
# Technical Specifications for High Definition Program Acceptance

Revision 3.0, January 2009

Prepared by the working group on HD standards,
members of which are listed in Section 12 of this document.

# Table of Contents

# 1 Scope

The standards defined in this document apply to all high definition programs, program blocks, commercials, and other high definition television content provided to the English and French networks of CBC/Radio-Canada for broadcast.

These standards apply to HD programs delivered on tape.

# 2 Introduction

CBC/Radio-Canada has a mission to adopt and promote the best possible practices in high definition (HD) production and broadcasting so as to deliver high definition programming of optimum quality to its audience. We want to ensure that these services be appreciated to their full potential, to rapidly increase the interest of viewers, thereby accelerating the transition from conventional to high definition television.

CBC/Radio-Canada's policy further states that audio and video signals broadcast by owned stations or distributed to affiliate stations must meet Industry Canada technical specifications and recommendations.

In addition, CBC/Radio-Canada is actively involved in the development of various technical standards for TV production and broadcasting, namely SMPTE, IEEE, ITU and AES. It is therefore CBC/Radio-Canada's policy to support the use of these standards, in the field of high definition television (HDTV) amongst others, in order to facilitate HD material exchange between the various members of the production community, so as to harmonize and optimize audiences' HDTV viewing and listening experiences.

This document is intended for all those who work at producing HD content for broadcast on the English and French services of CBC/Radio-Canada. We trust that it will serve as an aid in selecting proper parameters and as a guide to adapting their production techniques to create HD content that meets our standards and hence benefits the public.

The standards described in this document are also intended to serve as a reference to CBC/Radio-Canada personnel who review and approve the technical quality of HD programs.

Because HDTV is by nature and by definition an electronic medium of superior quality to conventional or standard definition television (SDTV), CBC/Radio-Canada considers that subjective quality requirements must be accordingly and significantly more stringent for HDTV than for SDTV, if we are to take full advantage of the new medium's stricter technical specifications and the corresponding gains in image and sound quality, and in turn allow the audience to enjoy its full benefits.

Finally, some passages in this document are deliberately repeated in various sections to ensure they will be read.

# 3 Terminology

The following terminology is used in the document.

| | |
|---|---|
| HD: | This term is used for native high definition productions, live or on tape, carrying high definition signals. It is also used to designate broadcasting on the CBC/Radio-Canada digital TV network in high definition mode. |
| SD: | This term is used for native standard definition productions, live or on tape, carrying standard definition signals. It encompasses analog and digital signals and formats. It is also used to designate broadcasting on the CBC/Radio-Canada conventional television (SDTV) network. |
| Anamorphic 16:9 SD: | Component digital video format having a 16:9 aspect ratio, made of 720 x 480 rectangular pixels, that can be recorded and processed as a regular 4:3 SD signal. Sometimes referred to as “full screen 16:9 SD.” |
| HDV™: | Consumer format mainly developed by Sony that allows the recording of 1440 x 1080 pixel images (at 30i) and 2 audio tracks, compressed at 25 Mbps, long GOP, on DV tapes. |
| Lo/Ro: | (Left Only / Right Only) Conventional stereo signal. |
| Lt/Rt: | (Left Total / Right Total) Matrix-encoded stereo signal in either Dolby® Surround or Dolby® Pro Logic II™. |
| Dolby® Surround, Pro Logic™: | Dolby technology that combines four audio channels into a matrix-encoded two-channel Lt/Rt signal, allowing multichannel audio to be delivered to homes through any stereo-only transmissions. Any consumer systems equipped with Dolby Pro Logic decoders can provide the four playback channels. At any time, the Lt/Rt signal can be listened to as a conventional stereo signal. |
| Dolby®, Pro Logic II™: | Dolby technology that combines five audio channels into a matrix-encoded two-channel Lt/Rt signal. |
| Dolby E™: | Dolby coding system optimized for the distribution of multichannel audio through two-channel audio within professional production environments. Even after multiple encoding cycles, there is no significant degradation in audio quality. |
| Dolby Digital™: (AC3) | Dolby coding technology that can deliver 1- to 5.1-channel audio programs in a variety of configurations, intended for distribution to the consumer through SD/HD digital television broadcast. Unlike Dolby E, this technology is not suitable for multiple coding cycles. |

# 4 Delivery Media (Tapes)

CBC/Radio-Canada requires that the HD material be provided on Sony Hdcam SR™ videotape.

Delivery of any program on a medium other than Hdcam SR™ shall have to be approved beforehand by CBC/Radio-Canada, shall be submitted two weeks before the planned delivery date, and shall be transferred to Hdcam SR™ format by CBC/Radio-Canada at the producer's expense.

# 5 Video

## 5.1 Image Format

The image format shall be 1920 x 1080 pixels and compliant with the SMPTE 274-1998 standard.

The sampling structure shall be 4:2:2 with 10-bit quantizing. These image specifications should be preserved as much as possible throughout the complete production process.

## 5.2 Frame Rate

The video frame rate shall be 29.97 frames per second, 2:1 interlaced. The exact value of this frame rate is given by 30 / 1.001.

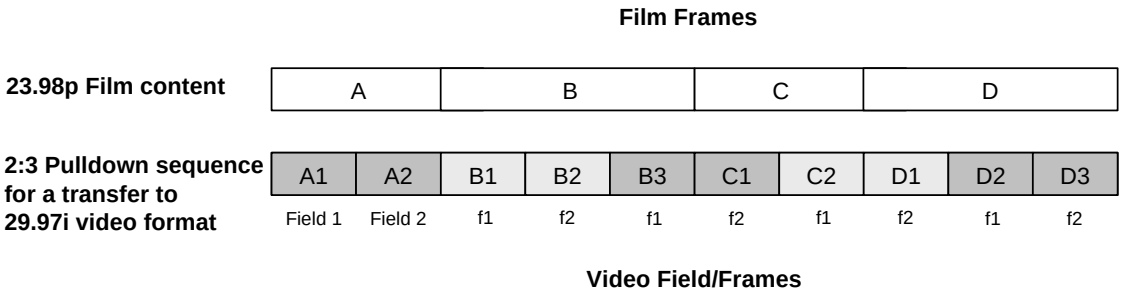
This format is defined at line 5 of Table 1 in the SMPTE 274-1998 standard, and is commonly designated as 59i.

Any show or program originally shot at another frame rate, such as 24p or 23.98p, shall be converted to 29.97 fps before being delivered to CBC/Radio-Canada.

### 5.2.1 2:3 Pulldown

The 2:3 pulldown (sometimes referred to as 3:2 pulldown), used to convert 4 film frames into 5 video frames, shall be as described in SMPTE recommendation RP 197-2003.

If 4 film frames are represented as A, B, C, D, the pulldown sequence of the video fields generated from them shall be:




This 2:3 sequence shall be respected not only for transfers on telecines but also for frame rate conversions performed with any other system (standard converters, non-linear editing systems, etc.). It will ensure a fluid perception of movements.

## 5.3 Subjective Quality Assessment

Because HDTV is by nature and by definition an electronic medium of superior quality to conventional or standard definition television (SDTV), CBC/Radio-Canada considers that subjective quality requirements must be accordingly and significantly more stringent.

The image quality of HD programs provided on tape shall be evaluated according to the five-point scale suggested in the International Telecommunication Union ITU-R BT-500 standard, Section 4.1.5.1:

| Rating | Impairments | Quality |
|---|---|---|
| 5 | Imperceptible | Excellent |
| 4 | Perceptible but not annoying | Good |
| 3 | Slightly annoying | Fair |
| 2 | Annoying | Poor |
| 1 | Very annoying | Bad |

Programs should meet the criteria for a 5 rating. Exceptionally, on program portions including, for example, archival material, the minimum acceptable quality shall be a 3 rating.

## 5.4 Safe Action and Title Areas

CBC/Radio-Canada recommends, in accordance with SMPTE recommended practice RP 218-2002, that:

- the main action be framed inside a central zone of height 90% and width 90% of the full HD picture;
- all titles be framed inside a central zone of height 80% by width 80% of the full HD picture.

## 5.5 Use of SD Material

Use of native SD visual sequences, including NTSC, PAL or SECAM, or ITU-BT R.601 digital video, is accepted only in special cases; for example, insertion of archival material. The producer shall inform CBC/Radio-Canada of, among other things, the total anticipated length of up-converted SD video material to be inserted into the HD program, and clearly justify its use. Any use of SD sequences in an HD program shall be approved beforehand by CBC/Radio-Canada.

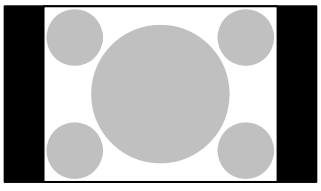
### 5.5.1 4:3 SD Material

When the use of 4:3 SD material is essential and has been approved by CBC/Radio-Canada, two basic modes of aspect ratio conversion may be used: pillarbox and top-bottom crop. When the sidebar mode is used, care must be taken to remove EIA608 closed captioning signals from lines 21 and 284 of the SD frames before conversion.

In all cases of SD to HD up-conversion:

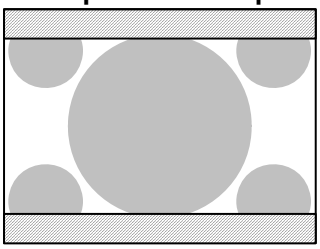
- No alteration of horizontal versus vertical proportions (geometric distortion) shall be tolerated. Conversion by horizontal stretching is therefore prohibited.
- Care must be taken to ensure that the main elements of the original 4:3 composition (e.g., principal action, graphic) are preserved.

**Pillarbox display**



Dark areas are inside the displayed 16:9 frame

**Top-bottom crop**



Hatched areas indicate portions of the original 4:3 image not displayed on the 16:9 screen.

### 5.5.2 16:9 SD Material

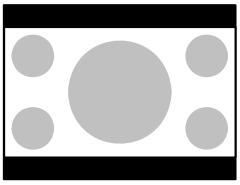
When the use of 16:9 SD material is essential and has been authorized by CBC/Radio-Canada, the aspect ratio conversion should be such that the 16:9 SD image be enlarged to fill the 16:9 HD frame. No alteration of horizontal versus vertical proportions (geometric distortion) shall be tolerated.

When both anamorphic and letterboxed 16:9 SD materials are available, CBC/Radio-Canada recommends using the anamorphic material as the source for up-conversion in preference to letterbox.

**Explanatory note**

Two 16:9 SD video formats are commonly encountered: letterboxed and anamorphic.

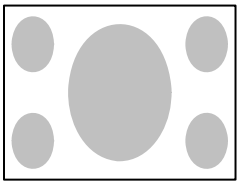
- Letterboxed 16:9 SD consists of a 16x9 picture contained entirely within a 4:3 frame filled at top and bottom with bars, usually black.



**Letterboxed 16:9 SD**
Black bars are added on the top and bottom of the 16x9 frame.

For SD presentation, this format does not need aspect ration conversion.
When up-converting to HD, it requires vertical and horizontal proportional rescaling (zoom). The vertical rescaling generates 1080 lines from the 360 lines of the original image.

- Anamorphic 16:9 SD designates a standard definition component digital video format of 720x480 rectangular pixels, shot with 16:9 cameras and to be displayed on 16:9 capable monitors, but designed to be carried on a regular 270Mbps SDI feed and recordable on most standard definition VCRs. It is sometimes referred to as “full screen 16:9 SD.” When erroneously viewed on 4:3 monitors, images appear compressed horizontally.



**Anamorphic 16:9 SD**
erroneously viewed on a 4:3 monitor.

For SD presentation, anamorphic 16:9 SD requires conversion to letterboxed 16:9 SD. When up-converting to HD, anamorphic requires vertical and horizontal “rescaling.” However, the vertical rescaling is smaller than for the letterbox: the 1080 HD lines are generated from the 480 lines of the original image, yielding a better vertical resolution than with letterbox, hence our preference for it.

## 5.6 Film-originated Material

When movies and other productions shot on film or using digital technologies equivalent to film are converted to HD and delivered to CBC/Radio-Canada for broadcast, the aspect ratio conversion shall preserve the complete original picture area. Therefore, “pan and scan” is not accepted.

The scanned area on 35mm film shall be in accordance with SMPTE 96M-2004, Table 2. The appropriate aspect ratio conversion mode shall be selected according to the following table:

| Original Film Aspect Ratio | Aspect Ratio Conversion Mode for 16:9 |
|---|---|
| 1.78 (16:9) | Equivalent |
| 1.85 | Letterbox |
| 2.39 * | Letterbox |

In all cases, no alteration of the original horizontal/vertical proportions (geometric distortion) shall be tolerated.

As specified in Section 5.2, any program originally shot in 24p or 23.98p shall be converted to 29.97 fps before being delivered to CBC/Radio-Canada.

### 5.6.1 Credits

All credits shown in vertical scroll shall be produced in a way that makes them clearly readable when viewed at a frame rate of 29.97 (30/1.001) fps interlaced.

## 5.7 HDV™ and Consumer Formats

Use of visual sequences originated on HDV™ is usually not accepted within HD programs unless particular circumstances warrant its use; for example, shooting in confined spaces or in high-risk conditions (e.g., war zone, stunt work). Any use of HDV™ technologies shall be declared by the producer prior to the signing of the contract with CBC/Radio-Canada and shall be accepted only in cases of absolute necessity.

* This production aspect ratio is often mislabeled “2.35”.

# 6 Audio

This section deals mostly with audio levels, dynamic range and allocation of audio tracks and channels.

The standards described in this section will change over time. Potential changes to the standards will be addressed in new editions.

CBC/Radio-Canada reserves the right to reject productions that do not meet the criteria described herein.

## 6.1 General

### 6.1.1 Versions

CBC/Radio-Canada recommends producing HD programs with 5.1 multichannel audio. Programs provided on HD media shall be delivered with discrete audio channels.

If the producer cannot provide a 5.1 multichannel audio mix, a stereo mix will be accepted.

Programs delivered on HD media shall include two mixes:

- The main 5.1 (or stereo) program mix;
- A second stereo mix (Lo/Ro or Lt/Rt). It is required for broadcast on the conventional NTSC network, and shall meet CBC/Radio-Canada's SD audio standard for reference levels and dynamic range.

Section 6.4 summarizes the SD standard. For additional technical information, please refer to the complete document *CBC technical specifications for film/videotape program acceptance, development report EO 6350-2 CAVT 91E*.

In case of ambiguity in interpretation, the full version will prevail.

### 6.1.2 Test Tones

A reference tone shall be present at the start of all tapes; it shall be in phase and be on all audio channels used for the program (including the stereo mix on tracks 7 and 8, and DV, if it is present).

The level of the reference tone, as indicated in Section 6.3.1, shall be consistent with the recorded program.

The test tone shall be 1 kHz on all channels. The length of the test tones shall be 60 seconds. A 30-second period of silence shall follow the test tones.

Unused channels shall be free of any signal.

### 6.1.3 Vocal Track Identification

In addition to the test tones, the audio shall also contain a vocal identification. This identification, to last 10 seconds in all, shall precede the test tones. It shall be clear, precise and sequential, such that track allocation is easily identifiable. The label accompanying the cassette shall also include the identification of the recorded audio program and the audio tracks used.

### 6.1.4 Audio Labelling

Program type and track allocation shall be clearly and correctly identified on the cassette label.

The channel allocation nomenclature shall be compliant with the SMPTE 320M-1999 standard:

| | |
|---|---|
| L | Left |
| R | Right |
| C | Center |
| LFE | Low Frequency Effect |
| LS | Left Surround |
| RS | Right Surround |
| MS | Mono Surround |
| MS (-3dB) | Mono Surround at –3dB |
| Lt | Left total |
| Rt | Right total |
| Lo | Left only |
| Ro | Right only |
| M | Mono |
| F | Freely usable |
| U | Unused / Unassigned |
| | |
| DV | Described Video (not defined in SMPTE 320M) |

Programs recorded on tape shall be identified using one of the following audio format labels:

- Multi-channel discrete
- Stereo
- Pro Logic™ or Pro Logic II™
- Mono

Example of recorded audio program labelling:

Program: Multichannel discrete

| | |
|---|---|
| 1 : L | 7 : Lt/Lo |
| 2 : R | 8 : Rt/Ro |
| 3 : C | 9 : U |
| 4 : U | 10 : U |
| 5 : LS | 11 : DV |
| 6 : RS | 12 : DV |

### 6.1.5 Described Video

As of this writing, some sites are already acquiring external material including Described Video (DV) content, and possess the infrastructure to include this service with the on-air presentation program.

The Described Video channel is a mono mix derived from the main program to which descriptive commentary is added. The audio level of this channel shall be similar to the main program level.

The other parameters are not yet defined and will be addressed in a future document.

Tracks 11 and 12 have been selected for an eventual stereo DV mix. In the mean time, only a dual mono mix is required. Broadcasting dual mono audio allows the audience to listen to the described video service on both left and right speakers instead of just one speaker.

### 6.1.6 Subjective Quality

The audio program shall be produced with reproduction in a domestic environment in mind.

- The entire audio program shall be of superior quality, free of all noise and interference (buzz, hum, distortion, excessive sibilance)
- The entire audio program shall have an acceptable dynamic range. A compression rate sufficiently high to adversely affect the sound quality shall not be accepted.
- The tone shall be natural and pleasant.
- Dialogue must remain intelligible throughout the entire audio program.
- Audio-video synchronization shall be maintained throughout the program. The maximum tolerable misalignment of sound and picture shall be ± 16.6 ms ( + or - one field at 29.97 fps).
- The described video level shall be similar to the main program level.

### 6.1.7 Subjective Quality Assessment

In addition to having to meet the criteria listed in Section 6.1.6, submitted programs shall be evaluated according to the five-point scale of the International Telecommunication Union (ITU-R BS.1284-1) as indicated in the following table:

| Rating | Impairments | Quality |
|---|---|---|
| 5 | Imperceptible | Excellent |
| 4 | Perceptible but not annoying | Good |
| 3 | Slightly annoying | Fair |
| 2 | Annoying | Poor |
| 1 | Very annoying | Bad |

Programs should meet the criteria for a 5 rating. The minimum acceptable quality for all program types shall be that of a 3 rating with rare exceptions, for example, in the case where program segments contain archival clips.

### 6.1.8 Mono Compatibility

Mono compatibility of stereo programs shall be guaranteed at all times.

## 6.2 Audio Track Allocation

CBC/Radio-Canada recommends production of HD programs with multichannel audio and delivery of HD material on HDCAM SR tape.

CBC/Radio-Canada broadcasts discrete audio channels on HD productions. Content on HD media shall therefore be delivered with discrete audio channels.

Any provider who cannot deliver program material with the expected audio format shall inform CBC/Radio-Canada about the said material and have it approved. Additional fees shall be charged for format conversion.

The producer has two audio track allocation options depending on the program version he plans to deliver to CBC/Radio-Canada: either multichannel 5.1 sound, or stereo. CBC/Radio-Canada strongly recommends the multichannel 5.1 production mode. The audio track allocation shall be:

| Tracks | Channel 5.1 Program | Channel Stereo Program |
|---|---|---|
| 1 | L | Lt/Lo |
| 2 | R | Rt/Ro |
| 3 | C | U |
| 4 | LFE | U |
| 5 | LS | U |
| 6 | RS | U |
| 7 | Lt/Lo (always required) | Lt/Lo (always required) |
| 8 | Rt/Ro (always required) | Rt/Ro (always required) |
| 9 | F | F |
| 10 | F | F |
| 11 | DV | DV |
| 12 | DV | DV |

Audio Track Allocation - HDCAM SR

Unused tracks shall be free of any signal. The track identification shall be clearly indicated on the label as per Section 10.3.

It is important to note that in the stereo program mode, the signals L and R must be present on tracks 1 and 2, as well as on tracks 7 and 8. The tracks 1 and 2 will be used for the HD broadcast, the tracks 7 and 8 will be used for broadcast on the conventional NTSC network.

The stereo audio version on tracks 7 and 8 shall meet CBC/Radio-Canada's SD audio standard [*] for reference levels and dynamic range.

## 6.3 HD Standards for Levels and Dynamic Range

### 6.3.1 Standard Reference Level

The CBC/Radio-Canada Television reference level is set at –20dBFs as defined in SMPTE recommended practice RP 155-2004. It corresponds to an alignment level of +4dBu. The reference tone level shall be consistent with the recorded program.

### 6.3.2 Dialogue Normalization

During the initial phase of transition to high definition, CBC/Radio-Canada will use static metadata parameters for broadcast. A table defining the metadata applicable to the CBC/Radio-Canada HD broadcast network appears in Section 6.4 of this document. The dialogue normalization level (dialnorm) is set statically at the transmission stage.

[*] Reference: *CBC technical specifications for film/videotape program acceptance*, development report EO 6350-2 CAVT 91E.

### 6.3.3 Dynamic Range

The signal measured using a broadcast loudness meter having the same ballistic as a Dolby® LM-100, shall meet the following criteria:

- Algorithm used: recommendation ITU-R BS.1770
- "Measurement Method = **Infinite**" integration mode;
- If a Dolby® LM-100 is used, the "Dialogue Intelligence™" option must be set to **OFF**;
- The dialogue **loudness level** measured on the central channel* at representative sections of normal dialogue level (ideally without any music or sound effect) shall be -**24dBFs +/- 1dB** (Leq RLB measurement);
- The whole program should be consistent and should not contain dynamic excursions that could hamper listening comfort.
- No peak must exceed –3dBFs (instantaneous measure: rise time 0 ms, fall time 200 ms);
- No compromise shall be accepted with regard to dialogue intelligibility;
- If a stereo program has been supplied on tracks 1 and 2, the dialogue loudness level will be measured on both left and right channels.

## 6.4 SD Standards for Levels and Dynamic Range

This section summarizes the levels and dynamic range of audio destined for the SD distribution:

- The CBC/Radio-Canada Television reference level is set at –20dBFs. It corresponds to an alignment level of +4dBu.The reference tone level shall be consistent with the recorded program.
- The program dynamic range allowed for broadcast on the analog antenna is 10dB with reference to the alignment level. No peak must exceed –10dBFs (instantaneous measure: rise time 0 ms, fall time 200 ms). Peaks will be limited to +14dBu on the analog distribution network.
- The average dialogue level should be within the range of –7 to 0 measured with a VUmeter (rise time 300msec, fall time 300msec). Occasional excursions up to **+1dB** on a VUmeter scale will be tolerated. No excursion above **+1dB** on the VUmeter scale will be tolerated.

For more technical information, please refer to the complete *CBC technical specifications for film/videotape program acceptance*, development report EO 6350-2 CAVT 91E.

* The BS.1770 recommendation (rev. 2006) specifies that the overall program loudness value should include the input of all channels (except the LFE channel) and not just the centre channel. However, the LM100 has only one AES input. The audio program needs to be pre-encoded in either AC3/DolbyE format to perform a loudness measurement on all channels. CBC/SRC is aware that not all producers own these coding devices and decided not to impose the loudness measurement on all channels for the moment.

## 6.5 Metadata Parameters Encoded for On-Air Broadcast

During the initial phase of transition to high definition, CBC/Radio-Canada will use static metadata parameters. For this reason, production must be fully compliant with the standards described below.

Prior to broadcast of programs on the HD broadcast network the metadata parameters in the Dolby Digital (AC3) encoder will be set according to 2 profiles defined by the program type. The metadata parameters will be set statically, with the following values:

| **Parameter** | **Profile 5.1** | **Profile 2.0** |
|---|---|---|
| Dialogue Level | –24 | –24 |
| Channel Mode | 3 / 2 | 2 / 0 |
| LFE Channel | Enable | Disable |
| Bitstream Mode | Main Complete | Main Complete |
| Line Mode Profile | Film Light | Film Light |
| RF Mode Profile | Film Light | Film Light |
| RF Overmodulation Protection | Disable | Disable |
| Center Downmix Lev | 0.707 (-3dB) | N /A |
| Surround Downmix Lev | 0.707 (-3dB) | N /A |
| Dolby Surround Mode | Not Indicated | Not Indicated |
| Audio Prod Info | No | No |
| Mix Level | N /A | N /A |
| Room type | N /A | N /A |
| Copyright | Yes | Yes |
| Original Bitstream | Yes | Yes |
| Preferred Stereo Downmix | Not Indicated | N /A |
| Lt/Rt Center Downmix Level | 0.707 (–3dB) | N /A |
| Lt/Rt Surround Downmix Level | 0.707 (–3dB) | N /A |
| Lo/Ro Center Downmix Level | 0.707 (–3dB) | N /A |
| Lo/Ro Surround Downmix Level | 0.707 (–3dB) | N /A |
| Dolby Surround EX Mode | Not Surround EX | N /A |
| A/D Converter type | Standard | Standard |
| DC Filter | Enable | Enable |
| Lowpass Filter | Enable | Enable |
| LFE Lowpass Filter | Enable | N /A |
| Surround 3 dB Attenuation | Disable | N /A |
| Surround Phase Shift | Enable | N /A |

# 7 Time Code

- Both Longitudinal Time Codes (LTC) and Vertical Interval Time Codes (VITC) shall be recorded on tape.
- The Longitudinal Time Codes (LTC) and Vertical Interval Time Codes (VITC) shall be identical during the whole recording.
- The two time codes shall be present and continuous from the beginning of the leader up to the end of the trailer (refer to Section 9).
- The time code shall be of drop frame type to ensure that it remains synchronous with real time. It is important to pay particular attention to drop frame when a program is transferred from 23.98 or 24 frames/seconds to 29.97 frames/seconds.
- The time code value shall be 10:00:00:00 (hh:mm:ss:ff) at the first frame of the program.
- The time code shall be compliant with SMPTE standard 12M-1999 and follow SMPTE recommended practices RP 188 and RP 196.

# 8 Closed Captions

Closed captions (CC) shall be present and encoded into the digital video signal as data packets, per SMPTE 334M-2000. The closed captions shall be of EIA 608 type encapsulated into EIA 708 data, in compliance with the EIA 708 standard. This requirement is necessary because most HDTV receivers in use at this time can only decode EIA 608 captions encapsulated into EIA 708 (and not pure 708 data packets).

CBC/Radio-Canada's reference device for verification of CC integrity is the Evertz 7760CCM-HD closed caption decoder.

No EIA 608 type of closed caption signal, as usually found on line 21 in SD video, shall be present in the HD video signal, either in the active video area or in the vertical interval. Lines 21 and 584 (the top lines of the active picture area) of the HD video signal shall carry picture information (Y Cb Cr values).

# 9 Tape Leader and Trailer

HD programs or commercials delivered on tape shall include leaders and trailers as described in the following table:

<table>
<tr><th>Time code<br>(at start)</th><th>Duration<br>(seconds)</th><th>Audio</th><th>Video</th><th>Tape</th></tr>
<tr><td>----</td><td>10 (minimum)</td><td>Black and silence</td><td></td><td rowspan="5">Leader</td></tr>
<tr><td>09:58:20:00</td><td>10</td><td>Vocal ID</td><td rowspan="2">SMPTE RP 219<br>HD colour bars</td></tr>
<tr><td>09:58:30:00</td><td>60</td><td>Reference tones</td></tr>
<tr><td>09:59:30:00</td><td>20</td><td rowspan="2">Silence</td><td>Slate</td></tr>
<tr><td>09:59:50:00</td><td>10</td><td>Black</td></tr>
<tr><td>10:00:00:00</td><td>----</td><td>Program</td><td>Program</td><td>----</td></tr>
<tr><td>----</td><td>20</td><td>Silence</td><td>Black</td><td>Trailer</td></tr>
</table>

## 9.1 Vocal Track Identification

The recording shall start with a vocal identification of the audio tracks. This identification, to last 10 seconds in all, shall precede the test tones. It shall be clear, precise and sequential, such that track allocation is easily identifiable.

## 9.2 Audio Test Tones

A reference tone shall be present at the start of all tapes; it shall be in phase and be on all audio channels used for the program (including the stereo mix on tracks 7 and 8, and DV on track 11and 12, if it is present).

The CBC/Radio-Canada Television reference level is set at –20dBFs as defined in the SMPTE recommended practice155-2004. It corresponds to an alignment level of +4dBu.

The reference tone level shall be consistent with the recorded program.

The test tone shall be 1 kHz on all channels. The length of the test tones shall be 60 seconds. A 30-second period of silence shall follow the test tones.

Unused channels shall be free of all signals.

### 9.3 Colour Bars

The colour bars, in HD 16:9 format, shall be compliant with the SMPTE recommended practice RP 219-2002. The colour bars should be generated from a test generator in the edit suite that produced the final edit, and to which the edit suite has been calibrated. The colour bars must not be generated by the internal test generator of the recording VCR.

### 9.4 Slate

The slates shall include the following information:

- Program title
- Series and episode title/number
- Producer's name
- Program length
- Main program audio type (mono, stereo, multichannel)
- Audio track allocation
- CC (English) or STC (French) closed captions

## 10 Labelling

All videotapes shall be properly labelled on both the cassette and the container.

### 10.1 Cassette Label

The **cassette label** shall indicate the following information:

- Title
- Episode subtitle and number
- Main program audio type(mono, stereo, multichannel)
- Audio track allocation (refer to Section 10.3)
- Video format identification (refer to Section 10.4)

## 10.2 Container Label

The tape **container** labels shall contain the same information as the cassette label, and, additionally, the following information:

- Contract number
- Distributor's name
- Production centre
- Program length (Hrs. Min. Sec.)
- CC (English) or STC (French) closed captions
- For film-originated programs:
    - Original aspect ratio: 1.66, 1.78, 1.85 or 2.39
    - Type of aspect ratio conversion used: letterbox or other
- Described Video (Yes/No)

## 10.3 Audio Format and Track Allocation

Program type and track allocation shall be clearly and correctly identified on the cassette label.

The channel allocation nomenclature shall be compliant with the SMPTE 320M-1999 standard:

| | |
|---|---|
| L | Left |
| R | Right |
| C | Center |
| LFE | Low Frequency Effect |
| LS | Left Surround |
| RS | Right Surround |
| MS | Mono Surround |
| MS (-3dB) | Mono Surround at –3dB |
| Lt | Left total |
| Rt | Right total |
| Lo | Left only |
| Ro | Right only |
| M | Mono |
| F | Freely usable |
| U | Unused / Unassigned |
| | |
| DV | Described Video (not defined in SMPTE 320M) |

Programs recorded on tape shall be identified using one of the following audio format labels:

- Multi-channel discrete
- Stereo
- Pro Logic™ or Pro Logic II™
- Mono

Example of recorded audio program labelling:

Program: Multichannel discrete

| | |
|---|---|
| 1 : L | 7 : Lt/Lo |
| 2 : R | 8 : Rt/Ro |
| 3 : C | 9 : U |
| 4 : U | 10 : U |
| 5 : LS | 11 : DV |
| 6 : RS | 12 : DV |

### 10.4 Video Format Identification

The video format recorded on tape shall be identified using the following notation:

**LLLL S FF**
where:

| | Number of active **l**ines per frame | **S**can mode | **Frame** rate (Not field rate) |
|---|---|---|---|
| | **LLLL** | **S** | **FF** |
| **Possible Values** | **1080** | **i** | 23.98 |
| | | | 24 |
| | | | 25 |
| | | | **29.97** |
| | 720 | p | 30 |
| | | sf | 50 |
| | | | 59.94 |
| | | | 60 |

The range of possible values is indicated for informative purposes only. As specified in sections 5.1 and 5.2, the HD video format accepted by CBC/Radio-Canada is **1080 i 29.97**.

## 11 Right of Refusal

CBC/Radio-Canada reserves the right to reject any production that fails to meet the standards described in this document.

# 12 Acknowledgments

This document was written with the collaboration of people from various departments within CBC/Radio-Canada. We acknowledge the valuable input of the members of the working group:

| | |
|---|---|
| Costa Babalis | Manager, BET |
| André Bernard | Chief Video Technician and Instructor, FTV |
| Guy Boisclair | Senior Maintenance Technician, FTV |
| Guy E. Bouchard | Chief Technician (Audio), FTV |
| Guy Bouchard | Manager, NBT |
| Anthony Caruso | Director, S&P, NBT |
| Christian Demers | Project Engineer, BEM |
| Vincent Desmarais | Senior Engineer, NBT |
| Julie Gagnon | Engineer, NBT |
| Raymond Gagnon | Chief Technician, Post-production, FTV |
| Jean Lafontaine | Site Director, FTV |
| Marc Landry | Supervising Technician, Network Presentation, ETV |
| Rudi Lingohr | Director, BET |
| Paul MacKeigan | Network Liaison Office, ETV |
| Pierre Marion | Director, BEM |
| Claude C. Pilon | Site Director, Post-production, FTV |
| Ken Puskar | Instructor, TPC- Post Production, ETV |
| Daniel Vaillancourt | Chief Technician, Post-production, FTV |
| Bruno Vigneault | Chief Technician and Instructor (Audio), FTV |
| Adam Vulic | Senior Systems Engineer, BET |
| Robert Walton | Manager, Network Presentation, ETV |

Acronyms:
BET: Broadcast Engineering Toronto
BEM: Broadcast Engineering Montreal
ETV: CBC Television (English Television)
FTV: Télévision de Radio-Canada (French Television)
NBT: New Broadcast Technologies