INTERNATIONAL TELECOMMUNICATION UNION

ITU-T G.172

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

TRANSMISSION SYSTEMS AND MEDIA

TRANSMISSION PLAN ASPECTS OF SPECIAL CIRCUITS AND CONNECTIONS USING THE INTERNATIONAL TELEPHONE CONNECTION NETWORK

TRANSMISSION PLAN ASPECTS OF INTERNATIONAL CONFERENCE CALLS

ITU-T Recommendation G.172

(Extract from the *Blue Book*)

NOTES

1 ITU-T Recommendation G.172 was published in Fascicle III.1 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.

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Recommendation G.172

TRANSMISSION PLAN ASPECTS OF INTERNATIONAL CONFERENCE CALLS

(Malaga-Torremolinos, 1984; amended at Melbourne, 1988)

The transmission considerations given here are applicable to conference calls set up and operated in accordance with Recommendation E.151.

1 In order to respect CCITT Recommendations concerning loudness ratings on international connections, high quality bridging equipment shall be used. This equipment shall be designed to provide a nominal transmission loss of 0 dB in the direction from whichever participant is for the moment active (speaking) to all inactive (listening) participants. This loss shall be measured between equal level switching points of national circuits or virtual switching points of international circuits.

Note - Some conference bridges employ the use of automatic gain control (AGC) to minimize the contrast that exists between the speech levels of participants on connections having different losses, and the above consideration does not apply for such bridges. The transmission consideration for bridges with AGC is a subject for future study.

2 A modern conference bridge shall be used which employs techniques to avoid excessive transmission impairment from the accumulation of noise and echo at the output of the bridge in a multiport conference arrangement.

In a conference connection with two bridges: one bridge has N1 ports including a talker and the other bridge has N2 ports, noise increases as the number of ports is increased, according to the approximate rule: 10 log (N1 + N2 - 1).

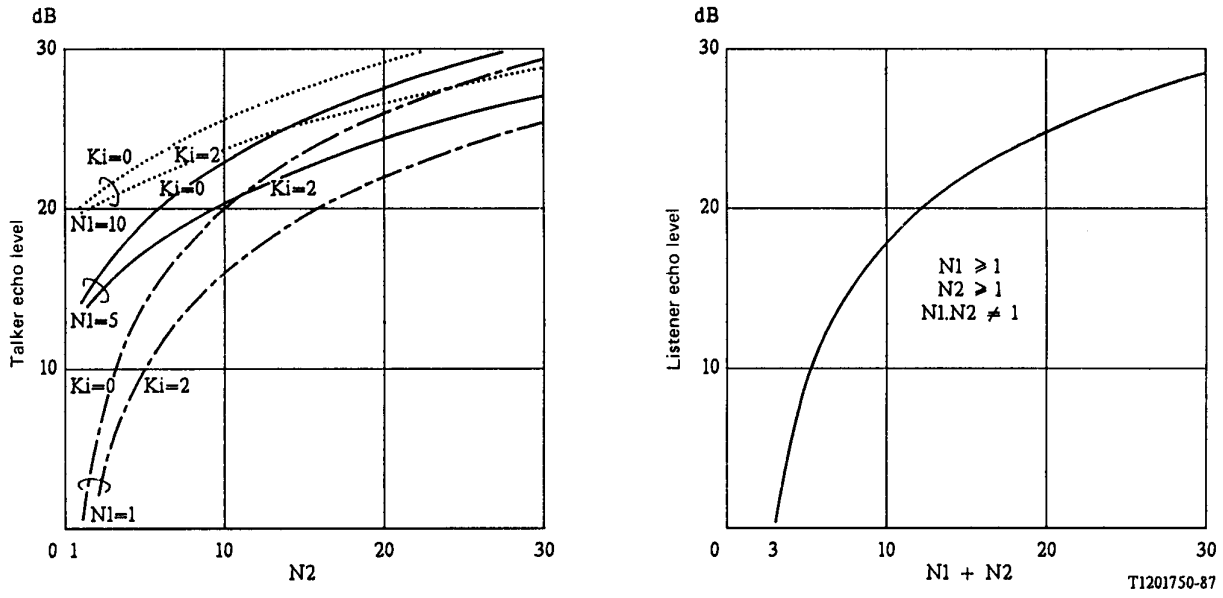
Talker and listener echoes also increase as the number of ports is increased as shown in Figure 1/G.172.

The multi-bridge configuration thus highlights the need for noise and echo control.

Note 1 - For example, a conference bridge which provides voice-activated switched loss or its equivalent may be used. In such a bridge, 15 dB of loss would be connected in each input to the bridge when the customer on that path is inactive. When a participant becomes active the loss is switched from his talking path to his listening path. This differential action protects the talker from echo and prevents a reduction of singing margin when the switch is operated. The loss which normally exists in the transmit path attenuates weak input signals such as noise before they enter the bridge. With this arrangement the level of the total signal reflected back to any active port will be the sum of the individual reflections from all other ports diminished by 30 dB.

This bridge can be equipped with about 30 ports.

Note 2 - A description of a conference bridge employing voice-activated switched loss is available in Annex 2 to Question 6/XVI in Volume III-3 of the *Green Book*. The transmission requirements contained in that annex could be used for the design of bridging equipment. Requirements for the design of bridging equipment using other techniques to control level contrast and noise and echo accumulation are the subject of future study.



a) Talker echo level

b) Listener echo level

Ki Transmission loss between bridges
N1 Number of #1 bridge's subscribers
N2 Number of #2 bridge's subscribers

FIGURE 1/G.172

Increased talker and listener echo levels in a conference with two bridges

3 Optimum operation of a conference bridge is obtained when its location is close to the center of the connection. This tends to equalize loss from the bridge to all conference locations on the connection, thus minimizing level contrast. Thus bridging equipment for international calls should be at high order transit centers.

4 Bridging equipment should he 4-wire presented and 4-wire switched on both national and international circuits, wherever possible.

5 Attention is called to Recommendation G.114 concerning mean one-way propagation time which recommends that connections with delays in excess of 400 ms should not be used except under the most exceptional circumstances. To comply with this recommendation, care should be taken in the selection of a connection diagram so as to avoid the use of more than a single satellite circuit. For some conferences, using a single star network, this could influence the choice of location for the conference bridge. For other conferences, the use of a multiple star network could be selected with a single satellite circuit, equipped with appropriate echo suppressors, linking the conference bridges.

6 The conference connections should be carefully chosen so as to minimize the number of voice-activated switched loss devices in tandem to no more than two per conference leg. This includes customer premises conference equipment (such as loudspeaking telephones) and network equipment (such as echo suppressors), but excludes the bridging equipment.

7 Whenever the conference involves a single person at a location using a subscriber handset the room noise should be limited to about 60 dBSPL(A)[1)] at the user position to provide good quality transmission. Figure 2/G.172 shows the mean opinion score of transmission quality versus room noise [1]. Failure of the customer to comply with this guideline may cause the conference to be unacceptable.

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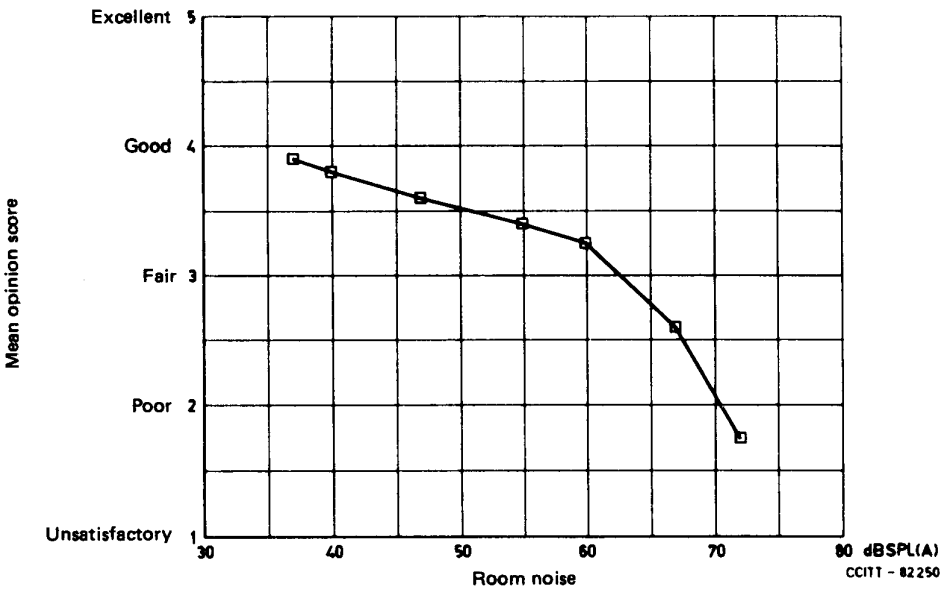
1) Sound pressure level relative to 20 μPa and using the A-weighting. See Recommendation P.54 for information concerning sound level measurements.

8 When a conference involves more than a single person at each location it may be desirable to use conference rooms equipped with microphones and loudspeakers. To assure an adequate signal-to-noise ratio and freedom from the effects of conference room reverberation, the microphone and loudspeaker placement guidelines contained in Supplement No. 4, Volume V should be followed[2] .



Note - This curve represents the opinion of customers listening over the telephone in room noise from 37 dBSPL(A) to 72 dBSPL(A). Each point is an average over all values of speech level and circuit noise given at that room noise level.

FIGURE 2/G.172

Relationship of transmission quality to room noise

Reference

[1] *Guidelines for improving telephone communications in noisy room environments,* Bell System Technical Reference, PUB 42902, February 1980, American Telephone and Telegraph Co.

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[2] Another problem associated with hands-free conferencing is the likelihood of acoustic feedback between loudspeaker and microphone. While this feedback is today generally controlled using voice-activated switched loss in the conference room terminal equipment, note is taken of the fact that Study Group XV has proposed new studies to determine how to use echo cancellers to control the acoustic feedback.