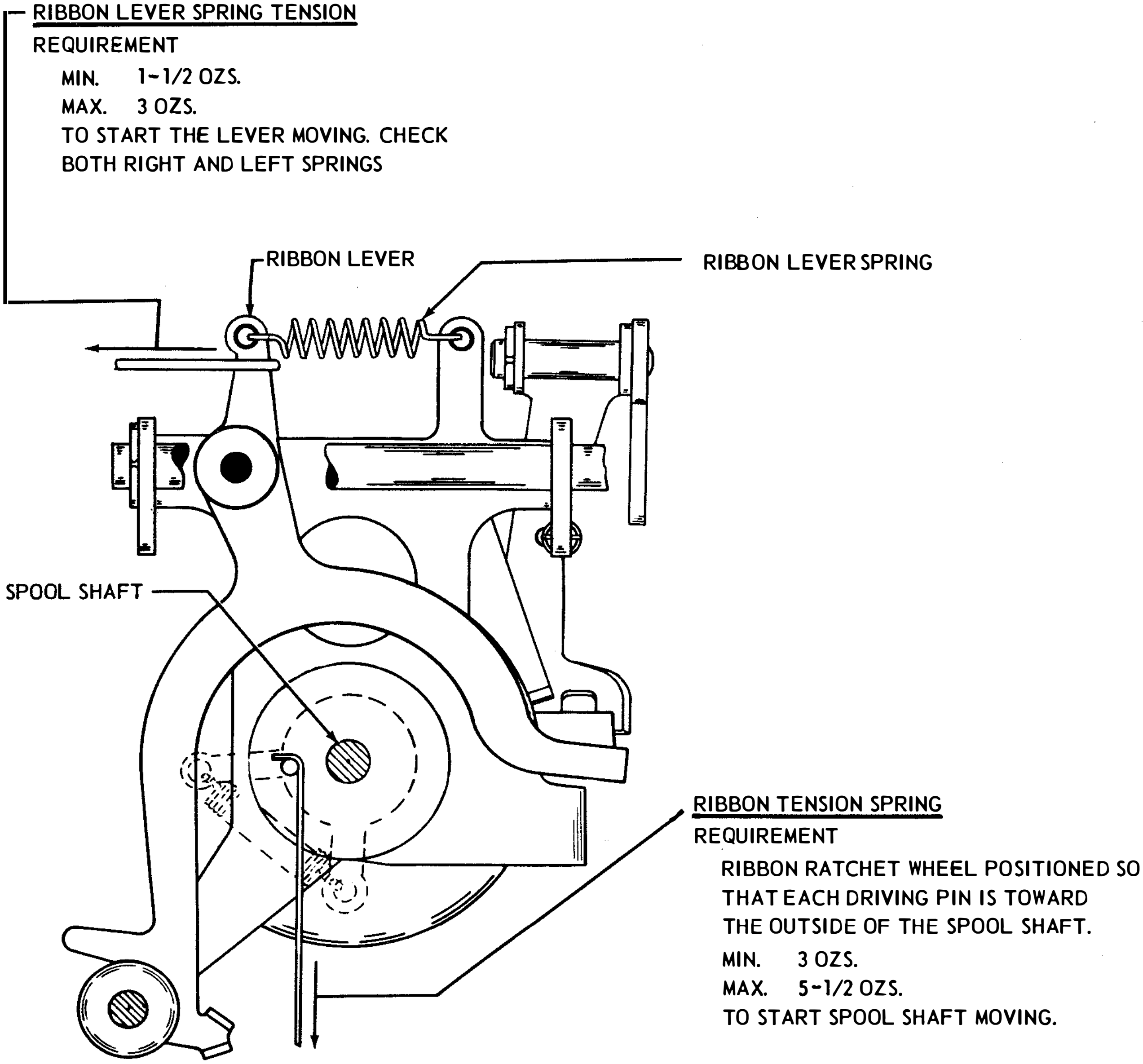


Figure 5-47. Typing Unit, Ribbon Lever Spring and Ribbon Tension Spring

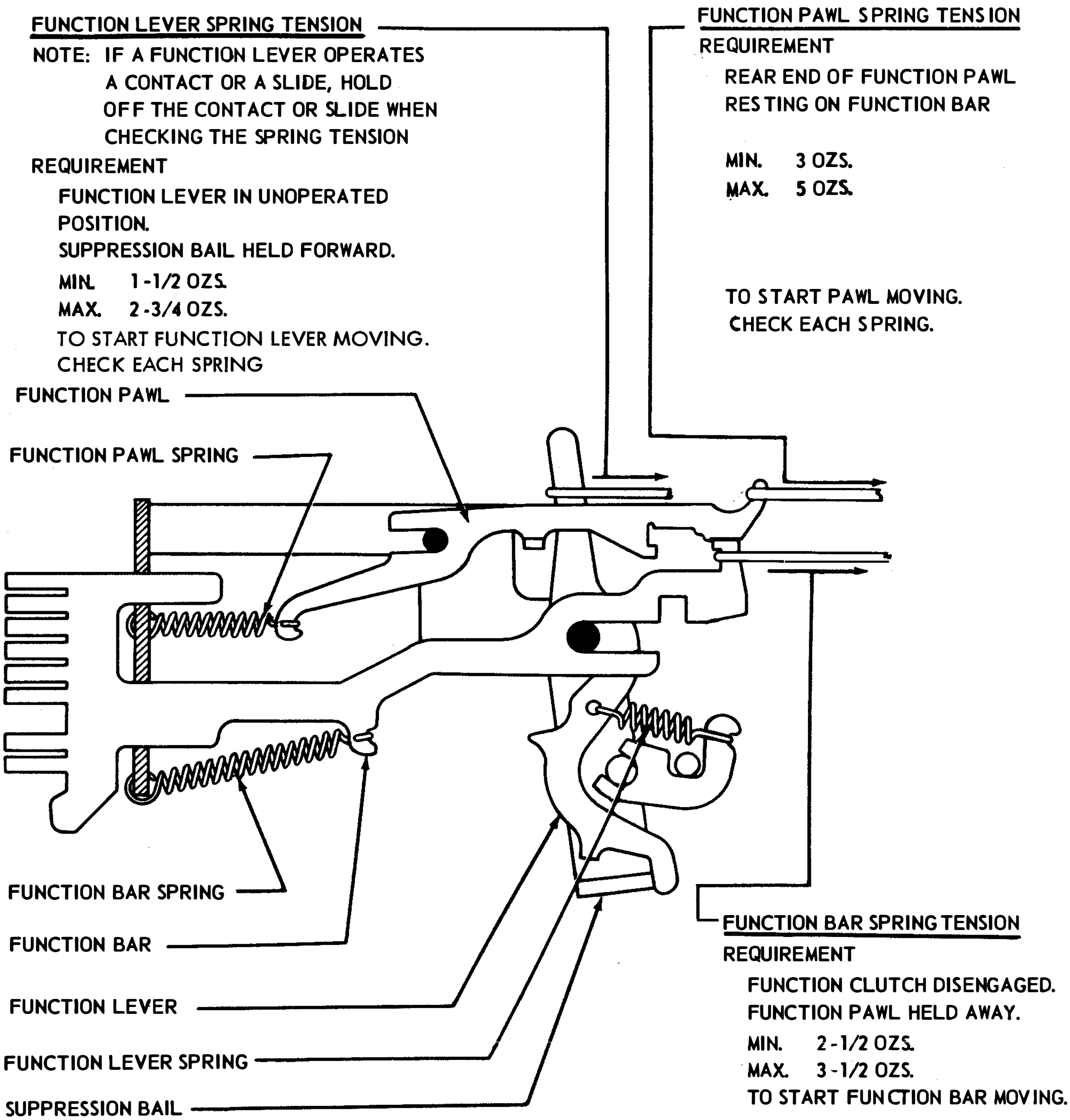


Figure 5-48. Typing Unit, Function Box Mechanism

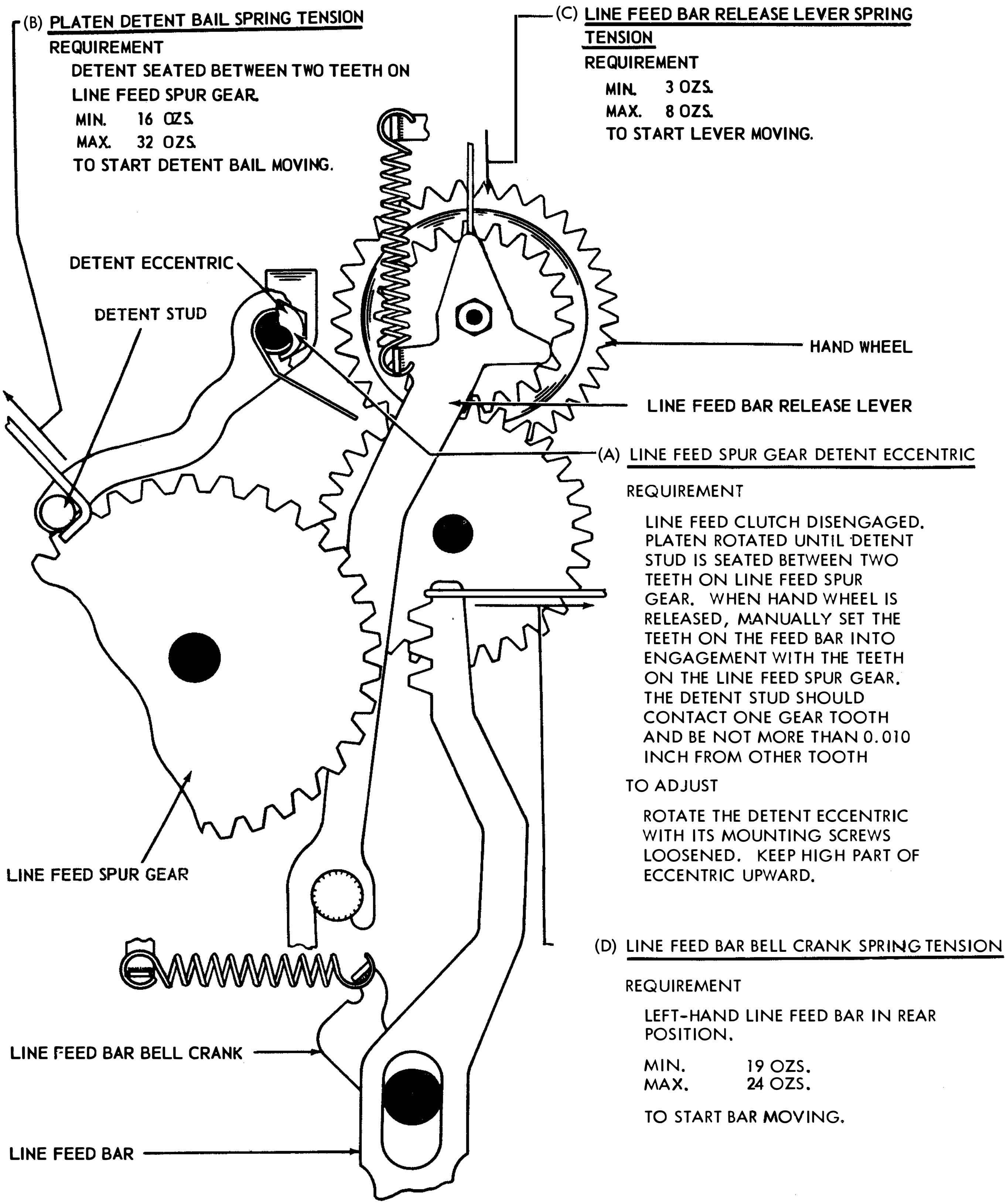


Figure 5-49. Typing Unit, Line Feed Mechanism

STRIPPER BLADE DRIVE CAM POSITION

REQUIREMENT

STRIPPER BLADE DRIVE CAM SHOULD MOVE EACH STRIPPER BLADE CAM ARM AN EQUAL DISTANCE ABOVE AND BELOW CENTER LINE OF ITS PIVOT (GAUGE BY EYE)

A. UPWARD DIRECTION
B. DOWNWARD DIRECTION

TO CHECK

WITH FUNCTION CLUTCH DISENGAGED OBSERVE ENGAGEMENT OF STRIPPER BLADE DRIVE CAM (UPPER PEAK) WITH STRIPPER BLADE CAM ARM. THEN ROTATE CLUTCH TO TURN CAM TO ITS EXTREME DOWNWARD POSITION AND OBSERVE ENGAGEMENT OF LOWER CAM PEAK.

TO ADJUST

WITH STRIPPER BLADE DRIVE ARM MOUNTING SCREWS LOOSENED, EQUALIZE THE OVERTRAVEL OF EACH CAM PEAK.

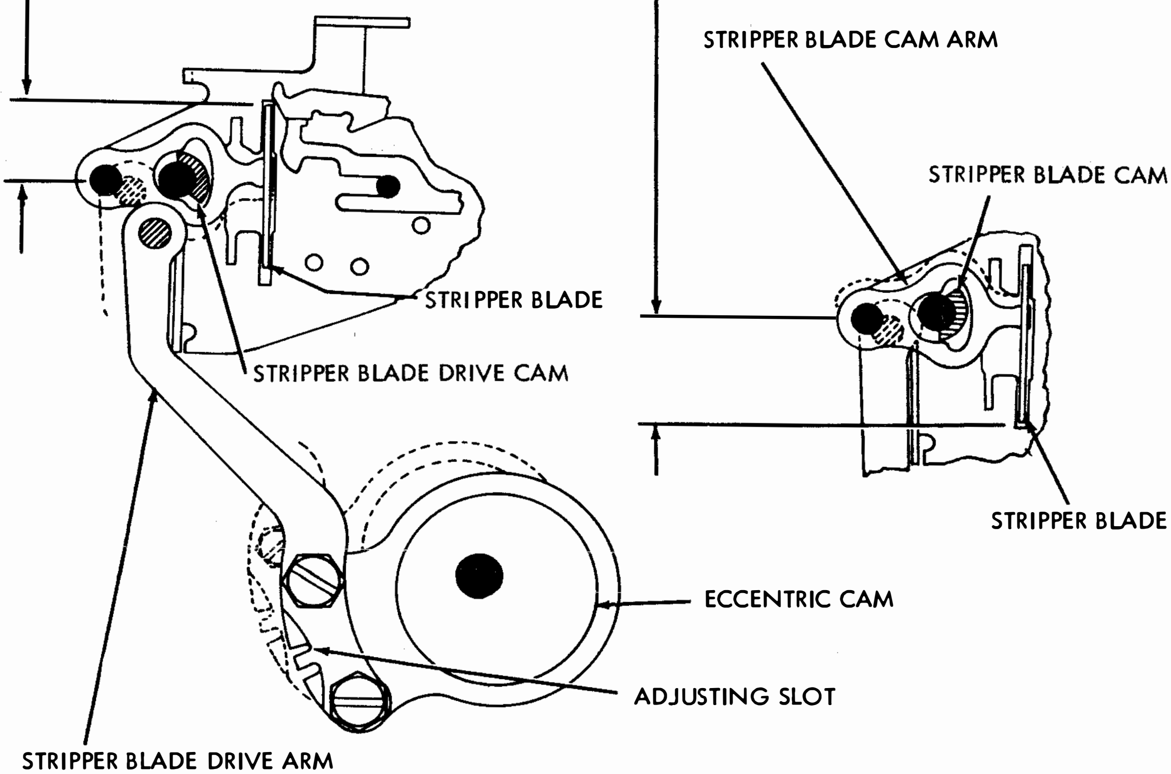


Figure 5-50. Typing Unit, Function Pawl Stripper Blade

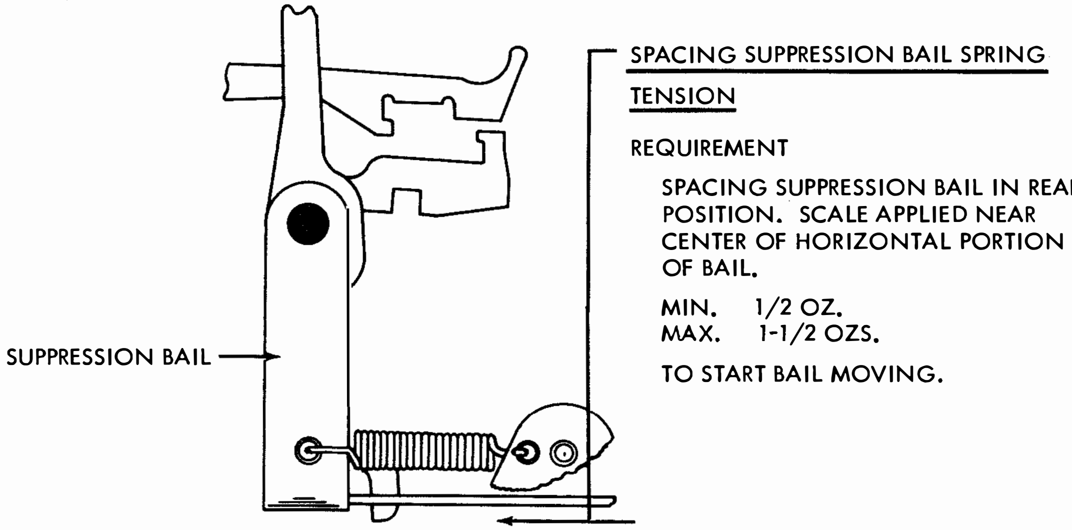


Figure 5-51. Typing Unit, Spacing Suppression Bail Spring Tension

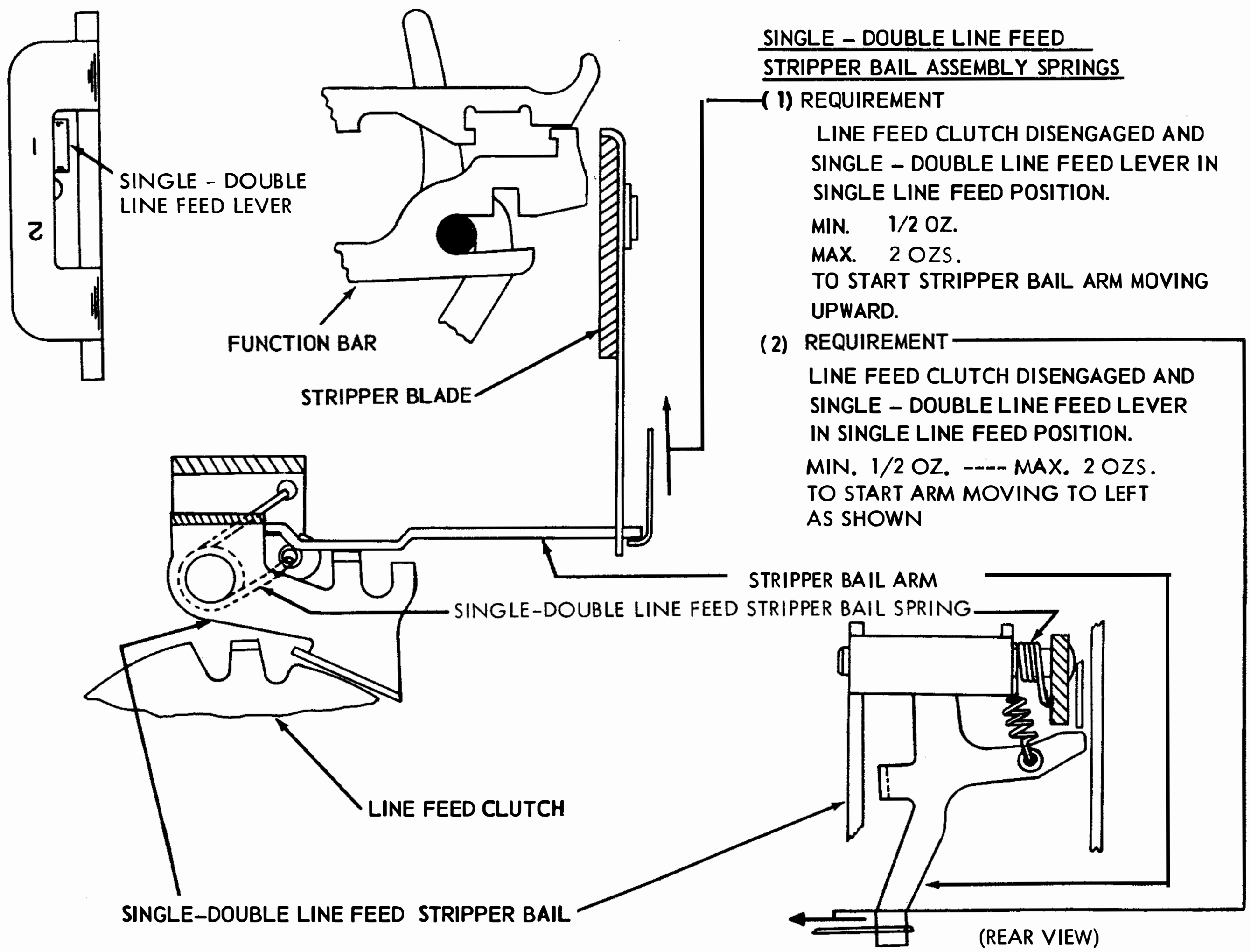
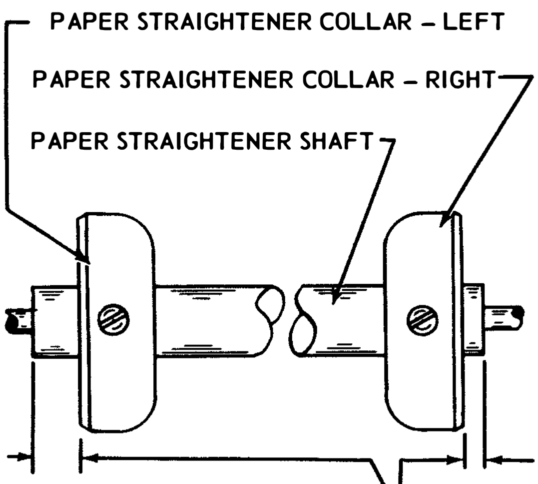


Figure 5-52. Typing Unit, Single-Double Line Feed Spring Tension



PAPER STRAIGHTENER COLLAR

REQUIREMENT

LEFT COLLAR SPACE

MIN. 9/32 INCH

MAX. 21/64 INCH

FROM THE LEFT SHOULDER ON THE PAPER STRAIGHTENER SHAFT.

RIGHT COLLAR SPACED.

MIN. 1/16 INCH

MAX. 5/64 INCH

FROM THE RIGHT SHOULDER.

TO ADJUST

POSITION COLLARS ON SHAFT WITH SET SCREWS LOOSENED

PAPER STRAIGHTENER LEVER SPRING TENSION

REQUIREMENT

MIN. 1-1/2 OZS.

MAX. 4 OZS.

TO START THE LEVER MOVING

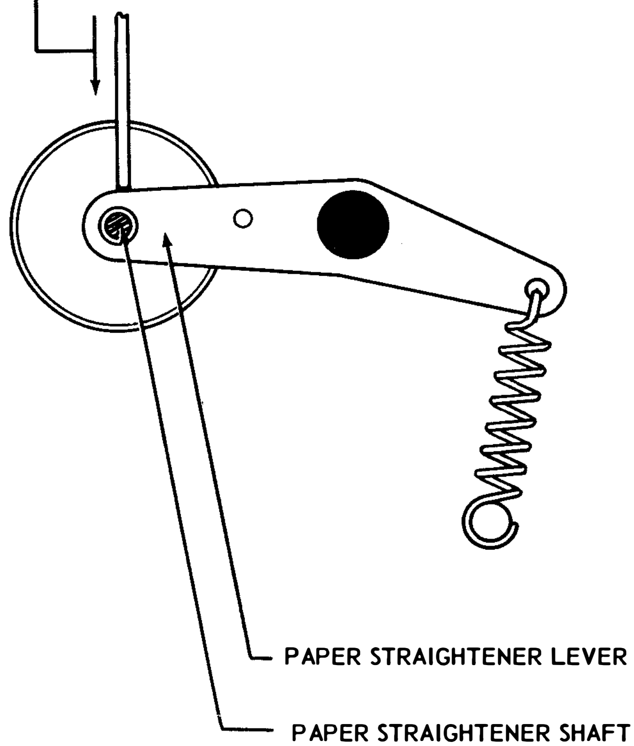
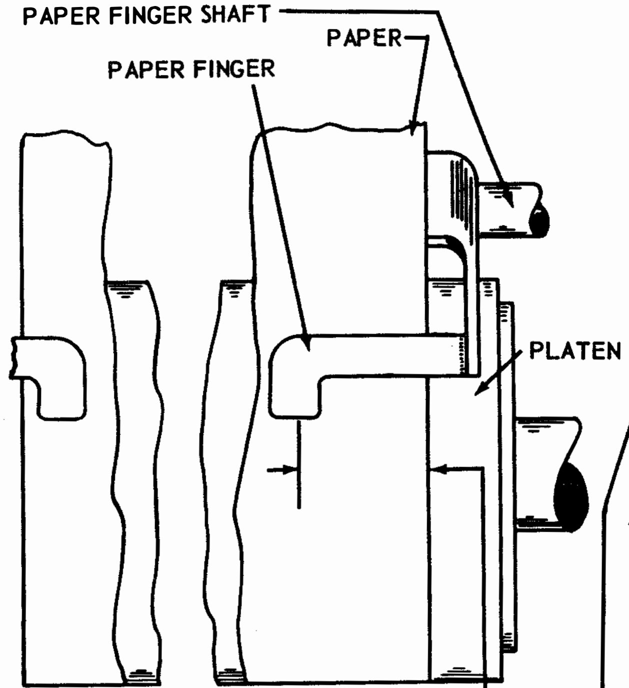
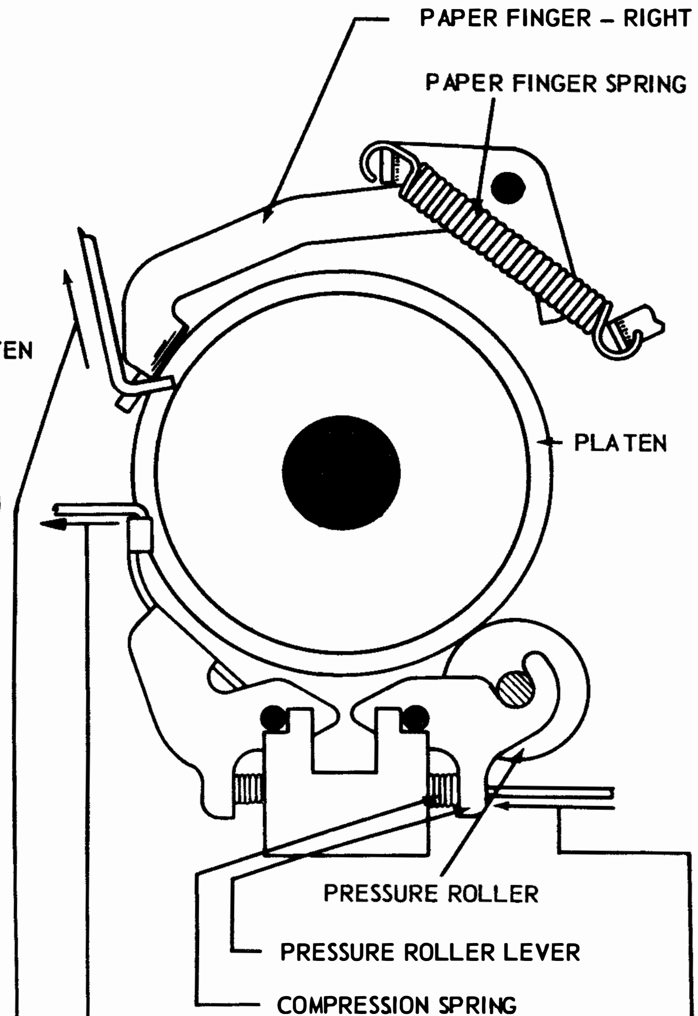


Figure 5-53. Typing Unit, Paper Mechanism





PAPER FINGER ADJUSTMENT

REQUIREMENT

THE PRESSURE END OF THE PAPER FINGERS SHOULD OVERLAP THE PAPER FROM 3/8 INCH TO 1/2 INCH.

TO ADJUST

POSITION THE PAPER FINGERS BY SLIDING THEM ON THEIR SHAFT.

PAPER FINGER SPRING TENSION

REQUIREMENT

PULL UPWARD ON RIGHT PAPER FINGER TO START LEFT PAPER FINGER MOVING FROM PLATEN.

MIN. 3 OZS.
MAX. 6 OZS.

PRESSURE ROLLER LEVER SPRING

REQUIREMENT

MIN. 28 OZS
MAX. 36 OZS.
TO START EACH CENTER LEVER MOVING. ALTERNATELY

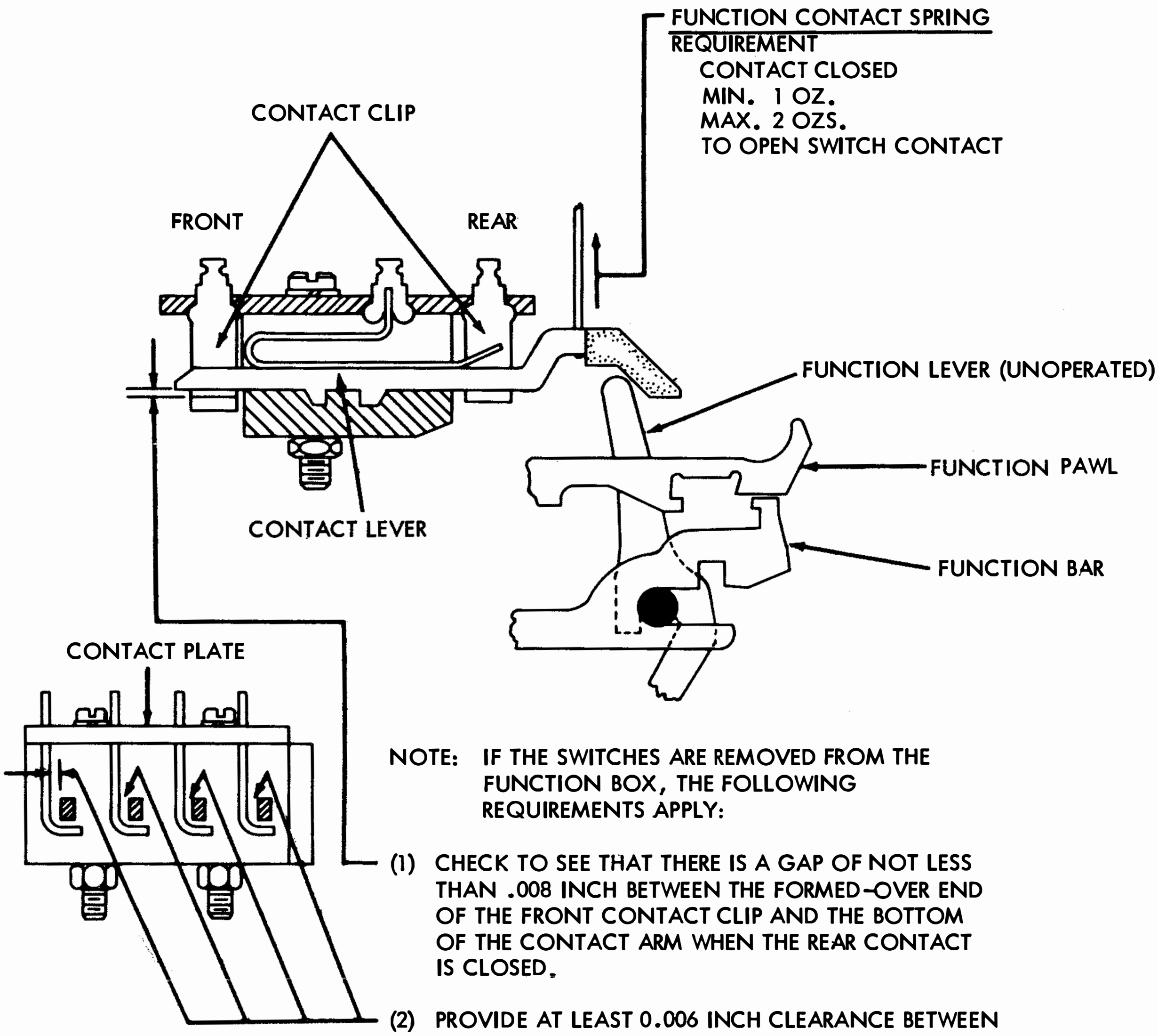
PAPER PRESSURE BAIL SPRING TENSION

REQUIREMENT

SCALE HOOKED OVER PRESSURE BAIL AT EACH END OF PLATEN.

MIN. 7 OZS.
MAX. 20 OZS.
TO MOVE PRESSURE BAIL FROM PLATEN.

Figure 5-54. Typing Unit, Paper Mechanism

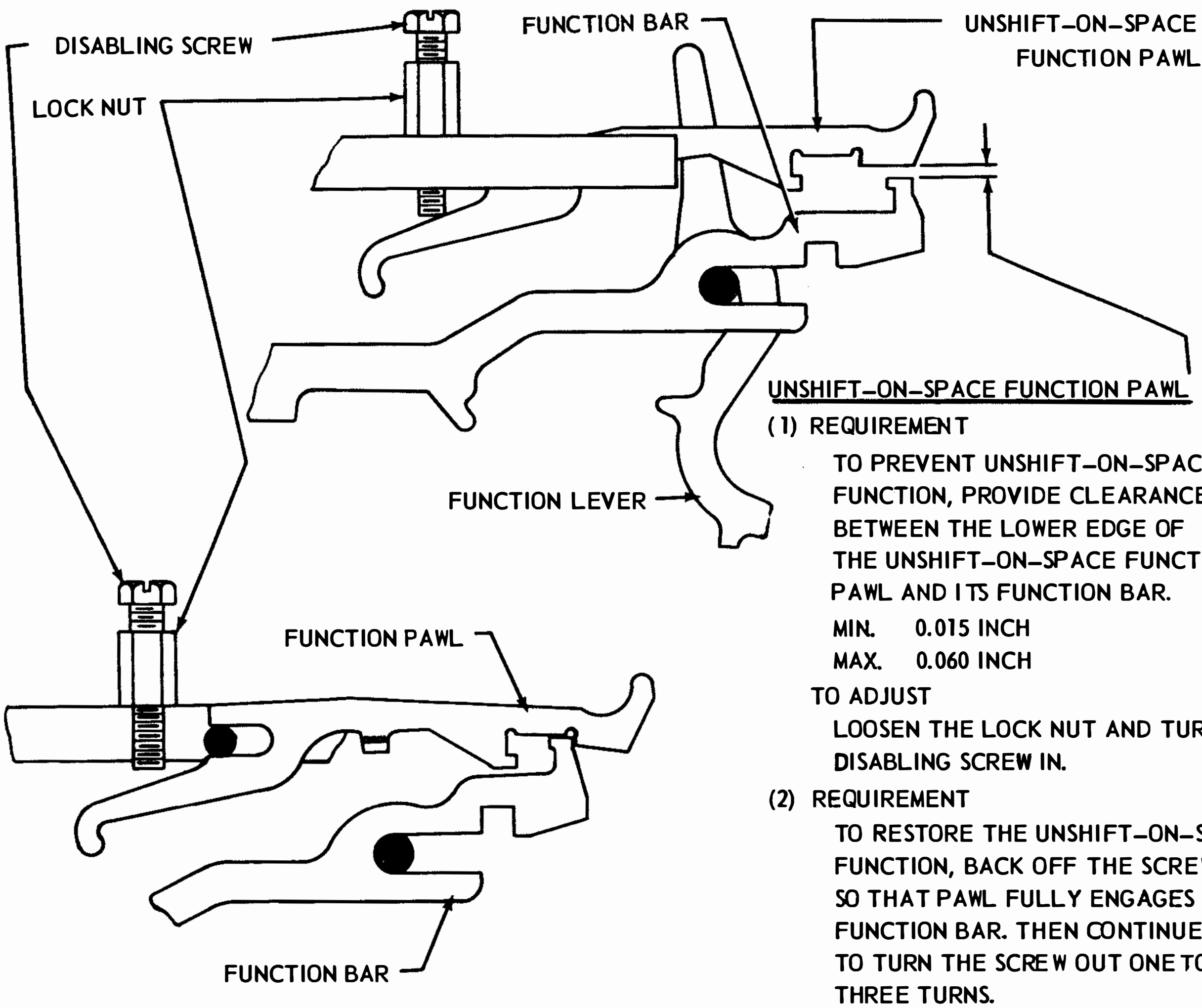


NOTE: IF THE SWITCHES ARE REMOVED FROM THE FUNCTION BOX, THE FOLLOWING REQUIREMENTS APPLY:

(1) CHECK TO SEE THAT THERE IS A GAP OF NOT LESS THAN .008 INCH BETWEEN THE FORMED-OVER END OF THE FRONT CONTACT CLIP AND THE BOTTOM OF THE CONTACT ARM WHEN THE REAR CONTACT IS CLOSED.

(2) PROVIDE AT LEAST 0.006 INCH CLEARANCE BETWEEN THE CONTACT ARM AND THE VERTICAL PORTION OF THE CONTACT CLIP. THIS CLEARANCE APPLIES TO BOTH FRONT AND REAR. TO OBTAIN THE CLEARANCE, POSITION THE CONTACT PLATE BEFORE TIGHTENING THE CONTACT PLATE SCREWS.

Figure 5-55. Typing Unit, Function Contacts



UNSHIFT-ON-SPACE FUNCTION PAWL

(1) REQUIREMENT

TO PREVENT UNSHIFT-ON-SPACE FUNCTION, PROVIDE CLEARANCE BETWEEN THE LOWER EDGE OF THE UNSHIFT-ON-SPACE FUNCTION PAWL AND ITS FUNCTION BAR.

MIN. 0.015 INCH
MAX. 0.060 INCH

TO ADJUST

LOOSEN THE LOCK NUT AND TURN THE DISABLING SCREW IN.

(2) REQUIREMENT

TO RESTORE THE UNSHIFT-ON-SPACE FUNCTION, BACK OFF THE SCREW SO THAT PAWL FULLY ENGAGES THE FUNCTION BAR. THEN CONTINUE TO TURN THE SCREW OUT ONE TO THREE TURNS.

Figure 5-56. Typing Unit, Unshift-on-Space Function Pawl

CODE BAR DETENT

REQUIREMENT

FRONT PLATE REMOVED. ALL CLUTCHES DISENGAGED.
SUPPRESSION AND SHIFT CODE BARS SHOULD
DETENT EQUALLY (GAUGED BY EYE).

TO ADJUST

EQUALIZE THE DETENTING OF THE CODE BARS
BY ADDING OR REMOVING SHIMS BETWEEN
THE CASTING AND THE CODE BAR BRACKET.

CODE BAR DETENT SPRING TENSION

NOTE

UNLESS THERE IS REASON TO BELIEVE THAT THESE SPRINGS ARE CAUSING OPERATING FAILURE DO NOT CHECK THIS REQUIREMENT.

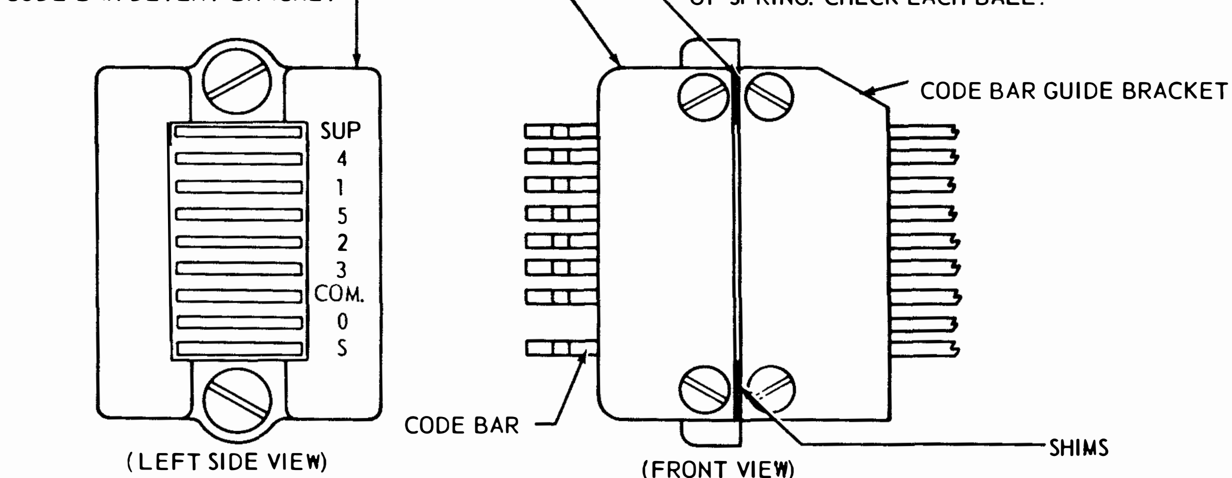
REQUIREMENT

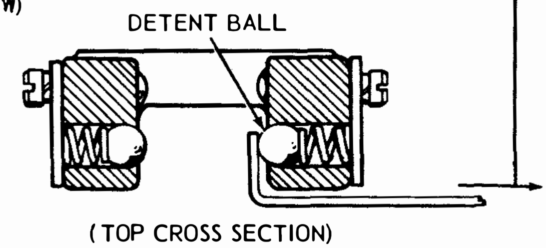
CODE BAR DETENT BRACKET CAREFULLY REMOVED AND CODE BARS REMOVED FROM DETENT BRACKET. SCALE APPLIED TO DETENT BALL AND PULLED IN DIRECTION OF BALL TRAVEL

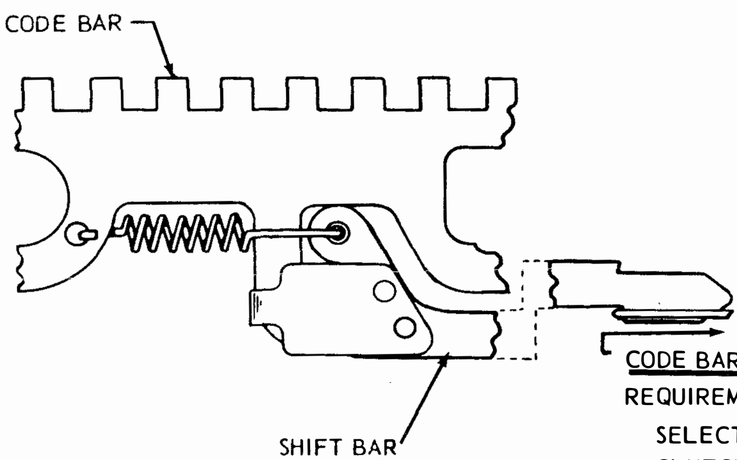
MIN. 1-1/2 OZS.

MAX. 3-1/2 OZS.

TO START BALL MOVING AGAINST COMPRESSION OF SPRING. CHECK EACH BALL.







CODE BAR YIELD SPRING

REQUIREMENT

SELECTOR CLUTCH, CODE BAR CLUTCH, AND TYPE BOX CLUTCH DISENGAGED. NO. 1 CODE BAR IN SPACING POSITION.

MIN. 14 OZS.

MAX. 23 OZS.

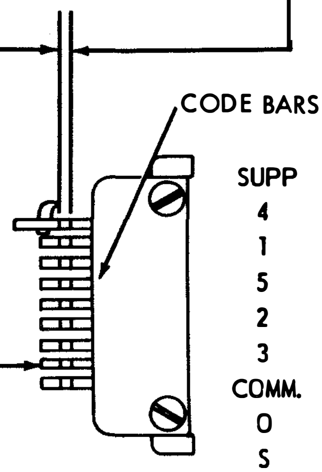
TO START CODE BAR SHIFT BAR PIVOT MOVING AWAY FROM CODE BAR. CHECK NO. 2 AND COMMON CODE BAR SHIFT BAR IN THE SAME MANNER.

Figure 5-57. Typing Unit, Code Bar Detent Mechanism

NOTE: TO CHECK REQUIREMENTS (A, B, AND D), SET FUNCTION CLUTCH IN STOP POSITION AND ALL CODE BARS TO THE RIGHT.

(A) CODE BAR SHIFT MECHANISM
REQUIREMENTS
1. WITH FUNCTION CLUTCH IN STOP POSITION, LATCH FUNCTION LEVER (SHIFT MECH.) ON ITS LOWER RELEASING LATCH. NOTCH IN SUPP. CODE BAR SHOULD ALIGN WITH NOTCHES IN OTHER CODE BARS WHEN ALL CODE BARS ARE SHIFTED TO THE RIGHT.
TO ADJUST
POSITION UPPER OR LOWER GUIDE PLATE WITH ITS CLAMP NUTS LOOSENED.
2. REPEAT FOR EACH STUNT CASE CODE BAR SHIFT MECHANISM.
NOTE --- POSITION THE ASSOCIATED GUIDE PLATE SO THAT THE MOVEMENT OF THE FORK IS NOT RESTRICTED WITHIN THE RANGE OF ADJUSTMENT.

(D) OFF LINE SHIFT SOLENOID BRACKET ASSEMBLY (OFF LINE ONLY)
REQUIREMENT
NOTCH IN SUPPRESSION CODE BAR SHOULD ALIGN WITH NOTCHES IN OTHER CODE BARS WHEN ALL CODE BARS ARE SHIFTED TO THE RIGHT.
TO ADJUST
POSITION THE SOLENOID BRACKET ASSEMBLY WITH ITS MOUNTING SCREWS LOOSENED.



(C) TYPE BOX CLUTCH SUPPRESSION ARM
(SEE FIGURE 5-57B)

(B) CONDITION CODE (ZERO) CODE BAR SHIFT MECHANISM
REQUIREMENT
WITH FUNCTION CLUTCH IN STOP POSITION, LATCH FUNCTION LEVER (SHIFT MECH.). THE NOTCH IN CONDITION CODE (ZERO) CODE BAR SHOULD ALIGN WITH NOTCHES IN OTHER CODE BARS WHEN ALL CODE BARS ARE SHIFTED TO THE RIGHT.
TO ADJUST
POSITION THE UPPER OR LOWER GUIDE PLATE WITH ITS CLAMP NUTS LOOSENED.
NOTE --- POSITION THE ASSOCIATED GUIDE PLATE SO THAT THE MOVEMENT OF THE FORK IS NOT RESTRICTED.

Figure 5-57A. On Line and Off Line Stunt Shift Control

(C) TYPE BOX CLUTCH SUPPRESSION ARM (WITH OR WITHOUT SOLENOID SHIFT)

REQUIREMENT

SUPPRESSION ARM IN BLOCKING POSITION. SHAFT ROTATED UNTIL THE FUNCTION CLUTCH SHOE LEVER IS OPPOSITE THE FUNCTION CLUTCH TRIP LEVER.

1. AT LEAST 0.003 INCH CLEARANCE BETWEEN TRIP ARM EXTENSION AND CLUTCH TRIP LEVER.
2. AT LEAST 0.006 INCH CLEARANCE BETWEEN THE FUNCTION CLUTCH SHOE LEVER AND FUNCTION CLUTCH TRIP LEVER.

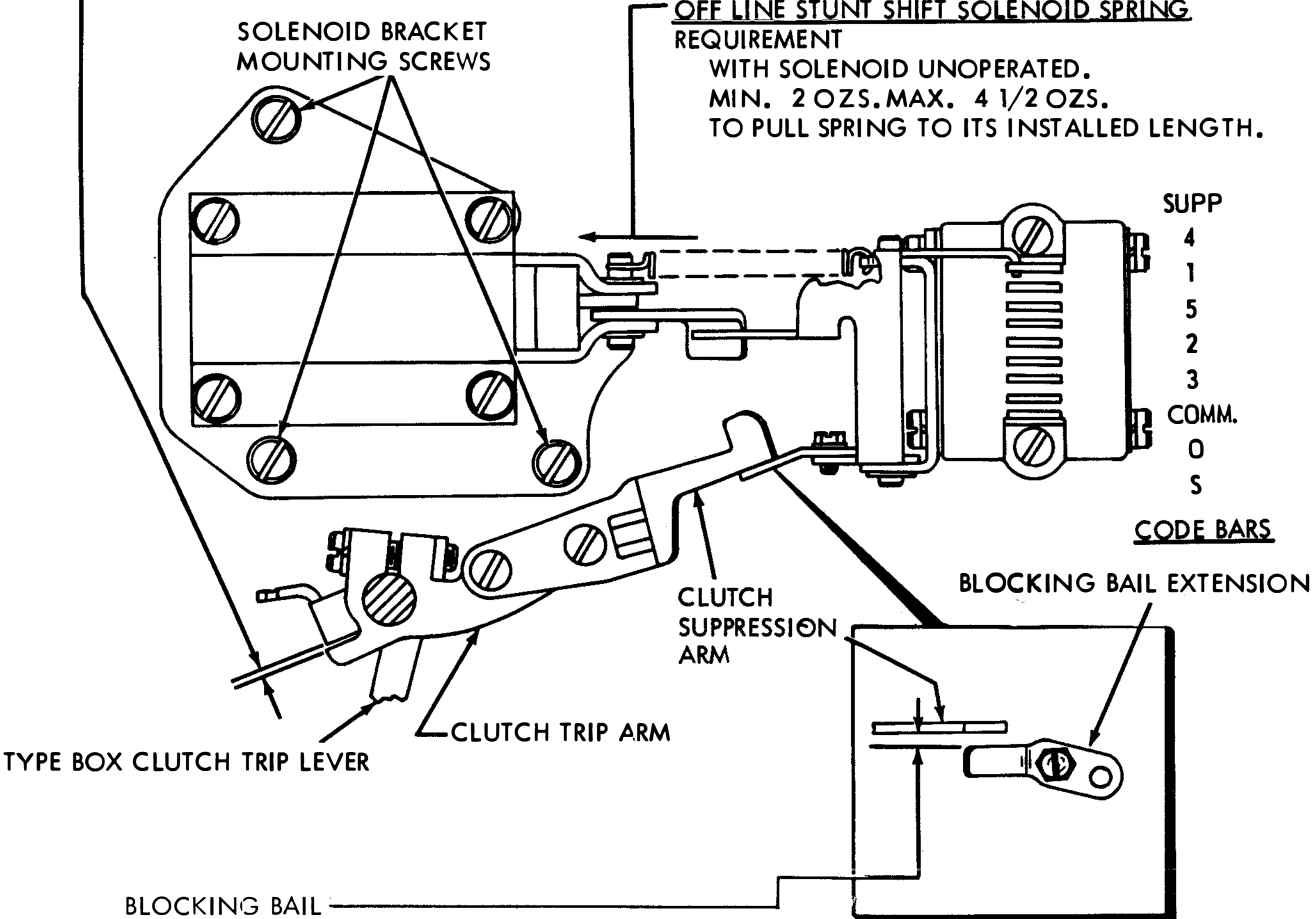
TO ADJUST

POSITION SUPPRESSION ARM WITH ITS MOUNTING SCREWS LOOSENED.

OFF LINE STUNT SHIFT SOLENOID SPRING

REQUIREMENT

WITH SOLENOID UNOPERATED.
MIN. 2 OZS. MAX. 4 1/2 OZS.
TO PULL SPRING TO ITS INSTALLED LENGTH.



BLOCKING BAIL

REQUIREMENT

1. LATCH FUNCTION LEVER OF ANY STUNT CASE CODE BAR SHIFT MECHANISM AND ROTATE MAIN SHAFT UNTIL LOWER SURFACE OF THE SUPPRESSION ARM IS ALIGNED (APPROX.) WITH BOTTOM SURFACE OF BLOCKING BAIL EXTENSION. CLEARANCE BETWEEN SUPPRESSION ARM AND BLOCKING BAIL EXTENSION, WITH PLAY TAKEN UP TO PRODUCE MINIMUM CLEARANCE.
   MIN. 0.008 INCH ——— MAX. 0.055 INCH

TO ADJUST

POSITION EXTENSION WITH ITS MOUNTING SCREW LOOSENED. REFINE THE ADJUSTMENT IF NECESSARY, AND RECHECK EACH SHIFT MECHANISM.

2. REFINE THE STUNT CASE CODE BAR SHIFT MECHANISM ADJUSTMENT OF ANY SHIFT MECHANISM THAT DOES NOT MEET THE ABOVE REQUIREMENT.

Figure 5-57B. On Line and Off Line Stunt Shift Control

TYPE BOX CLUTCH TRIP LEVER
(SELECTIVE - CALLING UNITS WITH OR WITHOUT OFF-LINE SHIFT SOLENOID)
CLEARANCE BETWEEN TYPE BOX CLUTCH TRIP LEVER AND CLUTCH DISK STOP LUG SHOULD BE
MIN. 0.040 INCH --- MAX. 0.055 INCH
(SEE FIGURE 5-17)

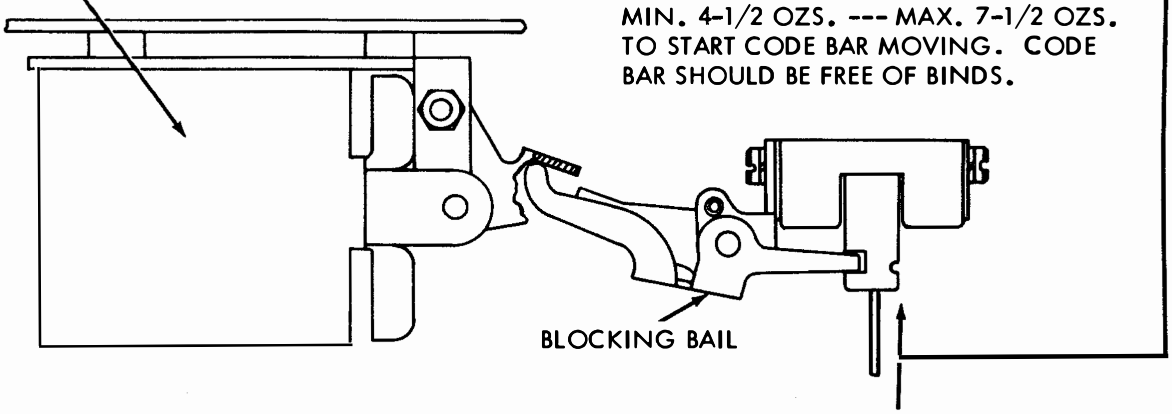
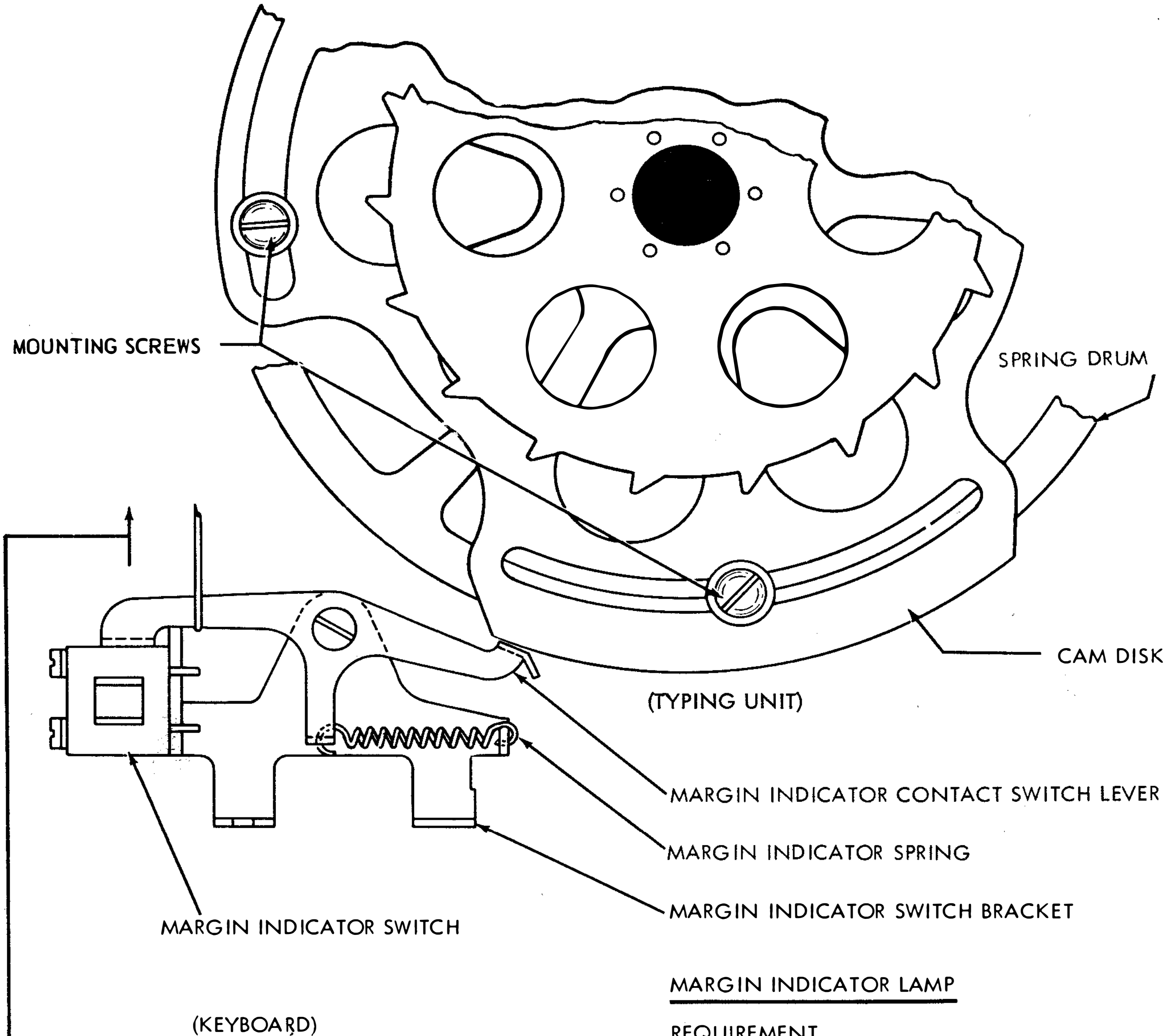


Figure 5-57C. On Line and Off Line Stunt Shift Control



MARGIN INDICATOR SPRING TENSION

REQUIREMENT

MIN. 7 OZS.
MAX. 11 OZS.
TO START LEVER MOVING.

MARGIN INDICATOR LAMP

REQUIREMENT

OPERATING UNDER POWER, THE LAMP SHOULD LIGHT ON THE DESIRED CHARACTER

TO ADJUST

SET THE TYPE BOX CARRIAGE TO PRINT THE DESIRED CHARACTER AND POSITION THE CAM DISK COUNTERCLOCKWISE ON THE SPRING DRUM WITH ITS THREE MOUNTING SCREWS LOOSENED SO THAT THE SWITCH JUST OPENS.

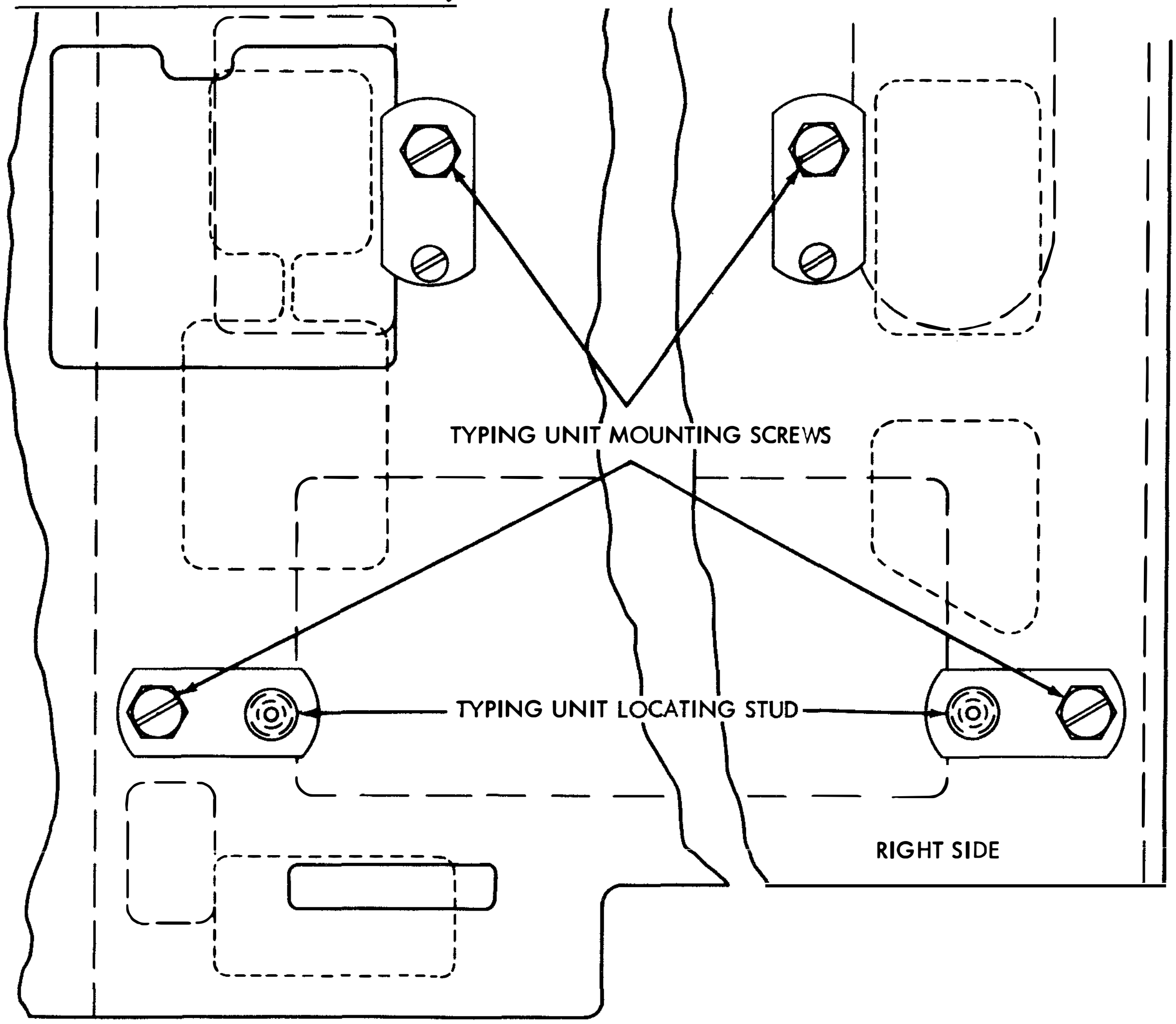
Figure 5-58. Typing Unit and Keyboard, Margin Indicating Mechanism

e. BASE LB10/000

THE FOLLOWING KEYBOARD ADJUSTMENTS CONSTITUTE THE ADJUSTMENTS FOR THE BASE:

(1) ADJUSTMENTS:
   (a) INTERMEDIATE GEAR BRACKET - FIGURE 5-60
   (b) MOUNTING TYPING UNIT ON BASE - FIGURE 5-59
(2) SPRING TENSIONS
   (a) LOCAL CARRIAGE RETURN FUNCTION BAIL - FIGURE 5-71
   (b) LOCAL LINE FEED TRIP LINK - FIGURE 5-69
   (c) MARGIN INDICATOR - FIGURE 5-58

f. KEYBOARD LK25BRW, LK52BRW, LK53BRW, LAK21BRW, LAK33BRW AND LAK47BRW ADJUSTMENTS ARE THE SAME EXCEPT FOR THOSE FEATURES ON THE LAK WHICH COVER THE LINKAGES WITH ASSOCIATED TYPING REPERFORATORS.



MOUNTING TYPING UNIT ON KEYBOARD OR BASE

REQUIREMENT

WHEN PLACING THE TYPING UNIT ON THE BASE HOLD IT TILTED SLIGHTLY TO THE RIGHT AND LOWER THE RIGHT END INTO ENGAGEMENT WITH THE RIGHT LOCATING STUD. WHILE EASING THE LEFT END DOWNWARD ROTATE THE MOTOR BY HAND TO PROPERLY MESH THE GEARS. SECURE BY FOUR MOUNTING SCREWS.

ROTATE THE MOTOR BY HAND TO INSURE PROPER MESHING OF GEARS.

Figure 5-59. Base or Keyboard, Mounting Typing Unit

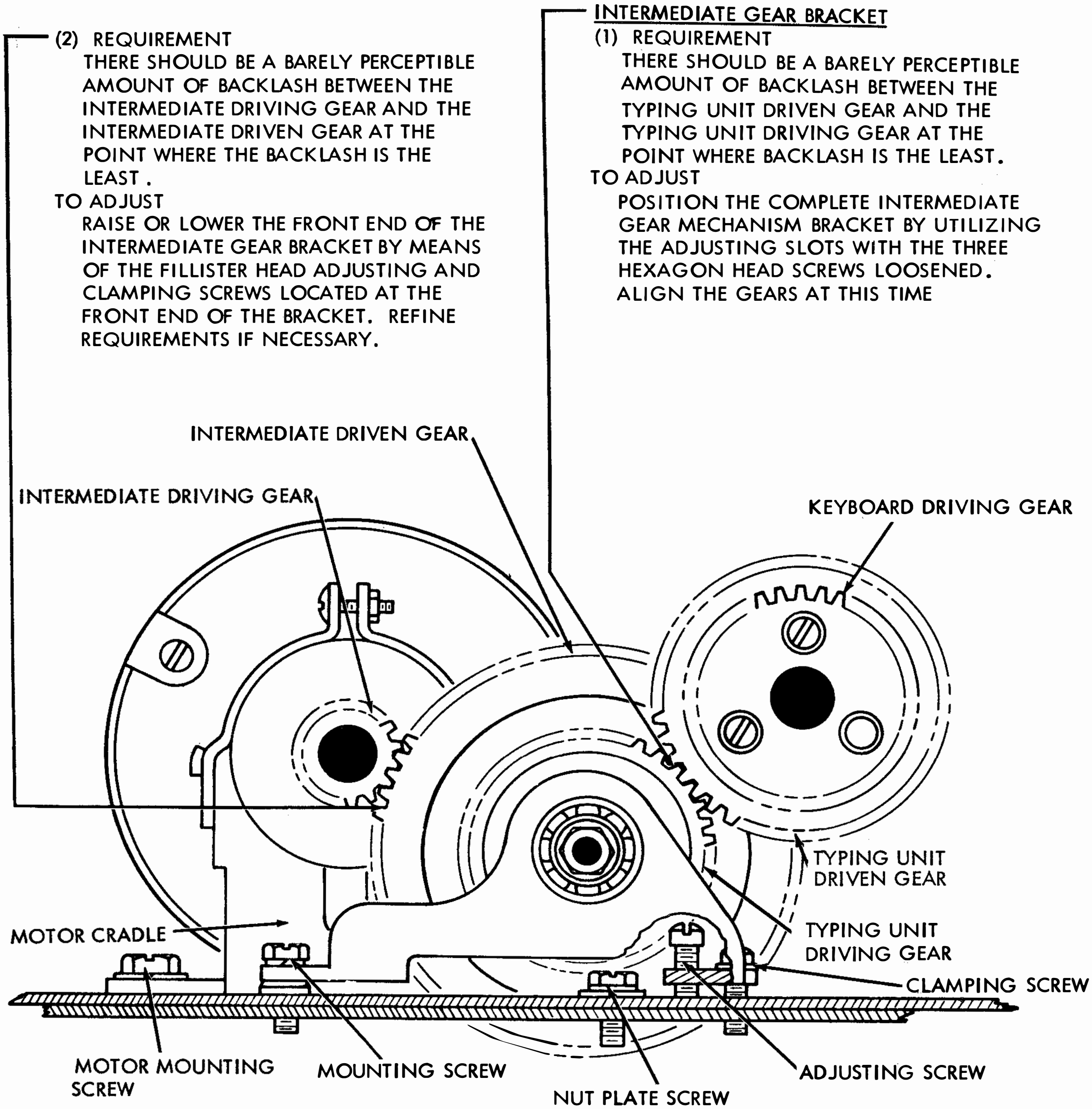
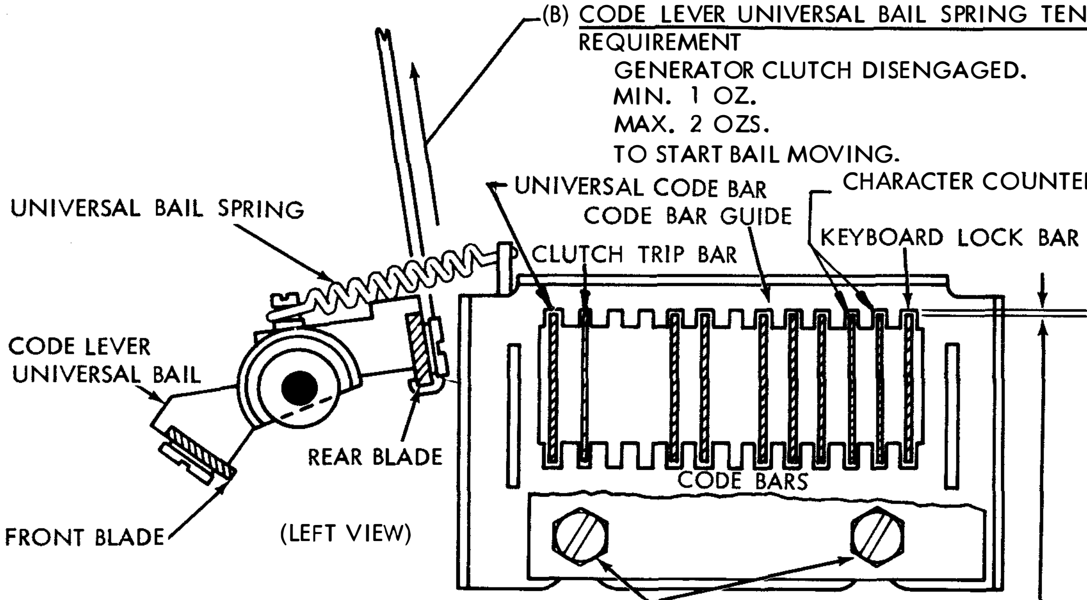


Figure 5-60. Keyboard or Base, Intermediate Gear Assembly

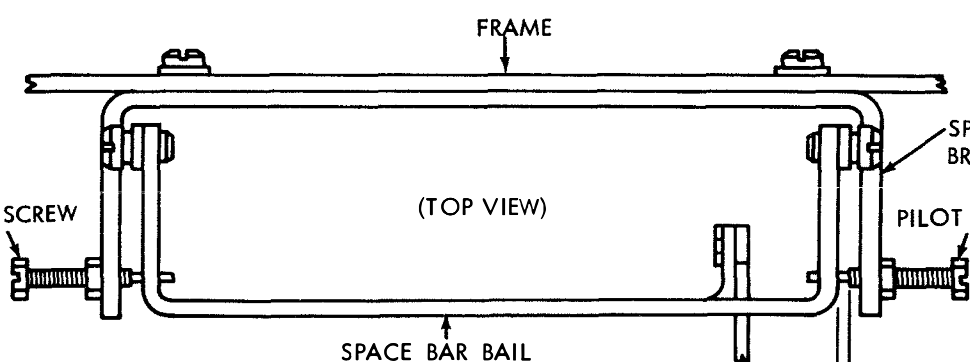
(B) CODE LEVER UNIVERSAL BAIL SPRING TENSION
REQUIREMENT
GENERATOR CLUTCH DISENGAGED.
MIN. 1 OZ.
MAX. 2 OZS.
TO START BAIL MOVING.



(A) CODE BAR GUIDE CLEARANCE
REQUIREMENT
MIN. SOME CLEARANCE --- MAX. 0.010 INCH
BETWEEN CODE BAR GUIDE AND ALL CODE BARS. CHECK BOTH ENDS OF CODE BARS.
ALL CODE BARS SHOULD MOVE FREELY WITHOUT BIND INCLUDING THE CLUTCH TRIP BAR AND KEYBOARD LOCKBAR.
TO ADJUST
LOOSEN MOUNTING SCREWS AND POSITION CODE BAR GUIDE.

NOTE: REMOVE KEYBOARD FROM CABINET BEFORE ADJUSTING CODE BARS.

NOTE: KEYLEVER COVER MUST BE REMOVED. SEE DISASSEMBLY AND REASSEMBLY.

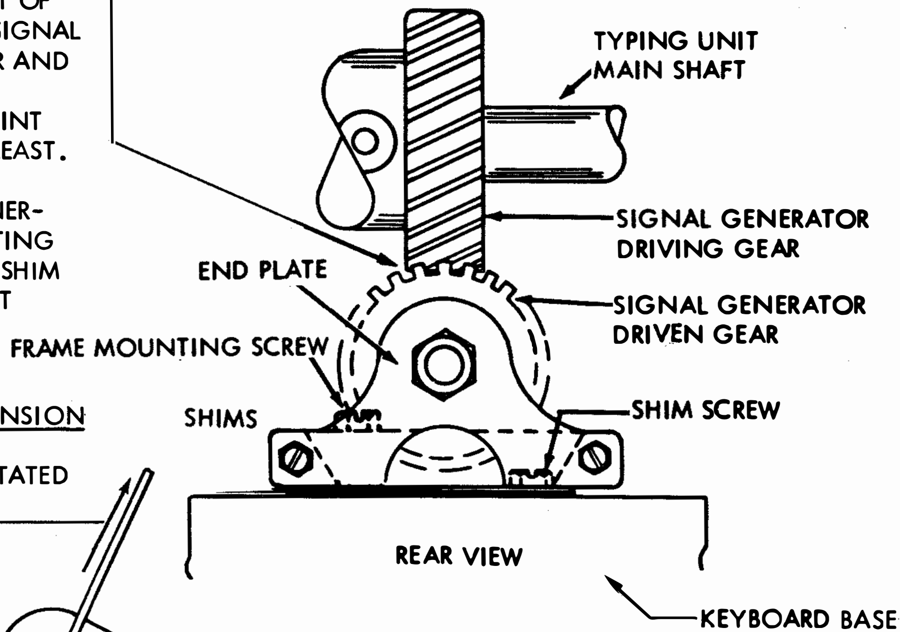


NOTE: THE BAIL SHOULD BE SO ADJUSTED THAT THE SPACE BAR CAN BE OPERATED WITHOUT BINDING IN THE HOLES IN THE GUIDE PLATE AND THE FRAME.

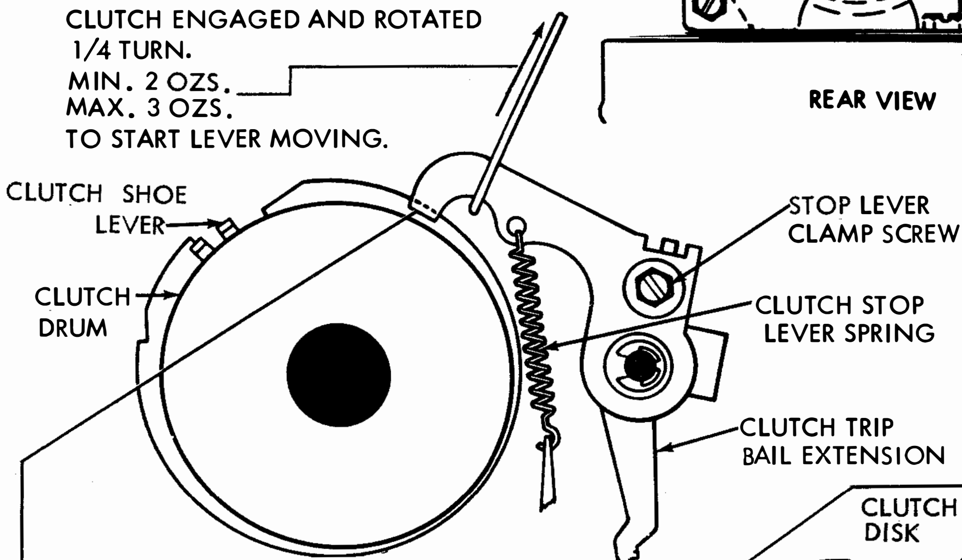
(C) SPACE BAR BAIL PIVOT
REQUIREMENT
MIN. SOME END PLAY --- MAX. 0.010 INCH
SPACE BAR FREE FROM BIND.
TO ADJUST
POSITION SPACE BAR WITH PILOT SCREWS.

Figure 5-61. Keyboard, Code Bar and Space Bar Mechanisms

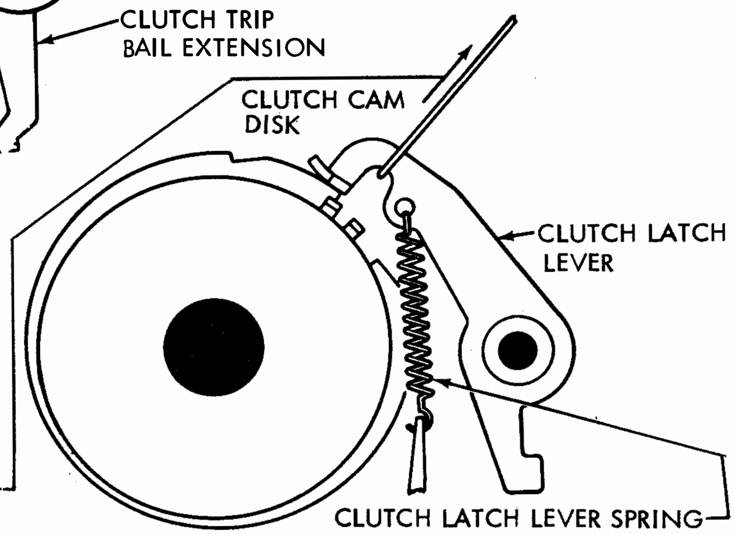
(A) SIGNAL GENERATOR FRAME
REQUIREMENT
WITH TYPING UNIT MOUNTED IN POSITION, THERE SHOULD BE A PERCEPTIBLE AMOUNT OF BACKLASH BETWEEN THE SIGNAL GENERATOR DRIVEN GEAR AND THE SIGNAL GENERATOR DRIVING GEAR AT THE POINT WHERE BACKLASH IS THE LEAST.
TO ADJUST
REMOVE THE SIGNAL GENERATOR FRAME REAR MOUNTING SCREW AND LOOSEN THE SHIM SCREW. ADD OR SUBTRACT SHIMS AS REQUIRED.



(C)
CLUTCH STOP LEVER SPRING TENSION
REQUIREMENT
CLUTCH ENGAGED AND ROTATED 1/4 TURN.
MIN. 2 OZS.
MAX. 3 OZS.
TO START LEVER MOVING.



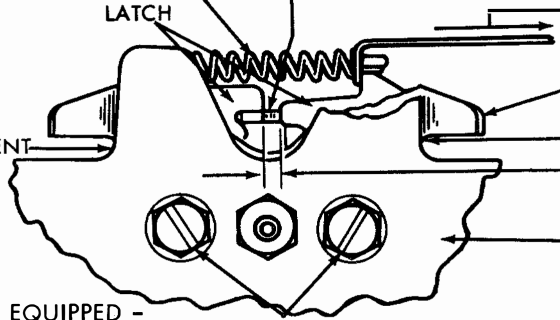
(B) CLUTCH STOP LEVER
REQUIREMENT
SHOULD FULLY ENGAGE CLUTCH SHOE LEVER.
DURING ROTATION, THE LEVER SHOULD NOT TOUCH THE CLUTCH DRUM AT ANY POINT.
TO ADJUST
POSITION STOP LEVER WITH ITS CLAMP SCREW LOOSENED.



(D) CLUTCH LATCH LEVER SPRING TENSION
REQUIREMENT
CLUTCH LATCH LEVER RESTING ON THE HIGHEST POINT OF CLUTCH DISK.
MIN. 2 OZS.
MAX. 3 OZS.
TO START LATCH LEVER MOVING.

CLUTCH DRUM POSITION — SEE FIGURE 5-19
CLUTCH SHOE LEVER SPRING TENSION — SEE FIGURE 5-19
CLUTCH SHOE SPRING TENSION — SEE FIGURE 5-19

Figure 5-62. Keyboard, Signal Generator Clutch



(B) TRANSFER BAIL DETENT LATCH SPRING TENSION
REQUIREMENT
HOLD TRANSFER BAIL TO THE LEFT
MIN. 2-3/4 OZS. --- MAX. 4-1/4 OZS.
TO START LATCH MOVING.

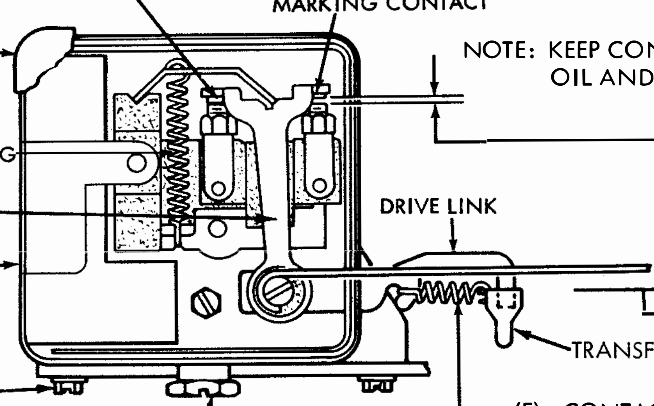
CAUTION: ON UNITS SO EQUIPPED - CLEAN GOLD CONTACTS BY PULLING TWILL JEAN HALF WAY THROUGH THE CLOSED CONTACTS, OPEN CONTACTS AND REMOVE TWILL JEAN. USE NO OTHER CLEANING OR BURNISHING METHODS. AVOID PITTING OR CHIPPING THE CONTACTS.

(A) **TRANSFER BAIL DETENT PLATE**
REQUIREMENT
EQUAL L. H. AND R. H. CLEARANCE WITHIN 0.002 INCH WHEN TRANSFER BAIL IS AT EXTREME L.H. OR R.H. POSITION AS THESE OCCUR IN A CHARACTER BETWEEN START AND NO. 1 PULSES ONLY.

(C) CONTACT BOX CONTACT CLEARANCE
REQUIREMENT
MARKING AND SPACING GAPS SHOULD BE EQUAL WITHIN 0.001 INCH.
TO CHECK
DEPRESS Y KEYLEVER AND ROTATE SIGNAL GENERATOR CAM SLEEVE UNTIL EACH CONTACT HAS FULLY OPENED.
TO ADJUST
LOOSEN MOUNTING SCREWS AND MOVE CONTACT BOX BY MEANS OF ECCENTRIC.

NOTE

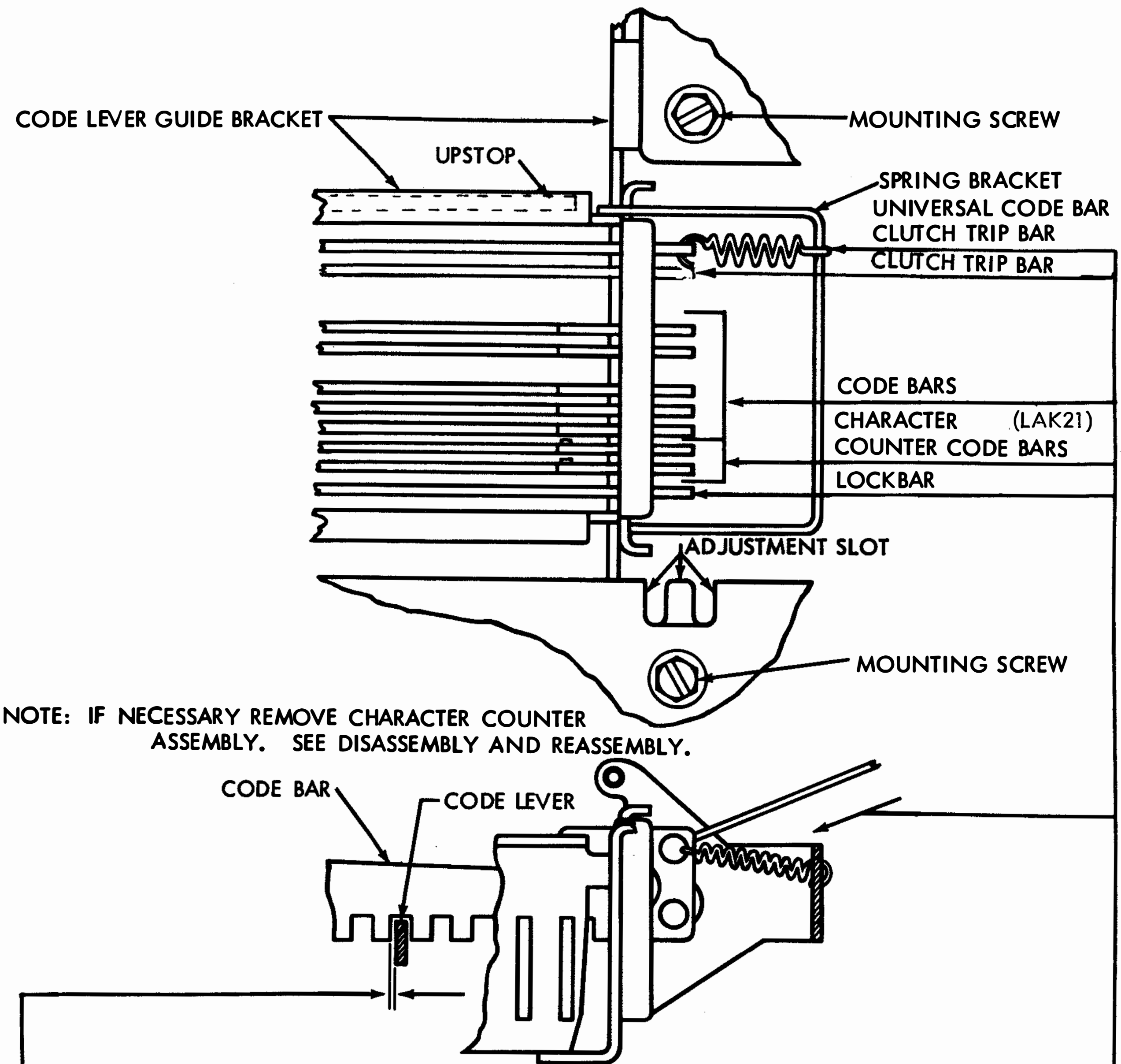
CHECK BY MEANS OF SIGNAL CHECKING DEVICE WHERE POSSIBLE, AND CAREFULLY REFINE THE ADJUSTMENT TO ELIMINATE ALL BIAS FROM THE SIGNALS BY EQUALIZING THE CURRENT-ON AND CURRENT-OFF INTERVALS.



(D) CONTACT BOX DRIVE LINK SPRING TENSION
REQUIREMENT
WITH MAINSHAFT IN STOP POSITION AND TRANSFER BAIL DETENT LATCH SPRING UNHOOKED (SEE FIG. ABOVE) MOVE LATCHES AWAY FROM TRANSFER BAIL EXTENSION. HOLD THE TOGGLE FIRMLY AGAINST CONTACTS.
MIN. 6 OZS.---MAX. 9 OZS.
TO START TRANSFER BAIL EXTENSION MOVING.

(E) CONTACT BOX SPRING TENSION
REQUIREMENT
WITH MAIN SHAFT IN STOP POSITION AND COVER OF CONTACT BOX REMOVED, UNHOOK THE DRIVE LINK SPRING AND HOLD TRANSFER BAIL CLEAR OF DRIVE LINK
MIN. 2 OZS.
MAX. 3 OZS.
TO START LINK MOVING.

Figure 5-63. Keyboard, Transfer Bail and Contact Box Mechanisms



(A) <u>CODE BAR AND CODE LEVER CLEARANCE</u>
REQUIREMENT
CARRIAGE RETURN KEY DEPRESSED BUT NOT ENOUGH TO TRIP OFF UNIVERSAL BAIL LATCH OR CLUTCH BAR.
MIN. 0.006 INCH --- MAX. 0.017 INCH
MEASURE AT CODE BAR #3
TO ADJUST
POSITION GUIDE BY ADJUSTING SLOT WITH FOUR MOUNTING SCREWS LOOSENED.

(B) <u>CLUTCH TRIP BAR SPRING TENSION</u>
REQUIREMENT
BLANK KEY DEPRESSED TO ALLOW THE CLUTCH TRIP BAR TO FALL TO RIGHT.
SPRING UNHOOKED FROM BRACKET
MIN. 8 OZS. --- MAX. 12 OZS.
TO PULL SPRING TO INSTALLED LENGTH.

NOTE: SEE FOLLOWING PAGE FOR ADJUSTMENTS (C),(D),(E) AND (F).

Figure 5-64. Keyboard, Code Bar and Code Lever Mechanisms

NOTE: ADJUSTMENTS CONTINUED FROM PRECEDING PAGE.

(C) CLUTCH TRIP BAR (USED FOR SYNCHRONOUS PULSED TRANSMISSION)

REQUIREMENT

WITH THE CLUTCH DISENGAGED AND LATCHED, POWER OFF AND ARMATURE OF THE MAGNET ASSEMBLY HELD AWAY FROM THE CLUTCH TRIP BAR. PUSH AT THE RIGHT HAND END OF CLUTCH TRIP BAR.

MIN. 9 OZS. --- MAX. 12 OZS.

TO START CLUTCH TRIP BAR MOVING.

NOTE: HOLD THE SWINGER OF THE CONTACT ASSEMBLY AWAY FROM THE UNIVERSAL CODE BAR WHEN MEASURING THE CLUTCH TRIP SPRING TENSION.

(D) UNIVERSAL CODE BAR (USED FOR SYNCHRONOUS PULSED TRANSMISSION)

REQUIREMENT

WITH THE CLUTCH DISENGAGED AND LATCHED, DEPRESS THE BLANK KEY TO ALLOW THE UNIVERSAL CODE BAR TO FALL TO THE RIGHT. SPRING UNHOOKED FROM THE BRACKET.

MIN. 8 OZS. --- MAX. 12 OZS.

TO PULL SPRING TO INSTALLED LENGTH.

(E) CODE BAR SPRING TENSION

REQUIREMENT

KEYBOARD IN K POSITION, LETTERS KEYLEVER DEPRESSED (POWER OFF) HOLD TRANSFER LEVERS (REF. FIGURE 1-15) TO THE RIGHT SO THEY DO NOT AFFECT THE CODE BARS.

MIN. 3 OZS. --- MAX. 5 OZS.

TO START CODE BAR MOVING.

(F) LOCK BAR SPRING TENSION

REQUIREMENT

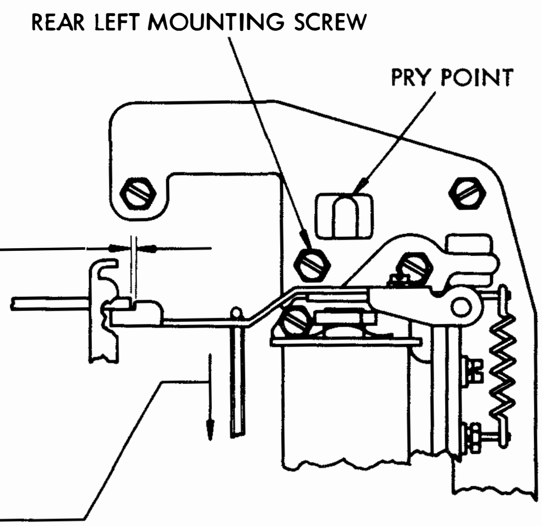
CLUTCH DISENGAGED, KEYBOARD LOCK KEYLEVER DEPRESSED. APPLY PUSH END OF SCALE AGAINST R.H. END OF LOCK BAR.

MIN. 2-1/2 OZS. --- MAX. 6 OZS.

TO START LOCK BAR MOVING.

Figure 5-64A. Keyboard, Code Bar and Code Lever Mechanism

MOUNTING BRACKET (B)
TO CHECK
WITH MAGNET NOT ATTRACTED AND CLUTCH TRIP BAR IN FURTHEST LEFT POSITION.
REQUIREMENT
MIN. 0.005 INCH --- MAX. 0.015 INCH BETWEEN CLUTCH TRIP BAR AND ARMATURE LEVER.
TO ADJUST
POSITION MOUNTING BRACKET WITH THREE MOUNTING SCREWS LOOSE BY MEANS OF PRY POINT.
NOTE
TIGHTEN REAR LEFT MOUNTING SCREW AND MAKE MOUNTING BRACKET ADJUSTMENT (C).



(D) MAGNET ARMATURE
TO CHECK
CLUTCH TRIP BAR IN EXTREME LEFT POSITION. HOOK 32 OZ. SCALE TO ARMATURE LEVER AS SHOWN. MEASURE AT RIGHT ANGLE TO ARMATURE LEVER AS INDICATED.
REQUIREMENT
MIN. 3 OZS. --- MAX. 5 OZS.
TO PULL ARMATURE LEVER FROM CLUTCH TRIP BAR.

(A) ARMATURE HINGE
REQUIREMENT
WITH ARMATURE IN ATTRACTED POSITION ARMATURE FLUSH WITH POLE FACE AND MAGNET BRACKET EXTENSION.
TO ADJUST
POSITION ARMATURE WITH HINGE BRACKET MOUNTING SCREW AND SPRING POST LOOSE.

(C) MOUNTING BRACKET
TO CHECK
WITH ARMATURE LEVER HELD AGAINST MAGNET POLE FACE AND CLUTCH TRIP BAR IN FURTHEST RIGHT POSITION.
REQUIREMENT
MIN. 0.005 INCH --- MAX. 0.015 INCH BETWEEN CLUTCH TRIP BAR AND ARMATURE LEVER.
TO ADJUST
WITH RIGHT REAR AND LEFT FRONT MOUNTING BRACKET SCREWS LOOSE POSITION MOUNTING BRACKET BY MEANS OF PRY POINT.

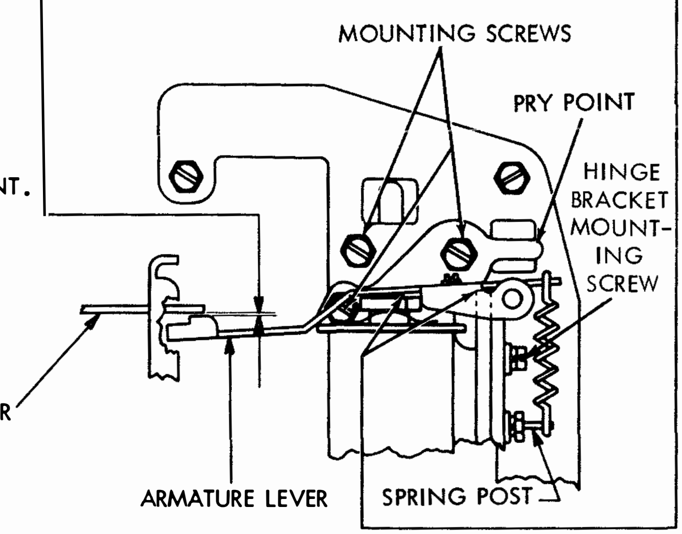
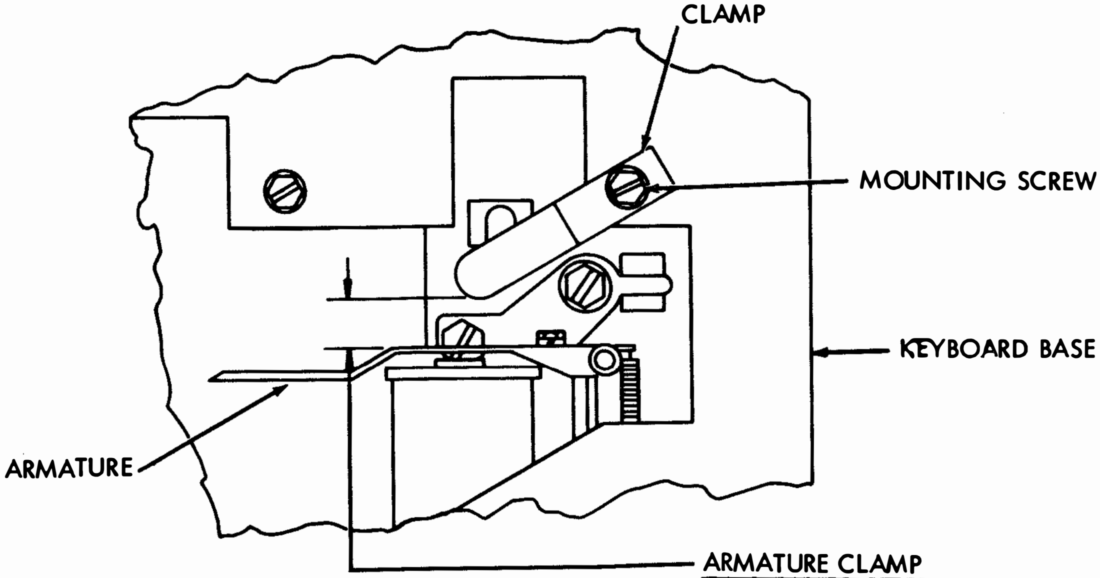


Figure 5-65. Keyboard, Synchronous Pulsed Magnet Mechanism



NOTE: TO MAKE KEYBOARD OPERABLE WITHOUT ELECTRICAL PULSE TO OPERATE STEPPING MAGNET LOOSEN CLAMP MOUNTING SCREW AND ROTATE CLAMP COUNTERCLOCKWISE TO HOLD THE ARMATURE IN THE OPERATING POSITION. MAINTAIN 0.005 INCH TO 0.015 INCH CLEARANCE BETWEEN CLUTCH TRIP BAR AND ARMATURE LEVER.

<u>ARMATURE CLAMP</u>

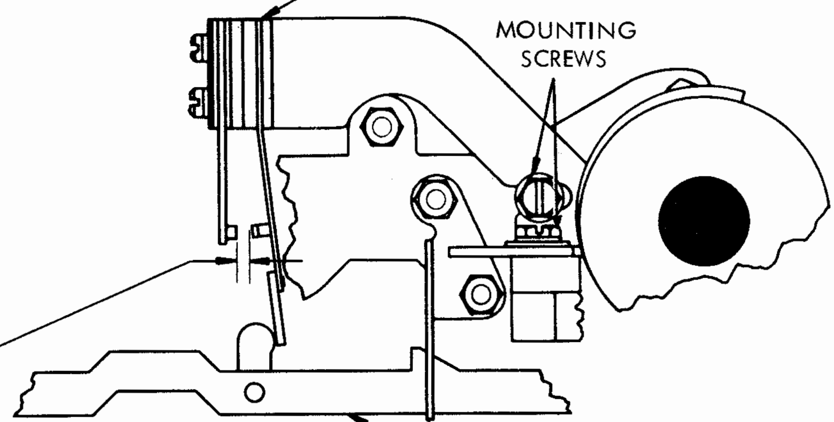
REQUIREMENT

WITH ARMATURE OPERATED, CLEARANCE BETWEEN ARMATURE CLAMP AND ARMATURE APPROX. 3/8 INCH

TO ADJUST

POSITION CLAMP WITH ITS MOUNTING SCREW LOOSENED.

Figure 5-65A. Keyboard, Synchronous Pulsed Magnet Mechanism



CONTACT GAP

REQUIREMENT
WITH UNIVERSAL CODE BAR IN STOP POSITION
(TO RIGHT AS VIEWED FROM REAR) CONTACT
GAP SHOULD BE
MIN. 0.020 INCH --- MAX. 0.035 INCH

TO ADJUST
POSITION CONTACT MOUNTING BRACKET
WITH MOUNTING SCREWS LOOSE.

UNIVERSAL CODE BAR CONTACT

REQUIREMENT
WITH UNIVERSAL CODE BAR IN OPERATED
POSITION (TO THE LEFT AS VIEWED FROM REAR)
MIN. 3-1/2 OZS. --- MAX. 4-1/2 OZS.
TO OPEN CONTACTS.

TO ADJUST
BEND CONTACT SWINGER.

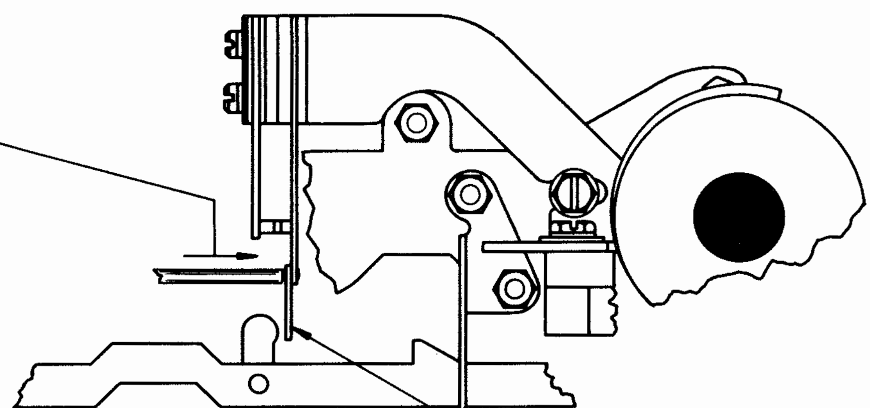


Figure 5-66. Keyboard, Conditioning Contact Mechanism

(A) FUNCTION BAIL AND CODE LEVER CLEARANCE

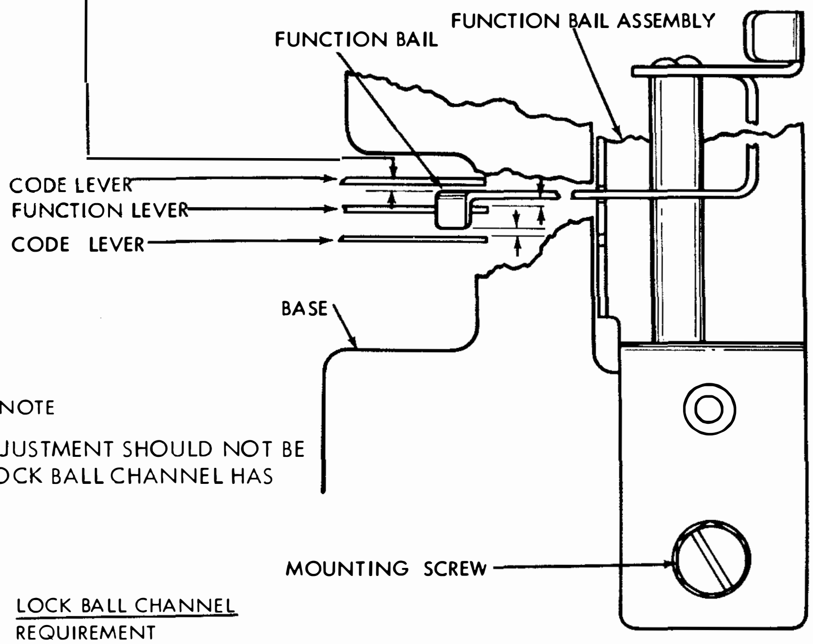
REQUIREMENT

MIN. 0.015 INCH

BETWEEN ANY FUNCTION BAIL AND ITS ADJACENT CODE LEVER.

TO ADJUST

POSITION FUNCTION BAIL ASSEMBLY WITH MOUNTING SCREWS LOOSENED.



NOTE

THE FOLLOWING ADJUSTMENT SHOULD NOT BE MADE UNLESS THE LOCK BALL CHANNEL HAS BEEN DISASSEMBLED.

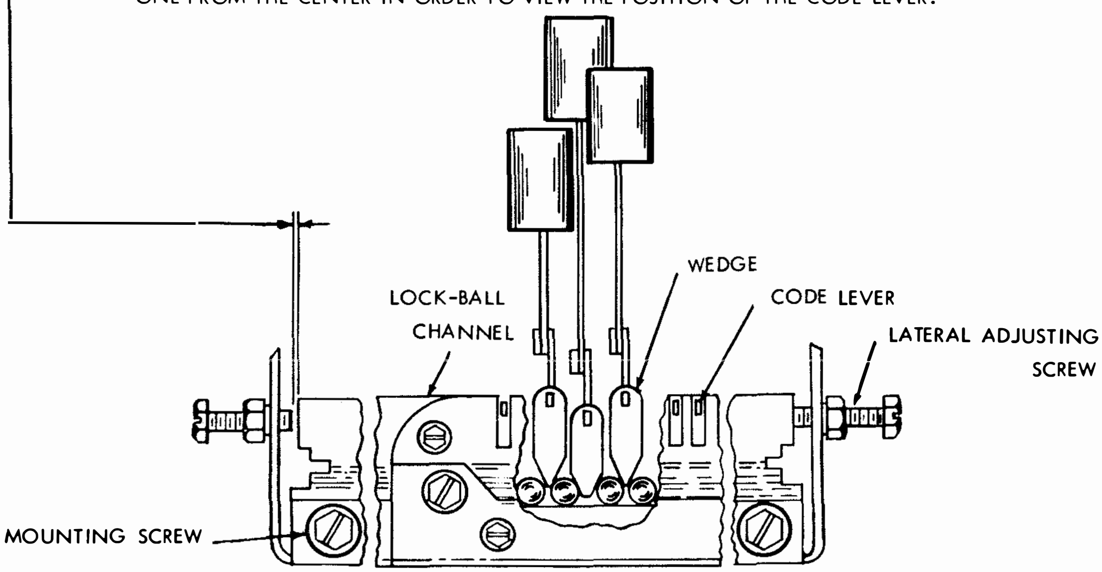
(B) LOCK BALL CHANNEL

REQUIREMENT

THERE SHOULD BE SOME TO 0.006 INCH CLEARANCE BETWEEN END OF LOCK BALL CHANNEL AND ADJUSTING SCREW WHEN MOST OF THE CODE LEVERS ARE CENTRALLY LOCATED IN THE LOCK BALL CHANNEL SLOTS.

TO CHECK

REMOVE THE LOCK BALL RETAINER. REMOVE A WEDGE FROM EACH END AND ONE FROM THE CENTER IN ORDER TO VIEW THE POSITION OF THE CODE LEVER.

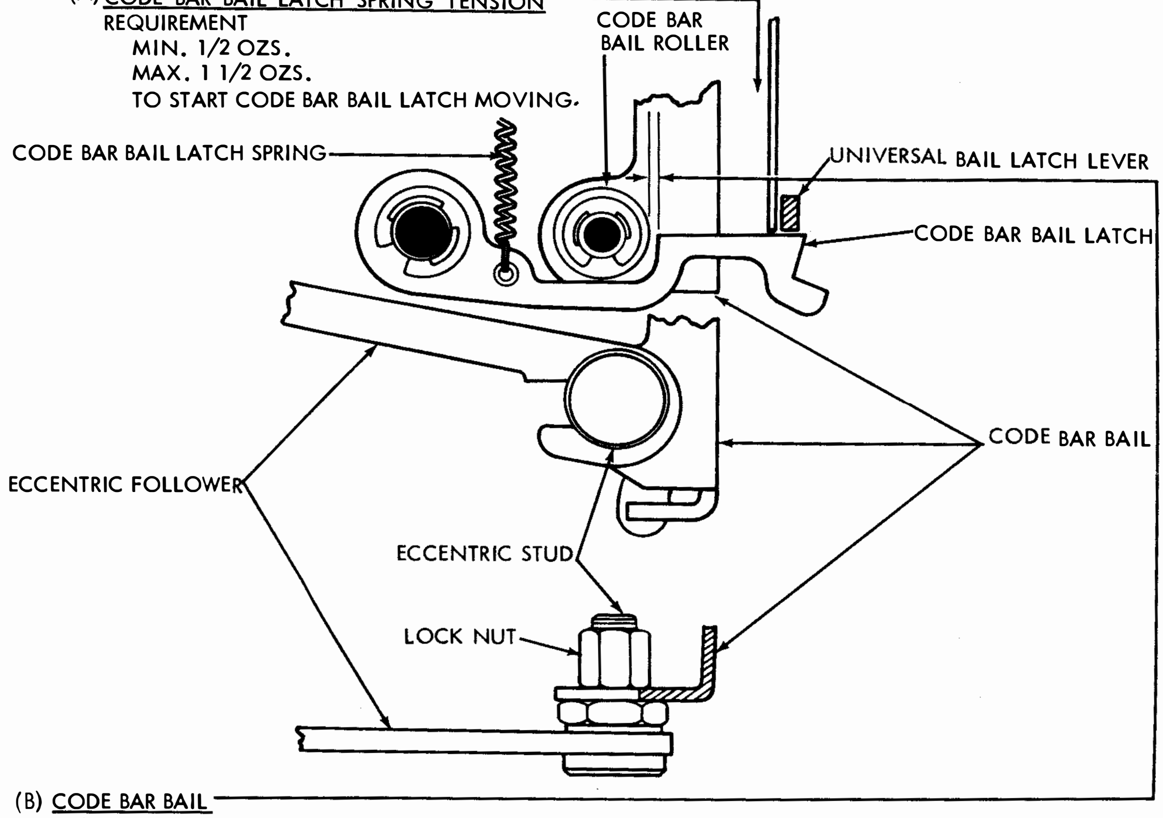


TO ADJUST

LOOSEN THE LOCK BALL CHANNEL MOUNTING SCREWS. BACK OFF LATERAL ADJUSTING SCREWS AND POSITION CHANNEL. TURN ONE ADJUSTING SCREW IN AGAINST THE END OF THE CHANNEL AND LOCK IT. TURN THE OTHER ADJUSTING SCREW IN TO THE END OF THE CHANNEL AND BACK IT OFF 1/4 TURN. LOCK THE SCREW. REPLACE THE WEDGES AND CHECK THEIR POSITION WITH RESPECT TO THE BALLS. PULL CHANNEL ASSEMBLY DOWNWARD UNTIL ALL CODE LEVERS STRIKE THEIR UPSTOP WITHOUT WEDGES JUMPING OUT OF POSITION. REPLACE LOCK-BALL RETAINER. BACK OFF BALL-END-PLAY ADJUSTING SCREW.

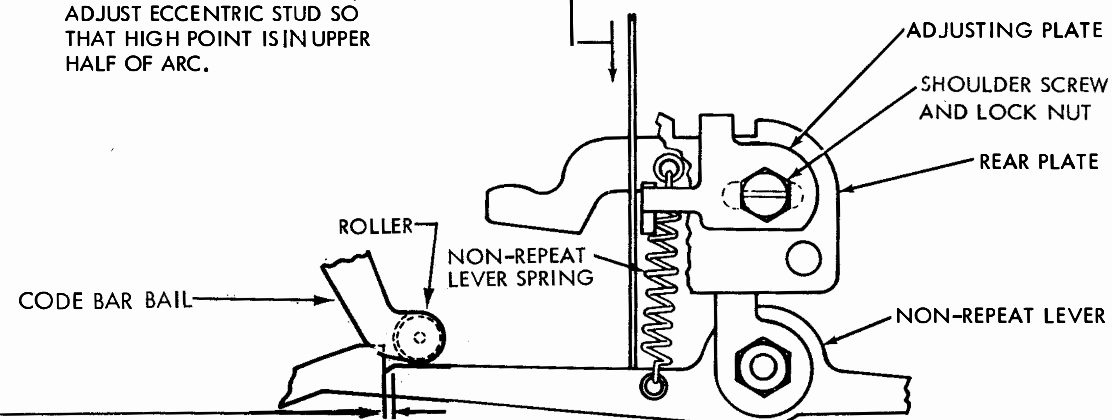
Figure 5-67. Keyboard, Fuction Bail and Lock Ball Track Mechanisms

(A) CODE BAR BAIL LATCH SPRING TENSION
REQUIREMENT
MIN. 1/2 OZS.
MAX. 1 1/2 OZS.
TO START CODE BAR BAIL LATCH MOVING.



(B) CODE BAR BAIL
REQUIREMENT
CAM ECCENTRIC AND ARM WHICH HOLD THE BAIL IN EXTREME RESET POSITION TO THE LEFT.
MIN. SOME
MAX. 0.006 INCH
BETWEEN CODE BAR BAIL ROLLER AND CODE BAR BAIL LATCH
TO ADJUST
WITH LOCK NUT LOOSENED, ADJUST ECCENTRIC STUD SO THAT HIGH POINT IS IN UPPER HALF OF ARC.

(C) NON-REPEAT LEVER SPRING TENSION
REQUIREMENT
ANY KEYLEVER DEPRESSED
MIN. 2 OZS.
MAX. 3-1/4 OZS.
TO START NON-REPEAT LEVER MOVING DOWNWARD.



(D) CODE BAR BAIL AND NON-REPEAT LEVER CLEARANCE
REQUIREMENT
MECHANISM IN INITIAL TRIP-OFF POSITION, ANY KEY DEPRESSED, NO POWER.
MIN. 0.010 INCH
MAX. 0.020 INCH
BETWEEN ROLLER OF CODE BAR BAIL AND NON-REPEAT LEVER PICK-UP STEP.
TO ADJUST
LOOSEN LOCK NUT AND SHOULDER SCREW AND MOVE MECHANISM LEFT OR RIGHT

Figure 5-68. Keyboard, Function Bail, Code Bar Bail, and Non-Repeat Lever Mechanisms

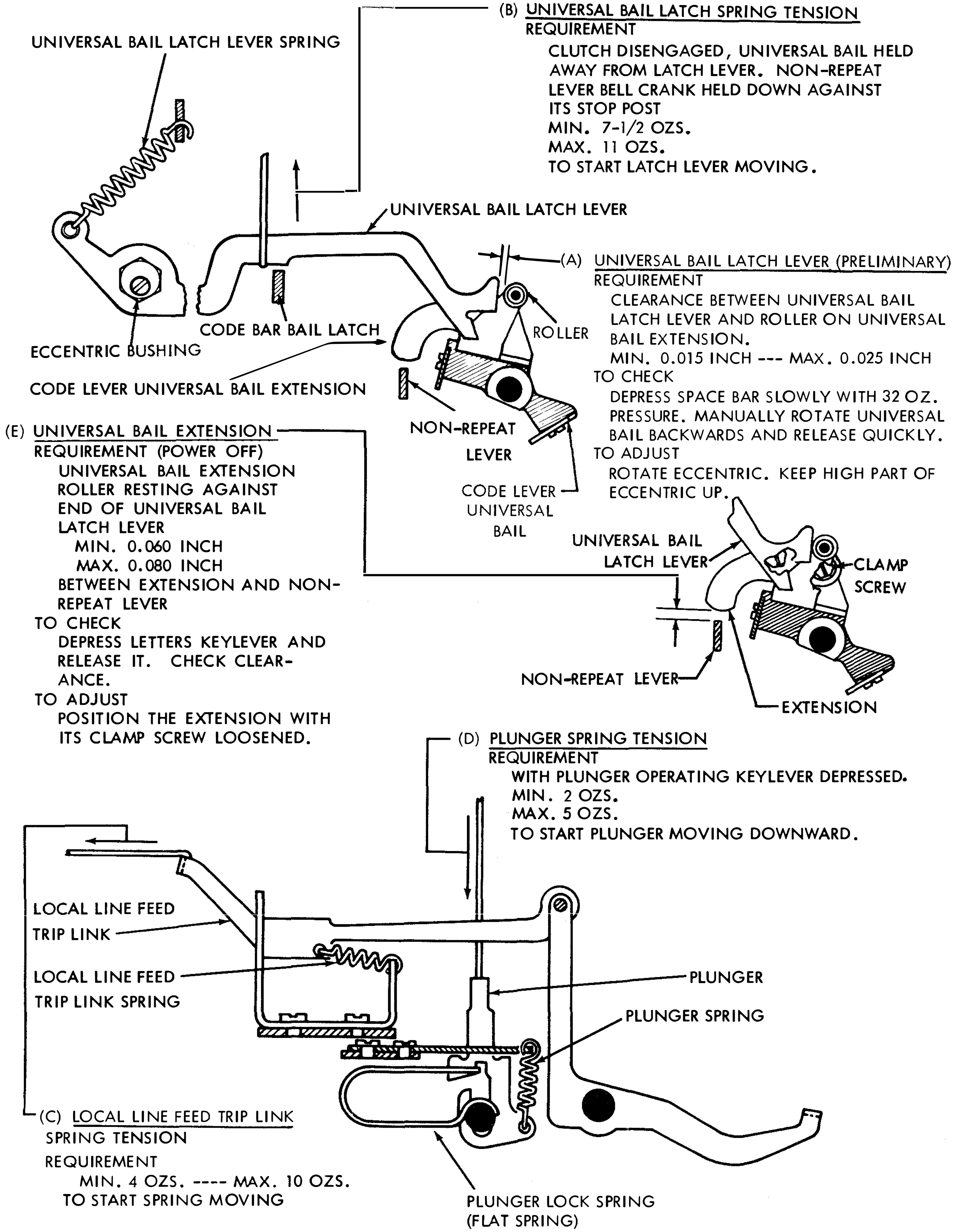


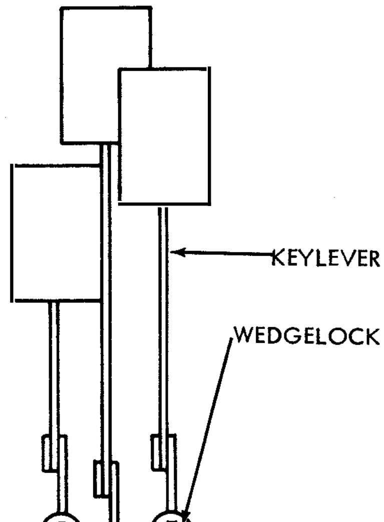
Figure 5-69. Keyboard, Universal Bail Latch Lever and Local Line Feed Trip Link Mechanisms

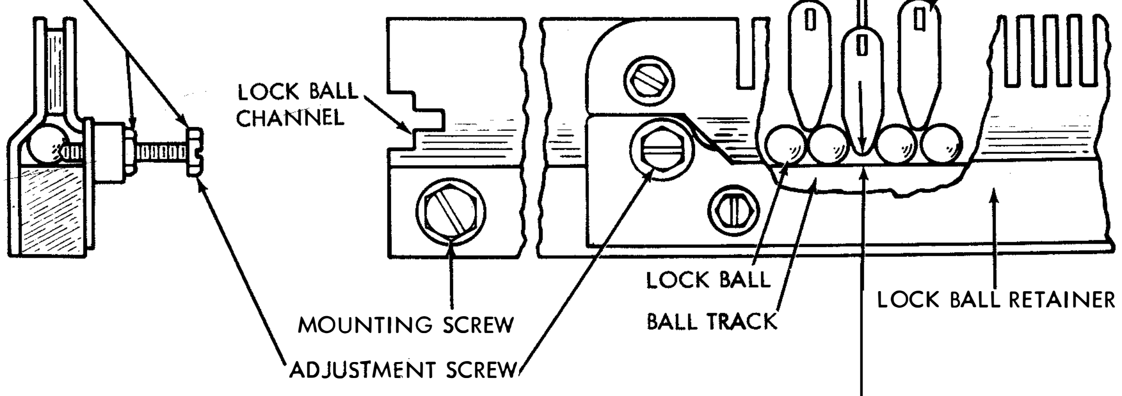
(A) BALL WEDGELOCK CLEARANCE (PRELIMINARY)
REQUIREMENT
CLEARANCE BETWEEN TIP OF WEDGE AND THE TRACK
MIN. 0.005 INCH --- MAX. 0.015 INCH AND EQUAL WITHIN 0.005 INCH.
TO CHECK
DEPRESS "Q" AND "P" KEYLEVER ALTERNATELY WITH 32 OZS. PRESSURE AND MEASURE CLEARANCE IN EACH INSTANCE.
THERE SHOULD BE NO CLEARANCE BETWEEN LOWER EDGE OF CODE LEVER EXTENSIONS AND BOTTOM OF SLOTS IN WEDGES.
TO ADJUST
POSITION BALL TRACK UP OR DOWN WITH THE TWO MOUNTING SCREWS LOOSENED.

NOTE: REMOVE KEYBOARD COVER IN ORDER TO MAKE THIS ADJUSTMENT. SEE DISASSEMBLY AND REASSEMBLY, SECTION 6, PARAGRAPH 4.

(B) BALL END PLAY (PRELIMINARY)
REQUIREMENT
CLEARANCE BETWEEN BALLS SHOULD BE MINIMUM.
TO CHECK
WITH BALL END PLAY ADJUSTMENT SCREW BACKED OFF, DEPRESS "CAR. RET." KEY WITH 32 OZS. PRESSURE.
TO ADJUST
MAINTAIN 32 OZS. PRESSURE AND ROTATE ADJUSTING SCREW WITH FINGERS UNTIL A SLIGHT RESISTANCE IS FELT. TIGHTEN LOCK NUT.

NOTE: A TOTAL OF 43 BALLS ARE REQUIRED IN THE BALL TRACK ASSEMBLY.



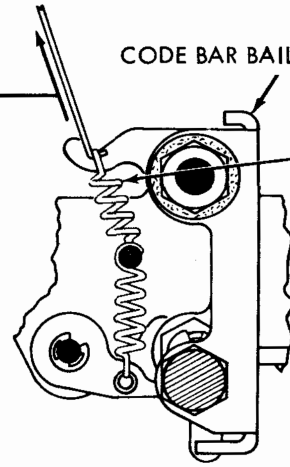


(C) BALL WEDGELOCK, BALL END PLAY, AND UNIVERSAL BAIL LATCH (FINAL)
REQUIREMENT (UNDER POWER)
1. TRIP-OFF PRESSURE OF ANY CENTER ROW KEY SHOULD BE MIN. 2 OZS.---MAX. 5 OZS.
2. APPLY 5-1/2 OZS. PRESSURE PERPENDICULAR TO "A" KEY, DEPRESS EACH KEY IN THIRD ROW. THE "A" KEY SHOULD TRIP EACH TIME A KEY IS RELEASED.
3. REPEAT 2. WITH THE 5-1/2 OZS. PRESSURE ON "CAR. RET." KEY.
4. CLUTCH SHOULD NOT TRIP WHEN TWO KEYS ARE DEPRESSED SIMULTANEOUSLY.
5. APPLY 4-1/4 OZS. TO "SPACE BAR," DEPRESS "CAR. RET." KEY AND LIFT FINGER FROM KEY HORIZONTALLY. THE "SPACE BAR" SHOULD TRIP EACH TIME "CAR. RET." IS RELEASED.

TO ADJUST
IF NECESSARY, REFINE BALL WEDGELOCK CLEARANCE (PRELIMINARY), BALL END PLAY (PRELIMINARY), UNIVERSAL BAIL LATCH LEVER (PRELIMINARY), AND UNIVERSAL BAIL EXTENSION.

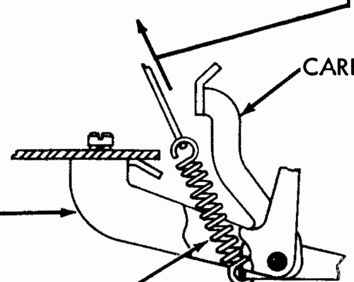
Figure 5-70. Keyboard, Wedgelock and Ball Track Mechanisms

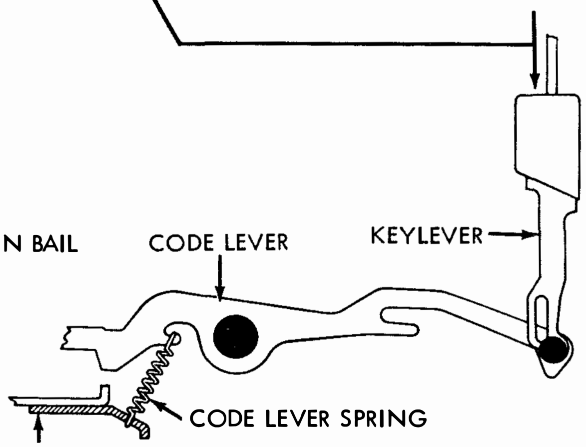
CODE BAR BAIL SPRING TENSION
REQUIREMENT
CLUTCH DISENGAGED, SPRING UNHOOKED FROM ARM.
MIN. 9 OZS. --- MAX. 11 OZS.
TO PULL TO INSTALLED LENGTH.



CODE LEVER SPRING TENSION
(1) REQUIREMENT
MIN. 1 OZ. --- MAX. 2 OZS.
TO START CODE LEVER MOVING DOWNWARD.
(2) REQUIREMENT
POWER ON. GENERATOR CLUTCH DISENGAGED.
MIN. 3 OZS. --- MAX. 5 OZS.
TO OPERATE KEYLEVER OR SPACE BAR.

LOCAL CARRIAGE RETURN BAIL SPRING
(BASE LB10 ONLY)
REQUIREMENT
SPRING UNHOOKED FROM BRACKET.
MIN. 10 OZS.
MAX. 15 OZS.
TO PULL SPRING TO INSTALLED LENGTH.





LOCAL CARRIAGE RETURN FUNCTION BAIL SPRING TENSION
(COMBINED CODE LEVER AND BAIL SPRING)
REQUIREMENT
MIN. 1 OZ. ---- MAX. 3 OZS.
TO MOVE KEYLEVER DOWNWARD.

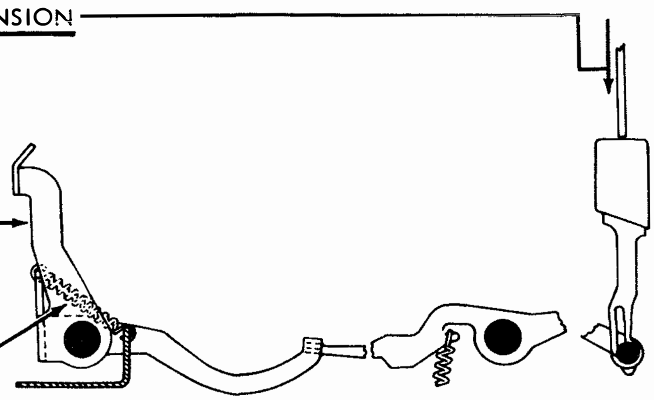


Figure 5-71. Keyboard, Code Bar Bail, Code Lever, and Local Carriage Function Bail Mechanisms

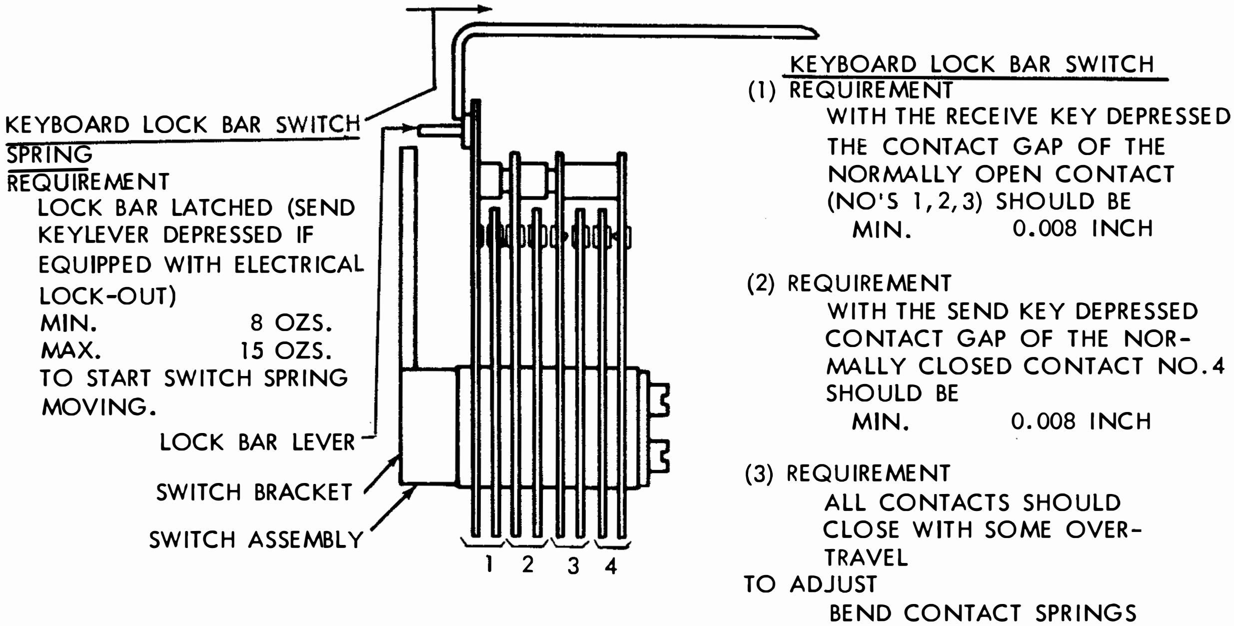


Figure 5-72. Keyboard LAK21, LAK33 and LAK47), Lock Bar Switch

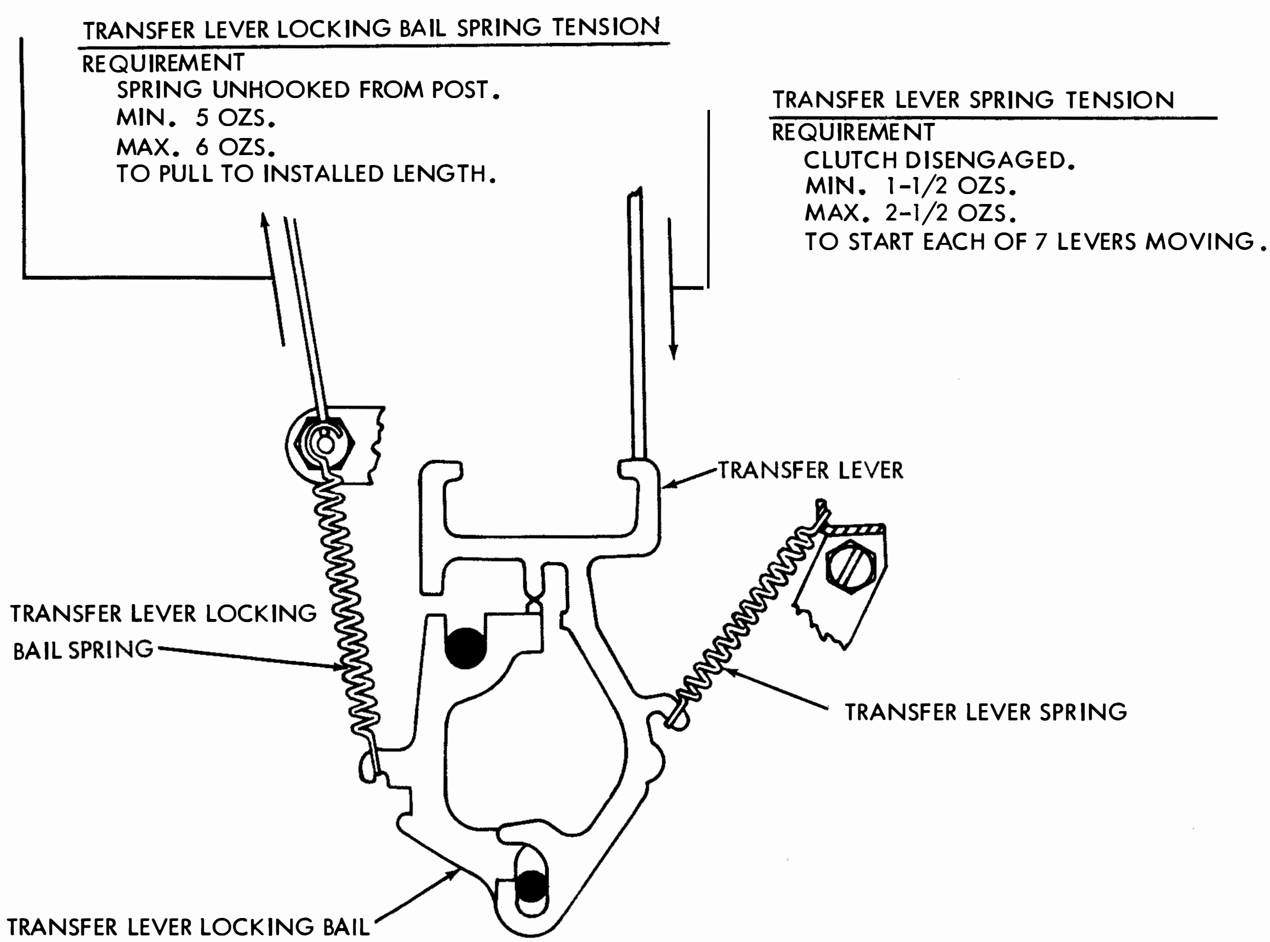
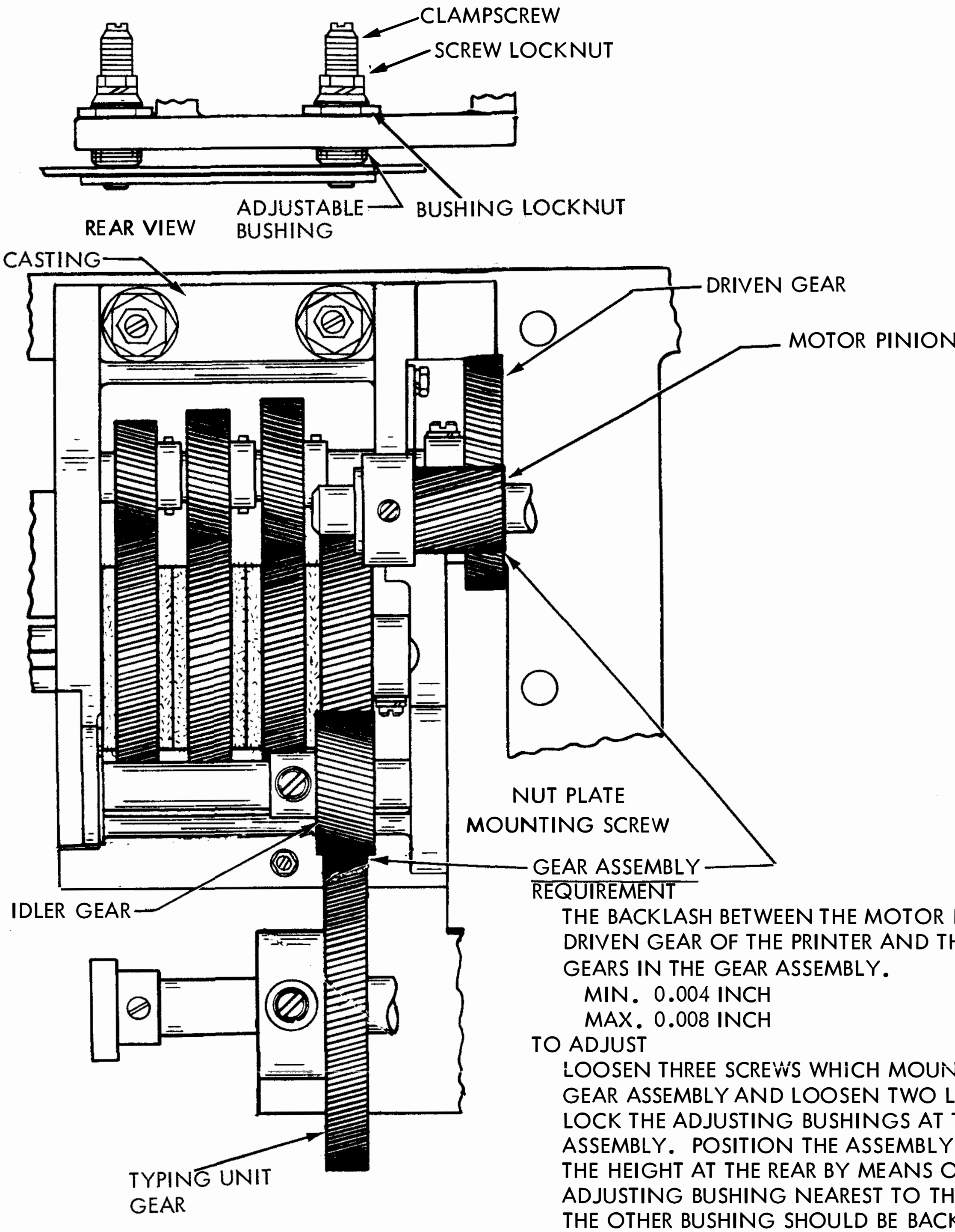


Figure 5-73. Keyboard, Transfer Lever Mechanism



REQUIREMENT

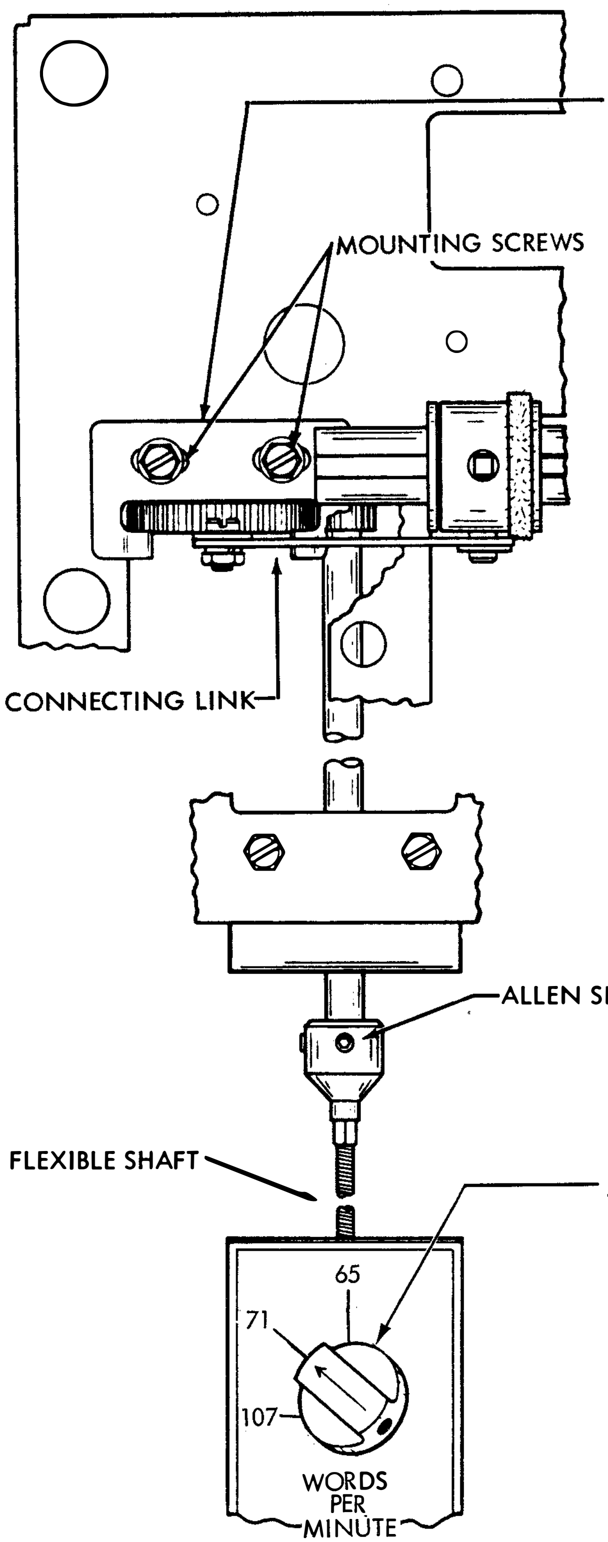
THE BACKLASH BETWEEN THE MOTOR PINION, THE DRIVEN GEAR OF THE PRINTER AND THEIR MATING GEARS IN THE GEAR ASSEMBLY.

MIN. 0.004 INCH
MAX. 0.008 INCH

TO ADJUST

LOOSEN THREE SCREWS WHICH MOUNT THE SPEED SHIFT GEAR ASSEMBLY AND LOOSEN TWO LOCK NUTS WHICH LOCK THE ADJUSTING BUSHINGS AT THE REAR OF THE ASSEMBLY. POSITION THE ASSEMBLY AND ADJUST THE HEIGHT AT THE REAR BY MEANS OF THE ADJUSTING BUSHING NEAREST TO THE MOTOR. THE OTHER BUSHING SHOULD BE BACKED OUT FOR CLEARANCE. AFTER CORRECT ADJUSTMENT HAS BEEN OBTAINED, LOCK THE ADJUSTING BUSHING NUT. TURN THE OTHER BUSHING WITH THE FINGERS UNTIL IT TOUCHES THE BASE AND TIGHTEN THE LOCK NUT. TIGHTEN ALL MOUNTING SCREWS AND RECHECK REQUIREMENTS.

Figure 5-74. Keyboard (LK52BRW)



STOP AND REAR SHAFT MOUNTING BRACKET

(B) REQUIREMENT

(1) SPEED SHIFT KNOB POINTING TO 65 AND 107 WPM MARKS WHEN GEAR IS ADJUSTED TO THESE POSITIONS WITH ANY OVER-TRAVEL APPROXIMATELY EQUAL.

(2) REAR SHAFT MOUNTING BRACKET POSITIONED SO THAT LINK IS PARALLEL TO FLANGED SLEEVE AND BEARING ASSEMBLY.

TO ADJUST

LOOSEN TWO SCREWS WHICH MOUNT STOP AND REAR SHAFT MOUNTING BRACKET. POSITION BRACKET SIDEWAYS FOR REQUIREMENT 1 AND BACKWARD OR FORWARD FOR REQUIREMENT 2.

GEAR SHIFT KNOB

(A) REQUIREMENT

WITH GEAR SHIFT SET AT 71 WPM, POINTER ON KNOB SHOULD POINT TO 71 WPM MARK WITH ANY PLAY BEING EQUAL ON EITHER SIDE OF MARK.

TO ADJUST

LOOSEN TWO ALLEN SET SCREWS WHICH FASTEN FLEXIBLE SHAFT. POSITION FLEXIBLE SHAFT UNTIL REQUIREMENT IS MET.

Figure 5-74A. Keyboard (LK52BRW)

GEAR SHIFT KEY SPRING

TO CHECK

DISCONNECT OPERATING LINKAGE FROM FLANGE SLEEVE BY REMOVING RETAINER RING . MOVE SPRING OUT FROM UNDER GEARS. CAUTION: PULL KEY TO LEFT SLOWLY. WHEN HEAD OF SPRING PIN BEGINS TO EMERGE HOLD IT IN PLACE UNTIL COMPLETELY OUT. OTHERWISE PIN AND SPRING WILL FLY WITH DANGER OF LOSS.

REQUIREMENT

MIN. 25 OZS. --- MAX. 40 OZS. TO DEPRESS KEY TO LOWERMOST POSITION.

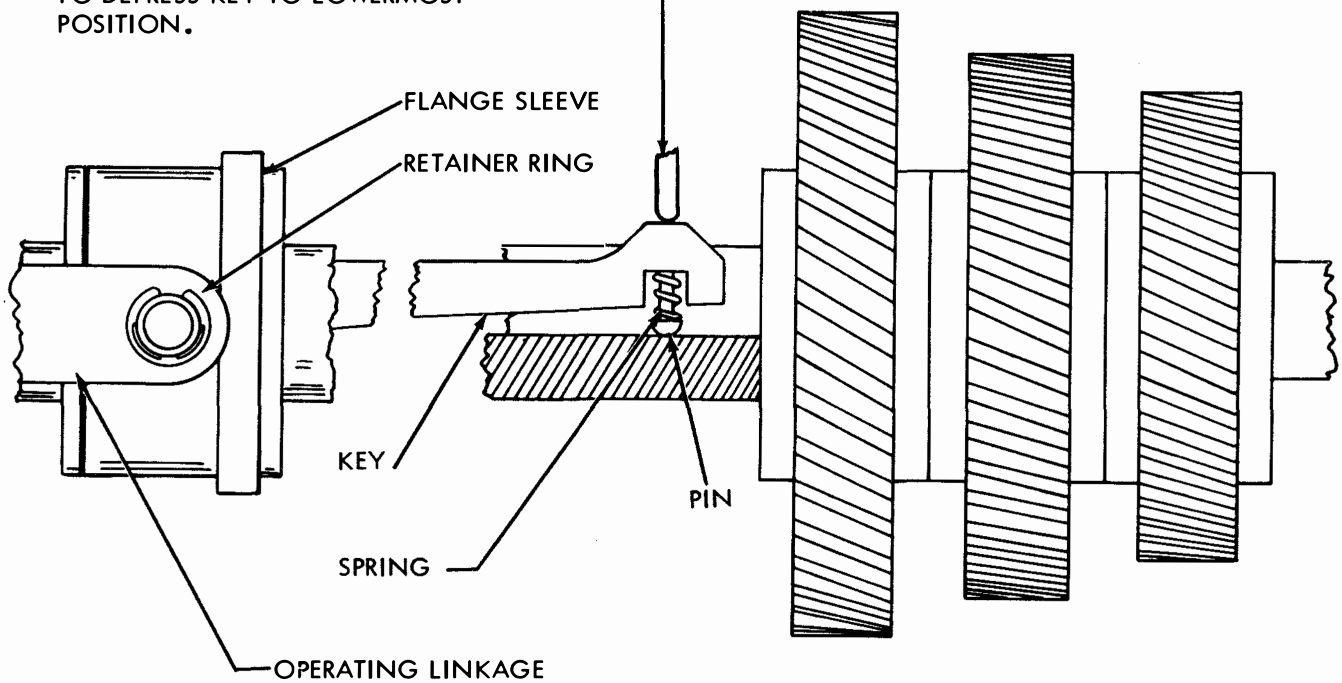
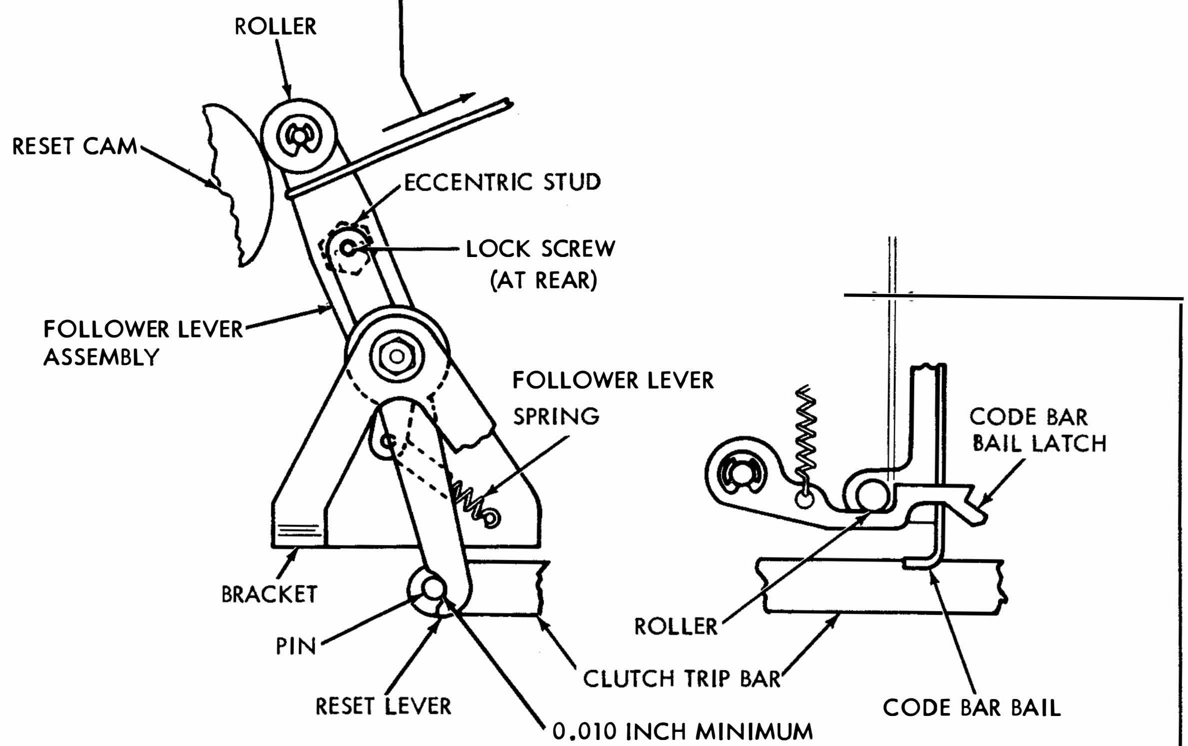


Figure 5-74B. Keyboard (LK52BRW)

FOLLOWER LEVER SPRING
REQUIREMENT
PERFORATOR CLUTCH DISENGAGED
MIN. 12 OZS.
MAX. 18 OZS.
TO START ROLLER AWAY FROM RESET CAM.



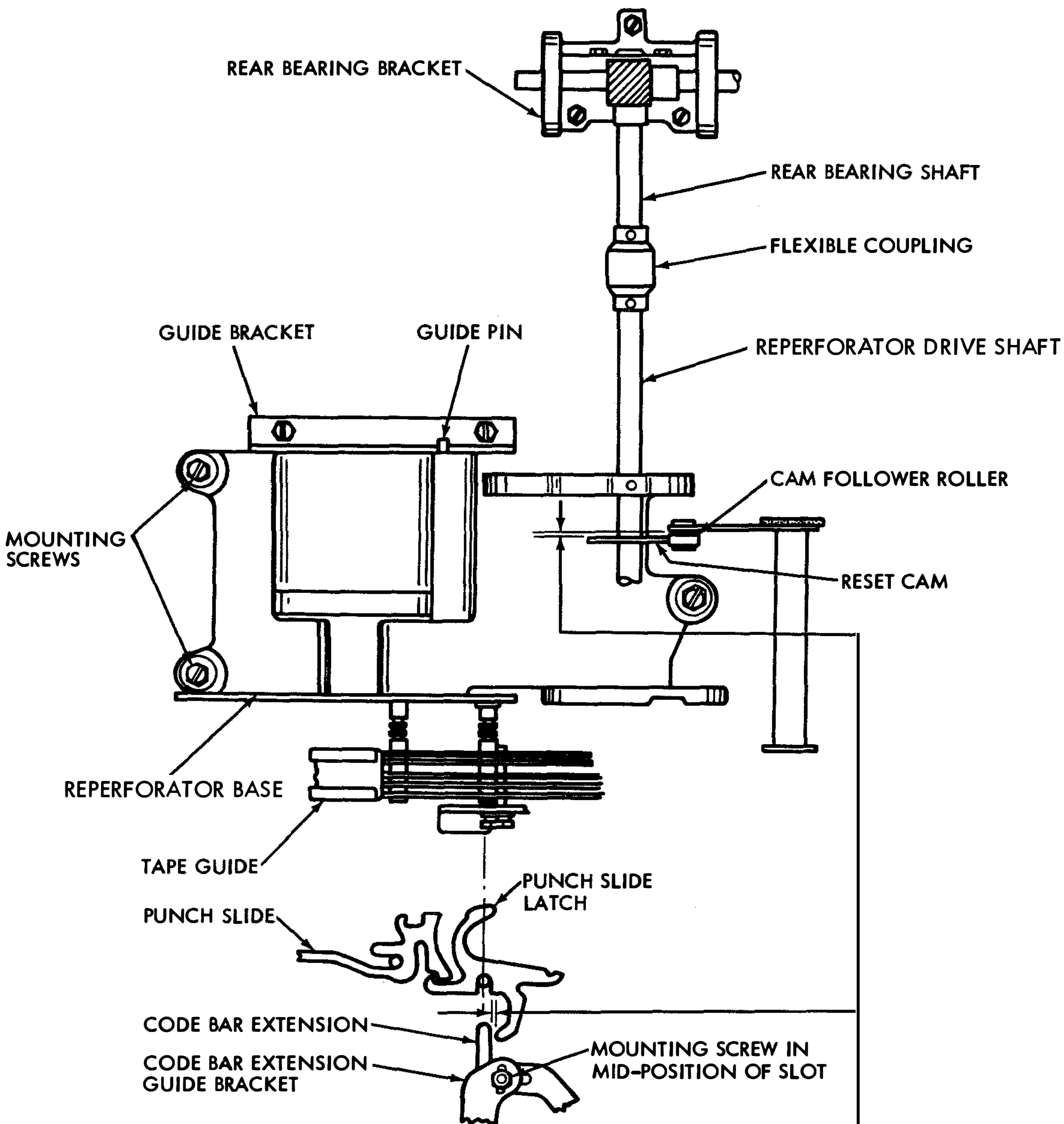
CODE BAR BAIL
REQUIREMENT
CONTROL KNOB IN T POSITION. CODE BAR BAIL AT EXTREME LEFT. CLEARANCE
MIN. SOME
MAX. 0.006 INCH
BETWEEN CODE BAR BAIL LATCH LEVER AND ROLLER.

TO ADJUST
POSITION ECCENTRIC STUD WITH LOCK SCREW LOOSENED TO MEET REQUIREMENT.
RECHECK AFTER TIGHTENING LOCK SCREW.

NOTE

WITH ALL CLUTCHES LATCHED, DEPRESS LTRS KEY. AFTER CODE BARS HAVE FALLEN TO RIGHT, THERE MUST BE SOME CLEARANCE BETWEEN RESET LEVER AND PIN ON CLUTCH TRIP BAR AS MEASURED BETWEEN RESET CAM AND ROLLER. IF GAP CANNOT BE OBTAINED, REPOSITION REPERFORATOR TO RIGHT OR LEFT AND READJUST.

Figure 5-75. Keyboard (LAK21, LAK33 and LAK47), Code Bar Bail and Cam Follower Mechanisms



REPERFORATOR ALIGNMENT

(1) REQUIREMENT

PUNCH SLIDE LATCHES SHOULD ALIGN WITH CODE BAR EXTENSIONS MIN. 0.010 -- MAX. 0.020 INCH TO RIGHT OF CODE BAR EXTENSION.

(2) REQUIREMENT

RESET CAM SHOULD ALIGN WITH ITS CAM FOLLOWER ROLLER APPROXIMATELY 0.030 INCH FORWARD OF THE REAR EDGE OF THE ROLLER.

TO ADJUST

LOOSEN SET SCREWS AND DISENGAGE FLEXIBLE COUPLINGS. LOOSEN TWO ALIGNMENT BRACKET SCREWS AND THREE REPERFORATOR MOUNTING SCREWS. SET EXTENSION GUIDE PIN IN MIDDLE OF GUIDE BRACKET SLOT AND ALIGN REPERFORATOR AND RESET CAM. TIGHTEN REPERFORATOR MOUNTING SCREWS. POSITION ALIGNMENT BRACKET SO THAT IT CONTACTS REPERFORATOR CASTING FOR ITS FULL LENGTH, AND TIGHTEN SCREWS. POSITION REAR BEARING BRACKET UNTIL REPERFORATOR DRIVE SHAFT LINES UP WITH BEARING BRACKET SHAFT, AND TIGHTEN SCREWS. ENGAGE FLEXIBLE COUPLING. IF NECESSARY, REFINE LINE UP OF PUNCH SLIDE LATCHES AND CODE BAR EXTENSIONS BY ADJUSTING THE CODE BAR EXTENSION GUIDE BRACKET IN ITS MOUNTING HOLES.

Figure 5-76. Keyboard (LAK21, LAK33 and LAK47), Reperforator Shaft Alignment (ASR)

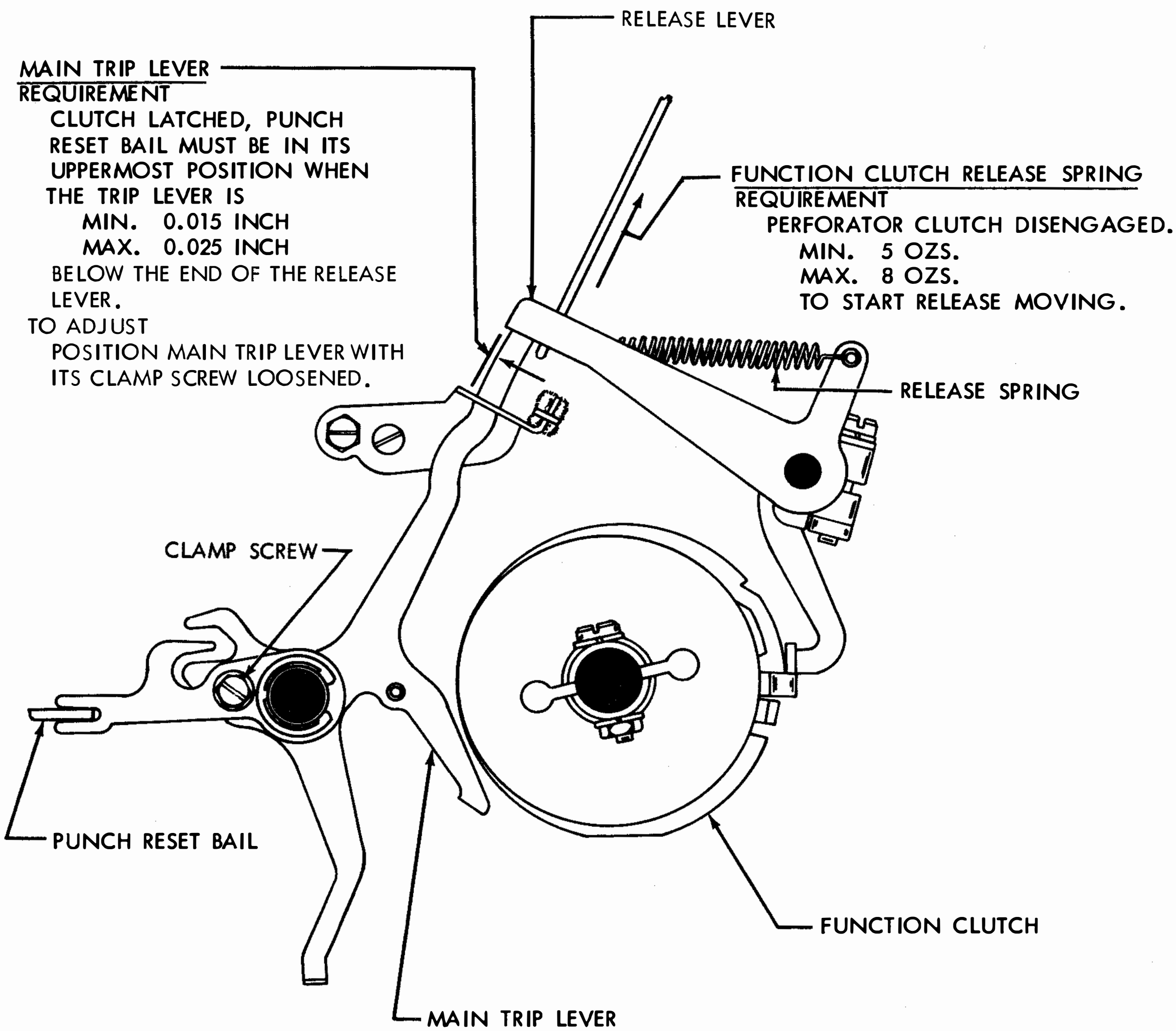
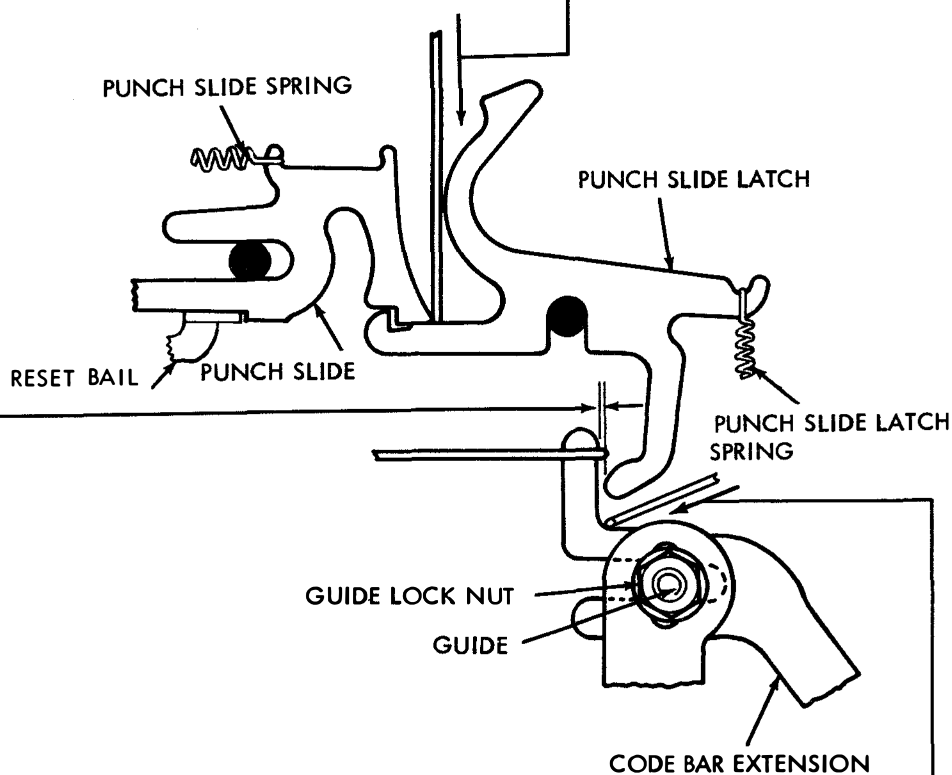


Figure 5-77. Keyboard (LAK21, LAK33 and LAK47), Typing Reperforator Trip Lever Mechanism

CODE BAR EXTENSION AND PUNCH SLIDE LATCH
REQUIREMENTS
(1) SELECTOR SWITCH KNOB IN T POSITION. BLANK KEYLEVER DEPRESSED. PUNCH SLIDES LATCHED. CLEARANCE SHOULD BE
MIN. SOME ---- MAX. 0.010 INCH
BETWEEN CODE BAR EXTENSIONS AND CLOSEST PUNCH SLIDE LATCH.
(2) LTRS KEYLEVER DEPRESSED, CODE BAR EXTENSIONS SHOULD ROTATE PUNCH SLIDE LATCHES TO RELEASE ALL PUNCH SLIDES.
TO ADJUST
POSITION GUIDE VERTICALLY WITH GUIDE LOCK NUT LOOSENED TO OBTAIN REQUIRED CLEARANCE. TIGHTEN LOCK NUT

PUNCH SLIDE LATCH SPRING
REQUIREMENT
MIN. 1 OZ.
MAX. 3 OZS.
TO START LATCH MOVING.



CODE BAR EXTENSION SPRING
REQUIREMENT
MIN. 5 OZS.
MAX. 7 OZS.
TO START EACH EXTENSION MOVING.

Figure 5-78. Keyboard (LAK21, LAK33 and LAK47), and Typing Reperforator, Code Bar Extension and Punch Latch Mechanism

REPERFORATOR CLUTCH RELEASE TRIP

REQUIREMENT

REPERFORATOR CLUTCH SHOULD TRIP CONSISTENTLY IN K-T POSITION WHEN BLANK AND REPEAT KEYLEVERS ARE DEPRESSED SIMULTANEOUSLY. WHEN THE SELECTOR SWITCH KNOB IS TURNED FROM K TO K-T POSITION, THE REPERFORATOR CLUTCH SHOULD TRIP WHEN THE FIRST KEYLEVER IS DEPRESSED.
CLEARANCE BETWEEN MAIN TRIP LEVER AND CLUTCH RELEASE
MIN. 0.015 INCH
MAX. 0.025 INCH

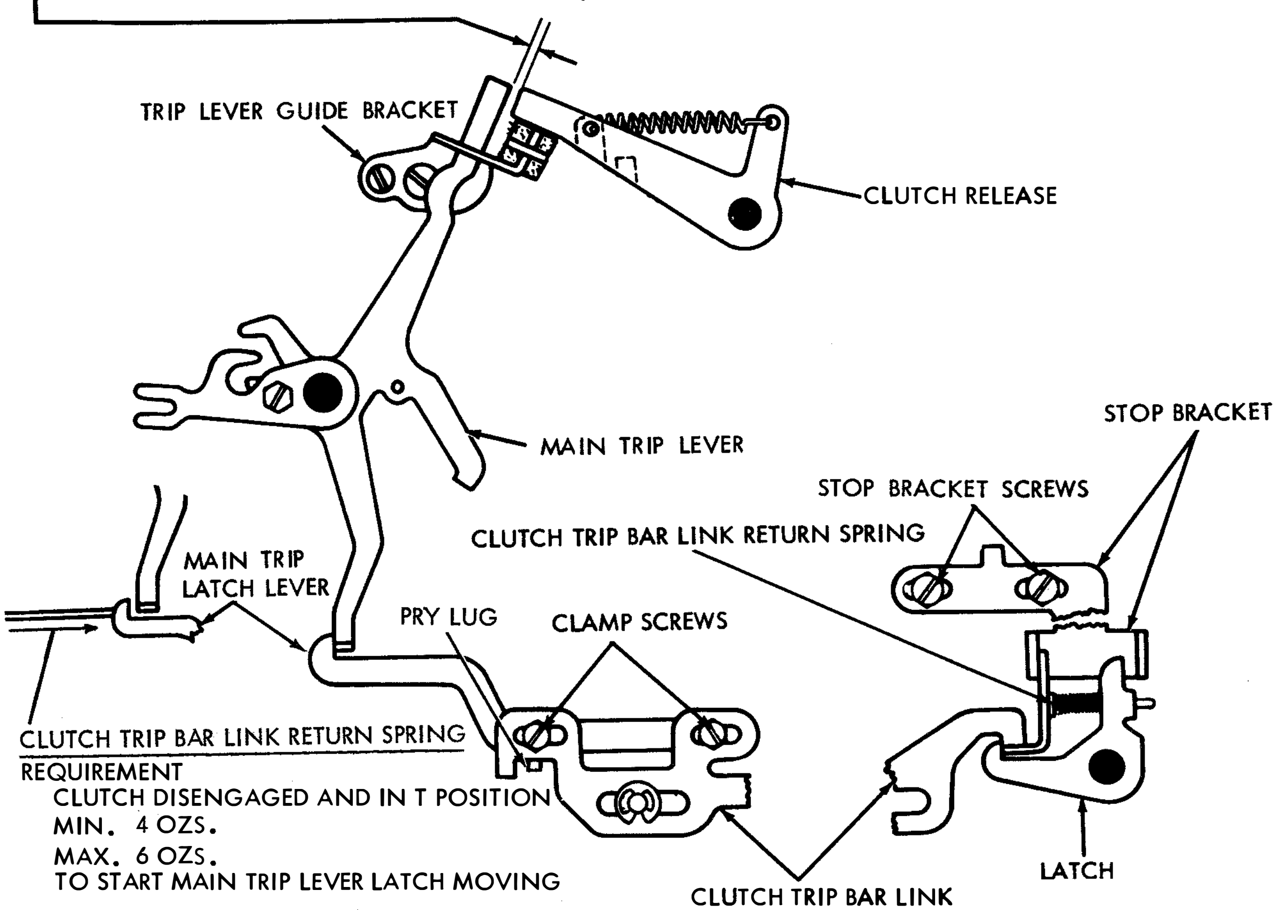
TO ADJUST

PLACE SELECTOR SWITCH KNOB IN T POSITION. LOOSEN MAIN TRIP LEVER LATCH CLAMP SCREWS AND MOVE LATCH TO EXTREME LEFT. WITH CODE BARS TO THE RIGHT, STRIKE BLANK KEYLEVER AND MOVE STOP BRACKET TO RIGHT UNTIL IT DISENGAGES LATCH. MOVE CLUTCH TRIP BAR EXTENSION TO RIGHT UNTIL IT LATCHES. POSITION MAIN TRIP LEVER LATCH TO RIGHT TO OBTAIN REQUIRED CLEARANCE. TIGHTEN SCREWS.

TO CHECK

WITH THE STOP BRACKET SCREWS FRICTION TIGHT, MOVE THE STOP BRACKET SLOWLY TO THE LEFT UNTIL THE LATCH JUST TRIPS. TURN ON MOTOR. DEPRESS BLANK AND REPEAT KEYLEVERS SIMULTANEOUSLY. IF OPERATION IS SATISFACTORY, TURN TO K POSITION AND BACK TO K-T POSITION. DEPRESS A KEYLEVER. REPERFORATOR CLUTCH SHOULD TRIP. IF IT DOES NOT, MOVE STOP BRACKET SLIGHTLY TO THE RIGHT AND REPEAT THE ABOVE ADJUSTMENT.

NOTE: CHECK FOR CLEARANCE BETWEEN RESET BAIL AND SLIDES WHEN THE RESET LEVER IS TRIPPED. REFINE ADJUSTMENT IF NECESSARY TO OBTAIN OPERATIONAL CLEARANCE.



CLUTCH TRIP BAR LINK RETURN SPRING

REQUIREMENT

CLUTCH DISENGAGED AND IN T POSITION
MIN. 4 OZS.
MAX. 6 OZS.
TO START MAIN TRIP LEVER LATCH MOVING

Figure 5-79. Keyboard (LAK21, LAK33 and LAK47), Typing Reperforator Clutch Release Mechanism

CODE BAR EXTENSION BLOCKING ASSEMBLY

REQUIREMENT

SELECTOR SWITCH KNOB IN K POSITION. CODE BAR EXTENSIONS AND CHARACTER COUNTER BARS SHOULD NOT OPERATE.

(1) CLEARANCE BETWEEN RIGHT END AT CODE BAR EXTENSIONS AND CODE BARS.
MIN. SOME
MAX. 0.015 INCH

(2) CLEARANCE BETWEEN BLOCKING LEVER AND SIDE OF NOTCH IN CHARACTER COUNTER CODE BARS.
MIN. SOME
MAX. 0.010 INCH

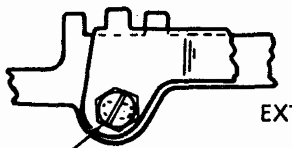
TO ADJUST

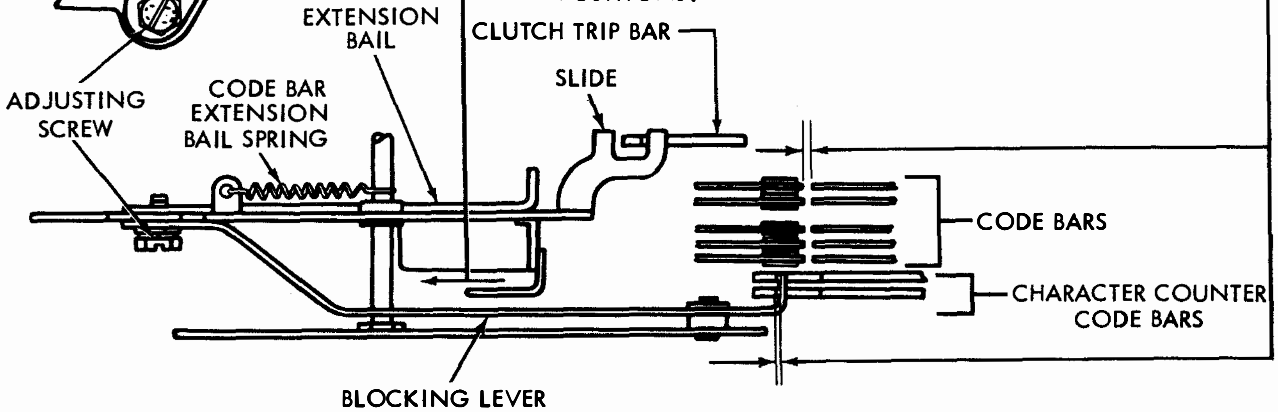
WITH CLUTCH LATCHED, TURN SELECTOR SWITCH KNOB TO THE K POSITION. STRIKE LTRS KEYLEVER AND ROTATE SIGNAL GENERATOR SHAFT TO RETURN CODE BARS TO EXTREME LEFT. WITH ADJUSTING SCREW FRICTION TIGHT, POSITION EXTENSION BAIL TO OBTAIN REQUIREMENT (1) AND POSITION BLOCKING LEVER TO OBTAIN REQUIREMENT (2). MAKE CERTAIN THAT THE CODE BAR EXTENSION BAIL IS FREE ON ITS GUIDE POST. TEST OPERATION IN K, K-T AND T POSITIONS.

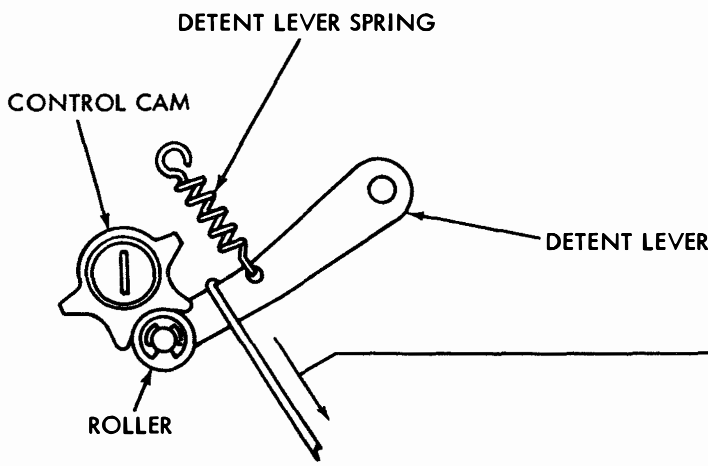
CODE BAR EXTENSION BAIL SPRING

REQUIREMENT

SELECTOR SWITCH KNOB IN T POSITION
MIN. 7 OZS.
TO START EXTENSION BAIL MOVING.





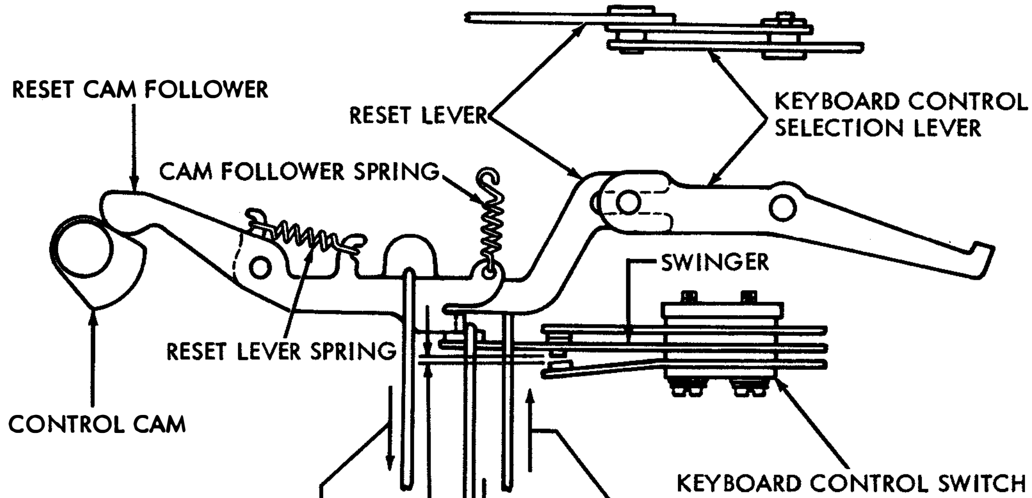


DETENT LEVER SPRING

REQUIREMENT

MIN. 4 LBS.
MAX. 5 LBS.
TO START LEVER MOVING.

Figure 5-80. Keyboard (LAK21, LAK33 and LAK47), Code Bar Extension and Detent Lever Mechanisms



CAM FOLLOWER SPRING
REQUIREMENT
MIN. 3 OZS.
MAX. 5 OZS.
TO START CAM FOLLOWER MOVING.

KEYBOARD CONTROL SWITCH
REQUIREMENT
IN T OR K-T POSITIONS, GAP BETWEEN CONTACTS
MIN. 0.015 INCH
TO ADJUST
BEND CONTACT SPRING. ALL CONTACTS SHOULD CLOSE WITH SOME OVERTRAVEL.

RESET LEVER SPRING
REQUIREMENT
SELECTOR SWITCH KNOB IN T POSITION
MIN. 10 OZS.
MAX. 14 OZS.
TO START LEVER MOVING.

KEYBOARD CONTROL SWITCH SPRING
REQUIREMENT
SELECTOR SWITCH KNOB IN T POSITION
MIN. 1 OZ.
MAX. 2 OZS.
TO SEPARATE CONTACTS

Figure 5-81. Keyboard (LAK21, LAK33 and LAK47), Reset Cam Follower and Control Switch Mechanisms

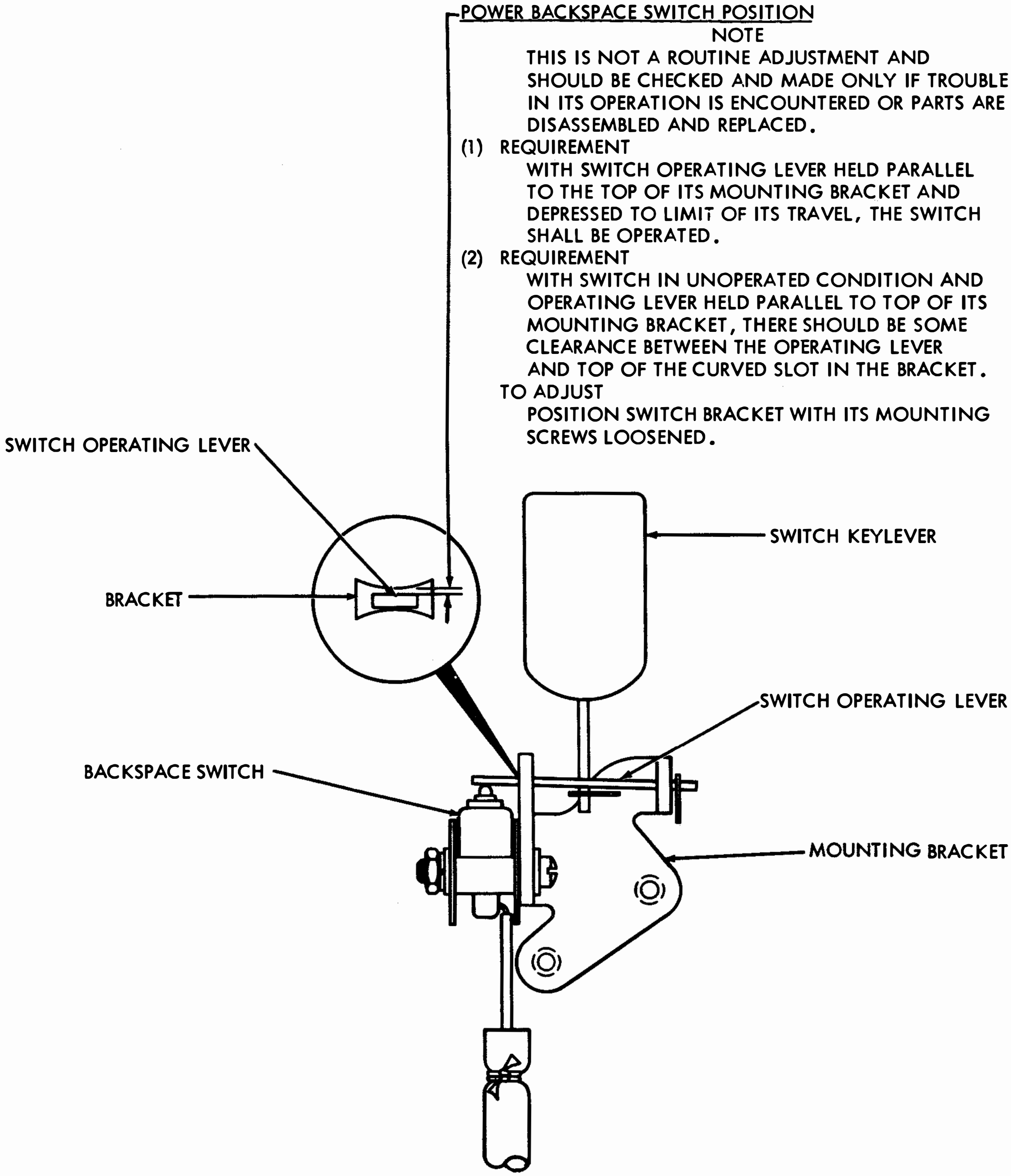


Figure 5-81A. Keyboard (LAK33 and LAK47), Tape Backspace Switch

g. TYPING REPERFORATORS LPR35, LPR36 AND LPR57

THE FOLLOWING ADJUSTMENTS (FIGURES 5-82 THROUGH 5-119A) ARE COMMON TO ALL TYPING REPERFORATORS UNLESS IDENTIFIED OTHERWISE.

TO FACILITATE ADJUSTMENTS, REMOVE TYPING REPERFORATOR FROM ITS BASE AS INSTRUCTED IN SECTION 6, PARAGRAPH 4.

NOTE

ADJUST THE SELECTOR MECHANISM AS DESCRIBED IN CONNECTION WITH THE TYPING UNIT, FIGURES 5-1 THROUGH 5-7 AND THE CLUTCH MECHANISM ADJUSTMENTS ACCORDING TO FIGURE 5-19.

CLUTCH SHOE LEVER

NOTE:
THIS ADJUSTMENT SHOULD BE MADE FOR BOTH SELECTING AND FUNCTION CLUTCHES.

TO CHECK
(1) DISENGAGE CLUTCH. MEASURE CLEARANCE.
(2) ALIGN HEAD OF CLUTCH DRUM MOUNTING SCREW WITH STOP LUG. ENGAGE CLUTCH. MANUALLY PRESS SHOE LEVER AND STOP LUG TOGETHER AND ALLOW TO SNAP APART. MEASURE CLEARANCE.

REQUIREMENT
CLEARANCE BETWEEN SHOE LEVER AND STOP LUG:
MIN. 0.055 INCH----MAX. 0.085 INCH
GREATER WHEN CLUTCH ENGAGED (2) THAN WHEN DISENGAGED (1).

TO ADJUST
ENGAGE WRENCH OR SCREWDRIVER WITH LUG ON ADJUSTING DISK. ROTATE DISK WITH CLAMP SCREWS LOOSENED.

NOTE:
AFTER MAKING ADJUSTMENT, DISENGAGE CLUTCH. REMOVE DRUM MOUNTING SCREW. ROTATE DRUM IN NORMAL DIRECTION AND CHECK TO SEE IF IT DRAGS ON SHOE. IF IT DOES REFINE ADJUSTMENT.

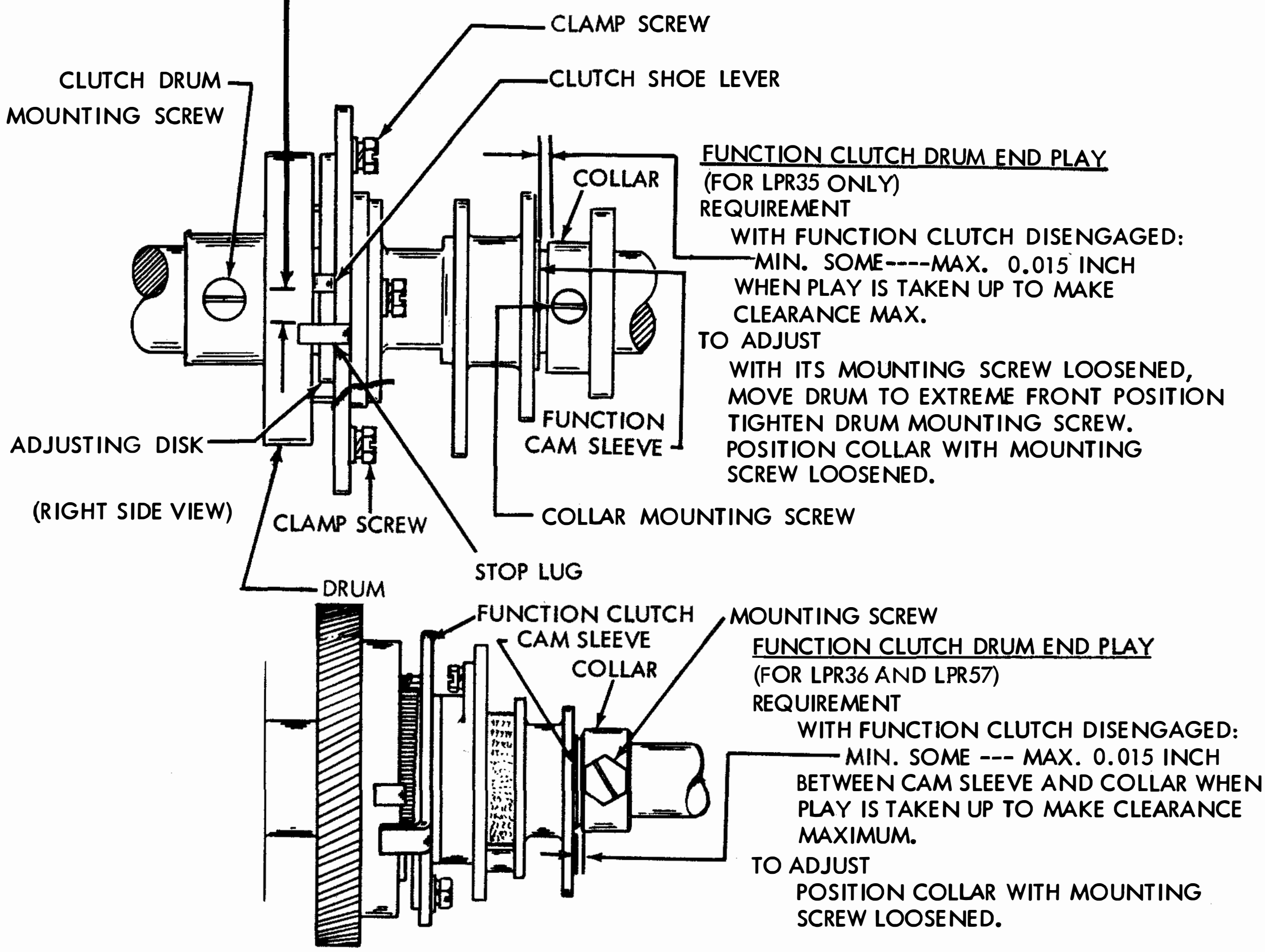
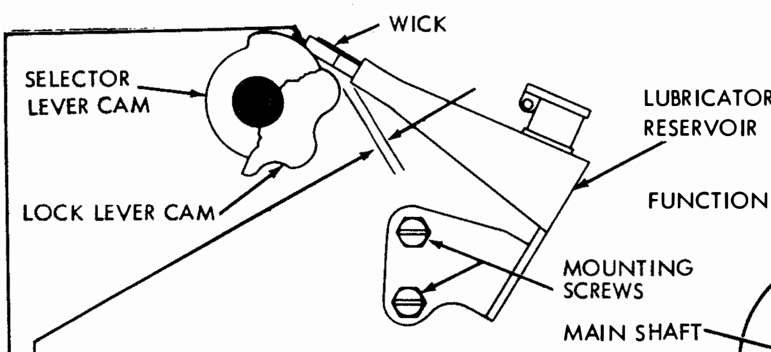


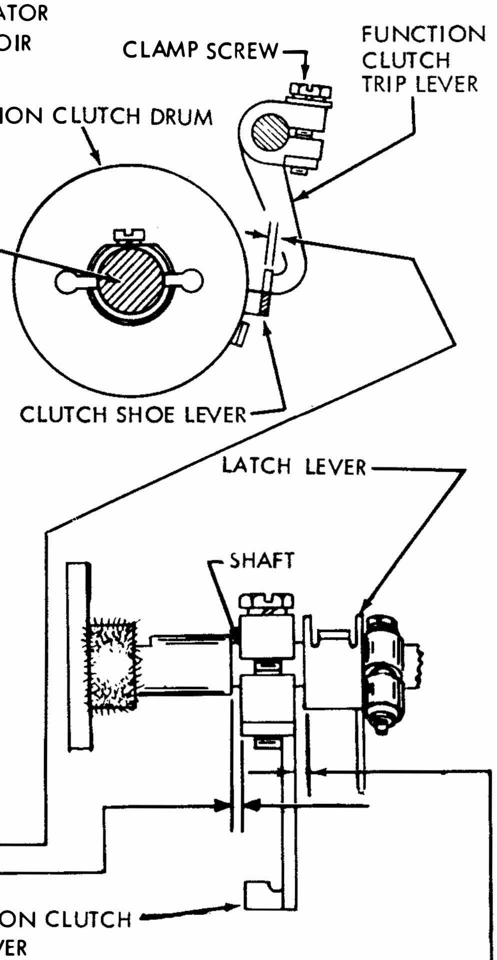
Figure 5-82. Typing Reperforator, Selecting and Function Cam-Clutches



(A)
SELECTOR CAM LUBRICATOR

REQUIREMENT
LUBRICATOR TUBE SHOULD CLEAR HIGH PART OF LOCK LEVER CAM:
MIN. 0.020 INCH
HIGH PART OF SELECTOR LEVER CAMS SHOULD TOUCH LUBRICATOR WICK, BUT SHOULD NOT RAISE IT MORE THAN 1/32 INCH.
THERE SHOULD BE SOME CLEARANCE BETWEEN MARKING LOCK LEVER SPRING AND RESERVOIR.

TO ADJUST
POSITION LUBRICATOR WITH MOUNTING SCREWS LOOSENED.



(B)
FUNCTION CLUTCH TRIP LEVER

REQUIREMENT
(1) WITH RELEASE RESTING ON MAIN TRIP LEVER (SEE BELOW), FUNCTION CLUTCH TRIP LEVER SHOULD ENGAGE FULL THICKNESS OF SHOE LEVER.
(2) MIN. SOME --- MAX. 0.010 INCH END PLAY IN TRIP LEVER.

TO ADJUST
POSITION TRIP LEVER ON ITS SHAFT WITH CLAMP SCREW LOOSENED.

(C)
RESET ARM

TO CHECK
TRIP FUNCTION CLUTCH AND POSITION MAIN SHAFT SO THAT RESET ARM IS HELD IN ITS HIGHEST POSITION BY CAM PIN.

REQUIREMENT
(1) CLEARANCE BETWEEN RELEASE AND MAIN TRIP LEVER:
MIN. 0.005 INCH --- MAX. 0.030 INCH
(2) LATCH LEVER END PLAY:
MIN. SOME --- MAX. 0.010 INCH
(3) CLEARANCE BETWEEN RELEASE LEVER AND FUNCTION CAM:
MIN. SOME

TO ADJUST
POSITION RESET ARM WITH CLAMP SCREW LOOSENED.

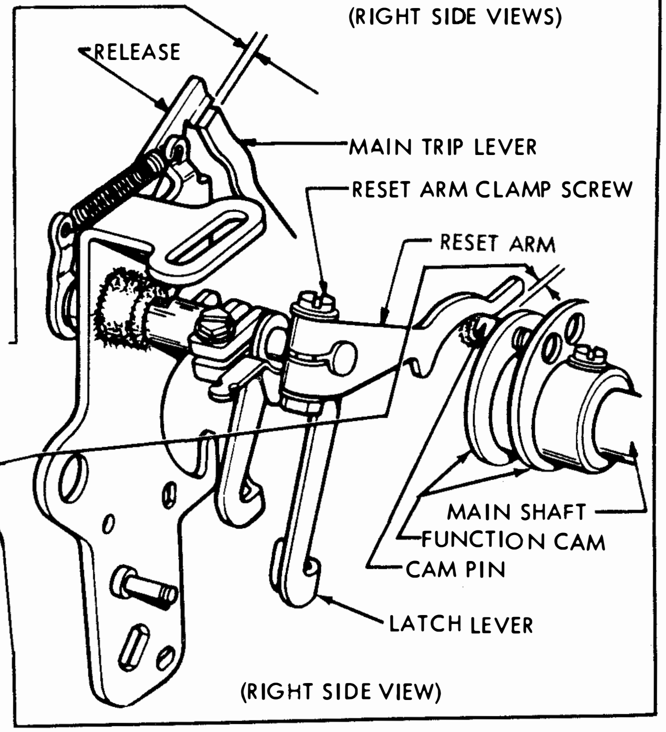


Figure 5-83. Typing Reperforator, Selecting and Function Mechanisms

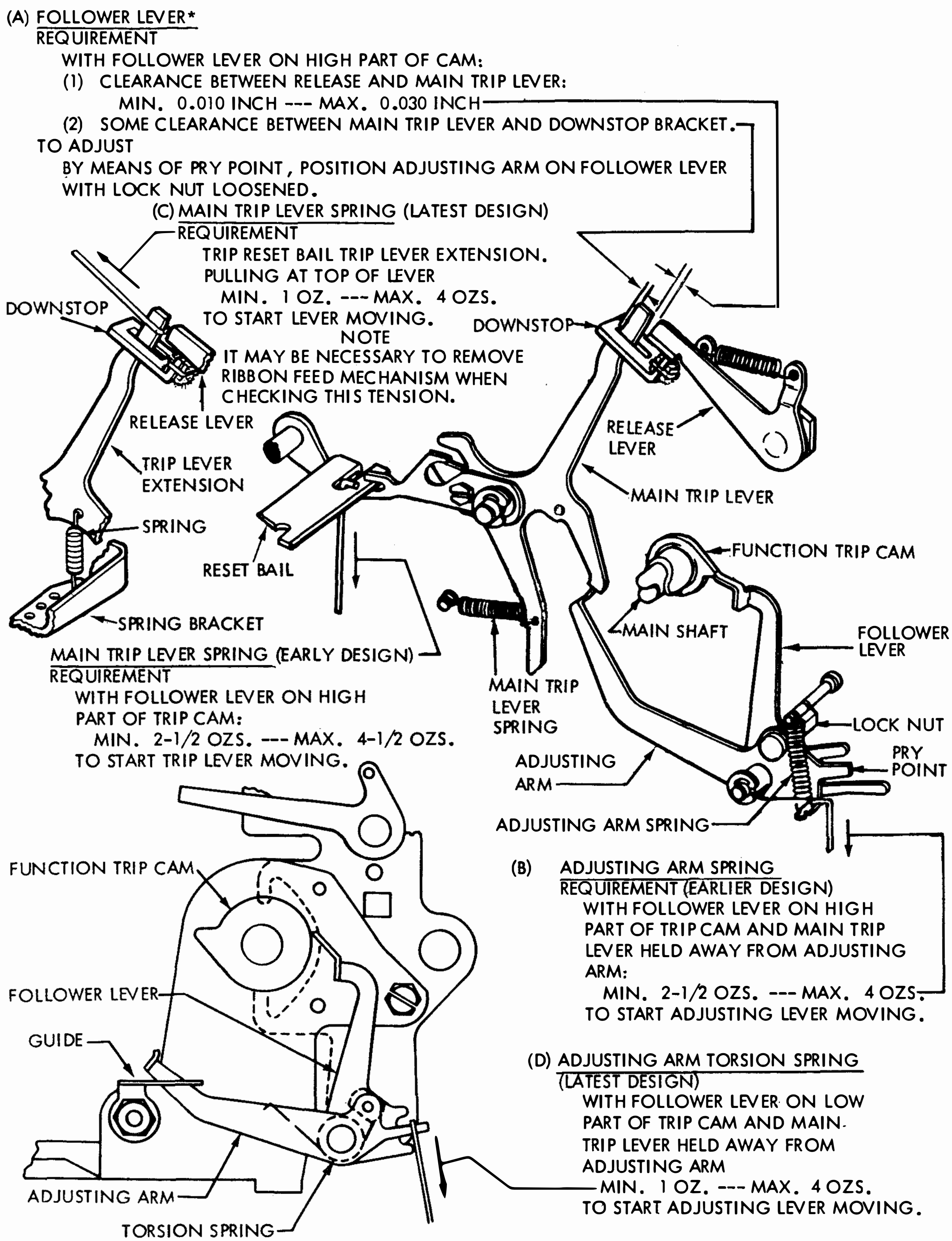
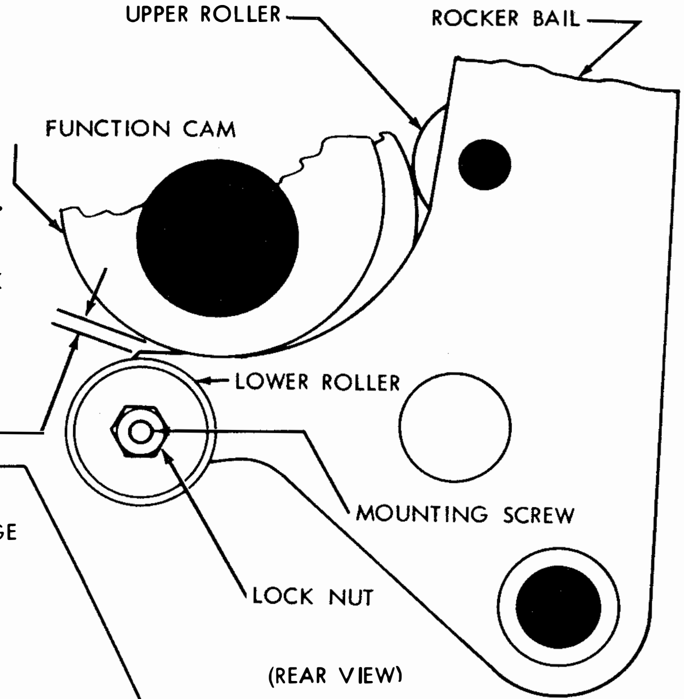
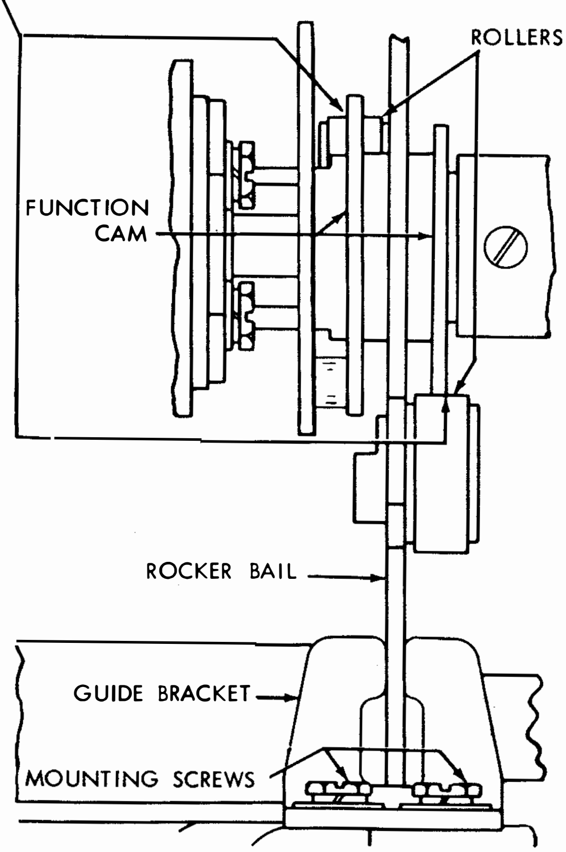


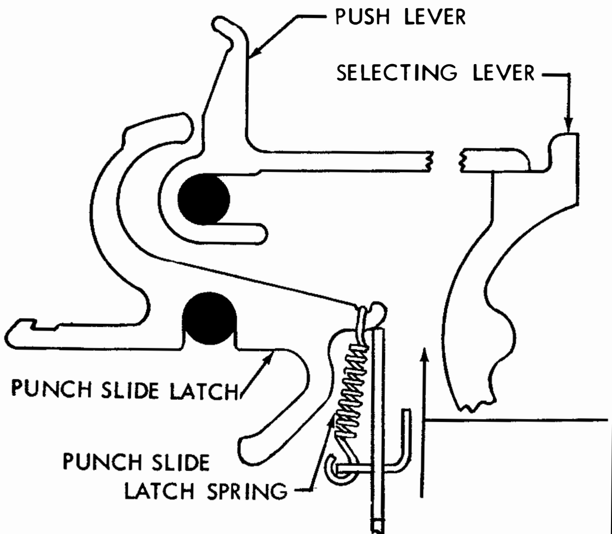
Figure 5-84. Typing Reperforator, Function and Selecting Mechanisms

(B) ROCKER BAIL
REQUIREMENT
WITH ROCKER BAIL POSITIONED TO ITS EXTREME LEFT AND UPPER ROLLER IN CONTACT WITH FUNCTION CAM:
MIN. SOME --- MAX. 0.004 INCH CLEARANCE BETWEEN CAM AND LOWER ROLLER AT POINT OF LEAST CLEARANCE.
TO ADJUST
POSITION LOWER ROLLER MOUNTING SCREW IN ELONGATED SLOT WITH LOCK NUT LOOSENED. CHECK THROUGHOUT A COMPLETE REVOLUTION FOR BINDS.



(C) ROCKER BAIL GUIDE BRACKET
REQUIREMENT
(1) ROCKER BAIL ROLLERS SHOULD ENGAGE FULL THICKNESS OF FUNCTION CAM.
(2) LIFTER ROLLER IN FULL ENGAGEMENT WITH ROCKER BAIL CAMMING SURFACE.
(SEE FIGURE 5-103).
TO ADJUST
POSITION ROCKER BAIL AND GUIDE BRACKET WITH GUIDE BRACKET MOUNTING SCREWS LOOSENED.





(A) PUNCH SLIDE LATCH SPRINGS
TO CHECK
SELECT LETTERS CODE COMBINATION (12345). POSITION ROCKER BAIL TO EXTREME LEFT. STRIP PUSH LEVERS FROM SELECTING LEVERS.
REQUIREMENT
MIN. 1-1/2 OZ. --- MAX. 3 OZS. TO START LATCH MOVING.

Figure 5-85. Typing Reperforator, Function Mechanism

PERFORATOR POSITION

(1) TO CHECK

SELECT LETTERS CODE COMBINATION (12345). ROTATE MAIN SHAFT UNTIL FUNCTION CLUTCH TRIPS.

REQUIREMENT

CLEARANCE BETWEEN PUNCH SLIDE AND PUNCH SLIDE LATCH:
MIN. 0.020 INCH --- MAX. 0.030 INCH
AT SLIDE WHERE CLEARANCE IS LEAST.

TO ADJUST

LOOSEN PERFORATOR MOUNTING SCREWS, ADJUSTING CLAMP LOCK SCREW, ADJUSTING CLAMP PIVOT SCREW AND ANCHOR BRACKET SCREW UNTIL FRICTION TIGHT. PLACE TIP OF SCREW DRIVER BETWEEN SCREW AND RIM OF PRY HOLE AND PRY PERFORATOR UP OR DOWN. TIGHTEN ONLY ADJUSTING CLAMP LOCK SCREW.

(2) TO CHECK

SELECT "V" CODE COMBINATION (-2345). TRIP FUNCTION CLUTCH AND MOVE ROCKER BAIL TO EXTREME LEFT.

REQUIREMENT

CLEARANCE BETWEEN TOP OF THE REAR LEG OF STRIPPER PLATFORM AND TYPE-WHEEL FIGURE "5" WHEN UNIT IS IN STOP POSITION.
MIN. 0.075 INCH --- MAX. 0.095 INCH

TO ADJUST

REMOVE RIBBON FROM CARRIER (FIGURE 5-113). POSITION PERFORATOR WITH TWO MOUNTING SCREWS, ADJUSTING CLAMP PIVOT SCREW AND ANCHOR BRACKET SCREW LOOSENED. CHECK RESET BAIL TRIP LEVER REQUIREMENT (FIGURE 5-90) FOR SOME CLEARANCE AND ADJUST IF NECESSARY.

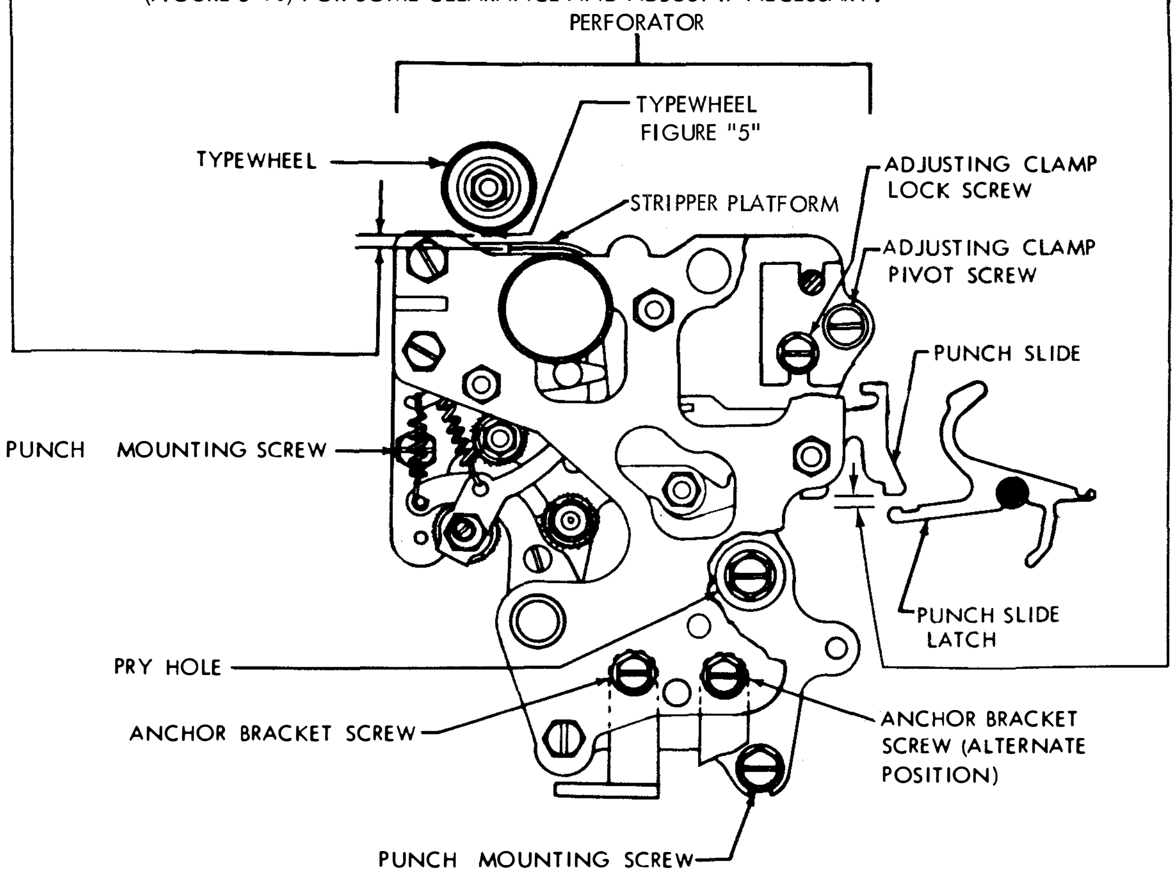
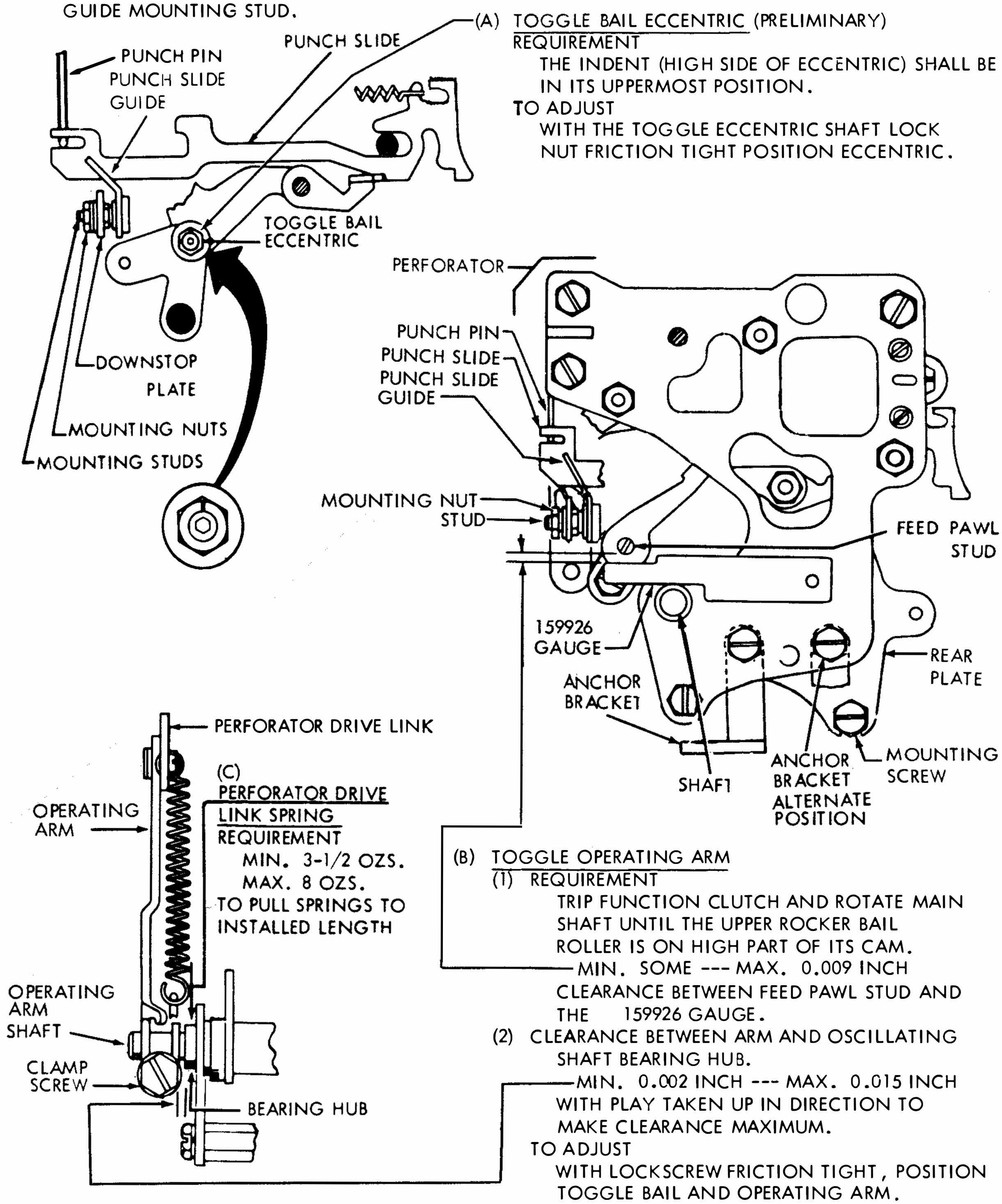


Figure 5-86. Typing Reperforator, Punch Mechanism

NOTE

BEFORE PROCEEDING WITH THE PUNCH MECHANISM ADJUSTMENTS, CHECK THE ROCKER BAIL CAM FOLLOWER ROLLER ADJUSTMENT AND LOOSEN THE PUNCH SLIDE DOWNSTOP MOUNTING NUT AND GUIDE MOUNTING STUD.



(A) TOGGLE BAIL ECCENTRIC (PRELIMINARY)

REQUIREMENT

THE INDENT (HIGH SIDE OF ECCENTRIC) SHALL BE IN ITS UPPERMOST POSITION.

TO ADJUST

WITH THE TOGGLE ECCENTRIC SHAFT LOCK NUT FRICTION TIGHT POSITION ECCENTRIC.

(C) PERFORATOR DRIVE LINK SPRING

REQUIREMENT

MIN. 3-1/2 OZS.
MAX. 8 OZS.
TO PULL SPRINGS TO INSTALLED LENGTH

(B) TOGGLE OPERATING ARM

(1) REQUIREMENT

TRIP FUNCTION CLUTCH AND ROTATE MAIN SHAFT UNTIL THE UPPER ROCKER BAIL ROLLER IS ON HIGH PART OF ITS CAM.
MIN. SOME --- MAX. 0.009 INCH CLEARANCE BETWEEN FEED PAWL STUD AND THE 159926 GAUGE.

(2) CLEARANCE BETWEEN ARM AND OSCILLATING SHAFT BEARING HUB.
MIN. 0.002 INCH --- MAX. 0.015 INCH WITH PLAY TAKEN UP IN DIRECTION TO MAKE CLEARANCE MAXIMUM.

TO ADJUST

WITH LOCKSCREW FRICTION TIGHT, POSITION TOGGLE BAIL AND OPERATING ARM.

Figure 5-87. Typing Reperforator, Punch Mechanism

(A) PUNCH PIN PENETRATION

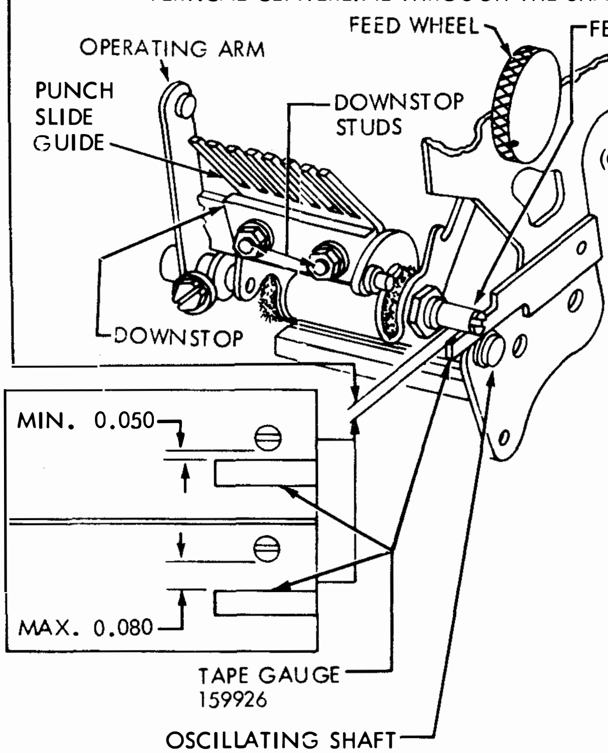
REQUIREMENT

(1) WITH THE RUBOUT COMBINATION SELECTED, FUNCTION CLUTCH ENGAGED. ROTATE MAIN SHAFT UNTIL ALL PUNCH PINS ARE INTO OR ABOVE THE TAPE APERTURE IN PUNCH BLOCK. WITH THE 159926 GAUGE IN POSITION
MIN. 0.050 INCH
CLEARANCE BETWEEN FEED PAWL STUD AND THE GAUGE.

(2) WITH RUBOUT COMBINATION SELECTED, FUNCTION CLUTCH ENGAGED. ROTATE MAIN SHAFT UNTIL ALL PUNCH PINS HAVE CLEARED THE PUNCH BLOCK. WITH THE 159926 GAUGE IN POSITION
MAX. 0.080 INCH
CLEARANCE BETWEEN FEED PAWL STUD AND GAUGE.

TO ADJUST

REFINE THE TOGGLE BAIL ECCENTRIC ADJUSTMENT KEEPING THE INDENT TO THE RIGHT OF A VERTICAL CENTERLINE THROUGH THE SHAFT.



(C) PUNCH SLIDE DOWNSTOP POSITION

REQUIREMENT

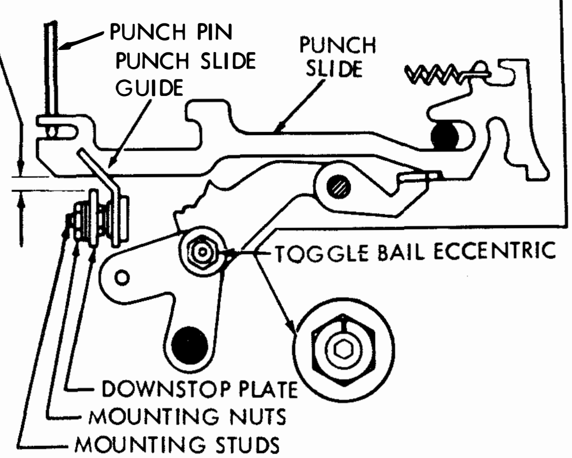
WITH FUNCTION CLUTCH DISENGAGED AND LATCHED. PLAY TAKEN UP TOWARD THE TOP, CLEARANCE BETWEEN BOTH THE FRONT AND REAR PUNCH SLIDES AND THE DOWNSTOP PLATE
MIN. SOME --- MAX. 0.008 INCH
ALL OTHER PUNCH SLIDES SHALL HAVE SOME CLEARANCE.

NOTE

TO CHECK FOR SOME CLEARANCE, PLACE UNIT IN STOP POSITION, TRIP FUNCTION TRIP MECHANISM AND LATCHES, THE PUNCH SLIDES SHALL MOVE FULLY TO THEIR OPERATED POSITION.

TO ADJUST

WITH UNIT IN STOP POSITION, LOOSEN THE TWO DOWNSTOP PLATE MOUNTING LOCK NUTS AND LOCATE THE DOWNSTOP PLATE TO MEET THE REQUIREMENT.



(B) PUNCH SLIDE GUIDE

REQUIREMENT

THE PUNCH SLIDES SHOULD ALIGN WITH THEIR CORRESPONDING PUNCH PINS AND BE FREE OF BINDS AFTER TIGHTENING THE GUIDE MOUNTING STUDS. EACH PUNCH SLIDE SHOULD RETURN FREELY AFTER BEING PUSHED IN NOT MORE THAN 1/16 INCH.

TO ADJUST

POSITION THE GUIDE WITH ITS MOUNTING STUDS FRICTION TIGHT.

Figure 5-88. Typing Reperforator, Punch Mechanism

RESET BAIL TRIP LEVER

REQUIREMENT

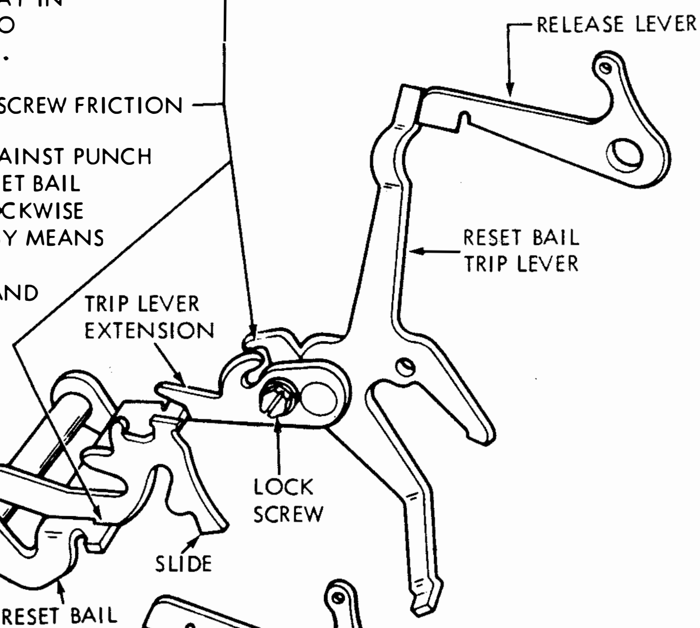
(1) MANUALLY SELECT THE BLANK COMBINATION. MANUALLY ROTATE RESET BAIL TRIP LEVER. THE PUNCH SLIDE RESET BAIL SHALL TRIP BEFORE THE FUNCTION CLUTCH IS TRIPPED.

(2) WITH FUNCTION AND SELECTOR CLUTCHES DISENGAGED AND LATCHED, THE PUNCH SLIDE RESET BAIL SHALL FULLY ENGAGE THE PUNCH SLIDE LATCHING SURFACE WHEN PLAY IN PARTS IS TAKEN UP IN DIRECTION TO MAKE THE ENGAGEMENT THE LEAST.

TO ADJUST

(1) WITH TRIP LEVER EXTENSION LOCK SCREW FRICTION TIGHT AND LETTERS COMBINATION SELECTED, POSITION RESET BAIL AGAINST PUNCH SLIDES. TAKE UP PLAY BETWEEN RESET BAIL AND TRIP LEVER IN A COUNTER CLOCKWISE DIRECTION. POSITION TRIP LEVER BY MEANS OF ITS PRY POINT.

(2) RECHECK REQUIREMENT (1) ABOVE AND REFINE ADJUSTMENT IF NECESSARY.



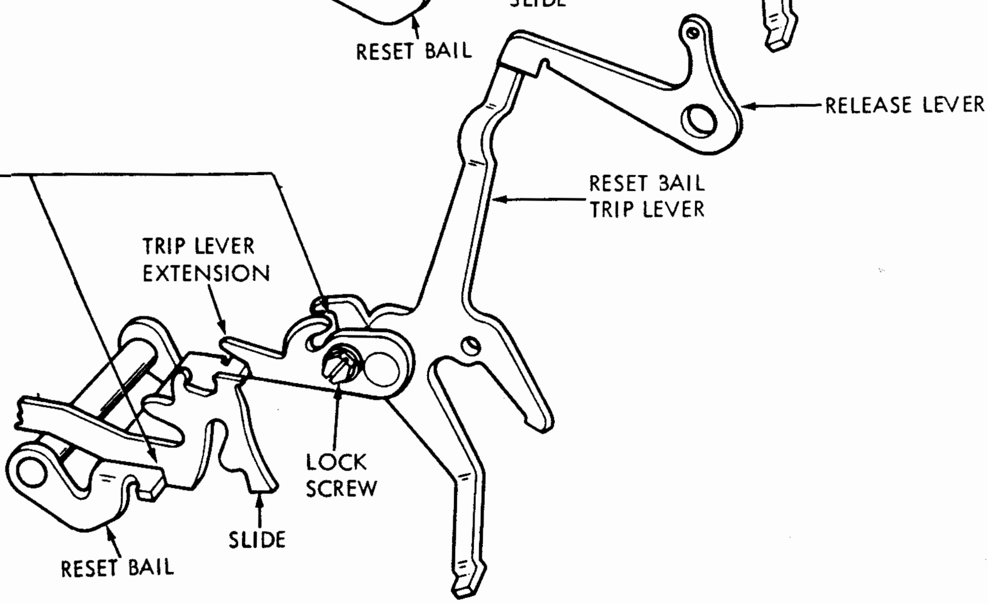
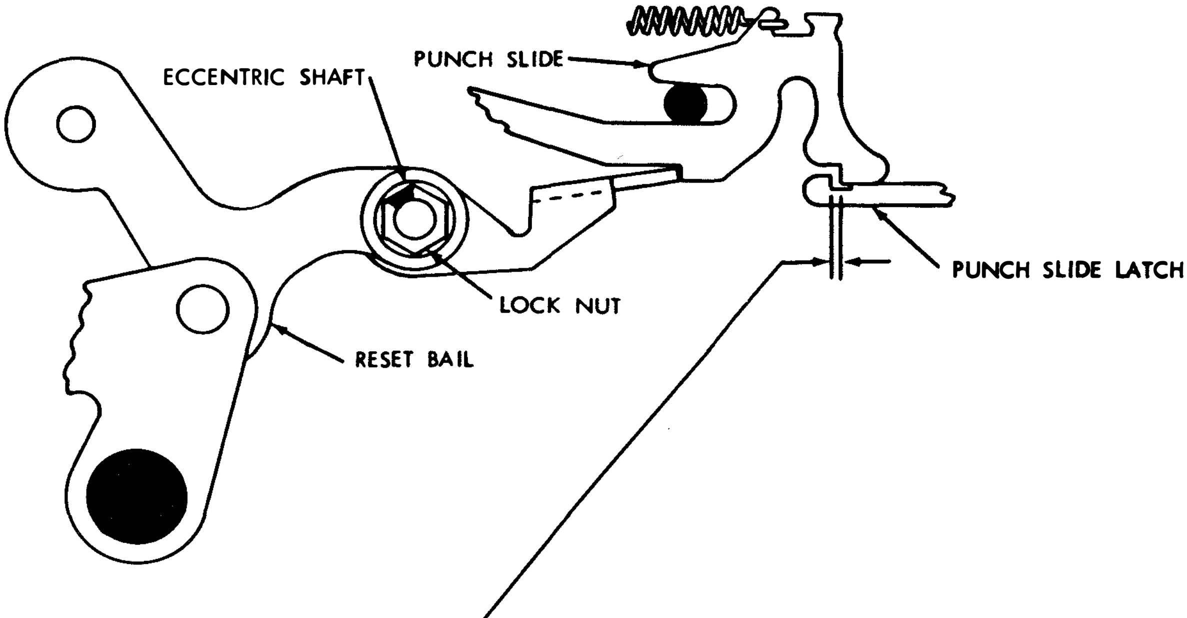


Figure 5-89. Typing Reperforator, Reset Bail Trip Lever



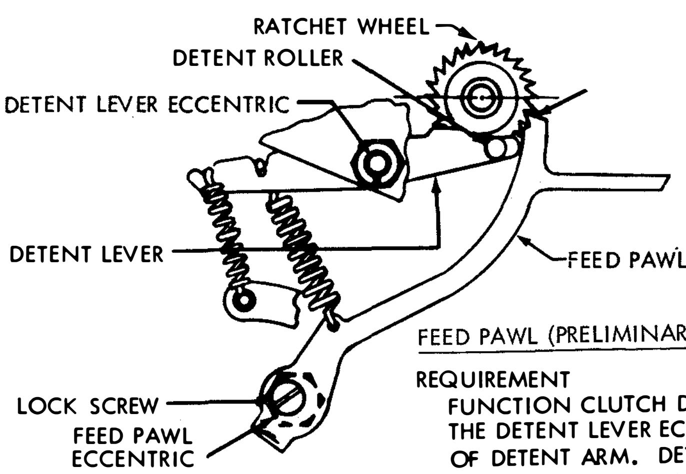
PUNCH SLIDE RESET BAIL

REQUIREMENT
FUNCTION CLUTCH DISENGAGED AND LATCHED. CLEARANCE AT PUNCH SLIDE LATCH CLOSEST TO PUNCH SLIDE:
MIN. 0.005 INCH ---- MAX. 0.015 INCH

TO ADJUST
ROTATE THE RESET BAIL ECCENTRIC SHAFT WITH ITS LOCK NUT LOOSENED. KEEP THE INDENTATION IN THE ECCENTRIC SHAFT HIGH AND TO THE LEFT OF A VERTICAL CENTERLINE THROUGH THE SHAFT.

NOTE

THIS ADJUSTMENT AND LATERAL FEED WHEEL ADJUSTMENT ARE INTER-RELATED AND SHALL BE PERFORMED TOGETHER.



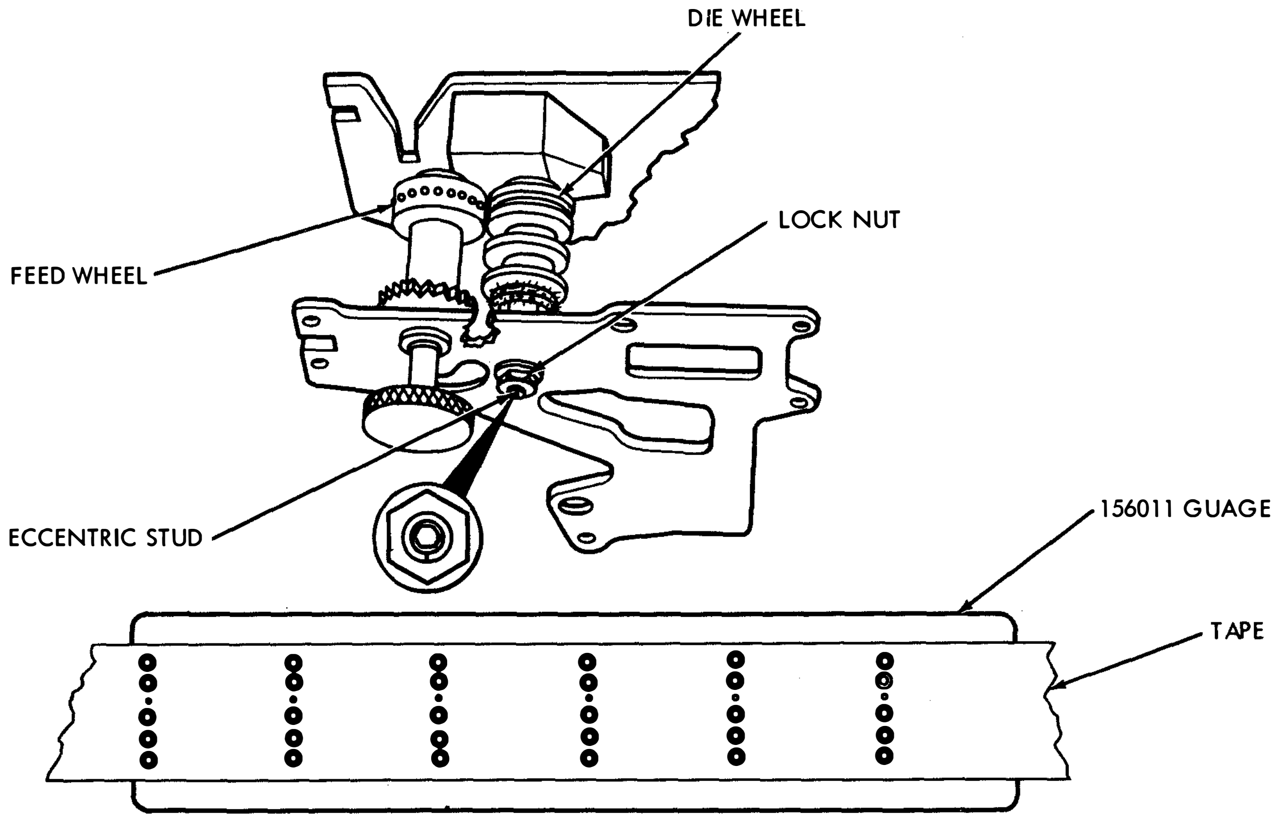
FEED PAWL (PRELIMINARY)

REQUIREMENT
FUNCTION CLUTCH DISENGAGED AND LATCHED. THE INDENT OF THE DETENT LEVER ECCENTRIC AT RIGHT ANGLE TO CENTER LINE OF DETENT ARM. DETENT ROLLER IN ENGAGEMENT WITH FEED WHEEL RATCHET, AND HIGH SIDE OF FEED PAWL ECCENTRIC TO RIGHT OF ITS LOCKING SCREW. THE FEED PAWL SHALL ENGAGE THE FIRST TOOTH BELOW HORIZONTAL CENTER LINE OF RATCHET WHEEL WITH NO PERCEPTIBLE CLEARANCE.

TO ADJUST
ROTATE THE FEED PAWL ECCENTRIC WITH LOCK SCREW LOOSENED.

Figure 5-90. Typing Reperforator, Punch Slide Reset Bail and Feed Pawl

NOTE
BEFORE PROCEEDING WITH THE FOLLOWING ADJUSTMENT CHECK BOTH TAPE GUIDE SPRING TENSIONS (FIGURE 5-93)



FEED HOLE SPACING

(1) REQUIREMENT

WITH A PIECE OF TAPE PERFORATED WITH SIX SERIES OF 9 BLANK CODE COMBINATIONS FOLLOWED BY A LETTERS COMBINATION PLACED OVER THE SMOOTH SIDE OF THE 156011 TAPE GAUGE SO THAT THE CIRCULAR PORTION OF THE FIRST NUMBER 2 CODE HOLE IN THE TAPE IS CONCENTRIC WITH THE FIRST HOLE OF THE TAPE GAUGE, THE NEXT FOUR HOLES IN THE TAPE GAUGE SHOULD BE VISIBLE THROUGH THE NUMBER 2 CODE HOLES IN THE TAPE AND THE CIRCULAR PORTION OF THE LAST (SIXTH) NUMBER 2 CODE HOLE IN THE TAPE SHALL BE ENTIRELY WITHIN THE .090 DIAMETER HOLE OF THE TAPE GAUGE.

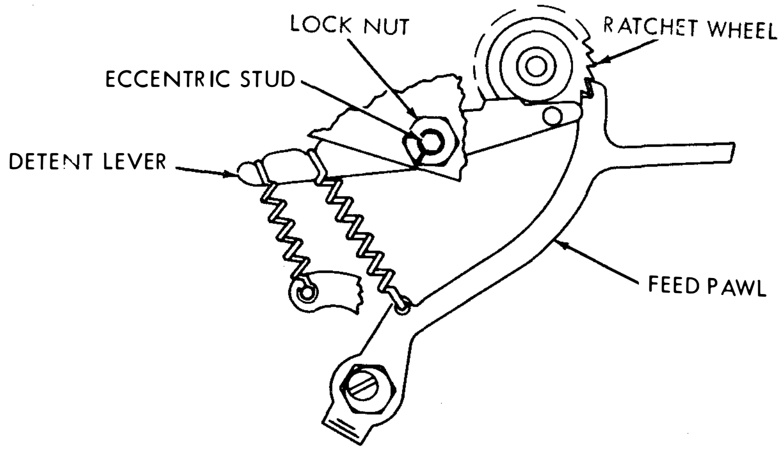
(2) REQUIREMENT

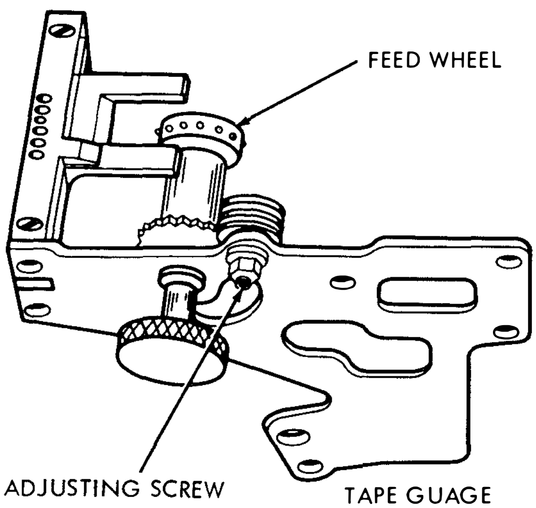
WITH TAPE SHOE HELD AWAY FROM FEED WHEEL, FEED PAWL AND DETENT DISENGAGED AND TAPE REMOVED, FEED WHEEL SHOULD ROTATE FREELY.

TO ADJUST

WITH TAPE REMOVED FROM THE PUNCH MECHANISM, LOOSEN THE ECCENTRIC LOCK NUT AND ROTATE THE DIE WHEEL ECCENTRIC SHAFT UNTIL IT BINDS AGAINST THE FEED WHEEL. BACK OFF THE ECCENTRIC UNTIL THE DIE WHEEL IS JUST FREE. KEEP THE INDENT OF THE ECCENTRIC BELOW THE HORIZONTAL CENTERLINE OF THE STUD. REFINE ADJUSTMENT FOR REQUIREMENT (1), IF NECESSARY, BY MOVING THE DIE WHEEL TOWARD THE FEED WHEEL TO DECREASE THE CHARACTER SPACING AND AWAY FROM THE FEED WHEEL TO INCREASE THE CHARACTER SPACING.

Figure 5-91. Typing Reperforator, Feed Hole Spacing





FEED HOLE LATERAL ALIGNMENT (DETENT)

(1) REQUIREMENT

WHEN A PIECE OF TAPE IS PERFORATED WITH A SERIES OF BLANK CODE COMBINATIONS THE INDENTATIONS OF THE FEED WHEEL SHALL BE FULLY PUNCHED OUT.

TO ADJUST

RIGHT OR LEFT, ROTATE THE DETENT LEVER ECCENTRIC STUD CLOCKWISE TO MOVE THE FEED WHEEL PERFORATION TOWARDS THE LEADING EDGE OF THE CODE HOLES, AND COUNTERCLOCKWISE TO MOVE THE FEED WHEEL PERFORATIONS TOWARD THE TRAILING EDGE OF THE CODE HOLES. REFINE THE FEED PAWL ADJUSTMENT.

FRONT TO REAR, LOOSEN THE LOCK NUT ON THE ADJUSTING SCREW AND TURN THE SCREW CLOCKWISE TO MOVE TAPE TOWARD REFERENCE EDGE (REAR), AND COUNTERCLOCKWISE TO MOVE THE TAPE AWAY FROM REFERENCE EDGE (FRONT).

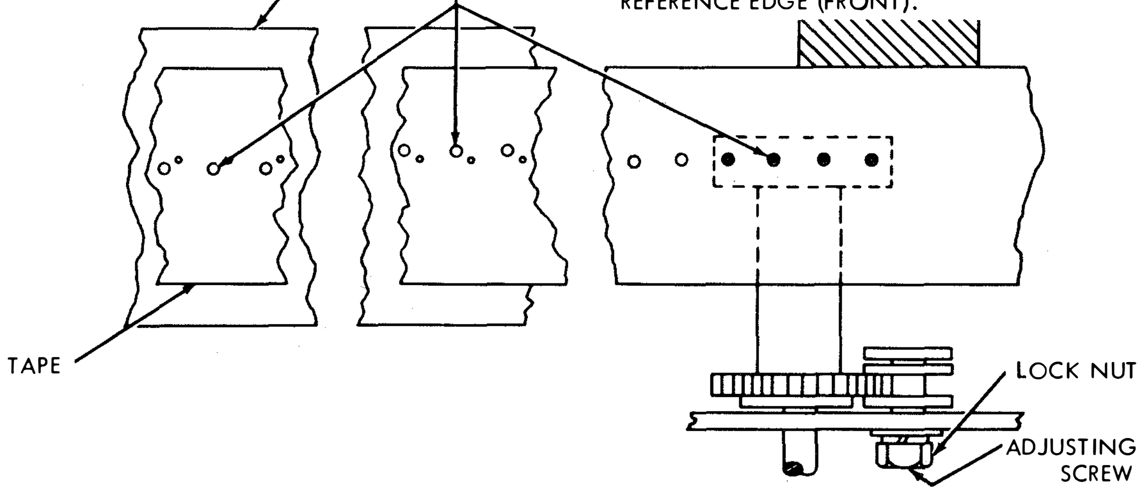
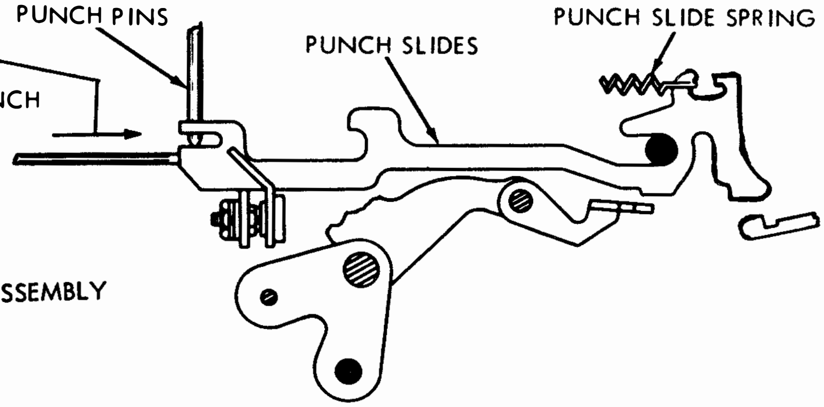
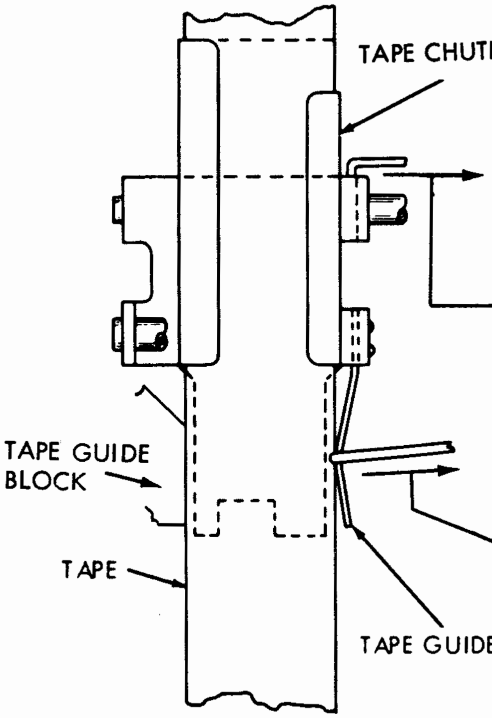


Figure 5-92. Typing Reperforator, Detent Lever and Feed Hole Lateral Alignment



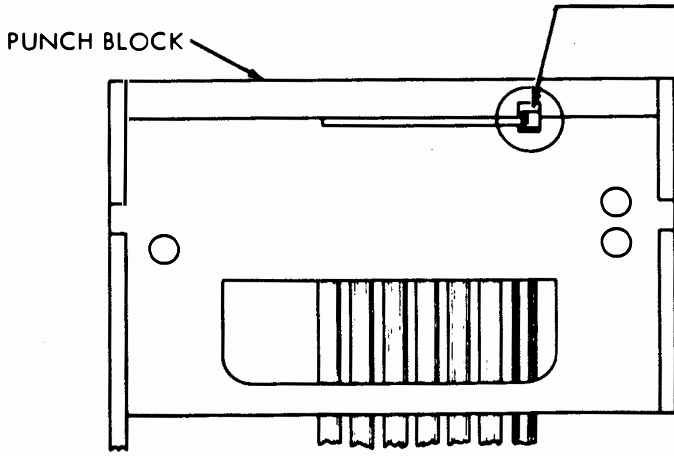
PUNCH SLIDE SPRING
REQUIREMENT
LETTERS COMBINATION SET UP AND PUNCH SLIDES IN SELECTED POSITION.
MIN. 2-1/4 OZS.
MAX. 3-1/4 OZS.
TO START EACH SLIDE MOVING



TAPE GUIDE ASSEMBLY SPRING
REQUIREMENT
THE TAPE GUIDE ASSEMBLY SHALL BE FREE TO RETURN TO REST AGAINST THE TAPE GUIDE BLOCK AFTER A
MIN. 16 OZS.
TO PULL THE TAPE GUIDE ASSEMBLY AWAY FROM THE BLOCK.
TO ADJUST
IF THE SPRING DOES NOT MEET THE REQUIREMENT, REPLACE THE SPRING. IF THE TAPE GUIDE ASSEMBLY IS NOT FREE TO RETURN, REPOSITION THE TAPE GUIDE ASSEMBLY MOUNTING POST TO FREE THE TAPE GUIDE ASSEMBLY.

TAPE GUIDE SPRING (TAPE CHUTE)
REQUIREMENT
CLUTCH DISENGAGED AND TAPE THREADED THROUGH THE PUNCH ASSEMBLY, IT SHOULD REQUIRE
MIN. 1-1/4 OZS. --- MAX. 2-1/4 OZS.
TO JUST MOVE THE SPRING AWAY FROM THE TAPE.
TO ADJUST
BEND THE SPRING.

TAPE GUIDE SPRING (PUNCH BLOCK)
(1) REQUIREMENT
WITH TAPE REMOVED FROM THE PUNCH BLOCK THE TAPE GUIDE SPRING SHOULD REST AGAINST THE CLEARANCE SLOT IN THE BLOCK IN A SYMETRICAL MANNER.
(2) REQUIREMENT
WITH TAPE IN THE PUNCH BLOCK AND THE REPERFORATOR OPERATING UNDER POWER, THE SPRING SHOULD NOT DISTORT THE EDGE OF THE TAPE.
TO ADJUST
BEND THE SPRING AND POSITION IT WITH ITS MOUNTING SCREW LOOSENED.



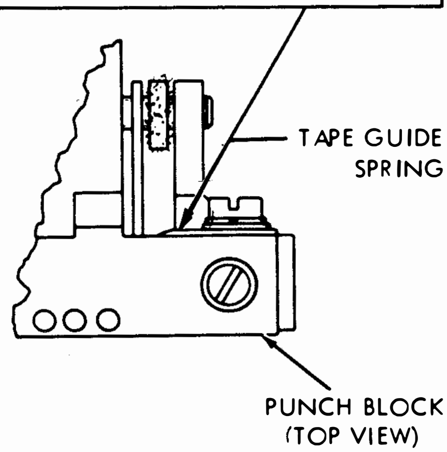
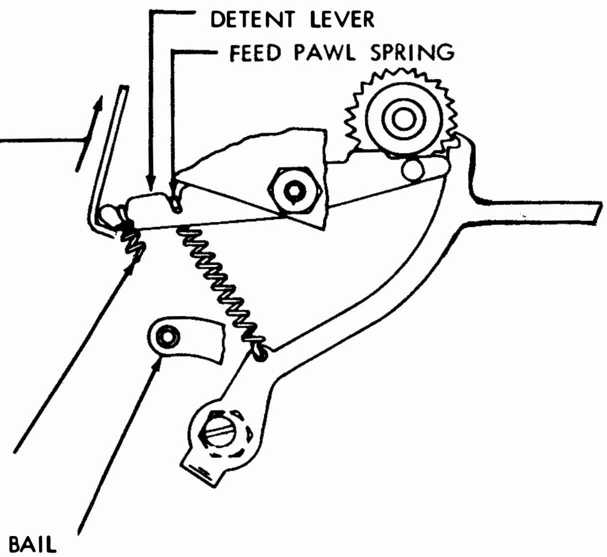


Figure 5-93. Typing Reperforator, Punch Mechanism

FEED PAWL SPRING

REQUIREMENT
FUNCTION CLUTCH DISENGAGED AND LATCHED. DETENT SPRING UNHOOKED FROM TOGGLE BAIL
MIN. 3 OZS.
MAX. 4-1/2 OZS.
TO START THE DETENT LEVER MOVING



DETENT LEVER SPRING

REQUIREMENT
FUNCTION CLUTCH DISENGAGED AND LATCHED. FEED PAWL SPRING UNHOOKED.
MIN. 7 OZS.
MAX. 10 OZS.
TO START THE DETENT LEVER MOVING.

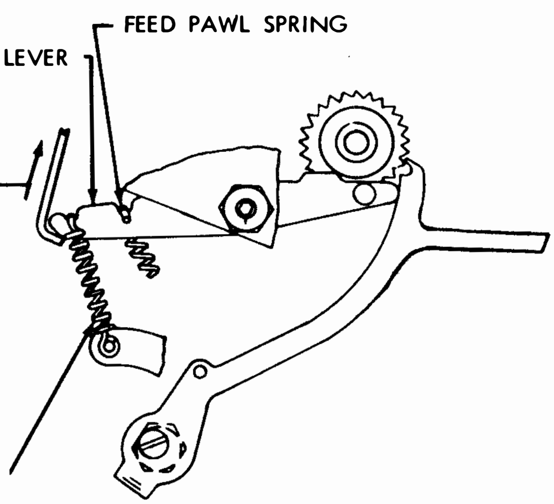


Figure 5-94. Typing Reperforator, Tape Feed Mechanism

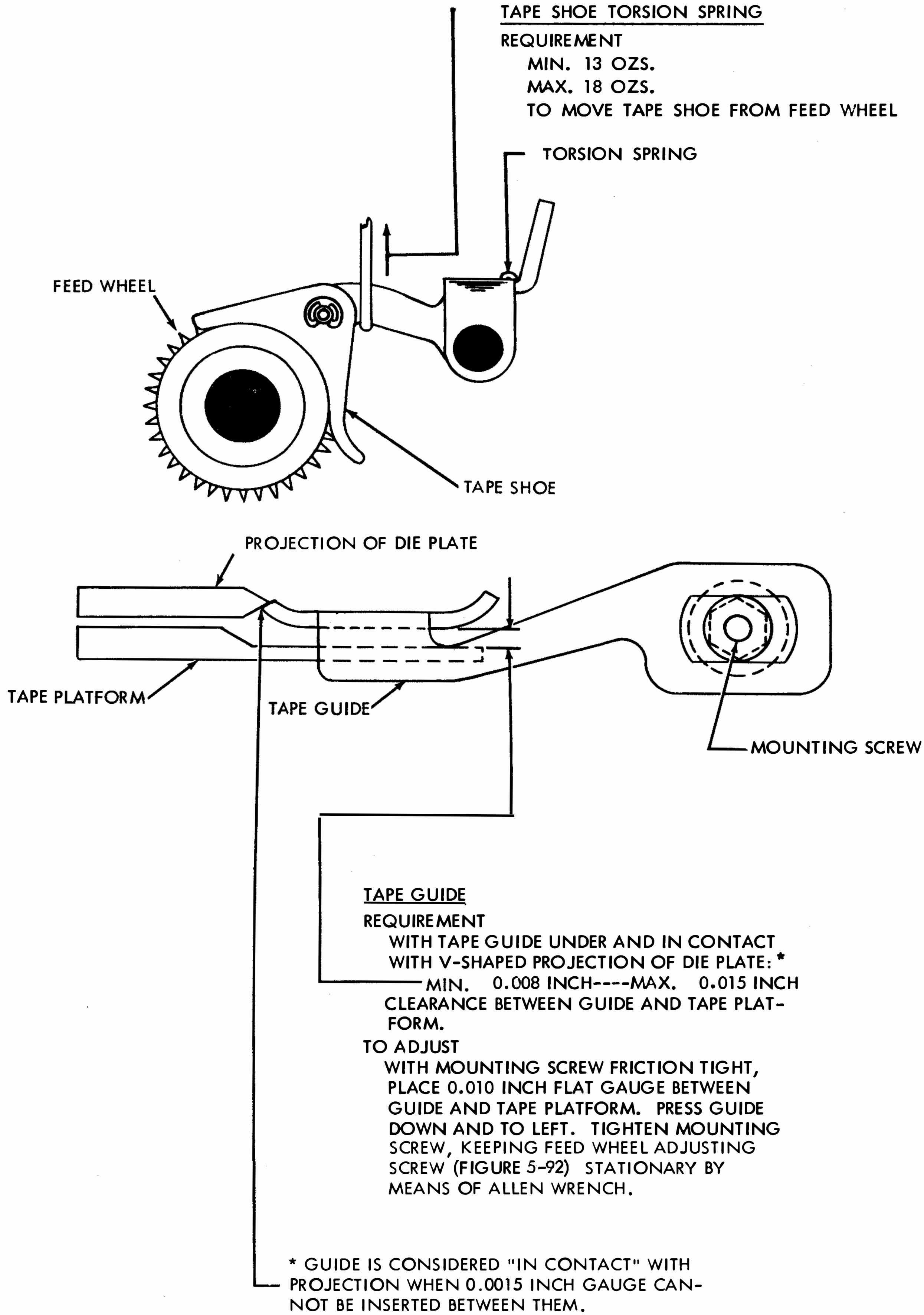
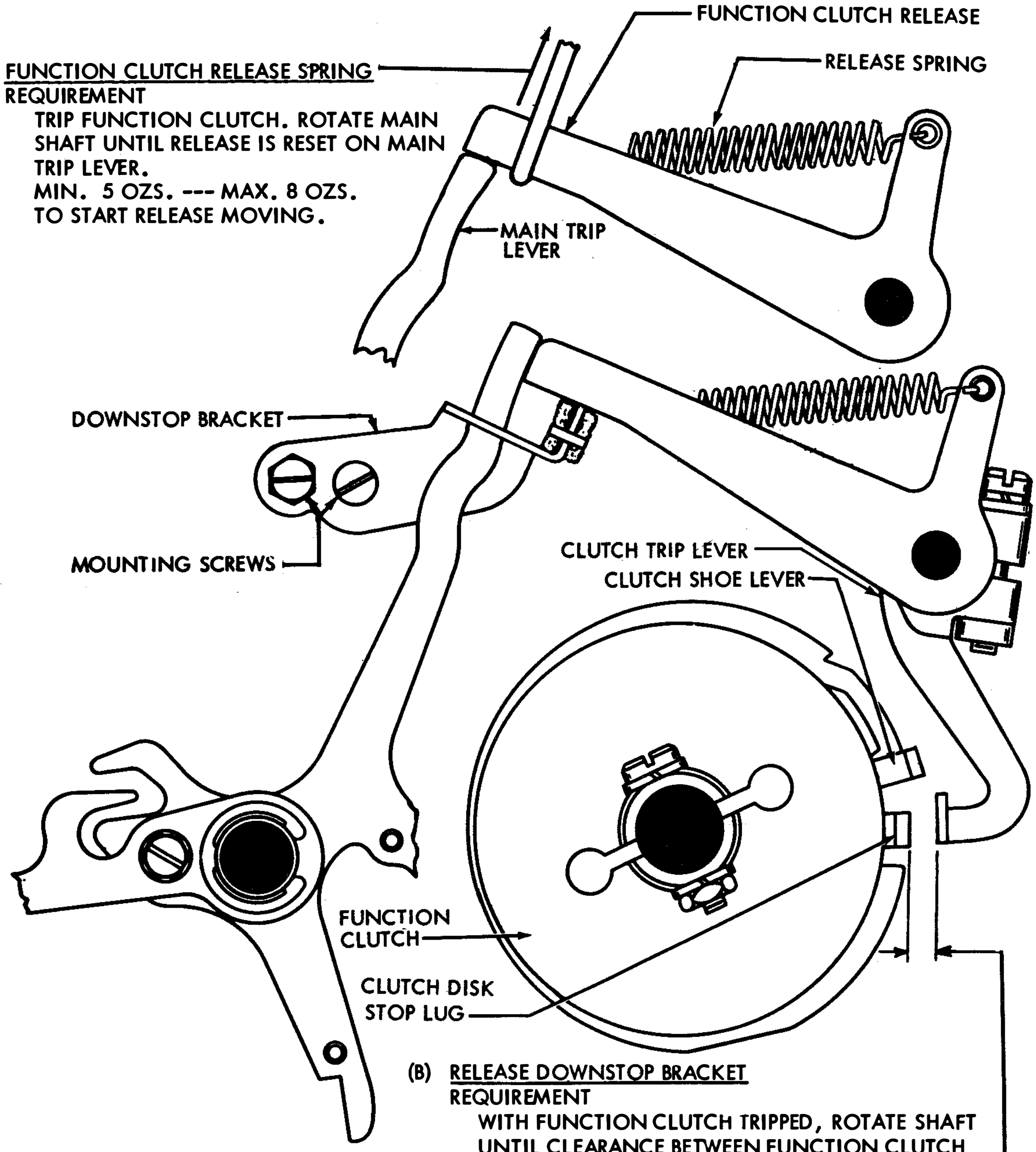


Figure 5-95. Typing Reperforator, Feed Wheel and **Tape Guide**



(A) FUNCTION CLUTCH RELEASE SPRING
REQUIREMENT
TRIP FUNCTION CLUTCH. ROTATE MAIN SHAFT UNTIL RELEASE IS RESET ON MAIN TRIP LEVER.
MIN. 5 OZS. --- MAX. 8 OZS.
TO START RELEASE MOVING.

(B) RELEASE DOWNSTOP BRACKET
REQUIREMENT
WITH FUNCTION CLUTCH TRIPPED, ROTATE SHAFT UNTIL CLEARANCE BETWEEN FUNCTION CLUTCH DISK STOP LUG AND CLUTCH STOP LEVER IS AT A MINIMUM. RELEASE RESTING AGAINST DOWNSTOP BRACKET. CLEARANCE BETWEEN FUNCTION CLUTCH DISK STOP LUG AND STOP LEVER:
MIN. 0.002 INCH --- MAX. 0.045 INCH
TO ADJUST
REMOVE TAPE GUARD. WITH DOWNSTOP BRACKET MOUNTING SCREWS FRICTION TIGHT POSITION BRACKET. RECHECK FOR SOME CLEARANCE BETWEEN TRIP LEVER EXTENSION AND LEFT END OF SLOT IN RELEASE LEVER DOWNSTOP BRACKET.

Figure 5-96. Typing Reperforator, Function Mechanism

PUSH BAR OPERATING BLADE (PRELIMINARY)

TO CHECK

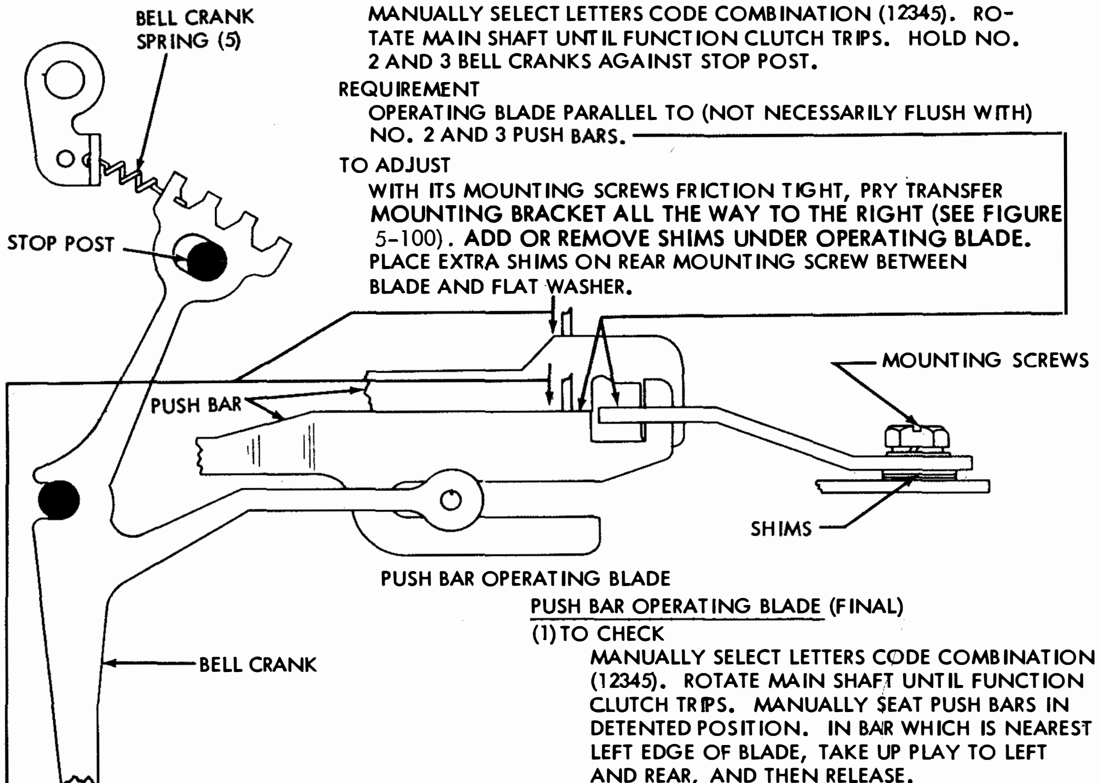
MANUALLY SELECT LETTERS CODE COMBINATION (12345). ROTATE MAIN SHAFT UNTIL FUNCTION CLUTCH TRIPS. HOLD NO. 2 AND 3 BELL CRANKS AGAINST STOP POST.

REQUIREMENT

OPERATING BLADE PARALLEL TO (NOT NECESSARILY FLUSH WITH) NO. 2 AND 3 PUSH BARS.

TO ADJUST

WITH ITS MOUNTING SCREWS FRICTION TIGHT, PRY TRANSFER MOUNTING BRACKET ALL THE WAY TO THE RIGHT (SEE FIGURE 5-100). ADD OR REMOVE SHIMS UNDER OPERATING BLADE. PLACE EXTRA SHIMS ON REAR MOUNTING SCREW BETWEEN BLADE AND FLAT WASHER.



PUSH BAR OPERATING BLADE (FINAL)

(1) TO CHECK

MANUALLY SELECT LETTERS CODE COMBINATION (12345). ROTATE MAIN SHAFT UNTIL FUNCTION CLUTCH TRIPS. MANUALLY SEAT PUSH BARS IN DETENTED POSITION. IN BAR WHICH IS NEAREST LEFT EDGE OF BLADE, TAKE UP PLAY TO LEFT AND REAR, AND THEN RELEASE.

REQUIREMENT

CLEARANCE BETWEEN BAR AND LEFT EDGE OF BLADE:

MIN. 0.015 INCH --- MAX. 0.030 INCH

(2) REQUIREMENT

SOME CLEARANCE BETWEEN RIGHT EDGE OF BLADE AND PUSH BARS WHEN PLAY IN BARS HAS BEEN TAKEN UP TO RIGHT AND RELEASED.

(3) REQUIREMENT

WITH UNIT IN STOP POSITION, SOME CLEARANCE BETWEEN RIGHT EDGE OF BLADE AND BARS WHEN PLAY IN BARS HAS BEEN TAKEN UP TO RIGHT AND RELEASED.

TO ADJUST

WITH MOUNTING SCREWS LOOSENED, POSITION OPERATING BLADE IN ELONGATED HOLES.

BELL CRANK SPRINGS (5)

TO CHECK

SELECT LETTERS CODE COMBINATION (12345). ROTATE MAIN SHAFT UNTIL FUNCTION CLUTCH TRIPS.

REQUIREMENT

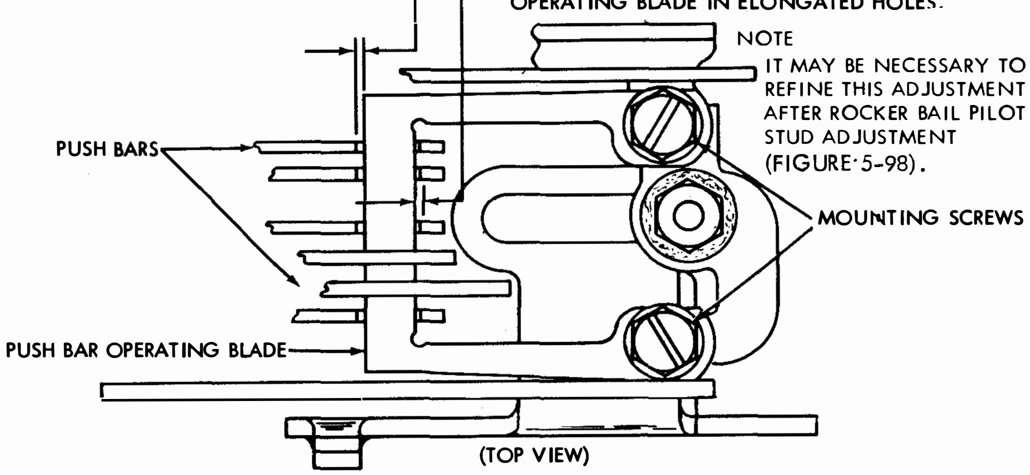
MIN. 1 OZ.---MAX. 3 OZS. TO START PUSH BAR MOVING

NOTE:

CHECK ALL FIVE SPRINGS.

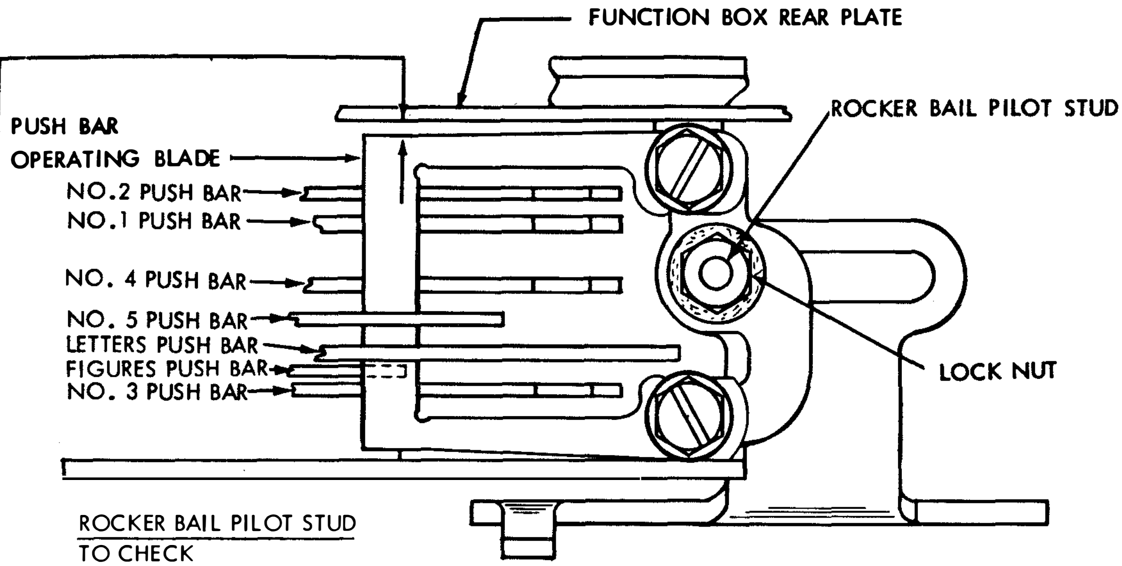
NOTE

IT MAY BE NECESSARY TO REFINE THIS ADJUSTMENT AFTER ROCKER BAIL PILOT STUD ADJUSTMENT (FIGURE 5-98).



(TOP VIEW)

Figure 5-97. Typing Reperforator, Function Mechanism



(TOP VIEW)

ROCKER BAIL PILOT STUD

TO CHECK

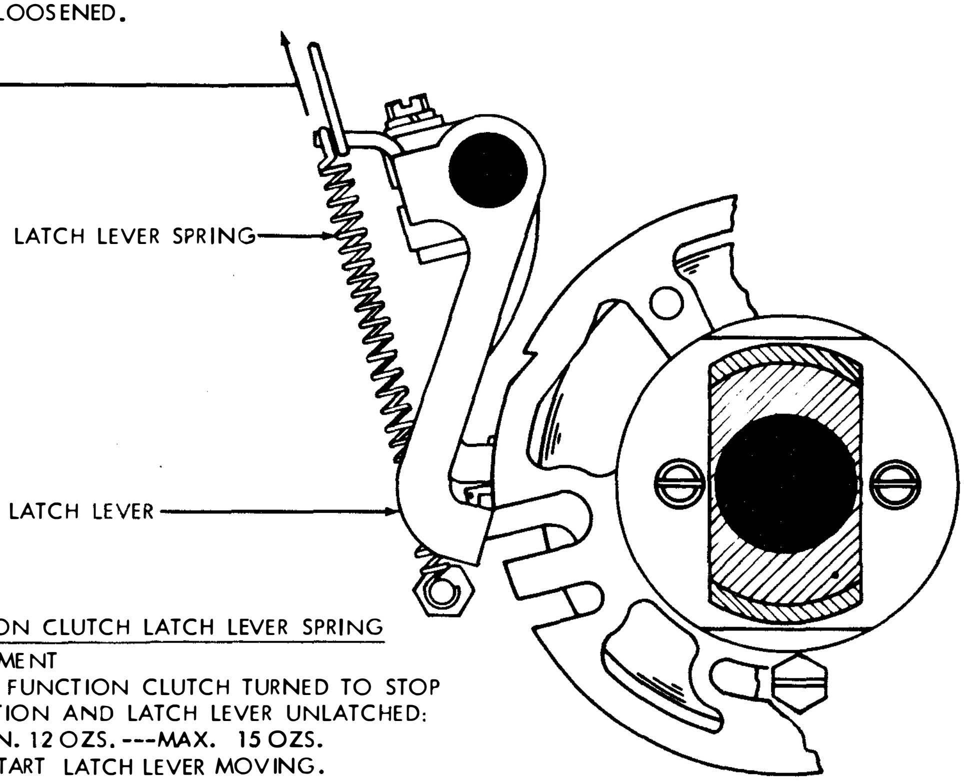
SELECT BLANK COMBINATION. POSITION ROCKER BAIL THROUGH A COMPLETE CYCLE TO INSURE THE CLEARANCE IS A MINIMUM.

REQUIREMENT

CLEARANCE BETWEEN FUNCTION BOX REAR PLATE AND PUSH BAR OPERATING BLADE:
MIN. 0.005 INCH --- MAX. 0.020 INCH
AT A POINT IN THE CYCLE AND WHEN PLAY IS TAKEN UP TO MAKE CLEARANCE MINIMUM.

TO ADJUST

POSITION ROCKER BAIL PILOT STUD IN ELONGATED HOLE WITH LOCK NUT LOOSENED.



FUNCTION CLUTCH LATCH LEVER SPRING

REQUIREMENT

WITH FUNCTION CLUTCH TURNED TO STOP POSITION AND LATCH LEVER UNLATCHED:
MIN. 12 OZS. --- MAX. 15 OZS.
TO START LATCH LEVER MOVING.

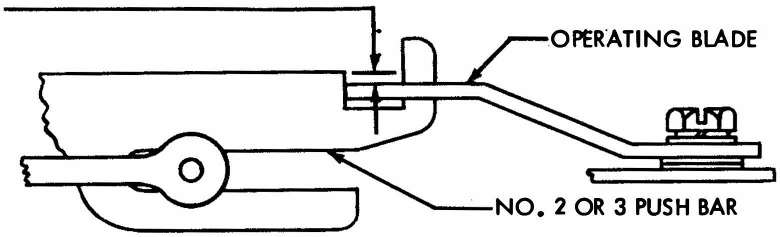
(REAR VIEW)

Figure 5-98. Typing Reperforator, Function Mechanism

FUNCTION BOX

REQUIREMENT

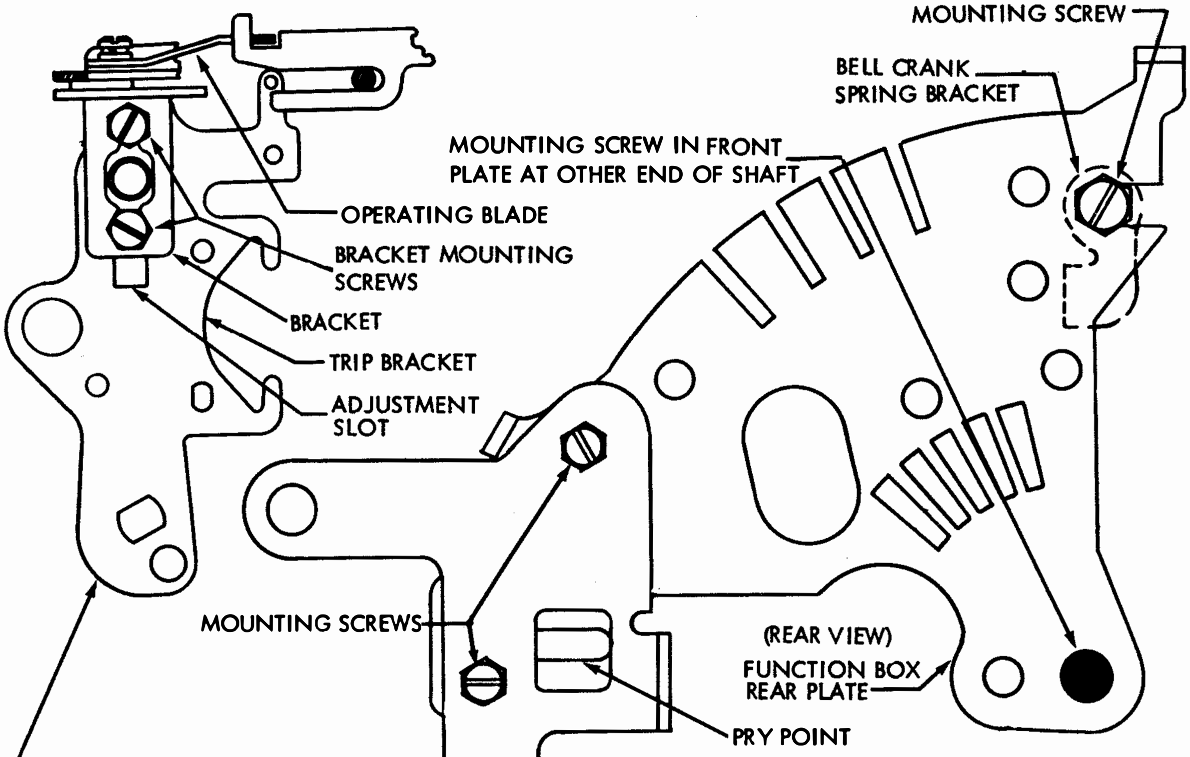
MANUALLY SELECT LETTERS CODE COMBINATION (12345). ROTATE MAIN SHAFT UNTIL FUNCTION CLUTCH TRIPS, AND PUNCH SLIDES ARE DISENGAGED FROM LATCHES. THE TOP OF THE OPERATING BLADE SHALL BE FLUSH --- MAX. 0.020 INCH



BELOW THE TOPS OF THE NO. 2 AND 3 PUSH BARS. TAKE UP PLAY IN PUSHBARS IN A DOWNWARD DIRECTION THEN RELEASE.

TO ADJUST

WITH THREE MOUNTING SCREWS IN REAR PLATE AND ONE MOUNTING SCREW IN FRONT PLATE LOOSENED, POSITION FUNCTION BOX BY MEANS OF PRY POINT. CHECK POSITION OF BELL CRANK SPRING BRACKET.



NOTE

ON UNITS EQUIPPED WITH TWO-PIECE TRIP BRACKET, SET ABOVE ADJUSTMENT IN CENTER OF ITS RANGE AND TIGHTEN SCREWS. LOOSEN TWO SCREWS WHICH MOUNT GUIDE TO BRACKET AND POSITION GUIDE TO MEET ABOVE REQUIREMENT.

Figure 5-99. Typing Reperforator, Function Box Mechanism

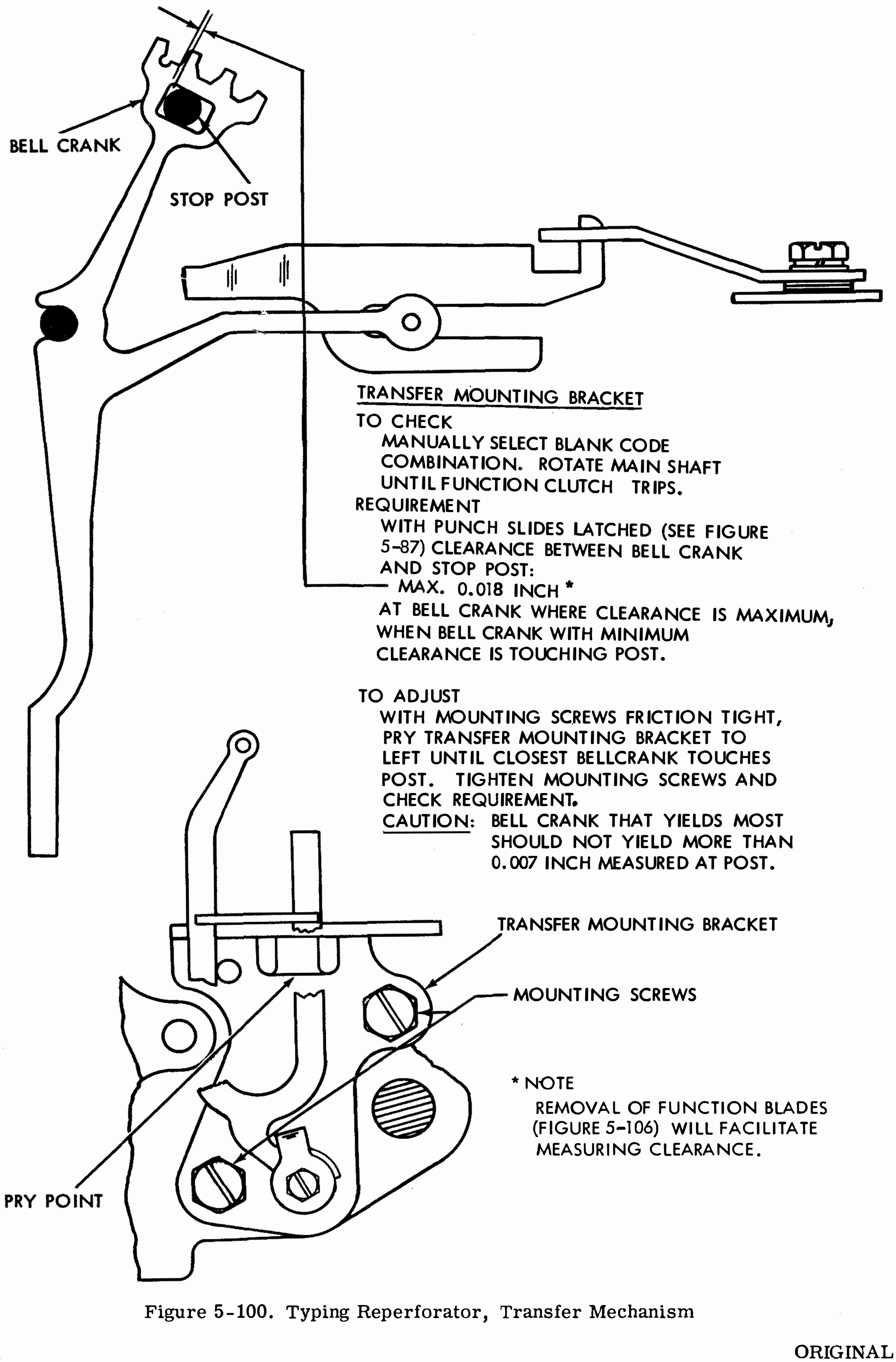


Figure 5-100. Typing Reperforator, Transfer Mechanism

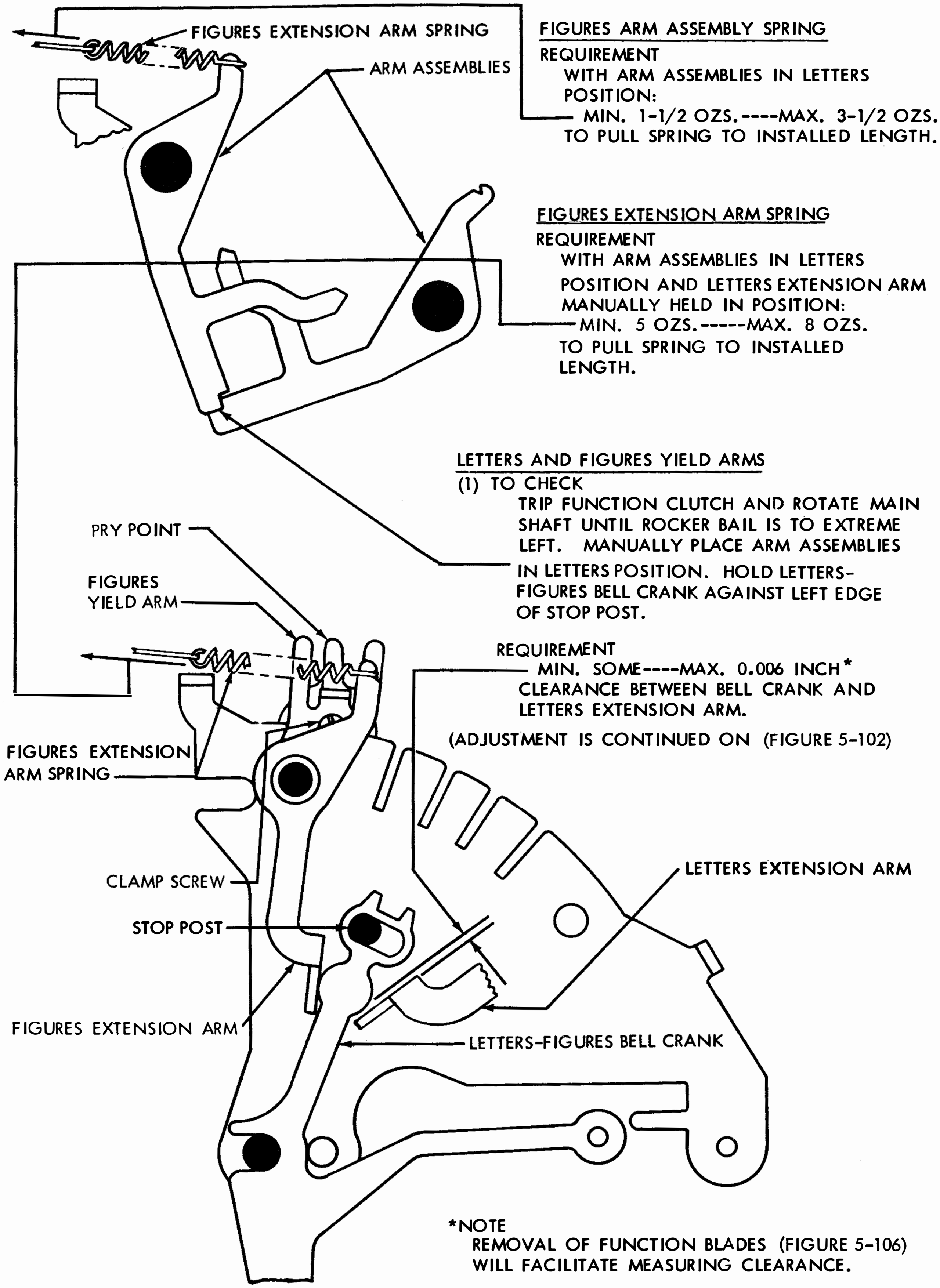
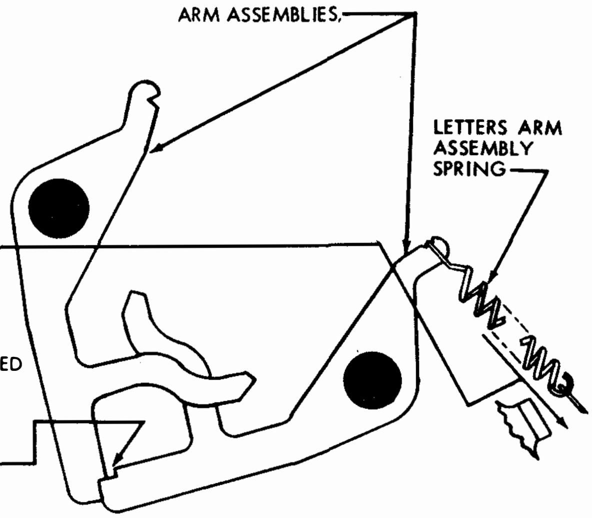


Figure 5-101. Typing Reperforator, Function Box Mechanism

LETTERS ARM ASSEMBLY SPRING

REQUIREMENT
WITH ARM ASSEMBLIES IN FIGURES POSITION:
MIN. 1-1/2 OZS.----MAX. 3-1/2 OZS.
TO PULL SPRING TO INSTALLED LENGTH.

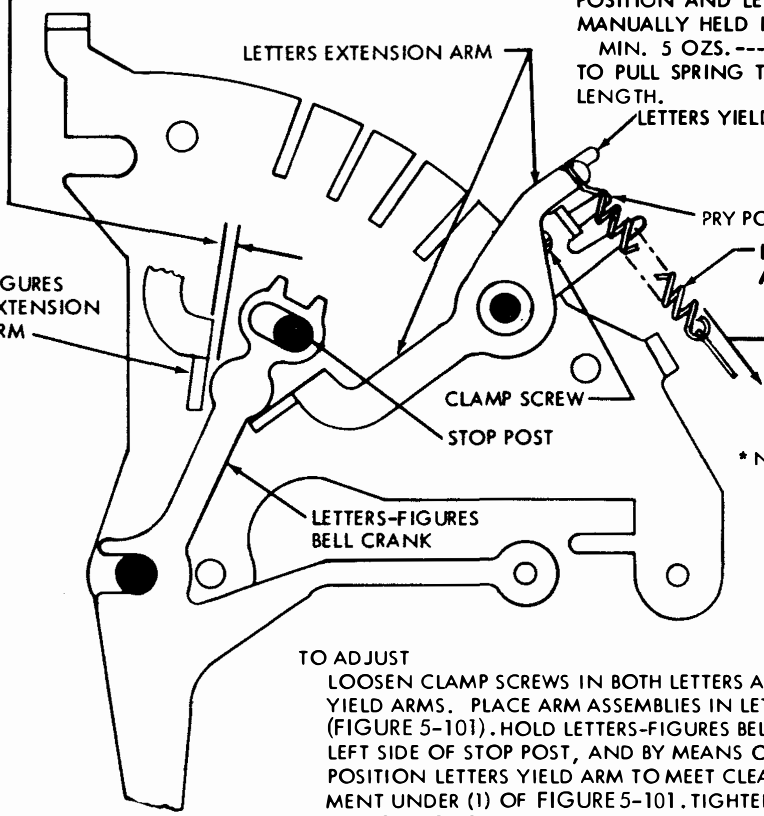
LETTERS AND FIGURES YIELD ARMS (CONTINUED FROM FIGURE 5-101)
(2) TO CHECK
MANUALLY PLACE ARM ASSEMBLIES IN FIGURES POSITION.



REQUIREMENT
MIN. SOME----MAX. 0.006 INCH*
CLEARANCE BETWEEN BELL CRANK AND FIGURES EXTENSION ARM.

LETTERS EXTENSION ARM SPRING

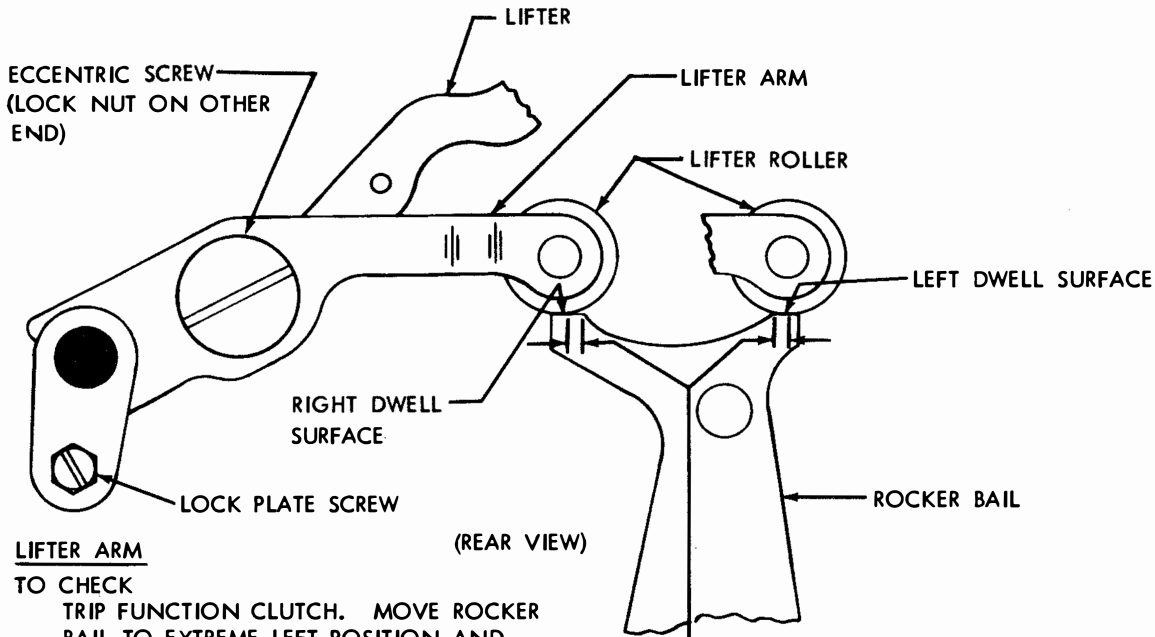
REQUIREMENT
WITH ARM ASSEMBLIES IN FIGURES POSITION AND LETTERS EXTENSION ARM MANUALLY HELD IN POSITION
MIN. 5 OZS.----MAX. 8 OZS.
TO PULL SPRING TO INSTALLED LENGTH.



* NOTE:
REMOVAL OF FUNCTION BLADES (FIGURE 5-103) WILL FACILITATE MEASURING CLEARANCE.

TO ADJUST
LOOSEN CLAMP SCREWS IN BOTH LETTERS AND FIGURES YIELD ARMS. PLACE ARM ASSEMBLIES IN LETTERS POSITION (FIGURE 5-101). HOLD LETTERS-FIGURES BELL CRANK AGAINST LEFT SIDE OF STOP POST, AND BY MEANS OF PRY POINT, POSITION LETTERS YIELD ARM TO MEET CLEARANCE REQUIREMENT UNDER (1) OF FIGURE 5-101. TIGHTEN LETTERS YIELD ARM CLAMP SCREW.
PLACE ARM ASSEMBLIES IN FIGURES POSITION. HOLD LETTERS-FIGURES BELL CRANK AGAINST RIGHT SIDE OF STOP POST, AND BY MEANS OF PRY POINT POSITION FIGURES YIELD ARM (FIGURE 5-101) TO MEET REQUIREMENT UNDER (2) ABOVE. TIGHTEN FIGURES YIELD ARM CLAMP SCREW.
CAUTION: ARM ASSEMBLIES MAY CHANGE POSITION DURING ADJUSTMENT. AS TIGHTENING OF SCREWS MAY AFFECT ADJUSTMENT, RECHECK REQUIREMENTS.

Figure 5-102. Typing Reperforator, Function Box Mechanism



LIFTER ARM

TO CHECK

TRIP FUNCTION CLUTCH. MOVE ROCKER BAIL TO EXTREME LEFT POSITION AND OBSERVE TRAVEL OF LIFTER ROLLER ON RIGHT DWELL SURFACE. MOVE ROCKER BAIL TO EXTREME RIGHT POSITION AND OBSERVE TRAVEL OF ROLLER ON LEFT DWELL SURFACE.

REQUIREMENT

APPROXIMATELY EQUAL TRAVEL ON EACH DWELL SURFACE.

TO ADJUST

LOOSEN LOCK PLATE SCREW UNTIL FRICTION TIGHT. WITH ECCENTRIC SCREW LOCK NUT FRICTION TIGHT, POSITION LIFTER ARM ON LIFTER. TIGHTEN LOCK PLATE SCREW. DO NOT TIGHTEN LOCK NUT.

LIFTER ARM ECCENTRIC SCREW

REQUIREMENT

WITH FUNCTION CLUTCH DISENGAGED:

(1) CLEARANCE BETWEEN CLOSEST PROJECTION OF BELL CRANKS AND ASSOCIATED LETTERS OR FIGURES FUNCTION BLADE PROJECTION:
MIN. 0.008 INCH --- MAX. 0.020 INCH

(2) MIN. 0.005 INCH
CLEARANCE FOR FUNCTION BLADES OTHER THAN LETTERS OR FIGURES IF UNIT IS SO EQUIPPED.

TO ADJUST

POSITION LIFTER ARM ECCENTRIC SCREW WITH LOCK NUT LOOSENED.

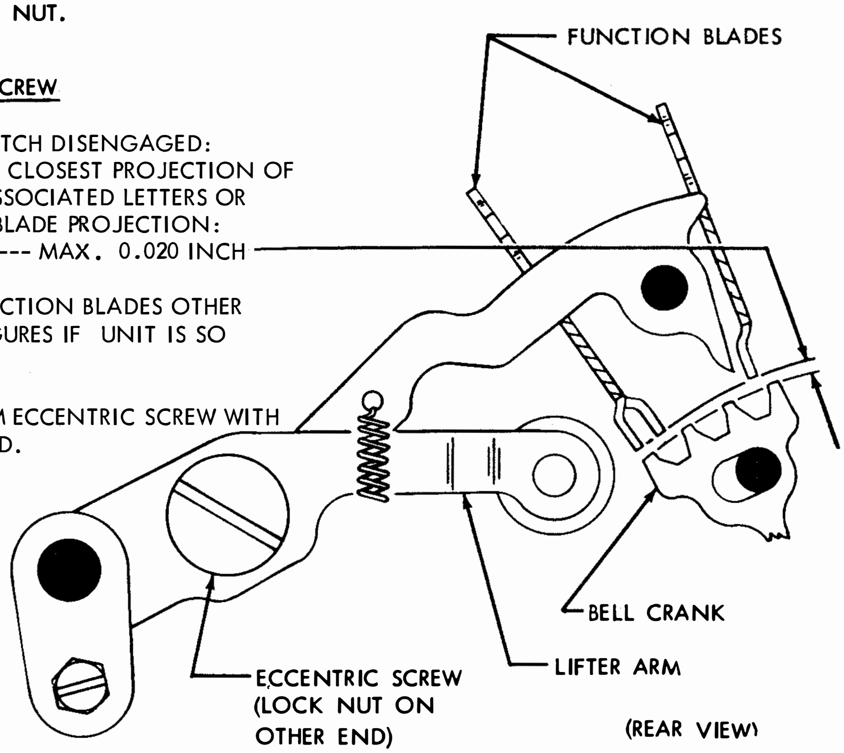
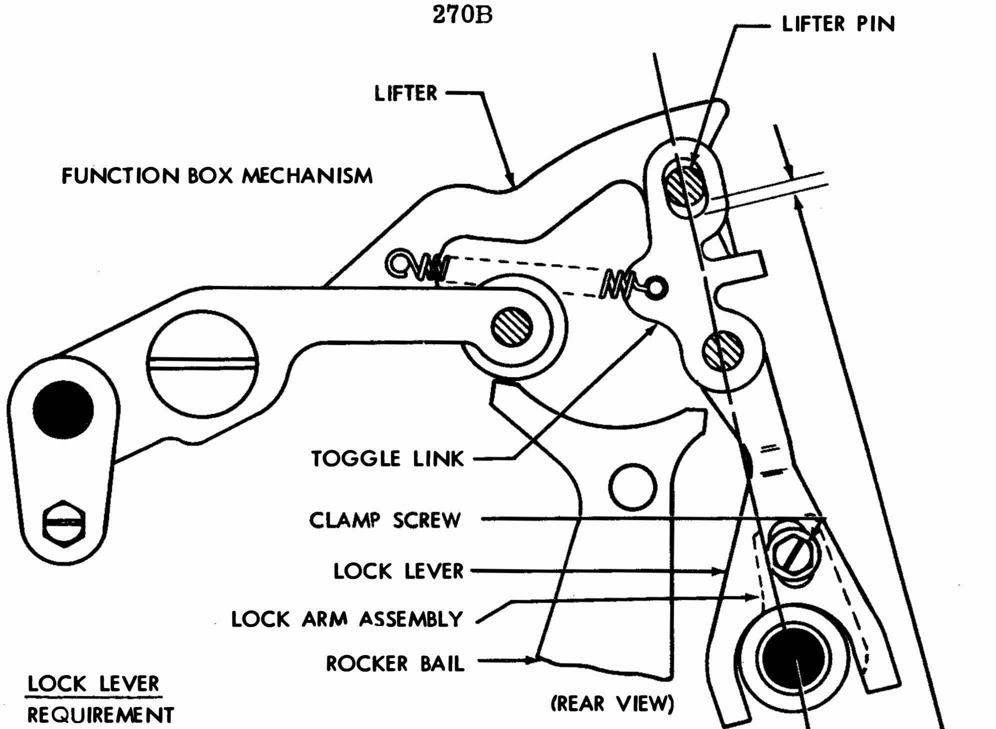


Figure 5-103. Typing Reperforator, Function Box Mechanism



LOCK LEVER

REQUIREMENT

(1) WITH LETTERS CODE COMBINATION (12345) SELECTED AND ROCKER BAIL TO EXTREME LEFT, TOGGLE LINKAGE SHOULD MOVE THROUGH POINT WHERE TOGGLE LINK AND LOCK LEVER ARE IN STRAIGHT LINE WITHOUT RAISING LIFTER.

(2) WITH TOGGLE LINK AND LOCK LEVER IN STRAIGHT LINE, CLEARANCE BETWEEN TOGGLE LINK AND LIFTER PIN:
MIN. SOME ----MAX. 0.015 INCH

TO ADJUST

POSITION LOCK LEVER ON LOCK ARM ASSEMBLY WITH CLAMP SCREW FRICTION TIGHT.

NOTE:

TO AVOID INTERFERENCE WITH LOCK LEVER, IT MAY BE NECESSARY TO MOVE HIGH PART OF CORRECTING DRIVE LINK ECCENTRIC BUSHING (SEE FIGURE 5-110) ABOVE HORIZONTAL CENTER LINE.

NO. 5 PULSE BEAM SPRING

REQUIREMENT

MIN. 10 OZS.---MAX. 15 OZS.
TO PULL SPRING TO LENGTH OF 7/16 INCH.

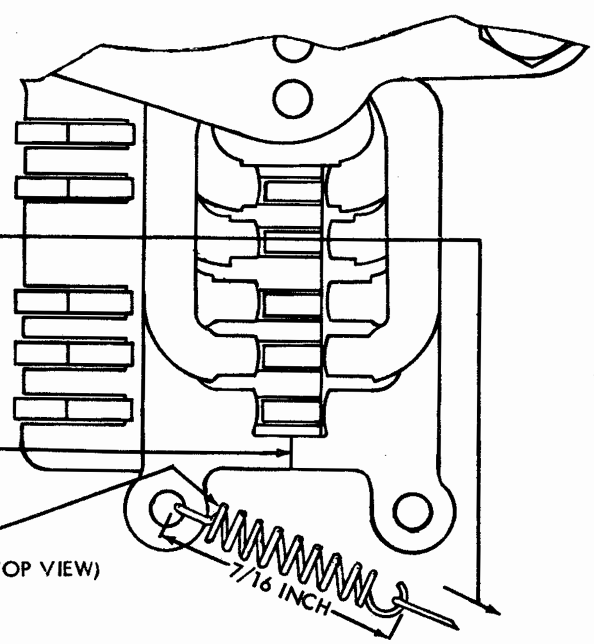


Figure 5-104. Typing Reperforator, Function Box and Transfer Mechanisms

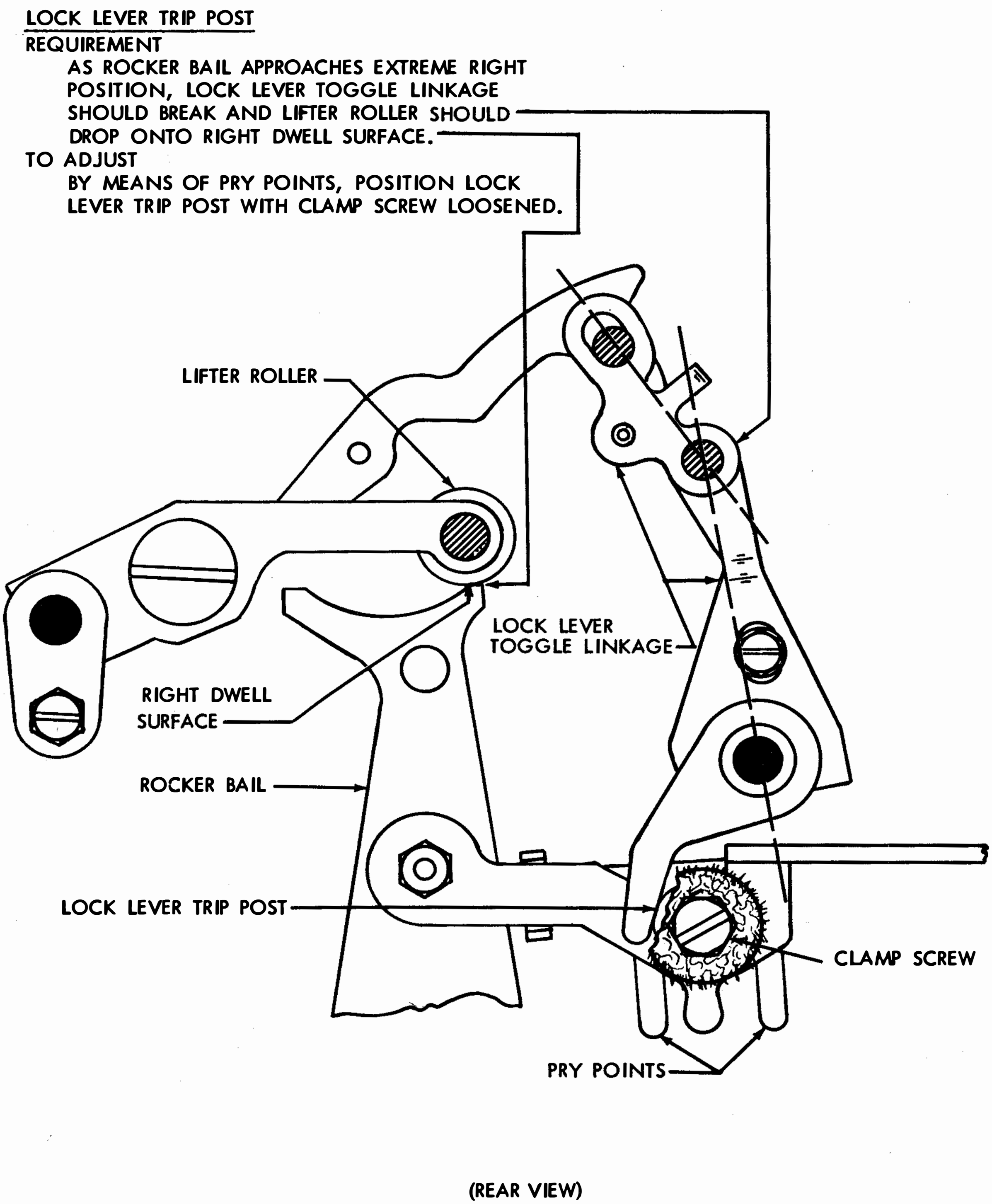


Figure 5-105. Typing Reperforator, Lock Lever Trip Post

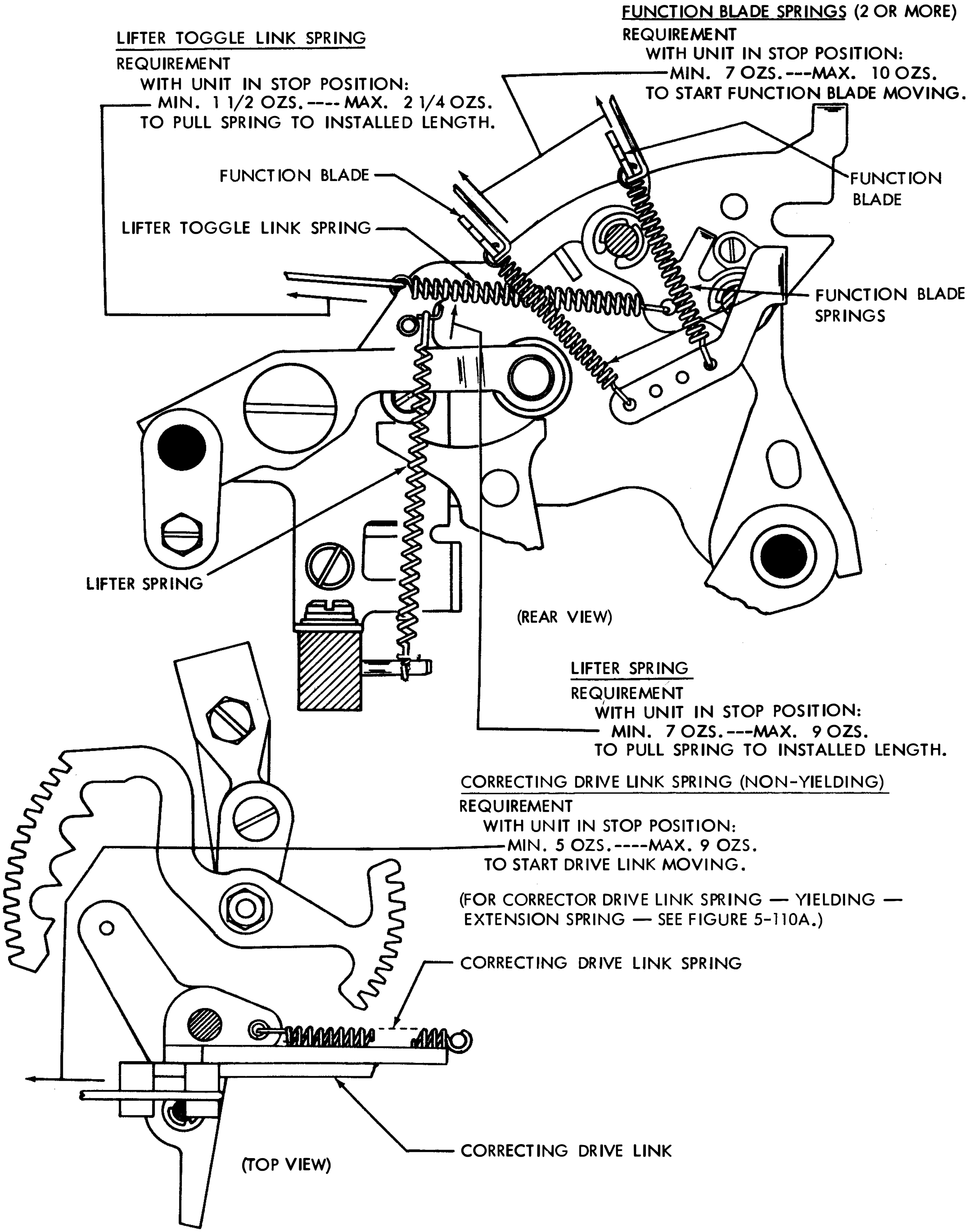


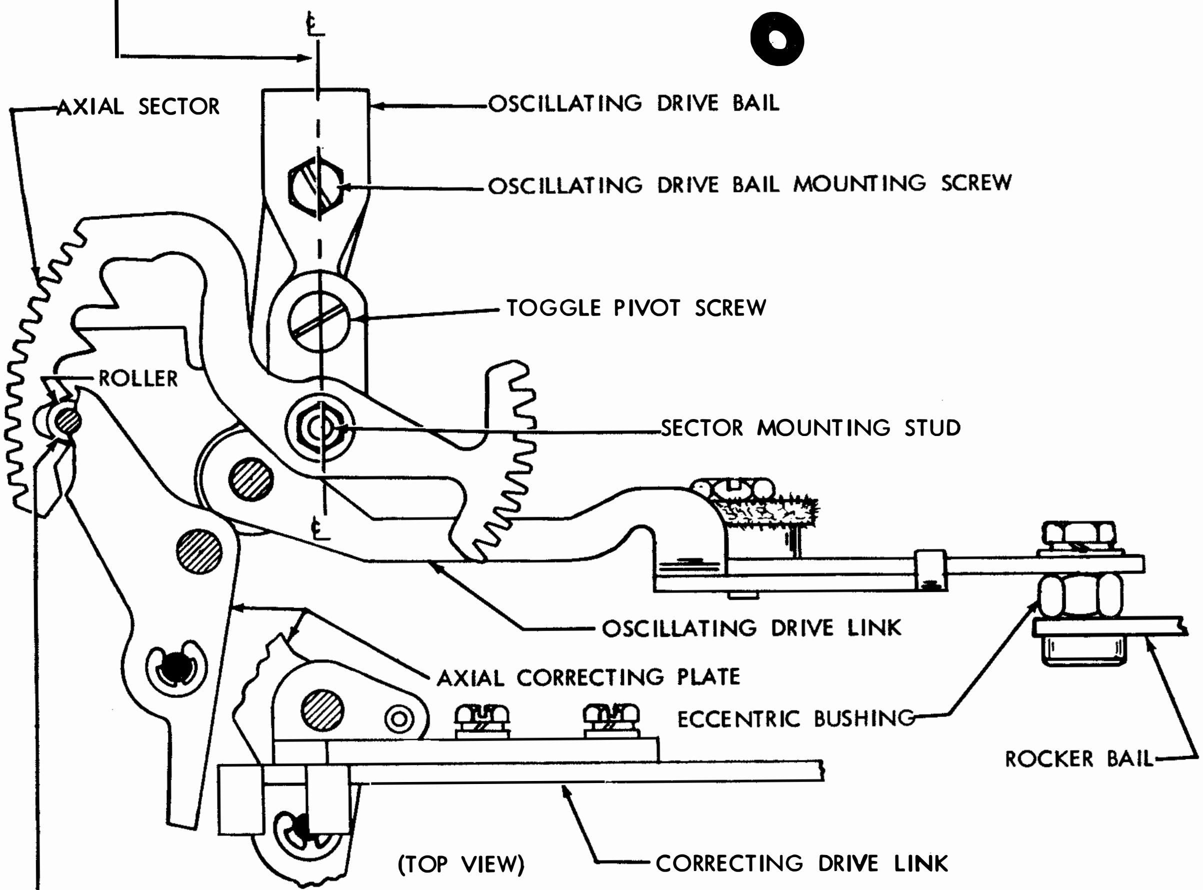
Figure 5-106. Typing Reperforator, Function Box and Correcting Mechanisms

OSCILLATING DRIVE LINK

TO CHECK
POSITION ROCKER BAIL TO ITS EXTREME LEFT.

REQUIREMENT
SECTOR MOUNTING STUD, TOGGLE PIVOT SCREW AND OSCILLATING DRIVE BAIL MOUNTING SCREW SHOULD APPROXIMATELY LINE UP.

TO ADJUST
POSITION OSCILLATING DRIVE LINK BY MEANS OF ITS ECCENTRIC BUSHING.



OSCILLATING DRIVE BAIL

REQUIREMENT
WITH "BLANK" COMBINATION SELECTED, ROTATE MAIN SHAFT, TAKING UP AXIAL PLAY IN TYPE WHEEL SHAFT TOWARD FRONT OF UNIT, THE AXIAL CORRECTOR ROLLER SHALL ENTER THE FIRST NOTCH OF THE SECTOR CENTRALLY.

TO ADJUST
LOOSEN OSCILLATING BAIL ADJUSTING SCREW. SELECT "BLANK" COMBINATION. POSITION OSCILLATING BAIL BY MEANS OF ITS ELONGATED MOUNTING HOLE SO CORRECTOR ROLLER ENTERS FIRST NOTCH OF SECTOR WHEN ROCKER BAIL MOVES TO ITS EXTREME LEFT POSITION. HOLD CORRECTOR ROLLER FIRMLY IN FIRST NOTCH AND TAKE UP PLAY IN OSCILLATING BAIL LINKAGE BY APPLYING A FORCE TO OSCILLATING BAIL TOWARD REAR OF UNIT. TIGHTEN THE OSCILLATING BAIL ADJUSTING SCREW.

Figure 5-107. Typing Reperforator, Axial Positioning Mechanism

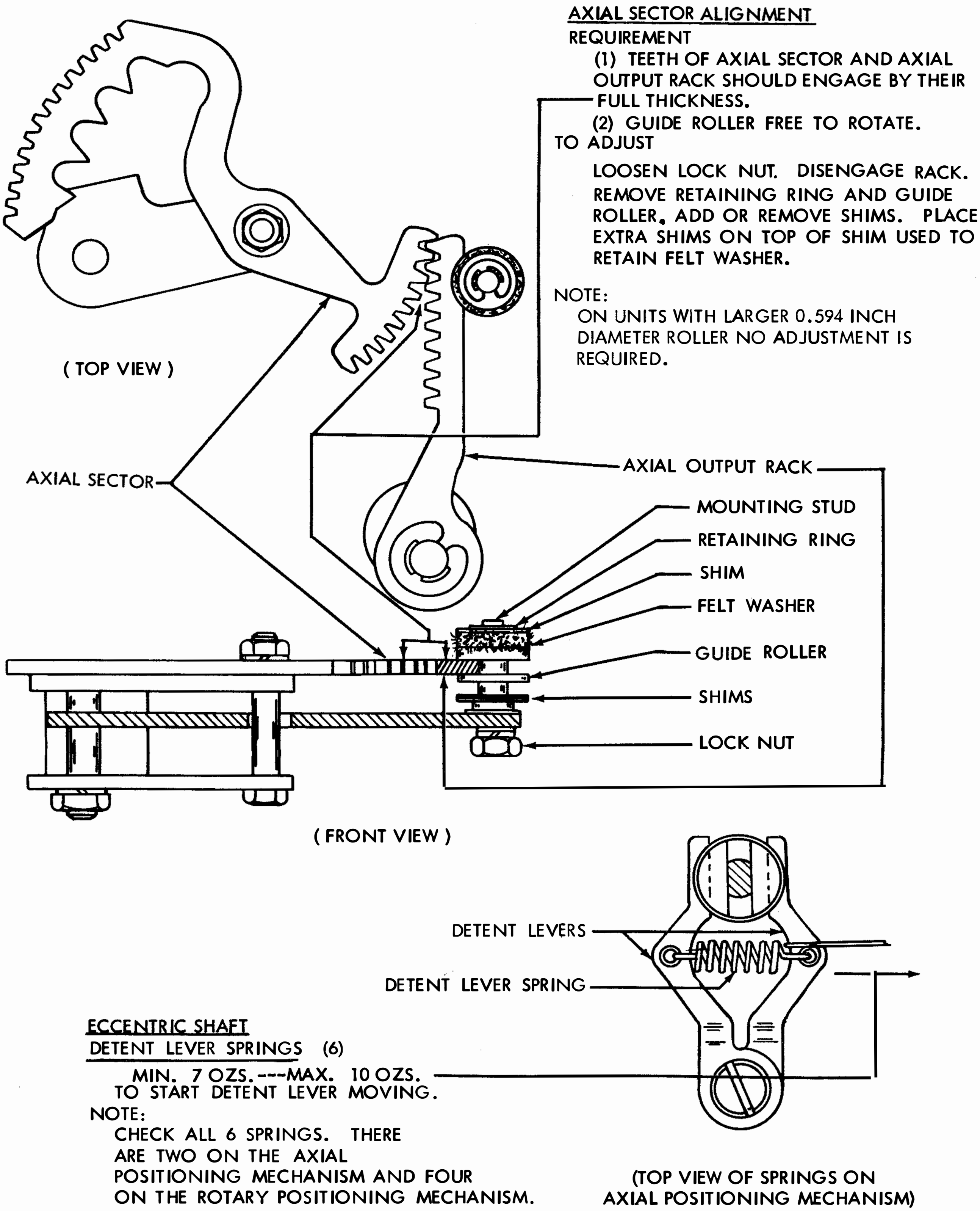
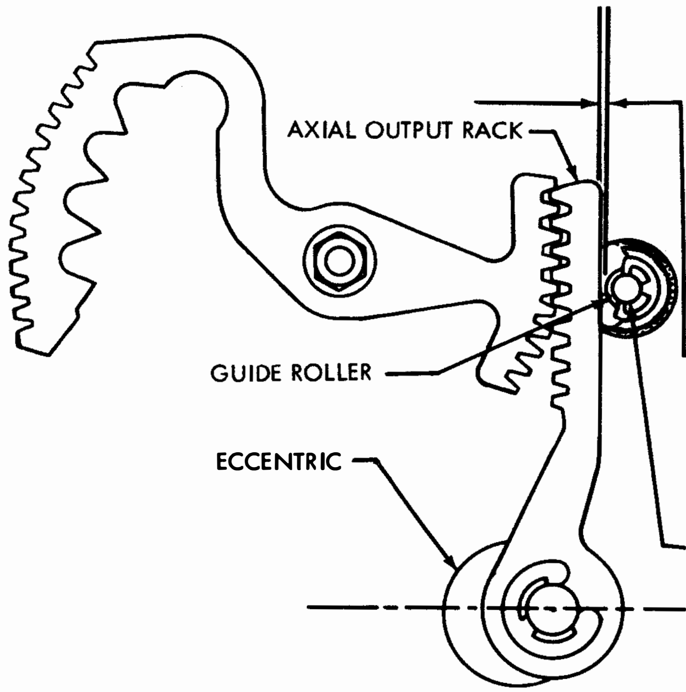


Figure 5-108. Typing Reperforator, Axial Positioning Mechanism



AXIAL OUTPUT RACK GUIDE ROLLER

TO CHECK

SELECT LINE FEED CODE COMBINATION (-2---). ROTATE MAIN SHAFT UNTIL ECCENTRIC HAS ROTATED 90 DEGREES. TAKE UP PLAY TO MAKE CLEARANCE BETWEEN OUTPUT RACK AND GUIDE ROLLER MAXIMUM.

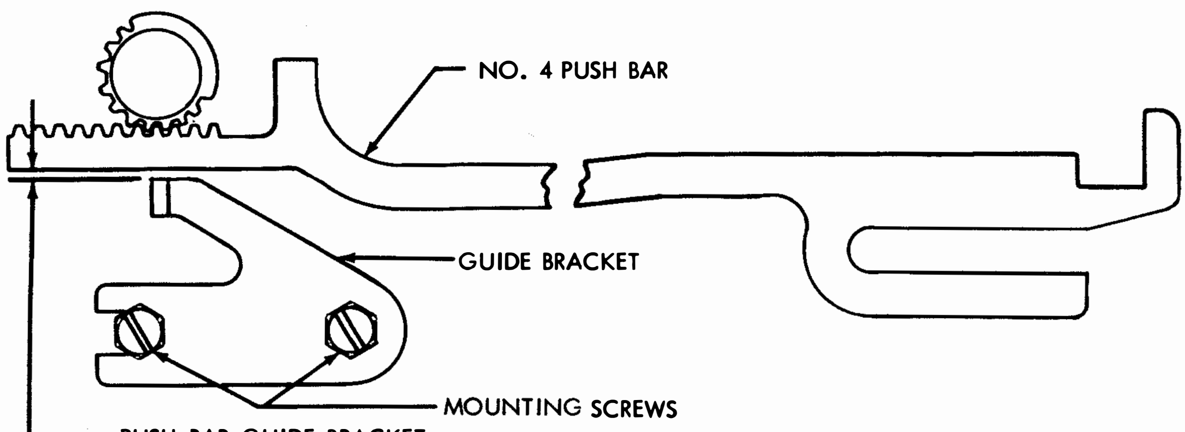
REQUIREMENT

MIN. SOME---------MAX. 0.008 INCH

TO ADJUST

POSITION GUIDE ROLLER MOUNTING STUD IN ELONGATED HOLE WITH LOCK NUT LOOSENED.

(TOP VIEW)



PUSH BAR GUIDE BRACKET

TO CHECK

MANUALLY SELECT CARRIAGE RETURN CODE COMBINATION (---4-). ROTATE MAIN SHAFT SO THAT NO. 4 PUSH BAR MOVES THROUGH COMPLETE RANGE OF TRAVEL.

REQUIREMENT

WHEN PLAY IS TAKEN UP TO MAKE CLEARANCE MAXIMUM:

MIN. SOME----MAX. 0.008 INCH

BETWEEN NO. 4 PUSH BAR AND GUIDE BRACKET THROUGHOUT COMPLETE TRAVEL OF BAR.

TO ADJUST

POSITION GUIDE BRACKET WITH MOUNTING SCREWS LOOSENED.

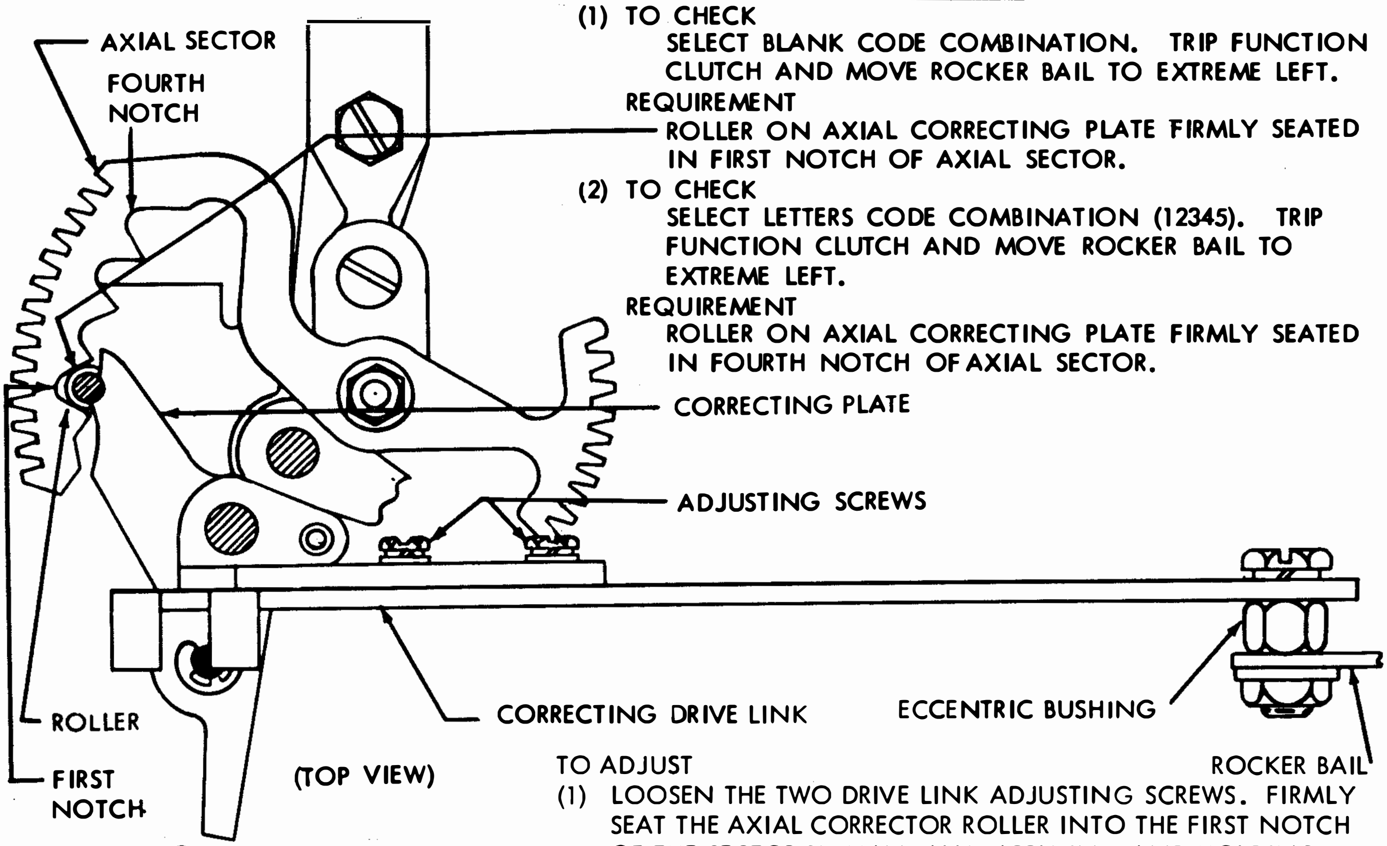
Figure 5-109. Typing Reperforator, Axial and Rotary Positioning Mechanisms

(FOR AXIAL CORRECTOR - YIELDING - SEE FIGURE 5-110A)

AXIAL CORRECTOR (NON-YIELDING)

(1) TO CHECK
SELECT BLANK CODE COMBINATION. TRIP FUNCTION CLUTCH AND MOVE ROCKER BAIL TO EXTREME LEFT.
REQUIREMENT
ROLLER ON AXIAL CORRECTING PLATE FIRMLY SEATED IN FIRST NOTCH OF AXIAL SECTOR.

(2) TO CHECK
SELECT LETTERS CODE COMBINATION (12345). TRIP FUNCTION CLUTCH AND MOVE ROCKER BAIL TO EXTREME LEFT.
REQUIREMENT
ROLLER ON AXIAL CORRECTING PLATE FIRMLY SEATED IN FOURTH NOTCH OF AXIAL SECTOR.



TO ADJUST
(1) LOOSEN THE TWO DRIVE LINK ADJUSTING SCREWS. FIRMLY SEAT THE AXIAL CORRECTOR ROLLER INTO THE FIRST NOTCH OF THE SECTOR BY MANUALLY APPLYING AND HOLDING THIS POSITION FOR THE NEXT PART OF THE ADJUSTMENT.
(2) APPLY A MANUAL PRESSURE ON THE DRIVE LINK SUCH THAT THE SLOT IN THE LINK WILL BOTTOM AGAINST THE BUSHING OF THE ROCKER BAIL.
(3) MAINTAINING PRESSURE AT THESE TWO PLACES. TIGHTEN ADJUSTING SCREWS.

IDLER GEAR ECCENTRIC SHAFT

REQUIREMENT
WITH UNIT IN LETTERS CONDITION AND FUNCTION CLUTCH DISENGAGED:
MIN. SOME ----- MAX. 0.015 INCH
CLEARANCE BETWEEN TYPEWHEEL RACK TOOTH AND IDLER GEAR TOOTH.
TO ADJUST
WITH MOUNTING SCREW LOOSENED, POSITION IDLER GEAR ECCENTRIC SHAFT BY MEANS OF THREE ADJUSTING HOLES. CHECK RACK THROUGHOUT ITS TRAVEL FOR BINDS.

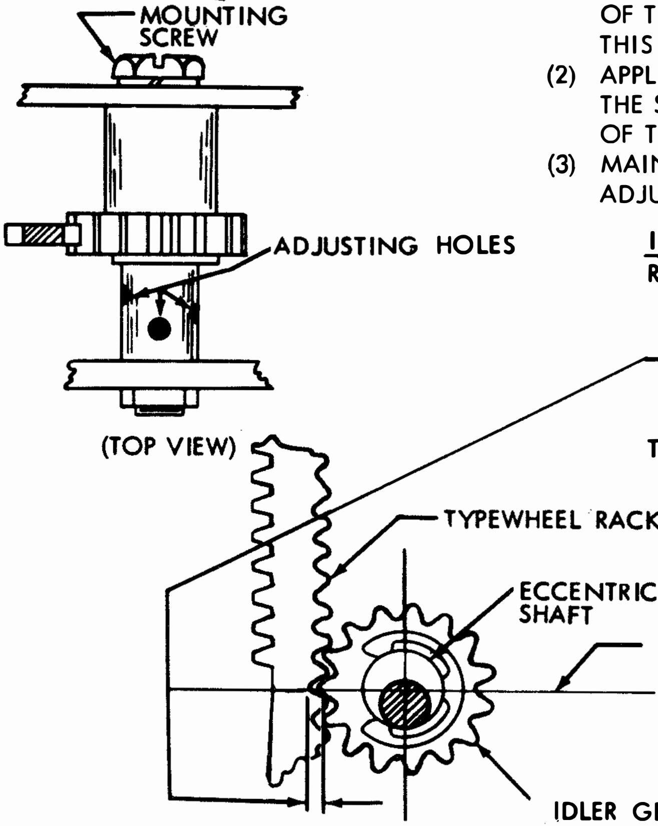


Figure 5-110. Typing Reperforator, Correcting Mechanism

CORRECTOR DRIVE LINK (YIELDING)
EXTENSION SPRING TENSION

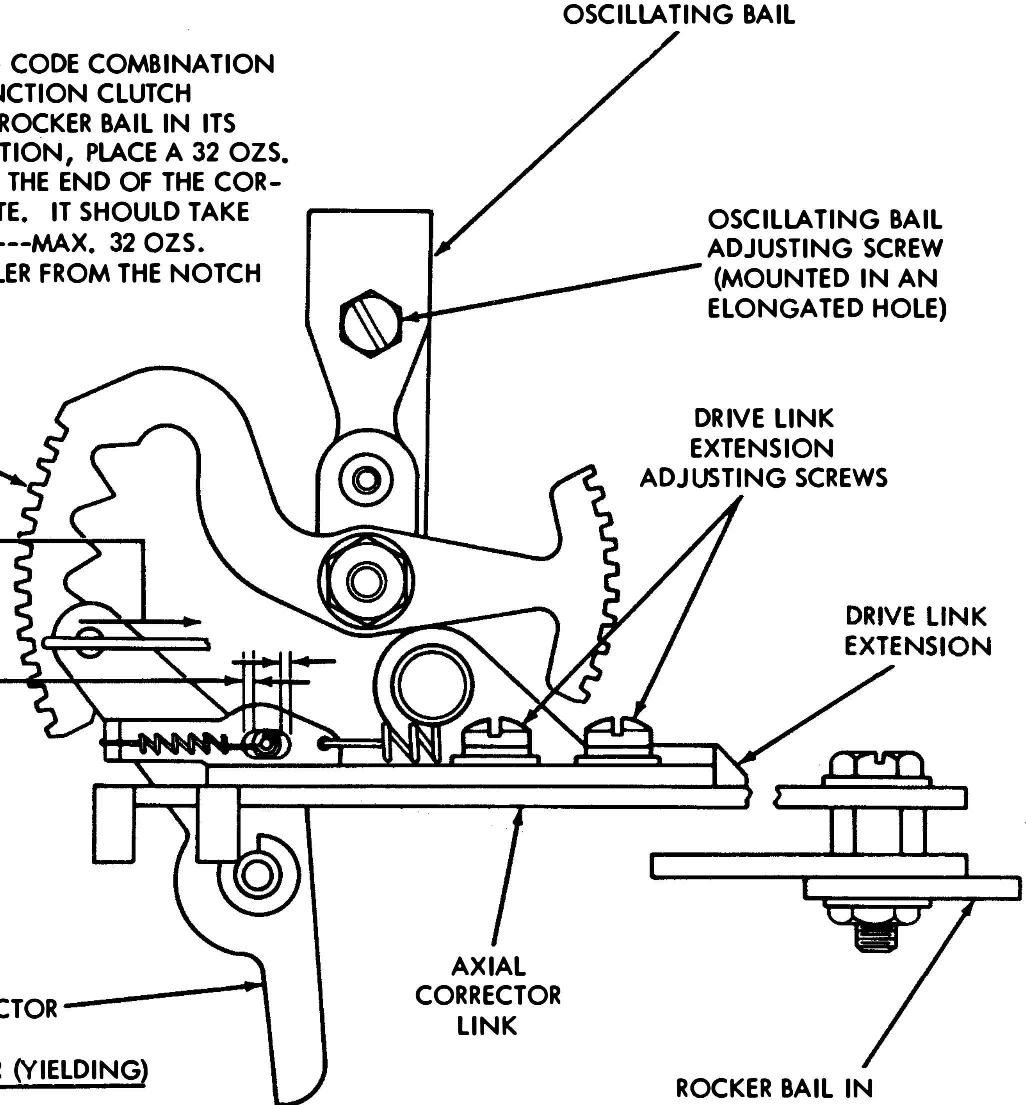
(FOR CORRECTOR DRIVE LINK SPRING-NON-YIELDING - SEE FIGURE 5-106)

REQUIREMENT

WITH ALL SPACING CODE COMBINATION SELECTED, THE FUNCTION CLUTCH TRIPPED, AND THE ROCKER BAIL IN ITS EXTREME LEFT POSITION, PLACE A 32 OZS. SPRING HOOK ON THE END OF THE CORRECTOR AXIAL PLATE. IT SHOULD TAKE

MIN. 16 OZS.---MAX. 32 OZS.

TO MOVE THE ROLLER FROM THE NOTCH IN THE SECTOR.



AXIAL CORRECTOR (YIELDING)

REQUIREMENT

WITH ALL SPACING CODE COMBINATION SELECTED, FUNCTION CLUTCH TRIPPED AND ROCKER BAIL IN ITS EXTREME LEFT POSITION, THE AXIAL CORRECTOR ROLLER SHOULD SEAT IN THE FIRST SECTOR NOTCH AND THERE SHOULD BE

MIN. 0.005 INCH

BETWEEN THE ENDS OF THE SLOT AND THE SPRING POST. CHECK BOTH SIDES AND CHECK SEATING IN FOURTH NOTCH (LETTERS SELECTION). TURN THE TRU ARC FASTENING THE DRIVE LINK EXTENSION TO THE CORRECTOR PLATE TO CHECK THE MINIMUM REQUIREMENT.

TO ADJUST

LOOSEN TWO DRIVE LINK ADJUSTING SCREWS. POSITION DRIVE LINK TO MEET THE REQUIREMENT AND RETIGHTEN THE SCREWS.

Figure 5-110A. Typing Reperforator, Correcting Mechanism

ROTARY CORRECTING LEVER

(1) TO CHECK

LOOSEN CORRECTING CLAMP ADJUSTING SCREW. WITH UNIT IN FIGURES CONDITION, SELECT NO. 9 CODE COMBINATION (---45). TRIP FUNCTION CLUTCH AND POSITION ROCKER BAIL TO EXTREME LEFT. MANUALLY SEAT ROTARY CORRECTING LEVER IN TYPE WHEEL RACK.

REQUIREMENT

SECOND TOOTH FROM TOP OF RACK SEATED BETWEEN LOBES OF CORRECTING LEVER.

TO ADJUST

LOOSEN ECCENTRIC BUSHING LOCK NUT. WITH CLAMP ADJUSTING SCREW LOOSENED AND CORRECTING LEVER PIVOT TO RIGHT OF CENTER LINE, POSITION CORRECTING LEVER. TIGHTEN BUSHING LOCK NUT. DO NOT TIGHTEN CLAMP ADJUSTING SCREW AT THIS TIME.

(2) TO CHECK

IN A MANNER SIMILAR TO THAT DESCRIBED ABOVE CHECK ENGAGEMENT OF FIFTH TOOTH (--34- CODE COMBINATION SELECTED IN FIGURES CONDITION), NINTH TOOTH (---4- CODE COMBINATION SELECTED IN LETTERS CONDITION) AND SIXTEENTH TOOTH (--3-5 CODE COMBINATION SELECTED IN LETTERS CONDITION).

TO ADJUST

REFINE ADJUSTMENT UNDER (1) ABOVE.

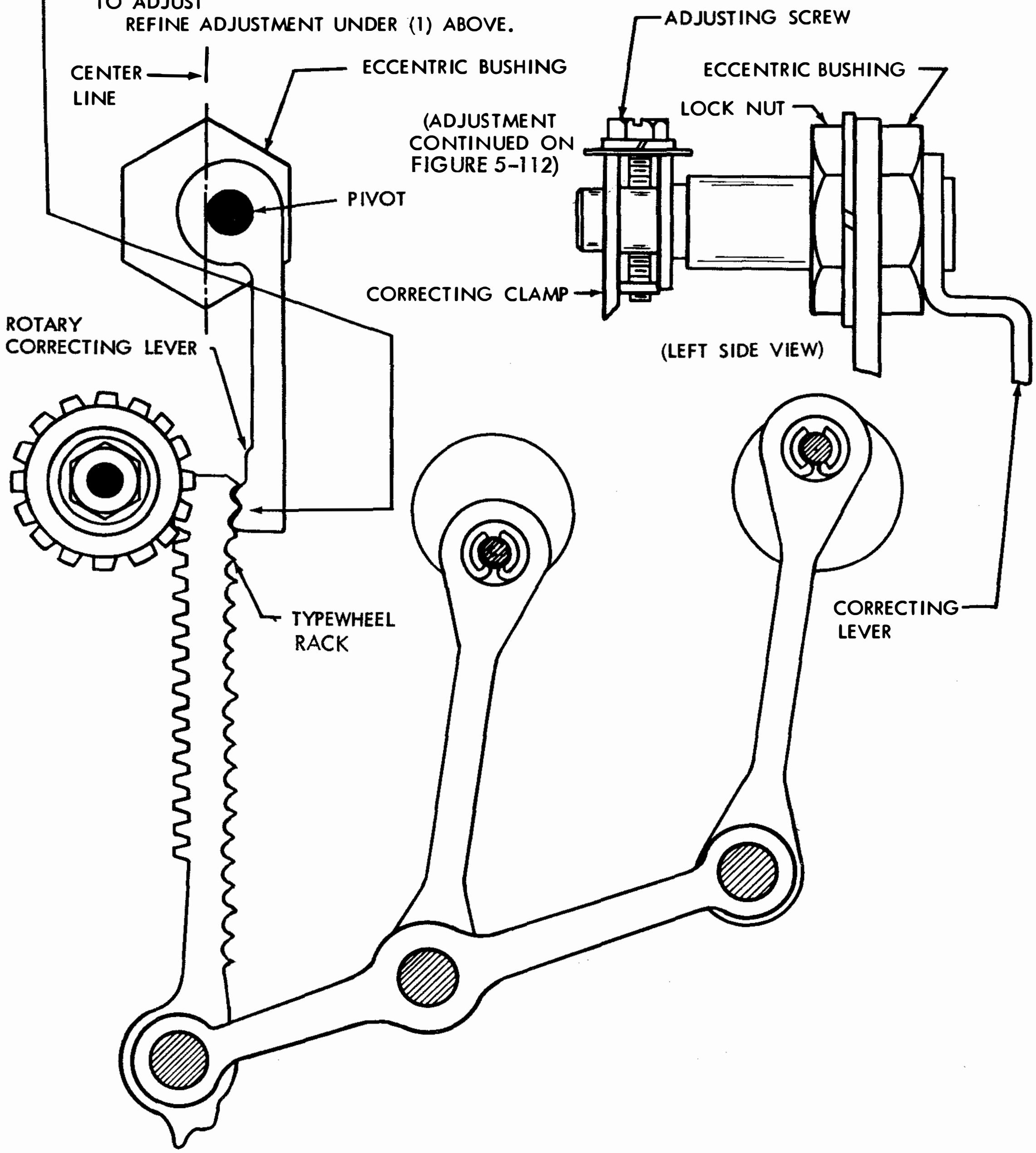
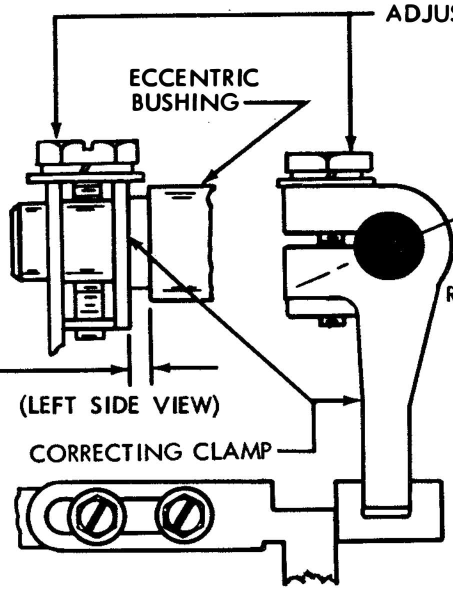
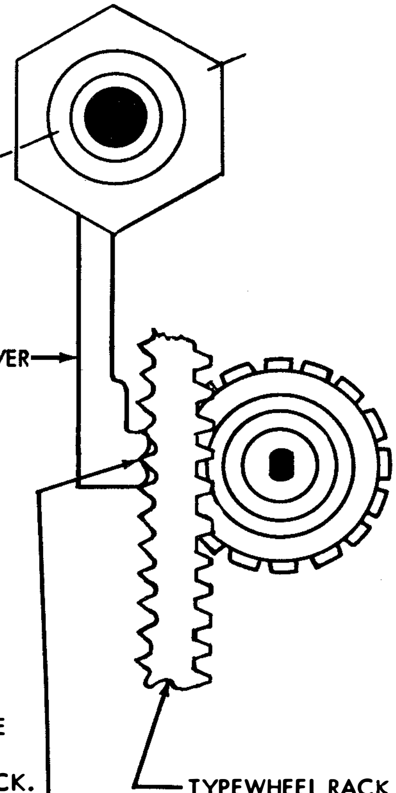


Figure 5-111. Typing Reperforator, Rotary Correcting Lever





ROTARY CORRECTING LEVER (CONTINUED FROM FIGURE 5-111)

(3) TO CHECK

WITH UNIT IN LETTERS CONDITION, SELECT LETTERS CODE COMBINATION (12345). POSITION ROCKER BAIL TO EXTREME LEFT. MANUALLY SEAT CORRECTING LEVER IN RACK.

REQUIREMENT

A. LOBES OF ROTARY CORRECTING LEVER FIRMLY SEATED IN TYPEWHEEL RACK.

B. END PLAY BETWEEN CORRECTING CLAMP AND ECCENTRIC BUSHING:
MIN. SOME----MAX. 0.006 INCH

TO ADJUST

WITH CORRECTING CLAMP ADJUSTING SCREW LOOSENED, TRIP FUNCTION CLUTCH AND ROTATE MAIN SHAFT UNTIL ROLLER ON AXIAL CORRECTING PLATE APPROACHES SEATED POSITION IN NOTCH OF AXIAL SECTOR. WHEN CLEARANCE BETWEEN ROLLER AND SECTOR IS
MIN. SOME----MAX. 0.005 INCH
POSITION CORRECTING LEVER FINGER-TIGHT AGAINST RACK. TIGHTEN CORRECTING CLAMP ADJUSTING SCREW.

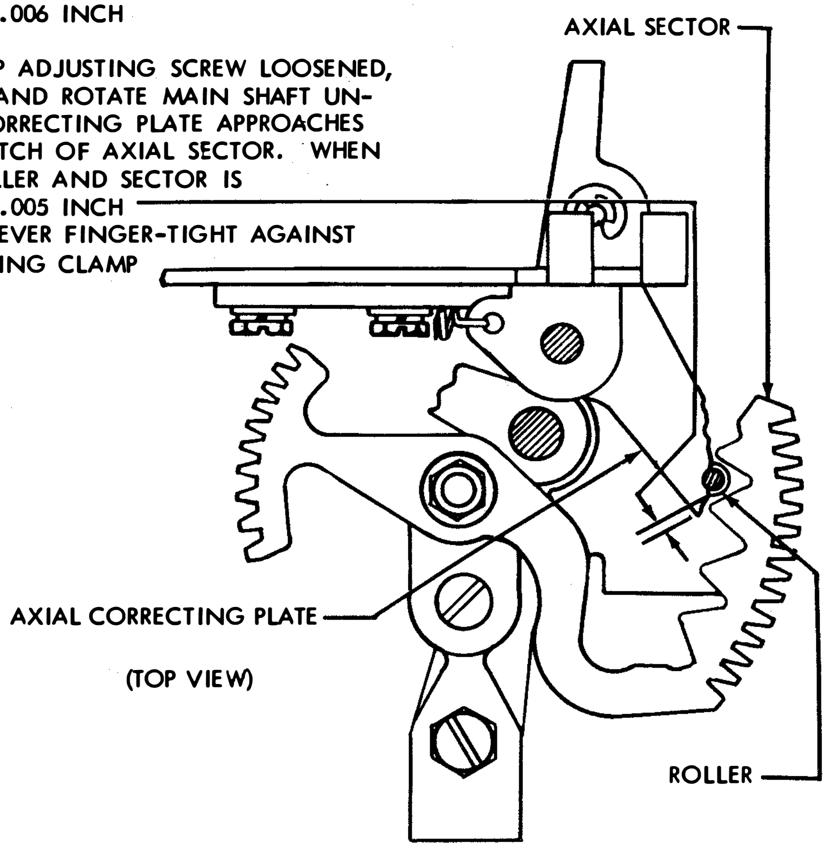


Figure 5-112. Typing Reperforator, Rotary Correcting Lever

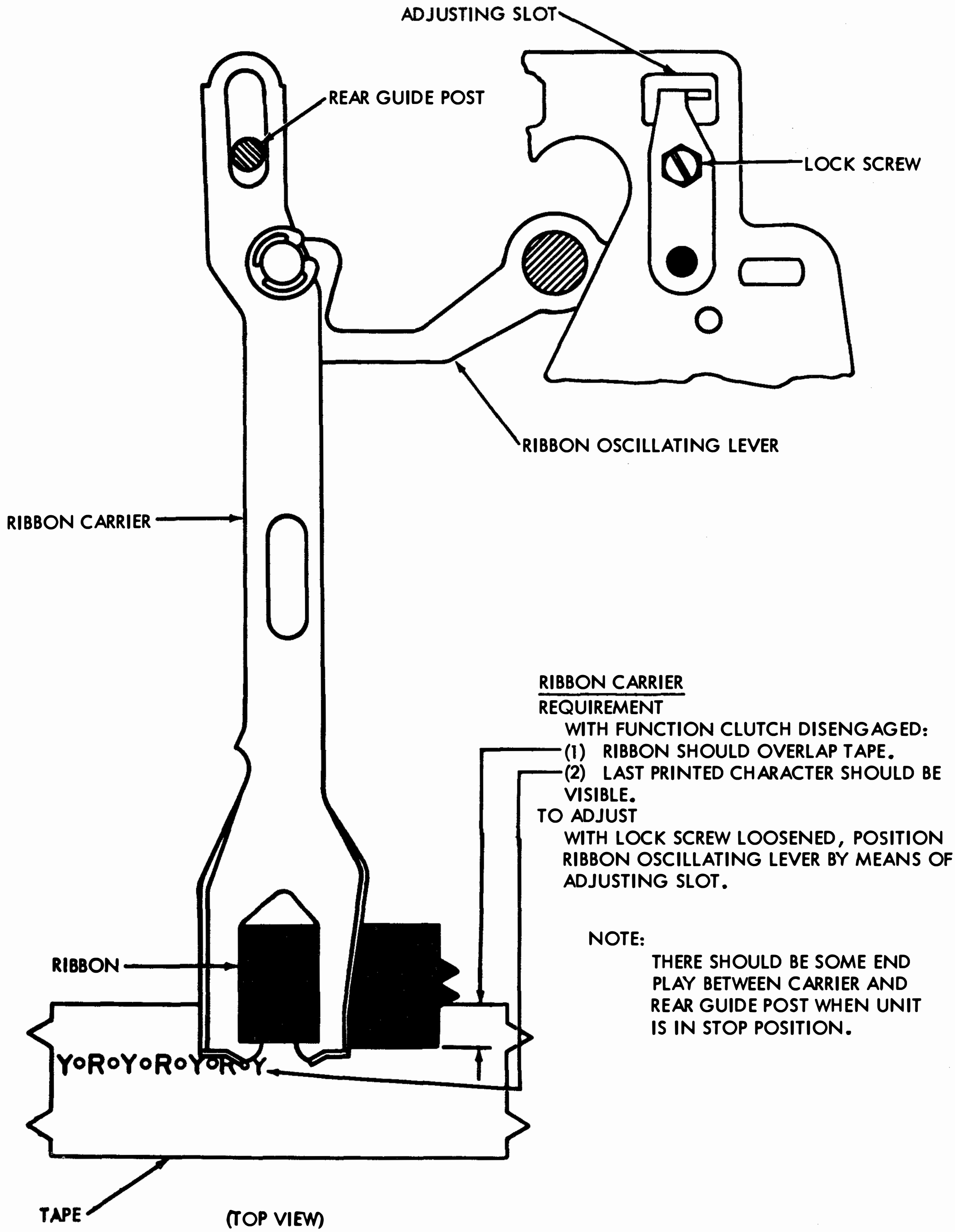


Figure 5-113. Typing Reperforator, Ribbon Oscillating Mechanism

PRINTING TRIP LINK

TO CHECK

TRIP FUNCTION CLUTCH AND POSITION ROCKER BAIL TO EXTREME LEFT. MANUALLY LIFT ACCELERATOR SO THAT LATCHING SURFACES OF PRINTING LATCH AND ACCELERATOR ARE EVEN.

REQUIREMENT

MIN. SOME --- MAX. 0.015 INCH CLEARANCE BETWEEN ACCELERATOR AND LATCH.

TO ADJUST

WITH LOCK NUT LOOSENED, POSITION PRINTING TRIP LINK BY MEANS OF ECCENTRIC MOUNTING SCREW. KEEP HIGH PART OF SCREW TO LEFT OF CENTER LINE.

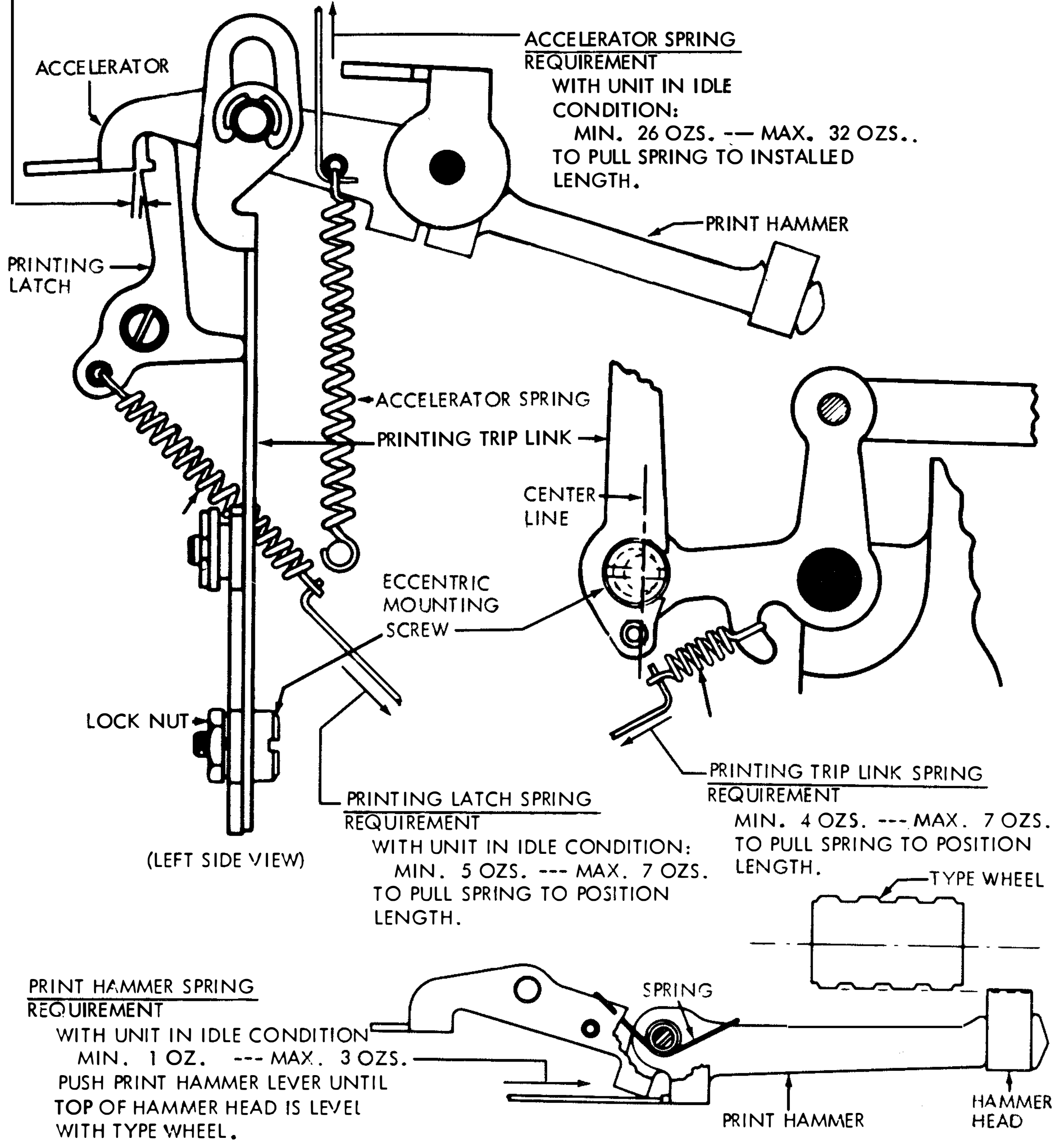
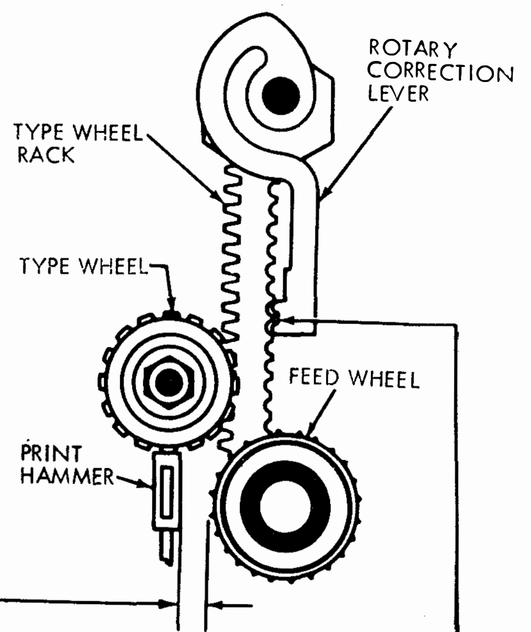
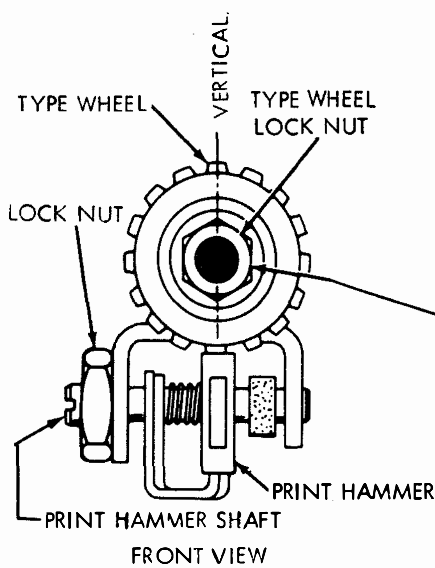


Figure 5-114. Typing Reperforator, Printing Mechanism

PRINT HAMMER (PRELIMINARY)
REQUIREMENT
POSITION PRINT HAMMER
MIN. 0.030 INCH --- MAX. 0.040 INCH
FROM THE PIN POINTS ON THE FEED WHEEL.
TO ADJUST
WITH THE PRINT HAMMER SHAFT LOCK NUT LOOSE POSITION THE PRINT HAMMER BY TURNING THE SHAFT CLOCKWISE TO MOVE PRINT HAMMER TOWARD THE FEED WHEEL AND COUNTER CLOCKWISE TO MOVE THE PRINT HAMMER AWAY FROM THE FEED WHEEL.





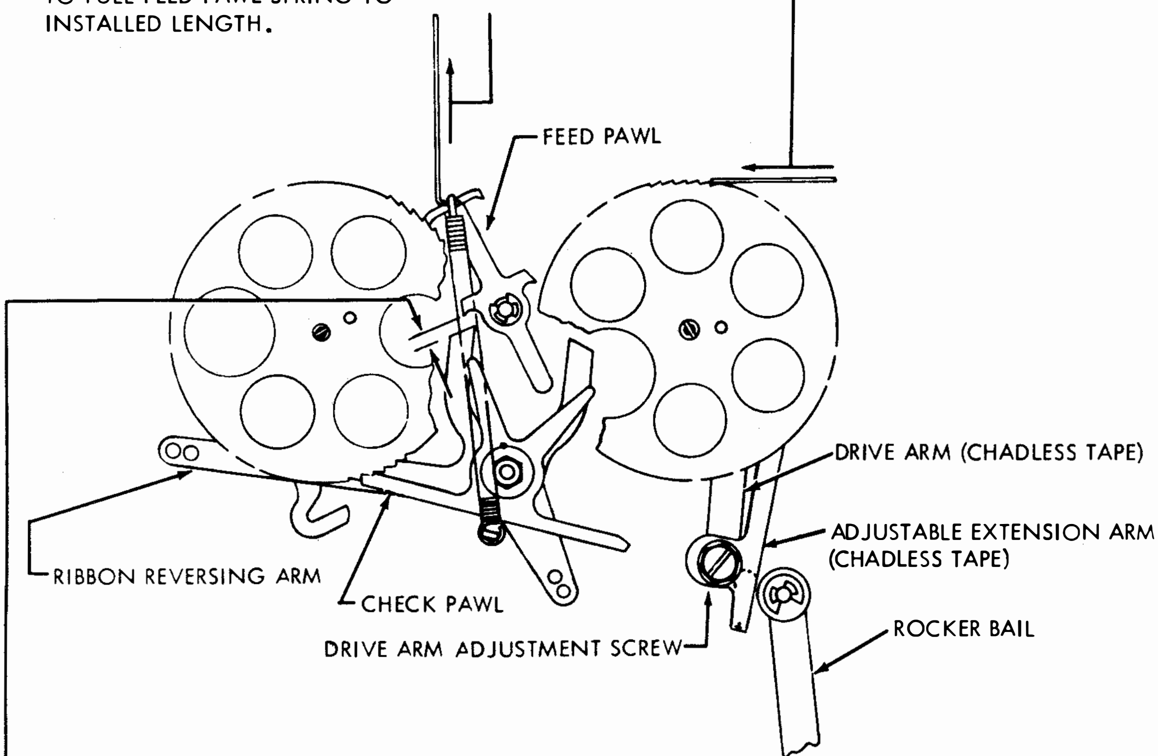
TYPE WHEEL POSITIONING AND PRINT HAMMER (FINAL)
REQUIREMENT
WITH "M" CODE COMBINATION (--345) SELECTED, AND ROCKER BAIL IN ITS EXTREME LEFT POSITION CHECK THAT THE ROTARY CORRECTOR IS FIRMLY SEATED IN THE TYPE WHEEL RACK. THE TYPE WHEEL AND PRINT HAMMER ALIGNMENT COULD BE SUCH THAT A FULL CHARACTER IS PRINTED UNIFORMLY BETWEEN THE FEED HOLES.
TO ADJUST
WITH TYPEWHEEL LOCK NUT LOOSE POSITION THE TYPE WHEEL. IF NECESSARY, REFINE THE PRINT HAMMER ADJUSTMENT MAKING CERTAIN THE PRINT HAMMER HEAD DOES NOT COME IN CONTACT WITH THE FEED WHEEL.

Figure 5-115. Typing Reperforator, Printing Mechanism

LATEST DESIGN (FOR EARLIER DESIGN SEE (FIGURES 5-118, 5-119, AND 5-119A)

RATCHET WHEEL TORQUE SPRING
REQUIREMENT
MIN. 1 OZS. --- MAX. 3 OZS.
APPLIED TANGENTIALLY TO THE RATCHET
WHEEL TO START IT TO ROTATE.

FEED PAWL SPRING
REQUIREMENT
WITH ROCKER BAIL TO EXTREME RIGHT:
MIN. 4 OZS. --- MAX. 6 OZS.
TO PULL FEED PAWL SPRING TO
INSTALLED LENGTH.



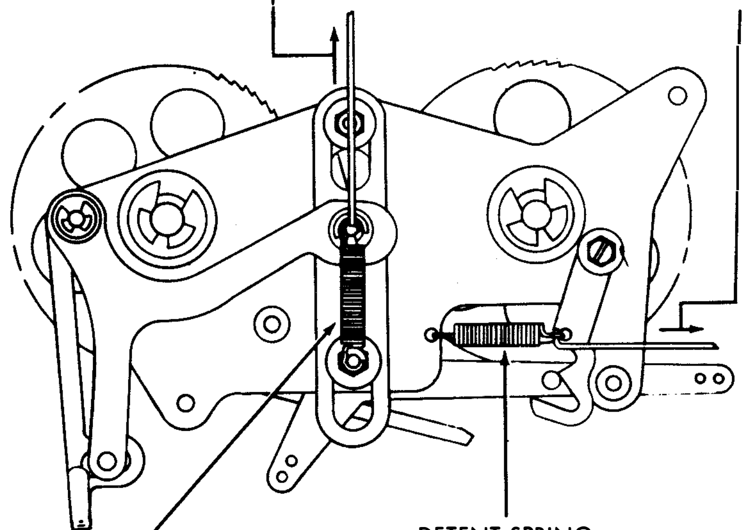
DRIVE ARM
TO CHECK
POSITION ROCKER BAIL TO EXTREME LEFT. HOLD THE RIBBON REVERSING ARM UNDER LOWER REVERSING EXTENSION OF FEED PAWL.
REQUIREMENT
(1) CLEARANCE BETWEEN BLOCKING EDGE OF RIBBON REVERSE ARM AND REVERSING EXTENSION OF FEED PAWL:
MIN. SOME
(2) CLEARANCE SHALL NOT BE SO GREAT AS TO ALLOW FEED PAWL TO FEED MORE THAN TWO TEETH AT A TIME.
(3) FEED PAWL DETENTED IN BOTH ITS RIGHT AND LEFT POSITION.
TO ADJUST
POSITION DRIVE ARM ADJUSTABLE EXTENSION LEVER WITH ITS MOUNTING SCREW LOOSENED.

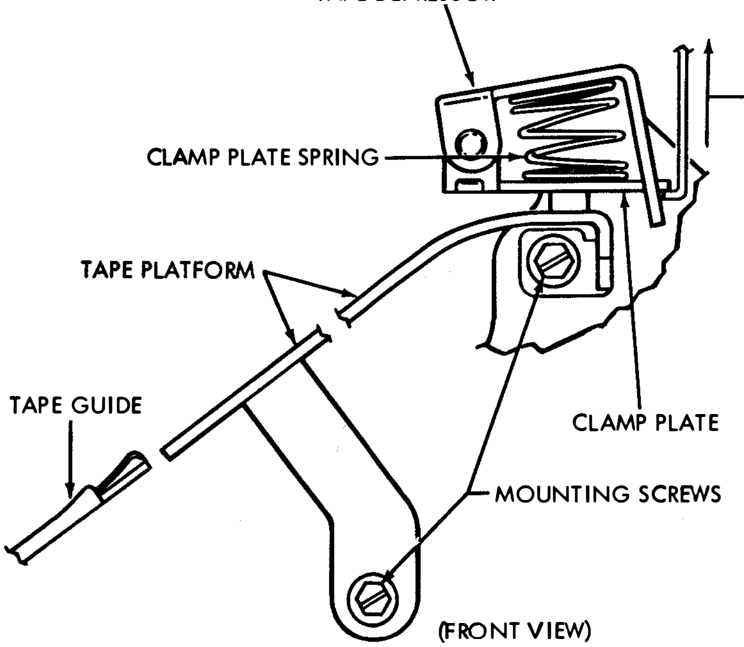
Figure 5-116. Typing Reperforator, Ribbon Feed Mechanism Latest Design

LATEST DESIGN (FOR EARLIER DESIGN SEE (FIGURES 5-118, 5-119 AND 5-119A)

DETENT SPRING
REQUIREMENT
WITH REVERSING ARM IN ITS EXTREME RIGHT OR LEFT POSITION:
MIN. 2 OZS. --- MAX. 4 OZS.
TO PULL DETENT SPRING TO ITS INSTALLED LENGTH.

DRIVE ARM SPRING
REQUIREMENT
WITH ROCKER BAIL TO EXTREME RIGHT:
MIN. 9 OZS. --- MAX. 14 OZS.
TO PULL DRIVE ARM SPRING TO INSTALLED LENGTH.





TAPE PLATFORM
REQUIREMENT
TOP SURFACE OF TAPE PLATFORM SHOULD BE FLUSH WITH TOP SURFACE OF TAPE GUIDE.

TO ADJUST
WITH TAPE PLATFORM MOUNTING SCREWS LOOSENED, POSITION TAPE PLATFORM.

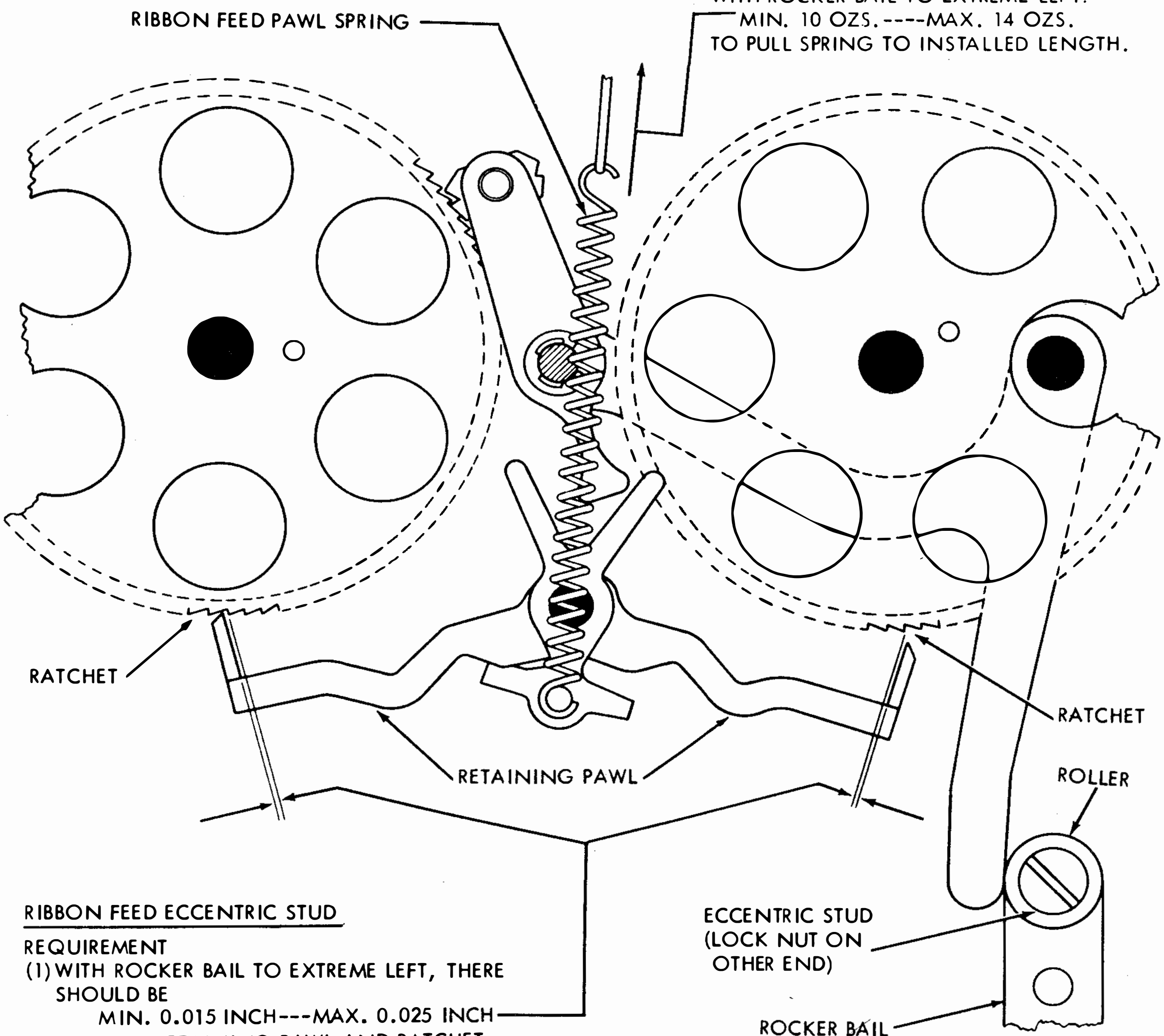
CLAMP PLATE SPRING
REQUIREMENT
FUNCTION CLUTCH DISENGAGED AND LATCHED. CLAMP PLATE SPRING BOWED TO THE RIGHT.
MIN. 18 OZS. --- MAX. 24 OZS.
TO MOVE CLAMP PLATE FROM BOTTOM OF SLOT IN TAPE DEPRESSOR.

Figure 5-117. Typing Reperforator, Ribbon Feed Mechanism (Latest Design) And Slack Tape Mechanism

EARLY DESIGN
(FOR LATEST DESIGN SEE FIGURES 5-116 AND 5-117)

RIBBON FEED PAWL SPRING

REQUIREMENT
WITH ROCKER BAIL TO EXTREME LEFT:
MIN. 10 OZS.----MAX. 14 OZS.
TO PULL SPRING TO INSTALLED LENGTH.



RIBBON FEED ECCENTRIC STUD

REQUIREMENT
(1) WITH ROCKER BAIL TO EXTREME LEFT, THERE SHOULD BE
MIN. 0.015 INCH---MAX. 0.025 INCH
BETWEEN RETAINING PAWL AND RATCHET TOOTH ON SIDE WHERE CLEARANCE IS LEAST.

TO ADJUST
(1) UNITS EQUIPPED WITH ECCENTRIC STUD: POSITION STUD WITH LOCK NUT LOOSENED.
(2) UNITS EQUIPPED WITH ADJUSTABLE ARM: BY MEANS OF PRY POINT, POSITION ADJUSTABLE ARM WITH MOUNTING SCREWS FRICTION TIGHT.

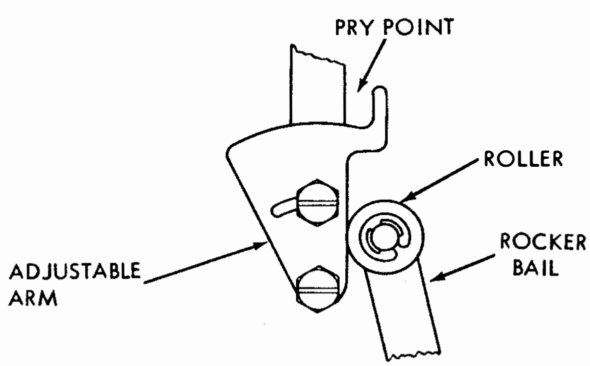


Figure 5-118. Typing Reperforator, Ribbon Feed Mechanism Early Design

EARLY DESIGN
(FOR LATEST DESIGN SEE FIGURES 5-116 AND 5-117)

RIBBON FEED DRIVE ARM SPRING

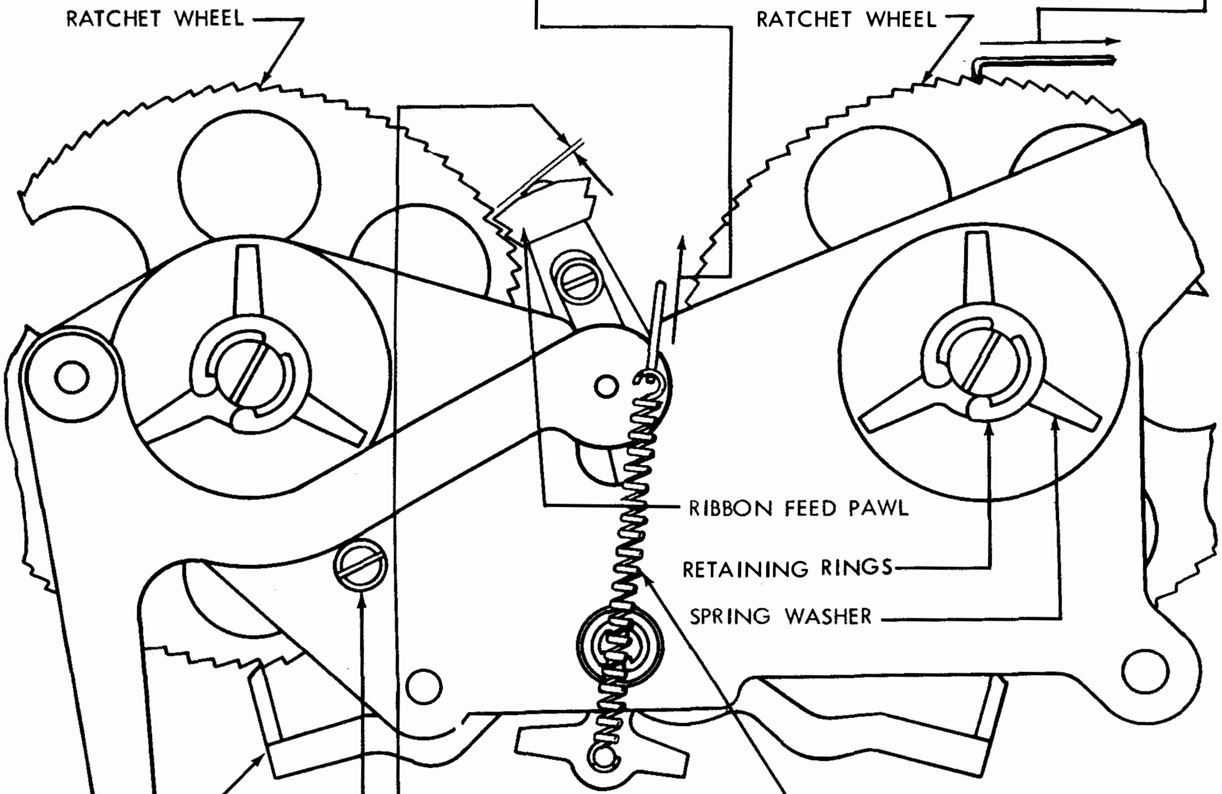
REQUIREMENT
WITH UNIT IN STOP POSITION:
MIN. 3 OZS. ----MAX. 5 OZS.
TO PULL SPRING TO INSTALLED LENGTH.

RIBBON RATCHET WHEEL SPRING WASHERS

REQUIREMENT
WITH FEED PAWL AND RETAINING PAWL SHIFTED TO OPPOSITE RATCHET WHEEL:
MIN. 1 OZ. ----MAX. 2 1/2 OZS.
TO START WHEEL TURNING.

TO ADJUST
REMOVE RETAINING RING AND BEND SPRING WASHER.

NOTE:
MAKE THIS ADJUSTMENT FOR BOTH RATCHET WHEELS.



(REAR VIEW)

RIBBON FEED PAWL DOWNSTOP ECCENTRIC

TO CHECK
DISENGAGE FUNCTION CLUTCH. TAKE UP BACKLASH IN RATCHET WHEEL SO THAT CLEARANCE BETWEEN FEED PAWL AND RATCHET TOOTH IS AT MINIMUM. MEASURE CLEARANCE. REPEAT FOR OTHER RATCHET WHEEL.

REQUIREMENT
(1) CLEARANCE BETWEEN FEED PAWL AND RATCHET TOOTH:
MIN. 020 INCH ---- MAX. 0.040 INCH
ON SIDE WHERE CLEARANCE IS LEAST.
(2) PAWL SHOULD FEED ONE TOOTH AT A TIME.

TO ADJUST
POSITION DOWNSTOP ECCENTRIC WITH LOCK NUT LOOSENED

Figure 5-119. Typing Reperforator, Ribbon Feed Mechanism Early Design

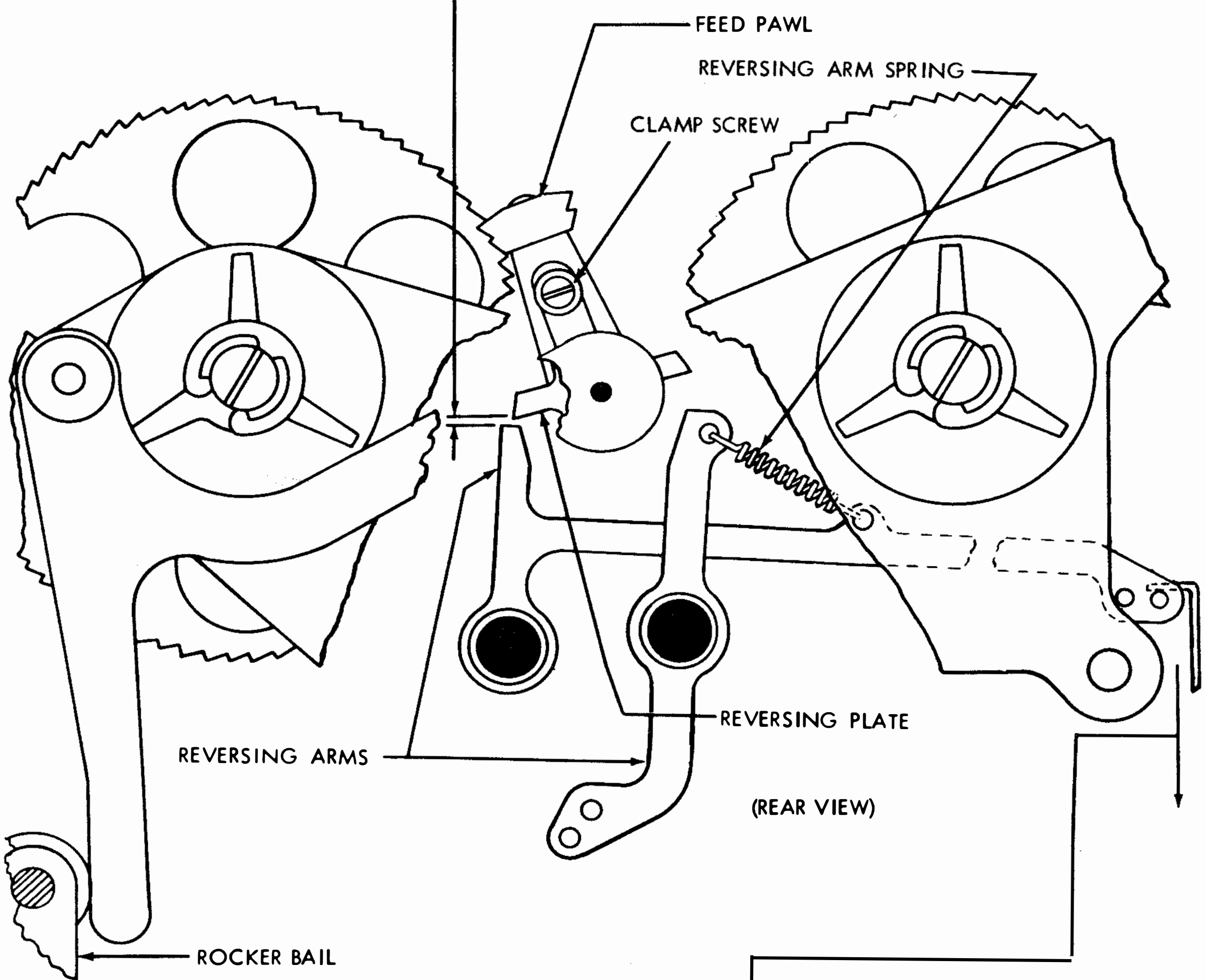
EARLY DESIGN
(FOR LATEST DESIGN SEE FIGURES 5-116 AND 5-117)

RIBBON REVERSING PLATE

TO CHECK
POSITION ROCKER BAIL TO EXTREME LEFT.
HOLD REVERSING ARM UNDER REVERSING PLATE AND MEASURE CLEARANCE.
WITH FEED PAWL AGAINST OTHER RATCHET, REPEAT PROCEDURE FOR OTHER REVERSING ARM.

REQUIREMENT
CLEARANCE BETWEEN REVERSING ARM AND REVERSING PLATE:
MIN. 0.010 INCH---MAX. 0.020 INCH
AT REVERSING ARM WHERE CLEARANCE IS LEAST.

TO ADJUST
POSITION REVERSING PLATE WITH CLAMP SCREW LOOSENED.



RIBBON FEED REVERSING ARM SPRING

REQUIREMENT
WITH FEED PAWL IN HIGHEST POSITION:
MIN. 10 GRAMS ----- MAX. 30 GRAMS
TO START REVERSING ARM MOVING.

Figure 5-119A. Typing Reperforator, Ribbon Feed Mechanism Early Design

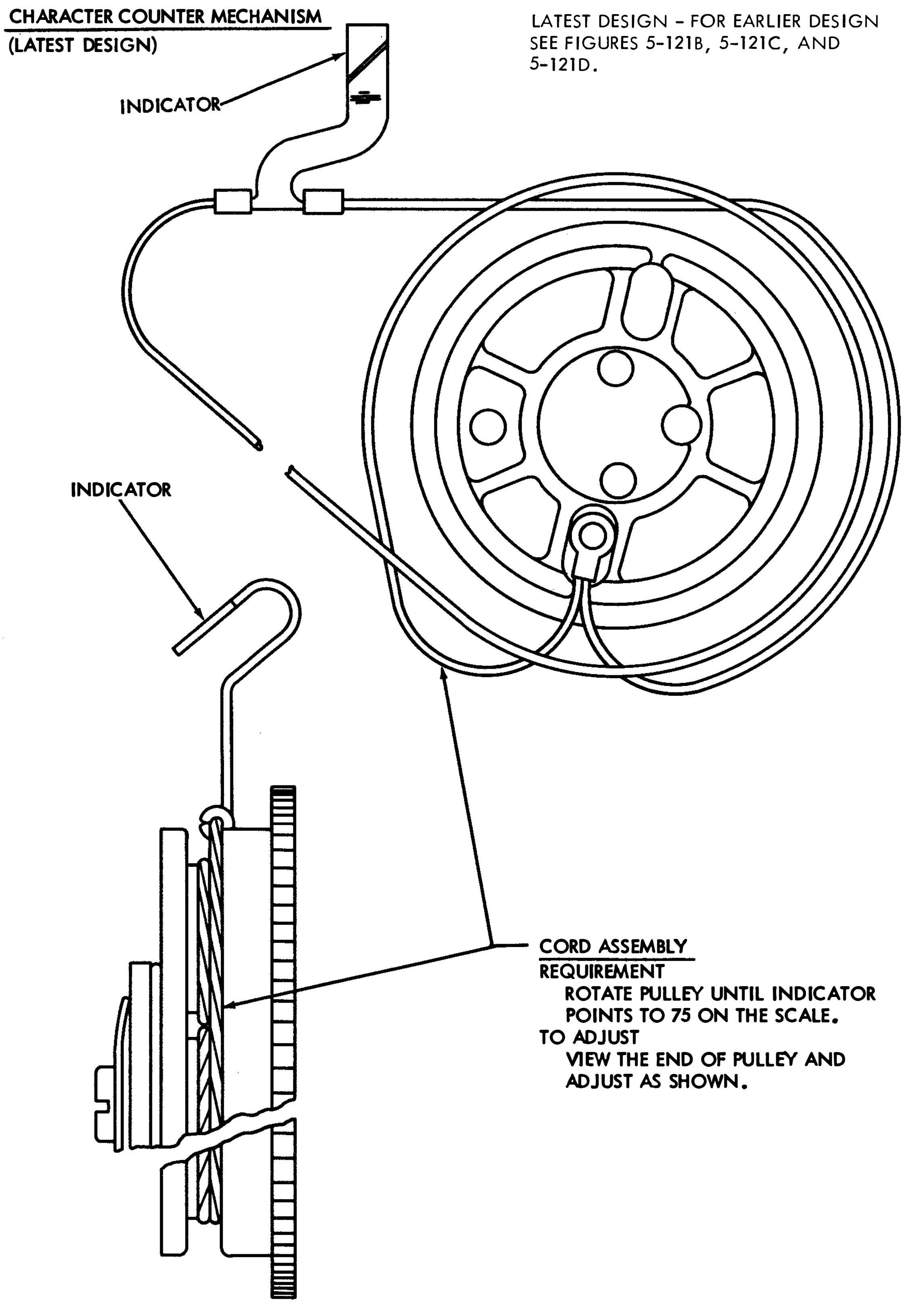
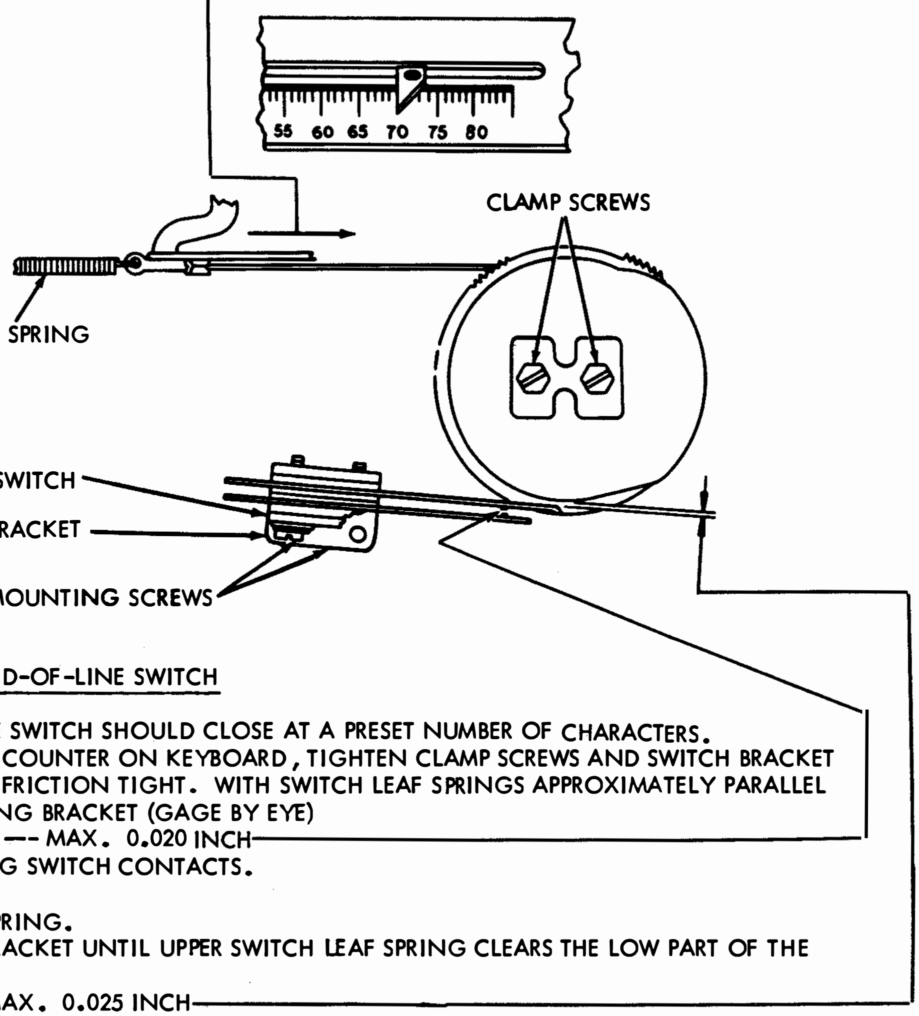


Figure 5-119B. Keyboard (LAK21BRW, LAK33BRW and LAK47BRW), Character Counter Mechanism Latest Design

LATEST DESIGN - FOR EARLIER DESIGN SEE FIGURES 5-121B, 5-121C AND 5-121D.

RATCHET DRUM ASSEMBLY RETURN SPRING
REQUIREMENT
(1) WHEN INDICATOR POINTS TO 35 ON THE SCALE.
MIN. 1/2 OZS. --- MAX. 1-1/2 OZS.
TO START INDICATOR MOVING.
(2) WHEN INDICATOR POINTS TO 70 ON THE SCALE.
MIN. 1-1/2 OZS. --- MAX. 2-1/2 OZS.
TO START INDICATOR MOVING.



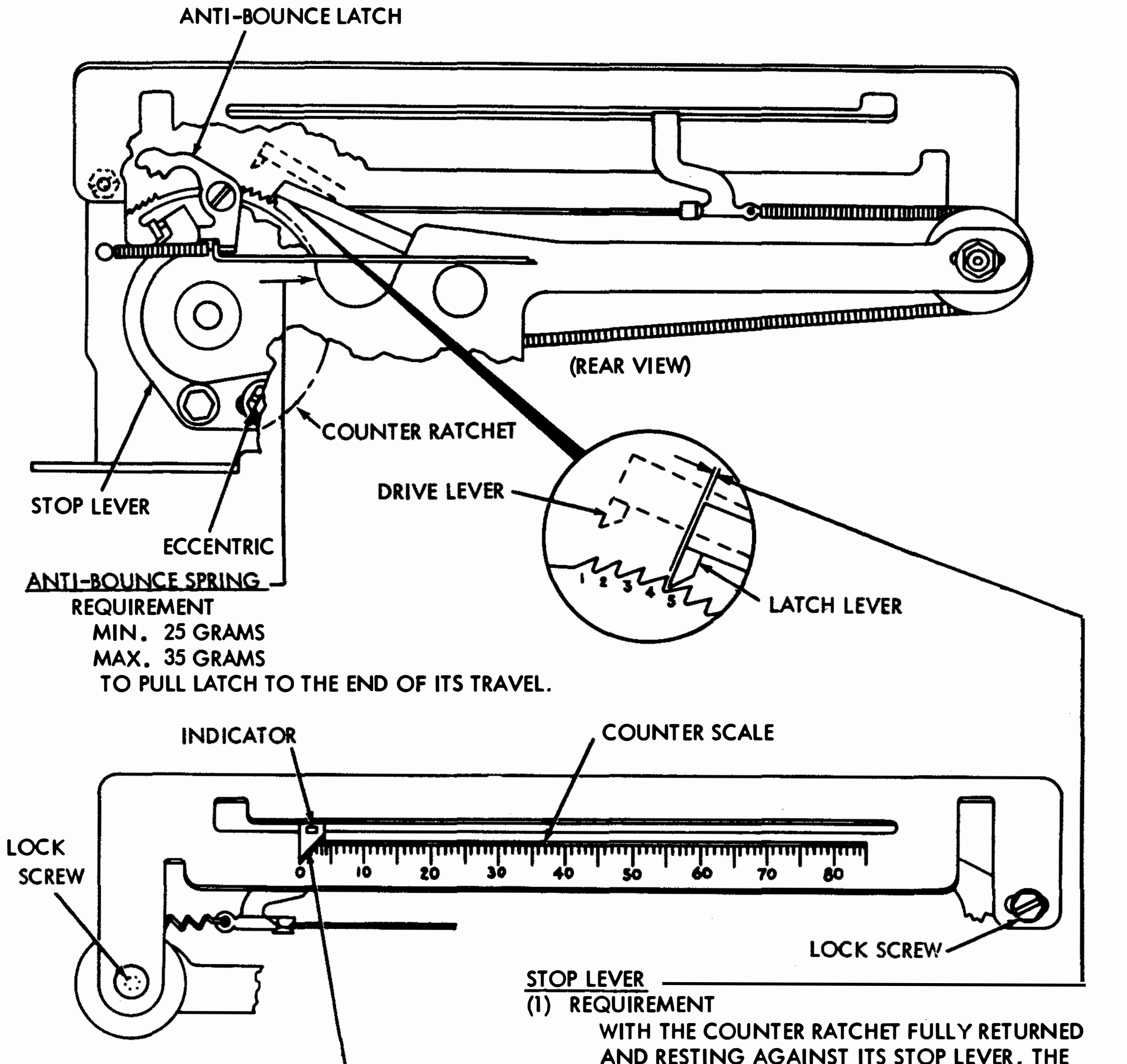
CHARACTER COUNTER END-OF-LINE SWITCH
(1) REQUIREMENT
THE END-OF-LINE SWITCH SHOULD CLOSE AT A PRESET NUMBER OF CHARACTERS.
(2) BEFORE INSTALLING COUNTER ON KEYBOARD, TIGHTEN CLAMP SCREWS AND SWITCH BRACKET MOUNTING SCREWS FRICTION TIGHT. WITH SWITCH LEAF SPRINGS APPROXIMATELY PARALLEL TO SWITCH MOUNTING BRACKET (GAGE BY EYE)
MIN. 0.005 INCH --- MAX. 0.020 INCH
BETWEEN LEAF SPRING SWITCH CONTACTS.

TO ADJUST
(1) BEND LOWER LEAF SPRING.
(2) POSITION SWITCH BRACKET UNTIL UPPER SWITCH LEAF SPRING CLEARS THE LOW PART OF THE CAM BY
MIN. SOME --- MAX. 0.025 INCH
CHECK CLOSEST POINT AND TIGHTEN MOUNTING SCREWS. SET INDICATOR TO COUNT DESIRED, AND ADJUST CAM UNTIL SWITCH JUST CLOSES. TIGHTEN CLAMP SCREWS.

TO CHECK
MOVE RATCHET DRUM UNTIL INDICATOR TRAVERSES THE ENTIRE SCALE. THE SWITCH SHOULD CLOSE ON DESIRED COUNT, WITH A SMALL AMOUNT OF OVERTRAVEL OF BOTH BLADES. IT MAY BE NECESSARY TO REFINE ABOVE ADJUSTMENTS WHEN OPERATING ON THE EXTREME ENDS OF 65 TO 80 CHARACTER RANGE.

Figure 5-120. Keyboard (LAK21BRW, LAK33BRW and LAK47BRW), Character Counter Mechanism Latest Design

LATEST DESIGN - FOR EARLIER DESIGN SEE FIGURES 5-121B, 5-121C, AND 5-121D.



ANTI-BOUNCE SPRING
REQUIREMENT
MIN. 25 GRAMS
MAX. 35 GRAMS
TO PULL LATCH TO THE END OF ITS TRAVEL.

CHARACTER COUNTER SCALE
(1) REQUIREMENT
WHEN INDICATOR IS AT EXTREME LEFT OF SCALE, IT SHOULD POINT TO ZERO.
TO ADJUST
SET INDICATOR TO LEFT. LOOSEN LOCK SCREWS AND POSITION SCALE.
(2) REQUIREMENT
POINT OF INDICATOR SHOULD NOT TOUCH THROUGHOUT ITS ENTIRE TRAVEL.
TO ADJUST
FORM THE INDICATOR.

STOP LEVER
(1) REQUIREMENT
WITH THE COUNTER RATCHET FULLY RETURNED AND RESTING AGAINST ITS STOP LEVER, THE CLEARANCE BETWEEN THE LATCH LEVER AND THE FACE OF THE 4TH RATCHET TOOTH SHOULD BE
MIN. 0.002 INCH
MAX. 0.010 INCH
(2) REQUIREMENT
THE ANTI-BOUNCE LATCH SHOULD NOT INTERFERE WITH THE ROTATION OF THE RATCHET.
TO ADJUST
HOLD THE DRIVE LEVER OUT OF ENGAGEMENT WITH THE RATCHET AND ROTATE THE STOP LEVER ECCENTRIC.

Figure 5-121. Keyboard (LAK21BRW, LAK33BRW and LAK47BRW), Character Counter Mechanism Latest Design

LATEST DESIGN - FOR EARLIER DESIGN SEE FIGURES 5-121B, 5-121C, AND 5-121D.

(A) CHARACTER COUNTER STROKE

REQUIREMENT

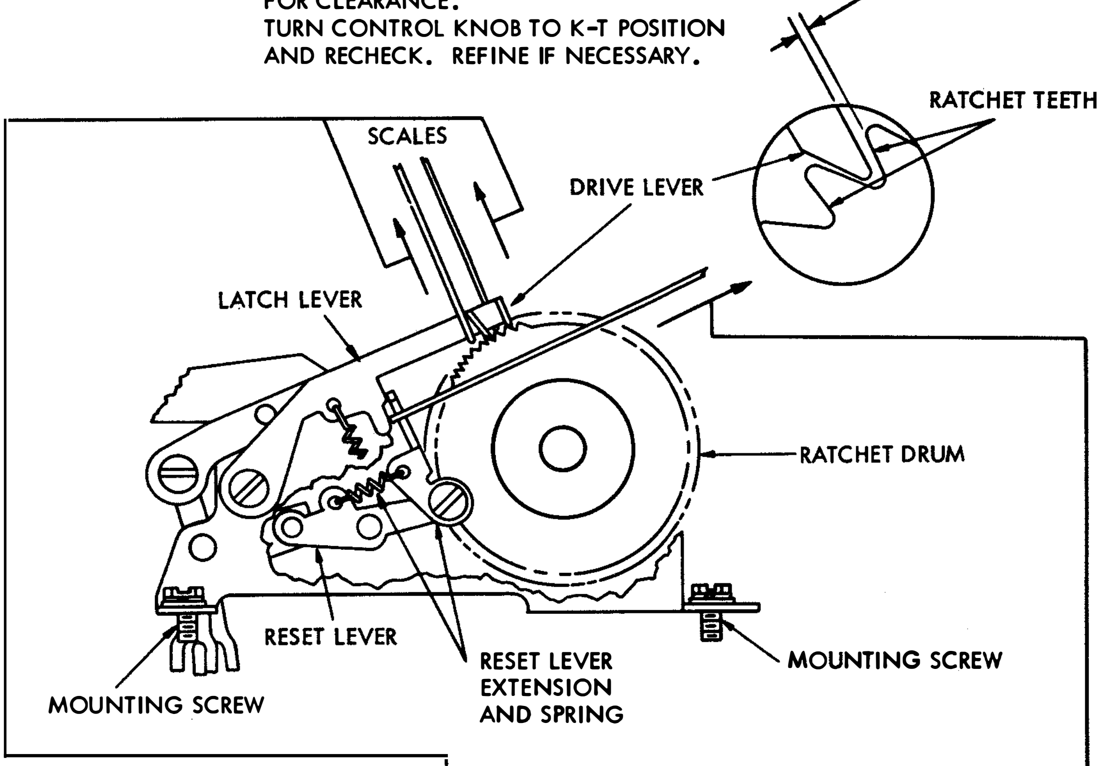
WHEN CHARACTER AND REPEAT KEYS ARE DEPRESSED, THE COUNTER SHOULD OPERATE CONSISTENTLY IN T OR K-T POSITION.
WHEN CARRIAGE RETURN KEY IS DEPRESSED, THE COUNTER SHOULD RESET WITHOUT BINDING.
THE COUNTER MECHANISM SHOULD COUNT THE FIRST CHARACTER ON A RESTART AFTER RESET CONDITION.

MIN. 0.006 INCH
MAX. 0.015 INCH

BETWEEN DRIVE LEVER AND RATCHET TOOTH, WHEN COUNTER IS SET NEAR MID-POINT OF ITS RANGE.

TO ADJUST

LOOSEN MOUNTING SCREWS.
WITH KEYBOARD IN T POSITION, START MOTOR AND STRIKE "CARRIAGE RETURN" KEY, AND THEN E KEY.
TURN OFF MOTOR. DEPRESS E KEY.
POSITION CHARACTER COUNTER FRAME FOR CLEARANCE.
TURN CONTROL KNOB TO K-T POSITION AND RECHECK. REFINE IF NECESSARY.



(C) LATCH LEVER AND DRIVE SPRING

REQUIREMENT

MIN. 1/2 OZ.
MAX. 1 OZ.
TO MOVE EITHER LEVER.

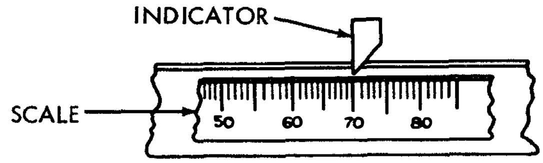
(B) RESET LEVER EXTENSION SPRING

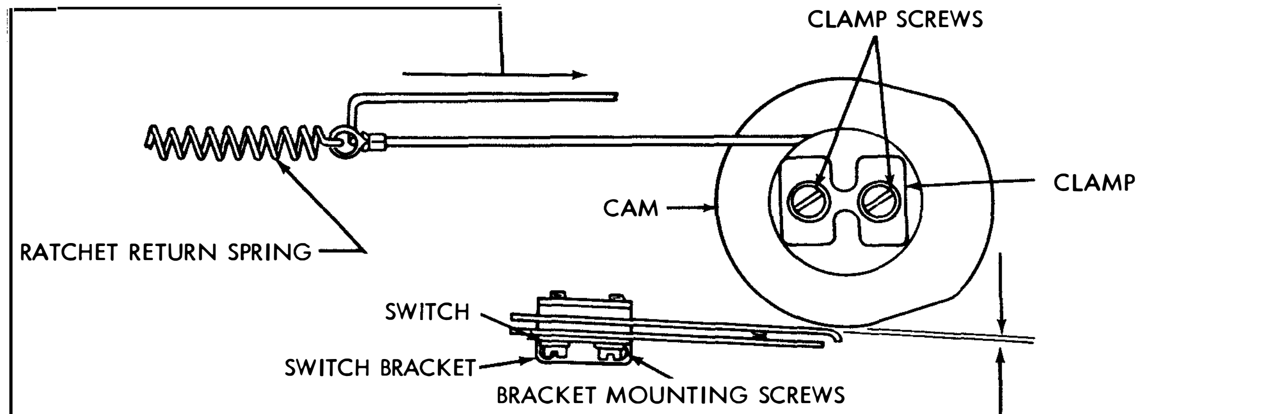
REQUIREMENT

WITH CODE BARS IN LATCHED POSITION.
MIN. 1/2 OZS. --- MAX. 1-1/4 OZS.
TO START LEVER MOVING.

Figure 5-121A. Keyboard LAK21BRW, LAK33BRW and LAK47BRW), Character Counter Mechanism Latest Design

EARLY DESIGN - FOR LATEST DESIGN SEE FIGURES 5-119B, 5-120, 5-121, AND 5-121A.





RATCHET DRUM ASSEMBLY RETURN SPRING
REQUIREMENT
1-1/2 TO 2-1/2 OZS. WHEN INDICATOR POINTS TO 0 TO START EYELET MOVING.
3-1/2 TO 6-1/2 OZS. WHEN INDICATOR POINTS TO 70 TO START EYELET MOVING.

CHARACTER COUNTER END-OF-LINE SWITCH
(1) REQUIREMENT (REMOVE CHARACTER COUNTER)
THE SWITCH SHOULD CLOSE AT A PRESET NUMBER OF CHARACTERS WITH A SMALL AMOUNT OF OVERTRAVEL BY BOTH CONTACT SPRINGS.
(2) REQUIREMENT
CLEARANCE BETWEEN LONG CONTACT SPRING AND LOW PART OF CAM.
MIN. 0.012 - MAX. 0.025 INCH
TO ADJUST
POSITION SWITCH BRACKET WITH ITS MOUNTING SCREWS LOOSENED. THEN SET COUNTER TO THE DESIRED COUNT. LOOSEN CAM CLAMP SCREWS AND POSITION CAM UNTIL CONTACTS CLOSE WITH SOME OVERTRAVEL. REPLACE UNIT.

CHARACTER COUNTER SCALE BRACKET
REQUIREMENT
INDICATOR SHOULD REST LIGHTLY ON BRACKET FOR ITS FULL TRAVEL FROM 0 TO MAX. TRAVEL
TO ADJUST
LOOSEN LOCK SCREWS AND POSITION BRACKET. CORD SHOULD REMAIN IN STRAIGHT LINE.

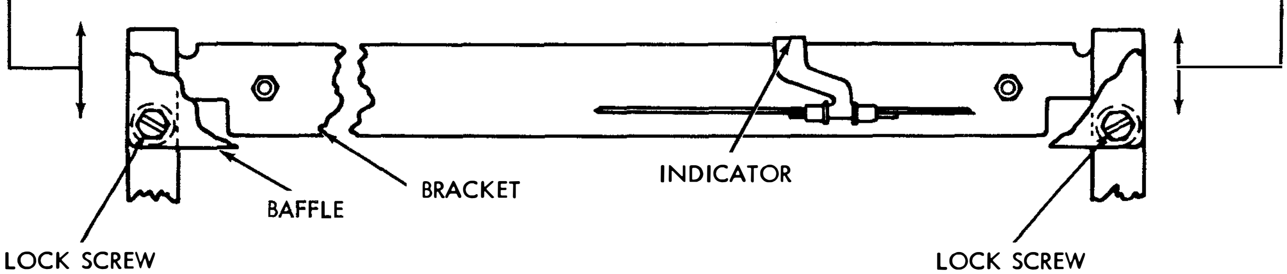
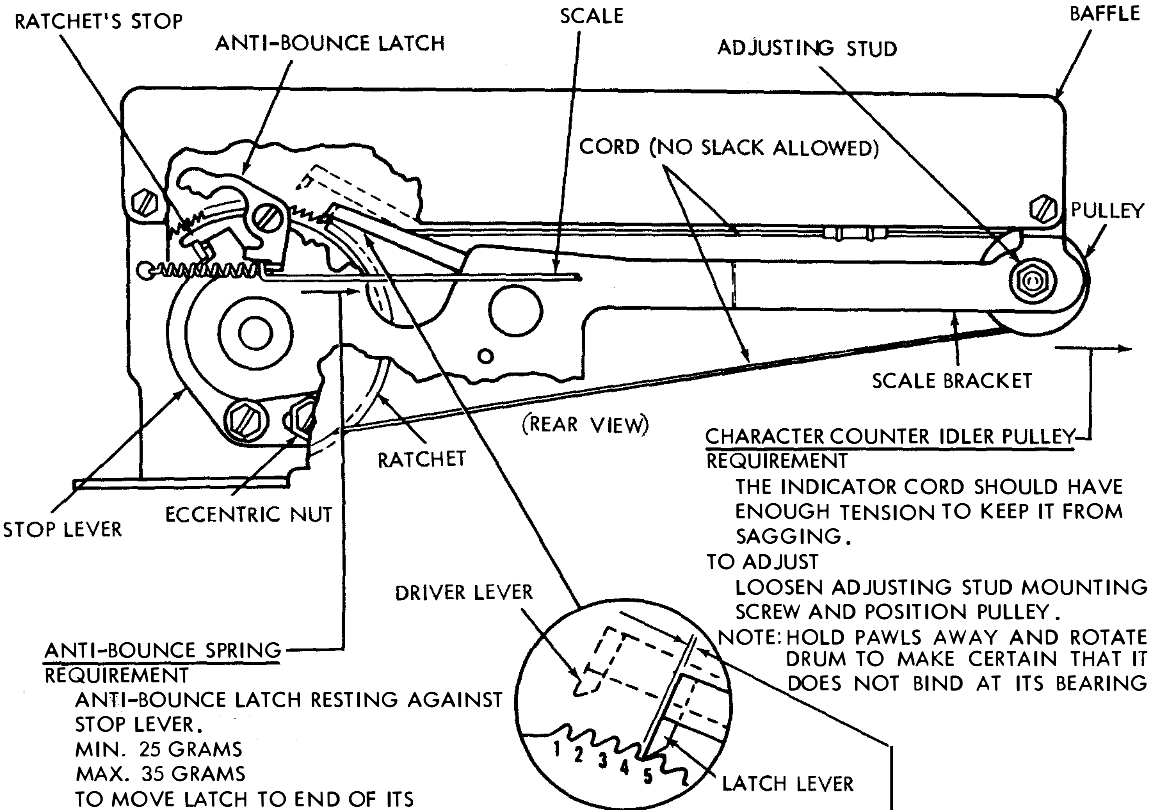


Figure 5-121B. Keyboard (LAK21BRW, LAK33BRW and LAK47BRW), Character Counter Mechanism Early Design

EARLY DESIGN - FOR LATEST DESIGN SEE FIGURES 5-119B, 5-120, 5-121, AND 5-121A



CHARACTER COUNTER IDLER PULLEY

REQUIREMENT

THE INDICATOR CORD SHOULD HAVE ENOUGH TENSION TO KEEP IT FROM SAGGING.

TO ADJUST

LOOSEN ADJUSTING STUD MOUNTING SCREW AND POSITION PULLEY.

NOTE: HOLD PAWLS AWAY AND ROTATE DRUM TO MAKE CERTAIN THAT IT DOES NOT BIND AT ITS BEARING

ANTI-BOUNCE SPRING

REQUIREMENT

ANTI-BOUNCE LATCH RESTING AGAINST STOP LEVER.
MIN. 25 GRAMS
MAX. 35 GRAMS
TO MOVE LATCH TO END OF ITS OPERATING TRAVEL

STOP LEVER

(1) REQUIREMENT

WITH THE COUNTER RATCHET FULLY RETURNED AND RESTING AGAINST ITS STOP LEVER, THE CLEARANCE BETWEEN THE LATCH LEVER AND THE FACE OF THE 4TH RATCHET TOOTH SHOULD BE
MIN. 0.002 INCH.
MAX. 0.010 INCH.

(2) REQUIREMENT

THE ANTI-BOUNCE LATCH SHOULD NOT INTERFERE WITH THE ROTATION OF THE RATCHET.

TO ADJUST

HOLD THE FEED LEVER OUT OF ENGAGEMENT WITH THE RATCHET AND ROTATE THE STOP LEVER ECCENTRIC.

CHARACTER COUNTER SCALE

REQUIREMENT

WHEN INDICATOR IS AT EXTREME LEFT OF SCALE, IT SHOULD POINT TO ZERO.

TO ADJUST

SET INDICATOR TO LEFT.
LOOSEN LOCK SCREWS AND POSITION SCALE.

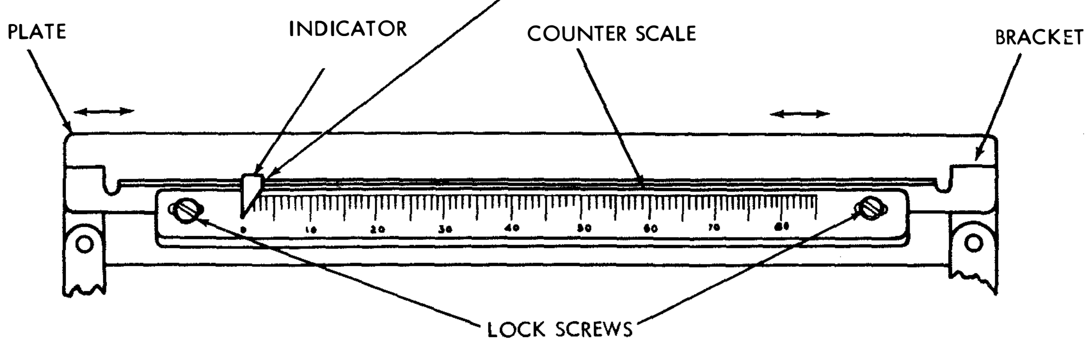
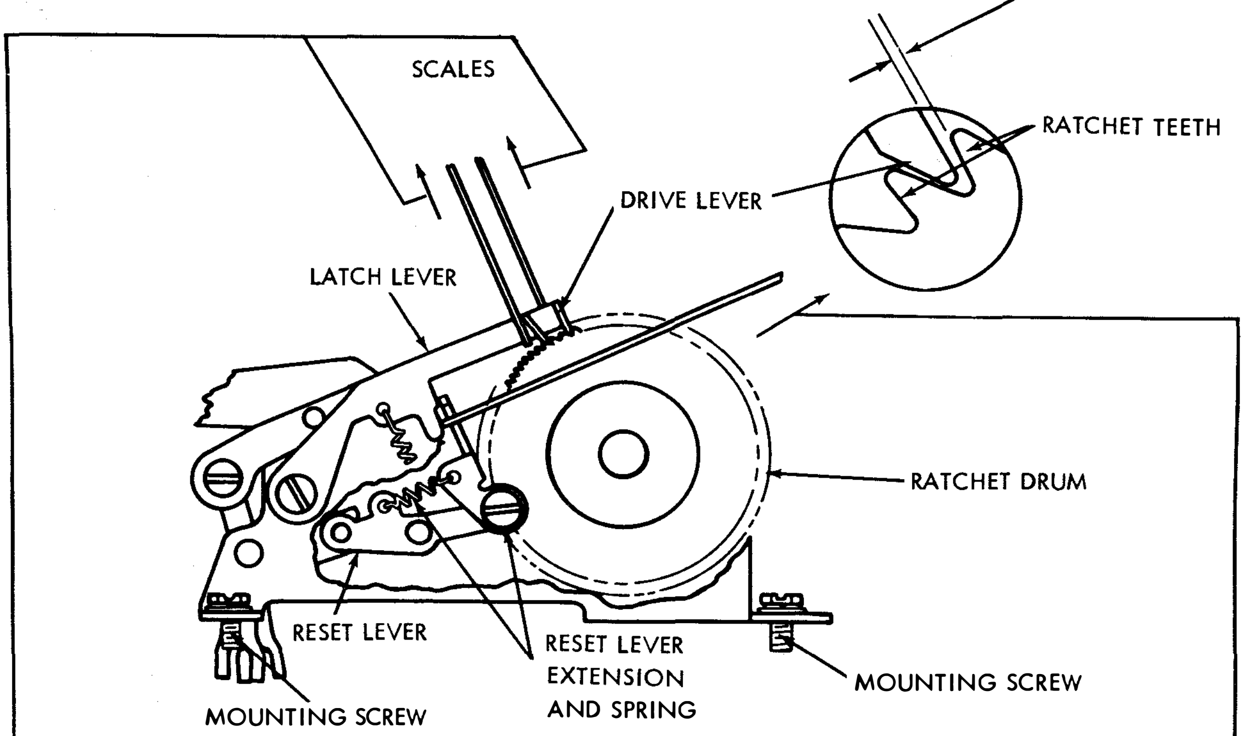


Figure 5-121C. Keyboard (LAK21BRW, LAK33BRW and LAK47BRW), Character Counter Mechanism Early Design

EARLY DESIGN - FOR LATEST DESIGN SEE FIGURES 5-119B, 5-120, 5-121, AND 5-121A.

CHARACTER COUNTER STROKE
REQUIREMENT
WHEN CHARACTER AND REPEAT KEYS ARE DEPRESSED, THE COUNTER SHOULD OPERATE CONSISTENTLY IN T POSITION.
WHEN CARRIAGE RETURN KEY IS DEPRESSED, THE COUNTER SHOULD RESET WITHOUT BINDING.
THE COUNTER MECHANISM SHOULD COUNT THE FIRST CHARACTER ON A RESTART AFTER RESET CONDITION.
MIN. 0.006 INCH
MAX. 0.012 INCH
BETWEEN DRIVE LEVER AND RATCHET TOOTH, WHEN COUNTER IS SET NEAR MID-POINT OF ITS RANGE.
TO ADJUST
LOOSEN MOUNTING SCREWS.
WITH KEYBOARD IN T POSITION, START MOTOR AND STRIKE "CARRIAGE RETURN" KEY, AND THEN "E" KEY.
TURN OFF MOTOR. DEPRESS "E" KEY. POSITION CHARACTER COUNTER FRAME FOR CLEARANCE.
TURN SELECTOR SWITCH KNOB TO K-T POSITION AND BACK TO T POSITION. RECHECK AND REFINE IF NECESSARY.



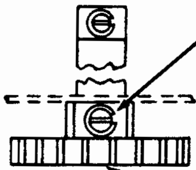
LATCH LEVER AND DRIVE LEVER SPRING
REQUIREMENT
MIN. 1/2 OZ.
MAX. 1 OZ.
TO MOVE EITHER LEVER.

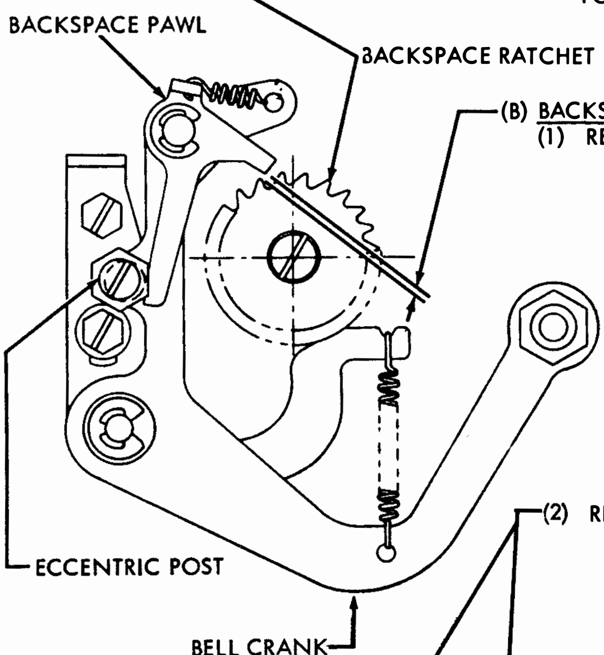
RESET LEVER EXTENSION SPRING
REQUIREMENT
MIN. 3/4 OZ.
MAX. 1 1/4 OZS.
TO START LEVER MOVING.

Figure 5-121D. Keyboard (LAK21BRW, LAK33BRW and LAK47BRW), Character Counter Mechanism Early Design

8. POWER DRIVE BACKSPACE MECHANISM
FOR FULLY PERFORATED TAPE.

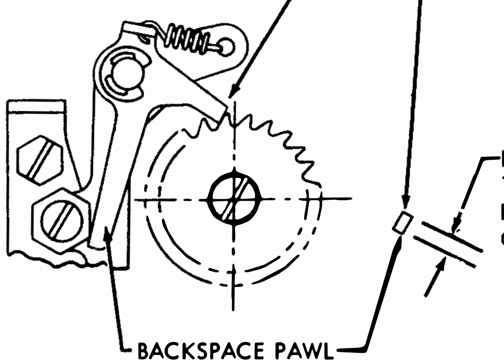
(A) BACKSPACE RATCHET
REQUIREMENT
TEETH OF BACKSPACE AND FEED WHEEL RATCHETS TO LINE UP (VISUAL ALIGNMENT) FEED WHEEL RATCHET TO BE IN DETENTED POSITION.
TO ADJUST
WITH ADJUSTING CLAMP MOUNTING SCREW FRICTION TIGHT, ROTATE BACKSPACE RATCHET TO MEET THE REQUIREMENT.





(B) BACKSPACE PAWL CLEARANCE
(1) REQUIREMENT --- PRELIMINALY
WITH BACKSPACE BELL CRANK ROTATED CLOCKWISE, THE BACKSPACE PAWL SHALL MISS THE FIRST TOOTH BY A CLEARANCE OF:
MIN. 0.003 INCH
MAX. 0.010 INCH
AT POINT OF LEAST CLEARANCE.

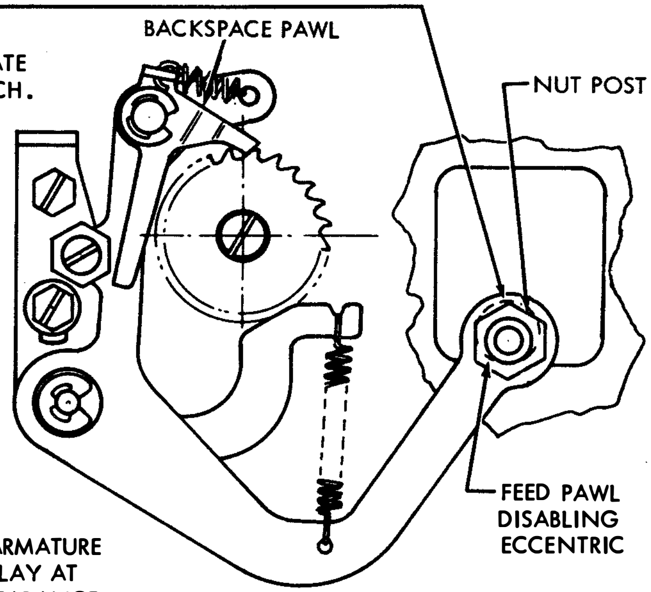
(2) REQUIREMENT --- FINAL
THE BACKSPACE PAWL SHALL MISS THE FIRST TOOTH AND ENGAGE THE SECOND TOOTH BY AT LEAST 1/2 OF THE RIGHT ENGAGING SURFACE OF THE BACKSPACE PAWL (AS GAUGED BY EYE) WHEN BACKSPACE PAWL FIRST CONTACTS THE RATCHET TOOTH.
TO ADJUST
TAKE UP ALL ROTATIONAL PLAY OF BACKSPACE RATCHET IN RELATION TO FEED RATCHET BY ROTATING IT CLOCKWISE AT SAME TIME ROTATE BELL CRANK CLOCKWISE. WITH MOUNTING SCREW FRICTION TIGHT ROTATE ECCENTRIC POST TO MEET THE REQUIREMENTS.



FINAL MINIMUM ENGAGEMENT:
1/2 OF SURFACE WITH SECOND RATCHET TOOTH AT FIRST POINT OF CONTACT.

Figure 5-122. Typing Reperforator (LPR57), Power Drive Backspace Mechanism

(A) FEED PAWL DISABLING
REQUIREMENT
WHEN BELL CRANK IS IN OPERATED POSITION HIGH SIDE OF FEED PAWL DISABLING ECCENTRIC SHOULD BE IN UPPERMOST POSITION.
TO ADJUST
WITH NUT POST FRICTION TIGHT, ROTATE ECCENTRIC WITH A 0.060" ALLEN WRENCH.



(B) ARMATURE HINGE
REQUIREMENT
WITH ARMATURE BAIL SPRING REMOVED, ARMATURE HELD AGAINST THE POLE FACE, TAKE UP PLAY AT HINGE IN A DOWNWARD DIRECTION. CLEARANCE BETWEEN THE ARMATURE AND MAGNET BRACKET.
MIN. SOME
MAX. 0.004 INCH
TO ADJUST
WITH HINGE MOUNTING SCREWS FRICTION TIGHT, POSITION HINGE. ARMATURE SHOULD TOUCH FRONT AND REAR OF POLE FACE. TIGHTEN SCREWS AND RECHECK ADJUSTMENT.

NOTE: FOR DC OPERATION, THE BACKSPACE MAGNET ARMATURE SHALL BE POSITIONED SO THAT THE SIDE MARKED "C" SHALL FACE THE POLE FACE AT THE MAGNET CORE. FOR AC OPERATION, THE UNMARKED SIDE OF THE MAGNET ARMATURE SHALL FACE THE MAGNET CORE.

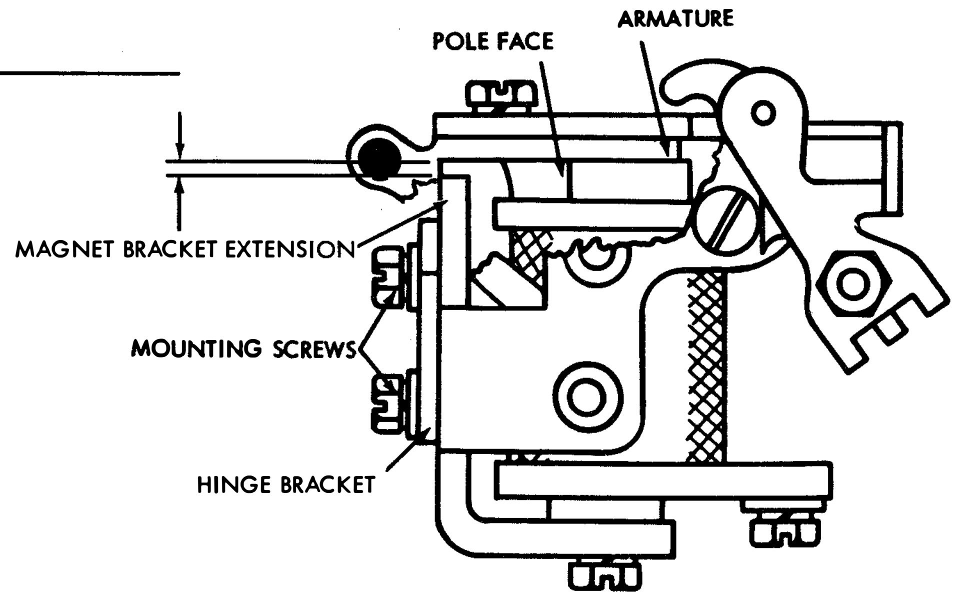
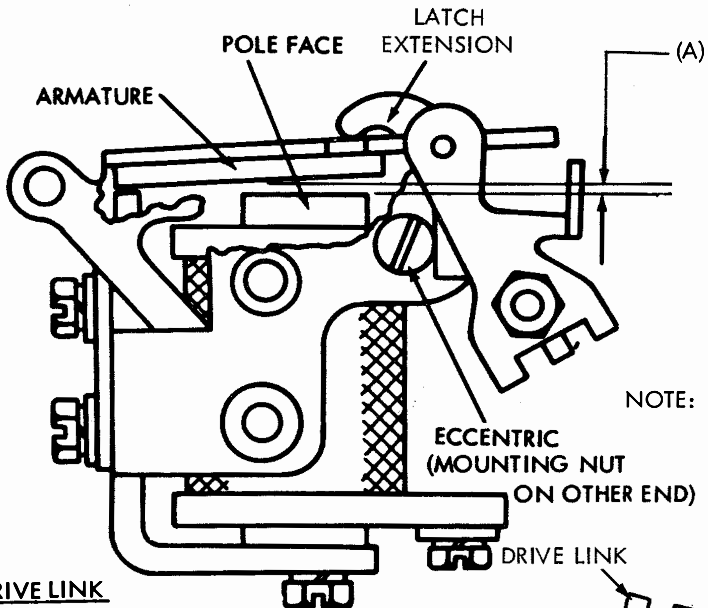


Figure 5-122A. Typing Reperforator (LPR57), Power Drive Backspace Mechanism



(A) ARMATURE UP-STOP

REQUIREMENT

ARMATURE IN UNOPERATED POSITION. GAP BETWEEN ARMATURE AND POLE FACE
MIN. 0.025 INCH --- MAX. 0.030 INCH
AT CLOSEST POINT.

TO ADJUST

ROTATE ECCENTRIC WITH MOUNTING NUT LOOSENED. KEEP HIGH PART OF ECCENTRIC TO LEFT.

NOTE: THIS ADJUSTMENT IS MADE AT THE FACTORY AND SHOULD NOT BE DISTURBED UNLESS A REASSEMBLY OF THE UNIT IS UNDERTAKEN, THE PUNCH UNIT SHOULD BE REMOVED. SEE DISASSEMBLY AND REASSEMBLY. REMAKE PUNCH UNIT POSITION ADJUSTMENT.

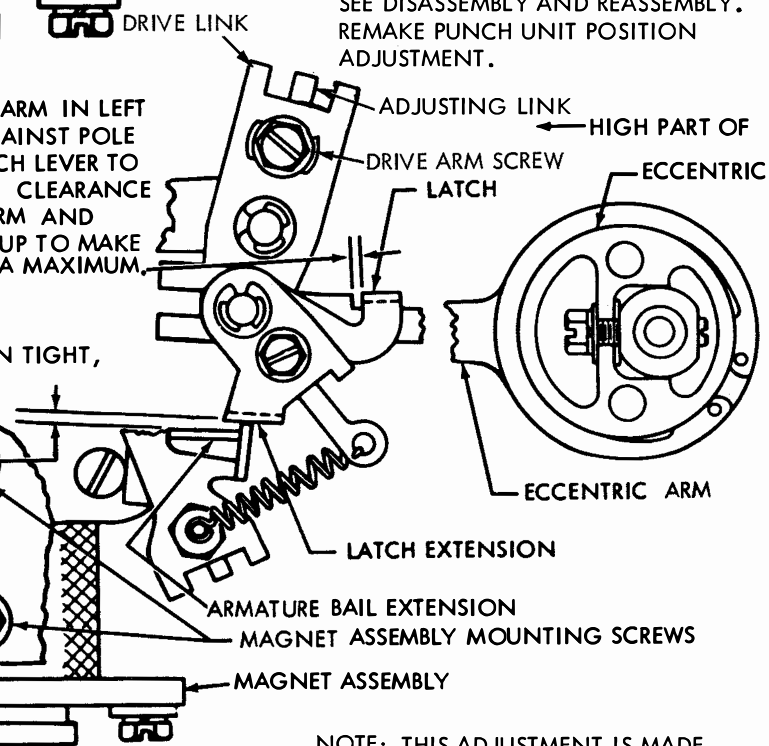
(B) DRIVE LINK

REQUIREMENT

WITH HIGH PART OF ECCENTRIC ARM IN LEFT HAND POSITION, ARMATURE AGAINST POLE FACE TO ALLOW DRIVE ARM LATCH LEVER TO REST AGAINST ECCENTRIC LINK. CLEARANCE BETWEEN STEP ON ECCENTRIC ARM AND LATCH LEVER WITH PLAY TAKEN UP TO MAKE GAP A MAXIMUM.
MIN. 0.040 INCH
MAX. 0.045 INCH

TO ADJUST

WITH DRIVE ARM SCREW FRICTION TIGHT, POSITION ADJUSTING LINK.



(C) LATCH EXTENSION (EARLY DESIGN)

REQUIREMENT

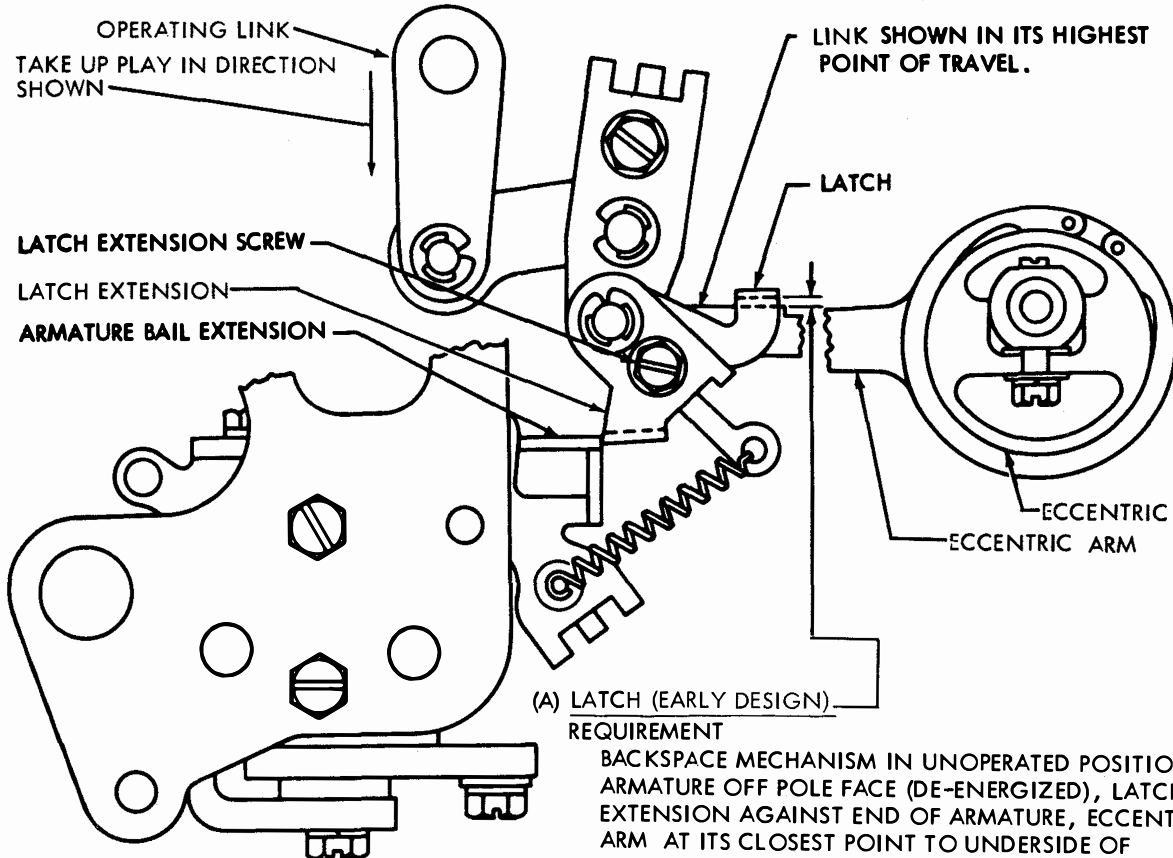
WITH BACKSPACE MECHANISM IN UNOPERATED POSITION, ECCENTRIC HIGH PART OF THE LEFT, ARMATURE AGAINST THE POLE FACE, LATCH RESTING ON THE ECCENTRIC ARM NOTCH. CLEARANCE BETWEEN TOP OF ARMATURE EXTENSION AND LATCH EXTENSION.
MIN. 0.005 INCH
MAX. 0.020 INCH

TO ADJUST

WITH MAGNET MOUNTING SCREWS FRICTION TIGHT, SWING MAGNET LEFT OR RIGHT.

NOTE: THIS ADJUSTMENT IS MADE AT THE FACTORY AND SHOULD NOT BE DISTURBED UNLESS A REASSEMBLY OF THE UNIT IS UNDERTAKEN. IF NECESSARY TO MAKE THIS ADJUSTMENT, THE PUNCH UNIT SHOULD BE REMOVED. SEE DISASSEMBLY AND REASSEMBLY. REMAKE PUNCH UNIT POSITION ADJUSTMENT.

Figure 5-122B. Typing Reperforator (LPR57), Power Drive Backspace Mechanism



(A) LATCH (EARLY DESIGN)

REQUIREMENT

BACKSPACE MECHANISM IN UNOPERATED POSITION, ARMATURE OFF POLE FACE (DE-ENERGIZED), LATCH EXTENSION AGAINST END OF ARMATURE, ECCENTRIC ARM AT ITS CLOSEST POINT TO UNDERSIDE OF LATCH LEVER. CLEARANCE BETWEEN LATCH AND ECCENTRIC ARM WITH PLAY IN THE LINKS TAKEN UP TO MAKE THE CLEARANCE A MINIMUM SHOULD BE:

MIN. 0.005 INCH

MAX. 0.025 INCH

TO ADJUST

WITH LATCH EXTENSION SCREW FRICTION TIGHT, POSITION LATCH.

(B) NON-REPEAT ARM (EARLY DESIGN)

REQUIREMENT

BACKSPACE MECHANISM IN UNOPERATED POSITION. CLEARANCE BETWEEN TOP SURFACE OF NON-REPEAT ARM AND LOWEST POINT OF LATCH EXTENSION:

MIN. 0.002 INCH

MAX. 0.010 INCH

TO ADJUST

WITH ARM SCREW FRICTION TIGHT, POSITION ADJUSTING ARM.

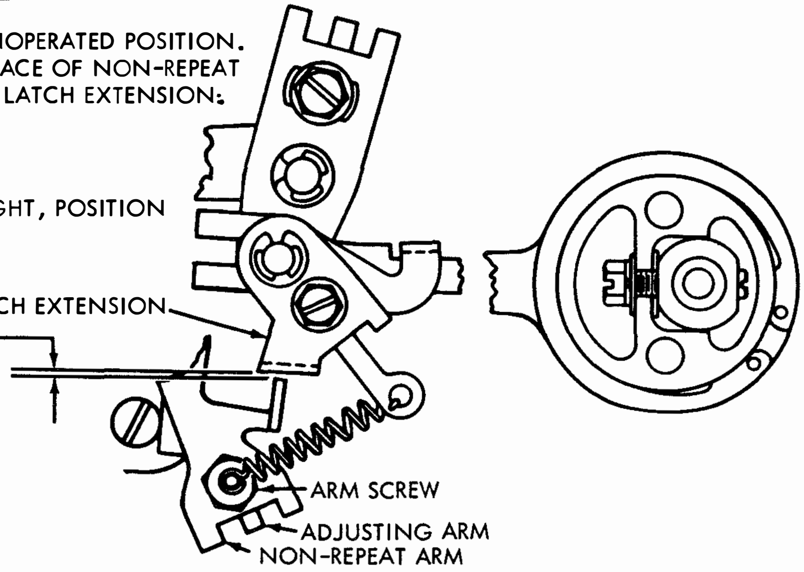


Figure 5-122C. Typing Reperforator (LPR57), Power Drive Backspace Mechanism

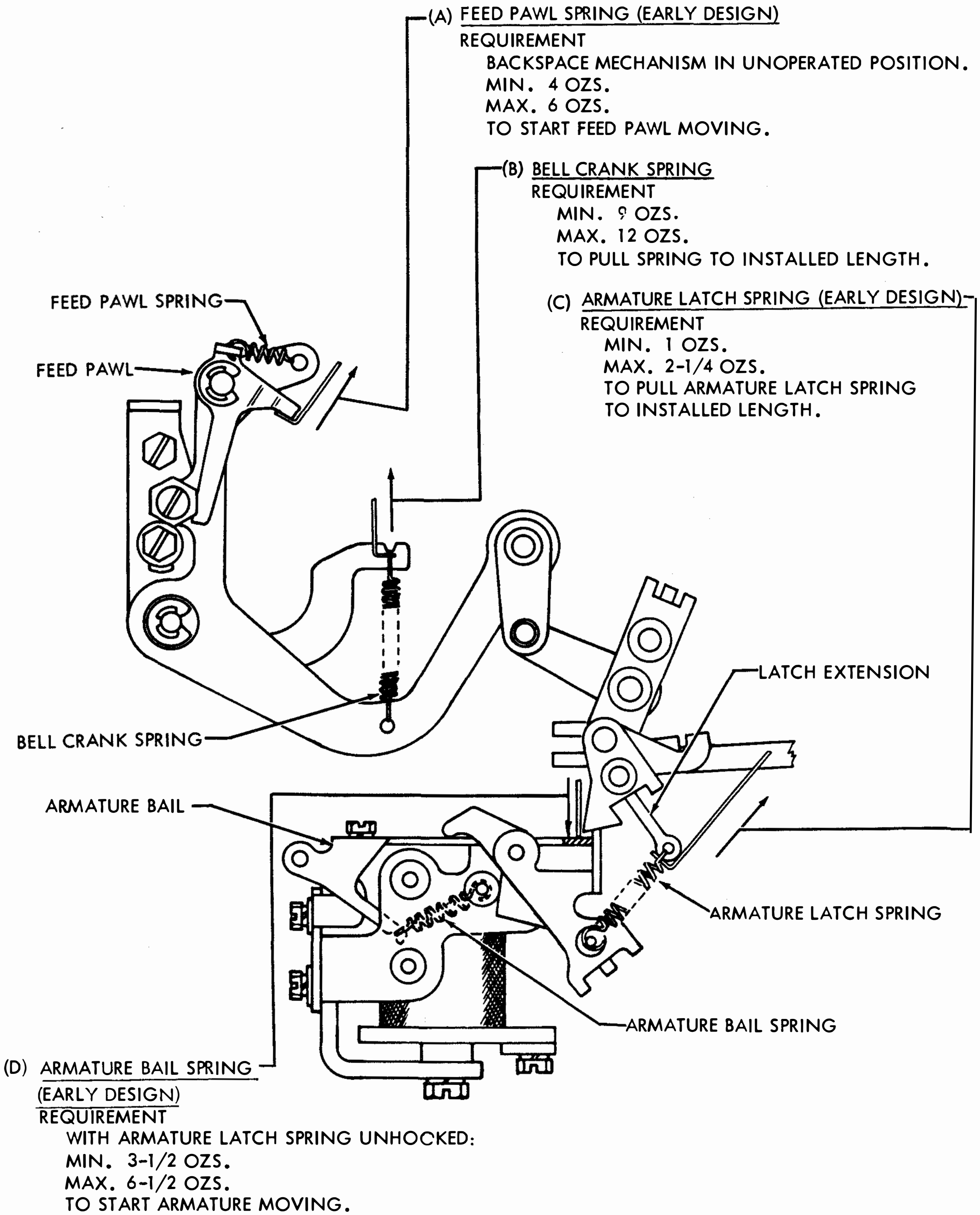
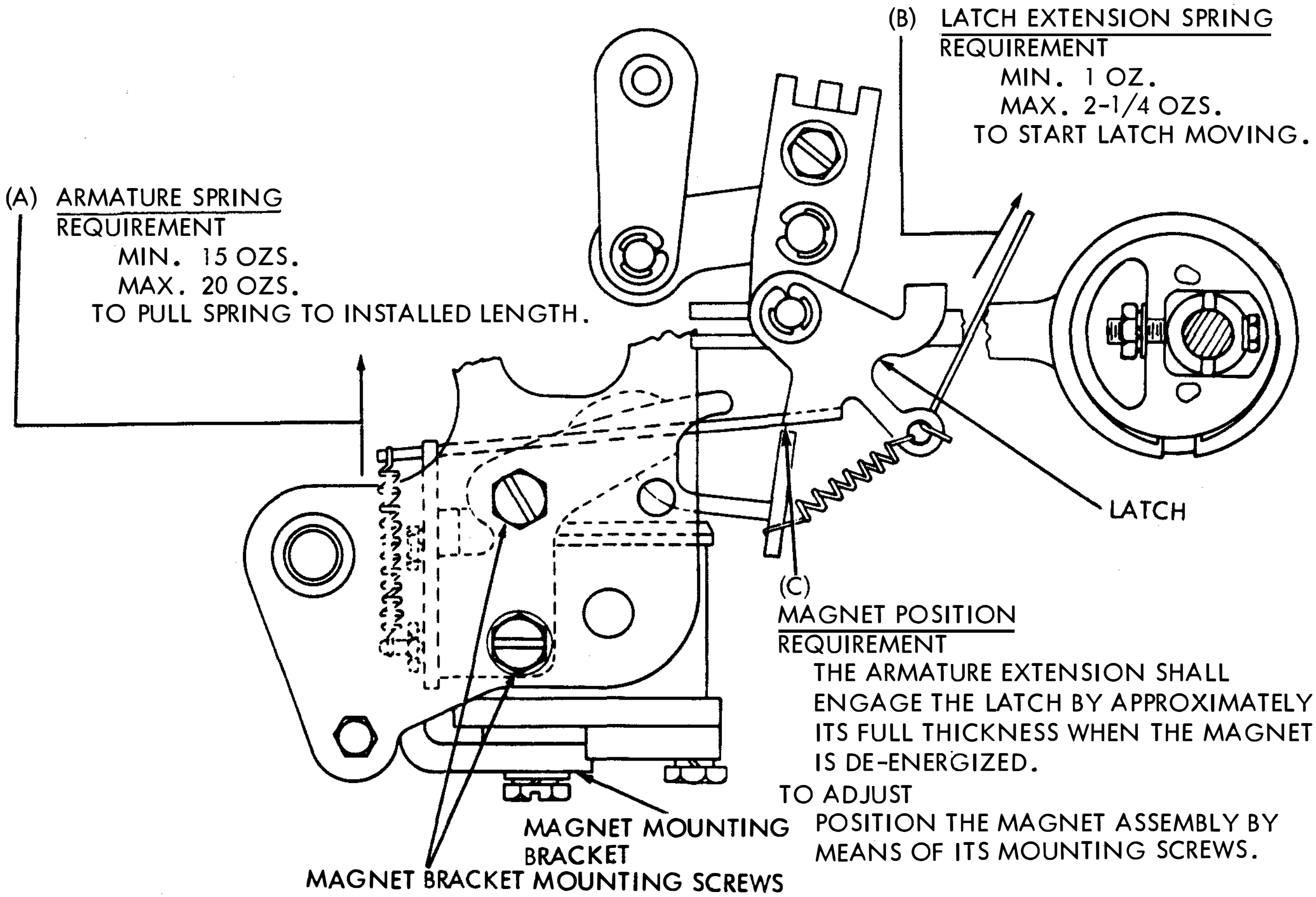


Figure 5-122D. Typing Reperforator (LPR57), Power Drive Backspace Mechanism

Power Drive Backspace Mechanism (Latest Design)
(Non-Adjustable Backspace Magnet Assembly)



NOTE: THE FINAL ADJUSTMENT REQUIREMENT FOR ALL BACKSPACE MECHANISM, MANUAL OR POWER DRIVE, REGARDLESS OF THE TYPE OF UNIT WILL READ AS FOLLOWS:

(D) FINAL POWER OR MANUAL
REQUIREMENT
(1) WITH TAPE IN THE UNIT, PLACE THE FEED WHEEL SHAFT OIL HOLE IN ITS UPPERMOST POSITION AND OPERATE THE BACKSPACE MECHANISM ONCE. THE RATCHET WHEEL SHALL BE BACKED ONE SPACE INTO A FULLY DETENTED POSITION.

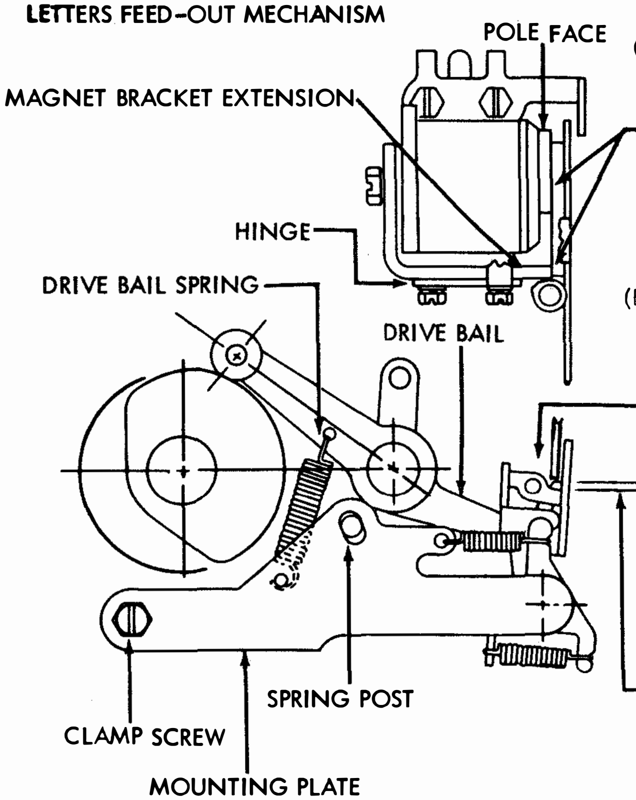
NOTE: A FULLY DETENTED POSITION IS DEFINED AS: WITH THE DETENT ROLLER IN CONTACT WITH THE RATCHET WHEEL, THE PUNCH UNIT FEED PAWL SHALL ENGAGE THE FIRST TOOTH BELOW THE HORIZONTAL CENTER LINE OF THE FEED WHEEL RATCHET WITH NO PERCEPTIBLE CLEARANCE.

(2) WITH THE UNIT OPERATING UNDER POWER, PERFORATE APPROXIMATELY TWO (2) INCHES OF TAPE WITH THE "LETTERS" COMBINATION SELECTED. BACKSPACE TWELVE (12) CHARACTERS IN SUCCESSION. WITH THE UNIT STILL UNDER POWER, AGAIN PERFORATE APPROXIMATELY TWO (2) INCHES OF TAPE WITH THE "LETTERS" COMBINATION SELECTED. CLIPPING OF THE CODE HOLES SHALL BE HELD TO A MINIMUM AND SHALL NOT EXCEED 0.005" AS GAUGED BY EYE.

TO ADJUST
(1) ON MANUAL BACKSPACE UNITS, REFINE THE FEED PAWL PRELIMINARY ADJUSTMENT.
(2) ON BACKSPACE MECHANISMS EQUIPPED WITH POWER DRIVE, LOOSEN THE ARM ADJUSTING SCREW AND POSITION THE ADJUSTING PLATE. TIGHTEN THE ARM ADJUSTING SCREW.

Figure 5-122E. Typing Reperforator (LPR57), Power Drive Backspace Mechanism

LETTERS FEED-OUT MECHANISM



(A) ARMATURE HINGE
REQUIREMENT
WITH ARMATURE MANUALLY OPERATED, IT SHALL BE FLUSH AGAINST POLE FACE AND MAGNET BRACKET EXTENSION.
TO ADJUST
LOOSEN ARMATURE HINGE BRACKET MOUNTING SCREWS, POSITION ARMATURE AND TIGHTEN SCREWS.

(B) DRIVE BAIL SPRING
REQUIREMENT
ROTATE MAIN SHAFT UNTIL DRIVE BAIL IS ON HIGH PART OF ITS CAM.
MIN. 20 OZS. --- MAX. 28 OZS.
TO START THE DRIVE BAIL MOVING.

(C) MOUNTING PLATE
REQUIREMENT
WITH ARMATURE IN UNOPERATED POSITION. ROTATE MAIN SHAFT UNTIL DRIVE BAIL IS ON HIGH PART OF ITS CAM. CLEARANCE BETWEEN THE BLOCKING BAIL AND DRIVE BAIL SURFACE.
MIN. 0.005 INCH
MAX. 0.015 INCH
TO ADJUST
POSITION BLOCKING BAIL WITH MOUNTING PLATE CLAMP SCREW AND SPRING POST FRICTION TIGHT.

MAGNET ASSEMBLY
REQUIREMENT
WITH ARMATURE HELD IN OPERATED POSITION, ROTATE MAIN SHAFT UNTIL DRIVE BAIL ROLLER IS ON HIGH PART OF ITS CAM. CLEARANCE BETWEEN BLOCKING BAIL AND RIGHT EDGE OF DRIVE BAIL.
MIN. 0.005 INCH
MAX. 0.015 INCH
TO ADJUST
POSITION MAGNET ASSEMBLY, ARMATURE HELD AGAINST MAGNET POLE PIECE WITH MAGNET BRACKET MOUNTING SCREWS FRICTION TIGHT.

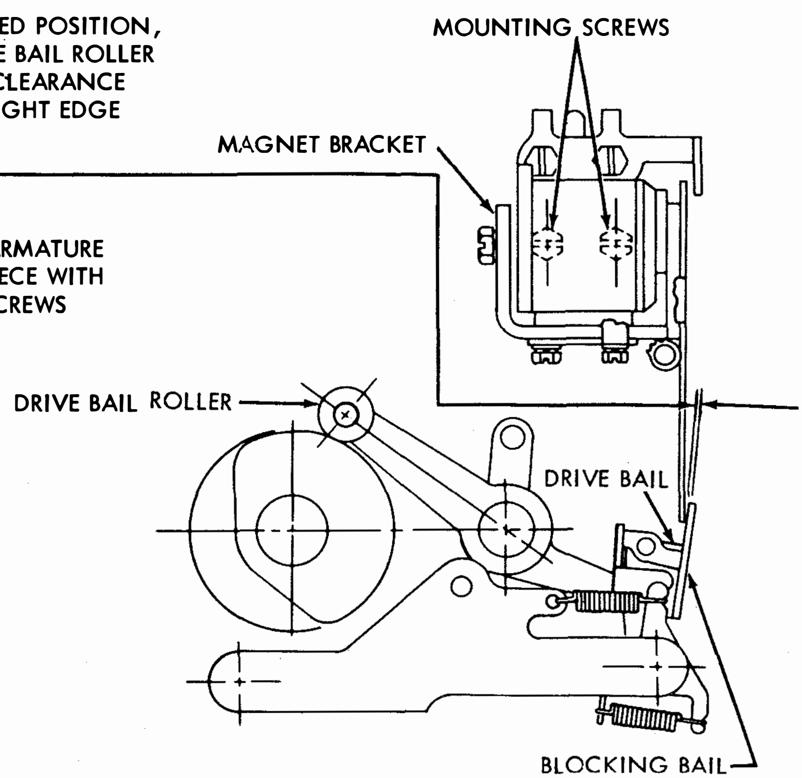
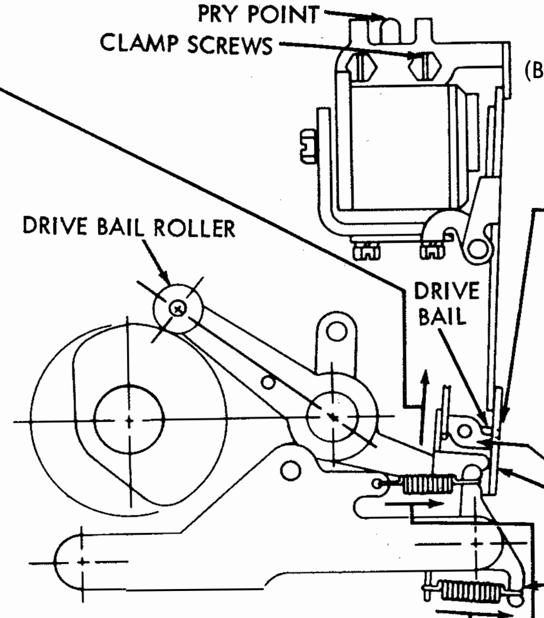


Figure 5-123. Typing Reperforator (LPR35), Remote Control Non-Interfering Letters Tape Feed-Out Mechanism

(A) BLOCKING LATCH TORSION SPRING

REQUIREMENT

WITH ARMATURE IN UNOPERATED POSITION AND DRIVE BAIL ROLLER ON HIGH PART OF ITS CAM.
MIN. 15 GRAMS --- MAX. 40 GRAMS
TO START BLOCKING LATCH MOVING.



(B) ARMATURE BACKSTOP

REQUIREMENT

WITH ARMATURE IN UNOPERATED POSITION, ROTATE MAIN SHAFT UNTIL DRIVE BAIL ROLLER IS ON HIGH PART OF ITS CAM.
MIN. SOME --- MAX. 0.005 INCH CLEARANCE BETWEEN THE BLOCKING LATCH AND NON-REPEAT LEVER. THE DRIVE BAIL SHOULD ENGAGE THE BLOCKING BAIL BY AT LEAST 2/3 OF ITS THICKNESS.

TO ADJUST

WITH THE ARMATURE BACKSTOP MOUNTING SCREWS FRICTION TIGHT, POSITION BY MEANS OF PRYPOINT.

(C) NON-REPEAT LEVER SPRING

REQUIREMENT

WITH ARMATURE IN UNOPERATED POSITION AND DRIVE BAIL ROLLER ON HIGH PART OF ITS CAM
MIN. 6 OZS. --- MAX. 9 OZS.
TO PULL SPRING TO INSTALLED LENGTH.

(D) BLOCKING BAIL SPRING

REQUIREMENT

WITH ARMATURE IN UNOPERATED POSITION AND DRIVE BAIL ROLLER ON HIGH PART OF ITS CAM.
MIN. 3 OZS. --- MAX. 5 OZS.
TO PULL SPRING TO INSTALLED LENGTH.

(E) RELEASE LEVER

REQUIREMENT

WITH ARMATURE IN OPERATED POSITION. ROTATE MAIN SHAFT UNTIL DRIVE BAIL ROLLER IS IN INDENT OF ITS CAM. CLEARANCE BETWEEN RELEASE LEVER AND LATCH LEVER.
MIN. 0.010 INCH
MAX. 0.025 INCH

TO ADJUST

WITH CLAMP SCREW FRICTION TIGHT POSITION RELEASE LEVER.

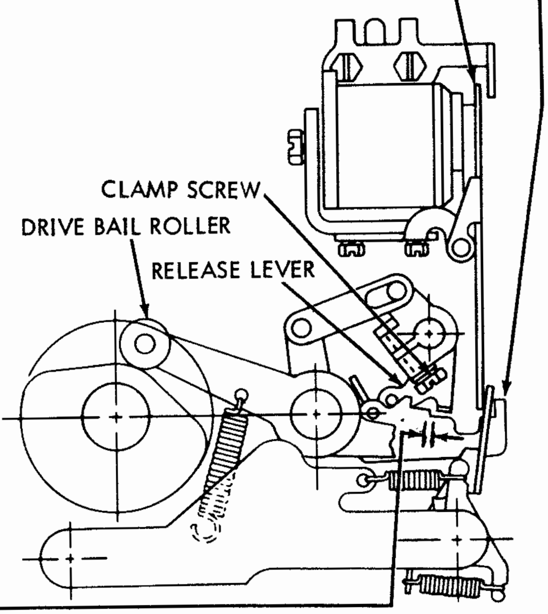
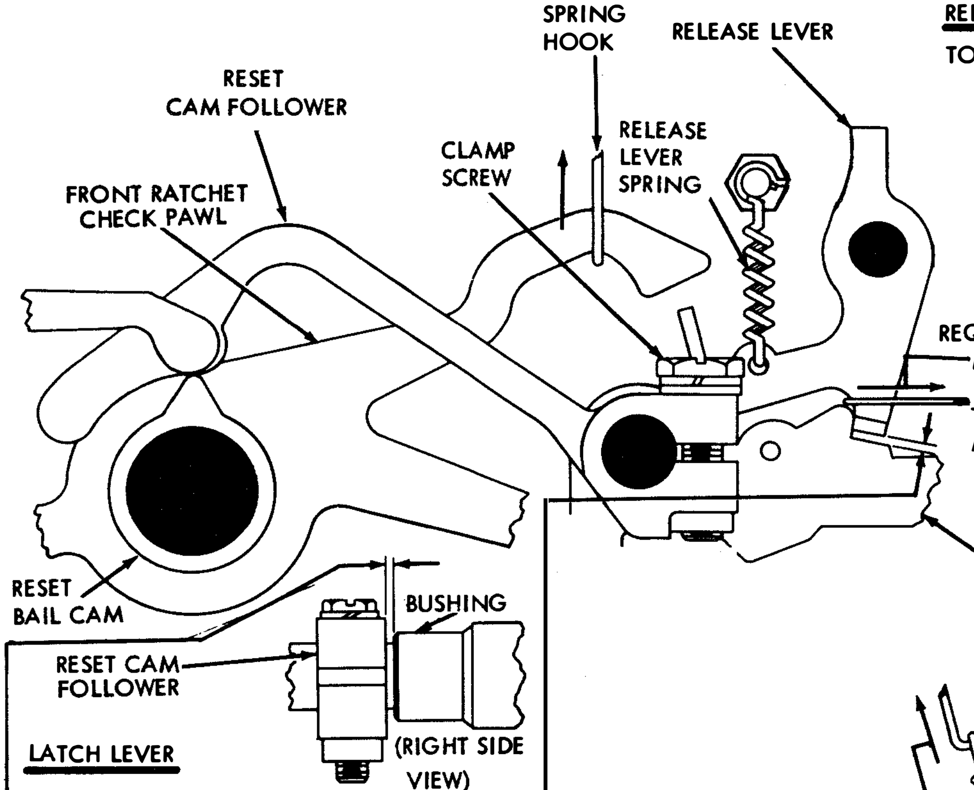


Figure 5-124. Typing Reperforator (LPR35), Remote Control Non-Interfering Letters Tape Feed-Out Mechanism



RELEASE LEVER SPRING

TO CHECK
TRIP SELECTOR CLUTCH. ROTATE MAIN SHAFT UNTIL RESET CAM FOLLOWER IS ON PEAK OF RESET BAIL CAM. WITH SPRING HOOK, HOLD FRONT RATCHET CHECK PAWL AWAY FROM RELEASE LEVER.

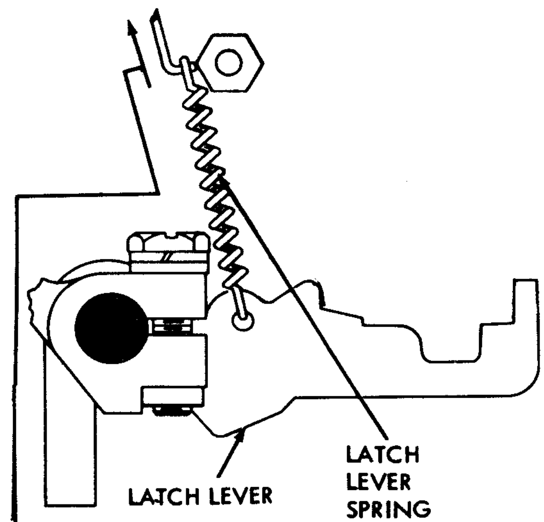
REQUIREMENT
MIN. 5 OZS.---MAX. 7 OZS.
TO START RELEASE LEVER MOVING.

LATCH LEVER

TO CHECK
TRIP SELECTOR CLUTCH. ROTATE MAIN SHAFT UNTIL RESET CAM FOLLOWER IS ON PEAK OF RESET BAIL CAM WHERE THE CLEARANCE FOR THE FOLLOWING ADJUSTMENT IS AT A MINIMUM.

REQUIREMENT
(1) MIN. 0.018 INCH---MAX. 0.028 INCH BETWEEN RELEASE LEVER AND LATCH LEVER.
(2) MIN. SOME---MAX. 0.008 INCH END PLAY BETWEEN CAM FOLLOWER AND BUSHING.

TO ADJUST
POSITION LATCH LEVER WITH CLAMP SCREW ON RESET CAM FOLLOWER LOOSENED.



LATCH LEVER SPRING

TO CHECK
TRIP SELECTOR CLUTCH. ROTATE MAIN SHAFT UNTIL RESET CAM FOLLOWER IS ON PEAK OF RESET BAIL CAM.

REQUIREMENT
MIN. 7 OZS.---MAX. 10 OZS.
TO PULL SPRING TO INSTALLED LENGTH.

Figure 5-125. Typing Reperforator (LPR35), Remote Control Non-Interfering Letters Tape Feed-Out Mechanism

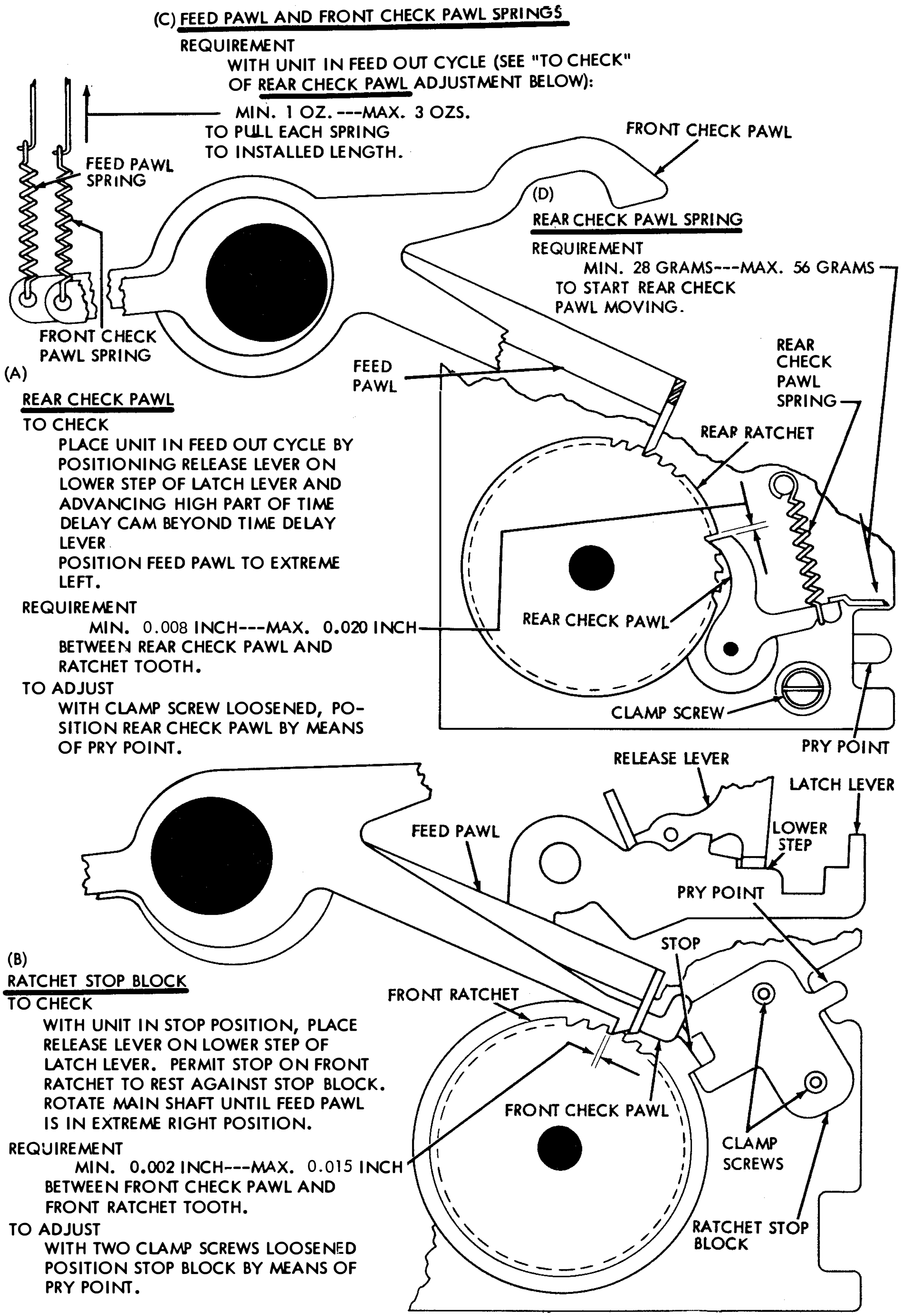
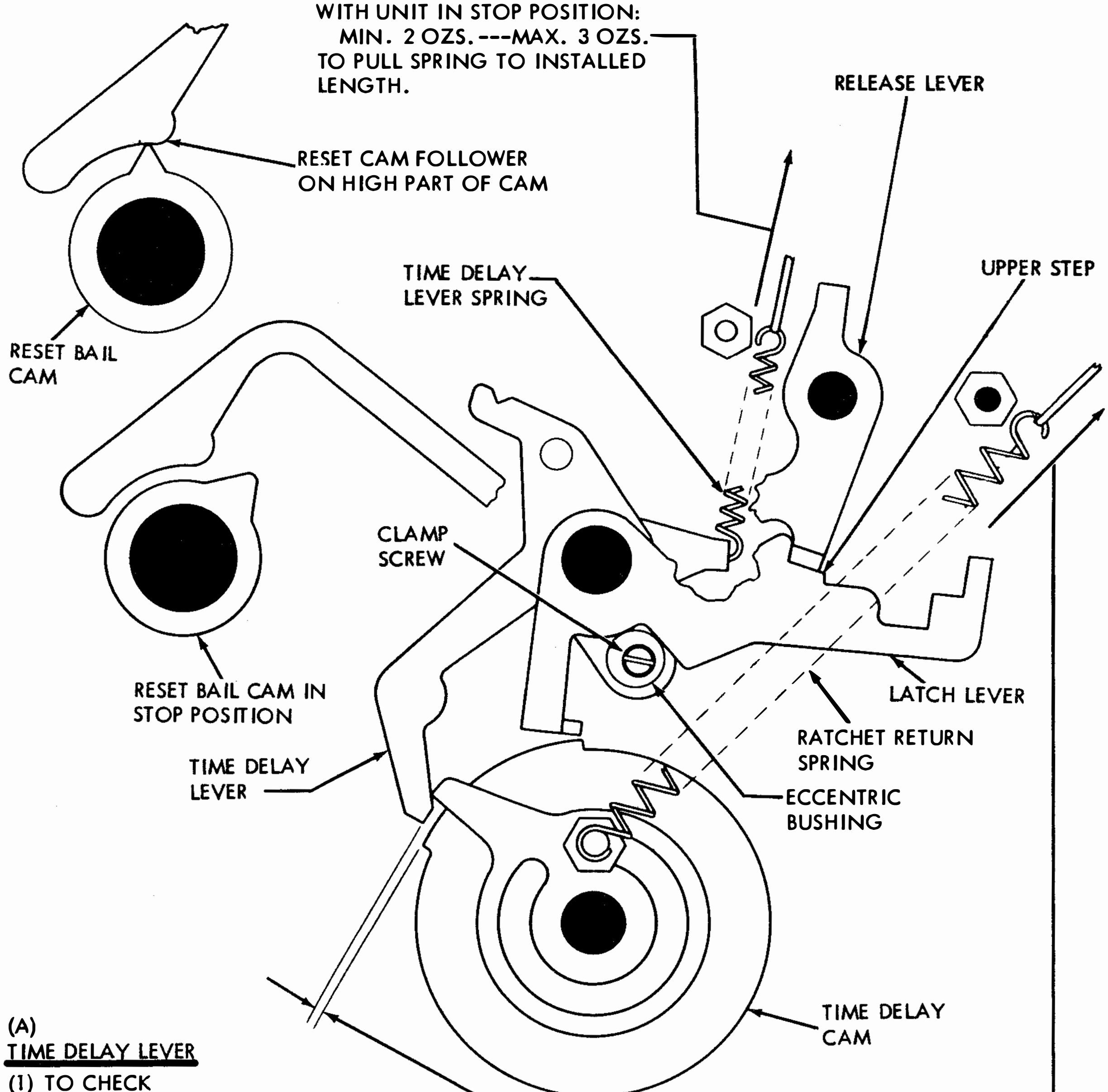


Figure 5-126. Typing Reperforator (LPR35),
Remote Control Non-Interfering Letters Tape Feed-Out Mechanism

(B) TIME DELAY LEVER SPRING

REQUIREMENT
WITH UNIT IN STOP POSITION:
MIN. 2 OZS.---MAX. 3 OZS.
TO PULL SPRING TO INSTALLED LENGTH.



(A)
TIME DELAY LEVER

(1) TO CHECK
TRIP SECLECTOR CLUTCH AND ROTATE MAIN SHAFT UNTIL RESET CAM FOLLOWER IS ON HIGH PART OF RESET BAIL CAM.

REQUIREMENT
MIN. 0.040 INCH---MAX. 0.060 INCH
CLEARANCE BETWEEN TIME DELAY LEVER AND HIGH PART OF TIME DELAY CAM.

(2) REQUIREMENT
WITH UNIT IN STOP POSITION:
MIN. SOME
CLEARANCE BETWEEN TIME DELAY LEVER AND HIGH PART OF TIME DELAY CAM.

TO ADJUST
WITH CLAMP SCREW LOOSENED, POSITION ECCENTRIC BUSHING.

(C) RATCHET RETURN SPRING

REQUIREMENT
WITH UNIT IN STOP POSITION:
MIN. 5 OZS.---MAX. 7 OZS.
TO PULL SPRING TO INSTALLED LENGTH.

Figure 5-127. Typing Reperforator (LPR35),
Remote Control Non-Interfering Letters Tape Feed-Out Mechanism

(A) RELEASE ARM

(1) REQUIREMENT

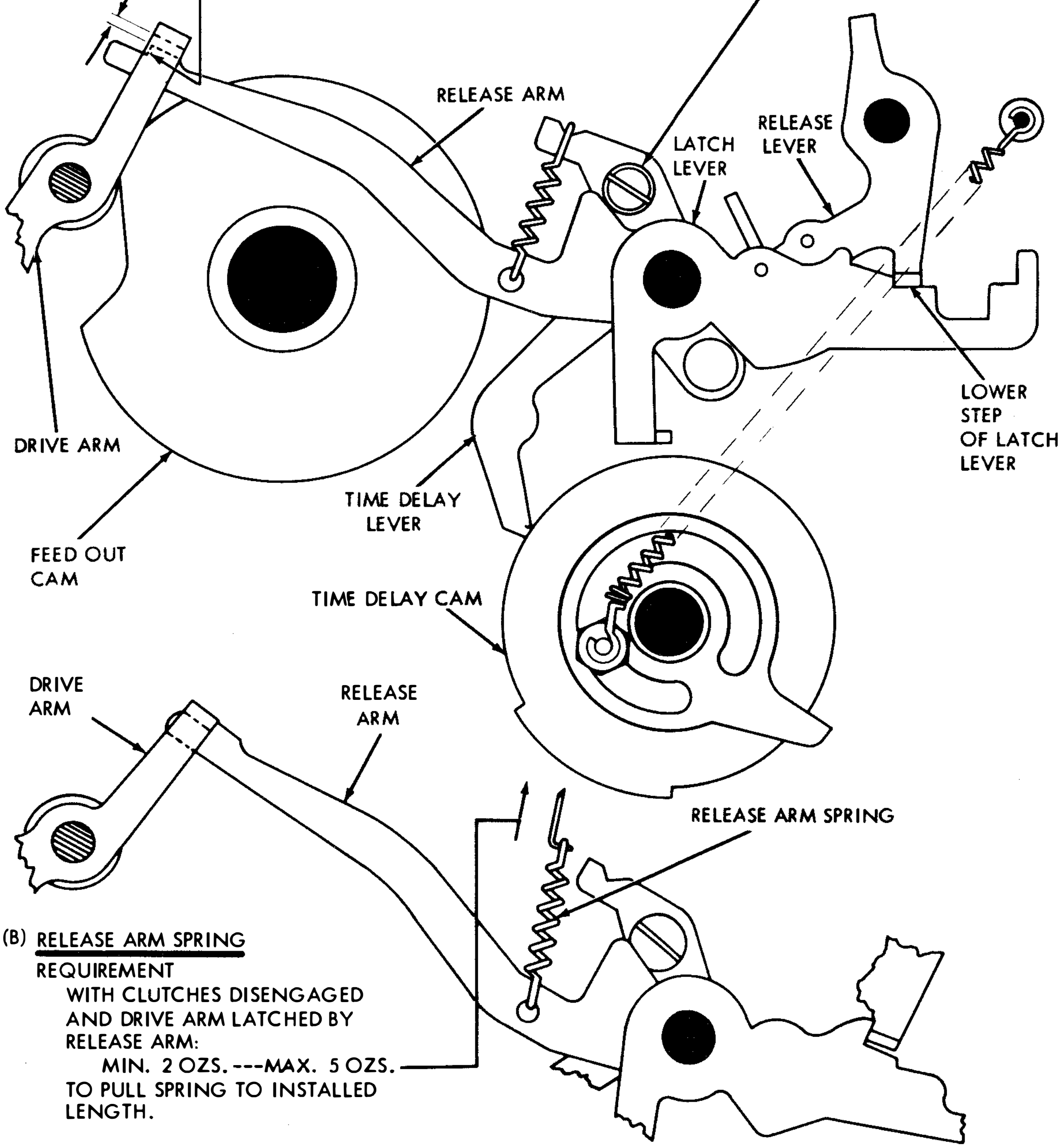
WITH UNIT IN THE FEED-OUT CYCLE, RATCHETS ADVANCED BEYOND THE TIME DELAY. CLEARANCE BETWEEN THE DRIVE ARM AND UPPER SURFACE OF RELEASE ARM:
MIN. 0.010 INCH
MAX. 0.030 INCH
POSITION CAM SO SURFACES ARE IN LINE.

(2) REQUIREMENT

WITH UNIT IN STOP POSITION THE SURFACE OF THE DRIVE BAIL THAT DOES NOT ENGAGE THE RELEASE ARM SHALL NOT EXCEED:
MAX. 0.015 INCH

TO ADJUST

WITH CLAMP NUT FRICTION TIGHT, POSITION RELEASE ARM BY MEANS OF ECCENTRIC SCREW ON TIME DELAY LEVER.



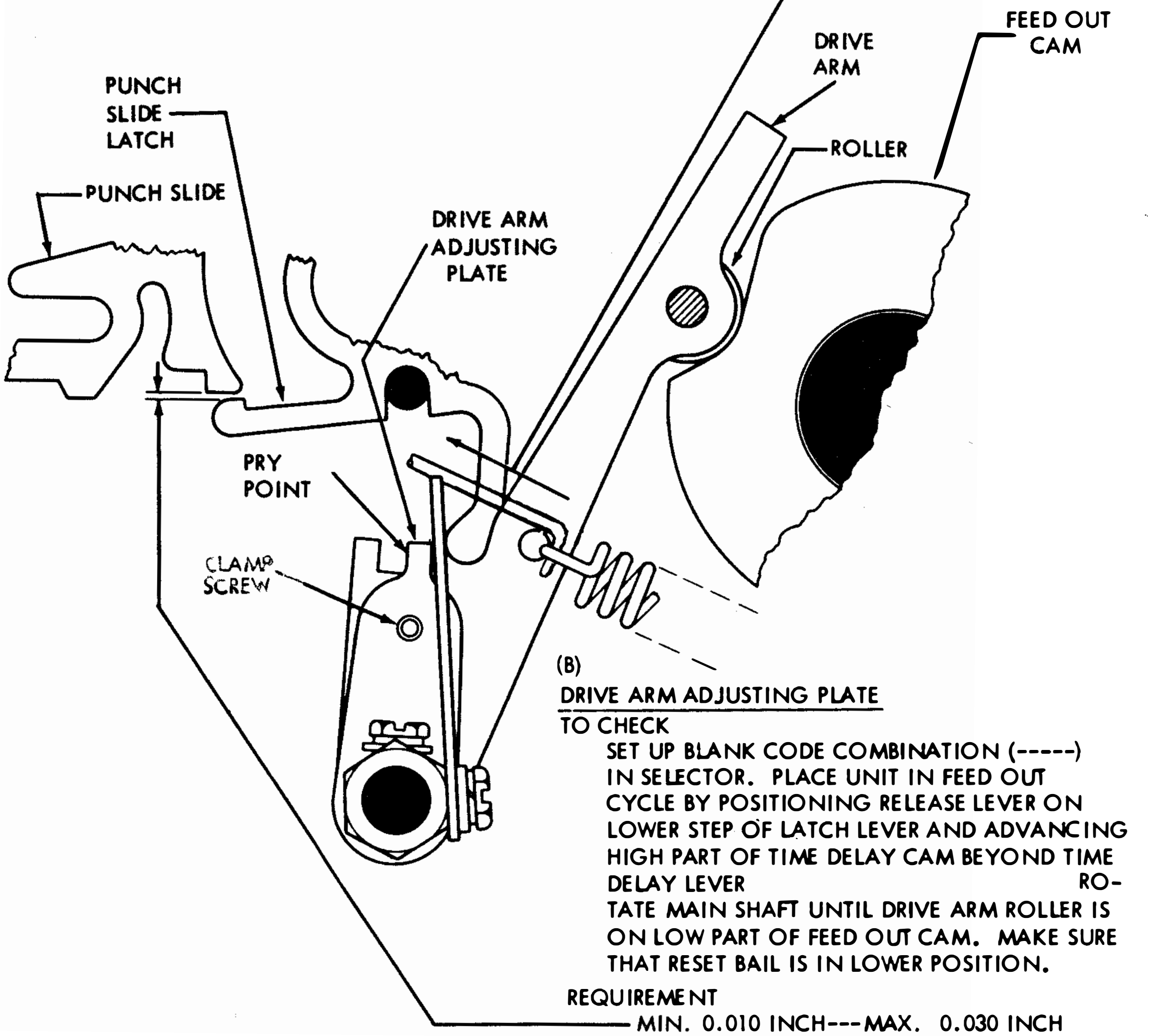
(B) RELEASE ARM SPRING

REQUIREMENT

WITH CLUTCHES DISENGAGED AND DRIVE ARM LATCHED BY RELEASE ARM:
MIN. 2 OZS.---MAX. 5 OZS.
TO PULL SPRING TO INSTALLED LENGTH.

Figure 5-128. Typing Reperforator (LPR35), Remote Control Non-Interfering Letters Tape Feed-Out Mechanism

(A) DRIVE ARM SPRING
REQUIREMENT
WITH UNIT IN FEED-OUT CYCLE AND DRIVE ARM ROLLER HELD FIRMLY AGAINST ITS CAM INDENT.
MIN. 30 OZS. --- MAX. 40 OZS.
TO PULL SPRING TO INSTALLED LENGTH.



(B)
DRIVE ARM ADJUSTING PLATE
TO CHECK
SET UP BLANK CODE COMBINATION (-----) IN SELECTOR. PLACE UNIT IN FEED OUT CYCLE BY POSITIONING RELEASE LEVER ON LOWER STEP OF LATCH LEVER AND ADVANCING HIGH PART OF TIME DELAY CAM BEYOND TIME DELAY LEVER RO-TATE MAIN SHAFT UNTIL DRIVE ARM ROLLER IS ON LOW PART OF FEED OUT CAM. MAKE SURE THAT RESET BAIL IS IN LOWER POSITION.
REQUIREMENT
MIN. 0.010 INCH---MAX. 0.030 INCH BETWEEN PUNCH SLIDE AND PUNCH SLIDE LATCH AT SLIDE WHERE CLEARANCE IS LEAST.
TO ADJUST
WITH CLAMP SCREW LOOSENED, POSITION DRIVE ARM ADJUSTING PLATE BY MEANS OF PRY POINT.

Figure 5-129. Typing Reperforator (LPR35), Remote Control Non-Interfering Letters Tape Feed-Out Mechanism

(B)
ADJUSTING LEVER

TO CHECK

PLACE UNIT IN FEED OUT CYCLE BY POSITIONING RELEASE LEVER ON LOWER STEP OF LATCH LEVER AND ADVANCING HIGH PART OF TIME DELAY CAM BEYOND TIME DELAY LEVER.

POSITION MAIN SHAFT SO THAT DRIVE ARM ROLLER IS ON LOW PART OF FEED OUT CAM.

REQUIREMENT

(1) MIN. 0.010 INCH---MAX. 0.030 INCH BETWEEN RELEASE AND MAIN TRIP LEVER.

(2) SOME CLEARANCE BETWEEN MAIN TRIP LEVER AND DOWNSTOP BRACKET.

TO ADJUST

LOOSEN THE CLAMP SCREW ON THE ADJUSTING LEVER AND POSITION MAKING SURE THE ADJUSTING LEVER RIDES FULLY ON THE SLIDE TRIP LEVER.

(A) FOLLOWER LEVER

REQUIREMENT

WITH FOLLOWER LEVER ON HIGH PART OF TRIP CAM:

(1) MIN. 0.010 INCH---MAX. 0.030 INCH BETWEEN RELEASE AND MAIN TRIP LEVER.

(2) SOME CLEARANCE BETWEEN MAIN TRIP LEVER AND DOWNSTOP BRACKET.

TO ADJUST

WITH LOCK NUT LOOSENED, POSITION ADJUSTING ARM BY MEANS OF PRY POINT.

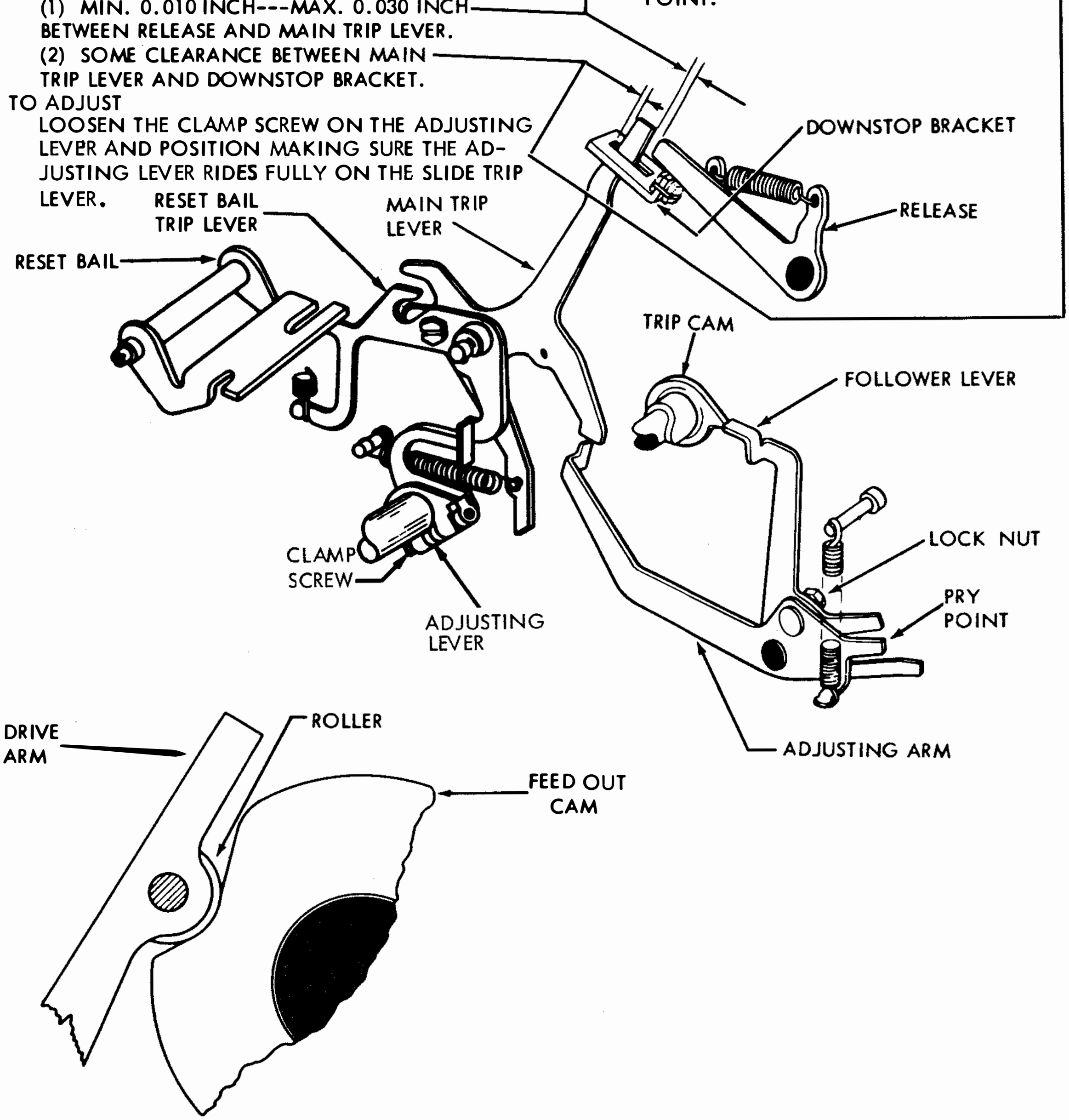
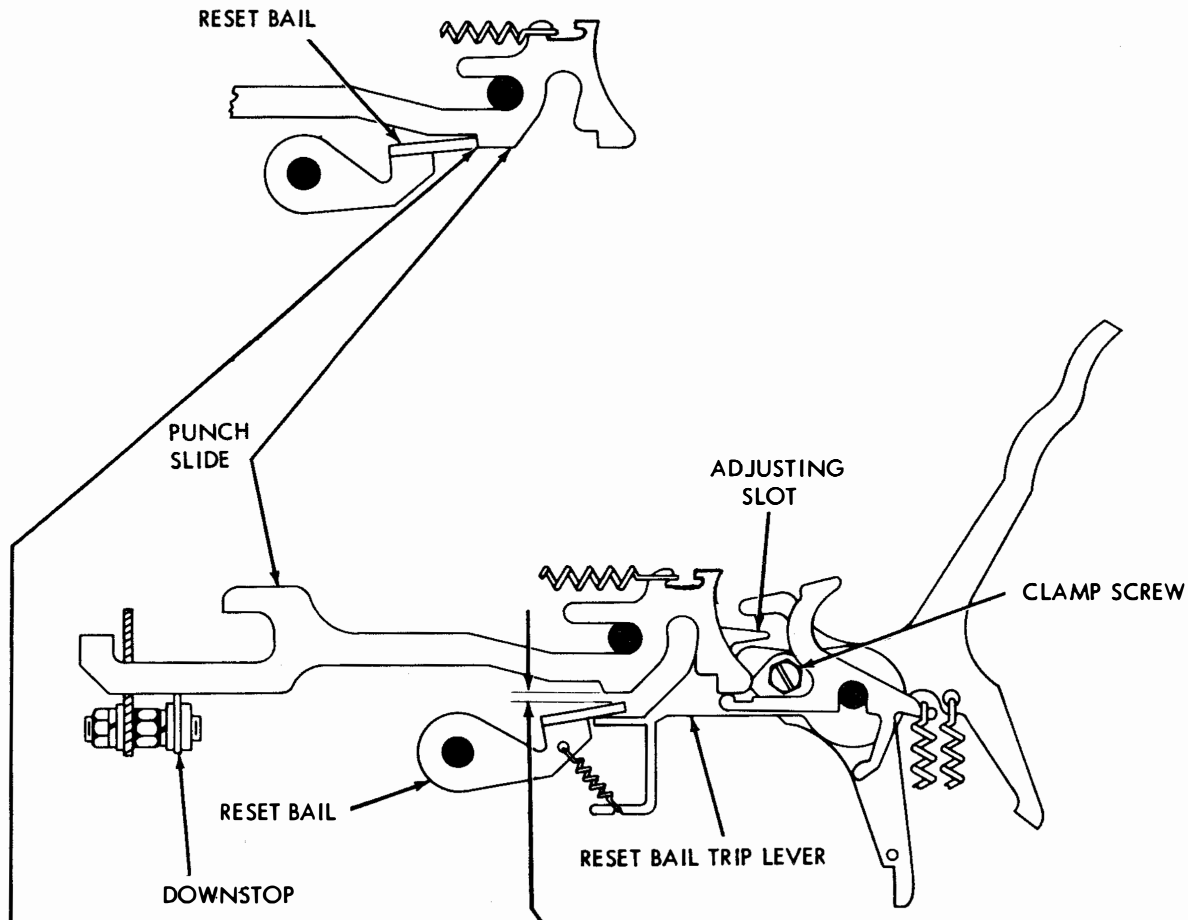


Figure 5-130. Typing Reperforator (LPR35), Remote Control Non-Interfering Letters Tape Feed-Out Mechanism



<u>RESET BAIL TRIP LEVER</u>

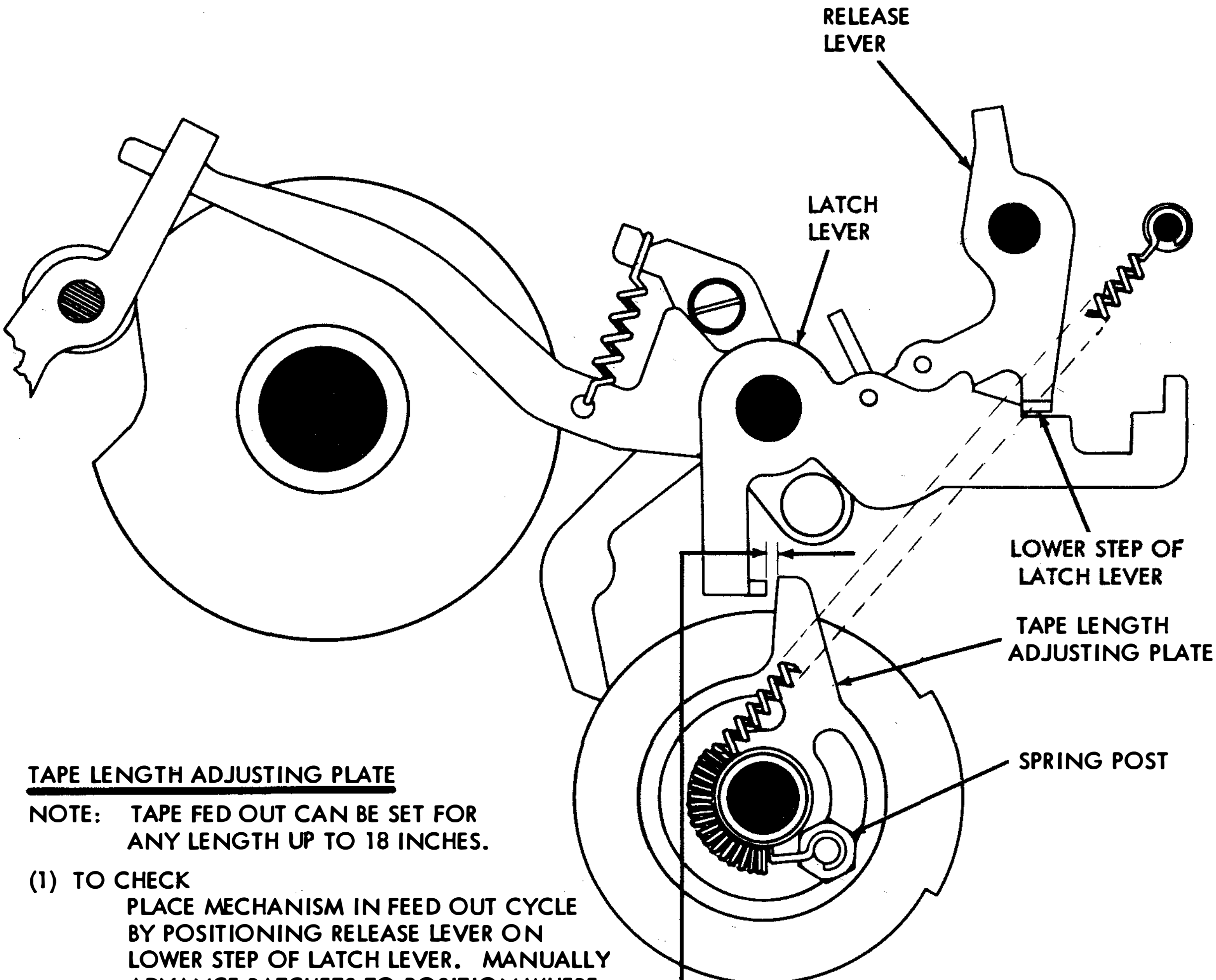
(1) TO CHECK
SELECT LETTERS CODE COMBINATION (12345). ROTATE MAIN SHAFT UNTIL FUNCTION CLUTCH TRIPS. POSITION PUNCH SLIDES AGAINST DOWNSTOP.

REQUIREMENT
MIN. 0.008 INCH --- MAX. 0.020 INCH BETWEEN PUNCH SLIDE AND RESET BAIL.

(2) REQUIREMENT
WITH CLUTCHES FULLY DISENGAGED RESET BAIL SHOULD FULLY ENGAGE NOTCHES IN PUNCH SLIDES.

TO ADJUST
WITH CLAMP SCREW LOOSENED, POSITION RESET BAIL TRIP LEVER BY MEANS OF ADJUSTING SLOT.

Figure 5-131. Typing Reperforator (LPR35), Remote Control Non-Interfering Letters Tape Feed-Out Mechanism



TAPE LENGTH ADJUSTING PLATE

NOTE: TAPE FED OUT CAN BE SET FOR ANY LENGTH UP TO 18 INCHES.

(1) TO CHECK

PLACE MECHANISM IN FEED OUT CYCLE BY POSITIONING RELEASE LEVER ON LOWER STEP OF LATCH LEVER. MANUALLY ADVANCE RATCHETS TO POSITION WHERE NEXT ROTATION OF MAIN SHAFT WILL STOP FEED OUT CYCLE (FEED PAWL MUST BE IN DEEP TOOTH OF REAR RATCHET.)

REQUIREMENT

MIN. 0.002 INCH --- MAX. 0.020 INCH BETWEEN ADJUSTING PLATE AND LATCH LEVER.

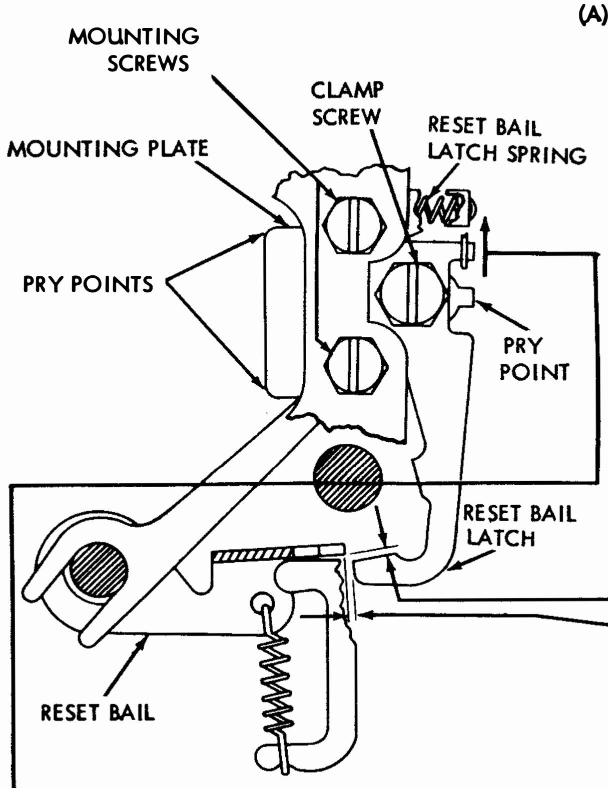
(2) REQUIREMENT

WHEN OPERATING UNDER POWER, UNIT SHOULD FEED OUT CORRECT LENGTH OF TAPE.

TO ADJUST

WITH SPRING POST LOOSENED, POSITION ADJUSTING PLATE.

Figure 5-132. Typing Reperforator (LPR35BWA), Remote Control Non-Interfering Letters Tape Feed-Out Mechanism



(A) **RESET BAIL LATCH**

(1) TO CHECK (VERTICAL CLEARANCE)
SELECT LETTERS CODE COMBINATION (12345). ROTATE MAIN SHAFT UNTIL FUNCTION CLUTCH TRIPS AND PUNCH SLIDES ARE TO EXTREME LEFT. SET UP BLANK CODE COMBINATION (-----) IN SELECTOR BY STRIPPING ALL PUSH LEVERS FROM SELECTING LEVERS. ROTATE MAIN SHAFT UNTIL PUNCH SLIDES ARE JUST LATCHED.

REQUIREMENT
MIN. 0.008 INCH---MAX. 0.020 INCH BETWEEN RESET BAIL AND RESET BAIL LATCH.

TO ADJUST
WITH MOUNTING SCREWS LOOSENED, POSITION MOUNTING PLATE BY MEANS OF PRY POINTS.

(2) REQUIREMENT (HORIZONTAL CLEARANCE)
WITH CLUTCHES DISENGAGED,
MIN. 0.005 INCH---MAX. 0.020 INCH BETWEEN RESET BAIL AND RESET BAIL LATCH.

TO ADJUST
POSITION RESET BAIL SO THAT APPROX. HALF ITS THICKNESS IS BELOW TOP SURFACE OF ITS LATCH. WITH CLAMP SCREW LOOSENED, POSITION RESET BAIL LATCH BY MEANS OF PRY POINT.

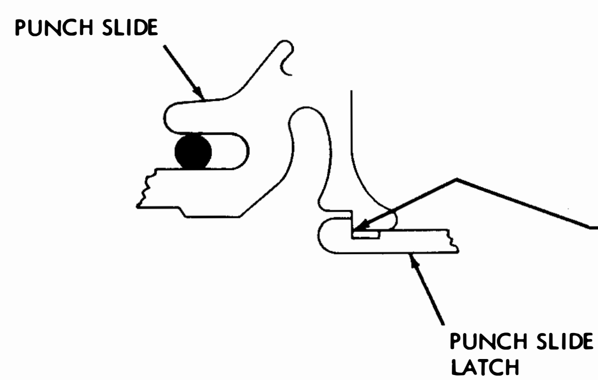
(3) TO CHECK
SELECT LETTERS CODE COMBINATION (12345). ROTATE MAIN SHAFT UNTIL FUNCTION CLUTCH TRIPS. SET UP BLANK CODE COMBINATION (-----) IN SELECTOR BY STRIPPING ALL PUSH LEVERS FROM SELECTING LEVERS. ROTATE MAIN SHAFT TO STOP POSITION.

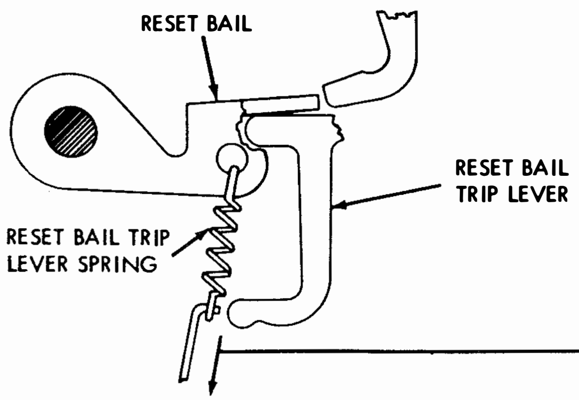
REQUIREMENT
PUNCH SLIDES LATCHED BY PUNCH SLIDE LATCHES

TO ADJUST
REFINE (1) AND (2) ABOVE.

(B)
RESET BAIL LATCH SPRING

REQUIREMENT
WITH UNIT IN STOP CONDITION:
MIN. 1 OZ.---MAX. 3 OZS.
TO START RESET BAIL LATCH MOVING.





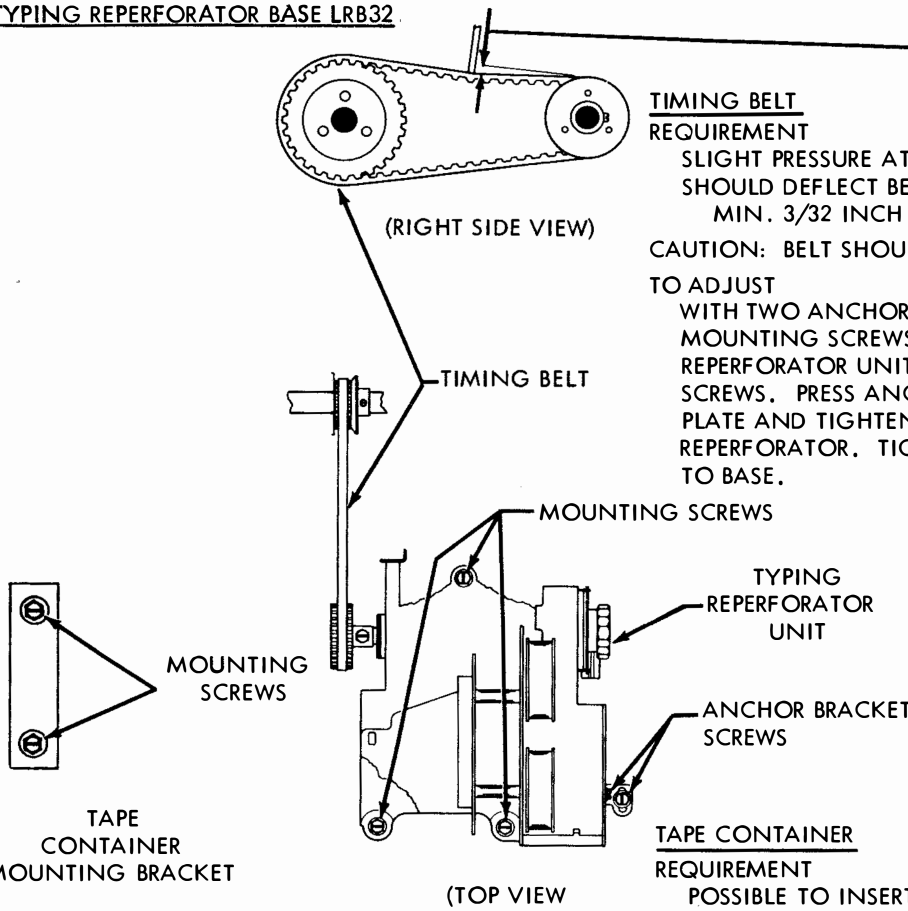
(C) **RESET BAIL TRIP LEVER SPRING**

TO CHECK
DISENGAGE BOTH CLUTCHES. TRIP FUNCTION CLUTCH BY PIVOTING MAIN TRIP LEVER COUNTERCLOCKWISE. HOLD RESET BAIL TRIP LEVER UP AGAINST RESET BAIL.

REQUIREMENT
MIN. 18 OZS.---MAX. 24 OZS.
TO PULL SPRING TO INSTALLED LENGTH.

Figure 5-133. Typing Reperforator (LPR35),
Remote Control Non-Interfering Letters Tape Feed-Out Mechanism

h. TYPING REPERFORATOR BASE LRB32



TIMING BELT

REQUIREMENT
SLIGHT PRESSURE AT CENTER OF SPAN (8 ± 1 OZS.) SHOULD DEFLECT BELT
MIN. 3/32 INCH ---- MAX. 5/32 INCH.

CAUTION: BELT SHOULD NOT BE TIGHT.

TO ADJUST
WITH TWO ANCHOR BRACKET SCREWS AND THREE MOUNTING SCREWS LOOSENED, POSITION TYPING REPERFORATOR UNIT. TIGHTEN THREE MOUNTING SCREWS. PRESS ANCHOR BRACKET AGAINST BASE PLATE AND TIGHTEN SCREW HOLDING BRACKET TO REPERFORATOR. TIGHTEN SCREW HOLDING BRACKET TO BASE.

TAPE CONTAINER

REQUIREMENT
POSSIBLE TO INSERT FULL ROLL OF TAPE INTO TAPE CONTAINER THROUGH ACCESS DOOR IN DOME.

TO ADJUST
POSITION TAPE CONTAINER WITH TWO MOUNTING SCREWS LOOSENED

INTERMEDIATE DRIVE ASSEMBLY

REQUIREMENT
BARELY PERCEPTIBLE BACKLASH BETWEEN MOTOR DRIVE GEAR AND DRIVEN GEAR AT POINT WHERE BACKLASH IS LEAST.

TO ADJUST
WITH THREE MOUNTING SCREWS LOOSENED, POSITION INTERMEDIATE DRIVE ASSEMBLY.

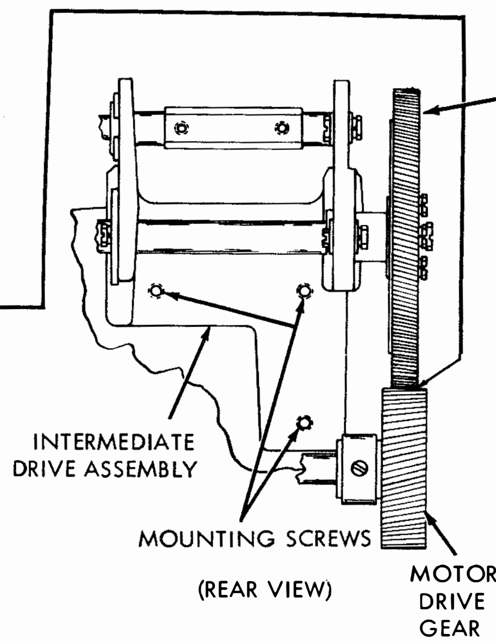


Figure 5-134. Typing Reperforator Base (LRB32), Mounting Typing Reperforator (LPR35)

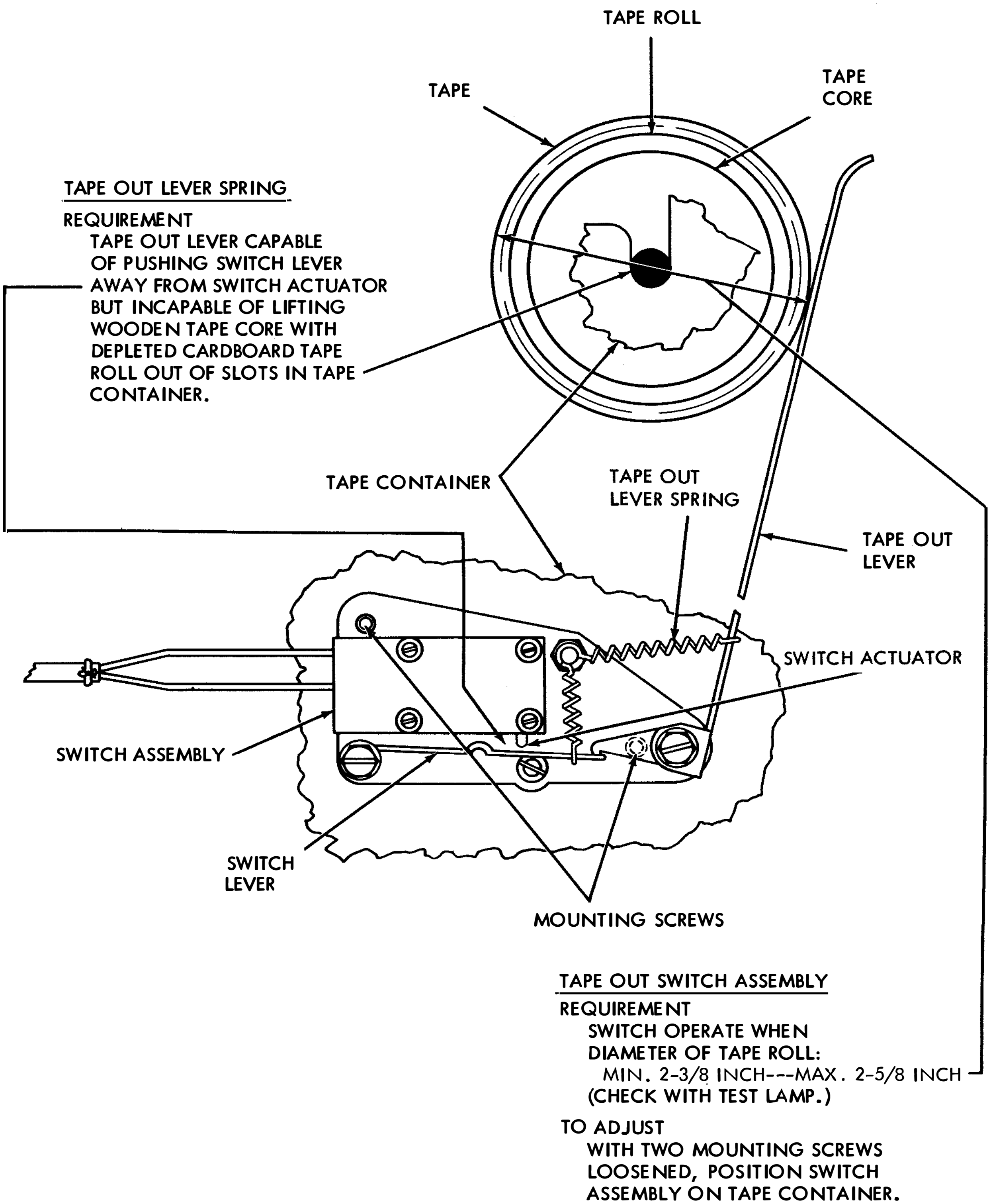
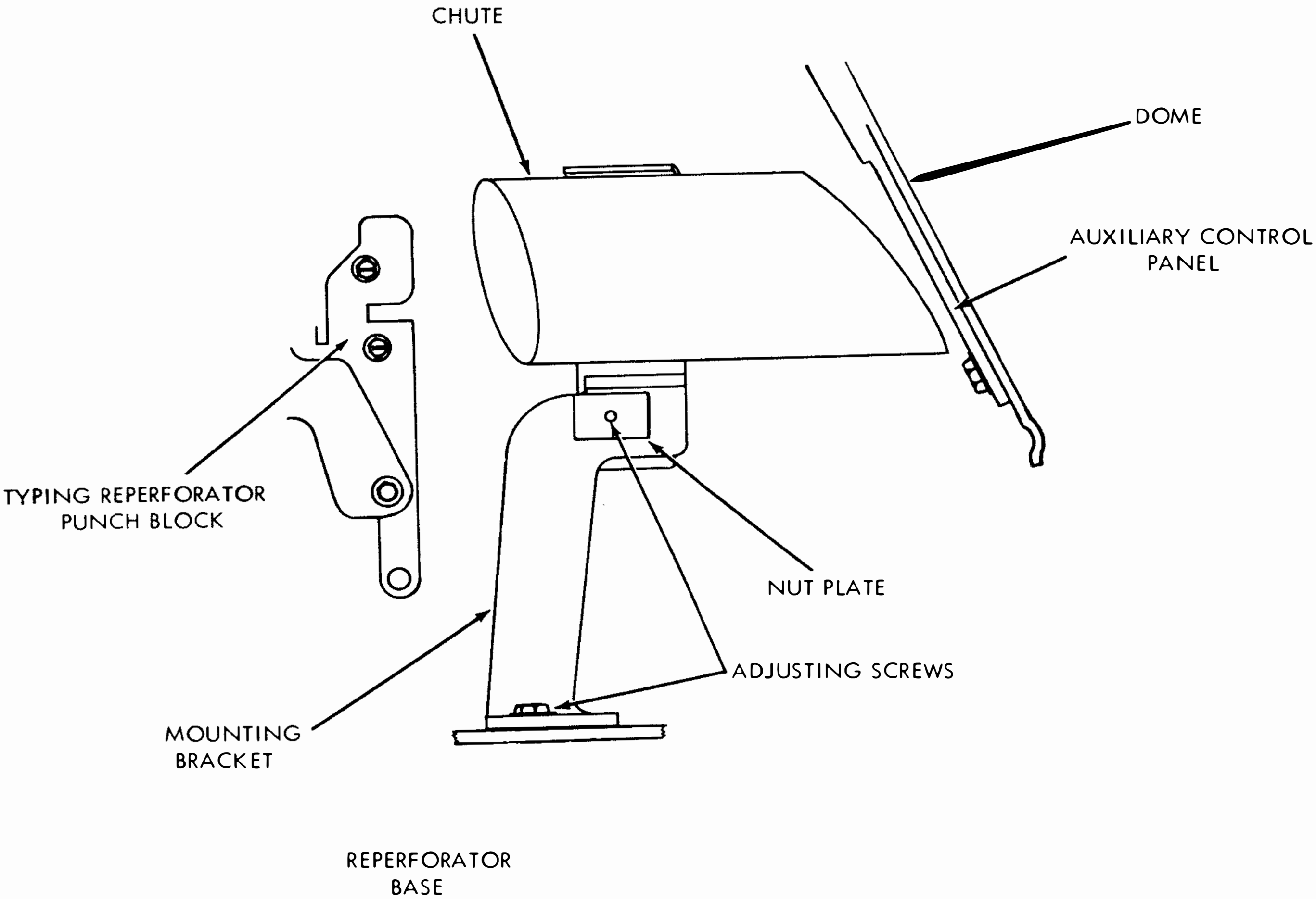


Figure 5-135. Typing Reperforator Base, Low Tape Switch



TAPE GUIDE CHUTE

REQUIREMENT

WITH LEFT TOP AND MIDDLE DOME DOORS OPEN, FRONT AND REAR ENDS OF CHUTE ALIGN WITH PUNCH BLOCK TAPE APERTURE AND WITH HOLE IN AUXILIARY CONTROL PANEL.

TO ADJUST

POSITION MOUNTING BRACKET WITH MOUNTING SCREWS FRICTION TIGHT UNTIL CHUTE IS POSITIONED HORIZONTALLY. WITH UPPER ADJUSTING SCREW FRICTION TIGHT IN ITS NUT PLATE, POSITION CHUTE VERTICALLY.

NOTE: TAPE GUIDE CHUTE SHOULD NOT TOUCH TYPING REPERFORATOR OR CABINET. TAPE SHOULD FEED WITHOUT BINDING OR TWISTING.

Figure 5-136. Typing Reperforator Base, Tape Guide

CHAD CHUTE ASSEMBLY

REQUIREMENT
CLEARANCE BETWEEN EACH CHAD CHUTE AND ADJACENT UNITS SHOULD BE EQUAL IN ALL DIRECTIONS.

TO ADJUST
WITH MOUNTING SCREWS FRICTION TIGHT POSITION EACH CHUTE BY MEANS OF THEIR ELONGATED SLOTS.

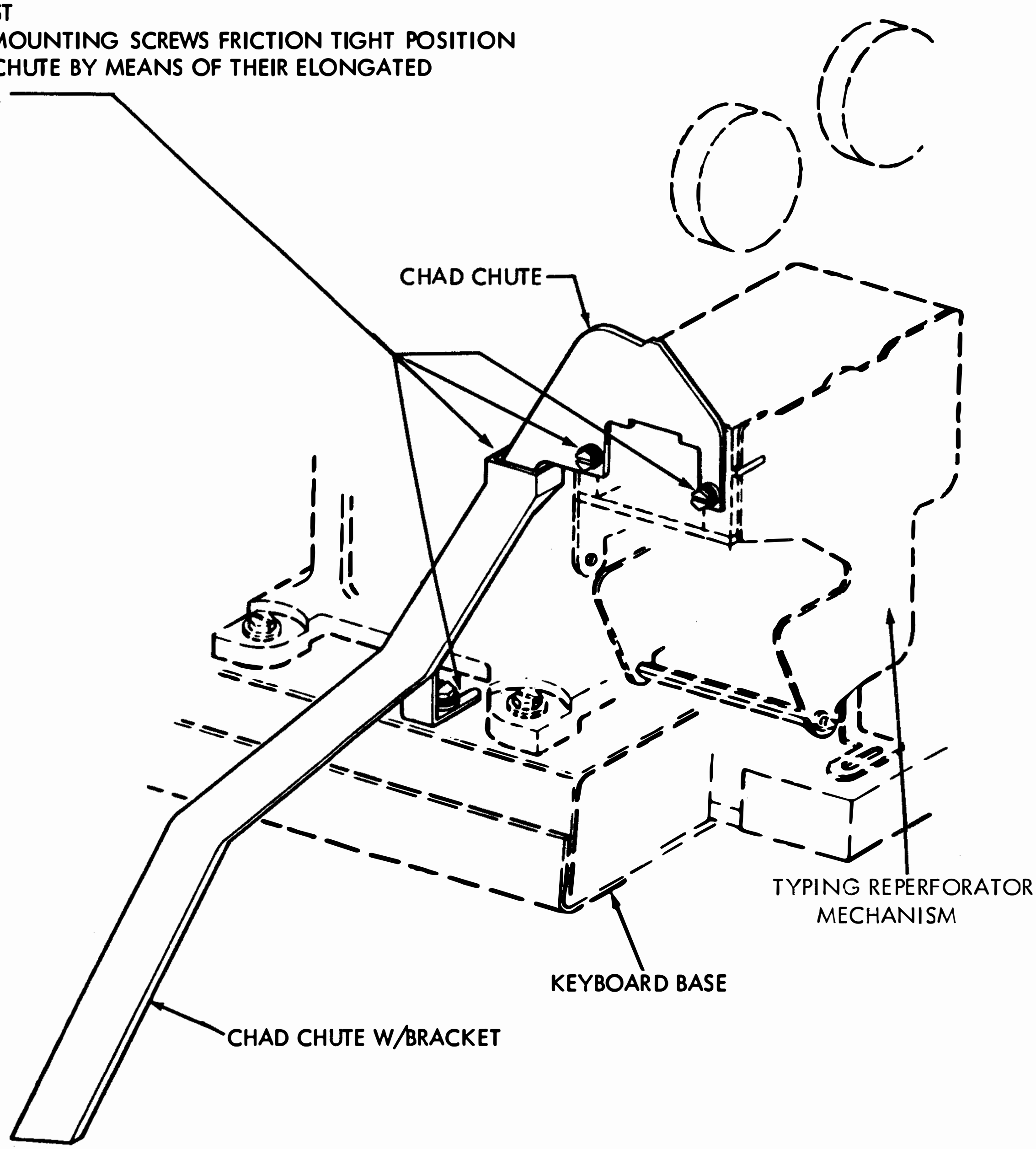
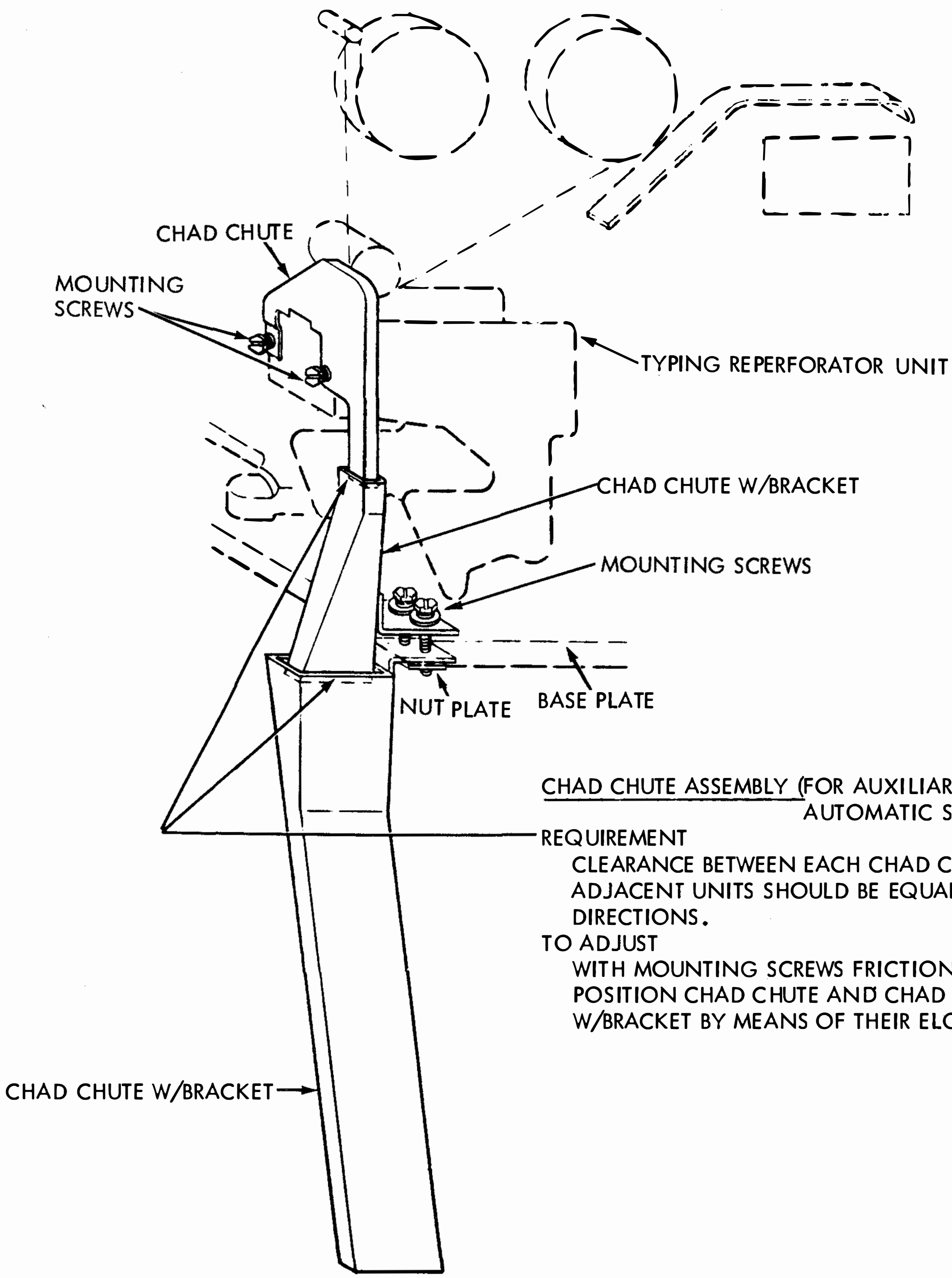


Figure 5-136A. Typing Reperforator, Chad Chute Assembly



<u>CHAD CHUTE ASSEMBLY</u> (FOR AUXILIARY REPERFORATOR - AUTOMATIC SEND-RECEIVE SET)

REQUIREMENT
CLEARANCE BETWEEN EACH CHAD CHUTE AND ADJACENT UNITS SHOULD BE EQUAL IN ALL DIRECTIONS.

TO ADJUST
WITH MOUNTING SCREWS FRICTION TIGHT POSITION CHAD CHUTE AND CHAD CHUTE W/BRACKET BY MEANS OF THEIR ELONGATED SLOTS.

Figure 5-136B. Chad Chute Assembly For Auxiliary Typing Reperforator Automatic Send-Receive Set

CHAD CHUTE AND CHAD BIN ASSEMBLIES -
(AUTOMATIC SEND-RECEIVE SET)
REQUIREMENT
WHEN CHAD BIN IS INSERTED ON SLIDE PLATES, THE CABINET DOOR SHOULD CLOSE WITHOUT INTERFERING WITH CHAD BIN.
TO ADJUST
USING THE SLACK IN THE MOUNTING SCREW BODY HOLES, POSITION THE CHAD CHUTE AND THE CHAD BIN LEFT AND RIGHT SIDE PLATES.

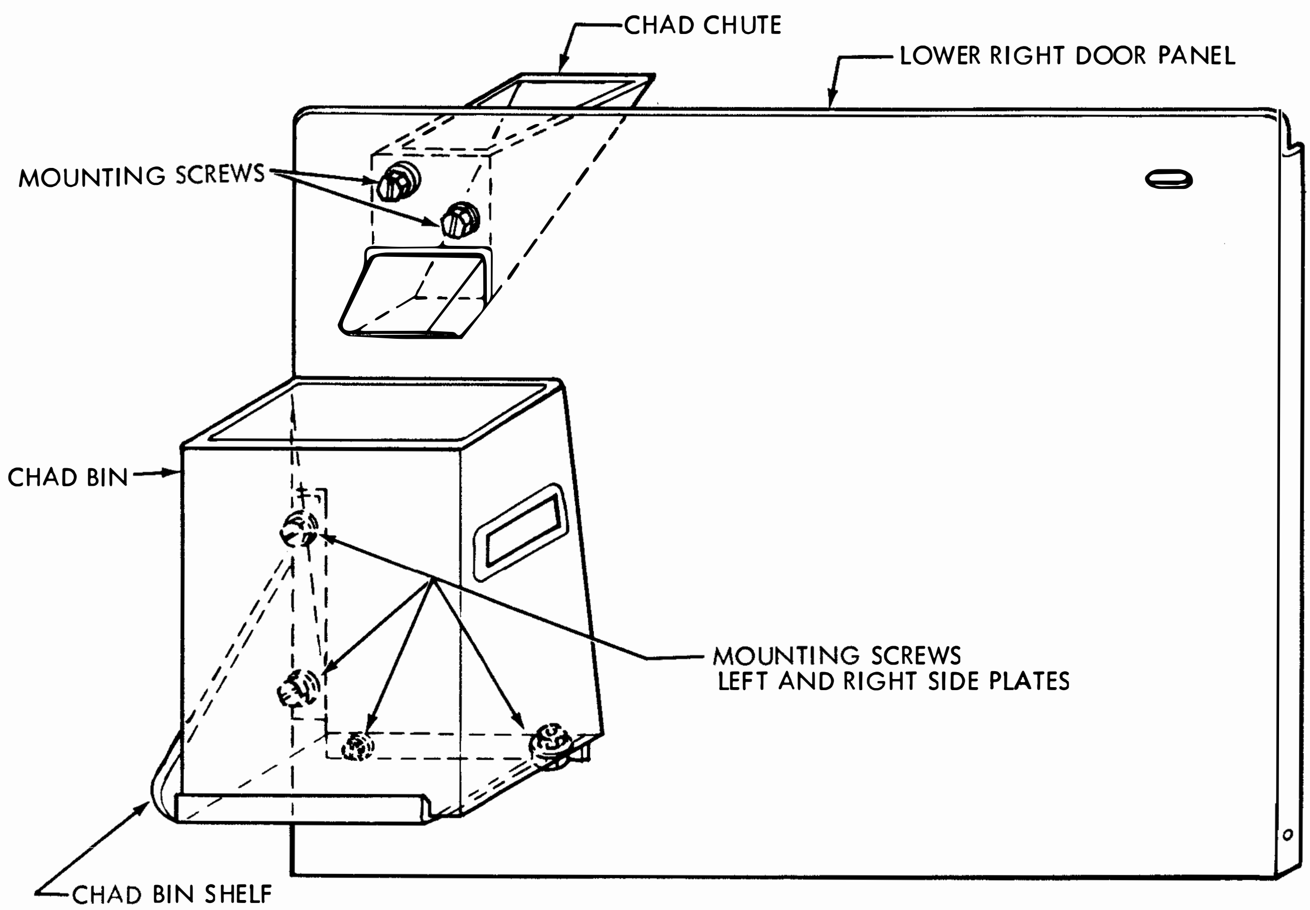


Figure 5-136C. Chad Chute and Chad Bin Assemblies Automatic Send-Receive Set

i. TRANSMITTER DISTRIBUTOR LXD

(1) REMOVING FRONT PANEL
PULL OUTWARD ON LOWER RIGHT AND LEFT REAR CORNER OF FRONT PANEL AND SLIDE PANEL TOWARD THE FRONT. REPLACE IN REVERSE ORDER.

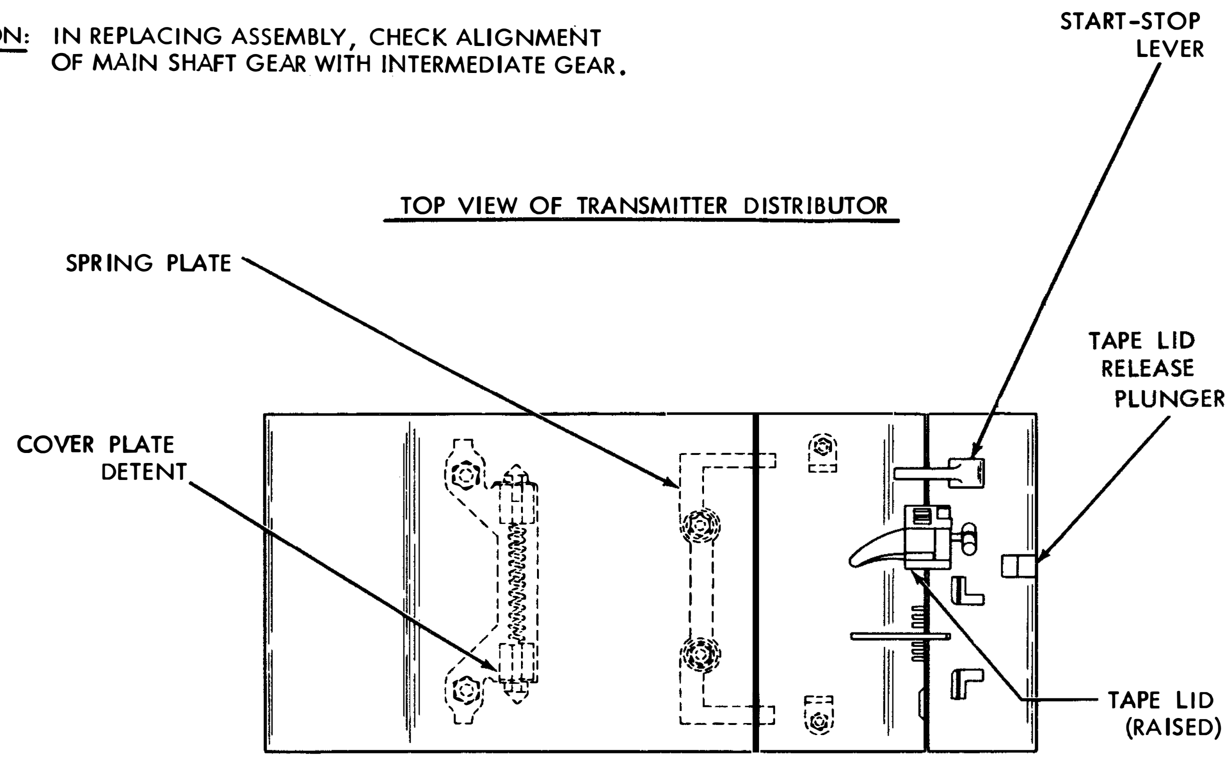
(2) REMOVING COVER PLATE
LIFT END OF COVER PLATE TO DISENGAGE DETENTS. THEN SLIDE PLATE TOWARD THE LEFT TO DISENGAGE SPRING PLATE. REPLACE IN REVERSE ORDER.

(3) REMOVING TOP PLATE
WITH FRONT AND REAR MOUNTING SCREWS LOOSENED (DO NOT DISTURB MOUNTING NUTS) AND TAPE LID RAISED, LIFT PLATE UPWARD. REFER TO FIGURE 5-139 WHEN REPLACING PLATE.

(4) REMOVING TAPE GUIDE PLATE
WITH FRONT AND REAR MOUNTING SCREWS LOOSENED (DO NOT DISTURB MOUNTING NUTS) AND TAPE LID RAISED, LIFT PLATE UPWARD. REFER TO FIGURE 5-141 WHEN REPLACING PLATE.

(5) REMOVING TRANSMITTER DISTRIBUTOR ASSEMBLY
REMOVE RIGHT AND LEFT MOUNTING SCREWS ATTACHED TO BASE AND LIFT ASSEMBLY UPWARD TO DISENGAGE MAIN SHAFT GEAR.

CAUTION: IN REPLACING ASSEMBLY, CHECK ALIGNMENT OF MAIN SHAFT GEAR WITH INTERMEDIATE GEAR.



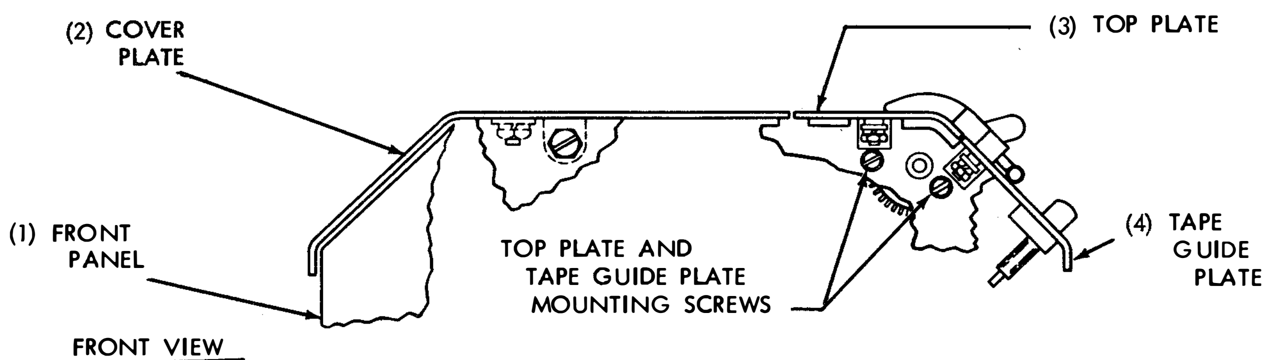
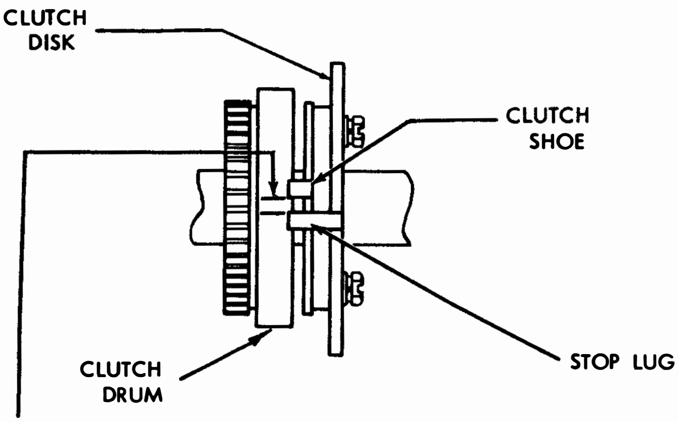


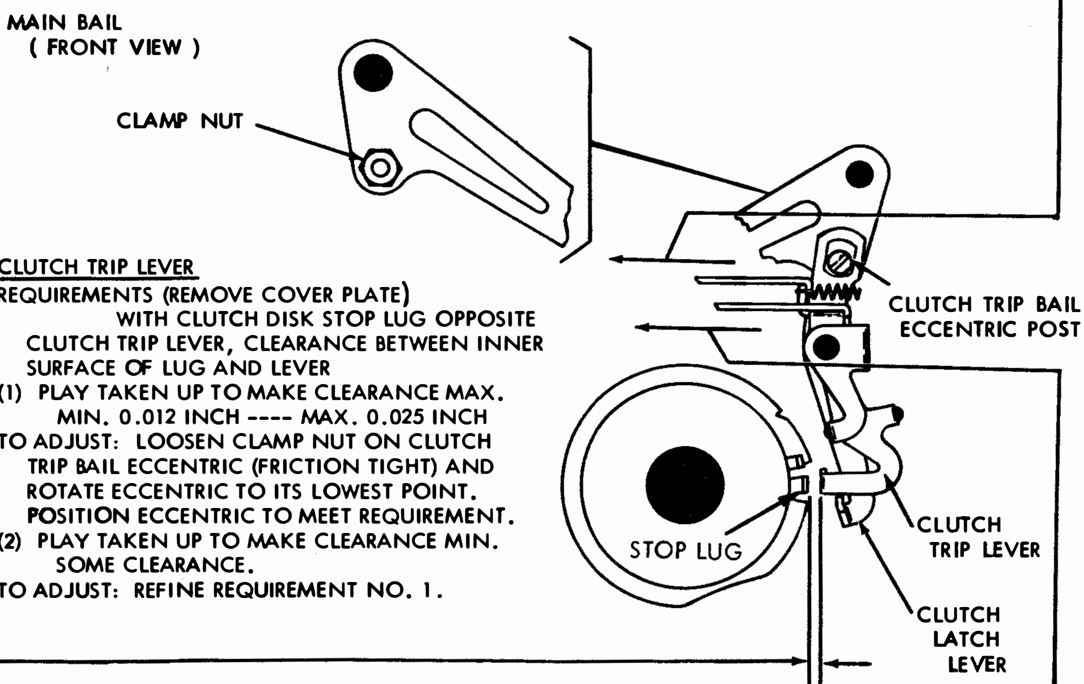
Figure 5-137. Transmitter Distributor, Cover Assemblies



CLUTCH LATCH LEVER SPRING
REQUIREMENT
ENGAGE CLUTCH AND ROTATE CLUTCH UNTIL LATCH LEVER IS ON LOW PART OF DISK.
MIN. 3 OZS.
MAX. 5-1/2 OZS.
TO START LATCH MOVING.

CLUTCH SHOE LEVER
REQUIREMENT
CLEARANCE AS SHOWN SHOULD BE
0.055 INCH----TO----0.085 INCH
GREATER WITH CLUTCH ENGAGED
THAN WITH CLUTCH DISENGAGED.
TO ADJUST
WITH CLUTCH DISK CLAMP SCREWS LOOSENED, PLACE WRENCH OVER STOP LUG AND MOVE DISK.

CAUTION: MAKE SURE THAT DRUM DOES NOT DRAG ON SHOES WHEN CLUTCH IS DISENGAGED AND DRUM IS ROTATED IN ITS NORMAL DIRECTION. REFINE ABOVE ADJUSTMENT TO CORRECT SHOE DRAG.



CLUTCH TRIP LEVER
REQUIREMENTS (REMOVE COVER PLATE)
WITH CLUTCH DISK STOP LUG OPPOSITE CLUTCH TRIP LEVER, CLEARANCE BETWEEN INNER SURFACE OF LUG AND LEVER
(1) PLAY TAKEN UP TO MAKE CLEARANCE MAX.
MIN. 0.012 INCH ---- MAX. 0.025 INCH
TO ADJUST: LOOSEN CLAMP NUT ON CLUTCH TRIP BAIL ECCENTRIC (FRICTION TIGHT) AND ROTATE ECCENTRIC TO ITS LOWEST POINT. POSITION ECCENTRIC TO MEET REQUIREMENT.
(2) PLAY TAKEN UP TO MAKE CLEARANCE MIN.
SOME CLEARANCE.
TO ADJUST: REFINE REQUIREMENT NO. 1.

CLUTCH TRIP LEVER SPRING
REQUIREMENT: WITH CLUTCH ENGAGED
MIN. 7 OZS. ---- MAX. 10-1/2 OZS.
TO START CLUTCH TRIP LEVER MOVING.

CLUTCH SHOE LEVER SPRING — SEE FIGURE 5-19

CLUTCH SHOE SPRING — SEE FIGURE 5-19

Figure 5-138. Transmitter Distributor, Clutch Trip Mechanism

TAPE LID

REQUIREMENTS --- (REMOVE TOP AND TAPE GUIDE PLATES. LUBRICATE PRIOR TO ADJUSTMENT)

(1) PRELIMINARY WITH TAPE LID HELD AGAINST NOTCH IN TAPE GUIDE PLATE:

A FEED WHEEL GROOVE IN TAPE LID SHOULD ALIGN WITH SLOT IN PLATE.

B HOLE IN TAPE LID FOR TAPE-OUT PIN SHOULD ALIGN WITH HOLE IN PLATE. (GAUGE BY EYE.)

C CLEARANCE BETWEEN PIVOT SHOULDER AND TAPE LID SHOULD BE: MIN. SOME --- MAX. 0.010 INCH

TO ADJUST

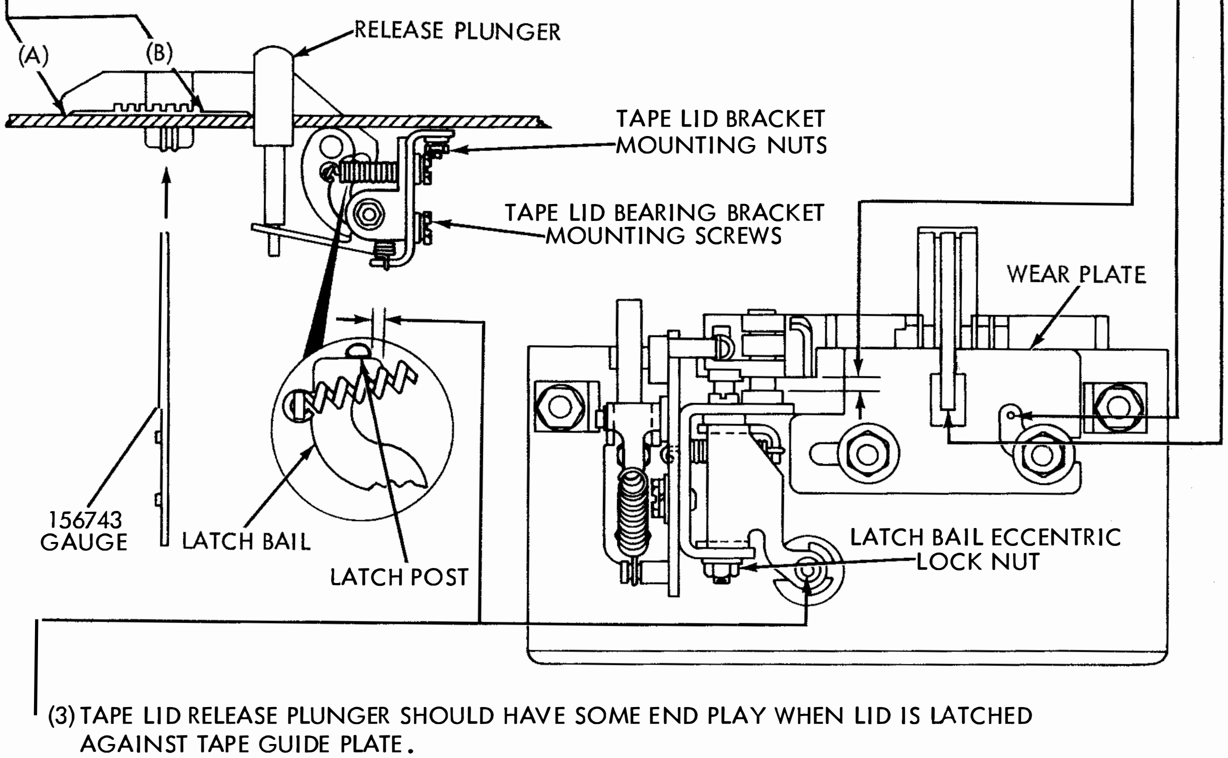
WITH TAPE LID MOUNTING BRACKET NUTS (2) FRICTION TIGHT, INSERT TIP OF 156743 GAUGE THROUGH SLOT AND INTO GROOVE OF LID, AND POSITION TAPE LID BRACKET. RETIGHTEN NUTS.

(2) FRONT BEARING SURFACE (A) OF TAPE LID SHOULD BE HELD FIRMLY AGAINST TAPE GUIDE PLATE. CLEARANCE MEASURED AT FIN (B) OF TAPE LID (FIN IN LINE WITH REAR TAPE GUIDE) SHOULD BE:
MIN. 0.010 INCH --- MAX. 0.018 INCH
NOTE: WHEN BOTH PLATES ARE ASSEMBLED ON UNIT, LEFT EDGE OF LID MAY TOUCH TOP PLATE, AND SOME CHANGE IN THIS CLEARANCE MAY BE EXPECTED.

TO ADJUST

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

SEE SPRING REQUIREMENTS IN FIGURE 5-140

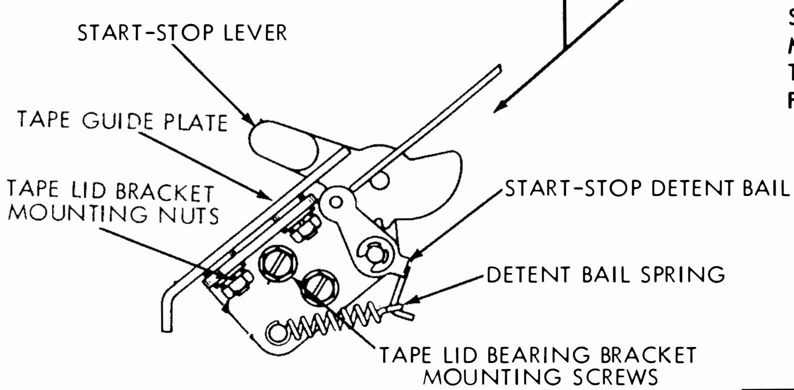


(3) TAPE LID RELEASE PLUNGER SHOULD HAVE SOME END PLAY WHEN LID IS LATCHED AGAINST TAPE GUIDE PLATE.

TO ADJUST

WITH ECCENTRIC MOUNTING POST LOCKING NUT FRICTION TIGHT AND TAPE LID RAISED, ROTATE HIGH PART OF ECCENTRIC TOWARD TAPE GUIDE PLATE. CLOSE LID AND ROTATE ECCENTRIC TOWARD BRACKET UNTIL LATCH JUST FALLS UNDER FLAT ON POST. RECHECK BY DEPRESSING PLUNGER. WITH LID HELD DOWN, TIP OF LATCH SHOULD CLEAR POST AS PLUNGER IS OPERATED.

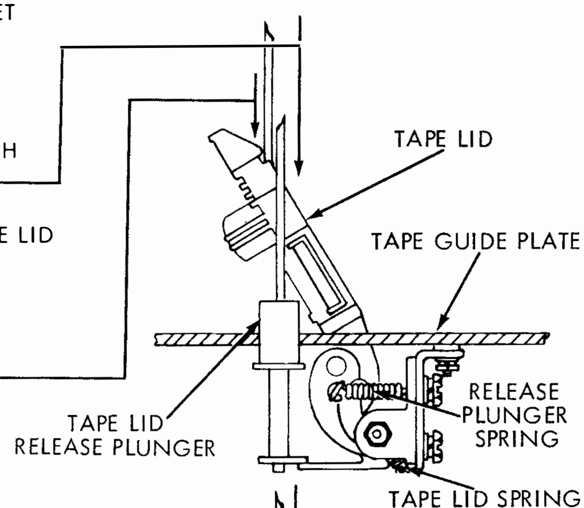
Figure 5-139. Transmitter Distributor, Tape Guide Plate



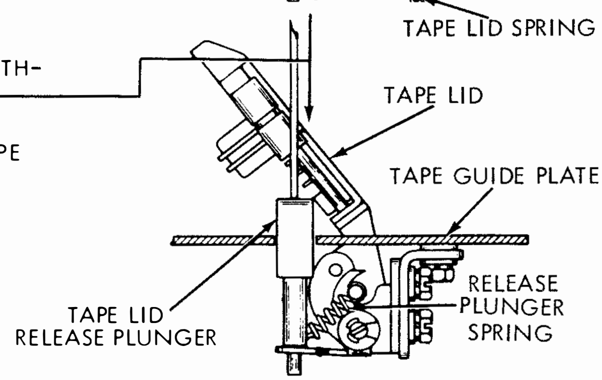
START-STOP DETENT BAIL SPRING
REQUIREMENT --- WITH START-STOP LEVER IN RUN POSITION, PLACE SPRING SCALE AGAINST DETENT STUD
MIN. 28 OZS. ——— MAX. 48 OZS.
TO START DETENT BAIL MOVING AWAY FROM START-STOP LEVER.

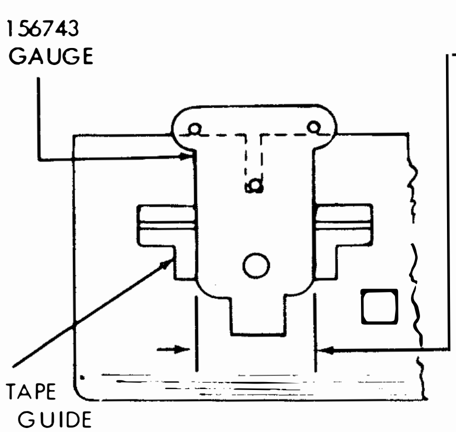
TAPE LID RELEASE PLUNGER SPRING (TAPE GUIDE PLATE WITH TAPE LID SPRING)
REQUIREMENT
WITH TAPE GUIDE PLATE HELD HORIZONTALLY AND TAPE LID UNLATCHED
MIN. 28 OZS. --- MAX. 48 OZS.
TO START TAPE LID BAIL MOVING.

TAPE LID SPRING
REQUIREMENT
WITH RELEASE PLUNGER HELD FULLY DEPRESSED
MIN. 3 OZS. --- MAX. 4-1/2 OZS.
TO START TAPE LID MOVING.



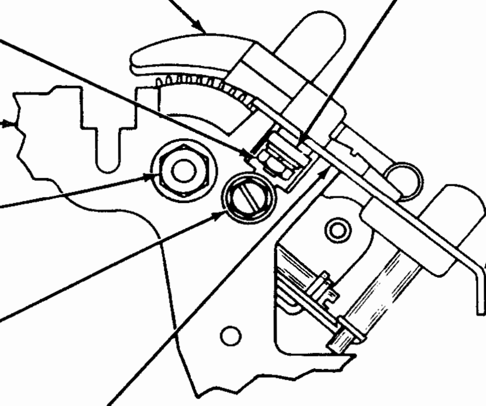
TAPE LID RELEASE PLUNGER SPRING (TAPE GUIDE PLATE WITHOUT TAPE LID SPRING)
REQUIREMENT
WITH TAPE GUIDE PLATE HELD HORIZONTALLY AND TAPE LID UNLATCHED
MIN. 3 OZS. --- MAX. 4-1/2 OZS.
TO START TAPE LID BAIL MOVING.





TAPE GUIDE
REQUIREMENTS (WITH 156743 GAUGE POSITIONED AS SHOWN)
(1) CLEARANCE BETWEEN RIGHT AND LEFT TAPE GUIDE AND GAUGE
SOME ---- TO ---- 0.003 INCH.
(2) EDGE OF WEAR PLATE SHOULD BE FLUSH WITH EDGE OF TAPE GUIDE PLATE.
TO ADJUST
WITH EACH TAPE GUIDE MOUNTING NUT FRICTION TIGHT, MOVE WEAR PLATE UPWARD UNTIL IT OVERHANGS EDGE OF TAPE GUIDE PLATE. PLACE GAUGE IN POSITION AND MOVE GAUGE AND WEAR PLATE DOWNWARD UNTIL BOTH STUDS ENGAGE EDGE OF TAPE GUIDE PLATE TO ALIGN COMMON EDGES. HOLD GAUGE AND WEAR PLATE AND POSITION EACH GUIDE. (GAUGE MAY TOUCH BUT NOT BIND.)

Figure 5-140. Transmitter Distributor, Tape Lid Assembly



REPLACING AND POSITIONING TAPE GUIDE PLATE

REQUIREMENTS

(1) SHOULDER OF FEED WHEEL POST SHOULD NOT INTERFERE WITH TOP PLATE OR TAPE GUIDE PLATE MOUNTING BRACKETS.

TO ADJUST (SEE NOTE)

WITH FEED WHEEL BEARING POST CLAMP NUT FRICTION TIGHT, POSITION THE POST.

(2) TAPE GUIDE SHOULD REST FIRMLY AGAINST AT LEAST THREE PROJECTIONS OF FRONT AND REAR PLATE.

TO ADJUST (SEE NOTE)

WITH CLAMP NUT THAT SECURES TAPE GUIDE PLATE MOUNTING BRACKET (FRONT AND REAR) FRICTION TIGHT, TRIP CLUTCH AND ROTATE SHAFT UNTIL SENSING PINS ARE IN THEIR UPPERMOST POSITION. WITH TAPE LID RAISED AND START-STOP LEVER IN RUN POSITION PRESS GUIDE PLATE INTO POSITION WHILE GUIDING MOUNTING SCREWS INTO NOTCH OF FRONT AND REAR PLATE ENGAGE TIP OF TAPE-OUT PIN WITH HOLE IN TAPE GUIDE PLATE.

(3) OUTER EDGES OF MOUNTING BRACKETS AND OUTER EDGES OF (MOUNTING STUD) SHOULDER SHOULD ALIGN OR BE POSITIONED EQUALLY AT FRONT AND REAR WITH RESPECT TO THE BRACKETS. (GAUGE BY EYE. SEE FIGURE 5-152).

TO ADJUST

MOVE TAPE GUIDE PLATE TOWARD THE FRONT OR REAR. TIGHTEN NUTS ONLY AFTER TOP PLATE (FIGURE 5-142) IS ADJUSTED.

NOTE: POSITION TAPE-OUT SENSING PIN STOP ARM (SEE FIGURE 5-144) IN ITS LOWEST POSITION AND HOLD START-STOP BAIL EXTENSION FROM RATCHET WHEEL.

Figure 5-141. Transmitter Distributor, Tape Guide Plate Mounting

REPLACING AND POSITIONING TOP PLATE --- LOOSEN NUTS (FRICTION TIGHT) THAT SECURE MOUNTING BRACKETS. PRESS TOP PLATE INTO POSITION WHILE GUIDING BRACKET MOUNTING SCREWS INTO NOTCH OF FRONT AND REAR PLATE. MAKE SURE THAT TOP PLATE SEATS FIRMLY AGAINST PROJECTIONS OF FRONT AND REAR PLATE (5 PROJECTIONS SHOULD ENGAGE) AND TIGHT-TAPE ARM EXTENSION IS UNDER TOP PLATE.

REQUIREMENT

(1) MATING EDGE OF TOP PLATE SHOULD BE FLUSH----TO----0.003 INCH UNDER FLUSH WITH EDGE OF TAPE GUIDE PLATE (WITHIN AREA OF TAPE LID) WHEN PLATE ENGAGES AT LEAST 3 PROJECTIONS.

(2) FEED WHEEL SLOT SHOULD ALIGN WITH SLOT IN TAPE GUIDE PLATE.

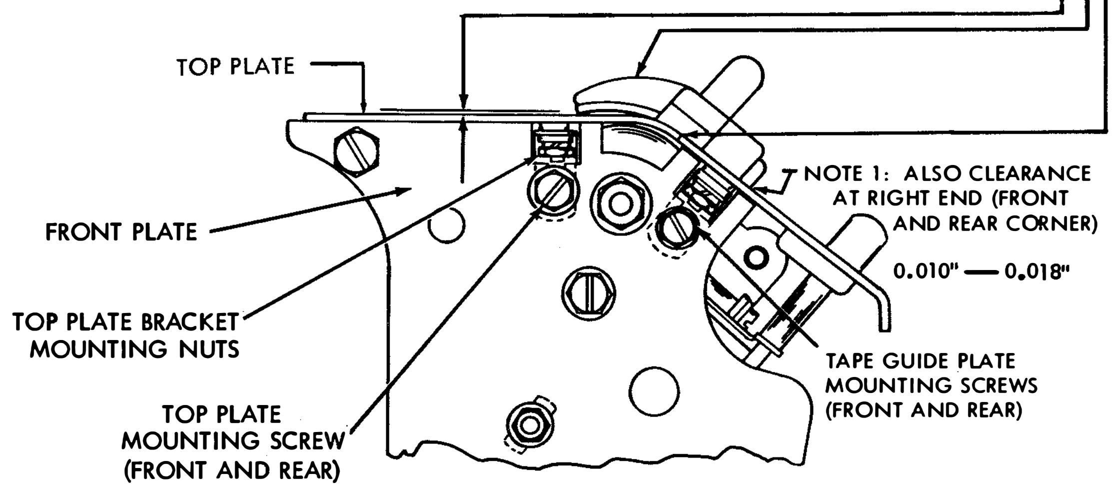
(3) CLEARANCE BETWEEN PROJECTION OF TAPE LID AND TOP PLATE (SEE NOTE 1),
MIN. 0.010 INCH---MAX. 0.025 INCH ON FLAT PORTION
MIN. 0.010 INCH---MAX. 0.020 INCH ON CURVED PORTION

TO ADJUST REQUIREMENT NUMBER

(1) POSITION TOP PLATE AND TAPE GUIDE PLATE BY MEANS OF THEIR OVERSIZED MOUNTING HOLES. TIGHTEN MOUNTING SCREWS.

(2) POSITION PLATES SO THAT FEED WHEEL ROTATES FREELY WHEN ITS DETENT AND FEED PAWL ARE DISENGAGED. TIGHTEN NUTS THAT SECURE MOUNTING BRACKETS TO TOP PLATE AND TAPE GUIDE PLATE. (DO NOT DISTURB REQUIREMENT 2, FIGURE 5-141).

(3) IF NECESSARY, LOOSEN TAPE LID BEARING BRACKET MOUNTING SCREWS AND POSITION TAPE LID. TIGHTEN SCREWS AND RECHECK REQUIREMENTS (1) AND (2), FIGURE 5-139.



REPLACING AND POSITIONING COVER PLATE

REQUIREMENT----

1. RIGHT EDGE OF COVER PLATE SHOULD BE HELD FLUSH AGAINST LEFT EDGE OF TOP PLATE BY THE COVER PLATE DETENTS.
2. COVER PLATE SHOULD REST AGAINST AT LEAST THREE OF THE FOUR PROJECTIONS (FRONT & REAR PLATE).
3. FRONT EDGE OF COVER PLATE AND TOP PLATE SHOULD ALIGN.

TO ADJUST----WITH DETENTING NUT CLAMP SCREW (FRONT & REAR PLATE) FRICTION TIGHT, MOVE CLAMP SCREWS TO THEIR EXTREME LOWER RIGHT POSITION THEN TIGHTEN SCREWS. LOOSEN DETENT BRACKET AND SPRING PLATE MOUNTING NUTS. PLACE COVER ON UNIT AND POSITION HORIZONTALLY TO MEET THE REQUIREMENTS.

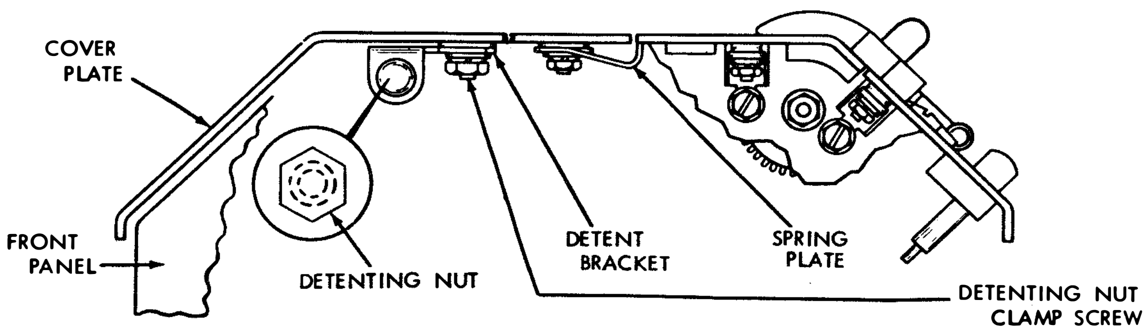


Figure 5-142. Transmitter Distributor, Top Plate and Cover Plate Mounting

TAPE-OUT CONTACT ASSEMBLY

REQUIREMENT
(COVER PLATE AND TOP PLATE REMOVED. REMOVAL OF TAPE GUIDE PLATE OPTIONAL.)
START-STOP SWITCH IN STOP POSITION. WITH TAPE-OUT SPRING BRACKET FRICTION TIGHT, MOVE BRACKET DOWNWARD UNTIL TAPE-OUT PIN CLEARS INSULATED PORTION OF CONTACT SWINGER.

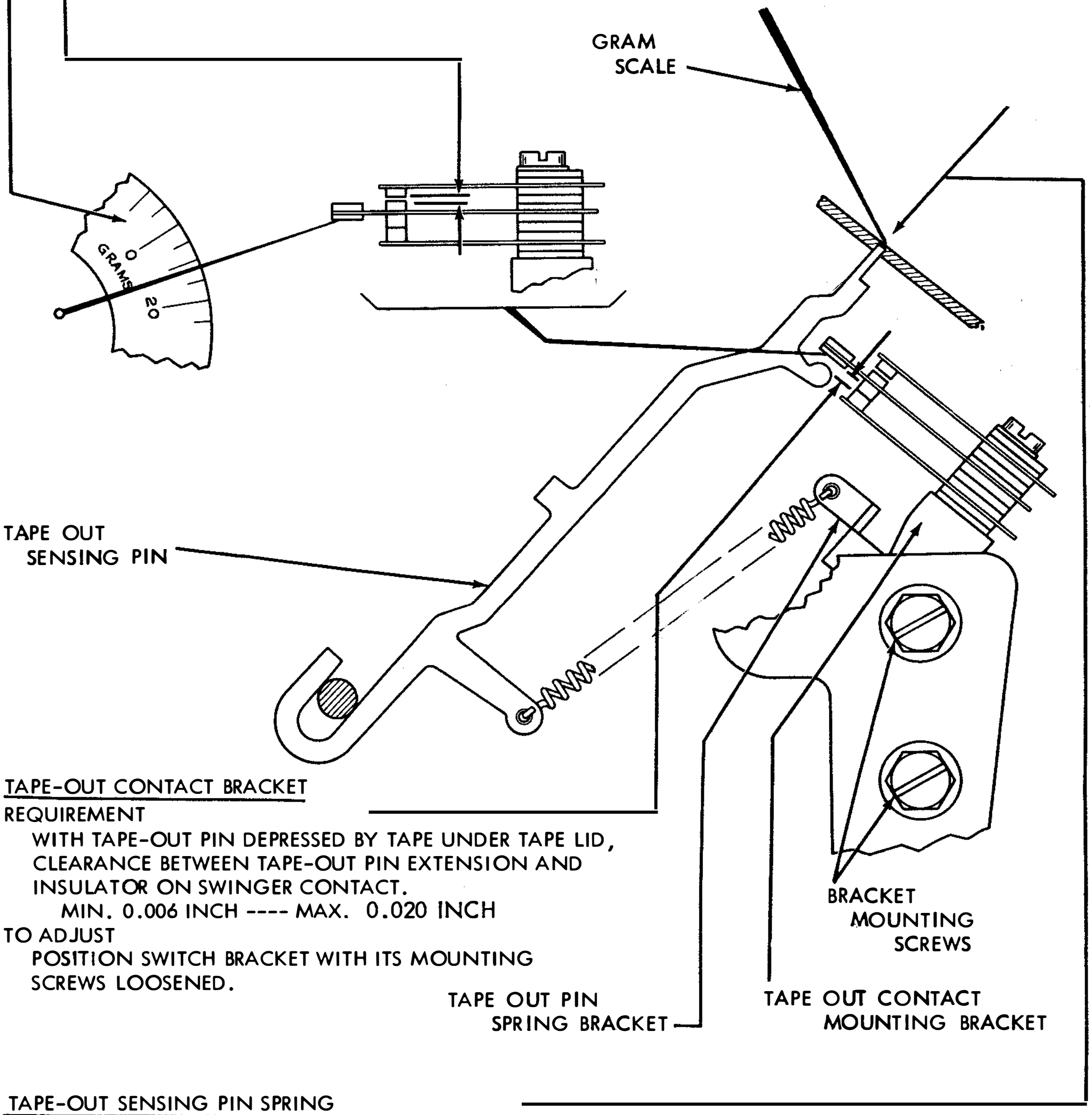
(1) WITH GRAM SCALE APPLIED AS SHOWN,
MIN. 8 GRAMS ---- MAX. 15 GRAMS, TO SEPARATE NORMALLY CLOSED CONTACTS.

TO ADJUST
REMOVE BAIL SPRING AND CONTACT ASSEMBLY. FORM THE CONTACT SWINGER WITH THE 110445 SPRING BENDER.

(2) CLEARANCE BETWEEN NORMALLY OPEN CONTACTS,
MIN. 0.008 INCH ---- MAX. 0.015 INCH.

TO ADJUST
FORM UPPER CONTACT SPRING USING THE 110445 SPRING BENDER.

NOTE: REPLACE CONTACT ASSEMBLY WITH SWINGER OVER TAPE-OUT PIN EXTENSION. PLACE SPRING BRACKET SHOULDER BUSHING ON UPPER HOLE AND THE WASHER ON LOWER MOUNTING HOLE.



TAPE-OUT CONTACT BRACKET

REQUIREMENT
WITH TAPE-OUT PIN DEPRESSED BY TAPE UNDER TAPE LID, CLEARANCE BETWEEN TAPE-OUT PIN EXTENSION AND INSULATOR ON SWINGER CONTACT.
MIN. 0.006 INCH ---- MAX. 0.020 INCH

TO ADJUST
POSITION SWITCH BRACKET WITH ITS MOUNTING SCREWS LOOSENED.

TAPE-OUT SENSING PIN SPRING

REQUIREMENT
WITH START-STOP LEVER IN RUN POSITION, APPLY GRAM SCALE TO TIP END OF SENSING PIN.
MIN. 38 GRAMS ---- MAX. 45 GRAMS, TO MOVE PIN TO A POSITION FLUSH WITH TAPE GUIDE PLATE

TO ADJUST
WITH CONTACT BRACKET LOWER MOUNTING SCREW LOOSENED. POSITION THE SPRING BRACKET.

Figure 5-143. Transmitter Distributor, Tape-Out Contact Assembly

TAPE-OUT SENSING PIN

REQUIREMENTS

1. WITH START-STOP LEVER IN FREE WHEELING OR STOP POSITION, TIP OF TAPE-OUT PIN SHOULD BE FLUSH----TO----0.010 INCH BELOW TOP SURFACE OF TAPE GUIDE PLATE.

TO ADJUST: PLACE START-STOP LEVER IN STOP POSITION. WITH STOP ARM CLAMP SCREW FRICTION TIGHT, POSITION THE STOP ARM.

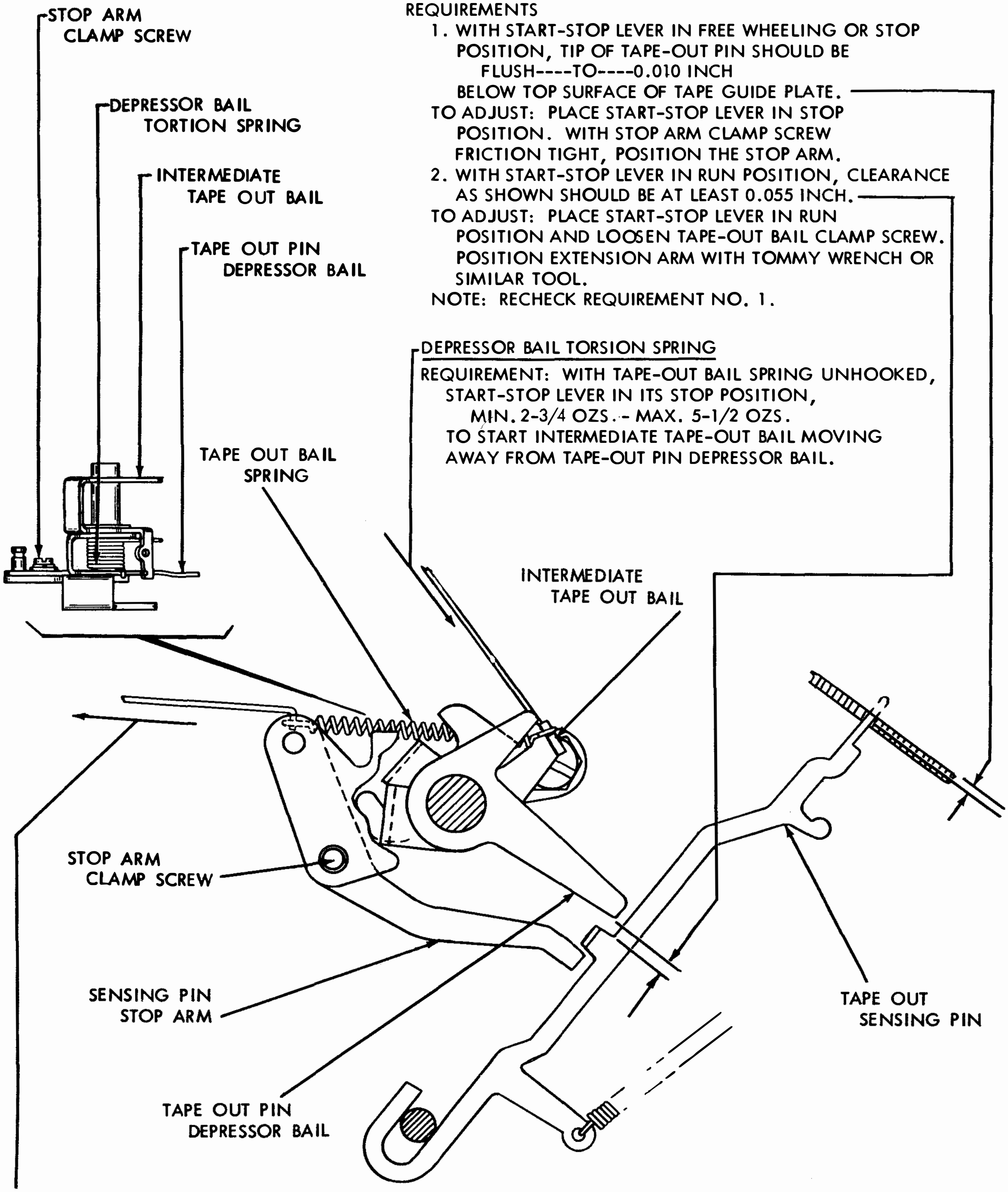
2. WITH START-STOP LEVER IN RUN POSITION, CLEARANCE AS SHOWN SHOULD BE AT LEAST 0.055 INCH.

TO ADJUST: PLACE START-STOP LEVER IN RUN POSITION AND LOOSEN TAPE-OUT BAIL CLAMP SCREW. POSITION EXTENSION ARM WITH TOMMY WRENCH OR SIMILAR TOOL.

NOTE: RECHECK REQUIREMENT NO. 1.

DEPRESSOR BAIL TORSION SPRING

REQUIREMENT: WITH TAPE-OUT BAIL SPRING UNHOOKED, START-STOP LEVER IN ITS STOP POSITION, MIN. 2-3/4 OZS. - MAX. 5-1/2 OZS. TO START INTERMEDIATE TAPE-OUT BAIL MOVING AWAY FROM TAPE-OUT PIN DEPRESSOR BAIL.



INTERMEDIATE TAPE OUT BAIL SPRING

REQUIREMENT --- WITH START-STOP LEVER IN ITS RUN POSITION, HOOK SPRING SCALE IN LOOP. MIN. 3 OZS. ---- MAX. 5 OZS., TO PULL SPRING TO ITS INSTALLED LENGTH.

Figure 5-144. Transmitter Distributor, Tape-Out Sensing Pin

START-STOP SWITCH BRACKET

REQUIREMENTS (CLUTCH DISENGAGED)

(1) WITH START-STOP LEVER IN RUN POSITION, CLEARANCE BETWEEN START-STOP BAIL EXTENSION AND INSULATOR ON START-STOP SWITCH SWINGER

MIN. 0.006 INCH ---- MAX. 0.015 INCH

TO ADJUST

WITH SWITCH BRACKET MOUNTING SCREWS LOOSENED, POSITION THE BRACKET.

(2) START-STOP BAIL EXTENSION SHOULD FULLY ENGAGE INSULATED PORTION OF SWITCH SWINGER.

TO ADJUST

LOOSEN CONTACT PILE-UP MOUNTING SCREWS AND ALIGN CONTACT ASSEMBLY.

TIGHT TAPE, START-STOP SWITCH CONTACT SPRING

REQUIREMENT

WITH START-STOP LEVER IN RUN POSITION

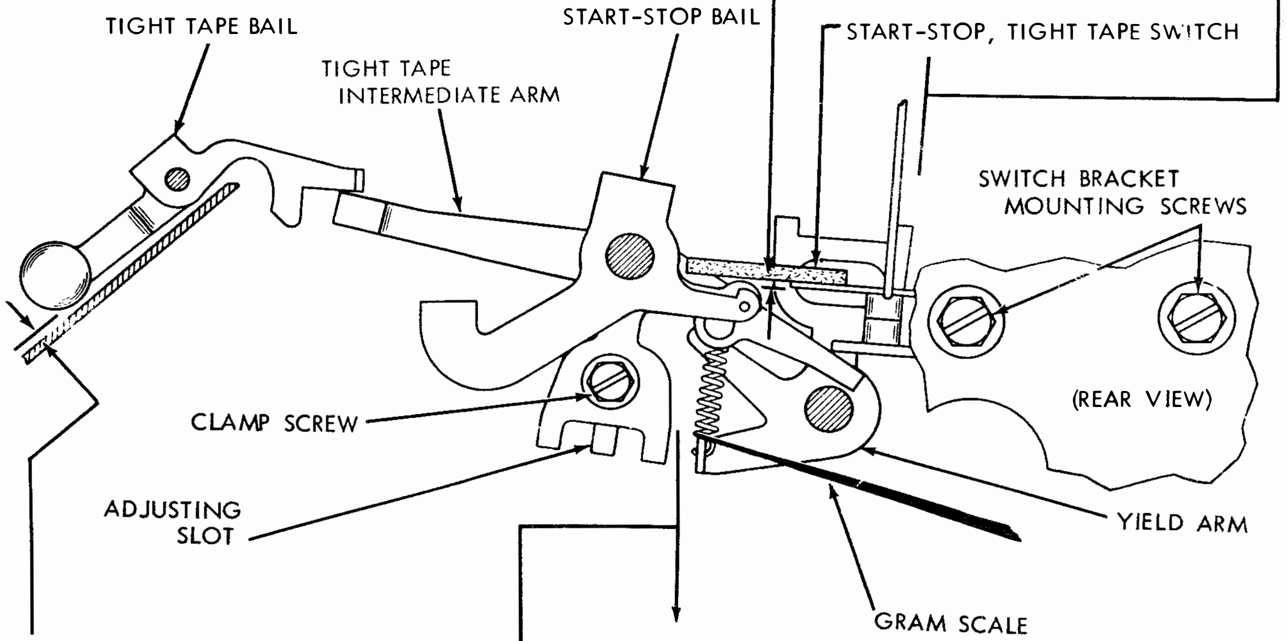
MIN. 3 OZS. ---- MAX. 4 OZS.

TO SEPARATE CONTACTS

TO ADJUST

FORM SWINGER WITH 110455 SPRING BENDER

NOTE: RECHECK REQUIREMENTS FOR START-STOP SWITCH BRACKET AND TIGHT TAPE INTERMEDIATE ARM.



TIGHT TAPE INTERMEDIATE ARM

REQUIREMENT

WITH START-STOP LEVER IN RUN POSITION, TIGHT TAPE, START-STOP CONTACTS SHOULD FUNCTION AS FOLLOWS:

(1) REMAIN CLOSED WHEN TIGHT TAPE BAIL IS RAISED 0.045 INCH.

(2) OPEN AS BAIL IS RAISED TO HEIGHT OF 0.075 INCH.

TO ADJUST

WITH TIGHT TAPE INTERMEDIATE ARM CLAMP SCREW LOOSENED, POSITION THE ARM AT ITS ADJUSTING SLOT.

TIGHT TAPE INTERMEDIATE ARM SPRING

REQUIREMENT

WITH START-STOP LEVER IN RUN POSITION,

MIN. 20 GRAMS (3/4 OZ.) ---- MAX. 40 GRAMS (1-1/2 OZS.)

TO START INTERMEDIATE ARM MOVING AWAY FROM ITS YIELD ARM

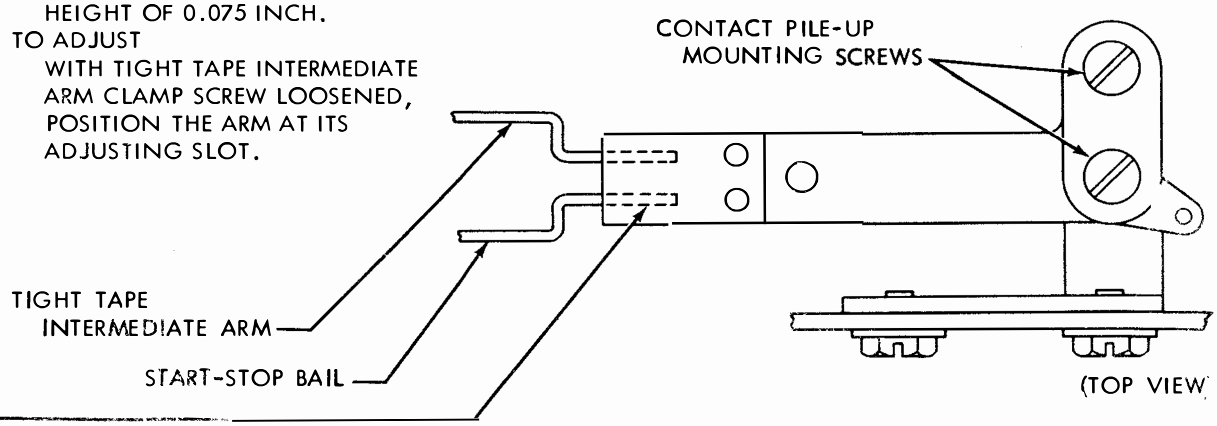


Figure 5-145. Transmitter Distributor, Start-Stop Switch Assembly

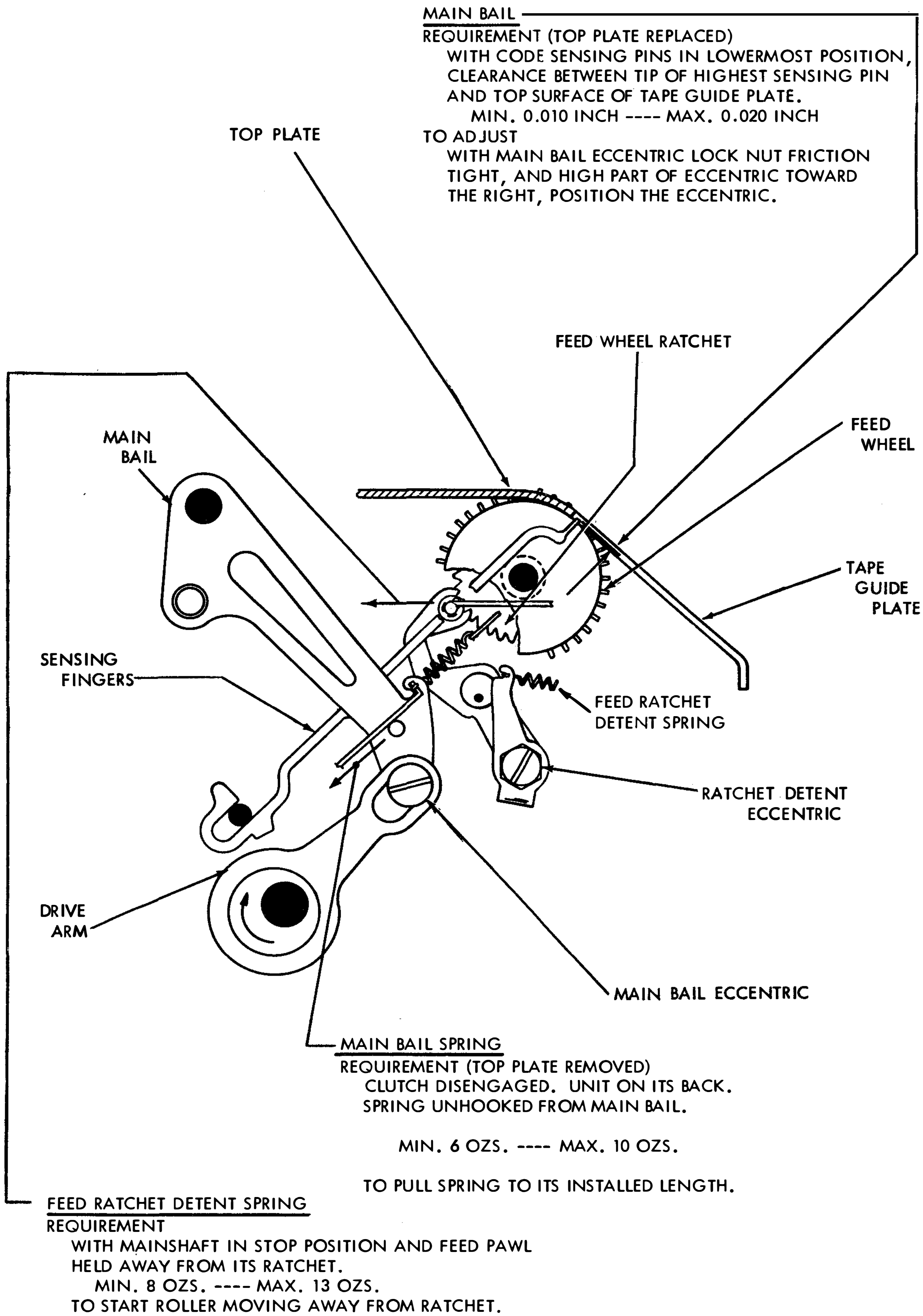


Figure 5-146. Transmitter Distributor, Main Bail Assembly

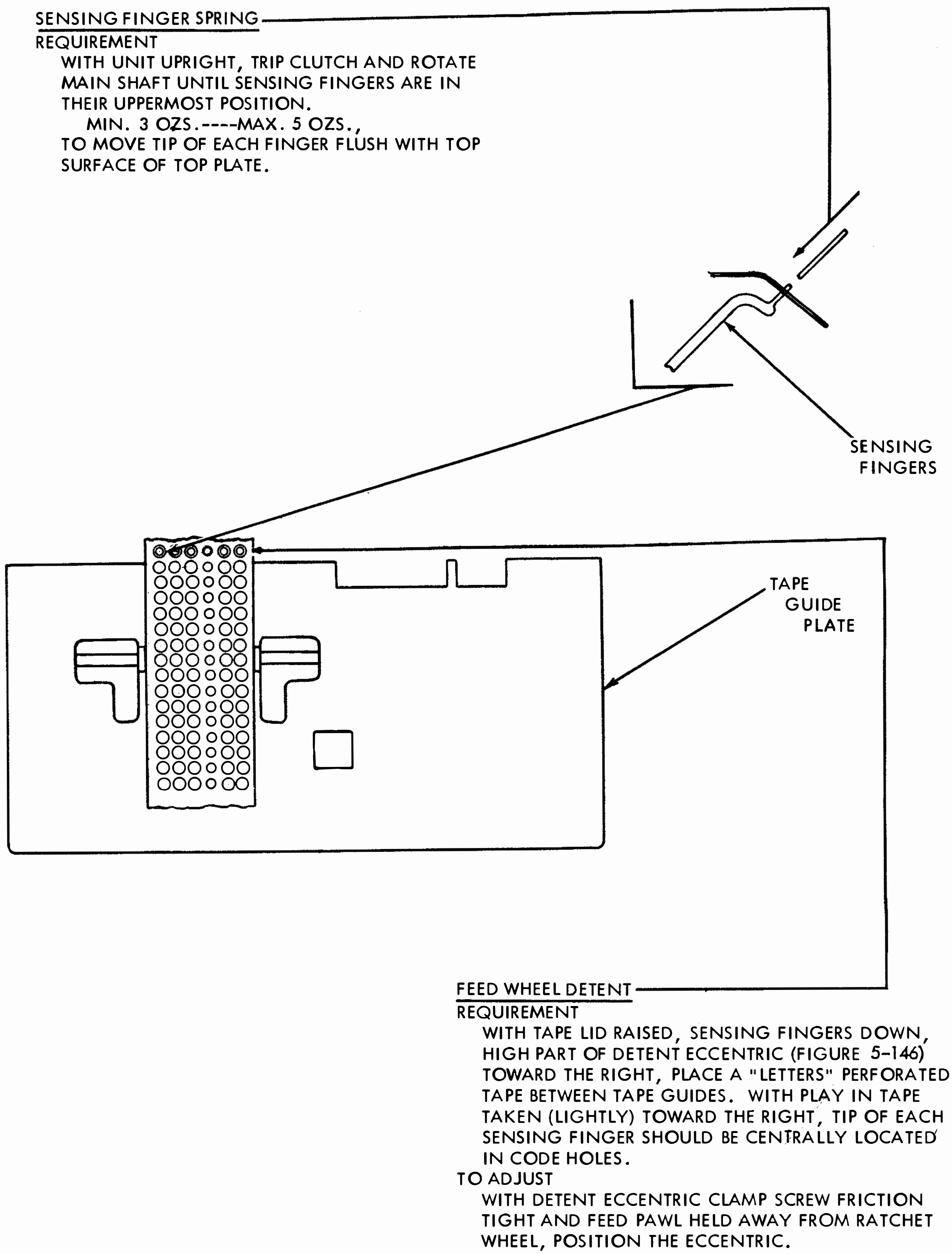


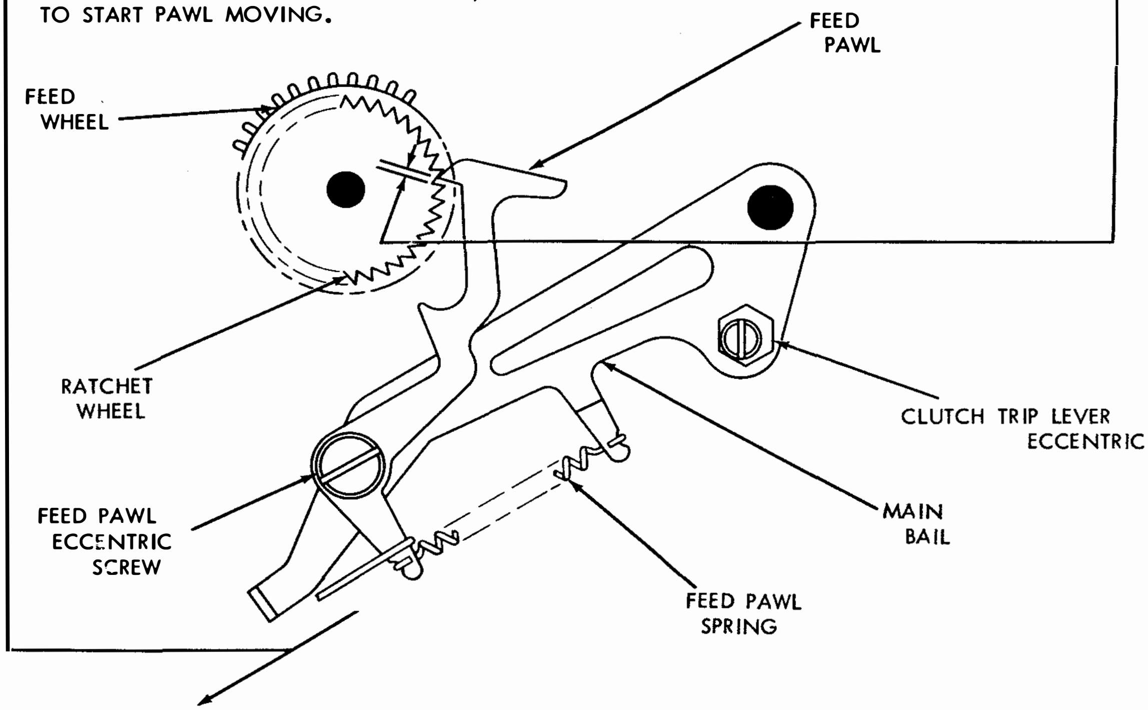
Figure 5-147. Transmitter Distributor, Code Sensing Fingers

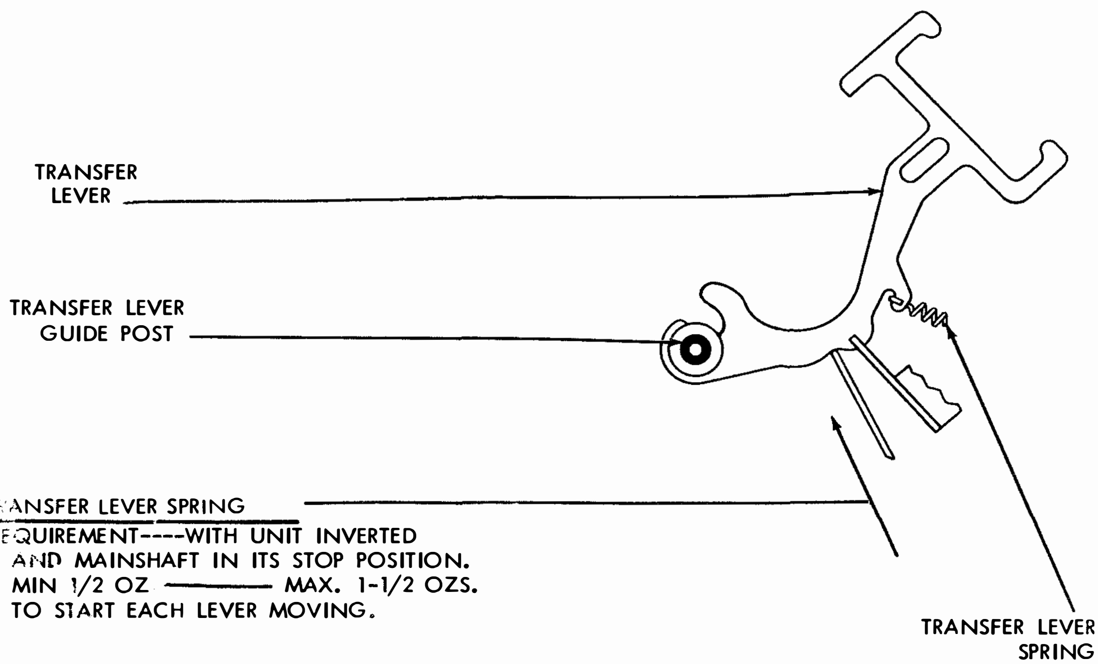
FEED PAWL

REQUIREMENT----(TOP PLATE REMOVED) - WITH HIGH PART OF ECCENTRIC TOWARD THE RIGHT AND SENSING FINGERS IN THEIR LOWERMOST POSITION, CLEARANCE BETWEEN FEED PAWL AND RATCHET TOOTH JUST ENGAGED.
SOME ———— TO ———— 0.003 INCH
TO ADJUST----WITH ECCENTRIC SCREW LOCK NUT LOOSENED, POSITION THE SCREW. RE-CHECK REQUIREMENT AT FOUR POSITIONS OF RATCHET APPROXIMATELY 90 DEGREES APART.

FEED PAWL SPRING

REQUIREMENT----WITH UNIT TILTED TOWARD THE LEFT AND MAINSHAFT IN ITS STOP POSITION.
MIN. 2 OZS. ———— MAX. 3-1/2 OZS.
TO START PAWL MOVING.





TRANSFER LEVER SPRING

REQUIREMENT----WITH UNIT INVERTED AND MAINSHAFT IN ITS STOP POSITION.
MIN 1/2 OZ ———— MAX. 1-1/2 OZS.
TO START EACH LEVER MOVING.

Figure 5-148. Transmitter Distributor, Feed Pawl Mechanism

MAIN BAIL TRIP LEVER

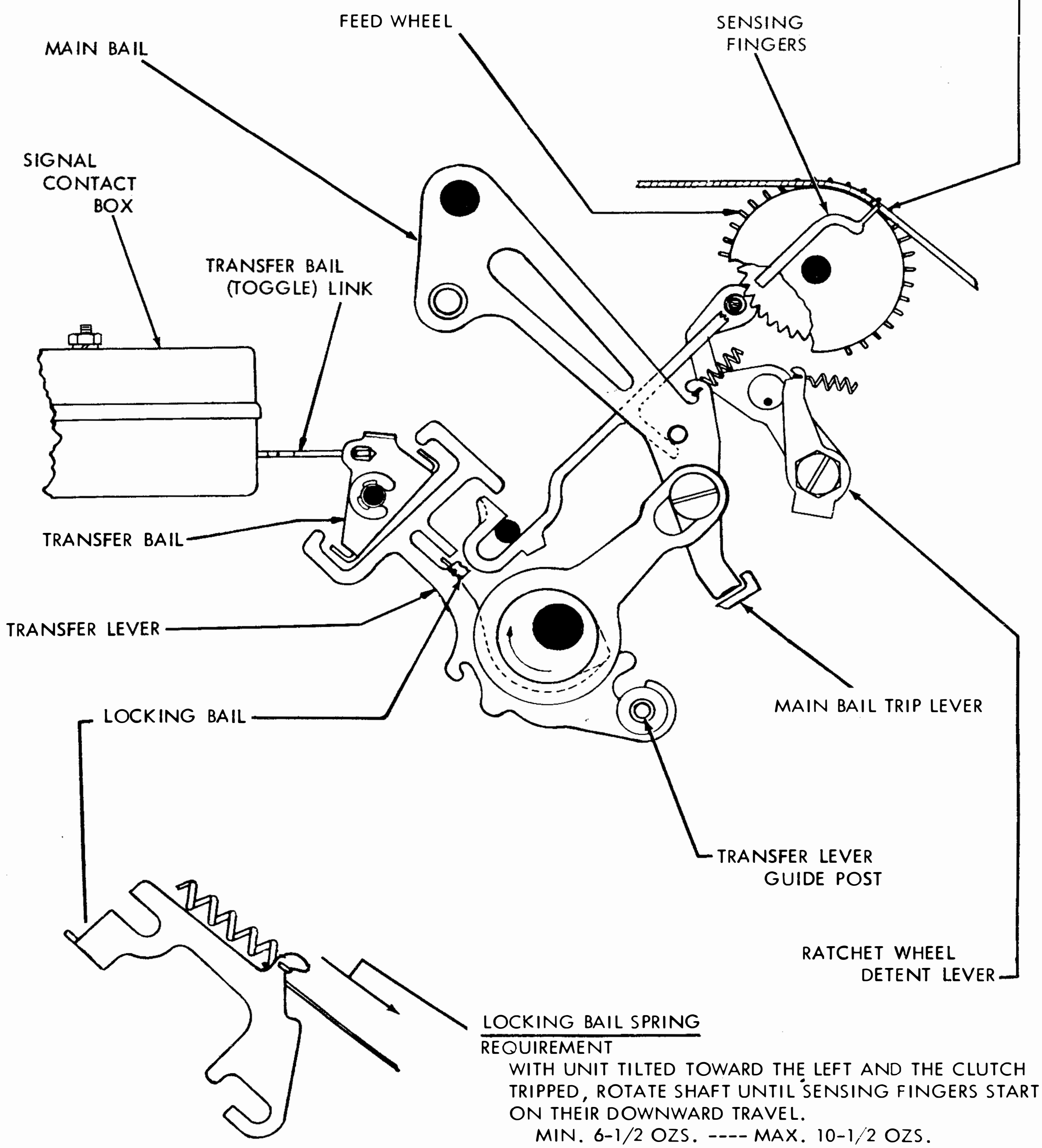
REQUIREMENT (TOP PLATE REPLACED)

WITH CLUTCH DISENGAGED AND MAINSHAFT IN ITS STOP POSITION, TIP OF HIGHEST SENSING FINGER SHOULD BE

FLUSH ---- TO ---- 0.005 INCH BELOW TOP SURFACE OF TAPE GUIDE PLATE.

TO ADJUST

WITH CLAMP NUTS (FRONT AND REAR) THAT SECURE THE TRANSFER LEVER GUIDE POST LOOSENED, ROTATE POST SO THAT ITS ECCENTRIC (REAR END OF POST) POSITIONS THE TRIP LEVER TO MEET REQUIREMENT.



LOCKING BAIL SPRING

REQUIREMENT

WITH UNIT TILTED TOWARD THE LEFT AND THE CLUTCH TRIPPED, ROTATE SHAFT UNTIL SENSING FINGERS START ON THEIR DOWNWARD TRAVEL.

MIN. 6-1/2 OZS. ---- MAX. 10-1/2 OZS.

TO START BAIL MOVING.

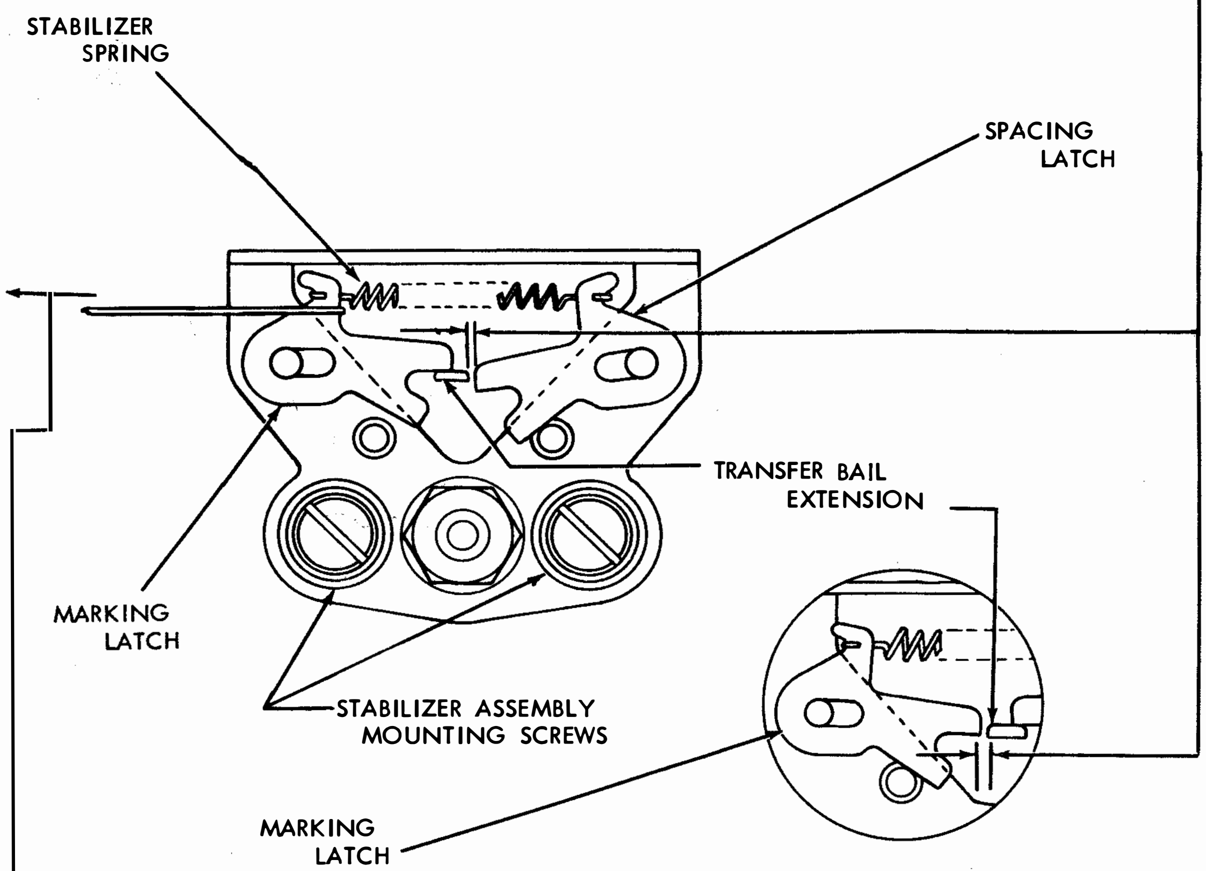
Figure 5-149. Transmitter Distributor, Main Bail Trip Assembly

TRANSFER BAIL STABILIZER

REQUIREMENT --- (1) WITH A "LETTERS" COMBINATION SELECTED, ROTATE MAINSHAFT UNTIL #3 TRANSFER LEVER IS ON HIGH PART OF ITS CAM. CHECK CLEARANCE BETWEEN SIDE OF TRANSFER BAIL EXTENSION AND ITS LATCH. (2) REPEAT ABOVE PROCEDURE WITH A "BLANKS" COMBINATION SELECTED AND CHECK THE CLEARANCE ON OTHER LATCH. CLEARANCE IN MARKING AND SPACING POSITION SHOULD BE EQUAL WITHIN 0.002 INCH.

TO ADJUST --- WITH STABILIZER ASSEMBLY MOUNTING SCREWS FRICTION TIGHT, POSITION THE ASSEMBLY.

NOTE --- LATCHES SHOULD DROP IN PLACE AS OTHER TRANSFER LEVERS CAM THE TRANSFER BAIL.



STABILIZER SPRING

REQUIREMENT----WITH UNIT UPRIGHT AND MAINSHAFT IN STOP POSITION.
MIN. 2-1/2 OZS. —— MAX. 5 OZS.
TO START STABILIZER LATCH MOVING.

NOTE: AFTER COMPLETING THIS ADJUSTMENT, MAKE THE ADJUSTMENTS OF THE CONTACT BOX DESCRIBED IN CONNECTION WITH THE KEYBOARD, FIGURE 5-74. IN ORDER TO REMOVE THE COVER OF THE CONTACT BOX, IT IS NECESSARY TO REMOVE THE DETENT WHICH HOLDS THE COVER PLATE. WHEN REPLACING THIS NUT, RECHECK THE COVER PLATE ADJUSTMENT, FIGURE 5-142.

Figure 5-150. Transmitter Distributor, Transfer Bail Stabilizer

CLUTCH MAGNET

REQUIREMENT

(1) WITH ARMATURE IN ITS ENERGIZED POSITION,
A. TOP END OF ARMATURE SHOULD CONTACT UPPER CORE FACE.
B. CLEARANCE AT LOWER MAGNET CORE FACE
SOME ---- TO ---- 0.004 INCH.
(CHECK POINT OF LEAST CLEARANCE WITH PLAY TAKEN UP TO MAKE CLEARANCE A MAXIMUM.)

TO ADJUST

WITH MAGNET ASSEMBLY MOUNTING SCREWS REMOVED, LIFT ASSEMBLY FROM UNIT. INVERT ASSEMBLY, LOOSEN HINGE BRACKET MOUNTING SCREWS AND POSITION BRACKET.

(2) WITH ARMATURE IN ITS ENERGIZED POSITION AND HIGH PART OF BACKSTOP ECCENTRIC UPWARD, CLEARANCE BETWEEN ARMATURE BAIL AND BACKSTOP.
MIN. 0.045 INCH ---- MAX. 0.055 INCH

TO ADJUST

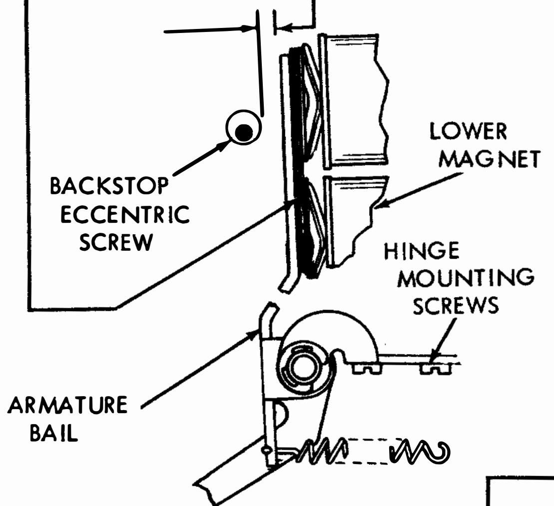
LOOSEN BACKSTOP CLAMP NUT AND POSITION THE ECCENTRIC.

(3) WITH MAGNET ASSEMBLY REPLACED AND CLUTCH DISENGAGED, CLEARANCE BETWEEN END OF ARMATURE BAIL EXTENSION AND MAIN BAIL LATCH.
MIN. 0.007 INCH ---- MAX. 0.015 INCH

TO ADJUST

WITH BRACKET MOUNTING SCREWS FRICTION TIGHT, MOVE ASSEMBLY TO ITS LOWERMOST POSITION. THEN POSITION BRACKET BY ITS ADJUSTING SLOT.

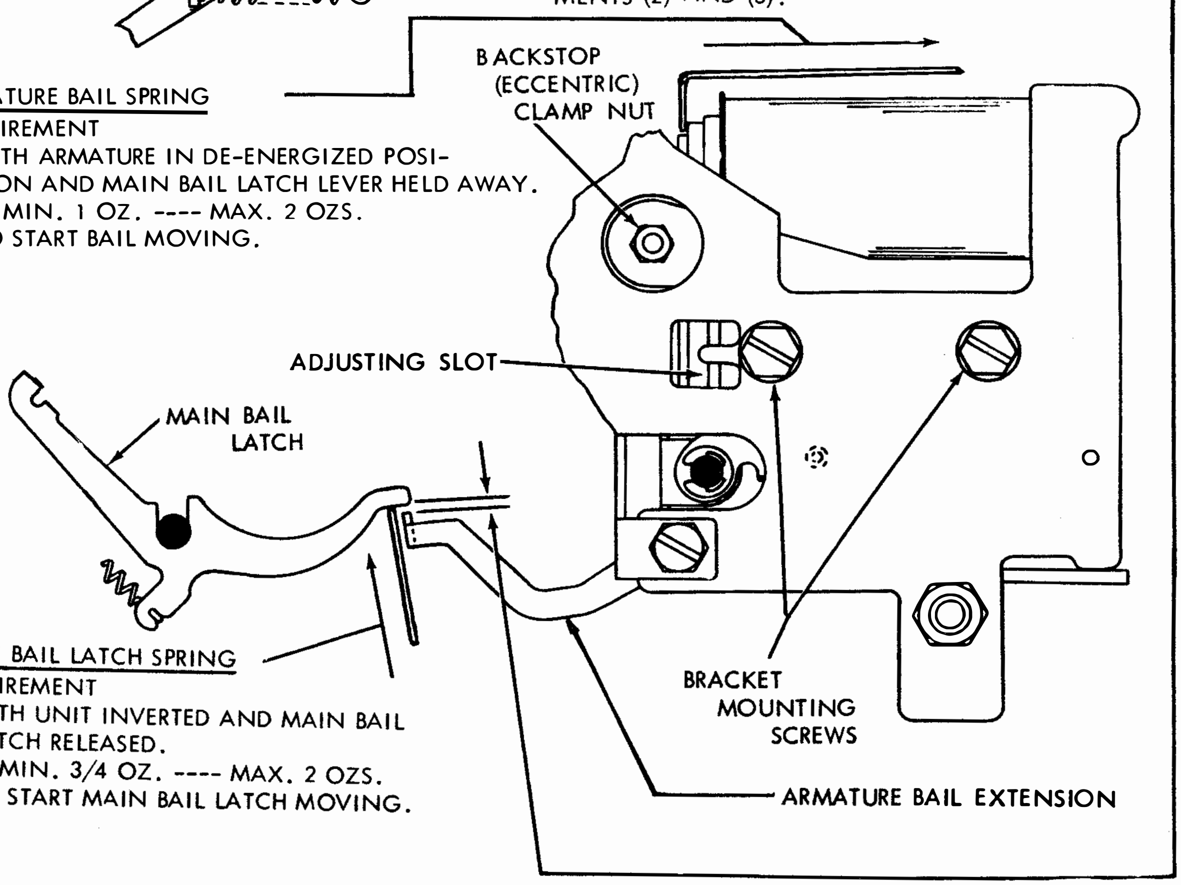
NOTE: IF EXCESS CHATTER IS PRESENT, REFINE REQUIREMENT (1) AND RECHECK REQUIREMENTS (2) AND (3).



ARMATURE BAIL SPRING

REQUIREMENT

WITH ARMATURE IN DE-ENERGIZED POSITION AND MAIN BAIL LATCH LEVER HELD AWAY.
MIN. 1 OZ. ---- MAX. 2 OZS.
TO START BAIL MOVING.



MAIN BAIL LATCH SPRING

REQUIREMENT

WITH UNIT INVERTED AND MAIN BAIL LATCH RELEASED.
MIN. 3/4 OZ. ---- MAX. 2 OZS.
TO START MAIN BAIL LATCH MOVING.

Figure 5-151. Transmitter Distributor, Clutch Trip Magnet Assembly

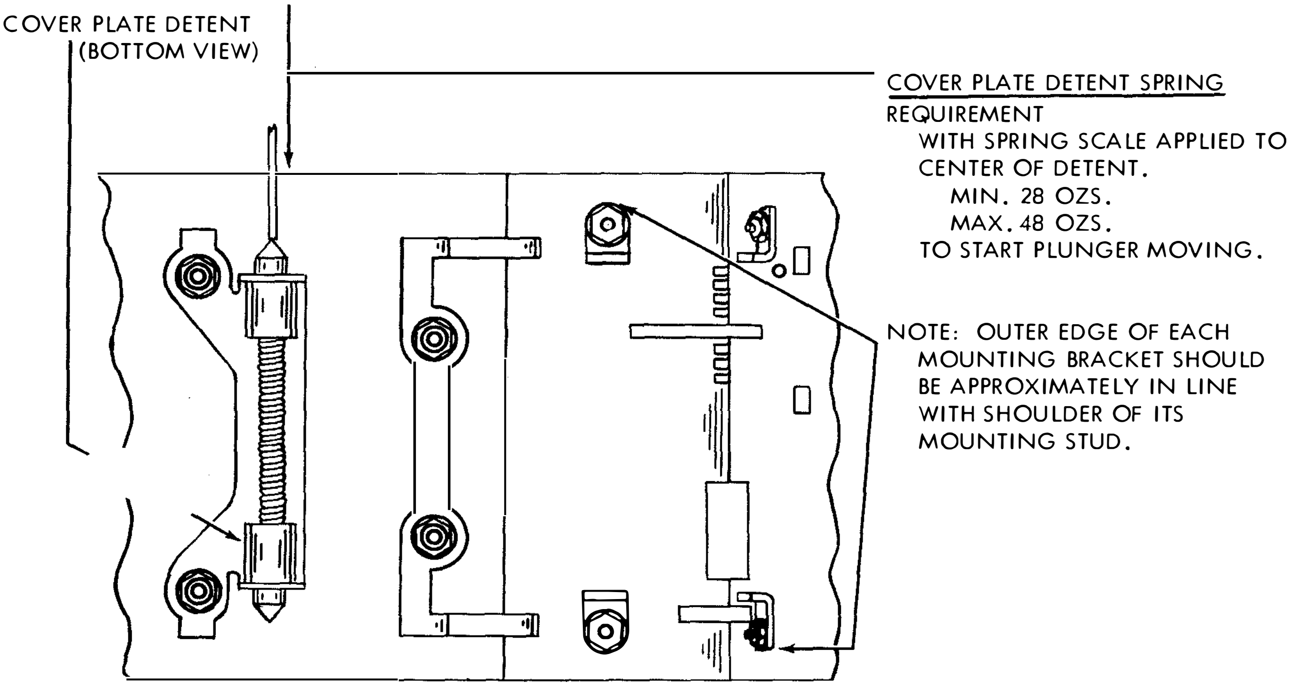


Figure 5-152. Transmitter Distributor, Cover Plate Detent

i. TRANSMITTER DISTRIBUTOR BASE LCXB13

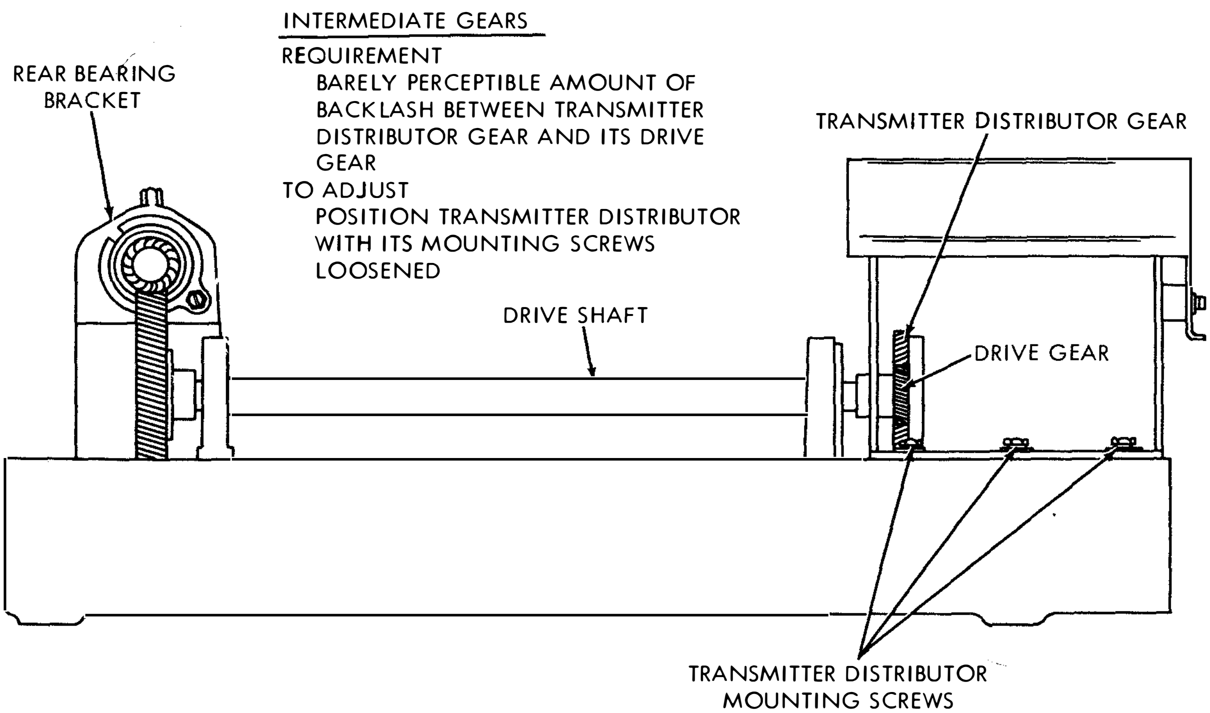
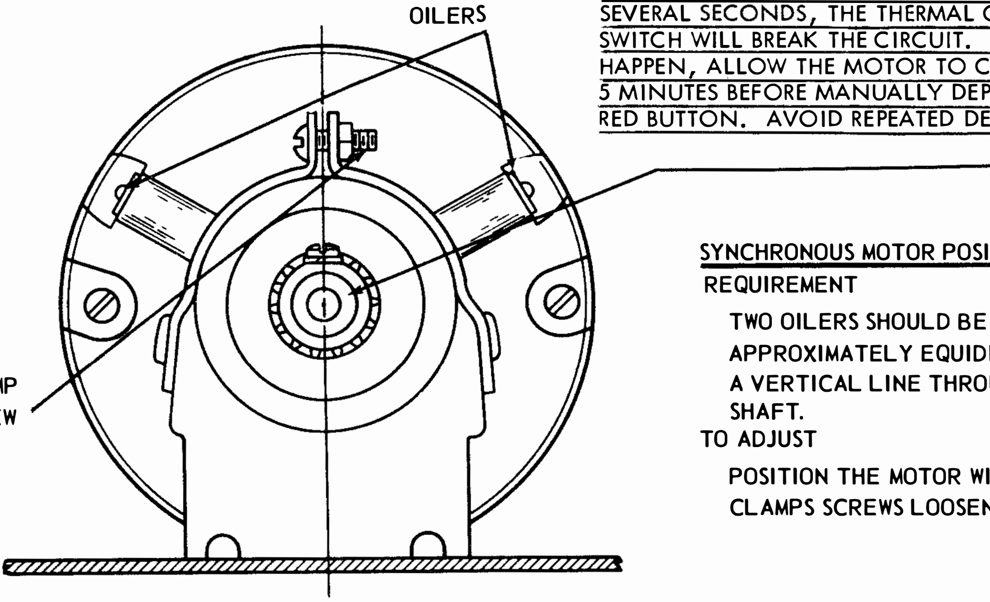


Figure 5-153. Transmitter Distributor, Base, Intermediate Gears

k. MOTOR UNITS (SYNCHRONOUS AND GOVERNED)

CAUTION

IF THE MOTOR SHOULD BECOME BLOCKED FOR SEVERAL SECONDS, THE THERMAL CUT-OUT SWITCH WILL BREAK THE CIRCUIT. SHOULD THIS HAPPEN, ALLOW THE MOTOR TO COOL AT LEAST 5 MINUTES BEFORE MANUALLY DEPRESSING THE RED BUTTON. AVOID REPEATED DEPRESSION.



SYNCHRONOUS MOTOR POSITIONING

REQUIREMENT

TWO OILERS SHOULD BE UPWARD AND APPROXIMATELY EQUIDISTANT FROM A VERTICAL LINE THROUGH THE MOTOR SHAFT.

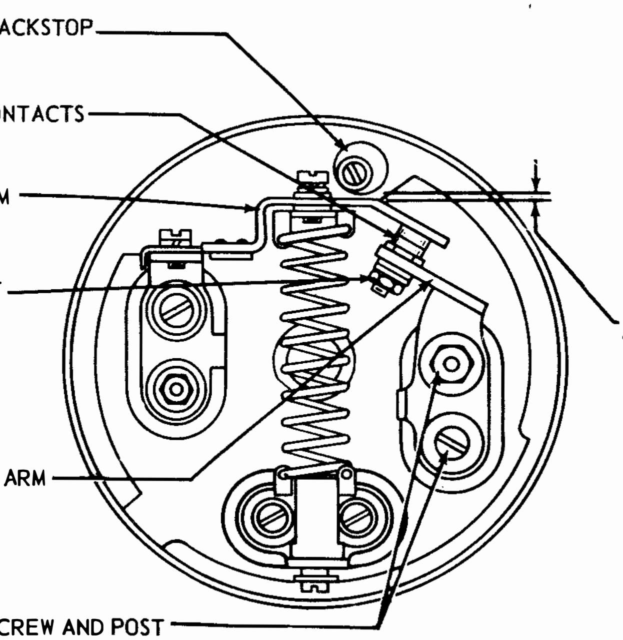
TO ADJUST

POSITION THE MOTOR WITH THE TWO CLAMPS SCREWS LOOSENED.

GOVERNED MOTOR POSITIONING

REQUIREMENT

MOTOR SHOULD BE CENTRALLY POSITIONED IN ITS RUBBERMOUNTS SO AS TO PROVIDE AT LEAST 0.020 CLEARANCE BETWEEN THE MOTOR HOUSING AND THE CRADLE AT THE GOVERNOR END. THE CABLE SHOULD ALSO CLEAR THE GROMMET IN THE SCREEN BY AT LEAST 0.030 INCH.



GOVERNOR CONTACT

REQUIREMENT

THE CONTACTS SHOULD MEET SQUARELY AND NOT OVERLAP MORE THAN 0.010 INCH.

TO ADJUST

POSITION THE STATIONARY CONTACT AND CONTACT ARM WITH THE CLAMP SCREW AND POST LOOSENED.

GOVERNOR CONTACT BACKSTOP

REQUIREMENT

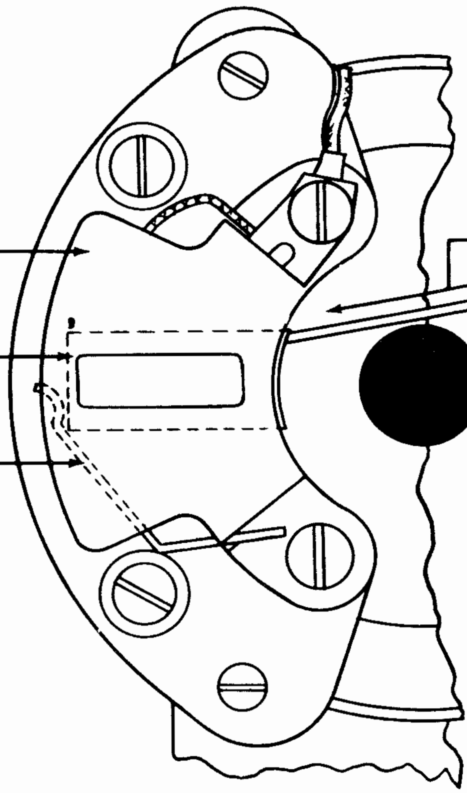
CLEARANCE BETWEEN THE MOVABLE CONTACT ARM AND ITS ECCENTRIC BACKSTOP.

MIN. 0.030 INCH
MAX. 0.050 INCH

TO ADJUST

ROTATE THE ECCENTRIC BACKSTOP WITH CLAMPING SCREW LOOSENED.

Figure 5-154. Motor Units, Positioning



GOVERNED MOTOR SPEED ADJUSTMENT

REQUIREMENT

WITH THE TARGET ILLUMINATED AND VIEWED THROUGH THE VIBRATING SHUTTERS OF A 120 VPS TUNING FORK, THE SPOTS SHOULD APPEAR STATIONARY WHILE ROTATING (4 SPOT TARGET).

TO ADJUST

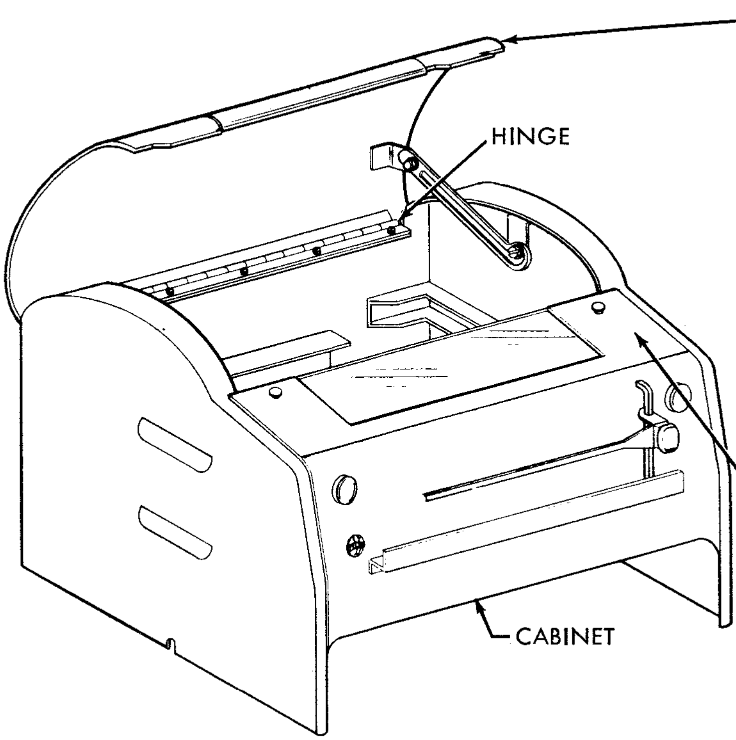
STOP THE MOTOR AND TURN THE ADJUSTING SCREW AS INDICATED ON THE GOVERNOR COVER.

NOTE

IT IS POSSIBLE TO ADJUST THE MOTOR AT SOME MULTIPLE OF THE CORRECT SPEED. TO CHECK FOR CORRECT SPEED, HAVE THE TYPE BOX CARRIAGE AT THE LEFT MARGIN, SET UP ANY CHARACTER ON THE SELECTOR AND MANUALLY TRIP THE TYPE BOX CLUTCH TRIP LEVER. IF THE UNIT IS EQUIPPED WITH GEARS FOR 45.5 BAUD OPERATION, IT SHOULD PRINT 65 CHARACTERS IN 10 SECONDS AND 53 CHARACTERS IN 5 SECONDS AT 75 BAUD.

Figure 5-155. Motor Unit, Speed Adjustment (Governed Motor)

I. CABINETS LPC206BR, LAC213BR AND LAAC229BR



DOME

REQUIREMENT

(1) THE FRONT EDGE OF THE DOME TO FIT FLUSH TO THE FRONT EDGE OF THE CABINET.

(2) THE DOME TO BE CENTERED FROM SIDE TO SIDE ON THE CABINET.

TO ADJUST

WITH THE SIX SCREWS, WHICH SECURE THE HINGES TO THE DOME, LOOSE CENTER THE DOME TO MEET REQUIREMENTS.

SMALL DOOR

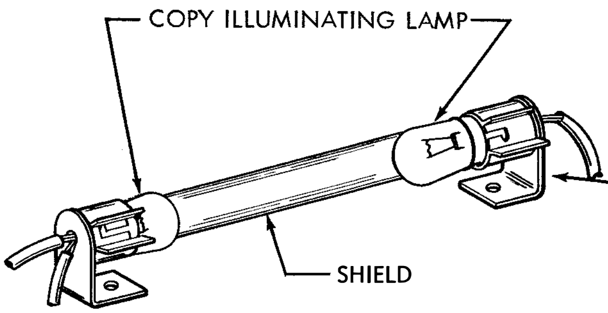
REQUIREMENT

(1) DOOR TO BE FLUSH WITHIN 3/32" ABOVE THE DOME.

(2) DOOR TO BE PARALLEL TO DOME WITHIN 3/32"

TO ADJUST

WITH THE FOUR NUTS, SECURING THE HINGE EXTENSION TO THE HINGES, LOOSE POSITION THE DOOR TO MEET REQUIREMENTS.



COPY ILLUMINATION

REQUIREMENT

SUFFICIENT ILLUMINATION ON PRINTED COPY.

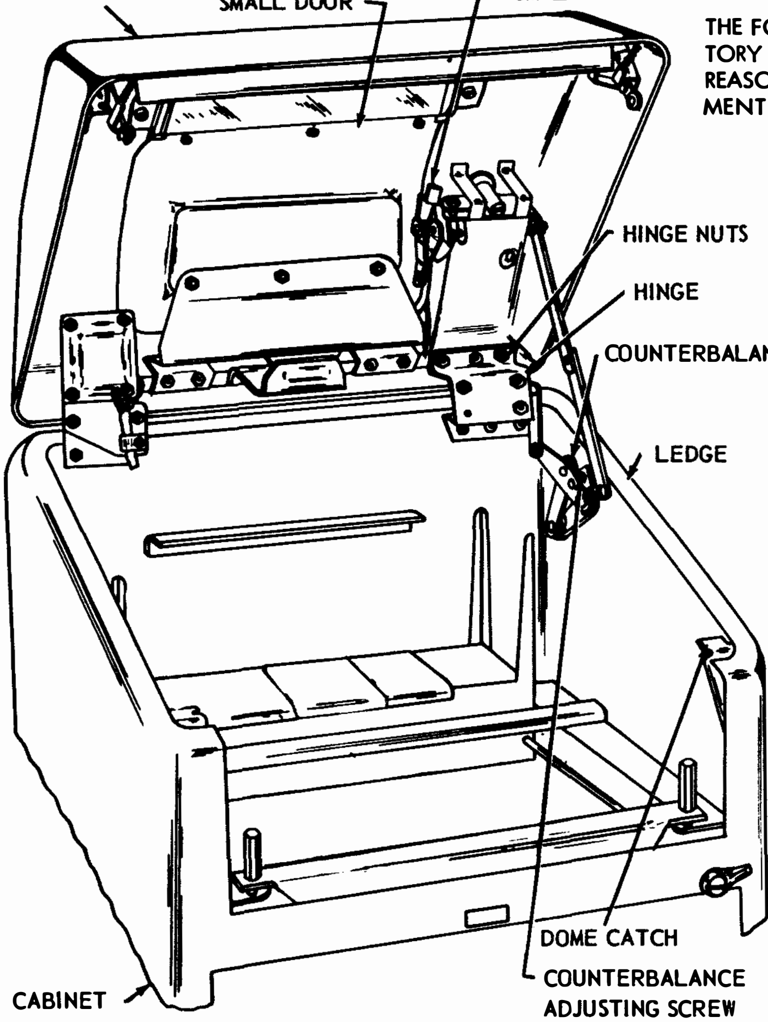
TO ADJUST

ROTATE THE SHIELD ON THE COPY ILLUMINATING LAMP TO PROVIDE DESIRED ILLUMINATION.

NOTE

MAKE INDICATOR LAMP, COPY LAMP, AND COPY HOLDER ADJUSTMENTS, FIGURE 5-159.

Figure 5-156. Cabinet LPC206, Dome Mechanism



NOTE

THE FOLLOWING ADJUSTMENTS ARE MADE AT THE FACTORY AND SHOULD NOT BE DISTURBED UNLESS THERE IS REASON TO BELIEVE THAT THE PARTS ARE OUT OF ADJUSTMENT OR HAVE BEEN DISASSEMBLED.

DOME

(1) REQUIREMENT
THE DOME SHOULD BE CENTERED ON THE CABINET FROM RIGHT TO LEFT AND PLACED
MIN. 1/4 INCH MAX. 5/16 INCH
FROM THE FRONT EDGE OF THE CABINET

TO ADJUST
POSITION THE DOME WITH THE SIX NUTS WHICH SECURE THE DOME HINGES TO THE DOME LOOSENED. TIGHTEN THE NUTS.

(2) REQUIREMENT
THERE SHOULD BE A LIGHT-PROOF SEAL AT THE REAR OF THE DOME BETWEEN THE RUBBER GASKET AND THE TOP EDGE OF THE CABINET.

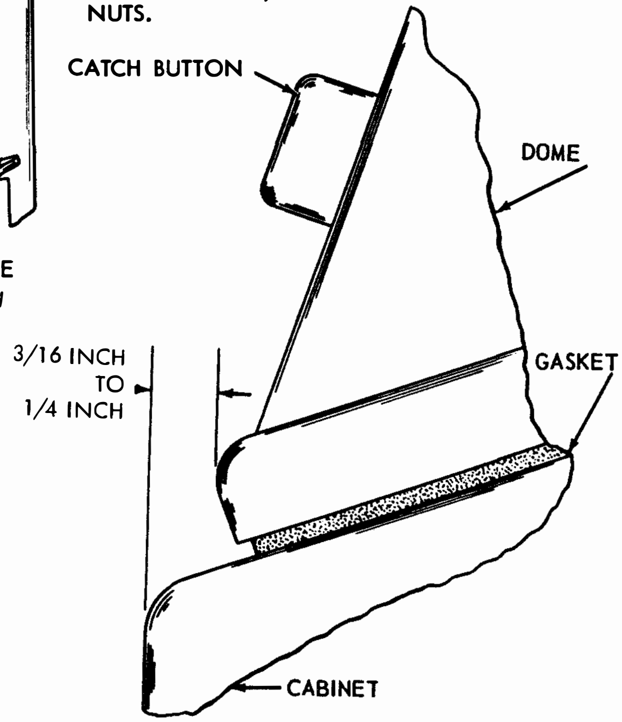
TO ADJUST
POSITION THE DOME DOWNWARD WITH THE SIX NUTS, WHICH SECURE THE DOME HINGES TO THE CABINET, LOOSENED. TIGHTEN THE NUTS.

DOME CATCH

(1) REQUIREMENT
THE DOME SHOULD LATCH SECURELY WITH A LIGHT-PROOF SEAL AT THE FRONT OF THE DOME BETWEEN THE RUBBER GASKET AND THE TOP EDGE OF THE CABINET.

(2) REQUIREMENT
THE DOME CATCH SHOULD UNLATCH WHEN THE CATCH BUTTON IS DEPRESSED NO DEEPER THAN THE OUTER SURFACE OF THE DOME

TO ADJUST
BEND THE TWO DOME CATCHES



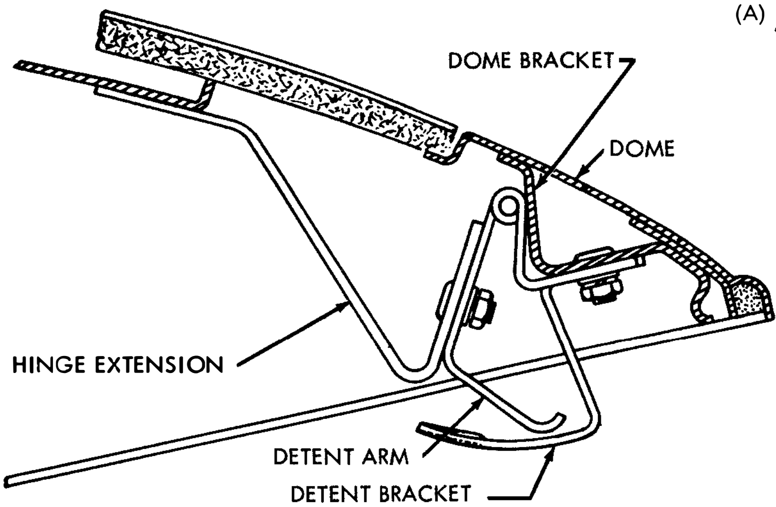
SMALL DOOR CATCH

(1) REQUIREMENT
WITH THE SMALL DOOR LATCHED. THE RUBBER GASKET SHOULD PRESS AGAINST THE LEDGE OF THE DOME AT ALL POINTS. THE DOOR SHOULD BE FLUSH WITHIN 1/16 INCH WITH TOP SURFACE OF THE DOME.

(2) REQUIREMENT
WHEN THE DOOR IS RELEASED FROM ITS CATCH IT SHOULD SPRING OPEN AT LEAST 1/2 INCH.

TO ADJUST
BEND THE SMALL DOOR CATCH. RECHECK REAR OF DOOR TO MAKE CERTAIN IT IS FLUSH WITH OR SLIGHTLY ABOVE THE DOME.

Figure 5-157. Cabinet LAC214BR, Dome Mechanism



(A) SMALL DOOR

REQUIREMENT

THE SMALL DOOR SHOULD BE CENTERED FROM RIGHT TO LEFT. IT SHOULD BE POSITIONED SO AS TO PROVIDE A LIGHT-TIGHT SEAL BETWEEN THE RUBBER GASKET AND THE EDGE OF THE DOME AT ALL POINTS.

TO ADJUST

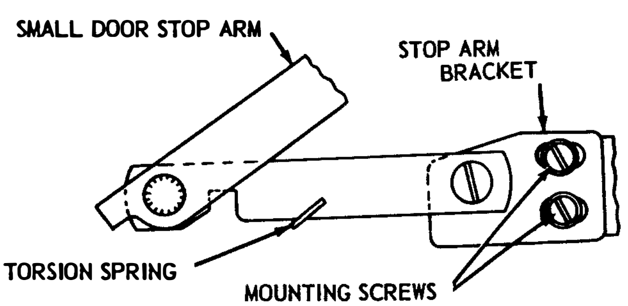
LOOSEN THE TWO NUTS WHICH SECURE THE DETENT BRCKET TO THE DOME BRACKET. LOOSEN THE TWO NUTS WHICH SECURE THE DETENT ARM TO THE HINGE EXTENSION. LOOSEN THE FOUR NUTS WHICH SECURE THE DOME HINGES TO THE DOME BRACKET. PUSH THE HINGES AGAINST THE THE DOME BRACKET AND TIGHTEN THE FOUR NUTS. LOOSEN THE THREE NUTS WHICH SECURE THE HINGE EXTENSION TO THE DOOR. SLIDE THE DOOR TO ITS EXTREME FORWARD POSITION AND POSITION CENTRALLY FROM SIDE TO SIDE. TIGHTEN THE THREE NUTS WHICH SECURE THE HINGE EXTENSION TO THE HINGES. POSITION THE DOOR SO THAT IT IS FLUSH WITH OR SLIGHTLY ABOVE THE DOME AND TIGHTEN THE FOUR NUTS. LOOSEN THE THREE NUTS WHICH SECURE THE HINGE EXTENSION TO THE DOOR. CLOSE THE DOOR AND SLIDE IT TOWARD THE REAR TO PROVIDE A LIGHT-TIGHT SEAL AT THE FRONT CORNERS OF THE DOOR. TIGHTEN THE FOUR NUTS.

(B) DETENT ARM AND DETENT BRACKET

(1) REQUIREMENT
THE DETENT ARM SHOULD BE HORIZONTALLY IN LINE WITH THE UPPER EDGES OF THE TWO HINGES.

TO ADJUST
POSITION THE ARM AND TIGHTEN THE TWO NUTS.

(2) REQUIREMENT
WITH THE DOME RAISED AND THE SMALL DOOR LATCH BUTTON DEPRESSED. THE DOOR SHOULD NOT OPEN BEYOND ITS DETENT. WITH DOME CLOSED, SMALL DOOR SHOULD SPRING OPEN AT LEAST 1/2 INCH WHEN RELEASED FROM ITS LATCH.



TO ADJUST
POSITION THE DETENT BRACKET AND TIGHTEN THE TWO NUTS. IF NECESSARY REPOSITION THE DETENT ARM. RECHECK ALL NUTS FOR TIGHTNESS.

(C) SMALL DOOR STOP ARM

REQUIREMENT
STOP ARM SHOULD BE FREE OF BINDS WHEN DOOR IS OPENED OR CLOSED.

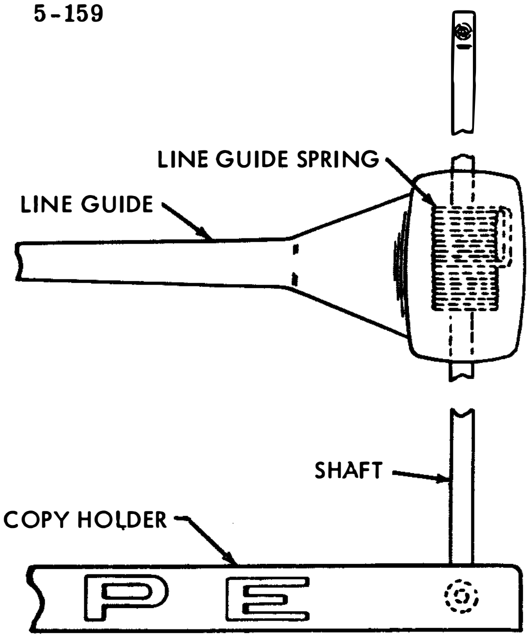
TO ADJUST
LOOSEN THE STOP ARM BRACKET MOUNTING SCREWS. CLOSE THE DOOR. DISCONNECT THE TORSION SPRING. ALIGN STOP ARM FOR FREENESS AND TIGHTEN MOUNTING SCREWS WITH DOOR CLOSED. REPLACE TORSION SPRING.

(D) COUNTERBALANCE

REQUIREMENT
THE DOME SHOULD REMAIN IN ITS MAXIMUM OPEN POSITION AND NOT CLOSE UNLESS MOVED MANUALLY

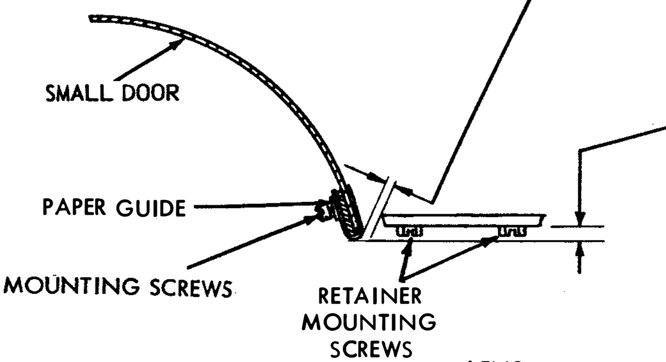
TO ADJUST
TURN THE COUNTERBALANCE ADJUSTING SCREW. SEE FIG. 5-157.

Figure 5-158. Cabinet LAC214BR. Dome Mechanism



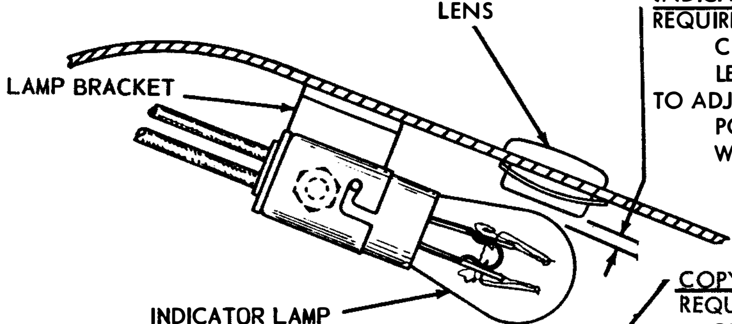
COPYHOLDER
REQUIREMENT
THERE SHOULD BE SUFFICIENT TENSION ON THE LINE GUIDE TO PREVENT IT FROM SLIPPING DOWN ITS SHAFT. IT SHOULD ALSO HOLD THE COPY IN PLACE.

TO ADJUST
REMOVE THE MOUNTING SCREWS FROM THE LINE GUIDE SHAFT AND TURN THE SHAFT TO INCREASE SPRING TENSION. REMOUNT THE SHAFT AND TIGHTEN SCREWS.



WINDOW AND PAPER GUIDE

(1) REQUIREMENT
THE PAPER GUIDE ON SMALL DOOR SHOULD CLEAR THE WINDOW WHEN THE DOOR IS OPENED OR CLOSED.
MIN. 0.080 INCH MAX. 0.110 INCH
TO ADJUST
POSITION WINDOW WITH ITS RETAINER SCREWS LOOSENED.
(2) REQUIREMENT
WITH SMALL DOOR CLOSED, THE BOTTOM EDGE OF THE PAPER GUIDE SHOULD BE
MIN. 7/64 INCH MAX. 9/64 INCH
BELOW BOTTOM SURFACE OF WINDOW.
TO ADJUST
POSITION THE PAPER GUIDE WITH ITS MOUNTING SCREWS LOOSENED.



INDICATOR LAMP
REQUIREMENT
CLEARANCE BETWEEN INDICATOR LAMP AND LENS - APPROXIMATELY 1/16 INCH
TO ADJUST
POSITION LAMP HOLDER ON ITS BRACKET WITH MOUNTING SCREWS LOOSENED

COPY LAMP
REQUIREMENT
CLEARANCE BETWEEN COPY LAMP AND COVER APPROXIMATELY 1/16 INCH
TO ADJUST
POSITION LAMP HOLDER ON ITS BRACKET WITH ITS MOUNTING NUT LOOSENED

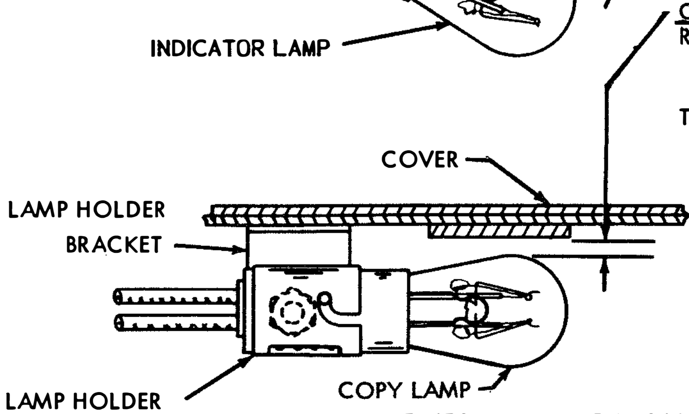
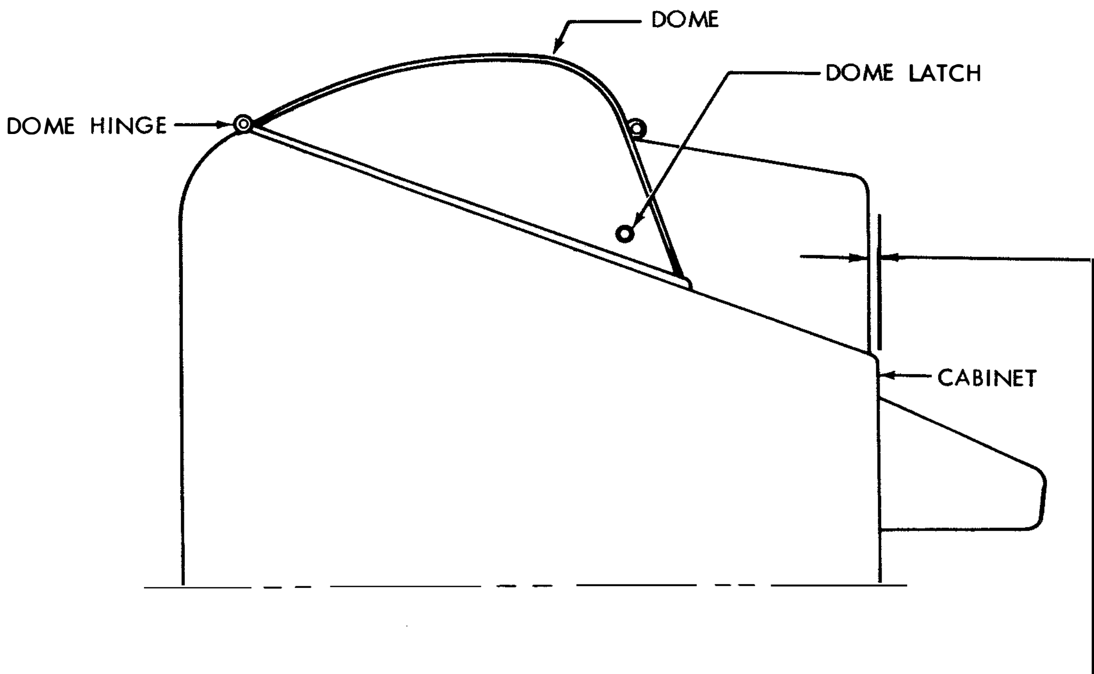


Figure 5-159. Cabinet LAC214BR, Dome Accessories



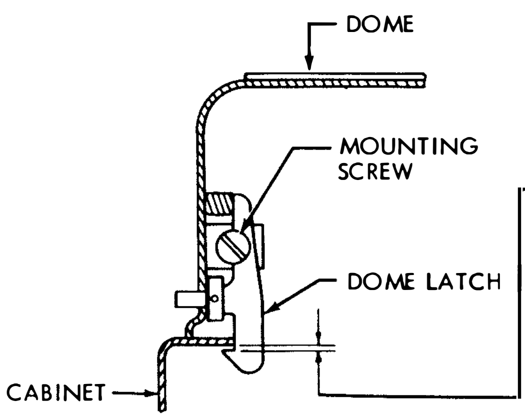
DOME

REQUIREMENT

THE DOME SHOULD BE CENTERED ON THE CABINET FROM RIGHT TO LEFT AND PLACED APPROXIMATELY 0.050 INCH FROM THE FRONT EDGE OF THE CABINET

TO ADJUST

POSITION THE DOME WITH THE SCREWS, WHICH SECURE THE DOME HINGE TO THE CABINET, LOOSENED.



NOTE: IF NECESSARY TO CHECK REQUIREMENT, REMOVE CONTROL PANEL OVER AUXILIARY REPERFORATOR.

DOME LATCH

REQUIREMENT

WITH THE DOME CLOSED AND TOUCHING THE CABINET, THE DOME LATCHES SHOULD BE LATCHED WITH A CLEARANCE OF

MIN. SOME

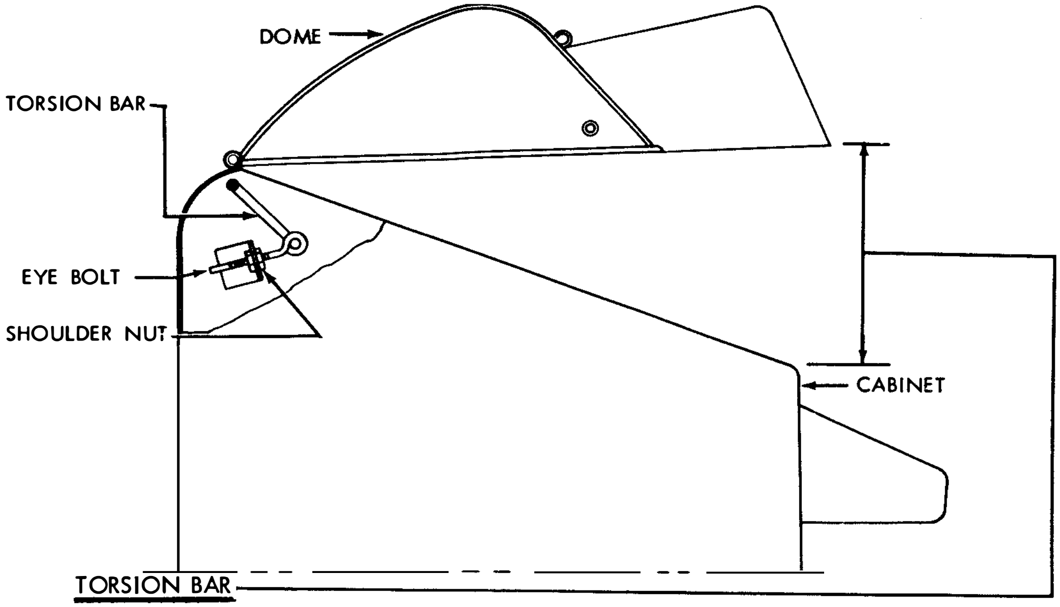
MAX. 0.032 INCH

BETWEEN THE LATCHING SURFACE OF EACH LATCH AND ITS LATCHING SURFACE OF THE CABINET

TO ADJUST

POSITION EACH LATCH WITH ITS MOUNTING SCREW LOOSENED.

Figure 5-160. Cabinet LAA229BR, Dome Mechanisms



TORSION BAR

REQUIREMENT

THE DOME IN "FREE FALL" SHOULD NOT LATCH AND SHOULD COME TO REST MIN. 7 INCHES---MAX. 9 INCHES ABOVE RIGHT FRONT EDGE OF CONSOLE.

TO ADJUST

TURN THE SHOULDER NUTS ON THE EYE BOLTS CLOCKWISE TO INCREASE THE SPRING TORQUE, AND COUNTERCLOCKWISE TO DECREASE THE SPRING TORQUE.

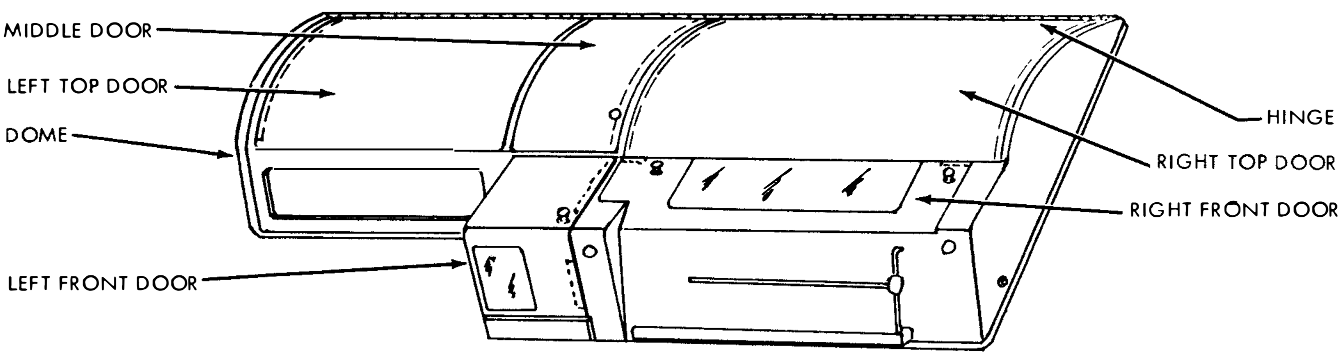
TOP DOORS (RIGHT AND LEFT)

REQUIREMENT

THE DOORS SHOULD SET SQUARELY AND UNIFORMLY ON THE CONTOUR OF THE DOME.

TO ADJUST

POSITION EACH DOOR WITH ITS HINGE MOUNTING SCREWS LOOSENED.



TOP MIDDLE DOOR

REQUIREMENT

THE DOOR SHOULD REST FLAT AND SQUARELY ON THE DOME. THE REINFORCEMENT CHANNEL SHOULD FIT OVER ITS GUIDE BRACKET IN THE DOME.

TO ADJUST

REMOVE THE SPRING DETENT FROM CENTER OF DOME AND POSITION THE DOOR WITH ITS HINGE MOUNTING SCREWS AND BRACKET MOUNTING SCREWS LOOSENED.

RIGHT FRONT DOOR

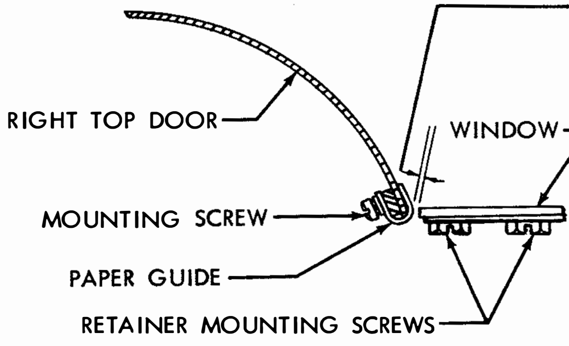
REQUIREMENT

THE RIGHT AND LEFT EDGES OF THE RIGHT FRONT DOOR SHOULD BE EVEN WITH THE RIGHT TOP DOOR. WITH THE DOOR CLOSED IT SHOULD REST FLAT ON THE HORIZONTAL SURFACE OF THE DOME.

TO ADJUST

REMOVE THE THUMB SCREWS, LATCHES, AND SPRINGS FROM THE DOOR, AND POSITION THE DOOR WITH ITS MOUNTING SCREWS LOOSENED.

Figure 5-161. Cabinet LAAC229BR, Dome Requirements



WINDOW

REQUIREMENT

WHEN RIGHT FRONT DOOR IS OPENED OR CLOSED, THE WINDOW SHOULD CLEAR THE PAPER GUIDE BY 1/16 INCH

TO ADJUST

POSITION THE WINDOW WITH ITS RETAINER MOUNTING SCREWS LOOSENED.

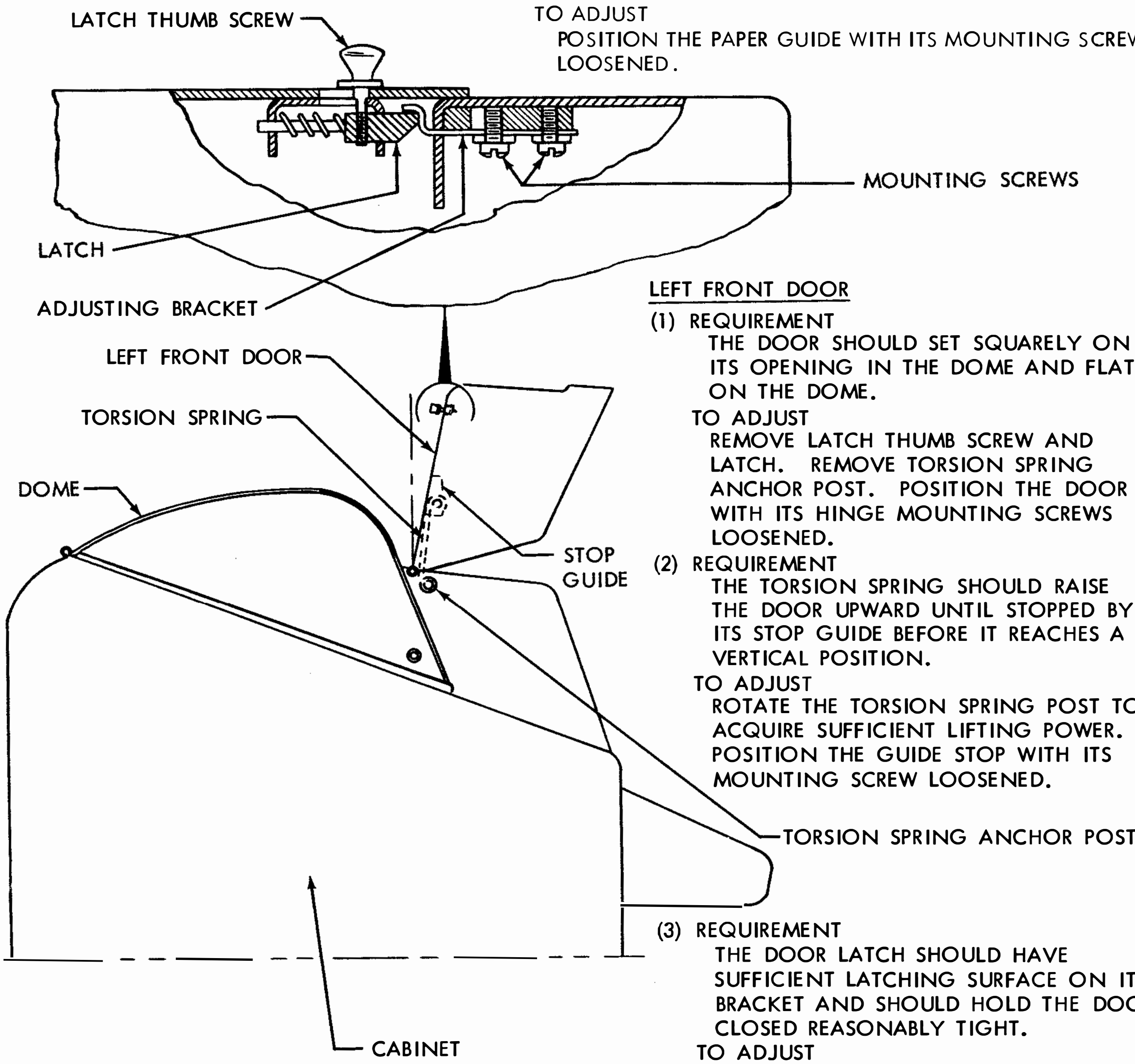
PAPER GUIDE

REQUIREMENT

WITH THE RIGHT TOP DOOR CLOSED, THE BOTTOM EDGE OF THE PAPER GUIDE SHOULD BE FLUSH WITH THE BOTTOM SURFACE OF THE WINDOW IN THE RIGHT FRONT DOOR.

TO ADJUST

POSITION THE PAPER GUIDE WITH ITS MOUNTING SCREWS LOOSENED.



LEFT FRONT DOOR

(1) REQUIREMENT

THE DOOR SHOULD SET SQUARELY ON ITS OPENING IN THE DOME AND FLAT ON THE DOME.

TO ADJUST

REMOVE LATCH THUMB SCREW AND LATCH. REMOVE TORSION SPRING ANCHOR POST. POSITION THE DOOR WITH ITS HINGE MOUNTING SCREWS LOOSENED.

(2) REQUIREMENT

THE TORSION SPRING SHOULD RAISE THE DOOR UPWARD UNTIL STOPPED BY ITS STOP GUIDE BEFORE IT REACHES A VERTICAL POSITION.

TO ADJUST

ROTATE THE TORSION SPRING POST TO ACQUIRE SUFFICIENT LIFTING POWER. POSITION THE GUIDE STOP WITH ITS MOUNTING SCREW LOOSENED.

(3) REQUIREMENT

THE DOOR LATCH SHOULD HAVE SUFFICIENT LATCHING SURFACE ON ITS BRACKET AND SHOULD HOLD THE DOOR CLOSED REASONABLY TIGHT.

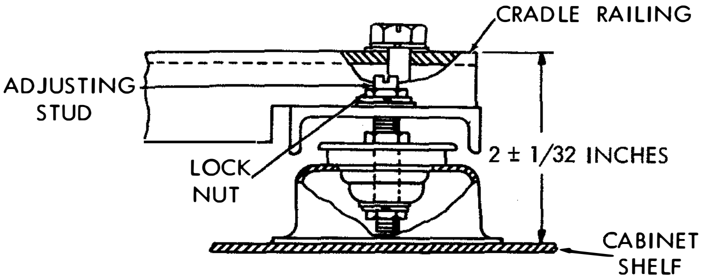
TO ADJUST

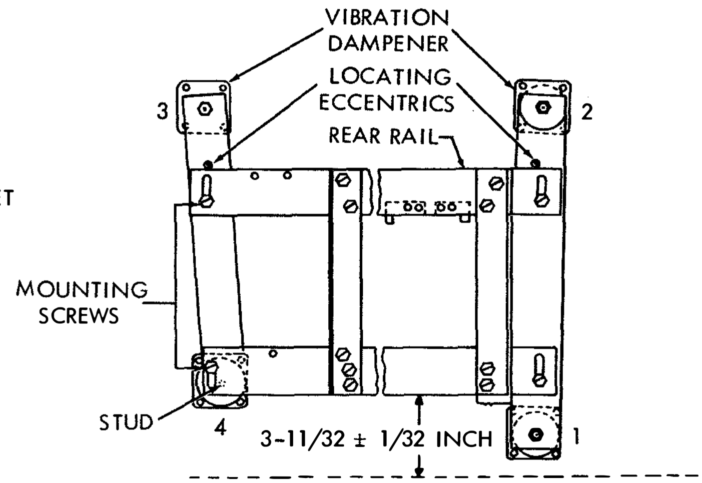
POSITION ITS ADJUSTING BRACKET HORIZONTALLY WITH ITS MOUNTING SCREWS LOOSENED. MODIFY UP OR DOWN POSITION OF BRACKET IF NECESSARY.

NOTE

MAKE INDICATOR LAMP, COPY LAMP AND COPY HOLDER ADJUSTMENTS, FIGURE 5-159.

Figure 5-162. Cabinet LAAC229BR, Dome Mechanisms





<u>CRADLE</u> (FOR LAAC229BR ONLY)

(1) REQUIREMENT

UNDER NO LOAD, THE TOP OF THE CRADLE RAILING SHOULD BE MIN. 1-31/32 INCHES---MAX. 2-1/32 INCHES FROM THE SHELF OF THE CABINET.

TO ADJUST

LOOSEN THE LOCK NUTS ON VIBRATION DAMPENER NO. 1, 2, AND 3 ON TOP OF THE LEFT AND RIGHT RAILS. LOOSEN THE NUT ON THE LOWER END OF STUD IN MOUNT NO. 4 ROTATE THE ADJUSTING STUDS UNTIL THE RAILS HAVE REACHED THE DESIRED HEIGHT. TIGHTEN ALL NUTS PREVIOUSLY LOOSENED.

(2) REQUIREMENT

THE FRONT RAIL SHOULD BE POSITIONED MIN. 3-5/16 INCHES---MAX. 3-3/8 INCHES FROM AND PARALLEL TO THE FRONT OF CABINET.

TO ADJUST

POSITION THE BASE RAIL ASSEMBLY WITH ITS FOUR MOUNTING SCREWS AND TWO LOCATING ECCENTRICS LOOSENED AFTER POSITIONING THE RAIL ASSEMBLY TO DESIRED POSITION. ROTATE THE ECCENTRICS AGAINST THE REAR RAIL AND LOCK IN POSITION.

<u>TRANSMITTER DISTRIBUTOR HOUSING CLEARANCE</u>

REQUIREMENT (FOR LAAC229BR ONLY)

A MINIMUM OF 1/32 IN. CLEARANCE BETWEEN THE TRANSMITTER DISTRIBUTOR COVER PLATE, TAPE GUIDE PLATE, FRONT COVER PLATE WHICH IS FASTENED TO THE TRANSMITTER DISTRIBUTOR AND THE AUXILIARY HOUSING WHICH SNAPS ONTO THE CABINET.

NOTE

THE TRANSMITTER DISTRIBUTOR MUST "FLOAT" WITHIN THE AUXILIARY HOUSING OF THE CABINET.

TO ADJUST

REFINE THE CRADLE HEIGHT ADJUSTMENT AND THE FRONT RAIL POSITION ADJUSTMENT IF NECESSARY.

<u>CRADLE</u> (FOR LAC214BR ONLY)

REQUIREMENT

TOP OF HINGE BRACKET PARALLEL TO TOP OF HINGE BAR.

TO ADJUST

TURN STOP SCREW WITH LOCK NUT LOOSENED.

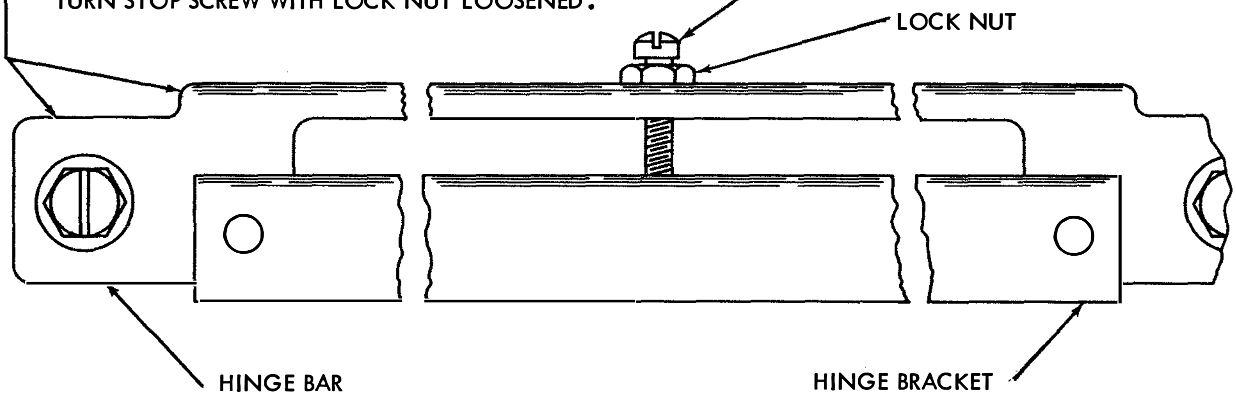


Figure 5-163. Cabinet, Cradle Rails

m. PAPER WINDER LPW300BR AND PW201BR

SPINDLE SHAFT END PLAY

REQUIREMENT

WITH PLAY OF SHAFT TAKEN UP AWAY FROM MOTOR. THERE SHOULD BE APPROX. 1/32" CLEARANCE BETWEEN SHOULDER ON SHAFT AND FRICTION DRIVE ASSEMBLY.

TO ADJUST

POSITION BEARING BRACKET BY MEANS OF ITS ELONGATED MOUNTING HOLES.

FRICTION CLUTCH TORQUE

TO CHECK

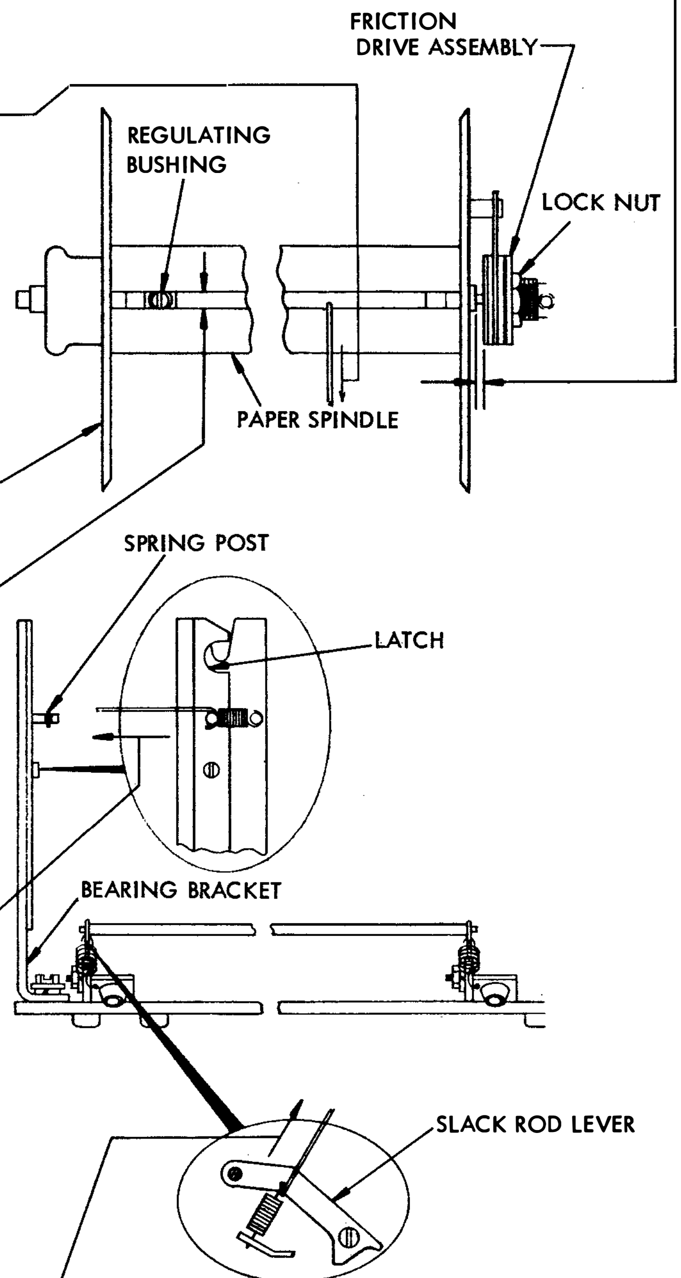
RUN PAPER WINDER WITH SPINDLE HELD STATIONARY FOR 10 MINUTES. HOOK 8 OZ. SCALE IN SLOT OF PAPER SPINDLE.

REQUIREMENT

5 TO 7 OZS. TO HOLD PAPER SPINDLE STATIONARY AGAINST MOTOR ROTATION.

TO ADJUST

WITH LOCK NUT LOOSE ADJUST CAPSTAN NUT TO MEET REQUIREMENT.



PAPER CYLINDER ADJUSTMENT

REQUIREMENT

SUFFICIENT TENSION TO RETAIN CYLINDER FLANGE

TO ADJUST

POSITION REGULATING BUSHING WITH SET SCREW LOOSE TO DESIRED TENSION.

LATCH SPRING TENSION

REQUIREMENT

WITH PAPER SPINDLE REMOVED, HOOK 32 OZ. SCALE OVER SPRING POST ON LATCH. PULL HORIZONTALLY AS INDICATED.

MIN. 20 OZ. --- MAX. 30 OZ.

TO START LATCH MOVING.

SLACK ROD LEVER SPRING TENSION

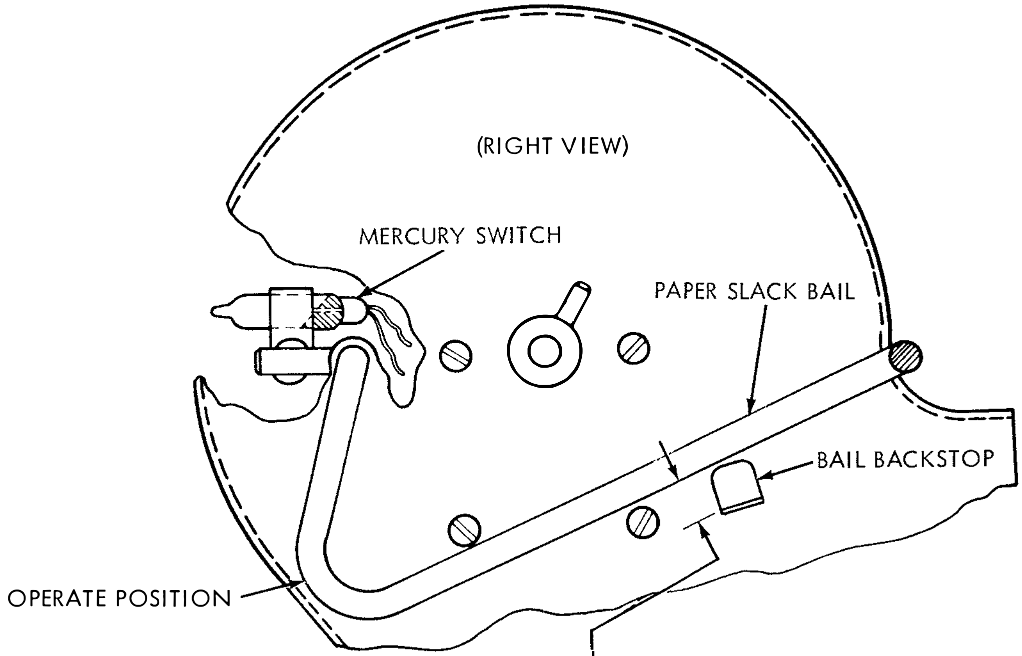
REQUIREMENT

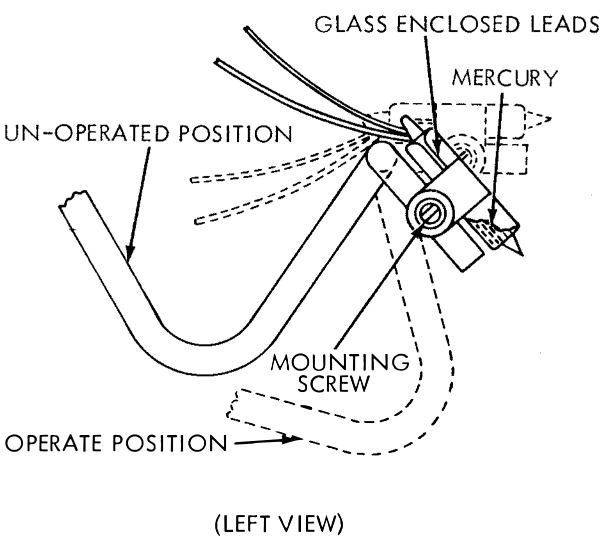
HOOK 32 OZ. SCALE UNDER SLACK ROD LEVER AT SPRING HOLE AND PULL IN LINE WITH SPRING

MIN. 19 OZS. --- MAX. 23 OZS.

TO START LEVER MOVING. CHECK BOTH SIDES

Figure 5-164. Paper Winder (PW201), Rewind Mechanism





MERCURY SWITCH POSITION
REQUIREMENT

MERCURY MUST MAKE CONTACT WITH TWO GLASS ENCLOSED LEADS WHEN SWITCH IS IN OPERATE POSITION. CLEARANCE (FOR OPERATE POSITION) BETWEEN LOWER EDGE OF PAPER SLACK BAIL AND BAIL BACKSTOP SHOULD BE

MIN. 3/4 INCH
MAX. 1-1/4 INCH

TO ADJUST

POSITION SWITCH WITH MOUNTING SCREW LOOSENED.

Figure 5-164A. Paper Winder (LPW300BR), Mercury Switch

n. CABINET (LBAC255)

NOTE: REST CABINET ON A LEVEL FLOOR WHEN MAKING THE FOLLOWING ADJUSTMENTS.

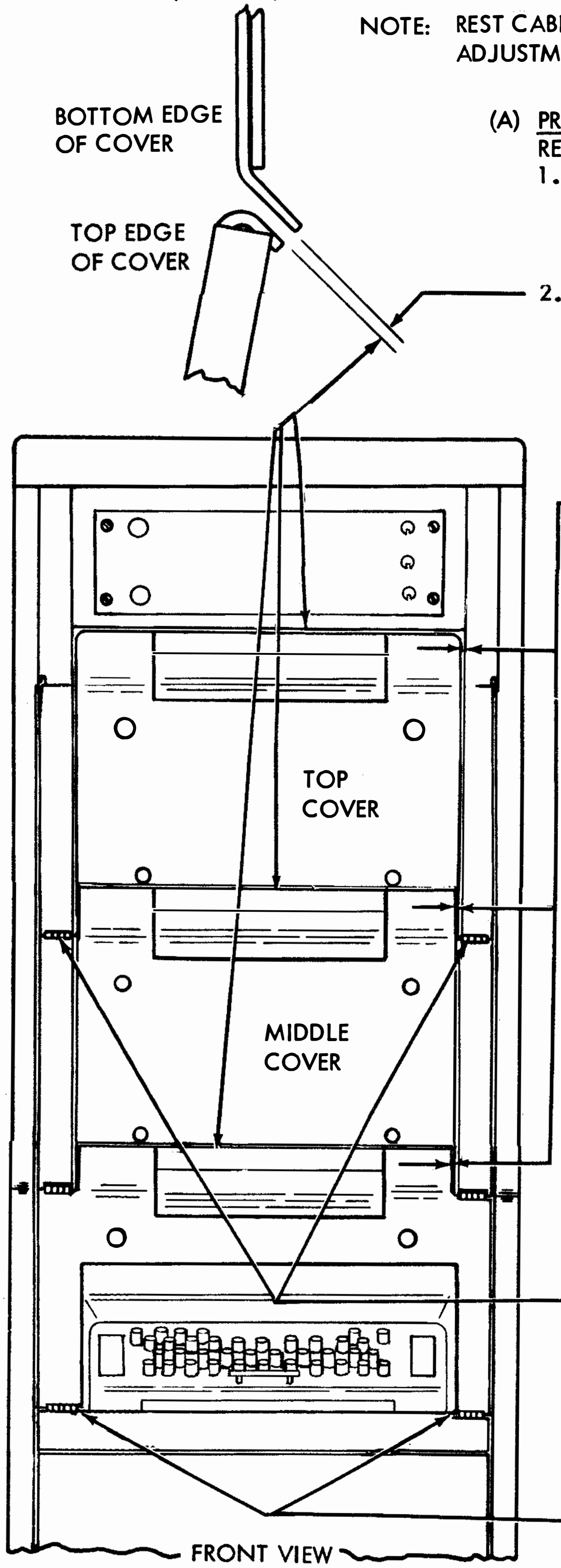
(A) <u>PRINTER COVERS</u>
REQUIREMENT

1. GENERALLY, ALL GAPS AROUND THE COVERS SHOULD BE EQUAL WITHIN ± 1/16 INCH

2. WITH COVERS CLOSED, CLEARANCE BETWEEN TOP EDGE OF COVERS AND BOTTOM EDGE OF ADJACENT COVERS SHOULD BE APPROXIMATELY 1/16 INCH
COVERS MUST NOT TOUCH WHEN BEING OPENED.

3. WITH COVERS CLOSED, SIDE CLEARANCE BETWEEN COVERS AND ADJACENT COVERS SHOULD BE APPROXIMATELY EQUAL

(CONTINUED ON THE FOLLOWING PAGE)



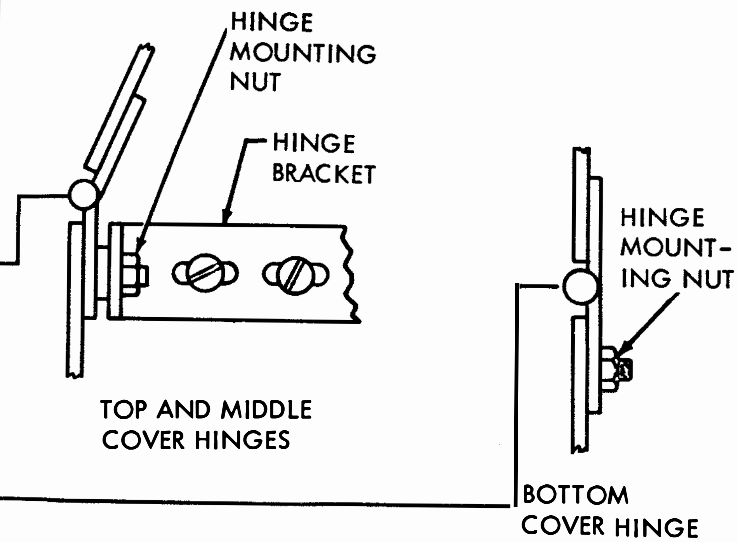
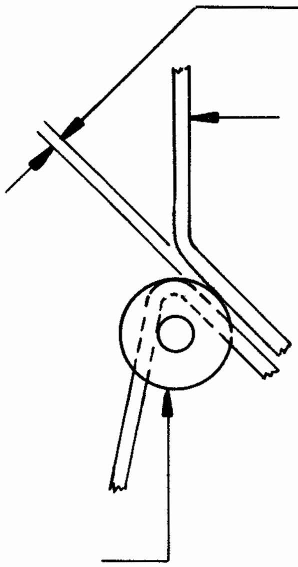


Figure 5-164B. Cabinet LBAC255BR for Multiple Mounting Page Printers

(CONTINUED FROM THE PRECEDING PAGE)



4. FINAL ADJUSTMENT (AFTER TYPING UNIT IS INSTALLED). THE GAP BETWEEN THE TOP OF THE ROLLER ON THE TYPING UNIT AND THE RETURN ON THE COVER SHALL BE APPROXIMATELY 1/16 INCH.

TO ADJUST

POSITION THE COVERS WITH THEIR HINGE NUTS FRICTION TIGHT.

NOTE: CLEARANCE BETWEEN LOWER EDGE OF BOTTOM COVER AND CENTER CROSS BRACE SHOULD BE MAX. 1/4 INCH

TO ADJUST

REFINE #2 ABOVE WITH LARGER GAP BEGINNING AT TOP COVER.

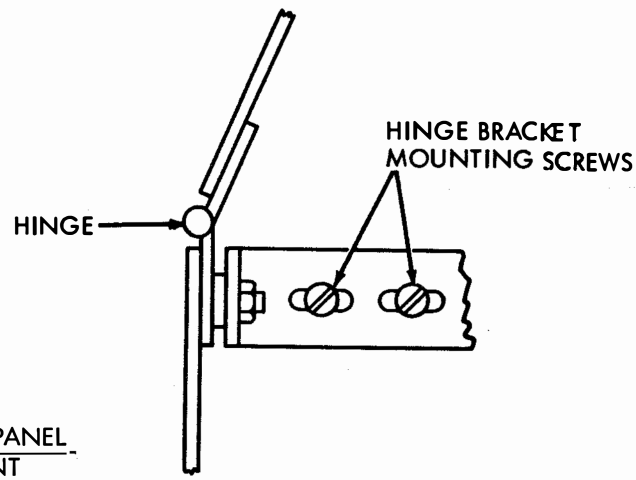
TOP AND MIDDLE PRINTER COVER DEPTH

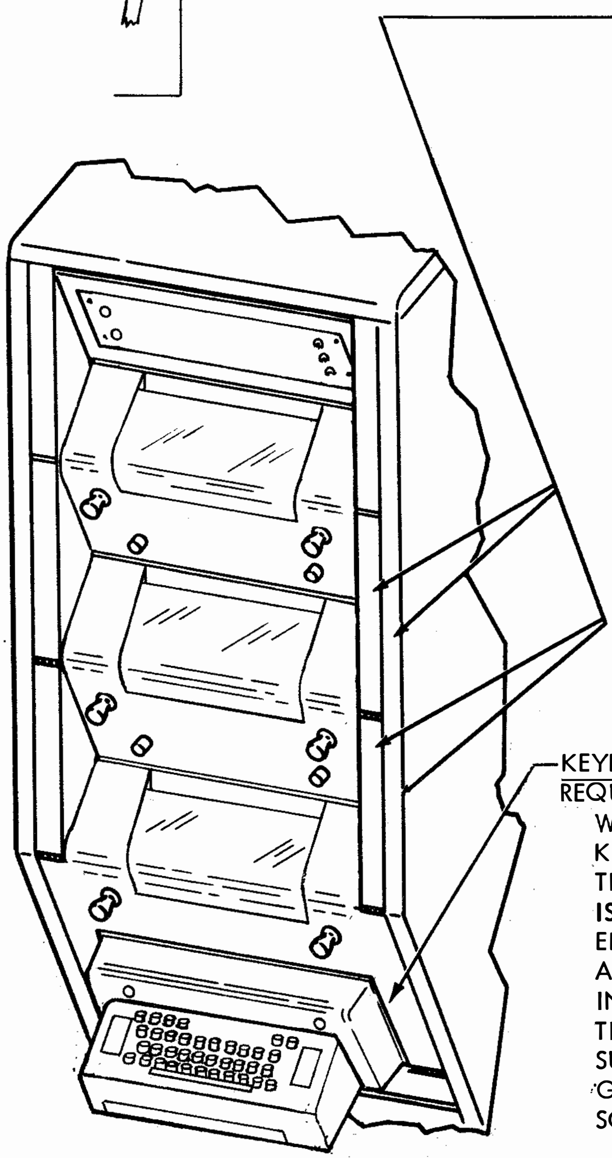
REQUIREMENT

WITH PRINTER COVERS IN CLOSED POSITION, THEIR LEFT AND RIGHT OUTER SURFACES SHOULD BE FLUSH WITH OR NO MORE THAN 1/16 INCH BELOW LEFT AND RIGHT FLANGES OF CABINET SHELL.

TO ADJUST

POSITION PRINTER COVERS WITH THEIR RESPECTIVE FOUR HINGE BRACKET MOUNTING SCREWS FRICTION TIGHT.





KEYBOARD PANEL

REQUIREMENT

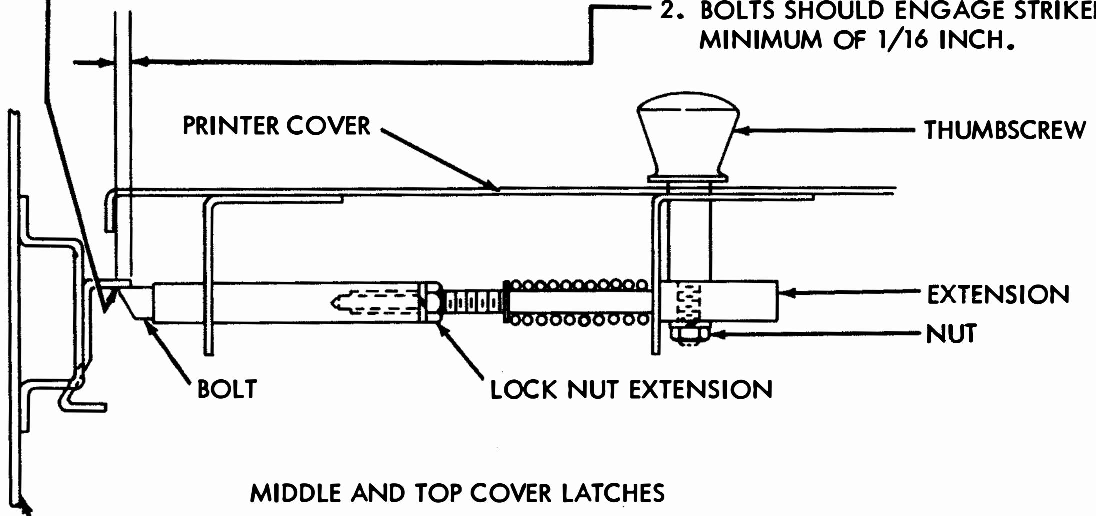
WITH THE MOUNTING SCREWS FOR THE KEYBOARD PANEL FRICTION TIGHT, POSITION THE COVER SO THE BOTTOM RETURN OF COVER IS IN LINE APPROXIMATELY WITH THE FORMED EDGE OF THE TOP FRONT BRACE ASSEMBLY AND THE PANEL IS APPROXIMATELY CENTERED IN THE OPENING IN THE BOTTOM COVER. TIGHTEN THE TOP MOUNTING SCREWS BEING SURE TO PULL THE PANEL TIGHT AGAINST THE RUBBER GASKET ON THE KEYBOARD BEFORE TIGHTENING SCREWS.

Figure 5-164C. Cabinet LBAC255BR for Multiple Mounting Page Printers

PRINTER COVER LATCHES
REQUIREMENT

1. WITH COVER IN CLOSED POSITION, BOLTS SHOULD TOUCH STRIKER PLATES.

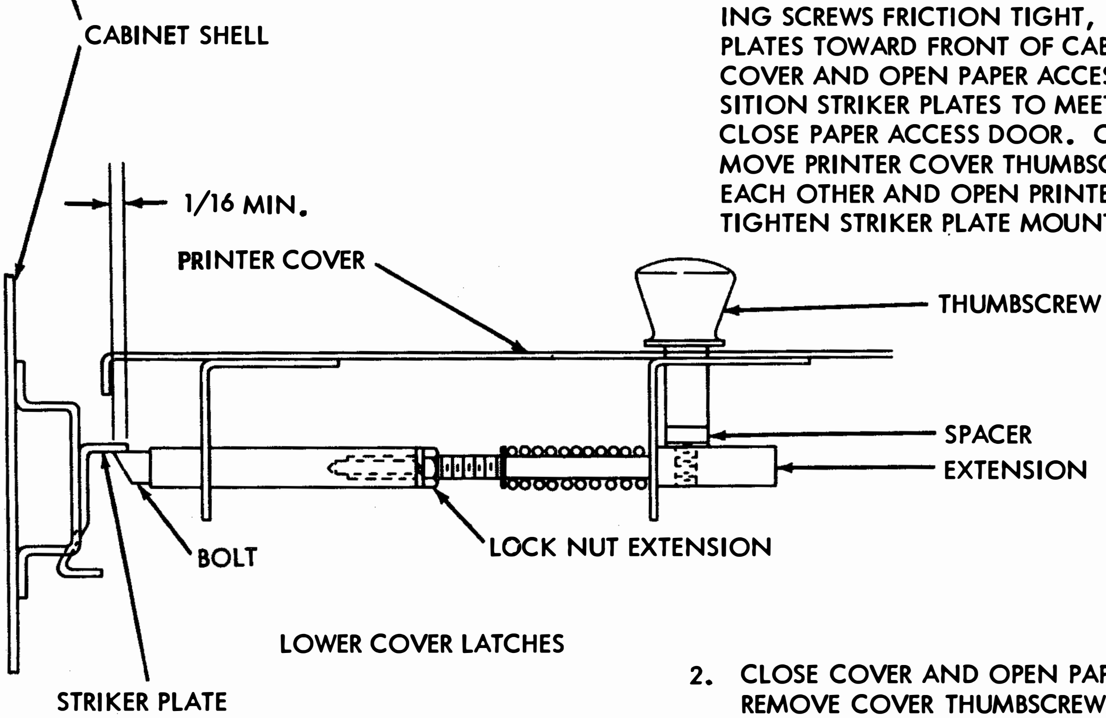
2. BOLTS SHOULD ENGAGE STRIKER PLATES BY A MINIMUM OF 1/16 INCH.



MIDDLE AND TOP COVER LATCHES

TO ADJUST

1. WITH COVER OPEN AND STRIKER PLATE MOUNTING SCREWS FRICTION TIGHT, MOVE STRIKER PLATES TOWARD FRONT OF CABINET. CLOSE COVER AND OPEN PAPER ACCESS DOOR. POSITION STRIKER PLATES TO MEET (1) ABOVE. CLOSE PAPER ACCESS DOOR. CAREFULLY MOVE PRINTER COVER THUMBSCREWS TOWARD EACH OTHER AND OPEN PRINTER COVER. TIGHTEN STRIKER PLATE MOUNTING SCREWS.



LOWER COVER LATCHES

2. CLOSE COVER AND OPEN PAPER ACCESS DOOR. REMOVE COVER THUMBSCREWS AND THEIR LOCKWASHERS FROM EXTENSIONS. WITH THEIR LOCKNUTS LOOSE, ROTATE EXTENSIONS TO MOVE BOLTS RIGHT OR LEFT AS REQUIRED. ALIGN TAPPED HOLE IN EXTENSION WITH HOLE IN COVER. REPLACE THUMBSCREWS AND LOCKWASHERS. TIGHTEN EXTENSION LOCKNUTS.

Figure 5-164D. Cabinet LBAC255BR for Multiple Mounting Page Printers

(A) SLIDE STOPS

REQUIREMENT

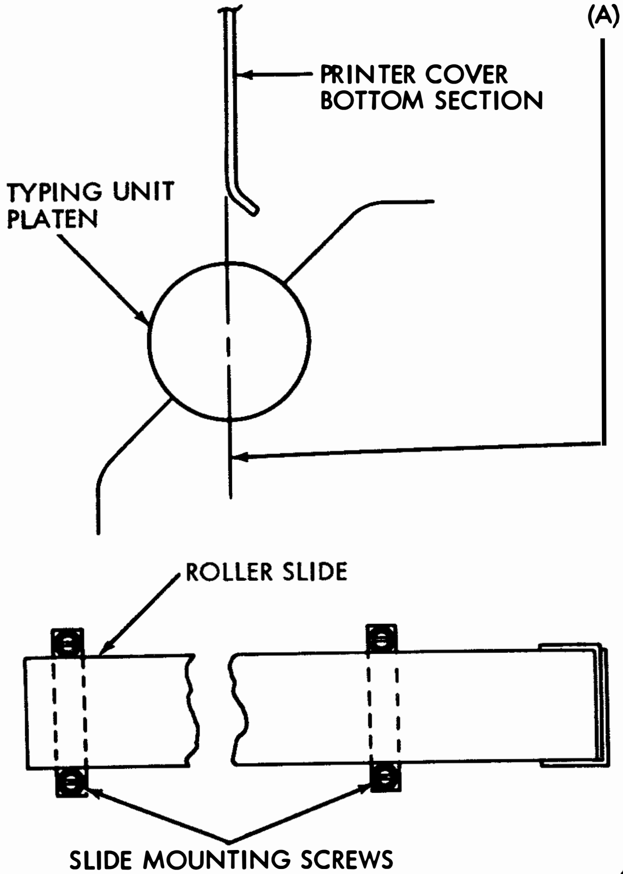
(1) WITH EACH PRINTER UNIT IN REARMOST POSITION, CENTER OF TYPING UNIT PLATEN SHOULD BE IN LINE WITH, PLUS OR MINUS 1/16 INCH, FRONT EDGE OF PRINTER COVER ABOVE IT FOR THE UPPER TWO TYPING UNITS.

(2) CENTER OF PLATEN OF BOTTOM TYPING UNIT SHOULD BE IN LINE WITH FRONT EDGE OF COVER ABOVE IT WITHIN 1/16 INCH FORWARD - 3/16 INCH REARWARD.

TO ADJUST

(1) (2) OPEN COVER AND LOOSEN SLIDE MOUNTING SCREWS FRICTION TIGHT. POSITION SLIDE, BASE AND TYPING UNIT TO MEET REQUIREMENT.

NOTE: THIS ADJUSTMENT AFFECTS CARRIAGE RETURN AND LINE FEED LEVER ADJUSTMENTS. THEREFORE, IF SLIDE STOPS ARE READJUSTED, CARRIAGE RETURN AND LINE FEED LEVERS SHOULD ALSO BE READJUSTED.



(B) CARRIAGE RETURN AND LINE FEED LEVERS

REQUIREMENT (EACH PRINTER COVER)

WITH PRINTER COVER CLOSED
MIN. 3/32 INCH — MAX. 5/32 INCH
CLEARANCE BETWEEN HEAD OF LEVER ADJUSTING SCREW AND REAR SURFACE OF KEYLEVER MOUNTING BRACKET.

TO ADJUST

DEPRESS KEYLEVER ASSEMBLY AND ROTATE IT 90 DEGREES. REMOVE KEYLEVER ASSEMBLY AND KEYLEVER SPRING. CLOSE COVER AND TURN LEVER ADJUSTING SCREW, ACCESSIBLE THROUGH HOLE IN COVER, TO MEET REQUIREMENT.

NOTE: THE SLOT IN THE ADJUSTING SCREW SHOULD BE HORIZONTAL AFTER ADJUSTING.

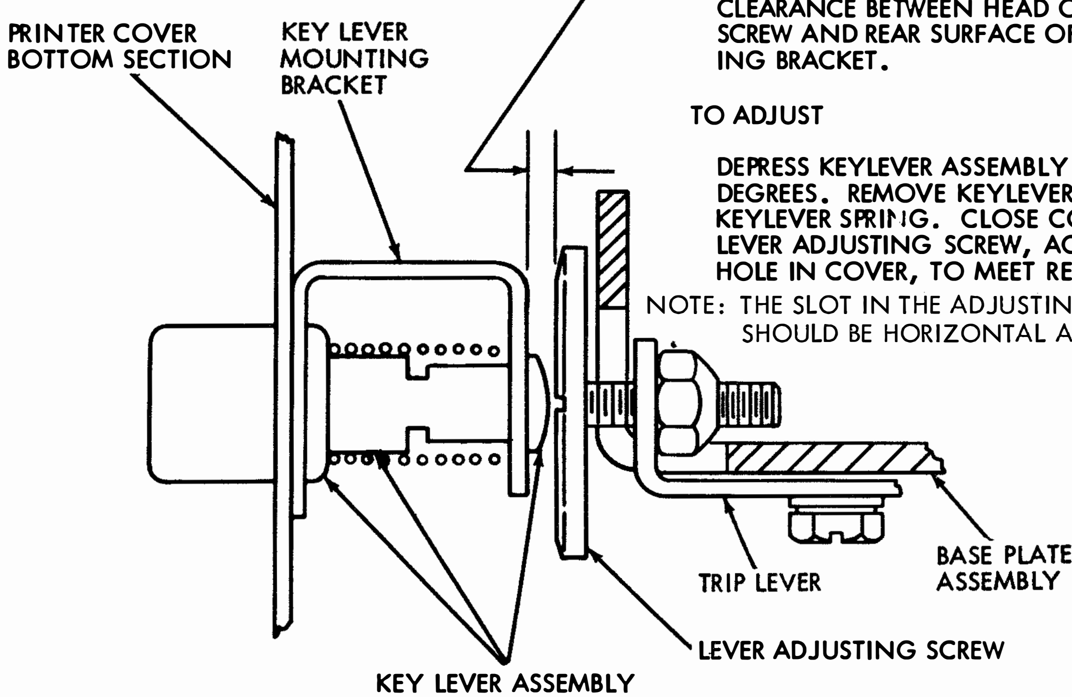
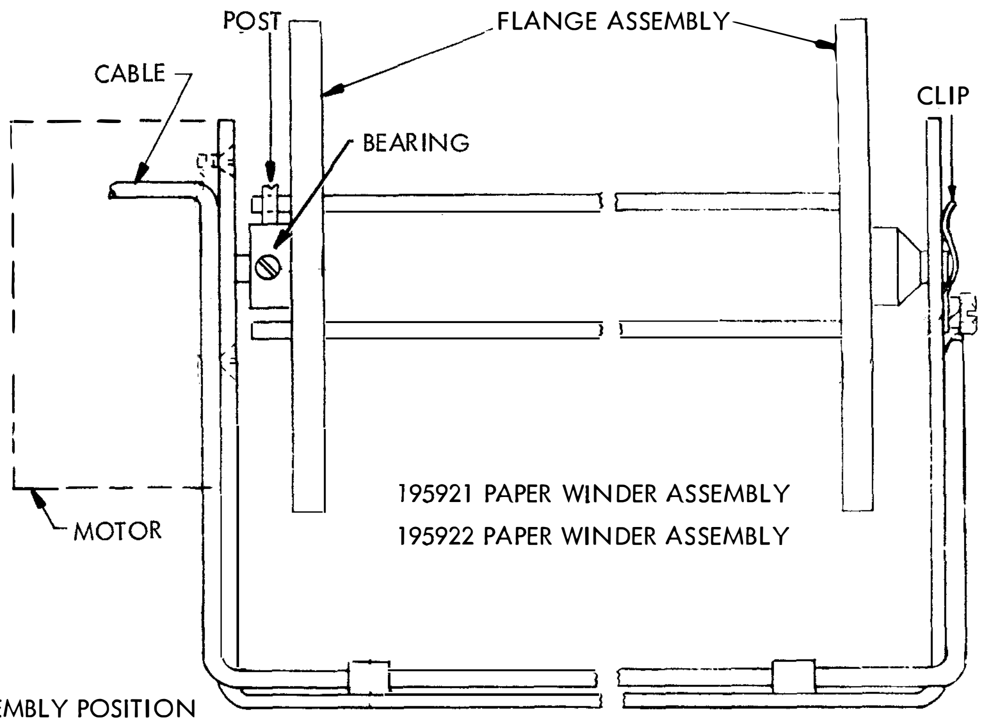


Figure 5-164E. Cabinet LBAC255BR for Multiple Mounting Page Printers



PAPER WINDER ASSEMBLY POSITION

REQUIREMENT

THE COMBINED ASSEMBLY SHOULD BE POSITIONED (LEFT OR RIGHT) SO THAT THE PAPER AS IT COMES OFF THE PLATEN SHALL LINE UP WITH THE FLANGES OF THE PAPER WINDER SPINDLE. IT IS IMPORTANT THAT THE CENTERLINE OF THE PAPER WINDER SPINDLE BE AS CLOSE TO PARALLEL AS POSSIBLE WITH THE CENTERLINE OF THE PLATEN. THIS IS TO MINIMIZE "WALKING" OF THE PAPER FROM SIDE TO SIDE.

TO ADJUST

POSITION PAPER WINDER ASSEMBLY WITH ITS MOUNTING SCREWS LOOSENED.

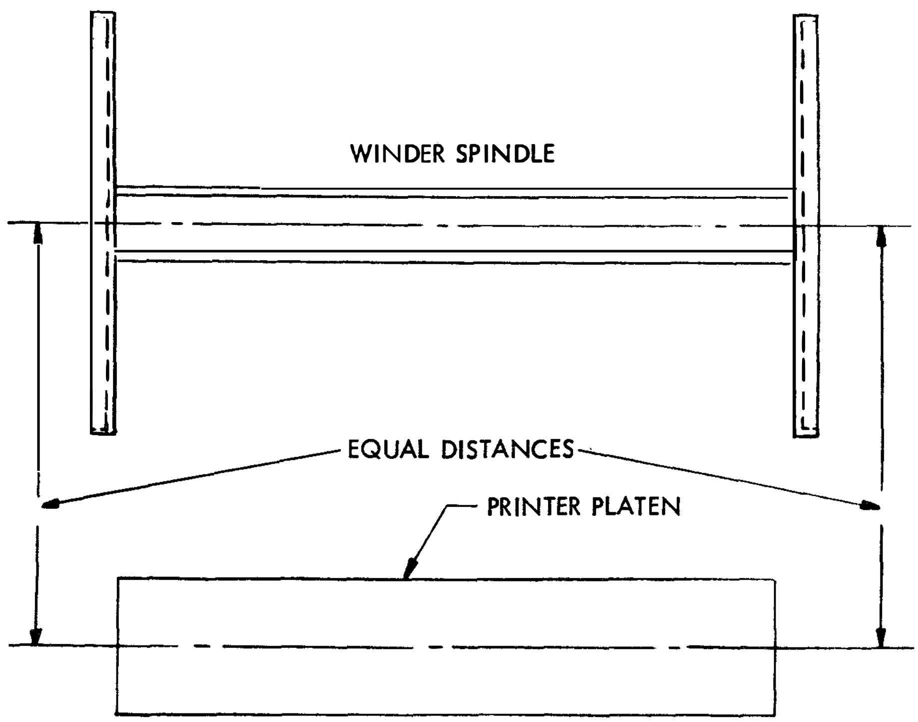


Figure 5-164F. Cabinet LBAC255 for Multiple Mounting Page Printers

MERCURY SWITCH POSITION

REQUIREMENT

(1) THE GLASS ENCLOSED LEADS OF THE SWITCH MUST BE IN A HORIZONTAL PLANE AND PARALLEL WITH THE PAPER SLACK MOUNTING END BAIL WHEN THE SLACK MOUNTING END IS HORIZONTAL WITH THE BASE PLATE.

(2) THE MERCURY SWITCH MUST START MOTOR ROTATION WHEN THE LOWER EDGE OF THE PAPER SLACK BAIL IS PARALLEL WITH THE BASE PLATE OR 1/2 INCH ABOVE THE PAPER SLACK BAIL BACK STOP.

TO ADJUST

POSITION SWITCH WITH MOUNTING SCREW LOOSENED.

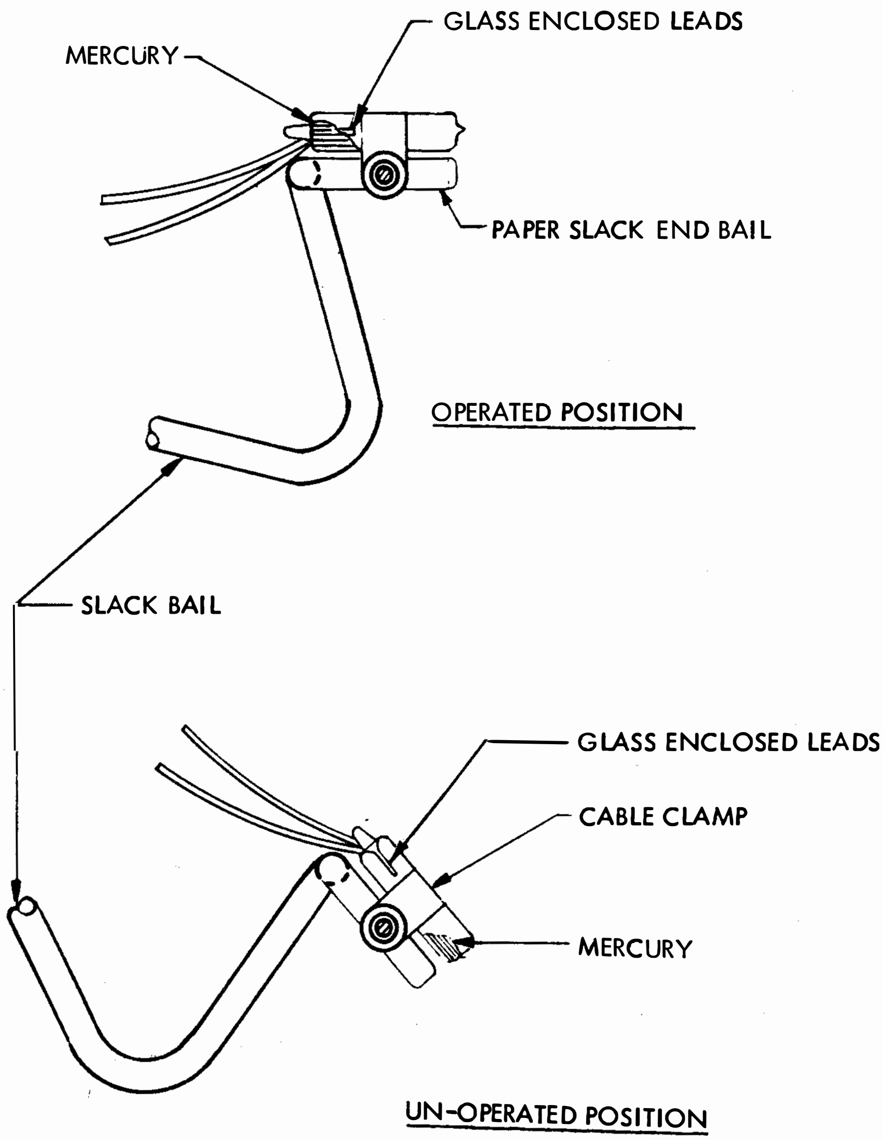


Figure 5-164G. Cabinet LBAC255BR for Multiple Mounting Page Printers

5-3. LUBRICATION

a. GENERAL

(1) Lubricate the equipment as directed in figures 5-165 through 5-236. These figures indicate the points to be lubricated and the type and quantity of lubricant to be used. On new equipment, after a few weeks of service, relubricate to make certain that all points receive lubricant.

(2) Follow this lubrication schedule:

OPERATING SPEED	LUBRICATING INTERVAL
45.5 Baud (65 WPM)	3,000 hours or 1 year
75.0 Baud (106 WPM)	1,500 hours or 6 months

(3) For normal or high temperatures (5^{O} to 55^{O} C; 41^{O} to 131^{O} F) use Teletype KS-7470 oil at all locations where the use of oil is indicated. For lower temperatures, dilute the KS-7470 oil with kerosene (half and half). Use KS-7471 grease on all surfaces where grease is indicated, except the motor bearings. Apply six drops of KS-7470 oil to motor bearings every four months (depress oiler with metal object). If the motor is disassembled at any time, repack the bearings with grease (Beacon 325) (Teletype 195298) or its equivalent.

(4) The equipment should be thoroughly lubricated, but over-lubrication which might allow oil to drip or grease to be thrown on other parts should be avoided. The following general instructions supplement the specific lubricating points shown on the following pages:

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

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

(c) Apply a thick coat of grease to all gears.

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

(e) Apply oil to all pivot points.

(f) Apply oil to all sliding surfaces.

NOTE

Exercise special care to prevent any oil or grease from getting between armatures and pole pieces of selector magnets, transmitter distributor clutch magnets or tape-feed out magnets. Keep all electrical contacts free of oil or grease.

(5) Apply a thick film of grease to all gears and to the spacing clutch reset cam. When gear changes are made to change operating speed of the components, lubricate the replacement pinion and gear when the change is made.

(6) Specific lubrication requirements and the amount of lubricant are indicated at each lubrication point in accordance with the following code:

0 Apply one drop of oil.

02 Apply two drops of oil.

03 Apply three drops of oil.

G Apply thin coat of grease.

SAT Saturate with oil (felt washers, etc.)

(7) Lubricate according to the applicable lubrication instructions whenever parts or assemblies are removed and reassembled, or when handling the equipment for adjustment purposes may have removed some or all of the lubricant.

NOTE

During each lubrication period, check the following adjustments:

Carriage draw wire rope, figure 5-33.

Printing carriage position, figure 5-40.

Printing hammer bearing stud, figure 5-40.

Printing hammer stop bracket, figure 5-43.

Printing arm, figure 5-43.

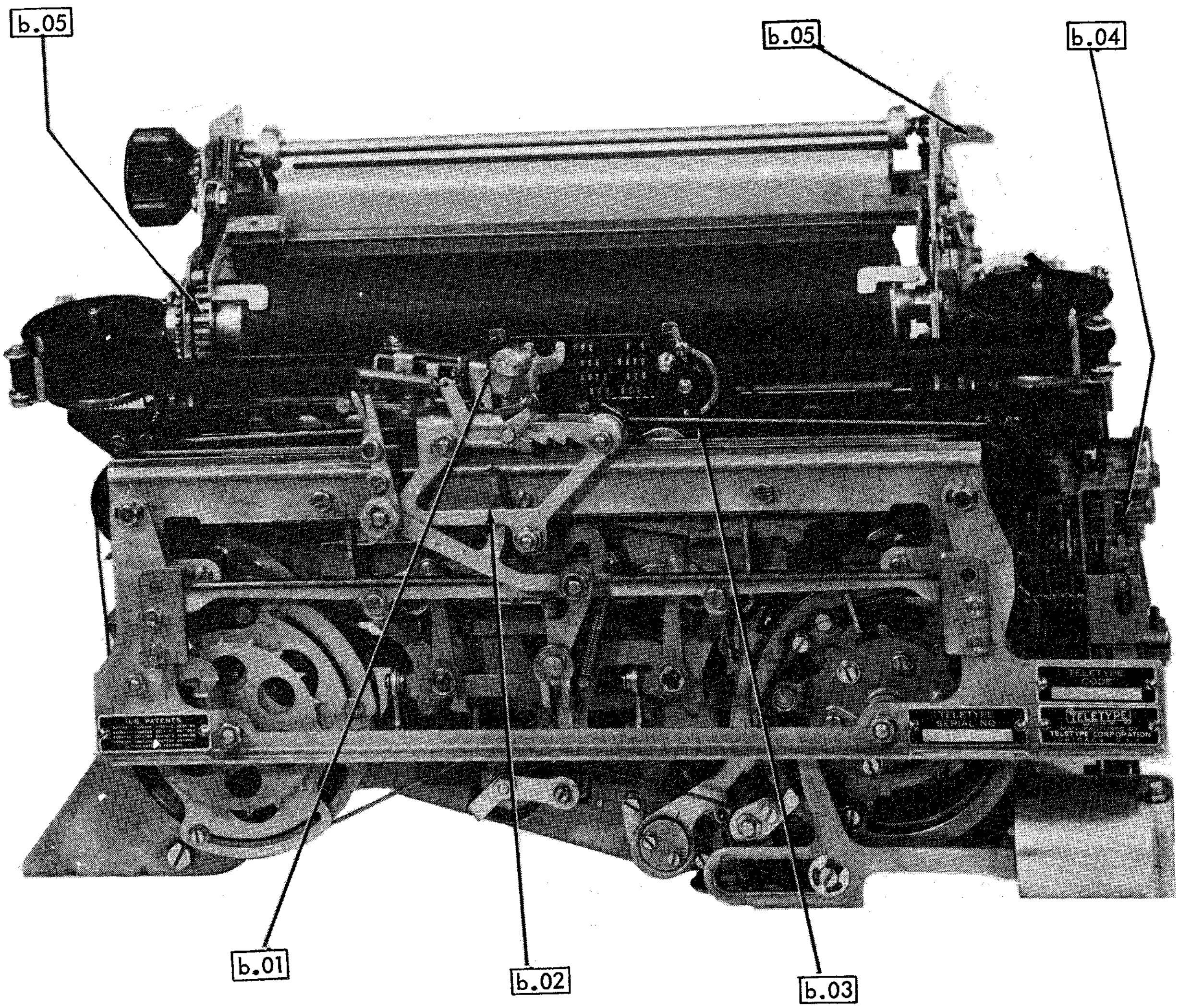
Printing trip link, figure 5-114.

Typewheel, figure 5-116.

Print hammer, figure 5-116.

Dashpot vent screw, figure 5-36 and check transfer slide for binds.

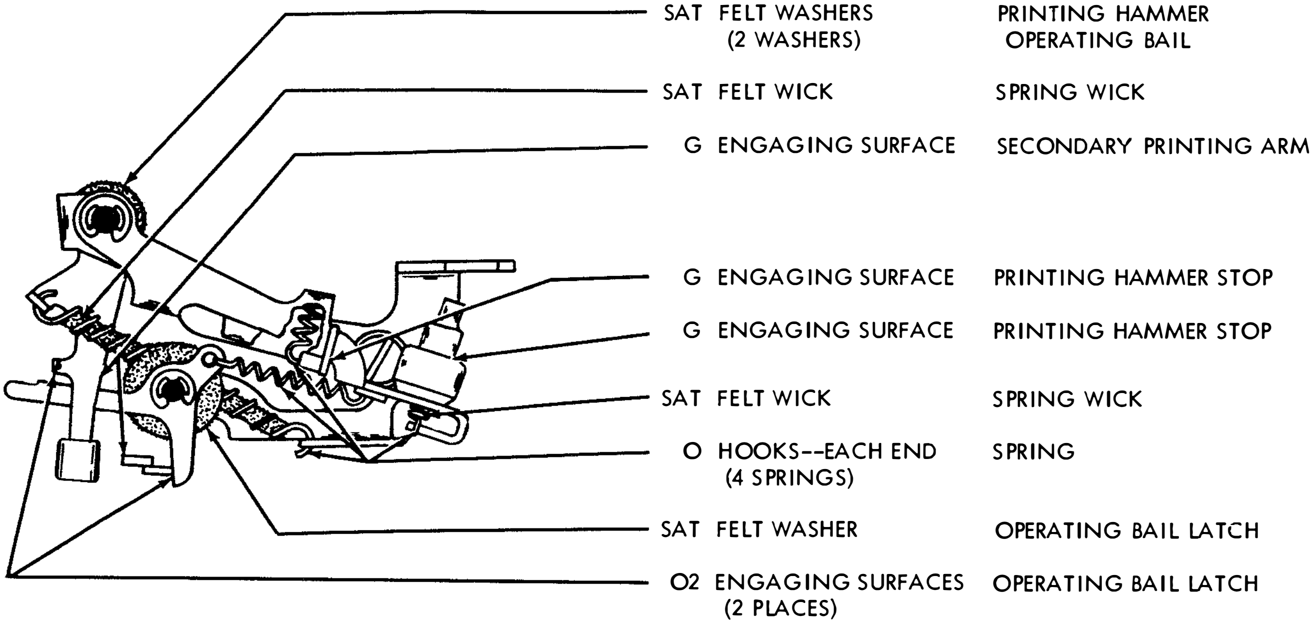
b. TYPING UNIT (LP)



(REST TYPING UNIT IN UPRIGHT POSITION)

Figure 5-165. Typing Unit

b.01 PRINTING MECHANISM



b.02 PRINTING MECHANISM (Continued)

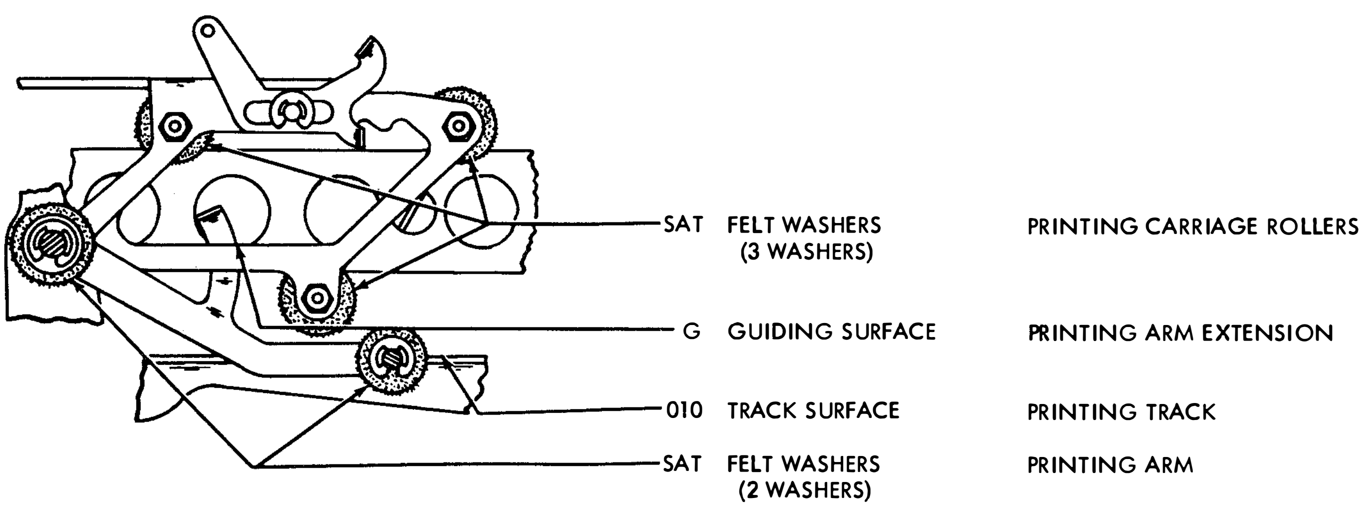
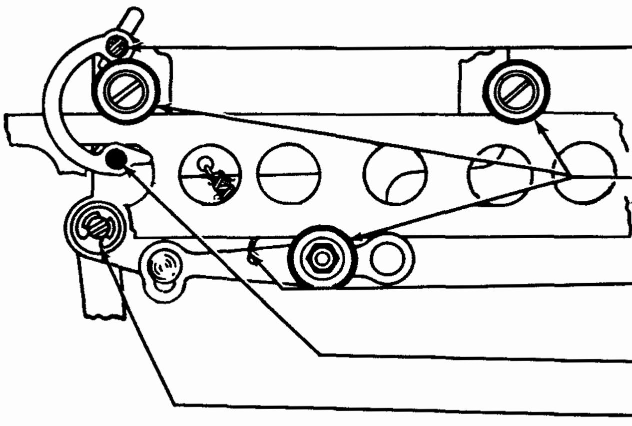


Figure 5-166. Typing Unit

b.03 TYPE BOX CARRIAGE MECHANISM



O BEARING SURFACE — TYPE BOX CARRIAGE LATCH TOGGLE

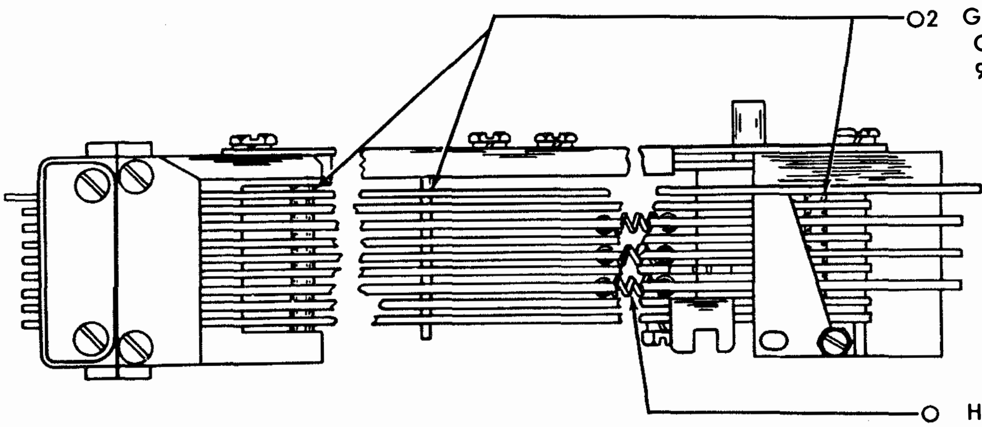
O2 BEARINGS (3 ROLLERS) — TYPE BOX CARRIAGE ROLLERS

O HOOK-EACH END / SAT FELT WICK — SPRING

O BEARING SURFACE — TYPE BOX CARRIAGE LATCH

O2 BEARING SURFACE — TYPE BOX CARRIAGE LINK

b.04 CODE BAR MECHANISM

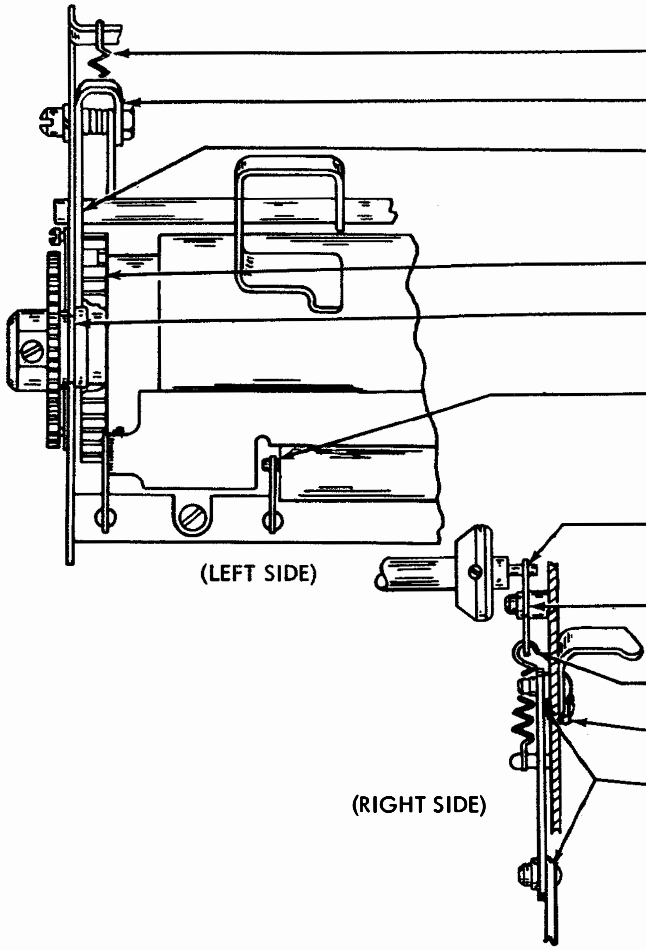


O2 GUIDE SLOTS (RIGHT CENTER, AND LEFT- 9 BARS) — CODE BARS

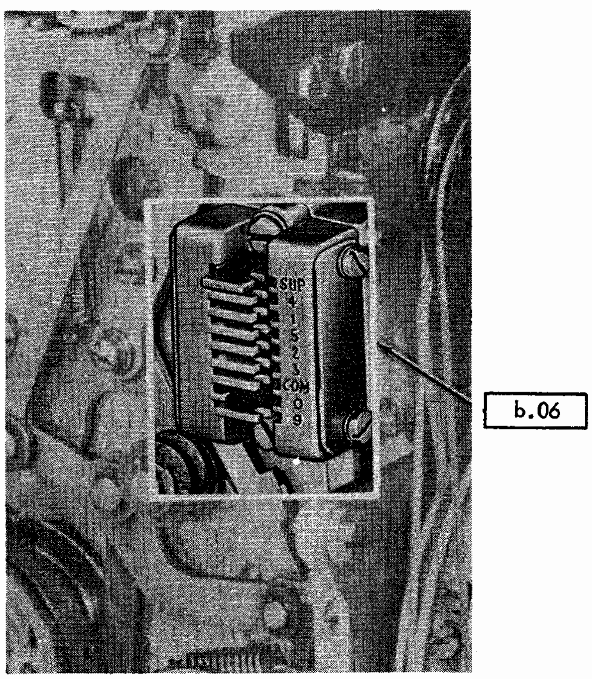
O HOOKS-EACH END (3 PLACES) — SPRING

Figure 5-167. Typing Unit

b.05 PAPER FEED MECHANISM (FRONT VIEW)

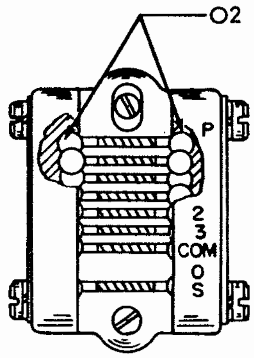


O	HOOKS-EACH END	SPRING
O2	BEARING SURFACE	PLATEN DETENT BAIL
O2	BEARING SURFACES (EACH END)	PAPER FINGER SHAFT
G	TEETH (2 GEAR)	PLATEN GEARS
O2	BEARINGS (EACH END)	PLATEN SHAFT
O	BEARING SURFACES-EACH END (6 ROLLERS)	PAPER PRESSURE ROLLER SHAFTS (WIPE OFF EXCESS OIL)
O2	BEARING SURFACES (EACH END)	PAPER STRAIGHTENER SHAFT
O2	BEARING SURFACES (RIGHT AND LEFT)	PAPER STRAIGHTENER LEVERS
O	HOOKS-EACH END	SPRING
O2	BEARING SURFACE	RELEASE LEVER
O2	BEARING SURFACES (EACH END)	RELEASE LEVER LINK



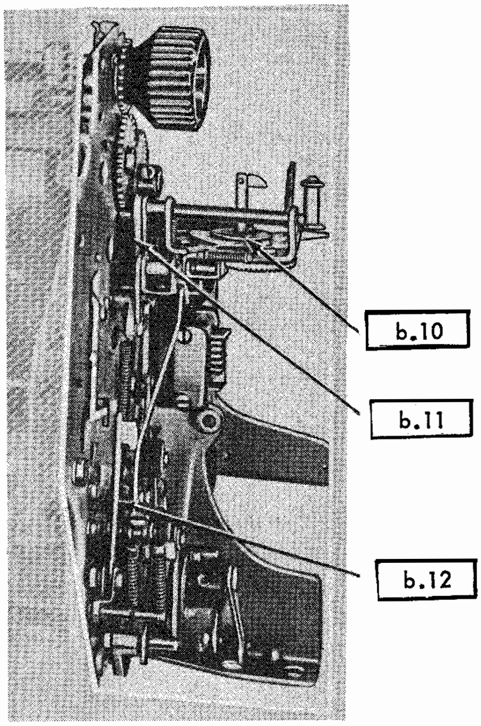
(LEFT SIDE VIEW)

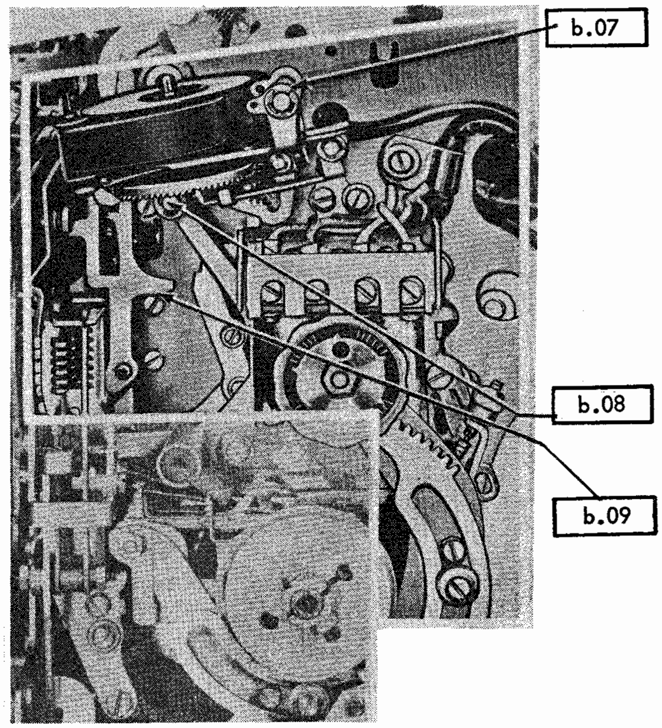
b.06 CODE BAR MECHANISM



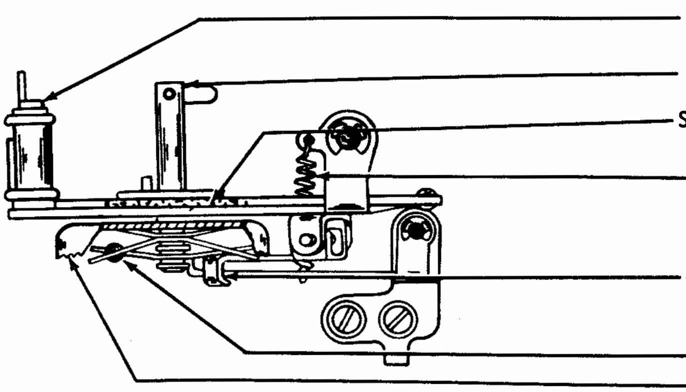
O2	BEARING BALLS (9 BALLS)	CODE BAR DETENT

Figure 5-168. Typing Unit



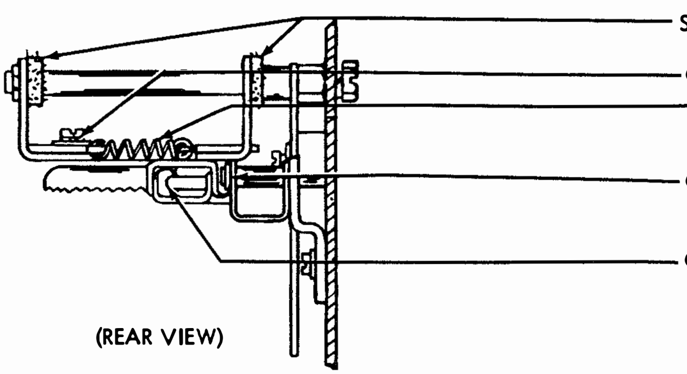


b.07 RIBBON FEED MECHANISM (RIGHT SIDE)



O2	BEARING SURFACE	RIBBON ROLLER SHAFT
O2	BEARING SURFACE	RIBBON SPOOL TOGGLE
SAT	FELT WASHER	RIBBON SPOOL SHAFT
O	HOOKS-EACH END	RIBBON FEED LEVER SPRING
O2	ENGAGING SURFACE	RIBBON DETENT LEVER
O	HOOKS-EACH END	RIBBON RATCHET WHEEL SPRING
G	TEETH	RIBBON RATCHET WHEEL

(RIGHT SIDE VIEW)

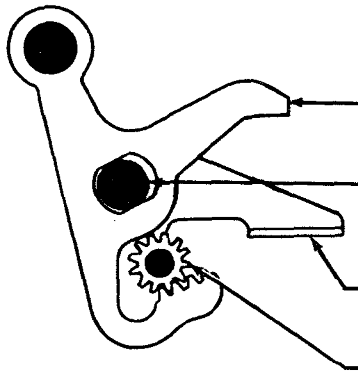


SAT	FELT WASHERS (2 WASHERS)	RIBBON FEED LEVER BAIL
O2	BEARING SURFACE	RIBBON LEVER
O	HOOKS-EACH END	SPRING
O2	BEARING SURFACES (2 PLACES)	RATCHET FEED LEVER SHAFT
O2	BEARING SURFACE (2 PLACES)	RIBBON DETENT LEVER SHAFT

(REAR VIEW)

Figure 5-169. Typing Unit

b.08 RIBBON REVERSE MECHANISM



b.09 VERTICAL POSITIONING MECHANISM (RIGHT SIDE)

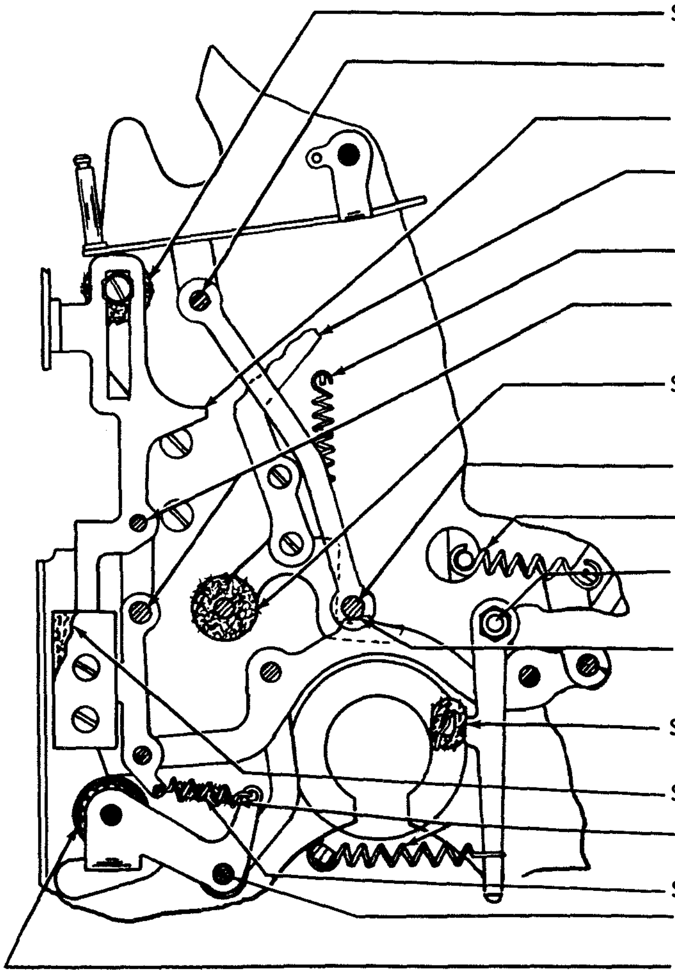
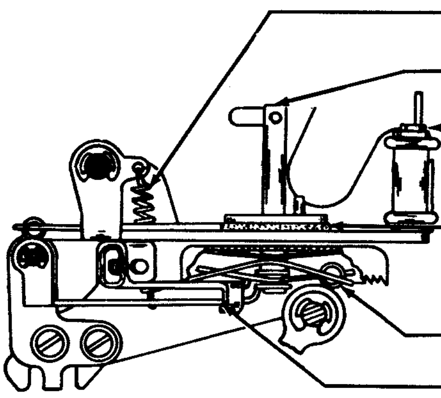


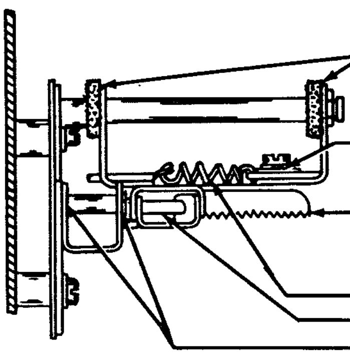
Figure 5-170. Typing Unit

b.10 RIBBON FEED MECHANISM (LEFT SIDE)



O	HOOKS-EACH END	SPRING
O	BEARING SURFACE	RIBBON SPOOL SHAFT
O2	BEARING SURFACE	RIBBON ROLLER SHAFT
SAT	FELT WASHER	RIBBON SPOOL SHAFT
O	HOOKS-EACH END	SPRING
O2	ENGAGING SURFACE	RIBBON DETENT LEVER

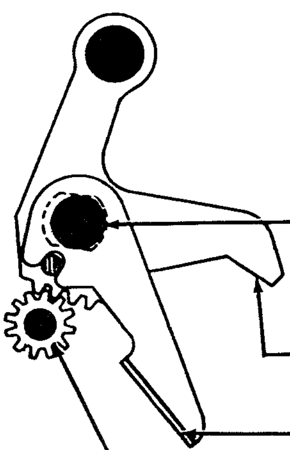
(LEFT SIDE VIEW)



SAT	FELT WASHERS (2 WASHERS)	RIBBON FEED LEVER BAIL
O2	BEARING SURFACE	RIBBON REVERSE LEVER
G	TEETH	RIBBON RATCHET WHEEL
O	HOOKS-EACH END	SPRING
O2	ENGAGING SURFACE	RIBBON DETENT LEVER SHAFT
O2	BEARING SURFACES (2 PLACES)	RATCHET FEED LEVER SHAFT

(REAR VIEW)

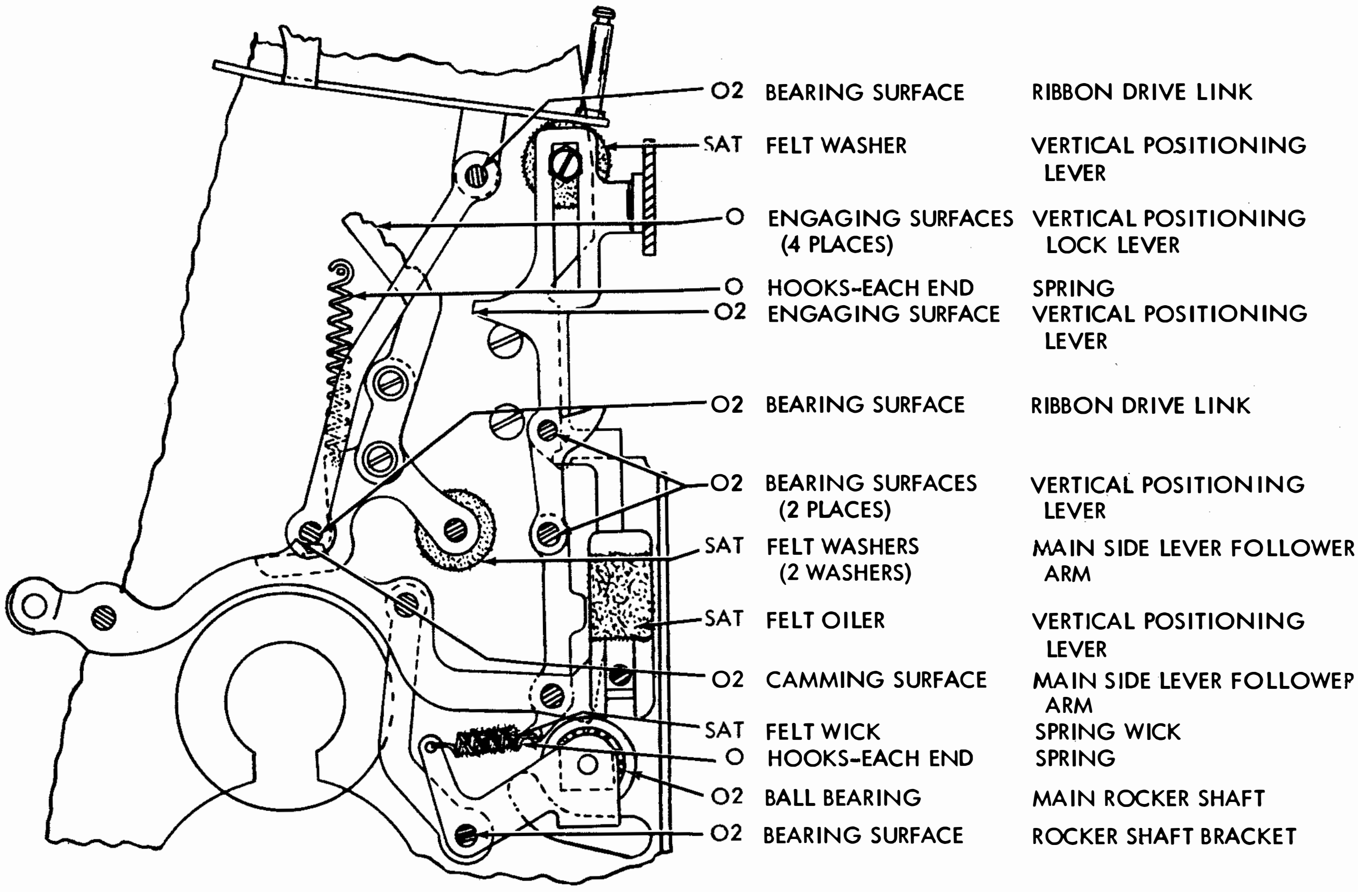
b.11 RIBBON FEED MECHANISM (Continued)



O2	BEARING SURFACE	RIBBON DETENT LEVER
O2	ENGAGING SURFACE	RIBBON REVERSING LEVER
O2	ENGAGING SURFACE	RIBBON REVERSE LEVER
G	TEETH	RIBBON REVERSE SPUR GEAR

Figure 5-171. Typing Unit

b.12 VERTICAL POSITIONING MECHANISM (LEFT SIDE)



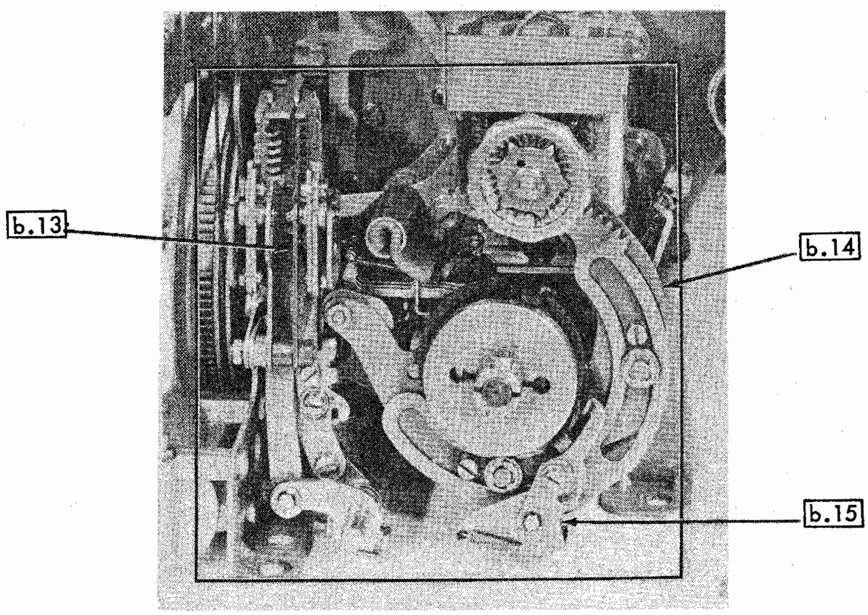
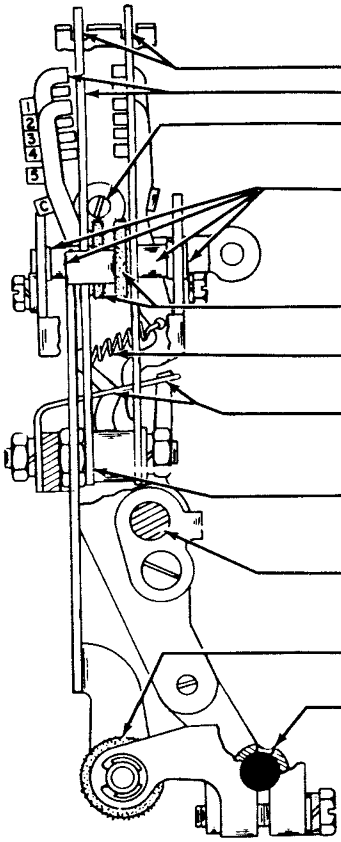


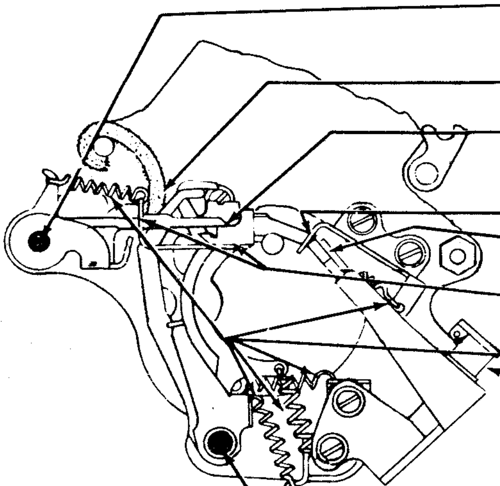
Figure 5-172. Typing Unit

b.13 CODE BAR MECHANISM



O2	GUIDE SLOTS	SHIFT LEVERS
O2	ENGAGING SURFACE	SHIFT AND TRANSFER LEVERS
O2	BEARING GUIDE SLOTS (6 SLOTS)	TRANSFER LEVER GUIDE BEARING
O2	ROLLER BEARINGS (4 ROLLERS)	SHIFT LEVER LINK ROLLERS
SAT	FELT WASHERS (2 WASHERS)	SHIFT LEVER LINK SHAFT
O	HOOKS-EACH END (5 SPRINGS)	SPRING
O2	GUIDE SLOTS (5 SLOTS)	INTERMEDIATE ARMS AND TRANSFER LEVERS
O2	BEARING SURFACES (2 PLACES)	SHIFT LEVERS
O2	BEARING GUIDE SLOTS (5 SLOTS)	INTERMEDIATE ARM GUIDE BEARING
SAT	FELT WASHER	SHIFT LEVER LINK
O3	OIL HOLE	SHIFT LEVER DRIVE ARM SHAFT

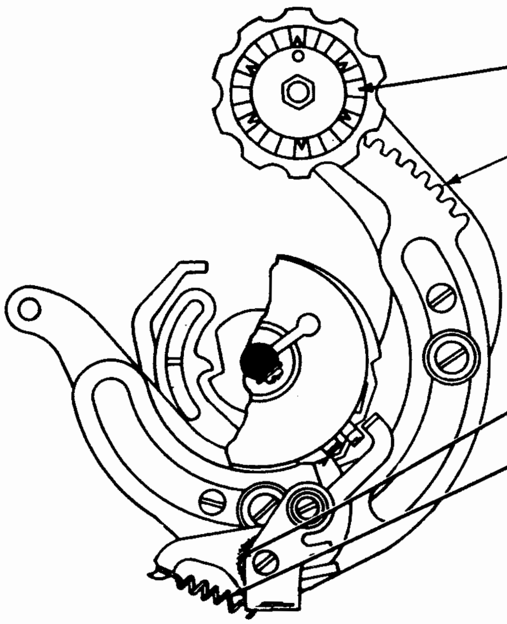
b.14 SELECTOR MECHANISM



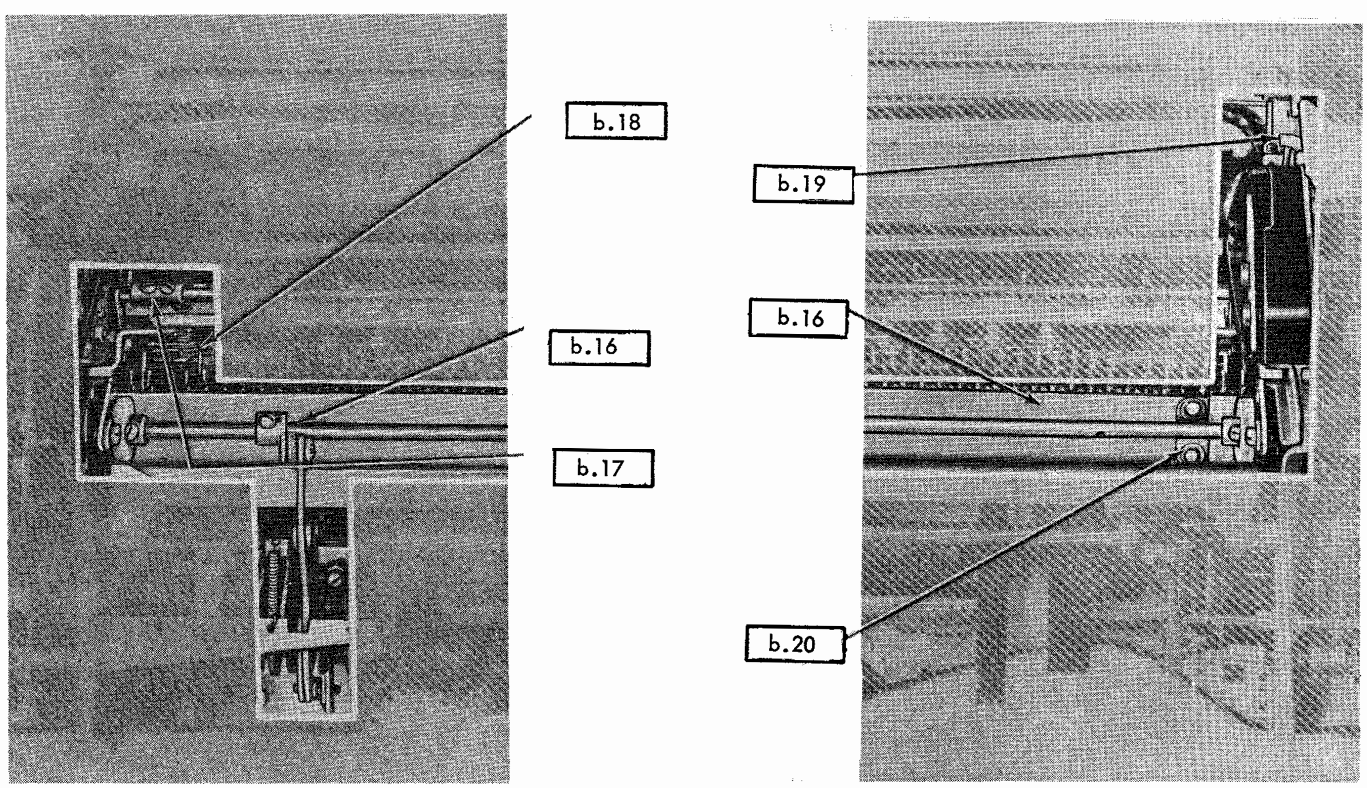
O2	BEARING GUIDE SLOTS (5 SLOTS)	PUSH LEVER GUIDE BEARING
SAT	FELT WICK	SELECTOR WICK
O2	ENGAGING SURFACES (5 LEVERS)	PUSH LEVERS
O2	GUIDE SLOT	MARKING LOCK LEVER
O2	WICK	LUBRICATOR WICK
O2	GUIDE SLOTS	SELECTOR AND PUSH LEVERS
O	HOOKS-EACH END (12 SPRINGS)	SPRINGS
FILL (AVOID AIR LOCK)	CUP	LUBRICATOR RESERVOIR
O2	BEARING GUIDE SLOTS (6 SLOTS)	SELECTOR LEVER GUIDE BEARING

Figure 5-173. Typing Unit

b.15 SELECTOR MECHANISM (Continued)



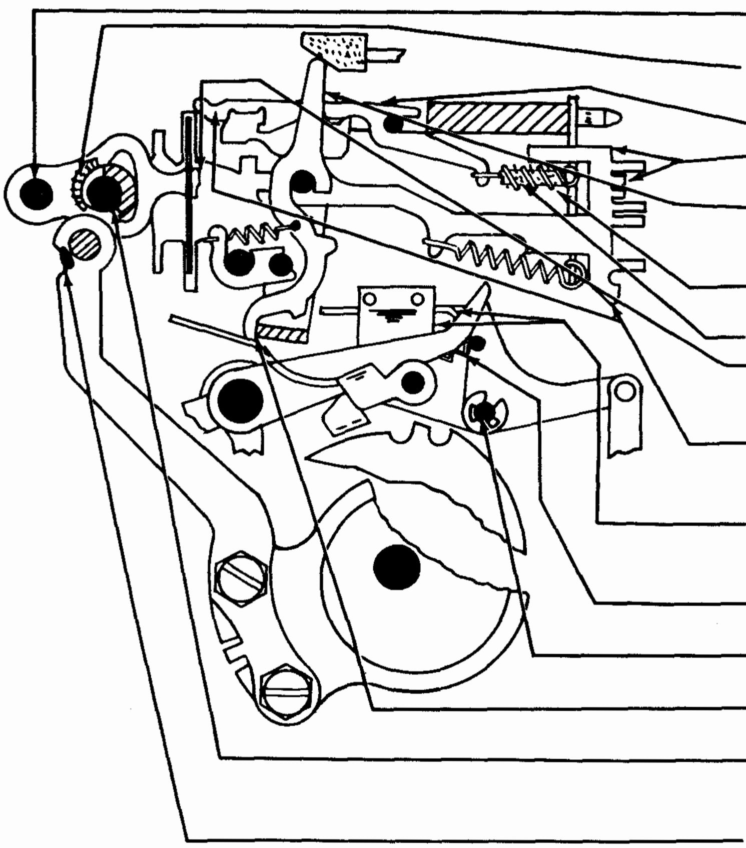
G	KNOB AND GEAR	TEETH OF GEAR AND RANGE SCALE
G	TEETH	RACK
SAT	FELT WASHERS (2 WASHERS)	CLUTCH TRIP LEVER
O	HOOKS-EACH END	SPRING



(REAR VIEW) (REAR VIEW)

Figure 5-174. Typing Unit

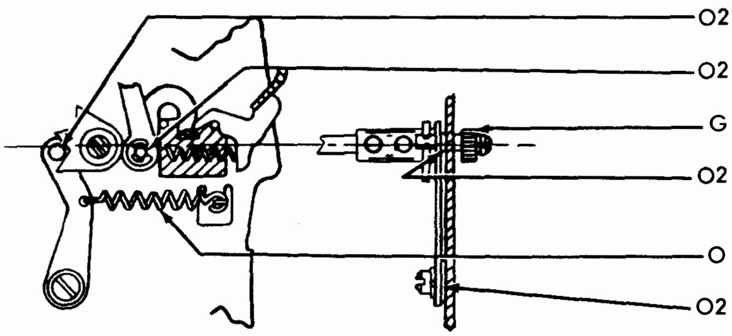
b.16 FUNCTION BOX MECHANISM



O2	BEARING SURFACES (2 BEARINGS)	CAM ARMS
SAT	FELT WASHERS (4 WASHERS)	DRIVING CAM
O2	GUIDE SLOTS	FUNCTION PAWLS
O2	GUIDE SLOTS	FUNCTION BARS
G	ENGAGING SURFACES (EACH ARM)	CONTACT ARM
O	HOOKS-EACH END	SPRINGS
SAT	EACH FELT WICK	FUNCTION PAWL SPRINGS
G	ENGAGING SURFACES (2 ARMS)	CAM ARMS
O2	ENGAGING SURFACES (FRONT & REAR)	FUNCTION BARS
O2	GUIDE AND ENGAGING SURFACES	LINE FEED SLIDE ARM
O	HOOKS-EACH END	SPRING
O2	BEARING SURFACE	KEYBOARD LOCK LEVER
O2	ENGAGING SURFACES	FUNCTION LEVERS
G	CAMMING SURFACES (2 CAMS)	DRIVING CAMS
SAT	FELT WASHER	STRIPPER BLADE DRIVING ARM

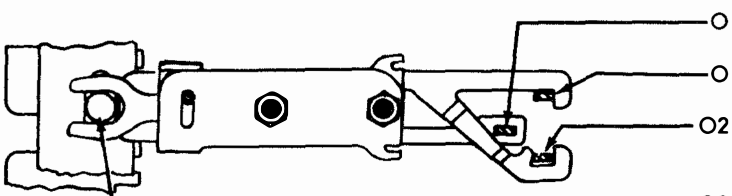
(LEFT SIDE VIEW)

b.17 RIBBON REVERSE MECHANISM



O2	ENGAGING SURFACE	RIBBON REVERSE DETENT
O2	BEARING SURFACE	PAPER RELEASE LEVER
G	TEETH	RIBBON REVERSE SPUR GEAR
O2	BEARING (RIGHT AND LEFT)	RIBBON REVERSE SHAFT
O	HOOKS-EACH END	SPRING
O2	BEARING SURFACE	RIBBON REVERSE DETENT LEVER

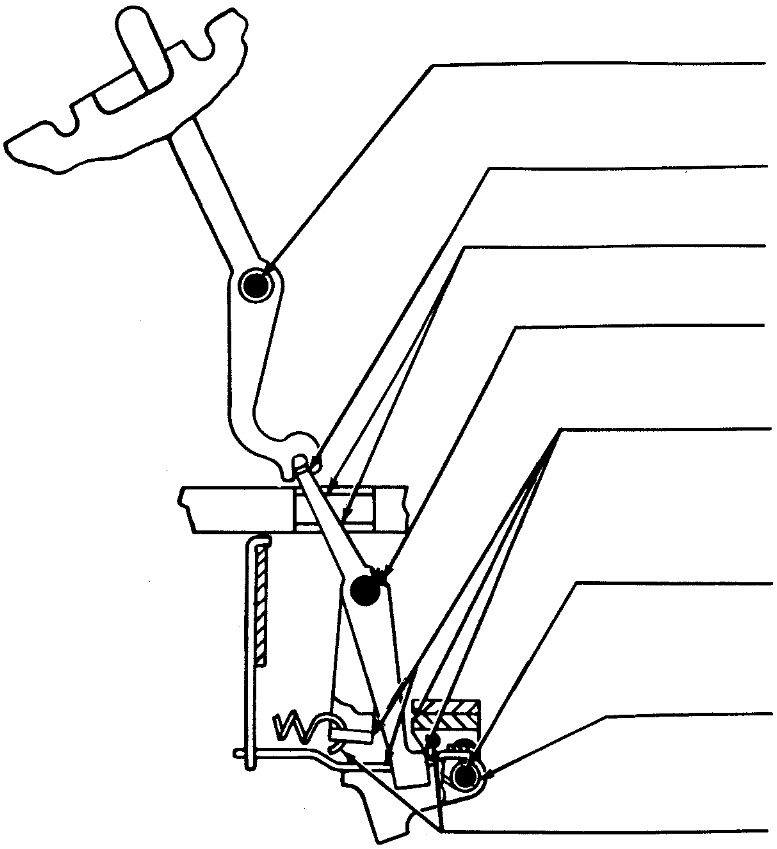
b.18 SHIFT MECHANISM



O	ENGAGING SURFACES	FIGURES FUNCTION SLIDE
O	ENGAGING SURFACE	LETTERS FUNCTION SLIDE
O2	GUIDE SURFACES (EACH SLIDE)	LETTERS AND FIGURES FUNCTION SLIDES
O2	ENGAGING SURFACE	LETTERS-FIGURES CODE BAR FORK

Figure 5-175. Typing Unit

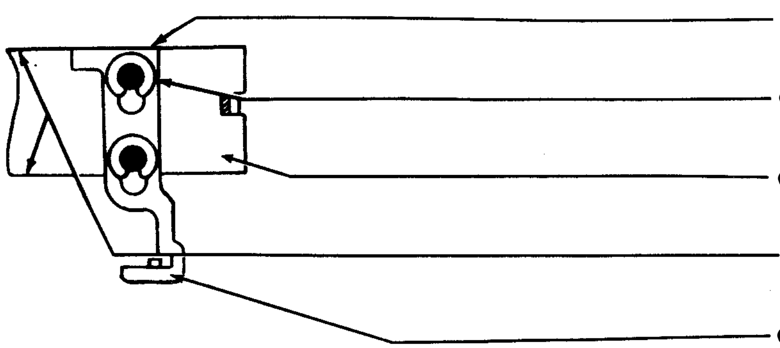
b.19 SINGLE - DOUBLE LINE FEED MECHANISM



O2	PIVOT	SINGLE-DOUBLE LINE FEED LEVER
O2	ENGAGING SURFACE	OPERATING ARM
O2	GUIDE SURFACES	OPERATING ARM
SAT	FELT WASHER	OPERATING ARM
O2	ENGAGING SURFACES (4 SURFACES)	STRIPPER BAIL
O2	COILS	TORSION SPRING
O2	HOOKS-EACH-END	SPRING
O2	HOOKS-EACH-END	SPRING

(RIGHT SIDE VIEW)

b.20 STRIPPER BLADE MECHANISM



O	ENGAGING SURFACE	LINE FEED STRIPPER SLIDE
O2	GUIDE SURFACES (2 PLACES)	STRIPPER SLIDE
O2	GUIDE SURFACES (EACH END)	STRIPPER BLADE
G	ENGAGING SURFACES (2 PLACES)	STRIPPER BLADE
O2	ENGAGING SURFACE	STRIPPER BAIL

(REAR VIEW)

Figure 5-176. Typing Unit

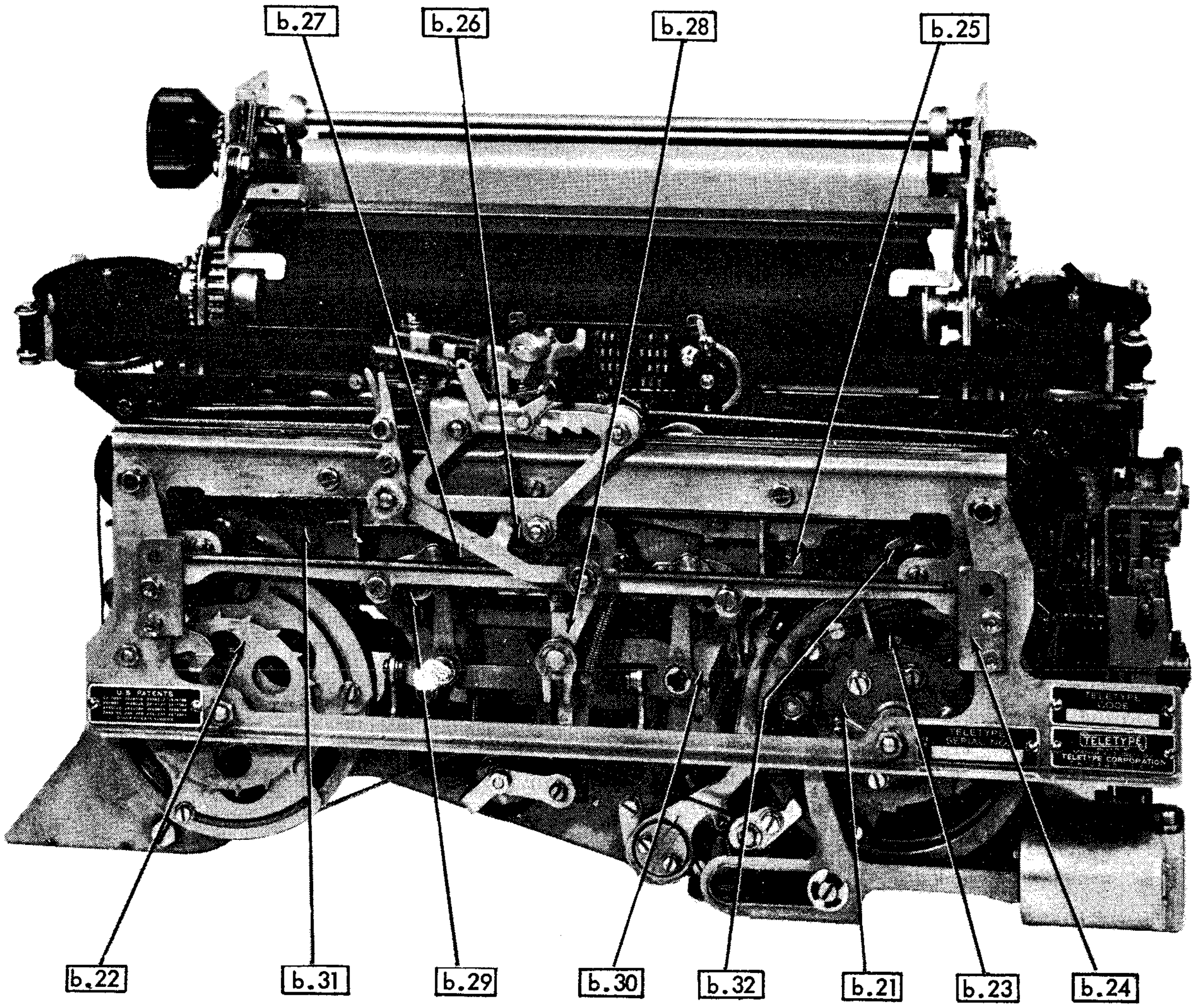
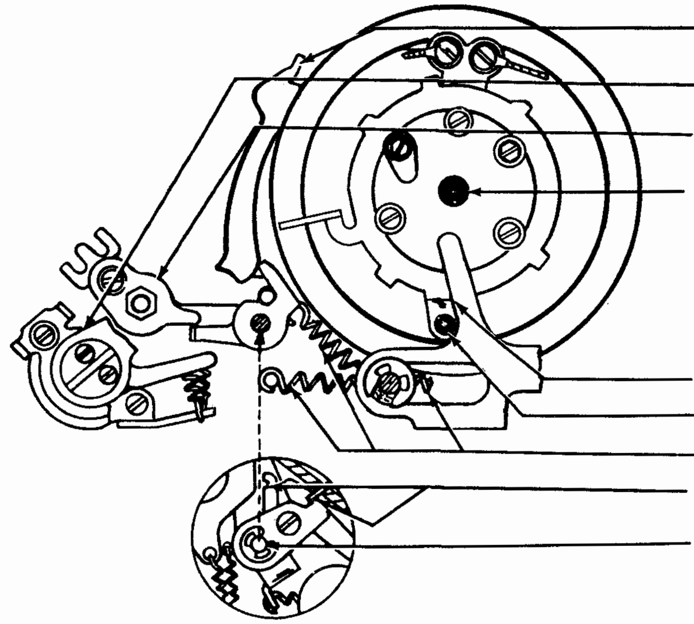
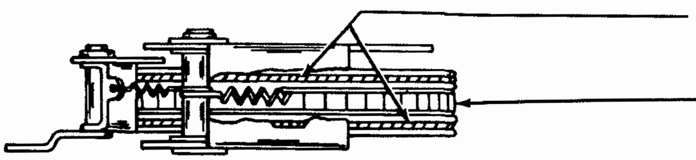


Figure 5-177. Typing Unit

b.21 SPACING DRUM DRIVE MECHANISM





b.22 CARRIAGE RETURN MECHANISM

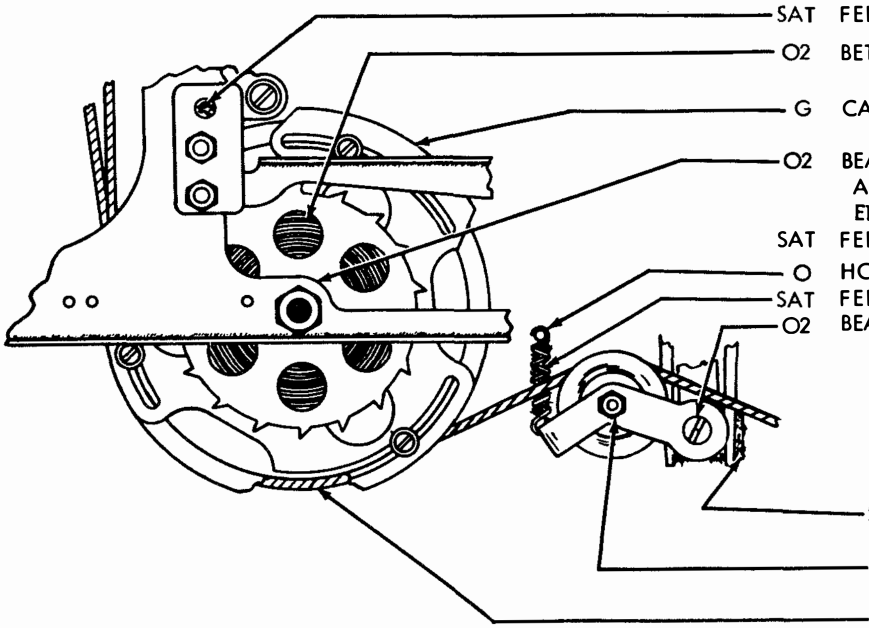
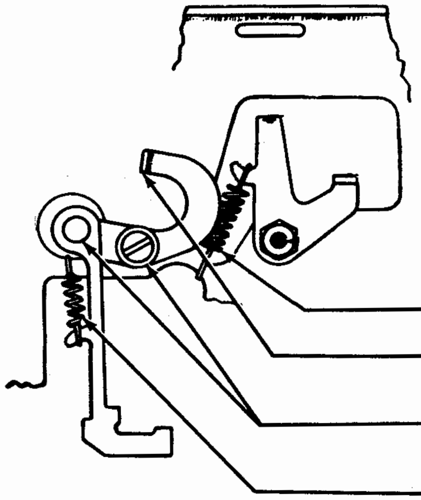


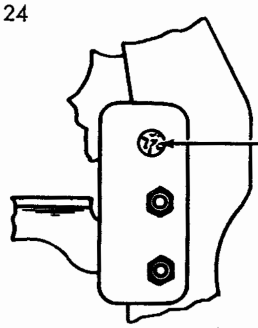
Figure 5-178. Typing Unit

b.23 CARRIAGE RETURN MECHANISM (Continued)



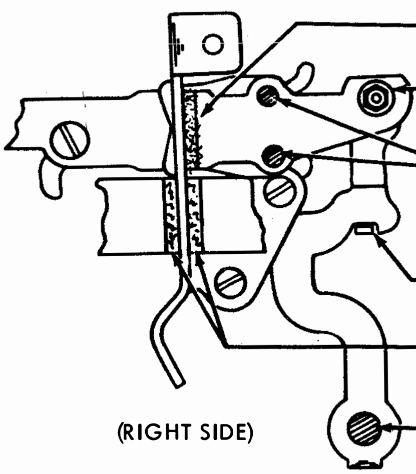
O	HOOKS-EACH END	SPRING
O2	ENGAGING SURFACE	SPACING DRUM FEED PAWL RELEASE LINK
O2	BEARING SURFACES (2 PLACES)	SPACING DRUM FEED PAWL RELEASE LINK
O	HOOKS-EACH END	SPRING

b.24



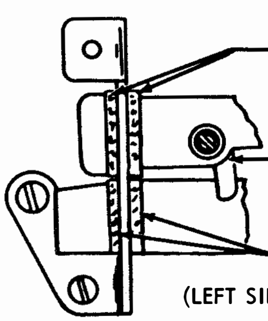
SAT	FELT OILER	PRINTING TRACK GUIDE

b.25 HORIZONTAL POSITIONING MECHANISM (FRONT VIEW)



(RIGHT SIDE)

SAT	FELT WASHER	HORIZONTAL REVERSING SLIDE
02	ENGAGING SURFACE	HORIZONTAL REVERSING SLIDE SHIFT LEVER
02	DETENTS (2 DETENTS)	DETENT BAILS
02	ENGAGING SURFACE	HORIZONTAL REVERSING SLIDE SHIFT LEVER
SAT	FELT WASHERS (2 WASHERS)	OSCILLATING RAIL SHIFT SLIDE
02	BEARING SURFACE	HORIZONTAL REVERSING SLIDE SHIFT LEVER

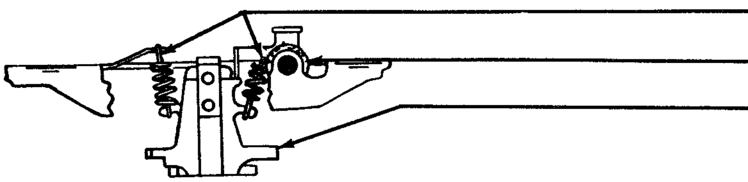


(LEFT SIDE)

SAT	FELT WASHERS (2 WASHERS)	HORIZONTAL REVERSING SLIDE
02	ENGAGING SURFACES (2 PLACES)	HORIZONTAL REVERSING SLIDE
SAT	FELT WASHERS (2 WASHERS)	OSCILLATING RAIL SHIFT SLIDE

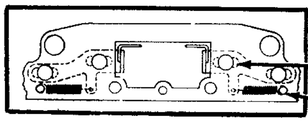
Figure 5-179. Typing Unit

b.26 HORIZONTAL POSITIONING MECHANISM (Continued)



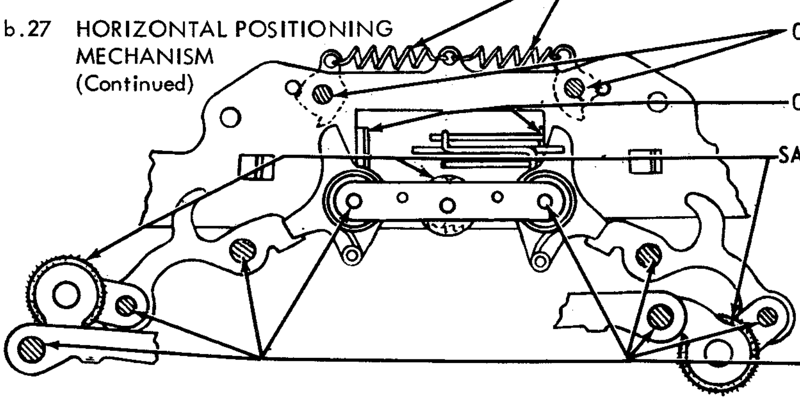
O	HOOKS–EACH END	SPRING
SAT	FELT WASHER	CODE BAR BELL CRANK
O2	ENGAGING SURFACES (3 SLIDES)	HORIZONTAL MOTION STOP SLIDES

(TOP VIEW)



(NEW STYLE)

b.27 HORIZONTAL POSITIONING MECHANISM (Continued)

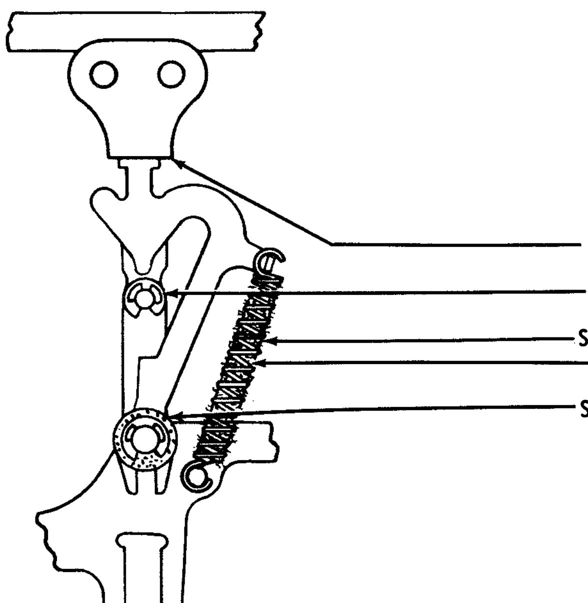


O2	ENGAGING SURFACES	DECELERATING SLIDE (SEE NOTE 1)
O	HOOKS–EACH END (2 SPRINGS)	SPRING
O2	BEARING SURFACES (2 BELL CRANKS)	DECELERATING SLIDE BELL CRANKS
O2	ENGAGING SURFACES (2 SLIDES)	DECELERATING SLIDES (SEE NOTE 2)
SAT	FELT WASHERS (3 WASHERS)	SHIFT SLIDE DRIVE LINKS
O	BEARING SURFACES (8 PLACES)	SHIFT SLIDE DRIVE LINKS

(FRONT VIEW)

NOTES
1. WITH SPRINGS LOCATED ON REAR SIDE OF SLIDE
2. WITH SPRINGS LOCATED ABOVE THE SLIDE

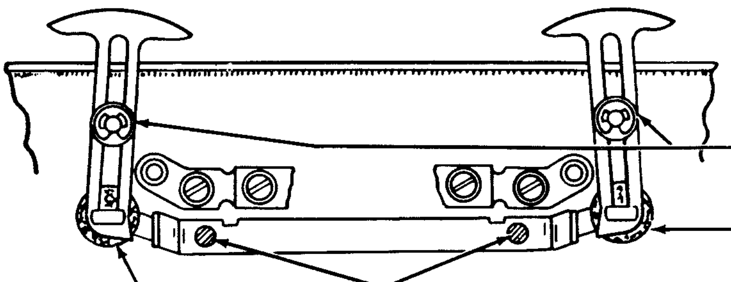
b.28 HORIZONTAL POSITIONING MECHANISM (Continued)



O2	GUIDING SURFACE	HORIZONTAL POSITIONING LOCK LEVER
O2	BEARING SURFACE	HORIZONTAL LOCK LEVER ARM ROLLER
SAT	FELT WICK	SPRING WICK
O	HOOKS–EACH END	SPRING
SAT	FELT WASHER	HORIZONTAL POSITIONING LOCK LEVER

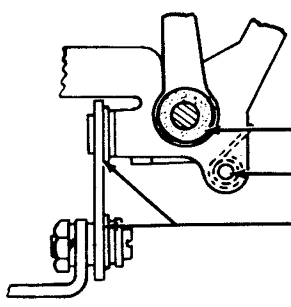
Figure 5-180. Typing Unit, Horizontal Positioning Mechanism

b.29 LETTERS-FIGURES SHIFT MECHANISM



O2	GUIDING SURFACES (2 SLIDES)	SHIFT LINK BREAKER SLIDE
SAT	FELT WASHER	LETTERS-FIGURES SHIFT SLIDE POST
O2	BEARING SURFACE	LETTERS-FIGURES SHIFT SLIDE
SAT	FELT WASHER	LETTERS-FIGURES SHIFT SLIDE POST

b.30 LETTERS FIGURES SHIFT MECHANISM (Continued)

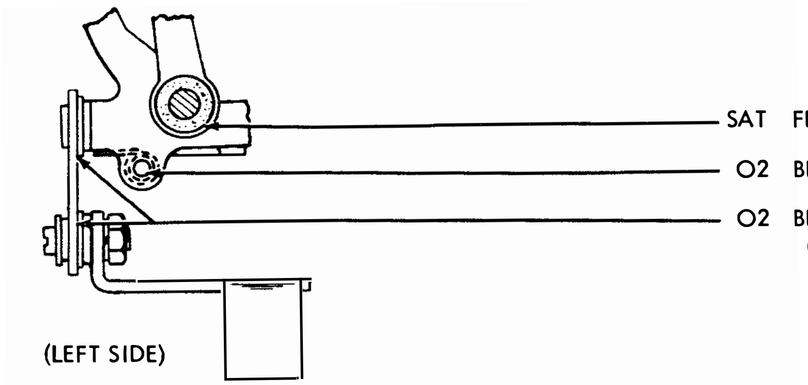


SAT	FELT WASHER	SHIFT SLIDE DRIVE LINK
O2	BEARING SURFACE	BREAKER SLIDE BAIL
O2	BEARING SURFACES (2 PLACES)	MAIN BAIL LINK

(RIGHT SIDE)

Figure 5-181. Typing Unit

b.30 LETTERS FIGURES SHIFT MECHANISM (CONT'D)



b.31 OSCILLATING MECHANISM

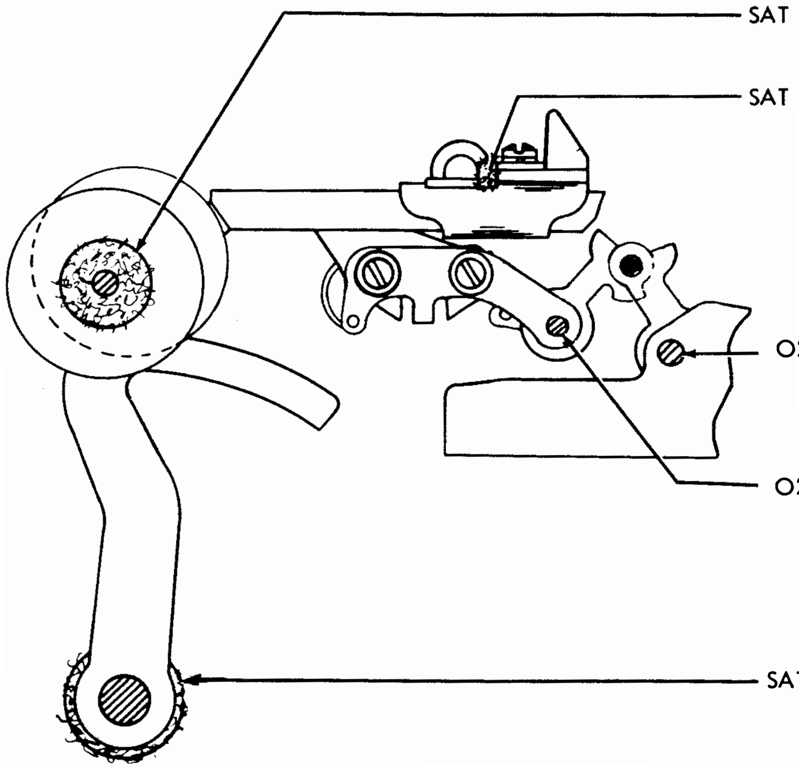
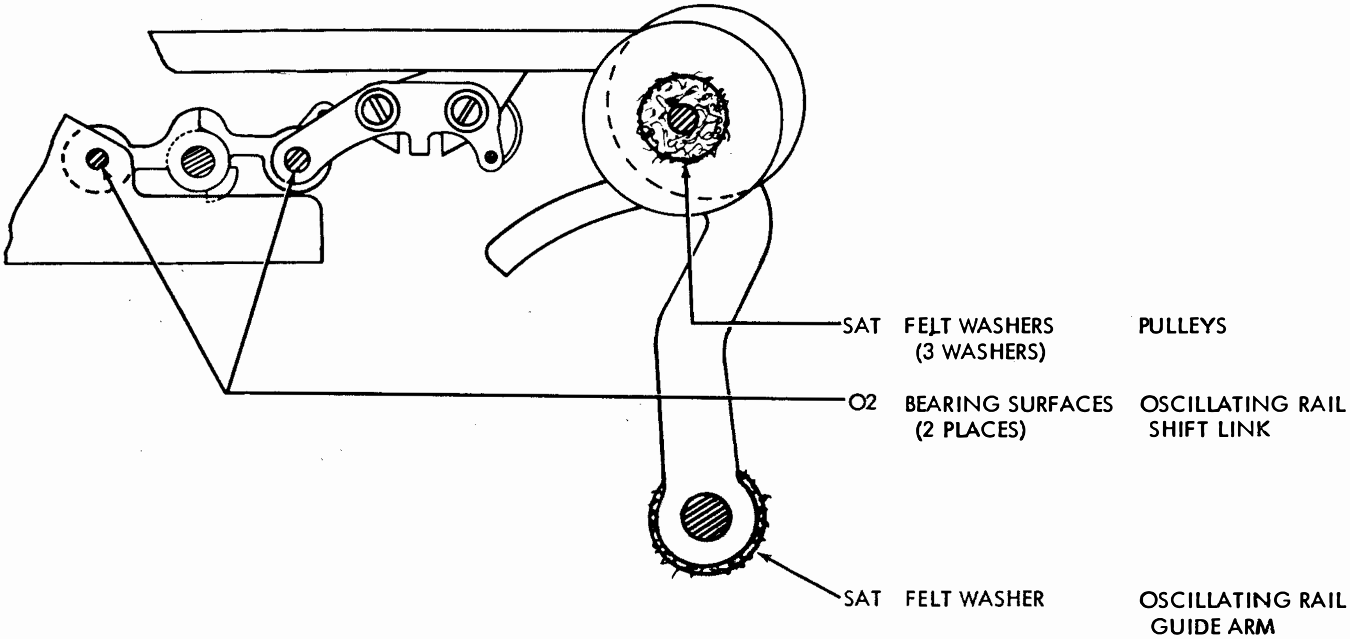


Figure 5-182. Typing Unit

b.32 OSCILLATING MECHANISM (Continued)



(REST TYPING UNIT BOTTOM UPWARD)

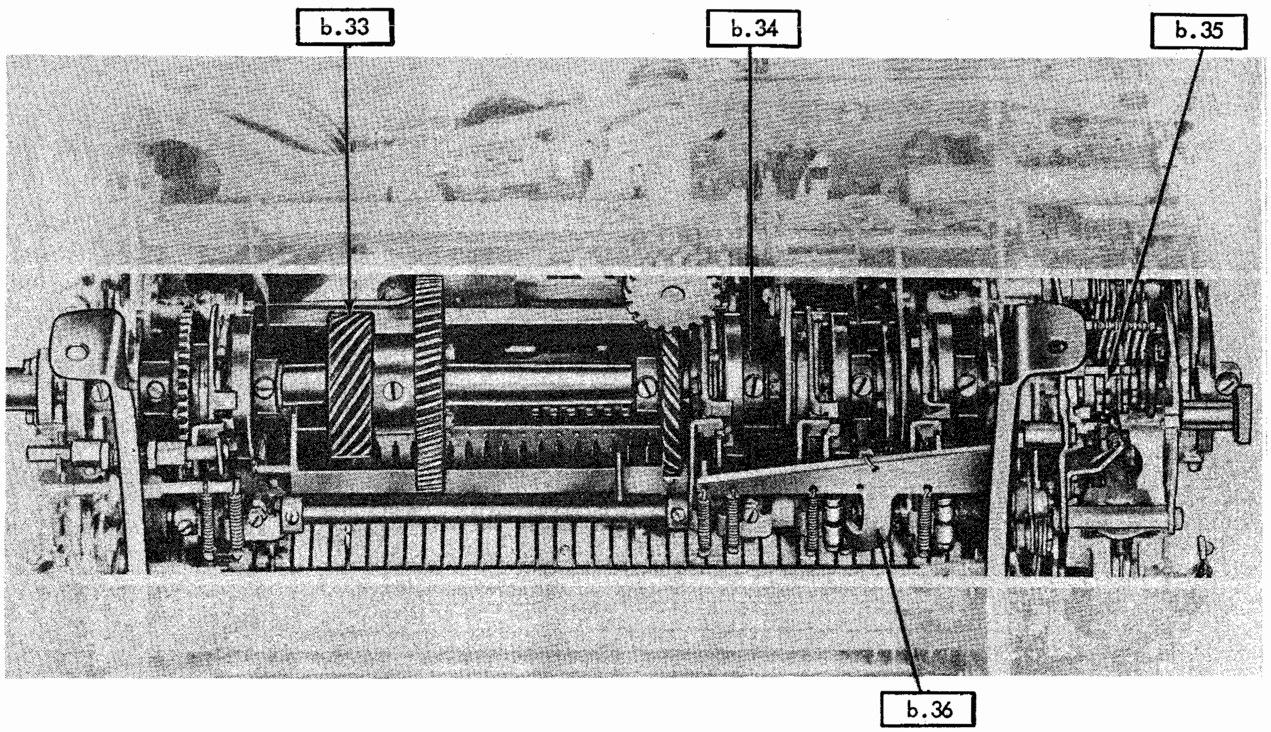
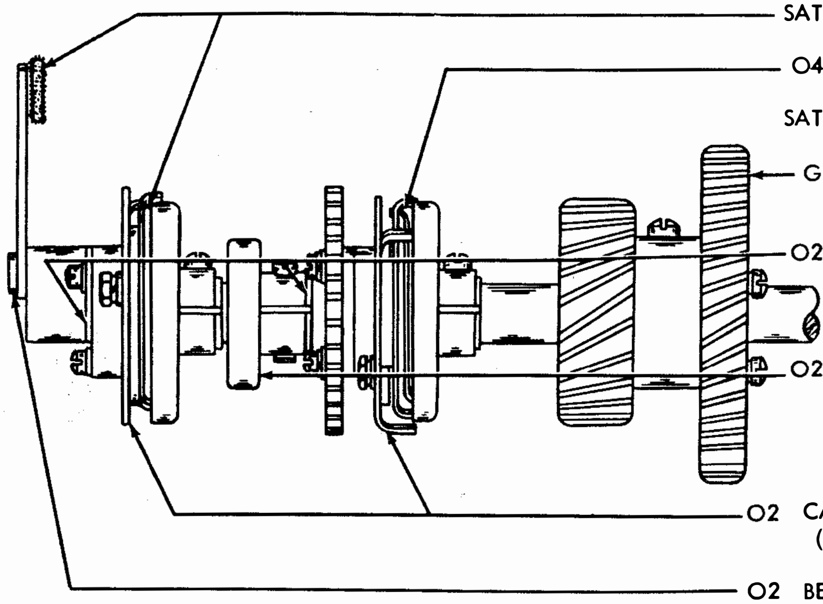
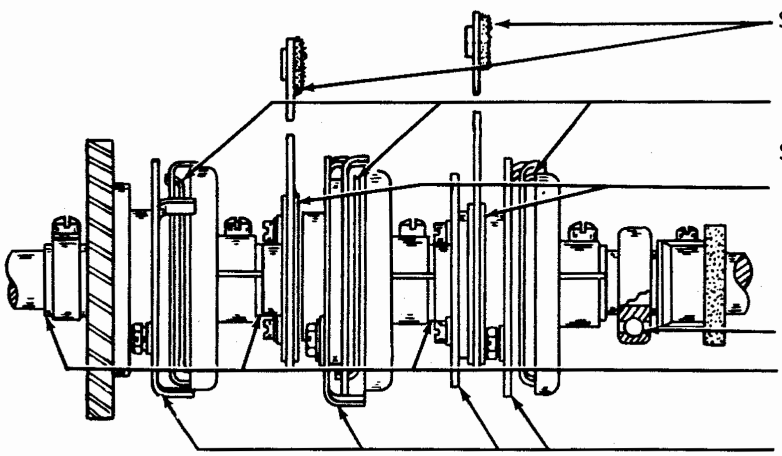


Figure 5-183. Typing Unit, Oscillating Mechanism and Main Shaft

b.33 MAIN SHAFT (CLUTCHES, GEARS)



b.34



b.35 SELECTOR CAM CLUTCH ASSEMBLY

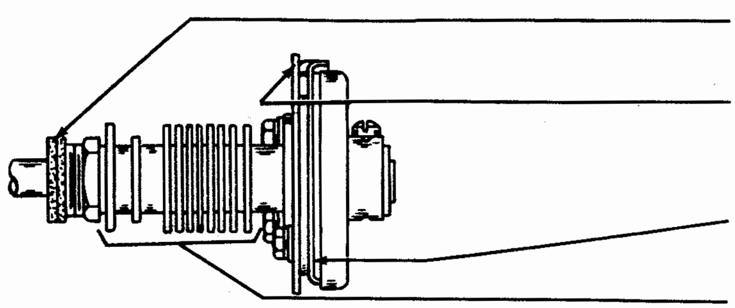
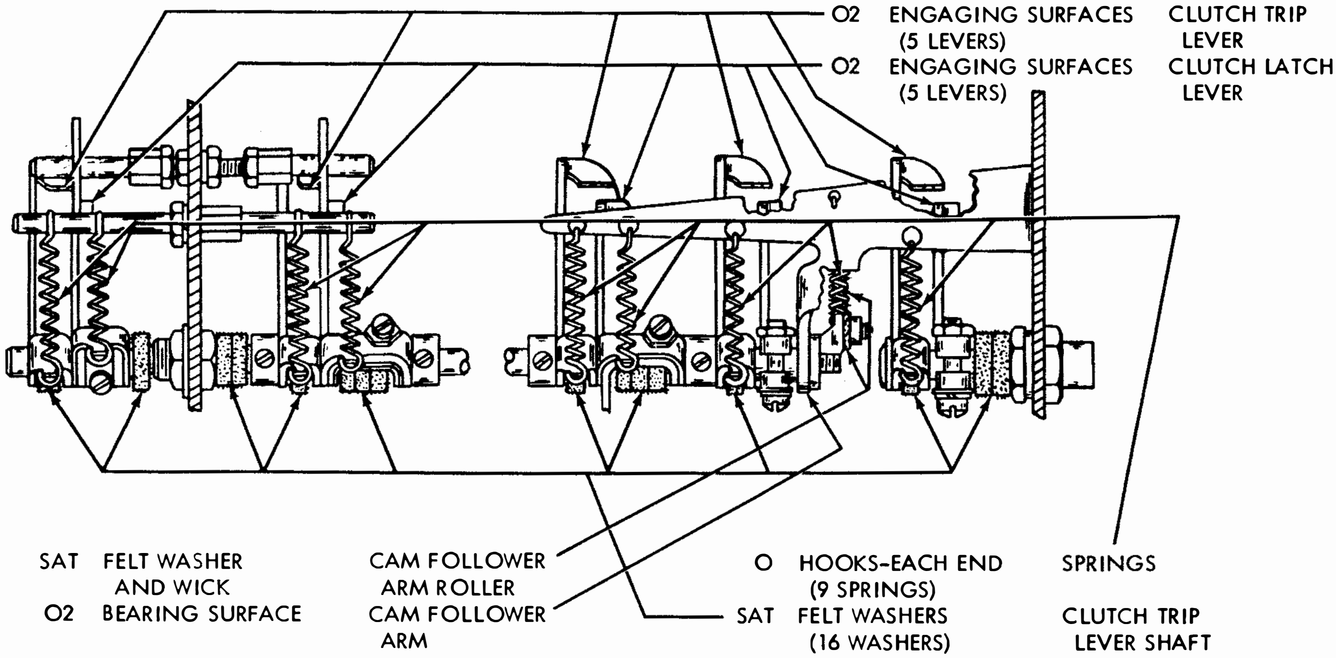
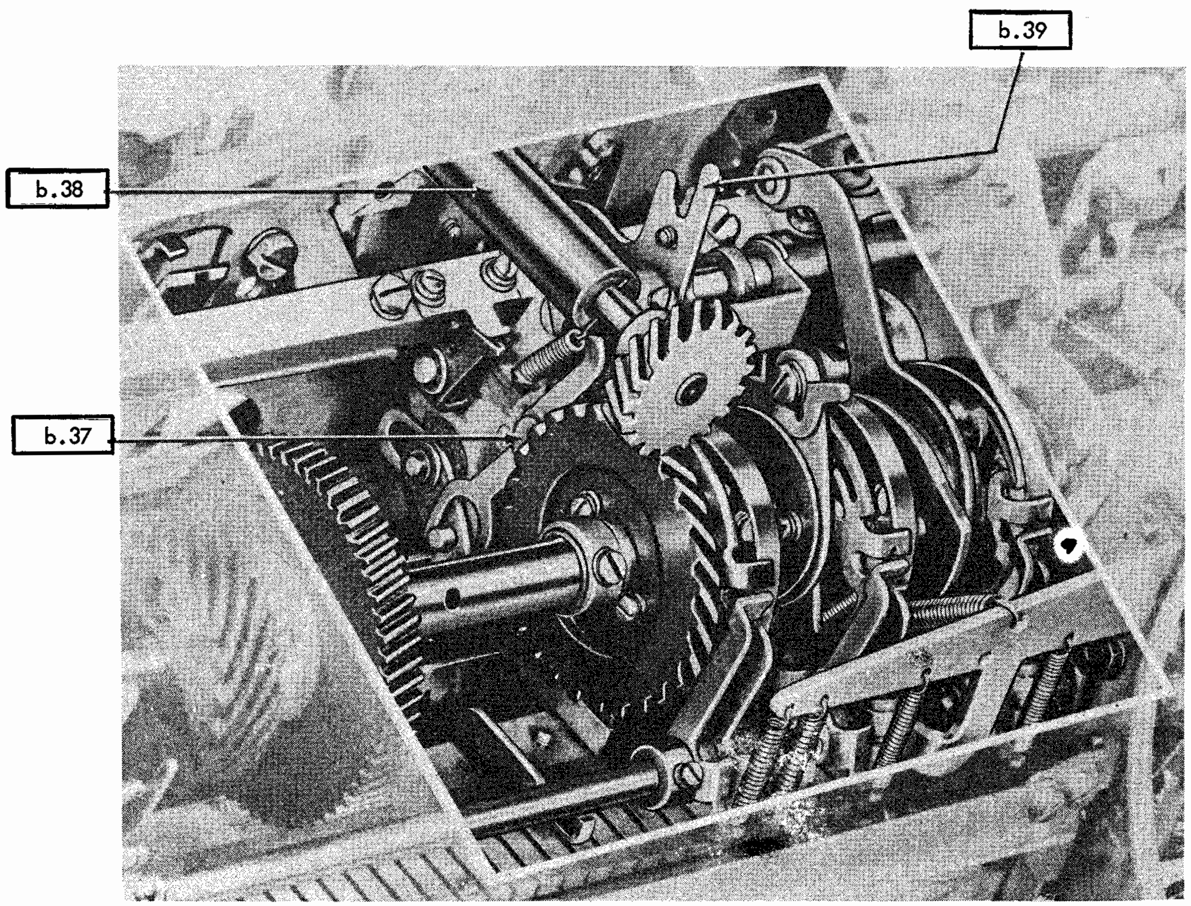


Figure 5-184. Typing Unit

b.36 MAIN SHAFT (CLUTCHES, GEARS) (Continued)

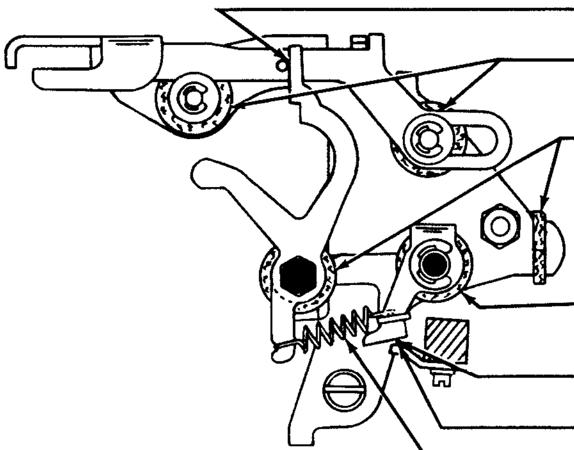




(BOTTOM VIEW)

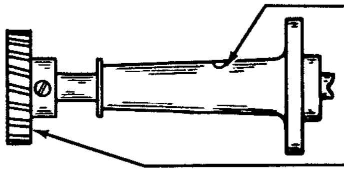
Figure 5-185. Typing Unit

b.37 SPACING MECHANISM



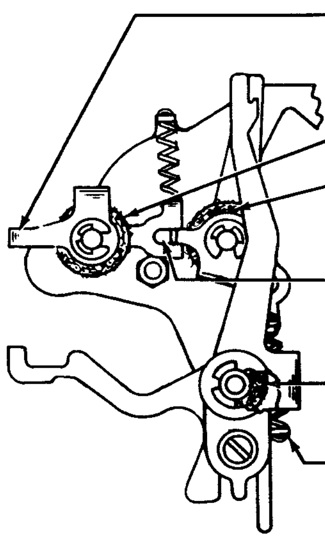
O2	ENGAGING SURFACES	SPACING TRIP LEVER
SAT	FELT WASHERS (2 WASHERS)	SPACING SUPPRESSION SLIDE
SAT	FELT WASHER	SPACING TRIP LEVER
SAT	FELT WASHER	SPACING TRIP LEVER BAIL SHAFT
O2	ENGAGING SURFACE	SPACING TRIP LEVER BAIL
G	ENGAGING SURFACE	TRIP RESET CAM PLATE
O	HOOKS-EACH END (2 SPRINGS)	SPRING

b.38 SPACING MECHANISM (Continued)



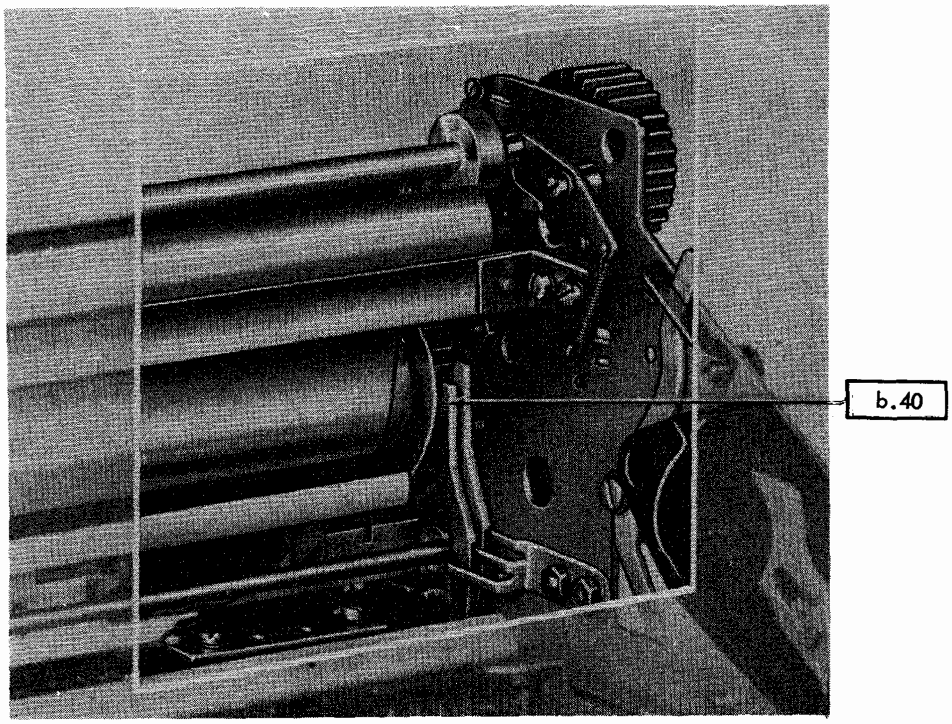
O2	OIL HOLE	SPACING SHAFT
G	TEETH	SPACING SHAFT GEAR

b.39 SPACING MECHANISM (Continued)



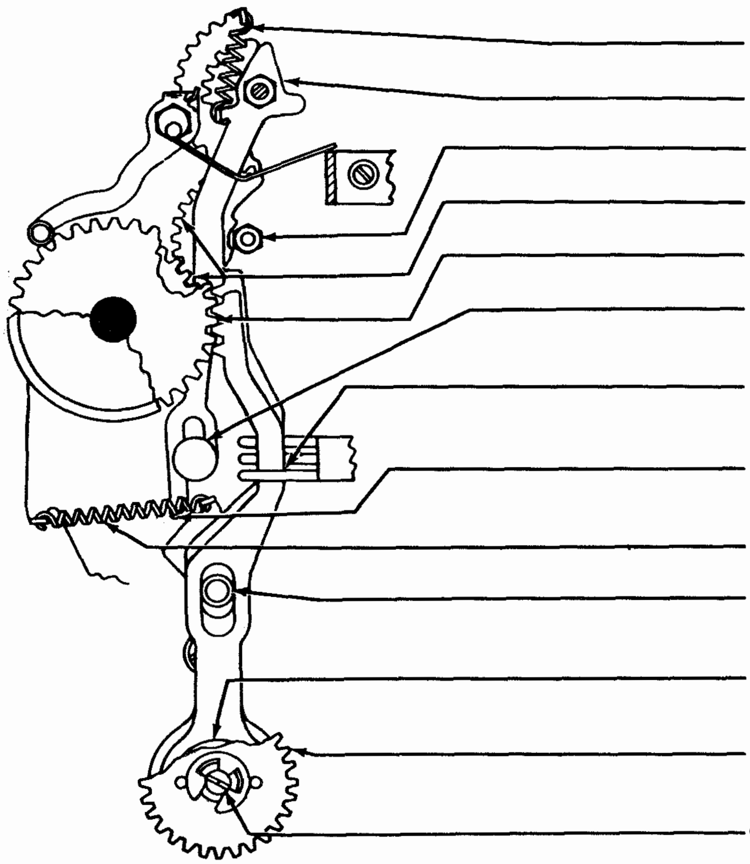
O2	ENGAGING SURFACE	SPACING CUT-OUT TRANSFER BAIL
SAT	FELT WASHERS (2 WASHERS)	SPACING CUT-OUT TRANSFER BAIL
SAT	FELT WASHER	SPACING CUT-OUT BAIL
O2	ENGAGING SURFACE	SPACING CUT-OUT BAIL
SAT	FELT WASHERS (2 WASHERS)	CARRIAGE RETURN BAIL SHAFT
O	HOOKS-EACH END	SPRING

Figure 5-186. Typing Unit



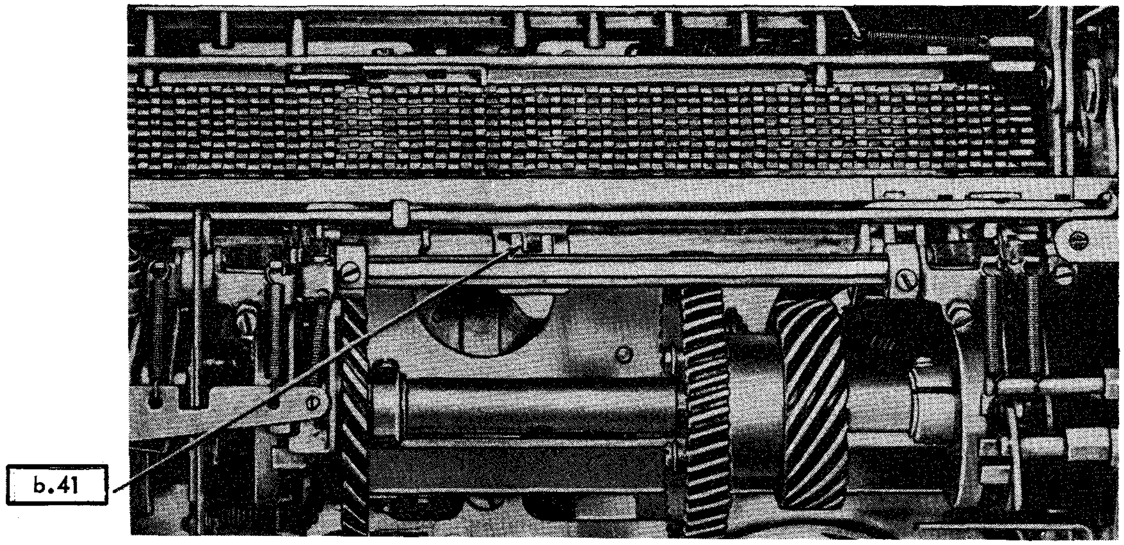
(REST TYPING UNIT UPRIGHT) (REAR VIEW)

b.40 LINE FEED MECHANISM



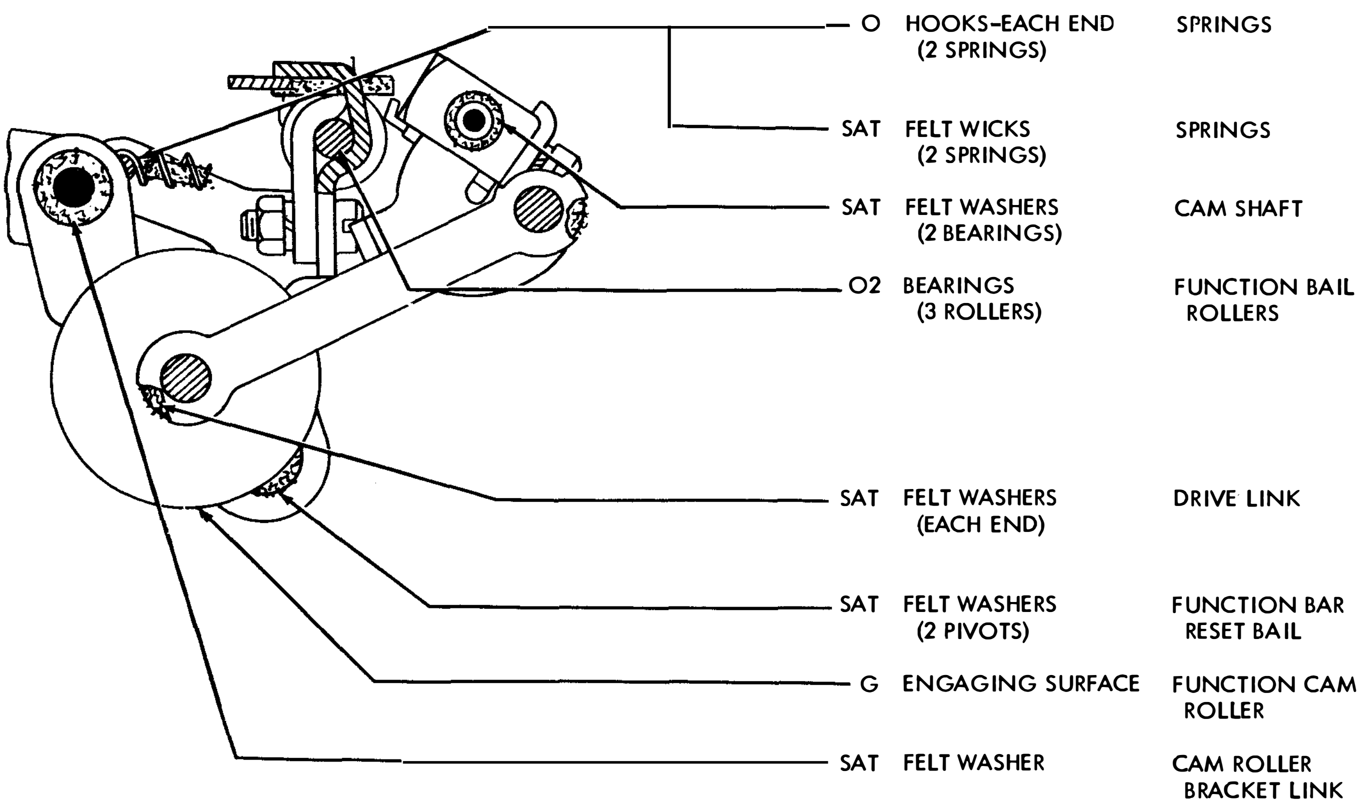
O	HOOKS-EACH END	SPRING
O2	BEARING SURFACE	PLATEN HAND WHEEL
O2	BEARING SURFACE	PLATEN IDLER SPUR GEAR
G	TEETH (2 GEARS)	PLATEN SPUR GEARS
O2	ENGAGING SURFACE	LINE FEED BARS
O2	GUIDING SURFACE	LINE FEED BAR RELEASE LEVER
O2	GUIDING SURFACES (2 BARS)	LINE FEED BARS
O2	ENGAGING SURFACE	LINE FEED BAR RELEASE LEVER
O	HOOKS-EACH END	SPRING
O2	GUIDING SURFACES (2 BARS)	LINE FEED BAR BELL CRANK
O2	BEARING SURFACES (2 BEARINGS)	LINE FEED BAR ECCENTRIC BEARING
G	TEETH	LINE FEED CLUTCH SPUR GEAR
O2	BEARING SURFACE	LINE FEED CLUTCH SPUR GEAR SHAFT

Figure 5-187. Typing Unit



(LEFT SIDE VIEW)

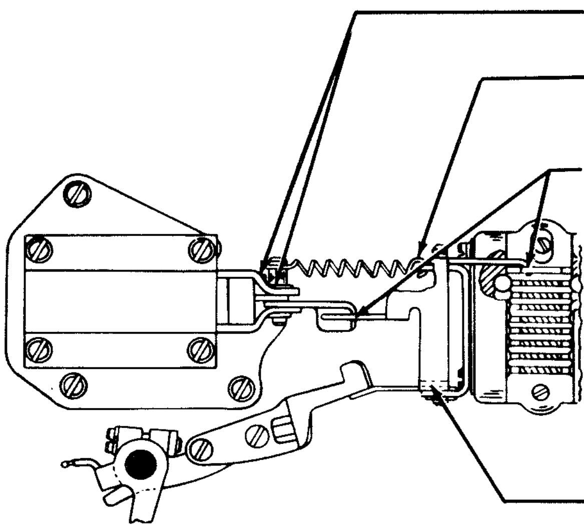
b.41 FUNCTION RESET BAIL MECHANISM



(LEFT SIDE VIEW)

Figure 5-188. Typing Unit

b.42 ON LINE AND OFF LINE STUNT SHIFT CONTROL MECHANISM



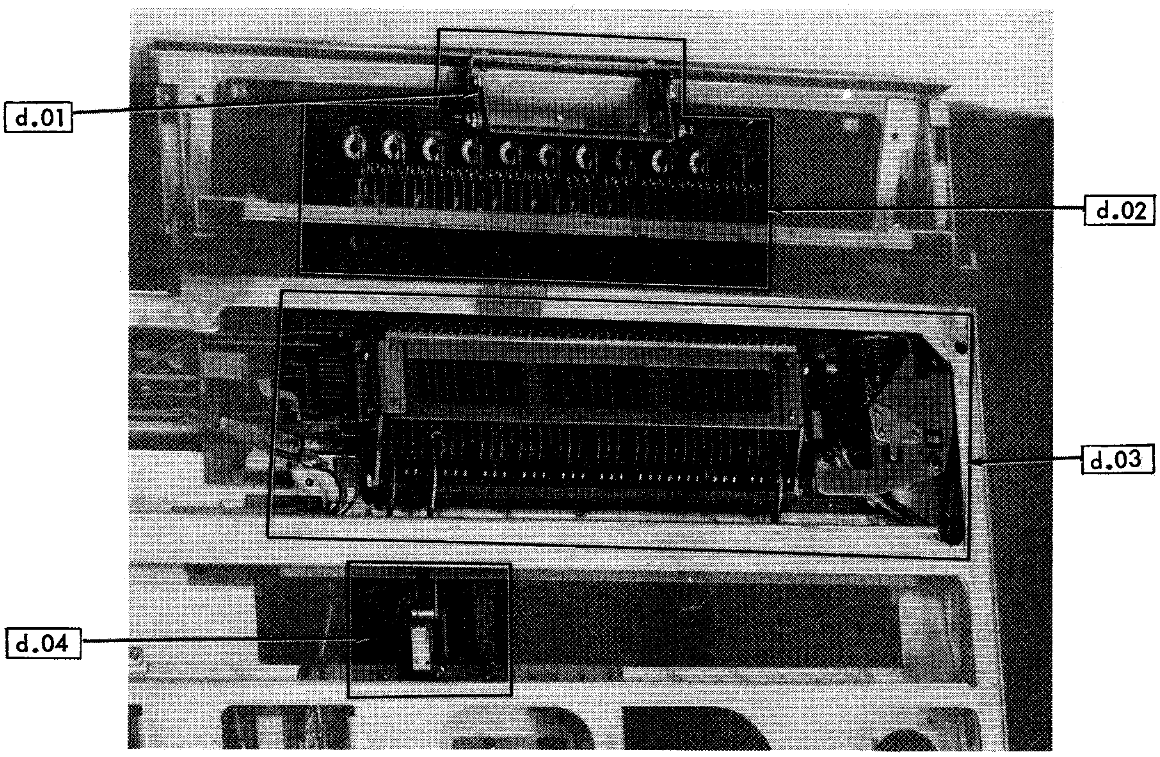
O2	BEARING SURFACES (2 PLACES)	SOLENOID BELL CRANK LEVER
O	HOOKS - EACH END	SPRING
O2	ENGAGING SURFACES (2 PLACES)	BLOCKING BAIL
SAT	FELT WASHERS (2 PLACES)	BLOCKING BAIL

(LEFT SIDE VIEW)

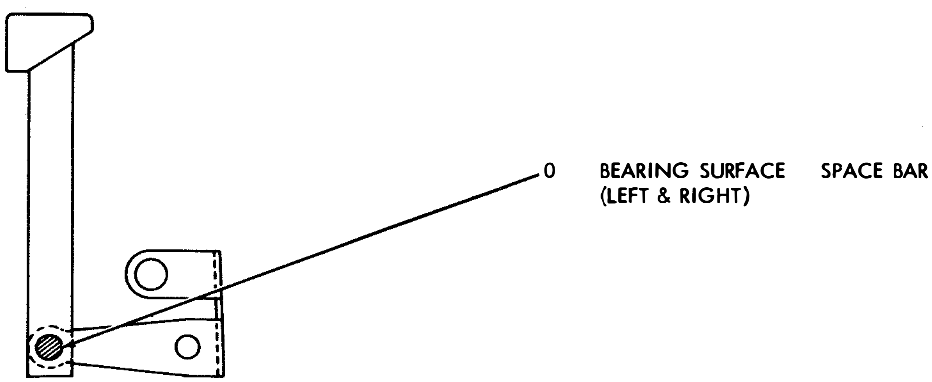
Figure 5-188A. Typing Unit

c. BASE (LB10/000) - BASE LUBRICATION IS COVERED IN THE FOLLOWING FIGURES:
LOCAL CARRIAGE RETURN, PARAGRAPH d.15
LOCAL LINE FEED, PARAGRAPH d.24
INTERMEDIATE GEAR, PARAGRAPH d.26

d. KEYBOARDS (LK25BRW, LK52BRW, LK53BRW, LAK21BRW, LAK33BRW AND LAK47BRW) - THE FOLLOWING FIGURES (5-189 THRU 5-200) ARE COMMON TO ALL KEYBOARDS. FIGURES 5-200 THRU 5-202 APPLY TO LAK21BRW, LAK33BRW AND LAK47BRW.



d.01 SPACE BAR MECHANISM



d.02 KEYLEVER MECHANISM

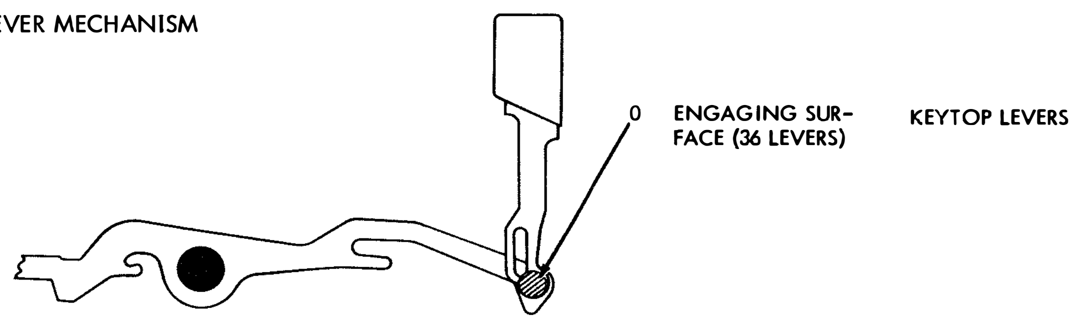
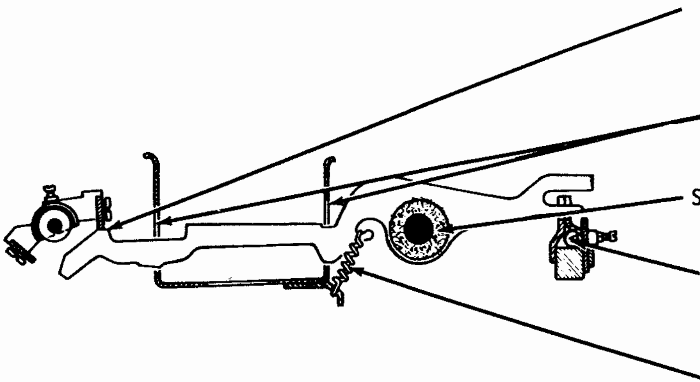


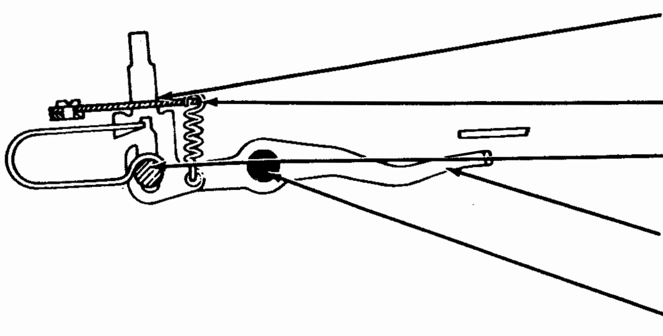
Figure 5-189. Keyboard

d.03 CODE LEVER MECHANISM



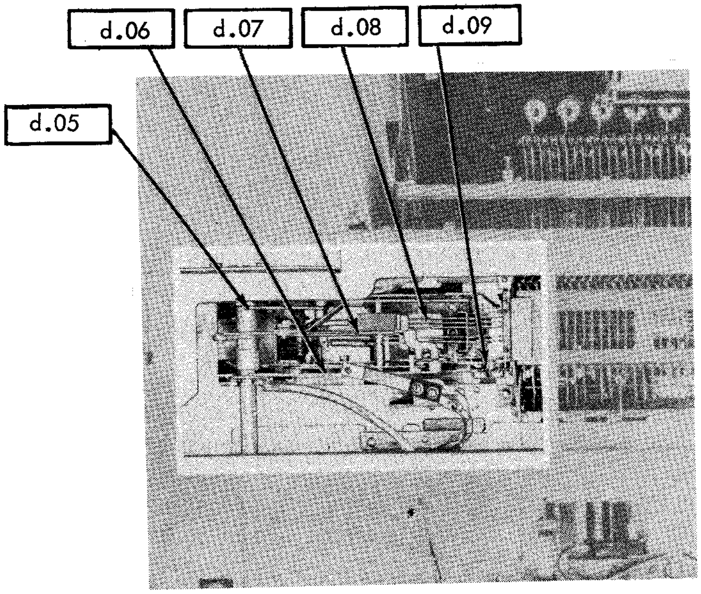
G	CONTACTING SURFACE (32 LEVERS)	CODE LEVER UNIVERSAL BAIL
0	GUIDE SLOTS (32 LEVERS)	CODE LEVERS
SAT	FELT WASHERS (6 WASHERS)	CODE LEVER SHAFT
0	BEARING SURFACES (32 WEDGES)	LOCK BALL TRACK
0	HOOKS-EACH END (40 SPRINGS)	SPRING

d.04 KEYBOARD LOCK MECHANISM



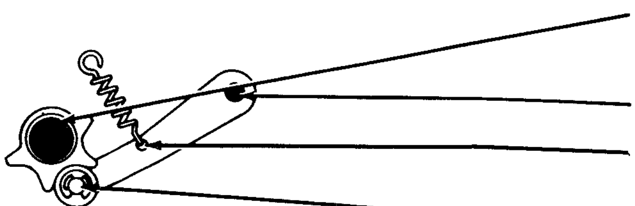
0	GUIDE SLOT	KEYBOARD LOCK PLUNGER
0	HOOKS-EACH END	SPRING
0	BEARING SURFACE	KEYBOARD LOCK LEVER
G	ENGAGING SURFACE	KEYBOARD LOCK FUNCTION LEVER
0	BEARING SURFACE	FUNCTION BAIL

Figure 5-190. Keyboard



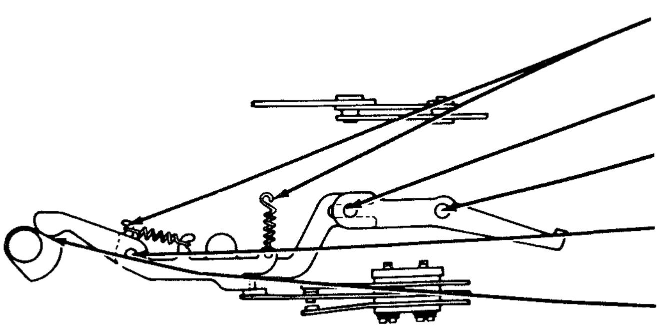
(BOTTOM VIEW)

d.05 DETENT LEVER MECHANISM



0	BEARING SURFACES (FRONT AND REAR)	CONTROL CAM
0	BEARING SURFACE	DETENT LEVER
0	HOOKS-EACH END	SPRING
0	BEARING SURFACE	ROLLER

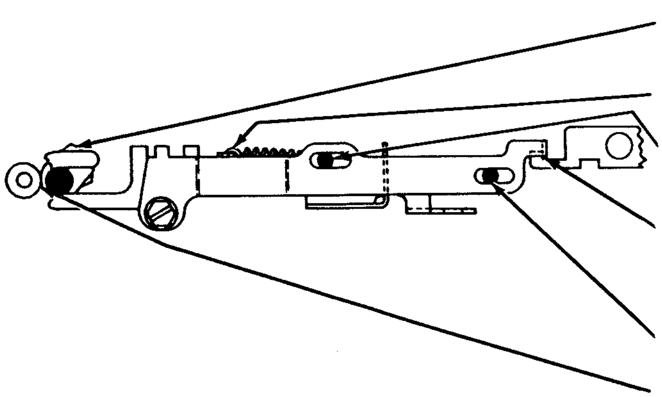
d.06 SELECTION LEVER MECHANISM



0	HOOKS-EACH END (2 SPRINGS)	SPRINGS
0	SLIDING SURFACE	RESET LEVER
0	BEARING SURFACE	KEYBOARD CONTROL SELECTION LEVER
0	BEARING SURFACE	RESET CAM FOLLOWER AND RESET LEVER
0	CAMMING SUR- FACE	RESET CAM FOLLOWER

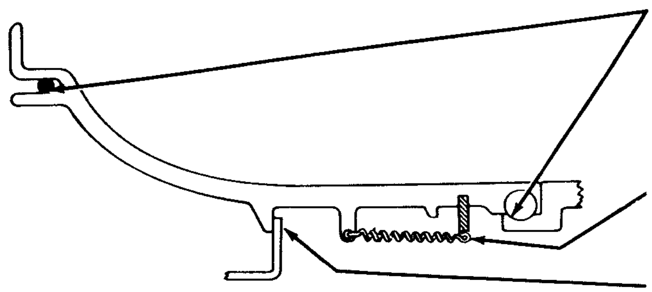
Figure 5-191. Keyboard

d.07 CODE BAR EXTENSION BAIL MECHANISM



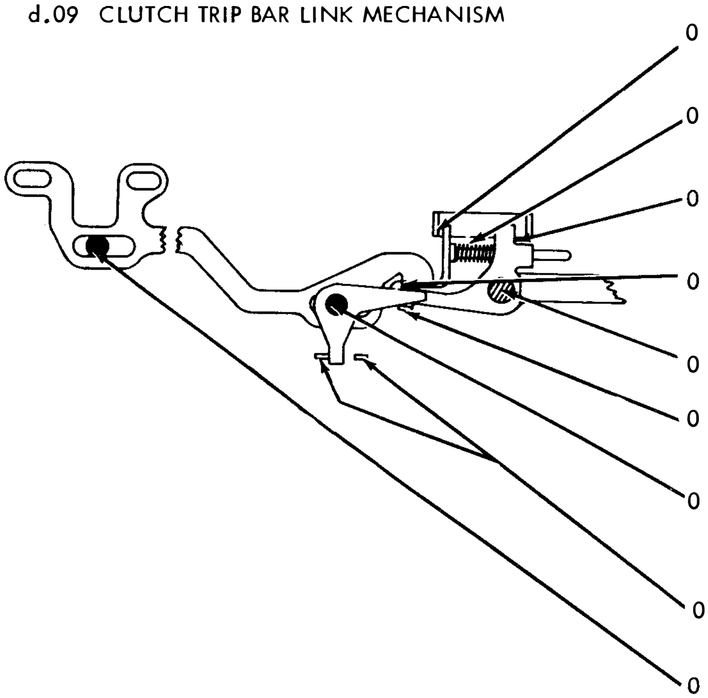
0	CAMMING SURFACE	SLIDE ROLLER
0	HOOKS-EACH END	SPRING
0	SLIDING SURFACE (2 PLACES)	LEVER AND EXTENSION
0	ENGAGING SURFACES (TWO PLACES)	LEVER
0	SLIDING SURFACE	LEVER
0	SLIDING SURFACE	CONTROL CAM

d.08 CODE BAR EXTENSION MECHANISM



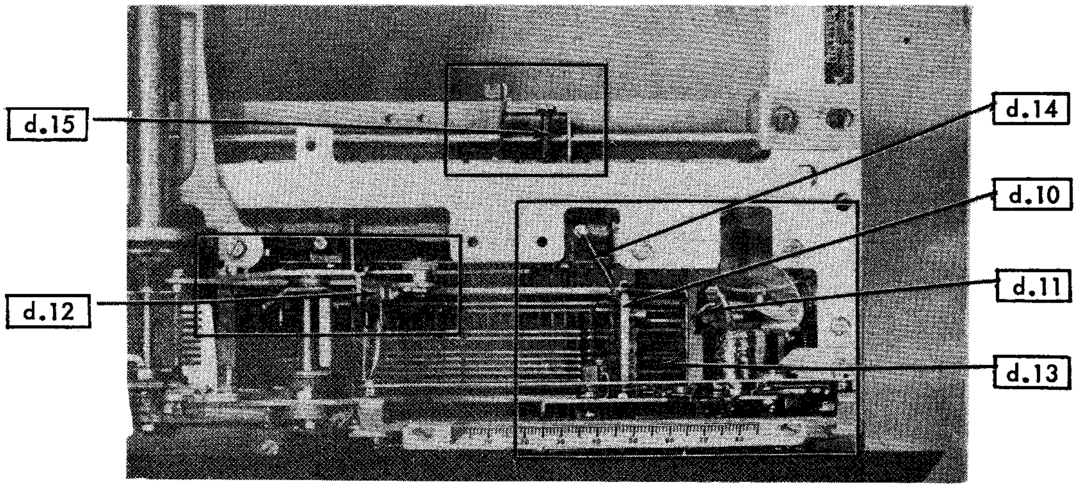
0	GUIDE SURFACES (5 EXTENSIONS-TWO PLACES)	CODE BAR EXTENSIONS
0	HOOKS-EACH END (5 SPRINGS)	SPRINGS
0	CONTACT SURFACE (5 EXTENSIONS)	CODE BAR EXTENSION

d.09 CLUTCH TRIP BAR LINK MECHANISM



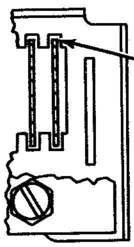
0	CONTACT SURFACE	CLUTCH TRIP BAR LINK EXTENSION
0	COMPRESSION SPRING-EACH END	LINK GUIDE PIN
0	CONTACT SURFACE	TRIP BAR LINK LATCH
0	ENGAGING SURFACE	CLUTCH TRIP BAR LINK
0	BEARING SURFACE	TRIP BAR LINK LATCH
0	CONTACT SURFACE	BELLCRANK
0	BEARING SURFACE AND SLIDING SURFACE	BELLCRANK AND CLUTCH TRIP BAR LINK
0	CONTACT SURFACE (BOTH SIDES)	BELLCRANK
0	SLIDING SURFACE	CLUTCH TRIP BAR LINK

Figure 5-192. Keyboard



FRONT

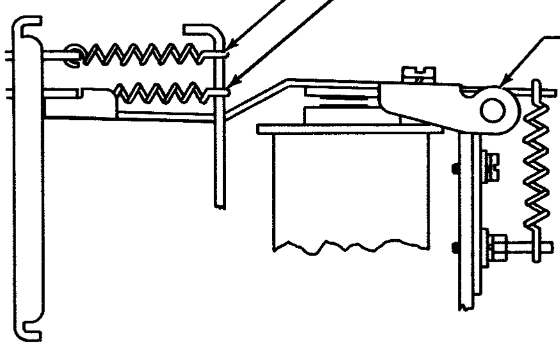
d.10 CODE BAR GUIDE



O	GUIDE SLOTS (LEFT, RIGHT, TOP AND BOTTOM)		

d.11 SYNCHRONOUS PULSED MAGNET MECHANISM

O	HOOKS-EACH END	UNIVERSAL CODE BAR SPRING	
O	HOOKS-EACH END	CLUTCH TRIP BAR SPRING	
SAT	FELT WASHERS	ARMATURE-PIVOT	



d.12 CONTACT SWINGER

G	ENGAGING SURFACE		

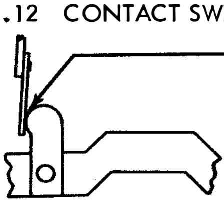
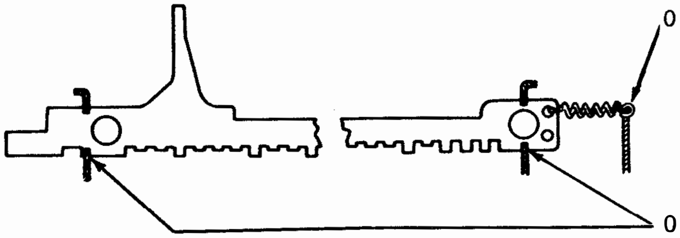


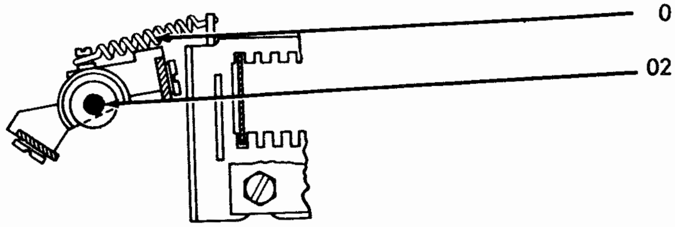
Figure 5-193. Keyboard

d.13 CODE BAR MECHANISM



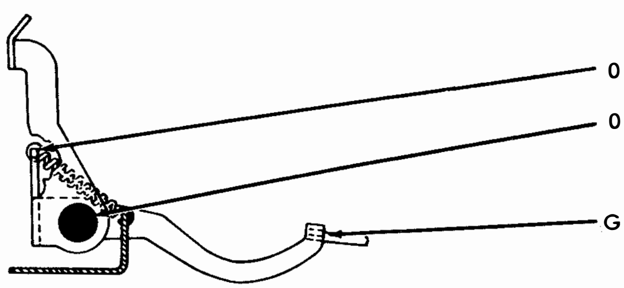
0	HOOKS-EACH END (8 SPRINGS)	SPRING
0	GUIDE SLOTS (LEFT AND RIGHT-TOP AND BOTTOM)	CODE BAR GUIDES

d.14 CODE LEVER UNIVERSAL BAIL MECHANISM



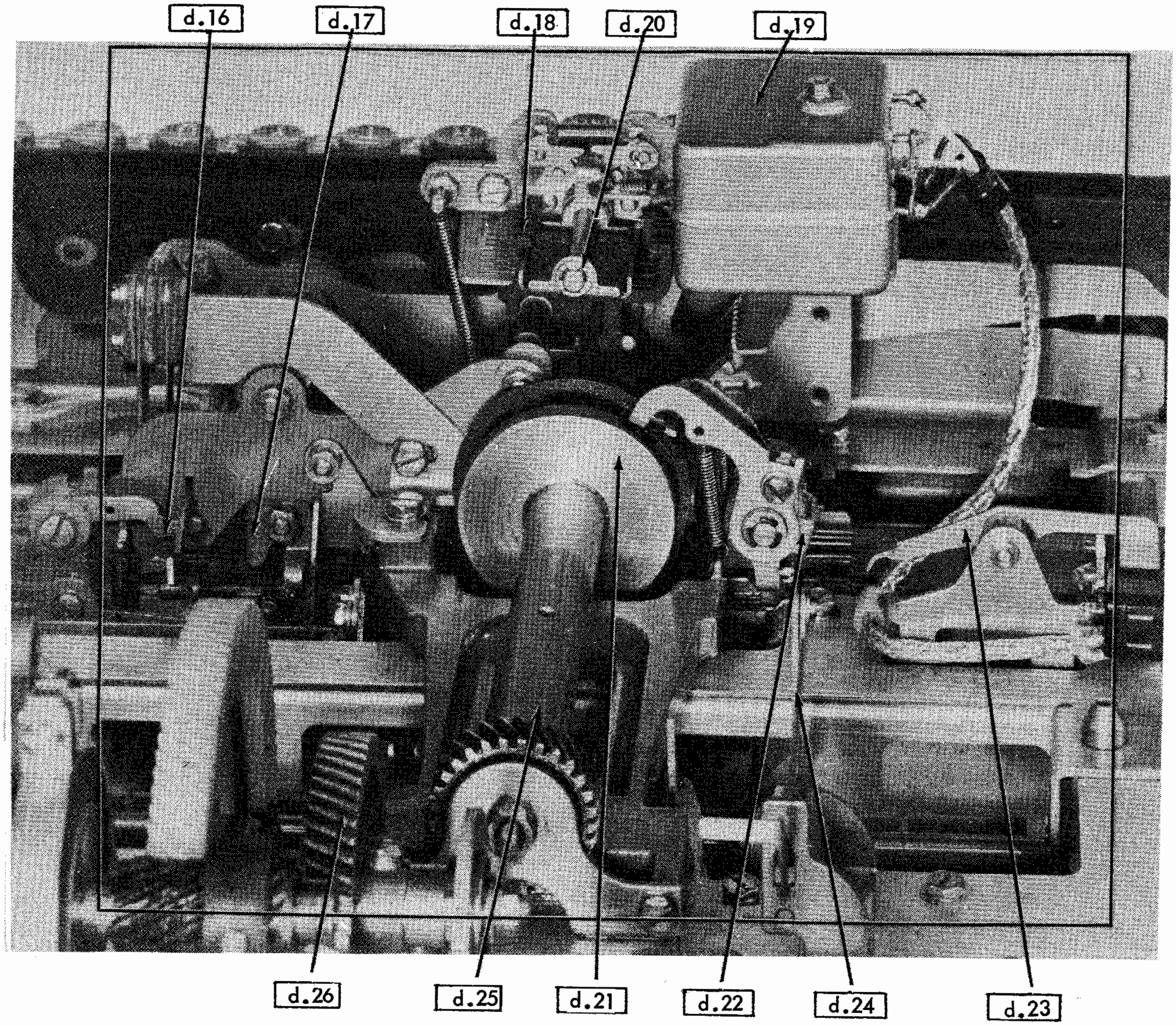
0	HOOKS-EACH END	SPRING
02	BEARING SURFACE	CODE LEVER UNIVERSAL BAIL

d.15 LOCAL CARRIAGE RETURN MECHANISM

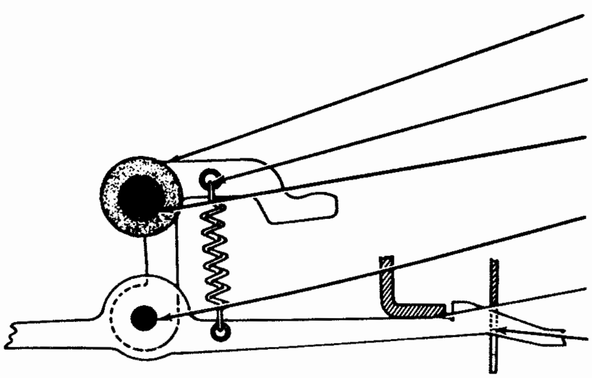


0	HOOKS-EACH END	SPRING
0	BEARING SURFACE (2 PLACES)	LOCAL CARRIAGE RETURN FUNCTION BAIL
G	ENGAGING SURFACE	LOCAL CARRIAGE RETURN FUNCTION LEVER

Figure 5-194. Keyboard



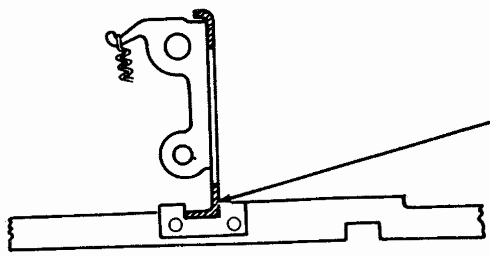
d.16 NON-REPEAT LEVER MECHANISM



SAT	FELT WASHER	NON-REPEAT LEVER CRANK
0	HOOKS-EACH END	SPRING
02	BEARING SURFACE	NON-REPEAT LEVER CRANK
02	BEARING SURFACE	NON-REPEAT LEVER
G	ENGAGING SURFACE	NON-REPEAT LEVER
02	GUIDE SLOT	NON-REPEAT LEVER

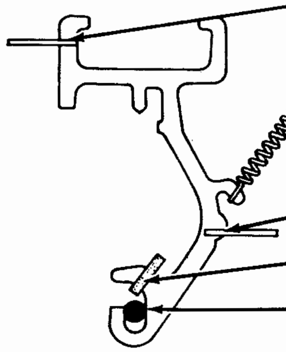
Figure 5-195. Keyboard

d.17 CLUTCH TRIP BAR MECHANISM



G SAT	SLOT	CLUTCH TRIP BAR WEAR PLATE

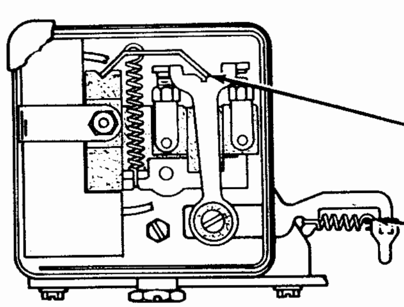
d.18 TRANSFER LEVER MECHANISM



0	GUIDE SLOTS	TRANSFER LEVERS (7 LEVERS)
0	HOOKS-EACH END (7 SPRINGS)	SPRING
0	GUIDE SLOTS	TRANSFER LEVERS (7 LEVERS)
SAT	FELT WASHERS (4 WASHERS)	CAMMING SURFACES
0	GUIDE SLOTS	TRANSFER LEVERS (7 LEVERS)

d.19 CONTACT BOX

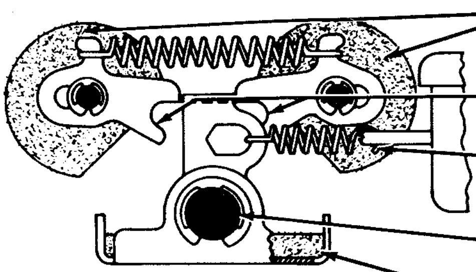
DISASSEMBLY: REMOVE NUT AND LOCK WASHER SECURING CONTACT BOX COVER AND REMOVE COVER.



G	ENGAGING SURFACE	CONTACT TOGGLE
0	HOOKS-EACH END	SPRING

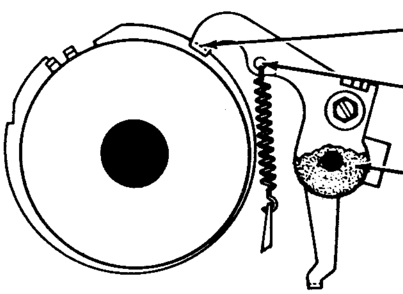
Figure 5-196. Keyboard

d.20 TRANSFER BAIL MECHANISM



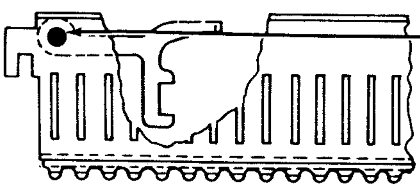
SAT	FELT WASHERS (2 WASHERS)	LATCHES
G	ENGAGING SURFACES	TRANSFER BAIL
0	HOOKS-EACH END (2 SPRINGS)	SPRING
02	BEARING SURFACE (EACH END)	TRANSFER BAIL
SAT	OIL WICK	TRANSFER BAIL

d.21 KEYBOARD CLUTCH MECHANISM



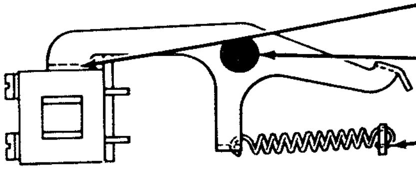
02	LATCHING SURFACE	CLUTCH STOP LEVER AND CLUTCH LATCH LEVER
0	HOOKS-EACH END (2 SPRINGS)	SPRING
SAT	FELT WASHERS (2 FRONT & REAR)	CLUTCH TRIP BAIL

d.22 LOCK BAR LATCH MECHANISM



0	BEARING SURFACE	LOCK BAR LATCH

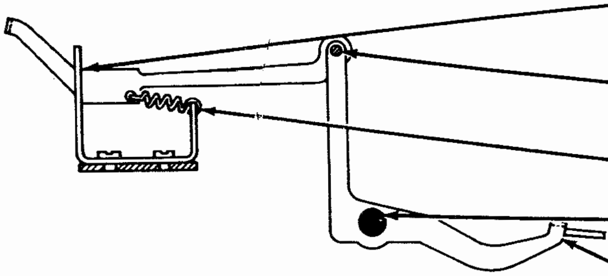
d.23 MARGIN INDICATING MECHANISM



0	ENGAGING SURFACE	MARGIN INDICATOR SWITCH
0	BEARING SURFACE	SWITCH LEVER
0	HOOKS-EACH END	SPRING

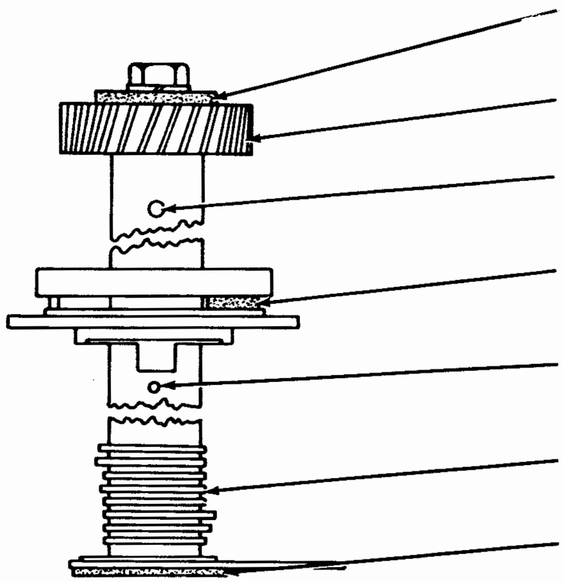
Figure 5-197. Keyboard

d.24 LOCAL LINE FEED MECHANISM



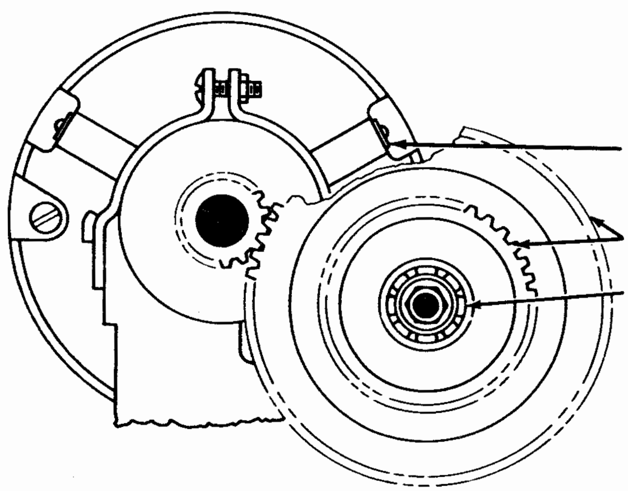
02	GUIDE SLOT	LOCAL LINE FEED TRIP LINK
0	BEARING SURFACE	LOCAL LINE FEED FUNCTION LEVER
0	HOOKS-EACH END	SPRING
0	BEARING SURFACE	FUNCTION BAIL
G	ENGAGING SURFACE	LOCAL LINE FEED FUNCTION LEVER

d.25 KEYBOARD SHAFT MECHANISM



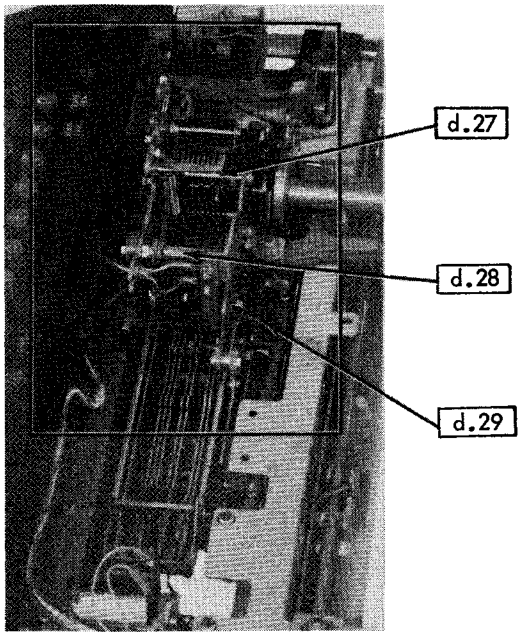
SAT	FELT WASHER	SIGNAL GENERATOR SHAFT
G	GEAR TEETH	SIGNAL GENERATOR SHAFT
020	OIL HOLE	SIGNAL GENERATOR SHAFT
04	INTERNAL MECHANISM	KEYBOARD CLUTCH
SAT	FELT WICK	
020	OIL HOLE	SIGNAL GENERATOR CAM
02	CAMMING SURFACE EACH CAM	SIGNAL GENERATOR CAM
SAT	FELT WASHER	SIGNAL GENERATOR SHAFT

d.26 INTERMEDIATE GEAR MECHANISM



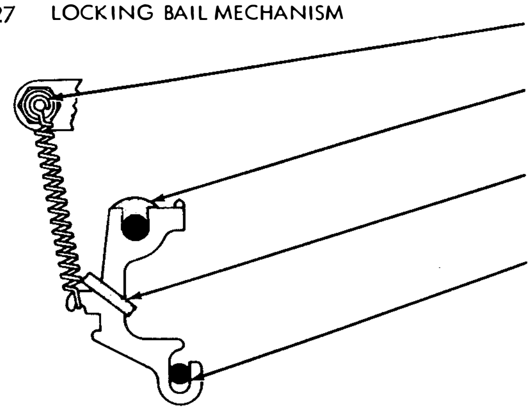
02	OILER-EACH END (RIGHT AND LEFT)	MOTOR SHAFT
G	TEETH (2 GEARS)	INTERMEDIATE GEARS
02	BALL BEARING (2 BEARINGS)	INTERMEDIATE GEAR SHAFT

Figure 5-198. Keyboard



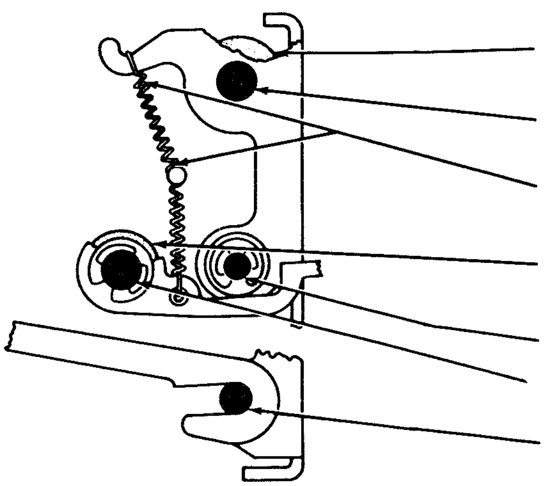
(RIGHT SIDE VIEW)

d.27 LOCKING BAIL MECHANISM



0	HOOKS-EACH END	SPRING
SAT	FELT WASHERS (2 WASHERS - FRONT AND REAR)	LOCKING BAIL POST
SAT	FELT WICK	CAMMING SURFACES
0	GUIDE SLOTS (3 SLOTS)	LOCKING BAIL

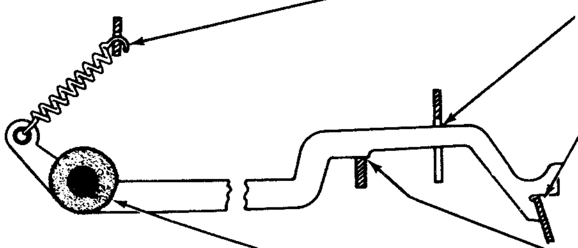
d.28 CODE BAR BAIL MECHANISM



SAT	FELT WASHERS (TWO WASHERS)	CODE BAR BAIL
0	BEARING SURFACE (2 PLACES)	CODE BAR BAIL
0	HOOKS-EACH END (2 SPRINGS)	SPRING
SAT	FELT WASHER	CODE BAR BAIL LATCH
04	BEARING	CODE BAR BAIL
02	BEARING SURFACE	CODE BAR BAIL LATCH
02	ENGAGING SURFACE	ECCENTRIC FOLLOWER

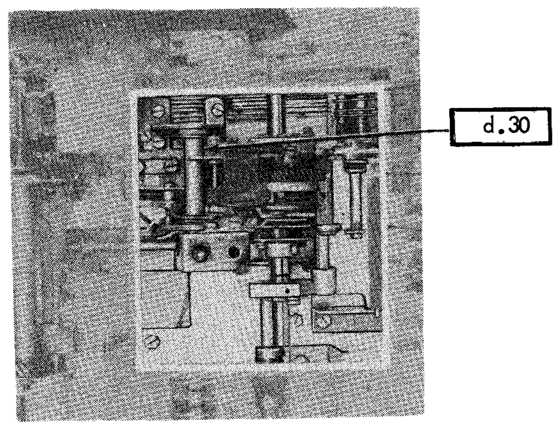
Figure 5-199. Keyboard

d.29 UNIVERSAL BAIL LATCH LEVER MECHANISM



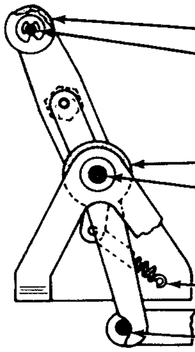
0	HOOKS (EACH END)	SPRING
02	GUIDE SLOT (EACH SIDE OF SLOT)	UNIVERSAL BAIL LATCH LEVER
G	ENGAGING SURFACE	CODE BAR BAIL EXTENSION
0	ENGAGING SURFACE	RESET BAIL LATCH
SAT	FELT WASHER	UNIVERSAL BAIL LATCH LEVER

(REST KEYBOARD IN UPRIGHT POSITION)



(TOP VIEW)

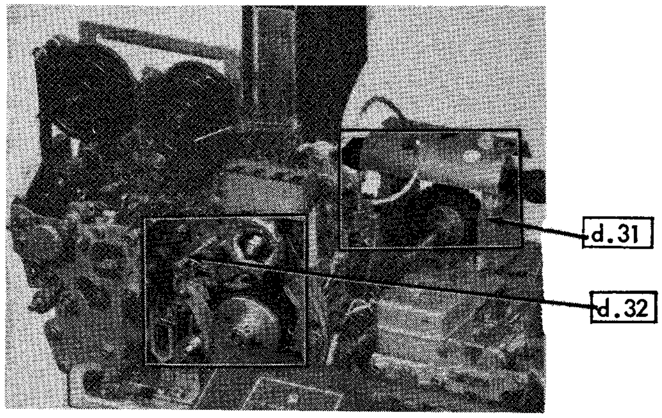
d.30 RESET CAM FOLLOWER MECHANISM (LAK)



SAT	FELT WASHER	ROLLER
0	BEARING SURFACE	RETAINING RING
SAT	FELT WASHERS (FRONT & REAR)	RESET CAM FOLLOWER SHAFT
05	OIL HOLE	RESET CAM FOLLOWER SHAFT
0	HOOKS-EACH END	SPRING
0	ENGAGING SURFACE	RESET LEVER

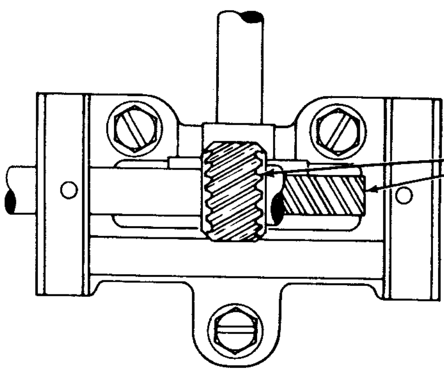
Figure 5-200. Keyboard

(REST KEYBOARD IN UPRIGHT POSITION)



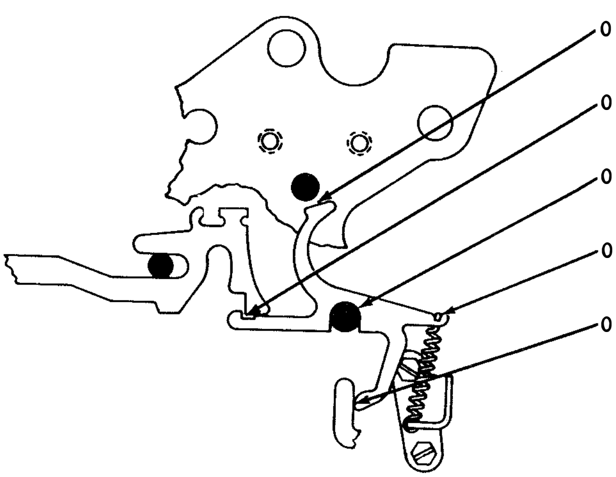
(FRONT VIEW)

d.31 REAR BEARING BRACKET GEAR MECHANISM



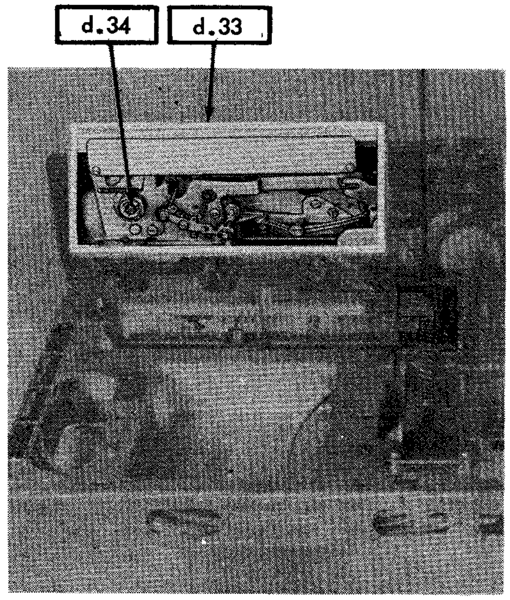
G	GEAR TEETH	REAR BEARING BRACKET GEAR

d.32 PUNCH SLIDE LATCH MECHANISM



0	ENGAGING SURFACE (5 LATCHES)	PUNCH SLIDE LATCH
0	ENGAGING SURFACE (5 LATCHES)	PUNCH SLIDE LATCH
0	BEARING SURFACE (5 LATCHES)	PUNCH SLIDE LATCH
0	HOOKS-EACH END (5 SPRINGS)	SPRINGS
0	ENGAGING SURFACE (5 LATCHES)	PUNCH SLIDE LATCH

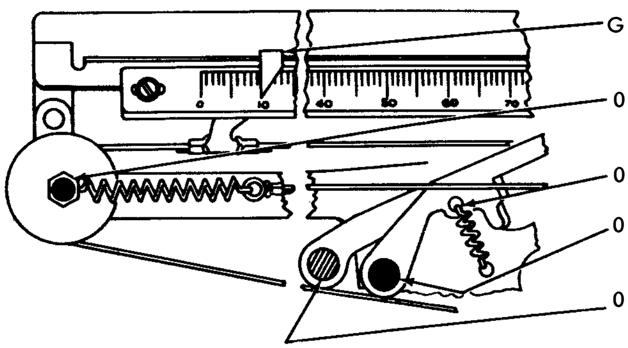
Figure 5-201. Keyboard and Typing Reperforator



(REAR VIEW)

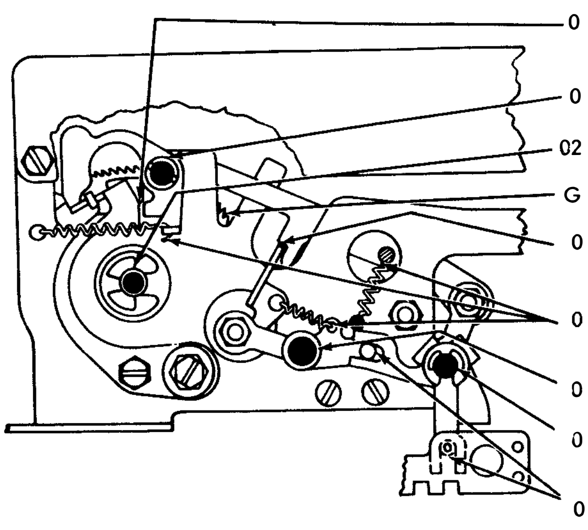
(REST KEYBOARD IN UPRIGHT POSITION)

d.33 CHARACTER COUNTER MECHANISM



G	ENGAGING SURFACE	COUNTER SCALE BRACKET
0	BEARING SURFACE	INDICATOR CORD PULLEY
0	HOOKS-EACH END	SPRING
0	BEARING SURFACE	RATCHET LATCH LEVER
0	BEARING SURFACE	RATCHET DRIVE LEVER

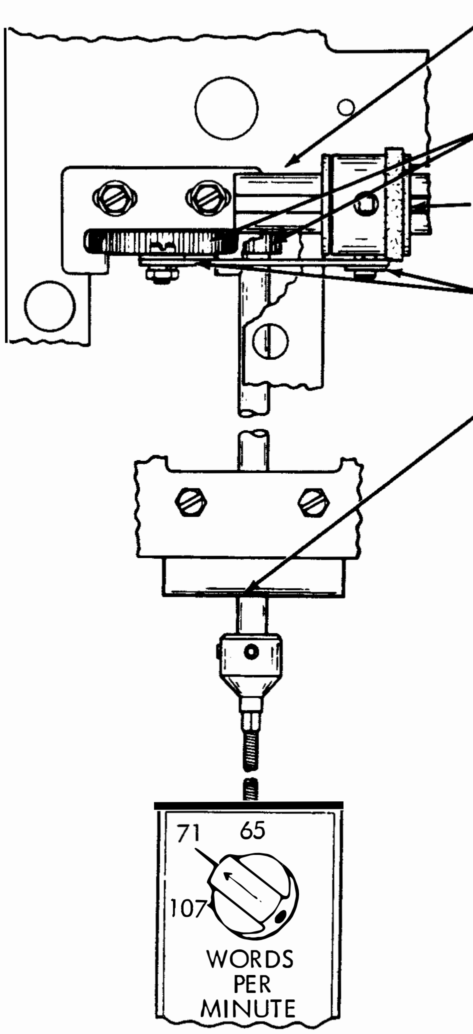
d.34 CHARACTER COUNTER MECHANISM



0	CONTACT SURFACE	ANTI-BOUNCE LATCH
0	BEARING SURFACE	ANTI-BOUNCE LATCH
02	BEARING SURFACE	RATCHET DRUM
G	TEETH	RATCHET
0	ENGAGING SURFACES (2 PLACES)	RESET LEVER EXTENSION
0	HOOKS-EACH END (3 SPRINGS)	SPRING
0	BEARING SURFACE	RESET BAIL
0	BEARING SURFACE	DRIVE LEVER FEED BAIL
0	ENGAGING SURFACES (3 SURFACES)	DRIVE LEVER FEED BAIL & RESET BAIL

Figure 5-202. Keyboard

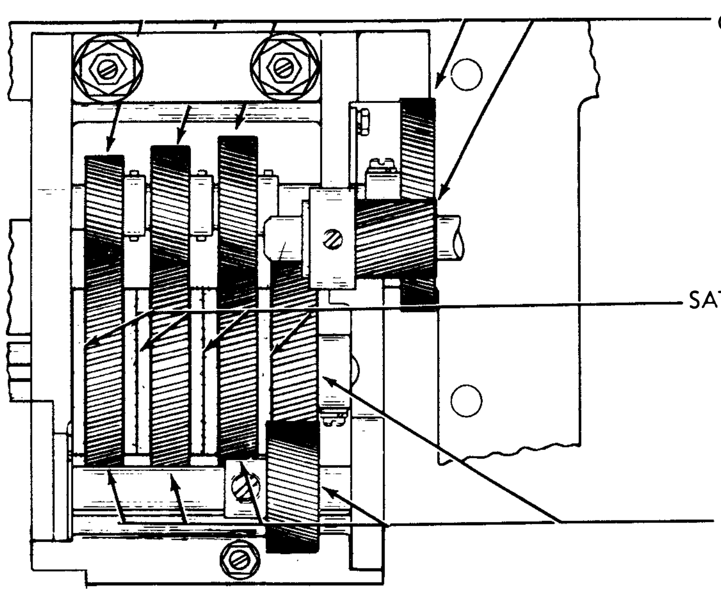
d.35 SPEED INDICATOR ASSEMBLY (LK52BRW)



O	FLANGED SLEEVE	SPEED SHIFT LINKAGE
G	TEETH	GEARS
SAT	FELT WASHERS	SPEED SHIFT LINKAGE
O	PIVOT POINTS	SPEED SHIFT LINKAGE
O	BEARING POINT	SPEED INDICATOR SHAFT

Figure 5-202A. Keyboard (LK52BRW)

d.36 GEAR SHIFT ASSEMBLY (LK52BRW)



d.37 GEAR SHIFT MECHANISM (LK52BRW)

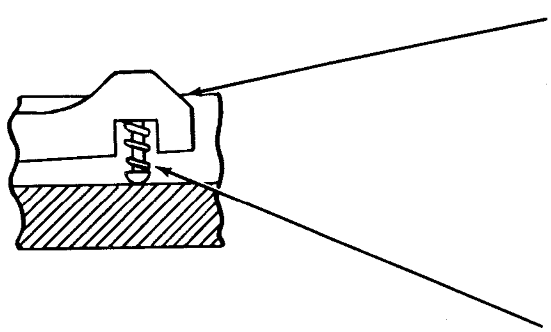


Figure 5-202B. Keyboard (LK52BRW)

e. TYPING REPERFORATORS (LPR35, LPR36, AND LPR57)

FIGURES 5-203 THROUGH 5-221 ARE COMMON TO ALL TYPING REPERFORATORS UNLESS OTHERWISE INDICATED.

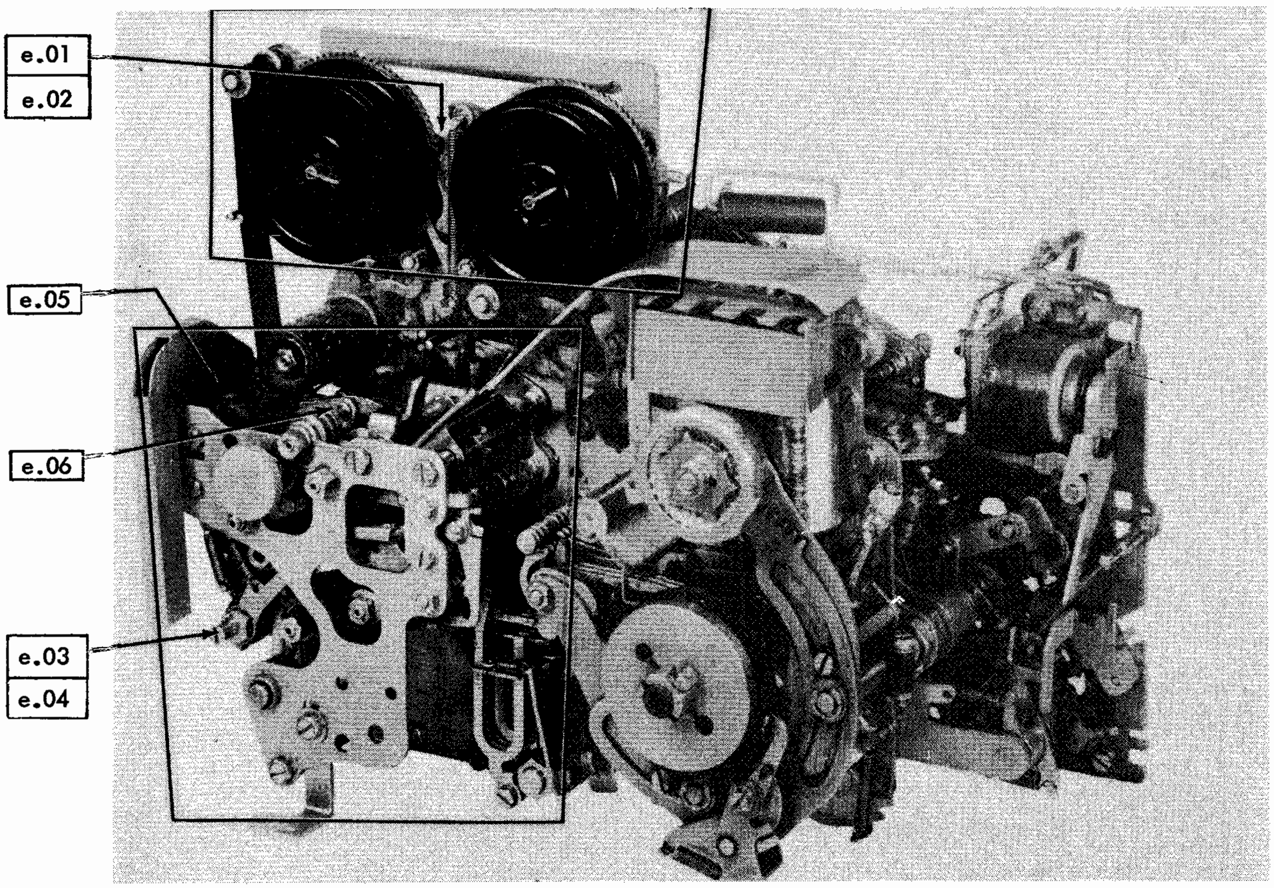
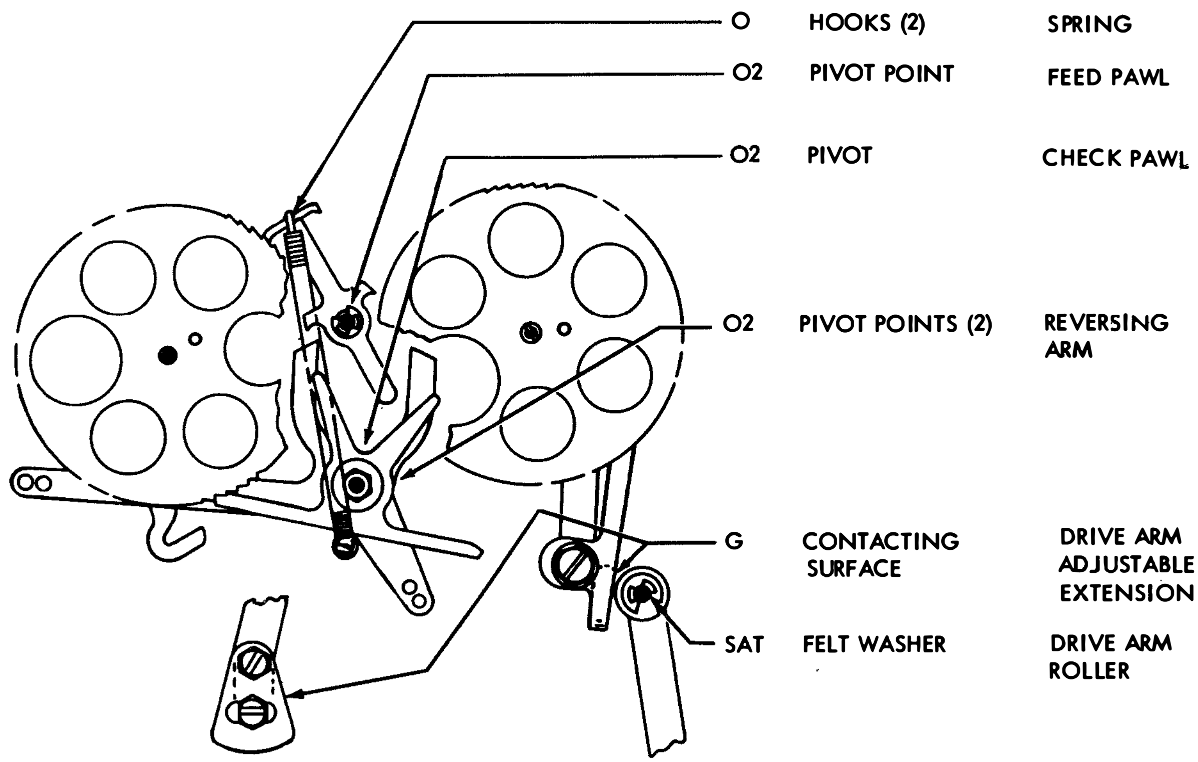


Figure 5-203. Typing Reperforator

e.01 RIBBON FEED MECHANISM - LATEST DESIGN (FOR EARLY DESIGN SEE PARAGRAPHS e.01A AND e.02A)



e.02 RIBBON FEED MECHANISM - LATEST DESIGN (FOR EARLY DESIGN SEE PARAGRAPHS e.01A AND e.02A)

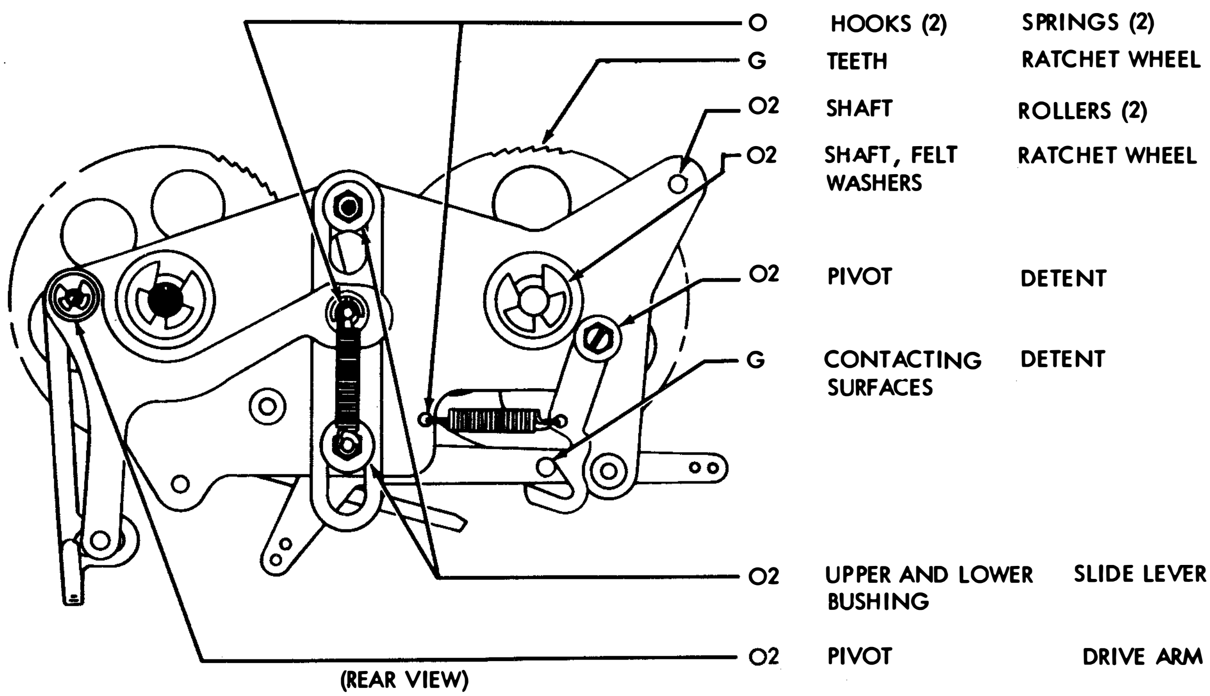
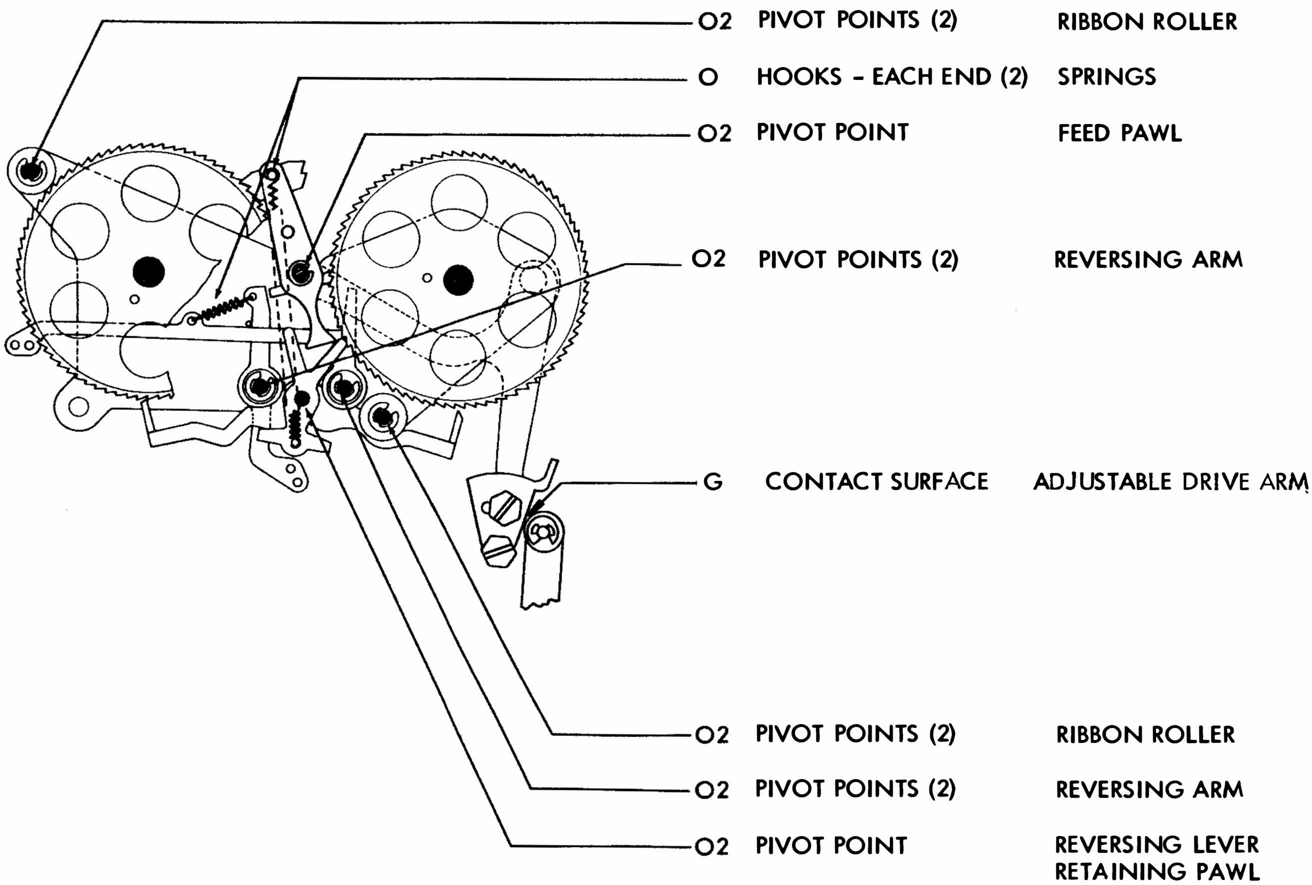
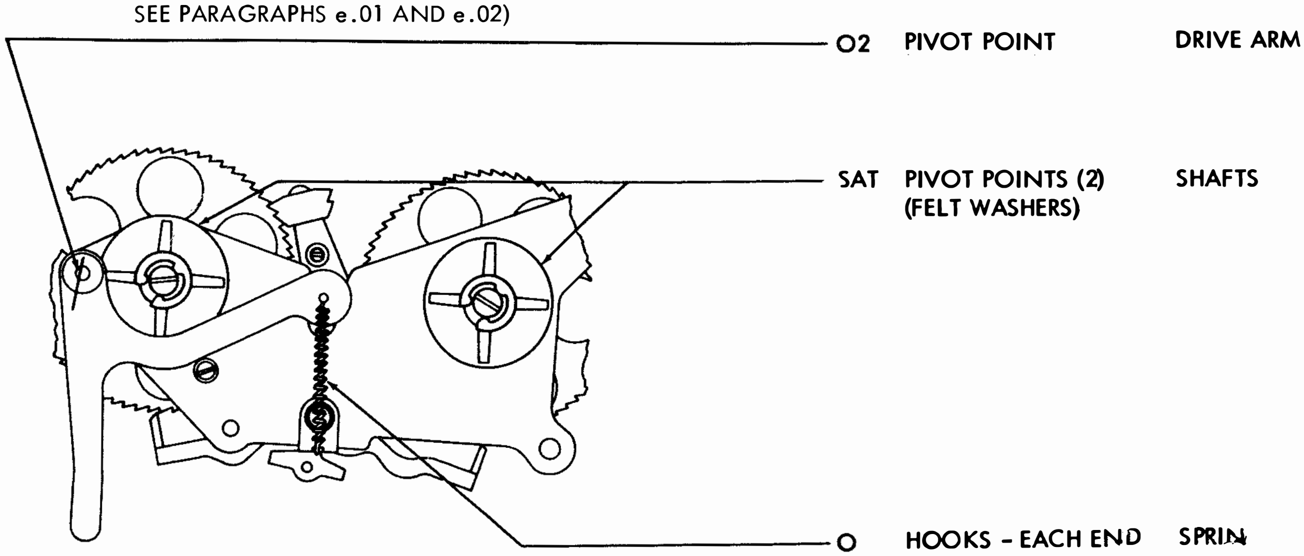


Figure 5-204. Typing Reperforator

e.01A RIBBON FEED MECHANISM - EARLY DESIGN (FOR LATEST DESIGN SEE PARAGRAPHS e.01 AND e.02)



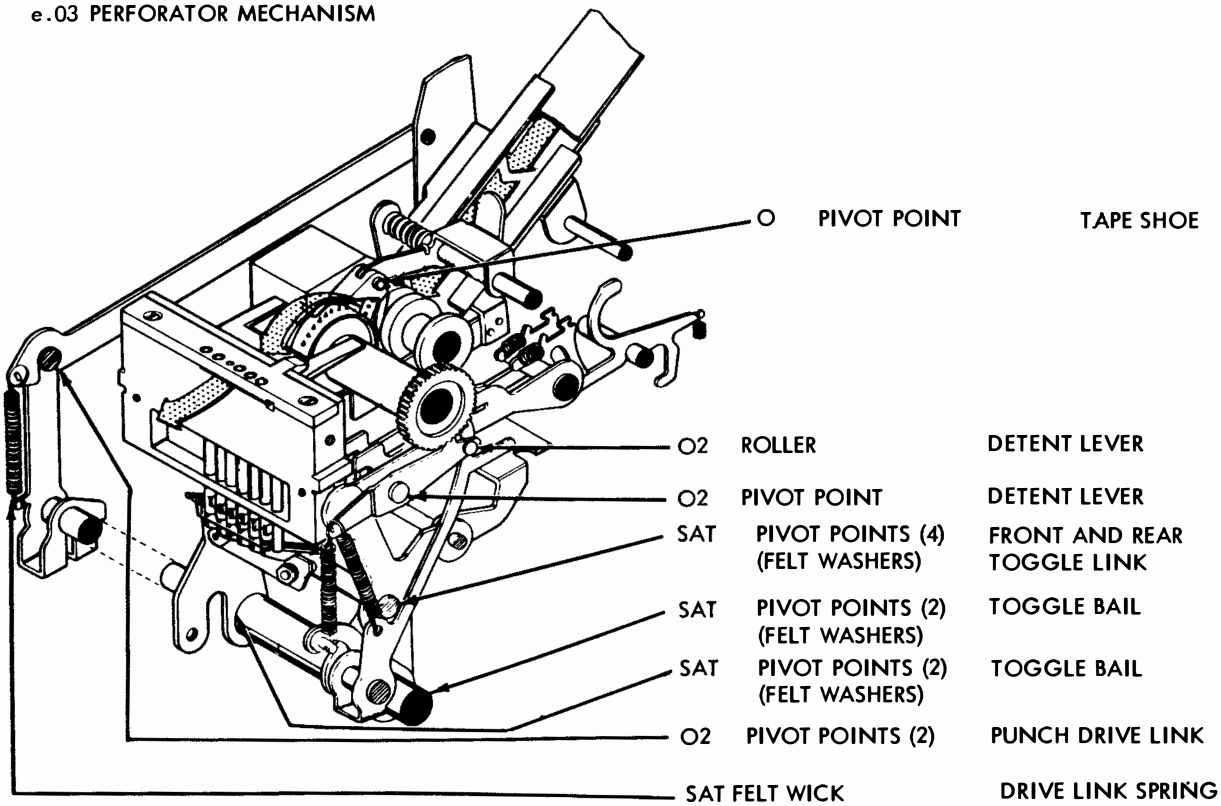
e.02A RIBBON FEED MECHANISM - EARLY DESIGN (FOR LATEST DESIGN SEE PARAGRAPHS e.01 AND e.02)



(REAR VIEW)

Figure 5-204A. Typing Reperforator

e.03 PERFORATOR MECHANISM



e.04 PERFORATOR MECHANISM

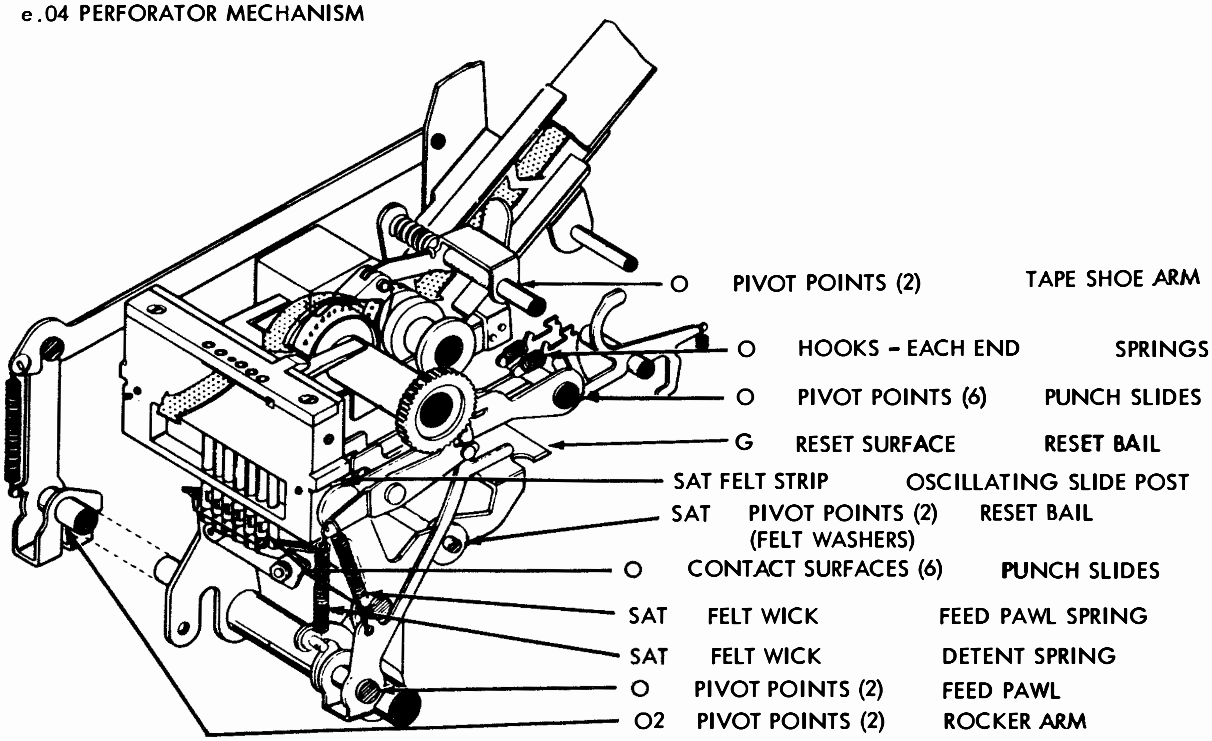
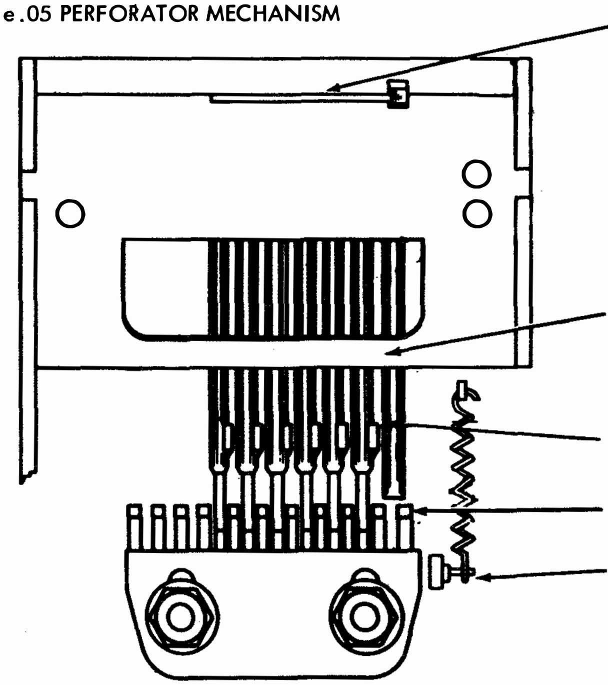


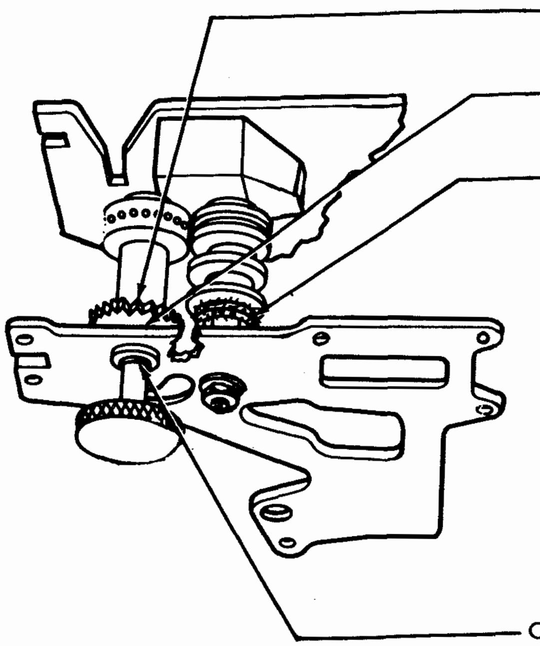
Figure 5-205. Typing Reperforator

e.05 PERFORATOR MECHANISM



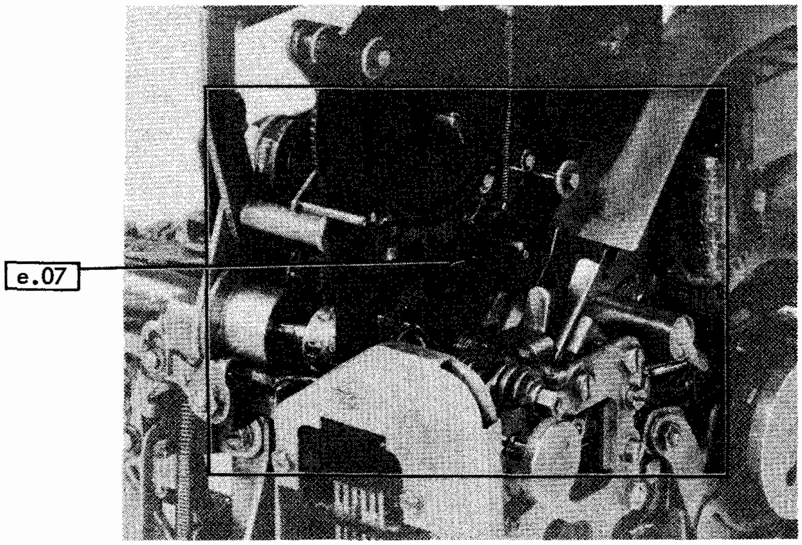
O	SLIDING SURFACE (6) (UPPER GUIDE)	PUNCH PIN
O	SLIDING SURFACE (6) (LOWER GUIDE)	PUNCH PIN
O	SLIDING SURFACE (6)	PUNCH PIN
O	SLIDING SURFACE (6)	PUNCH SLIDE GUIDE
O	HOOKS-EACH END	SPRING

e.06 PERFORATOR MECHANISM



G	RATCHET TEETH (2)	FEED WHEEL
SAT	PIVOT POINT (FELT WASHER)	FEED WHEEL
SAT	PIVOT POINT (FELT WASHER)	DIE WHEEL
O2	PIVOT POINTS (2)	HANDWHEEL BEARING

Figure 5-206. Typing Reperforator



e.07 ROTARY POSITIONING MECHANISM

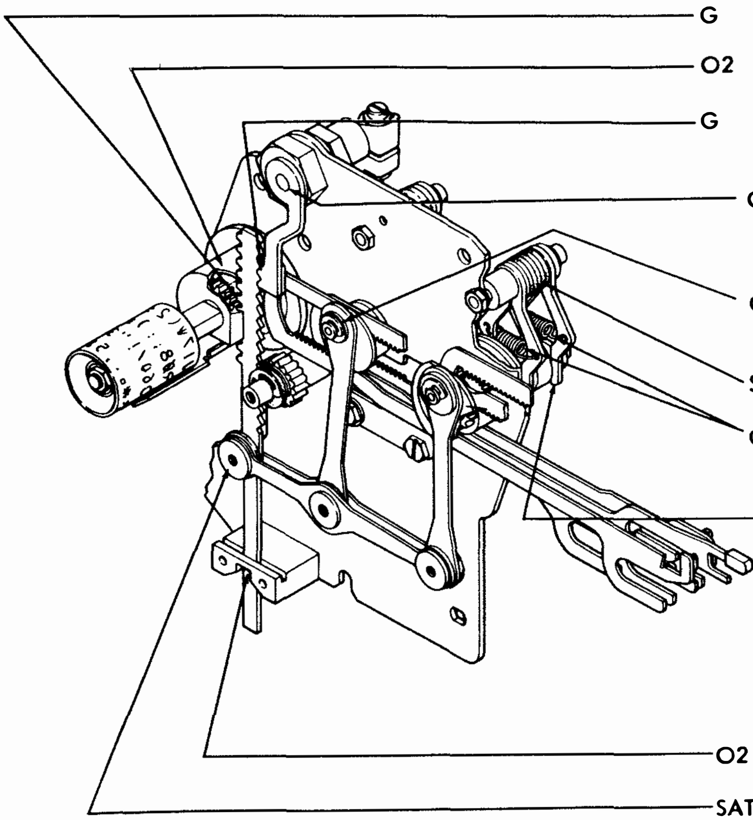
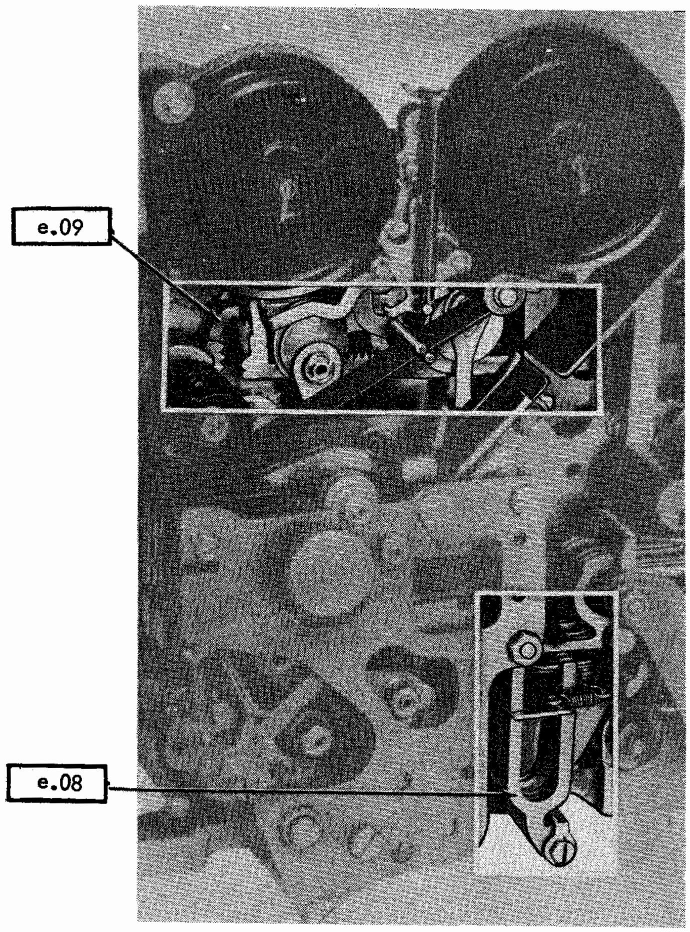


Figure 5-207. Typing Reperforator



e.08 TRANSFER MECHANISM

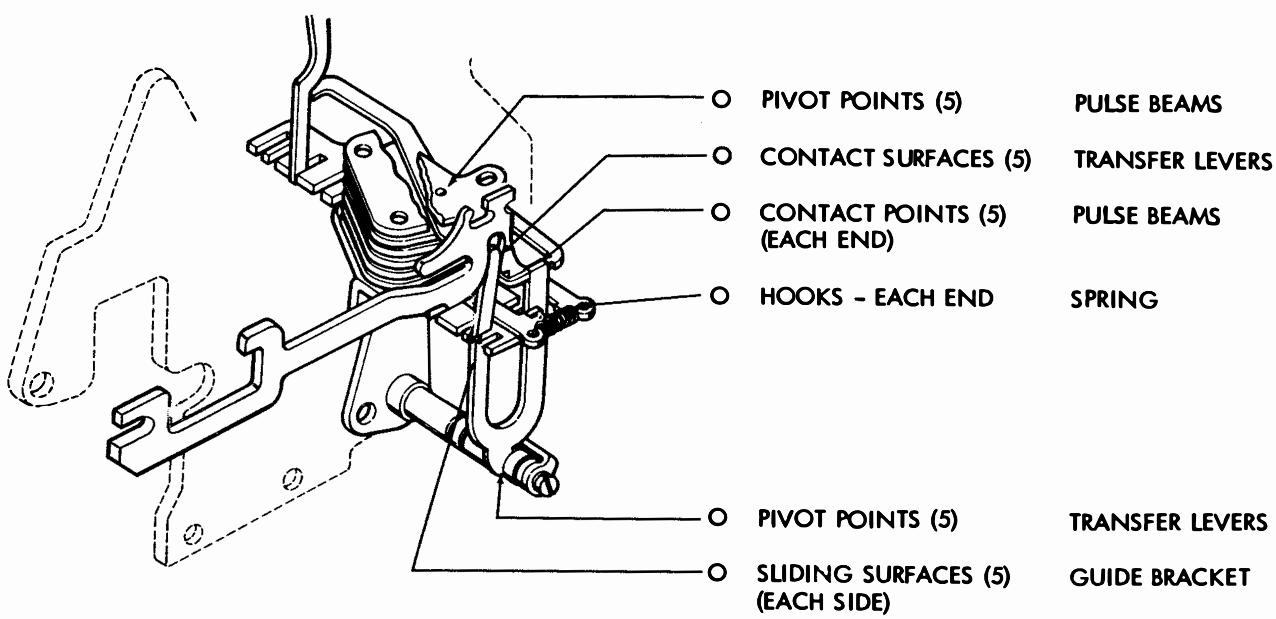
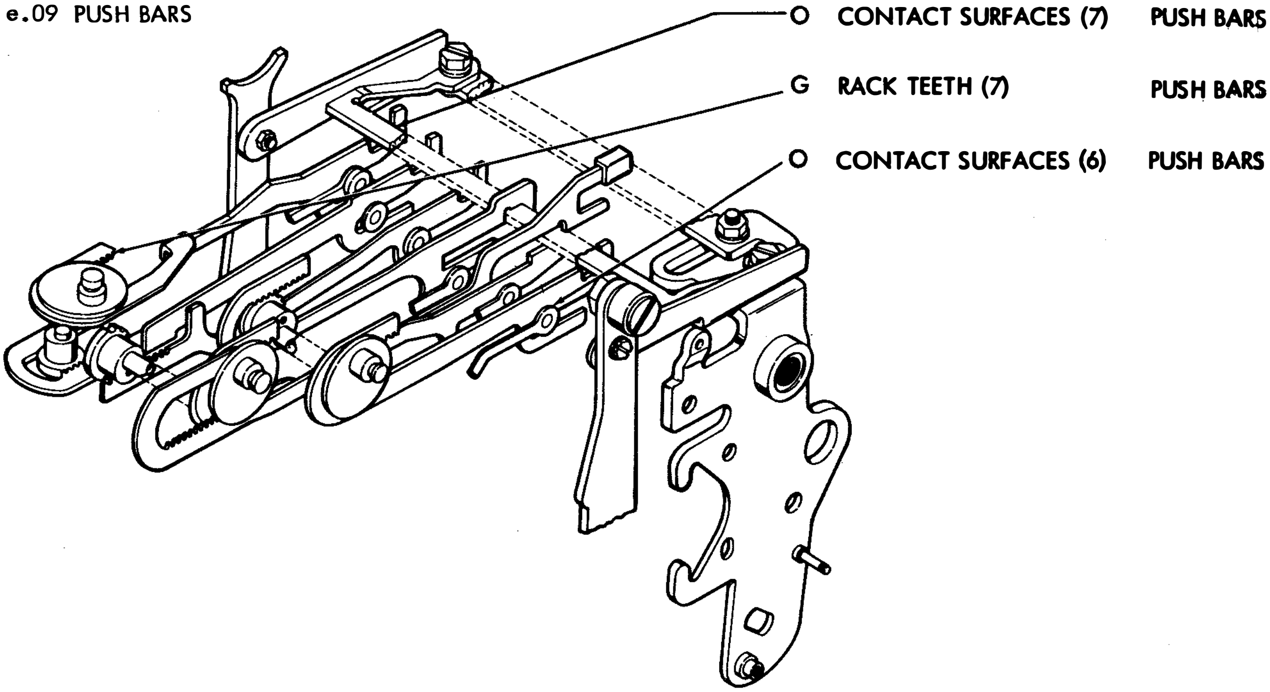


Figure 5-208. Typing Reperforator

Figure
5-209
e.09 PUSH BARS



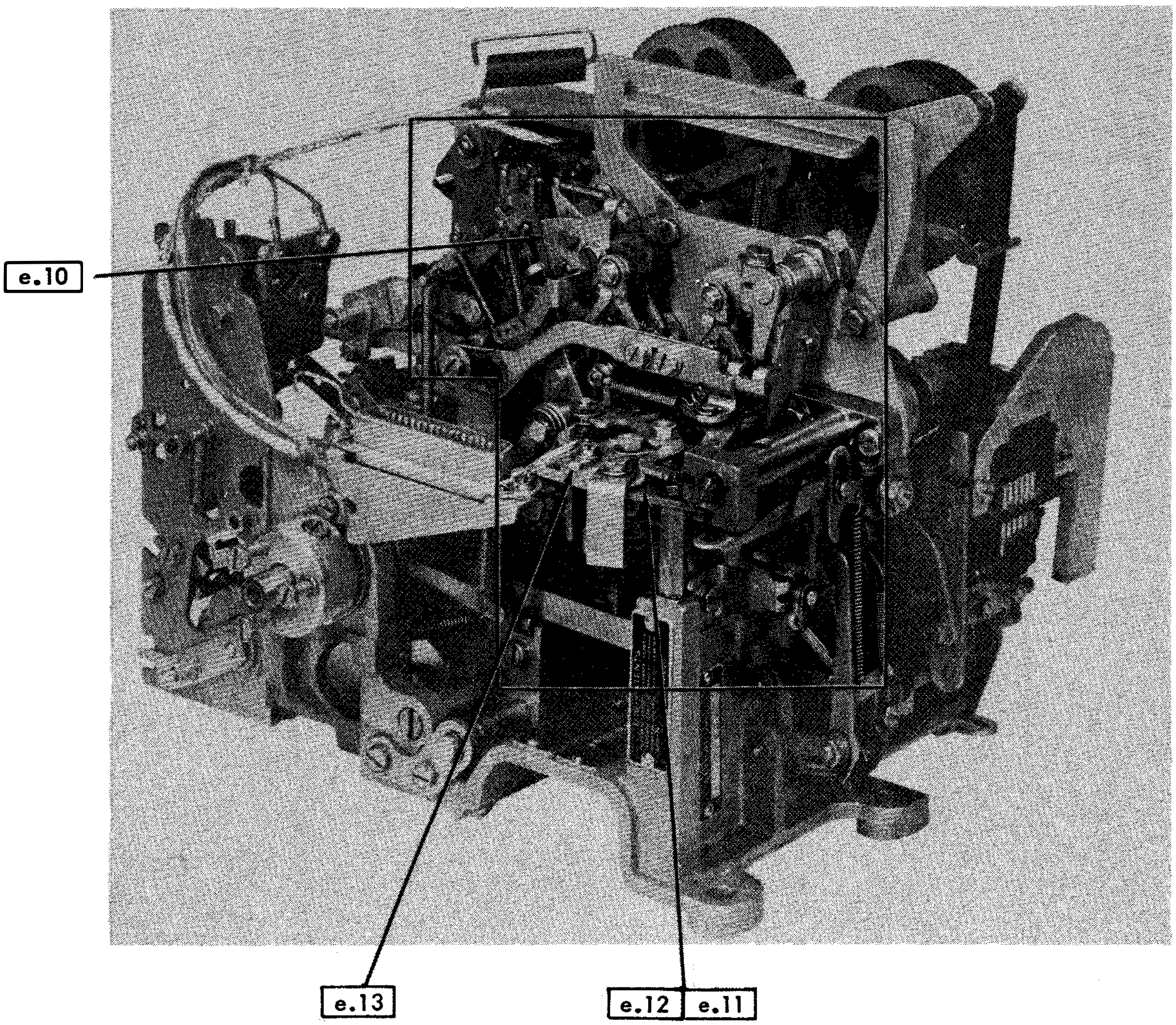
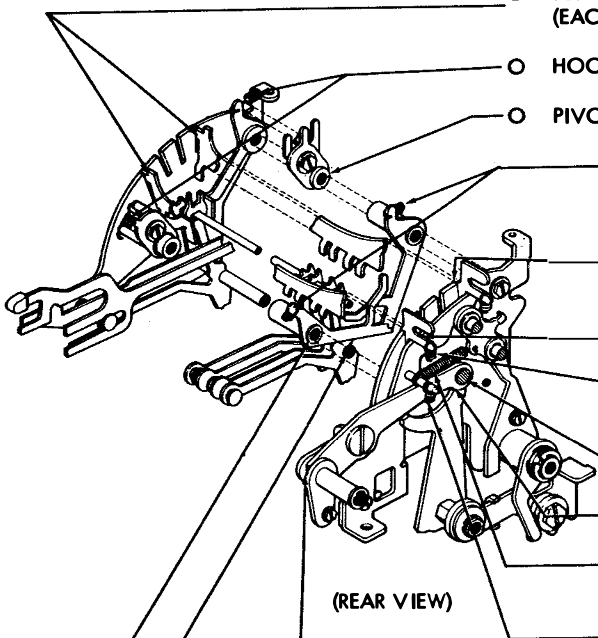


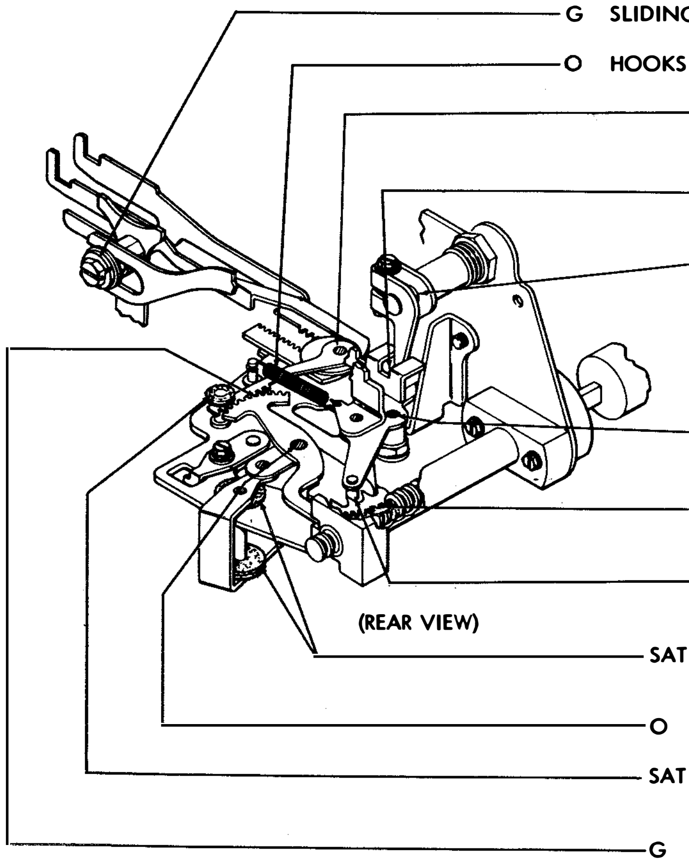
Figure 5-209. Typing Reperforator

e.10 FUNCTION BOX



O	SLIDING SURFACES (EACH SIDE)	FUNCTION BLADES
O	HOOKS - EACH END (2)	EXTENSION ARM SPRINGS
O	PIVOT POINTS	FIGURES ARM ASSEMBLY
O	HOOKS - EACH END (2)	LETTERS AND FIGURES ARM ASSEMBLY SPRINGS
O	SLIDING SURFACES (EACH SIDE)	FUNCTION BLADES
G	CONTACT POINTS (2)	FUNCTION BLADES
O	HOOKS - EACH END	FUNCTION BLADE SPRINGS (2)
O	PIVOT POINT	LIFTER ROLLER
G	ROLLER SURFACE	LIFTER ROLLER
O	HOOKS - EACH END	LIFTER TOGGLE LINK SPRING
O	HOOKS - EACH END	LIFTER SPRING
O	PIVOT POINT	FUNCTION BLADE LIFTER
O	PIVOT POINTS (6)	BELL CRANKS
O	PIVOT POINTS	LETTERS ARM ASSEMBLY EXTENSION

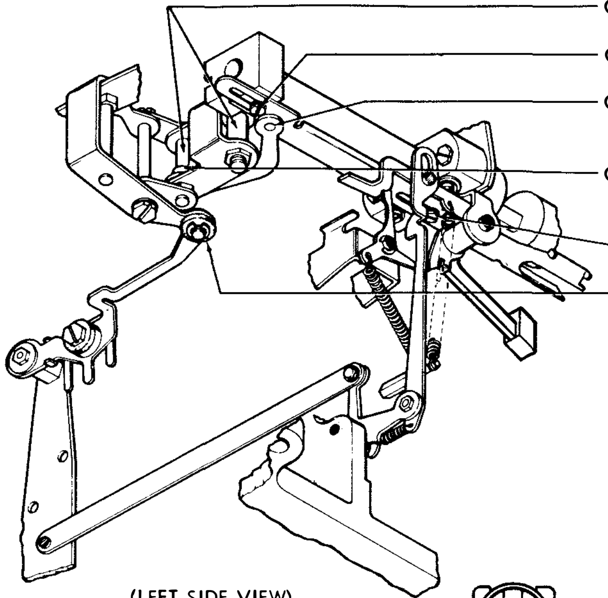
e.11 AXIAL POSITIONING MECHANISM



G	SLIDING GUIDE SURFACES	CORRECTING DRIVE LINK
O	HOOKS - EACH END	SPRING
O	PIVOT POINT	AXIAL OUTPUT RACK
G	CONTACT POINTS	ROTARY CORRECTING CLAMP
O2	PIVOT POINT	ROTARY CORRECTING LEVER SHAFT
O	PIVOT POINT	AXIAL CORRECTING PLATE
G	TEETH	AXIAL SECTOR TYPEWHEEL SHAFT
G	CONTACT SURFACE	AXIAL CORRECTING PLATE ROLLER
SAT	PIVOT POINTS (FELT WASHERS)	OSCILLATING DRIVE BAIL
O	PIVOT POINT	AXIAL SECTOR
SAT	PIVOT POINT (FELT WASHER)	GUIDE ROLLER
G	TEETH	AXIAL SECTOR AXIAL OUTPUT RACK

Figure 5-210. Typing Reperforator

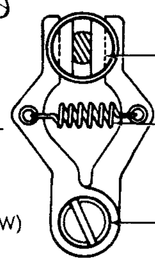
e.12 AXIAL POSITIONING MECHANISM



O	PIVOT POINT	OSCILLATING BAIL
O	CONTACT SURFACES	RIBBON CARRIER
O	PIVOT POINTS	RIBBON OSCILLATING LEVER
O	PIVOT POINT (FELT WASHER)	RIBBON OSCILLATING LEVER
O	CONTACT SURFACES	RIBBON CARRIER
SAT	PIVOT POINTS (2) (FELT WASHERS)	OSCILLATING DRIVE LINK

(LEFT SIDE VIEW)

e.13 DETENT ASSEMBLIES (TWO ON AXIAL POSITIONING MECHANISM.



(BOTTOM VIEW)

O	DETENT POINTS	DETENT LEVERS (4)
O	HOOKS - EACH END	DETENT LEVER SPRINGS (2)
SAT	PIVOT POINTS (FELT WASHERS)	DETENT LEVERS (4)

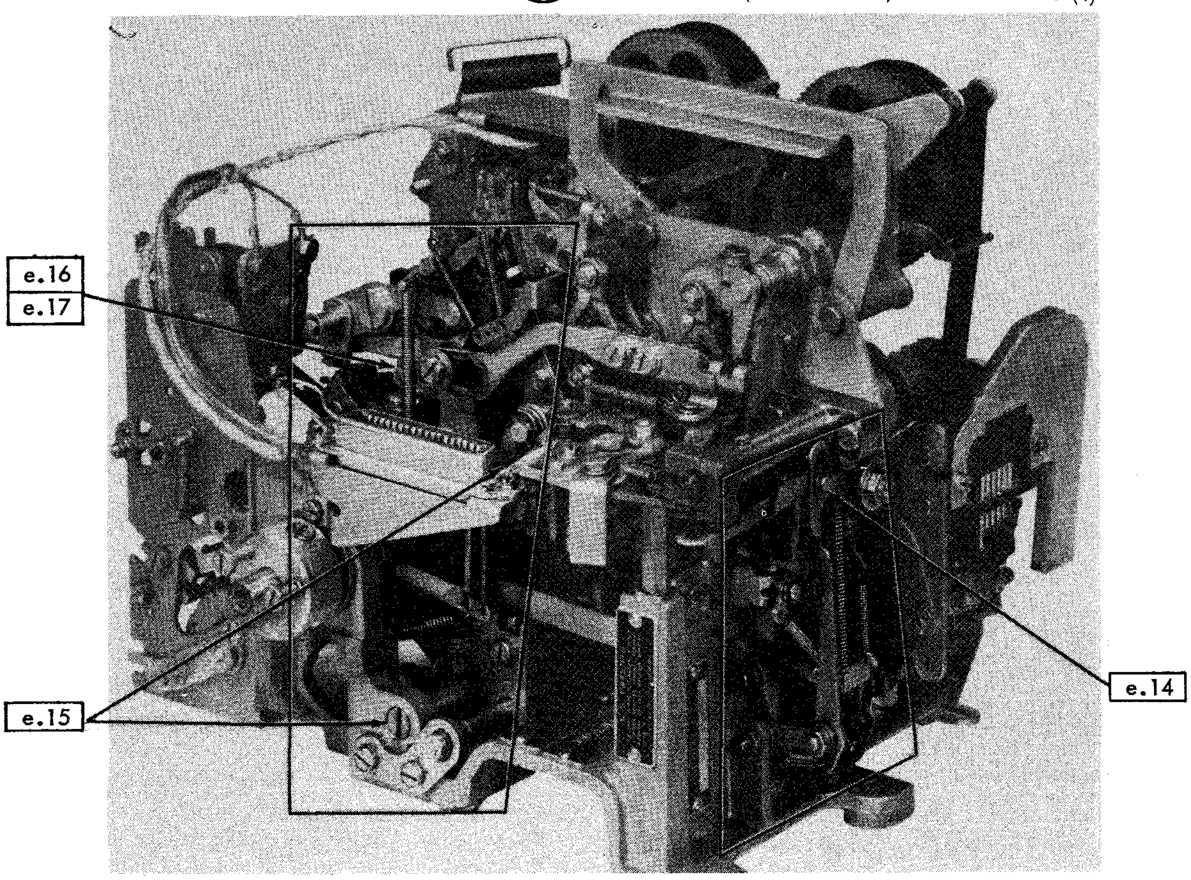
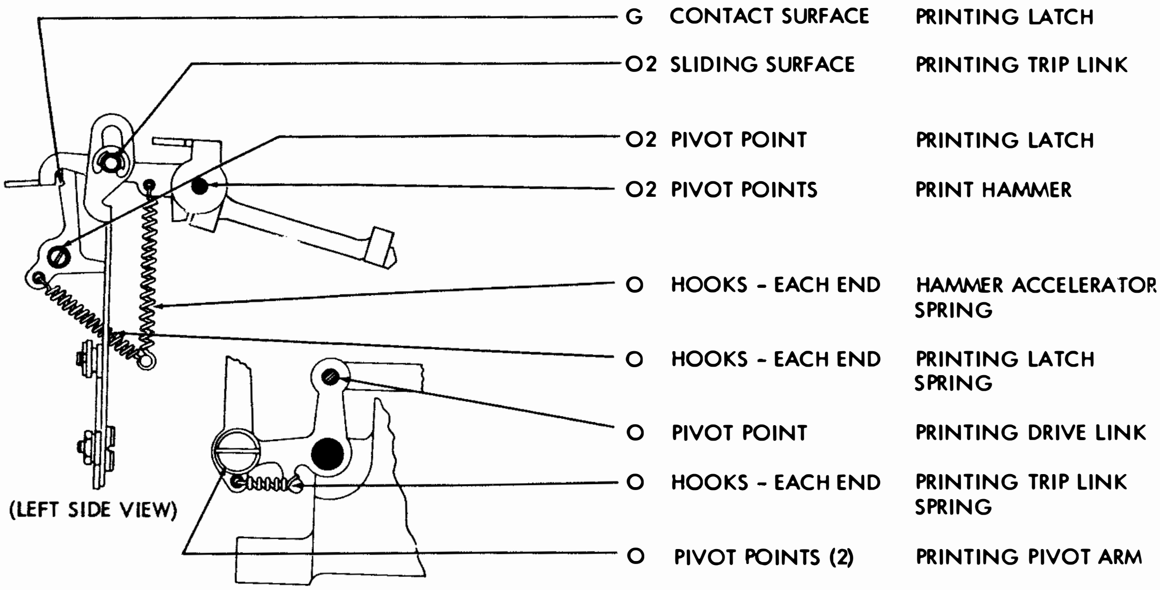


Figure 5-211. Typing Reperforator

e.14 PRINTING MECHANISM



e.15 ROCKER BAIL MECHANISM

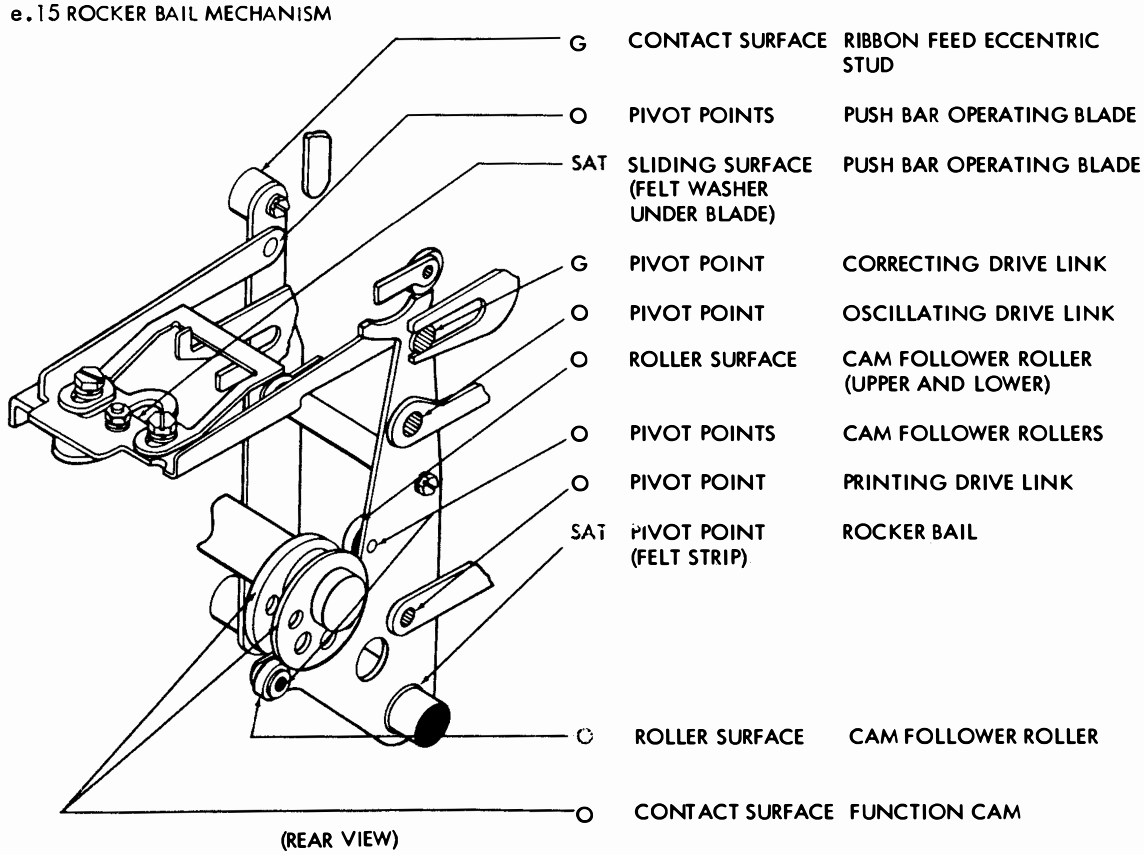
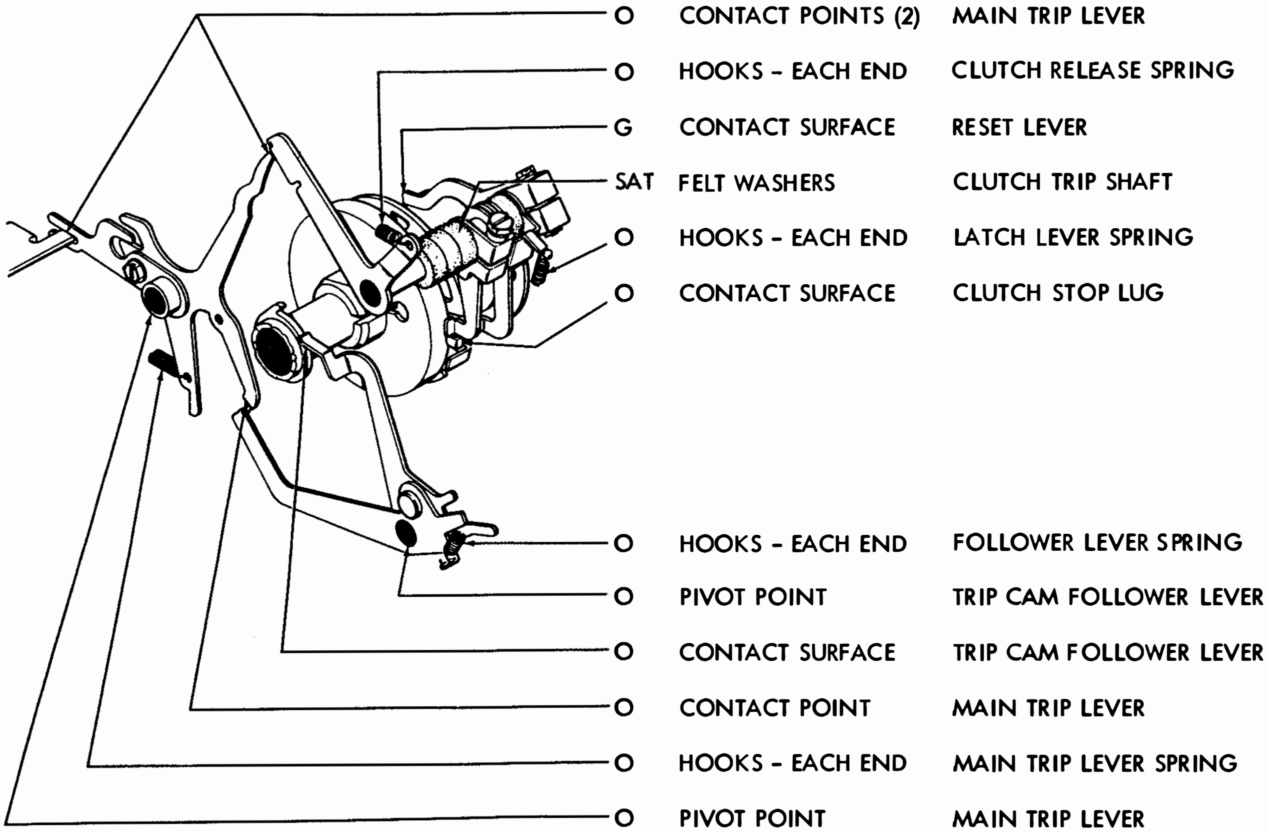


Figure 5-212. Typing Reperforator

e.16 FUNCTION–CLUTCH TRIP MECHANISM (LPR36 AND LPR57)



e.17 FUNCTION CAM–CLUTCH TRIP MECHANISM (LPR35 ONLY)

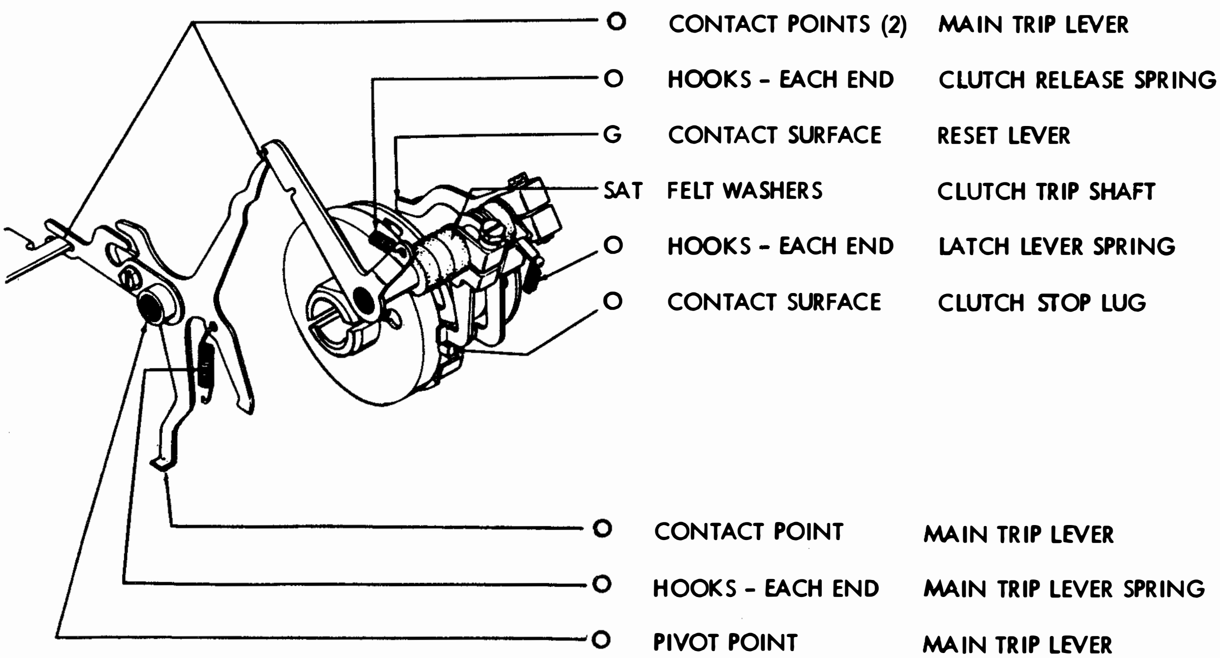
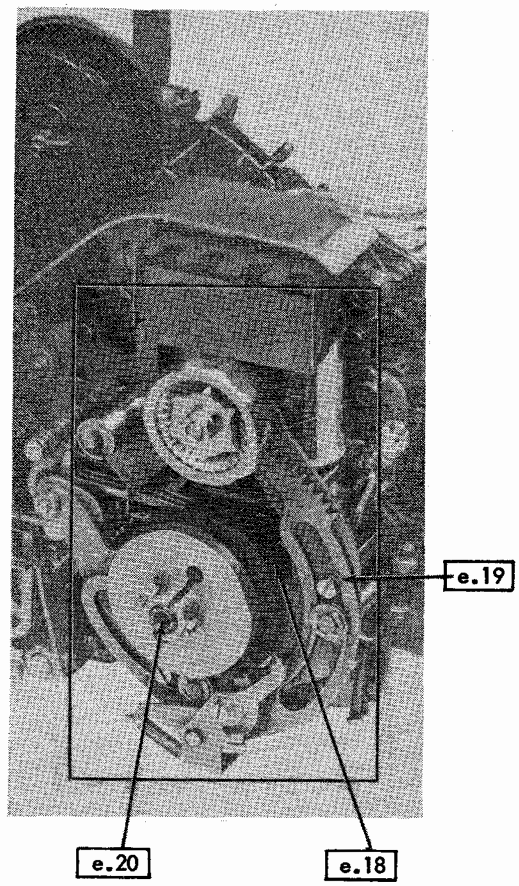
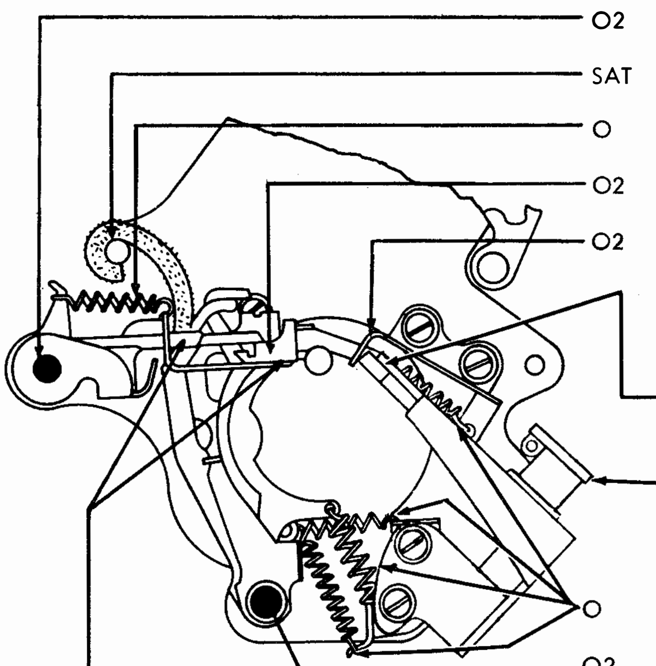


Figure 5-213. Typing Reperforator



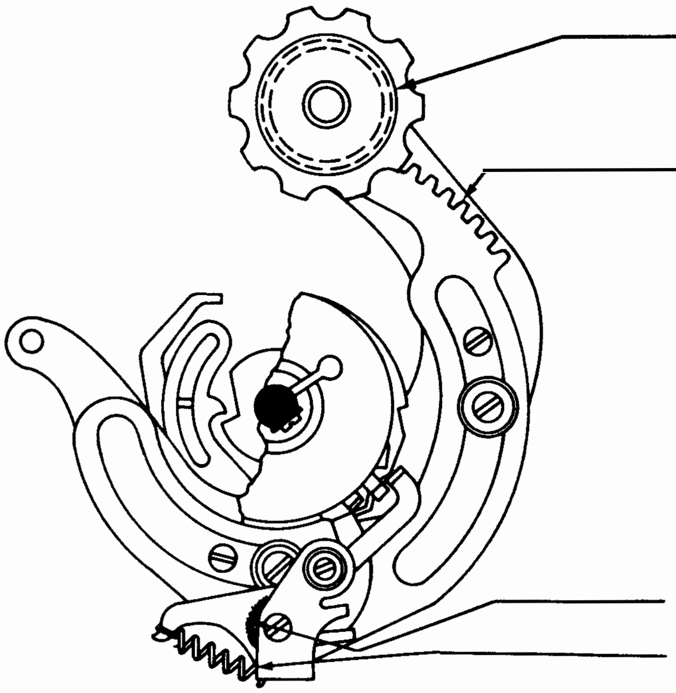
e.18 SELECTING MECHANISM



O2	BEARING GUIDE SLOTS (5)	PUSH LEVER GUIDE
SAT	FELT WICK	SELECTOR WICK
O	HOOKS - EACH END (12)	SPRINGS
O2	ENGAGING SURFACES (5)	PUSH LEVERS
O2	GUIDE SLOT	MARKING LOCK LEVER
O2	WICK	LUBRICATOR WICK
FILL UP (AVOID AIRLOCK)		LUBRICATOR RESERVOIR
O	HOOKS - EACH END (12)	SPRINGS
O2	BEARING GUIDE SLOTS (6)	SELECTOR LEVER GUIDE
O2	GUIDE SLOTS	SELECTOR AND PUSH LEVER GUIDE

Figure 5-214. Typing Reperforator

e.19 RANGE FINDER MECHANISM



e.20 MAIN SHAFT MECHANISM

*IF FUNCTION CAM NEEDLE BEARINGS ARE DISASSEMBLED AT ANY TIME, REPACK BEARINGS WITH GREASE (BEACON 325) (TELETYPE 195298) OR ITS EQUIVALENT.

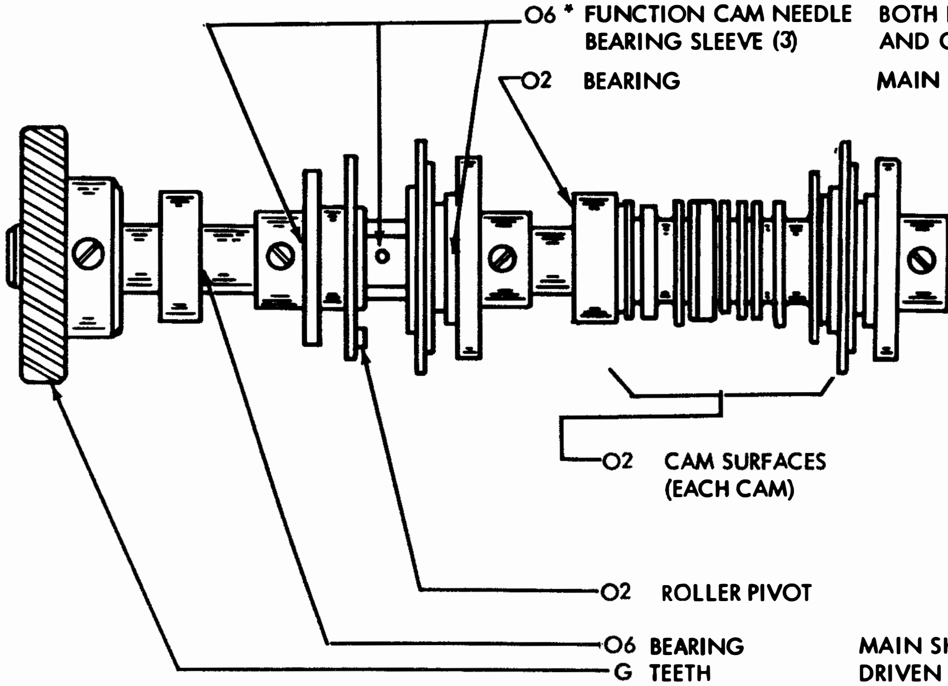
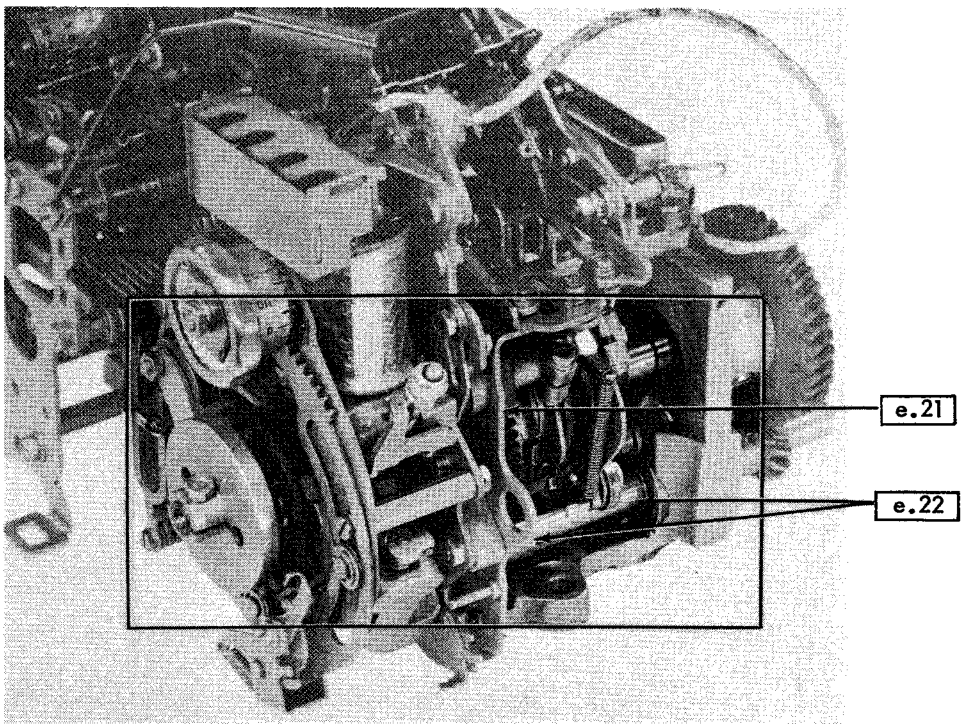


Figure 5-215. Typing Reperforator



e.21 SHAFT MECHANISM
e.22 SHAFT MECHANISM (LPR36 AND LPR57)

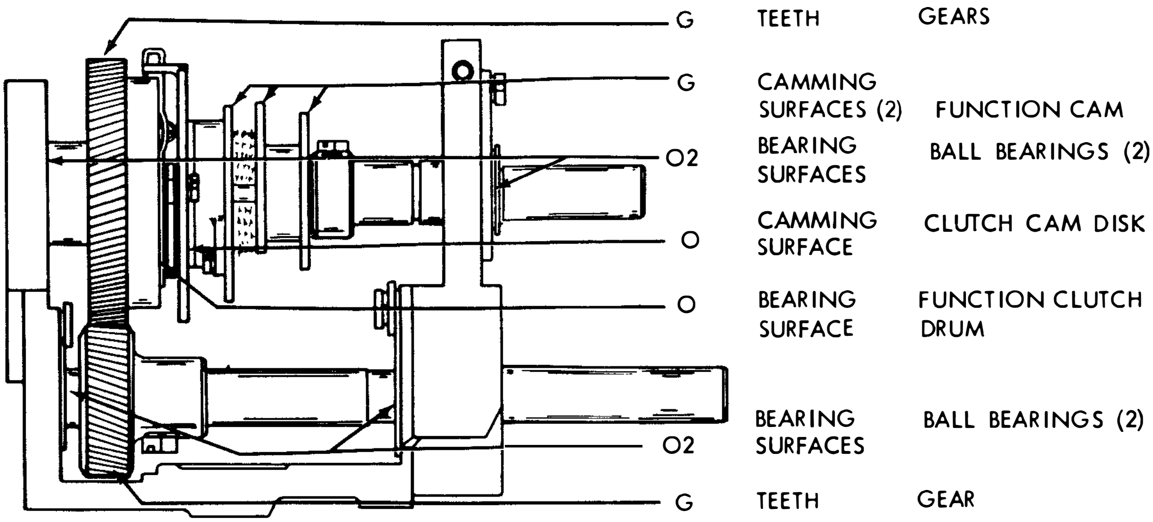


Figure 5-216. Typing Reperforator

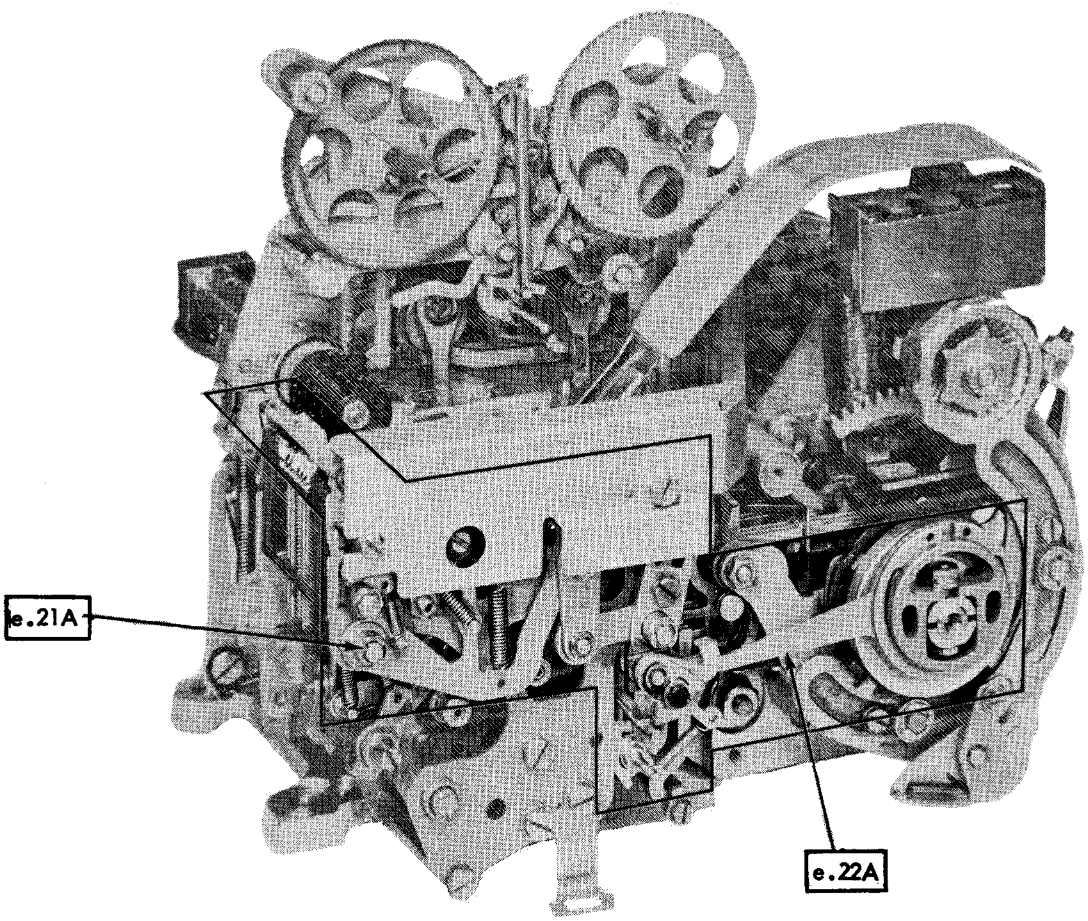
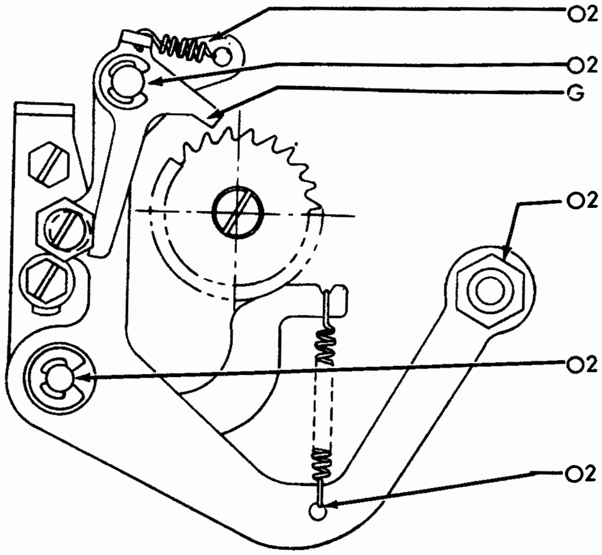
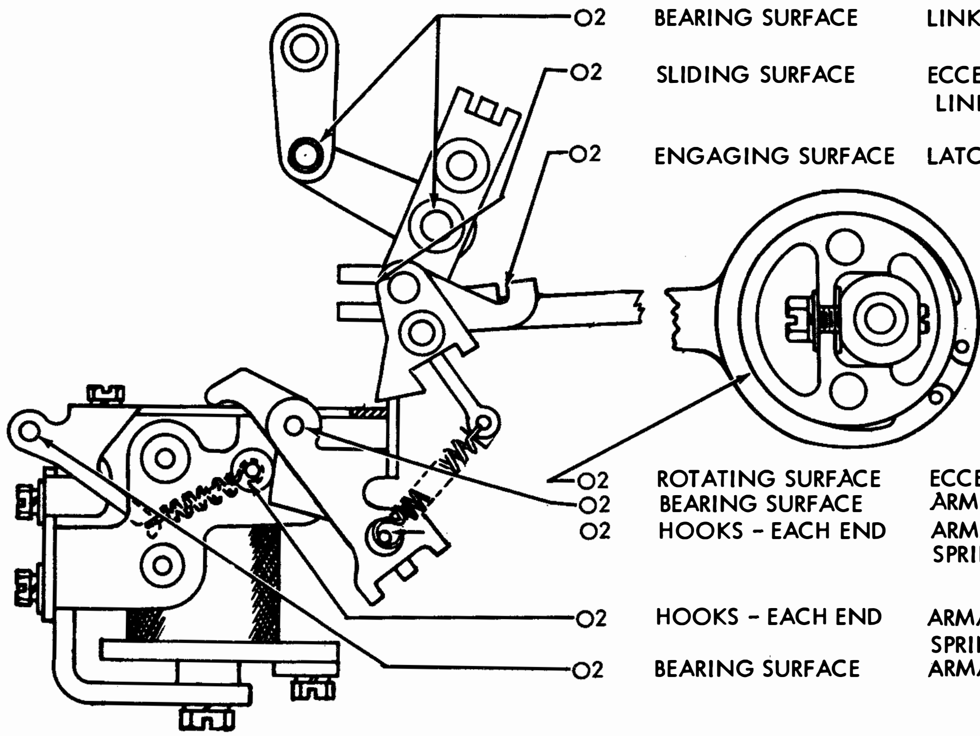


Figure 5-216A. Typing Reperforator (LPR57) e.21A POWER DRIVE BACKSPACE MECHANISM FOR FULLY PERFORATED TAPE



O2	HOOKS - EACH END	BACKSPACE PAWL SPRING
O2	BEARING SURFACE	BACKSPACE PAWL
G	FEEDING SURFACE	BACKSPACE PAWL
O2	BEARING SURFACE	NUT, SHOULDER
O2	BEARING SURFACE	BELL CRANK
O2	HOOKS - EACH END	BELL CRANK SPRING

e.22A POWER DRIVE BACKSPACE MECHANISM FOR FULLY PERFORATED TAPE



O2	BEARING SURFACE	LINK
O2	SLIDING SURFACE	ECCENTRIC DRIVE LINK FORK
O2	ENGAGING SURFACE	LATCH
O2	ROTATING SURFACE	ECCENTRIC ARM
O2	BEARING SURFACE	
O2	HOOKS - EACH END	ARMATURE LATCH SPRING
O2	HOOKS - EACH END	ARMATURE BAIL SPRING
O2	BEARING SURFACE	ARMATURE BAIL

Figure 5-216B. Typing Reperforator (LPR57 Only)

e.22b POWER DRIVE BACKSPACE MECHANISM (LATEST DESIGN)

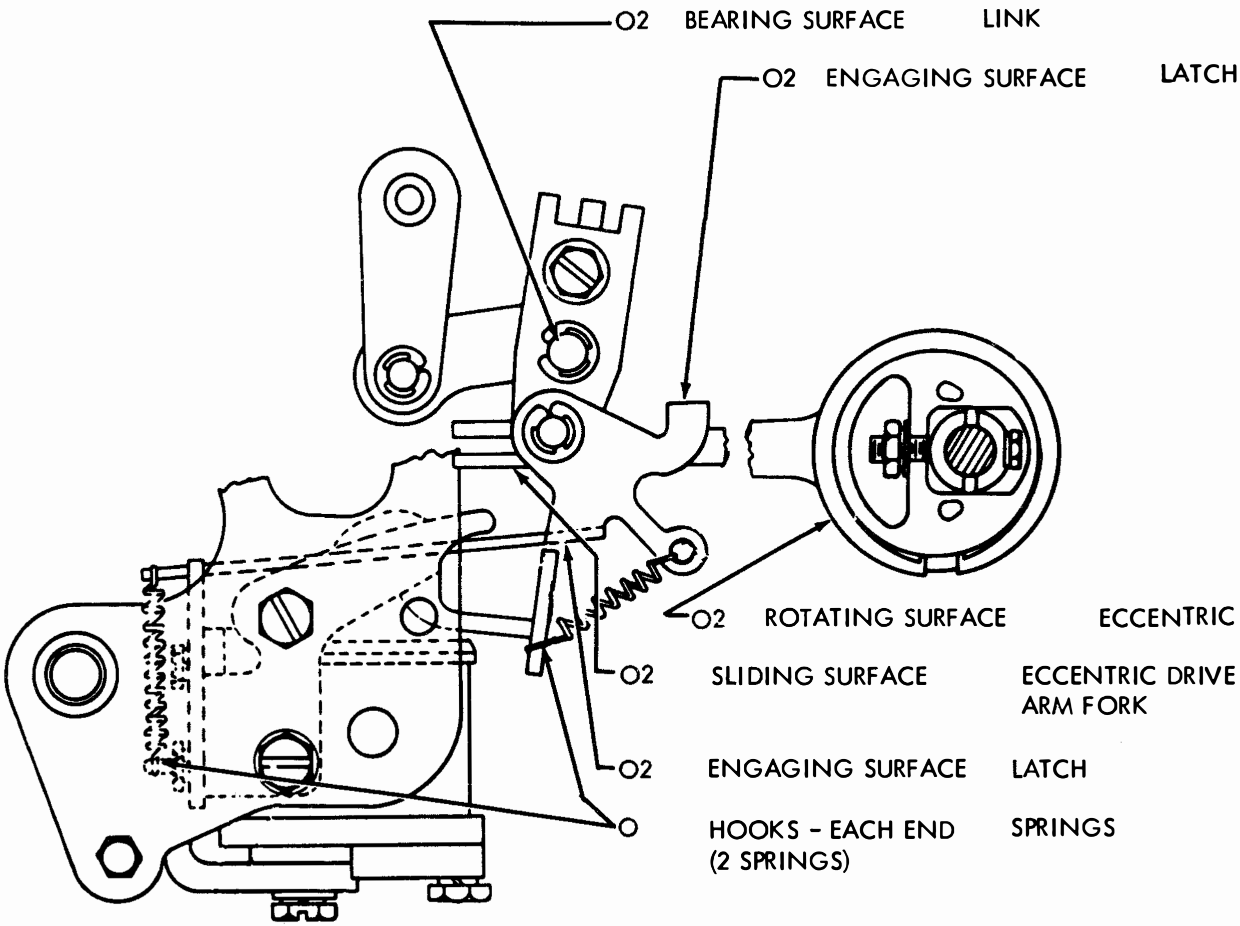


Figure 5-216C. Typing Reperforator LPR57BRP

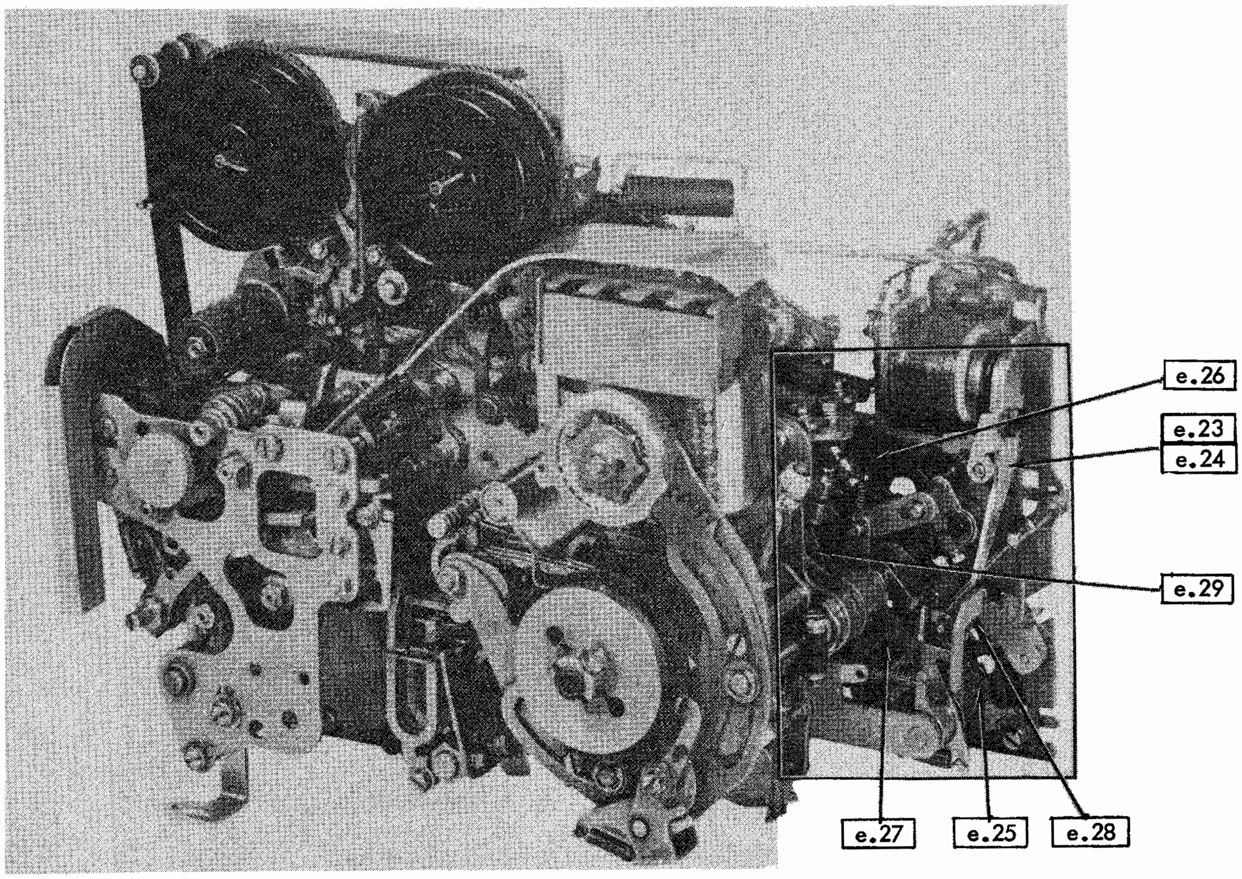
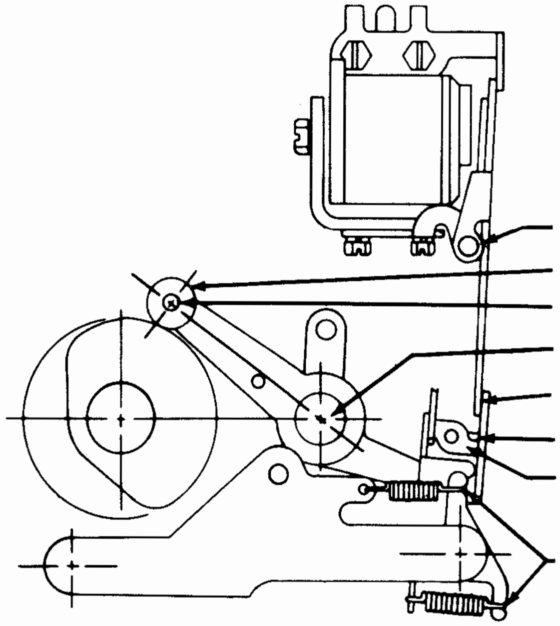


Figure 5-217. Typing Reperforator (LPR35)

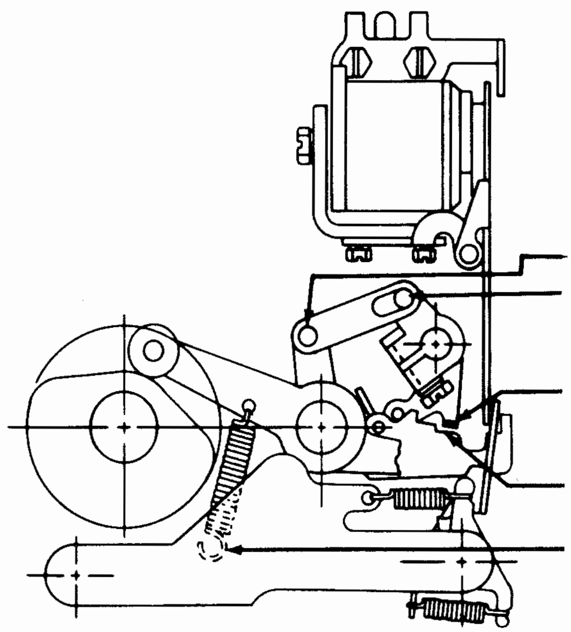
NOTE: THE FOLLOWING LUBRICATION INSTRUCTIONS APPLY TO THE LPR35 TYPING REPERFORATOR ONLY.

e.23 NON-INTERFERING LETTERS TAPE FEED OUT MECHANISM



O2	PIVOT POINT	ARMATURE HINGE
O2	ROLLER SURFACE	DRIVE BAIL ROLLER
O2	PIVOT POINT	DRIVE BAIL ROLLER
O2	PIVOT POINT	DRIVE BAIL
G	CONTACT POINT	BLOCKING BAIL
G	CONTACT POINT	DRIVE BAIL
G	CONTACT POINT	BLOCKING LATCH
O	HOOKS-EACH END (2)	SPRING

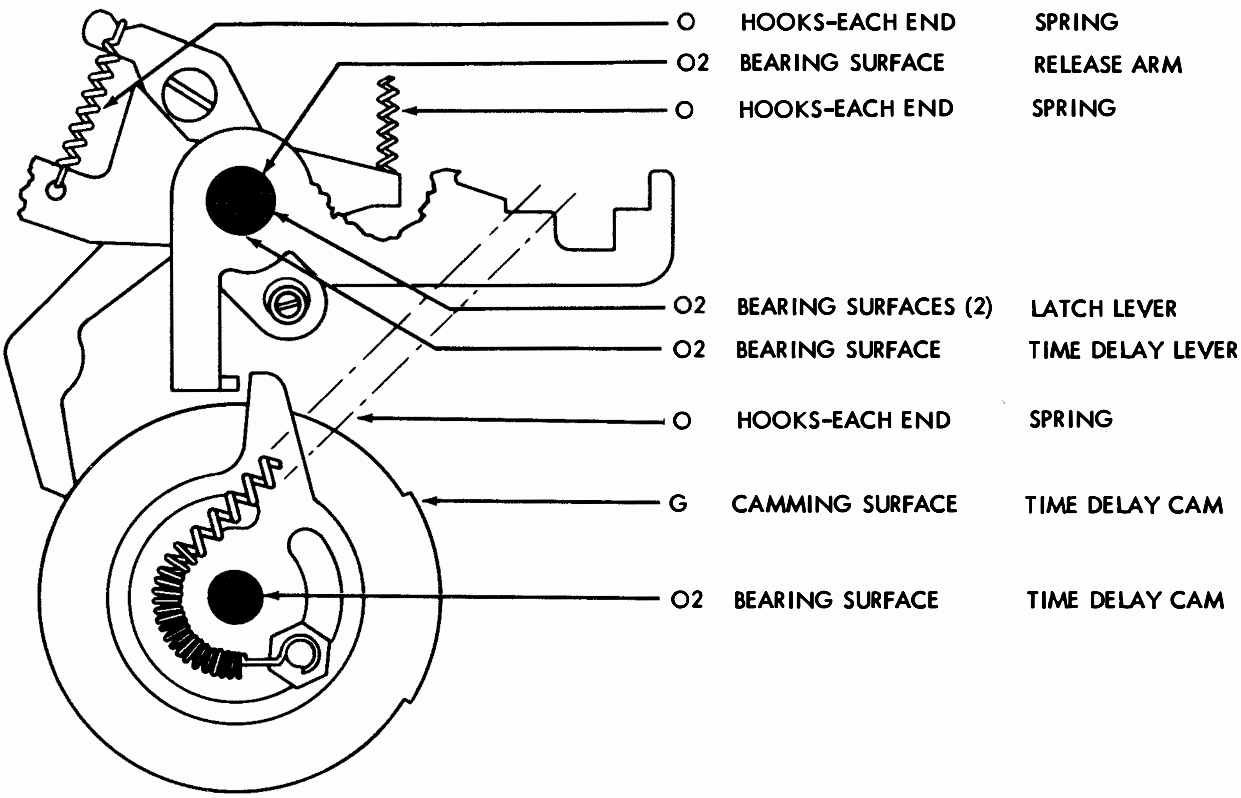
e.24 NON-INTERFERING LETTERS TAPE FEED OUT MECHANISM



O2	PIVOT POINT	DRIVE LINK
O2	SLIDE SURFACE	DRIVE LINK
G	CONTACT POINT	RELEASE LEVER
G	CONTACT POINT	LATCH LEVER
O2	HOOKS-EACH END	SPRING

Figure 5-218. Typing Reperforator (LPR35 Only)

e.25 REMOTE NON-INTERFERING LETTERS TAPE FEED OUT MECHANISM



e.26 REMOTE NON-INTERFERING LETTERS TAPE FEED OUT MECHANISM

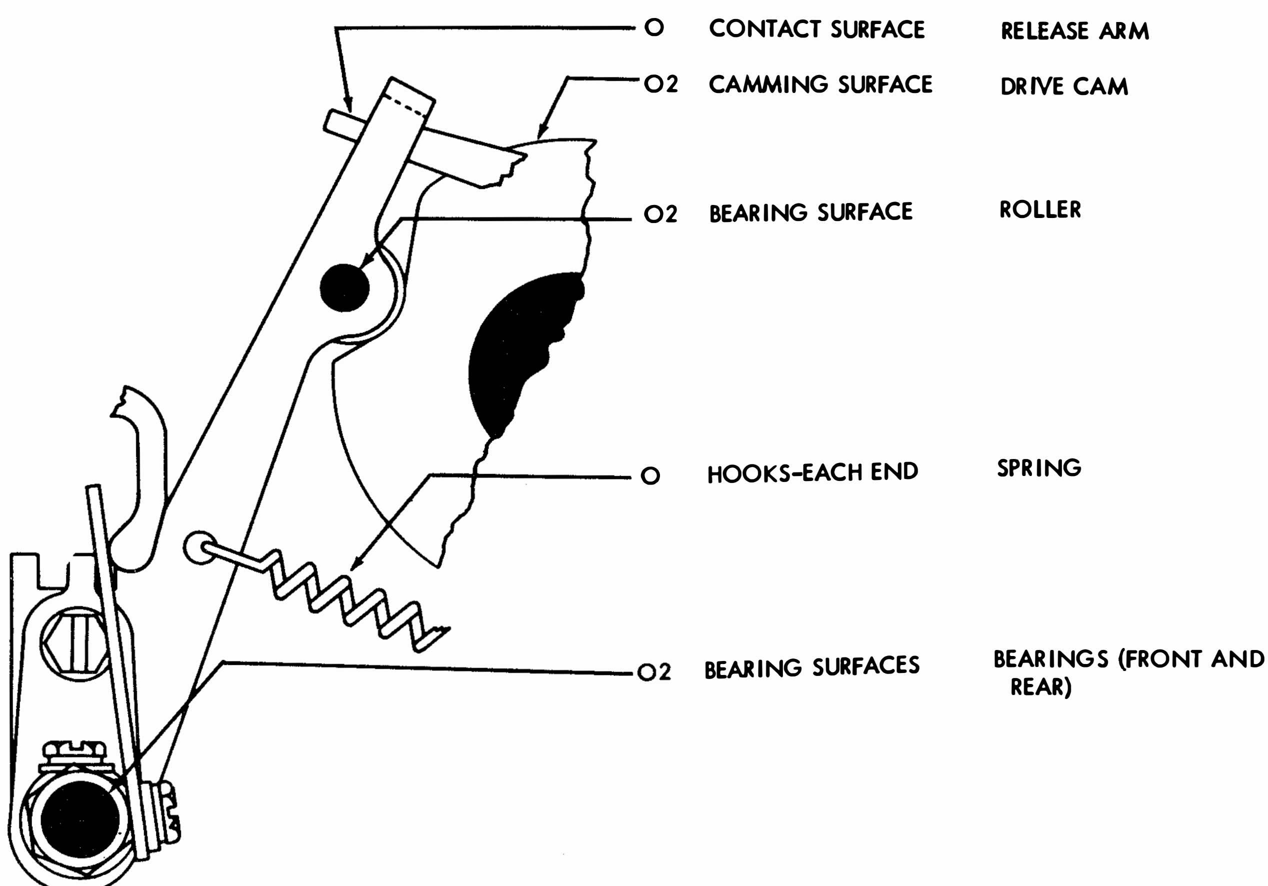
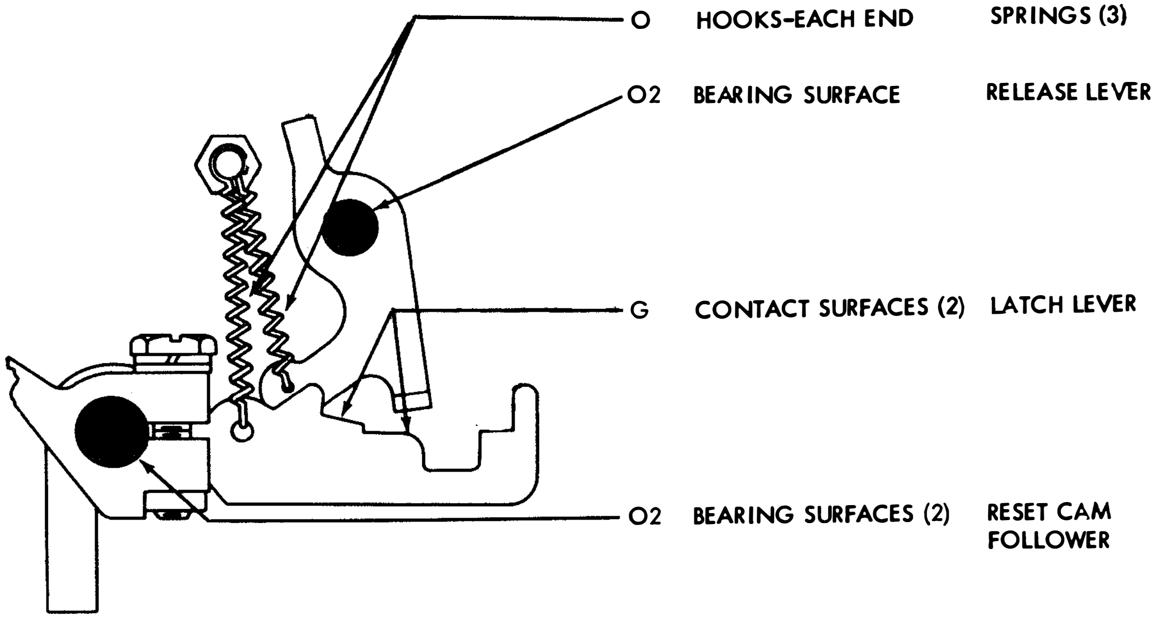


Figure 5-219. Typing Reperforator (LPR35 Only)

e.27 REMOTE NON-INTERFERING LETTERS TAPE FEED-OUT MECHANISM



e.28 REMOTE NON-INTERFERING LETTERS TAPE FEED OUT MECHANISM

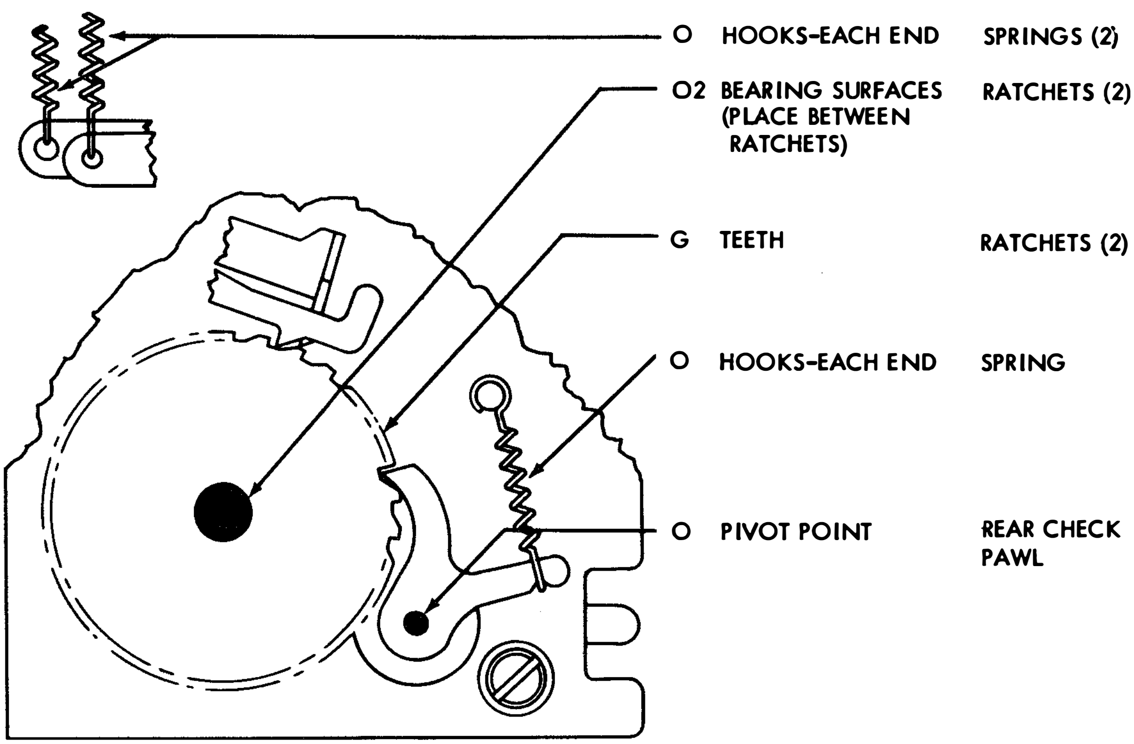
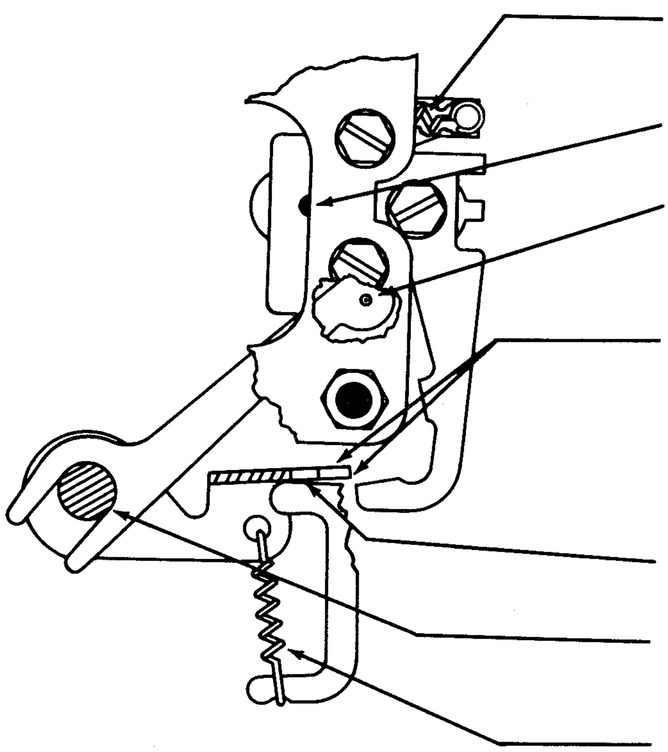


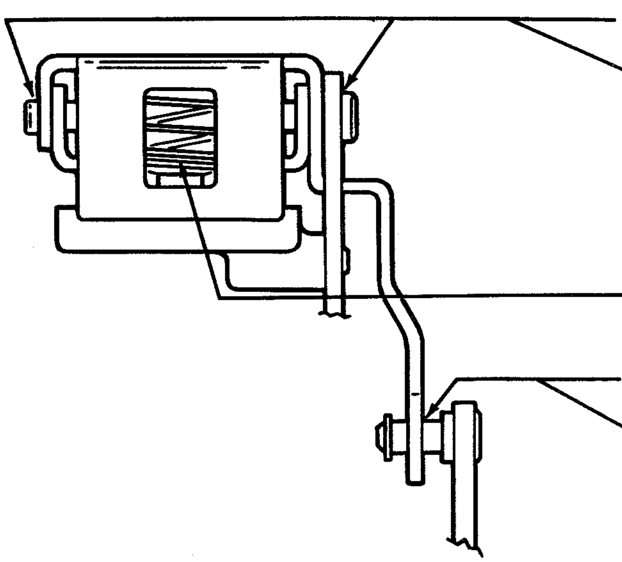
Figure 5-220. Typing Reperforator (LPR35 Only)

e.29 REMOTE NON-INTERFERING LETTERS TAPE FEED OUT MECHANISM (LPR 35)



O	HOOKS-EACH END	SPRING
O	PIVOT POINT	RESET BAIL LATCH
O	PIVOT POINT	RESET BAIL LINK
O	CONTACT SURFACES (2)	RESET BAIL
O	CONTACT SURFACE	RESET BAIL TRIP LEVER
O	CONTACT SURFACE	RESET BAIL LINK
O	HOOKS-EACH END	SPRING

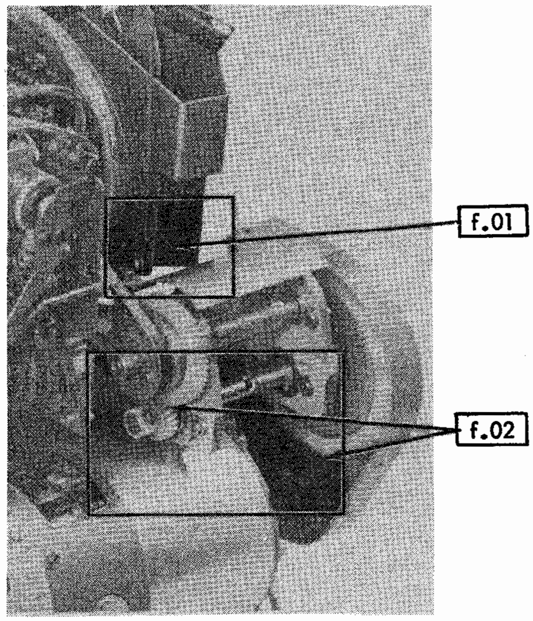
e.30 TAPE DEPRESSOR MECHANISM



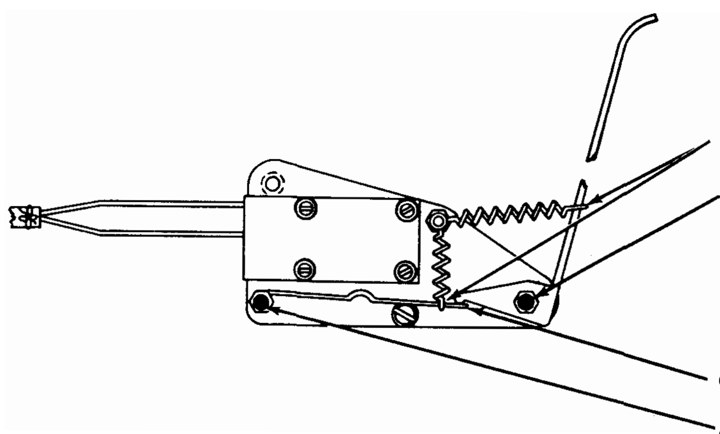
O2 G	PIVOT POINTS	TAPE DEPRESSOR
G	CONTACTING SURFACES - EACH END	CLAMP PLATE SPRING
O2 G	ROLLER SURFACE	DRIVE ROLLER

Figure 5-221. Typing Reperforator

f. TYPING REPERFORATOR BASE LRB32



f.01 LOW-TAPE ALARM SWITCH MECHANISM

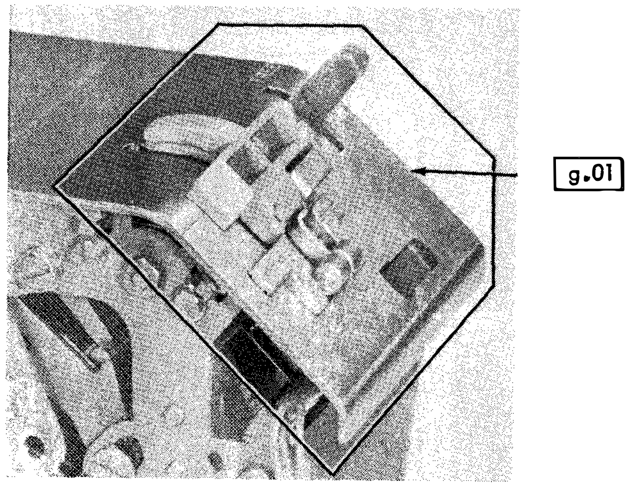


f.02 GEARS G TEETH GEARS

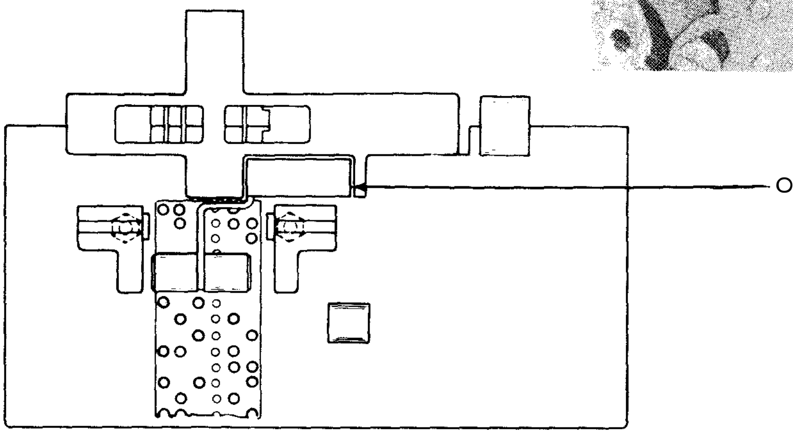
Figure 5-222. Typing Reperforator Base

g. TRANSMITTER DISTRIBUTOR LXD

TOP VIEW



g.01 TAPE GUIDE PLATE



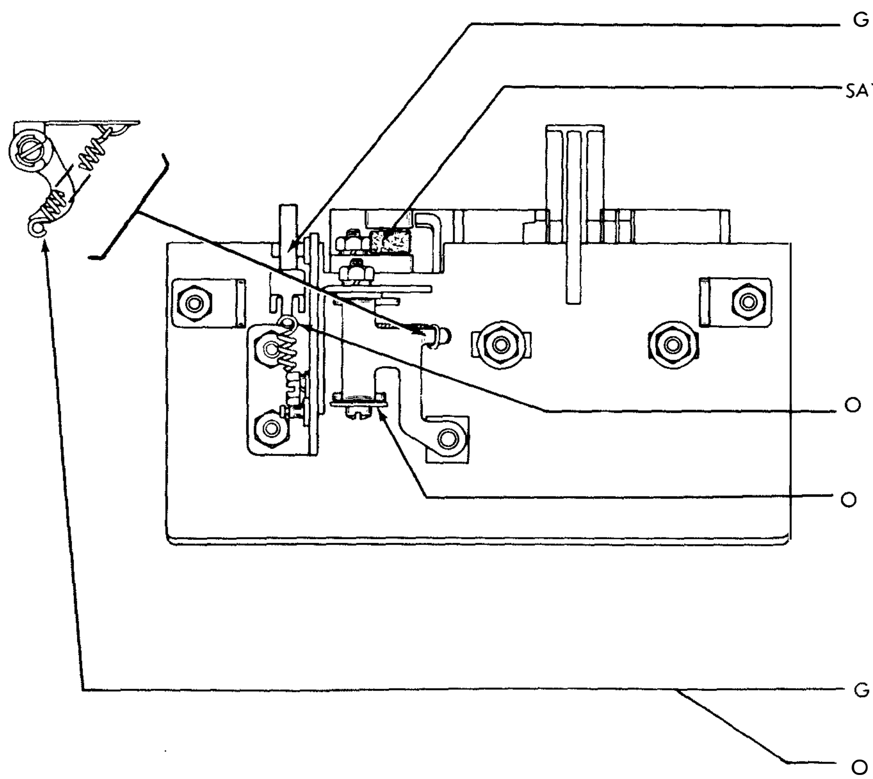
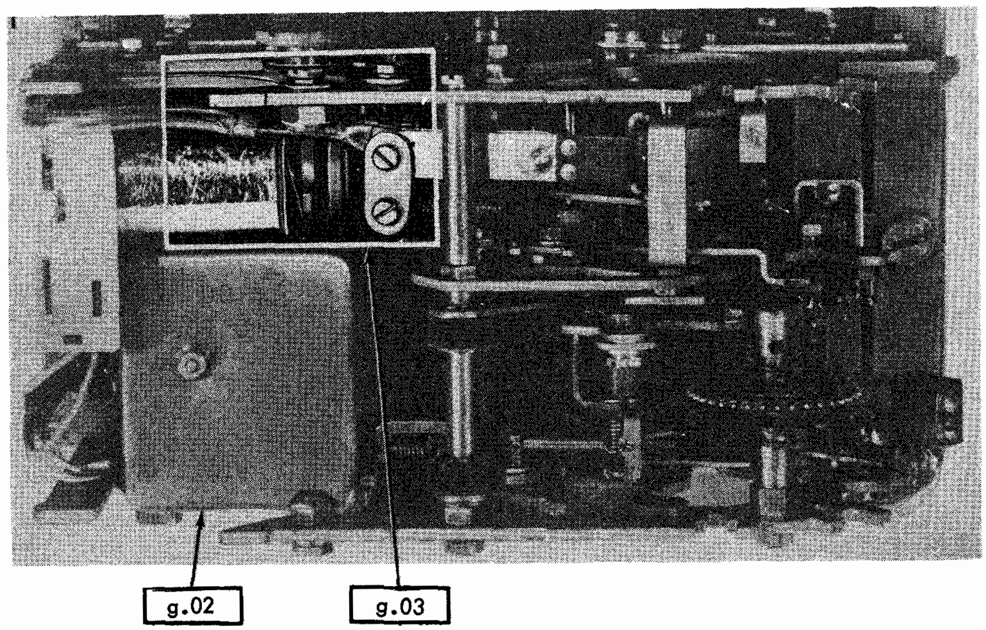


Figure 5-223. Transmitter Distributor



g.02 SIGNAL CONTACT ASSEMBLY

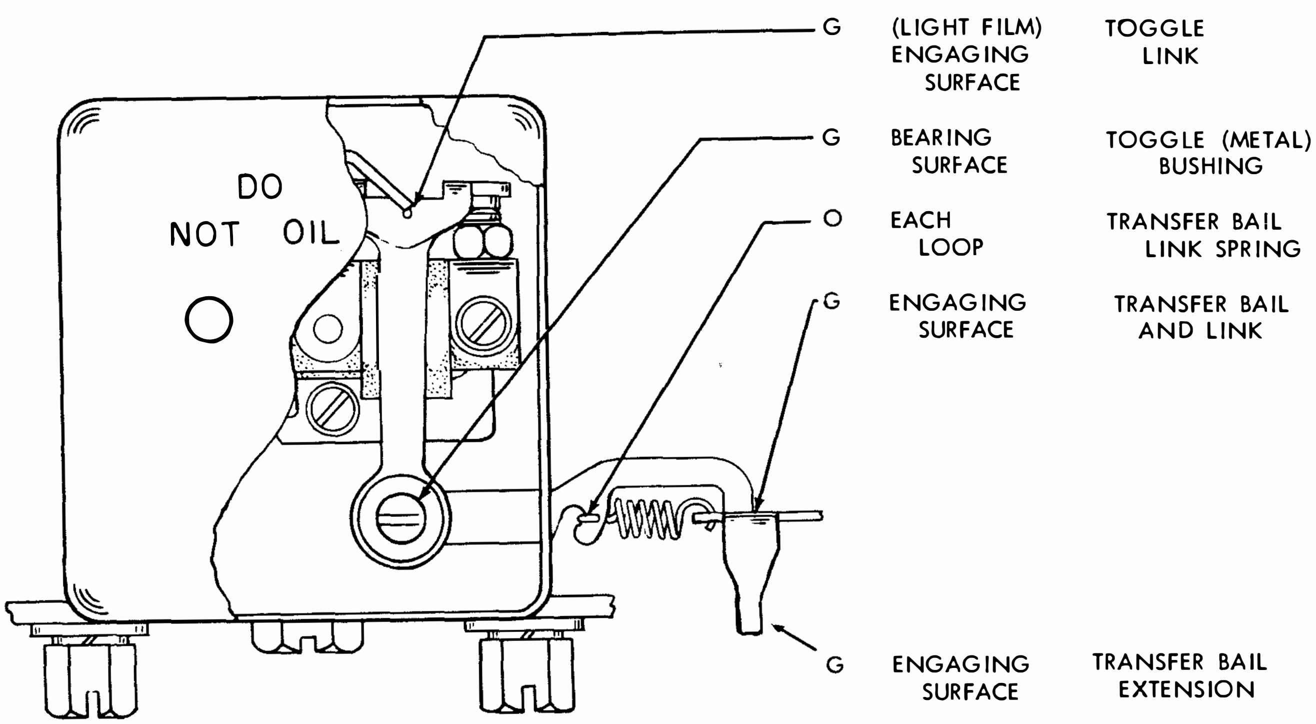
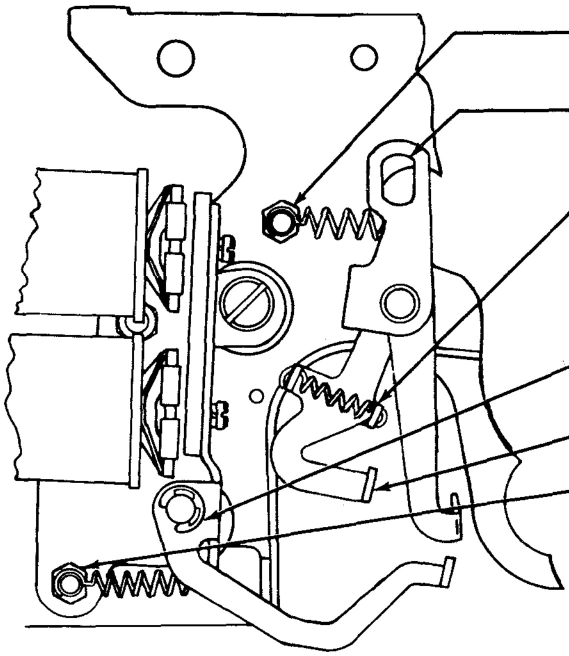


Figure 5-224. Transmitter Distributor

g.03 CLUTCH TRIP ASSEMBLY



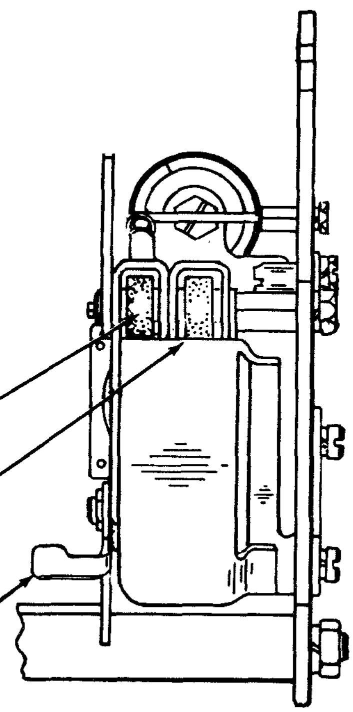


Figure 5-225. Transmitter Distributor

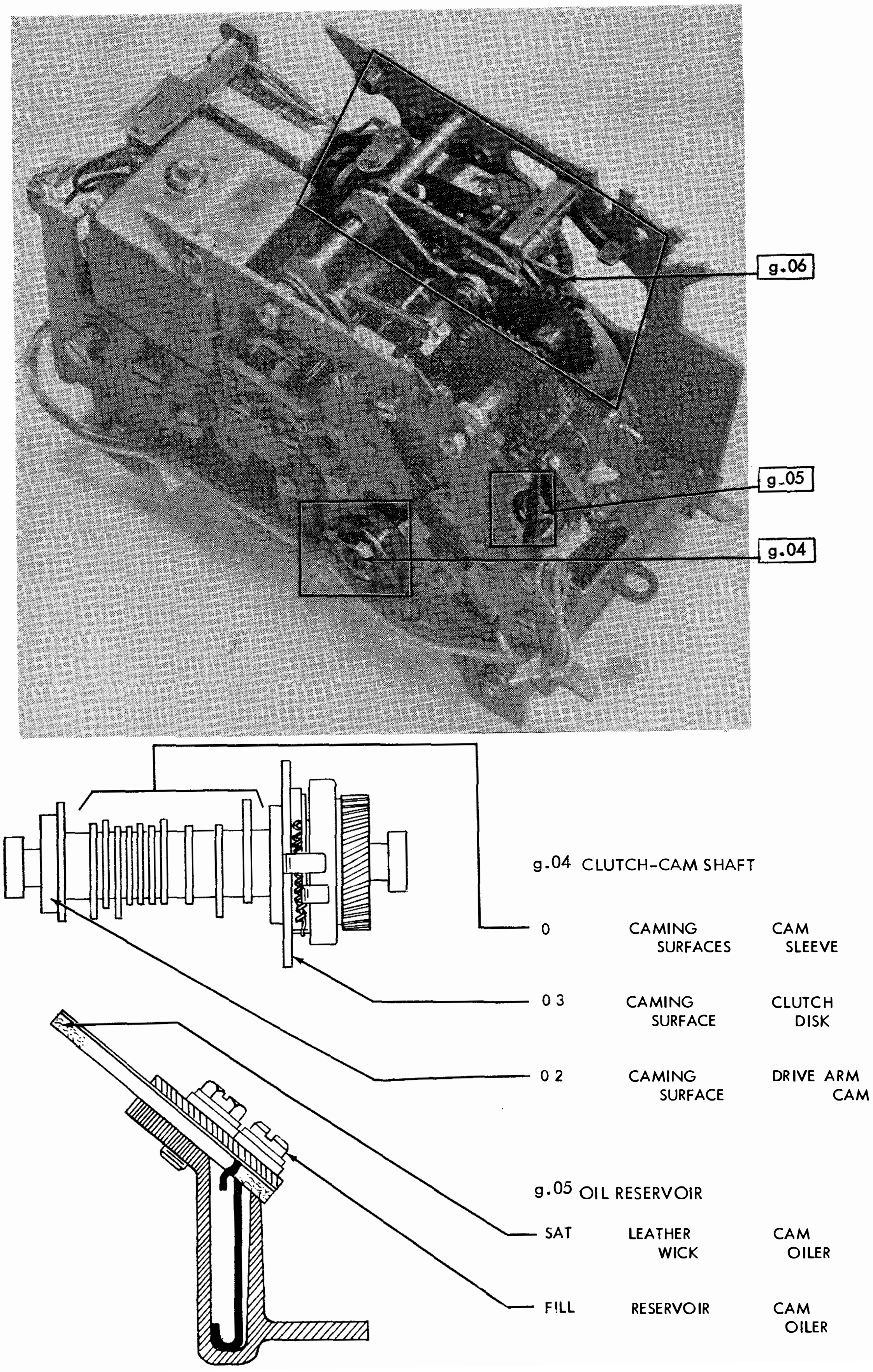


Figure 5-226. Transmitter Distributor

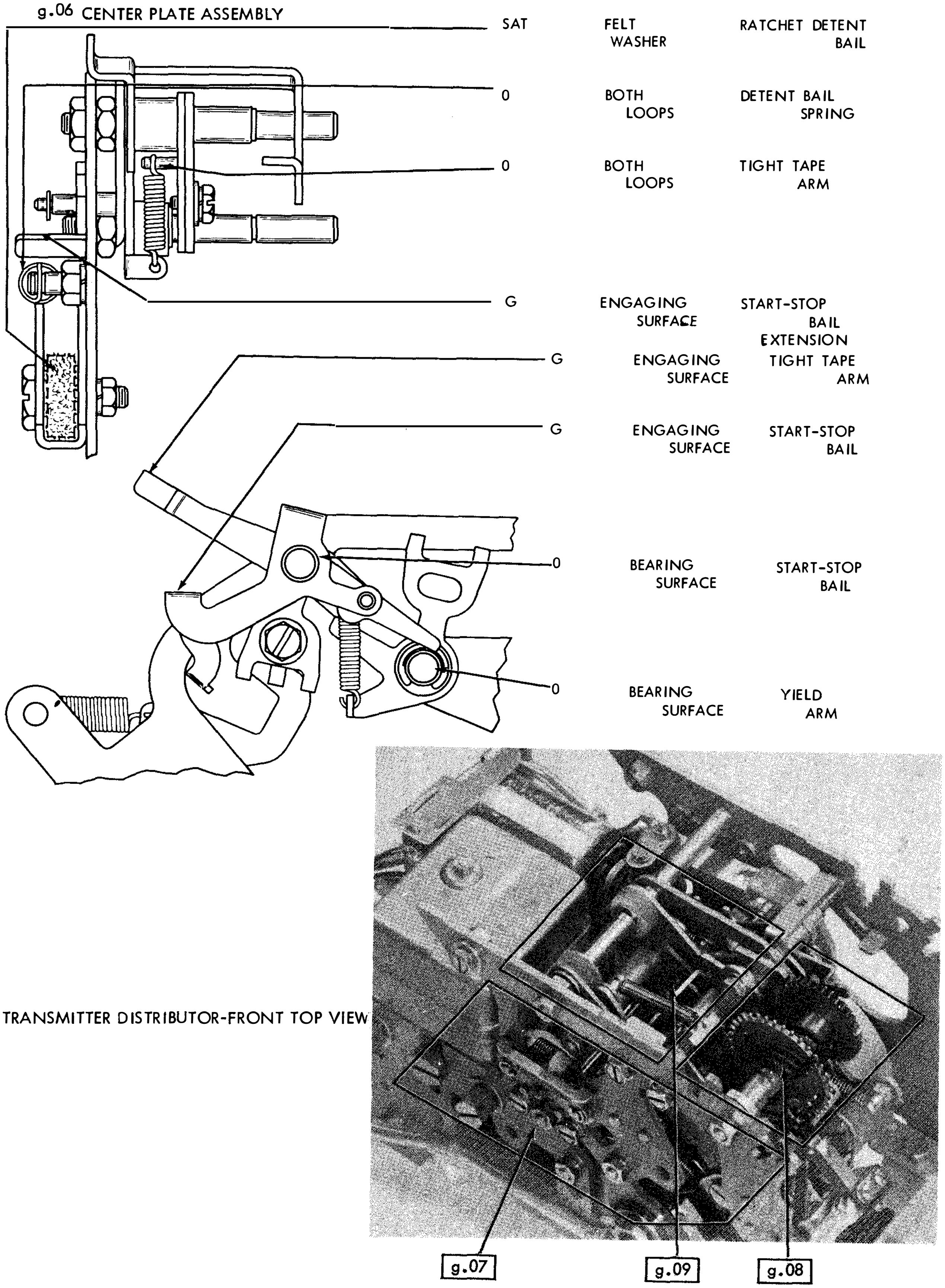
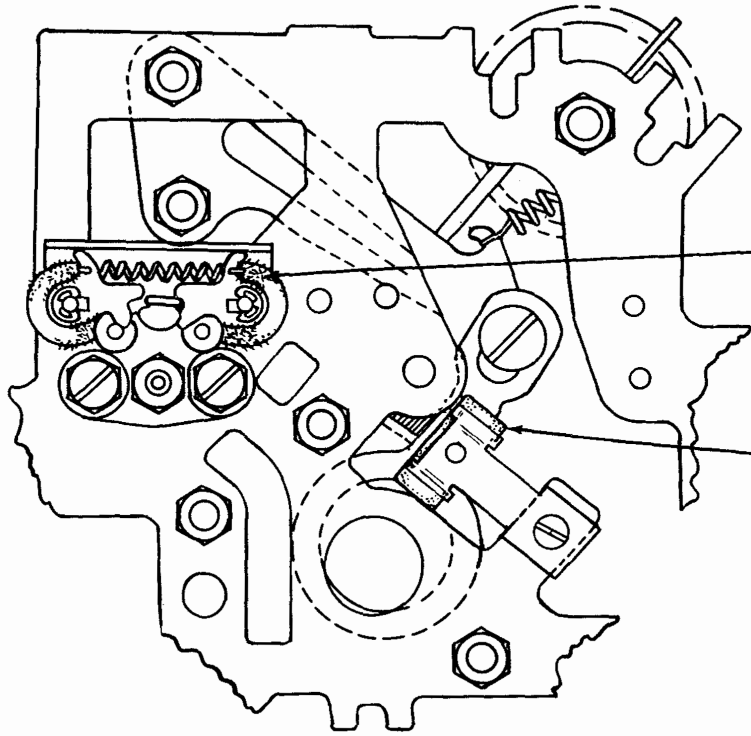


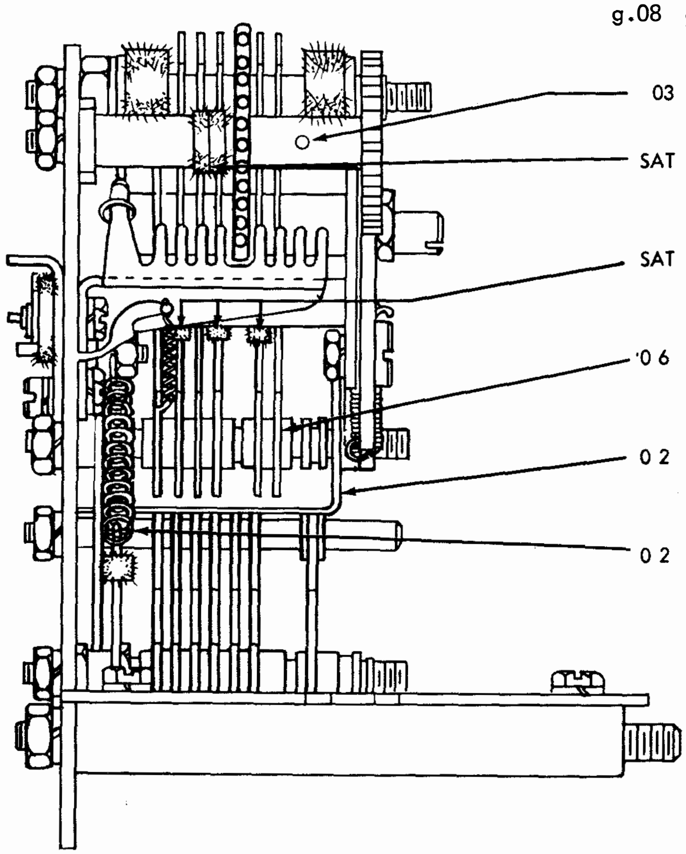
Figure 5-227. Transmitter Distributor

g.07 FRONT PLATE ASSEMBLY



SAT	FELT WICK	STABILIZER LATCH
SAT	LEATHER WICK	DRIVE ARM OILER

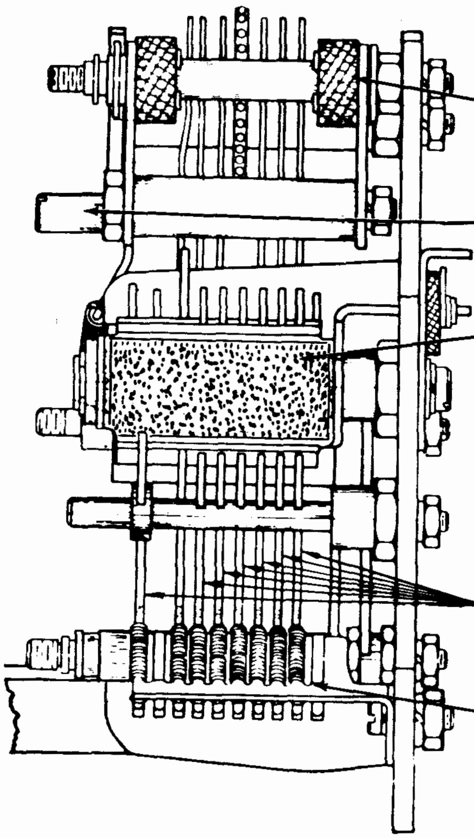
g.08 SENSING AND FEED MECHANISM



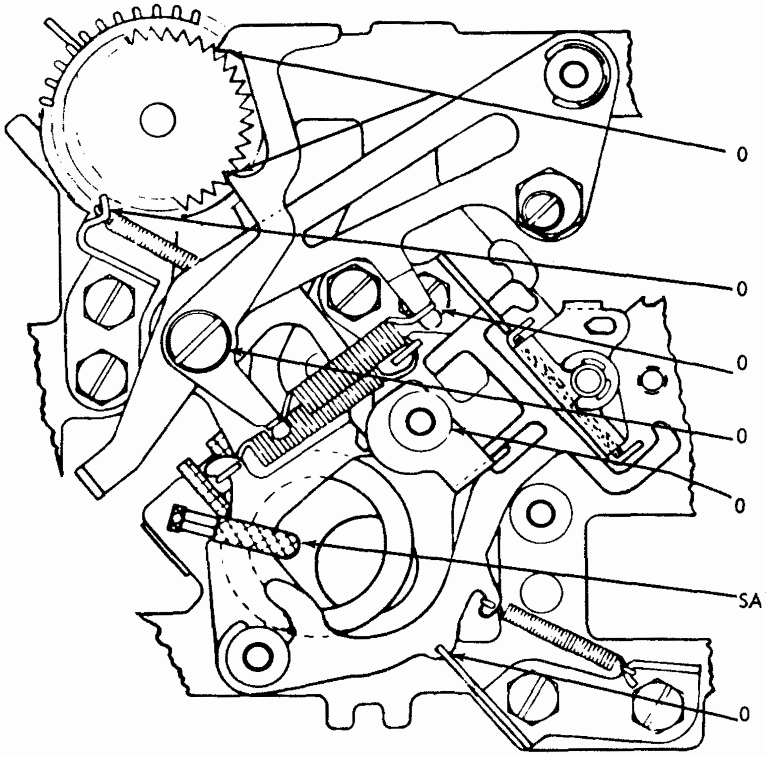
03	SHAFT	FEED WHEEL
SAT	FELT WICKS	FEED WHEEL BEARING
SAT	FELT WICKS	SENSING PINS
'0 6	SLIDING SURFACE	SENSING PIN GUIDE POST
0 2	SLIDING SURFACE	LOCKING BAIL
0 2	BOTH LOOPS	LOCKING BAIL SPRING

Figure 5-228. Transmitter Distributor

g.09 TRANSFER MECHANISM



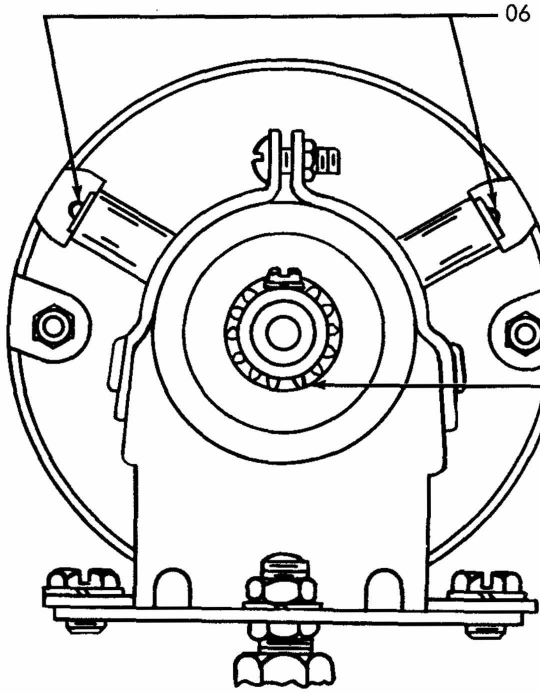
SAT	EACH FELT WASHER	MAIN BAIL PIVOTS
G	SLIDING SURFACE	BAIL DRIVE POST
SAT	LEATHER PAD	TRANSFER BAIL
0	SLIDING SURFACES	TRANSFER LEVERS
0	EACH LOOP	TRANSFER LEVER SPRINGS
0	EACH LOOP	LOCKING BAIL SPRING



0	TEETH	FEED PAWL AND RATCHET WHEEL
0	EACH LOOP	
0	EACH LOOP	FEED PAWL SPRING
0	SLIDING SURFACE	FEED PAWL PIVOT
0	ENGAGING SURFACE	LOCKING BAIL
SAT	FELT WASHER	LOCKING BAIL
0	SLIDING SURFACE	TRANSFER LEVERS

Figure 5-229. Transmitter Distributor

h. MOTOR UNITS (SYNCHRONOUS AND GOVERNED)

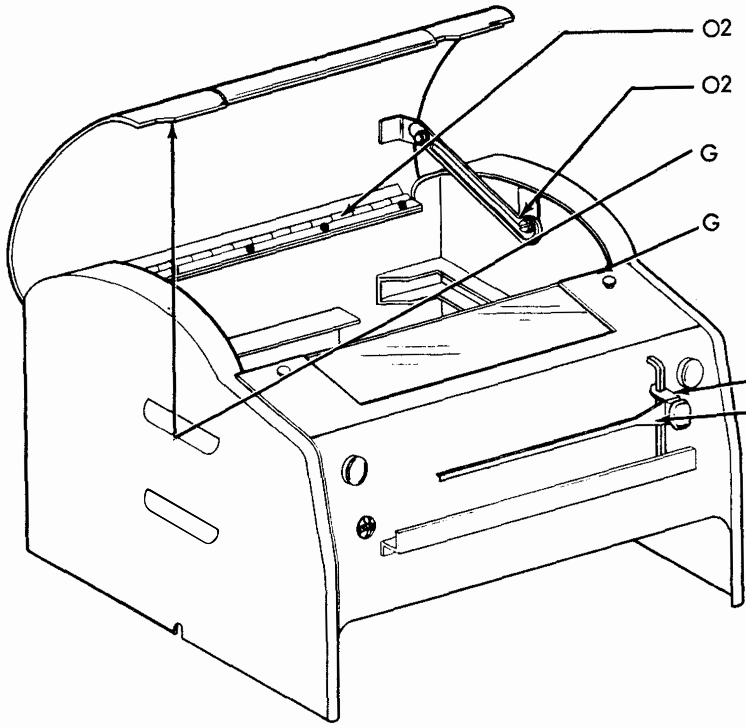


*APPLY OIL EVERY FOUR MONTHS. IF MOTOR IS DISASSEMBLED AT ANY TIME, REPACK BEARINGS WITH GREASE (BEACON 325) (TELETYPE 195298) OR ITS EQUIVALENT.

Figure 5-230. Motor Lubrication

i. CABINETS (LPC, LAC, LAAC AND LBAC)

i.01 CABINET LPC206BR



i.02 CABINET LAC214BR

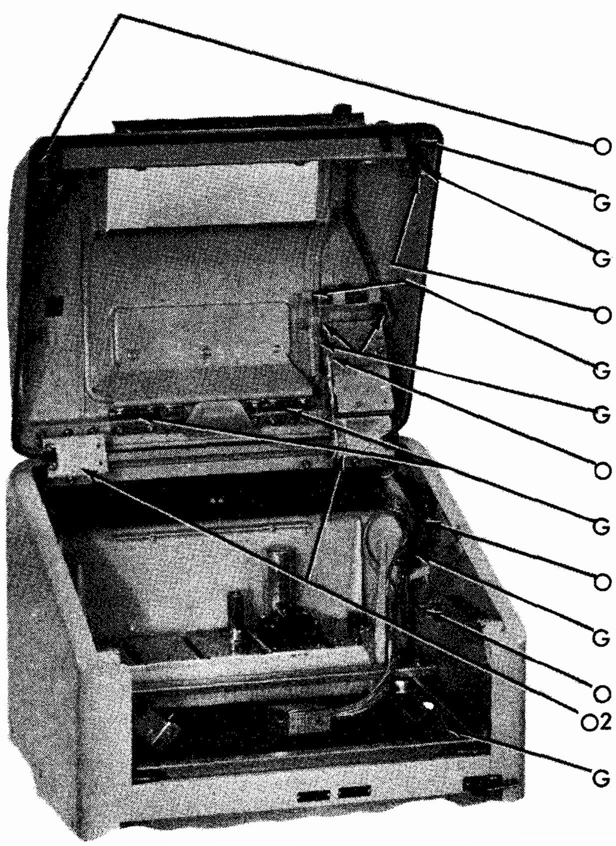
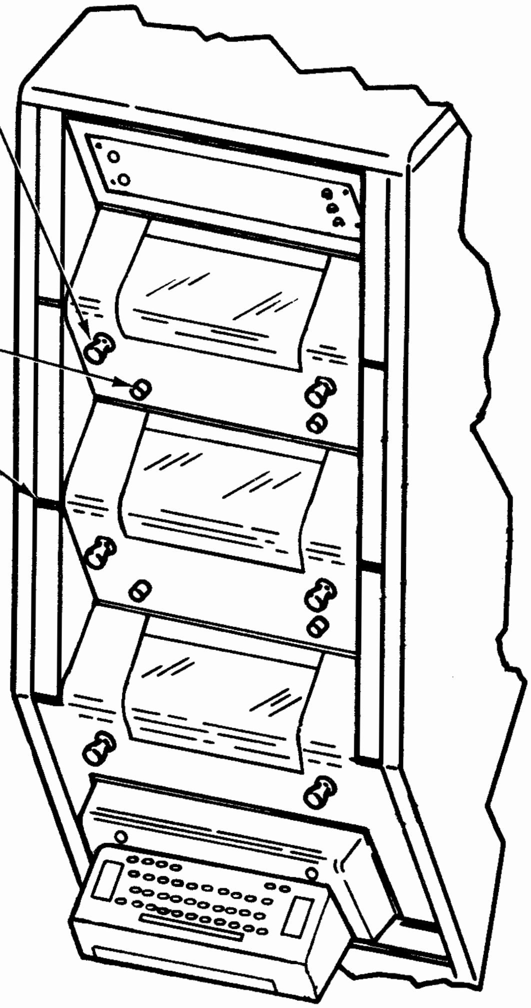


Figure 5-231. Cabinets

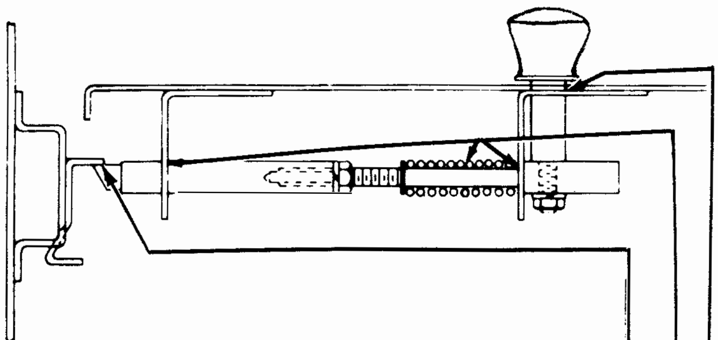
i.03 CABINET LBAC255BR



04 HINGES (6)

COVER

i.04 COVER LATCHES

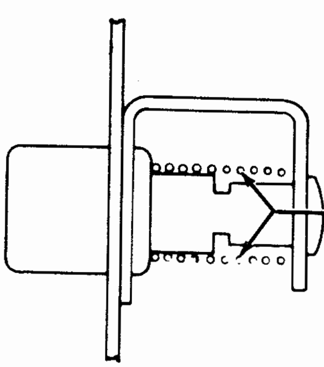


G SLIDING MEMBERS COVER LATCHES (6)

04 SPRINGS AND BRACKETS COVER LATCHES (6)

i.05 CARRIAGE RETURN AND LINE FEED KEYLEVERS

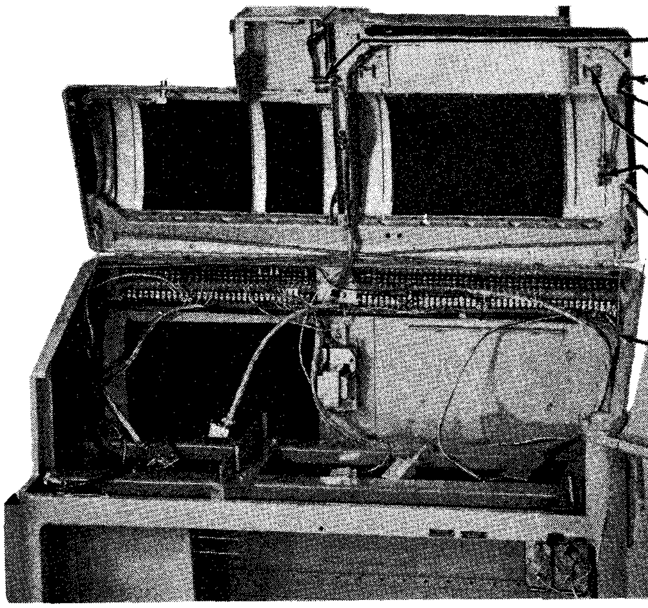
G SLIDING MEMBERS LATCH BOLT (6)



04 SPRING KEYLEVER (6)

Figure 5-231A. Cabinets

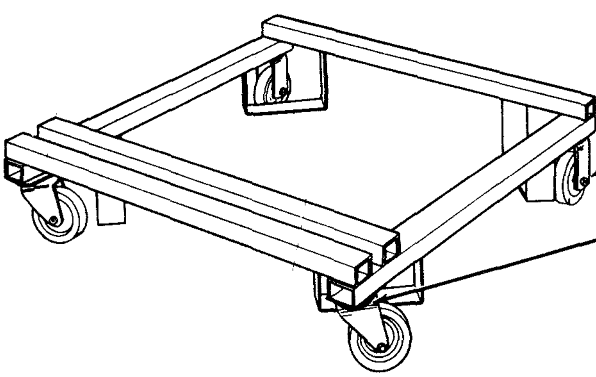
i.06 CABINET LAAC229BR



O3	SLIDING SURFACE-SPRING	TORSION SPRING -UPSTOP
O	BEARING SURFACE (2 PLACES)	DOME LATCH
G	LATCHING SURFACE (2 PLACES)	DOME LATCH
G	LATCHING SURFACE (ALL LATCHES)	ALL DOORS
O	BEARING SURFACE AND SPRING	RIGHT TOP DOOR UPSTOP ARM
O	BEARING SURFACE (2 PLACES)	DOME UPSTOP ARM

Figure 5-232. Cabinet

j. DOLLY



01	AXEL (2 PLACES)	WHEEL
02	PIVOT	CASTER

Figure 5-233. Dolly

k. PAPER WINDER LPW300BR AND PW201BR

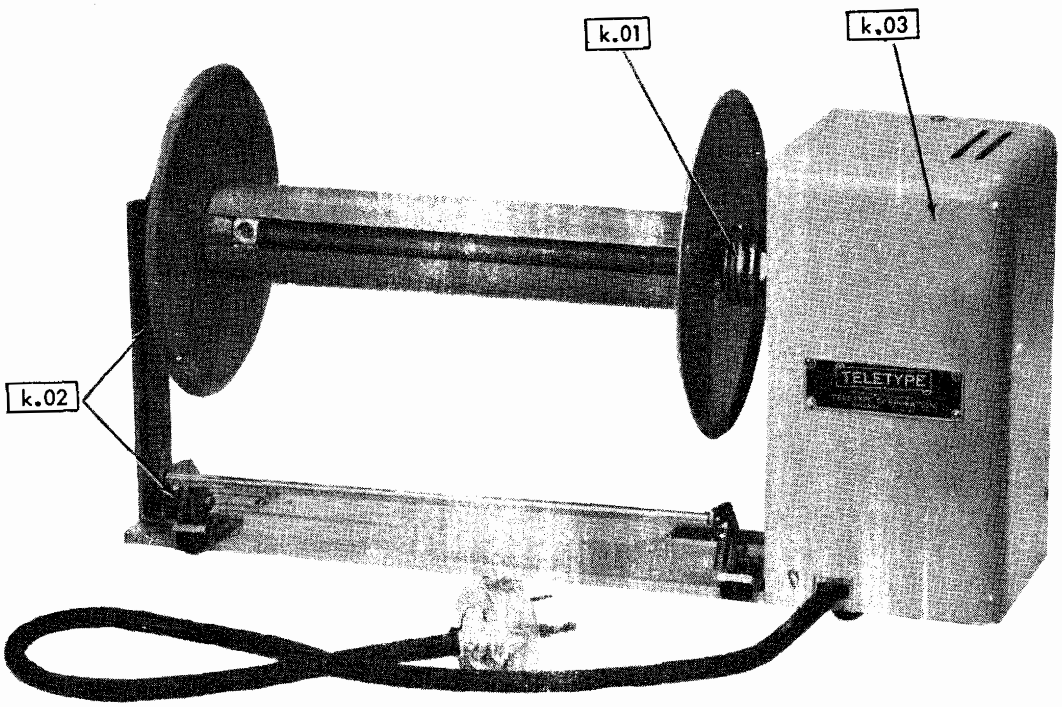
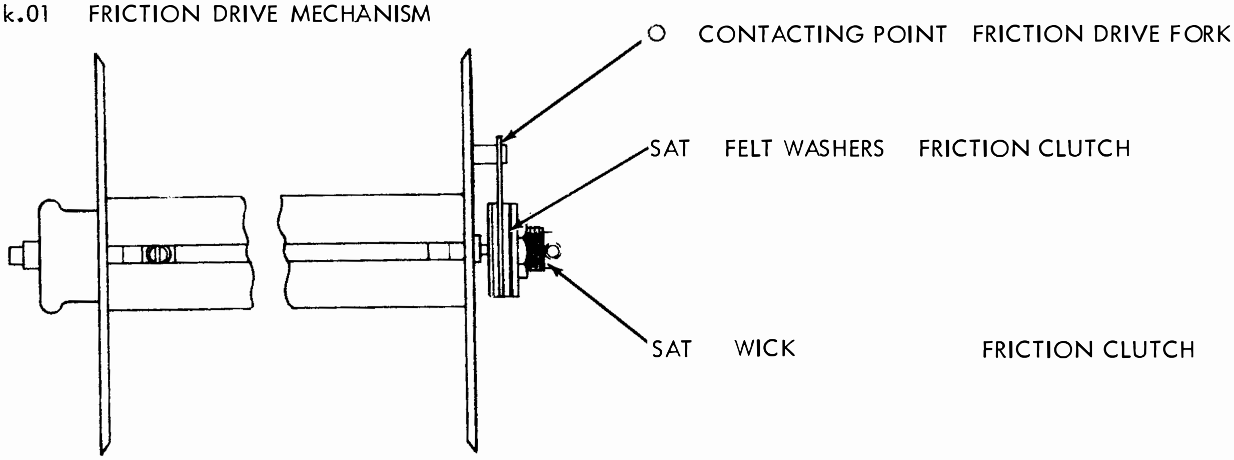
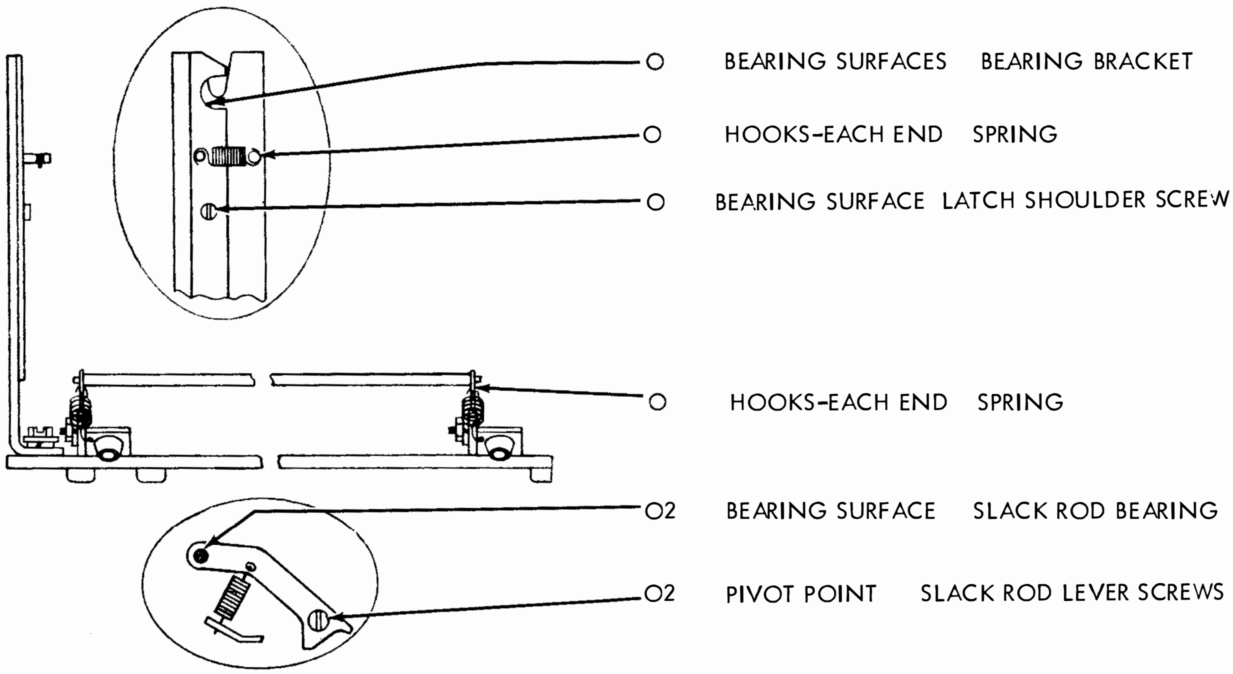


Figure 5-234. Paper Winder (PW201BR)

k.01 FRICTION DRIVE MECHANISM



k.02 BEARING BRACKET ASSEMBLY



k.03 MOTOR ASSEMBLY

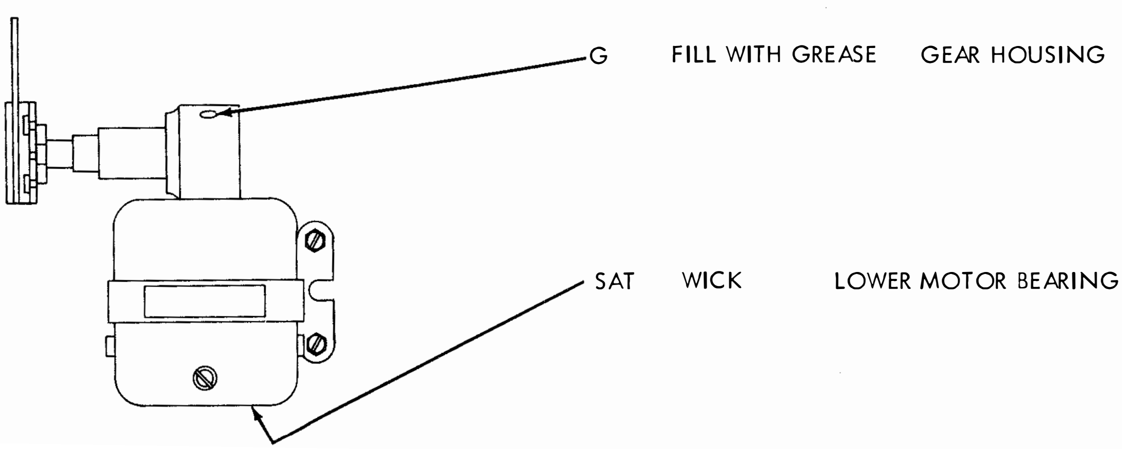
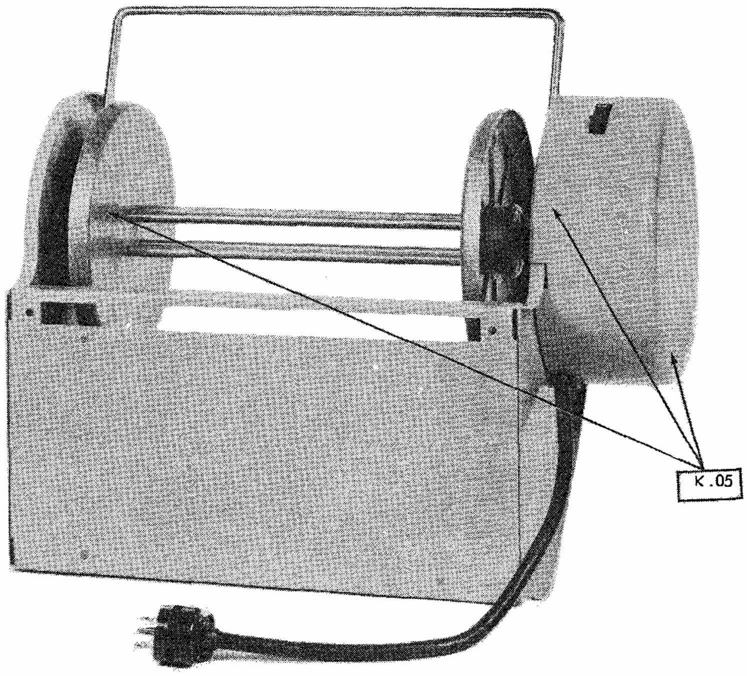
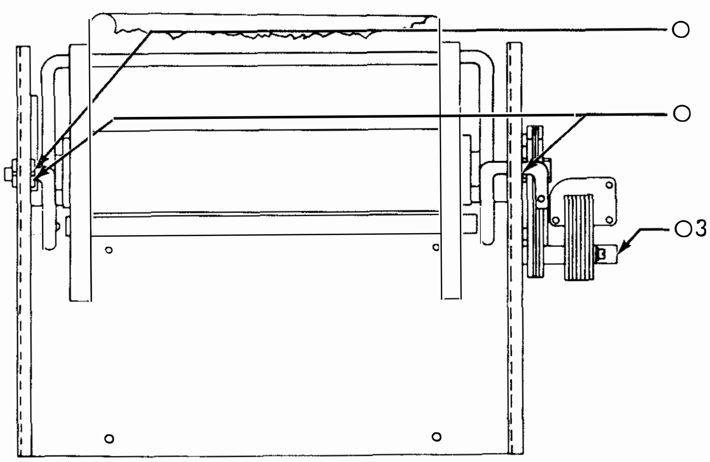


Figure 5-235. Paper Winder (PW201BR)

K.04 PAPER WINDER



K.05 PAPER SLACK BAIL AND DRIVE MOTOR



O	BEARING SURFACE	PAPER SPINDLE VEE BRACKET
O	BEARING SURFACE (2 PLACES)	PAPER SLACK BAIL
O3	BEARING	DRIVE MOTOR

Figure 5-236. Paper Winder (LPW300BR)

SECTION 6
SERVICE AND REPAIR

6-1. GENERAL

a. The information in this section covers most of the preventive maintenance and trouble shooting procedures employed in the servicing of the Teletype Equipment discussed in previous sections of this manual, and gives in detail, disassembly and reassembly procedures of component parts of the sets.

b. The preceding Section 5, Adjustment and Lubrication, contains lubrication information necessary for proper maintenance, and adjustment procedures necessary to return the equipment to proper operating condition following repair. Sections 5 and 6 must be used together to properly service and repair these sets.

c. This section is arranged to present information to maintenance personnel to aid in effectively locating and clearing trouble. It is necessary that technicians be thoroughly familiar with the principles of operation of the equipment (Section 4) as well as the adjusting routine (Section 5) before attempting any maintenance procedures. Refer to Paragraph 4 of this section for disassembly instructions.

d. In both preventive maintenance and repair, great care should be used to avoid dislodging, distorting or damaging springs or unnecessarily disturbing adjustments. Never use compressed air for cleaning operations since it may dislodge springs and scatter dust to other areas. If available, use vacuum cleaning equipment for removing loose dust, paper lint, chad and dirt from the teletypewriter set.

6-2. PREVENTIVE MAINTENANCE

a. PURPOSE - Preventive maintenance is applied for the purpose of detecting and correcting troubles before they develop to the point of interference with satisfactory operation of the equipment. Proper lubrication, but not over-lubrication, is an important preventive maintenance measure. Use care to prevent the introduction of trouble when work on the equipment is necessary. Do not disturb the adjustments unnecessarily.

b. INSPECTION - A thorough visual inspection of the equipment during periodic checks may uncover conditions that could possibly cause trouble later. The appearance of oxidized (red) metal dust adjacent to any bearing surface may indicate insufficient lubrication. A dislodged attaching part should always be correctly identified and replaced, and all associated parts should always be located at once. The adjustable clearances of working parts should also be observed. A visual examination should be accompanied by a manual one. Connections at terminal boards should be checked for tightness. Nuts and screws that lock adjustable features should be carefully observed for looseness and tightened if necessary. While cleaning the units, care should be exercised to avoid damage or distortion to delicate springs that might weaken their tension. Electrical contact points should be kept free and clear of dirt, oil, corrosion, or pitting. Check that operating clearance has been maintained when a contact has been cleaned.

c. CLEANING - Periodic cleaning is essential to proper performance. It will simplify the task to have available a supply of clean, dry cloths, a dry brush, a typewriter brush for type cleaning, a piece of crocus cloth and a supply of solvent.

CAUTION

THE SOLVENT IS HIGHLY VOLATILE - PROVIDE ADEQUATE VENTILATION AND AVOID BREATHING THE FUMES. SOME CLEANING COMPOUNDS ARE FLAMMABLE - DO NOT USE NEAR A FLAME. DO NOT USE ON RUBBER OR PLASTIC SURFACES. DO NOT USE ON THE INSULATION OF WIRES.

(1) OIL-IMPREGNATED BRONZE PARTS - Do not immerse oil-impregnated bronze (oilite) bearings and other oil-impregnated parts in solvent because the impregnated oils will dissolve. To clean these parts, use a stiff brush or wipe with an oil-soaked cloth.

(2) BALL BEARINGS - All ball bearings used on the teletypewriter set are sealed. Do not attempt to clean or lubricate them, other than to wipe them with a clean, dry cloth. Replace any bearings that do not spin freely.

(3) PLATEN - Clean the metal parts of the platen with a cloth dampened with solvent. Clean the rubber platen and the plastic paper roller with soap and water; wipe off with a clean dry cloth.

(4) MOTORS - Clean the motors as follows:

(a) Use a clean, dry brush to remove dust and dirt from the exterior of the motor. Remove all oil and gummy deposits with a clean, lint-free cloth dampened with solvent.

(b) To clean the internal parts of the motors; disassemble the motor. Remove all dust and dirt from the motor with a clean dry brush.

NOTE

Use care in cleaning not to damage the windings.

(c) Clean all parts made entirely of metal by immersing in a container of solvent.

(5) SELECTOR-MAGNET - Clean the coils of the selector - magnet with a cloth dampened in solvent. Remove oil from between the magnet cores and the armature with clean, lint-free paper.

(6) FELT WASHERS - Discard any dirty or gritty felt washers or oilers. Do not clean by immersing in solvent. When overhauling the equipment replace all nonmetallic washers, mechanically preformed felts, and felt washers regardless of condition, with new ones.

d. Routine Preventive Maintenance Check Chart - See Table 6-1.

CAUTION

TURN OFF THE POWER BEFORE STARTING MAINTENANCE OR REPAIR OPERATIONS.

TABLE 6-1. ROUTINE MAINTENANCE CHECK CHART

WHAT TO CHECK	HOW TO CHECK	PRECAUTIONS
1. Accumulation of dust and dirt.	Check for dust from paper beneath its path through typing unit and for dust and dirt on other parts of the equipment. Clean by wiping with a soft, lint-free cloth. Cleaning with an air hose should be avoided.	Be sure that springs are not disengaged or other parts disturbed in cleaning. Avoid getting dust or dirt into bearings or other moving parts.
2. Selector response.	If the selector responds to distorted signals in the manner specified in section 5, figure 5-7, no maintenance is required. If the requirements are not met, the following routine should be observed: a. Clean the magnet pole faces by running a clean piece of paper between them and the armature. b. Examine selector parts for wear and replace if worn. c. Check adjustment of selector mechanism. See figures 5-1, 5-2, 5-3 and 5-82. d. Check selector mechanism springs and replace if necessary.	
3. Adjustments.	Most adjustments will remain within specification limits for the life of the equipment and, therefore, do not require checking unless trouble occurs. The following adjustments should be checked and remade if necessary. a. Dashpot, figure 5-36. b. Carriage wire rope, figure 5-33. c. Signal generator contact, figures 5-74 and 5-150. d. All clutches, figures 5-18, 5-19, 5-62, 5-82, 5-101, and 5-138.	Exercise extreme precaution to guard against overtightening screws which might result in stripping.
4. Motor brushes.	Remove and replace if length is less than 3/8 inch. Wipe and brush off the accumulation of carbon dust.	Relationship of brush to armature should be maintained (governed motors only).
5. Governor brushes.	Examine length and replace if less than 3/8 inch remains. Wipe and brush off accumulation of carbon dust.	Be sure brush springs are in place (governed motors only).

TABLE 6-1. ROUTINE MAINTENANCE CHECK CHART - Continued

WHAT TO CHECK	HOW TO CHECK	PRECAUTIONS
6. Governor contacts.	Replace if badly burned.	Be sure that contacts are properly aligned.
7. Governor speed.	See section 5, paragraph 2b(10).	Applies to governed motor only. Motor may be considered on-speed if not more than 12 target spots pass a given point in ten seconds.
8. Lubrication.	For disassembly prior to lubrication, see instructions in paragraph 6-4. Remove the typer from the keyboard. Examine all of its mechanism for signs of lubrication failure, usually evidenced by the presence of red powdery substance at point of failure. If failure is observed, parts should be examined and if damaged they should be replaced. Lubricate the equipment in accordance with figures 5-165 through 5-235 and wipe off excessive lubricant with a clean cloth.	Be sure that springs are not disengaged and that other parts are not disturbed during examination and lubrication.
9. Cords, cables and wiring.	a. Check for cracked, deteriorated, frayed or cut insulation, and kinks or strain. b. Tighten loose connections and repair soldered connections. c. Clean connector straps with brush and solvent and dry. Connector contacts should be clean and bright. d. Check ground connections for corrosion, etc.	Be sure outer insulation on cables is wiped clean. Use moistened cloth. Do not use oil or solvent on rubber insulation.
10. Terminal Boards	a. Inspect for cracks, breaks and loose connecting or mounting screws. b. Tighten loose screws, lugs and bolts. c. Clean terminals with cloth and solvent. d. Clean corroded connections with crocus cloth.	Do not strip threads. Use correct size tools. Wipe off any moisture. Do not get solvent on insulation of wires.
11. Switches	a. Check mechanical action of switches. b. Tighten screws, resolder corroded or loose connection. c. Polish contact surfaces with burnishing tool after using crocus cloth or contact file.	Observe spring tension. Wipe off any moisture. Do not remove too much metal.
12. All mechanical assemblies.	a. Check for signs of wear. b. Over lubrication or lack of lubrication. c. Looseness of any parts. d. Check for cracks or other damage. e. Check that all parts move freely. f. Check for missing, broken or damaged springs. g. Check for accumulations of dirt and grime.	See precautions of Items 1, 3 and 8.
13. Ribbons	Check condition of inking ribbons and replace if necessary.	Observe installation procedure in Section 3, paragraph 2d(2).

TABLE 6-1. ROUTINE MAINTENANCE CHECK CHART - Continued

WHAT TO CHECK	HOW TO CHECK	PRECAUTIONS
14. Paper and tape	Check supply.	Install per instructions in Section 3, paragraphs 2d(1) and 2d(3).
15. Type box	Remove type box and check type faces for dirt. To clean type faces, rub type box lightly against a clean cloth dampened with solvent. Use dry type-brush to clean type faces.	See paragraph 6-4c(1). Do not get solvent in the type box. Do not use solvent on the type-brush.
16. Typewheel (ASR only)	Check characters on typewheel for dirt deposits. To clean, remove ribbon from guides and insert a piece of paper under typewheel. With typewheel in forward position, brush lightly with a dry type-brush. Wipe the cleaned area with a dry cloth. Rotate typewheel and repeat process to clean entire wheel.	Brush toward the front of the reperforator to avoid spattering dirt particles into operating mechanisms.
17. Keytops	Clean keytops and keyboard cover with a clean damp cloth.	Do not use solvent.
18. Signal generator Contacts	To check the contacts remove the contact box cover. File or burnish contacts if dirty, built-up or pitted.	Clean contacts thoroughly after filing or burnishing.
19. Bases (Keyboard, reperforator, transmitter distributor)	Remove deposits of dirt, oil and grease. Use cloth with solvent. Use brush to clean hard to reach places.	
20. Motors	a. Check for evidence of overheating (discoloration or odor of burned insulation). b. Clean motor per 6-2c(4). c. Tighten mounting strap screws. d. Check position of motor on mounting bracket.	Shaft should turn freely, smoothly and quietly.
21. Electrical Service Assembly	a. Check wiring and connections. b. Look for evidence of overheating of transformer or rectifier. c. Check fuses and remove corrosion with crocus cloth. d. Remove dust and dirt or oil. e. Check keyer tube pin alignment. f. Check tube socket for cracked insulation, loose pin contacts.	
22. Cabinets	a. Check dome and access doors and copy holder. b. Replace copy lamps and margin lamp if necessary. c. Check that cabinet is level. d. Clean cabinet with cloth dampened with water. Use cloth with small amount of solvent for grease deposits.	

6-3. TROUBLE SHOOTING

a. GENERAL - Failures of the equipment can be traced functionally by means of the trouble shooting chart, Table 6-2. A step-by-step analysis of the behavior of the equipment in response to the tabulated checks will indicate the area of trouble in which to apply remedial measures outlined below and referenced in the chart. Since, in most cases, each check step is conditioned by the procedure in preceding steps, examine the condition of all controls, and in particular the keyboard selector switch mode (paragraph 4-3q) before rechecking any step or otherwise performing any trouble shooting check out of sequence. An eliminative process relative to probable troubles indicated should greatly facilitate clearing faulty operation at any point in the equipment.

(1) When check of an adjustment is indicated, care should be exercised not to disturb the adjustment or related adjustments. Reference is made to adjustment illustrations in Section 5 as required. If adjustment is found to be needed, check Section 5, paragraph 2 to determine if related adjustments may be required.

(2) For removal and disassembly procedures, when indicated, refer to Section 6, paragraph 4 and to the exploded views of the equipment contained in Volume 2 of this manual.

(3) Comprehensive electrical analysis of the equipment is not generally required in trouble shooting. Reference to an "open" condition is to a circuit through which current will not flow, due either to a break, a poor connection, or a poor or dirty contact mechanism. Reference to a "closed" condition is to a normally or intermittently open circuit through which current will flow, either due to a short or to a sticky, dirty or poorly adjusted contact mechanism.

(4) "Running open" is a condition created by an open signal circuit, resulting in operation of typing and printing mechanisms because of the absence of a stop signal to latch the function clutches.

(5) "Running closed" is a condition created by a closed signal circuit, resulting in failure of typing and printing mechanisms to respond to a signal, due to the absence of the start and spacing elements in the signal, or to mechanical failure.

(6) "Garbling" is a condition in which the response of the typing and printing mechanisms does not correspond to the mechanical or signal input.

NOTE

If trouble shooting checks indicate abnormal conditions, proceed to paragraph 6-3c, Elimination of Trouble Indications, in this section. If lubrication is indicated, proceed to paragraph 5-3, Lubrication.

b. PROCEDURE - The trouble shooting information presented in this section consists of operational, electrical, and mechanical checks designed to lead maintenance personnel to the specific part, adjustment, or electrical component that is causing the trouble in the equipment. A thorough knowledge of the sequence of operation for each functioning element is of fundamental importance. Refer to the theory sections of this manual to clarify the operation and function of all teletypewriter parts. Because the teletypewriter sets are an assemblage of components, the first step in troubleshooting, if the trouble is not obvious, is to sectionalize the trouble to a particular component, then determine what specific mechanism or electrical part is faulty.

(1) Make a visual inspection of the equipment to determine if the trouble is caused by loose line or power connections, improperly set switches, erratic motor speed, or improper rangefinder setting.

(2) Arrange the equipment to operate on a test circuit and perform the procedures given in the Installation Section (Sec. 2, par. 4) to sectionalize the trouble. These procedures are primarily performed after initial installation of new or repaired equipment and may be used to locate troubles when they occur.

(3) Localizing Electrical Troubles - Most electrical troubles are found at the various contacts in the equipment, which include, switch contacts, plug-in connector and pin contacts, terminal board contacts, soldered contacts, (including spliced wires), and chassis ground contacts. Electrical circuits in the teletypewriter set have terminal board connections at the points where tests must be made. Do not disturb the wiring more than necessary when testing or inspecting. Maintenance personnel must be thoroughly familiar with the schematic and wiring diagrams and use them while making point-to-point checks of the circuits. Schematic wiring diagrams of external equipment to which the teletypewriter set is connected furnish information helpful for testing and localizing trouble.

(a) Power Supply Checks - To be sure that proper operating conditions exist, check the input power, ac circuits, and dc circuits in turn before making other tests. These checks will, of necessity, include normal operation of the parts in these circuits and the requirements of all adjustments which would affect the indicated trouble as related to the parts. When check of an adjustment is indicated, care should be exercised not to disturb the adjustment or related adjustments.

(b) Continuity, Resistance, and Capacitor Checks

1. Continuity. The continuity check is used to locate suspected open circuits. In making continuity checks, be sure that parallel current paths are disconnected. Make the tests by checking the continuity through the circuit suspected to be faulty by connecting the test leads so that the current can go only through the suspected circuit. Be sure no other part of the circuit is shunting the circuit being tested. If necessary, disconnect certain leads. Check all likely circuits, in this manner. If, after checking all possible causes, the fault cannot be located, make a continuity test of the entire circuit. Test from one terminal to a half-way point in the circuit. If continuity is indicated, test the other half of the circuit. Continue subdividing the circuit until the open point is definitely located.

2. Resistance. The resistance check is used to locate suspected open or shorted coil windings, transformer windings, motor windings, fixed resistors and inductors. In making resistance checks, follow the same general procedures as those described for continuity checks (1. Above).

3. Capacitor. The capacitor check is used to locate shorted or leaking elements. To test, discharge the suspected capacitor with an insulated shorting jumper. Then disconnect one lead and connect the capacitor to an ohmmeter. Use the highest reading scale. A good capacitor will be indicated by the ohmmeter pointer first moving up the scale rapidly, then returning more slowly to the infinity mark. A capacitor which is open will give a reading of infinite ohms. A shorted capacitor will give a reading of constant value between zero and infinity, depending upon the resistance of the short.

WARNING

Be extremely careful when handling charged capacitors. A severe electrical shock may be received from the capacitor or leads connected to a power supply in operation.

(c) Electrical Checks

1. Check for external interruptions to the 115-volt ac power supply at the cabinet terminal boards.

2. Check for open fuses located on the equipment electrical service assembly. Check for open fuse located on the auxiliary reperforator base. If open, rotate the motor by hand and check for excessive mechanical load before replacing the fuse. If a replaced fuse burns out immediately upon installation, check for shorted wiring in the motor, selector magnets, the copy light transformer, or the rectifier transformers.

3. Refer to Trouble Shooting Chart, Table 6-2, for a more complete tabulation.

(4) Localizing Mechanical Troubles - Although many mechanical troubles can occur in the teletypewriter sets, no difficulty should be experienced in locating the fault if the sequence of operation is checked through its various steps. When a mechanical function fails to operate, or operates in a faulty manner, the trouble may be in a particular adjustment, or series of adjustments, or it may be in a particular assembly. One method for checking troubles involves checking the individual requirement for all adjustments in the faulty subassembly or mechanism. Use the related data, found in the detailed adjustment procedures to determine the sequence to be followed. A second method involves setting up by hand the selecting mechanism and completing the operation by manually rotating the motor, shaft, gear, or cam that normally drive the assembly. This second method is usually quicker when only one adjustment is faulty and the remainder of the mechanism is in good condition. In such cases only the related adjustments need be checked. In some instances, faulty operation may be observed only when the mechanism is power-driven. The experience of the maintenance personnel and the over-all condition of the equipment will indicate which of the two methods is the better approach to various troubles. As with electrical troubles, additional aid in locating mechanical troubles may be secured from records of previous troubles and adjustments. The procedure for localizing mechanical trouble is divided into the effects of the trouble observed. See Table 6-2.

NOTE

In cases requiring operation of the keyboard (LK25 or LAK21) for test purposes, the clutch trip magnet (synchronous pulsed magnet) must be operated by a current of approximately 0.050 amperes dc or by mechanically blocking the magnet armature in its operated position in order to unblock the clutch trip bar.

TABLE 6-2. TROUBLE SHOOTING CHART FOR RO, KSR, ASR, AND MULTIPLE KSR AND RO SETS AS APPLICABLE

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	NEXT STEP	CORRECTION (REFER TO PARAGRAPH)
1	Main power switch ON; cabinet switch in NORMAL position; cabinet lamps lighted; keyboard motor starts.	No cabinet illumination.	Check external power.	6-3c(1)(a)
			Check main fuse.	6-3c(1)(b)
			Check cabinet transformer.	6-3c(1)(c)
		Some cabinet copy lamps not illuminated.	Check bulbs and sockets.	6-3c(1)(d)
		Margin indicator, end-of-line lamp not illuminated.	Check steps 14 and 19 in normal checking sequence.	
2	Auxiliary power switch ON; auxiliary motor starts (synchronous).	Motor does not start.		
			Check power connections.	6-3c(2)(a)
			Check auxiliary fuse.	6-3c(2)(b)
			Check motor thermal cut-out switch.	6-3c(2)(c)
3	Motors (synchronous) run.	Motors run at incorrect speed.	Check power line frequency.	6-3c(2)(d)
1, 2 (ref)	Auxiliary motor (governed) starts.	Motor does not start.	Check power connections and auxiliary fuse.	6-3c(2)(a) 6-3c(2)(b)
			Check motor brushes and governor brushes.	6-3c(3)(a)
			Check governor adjustment.	6-3c(3)(b)
3 (ref)	Motor (governed) run.	Motors run at incorrect speed.	Check 115 V ac line voltage.	6-3c(3)(b)
			Check motor and governor brushes.	6-3c(3)(a)
			Check governor adjustment.	6-3c(3)(b)

TABLE 6-2. TROUBLE SHOOTING CHART FOR RO, KSR, ASR, AND MULTIPLE KSR AND RO SETS AS APPLICABLE (Continued)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	NEXT STEP	CORRECTION (REFER TO PARAGRAPH)
3 (ref)	Motor (governed) run.	Motors run at incorrect speed.	Check governor resistor.	6-3c(3)(c)
		Motor speed uncontrollable.	Check governor capacitor and resistor.	6-3c(3)(d)
			Check for sticking governor contacts.	6-3c(3)(d)
4	Typing unit runs closed on idle signal; operates on signal impulse. Keyboard selector switch in K mode on ASR sets.	Typing unit runs open.	Check connection of cables from terminal boards.	6-3c(4)(a)
			Check for open selector unit magnets.	6-3c(4)(b)
			Check associated tube in electrical service unit.	6-3c(4)(c)
			Check signal line.	6-3c(4)(d)
			Check rectifier.	6-3c(4)(e)
			Check contact mechanisms in keyboard and transmitter distributor signal generators.	6-3c(4)(f)
			Check keyboard electrical lock switch contacts.	6-3c(4)(g)
			Check mechanical linkages.	6-3c(4)(h)
		Typing unit runs closed.	Check contact mechanisms in keyboard and transmitter distributor signal generators for open spacing contacts.	6-3c(4)(f)
			Check 6005 tube in Electronic keyer.	6-3c(4)(c)
			Check mechanical linkages.	6-3c(4)(h)

TABLE 6-2. TROUBLE SHOOTING CHART FOR RO, KSR, ASR, AND MULTIPLE KSR AND RO SETS AS APPLICABLE (Continued)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	NEXT STEP	CORRECTION (REFER TO PARAGRAPH)
		Typing unit runs closed.	Check clutch trip magnet.	6-3c(4)(i)
		Auxiliary typing reperforator runs open.	Check selector unit.	6-3c(4)(b) 6-3c(4)(h)
			Check associated tube in electrical service unit.	6-3c(4)(c)
		Auxiliary typing reperforator runs closed on verifiable incoming signal (or with signal line wired in series with the keyboard signal circuits for test purposes).	Check selector unit.	6-3c(4)(b) 6-3c(4)(h)
			Check electrical service unit.	6-3c(4)(c)
5	Depress SEND or KBD UNLK key and type; local transmission produces typed copy in typing unit. (Mechanically operate keyboard trip magnet on ASR and KSR sets, send test message to RO sets.)	Selector receiving margin short.	Check line current and keyer.	6-3c(5)(a) 6-3c(4)(e) 6-3c(4)(c)
			Check selector magnets.	6-3c(5)(b)
			Check motor speed, Step 3.	
			Check mechanical linkages.	6-3c(5)(c)
			Check selector adjustments.	6-3c(5)(d)
		Intermittent errors.	Check line current and keyer.	6-3c(6)(a) 6-3c(4)(e)
			Check motor speed, Step 3.	
			Check selector magnets.	6-3c(5)(b)
			Check mechanical linkages.	6-3c(5)(c)
			Check range finder.	6-3c(6)(b)
			Check selector and code bar adjustments.	6-3c(6)(c)

TABLE 6-2. TROUBLE SHOOTING CHART FOR RO, KSR, ASR, AND MULTIPLE KSR AND RO SETS AS APPLICABLE (Continued)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	NEXT STEP	CORRECTION (REFER TO PARAGRAPH)
		Gaining or losing a pulse.	Check mechanical linkages.	6-3c(7)(a)
			Check selector and code bar adjustments.	6-3c(7)(b)
		Garbling	Check line current or keyer.	6-3c(6)(a) 6-3c(4)(e)
			Check motor speed, Step 3.	
			Check selector magnets.	6-3c(5)(b)
			Check range finder.	6-3c(6)(b)
			Check mechanical linkages.	6-3c(8)
		Ribbon fails to feed or reverse.	Check riobon eyelet.	6-3c(9)(a)
			Check mechanical linkages.	6-3c(9)(b)
			Check detent cam.	6-3c(9)(c)
			Check ribbon adjustments.	6-3c(9)(d)
		Failure to position.	Check mechanical linkages.	6-3c(10)(a)
			Check adjustments.	6-3c(10)(b)
		Failure to print.	Check mechanical linkages.	6-3c(11)(a)
			Check ribbon installation.	6-3c(11)(b)
			Check adjustments.	6-3c(11)(c)
6	LOC LF key depressed; paper feeds into typing unit at rapid rate.	No line feed.	Check mechanical linkages.	6-3c(12)(a)
			Check local line feed adjustment.	6-3c(12)(b)
			Step 16.	

TABLE 6-2. TROUBLE SHOOTING CHART FOR RO, KSR, ASR, AND MULTIPLE KSR AND RO SETS AS APPLICABLE (Continued)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	NEXT STEP	CORRECTION (REFER TO PARAGRAPH)
7	LOC CR key depressed; type box carriage returns to left hand margin.	Type box does not return.	Check mechanical linkages.	6-3c(13)(a)
			Check local carriage return adjustment.	6-3c(13)(b)
			Step 15.	
8	BLANK key depressed twice successively; local keyboard is locked.	Continued local transmission (without use of SEND or KBD UNLK key) produces typed copy.	Check blank and keyboard lock function levers.	6-3c(14)(a)
			Check code bar adjustment.	6-3c(14)(b)
			Check keyboard lock mechanisms.	6-3c(14)(b)
9	Space bar depressed; type box carriage advanced one character without printing; any character depressed, type box prints and advances one character; FIGS key depressed and space bar operated twice successively, unit automatically shifts to LTRS.	Spacing failure or multiple spacing.	Check mechanical linkages.	6-3c(15)(a)
			Check adjustments of spacing, carriage return and function mechanisms.	6-3c(15)(b)
		Failure of unshift-on-space (feature may be mechanically disabled).	Check disabling screw.	6-3c(15)(c)
			Check adjustment.	6-3c(15)(c)
10	Operate any character key with type box at extreme right of platen; spacing does not occur at far end of line.	Failure of spacing suppression causes over-spacing at end of line when carriage is not returned.	Check mechanical linkages.	6-3c(16)(a) 6-3c(16)(b)
11	LTRS and FIGS depressed alternately with any other character key; shift indicated by correctly typed character.	Failure on letters-figures shift.	Check mechanical linkages.	6-3c(17)(a)
			Check adjustments.	6-3c(17)(b)
12	CAR RET key depressed; type box returns to left side of platen without line feed.	Failure on carriage return.	Check mechanical linkages.	6-3c(18)(a)
			Check adjustments.	6-3c(18)(b)

TABLE 6-2. TROUBLE SHOOTING CHART FOR RO, KSR, ASR, AND MULTIPLE KSR AND RO SETS AS APPLICABLE (Continued)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	NEXT STEP	CORRECTION (REFER TO PARAGRAPH)
13	LINE FEED key depressed; copy paper in typing unit is advanced one or two spaces depending on line feed lever setting.	Failure on line feed.	Check mechanical linkages.	6-3c(19)(a)
			Check line feed clutch and function bar and reset bail adjustments.	6-3c(19)(b)
			Check line feed lever.	6-3c(19)(c)
14	REPT key and any other character key held simultaneously depressed through at least one full line of typing; character repeats correctly and without spacing; margin indicator lamp illuminated prior to end of line.	Failure in repeat function.	Check mechanical linkage.	6-3c(20)(a)
			Check adjustments.	6-3c(20)(b)
		Margin indicator lamp failure.	Check switch adjustment.	6-3c(21)(a)
			Check cabinet lamp switch and socket and bulb.	6-3c(21)(b) 6-3c(1)(d)
15	SEND key depressed; keyboard is conditioned for transmission.	Local transmission does not produce typed copy.	Check lock bar switch.	6-3c(22)(a)
			Check mechanical linkage.	6-3c(22)(b)
			Check adjustments.	6-3c(22)(c)
16	Keyboard selector switch in K-T mode, repeat steps and indications 4 through 15.	Any failure noted in steps 4 through 15.	Steps 4 through 15.	
17	Local transmission produces typed, perforated tape in typing reperforator (ASR only).	Keyboard failure.	Check SEND key operated.	6-3c(23)(a)
			Check keyboard signal generator shaft and clutch linkages.	6-3c(23)(b)
		Perforating failure in reperforator.	Check mechanical linkages to keyboard motor.	6-3c(24)(a)
			Check function cam-clutch and rocker bail and trip mechanisms.	6-3c(24)(b)
			Check adjustments.	6-3c(24)(c)

TABLE 6-2. TROUBLE SHOOTING CHART FOR RO, KSR, ASR, AND MULTIPLE KSR AND RO SETS AS APPLICABLE (Continued)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	NEXT STEP	CORRECTION (REFER TO PARAGRAPH)
		Tape does not feed	Check adjustments.	6-3c(24)(d)
		Punch pins fail to penetrate	Check adjustments.	6-3c(24)(e)
		Typing failure in typing reperforator: No printing	Check ribbon installation.	6-3c(25)(a)
		Ribbon feed or reverse failure	Check ribbon eyelet.	6-3c(9)(a)
			Check mechanical linkages.	6-3c(25)(b)
			Check adjustments.	6-3c(25)(c)
18	LTRS and FIGS keys alternately depressed results in typing letters and figures symbol and perforating letters and figures code holes.	Perforating failure	Check mechanical linkages.	6-3c(26)(a)
		Typewheel fails to shift	Check function mechanism.	6-3c(26)(b)
			Check positioning mechanism.	6-3c(26)(c)
19	R and Y keys alternately depressed produces alternate mark-space code on tape and printed characters R and Y; character counter advances, and end-of-line indicator is illuminated at preset character.	Garbling	Check positioning mechanism.	6-3c(27)(a)
		Letters not positioned squarely for printing.	Check axial and rotary correcting mechanisms.	6-3c(27)(b)
		Only tops of characters printing	Check oscillating drive link and bail.	6-3c(27)(c)
		Character counter fails to advance one unit for each character typed	Check code bar mechanism.	6-3c(28)(a)
			Check stepping mechanism.	6-3c(28)(b)
			Check indicator.	6-3c(28)(c)
		End-of-line indicator lamp fails to illuminate	Check cabinet illumination switch.	6-3c(28)(d)
			Check switch contacts.	6-3c(28)(e)
			Adjust bracket and cam.	6-3c(28)(f)

TABLE 6-2. TROUBLE SHOOTING CHART FOR RO, KSR, ASR, AND MULTIPLE KSR AND RO SETS AS APPLICABLE (Continued)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	NEXT STEP	CORRECTION (REFER TO PARAGRAPH)
20	CAR RET key depressed; end-of-line lamp out; character counter indicator to zero	Character counter indicator fails to return to zero position	Check mechanical linkage.	6-3c(28)(a)
			Check reset mechanism.	6-3c(28)(g)
		End-of-line lamp stays on	Re-check switch contacts.	6-3c(28)(e-f)
21	Transmitter distributor base intermediate shaft rotates	No power to transmitter distributor main shaft	Check mechanical linkages and flexible couplings to keyboard motor.	6-3c(29)(a)
22	Tape lid (red) button depressed; perforated tape inserted; lid closed	Tape lid fails to open	Check mechanical linkage and loose or missing springs.	6-3c(29)(b)
			Check adjustment.	6-3c(29)(c)
		Tape feed wheel does not engage tape feed wheel holes	Check feed holes on tape.	6-3c(24)(d)
			Check tape guide adjustment.	6-3c(29)(c)
23	Start-stop lever moved to left (free wheeling); tape can be moved freely in tape guide	Tape binds when pushed manually through tape guide	Check mechanical linkages.	6-3c(29)(d)
24	Start-stop lever in RUN position, keyboard SEND key depressed; unit transmitting from input tape codes, monitored by typing unit	Clutch does not trip	Check keyboard selector switch for K mode position; should be K-T or T mode.	6-3c(30)(a)
			Check for raised tight tape lever on tape guide.	6-3c(30)(b)
			Check start-stop (tight tape) and tape out contacts.	6-3c(30)(c)
			Check lock bar switch contacts.	6-3c(22)(a)
		Typing unit runs open	Check both transmitter distributor and keyboard signal generator contacts.	6-3c(4)(f)

TABLE 6-2. TROUBLE SHOOTING CHART FOR RO, KSR, ASR, AND MULTIPLE KSR AND RO SETS AS APPLICABLE (Continued)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	NEXT STEP	CORRECTION (REFER TO PARAGRAPH)
24		Typing unit runs open	Check connections of cables from cabinet terminal blocks.	6-3c(4)(a)
		Typing unit runs closed.	Check signal generator contacts.	6-3c(4)(f)
			Check transfer bail, stabilizer and toggle mechanical linkages and adjustments.	6-3c(31)(a)
		Garbling	Check code perforations and typed characters of input tape.	6-3c(31)(b)
			Check orientation of sensing pins in tape code holes.	6-3c(31)(b)1
			Check mechanical linkages.	6-3c(31)(b)2
			Check contact box adjustments.	6-3c(31)(b)3
			Check capacitor for leakage.	6-3c(31)(b)3
		Transmission stops	Check main bail eccentric drive arm and trip assembly linkage.	6-3c(31)(c)
			Check input tape for double blank code or unperforated segment at sensing pins.	6-3c(31)(c)
			Steps 25 through 28 outline conditions for intentional interruption of transmission.	

TABLE 6-2. TROUBLE SHOOTING CHART FOR RO, KSR, ASR, AND MULTIPLE KSR AND RO SETS AS APPLICABLE (Continued)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	NEXT STEP	CORRECTION (REFER TO PARAGRAPH)
25	SEND key on keyboard depressed; transmission is resumed	Transmission does not resume	Step 24	
26	Input tape lifted slightly at right of tape guide, to raise tight tape lever; transmission stops	Transmission does not stop.	Check tight tape intermediate arm linkage.	6-3c(31)(d)1
			Check adjustments.	6-3c(31)(d)1
			Check switch contacts.	6-3c(30)(c)
27	Cut off end of fully perforated input tape fed through tape guide, or tape lid button depressed during transmission; transmission stops	Unit continues transmission of letters code.	Check tape out sensing pin	6-3c(31)(d)2
			Check mechanical operation of tape out switch.	6-3c(31)(d)3
			Check tape out switch contacts.	6-3c(31)(d)4
28	Start-stop switch moved to center (OFF) position during transmission; any character key on keyboard depressed NOTE Operation of keyboard while transmitter distributor is transmitting in K-T mode is possible but induces garbling in the typing unit and in the signal line	Keyboard operation does not produce typed copy on typing unit.	Steps 5 through 15	6-3c(31)(d)4
29	In K-T mode (auxiliary power switch in ON position); auxiliary typing reperforator produces typed, perforated tape in response to incoming line signal, or when wired in series with the keyboard signal line for test purposes	Troubles checked in steps 17 through 20 occur, with reference to auxiliary typing reperforator, rather than typing reperforator.	Steps 17 through 20 except delete keyboard induced conditions unless typing reperforator is wired to keyboard signal line for test purposes.	6-3c(23) through 6-3c(28)
30	Keyboard selector switch in T mode, repeat steps and indications 4 through 15	Any failure noted in steps 4 through 15.	Steps 4 through 15	

TABLE 6-2. TROUBLE SHOOTING CHART FOR RO, KSR, ASR, AND MULTIPLE KSR AND RO SETS AS APPLICABLE (Continued)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	NEXT STEP	CORRECTION (REFER TO PARAGRAPH)
31	Transmitter distributor operates as in steps 21 through 27	Any failure noted in steps 21 through 27	Steps 21 through 27	
32	While transmitter distributor is operating, repeat steps 17 through 20	Troubles checked in steps 17 through 20 occur, with reference to auxiliary typing reperforator, rather than typing reperforator	Steps 17 through 20	
33	In T mode (auxiliary power switch in ON position) auxiliary typing reperforator produces typed, perforated tape (See step 29 indications)	Troubles checked in steps 17 through 20 occur, with reference to auxiliary typing reperforator	Steps 17 through 20, except delete keyboard induced conditions unless typing reperforator is wired to keyboard signal line for test purposes.	
34	Tape feed-out button depressed when typing reperforator is in idling condition on line; predetermined measure of tape feeds out; incoming signal impulse stops feed-out	Tape fails to feed	Check switch.	6-3c(32)(a)
			Check magnet and armature.	6-3c(32)(b)
			Check mechanical linkages.	6-3c(32)(c)
			Check adjustments.	6-3c(32)(d)
		Incorrect tape length fed	Check tape length adjusting plate.	6-3c(32)(e)
		Feed-out does not stop on incoming line signal	Check latch lever mechanism linkage.	6-3c(32)(f)
35	Lift tape roll out of auxiliary tape container; low tape switch will close operating its audible or visible alarm	Low tape alarm does not operate	Check mechanical linkage controlling low tape switch.	6-3c(33)(a)
			Check low tape switch.	6-3c(33)(b)
36	Replace full tape roll in auxiliary tape container; low tape switch circuit to alarm will be open.	Low tape indicator continues to operate	Check low tape switch.	6-3c(33)(b)
37	Paper winder operates	Does not operate	Check external power.	6-3c(1)(a)

TABLE 6-2. TROUBLE SHOOTING CHART FOR RO, KSR, ASR, AND MULTIPLE KSR AND RO SETS AS APPLICABLE (Continued)

STEP	PROCEDURE AND NORMAL INDICATION	TROUBLE	NEXT STEP	CORRECTION (REFER TO PARAGRAPH)
37	Paper winder operates	Does not operate	Check main fuse.	6-3c(1)(b)
		Does not wind	Check paper is not slipping.	6-3c(34)(a)
			Check paper routing.	6-3c(34)(b)
			Check cylinder seated.	6-3c(34)(c)
			Check slack rod.	6-3c(34)(d)
			Check friction clutch.	6-3c(34)(e)
38	SYSTEM CHECK: With auxiliary typing reperforator signal line wired in series with keyboard signal line, keyboard selector switch in T mode, type test tape message. Feed tape into transmitter distributor; depress SEND key and move start-stop switch to ON position. Message should be monitored on typing unit and typing reperforator as typed. Feed tape prepared in typing reperforator into transmitter distributor. System operated without keyboard input.	Trouble in cabinet	Step 1	
		Trouble in motors	Steps 1 through 3	
		Trouble in typing unit	Steps 4 through 15	
		Trouble in keyboard	Steps 6 through 17	
		Trouble in typing reperforator	Steps 17 through 20	
		Trouble in transmitter distributor	Steps 21 through 28 and 30 and 31	
		Trouble in auxiliary typing reperforator	Steps 17 through 20 and 33 and 34	

c. ELIMINATION OF TROUBLE INDICATIONS (See Table 6-2. Follow steps in numerical order, and be sure correct procedure has been followed if indication is not normal.)

(1) CABINET ILLUMINATION FAILURE

(a) Check for external interruptions to 115 v ac power supply to the cabinet terminal boards.

(b) Check for open main fuse located on the right side of the electrical service assembly at the rear of the cabinet. If open, rotate the motor by hand and check for excessive load before replacing fuse. If a replaced fuse burns out immediately upon installation, check for shorted wiring in the motor, the transmitter distributor clutch coils, the selector magnet coils, the keyer, or the cabinet illumination transformer.

(c) Check for burned out cabinet transformer or loose transformer leads.

(d) If some, but not all three, of the cabinet copy lamps are illuminated, check for loose or broken socket connections or broken or burned out bulbs.

(2) MOTOR FAILURE (SYNCHRONOUS MOTOR)

(a) Check connection of cable to cabinet terminals and to keyboard. Check connection of auxiliary power cable from cabinet terminals to connector on typing reperforator base terminal board bracket.

(b) If auxiliary motor fails to start, check the auxiliary fuse on the typing reperforator base terminal board bracket. (See paragraph 6-3c(1)(b).

(c) Check for open thermal cut-out switch at the rear of the motor mounting bracket. If the red switch button is raised, rotate the motor manually and check mechanical linkages to the motor shaft for an obstruction. Depress the switch button. If the cut-out operates shortly after the motor switch has been reset, allow the motor to cool for five minutes and check further for the cause of overheating before resetting.

(d) If motor operates at incorrect speed, check for 60 cycle (plus or minus 0.5 cycle) frequency in the power supply.

(3) MOTOR FAILURE (GOVERNED MOTOR)

(a) Examine motor brushes and replace if length is less than 3/8 of an inch. Wipe and brush off accumulated carbon dust. Relationship of brush to armature should be maintained. Similarly, examine governor brushes, and be sure brush springs are in place.

(b) Check governor adjustment, figure 5-155. If motor runs at incorrect speed, check for 115 v ac power line supply. If line voltage is uniform and adequate, use a tuning fork to check the governor (Section 5, paragraph 2k). Adjust if required.

(c) If motor runs at incorrect speed, check for open governor resistor.

(d) If motor speed is uncontrollable, check for short in governor capacitor or resistor or for sticking governor contacts. Burnish and readjust contacts (figure 5-155).

(4) TYPING UNIT RUNS OPEN OR RUNS CLOSED

(a) Check connection of cable at cabinet terminal boards and receptacle to typing unit and of cable connections and receptacle to transmitter distributor base.

(b) Check for open magnets or faulty connections in selector unit on typing unit.

(c) Check for defective 6005 tube in electronic keyer of selector circuit involved.

(d) Check incoming dc signal at terminals in the cabinet. Check equipment independently of line signal (except auxiliary equipment, unless it is wired in series with the keyboard signal circuit for test purposes).

(e) Check operation of rectifier by verifying output current (d-c) across terminals of the cabinet terminal boards. See 6-3c(4)(c) also.

(f) Check signal generators in the keyboard and transmitter distributor for dirty or poorly adjusted contacts, figures 5-74 and 5-150. Examine the mechanisms for open marking contacts. Burnish and readjust dirty contacts.

(g) Check for dirty or poorly adjusted lock bar switch contacts, figure 5-72. Burnish contacts and readjust.

(h) Check for binding mechanism in selector unit and transfer mechanism. Check linkage for freeness.

(i) Check clutch trip magnet (synchronous pulsed magnet) adjustments figure 5-65.

(5) SHORT ON MARGIN

(a) Check for inadequate or excessive line current.

(b) Check for shorted selector magnet coils. Drag a thin piece of clean paper between the armature and the magnet core to clean a dirty or oily armature.

(c) Check for freeness in moving parts of the code bar linkages.

(d) Check selector adjustments, figures 5-2, 5-1, 5-3, 5-5, and 5-7 in order indicated.

(6) INTERMITTENT ERRORS

(a) Check for inadequate or excessive line current.

(b) Check for range finder setting beyond the range of incoming signal. For operational check, see paragraph 4-4d. See paragraph 5-2d for adjustment.

(c) Check selector and code bar adjustments, figures 5-2, 5-11, 5-57, 5-4, and 5-8 in order indicated.

(7) GAINING OR LOSING A PULSE

(a) Check for binds in moving parts of selector and code bar mechanism. Note freeness in the particular pulse linkage in trouble.

(b) Check selector and code bar adjustments on the particular pulse in trouble as indicated in figures 5-2, 5-11, 5-57, 5-4, and 5-8 in order indicated.

(8) GARBLING. - Check line current and keyer selector magnets, and range finder as indicated above. Check for binds in mechanical linkage of selector and code bar mechanisms illustrated in figures 5-2, 5-57, 5-3, and 5-5, omitting adjustments indicated therein.

(9) TYPING UNIT RIBBON FAILS TO FEED OR REVERSE

(a) Check position of ribbon eyelet between ribbon spool and ribbon reverse detent lever.

(b) Check for binds in moving parts of ribbon feeding or reversing mechanism. Check for freeness of ribbon feed levers, ribbon lever, ribbon reversing lever and ribbon reverse detent lever.

(c) Check loose detent cam set screws, figure 5-45.

(d) Check adjustments, figures 5-45, 5-46, and 5-47.

(10) FAILURE TO POSITION

(a) Check binds in moving parts of linkage for type box positioning mechanism. Check for freeness of main rocker shaft, the vertical positioning mechanism (figure 5-24) the suppression, 1, 2, 3, and common code bars (figure 5-23, shift slide drive linkage (figure 5-30), and oscillator rail linkage.

(b) Check adjustment figures 5-21, 5-23 and 5-24, 5-30, 5-23, (vertical positioning lever spring), 5-41, and 5-24 (vertical positioning lock lever spring).

(11) FAILURE TO PRINT

(a) Binds in printing carriage assembly should be checked. Check for freeness in moving parts and for missing springs.

(b) Check proper installation of ribbon (paragraph 3-2d(2).

(c) Check adjustments, figures 5-42 and 5-43.

(12) FAILURE ON LOCAL LINE FEED

(a) Check linkage from keylever to typing unit.

(b) Check local line feed adjustment, figure 5-69.

(c) Check the line feed mechanism, paragraph 6-3c(19).

(13) FAILURE ON LOCAL CARRIAGE RETURN

(a) Check linkage from keylever to typing unit.

(b) Check local carriage return adjustment, figure 5-71.

(c) Check carriage return mechanism, paragraph 6-3c(18).

(14) KEYBOARD LOCK FAILURE ON DOUBLE BLANK SIGNAL

(a) Check mechanical linkage of blank and keyboard lock function levers in function box, figure 5-48. Adjust as required.

(b) Check mechanical alignment of keyboard lock mechanisms on typing unit (figure 5-36) and keyboard (figure 5-69). Adjust as required.

(15) SPACING FAILURE OR MULTIPLE SPACING

(a) Check for binds in mechanical linkages from keyboard space bar. See figures 5-20 and 5-26 for mechanical requirements. Parts should operate freely.

(b) Check adjustments figures 5-26 (spacing trip lever bail cam plate), 5-15 (spacing clutch trip lever), 5-35 (carriage return lever), 5-26 (spacing trip lever spring), 5-26 (spacing trip lever bail spring), 5-25 (spacing feed pawl spring), 5-14 (clutch trip shaft set collar), 5-50 (function stripper blade arm), and 5-48 (function bar spring) in the order indicated.

NOTE

Do not confuse "spacing" as a mechanical function with the electrical signal line "spacing" or no current, condition.

(c) If unshift-on-space mechanism is inoperative, or if disabling the mechanism is desired, check the disabling screw and lock nut located over the unshift-on-space function lever at the extreme left of the function box. Lower the screw to disable the mechanism. Raise it to activate the feature. Adjust as indicated in figure 5-56.

(16) SPACING SUPPRESSION

(a) Check mechanical linkages of typing unit code bar suppression slide and the spacing clutch. Check in particular the relationship of the spacing suppression bail to the function lever involved (see figure 4-44).

(b) Check adjustments, figures 5-23, 5-37, 5-51, and 5-20.

(17) FAILURE ON LETTERS-FIGURES SHIFT

(a) Check for binds in the moving parts of the letters-figures shift linkage. Note freeness of selector and code bar linkage and letters and figures function slide (figure 5-27).

(b) Check adjustments, figures 5-50, 5-27, and 5-48 in the order indicated.

(18) FAILURE ON CARRIAGE RETURN

(a) Check for binds in moving parts of carriage return function linkage. Note freeness of selector and code bar linkage, function bar linkage and reset bail, and carriage return bail and slide.

(b) Check adjustments, figures 5-28 and 5-48.

(19) FAILURE ON LINE FEED

(a) Check for binds in moving parts of linkage for line feed function. Examine freeness of selector and code bar linkage, function bar and function bar reset linkage in the function box, line feed function slide arm and line feed clutch trip lever (figure 5-16), line feed bars (figure 5-21) line feed stripper, and line feed stripper bail (figure 5-52).

(b) Check adjustments, figures 5-16 (line feed clutch trip lever eccentric post), 5-16 (line feed clutch trip lever adjusting screw), 5-15 (trip lever spring tension), 5-28 and 5-48 in the order indicated.

(c) Perform the above checks in both 1 and 2 positions of the single-double line feed lever behind the platen at the left of the typing unit.

(20) FAILURE IN REPEAT FUNCTION

(a) Check freedom of linkage and mating of repeat keylever and code bar non-repeat lever (figure 5-68).

(b) Check adjustments, figures 5-68 and 5-69.

(21) MARGIN INDICATOR LAMP FAILURE

(a) Check margin indicator switch adjustment, figure 5-58.

(b) Check cabinet illumination switch for NORMAL ON position. Check margin indicator end-of-line lamp socket and bulb.

(22) KEYBOARD UNLOCK (SEND) FAILURE

(a) Check the keyboard lock bar switch at the right end of the code bar mechanism. With the SEND key depressed, the swingers should be positioned to the right, closing the unlocking contacts. Check for dirty contacts, burnish contacts, and adjust (see figure 5-72).

(b) Check mechanical linkage through code bar lock bar from keylever to lock bar switch.

(c) Check adjustment, figure 5-64.

(23) KEYBOARD FAILURE IN K-T MODE

(a) Depress SEND key and check mechanism (paragraph 6-3c(22).

(b) Check keyboard intermediate gear, signal generator shaft, and signal generator clutch linkages.

(24) REPERFORATOR FAILURE

(a) Check to determine that hex head set screws on flexible couplings are tightened firmly to the flats of shafts connecting jack shaft to keyboard motor through the gear and bearing bracket assembly.

(b) Check for binds in basket mechanism containing keyboard and typing reperforator code bar extensions and clutch latch lever (figure 5-78). Check function clutch and cam mechanisms (figures 5-83 and 5-84) and rocker bail operation. Check punch positioning (figure 5-86).

(c) Check adjustments, figures 5-78, 5-79, 5-82, 5-83, 5-84, 5-85, 5-86, and 5-88.

(d) TAPE DOES NOT FEED - Check adjustments, figures 5-90 through 5-92.

(e) PUNCH PINS FAIL TO PENETRATE - Check adjustment, figure 5-87.

(25) TYPING REPERFORATOR TYPING FAILURE

(a) Check ribbon installation (paragraph 3-2d(2).

(b) Check for binds in moving parts of ribbon feeding or reversing mechanism. Check for freeness of ribbon feed pawl, drive arm and rocker bail eccentric, retaining pawls, reversing arms, and reversing plate.

(c) Check adjustments, figures 5-117 through 5-119.

(26) TYPING REPERFORATOR LETTERS-FIGURES SHIFT FAILURE

(a) Check mechanical linkage from code bar extensions through punch slide latches and punch slides to punch pins for binding on erroneous code hole perforating sequence.

(b) Check function mechanism linkage and adjustments, figures 5-97 through 5-99 and 5-101 through 5-103.

(c) Check axial and rotary positioning mechanisms and adjustments, figures 5-107 through 5-112.

(27) GARBLING - Check axial and rotary positioning mechanism and adjustments, figures 5-107 through 5-112.

(a) Check free movement of linkages around eccentrics in linkage from code bar extension through transfer mechanism and bell cranks to push bars. Check the particular linkage for the code or code element (see figure 4-2) most frequently involved in the incorrect interpretation of the input signal.

(b) Check and adjust axial and rotary correcting mechanisms for firm positioning of correcting plate roller (axial) or correcting lever lobes (rotary) simultaneously with activation of the printing hammer.

(c) Check oscillating drive link and bail if only the tops of characters are printing. Mechanism may be withdrawing the type wheel prior to printing hammer stroke. Adjust per adjustment figure 5-107.

(28) CHARACTER COUNTER FAILURE

(a) Check for binds on character counter code bars in code bar mechanism (figure 5-64) and adjust as required.

(b) Check operation and adjustment of stepping mechanism (figure 5-122).

(c) Check that the indicator is fastened to the indicator cord and that the mechanism is free to move along the scale as the ratchet advances. Check adjustments, figures 5-120 and 5-121.

(d) Check cabinet illumination switch for NORMAL ON position. Check margin indicator end-of-line lamp socket and bulb.

(e) Check the normally open contacts of the end-of-line switch for dirt or faulty adjustment. Burnish and readjust if necessary (figure 5-120).

(f) Check trip-off position of end-of-line indicator lamp by adjusting the switch cam and the switch bracket (figure 5-120).

(g) Check reset mechanism if indicator fails to zero and lamp remains illuminated when CAR RET key is depressed. Check adjustments, figures 5-121 and 5-122.

(29) TRANSMITTER DISTRIBUTOR FAILURE

(a) Check to determine that hex head set screws on flexible couplings are tightened firmly to the flats of shafts connecting the transmitter distributor intermediate gear mechanism to the keyboard motor shaft. Check for binding in the intermediate gear and bearing bracket assemblies on the keyboard.

(b) If tape lid fails to open in response to depressing the red button, check for missing springs in tape lid latch mechanism.

(c) Check adjustment figure 5-139.

(d) If tape fails to move freely through the tape guide (manually) when start-stop lever is in left or FREE WHEELING position, check the mechanical linkage releasing the feed pawl detent lever from the feed wheel and depressing the tape out sensing pin (figures 5-150, 5-149, 5-146, and 5-145).

(30) TAPE TRANSMISSION FAILURE

(a) Check controls. Start-stop lever must be in RUN position. Keyboard SEND key must be depressed. Keyboard selector switch must not be in K mode. Transmitter distributor is operative only in K-T or T modes.

(b) Check tight tape lever on front of tape guide. If tight or twisted tape has elevated the lever, correct the obstruction in the tape completely before resuming transmission attempt.

(c) Check for dirty or unadjusted normally open contacts on the start-stop and tight tape switch (figure 5-145) and the tape out contacts (figure 5-143). Burnish contacts and readjust as required.

(31) SIGNAL FAILURE IN TRANSMISSION

(a) Perform all checks indicated in Table 6-2, step 4, for typing unit running open or closed when transmitter distributor tape is being read. Check mechanical linkages of transfer lever, stabilizer, and toggle (figure 5-149 and 5-150) and adjust as required.

(b) GARBLING - Check the code perforations against the typed characters of the input tape to be sure garbling is not on input.

1. Check orientation of sensing pins in tape code holes (figure 5-147). Any adjustment required must be preceded by adjustment of tape guide, figure 5-139.

2. Check mechanical linkages of transmitter mechanism for binding in sensing fingers sequence of operations to transfer bail stabilizer. Check out the particular code element linkage responsible for garbling if possible.

3. Check contact box adjustments, figure 5-74. Check for leakage in signal box capacitor.

(c) TRANSMISSION STOPS - Check main bail eccentric drive arm and trip assembly linkage for binding or poor adjustment to allow latch lever to engage stop lever on clutch. (See figure 5-149). Check the input tape to determine if a double blank code or a segment of unperforated tape has passed the sensing pins, locking the keyboard through the function mechanism of the typing unit. Resume transmission by depressing the SEND key on the keyboard.

(d) TIGHT TAPE AND TAPE - OUT FAILURE

1. Check mechanical linkage through intermediate arm to switch for binding or maladjustment. See adjustment of tight tape intermediate arm and switch, figure 5-145.

2. Check for binds in mechanical linkage of tape out sensing pin (figure 5-144). Note in particular that the pin clears the aperture in the tape guide plate. Adjust per figure 5-144 as required.

3. Check mechanical linkage of tape out sensing pin and tape out switch and adjust switch bracket as required. See adjustments, figure 5-143.

4. Check for sticking or badly adjusted contacts in the normally closed tape out switch. Burnish and readjust contacts per figure 5-143.

(32) AUXILIARY TYPING REPERFORATOR FAILURE - Refer to paragraphs 6-3c(23) through 6-3c(27) for failures common to the typing reperforator and auxiliary typing reperforator mechanisms.

(a) Check for defective switch on panel.

(b) Check for an open tape feed-out magnet or dirty magnet armature. Draw a thin piece of paper between the armature and the magnet pole piece to clean dirt, lint, or oil.

(c) Check tape feed out mechanical linkages from the armature to the punch block feed wheel (figures 5-123 through 5-133). Check metering feed pawl ratchet mechanism (figure 5-126).

(d) Check adjustments, figures 5-123 through 5-133.

(e) Check the tape length adjusting plate (figure 5-132) and adjust to desired length of tape feed-out, up to 18 inches.

(f) Check latch lever mechanical linkages and adjust as required (figure 5-125).

(33) LOW TAPE SWITCH CIRCUIT FAILURE (AUXILIARY TYPING REPERFORATOR)

(a) Check missing springs or mechanical linkage preventing rising tape lever from activating tape-out switch.

(b) Check for faulty operation of normally open tape-out switch. Check associated alarm.

(34) PAPER WINDER FAILURE

(a) Check that the paper is not slipping on the rewind cylinder. Wind several turns of paper securely on the cylinder by hand before energizing the motor.

(b) Check that paper is properly routed and is free to wind up.

(c) Check the cylinder for proper installation and that the pin on the cylinder hub engages in the clutch arm.

(d) Check the slack rod is free to rotate without binding.

(e) Check winder adjustments figure 5-164.

(35) ELECTRONIC SELECTOR MAGNET DRIVER FAILURE

(a) The following covers trouble shooting and repair of Selector Magnet Driver. General instructions in paragraphs 6-3.c.(35)(b) through 6-3.c.(35)(e).

(b) It is recommended that field servicing be limited to replacing the Driver with a spare since it is probable that suitable tools and test equipment will not be available. Replace the device upon the absence of output signal when a known test signal of proper polarity is applied. The mere absence of an output signal does not necessarily require replacement since the trouble may be checked in the signal or power circuits external to the Driver. Therefore, these should be checked first.

(c) Repairs should be made at a properly-equipped maintenance center by qualified personnel. Testing and repair should preferably be handled by persons familiar with transistor circuits. The following equipment is required:

1. A suitable source of d.c. teletypewriter signals such as a Distortion Test Set or a Transmitter Distributor.

2. An oscilloscope with differential pre-amp for observing current waveforms.

3. A 0-5-50 20,000 ohm per volt DC voltmeter.

4. A 0-150 5,000 ohm per volt AC voltmeter.

5. A 0-100 DC milliameter.

6. A selector-magnet assembly to receive Driver's output.

7. A 1-ohm resistor in series with selector-magnet assembly to monitor selector's current waveform.

(d) To locate a trouble, proceed as follows:

1. Check input signals for quality and correct polarity (see Tables 6-3 and 6-4).

2. Check output signal for absence or distortion (see Tables 6-3 and 6-4).

3. Check power supply's d.c. voltage (approx. -40V).

4. Using some sort of repetitive signal as an input, check collector of each transistor to see if it is switching, i.e., changing each time input signal changes (see Tables 6-3 and 6-4). This should locate general circuit that has the trouble.

5. Use Table 6-5 to determine component causing trouble.

(e) Replacement of parts such as resistors maybe replaced by those obtained from local electronic suppliers. On the other hand, to ensure obtaining proper parts, diodes, transistor, etc. should be ordered by part number from Teletype Corporation. In an emergency, a 2N1008B transistor maybe used as a replacement for any transistor on the Driver. Do not substitute diodes.

1. When parts are replaced, do not overheat leads of transistors or diodes, or card itself. Excessive heat will damage components and cause printed circuits to lift from board. Use a small soldering iron with a relatively low operating temperature.

2. CAUTION - If circuit card is removed, when replacing it, place 131228 insulating washer between card and 152426 nut otherwise, nut will contact printed circuit and will cause damage to Driver. It may be more satisfactory to replace entire circuit card than

to trouble shoot the card and replace individual components.

3. During testing or servicing of teletypewriter equipment, it may be necessary to remove typing unit or disconnect selector magnets from Driver. Before doing either, turn off or remove a.c. power from equipment. Otherwise Driver may operate into an open circuit, or into a short circuit if line shunting contacts are present. Either condition will cause damage to Driver.

(f) If the open line relay does not energize when an open line occurs, operate the relay armature to determine if it will hold energized. If the relay remains energized, the condition indicates either too high relay contact tension, defective C6 capacitor or defective 4 layer diode Q8.

1. If the relay will not hold energized, refer to associated wiring diagram for test points. Refer to Table 6-3 to check the voltages and to isolate defective components.

TABLE 6-3. ELECTRONIC SELECTOR MAGNET DRIVER CIRCUIT VOLTAGES

LOCATION	TEST POINT	INPUT LINE CONDITION	
		MARK	SPACE
Negative Signal Line	TP1	2.9 v.	0.85 v.
Q1 Base		2.7 v.	0.85 v.
Q1 Emitter	TP7 or Terminal Post #3	2.2 v.	2.2 v.
Q1 Collector	Terminal Post #5	2.2 v.	3.4 v.
Junction R4 - R5		4.3 v.	10.9 v.
Q2 Base	Terminal Post #6	2.2 v.	3.4 v.
Q2 Emitter		2.95 v.	2.95 v.
Q2 Collector	TP4	9.2 v.	3.0 v.
Q3 Base		4.15 v.	3.4 v.
Q3 Emitter		3.65 v.	3.6 v.
Q3 Collector	TP8	3.8 v.	10.9 v.
CR10 Cathode	TP5	4.6 v.	3.0 v.
Q4 Base		9.7 v.	3.4 v.
Q4 Emitter	TP4	9.2 v.	3.0 v.
Q4 Collector - Q5 Base	TP3	9.3 v.	3.1 v.
Junction R7 - R8		36.0 v.	35.0 v.
Q5 Emitter		9.85 v.	3.65 v.
Q5 Collector	TP2	39.5 v.	39.0 v.

NOTES: All voltages negative with respect to TP6.
Nominal Power supply voltage (TP2 to TP6): 39.5 v.
Voltage readings may vary ±15% from above values.

TABLE 6-4. ELECTRONIC SELECTOR MAGNET DRIVER WAVEFORMS

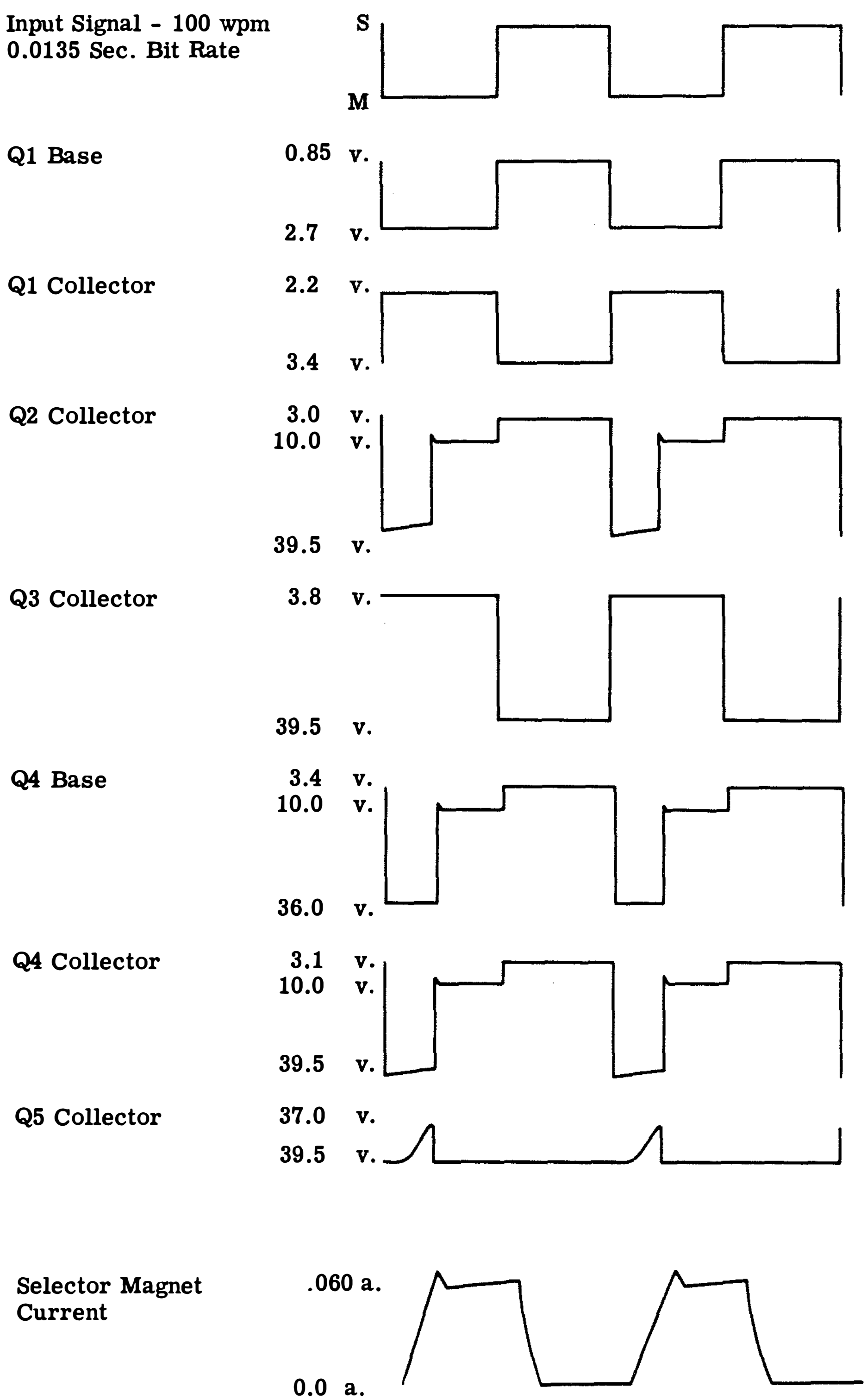


TABLE 6-5. ELECTRONIC SELECTOR MAGNET DRIVER

STEP	PROCEDURE AND NORMAL INDICATION	* TROUBLE	** NEXT STEP	CORRECTION (REFERENCE PARAGRAPH)
1.	Output remains marking despite changes in input signal.	Q1 shorted.	Check Q1 collector, -2.2 volts. With spacing input.	6-3.c.(35)(b) through 6-3.c.(35)(e)
		Q2 open.	Check Q2 collector, -9.3 volts with spacing input.	
		Q3 shorted.	Check Q3 collector, -3.6 volts with spacing input.	
		CR10 shorted.	Check TP4, -8.5 volts with marking input.	
2.	Output remains spacing despite changes in input signal.	Q1 open.	Check Q1 collector, -3.4 volts with marking input.	6-3.c.(35)(b) through 6-3.c.(35)(e)
		Q2 shorted.	Check Q2 collector, -3.0 volts with marking input.	
		Q3 open.	Check Q2 or Q3 collector, -44 volts with marking input.	
		Transformer open.	Check TP2, nominal DC voltage outside rated limits of 39.5 volts ±5 volts.	
		Transformer shorted.	Check TP2, nominal DC voltage outside rated limits of 39.5 volts ±5 volts.	
		C1 shorted.	Check Q4 and Q2 or Q3 inoperative, probably destroyed.	
		C2 open.	Check DC output voltage drops to approximately 32 volts across TP2 and TP6 shows pulsating DC (no filtering).	
		C2 shorted. CR9 shorted reversed or open.	Check TP2, DC output voltage drops to 0 volts transformer and diodes CR14, CR15, may be damaged, Q3 inoperative, probably destroyed.	

TABLE 6-5. ELECTRONIC SELECTOR MAGNET DRIVER - Continued

STEP	PROCEDURE AND NORMAL INDICATION	* TROUBLE	** NEXT STEP	CORRECTION (REFERENCE PARAGRAPH)
2. Cont.		CR14, CR15 shorted.	Check TP2, DC output voltage drops very low oscilloscope shows AC.	
		CR14, CR15 open.	Check TP2, DC voltage -35 volts with one diode open. With both diodes open 0 volts.	
		CR11 shorted.	Check TP4, -5.1 volts with marking input.	
		CR11 reversed.	Check TP4, -5.1 volts with marking input.	
		CR10 open.	Check TP4 and TP5, -44 volts with marking input.	
		CR10 reversed.	Check TP4 and TP5, -44 volts with marking input.	
		Q4 open.	Check Q5, Q2 and/or Q3 inoperative probably destroyed.	
		Q5 shorted.	Check Q2, Q3 and Q4 inoperative, probably destroyed.	
3.	Garbling or loss of range.	Q5 open.	Delayed current rise time in selector magnet coils. 0.010 to 0.012 sec. to reach 0.060 ampere level. No overshoot current. (See Table 6-4) poor margin on spacing bias distortion.	6-3.c.(35)(b) through 6-3.c.(35)(e)
		CR13 open.	Check Q5 emitter -39.5 volts with marking or spacing input. Also symptoms of Q5 open.	
		Q4 shorted.	Delayed current rise time in selector magnet coils. 0.010 to 0.012 seconds to reach 0.060 ampere level. No overshoot current. (See Table 6-4) poor margin on spacing bias distortion.	

TABLE 6-5. ELECTRONIC SELECTOR MAGNET DRIVER - Continued

STEP	PROCEDURE AND NORMAL INDICATION	* TROUBLE	** NEXT STEP	CORRECTION (REFERENCE PARAGRAPH)
3. Cont.		CR8 open.	Check R4 - R5 junction, -10.3 volts with marking input. Vary input current above and below 0.030 ampere trigger level. Oscillations observed when scope connected across one ohm sampling resistor in series with selector magnet coils. Transistors Q1 through Q5 may be damaged by this trouble condition.	
		CR8 shorted.	Delayed current fall time in selector magnet coils. Approximately 0.007 seconds to reach 0 current level. Printer has poor range on marking bias signal.	
		CR8 reversed.	Delayed current fall time as described above (CR8 shorted). Also, as above (CR8 open) oscillations observed.	
		CR11 open.	Check Q3 collector, -3.8 volts with spacing input. Delayed current fall time in selector magnet coils, 0.030 seconds to reach zero current level. Poor range on marking bias distortion.	
		CR12 open.	Delayed current rise time in selector magnet coils. 0.012 seconds to rise to 0.060 ampere level; no overshoot current. (See Table 6-4) Poor margin on spacing bias signals.	
		CR12 shorted.	Delayed current rise time in selector magnet coils; 0.012 seconds to reach 0.060 ampere level; no overshoot current. (See Table 6-4) Poor range on spacing bias distortion. Maximum selector magnet current 0.100 ampere.	

TABLE 6-5. ELECTRONIC SELECTOR MAGNET DRIVER - Continued

STEP	PROCEDURE AND NORMAL INDICATION	* TROUBLE	** NEXT STEP	CORRECTION (REFERENCE PARAGRAPH)
3. Cont.		CR12 reversed.	Delayed current rise time in selector magnet coils; 0.012 seconds to reach 0.060 ampere level; no overshoot current. (See Table 6-4) Poor range on spacing bias signals. Maximum selector magnet current 0.100 ampere.	
		CR14 or CR15 open.	Check DC voltage at TP2 decreases below 39.5 volts -15%. Maximum selector magnet current approximately 0.040 ampere. Poor range on spacing bias signals.	
		C2 open.	Check TP2, low DC output volts; high ripple voltage; poor overall range.	

* "Shorted" refers to short-circuit between emitter and collector.
"Open" refers to any pair or all three terminals open.

** Voltages shown are measured with respect to TP6.

6-4. DISASSEMBLY AND REASSEMBLY

a. GENERAL - Refer to Volume 2 of this manual for the appropriate exploded view illustration of the mechanism to be disassembled, for location and visual identification of parts and detailed disassembly and reassembly features. Most maintenance, lubrication, and adjustment can be accomplished by removing the major components from the cabinet. Insofar as possible, further disassembly should be confined to assemblies, which can frequently be removed without disturbing adjustments. When reassembling assemblies, be sure to check all adjustments, clearances and spring tensions (paragraph 5-1).

NOTE

If a part is mounted on shims, the number of shims used at each of its mounting screws should be noted at the time of removal, so that the same shim pile-up can be replaced when the part is reassembled. Retaining rings are spring steel and have a tendency to release suddenly. Hold ring with left hand to prevent rotation, and place the blade of a suitable screw driver in one of the slots of the retaining ring. Rotate the screw driver in a direction to increase the diameter of the retaining ring. It will come off easily without springing. Avoid loss of springs in disassembly by holding one spring loop with the left hand while gently removing the opposite loop with a spring hook or suitable probe. Do not stretch or distort springs in removal.

(1) Tools required for service and repair will be found listed and described in Teletype Bulletin 1124B. They are not supplied as a part of this equipment.

(2) Refer to Section 5 for adjustment and lubrication information. See table below for location in Section 5 of component adjustments.

COMPONENT	FIGURES
Typing Unit (LP)	5-1 through 5-59
Base (LB) and Keyboards (LK and LAK)	5-60 through 5-81A and 5-119A through 5-121D
Typing Reperforator (LPR)	5-82 through 5-119A and 5-122A through 5-122D
Auxiliary Typing Reperforator (LPR)	5-82 through 5-119A and 5-123 through 5-133
Auxiliary Typing Reperforator Base (LRB)	5-134 through 5-136
Transmitter Distributor (LXD)	5-137 through 5-153
Transmitter Distributor Base (LCXB)	No adjustable features
Electrical Service Assemblies	No adjustable features
Cabinets (LPC, LAC, LAAC and LBAC)	5-156 through 5-164G
Paper Winder (PW)	5-164
Synchronous and Governed Motors (LMU)	5-154 through 5-155
Dolly 173861	No adjustable features
Sub-Base	No adjustable features

b. PROCEDURE

(1) Disconnect cables before removing components from the cabinet. Remove cables by compressing the lower ends of the two latches and pulling the receptacle and cable from the plug on the unit. To disconnect the power cable prior to removing the auxiliary typing reperforator base from the cabinet (ASR Sets only), unscrew the knurled locking ring on the 161818 auxiliary power cable before disconnecting the cable from the auxiliary typing reperforator base. See figure 4-2, Volume 2.

(2) Disconnect the two 158020 flexible couplings from the 158013 shaft, and remove the shaft before removing either the keyboard or the transmitter distributor base. See figure 4-1, Volume 2.

(3) Remove the 154496 cabinet front panel and 154490 cross bar (figure 5-2, Volume 2) before removing the keyboard.

(a) Remove the 154445 keyboard selector switch control knob (figure 1-7) by loosening the 119367 set screw. Remove the 6344 screws and 2191 washers which secure the 158695 designation plate, and slide the plate from beneath the rubber noise shield around the keyboard to remove the plate.

(b) Remove two 111017 screws from the 154496 front panel (figure 5-2, Volume 2). Loosen the 151526 thumb screw and slide the front panel to the right and upward to remove it from the cabinet, exercising extreme care to avoid damage to the character counter scale.

(c) Loosen, but do not remove, the two 151631 screws locking the 154490, cross bar to the left side of the cabinet (figure 5-2, Volume 2). Remove the 151723 screw, 2669 lock washer, and 117535 flat washer. Push back on the left end of the cross bar to disengage it from the cabinet, and move the cross bar to the left to disengage it from the slot in the 154416 adjusting plate. Lift the cross bar from the cabinet.

CAUTION

Do not loosen or remove the factory adjusted plate (154416). Avoid damaging the character counter or the typing reperforator when disengaging the tightly fitted front panel or cross bar from the cabinet.

(4) Cradle mounted components on the cabinet shelf may be moved forward slightly in the cabinet when the front panel and cross bar have been removed. This will provide sufficient room to remove the power distribution panel without removing the keyboard and may aid in servicing the cabinet terminal blocks.

(a) Loosen, but do not remove, the four 79890 screws (figure 1-3, Volume 2) and slide the cradle forward on its side rails. It will move a maximum of approximately one inch.

(b) To reposition the cradle, slide it back until the rear base rail (158678) contacts the 158260 detents. Tighten the two screws.

CAUTION

Do not drop or lower the cabinet dome when cradle is in forward position for servicing.

c. **TYPING UNIT** (LP) **(See figures 6-1 through 6-25 in Volume 2) - Check preliminary procedures suggested in paragraph 6-4a and b. Remove the four 151678 screws attaching the typing unit to the keyboard, and lift off the typing unit using the lower rear corner of the left side plate and the right bottom edge of the pulley support plate as hand holds.**

(1) TYPE BOX (See figure 6-8, Volume 2)

(a) Trip type box latch 152503 to the right.

(b) Lift the right end of type box 173803 upward to an angle of approximately 45^{o} and pull the type box toward the right to disengage it from the left hand bearing stud.

(c) Type box disassembly is shown in figure 6-23, Volume 2.

(d) To reinstall the type box reverse the procedure used in removing it. The type box should be firmly seated on the bearing studs, and the point of the latch toggle should be placed in the notch of the type box plate before moving the toggle to its latched position.

(2) PRINTING CARRIAGE (See figure 6-22, Volume 2)

(a) Loosen the two 151152 screws, 110-743 lock washers and 125011 flat washers which clamp the 150230 plate to the wire rope, and disengage the carriage from the rope.

(b) Move the carriage to the left end of its track, and tilt the lower part forward to disengage the rollers from the track.

(c) Disassembly of the printing carriage is shown in figure 6-22, Volume 2.

(d) To reinstall carriage, reverse disassembly procedure. Make certain that the 150068 printing arm is correctly re-engaged with the 150588 printing track.

(e) Position the carriage clamp on the wire rope for correct printing position. Refer to PRINTING CARRIAGE POSITION adjustment, figure 5-40, Volume 1.

(3) TYPE BOX CARRIAGE (See figure 6-8, Volume 2)

(a) Move the type box carriage to its extreme right position.

(b) Hold the 152255 and 152548 code bar shift bars (figure 6-21, Volume 2) in the marking position, and rotate the main shaft so that the type box is in its uppermost position.

(c) Remove the 119649 tru-arc from the stud in the right hand end of the 152503 type box carriage link, and disengage the link from the carriage.

(d) Hold the 153810 ribbon guide forward and the 150311 ribbon reverse lever (figure 6-19, Volume 2) back, and pull the carriage toward the right to disengage it from the carriage track.

(e) Type box carriage disassembly is shown in figure 6-8, Volume 2.

(f) To reinstall carriage, reverse disassembly procedure. See PRINTING CARRIAGE LOWER ROLLER adjustment, figure 5-39, Volume 1.

(4) PALLETS OR PALLET SPRINGS (See figure 6-23, Volume 2)

(a) Remove type box from its carriage (paragraph 6-4c(1).

(b) Remove the two screws (110434 and 151738), 110743 lock washers, 125011 flat washers, 150079 nut, and 150078 nut securing the 152560 front plate and 154616 rear plate. Separate the two plates.

(c) Remove the 157238 spring from the pallet by compressing the spring slightly and pulling the formed end out of the slot in the pallet.

NOTE

This spring should be discarded once it has been removed from the assembly.

(d) Replace pallet (omit this step if replacing spring only).

(e) Install new pallet spring, making sure that the formed end of the spring extends the slot in the pallet.

(f) Line up the front plate with the rear plate assembly and draw the two plates together until the head of the pallet leaves the rear plate by approximately 1/16 inch. This may be accomplished by using two 6-40 screws (at least 11/32 inch long) and nuts in place of the screws and nuts removed in step (b), and tightening them only enough to hold the pallets together as specified above. Do not clamp the plates together until all pallets have been moved into their correct position.

(g) Manipulate the pallets until they fall into their respective openings in the front plate, and press the plates together.

(h) Discard parts used in step (f), replacing the screws and washers removed in step (b).

(5) FRONT PLATE (See figure 6-13 through 6-15, Volume 2)

(a) Remove typing unit from keyboard (see paragraph 6-4c).

(b) Disengage 152503 type box carriage link from carriage (see paragraph 6-4c(3)(c).

(c) Remove two 153841 screws (figure 6-7, Volume 2) which secure the main bail drive bracket 150245 (figure 6-15, Volume 2) to the 150365 rocker shaft.

(d) Remove 150202 spacing shaft gear.

(e) Remove four 151723 screws which secure the front plate assembly to the side frames.

(f) Pull the front plate assembly forward to disengage it from its connecting parts in the typing unit.

(g) Disassemble front plate as shown in figures 6-13 through 6-15, Volume 2.

(h) To reinstall front plate assembly, reverse disassembly procedure. Make certain that code bar bell cranks 150770 and 150771 (figure 6-14, Volume 2), letters-figures shift slide 152596, reversing slide shift lever 152-522, automatic carriage return - line feed bell crank 157972, and 152545 carriage return lever extension are properly engaged with their mating parts before tightening the 151723 front plate mounting screws. Replace the 150202 spacing shaft gear. See SPACING GEAR PHASING adjustment, figure 5-20, Volume 1.

(6) FUNCTION BOX (See figure 6-25, Volume 2)

(a) Remove typing unit from keyboard (see paragraph 6-4c).

(b) Remove the rear 151627 tie bar (figure 6-5, Volume 2) from the typing unit side frames.

(c) Remove the two 155099 and 151692 screws which secure the function box assembly in the typing unit.

(d) Remove the 151637 screw and 110-743 lock washer, and slide the 153291 cam shaft drive arm out of engagement with the 153300 stripper blade drive arm (figure 6-10, Volume 2).

(e) Lift the function box assembly upward to disengage it from its locating brackets, and pull toward the rear to disengage the letters-figures code bar fork 155935 (figure 6-25, Volume 2) from the code bars. Remove the five switch assemblies (three 172550, one 172-608, and one 172558) and 173698 cable assembly from function box. Remove the function box.

(f) Function box disassembly is shown in figure 6-25, Volume 2. The 157273 connector (part of 173698 cable assembly) is removed by loosening four 151637 screws (see figure 6-18, Volume 2).

(g) Replace switch assemblies before reinstalling function box. To reinstall function box assembly, push it forward in its guide rails to within 1/8 inch of its final position. Then, manually disengage the function pawls from their function levers and push the function box assembly forward and downward until it is latched in place on its locating brackets.

(h) Replace function box mounting screws and rear tie bar removed in paragraphs 6-4c(6)(b) and (c).

(i) If it is necessary to replace the 172591 contact spring in the switch assemblies proceed as follows:

1. Remove 151689 screw(s) which hold the 172595 or 172619 contact plate to the 172597 or 172599 block.

2. Carefully unsolder the cable from the terminal lugs using as little heat as possible to avoid removing temper from springs.

3. Remove contact plate with spring.

4. Remove 157899 contact arm from block.

5. Remove spring from contact plate.

6. Place new spring in position.

7. Mount the contact plate with springs and the contact block in the required location with the mounting screws friction tight.

8. Carefully resolder cables to terminal lugs. AVOID OVER HEATING.

9. Insert the pointed end of the contact arm, notch downward, between the bent up end of the spring and the formed ones portion of the contact clip. Push arm into its operating position in the contact block.

10. Refer to figure 5-55, Volume 1 for adjustment of switch before tightening the contact plate screws.

(7) Function Bars (See figure 6-25, Volume 2)

(a) Remove function box (see paragraph 6-4c(6)(a) through (e).

(b) Unhook the 4703 function bar spring.

(c) Hold the function bar toward the rear of the function box and disengage its function panel from the function bar.

(d) Pull the function bar toward the front to remove it from the function box.

(e) Disassembly of function box is shown in figure 6-25, Volume 2.

(8) CODE BARS (See figure 6-21)

(a) Remove typing unit from keyboard (see paragraph 6-4c).

(b) Remove function box assembly (paragraph 6-4c(6)(a) through (e), and front plate assembly (6-4c(5).

(c) Remove screws 42827 and 151657 and associated lock washers 153819 and 2191 which secure the code bar assembly to the side frames.

(d) Remove code bar shift bar 150310 retainer plate from the right hand code bar casting 152573.

(e) Remove 152255 and 152548 code bar shift bars, and pull the code bar assembly forward and to the left.

(f) Disassembly of code bar assembly is shown in figure 6-21, Volume 2.

(g) To install code bars, reverse disassembly procedure, but do not tighten mounting screws. Loosen the two 151630 code bar assembly tie bar (153321) screws, and hold the code bar castings back and downward firmly against their locating surfaces on the side frame. Tighten the four mounting screws and two 151630 tie bar screws.

(9) SELECTOR CAM-CLUTCH (See figures 6-10 and 6-17, Volume 2)

(a) Lift the 152410 push lever reset bail cam follower (figure 6-17, Volume 2) from its cam and latch it in its raised position on the push lever guide by pushing it toward the left. Lift the selector levers and the marking lock lever from their cams by moving the marking lock lever forward until the armature drops behind it.

(b) Remove the 119652 screw (figure 6-10, Volume 2) which mounts the 150000 selector clutch drum, and position the cam-clutch so that the stop lug on the 150026 disk is in its uppermost position.

(c) Hold 161342 start lever (figure 6-17, Volume 2) and 152407 spacing lock lever away from their cams with the thumb and forefinger of the left hand. Withdraw cam-clutch assembly by pulling forward while rocking it back and forth slightly.

(d) Disassembly of the selector cam-clutch is shown in figure 6-10, Volume 2.

(e) To replace cam-clutch assembly reverse disassembly, except, as the cam-clutch approaches its fully installed position move the trip shaft lever and the cam-clutch latch lever so that they ride on their respective cams. Restore push lever reset bail and the armature to their operating position.

(10) SELECTOR MECHANISM (See figures 6-16 and 6-17, Volume 2)

(a) Remove selector cam-clutch from typing unit (paragraph 6-4c(9).

(b) Remove the 152457 felt wick (figure 6-16, Volume 2). Remove the 151658 screw which secures the selector mechanism to bracket 152546 on the code bar positioning mechanisms.

(c) Remove the 150563 spring, from the selector mechanism, which connects with the 152640 common transfer lever on the code bar positioning mechanism.

(d) Remove three remaining 151630 selector mounting screws (figure 6-17, Volume 2), and lift selector from main shaft bearing housing.

(e) Disassembly of selector mechanism is shown in figure 6-17, Volume 2.

(f) To replace selector mechanism, reverse procedure used in removing it. To readjust selector mechanism, see paragraph 5-2, adjustment figures 5-1, 5-3, and 5-9 through 5-13.

(11) CODE BAR POSITIONING MECHANISM (See figure 6-21, Volume 2)

(a) Remove 150563 selector spring (figure 6-16, Volume 2) attached to common transfer lever, and restore any operating push levers to the spacing position by raising the 152410 reset bail (figure 6-17, Volume 2).

(b) Loosen the 151721 clamp screw (figure 6-16, Volume 2) on the 150447 shift lever drive arm, and remove the 151630 and 151658 screws which mount the mechanism to the side plate and to the 152400 selector plate.

(c) Manipulate transfer levers 152635 to 152640 (figure 6-16, Volume 2) and the 152-255 and 152548 code bar shift bars (figure 6-21, Volume 2) while gently twisting the mechanism so as to slide the mechanism off the code bar shift bars.

(d) Disassembly of code bar positioning mechanism is shown in figure 6-21, Volume 2.

(e) To replace mechanism, reverse disassembly procedure. With main shaft in stop position, push the code bar shift bars to the marking position (left front view). Manipulate the code bar shift bars and transfer levers so that the shift bars line up with their respective slots in bracket 155586 (figure 6-16, Volume 2), and slide the shift bars through the slots, one at a time (leave bottom slot vacant).

(12) SELECTOR MAGNET ASSEMBLY (See figure 6-18, Volume 2)

(a) Remove two 151657 screws (figure 6-17, Volume 2) and 3598 nut which mount range finder on the selector.

(b) Remove 173450 cable (figure 6-18, Volume 2) from 81778 coil terminal screws,

(c) Remove magnet assembly mounting screws 151631, and lift assembly out.

(d) Disassembly of selector magnet assembly is shown in figure 6-18, Volume 2.

(e) To replace magnet assembly, reverse disassembly procedure.

(13) MAIN SHAFT (See figures 6-9 and 6-10, Volume 2)

(a) Remove typing unit from keyboard, and remove selector cam-clutch assembly (paragraph 6-4c(9). Rest typing unit upside down, and return carriage to its left hand position.

(b) Remove 150673 spacing shaft and 150202 gear by removing 151686 screw (figure 6-14), which secures the shaft in the 150668 spacing pawl hub.

(c) Remove 151689 screw (figure 6-10, Volume 2) which secures 153823 collar and 153824 clamp from the right end of the main shaft. Remove main shaft right hand 152573 bearing retainer plate.

(d) Remove 150010 retainer plate (figure 6-9, Volume 2) at the 150046 clutch bearing, and remove the 150244 link.

(e) Remove two 151630 screws from the main shaft left hand 152537 bearing clamp.

(f) Unhook six 74701 springs, and springs 135716, 110473, 153806, 70388, and 160843 (figure 6-11, Volume 2) from the trip levers and latch levers associated with all clutches, and position the code bar clutch so that the low part of the clutch cam clears the spring arm on the cam follower.

(g) Move the main shaft assembly toward the left to disengage the code bar clutch and function clutch links from their connecting pins.

(h) Lift the left end of the shaft assembly out of the side frame and position the shaft so that the function clutch link passes the suppression assembly bracket, and remove the shaft assembly from the typing unit.

(i) When assembling clutches which have cams and disks marked (0) for identification, the marked side of the parts should face away from the clutch side of the assembly. The function and code bar clutches should have their driving link assembled so that the larger end of the hub faces away from the clutch side of the assembly.

(j) Disassembly of the main shaft and clutches is shown in figures 6-9 and 6-10, Volume 2.

(k) To reinstall shaft assembly, reverse disassembly procedure. To phase spacing gears and line feed gears, see paragraph 5-2 adjustment figures 5-20 and 5-21, respectively.

(14) UPPER DRAW WIRE ROPE (See figure 6-12, Volume 2)

(a) Return carriage to left hand position.

(b) Loosen 112626 nut on the front end of the 150197 drum bearing post (figure 6-12, Volume 2). Operate ratchet escapement lever 150909 (figure 6-13, Volume 2) to unwind the 74272 carriage return spring (figure 6-12, Volume 2).

(c) Remove 150712 wire rope from 150230 clamp plate on the printing carriage (figure 6-22) and 152521 clamp on the 150728 oscillating rail slide (figure 6-13).

(d) Loosen the 151618 clamp screw (figure 6-12, Volume 2) which secures the wire rope to the 150843 spring drum, and remove the wire rope from the drum.

(e) Remove 151618 screw in the spacing drum, which secures the ends of the wire rope, and remove wire rope from drum.

(f) Disassembly of wire rope, spring drum, and spacing drum is shown in figure 6-12, Volume 2.

(g) To replace upper draw wire rope, reverse disassembly procedure.

(15) LOWER DRAW WIRE ROPE (See figure 6-12, Volume 2)

(a) Remove 151658 screw which secures the 150225 lower draw wire rope to the 154627 spacing drum, and remove the end of the rope from the drum.

(b) Loosen the 151637 screws which secure the 150796 margin indicator cam disk on the spring drum, and position the disk to expose the wire rope mounting screw.

(c) Remove the lower draw wire rope 151346 screw, and remove the 150798 rope from the spring drum.

(d) Loosen the two 151632 screws (figure 6-13, Volume 2) in 150800 bearing studs which mount printing carriage 150224 pulleys, and move the studs toward the center of the typing unit.

(e) Disassembly of lower draw wire rope is shown in figure 6-12, Volume 2.

(f) To replace wire rope, reverse disassembly procedure. Make certain each rope is in its correct track around the drums. Adjust and position the type box, printing carriage, and wire rope tension in accordance with paragraph 5-2 adjustment figures 5-37, 5-39, and 5-33.

(16) PLATEN (See figure 6-6, Volume 2)

(a) Remove 150715 line feed spur gear and 150719 and 150720 platen bearing retainers. Remove 150685 paper finger shaft (figure 6-3, Volume 2). Hold off the 150900 detent (figure 6-2, Volume 2), and lift platen out of side frame.

(b) Disassembly of platen is shown in figure 6-6, Volume 2.

(c) To replace platen, reverse disassembly procedure. When replacing each platen bearing retainer (150719 and 150720), put its upper screw in first. Leave the screw slightly loose. Press the lower end of the retainer downward, and hook it into the elongated hole in the side frame. Replace lower screw. Tighten both screws.

d. **KEYBOARDS (LK, LAK and BASE LB) (See figures 3-1 through 3-31, Volume 2) - Check preliminary instructions suggested in paragraph 6-4.a. and b. Remove typing unit (see paragraph 6-4.c.) from the base of keyboard. Remove the four 151678 screws at each corner of the keyboard or base, which secures the units to their respective cradles (see figures 1-3, 1-7, and 1-21, Volume 2). Remove the 152647 connector mounted near the left corner of the LK keyboard and LB base, or the rear center of the LAK keyboard. Remove the keyboard or base with motor and typing reperforator (ASR sets only) in place. Disconnect the motor leads from the keyboard or base terminal block, and tag the leads. Remove the four 151678 motor mounting screws, and remove the motor and gear guard. Do not remove the typing reperforator from the LAK keyboard if maintenance can be accomplished with it in place. If it is necessary to remove the typing reperforator, refer to paragraph 6-4.e.**

(1) BASE LB10/000 (See figures 3-1 through 3-5, Volume 2).

(a) INTERMEDIATE GEAR MECHANISM (See figure 3-2, Volume 2) - Remove the typing unit and motor from the base (see paragraph 6-4d above). The intermediate gear assembly on bracket 151228 is illustrated in figure 3-3, Volume 2.

1. To change operating speed ratios for the typing unit, it is not necessary to disassemble the intermediate gear mechanism. Remove the 151631 screw and 2191 lock washer from the 154663 shaft. Select the desired matching gear and pinion set (figure 3-18) and replace the gear attached to the hub end of the 154663 shaft. Replace the pinion on the motor shaft to mate with the new driven gear.

2. Remove the two 151724 and one 151725 screws, and three 2669 lock washers from the 151228 bracket. Lift the intermediate gear assembly from the base. Disassemble as shown in figure 3-2, Volume 2.

3. To reassemble and install the intermediate gear mechanism, reverse disassembly procedure. Adjust motor pinion and gear mesh according to paragraph 5-2 adjustment figure 5-60.

(b) BASE LABEL (See figure 3-5, Volume 2) - Remove the two 151637 mounting screws, and remove the 153118 plastic window. To reassemble, reverse disassembly procedure.

(c) KEYLEVER COVER (See figure 3-5, Volume 2).

1. Remove the two 151658 screws and 2191 lock washers at the top rear of the 151326 seal plate.

2. Push the 153117 cover down until it clears the two 100149 studs on the 151867 cover retaining brackets. Pull the cover out to clear the brackets and lift up until it clears the 153444 and 153445 function keys.

3. To replace keylever cover, reverse disassembly procedure.

(d) KEYLEVER (See figure 3-5, Volume 2).

1. Remove keylever cover (paragraph 6-4d(1)(c) above).

2. Remove the 1047 shoulder screw pivot. Remove keylever.

3. To replace keylever, reverse disassembly procedure.

(e) BASE SEALING PLATE (See figure 3-5, Volume 2)

1. Remove keylever cover (paragraph 6-4d(1)(c) above).

2. Remove the four 151659 screws and 2191 lock washers (two at the lower right and two at the lower left) from the front of the 151326 sealing plate.

3. To replace the sealing plate, reverse disassembly procedure.

(f) LOCAL LINE FEED OR CARRIAGE RETURN OPERATING LEVER (See figure 3-5, Volume 2)

1. Remove keylevers (See paragraph 6-4d(1)(d) above).

2. Remove the four 151692 screws and 2191 lock washers that retain the 153112 operating levers guide bracket.

3. Remove the 153112 bracket.

4. Remove the 100149 lever pivot stud, and remove the 153109 operating lever.

5. To replace the operating lever, reverse disassembly procedure.

(g) CARRIAGE RETURN MECHANISM (See figure 3-3, Volume 2)

1. Remove the three 151692 screws and 2191 lock washers which mount the 153268 bracket to the base. Remove the mechanism from the base.

2. See figure 3-3, Volume 2 for disassembly of the carriage return mechanism. To reassemble and install, reverse disassembly procedure.

(h) LOCAL LINE FEED MECHANISM (See figure 3-4, Volume 2)

1. Detach the 112630 spring from the 151859 trip link.

2. Remove the 119651 retaining ring from the stud on the 151858 bail. Remove the 151859 trip link.

3. Remove the two 151692 screws and 2191 lock washers from the 151862 bracket. Remove the mechanism from the base.

4. See figure 3-4, Volume 2 for disassembly of the local line feed mechanism. To reassemble and install, reverse disassembly procedure.

(i) To reassemble and install the base unit, reverse the disassembly procedures.

(2) KEYBOARD (LAK) (See figures 3-6 through 3-31, Volume 2)

(a) INTERMEDIATE GEAR AND BEARING BRACKET MECHANISM (See figures 3-8 and 3-27, Volume 2) - Remove the typing unit and motor from the keyboard (paragraph 6-4c). It is not necessary to remove the keyboard from the cabinet. The intermediate gear assembly on bracket 151228 is illustrated in figure 3-8, Volume 2. The bearing bracket mechanism assembled on bracket 158071 is illustrated in figure 3-27, Volume 2. These assemblies transmit motor driven power to the shafts of the typing unit and typing reperforator.

1. To change operating speed ratios for the keyboard and typing unit, it is not necessary to disassemble the intermediate gear mechanism. Remove the 151631 screw and 2191 lock washer from the 154663 shaft (figure 3-8, Volume 2). Select the desired matching gear and pinion set (figure 3-18, Volume 2) and replace the gear attached to the hub end of the 154663 shaft. Replace the pinion on the motor shaft to mate with the new driven gear. Gearing in the bearing bracket mechanism is not interchangeable.

2. Remove the two 151724 screws, and one 151725 screw from the 151228 bracket, and lift the intermediate gear assembly from the keyboard. Disassembly is as shown in figure 3-8, Volume 2.

3. To remove the bearing assembly, loosen the set screws on the 173645 coupling (figure 3-27, Volume 2) attaching the bearing bracket shaft to the motor shaft, typing reperforator shaft, and transmitter distributor shaft. Loosen the two 151631 screws and slide the 158271 gear guard from the 158071 bracket. Remove the three 151724 screws, 3639 lock washers and 117535 washers and lift the assembly from the keyboard. Disassembly is as shown in figure 3-27, Volume 2.

4. To reassemble and install the intermediate and bearing bracket assemblies, reverse the disassembly procedure. Position the bearing bracket in its elongated mounting holes so that the 158073 shaft is aligned with the jack shaft on the typing reperforator. When reassembling the flexible couplings to their shafts, be sure the set screws lock on the flats of both shafts in the linkage.

(b) TAPE CONTAINER (See figure 3-30, Volume 2) - The tape container may be removed separately by removing the four 151630 screws, 2191 lock washers, and 7002 washers, or assembled on its mounting bracket (158233) by removing the four 151632 screws and associated washers. For access to the keyboard selector switch mechanism, remove the container and bracket. To reinstall, reverse disassembly procedure. Replace tape to feed from the bottom of the roll at the front of the container.

(c) KEYBOARD SELECTOR SWITCH (See figure 3-29, Volume 2) - Remove the tape container (paragraph (b) above).

1. Loosen the 158207 set screw and remove gear 158208. Remove the nut and washer (part of the 158219 switch) from the switch shaft and slide the shaft from the 164107 bracket. If the switch is to be replaced, tag and unsolder the switch leads. To remove switch and cable, disconnect and tag leads to the 158250 terminal board (figure 3-21, Volume 2).

2. To reassemble and install, reverse disassembly procedure. Note that the notched end of the 158210 shaft engages the dog on the rear of the 158114 shaft (figure 3-25, Volume 2), and the rear end of the 158210 shaft engages the bearing hole in the 164107 bracket.

(d) SYNCHRONOUS PULSED MAGNET ASSEMBLY (See figure 3-20, Volume 2)

1. Remove the two 151630 and one 151632 screws, and associated washers, which secure the 164649 mounting bracket to the keyboard.

CAUTION

Do not loosen the three 151631 screws holding the 164646 adjusting plate.

2. To remove the assembly from the keyboard, loosen the two 81778 screws on the 263M magnet and detach the 173124 cable terminals from the magnet.

3. Disassemble the synchronous pulsed magnet assembly as shown in figure 3-20, Volume 2.

4. To reassemble and install the assembly, reverse disassembly procedure.

(e) CHARACTER COUNTER (See figure 3-31, Volume 2) - Removal of the character counter mechanism is suggested prior to removing the signal generator, and is necessary in order to service the code bar mechanism. If service to the character counter is not required, it may be removed the distance allowed by the end-of-line switch leads. Do not unsolder leads unless the 158050 switch is to be removed.

1. To detach the character counter from the keyboard remove the two 151631 screws, 2191 lock washers, and 7002 washers and lift the mechanism from the keyboard as far as permitted by the end-of-line switch leads. One of the mounting screws is located beneath these lead wires. It is accessible by inserting a screw driver between the 158046 and 158019 baffles.

CAUTION

When removing the forward mounting screw, use an insulated electrical screw driver. The screw is located between the soldered terminals of the 158050 switch, which is powered when the cabinet maintenance lamps are on. Exercise caution to avoid damage to the insulating sleeves on these leads.

2. If it is necessary to remove the character counter after it has been detached from the keyboard, remove the two 151685 screws, 110743 lock washers, and 114876 washers which attach the 158050 switch to the 158021 bracket. Remove the switch. Do not remove the bracket.

3. Disassembly is as shown in figure 3-31, Volume 2.

4. To reassemble and install the character counter, reverse disassembly procedure. Note that the forks on 158031 and 158032 engage pins on the 158105 and 158107 character counter code bars (figure 3-23, Volume 2).

(f) SIGNAL GENERATOR (See figures 3-13 through 3-15 and 3-24, Volume 2) - It is convenient, but not essential to remove the character counter (paragraph (e) above) prior to removal of the signal generator. Remove the two 153841 screws and 2191 lock washers from the front of the 154200 frame (figure 3-13, Volume 2). Remove the 74805 screw and 2669 lock washer at the rear of the frame. Lift the frame carefully from the keyboard, tilting the left edge first to clear the code bar extensions, and moving the entire assembly to the right to disengage the 154026 non-repeat lever (figure 3-24, Volume 2). It is possible to manipulate the frame and its components considerably within the limits of the leads to the signal generator. If the assembly is to be removed from the keyboard, proceed to removal of the contact box.

CAUTION

If the 154026 non-repeat lever is pulled down approximately 90 degrees from normal position, its spring might be stretched beyond its elastic limits, resulting in malfunction of the assembly.

1. CONTACT BOX (See figure 3-17, Volume 2) - Remove the two 151632 screws, 2191 lock washers, and 7002 washers and lift the 174416 contact box assembly and 154056 bracket from the signal generator. To remove the contact box, remove the 3599 nut and 3640 lock washer and remove the 174415 cover. Tag and disconnect the leads to the 154043 terminals. Disassembly is as shown in figure 3-17, Volume 2.

2. SHAFT AND CAM CLUTCH (See figures 3-13 and 3-14, Volume 2) - Release the 3870 springs on the 154034 latch lever and 154-033 stop lever (figure 3-13, Volume 2). Remove the two 112626 nuts and 2669 lock washers retaining the 154030 shaft (figure 3-14, Volume 2) to the 154200 frame. Remove the two 51631 screws and 2191 lock washers, and remove the 154101 rear shaft mounting plate (figure 3-13, Volume 2). Remove the 154030 shaft by rotating it until the clutch cams clear the transfer levers. The 154083 cam spacer, 154138 felt washer, and 154019 eccentric cam follower (figure 3-14, Volume 2) will fall free as the shaft is removed. Remove the shaft, clutch, and cam mechanisms by compressing the 150026 shoe lever against the stop lug on the 150028 clutch disk and sliding the mechanisms from the shaft. Disassemble as indicated in figure 3-14, Volume 2.

3. FRONT AND REAR PLATE MECHANISMS (See figures 3-15 and 3-24, Volume 2) - After removal of the shaft and cam-clutch mechanisms, the front and rear plates can be removed from the signal generator frame. Remove the 3598 nut and 2191 lock washer (figure 3-13, Volume 2). Detach the plates from the frame by removing the two 151631 screws and 2191 lock washers. To separate the rear plate assembly, detach the three 3598 nuts, 2191 lock washers, and one 7002 washer (figure 3-24, Volume 2). Disassembly as indicated in figures 3-15 and 3-24 (or 3-16 for LK25BRW), Volume 2.

4. To reassemble and install the signal generator mechanism, reverse disassembly procedure. Be sure the 154040 transfer levers are riding upon their proper cams on the cam clutch mechanism. Replace the 154083 cam spacer, 154138 felt washer, and 154019 eccentric cam follower on the front of the 154030 shaft before inserting it through the front plate, and be sure that the 154019 eccentric engages the 154017 follower stud (figure 3-24, Volume 2). The 154026 non-repeat lever (154237 non-repeat lever on LK25BRW) must be located in the slot of the 154091 guide, with its left end engaged under the 154238 universal bail extension (figure 3-11, Volume 2). Push the universal bail back to clear the 154283 bail extension in positioning the frame on the keyboard. Push the 164489 clutch code bar (figure 3-23, Volume 2) to the left until it engages the bail on the signal generator, noting that the extreme left of the code bar is still engaged with the fork on the 7603 reset lever (figure 3-25, Volume 2) through the 158099 selecting lever. Engage the five vertical extensions on the code bar levers in the slots behind the 154040 transfer levers. Do not tighten down the signal generator frame unless it fits squarely and easily over its mounting holes without binding. If there seems to be a bind, recheck the positioning of the code bar extensions, the clutch code bar, the non-repeat lever, and the universal bail.

(g) KEYBOARD LABEL (See figure 3-22, Volume 2) - Remove the two 154202 screws and pick up the 154198 plastic cover. See figure 3-22, Volume 2 for disassembly. To reassemble, reverse disassembly procedure.

(h) KEYBOARD COVER AND SEAL PLATES (See figure 3-22, Volume 2) - The keyboard cover can be removed immediately by following paragraph 1 below. For complete disassembly, remove the signal generator (paragraph 6-4d(2)(f) and the character counter (paragraph 6-4d(2)(e). Remove the keyboard labels at both sides of the keyboard (paragraph (g) above).

1. Remove the four 151659 screws and 81774 washers, and two 151632 screws, 2191 lock washers, and 7002 washers under the cover. Pull the hood forward to remove.

2. Stretch the 154020 rubber seal to remove it from the 163511 topseal plate and 163512 bottom seal plate.

3. Remove the 151722 screws and 2191 lock washers behind the topseal plate, and the 151722 screws and 2191 lock washers which mount the bottom seal plate. Remove the plates.

4. To reassemble, reverse disassembly procedure.

(i) KEYBOARD (See figures 3-21, 3-22, and 3-23, Volume 2) - Remove the signal generator, keyboard labels, and keyboard cover (paragraphs 6-4d(2)(f), (g), and (h).

1. Remove the screws and washers attaching the 163585 and 163586 brackets to the 158000 base. Remove the four 151442 screws, 2191 lock washers, and 7002 washers which attach the 154068 and 154069 code lever guide brackets (figure 3-23, Volume 2) to the base. Remove the two 151632 screws, 2191 lock washers, and 7002 washers. Tip up the front of the keyboard, disengaging the 158099 selecting lever from the 158116 reset lever, and pull the assembly forward.

2. To reassemble, reverse disassembly procedure. All function levers are under their corresponding function bails except the receive key function lever, which fits on top of its function bail. When reassembling, depress the REC keylever so that the lock function lever will go over its bail, instead of under as the other function levers.

(j) SPACE BAR (See figure 3-22, Volume 2) - Remove the 151045 space bar by removing the two 151223 shoulder screws attaching it to the 154117 space bar bail. Pull the space bar from the 154111 keylever guide. Further disassembly is as shown in figure 3-22, Volume 2. Reassemble in reverse order.

(k) KEYLEVER GUIDE (See figure 3-22, Volume 2) - Remove labels (paragraph (g) above) and the keyboard cover (paragraph (h) above). Remove the three screws (151631 and 151659) and associated washers which secure the 154111 keylever guide to the 154212 keyboard frame.

1. Work the 154111 keylever guide off the key tops and let them fall free.

2. To reassemble, replace the guide plate over the keylevers, flopping all levers to the rear. Place the guide plate on the 154212 frame and push the keylevers into their respective holes, starting with the bottom row and proceeding upward to the top row. Replace all screws, and washers removed.

(l) KEYLEVER (See figure 3-23, Volume 2) - Remove the keyboard label (paragraph (g) above) and cover (paragraph (h) above) and depress the key to be removed to locate it under the keylever guide, if a keylever is to be removed singly. Remove the keylever guide (paragraph (j) above) to remove all keylevers.

1. Use keylever removing tool No. 151383 (not supplied as part of the equipment). Insert the smaller lug of the keylever remover in the slot of the keylever, and engage the shoulder of the larger lug on the top of the code lever. Pry upward to unsnap the keylever from the code lever. The plastic keytop should not be removed from any keylever to change a character. See figure 3-23, Volume 2 for disassembly.

2. To replace the keylever, place the fork of the keylever over the stud on the code lever. Support the code lever from underneath, and press the keylever into position.

(m) KEYBOARD WEDGELOCK MECHANISM (See figures 3-12 and 3-22, Volume 2) - Remove keyboard label and cover (paragraphs (g) and (h) above).

1. Loosen the 1274 adjusting screw and 3598 nut under the 163585 and 163586 brackets (figure 3-22, Volume 2) at either side of the keyboard.

2. Holding the wedgelock assembly in place to prevent its falling when released, remove two 151631 screws, 2191 lock washers, and 125015 washers attaching the assembly to the 163585 and 163586 brackets. Carefully pull the channel away from the code bars without dislodging the 154080 wedgelocks (figure 3-23, Volume 2) from their code bars. Disassemble as shown in figure 3-12, Volume 2.

3. To replace the wedgelock mechanism, reverse disassembly procedure. Replace any dislodged wedgelocks individually on their code bars. Note that there are no wedgelocks provided for the function keylever code bars and the space code bar.

(n) CODE LEVERS (See figure 3-23, Volume 2) - Remove the signal generator, keyboard labels, cover and keylever guide, keyboard assembly, keylevers, and the wedgelock assembly (paragraphs 6-4d(2)(f) through (m).

1. Remove the 154080 wedgelocks from the code bars.

2. Unhook the 154125 springs from the 154070 code lever guide.

3. Remove the 119645 retaining rings securing the 154016 code bar lever shaft between the 154068 and 154069 brackets. Carefully slide the shaft free of the code levers, retaining each part removed from the shaft in the order in which it was removed. Slide the levers out of the code bar guide carefully from the front. Disassemble as shown in figure 3-23, Volume 2.

4. To replace code bars, reverse the procedure followed in disassembly. Be sure the order of insertion of the code levers in the guide slots is the same as when disassembled. When wedgelocks are replaced, note that there are none for function and space bar code levers.

(o) FUNCTION MECHANISMS (See figures 3-7 and 3-21, Volume 2) - Remove the signal generator, keyboard label and cover, and keyboard guide plate (paragraph 6-4d(2)(f), (g), (h), and (k). It is not necessary to remove the keyboard assembly or the code levers. However, removal of the repeat and send functions is accomplished in the removal of the code levers (paragraph (n) above). The following removal procedures cover local line feed, receive, and local carriage return functions. For space bar function mechanism removal, see paragraph (j) above.

1. Disconnect the 154066 local line feed lever from the 153252 trip lever (figure 3-21, Volume 2) by removing the 119651 retaining ring. Disconnect the 154067 send lever from the 154109 lock plunger by compressing the 151352 spring and disengaging the roller on 154067 send lever from the slot in 154109.

2. Remove the 162333 locating studs and 151146 nut plates attaching each end of the 154059 bracket to the base. Remove the bracket and function levers.

3. Remove the 49420 spring from the 154059 bracket. Remove the two 119653 retaining rings and slide the 154092 shaft from the bracket, retaining the levers in the order in which removed from the shaft.

4. Remove the two 151632 screws and 2191 lock washers to remove the 154106 local line feed trip link bracket, and the 153252 trip link from the base. Remove the 112630 spring from the trip link.

5. Remove the two 151722 screws and 2191 lock washers to remove the 154115 lock plunger guide plate, plunger, and spring. Remove the 3870 spring from the plunger.

6. Disassembly procedures are complete as indicated above, except that keylever and code lever removal for all functions are as described in paragraphs 6-4d(2)(l) and (n). To reassemble the function mechanism components, reverse disassembly procedure.

(p) CODE BARS (See figure 3-23, Volume 2) - Remove the keyboard, keylever guide, keylevers, wedgelock mechanism, and code levers (paragraphs 6-4d(2)(i) and (k) through (n).

1. Remove the 119650 retaining ring so that the 154023 lock bar latch can be removed when the 154052 lock bar is detached.

2. Remove the two 151630 screws and 2191 lock washers holding the 154068 and 154013 brackets and 154008 guide in place while removing the 2415 and 110437 springs, which retain the code bars and 154013 spring bracket. Remove the three brackets and withdraw the code bars from the 154070 guide, retaining the components in the order in which they were removed. Disassembly is illustrated in figure 3-23, Volume 2.

3. Reassemble and install in reverse order of disassembly. Replace the universal bail on its pilot screws before attaching the 154068 bracket.

(q) UNIVERSAL BAIL MECHANISM (See figure 3-11, Volume 2) - When the 154068 bracket is removed in code bar disassembly, the 154071 universal bail pilot screw will be separated from the 154179 bail. Disengage the other end of the bail, and disassemble as shown in figure 3-11, Volume 2. Install the universal bail (assemble in reverse order of disassembly) before attaching the 154068 bracket in reassembling the code bars (paragraph (p) above).

(r) CAM FOLLOWER MECHANISM (See figure 3-26, Volume 2) - Remove the typing reperforator from the keyboard (paragraph 6-4e). Remove the 151631 screw, 2191 lock washer, and 7002 washer to disconnect the signal generator contact box cable and 121242 cable clamp. Remove the two 1210 screws and 93117 lock washers to disconnect the 158163 switch from the 158162 switch bracket. Remove screws 151657 and 151630 and associated washers, to permit the 158067 switch bracket and 158066 switch to drop free of the mechanism. Do not unsolder switch leads unless switches are to be replaced.

1. Remove the four 151632 screws, 2191 lock washers, and 7002 washers and lift the cam follower mechanism from the base. Disassemble mechanism as shown in figure 3-26, Volume 2.

2. To reassemble, reverse disassembly procedure. Position the 158066 switch and 158067 bracket from the bottom of the base to locate for installation.

(s) CODE BAR EXTENSION MECHANISM (See figure 3-25, Volume 2) - Remove the cam follower mechanism (paragraph (r) above). Pull the selector switch shaft out of engagement with the 158114 shaft.

1. Remove the 151631 screw and 2191 lock washer, and lift the code bar extension mechanism from the 158000 base. Pull slightly forward if the auxiliary switch shaft is engaged at the rear of the 158114 shaft, and lift to the left to disengage the 158116 reset lever fork.

2. Disassemble as shown in figure 3-25, Volume 2.

3. Reassemble in reverse order of disassembly. Note that the 158061 link guide pin and 158060 spring are engaged between the 158135 clutch trip bar link and the 158103 trip bar link (figure 3-23, Volume 2) in the code bar mechanism. The reset lever fork must engage the pin on the 158099 keyboard control selector lever. The 158117 reset lever slides between the two bars which comprise the 158-099 selector lever.

(t) Further disassembly of keyboard base is as shown in figure 3-21, Volume 2.

(u) To reassemble keyboard, reverse disassembly procedure of components and mechanisms. All adjustments should be checked (paragraph 5-2d) as the keyboard is assembled.

(3) KEYBOARD (LK) (See figures 3-6 through 3-31, Volume 2)

(a) INTERMEDIATE GEAR MECHANISM (See figure 3-8, Volume 2) - Remove the typing unit and motor from the keyboard (paragraph 6-4c). It is not necessary to remove the keyboard from the cabinet. The intermediate gear mechanism is illustrated in figure 3-8, Volume 2.

1. To change operating speed ratios for the keyboard and typing unit, it is not necessary to disassemble the intermediate gear mechanism. Remove the 151631 screw and 2191 lock washer from the 154663 shaft (figure 3-8, Volume 2). Select the desired matching gea. and pinion set (figure 3-18, Volume 2) and replace the gear attached to the hub end of the 154663 shaft. Replace the pinion on the motor shaft to mate with the new driven gear.

2. Remove the two 151724 screws, and one 151725 screw from the 151228 bracket, and lift the intermediate gear assembly from the keyboard. Disassembly is as shown in figure 3-8, Volume 2.

3. To reassemble and install the intermediate gear mechanism, reverse disassembly procedure.

(b) SYNCHRONOUS PULSED MAGNET ASSEMBLY (See figure 3-20, Volume 2) - Refer to paragraph 6-4d(2)(d).

(c) SIGNAL GENERATOR (See figures 3-13 through 3-17, Volume 2) - Remove the two 153841 screws and 2191 lock washers from the front of the 154200 frame (figure 3-13, Volume 2). Remove the 74805 screw and 2669 lock washer at the rear of the frame. Lift the frame carefully from the keyboard, while holding the universal bail back so that the non-repeat lever clears and its spring will not be excessively stretched.

CAUTION

If the 154026 non-repeat lever is pulled down approximately 90 degrees from normal position, its spring might be stretched beyond its elastic limits, resulting inmalfunction of the assembly.

1. CONTACT BOX (See figure 3-17, Volume 2) - Refer to paragraph 6-4d(2)(f)1.

2. SHAFT AND CAM CLUTCH (See figures 3-13 and 3-14, Volume 2) - Refer to paragraph 6-4d(2)(f)2.

3. FRONT AND REAR PLATE MECHANISMS (See figures 3-15 and 3-16, Volume 2) - Refer to paragraph 6-4d(2)(f)3 for disassembly procedure. Disassembly is identical to that for the LAK21BRW mechanisms with only slight part differences (see figures 3-16 and 3-24, Volume 2).

(d) KEYBOARD LABEL (See figure 3-9, Volume 2) - Refer to paragraph 6-4d(2)(g), and figure 3-9, Volume 2 for disassembly and reassembly.

(e) KEYBOARD COVER AND SEAL PLATES (See figure 3-9, Volume 2) - The keyboard cover can be removed immediately by following step 1 below. For complete disassembly, remove the signal generator (paragraph 6-4d(3)(c). Remove the keyboard labels at both sides of the keyboard (paragraph (d) above).

1. Remove the four 151659 screws and 81774 washers, and two 151632 screws, 2191 lock washers, and 7002 washers under the cover. Pull the hood forward and downward to unhook it from the two 154203 brackets near the bottom.

2. Stretch the 154020 rubber seal to remove it from the 154058 top seal plate, and the 154057 bottom seal plate.

3. Remove the three 151722 screws and 2191 lock washers to remove the 154058 top seal plate. Remove the two 154203 hood mounting brackets by removing the four 151-442 mounting screws and 2191 lock washers. Remove the two 151632 screws and 2191 lock washers, and remove the 154057 bottom seal plate.

4. To reassemble, reverse disassembly procedure.

(f) KEYBOARD (See figures 3-6, 3-9, and 3-10, Volume 2) - Remove the signal generator, keyboard labels, and keyboard cover (paragraphs 6-4d(3)(c), (d), and (e).

1. Remove the four 151631 screws and 2191 lock washers which hold the 154210 and 154211 front frames to the 154000 base.

2. Remove the two 151722 screws, 2191 lock washers, and 7002 washers which hold the 154068 and 154069 right and left code lever guide brackets on the top of the base, and the two 151632 screws and 2191 lock washers at the extreme right and left of the 154055 front bracket which hold it on the base. Tip up the front of the keyboard assembly and pull it forward, disengaging the function levers.

3. To reassemble, reverse disassembly procedure. All function levers are under their corresponding function bails except the keyboard lock function lever, which fits on top of its function bail. When reassembling, depress the keyboard lock keylever so that the lock function lever will go in over its bail instead of under as the other function levers.

(g) SPACE BAR (See figure 3-9, Volume 2) - Refer to paragraph 6-4d(2)(j) for disassembly procedure. Refer to figure 3-9, Volume 2 during disassembly and reassembly of space bar.

(h) KEYLEVER GUIDE (See figure 3-9, Volume 2) - Refer to paragraph 6-4d(2)(k).

(i) KEYLEVER (See figure 3-10, Volume 2) - Refer to paragraph 6-4d(2)(l) for disassembly procedure. Refer to figure 3-10, Volume 2 during disassembly and reassembly of keylevers.

(j) KEYBOARD WEDGELOCK MECHANISM (See figures 3-9 and 3-12, Volume 2) - Remove keyboard labels and cover (paragraphs (d) and (e) above).

1. Remove the two 156631 screws, 2191 lock washers, and 125015 washers at the right and left ends of the wedgelock assembly. Hold the assembly to prevent its falling when released. Carefully pull the channel away from the code bars without dislodging the 154-080 wedgelocks (see figure 3-10, Volume 2). Disassemble as shown in figure 3-12, Volume 2.

2. To reassemble and install wedge lock mechanism, reverse disassembly procedure. Replace any dislodged wedgelocks individually on their code bars. Note that there are no wedgelocks provided for the function keylever code bars and the space code bar.

(k) CODE LEVERS (See figure 3-10, Volume 2) - Remove the signal generator, keyboard labels, cover and keylever guide, keyboard assembly, keylevers, and the wedgelock assembly (paragraphs 6-4d(3)(c) through (j). Refer to paragraph 6-4(2)(n)1 through 4 for disassembly procedure. Refer to figure 3-10, Volume 2 during disassembly and reassembly of the code levers.

(l) FUNCTION MECHANISMS (See figure 3-6 and 3-7, Volume 2) - Remove the signal generator, keyboard labels and cover, and keyboard guide plate (paragraph 6-4d(3), (c), (d), (e) and (h). It is not necessary to remove the keyboard assembly or the code levers. However, removal of the repeat and keyboard unlock functions is accomplished in the removal of the code levers (paragraph 6-4d(3)(k). The following removal procedures cover local line feed, keyboard unlock, and local carriage return functions. For space bar function removal see paragraph (g) above.

1. Refer to paragraphs 6-4d(2)(o) 1 through 5 for disassembly procedure.

2. For keylever and code lever removal for all functions refer to paragraph 6-4d (3)(i) and (k). To reassemble the function mechanism components, reverse disassembly procedure.

(m) CODE BARS (See figure 3-10, Volume 2) - Remove the keyboard, keylever guide, keylevers, wedgelock mechanism, and code levers (paragraphs 6-4d(3)(f) through (k). Refer to paragraph 6-4d(2)(p)1 through 3 for disassembly procedure. Refer to figure 3-10, Volume 2 during disassembly and reassembly of the code bar mechanism.

(n) UNIVERSAL BAIL MECHANISM (See figure 3-11, Volume 2) - Refer to paragraph 6-4d(2)(q) for disassembly procedure. Refer to figure 3-11, Volume 2 during disassembly and reassembly of the universal bail mechanism.

(o) Further disassembly of the keyboard base is as shown in figure 3-10, Volume 2. To reassemble keyboard, reverse disassembly procedure of components and mechanism. All adjustments should be checked (paragraph 5-2d) as the keyboard is assembled.

e. TYPING REPERFORATOR (LPR) (See figures 5-1 through 5-19, Volume 2) - Check preliminary procedures suggested in paragraph 6-4a and b. To remove typing reperforator from keyboard, remove three 74014 screws, 3639 lock washer, 3438 washers (figure 3-21, Volume 2), and 151631 screw, 2191 lock washer, and 125015 washer (figure 5-5, Volume 2). Carefully disengage reperforator from the keyboard, avoiding damage to the connecting linkages.

(1) SELECTOR MECHANISM (See figures 6-17 and 6-18 and figures 5-12 through 5-14, Volume 2) - Removal, disassembly and reassembly of the selector cam-clutch and selector mechanism are as described in connection with the identical mechanism in the typing unit. Remove the cam clutch and selector mechanism (paragraphs 6-4c (9), (10) and (12). Disassemble as shown in figures 5-12 through 5-14, Volume 2. Reassemble and install in the reverse order of disassembly. To readjust the selector mechanism, see paragraph 5-2 adjustment figures 5-1, 5-3, and 5-9 through 5-13.

(2) RIBBON MECHANSIM (See figure5-16, Volume 2) - Remove two 151632 screws and 2191 lock washers, and detach the 156414 ribbon mechanism mounting plate from the typing reperforator. Disassemble as indicated in figure 5-16, Volume 2. To reassemble and install, reverse disassembly procedure. For ribbon installation, see paragraph 3-2d(2)(b).

(3) PUNCH ASSEMBLY (See figures 5-4 through 5-6, Volume 2)

(a) Disengage the main drive link spring 90573 from the 156412 link (figure 5-2, Volume 2), and separate the link from the 156884 rocker arm (figure 5-6, Volume 2).

(b) Remove the 151632 screw, 2191 lock washer, and 7002 washer (figure 5-15, Volume 2). Remove the 151631 screw, 2191 lock washer, and 7002 washer (figure 5-11, Volume 2). Remove two 151631 screws, and 2191 lock washers retaining the 159472 main perforator plate (figure 5-1, Volume 2) to the 159861 frame (figure 5-18, Volume 2) or the 156876 frame (figure 5-18, Volume 2) in the case of the LPR35BWA typing reperforator. Carefully pull the main plate and attached mechanisms straight forward to clear the bell cranks and the printing hammer on the typing mechanism.

(c) FRONT PLATE MECHANISM (See figure 5-5, Volume 2)

1. Remove two 151630 screws and 2191 lock washers. Remove 3598 nut and 2191 lock washer. Remove 151416 nut, 2191 lock washer, and 7002 washer.

2. Disconnect 91120 and 41382 springs, and remove front plate and attached mechanisms. Disassembly is as shown in figure 5-5, Volume 2.

3. To reassemble and install front plate mechanisms, reverse disassembly order.

(d) REAR PLATE MECHANISM (See figure 5-4, Volume 2)

1. Remove 151631 screw, 2191 lock washer, and 7002 washer. Remove 159621 screw, 2191 lock washer, and 8330 washer. Remove 151632 screw, 2191 lock washer, and 7002 washer. Remove 161108 stud, 2191 lock washer, and 3598 nut, and separate the rear plate from the main perforator 159472 plate.

2. Disassembly of rear plate mechanism and punch block, 173770, is shown in figure 5-4, Volume 2.

3. To reassemble, reverse disassembly procedure.

(e) TRANSFER MECHANISM (See figure 5-15, Volume 2) - Remove punch assembly (paragraph 6-4e(3). Remove the 151631 and 151632 screws, 2191 lock washers, and 7002 washers, and separate the transfer mechanism from the main perforator plate. Disassembly of transfer mechanism is indicated in figure 5-15, Volume 2. Reassemble in reverse order of disassembly.

(f) To reinstall punch mechanism, reverse procedure used in removing and disassembling the mechanisms. Be sure transfer levers are properly engaged with the punch bars and with the bell cranks.

(4) TYPING MECHANISM (See figure 5-17, Volume 2)

(a) Remove ribbon mechanism, and punch assembly (paragraph 6-4e(2) and (3).

(b) Remove 156872 operating blade (figure 5-2, Volume 2) by removing the two 151657 screws, 2191 lock washers, 8330 washers, and 82392 shims.

(c) Remove 119651 retaining ring and disconnect the 159512 printing trip link (figure 5-17, Volume 2). Disconnect the 159526 oscillating drive link (figure 5-10, Volume 2) by removing the 153841 screw, 2191 lock washer, 125011 washer, and 160839 eccentric (figure 5-2, Volume 2).

(d) Remove the 33828 spring (figure 5-17, Volume 2) from the 173981 accelerator (figure 5-8, Volume 2) and the 90606 spring (figure 5-1, Volume 2) from the 156252 lifter (figure 5-17, Volume 2).

(e) Remove the 151692 screw, 2191 lock washer, and 8330 washer and detach the 159434 lifter plate (figure 5-17, Volume 2) from the 162862 bar (figure 5-1, Volume 2).

(f) Remove the 151630 screw and 2191 lock washer from the 159404 post (figure 5-10, Volume 2). The 151631 screw, 2191 lock washer, and 7002 washer are previously detached in removal of the punch mechanism, to free the 159487 front plate on the function box (figure 5-11, Volume 2).

(g) Remove the 119653 retaining ring to detach the 159658 screw and 2191 lock washer, and the 159536 gear and 159659 eccentric shaft (figure 5-8, Volume 2).

(h) Remove the three 151631 screws, 2191 lock washers, and 7002 washers which secure the 159535 front plate to the frame (figure 5-7, Volume 2). Remove front plate and attached typing mechanisms from the frame.

(i) To remount typing mechanism, reverse disassembly procedure.

(5) FUNCTION BOX MECHANISM (See figure 5-11, Volume 2) - Remove 151631 screw, 2191 lock washer, and 7002 washer attaching the 156316 function box rear plate and 159483 spring bracket to the 159535 front plate. Lift the function box from the typing mechanism. Disassembly is shown in figure 5-11, Volume 2. To reinstall function box, reverse disassembly procedure.

(6) AXIAL PLATE MECHANISM (See figures 5-9 and 5-10, Volume 2)

(a) Remove the 3870 spring (figure 5-17, Volume 2) from the 156413 correcting drive link. Remove the 119651 retaining ring and detach the correcting drive link.

(b) Remove the 119649 retaining ring and remove the 156870 ribbon oscillating lever (figure 5-9, Volume 2).

(c) Remove the two 151630 screws and 2191 lock washers (third one removed during typing mechanism disassembly, figure 6-4e(4) (f) which mount the 159525 axial plate to the 159535 front plate from the front and from the rear. Remove axial plate assembly.

(d) Axial plate disassembly is illustrated in figures 5-9 and 5-10, Volume 2.

(e) To reassemble and remount axial plate assembly, reverse disassembly procedure. The rearmost tooth space on the 156294 sector (figure 5-9, Volume 2) must mesh with the rearmost tooth on the 173775 type wheel shaft rack, and the forward tooth on the sector must mesh with the second tooth space on the shaft. There is an extra tooth space on the forward portion of the shaft's rack.

(7) FRONT PLATE ASSEMBLY (See figures 5-7 and 5-8, Volume 2) - Remove the function box assembly and axial plate assembly after removing the typing unit from the frame (paragraph 6-4e(4) through (6). Disassemble remaining front plate mechanism as shown in figures 5-7 and 5-8, Volume 2. To reassemble, reverse disassembly procedure.

(8) PUSH BARS (See figure 5-7 and 5-10, Volume 2)

(a) To remove push bars, remove typing mechanism and function box mechanism (paragraph 6-4e(4) and (5). Remove push bars by disengaging the push bar rack from its associated pinion.

(b) When reassembling push bars, care must be taken to assure the correct rack-pinion mesh. Correct gear tooth engagement of racks is as follows:

1. PUSH BARS #1 (159533), #2 (159534) (figure 5-10, Volume 2), #3 (159529), #4 (159530), and #5 (159528) (figure 5-7, Volume 2) - Correct mesh for these push bars is such that the first tooth on the pinion and the first tooth space on the rack are meshed. The last tooth on the pinion and the last tooth space on the rack should also mesh. Misalignment of the mesh by as little as one tooth will produce a jam in the machine and cause part breakage if the unit is put under power while the condition exists.

2. "LETTERS" (159563) and "FIGURES" (159532) PUSH BARS (figure 5-7, Volume 2) - The assembly of these two push bars to

the left eccentric assembly must follow the assembly of the detents on the same eccentric. Starting with the left eccentric in the lower detented position, locate the gear tooth of the pinion which is at top dead center (using oil hole in eccentric housing as a reference may help, since it's also located at top dead center). The first tooth space of the rack of the "letters" push bar must engage the tooth located directly below. This requirement is met when the indicating mark on the push bar and eccentric shaft are in line. Pull the "letters" push bar all the way on the pinion. The eccentric shaft should now be in the upper detented position. Now locate the tooth at bottom dead center. The first tooth space of the rack on the "figures" push bar should engage the tooth just located. The full travel of either push bar should result in the eccentric shaft being rotated from one detented position to the other without jamming. As before, a misalignment of the mesh by one tooth will cause a jam and parts breakage if the machine is put under power.

(9) ROCKER BAIL ASSEMBLY (See figure 5-2, Volume 2) - Remove typing mechanism from the typing reperforator (paragraph 6-4e (4).

(a) Disconnect the 156937 printing drive link by removing the 119651 retaining ring (figure 5-17, Volume 2).

(b) Remove the 3598 nut, 2191 lock washer, 7002 washer, 156877 felt washer, 156876 bushing, 125015 washer, and 151632 screw from the operating blade 156871 mounting bail (figure 5-2, Volume 2).

(c) Remove the 125231 nut, 2669 lock washer, and 156921 adjusting lever guide, and remove the 156366 rocker bail shaft. Remove the rocker bail. Disassembly is shown in figure 5-2, Volume 2 .

(d) To replace the rocker bail, reverse disassembly procedure.

(10) MAIN SHAFT (See figures 5-3 and 5-18, Volume 2)

(a) Remove the 87401 spring from the 150355 function clutch latch lever (figure 5-1, Volume 2). Remove the 156467 retaining ring, 151426 flat washers, and 156465 spring washer from the forward (longer) end of the 154397 main shaft (figure 5-2, Volume 2). Remove the 151630 screw and 2191 lock washer from the 158745 bearing clamp and remove the clamp.

(b) Remove the 150040 screw and 2191 lock washer from the 150000 function clutch drum. Remove the 151632 screw and 2191 lock washer from the 173340 collar (figure 5-3, Volume 2).

(c) Pull the main shaft out of the rear of unit, removing the cam-clutch and 173340 collar.

CAUTION

Note the location of the main shaft 154398 needle roller bearings shown in figure 5-3, Volume 2. Move the main shaft toward the rear of the unit slowly, exercising care not to drop or contaminate the 20 needle bearing rollers in each race. A spring (such as a 125252 spring used on the ribbon feed pawl) may be stretched around the shaft and roller bearings, and the ends of the spring hooked together. The spring, plus the KS74171 grease around the bearings, will hold the rollers in place.

(d) To replace main shaft assembly, reverse disassembly procedure. Make sure roller bearings are clean, and lubricate bearing races with KS7471 grease. Apply a liberal amount of KS7470 oil at each end of the bearing sleeve.

NOTE

When the main shaft is inserted into the cam-clutch, hold the latter firmly so that the drum is not pushed off the clutch. Compress the drum and cam disk together so that holes in drum and clutch bearings are aligned.

(11) JACK SHAFT (See figure 5-18, Volume 2) - Remove the rear 155995 bearing retainer screw, 112967 washer, 2191 lock washer, and 3598 nut from the typing reperforator frame. Remove the two front 151346 bearing retainer screws, 2191 lock washers and 158881 nuts. Remove the 151632 screw and 2191 lock washer to separate the 159885 gear from the 158171 shaft. Remove the 3603 nut and 93108 washer from the end of the jack shaft and remove the shaft from the frame. To reassemble, reverse disassembly procedure.

(12) To reassemble and install the typing reperforator, reverse the disassembly procedure.

f. **AUXILIARY TYPING REPERFORATOR (LPR)** (See figures 5-1 through 5-19, Volume 2) - The auxiliary typing reperforator is an auxiliary signal receiving component mounted on the LRB32 base in the ASR sets. Disassembly of the auxiliary typing reperforator is identical in most respects to the typing reperforator (paragraph 6-4e.), with two exceptions - the addition of a remote control non-interfering "letters" tape feed-out mechanism, and the absence of the jack shaft (paragraph 6-4e(11). Check the preliminary procedures suggested in paragraph 6-4a and b. Remove the auxiliary typing reperforator from its base (paragraph 6-4g).

(1) REMOTE CONTROL NON-INTERFERING "LETTERS" TAPE FEED-OUT MECHANISM (See figures 5-20 through 5-22, Volume 2)

(a) Remove the two 119652 retaining rings holding the 162798 roller on the 162791 shaft (figure 5-20, Volume 2).

(b) Remove the 162798 roller, 172795 ratchet assembly, and 172793 ratchet from the 162791 shaft.

(c) Remove the two 119652 retaining rings holding the 173614 link (with stud) to the 173605 bail assembly and 164888 lever (figure 5-22, Volume 2).

(d) Remove the two 151631 screws, 2191 lock washers, and 8330 flat washers which mount the 162773 main plate to the typing reperforator frame (figure 4-87, Volume 1).

(e) Remove mechanism from typing reperforator frame. For further disassembly refer to figures 5-20 through 5-22, Volume 2.

(f) To reassemble and install the remote control non-interfering "letters" tape feed-out mechanism, reverse disassembly procedure. When remounting the mechanism, make certain the following conditions are met:

1. The 162786 blocking arm (figure 5-20, Volume 2) must engage the 162745 drive arm (figure 5-21, Volume 2).

2. Fit the 163326 lever (figure 5-21, Volume 2) into the rectangular opening of the 162760 latch lever (figure 5-20, Volume 2).

3. Position the 173620 armature bail (figure 5-20, Volume 2) so that it moves the 173618 bail (figure 5-22, Volume 2) away from the 173605 bail assembly.

(2) SELECTOR MECHANISM - Refer to paragraph 6-4e(1).

(3) RIBBON MECHANISM - Refer to paragraph 6-4e(2).

(4) PUNCH ASSEMBLY - Refer to paragraph 6-4e(3).

(5) TYPING MECHANISM - Refer to paragraph 6-4e(4).

(6) FUNCTION BOX MECHANISM - Refer to paragraph 6-4e(5).

(7) AXIAL PLATE MECHANISM - Refer to paragraph 6-4e(6).

(8) FRONT PLATE ASSEMBLY - Refer to paragraph 6-4e(7).

(9) PUSH BARS - Refer to paragraph 6-4e (8).

(10) ROCKER BAIL ASSEMBLY - Refer to paragraph 6-4e(9).

(11) MAIN SHAFT - Refer to paragraph 6-4e(10). In addition to the removal of the parts listed in paragraph 6-4e(10), the 156400 belt sprocket (figure 4-4, Volume 2) must be removed.

(12) To reassemble and install the auxiliary typing reperforator, reverse disassembly procedure. Adjust the position of the unit to meet requirements of paragraph 5-2 adjustment figure 5-134, and tighten the three 153537 mounting screws. Loosen the 151630 screw (figure 5-5, Volume 2) and press the 156183 anchor bracket to the base. Tighten the 151630 screw. Install and tighten the 151631 screw, 2191 lock washer, and 125015 washer, securing the reperforator to the base. Install tape in the tape container and feed it through the reperforator (paragraph 3-2d(3). Connect the 161239 plug on the auxiliary typing reperforator base to the 161238 connector on the reperforator (figure 5-19, Volume 2).

g. AUXILIARY TYPING REPERFORATOR BASE LRB32 (See figures 4-2 through 4-4, and 4-6, Volume 2) - The auxiliary typing reperforator provides mounting and drive facilities for the auxiliary typing reperforator. Check preliminary procedures suggested in paragraph 6-4a and b. Remove the auxiliary reperforator from the base by removing the three 151632 screws, 2191 lock washers, and 76461 washers, and also the 151631 screw, 2191 lock washers, and 125015 washer securing the anchor bracket to the base (figure 4-2, Volume 2). Remove the 161806 timing belt (figure 4-4, Volume 2) and disconnect the 161239 plug from its mating connector in the reperforator. Lift the typing reperforator from the base.

(1) REMOVAL - To remove the auxiliary typing reperforator base from the ASR Cabinet, remove the three 162730 screws, two 2449 lock washers, one 82832 star washer, and three 3226 washers which secure the base to the 161777 and 161778 mounting studs (figure 4-6, Volume 2). Lift the base and attached motor and tape container from the cabinet. Disconnect all cabling from the base to the cabinet terminal board.

(2) TAPE CONTAINER (See figure 4-2, Volume 2) - Remove two 151723 screws, 2669 lock washers, and 111516 washers which mount the tape container to the base. Remove the

container to the extent permitted by leads to the 158163 switch. To remove completely, tag and disconnect cable 161821 terminals at the base terminal board. Disassemble the tape container as shown in figure 4-3, Volume 2. Reassemble in reverse disassembly order.

(3) GEAR BRACKET MECHANISM (See figure 4-3, Volume 2) - Remove the three 153-442 screws, 2669 lock washers, and 161770 washers (figure 4-2, Volume 2). Lift the 161-772 gear shift frame and attached mechanisms from the base. Disassemble as indicated in figures 4-3 and 4-4, Volume 2. To reassemble, reverse disassembly procedure.

(4) MOTOR REMOVAL - (See figure 4-2, Volume 2) - Remove gear bracket gear guard by loosening the two 151630 mounting screws and the 151631 mounting screw (figure 4-3, Volume 2). Remove the four 162730 motor mounting screws, four 92146 nuts, eight 3226 washers, six 2449 lock washers, and two 82832 star washers, and remove the motor from the base. For disassembly of governed or synchronous motors, refer to paragraph 6-4m. To reassemble and install motor reverse disassembly procedure.

(5) Disassemble the auxiliary typing reperforator base as shown in figure 4-2, Volume 2. To reassemble, reverse disassembly procedure. Do not replace the tape container until all connections to the base terminal boards have been completed.

h. TRANSMITTER DISTRIBUTOR (LXD) (See figures 7-1 through 7-8, Volume 2) - Check preliminary procedures suggested in paragraph 6-4a and b. Slide the 154485BR transmitter distributor housing (figure 1-6, Volume 2) from its spring detents on either side to expose the mechanism. Remove the two 151693 screws, 2191 lock washers, and 7002 washers which secure the 162019 plate, and remove plate. Remove the three 151632 transmitter distributor mounting screws, 2191 lock washers, and 125015 washers, and lift the transmitter distributor from the base.

(1) COVER PLATE (See figure 7-9, Volume 2) - Lift upward on the left edge of the 156608 cover plate to unlatch the 156779 spring detents, and pull to the left to release the 156-609 spring catches. Disassemble as indicated in figure 7-9, Volume 2. To reassemble, reverse disassembly procedure.

(2) TOP PLATE (See figure 7-10, Volume 2) - Loosen the two 152893 screws, 110743 lock washers, and 125011 washers, and lift top plate from the transmitter distributor. Disassembly is shown in figure 7-10, Volume 2. To reassemble, reverse disassembly procedure.

(3) TAPE GUIDE PLATE (See figure 7-8, Volume 2) - Loosen the two 152893 screws, 110743 lock washers and 125011 washers, and lift the tape guide plate and attached mechanisms from the transmitter distributor. Disassembly is shown in figure 7-8, Volume 2. To reassemble, reverse disassembly procedure.

(4) REAR PLATE ASSEMBLY (See figures 7-4 and 7-6, Volume 2) - Remove the transmitter distributor from its base, and remove the cover, top and tape guide plates (paragraphs 6-4h(1) through (3).

(a) Remove the two 112626 nuts and 2669 lock washers. Remove the 151630 screw and 2191 lock washer (figure 7-3, Volume 2). Pull the rear plate assembly from the transmitter distributor to the extent permitted by leads to the magnets and the start-stop tight tape switch.

(b) To completely remove the assembly, remove the two 152893 screws, 110743 lock washers, and 125802 washers and remove the 160639 switch. Removal of the switch lead requires disassembly of the switch. See figure 7-4, Volume 2. Tag and disconnect the four magnet leads by removing the four 81778 screws and 2438 washers (figure 7-6, Volume 2).

(c) Disassemble the rear plate assembly as indicated in figures 7-4 and 7-6, Volume 2.

(d) To reassemble, reverse disassembly procedure. The slotted arm of bail 156596 (figure 7-4, Volume 2) must engage the 156523 eccentric (figure 7-1, Volume 2).

(5) CENTER PLATE MECHANISM (See figure 7-3, Volume 2) - Remove the rear plate assembly (paragraph 6-4h(4).

(a) Disconnect the 156590 clutch latch spring (figure 7-1, Volume 2).

(b) Remove the 156622 spacer (figure 7-3, Volume 2), 3598 nut, and 2191 lock washer (figure 7-1, Volume 2). Remove the center plate mechanism.

(c) Disassemble as shown in figure 7-3, Volume 2.

(d) To reassemble and install, reverse disassembly procedure.

(6) MAIN SHAFT (See figure 7-5, Volume 2) - Remove the rear plate assembly (paragraph 6-4h(4).

(a) Remove the 156501 screw and 2191 lock washer to remove the 156832 bearing retainer (figure 7-2, Volume 2). Rotate the shaft assembly to clear the cams and withdraw the shaft from the rear of the transmitter distributor.

(b) Disassembly of main shaft is shown in figure 7-5, Volume 2.

(c) To reassemble and install main shaft, reverse disassembly procedure.

(7) CONTACT BOX ASSEMBLY (See figure 7-7, Volume 2) - Remove cover plate (paragraph 6-4h(1).

(a) Remove the 3599 nut and 3640 lock washer, and lift the 174415 cover from the contact box. Disconnect the 86304 spring.

(b) Tag and disconnect the signal line leads by removing the three 1293 screws and 110743 lock washers.

(c) Remove the two 151632 screws, 2191 lock washers, and 7002 washers, and lift the contact box from the 156649 front plate.

(d) Disassembly of the contact box is shown in figure 7-7, Volume 2.

(e) To reassemble contact box, reverse disassembly procedure.

(8) FRONT PLATE MECHANISM (See figures 7-1, and 7-2, Volume 2) - Remove rear plate assembly, center plate mechanism, main shaft, and contact box (paragraph 6-4h(3) through (7). The remaining mechanisms in the transmitter distributor are associated with the 156649 front plate (figure 7-1, Volume 2) and are disassembled as shown in figures 7-1 and 7-2, Volume 2. To disconnect leads to the tape-out switch, remove the two 151632 screws, 2191 lock washer, and the 76275 nut plate. This detaches the 160629 switch bracket, 160-638 adjusting bracket, 101998 bushing, and 76461 spacer, all of which are part of the 160-632 switch assembly. Removal of the leads requires disassembly of the switch. To reassemble the front plate mechanism, reverse the disassembly procedure.

(9) To reassemble the transmitter distributor, reverse the procedures used in removing the component mechanisms. Be sure the upper extension on the 160640 tape-out sensing pin (figure 7-1, Volume 2) rides under the 160628 swinger of the 160632 switch (figure 7-2, Volume 2). The 156641 tape sensing pins (figure 7-1, Volume 2) should be centered in their slots on the 156567 top plate (figure 7-10, Volume 2).

i. TRANSMITTER DISTRIBUTOR BASE LC-XB13 (See figure 4-1, Volume 2) - Remove the transmitter distributor (paragraph 6-4h), the auxiliary typing reperforator base (paragraph 6-4f(1), and the 161778 mounting stud (figure 4-6, Volume 2).

(1) Remove the three 74807 nuts, 2669 lock washers, 103305 washers, and 163517 rubber bushings from the 164101 stud (figure 1-3, Volume 2).

(2) Remove the rear 151723 screw and 2669 lock washers, securing the 158018 connector bracket to the base, to remove the 117-366 ground strap. Lift the base out of the cabinet.

(3) Disassembly of the base is as shown in figure 4-1, Volume 2.

(4) To reassemble and install base, reverse disassembly procedure.

CAUTION

Make certain ground strap removed in step (2) is re-connected to connector bracket to avoid shock hazards.

j. ELECTRICAL SERVICE ASSEMBLIES (ESA)

(1) ESA 173824 and 173783 (See figures 2-3, 2-4, 2-6, 2-7, and 2-9, Volume 2) - Remove the two 151437 studs (figure 2-3, Volume 2) to detach the 173824 electrical service assembly (ESA) from the ASR cabinet, and the 173783 ESA from the KSR cabinet. To remove the ESA's from either cabinet, the 154443 switch shaft (figures 1-7 and 1-17, Volume 2) must be disengaged from the ESA container. Cable connections to the cabinet blocks need not be removed to service assemblies. Either ESA can be serviced by inverting it to stand on its four legs. The cradle mounted cabinet components must be moved forward before the electrical service assembly can be inverted.

(a) GENERAL - Disassembly of the 173824 and 173783 electrical service assemblies is as shown in figures 2-3, 2-4, 2-6, 2-7, and 2-9, Volume 2. Tag all terminal board leads before disconnecting them. Do not unsolder cable connections unless a component is to be replaced.

(b) RECTIFIER (See figures 2-6 and 2-7, Volume 2) - A rectifier power supply is mounted on each ESA, and can be serviced without removal of other teletypewriter components.

1. Loosen but do not remove the two 150040 screws to detach the 151427 latch plates, and lift the rectifier assembly from the electrical service assembly container to the extent permitted by the 153477 cable.

2. If it is necessary to remove the rectifier assembly from the ESA container, invert the container, and detach the 153477 cable terminals from their respective terminal posts. Tag all leads, and separate the rectifier assembly from the container.

3. Disassembly of the rectifier assembly is indicated in figure 2-6 or 2-7, Volume 2.

4. To reassemble and install the rectifier assembly, reverse the disassembly procedure.

(c) ELECTRONIC KEYER (See figure 2-4, Volume 2) - One or more (maximum of three) electronic keyers are mounted on the electrical service assemblies, and can be serviced without removal of other teletypewriter components.

1. Loosen but do not remove the two 150040 screws to detach the 151427 latch plates, and lift the electronic keyer assembly from the ESA container to the extent permitted by the interconnecting cables.

2. If it is necessary to remove a keyer from the ESA container, invert the container and detach all leads from the keyer components to the container terminal boards. Tag all leads, and separate the keyer from the container.

3. Disassembly of the electronic keyer assembly is as shown in figure 2-4, Volume 2.

4. To reassemble and install the keyer assembly, reverse the disassembly procedure.

(2) ESA 173395BR and 173816BR (See figures 2-1, 2-2, 2-5, 2-6, 2-8 and 2-10, Volume 2) - These electrical service assemblies are used in conjunction with rack mounted Receive-Only (RO) and Send-Receive (KSR) Sets. Either of these ESA's may be serviced by removing them from their mounted positions (if necessary) and removing the three 156740 screws (figure 2-1, Volume 2) which secure the hinged 173957 container cover to the ESA.

(a) GENERAL - Disassembly of the 173395BR and 173816BR electrical service assemblies is shown in figures 2-1, 2-2, 2-5, 2-6, and 2-8, Volume 2. Tag all terminal board leads before disconnecting them. Do not unsolder cable connections unless a component is to be replaced.

(b) RECTIFIER (See figure 2-6, Volume 2) - A rectifier power supply is mounted in each ESA, and can be serviced without being entirely disconnected from the container.

1. Remove the four 3598 nuts, 2191 lock washers, and 7002 washers from the 861-99 studs, and lift the rectifier assembly from the electrical service assembly container to the extent permitted by the interconnecting cables.

2. If it is necessary to completely remove the rectifier assembly from the ESA, detach all necessary cable connections from their respective terminals. Be sure to tag all leads before disconnecting cables. Remove the rectifier assembly from the ESA.

3. Disassembly of the rectifier assembly shown in figure 2-6, Volume 2.

4. To reassemble and install the rectifier assembly, reverse the disassembly procedure.

(c) ELECTRONIC KEYER (See figure 2-5, Volume 2) - One electronic keyer is mounted in each ESA, and can be serviced without being entirely disconnected from the container.

1. Remove the 3598 nuts, 2191 lock washers, and 7002 washers from the keyer mounting studs, and lift the keyer from the ESA container to the extent permitted by the interconnecting cables.

2. If it is necessary to completely remove the keyer assembly from the ESA, detach all necessary cable connections from their respective terminals. Be sure to tag all leads before disconnecting cables. Remove the keyer assembly from the ESA.

3. Disassembly of the electronic keyer is shown in figure 2-5, Volume 2.

4. To reassemble and install the keyer assembly, reverse disassembly procedure.

k. CABINETS (See Section 1, Volume 2) - Most necessary removal and disassembly of cabinet components can be accomplished by reference to the applicable parts illustrations. Some of these procedures can be accomplished without removing teletypewriter components. Remove teletypewriter components only as required for a maintenance operation.

(1) GENERAL - References to parts illustrations may be made as follows for details on removal and disassembly of cabinet components.

(a) CABINET LAAC229BR (See figures 1-1 through 1-15, Volume 2)

1. Latch mechanisms and front panels, cabinet shell, dome, panels, and doors. See figures 1-1 and 1-2, Volume 2.

2. Cradle, see figure 1-3, Volume 2.

3. Terminal blocks and cabinet components. See figures 1-4 and 1-5, Volume 2.

4. Transmitter distributor housing, switches, tape guide, offset copyholder, sub-base, and directory holder. See figures 1-6 through 1-10, Volume 2.

5. Chad disposal and chad container facilities. See figures 1-11 through 1-13, Volume 2.

6. Cabinet cabling, see figures 1-14 and 1-15, Volume 2.

(b) CABINET LAC214BR (See figures 1-16 through 1-19).

1. Latch mechanisms, cross bar, cabinet shell, dome, and doors. See figure 1-16, Volume 2.

2. Cradle, copyholder, switch, rerun cart, electrical components, and windows. See figure 1-17, Volume 2.

3. Copylight and cabling. See figures 1-18 and 1-19, Volume 2.

(c) COVER LPC206BR (See figures 1-20 through 1-22, Volume 2).

1. Latch mechanism, copyholder, and electrical components. See figure 1-20, Volume 2.

2. Cradle, sub-base, windows, and margin lamp. See figure 1-21, Volume 2.

3. Cabinet cabling. See figure 1-22, Volume 2.

(2) REMOVAL OF TELETYPEWRITER COMPONENTS - Refer to previous removal instructions as follows:

(a) **Typing unit (LP), see paragraph 6-4c.**

(b) **Base (LB) and Keyboards (LK and LAK), see paragraph 6-4d.**

(c) **Typing reperforator (LPR), see paragraph 6-4e.**

(d) **Auxiliary typing reperforator (LPR), see paragraph 6-4f.**

(e) **Auxiliary Base (LRB), see paragraph 6-4g.**

(f) **Transmitter Distributor (LXD), see paragraph 6-4h.**

(g) **Transmitter Distributor Base (LCXB), see paragraph 6-4i.**

(3) Reassembly and installation of cabinet components will be accomplished in the reverse order of disassembly. Clean the glass window of the front panel with a soft cloth prior to installation of the front panel. Avoid damage to the character counter (LAAC229BR Cabinet) when positioning the front panel.

l. PAPER WINDER PW201BR (See figures 1-23 through 1-25, Volume 2).

(1) Remove the 101021BR motor cover.

(2) Refer to figures 1-23 and 1-24, Volume 2, for disassembly procedure.

(3) See paragraph 3-5c and d, Volume 1, for paper loading instructions.

(4) To reassemble the paper winder, reverse disassembly procedure.

m. MOTORS (See figures 8-1 through 8-5, Volume 2) - Removal of keyboard (or base) mounted motors is identical for either synchronous or governed units, as described in paragraph 6-4d. The LMU3 and LMU4 motor units are used in Received - Only and Send - Receive Sets, and on the auxiliary typing reperforator base. The LMU12 or LMU14 motor units are used only on the Automatic Send - Receive Sets.

(1) SYNCHRONOUS MOTORS LMU3 and LMU12 (see figures 8-1 and 8-2, Volume 2) - Disassembly of the synchronous motor is as shown in figures 8-1 and 8-2, Volume 2. To reassemble the motors, reverse disassembly procedure.

(2) GOVERNED MOTORS LMU4 and LMU-14 (See figures 8-3 through 8-5, Volume 2) - Disassembly of the governed motors is as shown in figure 8-3, Volume 2. Disassembly of the governor mehcanism is illustrated in figure 8-4, Volume 2.

(a) In order to prolong the life of governor slip ring brushes, the slip rings are machined to close concentricity requirements after assembly. These slip rings should not be replaced unless facilities for the machining operation are available.

(b) After the governor parts are assembled, in the reverse of disassembly order, the governor is carefully balanced to reduce vibration. It is, therefore, necessary, when making parts replacements, to move only the parts replaced. Do not disturb other parts.

(c) Motor reassembly is to be the reverse of the procedure followed in disassembly.