A.1A distinction is made between

a) circuits which are fitted with compandors to subjectively improve the noise generated by a terrestrial section; and

b) circuits which are fitted with compandors to subjectively improve the noise generated by a satellite section.

This distinction is made because in case a) it is not possible to specify noise or total distortion objectives. However, in case b), the satellite system operator can specify noise objectives for the satellite section. Thus these limits can be combined with those contained in Recommendation M.580 to calculate an overall limit.

A.2Examples of calculations of total distortion for case b)

Example 1

Consider an analogue circuit which has a terrestrial length of 1,600 km and which is routed via a satellite which has a specified idle channel noise objective of -41 dBm0p for analogue channels.

From Table 4/M.580, the noise objective for a length of l,600 km is
-49 dBm0p.

Combining -41 dBm0p and 49 dBm0p gives a total distortion of
-40.36 dBm0p.

Thus the total distortion objective should be -40 dBm0p.

Example 2

Consider a mixed analogue/digital circuit which has a terrestrial length of l,600 km, two analogue/digital conversions using 8 bit coding and which is routed via a satellite which has a specified idle channel noise objective of -41 dBm0p for analogue channels.

From Table 6/M.580, the total distortion objective for a length of 1,600 km is -42 dBm0p.

Combining -41 dBm0p and -42 dBm0p gives a total distortion of -38.46 dBm0p.
Thus the total distortion objective should be -38 dBm0p.

- For mixed analogue/digital routed circuits the total distortion objectives given in Table 6/M.580 for the appropriate terrestrial length of circuit should be combined with the total distortion objective for the satellite channel[2] to produce a total distortion objective for the whole circuit. See Annex A to this Recommendation for an example of this calculation.

- If the total distortion which is measured is higher than the calculated total distortion objective, then a fault should be suspected and action should be taken to locate and remedy any fault where possible.

- When the total distortion measurement has been made and is found to meet the calculated total distortion objectives, an idle channel noise measurement should be made.

    - The idle channel noise measurement should be compared with the maintenance objective given in Table 4/M.580 for the appropriate length of circuit, taking into account the Note associated with this table that the satellite section of the circuit may be considered to have an equivalent length of 2,500 km. This is a valid consideration provided that the total distortion objective of the satellite channel is not greater than -30 dBm0p.

- If the measured value is higher by 5 dB or more than the noise objective given in Table 4/M.580 or is higher than -37 dBm0p, whichever is the more stringent requirement, then a fault should be suspected and action should be taken to locate and remedy any fault where possible.

4.A speaking test should be made on the circuit to verify the correct operation of the compandors.

5.Designations

Companded circuits and groups of circuits which are all companded should be designated in accordance with Recommendation M.140.

Note - Repeater station staff should be well instructed as to the subjective effect of errors and the location of faults affecting compandors.

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[2] The total distortion objective for INTELSAT single sideband Standard B satellite channels is -41 dBm0p (FM companded circuit).

ANNEX A

(to revised Recommendation M.590)

Total distortion and idle channel noise objectives for circuits which are fitted with compandors in order to subjectively reduce the effect of noise generated on satellite channels

Revised Recommendation M.590

SETTING UP AND LINING UP A CIRCUIT FITTED WITH A COMPANDOR

1.The compandor should first be tested in accordance with the appropriate design information which should be made available in a suitable form to repeater station staff. In particular, because the unaffected level of a compandor is defined with reference to an 800 Hz signal, it should be verified for each type of compandor that use of a reference test frequency of 1 020 Hz produces the same results as using a reference test frequency of 800 Hz.

2.Circuits with compandors fitted should be lined up to achieve the same limits as circuits without compandors. The compandor should be fitted to the circuit only after the circuit without its compandor is considered satisfactory in respect of loss and loss/frequency response. It should be noted that to achieve the limits for loss/frequency response on the companded circuit without equalization, it will be necessary for the loss/frequency response of the uncompanded circuit to be within one half of the circuit limits.

3.Measurements of total distortion and idle channel noise

After compandors have been fitted, total distortion and idle channel noise measurements should be made. The test signal used for the total distortion measurement should be applied at the unaffected level of the compandor.

In the case of a circuit which is fitted with a compandor to subjectively reduce the noise generated within a terrestrial circuit section, the measurements should be noted.

In the case of a circuit which is fitted with a compandor to subjectively reduce the noise generated by a satellite circuit section, the procedure is as follows:

- [1] For analogue routed circuits the noise objectives given in Table 4/M.580 for the appropriate terrestrial length of circuit should be combined with the total distortion objective for the satellite channel[2] to produce a total distortion objective for the whole circuit. See Annex A to this Recommendation for an example of this calculation.

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[1] It should be noted that in the case of mixed analogue/digital circuits, if the unaffected level is other than -10 dBm0 then this procedure will produce less accurate results and in this case it should be used as a general guide only.

[2] The total distortion objective for INTELSAT single sideband Standard B satellite channels is -41 dBm0p (FM companded circuit).