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PERIODICAL IN-STATION TESTS OF ECHO SUPPRESSORS COMPLYING WITH RECOMMENDATIONS G.161 AND G.164

ITU-T Recommendation M.660

(Extract from the *Blue Book*)

NOTES

1 ITU-T Recommendation M.660 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.

Recommendation M.660

PERIODICAL IN-STATION TESTS OF ECHO SUPPRESSORS COMPLYING WITH RECOMMENDATIONS G.161 AND G.164

Note 1 – Certain of the tests in this Recommendation may conveniently be carried out on an in-station (or in-circuit) basis using measuring equipment to the specification in Recommendation O.25 [1]. This equipment will not provide reliable test results for a circuit which is routed through circuit multiplication systems (CMS) employing interpolation techniques [this includes the case where a circuit is routed over time division multiple access/digital speech interpolation (TDMA/DSI) satellite channels] and therefore should not be used in this instance unless a permanent trunk-channel association in both directions of transmission can be made for the duration of the test sequence. The reason for this is that without such a trunk-channel association, circuit continuity may not be maintained within the CMS in the absence of a signal and during very low signal level conditions.

Note 2 – The tests and periodicities specified in this Recommendation have been prepared to meet the needs of echo suppressors conforming to Recommendations G.161 [2] and G.164 [3].

1 Tests and periodicities applied to valve, rectifier and relay type echo suppressors

1.1 The following tests should be made monthly:

1.1.1 *Check of suppression operate level*

If not within ± 2 dB of the initial value, readjust to be as close to the initial value as possible.

1.1.2 *Check of suppression loss (blocking attenuation)*

The suppression loss should not be less than 30 dB in the frequency range 200 - 3500 Hz and not less than 40 dB in the range 1000 - 1500 Hz.

1.1.3 *Check of differential sensitivity*

a) Check that the suppression loss is removed in the presence of signal on the send path of sufficient magnitude as compared with a signal on the receive path. This check should be made with magnitudes of the signal on the receive path, ranging from the operate level to the expected maximum speech level.

b) Check also that the suppression loss is not removed by the echo produced under the conditions corresponding to the worst expected return loss. Use of an interrupted signal at the operate-frequency or a test speech signal is likely to be effective for this check.

Note – These tests will be necessary when the break-in function is provided.

1.1.4 *Check of disabling facilities*

a) Some echo suppressors can be disabled by the associated signalling and switching equipment. The correct performance of this function, when provided, should be checked.

b) Some echo suppressors can be disabled by special audio frequency signals on the circuit. The correct performance of this function, when provided, should be checked.

1.2 The following characteristic times should be measured every six months and if they are not within 20% of the initial values they should be readjusted to be as close to the initial values as possible.

1.2.1 *Suppression operate times*

a) Relay-type echo suppressor. The operate time should not exceed 4 ms. Alternatively, the operate time should not be greater than 12 ms with a test signal at the operating frequency and 3 dB above the operate level.

b) Valve or rectifier type echo suppressor. The operate time should not exceed 4 ms. The period subsequent to the operate time, during which the specified suppression loss is achieved, should not exceed 0.5 ms. Thereafter, as long as the test signal is applied, the loss should not fall below that specified.

1.2.2 *Suppression hangover time*

The hangover time of the echo suppressor should be 50 ms. Exceptionally, where there is a long chain of national or international circuits beyond the point where the half-echo suppressor is fitted, the hangover time should be 70 ms.

2 Tests and periodicities applicable to semi-conductor type echo suppressors

2.1 The following tests should be made every six months:

2.1.1 *Check of suppression operate level*

If not within ± 2 dB of –31 dBm0 readjust to be as close to this level as possible.

2.1.2 *Check of suppression loss*

The suppression loss should be at least 50 dB.

2.1.3 *Check of break-in differential sensitivity and receive loss*

Check that the suppression loss is removed when the signal applied to the send-in port is within ± 2 dB of the level of a signal of the same frequency applied to the receive-in port. The level of the signal applied at the receive-in port should be between –15 and –20 dBm0. Check that the loss in the receive path (receive loss), when break-in occurs is between 5 and 15 dB when the level applied at the receive-in port is in the range –15 to –20 dBm0.

2.1.4 *Check of signalling disabling*

The operation and release of the signalling disabler circuit should be checked.

2.1.5 *Check of tone disabling*

The characteristics of the tone disabler circuit should be checked and should be within the following limits:

a) *Disabler sensitivity*

The disabler should operate for any single frequency within the disabling design range at a level of –30 dBm0.

The disabler should be released when the disabling tone is reduced to a level of –36 dBm0.

b) *Guard sensitivity*

With either a 1020 Hz signal applied to the receive-in port and a 2100 Hz signal at a level of –28 dBm0 applied simultaneously to the send-in port, the suppressor should disable when the level of the 1020 Hz signal is below –33 dBm0 and should not disable when this signal is above –28 dBm0.

c) *Broadband holding and release*

Once disabled a –31 dBm0 signal of either 1020 Hz should hold disabling and a –36 dBm0 signal should not.

2.2 The following characteristic times should be measured every six months and should be within the limits shown:

2.2.1 *Suppression*

a) Suppression operate time: 5 ms (maximum).

b) Suppression hangover time: 40-75 ms.

2.2.2 *Break-in*

a) Break-in operate time: 30 ms (maximum).

b) Break-in hangover time: 150-350 ms.

2.2.3 *Tone disability*

a) Tone disabler operate time: 300 ± 100 ms.

b) Tone disabler hangover time: 250 ± 150 ms.

Note – The disabler should not release for breaks of less than 100 ms in the disabling tone.

(For definitions of terms see Recommendation G.161 [2].)

3 Tests and periodicities applicable to echo suppressors conforming to Recommendation G.164

3.1 The following tests should be made, e.g. every six months.

Note 1 – If the echo suppressor interface is digital (for example, 2048 kbit/s) the levels prescribed for the various tests are coded in corresponding bit sequences.

Note 2 – Modern digital techniques may allow the tests listed below to be carried out continuously without causing any disturbance of the traffic on the circuit (in-built test system).

3.1.1 *Check of suppression operate level*

The operate level in the receive paths should be within ± 2 dB of –31 dBm0.

3.1.2 *Check of suppression loss*

The suppression loss should be at least 50 dB.

3.1.3 *Check of break-in differential sensitivity and receive loss*

Check that the suppression loss is removed when the signal applied to the send-in port is within the range 0 to –3 dB of the level of a signal of the same frequency applied to the receive-in port. The level of the signal applied at the receive-in port should be any single value within the range –15 and –20 dBm0.

Check that the loss in the receive path (receive loss), when break-in occurs, corresponds to the design value of the echo suppressor when the level applied at the receive-in port is in the range –15 dBm0 to –20 dBm0.

3.1.4 *Check of signalling disabling*

The operation and release of the signalling disable circuit should be checked.

3.1.5 *Check of tone disabling*

The characteristics of the tone disabler circuit should be checked and should be within the following limits:

a) *Disabler sensitivity*

The disabler should operate for any single frequency within the disabling design range at a level of –30 dBm0. The disabler should be released when the disabling tone is reduced to a level of –36 dBm0.

b) *Broadband holding and release*

Once disabled, a –31 dBm0 signal of 1020 Hz or a corresponding bit sequence should hold disabling and a –36 dBm0 signal should not.

3.2 The following characteristic times should be measured and should be within the limits shown:

3.2.1 *Suppression*

a) Suppression operate time: ≤ 1 ms (see Note under § 3.2.2).

b) Suppression hangover time: 24-36 ms.

3.2.2 *Break-in* (L_R = constant)

See Table 1/M.660.

TABLE 1/M.660

Time Conditions For Break-In

Function	Operate times	Hangover times
Partial break-in	≤ 2 ms (see Note)	≤ 26 ms
Full break-in	6-10 ms	48-66 ms

L : Level of signal at receive-in ports.

Note – Some types of built-in processor-controlled digital test systems use scanning periods in excess of these values (for example, 4 ms) and would therefore affect the measured values. It is for Administrations using such test systems to assess the impact of this ambiguity and to determine the need for any supplementary tests.

3.2.3 *Tone disability*

a) Tone disabler operate time: 300 ± 100 ms.

b) Tone disabler hangover time: 250 ± 150 ms (release time).

Note – The disabler should not release for breaks of less than 100 ms in the disabling tone (for definitions of terms, see Recommendation G.164 [3]).

3.3 *Adaptive function*

If the echo suppressor incorporates the adaptive function, the following test should be made:

Check that the break-in sensitivity of the echo suppressor increases at a speed of at least 4 dB/s during the phase of convergence if a level greater than –20 dBm0 is applied to the input of the receive equipment.

3.4 *Consequence*

If an echo suppressor is found not to comply with one of these tests, it should be taken out of service.

References

[1] CCITT Recommendation *Semi-automatic in-circuit echo suppressor testing system (ESTS)*, Vol. IV, Rec O.25.

[2] CCITT Recommendation *Echo suppressors suitable for circuits having either short or long propagation times*, Orange Book, Vol. III, Rec. G.161, ITU, Geneva, 1977.

[3] CCITT Recommendation *Echo suppressors*, Vol. III, Rec. G.164.