The Computer and Telecommunications Handbook

Jeff Maynard

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Preface

This is the sort of book I wish someone else had written at least ten years ago. For, if they had, I would have spent far less time researching for these odd items of reference information which are always necessary for project completion.

Indeed, it was the memories of these searches that prompted me to think about compiling this work. How I searched for such simple but difficult to find items as

- the ASCII code for End of Text,
- the symbol for an FET,
- which country uses the telex answerback HX, and
- how to calculate power loss

only reinforced the view that a single source of reference would be a great help to others in the computing and telecommunications fields.

But what to include in such a book? Would my needs be the same as those of other people? In the latter case, I think the answer is 'substantially, yes', and so I have compiled a collection of information useful to the computer and the telecommunication practitioner.

This is not really a book for browsing, although I am sure many readers will so do, but is essentially a reference work. The programmer, the system designer, the business analyst, the maintenance engineer, the network designer, the student, and the many, many other people involved today in the fields associated with information technology will find this invaluable at their right hand.

Such a work can never be exhaustive, but the bulk of what you will need, but can never find, is here. I hope the time you can save with it will be profitably spent elsewhere.

J. MAYNARD
Cheshire

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The author would like to thank the Telecommunications Users' Association (TUA) for the support they have pledged to this handbook. The TUA, (to be found at: 34, Grand Avenue, London N10 3BP; tel 01-883 7229), is an independent consumer body whose aims are to ensure that the U.K. telecommunications network serves the users as effectively as possible, making full use of modern technology, and to provide expert advice and representation for its members.

Contents

1 Character Codes

ASCII
AMERICAN NATIONAL STANDARD
CODE FOR INFORMATION INTERCHANGE

b_7 b_6 b_5 / Bits					0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
b_4	b_3	b_2	b_1	ROW ↓ / COLUMN →	0	1	2	3	4	5	6	7
0	0	0	0	0	NUL	DLE	SP	0	@	P		p
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	DC2	"	2	B	R	b	r
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
0	1	0	0	4	EOT	DC4	$	4	D	T	d	t
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	10	LF	SUB	*	:	J	Z	j	z
1	0	1	1	11	VT	ESC	+	;	K	[	k	{
1	1	0	0	12	FF	FS	,	<	L	\	l	|
1	1	0	1	13	CR	GS	-	=	M	]	m	}
1	1	1	0	14	SO	RS	.	>	N	^	n	~
1	1	1	1	15	SI	US	/	?	O	_	o	DEL

CHARACTER REPRESENTATION AND CODE IDENTIFICATION

The standard 7-bit character representation, with b_7 the high-order bit and b_1 the low-order bit, is shown below:

Example: The bit representation for the character 'K,' positioned in column 4, row 11, is

b_7	b_6	b_5	b_4	b_3	b_2	b_1
1	0	0	1	0	1	1

The code table for the character 'K' may also be represented by the notation 'column 4, row 11' or alternatively as '4/11.' The decimal equivalent of the binary number formed by bits b_7, b_6, and b_5, collectively, forms the column number,

and the decimal equivalent of the binary number formed by bits b_4, b_3, b_2, and b_1, collectively, forms the row number.

Control Characters

Col/ Row	Mnemonic and Meaning[1]	Col/ Row	Mnemonic and Meaning[1]
0/0	NUL Null	1/0	DLE Data Link Escape (CC)
0/1	SOH Start of Heading (CC)	1/1	DC1 Device Control 1
0/2	STX Start of Text (CC)	1/2	DC2 Device Control 2
0/3	ETX End of Text (CC)	1/3	DC3 Device Control 3
0/4	EOT End of Transmission (CC)	1/4	DC4 Device Control 4
0/5	ENQ Enquiry (CC)	1/5	NAK Negative Acknowledge (CC)
0/6	ACK Acknowledge (CC)	1/6	SYN Synchronous Idle (CC)
0/7	BEL Bell	1/7	ETB End of Transmission Block (CC)
0/8	BS Backspace (FE)	1/8	CAN Cancel
0/9	HT Horizontal Tabulation (FE)	1/9	EM End of Medium
0/10	LF Line Feed (FE)	1/10	SUB Substitute
0/11	VT Vertical Tabulation (FE)	1/11	ESC Escape
0/12	FF Form Feed (FE)	1/12	FS File Separator (IS)
0/13	CR Carriage Return (FE)	1/13	GS Group Separator (IS)
0/14	SO Shift Out	1/14	RS Record Separator (IS)
0/15	SI Shift In	1/15	US Unit Separator (IS)
		7/15	DEL Delete

[1] (CC) Communication Control; (FE) Format Effector; (IS) Information Separator.

Graphic Characters

Column/Row	Symbol	Name
2/0	SP	Space (Normally Non-printing)
2/1	!	Exclamation Point
2/2	"	Quotation Marks (Diaeresis)
2/3	#	Number Sign
2/4	$	Dollar Sign
2/5	%	Percent Sign
2/6	&	Ampersand
2/7	'	Apostrophe (Closing Single Quotation Mark; Acute Accent)
2/8	(	Opening Parenthesis
2/9	)	Closing Parenthesis
2/10	*	Asterisk
2/11	+	Plus
2/12	,	Comma (Cedilla)
2/13	-	Hyphen (Minus)
2/14	.	Period (Decimal Point)
2/15	/	Slant
3/0 to 3/9	0 . . . 9	Digits 0 through 9
3/10	:	Colon
3/11	;	Semicolon
3/12	<	Less Than
3/13	=	Equals
3/14	>	Greater Than

Column/Row	Symbol	Name
3/15	?	Question Mark
4/0	@	Commercial At
4/1 to 5/10	A . . . Z	Upper case Latin letters A through Z
5/11	[	Opening Bracket
5/12	\	Reverse Slant
5/13	]	Closing Bracket
5/14	^	Circumflex
5/15	—	Underline
6/0	`	Opening Single Quotation Mark (Grave Accent)
6/1 to 7/10	a . . . z	Lower case Latin letters a through z
7/11	{	Opening Brace
7/12	|	Vertical Line
7/13	}	Closing Brace
7/14	~	Tilde

ASCII (OCTAL AND HEXADECIMAL)

ASCII CODE SET

ASCII CODES					
GRAPHIC	OCTAL	HEX			
NUL	000	00	CAN	030	18
SOH	001	01	EM	031	19
STX	002	02	SUB	032	1A
ETX	003	03	ESC	033	1B
EOT	004	04	FS(IS 4)	034	1C
ENQ	005	05	GS(IS 3)	035	1D
ACK	006	06	RS(IS 2)	036	1E
BEL	007	07	US(IS 1)	037	1F
BS(FE 0)	010	08	SPACE	040	20
HT(FE 1)	011	09	!	041	21
LF(FE 2)	012	0A	"	042	22
VT(FE 3)	013	0B	£ (#)	043	23
FF(FE 4)	014	0C	$	044	24
CR(FE 5)	015	0D	%	045	25
SO	016	0E	&	046	26
SI	017	0F	'	047	27
DLE	020	10	(	050	28
DC1	021	11	)	051	29
DC2	022	12	*	052	2A
DC3	023	13	+	053	2B
DC4	024	14	,	054	2C
NAK	025	15			
SYN	026	16			
ETB	027	17			

ASCII CODES			ASCII CODES		
GRAPHIC	OCTAL	HEX	GRAPHIC	OCTAL	HEX
	055	2D	Z	132	5A
.	056	2E	[	133	5B
/	057	2F	\	134	5C
0	060	30	]	135	5D
1	061	31	^	136	5E
2	062	32	_	137	5F
3	063	33	`	140	60
4	064	34	a	141	61
5	065	35	b	142	62
6	066	36	c	143	63
7	067	37	d	144	64
8	070	38	e	145	65
9	071	39	f	146	66
:	072	3A	g	147	67
;	073	3B	h	150	68
<	074	3C	i	151	69
=	075	3D	j	152	6A
>	076	3E	k	153	6B
?	077	3F	l	154	6C
@	100	40	m	155	6D
A	101	41	n	156	6E
B	102	42	o	157	6F
C	103	43	p	160	70
D	104	44	q	161	71
E	105	45	r	162	72
F	106	46	s	163	73
G	107	47	t	164	74
H	110	48	u	165	75
I	111	49	v	166	76
J	112	4A	w	167	77
K	113	4B	x	170	78
L	114	4C	y	171	79
M	115	4D	z	172	7A
N	116	4E	{	173	7B
O	117	4F	|	174	7C
P	120	50	}	175	7D
Q	121	51	~	176	7E
R	122	52	DEL	177	7F
S	123	53			
T	124	54			
U	125	55			
V	126	56			
W	127	57			
X	130	58			
Y	131	59			

CCITT NO. 2

BAUDOT CODE

CHARACTER		IMPULSE POSITION				
Lower Case	Upper Case	1	2	3	4	5
A	–	●	●			
B	?	●			●	●
C	:		●	●	●	
D	$	●			●	
E	3	●				
F	!	●		●	●	
G	&		●		●	●
H	£			●		●
I	8		●	●		
J	'	●	●		●	
K	(	●	●	●	●	
L	)		●			●
M	.			●	●	●
N	,			●	●	
O	9				●	●
P	0		●	●		●
Q	1	●	●	●		●
R	4		●		●	
S	Bell	●		●		
T	5					●
U	7	●	●	●		
V	;		●	●	●	●
W	2	●	●			●
X	/	●		●	●	●
Y	6	●		●		●
Z	"	●				●

CHARACTER		IMPULSE POSITION				
Lower Case	Upper Case	1	2	3	4	5
LETTERS (SHIFT TO LOWER CASE)		●	●	●	●	●
FIGURES (SHIFT TO UPPER CASE)		●	●		●	●
SPACE				●		
CARRIAGE RETURN					●	
LINE FEED			●			
BLANK						
PRESENCE OF ● INDICATES MARKING IMPULSE (MARK)						
ABSENCE OF ● INDICATES SPACING IMPULSE (SPACE)						

CCITT ALPHABET NO. 5 (ISO 7 BIT CODE ISO 646)

BASIC CODE TABLE

				b_7	0	0	0	0	1	1	1	1
				b_6	0	0	1	1	0	0	1	1
				b_5	0	1	0	1	0	1	0	1
				column	0	1	2	3	4	5	6	7
b_4	b_3	b_2	b_1	row								
0	0	0	0	0	NUL	TC_7 (DLE)	SP	0	③	P	④	p
0	0	0	1	1	TC_1 (SOH)	DC_1	!	1	A	Q	a	q
0	0	1	0	2	TC_2 (STX)	DC_2	" ⑥	2	B	R	b	r
0	0	1	1	3	TC_3 (ETX)	DC_3	£(#) ②	3	C	S	c	s
0	1	0	0	4	TC_4 (EOT)	DC_4	$(¤) ③	4	D	T	d	t
0	1	0	1	5	TC_5 (ENQ)	TC_8 (NAK)	%	5	E	U	e	u
0	1	1	0	6	TC_6 (ACK)	TC_9 (SYN)	&	6	F	V	f	v
0	1	1	1	7	BEL	TC_{10} (ETB)	' ⑥	7	G	W	g	w
1	0	0	0	8	FE_0 (BS)	CAN	(	8	H	X	h	x
1	0	0	1	9	FE_1 (HT)	EM	)	9	I	Y	i	y
1	0	1	0	10	FE_2 (LF)①	SUB	*	:	J	Z	j	z
1	0	1	1	11	FE_3 (VT)①	ESC	+	;	K	③	k	③
1	1	0	0	12	FE_4 (FF)①	IS_4 (FS)	, ⑥	<	L	③	l	③
1	1	0	1	13	FE_5 (CR)①	IS_3 (GS)	-	=	M	③	m	③
1	1	1	0	14	SO	IS_2 (RS)	.	>	N	^ ④⑥	n	¯ ④⑤
1	1	1	1	15	SI	IS_1 (US)	/	?	O	-	o	DEL

NOTES ABOUT BASIC CODE TABLE

① The format effectors are intended for equipment in which horizontal and vertical movements are effected separately. If equipment requires the action of CARRIAGE RETURN to be combined with a vertical movement, the format effector for that vertical movement may be used to effect the combined movement. For example, if NEW LINE (symbol NL, equivalent to CR + LF) is required, FE_2 shall be used to represent it. This substitution requires agreement between the sender and the recipient of the data.

The use of these combined functions may be restricted for international transmission on general switched telecommunication networks (telegraph and telephone networks).

② The symbol £ is assigned to position 2/3 and the symbol $ is assigned to position 2/4. In a situation where there is no requirement for the symbol £ the symbol # (number sign) may be used in position 2/3. Where there is no requirement for the symbol $ the symbol ¤ (currency sign) may be used in position 2/4. The chosen allocations of symbols to these positions for international information interchange shall be agreed between the interested parties. It should be noted that, unless otherwise agreed between sender and recipient, the symbols £, $ or ¤ do not designate the currency of a specific country.

③ National use positions. The allocations of characters to these positions lies within the responsibility of national standardisation bodies. These positions are primarily intended for alphabet extensions. If they are not required for that purpose, they may be used for symbols.

④ Positions 5/14, 6/0 and 7/14 are provided for the symbols UPWARD ARROW HEAD, GRAVE ACCENT and OVERLINE. However, these positions may be used for other graphical characters when it is necessary to have 8, 9 or 10 positions for national use.

⑤ Position 7/14 is used for the graphic character ‾ (OVERLINE), the graphical representation of which may vary according to national use to represent ~ (TILDE) or another diacritical sign provided that there is no risk of confusion with another graphic character included in the table.

⑥ The graphic characters in positions 2/2, 2/7, 2/12 and 5/14 have respectively the significance of QUOTATION MARK, APOSTROPHE, COMMA and UPWARD ARROW HEAD; however, these characters take on the significance of the diacritical signs DIAERESIS, ACUTE ACCENT, CEDILLA and CIRCUMFLEX ACCENT when they are preceded or followed by the BACKSPACE character (0/8).

CONTROL CHARACTERS

Abbreviation	Note	Meaning	Position in the code table
ACK		Acknowledge	0/6
BEL		Bell	0/7
BS		Backspace	0/8
CAN		Cancel	1/8
CR	1	Carriage Return	0/13
DC		Device Control	–
DEL		Delete	7/15
DLE		Data Link Escape	1/0
EM		End of Medium	1/9
ENQ		Enquiry	0/5
EOT		End of Transmission	0/4
ESC		Escape	1/11
ETB		End of Transmission Block	1/7
ETX		End of Text	0/3
FE		Format Effector	–
FF	1	Form Feed	0/12
FS		File Separator	1/12
GS		Group Separator	1/13
HT		Horizontal Tabulation	0/9
IS		Information Separator	–
LF	1	Line Feed	0/10
NAK		Negative Acknowledge	1/5
NUL		Null	0/0
RS		Record Separator	1/14
SO		Shift-Out	0/14
SI		Shift-In	0/15
SOH		Start of Heading	0/1
SP		Space	2/0
STX		Start of Text	0/2
SUB		Substitute Character	1/10
SYN		Synchronous Idle	1/6
TC		Transmission Control	–
US		Unit Separator	1/15
VT	1	Vertical Tabulation	0/11