
PROPOSED SMPTE STANDARD

SMPTE 404M

for Television, Audio and Film — SMPTE Epoch

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1 Scope

This standard defines a point in time called the SMPTE Epoch. It also defines the relationship of analog video signals to the SMPTE epoch.

2 Definition of terms and acronyms

Epoch: An Epoch is defined as 'a point in time defining a new or distinctive period'. In the context of this application of the term, the 'new or distinctive period' is characterized as one where the phase of signals with a specified relationship to the epoch can be determined.

BIPM: Bureau International des Poids et Mesures. French acronym for International Office of Weights and Measures.

CGPM: Conférence Générale des Poids et Mesures. French acronym for General Conference of Weights and Measures.

IERS: International Earth Rotation Service.

TAI: International Atomic Time – As per the ITU-R TF.460, the international reference scale of atomic time (TAI), based on the second (SI), as realized at sea level, is formed by the BIPM on the basis of clock data supplied by cooperating establishments. It is in the form of a continuous scale, e.g. seconds from the origin January 1 1958 (adopted by the CGPM 1971).

UTC: Coordinated Universal Time – As per the ITU-R TF.460, UTC is the time-scale maintained by the BIPM, with assistance from the IERS, which forms the basis of a coordinated dissemination of standard frequencies and time signals. It corresponds exactly in rate with TAI but differs from it by an integer number of seconds (leap seconds).

Modified Julian Date (MJD): This is a linear sequence of day numbers, which equals the Julian Date less 2,400,000.5 days. The origin of MJD equals 00:00 hours UTC time, 17 November 1858. MJD is specified by a number with five significant figures. (The Julian Date has its origin at 1200 hours UTC and its value consequently was 2,400,000.5 at the time of MJD origin.)

Julian Date, (JD): The Julian Date (JD) is the interval of time in days and fraction of a day since 4713 B.C. January 1, Greenwich noon. The Julian Day Number (also JD) is the integer part of the Julian Date.

3 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below.

SMPTE 170M-1999, Television — Composite Analog Video Signal — NTSC for Studio Applications

SMPTE RP 168-2002, Definition of Vertical Interval Switching Point for Synchronous Video Switching

ITU-R BT.470-6 (11/98), Conventional Television Systems

ITU-R TF.457-2 (10/97), Use of the Modified Julian Date by the Standard Frequency and Time-Signal Services

ITU-R TF.460-6 (02/02), Standard-Frequency and Time-Signal Emissions

4 SMPTE epoch

The SMPTE epoch is defined as 1958-01-01T00:00:00Z (Time 00:00:00 of Wednesday, January 1, 1958, 00:00:00 being the midnight at the start of January 1). This corresponds to the origin for International Atomic Time (TAI) and Coordinated Universal Time (UTC). The corresponding Modified Julian Date (MJD) is 36204.

At the SMPTE epoch, the video signal alignments specified in SMPTE RP 168, annex A, were met and their respective nominal alignment points were coincident with the SMPTE epoch. For composite video signals complying to SMPTE 170M and ITU-R BT.470, this corresponds to the start of the first field of the color frame sequence.

Annex A (informative)

Signal alignments at the SMPTE epoch

At the SMPTE epoch:

- Digital video signals were aligned to their respective frame reference point as defined in corresponding SMPTE standard documents.
- Audio signals as defined by AES3 were aligned to their nominal point with video signals as defined in AES11.
- Time code was aligned to its nominal point with video signals as specified in SMPTE 12M.
- Other signals may also use this epoch as a reference point and align themselves to the SMPTE epoch.

Annex B (informative)

Bibliography

ANSI/SMPTE 125M-1995, Television — Component Video Signal 4:2:2 — Bit-Parallel Digital Interface

SMPTE 12M-1999, Television, Audio and Film — Time Control Code

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SMPTE 274M-2003, Television — 1920 x 1080 Image Sample Structure Digital Representation and Digital Timing Reference Sequences for Multiple Picture Rates

SMPTE 293M-2003, Television — 720 x 483 Active Line at 59.94-Hz Progressive Scan Production — Digital Representation

SMPTE 296M-2001, Television — 1280 x 720 Progressive Image Sample Structure — Analog and Digital Representation and Analog Interface

AES3-1992 (R1999), Serial Transmission Format for Two-Channel Linearly Represented Digital Audio Data

AES11-1997, Synchronization of Digital Audio Equipment in Studio Operations

ITU-R BT.656-4 (02/98), Interfaces for Digital Component Video Signals in 525-line and 625-line Television Systems Operating at the 4:2:2 Level of Recommendation ITU-R BT.601 (Part A)