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M.500

**MAINTENANCE:
INTERNATIONAL TRANSMISSION SYSTEMS
(ANALOGUE)**

**ROUTINE MAINTENANCE MEASUREMENTS
TO BE MADE ON REGULATED LINE SECTIONS**

ITU-T Recommendation M.500

(Extract from the *Blue Book*)

NOTES

- 1 ITU-T Recommendation M.500 was published in Fascicle IV.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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**ROUTINE MAINTENANCE MEASUREMENTS TO BE MADE ON
REGULATED LINE SECTIONS**

1 Radio-relay regulated line section

Measurements should be made as indicated below:

1.1 *Regulated line section terminal stations:*

- a) daily reading of the line pilot level if necessitated by the type of system. It is preferable that such measurements should always be made at the same time of day;
- b) as necessary, readjustment to the nominal value as described in Recommendation M.510.

1.2 *Radio-systems terminals*

1.2.1 At intervals to be determined by agreement between the Administrations concerned, and based on experience of the reliability of the system:

- measurement of the loss/frequency distortion at frequencies in the baseband (additional measuring frequencies) (permissible limits ± 2 dB);
- when there is no continuous recording of noise, measurement of the total noise level on the noise-measurement channels outside the baseband in accordance with CCIR Recommendation No. 398¹⁾ [1]. This measurement can be made without causing any interference in the transmission channel.

1.2.2 When the measurement mentioned in § 1.2.1 above gives unacceptably high noise values, or more often, when the reliability of the system makes it desirable, check of the following measurements in accordance with the appropriate CCIR Recommendations for the radio-relay system concerned should be made, the radio-frequency channel being switched to the standby equipment, and the measurement results compared with the results of the reference measurements required by Recommendation M.450, § 3:

- the deviation of the frequency at which the level is unchanged by pre-emphasis;
- the pilot frequency deviation;
- the central position of the intermediate frequency in the non-modulated condition of the system;
- the level of the baseband reference frequency (single frequency check);
- the relative level at the radio reference measurement frequencies (multifrequency check);
- the level of individual interfering signals in the baseband in the non-modulated condition of the system.

1.2.3 So as to enable the limits for circuit loss variation to be met (see Recommendation M.160), the difference in response between two systems in diversity reception or between a working and standby system should be minimized.

2 Coaxial regulated line section

The following measurements should be made at regulated line section terminal stations:

- a) daily reading of the line pilot level if necessitated by the type of system. It is preferable that such measurements should always be made at the same time of day;
- b) as necessary, readjustment to the nominal value as described in Recommendation M.510.

The Administrations concerned are left to decide for themselves about measurements at additional measuring frequencies and about checking the operation of the regulators.

¹⁾ Where a protection channel is provided, and if Administrations so desire, noise measurements may be made on that channel with artificial loading, in accordance with CCIR Recommendation 399 [2].

Note – Precautions to be taken with additional measuring frequencies:

- i) When the end of a regulated line section:
 - is not the same as the end of a line link (i.e. when all the groups, supergroups, etc., are through-connected from one regulated line section to another without passing via the through-connection equipment to the basic groups);
 - is the same as the end of a line link without complete demodulation to the groups, supergroups or mastergroups (i.e. when only part of the groups, supergroups, etc., are through-connected direct from one line link to another, without passing via the through-connection equipment to the basic groups);the maintenance personnel should:
 - a) avoid sending a measuring frequency that is the same as a pilot frequency of a following regulated line section (unless the pilot frequency on such a following section is protected by a blocking filter at the beginning of the section);
 - b) take into account the possibility of attenuation to additional measuring frequencies lying at the edges of the frequency band of a through-connected basic group, supergroup, etc., due to the presence of through-connection filters.
- ii) Interference between additional measuring frequencies on adjacent coaxial links is possible if precautions are not taken to avoid carrying out simultaneous measurements on adjacent links. For this reason:
 - a) there should be different dates for routine maintenance measurements on two adjacent links;
 - b) before making any measurement using an additional measuring frequency, and especially those made when clearing faults, repeater station staff should see to it that measurements are not in progress on an adjacent coaxial link.

3 Symmetric pair regulated line section

The following measurements should be made at regulated line section terminal stations:

- a) daily reading of the line pilot level if necessitated by the type of system. It is preferable that such measurements should always be made at the same time of day;
- b) as necessary, readjustment to the nominal value as described in Recommendation M.510.

The Administrations concerned are left to decide on measurements at additional measuring frequencies and on checking the operation of the regulators, if applicable. The same applies to any kind of measurement or pilot level reading at intermediate attended or unattended stations.

References

- [1] CCIR Recommendation *Measurements of noise in actual traffic over radio-relay systems for telephony using frequency-division multiplex*, Vol. IX, Rec. 398, ITU, Geneva, 1986.
- [2] CCIR Recommendation *Measurement of noise using a continuous uniform spectrum signal on frequency-division multiplex telephony radio-relay systems*, Vol. IX, Rec. 399, ITU, Geneva, 1986.