

## 1. Title

Operational Practices for the Digital Betacam<sup>1</sup> videotape format.

## 2. Scope

- 2.1 This document specifies Operational Practices when employing the Digital Betacam videotape format. It recommends the video and audio alignment signals<sup>2</sup> to precede the program content, the video/audio Identification section, the Countdown section and the Time and Control Code requirements.
- 2.2 The Digital Betacam system will be used in many cases where the video inputs (and outputs) will be Serial Digital and/or composite PAL and/or Component Analogue Video. This will require that test signals in the various formats match each other to a high degree of accuracy and that the PAL encoders and decoders in the machines be accurately aligned. References below the video alignment test signal do not define the input format of the signal. This is at the users discretion.
- 2.3 The Audio input/output may be in either Analogue or AES/EBU digital forms. This will require that a reference level alignment test signal in both the digital and analogue forms produce the same reference meter reading. This is defined as -20dBFS by SMPTE RP155. References below to the audio Alignment test signal do not define the input format of the signal. This is at the users discretion.

## 3. Alignment Signals

- 3.1 As the system is cassette based there is no requirement for any black video and silence at the head of the tape.

The European and American practice is to have 10 seconds of black video and silence at the head of their tapes and thus it is decided that this also may be an option for the purpose of this O.P.

- 3.2 At the head of the recording a minimum 60 seconds of an alignment video signal should be recorded comprised of a colour bar signal of type 100/0/75/0 (ITU Rec.471) occupying at least 3/4 of the picture height.

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<sup>1</sup> Digital Betacam is IEC 61904 (2000-04) Video recording – Helical-scan digital component video cassette recording format using 12.65mm magnetic tape and incorporating data compression (Format digital-L)

<sup>2</sup> Until such time as the TV production and recording/playback process is fully digital, there will be a need for alignment signals when using an otherwise digital videotape system. Even then, alignment signals may be necessary if the video signals are subject to modification of any kind.

Note: The content of the remaining quarter of the picture height is optional. A test generator (Rainbow) is available on the market which demonstrates the legal boundaries of a PAL signal. It is possible in the component domain for signals that are legal as far as amplitude is concerned but produce illegal PAL signals.

- 3.3 In the case of tape duplication, the alignment signal should be the output of an appropriate generator and should not be part of the tape to tape transfer. (The purpose of the alignment signal is to enable the characteristics of the replay machine to be made complementary to that of the recording machine).
- 3.4 It is essential that if a colour bar signal other than that recommended is used, it must be accompanied by a visual identification specifying the signal used.
- 3.5 Simultaneously with the video alignment signal a reference level audio tone of  $1000\text{Hz} \pm 20\text{Hz}$  should be recorded in phase and from a single source on all tracks intended to carry program material. The audio test signal on tracks 1 and 3 should remain at constant level whilst the audio test signal on tracks 2 and 4 should be interrupted every 3 seconds for a period of approx 0.25 seconds to identify the right channel of a stereo pair or pairs.
- 3.6 The reference tone recordings should be made under the same conditions of equipment adjustment as used for the sound portion of the program.

## 4. Audio Track Assignment

- 4.1 The Digital Betacam system has four identical high quality digital audio tracks. On a monophonic recording the mono program sound should be dual recorded in phase on both tracks 1 and 2.
- 4.2 If an associated mono M and E track is present, it should be recorded on track 3. This is in line with an EBU Recommendation.
- 4.3 In a stereophonic recording the stereo program sound should be recorded with the left channel on track 1 and the right channel on track 2.
- 4.4 Stereophonic M and E should be recorded with the left channel on track 3 and the right channel on track 4.
- 4.5 Correct relative phasing of M and E to program tracks should be maintained at all times.

Note: It is recognised that in post production activities other track arrangements may be used.

- 4.6 The analogue cue track is a “users track” and is available at the users discretion for recording cueing information where necessary.

## **5. Time and Control Code**

- 5.1 Longitudinal Time and Control Code according to EBU Tech 3097 and N12 should be recorded on the Time Code track.
- 5.2 Vertical Interval Time and Control Code according to EBU Tech 3097 and N12 should be inserted in lines 18(331) and 20(333) of the video signal.
- 5.3 Both Time Codes should match and be continuous for the duration of the recording.
- 5.4 The Time Code should not pass through 2400 hours for the duration of the recording.
- 5.5 If the recording is derived by decoding a composite PAL signal, then the Time Code should be referenced to the 8 field PAL sequence.
- 5.6 The use of “User Bits” within the Time and Control Code for the purpose of indicating program identification and segment duration is to be encouraged.

## **6. Visual and Aural Identification Information**

- 6.1 Visual identification information (clapper board) should be recorded, following the alignment signal, for a minimum of 20 seconds. Aural identification is optional and may be dual recorded on audio tracks 1 and 2.
- 6.2 The visual identification should contain information relative to:
- (1) Title
  - (2) Episode/ Clearance number
  - (3) Production number
  - (4) Recording Studio name
  - (5) Date of recording
  - (6) Stereo/Surround/Mono/Dissimilar/Audio
  - (7) Aspect ratio of image

## **7. Countdown**

- 7.1 A visual/aural countdown signal should be recorded following the Identification section.
- 7.2 The audio countdown signal as described below should be recorded on both audio tracks 1 and 2.

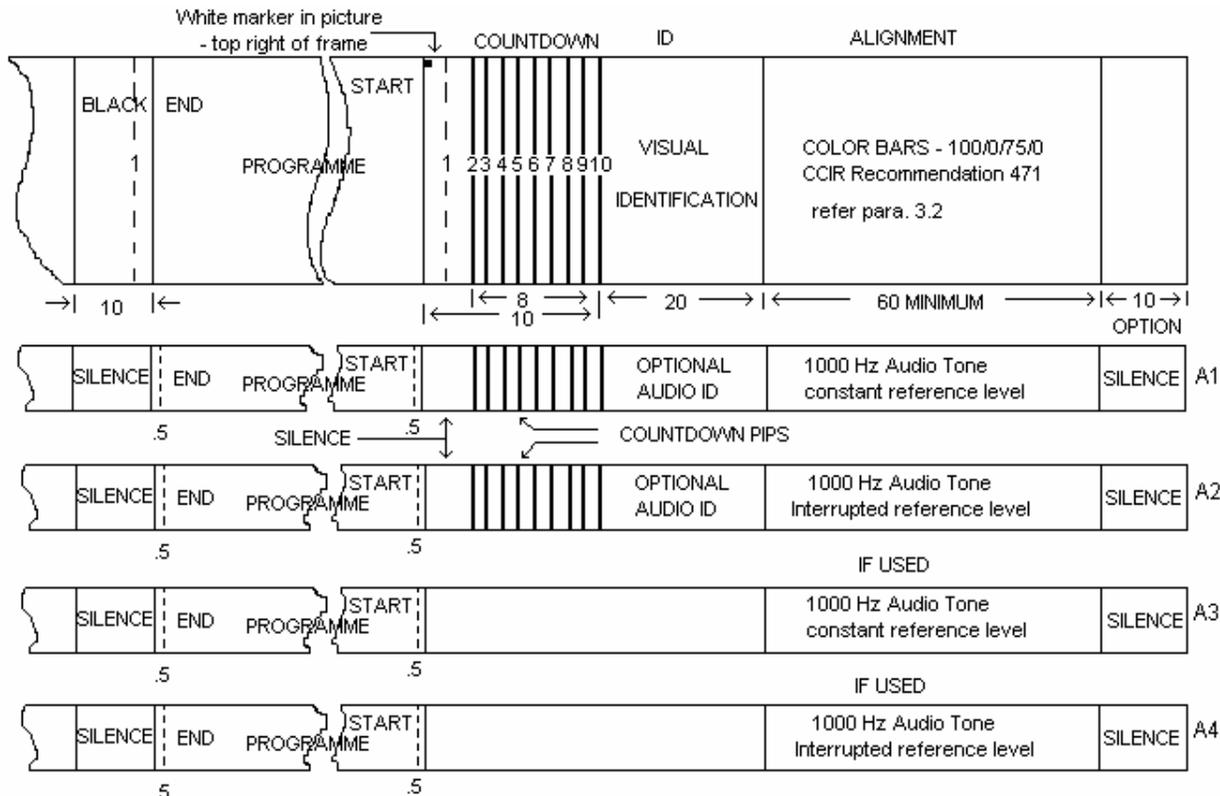
- 7.3 The audio countdown signal should consist of a series of reference level  $400 \text{ Hz} \pm 20 \text{ Hz}$  bursts each of  $1/5$ th second duration, occurring at 1 second intervals over the range from 10 seconds ahead of program start to 2 seconds ahead of program start.
- 7.4 In addition, a steady component of the countdown audio tone should be recorded approximately 20db below the level of the tone bursts, starting with the first burst and ending with the last, leaving a 2 second silent interval before program start.
- 7.5 A numerical visual countdown signal should be recorded during the entire period of the steady component of the above described audio tone signal. Video black should be recorded during the 2 second interval from the end of the tone bursts to active program start.
- 7.6 Accurate identification of first frame of active video on commercials should be provided by the inclusion on the color black in the 2 second interval, of a white marker on the frame, top right of picture, outside picture safe, before first frame of active video. The white marker should be a minimum picture height of 12 lines and a width of 18 pixels. Timing of the commercial is referenced from the first frame of active video.

## **8. Continuity of Recorded Signals**

- 8.1 There must be continuity of recorded signals from a point at least 30 seconds before program start.
- 8.2 Video black should continue for at least 10 seconds following the conclusion of the program. The accompanying audio track should be silent.

**FREE TV AUSTRALIA OPERATIONAL PRACTICE OP-28**  
DIGITAL BETACAM

Issue 2  
December 2002



THIS DRAWING SHOWS THE START AND END TIMES OF AUDIO AS DEFINED FOR COMMERCIAL AND PROMOTIONAL MATERIAL (BETWEEN DOTTED LINES). THE START AND END TIMES FOR PROGRAMME MATERIAL TEND TO BE ARBITRARY AND NOT CAPABLE OF DEFINITION.

DRAWING NOT TO SCALE.

