

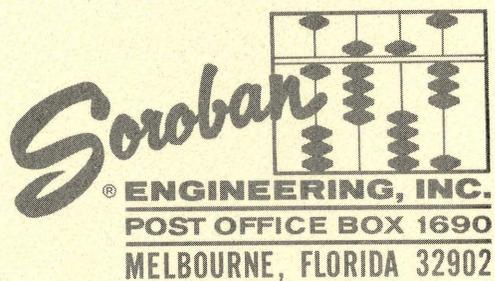
TECHNICAL MANUAL

**OPERATION AND SERVICE
WITH ILLUSTRATED PARTS BREAKDOWN**

for

CODER UNIT

MODELS EC AND ETC COMPUTERITER



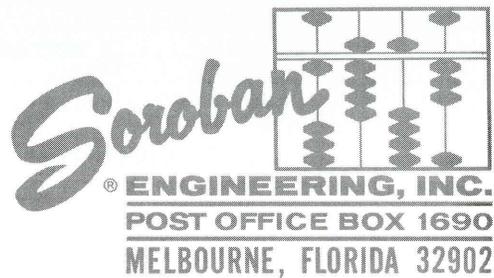
MARCH 1963

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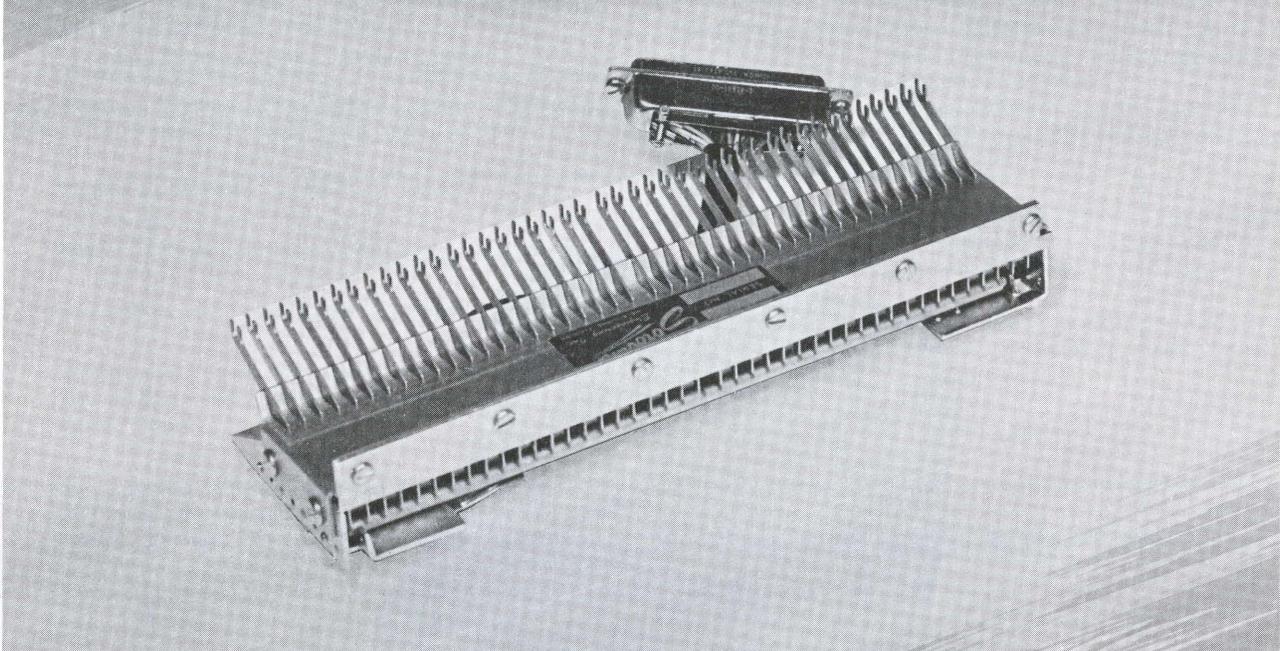
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SECTION I GENERAL INFORMATION

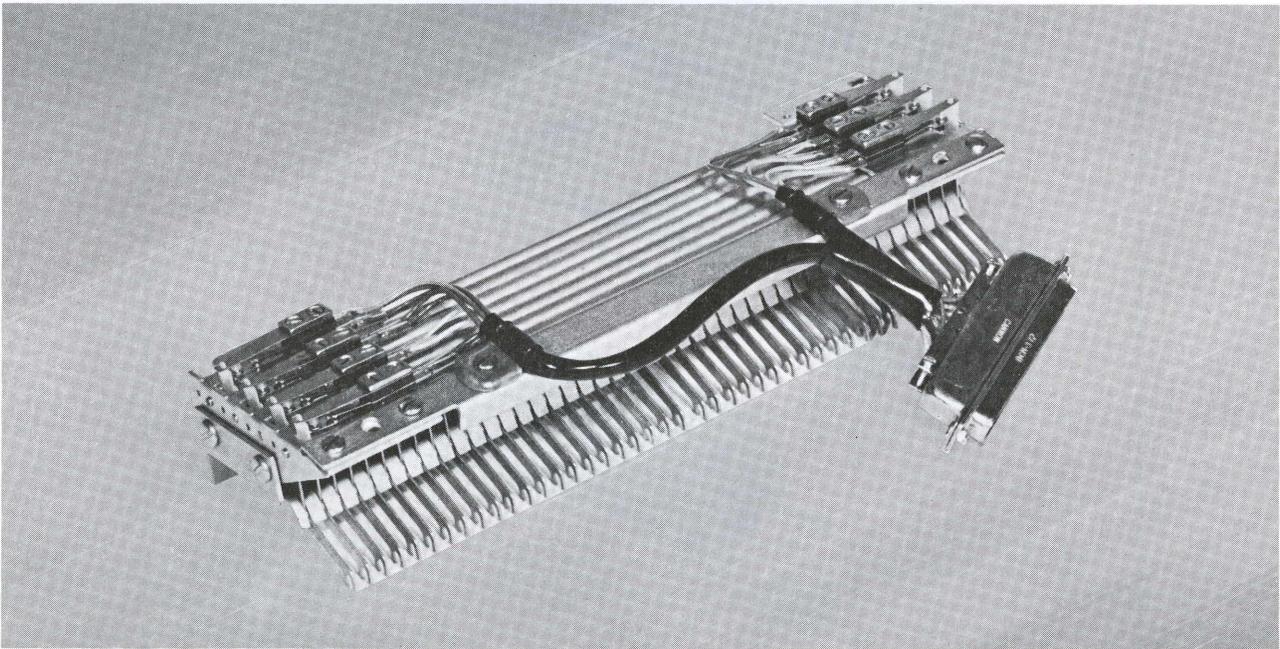
1-1. FUNCTIONAL DESCRIPTION.

1-2. GENERAL. The Coder (Figure 1-1) is an extremely reliable mechanical device designed for use in Soroban Models EC and ETC Computeriters. With the Coder (2,

Figure 1-2) installed in the typewriter (1), the yokes of the code selectors encompass pins projecting from the side of the typewriter cams. Operation of the typewriter imparts mechanical power, through the linkage, to contacts mounted on the Coder. Opening and closing of the electrical contacts generates the desired parallel output code.



TOP VIEW



BOTTOM VIEW

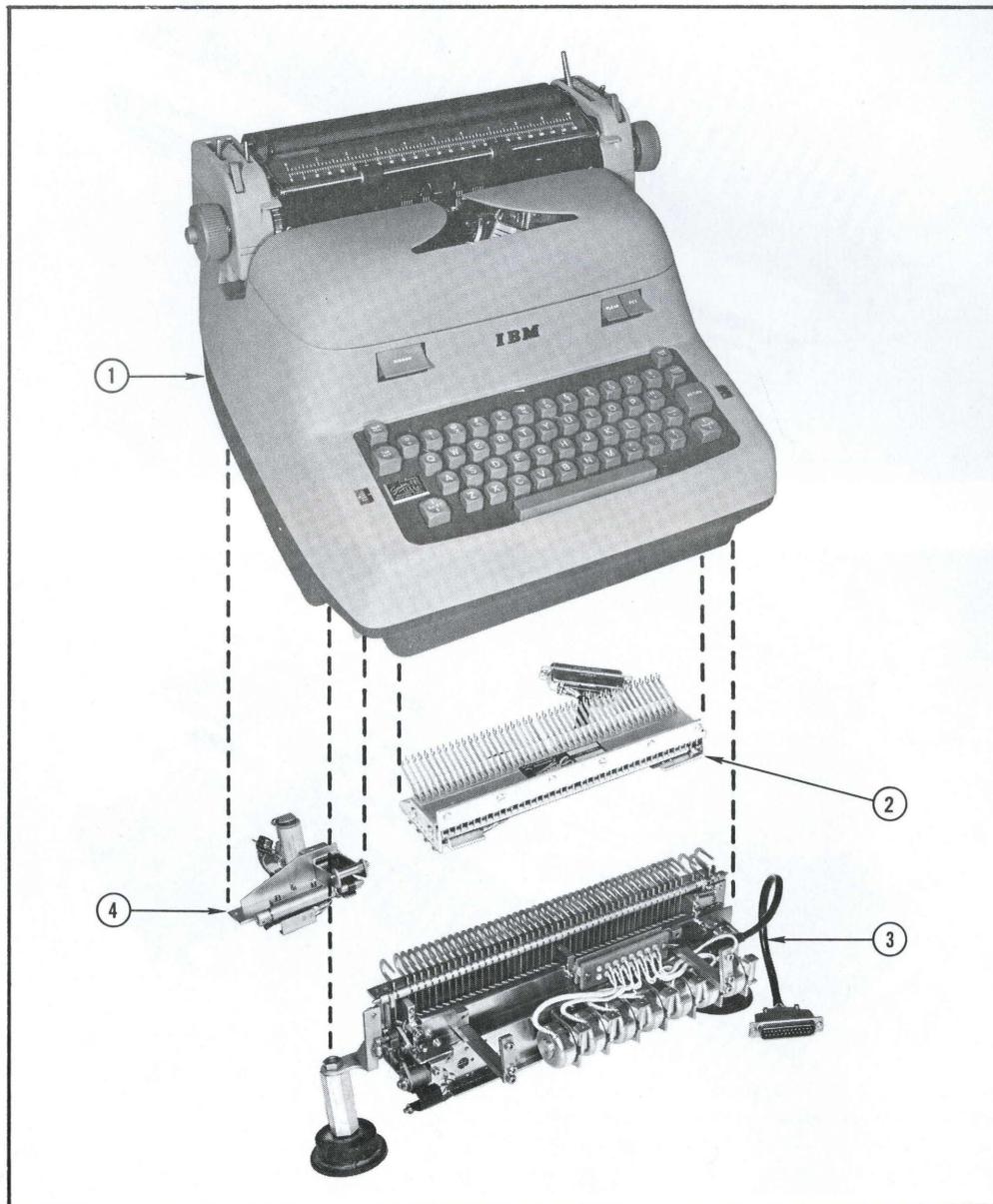
Figure 1-1. Computeriter Coder

1-3. THE CODER. The Coder (2) generates a binary system code of up to eight parallel bits when a keyboard character is depressed, by opening and closing contacts of the parallel levels. The Coder must be interconnected to equipment which will respond to the open and closed contacts of the code character generated. This may be tape perforating or electronic equipment. No electrical power is required to operate the Coder itself.

1-4. CODES. Codes for alpha-numeric keyboard characters have never been standardized; the codes supplied are in accordance with those specified when the unit was ordered. The only requirement is that the codes in the Coder must be compatible with the codes required by the translating (decoding) equipment.

1-5. CODER CHARACTERISTICS. The characteristics of the Coder are as follows:

- Maximum Speed: Nominal 10 characters per second (limited by operator and typewriter speed).
- Codes: 5, 6, 7 or 8 level codes can be furnished.
- Contacts: Rated 2 amp. maximum at 115 v d-c resistive load. Code contacts, Form A or C optional.
- Auxiliary Contacts: Form A, B or C contacts can be mounted for individual key characters for alternate code selectors (on custom order).
- Typewriter: 42 or 44 key, Model B IBM Typewriter, 115 volt 60 cycle a-c, modified by Soroban Engineering for Computeriter service.
- Connector: 37 pin, Cannon type DC-37. None required for Coder.



- 1. COMPUTERITER
- 2. CODER
- 3. TRANSLATOR
- 4. POWER UNIT (TRANSLATOR)

Figure 1-2. Computeriter Coder Placement

SECTION II

INSTALLATION

2-1. UNPACKING AND HANDLING.

2-2. GENERAL. The Coder is factory installed in a Computeriter prior to shipment of this equipment. The only handling required is removal and replacement of the Coder during Computeriter maintenance.

2-3. REMOVING THE CODER. A cast aluminum cover on the bottom of the Computeriter protects the Coder from damage. To remove the Coder proceed as follows:

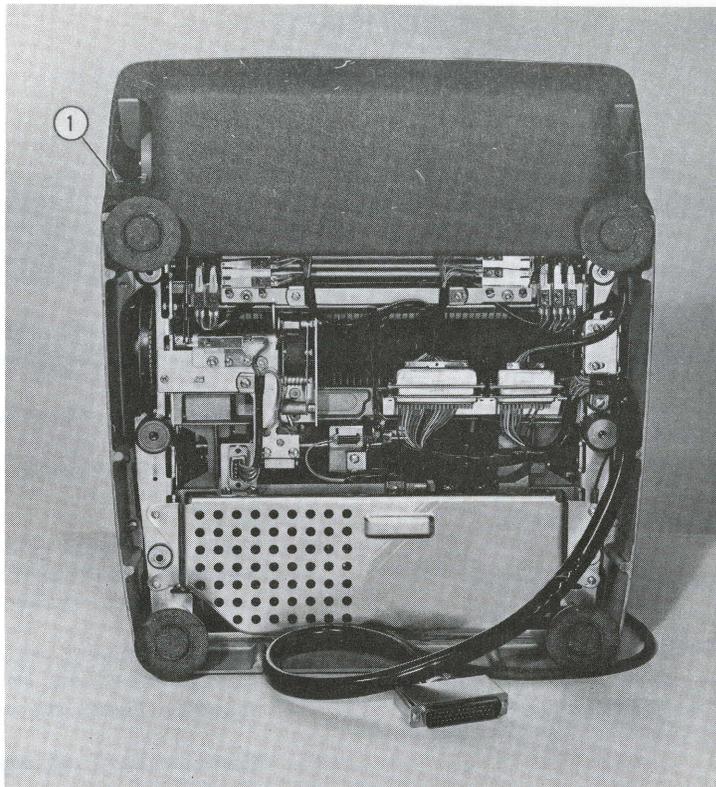
- a. Stand Computeriter on its back (Figure 2-1).
- b. Remove the two screws (1) and remove cover.
- c. Disconnect the 37-pin Coder connector (5).
- d. Remove the socket head cap screws (4), one at each end of the Coder, and mounting spacers under Coder frame.
- e. Using an upward rolling motion to clear the code selector yokes from the cam pins, lift out the Coder assembly (2).

NOTE

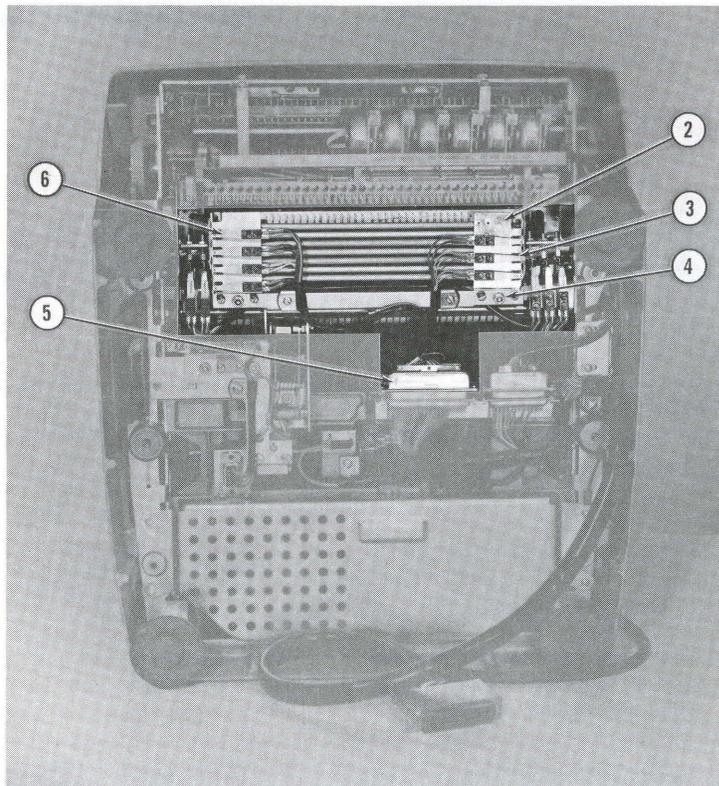
Care should be exercised to prevent damage to Coder components during handling.

2-4. REPLACING THE CODER. Replace the Coder in the Computeriter by the following procedure:

- a. Stand Computeriter on its back.
- b. Hold Coder assembly (2) with the code selector yokes downward.
- c. Using a downward rolling motion, place Coder in position in the Computeriter, making sure the code selector yokes straddle pins in key cams.
- d. Replace mounting spacers under Coder, place socket head screws (4) through Coder frame and spacers. Tighten the screws.
- e. Reconnect the 37 pin connector (5).
- f. Replace protective cover and two screws (1).
- g. Place Computeriter in operating position.



TYPEWRITER WITH COVER IN PLACE



- | | |
|------------------------|-----------------------|
| 1. COVER SCREWS | 4. CAP SCREW |
| 2. CODER | 5. CODER CONNECTOR |
| 3. EVEN LEVEL CONTACTS | 6. ODD LEVEL CONTACTS |

Figure 2-1. Computeriter Showing Coder, Bottom View

SECTION III OPERATORS SECTION

3-1. OPERATOR INSTRUCTIONS.

3-2. GENERAL. The Coder requires no operator instructions. Its functions are controlled by operation of the Computeriter.

3-3. CODING RATE. The rate at which characters may be manually coded is a function of the operator's speed. The coder will respond to character rates up to 10 characters per second.

SECTION IV PRINCIPLES OF OPERATION

4-1. FUNCTIONAL OPERATION.

4-2. GENERAL. Functional operation of the Coder is the positioning of a code selector bar by depressing a keyboard character, which results in parallel levels of open and closed contacts in the form of a binary system code.

4-3. CONTACT LEVELS. The number of contact levels required to generate a binary system code depends on the number of characters on the keyboard. The binary system is based on mathematical powers of the numeral two as follows:

Number of Levels	Power of Two	Number of Combinations Obtained
2	2^2	4
3	2^3	8
4	2^4	16
5	2^5	32
6	2^6	64

The number of keyboard characters is the number of combinations required to generate a binary code. A 42 to 44 character keyboard requires six contact levels and the remaining combinations are not used. In addition to the six levels a Coder Common Contact level is required.

4-4. CONTACT LOCATIONS. Code contacts are mounted on the ends of the Coder frame. (See Figure 2-1.) ODD level contacts (6) are mounted on the left end of the frame. These are levels one, three, five and seven, counting from the rear of the Computeriter. Likewise, the EVEN level contacts two, four, six and eight are on the right end of the frame. On a six-level Coder, the Coder Common Contact is normally in the seventh level position.

4-5. CODER COMMON CONTACT. The Coder Common Contact (CCC) acts as an electrical gate for the code contacts by closing after the code contacts close and opening before the code contacts open. The timing diagram, Figure 4-1, illustrates schematically the gating principle.

4-6. NON-PRINT OPERATIONS. The contacts for non-print operations of space, tabulate, upper-case shift, lower-case shift, back-space and carriage return are provided as separate contacts, where a circuit closure for these operations is necessary. Locations of some of these contacts are shown in Figure 4-2.

4-7. AUXILIARY CONTACTS. When auxiliary contacts are required for special operations, where binary code contacts are not usable, these contacts are mounted on the Coder. Space is available to accommodate an auxiliary contact for approximately every other character. Auxiliary contacts may be used for computer programming or other purposes.

4-8. MECHANICAL LINKAGE.

4-9. GENERAL. The mechanical linkage consists of the Computeriter key lever cam pin, straddled by the yoke of a code selector bar equipped with teeth, to engage bails with pushers to operate the code contacts.

4-10. CODE SELECTOR. The code selector (Figure 4-3) is a special shaped metal bar having a yoke and up to eight teeth. The Coder contains one code selector for each character on the Computeriter. A 44-character keyboard requires 44 code selectors. Each tooth on the selector is associated with a binary code level bail. A character code is generated by the removal of teeth for the binary level where a bail should not be actuated. The tooth associated with level ONE is nearest the yoke. (See Figure 5-4.)

4-11. BAILS. The Coder has one bail (Figure 4-3) for each binary code level up to eight. Normally, a 44 character keyboard Computeriter will have six code level bails and a Coder Common Contact bail. When all teeth are present on the code selector, all bails will be actuated. Where teeth are missing on the selector, the associated bail will remain stationary. (See Figure 5-4.) Each bail has an arm, or tab, which operates a nylon pusher to close its associated code contact. Each time a tooth on the selector actuates its associated bail, the code contact of that bail level is closed. Any of the available combinations of closed code contacts are obtained by presence of teeth on the code selector.

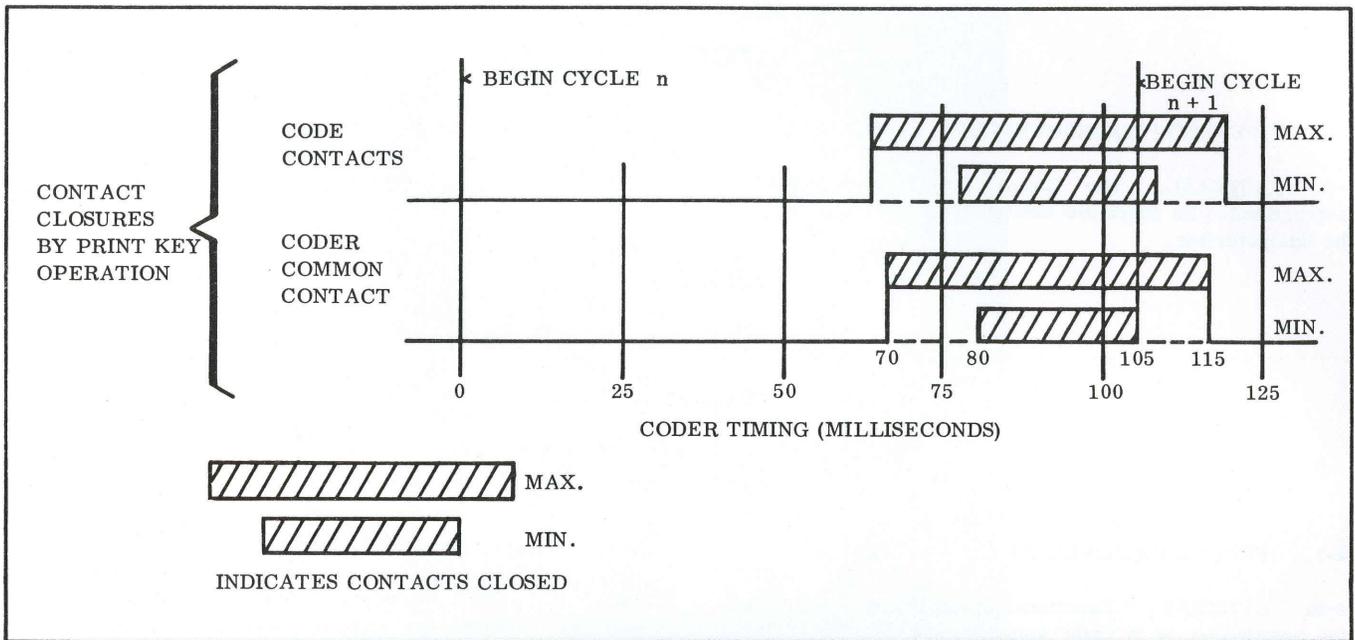


Figure 4-1. Coder Timing Diagram

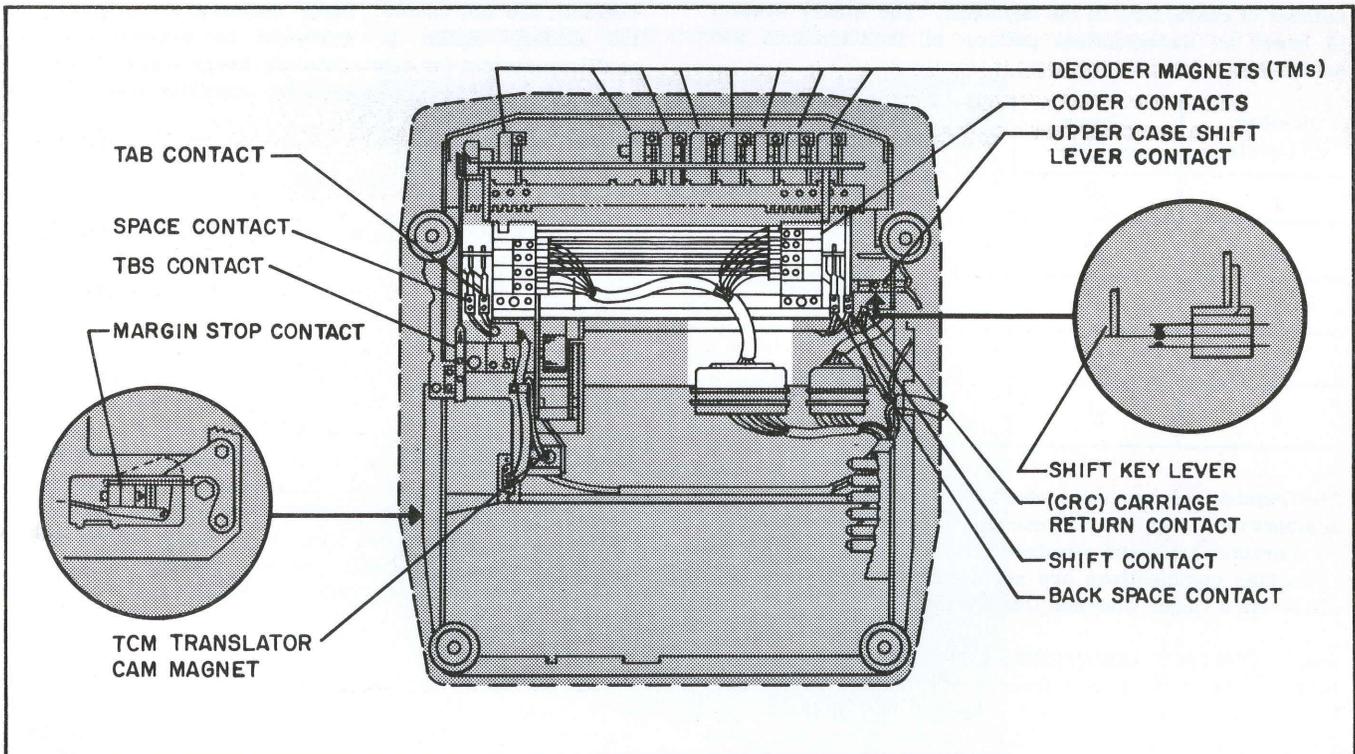


Figure 4-2. Underside of Computeriter

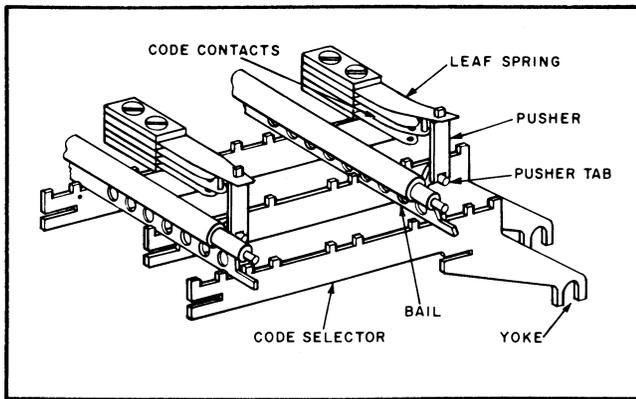


Figure 4-3. Mechanics of Coder

4-12. INTERLOCKS. The Coder itself does not contain interlocks to prevent depressing more than one character

simultaneously. An interlock can be provided on the Computeriter to prevent this kind of mishandling, which deranges the code. The Coder cannot be operated when the Computeriter switch is in the OFF position as the stop bar prevents depressing any of the keys.

4-13. THEORY OF OPERATION.

4-14. GENERAL. The theory of operation of the Coder is the translation of character key motion through mechanical linkage to close selected contacts arranged in binary code levels.

4-15. OPERATION. Operation of the Coder consists of placing the Computeriter switch in the ON position and depressing the character keys in the same manner as operating an electric typewriter. Depressing a character key moves its associated code selector. The remaining teeth on the selector move their associated bails and their nylon pushers close the code contacts.

SECTION V TROUBLE SHOOTING AND MAINTENANCE

5-1. TROUBLE SHOOTING.

5-2. GENERAL. The Coder is a highly reliable mechanical device that will give long trouble-free service with a minimum of attention. Normally, the only trouble which may develop will be with the contacts which make and break an electrical circuit carrying current. (See Figure 4-1.)

5-3. CODE LEVEL CONTACTS. The code level contacts are not subject to arcing as they do not initiate or interrupt a flow of electric current. In an exceptionally dirty or chemical laden environment it is possible for these contacts to accumulate dirt or oxides, which could interfere with the production of code characters. Should this occur, clean the Coder as outlined in Paragraph 5-9.

5-4. CODER COMMON CONTACTS. The Coder Common Contacts operate as an electrical gate to close and open the circuit, permitting current to flow and interrupting the flow of current. These contacts may be subject to slight arcing which could interfere with production of code characters. When necessary, burnish the contacts as outlined in Paragraph 5-21.

5-5. NON-PRINT CONTACTS. The non-print contacts may be subject to slight arcing which could interfere with their functions. When necessary, burnish the contacts as outlined in Paragraph 5-21.

5-6. MAINTENANCE.

5-7. GENERAL. The few wearing parts and critical tolerances reduce maintenance of the Coder to a minimum.

5-8. SERVICE SCHEDULE. The Coder need not be serviced more often than the normal schedule for the Computeriter. Inspection will reveal extent of service required.

5-9. CLEANING. The Coder ordinarily will not malfunction even when very dirty. When inspection reveals cleaning is necessary, proceed as follows:

- a. Remove Coder as outlined in Paragraph 2-3.
- b. Place entire Coder in a tall container of Inhibisol* solvent, swirling it around to wash out dirt and congealed lubricant.
- c. Remove Coder and drain off surplus solvent.
- d. Dry by using low pressure, clean, dry compressed air.
- e. Lubricate as outlined in Paragraph 5-10.

5-10. LUBRICATION. Lubricate bearing surfaces of code selectors and pivots at both ends of the bails with a good grade of lubricating oil such as Lubriplate #1. No other lubrication is necessary.

*Use only recommended solvent to avoid damaging plastic parts and insulation. Inhibisol is made by the Penetone Company of Tenafly, New Jersey.

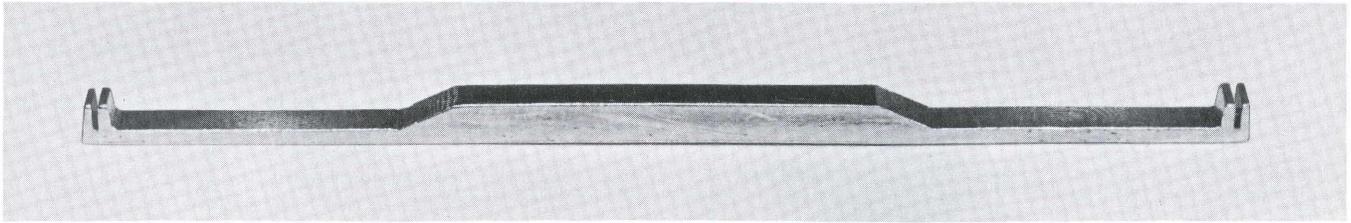


Figure 5-1. Contact Adjusting Tool (twice actual size)

5-11. ADJUSTMENTS.

5-12. GENERAL. The Coder, installed in a Computeriter at the factory, has been properly adjusted and should not be disturbed. When these adjustments are disturbed during parts replacement, readjustment may be necessary.

5-13. MECHANICAL ADJUSTMENT. The only mechanical adjustment is one that shifts the entire Coder with respect to the teeth on the code selectors. This adjustment is maintained by four screws (16, Figure 6-1) which have been sealed with a touch of Glyptal. Adjustment is made as follows:

- a. Loosen the four screws (16).
- b. Move Coder assembly as required, until the selector tooth for the CCC level of all the selectors just touches the CCC level bail.

NOTE

On six-level Coders, this is the seventh tooth from the yoke on all selectors and the seventh level bail.

- c. Tighten the four screws (16) and seal with a spot of Glyptal.

5-14. CONTACT ADJUSTMENT. The Coder contacts are mechanically adjusted by using a Contact Adjusting Tool (Figure 5-1). The slot in the end of the tool is placed straddling the spring leaf near the spacing insulator stack (see Figure 5-2). Gently bending the leaf toward the pole (contact long spring leaf) causes the contact to make (close) earlier. Bending the leaf away from the pole causes the contact to close later.

CAUTION

Never bend the pole spring leaf.

5-15. CONTACT TIMING.

5-16. GENERAL. To adjust the contacts for proper timing, a light box (Figure 5-3) should be connected to the Coder as follows:

- a. Place Computeriter switch in OFF position.
- b. Stand Computeriter on its back.
- c. Disconnect the 37-pin Coder connector (5, Figure 2-1).

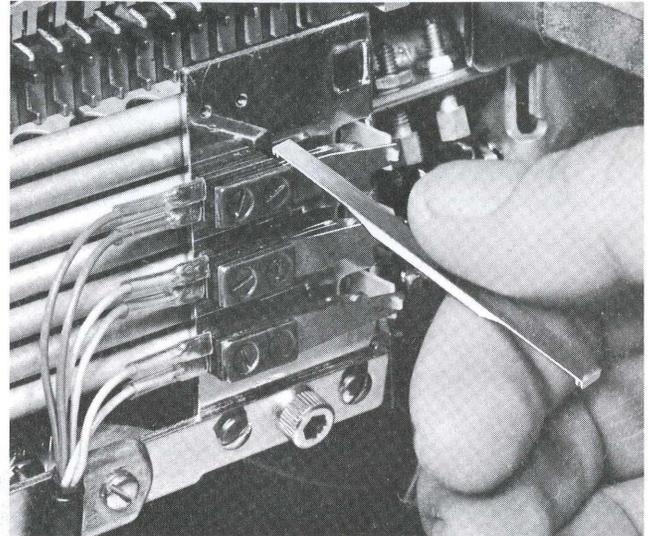


Figure 5-2. Adjusting Coder Contacts

- d. Connect the 37 pin connector of the light box to the Coder connector.
- e. Plug power cord of light box into a convenient outlet (115 v a-c, 60 cycle) and place light box switch in ON position.

5-17. CODE CONTACTS. The code contact proper timing is obtained as follows:

- a. Pick up a character type bar by hand and move it toward the platen.
- b. With the type face 1-1/2 inches from platen, contacts should "make" and the corresponding code should be lighted on the light box.

NOTE

A typical keyboard code is shown in Figure 5-4.

- c. Adjust the code level contacts, as required, so the proper code lights become lighted and extinguished simultaneously.

NOTE

When a code level has been properly timed for one character it will automatically be correct for all characters using that contact level.

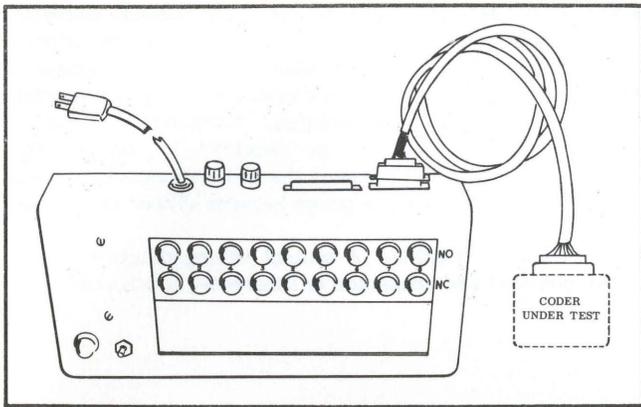


Figure 5-3. Light Box

- d. Repeat steps a through c, as required, to properly time all code level contacts.

5-18. CODER COMMON CONTACTS. The CCC must be timed to make after the code contacts and break before the code contacts as illustrated in Figure 4-1.

5-19. CONTACT SEQUENCE. The sequence of make and break of the CCC and code contacts, in accordance with timing diagram, Figure 4-1, is as follows:

- a. Normally closed common contact breaks.
- b. Normally open code contacts make.
- c. Normally open common contact makes.
- d. Normally open common contact breaks.
- e. Normally open code contacts break.
- f. Normally closed common contact makes.

5-20. BAIL SPRING TENSION. The bail spring (2, Figure 6-1, top spring actuated by (3) nylon pusher) should have a tension between 3-1/2 and 4-1/2 ounces. Greater tension will slow down Computeriter operation and a lesser tension will result in contact bounce.

TYPEWRITER		CODER								
FUNCTION	KEY POSITION	CODE SELECTOR POSITION	CODE							
TAB	S									
SPACE	T									
+ 0	0	1								
q Q	1	2								
a A	2	3								
l *	3	4								
z Z	4	5								
w W	5	6								
s S	6	7								
2 @	7	8								
x X	8	9								
e E	9	10								
d D	10	11								
3 #	11	12								
c C	12	13								
r R	13	14								
f F	14	15								
4 \$	15	16								
v V	16	17								
t T	17	18								
g G	18	19								
5 %	19	20								
b B	20	21								
y Y	21	22								
h H	22	23								
6 ¢	23	24								
n N	24	25								
u U	25	26								
j J	26	27								
7 &	27	28								
m M	28	29								
i I	29	30								
k K	30	31								
8 1/2	31	32								
,	32	33								
o O	33	34								
l L	34	35								
9 (35	36								
.	36	37								
p P	37	38								
:	38	39								
0)	39	40								
/ ?	40	41								
' "	41	42								
- _	42	43								
= ÷	43	44								
BACK SPACE		V								SINGLE CONTACT
UPPER CASE		W								SINGLE CONTACT
CARRIAGE RETURN		Y								SINGLE CONTACT
LOWER CASE		Z								SINGLE CONTACT

SHADED SPACES REPRESENT SELECTOR TEETH PRESENT

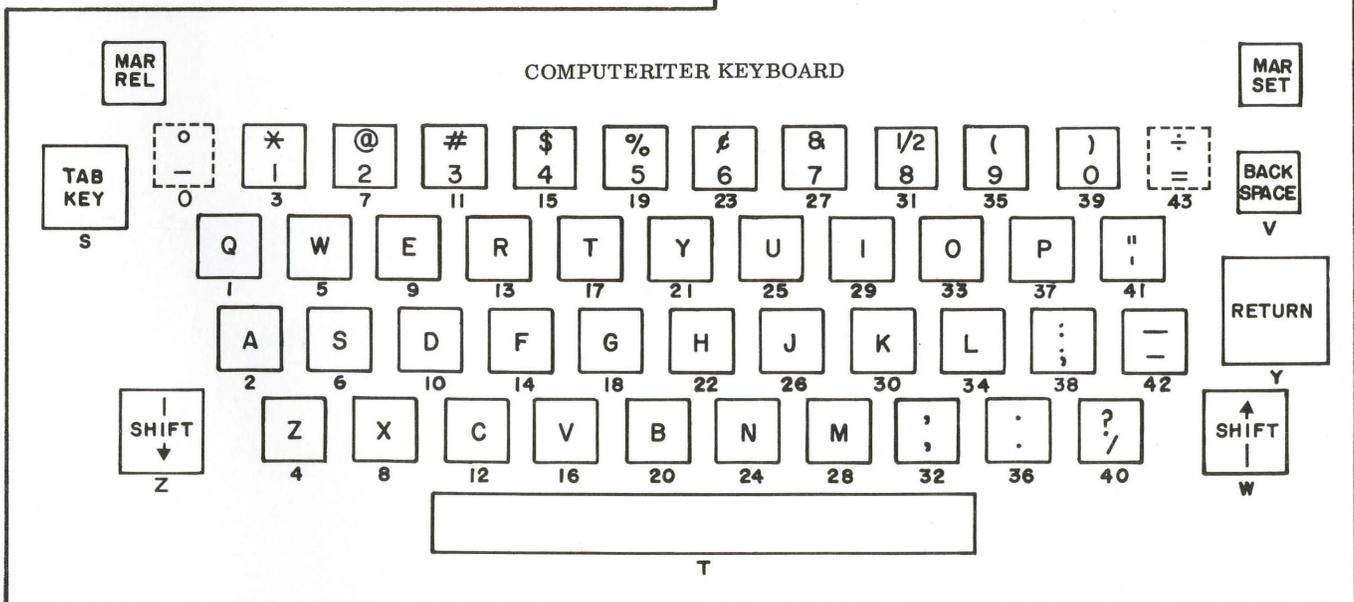


Figure 5-4. Typical Code Translation

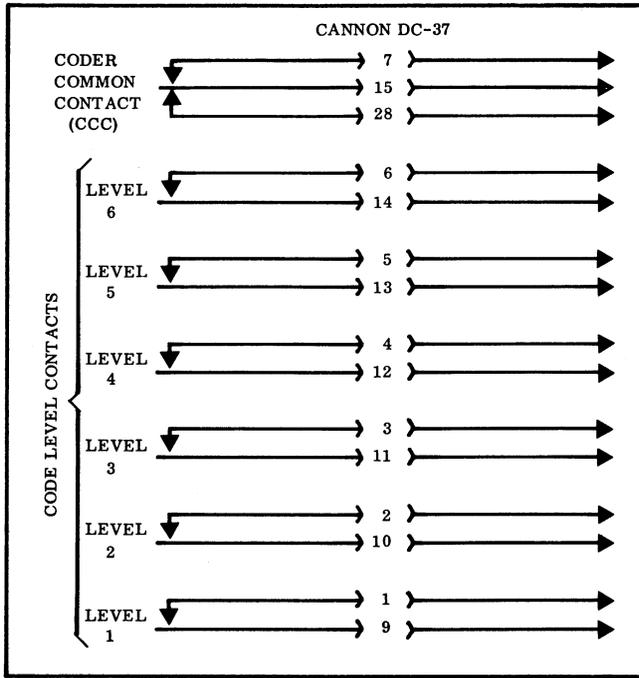


Figure 5-5. Typical Wiring Diagram, Six Level Code

5-21. CONTACT BURNISHING. The only contacts carrying current during make and break operation are the Coder Common Contacts. The CCC should be lightly burnished, as required, to maintain proper operation. Slight oxidation may develop on the code contacts. Normally a piece of ordinary paper is all that is required to burnish the contacts. Insert paper between the contacts and close them on the paper. Gently draw paper between closed contacts.

5-22. CODER WIRING. A typical wiring diagram of the Coder contacts and connector is illustrated in Figure 5-5.

SECTION VI ILLUSTRATED PARTS BREAKDOWN

6-1. PARTS LIST.

6-2. GENERAL. Certain parts of the Computeriter Coder have optional features. Most common of these are the code contacts. Auxiliary contacts are not listed as

their application is of a custom nature. (See Figure 6-1.)

6-3. QUANTITY. The words "up to" before a quantity indicate this may vary. The code selector quantity reflects the number required for a 44 character keyboard.

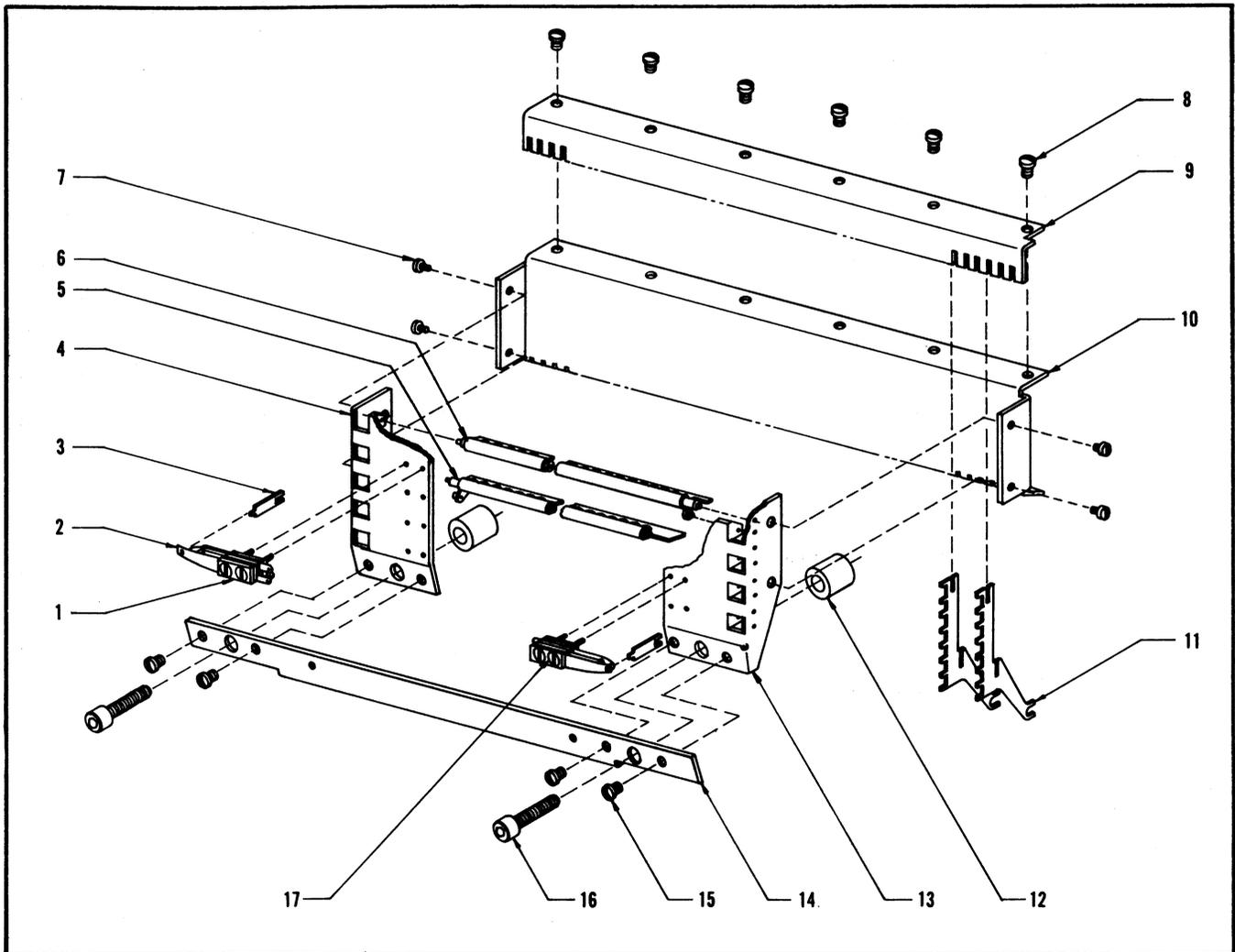


Figure 6-1. Exploded View of Coder

PARTS LIST

REF. DESIGN.	DESCRIPTION	PART NO.	QTY. PER EQUIP.
1*	CONTACT, Form "C" (Transfer)	P. B. 3-MH-528C	Up to 8
1*	CONTACT, Form "B" (Normally Closed)	P. B. 3-MH-388B	Up to 8
1*	CONTACT, Form "A" (Normally Open)	P. B. 3-MH-630A	Up to 8
2	CODE BAIL SPRING	A-4912A	Up to 8
3	PUSHER	A-4911	Up to 8
4	CODER SUPPORT, LH.	B-4995	1
5	CODE BAIL Assembly	B-4917B, G1	Up to 4
6	CODE BAIL Assembly	B-4917B, G2	Up to 4
7	SCREW, Binder Head	6-32 x 3/32" SS	4
8	SCREW, Binder Head	4-40 x 3/32" SS	6
9	GUIDE, Code Selector	B-4993	1
10	CODER FRAME	C-4916	1
11	CODE SELECTOR	B-4906	44
12	SPACER	A-4913	2
13	CODER SUPPORT, RH.	B-4994	1
14	CODER STRAP	B-5020	1
15	SCREW, Binder Head	4-40 x 1/8" SS	4
16	SCREW, Socket Head	10-32 x 3/4" SS	2
17	SCREW, Flat Head	2-56 x L High Strength SS or Cad. Pl. Steel	Up to 16**

*Optional

**Length of screws depends on style of contact



QUALITY DATA PROCESSING DEVICES & SYSTEMS
TELEPHONE PARKWAY 3-7221 · BOX 1717 · MELBOURNE, FLORIDA

2 November 1962

Massachusetts Institute of Technology
Research Laboratory for Electronics
Cambridge 39, Massachusetts

Attention: Mr. John A. McKenzie
Room 26-248

Gentlemen:

This is in reply to your October 29 letter requesting adjustment information for your Soroban Model Computeriter.

We are enclosing a Polaroid photograph to assist you in the adjustment necessary to effect the proper operation of your equipment.

In taking the enclosed picture the carriage return and back space buttons were removed so as not to block the view. It is not absolutely necessary to remove these buttons in order to make the adjustment that follows.

The pointer in the picture is touching the Seeker which provides the pull necessary to operate the Upper Case Latch Actuator, or hook shaped attachment to the key lever. This Seeker must be formed slightly to the left, so that it rests half way into the slot of the Upper Case Latch Actuator. This adjustment should be all that is necessary to correct your problem.

We are enclosing also one specially formed seeker which you may install in place of the offending Seeker, should the above adjustment fail to correct your trouble. Please note that this Seeker is not straight, was purposely formed with a bend in the hooked end, and if used, should not be straightened.

Mr. John A. McKenzie
Massachusetts Institute of Technology

2 November 1962
Page -2-

In the event this corrective action causes you any further trouble, or you have other problems, please feel free to contact us at any time.

Yours very truly,

SOROBAN ENGINEERING, INC.

A handwritten signature in blue ink that reads "Eugene E. Mac Mahan". The signature is written in a cursive style with a large, prominent initial "E".

Eugene E. Mac Mahan
Manager: Spare Parts Sales

EEM/s1

Enc: 2

