

1. SCOPE

This Operational Practice recommends the format and quality of video and audio associated with the delivery of SDTV and HDTV commercials to the Australian terrestrial television broadcast industry on storage media¹. Free TV OP 29 recommends the format and quality of video and audio associated with the delivery of SDTV and HDTV commercials in a file format to the Australian terrestrial television broadcast industry.

Television commercials / advertisements for broadcast in Australia must comply with the Commercial Television Industry Code of Practice that has been registered by the Australian Communications and Media Authority (ACMA).

Television commercials / advertisements broadcast in Australia are inserted into breaks between programs and within programs. Hourly limits of advertising content vary between 13 to 16 minutes' dependent upon time of day. The commercials advertising breaks are constituted by a sequential series of advertisements for products and services.

Recognising that the Television Program Standard for Australian Content in Advertising (TPS 23) permits a percentage of foreign produced advertising content advice is provided on standards conversion from overseas formats to the specifications required by Australian television broadcasters.

Free TV OP 29 seeks to establish uniform quality specifications for presentation of advertising content on Australian free to air commercial television.

2. DEFINITIONS

2.1 Standard Definition

2.1.1 Standard Definition is a 625 total lines, 576 active lines, 25 frames per second, 2:1 interlaced signal produced in agreement with the specifications of ITU-R Rec. BT 601². The aspect ratio shall be a full height 16: 9 image.

The associated audio signal should be a stereo pair, optionally encoded Dolby Surround (Pro Logic II), with the centre and surround information encoded into the Lt and Rt signals. Regular stereo (Lo/Ro) is also acceptable.

2.2 High Definition

2.2.1 High Definition is a signal produced in agreement with the specifications of ITU-R BT. 709-6³

2.2.2 The aspect ratio shall be a full height 16: 9 image. The preferred

¹ Storage media – video tape, DVD etc

² The companion signal interface document is ITU-R BT.656-5 *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*

³ The companion signal interface document is ITU-R BT.1120-9 *Digital Interfaces for studio signals with 1 920 x 1 080 image formats*

video format for the exchange of commercial material is:

1125 lines total per frame

1920 horizontal pixels by 1080 active lines

25 frames per second, 2:1 interlace

- 2.2.3 The preferred *ideal* associated audio signal should be 8 discrete PCM audio channels comprising *two* audio programmes, stereo & 5.1 Surround. The 8 discrete channels representing – Stereo Left / Stereo Right / 5.1 Front Left / 5.1 Front Right / 5.1 Centre / 5.1 Low Frequency Effects (LFE) / 5.1 Left Surround / 5.1 Right Surround.

If a 5.1 surround audio mix is not available, then the preferred minimum audio requirement should be a stereo pair, optionally encoded Dolby Surround (Pro Logic II), with the centre and surround information encoded into the Lt and Rt signals. Regular stereo (Lo/Ro) is also acceptable. The remaining audio channels shall be present but remain silent.

- 2.2.4 Delivery of HDTV content in a High Dynamic Range image format should comply with the specifications for Hybrid Log Gamma found in Recommendation ITU-R BT.2100 *Image parameter values for high dynamic range television for use in production and international programme exchange*.
- 2.2.5 Down conversion from a UHDTV HDR image format found in Recommendation ITU-R BT.2100 to the HD image format⁴ Recommendation BT. 709-5 should be undertaken in accordance with ITU-R Report ITU-R BT.2446 *Methods for conversion of high dynamic range content to standard dynamic range content and vice-versa*.
- 2.2.6 Reference to UHDTV image formats should be undertaken in accordance with Recommendation ITU-R BT.2020 *Parameter values for ultra-high definition television systems for production and international programme exchange*.

3. DELIVERY

3.1 Standard Definition

- 3.1.1 For Standard Definition, commercials shall be supplied on a 625 line 25 frame per second 2:1 interlace component digital system.

3.2 High Definition

- 3.2.1 For High Definition, commercials shall be supplied in an 1125 line, 1080 active 25 frame per second 2:1 interlace format system.
- 3.2.2 By prior arrangement with the broadcaster, multiple commercials may be delivered provided that each item is clearly and uniquely identified with its own identification.

⁴ Recommendation ITU-R BT.2100 specifies progressive image formats.

- 3.2.3 When multiple commercials are supplied on the one piece of storage media, each commercial item shall commence on an even integer minute.

4. VIDEO REQUIREMENTS

4.1 Common Video Requirements

- 4.1.1 Television commercials / advertisement should not be produced with monitors in an overscan display mode during the production and post-production process.
- 4.1.2 The commercial shall be produced in a full height 16:9 Aspect Ratio format - and shall be delivered to the broadcaster in that format. It shall also be produced so that there is meaningful and useful image content to the 16:9 image area limits. Distortion of the geometry of the original picture aspect ratio is not acceptable.
- 4.1.3 If commercial producers observe the requirements of 4.1.1 then acceptable presentation will occur. Failure to observe these requirements will cause problematic presentation.
- 4.1.4 All titles and essential information must fall into the safe areas defined in Annex A and B. Refer to Annex C for Recommended Text Size.
- 4.1.5 Black level shall not extend below blanking level (0mV luma in the analog domain).
- 4.1.6 The line-up colour bar test signal shall replay at the correct levels. Video levels shall be consistent with line-up video levels.
- 4.1.7 If a commercial is originated on film the horizontal and vertical instability, the rate of any picture movement shall not be subjectively annoying.

The film elements shall be clean and free of both surface dirt and printed dirt and shall not have any emulsion or base side damage.

- 4.1.8 In all cases a commercial shall be of the highest quality suitable for television broadcast without further processing of the picture. Where a commercial is produced to Standard Definition Recommendation BT.601, the quality shall be such that an acceptable upconversion to a HD resolution level can be made.

4.2 Standards Conversion / artifacts / frame duplication / field blending

- 4.2.1 The object is always the elimination of temporal motion artifacts.
- 4.2.2 If a commercial is originated using electronic cameras in the 525/60 or HD 1125/60 domain then the supplied product shall be a standards conversion via a 'Motion Vector Compensated' or phase correlation standards conversion system.

Inherent motion blur as a result of low frame rate capture, like 23.976p, 25p or blurring as a rendered video effect, is not rejected. However, poor standards conversions which result in frame blending/interpolation and repeated frames will be rejected when

detected by Australian commercial television broadcasters.

- 4.2.3 Video should be free of frame duplication. A typical example is where the 24th frame has been duplicated to fill the 25th frame resulting in the picture “stuttering” - i.e., appearing to stop on a regular basis and is seen when 24 fps original material has been converted to 25 fps using low quality conversion.
- 4.2.4 If the supplied footage does contain frame duplication then the duplicated frames must be removed before being supplied to the television broadcaster
- 4.2.5 An advertiser may choose to speed up material shot at 24 fps by 4% to 25fps, provide audio “pitch correction” if required and correct end frames to fulfil total duration. If speeding up 24 fps material is not appropriate, then high quality standards conversion may be employed where good interpolation results in minimized artifacts from the “blending” of frames.
- 4.2.6 Material originally shot on film or electronically at 24 fps which is then converted to 30fps (60 interlaced fields per second*) by the 3:2 field pull-down technique and then converted back to 24fps or 25fps without the use of 3:2 pull-down removal algorithms (cadence detection, correction & removal), can result in a soft, blurred picture. The Advertiser may deem quality issues resulting from poor blending or conversion artifacts as acceptable by notifying the Broadcaster of such acceptance by the Advertiser.

*30 fps also refers to 29.97 fps & 59.94 interlaced fields per second

4.3 Reverse Field Dominance

- 4.3.1 Field dominance simply states whether the top/odd field or the bottom/even field is supposed to be shown first. For example, a dominance of 'top field first' would mean that the top field is displayed before the bottom field in a frame. 'Top field first' is the requirement in the context of this document. Commercials delivered with Reverse Field Dominance will be rejected by a broadcaster. A typical example is where a crawl has been added with the wrong field dominance in progressive mode, resulting in errors when replayed in interlaced mode. This effect is impossible to see on many progressive- displays but easily visible on interlaced TV displays.

It is essential that production, post production and standards conversion for picture content **MUST** be undertaken on interlace television picture monitors. Otherwise standards conversion artifacts or errors may not be detected on progressive displays. Content must be viewed on broadcast grade monitors which can accept interlaced signals and display them properly.

4.4 Standard Definition

- 4.4.1 For Standard Definition the video signal shall be a 625 total lines, 576 active lines, 25 frames per second, 2:1 interlace signal produced in accordance with ITU-R Rec BT. 601.

- 4.4.2 Vertical and horizontal blanking shall be in accordance with ITU-R Rec. BT. 1848. The active digital picture line width is 720 pixels producing what is commonly called 'Narrow' blanking. For product produced purely in the digital domain this is the preferred blanking. Reference to Annex A of this Operational Practice indicates that only the central 720 pixels will normally reach the display.

The centre of the picture should retain its position throughout all production processes unless there are creative reasons to deliberately do otherwise. The horizontal centre of the image is located between pixels 359 and 360. The vertical centre of the image is located midway between line 167 of field 1 and line 479 of field 2.

- 4.4.3 For programs transferred into the digital component domain from archival material originated in a composite PAL or NTSC format, care is necessary to ensure that any burst to chroma phase errors do not exceed 5° since these errors cannot be corrected on playback.

4.5 High Definition

- 4.5.1 For High Definition the video signal shall be an 1125 total lines, 1080 active lines by 1920 pixels horizontally, 25 frames per second, 2:1 interlace signal produced in accordance with ITU-R Rec. BT. 709-6.

5. SUBJECTIVE VIDEO QUALITY

5.1 Common Subjective Video Quality

- 5.1.1 Picture quality appreciation and production grading shall be made in a Review Room which meets SMPTE recommendations for that purpose, including a 6500°K illuminant monitor surround.
- 5.1.2 The picture black level shall appear to be subjectively correct with respect to content, free of any noticeable black crushing, compression or clipped dark areas.
- 5.1.3 Low key scenes shall have sufficient contrast and APL (average picture level) to appear acceptable under typical domestic viewing conditions.
- 5.1.4 Picture white areas where detail is required shall appear normal and free of noticeable highlight compression.
- 5.1.5 The transient (edge) response shall be crisp and clean - free of any noticeable horizontal or vertical pre-shoot, overshoot, ringing, smear/streak, echoes or telecine afterglow errors.
- 5.1.6 Moire and fixed pattern noise shall not be visible.
- 5.1.7 The resulting subjective resolution shall meet the specification of the electro-optical production chain.
- 5.1.8 Any video noise shall be fine grained (i.e. high frequency) and not visible at normal viewing distances. However, the use of MPEG video

data compression does require an image which is not only noise free but also free of artifacts such as film dirt or scratches or unwanted image movement.

Note: The excessive use of noise reduction will cause motion artifacts and a noticeable loss of resolution. The amount of noise reduction should only be sufficient to minimise noise.

- 5.1.9 The colour balance of the image shall be essentially neutral i.e. appears to be illuminated by light of 6500°K. The correct hue of skin tones shall be achieved and these skin tones shall be natural and characteristic in both hue and saturation. The above in no way prevents the use of colour variations for artistic purposes.

5.2 Television production and standards conversion artefacts

Australian TV networks transmit mostly in interlaced format whilst, most commonly the monitoring used in non-linear editing systems displays in progressive format.

Extra care needs to be taken to ensure that commercials delivered to Australian television broadcasters do not have artifacts or errors which may not have been evident in the progressive environment, but which are evident on the broadcast interlaced display.

It is essential that production, post production and standards conversion for picture content **MUST** be undertaken on interlace television picture monitors. Otherwise standards conversion artefacts or errors may not be detected on progressive displays.

5.3 Standard Definition

- 5.3.1 Standard Definition images shall be viewed on a correctly calibrated grade 1 display, of at least 60cm diagonal and viewed at approximately 5 times picture height.
- 5.3.2 Standard Definition images must be judged critically with respect to their capacity for upconversion. A high quality BT.601 level product can produce acceptable HD level material. Equally, poor to average BT.601 level product will not produce acceptable HD level material.

5.4 High Definition

- 5.4.1 High Definition images shall be viewed on a correctly calibrated grade 1 display of at least 100cm diagonal and viewed at approximately 3 times picture height. The light emitters shall have ITU-R BT.709-6 colorimetry.

6. AUDIO REQUIREMENTS

6.1 Standard Definition

- 6.1.1 For the Standard Definition commercials the preferred audio shall be a shall be a stereo pair (Lt and Rt), however, regular stereo (Lo and Ro) is also acceptable or optionally encoded Dolby Surround (Pro Logic II). The L and R stereo pair shall have a combined loudness

measurement and management techniques.

6.2.2 If a HD format is provided that can cater for up to 8 PCM audio channels, then the audio track layout shall be as follows:

Track 1	Left (L _t)	(Full Stereo Mix)
Track 2	Right (R _t)	(Full Stereo Mix)
Track 3	Left Front	(5.1 mix)
Track 4	Right Front	(5.1 mix)
Track 5	Centre	(5.1 mix)
Track 6	LFE	(5.1 mix)
Track 7	Left Surround	(5.1 mix)
Track 8	Right Surround	(5.1 mix)

7. SUBJECTIVE AUDIO QUALITY

- 7.1 The overall quality shall be pleasing and free of any audible noise or spurious signals (e.g. hum, buzz, distortion, wow, flutter or excessive sibilance) when monitored in a noise free environment on an essentially flat wide-band speaker system.
- 7.2 The 0.5 seconds of silence at the beginning and end of the final mix of the soundtrack shall apply a silence threshold of -70dB below the alignment level of the soundtrack.
- 7.3 The tonal balance, bass to mid-range to treble shall be pleasing and natural.
- 7.4 Stereo and multi-channel material shall have the correct spatial relationships between audio and picture content (such as left-right or front-rear).
- 7.5 Program audio shall be in lip sync with the picture content.
- 7.6 Any supplied 5.1 audio shall be mixed in such a way that it will create an acceptable downmix to 2.0 stereo L_t and R_t if required, using industry standard downmix parameters. Refer Free TV OP60.

8. COMMERCIAL TIMING

- 8.1 The duration of commercial or promotional material should be measured from the start of active video to the end of active video.
- 8.2 Sound should commence 0.5 seconds after the commencement of active video. This provides time for the sound channel to be opened after the start of video without risk of sound clipping and provides aural separation between adjacent commercials and program material.
- 8.3 The end of the commercial sound including any sound tag shall occur 0.5 seconds before the end of active video.
- 8.4 Accurate identification of first frame of active video on commercials is important to commercial television broadcasters. This is particularly important with respect to commercials which "fade up from black". This can be provided

by the inclusion of a white marker on the colour black in the 2 second interval prior to the start of active video, top right of picture, outside picture safe, immediately before first frame of active video. The white marker should be a minimum picture height for SD of 12 lines and minimum width of 18 pixels. For HD, the white marker should be a minimum picture height of 24 lines and a minimum width of 36 pixels.

Timing of the commercial is referenced from the first frame of active video.

9. COMMERCIAL IDENTIFICATION

9.1 Each individual television commercial / advertisement shall have some form of identification. Legibility of the identification is most important to commercial television broadcasters.

9.2 The identification should contain information on:

- a) Client / Advertiser
- b) Agency / Production Company
- c) Product
- d) Title
- e) Key Number
- f) Duration (in seconds)
- g) CAD Number / CAD Number Pending
- h) Classification – as provided by CAD / CAD Number Pending
- i) Video format – SDTV
- j) Video format - HDTV
- k) Audio Loudness Level and Compliance to Free TV OP48 (-24LKFS)⁵
- l) Audio format (Stereo)
- m) Audio format (5.1 Surround)
- n) Aspect ratio (always 16:9)
- o) Closed captions
- p) Date (delivery date)

Note 1. Advertisers, agencies, production companies and TVC delivery vendors should note that if amendments are made to a commercial after a CAD number has been issued and the commercial has been despatched to broadcasters, a revised Key Number will need to be associated with the final commercial and a new CAD number sought.

Note 2. When a CAD Number is not available the following text should appear in the visual identification - "CAD Number Pending" i.e. in the case of delivery to CAD for approval and early delivery to a television broadcaster.

10. TIME AND CONTROL CODE

10.1 For Standard Definition, the Vertical Interval Time Code (VITC) shall appear on lines 18/331 and 20/333 of the 625/25 recording.

10.2 For High Definition, the Vertical Interval Time Code (VITC) shall be according to a standard yet to be identified.

- 10.3 Both Longitudinal and Vertical Interval Time Codes shall Time code shall match and be continuous and ascending for the duration of the recording.
- 10.4 The Time Code shall not pass through 2400 hours for the duration of the recording.

11. CLOSED CAPTIONS – STANDARD DEFINITION

- 11.1 For distribution / delivery of SDTV commercials to television broadcasters, caption data should be carried on line 21 in the vertical blanking interval (VBI) on both fields, or carried within SMPTE436 ancillary data essences within the MXF wrapper, by agreement between the Distributor and the Broadcaster. Ancillary data also needs to be able to be decoded on both fields of vision.
- 11.2 The Australian Standard for transmission of closed captioning is for the data to be carried on line 21/334 for a 625/25 signal. The data format is in accordance with the Australian Teletext System Standard. Caption data shall be distributed, transmitted and monitored according to the requirements of Free TV Australia Operational Practice OP42.
- 11.3 Identification of the presence of closed caption information is necessary.
- 11.4 A command to clear any existing caption shall be included in the first half (0.5) second of the commercial. Where closed caption data is included, the caption information should commence no earlier than a half (0.5) second after the start of active video and a caption erase signal is required (last caption time code out) not later than a half (0.5) second before the end of active video. First caption time code in will be at an arbitrary point determined by content.

12. CLOSED CAPTIONS – HIGH DEFINITION

- 12.1 Carriage of closed captions for High Definition shall be in accordance with the requirements of Free TV Australia Operational Practice OP47 and SMPTE Registered Disclosure Document RDD 8.
- 12.2 A command to clear any existing caption shall be included in the first half (0.5) second of the commercial. Where closed caption data is included the caption information should commence no earlier than a half (0.5) second after the start of active video and a caption erase signal is required (last caption time code out) not later than a half (0.5) second before the end of active video. First caption time code in will be at an arbitrary point determined by content.

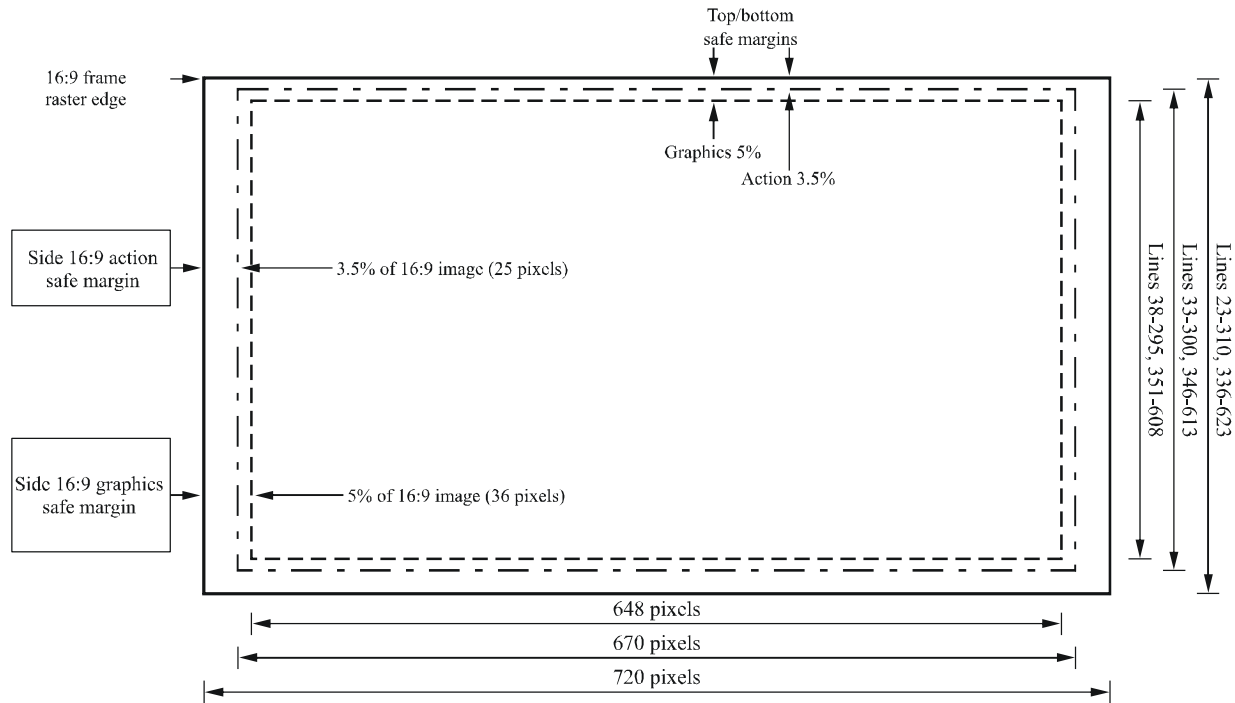
Annex A

1. SDTV - SAFE ACTION AND SAFE GRAPHIC AREAS

- 1.1 The recommended SDTV 'Safe Action' and 'Safe Graphic' areas are defined by the following diagram.
- 1.2 The active video line length is defined as a nominal 720 pixels which represents normal digital active line length (refer to Clause 4.4.2).
- 1.3 The overscan of displays is assumed to be a maximum of 7% of overall picture width or height i.e. 3.5% at each edge but any one picture edge should not exceed 4% of total picture width or height.
- 1.4 Figure 1 - Widescreen shoot to protect the 16:9 full image

This indicates the safe areas of a 16:9 widescreen display.

FIGURE 1
16:9 shoot-to-protect the 16:9 full image, 625-line interlaced scan



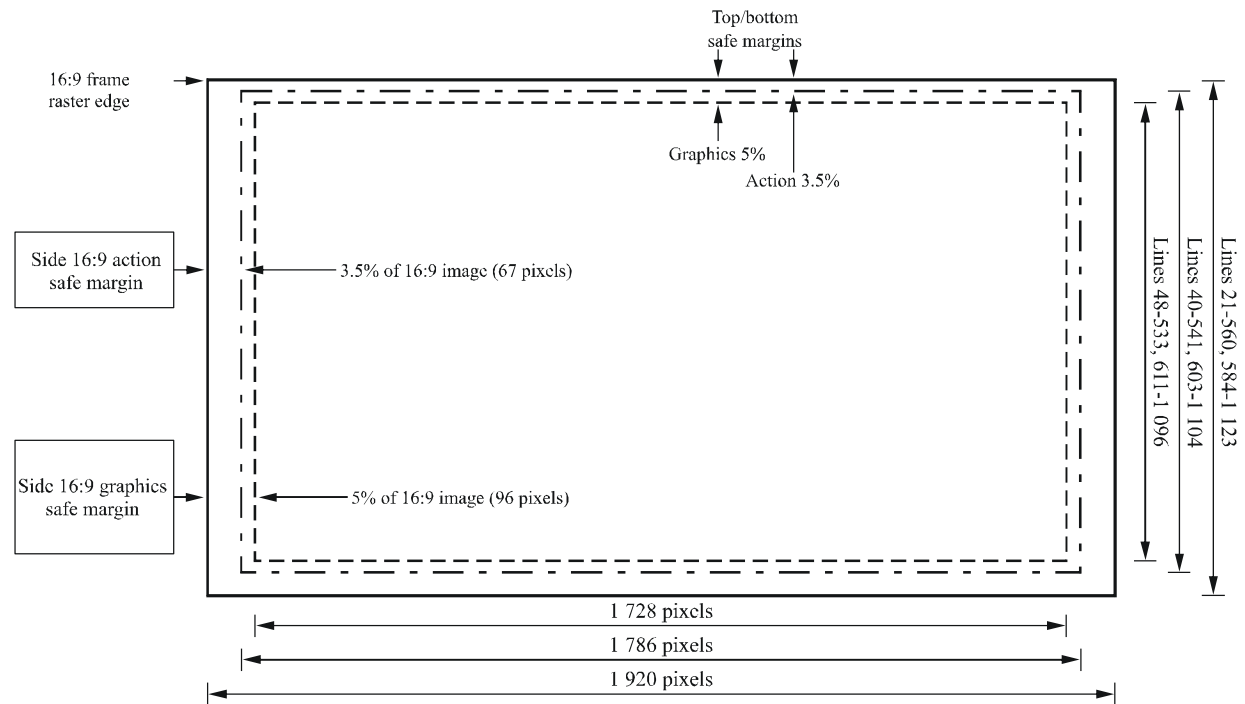
1848-01

Annex B

1. HDTV – SAFE ACTION AND SAFE GRAPHIC AREAS

- 1.1 The recommended HDTV 'Safe Action' and 'Safe Graphic' areas are defined by the following diagram.
- 1.2 Figure 1 is the HD transmission situation, 16:9 Shoot to Protect 16:9, with a line length of 1920 pixels. The safe areas are calculated to this base.
- 1.3 The overscan of displays is assumed to be 7% of overall picture width or height (i.e. 3.5% at each edge) but any one picture edge should not exceed 4% of total picture width or height.

FIGURE 1
16:9 shoot-to-protect the 16:9 full image, 1 080-line interlaced scan



Annex C

1. RECOMMENDED TEXT SIZE (lower frame supers)

Considering that it is desirable that text be readable under normal display and viewing conditions and that additionally in certain circumstances there may be a legal requirement for the text to be readable.

The following is recommended:

For standard definition images, the minimum height of the text lower case elements be 15 pixels / lines in 576 displayed lines on a professional monitor's raster.

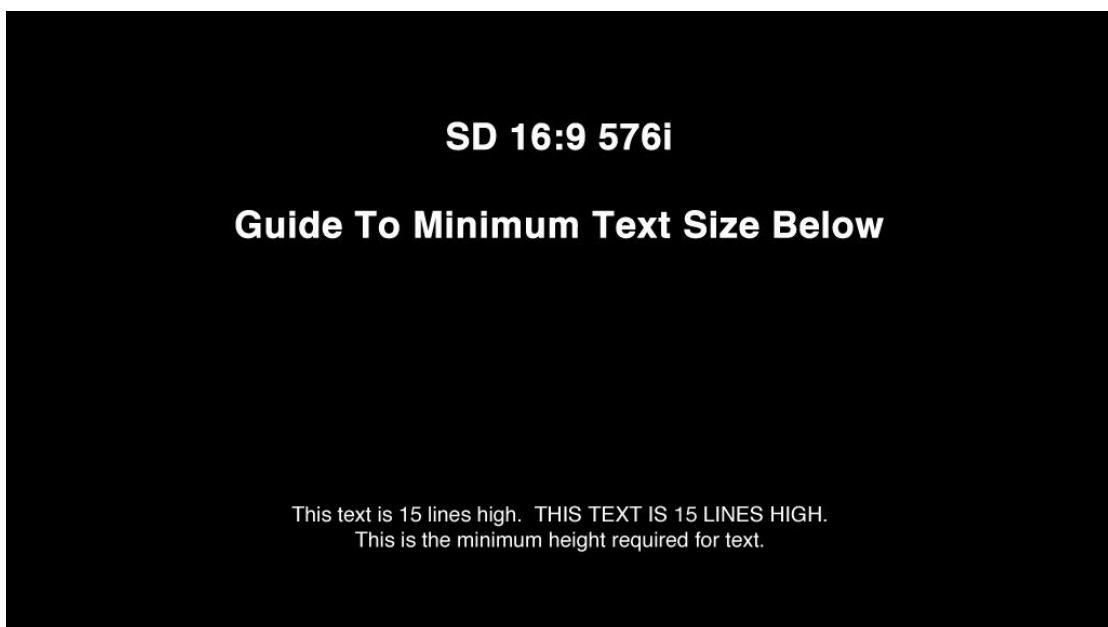


Figure 1: Minimum height for text in a Standard Definition Television Commercial

For high definition images, the minimum height of the text lower case elements should be 28 pixels / lines in 1080 displayed lines on a professional monitor's raster.



Figure 2: Minimum height for text in a High Definition Television Commercial

More information is available on the Free TV website at -
http://www.freetv.com.au/content_common/pg-engineering-guides.seo

Annex D

1. AUDIO LEVELS AND LOUDNESS

This annex provides advice on the relationship of this OP and Free TV Australia OP48 *Audio Levels and Loudness* which sets out the requirements for television advertisements (commercials) in relation to audio levels and loudness and applies to all commercials.

The elements of an advertising soundtrack, namely dialogue, music and effects are subject to various processes during production. Where these elements sit in the final sound track, with respect to audio levels and loudness, is the result of a final mix and effectively it is here that the loudness of the soundtrack will be principally influenced.

Most advertisement sound track pre-final mix elements are passed through devices such as *equalisers* and *compressors*, which are designed to enhance their *presence* i.e. to make them sound “up close” or brighter or more immediate. This is referred to as “processing”.

Material that has been compressed will sound louder, even though there is no increase in volume. This is because compression of a sound track raises the energy content of the sound by reducing the dynamic range (i.e. the difference between the loudest and softest levels of the sound) thereby making it more dense.

Many modern processors are not calibrated in dB, have constantly varying compression ratios and are likely to be multi-band devices which apply different amounts of compression in different frequency bands. This makes it difficult for sound track producers to accurately measure and quantify how much compression is applied to a soundtrack. However, prior to the final mix it is recommended that every effort should be made to ensure that the nature of any compression or equalisation used is such that the end result does not produce a sound track with a loudness characteristic which is incompatible with program material.

Broadcasters provide the following advice and recommendations for definition of a compression profile related to any processing applied AFTER the final mix. Figure 1 provides a diagrammatic representation of this simple profile. In all cases the loudness of the final mix should be measured using a ITU-R BS-1770-3⁶ compliant loudness meter to ensure conformance to the -24LKFs loudness level.

If any further peak limiting were to be necessary, it would be provided automatically by the transmission processor.

It is undesirable and not creatively responsible to simply use aggressive compression on the final mix to reach -24LKFS compliance. A degree of dynamic contrast in the soundtrack is encouraged and professional mixing techniques should be employed to achieve -24LKFS compliance.

⁶ Loudness measurements made on BS.1770-2 and BS.1770-3 meters are identical.

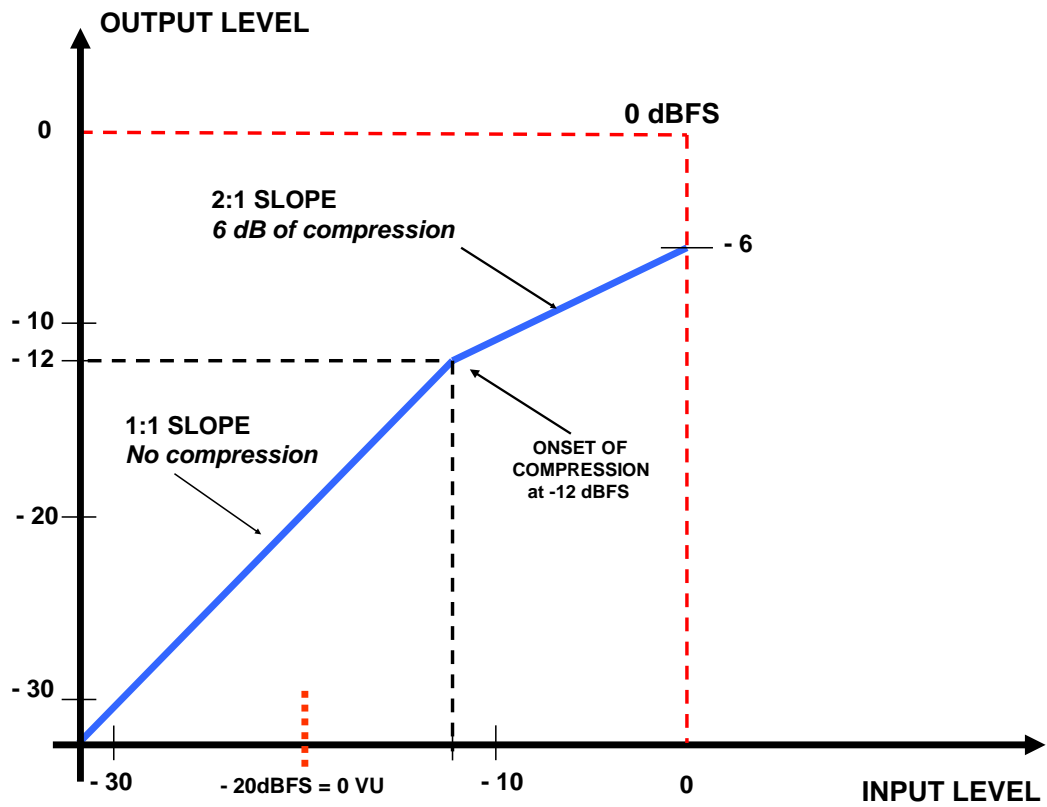


Figure 1