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# CCITT

THE INTERNATIONAL  
TELEGRAPH AND TELEPHONE  
CONSULTATIVE COMMITTEE

## T.50

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### TERMINAL EQUIPMENT AND PROTOCOLS FOR TELEMATIC SERVICES

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### INTERNATIONAL REFERENCE ALPHABET (IRA)

(FORMERLY INTERNATIONAL ALPHABET No. 5 or IA5)

### INFORMATION TECHNOLOGY – 7-BIT CODED CHARACTER SET FOR INFORMATION INTERCHANGE



Recommendation T.50

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## FOREWORD

The CCITT (the International Telegraph and Telephone Consultative Committee) is a permanent organ of the International Telecommunication Union (ITU). CCITT is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

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Recommendation (revised) T.50 was prepared by Study Group VIII and was approved under the Resolution No. 2 procedure on the 18th of September 1992.

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## CCITT NOTES

- 1) In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized private operating agency.
- 2) A list of abbreviations used in this Recommendation can be found in Annex C.

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**Recommendation T.50****INTERNATIONAL REFERENCE ALPHABET (IRA)**

(Formerly International Alphabet No. 5 or IA5)

**Information technology – 7-bit coded character set for information interchange***(revised 1992)***1 Scope**

1.1 This Recommendation specifies a set of 128 characters, (control characters and graphic characters such as letters, digits and symbols) with their coded representation. Most of these characters are mandatory and unchangeable, but provision is made for some flexibility to accommodate national and other requirements.

1.2 This Recommendation specifies a 7-bit coded character set with a number of options. It also provides guidance on how to exercise the options to define specific national versions and application-oriented versions. Furthermore, it specifies the International Reference Version (IRV) in which such options have been exercised.

1.3 This character set is primarily intended for the interchange of information among data processing systems and associated equipment, and within data communication systems. The need for graphic characters and control functions in data processing has also been taken into account in determining this character set.

1.4 This character set is applicable to alphabets of the Latin script.

1.5 This character set allows the use of control characters for code extension where its character set is insufficient for particular applications. Procedures for the use of these control characters are specified in ISO 2022.

1.6 The definitions of the control characters mentioned in this Recommendation are specified in Annex A. It is assumed that data associated with them are to be processed serially in a forward direction. When they are included in strings of data which are processed other than serially in a forward direction, or when they are included in data formatted for fixed-record processing, they may have undesirable effects or may require additional special treatment to ensure that they result in their desired function.

1.7 This is a paired Recommendation/International Standard, equivalent in technical content to ISO/IEC 646 (1991).

**2 Conformance and implementation****2.1 Conformance****2.1.1 Conformance of information interchange**

A coded-character-data-element (CC-data-element) within coded information for interchange is in conformance with this Recommendation if all the coded representations of characters within that CC-data-element conform to the requirements of § 8.1.

A claim of conformance shall identify the version adopted in accordance with §§ 8.2 to 8.4.

## 2.1.2 *Conformance of devices*

A device is in conformance with this Recommendation if it conforms to the requirements of § 2.1.2.1, and either or both of §§ 2.1.2.2 and 2.1.2.3 below. A claim of conformance shall identify the version adopted.

### 2.1.2.1 *Device description*

A device that conforms to this Recommendation shall be the subject of a description that identifies the means by which the user may supply characters to the device, or may recognize them when they are made available to the user, as specified respectively in §§ 2.1.2.2 and 2.1.2.3 below.

### 2.1.2.2 *Originating devices*

An originating device shall allow its user to supply any sequence of characters from the version adopted, and shall be capable of transmitting their coded representations within a CC-data-element.

### 2.1.2.3 *Receiving devices*

A receiving device shall be capable of receiving and interpreting any coded representations of characters that are within a CC-data-element, and that conform to § 2.1.1, and shall make the corresponding characters available to its user in such a way that the user can identify them from among those of the version adopted, and can distinguish them from each other.

## 2.2 *Implementation*

The use of this character set requires definitions of its implementation in various media. For example, these could include punched tapes, punched cards, magnetic and optical interchangeable media and transmission channels, thus permitting interchange of data to take place either indirectly by means of an intermediate recording on a physical medium, or by local connection of various units (such as input and output devices and computers) or by means of data transmission equipment.

The implementation of this coded character set in physical media and for transmission, taking into account the need for error checking, is the subject of other Recommendations.

## 3 *Normative references*

The following standards contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Recommendation are encouraged to investigate the possibility of applying the most recent editions of the standards listed below.

ISO 2022: 1986 *Information processing – ISO 7-bit and 8-bit coded character sets – Coded extension techniques*.

## 4 *Definitions*

For the purpose of this Recommendation the following definitions apply.

### 4.1 *active position*

The character position which is to image the graphic symbol representing the next graphic character or relative to which the next control function is to be executed.

*Note* – In general, the active position is indicated by a cursor.

### 4.2 *bit combination*

An ordered set of bits used for the representation of characters.

**4.3 character**

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

**4.4 character position**

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

**4.5 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 representation by one or more bit combinations.

**4.6 coded character-data-element (CC-data-element)**

An element of interchanged information that is specified to consist of a sequence of coded representations of characters, in accordance with one or more identified standards for coded character sets.

*Note 1* – In a communication environment according to the Reference Model for Open Systems Interconnection of Recommendation X.200 (ISO 7498) a CC-data-element will form all or part of the information that corresponds to the application user data and the presentation protocol data unit (PPDU) defined in that Recommendation.

*Note 2* – When information interchange is accomplished by means of interchangeable media, a CC-data-element will form all or part of the information that corresponds to the user data, and not that recorded during formatting and initialization.

**4.7 code extension**

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

**4.8 code table**

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

**4.9 control character**

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

**4.10 control function**

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

**4.11 device**

A component of information processing equipment which can transmit, and/or can receive, coded information within CC-data-elements.

*Note* – It may be an input/output device in the conventional sense, or a process such as an application program or gateway function.

**4.12 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.

**4.13 graphic symbol**

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

4.14 position

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

4.15 repertoire

A specified set of characters that are represented by means of one or more bit combinations of a coded character set.

4.16 user

A person or other entity that invokes the services provided by a device.

*Note 1* – This entity may be a process such as an application program if the “device” is a code convertor or a gateway function, for example.

*Note 2* – The characters, as supplied by the user or made available to the user, may be in the form of codes local to the device, or of non-conventional visible representations, provided that § 2.1.2 above is satisfied.

5 Notation, code table and names

5.1 Notation

The bits of the bit combinations of the 7-bit code are identified by  $b_7$ ,  $b_6$ ,  $b_5$ ,  $b_4$ ,  $b_3$ ,  $b_2$ , and  $b_1$ , where  $b_7$  is the highest-order, or most-significant, bit and  $b_1$  is the lowest order, or least-significant, bit.

The bit combination may be interpreted to represent integers in the range 0 to 127 in binary notation by attributing the following weights to the individual bits:

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

In this Recommendation, the bit combinations are identified by notations of the form  $x/y$ , where  $x$  is a number in the range 0 to 7 and  $y$  is a number in the range 0 to 15. The correspondence between the notations of the form  $x/y$  and the bit combinations consisting of the bits  $b_7$  to  $b_1$  is as follows:

- $x$  is the number represented by  $b_7$ ,  $b_6$ , and  $b_5$ , where these bits are given the weights 4, 2 and 1 respectively;
- $y$  is the number represented by  $b_4$ ,  $b_3$ ,  $b_2$ , and  $b_1$ , where these bits are given the weights 8, 4, 2 and 1 respectively.

The notations of the form  $x/y$  are the same as those used to identify code table positions, where  $x$  is the column number and  $y$  the row number (see § 9).

## 5.2 *Code table*

A 7-bit code table consists of 128 positions arranged in 8 columns and 16 rows. The columns are numbered 0 to 7 and the rows 0 to 15.

The code table positions are identified by notations of the form  $x/y$ , where  $x$  is the column number and  $y$  is the row number.

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

The allocation of individual characters to the bit combinations of the 7-bit code is specified in §§ 6.2 to 6.5.

## 5.3 *Names*

This Recommendation assigns one name to each character. In addition, it specifies an acronym for each control character and for the character SPACE, and a graphic symbol for each graphic character. By convention, only capital letters, space and hyphen are used for writing the names of the characters. For acronyms only capital letters and digits are used. It is intended that the acronyms and this convention be retained in all translation of the text.

The names chosen to denote graphic characters are intended to reflect their customary meaning. However, this Recommendation does not define and does not restrict the meanings of graphic characters. Neither does it specify a particular style or font design for the graphic characters when imaged.

# 6 **Specification of the coded character set**

## 6.1 *Structure*

The coded character set of this Recommendation shall have the following structure:

- a C0 control character set of up to 32 control characters allocated to positions 0/0 to 1/15;
- the graphic character SPACE (SP) allocated to position 2/0;
- a G0 graphic character set of up to 94 graphic characters allocated to positions 2/1 to 7/14;
- the character DELETE (DEL) allocated to position 7/15.

## 6.2 *Control characters*

The control characters allocated to positions 0/0 to 1/15 shall be as specified in Annex A.

## 6.3 *Character SPACE*

The acronym of the character SPACE is SP and its coded representation is 2/0.

This character is a graphic character; it has a visual representation consisting of the absence of a graphic symbol.