"DATASPEED*" 4500 KEYBOARDS

DESCRIPTION AND OPERATION

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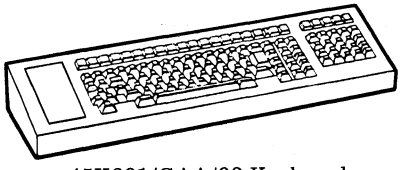
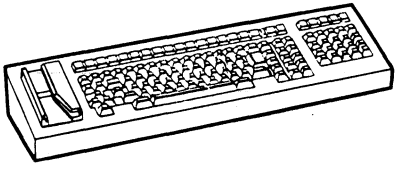
1. GENERAL

1.01 This section provides description and operation for the DATASPEED 4500 series keyboards as in Fig. 1.



45K301/GAA/03 Keyboard
Without Magnetic Stripe Reader



45K301/GAA/02 Keyboard
With Magnetic Stripe Reader

Fig. 1—DATASPEED 4500 Keyboards

1.02 Whenever this section is reissued the reason for reissue will be listed in this paragraph.

Note: When ordering replaceable parts, prefix each part number with the letters "TP" (ie, TP123456), unless otherwise specified.

2. DESCRIPTION

A. General

2.01 The keyboard provides attendant input and system status. Teletype Standard Serial Interface (SSI) signalling is used in all device/controller transmission. The keyboard is comprised of modular keyswitches mounted on a logic circuit card enclosed in a metal framework and a removable plastic cover. The key position layout used for a 45K301-type keyboard is shown in Fig. 2. This arrangement has five rows of alphanumeric and control keyswitches (some with indicators) and an external cluster of keyswitches. There are seven repeat keys (underline, dash, period, right arrow, space, cursor up, cursor down, cursor left and right). The repeat action is accomplished by depressing the keyswitch with additional force. A slight delay of approximately 100 milliseconds is provided to avoid false entries during the repeat mode.

2.02 The keyswitches also provide an audible click and touch similar to that of a standard typewriter. The keyboard is designed to accommodate slow or fast typing speeds with "N" key rollover.

2.03 "N" key rollover is the ability to select a new key without releasing the previously selected key. Only one key may be depressed if it is repeatable and it will generate a single character output.

2.04 The mode of operation is signalled by the LED indicators in the top row. No latching keyswitches are used on the 45K301-type keyboard.

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Prepared for American Telephone and Telegraph Company by Teletype Corporation

2.05 An alarm is provided to alert the operator of improper entries or that the test mode has been entered. A volume control for the alarm is located under the right side of the keyboard.

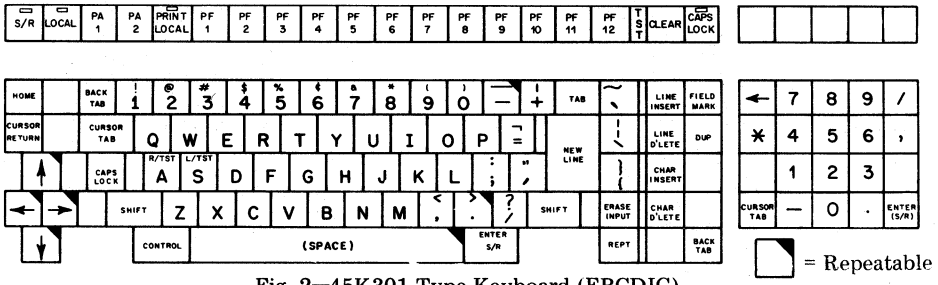


Fig. 2—45K301-Type Keyboard (EBCDIC)

2.06 Self-testing capabilities are designed into the keyboard. The self-test routines are described in Section 582-311-500.

B. Options

2.07 A Magnetic Stripe Reader (MSR) is provided in 45K301/GAA/02 for secured entry to the keyboard. The MSR consists of a read head assembly, amplifier circuit card and a card in place switch. The reader is located to the left of the main key arrangement, see Fig. 3. A filler panel is inserted in 45K301/GAA/03 when the reader is not used.

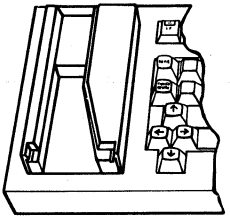


Fig. 3—Keyboard With Magnetic Stripe Reader (Left Side)

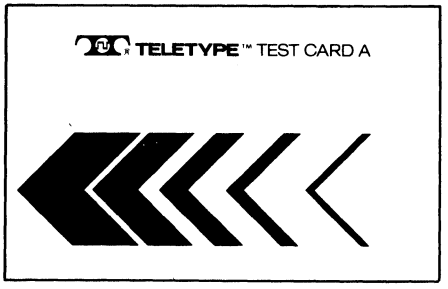
2.08 The forty character maximum magnetic stripe cards used in the MSR are obtainable on a local basis from commercial card suppliers. They are not supplied by Teletype Corporation or the operating telephone companies. The following list of companies is provided as a convenience (not to be interpreted as a complete list or as a recommendation; since no attempt has been made to verify the quality of their product).

DATA CARD CORPORATION — South Gate, California
FREEMAN PLASTICS — Brooklyn, New York
KIRK PLASTIC COMPANY — Los Angeles, California
MALCO PLASTICS, INC. — Garrison, Maryland
SILLCOCKS-MILLER COMPANY — Berkeley Heights, New Jersey

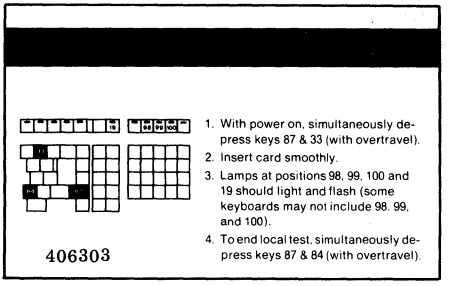
Cards for use in the magnetic stripe reader must conform to the following specifications:

Size — Spec. ANSI X4.15 — 1971.

Stripe Location and Encoding Scheme — ANSI X4.16 — 1976.



(Front)



(Rear)

Fig. 4—Magnetic Stripe Reader Test Card

2.09 Blocking or ASCII charactered keytops may be ordered to cover or replace unwanted keys or indicators. Covering keyswitches or adding ASCII keytops does not change the keyboard code. All blocked functions (though inaccessable) remain active in the keyboard logic. Translation of ASCII/EBCDIC characters is an option feature of the controller.

2.10 An external cluster of twenty keys, plus five indicators is placed on the main key arrangement. This cluster contains a numeric pad and a few function keys, as shown in Fig. 2. Blocking keytops cover the cluster area keys, if they are not desired.

2.11 A keyed locking device (347300 modification kit) may be added to the left side of the keyboard. When locked, transmitting of data is prohibited. The keyboard still indicates Information To Device (ITD) by lighting indicators.

3. TECHNICAL DATA

Physical Characteristics

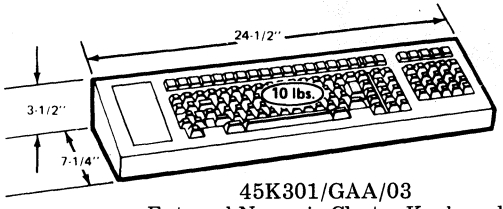
Height	3-1/2 inches
Width	7-1/4 inches
Length	24-1/2 inches
Weight without MSR	10 pounds
Weight with MSR	11 pounds

Environmental Operating Conditions

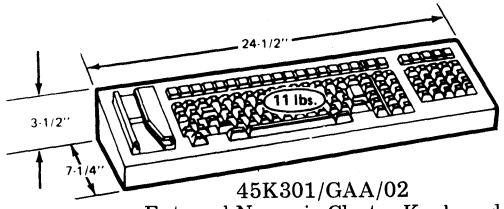
Ambient Temperature	4.5 to 43°C
Ambient Humidity	5% to 95% (no condensation)

Environmental Storage Conditions

Ambient Temperature	-40 to +65°C
Ambient Humidity	5% to 95% (no condensation)



45K301/GAA/03
External Numeric Cluster Keyboard
Without Magnetic Stripe Reader



45K301/GAA/02
External Numeric Cluster Keyboard
With Magnetic Stripe Reader

Fig. 5—Physical Characteristics

Power Requirements @ 25°C
+12V ± 10% at 0.680 Amp. Max. (0.570 Amp. Max. at nominal voltage)
-12V ± 10% at 0.360 Amp. Max. (0.280 Amp. Max. at nominal voltage)
+5V ± 10% at 0.150 Amp. Max. (0.130 Amp. Max. at nominal voltage)
Note: When the +12V remote supply voltage is grounded (0V) the +5V supply shall shut-off in less than 20 milliseconds.

4. OPERATION

4.01 In operation, the keyswitch positions, shown in Fig. 6 are sensed by continuous logic scans. The keyswitch status is then translated and sent to the controller. All received system status information is translated for use by an indicator or the alarm.

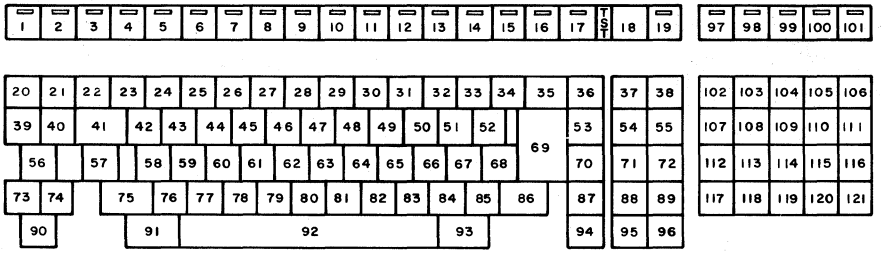


Fig. 6—Keyswitch Position Numbering

4.02 Internal information transfer keyswitch to keyboard output is shown in Fig. 7.

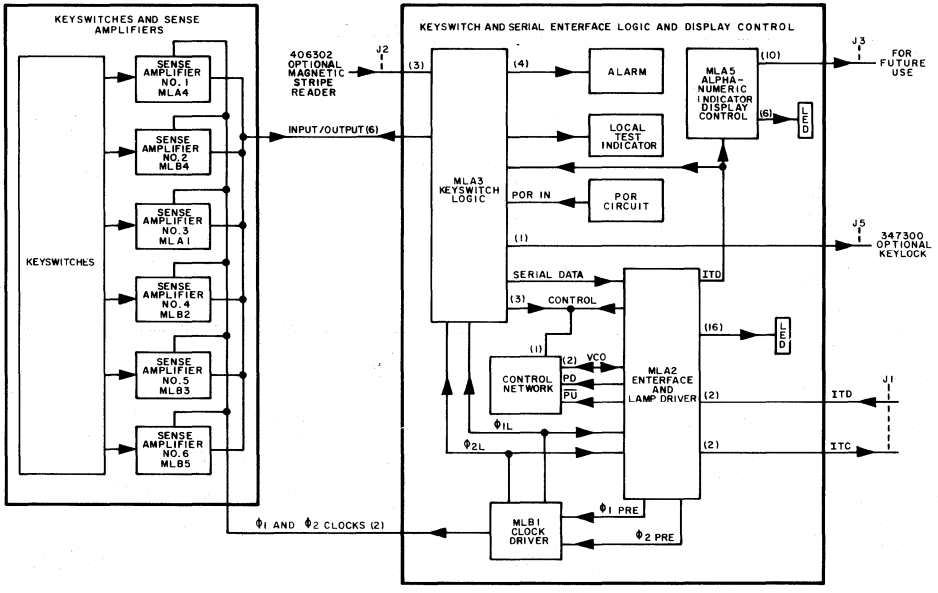


Fig. 7—Keyboard Logic Diagram

4.03 Each keyswitch depression and release is sensed by a sense amplifier (SA), as shown in Fig. 8. Twenty-one (21) keyswitches are connected to each amplifier. Each SA has one output lead, connected to the keyswitch logic.

Sense Amp Pin No.	Sense Amp 1 (MLA4)	Sense Amp 2 (MLB4)	Sense Amp 3 (MLA1)	Sense Amp 4 (MLB2)	Sense Amp 5 (MLB3)	Sense Amp 6 (MLB5)
11	38	94	24	90 OT	84	98
10	37	96	23	61	66	99
9	53	88	22	45	49	100
8	112	52	57	27	65	116
7	36	67	41	74	46	106
6	35	51	4	75	28	111
5	34	50	3	74 OT	79	121
3	33	31	20	73 OT	80	120
2	32	85	56	91	92	117
28	10	68	1	56 OT	29	113
27	103	69	9	58	47	118
26	11	84 OT	8	76	63	108
24	15	55	7	59	62	104
23	16	86	2	77	81	109
20	17	70	39	43	82	114
19	14	71	40	44	48	119
17	13	72	5	26	30	105
16	12	89	6	60	64	110
15	18	87	21	78	83	115
14	102	95	25	90	93	97
13	33 OT	54	42	73	92 OT	107

Note: OT = Over-Travel Key

Fig. 8—Sense Amplifier to Keyswitch Connections

4.04 In Fig. 8, the sense amplifier inputs are referred to as sense amp pin numbers. The output of a sense amp is always pin 25. These outputs are scanned by the keyswitch logic every 4.5 milliseconds.

4.05 The keyswitch logic converts the information to separate binary codes. These codes are serially sent to lamp driver and interface for transmission. The binary and hexadecimal codes for each keyswitch position are shown in Fig. 9.

4.06 The keyboard sends the codes as pairs. A depression code will be followed by an appropriate release code, unless there is a power interruption. The keyboard send rate maximum is 875 characters-per-second. The keyboard logic introduces a 3.5 μsec. phase delay, controller to device, at the connecter.

4.07 In controller to keyboard operation, the controller requests status by sending an Information To Device (ITD) control word, see Fig. 10. With bit 1 marking and bit 5 spacing, the keyboard will send an Information To Controller (ITC) status reply. If bit 1 and 5 are both marking, the keyboard and the magnetic stripe reader (MSR) will both reply. The MSR status word will precede the keyboard status word by 4 to 10 milliseconds.

4.08 The data word, either ITC or ITD, start bit is a "0" and the steer bit is a "1", followed by sixteen data bits. The data bits are used for ITD indicator information codes, or for ITC character information from a key.

POSITION NO.	KEY NO.	KEY DOWN CODE 8 7 6 5 4 3 2 1 0	HEX.	KEY UP CODE 8 7 6 5 4 3 2 1 0	HEX.
1	1	0 1 0 1 1 1 0 0 0	88	1 0 0 1 1 1 0 0 0	38
2	2	1 1 1 0 1 0 0 0 0	D0	0 0 1 0 1 0 0 0 0	50
3	3	0 1 0 1 0 0 1 1 0	A6	1 0 0 1 0 0 1 1 0	26
4	4	0 1 0 1 0 0 0 0 0	A0	1 0 0 1 0 0 1 0 0	20
5	5	0 1 1 1 0 0 0 1 0	E2	1 0 1 1 0 0 0 1 0	62
6	6	0 1 1 1 0 1 0 0 0	E8	1 0 1 1 0 1 0 0 0	68
7	7	0 1 1 0 0 1 0 1 0	CA	1 0 1 0 0 1 0 1 0	4A
8	8	1 1 1 0 0 0 1 0 0	C4	0 0 1 0 0 0 1 0 0	44
9	9	0 1 0 1 1 1 1 1 0	BE	1 0 0 1 1 1 1 1 0	3E
10	10	1 1 0 1 1 0 1 1 0	B6	0 0 0 1 1 0 1 1 0	36
11	11	1 1 1 1 0 0 0 0 1 0	C2	0 0 1 1 0 0 0 0 1 0	42
12	12	1 1 1 1 1 0 0 1 1 0	E6	0 0 1 1 1 0 0 1 1 0	66
13	13	1 1 1 0 1 0 0 0 0 0	E0	0 0 1 1 1 0 0 0 0 0	60
14	14	1 1 1 0 1 1 1 0 1 0	DA	0 0 1 0 1 1 1 0 1 0	5A
15	15	1 1 1 0 0 1 1 0 0 0	C8	0 0 1 0 0 1 1 0 0 0	48
16	16	1 1 1 0 0 1 1 1 1 0	CE	0 0 1 0 0 1 1 1 1 0	4E
17	17	0 1 1 0 1 0 1 0 0	D4	1 0 1 0 1 0 1 0 0	54
*18	18	1 1 1 1 0 1 1 0 0	EC	0 0 1 1 0 1 1 0 0	6C
*20	19	0 1 0 1 0 1 1 0 0	AC	1 0 0 1 0 1 1 0 0	2C
21	20	0 1 1 1 0 1 1 1 0	EE	1 0 1 1 0 1 1 1 0	6E
22	21	0 1 0 0 0 1 1 1 0	8E	1 0 0 0 0 1 1 1 0	0E
23	22	0 1 0 0 0 1 0 0 0	88	1 0 0 0 0 1 0 0 0	08
24	23	0 1 0 0 0 0 0 1 0	82	1 0 0 0 0 0 0 1 0	02
25	24	1 1 1 1 1 0 1 0 0	F4	0 0 1 1 1 0 1 0 0	74
26	25	1 1 1 1 0 0 0 1 1	E3	0 0 1 1 1 0 0 0 1	63
27	26	0 1 0 0 1 0 1 0 1	95	1 0 0 0 1 0 1 0 1	15
28	27	1 1 0 1 0 0 0 1 0	A2	0 0 0 1 0 0 0 1 0	22
29	28	1 1 0 1 1 1 0 1 0	BA	0 0 0 1 1 1 0 1 0	3A
30	29	0 1 1 1 0 0 1 0 0	E4	1 0 1 1 0 0 1 0 0	64
31	30	1 1 0 1 0 1 0 1 1	AB	0 0 0 1 0 1 0 1 1	2B
32	31	1 1 0 1 1 0 0 0 0	B0	0 0 0 1 1 0 0 0 0	30
33	32	0 1 0 1 0 1 0 1 0	AA	1 0 0 1 0 1 0 1 0	2A
330T	33	1 1 1 1 1 1 0 0 0	F8	0 0 1 1 1 1 0 0 0	78
34	34	1 0 1 0 0 1 0 0 0	A4	0 0 0 1 0 0 1 0 0	24
35	35	1 1 0 0 1 1 1 1 0	9E	0 0 0 0 1 1 1 1 0	1E
36	36	1 1 0 0 1 1 0 0 0	98	0 0 0 0 1 1 0 0 0	18
37	37	1 1 0 0 0 0 1 1 0	86	0 0 0 0 0 0 1 1 0	06
38	38	1 1 0 0 0 0 0 0 0	80	0 0 0 0 0 0 0 0 0	00
39	39	1 1 1 0 1 0 1 1 0	D6	0 0 1 0 1 0 1 1 0	56
40	40	1 1 1 0 1 1 1 0 0	DC	0 0 1 0 1 1 1 0 0	5C
41	41	0 1 0 0 1 1 0 1 0	9A	1 0 0 0 1 1 0 1 0	1A
42	42	0 1 1 1 1 1 0 1 0	FA	1 0 0 1 1 1 0 1 0	7A
43	43	0 1 1 0 1 0 1 1 1	D7	1 0 1 0 1 0 1 1 1	57
44	44	0 1 1 0 1 1 1 0 1	DD	1 0 1 0 1 1 1 0 1	5D
45	45	1 1 1 0 0 0 1 1 1	8F	0 0 0 0 1 1 1 1 1	0F
46	46	0 1 1 0 0 1 1 0 0	9C	1 0 1 0 0 1 1 0 0	1C
47	47	0 1 1 0 0 0 0 0 0	C0	1 0 1 0 0 0 0 0 0	40
48	48	0 1 1 0 1 1 1 1 0	DE	1 0 1 0 1 1 1 1 0	5E
49	49	0 1 1 0 0 1 0 0 0	90	1 0 1 0 0 1 0 0 0	10
50	50	0 1 0 1 0 0 1 0 1	A5	1 0 0 1 0 0 1 0 1	25
51	51	0 1 1 0 0 1 1 1 1	9F	1 0 1 0 0 1 1 1 1	1F
52	52	0 1 0 0 1 0 0 1 1	93	1 0 0 0 1 0 0 1 1	13
53	53	1 1 1 0 0 1 1 0 0	8C	0 0 0 0 1 1 1 0 0	0C
54	54	0 1 1 1 1 1 0 0 1	F9	1 0 1 1 1 1 0 0 1	79
55	55	0 1 1 0 0 1 0 0 1	C9	1 0 1 0 0 1 0 0 1	49
56	56	0 1 0 1 1 0 0 1 0	B2	1 0 0 1 1 0 0 1 0	32
560T	57	1 1 1 0 0 1 1 0 0	B9	0 0 0 1 1 1 0 0 1	39
57	58	1 1 0 0 1 0 1 0 0	94	0 0 0 1 1 0 1 0 0	14
58	59	1 1 0 1 1 1 1 1 1	BF	0 0 0 1 1 1 1 1 1	3F
59	60	1 1 1 0 0 1 0 1 1	CB	0 0 1 0 0 1 0 1 1	4B
60	61	1 1 1 0 1 0 0 0 1	E9	0 0 1 1 0 1 0 0 1	69
61	62	1 1 1 0 0 0 1 0 1	89	0 0 0 0 1 1 0 0 1	09
62	63	0 1 1 0 0 1 1 0 0	CC	1 0 1 0 0 1 1 0 0	4C

POSITION NO.	KEY NO.	KEY DOWN CODE 8 7 6 5 4 3 2 1 0	HEX.	KEY UP CODE 8 7 6 5 4 3 2 1 0	HEX.
63	64	0 1 1 0 0 0 1 1 0	C6	1 0 1 0 0 0 1 1 0	46
64	65	1 1 1 1 0 1 0 1 0	EA	0 0 1 1 0 1 0 1 0	6A
65	66	0 1 0 0 1 0 1 1 0	96	1 0 0 0 1 0 1 1 0	16
66	67	1 1 0 0 0 1 0 1 0	8A	0 0 0 0 0 1 0 1 0	0A
67	68	0 1 0 0 1 1 0 0 1	99	1 0 0 0 1 1 0 0 1	19
68	69	0 1 0 1 1 0 1 1 1	B7	1 0 0 1 1 0 1 1 1	37
69	70	0 1 0 1 1 1 1 0 1	BD	1 0 0 1 1 1 1 0 1	3D
70	71	1 1 1 1 0 1 0 1 1	D5	0 0 1 0 1 0 1 1 1	55
71	72	0 1 1 0 1 1 0 1 1	DB	1 0 1 0 1 1 0 1 1	5B
72	73	0 1 1 1 0 0 0 0 1	E1	1 0 1 1 0 0 0 0 1	61
73	74	1 1 1 1 1 1 1 0 1	FB	0 0 1 1 1 1 1 0 1	7B
730T	75	1 1 0 1 0 1 1 0 1	AD	0 0 1 0 1 0 1 1 1	2D
74	76	1 1 0 0 1 1 1 0 1	9B	0 0 0 0 1 1 1 0 1	1B
740T	77	1 1 0 1 0 0 1 1 1	A7	0 0 0 1 0 0 1 1 1	27
75	78	1 1 0 1 0 0 0 0 1	A1	0 0 0 1 0 0 0 0 1	21
76	79	0 1 1 0 0 0 1 0 1	C5	1 0 1 0 0 0 1 0 1	45
77	80	0 1 1 0 1 0 0 0 1	D1	1 0 1 0 1 0 0 0 1	51
78	81	1 1 1 1 0 1 1 1 1	EF	0 0 1 1 0 1 1 1 1	6F
79	82	1 1 0 1 0 1 0 0 0	A8	0 0 0 1 0 1 0 0 0	28
80	83	1 1 0 1 0 1 1 1 0	AE	0 0 0 1 0 1 1 1 0	2E
81	84	0 1 1 0 1 0 0 1 0	D2	1 0 1 0 1 0 0 1 0	52
82	85	0 1 1 0 1 1 0 0 0	D8	1 0 1 0 1 1 0 0 0	58
83	86	0 1 1 1 1 0 0 0 0	F0	1 0 1 1 1 0 0 0 0	70
84	87	0 1 0 0 0 0 1 0 0	84	1 0 0 0 0 0 1 0 0	04
840T	88	0 1 1 0 0 0 0 1 1	C3	1 0 1 0 0 0 0 1 1	43
85	89	0 1 0 1 1 0 0 0 1	B1	1 0 0 1 1 0 0 0 1	31
86	90	0 1 1 0 0 1 1 1 1	CF	1 0 1 0 0 1 1 1 1	4F
87	91	0 1 1 1 0 1 1 0 1	ED	1 0 1 1 0 1 1 0 1	6D
88	92	0 1 0 0 0 1 1 0 1	8D	1 0 0 0 0 1 1 0 1	0D
89	93	0 1 1 1 0 0 1 1 1	E7	1 0 1 1 0 0 1 1 1	67
90	94	0 1 1 1 1 0 1 0 1	F5	1 0 1 1 1 0 1 0 1	75
900T	95	1 1 0 0 0 0 0 1 1	83	0 0 0 0 0 0 0 1 1	03
91	96	1 1 0 1 1 0 0 1 1	B3	0 0 0 1 1 0 0 1 1	33
92	97	0 1 0 1 1 0 1 0 0	B4	1 0 0 1 1 0 1 0 0	34
920T	98	0 1 1 1 1 1 1 0 0	FC	1 0 1 1 1 1 1 0 0	7C
93	99	0 1 1 1 1 0 1 1 0	F6	1 0 1 1 1 1 0 1 0	76
94	100	0 1 0 0 0 0 0 0 1	81	1 0 0 0 0 0 0 0 1	01
95	101	0 1 1 1 1 0 0 1 1	F3	1 0 1 1 1 0 0 1 1	73
96	102	0 1 0 0 0 0 1 1 1	87	1 0 0 0 0 1 1 1 1	07
97	103	1 1 1 1 1 1 0 1 1	F7	0 0 1 1 1 1 0 1 1	77
98	104	1 1 0 0 0 0 1 0 1	85	0 0 0 0 0 0 1 0 1	05
99	105	0 1 0 0 0 0 1 0 1	85	1 0 0 0 0 1 0 1 1	08
*100	106	1 1 0 0 1 0 0 0 1	91	0 0 0 0 1 0 0 0 1	11
*102	107	1 1 1 1 1 1 0 1 0	F2	0 0 1 1 1 1 0 1 0	72
103	108	1 1 0 1 1 1 1 0 0	BC	0 0 1 1 1 1 1 0 0	3C
104	109	1 1 1 1 0 0 1 1 1	CD	0 0 1 1 0 0 1 1 1	4D
105	110	1 1 1 1 0 0 1 0 1	E5	0 0 1 1 0 0 1 0 1	65
106	111	1 1 1 0 1 1 1 0 1	9D	0 0 0 1 1 1 1 0 1	1D
107	112	1 1 1 1 1 1 1 0 1	FD	0 0 1 1 1 1 1 0 1	7D
108	113	1 1 1 0 0 0 1 1 1	C7	0 0 1 1 0 0 0 1 1	47
109	114	1 1 1 0 1 0 0 1 1	D3	0 0 1 1 0 1 0 0 1	53
110	115	0 1 1 1 0 1 0 1 1	EB	1 0 1 1 0 1 0 1 1	6B
111	116	0 1 0 1 0 0 0 1 1	A3	1 0 0 1 0 0 0 1 1	23
112	117	1 1 0 0 1 0 0 1 0	92	0 0 0 0 1 0 0 1 0	12
113	118	0 1 0 1 1 1 0 1 1	BB	1 0 0 1 1 1 0 1 1	3B
114	119	1 1 1 0 1 1 0 0 1	D9	0 0 1 0 1 1 0 0 1	59
115	120	1 1 1 1 1 1 0 0 1	F1	0 0 1 1 1 1 0 0 1	71
116	121	1 1 0 0 1 0 1 1 1	97	0 0 0 0 1 0 1 1 1	17
117	122	1 1 0 1 1 0 1 0 1	B5	0 0 0 1 1 0 1 0 1	35
118	123	1 1 1 0 0 0 0 0 1	C1	0 0 1 0 0 0 0 0 1	41
119	124	1 1 1 1 0 1 1 1 1	DF	0 0 1 0 1 1 1 1 1	5F
120	125	0 1 0 1 0 1 1 1 1	AF	1 0 0 1 0 1 1 1 1	2F
121	126	0 1 0 1 0 1 0 0 1	A9	1 0 0 1 0 1 0 0 1	29

* — Positions 19 and 101 do not have keyswitches.
OT — Over-Travel

Fig. 9-Keyswitch Position Codes

4.09 An ITD control word consists of a start and steer bit of "0", followed by sixteen control bits. The control words cause logic initialization, a status reply to be sent, or to activate the alarm.

4.10 An ITC status reply word also consists of the start and steer bit being at "0" and then sixteen status bits.

4.11 An example of an ITD data word would be: 01 1000 00 10 (with bits 8 to 15 being at "0").

Start bit "0", steer bit "1" = ITD data word,
Bit 0 at "1", bits 1, 2, 3 at "0" = location prefix,
Bits 4 and 5 at "0" = key position 1,
Bit 6 at "1", bit 7 at "0" = lamp on.

This ITD data word when sent from the controller to the keyboard logic, will light the S/R mode indicator at keyswitch position 1. The function of the indicator is to notify the operator that the status of the system has changed.

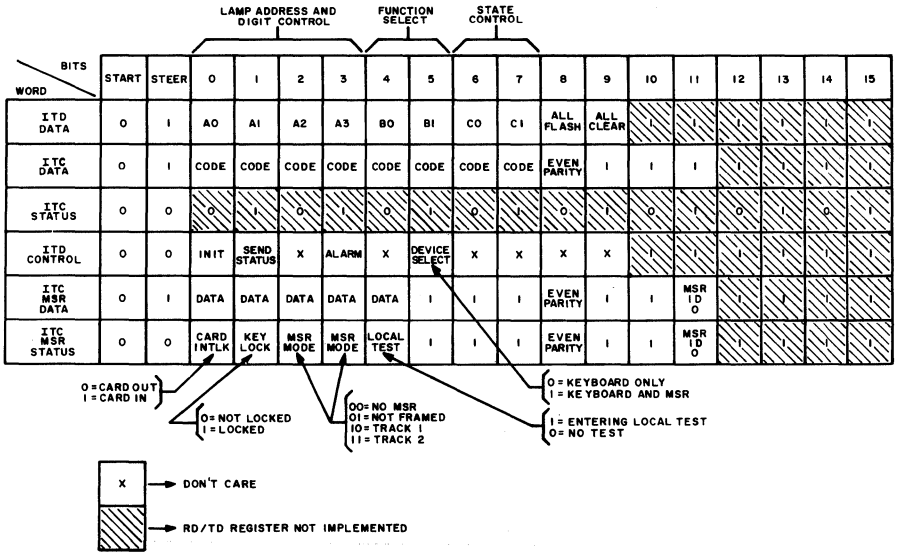


Fig. 10—Status Word SSI Bits

4.12 The keyboard alarm will sound a tone of 750 milliseconds, on receipt of any ITD control word with bit 5 high. The controller will continue to send the control word until the alarm condition is corrected.

4.13 The keyboard goes into a power on reset (POR) cycle of 110 milliseconds, when power is turned on. During this cycle, no clock is applied to ITC, but it is possible to receive noise on ITC in the first 20 milliseconds. ITD and power must both be stable to achieve phase lock. Phase lock is timed from application of ITD. The ITD signal coming up before phase lock can cause random indicators to flash.

4.14 The magnetic stripe reader (MSR) begins operation as the inserted card moves against the sense switch. The read head senses each flux reversal magnetically prerecorded on the card stripe. In the signal generated to the transmitting distributor, logic bit 0 is least significant bit and bit 4 is parity. The signal is checked for parity, start of record and uses a longitudinal redundancy check. Status words are generated when the card is first sensed, when it is withdrawn and for a status request.