



DCI Global Technical Specifications

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GENERAL STANDARD DEFINITION TECHNICAL REQUIREMENTS 3

1. STANDARD DEFINITION VIDEO REQUIREMENTS 3

 1.1 Editing Codecs 3

 1.2 DCI Bug Clearance Specifications 3

 1.3 NTSC and PAL VIDEO SPECIFICATIONS 4

 Tape Leader 4

 1.3.1 Vertical Blanking 4

 1.3.2 Horizontal Blanking 4

 1.3.3 Composite Video White Levels 5

 1.3.4 Composite Chroma Levels 5

 1.3.5 Program Text Title Safe 5

 1.3.6 Aspect Ratio Guidelines 5

 1.4 Timecode Specifications 5

 1.4.1 NTSC 5

 1.4.2 PAL 5

2. GENERAL TECHNICAL REQUIREMENTS FOR HD 5

 2.2 HIGH DEFINITION VIDEO REQUIREMENTS 6

 2.2.1 DCI Bug Clearance Specifications 7

 2.2.2 Video White Levels 7

 2.2.3 Program Text Title Safe 7

 2.3 1080i 59.94 and 1080PsF 23.98 TECHNICAL SPECIFICATIONS 7

 2.3.1 Tape Leader 7

 2.3.2 Vertical Blanking 8

 2.3.3 Horizontal Blanking 8

 2.3.4 Timecode 8

 2.4 1080PsF 25 and 1080i 50 TECHNICAL SPECIFICATIONS 8

 2.4.1 Tape Leader 9

 2.4.2 Vertical Blanking 9

 2.4.3 Horizontal Blanking 9

 2.4.4 Timecode 9

3. AUDIO REQUIREMENTS 10

 3.1 Audio Phase 10

 3.2 Audio Levels 10

 3.3 Dynamic Compression 11

 3.4 Picture/Lip Sync 11

 3.5 Audio Track Configurations 11

 3.5.1 Audio for HD Programming 11

 3.5.2 Audio for SD Programming 12

 3.6 Broadcast Wave File Specifications 13

4. GRAPHICS FILE REQUIREMENTS 13

This document contains all technical specifications for NTSC, PAL, 1125/59.94 Interlace HD, 1125/23.98 Progressive Segmented HD, 1125/50Interlace HD, and 1125/25 Progressive Segmented HD DCI Technical Requirements. Refer to your contracted DCI Program Materials Exhibit for program's contracted technical requirement.

GENERAL STANDARD DEFINITION TECHNICAL REQUIREMENTS

1. STANDARD DEFINITION VIDEO REQUIREMENTS

Video footage should be acquired using formats acceptable to DCI on professional-quality media. Productions may be photographed using any of the following formats-

Standard Definition Formats	High Definition Formats	Film Formats
Sony Digital Betacam	Sony HDCAM	Super 16 MM Film
Sony Betacam SP	Sony HDCAM SR	35 mm film
Sony MPEG IMX 50 Mbps (tape)	Panasonic DVC PRO 100 Mbps (HD)	70 mm film (IMAX)
Sony MPEG IMX 50 Mbps (XDCAM)	Panasonic HD-D5 (Film Transfers)	
Panasonic DVC PRO 50 (tape)	Sony XDCAM HD (35 Mbps only)	
	HDV 25 Mbps and 19.4 Mbps	

Material not acquired in one of the acceptable formats must be approved by the Production Manager prior to the commencement of production. A comprehensive listing of acceptable camera systems and DCI's policies on different acquisition formats can be found in our Global Vendor Guide.

1.1 Editing Codecs

Video program material shall be produced using industry standards and professional workmanship. DCI requires that its production partners use only selected codecs and media types when working in nonlinear editing systems.

Systems that use uncompressed SDI or JFIF 1:1 are acceptable; as are systems that use MXF compliant MPEG-2 I-frame media at 50 Mbps. Systems that use Motion JPEG codecs, DV 25 media, or JFIF at ratios higher than 1:1 are not acceptable for online output. If there are questions about the qualifications of a particular editing system or type of media, please contact the DCI Production Technical Operations group.

Acceptable Editing Codecs

Codec	Bit rate or Ratio
Uncompressed 601 digital	270 Mbps
MPEG-2 MXF	50 Mbps I-frame
JFIF (Meridien/Symphony)	1:1 SD
DVCPRO 50	50 Mbps 4:2:2

Unacceptable Editing Codecs

Codec	Bit rate or Ratio
DV 4:1:1 or 4:2:0	25 Mbps
JFIF (Meridien/Symphony)	Ratios greater than 1:1
Motion JPEG (AVR)	AVR 2 to AVR 77
DVCPRO 25	25 Mbps 4:1:1

1.2 DCI Bug Clearance Specifications

DCI requires that lower third and other graphic elements containing text be kept clear of the network on-air branding logo, or "bug", to prevent a conflict that makes the text unreadable. The following areas of the picture may not contain static text information, although moving text elements may pass through the area as long as their final position lies outside the reserved area. All horizontal measurements are given in microseconds, with the start of the measurement at the end of the last cycle of horizontal color burst.

No text shall remain in the space between 38.7 microseconds and 50.0 microseconds between lines 190 and 243 (field 1) NTSC, lines 226 and 290 (field 1) PAL. This space represents a large portion of the lower right corner of the television image. In addition, to prevent interference with international IDs, text elements shall not be placed between 37 microseconds and the end of active picture between lines 21 and 81 (field 1) NTSC, lines 25 and 90 (field 1) PAL. This area represents the entire upper-right corner of the screen. Reference TIFF files outlining the bug clearance area will be provided on request.

This document contains all technical specifications for NTSC, PAL, 1125/59.94 Interlace HD, 1125/23.98 Progressive Segmented HD, 1125/50 Interlace HD, and 1125/25 Progressive Segmented HD DCI Technical Requirements. Refer to your contracted DCI Program Materials Exhibit for program's contracted technical requirement.

1.3 NTSC and PAL VIDEO SPECIFICATIONS

Master and source videotapes must meet manufacturer's standards for tape format interchange. All tapes should be recorded on VTRs that have been maintained in compliance with the manufacturer's instructions and have been accurately calibrated per the manufacturer's specifications. Tapes shall be free of dropouts, flash frames, and other visible artifacts.

Tape Leader

Industry-standard reference signals should be provided at the beginning of any tape delivered to DCI. The arrangement of the reference signals should be as follows-

Starting Code	Ending Code	Duration	Video	Audio
NTSC 00:58:30:00 PAL 09:58:30:00	NTSC 00:59:30:00 PAL 09:59:30:00	NTSC 1:00:00 PAL 1:00:00	SMPTE Color Bars at 75% saturation	Reference tone at 1 kHz on channels 1 and 2, reference tone of 400 Hz on channels 3 and 4. Reference tone should be at +4dBu with a 600 ohm impedance load (Equal to -20 dBFS)
NTSC 00:59:30:00 PAL 09:59:30:00	NTSC 00:59:35:00 PAL 09:59:35:00	NTSC 00:05:00 PAL 00:05:00	Black	Silence
NTSC 00:59:35:00 PAL 09:59:35:00	NTSC 00:59:50:00 PAL 09:59:50:00	NTSC 00:15:00 PAL 00:15:00	Program Slate	Silence
NTSC 00:59:50:00 PAL 09:59:50:00	NTSC 00:59:58:00 PAL 09:59:58:00	NTSC 00:08:00 PAL 00:08:00	Video Countdown from 10 to 2	Audible tone at each 1 second interval
NTSC 00:59:58:00 PAL 09:59:58:00	NTSC 00:59:58:01 PAL 09:59:58:01	NTSC 00:00:01 PAL 00:00:01	White	Tone (Two-Pop)
NTSC 00:59:58:01 PAL 09:59:58:01	NTSC 00:59:59:29 PAL 09:59:59:24	NTSC 00:01:28 PAL 00:01:23	Black	Silence
NTSC 1:00:00:00 PAL 10:00:00:00			Program begins	Program begins

1.3.1 Vertical Blanking

Vertical blanking for NTSC should adhere to SMPTE specification 170M. Discovery will accept vertical blanking that falls between 17 and 22 scan lines when measured as a composite NTSC signal. PAL projects should fall within EBU specifications, adhering to the ITU-R standard BT.470-6. Discovery will accept programs with vertical blanking measurements of between 23 and 26 scan lines in the PAL standard.

1.3.2 Horizontal Blanking

Horizontal blanking should adhere to SMPTE specification 170M. PAL projects should fall within EBU specifications, adhering to the ITU-R standard BT.470-6. Discovery will accept horizontal blanking widths of between 10.4 and 12.0 microseconds (PAL 11.5 and 13.0) with a front porch measurement of 1.0 to 2.0 microseconds and a distance of 9.4 to 10.0 (PAL 10.5 to 11) microseconds from the falling edge of sync to the end of the horizontal blanking.

For NTSC programs, Discovery measures the start of blanking when the edge of the signal falls below 7.5 IRE, and the end of blanking when the signal rises above 7.5 IRE.

For PAL programs, Discovery measures the start of blanking when the edge of the signal crosses below 0 millivolts and the end of blanking as the signal rises above 0 millivolts. Black edges on the image will be measured as program blanking, and may result in blanking measurements being wide.

1.3.3 Composite Video White Levels

Composite video white levels for NTSC should not exceed 100 IRE units, and program black levels should not extend below 7.5 IRE units. Neither the program luminance whites nor blacks should be clipped excessively. For PAL programs white levels should not exceed 700 millivolts, and program black levels should not extend below 0 mv. Program white and black levels should not be clipped excessively.

1.3.4 Composite Chroma Levels

Composite chroma levels for NTSC should not exceed 120 IRE when measured in the composite color space using a waveform monitor with a flat filter. Illegal levels may be clipped to prevent transmission overmodulation, resulting in a loss of color fidelity and detail. For PAL projects chroma levels should not exceed 840 millivolts and may be clipped to prevent transmission overmodulation. Discovery standards do not distinguish between shows of digital component origination or those of composite origination when evaluating encoded chrominance levels. If digital production methods are used, it is the responsibility of the vendor to ensure that the encoded signal meets the composite guidelines. All programs will be judged against these analog composite guidelines, irrespective of their native origination. In PAL projects, PAL composite gamut legality is also required of all programs, regardless of origination.

1.3.5 Program Text Title Safe

Program text should be placed within the text safe area as defined in SMPTE RP 218. For NTSC (525) signals, the safe title area is the central 80% of the picture, an area of 576 by 384 pixels beginning 72 pixels from the left edge and 47 pixels from the top of the image and ending 648 pixels from the left edge and 432 pixels from the top of the image. For PAL (625) signals, the safe title area is the central 80% of the picture, an area of 576 by 460 pixels beginning 72 pixels from the left edge and 58 pixels from the top of the image and ending 648 pixels from the left edge and 518 pixels from the top of the image.

1.3.6 Aspect Ratio Guidelines

Images acquired in the 16:9 aspect ratio must be protected for 14:9 viewing.

16:9 NTSC Letterbox: 181 (field 1) scan lines, picture starts at line 50 and ends at 233

16:9 PAL Letterbox: 216 scan lines, picture starts at line 58 and ends at 275

If any images are delivered in letterbox form the masking at the top and bottom of the letterbox must be clean. No partial lines of picture should be visible at the edges of the letterbox.

1.4 Timecode Specifications

1.4.1 NTSC

SMPTE drop frame time code is mandatory. Program start time code must read 01:00:00:00. Time code should be continuous, without error, and contain the appropriate flagging information in adherence with SMPTE 12M.

All time code references, i.e. vertical interval time code, (VITC), longitudinal time code. (LTC) or audio sector time code on Digital formats (ASTC) must match exactly. VITC must be placed on lines 16 and 18 of the NTSC vertical blanking signal.

1.4.2 PAL

EBU Time code is mandatory. Program start time code must read 10:00:00:00. Time code should be continuous, free of errors, and contain all appropriate flagging bits. All time code references, i.e. vertical interval time code, (VITC), longitudinal time code. (LTC) or audio sector time code on Digital formats (ASTC) must match exactly. VITC must be placed on lines 19 and 21 of the PAL vertical blanking signal.

2. GENERAL TECHNICAL REQUIREMENTS FOR HD

In an effort to increase high definition production worldwide, Discovery is now moving to a tiered approach for its high definition programs. The tiers: Gold, Silver, and Bronze, represent different levels of image quality and resolution. Each tier employs a different set of tools for acquisition, production, and postproduction. Your production tier information is provided in the deliverables section of your contract.

This document contains all technical specifications for NTSC, PAL, 1125/59.94 Interlace HD, 1125/23.98 Progressive Segmented HD, 1125/50 Interlace HD, and 1125/25 Progressive Segmented HD DCI Technical Requirements. Refer to your contracted DCI Program Materials Exhibit for program's contracted technical requirement.



DCI TECHNICAL SPECIFICATIONS

Gold tier programming uses the highest quality production and acquisition tools, resulting in images that take full advantage of the resolution of the HD medium. These programs are brand-defining series that are visually driven. They contain minimal unconverted material and use high-end HD cameras as their primary acquisition system. Editing is done in the uncompressed HD domain or using minimally compressed systems that preserve the full 1920 by 1080 image.

Silver tier programming uses professional-grade HD equipment that delivers the viewer an impressive HD image. However, the Silver tier allows for more frequent use of HDV and unconverted footage as a concession to restraints on the production environment and on the production budget. Silver programs may be edited using somewhat compressed HD systems that may not preserve a full 1920 by 1080 image area.

Bronze tier programming uses professional or “prosumer” grade HD equipment that delivers a tolerable HD image to the home viewer. Programs use the bronze standard cameras and acquisition systems when using larger cameras represents a threat to the health or safety of the cast and crew or when the nature of shooting environment presents a high risk of camera damage or loss. These are productions shot under adverse and exceptional circumstances. HDV cameras may be used freely for these programs and represent up to 100% of the program’s content. Unconverted footage may also be used with minimal restrictions. Bronze programs may be edited using highly compressed HD systems that may not preserve a full 1920 by 1080 image area.

2.2 HIGH DEFINITION VIDEO REQUIREMENTS

Video Footage should be acquired using formats acceptable to DCI on professional-quality media.

Material not acquired in one of the acceptable formats must be approved by the Production Manager prior to the commencement of production. A comprehensive listing of acceptable camera systems and DCI’s policies on different acquisition formats can be found in DCI’s Global Vendor Guide.

Productions may be photographed using any of the following formats-

Tier	Acceptable Acquisition Systems	Unconverted Content Standards	HDV Usage Standards	Acceptable Editing Codecs
Gold	Sony HDCAM Sony HDCAM SR 35 mm Film Datacine Panasonic DVCPRO HD	Unconverted content may account for up to 10% of the program’s content. No more than one minute contiguous unconverted footage. Upconversion footage should only be used when absolutely necessary and should come from professional-quality SD formats.	Minimal use of HDV, not to exceed 10% of the final program. Must use approved HDV cameras.	Uncompressed 8 bit / 10 bit Avid DNxHD 220/185/175
Silver	Sony HDCAM Sony HDCAM SR 35 mm Film Datacine 16 mm Film Datacine Panasonic DVCPRO HD Sony XDCAM HD (35 Mbps only)	Unconverted content may account for up to 20% of the program’s content. No more than one minute contiguous unconverted footage. Upconversion may be used to allow for lipstick cameras and can include consumer-source footage as needed.	Moderate use of HDV, not to exceed 30% of the final program. Must use approved HDV cameras.	Uncompressed 8 bit / 10 bit Avid DNxHD 220/185/175 Avid DNxHD 145/120/115 DVCPRO HD 1280 X 1080 DVCPRO HD 960 X 720
Bronze	Sony HDCAM Sony HDCAM SR 35 mm Film Datacine 16 mm Film Datacine Panasonic DVCPRO HD Sony XDCAM HD (35 Mbps only) HDV (1080i and 720p)	Unconverted material may be used as needed and should not account for more than 30% of a program’s total content.	Unlimited use. Must use approved HDV cameras.	Uncompressed 8 bit / 10 bit Avid DNxHD 220/185/175 Avid DNxHD 145/120/115 DVCPRO HD 1280 X 1080 DVCPRO HD 960 X 720 XDCAM HD (35 Mbps) HDV Native (25 Mbps, 19.4 Mbps)

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Video program material shall be produced using industry standard and accepted norms for good practice and workmanship. DCI requires that its production partners use only selected codecs and media types when working in nonlinear editing systems. Systems that use uncompressed HDSDI are acceptable, as are systems that use the native codecs for the DVCPRO HD (Silver and Bronze programs only) and HDCAM formats. Systems that are incapable of using HD-resolution media are not acceptable for online output. If there are questions about the qualifications of a particular editing system or type of media, please contact the DCI Production Technical Operations group.

2.2.1 DCI Bug Clearance Specifications

DCI requires that lower third and other graphic elements containing text be kept clear of the network on-air branding logo, or "bug", to prevent a conflict that makes the text unreadable. The following areas of the picture may not contain static text information, although moving text elements may pass through the area as long as their final position lies outside the reserved area. All horizontal measurements are given in microseconds, with the start of the measurement at the end of the last cycle of horizontal color burst. All horizontal measurements are given in microseconds, with the start of the measurement at the SAV reference pulse.

No static text shall remain in the space between 21 microseconds and 24.5 microseconds between lines 459 and 541 (field 1) in a 1080i 59.94 signal. Broadcast resolution TIF files outlining the bug safe area for 1080 interlaced and other HD formats will be provided on request.

2.2.2 Video White Levels

Video white levels should not exceed 700mV for component signals, and program black levels should not extend below 0 mV. Neither the program luminance whites nor blacks should be clipped excessively. For color difference signals R-Y and B-Y, levels shall not exceed 700 mV or fall below 0 mV when measured at a 350 mV offset.

2.2.3 Program Text Title Safe

Program text should be placed within the text safe area as defined in SMPTE RP 218. For 1080 line signals, the safe title area is the central 80% of the picture, an area of 1536 by 864 pixels beginning 192 pixels from the left edge and 108 pixels from the top of the image and ending 1728 pixels from the left edge and 972 pixels from the top of the image.

2.3 1080i 59.94 and 1080PsF 23.98 TECHNICAL SPECIFICATIONS

1125 Line/ 59.94 Hz line rate Interlace and 1125 Line/ 23.98 Hz line rate Progressive Segmented High Definition Video Specifications

All video shall conform to SMPTE 274M, *1920 x 1080 Scanning and Analog and Parallel Digital Interfaces for Multiple Picture Rates* and SMPTE240M, *Signal Parameters – 1125- line High Definition Productions Systems* broadcast standards. All video information must be compliant with either SMPTE 260M, *1125/60 High-Definition Production System – Digital Representative and Bit-Parallel Interface*, or SMPTE 292M *Bit –Serial Digital Interface for High-Definition Systems*.

Master and source videotapes must meet manufacturer's standard for tape format interchange. Source tapes must be HDCAM SR, at the 1080 interlace 59.94 Hz line rate or 1080 Progressive Segmented 23.98 Hz line rate. All tapes should be recorded on VTRs that have been maintained in compliance with the manufacturer's instructions and have been accurately calibrated per the manufacturer's specifications. Tapes shall be free of dropouts, flash frames, and glitches. If acquisition is made by film stock, 35mm film with an aspect ratio of 1.77 (16 x 9) is required.

Video shall adhere to SMPTE 274M standards, table 1: refer there for more information. 1035 line material is not acceptable for newly acquired program elements.

2.3.1 Tape Leader

This document contains all technical specifications for NTSC, PAL, 1125/59.94 Interlace HD, 1125/23.98 Progressive Segmented HD, 1125/50Interlace HD, and 1125/25 Progressive Segmented HD DCI Technical Requirements. Refer to your contracted DCI Program Materials Exhibit for program's contracted technical requirement.



Industry standard reference signals should be provided at the beginning of any tape delivered to DCI. The arrangement of the reference signals should be as follows-

Starting Code	Ending Code	Duration	Video	Audio
00:58:30:00	00:59:30:00	1:00:00	SMPTE Color Bars at 75% saturation	Reference tone at 1 kHz on channels 1 and 2, reference tone of 400 Hz on channels 3 and 4. Reference tone should be at +4dBu with a 600 ohm impedance load (Equal to -20 dBFS)
00:59:30:00	00:59:35:00	00:05:00	Black	Silence
00:59:35:00	00:59:50:00	00:15:00	Slate	Silence
00:59:50:00	00:59:58:00	00:08:00	Video Countdown from 10 to 2	Audible tone at each 1 second interval
(59.94)00:59:58:00 (23.98)00:59:58:00	00:59:58:01 00:59:58:01	00:00:01	White	Tone (Two Pop)
(59.94)00:59:58:01 (23.98)00:59:58:01	00:59:59:59 00:59:59:23	00:01:59	Black	Silence
1:00:00:00			Program begins	Program begins

2.3.2 Vertical Blanking

Vertical blanking should fall within SMPTE 274M specifications, as stated in section 14 *Analog Synch* and section 15 *Analog Interface* and in ITU-R specification BT.709-4. The vertical blanking interval should equal lines 1-20 and lines 561-563 of the first field and lines 564-583 and lines 1124-1125 in the second field for 1080i 59.94 programs. For 1080PsF 23.98 programs, vertical blanking interval should equal lines 1-41 and lines 1122-1125.

2.3.3 Horizontal Blanking

Horizontal blanking should fall within SMPTE 274M specifications, as stated in section 14 *Analog Synch* and section 15 *Analog Interface* and ITU-R specification BT.709-4. For 1080i 59.94 programs horizontal blanking should be between 280 clock periods and a maximum of 292 clock periods, creating a blanking width of between 3.775 microseconds and 3.935 microseconds when a clock period is equal to 13.48 nanoseconds. For 1080PsF 23.98 programs, horizontal blanking should be between 830 clock periods and a maximum of 842 clock periods.

2.3.4 Timecode

SMPTE drop frame timecode is mandatory for 1080i 59.94 programs and SMPTE non drop frame timecode for 1080PsF 23.98 programs. Time code shall adhere to SMPTE 12M, "Time and Control Code". Program start time code must read 01:00:00:00 (01;00;00;00 for drop frame programs). Time code should be continuous and free of errors, containing all appropriate flagging bits. All time code references, i.e. vertical interval time code, (VITC), longitudinal time code. (LTC) or audio sector time code on Digital formats (ASTC) must match exactly.

2.4 1080PsF 25 and 1080i 50 TECHNICAL SPECIFICATIONS

1125 Line/ 25 Hz line rate Progressive and 1125 Line/ 50 Hz line rate Interlace High Definition Video Specifications

All video shall conform to SMPTE 274M, *1920 x 1080 Scanning and Analog and Parallel Digital Interfaces for Multiple Picture Rates* and SMPTE240M, *Signal Parameters – 1125- line High Definition Productions Systems* broadcast standards. All video information must be compliant with either SMPTE 260M, *1125/60 High-Definition Production System – Digital Representative and Bit-Parallel Interface*, or SMPTE 292M *Bit –Serial Digital Interface for High-Definition Systems*.

Master and source videotapes must meet manufacturer's standard for tape format interchange. Source tapes must be HDCAM SR, at the 1080 progressive 25 Hz line rate or at the 1080 interlace 50 Hz line rate. All tapes should be recorded on VTRs that have been maintained in compliance with the manufacturer's instructions and have been accurately calibrated per the manufacturer's specifications. Tapes shall be free of dropouts, flash frames, and glitches. If acquisition is made by film stock, 35mm film with an aspect ratio of 1.77 (16 x 9) is required.

This document contains all technical specifications for NTSC, PAL, 1125/59.94 Interlace HD, 1125/23.98 Progressive Segmented HD, 1125/50Interlace HD, and 1125/25 Progressive Segmented HD DCI Technical Requirements. Refer to your contracted DCI Program Materials Exhibit for program's contracted technical requirement.

Video shall adhere to SMPTE 274M standards; table 1. Refer there for further information.

1035 line material is not acceptable for newly shot pieces.

2.4.1 Tape Leader

Industry standard reference signals should be provided at the beginning of any tape delivered to DCI. The arrangement of the reference signals should be as follows-

Starting Code	Ending Code	Duration	Video	Audio
09:58:30:00	09:59:30:00	1:00:00	SMPTE Color Bars at 75% saturation	Reference tone at 1 kHz on channels 1 and 2, reference tone of 400 Hz on channels 3 and 4. Reference tone should be at +4dbu with a 600 ohm impedance load (Equal to -20 dBFS)
09:59:30:00	09:59:35:00	00:05:00	Black	Silence
09:59:35:00	09:59:50:00	00:15:00	Program Slate	Silence
09:59:50:00	09:59:58:00	00:08:00	Video Countdown from 10 to 2	Audible tone at each 1 second interval
09:59:58:00	09:59:58:001	00:00:01	White	Tone (Two Pop)
09:59:58:01	09:59:58:24	00:01:24	Black	Silence
10:00:00:00			Program begins	Program begins

2.4.2 Vertical Blanking

Vertical blanking should fall within SMPTE 274M specifications, as stated in section 14 *Analog Synch* and section 15 *Analog Interface* and in ITU-R specification BT.709-4. For 1080PsF 25 programs the vertical blanking interval should equal lines 1-41 and lines 1122-1125. For 1080i 50 programs, the vertical blanking interval should equal lines 1-20 and lines 561-563 of the first field and lines 564-583 and lines 1124-1125 in the second field.

2.4.3 Horizontal Blanking

Horizontal blanking should fall within SMPTE 274M specifications, as stated in section 14 *Analog Synch* and section 15 *Analog Interface* and in ITU-R specification BT.709-4. For 1080PsF 25 projects, horizontal blanking should be between 714 clock periods and a maximum of 726 clock periods. For 1080i 50 projects, horizontal blanking should be between 280 clock periods and a maximum of 292 clock periods, creating a blanking width of between 3.775 microseconds and 3.935 microseconds when a clock period is equal to 13.48 nanoseconds.

2.4.4 Timecode

EBU 25-frame timecode is mandatory. Timecode shall adhere to SMPTE 12M, *Time and Control Code*. Program start time code must read 10:00:00:00. Time code should be continuous and free of errors, containing all appropriate flagging bits. All time code references, i.e. vertical interval time code, (VITC), longitudinal time code. (LTC) or audio sector time code on Digital formats (ASTC) must match exactly.

This document contains all technical specifications for NTSC, PAL, 1125/59.94 Interlace HD, 1125/23.98 Progressive Segmented HD, 1125/50Interlace HD, and 1125/25 Progressive Segmented HD DCI Technical Requirements. Refer to your contracted DCI Program Materials Exhibit for program's contracted technical requirement.



3. AUDIO REQUIREMENTS

Audio Program Material shall be produced using industry standard and accepted norms for good practice and workmanship. The audio portion of master and source audio, as well as file-based deliverables, must contain minimal unintentional noise, static, dropouts, square-wave distortion, heavy dynamic compression, or perceivable brick wall limiting. As a broadcaster of primarily speech-driven content, Discovery has designed its spec on the assumption that a program mix will be balanced in such a way that narrative, storytelling speech always takes precedence above music and sound effects.

3.1 Audio Phase

All stereo content must be fully mono compatible. When the left and right stereo channels are actively summed to mono, there should be no phase cancellation, or discernible change in fidelity. Use of stereo-enhancement software or hardware should therefore be employed in such a manner that enhances the stereo experience, without compromising mono playback in any way.

3.2 Audio Levels

Audio Levels are evaluated by means of three measurements: peak program (PPM), signal average (RMS/VU), and dialog loudness (LeQ(A)). Program audio must adhere to the following standards for all three measurements.

3.2.1 Peak Program Levels

Peak program levels are evaluated using a digital TruePeak meter with a 0ms (instantaneous) rise response. On full mix tracks, peak audio levels may not rise above -10 dBFS at any point during the program for NTSC content, or above -8 dBFS for PAL content.

3.2.2 Signal Average

Signal average is evaluated using the Type I RMS/VU ballistic, with a 300 millisecond per 20dB broadband (unweighted) rise response. To ensure that speech signals occupy the optimal dynamic range for broadcast, RMS/VU levels for narrative speech should consistently maintain the space between -32 and -20 dBFS. Dialog which measures below -32 dBFS RMS/VU may experience transmission anomalies or become inaudible on-air, and is therefore discouraged. RMS/VU levels, whether for speech or nonspeech content, may not rise above -17 dBFS at any point during the program.

3.2.3 Program Dialog

Program dialog must be analyzed using a Dolby model LM100 Broadcast Loudness Meter. For a detailed explanation of Discovery’s application of the LM100, please refer to the Vendor Guide. The LM100 provides the capability to measure the perceived loudness of human speech discretely within a fully mixed program.

When measured on an LM100 set to “all” or “stereo” operation, with Dialog Intelligence enabled, short term dialog levels should report values between -32 and -22, and long term levels should reside between -26 and -28 for the entire program.

DCI utilizes the Dolby Universal Remote application, in combination with the LM100, to take and record these measurements.

When measuring a single (monaural) channel of audio on the LM100, the reported dialog level will be 3dB lower than if the same signal were to be doubled and measured as a stereo signal. Consequently, the dialog level standards for monaural tracks are 3dB lower.

DCI AUDIO LEVEL SPECIFICATIONS

Track Type	PPM 0ms TRUE PEAK	RMS/VU 300ms/20dB	LM100 Dialog Level SHORT TERM	LM100 Dialog Level INFINITE TERM
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DCI TECHNICAL SPECIFICATIONS

Full Mix (stereo or dual mono) NTSC	≤ -10 dBFS	≤ -17 dBFS	Between -32 and -22	-28 to -26
Full Mix (single channel mono) NTSC	≤ -10 dBFS	≤ -17 dBFS	Between -35 and -25	-31 to -29
Full Mix (stereo or dual mono) PAL	≤ -8 dBFS	≤ -14 dBFS	Between -29 and -19	-25 to -23
Full Mix (single channel mono) PAL	≤ -8 dBFS	≤ -14 dBFS	Between -32 and -22	-28 to -26
5.1 Surround Mix Tracks	≤ -3 dBFS	UNRESTRICTED	Between -32 and -22	-28 to -26
Element tracks (Music, FX, Mix Minus Narration, Dialog, Narration)	≤ -3 dBFS	UNRESTRICTED	UNRESTRICTED or N/A	UNRESTRICTED or N/A

3.3 Dynamic Compression

There exists a common belief that a “hyped” mixing style will receive a more positive viewer response than one whose natural dynamics are in tact. However, this proves untrue, most especially with long-form programming. Program audio should therefore mixed with a dynamic range that is comfortable to experience for sustained periods of time, but is neither as dynamic as mixes tailored for film or theater playback, nor heavily hyped or compressed.

For a detailed explanation of Discovery’s policy on dynamic compression, please refer to the Vendor Guide.

Any situation in which a content provider is unable to maintain the above-specified volume/loudness ranges and/or standards for quality, areas of heavy dynamic compression, as well as intentional use of noise, distortion, static or dropouts for artistic effect, should be explained and noted within the delivered program master materials.

3.4 Picture/Lip Sync

Audio elements should match video image. There should be no detectable error in the timing of visual action with associated sound.

3.5 Audio Track Configurations

3.5.1 Audio for HD Programming

Discovery requires different audio track configurations for HD programs based on their quality standard. Programs that adhere to the gold standard, as defined previously in this document, must deliver a 5.1 mix along with several secondary elements. Programs that adhere to the bronze or silver standard need only provide audio that meets the standard stereo deliverable.

Primary audio tracks are to be recorded on the videotape master, but some of the secondary tracks must be delivered as broadcast WAV files on data DVDS. Broadcast wave file specifications and naming conventions are listed in section 3.6.

All 5.1 Surround Sound mixes should be delivered in standard “5.1+2” format and adhere to the SMPTE standard 320M-1999 for surround track arrangement:

- 1) L (5.1 Mix Left)
- 2) R (5.1 Mix Right)
- 3) C (Center Channel)
- 4) LFE (Low Frequency Effects, or Subwoofer)
- 5) Ls (Left Surround)
- 6) Rs (Right Surround)

This document contains all technical specifications for NTSC, PAL, 1125/59.94 Interlace HD, 1125/23.98 Progressive Segmented HD, 1125/50Interlace HD, and 1125/25 Progressive Segmented HD DCI Technical Requirements. Refer to your contracted DCI Program Materials Exhibit for program’s contracted technical requirement.



- 7) Stereo Left
- 8) Stereo Right

Stereo and Surround content should be acoustically level-matched, and consequently should measure identically on a Dolby LM100 Loudness Meter.

HDGold Tier- English 5.1 Surround Mix

Track	Stereo/Mono	Description
1	5.1	5.1 Original Language Mix, Left Channel
2	5.1	5.1 Original Language Mix, Right Channel
3	5.1	5.1 Original Language Mix, Center Channel
4	5.1	5.1 Original Language Mix, LFE (SUB) Channel
5	5.1	5.1 Original Language Mix, Left Surround Channel
6	5.1	5.1 Original Language Mix, Right Surround Channel
7	Stereo	Full Mix, Original Language, Left
8	Stereo	Full Mix, Original Language, Right
9	Stereo	Mix Minus Narration, Undipped Left
10	Stereo	Mix Minus Narration, Undipped Right
11	Stereo	Music and Effects, Undipped Left
12	Stereo	Music and Effects, Undipped Right
BWAV	Stereo	Music, Undipped, Left
BWAV	Stereo	Music, Undipped, Right
BWAV	Stereo	Effects + Background (noninterview) Dialogue, Undipped
BWAV	Stereo	Interview Dialogue, Undipped
BWAV	Stereo	Narration and Translations, Original Language

HD Silver and Bronze Tier

Track	Stereo/Mono	Description
1	Stereo	Full Mix, Original Language, Left
2	Stereo	Full Mix, Original Language, Right
3	Stereo	Mix Minus Narration, Undipped, Left
4	Stereo	Mix Minus Narration, Undipped, Right
5	Stereo	Music, Undipped, Left
6	Stereo	Music, Undipped, Right
7	Mono	Effects and Background Dialogue, Undipped
8	Mono	Interview Dialogue, Undipped
9	Mono	Narration, Original Language

Tracks 10-12 of the SR are not used in this configuration.

3.5.2 Audio for SD Programming

All stereo stem (source element) tracks should be submitted without dips for narration or dialog, at *equivalent program volume level*; i.e. in areas of nonspeech, such as during a music passage, stem elements should be at a level generally identical to the full mix.

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Primary audio tracks are to be recorded on the videotape master, but some of the secondary tracks must be delivered as broadcast WAV files on data DVDS. Broadcast wave file specifications and naming conventions are listed in section 3.6.

IMX and BWA V for SD Programs

Track	Stereo/Mono	Description
1	Stereo	Full Mix, Original Language, Left
2	Stereo	Full Mix, Original Language, Right
3	Stereo	Mix Minus Narration, Undipped Left
4	Stereo	Mix Minus Narration, Undipped Right
5	Stereo	Music, Undipped, Left
6	Stereo	Music, Undipped, Right
7	Stereo	Effects + Background (noninterview) Dialogue, Undipped
8	Stereo	Interview Dialogue, Undipped
BWA V	Stereo	Narration and Translations, Original Language

3.6 Broadcast Wave File Specifications

BWA V files should have a naming convention that follows the program’s PAID, the track description behind that, and a file extension of BWF. For example, the music BWF file for program 123456.123.12.123 would have the filename “123456.123.12.123_Music.BWF”

BWA V files should have a sample rate of 48k and a bit depth rate of 16 bits. Timecode should match master videotape exactly. Broadcast wave files should be delivered as stereo files, even if the track content is inherently mono, such as the case of narration. This prevents inadvertent level changes during a mono to stereo or stereo to mono conversion during file importing or exporting.

4. GRAPHICS FILE REQUIREMENTS

Graphics files must be delivered on a PC compatible data DVD (DVD-R). All moving graphic elements should be delivered as Quicktime movies in the native resolution of the project and in the “Animation” codec. Field dominance should be “even”, or “lower field first”. Still image files should be delivered as uncompressed TIFF files in 8 bit RGB mode with embedded alpha channel information.

Format	Square Pixel 4X3	Square Pixel 16:9	Non-Square Pixel 4:3 and 16:9
NTSC	648x486	864x486	720x486
PAL	768x576	1050x576	720x576
HD (1080)	N/A	1920x1080	N/A

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