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(10/96)

SERIES K: PROTECTION AGAINST INTERFERENCE

Low frequency interference due to unbalance about earth of telecommunication equipment

ITU-T Recommendation K.10

(Previously CCITT Recommendation)

ITU-T K-SERIES RECOMMENDATIONS
PROTECTION AGAINST INTERFERENCE

For further details, please refer to ITU-T List of Recommendations.

FOREWORD

The ITU-T (Telecommunication Standardization Sector) is a permanent organ of the International Telecommunication Union (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 (Helsinki, March 1-12, 1993).

ITU-T Recommendation K.10 was revised by ITU-T Study Group 5 (1993-1996) and was approved by the WTSC (Geneva, 9-18 October, 1996).

NOTES

1. In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.
2. The status of annexes and appendices attached to the Series K Recommendations should be interpreted as follows:
 - an *annex* to a Recommendation forms an integral part of the Recommendation;
 - an *appendix* to a Recommendation does not form part of the Recommendation and only provides some complementary explanation or information specific to that Recommendation.

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Recommendation K.10 (10/96)

i

CONTENTS

	<i>Page</i>
1 Introduction	1
2 Scope	1
3 Reference texts	1
4 Definitions	2
4.1 Reference circuit representation	2
5 Unbalance test	3
5.1 Test arrangement	3
5.2 Testing conditions	4
5.3 Measurements	5
6 Admissible values	6
7 Protection against effects of unbalance of equipment	7
Appendix I – Disturbing mechanisms	7
I.1 Origin of noise effects	7
I.2 Conversion mechanism at the input of an equipment	8

SUMMARY

This Recommendation gives limiting values of unbalance about earth of telecommunication equipment for the domain of the low frequency band (below a few tens of kHz), presents methods of measurements permitting characterization of the effects of unbalance and provides information about the choice of relevant means of protection.

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Recommendation K.10**LOW FREQUENCY INTERFERENCE DUE TO UNBALANCE ABOUT
EARTH OF TELECOMMUNICATION EQUIPMENT***(Mar del Plata, 1968; revised in 1984, 1993, 1996)***1 Introduction**

When a telecommunication installation located in an electromagnetic environment presents an unbalance of impedances about a reference conductor (earth, common conductor), it exposes the network not only to noise effects disturbing the useful signals (reception aspect) but also to radiating phenomena able to disturb other telecommunication installations placed in the vicinity (emission aspect).

From this point of view, the balance constitutes a fundamental aspect of quality which is necessary for the electromagnetic compatibility of networks.

This Recommendation presents methods of measurement permitting characterization of the effects of unbalance and also gives some information about the choice of relevant means of protection. The user will find in Appendix I some theoretical tools useful for the analysis of unbalanced equipment.

In addition, information is given in several other ITU-T publications concerning the theory of disturbing mechanisms, the definitions of unbalance parameters and some principles of measurement [1] and [2].

2 Scope

This Recommendation covers the domain of the low frequency band extending from the fundamental frequency (16 2/3 Hz, 50 Hz, 60 Hz) and its harmonics, generated by the electrical power and traction systems, up to higher frequencies (up until a few tens of kHz) generated by any other industrial or domestic electrical equipment.

In this frequency range and considering a normal situation (very low unbalance), the emission effects due to unbalance are negligible. Consequently, this Recommendation will consider only the reception aspect of unbalance as the conversion from common mode to differential mode process.

Considering the low frequency band, the typical equipment under study will be the terminating equipment connected at the ends of lines, such as the interfaces in exchange and the subscriber's terminal including indoor cabling. The cables will not be taken into consideration, due to the fact that they present a balance much higher than that normally found in equipment. Furthermore, ISDN equipment is not covered by this Recommendation.

The methods of measurement presented in this Recommendation refer to the field of testing in the laboratory and some aspects of maintenance activities.

3 Reference texts

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

- [1] ITU-T Directives, Volumes II, III, VI and IX.
- [2] CCITT Recommendation O.9 (1988), *Measuring arrangements to assess the degree of unbalance about earth.*
- [3] ITU-T Recommendation G.117 (1996), *Transmission aspects of unbalance about earth.*

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