

The Walt Disney Studios

Disney Digital 3-D™

**Dual Projection Stereoscopic
Requirements**

V1.00

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Table of Contents

DOCUMENT LANGUAGE CONVENTION.....	1
1. DUAL PROJECTION STEREOSCOPIC REQUIREMENT	
1.1. GENERAL REQUIREMENTS	2
1.1.1. <i>During the Trial Period</i>	2
1.2. GLASSES REQUIREMENTS.....	4
1.2.1. <i>General Requirements</i>	4
1.2.2. <i>Domestic Glasses</i>	4
1.2.2.1. Single Use Glasses	4
1.2.2.2. Re-usable Glasses	4
1.2.3. <i>International</i>	5
1.2.3.1. Single Use Glasses	5
1.2.3.2. Re-usable Glasses	5
1.3. INSTALLATION AND SETUP SPECIFICATIONS	6
1.3.1. <i>Dual Stack Projector System</i>	6
1.3.2. <i>Refresh Rate</i>	6
1.3.3. <i>Macros</i>	6
1.3.4. <i>Y',C'_B,C'_R vs. Y',C'_X,C'_Z</i>	6
1.3.5. <i>Polarization Crosstalk</i>	6
1.3.6. <i>Link Encryption and Forensic Markings</i>	6
1.3.7. <i>Initial Alignment Of Light Levels</i>	7
1.3.8. <i>Color and Light Alignment</i>	7
1.4. OPERATIONAL STANDARDS.....	8
1.4.1. <i>Crosstalk Cancelation</i>	<i>Error! Bookmark not defined.</i>
1.4.2. <i>Disney Digital 3-D™ Alignment Chart</i>	8
1.4.3. <i>Run-Through</i>	8
1.4.4. <i>Contacting Distribution Vendor</i>	8
1.4.5. <i>In-Theatre Supplies</i>	8
1.4.6. <i>Transition From 2-D to 3-D</i>	8
1.4.7. <i>3-D System at The Walt Disney Studio</i>	9
1.4.8. <i>Service Calls and Response Time</i>	9
1.4.9. <i>Trained And Certified Projectionist</i>	9
1.4.10. <i>Operating Efficiency</i>	9
1.4.11. <i>Operational Control Panel</i>	9
1.4.12. <i>KDM Backup Strategy</i>	9
1.5. MAINTENANCE SPECIFICATIONS	10
1.5.1. <i>Specifications</i>	10
1.5.1.1. Color	10
1.5.1.2. Focus	10
1.5.1.3. Light levels.....	10
1.5.2. <i>Projector Calibration</i>	10
1.5.2.1. Geometry – Convergence.....	10
1.5.3. <i>Preventative Maintenance</i>	11
1.5.3.1. Bulb replacement.....	11
1.5.3.2. System Integrator	11
1.5.3.3. Maintenance/Alignment Visits	11
1.6. PROJECTIONIST TRAINING AND CERTIFICATION CRITERIA	12
1.6.1. <i>Projectionist Operations</i>	12
1.6.2. <i>Projectionist Troubleshooting</i>	12
1.6.2.1. General Troubleshooting Techniques	12
1.6.2.2. Image Troubleshooting Techniques	12
1.6.2.3. Audio Troubleshooting Techniques	13

1.7. SUPPLIES AND DEPOT REQUIREMENTS..... 14
1.8. ADMINISTRATIVE REQUIREMENTS..... 14
1.9. TECHNICAL STANDARDS 15

ANNEX A: DISNEY APPROVED THIRD PARTY EQUIPMENT VERIFICATION VENDORS

A.1. DOLBY 16
A.2. FILM TON TECHNIK 16
A.3. OTHERS 16

Document Language Convention

For the purposes of this document the following command language conventions apply: Text that does not contain command language is merely explanatory and cannot contain a requirement or permission.

Shall: *Conforming Digital Cinema systems are required to support the requirement*

Should: *Conforming Digital Cinema systems are strongly suggested to support the capability*

May: *Indicates an allowed behavior for a conforming Digital Cinema system ? from Mike*

System Integrator: *The System Integrator is the responsible party requesting a dual projection system. This may be an existing System Integrator, Deployment Vendor or Independent Exhibitor. The responsible party is required to meet all the requirements in this document as set forth.*

NOTICE: The specifications in this document and some of the underlying references are subject to ongoing development and subsequent change. Parties who rely on outdated versions do so at their own and sole risk. Please contact Studio New Technology (818-560-2845) or Projection Engineering (818-560-5566) Departments to ensure that you are relying on the latest version.

This document is not an endorsement of dual projector 3-D systems. On the contrary, Walt Disney Studios Motion Pictures discourages the use of these systems. We believe that one of the most significant benefits and opportunities afforded by digital cinema technology is single projector 3-D.

Single projector 3-D systems provide constant alignment, light levels, color, and focus for each eye. Dual projector systems create the risk of variation in each of these elements delivered to each eye, which can cause eye strain. Single projector 3-D systems eliminate this risk.

1. Dual Projection Stereoscopic Requirements

1.1. General Requirements

To ensure a reliable system and quality performance there will be a Trial for each installation. The Trial will consist of at least three Disney Digital 3-D™ titles.

- Projectors shall be technically and operationally stable and demonstrate proof of performance.
- Once the dual projector system is installed and approved, the 3-D projection system shall not move – it shall be physically locked together. Any movement of the projection system after approval voids the proof of performance and a new three picture Trial begins.
- In the event that a dual projection system is not approved, then the system shall be replaced thirty days prior to the opening of any Disney Digital 3-D™ motion picture by a complete 3-D system consisting of a Disney approved projector, server and 3-D add on system including a silver screen, if necessary. We will not provide Disney content to any system which is not approved.
- Each installation shall demonstrate proof of performance to a Disney representative or agreed upon independent third party a minimum of two weeks before the opening of any Disney Digital 3-D™ motion picture. Please refer to the Disney Digital 3-D Stereoscopic Specifications V 1.00 dated February 13, 2008.

1.1.1. During The Trial

- If during the Trial there are two or more missed shows, then that Trial picture will not count towards the three required. Missed shows include those resulting from equipment or operational failures including operator error during the engagement.
- If during the Trial there are two consecutive motion pictures which have had two or more missed shows, then the Trial will be discontinued until the System Integrator corrects the problems and a new Trial will begin.
- If during the Trial the equipment is moved or replaced, then a new Trial will begin.
- Disney may use independent checking services to evaluate presentations for alignment, color, focus, light levels and general playback. Any checker reporting that the presentation is not perfect will require immediate attention by the system integrator and based on the findings may result in that picture not qualifying as part of the three required pictures.
- System Integrator shall accomplish full certification of all projectionists and circuit technicians within the three picture Trial.
- A Disney Representative or mutually agreed upon independent third party shall approve every dual projector 3-D installation at the system integrator's expense prior to the first exhibition of each Disney Digital 3-D™ motion picture during the Trial.
- System integrators:
 1. Shall meet Disney Digital 3-D™ Glasses Requirements
 2. Shall meet Disney Installation And Setup Specifications
 3. Shall meet Disney Operational Standards.
 4. Shall meet Disney Maintenance Specifications

5. Shall meet Disney Projectionist Training and Certification Criteria
6. Shall meet Disney Supplies and Depot Requirements
7. Shall meet Disney Administration Requirements
8. Shall meet Disney Technical Standards

1.1.2. Successful completion of the Trial

- System Integrator technician will no longer be required to be present for the QC of test, feature and feature with supplemental package content.
- System Integrator technician will no longer be required to be present for opening weekend (Friday, Saturday and Sunday), second and third weekends and holidays.
- System integrator may remove the dual projector system on The Walt Disney Studio Lot.
- If the dual projection system in an auditorium includes an automated alignment system, then we will reevaluate those requirements, within this document, that require a manual alignment,

1.2. Glasses Requirements

1.2.1. General Requirements

- Any 3-D system that utilizes polarized lenses shall only be circular.
- Disney shall approve any style changes, in any part of the glasses, and will not approve any change that alters the guest experience with regard to comfort or quality of the 3-D experience.
- Glasses shall meet all federal, state and local safety and sanitation standards.

1.2.2. Domestic Glasses

1.2.2.1. Single Use Glasses

- For single use glasses, the System Integrator or the provider of the 3-D system shall be responsible for the initial order, storage and shipment of all glasses. Disney will determine the initial order for each title.
- The Walt Disney Studio will pay a usage fee for single use glasses based on an agreed upon rate for every patron as counted by an independent third party. This fee will be based on the initial cost, shipment to theatre, storage, shrinkage and third party tracking cost for single use glasses only. Single use glasses shall be distributed in sealed bags. Each bag shall be printed with the Disney approved "Warning" message in English, French and Spanish.

1.2.2.2. Re-usable Glasses

- For re-usable glasses, the System Integrator or the provider of the 3-D system is responsible for the cost, order, storage, shipment, cleaning and maintenance of the glasses. Disney will pay no fee and will allow no deduction from gross receipts and no credit for cost or expenses of reusable glasses.
- Re-usable glasses shall be sanitized prior to each reuse.

1.2.3. International

1.2.3.1. Single Use Glasses

Exhibitors purchase the desired quantity on a picture-by-picture basis. Disney reimburses exhibitor at a pre-agreed rate based upon a mutually determined total number of admissions. Storage, shipping and shrinkage are the responsibility of the exhibitor.

- Single use glasses shall be distributed in sealed bags and be printed with the Disney approved "Warning" message in English, French and Spanish. In addition, the exhibitor shall translate the "Warning" message into the local language and adhere to local posting laws and regulations.

1.2.3.2. Re-usable Glasses

- For re-usable glasses, a party other than Disney (e.g. the exhibitor, System Integrator or the provider of the 3-D system) will be responsible for the cost order, storage, shipment, cleaning and maintenance of the glasses. Disney will pay no fee and will allow no deduction from gross receipts and no credit for cost or expenses of reusable glasses.
- Re-usable glasses shall be sanitized prior to each reuse.

1.3. Installation and Setup Specifications

1.3.1. Dual Stack Projector System

Due to complicated alignment and maintenance requirements, Disney prefers a locked and rigid physical stacked dual projector system. An anti-sway bar or similar rigid device will further promote stability.

Note: Disney does not recommend dual side-by-side projection, as alignment is more difficult. Further, such systems increase the distance between the individual projector lenses and increase geometry alignment errors and on-screen distortion.

1.3.2. Refresh Rate

For Disney Digital 3-D™ content the refresh rate of the projection system shall be:

- Theatrical Exhibition - 72.00Hz per eye or greater for (2048x1080/24P)
- Theatrical Live Events - 79.14 Hz per eye or greater for (1920x1080/23.98/PsF)
- Live Sport Events – 59.94Hz per eye or greater for (1280x720/59.94/P)

1.3.3. Macros

Projection Macros (2-D and 3-D) shall be set up prior to exhibition due to the many different parameters that are required for the different Stereoscopic Display Systems. These macros shall be labeled appropriately and easy to access and invoke by a trained certified projectionist.

1.3.4. Y',C'_B,C'_R vs. Y',C'_X,C'_Z

Projectors shall be capable of 1) interpreting both formats for dual link HDSDI and 2) selecting between the two formats and memorizing the selection within the projector macros.

1.3.5. Polarization Crosstalk

Each Stereoscopic Display System shall minimize leakage between the left eye and right eye. Using the Disney Digital 3-D™ Alignment Chart as a reference, leakage shall not exceed 1.0% on either static or dynamic polarizers.

1.3.6. Link Encryption and Forensic Markings

At a minimum, the Image Media Block is required to decrypt, decompress and forensically mark the image and provide this mark to the projector interface or DCI compliant enclosure.

1.3.7. Initial Alignment Of Light Levels

When a bulb is near the end of its life a warning message or visual indication should appear on the main menu. Light levels are critical for 3D and when a bulb is at its end of life, luminance levels cannot be maintained and therefore, the left eye and right eye become misaligned.

- Light levels of each projector shall not exceed a differential of ± 0.25 fL ($\pm 0.86 \text{cd/m}^2$) between left eye and right eye.
- The combined projectors shall provide the calibrated white light of 4.5 ± 1.0 fL ($15.4 \pm 3.42 \text{cd/m}^2$) through the complete 3-D display system.

1.3.8. Color and Light Alignment

- Tools and procedures shall be used by the installer for aligning color balance and light level uniformity.
- Color Uniformity shall be set between projectors at the beginning of the engagement and shall be consistent during the entire engagement.
- Tools and proper alignment procedure instructions shall be readily available for installation, set-up, operations and maintenance.

1.4. Operational Standards

During the Trial, System Integrator technicians shall be present for all shows opening weekend (Friday, Saturday and Sunday), second and third weekends and any holiday periods. System Integrator technicians shall also train and certify all projectionists at the site. Technicians shall also be present for run-throughs of test content.

1.4.1. Crosstalk Cancellation

If the Dual Projection 3-D system does not meet the specification for leakage of 1.0% from left eye to right eye, then image processing pre-compensation (Ghost-Busting) must be performed. Ghost-Busting is a stop gap and a disfavored last resort; the system should be designed and built to minimize leakage from the beginning.

- When required, Ghost-Busting shall be done at the auditorium in real time.
- Disney will not provide pre-compensated (Ghost-Busted) content to dual projection systems

1.4.1. Disney Digital 3-D™ Alignment Chart

Prior to the first show every day the projectionist shall use the Disney Digital 3-D™ Alignment Chart to verify Alignment, Light Levels, Color Space and Focus.

1.4.2. Run-Through

Every theatre shall complete run-throughs of test content, feature, or feature with supplemental package on every screen playing the feature, no later than two nights prior to opening. (i.e. a feature opening on Friday shall be QC'd no later than close of theatre Wednesday night.)

1.4.3. Contacting Distribution Vendor

Every theatre shall call in to Disney's distribution vendor (i.e. Technicolor or Access IT) once a successful QC has been performed for the test content, feature or feature supplemental package. Every theatre shall call Disney's distribution vendor in the event of a service disruption. These requirements pertain to every digital cinema system screen at the theatre.

1.4.4. In-Theatre Supplies

Every theatre site shall store a minimum of two bulbs (or bulb systems) in order to ensure proper light alignment between the projectors and proper illumination on screen.

1.4.5. Transition From 2-D to 3-D

Every system shall be capable of converting from a 2-D feature presentation to a 3-D feature presentation and vice versa within 10 minutes. Within the 3-D presentation, the system shall be capable of a seamless transition between 2-D content and 3-D content within the same play list.

1.4.6. 3-D System at The Walt Disney Studio

As a condition of approval, each supplier of an approved system shall maintain a similar dual projector system at The Walt Disney Studio including the latest versions of hardware, firmware and software until one installation passes the Trial.

1.4.7. Service Calls and Response Time

Each System Integrator shall provide a 24-hour, 7 day per week service center. In the event of a service disruption, a technician shall be dispatched to a site if the problem has not been corrected within two hours. (This service shall include "Super User" password support if required to re-engage the system.)

1.4.8. Trained And Certified Projectionist

A trained and certified projectionist shall be on theatre premises at all times.

1.4.9. Operating Efficiency

A primary goal is to not miss any shows. In the event of a missed show the system integrator shall have a response plan in place before a second missed show occurs.

1.4.10. Operational Control Panel

The operational control panel shall be stable, robust and easy to use by a certified projectionist.

1.4.11. KDM Backup Strategy

System Integrator shall establish a procedure to back up and maintain KDMs.

1.5. Maintenance Specifications

To provide the best 3-D guest experience all specifications shall be met, maintained and supported by a strict preventative maintenance program.

1.5.1. Specifications

1.5.1.1. Color

- Systems Integrator shall provide procedure and process to maintain color balance.
- Color shall not drift over time.

1.5.1.2. Focus

Focus shall be maintained by each projector so that one projector is not misaligned as compared to the other.

1.5.1.3. Light Levels

The projectors required for use in stereoscopic presentation shall maintain a consistent and maintainable light level throughout the run of the presentation. Due to the inefficiency of stereoscopic display systems (70 to 85% reduction in light) these projectors shall provide at a minimum 20,000 lumens for screens up to 40 feet. Projection systems shall provide between 24 to 37 fL without any 3D display equipment in line.

- Each projector's power supply should be free of ripple that may be translated into flicker of the light output.
- Light levels of each projector shall not exceed a differential of ± 0.25 fL (± 0.86 cd/m²) between left eye and right eye.

The combined projectors shall provide the calibrated white of 4.5 ± 1.0 fL (15.4 ± 3.42 cd/m²) (through the 3-D glasses and the 3-D display system) measuring the center white circle of the Disney 3-D Alignment Chart. The feature will be timed to that level. The acceptable range is 3.5fL to 5.5fL (12 – 18.8cd/m²). Maintaining this range will enhance the viewing experience.

1.5.2. Projector Calibration

The projection system shall be calibrated to meet the Disney Digital 3-D™ Stereoscopic Specification at a minimum of once per month.

1.5.2.1. Geometry – Convergence

Convergence alignment of left eye to right eye across the complete screen at 1 pixel or less.

1.5.3. Preventative Maintenance

1.5.3.1. Bulb Replacement

- Technicians shall check light levels, alignment and confirm the lamps are flicker free. Technicians should install new lamps and calibrate at the beginning of each Disney Digital 3-D™ engagement. The replacements should be done in a timely manner as to ensure 600 hours of useful lamp life for the beginning of the engagement.
- Colors shall be shot, and calibration procedures performed, at the beginning of each engagement and within 24 hours if a bulb is replaced during an engagement.

1.5.3.2. System Integrator

The System Integrator shall provide each theater with their standard procedure shall be provided to for the daily maintenance of the equipment.

1.5.3.3. Maintenance/Alignment Visits

- Shall be performed at a minimum of one (1) month during the Trial and every six (6) months after that.
- Systems shall be aligned prior to every Disney engagement both during the Trial and after.
- After installation and approval of an automatic alignment system this requirement for alignment visits can be waived.

1.6. Projectionist Training and Certification Criteria

All projectionists at the theatre shall be trained and certified on the use of the dual projector 3-D system.

1.6.1. Projectionist Operations

- Projectionists shall be able to do projector start up and shut down sequences.
- Projectionists shall be able to ingest content and KDM's, create show play lists and delete content.
- Projectionist shall be able to switch between 2-D and 3-D system formats in ten minutes or less.
- Projectionist shall be able to load content and KDM's for supplemental packages.
- Projectionists shall be able to program and delete automation cues.
- Projectionists shall be able to select macros.

1.6.2. Projectionist Troubleshooting

1.6.2.1. General Troubleshooting Techniques

- Projectionists shall call trouble hotlines within fifteen minutes if a problem cannot be resolved, to include regional technicians and distribution vendors.
- Projectionist shall monthly maintain clean lenses, port glass, filters and polarizers to maximize light levels.
- Technicians shall train projectionist on how to use the Disney Digital 3-D™ Alignment Chart as well as the Alignment Charts provided by the Systems Integrator.
- Technicians shall offer follow-up training during service calls to all projectionists who want to receive refresher training.
- All projectionists shall be certified before completion of the three picture Trial.
- Each System Integrator shall provide training and certification to Disney projectionists on The Walt Disney Studios Lot prior to systems deployment.
- Disney may evaluate the training process and procedures
- The System Integrator shall send technical bulletins to Disney prior to delivery to the deployment sites.
- Regional technicians shall be capable of doing full projector alignments as well as audio system alignments.
- Disney shall be notified on a continuing basis that the theatre has certified and trained all projectionist including their names and phone numbers

1.6.2.2. Image Troubleshooting Techniques

Projectionists shall be trained to successfully perform all of the following functions without assistance:

- Projectionists shall be able to reset/reboot servers and projectors.
- Projectionists shall be able to diagnose and correct all routine system problems such as:
 - Clearly describe the nature of inoperable equipment to a regional technician, N.O.C. or deployment vendor.
 - Replacing xenon bulbs and resetting lamp hour meters.

Note: After replacement, colors should be shot by regional technician within 24 hours.

- Projectionists shall be able to play test DCP's and alignment charts for picture in the following formats:
 - 2D, 1.85:1, 2.39:1 and 3D, 1.85:1, 2.39:1
 - Projectionist shall be able to identify correct aspect ratios and geometry. Projectionists shall be able to adjust alignment and zoom for proper presentation.

1.6.2.3. Audio Troubleshooting Techniques

Projectionists shall be able to successfully perform the following functions without assistance:

- Before any exhibition to ensure that the sound processor is in the correct format all amps and speaker systems are enabled.
- To play test DCP's of sync test, tone and channel ID files to identify out of sync conditions, missing or distorted channels.
- To ensure sure the sync delay is set properly
 - Audio to Picture
 - Surround Delay

1.7. Supplies and Depot Requirements

With the use of a dual projection system the potential need for replacement parts is twice as great

- Each theatre shall have a supply of at least two bulbs or bulb systems at all times during the run of the engagement.
- Regional US and Canadian depots shall maintain an inventory of frequently used spare parts, including bulbs or bulb systems, in New York, Los Angeles, Atlanta, Dallas, Chicago, Denver and Toronto.
- International depots shall maintain the same inventory as maintained by US and Canadian depots. Sites shall be agreed upon between Manufacture / Integrator and The Walt Disney Studio and subject to change as technology matures.
- System Integrator shall establish procedures to ensure that spare parts are restocked in theatre and depot inventory within 24 hours, including bulbs and bulb systems.
- Theaters shall be in receipt of repair or replacement parts within 24 hours and coordinated with service provider for minimum delay of repair.

1.8. Administrative Requirements

Administering up to date trusted device list information is critical to the success of digital cinema and is an on-going responsibility of the system Integrator [delete all the caps unless it's a proper name or a defined term.

System Integrator shall provide to Disney:

- Trusted Device List information on all dual projector systems in a format provided by Disney's IT department, and provide such information to all Disney vendors and approved distribution vendors. For U.S and Canada, information shall be provided at a minimum of at least once per week using Rentrak ID numbers as the verification of the theatre. For International, in the absence of a Rentrak ID number, System Integrator shall provide to Disney the name of theatre, address and screen number information two weeks prior to the engagement.
- A list of all approved certified technicians capable of making dual projector adjustments. List shall include at a minimum the geographical area serviced, the office, cell phone number and email address
- All technical updates and information regarding the dual projection system.
- A dedicated engineering team to support The Walt Disney Studios.
- The most updated equipment, hardware, firmware and software, including providing this information to Disney-designated offices worldwide.
- Latest update for servers and projectors located at The Walt Disney Studios and other Disney locations
- Logging information on all installations on a daily basis.
- A list of all service disruptions in a format provided by Disney.

1.9. Technical Standards

For Detailed technical specifications, please refer to “The Walt Disney Studios Disney Digital 3-D™ Stereoscopic Specifications” document. Be aware that this document may be frequently updated. To ensure you have the latest version, please contact Studio New Technology (818-560-2845) or Projection Engineering (818-560-5566) Departments.

Annex A: Disney Approved Third Party Equipment Verification Vendors

A.1. Dolby

Contact
Address
Telephone
Email

A.2. Film Ton Technik

Contact
Address
Telephone
Email

A.3. Others

Contact
Address
Telephone
Email

3-D solutions

Imagica

Ian Thomas