INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

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

Operation, numbering, routing and mobile services – International operation – Numbering plan of the international telephone service

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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

(Previously 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

Source

ITU-T Recommendation E.161 was revised by ITU-T Study Group 1 (1993-1996) and was approved under the WTSC Resolution No. 1 procedure on the 16th of May 1995.

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. The 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 Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 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.

INTELLECTUAL PROPERTY RIGHTS

The ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. The ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, the 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.

CONTENTS

ARRANGEMENT OF DIGITS, LETTERS AND SYMBOLS ON TELEPHONES AND OTHER DEVICES THAT CAN BE USED FOR GAINING ACCESS TO A TELEPHONE NETWORK

(Melbourne, 1988; revised in 1993 and 1995)

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 Recommendation E.123.)

2 Rotary dials

See Figure 1.

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.

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 in the two options that follow:

Option A			Option B[1]		
1	2 ABC	3 DEF	1 QZ	2 ABC	3 DEF
4 GHI	5 JKL	6 MNO	4 GHI	5 JKL	6 MNO
7 PQRS	8 TUV	9 WXYZ	7 PRS	8 TUV	9 WXY
	0			0	

3 Pushbuttons or keys

3.1 Ten pushbuttons

3.1.1 Arrangement and numbering

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

1 2 3

4 5 6

7 8 9

0

[1] Not preferred for countries which are introducing a standard on alphanumeric keypads. To be phased out, in international service, where practicable, in those countries using this option, preferably by 1 April 1996.

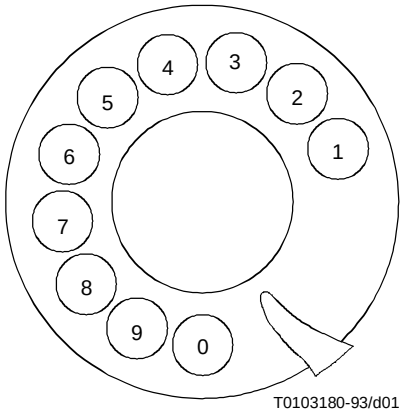

Figure 1/E.161 – Rotary dial

Extensive research has shown that this arrangement leads to shorter entry times and lower error rates than other arrangements[2].

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**
1	**2**	**3**	**4**	**5**	**3**	**4**
6	**7**	**8**	**9**	**0**	**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[3], 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-funcional terminal used both for the entry of telephone number information and data is the standard arrangement shown at the beginning of this subclause.

Exceptionally, for devices intended to be used principally for data entry but which may sometime 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[4].

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

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

4 The corresponding ISO standard can be found in ISO Draft Proposal 9995, entitled "Keyboard Layouts for Text and Office Systems".

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 pushbuttons

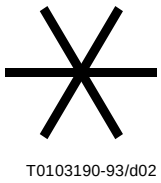
3.2.1 Arrangement

For 12 pushbuttons 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 Recommendation 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.



T0103190-93/d02

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 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 Recommendation Q.23, is used to transmit the frequency pair 941 Hz and 1477 Hz, should conform in shape to the specifications given in Figures 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 80° 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.

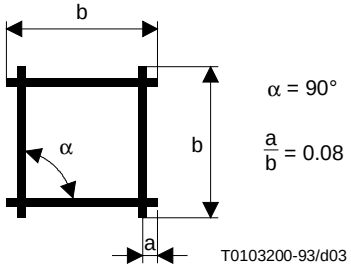


Figure 3/E.161

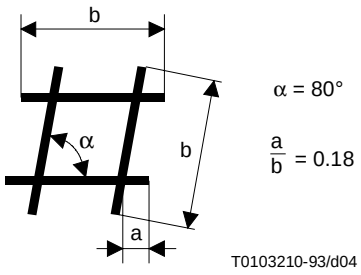


Figure 4/E.161

The preferred values are either:

– $\alpha = 90°$ with a/b = 0.08;

– $\alpha = 80°$ 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[5].

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

Standard 4 × 3 array	6 × 2 array	2 × 6 array
1 2 3	**1 2**	**1 2 3 4 5** ✳
4 5 6	**3 4**	**6 7 8 9 0 #**
7 8 9	**5 6**	
✳ **0 #**	**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 Use of colours

The question of standardization of pushbutton and symbol colour for international purposes is still not settled. In the meantime, colours different from the digit buttons and symbols should not be used.

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

In all push-button dials, the figures, letters and symbols 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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5 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.

4 Additional pushbuttons for use on telephones

4.1 General

For purposes other than dialling, additional pushbuttons may be required on a telephone. For example, a telephone may have a pushbutton 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 subscriber confusion it may be desirable that the symbols used on those pushbuttons which have identical functions be standardized.

4.2 Specific recommendations

4.2.1 Register recall pushbutton

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

– a switchhook flash;

– a depression of one of the pushbuttons of the normal 10 or 12 button array;

– a depression of another pushbutton specially provided for this purpose – the register recall pushbutton.

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

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

Reference

[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).

ITU-T RECOMMENDATIONS SERIES

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