International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

P.64

Amendment 1

(03/2007)

SERIES P: TELEPHONE TRANSMISSION QUALITY, TELEPHONE INSTALLATIONS, LOCAL LINE NETWORKS

Objective electro-acoustical measurements

Determination of sensitivity/frequency characteristics of local telephone systems

Amendment 1: Revised Annexes D and E

ITU-T Recommendation P.64 (1999) – Amendment 1

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ITU-T Recommendation P.64

Determination of sensitivity/frequency characteristics of local telephone systems

Amendment 1

Revised Annexes D and E

Summary

This amendment revises Annexes D and E.

Source

Amendment 1 to ITU-T Recommendation P.64 (1999) was approved on 1 March 2007 by ITU-T Study Group 12 (2005-2008) under the ITU-T Recommendation A.8 procedure.

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.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure e.g. interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

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Annex D

Definition of handset positions for measuring loudness ratings and frequency responses using the P.57 type 3.4 artificial ear on HATS

Scope

This annex describes two handset positions which should be used to measure the sensitivities of commercial telephone sets in sending and receiving directions.

D.1 This annex describes two handset positions which should be used to measure the sensitivities of commercial telephone sets in sending and receiving directions. The first position described in this annex is the standard position compatible to the LRGP position in terms of sending sensitivity. The second one is an alternative position which can be applied for very flat (e.g., mobile) handsets which may touch the head outside the pinna area in case the standard position is used.

The handset positions are defined according to the procedure described in Annex C. The orientation of the handset is defined by a vector normal to the plane of the ear cap ($\vec{n}_{EC}$) and a vector normal to the plane of symmetry of the handset ($\vec{n}_{HS}$), as shown in Figure D.1.

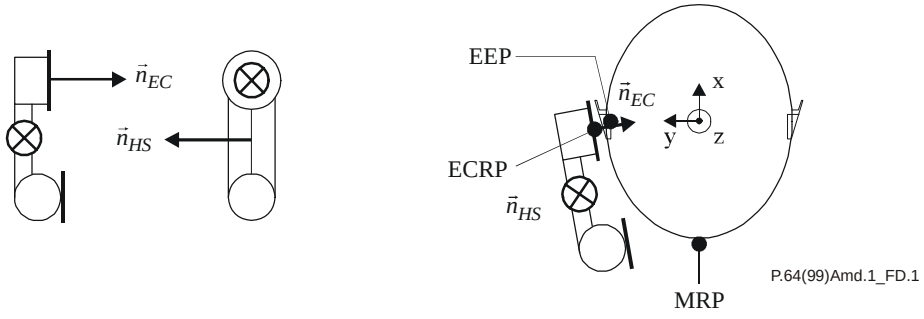

Figure D.1 – Definition of unit vectors $\vec{n}_{EC}$ and $\vec{n}_{HS}$ relative to handset (left) and in connection to HATS (right)

In Figure D.1, in addition the ear canal entrance point (EEP), the centre of the earcap (ECRP) and the mouth reference point (MRP) are indicated.

D.2 The **standard position** is defined by the following vectors:

1) Unit vector normal to the plane of the ear cap:

$\vec{n}_{EC} = \pm (+0.1771, -0.9842, +0.0086)$

2) Unit vector normal to plane of the symmetry of the handset:

$\vec{n}_{HS} = \pm (+0.4083, +0.0655, -0.9105)$

The relative position between EEP and plain of lips are defined in ITU-T Rec. P.58. The ECRP is shifted from the EEP by +8.0 mm in x-direction and +10.0 mm in z-direction. When coupling normal-shaped, flat earcaps to the artificial ear, the ERP would approximate to the position taken up by the ECRP.

NOTE – The handset is moved in y-direction in order to apply different pressure force to the ear.

D.3 For some recent handsets, especially for mobile phones, this position may be impossible, since α may be too large. For that case a **flat handset position** can be used, with α decreased by 5°. The vectors for that second position are:

1) Unit vector normal to the plane of the ear cap:

$\vec{n}_{EC} = \pm (+0.09066, -0.99587, +0.00869)$

2) Unit vector normal to plane of the symmetry of the handset:

$\vec{n}_{HS} = \pm (+0.41214, +0.02957, -0.91067)$

The relative position between EEP and plain of lips are defined in ITU-T Rec. P.58. The centre of the earcap is shifted from the EEP by +8.0 mm in x-direction and +10.0 mm in z-direction; thus, the alternative position shows the same displacement as the standard position described in clause D.2.

NOTE – The handset is moved in y-direction in order to apply different pressure force to the ear.

Annex E

Definition of handset positions for measuring loudness ratings and frequency responses using the P.57 types 3.2 and 3.3 artificial ear on HATS

Scope

This annex describes the handset position to be used when measuring sensitivity/frequency characteristics of local telephone systems using HATS, allowing handsets to be measured using the so-called "Standard Handset Position" or offering the possibility to make use of another alternative position for the type 3.3 ear.

E.1 Definition of standard handset position for measuring of loudness ratings and frequency responses using the P.57 types 3.2 and 3.3 artificial ear on HATS

This clause describes the handset position to be used when measuring sensitivity/frequency characteristics of local telephone systems using HATS. The HATS position has been shown to be essentially identical to the LRGP position, except for the mouth speaking direction, which has been corrected with a 19 degrees downwards rotation.

Using P.64 terminology, a Cartesian coordinate system with origin in the centre of lips (CL) is introduced. The x_m axis coincides with the mouth reference axis, and has positive direction into the mouth. The y_m axis is horizontal, perpendicular to the x_m axis, with positive direction towards the right side of the mouth/test head. The z_m axis is perpendicular to the x_m and y_m axes and with positive direction upwards (refer to Figure E.1). This head-fixed, mouth coordinate system is used. It is parallel to the Frankfurter plane and the HATS reference plane.

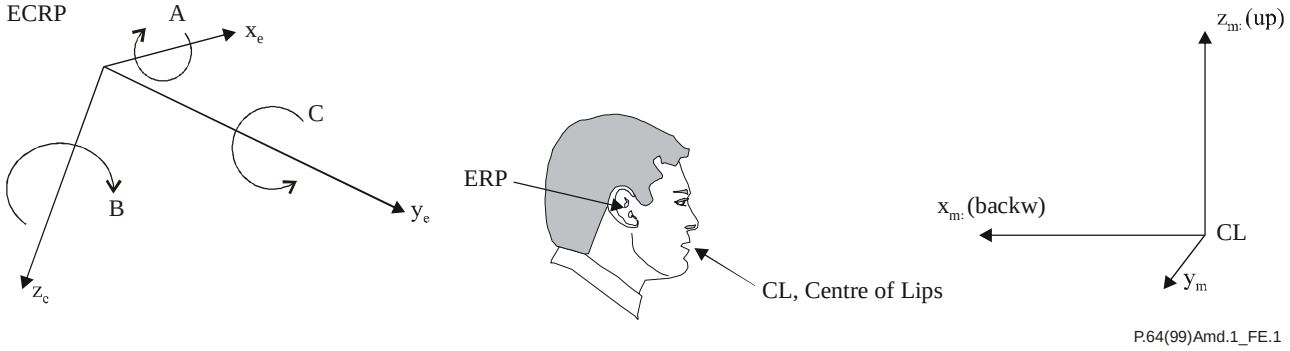

Figure E.1 – Cartesian coordinate systems

NOTE – For the standard HATS position, ERP and ECRP are coincident.

Figure E.1 also shows the ECRP-based Cartesian coordinate system with the axes:

- x_e axis: axis of earcap with positive away from the earphone (into the ear).
- y_e axis: line of intersection of the handset symmetry plane with the earcap plane. Positive direction towards the microphone.
- z_e axis: normal to the two other axes. On the right ERP pointing obliquely downwards.

The standard HATS position is defined by the following vectors:

$$\text{CL-ERP (nominal, right side)} = \begin{bmatrix} x_m \\ y_m \\ z_m \end{bmatrix} = \begin{bmatrix} 110.0 \\ 77.9 \\ 40.3 \end{bmatrix}$$

$$\text{EEP-ERP vector (nominal, right side)} = \begin{bmatrix} x_m \\ y_m \\ z_m \end{bmatrix} = \begin{bmatrix} 6.0 \\ 11.9 \\ -1.7 \end{bmatrix}$$

$$\mathbf{x_e} \text{ unit vector} = \begin{bmatrix} x_m \\ y_m \\ z_m \end{bmatrix} = \begin{bmatrix} 0.1932 \\ -0.9740 \\ 0.1184 \end{bmatrix}$$

$$\mathbf{y_e} \text{ unit vector} = \begin{bmatrix} x_m \\ y_m \\ z_m \end{bmatrix} = \begin{bmatrix} -0.9088 \\ -0.2231 \\ -0.3527 \end{bmatrix}$$

$$\mathbf{z_e} \text{ unit vector} = \begin{bmatrix} x_m \\ y_m \\ z_m \end{bmatrix} = \begin{bmatrix} 0.3699 \\ -0.0394 \\ -0.9282 \end{bmatrix}$$

For the HATS position, the nominal CL-ERP distance is 140.7 mm.

E.2 Definition of the alternative handset position for measuring of loudness ratings and frequency responses using the P.57 3.3 artificial ear on HATS

This clause describes an alternative handset position to be used when measuring sensitivity/frequency characteristics of local telephone systems using HATS. In the case that the standard handset position as defined in clause E.1 is found to poorly represent human usage of a handset, the alternative position, defined herein, may be defined.

The unit vectors defining the coordinate system of the handset and handset positioner are defined in clause E.1 as x_e, y_e and z_e. Additionally, rotation degrees of freedom, as illustrated in Figure E.1 are defined as follows:

- Rotational degree of freedom **A** is defined as a clockwise rotation about the x_e unit vector;
- Rotational degree of freedom **B** is defined as a clockwise rotation about the z_e unit vector;
- Rotational degree of freedom **C** is defined as a clockwise rotation about the y_e unit vector.

The manufacturer-defined earcap reference point (MECRP) allows for a new point to be defined on the surface of the phone. The MECRP is defined with respect to the ECRP and allows displacement along the z_e and y_e unit vectors only. The pressure force employed to hold the handset to the HATS will define the position of the handset along the y_m axis.

The acceptable range of offset of the MECRP shall not exceed:

- –10/+15 mm along unit vector y_e;
- ±10 mm along unit vector z_e.

The acceptable range of handset rotations about the MECRP shall not exceed:

- ±6° in rotational degree of freedom **A**;
- ±6° in rotational degree of freedom **B**;
- ±5° in rotational degree of freedom **C**.

NOTE – In exceptional cases for handsets showing a design where even these ranges for offset and rotation do not allow a close to human use positioning, these ranges may be exceeded. Sufficient justification for such deviation shall be given by the manufacturer and/or the test laboratory. The procedure for defining an alternative position is defined as a two-step process. Firstly, the handset MECRP is to be defined, allowing an offset along the z_e and y_e unit vectors only. In many cases this will suffice to provide a placement of the handset on the HATS which is similar to human usage. The MECRP may be coincident with the ECRP.

However, with certain handset form-factors, additional angular rotations may be required to achieve correct placement. Secondly, the angular rotations shall occur about the MECRP. Thirdly, the application force is applied by moving the handset in y_m direction.

In order to ensure that the alternative position is unambiguously defined for a given handset type and to ensure that the alternative position can be repeated in any laboratory, the reporting format described in Table E.1 shall be used.

In the standard position, angles A, B and C are defined as the deviation to the unit vectors y_e and z_e from the HATS reference plane and the HATS plane of symmetry. The planes are shown in Figure 1 of ITU-T Rec. P.58. The values for these angles in the standard position are 21.2°, 13.8° and 2.4° for angles A, B and C, respectively. The adjustment tolerances refer to deviations from the standard position angles.

Table E.1 – Template structure for reporting the alternative handset position when using the ITU-T P.57 3.3 artificial ear on HATS

MECRP (delta from actual ECRP)

Axis	**Delta [mm]**
y_e	
z_e	

Angle settings

Angle	**Delta from standard angle [°]**
A	
B	
C	

Application force [N]	

If the handset manufacturer selects to use either the standard position (as defined in clause E.1) or the alternative position (as defined in clause E.2), this uniquely defined position shall be used for all measurements associated with this handset type.

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