

RECOMMENDATION ITU-R BT.1359

RELATIVE TIMING OF SOUND AND VISION FOR BROADCASTING

(Question ITU-R 35-4/11)

(1998)

The ITU Radiocommunication Assembly,

considering

- a) that a perceptible time difference between the sound and vision components of a television signal impairs the viewers' reception of the programme;
- b) that separate picture and sound processing is becoming more and more widely used in broadcasting systems;
- c) that digital production and distribution equipment causes differential delay between the sound and vision signals;
- d) that program production may involve tandem connected studios;
- e) that in studios the sound/vision relative timing should be the responsibility of the programme production directors;
- f) that the transmitting equipment and the receiver may introduce an additional, variable timing difference;
- g) that subjective evaluations show that detectability thresholds are about +45 ms to -125 ms and acceptability thresholds are about +90 ms to -185 ms on the average, a positive value indicates that sound is advanced with respect to vision,

recommends

- 1** that the timing zero, as a reference for the subsequent measurement of the relative timing of sound and vision signals is defined at the point of the final programme source selection element*;
- 2** that the timing difference in the path from the output of the final programme source selection element* to the input to the transmitter for emission should be kept within the values +22.5 ms and -30 ms, a positive value indicates that sound is advanced with respect to vision.**

Appendix 1 is an explanation of the selection of the recommended timing difference values.

Appendix 2 details techniques which can be used to measure sound/vision timing.

* The definition of this point may vary depending on the particular broadcast organization and operating requirements. Typical examples are master control, network control, master switching or outside broadcast control.

** Where the path from the output of the final programme source selection element to the input of the transmitter is comprised of one or more digital codecs it should be noted that Recommendation ITU-R BT.1203 specifies that the delay error introduced by any single digital codec should be in the range ± 2 ms.

APPENDIX 1

Explanation for the selection of the recommended value for sound/vision timing difference

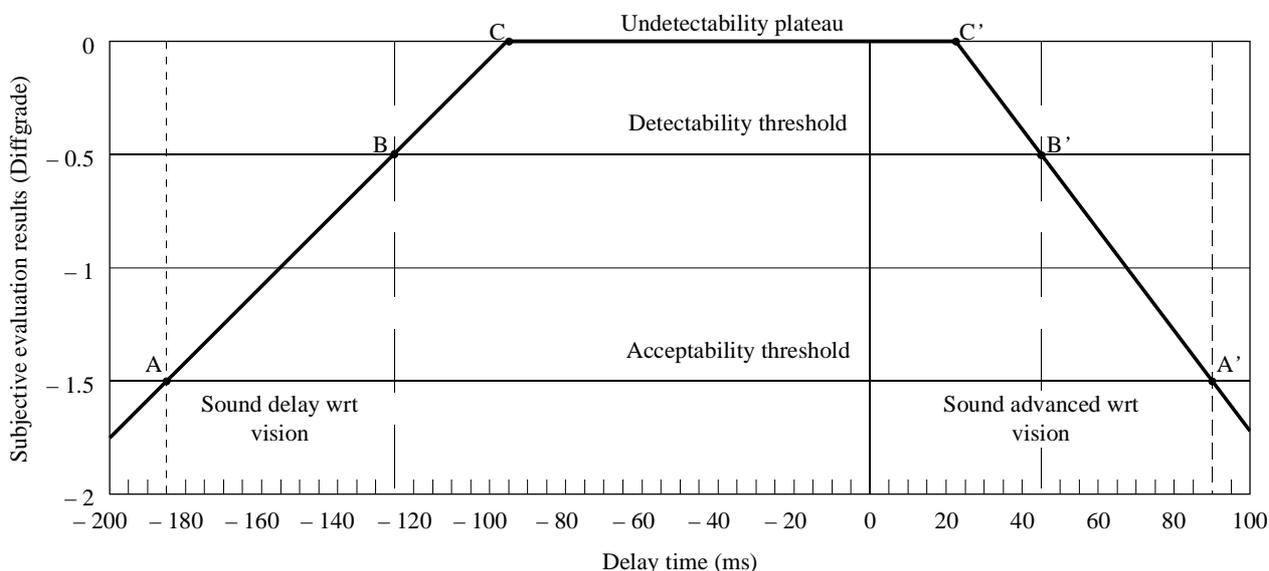
1 It is known for many years from experience with film projection that the relative timing between picture and sound is very important and shows an identifiable point at which the timing error becomes objectionable to the viewer. Recommendation ITU-R BR.265 indicates that the precision of accuracy of location of sound and picture information should be within +/- half a frame. For 24 fps film, this is an acceptable variation of about ± 22 ms.

2 Differing imaging techniques generating source television signals appear to introduce unavoidable uncertainty of the actual sound/vision timing of about half a television field.

3 Subjective evaluation undertaken in Japan, Switzerland and Australia shows a high degree of similarity in the sensitivity of viewers to errors in sound/vision timing in television material for NTSC and PAL systems. Tests conducted have shown that the thresholds of detectability are about +45 ms to -125 ms and thresholds of acceptability are about +90 ms to -185 ms on the average. Each set of test results indicates a broad area of acceptable timing covering "sound leading" through zero timing difference to "sound delayed". The range of timing between the "just detectable" limits of sound leading and sound delayed is about 170 ms. Each case also shows a clearly defined and rather consistent range of values for the difference (1 grade) between detectable and acceptable limits of about 45 ms for sound leading and about 60 ms for sound delayed as shown in Figure 1.

FIGURE 1

Detectability and acceptability thresholds



Temp 11/85-01

4 For the purpose of establishing a Recommendation concerning an agreed limit to sound/vision timing error in television, the range of values between the detectable limits is not relevant. The actual timing values is the province of the programme producer in the studio. Because we do not necessarily know, and have no recommended way of determining, the precise timing difference, we accept as correct the relative timing that occurs at the studio output. An unsatisfactory situation may now exist because the studio output timing may be set to be very close to one of the limits of perceptibility and thus there is a limited margin of additional error before the timing error is such as to become unacceptable.

5 Because of the undetectable plateau (C-C', see Figure 1) the limit of allowable error should be constrained within 0.5 grade points (5 point impairment scale) above the subjectively evaluated detectable threshold (B-B'). The subjective evaluations have shown that a one grade point impairment results in a 60 ms change in delay which is shown on Figure 1 as the rising slope from A-B. The allowable delay should be constrained within a half grade point impairment which is 30 ms shown in Figure 1 on the rising slope from B-C. Likewise the advance limit is determined to be 22.5 ms from the rise on the slope from B'-C'.

APPENDIX 2

Sound/vision timing measuring techniques

Techniques for both off-line and on-line measurements of sound/vision timing within the studio production chain were described in contributions submitted to ITU-R Study Group 11 during the 1993-1995 study period, together with the results of subjective evaluations used in preparing this Recommendation. These methods will be further developed for inclusion in this appendix.

Further study of techniques which can be used to measure sound/vision timing is required and contributions are requested as soon as possible for inclusion in this appendix.
