Draft Recommendation O.xx(0.6)

1 020 Hz REFERENCE TEST FREQUENCY

1. Introduction

The intent of this Recommendation is to specify a single nominal reference frequency of 1 020 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, e.g., 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 testing of circuits routed over PCM systems provide a major consideration when selecting a suitable reference test frequency. 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 $\pm$0.15 dB at 800 Hz and $\pm$0.20 dB at 1 000 Hz with a sampling rate of 8 000 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 1 000 Hz by varying amounts but within the ranges 804 - 860 Hz or 1 004 - 1 020 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 1 020 Hz.

3. Considerations for new measuring equipment specifications

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

i) A reference test frequency of 1 020 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].

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[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 O-Series Recommendations (e.g. Recommendation O.133).

ii) The nominal level of the reference test frequency when used on in-service equipment should not be greater that -10 dBmO = 1 dB.

iii) Measuring circuits or instruments which utilize the reference test frequencies should provide, if possible, for measurement of any frequencies within the nominal range of 1 000 to 1 025 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.1, Recommendation M.20.