RECOMMENDATION ITU-R BT.711-1*

Synchronizing reference signals for the component digital studio

(1990-1992)

The ITU Radiocommunication Assembly,

considering

a) that the definition of synchronizing reference signals for component digital studios would be of benefit in the implementation of equipment operating in accordance with Recommendations ITU-R BT.601 and ITU-R BT.656;

b) that such signals should have a maximum of commonality between the 525 line and 625 line versions;

c) that signals in accordance with Recommendation ITU-R BT.656 contain in a conveniently accessible and accurate form all the information required to synchronize digital component equipment;

d) that the use of digital circuitry introduces the possibility of new techniques in studio synchronization;

e) that equipment in accordance with Recommendations ITU-R BT.601 and ITU-R BT.656 may have to operate in a mixed analogue and digital environment for a considerable period;

f) that compatibility with synchronizing reference signals for component analogue studios would be an advantage;

g) that signals generated in accordance with Recommendation ITU-R BT.470 are widely used for synchronization in studios,

recommends

that the synchronizing reference signals for component digital equipment operating in accordance with Recommendations ITU-R BT.601 and ITU-R BT.656 should be as defined below:

1 Synchronization method

1.1 Input synchronization

Input synchronization means the synchronization of the component digital studio or equipment by an input signal.

When synchronizing to an input signal, the equipment has of necessity to derive clock and timing reference information from the input video signal.

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* Radiocommunication Study Group 6 made editorial amendments to this Recommendation in 2003 in accordance with Resolution ITU-R 44.

1.2 Output synchronization

Output synchronization means the synchronization of two or more signal sources.

Equipment requiring a separate reference for output signals should be capable of using either a digital signal in accordance with Recommendation ITU-R BT.656 or of deriving clock and timing reference information from a signal of the form defined in Annex 1. Equipment requiring such a reference should make provision for analogue and digital signals as alternatives (see Notes 1 and 2).

NOTE 1 – In order to provide a reference signal within the specified tolerances, it may be necessary in practice to provide a timing reference generator or a synchronizing pulse generator to serve the local area.

NOTE 2 – It is appropriate to provide for the fully digital environment by allowing for the use of a digital signal conforming to Recommendation ITU-R BT.656 as a synchronizing reference.

Annex 1

1 Introduction

This Annex describes an analogue reference signal for the synchronization of component digital video equipment*.

2 Analogue synchronizing reference signal

2.1 Signal characteristics

The reference signal shall be a 525-line or 625-line signal as defined in Recommendation ITU-R BT.470, appropriate to the system, in which the active video information is replaced by blanking level**.

In this application the chrominance subcarrier burst or the unmodulated subcarrier of the SECAM system are optional.

2.2 Signal amplitude and polarity

The amplitude of the synchronizing pulses shall be 300 mV nominal.

The amplitude of the optional subscriber burst shall be 300 mV peak-to-peak nominal.

The polarity of the synchronizing pulses shall be negative.

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* Studies of broadcasting with both 525-line and 625-line standards have concluded that, to cater for a mixed analogue/digital environment, satisfactory performance, flexibility and commonality are achieved by the use of the analogue black signal modified slightly in respect of the tolerance on rise-time and jitter.

** Reference signals of higher constant average picture level (APL) are specifically not recommended because they may cause performance degradation related to APL variations between the vertical interval and other parts of the signal. Furthermore, reference signals with changing APL, such as moving video or switched test signals, are also specifically not recommended because they may cause disturbances to the video signal being processed by the equipment for which they are the reference.

2.3 Build-up time of line synchronizing pulses

The build-up time of the leading (reference) edge of line synchronizing pulses shall not exceed 210 ns, measured between the 10% and 90% amplitude levels.

2.4 Jitter

The timing of individual leading edges of line synchronizing pulses shall be within ±2.5 ns of the average timing of leading edges, as determined over at least one field.

2.5 Impedance

The reference signal shall operate in a 75 Ω environment.

2.6 Connector

The connector shall conform to the standard BNC type (IEC Publication 169-8 (1978)).