



User Manual

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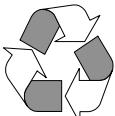
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S.G.



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Declaration of Conformity

according to ISO/IEC Guide 22 and EN45104

Manufacturer's name: High End Systems
Distributor's name: High End Systems Europe Ltd.
Distributor's address: 53 Northfield Road
London. W13 9SY

Declares that the product:

Product Name: Catalyst
Product Number: All
Product Options: All

Conforms to the following EEC directives:
73/23/EEC, as amended by 93/68/EEC
89/336/EEC, as amended by 92/31/EEC and 93/68/EEC

Equipment referred to in this declaration of conformity was first manufactured in compliance with the following standards in 2001:

Catalyst Interface Box
EMC: EN55103-1:1996 (E2)
EN55103-2:1996 (E2)

Catalyst Head and Power Supply
EMC: EN5002:1998 Class A
EN61000-3-2 Class A
EN61000-3-3 Class A
EN50024:1998
EN61000-4-2 Level 3 Class 2
EN61000-4-3 Level 2
EN61000-4-4 Level 2
EN61000-4-5 Level 3
EN61000-4-6 Level 2
EN61000-4-11

Catalyst Power Supply
Safety: EN60950:2000

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directives and Standards.



Ken Hansen
22 May 2002

Product Modification Warning

High End Systems products are designed and manufactured to meet the requirements of United States and International safety regulations. Modifications to the product could affect safety and render the product non-compliant to relevant safety standards.

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Produktmodifikationswarnung

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FCC Information

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Important Safety Information

Instructions pertaining to continued protection against fire, electric shock, and injury to persons are found in Appendix C.

Please read all instructions prior to assembling, mounting, and operating this equipment.

Important: Informations De Sécurité

Les instructions se rapportant à la protection permanente contre les incendies, l'électrocution, excessif et aux blessures corporelles se trouvent dans l'Annexe C.

Veuillez lire toutes les instructions avant d'assembler, de monter ou d'utiliser cet équipement.

Wichtige Sicherheitshinweise

Sicherheitsanleitungen zum Schutz gegen Feuer, elektrischen Schlag, und Verletzung von Personen finden Sie in Anhang C.

Vor der Montage, dem Zusammenbau und der Inbetriebnahme dieses Geräts alle Anleitungen sorgfältig durchlesen.

Informazioni Importanti Di Sicurezza

Le istruzioni sulla protezione da incendi, folgorazione, e infortuni sono contenute nell'appendice C.

Si prega di leggere tutte le istruzioni prima di assemblare, montare e azionare l'apparecchiatura.

Informacion Importante De Seguridad

En el Apéndice C se encuentran instrucciones sobre protección continua contra incendios, descarga eléctrica, y lesiones personales.

Lea, por favor, todas las instrucciones antes del ensamblaje, montaje y operación de este equipo.

Symbols

The following international caution and warning symbols appear in margins throughout this manual to highlight messages.



Caution: This symbol appears adjacent to Caution messages. Not heeding these messages could result in personal injury and/or damage to equipment.



Warning: This symbol appears adjacent to high voltage warning messages. Not heeding these messages could result in serious personal injury.

Warranty Information

Limited Warranty

Unless otherwise stated, your *product* is covered by a one year parts and labor limited warranty. It is the owner's responsibility to furnish receipts or invoices for verification of purchase, date, and dealer or distributor. If purchase date cannot be provided, date of manufacture will be used to determine warranty period.

Returning an Item Under Warranty for Repair

It is necessary to obtain a Return Material Authorization (RMA) number from your dealer or point of purchase BEFORE any units are returned for repair. The manufacturer will make the final determination as to whether or not the unit is covered by warranty.

Any Product unit or parts returned to High End Systems must be packaged in a suitable manner to ensure the protection of such Product unit or parts, and such package shall be clearly and prominently marked to indicate that the package contains returned Product units or parts and with an RMA number. Accompany all returned Product units or parts with a written explanation of the alleged problem or malfunction. Ship returned Product units or parts to: 2227 West Braker Lane, Austin, TX 78758 USA.

Note: Freight Damage Claims are invalid for fixtures shipped in non-factory boxes and packing materials.

Freight

All shipping will be paid by the purchaser. Items under warranty shall have return shipping paid by the manufacturer only in the Continental United States. Under no circumstances will freight collect shipments be accepted. Prepaid shipping does not include rush expediting such as air freight. Air freight can be sent customer collect in the Continental United States.

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Warranty is void if the product is misused, damaged, modified in any way, or for unauthorized repairs or parts. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

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Chapter 1: Features and Specifications

Catalyst System Components

The Catalyst system from High End Systems® combines a Digital Media Server with an Orbital Movement System to integrate digital media projection with automated lighting effects.

When used together on a standard DMX512 link (see Figure 1-1), a complete Catalyst system provides both real time image control and precision image positioning. In addition, multiple Catalyst systems can synchronize playback to single frame accuracy.

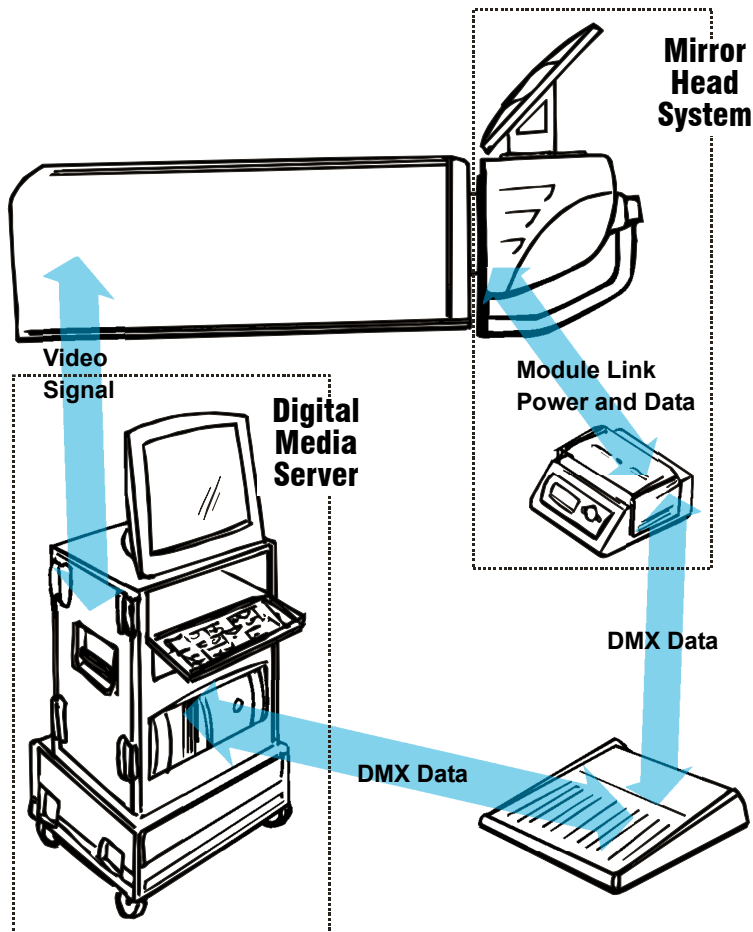


Figure 1-1 Total Catalyst system

Digital Media Server

The Digital Media Server creates, manipulates and controls still images or digital video and outputs to any device accepting an XGA signal. It can be controlled with a lighting console to output a digital image to one or more projectors as part of a DMX512 link.

The Digital Media Server can also provide independent control for LED panels and video walls.

Each Media Server produces one video signal/image. That one image may be fed to one or more projectors, each with its own Mirror Head for positioning. Even though the same image will appear from each projector, the Mirror Head systems can be independently controlled.

The Catalyst Digital Media Server control rack hardware consists of:

- A video processing Macintosh® computer
- Monitor, keyboard and mouse
- Catalyst Interface Box (CIB)
- Video Distribution Amplifier
- Cabling for power and USB connections

Mirror Head System

The Mirror Head System utilizes a moving Mirror Head mounted on front of a video projector to position a projected image anywhere in three-dimensional space. It operates with the Catalyst Media Server or independently as a standalone fixture on a DMX link. The Mirror Head system ships with:

- A Periscopic Dual-Mirror Head
- A Power Hub
- Unistrut Universal mount kit
- Cabling for XLR, RS-232 and power connections

Other Requirements

User provided components for the Catalyst system are:

- A DMX lighting console that can control 56 channels per fixture and support true 16-bit values on 15+ channels. The Wholehog II® Wholehog III™, lighting consoles, and the HandShake™ handheld controller are DMX controllers available from High End Systems to control the Catalyst system (see “Catalyst Accessories” on page 1-5). Contact the controller’s vendor regarding Catalyst support on other DMX controllers. For more information on operating the fixture with a controller (or control device such as DMX control software), consult controller documentation.

- The Catalyst system is compatible with most high-powered single lens video projectors. High End System recommends using a 3-chip, DLP™-based projector.
- Any video wall, LED panel or other video display required for a specific application.

The Catalyst product components ship in customized roadcases under separate part numbers.

- Catalyst Media Server control rack (Part number 56020001)
- Catalyst Orbital Movement System (Part number 56010001)

Features

Catalyst Digital Media Server

Operation

- Real-time control of multi-layered video and still images
- Frame-by-frame synchronization between multiple Catalyst systems
- Digital still image and video playback from hard drive
- A rackmount Apple® Power Mac® computer optimally configured for Catalyst with preloaded Catalyst software and interface hardware
- Live digital video input via Firewire® interface or other external video using third-party format converters
- USITT DMX512 compatible control interface
- High resolution output on 5 BNC connectors to projector, video wall or LED display panel
- Connections for Midi In/Out/Through and RS-485

Image Control

- Rotation and scaling of digital images and video in three planes
- Visual effects including Invert, Wobble, and Tiling
- Adjustable masking effects
- Movie frame and playback direction control
- Color mixing
- Gradient color (fountain fills)
- Adjustable beam shape and keystone correction on image layer

- Capacity to store over 65,000 image files. Catalyst ships with over 200 video and image files in onboard image libraries including:
 - High End Systems® lithos
 - DHA™ gobos
 - Artbeats™ footage
 - Digital Juice Ambient Loops
- Apple® Quicktime™ technology for compatibility with content created in Quicktime Pro®, Final Cut Pro®, After Effects®, and Photoshop® and other image and move formats.

Mirror Head System

- USITT DMX512 compatible control
- High resolution 16-bit stepper motors (180,000 steps per revolution) to provide smooth, micro-stepped 270° x 360° movement
- Quick Path feature to allow faster position changes in Mirror 2 movement
- Mounting hardware to allow mounting to a variety of video projectors
- Variable 100–230V power input
- On-board menu system with dot matrix display
- Built in RS-485/RS-232 converter for projector control

Catalyst Accessories



The following table lists accessories available for the Catalyst system from your High End dealer/distributor. For more information, contact your High End Systems dealer/distributor or see “Contacting High End Systems” on page ii.

Part Description	Part Number
Additional Power Hub for Catalyst Mirror Head	56040001
Additional Video Distribution Amplifier	56040002
Unistrut kit	56040003
Catalyst Interface Box	56040004
Catalyst Outer Mirror	80180006
Catalyst Inner Mirror	80180007
Wholehog II lighting console	25020001
Wholehog III lighting console	61020001
Media Server control rack roadcase	56070001
LCD Monitor	56070009
HandShake handheld controller	10020001
Galvanized safety cable	12040001
Cheeseborough clamp	55040014
Lightwave Research Upload Dongle	26040002
Male 5-pin DMX terminator	90404039
Heavy duty 5-pin XLR cable (10')	55050017
Heavy duty 5-pin XLR cable (25')	55050018
Heavy duty 5-pin XLR cable (50')	55050019
Heavy duty 5-pin XLR cable (100')	55050020
User Manual	60600204

Media Server Specifications

Physical Specifications

The following specifications apply to the Media Server control rack as shipped in a custom roadcase.

Dimensions (including casters): 686 mm (27in) x 610 mm (24in) x 737 mm (29in)

Weight: 81.6kg (180lbs)

Electrical Specifications



Warning: Class I equipment – This equipment must be earthed

Selectable input voltage: 115V or 230V (50-60Hz)

Rated Power: 400W

Environmental Specifications

Maximum ambient temperature (Ta): 35° C

Cable and Connector Specifications

DMX and RS-485 Projector Link

Cables: Belden 9841 or equivalent (meets specifications for EIA RS-485 applications) with the following characteristics:

- Two twisted pairs (4-conductor) plus a shield
- Maximum capacitance between conductors: 30 pF/ft
- Maximum capacitance between conductor and shield: 55 pF/ft
- Maximum resistance: 20 Ohm/100 ft
- Nominal impedance: 100–140 Ohm

Connectors: Two 5-pin male and female XLR connectors:

- Pin 1 Ground
- Pin 2 Data–
- Pin 3 Data+
- Pin 4 Secondary data–
- Pin 5 Secondary data+

Note: Projector link communication is a full-duplex link and requires both pairs be connected.

Termination connector: 5-pin male XLR connector with a 120 Ohm terminating resistor fitted between pins 2 and 3.

Video

Cables: 75 Ohm co-axial cables

Connectors: 75 Ohm BNC

Mirror Head System Specifications

Physical Specifications

Mirror Head

Dimensions: 349mm x 369mm x 686mm (13.7in x 14.5in x 27in). See Figure 1-2 for additional Dimensions.

Weight: 12.7kg (28lbs)

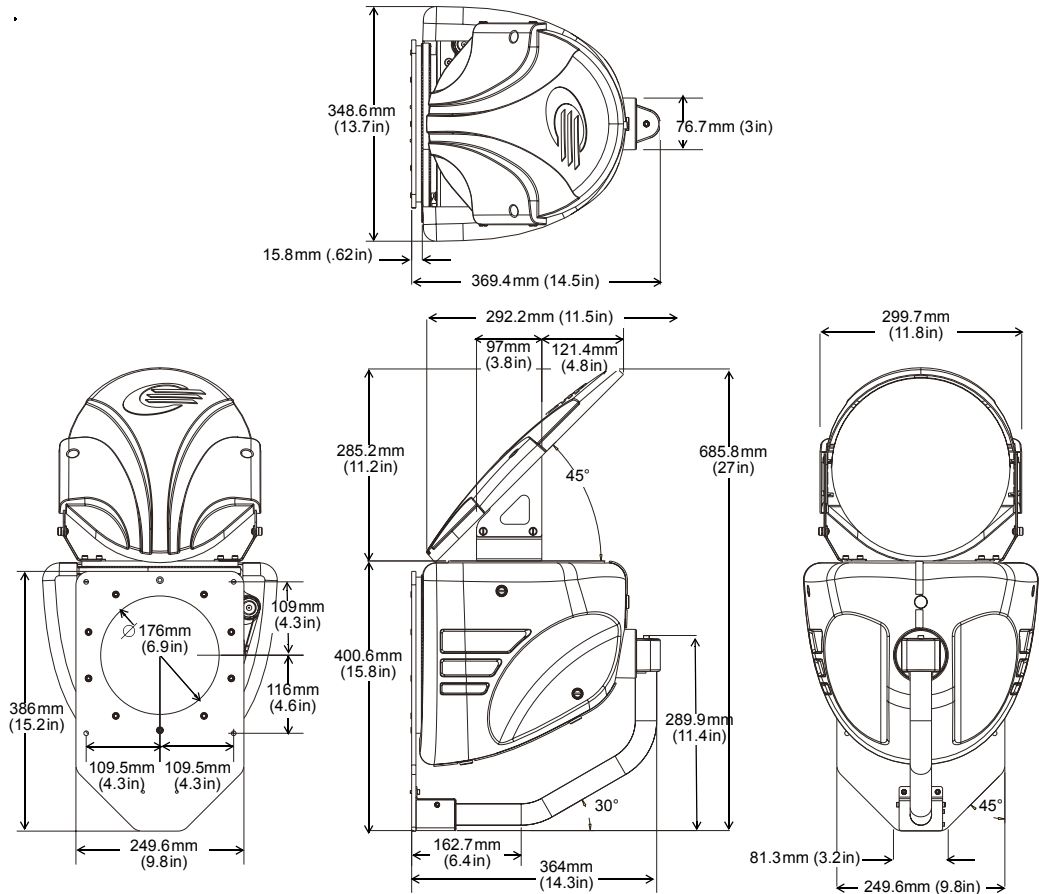


Figure 1-2 Mirror Head dimensions

Power Hub

Dimensions: 276 mm x 301 mm x 120 mm (10.9 in x 11.8 in x 4.7 in). See Figure 1-3 for additional dimensions.

Weight: 2.3 kg (5 lbs)

Roadcase

Dimensions (including casters): 1150 mm x 622 mm x 660 mm (45 in x 24.5 in x 26 in)

Weight (with components loaded): 71.7 kg (158 lbs)

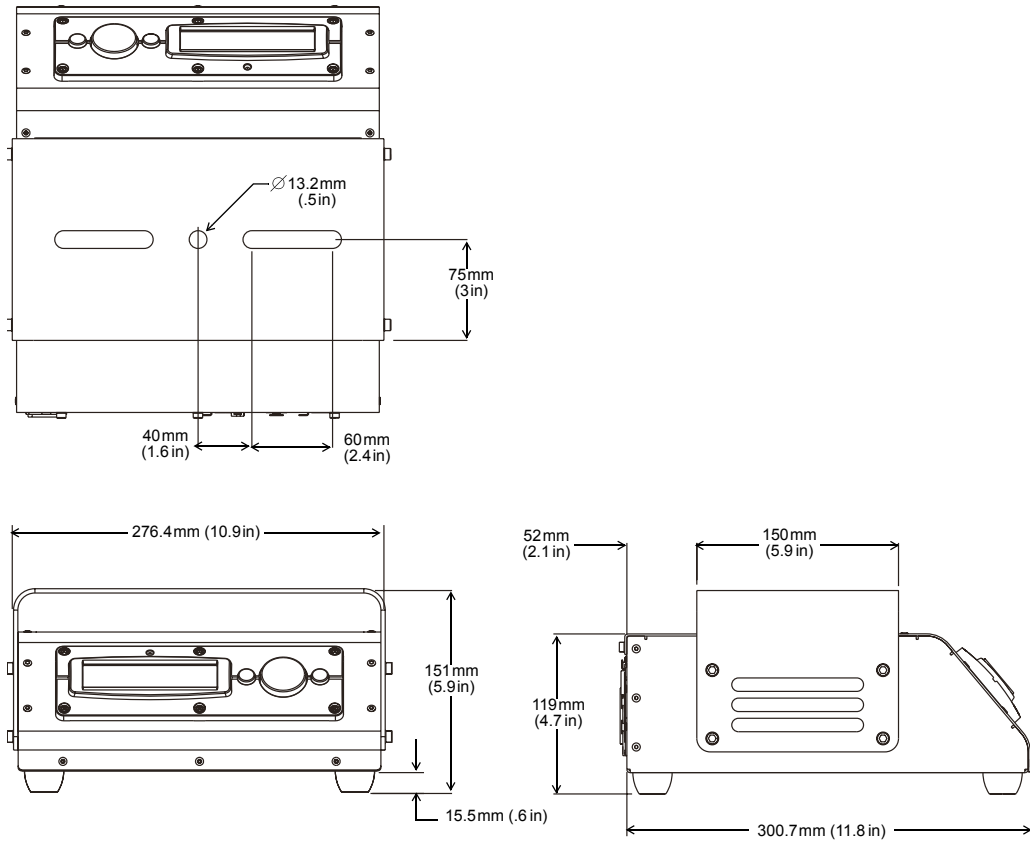


Figure 1-3 Power Hub Dimensions

Electrical Specifications

The following physical specifications apply to the the power hub component of the Mirror Head System.



Warning: Class I equipment – This equipment must be earthed

Universal Input from 100–230 VAC, (50–60Hz)

Rated power: 100 W

Fuse: Power supply output fuse: 2.5A, 250V slow blow only.

Environmental Specifications

Maximum ambient temperature (Ta): - 40° C

IP Rating: IP 20

Cable and Connector Specifications

DMX and RS-485 Projector Link

Cables: Belden 9841 or equivalent (meets specifications for EIA RS-485 applications) with the following characteristics:

- Two 4-conductor twisted pairs plus a shield
- Maximum capacitance between conductors: 30 pF/ft
- Maximum capacitance between conductor and shield: 55 pF/ft
- Maximum resistance: 20 Ohm/100 ft
- Nominal impedance: 100–140 Ohm

Connectors: Two 5-pin male and female XLR connectors:

- Pin 1 Ground
- Pin 2 Data–
- Pin 3 Data+
- Pin 4 Secondary data–
- Pin 5 Secondary data+

Terminator: 5-pin male XLR connector with a 120 Ohm terminating resistor fitted between pins 2 and 3.

Mirror Head to Power Hub Connection

Cable: 4–core, 1.5 mm² with a maximum length of 2 meters

Connectors: 3-pin male and female XLR connectors:

- Pin 1 Ground
- Pin 2 Data Complement
- Pin 3 Data True
- Pin 4 +40V

Chapter 2: Setup and Configuration

2

Inspecting the Catalyst System

Unpack the Catalyst fixture and verify that it is undamaged. Inspect both the outside of the fixture for physical damage and the optical surfaces of the mirror head. If the product is damaged or there are items missing, notify both the shipping agent and your sales agent immediately.

The complete Catalyst system ships in two parts:

1. Catalyst Media Server control rack
2. Catalyst Mirror Head system

Catalyst Media Server Control Rack

The Catalyst Media Server is self contained in a flightcased equipment rack that houses the system components and includes monitor and keyboard storage. The Catalyst Media Server control rack ships with the following components:

Hardware

- Apple Power Mac G4 computer
- Catalyst Interface Box (CIB)
- 2-way Video Distribution Amplifier (VDA)
- LCD Monitor, Keyboard, and Mouse

Cables

- IEC 320 power cable

Documentation

- MacOS CDs
- Catalyst application software CDs
- User Manual

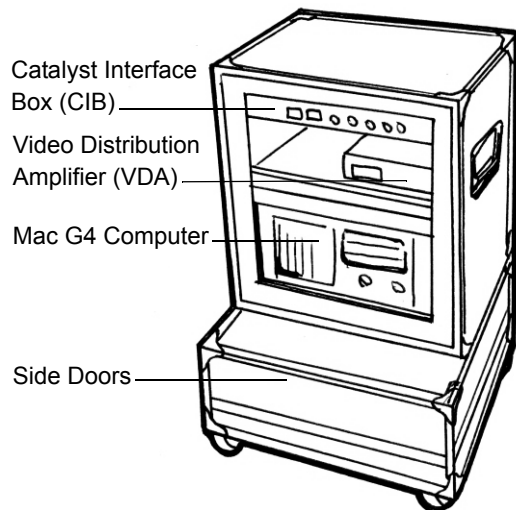


Figure 2-1 Catalyst Digital Media Server Control Rack

Mirror Head System

The moving Mirror Head, Power Hub, and mounting hardware ship together. The box contains the following components:

Hardware

- Moving mirror head
- Power hub

Mounting Parts

- Projector mounting plate
- Two each of Unistrut® in lengths of 0.8m, 0.7m, 0.6m and 0.4m
- Two Unistrut splice plates
- Four Cantilever arms in two lengths
- Four Unistrut bridge components
- Hardware kit

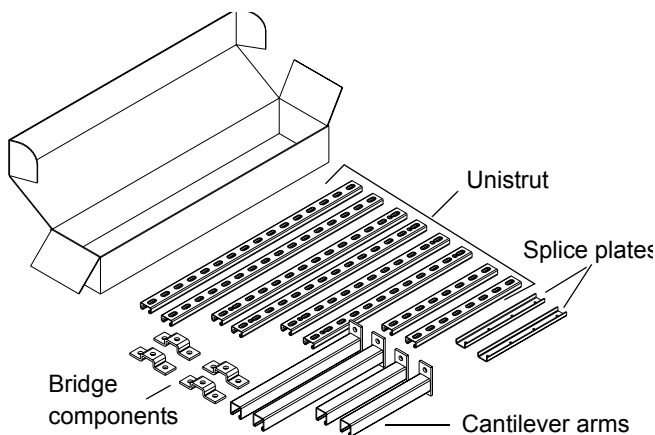


Figure 2-2 Unistrut mounting parts

Cabling

- 4-pin XLR Power hub cable
- US power cable
- European power cable

Save All Shipping Materials

Do not discard shipping materials. Packing materials are specifically designed to protect the product during transport.

High End Systems® assumes no responsibility for products that are damaged during transport. Return a product for repair in its original shipping carton and packing materials.

Before sending anything to the factory, call your High End Systems dealer/distributor for a Return Material Authorization (RMA) number. The factory cannot accept any goods shipped without an RMA number.

Installing Power Cord Caps

2

Both the Catalyst Media Server control rack and the Power Hub for the Mirror Head System may ship without an attached power cord cap. Different locations (even within the same country) may require a different power cord cap to connect the fixture to a power outlet.

Because of the variety of power cord caps used worldwide, High End Systems, Inc. cannot make specific recommendations for the power cord cap.

Contact a local authority for the type of power cord cap needed. When installing the power cord cap, note that the cores in the mains lead are colored in accordance with the following code:

- green and yellow = earth
- blue = neutral
- brown = live



Warning: Class 1 equipment - This equipment must be earthed.

Installing a Line Cord Cap - U.K. Only

In the United Kingdom, the colours of the cores in the mains lead of this equipment may not correspond with the coloured markings identifying the terminals in the fixture's plug. Therefore, install a line cord cap in accordance with the following code:

- The core which is coloured green and yellow must be connected to the plug terminal which is marked with the letter "E," or by the earth symbol \oplus , or coloured green, or green and yellow.
- The core which is coloured blue must be connected to the terminal which is marked with the letter "N" or coloured black.
- The core which is coloured brown must be connected to the terminal which is marked with the letter "L" or coloured red.



Warning: Class 1 equipment - This equipment must be earthed.

Vatic Fitter Heads Information - Danmark

Advarsel: Beskyttelse mod elektrisk chock.

Vigtigt!

Lederne med gul/groen isolation maa kun tilsluttes en klemme maerket



Digital Media Server Setup

The roadcase serves as a control rack for the Catalyst Digital Media.

To set up control rack:

1. Detach roadcase doors and remove monitor, keyboard and mouse from storage compartments with doors. Doors can be stacked to use as a platform for the rest of the case.
2. Set monitor on top of rack plug power cord into the VDA 'monitor in' connection on back of control rack.
3. Place keyboard on shelf and connect to the shelf-mounted USB port.
4. Attach mouse to keyboard.

Mirror Head System Setup

Mounting the Catalyst Mirror Head



Warnings: Equipment suitable for dry locations only. Do not expose this equipment to rain or moisture.



Caution: If mirror surface needs to be cleaned during setup procedure, use only a mild glass cleaner (containing no ammonia) and a soft, lint-free cotton cloth to avoid scratching mirror surface.

The Catalyst Mirror Head ships with a universal mounting kit adapted to suit most major manufacturer's high output video projectors. Not all the mounting components provided will be used on any one particular projector. Due to the wide variety of possible projectors, High End Systems cannot make specific recommendations for mounting. The following procedure is a suggested procedure for mounting the Catalyst Mirror Head to a typical video projector.

Mounting Considerations

The Mirror Head must be able to rotate freely. When using the unistrut system to mount the Mirror Head, position and adjust framing components and the mounting plate to avoid impeding Mirror Head movement. Nuts and spacers have been included in the hardware kit to use where needed.

Center the plate in front of the lens to allow for maximum beam area.

Mirror Head Mounting Procedure

To mount the mirror head to the projector:

1. Fix two lengths of 0.7m Unistrut across the projector as shown in Figure 2-1. For smaller projectors, 0.6m Unistrut may be more appropriate. Using the supplied hardware, attach to projector at four points, leaving the slot accessible from above. *The Unistrut™ should be fitted with slot facing upwards for top mounted Unistrut, down for bottom mounted Unistrut.* Where necessary, use nuts to space the Unistrut away from the projector, and to keep it level.

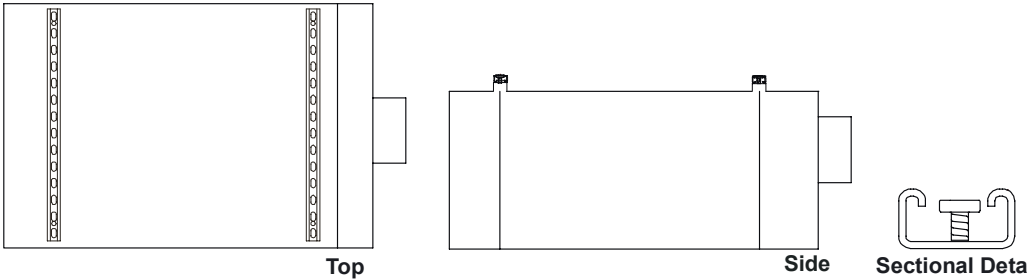


Figure 2-1 Attach Unistrut to projector

2. Construct two 1.2m Unistrut lengths by joining 0.8m and 0.4m lengths of Unistrut using a splice plate inside the Unistrut and screws as shown in Figure 2-2. Align screws so they bottom out against metal and don't protrude through the unistrut holes. The combination of Unistrut lengths required depends on the overall length of the projector .



Figure 2-2 Construct Unistrut crosspieces

3. Fix these two long lengths of Unistrut, channel downward to the top of the projector as shown in Figure 2-3. The two lengths should run parallel 270mm apart and be spaced equal distances from either side of the lens.

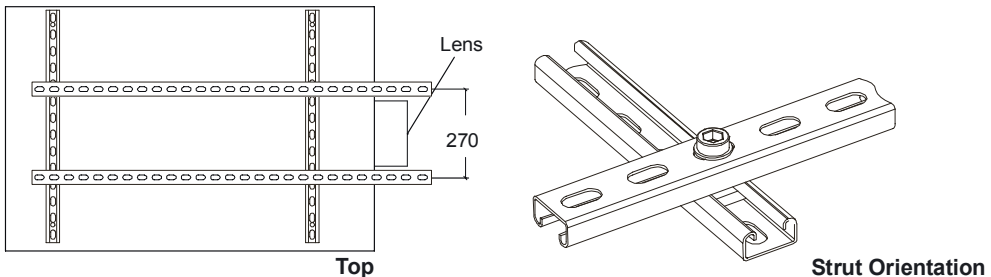


Figure 2-3 Connecting Unistrut supports

- Referring to Figure 2-4, attach the cantilever arms so that the channel runs vertically each side of the lens. Attach each end of Unistrut using four M10 x 25mm cap screws and nuts.

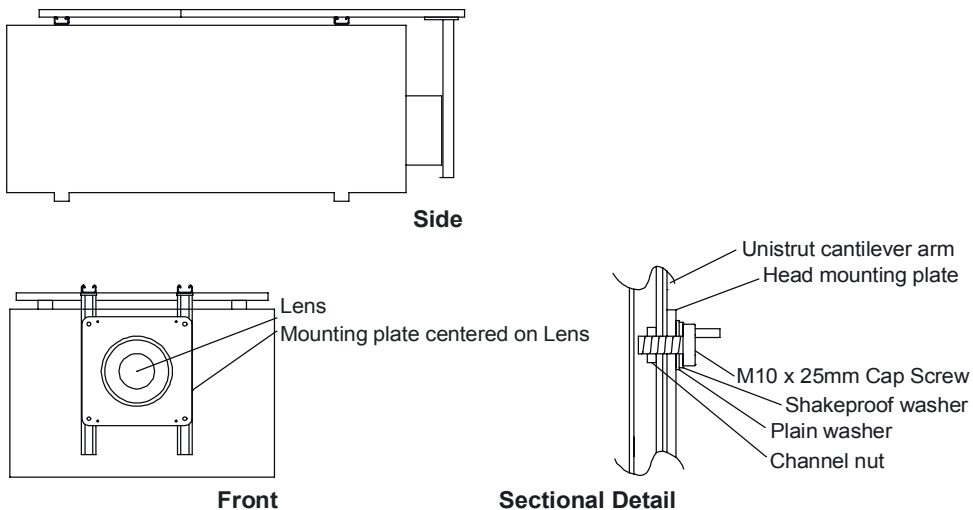


Figure 2-4 Attaching cantilever arms and adaptor plate

- Fit the Catalyst head adaptor plate to the Cantilever arms using channel nuts and M10 x 25mm cap screws as shown in Figure 2-4. Position the plate with the lens in the centered in the opening and flush with the plate. Use countersunk screws to attach plate to cantilever arms.

Note: The mounting can also be attached to the base of the projector.

- Fit the Mirror Head to the adaptor plate by first hanging it on the positioning pins and then securing with cap screws. Loop a safety cables through the hole provided in the head mounting plate and around an independent support.

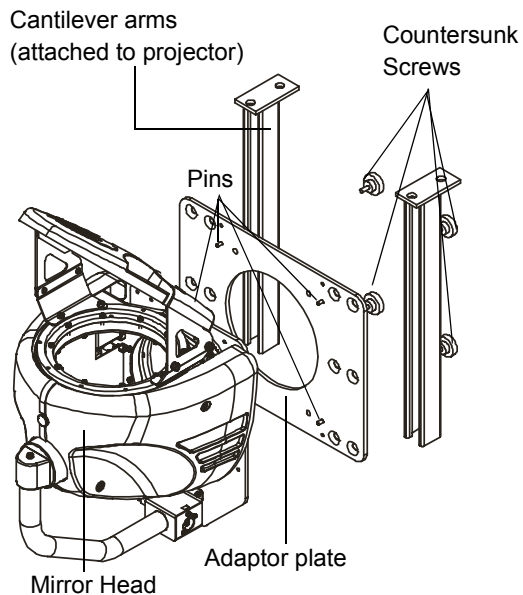


Figure 2-5 Mounting the Mirror Head

Mounting the Power Hub

Attach one or two cheeseborough clamps to the mounting bracket for mounting on any standard truss. Use safety cable to secure the Power Hub to an independent support.

Note: The power hub must be located within two meters of the projector head for correct performance.

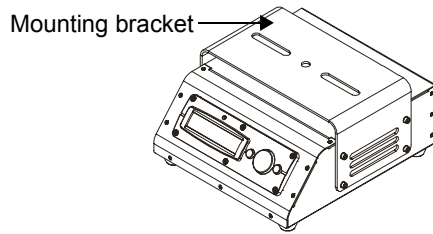


Figure 2-6 Mounting Power Hub

Connecting the Catalyst System

This section describes all the Catalyst system connections. The system ships with most of the components already connected. In general, the user will only need to make the following connections.

Media Server Connections

- Media Server control rack to power source
- Peripherals to Media Server
- RGBHV from the CIB to the projector
- DMX from a lighting console or previous fixture on a link to the CIB 'DMX In' connection
- DMX from the CIB 'DMX Thru' connection to the next fixture or Catalyst system on the link
- Optional ethernet connections between multiple Catalyst systems to enable the Synchronize feature

Mirror Head System Connections

- Power Hub to power source
- Power Hub to the mirror head
- RS232 connection from the power hub to the projector
- DMX connection to Power Hub 'data in' from the Lighting console or previous fixture on a link
- DMX connection from the Power Hub 'data out' to the next fixture on the DMX link

Media Server Connections

Media Server to Power Source



Caution: Before connecting power confirm that the voltage selection switch on the rear of the Power Mac G4 computer is set to the appropriate voltage, see “Selecting the Voltage” on page 2-13.

After attaching a suitable line cord plug (see “Installing Power Cord Caps” on page 2-3), connect the mains supply to the IEC power distribution strip at the rear of the control rack. From here, power is distributed to the computer and the video distribution amplifier.

Video Distribution Amplifier (VDA) Connections

The Catalyst Media Server uses a video distribution amplifier to split the video signal and allow display on the monitor as well as the projector. It also amplifies the signal to accommodate the distance between the Media Server and the projector.

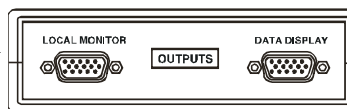


Figure 2-7 VDA connection

The computer inputs to the VDA inside the control rack. The VDA outputs to the CIB and the Monitor. VDA output connections are labeled Local Monitor and Data Display. The CIB has been connected to the Data Display output. The user connects the monitor VGA cable to the local monitor output port on the VDA.

Computer to Peripheral Device Connections

The mouse and keyboard connect to the spare USB connector from the computer mounted on the control rack shelf.

Use the ethernet port to connect and synchronize multiple Media Servers. For more information about the synchronize feature, see “Synchronized Playback on Multiple Catalyst Systems” on page 4-3

Connect optional external digital video using the FireWire connection.

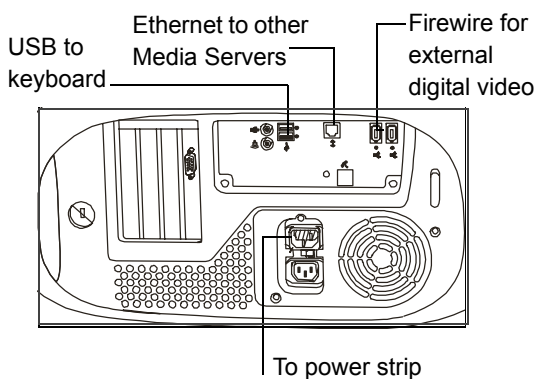


Figure 2-8 Computer connections

Note: If the FireWire® technology’s hot-swap feature does not recognize input to Catalyst, reset the computer.

For more information on using input and output devices with the computer, see the documentation for the Power Mac G4.

CIB Output Connection

The video connects to the projector or other compatible output device (LED Display panel or Video wall) by way of five BNC connectors on the front of the Control Interface Box, see (Figure 2-9).

Connect these to the video projector using high quality co-axial cable.

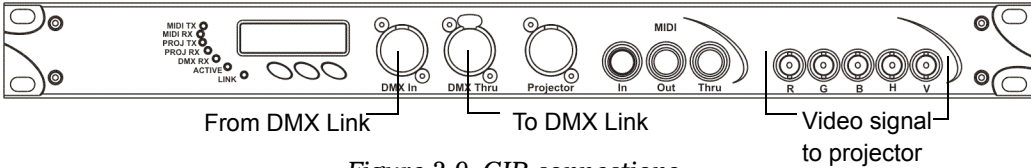


Figure 2-9 CIB connections

CIB to DMX Controller Data Connections

Use the CIB ‘data in’ connection to bring data from a DMX link and the ‘data through’ connection to route the signal back to the link, (see Figure 2-9) using appropriate data cable, (see “Cable and Connector Specifications” on page 1-6).

Note: The Media Server should be connected to the same DMX controller as the mirror head for operation as a unit. For further details on linking the Catalyst system, see “Connecting to a DMX512 Link” on page 2-10.

Mirror Head System Connections

The Catalyst Power Hub has four XLR connections shown in Figure 2-10:

- 3-Pin: Power in
- 4-Pin XLR (female): Power/Data to mirror head: IEC320 receptacle
- 5-Pin XLR (male): DMX data in
- 5-Pin XLR (female): DMX data out (through)

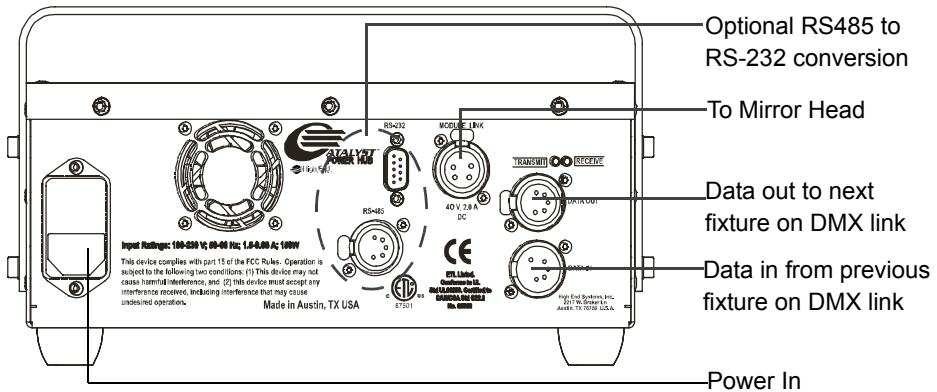


Figure 2-10 Power Hub connections

Power Connection

After attaching a suitable line cord plug (see “Installing Power Cord Caps” on page 2-3), use the appropriate cable to connect the power hub a power source. Both US and UK power cords ship with the unit.



Caution: See “Before Applying Power” on page 2-14 before making this connection.

Power Hub to Mirror Head Connection

The Power Hub provides data and power to the Mirror Head through the two meter, 4-pin XLR cable provided. This cable should not be lengthened.

Note: The cable has 1.5 mm² cores designed to carry power to the Mirror Head. Do not substitute a microphone or similar cable.

DMX Data Connection

The Power Hub connects to a DMX controller through the CIB or another fixture on a DMX 512 link using a 5-pin DMX512 data connector compliant with the USITT standard. See “Connecting to a DMX512 Link” for detailed instructions on data cable construction and connection.

Connecting to a DMX512 Link

The complete Catalyst system (Media Server plus the Mirror Head system) can be controlled with a DMX console on a DMX512 link for real time image manipulation and positioning.

The Mirror Head system can also operate without the server as a standalone fixture on a DMX link to position projector output utilizing the moving Mirror Head.

Required Data Cabling and Connectors

To link one or more fixtures to a controller and/or to each other, obtain data cabling. Cabling can be purchased from High End Systems (see “Catalyst Accessories” on page 1-5) or constructed according to the following specifications.

High End Systems recommends data-grade cable. Data-grade cable is designed to carry a high-quality signal with less susceptibility to electromagnetic interference.

DMX Data Cables

Use Belden[®] 9842 or equivalent (meets specifications for EIA RS-485 applications) data cables with the following characteristics:

- Two twisted pairs (4-conductors) plus a shield
- Maximum capacitance between conductors: <15 pF/ft.
- Maximum capacitance between conductor and shield: 55 pF/ft.
- Maximum resistance: 20 Ω /1000 ft.

—Nominal impedance: 120 Ω

Cable Connectors

The Catalyst Media Server CIB and the Mirror Head system Power Hub accept 5-pin XLR cable connectors. Cabling must have a male XLR connector on one end of the cable and a female XLR connector on the other end.

Pin one is the common (cable shield), pin two is the data complement (negative), pin three is the data true (positive). Pins four and five are not used, but they allow a secondary data link to pass through the fixture, (see Figure 2-11).

Test each cable with a voltage/ohm meter (VOM) to verify correct polarity and to make sure that the negative and positive pins are not grounded or shorted to the shield or to each other.

2



Caution: Do not connect anything to the ground lug on the XLR connectors. Do not connect or allow contact between the common (cable shield) and the fixture's chassis ground. Grounding the common could cause a ground loop and/or erratic behavior.

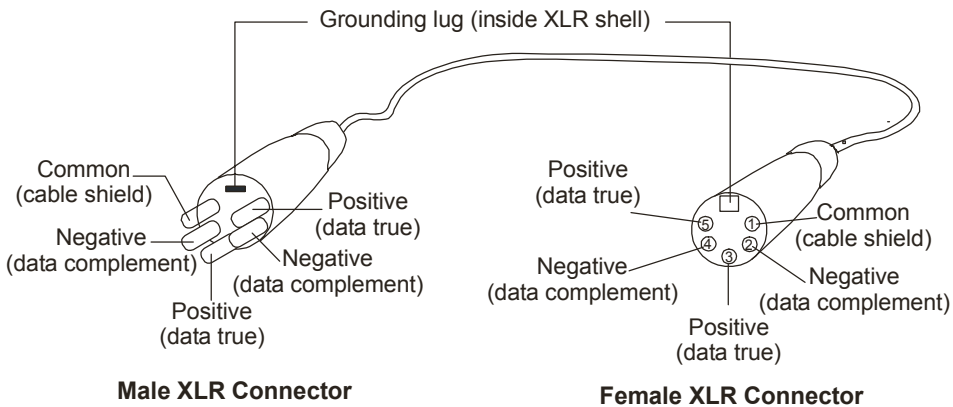


Figure 2-11 XLR 5-pin connector cable

Constructing a Terminator

Install a 120 ohm, 1/4 watt (minimum) terminator in the fixture's Data Out (female) cable connector in the *last* fixture on each DMX link. A terminator on the last fixture of the link prevents data reflection, which can corrupt the data communication on the link.

Purchase a terminator from a High End Systems dealer/distributor (see “Catalyst Accessories” on page 1-5), or follow the instructions below to construct a terminator.

To construct a terminator:

1. Disassemble a male 5-pin XLR connector.
2. Solder a 120 ohm resistor, minimum of 1/4 watt, between pins two and three (see 3.).
3. Reassemble the XLR connector

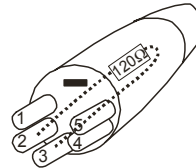


Figure 2-12 Data cable terminator

Setting Up a DMX Link

Each fixture on a DMX link in and a data out (through) connection. The Catalyst system can be daisy-chained to other automated lighting fixtures on the link. The Media Server and the Mirror Head components of the Catalyst system connect to the link as individual fixtures. They do not have to be physically linked to each other to work together, only to the link.

Without the Digital Media Server, the Mirror Head system can function as a fixture on the link using 6 channels to control mirror movement. In this application, the controller sends commands through the Power Hub to control mirror movement and position an image from the projector.

To connect the catalyst system to a DMX link:

1. Connect the male XLR connector of a DMX data cable to the controller's DMX 'data out' connector.
2. Connect the Data cable's female XLR connector to the 'data in' connector of the first (or next) unit on the DMX link. This connection is on the CIB for the Media Server and on the Power hub for the Mirror Head system as shown in Figure 2-13.

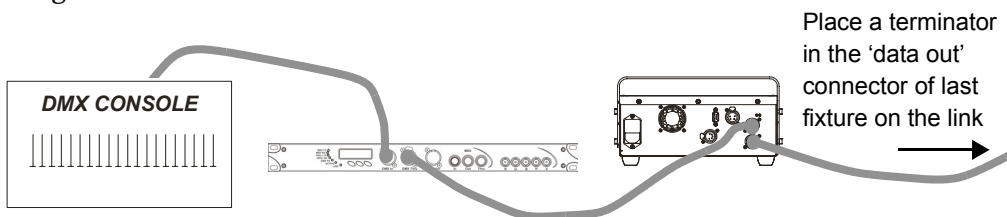


Figure 2-13 Daisy-chaining fixtures in a DMX 512 link

3. Continue linking the remaining fixtures connecting a cable from the 'data out' (data thru) connector of each fixture to the 'data in' connector of the next fixture on the link.
4. Connect a male terminator to the 'data out' connector of the last fixture in the link.

Powering On the System

Digital Media Server



Caution: Before connecting power, confirm that the voltage selection switch on the rear of the Power Mac G4 computer is set at the right voltage.

2

Selecting the Voltage

To verify or set the correct voltage:

1. Locate the voltage switch on the back of the computer next to the power connection as shown in Figure 2-14. The switch will show 115 or 230.
2. To change the setting insert a small screwdriver in the slot and slide the switch. Set the switch to show 115 for AC voltages in the 100-120V range. Set the switch to show 230 for AC voltages in the 200-240V range.

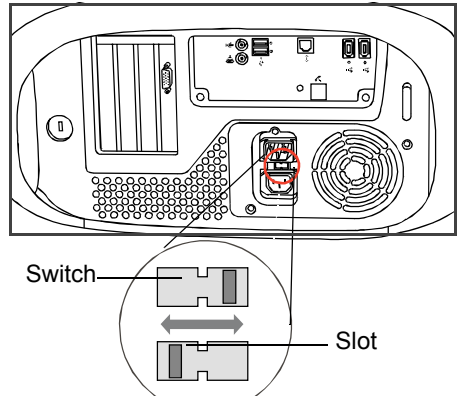


Figure 2-14 Voltage selection switch

Applying Power

To apply power to the Digital Media Server

1. Verify that the Control rack has suitable line cord plug (see “Installing Power Cord Caps” on page 2-3) and is connected to the mains supply to the IEC power distribution strip at the rear of the control rack.
2. Power up the G4 via the On/Off Switch on front panel of computer. The Catalyst application folder and any connected media devices will appear on the desktop once the G4 has completed its boot up.

Mirror Head System



Warnings: Connect this equipment only to a branch circuit having a maximum overload protection of 20 A.

The head moves under remote control, and is designed for use by proficient technicians in a professional environment.



Caution: Do not power on the fixture until verifying that the line cord cap is suitable for the power source in your location.

Keep hands free from the mirror head when powering up the system to avoid a pinching hazard as the mirror head begins to move during automatic homing.

Before Applying Power

- Manually rotate the head, checking that it can move freely on both axes without hitting the projector or any rigging hardware.
- Ensure that all cables, set pieces etc. are clear of the equipment.
- Keep all clothing and body parts clear of the equipment.
- Ensure that the equipment may not be accessed by the public or unqualified persons.

Applying Power



Caution: Keep hands free from the mirror head when powering up the system to avoid a pinching hazard as the mirror head begins to move during automatic homing.

To apply power, connect the appropriate power hub line cord into your power source. For more information on attaching a linecord, see “Installing Power Cord Caps” on page 2-3.

Once connected to power, the head will initialize (home). During this process, both mirrors on the Mirror Head rotate to locate end stops and verify that the fixture is operating correctly.

Verifying/Uploading Mirror Head Software

Check the Power Hub display in the Menu Locked mode to identify the software version loaded on that fixture. Verify that the version displayed by the fixture is the latest available. The latest software for the Catalyst system is available in the support section of the High End Systems® web site (www.highend.com). If a software upgrade is required, there are three ways to upload new software to the Catalyst system:

1. Attach a High End Systems Upload Dongle to the computer and upload the software to the Catalyst system.
A High End Systems Upload Dongle requires a 386-based (or faster) computer, MS DOS® version 3.3 (or later) or Windows 95/98/ME, and one MB of free disk space. To obtain an Upload Dongle (with installation and operation instructions), contact your High End Systems dealer/distributor (see “Contacting High End Systems®” on page -ii).
2. Crossload software from one system that contains the new software to all other Catalyst systems on the link. See “Crossloading Fixture Software” on page 3-18.
3. Upload the new software to all Catalyst fixtures on the link using a HandShake™ handheld controller from High End Systems.

Note: Before uploading new software, disconnect any controllers, bypass any serial data distributors and/or data line optoisolators, and bypass or make sure that

any fixtures using RS-422 communications (such as Dataflash® AF1000 xenon strobes, and Intellabeam® fixtures) are located after all the Catalyst fixtures on the link. These devices will block communication with any other Catalyst fixtures on the link

Setting a DMX Start Channel

A lighting console uses a Start Channel to identify the range of channels on a DMX link associated with a particular fixture. There are 512 available channels on each DMX link divided among *all* the devices on the link. A fixture must have a *unique* Start channel number in order to respond *independently* to controller commands.

Determining a Valid Start Channel

The Start channel is the first number a fixture’s channel range. To determine a fixture’s DMX start channel in a link, identify the channel range of every fixture on the link. Channel range is the number of consecutive channels a fixture requires. Each Catalyst Media Server on a link requires a block of 56 consecutive channels on a 512-Channel DMX link. A Mirror Head system requires 6 consecutive channels.

Catalyst has an extensive range of functions, and is recommended for use with an advanced lighting control console that can accommodate it’s channel range. The Wholehog II, Wholehog III consoles and the HandShake handheld controller from High End Systems are all suitable, and fixture libraries are available to map the fixture to these controllers.

Note: The channel range for Catalyst will continue to expand as new features are added. Before setting the DMX channel, check that you have the latest software and are using a controller that can accommodate the channel range, (see “Verifying/Uploading Mirror Head Software” on page 2-14).

Setting Media Server Start Channel

There are two options for setting a start channel for the Media Server. The start channel can be set through the Software application or with the menu buttons on the front of the CIB.

To set a Start Channel on the CIB:

1. Power up the G4 via the On/Off Switch on front panel of computer. The Catalyst application folder and any connected media devices will appear on the desktop once the G4 has completed its boot up.
2. Double click on the application folder and then the application file to launch the Catalyst application.

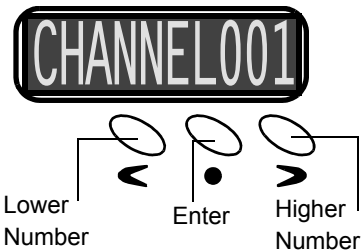


Figure 2-15 Setting Start Channel on the CIB

3. Locate the menu buttons on the CIB shown in Figure 2-15. The display will show the current start channel.
4. Press ◀ to decrease value. Press ▶ to increase value. Press ● to enter value.

Note: The last valid Start channel for an Catalyst system is based on the channel range required by fixture's module configuration. The last valid start channel for the complete Catalyst system is 457 (512–56+1).

For more information on setting a Start Channel for the Media Server using the Catalyst application viewed on the monitor, see “Info Display Screens” and “Setting a Start Channel Using the DMX Info Screen” on page 3-11.

Setting Mirror Head System Start Channel

Set the Start Channel for the Mirror Head using the Power Hub's onboard menu system.

To set the DMX start channel on the Power Hub:

1. Press the Menu button to unlock the menu system or to move back up the system to the top level menus. DMX ADDRESS MENU is the first menu item at the top level.
1. Press the Enter button to select. The display will show SET DMX START CHANNEL:####. The display will show the start channel currently assigned to the fixture.
2. Use the up and down arrows on the Navigation button to select the same DMX start channel as the Media Server for the complete Catalyst system. The display will flash a new option ready for selection.

Note: The last valid Start channel for an Catalyst system is based on the channel range required by fixture's module configuration. The last valid Start channel for the Mirror Head System 507 (512–6+1).

3. Press the Enter button to accept the new DMX Start channel.

Note: If the Enter button is not pressed, the old value will remain selected after exiting the menu.

For more information on navigating the menu system, see “The Power Hub Menu Display” on page 3-12.

Chapter 3:

Operation and Maintenance

3

The Catalyst Media Server and the Mirror Head system are designed to function together as a single system on a controller-managed DMX512 link, or as independent systems. The Catalyst Media Server utilizes the video processing capability of a rack-mount Apple Power Mac computer to create, manipulate and control images in real time via any DMX lighting console. The Media Server can also function independently to drive LED Panels and video walls that accept XGA signals. The Mirror Head system functions on a DMX link to position projector output.

Catalyst requires a DMX lighting console that can control 56 channels per fixture and support true 16-bit values on 15+ channels. The Whole Hog II® Whole Hog III™, lighting consoles, and the HandShake™ handheld controller are DMX controllers available from High End Systems to control the Catalyst system (see “Catalyst Accessories” on page 1-5). Fixture libraries are available to map the fixture to any of these controllers.

This chapter outlines the Catalyst application software file organization and the onboard menu system for the Mirror Head system. For basic DMX programming concepts, and a functional description of the Catalyst DMX protocol parameters, see “Chapter 4: DMX Programming”. For a complete table of DMX values for the Catalyst protocol, see. “Appendix A: Catalyst DMX Protocol”. For more information on operating the fixture with a controller, consult the controller documentation.

Catalyst Media Server Operation

The Catalyst system ships with the Catalyst Application loaded on the Power Mac G4. The Catalyst Application folder contains:

- Catalyst Application
- Library Files Folder
- Into Extensions Folder
- Other related files including:
 - Sam SC Settings
 - Catalyst Library Files.txt
 - _lib.lib.

Accessing the Catalyst Application

Opening the Catalyst Application

To open the Catalyst application on the media server:

1. Complete the mounting and connection procedures described in “Chapter 2: Setup and Configuration”.



Caution: Before powering up the Power Mac G4, ensure the correct local voltage is set on the back of the computer. See “Selecting the Voltage” on page 2-13 for information on how to change the voltage setting.

2. Power up the G4 via the On/Off Switch on front panel of computer. The Catalyst application folder and any connected media devices will appear on the desktop once the G4 has completed its boot up.
3. Double click on the Catalyst application folder and then the Catalyst Application icon. Catalyst will launch into fullscreen mode.

Note: Hold down ‘Shift’ key to avoid entering fullscreen mode while launching program.

Opening the Application activates Hot Keys that allow a user to toggle between full screen and preview modes and navigate through the Info Screen options. Table 3-1 lists the available hot keys and their associated actions.

Table 3-1 Catalyst Hot Keys

Key	Action
A	Full Screen
S	Preview Mode
Q	Info Display OFF
W	File Info Display
E	Gobo Info Display
R	Color Info Display
T	Size Info Display
Y	Keystone
U	Sync
I	DMX Info Display

Closing the Catalyst Application

To close the Catalyst application:

4. To Exit the Catalyst Program, press Command (Apple) Key + Q to Quit program or select ‘Quit’ from File Menu.
5. To shutdown the Macintosh, select ‘Shut Down’ from the ‘Special’ Menu in the Apple Finder.

Note: The Power Mac G4 used in the Catalyst system is optimized to run with the Catalyst software application. Changing system setting or loading other applications may affect Catalyst performance.

For more information on Macintosh menus, command keys, and finder, see the Power Mac documentation shipped with the Catalyst system. Image File Organization

Library Files Folder

The Library Files folder is located in the Catalyst application folder on the desktop and contains folders for different image and video collections. All image stills, Quick-

Time movies and Flash™ animations reside in the Catalyst Library Files folder.

Image and Video File Libraries

After double clicking on the Catalyst application folder, double click on the Library Files folder to open it. Inside the Library Files folder are folders holding collections of media files, (see Figure 3-1). Each collection has a unique index number attached to the folder name. Up to 255 folders can be specified for content.

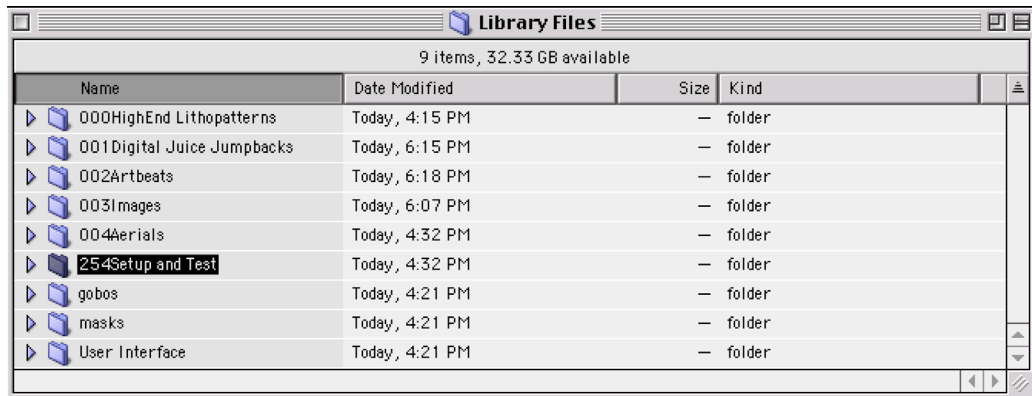


Figure 3-1 Library Files folder contents on Macintosh harddrive

Each folder name begins with an index number. This index number corresponds to a DMX value for the Library (Channel 7) parameter. The index number must be a 3-digit number from 000-255. For example, when the DMX value of Library (Channel 7) is 0, you will be able to access the 000High End Lithopatterns folder.

Any custom content created for the Catalyst system needs to follow this naming convention to work with the Catalyst application.

Table 3-2 describes the contents of the preloaded content folders that ship with the Catalyst Media Server.

Table 3-2 Preloaded content folder descriptions

Folder Name	Content Description
000HighEnd Gobos	160 High End Systems lithopattern® images. See “Appendix D: Catalyst Image Content” for file names and a thumbnail representation of each pattern.
001Digital Juice Jumpbacks	Twenty 15–30 sec. animated backgrounds
002Artbeats	Seven video clips including fire, water and cloud images
003images	Empty folder to hold custom images
254Aerials	Flash animations created exclusively for the Catalyst system achieve multi-colored, rotating aerial effects.
255Video Input (Do Not Use)	Reserved for Firewire input. Do not use for content

Table 3-2 Preloaded content folder descriptions

Folder Name	Content Description
gobos	Contains a single 'movie' file of the DHA gobo library. Each gobo occupies 50 frames at varying diffusion levels. "DHA Gobos" on page D-7 shows a thumbnail and DMX index value for each Gobo pattern.
Masks	Mask pattern file
User Interface	Reserved for application menus. Do not alter.

Each collection can have up to 255 files. The indexed files within each folder use the same indexing system as the folders, except the files are indexed to the File (Channel 8) parameter from 000 to 255. The example in Figure 3-2 shows files in the High End Lithopatterns collection.

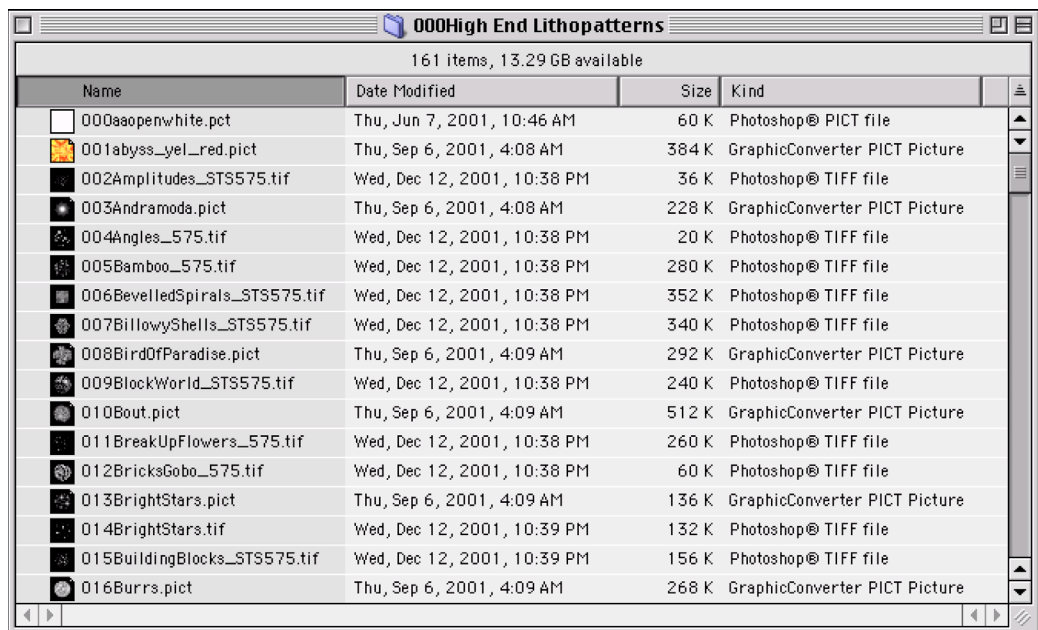


Figure 3-2 File organization and naming on the Macintosh harddrive

Creating Custom Image Files

The Catalyst system supports QuickTime technology and will accept the following file formats:

3DMF	JPEG/JFIF	PNG
Karaoke	MacPaint	QuickTime Image File
AVI	Macromedia® Flash™ 4	QuickTime Movie
BMP	Photoshop®*	Targa
Cubic VR	PICS	Text
DV	PICT	TIFF*
FlashPix*	GIF	TIFF Fax
FLC		Virtual Reality (VR)

* QuickTime also supports import of multiple images and layers in TIFF, FlashPix, and Photoshop files.

In addition, use the following recommendation when creating still image files for use in a Catalyst system to ensure the best results:

1. The largest image dimensions the Catalyst system can display are 2048 pixels wide by no more than 1024 pixels tall. Images beyond these dimensions will be cropped along the right or bottom edge to these limits.

For most high resolution still image preparation, from scans or digital camera over 1.5 MegaPixels, or images rasterized from line art or vector based graphics, this will mean scaling the image to a height of 1024 pixels tall by whatever width the aspect ratio of the source image will allow. Figure 3-3 shows aspect ratio examples.

Digital images with less than 1024 vertical pixels should be kept at original size. Scaling up may add distortion.

2. For “art images” meant to act more as lighting textures than pictures, make the image square and/or keep important parts of the image within an imaginary circle inscribed and centered within the image area as shown in the two examples in Figure 3-4 on page 3-6.

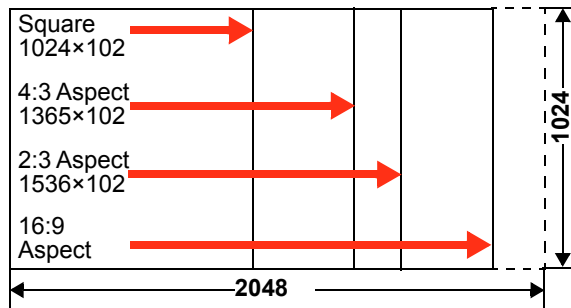


Figure 3-3 Aspect ratio image adjustment

Art outside of this area may be masked or clipped at times. Logos with non-black backgrounds should be kept well within this circular area. Logo's with pure black backgrounds can extend to the entire image area.

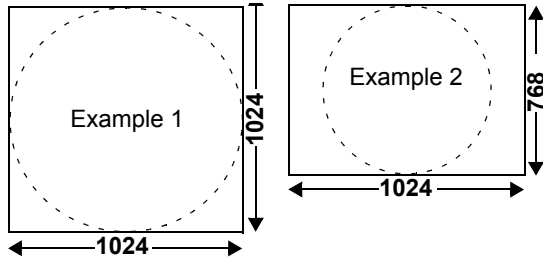


Figure 3-4 Art image size adjustment

3. Although the file formats listed at the beginning of this section are all accepted by the Catalyst system, the optimum format choice will depend on the nature of the image. Most photographs work well in JPEG format, though TIFF offers lossless compression for highest quality at the cost of file size. For simple line art and graphics with 256 colors or fewer, GIF is a good choice. File size primarily effects load time in the Catalyst system, as well as ultimate hard disk capacity.

Naming and Saving Custom Image Files

Adding new images or video files requires using the existing Catalyst file organization and naming conventions.

Creating a Library Folder

To create a new Library folder:

1. Choose a DMX address value that is not currently being indexed by another folder. To open the Library folder, double click the mouse. Select File>New Folder, or type Command + N. This will create a new folder in the Library Files folder.
2. Click on the new 'Untitled Folder' and type in a 3-digit index number not already being used followed by a descriptive name, and press Enter. For example, to create a folder called 'pictures' that indexes DMX address 12, name the folder '012pictures'.

Note: The 255Video Input file is reserved to select live digital video input to the system through the Firewire port and is not available to use for content.

Storing an Image File

To store a new image file:

1. Ensure the file is compatible with the Catalyst system. See “Creating Custom Image Files” on page 3-5 Catalyst uses Quick Time technology and supports Drag and drop the image file into the relevant indexed folder.
2. Click on the name portion of the file to rename the file. The file name must begin with a 3-digit index number from 000–255 not already assigned to a file in that

folder. Press Enter to store the name. For example, to index a QuickTime movie called 'clouds' to DMX value 12, rename the file '012clouds'.

Creating Custom Gobos

The following example shows the steps for creating a gobo like the one overlaying the flag in Figure 3-5. These instructions are for use with the QuickTime “Pro” application, which enables many features of the free QuickTime player, including importing, basic editing, trimming, adjusting, compression, effects, and exporting functions. QuickTime Pro gives full access to any installed video compressors, several of which are installed with QuickTime.

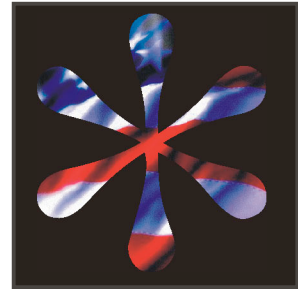


Figure 3-5 Sample Gobo

Image Preparation will also require an image editing application such as Adobe’s PhotoShop.

Preparing a New Gobo Image

Use the following specifications shown in Figure 3-6 to create Gobo overlays.

- Images to be used as Catalyst gobos must be 512 x 512 pixels in size. Default values are acceptable (72 or 96 DPI).
- The design should be kept within a circular area centered inside the square image. This is not an absolute requirement, but it will allow clean rotation of the image.
- The images should be in black and white, or grayscale. Black represents the areas that will become transparent allowing the background image to show through. White represents the opaque or solid areas of the gobo (which will usually be projected as black). Shades of gray represent proportional amount of transparency, often used to create “soft” edged gobo images. As a matter of example, most gobo image files will be a black design on a white background.
- Files should be saved in a non-compressed file format such as TIFF, Pict, or BMP. If using Adobe PhotoShop, the native PhotoShop .psd file will work as is.
- Avoid JPEG, as it may introduce undesirable artifacts and distortion when used with a non-photographic image.

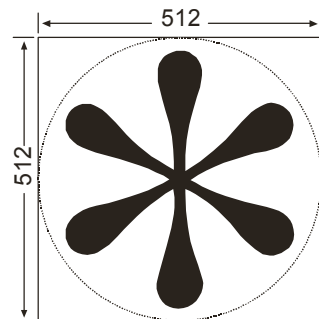


Figure 3-6 Gobo image specifications

Saving the New Gobo

The entire DHA gobo library included with Catalyst is stored as one large movie file with each frame a different image. As shipped, a gobo is repeated in 50 consecutive frames, each having an increasing amount of diffusion to produce soft edges.

It is not necessary to create 50 variations for each custom gobo since frames are recalled individually. Create only the variations needed using the following steps:

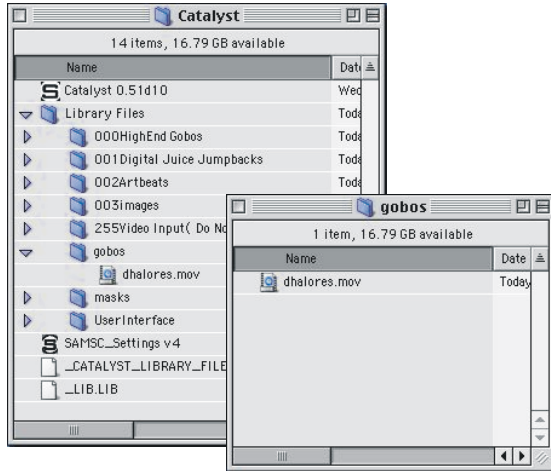


Figure 3-7 Locating dhalores.mov file

Locate the existing gobo file

1. Open Catalyst application folder, then Library Files folder, then gobos folder. Click on the file named dhalores.mov to select.
2. Choose “Duplicate” from file menu or press Command+D to duplicate the file.
3. Copy or move your new gobo images to this same gobos directory.

Add new image(s) to the dhalores.mov file

1. Double click on the dhalores.mov file to launch QuickTime Player with this file open. Or, from within QuickTime Player, open the file dhalores.mov from within the gobos folder inside the Library Files folder located inside the Catalyst application folder. The player should open onto a black design on a white background (Figure 3-8 a.). The picture may be different if the movie is not “rewound” to the beginning. Because gobos are selected by frame number, any new gobos should be added at the end of the movie, so that the built-in gobos will keep their existing frame numbers.
2. Press the right transport button (Figure 3-8 b.) to jump to the end of the movie. The inverted triangle on the top of the time line should move to the far right end of the time line.

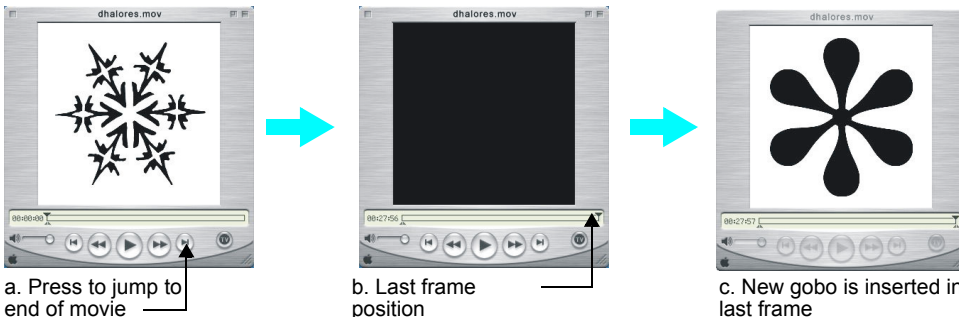


Figure 3-8 Adding a custom image to the gobo ‘movie’

3. Drag the new gobo image from the gobos folder onto the open QuickTime player window. The new image should now be visible as the last frame of the movie file (Figure 3-8 c.). If there are additional images, drag them one by one onto the QuickTime window in the order desired.
4. Select save from the file menu.

Info Display Screens

The Info Screen shown in Figure 3-9 displays the current DMX parameter setting for a selected image. It can be activated by choosing any of the Hot Keys ‘Q’ ‘W’ ‘E’ ‘R’ ‘T’ ‘Y’ ‘U’ or ‘I’, see Table 3-1, “Catalyst Hot Keys,” on page 3-2. The Info Screen appears as a transparent overlay on the currently selected image. Use a Hot Key or click on a screen activation button to access a particular screen.

The File, Gobo, Color, Size and Keystone info screens function as display screens for DMX values related to parameters associated with that item. Values can only be set in the Sync and DMX info screens.

To remove the Info Screen, press the ‘Q’ Hot Key.

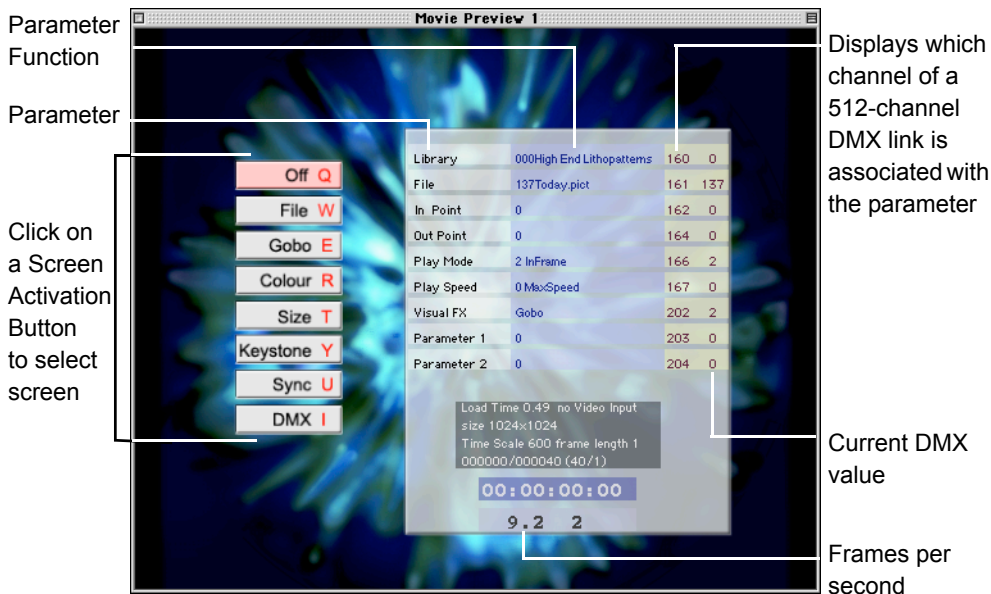


Figure 3-9 Info Display screen

File Info Screen

The 'File' Info Screen displays the parameter settings for the current image. The current DMX value is shown for each parameter's option. Use a DMX controller to change the values, according to "Appendix A: Catalyst DMX Protocol". For additional description of Parameters and their options, see "Digital Media Server DMX Parameters" on page 4-1, "Composite Image Control" on page 4-6, and "Visual Effects Control" on page 4-9.

Load time
Image size in pixels
This frame/Total # of frames
Time Codes
Frames/sec.

Library	000High End Lithopatterns	160	0
File	000aaopenwhite.pct	161	0
In Point	0	162	0
Out Point	0	164	0
Play Mode	2 InFrame	166	2
Play Speed	0 MaxSpeed	167	0
Visual FX	Gobo	202	2
Parameter 1	0	203	0
Parameter 2	0	204	0

Load Time	0.28	no Video Input
size	1024x1024	
Time Scale	600	frame length 1
	000000/000040	(40/1)
Time Codes	00:00:00:00	
Frames/sec.	66.6	18

Figure 3-10 File Info Screen

Gobo Info Screen

The Gobo Info Screen displays current settings for parameters related to a gobo or mask overlay on the current image. Gobo Frame, Gobo Size, Gobo Rotate Mask and Mask Rotate functions are described further in "Overlay Gobo Control" on page 4-4 and "Mask Layer Control" on page 4-8. Use a controller to change values according to "Appendix A: Catalyst DMX Protocol".

Color

The Color Info Screen displays selected options for parameters related to color. For more information, see "Color Control" on page 4-8. DMX protocol for changing DMX values can be found in "Color Control" on page A-4.

Size

The Size Info Screen shows the Scale, Aspect Ratio, Movement Speed, Position and Rotation values currently selected. To change values for any parameter, see "Appendix A: Catalyst DMX Protocol". See "Chapter 4: DMX Programming" for more information about individual parameters.

Keystone

Keystone correction for the image layer is displayed on the Keystone Info Screen. The current DMX values for the x and y direction on each corner of the image are shown. To change the Keystone values, see "Appendix A: Catalyst DMX Protocol". For more information on the Keystone feature, see "Keystone Correction" on page 4-9.

Sync Info Screen

The Sync Info Screen displays the ID assignment for every Catalyst systems sharing an ethernet link. The Sync ID can be set on the screen for the system in use with the following procedure.

1. Double click on the Catalyst application to launch.
2. While running catalyst, press the “U” key to display the sync info screen.
3. Click on the current sync ID value and drag the mouse up or down to set the ID from 0 to 19.

For more information on the Synchronize feature, see “Synchronized Playback on Multiple Catalyst Systems” on page 4-3.

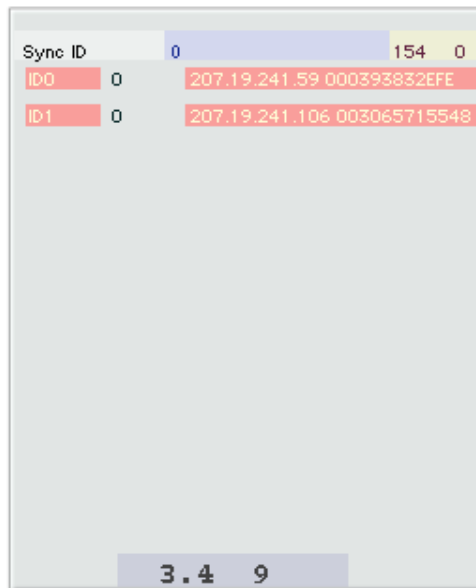


Figure 3-11 File Sync Screen

Setting a Start Channel Using the DMX Info Screen

The Start channel for the Media Server can be set in the info screen as an alternative to the CIB. Before setting the Start channel, see “Determining a Valid Start Channel” on page 2-15.

To change or set a Start channel for the Catalyst Digital Media Server:

1. Double click on the Catalyst application to launch.
2. Press ‘I’ or click on the DMX button to open the DMX Info screen shown in Figure 3-12.
3. Click on “Base DMX” at the top of the window and drag the mouse up or down to set the address.

To set the DMX Start channel address on the Power Hub of the Catalyst mirror head, see “Setting Mirror Head System Start Channel” on page 2-16.

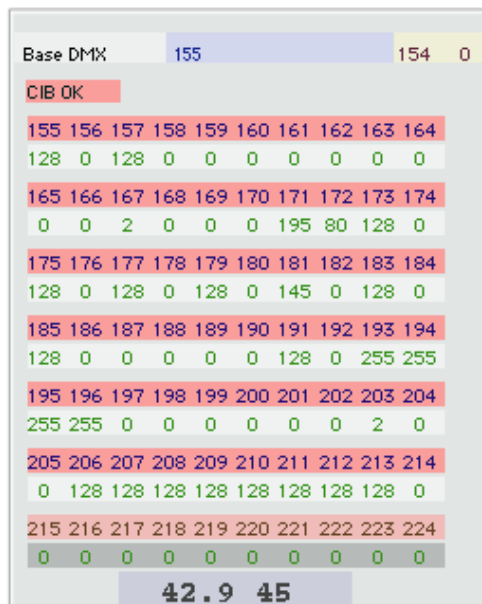


Figure 3-12 DMX Info Screen

Mirror Head System Control

The Power Hub has an on-board menu system allows the user to:

- Set a Start Channel
- Enable and disable default parameter settings
- View Protocol type
- Crossload firmware
- Home the mirror head
- Test movement and sensor functions
- View current DMX values for all parameters
- View Fixture number, Software version, Errors, Channels needed, and Next available DMX channel.

The Power Hub Menu Display

The front panel on the Catalyst Power Hub in Figure 3-13 has a dot matrix display and six arrows on buttons that control navigation for the on-board menu system. The buttons are configured with the Menu button on the left and the Enter button on the right. The center button navigates through the current level of menu options [Left and Right] and values available for the current option [Up and Down].

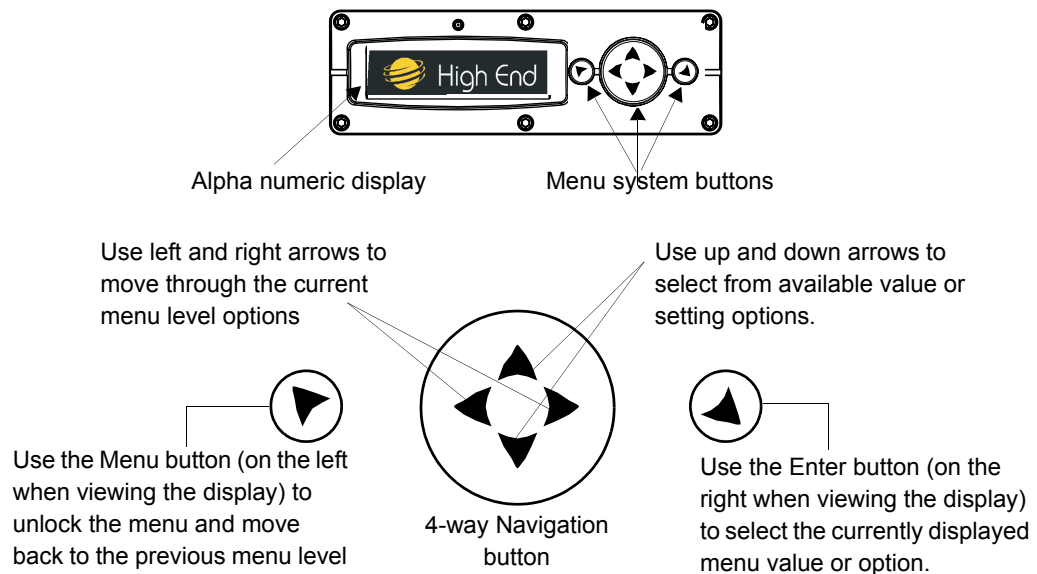


Figure 3-13 Power hub front panel display

Navigational Basics

1. Unlock the Menu system by pressing the Menu ▼ button for a few seconds until the display goes to the 2-line format.
2. Use the left and right arrows ◀▶ on the 4-way Navigation button to scroll through Menu options at the current level.
3. Stop at the desired menu and press the Enter ▲ button to select. The new option will not be stored unless the Enter button is pressed.
4. If there is another level of menu choices repeat Steps 2 and 3.
5. At the option or setting menu level, use the up and down arrows on the Navigation button ▼▲ to scroll to the desired option or setting. The option flashes until the Enter button is pressed. Pressing the Enter button stores the new value for that option. Pressing the Menu button returns to the previous menu level *without changing* the value of an option.
6. Continue pressing the Menu button to move back up levels and exit the menu system.

Display in Menu Locked Mode

The Catalyst Power Hub display panel gives access to the onboard Menu System. When the Menu System is in locked mode, the panel displays in large 8-character words designed to be viewed from a distance. Under normal circumstances, when the display is locked, it cycles between displaying the fixture's software version [V###.###], the High End Systems logo, the Catalyst logo, the fixture's configuration type [STANDARD] and the fixture's DMX Start channel [DMX_C####]. Any errors present are also displayed in an 8-character error description.

Fixture Software Version

The software version loaded on the system can vary even between units purchased at the same time. “Verifying/Uploading Mirror Head Software” on page 2-14 describes the procedures to ensure that all Catalyst systems on the link are running the latest software.

System Configuration Type

The configuration type indicates the system's modular setup.

DMX Start Channel

The DMX Start Channel is the first channel currently assigned to that fixture in its range of channels on a DMX link. For more information on DMX Start channels, see “Setting a DMX Start Channel” on page 2-15.

Error Message Display

Errors are displayed in short 8-character form when the menu system is locked. Unlocked, menu system's 2-line format displays more detailed information.

Unlocking the Menu System

To unlock the menu system, press and hold the Menu button until the display changes to the 2-line format. The menu system is protected against inadvertent menu changes by requiring the Menu button to be held for a few seconds before allowing entry to the menus. DMX Address Menu is the first option on the top menu level.

Exiting the Menu System

To exit the menu system, keep pressing the Menu button to back out of each menu level until the High End Systems logo appears. The word **AUTOLOCK** will appear briefly on the display to indicate the fixture’s software is “locking” the display. The display switches back to the large 8-character format and, after a few seconds, begins the standard display for the locked mode as described above.

Menu Map

Use the following table to navigate the menu options on the Power Hub.

Level 1	Level 2	Level 3	Option/Setting	Description/Notes
▼ enters /exits Menu System and moves up levels ◀▶ moves between items on same level. ▲ selects			⬆ scrolls between values ▲ selects	
DMX ADDRESS MENU	SET DMX START CHANNEL: ###		1-512	Selected value becomes the first DMX value in the range for that mirror head on a DMX 512 link.
SET PARAMETERS MENU	FACTORY DEFAULT SETTINGS: ###		ON	Reverts mirror head to default setting
			OFF	Indicates a factory default has changed
	DISPLAY INVERT:		ENABLED	Inverts display functions
			DISABLED	Prevents display inversion
			AUTO	Returns display to normal orientation
	DISPLAY LEVEL:		ON	Turns display on
		OFF	Display fully dimmed when menu is locked	
MIRROR 2 QUICK PATH:		ON	Allows mirror to take the shortest path to the selected position	
		OFF	Disables the Quick-Path feature	
FIXTURE MODE MENU	PROTOCOL MODE:		STANDARD	Factory default setting
	CROSSLLOAD FIRMWARE:		NO	Safe setting
			YES	Uploads Catalyst software to all other Catalyst fixtures on the link
TEST OPTIONS MENU	HOME MIRROR HEAD:		ALL	Homes the mirror head
	COPY BOOT:		NO	Safe position: no action when selected
			YES	Copies boot code to fixture
SELF TEST MENU:		ALL	Performs and displays all self test functions sequentially in the format: STEP ## DMX:###	

Level 1	Level 2	Level 3	Option/Setting	Description/Notes	
▼ enters /exits Menu System and moves up levels ◀▶ moves between items on same level. ▲ selects		▲ scrolls between values ▲ selects			
INFORMATION MENU	SENSOR STATUS MENU	MIRROR 1 ENCODER ####		Displays absolute position of Mirror 1	
		MIRROR 2 ENCODER #####		Displays absolute position of Mirror 2	
	UNIQUE NUMBER #####			Displays fixture's unique 10-character number	
	DMX VALUES MENU		1:### ### ###		Displays current values for Channels 001– 512 and 6 DMX values/screen. The number at the beginning of each line indicates the first channel with a value displayed on that line.
			4:### ### ###		
			7 ### ### ###		
			10:### ### ###		
			###:### ## ###:###:### ## ###		
	FIXTURE HOURS				Displays fixture operation time in hours:minutes
	FIXTURE HOURS RESET:		NO		Default "safe" setting
		YES		Press Enter for 5 seconds to reset fixture hours to 0	
SOFTWARE VERSION:	V ##.##.###			Major.Minor.Build	
MODULE VERSION MENU	MIRROR 1 HW:# SW:#			Displays the Hardware and Software versions for each logic board in the fixture. Displays NOT AVAILABLE if a board does not exist in that position.	
	MIRROR 2 HW:# SW:#				
DISPLAY ERRORS MENU	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX			Scrolls through errors displayed in 2-line, 16-character format	
CHANNELS NEEDED:	##			Displays channel range for current Mirror Head configuration	
NEXT DMX CHANNEL:	##			(Current start channel + channels needed+1)	

DMX Address Menu

DMX Address is the top level menu selection used to set the fixture's DMX start channel. Use this menu option, to change the *existing* DMX start channel to another DMX start channel.

Setting a DMX Start Channel

To set the DMX start channel on the Power Hub:

1. Press the Menu button to unlock the menu system or to move back up the system to the top level menus. DMX ADDRESS MENU is the first menu item at the top level.

1. Press the Enter button to select. The display will show SET DMX START CHANNEL:###. The display will show the start channel currently assigned to the fixture.
2. Use the up and down arrows on the Navigation button to select the same DMX start channel as the Media Server for the complete Catalyst system. The display will flash a new option ready for selection.

Note: The last valid Start channel for an Catalyst system is based on the channel range required by fixture's module configuration. The last valid Start channel for the Mirror Head System 507 (512-6+1).

3. Press the Enter button to accept the new DMX Start channel.

Note: If the Enter button is not pressed, the old value will remain selected after exiting the menu.

Set Parameters Menu

The Set Parameters menu sets all factory options to their default settings or changes the factory options individually.

Factory Default Settings

The Catalyst Mirror Head system ships with the following factory default settings:

Display Invert=AUTO
Display Level=ON
Mirror 2 Quick Path=OFF

If any of the default settings are changed, this menu reverts to the OFF option. The ON option restores all factory defaults.

To check and reset factory defaults:

1. Press the Menu button to unlock the menu system or to move back up the system to the top level menus.
2. Using the left and right arrows on the Navigation button, scroll through the top level to SET PARAMETERS MENU and press the Enter button to select.
3. Using the left and right arrows on the Navigation button, scroll to FACTORY DEFAULT SETTINGS. The current state (ON or OFF) will be displayed.
4. To reinstate the factory defaults if OFF is displayed, use the up and down arrows on the Navigation button to scroll to ON and press the Enter button to select.

Display Invert

This menu item selects automatic or manual control of the display invert feature. The Power Hub is set to automatically invert the orientation of the display's alphanumeric characters and navigation control functions when the fixture rotates more than 45% off the horizontal axis.

To control the DISPLAY INVERT feature:

1. Press the Menu button to unlock the menu system or to move back up the system to the top level menus.
2. Using the left and right arrows on the Navigation button, scroll through the top level to SET PARAMETERS MENU and press the Enter button to select.
3. Using the left and right arrows on the Navigation button, scroll to the DISPLAY INVERT MENU.
4. Using the up and down arrows on the Navigation button, choose ENABLE to invert the fixture's alphanumeric characters, DISABLE option to prevent inverting or AUTO to return the fixture's alphanumeric characters to normal orientation. Press the Enter button to accept the desired option.

Display Level

Use this menu option to turn the display on or off.

To change display level:

1. Press the Menu button to unlock the menu system or to move back up the system to the top level menus.
2. Using the left and right arrows on the Navigation button, scroll through the top level to SET PARAMETERS MENU and press the Enter button to select.
3. Using the left and right arrows on the Navigation button, scroll to the DISPLAY LEVEL.
4. Using the up and down arrows on the Navigation button, choose ON to turn the display on or OFF to dim the display and press the Enter button to store the option.

Mirror 2 Quick Path

Turning this menu option ON directs the outer mirror to take the shortest path to the selected position to provide very fast position changes. The default is OFF.

To turn Mirror 2 Quick Path ON:

1. Press the Menu button to unlock the menu system or to move back up the system to the top level menus.
2. Using the left and right arrows on the Navigation button, scroll through the top level to SET PARAMETERS MENU and press the Enter button to select.

3. Using the left and right arrows on the Navigation button, scroll to the MIRROR 2 QUICK PATH.
4. Using the up and down arrows on the Navigation button, choose ON and press the Enter button to store the option.

Fixture Mode Menu

The Mode menu sets the module and protocol configuration and crossloads software from one fixture to other Mirror Head systems on the link.

Protocol Mode

This option sets the Protocol to be followed in assigning Start Channels and programming parameters. STANDARD protocol is the default.

Crossloading Fixture Software

A fixture running a newer software version can load the new software to all other Catalyst systems on the link using the CROSSLOAD FIRMWARE menu option.

To CROSSLOAD FIRMWARE from one fixture to all Mirror Head systems on the link:

1. Disconnect or bypass any controllers, serial data distributors, data line optoisolators, and any fixtures using RS-422 communications (such as Dataflash® AF1000 xenon strobes, and Intellabeam® fixtures). These devices will block communication between the crossloading fixture and any other Mirror Head systems on the link.
2. On the crossloading fixture *only*, unlock the menu system by pressing and holding down the Menu button until the extended 2-line display appears indicating the top menu level.
3. Using the left and right arrows on the Navigation button, scroll to the FIXTURE MODE MENU and press the Enter button to select.
4. Use the left and right arrows on the Navigation button to scroll to CROSSLOAD FIRMWARE.
5. Use the up and down arrows on the Navigation button to scroll to the YES option and press the Enter button to store. The fixture will upload its software to all other Mirror Head systems on the link.

When the crossload has finished successfully, CROSSLOADING COMPLETE will appear briefly in the display of the crossloading fixture, and all other fixtures will automatically home.

Note: If a new boot code was included with the latest software, the fixture displays a BOOTDIFF error when it returns to the locked mode of the menu system. To correct the boot code, copy the new boot code to each fixture (see “Copying the Boot Code” on page 4-19).

Test Options Menu

The TEST OPTIONS MENU manually homes the fixture, performs fixture self tests, and stores new boot code information. Performing fixture self tests may help identify mechanical problems in the fixture.

Homing the Fixture

The Mirror Head system automatically homes all its functions whenever it is turned on. This menu option manually homes the entire fixture.

To remotely home the fixture using a DMX controller, see “Mirror Head Positioning” on page 4-10 and “Control Function” on page A-8.

To manually home the fixture:

1. Press the Menu button to unlock the menu system or to move back up the system to the top level menus.
2. Use the left and right arrows on the Navigation button to scroll to the TEST OPTIONS MENU and press the Enter button to select.
3. Use the left and right arrows on the Navigation button to scroll to HOME FIXTURE.
4. Use the up and down arrows on the Navigation button to scroll through the homing options available from all to selected function homing options. Press the Enter button to select.

Copying the Boot Code

When new software is uploaded to a Mirror Head system, it may contain a new boot code which must be copied to each fixture. This is apparent if the fixture displays a BOOTDIFF error.



Caution: Do not remove power from the fixture while performing a boot copy.

To accept and store the new boot code:

1. Press the Menu button to unlock the menu system or to move back up the system to the top level menus.
2. Using the left and right arrows on the Navigation button, scroll to the TEST OPTIONS MENU and press the Enter button to select.
3. Using the left and right arrows on the Navigation button, scroll to the COPY BOOT option and press the Enter button to select.
4. Use the up and down arrows on the Navigation button to scroll to the YES option and then press the Enter button to store the command. The fixture will store the new boot code, then automatically home.

Self Test Menu

This option displays the steps and DMX values generated as the fixture tests the motor operation of various functions. Self test can be run and viewed on all the fixture parameters sequentially, or individual parameters.

To access the SELF TEST MENU:

1. Press the Menu button to unlock the menu system or to move back up the system to the top level menus.
2. Use the left and right arrows on the Navigation button to scroll to the TEST OPTIONS MENU and press the Enter button to select. The menu displays ALL.
3. Press the Enter button to select. The fixture begins running the self tests sequentially.

Information Menu

The Information menu displays current fixture information such as sensor status, total fixture hours, hardware and software versions, DMX errors, and DMX data for any device on the link. Fixture hours resets are also executed in the Information Menu.

Sensor Status Menu

The Sensor Status displays the current numeric position of the fixture's encoders.

To view encoder values:

To access the DMX VALUES MENU:

1. Press the Menu button to unlock the menu system or to move back up the system to the top level menus.
2. Use the left and right arrows on the Navigation button to scroll to the INFORMATION MENU and press the Enter button to select.
3. Use the left and right arrows on the Navigation button to scroll to the SENSOR MENU and press the Enter button to select.
4. Use the left and right arrows on the Navigation button to scroll to view MIRROR 1 ENCODER or MIRROR 2 ENCODER value.

Unique Number

Each Mirror Head system has a unique number similar to a serial number. TalkBack™ protocol uses this number to identify a fixture for remote communication over a DMX link. Use this option to view the fixture's unique number.

DMX Values Menu

Use this menu option to view current DMX value settings by channel or by parameters. A Mirror Head system utilizes 6 channels on a DMX 512 link. Each DMX value is from 0-255.

When viewing DMX value settings by Channel, the Mirror Head system displays current values for Channels 001– 512 in two lines of three DMX values each per screen. The number at the beginning of each line indicates the first channel with a value displayed on that line.

When viewing current DMX value settings by the Parameters, the menu displays one parameter with the DMX value below it per screen. Parameters will change for different module configurations.

To access the DMX VALUES MENU:

1. Press the Menu button to unlock the menu system or to move back up the system to the top level menus.
2. Use the left and right arrows on the Navigation button to scroll to the INFORMATION MENU and press the Enter button to select.
3. Use the left and right arrows on the Navigation button to scroll to the DMX VALUES MENU and press the Enter button to select.
4. Use the up and down arrows scroll through the channel range. The display shows 6 DMX values per screen in two lines of 3 values each. The number at the beginning of the line indicates the channel number corresponding to the first value in that line.

Fixture Hours

Use this option to view the fixture operation time in hours and minutes.

Fixture Hours Reset

Use this option to reset the fixture operation time to Zero.

To access the FIXTURE HOURS RESET option:

1. Press the Menu button to unlock the menu system or to move back up the system to the top level menus.
2. Use the left and right arrows on the Navigation button to scroll to the INFORMATION MENU and press the Enter button to select.
3. Use the left and right arrows on the Navigation button to scroll to the FIXTURE HOURS RESET option and press the Enter button to select.
4. Use the up and down arrows on the Navigation button to scroll to YES. Press and hold the Enter button down for 5 seconds to select.

Software Version

This option display's the fixture's CPU board Software version. The version number is composed of: V(Major).(Minor).(Build)

Module Version Menu

This option display's the hardware and software version number for each logic board in the fixture. Displays NOT AVAILABLE if a board does not exit in that position.

Display Errors

This menu option displays current errors in a descriptive 32-character text field.

To DISPLAY ERRORS:

1. Press the Menu button to unlock the menu system or to move back up the system to the top level menus.
2. Use the left and right arrows on the Navigation button to scroll to the INFORMATION MENU and press the Enter button to select.
3. Use the left and right arrows on the Navigation button to scroll to the DISPLAY ERRORS menu option and press the Enter button to select.
4. Use the up and down arrows on the Navigation button to view the list of current errors.

Channels Needed

Use this option to view the number of channels required (channel range) for the fixture's specific configuration. The Mirror Head System requires 6 channels on a DMX link.

Next DMX Channel

Use this option to view the next available DMX Start channel on the link following this fixture and is based on the fixture's specific configuration. The value displayed uses the formula (current Start channel + channels needed for this fixture + 1).

Catalyst Maintenance

Resetting Media Server

Use the following procedure to set up the Catalyst application if it becomes necessary to re-install the Power Mac operating system software.

1. Select control panel and extensions manager
2. Turn the following extensions off

Applications switcher	Fax Print	Speakable items
Control strip extension	FBC indexing scheduler	Speech manager
Desktop printer spooler	Find by content	Speech recognition
Desktop print manager	Folder actions	STF tool box
DVD autolauncher	Queue monitor	STF init
Fax Monitor	Queue watcher	

3. Go to control panel, go to memory, turn off Virtual Memory
4. Go to control panel and select “monitors” and choose 1024x768 60hz
5. Go to control panel, select energy saver and set to “never”
6. Restart
7. Hit “cancel” when USB window pops up.

Replacing the Power Hub Fuse



Warning: Disconnect power before servicing.

This fixture must only be serviced by qualified personnel. The following information is intended to assist qualified personnel only.

Replace fuses with the specified type and rating only.

To replace a fuse:

8. Disconnect power to the power supply hub.
9. Remove the three screws on the back of the power supply hub and lift the cover.
10. Locate the fuse on the bridge over the power supply.
11. Replace the Power supply fuse with the following:.

Fuse	Fuse Type and Rating	Manufacturer	High End Systems p/n
Power supply	2.5A, 250V, Slow Blow	Littelfuse 215 02.5	90403027

Replacement Parts

The Catalyst system has no user-serviceable parts. To return the Catalyst system

for servicing, call your High End Systems dealer/distributor for a Return Material Authorization (RMA) number. High End Systems cannot accept any goods shipped without an RMA number. For more information, see “Warranty Information” on page vi.

Cleaning the Mirrors

If the mirrors become dirty, clean them using a mild glass cleaner (containing no ammonia) and a soft, lint-free cotton cloth.

Chapter 4:

DMX Programming

The following sections describe the Parameter functions for the Catalyst Digital Media Server and the Mirror Head system. For the complete DMX protocol for controllers using decimal, percent, or hex values, see “Appendix A: Catalyst DMX Protocol”.

Note: New channels are continually added to the Catalyst Protocol. The latest software and DMX tables for Catalyst fixtures is available in the support section of the High End Systems® web site (www.highend.com). For more information on upgrading software, see “Verifying/Uploading Mirror Head Software” on page 2-14.

4

DMX Programming Terminology

A Parameter (construct) is a fixture attribute that can be controlled to modify the light beam in terms of color, beam quality and pattern, intensity, or focus (position). To program fixtures, DMX values are assigned to each of the fixture’s parameters according to that fixture’s DMX protocol.

A cue (sometimes referred to as a *scene* or *look* depending on the controller used) is one set of attribute options. Combining cues into sequences, assigning times and synchronizing fixtures on a link are the basics of show creation. Using a DMX controller, a designer can control all the fixtures on a link programming an unlimited number of sequences and their associated timing.

Digital Media Server DMX Parameters

DMX protocol for the Catalyst Media Server contains parameters that control:

- image selection, scaling and rotation
- gobo selection, scaling and rotation
- mask layer selection
- color
- visual effects
- keystone correction

Image/Video Selection

Catalyst gives a designer the ability to manipulate images in a layered structure. A base layer image can be overlaid with a gobo layer and/or a mask layer.

Image and Gobo layers can be controlled independently, but the image layer is primary and gobo rotation and scale selections adjust in relationship to the image layer. The mask layer is controlled independently from the other layers.

For a complete listing of DMX values for all image selection parameters, see “Video/Image Selection” on page A-1.

Catalyst provides a wide range of pre-loaded images including:

- The High End Systems® LithoPatterns® library
- Digital Juice animated backgrounds
- Artbeats digital video clips including fire, water and cloud images
- Flash™ animations for creating aerial effects
- DHA gobo library (for use in the Gobo layer, see “Overlay Gobo Control” on page 4-4).
- Setup and test patterns

A user can also add custom images and video to the hard drive using the same file structure (see “Creating Custom Image Files” on page 3-5).

Digital Video can be fed directly into the system via the Power Mac FireWire port. Catalyst is compatible with formats supported by DVD, digital betacam players, and professional studio cameras. A media converter can be used to convert most video signals to Firewire so they may be input into Catalyst. This allows any device to be used with Catalyst such as: tape decks, DVD players, live feeds, etc. Once input, all of the real time manipulations available to any image within Catalyst are available to the Firewire feed.

Note: A lag of 1/3 to 1/2 second is normal when using video through the Firewire port.

Locating and Selecting an Image/Video File

Set the parameters in Channels 1 and 2 to select a still image, a movie file or a movie segment from the Catalyst **Library** folders as the base layer image. To select an image folder, set a DMX value in Channel 1. Use the DMX value that corresponds to the index number in the desired Library folder name.

The Channel 2 DMX value determines the **File** to access within the selected folder. For DMX value assignments and thumbnail images of High End Systems lithopattern content and the DHA gobo file, see “Appendix D: Catalyst Image Content”.

For example, setting a DMX value of 0 in Channel 1 selects the High End Systems Lithopattern library (000HighEnd Lithopatterns). Then setting a DMX value of 26 in

Channel 2 selects the 'Comets' pattern (026Comets_STS575.tif) from the High End Systems Lithopattern folder. (For more information on file organization and naming, see "Library Files Folder" on page 3-2.

Note: A DMX value of 255 in Channel 1 selects external digital video input via the FireWire port. This is a reserved value and cannot be assigned to a image or video file.

Defining a Video Segment

In addition to playing movie files, it is possible to play just a portion or segment of a movie. Select a video segment by choosing the **'In' Frame** as a starting frame and an **'Out' Frame** as an endpoint for movie playback. Channels 3 and 4 provide coarse and fine scrolling and selection for In Frame. Channels 5 and 6 provide coarse and fine scrolling and selection for Out Frame.

Video Playback

The Play Mode (Channel 7) controls how the video will play. The segment of a video file between a selected 'In' Frame and 'Out' Frame can be set to play in any of the following ways:

- Play loop forward—Plays loop from 'In' frame to 'Out' frame and repeats.
- Play loop reverse—Plays the movie from 'Out' frame to 'In' frame and repeats.
- Play once forward—Plays the movie from 'In' frame to 'Out' frame and stops.
- Play once reverse—Plays the movie from 'Out' frame to 'In' frame and stops.
- Stop—Stops playing at current frame.
- Random—Plays random frame from selected movie.
- PlaySine—Plays the movie from 'In' frame to 'Out' frame, then plays from 'Out' frame to 'In' frame with the playback rate varying as a sinewave.
- Sync—Identifies the Catalyst system Sync ID number to reference for synchronized playback of the selected file.

Synchronized Playback on Multiple Catalyst Systems

Synchronized playback mode allows two or more Catalyst systems to play video with accurate frame by frame synchronization using an Ethernet network connection. This works either for simultaneous playback of the same clip on multiple systems, or for playback of multiple coordinated clips designed to play across multiple screens.

Note: To connect 2 media servers use a ethernet cable between the ethernet connections on the Power Mac computer of each system or use an ethernet hub to connect several systems. A crossover cable is not required to connect Power Mac systems.

Synchronization requires assigning one system to provide the "Master" timing for a cue. Other linked systems act as "Slaves", taking their timings from the designated master. Up to 20 different Catalyst systems may simultaneously act as masters by

assigning each system to a unique ‘Sync ID’ value. Any system may then be set, using the Play Mode DMX channel, to synchronize to any one of the 20 synchronization ID's. Any system may synchronize to any other system at anytime using the ‘Sync to 0’ through ‘Sync to 19’ play modes. There is no need for a system to be permanently designated as a master or slave.

Synchronization occurs on a frame by frame reference basis, so the video clips may be different lengths or sizes or formats. If the master is playing the fiftieth frame of a movie, for example, the systems synchronizing to that ‘Sync ID’ will play the fiftieth frame of whatever movie is selected on those systems. The master may use any of the play modes (Inframe, Outframe, PlayLoopForward, PlayLoopReverse, PlayOnceForward, PlayOnceReverse, Stop, PlaySine, or Random). The slave systems match the master system playback frame by frame, even if the frames are being selected manually using the Inframe or Outframe mode.

If the master plays a frame number that does not exist in the slaved movie, the last available frame of that movie will be displayed. Therefore, if the master movie is longer than the slaved movie, the slave will effectively freeze on its last frame until the master clip loops. If the Inframe of the master is set higher than the length of the slave movie the slave will remain frozen on its last frame. If the slave movie is longer than the master movie, the slave will loop at the same frame as the master, and the end portion of the slaved movie will never be reached.

Set the Sync ID using the Info Screen as described in “Sync Info Screen” on page 3-11.

Playback Speed

Set the Playback speed in Channel 8 from 0.3 frames per second to 39.8 frames per second. Channel 8 also includes an option to pause playback.

Setting playback speed to the maximum plays the movie at the fastest speed the system will allow. This maximum speed may change between different versions of software. So it is recommended that maximum speed be used only if timing is not important. Actual programmed speeds will remain more consistent between software updates.

Overlay Gobo Control

A selected Gobo can be sized and rotated independent of the base image layer. When combined with a base image the settings in the Gobo control channels “track” image manipulation in the underlying layer, see Figure 4-1. Transparency options for displaying the pattern are available when Gobo is selected in the Effects Function Channel, see “Effects Control” on page A-5.

For complete DMX values, see “Gobo Layer Control” on page A-2.

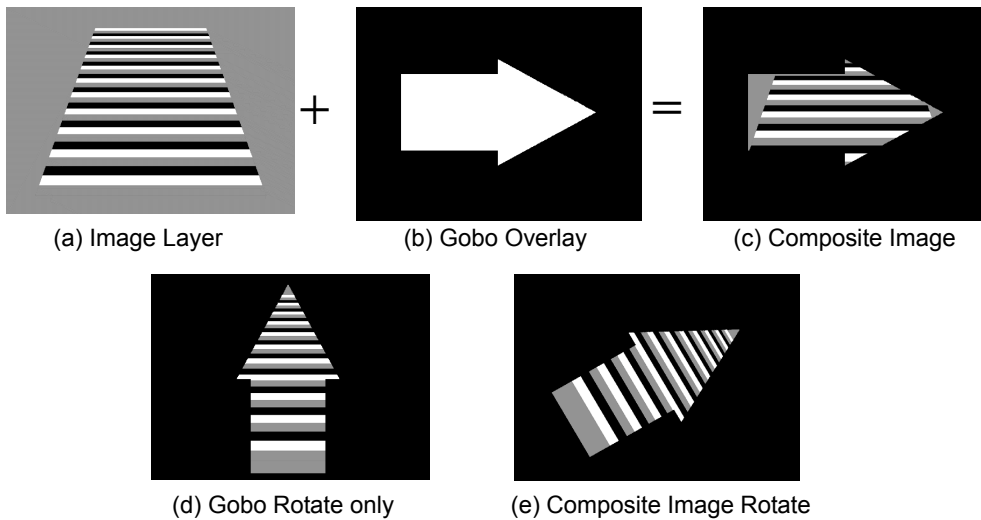


Figure 4-1 Gobo rotation interaction with image layer

Gobo Selection

Channels 9 and 10 provide coarse and fine control for selecting a Gobo pattern to overlay the base image. A Gobo pattern is actually a movie with each frame modifying the pattern edges from sharp to diffused. This allows the user to select a frame of that pattern with the desired “focus”.

The DHA gobo library has been pre-loaded in a Libraries folder named ‘Gobos’. For more information on locating a gobo pattern on the Power Mac hard drive, see “Image and Video File Libraries” on page 3-3. For a thumbnail image and DMX value for a specific DHA gobo, see “DHA Gobos” on page D-7.

Gobo Layer Sizing

Channel 11 and 12 control gobo size with coarse and fine selection respectively. A gobo can scale from 0–8x in a positive or negative direction with the midpoint of the DMX value range equaling 0 scale. As the size moves between positive and negative values along the x and y axis, the image “flips” horizontally and vertically. Actual size and normal orientation occurs at a DMX 16-bit value of 36864 (decimal) or 9000 (hex).

Gobo Rotate

Gobo Rotate is controlled by Channels 13 and 14 allows coarse and fine rotation adjustment. The Gobo Rotate parameter provides rotation independent of image layer rotation, (see Figure 4-1) and includes options for clockwise and counterclockwise rotation in continuous or variable modes.

Composite Image Control

Channels 15-28 control the rotation, scaling and shaping of the base image along with any selected gobo overlay as a composite image. Any size and rotation settings made in the Gobo Layer Control Channels (11-14) adjust in relation to the image controls set in the Composite Image Control Channels, see Figure 4-1 on page 4-5.

Rotation

Channels 15-20 provide image rotation control in forward and reverse directions around the selected axis. Figure 4-2 illustrates the different rotation options.

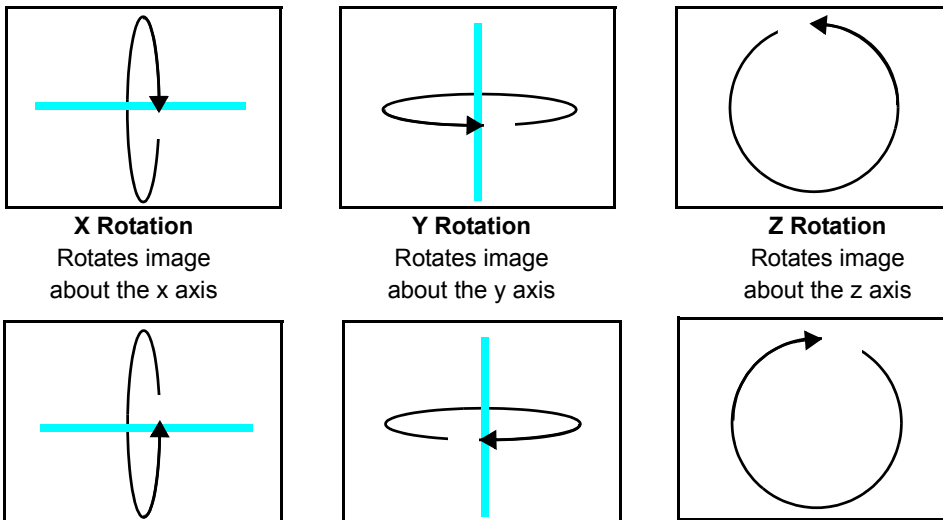


Figure 4-2 X, Y, and Z rotation

The x axis is the reference for rotation with y-axis rotation dependent on x, and z-axis rotation dependent on y.

An 'x' rotation produces the effect of a vertical flip and a 'y' rotation produces a horizontal flip.

Rotation selection for each axis is provided in coarse and fine 16-bit control for accurate adjustment.

Table 4-1 shows DMX values for some common rotation points in decimal and hex units. In this case, degrees positive indicate counterclockwise movement and degrees negative indicate clockwise movement.

Note: In reality, motion stops just short of $\pm 720^\circ$.

Table 4-1 DMX values for selected degrees of rotation

Rotation	Dec.Value	Hex Value
-720°	49151	BFFF
-540°	45056	B000
-360°	40960	A000
-180°	36864	9000
-90°	34816	8800
0°	32768	8000
90°	30720	7800
180°	28672	7000
360°	24576	6000
540°	20480	5000
720°	16385	4001

Scaling

Channels 21 and 22 provide a scaling range $\pm 8x$ with the midpoint of the DMX value range equaling 0. As the size moves between positive and negative values on the x and y axes, the image “flips” horizontally and vertically.

These settings scale the image along with any accompanying Gobo pattern as a composite image, (see “Gobo rotation interaction with image layer” on page 4-5.

Panning

The Pan selections in Channels 23-26 allow the designer to pan across the image in an x or y direction. This can yield striking effects when used in conjunction with Scaling and Masking. For example, scaling an image up behind a mask gives the appearance of “zooming in” on the image. Then, adjusting the pan in the x direction creates an effect of sliding across the image.

Image Movement Speed

Channel 27 adjusts the time to complete a movement. This allows for a smooth transitions with moving from one setting to another and can be applied to Scale, X-position, Y-position, and Gobo Size parameters. The Image Movement Speed parameter functions like the MSpeed parameter in the Mirror Head DMX protocol, see “MSpeed (Motor Speed)” on page 4-10.

Aspect Ratio

Channel 28 allows horizontal or vertical image compression from full screen down to a thin line (1-4 pixels). This function is useful to compensate for dissimilar aspect ratios encountered in various video formats. For example, a designer can correct D1/DV-NTSC Video to a 4:3 aspect ratio with a DMX setting of 242 or to a 16:9 aspect ratio with a DMX setting of 120.

Other Effects

Additional effects can be applied to the composite image in Channels 40-45. Table 4-3 “Visual Effect Options” on page 4-9 shows the relationship between the Visual effects channel functions selected and the image.

For complete DMX values, see “Composite Image Control” on page A-2.

Table 4-2 Sample size DMX values

Rotation	Dec. Value	Hex Value
8x	49151	BFFF
4x	45056	B000
2x	40960	A000
1x	36864	9000
Zero	32768	8000
-1x	28672	7000
-2x	24576	6000
-4x	16684	4000
-8x	00000	0000

Mask Layer Control

A mask is an overlay layer that frames the composite image and blacks out the outer edge of the image. Channels 29-32 control Mask shape selection, size and rotation. Mask Shapes on Catalyst include variations of:

- Circle
- Vertical Rectangle
- Horizontal Rectangle
- Square

Unlike the image and gobo layers which can be manipulated separately or jointly, the Mask layer is always manipulated independently from the other layers.

Select both the mask shape and the size using Channel 29(coarse) and Channel 30(fine).

Channels 31 and 32 control coarse and fine rotation adjustment of the selected mask over the image in clockwise and counterclockwise directions.

For complete DMX Mask Parameter values, see “Mask Layer Control” on page A-4.

Color Control

Color Control Parameters (Channels 33-39) control the intensity, color filtering, and gradient color effects.

Channel 33 provides digital adjustment to image intensity. The selectable intensity levels range from black to full intensity.

The Catalyst product implements a RGB color mixing system that filters out specific percentages of Red Green and Blue to modify image color. At a DMX value of 0 on Color channels 34, 35, and 36; all color is filtered out and the result is black. A DMX value of 255 yields white or no color adjustment to the image.

The Catalyst system provides a second color adjustment to create a color gradient effect using Channels 37, 38, and 39. In an un-rotated image, the color transition moves down the image from the top color setting (selected in Channels 34, 35, and 36) to the bottom color setting (selected in Channel 34, 35, and 36). To turn off this effect, Channels 37, 38 and 39 must all be set to zero. Any other value in any of these channels will automatically turn on the Gradient Color feature.

As another color related feature, Channel 42 allows an option for color rotation. For complete DMX values, see “Color Rotate” on page A-5.

For complete DMX Color Parameter values, see “Color Control” on page A-4.

Visual Effects Control

Channels 40-45 control visual effects that can be applied to an image including strobing at variable speeds and variable color rotation. Selecting a Effect Function in Channel 43 affects the options available through the Visual Effect 1 and Visual Effect 2 channels.

Table 4-3 describes the interaction between the various Effects Function Settings and Visual Effects parameters

Table 4-3 Visual Effect Options

Effects Function Setting	Visual Effect 1 Options	Visual Effect 2 Options
Gobo (Default)	Transparent on Black	Not used
	Black on White	
	Transparent	
	Black on Transparent	
	Transparent on White	
	Edge outline	
	Transparent on 50% alpha white	
	Transparent on 75% alpha white	
	TBD	
Wobble	No wobble	No wobble
	Increasing x-axis wobble effect	Increasing y-axis wobble effect
	Maximum x-axis wobble	Maximum y-axis wobble
Tile	Select from 1–8 image duplications across the x-axis	Select from 1–8 image duplications across the y-axis
Invert	Invert	No color
	Normal	Variable color filtering in Cyan
	Various inversion effects	Variable color filtering in Magenta Variable color filtering in Yellow
Keystone	Not used	Not used

For complete DMX values, see “Effects Control” on page A-5.

Keystone Correction

Projected image shape is affected by the angle of projection. A rectangular image may appear as a keystone shape on the wall. Keystone correction parameters allow adjustment of each corner in the x and y direction to compensate for this effect. Channels 46-53 each address one corner of the image in the x or y direction.

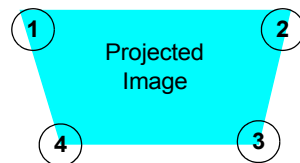


Figure 4-3 Corner designation on unrotated image

Keystone correction only affects the image layer and should only be applied after all other image manipulation values are set.

For complete DMX values, see “Keystone Correction Control” on page A-7.

Mirror Head Control Parameters

The parameters for Channels 1-6 control the mirror head’s movement direction and speed using 16-bit values to provide very smooth and accurate adjustment.

Mirror Head Positioning

The Catalyst Mirror Head system positions the projected image by independently moving the inner and outer mirrors on the Mirror Head. The inner mirror (Mirror 1) maps to Pan on DMX control consoles and can move from 0°–270°. The outer mirror (Mirror2) maps to Tilt on DMX controllers and has a range of 360°. Channels 1 and 2 control coarse and fine adjustment of **Mirror 1** and Channels 3 and 4 control coarse and fine adjustment on **Mirror 2**.

MSpeed (Motor Speed)

DMX Channel 5 controls the **MSpeed** parameter. MSpeed is the time required for a motor to complete movement when changing from one position to another. MSpeed provides a means for all motors to reach their target position at the same time, even though each motor may have different distances to travel. MSpeed movement is extremely smooth because the fixture controls movements independent of DMX refresh rates. In general, MSpeed provides a balance between quick response and smooth motion with some lag.

MSpeed times vary from 0.15 seconds to 252.7 seconds. However, when MSpeed is applied to a parameter, the delay value (length of time allowed for the entire scene) needs to be longer than the MSpeed value to allow the motors to complete their movement before the end of the cue.

An MSpeed value that is longer than the delay value can be used to smoothly change directions or in creating circles or ballyhoos. It could also produce an undesirable result; for example, no light output during the scene. For a listing of exact MSpeed times, see “Appendix B: MSpeed Conversion Table”.

Note: In the Catalyst System, the MSpeed option only applies to mirror head movement speed. Mirror head Speed can also be varied using XFADE time on most DMX consoles. If a DMX controller cannot perform a smooth 16-bit XFADE, an MSpeed between 95-99% may greatly improve smoothness.

For complete DMX values of all movement control parameters, see , on page A-8.

Appendix A:

Catalyst DMX Protocol

The Catalyst Media Server and Mirror Head System are patched by a DMX controller as individual fixtures on a DMX link. The Media Server requires a range of 56 channels on the link; the Mirror Head a 6-channel range. This appendix includes:

- “Media Server DMX Protocol” on page A-1
- “Mirror Head DMX Protocol” on page A-8
- “Recommended Media Server DMX Default Values” on page A-9
- “Recommended Mirror Head DMX Default Values” on page A-9

Note: Several Catalyst functions are programmed as 16-bit values whether adjustment is coarse or fine. Values given in those cases are 16-bit values.

Media Server DMX Protocol

Chan #	Function	Description	Value dec.	Value %	Value hex
VIDEO/IMAGE SELECTION					
1	Library	Selects folder to access from hard drive.	0-254	0-99	0-FE
		Live video input from firewire.	255	100	FF
2	File	Selects image file to be accessed and displayed.	0-255	0-100	00-FF
3	In Frame Coarse	Adjusts the 'In' frame point	0-	0-100	0000-FFFF
4	In Frame Fine		65535		
5	Out Frame Coarse	Adjusts the 'Out' frame point	0-	0-100	0000-FFFF
6	Out Frame Fine		65535		
7	Play mode	Display the 'In' frame	0-4	0-2	0-04
		Display the 'Out' frame	5-9	2-4	05-09
		Play loop forward	10-19	4-8	0A-13
		Play loop reverse	20-29	8-11	14-1D
		Play once forward	30-39	12-15	1E-27
		Play once reverse	40-49	16-19	28-31
		Stop	50-59	20-23	32-3B
		Random	60-69	24-27	3C-45
		PlaySine	70-79	28-31	47-4F
		Synchronize to master unit (1-19)	80-99	31-39	50-63
		Reserved	100-255	40-100	64-FF
8	Play speed	Playback at maximum speed	0	0	0
		Pause playback	1	0	1
		Playback at 0.3 frames per second to 39.8 frames per second	2-255	2-100	02-FF

A

Chan #	Function	Description	Value dec.	Value %	Value hex
GOBO LAYER CONTROL					
9	Gobo Frame Coarse	Select overlay frame from Gobo library file	0-	0-100	0000-FFFF
10	Gobo Frame Fine		65535		
11	Gobo Size Coarse	Sizes image from -8x to 0x	0-32767	0-49	0000-7FFF
		0 scale	32768	50	8000
		Sizes images from 0-1x	32769-36863	50-56	8001-8FFF
12	Gobo Size Fine	Actual size	36864	56	9000
		Sizes image from 1x to +8x	36865-65535	57-100	9001-FFFF
13	Gobo Rotate Coarse	Continuous variable-speed counterclockwise gobo overlay rotation (fast to slow)	0-16383	0-25	0000-3FFF
		Continuous Rotation Stop	16384	25	4000
		Counterclockwise rotation position from 720° - 0°	16385-32767	26-49	4001-7FFF
		0° rotation	32768	50	8000
14	Gobo Rotate Fine	Clockwise rotation position from 0° to 720°	32769-49151	51-75	8001-BFFF
		Continuous Rotation Stop	49152	75	C000
		Continuous variable speed clockwise gobo overlay rotation (slow to fast)	49153-65535	76-100	C001-FFFF
COMPOSITE IMAGE CONTROL					
15	X-axis Rotate Coarse (Vertical flip)	Continuous variable-speed counterclockwise image rotation about the x axis (fast to slow)	0-16383	0-25	0000-3FFF
		Continuous Rotation Stop	16384	25	4000
		Rotates the image counterclockwise about the x axis from 720° to 0°	16385-32767	26-49	4001-7FFF
		0° rotation about the x axis	32768	50	8000
16	X-axis Rotate Fine (Vertical flip)	Rotates the image clockwise about the x axis 0° to 720°	32769-49151	51-75	8001-BFFF
		Continuous Rotation Stop	49152	75	C000
		Continuous variable-speed clockwise image rotation about the x axis (slow to fast)	49153-65535	76-100	C001-FFFF

Chan #	Function	Description	Value dec.	Value %	Value hex
17	Y-axis Rotate Coarse (Horizontal flip)	Continuous variable-speed counterclockwise image rotation about the y axis (fast to slow)	0-16383	0-25	0000-3FFF
		Continuous Rotation Stop	16384	25	4000
		Rotates the image counterclockwise about the y axis from 720° to 0°	16385-32767	26-49	4001-7FFF
		0° rotation about the y axis	32768	50	8000
18	Y-axis Rotate Fine (Horizontal flip)	Rotates the image clockwise about the y axis 0° to 720°	32769-49151	51-75	8001-BFFF
		Continuous Rotation Stop	49152	75	C000
		Continuous variable-speed clockwise image rotation about the x axis (slow to fast)	49153-65535	76-100	C001-FFFF
19	Z-axis Rotate Coarse (Circular rotation)	Continuous variable-speed counterclockwise image rotation about the y axis (fast to slow)	0-16383	0-25	0000-3FFF
		Continuous Rotation Stop	16384	25	4000
		Rotates the image counterclockwise about the y axis from 720° to 0°	16385-32767	26-49	4001-7FFF
		0° rotation about the y axis	32768	50	8000
20	Z-axis Rotate Fine (Circular rotation)	Rotates the image clockwise about the y axis 0° to 720°	32769-49151	51-75	8001-BFFF
		Continuous Rotation Stop	49152	75	C000
		Continuous variable-speed clockwise image rotation about the x axis (slow to fast)	49153-65535	76-100	C001-FFFF
21	Scale Coarse	Adjusts size of inverted image from 8x to 0	0-32767	0-50	0000-7F7F
		Image scaled to zero	32768	50	8080
		Sizes images from 0-1x	32769-36863	50-56	8001-8FFF
		Actual size	36864	56	9000
22	Scale Fine	Adjusts normal image size from 0 to 8x	32769-65535	51-100	8081-FFFF
23	X position Coarse (Pan Image Left to Right)	Pans the image from left to center	0-32767	0-50	0000-7FFF
		Centers image in projection area	32768	50	8000
24	X position Fine (Pan Image Left to Right)	Pans image from center to right	32769-65535	51-100	8001-FFFF
25	Y position Coarse (Pan image top to bottom)	Pans image area from bottom to center	0-32767	0-50	0000-7FFF
		Centers image in projection area	32768	50	8000
26	Y position Fine (Pan image top to bottom)	Pans image area from center to top	32769-65535	51-100	8001-FFFF



Chan #	Function	Description	Value dec.	Value %	Value hex		
27	Movement Speed	Image and Video speed	0-255	0-100	00-FF		
28	Aspect Ratio	Compresses image horizontally	0-128	0-50	00-80		
		Compresses image vertically	129-255	51-100	81-FF		
MASK LAYER CONTROL							
29	Mask Select Coarse	No mask	0		0000		
		Big Circle	1		0001		
		Variable size circle	2-98		0002-0062		
		Small circle	99		0063		
		Large square	100		0064		
		Variable width (vertical) rectangle	101-124		0065-007C		
		Narrow vertical rectangle	125		007D		
		Large square	126		007E		
30	Mask Select Fine	Variable height (horizontal) rectangle	127-149		007F-0095		
		Narrow horizontal rectangle	150		0096		
		Large square	151		0097		
		Variable size square	152-198		0098-00C6		
		Small square	199		00C7		
		Reserved	200-65535		00C8-FFFF		
		31	Mask Rotate Coarse	Continuous variable-speed counterclockwise mask overlay rotation (fast to slow)	0-16383	0-25	0000-3FFF
				Continuous Rotation Stop	16384	25	4000
Counterclockwise rotation position from 720° - 0°	16385-32767			26-49	4001-7FFF		
0° rotation	32768			50	8000		
32	Mask Rotate Fine	Clockwise rotation position from 0° to 720°	32769-49151	51-75	8001-BFFF		
		Continuous Rotation Stop	49152	75	C000		
		Continuous variable speed clockwise mask overlay rotation (slow to fast)	49153-65535	76-100	C001-FFFF		
COLOR CONTROL							
33	Intensity	Black	0	0	0		
		Adjusts intensity from black to full	1-254	0-99	0-FE		
		Full Intensity	255	100	FF		
34	Red	Filters out all Red in image	0	0	0		
		Adjusts less to full Red in image	1-254	0-99	0-FE		
		Red in image unaffected	255	100	FF		

Chan #	Function	Description	Value dec.	Value %	Value hex
35	Green	Filters out all Green in image	0	0	0
		Adjusts less to full Green in image	1-254	0-99	0-FE
		Green in image unaffected	255	100	FF
36	Blue	Filters out all Blue in image	0	0	0
		Adjusts less to full Blue in image	1-254	0-99	0-FE
		Blue in image unaffected	255	100	FF
37	Gradient Color* (Red)	Filters out all Red in gradient color	0	0	0
		Adjusts less to full Red in gradient color	1-254	0-99	0-FE
		Red in gradient color unaffected	255	100	FF
38	Gradient Color * (Green)	Filters out all Green in gradient color	0	0	0
		Adjusts less to full Green in gradient color	1-254	0-99	0-FE
		Green in gradient color unaffected	255	100	FF
39	Gradient Color* (Blue)	Filters out all Blue in gradient color	0	0	0
		Adjusts less to full Blue in gradient color	1-254	0-99	0-FE
		Blue in gradient color unaffected	255	100	FF
EFFECTS CONTROL					
40	Strobe	No strobe	0	0	0
		Variable speed strobe	1-255	1-100	01-FF
41	Crossfade	Reserved	0-255	0-100	00-FF
42	Color Rotate	Variable direction of color gradation	0-255	0-100	00-FF
43	Effects Function	Gobo (Default)	0-4	0-2	00-04
		Wobble effect	5-9	2-4	05-09
		Tile effect	10-19	4-8	0A-13
		Invert image	20-29	8-11	14-1D
		Keystone correction to image layer	30-39	12-14	1E-27
		Reserved	40-255	15-100	28-FF

* To turn Gradient Function OFF, set Channels 37, 38 and 39 all to zero.



Chan #	Function	Description	Value dec.	Value %	Value hex
44	Visual effect 1	<i>Gobo (Default) Mode</i>			
		Transparent on Black	0-1	0-1	00-01
		Black on White	2	0	02
		Transparent	3	1	03
		Black on Transparent	4	1	04
		Transparent on White	5	2	05
		Edge outline	6	2	06
		Transparent on 50% alpha white	7	3	07
		Transparent on 75% alpha white	8	3	08
		Reserved	9-255	4-100	09-FF
		<i>Wobble Mode</i>			
		No Wobble	0	0	0
		Variable Wobble on x axis from slow to fast	1-255	1-100	01-FF
		<i>Tile Mode</i>			
		Single image along x axis	0-32	0-13	00-20
		Two images along x axis	33-64	13-25	21-40
		Three images along x axis	65-96	26-38	41-60
		Four images along x axis	97-128	38-50	61-80
		Five images along x axis	129-160	51-63	81-A0
		Six images along x axis	161-192	63-75	A1-C0
		Seven images along x axis	193-224	76-88	C1-E0
		Eight images along x axis	225-255	88-100	E1-FF
		<i>Invert Mode</i>			
		Normal	0	0	0
		Various Inversion effects	1-29	0-11	0-1D
		Reserved	30-255	12-100	1E-FF

Chan #	Function	Description	Value dec.	Value %	Value hex
45	Visual effect 2	Wobble Mode			
		No Wobble	0	0	0
		Variable Wobble on y axis from slow to fast	1-255	1-100	01-FF
		Tile Mode			
		Single image along y axis	0-32	0-13	00-20
		Two images along y axis	33-64	13-25	21-40
		Three images along y axis	65-96	26-38	41-60
		Four images along y axis	97-128	38-50	61-80
		Five images along y axis	129-160	51-63	81-A0
		Six images along y axis	161-192	63-75	A1-C0
		Seven images along y axis	193-224	76-88	C1-E0
		Eight images along y axis	225-255	88-100	E1-FF
		Invert Mode			
		No color	0-1	0-1	00-01
		Variable Cyan filtering	2-50	1-20	02-32
		Variable Magenta filtering	51-100	20-39	33-64
		Variable Yellow filtering	101-150	40-59	65-96
Reserved	151-255	59-100	97-FF		
KEYSTONE CORRECTION CONTROL (left/right/top/down designations may be affected by pan and tilt position)					
46	Keystone 1x	Moves upper left-hand corner left on x axis	0-127	0-49	0-79
		No correction	128	50	80
		Moves upper left-hand corner right on x axis	129-255	51-100	81-FF
47	Keystone 1y	Moves upper left-hand corner left on y axis	0-127	0-49	0-79
		No correction	128	50	80
		Moves upper left-hand corner right on y axis	129-255	51-100	81-FF
48	Keystone 2x	Moves lower right-hand corner left on x axis	0-127	0-49	0-79
		No correction	128	50	80
		Moves lower right-hand corner right on x axis	129-255	51-100	81-FF
49	Keystone 2y	Moves lower right-hand corner left on x axis	0-127	0-49	0-79
		No correction	128	50	80
		Moves lower right-hand corner right on x axis	129-255	51-100	81-FF
50	Keystone 3x	Moves lower right-hand corner left on y axis	0-127	0-49	0-79
		No correction	128	50	80
		Moves lower left-hand corner right on y axis	129-255	51-100	81-FF



Chan #	Function	Description	Value dec.	Value %	Value hex
51	Keystone 3y	Moves lower right-hand corner left on y axis	0-127	0-49	0-79
		No correction	128	50	80
		Moves lower right-hand corner right on y axis	129-255	51-100	81-FF
52	Keystone 4x	Moves lower left-hand corner left on y axis	0-127	0-49	0-79
		No correction	128	50	80
		Moves lower left-hand corner right on y axis	129-255	51-100	81-FF
53	Keystone 4y	Moves lower left-hand corner left on y axis	0-127	0-49	0-79
		No correction	128	50	80
		Moves lower left-hand corner right on y axis	129-255	51-100	81-FF
54	Information	Reserved			
55		Reserved			
56		Reserved			

Mirror Head DMX Protocol

Chan #	Function	Description	Value dec.	Value %	Value hex
1	Mirror 1 Coarse	Moves inner mirror from 0°–270° (Maps to Pan)	0-	0-100	0000-FFFF
2	Mirror 1 Fine		65535		
3	Mirror 2 Coarse	Moves outer mirror from 0°–360° (Maps to Tilt)	0-	0-100	0000-FFFF
4	Mirror 2 Fine		65535		
5	MSpeed	See Appendix B for conversion tables	0-255	0-100	00-FF
6	Control Function	Reserved	90-98	35-38	5A-62
		Shutdown	120-130	47-51	78-82
		Reserved	140-149	55-58	8C-95
		Homes Mirror 1 and Mirror 2	160-168	63-66	A0-A8
		Reserved	170-255	67-100	AA-FF

Recommended Media Server DMX Default Values

High End Systems recommends setting the following Default values on the Catalyst system to create consistent and predictable profiles across several controllers.

#	Channel Function	Dec.	%	Hex	#	Channel Function	Dec.	%	Hex
1	Library	0	0	0	29	Mask Select Coarse	0	0	0
2	File	0	0	0	30	Mask Select Fine			
3	In Frame Coarse	0	0	0	31	Mask Rotate Coarse	36864	50	8000
4	In Frame Fine				32	Mask Rotate Fine			
5	Out Frame Coarse	0	0	0	33	Intensity	0	0	0
6	Out Frame Fine				34	Red	255	100	FF
7	Play mode	0	0	0	35	Green	255	100	FF
8	Play speed	0	0	0	36	Blue	255	100	FF
9	Gobo Frame Coarse	0	0	0	37	Gradient Color (Red)	0	0	0
10	Gobo Frame Fine				38	Gradient Color (Green)	0	0	0
11	Gobo Size Coarse	36864	56	9000	39	Gradient Color (Blue)	0	0	0
12	Gobo Size Fine				40	Strobe	0	0	0
13	Gobo Rotate Coarse	36864	50	8000	41	Crossfade	0	0	0
14	Gobo Rotate Fine				42	Color Rotate	0	0	0
15	X-axis Rotate Coarse	36864	50	8000	43	Effects Function	0	0	0
16	X-axis Rotate Fine				44	Visual effect 1	0	0	0
17	Y-axis Rotate Coarse	36864	50	8000	45	Visual effect 2	0	0	0
18	Y-axis Rotate Fine				46	Keystone 1x	128	50	80
19	Z-axis Rotate Coarse	36864	50	8000	47	Keystone 1y	128	50	80
20	Z-axis Rotate Fine				48	Keystone 2x	128	50	80
21	Scale Coarse	36864	56	9000	49	Keystone 2y	128	50	80
22	Scale Fine				50	Keystone 3x	128	50	80
23	X -axis Pan Coarse	36864	50	8000	51	Keystone 3y	128	50	80
24	X -axis Pan Fine				52	Keystone 4x	128	50	80
25	Y-axis Pan Coarse	36864	50	8000	53	Keystone 4y	128	50	80
26	Y -axis Pan Fine				54	Information	0	0	0
27	Movement Speed	0	0	0	55	Reserved	0	0	0
28	Aspect Ratio	0	0	0	56	Reserved	0	0	0



Recommended Mirror Head DMX Default Values

#	Function	Dec.	%	Hex
1	Mirror 1 Coarse	32768	50	8000
2	Mirror 1 Fine			
3	Mirror 2 Coarse	32768	50	8000
4	Mirror 2 Fine			
5	MSpeed	0	0	0
6	Control Function	0	0	0

Appendix B:

MSpeed Conversion Table

The following table lists the MSpeed (motor) movement times and their corresponding DMX controller values. If you have a numeric-type controller, use the Value Decimal (dec.) column. If you have a fader-type controller, use the Value Percentage (%) column. If your controller allows you to program hex values, use the Value (hex) column.

Time (sec.)	Value (dec.)	Value (%)	Value (hex)
0.15	255	100	FF
0.15	254	100	FE
0.17	253	99	FD
0.19	252	99	FC
0.21	251	98	FB
0.25	250	98	FA
0.29	249	98	F9
0.35	248	97	F8
0.41	247	97	F7
0.47	246	96	F6
0.55	245	96	F5
0.63	244	96	F4
0.73	243	95	F3
0.83	242	95	F2
0.94	241	95	F1
1.05	240	94	F0
1.18	239	94	EF
1.31	238	93	EE
1.45	237	93	ED
1.60	236	93	EC
1.75	235	92	EB
1.92	234	92	EA
2.09	233	91	E9
2.27	232	91	E8
2.46	231	91	E7
2.66	230	90	E6
2.86	229	90	E5

Time (sec.)	Value (dec.)	Value (%)	Value (hex)
3.07	228	89	E4h
3.29	227	89	E3
3.52	226	89	E2
3.76	225	88	E1
4.00	224	88	E0
4.25	223	87	DF
4.52	222	87	DE
4.78	221	87	DD
5.06	220	86	DC
5.34	219	86	DB
5.64	218	85	DA
5.94	217	85	D9
6.25	216	85	D8
6.56	215	84	D7
6.89	214	84	D6
7.22	213	84	D5
7.56	212	83	D4
7.91	211	83	D3
8.27	210	82	D2
8.63	209	82	D1
9.00	208	82	D0
9.39	207	81	CF
9.77	206	81	CE
10.17	205	80	CD
10.58	204	80	CC
10.99	203	80	CB
11.41	202	79	CA

Time (sec.)	Value (dec.)	Value (%)	Value (hex)
11.84	201	79	C9
12.28	200	78	C8
12.72	199	78	C7
13.17	198	78	C6
13.63	197	77	C5
14.10	196	77	C4
14.58	195	76	C3
15.07	194	76	C2
15.56	193	76	C1
16.06	192	75	C0
16.57	191	75	BF
17.09	190	75	BE
17.61	189	74	BD
18.14	188	74	BC
18.68	187	73	BB
19.23	186	73	BA
19.79	185	73	B9
20.36	184	72	B8
20.93	183	72	B7
21.51	182	71	B6
22.10	181	71	B5
22.70	180	71	B4
23.30	179	70	B3
23.92	178	70	B2
24.54	177	69	B1
25.17	176	69	B0
25.80	175	69	AF

B

Time (sec.)	Value (dec.)	Value (%)	Value (hex)
26.45	174	68	AE
27.10	173	68	AD
27.76	172	67	AC
28.43	171	67	AB
29.11	170	67	AA
29.80	169	66	A9
30.49	168	66	A8
31.19	167	65	A7
31.90	166	65	A6
32.62	165	65	A5
33.34	164	64	A4
34.08	163	64	A3
34.82	162	64	A2
35.57	161	63	A1
36.33	160	63	A0
37.09	159	62	9F
37.87	158	62	9E
38.65	157	62	9D
39.44	156	61	9C
39.44v	156	61	9C
40.23	155	61	9B
41.04	154	60	9A
41.85	153	60	99
42.68	152	60	98
43.50	151	59	97
44.34	150	59	96
45.19	149	58	95
46.04	148	58	94
46.90	147	58	93
47.77	146	57	92
48.65	145	57	91
49.54	144	56	90
50.43	143	56	8F
51.33	142	56	8E
52.24	141	55	8D
53.16	140	55	8C
54.09	139	55	8h
55.02	138	54	8A

Time (sec.)	Value (dec.)	Value (%)	Value (hex)
55.96v	137	54	89
56.91	136	53	88
57.87	135	53	87
58.84	134	53	86
59.81	133	52	85
60.79	132	52	84
61.78	131	51	83
62.78	130	51	82
63.79	129	51	81
64.80	128	50	80
65.82	127	50	7F
66.85	126	49	7E
67.89	125	49	7D
68.94	124	49	7C
69.99	123	48	7B
71.05	122	48	7A
72.13	121	47	79
73.20	120	47	78
74.29	119	47	77
75.38	118	46	76
76.49	117	46	75
77.60	116	45	74
78.71	115	45	73
79.84	114	45	72
80.98	113	44	71
82.12	112	44	70
83.27	111	44	6F
84.43	110	43	6E
85.59	109	43	6D
86.77	108	42	6C
87.95	107	42	6B
89.14	106	42	6A
90.34	105	41	69
91.55	104	41	68
92.76	103	40	67
93.98	102	40	66
95.21	101	40	65
96.45	100	39	64

Time (sec.)	Value (dec.)	Value (%)	Value (hex)
97.70	99	39	63
98.95	98	38	62
100.22	97	38	61
101.49	96	38	60
102.77	95	37	5F
104.05	94	37	5E
105.35	93	36	5D
106.65	92	36	5C
107.96	91	36	5B
109.28	90	35	5A
110.61	89	35	59
111.94	88	35	58
113.28	87	34	57
114.63	86	34	56
115.99	85	33	55
117.36	84	33	54
118.73	83	33	53
120.12	82	32	52
121.5v	81	32	51
122.91	80	31	50
124.31	79	31	4F
125.73	78	31	4E
127.15	77	30	4D
128.58	76	30	4C
130.02	75	29	4B
134.39	72	28	48
135.86	71	28	47
137.34	70	27	46
138.82	69	27	45
140.32	68	27	44
141.82	67	26	43
143.33	66	26	42
144.85	65	25	41
146.38	64	25	40
147.92	63	25	3F
149.46	62	24	3E
151.01	61	24	3D
152.57	60	24	3C

Time (sec.)	Value (dec.)	Value (%)	Value (hex)
154.14	59	23	3B
155.71	58	23	3A
157.30	57	22	39
158.89	56	22	38
160.49	55	22	37
162.09	54	21	36
163.71	53	21	35
165.33	52	20	34
166.96	51	20	33
168.60	50	20	32
170.25	49	19	31
171.91	48	19	30
173.57	47	18	2F
175.24	46	18	2E
176.92	45	18	2D
178.61	44	17	2C
180.30	43	17	2B
182.01	42	16	2A
183.72	41	16	29
185.44	40	16	28
187.17	39	15	27
188.90	38	15	26
190.65	37	15	25
192.40	36	14	24
194.16	35	14	23
195.92	34	13	22
197.70	33	13	21
199.48	32	13	20
201.28	31	12	1F
203.08	30	12	1E
204.88	29	11	1D
206.70	28	11	1C
208.52	27	11	1B
210.36	26	10	1A
212.19	25	10	19
214.04	24	9	18
215.90	23	9	17
217.76	22	9	16

Time (sec.)	Value (dec.)	Value (%)	Value (hex)
219.63	21	8	15
221.51	20	8	14
223.40	19	7	13
225.30	18	7	12
227.20	17	7	11
229.11	16	6	10
231.03	15	6	0F
232.96	14	5	0E
234.90	13	5	0D
236.84	12	5	0C
238.79	11	4	0B
240.75	10	4	0A
242.72	9	4	09
244.70	8	3	08
246.68	7	3	07
248.68	6	2	06
250.68	5	2	05
246.68	7	3	07
248.68	6	2	06
250.68	5	2	05
252.68	4	2	04

B


Appendix C:

Safety Information

Warning: For Continued Protection Against Fire

1. This equipment for connection to branch circuit having a maximum overload protection of 20 A.

Warning: For Continued Protection Against Electric Shock

1. If this equipment was received without a line cord plug, attach the appropriate line cord plug according to the following code:
 - brown–live
 - blue–neutral
 - green/yellow–earth
2. As the colours of the cores in the mains lead of this equipment may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:
 - the core which is coloured green and yellow must be connected to the terminal in the plug which is marked with the letter E or by the earth symbol , or coloured green or green and yellow.
 - the core which is coloured blue must be connected to the terminal which is marked with the letter N or coloured black.
 - the core which is coloured brown must be connected to the terminal which is marked with the letter L or coloured red.
3. Class I equipment. This equipment must be earthed.
4. Equipment suitable for dry locations only. Do not expose this equipment to rain or moisture.
5. Refer servicing to qualified personnel; no user serviceable parts inside.

C

Appendice C

Importantes Informations Sur La Sécurité

Mise En Garde: Pour Une Protection Permanente Contre Les Incendies

1. Cet appareil de connection au circuit comporte une protection contre les surcharges de 20 A.

Mise En Garde: Pour Une Protection Permanente Contre Les Chocs Électriques

1. Si cet équipement est livré sans prise de cable, veuillez connecter la prise de cable correcte selon le code suivant:
 - marron - phase
 - bleu - neutre
 - vert/jaune - terre
2. Débrancher le courant avant de changer les lampes ou d'effectuer des réparations.
3. Cet équipement doit être uniquement utilisé dans des endroits secs. Ne pas l'exposer à la pluie ou l'humidité.
4. À l'intérieur de l'équipement il n'y a pas de pièces remplaçables par l'utilisateur. Confiez l'entretien à un personnel qualifié.
5. Equipement de Classe I. Cet équipement doit être mis à la terre.

Anhang C

Wichtige Hinweise Für Ihre Sicherheit

Warnung: Zum Schutz Vor Brandgefahr

1. Dieses Gerät darf nur an eine Zweigleitung mit einem Überlastungsschutz von höchstens 20 A angeschlossen werden.

Warnung: Zum Schutz Gegen Gefährliche Körperströme

1. Wenn dieses Gerät ohne einen Netzkabelstecker erhalten wurde, ist der entsprechende Netzkabelstecker entsprechend dem folgenden Code anzubringen:
 - Braun - Unter Spannung stehend
 - Blau - Neutral
 - Grün/Gelb - Erde
2. Vor dem Austauschen von Lampen oder vor Wartungsarbeiten stets den Netzstecker ziehen.
3. Diese Geräte sind nur zum Einbau in trockenen Lagen bestimmt und müssen vor Regen und Feuchtigkeit geschützt werden.
4. Servicearbeiten sollten nur von Fachpersonal ausgeführt werden. Das Gerät enthält keine wartungsbedürftigen Teile.
5. Dieses Gerät gehört zur Klasse I. Dieses Gerät muß geerdet werden.



Apéndice C

Información Importante De Seguridad

Advertencia: Para Protección Continua Contra Incendios

1. Este equipo debe conectarse a un circuito que tenga una protección máxima contra las sobrecargas de 20 A.

Advertencia: Para La Protección Continua Contra Electroclusiones

1. Si se recibió este equipo sin el enchufe de alimentación, monte usted el enchufe correcto según el clave siguiente:
 - moreno - vivo
 - azul - neutral
 - verde/amarillo - tierra
2. Desconecte el suministro de energía antes de recambiar lámparas o prestar servicio de reparación.
3. Este equipo se adecua a lugares secos solamente. no lo exponga a la lluvia o humedad.
4. Derive el servicio de reparación de este equipo al personal calificado. El interior no contiene repuestos que puedan ser reparados por el usuario.
5. Equipo de Clase I. Este equipo debe conectarse a la tierra.

Appendice C

Importanti Informazioni Di Sicurezza

Avvertenza: Per Prevenire Incendi

1. Questa apparecchiatura e' da collegarsi ad un circuito con una protezione da sovraccarico massima di 20 amperes.



Avvertenza: Per Prevenire Le Scosse Elettriche

1. Se questa apparecchiatura è stata consegnata senza una spina del cavo di alimentazione, collegare la spina appropriata del cavo di alimentazione in base ai seguenti codici:
 - marrone - sotto tensione
 - blu - neutro
 - verde/giallo - terra
2. Disinnestare la corrente prima di cambiare la lampadina o prima di eseguire qualsiasi riparazione.
3. Questa apparecchiatura e' da usarsi in ambienti secchi. Non e' da essere esposta ne alla pioggia ne all' umidita'.
4. Per qualsiasi riparazione rivolgersi al personale specializzato. L' utente non deve riparare nessuna parte dentro l' unita'.
5. Aparecchio di Classe I. Questa apparecchiatura deve essere messa a terra.

C

Vigtig Sikkerhedsinformation

Advarsel: Beskyttelse mod elektrisk chock.

VIGTIGT! LEDEREN MED GUL/GROEN ISOLATION MAA KUN TILSLUTTES KLEMME MAERKET  ELLER .

Appendix D:

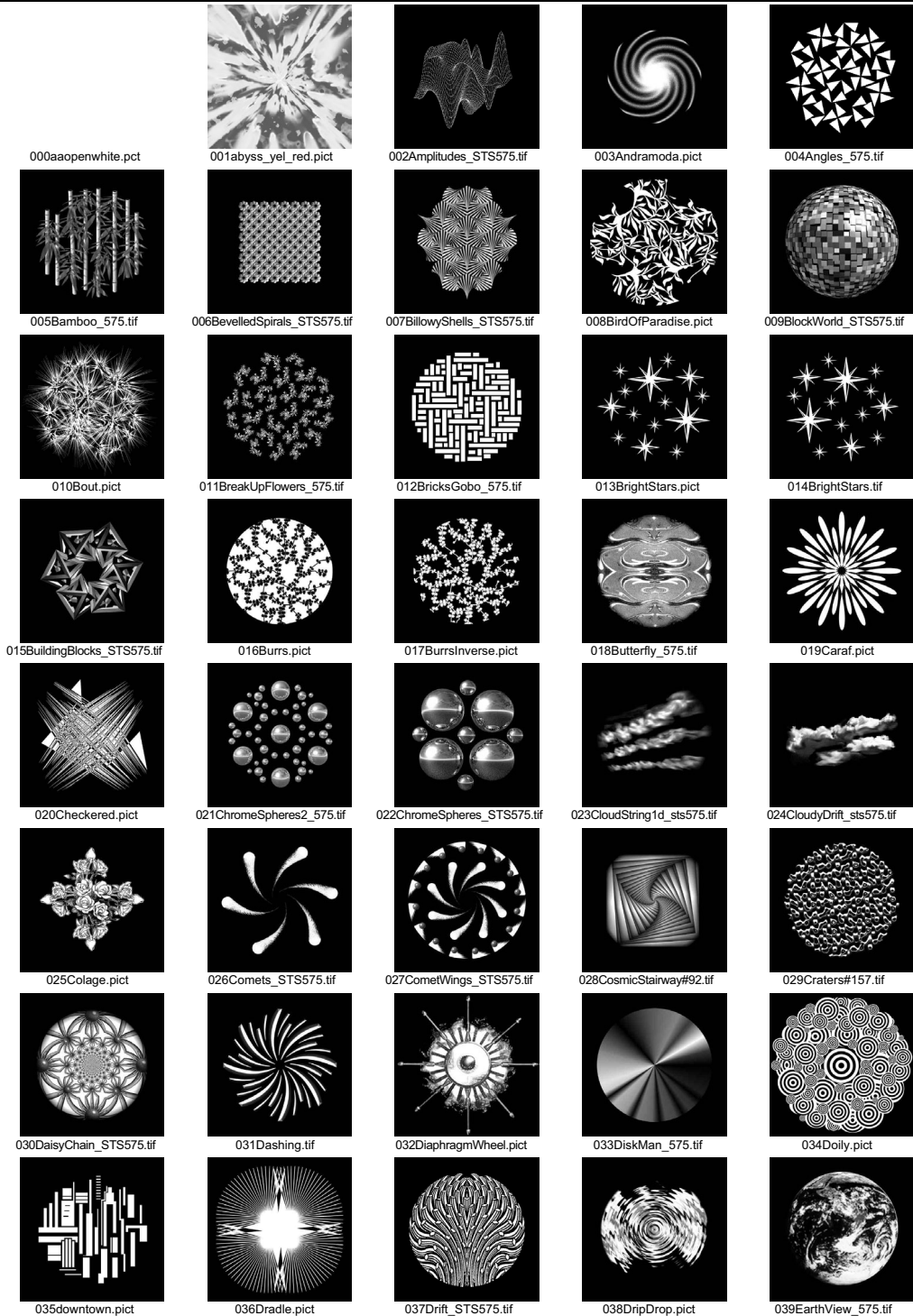
Catalyst Image Content

The Catalyst Digital Media server ships with an extensive library of image files as shown in the following table.

Folder Name	Content Description
000 High End Lithopatterns	160 High End Systems lithopattern® images. File names and a thumbnail representation of each pattern begins on page D-2.
001 Digital Juice Jumpbacks	Twenty 15–30 sec. animated backgrounds. For more information, visit the Digital Juice website at http://www.digitaljuice.com
002 Artbeats	Seven video clips including fire, water and cloud images. For more information on Artbeats film library visit the Artbeats website at http://www.artbeats.com
003 images	Empty folder to hold custom images
254 Aerials	Flash animations created exclusively for the Catalyst system achieve multi-colored, rotating aerial effects.
255 Video Input (Do Not Use)	Reserved for Firewire input. Do not use for content
gobos	Contains a single 'movie' file of the DHA gobo library. Each gobo occupies 50 frames. Each of the 50 frames displays a different level of diffusion or "focus" applied to the image. The section entitled "DHA Gobos" on page D-7 shows a thumbnail and DMX index value for each Gobo pattern.
Masks	Mask pattern file includes variable rectangle, circular and square mask patterns.

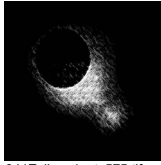
D

High End Systems Lithopatterns





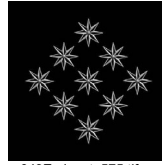
040Earth_color.tif



041Eclipse1_sts575.tif



042Egypt_575.tif



043Eminent_575.tif



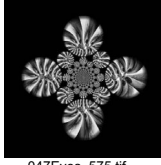
044Euphoriscape_STS575.tif



045Everglades.pict



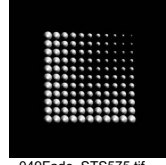
046Everglades_575.tif



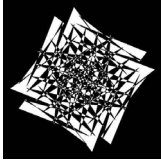
047Eyes_575.tif



048FaceintheSun_STS575.tif



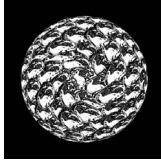
049Fade_STS575.tif



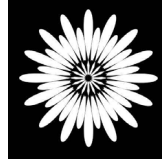
050Finichy.pict



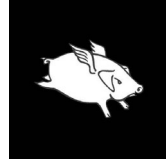
051Fireworks_STS575.tif



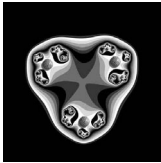
052FishEyes.pict



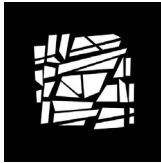
053Floris.pict



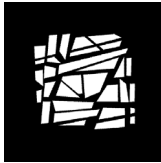
054FlyingPigColor.tif



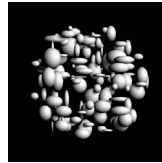
055FractalBurst_STS575.tif



056Fracture.pict



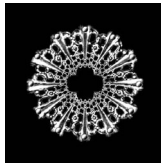
057Fracture_575.tif



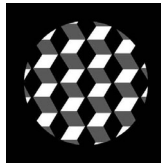
058Genesis_STS575.tif



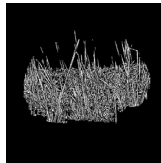
059GlitteringStars_STS575.tif



060GothicVortex_STS575.tif



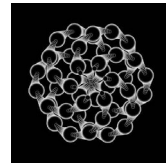
061Gradation_STS575.tif



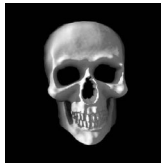
062Grass_575.tif



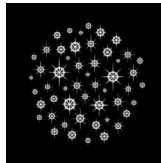
063GuardsHall_STS575.tif



064Gyration#97.tif



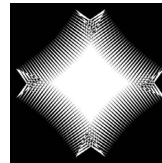
065HalloweenSkull_STS575.tif



066Halo_STS575.tif



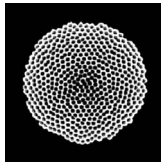
067HappyDais_STS575.tif



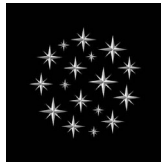
068Herring.pict



069HES Logo color.tif



070Hive_STS575.tif



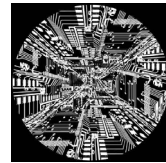
071HollywoodStars_STS575.tif



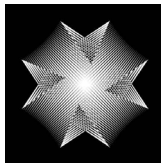
072HornsColor.tif



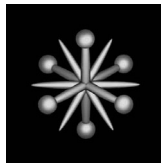
073HyophPalm.pict



074Intown.pict



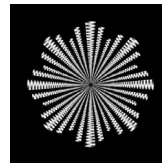
075Inward.pict



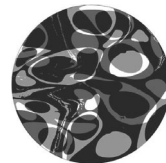
076Jax_STS575.tif



077Lament_STS575.tif

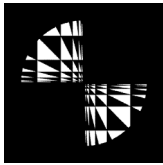


078Lapse_STS575.tif

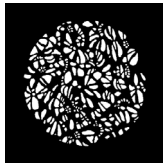


079LAVA_Cyan/Mgnt.tif

D



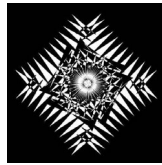
080LeadCrystals_ST575.tif



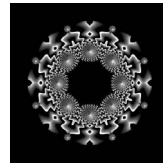
081Leaves_575.tif



082LightFluffyClouds_575.tif



083Linear.pict



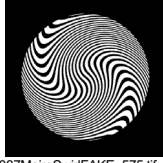
084Lucid_575/Xspot.tif



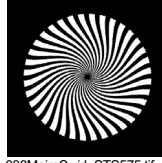
085LumolPink/Yellow.tif



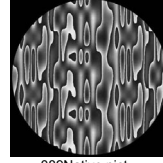
086MoireStraightFAKE_250.tif



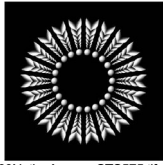
087MoireSwirlFAKE_575.tif



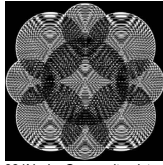
088MoireSwirl_ST575.tif



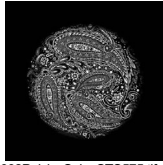
089Native.pict



090NativeArrows_ST575.tif



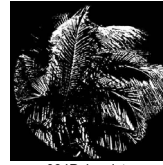
091NudgeComposite.pict



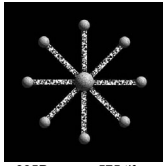
092PaisleySpin_ST575.tif



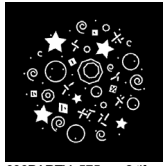
093Paisley_575_rev2.tif



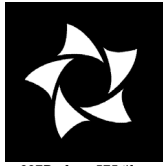
094Palm.pict



095Paragon_575.tif



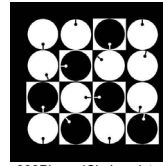
096PARTY_575_rev2.tif



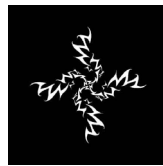
097Perfora_575.tif



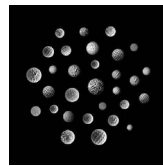
098Phantom_ST575.tif



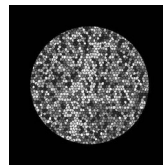
099PiercedCircles.pict



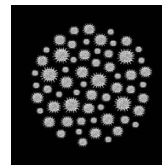
100place holder.pict



101Planetoids#107.tif



102praise.pict



103Proto_ST575.tif



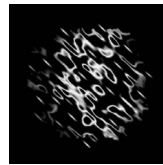
104Psychedellic_ST575.tif



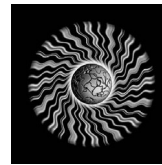
105PsyDye.tif



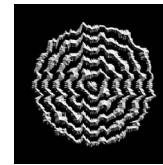
106PsySpin.tif



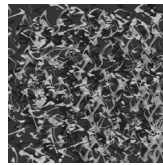
107Puddle_575.tif



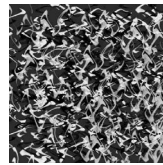
108PulsarRays_575.tif



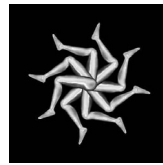
109RockRings_ST575.tif



110Rumihaze.pict



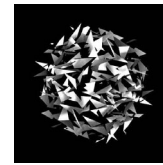
111Rumihaze_b/w.pict



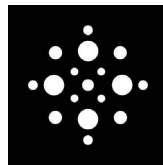
112Running_575.tif



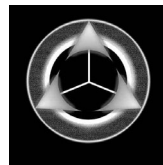
113Sandscape_ST575.tif



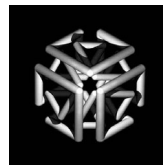
114Shatter_ST575.tif



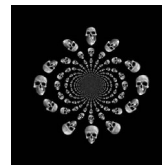
115Sieve.pict



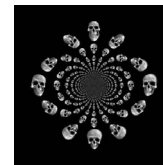
116Sight(2).pict



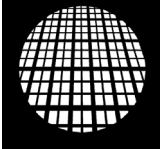
117SlicSquare_ST575.tif



118SkullExplosion.pict



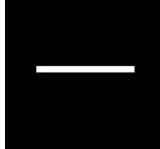
119SkullExplosion_ST575.tif



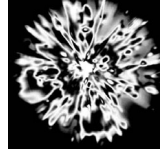
120Skycraper_575.tif



121Slinky_STS575.tif



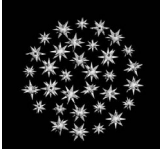
122Slot_STS575.tif



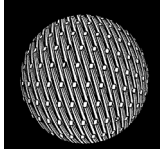
123Snapshot.pict



124Snowflake_STS575.tif



125SpaceMines_STS575.tif



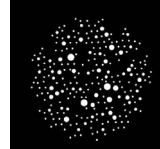
126Spangles_575.tif



127Spinner_STS575.tif



128Squiggle_575.tif



129StaryNight_STS575.tif



130StoneWall_575.tif



131Streaks_575.tif



132SunColor.tif



133SwayStar_STS575.tif



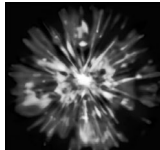
134ThirdEye_575.tif



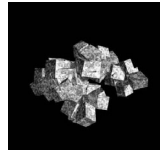
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136ThreeBrokenRings_575.tif



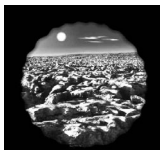
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138TonsofBlocks_STS575.tif



139Torches_STS575.tif



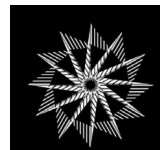
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141Trees_STS575.tif



142TriadOne_STS575.tif



143TripWheel_STS575.tif



144Trust_STS575.tif



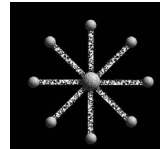
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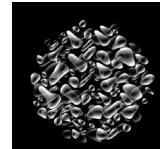
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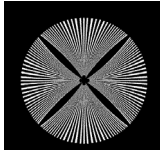
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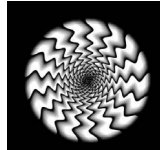
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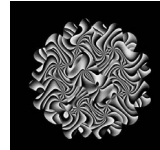
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151WavyTunnel_STS575.tif



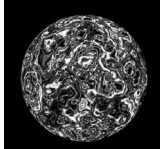
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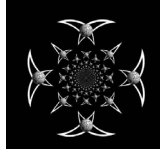
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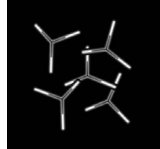
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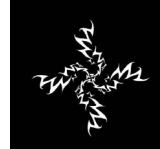
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156WingRock_575.tif



157Ytacy.pict



158Zap2_TB.pict



159Zap_TB.pict

D



160OceanPrint.pict

DHA Gobos



DHA 001 / DMX 0



DHA 002 / DMX 50



DHA 003 / DMX 100



DHA 004 / DMX 150



DHA 005 / DMX 200



DHA 006 / DMX 250



DHA 007 / DMX 300



DHA 008 / DMX 350



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DHA 012 / DMX 550



DHA 013 / DMX 600



DHA 014 / DMX 650



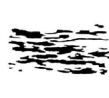
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DHA 017 / DMX 800



DHA 018 / DMX 850



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DHA 022 / DMX 1050



DHA 023 / DMX 1100



DHA 024 / DMX 1150



DHA 025 / DMX 1200



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DHA 029 / DMX 1400



DHA 030 / DMX 1450



DHA 031 / DMX 1500



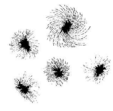
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DHA 033 / DMX 1600



DHA 034 / DMX 1650



DHA 035 / DMX 1700



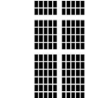
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DHA 037 / DMX 1800



DHA 038 / DMX 1850



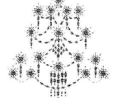
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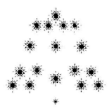
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DHA 041 / DMX 2000



DHA 042 / DMX 2050



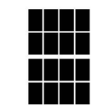
DHA 043 / DMX 2100



DHA 044 / DMX 2150



DHA 045 / DMX 2200



DHA 046 / DMX 2250



DHA 047 / DMX 2300



DHA 048 / DMX 2350



DHA 049 / DMX 2400



DHA 050 / DMX 2450



DHA 051 / DMX 2500



DHA 052 / DMX 2550



DHA 053 / DMX 2600



DHA 054 / DMX 2650



DHA 055 / DMX 2700



DHA 056 / DMX 2750



DHA 057 / DMX 2800



DHA 058 / DMX 2850



DHA 059 / DMX 2900



DHA 060 / DMX 2950



DHA 061 / DMX 3000



DHA 062 / DMX 3050



DHA 063 / DMX 3100



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DHA 066 / DMX 3250



DHA 067 / DMX 3300



DHA 068 / DMX 3350

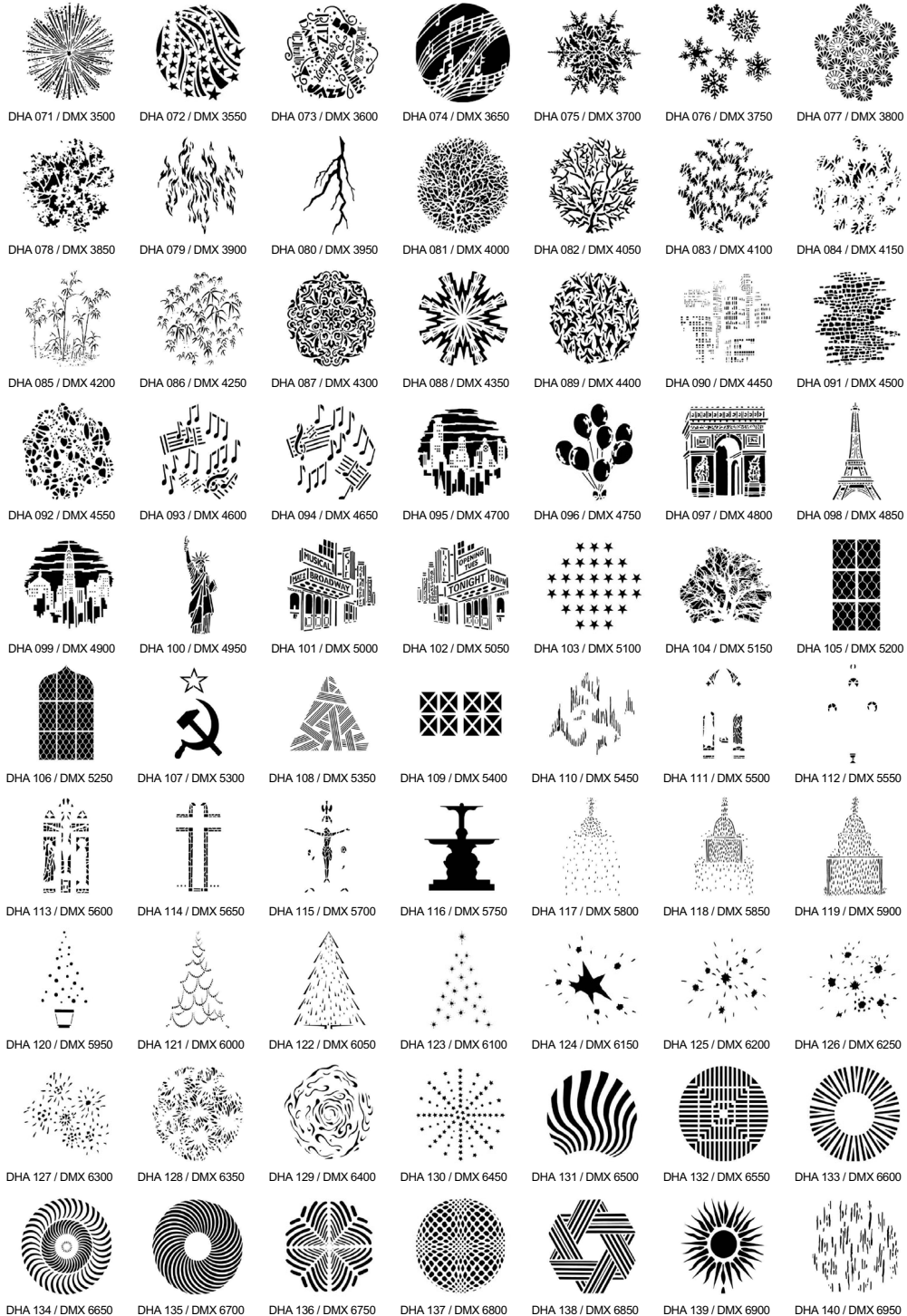


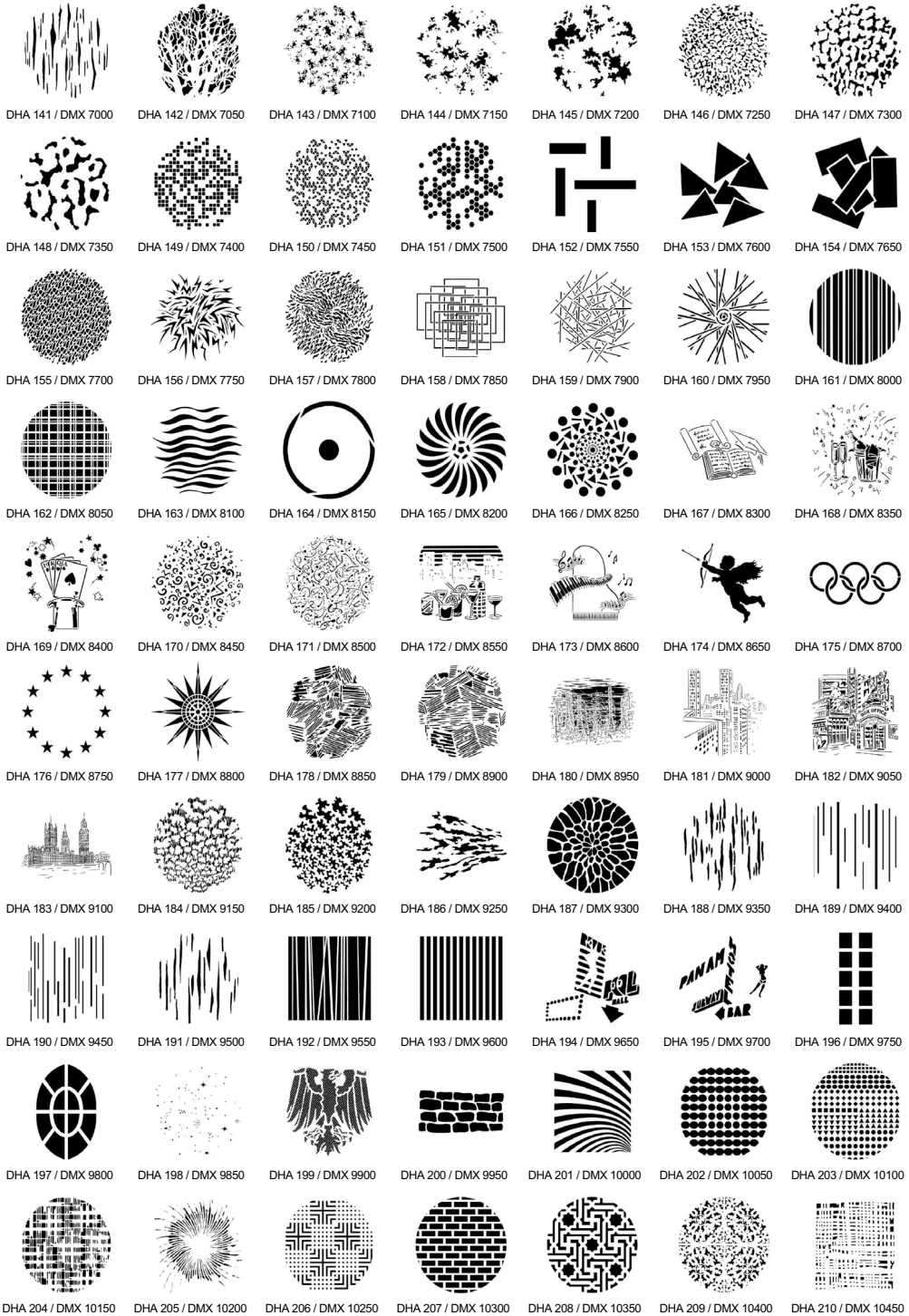
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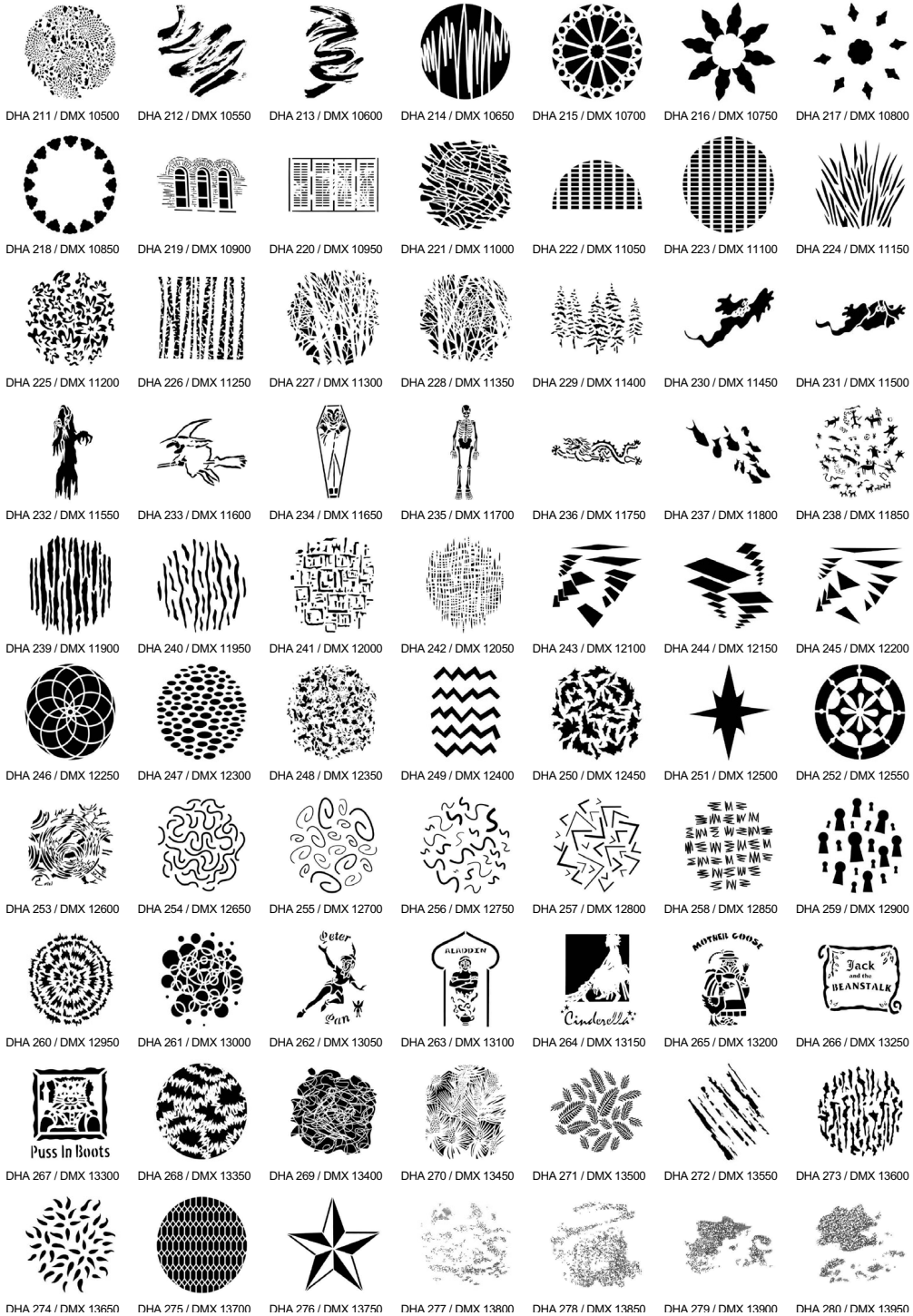


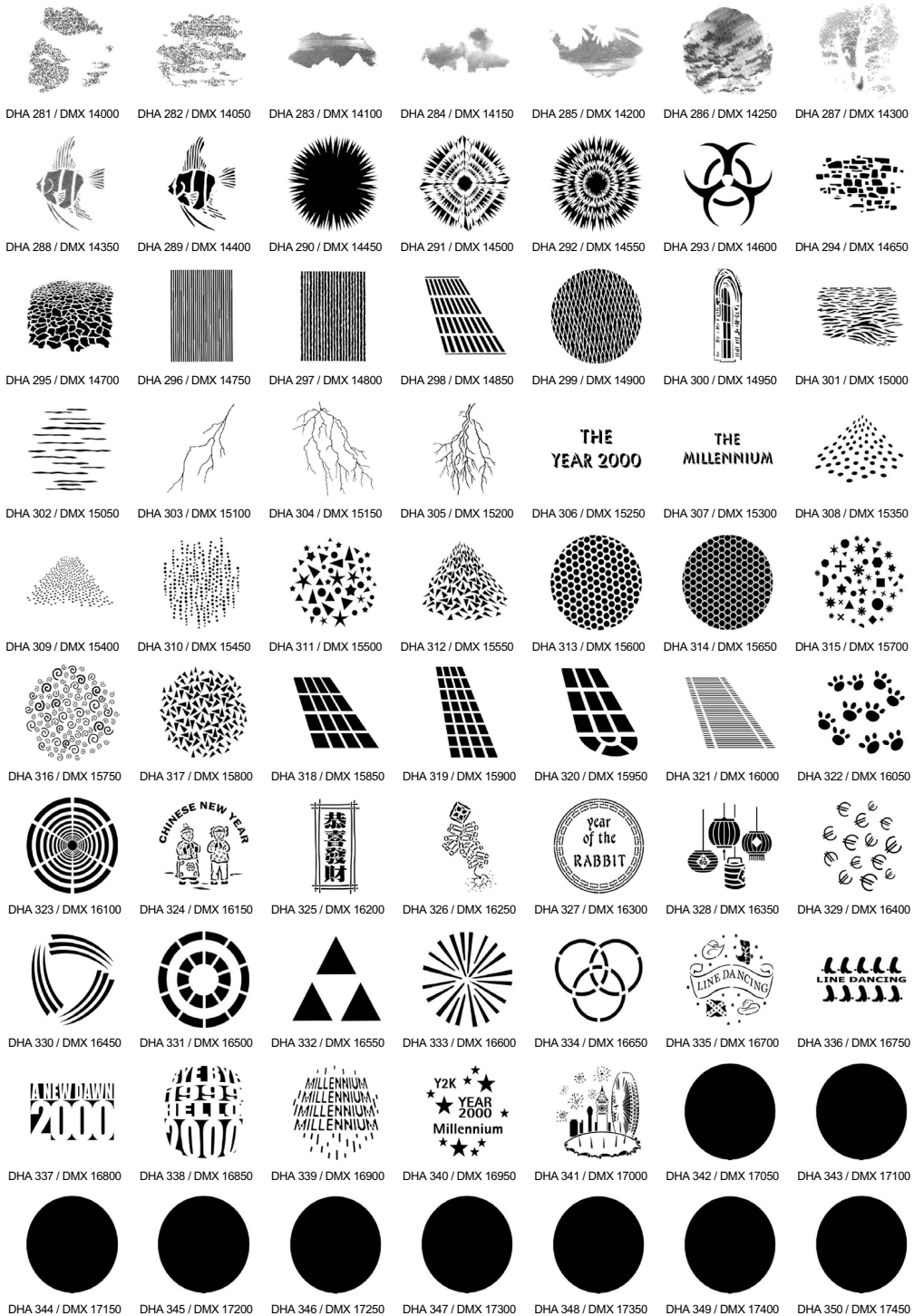
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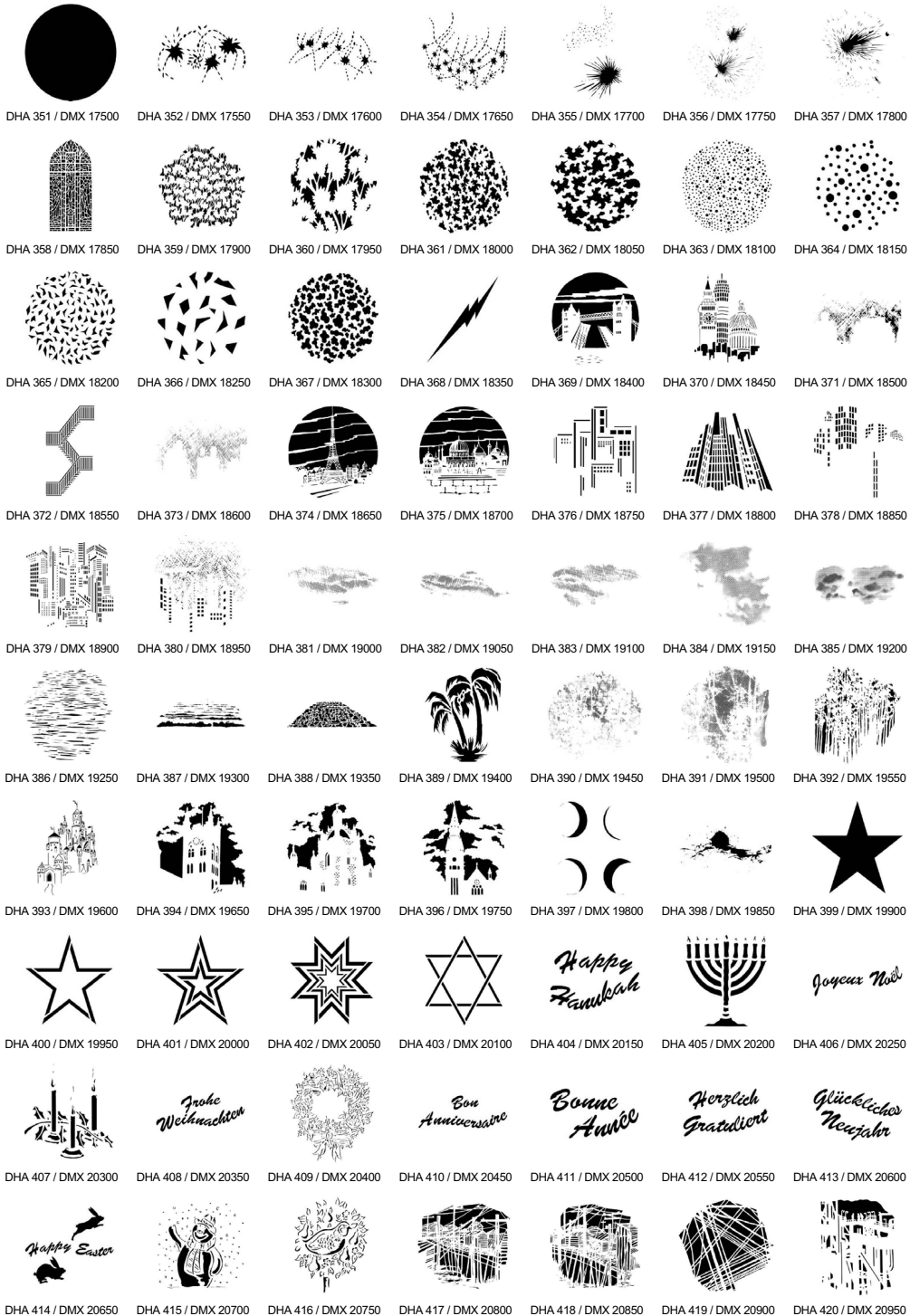














DHA 421 / DMX 21000



DHA 422 / DMX 21050



DHA 423 / DMX 21100



DHA 424 / DMX 21150



DHA 425 / DMX 21200



DHA 426 / DMX 21250



DHA 427 / DMX 21300



DHA 428 / DMX 21350



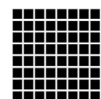
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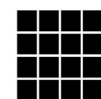
DHA 430 / DMX 21450



DHA 431 / DMX 21500



DHA 432 / DMX 21550



DHA 433 / DMX 21600



DHA 434 / DMX 21650



DHA 435 / DMX 21700



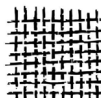
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DHA 437 / DMX 21800



DHA 438 / DMX 21850



DHA 439 / DMX 21900



DHA 440 / DMX 21950



DHA 441 / DMX 22000



DHA 442 / DMX 22050



DHA 443 / DMX 22100



DHA 444 / DMX 22150



DHA 445 / DMX 22200



DHA 446 / DMX 22250



DHA 447 / DMX 22300



DHA 448 / DMX 22350



DHA 449 / DMX 22400



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DHA 453 / DMX 22600



DHA 454 / DMX 22650



DHA 455 / DMX 22700



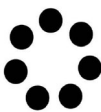
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DHA 457 / DMX 22800



DHA 458 / DMX 22850



DHA 459 / DMX 22900



DHA 460 / DMX 22950



DHA 461 / DMX 23000



DHA 462 / DMX 23050



DHA 463 / DMX 23100



DHA 464 / DMX 23150



DHA 465 / DMX 23200



DHA 466 / DMX 23250



DHA 467 / DMX 23300



DHA 468 / DMX 23350



DHA 469 / DMX 23400



DHA 470 / DMX 23450



DHA 471 / DMX 23500



DHA 472 / DMX 23550



DHA 473 / DMX 23600



DHA 474 / DMX 23650



DHA 475 / DMX 23700



DHA 476 / DMX 23750



DHA 477 / DMX 23800



DHA 478 / DMX 23850



DHA 479 / DMX 23900



DHA 480 / DMX 23950



DHA 481 / DMX 24000



DHA 482 / DMX 24050



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DHA 486 / DMX 24250



DHA 487 / DMX 24300



DHA 488 / DMX 24350

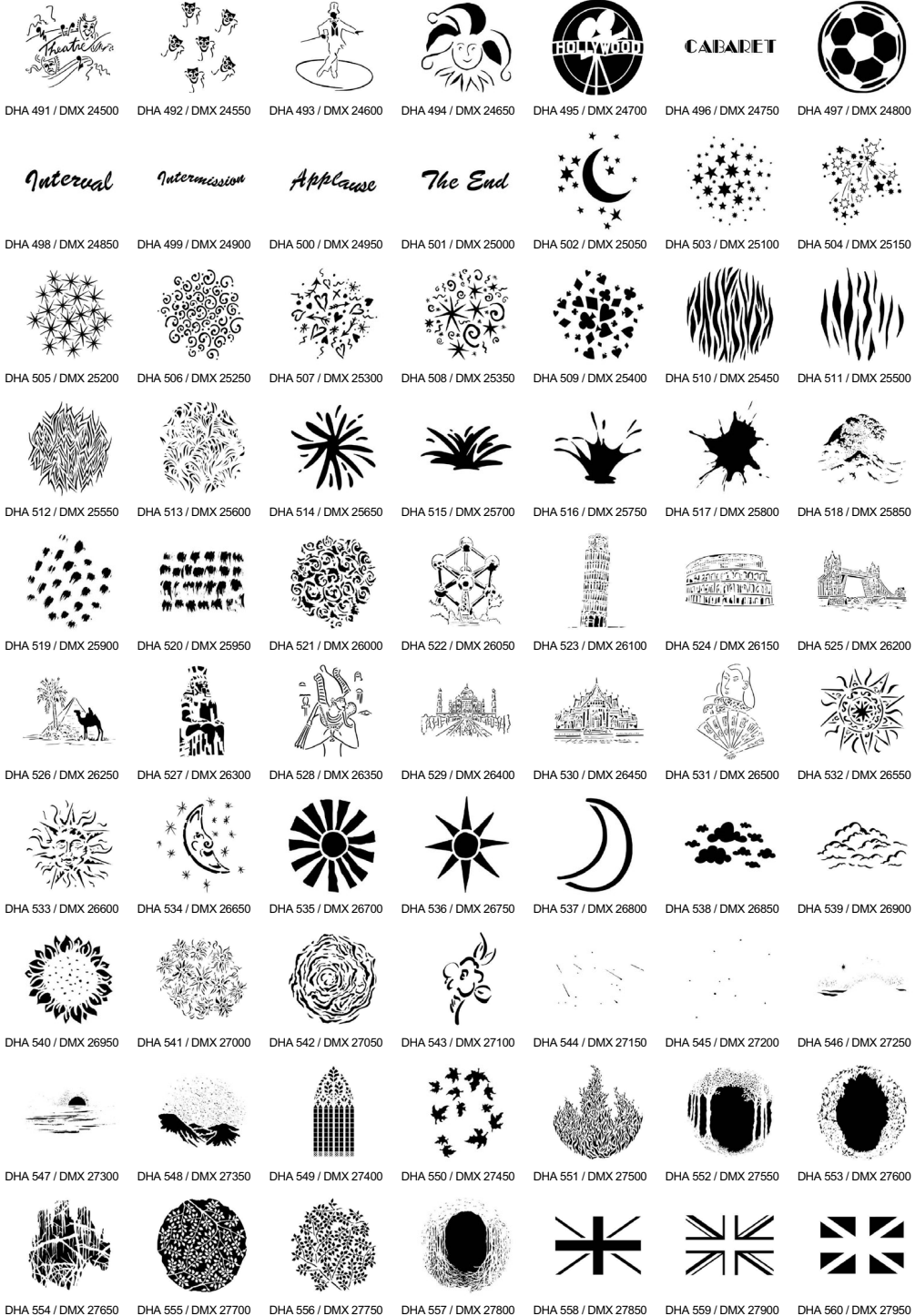


DHA 489 / DMX 24400



DHA 490 / DMX 24450







DHA 561 / DMX 28000



DHA 562 / DMX 28050



DHA 563 / DMX 28100



DHA 564 / DMX 28150



DHA 565 / DMX 28200



DHA 566 / DMX 28250



DHA 567 / DMX 28300



DHA 568 / DMX 28350



DHA 569 / DMX 28400



DHA 570 / DMX 28450



DHA 571 / DMX 28500



DHA 572 / DMX 28550



DHA 573 / DMX 28600



DHA 574 / DMX 28650



DHA 575 / DMX 28700



DHA 576 / DMX 28750



DHA 577 / DMX 28800



DHA 578 / DMX 28850



DHA 579 / DMX 28900



DHA 580 / DMX 28950



DHA 581 / DMX 29000



DHA 582 / DMX 29050



DHA 583 / DMX 29100



DHA 584 / DMX 29150



DHA 585 / DMX 29200



DHA 586 / DMX 29250



DHA 587 / DMX 29300



DHA 588 / DMX 29350



DHA 589 / DMX 29400



DHA 590 / DMX 29450



DHA 591 / DMX 29500



DHA 592 / DMX 29550



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DHA 597 / DMX 29800



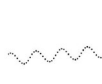
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DHA 599 / DMX 29900



DHA 600 / DMX 29950



DHA 601 / DMX 30000



DHA 602 / DMX 30050



DHA 603 / DMX 30100



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DHA 605 / DMX 30200



DHA 606 / DMX 30250



DHA 607 / DMX 30300



DHA 608 / DMX 30350



DHA 609 / DMX 30400



DHA 610 / DMX 30450



DHA 611 / DMX 30500



DHA 612 / DMX 30550



DHA 613 / DMX 30600



DHA 614 / DMX 30650



DHA 615 / DMX 30700



DHA 616 / DMX 30750



DHA 617 / DMX 30800



DHA 618 / DMX 30850



DHA 619 / DMX 30900



DHA 620 / DMX 30950



DHA 621 / DMX 31000



DHA 622 / DMX 31050



DHA 623 / DMX 31100



DHA 624 / DMX 31150



DHA 625 / DMX 31200



DHA 626 / DMX 31250



DHA 627 / DMX 31300



DHA 628 / DMX 31350



DHA 629 / DMX 31400



DHA 630 / DMX 31450





DHA 631 / DMX 31500



DHA 632 / DMX 31550



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DHA 637 / DMX 31800



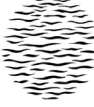
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DHA 639 / DMX 31900



DHA 640 / DMX 31950



DHA 641 / DMX 32000



DHA 642 / DMX 32050



DHA 643 / DMX 32100



DHA 644 / DMX 32150



DHA 645 / DMX 32200



DHA 646 / DMX 32250



DHA 647 / DMX 32300



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DHA 650 / DMX 32450



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DHA 652 / DMX 32550



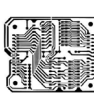
DHA 653 / DMX 32600



DHA 654 / DMX 32650



DHA 655 / DMX 32700



DHA 656 / DMX 32750



DHA 657 / DMX 32800



DHA 658 / DMX 32850



DHA 659 / DMX 32900



DHA 660 / DMX 32950



DHA 661 / DMX 33000



DHA 662 / DMX 33050



DHA 663 / DMX 33100



DHA 664 / DMX 33150



DHA 665 / DMX 33200



DHA 666 / DMX 33250



DHA 667 / DMX 33300



DHA 668 / DMX 33350



DHA 669 / DMX 33400



DHA 670 / DMX 33450



DHA 671 / DMX 33500



DHA 672 / DMX 33550



DHA 673 / DMX 33600



DHA 674 / DMX 33650



DHA 675 / DMX 33700



DHA 676 / DMX 33750



DHA 677 / DMX 33800



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DHA 682 / DMX 34050



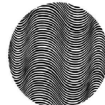
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DHA 684 / DMX 34150



DHA 685 / DMX 34200



DHA 686 / DMX 34250



DHA 687 / DMX 34300



DHA 688 / DMX 34350



DHA 689 / DMX 34400



DHA 690 / DMX 34450



DHA 691 / DMX 34500



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DHA 694 / DMX 34650



DHA 695 / DMX 34700



DHA 696 / DMX 34750



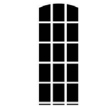
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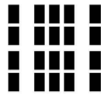
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DHA 700 / DMX 34950



DHA 701 / DMX 35000



DHA 702 / DMX 35050



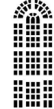
DHA 703 / DMX 35100



DHA 704 / DMX 35150



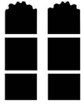
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DHA 706 / DMX 35250



DHA 707 / DMX 35300



DHA 708 / DMX 35350



DHA 709 / DMX 35400



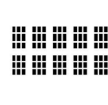
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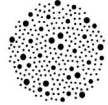
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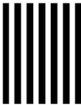
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DHA 713 / DMX 35600



DHA 714 / DMX 35650



DHA 715 / DMX 35700



DHA 716 / DMX 35750



DHA 717 / DMX 35800



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DHA 720 / DMX 35950



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DHA 722 / DMX 36050



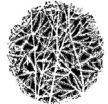
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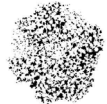
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DHA 727 / DMX 36300



DHA 728 / DMX 36350



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DHA 730 / DMX 36450



DHA 731 / DMX 36500



DHA 732 / DMX 36550



DHA 733 / DMX 36600



DHA 734 / DMX 36650



DHA 735 / DMX 36700



DHA 736 / DMX 36750



DHA 737 / DMX 36800



DHA 738 / DMX 36850



DHA 739 / DMX 36900



DHA 740 / DMX 36950



DHA 741 / DMX 37000



DHA 742 / DMX 37050



DHA 743 / DMX 37100



DHA 744 / DMX 37150



DHA 745 / DMX 37200



DHA 746 / DMX 37250



DHA 747 / DMX 37300



DHA 748 / DMX 37350



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DHA 752 / DMX 37550



DHA 753 / DMX 37600



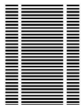
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DHA 755 / DMX 37700



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DHA 757 / DMX 37800



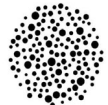
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DHA 764 / DMX 38150



DHA 765 / DMX 38200



DHA 766 / DMX 38250



DHA 767 / DMX 38300



DHA 768 / DMX 38350



DHA 769 / DMX 38400



DHA 770 / DMX 38450





DHA 771 / DMX 38500



DHA 772 / DMX 38550



DHA 773 / DMX 38600



DHA 774 / DMX 38650



DHA 775 / DMX 38700



DHA 776 / DMX 38750



DHA 777 / DMX 38800



DHA 778 / DMX 38850



DHA 779 / DMX 38900



DHA 780 / DMX 38950



DHA 781 / DMX 39000



DHA 782 / DMX 39050



DHA 783 / DMX 39100



DHA 784 / DMX 39150



DHA 785 / DMX 39200



DHA 786 / DMX 39250



DHA 787 / DMX 39300



DHA 788 / DMX 39350



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DHA 790 / DMX 39450



DHA 791 / DMX 39500



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DHA 795 / DMX 39700



DHA 796 / DMX 39750



DHA 797 / DMX 39800



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DHA 801 / DMX 40000

DHA 802 / DMX 40050

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DHA 813 / DMX 40600

DHA 814 / DMX 40650

DHA 815 / DMX 40700

DHA 816 / DMX 40750

DHA 817 / DMX 40800

DHA 818 / DMX 40850

DHA 819 / DMX 40900

DHA 820 / DMX 40950

DHA 821 / DMX 41000

DHA 822 / DMX 41050

DHA 823 / DMX 41100

DHA 824 / DMX 41150

DHA 825 / DMX 41200

DHA 826 / DMX 41250

DHA 827 / DMX 41300

DHA 828 / DMX 41350

DHA 829 / DMX 41400

DHA 830 / DMX 41450

DHA 831 / DMX 41500

DHA 832 / DMX 41550

DHA 833 / DMX 41600

DHA 834 / DMX 41650

DHA 835 / DMX 41700

DHA 836 / DMX 41750

DHA 837 / DMX 41800

DHA 838 / DMX 41850

DHA 839 / DMX 41900