ECMA
EUROPEAN COMPUTER MANUFACTURERS ASSOCIATION

STANDARD ECMA-48

CONTROL FUNCTIONS FOR CODED CHARACTER SETS

4th Edition – December 1986

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BRIEF HISTORY

In parallel with the work on Standards ECMA-6 for the 7-bit coded character set, ECMA-35 for code extension techniques and ECMA-43 for the rules and structure of 8-bit codes, TC1, the coding committee of ECMA, worked on the definition and coding of the control functions to be used with the various standards for coded graphic character sets produced by ECMA, viz. ECMA-94, ECMA-113, ECMA-114 and ECMA-118.

The first edition of this Standard ECMA-48 was published in 1976. A second and a third edition were published in 1979 and 1984, respectively. The text was technically identical with that of ISO 6429. In the meantime a revision of the latter has been undertaken by ISO/TC97/SC2/WG-6.

The scope of the standard has been enlarged so as to comprise all possible control functions needed by very different applications and codes, including those specified in ECMA-6 and the shift functions of ECMA-35. SC2/WG-6 being responsible in ISO for the standardization of the definitions and coding of control functions numerous requests have been received from other standardization committees for inclusion of control functions needed in specific applications. As a consequence the publication of the next edition of ISO 6429 is delayed, although a body of about 150 control functions is now stable and well defined.

The present 4th edition of ECMA-48 contains the definitions and coding of all control functions already agreed by SC2/WG-6. The purpose of this publication is to make them available to the information technology community at large so that their implementation facilitates data interchange.

Adopted by the General Assembly of ECMA on Dec. 11, 1986.

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1. SCOPE AND FIELD OF APPLICATION

1.1 This ECMA Standard defines control functions and their coded representations for use in a 7-bit code, an extended 7-bit code, an 8-bit code or an extended 8-bit code, if such a code is structured in accordance with Standard ECMA-35. This Standard specifies a C0 set, a C1 set, control functions derived therefrom and a number of independent control functions.

1.2 The control functions are intended to be used embedded in character-coded data for interchange with character-imaging devices.

A character-imaging device is a device which is capable of receiving a data stream that consists of coded control functions and graphic characters, and is capable of producing character image output, i.e. output that can be read by a human being. The character image output is, in general, produced in the form of one or more rectangular arrays of character positions and lines which are called pages.

If the device is an input/output device rather than merely an output device, it is also capable of transmitting a data stream that consists of coded control functions and graphic characters; the transmitted data stream is, in general, composed of a combination of data which have been sent to the device and data which have been entered locally into the device, for example by an associated keyboard.

In general, the control functions are defined by their effects on a character-imaging input/output device. It is, therefore, necessary to make certain assumptions about the device architecture. These assumptions are as unrestrictive as possible; they are specified in 6.

In addition to being performed the control functions may need to be represented by a graphic symbol.

The structure of this Standard is open-ended, so that more control functions can be included in future editions.

Other standards specifying control functions may define more restricted definitions of them than those in this Standard.

1.3 The devices to which this Standard applies can vary greatly from each other depending on the application for which a device has been specifically designed. It is technically and economically impractical for one device to implement all the facilities specified in this Standard. The intention is that within any type of device only a limited selection of the facilities appropriate to the application will be implemented.

2. CONFORMANCE

2.1 Types of Conformance

Full conformance to a standard means that all of its requirements are met. Conformance will only have a unique meaning if the standard contains no options. If there are options within the standard they must be clearly identified, and any claim of conformance must include a statement that identifies those options that have been adopted.

This Standard is of a different nature since it specifies a large number of facilities from which different selections may be made to suit individual applications. These selections are not identified in the Standard, but must be identified at the time that a claim of conformance is made. Conformance to such an identified selection is known as limited conformance.

2.2 Conformance of Information Interchange

Information that is interchanged at a coding interface is in conformance with this Standard if the coded representations of that information satisfy the following conditions :

i) A coded representation of a control function that is specified in this Standard shall always represent that control function.

ii) A control function that is specified in this Standard shall always be represented by the coded representation that is specified in this Standard for that control function.

iii) Any coded representation that is reserved for future standardization by this Standard shall not appear.

Coded representations of control functions and modes not specified in this Standard may appear in interchanged information subject to the above conditions (see 7.4).

2.3 Conformance of Devices

A device is in conformance with this Standard if it conforms to the requirements of 2.3.1, and either or both of 2.3.2 and 2.3.3 below. Any claim of conformance shall identify the document which contains the description specified in 2.3.1.

2.3.1 Device Description

A device that conforms to this Standard shall be the subject of a description that :

i) identifies, by reference to the clauses of, or to the control functions specified in this Standard, the selection of control functions, the coded representations of which the device can originate or can receive and interpret;

ii) identifies the means by which the user may supply the corresponding control functions, or may recognize them, as specified respectively in 2.3.2 and 2.3.3 below.

2.3.2 Originating Devices

An originating device shall be capable of transmitting over a coding interface the coded representations of an identified selection of control functions, and of their parameter values (including mode selection parameters), conforming to this Standard.

Such a device shall allow the user to supply any control function that he chooses from among the identified selection for the purpose of transmitting its coded representation over the coding interface.

2.3.3 Receiving Devices

A receiving device shall be capable of receiving over a coding interface and interpreting the coded representations of an identified selection of control functions, and of their parameter values (including mode selection parameters), conforming to this Standard.

If the identified selection contains a control sequence for which a default value for a parameter is specified in this Standard, the identified selection shall include the default value both in explicit and in implicit representations.

Such a device shall make available to the user any control function that is within the identified selection, and the coded representation of which is received over the coding interface, in such a form that the user can recognize it from among the control functions within the identified selection.

3. REFERENCES

ECMA-6 : 7-Bit Coded Character Set

ECMA-35 : Code Extension Techniques

ECMA-43 : 8-Bit Code - Structure and Rules

ECMA-94 : 8-Bit Single-Byte Coded Graphic Character Set - Latin Alphabet No 1 to No 4

ECMA-113 : 8-Bit Single-Byte Coded Graphic Character Sets - Latin/Cyrillic Alphabet

ECMA-114 : 8-Bit Single-Byte Coded Graphic Character Sets - Latin/Arabic Alphabet

ECMA-118 : 8-Bit Single-Byte Coded Character Sets - Latin/Greek Alphabet

ECMA- : 8-Bit Single-Byte Coded Character Sets - Latin/Hebrew Alphabet (in preparation)

ISO 1745 : Information Processing - Basic Mode Control Procedures for Data Communication Systems

ISO 2375 : Data Processing - Procedure for Registration of Escape Sequences

ISO 6937/3 : Information Processing - Coded Character Sets for Text Communication - Part 3 : Control Functions for Page Image Format

ISO 6937/4 : Information Processing - Coded Character Sets for Text Communication - Part 4 : Control Functions for Formattable and Formatted Text

ISO 7350 : Text Communication - Registration of Graphic Character Subrepertoires.

ISO International Register of Coded Character Sets to be Used with Escape Sequences.

CCITT Recommendation T.61, 1984.

4. NOTATION AND DEFINITIONS

4.1 Notation

In this Standard a convention has been adopted to assist the reader. Capital letters are used to refer to a specific control function, mode, mode setting, or graphic character in order to avoid confusion , for example, between the concept "space" and the character SPACE (pos. 02/00).

It is intended that this convention and the acronyms of the modes and the control functions be retained in all translations of the text.

This Standard uses the notation of the form xx/yy, where xx represents the column number 00 to 07 in a 7-bit code table or 00 to 15 in an 8-bit code table, and yy represents the row number 00 to 15.

4.2 Definitions

For the purpose of this Standard, the following definitions apply.

4.2.1 Active Area

The area which contains the active position.

4.2.2 Active Field

The field which contains the active position.

4.2.3 Active Line

The line which contains the active position.

4.2.4 Active Page

The page which contains the active position.

4.2.5 Active Position

The character position which is to image the graphic symbol representing the next graphic character or the next control function for which a graphic representation is required. In general, the active position is indicated by a cursor.

4.2.6 Area

A series of successive character positions that are not necessarily on the same line.

4.2.7 Bit Combination

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

4.2.8 Byte

A bit string that is operated upon as a unit.

4.2.9 Character

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

4.2.10 Character-imaging Device

A device that gives a visual representation of data in the form of graphic symbols using any technology, for example, cathode ray tube or printer.

4.2.11 Character Path

The direction of presentation of successive graphic characters along a line.

4.2.12 Character Position

The portion of a display that is imaging or is capable of imaging a graphic symbol.

4.2.13 Coded Character Set; Code

A set of unambiguous rules that establishes a character set and the one-to-one relationship between the characters of the set and their bit combinations.

4.2.14 Code Extension

The techniques for the encoding of characters that are not included in the character set of a given code.

4.2.15 Code Table

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

4.2.16 Coding Interface

The boundary across which coded information, including coded characters, may be conveyed between an originating device and a receiving device.

4.2.17 Control Character

A control function the coded representation of which consists of a single bit combination.

4.2.18 Control Function

An element of a character set that affects the recording, processing, transmission, or interpretation of data, and that has a coded representation consisting of one or more bit combinations.

4.2.19 Default

A value or a state that is to be assumed when no value or state is explicitly specified.

4.2.20 To designate

To identify a set of characters that are to be represented, in some cases immediately and in others on the occurrence of a further control function, in a prescribed manner.

4.2.21 Display

The region for visual presentation of data on any type of character-imaging device, including printer and cathode ray tube devices. A display consists of a series of lines composed of character positions.

Note 1

In this Standard the term display does not mean a cathode ray tube device exclusively.

4.2.22 Environment

The characteristic that identifies the number of bits used to represent a character in a data processing or data communication system or in part of such a system.

4.2.23 Escape Sequence

A bit string that is used for control purposes in code extension procedures and that consists of two or more bit combinations. The first of these bit combinations represents the character ESCAPE.

4.2.24 Field

An area consisting of the character position at a character tabulation stop (beginning of the field) and the character positions up to, but not including, the character position at the following character tabulation stop (end of the field).

4.2.25 Final Byte

The bit combination that terminates an Escape Sequence or a Control Sequence.

4.2.26 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.

4.2.27 Graphic Rendition

The visual style of displaying a set of graphic symbols.

4.2.28 Graphic Symbol

A visual representation of a graphic character or of a control function.

4.2.29 Initial State

The state a device has after it is made operational. It is recommended "reset" state of the modes.

4.2.30 Intermediate Byte

- In an Escape Sequence, a bit combination that may occur between the control function ESCAPE (ESC) and the Final Byte.
- In a Control Sequence, a bit combination that may occur between the control function CONTROL SEQUENCE INTRODUCER (CSI) and the Final Byte, or between the parameter string and the Final Byte.

4.2.31 To invoke

To cause a designated set of characters to be represented by the prescribed bit combinations whenever those bit combinations occur, until an appropriate code extension function occurs.

4.2.32 Line Progression

The direction of presentation of successive lines.

4.2.33 Operating System

The software that controls the execution of computer programs and that may provide scheduling, debugging, input/output control, accounting, compilation, storage assignment, data management, and related services.

4.2.34 Parameter Byte

In a Control Sequence, a bit combination that may occur between the control function CONTROL SEQUENCE INTRODUCER (CSI) and the Final Byte, or between CSI and an Intermediate Byte.

4.2.35 Position

The part of a code table identified by its column and row coordinates.

4.2.36 Private (or Experimental) Use

The means of representing a non-standardized control function in a manner compatible with this Standard.

4.2.37 Repertoire

The set of characters which can be represented by means of a coded representation using a coded character set.

4.2.38 Scroll

The action whereby all, or a part of, the graphic symbols of a display are moved in a specified direction.

4.2.39 Tabulation

The technique of identifying character positions or lines in a display for the purpose of arranging information systematically.

4.2.40 Tabulation Stop

The indication that a character position or a line is to be used for tabulation ; a character tabulation stop may also serve as a boundary between fields.

5. CODED REPRESENTATION

5.1 General

Each control function in this Standard (except DELETE) belongs to one of the following types:

- Elements of the C0 set
- Elements of the C1 set
- Control sequences
- Independent control functions
- Control strings.

5.2 DELETE

This control function does not belong to any set. For reference purposes it is considered to be an element of the Cx set.

5.3 Elements of the C0 Set

These control functions are represented in 7-bit and 8-bit codes by bit combinations from 00/00 to 01/15.

This method of representation permits coding of up to 32 control functions.

The definitions and the coded representations of the control functions are specified in 8.3. See also Table 1.

The 3-character escape sequence designating and invoking this C0 set is ESC 02/01 04/00.

Note 2

It is assumed that even with no invoked C0 set the control character ESCAPE is available and is represented by bit-combination 01/11.

Row Number	Column Number	
	00	01
00	NUL	DLE
01	SOH	DC1
02	STX	DC2
03	ETX	DC3
04	EOT	DC4
05	ENQ	NAK
06	ACK	SYN
07	BEL	ETB
08	BS	CAN
09	HT	EM
10	LF	SUB
11	VT	ESC
12	FF	IS4
13	CR	IS3
14	SO or LS1	IS2
15	SI or LS0	IS1

TABLE 1 - Bit Combinations representing the Control Functions of the C0 Set.

5.4 Elements of the C1 Set

These control functions are represented:

- In a 7-bit code by 2-character escape sequences of the form ESC Fe, where ESC is represented by bit combination 01/11 and Fe is represented by a bit combination from 04/00 to 05/15.
- In an 8-bit code by bit combinations from 08/00 to 09/15.

Note 3

When the Announcer sequence ESC 02/00 04/06 according to ECMA-35 is used, the control functions of the C1 set are represented by ESC Fe sequences in a 7-bit as well as in an 8-bit code.

This method of representation permits coding of up to 32 control functions.

The definitions and the coded representations of the control functions are specified in 8.3. See also Table 2.

The 3-character escape sequence designating and invoking this C1 set is ESC 02/02 F. When the C1 set will be registered according to ISO 2375, the letter F will be replaced by the bit combination for the Final Byte allocated by the Registration Authority.

Row Number	Column Number		
	7-bit code	04	05
	8-bit code	08	09
00		-	DCS
01		-	PU1
02		BPH	PU2
03		NBH	STS*
04		IND*	CCH
05		NEL	MW
06		SSA	SPA*
07		ESA	EPA*
08		HTS	SOS
09		HTJ	-
10		VTS	SCI
11		PLD	CSI
12		PLU	ST
13		RI	OSC
14		SS2	PM
15		SS3	APC

* See Appendix E2

TABLE 2 - Bit Combinations representing the Control Functions of the C1 Set

The unallocated bit combinations in the table are reserved for future standardization and shall not be used. They are not available for private (or experimental) use.

Note 4

In a 7-bit code the bit combinations shown in columns 04 and 05 are preceded by the control character ESCAPE to represent the control functions listed in the table.

5.5 Control Sequences

A control sequence consists of the control function CONTROL SEQUENCE INTRODUCER (CSI) followed by one or more bit combina-

tions representing parameters, if any, and by one or more bit combinations identifying the control function. The control function CSI itself is an element of the C1 set.

The format of a control sequence is

CSI P...P I...I F

where:

- CSI is represented by bit combinations 01/11 (representing ESC) and 05/11 in a 7-bit code or by bit combination 09/11 in an 8-bit code (see 5.4),
- P...P are Parameter Bytes, which, if present, consist of bit combinations from 03/00 to 03/15,
- I...I are Intermediate Bytes, which, if present, consist of bit combinations from 02/00 to 02/15. Together with the Final Byte F, they identify the control function,

  Note 5

  The number of Intermediate Bytes is not limited by this Standard; in practice, one Intermediate Byte will be sufficient since over one thousand control functions may be identified in this way.

- F is the Final Byte; it consists of a bit combination from 04/00 to 07/14; it terminates the control sequence and together with the Intermediate Bytes, if present, identifies the control function.

The definitions and the coded representations of the control functions are specified in 8.3. See also Tables 3 and 4.

Row Number	Column Number		
	04	05	06
00	ICH	DCH	HPA
01	CUU	SEE	HPR
02	CUD	CPR	REP
03	CUF	SU	DA
04	CUB	SD	VPA
05	CNL	NP	VPR
06	CPL	PP	HVP
07	CHA	CTC*	TBC
08	CUP	ECH	SM
09	CHT	CVT	MC
10	ED	CBT	HPB
11	EL	SRS	VPB
12	IL	PTX	RM
13	DL	-	SGR
14	EF	-	DSR
15	EA	-	DAQ

* See Appendix E2

TABLE 3 - Final Bytes of Control Sequences without Intermediate Bytes.

The unallocated bit combinations in the table are reserved for future standardization and shall not be used. The bit combinations from 07/00 to 07/14 are available for representing the Final Bytes of control sequences for private (or experimental) use.

Row Number	Column Number		
	04	05	06
00	SL	PPA	TATE
01	SR	PPR	TALE
02	GSM	PPB	TAC
03	GSS	SPD	TCC
04	FNT	DTA	TSR
05	TSS	SLH	-
06	JFY	SLL	-
07	SPI	FNK	-
08	QUAD	SPQR	-
09	SSU	SEF	-
10	PFS	PEC	-
11	SHS	SSW	-
12	SVS	SACS	-
13	IGS	SAPV	-
14	HTSA*	STAB	-
15	IDCS	GCC	-

* See Appendix E.2

TABLE 4 - Final Bytes of Control Sequences with a single Intermediate Byte 02/00.

The unallocated bit combinations in the table are reserved for future standardization and shall not be used. The bit combinations from 07/00 to 07/14 are available for representing the Final Bytes of control sequences for private (or experimental) use.

5.5.1 Parameter Representation

A control sequence may contain a string of Parameter Bytes P...P representing one or more parameters to complete the specification of the control function.

The Parameter Bytes are bit combinations from 03/00 to 03/15 and is interpreted as follows:

- If the first bit combination of the parameter string is in the range 03/00 to 03/11, the parameter string is interpreted according to the format described in 5.5.2.
- If the first bit combination of the parameter string is in the range 03/12 to 03/15, the parameter string is

available for private (or experimental) use. Its format and meaning are not defined by this Standard.

5.5.2 Parameter String Format

A parameter string which does not start with a bit combination in the range 03/12 to 03/15 shall have the following format:

i) A parameter string consists of one or more parameter sub-strings, each of which represents a number in decimal notation.

ii) Each parameter sub-string consists of one or more bit combinations from 03/00 to 03/10; the bit combinations from 03/00 to 03/09 represent the digits ZERO to NINE; bit combination 03/10 may be used as a separator in a parameter sub-string, for example, to separate the integer and decimal fraction part of a number.

iii) Parameter sub-strings are separated by one bit combination 03/11.

iv) Bit combinations 03/12 to 03/15 are reserved for future standardization except when used as the first bit combination of the parameter string.

v) An empty parameter sub-string represents a default value which depends on the control function (see E.1.4).

vi) In each parameter sub-string, leading bit combinations 03/00 are not significant and may be omitted.

vii) If the parameter string starts with the bit combination 03/11, an empty parameter sub-string is assumed preceding the separator; if the parameter string terminates with the bit combination 03/11, an empty parameter sub-string is assumed following the separator; if the parameter string contains successive bit combinations 03/11, empty parameter sub-strings are assumed between the separators.

viii) If the control function has more than one parameter, and some parameter sub-strings are empty, the separators (bit combination 03/11) must still be present. However, if the last parameter sub-string(s) is empty, the separator preceding it may be omitted (see Appendix B).

5.5.3 Types of Parameters

In a control sequence with parameters, each parameter sub-string corresponds to one parameter and represents the value of that parameter. The number of parameters is either fixed or variable, depending on the control function. If the number of parameters is variable, neither the maximum number of values nor the order in which the corresponding actions are performed are defined by this Standard.

A parameter may be purely numeric or it may be selective, i.e. denoting one of a numbered list of actions the control function can perform.

In the case of selective parameters a particular parameter value may have the same meaning as a combination of two or more separate values.

Unassigned selective parameter values are reserved for future standardization.

5.6 Independent Control Functions

These control functions are represented in 7-bit and 8-bit codes by 2-character escape sequences of the form ESC Fs, where ESC is represented by bit combination 01/11 and Fs is represented by a bit combination from 06/00 to 07/14.

The definitions and the coded representations of the control functions are specified in 8.3. See also Table 5.

Row Number	Column Number	
	06	07
00	DMI	-
01	INT	-
02	EMI	-
03	RIS	-
04	CMD	-
05	-	-
06	-	-
07	-	-
08	-	-
09	-	-
10	-	-
11	-	-
12	-	LS3R
13	-	LS2R
14	LS2	LS1R
15	LS3	-

TABLE 5 - Independent Control Functions

The unallocated positions in the table are reserved for future standardization and shall not be used. They are not available for private (or experimental) use.

Note 6

ESC Fs sequences are registered in the ISO International Register of Coded Character Sets to be used with Escape Sequences, which is maintained by the Registration Authority for ISO 2375. Any candidates for ESC Fs sequences have to be approved by ISO/TC97/SC2 for registration. The coding for the Final Byte, Fs, will then be assigned by the Registration Authority.

5.7 Control Strings

A control string is a delimited string of characters which may occur in the data stream as a logical entity for control purposes. A control string consists of an opening delimiter, a

command string or a character string, and a terminating delimiter, the STRING TERMINATOR (ST).

A command string consists of a sequence of characters represented by bit combinations in the range 00/08 to 00/13 and 02/00 to 07/14.

A character string consists of a sequence of characters represented by any bit combination, except those representing START OF STRING (SOS) or STRING TERMINATOR (ST).

The interpretation of the command string or the character string is not defined by this Standard, but instead requires prior agreement between the sender and the recipient of the data.

The opening delimiters defined in this Standard are :

- APPLICATION PROGRAM COMMAND (APC)
- DEVICE CONTROL STRING (DCS)
- OPERATING SYSTEM COMMAND (OSC)
- PRIVACY MESSAGE (PM)
- START OF STRING (SOS)

6. DEVICE CONCEPTS

The definitions of the control functions in this Standard are based on general assumptions about the architecture of a character-imaging device. Examples of devices conforming to these concepts are : an alpha-numeric display device, a printer or a microfilm output device.

6.1 The Received Data Stream

The received data stream is considered to be a continuous stream. It may be structured in messages, records and/or blocks, but this does not affect the operation of the device at the abstract level of description in this Standard; the logical or physical units of data are regarded as being concatenated to form a continuous stream.

The device may contain a buffer in which the received data are temporarily stored before they are used to produce the character image output, or in which the received data are permanently stored and continuously used to produce the character image output.

6.2 The Character Image Output

The character image output may consist of one or more pages of a predetermined size.

A page is composed of a predetermined number of lines, each composed of a predetermined number of character positions. The device may have the capability of varying the number of lines per page, the number of character positions per line, the line spacing, and the character spacing during the operation of the device.

The lines constituting a page as well as the character positions constituting a line are identified by the natural numbers 1, 2, 3...

Each character position either is in the erased state or images a graphic symbol. A graphic symbol represents SPACE, a graphic character, or a control function for which a graphical representation is required.

The initial state of all character positions is "erased".

Depending on implementation, there may or may not be a distinction between a character position in the erased state and a character position imaging SPACE.

The size of a character position may be fixed or may depend on the character being imaged.

In this Standard, the character image output is regarded as produced in the form of a continuous stream, but it may in actual fact be made available character-by-character, line-by-line, or page-by-page.

The character positions are numbered relative to the character image (page) output, not to the buffer (if any).

The font design of the graphic symbols is not defined by this Standard.

6.3 The Active Position

At any time, there is a unique character position which is called the active position.

The active position is the character position which is to image the graphic symbol representing the next graphic character of the received data stream or the next control function for which a graphical representation is required. The active position is also the reference position against which certain formator functions or editor functions are performed (see 6.4). The line containing the active position is called the active line.

The field containing the active position is called the active field.

The page containing the active position is called the active page.

The area containing the active position is called the active area.

Implicit Movement

If the active position is not the last character position of the active line, it is moved to the following character position of the line.

An implicit movement is performed after SPACE or a graphic character is received or a control function, for which a graphical representation is required, is executed.

Explicit Movement

The active position is moved to a specified character position.

An explicit movement is performed when a control function is executed which causes the active position to be moved to a specified position.

Note 7

It is common practice to mark the active position by means of a special indicator which is called the cursor.

Note 8

In the following situations, the effect of an attempt to move the active position is not defined by this Standard :

- An attempt to perform an implicit movement when the active position is the last character position of a line.
- An attempt to perform an explicit movement to a nonexisting character position, for example beyond the last character position of a line, or beyond the last line of a page.
- Depending on implementation, an attempt to perform such an active position movement may :
  - . cause a wrap-around movement,
  - . cause the active position to be blocked (a condition in which no graphic character can be entered until a valid explicit active position movement is performed),
  - . cause the active position to remain where it is but permit graphic characters to be entered thereby replacing or overstriking the previously entered character,
  - . cause the cursor to disappear from the operator's view,
  - . cause the cursor to move to the opposite end of the display but one row or column offset,
  - . cause scrolling to occur,
  - . cause other implementation-dependent action.

6.4 Formator Functions and Editor Functions

Two classes of control functions have an action on the layout or positioning of information in character-imaging devices. They are formator functions and editor functions. The principal difference between editor functions and formator functions is that the latter are sensitive to the FORMAT EFFECTOR ACTION MODE (FEAM); whereas the former are not (see Appendix A).

6.4.1 Formator Functions

They are format effectors and presentation control functions. Formator functions may be part of the data stream. They describe how the originator of the data stream wishes the information to be formatted.

Therefore, if formator functions are not stored by the receiving device they shall be regenerated by the device for subsequent transmission to additional recipients in order to preserve data integrity.

Formator functions are processed depending on the setting of the FORMAT EFFECTOR ACTION MODE (FEAM) of the device.

6.4.2 Composite Graphic Characters

Composite graphic characters may be obtained by using formator functions only; editor functions shall not be used for this purpose (see Appendix A.3).

6.4.3 Editor Functions

The main purpose of editor functions is to edit, alter or transpose the visual arrangement of data.

Editor functions are performed immediately and do not become part of the data stream.

The active position (or the active line, where applicable) is the reference position against which all editing operations are performed.

6.5 Selected and Qualified Areas

This sub-clause is applicable primarily to buffered input/output devices. It may be also applicable to unbuffered input/output devices when the SEND/RECEIVE MODE (SRM) is set to SIMULTANEOUS.

6.5.1 Selected Areas

A selected area is a string of character positions, the contents of which may be eligible (see 7.3.1) to be transmitted in the form of a data stream or to be transferred to an auxiliary input/output device (see 6.6).

The beginning of a selected area is established by START OF SELECTED AREA (SSA). The character position which is the active position after the receipt of SSA is the first character position of the selected area.

The end of a selected area is established by END OF SELECTED AREA (ESA). The character position which is the active position before the receipt of ESA is the last character position of the selected area.

6.5.2 Qualified Areas

A qualified area is a string of character positions with which certain characteristics are associated, such as one or a combination of the following :

- The contents are protected against manual alteration.
- The kind of characters which are permitted to be entered is restricted (for example, to numeric or alphabetic characters only).
- The contents are protected against erasure.
- A tabulation stop is associated with the first character position.
- The contents are to be excluded, i.e. guarded (see 6.5.2.2) from transmission as a data stream, or from transfer to an auxiliary input/output device (see 6.6).

The beginning of a qualified area is established by DEFINE AREA QUALIFICATION (DAQ). The character position which is the active position after receipt of DAQ is the first character position of the qualified area. The type of area qualification is specified by the parameter of DAQ. The end of a qualified area is established by the beginning of the following qualified area.

6.5.2.1 Protected Areas

A protected area is a special case of a qualified area. It is a string of character positions, the contents of which are protected against manual alteration and may also be protected against erasure depending on the set-

ting of the ERASURE MODE (ERM). A protected area may, in general, be either guarded of unguarded.

6.5.2.2 Guarded Areas

A guarded area is a special case of a qualified area. It is a protected area the contents of which are excluded from transmission as a data stream and from transfer to an auxiliary input/output device, depending on the setting of the GUARDED AREA TRANSFER MODE (GATM).

6.6 Auxiliary Input/Output Devices

This sub-clause is applicable primarily to buffered input/output devices. It may be also applicable to unbuffered input/output devices when the SEND/RECEIVE MODE (SRM) is set to SIMULTANEOUS.

Data transfer from, or to, an auxiliary input/output device is initiated either by the operation of an appropriate key on a keyboard or by the control function MEDIA COPY (MC) appearing in the received data stream.

If there are more than one auxiliary input/output devices, the relevant device is specified by the parameter of MC.

An input data stream which is received from an auxiliary device is processed in the same way as any other received data stream. The method of terminating the input from the auxiliary device depends on the implementation.

7. MODES

7.1 The Concept of Modes

This Standard is intended to be applicable to a very large range of devices, in which there are variations. Some of these variations have been formalized in the form of modes. They deal with the way in which a device transmits, receives, processes, or images data. Each mode has two states. The reset state is shown first in the definitions in 7.2.

The states of the modes may be established explicitly in the data stream by the control functions SET MODE (SM) and RESET MODE (RM) or may be established by agreement between sender and recipient. In an implementation, some or all of the modes may have one state only.

To ensure data compatibility and ease of interchange with a variety of equipment the use of modes is deprecated. If modes have to be implemented for backward compatibility it is recommended that the reset state of the modes be the initial state. Otherwise, explicit agreements will have to be negociated between sender and recipient, to the detriment of "blind" interchange.

7.2 Definition of Modes

The modes are set and reset by the control functions SET MODE (SM) and RESET MODE (RM) (see 8.3). The parameter of SM or RM specifies the mode which is affected. In each of the mode definitions below, the first state is caused by RM, the second one by SM.

The modes are listed in the alphabetical order of their acronyms. It is intended that the acronyms be retained in all translations of the text.

7.2.1 CRM - CONTROL REPRESENTATION MODE

CONTROL

All control functions are performed as defined; the way formator functions are processed depends on the setting of the FORMAT EFFECTOR ACTION MODE (FEAM). A device may choose to image the graphical representations of control functions in addition to performing them.

GRAPHIC

All control functions, except RESET MODE (RM), are treated as graphic characters. A device may choose to perform some control functions in addition to storing them and imaging their graphical representations.

Note 9

All control functions, except RM, are affected.

7.2.2 EBM - EDITING BOUNDARY MODE (see Appendix E.1)

DISPLAY

The effects of the editor functions are limited to the active page of a multiple-page buffer.

ALL

The editor functions may affect character positions outside the active page of a multi-page buffer.

Note 10

Control functions affected are : DCH, DL, ICH, IL, SEE.

7.2.3 ERM - ERASURE MODE

PROTECT

Only the contents of unprotected areas are affected by an erasure control function.

ALL

The contents of protected as well as of unprotected areas are affected by an erasure control function.

Note 11

Control functions affected are : EA, ECH, ED, EF, EL.

7.2.4 FEAM - FORMAT EFFECTOR ACTION MODE

EXECUTE

Formator functions are performed immediately and may be stored in addition to being performed.

STORE

Formator functions are stored but not performed. In this case, the specified action is intended to be performed by another device when the associated data are transmitted or transferred.

Note 12

Control functions affected are : BPH, BS, CR, DTA, FF, FNT, GCC, GSM, GSS, HPA, HPB, HPR, HT, HTJ, HTS, HTSA, HVP, IND, JFY, NEL, PEC, PFS, PLD, PLU, PPA, PPB, PPR, PTX, QUAD, RI, SACS, SAPV, SGR, SHS, SLH, SLL, SPD, SPI, SPQR, SRS, SSU, SSW, STAB, SVS, TAC, TALE, TATE, TBC, TCC, TSS, VPA, VPB, VPR, VTS.

7.2.5 FETM - FORMAT EFFECTOR TRANSFER MODE

INSERT

Formator functions may be inserted in a data stream to be transmitted or in data to be transferred to an auxiliary input/output device.

EXCLUDE

No formator functions other than those received while the FORMAT EFFECTOR ACTION MODE (FEAM) is set to STORE are included in a transmitted data stream or in data transferred to an auxiliary input/output device.

Note 13

No control functions are affected.

7.2.6 GATM - GUARDED AREA TRANSFER MODE

GUARD

Only the contents of unguarded areas in an eligible area are transmitted or transferred.

ALL

The contents of guarded as well as of unguarded areas in an eligible area are transmitted or transferred.

Note 14

No control functions are affected.

7.2.7 GRCM - GRAPHIC RENDITION COMBINATION MODE

REPLACING

Each occurrence of the control function SELECT GRAPHIC RENDITION (SGR) cancels the effect of any preceding occurrence. Any graphic rendition aspects that are to remain unchanged after an occurrence of SGR have to be re-specified by that SGR.

CUMULATIVE

Each occurrence of the control function SELECT GRAPHIC RENDITION (SGR) causes only those graphic rendition aspects to be changed that are specified by that SGR. All other graphic rendition aspects remain unchanged.

Note 15

Control functions affected are : SGR.

7.2.8 HEM - CHARACTER EDITING MODE

FOLLOWING

A character insertion causes the contents of the active position and of the following character positions to be shifted in the direction of the character path; a character

deletion causes the contents of character positions following the active position to be shifted in the direction opposite to that of the character path.

PRECEDING

A character insertion causes the contents of the active position and of preceding character positions to be shifted in the direction opposite to that of the character path; a character deletion causes the contents of character positions preceding the active position to be shifted in the direction of the character path.

Note 16

Control functions affected are : DCH, ICH.

7.2.9 IRM - INSERTION REPLACEMENT MODE

REPLACE

The graphic symbol of a graphic character or of a control function, for which a graphical representation is required, replaces (or, depending upon the implementation, is combined with) the graphic symbol imaged at the active position.

INSERT

The graphic symbol of a graphic character or of a control function, for which a graphical representation is required, is inserted at the active position.

Note 17

Only control functions for which a graphical representation is required are affected.

7.2.10 KAM - KEYBOARD ACTION MODE (See E.1)

ENABLED

All or part of the manual input facilities are enabled to be used.

DISABLED

All or part of the manual input facilities are disabled.

Note 18

No control functions are affected.

7.2.11 MATM - MULTIPLE AREA TRANSFER MODE

SINGLE

Only the contents of the selected area which contains the active position are eligible to be transmitted or transferred.

MULTIPLE

The contents of all selected areas are eligible to be transmitted or transferred.

Note 19

No control functions are affected.

7.2.12 LF/NLM - LINE FEED/NEW LINE MODE

(See Appendix E.1)

7.2.13 PUM - POSITIONING UNIT MODE

CHARACTER

The unit for numeric parameters of the positioning format effectors is one character position.

SIZE

The unit for numeric parameters of the positioning format effectors is that established by SELECT SIZE UNIT (SSU).

Note 20

Control functions affected are : HPA, HPB, HPR, HTSA, HVP, SLH, SLL, SSU, VPA, VPB, VPR.

7.2.14 SATM - SELECTED AREA TRANSFER MODE

SELECT

Only the contents of selected areas are eligible to be transmitted or transferred.

ALL

The contents of all character positions, irrespective of any explicitly defined selected areas, are eligible to be transmitted or transferred.

Note 21

No control functions are affected.

7.2.15 SRM - SEND/RECEIVE MODE

MONITOR

Data which are locally entered are immediately imaged.

SIMULTANEOUS

Local input facilities are logically disconnected from the output mechanism; only data which are sent to the device are imaged.

Note 22

No control functions are affected.

7.2.16 SRTM - STATUS REPORT TRANSFER MODE

NORMAL

Status reports in the form of DEVICE CONTROL STRINGS (DCS) are not generated automatically.

DIAGNOSTIC

Status reports in the form of DEVICE CONTROL STRINGS (DCS) are included in every data stream transmitted or transferred.

Note 23

No control functions are affected.

7.2.17 TSM - TABULATION STOP MODE

MULTIPLE

Character tabulation stops are set or cleared in the active line and in the corresponding character positions of the following lines.

SINGLE

Character tabulation stops are set or cleared in the active line only.

Note 24

Control functions affected are : CTC, DL, HTS, HTSA, IL, TBC.

7.2.18 TTM - TRANSFER TERMINATION MODE

CURSOR

Only the contents of the character positions preceding the active position are eligible to be transmitted or transferred.

ALL

The contents of character positions preceding, following, and at the active position are eligible to be transmitted or transferred.

Note 25

No control functions are affected.

7.2.19 VEM - LINE EDITING MODE

FOLLOWING

A line insertion causes the contents of the active line and of following lines to be shifted in the direction of the line progression; a line deletion causes the contents of the lines following the active line to be shifted in the direction opposite to that of the line progression.

PRECEDING

A line insertion causes the contents of the active line and of preceding lines to be shifted in the direction opposite to that of the line progression; a line deletion causes the contents of the lines preceding the active line to be shifted in the direction of the line progression.

Note 26

Control functions affected are : DL, IL.

7.2.20 ZDM - ZERO DEFAULT MODE

(See Appendix E.1).

7.3 Interaction between Modes

Three groups of modes are specified below. Each group contains two or more modes which interact with one another.

i) GUARDED AREA TRANSFER MODE (GATM)
MULTIPLE AREA TRANSFER MODE (MATM)
SELECTED AREA TRANSFER MODE (SATM)
TRANSFER TERMINATION MODE (TTM)

ii) CONTROL REPRESENTATION MODE (CRM)
FORMAT EFFECTOR ACTION MODE (FEAM)

iii) CHARACTER EDITING MODE (HEM)
INSERTION REPLACEMENT MODE (IRM)

7.3.1 GUARDED AREA TRANSFER MODE (GATM), MULTIPLE AREA TRANSFER MODE (MATM), SELECTED AREA TRANSFER MODE (SATM), and TRANSFER TERMINATION MODE (TTM)

These modes have a combined effect on the format of a transmitted data stream or of a data stream transferred to an auxiliary input/output device, as described hereafter.

The term "active selected area" is used to denote the selected area containing the active position. The term "eligible" is used to denote any area which may be considered for transmitting or transferring.

i) If the TTM is set to CURSOR, the SATM to SELECT, and the MATM to SINGLE, then the contents of the active selected area, up to but excluding the active position, are eligible.

ii) If the TTM is set to CURSOR, the SATM to SELECT, and the MATM to MULTIPLE, then the contents of any selected area, up to but excluding the active position, are eligible.

iii) If the TTM is set to CURSOR and the SATM to ALL, then the contents of the buffer up to but excluding the active position, are eligible.

iv) If the TTM is set to ALL, the SATM to SELECT, and the MATM to SINGLE, then the complete contents of the active selected area are eligible.

v) If the TTM is set to ALL, the SATM to SELECT, and the MATM to MULTIPLE, then the complete contents of all selected areas are eligible.

vi) If the TTM and the SATM are both set to ALL, then the complete contents of the buffer are eligible.

vii) If the GATM is set to GUARD, the contents of the eligible area or areas are transmitted or transferred, except for the contents of guarded areas which are completely contained within an eligible area. In the case where a guarded area is only partly contained within an eligible area, the contents of the part contained in the eligible area may be transmitted or not, depending on the implementation.

viii) If the GATM is set to ALL, guarded as well as unguarded data in an eligible area are transmitted or transferred.

If the active position is not within a selected area, the format of the data stream in the first and fourth case above is not defined by this Standard.

7.3.2 CONTROL REPRESENTATION MODE (CRM) and FORMAT EFFECTOR ACTION MODE (FEAM)

i) If the CRM is set to CONTROL, and the FEAM is set to EXECUTE, all control functions are performed as defined.

ii) If the CRM is set to CONTROL, and the FEAM is set to STORE, formator functions are treated as graphic characters.

iii) If the CRM is set to GRAPHIC, all control functions except RM are treated as graphic characters.

7.3.3 CHARACTER EDITING MODE (HEM) and INSERTION REPLACEMENT MODE (IRM)

i) If the IRM is set to REPLACE, the HEM influences the control functions DELETE CHARACTER (DCH) and INSERT CHARACTER (ICH) only.

ii) If the IRM is set to INSERT then, in addition, the effect of the receipt of a graphic character or a control function for which a graphical representation is required depends on the setting of the HEM. If the latter is set to FOLLOWING, the implicit movement of the active position is performed normally, if it is set to PRECEDING, the active position does not move.

7.4 Private Modes

A device may implement modes other than those specified in 7.2.. Such modes are called Private Modes. See SET MODE (SM) and RESET MODE (RM), and 5.5.1.

The reset state of a private mode shall permit the selection of coded representations of control functions (including parameters for control of modes) that are identified in accordance with 2.3.1 to have the meanings specified in this Standard.

8. CONTROL FUNCTIONS

8.1 Types of Control Functions

There are different types of control functions. They are indicated by the following notations :

(Cx)	: Not an element of any set
(C0)	: Element of the C0 set
(C1)	: Element of the C1 set
(Pn)	: Control sequence with a single numeric parameter
(Pn1; Pn2)	: Control sequence with two numeric parameters
(Pn...)	: Control sequence with any number of numeric parameters
(Ps)	: Control sequence with a single selective parameter
(Ps1; Ps2)	: Control sequence with two selective parameters

(Ps...) : Control sequence with any number of selective parameters

(Fs) : Independent control function, represented by ESC Fs sequence.

8.2 Categories of Control Functions

The following list groups the control functions defined in 8.3 and Appendix E.2. This grouping is intended to aid in understanding the Standard and does not restrict the use of the control functions to the indicated categories.

8.2.1 Delimiters

Acronym	Notation	Name
APC	(C1)	APPLICATION PROGRAM COMMAND
CMD	(FS)	CODING METHOD DELIMITER
DCS	(C1)	DEVICE CONTROL STRING
OSC	(C1)	OPERATING SYSTEM COMMAND
PM	(C1)	PRIVACY MESSAGE
SOS	(C1)	START OF STRING
ST	(C1)	STRING TERMINATOR

8.2.2 Introducers

Acronym	Notation	Name
CSI	(C1)	CONTROL SEQUENCE INTRODUCER
ESC	(C0)	ESCAPE
SCI	(C1)	SINGLE CHARACTER INTRODUCER

8.2.3 Shift Functions

Acronym	Notation	Name
LS0	(C0)	LOCKING-SHIFT ZERO
LS1	(C0)	LOCKING-SHIFT ONE
LS1R	(FS)	LOCKING-SHIFT ONE RIGHT
LS2	(FS)	LOCKING-SHIFT TWO
LS2R	(FS)	LOCKING-SHIFT TWO RIGHT
LS3	(FS)	LOCKING-SHIFT THREE
LS3R	(FS)	LOCKING-SHIFT THREE RIGHT
SI	(C0)	SHIFT-IN
SO	(C0)	SHIFT-OUT
SS2	(C1)	SINGLE-SHIFT TWO
SS3	(C1)	SINGLE-SHIFT THREE

8.2.4 Format Effectors

Acronym	Notation	Name
BS	(C0)	BACKSPACE
CR	(C0)	CARRIAGE RETURN

FF	(C0)	FORM FEED
HPA	(Pn)	CHARACTER POSITION ABSOLUTE
HPB	(Pn)	CHARACTER POSITION BACKWARD
HPR	(Pn)	CHARACTER POSITION FORWARD
HT	(C0)	CHARACTER TABULATION
HTJ	(C1)	CHARACTER TABULATION WITH JUSTIFICATION
HTS	(C1)	CHARACTER TABULATION SET
HTSA	(Pn...)	CHARACTER TABULATION SET ABSOLUTE
HVP	(Pn1;Pn2)	CHARACTER AND LINE POSITION
IND	(C1)	INDEX
LF	(C0)	LINE FEED
NEL	(C1)	NEXT LINE
PLD	(C1)	PARTIAL LINE DOWN
PLU	(C1)	PARTIAL LINE UP
PPA	(Pn)	PAGE POSITION ABSOLUTE
PPB	(Pn)	PAGE POSITION BACKWARD
PPR	(Pn)	PAGE POSITION FORWARD
RI	(C1)	REVERSE LINE FEED
TBC	(Ps)	TABULATION CLEAR
TSR	(Pn)	TABULATION STOP REMOVE
VPA	(Pn)	LINE POSITION ABSOLUTE
VPB	(Pn)	LINE POSITION BACKWARD
VPR	(Pn)	LINE POSITION FORWARD
VT	(C0)	LINE TABULATION
VTS	(C1)	LINE TABULATION SET

8.2.5 Presentation Control Functions

Acronym	Notation	Name
BPH	(C1)	BREAK PERMITTED HERE
DTA	(Pn1;Pn2)	DIMENSION TEXT AREA
FNT	(Ps1;Ps2)	FONT SELECTION
GCC	(Ps)	GRAPHIC CHARACTER COMPOSITION
GSM	(Pn1;Pn2)	GRAPHIC SIZE MODIFICATION
GSS	(Pn)	GRAPHIC SIZE SELECTION
JFY	(Ps...)	JUSTIFY
NBH	(C1)	NO BREAK HERE
PEC	(Ps)	PRESENTATION EXPAND OR CONTRACT
PFS	(Ps)	PAGE FORMAT SELECTION
PTX	(Ps)	PARALLEL TEXTS

QUAD	(Ps...)	QUAD
SACS	(Pn)	SET ADDITIONAL CHARACTER SEPARATION
SAPV	(Ps)	SELECT ARABIC PRESENTATION VARIANTS
SGR	(Ps...)	SELECT GRAPHIC RENDITION
SHS	(Ps)	SELECT CHARACTER SPACING
SLH	(Pn)	SET LINE HOME
SLL	(Pn)	SET LINE LIMIT
SPD	(Ps)	SELECT PRESENTATION DIRECTIONS
SPI	(Pn1;Pn2)	SPACING INCREMENT
SPQR	(Ps)	SELECT PRINT QUALITY AND RAPIDITY
SRS	(Ps)	START REVERSED STRING
SSU	(Ps)	SELECT SIZE UNIT
SSW	(Pn)	SELECT SPACE WIDTH
STAB	(Ps)	SELECTIVE TABULATION
SVS	(Ps)	SELECT LINE SPACING
TAC	(Pn)	TABULATION ALIGNED CENTRED
TALE	(Pn)	TABULATION ALIGNED LEADING EDGE
TATE	(Pn)	TABULATION ALIGNED TRAILING EDGE
TCC	(Pn1;Pn2)	TABULATION CENTRED ON CHARACTER
TSS	(Pn)	THIN SPACE SPECIFICATION

8.2.6 Editor Functions

Acronym	Notation	Name
DCH	(Pn)	DELETE CHARACTER
DL	(Pn)	DELETE LINE
EA	(Ps)	ERASE IN AREA
ECH	(Pn)	ERASE CHARACTER
ED	(Ps)	ERASE IN PAGE
EF	(Ps)	ERASE IN FIELD
EL	(Ps)	ERASE IN LINE
ICH	(Pn)	INSERT CHARACTER
IL	(Pn)	INSERT LINE

8.2.7 Cursor Control Functions

Acronym	Notation	Name
CBT	(Pn)	CURSOR BACKWARD TABULATION
CHA	(Pn)	CURSOR CHARACTER ABSOLUTE
CHT	(Pn)	CURSOR FORWARD TABULATION
CNL	(Pn)	CURSOR NEXT LINE
CPL	(Pn)	CURSOR PRECEDING LINE
CTC	(Ps...)	CURSOR TABULATION CONTROL

CUB	(Pn)	CURSOR LEFT
CUD	(Pn)	CURSOR DOWN
CUF	(Pn)	CURSOR RIGHT
CUP	(Pn1;Pn2)	CURSOR POSITION
CUU	(Pn)	CURSOR UP
CVT	(Pn)	CURSOR LINE TABULATION

8.2.8 Display Control Functions

Acronym	Notation	Name
NP	(Pn)	NEXT PAGE
PP	(Pn)	PRECEDING PAGE
SD	(Pn)	SCROLL DOWN
SL	(Pn)	SCROLL LEFT
SR	(Pn)	SCROLL RIGHT
SU	(Pn)	SCROLL UP

8.2.9 Device Control Functions

Acronym	Notation	Name
DC1	(C0)	DEVICE CONTROL ONE
DC2	(C0)	DEVICE CONTROL TWO
DC3	(C0)	DEVICE CONTROL THREE
DC4	(C0)	DEVICE CONTROL FOUR

8.2.10 Information Separators

Acronym	Notation	Name
IS1	(C0)	INFORMATION SEPARATOR ONE
IS2	(C0)	INFORMATION SEPARATOR TWO
IS3	(C0)	INFORMATION SEPARATOR THREE
IS4	(C0)	INFORMATION SEPARATOR FOUR

Note 27

Each information separator is given two names. The names, INFORMATION SEPARATOR FOUR (IS4), INFORMATION SEPARATOR THREE (IS3), INFORMATION SEPARATOR TWO (IS2), and INFORMATION SEPARATOR ONE (IS1) are the general names. The names FILE SEPARATOR (FS), GROUP SEPARATOR (GS), RECORD SEPARATOR (RS), and UNIT SEPARATOR (US) are the specific names and are intended mainly for applications where the information separators are used hierarchically. The ascending order is then US, RS, GS, FS. In this case, data normally delimited by a particular separator cannot be split by a higher-order separator but will be considered as delimited by any higher-order separator.

In ISO 6937 part 3, IS2 and IS4 are given the names PAGE TERMINATOR (PT) and DOCUMENT TERMINATOR (DT), resp. and may be used to reset presentation attributes to the default state.

8.2.11 Area Definition

Acronym	Notation	Name
DAQ	(Ps...)	DEFINE AREA QUALIFICATION
EPA	(C1)	END OF GUARDED AREA

ESA	(C1)	END OF SELECTED AREA
SPA	(C1)	START OF GUARDED AREA
SSA	(C1)	START OF SELECTED AREA

8.2.12 Mode Setting

Acronym	Notation	Name
RM	(Ps...)	RESET MODE
SM	(Ps...)	SET MODE

8.2.13 Transmission Control Functions

Acronym	Notation	Name
ACK	(C0)	ACKNOWLEDGE
DLE	(C0)	DATA LINK ESCAPE
ENQ	(C0)	ENQUIRY
EOT	(C0)	END OF TRANSMISSION
ETB	(C0)	END OF TRANSMISSION BLOCK
ETX	(C0)	END OF TEXT
NAK	(C0)	NEGATIVE ACKNOWLEDGE
SOH	(C0)	START OF HEADING
STX	(C0)	START OF TEXT
SYN	(C0)	SYNCHRONOUS IDLE

8.2.14 Miscellaneous Control Functions

Acronym	Notation	Name
BEL	(C0)	BELL
CAN	(C0)	CANCEL
CCH	(C1)	CANCEL CHARACTER
CPR	(Pn1;Pn2)	ACTIVE POSITION REPORT
DA	(Ps)	DEVICE ATTRIBUTES
DEL	(Cx)	DELETE
DMI	(Fs)	DISABLE MANUAL INPUT
DSR	(Ps)	DEVICE STATUS REPORT
EM	(C0)	END OF MEDIUM
EMI	(Fs)	ENABLE MANUAL INPUT
FNK	(Pn)	FUNCTION KEY
IDCS	(Ps)	IDENTIFY DEVICE CONTROL STRING
IGS	(Ps)	IDENTIFY GRAPHIC SUBREPERTOIRE
INT	(Fs)	INTERRUPT
MC	(Ps)	MEDIA COPY
MW	(C1)	MESSAGE WAITING
NUL	(C0)	NULL
PU1	(C1)	PRIVATE USE ONE

PU2	(C1)	PRIVATE USE TWO
REP	(Pn)	REPEAT
RIS	(Fs)	RESET TO INITIAL STATE
SEE	(Ps)	SELECT EDITING EXTENT
SEF	(Ps)	SHEET EJECT AND FEED
STS	(C1)	SET TRANSMIT STATE
SUB	(C0)	SUBSTITUTE CHARACTER

8.3 Definitions of Control Functions

The control functions are listed in the alphabetical order of their acronyms. It is intended that the acronyms be retained in all translations of the text.

8.3.1 ACK - ACKNOWLEDGE

Notation : (C0)
Representation : 00/06

ACK is transmitted by a receiver as an affirmative response to the sender.

The use of ACK is defined in ISO 1745.

8.3.2 APC - APPLICATION PROGRAM COMMAND

Notation : (C1)
Representation : 09/15 (7-bit code : ESC 05/15)

APC is used as the opening delimiter of a control string for application program use. The command string following may consist of a sequence of characters represented by bit combinations in the range 00/08 to 00/13 and 02/00 to 07/14. The control string is closed by the terminating delimiter STRING TERMINATOR (ST). The interpretation of the command string depends on the relevant application program.

8.3.3 BEL - BELL

Notation : (C0)
Representation : 00/07

BEL is used when there is a need to call for attention; it may control alarm or attention devices.

8.3.4 BPH - BREAK PERMITTED HERE

Notation : (C1)
Representation : 08/02 (7-bit code : ESC 04/02)

BPH is used to indicate a point where a line break may occur when text is formatted. BPH may occur between two graphic characters, either or both of which may be SPACE.

8.3.5 BS - BACKSPACE

Notation : (C0)
Representation : 00/08

BS causes the active position to move one character position in the direction opposite to that of the character path.

The direction of the character path depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.6 CAN - CANCEL

Notation : (C0)
Representation : 01/08

CAN is used to indicate that the data preceding it in the data stream is in error. As a result, this data shall be ignored. The specific meaning of this control function shall be defined for each application and/or between sender and recipient.

8.3.7 CBT - CURSOR BACKWARD TABULATION

Notation : (Pn)
Representation : CSI Pn 05/10
Parameter default value : Pn = 1.

CBT causes the active position to be moved to the character position corresponding to the n-th preceding character tabulation stop, where n = the value of Pn.

The direction of the character path depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.8 CCH - CANCEL CHARACTER

Notation : (C1)
Representation : 09/04 (7-bit code : ESC 05/04)

CCH is used to indicate that both the preceding character in the data stream, if it is a graphic character (represented by one or more bit combinations) including SPACE, and the control function CCH itself are to be ignored for further interpretation of the data stream. If the character preceding CCH in the data stream is a control function or part of a coded control function, the effect of CCH is not defined by this Standard.

8.3.9 CHA - CURSOR CHARACTER ABSOLUTE

Notation : (Pn)
Representation : CSI Pn 04/07
Parameter default value : Pn = 1.

CHA causes the active position to be moved to the n-th character position of the active line, where n = the value of Pn.

The direction of the character path depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.10 CHT - CURSOR FORWARD TABULATION

Notation : (Pn)
Representation : CSI Pn 04/09
Parameter default value : Pn = 1.

CHT causes the active position to be moved to the character position corresponding to the n-th following character tabulation stop, where n = the value of Pn.

The direction of the character path depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.11 CMD - CODING METHOD DELIMITER

Notation : (Fs)
Representation : ESC 06/04

CMD is used to delimit a string of data coded according to ECMA-35 and to switch to a general level of control.

Note 28

This control function may be suitable for coding systems other than that of ECMA-35.

The use of CMD is not mandatory if the higher level protocol defines means of delimiting the string, for instance, by specifying the length of the string.

8.3.12 CNL - CURSOR NEXT LINE

Notation : (Pn)
Representation : CSI Pn 04/05
Parameter default value : Pn = 1.

CNL causes the active position to be moved to the first character position of the n-th following line, where n equals the value of Pn.

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.13 CPL - CURSOR PRECEDING LINE

Notation : (Pn)
Representation : CSI Pn 04/06
Parameter default value : Pn = 1.

CPL causes the active position to be moved to the first character position of the n-th preceding line, where n equals the value of Pn.

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.14 CPR - ACTIVE POSITION REPORT

Notation : (Pn1;Pn2)
Representation : CSI Pn1;Pn2 05/02
Parameter default values : Pn1 = 1, Pn2 = 1.

CPR is used to report the active position of the sending device as residing on the n-th line at the m-th character position, where n equals the value of Pn1 and m equals the value of Pn2.

CPR may be solicited by a DEVICE STATUS REPORT (DSR) or be sent unsolicited.

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.15 CR - CARRIAGE RETURN

Notation : (C0)
Representation : 00/13

CR causes the active position to be moved to the line home position of the same line.

The line home position depends on the parameter of SET LINE HOME (SLH) and on the direction of the character path specified by the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.16 CSI - CONTROL SEQUENCE INTRODUCER

Notation : (C1)
Representation : 09/11 (7-bite code : ESC 05/11)

CSI is used as the first character of a control sequence (see 5.4).

8.3.17 CTC - CURSOR TABULATION CONTROL

Notation : (Ps...)
Representation : CSI Ps... 05/07
Parameter default value : Ps = 0.

CTC causes one or more tabulation stops to be set or cleared, depending on the parameter values :

0 A character tabulation stop is set at the active position

1 A line tabulation stop is set at the active line

2 The character tabulation stop at the active position is cleared

3 The line tabulation stop at the active line is cleared

4 All character tabulation stops in the active line are cleared

5 All character tabulation stops are cleared

6 All line tabulation stops are cleared.

In the case of parameter values 0, 2, or 4 the number of lines affected depends on the setting of the TABULATION STOP MODE (TSM).

The direction of the line progression depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.18 CUB - CURSOR LEFT

Notation : (Pn)
Representation : CSI Pn 04/04
Parameter default value : Pn = 1.

CUB causes the active position to be moved leftwards by n character positions if the character path is horizontal, or by n lines if the character path is vertical, where n equals the value of Pn.

The direction of the character path depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.19 CUD - CURSOR DOWN

Notation : (Pn)
Representation : CSI Pn 04/02
Parameter default value : Pn = 1.

CUD causes the active position to be moved downwards by n lines if the character path is horizontal, or by n character positions if the character path is vertical, where n equals the value of Pn.

The direction of the character path depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.20 CUF - CURSOR RIGHT

Notation : (Pn)
Representation : CSI Pn 04/03
Parameter default value : Pn = 1.

CUF causes the active position to be moved rightwards by n character positions if the character path is horizontal, or by n lines if the character path is vertical, where n equals the value of Pn.

The direction of the character path depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.21 CUP - CURSOR POSITION

Notation : (Pn1;Pn2)
Representation : CSI Pn1;Pn2 04/08
Parameter default values : Pn1 = 1; Pn2 = 1.

CUP causes the active position to be moved to the n-th line at the m-th character position, where n equals the value of Pn1 and m = the value of Pn2.

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.22 CUU - CURSOR UP

Notation : (Pn)
Representation : CSI Pn 04/01
Parameter default value : Pn = 1.

CUU causes the active position to be moved upwards by n lines if the character path is horizontal, or by n character positions if the character path is vertical, where n equals the value of Pn.

The direction of the character path depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.23 CVT - CURSOR LINE TABULATION

Notation : (Pn)
Representation : CSI Pn 05/09
Parameter default value : Pn = 1.

CVT causes the active position to be moved to the corresponding character position of the line corresponding to the n-th following line tabulation stop, where n equals the value of Pn.

The direction of the line progression depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.24 DA - DEVICE ATTRIBUTES

Notation : (Ps)
Representation : CSI Ps 06/03
Parameter default value : Ps = 0.

With a parameter value not equal to 0, DA is used to identify the device which sends the DA. The parameter value is a device type identification code according to some register which is to be established. If the parameter value is 0, DA is used to request an identifying DA from a device.

8.3.25 DAQ - DEFINE AREA QUALIFICATION

Notation : (Ps...)
Representation : CSI Ps... 06/15
Parameter default value : Ps = 0.

DAQ is used to indicate that the active position is the first character position of a qualified area. The last character position of the qualified area is the character position immediately preceding the first character position of the following qualified area.

The parameter value designates the type of qualified area :

0 Unprotected and unguarded

1 Protected and guarded

2 Graphic character input

3 Numeric input

4 Alphabetic input

5 Input aligned on the last character position of the qualified area

6 Fill with ZEROes

7 Set a character tabulation stop at the active position (the first character position of the qualified area) to indicate the beginning of a field

8 Protected and unguarded

9 Fill with SPACEs

10 Input aligned on the first character position of the qualified area.

This control function operates independently of the setting of the TABULATION STOP MODE (TSM). The character tabulation stop set by parameter 7 applies to the active line only.

8.3.26 DC1 - DEVICE CONTROL ONE

Notation : (C0)
Representation : 01/01

DC1 is primarily intended for turning on or starting an ancillary device. If it is not required for this purpose, it may be used to restore a device to the basic mode of operation (see also DC2 and DC3), or for any other device control function not provided by other DCs.

When used for data flow control, DC3 is sometimes called "X-ON".

8.3.27 DC2 - DEVICE CONTROL TWO

Notation : (C0)
Representation : 01/02

DC2 is primarily intended for turning on or starting an ancillary device. If it is not required for this purpose, it may be used to set a device to a special mode of operation (in which case DC1 is used to restore the device to the basic mode), or for any other device control function not provided by other DCs.

8.3.28 DC3 - DEVICE CONTROL THREE

Notation : (C0)
Representation : 01/03

DC3 is primarily intended for turning off or stopping an ancillary device. This function may be a secondary level stop, for example wait, pause, stand-by or halt (in which case DC1 is used to restore normal operation). If it is not required for this purpose, it may be used for any other device control function not provided by other DCs.

When used for data flow control, DC3 is sometimes called "X-ON".

8.3.29 DC4 - DEVICE CONTROL FOUR

Notation : (C0)
Representation : 01/04

DC4 is primarily intended for turning off, stopping or interrupting an ancillary device. If it is not required for this purpose, it may be used for any other device control function not provided by other DCs.

8.3.30 DCH - DELETE CHARACTER

Notation : (Pn)
Representation : CSI Pn 05/00
Parameter default value : Pn = 1.

DCH causes the contents of the active position and, depending on the setting of the CHARACTER EDITING MODE (HEM), the contents of the n-1 preceding or following character positions to be removed, where n equals the value of Pn. The resulting gap is closed by shifting the contents of the adjacent character positions towards the active position. At the other end of the shifted part, n character positions are put into the erased state.

The extent of the shifted part is established by SELECT EDITING EXTENT (SEE).

The effect of DCH on the start or end of a selected area, the start or end of a qualified area, or a tabulation stop in the shifted part is not defined by this Standard.

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.31 DCS - DEVICE CONTROL STRING

Notation : (C1)
Representation : 09/00 (7-bit code : ESC 05/00)

DCS is used as the opening delimiter of a control string for device control use. The command string following may consist of a sequence of characters represented by bit combinations in the range 00/08 to 00/13 and 02/00 to 07/14. The control string is closed by the terminating delimiter STRING TERMINATOR (ST).

The command string represents either one or more commands for the receiving device, or one or more status reports from the sending device. The purpose and the format of the command string are specified by the most recent occurrence of IDENTIFY DEVICE CONTROL STRING (IDCS), if any, or depends on the sending and/or the receiving device.

8.3.32 DEL - DELETE

Notation : (Cx)
Representation : 07/15

DEL was originally used to erase or obliterate an erroneous or unwanted character in punched tape. DEL may be used for media-fill or time-fill. DEL characters may be inserted into, or removed from, a data stream without affecting the information content of that stream, but such action may affect the information layout and/or the control of equipment.

Note 29

Wen a set of 96 graphic characters is invoked into columns 02 to 07, or when the last character of such a set is invoked by a single-shift function, bit combination 07/15 will not have the meaning of DEL.

8.3.33 DL - DELETE LINE

Notation : (Pn)
Representation : CSI Pn 04/13
Parameter default value : Pn = 1.

DL causes the contents of the active line and, depending on the setting of the LINE EDITING MODE (VEM), the contents of the n-1 preceding or following lines to be removed, where n = the value of Pn. The resulting gap is closed by shifting the contents of a number of adjacent lines towards the active line. At the other end of the shifted part, n lines are put into the erased state.

The extent of the shifted part is established by SELECT EDITING EXTENT (SEE).

Any occurrences of the start or end of a selected area, the start or end of a qualified area, or a tabulation stop in the shifted part, are also shifted.

If the TABULATION STOP MODE (TSM) is set to SINGLE, character tabulation stops are cleared in the lines that are put into the erased state.

The active position is moved to the line home position within the active line.

The line home position depends on the parameter of SET LINE HOME (SLH) and on the direction of the character path.

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.34 DLE - DATA LINK ESCAPE

Notation : (C0)
Representation : 01/00

DLE is used exclusively to provide supplementary transmission control functions.

The use of DLE is defined in ISO 1745.

8.3.35 DMI - DISABLE MANUAL INPUT

Notation : (Fs)
Representation : ESC 06/00

DMI causes the manual input facilities of a device to be disabled.

8.3.36 DSR - DEVICE STATUS REPORT

Notation : (Ps)
Representation : CSI Ps 06/14
Parameter default value : Ps = 0.

DSR is used either to report the status of the sending device or to request a status report from the receiving device, depending on the parameter value :

0 Ready, no malfunction detected

1 Busy, another DSR must be requested later

2 Busy, another DSR will be sent later

3 Some malfunction detected, another DSR must be requested later

4 Some malfunction detected, another DSR will be sent later

5 A DSR is requested

6 A report of the active position in the form of ACTIVE POSITION REPORT (CPR) is requested.

DSR with parameter value 0, 1, 2, 3, or 4 may be sent either unsolicited or as a response to a request such as a DSR with a parameter value 5 or MESSAGE WAITING (MW).

8.3.37 DTA - DIMENSION TEXT AREA

Notation : (Pn1;Pn2)
Representation : CSI Pn1;Pn2 02/00 05/04
No parameter default value.

DTA is used to establish the dimensions of the text area for subsequent pages.

The established dimensions remain in effect until the next occurrence of DTA in the data stream.

Pn1 specifies the dimension in the direction perpendicular to the character path.

Pn2 specifies the dimension in the direction parallel to the character path.

The unit in which the parameter value is expressed depends on the setting of the POSITIONING UNIT MODE (PUM). If that mode is set to SIZE, the unit is that established by SELECT SIZE UNIT (SSU).

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.38 EA - ERASE IN AREA

Notation : (Ps)
Representation : CSI Ps 04/15
Parameter default value : Ps = 0.

EA causes some or all character positions in the active qualified area, i.e. the qualified area which contains the active position, to be put into the erased state, depending on the parameter value :

0 The active position and the character positions up to the end of the qualified area are put into the erased state.

1 The character positions from the beginning of the qualified area up to and including the active position are put into the erased state.

2 All character positions of the qualified area are put into the erased state.

Whether the character positions of protected areas are put into the erased state, or the character positions of unprotected areas only, depends on the setting of the ERASURE MODE (ERM).

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.39 ECH - ERASE CHARACTER

Notation : (Pn)
Representation : CSI Pn 05/08
Parameter default value : Pn = 1.

ECH causes the active position and the n-1 following character positions to be put into the erased state, where n equals the value of Pn.

Whether the character positions of protected areas are put into the erased state, or the character positions of unprotected areas only, depends on the setting of the ERASURE MODE (ERM).

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.40 ED - ERASE IN PAGE

Notation : (Ps)
Representation : CSI Ps 04/10
Parameter default value : Ps = 0.

ED causes some or all character positions of the active page, i.e. the page which contains the active position, to be put into the erased state, depending on the parameter value :

0 The active position and the character positions up to the end of the page are put into the erased state.

1 The character positions from the beginning of the page up to and including the active position are put into the erased state.

2 All character positions of the page are put into the erased state.

Whether the character positions of protected areas are put into the erased state, or the character positions of unprotected areas only, depends on the setting of the ERASURE MODE (ERM).

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.41 EF - ERASE IN FIELD

Notation : (Ps)
Representation : CSI Ps 04/14
Parameter default value : Ps = 0.

EF causes some or all character positions of the active field, i.e. the field which contains the active position, to be put into the erased state, depending on the parameter value :

0 The active position and the character positions up to the end of the field are put into the erased state.

1 The character positions from the beginning of the field up to and including the active position are put into the erased state.

2 All character positions of the field are put into the erased state.

Whether the character positions of protected areas are put into the erased state, or the character positions of unprotected areas only, depends on the setting of the ERASURE MODE (ERM).

The direction of the character path depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.42 EL - ERASE IN LINE

Notation : (Ps)
Representation : CSI Ps 04/11
Parameter default value : Ps = 0.

EL causes some or all character positions of the active line, i.e. the line which contains the active position, to be put into the erased state, depending on the parameter value :

0 The active position and the character positions up to the end of the line are put into the erased state.

1 The character positions from the beginning of the line up to and including the active position are put into the erased state.

2 All character positions of the line are put into the erased state.

Whether the character positions of protected areas are put into the erased state, or the character positions of unprotected areas only, depends on the setting of the ERASURE MODE (ERM).

The direction of the character path depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.43 EM - END OF MEDIUM

Notation : (C0)
Representation : 01/09

EM is used to identify the physical end of a medium, or the end of the used portion of a medium, or the end of the wanted portion of data recorded on a medium.

8.3.44 EMI - ENABLE MANUAL INPUT

Notation : (Fs)
Representation : ESC 06/02

EMI is used to enable the manual input facilities of a device.

8.3.45 ENQ - ENQUIRY

Notation : (C0)
Representation : 00/05

ENQ is transmitted by a sender as a request for a response from a receiver.

The use of ENQ is defined in ISO 1745.

8.3.46 EOT - END OF TRANSMISSION

Notation : (C0)
Representation : 00/04

EOT is used to indicate the conclusion of the transmission of one or more texts.

The use of EOT is defined in ISO 1745.

8.3.47 ESA - END OF SELECTED AREA

Notation : (C1)
Representation : 08/07 (7-bit code : ESC 04/07)

ESA is used to indicate that the active position is the last of a string of character positions, the contents of which are eligible to be transmitted in the form of a data

stream or transferred to an auxiliary input/output device. The beginning of this string is indicated by START OF SELECTED AREA (SSA).

8.3.48 ESC - ESCAPE

Notation : (C0)
Representation : 01/11

ESC is used for code extension purposes. It causes the meanings of a limited number of bit combinations following it in the data stream to be changed.

The use of ESC is defined in ECMA-35.

8.3.49 ETB - END OF TRANSMISSION BLOCK

Notation : (C0)
Representation : 01/07

ETB is used to indicate the end of a block of data where the data is divided into such blocks for transmission purposes.

The use of ETB is defined by ISO 1745.

8.3.50 ETX - END OF TEXT

Notation : (C0)
Representation : 00/03

ETX is used to indicate the end of a text.

The use of ETX is defined by ISO 1745.

8.3.51 FF - FORM FEED

Notation : (C0)
Representation : 00/12

FF causes the active position to be moved to the corresponding character position on a predetermined line of the next form or page.

8.3.52 FNK - FUNCTION KEY

Notation : (Pn)
Representation : CSI Pn 02/00 05/07
No parameter default value.

FNK is a control function in which the parameter identifies the function key which has been operated.

8.3.53 FNT - FONT SELECTION

Notation : (Ps1;Ps2)
Representation : CSI Ps1;Ps2 02/00 04/04
Parameter default values : Ps1 = 0; Ps2 = 0.

FNT is used to identify the character font to be selected as primary or alternative font by subsequent occurrences of SELECT GRAPHIC RENDITION (SGR) in the data stream. Ps1 specifies the primary or alternative font concerned :

0 Primary font

1 First alternative font

2 Second alternative font

3 Third alternative font

4 Fourth alternative font

5 Fifth alternative font

6 Sixth alternative font

7 Seventh alternative font

8 Eight alternative font

9 Ninth alternative font.

Ps2 identifies the character font according to some register which is to be established.

8.3.54 GCC - GRAPHIC CHARACTER COMPOSITION

Notation : (Ps)
Representation : CSI Ps 02/00 05/15
Parameter default value : Ps = 0.

GCC is used to indicate that two or more graphic characters are to be combined into one graphic symbol. GCC with a parameter value of 0 (or an empty parameter string) indicates that the following two graphic characters are to be presented as a single symbol; GCC with a parameter value of 1 and GCC with a parameter value of 2 indicate respectively the beginning and the end of a string of graphic characters which are to be combined into one graphic symbol for presentation.

Note 30

GCC does not explicitly specify the relative sizes or placements of the component parts of a composite graphic symbol. In the simplest case, two components may be "half-width" and side-by-side. In Japanese text presented with the character path either horizontal or vertical, a pair of Kanji characters, or a pair of "Arabic" digits may be required to be presented upright, side-by-side, and occupying the space of a normal-size Kanji character.

8.3.55 GSM - GRAPHIC SIZE MODIFICATION

Notation : (Pn1;Pn2)
Representation : CSI Pn1;Pn2 02/00 04/02
Parameter default values : Pn1 = 100; Pn2 = 100.

GSM is used to modify for subsequent text the height and/or the width of all primary and alternative fonts identified by FONT SELECTION (FNT) and established by GRAPHIC SIZE SELECTION (GSS). The established values remain in effect until the next occurrence of GSM or GSS in the data stream.

Pn1 specifies the height as a percentage of the height established by GSS.

Pn2 specifies the width as a percentage of the width established by GSS.

8.3.56 GSS - GRAPHIC SIZE SELECTION

Notation : (Pn)
Representation : CSI Pn 02/00 04/03
No parameter default value.

GSS is used to establish for subsequent text the height and the width of all primary and alternative fonts identified

by FONT SELECTION (FNT). The established values remain in effect until the next occurrence of GSS in the data stream. Where Pn specifies the height, the width is implicitly defined by the height.

The unit in which the parameter value is expressed is that established by SELECT SIZE UNIT (SSU).

8.3.57 HPA - CHARACTER POSITION ABSOLUTE

Notation : (Pn)
Representation : CSI Pn 06/00
Parameter default value : Pn = 1.

HPA causes the active position to be moved to position n within the active line, where n equals the value of Pn.

The unit in which the parameter value is expressed depends on the setting of the POSITIONING UNIT MODE (PUM). If that mode is set to SIZE, the unit is that established by SELECT SIZE UNIT (SSU).

The direction of the character path depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.58 HPB - CHARACTER POSITION BACKWARD

Notation : (Pn)
Representation : CSI Pn 06/10
Parameter default value : Pn = 1.

HPB causes the active position to be moved by n units in the direction opposite to that of the character path, where n equals the value of Pn.

The unit in which the parameter value is expressed depends on the setting of the POSITIONING UNIT MODE (PUM). If that mode is set to SIZE, the unit is that established by SELECT SIZE UNIT (SSU).

The direction of the character path depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.59 HPR - CHARACTER POSITION FORWARD

Notation : (Pn)
Representation : CSI Pn 06/01
Parameter default value : Pn = 1.

HPR causes the active position to be moved by n units in the direction of the character path, where n equals the value of Pn.

The unit in which the parameter value is expressed depends on the setting of the POSITIONING UNIT MODE (PUM). If that mode is set to SIZE, the unit is that established by SELECT SIZE UNIT (SSU).

The direction of the character path depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.60 HT - CHARACTER TABULATION

Notation : (C0)
Representation : 00/09

HT causes the active position to be moved to the following character tabulation stop.

In addition, if that following character tabulation stop has been set by TABULATION ALIGN CENTRE (TAC), TABULATION ALIGN LEADING EDGE (TALE), TABULATION ALIGN TRAILING EDGE (TATE) or TABULATION CENTRED ON CHARACTER (TCC), HT indicates the beginning of a string of text which is to be positioned within a line according to the properties of that tabulation stop. The end of the string is indicated by the next occurrence of HT or CARRIAGE RETURN (CR) or NEXT LINE (NEL) in the data stream.

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.61 HTJ - CHARACTER TABULATION WITH JUSTIFICATION

Notation : (C1)
Representation : 08/09 (7-bit code : ESC 04/09)

HTJ causes the contents of the active field to be shifted forward so that it ends at the character position preceding the following character tabulation stop. The active position is moved to that following character tabulation stop. The character positions which precede the beginning of the shifted string are put into the erased state.

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.62 HTS - CHARACTER TABULATION SET

Notation : (C1)
Representation : 08/08 (7-bit code : ESC 04/08)

HTS causes a character tabulation stop to be set at the active position.

The number of lines affected depends on the setting of the TABULATION STOP MODE (TSM).

The direction of the line progression depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.63 HVP - CHARACTER AND LINE POSITION

Notation : (Pn1;Pn2)
Representation : CSI Pn1;Pn2 06/06
Parameter default values : Pn1 = 1; Pn2 = 1.

HVP causes the active position to be moved to position n in the direction of the line progression and to position m in the direction of the character path, where n equals the value of Pn1 and m equals the value of Pn2.

The unit in which the parameter values are expressed depend on the setting of the POSITIONING UNIT MODE (PUM). If that mode is set to SIZE, the unit is that established by SELECT SIZE UNIT (SSU).

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.64 ICH - INSERT CHARACTER

Notation : (Pn)
Representation : CSI Pn 04/00
Parameter default value : Pn = 1.

ICH is used to prepare the insertion of n characters, by putting into the erased state the active position and, depending on the setting of the CHARACTER EDITING MODE (HEM), the n-1 preceding or following character positions, where n = the value of Pn. The previous contents of the active position and an adjacent string of character positions are shifted away from the active position. The contents of n character positions at the other end of the shifted part are removed.

The extent of the shifted part is established by SELECT EDITING EXTENT (SEE).

The effect of ICH on the start or end of a selected area, the start or end of a qualified area, or a tabulation stop in the shifted part, is not defined by this Standard.

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.65 IDCS - IDENTIFY DEVICE CONTROL STRING

Notation : (Ps)
Representation : CSI Ps 02/00 04/15
No parameter default value.

IDCS is used to specify the purpose and format of the command string of subsequent DEVICE CONTROL STRINGs (DCS). The specified purpose and format remain in effect until the next occurrence of IDCS in the data stream.

The parameter values are :

1 Reserved for use with the DIAGNOSTIC state of the STATUS REPORT TRANSFER MODE (SRTM).

2 Reserved for Dynamically Redefinable Character Sets (DRCS) according to ECMA-35.

The format and interpretation of the command string corresponding to these parameter values are to be defined in appropriate standards. If this control function is used to identify a private command string, a private parameter value shall be used.

8.3.66 IGS - IDENTIFY GRAPHIC SUBREPERTOIRE

Notation : (Ps)
Representation : CSI PS 02/00 04/13
Parameter default value : Ps = 0.

IGS is used to indicate that a subrepertoire of the graphic character repertoire of ISO 6937 is used in the subsequent text.

0 Identifies the complete graphic character repertoire of ISO 6937.

With a parameter value not equal to 0, IGS identifies a graphic character subrepertoire registered in accordance with the registration procedure specified in ISO 7350.

8.3.67 IL - INSERT LINE

Notation : (Pn)
Representation : CSI Pn 04/12
Parameter default value : Pn = 1.

IL is used to prepare the insertion of n lines, by putting into the erased state the active line and, depending on the setting of the LINE EDITING MODE (VEM), the n-1 preceding or following lines, where n = the value of Pn. The previous contents of the active line and of adjacent lines are shifted away from the active line. The contents of n lines at the other end of the shifted part are removed.

The extent of the shifted part is established by SELECT EDITING EXTENT (SEE).

Any occurrences of the start or end of a selected area, the start or end of a qualified area, or a tabulation stop in the shifted part, are also shifted.

If the TABULATION STOP MODE (TSM) is set to SINGLE, character tabulation stops are cleared in the lines that are put into the erased state.

The active position is moved to the line home position within the active line.

The line home position depends on the parameter of SET LINE HOME (SLH) and on the direction of the character path.

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.68 INT - INTERRUPT

Notation : (Fs)
Representation : ESC 06/01

INT is used to indicate to the receiving device that the current process is to be interrupted and an agreed procedure is to be initiated. This control function is applicable to either direction of transmission.

8.3.69 IS1 - INFORMATION SEPARATOR ONE (US - UNIT SEPARATOR)

Notation : (C0)
Representation : 01/15

IS1 is used to separate and qualify data logically; its specific meaning has to be defined for each application. If this control function is used in hierarchical order, it may delimit a data item called a unit (see 8.2.10).

8.3.70 IS2 - INFORMATION SEPARATOR TWO (RS - RECORD SEPARATOR)

Notation : (C0)
Representation : 01/14

IS2 is used to separate and qualify data logically; its specific meaning has to be defined for each application. If

this control function is used in hierarchical order, it may delimit a data item called a record (see 8.2.10).

8.3.71 IS3 - INFORMATION SEPARATOR THREE (GS - GROUP SEPARATOR)

Notation : (C0)
Representation : 01/13

IS3 is used to separate and qualify data logically; its specific meaning has to be defined for each application. If this control function is used in hierarchical order, it may delimit a data item called a group (see 8.2.10).

8.3.72 IS4 - INFORMATION SEPARATOR FOUR (FS - FILE SEPARATOR)

Notation : (C0)
Representation : 01/12

IS4 is used to separate and qualify data logically; its specific meaning has to be defined for each application. If this control function is used in hierarchical order, it may delimit a data item called a file (see 8.2.10).

8.3.73 JFY - JUSTIFY

Notation : (Ps...)
Representation : CSI Ps... 02/00 04/06
Parameter default value : Ps = 0.

JFY is used to indicate the beginning of a string of graphic characters that are to be justified according to the layout specified by the parameter values (see Appendix C) :

0 No justification, end of justification of preceding text

1 Word fill

2 Word space

3 Letter space

4 Hyphenation

5 Flush to line home position margin

6 Centre between line home position and line limit position margins

7 Flush to line limit position margin

8 Italian hyphenation.

The end of the string to be justified is indicated by the next occurrence of JFY in the data stream.

The line home position is established by the parameter of SET LINE HOME (SLH). The line limit position is established by the parameter of SET LINE LIMIT (SLL).

8.3.74 LF - LINE FEED

Notation : (C0)
Representation : 00/10

LF causes the active position to be moved to the corresponding character position of the following line.

The direction of the line progression depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.75 LS0 - LOCKING-SHIFT ZERO

Notation : (C0)
Representation : 00/15

LS0 is used for code extension purposes. It causes the meanings of the bit combinations following it in the data stream to be changed.

The use of LS0 is defined in ECMA-35.

Note 31

LS0 is used in 8-bit environments only; in 7-bit environments SHIFT-IN (SI) is used instead.

8.3.76 LS1 - LOCKING-SHIFT ONE

Notation : (C0)
Representation : 00/14

LS1 is used for code extension purposes. It causes the meanings of the bit combinations following it in the data stream to be changed.

The use of LS1 is defined in ECMA-35.

Note 32

LS1 is used in 8-bit environments only; in 7-bit environments SHIFT-OUT (SO) is used instead.

8.3.77 LS1R - LOCKING-SHIFT ONE RIGHT

Notation : (Fs)
Representation : ESC 07/14

LS1R is used for code extension purposes. It causes the meanings of the bit combinations following it in the data stream to be changed.

The use of LS1R is defined in ECMA-35.

8.3.78 LS2 - LOCKING-SHIFT TWO

Notation : (Fs)
Representation : ESC 06/14

LS2 is used for code extension purposes. It causes the meanings of the bit combinations following it in the data stream to be changed.

The use of LS2 is defined in ECMA-35.

8.3.79 LS2R - LOCKING-SHIFT TWO RIGHT

Notation : (Fs)
Representation : ESC 07/13

LS2R is used for code extension purposes. It causes the meanings of the bit combinations following it in the data stream to be changed.

The use of LS2R is defined in ECMA-35.

8.3.80 LS3 - LOCKING-SHIFT THREE

Notation : (Fs)
Representation : ESC 06/15

LS3 is used for code extension purposes. It causes the meanings of the bit combinations following it in the data stream to be changed.

The use of LS3 is defined in ECMA-35.

8.3.81 LS3R - LOCKING-SHIFT THREE RIGHT

Notation : (Fs)
Representation : ESC 07/12

LS3R is used for code extension purposes. It causes the meanings of the bit combinations following it in the data stream to be changed.

The use of LS3R is defined in ECMA-35.

8.3.82 MC - MEDIA COPY

Notation : (Ps)
Representation : CSI Ps 06/09
Parameter default value : Ps = 0.

MC is used either to initiate a transfer of data from or to an auxiliary input/output device or to enable or disable the relay of the received data stream to an auxiliary input/output device, depending on the parameter value :

0 Initiate transfer to a primary auxiliary device

1 Initiate transfer from a primary auxiliary device

2 Initiate transfer to a secondary auxiliary device

3 Initiate transfer from a secondary auxiliary device

4 Stop relay to a primary auxiliary device

5 Start relay to a primary auxiliary device

6 Stop relay to a secondary auxiliary device

7 Start relay to a secondary auxiliary device.

This control function is not to be used to switch on or off an auxiliary device.

8.3.83 MW - MESSAGE WAITING

Notation : (C1)
Representation : 09/05 (7-bit code : ESC 05/05)

MW is used to set a message waiting indicator in the receiving device. An appropriate acknowledgement to the receipt of MW may be given by using DEVICE STATUS REPORT (DSR).

8.3.84 NAK - NEGATIVE ACKNOWLEDGE

Notation : (C0)
Representation : 01/05

NAK is transmitted by a receiver as a negative response to the sender.

The use of NAK is defined in ISO 1745.

8.3.85 NBH - NO BREAK HERE

Notation : (C1)
Representation : 08/03 (7-bit code : ESC 04/03)

NBH is used to indicate a point where a line break must not occur when text is formatted. NBH may occur between two graphic characters, either or both of which may be SPACE.

8.3.86 NEL - NEXT LINE

Notation : (C1)
Representation : 08/05 (7-bit code : ESC 04/05)

NEL causes the active position to be moved to the line home position of the following line.

The line home position depends on the parameter of SET LINE HOME (SLH) and on the direction of the character path.

The lime home position is established by the parameter of SET LINE HOME (SLH).

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.87 NP - NEXT PAGE

Notation : (Pn)
Representation : CSI Pn 05/05
Parameter default value : Pn = 1.

NP causes the n-th following page to be displayed, where n = the value of Pn.

The effect of this control function on the active position is not defined by this Standard.

8.3.88 NUL - NULL

Notation : (C0)
Representation : 00/00

NUL is used for media-fill or time-fill. NUL characters may be inserted into, or removed from, a data stream without affecting the information content of that stream, but such action may affect the information layout and/or the control of equipment.

8.3.89 OSC - OPERATING SYSTEM COMMAND

Notation : (C1)
Representation : 09/13 (7-bit code : ESC 05/13)

OSC is used as the opening delimiter of a control string for operating system use. The command string following may consist of a sequence of characters represented by bit combinations in the range 00/08 to 00/13 and 02/00 to 07/14. The control string is closed by the terminating delimiter STRING TERMINATOR (ST). The interpretation of the command string depends on the relevant operating system.

8.3.90 PEC - PRESENTATION EXPAND OR CONTRACT

Notation : (Ps)
Representation : CSI Ps 02/00 05/10
Parameter default value : Ps = 0.

PEC is used to establish graphic character's spacing and the extent for subsequent text. The spacing and the extent are specified in the direction parallel to the character path as multiples of the spacing explicitly established and the extent implicitly established by the most recent occurrence of SELECT CHARACTER SPACING (SHS) or SPACING INCREMENT (SPI) in the data stream. The established spacing and extent remain in effect until the next occurrence of PEC, of SHS or of SPI in the data stream. The parameter values are :

0 Normal (as specified by SHS or SPI)

1 Expanded (multiplied by a factor not greater than 2)

2 Condensed (multiplied by a factor not less than 0,5).

The direction of the character path depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.91 PFS - PAGE FORMAT SELECTION

Notation : (Ps)
Representation : CSI Ps 02/00 04/10
Parameter default value : Ps = 0.

PFS is used to establish the available area for the imaging of pages of text based on paper size. The pages are introduced by the subsequent occurrence of FORM FEED (FF) in the data stream. The established image area remains in effect until the next occurrence of PFS in the data stream. The parameter values are :

0 Tall basic text communication format.

1 Wide basic text communication format.

Note 33

Other parameter values and examples of the available image areas may be found in ISO 6937/3 Annex A.

8.3.92 PLD - PARTIAL LINE DOWN

Notation : (C1)
Representation : 08/11 (7-bit code : ESC 04/11)

PLD causes the active position to be moved to the corresponding character position of an imaginary line with a partial offset in the direction of the line progression. This offset should be sufficient either to image following characters as subscripts until the first following occurrence of PARTIAL LINE UP (PLU) in the data stream, or, if preceding characters were imaged as superscripts, to restore imaging of following characters to the active line.

Any interactions between PLD and format effectors other than PLU are not defined by this Standard.

The direction of the line progression depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.93 PLU - PARTIAL LINE UP

Notation : (C1)
Representation : 08/12 (7-bit code : ESC 04/12)

PLU causes the active position to be moved to the corresponding character position of an imaginary line with a partial offset in the direction opposite to that of the line progression. This offset should be sufficient either to image following characters as superscripts until the first following occurrence of PARTIAL LINE DOWN (PLD) in the data stream, or, if preceding characters were imaged as subscripts, to restore imaging of following characters to the active line.

Any interactions between PLU and format effectors other than PLD are not defined by this Standard.

The direction of the line progression depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.94 PM - PRIVACY MESSAGE

Notation : (C1)
Representation : 09/14 (7-bit code : ESC 05/14)

PM is used as the opening delimiter of a control string for privacy message use. The command string following may consist of a sequence of characters represented by bit combinations in the range 00/08 to 00/13 and 02/00 to 07/14. The control string is closed by the terminating delimiter STRING TERMINATOR (ST). The interpretation of the command string depends on the relevant privacy discipline.

8.3.95 PP - PRECEDING PAGE

Notation : (Pn)
Representation : CSI Pn 05/06
Parameter default value : Pn = 1.

PP causes the n-th preceding page to be displayed, where n equals the value of Pn. The effect of this control function on the active position is not defined by this Standard.

8.3.96 PPA - PAGE POSITION ABSOLUTE

Notation : (Pn)
Representation : CSI Pn 02/00 05/00
Parameter default value : Pn = 1.

PPA causes the active position to be moved to the corresponding character and line position on the n-th page, where n equals the value of Pn.

8.3.97 PPB - PAGE POSITION BACKWARD

Notation : (Pn)
Representation : CSI Pn 02/00 05/02
Parameter default value : Pn = 1.

PPB causes the active position to be moved to the corresponding character and line position on the n-th preceding page, where n equals the value of Pn.

8.3.98 PPR - PAGE POSITION FORWARD

Notation : (Pn)
Representation : CSI Pn 02/00 05/01
Parameter default value : Pn = 1.

PPR causes the active position to be moved to the corresponding character and line position on the n-th following page, where n equals the value of Pn.

8.3.99 PTX - PARALLEL TEXTS

Notation : (Ps)
Representation : CSI Ps 05/12
Parameter default value : Ps = 0

PTX is used to delimit strings of graphic characters that are communicated one after another in the data stream but that are intended to be presented in parallel with one another, usually in adjacent lines.

The parameter values are :

0 End of parallel texts

1 Beginning of a string of principal parallel text

2 Beginning of a string of supplementary parallel text

3 Beginning of a string of supplementary Japanese Rubi annotation

4 Beginning of a string of supplementary Chinese phonetic annotation.

PTX with a parameter value of 1 indicates the beginning of the string of principal text intended to be presented in parallel with one or more strings of supplementary text.

PTX with a parameter value greater than 1 indicates the beginning of a string of supplementary text that is intended to be presented in parallel with either a string of principal text or the immediately preceding string of supplementary text, if any; at the same time it indicates the end of the preceding string of principal text or of the immediately preceding string of supplementary text, if any. The end of a string of supplementary text is indicated by a subsequent occurrence of PTX with a parameter value other than 1.

PTX with a parameter value of 0 indicates the end of the latter or last of two or more strings of text indended to be presented in parallel with one another.

Note 34

PTX does not explicitly specify the relative placement of the strings of primary and supplementary parallel texts, or the relative sizes of graphic characters in the strings of parallel text. A string of supplementary text is normally presented in a line adjacent to the line containing the string of principal text, or adjacent to the line containing the immediately preceding string of supplementary text, if any. The first graphic character of the string of principal text and the first graphic character of a string of supplementary text are normally presented in the same character position of their respective lines. However, a string of supplementary text longer (when presented) than the associated string of principal text may be centred on that string. In the case of long strings of text, such as paragraphs in different languages, the strings may be presented in successive lines in parallel columns, with their beginnings aligned with one another and the shorter of the paragraphs followed by an appropriate amount of "white space".

Japanese Rubi annotation typically consists of a few half-size or smaller Kana characters which indicate the pronunciation or interpretation of one or more Kanji characters and are presented above those Kanji characters if the character path is horizontal, or to the right of them if the character path is vertical.

The direction of the character path depends on the parameter of SELECT PRESENTATION DIRECTION (SPD).

Chinese phonetic annotation typically consists of a few Pinyin characters which indicate the pronunciation of one or more Hanzi characters and are presented above those Hanzi characters. Alternatively, the Pinyin characters may be presented in the same line as the Hanzi characters and following the respective Hanzi characters. The Pinyin characters will then be presented within enclosing pairs of parentheses.

8.3.100 PU1 - PRIVATE USE ONE

Notation : (C1)
Representation : 09/01 (7-bit code : ESC 05/01)

PU1 is reserved for a function without standardized meaning for private use as required, subject to the prior agreement of the sender and the recipient of the data.

8.3.101 PU2 - PRIVATE USE TWO

Notation : (C1)
Representation : 09/02 (7-bit code : ESC 05/02)

PU2 is reserved for a function without standardized meaning for private use as required, subject to the prior agreement of the sender and the recipient of the data.

8.3.102 QUAD - QUAD

Notation : (Ps...)
Representation : CSI Ps... 02/00 04/08
Parameter default value : Ps = 0.

QUAD is used to indicate the end of a string of graphic characters that are to be positioned on a single line according to the layout specified by the parameter values (see Appendix C) :

0 Flush to line home position margin

1 Flush to line home position margin and fill with leader

2 Centre between line home position and line limit position margins

3 Centre between line home position and line limit position margins and fill with leader

4 Flush to line limit position margin

5 Flush to line limit position margin and fill with leader

6 Flush to both margins.

The beginning of the string to be positioned is indicated by the preceding occurrence in the data stream of either QUAD or one of the following formator functions : FORM FEED (FF), CHARACTER AND LINE POSITION (HVP), INDEX (IND), LINE FEED (LF), NEXT LINE (NEL), PAGE POSITION ABSOLUTE (PPA), PAGE POSITION BACKWARD (PPB), PAGE POSITION FORWARD (PPR),

REVERSE LINE FEED (RI), LINE POSITION ABSOLUTE (VPA), LINE POSITION BACKWARD (VPB), LINE POSITION FORWARD (VPR), or LINE TABULATION (VT).

The line home position is established by the parameter of SET LINE HOME (SLH). The line limit position is established by the parameter of SET LINE LIMIT (SLL).

8.3.103 REP - REPEAT

Notation : (Pn)
Representation : CSI Pn 06/02
Parameter default value : Pn = 1.

REP is used to indicate that the preceding character in the data stream, if it is a graphic character (represented by one or more bit combinations) including SPACE, is to be repeated n times, where n equals the value of Pn. If the character preceding REP is a control function or part of a control function, the effect of REP is not defined by this Standard.

8.3.104 RI - REVERSE LINE FEED

Notation : (C1)
Representation : 08/13 (7-bit code : ESC 04/13)

RI causes the active position to be moved to the corresponding character position of the preceding line.

The direction of the line progression depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.105 RIS - RESET TO INITIAL STATE

Notation : (Fs)
Representation : ESC 06/03

RIS causes a device to be reset to its initial state, i.e. the state it has after it is made operational. This may imply, if applicable : clear tabulation stops, remove qualified areas, reset graphic rendition, put all character positions into the erased state, move the active position to the first position of the first line.

8.3.106 RM - RESET MODE

Notation : (Ps...)
Representation : CSI Ps... 06/12
No parameter default value.

RM causes the modes of the receiving device to be reset as specified by the parameter values :

1 GUARDED AREA TRANSFER MODE (GATM)

2 KEYBOARD ACTION MODE (KAM) see Appendix E.1.2

3 CONTROL REPRESENTATION MODE (CRM)

4 INSERTION REPLACEMENT MODE (IRM)

5 STATUS REPORT TRANSFER MODE (SRTM)

6 ERASURE MODE (ERM)

7 LINE EDITING MODE (VEM)

8 (Reserved for future standardization)

9 (Reserved for future standardization)

10 CHARACTER EDITING MODE (HEM)

11 POSITIONING UNIT MODE (PUM)

12 SEND/RECEIVE MODE (SRM)

13 FORMAT EFFECTOR ACTION MODE (FEAM)

14 FORMAT EFFECTOR TRANSFER MODE (FETM)

15 MULTIPLE AREA TRANSFER MODE (MATM)

16 TRANSFER TERMINATION MODE (TTM)

17 SELECTED AREA TRANSFER MODE (SATM)

18 TABULATION STOP MODE (TSM)

19 EDITING BOUNDARY MODE (EBM) see Appendix E.1.1

20 (Reserved for use as defined in Appendix E.1.3)

21 GRAPHIC RENDITION COMBINATION MODE (GRCM)

22 (Reserved for use as defined in Appendix E.1.4)

Note 35

Private modes may be implemented using private parameters (see 5.5.1 and 7.4).

8.3.107 SACS - SET ADDITIONAL CHARACTER SEPARATION

Notation : (Pn)
Representation : CSI Pn 02/00 05/12
Parameter default value : Pn = 0.

SACS is used to establish extra inter-character escapement for subsequent text. The established extra escapement remains in effect until the next occurrence of SACS in the data stream or until it is reset to the default value by a subsequent occurrence of CARRIAGE RETURN/LINE FEED (CR LF) or of NEXT LINE (NEL) in the data stream.

The unit in which the parameter value is expressed is that established by SELECT SIZE UNIT (SSU).

8.3.108 SAPV - SELECT ARABIC PRESENTATION VARIANTS

Notation : (Ps)
Representation : CSI Ps ... 2/0 5/13
Parameter default value : Ps = 0

SPAV is used to specify one or more variants for the presentation of text containing or consisting of graphic characters from the Arabic or related alphabets, depending on the parameter value :

0 Default presentation (implementation-defined); cancels the effect of any preceding occurrence of SAPV in the data stream

1 The decimal digits are presented by means of Arabic digits usual in Latin-alphabet text

2 The decimal digits are presented by means of Hindi digits usual in Arabic-alphabet text

3 Each of the graphic characters which is one of a left/right handed pair (parentheses, square brack-

ets, curly brackets, quotation marks, etc.) is presented as "mirrored", i.e. as the other member of the pair. For example, the coded graphic character given the name LEFT PARENTHESIS is presented as RIGHT PARENTHESIS, and vice versa

4 All graphic characters which represent operators and delimiters in mathematical formulae and which are not symmetrical about a vertical axis are presented as mirrored about that vertical axis

5 The following graphic character is presented in its independent form

6 The following graphic character is presented in its initial form

7 The following graphic character is presented in its medial form

8 The following graphic character is presented in its final form

9 The graphic character represented by bit combination 02/14 is presented as a FULL STOP if it appears in a numerical context

10 The graphic character represented by bit combination 02/14 is presented as a COMMA if it appears in a numerical context

11 Vowels superscripted

12 Vowels subscripted

13 Automatic shape determination with LAM-ALEPH ligatures

14 Automatic shape determination without LAM-ALEPH ligatures.

The direction of the character path depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.109 SCI - SINGLE CHARACTER INTRODUCER

Notation : (C1)
Representation : 09/10 (7-bit code : ESC 05/10)

SCI and the bit combination following it are used to represent a control function or a graphic character. The bit combination following SCI must be from 00/08 to 00/13 or 02/00 to 07/14. The use of SCI is reserved for future standardization.

8.3.110 SD - SCROLL DOWN

Notation : (Pn)
Representation : CSI Pn 05/04
Parameter default value : Pn = 1.

SD causes the displayed data to be moved by n lines if the character path is horizontal, or by n character positions if the character path is vertical, such that the data appear to move down. n equals the value of Pn.

The active position is not affected by this control function.

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.111 SEE - SELECT EDITING EXTENT

Notation : (Ps)
Representation : CSI Ps 05/01
Parameter default value : Ps = 0.

SEE is used to establish the editing extent for subsequent character insertion or deletion, depending on the parameter value :

0 The shifted part is limited to the active page

1 The shifted part is limited to the active line

2 The shifted part is limited to the active field

3 The shifted part is limited to the active qualified area

4 The shifted part consists of the relevant part of the entire buffer.

8.3.112 SEF - SHEET EJECT AND FEED

Notation : (Ps)
Representation : CSI Ps 02/00 05/09
Parameter default value : Ps = 0.

SEF causes a sheet of paper to be ejected from a printing device, and, for non-zero parameter values causes another sheet to be loaded into the printing device from the paper bin specified by the parameter value :

0 Eject sheet

1 Eject sheet and load another from bin 1

2 Eject sheet and load another from bin 2.

8.3.113 SGR - SELECT GRAPHIC RENDITION

Notation : (Ps...)
Representation : CSI Ps... 06/13
Parameter default value : Ps = 0.

SGR is used to establish one or more graphic rendition aspects for subsequent text. The established aspects remain in effect until the next occurrence of SGR in the data stream, depending on the setting of the GRAPHIC RENDITION COMBINATION MODE (GRCM). Each graphic rendition aspect is specified by a parameter value :

0 Default rendition (implementation-defined), cancels the effect of any preceding occurrence of SGR in the data stream regardless of the setting of the GRAPHIC RENDITION COMBINATION MODE (GRCM)

1 Bold or increased intensity

2 Faint, decreased intensity or second colour

3 Italicized

4 Underlined

5 Slowly blinking (less than 150 per minute)

6 Rapidly blinking (150 per minute or more)

7 Negative image

8 Concealed characters

9 Crossed-out (characters still legible but marked as to be deleted)

10 Primary (default) font

11 First alternative font

12 Second alternative font

13 Third alternative font

14 Fourth alternative font

15 Fifth alternative font

16 Sixth alternative font

17 Seventh alternative font

18 Eighth alternative font

19 Ninth alternative font

20 Fraktur (Gothic)

21 Doubly underlined

22 Normal colour or normal intensity (neither bold nor faint)

23 Not italicized, not fraktur

24 Not underlined (neither singly nor doubly)

25 Steady (not blinking)

26 (Reserved for proportional spacing as specified in CCITT Recommendation T.61 1984)

27 Positive image

28 Revealed characters

29 Not crossed out

30 Black display

31 Red display

32 Green display

33 Yellow display

34 Blue display

35 Magenta display

36 Cyan display

37 White display

38 (Reserved for future standardization)

39 Default display colour (implementation-defined)

40 Black background

41 Red background

42 Green background

43 Yellow background

44 Blue background

45 Magenta background

46 Cyan background

47 White background

48 (Reserved for future standardization)

49 Default background colour (implementation-defined)

50 (Reserved for future standardization)

51 Boxed

52 Encircled

53 Overlined

54 (Reserved for future standardization)

55 (Reserved for future standardization)

56 (Reserved for future standardization)

57 (Reserved for future standardization)

58 (Reserved for future standardization)

59 (Reserved for future standardization)

60 Ideogram underline or right side line

61 Ideogram double underline or double right side line

62 Ideogram overline or left side line

63 Ideogram double overline or double left side line

64 Ideogram stress marking.

Note 36

The usable combinations of parameter values are implementation-defined.

8.3.114 SHS - SELECT CHARACTER SPACING

Notation : (Ps)
Representation : CSI Ps 02/00 04/11
Parameter default value : Ps = 0.

SHS is used to establish the character spacing for subsequent text. The established spacing remains in effect until the next occurrence of SHS in the data stream. The parameter values are :

0 10 characters per 25,4 mm

1 12 characters per 25,4 mm

2 15 characters per 25,4 mm

3 6 characters per 25,4 mm

4 3 characters per 25,4 mm.

8.3.115 SI - SHIFT-IN

Notation : (C0)
Representation : 00/15

SI is used for code extension purposes. It causes the meanings of the bit combinations following it in the data stream to be changed.

The use of SI is defined in ECMA-35.

Note 37

SI is used in 7-bit environments only; in 8-bit environments LOCKING-SHIFT ZERO (LS0) is used instead.

8.3.116 SL - SCROLL LEFT

Notation : (Pn)
Representation : CSI Pn 02/00 04/00
Parameter default value : Pn = 1.

SL causes the displayed data to be moved by n character positions if the character path is horizontal, or by n lines if the character path is vertical, such that the data appear to move to the left. n equals the value of Pn.

The active position is not affected by this control function.

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.117 SLH - SET LINE HOME

Notation : (Pn)
Representation : CSI Pn 02/00 05/05
No parameter default value.

SLH is used to establish at position n within the active line and lines of subsequent text the position to which the active position will be moved by subsequent occurrences of CARRIAGE RETURN (CR), DELETE LINE (DL), INSERT LINE (IL) or NEXT LINE (NEL) in the data stream. n equals the value of Pn.

The established position is called the line home position and remains in effect until the next occurrence of SLH in the data stream.

The unit in which the parameter value is expressed depends on the setting of the POSITIONING UNIT MODE (PUM). If that mode is set to SIZE, the unit is that established by SELECT SIZE UNIT (SSU).

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.118 SLL - SET LINE LIMIT

Notation : (Pn)
Representation : CSI Pn 02/00 05/06
No parameter default value.

SLL is used to establish at the n-th position within the active line and lines of subsequent text the position beyond which no graphic character shall be imaged. n equals the value of Pn.

The established position is called the line limit position and remains in effect until the next occurrence of SLL in the data stream.

The unit in which the parameter value is expressed depends on the setting of the POSITIONING UNIT MODE (PUM). If that mode is set to SIZE, the unit is that established by SELECT SIZE UNIT (SSU).

The direction of the character path and the direction of the line progression depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.119 SM - SET MODE

Notation : (Ps...)
Representation : CSI Ps... 06/08
No parameter default value.

SM causes the modes of the receiving device to be set as specified by the parameter values :

1 GUARDED AREA TRANSFER MODE (GATM)

2 KEYBOARD ACTION MODE (KAM) see Appendix E.1.2

3 CONTROL REPRESENTATION MODE (CRM)

4 INSERTION REPLACEMENT MODE (IRM)

5 STATUS REPORT TRANSFER MODE (SRTM)

6 ERASURE MODE (ERM)

7 LINE EDITING MODE (VEM)

8 (Reserved for future standardization)

9 (Reserved for future standardization)

10 CHARACTER EDITING MODE (HEM)

11 POSITIONING UNIT MODE (PUM)

12 SEND/RECEIVE MODE (SRM)

13 FORMAT EFFECTOR ACTION MODE (FEAM)

14 FORMAT EFFECTOR TRANSFER MODE (FETM)

15 MULTIPLE AREA TRANSFER MODE (MATM)

16 TRANSFER TERMINATION MODE (TTM)

17 SELECTED AREA TRANSFER MODE (SATM)

18 TABULATION STOP MODE (TSM)

19 EDITING BOUNDARY MODE (EBM) see Appendix E.1.1

20 (Reserved for use as defined in Appendix E.1.3)

21 GRAPHIC RENDITION COMBINATION MODE (GRCM)

22 (Reserved for use as defined in Appendix E.1.4)

Note 38

Private modes may be implemented using private parameters (see 5.5.1 and 7.4).

8.3.120 SO - SHIFT-OUT

Notation : (C0)
Representation : 00/14

SO is used for code extension purposes. It causes the meanings of the bit combinations following it in the data stream to be changed.

The use of SO is defined in ECMA-35.

Note 39

SO is used in 7-bit environments only; in 8-bit environments LOCKING-SHIFT ONE (LS1) is used instead.

8.3.121 SOH - START OF HEADING

Notation : (C0)
Representation : 00/01

SOH is used to indicate the beginning of a heading.

The use of SOH is defined in ISO 1745.

8.3.122 SOS - START OF STRING

Notation : (C1)
Representation : 09/08 (7-bit code : ESC 05/08)

SOS is used as the opening delimiter of a control string. The character string following may consist of a sequence of characters represented by any bit combination, except those representing SOS or STRING TERMINATOR (ST). The control string is closed by the terminating delimiter STRING TERMINATOR (ST). The interpretation of the character string depends on the application.

8.3.123 SPD - SELECT PRESENTATION DIRECTIONS

Notation : (Ps)
Representation : CSI Ps 02/00 05/03
Parameter default value : Ps = 0.

SPD is used to establish for subsequent text the directions of the active position movement for graphic characters and for the control functions which initiate movement of the active position. The established directions remain in effect until the next occurrence of SPD in the data stream. The parameter values are :

0 The direction of the character path is from left to right; the direction of the line progression is from top to bottom.

1 The direction of the character path is from top to bottom; the direction of the line progression is from right to left.

2 (Reserved for future standardization).

3 The direction of the character path is from right to left; the direction of the line progression is from top to bottom.

8.3.124 SPI - SPACING INCREMENT

Notation : (Pn1;Pn2)
Representation : CSI Pn1;Pn2 02/00 04/07
No parameter default values.

SPI is used to establish the line spacing and the character spacing for subsequent text. The established line spacing remains in effect until the next occurrence of SELECT LINE SPACING (SVS) or of SPI in the data stream. The established character spacing remains in effect until the next occurrence of SELECT CHARACTER SPACING (SHS) or of SPI in the data stream.

Pn1 specifies the line spacing.

Pn2 specifies the character spacing.

The unit in which the parameter values are expressed is that established by SELECT SIZE UNIT (SSU).

8.3.125 SPQR - SELECT PRINT QUALITY AND RAPIDITY

Notation : (Ps)
Representation : CSI Ps 02/00 05/08
Parameter default value : Ps = 0.

SPQR is used to select the relative print quality and the print speed for devices the output quality and speed of which are inversely related. The selected values remain in effect until the next occurrence of SPQR in the data stream. The parameter values are :

0 Highest available print quality, low print speed

1 Medium print quality, medium print speed

2 Draft print quality, highest available print speed.

8.3.126 SR - SCROLL RIGHT

Notation : (Pn)
Representation : CSI Pn 02/00 04/01
Parameter default value : Pn = 1.

SR causes the displayed data to be moved by n character positions if the character path is horizontal, or by n lines if the character path is vertical, such that the data appear to move to the right. n equals the value of Pn.

The active position is not affected by this control function.

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.127 SRS - START REVERSED STRING

Notation : (Ps)
Representation : CSI Ps 05/11
Parameter default value : Ps = 0

With a parameter value not equal to zero, SRS indicates the beginning of a string of graphic characters which are communicated in the order in which they are intended to be read, but the order in which the graphic characters of the string are presented will not necessarily be that of the immediately preceding text.

A string delimited by SRS may contain n (where n is zero or more) further occurrences of SRS with a parameter value not equal to zero; the end of the string is indicated by the (n+1)-th following occurrence of SRS with a parameter value of zero (or an empty parameter string).

The ordering of the graphic characters in the string as presented is, according to the parameter value :

1 Opposite to that of the immediately preceding text

2 Left-to-right if lines of text are horizontal

3 Right-to-left if lines of text are horizontal.

Note 40

This definition allows "reversed" strings to be nested within one another, e.g. it permits a (left-to-right) Latin-alphabet text to include a (right-to-left) Arabic-alphabet text which itself contains a (left-to-right) number of numbers, i.e. numbers with the most-significant digit in the leftmost position.

The permitted depth (number of levels) of nesting will depend upon the implementation, the necessary depth upon the application; it may exceed that of the commonplace example above.

Other standards may specify the use of strings delimited by SRS but limit the parameter values used in a particular environment, and/or impose restrictions applying to the control functions permissible in such strings, and/or not permit them to be nested, or limit the permissible depth of nesting.

8.3.128 SS2 - SINGLE-SHIFT TWO

Notation : (C1)
Representation : 08/14 (7-bit code : ESC 04/14)

SS2 causes the bit combination following it in the data stream to be interpreted according to the currently designated G2 set.

The bit combination following SS2 shall be one from 02/00 to 07/15.

8.3.129 SS3 - SINGLE-SHIFT THREE

Notation : (C1)
Representation : 08/15 (7-bit code : ESC 04/15)

SS3 causes the bit combination following it in the data stream to be interpreted according to the currently designated G3 set.

The bit combination following SS3 shall be one from 02/00 to 07/15.

8.3.130 SSA - START OF SELECTED AREA

Notation : (C1)
Representation : 08/06 (7-bit code : ESC 04/06)

SSA is used to indicate that the active position is the first of a string of character positions, the contents of which are eligible to be transmitted in the form of a data stream or transferred to an auxiliary input/output device. The end of this string is indicated by END OF SELECTED AREA (ESA). The string of characters actually transmitted or transferred depends on the setting of the GUARDED AREA TRANSFER MODE (GATM) and on any guarded areas established by DEFINE AREA QUALIFICATION (DAQ).

8.3.131 SSU - SELECT SIZE UNIT

Notation : (Ps)
Representation : CSI Ps 02/00 04/09
Parameter default value : Ps = 0.

SSU is used to establish the unit in which the numeric parameters of formator functions are expressed when the POSITIONING UNIT MODE (PUM) is set to SIZE. The established unit remains in effect until the next occurrence of SSU in the data stream. The parameter values are:

0 CHARACTER

1 MILLIMETRE

2 COMPUTER DECIPOINT - 0,035 28 mm (1/720 of 24,5 mm)

3 DECIDIDOT - 0,037 59 mm (10/266 mm)

4 MIL - 0,025 40 mm (1/1000 of 25,4 mm)

5 BASIC MEASURING UNIT,
BMU - 0,021 17 mm (1/1200 of 25,4 mm)

6 MICROMETRE - 0,001 mm

7 PIXEL - The smallest specifiable increment in a device

8 DECIPOINT - 0,035 14 mm (35/996 mm).

Note 41

The horizontal and vertical dimensions of CHARACTER and those corresponding to PIXEL may differ.

8.3.132 SSW - SET SPACE WIDTH

Notation : (Pn)
Representation : CSI Pn 02/00 05/11
No parameter default value.

SSW is used to establish for subsequent text the character escapement associated with the character SPACE. The established escapement remains in effect until the next occurrence of SSW in the data stream or until it is reset to the default value by a subsequent occurrence of CR, LF, CR FF, or of NEL in the data stream.

The unit in which the parameter value is expressed is that established by SELECT SIZE UNIT (SSU).

The default character escapement of SPACE is specified by the most recent occurrence of SELECT CHARACTER SPACING (SHS) or of SELECT SPACING INCREMENT (SPI) in the data stream if the current font has constant spacing, or is

specified by the nominal width of the character SPACE in the current font if that font has proportional spacing.

8.3.133 ST - STRING TERMINATOR

Notation : (C1)
Representation : 09/12 (7-bit code : ESC 05/12)

ST is used as the closing delimiter of a control string opened by APPLICATION PROGRAM COMMAND (APC), DEVICE CONTROL STRING (DCS), OPERATING SYSTEM COMMAND (OSC), PRIVACY MESSAGE (PM), or START OF STRING (SOS).

8.3.134 STAB - SELECTIVE TABULATION

Notation : (Ps)
Representation : CSI Ps 02/00 05/14
No parameter default value

STAB causes subsequent text to be aligned according to the position and the properties of a tabulation stop which is selected from a list according to the value of the parameter Ps.

The use of this control function and means of specifying a list of tabulation stops to be referenced by the control function are specified in other standards, e.g. ISO 8613 part 6.

8.3.135 STX - START OF TEXT

Notation : (C0)
Representation : 00/02

STX is used to indicate the beginning of a text and the end of a heading.

The use of STX is defined in ISO 1745.

8.3.136 SU - SCROLL UP

Notation : (Pn)
Representation : CSI Pn 05/03
Parameter default value : Pn = 1.

SU causes the displayed data to be moved by n lines if the character path is horizontal, or by n character positions if the character path is vertical, such that the data appear to move up.
n equals the value of Pn.

The active position is not affected by this control function.

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.137 SUB - SUBSTITUTE

Notation : (C0)
Representation : 01/10

SUB is used in the place of a character that has been found to be invalid or in error. SUB is intended to be introduced by automatic means.

8.3.138 SVS - SELECT LINE SPACING

Notation : (Ps)
Representation : CSI Ps 02/00 04/12
Parameter default value : Ps = 0.

SVS is used to establish the line spacing for subsequent text. The established spacing remains in effect until the next occurrence of SVS in the data stream. The parameter values are :

0	6 lines per 25,4 mm
1	4 lines per 25,4 mm
2	3 lines per 25,4 mm
3	12 lines per 25,4 mm
4	8 lines per 25,4 mm
5	6 lines per 30,0 mm
6	4 lines per 30,0 mm
7	3 lines per 30,0 mm
8	12 lines per 30,0 mm
9	2 lines per 25,4 mm.

8.3.139 SYN - SYNCHRONOUS IDLE

Notation : (C0)
Representation : 01/06

SYN is used by a synchronous transmission system in the absence of any other character (idle condition) to provide a signal from which synchronism may be achieved or retained between data terminal equipment.

The use of SYN is defined in ISO 1745.

8.3.140 TAC - TABULATION ALIGNED CENTRED

Notation : (Pn)
Representation : CSI Pn 02/00 06/02
No parameter default value.

TAC causes a character tabulation stop calling for centring to be set at position n, within the active line and lines of subsequent text, where n equals the value of Pn. TAC causes the replacement of any tabulation stop previously set at that position, but does not affect other tabulation stops.

A text string centred upon a tabulation stop set by TAC will be positioned so that the (trailing edge of the) first graphic character and the (leading edge of the) last graphic character are at approximately equal distances from the tabulation stop.

The unit in which the parameter value is expressed depends on the setting of the POSITIONING UNIT MODE (PUM). If that mode is set to SIZE, the unit is that established by SELECT SIZE UNIT (SSU).

The direction of the character path depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.141 TALE - TABULATION ALIGNED LEADING EDGE

Notation : (Pn)
Representation : CSI Pn 02/00 06/01
No parameter default value.

TALE causes a character tabulation stop calling for leading edge alignment to be set at position n within the active line and lines of subsequent text, where n equals the value of Pn. TALE causes the replacement of any tabulation stop previously set at that position, but does not affect other tabulation stops.

A text string aligned with a tabulation stop set by TALE will be positioned so that the (leading edge of the) last graphic character of the string is placed at the tabulation stop. The unit in which the parameter value is expressed depends on the setting of the POSITIONING UNIT MODE (PUM). If that mode is set to SIZE, the unit is that established by SELECT SIZE UNIT (SSU).

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.142 TATE - TABULATION ALIGNED TRAILING EDGE

Notation : (Pn)
Representation : CSI Pn 02/00 06/00
No parameter default value.

TATE causes a character tabulation stop calling for trailing edge alignment to be set at position n within the active line and lines of subsequent text, where n = the value of Pn. TATE causes the replacement of any tabulation stop previously set at that position, but does not affect other tabulation stops.

A text string aligned with a tabulation stop set by TATE will be positioned so that the (trailing edge of the) first graphic character of the string is placed at the tabulation stop.

The unit in which the parameter value is expressed depends on the setting of the POSITIONING UNIT MODE (PUM). If that mode is set to SIZE, the unit is that established by SELECT SIZE UNIT (SSU).

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.143 TBC - TABULATION CLEAR

Notation : (Ps)
Representation : CSI Ps 06/07
Parameter default value : Ps = 0.

TBC causes one or more tabulation stops to be cleared, depending on the parameter value :

0 The character tabulation stop at the active position is cleared

1 The line tabulation stop at the active line is cleared

2 All character tabulation stops in the active line are cleared

3 All character tabulation stops are cleared

4 All line tabulation stops are cleared.

In the case of parameter value 0 or 2 the number of lines affected depends on the setting of the TABULATION STOP MODE (TSM).

8.3.144 TCC- TABULATION CENTRED ON CHARACTER

Notation : (Pn1;Pn2;)
Representation : CSI Pn1;Pn2 02/00 06/03
No parameter default value for Pn1;
Parameter default value : Pn2 = 32.

TCC causes a character tabulation stop calling for alignment of a target graphic character to be set at position n within the active line and lines of subsequent text, where n equals the value of Pn1, and the target character about which centring is to be performed is specified by Pn2. TCC causes the replacement of any tabulation stop previously set at that position, but does not affect other tabulation stops.

The positioning of a text string aligned with a tabulation stop set by TCC will be determined by the first occurrence in the string of the target graphic character; that character will be centred upon the tabulation stop. If the target character does not occur within the string, then the trailing edge of the first character of the string will be positioned at the tabulation stop.

The unit in which Pn1 is expressed depends on the setting of the POSITIONING UNIT MODE (PUM). If that mode is set to SIZE, the unit is that established by SELECT SIZE UNIT (SSU).

The value of Pn2 is that of coded representation of the target character in the currently invoked code. For a 7-bit code, the permissible range of values is 32 to 127; for an 8-bit code, the permissible range of values is 32 to 127 and 160 to 255.

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.145 TSR - TABULATION STOP REMOVE

Notation : (Pn)
Representation : CSI Pn 02/00 06/04
No parameter default value.

TSR causes any character tabulation stop at position n within the active line and lines of subsequent text to be cleared, but does not affect other tabulation stops. n = the value of Pn.

The unit in which the parameter value is expressed depends on the setting of the POSITIONING UNIT MODE (PUM). If that mode is set to SIZE, the unit is that established by SELECT SIZE UNIT (SSU).

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.146 TSS - THIN SPACE SPECIFICATION

Notation : (Pn)
Representation : CSI Pn 02/00 04/05
No parameter default value.

TSS is used to establish the width of a thin space for subsequent text. The established width remains in effect until the next occurrence of TSS in the data stream (see Appendix C). n equals the value of Pn.

The unit in which the parameter value is expressed is that established by SELECT SIZE UNIT (SSU).

8.3.147 VPA - LINE POSITION ABSOLUTE

Notation : (Pn)
Representation : CSI Pn 06/04
Parameter default value : Pn = 1.

VPA causes the active position to be moved to position n in the direction of the line progression, where n equals the value of Pn.

The unit in which the parameter value is expressed depends on the setting of the POSITIONING UNIT MODE (PUM). If that mode is set to SIZE, the unit is that established by SELECT SIZE UNIT (SSU).

The direction of the the line progression depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.148 VPB - LINE POSITION BACKWARD

Notation : (Pn)
Representation : CSI Pn 06/11
Parameter default value : Pn = 1.

VPB causes the active position to be moved by n units in the direction opposite to that of the line progression, where n equals the value of Pn.

The unit in which the parameter value is expressed depends on the setting of the POSITIONING UNIT MODE (PUM). If that mode is set to SIZE, the unit is that established by SELECT SIZE UNIT (SSU).

The direction of the the line progression depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.149 VPR - LINE POSITION FORWARD

Notation : (Pn)
Representation : CSI Pn 06/05
Parameter default value : Pn = 1.

VPR causes the active position to be moved by n units in direction of the line progression, where n equals the value of Pn.

The unit in which the parameter value is expressed depends on the setting of the POSITIONING UNIT MODE (PUM). If that mode is set to SIZE, the unit is that established by SELECT SIZE UNIT (SSU).

The direction of the line progression depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.150 VT - LINE TABULATION

Notation : (C0)
Representation : 00/11

VT causes the active position to be moved to the corresponding character position on the line at which the following line tabulation stop is set.

The direction of the line progression depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

8.3.151 VTS - LINE TABULATION SET

Notation : (C1)
Representation : 08/10 (7-bit code : ESC 04/10)

VTS causes a line tabulation stop to be set at the active line.

9. TRANSFORMATION BETWEEN 7-BIT AND 8-BIT CODED REPRESENTATIONS

The control functions defined in this Standard can be coded in a 7-bit code as well as in an 8-bit code; both forms of coded representation are equivalent and in accordance with ECMA-35.

However, when data containing these control functions are transformed from a 7-bit to an 8-bit coded representation or vice versa, the transformation algorithm specified in ECMA-35 may produce results which are formally in disagreement with this Standard.

In order to make allowance for such unintended but unavoidable deviations, the formal rules are extended in the manner described below.

In an 8-bit code, the bit combinations of columns 10 to 15 are permitted to represent :

a) Parameter Bytes, Intermediate Bytes, and Final Bytes of a control sequence;

b) the contents of the command string or the character string as part of a control string;

c) the operand of a single-shift control function.

In these situations, the bit combinations in the range 10/00 to 15/14 have the same meanings as the corresponding bit combinations in the range 02/00 to 07/14.

In a 7-bit code, the control functions SHIFT-OUT (SO) and SHIFT-IN (SI) are permitted to occur :

d) between the CONTROL SEQUENCE INTRODUCER (CSI) and the Final Byte of a control sequence;

e) between the opening delimiter of a control string and the STRING TERMINATOR (ST);

f) between a single-shift control function and its operand.

SO and SI have no effect on the interpretation of a control sequence, a control string or the operand of a SINGLE-SHIFT control function, but they may indeed affect the meanings of bit combinations following in the data stream.

APPENDIX A

FORMATOR FUNCTIONS AND EDITOR FUNCTIONS

A.1 Correspondence between Editor Functions and Formator Functions

Table 6 shows on the same line editor functions and formator functions with similar effects. Where there is only one entry on a single line, there is no control function corresponding to the other entry. For the notation see 8.1.

A.2 Differences between Editor Functions and Formator Functions

The contrast between editor functions and formator functions, together with their interaction with certain modes, is illustrated by the following example of the use of the control functions CURSOR NEXT LINE (CNL) and NEXT LINE (NEL).

In the example it is assumed that the direction of the character path is from left to right and the direction of the line progression is from top to bottom.

Furthermore, it is assumed that the string of capital letters

A B C D E F

has been entered or received, and that the active position has been moved back to the letter D, for example, by means of CURSOR LEFT (CUB). Starting from this situation, the following cases are considered:

i) A CURSOR NEXT LINE (CNL) is received. In this case, the active position is moved to the beginning of the next line without affecting the previously received data

ii) The FORMAT EFFECTOR ACTION MODE (FEAM) being set to EXECUTE, a NEXT LINE (NEL) is received. This has the same effect as in case i)

iii) The FORMAT EFFECTOR ACTION MODE (FEAM) being set to STORE and the INSERTION REPLACEMENT MODE (IRM) to REPLACE, a NEXT LINE (NEL) is received. In this case, the letter D is replaced by NEL.

If the data is subsequently forwarded to another device operating with the FORMAT EFFECTOR ACTION MODE (FEAM) being set to EXECUTE, the effect is :

A B C
E F

iv) The FORMAT EFFECTOR ACTION MODE (FEAM) being set to STORE and the INSERTION REPLACEMENT MODE (IRM) to INSERT, a NEXT LINE (NEL) is received. In this case, the NEL is inserted between the letters C and D. If the data is subsequently forwarded to another device operating with the FORMAT EFFECTOR ACTION MODE (FEAM) being set to EXECUTE, the effect is :

A B C
D E F

Formator Functions which have been received while the FORMAT EFFECTOR ACTION MODE (FEAM) is set to STORE can be operated upon with editor functions.

For example, the NEL which has been inserted between A B C and D E F in case iv) can be deleted using DELETE CHARACTER (DCH), resulting in the initial situation being restored.

A.3 Composite Graphic Characters

Because the formator functions can be stored in a receiving device, as opposed to the editor functions which are immediately performed, formator functions rather than editor functions shall be used for the construction of composite graphic characters. For example, if the symbol ≠ is to be composed using = (EQUALS SIGN) and / (SOLIDUS), the sequence:

= CUB /

does not produce the desired effect if received by a device which has no overstrike capability. Such a device may, however, process the sequence :

= BS /

in such a way that it is preserved and can be forwarded to a device which can indeed produce the intended composite symbol.

Note A.1

The use of formator functions for the construction of composite symbols may be subject of constraints specified in other standards.

EDITOR FUNCTION	FORMATOR FUNCTION
CBT (Pn)	
CHA (Pn)	CR (C0), HPA (Pn)
CHT (Pn)	HT (C0)
CNL (Pn)	NEL (C1)
CPL (Pn)	
CTC (Ps...)	HTS (C1), TBC (Ps), VTS (C1)
CUB (Pn)	BS (C0), HPB (Pn)
CUD (Pn)	IND (C1), LF (C0), VPR (Pn)
CUF (Pn)	HPR (Pn), SP (C0)
CUP (Pn1;Pn2)	HVP (Pn1;Pn2)
CUU (Pn)	RI (C1), VPB (Pn)
CVT (Pn)	VT (C0)
DCH (Pn)	
DL (Pn)	
EA (Ps)	
ECH (Pn)	
ED (Ps)	
EF (Ps)	
EL (Ps)	
	FNT (Ps1;Ps2)
	GSM (Pn1;Pn2)
	GSS (Pn)
	HTSA (Pn...)
	HTJ (C1)
ICH (Pn)	
IL (Pn)	

	JFY (Ps...)
NP (Pn)	FF, PPR (Pn)
	PLD (C1)
	PLU (C1)
PP (Pn)	
	PPA (Pn)
	PPB (Pn)
	QUAD (Ps...)
	SGR (Ps...)
	SPI (Pn1;Pn2)
SD (Pn)	
SL (Pn)	
SR (Pn)	
	SSU (Ps)
SU (Pn)	
	TSS (Pn)
	VPA (Pn)

TABLE 6 - CORRESPONDENCE BETWEEN EDITOR FUNCTIONS AND FORMATOR FUNCTIONS

In the case of the control functions CURSOR LEFT (CUB), CURSOR DOWN (CUD), CURSOR RIGHT (CUF) and CURSOR UP (CUU) which cause absolute directional movements the above correspondences apply only when the direction of the character path is horizontal (from left to right) and the direction of the line progression is vertical (from top to bottom).

APPENDIX B

CODING EXAMPLES

B.1 Examples of Complete Control Sequences

The general format of a control sequence is :

CSI P...P I...I F

In an 8-bit environment the control function CURSOR RIGHT (CUF) by one position can be represented in many ways. Examples are :

```
09/11   03/01   04/03
09/11   03/00   03/01   04/03
09/11   04/03
```

The second example shows that leading ZEROes (03/00) are not significant. The third example uses the fact that a default value for CUF is defined and is equal to 1. In a 7-bit environment the corresponding examples are :

```
01/11   05/11   03/01   04/03
01/11   05/11   03/00   03/01   04/03
01/11   05/11   04/03
```

In an 8-bit environment SCROLL RIGHT (SR) by 28 positions can be represented for instance by :

09/11 03/02 03/08 02/00 04/01

In a 7-bit environment the corresponding representation is :

01/11 05/11 03/02 03/08 02/00 04/01

In an 8-bit environment DEFINE AREA QUALIFICATION (DAQ) permitting numeric and alphabetic data to be entered into an input area can be represented by :

09/11 03/03 03/11 03/04 06/15

In a 7-bit environment the corresponding representation is :

01/11 05/11 03/03 03/11 03/04 06/15

B.2 Examples of Parameter Strings

Character Form	Bit Combination	Explanation
7	03/07	A parameter having the value 7

98	03/09	03/08	A parameter having the value 98
4;2	03/04 03/02	03/11	Two parameters having the values 4 and 2, respectively
=3	03/13	03/03	A private parameter string
6;	03/06	03/11	Two parameters, the first having the value 6 and the second taking the default value Note :The bit combination 03/11 may be omitted (see 5.5.2 viii)
;5	03/11	03/05	Two parameters, the first taking the default value and the second having the value 5
1;;4	03/01 03/11	03/11 03/04	Three parameters, the first having the value 1, the second taking the default value, and the third having the value 4
0007	03/00 03/00	03/00 03/07	A parameter having the value 7.

APPENDIX C

TEXT COMPOSITION DEVICE CONCEPTS

Display devices and systems involving text composition may use the control functions JUSTIFY (JFY) and QUAD (QUAD). When working in the field of text composition several words are used with quite specialized meaning. Those words have been used in this Standard with the meaning from the terminology of the printing and publishing industry. Explanation is provided in this Appendix in terms compatible with coded information interchange and the concepts of character-imaging devices.

Both QUAD and JFY deal with the positioning of text (graphic characters and free spaces) between "margins". Margins are areas protected against display at the boundaries of which lines of text may start and terminate. In the general case of a display device with a multiple-page buffer (capable of the QUAD or JFY functions) the margin(s) would be set at arbitrary absolute character positions. The QUAD function deals with single lines of text from the data stream, while the JFY function may deal with more than one line. In both cases it is possible to "flush" text. When text is flush, it starts or ends, as applicable, against a marginal boundary. Flush to line home position margin means start text at the appropriate margin (or first margin line home position in columnar texts). Similarly, flush to line limit position margin means end text at that appropriate margin. The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD). In the process of making text flush, open spaces may be generated.

The action to "fill" open spaces involves a concept particular to the JFY and QUAD functions. The open spaces may be filled with a "leader" in the QUAD function. A leader is a pattern (most often a repeated string of graphic characters) which is inserted into the open area. In the use of the JFY function the fill operation is more complicated and will be described below.

Having considered margins and flush text it is necessary to consider text which is not intended to be flush to the margins. Text which meets this criterion falls into two classes. They are "centered" text and "ragged" text. This Standard deals explicitly with ragged text. Centred text is arranged between margins such that the open space to the line home position margin and line limit position margin are as equal as possible. Ragged is the term applied when text is neither centred nor flush to a margin.

The process using the JFY function involves the arrangement of text between margins either being flush (explicitly) or ragged (implicitly). In order to accomplish flush to line home position margin and to line limit position margin ,"fill" may be required. The fill may consist of SPACEs, thin spaces, words, or parts of words. For the purpose of this description a word is

considered as including the graphic characters of the word itself and the punctuation mark or SPACE terminating the word. The rules regarding a specific justification process depend on the combination of the parameter values used. A line which is to be justified to line home position margin and line limit position margin with word fill will first be adjusted in length by the addition or removal of text in the form of words until the remaining words fit between the established margins. Words added to a line by such a process will be obtained from the data stream from its following line(s). Words removed from the line will be returned to the data stream in its following lines. Subsequent to having sufficient words to fit between margins the open spaces (between words or graphic characters) may be adjusted to accomplish the combined flush-to-line home position margin and flush-to-line limit position margin action. This spacing is adjusted by intervals, or variable-size spaces according to the implementation. When the Word space parameter value has been used the spacing adjustment occurs between words. When the Letter space parameter value has been used the spacing adjustment occurs between adjacent graphic characters. When both Word space and Letter space parameter values have been used the strategy for selecting which spacings are to be adjusted is implementation-dependent. Special cases of the above involve the use of partial words in the fill process. In these cases a hyphenation process is used. If the hyphenation parameter value is used, words may be subdivided according to an implementation strategy at language intervals often corresponding to syllables. If the Italian hyphenation parameter value is used the first word which will not fit between the margins is truncated, the last character of the line is underlined and the remainder of the word is inserted in the data stream for use in the next line.

APPENDIX D

IMPLEMENTATION-DEPENDENT FEATURES

The following introduces, but does not exhaustively list those matters left to the implementors.

1) The control functions which will be selected for implementation

2) The number of bits, number of characters, and form of the bit combination or bit combinations generated by a single or multiple key depression

3) Whether characters entered become immediately visible or are processed (partially or fully) prior to becoming visible

4) If there is a buffer, whether it has a capacity larger than, identical to, or smaller than, the display area

5) Whether a control function occupies buffer space, display space or both

6) At what point(s) in the processing of the data stream control functions are to be executed

7) What the representation of an erased state may be

8) Whether certain control sequences remain in their encoded state or are transformed into data in special registers and tables

9) Whether or not there are implementation-defined values for parametric functions when the Standard does not specify a standardized default value

10) What action will be taken in error recovery

11) The initial state of a device upon power-up, including the settings of the modes

12) Whether the width of a displayed character position is fixed or variable (depending on the character occupying the position)

13) The action to be taken by a device if a control function or a graphic character is received which the device cannot implement, because of design limitation or temporary functional disablement

14) Whether a change of the setting of the CONTROL REPRESENTATION MODE (CRM) affects the appearance of control functions already entered into, or received by, the device or whether only those control functions are affected that are entered or received subsequently

15) Whether or not the characters in that part of a guarded area which is contained in an eligible area are transmitted or transferred.

APPENDIX E

CHANGES MADE IN THIS EDITION

General

In this edition all the control functions of ECMA-6 (the C0 set) were included as well as the control functions from ECMA-35 (single-shift and locking-shift functions). This document now includes all control functions defined in ECMA Standards. The part on Definitions has been (and will still be) extended. Several texts have been re-arranged and duplicate parts were subsequently removed. To facilitate reference to the modes in translations of this Standard the modes were given acronyms.

Most of the modes and some control functions are intended to be removed from the next edition of this Standard, their use is deprecated. Two modes which were introduced for backward compatibility and some of the to-be-removed control functions are listed here for reference.

E.1 Modes

E.1.1 EBM - EDITING BOUNDARY MODE

Because a relevant parameter was added to SELECT EDITING EXTENT (SEE) this mode is no longer required and should no longer be used.

E.1.2 KAM - KEYBOARD ACTION MODE

It is recommended that instead of this mode the control functions ENABLE MANUAL INPUT (EMI) and DISABLE MANUAL INPUT (DMI) be used.

E.1.3 LF/NLM - LINE FEED/NEW LINE MODE

LINE FEED

The execution of the formator functions LINE FEED (LF), FORM FEED (FF), LINE TABULATION (VT) cause only movement of the active position in the direction of the line progression.

NEW LINE

The execution of the formator functions LINE FEED (LF), FORM FEED (FF), LINE TABULATION (VT) cause movement to the line home position of the following line, the following form, etc. In the case of LF this is referred to as the New Line (NL) option.

Note E.1

The mode defined in this part of the Appendix is provided for implementations of the 7-bit code according to ECMA-6 which have elected to make use of the option permitted in that standard to have formator functions for movements in the direction of the line progression effect a movement in the direction opposite to that of the characters path also.

Examples of such combined movements are :

New Line, equivalent to CR + LF
New Form, equivalent to CR + FF

Implementors are urged to use the control functions CR and LF to obtain the results of New Line. When it is necessary to have the combined movement of CR and LF affected by a single control function then the control function NEXT LINE (NEL) from this standard should be used.

The control function INDEX (IND) was provided in this Standard for use in those cases where LF had been implemented to mean New Line. See Appendix E.2.3.

E.1.4 ZDM - ZERO DEFAULT MODE

ZERO

A parameter value of 0 means a parameter value of ZERO.

DEFAULT

A parameter value of 0 represents a default parameter value which may be non-0.

Note E.2

The mode defined in this part of the Appendix is provided for implementations of the previous edition of this Standard which specified that "an empty parameter sub-string or a parameter sub-string which consists of bit combinations 03/00 only represents a default value which depends on the control function".

In this edition of this Standard, an empty parameter sub-string still represents a default value, but the "0 implies default" option is removed. For numeric parameters with a non-zero default value, that option implied that "0 = non-0" and prevented the use of a 0 parameter value which meant 0.

The removal of that option does not affect the existing control functions which have selective parameters since they all have a parameter default value of ZERO or no default value specified.

For numeric parameters which are expressed in units established by SELECT SIZE UNIT (SSU), 0 is now a specifiable value. For numeric parameters which are effectively repeat counts, a 0 parameter value now corresponds to a "no-op". In either instance, non-negative computed numeric parameter values may be used without treating 0 as a special (unusable) case.

Where an explicit parameter value is not used, implementors are urged to omit a parameter value (use an empty parameter sub-string) to imply a default parameter value.

It should not be necessary to continue to allow a "repeat count of 0" to imply a default value of 1 when the more obvious and useful options of a parameter value of 1 and an omitted parameter value are available. ZERO DEFAULT MODE will be removed from the next edition of this Standard.

It should be noted that the reset state of ZERO DEFAULT MODE is ZERO and the set state is DEFAULT. The recommended Initial State of this mode is ZERO, not DEFAULT.

E.2 Control functions

The escape sequence designating and invoking the C1 set that includes the C1 control functions listed below is ESC 02/02 04/03.

E.2.1 EPA - END OF GUARDED AREA

Notation : (C1)
Representation : 09/07 (7-bit code : ESC 05/07)

EPA is used to indicate that the active position is the last of a string of character positions, the contents of which are protected against manual alteration, are guarded against transmission or transfer, and may be protected against erasure, depending on the setting of the ERASURE MODE (ERM). The beginning of this string is indicated by START OF GUARDED AREA (SPA).

Note E.3

It is recommended that instead of EPA and SPA the control function DEFINE AREA QUALIFICATION (DAQ) be used.

E.2.2 HTSA - CHARACTER TABULATION SET ABSOLUTE

Notation : (Pn...)
Representation : CSI Pn... 02/00 04/14
No parameter default value.

HTSA causes a character tabulation stop to be set at each character position corresponding to a parameter value. All other character tabulation stops in the line are cleared. The active position is not affected.

The unit in which the parameter value is expressed depends on the setting of the POSITIONING UNIT MODE (PUM). If that mode is set to SIZE, the unit is that established by SELECT SIZE UNIT (SSU).

The number of lines affected depends on the setting of the TABULATION STOP MODE (TSM).

The direction of the character path and the direction of the line progression depend on the parameter of SELECT PRESENTATION DIRECTIONS (SPD).

E.2.3 IND - INDEX

Notation : (C1)
Representation : 08/04 (7-bit code : ESC 04/04)

IND causes the active position to be moved to the corresponding character position of the following line.

The direction of the line progression depends on the parameter of SELECT PRESENTATION DIRECTIONS (SPD). See also Appendix E.1.3.

E.2.4 SPA - START OF GUARDED AREA

Notation : (C1)
Representation : 09/06 (7-bit code : ESC 05/06)

SPA is used to indicate that the active position is the first of a string of character positions, the contents of which are protected against manual alteration, are guarded against transmission or transfer, and may be protected against erasure, depending on the setting of the ERASURE MODE (ERM). The end of this string is indicated by END OF GUARDED AREA (EPA).

Note E.4

It is recommended that instead of SPA and EPA the control function DEFINE AREA QUALIFICATION (DAQ) be used.

E.2.5 STS - SET TRANSMIT STATE

Notation : (C1)
Representation : 09/03 (7-bit code : ESC 05/03)

STS is used to establish the transmit state in the receiving device. In this state the transmission of data from the device is possible.

The actual initiation of transmission of data is performed by a data communication or input/output interface control procedure which is outside the scope of this Standard.

The transmit state is established either by the operation of an appropriate key on a keyboard or by STS appearing in the received data stream.