SPARC INTERNATIONAL

Version1
SPARC Keyboard Specification

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Chapter 1: Introduction

1.1. General

This specification provides key board manufacturers with a SPARC compliant 107-key keyboard.

1.2. Scope

This specification defines the functional, mechanical, electrical, environmental and reliability characteristics of the SPARC compatible keyboard.

1.3. Supporting Documents

The following documents, available from Key Tronic, may be of assistance to you:

49819 . . . . . .Factory Test Procedure

36-2464 . . . . . .Part 18 ESD Test Procedure

Chapter 2: Mechanical Specifications

2.1. Keyboard Profile

Figure 1 shows the keyboard profile.

Figure 3. Keytop Layout - U.S.

2.2. Keyboard Layout

Key Board Layout Pictures - To be inserted

2.3. LED Indicators

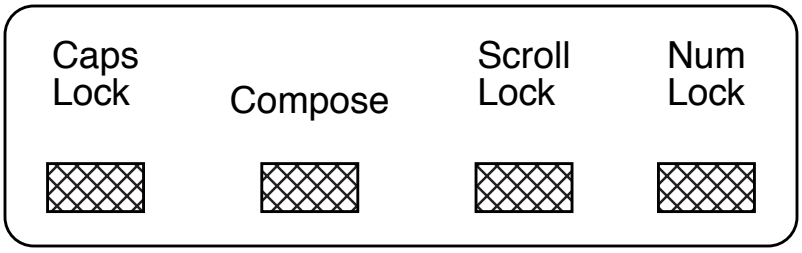
Each Keyboard may contain four LED indicators: Caps Lock, Compose, Scroll Lock and Num Lock.

The LED Indicators shall be located on the right-hand end of the function key row, directly above the numeric keypad. Indicators shall illuminate by a command from the system. (Refer to the 0x0E command). The illumi-

nated condition shall indicate that the keyboard is operating in the locked state.

2.4. Labels and Overlay

The Kayboard contains an overlay covering the LEDs:



Chapter 3: Firmware Specifications

3.1. Scan Codes

The keyboard shall generate an unique scan code for each keyswitch including codes for both depression (make) and release (break). The keyswitch to scan code assignments for US and International Keyboards are listed below..

Table 1. US Scan Set

Key Number	Key Legend	Shifted Legend	Make Code	Break Code
1	F1		0x05	0x85
2	F2		0x06	0x86
3	F3		0x08	0x88
4	F4		0x0A	0x8A
5	F5		0x0C	0x8C
6	F6		0x0E	0x8E
7	F7		0x10	0x90
8	F8		0x11	0x91
9	F9		0x12	0x92
10	F10		0x07	0x87
11	F11		0x09	0x89
12	F12		0x0B	0x8B
13	\	|	0x58	0xD8
14	Delete		0x42	0xC2
15	Stop		0x01	0x81
16	Again		0x03	0x83
17	Pause		0x15	0x95
18	Pr Sc		0x16	0x96
19	Break	Scroll Lock	0x17	0x97
20	Num Lock		0x62	0xE2
21	Props		0x19	0x99
22	Undo		0x1A	0x9A
23	Esc		0x1D	0x9D
24	1	!	0x1E	0x9E
25	2	@	0x1F	0x9F

Table 1. US Scan Set

Key Number	Key Legend	Shifted Legend	Make Code	Break Code
26	3	#	0x20	0xA0
27	4	$	0x21	0xA1
28	5	%	0x22	0xA2
29	6	^	0x23	0xA3
30	7	&	0x24	0xA4
31	8	*	0x25	0xA5
32	9	(	0x26	0xA6
33	0	)	0x27	0xA7
34	-	_	0x28	0xA8
35	=	+	0x29	0xA9
36	Backspace		0x2B	0xAB
37	=		0x2D	0xAD
38	/		0x2E	0xAE
39	*		0x2F	0xAF
40	-		0x47	0xC7
41	Front		0x31	0xB1
42	Copy		0x33	0xB3
43	Tab		0x35	0xB5
44	Q		0x36	0xB6
45	W		0x37	0xB7
46	E		0x38	0xB8
47	R		0x39	0xB9
48	T		0x3A	0xBA
49	Y		0x3B	0xBB
50	U		0x3C	0xBC
51	I		0x3D	0xBD
52	O		0x3E	0xBE
53	P		0x3F	0xEF
54	[	{	0x40	0xC0
55	]	}	0x41	0xC1
56	Return		0x59	0xD9
57	Home	7	0x44	0xC4

Table 1. US Scan Set

Key Number	Key Legend	Shifted Legend	Make Code	Break Code
58	(up cur)	8	0x45	0xC5
59	PgUp	9	0x46	0xC6
60	+		0x7D	0xFD
61	Open		0x48	0xC8
62	Paste		0x49	0xC9
63	Control		0x4C	0xCC
64	A		0x4D	0xCD
65	S		0x4E	0xCE
66	D		0x4F	0xCF
67	F		0x50	0xD0
68	G		0x51	0xD1
69	H		0x52	0xD2
70	J		0x53	0xD3
71	K		0x54	0xD4
72	L		0x55	0xD5
73	;	:	0x56	0xD6
74	‘	“	0x57	0xD7
75	‘	~	0x2A	0xAA
76	(Left Cur)	4	0x5B	0xDB
77	5		0x5C	0xDC
78	(Right Cur)	6	0x5D	0xDD
79	Find		0x5F	0xDF
80	Cut		0x61	0xE1
81	Shift		0x63	0xE3
82	Z		0x64	0xE4
83	X		0x65	0xE5
84	C		0x66	0xE6
85	V		0x67	0xE7
86	B		0x68	0xE8
87	N		0x69	0xE9
88	M		0x6A	0xEA
89	,	<	0x6B	0xEB

Table 1. US Scan Set

Key Number	Key Legend	Shifted Legend	Make Code	Break Code
90	.	>	0x6C	0xEC
91	/	?	0x6D	0xED
92	Shift		0x6E	0xEE
93	Line Feed		0x6F	0xEF
94	End	1	0x70	0xF0
95	(Dn Cur)	2	0x71	0xF1
96	PgDn	3	0x72	0xF2
97	Enter		0x5A	0xDA
98	Help		0x76	0xF6
99	Caps Lock		0x77	0xF7
100	Alt		0x13	0x93
101	(L Triangle)		0x78	0xF8
102	(Space Bar)		0x79	0xF9
103	(R triangle)		0x7A	0xFA
104	Compose		0x43	0xC3
105	Graph	Alt	0x0D	0x8D
106	Ins	0	0x5E	0xDE
107	Del	.	0x32	0xB2

Table 2. International Scan Set

Key Number	Key Legend	Shifted Legend	Make Code	Break Code
1	F1		0x05	0x85
2	F2		0x06	0x86
3	F3		0x08	0x88
4	F4		0x0A	0x8A
5	F5		0x0C	0x8C
6	F6		0x0E	0x8E
7	F7		0x10	0x90
8	F8		0x11	0x91

Table 2. International Scan Set

Key Number	Key Legend	Shifted Legend	Make Code	Break Code
9	F9		0x12	0x92
10	F10		0x07	0x87
11	F11		0x09	0x89
12	F12		0x0B	0x8B
13	\	|	0x58	0xD8
14	Delete		0x42	0xC2
15	Stop		0x01	0x81
16	Again		0x03	0x83
17	Pause		0x15	0x95
18	Pr Sc		0x16	0x96
19	Break	Scroll Lock	0x17	0x97
20	Num Lock		0x62	0xE2
21	Props		0x19	0x99
22	Undo		0x1A	0x9A
23	Esc		0x1D	0x9D
24	1	!	0x1E	0x9E
25	2	@	0x1F	0x9F
26	3	#	0x20	0xA0
27	4	$	0x21	0xA1
28	5	%	0x22	0xA2
29	6	^	0x23	0xA3
30	7	&	0x24	0xA4
31	8	*	0x25	0xA5
32	9	(	0x26	0xA6
33	0	)	0x27	0xA7
34	-	_	0x28	0xA8
35	=	+	0x29	0xA9
36	Backspace		0x2B	0xAB
37	=		0x2D	0xAD
38	/		0x2E	0xAE
39	*		0x2F	0xAF
40	-		0x47	0xC7

Table 2. International Scan Set

Key Number	Key Legend	Shifted Legend	Make Code	Break Code
41	Front		0x31	0xB1
42	Copy		0x33	0xB3
43	Tab		0x35	0xB5
44	Q		0x36	0xB6
45	W		0x37	0xB7
46	E		0x38	0xB8
47	R		0x39	0xB9
48	T		0x3A	0xBA
49	Y		0x3B	0xBB
50	U		0x3C	0xBC
51	I		0x3D	0xBD
52	O		0x3E	0xBE
53	P		0x3F	0xEF
54	[	{	0x40	0xC0
55	]	}	0x41	0xC1
56	Return		0x59	0xD9
57	Home	7	0x44	0xC4
58	(up cur)	8	0x45	0xC5
59	PgUp	9	0x46	0xC6
60	+		0x7D	0xFD
61	Open		0x48	0xC8
62	Paste		0x49	0xC9
63	Control		0x4C	0xCC
64	A		0x4D	0xCD
65	S		0x4E	0xCE
66	D		0x4F	0xCF
67	F		0x50	0xD0
68	G		0x51	0xD1
69	H		0x52	0xD2
70	J		0x53	0xD3
71	K		0x54	0xD4
72	L		0x55	0xD5

Table 2. International Scan Set

Key Number	Key Legend	Shifted Legend	Make Code	Break Code
73	;	:	0x56	0xD6
74	‘	“	0x57	0xD7
75	‘	~	0x2A	0xAA
76	(Left Cur)	4	0x5B	0xDB
77	5		0x5C	0xDC
78	(Right Cur)	6	0x5D	0xDD
79	Find		0x5F	0xDF
80	Cut		0x61	0xE1
81	Shift		0x63	0xE3
82	Z		0x64	0xE4
83	X		0x65	0xE5
84	C		0x66	0xE6
85	V		0x67	0xE7
86	B		0x68	0xE8
87	N		0x69	0xE9
88	M		0x6A	0xEA
89	,	<	0x6B	0xEB
90	.	>	0x6C	0xEC
91	/	?	0x6D	0xED
92	Shift		0x6E	0xEE
93	Line Feed		0x6F	0xEF
94	End	1	0x70	0xF0
95	(Dn Cur)	2	0x71	0xF1
96	Pg Dn	3	0x72	0xF2
97	Enter		0x5A	0xDA
98	Help		0x76	0xF6
99	Caps Lock		0x77	0xF7
100	Alt		0x13	0x93
101	(L Triangle)		0x78	0xF8
102	(Space Bar)		0x79	0xF9
103	(R triangle)		0x7A	0xFA
104	Compose		0x43	0xC3

Table 2. International Scan Set

Key Number	Key Legend	Shifted Legend	Make Code	Break Code
105	Graph	Alt	0x0D	0x8D
106	Ins	0	0x5E	0xDE
107	Del	.	0x32	0xB2

3.2. Protocol

3.2.1. Communication

The keyboard communicates with the system using asynchronous serial protocol with negative logic. The communication is full duplex at 1200 baud. The data has 1 start bit, 8 data bits, 1 stop bit and no parity.

3.2.2. Commands From System To Keyboard

- **0x01 - Reset**

  After receiving this command, the keyboard executes the self test routine. The keyboard responds with: 0FFH, 004H, 007FH if the self test passes and no keys are down. The code 07FH is replaced by the make code if a key is down.

  The keyboard sends 07EH, 001H if the self test fails.

- **0x02 - Bell On**

  The keyboard turns on the keyboard speaker until the bell off command is received.

  The speaker signal has a 480 microsecond period.

- **0x03 - Bell Off**

  The keyboard turns off the keyboard speaker.

- **0x0A - Click On**

  Enables the keyboard click. The speaker has a 480 microsecond period and the click lasts for approximately 5.0 milliseconds.

- **0x0B - Click Off**

  Disables the keyboard click.

- **0x0E - LED Command**

  This command is followed by a status byte. The status byte has a bit for each of the LEDs on the keyboard. If the bit is set (1), then the LED is on. Bit 0 corresponds to the Num Lock indicator, bit 1 is Compose, bit 2 is Scroll Lock and bit 3 is Caps Lock.

- **0x0F - Layout Command**

  This command requests the language layout of the keyboard. The keyboard responds with the binary coded value of the dip switch, with the bits for switches 1 and 2 cleared. The least significant bit is switch 8, with the switches numbered 1 through 8.

3.2.3. Commands From Keyboard To System

- **0x07F - Idle**

  Code sent after a key up if no other keys are pressed. Also sent after power-up and reset if no keys are pressed.

- **0x0FE - Layout Request Response**

  The request from the host for the layout is followed by this response, and then the dip switch setting. The switch setting is given binary coded with switch 8 being the least significant bit and switch 1 being the most significant. Bits 1 and 2 are cleared to 0.

- **0x0FF - Reset Response**

  The keyboard responds with this byte after a reset command from the host. The byte is followed by 004 Hex, and then 07F Hex if there are no keys down.

3.3. Key Rollover

The keyboard shall incorporate N-Key Rollover (NKRO) to avoid loss of keystroke data during high speed entry. NKRO is defined as all key

depressions and releases correctly detected in any sequence regardless of how many keys are being depressed.

3.4. Power-Up and Self Test

The keyboard shall conduct a self test after power-up. After completion of the test, the keyboard shall send the result of the diagnostic to the host. The keyboard sends 0FF hex, 004 Hex, 07F Hex to indicate successful completion of the test. If the ROM test fails, the keyboard sends 07E Hex, 001 Hex. If a key is down during the test, the keyboard sends 0FF hex, 004 Hex and the key make code. The key break code is sent when the keys is released.

3.5. Autorepeat

The host shall handle the autorepeat function of the keys.

3.6. Buffering

The keyboard shall be capable of storing 16 scan codes in a first-in-first-out (FIFO) circular buffer. If the FIFO is full, the code shall not be processed until space is available.

3.7. Layout Switch Settings

The keyboard must use the layout switch settings shown in the Table below.

Table 3. Mode Switch Settings

Switches 12345678	Country
00000011	Canada_French
00000100	DENMARK
00000010	FRENCH_BELGIUM
00000101	GERMANY
00000110	ITALY
00100000	JAPAN
00000111	NETHERLANDS
00001000	NORWAY
00001001	PORTUGAL
00001010	SPAIN_LATIN AMERICA
00001011	SWEDEN_FINLAND
00001100	SWISS_FRENCH
00001101	SWISS_GERMAN
00001110	UNITED KINGDOM
00000000	UNITED STATES

3.8. Software Watch Dog

The keyboard shall contain a watch dog timer which shall keep the microprocessor running properly at all times (in spite of possible noise glitches on the power supply or electrostatic discharge events).

Chapter 4: Electrical Specifications

The interface consists of a transmit and a receive line controlled by open collector drivers. The keyboard side is terminated by 3.3 K ohm resisters

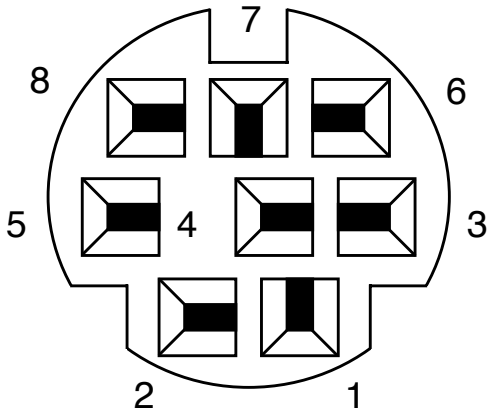
4.1. Connectors

The keyboard shall contain two 8-pin miniDin connectors, Hosiden (p/n TCS7587-01-401). Connections are shown in Table 3.

Table 4. MiniDin Connector

Pin	Function	Signal/ Voltage
1	Ground	0 V
2	Ground	0 V
3	Power	+5 Vdc
4	RX/TX	Mouse
5	RX	TTL
6	TX	TTL
7	Ground	0 V
8	Power	+5 Vdc

Keyboard Connector



8-Pin mini DIN Connector

4.2. Chassis Ground

The chassis ground shall be isolated from logic ground.

4.3. Power Requirement

The keyboard shall operate at 5 Volts dc +/-5% at 300 mA maximum.

Chapter 5: Environmental Specifications

5.1. Temperature

Operating . . . . . .0 to 40 C

Non-operating . . . . . .-40 to 70 C

5.2. Relative Humidity

Operating humidity . . . . . .10% to 90% non-condensing, ambient temperature

5.3. Shock

Non-operating . . . . . .50 G

5.4. Vibration

Non-operating . . . . . .4 G

5.5. Altitude

Operating . . . . . .-1,000 ft to +12,000 ft

Non-operating . . . . . .-1,000 ft to +60,000 ft

5.6. Electrostatic Immunity

The keyboard shall meet the electrostatic immunity requirements described in Key Tronic document 36-02464, Part 18.

5.7. EMI / RFI

The keyboard shall be certified to comply with FCC A equipment when used in conjunction with a SPARCstation 1+. The keyboard will be verified to a Class B.

5.8. Safety

The keyboard is manufactured from materials that are consistent with Underwriters Laboratories (UL) recognition.

Specifically, the materials used conform to the following UL requirements:

Printed Circuit Board UL94HB

Keytop and Enclosure UL94HB

Chapter 6: Reliability

6.1. Mean Time Before Failure (MTBF)

Shall be greater than 100,000 hours.

6.2. Switch Life

Switch life shall operate for a mean of at least 100 million cycles before failure, based on life test data.