33 KEYBOARD

GENERAL DESCRIPTION AND PRINCIPLES OF OPERATION

CONTENTS

1. GENERAL

1.01 This section provides general description and principles of operation for the 33 keyboard. It is reissued to consolidate information and update the coding information. ← ← Marginal arrows indicate changes and additions.

1.02 Both the nonparity (Figure 1) and parity keyboards (Figure 2) are covered in this section.

1.03 The 33 nonparity and parity keyboards are electromechanical apparatus used to mechanically select and electrically transmit ASCII (American National Standard Code for Information Interchange).

1.04 The functional difference between the nonparity and parity keyboards is in the control of the eighth level pulse:

(a) With nonparity keyboards the eighth pulse is always marking.

(b) With parity keyboards the eighth pulse changes so that an even number of marking pulses is transmitted for every character.

Note: For further details on ASCII and transmission principles, refer to Section 574-122-100TC covering the 33 Typing Unit.

1.05 References to left, right, front, rear, etc, consider the keyboard as viewed by the operator.

1.06 In the illustrations fixed pivots are solid black, and floating pivots — those mounted on parts that move — are crosshatched.

CAUTION: DISCONNECT ALL POWER FROM THE KEYBOARD PRIOR TO INSPECTION.

2. TECHNICAL DATA

Note: This equipment is intended to be operated in a room environment within the temperature range of 40°F to 110°F. Serious damage to it could result if this range is exceeded. In this connection, particular caution should be exercised in using acoustical and other enclosures.

2.01 Dimensions and Weight (Approximate)

Height	5 inches
Width	12-1/2 inches
Depth	5 inches
Weight	4-1/2 pounds

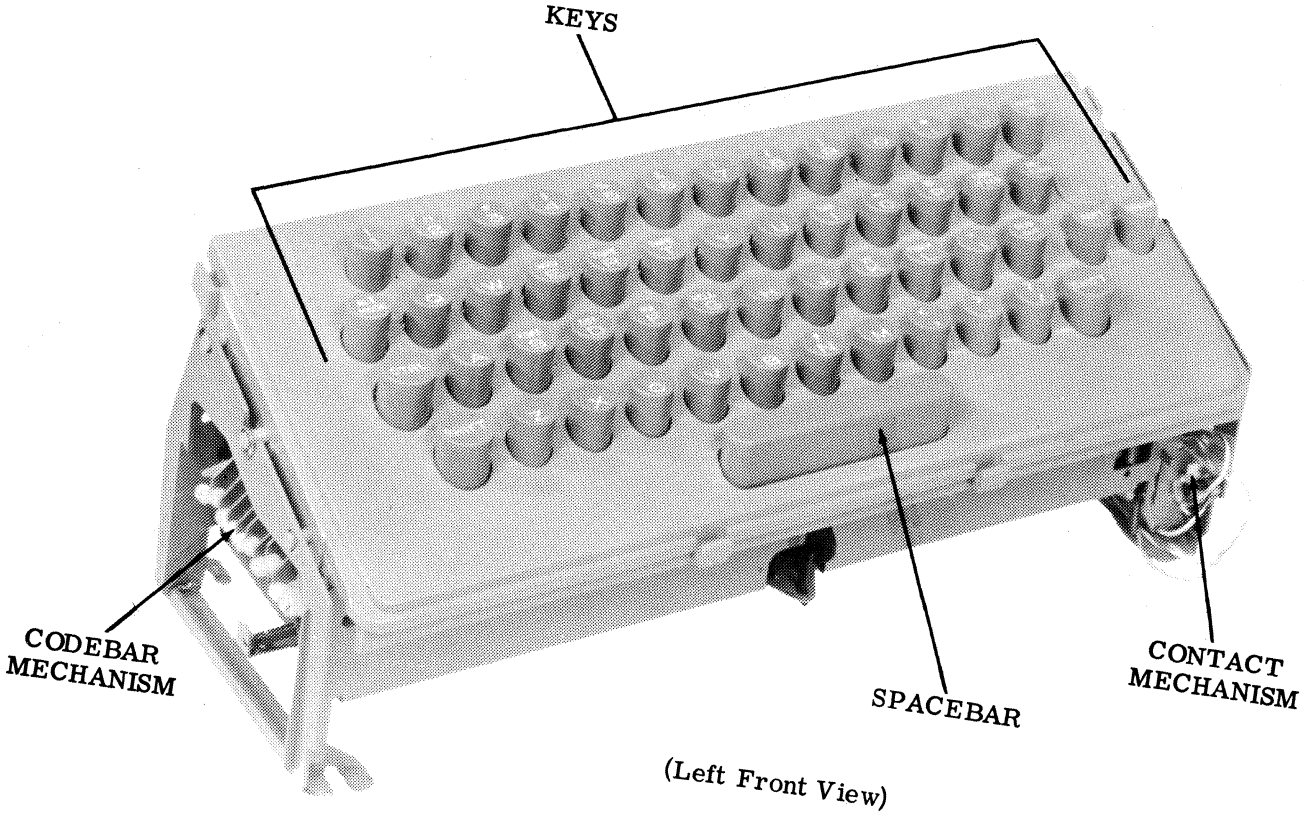


Figure 1 - Nonparity Keyboard

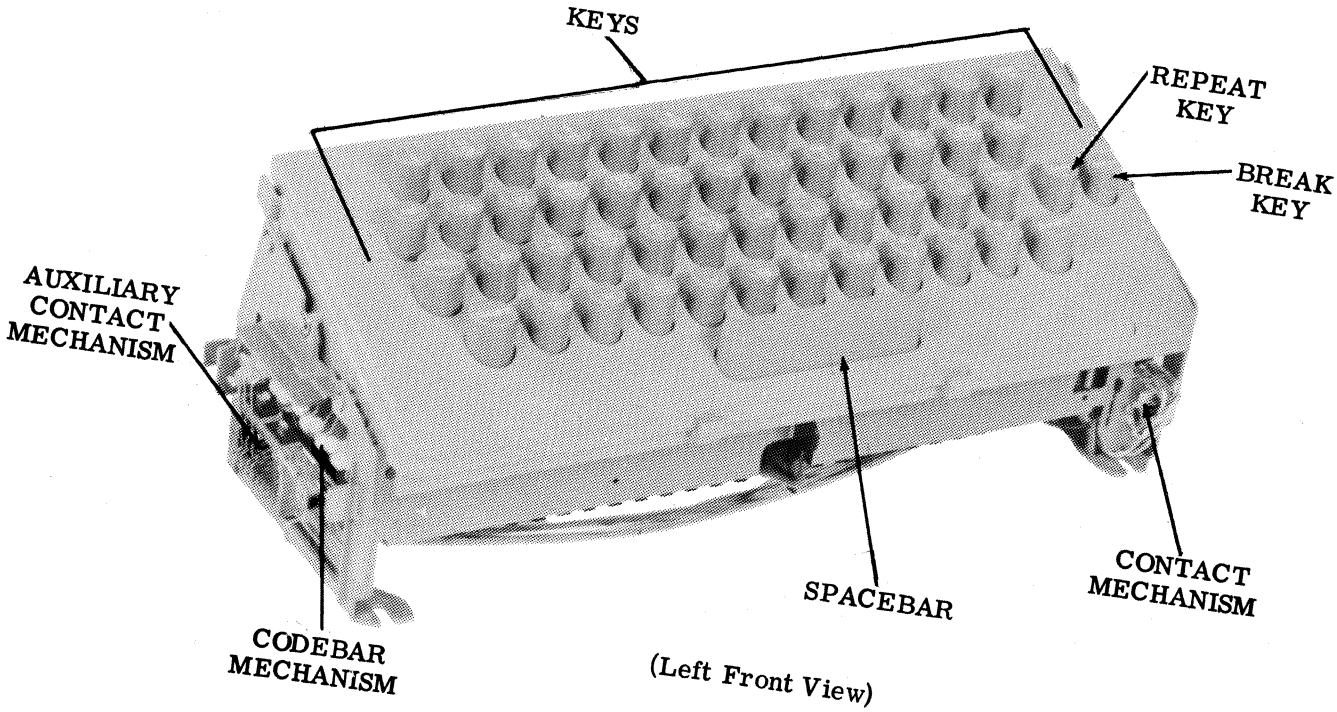


Figure 2 - Parity Keyboard

		b_7	0	0	0	0	1	1	1	1
		b_6	0	0	1	1	0	0	1	1
		b_5	0	1	0	1	0	1	0	1
b_4	b_3	b_2	b_1								
0	0	0	0	NUL	DLE	SP	0	@	P		
0	0	0	1	SOH	DC1	!	1	A	Q		
0	0	1	0	STX	DC2	"	2	B	R		
0	0	1	1	ETX	DC3	#	3	C	S		
0	1	0	0	EOT	DC4	$	4	D	T		
0	1	0	1	ENQ	NAK	%	5	E	U		
0	1	1	0	ACK	SYN	&	6	F	V		
0	1	1	1	BEL	ETB	'	7	G	W		
1	0	0	0	BS	CAN	(	8	H	X		
1	0	0	1	HT	EM	)	9	I	Y		
1	0	1	0	LF	SUB	*	:	J	Z		
1	0	1	1	VT	ESC Note 6	+	;	K	[		
1	1	0	0	FF	FS	,	<	L	\		! Note 2
1	1	0	1	CR	GS	-	=	M	]		Note 5
1	1	1	0	SO	RS	.	>	N	^		
1	1	1	1	SI	US	/	?	O	—		DEL

NUL - Null
SOH - Start of Heading
STX - Start of Text
ETX - End of Text
EOT - End of Transmission
ENQ - Enquiry
ACK - Acknowledge
BEL - Bell
BS - Backspace
HT - Horizontal Tabulation
LF - Line Feed
VT - Vertical Tabulation
FF - Form Feed
CR - Carriage Return
SO - Shift Out
SI - Shift In
DLE - Data Link Escape
DC - Device Control
NAK - Negative Acknowledge
SYN - Synchronous Idle
ETB - End of Transmission Block
CAN - Cancel
EM - End of Medium
SUB - Substitute
ESC - Escape
FS - File Separator
GS - Group Separator
RS - Record Separator
US - Unit Separator
SP - Space
DEL - Delete

LOCKED OUT BY CONTROL

NOT APPLICABLE TO 33 EQUIPMENT

SHIFT CHARACTERS

CONTROL CHARACTERS

LOCKED OUT BY SHIFT

Note 1: 1 = Mark, 0 = Space.

Note 2: Cannot be generated from keyboard.

Note 3: Blocks not indicating SHIFT or CTRL characters contain primary key characters.

Note 4: Filled-in corners or blocks indicate 8th pulse marking (in nonparity units, 8th pulse is always marking).

Note 5: This code can be generated on model 33 nonparity keyboards by depressing the ALT MODE key.

Note 6: The ESC control function may be generated by depressing the ESC key or by simultaneously depressing the K, SHIFT, and CTRL keys.

Note 7: The following keyboard generated control characters are obtained by holding both the CTRL and SHIFT key depressed while operating the specified key once for each character desired:

NUL . . . Shift, CTRL — P
ESC . . . Shift, CTRL — K
FS . . . . Shift, CTRL — L
GS . . . Shift, CTRL — M
RS . . . Shift, CTRL — N
US . . . Shift, CTRL — O

Figure 3 - 33 Application of ASCII

2.02 Electrical

Long loops . . . . . 0.015 to 0.070 ampere, 48 to 240 volts dc inductive

Short loops . . . . . 0.058 to 0.072 ampere, (local operation) 16 to 22 volts dc resistive

2.03 Transmission Code

Level 8

3. ASCII

3.01 The 33 keyboard operates according to ASCII. Figure 3 shows the 1968 version of the code used in 33 keyboards. The SHIFT and CONTROL characters, their associated keytop operation lockouts, and parity operation are also illustrated.

4. OUTLINE OF OPERATION

4.01 Transmission of messages is accomplished by an operator selectively depressing the keys and spacebar of the keyboard in the same manner as in typing. The downward movement of each key or the spacebar is translated by a codebar mechanism into a mechanical arrangement corresponding to the code combination representing the character on the keytop. The mechanical arrangements set up the code combinations in a set of keyboard contacts, and, by parallel output, the code combinations are transmitted to a distributor mechanism. A universal mechanism trips a distributor clutch, and a distributor mechanism then translates the parallel output from the keyboard contacts into corresponding start-stop signal for application to the transmission facilities.

5. DETAILED OPERATION

A. Codebar Mechanism

5.01 The codebar mechanism is illustrated in Figure 4.

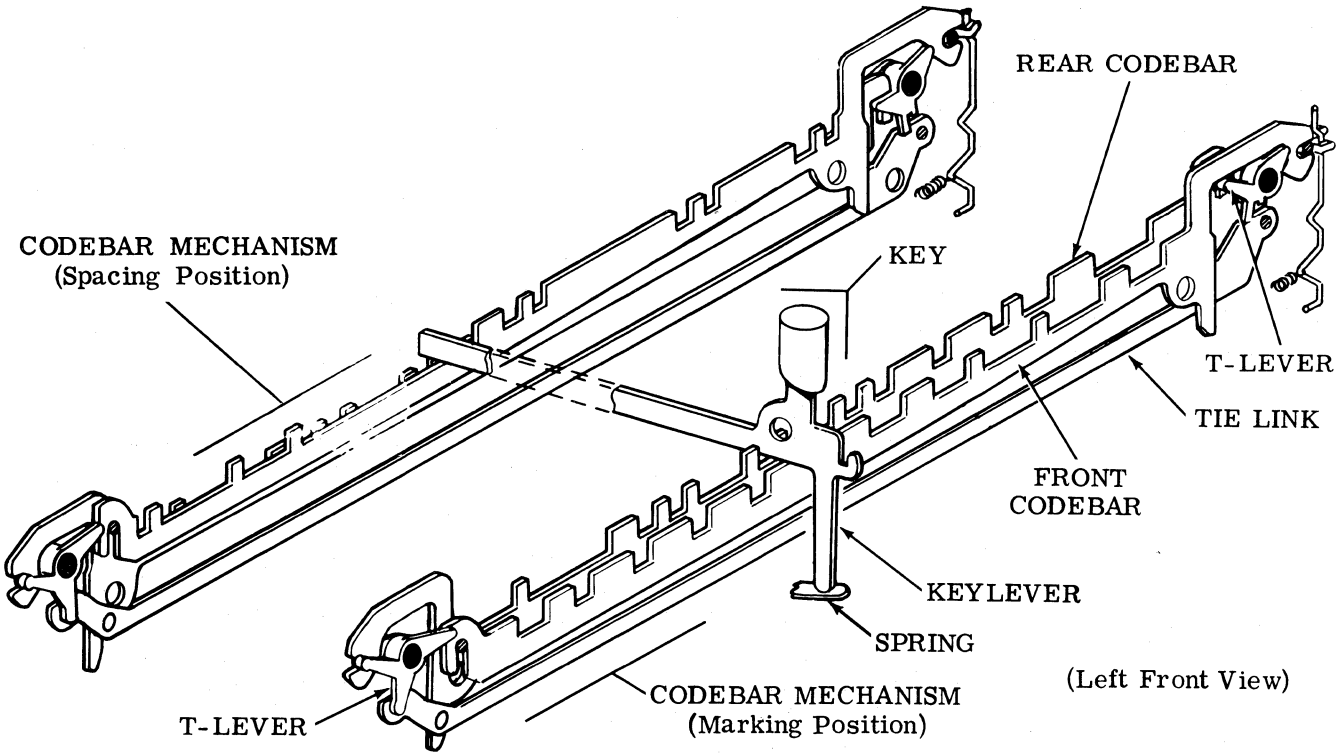


Figure 4 - Codebar Mechanism

5.02 For each level in the code there is a codebar mechanism which consists of a front codebar, a rear codebar, a tie link, and two T-levers. Thus in the 33 keyboard there are 8 pairs of codebars whose function is to set up 8 pairs of contacts in a coded arrangement representing the key depressed. The codebar mechanism also contains a shift mechanism (Figure 8) which consists of a front and rear codebar, a tie link, and two (three in parity keyboards) T-levers. Both the parity and nonparity keyboards contain a control blocking mechanism operated by the CTRL key. It consists of a tie link and two T-levers. The order in which the codebar mechanism is arranged varies, but the following may be considered typical. Thus from front to rear:

Nonparity Keyboard	UNIV, 1, SHIFT, 2, 3, 4, 5, 6, 7, CTRL
Parity Keyboard	UNIV, 1, 8, 2, 3, 4, 5, 6, 7, SHIFT, CTRL

5.03 The codebars have slots in their top edges which codes them so they are selectively depressed by the keys' keylevers. Each mechanism has a marking and a spacing position. In the marking position, the front codebar is down, the rear codebar is up, and the right T-lever is in the clockwise position. The spacing position is the opposite: front codebar up, rear codebar down, and right T-lever in counterclockwise position.

5.04 The two codebars in each mechanism are coded so that where one has a slot the other is solid. When a character key is depressed, it is returned to its up position by a leaf spring on the underside of the keyboard. However, the code combination set up in the codebars is retained until another key is depressed. When another key is depressed, only the mechanism whose code elements differ from those of the preceding combination are operated.

5.05 As an example assume that the letter E has been transmitted. The E code combination 1-3---78 remains in the codebar mechanisms. Now assume that the I (1--4--78) key is depressed. Its keylever encounters a slot in the rear codebar of the no. 1, 7, and 8 codebar mechanisms. Thus these mechanisms remain marking. In the case of the no. 2, 5, and 6 codebar mechanisms, the keylever encounters a slot in the front codebar, and they remain spacing. In the case of the no. 3 codebar mechanism, the keylever encounters the solid portion of the rear codebar and shifts it to its spacing position. In a similar manner, the keylever encounters the solid portion of the front codebar of the no. 4 codebar mechanism and shifts it to the marking position.

5.06 Since each code combination is different and is locked in the codebar mechanisms, the complementary coding of the codebars serves as an interlock for the keylevers. When one keylever is depressed, another cannot be depressed because it will be blocked by the solid portion of one or more codebars.

B. Universal Codebar Mechanism

5.07 The universal codebar mechanism is illustrated in Figure 5.

5.08 As a keylever nears the bottom of its travel, it depresses a codebar which is part of the universal codebar mechanism. The codebar, in turn, causes associated T-levers to pivot and a tie link to move to the left. After some free movement, the tie link encounters a tab on a nonrepeat lever and pivots the latter to the left. The tab, in turn, pivots a latchlever which releases a universal lever. Under spring pressure, the universal lever moves up and lifts the nonrepeat lever so that its tab is moved from between the universal tie link and the latchlever. Under spring pressure, the latchlever and nonrepeat lever move back to the right to their unoperated position.

5.09 In its up position, the universal lever locks the right intelligence T-levers in the positions set up by the keylever, permits a contact bail to pivot to its down position and, through a trip linkage, trips the distributor clutch. Near the end of the distributor cycle, the trip linkage moves the universal lever back to its down position where it is latched by the latchlever.

5.10 Should the keylever remain depressed beyond the end of the distributor cycle, when the universal lever moves to its down position, the nonrepeat lever under spring tension moves down until it hangs up on the top of the universal tie link which is still in its left position. When the keylever is finally released, the tie link moves back to the right and permits the nonrepeat lever to move all the way down so that its tab is again between the tie link and the latchlever. The trip mechanism operates in this way to prevent the distributor clutch from being retripped when a keylever is held down.

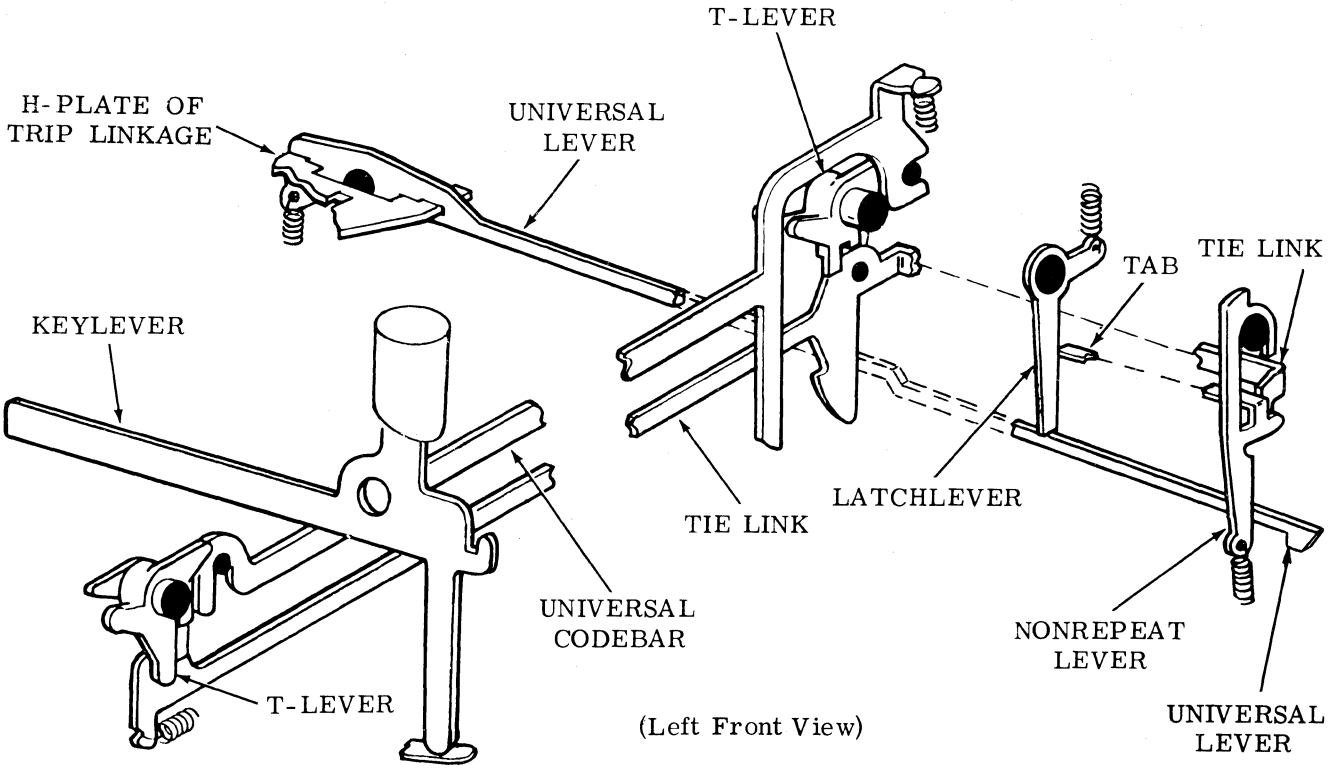


Figure 5 - Universal Codebar Mechanism

C. Keyboard Contact Mechanism

5.11 The keyboard contact mechanism is illustrated in Figure 6.

5.12 The codebar mechanisms set up the code combinations in a set of keyboard contacts. A contact wire is associated with each right T-lever, excluding the universal. In the stop condition of the keyboard, a contact bail is held in its up position by the universal lever. The contact bail holds the contact wires to the right, away from the T-levers.

5.13 When a keylever is depressed, a code combination is set up in the codebar mechanisms. The universal lever moves to its up position and permits the contact bail to pivot under spring tension to its down position. The contact wires associated with the T-levers that are in the marking (clockwise) position are permitted, under spring tension, to move to the left against a common terminal. Those associated with the T-levers that are in the spacing (counterclockwise) position are held to the right

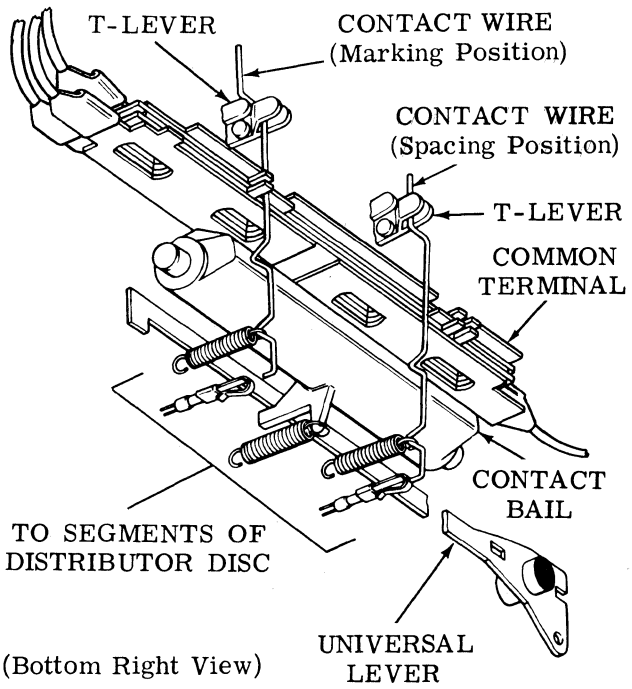


Figure 6 - Keyboard Contact Mechanism

away from the terminal. For example, if the I code combination (1--4--78) is set up in the code-bar mechanism, the no. 1, 4, 7, and 8 contact wires are against the common terminal. Similarly the no. 2, 3, 5, and 6 contact wires are away from the common terminal.

Note: When the universal lever is at the peak of its upward travel, it locks the T-levers in their assumed positions (Figure 7). This eliminates the possible loss of a marking or spacing pulse as a result of blocking T-levers repositioning during keyboard transmission.

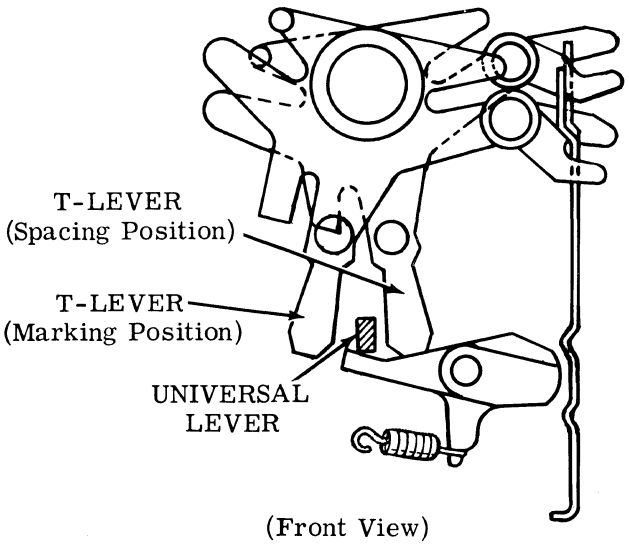


Figure 7 - T-Lever Positioning

5.14 The distributor mechanism converts these positions to start-stop signals. Near the end of the distributor cycle, the universal lever moves back to its down position and pivots the bail to its up position. The bail in turn cams the contact wires back to the right and holds them there in the stop position.

D. Line Break

5.15 When the BREAK key is depressed, it pivots a T-lever which opens the break contact. This action opens the signal line until the BREAK key is released.

E. Repeat

5.16 To repeat the transmission of a character, its keylever is held down along with the REPT keylever. The latter holds the nonrepeat lever down where its tab remains between the tie link and the latchlever (Figure 5). The latchlever is held in its left position and does not latch the universal lever at the end of the cycle. The universal lever thus moves up and trips the distributor clutch causing the character to be retransmitted as long as the REPT key is depressed.

F. HERE IS

5.17 When the HERE IS key is depressed, its keylever pivots linkages in the typing unit which in turn activate the local answer-back.

G. Keyboard — Typing Unit Interface

5.18 The H-plate (Figure 5) serves as the mechanical interface between the keyboard and the typing unit.

5.19 After a key is depressed and the keyboard contacts are positioned, the universal lever moves to its up position. This upward movement is transferred by the H-plate to the distributor clutch linkage, to trip the distributor clutch. Near the end of the distributor cycle the trip linkage, through the H-plate, resets the universal lever back to its lower position.

H. Nonparity Operation

5.20 Figure 9 is a simplified schematic of the signal wiring for the nonparity keyboard.

5.21 Intelligence transmitted from the nonparity keyboard is that of the ASCII system. The keyboard contains two SHIFT keys and one CTRL (Control) key (Figure 8). The control key, utilizing a tie link and T-levers, operates a contact wire in the contact mechanism. The SHIFT key is used to generate the code combinations for printing characters appearing on the upper keytop (eg $ above the 4). The CTRL key is used to generate the codes for the nonprinting control characters appearing on the upper keytops (eg EOT above the D). Simultaneous use of both CTRL and SHIFT keys allows access to special control functions, such as NULL. In every case, the SHIFT and/or CTRL keys must be held down while the appropriate character key is depressed.

5.22 The SHIFT key inverts the no. 5 code element on all 33 keyboards. If the element is normally marking, it makes it spacing; if the element is normally spacing, it makes it

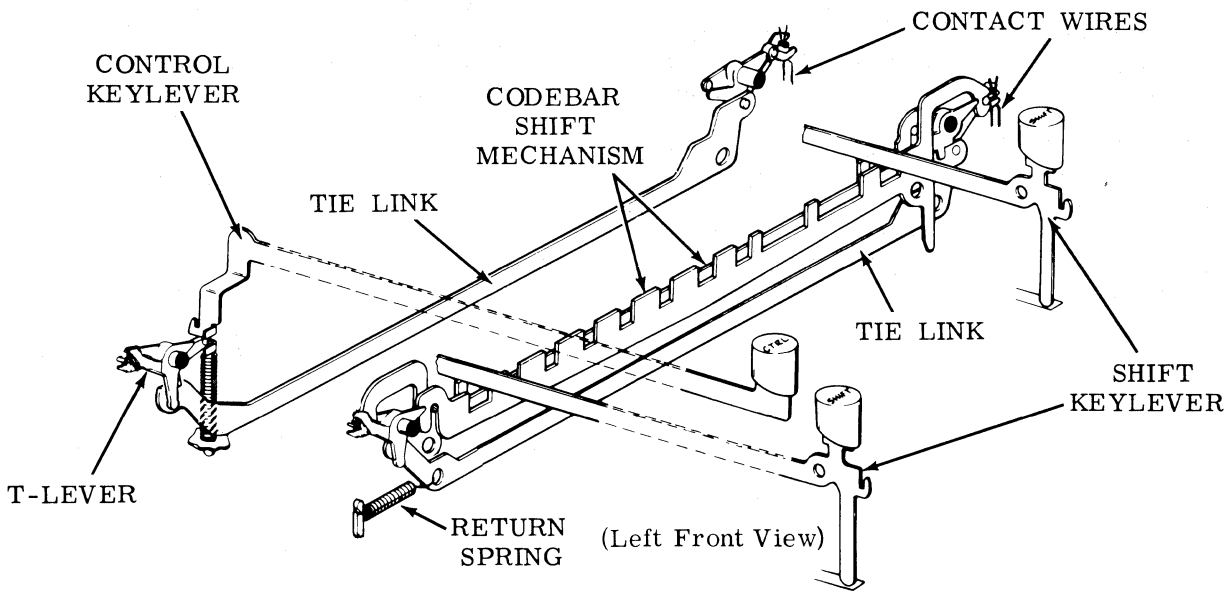
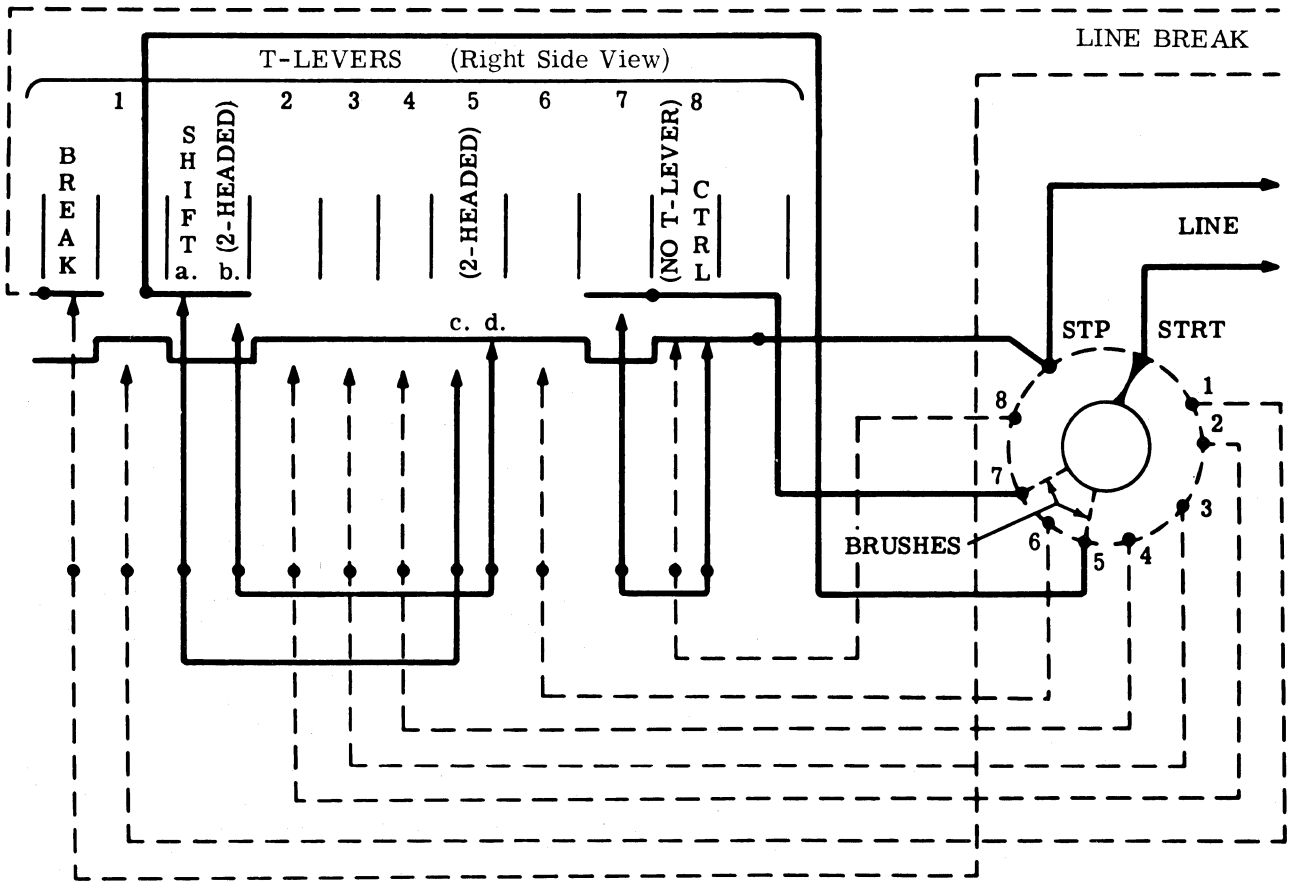


Figure 8 - SHIFT and CTRL Mechanisms — Nonparity Keyboard



Note: Intelligence contacts shown in spacing position.
Shift contacts shown in unoperated position.

Figure 9 - Contact Schematic — Nonparity Keyboard

marking. It does this by two 2-headed T-levers, one at the shift position, and one at the no. 5 position, each of which operates two contact wires, alternately opening one and closing the other. As shown in Figure 9, in the spacing condition, the "c" contact associated with the no. 5 T-lever is open, and the "d" contact is closed. In its unoperated position, the "a" contact associated with the SHIFT T-lever is closed, and the "b" contact is open. For example, if the "4" key alone is depressed, the code combination for "4" (--3-56-8) is set up in the keyboard contacts and subsequently transmitted. In this case, the 2-headed no. 5 T-lever holds the "c" contact closed and the "d" contact open, resulting in a marking no. 5 code element. (The signal path is through the stop distributor disc segment, the common terminal, the closed "c" contact, the closed "a" contact, the no. 5 distributor disc segment, the brushes, the inner distributor disc, and the start distributor disc segment, as shown in Figure 9.)

5.23 If the "4" key is depressed with the SHIFT key, the same condition is set up in the keyboard contacts, except that the 2-headed shift T-lever holds the "a" contact open and the "b" contact closed and thus opens the signal circuit. This results in the no. 5 code element being spacing rather than marking, and the code combination for "$" (--3--6-8) being transmitted.

5.24 If the "N" key alone is depressed, the code combination for "N" (-234--78) is set by the codebars and subsequently transmitted to the line. In this case, the 2-headed no. 5 T-lever holds the "c" contact open and the "d" contact closed. On the other hand, if the "N" key is depressed with the SHIFT key, the same condition is set up in the keyboard contacts as before, except that the SHIFT key opens the "a" contact and closes the "b" contact and thus closes the signal circuit. This results in the no. 5 code element being marking rather than spacing and the code combination for ^ (-2345-78) being transmitted.

5.25 The CTRL key converts the no. 7 code element from marking to spacing. For example, if the "E" key alone is depressed, the "E" code combination (1-3---78) is set up in the keyboard contacts and subsequently transmitted. (The path of the current for the marking no. 7 code element is through the stop distributor disc segment, the common terminal, the closed control contact, the closed no. 7 contact, the no. 7 distributor disc segment, the brushes, the inner distributor disc, and the start distributor disc segment.) If the "E" key is held down with the CTRL key, the same condition as before is set up in the contacts, except that the control T-lever opens the control contact and thus breaks the signal circuit. This results in the no. 7 code element being spacing and the code combination for "ENQ" (1-3----8) being transmitted.

I. Parity Operation

5.26 The parity keyboard facilities are similar to those of the nonparity keyboard. The functional difference between parity and nonparity keyboards is in the control of the 8th level pulse.

5.27 These differences include the adding of a codebar mechanism to generate binary information for the eighth intelligence element. In addition, the SHIFT key operates an expanded shift codebar mechanism (Figure 10) which operates three 2-headed T-levers, two 2-headed T-levers control contact wires at the contact mechanism, and one 2-headed T-lever controls contact wires at an added auxiliary contact mechanism (Figure 10). Also, the CTRL key directly operates a 2-headed T-lever which controls contact wires at the auxiliary contact mechanism.

5.28 Figure 10 illustrates how the CTRL key acts to mechanically block all keys which normally have the no. 6 code element marking. When the CTRL key is depressed, a tab on the keylever engages the rear codebar of the no. 6 codebar mechanism and forces it into its spacing position. Simultaneously, the front codebar moves up, and the solid portions on it block the keylevers of all characters which normally have their no. 6 code element marking. This blocking action will prevent false characters from being transmitted.

Note: Keyboard lockout (keylever downward travel blocked by codebar mechanism) may occur if SHIFT or CTRL keytops are only partially depressed when the universal codebar mechanism is activated. To clear the lockout, again depress and release the SHIFT or CTRL keytops and, if necessary, also depress and release the specific primary keytop with which the lockout occurred.

5.29 The SHIFT key inverts the no. 5 and no. 8 code elements on the parity keyboard. If either element is normally marking, it makes it

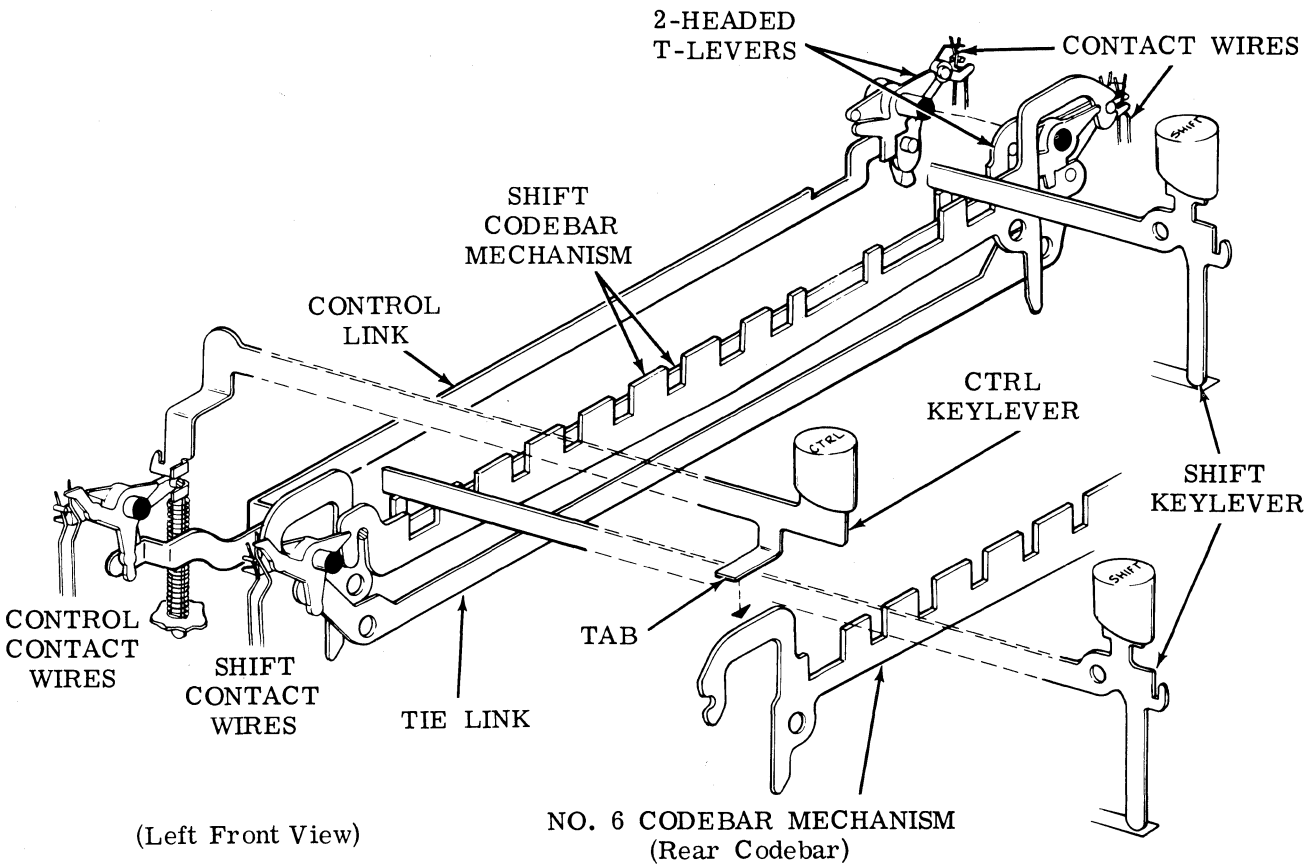
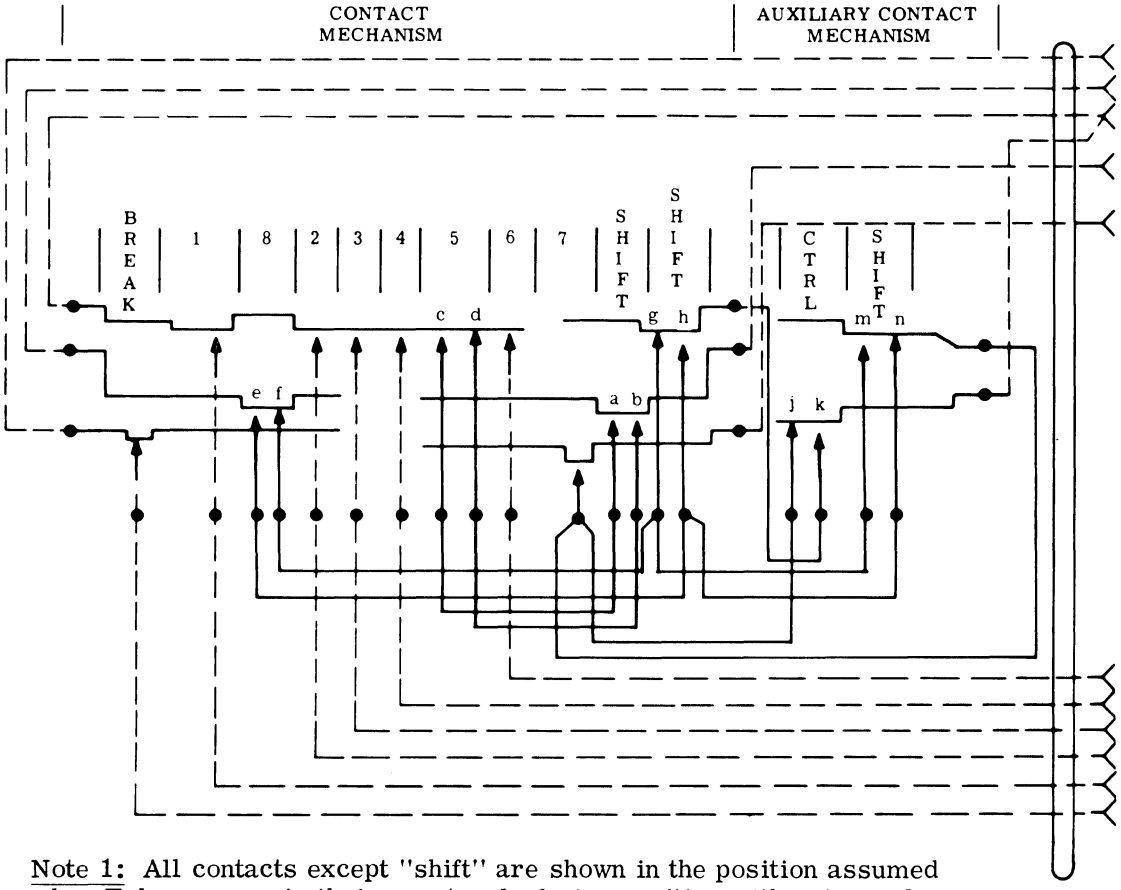


Figure 10 - SHIFT and CTRL Key Operation — Parity Keyboard

spacing; if either element is spacing, it makes it marking. This is accomplished by several 2-headed T-levers — one at the no. 5 position, two at the shift position on the contact mechanism, and one at the shift position on the auxiliary contact mechanism. Each 2-headed T-lever operates two contact wires, alternately opening one and closing the other. As shown in Figure 11 in the spacing condition, the "c" contact associated with the no. 5 T-lever and the "e" contact associated with the no. 8 T-lever are open, and the "d" and "f" contacts, respectively, are closed. In their unoperated positions, with the universal lever latched, the "b", "h", and "m" contacts associated with shift T-levers are open, while the "g" and "n" contacts are closed.

Note: The "a" contact is open on early design units equipped with the TP180043 shift marking contact wires and closed on late design units equipped with the TP186417 marking contact wires.

When the universal lever is tripped and the contact bail is pivoted, the "a" contact will be in the closed condition unless the SHIFT key is depressed, which will open the "a" contact and close the "b" contact. In addition, the "h" and "m" contacts will close and the "g" and "n" contacts will open. For example, if the "4" key alone is depressed, the code combination for "4" (--3-56-8) is set up in the keyboard contacts and subsequently transmitted. In this case, the 2-headed no. 5 T-lever holds the "c" contact closed and the "d" contact open, resulting in a marking no. 5 code element. The current path is from the connector, through the common terminal, the closed "c" contact, the closed "a" contact and terminal, and back to the connector. Since the no. 8 code element is to be marking, the 2-headed no. 8 T-lever holds the "e" contact closed and the "f" contact open. The current path is from the connector, through a terminal and the "e" contact, through the closed "n" contact and terminal, through the closed "j" contact and terminal, and back to the connector.



Note 1: All contacts except "shift" are shown in the position assumed when T-levers are in their counterclockwise position with universal lever latched.

Note 2: The "a" contact is open on early design units equipped with the TP180043 shift marking contact wires and closed on late design units equipped with the TP186417 marking contact wires.

Figure 11 - Contact Schematic — Parity Keyboard

5.30 If the "4" key is depressed with the SHIFT key, the same condition is set up in the keyboard contacts, except 2-headed T-levers hold the "a", "g", and "n" contacts open and the "b", "h", and "m" contacts closed. Thus, the current paths for the no. 5 and no. 8 code elements are open. This results in the no. 5 and no. 8 code elements being spacing rather than marking, and the code combination for $ (--3--6--) is transmitted.

5.31 If the "N" key alone is depressed, the code combination for "N" (-234--7-) is set up by the codebars and subsequently transmitted to the line. In this case, 2-headed T-levers at the no. 5 and no. 8 positions, respectively, hold the "c" and "e" contacts open and the "d" and "f" contacts closed. On the other hand, if the "N" key is depressed with the SHIFT key, the same condition is set up in the keyboard contacts as before, except that T-levers associated with the shift position open the "a", "g", and "n" contacts and close the "b", "h", and "m" contacts. Thus current paths for the no. 5 and no. 8 code elements are closed. This results in the no. 5 and no. 8 code elements being marking rather than spacing, and the code combination for ∧ (-2345-78) is transmitted.

5.32 The CTRL key converts the no. 7 code elements from marking to spacing and inverts the no. 8 code element. When the CTRL

key is operated, the no. 7 code element will always be spacing. Also, the no. 8 code element will be made spacing if it is normally marking; it will be made marking if it is normally spacing. For example, if the "D" key alone is depressed, the code combination (--3---7-) is set up in the keyboard contacts and subsequently transmitted. The current path for the marking no. 7 code element is from the connector, through the terminal and the closed no. 7 contact, through the closed "j" contact and terminal, and to the connector. Since the no. 8 code element is to be spacing, the 2-headed no. 8 T-lever holds the "e" contact open and the "f" contact closed, and there is no current path. If the "D" key is held down with the CTRL key, the same condition as before is setup in the contacts, except the 2-headed control T-lever opens the "j" contact and closes the "k" contact. This breaks the current path through the no. 7 contact, but closes the path through the "f" contact of the 2-headed no. 8 T-lever. The current path for the no. 8 code element is from the connector, through the terminal and closed "f" contact, through the closed "g" contact and terminal, through the closed "k" contact and terminal, and to the connector. This operation results in the no. 7 code element spacing and the no. 8 code element being marking. Thus, the code combination for "EOT" (--3----8) is transmitted.

6. KEYBOARDS

ALPHANUMERIC KEYBOARD

6.01 A typical alphanumeric keyboard arrangement is shown in Figure 12. Keyboards are shipped from the factory with even parity installed. The customer may:

(a) Retain even parity, or

(b) Wire the keyboard for the 8th bit always marking, or

(c) Wire the keyboard for the 8th bit always spacing.

6.02 These wiring options are implemented by connecting wires to terminals at the right front of the keyboard, and at the left contact block. The options and the corresponding wiring are shown in Wiring Diagram 9334WD.

NUMERIC KEYBOARD

6.03 The numeric keyboard is shown in Figure 13. Like the alphanumeric keyboard, the numeric keyboard utilizes the eight level ASCII at 100 words per minute. In some applications the numeric keyboard, when used as

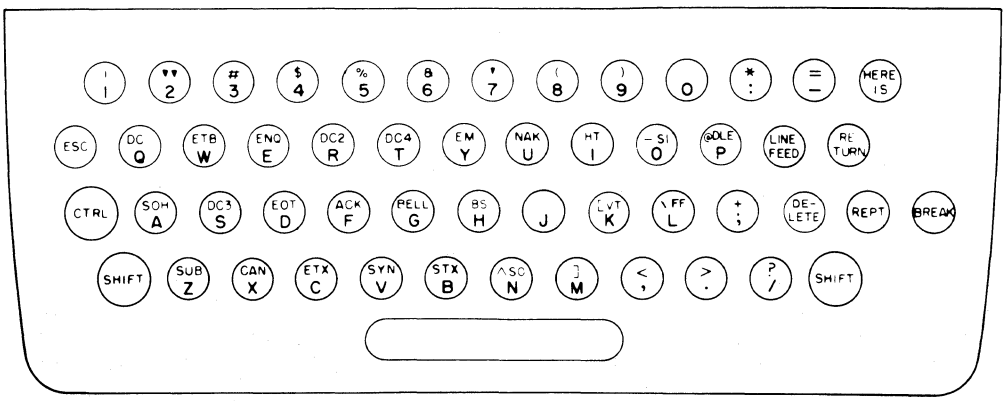
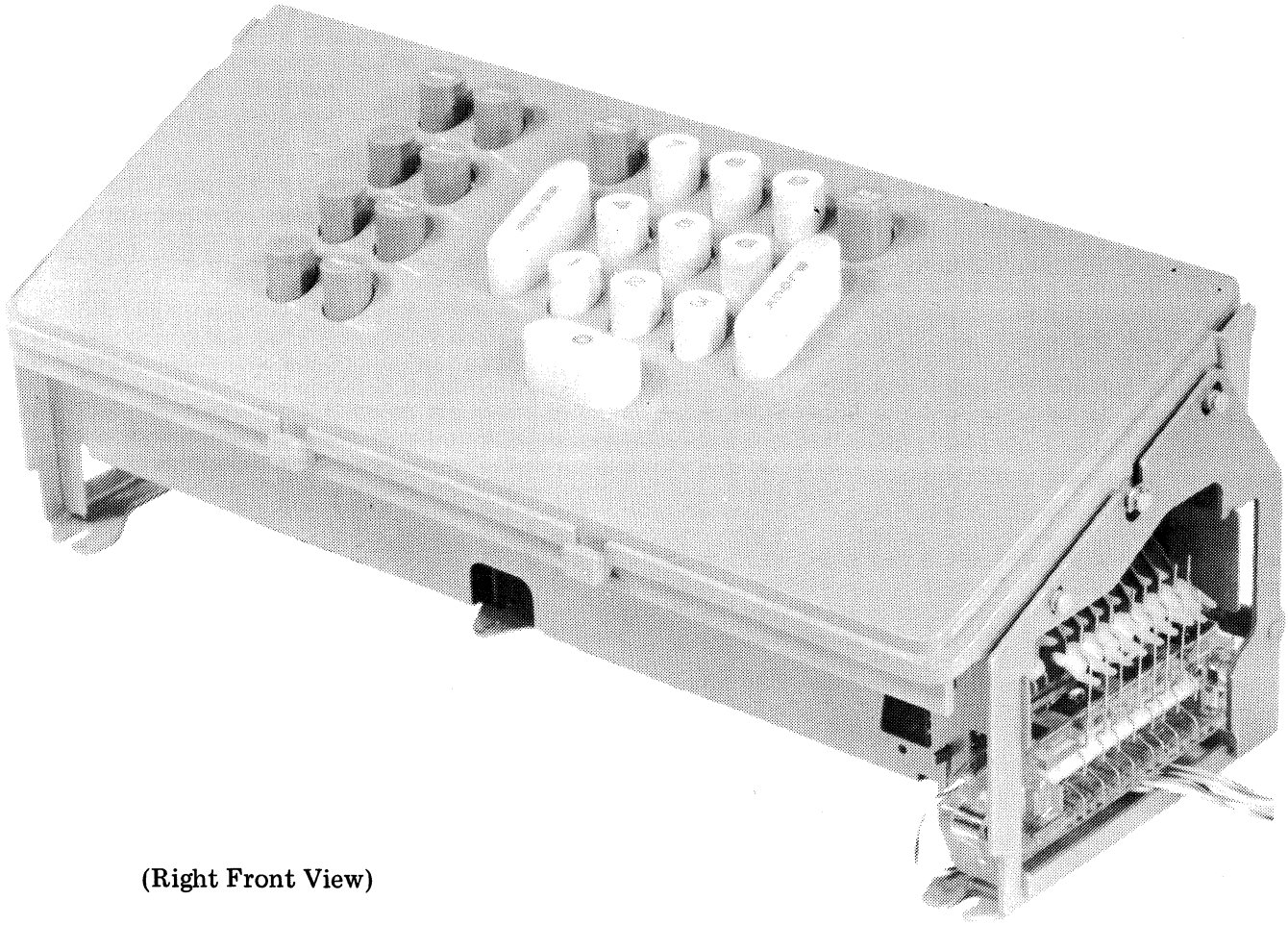


Figure 12 - Typical Alphanumeric Keyboard Arrangement



(Right Front View)

Figure 13 - Numeric Keyboard

part of an ASR set, is used for off-line tape perforations of basically numeric information, for use in later transmission.

6.04 Numerics transmitted are 0 through 9; nonprint functions utilized are EOT, SPACE, RUBOUT, RETURN, and LINE FEED. A repeat key is also located on the keyboard. The HERE IS keylever hole has been plugged for optional field installation. On some numeric keyboards, there is a plugged keylever hole for optional installation of the FORM-FEED keylever, and the codebars are coded for FORM-FEED. Depending on the keyboard, it contains FS, GS, RS, and US keys or variations of these keys.

6.05 The operation of the numeric keyboard is similar to the alphanumeric keyboard as described in Part 5.

33 KEYBOARD

LUBRICATION

CONTENTS PAGE

1. GENERAL

1.01 This section provides lubrication requirements for the 33 keyboard. It is reissued to add new lubrication interval requirements for the keyboard. Marginal arrows indicate changes and additions.

1.02 The general lubrication areas are illustrated by photographs. The specific points to receive lubricant are indicated on line drawings with appropriate textual instructions. The line drawings and textual instructions follow a photograph and are keyed to the photograph by paragraph numbers.

1.03 Thoroughly lubricate the keyboard, but avoid overlubrication that might permit the lubricant to drip or be thrown onto adjacent parts.

1.04 Initial lubrication of the tape punch should be completed just prior to placing it into service. The lubrication intervals for the tape punch are similar to the lubrication intervals of the set. The lubrication intervals are dictated by the hours of use (including idle time) on a daily basis. The following charts and notes list the appropriate lubrication intervals.

LUBRICATION INTERVALS IN WEEKS
BASED ON 5-DAY WEEK (Note 1)

NEWLY INSTALLED EQUIPMENT

	DAILY USE		
SPEED	0 TO 8 HOURS	8 TO 16 HOURS	16 TO 24 HOURS
All Speeds	3 Weeks	2 Weeks	1 Week

REGULAR LUBRICATION

	DAILY USE		
SPEED	0 TO 8 HOURS	8 TO 16 HOURS	16 TO 24 HOURS
60 WPM	39 Weeks	26 Weeks	13 Weeks
100 WPM	26 Weeks	13 Weeks	6 Weeks

Note 1: Reduce lubrication interval 15 percent when usage is 6 days per week and 30 percent when usage is 7 days per week.

Note 2: Sets operating at speeds between 60 and 100 wpm use lubrication requirements for the lower of the two speeds.

Note 3: The lubrication intervals are for the set as a whole — all components of the set should be lubricated.

Note 4: Just prior to storage all equipment should be thoroughly lubricated.

1.05 The textual instructions that accompany each line drawing consist of abbreviated directions, specific lubrication points, and parts affected. The meanings of the abbreviated directions (symbols) are given below:

Symbol	Meaning
D	Keep dry — no lubricant permitted.
O	Oil (KS7470).
G	Apply thin coat of grease (KS7471).

1.06 References to left, right, front, or rear, etc, consider the keyboard to be viewed from a position where the spacebar faces up and the contact mechanism is located to the viewer's right.

CAUTION: DO NOT USE ALCOHOL, MINERAL SPIRITS, OR OTHER SOLVENTS TO CLEAN PLASTIC PARTS OR PARTS WITH PROTECTIVE-DECORATIVE FINISHES. NORMALLY, A SOFT, DRY CLOTH SHOULD BE USED TO REMOVE DUST, OIL, GREASE, OR OTHERWISE CLEAN PARTS OR SUB-ASSEMBLIES. IF NECESSARY, A SOFT CLOTH DAMPENED WITH SOAP OR MILD DETERGENT MAY BE USED. RINSE WITH A SOFT, DAMP CLOTH AND BUFF WITH A SOFT, DRY CLOTH.

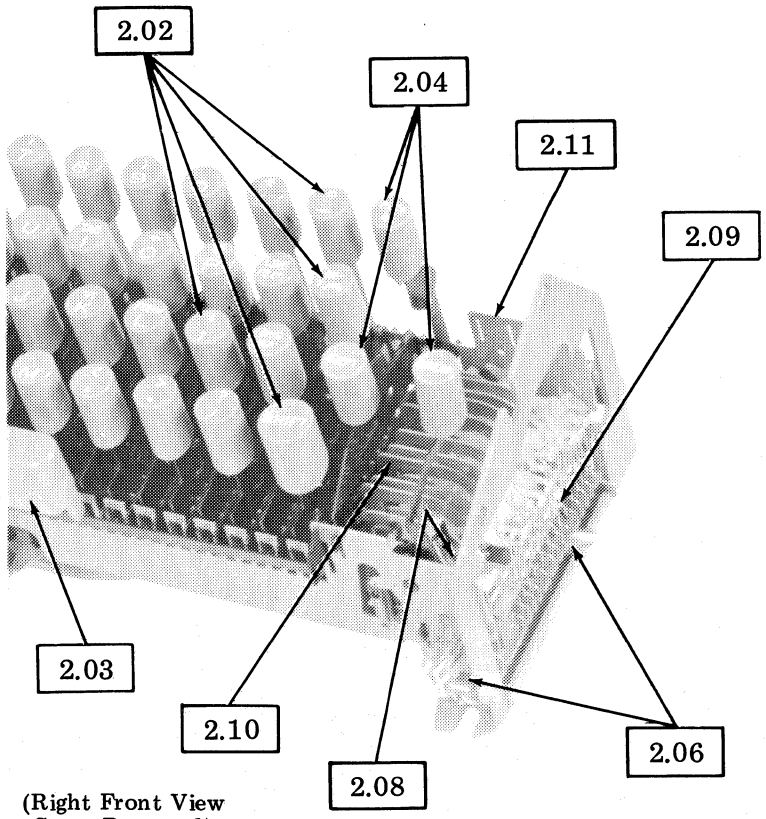
1.07 Materials needed for lubrication are listed in Section 570-005-800TC.

1.08 Disassembly and reassembly instructions are given in Section 574-121-702TC.

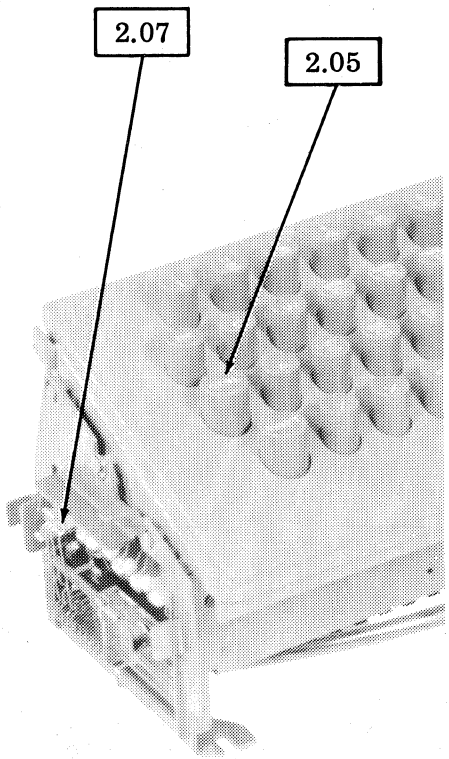
CAUTION: REMOVE ALL ELECTRICAL POWER FROM UNIT BEFORE LUBRICATION OR DISASSEMBLY.

2. BASIC UNIT

2.01 Keyboard

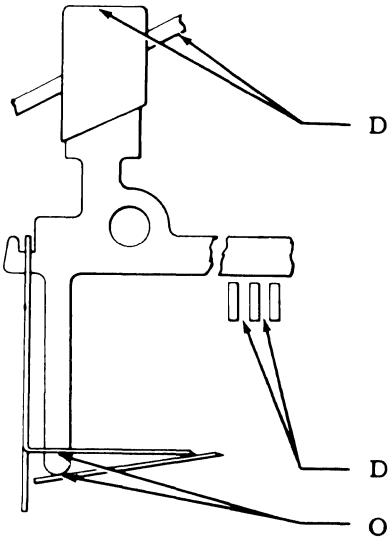


(Right Front View Cover Removed)



(Left Front View)

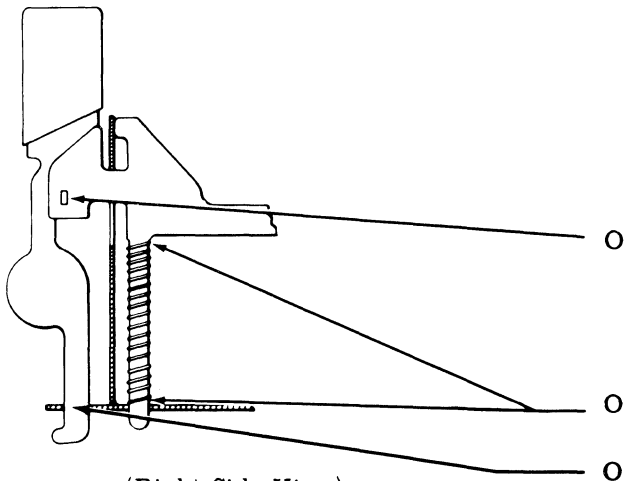
2.02 Keylevers



(Right Side View)

D	Top Surface	Keytops and Keyboard Cover
D	Areas Between Bars	Codebars
O	Contact Surface	Keylever Springs

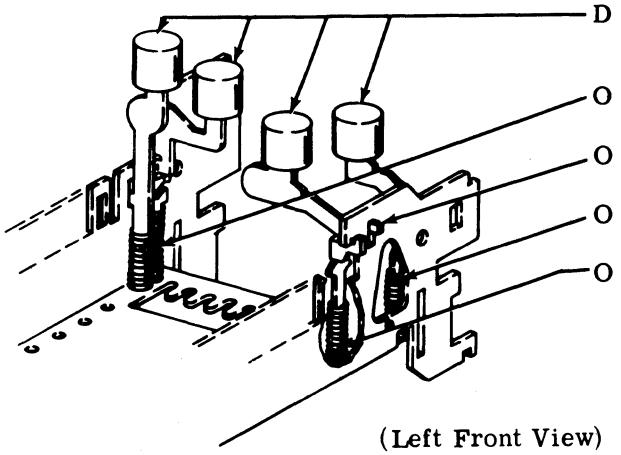
2.03 Spacebar



(Right Side View)

O	Contact Surfaces (5)	Space Lever
O	Seat (Each End)	Springs (2)
O	Sliding Surfaces	Space Lever

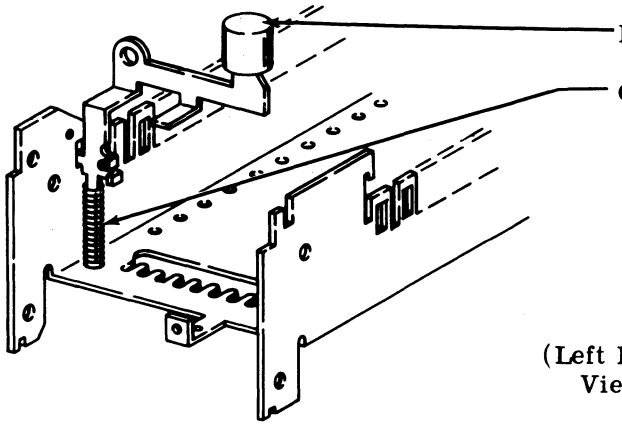
2.04 HERE IS, BREAK, and REPT Keylevers



(Left Front View)

D	Top Surface	Keytops
O	Seat (Each End)	Springs
O	Contact Surfaces	Keylevers
O	Seat (Each End)	Spring
O	Seat (Each End)	Spring

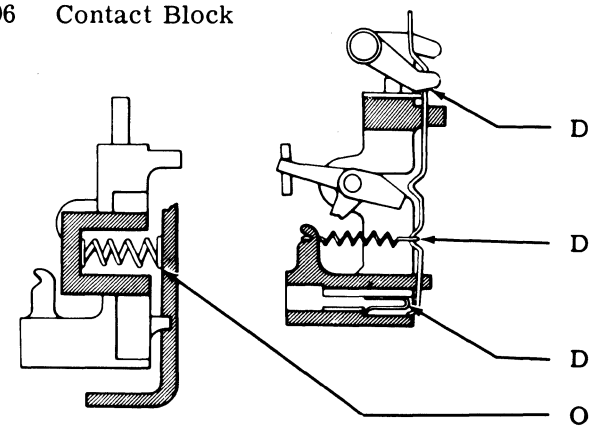
2.05 CTRL Keylever



D	Top Surface	Keytop
O	Seat (Each End)	Spring

(Left Front View)

2.06 Contact Block

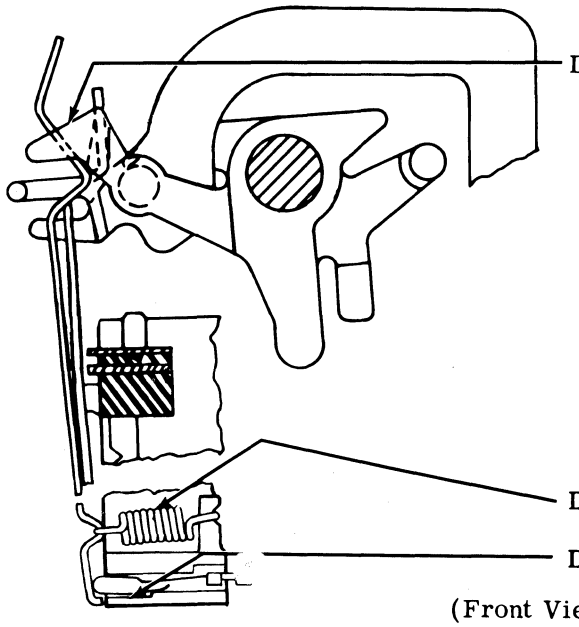


D	Contact Surface	Contact Wires
D	Springs	Contact Wires
D	Contact Surface	Contact Wires
O	Seat	Springs (2)

(Front Views)

CAUTION: DO NOT CLEAN THE KEYBOARD CONTACT BLOCK WITH ALCOHOL, MINERAL SPIRITS, OR OTHER SOLVENTS.

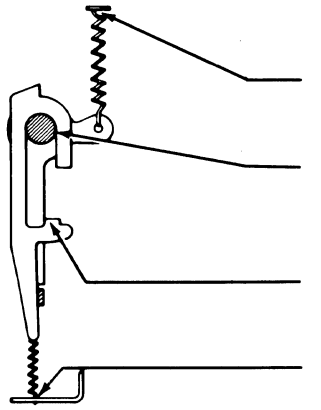
2.07 Auxiliary Contact Block



D	Contact Surfaces	Contact Wires
D	Springs	Contact Wires
D	Contact Surface	Contact Wires

(Front View)

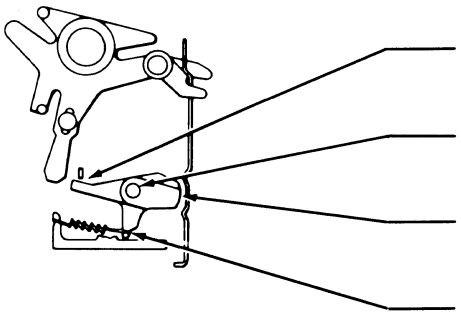
2.08 Latchlever Hooks



O	Hooks (Each End)	Latchlever Spring
O	Pivot	Latchlever and Nonrepeat Lever
O	Contact Surface	Latchlever
O	Hooks (Each End)	Nonrepeat Spring

(Front View)

2.09 Reset Bail

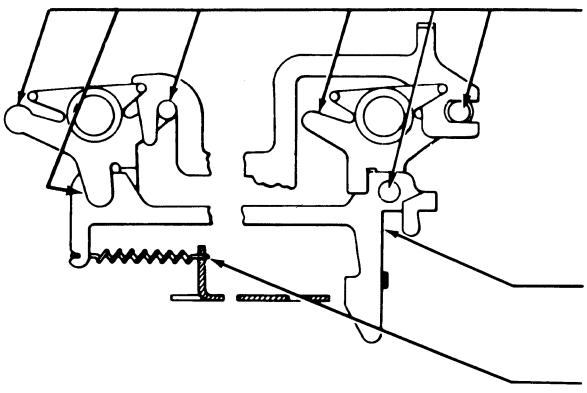


G*	Contact Surface	Universal Lever
O	Pivots (2)	Reset Bail
G*	Camming Surface	Reset Bail
O	Hooks (Each End)	Bail Spring

(Front View)

*At 1500 hour lubrication intervals, apply a coat of thoroughly mixed 50 percent KS7470 oil and 50 percent KS7471 grease.

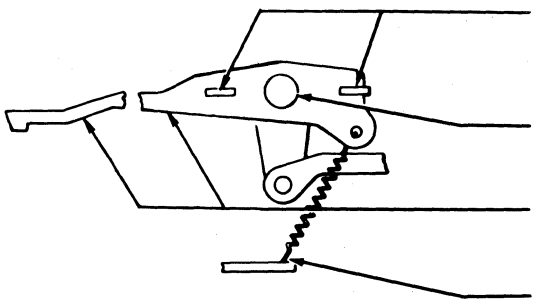
2.10 Codebar Mechanism



O	Pivots	T-Levers
O	Contact Surface	Universal Link
O	Hooks (Each End)	Link Spring

(Front View)

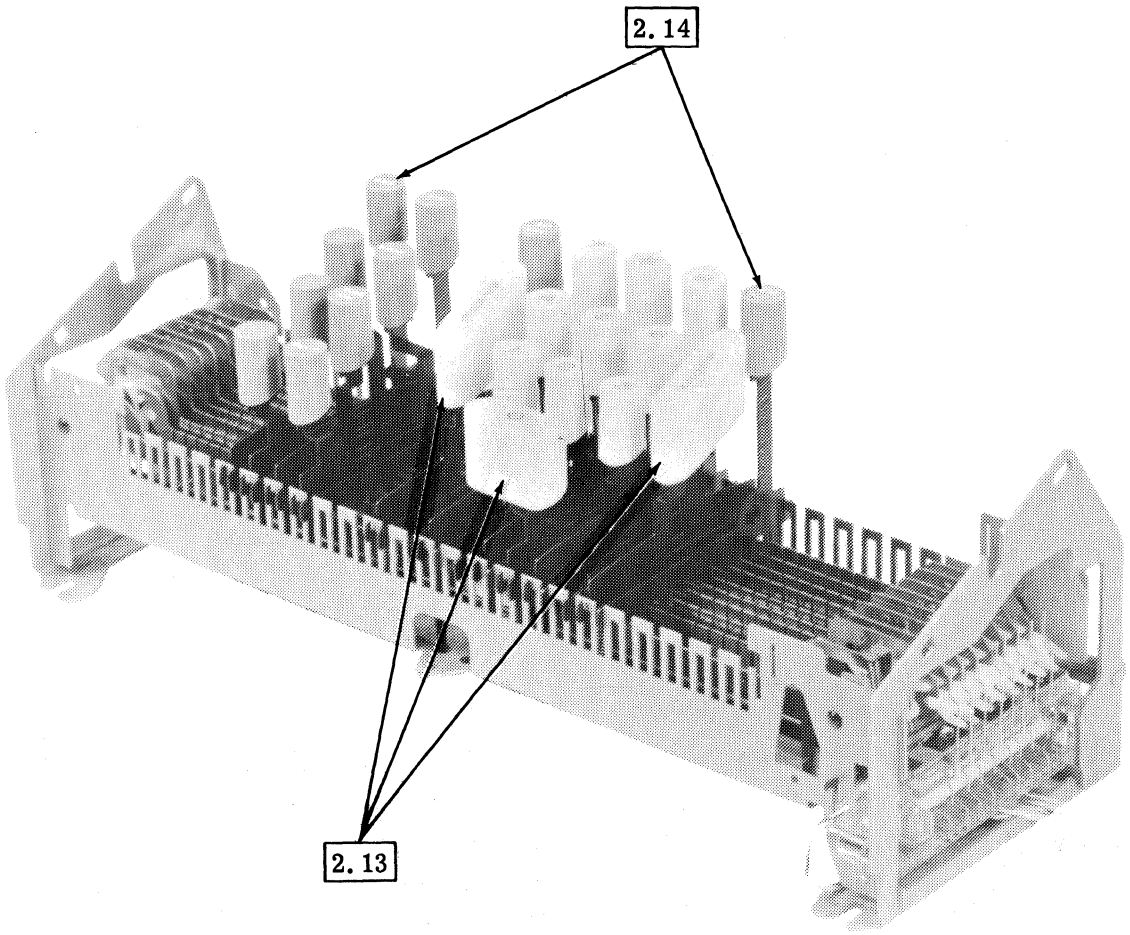
2.11 Universal Lever



O	Engaging Tabs	H-Lever
O	Pivot	Universal Lever
O	Engaging Surfaces	Universal Lever
O	Hooks (Each End)	Spring

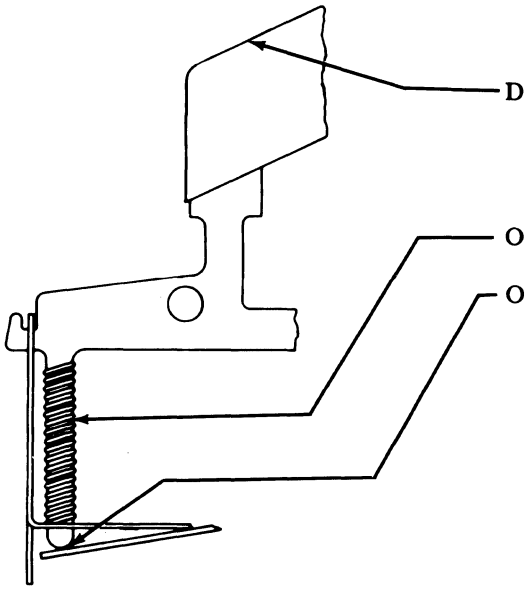
(Right Side View)

2.12 Numeric Keyboard (Cover Removed)



(Right Front View)

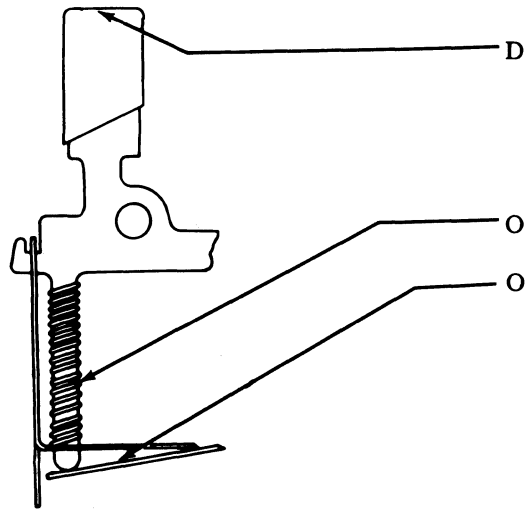
2.13 SPACE, BLOCK, and O Keylevers



D	Top Surface	Keytop
O	Seat (Each End)	Spring
O	Contact Surface	Keylever Springs

(Right Side View)

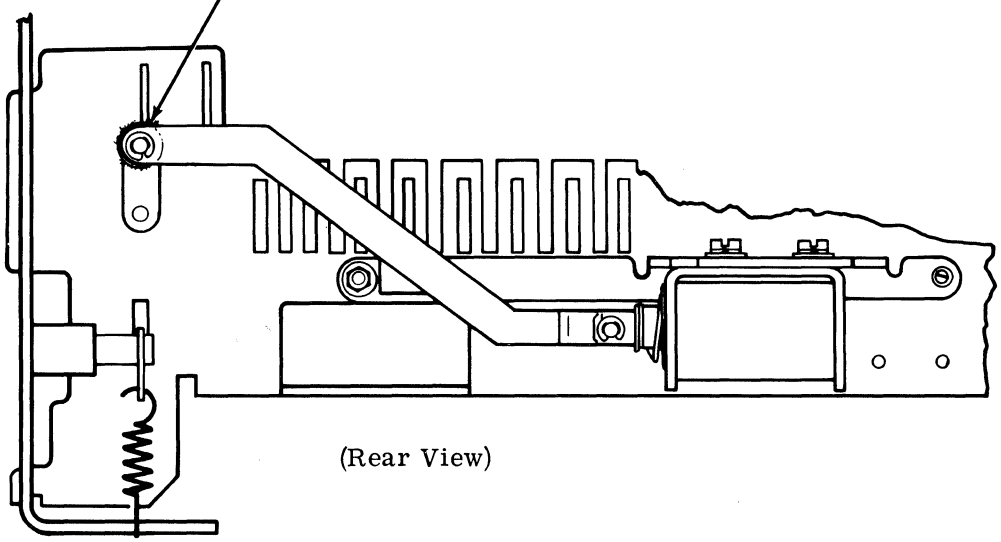
2.14 Numeric Keylevers



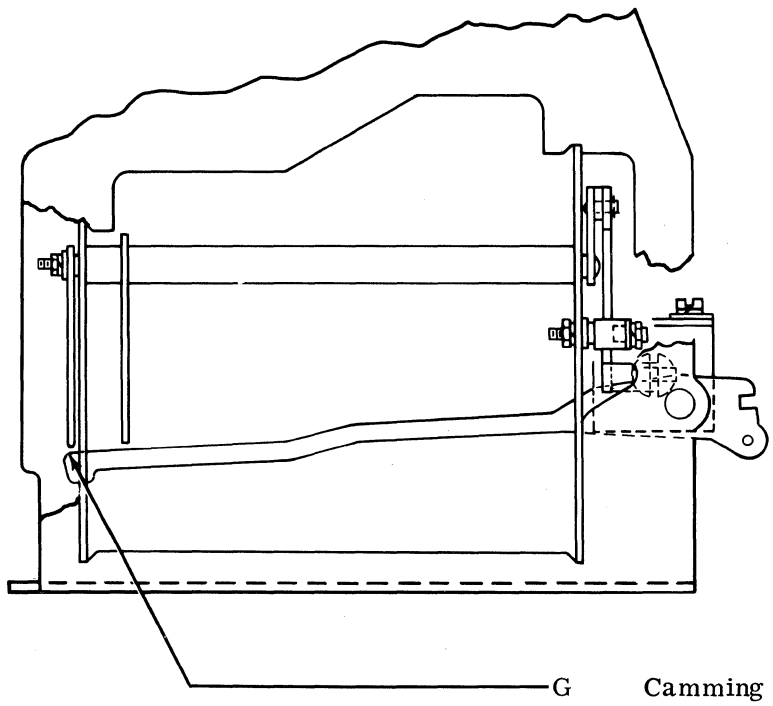
D	Top Surface	Keytops
O	Seat (Each End)	Spring
O	Contact Surface	Keylever Springs

(Right Side View)

→ 2.15 Locking Mechanism (Units So Equipped)



(Rear View)



(Right Side View)

33 KEYBOARD

DISASSEMBLY AND REASSEMBLY

CONTENTS

1. GENERAL

1.01 This section provides disassembly and reassembly for the 33 keyboard. It is reissued to make a few minor corrections. Marginal arrows are used to indicate the changes.

1.02 References to left, right, front, rear, etc, consider the keyboard to be viewed from a position where the spacebar faces up and the contact mechanism is located to the viewer's right.

1.03 Disassembly, as outlined in this section, covers the procedure for removing the principle subassemblies which make up the unit. If further disassembly is required, refer to the appropriate illustrated parts section which shows detailed arrangements of parts. Where it will help in determining their location, the numbers of the parts are given in the instructions.

CAUTION: BEFORE BEGINNING DISASSEMBLY, REMOVE CONNECTORS FROM EXTERNAL RECEPTACLES (POWER SOURCE, DATA SET, ETC).

1.04 When self-tapping screws are used to mount mechanisms onto castings, do not remove the self-tapping screws. Merely loosen them enough to remove the mechanisms unless specifically instructed otherwise.

1.05 Retaining rings are made of spring steel and have a tendency to release suddenly. To avoid loss of these rings when removing them, proceed as follows:

(a) Hold retaining ring to prevent its rotating.

(b) Place blade of screwdriver in one of ring's slots and rotate screwdriver to increase diameter.

(c) Ring will come off easily in fingers without flying.

1.06 All tools used to remove the mechanisms referred to in this section can be found in the 570-005-800TC standard tool section.

1.07 All damaged, worn, or distorted parts should be replaced if encountered in the disassembly and reassembly procedures.

2. DISASSEMBLY AND REASSEMBLY

Note: For information concerning the proper procedure to remove the keyboard assemblies from the set, refer to appropriate disassembly and reassembly set section.

KEYBOARD COVER

2.01 To remove the keyboard cover (Figure 2), proceed as follows.

(a) Remove TP119652 retaining ring from the left side of the keyboard cover, and rotate the left side bracket and contact guard away from the unit.

(b) Hold the right side bracket firmly in place against the two TP180331 compression springs of keyboard contact mechanism, and remove the TP119652 retaining ring from the right side of the keyboard cover.

(c) Continue to hold the right side bracket firmly in place, and disengage the keyboard cover from the right side bracket by moving it up and to the left. Lift the keyboard cover off the keys.

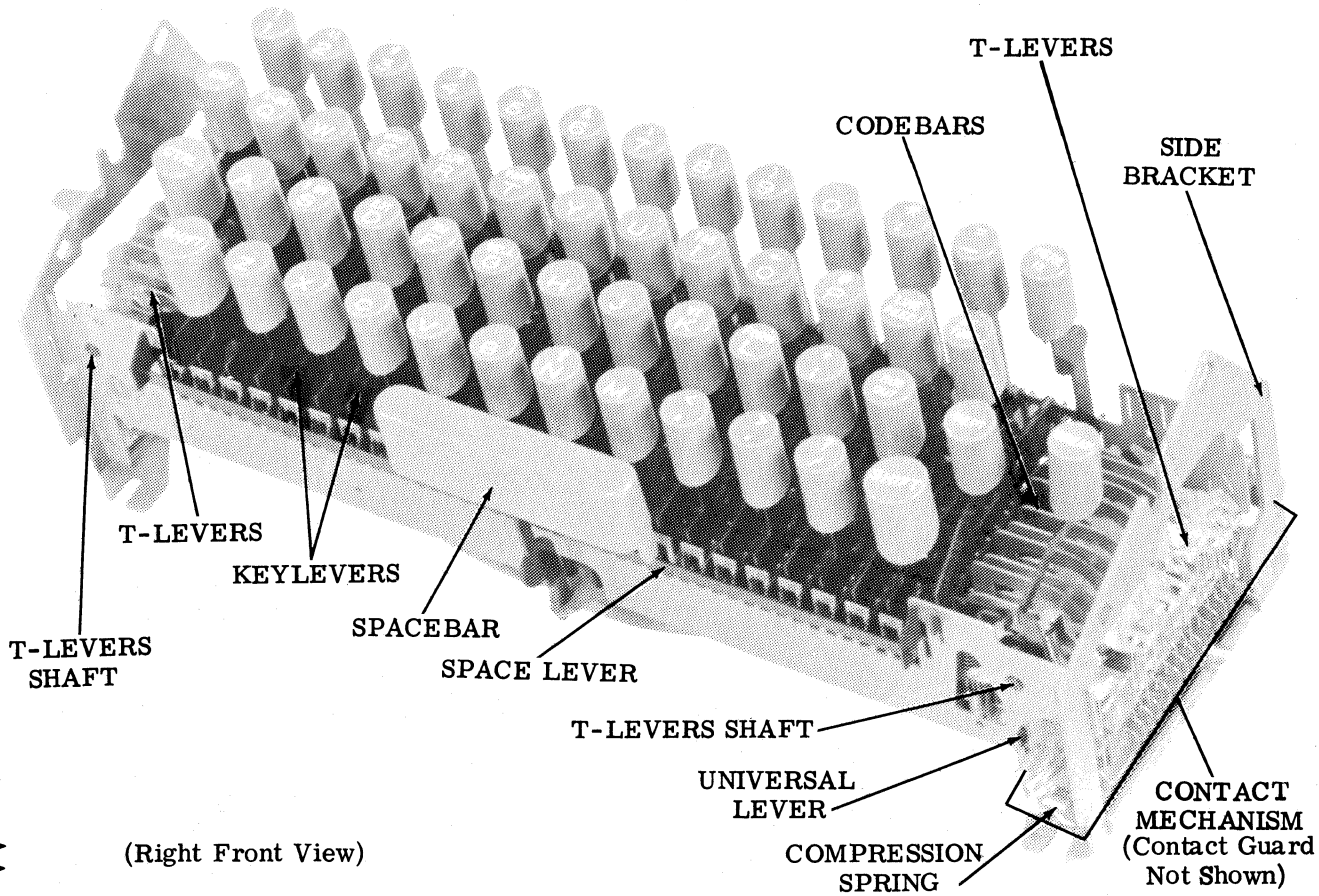
Note: With the keyboard cover removed, the right side bracket may be pushed unexpectedly from its assembled position, due to the spring load of two compression springs. If this happens, certain parts may prematurely fall off. To prevent this, always keep the right side bracket firmly against the two compression springs of the keyboard contact mechanism, i e, either hold the right side bracket in place by hand or place it firmly against a fixed vertical surface.

(d) To replace the keyboard cover, reverse the procedure used to remove it.

KEYLEVER

2.02 To remove any keylever (Figure 1), proceed as follows.

(a) Depress the front end of the TP182240 (early design) or TP185766 universal lever, or the TP186253 (late design) universal lever.



(Right Front View)

Figure 1 - Keyboard (Cover Removed)

(b) Depress keylever and disengage it from front or rear guide slot.

(c) Lift keylever out of keyboard frame.

(d) To replace any keylever, reverse procedure used to remove it.

Note: Certain levers have compression springs on their lower stems. Make sure that the springs are properly replaced during reassembly.

SPACEBAR MECHANISM

2.03 To remove spacebar mechanism (Figure 1), proceed as follows.

(a) Remove the TP180057 spacebar with the attached TP180054 keylever.

(b) Bow the TP180056 space lever and disengage it from the two TP180055 space keylevers.

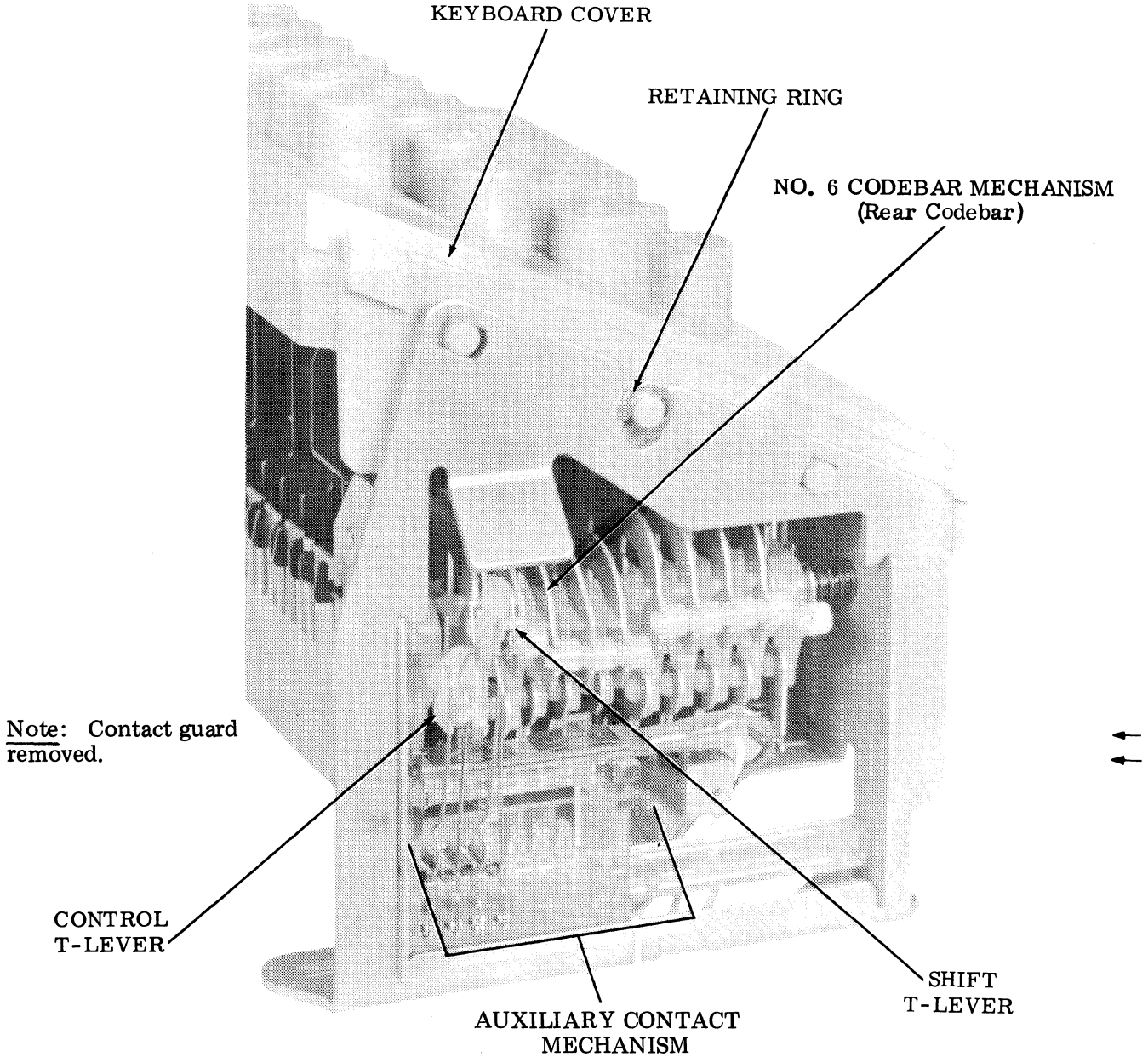


Figure 2 - Auxiliary Contact Mechanism

(c) Disengage space keylevers from guide slots and remove them from frame.

Note: Careful attention should be given to the position of compression springs on keylever's lower stems so that they can be properly replaced during reassembly.

(d) To replace spacebar, reverse procedure used to remove it.

CODEBAR

2.04 To remove any codebar (Figure 1), proceed as follows.

(a) Remove all keylevers from typing unit.

(b) Disengage codebars from left and right T-levers and remove them from keyboard frame.

(c) To replace codebars, reverse procedure used to remove them.

KEYBOARD CONTACT MECHANISM

2.05 To remove keyboard contact mechanism (Figure 1), proceed as follows.

(a) Disengage the TP185798 (early design) or TP186437 nonrepeat lever spring and the TP82442 (early design) or TP186435 universal lever spring.

(b) Remove the right side bracket by snapping if off the frame.

(c) Remove the contact mechanism.

Note: Careful attention should be given to the position of the TP180031 compression springs so that they may be properly replaced during reassembly.

(d) To replace the keyboard contact mechanism, reverse the procedure used to remove it.

Note: Be sure that the TP180046 contact reset bail operating arm is located beneath the TP182240, TP185766 or TP186253 universal lever after reassembly.

AUXILIARY CONTACT MECHANISM

2.06 To remove auxiliary contact mechanism (Figure 2), proceed as follows.

Note: These instructions apply only to parity keyboards.

(a) Remove left side bracket by snapping if off frame.

(b) Disengage the TP42661 (early design) or the TP186339 (late design) shift codebar link spring.

(c) Spread keyboard frame and remove the auxiliary contact.

(d) To replace the auxiliary contact mechanism, reverse the procedure used to remove it.

T-LEVER SHAFTS

2.07 To remove the T-lever shafts (Figure 1), proceed as follows.

(a) Disengage the TP84575 universal link spring.

(b) Remove corresponding side bracket; spread the frame and lift out.

Note: If it is desired to remove T-levers, remove the TP119653 retaining rings and slide levers off their shafts.

(c) To replace the T-lever shafts, reverse the procedure used to remove it.

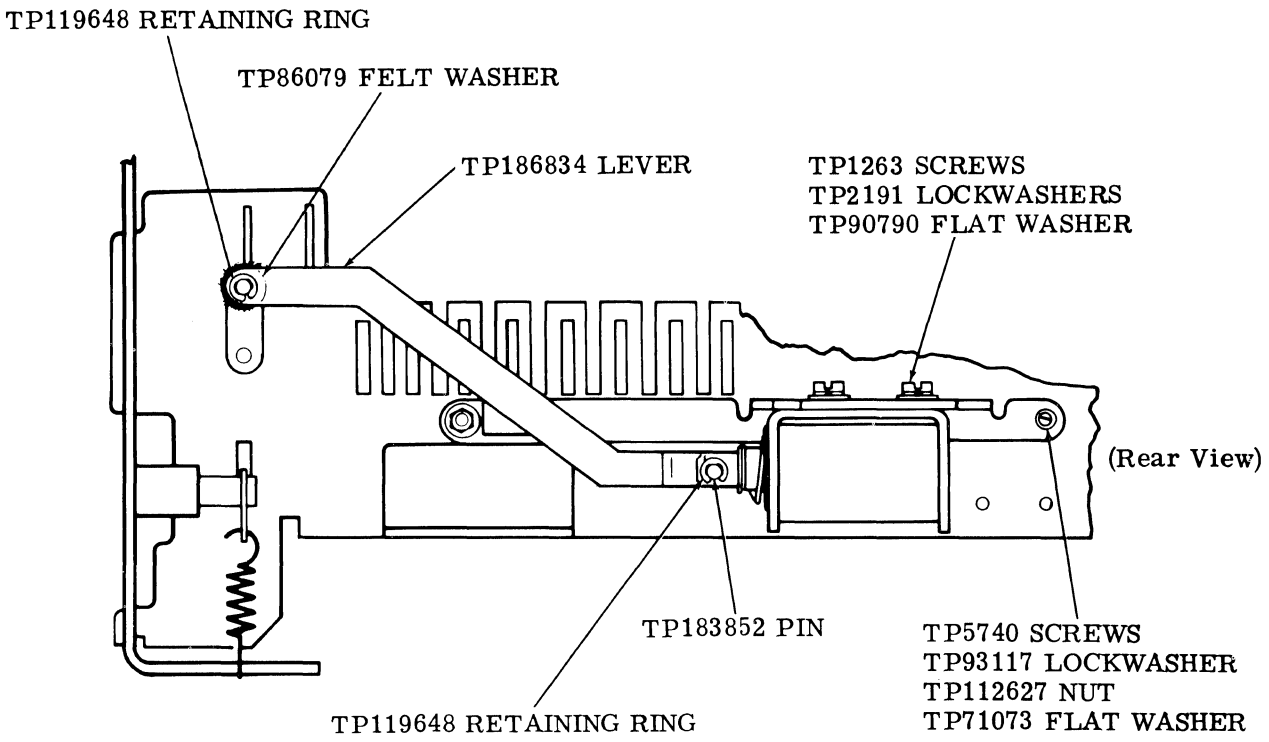
3. DISASSEMBLY AND REASSEMBLY OF LOCKING MECHANISM IN KEYBOARDS SO EQUIPPED (Figure 3)

3.01 Remove TP119648 retaining ring.
Remove TP186834 lever from post.
Remove TP86079 felt washer.

3.02 Remove the solenoid plunger with the TP186834 lever attached to it.

(a) Remove TP119648 retaining ring from the TP183852 pin.

(b) Remove the TP183852 pin.



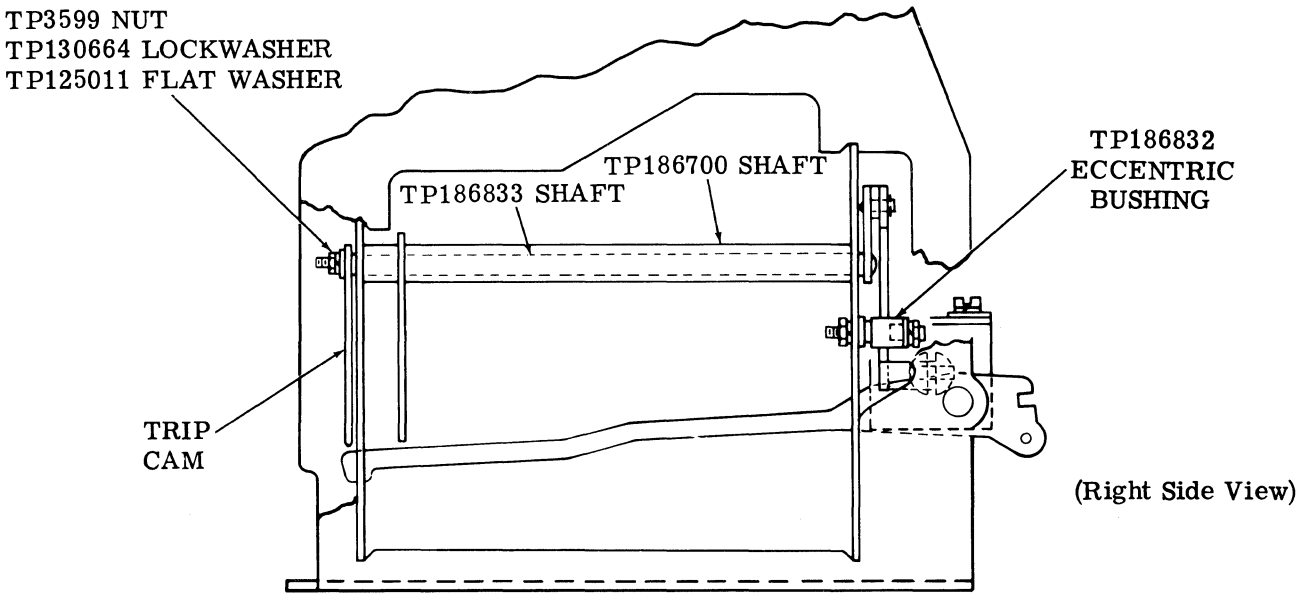


Figure 3 - Locking Mechanism on Keyboards So Equipped

(c) Remove the TP186834 lever from the slot in the solenoid plunger.

3.03 Remove TP186832 eccentric bushing from the stud on the TP186830 mounting bracket.

3.04 Disassemble trip cam by removing TP3599 nut, TP130664 lockwasher, and TP125011 flat washer.

3.05 Remove TP186833 shaft with lever from within the TP186700 shaft by pulling at the TP186833 from the rear of the keyboard.

3.06 Remove solenoid from its mounting bracket by removing two TP1263 screws, two TP2191 lockwashers, and two TP90790 flat washers.

3.07 Remove the solenoid mounting bracket with stud from the keyboard frame by removing the TP5740 screw, two TP93117 lockwashers, two TP112627 nuts, and TP71073 flat washer.

3.08 To reassemble the locking mechanism reverse the procedures used to remove it.