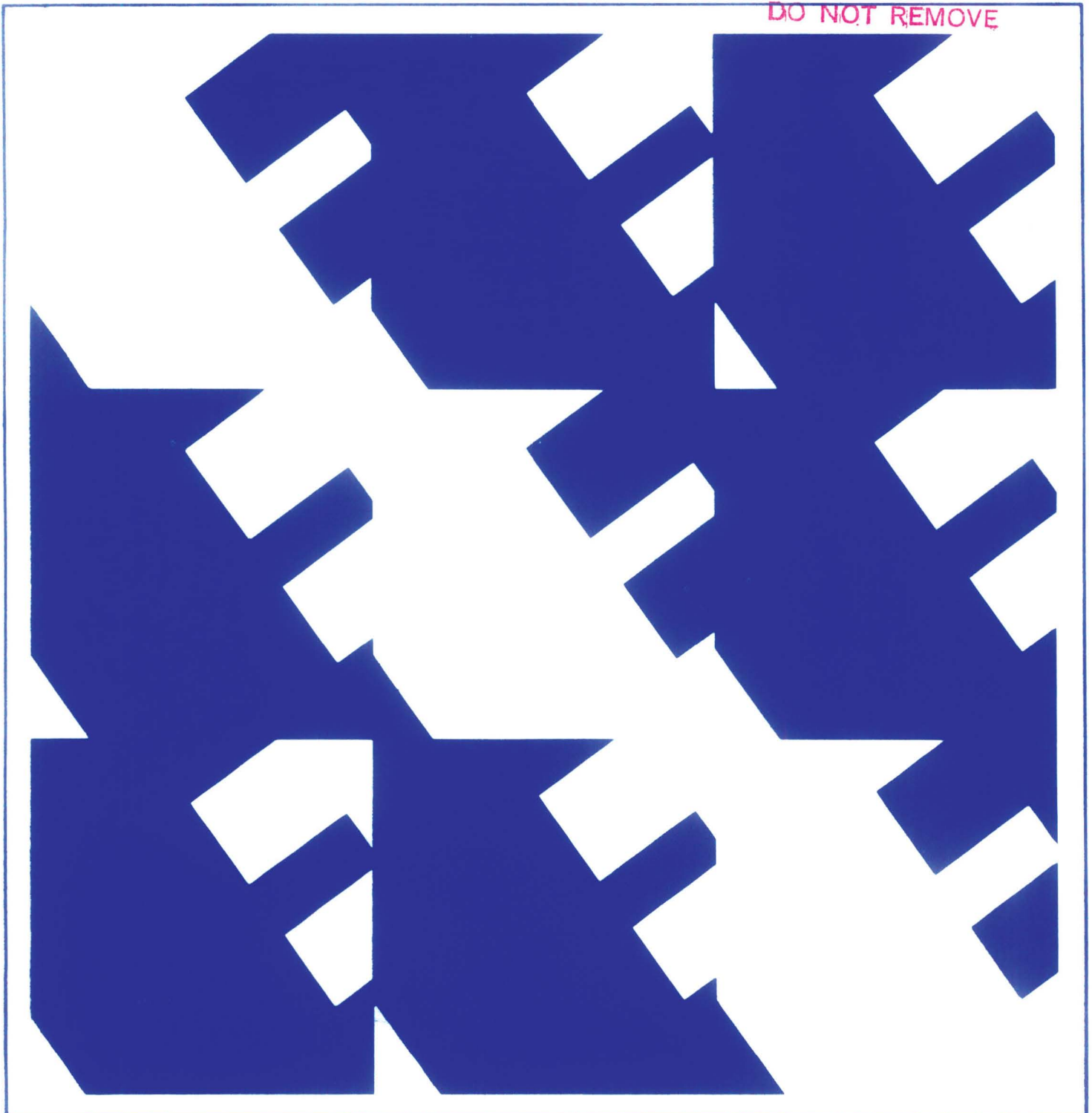


IEEE Standard Method for Measuring Transmission Performance of Telephone Sets

IEEE STANDARDS
ARCHIVES

DO NOT REMOVE



IEEE Std 269-1971



Published by The Institute of Electrical and Electronics Engineers, Inc. 345 East 47th Street, New York, New York 10017



Documents

Document Sharing Hub
SH01586

Authorized licensed use limited to: Tsinghua University. Downloaded on February 25, 2026 at 06:39:35 UTC from IEEE Xplore. Restrictions apply.

IEEE Standard
Method for Measuring Transmission
Performance of Telephone Sets

Sponsored by the
Wire Communication Committee of the
IEEE Communication Technology Group

© Copyright 1971 by

The Institute of Electrical and Electronics Engineers, Inc.

*No part of this publication may be reproduced in any form,
in an electronic retrieval system or otherwise,
without the prior written permission of the publisher.*

Approved February 4, 1971
IEEE Standards Committee

B. B. Barrow, *Chairman*

S. I. Sherr, *Secretary*

S. J. Angello
E. C. Barnes
F. K. Becker
W. H. Cook
W. H. Devenish
C. J. Essel
R. F. Estoppey

J. Forster
J. A. Goetz
A. D. Hasley
G. E. Hertig
A. R. Hileman
H. Lance
D. T. Michael
J. B. Owens

R. H. Rose, II
S. V. Soanes
L. Van Rooij
R. V. Wachter
B. O. Weinschel
C. E. White
W. T. Wintringham



Documents
Document Sharing Hub

Foreword

This IEEE Standard Method for Measuring Transmission Performance of Telephone Sets has been prepared in response to a widely expressed need by the telecommunications industry for a standard, comprehensive method for testing the transmission performance of telephone sets. The present document is a revision of a draft specification published in May of 1966. The revision contains some new material, and incorporates the results of a laboratory test program among several participating laboratories. Individuals from a broad segment of private and government design, manufacturing, and research organizations have given freely of their time in preparing, testing, and reviewing this standard.

The IEEE will maintain this document current with the state of the technology. Comments on this document and suggestions for the additional material that should be included are invited. These should be addressed to:

Secretary
IEEE Standards Committee
The Institute of Electrical and Electronics Engineers, Inc.
345 East 47th Street
New York, New York 10017

This publication was prepared by the Task Force on Telephone Instrument Testing Wire Communication Committee of the IEEE Communication Technology Group, which had the following members:

F. T. Andrews, *Chairman*

N. G. Long, *Secretary*

D. M. Atkinson
L. A. Berry
F. L. Crutchfield
J. F. Dunlap
J. W. Emling (*Chairman to 1962*)
J. B. Eppes, Jr.
M. D. Fagen (*Secretary to 1967*)
W. D. Goodale (*to 1963*)
E. J. Hineline
A. S. Howell

B. Katz
M. J. Leach
G. A. Ledbetter
A. Mankivsky
C. H. McGuire
L. R. Montfort (*Secretary to 1964*)
H. C. Pye (*to 1964*)
C. G. Svala
K. Simonsen

Contents

SECTION	PAGE
1. Introduction	7
2. Scope and Purpose	7
3. Definitions	8
4. Test Equipment	9
4.1 General	9
4.2 Artificial Mouth	10
4.3 Standard Circuits	10
4.4 Artificial Ear	11
4.5 Standard Pressure Microphone	11
4.6 Microphone Amplifier	11
4.7 Variable-Frequency Oscillator	12
4.8 Level Recorders	12
4.9 Harmonic Analysis	12
4.10 Distortion Analysis	13
4.11 Impedance Bridge	13
4.12 Milliammeter	13
4.13 Voltmeter	13
4.14 Noise Meter	13
4.15 Sound-Attenuating Cover for the Handset Transmitter	13
4.16 Sound-Attenuating Cover for the Handset Receiver	14
5. Test Procedure	14
5.1 General	14
5.2 Transmit	14
5.3 Receive	16
5.4 Sidetone	17
5.5 Air-to-Air Transmission	17
5.6 Telephone Set Impedance	17
5.7 Telephone Set Resistance	18

FIGURES

Fig. 1 Modal Position Recommended by the CCITT Laboratories for AEN Measurements	9
Fig. 2 Telephone Transmission Test Circuits	11
Fig. 3 Position of Pressure Microphone in Sound Field of Artificial Mouth	12
Fig. 4 DC Supply Circuit for Testing Transmit Equalization	12
Fig. 5 DC and AC Signal Voltage Supply for Testing Receive Equalization	12
Fig. 6 Artificial Ear	13
Fig. 7 Circuit for Telephone Impedance Measurements	13
Fig. 8 Circuit for Transmitter Noise Measurements	13
Fig. 9 Circuit and Transmitter Resistance Measurements	18
Fig. 10 Circuit for Measuring Sidetone	18
Fig. 11 Circuit for Telephone Resistance Measurements	18

IEEE Standard

Method for Measuring Transmission Performance of Telephone Sets

1. Introduction

The methods that are used to measure telephone-set transmission performance may be divided into two classes: objective methods and subjective methods. The objective methods, which are those to be discussed in this standard, utilize a sound source resembling the human mouth to drive the transmitter, and a simple air volume resembling that of the human ear as a termination for the receiver. The sound source comprises a source of electrical energy and a moving-coil loudspeaker unit having supplementary electrical and acoustical components that provide a sound field similar to that produced by a typical human voice. This special loudspeaker is referred to as an Artificial Mouth. The terminating air volume, in which the sound pressure generated by the receiver is measured, is provided by a device referred to as an Artificial Ear. The Artificial Mouth and Ear are useful in comparing the performance of telephone sets at frequencies in the significant portion of the speech range.

The subjective measurements which are particularly applicable for rating overall communication connections include real-voice and real-ear calibrations. This type of calibration is based on the ratio of the sensations of loudness and clarity, perceived when a real ear is in the sound field produced by a real voice, to those perceived when a telephone connection intervenes between the real voice and real ear. Other subjective methods include articulation tests, repetition counts, and judgment tests. The disadvantages of subjective methods are that they involve human subjects and necessitate a large number of tests for the results to have significance.

When agreements, on the basis of subjective methods, are reached, as to the desirability of particular performance characteristics for a given type of telephone connection, the maintenance of these characteristics can be achieved by purely objective methods such as

the Artificial Mouth and Ear measurements. It must be emphasized that the relationships which are established between subjective and objective measurements will vary with the physical constants of the telephone design, such as size and shape of the handset.

It would be expected, therefore, that correlation between subjective performance and objective measurements should be established separately for each telephone-set design before measurements obtained, using the techniques covered herein, could be interpreted to reflect performance under conditions of actual use.

2. Scope and Purpose

2.1 The purpose of this standard is to describe a practical method for measuring the transmission characteristics of a telephone set by means of objective measurements in a test connection. The test results thus obtained may be used as a means of evaluating or specifying the transmission performance of a telephone on a standardized basis.

The basic accuracy and reproducibility of measurements made in accordance with this standard will depend primarily upon the accuracy of the test equipment used, the care with which the measurements are conducted, and the inherent stability of the telephone and/or transducers under test.

Where a given set of measurements is repeated in the same laboratory and by the same operator, a relatively high degree of reproducibility should normally be obtained. However, when comparing measurements made by different laboratories, allowances must be made for the influencing factors mentioned above.

NOTE: An experimental test program based upon this standard indicated that differences of as much as 6 dB could occur in transmit and air-to-air measurements and as much as 3 dB in receive measurements. In most cases, however, these differences can be significantly reduced by means of special correlation studies between the participating laboratories.