

# ECMA

EUROPEAN COMPUTER MANUFACTURERS ASSOCIATION

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STANDARD ECMA-113

8-BIT SINGLE-BYTE  
CODED GRAPHIC CHARACTER SETS

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LATIN/CYRILLIC ALPHABET

June 1986

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## BRIEF HISTORY

The adoption of ECMA-6 (ISO 646) as the agreed international 7-bit code for information interchange had led to the development of many national, international and application-oriented versions of this code which are in wide used today.

These versions have a number of limitations generally inherent to the size of the code:

- they do not provide all graphic characters which may be needed,
- for some characters, specially for accented letters, it is necessary to resort to BACKSPACE sequences, which creates problems when processing data containing such composite characters,
- interchange among different versions is practically limited to the 82 common graphic characters.

With the advent of 8-bit coding it was possible to increase the number of graphic characters. ISO 6937/2, for example, provides a character set covering the requirements of most languages based on the Latin alphabet. This character set, although well suited for text communication, is difficult to use for processing as some graphic characters are represented by one and others by two bit combinations.

Thus the need was recognized for coded graphic character sets, each of which:

- is the same for all users of a given area,
- provides single-byte coding of all graphic characters thus permitting easy processing,
- takes into account character sets used in the industry.

Since 1982 the urgency of the need for an 8-bit single-byte coded character set was recognized in ECMA as well as in ANSI/X3L2 and numerous working papers were exchanged between the two groups. In February 1984 ECMA TC1 submitted to ISO/TC97/SC2 a proposal for such a coded character set. At its meeting of April 1984 SC2 decided to submit to TC97 a proposal for a new item of work for this topic. Technical discussions during and after this meeting led TC1 to adopt the coding scheme proposed by X3L2. International Standard ISO 8859/1 is based on this joint ANSI/ECMA proposal. ECMA published its corresponding Standard ECMA-94 in March 1985.

After this first publication, the work of ECMA TC1 on further coded graphic character sets has led to the following results:

- i) The present Standard for a Latin/Cyrillic coded graphic character set.
- ii) The second Edition of Standard ECMA-94 comprising four coded graphic character sets for the Latin script, identified as Latin Alphabets No 1 to No 4. These alphabets have a number of characters in common, in particular those allocated to columns 02 to 07. Latin Alphabet No 2 has been submitted to ISO and is the subject of ISO 8859/2.

iii) A series of ECMA Standards for coded graphic character sets comprising those characters of the Latin Alphabets allocated to columns 02 to 07 and characters of another script for multiple-language applications. These ECMA Standards cover the Greek and Arabic scripts. It is intended to submit them to ISO for further processing as ISO standards.

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Adopted as an ECMA Standard by the General Assembly of June 26, 1986.

1. SCOPE

This ECMA Standard consists of a set of 191 graphic characters identified as Latin/Cyrillic Alphabet, and specifies the coded representation of each of these characters by means of a single 8-bit byte. None of these characters are "non-spacing".

The use of control functions, such as BACKSPACE or CARRIAGE RETURN for the coded representation of composite characters is prohibited by this Standard.

2. FIELD OF APPLICATION

This set of graphic characters, the Latin/Cyrillic Alphabets intended for use in data and text processing applications and may also be used for information interchange.

This set is suited for multiple-language applications involving the Latin and the Cyrillic scripts. It allows handling of data and text expressed in Bulgarian, Byelorussian, English, Macedonian, Russian, Serbocroatian and Ukranian.

This set of graphic characters is suitable for use in a version of an 8-bit code according to ECMA-35 or ECMA-43.

3. CONFORMANCE

A set of graphic characters is in conformance with this Standard if it comprises all graphic characters specified herein to the exclusion of any other and if their coded representations are those specified by this Standard.

4. REFERENCES

- ECMA-6 : 7-bit Input/Output Coded Character Set
- ECMA-35 : Code Extension Techniques
- ECMA-43 : 8-bit Coded Character Set - Structure and Rules
- ECMA-48 : Control Functions
- ECMA-94 : 8-bit Single Byte Coded Graphic Character Sets - Latin Alphabets No 1 to No 4.
- ECMA-114 : 8-bit Single Byte Coded Graphic Character Sets - Latin/Arabic Alphabet
- ECMA- : 8-bit Single Byte Coded Graphic Character Sets - Latin/Greek Alphabet (in preparation)

5. DEFINITIONS

For the purpose of this Standard the following definitions apply:

5.1 Bit Combination; Byte

An ordered set of bits that represents a character or is used as a part of the representation of a character.

5.2 Character

A member of a set of elements used for the organization, control or representation of data.

5.3 Coded Character Set; Code

A set of unambiguous rules that establishes a character set and the one-to-one relationship between each character of the set and its coded representation.

5.4 Code Table

A table showing the character allocated to each bit combination in a code.

5.5 Graphic Character

A character, other than a control function, that has a visual representation normally handwritten, printed or displayed, and that has a coded representation consisting of one or more bit combinations.

Note 1

In this Standard a single bit combination is used to represent each character.

5.6 Graphic Symbol

A visual representation of a graphic character.

5.7 Position

That part of a code table identified by its column and row co-ordinates.

6. NOTATION, CODE TABLE AND NAMES

6.1 Notation

The bits of the bit combinations of the 8-bit code are identified by  $b_8, b_7, b_6, b_5, b_4, b_3, b_2$  and  $b_1$ , where  $b_8$  is the highest-order, or most-significant bit and  $b_1$  is the lowest-order, or least-significant bit.

The bit combinations may be interpreted to represent numbers in binary notation by attributing the following weights to the individual bits:

Bit	$b_8$	$b_7$	$b_6$	$b_5$	$b_4$	$b_3$	$b_2$	$b_1$
Weight	128	64	32	16	8	4	2	1

Using these weights, the bit combinations of the 8-bit code represent numbers in the range 0 to 255.

In this Standard, the bit combinations are identified by notations of the form  $xx/yy$ , where  $xx$  and  $yy$  are numbers in the range 00 to 15. The correspondence between the notations of the form  $xx/yy$  and the bit combinations consisting of the bits  $b_8$  to  $b_1$ , is as follows:

-  $xx$  is the number represented by  $b_8, b_7, b_6$  and  $b_5$  where these bits are given the weights 8, 4, 2 and 1 respectively;

-  $yy$  is the number represented by  $b_4, b_3, b_2$  and  $b_1$  where these bits are given the weights 8, 4, 2 and 1 respectively.

6.2 Layout of the Code Table

An 8-bit code table consists of 256 positions arranged in 16 columns and 16 rows. The columns and the rows are numbered 00 to 15.

The code table positions are identified by notations of the number.

The positions of the code table are in one-to-one correspondence with the bit combinations of the code. The notation of a code table position, of the form  $xx/yy$ , is the same as that of the corresponding bit combination.

6.3 Names and Meanings

This Standard assigns at least one name to each character. In addition, it specifies a graphic symbol for each graphic character. By convention only capital letters, the graphic symbols of small letters and hyphens are used for writing the names of the characters.

The names chosen to denote graphic characters are intended to reflect their customary meaning. However, except for SPACE (SP), NO-BREAK SPACE (NBSP) and SOFT HYPHEN (SHY), this Standard does not define and does not restrict the meanings of graphic characters. Neither does it specify a particular style or font design for imaging graphic characters.

6.3.1 SPACE (SP)

This character may be interpreted as a graphic character, a control character or as both. As a graphic character it has the visual representation consisting of the absence of a graphic symbol.

6.3.2 NO-BREAK SPACE (NBSP)

A graphic character the visual representation of which consists of the absence of a graphic symbol, for use when a line break is to be prevented in the text as presented.

6.3.3 SOFT HYPHEN (SHY)

A graphic character that is imaged by a graphic symbol identical with, or similar to, that representing HYPHEN, for use when a line break is permitted in the text as presented.

7. SPECIFICATION OF THE CODED CHARACTER SET

This Standard specifies 191 characters allocated to the bit combinations of the Code Table.

7.1 Characters of the Set and their Coded Representation

Bit Combination	Name
02/00	SPACE
02/01	EXCLAMATION MARK
02/02	QUOTATION MARK
02/03	NUMBER SIGN
02/04	DOLLAR SIGN
02/05	PERCENT SIGN
02/06	AMPERSAND
02/07	APOSTROPHE
02/08	LEFT PARENTHESIS
02/09	RIGHT PARENTHESIS
02/10	ASTERISK
02/11	PLUS SIGN
02/12	COMMA
02/13	HYPHEN, MINUS SIGN
02/14	FULL STOP
02/15	SOLIDUS
03/00	DIGIT ZERO
03/01	DIGIT ONE
03/02	DIGIT TWO
03/03	DIGIT THREE
03/04	DIGIT FOUR
03/05	DIGIT FIVE
03/06	DIGIT SIX
03/07	DIGIT SEVEN
03/08	DIGIT EIGHT
03/09	DIGIT NINE
03/10	COLON
03/11	SEMICOLON
03/12	LESS-THAN SIGN

Bit Combination	Name
03/13	EQUALS SIGN
03/14	GREATER-THAN SIGN
03/15	QUESTION MARK
04/00	COMMERCIAL AT
04/01	CAPITAL LETTER A
04/02	CAPITAL LETTER B
04/03	CAPITAL LETTER C
04/04	CAPITAL LETTER D
04/05	CAPITAL LETTER E
04/06	CAPITAL LETTER F
04/07	CAPITAL LETTER G
04/08	CAPITAL LETTER H
04/09	CAPITAL LETTER I
04/10	CAPITAL LETTER J
04/11	CAPITAL LETTER K
04/12	CAPITAL LETTER L
04/13	CAPITAL LETTER M
04/14	CAPITAL LETTER N
04/15	CAPITAL LETTER O
05/00	CAPITAL LETTER P
05/01	CAPITAL LETTER Q
05/02	CAPITAL LETTER R
05/03	CAPITAL LETTER S
05/04	CAPITAL LETTER T
05/05	CAPITAL LETTER U
05/06	CAPITAL LETTER V
05/07	CAPITAL LETTER W
05/08	CAPITAL LETTER X
05/09	CAPITAL LETTER Y
05/10	CAPITAL LETTER Z
05/11	LEFT SQUARE BRACKET
05/12	REVERSE SOLIDUS
05/13	RIGHT SQUARE BRACKET
05/14	CIRCUMFLEX ACCENT
05/15	LOW LINE
06/00	GRAVE ACCENT

Bit Combination	Name
06/01	SMALL LETTER a
06/02	SMALL LETTER b
06/03	SMALL LETTER c
06/04	SMALL LETTER d
06/05	SMALL LETTER e
06/06	SMALL LETTER f
06/07	SMALL LETTER g
06/08	SMALL LETTER h
06/09	SMALL LETTER i
06/10	SMALL LETTER j
06/11	SMALL LETTER k
06/12	SMALL LETTER l
06/13	SMALL LETTER m
06/14	SMALL LETTER n
06/15	SMALL LETTER o
07/00	SMALL LETTER p
07/01	SMALL LETTER q
07/02	SMALL LETTER r
07/03	SMALL LETTER s
07/04	SMALL LETTER t
07/05	SMALL LETTER u
07/06	SMALL LETTER v
07/07	SMALL LETTER w
07/08	SMALL LETTER x
07/09	SMALL LETTER y
07/10	SMALL LETTER z
07/11	LEFT CURLY BRACKET
07/12	VERTICAL LINE
07/13	RIGHT CURLY BRACKET
07/14	TILDE
10/00	NO-BREAK SPACE
10/01	SERBOCROATIAN CYRILLIC SMALL LETTER DJE
10/02	CYRILLIC SMALL LETTER GJE
10/03	CYRILLIC SMALL LETTER IO
10/04	UKRANIAN CYRILLIC SMALL LETTER JE
10/05	MACEDONIAN CYRILLIC SMALL LETTER DSE

Bit Combination	Name
10/06	UKRANIAN CYRILLIC SMALL LETTER I
10/07	UKRANIAN CYRILLIC SMALL LETTER YI
10/08	CYRILLIC SMALL LETTER JE
10/09	CYRILLIC SMALL LETTER LJE
10/10	CYRILLIC SMALL LETTER NJE
10/11	SERBOCROATIAN CYRILLIC SMALL LETTER T(J)SHE
10/12	MACEDONIAN CYRILLIC SMALL LETTER KJE
10/13	SOFT HYPHEN
10/14	CYRILLIC SMALL LETTER SHORT u
10/15	MACEDONIAN CYRILLIC SMALL LETTER DZE
11/00	NUMBER ACRONYM
11/01	SERBOCROATIAN CYRILLIC CAPITAL LETTER DJE
11/02	CYRILLIC CAPITAL LETTER GJE
11/03	CYRILLIC CAPITAL LETTER IO
11/04	UKRANIAN CYRILLIC CAPITAL LETTER JE
11/05	MACEDONIAN CYRILLIC CAPITAL LETTER DSE
11/06	UKRANIAN CYRILLIC CAPITAL LETTER I
11/07	UKRANIAN CYRILLIC CAPITAL LETTER YI
11/08	CYRILLIC CAPITAL LETTER JE
11/09	CYRILLIC CAPITAL LETTER LJE
11/10	CYRILLIC CAPITAL LETTER NJE
11/11	SERBOCROATIAN CYRILLIC CAPITAL LETTER T(J)SHE
11/12	MACEDONIAN CYRILLIC CAPITAL LETTER KJE
11/13	CURRENCY SIGN
11/14	CYRILLIC CAPITAL LETTER SHORT U
11/15	MACEDONIAN CYRILLIC CAPITAL LETTER DZE
12/00	CYRILLIC SMALL LETTER YU
12/01	CYRILLIC SMALL LETTER A
12/02	CYRILLIC SMALL LETTER BE
12/03	CYRILLIC SMALL LETTER TSE
12/04	CYRILLIC SMALL LETTER DE
12/05	CYRILLIC SMALL LETTER IE
12/06	CYRILLIC SMALL LETTER EF
12/07	CYRILLIC SMALL LETTER GHE
12/08	CYRILLIC SMALL LETTER HA
12/09	CYRILLIC SMALL LETTER I



Bit Combination	Name
12/10	CYRILLIC SMALL LETTER SHORT I
12/11	CYRILLIC SMALL LETTER KA
12/12	CYRILLIC SMALL LETTER EL
12/13	CYRILLIC SMALL LETTER EM
12/14	CYRILLIC SMALL LETTER EN
12/15	CYRILLIC SMALL LETTER O
13/00	CYRILLIC SMALL LETTER PE
13/01	CYRILLIC SMALL LETTER YA
13/02	CYRILLIC SMALL LETTER ER
13/03	CYRILLIC SMALL LETTER ES
13/04	CYRILLIC SMALL LETTER TE
13/05	CYRILLIC SMALL LETTER U
13/06	CYRILLIC SMALL LETTER ZAE
13/07	CYRILLIC SMALL LETTER VE
13/08	CYRILLIC SMALL SOFT SIGN
13/09	CYRILLIC SMALL LETTER YERU
13/10	CYRILLIC SMALL LETTER ZE
13/11	CYRILLIC SMALL LETTER SHA
13/12	CYRILLIC SMALL LETTER E
13/13	CYRILLIC SMALL LETTER SHCHA
13/14	CYRILLIC SMALL LETTER CHE
13/15	CYRILLIC SMALL HARD SIGN
14/00	CYRILLIC CAPITAL LETTER YU
14/01	CYRILLIC CAPITAL LETTER A
14/02	CYRILLIC CAPITAL LETTER BE
14/03	CYRILLIC CAPITAL LETTER TSE
14/04	CYRILLIC CAPITAL LETTER DE
14/05	CYRILLIC CAPITAL LETTER IE
14/06	CYRILLIC CAPITAL LETTER EF
14/07	CYRILLIC CAPITAL LETTER GHE
14/08	CYRILLIC CAPITAL LETTER HA
14/09	CYRILLIC CAPITAL LETTER I
14/10	CYRILLIC CAPITAL LETTER SHORT I
14/11	CYRILLIC CAPITAL LETTER KA
14/12	CYRILLIC CAPITAL LETTER EL
14/13	CYRILLIC CAPITAL LETTER EM

Bit Combination	Name
14/14	CYRILLIC CAPITAL LETTER EN
14/15	CYRILLIC CAPITAL LETTER O
15/00	CYRILLIC CAPITAL LETTER PE
15/01	CYRILLIC CAPITAL LETTER YA
15/02	CYRILLIC CAPITAL LETTER ER
15/03	CYRILLIC CAPITAL LETTER ES
15/04	CYRILLIC CAPITAL LETTER TE
15/05	CYRILLIC CAPITAL LETTER U
15/06	CYRILLIC CAPITAL LETTER ZHE
15/07	CYRILLIC CAPITAL LETTER VE
15/08	CYRILLIC CAPITAL SOFT SIGN
15/09	CYRILLIC CAPITAL LETTER YERU
15/10	CYRILLIC CAPITAL LETTER ZE
15/11	CYRILLIC CAPITAL LETTER SHA
15/12	CYRILLIC CAPITAL LETTER E
15/13	CYRILLIC CAPITAL LETTER SHCHA
15/14	CYRILLIC CAPITAL LETTER CHE
15/15	CYRILLIC CAPITAL HARD SIGN

7.2 Code Table

The Code Table shows the characters listed at the position in the code table corresponding to the specified bit combination.

The shaded positions correspond to bit combinations that do not represent graphic characters. Their use is outside the scope of this Standard, it is specified in other ECMA Standards, e.g. ECMA-6 or ECMA-48.

8. DESIGNATION OF THE CHARACTER SET

The graphic characters of this Standard constitute a single coded character set. However, when this character set is implemented together with other coding standards such as ECMA-35 or ECMA-43, the Code Table of this Standard shall be considered to consist of the following components:

- The character SPACE represented by bit combination 02/00.
- A 94-character G0 graphic character set represented by bit combinations 02/01 to 07/14.
- A 96-character G1 graphic character set represented by bit combinations 10/00 to 15/15.

When required by other coding standards, e.g. ECMA-35 or ECMA-43 the following pair of escape sequences shall be used:

ESC 02/08 04/02  
ESC 02/13 04/00

to designate the G0 and the G1 sets, respectively. According to ECMA-35 the character SPACE does not require designation.

CODE TABLE OF THE LATIN/CYRILLIC ALPHABET

b.	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1					
b.	0	0	0	0	1	1	1	0	0	0	0	1	1	1	1					
b.	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1					
b.	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0					
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15				
b.	b.	b.	b.																	
0	0	0	0	00			SP	0	а	Р	`	р			NBSP	№	ю	п	Ю	П
0	0	0	1	01			!	1	А	Q	а	q			ъ	Ѣ	а	я	А	Я
0	0	1	0	02			"	2	В	Р	б	р			ѓ	Ђ	б	р	Б	Р
0	0	1	1	03			#	3	С	Ѕ	с	ѕ			ё	Ё	ц	с	Ц	С
0	1	0	0	04			\$	4	Д	Т	д	т			є	Є	д	т	Д	Т
0	1	0	1	05			%	5	Е	U	е	u			ѕ	Ѕ	е	у	Е	У
0	1	1	0	06			&	6	Ф	Ѵ	ф	ѵ			і	І	ф	ж	Ф	Ж
0	1	1	1	07			'	7	Г	Ѵ	г	ѵ			ї	Ї	г	в	Г	В
1	0	0	0	08			(	8	Н	Х	н	х			ј	Ј	х	ь	Х	Ь
1	0	0	1	09			)	9	І	У	і	у			љ	Љ	и	ы	И	Ы
1	0	1	0	10			*	:	Ј	Ѕ	ј	ѕ			њ	Њ	й	з	Й	З
1	0	1	1	11			+	;	К	Ѓ	к	ќ			ћ	Ћ	к	ш	К	Ш
1	1	0	0	12			,	<	Л	Љ	л	љ			ќ	Ѓ	л	э	Л	Э
1	1	0	1	13			-	=	М	Ј	м	њ			SHY	ѡ	м	щ	М	Щ
1	1	1	0	14			.	>	Н	^	н	~			ў	Ў	н	ч	Н	Ч
1	1	1	1	15			/	?	О	_	о				џ	Џ	о	ѣ	О	ѣ