INTERNATIONAL TELECOMMUNICATION UNION

ITU-T O.6

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

SPECIFICATIONS FOR MEASURING EQUIPMENT

1020 Hz REFERENCE TEST FREQUENCY

ITU-T Recommendation O.6

(Extract from the *Blue Book*)

NOTES

1 ITU-T Recommendation O.6 was published in Fascicle VI.4 of the *Blue Book*. This file is an extract from the *Blue Book*. While the presentation and layout of the text might be slightly different from the *Blue Book* version, the contents of the file are identical to the *Blue Book* version and copyright conditions remain unchanged (see below).

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

Recommendation O.6

1020 Hz REFERENCE TEST FREQUENCY

(Melbourne, 1988)

1 Introduction

The intent of this Recommendation is to specify a single nominal reference frequency of 1020 Hz in order to provide guidance to manufacturers and Administrations in the design and operation of new equipment and systems. This Recommendation is not intended to have an effect on existing equipment or systems except where modifications are required to allow for interworking. For instance, an older analogue exchange would need to be provided with new reference frequency capability if circuits were provided between it and digital exchanges.

2 Test frequencies on circuits routed over PCM systems

The selection of a suitable test frequency is a major consideration when testing circuits routed over PCM systems. An error in level measurement can arise on circuits routed over PCM systems if the test frequency is a sub-multiple of the PCM sampling rate. This error can be nearly as great as ± 0.15 dB at 800 Hz and ± 0.20 dB at 1000 Hz with a sampling rate of 8000 Hz employing 8-bit coding. In addition, errors in other parameters, such as total distortion, may be even more significant.

Therefore, it is recommended that the use of a reference test frequency that is a sub-multiple of the PCM sampling rate should be avoided. Studies within CCITT reveal that some Administrations have employed nominal reference test frequencies offset from 800 Hz or 1000 Hz by varying amount but within the ranges 804-860 Hz or 1004-1020 Hz. These studies have confirmed that where interworking is not required, no significant problems in maintenance have been encountered by Administrations and existing test procedures and equipment may continue to be used.

In the case of interworking and for new equipment and systems, the Administrations expressed a strong preference for the selection of a reference test frequency of 1020 Hz.

3 Considerations for new measuring equipment specifications

The following should be considered for new measuring equipment specifications in the Series O Recommendations:

i) A reference test frequency of 1020 Hz is recommended for test frequency generating circuits or instruments that provide reference test frequencies. The specified frequency tolerance should be +2 to –7 Hz[1)].

ii) The nominal level of the reference test frequency when used on in-service equipment should not be greater that –10 dBm0 ± 0.1 dB.

iii) Measuring circuits or instruments which utilize the reference test frequencies should provide, if possible, for measurements of any frequencies within the nominal range of 1000 to 1025 Hz.

By agreement between the Administrations concerned, in the absence of the required sending or measuring apparatus, the use of a measuring frequency in the range of 800 to 860 Hz is admissible. Other considerations about the deployment and use of reference test frequencies are given in Recommendation M.20 [1].

References

[1] CCITT Recommendation *Maintenance philosophy for analogue, digital and mixed networks*, Volume IV, Recommendation M.20.

1) The negative tolerance of 7 Hz is intended to allow the use of digitally generated test signals that are generated by a sufficiently high number of samples to achieve the measurement accuracy specified in certain Series O Recommendations (e.g. Recommendation O.133).