

Keyboard Scan Codes

The keyboard communicates with the processor by scan codes assigned to the keys. When a key is pressed, the keyboard sends a make code to the computer, and when a key is released a break code is sent. Table H.1 shows the make codes of the original 83-key IBM keyboard; a break code can be obtained from the make codes by ORing it with 80h.

The INT 9 routine is responsible for getting the scan codes from the I/O port and placing an ASCII code and the scan code in the keyboard buffer. We can classify the keys into ASCII keys, function keys, and shift keys. The ASCII keys include the character keys, the space bar, and the control keys Esc, Enter, Backspace, and Tab; these keys have corresponding ASCII codes. The function keys include F1 to F10, the arrow keys, Pg Up, Pg Dn, Home, End, Ins, and Del. These keys do not have ASCII codes, and a 0 is used to indicate a function key in the keyboard buffer. The shift keys include left and right shifts, Caps Lock, Ctrl, Alt, Num Lock, and Scroll Lock. The scan codes of the shift keys are not placed in the keyboard buffer. Instead, the INT 9 routine uses the keyboard flags byte (address 0000:0417) to keep track of the shift keys. The keyboard flags can be retrieved by using INT 16h, function 2.

When certain shift keys are down, the INT 9 routine places different scan codes in the keyboard buffer to indicate key combinations. Table H.2 shows the scan codes for key combinations.

The 101-key enhanced keyboard uses a different set of make and break codes. However, except for the new keys F11 and F12, the INT 9 routine still generates the 83-key scan codes for the keyboard buffer to maintain compatibility. Table H.3 shows the new scan codes generated by the INT 9 routine for the enhanced keyboard. There are also some new combination scan codes. These new scan codes can only be retrieved by INT 16h functions 10h and 11h.

When the Ctrl key is down, INT 9 will generate different ASCII codes for letter keys. Table H.4 shows the scan code and ASCII for the key combinations.

Table H.1 83-Key Keyboard Scan Codes

<i>Hex Scan Code</i>	<i>Key</i>	<i>Hex Scan Code</i>	<i>Key</i>	<i>Hex Scan Code</i>	<i>Key</i>
01	Esc	1D	Ctrl	39	Space bar
02	1	1E	A	3A	Caps Lock
03	2	1F	S	3B	F1
04	3	20	D	3c	F2
05	4	21	F	3D	r3
06	5	22	G	3E	r4
07	6	23	H	3F	F5
08	7	24	J	40	F6
09	8	25	K	41	F7
0A	9	26	L	42	F8
0B	0	27	; :	43	F9
0c		28	' "	44	F10
0D	= +	29	' ~	45	Num lock
0E	Back Space	2A	Left Shift	46	Scroll Lock
0F	Tab	2B	\	47	7 Home
10	Q	2C	Z	48	8 Up Arrow
11	W	2D	X	49	9 Pg UP
12	E	2E	C	4A	- (num)
13	R	2F	V	4B	4 Left Arrow
14	T	30	B	4c	5 (num)
15	Y	31	N	4D	6 Right Arrow
16	U	32	M	4E	+ (num)
17	I	33	, <	4F	1 End
18	O	34	. >	50	2 Down Arrow
19	P	35	! ?	51	3 Pg Dn
1A	{ (36	Right Shift	52	0 Ins
1B	})	37	Prt Sc	53	Del
1C	Enter	38	Alt		

Table H.2 Scan Codes for Combination Keys

Scan Code	Keys	Scan Code	Keys	Scan Code	Keys
54	Shift F1	65	Ctrl F8	75	Ctrl End
55	Shift F2	66	Ctrl F9	76	Ctrl PgDn
56	Shift F3	67	Alt F10	77	Ctrl Home
57	Shift F4	68	Alt F1	78	Alt 1
58	Shift F5	69	Alt F2	79	Alt 2
59	Shift F6	6A	Alt F3	7A	Alt 3
5A	Shift F7	6B	Alt F4	7B	Alt 4
5B	Shift F8	6C	Alt F5	7c	Alt 5
5c	Shift F9	6D	Alt F6	7D	Alt 6
5D	Shift F10	6E	Alt F7	7E	Alt 7
5E	Ctrl F1	6F	Alt F8	7F	Alt 8
5F	Ctrl F2	70	Alt F9	80	Alt 9
60	Ctrl F3	71	Alt F10	81	Alt 0
61	Ctrl F4	72	Ctrl PrtSc	82	Alt .
62	Ctrl F5	73	Ctrl Left Arrow	83	Alt =
63	Ctrl F6	74	Ctrl Right Arrow	84	Ctrl PgUp
64	Ctrl F7				

Table H.3 Scan Codes for Enhanced Keyboard

Scan Code	Keys	Scan Code	Keys	Scan Code	Keys
85	F11	90	Ctrl + (num)	9B	Alt Left Arrow
86	F12	91	Ctrl Dn Arrow	9D	Alt Right Arrow
87	Shift F11	92	Ctrl Ins	9F	Alt End
88	Shift F12	93	Ctrl Del	A0	Alt Down Arrow
a9	Ctrl F11	94	Ctrl Tab	A1	Alt PgDn
8A	Ctrl F12	95	Ctrl / (num)	A2	Alt Ins
8B	Alt F11	96	Ctrl * (num)	A3	Alt Del
8C	Alt F12	97	Alt Home	A4	Alt / (num)
8D	Ctrl Up Arrow	98	Alt Up Arrow	A5	Alt Tab
8E	Ctrl . (num)	99	Alt PgUp	A6	Alt Enter (num)
8F	Ctrl 5 (num)				

(num) means numeric keypad keys.

Table H.4 ASCII Codes for Combination Keys

Keys	ASCII Code	Scan Code	Keys	ASCII Code	Scan Code
Ctrl A		1E	Ctrl N		31
Ctrl B	2	30	Ctrl O	F	18
Ctrl c	3	2E	Ctrl P	10	19
Ctrl D	4	20	Ctrl Q	11	10
Ctrl E	5	12	Ctrl R	12	13
Ctrl F	6	21	Ctrl S	13	1F
Ctrl G	7	22	Ctrl T	14	14
Ctrl H	8	23	Ctrl U	15	16
Ctrl I	9	17	Ctrl V	16	2F
Ctrl J	A	24	Ctrl W	17	11
Ctrl K	B	25	Ctrl x	18	2D
Ctrl L	C	26	Ctrl Y	19	15
Ctrl M	D	32	Ctrl Z	1A	2c