INTERNATIONAL TELECOMMUNICATION UNION

ITU-T M.1060

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

MAINTENANCE:

INTERNATIONAL LEASED CIRCUITS

MAINTENANCE OF INTERNATIONAL LEASED CIRCUITS

ITU-T Recommendation M.1060

(Extract from the *Blue Book*)

NOTES

1 ITU-T Recommendation M.1060 was published in Fascicle IV.2 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 M.1060

MAINTENANCE OF INTERNATIONAL LEASED CIRCUITS

1 General

This Recommendation deals with the maintenance procedures applicable to both ordinary and special quality international leased circuits which are provided by analogue transmission systems or by a mixture of analogue and digital systems.

Figure 1/M.1060 shows the constituent parts of an international leased point-to-point circuit.

Test signals transmitted over the international section and link should be applied at a level of –10 dBm0.

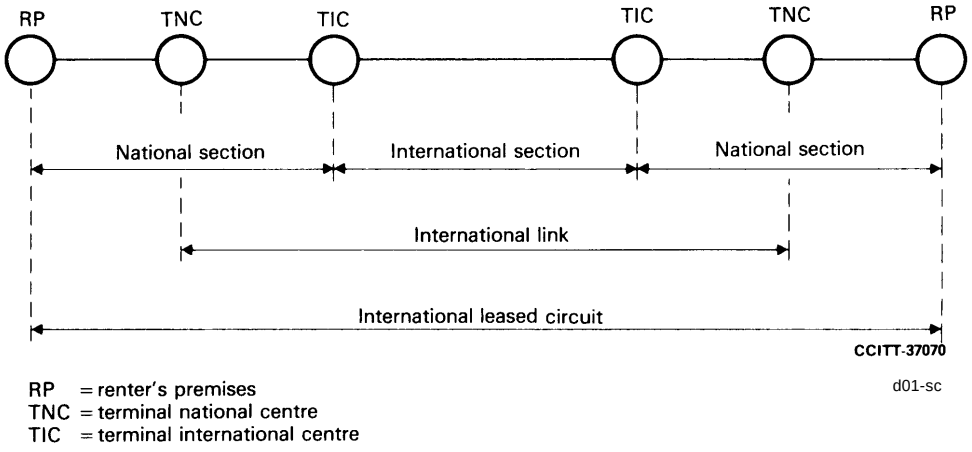

FIGURE 1/M.1060
The constituent parts of an international point-to-point leased circuit

2 Fault reporting procedures

As far as possible the provisions of Recommendations M.1012, M.1013 and M.1014 apply. Any additional special procedures, for example for international leased circuits forming part of a private switched network, must be devised by the parties concerned.

3 Fault localization

3.1 Upon receipt from the customer of a complaint concerning the performance of an international leased circuit the circuit control station should obtain from the customer specific assurance that all terminal equipment has been tested and is working correctly. Once this assurance has been received then efforts should be made to locate the fault.

3.2 Unless the control station has been informed of some condition which may be affecting the working of the international leased circuit, such as a major system failure or local failures involving the international leased circuit, then efforts should be made to localize and clear the fault condition.

3.3 In order to localize the fault, the leased circuit should be tested in sections in such a way as to minimize the requirement for international cooperation and allow rapid progress, i.e.:

– the section between the terminal national centre and the terminal international centre;

– the section between the terminal national centre and the interface at the customer's premises. In the case of 4-wire circuits it may be possible to check the continuity of both directions of transmission by utilizing the loop facility available at the interface point. To this end the customer may be requested to cooperate in the utilization of this facility;

– the national system, i.e. between the terminal international centre and the interface at the customer's premises. For 4-wire circuits a check of the continuity of the national system, in both directions of transmission, may be achieved by utilizing the loop facility which may be available at the interface for the customer as previously mentioned;

– the international section, i.e., from terminal international centre to distant terminal international centre.

Care must be taken to avoid simultaneous operation of loop facilities should they exist at both terminals.

3.4 For special quality circuits to M.1020 and M.1025 certain limits may be apportioned while others are not (see M.1050, § 4). When a fault investigation indicates that the fault can be possibly attributed to one or more unallocated parameters, sectional measurements should be made of these parameters. The section not meeting stated standards (for example, according to national practice), or that is significantly changed from readings recorded at the time of initial line-up, shall be carefully investigated in an effort to isolate a fault condition.

End-to-end measurements on a coordinated basis may still be required in order to fully isolate the fault, and in this case the section making the greatest contribution to the total readings should be first investigated and improvement sought.

4 Overall circuit check

Depending on the nature of the fault and/or any adjustments that are made, there may be need to check the performance of the overall circuit.

5 Special care with multiterminal circuits

In the case of multiterminal leased circuits care should be taken that fault localization and clearance procedures on one branch should not affect the availability or performance of other branches or the main body of the circuit involved.

In the case of circuits conforming to Recommendation M.1030, such a check may take the form of test calls.

6 Maintenance parameters

Maintenance measurements should normally be evaluated by comparison with those made during the line-up of the circuit and with the specified limits.

In the case of random noise, any substantial deterioration in performance from the original line-up value may serve to indicate a fault but with the overriding requirement that a noise level of –38 dBm0p should not be exceeded.

In addition to those specified in Recommendations M.1020 and M.1025, the following characteristics and limits may be employed for fault finding purposes on special quality leased circuits:

– go-to-return crosstalk ratio of –43 dB;

– short interruptions in transmission. Short interruptions in transmission should be measured with an instrument complying with Recommendation O.61 [1] or O.62 [2], with the threshold level set at 10 dB and the instrument dead time set at 125 ms. The objective is that there should be no short interruptions in transmission, of durations 3 ms-1 min, in any 15 minute measurement period. However, where a short interruption is detected, the measuring period should be extended to 30 min for which the total number of short interruptions should not exceed one (see Notes 1-4 below);

– number of phase hits greater than 15° should not exceed 10 in 15 minutes. Phase hits should be counted using an instrument complying with Recommendation O.95 [3] (see Notes 2-4 below).

Note 1 – Where a particular circuit is used primarily for data transmission, a more precise threshold level may be used. Such a threshold level should be established with reference to the actual overall loss of the circuit involved and the "line signal detector" levels of the modems being employed. For example, refer to the Recommendation cited in [4].

Note 2 – The limits for short interruptions in transmission, and phase hits are provisional and subject to further study.

Note 3 – Administrations should note that short interruptions in transmission, phase hits and amplitude hits are interrelated such that, for example, a short interruption in transmission may result in a count on phase hit and amplitude hit measuring instruments. This must be taken into account in the application of the respective limits for short interruptions, phase hits and amplitude hits.

Note 4 – To determine if the long-term performance of a leased circuit is satisfactory, it is highly desirable to check for transient impairments over a protracted period, for example, 24 hours.

7 Preventive maintenance measurements

In principle, the Recommendations concerning routine tests for international telephone circuits and voice-frequency telegraph links apply, as far as they can, to international leased circuits.

It will be necessary for Administrations to agree with the renters concerned upon the times at which the circuit may be released for test purposes.

The periodicities shown in Table 1/M.1060 for measurements should be used as a guide as far as is practicable and as is appropriate to the type of circuit.

TABLE 1/M.1060

Type of test	Peridoicity
Overall loss at 1020 Hz	As given in Recommendation M.610 [5]
Overall loss/frequency distorsion	Annually
Noise power level (see note)	As 1020 Hz test
Impulsive noise	6-monthly
Group-delay distorsion	Annually
Total distorsion	Annually

Note – See Recommendation M.1050 § 3.5.

All the measurements above would normally be made only between the installations of Administrations closest to the renters' installations, that is, between terminal national centres, and normally equipped with the necessary test equipment.

If measurements are required to be made at renters' installations then special arrangements must be made between the parties concerned.

8 Signal transmission level

The signal transmitted by the renters' apparatus should not exceed the limits (Note 3) shown below at the input to the international section:

– Data transmission (Recommendation V.2 [6] –13 dBm0

– – Voice-frequency telegraphy

amplitude-modulated
frequency-modulated
} See Recommendation M.810, § 4.1

– Phototelegraph or facsimile

amplitude modulation (white level)	–3 dBm0
frequency modulation	–13 dBm0

– Simultaneous transmission of various signals

total power	–13 dBm0

Note 1 – The above recommendations apply when the whole of the bandwidth is devoted to one particular transmission at any one time. When the band is divided among two or more types of transmission, the power levels permitted by the various Recommendations mentioned above should be reduced by the quantity 10 log (3100/*x*) dB, where *x* is the nominal bandwidth in hertz occupied by the transmission concerned.

Note 2 – In addition to the above specification, discrete frequency signals must comply with the requirements of Recommendation G.224 [7].

Note 3 – These are considered too high by some Administrations and additional study of these limits is anticipated in the future.

9 Level limiter

Where level limiting devices are fitted on the circuit, they should not introduce distortion when the levels transmitted are within the permitted limits.

10 Short-time rerouting of special quality leased circuits

The *make good* of a special quality circuit in case of a breakdown or planned outage needs special attention in order to keep the circuit characteristics within the required limits.

If there is a breakdown or planned interruption of a transmission system, rerouting should be carried out as far as possible at group, supergroup, etc., or digital path level. This would normally not seriously affect the attenuation and group-delay distortion. When such a rerouting of transmission links cannot be effected or when only the circuit concerned is faulty, a reroute circuit or circuit section of similar constitution as that in service should be chosen, in particular with regard to the number of FDM carrier sections and the relative number of analogue and digital circuit sections. The procedure of short-time rerouting at audio level can be facilitated if nominated reroute circuit sections having the same characteristics as the circuit sections of the regular route are available. This consideration also applies to the local line sections.

The circuit control station, if not directly involved, should be apprised of short-time rerouting which might affect the operation of the circuit. If a complete line-up is not practical, e.g., due to the expected short duration of the rearrangement, it is a minimum requirement that at least a check of the circuit overall loss at the reference frequency and a measurement of the random circuit noise should be made.

References

[1] CCITT Recommendation *Simple equipment to measure interruptions on telephone-type circuits*, Vol. IV, Rec. O.61.

[2] CCITT Recommendation *Sophisticated equipment to measure interruptions on telephone-type circuits*, Vol. IV, Rec. O.62.

[3] CCITT Recommendation *Phase and amplitude hit counters for telephone-type circuits*, Vol. IV, Rec. O.95.

[4] CCITT Recommendation *9600 bits per second modem standardized for use on point-to-point 4-wire leased telephone-type circuits*, Vol. VIII, Rec. V.29, § 6.1.

[5] CCITT Recommendation *Periodicity of maintenance measurements on circuits*, Vol. IV, Rec. M.610.

[6] CCITT Recommendation *Power levels for data transmission over telephone lines*, Vol. VIII, Rec. V.2.

[7] CCITT Recommendation *Maximum permissible value for the absolute power level (power referred to one milliwatt) of a signalling pulse*, Vol. III, Rec. G.224.