5i’

Recommendation N.13

MEASUREMENTS TO BE MADE BY THE BROADCASTING ORGANIZATIONS

DURING THE PREPARATORY PERIOD

After the broadcasting organizations have taken possession of the international sound-programme connection, they make measurements on the complete connection in the band of frequencies effectively transmitted, from the point where the programme is picked up to the point where the programme is received.

The broadcasting organizations should, for their measurements, send from the origin of the international sound-programme connection a sinusoidal signal at the reference frequency (800 or 1000 Hz) only, whose maximum amplitude is 9 dB below that of the maximum instantaneous voltage that should never be exceeded at this point in the course of a sound-programme transmission.

The duration of the period during which the signal at this level is sent should be kept as short as possible, for example, of the order of 30 seconds. If necessary, the ISPCs should verify that the received level at the access point on the international sound-programme circuit is equivalent to 0 dBm0.

When it is necessary, either for purposes of fault location or to maintain a watch on the continuity of the circuit, to send a continuous tone, or when making measurements at other frequencies than the reference frequency, the amplitude at the origin of the international sound-programme connection should be 21 dB below the voltage that should never be exceeded at this point during the course of a sound-programme transmission. Under these circumstances the level at the access point on the international sound-programme circuit is equivalent to —12 dBm0.

During the preparatory period a useful signal which can be used for the alignment of sound-programme connections is that shown in Figure A-1/N.13. The definitions and its method of use are given in Annex A of this Recommendation. A suitable automatic measuring equipment for this purpose is specified in Recommendation O.33 [1].

Note — The numerical values given above ensure that during the sound-programme transmission the peak voltage at a zero relative level point will not exceed that of a sinusoidal signal having an r.m.s. value of 2.2 volts.

The reason for sending the reference frequency only for short durations during this final line-up, at a voltage 9 dB below the peak voltage is that it is not desirable to subject carrier systems to overloading by continuously transmitting a test signal corresponding to the peak voltage reached only momentarily during the transmission of an actual programme.

ANNEX A

(to Recommendation N.13)

Signals for the alignment of international sound-programme connections

A.1 *Definitions*

A.1.1 **source identification**

An announcement should be used to identify the originating point of the test signals and should be preferably as short as possible. It is suggested that such an announcement contain at least the following information:

Based on CCIR Recommendation 661 [2].

— name of originating organization;

— location;

— country.

The sound programme signal should be controlled by the sending broadcaster so that the amplitudes of the peaks only rarely exceed the peak amplitude of the permitted maximum (sine-wave test) signal.

A.1.2 *Test signal and level definitions*

A.1.2.1 **alignment signal (AS)**

Sine-wave signal at 1020 Hz at a level of 0 dBm0s, which is used to align the international sound-programme connection.

A.1.2.2 **measurement signal (MS)**

Sine-wave signal at 1020 Hz at a level 12 dB below the alignment signal level, which should be used for long-term measurements and measurements at all frequencies.

A.1.2.3 **permitted maximum signal (PMS)**

Sine-wave signal at 1020 Hz, 9 dB above the alignment signal level, equivalent to the permitted maximum programme-signal level.

A.2 *Test signal format*

A.2.1 A three-level sinusoidal test signal at a reference frequency of 1 kHz should be used to check the alignment of international sound programme connection. These three levels should be combined with the source identification and be repeated cyclically as specified in the format shown in Figure A-1/N.13 for monophonic and stereophonic connections.

Figure A-1/N.13, p. 1

A.2.2 Provisionally, the portion of the test signal designated at +9 dBm0s in Figure A-1/N.13 will be replaced by a signal at 0 dBm0s. The resulting two-level test signal is required until all transmission systems are capable of carrying sinusoidal signals at +9 dBm0s without producing excessive channel loading or crosstalk into other channels.

A.2.3 Some organizations may not have automatically generated test levels as defined in §§ A.2.1 and A.2.2. In these cases, the alignment level of 0 dBm0s at 1020 Hz should be used for the alignment of international sound programme connections.

A.3 *Measurement methods*

The fundamental concept of the test signals is to provide organizations with accurate and well defined levels. These levels are intended to provide rapid identification of level errors as well as to allow operational personnel sufficient time to make the necessary level adjustments at the appropriate points in the international sound programme connection. Alignment of the connection is made by adjusting the alignment signal to the appropriate point on the programme level meter. Identification of left and right channels is provided as shown in Figure A-1/N.13.

References

[1] CCITT Recommendation *Automatic equipment for rapidly measuring stereophonic pairs and monophonic sound-programme circuits, links and connections,* Vol. IV, Rec. O.33.

[2] CCIR Recommendation *Signals for the alignment of international sound-programme connections,* Vol. XII, Rec. 661, ITU, Geneva, 1986.

Recommendation N.15

MAXIMUM PERMISSIBLE POWER DURING AN INTERNATIONAL SOUND-PROGRAMME TRANSMISSION

General

To check that the maximum power transmitted during a sound-programme transmission does not exceed the limits allowed by Administrations, it is recommended that broadcasting organizations and the terminal ISPCs of the international sound-programme connection should use volume-meters or peak programme meters, the same type of meter being used for preference by both the telephone Administration and the broadcasting organization of a country.

Since the international sound-programme connection is accurately adjusted before it is made available to the broadcasting organizations, there will be no danger of overloading the amplifiers during the sound-programme transmission if care is taken not to exceed the permissible limit at the sending end of the international sound-programme connection.

Hence, this check can be done only by the broadcasting organization and the ISPC of the transmitting country, and a check made further down the line would not seem to be very effective.

If so desired, monitoring equipment (volume-meters, peak-indicators) can be connected at the receiving end of the international sound-programme link and of the international sound-programme connection to obtain information about the general nature of the transmission. In this case, monitoring equipment at the two locations in the incoming country will have to be of the same type, but there is no need for the same kind of monitoring equipment to be used in both outgoing country and incoming country.

1 Maximum level permitted on sound-programme circuits

The peak power permitted on a sound-programme circuit should not exceed +9 dBm at a point of zero relative level on the sound-programme circuit.

(This corresponds to a peak voltage of 3.1 volts when measured as a 600-ohm through-level at a zero through relative level point. The r.m.s. value of the sinusoidal signal with this peak value is 2.2 volts).

If a transmission system overload is identified as being due to sound-programme transmission on 6.4 kHz or 10 kHz sound-programme circuits, the level at the zero relative point should be reduced by 3 dB to achieve an accompanying reduction in peak power, in accordance with Recommendation J.22, § A.2 [1].

2 Maximum level permitted on an international telephone circuit used to carry a sound-programme transmission

The power permitted on the international telephone circuit carrying a sound-programme transmission should not exceed +3 dBm at a point of zero relative level on the international telephone circuit. To allow the +9 dBm0 peak level permitted on a sound-programme circuit a 6 dB loss should be introduced at a point before the international telephone circuit enters a carrier system. At the receiving side a corresponding amplification of 6 dB at the end of the telephone circuit should be provided.

This reduction is necessary to avoid overloading on the carrier's system. Reasons for the possible overload are:

a) Commentary circuits are used in one direction only in comparison to a normal telephone connection. This leads to an increase of the mean power level.

b) In most cases the broadcasting authorities use better quality microphones compared with normal telephone sets.

Experience has shown that an attenuation of 6 dB is the most suitable value for this purpose.

Reference

[1] CCITT Recommendation *Performance characteristics of 10 kHz type sound-programme circuits* , Red Book, Vol. III, Rec. J.22, ITU, Geneva, 1984.

Recommendation N.16

IDENTIFICATION SIGNAL

At times during the preparatory period when no test transmission is taking place and during pauses when no programme transmission is taking place it is very desirable for broadcasting organizations to arrange that their studios and transmitting stations send *identification signals* over the international sound-programme connection and over the control circuits whilst they are not in use to indicate that the circuits are connected. During the preparatory period, particularly, the identification signal will serve to show for which sound-programme transmission the circuit is to be used.

This identification signal will not be broadcast, so that it will not be heard by listeners, but will be transmitted from end to end of the international sound-programme connection, from the programme origin to the destination.

The level of the identification signal applied to a sound-programme connection should not exceed a mean absolute power level of —15 dBm0.

Recommendation N.17

MONITORING THE TRANSMISSION

The transmission may be monitored in the terminal ISPCs by means of loudspeakers and/or apparatus with a visual display (peak programme meters, vu-meters, oscilloscopes, etc.). The means for monitoring the transmission should allow both visible and audible indications.

Digital sound-programme circuits established on 2048 kbit/s systems include a sound-programme signalling channel , allowing the exchange of service information, for example:

— transmission timing,

— identification signal,

— type of sound-programme circuit carried.

These will be decoded by appropriate devices to determine the elements for charging as required in Recommendation N.18.

Recommendation N.18

MONITORING FOR CHARGING PURPOSES, RELEASING

The monitoring of an international sound-programme transmission for charging purposes is carried out at the terminal ISPC of the international sound-programme link.

The technical staff of the designated ISPCs should come to an arrangement among themselves so that at the end of the sound-programme transmission they have accurate knowledge of:

a) the time of handing over the sound-programme link to the broadcasting organization (beginning of chargeable duration);

b) the time at which the sound-programme link is released by the broadcasting organization (end of chargeable duration);

c) where appropriate, the times and duration of every interruption or incident which may have occurred (in order to allow the operating services to determine whether a rebate is due, and if so, its amount).

The times of the beginning and of the end of the chargeable duration, as well as the times of occurrence and duration of any breakdowns which may occur, are entered on a daily report. This daily report is sent on the same day to the service responsible for coordinating all the details necessary for the establishment of the international accounts.

The conditions governing charging for sound-programme circuits and control circuits are given in Recommendation D.180 [1].

Reference

[1] CCITT Recommendation *Occasional provision of circuits for International sound- and television-programme transmissions* , Vol. II, Rec. D.180.

1.3 Lining-up and maintenance of international sound-programme circuits

Recommendation N.21

LIMITS AND PROCEDURES FOR THE LINING-UP OF A SOUND-PROGRAMME CIRCUIT

1 General

This Recommendation gives limits in Tables 1/N.21 to 5/N.21 for the lining-up of an international sound-programme circuit as defined in Recommendation N.1. These limits correspond to those for one audio section of the hypothetical reference circuit as defined in CCIR Recommendation 502 [1] for 5 kHz, 6.4 kHz, 7 kHz and 10 kHz sound-programme circuits, but correspond to two audio sections for 15 kHz type sound-programme circuits except for

The limits derived for one audio to audio section noise limits which correspond to one audio section.

It is recommended to use an automatic measuring equipment (see Recommendations O.31 [3], O.32 [4] and O.33 [5]). If no such equipment is available, measurements shall normally be restricted to loss/frequency distortion and weighted noise. For stereophonic pairs , the parameters Nos. 12, 13, 14 and 15 of Table 1/N.21 shall also be measured.

The limits for 15 kHz and 7 kHz circuits are applicable both for analogue and digital transmissions.

for sound-programme circuits of 15 kHz nominal bandwidth calculated in accordance with CCIR Recommendation 605 [2] are not met by the technical specification of available equipment in use on the international network.

2 Limits for the loss/frequency distortion of the component parts of an international sound-programme circuit

The limits are expressed in terms of the received level relative to the value of the received level at 1020 Hz. [6]. Some remarks with regard to the impedance at the points of interconnection are given in the introduction to Recommendation N.10.

International sound-programme circuits set up between ISPCs in any particular continent should usually be routed on a single group link (which includes only one circuit section, that is, one equipment for modulation from audio-frequencies and one for demodulation to audio-frequencies). Long international sound-programme circuits between ISPCs in different continents should not comprise more than three circuit sections.

Sound-programme circuits such as those associated with television transmissions using communication satellite systems are normally provided on a temporary basis. The international sound-programme circuit section is established via the satellite link(s) each time it is required for service. It should be noted that the group carrying the sound-programme circuit may terminate either at the earth station or at an international terminal repeater station.

The possible combination of group-terminals and the number of group-sections required for sound-programme circuits established by satellite link(s) are such that it may not be possible to meet the group-link limits without group-link equalization for each sound-programme circuit set up.

To avoid this situation, it may become necessary to tighten the limits for the loss at all frequencies and for the loss at the approximate mid-band frequency of the national and satellite group-sections.

3 Lining-up procedures

When each national section of the international sound-programme circuit and each section crossing a frontier has been equalized for loss/frequency distortion and, where necessary, for phase/frequency distortion, so as to meet CCITT Recommendations, these various sections are interconnected to form the complete international sound-programme circuit.

When agreement has been reached between two countries, operating via a communication satellite, to provide sound-programme circuits on a temporary basis, it is necessary to carry out an initial line-up of the sound-programme circuit using the same satellite and terrestrial facilities as will be used each time a sound-programme transmission is required.

In the case of international multiple destination sound-programme circuits, the number and location of all destinations is known only at the time of a transmission booking. The lining-up can therefore be carried out only after the booking details are known and must be carried out prior to the transmission.

The individual basic groups will have been set up and lined up for single destination sound-programme circuit requirements. When these are formed into a multiple-destination group, only pilot levels need be checked. The send reference station for the multiple destination group will coordinate this work in accordance with Recommendation M.460 [8].

3.1 *Measurement of received level* | 6]

A test signal of 1020 Hz is applied to the sending end of the international sound-programme circuit at a level equivalent to —12 dBm0. The level is measured at the receiving end of the circuit (output of last amplifier) and is adjusted to the nominal value appropriate to the ISPC (for example, —6 dBm).

For further information about the choice of test signal frequency, refer to Recommendation O.6 [7].

An automatic measuring equipment [3], [4], [5], may then be used to trace the curve of received level with frequency at the receiving end of the circuit. If no such equipment is available, individual measurements must be made at the terminal ISPC and at the frontier section at the following frequencies:

— for a 10-kHz circuit: 50, 80, 100, 200, 500, 800, 1000, 2000, 3200, 5000, 6000, 8500, 10 | 00 Hz; and if considered useful: 30, 40, 11 | 00, 12 | 00 and 15 | 00 Hz:

— for a 6.4-kHz circuit: 50, 80, 100, 200, 500, 800, 1000, 2000, 3200, 5000 and 6400 Hz.

The equalizers are adjusted to bring the curve within CCITT limits, which are given above.

3.2 *Measurement of group-delay distortion* | 6]

If necessary, the group-delay distortion/frequency characteristic is plotted for the whole international sound-programme circuit.

3.3 *Measurement of circuit noise*

When, after all necessary adjustments, the international sound-programme circuit meets the CCITT Recommendations, noise measurements are made.

These should consist of the weighted noise reading using a meter and network conforming to Recommendation O.41 [10] or CCIR Recommendation 468 [11] or a combination of these.

The noise limits given in the tables of this Recommendation are for circuits of 840 km maximum length. For longer circuits appropriate limits may be calculated from the formula given in CCIR Recommendation 605 [2].

3.4 *Measurement of nonlinearity distortion*

For circuits routed entirely on audio pairs and not equipped with pre-emphasis equipment the nonlinearity distortion is measured at the end of the international sound-programme circuit by sending, for a few seconds, a sinusoidal signal at an appropriate frequency in the band to be transmitted at a level of +9 dBm0.

For a circuit which includes at least one carrier section no measurement of nonlinearity distortion should be made. However, if, in very exceptional cases, it should be essential, in order to provide service on such a circuit, to carry out a check of nonlinearity distortion, for example, to locate a fault, the frequency of the sent signal should not exceed 1020 Hz at +9 dBm0 and the period for which the tone is connected should be as short as possible — that is, not more than about four seconds. However the best procedure would be to use a suitable automatic measuring equipment if such is available (see Recommendation O.31 [3], [4], [5]).

The total harmonic-distortion coefficient for the sound-programme hypothetical reference-circuit (2500 km) must not exceed 4% (harmonic margin 28 dB) at any frequency within the transmitted band. For shorter and for less complex circuits, the distortion should be less.

Moreover, since end-to-end measurements of nonlinearity distortion on circuits routed on carrier systems might give rise to serious disturbance to transmission on other channels, especially if the group is transmitted on a transistorized carrier system, it is permitted to make only local measurements of non-linearity distortion on terminal modulating and demodulating equipments. For example, a sound-programme circuit modulating and demodulating equipment could be connected back-to-back via a suitable network (and suitable amplifiers if necessary) and the measurement made on the resulting complete assembly.

Administrations are invited to propose measuring frequencies for 5 kHz circuits, 7 kHz circuits, and 15 kHz circuits. ISO standard No. 266 [9] should be taken into account.

The European Broadcasting Union has stated that many of its members have expressed the opinion that for a circuit 1500 km long, acceptable limits for nonlinearity distortion would be: 40 dB at fundamental frequencies above 100 Hz, 34 dB at fundamental frequencies of 100 Hz and below.

3.5 *Additional mesurements*

In addition to the measurements specified above, the following parameters may be measured at the discretion of the Administrations concerned. Such measurements may be particularly useful when a faulty condition is suspected.

3.5.1 *Interference caused by power supply sources*

When a sinusoidal test signal is transmitted over a sound-programme circuit at a level of 0 dBmO the level of the strongest unwanted modulation component should not exceed —45 dBmO.

3.5.2 *Frequency error*

The frequency error introduced by a sound programme circuit must not exceed the following limits:

7 kHz, 115 kHz ± | Hz

5 kHz, 6.4 kHz, 10 kHz ± | Hz

3.6 *Application of a simulated sound-programme test signal*

CCIR Recommendation 571 [12] specifies a simulated sound-programme test equipment which can be used for measuring interference in other channels.

3.7 *Single tone-interference level*

Where this parameter is concerned, the characteristic of the weighting filter according to CCIR Recommendation 468 [11] has to be taken into account by using the correction factor ψ. The latter, which can be determined from Figure 1/N.21 (identical with Figure 1b of CCIR Recommendation 468 [11] is to be subtracted from the numerical values of the tables. To exclude the effect of random noise, selective measurement is needed.

Figure 1/N.21, p. 2

3.8 *Measurement of stereophonic pairs*

The quality criteria given refer to those of Recommendations O.32 [4] and O.33 [5]. The limits can be easily measured with the aid of such equipments. If other measuring means are used, attention is drawn to the fact that the frequencies of 10, 11.92 and 14 kHz should be avoided because of possible stop filters which may be inserted in the transmission equipment concerned for reducing carrier leaks.

3.9 *Record of results*

The final measurements made under the above headings when the circuit has been lined up are reference measurements and should be carefully recorded.

H.T. [1T1.21]

TABLE 1/N.21

Limits for the lining-up of 15 kHz sound-programme circuits

Item	Parameter	Unit	Limits
	{		

Item	Parameter	Unit	Limits

12

{

{
14
Intelligible crosstalk ratio A/B
dB
52
}
{
15
Crosstalk ratio (intermodulation) A/B
dB
62
MONTAGE:
Additional parameters

for stereo transmission }					

Tableau 1/N.21 [1T1.21], p. 3

Blanc

H.T. [2T1.21]
TABLE 1/N.21 *(cont.)*

Item	Parameter	Unit	Limits

12
{
{
14
Intelligible crosstalk ratio A/B
dB
52
}
{
15
Crosstalk ratio (intermodulation) A/B
dB
62
MONTAGE:
Additional parameters
for stereo transmission
}			

Tableau 1/N.21 [2T1.21], p. 4

H.T. [T2.21]

TABLE 2/N.21

Limits for the lining-up of 10 kHz international sound-programme circuits

Item	Parameter	Unit	Limits	

Tableau 2/N.21 [T2.21], p. 5

H.T. [T3.21]

TABLE 3/N.21

Limits for the lining-up of 7 kHz international sound-programme circuits

Item	Parameter	Unit	Limits

Tableau 3/N.21 [T3.21], p. 6

H.T. [T4.21]

TABLE 4/N.21

Limits for the lining-up of 6.4 kHz international sound-programme circuits

Item	Parameter	Unit	Limits	

Tableau 4/N.21 [T4.21], p. 7

H.T. [T5.21]

TABLE 5/N.21

Limits for the lining-up of 5 kHz international sound-programme circuits

Item	Parameter	Unit	Limits

Tableau 5/N.21 [T5.21], p. 8

References

[1] CCIR Recommendation *Hypothetical reference circuits for sound-programme transmissions* , Vol. XII, Rec. 502, ITU, Geneva, 1986.

[2] CCIR Recommendation *Estimation of transmission performance of sound-programme circuits shorter or longer than the hypothetical reference circuit* , Vol. XII, Rec. 605, ITU, Geneva, 1986.

[3] CCITT Recommendation *Automatic measuring equipment for sound-programme circuits* , Vol. IV, Rec. O.31.

[4] CCITT Recommendation *Automatic measuring equipment for stereophonic pairs of sound-programme circuits* , Vol. IV, Rec. O.32.

[5] CCITT Recommendation *Automatic equipment for rapidly measuring stereophonic pairs and monophonic sound-programme circuits, links and connections,* Vol. IV, Rec. O.33.

[6] CCIR Report *Relative values of sound-programme signal levels established with the VU meter and with a peak-programme meter* , Vol. XII, Rep. 820, Geneva, 1986.

[7] CCITT Recommendation *1020 Hz reference test frequency,* Vol. IV, Rec. O.6.

[8] CCITT Recommendation *Bringing international group, supergroup, etc., links into service* , Vol. IV, Rec. M.460.

[9] ISO Standard No. 266 *Acoustics-preferred frequencies for measurements* .

[10] CCITT Recommendation *Psophometers (apparatuses for the objective measurements of circuit noise)* , Vol. IV, Rec. O.41.

[11] CCIR Recommendation *Measurement of audio-frequency noise voltage level in sound broadcasting* , Vol. X, Rec. 468, ITU, Geneva, 1986.

[12] CCIR Recommendation *A conventional test signal simulating sound-programme signals for measuring interference in other channels* , Vol. XII, Rec. 571, ITU, Geneva, 1986.

[13] CCIR Recommendation *Performance characteristics of 10 kHz type sound-programme circuits* , Vol. XII, Rec. 504, ITU, Geneva, 1982.

Recommendation N.23

MAINTENANCE MEASUREMENTS TO BE MADE ON INTERNATIONAL SOUND-PROGRAMME CIRCUITS

1 General

In Tables 1/N.23 to 5/N.23 maintenance limits for international sound-programme circuits are specified. If these limits are exceeded, the control station for the circuit should decide the appropriate action to be taken to bring the circuit back within these limits.

2 Routine measurements

Routine measurements should be made every six months and the circuit realigned to meet the limits given in Recommendation N.21. The control station should agree with other stations, the date and time of routine measurements and the parameters to be included. It is recommended to use an automatic measuring equipment (see Recommendations O.31 [1], O.32 [2],

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For the functions and responsibilities of the circuit control stations see Recommendation N.5.

O.33 [3]). The test procedures and frequencies to be used are detailed in Recommendation N.21. If no automatic measuring equipment is available, measurements shall normally be restricted to loss/frequency distortion and weighted noise. For the stereophonic pairs , the parameters Nos. 12, 13, 14 and 15 of Table 1/N.23 shall also be measured.

3 Release of circuit for routine measurements

Even if there is a general understanding with a renter of a permanently leased circuit on the time when routine tests are to be carried out, the ISPC should always confirm with the renter that the circuit can be released for these tests.

H.T. [1T1.23]

TABLE 1/N.23

Limits for international

15 kHz sound-programme circuits

Item	Parameter	Unit	Limits
{ TABLE 1/N.23 *(cont.)* }			
Item	Parameter	Unit	Limits
{			
{			
{ 14	Intelligible crosstalk ratio A/B	dB	50 }
{ 15	Crosstalk ratio (intermodulation) A/B	dB	60 }

Note — The limits given in this table are applicable both for analogue and digital transmissions.

MONTAGE: Additional parameters for stereo transmission **Tableau 1/N.23 [1T1.23], p. 9**

H.T. [2T1.23]

TABLE 1/N.23 *(cont.)*

Item	Parameter	Unit	Limits
14	Intelligible crosstalk ratio A/B	dB	50
15	Crosstalk ratio (intermodulation) A/B	dB	60

Note — The limits given in this table are applicable both for analogue and digital transmissions.

MONTAGE: Additional parameters for stereo transmission

Tableau 1/N.23 [2T1.23], p. 10

H.T. [T2.23]

TABLE 2/N.23

Limits for international
10 kHz sound-programme circuits

Item	Parameter	Unit	Limits

Tableau 2/N.23 [T2.23], p. 11

H.T. [T3.23]

TABLE 3/N.23

Limits for international
7 kHz sound-programme circuits

Item	Parameter	Unit	Limits	

Tableau 3/N.23 [T3.23], p. 12

H.T. [T4.23]

TABLE 4/N.23

Limits for international
6.4 kHz sound-programme circuits

Item	Parameter	Unit	Limits	

Tableau 4/N.23 [T4.23], p. 13

H.T. [T5.23]

TABLE 5/N.23

Limits for international
5 kHz sound-programme circuits

Item	Parameter	Unit	Limits

Tableau 5/N.23 [T5.23], p. 14

References

[1] CCITT Recommendation *Automatic measuring equipment for sound-programme circuits* , Vol. IV, Rec. O.31.

[2 CCITT Recommendation *Automatic measuring equipment for stereophonic pairs of sound-programme circuits,* Vol. IV, Rec. O.32.

[3] CCITT Recommendation *Automatic equipment for rapidly measuring stereophonic pairs and monophonic sound-programme circuits, links and connections,* Vol. IV, Rec. O.33.

[4] CCIR Recommendation *Performance characteristics of 10 kHz type sound-programme circuits* , Vol. XII, Recommendation 504, ITU, Geneva, 1982.