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SERIES E: OVERALL NETWORK OPERATION, TELEPHONE SERVICE, SERVICE OPERATION AND HUMAN FACTORS

International operation – Numbering plan of the international telephone service

Arrangement of digits, letters and symbols on telephones and other devices that can be used for gaining access to a telephone network

ITU-T Recommendation E.161

(Formerly CCITT Recommendation)

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ITU-T Recommendation E.161

Arrangement of digits, letters and symbols on telephones and other devices that can be used for gaining access to a telephone network

Summary

This Recommendation has been amended to include the preferred option for showing the relationship between letters and digits, where both appear on a keypad or dial. Additionally, in order to assist blind or visually impaired people in identifying the dialling push-buttons, it has been recommended that the button with the digit "5" be marked with a tactile identifier.

Source

ITU-T Recommendation E.161 was revised by ITU-T Study Group 2 (2001-2004) and approved under the WTSA Resolution 1 procedure on 2 February 2001.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

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ITU-T Recommendation E.161

Arrangement of digits, letters and symbols on telephones and other devices that can be used for gaining access to a telephone network

1 Use of digits and letters on telephone sets

1.1 For the automatic international service, it is preferable that the national numbering plan should not involve the routine use of letters, e.g. to designate local exchanges (associated with digits). However, letters may be used to designate the names of particular services, facilities, organizations or individual subscribers. The allocation of such mnemonics (and their equivalent national numbers) is a national matter.

1.2 For countries using letters in telephone numbers, it would be helpful to include in the directory a table for converting the letter codes into digits (see 2.2).

1.3 It would also be desirable to request those subscribers assigned mnemonic codes (particularly if they have considerable international traffic) to show on their letterheads, below their national telephone number, the international number with digits only. (See ITU-T E.123.)

2 Rotary dials

2.1 For countries which have not yet adopted any specific type of dial, the digits on the dial should be arranged in the following order: 1, 2, 3, ... , 0 as shown in Figure 1.

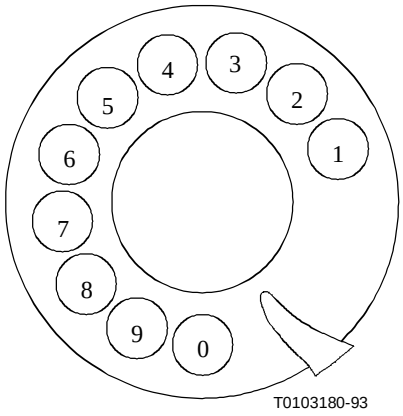

Figure 1/E.161 – Rotary dial

2.2 Where letters as well as digits appear on a dial or its surround, the recommended relationships between the letters and the digits are as shown below:

1	2 ABC	3 DEF
4 GHI	5 JKL	6 MNO
7 PQRS	8 TUV	9 WXYZ
	0	

3 Push-buttons or keys

3.1 Ten push-buttons

3.1.1 Arrangement and numbering

The standard arrangement and numbering for push-buttons corresponding to the digits 1 to 0 is as shown below:

1 2 3
4 5 6
7 8 9
0

Extensive research has shown that this arrangement leads to shorter entry times and lower error rates than other arrangements[1].

Where a need exists within an Administration for a 2 × 5 array or a 5 × 2 array for use on special telephone apparatus, the arrays should be as shown below:

1 2 3 4 5
6 7 8 9 0

1 2
3 4
5 6
7 8
9 0

NOTE – User dialling performance on these special arrays is slightly inferior to that on the standard array given above.

While numbering plans using only digits are widely used, there are advantages in allowing the use within these numbering plans of alphabetic equivalents for frequently used numbers (see 1.1). The use of letters rather than numbers is also convenient for data entry (interactive applications, entry of passwords, etc.) after a call has been established. The recommended relationships between the letters and the digits are the same as shown in 2.2[2], including its footnote. Care must be taken when letters and a digit are associated with a key such that legibility of the digit is not impaired.

The preferred and recommended arrangement for the keys of a separate numeric keypad on a multi-functional terminal used both for the entry of telephone number information and data is the standard arrangement shown at the beginning of this clause.

Exceptionally, for devices intended to be used principally for data entry but which may sometimes be used to enter telephone number information, the arrangement whereby the first and the third row of the standard ITU-T arrangement are interchanged may be used[3].

Also exceptionally, telephone number information may be input from the row of numeric keys.

1 2 3 4 5 6 7 8 9 0

of an alpha-numeric keyboard.

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1 An annotated list of literature references is available in the article cited in [1].

2 On the North American dials and keypads, the digit 0 is associated with the word "operator".

3 The corresponding ISO Standard can be found in ISO/IEC 9995-4, entitled "*Information technology – Keyboard layouts for text and office systems – Part 4: Numeric section*".

3.1.2 Symbols

The symbols for these buttons are the digits 1 to 0 as indicated in the arrangement of 3.1.1. These buttons are to be known as button 1, button 2, etc.

3.2 12 push-buttons

3.2.1 Arrangement

For 12 push-buttons the standard arrangement shown in 3.1.1 is extended by two additional buttons, one to the left and the other to the right of the button 0, thus making a pattern of four horizontal rows of three buttons each forming a 4 × 3 array.

Two buttons may also be added to the 5 × 2 array shown in 3.1.1. These should be located below and in line with buttons 9 and 0, thus making a 6 × 2 array.

3.2.2 Symbols

On the 4 × 3 array, the symbol on the button which is immediately to the left of the button 0 (on the 6 × 2 array, the corresponding button is located below 9, and on the 2 × 6 array to the right of button 5) and which, according to UIT-T Q.23, is used to transmit the frequency pair 941 Hz and 1209 Hz, should have a shape easily identified as the general shape shown in Figure 2.

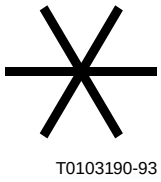

Figure 2/E.161

The symbol will be known as the *star* or the equivalent term in other languages.

On the 4 × 3 array, the symbol on the button which is immediately to the right of the button 0 (in the 6 × 2 array, the corresponding button is located below the button 0) and which, according to UIT-T Q.23, is used to transmit the frequency pair 941 Hz and 1477 Hz, should conform in shape to the specifications given in Figure 3 or 4. This symbol shall consist of four lines of equal length (b) forming two pairs of parallel lines. One pair is horizontal while the other is vertical or inclined to the right at an angle α of 80º as shown in Figure 4. It will be seen that two pairs of parallel lines overlap. The ratio a/b where *a* is the overlap, shall be between 0.08 and 0.18.

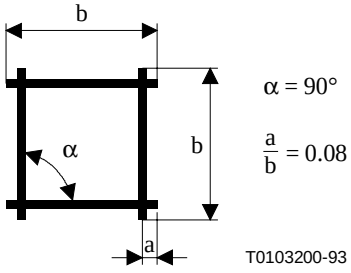

Figure 3/E.161

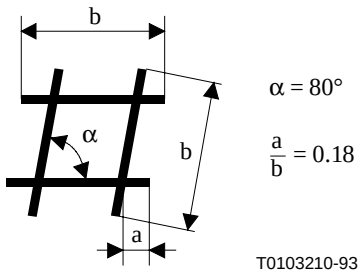

Figure 4/E.161

The preferred values are either:

– $\alpha = 90^{o}$ with a/b = 0.08;

– $\alpha = 80^{o}$ with a/b close to the upper limit of 0.18.

The symbol may be referred to as the square or the most commonly used equivalent term in other languages[4].

The additional buttons with these symbols will be placed as shown below:

Standard 4 × 3 array

1 2 3
4 5 6
7 8 9
✳ **0 #**

6 × 2 array

1 2
3 4
5 6
7 8
9 0
✳ **#**

2 × 6 array

1 2 3 4 5 ✳
6 7 8 9 0 #

3.3 Dual mode and engraving

Dual mode and engraving of the buttons ✳ and # are acceptable on telephones and on multi-functional terminals.

3.4 Design of symbols

Symbol size and the line thickness should be appropriate to provide optimal recognition.

3.5 Position of figures, letters and symbols on push-button sets

The figures, letters and symbols used for dialling should be unambiguously associated with the corresponding buttons, preferably, if adequate space is available, by being on the faces of the buttons themselves.

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[4] In some countries an alternative term (e.g. "hash", "pound" or "number sign") may be necessary for this purpose, particularly where the form in Figure 4 is commonly used, in which case it is useful to select and to recommend a preferred term for consistent use nationally.

3.6 Tactile identifier on the "5" button[5]

To assist blind and visually impaired people in identifying the dialling push-buttons and otherwise to facilitate dialling under low light conditions, it is recommended that the button with the "5" be marked with a tactile identifier so that the button can be identified by the sense of touch.

The preferred locations of the tactile identifier are:

– In the middle of the "5" button.

– As near the middle of the "5" button as possible.

– On the surface of the "5" button that is pressed when it is activated.

It is recommended that the tactile identifier is positioned in such a way that it will not obscure the legibility of the marking on the "5" button (see Figure 5).

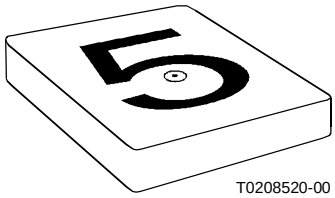

Figure 5/E.161

If none of these locations can be used, e.g. on small keys, alternative positions of the tactile identifier are acceptable. However, the tactile identifier shall unambiguously identify the "5" button.

The preferred form of the tactile identifier on the "5" button is a distinct raised round dot (see Figure 6).

The recommended dimensions of the raised round dot are:

– Height 0.6 mm (+0.2 mm).

– Diameter 1.5 mm (+0.2 mm).

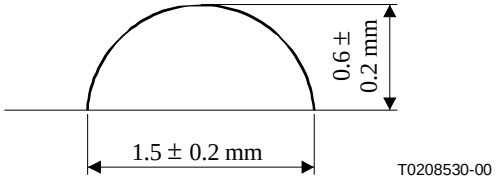

Figure 6/E.161

4 Additional push-buttons for use on telephones

4.1 General

For purposes other than dialling, additional push-buttons may be required on a telephone. For example, a telephone may have a push-button to recall during an active call, control logic (e.g. a register) or an operator, or to effect the transfer of an active call to another station. To prevent

[5] The material of this clause is taken from an ETSI Standard: ES 201 381 V1.1.1 [2].

subscriber confusion it may be desirable that the symbols used on those push-buttons which have identical functions be standardized.

4.2 Specific recommendations

4.2.1 Register recall push-button

For the recall of a register during an active call, the following methods are possible:

– a switchhook flash;

– a depression of one of the push-buttons of the normal 10 or 12 button array;

– a depression of another push-button specially provided for this purpose – the register recall push-button.

From the human factors viewpoint the depression of a push-button for register recall seems to be preferable to the use of a switchhook flash.

If a special register recall push-button is used, this push-button should be designated with the symbol R (capital) on, or next to the push-button. The push-button should be clearly distinguishable and spatially separated from the standard 12-push-button array.

This symbol is recommended because:

a) it symbolizes the term "Recall" in a number of languages;

b) studies have shown that it is subject to minimal auditory and visual confusion;

c) it avoids the difficulties inherent in specific technical terms for any lay subscribers.

The exact position, shape and colour of the button should not be standardized at the present time. Such standardization would inhibit design innovation and be unnecessarily restrictive.

References

[1] *The layout of digits on push-button telephones* – a review of the literature. *TELE*, No. 1, 1982 (copies available at the Library of the Telia, S-12386 FARSTA).

[2] ETSI ES 201 381 V1.1.1 (1998), *Human Factors (HF); Telecommunications keypads and keyboards; Tactile identifiers.*

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