FX-1 FLEXOWRITER TROUBLESHOOTING NOTES

PBC 4112

pb Packard Bell Computer

A DIVISION OF PACKARD BELL ELECTRONICS
1905 ARMACOST AVENUE • LOS ANGELES 25, CALIFORNIA

2nd Edition

January 1963

NOTICE

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INTRODUCTION

This publication contains information concerning the common troubles which may be encountered during the installation, operation, checkout and maintenance of the FX-1 Flexowriter supplied with the PB250 Computer manufactured by Packard Bell Computer Corporation, Los Angeles, California. Adjustment procedures for the correction of these troubles and certain customer performed adjustments are also included in this manual.

The information provided herein is for the use of technical personnel engaged in computer operation and maintenance functions. It is assumed that such personnel are familiar with basic computer technology or have completed a training program conducted by Packard Bell Computer Corporation.

FX-1 FLEXOWRITER

TROUBLESHOOTING NOTES

A. GENERAL

Refer to Figure 1 and Figure 2 as necessary during the performance of the following troubleshooting and adjustment procedures. A short glossary of terms and detailed Flexowriter specifications are provided for reference in the appendix of this manual. Refer to Volume 2 of PBC1002, PB250 Technical Manual for general information relating to the Flexowriter.

B. FLEXOWRITER TROUBLES

Common Flexowriter troubles are listed in Table 1. Refer to Figure 1 for location of specified component contacts.

Table 1. (Sheet 1 of 4)

COMMON FLEXOWRITER TROUBLES

On-Line	Trouble	Cause	Remarks
Input	Incorrect Flexowriter loading from reader	Faulty SR (X) Contact Adjustment Defective buffer gates. Bad Rf$\overline{Tf}$	See reader contact adjustment, paragraph C-8.

Table 1. (Sheet 2 of 4)

COMMON FLEXOWRITER TROUBLES

On-Line	Trouble	Cause	Remarks
Input	Incorrect Flexowriter loading from reader	Faulty mechanical adjustments	
		Reader dirty	
	Incorrect Flexowriter loading from key board	Faulty SS contact adjustment	See selector slide contact adjustment, paragraph C-9.
		Defective buffer gates	
		Bad $\overline{RfTf}$ signal	
	Computer hangs in TES line $35)_8$	Open leads; (Bp) contacts not "making"	
	Computer hangs in TES line $36)_8$	Open leads; SRC or SSC contacts not "making"	
	Computer hang in TES line $37)_8$	(Tb) contacts hung up or shorted	
Output	Incorrect Flexowriter type-out	Defective transistor in TD-100	Combining translator magnet pulses
		Defective type gates	
		Defective Flexowriter letter or number cam	

Table 1. (Sheet 3 of 4)

COMMON FLEXOWRITER TROUBLES

On-Line	Trouble	Cause	Remarks
Output	Incorrect Flexo-writer type-out.	Translator hook not over key lever stud	Combining translator magnet pulses
		Type bar binding in guide	
		Translator dirty and slow	
		Shorted or open arc suppressor circuit	
		Memory line 05 out of adjustment	
		Translator clutch out of adjustment	See translator magnets and clutch adjustment paragraph C-10.
	Flexowriter misses first character on Type-Out (after carriage return)	(Tb) signal fails to stay true	See (Tb) adjustment, paragraph C-1.
Output		Key lock bail re-main closed	CRT-1 contacts 1 and 2 fail to close before (Tb) signal CRT-2 contacts 4 and 5 open

Table 1. (Sheet 4 of 4)

COMMON FLEXOWRITER TROUBLES

On-Line	Trouble	Cause	Remarks
Output	On type-out of sector using OUP, Flexowriter carriage return causes storage of WOC command into line when BREAKPOINT is depressed	CRT-1, Contacts 1 and 2 not closed long enough	See SCRT-1 adjustment, paragraph C-7
	Flexowriter punches code holes when tape feed is depressed	Defective TD-100	
		Shorted arc suppressor circuit	
		Faulty mechanical adjustment of punch	
	Flexowriter punches incorrectly	Shorted arc suppressor circuit	
		Faulty mechanical adjustment of punch	
		C Register delay too short	
		Selector slide stack or selector contact shorted	
	Malfunction of Flexowriter during normal "off-line" operations		Disconnect computer and insert shorting plug JL-2.
			Type and punch test tape consisting of each character, number and function.
			Read tape with punch on.

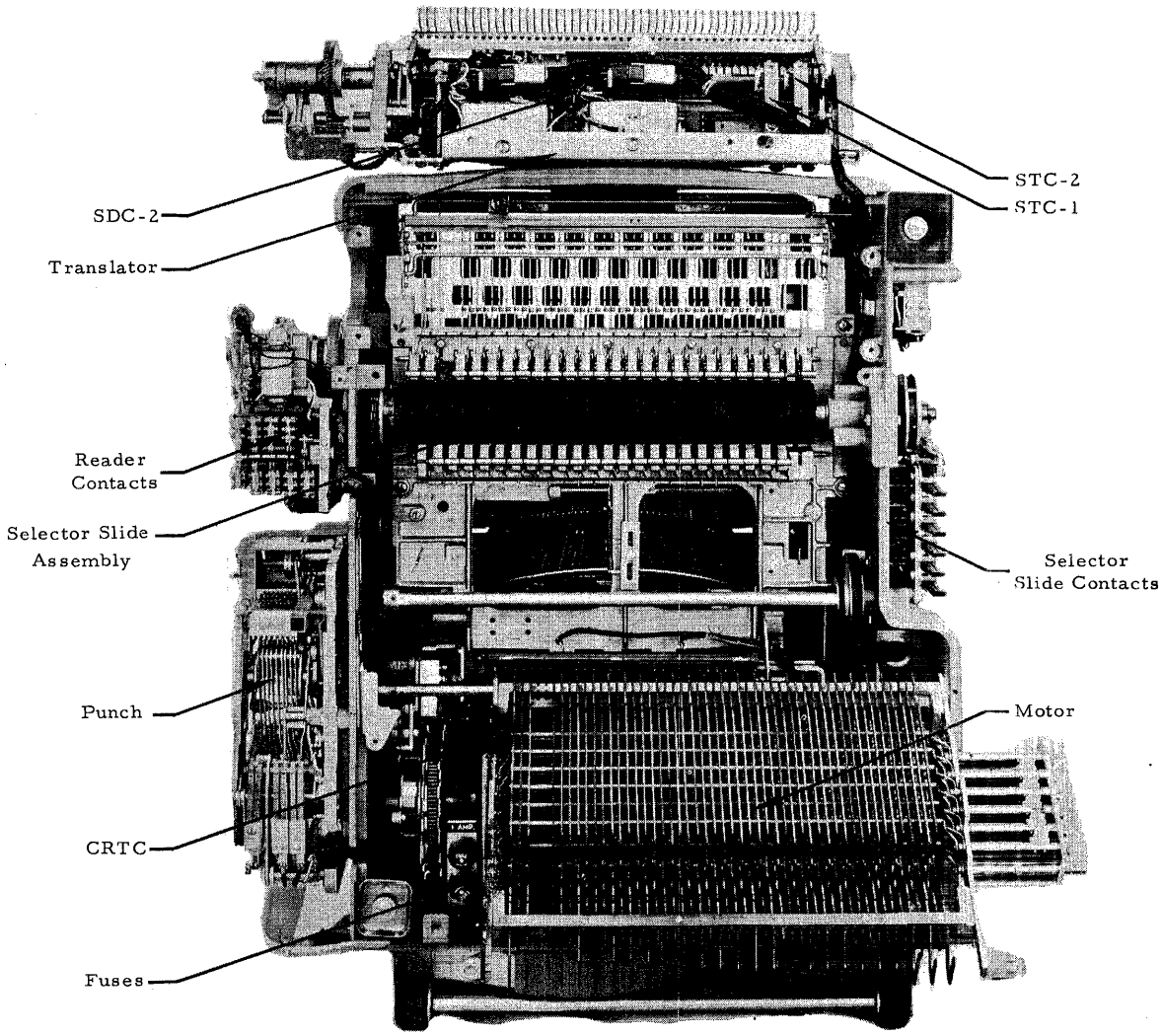


Figure 1. FX-1 Flexowriter (Bottom View)

C. FLEXOWRITER ADJUSTMENTS

The following tools are required to perform the typewriter busy Tb signal adjustments: (1) oscilloscope, (2) ohmmeter, (3) timing dial, (4) screwdrivers (Philips and regular), (5) spring hook, (6) bristol wrenches (assorted sizes).

C-1. INPUT (Tb) SIGNAL ADJUSTMENTS

If the input typewriter busy signal ((Tb), Figure 3) is observed coming "false" before completion of the type cycle or carriage return and tab, perform the following adjustments:

a. Disconnect the Flexowriter input/output cables and attach ohmmeter between pins 32 and 33 of plug JL-1.

b. Turn Flexowriter off and remove reader cover.

c. To test the normal typeout (Tb) signal, generated by contacts 2 and 3 of STC-2, release translator clutch and cycle Flexowriter by pulling motor belt. If ohmmeter does not show continuity throughout the translator cycle, remove translator and inspect the STC-2 contacts. Make certain that contacts are "making" from approximately 15 degrees to 320 degrees by attaching timing dial to translator clutch and observing ohmmeter. Check contact operator for smooth cam action. If cam action is not smooth it can cause the contacts to bounce at high speed. Contacts 2 and 3 of STC-2 are the cam operated contacts located nearest the clutch on the translator clutch shaft.

TYPICAL REFERENCE DESIGNATIONS:
LT2 INDICATES NO.2 SOLENOID OF TRANSLATOR
LP3 INDICATES NO.3 SOLENOID OF PUNCH
TA30 INDICATES PIN 30 OF TERMINAL BOARD A
TB35 INDICATES PIN 35 OF TERMINAL BOARD B
JRL INDICATES PIN L OF READER JACK
JPR INDICATES PIN R OF PUNCH JACK
JT2M INDICATES PIN M OF TRANSLATOR JACK NO.2
JT2M-R INDICATES PIN M AND PIN R OF TRANSLATOR JACK NO.1

FOR CONTINUOUS CODE DELETE, HOLD DOWN CODE DELETE SWITCH, THEN DEPRESS TAPE FEED SWITCH

FOR LPC, LP1 THROUGH LP6 AND LTC, LT1 THROUGH LT6
R1 = 2.2 K. 1/4 W
R3 = 270 Ω 1/4 W
C1 = 15 μf 20 V
CR1 = IN2069

ADJUST SCRT-2 4 AND 5 TO 0.010 GAP AND MAKE BEFORE SCRT-1 1 AND 2 BREAK.

STC-1 TO BE ADJUSTED BY CUSTOMER

SRC 3 AND 4 TO MAKE BEFORE SRC 1 AND 2

0.020 TO 0.025 GAP ON SS1 TO SS6

0.040 GAP

0.020 TO 0.025 GAP ON SS7 THROUGH SS12

TRANSLATOR MAGNET

TYPICAL REFERENCE DESIGNATIONS:
LT2 INDICATES NO.2 SOLENOID OF TRANSLATOR
LP3 INDICATES NO.3 SOLENOID OF PUNCH
TA30 INDICATES PIN 30 OF TERMINAL BOARD A
TB35 INDICATES PIN 35 OF TERMINAL BOARD B
JRL INDICATES PIN L OF READER JACK
JPR INDICATES PIN R OF PUNCH JACK
JT2M INDICATES PIN M OF TRANSLATOR JACK NO.2
JT2M-R INDICATES PIN M AND PIN R OF TRANSLATOR JACK NO.1

0.020 TO 0.025 GAP ON SS1 TO SS6

FOR LP1, LP1 THROUGH LP8 AND LT1, LT1 THROUGH LT6
R1 = 2.2 K 1/4 W
R3 = 270 Ω 1/4 W
C1 = 15 μf 20 V
CR1 = 1N2069

ADJUST SCRT-2 4 AND 5 TO 0.010 GAP AND MAKE BEFORE SCRT-1 1 AND 2 BREAK.
STC-1 TO BE ADJUSTED BY CUSTOMER

• STOP CODE CONTACTS
SRL 3 AND 4 TO MAKE BEFORE SRC 1 AND 2

NOTES:
1. UNLESS OTHERWISE INDICATED
(a) ALL RESISTANCE VALUES ARE IN 100 OHMS
(b) ALL CAPACITANCE VALUES ARE IN .01 MICRO MICROFARADS
(c) ALL R-C ARC SUPPRESSORS ARE 1056642
2. TRANSLATOR SUPPRESSOR ASSEMBLY - 1276-252
PUNCH SUPPRESSOR ASSEMBLY 1276-330
READER SUPPRESSOR ASSEMBLY 1276-289
3. K2 1040897 ANTI REPEAT
K3 1042399 PUNCH ERROR
K4 1046792 STOP CODE
K5 1271-436 CODE DELETE
K8 1042395 READ POWER
K9 1270-190 READ POWER
K10 1042397 NON PRINT
K11 1292-288 NON PRINT
K12 1040903 PUNCH CONTROL
K13 1040898 PUNCH CONTROL
K22 1046792 DELAY CONTROL
K23 1040907 READ CONTROL
SSC ALL KEYS
SDC CR, TAB
4. ADJUST SRC S&B TO 0.045 GAP (±0.005) & SR1 THRU SR8 3&4 TO 0.022 GAP (+0.005 −0.002) REFER TO CONTACT ADJ. CHART 1295-904
5. (-) = TA 31 AT A11 RELAYS

RELAY - SOLDER END

Figure 2. FX-1 and FX-2 Flexowriter and PB250 Interface, Schematic Diagram

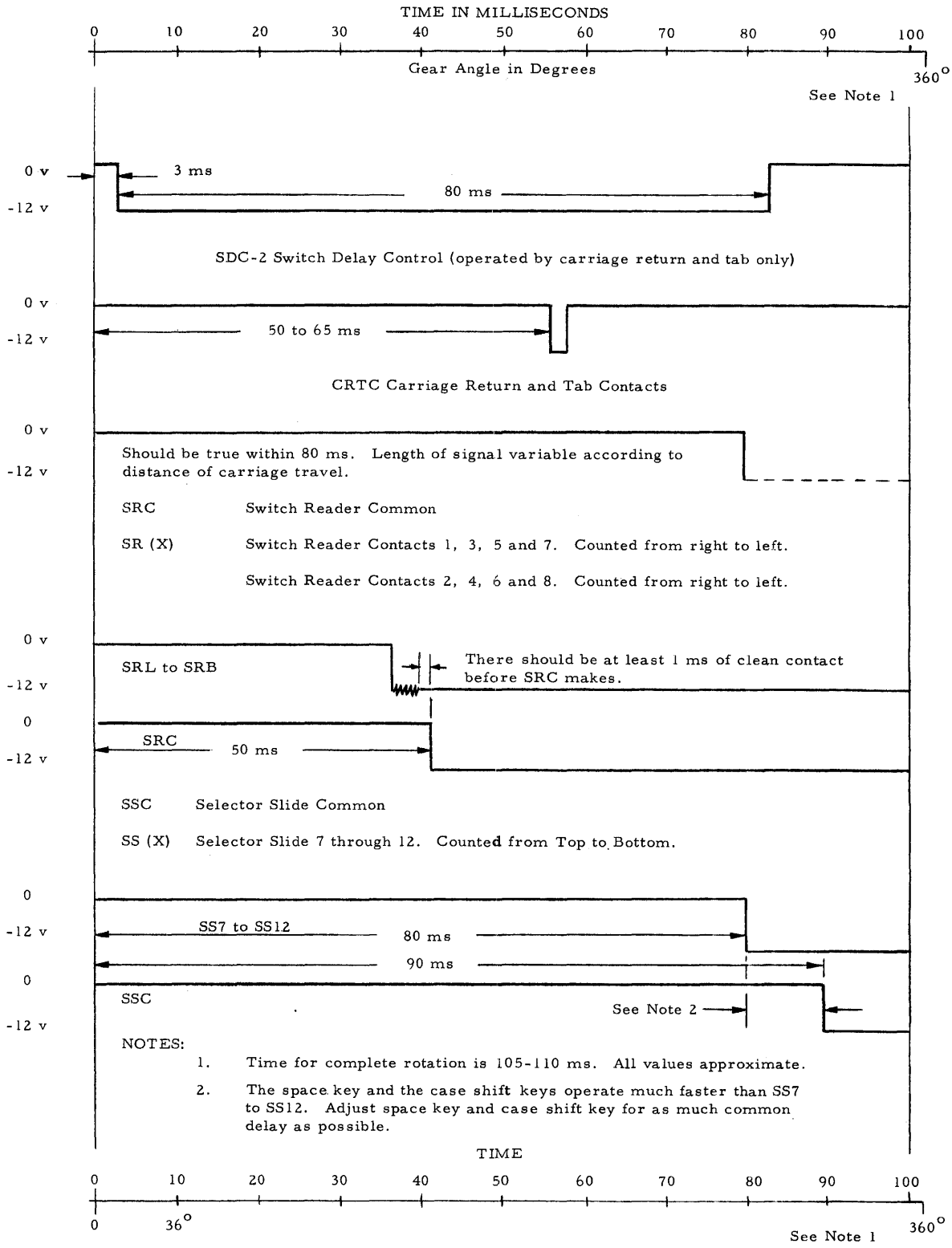


Figure 3. Signal Wave Forms

C-2. CARRIAGE RETURN (Tb) SIGNAL ADJUSTMENTS

To check the operating sequence of all carriage return (Tb) contacts, remove the POWER ON 2-AMP fuse, trip translator magnets 2, 3, 4, 6 and clutch. Attach the ohmmeter across pins 32 and 33 of plug JL-1 and cycle Flexowriter. (Tb) signal should remain true the length of carriage return as shown in figure 4.

Typeout failure on carriage return, can be caused by the faulty adjustment of the following five contacts which are listed in order of operation.

1) STC-2, contacts 1 and 2

2) SDC-2, contacts 4 and 5

3) SDC-1, contacts 2 and 3

4) RDC, contacts 5 and 6

5) SCRT-2, contacts 4 and 5

6) SCRT-1, contacts 1 and 2

C-3. STC-2 CONTACT ADJUSTMENT

Refer to paragraph C-1 for adjustment of the STC-2 contacts.

C-4. SDC-2 AND SDC-1 CONTACT ADJUSTMENTS

SDC-2, contacts 4 and 5 provide a momentary (Tb) signal to the computer while SDC-1, contacts 2 and 3 pick up relay delay control (RDC). These contacts are operated by the carriage return and tab keys as long as the key is pulled down by the translator. The contacts are located in the center of the translator shaft. Remove the translator and translator cover

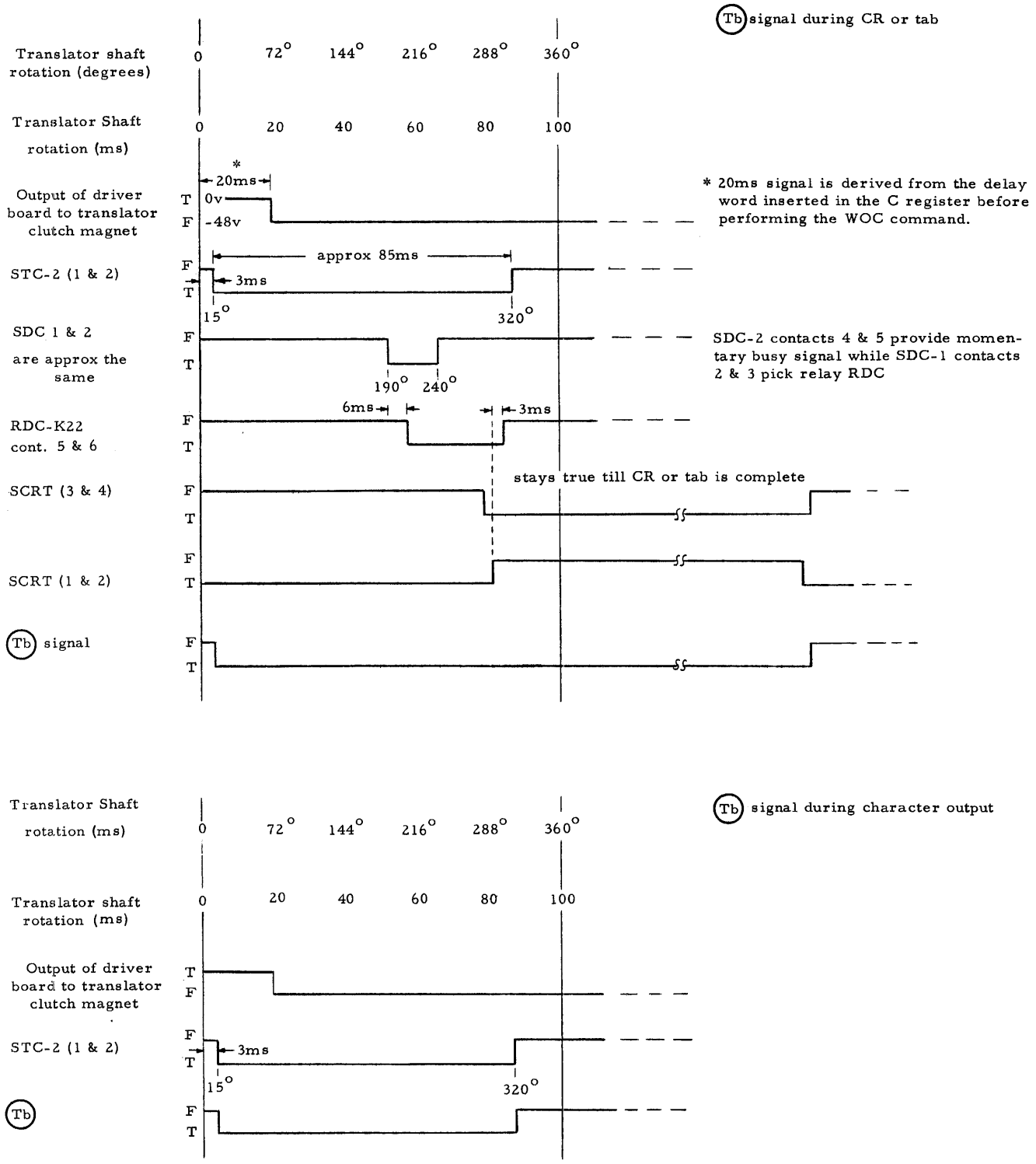


Figure 4. Contact Wave Forms and Location Chart

and adjust SDC-1 contacts 2 and 3 to "make" at the same time as contacts 4 and 5, with a gap of approximately 0.015 inch.

C-5. RDC CONTACT ADJUSTMENT (Relay, Delay Control)

RDC, contacts 4 and 5 of K22, provides the (Tb) signal to the computer until the SCRT contacts are operated. To adjust RDC contacts 4 and 5 remove Flexowriter relay cover and locate relay K22. Check contact for dirt, proper "make" (approx 0.005 wipe on contacts) broken or shorts, etc.

C-6. SCRT-2 CONTACT ADJUSTMENT

SCRT-2, contacts 4 and 5, which supply the (Tb) signal to the computer for the length of carriage travel are located to the left of the rectifier. To adjust, remove punch cover, tilt Flexowriter up and remove bottom cover plate. Remove punch, working through punch entrance, adjust contacts to 0.010 inch gap.

C-7. SCRT-1 CONTACT ADJUSTMENT (Switch, Carriage Return and Tab)

SCRT-1, contacts 1 and 2 are located and accessible the same as SCRT-2 (see paragraph C-6). Their purpose is to open the internal dc power line in the Flexowriter and drop out RDC at the same time the keylock magnet is de-energized, allowing the keylock bail to block typing during carriage return or tab. These must be adjusted to make before SCRT-2, contacts 4 and 5 "break" or "break" after 4 and 5 "make."

C-8. READER CONTACT ADJUSTMENTS

The computer input contacts of the Flexowriter reader are the middle set of contacts in each stack. The contact stacks are counted with the machine

tilted on back as follows: SRC, SR1, SR3, SR5, SR7 from right to left on bottom. On top from right to left: SRT, SR2, SR4, SR6, SR8. The reader contacts must be adjusted in relation to the reader common. The gap setting of the common from C contact should be 0.040 and 0.005. The reader contacts SR1-SR8 gap should be approximately 0.020. The best check of these contacts is the Boot Strap Program RPT and LAI with no tape in reader and blank tape in reader.

C-9. SELECTOR SLIDE CONTACT ADJUSTMENT

The computer input contacts of the selector slides are the inside set of the selector slide contacts, with a gap setting of approximately 0.015 inch with selector slides in position. The selector slide common with a gap of 0.040 - 0.005 inch is the outside, first set of contacts toward the front of the Flexowriter. With the Flexowriter tilted back, the contacts are counted as follows: Outside top to bottom, SSC, SS1, SS2, SS4, SS5, SS6; inside top to bottom, SS7, SS8, SS9, SS10, SS11, SS12.

C-10. TRANSLATOR MAGNETS AND CLUTCH OUTPUT SIGNAL ADJUSTMENT

The output signal from the computer to the Flexowriter translator magnets is direct. The common return, however, is controlled by the form C contacts of RRP-2 (K8, contacts 1, 2, and 3). During off-line operation, RR picks and transfers 2 to 3, breaking computer common return. Check that contacts are clean, have no shorts, and that they transfer properly when the relay is picked.

C-11. PUNCH MAGNETS AND CLUTCH OUTPUT SIGNAL ADJUSTMENT

Adjustment for the punch magnets and clutch are the same as for the translator magnets and clutch, described in paragraph C-10 except that the form C contacts of RPB-2 (K8, contacts 1, 2, and 3) control the computer common return.

C-12. TYPE LIGHT ADJUSTMENT

The indicator light is connected directly to a voltage source. If the indicator light is not illuminated check for loose or damaged bulb.

APPENDIX A

FX-1 FLEXOWRITER SPECIFICATIONS

SPECIFICATION

The following information is abstracted from Packard Bell Computer Corporation Specification 678-1A2137, which describes a Flexowriter Recorder, Reproducer, Receiver, Transmitter, manufactured by Commercial Controls Corporation, a subsidiary of Friden Calculating Machine Company Incorporated, for use with the PB250 Computer.

1) Basic Model FL with 12 inch carriage, standard 6 lines per inch friction feed platen. Paint finish to Packard Bell Computer Corporation Specification 678-1A2139.

2) Control Voltage: 48 volts dc

3) Standard alignment

4) Elite Gothic Inverted type style for alphabetic characters (slugs 1083518 through 1083543), plus special type slugs listed in Table A-1.

Table A-1. (Sheet 1 of 2)

SPECIAL TYPE SLUGS AND CODING

Position	Upper Case	Lower Case	Slug No. or Panel Switch
3	√	2	1081209
7	=	3	1087659
11	[	4	1084705
15	]	5	1081902

Table A-1. (Sheet 2 of 2)

SPECIAL TYPE SLUGS AND CODING

Position	Upper Case	Lower Case	Slug No. or Panel Switch
19	Ω	6	1085692
23	&	7	1081900
27	*	8	1084681
31	(	9	1081877
35	)	0	1081849
39	π	1	1087777
43	?	+	1081491
38	:	;	1088982
42	"	'	1088979
41	_	-	1085585
36		.	1088980
32		,	1088981
40	/	$	1081550

5) The code sequence for the tape shall be as indicated in Figure A-1.

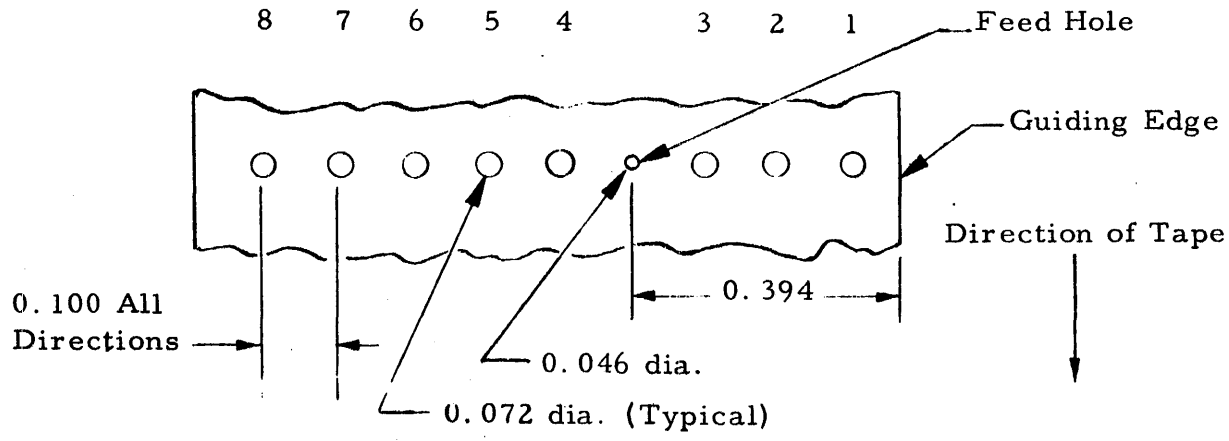


Figure A-1. Tape Code Sequence

6) The code for each character shall be as indicated in Table A-2.

Table A-2. (Sheet 1 of 3)

CODE CHART

Position	Character	Tape Code	Selector Code	Translator Code
R	Upper case	2-4-5-6	(C)-2-4-5-6	
S	Tab	2-3-4-5-6	(C)-2-3-4-5-6	
T	Space Bar	5	(C)-5	
U	———	———		
1	Q	4-5	(C)-4-5	
2	A	1-6	(C)-1-6	
3	√ over 2	2	(C)-2	
4	Z	1-4-6	(C)-1-4-6	Same as Tape Code
5	W	2-3-6	(C)-2-3-6	
6	S	2-5-6	(C)-2-5-6	
7	= over 3	1-2-5	(C)-1-2-5	
8	X	1-2-3-5-6	(C)-1-2-3-5-6	
9	E	1-3-5-6	(C)-1-3-5-6	
10	D	3-6	(C)-3-6	
11	[over 4	3	(C)-3	
12	C	1-2-5-6	(C)-1-2-5-6	
13	R	1-4	(C)-1-4	
14	F	2-3-5-6	(C)-2-3-5-6	
15	] over 5	1-3-5	(C)-1-3-5	
16	V	1-3-6	(C)-1-3-6	
17	T	1-2-6	(C)-1-2-6	
18	G	1-2-3-6	(C)-1-2-3-6	

Table A-2. (Sheet 2 of 3)

CODE CHART

Position	Character	Tape Code	Selector Code	Translator Code
19	Ω over 6	2-3-5	Ⓒ-2-3-5	
20	B	2-6	Ⓒ-2-6	
21	V	4-5-6	Ⓒ-4-5-6	
22	H	4-6	Ⓒ-4-6	
23	& over 7	1-2-3	Ⓒ-1-2-3	
24	N	1-3	Ⓒ-1-3	
25	U	3-5-6	Ⓒ-3-5-6	
26	J	1-5	Ⓒ-1-5	
27	* over 8	4	Ⓒ-4	
28	M	3-5	Ⓒ-3-5	Same as Tape Code
29	I	1-4-5-6	Ⓒ-1-4-5-6	
30	K	2-5	Ⓒ-2-5	
31	(over 9	1-4-5	Ⓒ-1-4-5	
32	, over ,	1-2-4-5-6	Ⓒ-1-2-4-5-6	
33	O	2-3	Ⓒ-2-3	
34	L	1-2	Ⓒ-1-2	
35	) over 0	6	Ⓒ-6	
36	. over .	1-2-4-6	Ⓒ-1-2-4-6	
37	P	1-2-3-5	Ⓒ-1-2-3-5	
38	: over 3	5-6	Ⓒ-5-6	
39	π over 1	1	Ⓒ-1	
40	/ over $	1-5-6	Ⓒ-1-5-6	
41	¬ over -	1-2-3-4-5	Ⓒ-1-2-3-4-5	
42	" over '	1-2-4-5	Ⓒ-1-2-4-5	
43	? over +	2-3-4-5	Ⓒ-2-3-4-5	

Table A-2. (Sheet 3 of 3)

CODE CHART

Position	Character	Tape Code	Selector Code	Translator Code
V	Carr. Ret.	-	-	↑ Same as Tape Code ↓
W	Uncoded	-	-	
Z	Lower Case	3-4-5-6	Ⓒ-3-4-5-6	

7) Switches S1 through S10 are on the Flexowriter keyboard (see Figure A-2). Table A-3 lists functions of switches.

8) All wiring shall be in accordance with Packard Bell Computer Corporation schematic 350-1J2051, arc suppression and line filter to be supplied as shown. Contacts shall be suppressed in accordance with Computer Controls Corporation drawing No. 1292-300. Relays and solenoids shall have arc suppression circuits as listed in Table A-4.

9) Feedback circuit must be closed when the Flexowriter is not conditioned to print.

10) Units are supplied with grey 6 foot power cord, terminated with Royal Electric Co. No. PA3 3-pin plug, or equivalent.

11) SSC and SRC shall be form C contacts.

12) The timing of SSC shall be related to SS1 through SS12, so that SS1 through SS12 close before SSC closes, and SSC opens before SS1 through SS12 open, with 0.040 inch gap adjustment of SSC, contacts 3 and 4.

13) The timing of SRC shall be related to SR1 through SR8 so that

SR1 through SR8 close before SRC closes, and SRC opens before SR1 through SR8 open, with 0.045 ± 0.005 inch gap adjustment of SRC (form C, made side) and 0.022 inch gap adjustment of SR1 through SR8.

14) STC-2 contacts shall be adjusted to make 13°, break 320°. SCRT-2 contacts 4 and 5 shall be adjusted to 0.010 inch gap.

15) Connections from Flexowriter components to pins of JL-1 connector shall be as listed in Table A-5. JL-1 shall be Cannon KOA 2-21L-50SN Position N.

16) Connections from Flexowriter components to pins of JL-2 connector shall be as listed in Table A-6. JL-2 shall be Cannon KOA 2-21L-50SN Position Y.

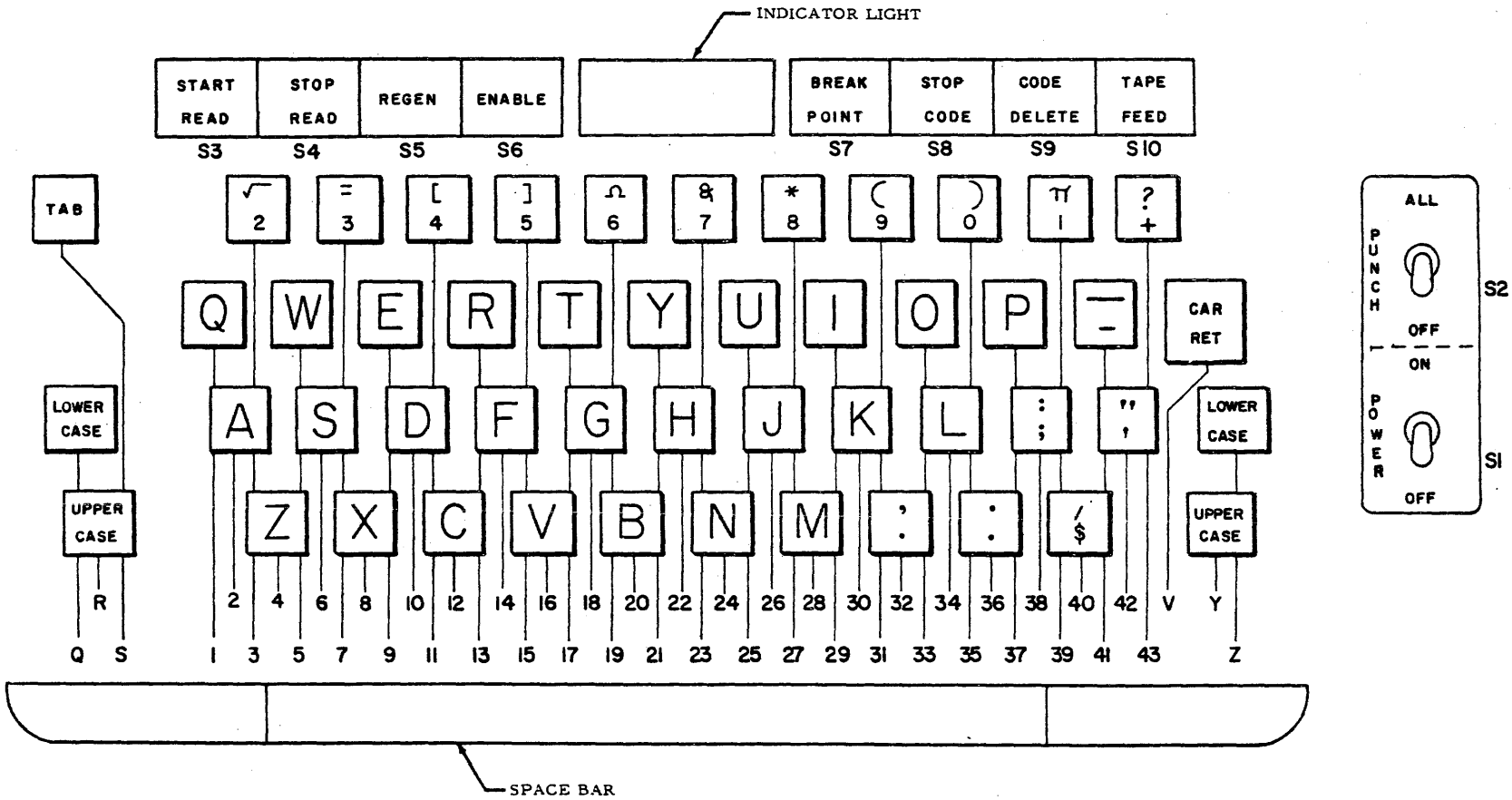


Figure A-2. Flexowriter Keyboard

Table A-3. (Sheet 1 of 2)

KEYBOARD CONTROLS

Reference Designation	Marking	Function
S1	POWER	In ON position, Flexowriter motor is on. In OFF position, Flexowriter motor is off.
S2	PUNCH	In ALL position, punches tape for all characters. In OFF position, prevents operation of tape punch.
S3	START READ	When depressed, puts tape reader in operation for off-line typing from prepared tapes.
S4	STOP READ	Manually depressed to stop tape reader during off-line typing.
S5	REGEN	When depressed while PUNCH switch is in ALL position, causes automatic duplication of tapes read by tape reader.
S6	ENABLE	When depressed, interrupts computation and conditions use of other keys and switches on Flexowriter.

Table A-3. (Sheet 2 of 2)

KEYBOARD CONTROLS

Reference Designation	Marking	Function
S7	BREAKPOINT	When depressed, sends a signal to the PB250 Computer which may be tested by the TES command and with ENABLE switch will clear parity flip-flop, as indicated by illumination of PARITY light.
S8	STOP CODE	When depressed with PUNCH switch in ALL position,punches code in tape. When tape is read, this code will automatically stop the tape reader.
S9	CODE DELETE	When depressed, punches 1-2-3-4-5-6 code in tape. If PUNCH switch is in ALL position, and both TAPE FEED switch and CODE DELETE switch are depressed,a series of delete codes are punched.
S10	TAPE FEED	When depressed with PUNCH switch in ALL position, causes tape to be fed through tape punch.

Table A-4

RELAY AND SOLENOID ARC SUPPRESSION CIRCUITS

Name	Arc Suppression Circuit
RAR (K2) RPE (K3)	Friden 1048362 Back-to-Back Rectifier
RSC (K4) RCD (K5)	Friden 1056642 R-C
RRP (contacts 1 and 2 of K8 and K9) RNP (contacts 1 and 2 of K10 and K11) RPC (contacts 1 and 2 of K12 and K13) RDC (K22) RRC (K23) LKL	Friden 1056642 R-C on each coil of double wound relays
LR LPC LTC LT1 through LT6 LP1 through LT8	Shall be suppressed in accordance with Packard Bell Computer Corporation schematic 350-1J2051
Start relay, contacts 1 and 2 Start relay, contacts 1 and 4 SPL-1, contacts 1 and 2 SRC, contacts 1 and 2	Friden 1056642 R-C

Table A-5

JL-1 PIN CONNECTIONS

Pin No.	Flexowriter Connections	Pin No.	Flexowriter Connections
1	SR1 Out	26	SPL-2 In
2	SR2 Out	27	SPL-2 Normally Closed
3	SR3 Out	28	SPT-2 In
4	SR4 Out	29	SPT-2 Out
5	SR5 Out	30	RPE In
6	SR6 Out	31	RPE Out
7	SR7 Out	32	STC-2 Interlock In
8	SR8 Out	33	STC-2 Interlock Out
9	SR1 through SR8 In	34	ENABLE Normally Open
10	SRC Normally Open	35	ENABLE In
11	SRC In	36	ENABLE Normally Closed
12	SRC Normally Closed	37	BREAKPOINT Normally Open
13	STC-1 Normally Open	38	BREAKPOINT In
14	STC-1 In	39	BREAKPOINT Normally Closed
15	STC-1 Normally Closed	40	Not Used
16	SS7 through SS12 In	41	
17	SS7 Out	42	
18	SS8 Out	43	
19	SS9 Out	44	
20	SS10 Out	45	
21	SS11 Out	46	
22	SS12 Out	47	Not Used
23	SSC In	48	Positive of Internal Supply
24	SSC Out	49	Not Used
25	SPL-2 Normally Open	50	Frame ground of machine

Table A-6

JL-2 PIN CONNECTIONS

Pin No.	Flexowriter Connection	Pin No.	Flexowriter Connection
1	LP1 In positive	26	LKL Negative
2	LP2 In positive	27	Negative of internal supply
3	LP3 In positive	28	LR Positive
4	LP4 In positive	29	Not Used
5	LP5 In positive	30	
6	LP6 In positive	31	
7	LP7 In positive	32	
8	LP8 In positive	33	
9	LPC In positive	34	
10	LP's Common negative return		
11	LT1 In	36	
12	LT2 In	37	
13	LT3 In	38	
14	LT4 In	39	
15	LT5 In	40	
16	LT6 In	41	
17	Not Used	42	
18	Not Used	43	
19	LTC In	44	
20	LT's Common return	45	
21	RPC In	46	
22	Indicator Light in positive	47	Not Used
23	Indicator Light in negative	48	Positive of internal supply
24	Internal LKL Control	49	Not Used
25	LKL In positive	50	Frame ground of machine

APPENDIX B

GLOSSARY

GLOSSARY

Boot Strap Program	Gives PB250 Computer enough intelligence to accept higher order programs.
(Bp)	BREAKPOINT switch
CRTC	Carriage Return and Tab Controls
LAI	Load A from Input Buffer
Off-Line	Operation under control of operator
On-Line	Operation under control of PB250 Computer
OUP	Octal Utility Package
RDC	Relay, Delay Control
Rf	Flip-flop forming one-half of combined input control
RRP	Relay, Read Power
RPT	Read Paper Tape
RPC	Relay, Punch Control
SCRT	Switch Carriage Return and Tab
SDC	Switch Delay Control
SPL	Switch Punch Latch
SR(X) or (Rx)	Switch Reader (Contacts)
SRC, (B5), (B6), (Rc), or (Rc)	Switch Reader Common

SRT	Switch Reader Tape
SS (X) or (Tx)	Selector Slide (Contacts)
SSC	Selector Slide Common
STC	Switch Translator Cam
(Tb)	Typewriter busy signal
TES	Transfer on External Control
Tf	Flip-flop forming one-half of combined input control
WOC	Write Output Character command

APPENDIX C

This appendix comprises lubrication procedures for FX-1 Flexowriters.

LUBRICATION PROCEDURES

1. SCOPE

This publication comprises special abridged instructions for cleaning and lubricating components of Flexowriters which are subjected to greatest amount of mechanical usage. The instructions contained herein do not obviate the necessity to periodically check and lubricate other components. It is recommended that all components which require Friden No. 9 grease be checked simultaneously as these instructions are carried out.

2. SPECIAL TOOLS OR EQUIPMENT

The following special tools or equipment will be required to perform the lubrication instructions contained herein:

a) Friden grease gun

b) Cleaning brush

c) Grease cloth

d) Compressed-air gun or dust cloths.

3. LUBRICANTS REQUIRED

The following lubricants will be required to perform the lubrication instructions contained herein:

a) Friden No. 9 grease (or equivalent)

b) Friden No. 1 oil (or equivalent)

c) Friden No. 2 bearing oil (or equivalent)

4. PROCEDURE

a. Disassembly

To expedite and facilitate subsequent cleaning and lubricating, the Flexowriter should be disassembled into the following five basic subassemblies:

1) Power drive mechanism (writing machine)
2) Code selector
3) Tape punch
4) Tape reader
5) Code translator

b. Cleaning

Each subassembly should be cleaned by removing any accumulation of dust. If available, use a compressed-air gun; otherwise use a clean dust cloth.

c. Lubrication

Refer to Table C-1 and Figures C-1 through C-6.

d. Reassaembly

Upon completion of cleaning and lubricating, reassemble the subassemblies into a complete Flexowriter. Perform an operational check to ascertain that the Flexowriter is operating properly.

Table C-1 (Sheet 1 of 4)

LUBRICATION CHART

Subassembly	Figure	Part	Index No.	Lubricant	Instructions
Power Drive Mechanisms	C-1	Bushing	B7* (see note)	No. 2 Oil	Apply moderate amount every 6 months or every 1000 operational hours.
Note: An asterisk following an index number indicates two or more identical parts.		Bushing	D6	No. 2 Oil	Same as above
		Bushing	D7	No. 2 Oil	Same as above
		Bushing	D9	No. 2 Oil	Same as above
		Felt Pad	B8*	No. 2 Oil	Saturate every 6 months or every 1000 operational hours.
		Drive chain	C	No. 9 Grease	Apply a light coat of grease every 6 months or every 1000 operational hours.
Code Selector	C-2	Stud, pivot	A3*	No. 9 Grease	Same as above
	C-2	Shaft, lower assembly	B1*	No. 9 Grease	Same as above
		Shaft, upper assembly	B5*	No. 9 Grease	Same as above

Table C-1 (Sheet 2 of 4)

LUBRICATION CHART

Subassembly	Figure	Part	Index No.	Lubricant	Instructions
		Shaft, fulcrum	C4	No. 2 Oil	Apply a light coat of oil every 6 months or every 1000 operational hours.
Tape Punch (clutch)	C-3	Zerk fitting	K10	No. 9 Grease	Fill fitting until new grease can be seen; every 6 months or every 1000 operational hours.
Tape Punch (proper)	C-3	Bearing	K6*	No. 2 Oil	Apply moderate amount of oil every 6 months or every 1000 operational hours.
		Bearing	R6*	No. 2 Oil	Same as above
Tape Reader	C-4	Bearing	F7	No. 2 Oil	Apply a light amount of oil every 6 months or every 1000 operational hours.
		Bearing	F3	No. 2 Oil	Same as above
		Bearing	C5	No. 2 Oil	Same as above
		Bearing	R6	No. 2 Oil	Same as above
		Shaft	E	No. 2 Oil	Same as above

Table C-1 (Sheet 3 of 4)

LUBRICATION CHART

Subassembly	Figure	Part	Index No.	Lubricant	Instructions
		Pins, Reader	C*	No. 2 Oil	Same as above
		Shaft	F6	No. 9 Grease	Apply very light coat of grease every 6 months or every 1000 operational hours.
		All Springs		No. 9 Grease	Apply very light coat of grease to the ends of all springs every 6 months or every 1000 operational hours.
Code Translator (Permutation Assembly)	C-5	Guide, Bar, Permutation	A1*	No. 2 Oil	Apply moderate amount of oil every 6 months or every 1000 operational hours.
		Activators	A7*	No. 2 Oil	Same as above
Code Translator (Frame Assembly	C-6	Bearing	D4*	No. 2 Oil	Same as above
		Bearing	G2*	No. 2 Oil	Same as above
		Bearing	K1	No. 2 Oil	Same as above
		Shaft	C3	No. 9 Grease	Apply light coat of grease every 6 months or 1000 operational hours.

Table C-1 (Sheet 4 of 4)

LUBRICATION CHART

Subassembly	Figure	Part	Index No.	Lubricant	Instructions
		Shaft	E2	No. 9 Grease	Same as above
Code Translator (Clutch)	C-6	Zerk Fitting		No. 9 Grease	Fill fitting until new grease can be seen; every 6 months or every 1000 operational hours.

Note: A star symbol located near an index number indicates that the component is referred to in Table C-1.

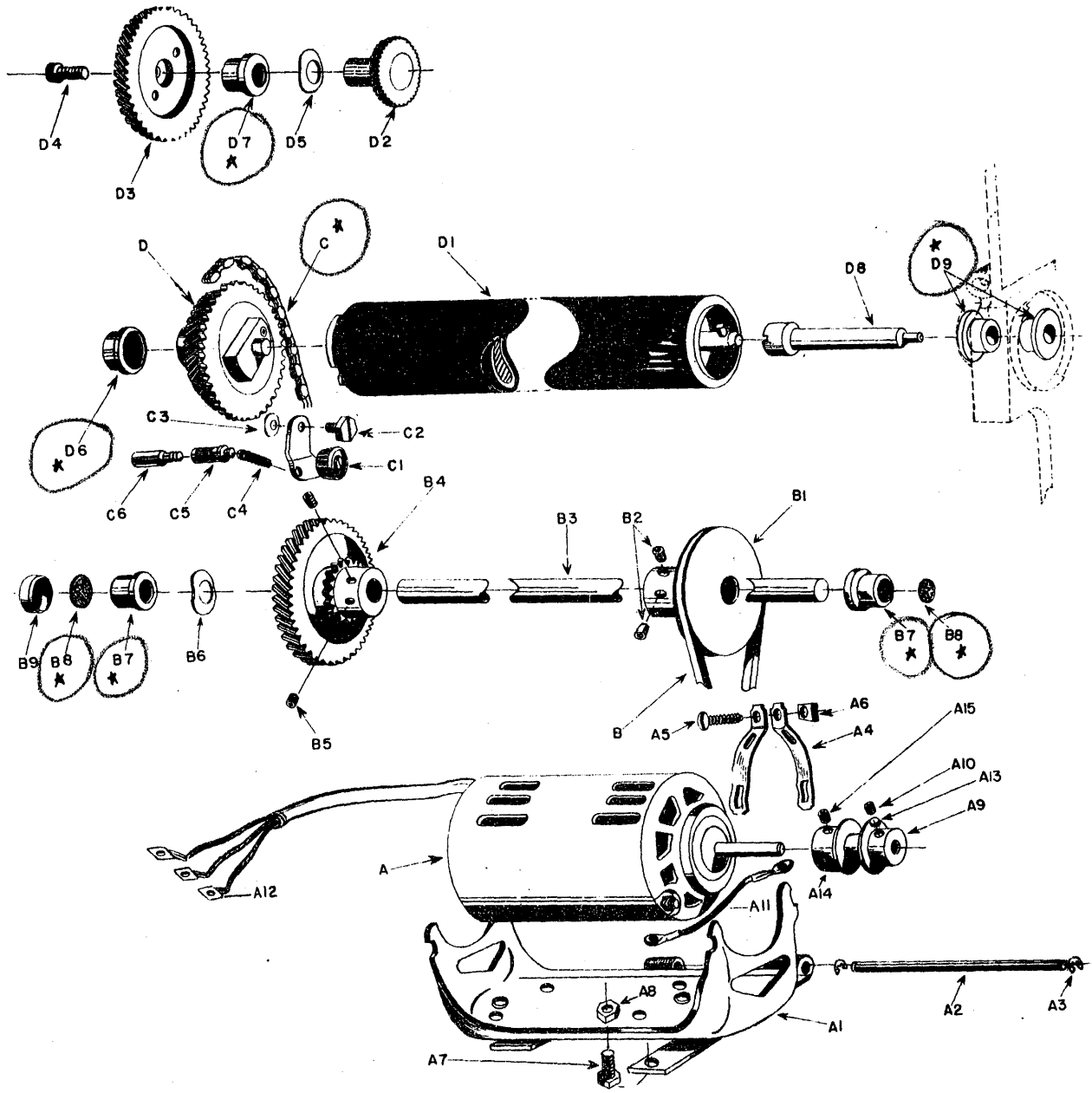


Figure C-1. Power Drive Mechanism

Note: A star symbol located near an index number indicates that the component is referred to in Table C-1.

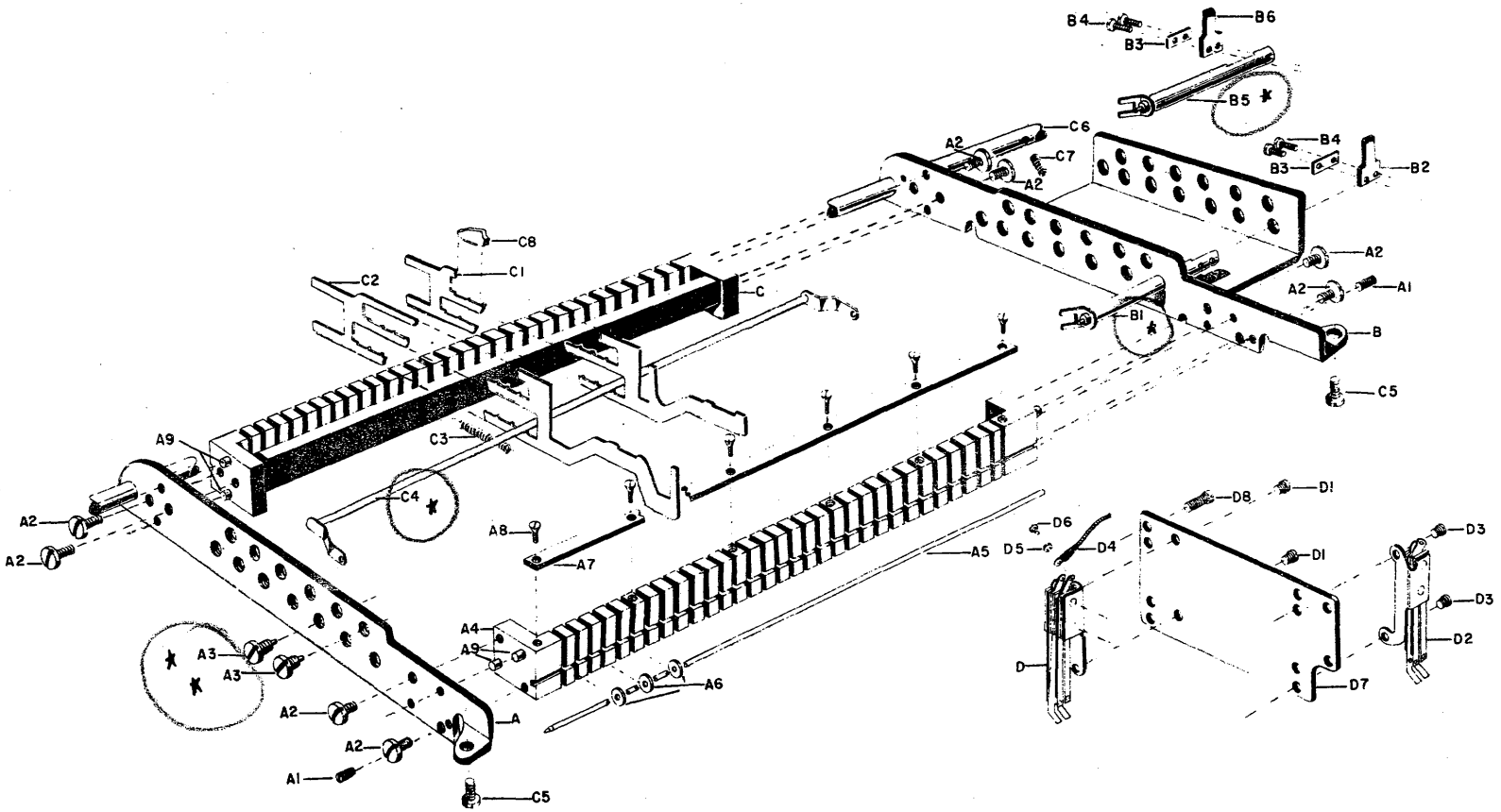


Figure C-2. Code Selector

Note: A star symbol located near an index number indicates that the component is referred to in Table C-1.

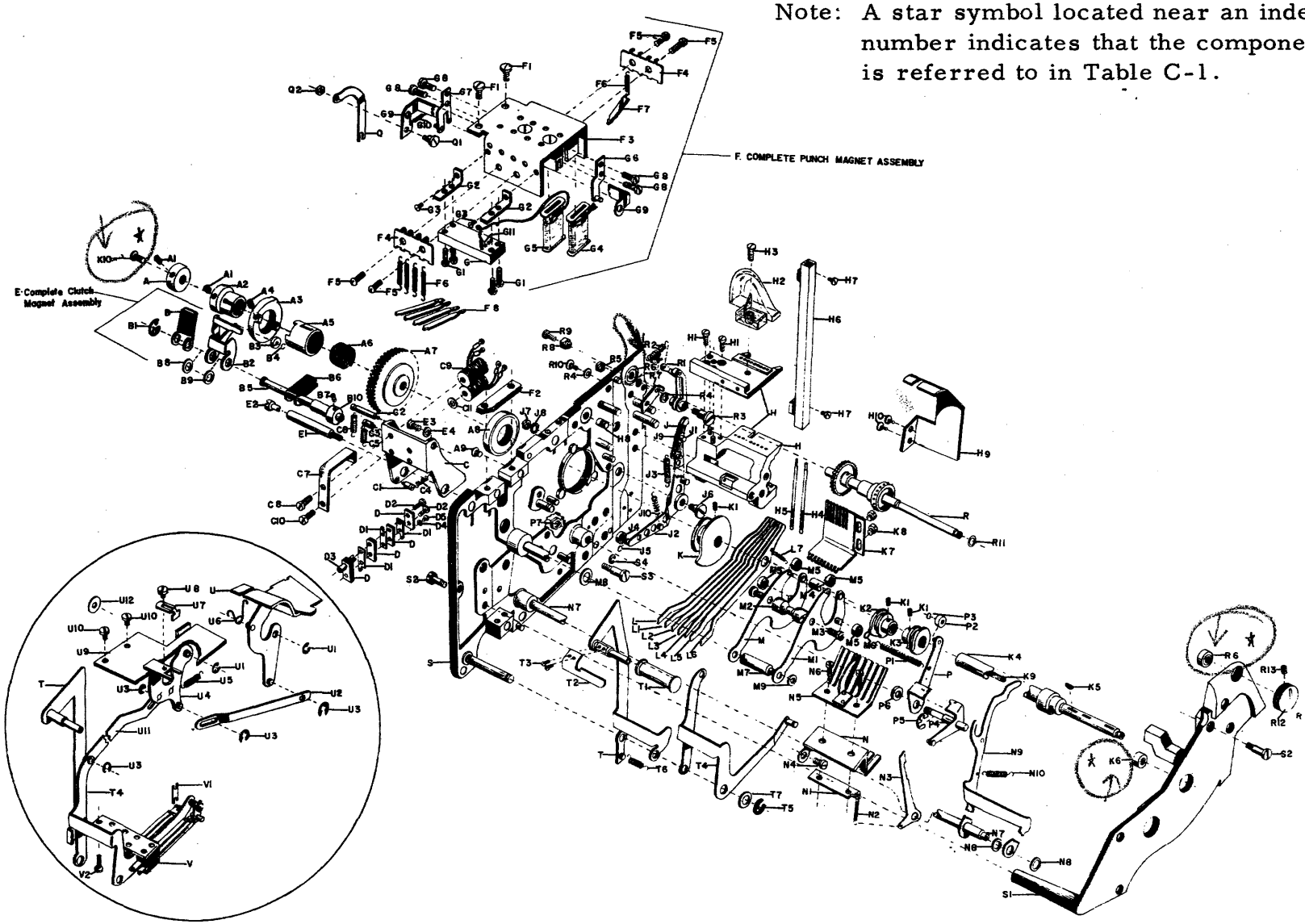


Figure C-3. Tape Punch

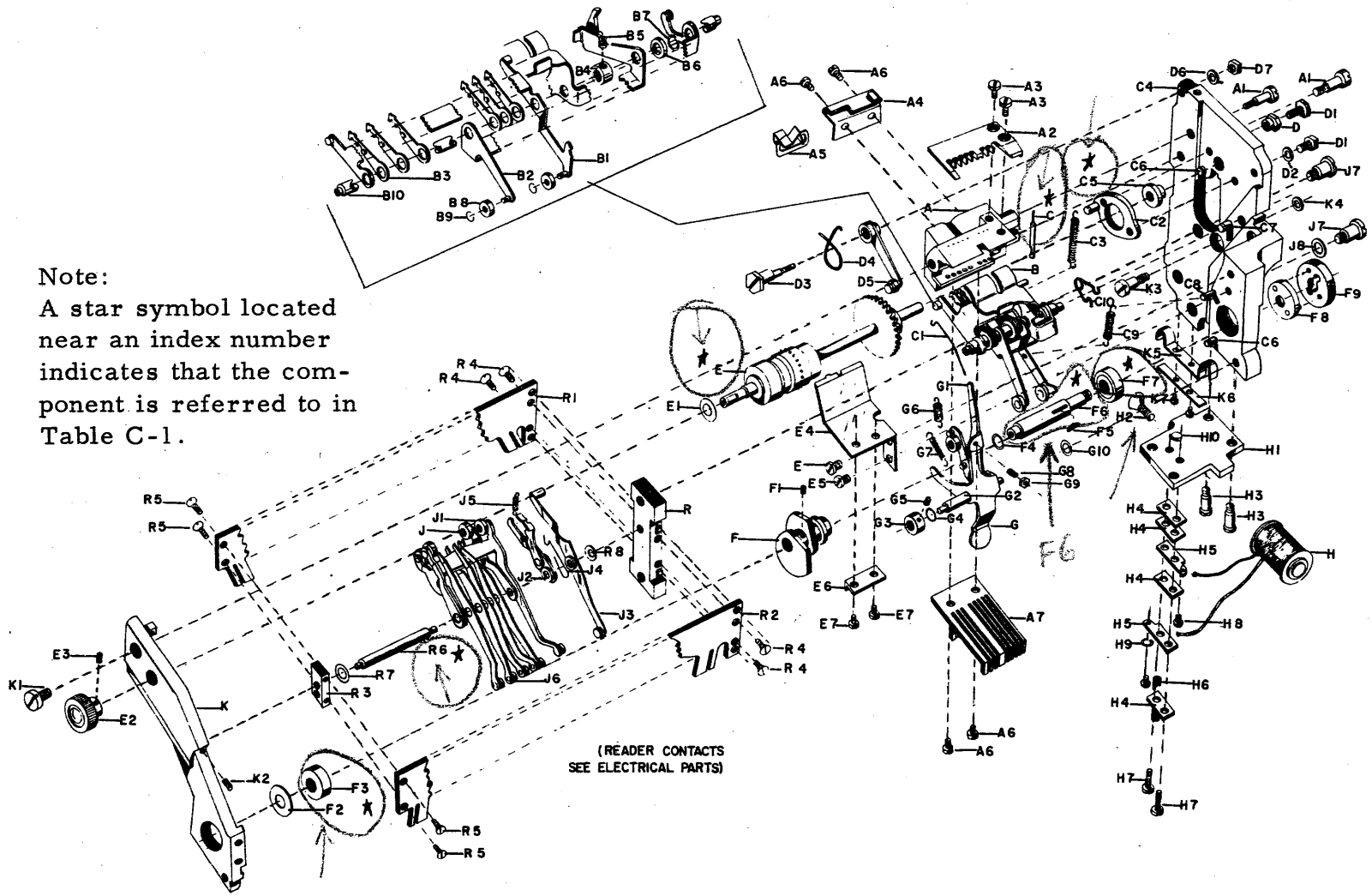


Figure C-4. Tape Reader

Note: A star symbol located near an index number indicates that the component is referred to in Table C-1.

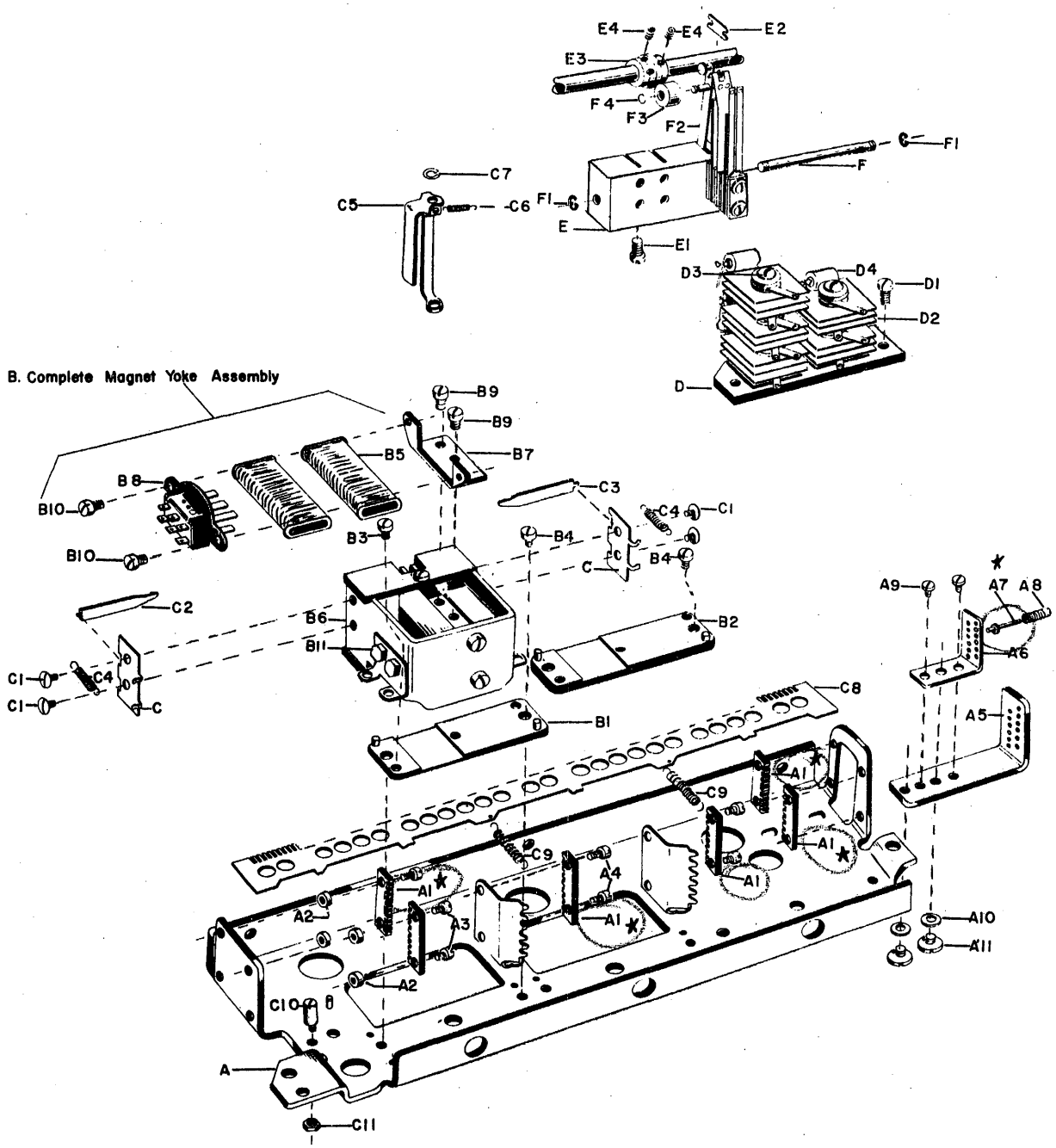


Figure C-5. Code Translator, Permutation Assembly

Note: A star symbol located near an index number indicates that the component is referred to in Table C-1.

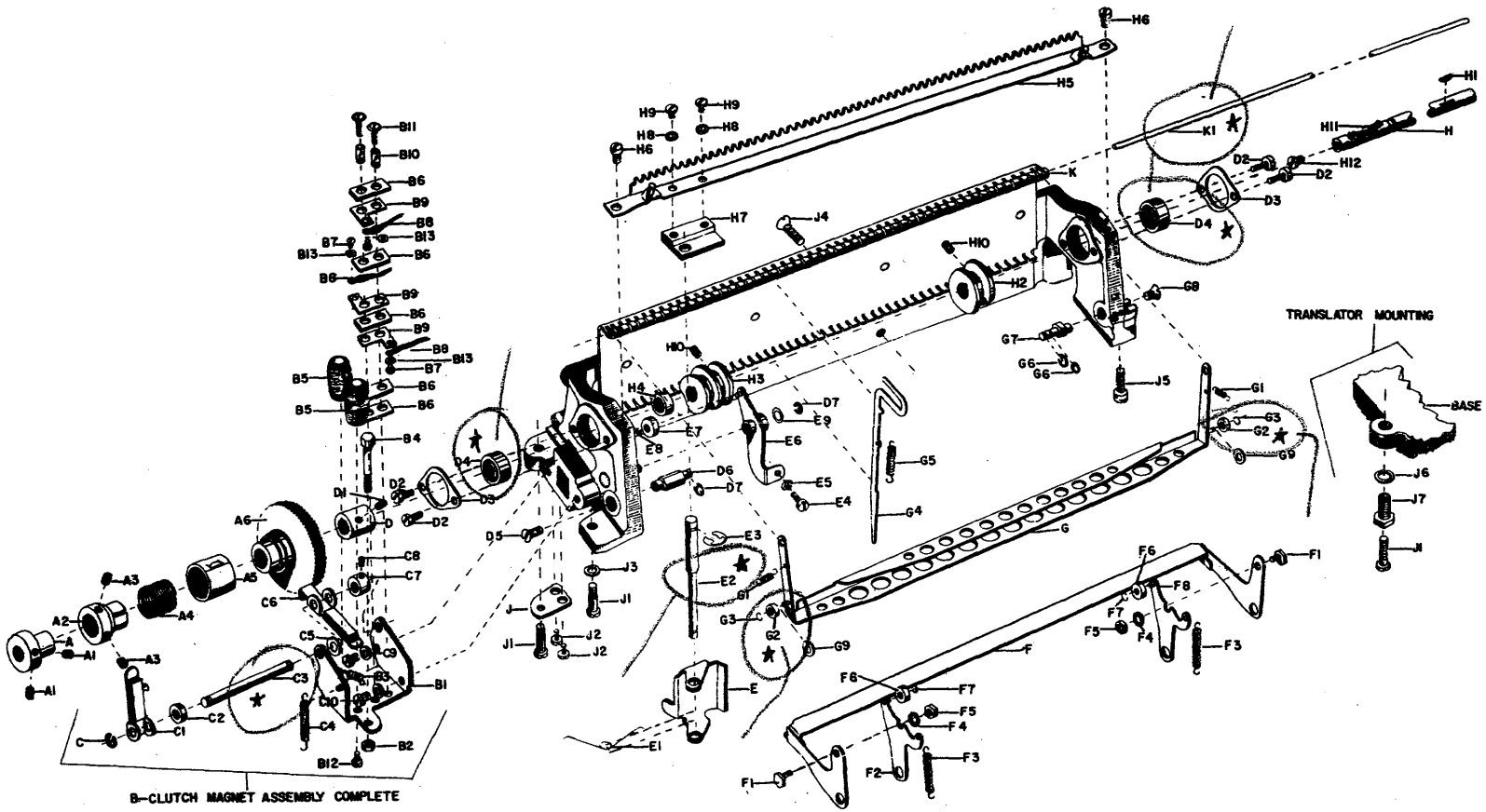
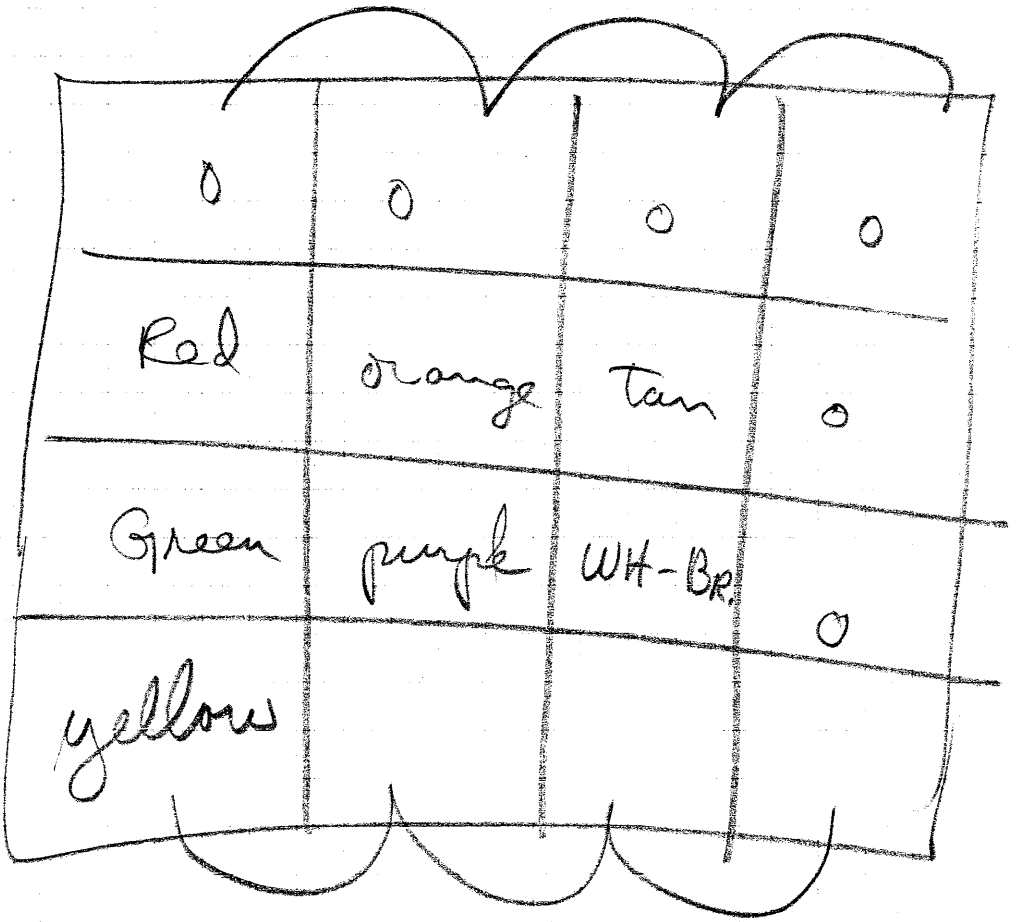


Figure C-6. Code Translator, Frame Assembly



yellow – old tape head

red	1	X
green	2	X
orange	3	X
—	4	•
purple	5	X
~~tan~~	6	X
white brown	7	X
	8	X
	9	X