STANDARD MICROSYSTEMS CORPORATION

KR3600

KR3600-XX
KR3600-ST
KR3600-STD
KR3600-PRO

Keyboard Encoder Read Only Memory

FEATURES

- Data output directly compatible with TTL
- N Key rollover or lockout operation
- Quad mode
- Lockout/rollover selection externally selected as option
- On chip-master/slave oscillator
- All 10 output bits available
- Fully buffered data outputs
- Output enable provided as option
- Data compliment control provided as option
- Pulse or level data ready output signal provided as an option
- Any key down output provided as an option
- Contact bounce circuit provided to eliminate contact bounce
- Static charge protection on all input/outputs
- Pin for Pin replacement for GI AY-5-3600

GENERAL DESCRIPTION

The SMC Microsystems KR3600-XX is a Keyboard Encoder containing a 3600 bit read only memory and all the logic necessary to encode single pole single throw keyboard closures into a 10 bit code.

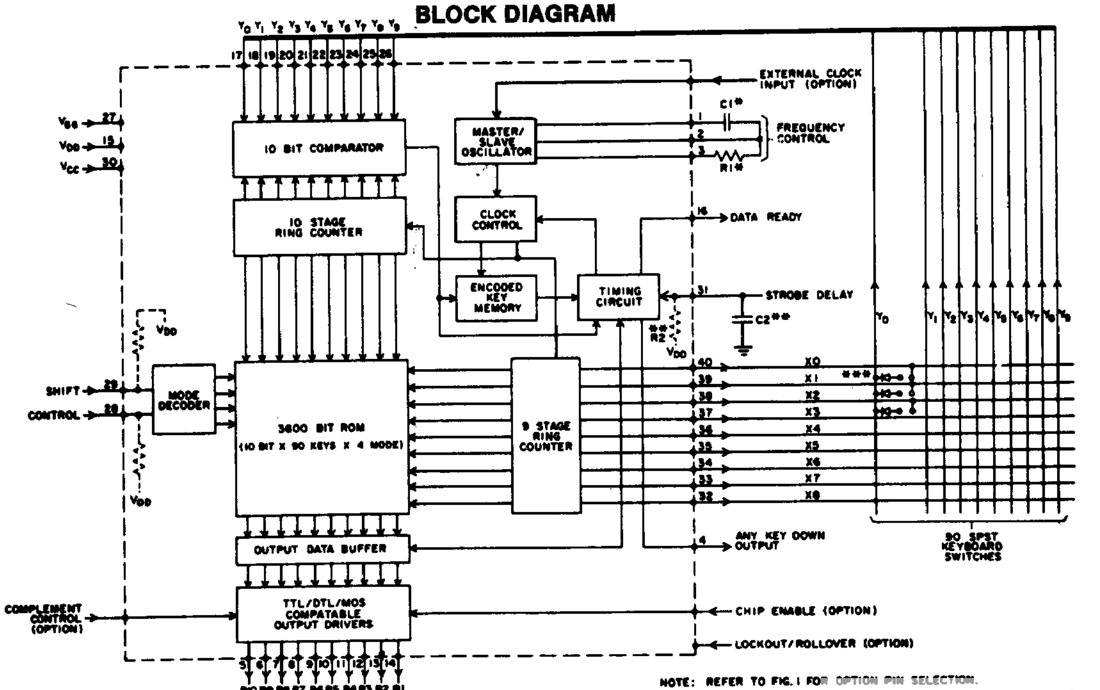
The KR3600-XX is fabricated with a low voltage p channel technology and contains the equivalent of 5000 transistors on a monolithic chip in a 40 lead dip ceramic package.

PIN CONFIGURATION

Function	Pin	Pin	Function
Option (See "Pin Assignment Chart")	1	40	X_0
Option (See "Pin Assignment Chart")	2	39	X_1
Option (See "Pin Assignment Chart")	3	38	X_2
Option (See "Pin Assignment Chart")	4	37	X_3
Option (See "Pin Assignment Chart")	5	36	X_4
Data Output B9	6	35	X_5
Data Output B8	7	34	X_6
Data Output B7	8	33	X_7
Data Output B6	9	32	X_8
Data Output B5	10	31	Delay Node Input
Data Output B4	11	30	V_{CC}
Data Output B3	12	29	Shift Input
Data Output B2	13	28	Control Input
Data Output B1	14	27	V_{GG}
V_{DD}	15	26	Y_9
Data Ready	16	25	Y_8
Y_0	17	24	Y_7
Y_1	18	23	Y_6
Y_2	19	22	Y_5
Y_3	20	21	Y_4

PACKAGE: 40-Pin D.I.P.

BLOCK DIAGRAM



NOTE: REFER TO FIG. 1 FOR OPTION PIN SELECTION.
*R1 (100K Ω), C1 (45pF) PROVIDES APPROX. [illegible] KHZ CLOCK FREQ.
**C2 (300nS DELAY/ [illegible]pF) R2 SUPPLIED INTERNALLY.
***DIODES NECESSARY FOR COMPLETE nKEY ROLLOVER OPERATION.

DESCRIPTION OF OPERATION

The KR3600 contains a 3600 bit ROM, 9-stage and 10-stage ring counters, a 10 bit comparator, timing circuitry, a 90 bit memory to store the location of encoded keys for n key rollover operation, an externally controllable delay network for eliminating the effect of contact bounce, an output data buffer, and TTL/DTL/MOS compatible output drivers.

The ROM portion of the chip is a 360 by 10 bit memory arranged into four 90-word by 10-bit groups. The appropriate levels on the Shift and Control Inputs selects one of the four 90-word groups; the 90-individual word locations are addressed by the two ring counters. Thus, the ROM address is formed by combining the Shift and Control Inputs with the two ring counters.

The external outputs of the 9-stage ring counter and the external inputs to the 10-bit comparator are wired to the keyboard to form an X-Y matrix with the 90-keyboard switches as the crosspoints. In the standby conditions, when no key is depressed, the two ring counters are clocked and sequentially address the ROM, thereby scanning the key switches for key closures.

When a key is depressed, a single path is completed between one output of the 9-stage ring counter (X0 thru X8) and one input of the 10-bit comparator (Y_0-Y_9). After a number of clock cycles, a condition will occur where a level on the selected path to the comparator matches a level on the corresponding comparator input from the 10-stage ring counter.

N KEY ROLLOVER — When a match occurs, and the key has not been encoded, the switch bounce delay network is enabled. If the key is still depressed at the end of the selected delay time, the code for the depressed key is transferred to the output data buffer, the data ready signal appears, a one is stored in the encoded key memory and the scan sequence is resumed. If a match occurs at another key location, the sequence is repeated thus encoding the next key. If the match occurs for an already encoded key, the match is not recognized. The code of the last key encoded remains in the output data buffer.

N KEY LOCKOUT — When a match occurs, the delay network is enabled. If the key is still depressed at the end of the selected delay time, the code for the depressed key is transferred to the output data buffer, the data ready signal appears and the remaining keys are locked out by halting the scan sequence. The scan sequence is resumed upon key release. The output data buffer stores the code of the last key encoded.

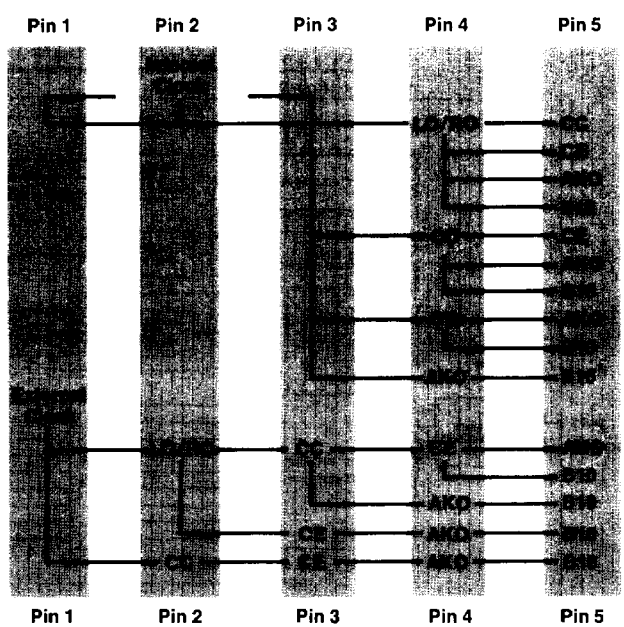
SPECIAL PATTERNS — Since the selected coding of each key and all the options are defined during the manufacture of the chip, the coding and options can be changed to fit any particular application of the keyboard. Up to 360 codes of up to 10 bits can be programmed into the KR3600 ROM covering most popular codes such as ASCII, EBCDIC, Selectric, etc., as well as many specialized codes.

CUSTOM CODING INFORMATION

The custom coding information for SMC's 3600 Bit Keyboard Encoder ROM should be transmitted to SMC. The Truth Table should be completed on the format supplied.

LEGEND

CC = Complement Control
AKO = Any Key Down Output
B10 = B10 (Data) Output
LO/RO = Lockout/Rollover
CE = Chip Enable
Internal Clock = Self Contained Oscillator
External Clock = External Frequency Source



OPTION SELECTION/PIN ASSIGNMENT

FIGURE 1

MAXIMUM GUARANTEED RATINGS*

Operating Temperature Range	0°C to +70°C
Storage Temperature Range	−55°C to +150°C
Lead Temperature (soldering, 10 sec.)	+325°C
Positive Voltage on any Pin, V_{CC}	+0.3 V
Negative Voltage on any Pin, V_{CC}	−25 V

*Stresses above those listed may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other condition above those indicated in the operational sections of this specification is not implied.

ELECTRICAL CHARACTERISTICS

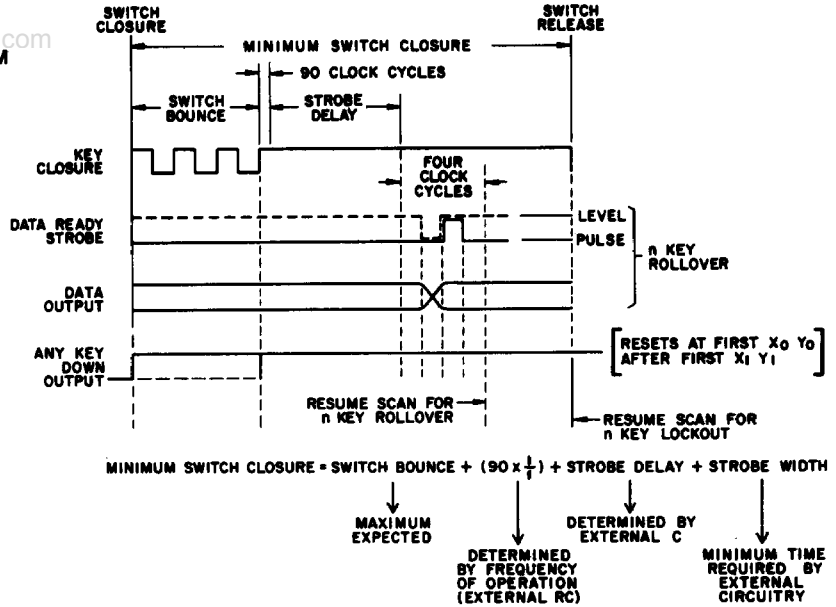
(T_A = 0°C to 70°C, V_{CC} = +5V ±5%, V_{GG} = −12V ±1.0V, V_{DD} = GND, unless otherwise noted)

Characteristics	Min	Typ**	Max	Units	Conditions
Clock Frequency	10	50	100	KHz	See Block diagram footnote* for typical R-C values
External Clock Width	7	—	—	μs	
Data & Clock Input (Shift, Control, Compliment Control, Lockout/Rollover, Chip Enable & External Clock)					
Logic "0" Level	V_{GG}	—	+0.8	V	
Logic "1" Level	V_{CC}−1.5	—	V_{CC}+0.3	V	
Shift & Control Input Current	75	150	220	μA	V_{IN} = +5V
X Output (X_0-X_8)					
Logic "1" Output Current	40	250	500	μA	V_{OUT} = V_{CC} (See Note 2)
	600	1300	4000	μA	V_{OUT} = V_{CC}−1.3V
	900	2000	6500	μA	V_{OUT} = V_{CC}−2.0V
	1500	2000	14,000	μA	V_{OUT} = V_{CC}−5V
	3000	10,000	23,000	μA	V_{OUT} = V_{CC}−10V
Logic "0" Output Current	8	30	60	μA	V_{OUT} = V_{CC}
	6	25	50	μA	V_{OUT} = V_{CC}−1.3V
	5	20	45	μA	V_{OUT} = V_{CC}−2.0V
	2	10	30	μA	V_{OUT} = V_{CC}−5V
	—	0.5	5	μA	V_{OUT} = V_{CC}−10V
Y Input (Y_0-Y_9)					
Trip Level	V_{CC}−5	V_{CC}−3	V_{CC}−2	V	Y Input Going Positive (See Note 2)
Hysteresis	0.5	0.9	1.4	V	(See Note 1)
Selected Y Input Current	18	100	170	μA	V_{IN} = V_{CC}
	14	80	150	μA	V_{IN} = V_{CC}−1.3V
	13	50	130	μA	V_{IN} = V_{CC}−2.0V
	5	40	110	μA	V_{IN} = V_{CC}−4.0V
Unselected Y Input Current	9	40	80	μA	V_{IN} = V_{CC}
	7	30	70	μA	V_{IN} = V_{CC}−1.3V
	6	25	60	μA	V_{IN} = V_{CC}−2.0V
	3	15	40	μA	V_{IN} = V_{CC}−5V
	—	0.5	20	μA	V_{IN} = V_{CC}−10V
Input Capacitance	—	3	10	pF	at 0V (All Inputs)
Switch Characteristics					
Minimum Switch Closure	—	—	—	—	See Timing Diagram
Contact Closure Resistance	—	—	300	Ω	Z_{CC}
	1 x 10^7	—	—	Ω	Z_{CO}
Strobe Delay					
Trip Level (Pin 31)	V_{CC}−4	V_{CC}−3	V_{CC}−2	V	
Hysteresis	0.5	0.9	1.4	V	(See Note 1)
Quiescent Voltage (Pin 31)	−3	−5	−9	V	With Internal Switched Resistor
Data Output (B1-B10), Any Key Down Output, Data Ready					
Logic "0"	—	—	0.4	V	I_{OL} = 1.6m A
Logic "1"	V_{CC}−1	—	—	V	I_{OH} = 1.0m A
	V_{CC}−2	—	—	V	I_{OH} = 2.2m A
Power					
I_{CC}	—	12	25	mA	V_{CC} = +5V
I_{GG}	—	12	25	mA	V_{GG} = −12V

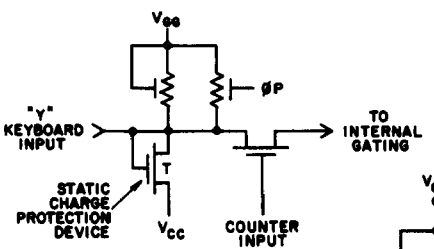
**Typical values are at +25°C and nominal voltages.

NOTE
1. Hysteresis is defined as the amount of return required to unlatch an input.
2. Precharge of X outputs and Y inputs occurs during each scanned clock cycle.

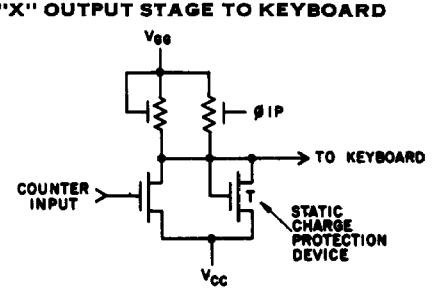
TIMING DIAGRAM



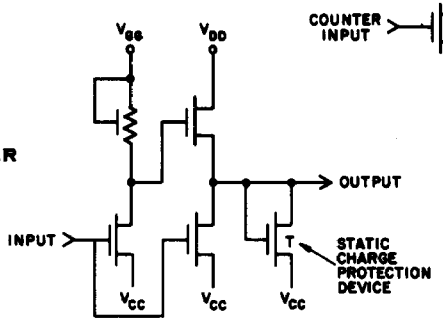
"Y" INPUT STAGE FROM KEYBOARD



"X" OUTPUT STAGE TO KEYBOARD

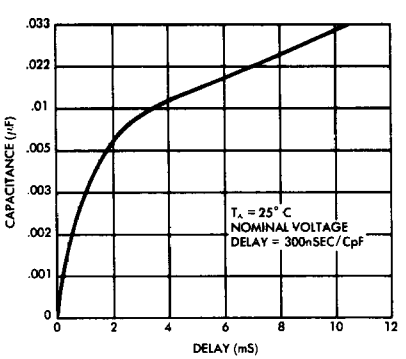


OUTPUT DRIVER

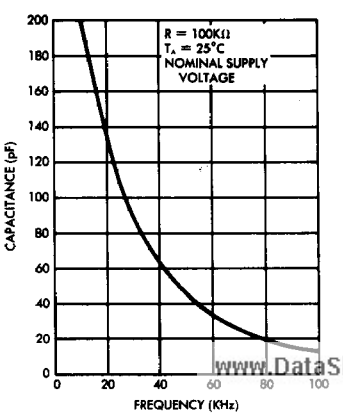


NOTE: Output driver capable of driving one TTL load with no external resistor. Capable of driving two TTL loads using an external 6.8KΩ resistor to V_{GG}

STROBE DELAY vs. C_2



OSCILLATOR FREQUENCY vs. C_1



KR3600-STD

XY	Normal B-12345678910	Shift B-12345678910	Control B-12345678910	Shift Control B-12345678910
00	1 1000111001	< 0011111001	1 1000111011	SUB 0101100001
01	q 1000110101	Q 1000100101	q 1000111111	DLE 0000100001
02	a 1000010101	A 1000000101	a 1000011111	@ 0000000101
03	z 0101110101	Z 0101100101	z 0101111111	P 0000100101
04	HT 1001000001	HT 1001000001	HT 1001000001	I 1001000101
05	H 0001000101	H 0001000101	H 0001000101	H 0001000111
06	+ 1101011001	+ 1101011001	+ 1101011001	+ 1101011011
07	SO 0111001001	> 0111111001	SO 0111000001	SO 0111000011
08	p 0000110101	@ 0000000101	NUL 0000000001	NUL 0000000001
09	1 1000111001	! 1000011001	SOH 1000000001	SOH 1000000001
10	2 0100111001	@ 0000000101	2 0100111011	ETB 1110100001
11	w 1110110101	W 1110100101	w 1110111111	^ 0011100101
12	s 1100110101	S 1100100101	s 1100111111	A 1000000101
13	x 0001110101	X 0001100101	x 0001111111	Q 1000100101
14	RS 0111100001	RS 0111100001	RS 0111100001	FS 0011100001
15	% 1010011001	% 1010011001	% 1010011001	% 1010011011
16	m 1011010101	] 1011100101	CR 1011000001	CR 1011000001
17	SI 1111000001	SI 1111000001	SI 1111000001	SI 1111000011
18	n 0111010101	^ 0111100101	SO 0111000001	SO 0111000001
19	2 0100111001	" 0100011001	STX 0100000001	STX 0100000001
20	3 1100111001	# 1100011001	3 1100111011	NAK 1010100001
21	e 1010010101	E 1010000101	e 1010011111	DC3 1100100001
22	d 0010010101	D 0010000101	d 0010011111	B 0100000101
23	c 1100010101	C 1100000101	c 1100011111	R 0100100101
24	— 1111100100	— 1111100100	— 1111100100	^ 0111100100
25	$ 0010011001	$ 0010011001	$ 0010011001	$ 0010011011
26	L 0011000101	L 0011000101	L 0011000101	L 0011000111
27	US 1111100001	US 1111100001	US 1111100001	US 1111100011
28	6 0110111001	& 0110011001	ACK 0110000001	ACK 0110000001
29	k 1101010101	[1101100101	DEL 1111111101	DEL 1111111101
30	4 0010111001	$ 0010011001	4 0010111011	DC4 0010100001
31	r 0100110101	R 0100100101	r 0100111111	ENQ 1010000001
32	f 0110010101	F 0110000101	f 0110011111	C 1100000101
33	SP 0000011000	SP 0000011000	SP 0000011000	SP 0000011000
34	CAN 0001101000	(0001011000	CAN 0001100000	BS 0001000000
35	CR 1011000001	CR 1011000001	CR 1011000001	M 1011000101
36	[1101111101	[1101111101	[1101111111	K 1101000101
37	VT 1101000000	VT 1101000000	VT 1101000000	VT 1101000010
38	7 1110111001	' 1110011001	BEL 1110000001	BEL 1110000001
39	" 0100011001	" 0100011001	" 0100011001	" 0100011011
40	5 1010111001	% 1010011001	5 1010111011	STX 0100000001
41	t 0010110101	T 0010100101	t 0010111111	EOT 0010000001
42	g 1110010101	g 1110000101	G 1110011111	D 0010000101
43	v 0110110101	V 0110100101	v 0110111111	S 1100100101
44	ETX 1100000001	ETX 1100000001	ETX 1100000001	ETX 1100000001
45	] 1011111101	] 1011111101	] 1011111111	N 0111000101
46	? 1111111001	? 1111111001	? 1111111011	[1101100101
47	— 1011011001	— 1011111001	— 1011011001	— 1011011011
48	) 1001011001	) 1001011001	) 1001011001	) 1001011011
49	SP 0000011001	SP 0000011001	SP 0000011001	SP 0000011011
50	6 0110111001	> 0111111001	6 0110111011	SOH 1000000001
51	y 1001110101	Y 1001100101	y 1001111111	DC1 1000100001
52	h 0001010101	H 0001000101	h 0001011111	E 1010000101
53	b 0100010101	B 0100000101	b 0100011111	T 0010100101
54	: 0101111001	* 0101011001	: 0101111011	SYN 0110100001
55	> 0111111001	> 0111111001	> 0111111011	Z 0101100101
56	; 1101111001	+ 1101011001	; 1101111011	Y 1001100101
57	NUL 0000000001	NUL 0000000001	NUL 0000000001	NUL 0000000001
58	* 0101011001	* 0101011001	* 0101011001	* 0101011011
59	! 1000011001	! 1000011001	! 1000011001	! 1000011011
60	7 1110111001	& 0110011001	7 1110111011	ETX 1100000001
61	u 1010110101	U 1010100101	u 1010111111	BEL 1110000001
62	j 0101010101	J 0101000101	j 0101011111	F 0110000101
63	n 0111010101	N 0111000101	n 0111011111	U 1010100101
64	= 1011111000	= 1011111000	= 1011111010	~ 0111111100
65	< 0011111001	< 0011111001	< 0011111011	W 1110100101
66	p 0000110101	P 0000100101	p 0000111111	J 0101000101
67	0 0000111001	) 1001011001	0 0000111011	DC2 0100100001
68	& 0110011001	& 0110011001	& 0110011001	& 0110011011
69	# 1100011001	# 1100011001	# 1100011001	# 1100011011
70	8 0001111001	* 0101011001	8 0001111011	ESC 1101100001
71	i 1001010101	I 1001000101	i 1001011111	ACK 0110000001
72	k 1101010101	K 1101000101	k 1101011111	G 1110000101
73	m 1011010101	M 1011000101	m 1011011111	V 0110100101
74	/ 1111011001	? 1111111001	/ 1111011001	' 1110011001
75	' 1110011001	" 0100011001	' 1110011001	" 0100011001
76	LF 0101000000	LF 0101000000	LF 0101000000	GS 1011100000
77	= 1011111001	+ 1101011001	= 1011111001	+ 1101011001
78	FF 0011001001	< 0011111001	FF 0011000001	FF 0011000011
79	(0001011001	(0001011001	(0001011001	(0001011011
80	9 1001111001	(0001011001	9 1001111011	EM 1001100001
81	o 1111010101	O 1111000101	o 1111011111	} 1011100101
82	l 0011010101	L 0011000101	l 0011011111	X 0001100101
83	, 0011011001	, 0011011001	, 0011011001	, 0011011011
84	. 0111011001	. 0111011001	. 0111011001	. 0111011011
85	; 1101111001	: 0101111001	; 1101111001	: 0101111001
86	] 1011100101	[1101100101	] 1011100101	[1101100101
87	- 1011011001	— 1111100101	- 1011011001	— 1111100101
88	0 0000111001	0 0000111001	0 0000111001	0 0000111001
89	9 1001111001	) 1001011001	HT 1001000001	HT 1001000001

Options:
Internal oscillator (pins 1, 2, 3)
Any key down (pin 4) positive output
N key rollover only

Pulse data ready signal
Internal resistor to VDD on shift and control pins
KR3600-STD outputs provides ASC II bits 1-6 on B1-B6, and bit 7 on B8

KR 3600-ST

XY	Normal B-123456789	Shift B-123456789	Control B-123456789	Shift/Control B-123456789
00	\ 000001101	~ 011111101	NUL 000000001	RS 011110001
01	= 101111010	+ 110101001	GS 101110001	VT 110100010
02	DC3 110010010	DC3 110010010	DC3 110010010	DC3 110010010
03	— 101101001	— 111110101	CR 101100010	US 111110010
04	BS 000100010	BS 000100010	BS 000100010	BS 000100010
05	0 000011001	0 000011001	0 000011001	0 000011001
06	• 011101001	• 011101001	• 011101001	• 011101001
07	000000000	000000000	000000000	000000000
08	000000000	000000000	000000000	000000000
09	000000000	000000000	000000000	000000000
10	/ 111101010	? 111111001	ST 111100001	US 111110010
11	• 011101001	> 011111010	SO 011100010	RS 011110001
12	? 001101010	< 001111001	FF 001100001	FS 001110010
13	m 101101110	M 101100101	CR 101100010	CR 101100010
14	n 011101110	N 011100101	SO 011100010	SO 011100010
15	b 010001110	B 010000101	STX 010000010	STX 010000010
16	v 011011110	V 011010101	SYN 011010010	SYN 011010010
17	c 110001101	C 110000110	ETX 110000001	ETX 110000001
18	x 000111101	X 000110110	CAN 000110001	CAN 000110001
19	z 010111110	Z 010110101	SUB 010110010	SUB 010110010
20	LF 010100001	LF 010100001	LF 010100001	LF 010100001
21	\ 001110101	: 001111110	FS 001110010	FS 001110010
22	DEL 111111110	DEL 111111110	DEL 111111110	DEL 111111110
23	[110110110	] 101110110	ESC 110110001	GS 101110001
24	7 111011010	7 111011010	7 111011010	7 111011010
25	8 000111010	8 000111010	8 000111010	8 000111010
26	9 100111001	9 100111001	9 100111001	9 100111001
27	000000000	000000000	000000000	000000000
28	000000000	000000000	000000000	000000000
29	000000000	000000000	000000000	000000000
30	; 110111010	: 010111001	ESC 110110001	SUB 010110010
31	l 001101101	L 001100110	FF 001100001	FF 001100001
32	k 110101110	K 110100101	VT 110100010	VT 110100010
33	j 010101101	J 010100110	LF 010100001	LF 010100001
34	h 000101110	H 000100101	BS 000100010	BS 000100010
35	g 111001110	G 111000101	BEL 111000010	BEL 111000010
36	f 011001101	F 011000110	ACK 011000001	ACK 011000001
37	d 001001110	D 001000101	EOT 001000010	EOT 001000010
38	s 110011110	S 110010101	DC3 110010010	DC3 110010010
39	a 100001110	A 100000101	SOH 100000010	SOH 100000010
40	000000000	000000000	000000000	000000000
41	{ 110111101	} 101111101	ESC 110110001	GS 101110001
42	GR 101100010	GR 101100010	GR 101100010	GR 101100010
43	' 111001001	" 010001001	BEL 111000010	STX 010000010
44	4 001011010	4 001011010	4 001011010	4 001011010
45	5 101011001	5 101011001	5 101011001	5 101011001
46	6 011011001	6 011011001	6 011011001	6 011011001
47	000000000	000000000	000000000	000000000
48	000000000	000000000	000000000	000000000
49	000000000	000000000	000000000	000000000
50	p 000011110	P 000010101	DEL 000010010	DEL 000010010
51	o 111101101	O 111100110	SI 111100001	SI 111100001
52	i 100101101	I 100100110	HT 100100001	HT 100100001
53	u 101011110	U 101010101	NAK 101010010	NAK 101010010
54	y 100111110	Y 100110101	EM 100110010	EM 100110010
55	t 001011101	T 001010110	DC4 001010001	DC4 001010001
56	r 010011101	R 010010110	DC2 010010001	DC2 010010001
57	e 101001101	E 101000110	ENQ 101000001	ENQ 101000001
58	w 111011101	W 111010110	ETB 111010001	ETB 111010001
59	q 100011101	Q 100010110	DC1 100010001	DC1 100010001
60	000000000	000000000	000000000	000000000
61	000000000	000000000	000000000	000000000
62	DC2 010010001	DC2 010010001	DC2 010010001	DC2 010010001
63	000000000	000000000	000000000	000000000
64	1 100011010	1 100011010	1 100011010	1 100011010
65	2 010011010	2 010011010	2 010011010	2 010011010
66	3 110011001	3 110011001	3 110011001	3 110011001
67	000000000	000000000	000000000	000000000
68	000000000	000000000	000000000	000000000
69	000000000	000000000	000000000	000000000
70	0 000011001	) 100101010	DLE 000010010	HT 100100001
71	9 100111001	(000101001	EM 100110010	BS 000100010
72	8 000111010	* 010101010	CAN 000110001	LF 010100001
73	7 111011010	& 011001010	ETB 111010001	ACK 011000001
74	6 011011001	^ 011110110	SYN 011010010	RS 011110001
75	5 101011001	% 101001010	NAK 101010010	ENQ 101000001
76	4 001011010	$ 001001001	DC4 001010001	EOT 001000010
77	3 110011001	# 110001010	DC3 110010010	ETX 110000001
78	2 010011010	@ 000000110	DC2 010010001	NUL 000000001
79	1 100011010	! 100001001	DC1 100010001	SOH 100000010
80	000000000	000000000	000000000	000000000
81	000000000	000000000	000000000	000000000
82	000000000	000000000	000000000	000000000
83	000000000	000000000	000000000	000000000
84	000000000	000000000	000000000	000000000
85	SP 000001010	SP 000001010	NUL 000000001	NUL 000000001
86	000000000	000000000	000000000	000000000
87	DC1 100010001	DC1 100010001	DC1 100010001	DC1 100010001
88	HT 100100001	HT 100100001	HT 100100001	HT 100100001
89	ESC 110110001	ESC 110110001	ESC 110110001	ESC 110110001

Options: Pin 1, 2, 3—Internal oscillator
Pin 4—Lockout (logic 1), rollover (logic 0)
Pin 5—Any key down output

All outputs complemented
Level data ready

KR 3600-PRO

XY	Normal	Shift	Control	Shift/Control
00	000000000	001000000	010000000	011000000
01	000000001	001000001	010000001	011000001
02	000000010	001000010	010000010	011000010
03	000000011	001000011	010000011	011000011
04	000000100	001000100	010000100	011000100
05	000000101	001000101	010000101	011000101
06	000000110	001000110	010000110	011000110
07	000000111	001000111	010000111	011000111
08	000001000	001001000	010001000	011001000
09	000001001	001001001	010001001	011001001
10	000001010	001001010	010001010	011001010
11	000001011	001001011	010001011	011001011
12	000001100	001001100	010001100	011001100
13	000001101	001001101	010001101	011001101
14	000001110	001001110	010001110	011001110
15	000001111	001001111	010001111	011001111
16	000010000	001010000	010010000	011010000
17	000010001	001010001	010010001	011010001
18	000010010	001010010	010010010	011010010
19	000010011	001010011	010010011	011010011
20	000010100	001010100	010010100	011010100
21	000010101	001010101	010010101	011010101
22	000010110	001010110	010010110	011010110
23	000010111	001010111	010010111	011010111
24	000011000	001011000	010011000	011011000
25	000011001	001011001	010011001	011011001
26	000011010	001011010	010011010	011011010
27	000011011	001011011	010011011	011011011
28	000011100	001011100	010011100	011011100
29	000011101	001011101	010011101	011011101
30	000011110	001011110	010011110	011011110
31	000011111	001011111	010011111	011011111
32	000100000	001100000	010100000	011100000
33	000100001	001100001	010100001	011100001
34	000100010	001100010	010100010	011100010
35	000100011	001100011	010100011	011100011
36	000100100	001100100	010100100	011100100
37	000100101	001100101	010100101	011100101
38	000100110	001100110	010100110	011100110
39	000100111	001100111	010100111	011100111
40	000101000	001101000	010101000	011101000
41	000101001	001101001	010101001	011101001
42	000101010	001101010	010101010	011101010
43	000101011	001101011	010101011	011101011
44	000101100	001101100	010101100	011101100
45	000101101	001101101	010101101	011101101
46	000101110	001101110	010101110	011101110
47	000101111	001101111	010101111	011101111
48	000110000	001110000	010110000	011110000
49	000110001	001110001	010110001	011110001
50	000110010	001110010	010110010	011110010
51	000110011	001110011	010110011	011110011
52	000110100	001110100	010110100	011110100
53	000110101	001110101	010110101	011110101
54	000110110	001110110	010110110	011110110
55	000110111	001110111	010110111	011110111
56	000111000	001111000	010111000	011111000
57	000111001	001111001	010111001	011111001
58	000111010	001111010	010111010	011111010
59	000111011	001111011	010111011	011111011
60	000111100	001111100	010111100	011111100
61	000111101	001111101	010111101	011111101
62	000111110	001111110	010111110	011111110
63	000111111	001111111	010111111	011111111
64	100000000	101000000	110000000	111000000
65	100000001	101000001	110000001	111000001
66	100000010	101000010	110000010	111000010
67	100000011	101000011	110000011	111000011
68	100000100	101000100	110000100	111000100
69	100000101	101000101	110000101	111000101
70	100000110	101000110	110000110	111000110
71	100000111	101000111	110000111	111000111
72	100001000	101001000	110001000	111001000
73	100001001	101001001	110001001	111001001
74	100001010	101001010	110001010	111001010
75	100001011	101001011	110001011	111001011
76	100001100	101001100	110001100	111001100
77	100001101	101001101	110001101	111001101
78	100001110	101001110	110001110	111001110
79	100001111	101001111	110001111	111001111
80	100010000	101010000	110010000	111010000
81	100010001	101010001	110010001	111010001
82	100010010	101010010	110010010	111010010
83	100010011	101010011	110010011	111010011
84	100010100	101010100	110010100	111010100
85	100010101	101010101	110010101	111010101
86	100010110	101010110	110010110	111010110
87	100010111	101010111	110010111	111010111
88	100011000	101011000	110011000	111011000
89	100011001	101011001	110011001	111011001

Options:
Internal oscillator (pins 1, 2, 3)
Lockout/rollover (pin 4), with internal resistor to VDD
Lockout is logic 1

Any key down (pin 5), positive output
Pulse data ready
Internal resistor to VDD on shift & control pins

DESCRIPTION

The KR 3600 PRO is a MOS/LSI device intended to simplify the interface of a microprocessor to a keyboard matrix. Like the other KR 3600 parts, the KR 3600 PRO contains all of the logic to de-bounce and encode keyswitch closures, while providing either a 2-key or N-key rollover.

The output of the KR 3600 PRO is a simple binary code which may be converted to a standard information code by a PROM or directly by a microprocessor. This permits a user maximum flexibility of key layout with simple field programming.

The code in the KR 3600 is shown in Table I. The format is simple: output bits 9, 8, 7, 6, 5, 4 and 1 are a binary sequence. The count starts at X0, Y0 and increments through X0Y1, X0Y2...X8Y9. Bit 9 is the LSB; bit 1 is the MSB.

Bits 2 and 3 indicate the mode as follows:

Bit 2	Bit 3	
0	0	Normal
0	1	Shift
1	0	Control
1	1	Shift Control

For maximum ease of use and flexibility, an internal scanning oscillator is used, with pin selection of N-key lockout (also known as 2-key rollover) and N-key rollover. An "any-key-down" output is provided for such uses as repeat oscillator keying.

Figure 1 shows a PROM-encoded 64 key, 4 mode application, using a 256x8 PROM, and Figure 2 a full 90 key, 4 mode application, utilizing a 512x8 PROM.

If N-key rollover operation is desired, it is recommended that a diode be inserted in series with each switch as shown. This prevents "phantom" key closures from resulting if three or more keys are depressed simultaneously.

FIGURE 1
KR 3600 PRO TYPICAL APPLICATION
64 KEY, 4 MODE

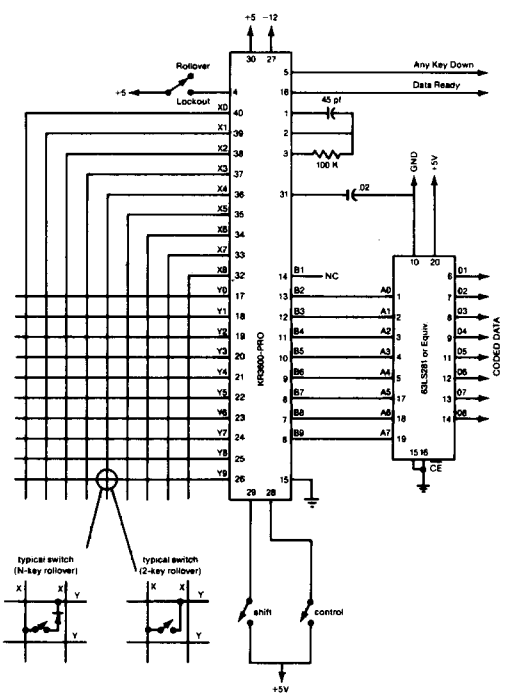


FIGURE 2
KR 3600 PRO TYPICAL APPLICATION
90 KEY, 4 MODE