



INSTALLATION/OPERATION MANUAL

CRYSTAL
S E R I E S L

CX-70DHD

**1080p, High-Definition Flat Panel LCD
and Digital High Definition (DHD) Controller
with Widevision™**



RuncoCare™ Standard Two Year Limited Warranty

Congratulations on your purchase of a Runco® product! With proper installation, setup and care, you should enjoy many years of unparalleled video performance.

This RuncoCare Standard Limited Warranty is provided free of charge by Runco International with the purchase of a covered Runco product. The following sets forth Runco's Standard Limited Warranty applicable to all Runco projectors, processors, LCD and plasma display products, with the exception of the following models: XP-103DHD, SC-1, SC-1a and VW-100HD¹.

The following terms and conditions of the RuncoCare Standard Limited Warranty represent a contract between us, Runco International and you, the customer who has purchased a Runco product. This contract applies to purchases of covered Runco products occurring on or after September 1, 2008. Runco reserves the right to change the terms of this contract, and such changes shall apply to purchases of covered Runco products that occur on or after any future effective date.

RuncoCare Standard Features

- Two-year protection from defects in material and workmanship
- Access to 24x7 phone support
- Complimentary, second-day one-way shipping

Warranty Coverage

Runco warrants its products to be free from defects in material and workmanship during the warranty period provided below. If, in Runco's determination, a product proves to be defective in material or workmanship during the warranty period, Runco will repair the product, replace the product with a similar new or like new product, or refund a prorata share of the purchase price (calculated based on the remainder of the warranty period and the then current MSRP² of a similar product), if repair or replacement of the product is determined by Runco to not be feasible.

Length of Warranty

Runco products are warranted for two (2) years from the date of shipment from Runco. Lamps are warranted six (6) months from the date of shipment or 1000 hours, whichever comes first. All other accessories, which includes, but is not limited to, cables, remotes, carrying cases, lens cap and other peripherals sold with the Runco product, are warranted for ninety (90) days from the date of shipment. Repaired product or replacement lamp is subsequently warranted for the remaining portion (if any) of the original warranty term or 90 days from the date the product was shipped to you, whichever is longer.

Eligibility

This RuncoCare Standard Limited Warranty is valid only for the first customer who purchases the covered product from an authorized Runco dealer or distributor. This warranty is not transferable. You may be required to provide proof of purchase in order to receive warranty services.

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1. Runco may update this list of products excluded from this warranty from time to time at Runco's sole discretion, but updates to the list of covered products will not apply on a retroactive basis.
 2. MSRP is defined as the most recent product price listed on Runco's price list.

RuncoCare Claim Procedure

In the event of a product defect, please follow the warranty claim procedure provided below:

1. The Customer is required to contact a Runco dealer or Runco Technical Support via email at support@runco.com or via phone at (toll free) 800-23RUNCO (800-237-8626). If the customer is located outside North America, call +3589 4200 554 in Europe for product service.
2. Be prepared to provide the date of purchase, the place of purchase, serial number, product model number, description of the problem and troubleshooting steps already attempted.
3. Runco Technical Support staff will attempt to correct any minor issues that may be causing the problem. If Runco is unable to fix the problem to the customer's satisfaction, Runco will issue a Return Material Authorization (RMA) if it is determined that the claim was made within the coverage period of the Standard Limited Warranty.
4. The customer will need to return the defective product to the Runco repair depot location specified by the Runco technical support representative. The customer will need to properly package the defective product, consisting of the product only, and not include any accessories (e.g., cables, remotes, carrying cases, lens, lens cap and other peripherals) and return it to the Runco repair depot specified by the technical support representative. It is the customer's responsibility to properly package the hardware, include all appropriate materials, and return it to the location specified by the Runco technical support department. The customer will need to address and resolve any shipping damage claims directly with the shipping company.
5. The customer is responsible for providing a suitable box to ship the defective product to an authorized Runco repair depot. Boxes may be purchased from a Runco technical support representative.
6. The customer is responsible for paying freight charges to ship the defective product to an authorized Runco repair depot.
7. Runco will pay freight charges to return the repaired/replacement product to the customer from the Runco repair depot.
8. Once an RMA has been created, the customer may contact serviceorders@runco.com for followup questions or confirmation status of the claim process.

Warranty Exclusions

This RuncoCare Standard Limited Warranty does not include or is limited by the following:

1. Products not purchased from an authorized Runco dealer
2. Rental costs incurred by the customer in the event of product defect or failure
3. Any product with a defaced, modified, or removed serial number
4. Damage, deterioration, or malfunction resulting from:
 - a Accident, abuse, misuse, neglect, improper ventilation, fire, water, disaster, lightning, or other acts of nature, smoke exposure (cigarette or otherwise), unauthorized product modification (including use of an unauthorized mount), or failure to follow instructions supplied with the product
 - b Repair or attempted repair by anyone not authorized by Runco
 - c Any damage to the product due to shipment
 - d Removal or installation of the product
 - e Causes external to the product, such as electric power fluctuations or failure
 - f Use of supplies or parts not meeting Runco's specifications
 - g Normal wear and tear
 - h Expected lamp degradation and normal decrease in lamp output over a period of time or as the lamp is consumed
 - i Customer caused defects, including but not limited to, scratched/defaced/altered plastics

-
- j Failure to follow maintenance procedures as outlined in the product's user guide where a schedule is specified for regular cleaning of the product
 - k Opening the product and/or tampering with internal circuitry
 - l Products lost, stolen or discarded
 - m Any damage or dissatisfaction associated with latent images, "burnin," or any other damage determined by Runco to be the result of customer use patterns
 - n Any other cause, which does not relate to a product defect in material or workmanship
5. Removal, installation, and setup service charges are excluded from this Standard Limited warranty
 6. Runco's warranty does not cover black uniformity issues or other LCD issues associated with usage outside the Runco recommended guidelines and specifications for the product
 7. Second day shipment delivery time and availability may vary based on origin and destination and Runco is unable to deliver to PO Box and FPO Box addresses

Extended Service Options

Runco offers extended and expanded service plans. For information on additional product protection, please email serviceorders@runco.com or call (toll free) 800-23RUNCO (800-237-8626).

Online Product Registration

Please visit <http://www.runco.com/info.html> to register product.

Limitation of Implied Warranties

RUNCO PROVIDES NO WARRANTIES, EXPRESS OR IMPLIED, EXCEPT THOSE EXPRESSLY PROVIDED HEREIN. RUNCO EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Exclusion of Damages

RUNCO'S MAXIMUM AGGREGATE LIABILITY HEREUNDER IS LIMITED TO THE COST OF REPAIR OR REPLACEMENT OF THE PRODUCT.

1. RUNCO SHALL NOT BE LIABLE FOR DAMAGE TO OTHER PROPERTY CAUSED BY ANY DEFECT IN THE PRODUCT, DAMAGES BASED UPON INCONVENIENCE, LOSS OF USE OF THE PRODUCT, LOSS OF TIME, LOSS OF PROFITS, LOSS OF BUSINESS OPPORTUNITY, LOSS OF GOODWILL, INTERFERENCE WITH BUSINESS RELATIONSHIPS, OR OTHER COMMERCIAL LOSS, EVEN IF THE CUSTOMER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.
2. RUNCO SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL, INDIRECT, SPECIAL, OR PUNITIVE DAMAGES ANY OTHER DAMAGES, WHETHER INCIDENTAL, INDIRECT, CONSEQUENTIAL OR OTHERWISE.
3. RUNCO SHALL NOT BE LIABLE FOR ANY CLAIM AGAINST THE CUSTOMER BY ANY OTHER PARTY.

Effect of Local Law

This warranty gives you specific legal rights, and you may have other rights, which vary from locality to locality. Some localities do not allow limitations on implied warranties and/or do not allow the exclusion of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

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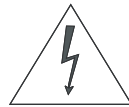
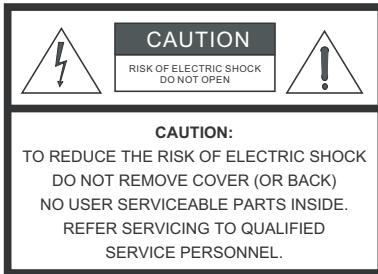
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Runco Products are manufactured under one or more of the following patents: US. Patent 6755540 and Other Patents Pending.

Important Safety Instructions

Thank you for your purchase of this quality Runco video product! It has been designed to provide you with the quality of video that is expected in a home theater. For the best performance, please read this manual carefully as it is your guide through the menus and operation.



WARNING

This symbol is intended to alert the user to the presence of uninsulated “dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock.



This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with a dry cloth.
7. Do not block any of the ventilation openings. Install in accordance with the manufacturer’s instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. When the provided plug does not fit into your outlet, consult an electrician for the replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles and the point where they exit from the apparatus.
11. Only use the attachments/accessories specified by the manufacturer.
12. Use only with a cart, stand, tripod, bracket or table specified by the manufacturer or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus to avoid injury from tip-over.
13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15. Keep the packing material in case the equipment should ever need to be shipped.



Compliance Information

DECLARATION OF CONFORMITY:

Manufacturer's Name: Runco International, LLC

Manufacturer's Address: 1195 NW Compton Drive, Beaverton, OR 97006-1992

hereby declares that the Products' Model Numbers:

CX-70DHD

conform with the provisions of:

Council Directive 2004/108/EC on Electromagnetic Compatibility;

EN 55022 "Limits and methods of measurements of radio interference characteristics of information technology equipment" 1998;

EN 55024 "Limits and methods of measurements of immunity characteristics of information technology equipment" 1998;

Including:

- EN 61000-4-2 "Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques Section 2: Electrostatic discharge immunity test"
- EN 61000-4-3 "Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques Section 3: Radiated, Radio-Frequency, Electromagnetic Field Immunity Test"
- EN 61000-4-4 "Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques Section 4: Electrical fast transient/burst immunity test"
- EN 61000-4-5 "Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques Section 5: Surge immunity test"
- EN 61000-4-6 "Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques Section 6: Conducted disturbances induced by radio-frequency fields immunity test"
- EN 61000-4-8 "Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques Section 8: Conducted disturbances induced by power frequency magnetic fields immunity test"
- EN 61000-4-11 "Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques Section 11: Voltage dips, short interruptions and voltage variations immunity tests"

And:

- EN 61000-3-2 "Electromagnetic compatibility (EMC) Part 3, Section 2: Limits for harmonic current emissions (equipment input current up to and including 16 A per phase)" 2000;
- EN 61000-3-3 "Electromagnetic compatibility (EMC) Part 3, Section 3: Limitations of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current up to and including 16 A and not subject to conditional connection" 1995;

Council Directive 2006/95/EC and amended by M1 and C1 on Low Voltage Equipment Safety;

EN 60950 "Safety of information technology equipment, including electrical business equipment"

The Technical Construction file required by this Directive is maintained at the corporate headquarters of Runco International, LLC, located at 1195 NW Compton Drive, Beaverton, OR 97006-1992.

Date of Declaration: August 2008

FCC PART 15:

NOTE: 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.

INDUSTRY CANADA (ICES-003):

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

PRODUCT DISPOSAL:

The Product contains small amounts of tin, lead and/or mercury. Disposal of these materials may be regulated due to environmental considerations.

IMPORTANT RECYCLE INSTRUCTIONS



This product may contain mercury or other electronic waste that can be hazardous if not disposed of properly. Recycle or dispose in accordance with local, state, or federal Laws.

For more information, contact the Electronic Industries Alliance at WWW.EIAE.ORG.

For lamp specific disposal information check WWW.LAMPRECYCLE.ORG.

DISPOSAL OF OLD ELECTRICAL AND ELECTRONIC EQUIPMENT (Applicable throughout the European Union and other European countries with separate collection programs)



This symbol found on your product or on its packaging, indicates that this product should not be treated as household waste when you wish to dispose of it. Instead, it should be handed over to an applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences to the environment and human health, which could otherwise be caused by inappropriate disposal of this product. The recycling of materials will help to conserve natural resources. This symbol is only valid in the European Union. If you wish to discard this product, please contact your local authorities or dealer and ask for the correct method of disposal.

Notes:

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Notes:

1. Introduction

This Owner's Manual describes how to install, set up and operate a Runco CX-70DHD Flat-Panel LCD and DHD Controller.

Throughout this manual, the Runco CX-70DHD Flat-Panel LCD and DHD Controller are referred to collectively as the "CX-70DHD."

Runco has prepared this manual to help installers and end users get the most out of the CX-70DHD.

Runco has made every effort to ensure that this manual is accurate as of the date it was printed. However, because of ongoing product improvements and customer feedback, it may require updating from time to time. You can always find the latest version of this and other Runco product manuals on-line, at www.runco.com.

Runco welcomes your comments about this manual. Send them to techpub@runco.com.

Text Conventions: The following conventions are used in this manual, in order to clarify the information and instructions provided:

- Remote control button identifiers are set in upper-case bold type; for example, "Press **EXIT** to return to the previous menu."
- Computer input (commands you type) and output (responses that appear on-screen) is shown in monospace (fixed-width) type; for example: "To change the aspect ratio to Letterbox, type `LETTERBOX <Enter>`."
- All keys with functional names are initial-capped, set in bold type and enclosed in angle brackets. These keys are the following: **<Enter>**, **<Spacebar>**, **<Control>**, **<Esc>** and **<Tab>**.
- **<Enter>** indicates that you may press either the RETURN or ENTER key on your computer keyboard if it has both keys.

In addition to these conventions, underlining, boldface and/or italics are occasionally used to highlight important information, as in this example:



Note

*A carriage return **must** be used after each command or string.*

1.1 About This Manual

◀ Target Audience

◀ If You Have Comments About This Manual...

◀ Textual and Graphic Conventions

Graphic Conventions: These symbols appear in numerous places throughout the manual, to emphasize points that you must keep in mind to avoid problems with your equipment or injury:



Tip

TIPS highlight time-saving short cuts and helpful guidelines for using certain features.



Note

NOTES emphasize text with unusual importance or special significance. They also provide supplemental information.



Caution

CAUTIONS alert users that a given action or omitted action can degrade performance or cause a malfunction.



WARNING

WARNINGS appear when a given action or omitted action can result in damage to the equipment, or possible non-fatal injury to the user.



DANGER!

DANGER appears when a given action can cause severe injury or death.

1.2 Using This Manual

Use the following table to locate the specific information you need in this manual.

If you need...	... Turn to page:
Information about obtaining service	iv
General information about the CX-70DHD Flat-Panel LCD and DHD Controller	3
Installation instructions	15
First-time configuration instructions	31
Advanced configuration instructions	42
Troubleshooting tips	49
Specifications for the CX-70DHD Flat-Panel LCD and DHD Controller	57

Following the longstanding tradition of providing the finest custom theater products, Runco proudly unveils its 70-inch Crystal Series™ LCD, the CX-70DHD. Runco's largest LCD flat panel joins the esteemed Crystal Series, which represents the finest Runco has to offer and is a testament to Runco's commitment to deliver the most exquisite flat-panel displays for an unsurpassed large-screen experience. Combining image prowess, impeccable design, flawless function and incredible craftsmanship, the Crystal Series products bespeak unparalleled luxury for the elite few who covet them.

The Runco CX-70DHD is a native "Full-HD" (1920 x 1080) LCD that is ideal for rooms of distinction where a large screen size is desired, but where ambient light makes front projection difficult and the glare of a plasma screen simply unacceptable. In addition to its exceptional contrast ratio and superb gray scaling for true-to-life image quality, the CX-70DHD features the ISF™ (Imaging Science Foundation) calibration suite, including day and night modes for an optimal picture in the most challenging lighting conditions.

Designed exclusively for discriminating tastes, the CX-70DHD is the first LCD flat panel to feature Runco's proprietary external DHD™ video controller/processor. The DHD not only incorporates Runco's exclusive advanced Vivix II™ digital video processing technology to achieve the highest level of image fidelity, but it also enhances standard-definition digital and NTSC content to near high-definition quality.

Regardless of video source, Runco's CX-70DHD provides rich, detailed HD imagery. While lesser displays may show signs of image distortion, especially at larger screen sizes, the CX-70DHD incorporates Runco's WideVision™ technology with exclusive VirtualWide™ content conversion, which masterfully converts all 4:3 content to widescreen 16:9 aspect ratio and optimizes Anamorphic and Letterbox content with no loss of image integrity.

The CX-70DHD offers exceptional installation flexibility. It measures less than six inches thin for unobtrusive installation on a wall, and the external DHD processor allows for a pristine installation, with just a single HDMI with HDCP output to the display required. All source and component inputs (Composite, S-Video, HDMI with HDCP, and RGB) are handled by Runco's DHD, which, like all of the components, can be hidden from view.

The CX-70DHD includes a discrete remote, RS-232 interface and three, +12 VDC triggers for greater integration capabilities that can help create the ideal entertainment environment with touch-of-a-button convenience. The display's elegant black bezel matches any room décor.

The CX-70DHD offers these key features and benefits:

- 16:9 Native Resolution: 1920 x 1080
- Multiple Aspect Ratios with VirtualWide™ Mode
- Includes DHD with HDMI video controller/processor
- Less than 6 inches thin
- Exceptional detail and artifact-free video enhancement
- Vivix™ video processing with 3:2 film detection circuitry

1.3 Description, Features and Benefits

◀ Key Features and Benefits

Parts List ➤ Your CX-70DHD is shipped with the following items. If any items are missing or damaged, please contact your Runco dealer or Runco Customer Service at (800) 23-RUNCO.

- CX-70DHD Flat-Panel LCD and DHD Controller
- Table Stand
- AC Power Cords (2)
- Remote Control Unit and two (2), AAA-size batteries
- Communication Cable, RJ-11 Male to RJ-45 Male, 20 feet (part number 175-0686-00)
- Rack-mount hardware for the DHD Controller
- CX-70DHD Installation/Operation Manual (this document)

Optional Accessories:

- Wall Mount Kit (part number 956-0285-00)

2. Controls and Functions

2.1 CX-70DHD at a Glance

◀ Controls and Indicators

Figure 2-1 shows the CX-70DHD controls and indicators.

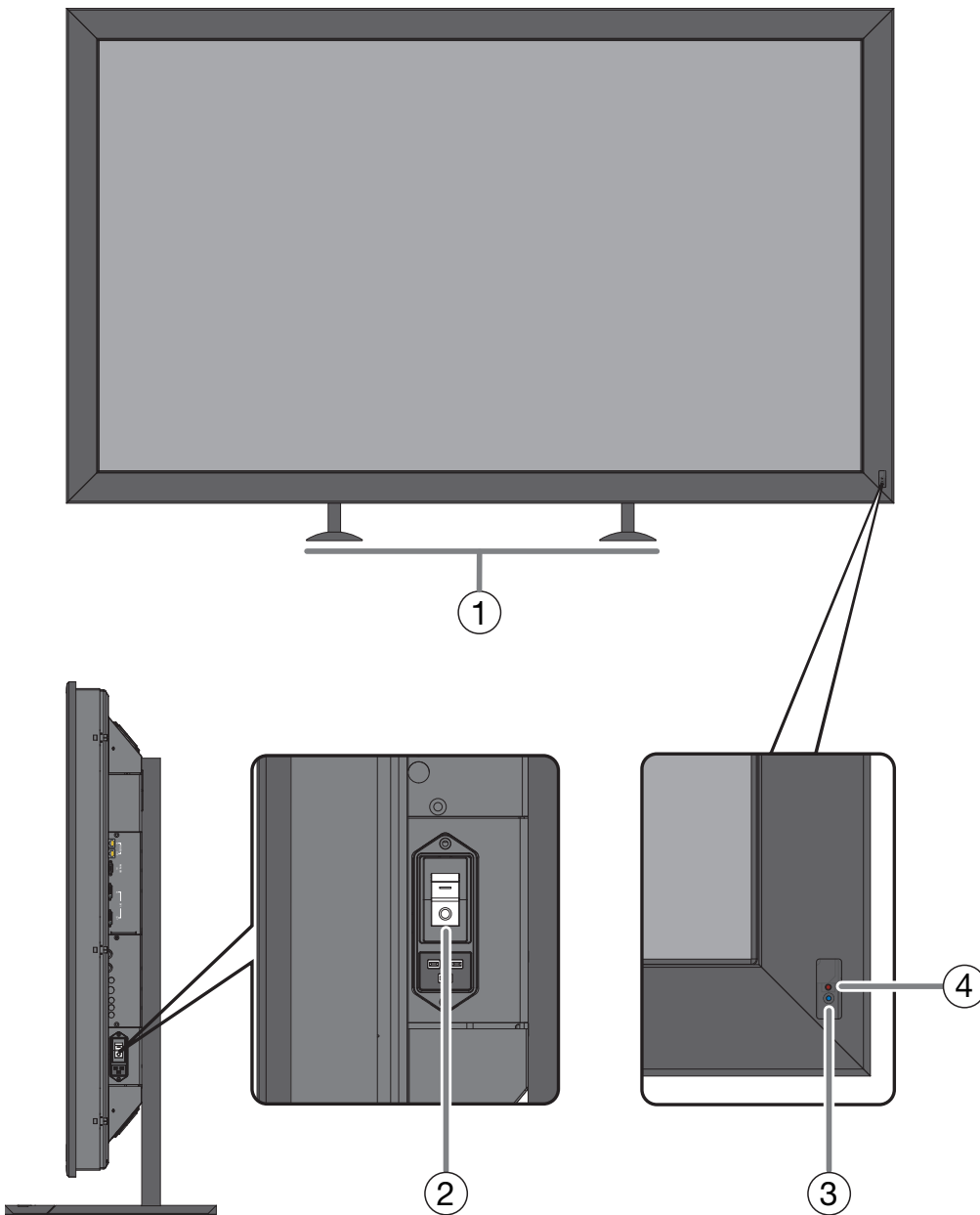


Figure 2-1. CX-70DHD Controls and Indicators

1. **DISPLAY STAND**
Included with the CX-70DHD for table-top installations.
2. **POWER SWITCH**
Connects or disconnects the display panel from the AC power source.
3. **STANDBY/ON INDICATOR**
 - Lights blue to indicate normal operation;
 - Lights red to indicate that the CX-70DHD is in standby mode.
4. **REMOTE CONTROL SENSOR**
Receives the signals from the remote control.

Connectors ➤ Figure 2-2 shows the connector locations on the CX-70DHD, and the paragraphs that follow describe them.

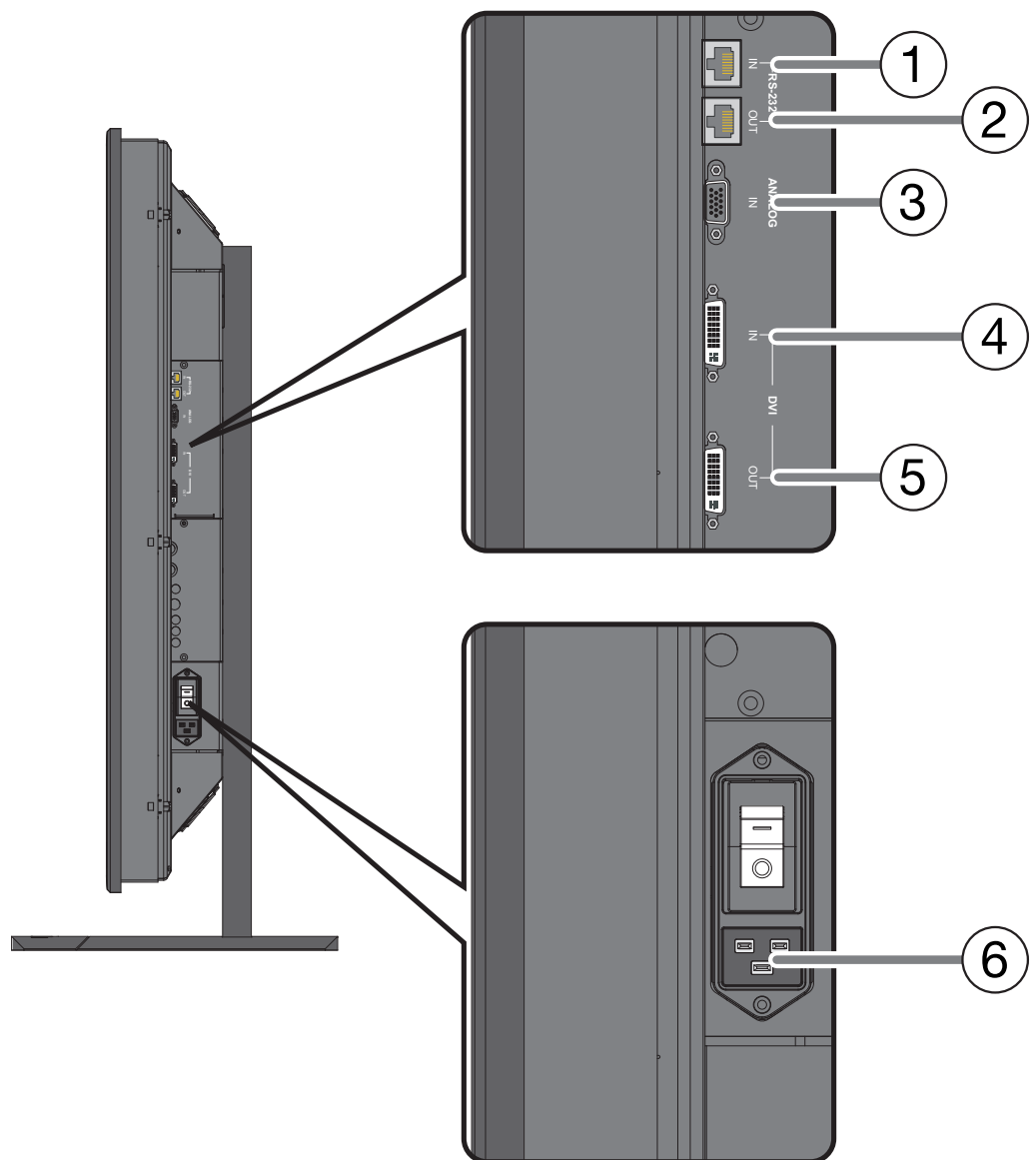


Figure 2-2. CX-70DHD Connector Locations

1. **RS-232 IN**
Connect the RS-232 OUT port on the DHD Controller to this input.
2. **RS-232 OUT**
Not used.
3. **ANALOG IN**
Not used.
4. **DVI IN**
Connect the HDMI output from the DHD Controller to this input.
5. **DVI OUT**
Not used.
6. **POWER INPUT**
Connect the CX-70DHD to AC power here.

Figure 2-3 shows the controls and indicators on the DHD Controller front panel; the paragraphs that follow describe them.

2.2 DHD Controller Front Panel

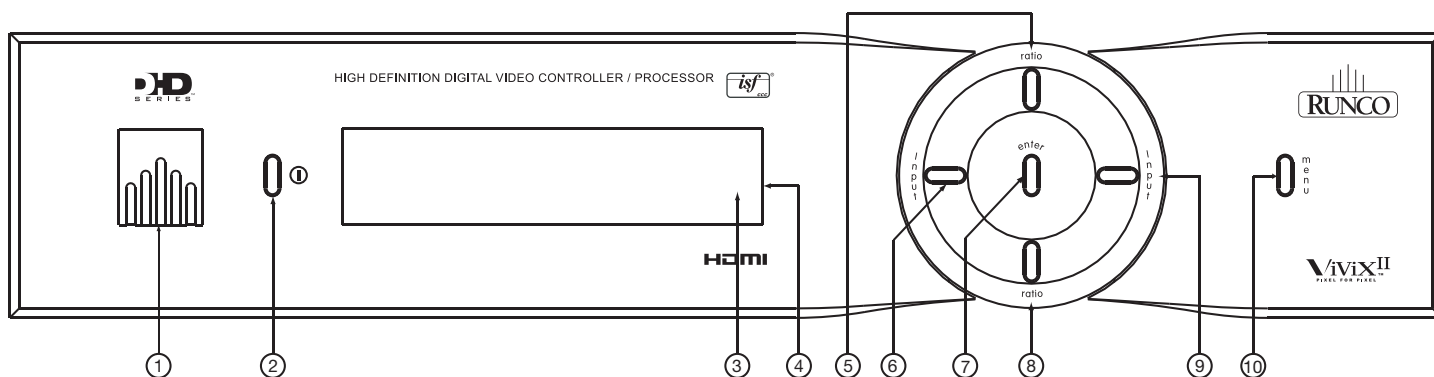


Figure 2-3. DHD Controller Front Panel

1. **RUNCO ICON**
Lights red to indicate that the DHD Controller is in standby mode; lights blue to indicate that the unit is on.
2. **POWER BUTTON**
Press once to toggle from standby mode to on mode. Press it again to return to standby mode. For a discrete on or off command, you can use the direct access buttons on the remote control.
3. **IR SENSOR**
Receives IR commands from the remote.
4. **VACUUM FLUORESCENT DISPLAY**
Can be used instead of the On-Screen Display (OSD). Displays currently-selected menu or – if no menu is selected – the current source, signal format (NTSC or PAL) and aspect ratio.

5. **UP BUTTON**

Used to direct select aspect ratios or move the menu cursor up in the OSD. When no menu is present on-screen, the **UP** button toggles through aspect ratios in the following order:

16:9 - 4:3 - Letterbox - VirtualWide - Cinema

6. **LEFT BUTTON**

Used to direct select inputs or move the menu cursor left in the On-Screen Display. When no menu is present on-screen, the **LEFT** button toggles through the different sources, in this order:

HDMI 2 - HDMI 1 - HD/RGB 2 - HD/RGB1 - Component SD - S-Video 2 - S-Video 1 - Composite

7. **ENTER BUTTON**

Press **ENTER** to select a highlighted menu item.

8. **DOWN BUTTON**

Used to direct select aspect ratios or move the menu cursor down in the OSD. When no menu is present on-screen, this button toggles through the different aspect ratios, in this order:

Cinema - VirtualWide - Letterbox - 4:3 - 16:9

9. **RIGHT BUTTON**

Used to direct select inputs or move the menu cursor right in the OSD. When no menu is present on-screen, the **RIGHT** button toggles through the different sources, in this order:

Composite - S-Video 1 - S-Video 2 - Component SD - HD/RGB 1 - HD/RGB 2 - HDMI 1 - HDMI 2



Note

*The “direct select” function of the **UP**, **DOWN**, **LEFT** and **RIGHT** buttons is available only on the analog inputs (HD/RGB, SD Component, Composite and S-Video).*

10. **MENU BUTTON**

Press this button to access the OSD controls, or to exit the current menu and return to the previous one.

Figure 2-4 shows the rear connector panel on the DHD Controller.

2.3 DHD Controller Rear Panel

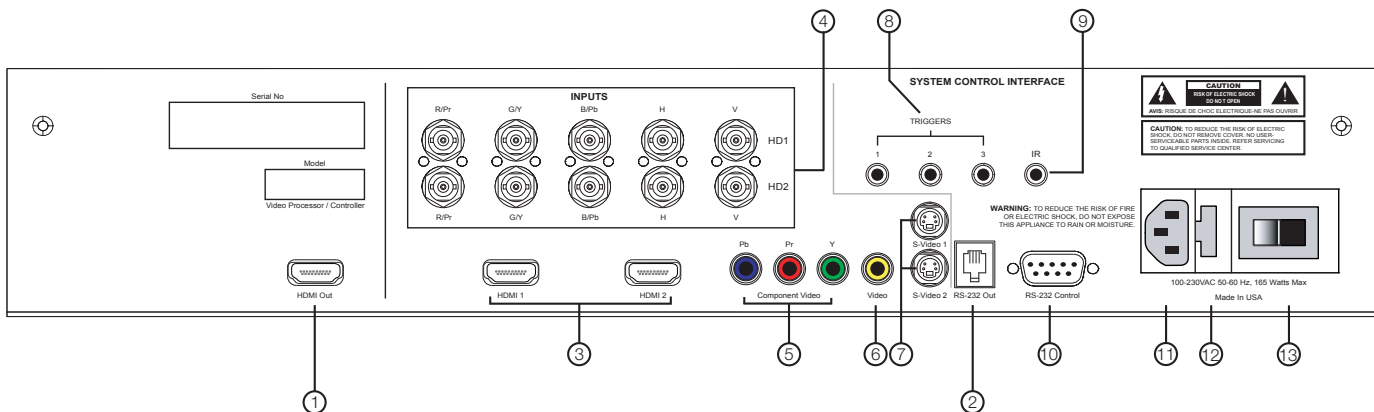


Figure 2-4. DHD Controller Rear Panel

1. **HDMI OUT**

Connect this to the **DVI IN** input on the CX-70DHD (see Figure 2-2).

◀ **Outputs**

2. **ComLink (RS-232) OUTPUT**

Connect this to the **RS-232 IN** input on the CX-70DHD, using the provided communication cable.

3. **HDMI 1 / HDMI 2 (Digital)**

Two, HDCP-compliant digital video inputs for connecting a DVD player or HD tuner with a DVI or HDMI output.

◀ **Inputs**

4. **HD1 / HD2 (5 x Analog BNCs)**

Two inputs (five BNCs per input) for connecting either RGB or component high-definition television signals. The DHD Controller automatically detects the signal format: RGB(HV) or YPrPb, 480p, 720p, 480i, 576i or 1080i.

5. **COMPONENT VIDEO (RCA connectors)**

Standard Definition (480i/576i) Component (YPrPb) input. This is the input for component video from sources such as DVD players.



Tip

For best results, do not run your DVD player in progressive mode.

6. **COMPOSITE VIDEO INPUT**

Standard composite video input for connecting a VCR, laser disc player or other composite video source.

7. **S-VIDEO 1 / S-VIDEO 2**

Two, standard S-Video inputs for connecting a DVD player, satellite receiver or Super VHS (S-VHS) VCR.

8. **12-VOLT (750 mA) TRIGGER OUTPUTS**

Connection for up to three (3), 12-volt trigger-controlled devices such as retractable screens or screen masks.

9. **IR**

Wired input from a wired remote control or infrared receiver. It is a 3.5-mm, mini phono jack, wired as follows:

Ring = +5V

Tip = IR Input

Sleeve = Ground



Note

When an external remote control or infrared receiver is connected to the wired IR input, the IR sensor on the front of the DHD Controller is disabled.

10. **RS-232 CONTROL PORT**

A female, 9-pin D-sub connector for interfacing with a PC or automation/control system.

11. **POWER INPUT (100 to 240 VAC)**

Connect the DHD Controller to power here.

12. **MAIN AC FUSE**

This is the main AC input fuse (5mm x 20mm, 500 mA, 250V slow-blow).

13. **MAIN POWER SWITCH**

Disconnects or applies power to the DHD Controller.

Figure 2-5 shows the DHD Controller remote control, and the paragraphs that follow describe its functionality.

2.4 DHD Controller Remote Control

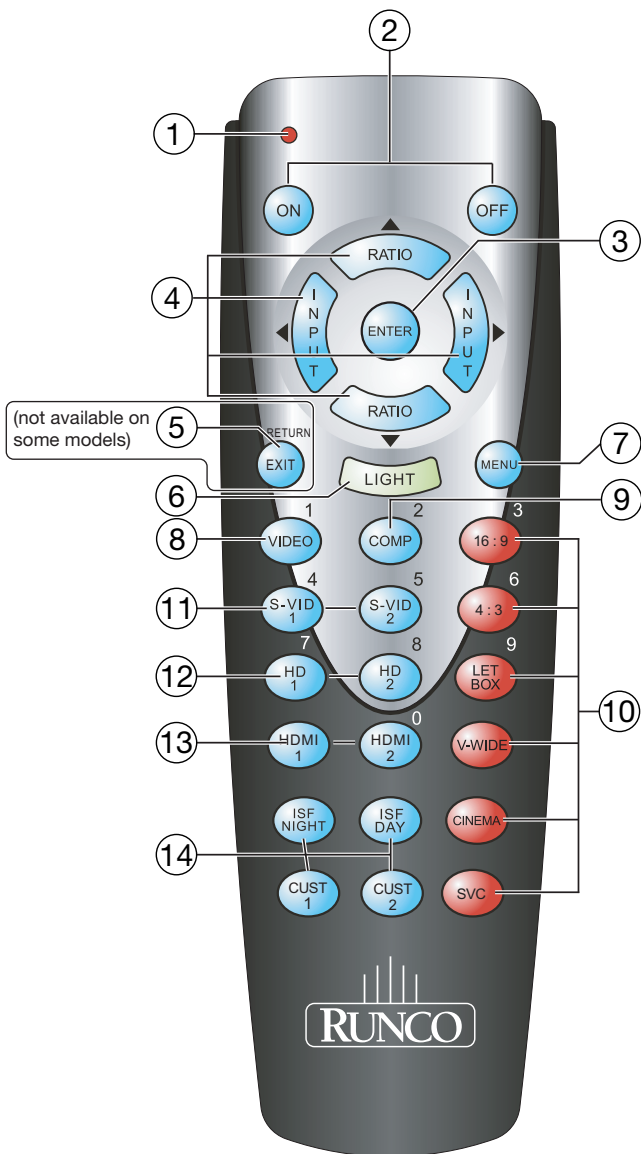


Figure 2-5. DHD Controller Remote Control

1. **IR OUTPUT INDICATOR**
Lights when a button is pressed to indicate that an IR signal is being transmitted.
2. **ON / OFF**
Press to turn the CX-70DHD on or off.
3. **ENTER**
Press to select a highlighted menu item or confirm a changed setting.
4. **Cursor Keys (▲, ◀, ▼, ▶)**
Use these buttons to select items or settings, adjust settings or switch display patterns.

When no menus are present on-screen, the **UP** and **DOWN** buttons toggle through the available aspect ratios, in this order:

UP Button = 16:9 - 4:3 - Letterbox - VirtualWide - Cinema

DOWN Button = Cinema - VirtualWide - Letterbox - 4:3 - 16:9

Likewise, the **LEFT** and **RIGHT** buttons toggle through the different source inputs, in this order:

LEFT Button = HDMI 2 - HDMI 1 - HD/RGB2 - HD/RGB 1 - Component SD - S-Video 2 - S-Video 1 - Composite

RIGHT Button = Composite - S-Video 1 - S-Video 2 - Component SD - HD/RGB 1 - HD/RGB 2 - HDMI 1 - HDMI 2

5. **RETURN / EXIT**
Press this button to exit the current menu and return to the previous one.



Note

*Not all remote control units have this button. If yours does not, use the **MENU** button (see below) to exit the current menu.*

6. **LIGHT**
Press to illuminate the buttons.
7. **MENU**
Press this button to show or hide the OSD controls.
8. **VIDEO (1)**
Press to select Composite video input as the source or to enter the numeric character "1."
9. **COMP (Component) (2)**
Press to select Component SD (480i/576i) video input as the source or to enter the numeric character "2."

10. Aspect Ratio Selection Buttons

Use the red buttons to select an aspect ratio directly or to enter numeric characters, as follows:

16 : 9 (3)

For viewing 16:9 DVDs or HDTV programs in their native aspect ratio.

4 : 3 (6)

Scales the input signal to fit 4:3 display mode in the center of the screen.

LETBOX (Letterbox) (9)

For viewing LaserDisc movies or non-anamorphic DVDs on a 16:9 screen.

V-WIDE (VirtualWide)

Enlarges a 4:3 image horizontally in a NON-linear fashion to fit 16:9 full screen display.

CINEMA

For viewing 2.35:1 source material on a 1.78:1 (16:9) screen. The upper and lower portions are masked.

SVC

Not used.

11. S-VID 1 (4) / S-VID 2 (5) (S-Video)

Press to select an S-Video input or to enter the numeric character "4" or "5."

12. HD 1 (7) / HD 2 (8)

Press to select a HD (RGBHV or YPbPr component) input or to enter the numeric character "7" or "8."

13. HDMI 1 / HDMI 2 (0)

Press to select a Digital Video input. Press **HDMI2** to enter the numeric character "0."

14. Memory Preset Buttons:

ISF NIGHT

Press to recall settings for the current input from the "ISF Night" memory preset.

ISF DAY

Press to recall settings for the current input from the "ISF Day" memory preset.

CUST 1

Press to recall settings for the current input from the "Custom 1" memory preset.

CUST 2

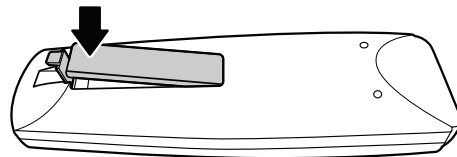
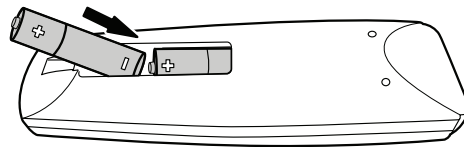
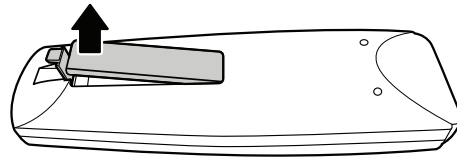
Press to recall settings for the current input from the "Custom 2" memory preset.

Notes:

3. Installation

To install batteries in the remote control:

1. Press down the tab on the cover and pull the cover in the direction of the arrow.
2. Insert the included batteries. Ensure that the polarities correctly match the \oplus and \ominus markings inside the battery compartment.
3. Insert the lower tab of the cover into the opening, and press down the cover until it clicks in place.



- When installing batteries, make sure that the battery polarities are correct.
- Do not mix an old battery with a new one or different types of batteries.
- If you will not use the remote control for a long time, remove the batteries to avoid damage from battery leakage.

The remote control can be used to control the CX-70DHD within the ranges shown in Figure 3-1.

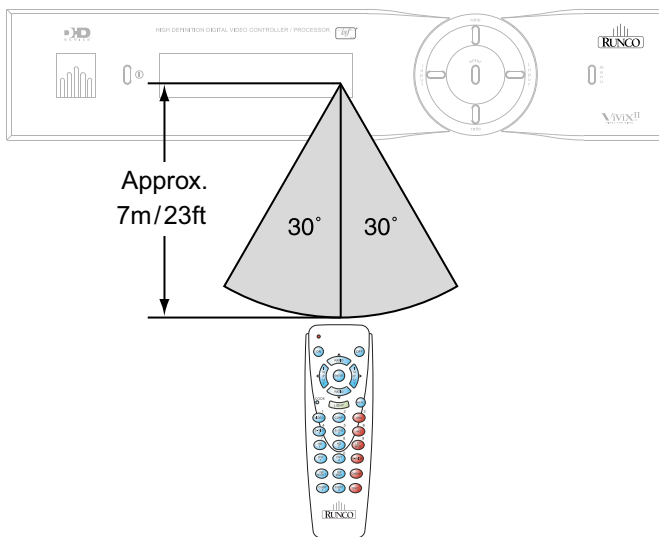


Figure 3-1. Available Range of the Remote Control

3.1 Remote Control

◀ Notes on Batteries

◀ Notes on Remote Control Operation

- Do not drop the remote control or expose it to moisture or high temperature.
- The remote control may malfunction under a fluorescent lamp. If that occurs, move the plasma display away from the fluorescent lamp.
- Make sure that there is nothing obstructing the infrared beam between the remote control and the IR receiver on the plasma display.



Note

The signal from the remote control can be reflected by walls or other surfaces.

- If the effective range of the remote control decreases, or it stops working, replace the batteries with new ones.
- Ambient conditions may possibly impede the operation of the remote control. If this happens, point the remote control at the plasma display and repeat the operation.

Table 3-1 gives a quick overview of the CX-70DHD installation process. The sections following this one provide detailed instructions.

3.2 Quick Setup



Note

Installation should be performed by a qualified custom video installation specialist.

Table 3-1. Installation Overview

Step	Procedure	For Details, refer to page...
1	Mount the CX-70DHD on a wall or table stand	19
2	Connect the DHD Controller to the CX-70DHD	21
3	Connect signal sources to the DHD Controller	23
4	Connect external controller to DHD Controller RS-232 port (optional)	28
5	Apply power to the CX-70DHD	31
6	If using the CX-70DHD with a computer, adjust computer display properties	31
7	Display calibration: adjust the following for analog inputs; save settings when finished: <ul style="list-style-type: none"> • Aspect ratio • Brightness • Contrast • Color level • Tint • Sharpness • White Balance 	35
8	Repeat Step 7 for digital inputs	46

3.3 Installation Considerations

Proper installation of your CX-70DHD will ensure the highest possible picture quality. Whether you are installing the CX-70DHD temporarily or permanently, you should take the following into account to ensure that it performs optimally.

Ambient Light ➤ In general, minimize or eliminate light sources directed at the display. Contrast ratio in your images will be noticeably reduced if light directly strikes the display, such as when a shaft of light from a window or floodlight falls on the image. Images may then appear washed out and less vibrant.

Ventilation ➤ If you are mounting the CX-70DHD in an enclosure, leave sufficient space on all sides between it and surrounding objects, as shown in Figure 3-2. This allows heat to disperse, maintaining the proper operating temperature.

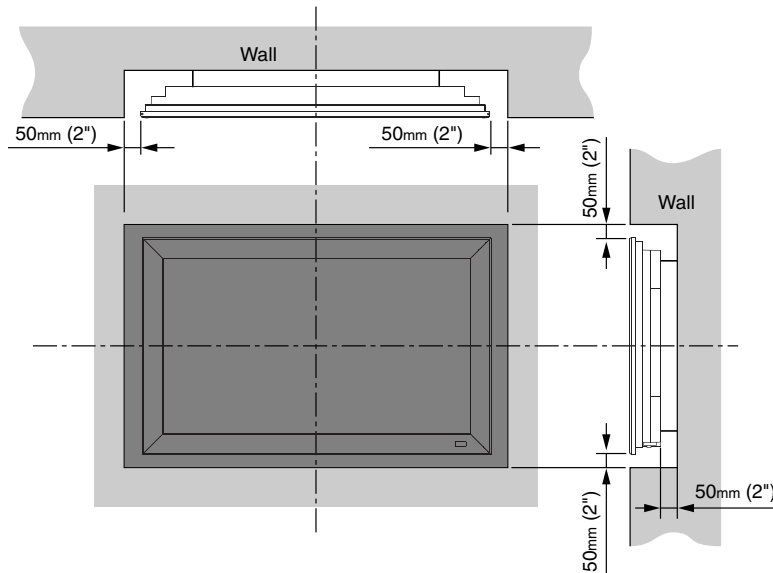


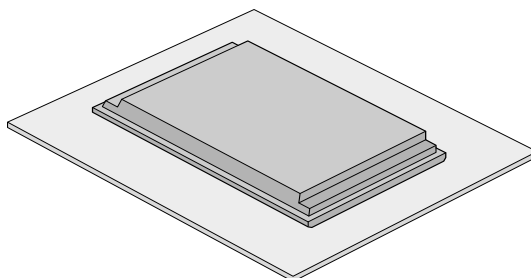
Figure 3-2. Ventilation Requirements for Enclosure Mounting

Here are some other considerations and tips that can help improve your installation, avoid damage and prolong operating life:

- Keep the ambient temperature constant and below 35°C (95°F). Keep the display away from heating and/or air conditioning vents. Changes in temperature may cause drifts in the display circuitry, which may affect performance.
- Keep the CX-70DHD away from devices that radiate electromagnetic energy such as motors and transformers. Common sources of these include slide projectors, speakers, power amplifiers and elevators.
- Handle the unit carefully when installing or carrying it. Use the built-in handles; DO NOT touch or hold the screen face.
- Set the unit away from heat, excessive dust, and direct sunlight.
- Protect the inside of the unit from liquids and small metal objects. In case of accident, unplug the power cord and have it serviced by an authorized Service Center.
- Do not hit or scratch the panel surface as this causes flaws on the surface of the screen.
- For correct installation and mounting it is strongly recommended to use a trained, authorized dealer.
- To avoid sulfurization, it is strongly recommended not to place the unit in a dressing room in a public bath or hot spring bath.

You can install the CX-70DHD either on a table or other flat surface (using the included table stand) or on a wall using the optional wall-mounting kit.

Before installing the wall mount or table stand, place the panel face down on a soft, flat surface. Place the protective sheet, which was wrapped around the panel when it was packaged, between the screen and your work surface to avoid scratching or otherwise damaging the screen surface.



◀ **Other Considerations**

◀ **Mounting the CX-70DHD on a Wall or Table Stand**

Table Stand Assembly: Figure 3-3 shows how to assemble the included table stand and attach it to the panel.

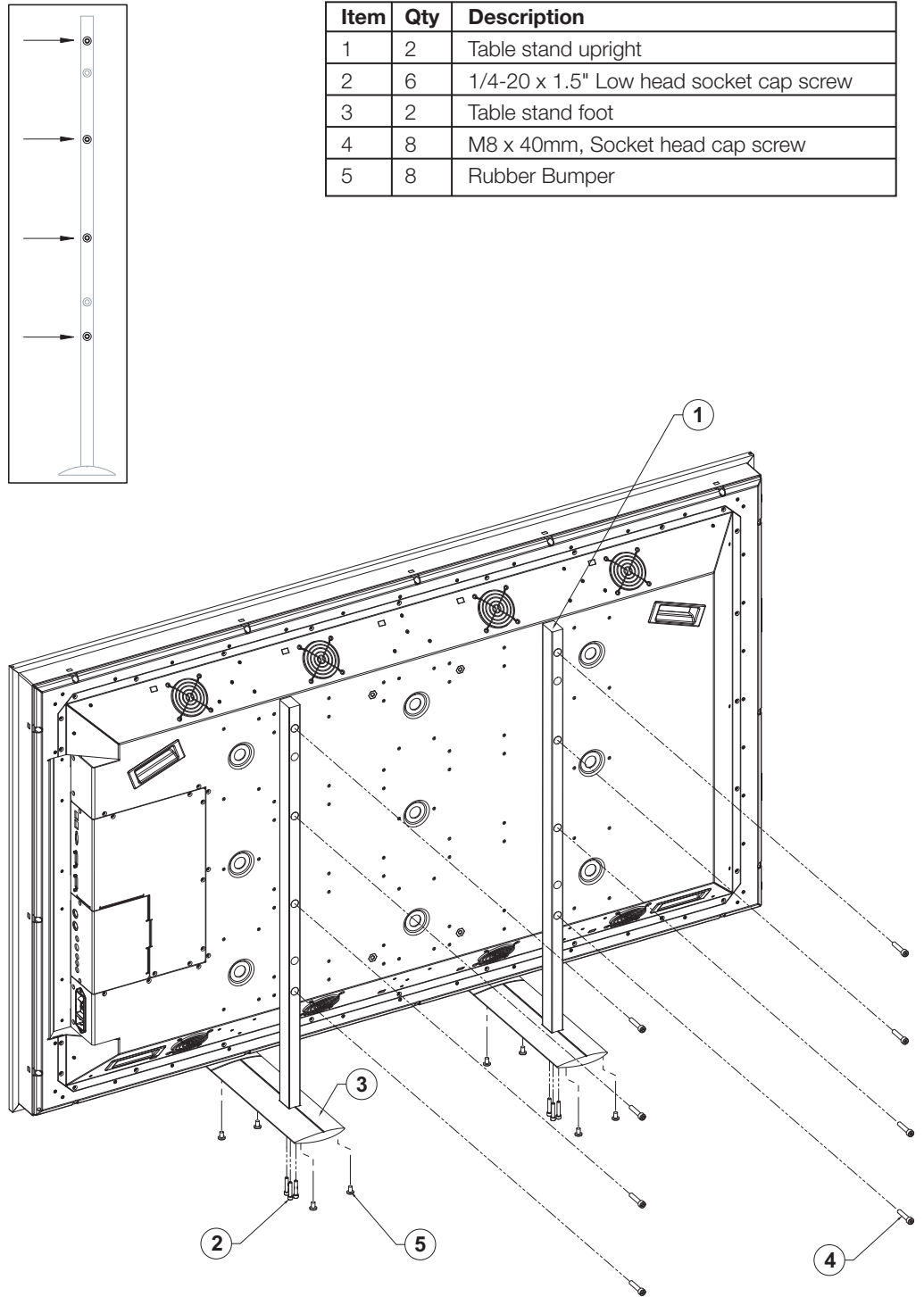


Figure 3-3. Assembling and Installing the Table Stand

If you choose to wall-mount the CX-70DHD, ensure that the wall-mount bracket is installed according to the instructions included with it. The wall must be capable of supporting a redundant weight factor five (5) times the weight of the display, or be reinforced.

Runco recommends that this be done by a custom installation specialist.



*Use only a Runco-approved wall-mount kit or table stand that is specifically designed for your display. Refer to **Parts List** on page 4 for ordering information.*

Proceed as follows to connect the CX-70DHD to the DHD Controller, your video sources, external controller(s) – if present – and AC power.

When connecting your equipment:

- Turn off all equipment before making any connections.
- Use the correct signal cables for each source.
- Ensure that the cables are securely connected. Tighten the thumbscrews on connectors that have them.

Connect the DHD Controller to the CX-70DHD as shown in Figure 3-4 and described in the sections that follow.

3.4 Connections to the CX-70DHD and DHD Controller

◀ Connecting the CX-70DHD to the DHD Controller

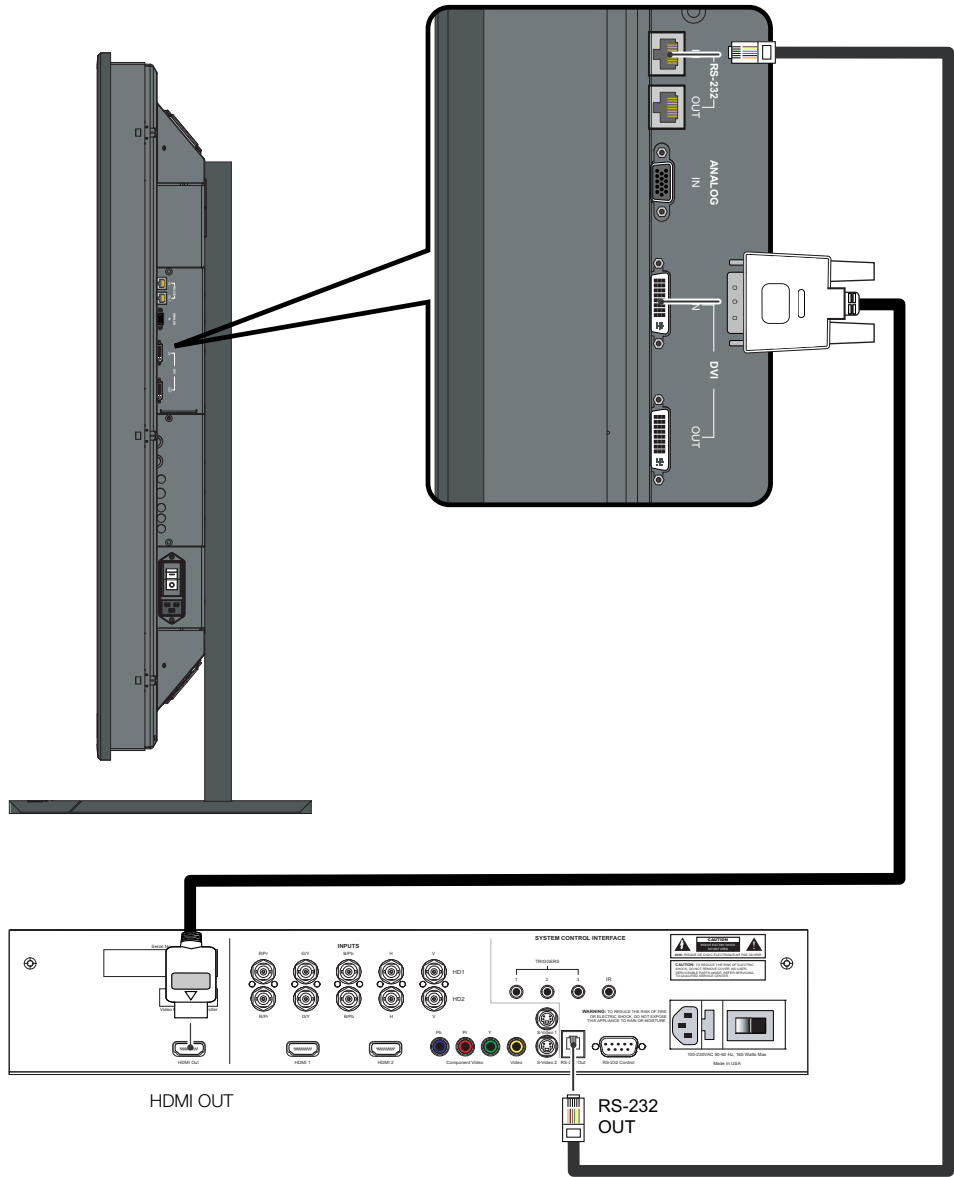
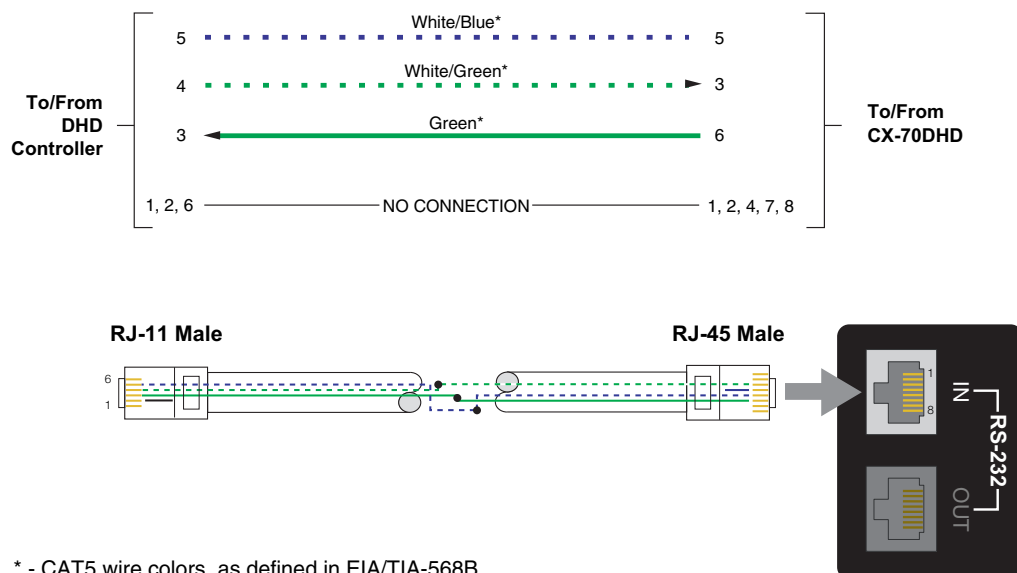


Figure 3-4. Connecting the CX-70DHD to the DHD Controller

Digital Video Connection: Connect the HDMI output from the DHD Controller to the **DVI IN** input on the CX-70DHD, using an HDMI-to-DVI cable.

RS-232 Connection: Connect the RS-232 output from the DHD Controller to the **RS-232 IN** input on the CX-70DHD. Use a cable with an RJ11 plug at the DHD Controller end and an RJ-45 plug at the CX-70DHD end. (The CX-70DHD accessory kit includes such a cable.)

If you make your own cable, it **must** be wired as shown in Figure 3-5.



* - CAT5 wire colors, as defined in EIA/TIA-568B

Figure 3-5. RS-232 Connection from the DHD Controller to the CX-70DHD

Connect your video sources to the DHD Controller as shown and described in the sections that follow.

HDMI Connections: See Figure 3-6.



Tip

Use the HDMI inputs whenever possible. This ensures the highest video quality because the signal is carried in the digital domain throughout the entire signal path, from source component output into the display.

◀ **Connecting Source Components to the DHD Controller**

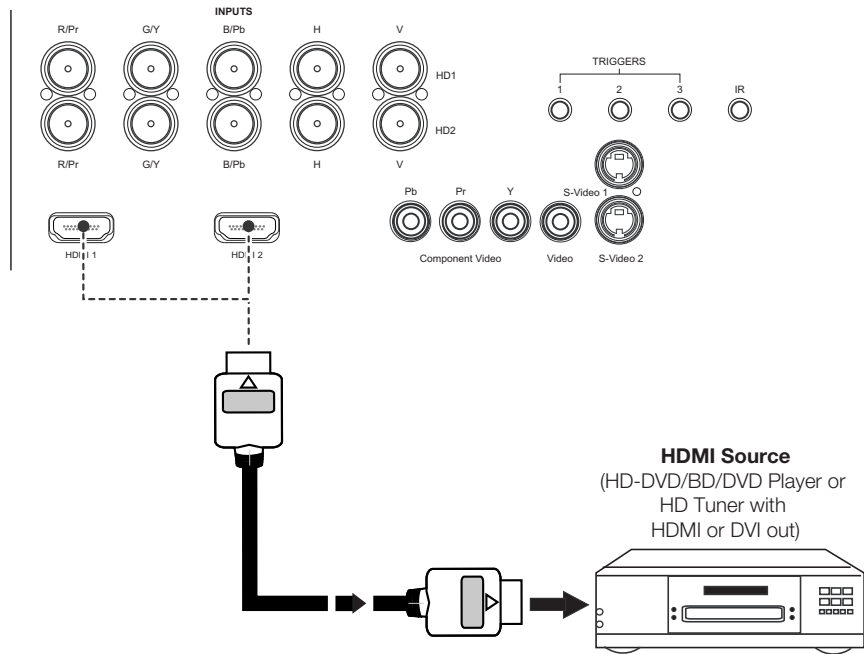


Figure 3-6. HDMI Source Connections

Digital (DTV) RGB or Component Video Connections: See Figure 3-7.

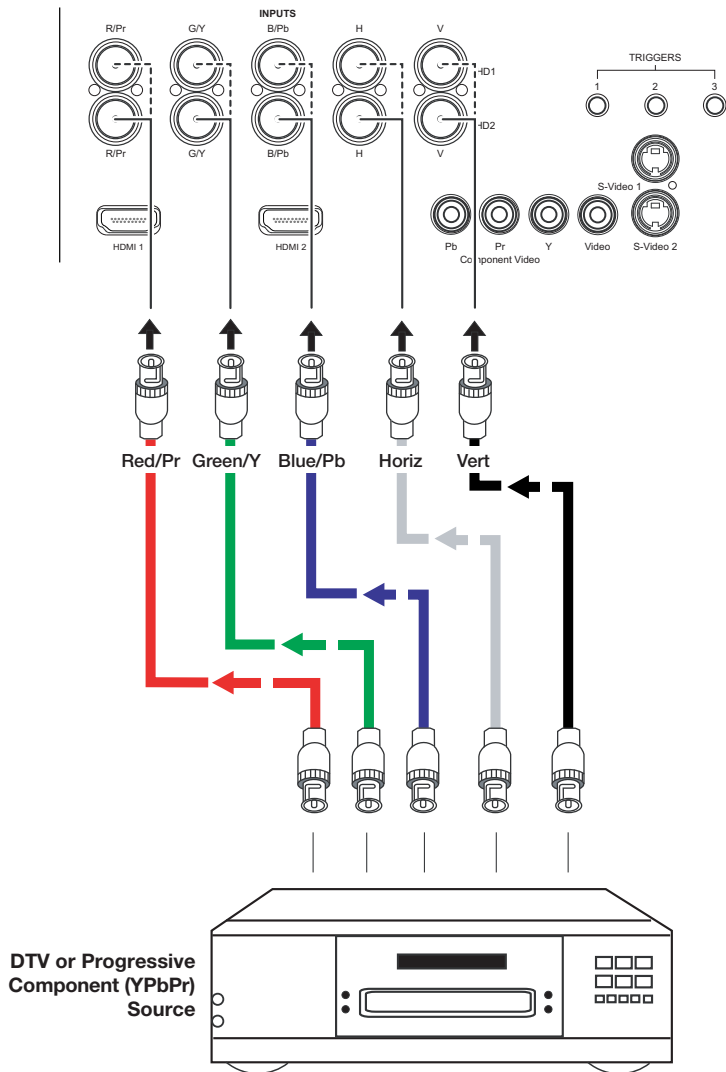


Figure 3-7. Digital (DTV) RGB or Component Video Connections

Analog (Computer) RGB Connections: See Figure 3-8.



Note

1. Refer to **Supported Timings** on page 60 for a list of computer signals compatible with the CX-70DHD. Use with signals other than those listed may cause some functions not to work.
2. Some Macintosh computers may require a Macintosh video adapter. Contact your nearest authorized service center or dealer.

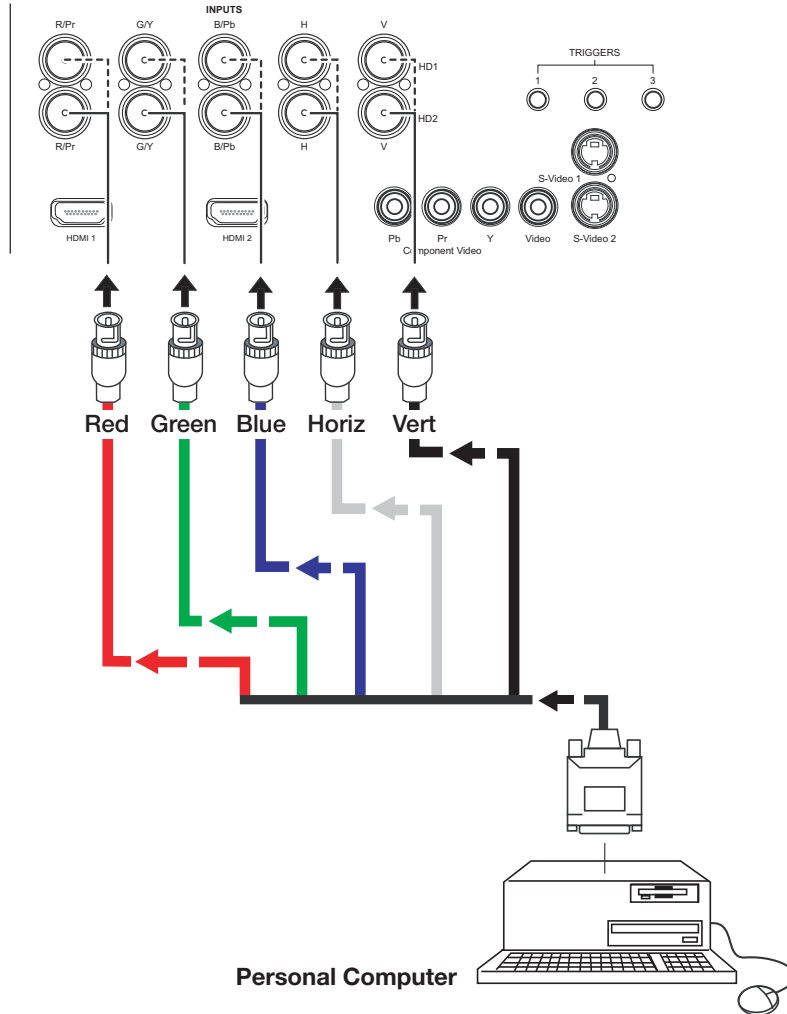


Figure 3-8. Analog RGB Connections

Composite/S-Video/Component Video Connections: See Figure 3-9.

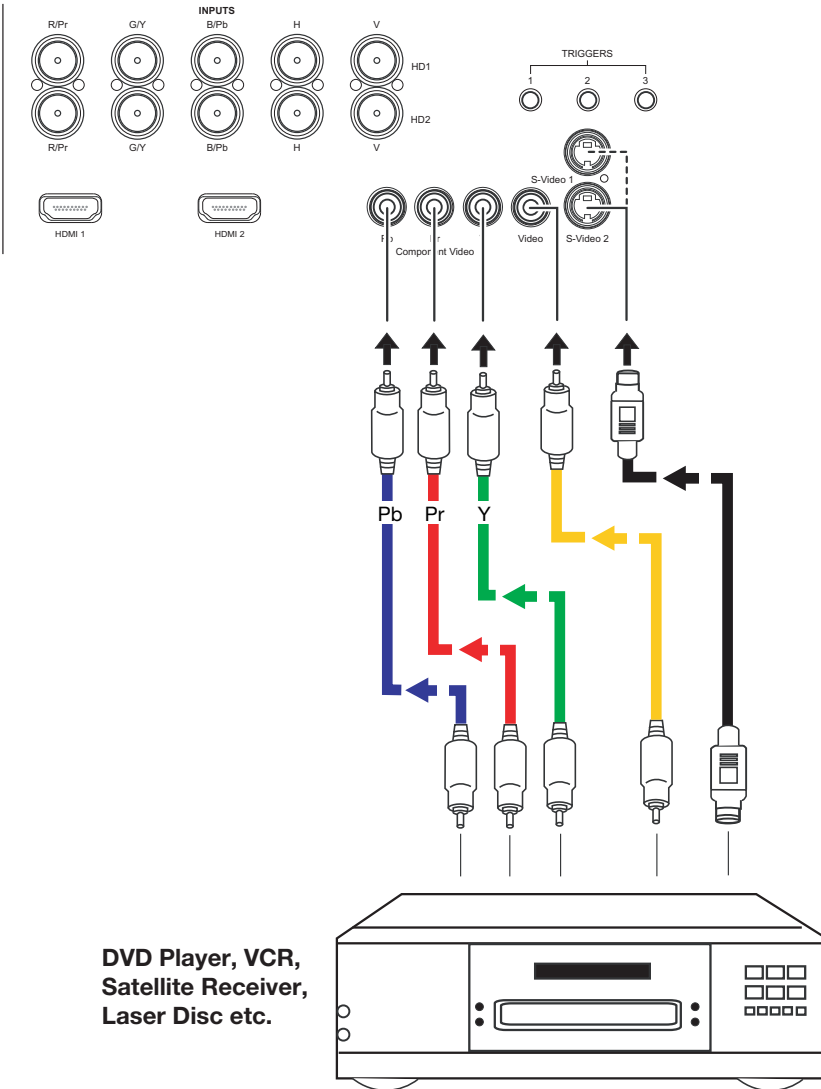


Figure 3-9. Composite, S-Video and Component Video Connections

RS-232 Controller Connection

Use a standard, 9-pin RS-232 cable to connect a PC or control/automation system (if present) to the RS-232 Control port on the DHD Controller; see Figure 3-10.

For more information about using this connection, refer to **Serial Communications** on page 51.

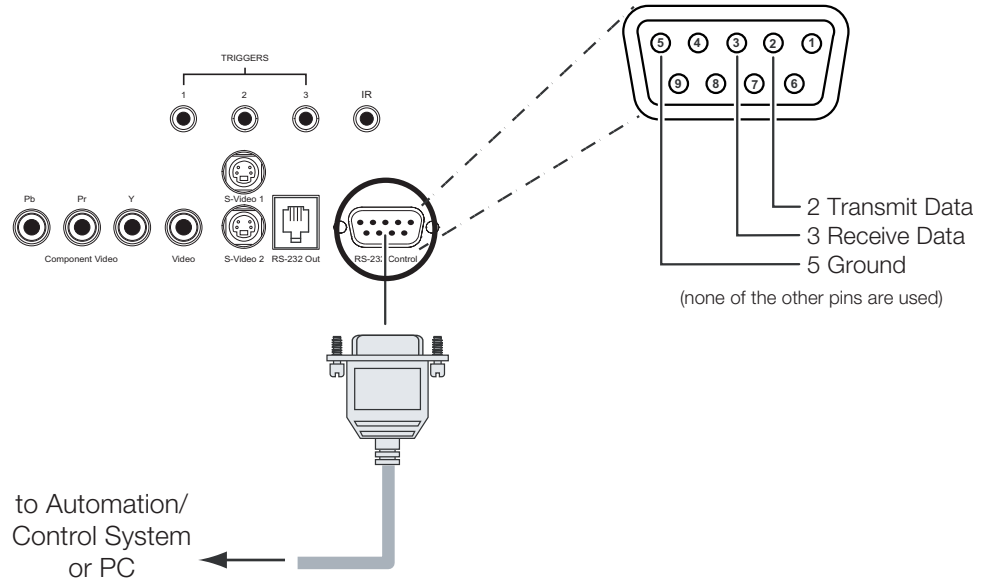


Figure 3-10. RS-232 Control System Connection

Connecting 12-Volt Trigger Outputs to External Equipment

If your installation includes equipment that responds to 12-Volt triggers, connect it to the 12-Volt trigger outputs as shown in Figure 3-11.

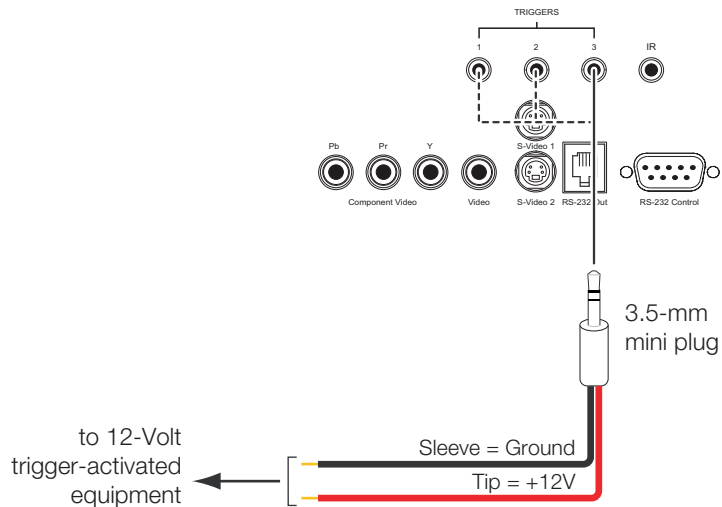


Figure 3-11. Connecting 12-Volt Trigger Outputs

If infrared signals from the remote control cannot reach the DHD Controller due to excessive distance or obstructions such as walls or cabinet doors, you can connect an external IR receiver to the DHD Controller to extend the range of the remote control. See Figure 3-12.

◀ **Connecting an External IR Receiver to the DHD Controller**

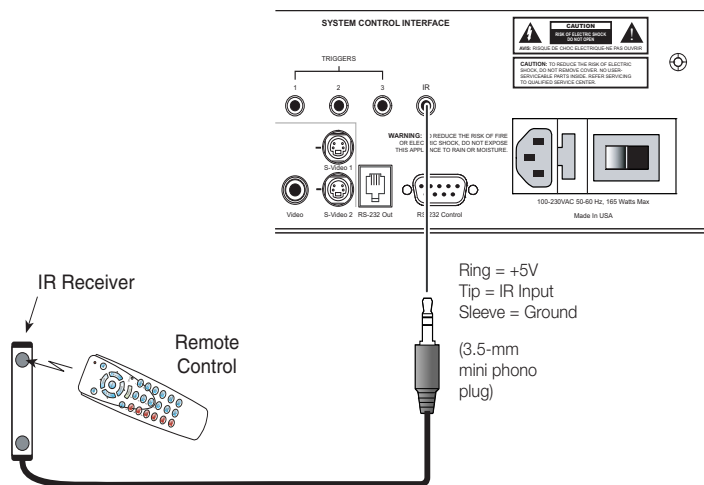


Figure 3-12. External IR Receiver Connection



Note

When an external IR receiver is connected to the wired IR input, the built-in IR sensor on the DHD Controller is disabled.

Plug the female end of the power cord into the AC receptacle on the rear of the CX-70DHD. Connect the other end to your AC power source.

◀ **Connecting AC Power**



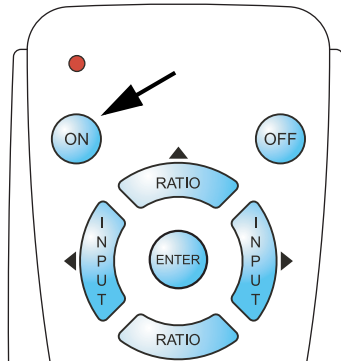
Similarly connect the DHD Controller to a nearby AC outlet.



Notes:

4. Operation

1. Turn on your source components.
2. Press the main power switch on the CX-70DHD (see Figure 2-1). The standby/on indicator lights red.
3. Set the main power switch at the rear of the DHD Controller (see Figure 2-4) to the “on” position.
4. Press the **ON** button on the remote control to turn on the DHD Controller and CX-70DHD (or press the power button on the front of the DHD Controller). The power indicator on the DHD Controller lights solid blue.
5. After a brief warm-up period, the CX-70DHD will display an image.



4.1 Turning on the Power

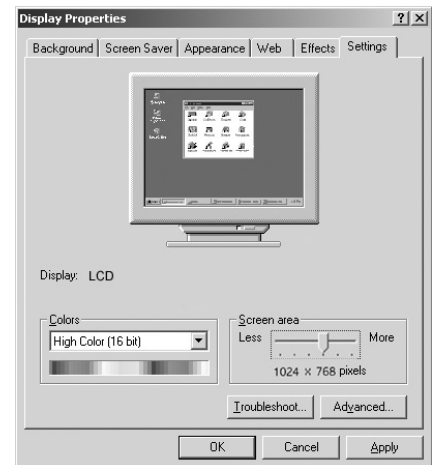
To maximize image quality when using the CX-70DHD with a personal computer, you may need to adjust the display properties of your computer's video card. To do this on a Microsoft® Windows®-based PC:

1. Choose Settings from the Windows Start Menu and click on “Control Panel.”



4.2 Setting the Computer Display Properties

2. Double click on the **Display** icon.
3. Click the **Settings** tab on the display dialog box.
4. Set the **Screen area** to 1024x768 pixels.



5. Click the **Advanced** button and click the **Monitor** tab on the dialog box. Set the **Refresh Frequency** to 60Hz and click **OK**.



Note

1. The native resolution of the CX-70DHD is 1920 x 1080. Other horizontal or vertical resolutions may be scaled upward or downward to fit the display.

2. With most computers, you can get the best picture at 1024 x 768 @ 60Hz.



WARNING

To prevent image retention (burn) on your display, **ALWAYS** use a screen saver and set it to the shortest possible time.

Press the **MENU** button on either the remote control or the DHD Controller front panel to display the Main Menu. To select a menu item, use the UP (▲) and DOWN (▼) buttons on either the remote control or the DHD Controller front panel to highlight it. Press **ENTER** to confirm your selection.

The CX-70DHD OSD menus are arranged hierarchically, as shown in Figure 4-1. Depending on the selected input source and signal characteristics, some menu options may not be available.

4.3 Using the DHD Controller Menus



Note

*When the input signal resolution is 1080i **analog** (via the HD1 or HD2 input) or lower, the menus appear both on-screen and on the front-panel display of the DHD Controller as you navigate them:*

Input Source	↑
Aspect Ratio	↓

*When the input signal resolution is 1080i **digital** or 1080p (via the HDMI1 or HDMI2 input), the menus appear on the front-panel display only.*

Input Source	Composite
	S Video 1
	S Video 2
	Component SD
	HD/RGB 1
	HD/RGB 2
	HDMI 1
HDMI 2	
Aspect Ratio	16:9
	4:3
	Letterbox
	VirtualWide
	Cinema
Picture	Brightness
	Contrast
	Color
	Tint
	Sharpness
Input Position	Left/Right
	Up/Down
	Width
	Height
	Overscan
Memory Presets	Recall ISF Night
	Recall ISF Day
	Recall or Save Custom 1
	Recall or Save Custom 2
	Reset Custom 1 and Custom 2 to Factory Default
Information (read-only)	Serial Number
	Hardware
	Firmware
	Date

Calibration (1080i analog and lower-resolution sources)	ISF Night - Display Color	Gain
		Offset
	ISF Night - Input Image	Brightness
		Contrast
		Color
		Tint
	ISF Night - Input Color	Sharpness
		Gain
		Offset
		Chroma Delay
	ISF Day - Display Color	Phase
		Noise Filter
		Gain
		Offset
	ISF Day - Input Image	Brightness
		Contrast
		Color
		Tint
	ISF Day - Input Color	Sharpness
		Gain
Offset		
Chroma Delay		
Save ISF Settings	Phase	
	Noise Filter	
	Back / Confirm	
	Left/Right	
Output Shift	Up/Down	
	Width	
	Height	
	Save	
Splash Configure	Owner Name	
	ISF Calibrated	
	ISF Other	
	Runco/ISF Logo Splash Screen Timers (2 ... 60 sec.)	
OSD Position	Vert./Horiz., Normal/Wide, Height	
Calibration (1080i digital and 1080p sources)	ISF Night - Display Image	Brightness
		Contrast
		Sharpness
		Back Light
		Red Gain, Blue Gain, Green Gain
		Red Offset, Blue Offset, Green Offset

Service	Test Video	Grey Bars 1	
		Grey Bars 2	
		Color Bars 1	
		Color Bars 2	
		Rename, Restore or Save	
	Input Names	Primary	
		Secondary	
	Remote Control		
	Analog Out Mode	RGB--, RGB++ or RGBS	
	Display Device	Display Position	Horiz. Position, Vert. Position
			Zoom Window Left/Right (H.Size.L/R)
			Zoom Window Top/Bottom (V.Size.T/B)
			Viewport Window Left/Right (H.VWPT.L/R)
	Display Image	Display Image	Viewport Window Top/Bottom (V.VWPT.T/B)
			Brightness, Contrast, Sharpness, Back Light
			Red / Blue / Green Gain
			Red / Blue / Green Offset (1080i digital and 1080p sources only)
	HD Format	HD/RGB 1	Auto, RGB or YUV
		HD/RGB 2	
		ADC Bandwidth	
YPbPr Input Resolution		Auto, 480i/p, 576i/p, 720p or 1080i	
Triggers	1 / 2 / 3 / Save		
Miscellaneous	Menu Mode		
	Timeout		
	Side Bar Color		
	Film Mode (SD src. only)		
System Reset			
Restore Saved Settings			

Figure 4-1. DHD Controller OSD Menu Structure for CX-70DHD

The Main Menu is the starting point for accessing all display functions.

(The Calibration and Service menus are hidden and not accessible until you enter a passcode.)

◀ **Main Menu**

Runco Video	
	Input Source
	Aspect Ratio
	Picture
	Input Position
	Memory Presets
	Information
	Calibration
	Service

From the Main Menu, select Input Source to choose a video signal source.

The active source is indicated by an arrow (>) to its left; in this example, Composite is the active source.

◀ **Input Source**

Input Source	
>	Composite
	S Video 1
	S Video 2
	Component SD
	HD/RGB 1
	HD/RGB 2
	HDMI 1
	HDMI 2

To change the aspect ratio (size and shape) of the projected image, select Aspect Ratio from the Main Menu and press **ENTER**. Select the appropriate aspect ratio for your screen size and the type of program material being viewed; refer to Table 4-1.

The currently-selected aspect ratio is indicated by a “☒” to its left; in this example, 16:9 is selected.

◀ **Aspect Ratio**

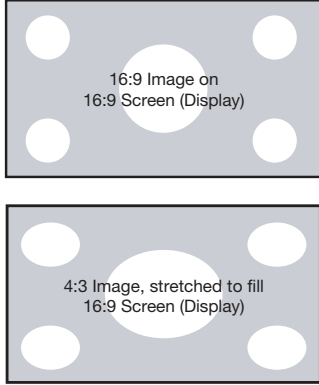
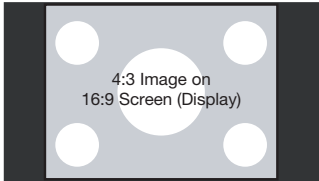


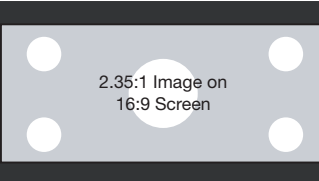
Aspect Ratio	
☒	16:9
<input type="checkbox"/>	4:3
<input type="checkbox"/>	Letterbox
<input type="checkbox"/>	VirtualWide
<input type="checkbox"/>	Cinema



Note

The aspect ratio selection is automatically saved for each input and resolution.

Table 4-1. Aspect Ratio Settings

Aspect Ratio	Remote Control Key	Description	
16:9	16:9	 <p>16:9 Image on 16:9 Screen (Display)</p> <p>4:3 Image, stretched to fill 16:9 Screen (Display)</p>	<p>Select 16:9 to view 16:9 DVDs and HDTV programs in their native aspect ratio.</p> <p>4:3 images are stretched horizontally to fit a 16:9 screen.</p>
4:3	4:3	 <p>4:3 Image on 16:9 Screen (Display)</p>	<p>4:3 scales the input signal to fit in the center of the 16:9 screen. 4:3 is the aspect ratio used by computer monitors, standard television programming and most VHS video cassettes.</p>
Letterbox	LET BOX	 <p>4:3 Image on 16:9 Display (Letterbox aspect ratio)</p>	<p>Letterbox mode scales (zooms in on) a 4:3 image linearly (by the same amount on all sides) to fill a 16:9 display. Letterbox is best suited for viewing LaserDisc movies or non-anamorphic DVDs on a 16:9 screen.</p>
VirtualWide	V-WIDE	 <p>4:3 Image on 16:9 Screen with VirtualWide</p>	<p>VirtualWide scales a 4:3 image NON-linearly (more on the sides than in the center) to fit a 16:9 screen.</p>
Cinema	CINEMA	 <p>2.35:1 Image on 16:9 Screen</p>	<p>Select Cinema to view 2.35:1 source material on a 16:9 screen. The upper and lower portions of the screen are masked, but the geometry of the active image area is not changed.</p>

Use the controls in the Picture Menu to calibrate the **analog** inputs on the CX-70DHD for optimum picture quality.

◀ **Picture**



Note

To calibrate the digital (HDMI 1 and HDMI 2) inputs, use the Display Image controls in the Service menu. For more information, refer to **Display Device** on page 46.

Picture
Brightness
Contrast
Color
Tint
Sharpness

The CX-70DHD has been designed to incorporate setup and calibration standards established by the Imaging Science Foundation (ISF). The ISF has developed carefully crafted, industry-recognized standards for optimal video performance and has implemented a training program for technicians and installers to use these standards to obtain optimal picture quality from Runco video display devices. Accordingly, Runco recommends that setup and calibration be performed by an ISF-certified installation technician.

All signal types require separate processing. Therefore, you need to calibrate each DHD Controller input separately.



Note

When you change a picture quality setting, save the change to a preset afterwards. Otherwise, the change will be lost when a different input is selected. (Picture quality settings are saved for each input separately.) For information about saving settings, refer to **Memory Presets** on page 41.

Although it may be possible to obtain satisfactory picture quality using the naked eye and regular program material, Runco recommends using the following calibration tools for best results:

- External test pattern source – Ovation Multimedia, Video Essentials or AVIA test DVD (or equivalent).
- A blue filter (provided with many test DVDs), for color level and tint adjustments.

Connect your test pattern source to the input that you are calibrating and proceed as follows. **Perform the adjustments in the order listed here.**

Brightness: On your external test pattern source, select a PLUGE pattern. (PLUGE is an acronym for “Picture Line-Up Generation Equipment.”) Figure 4-2 shows a typical PLUGE pattern.

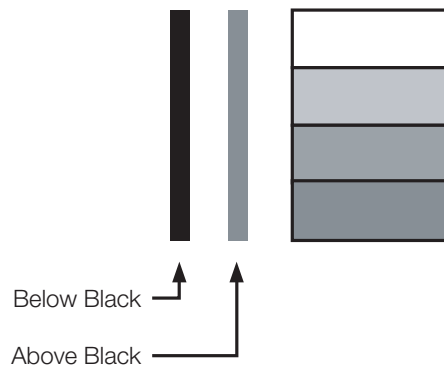


Figure 4-2. Typical PLUGE Pattern for Adjusting Brightness

PLUGE patterns vary but generally consist of some combination of black, white and gray areas against a black background. The example above includes two vertical bars and four shaded boxes.

Select Brightness from the Picture menu and press **ENTER**. Adjust the brightness so that:

- The darkest black bars disappear into the background.
- The dark gray areas are barely visible.
- The lighter gray areas are clearly visible.
- The white areas are a comfortable level of true white.
- The image contains only black, gray and white (no color).

Contrast: On your external test pattern source, select a stepped, gray-bar pattern like the one shown in Figure 4-3.



Figure 4-3. Typical Gray Bar Pattern for Adjusting Contrast

Select Contrast and press **ENTER**. Adjust the contrast to a point just below which the white rectangle starts to increase in size.



Note

Brightness and contrast controls are interactive. A change to one may require a subtle change to the other in order to achieve the optimum setting.

Color Saturation: On your external test pattern source, select a color bar pattern like the one shown in Figure 4-4.

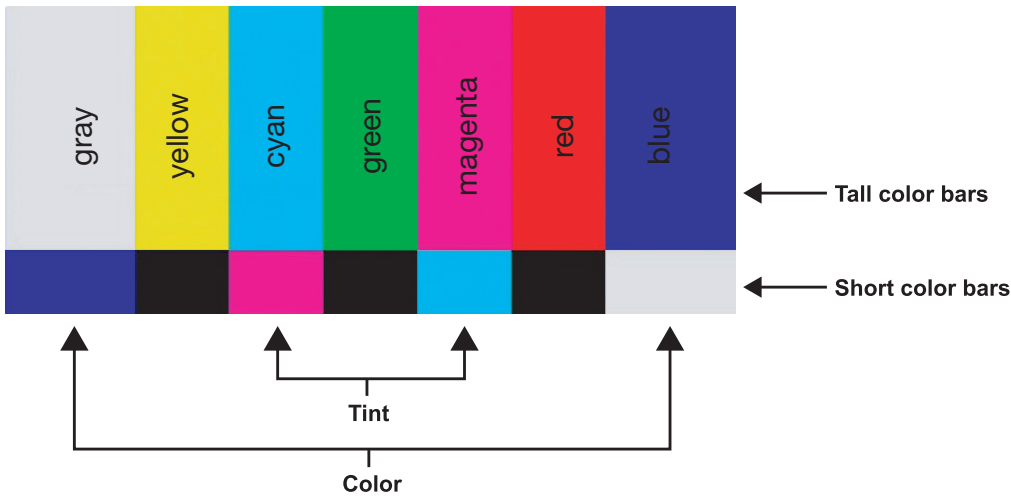
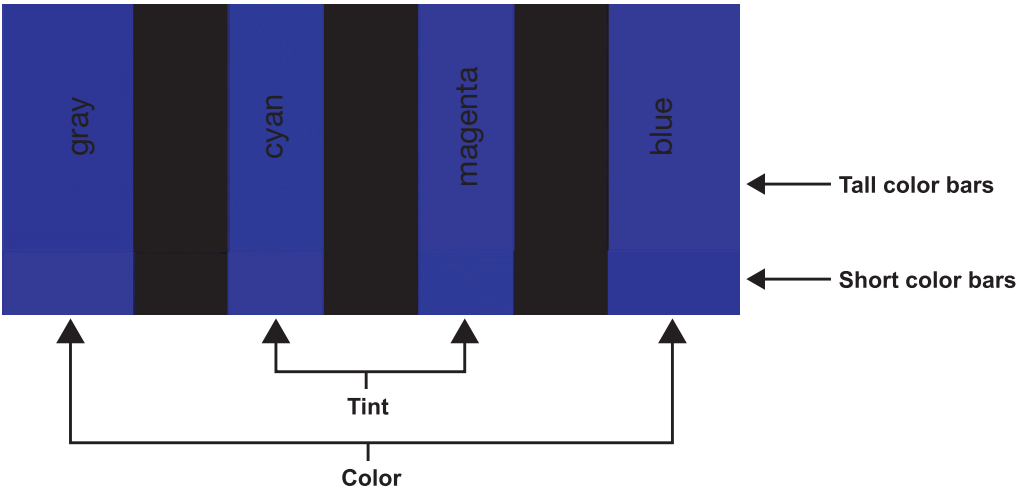


Figure 4-4. Typical Color Bar Pattern for Adjusting Color Saturation and Tint

Select Color and press **ENTER**. While looking at the color bar pattern through a blue filter, adjust the color saturation level until the outermost (gray and blue) color bars appear to be a single shade of blue:



Tint: Tint or “hue” is essentially the ratio of red to green in the color portion of the image. When tint is decreased, the image appears redder; when it is increased the image appears greener. To set the tint, select Tint and press **ENTER**. While looking at the color bar pattern through a blue filter, adjust the tint level until the cyan and magenta color bars (on either side of the green bar) appear to be a single shade of blue.



Note

Like the brightness and contrast controls, the color and tint controls are interactive. A change to one may require a subtle change to the other in order to achieve the optimum setting.

Sharpness: “Sharpness” is the amount of high-frequency detail in the image. To adjust sharpness, select Sharpness from the Picture menu and press **ENTER**. On your external test pattern source, select a pattern like the one shown in Figure 4-5. Adjust as needed, looking for white edges around the transitions from black to gray and differently-sized lines in the “sweep” patterns at the top and bottom. Lower the sharpness setting to eliminate them.

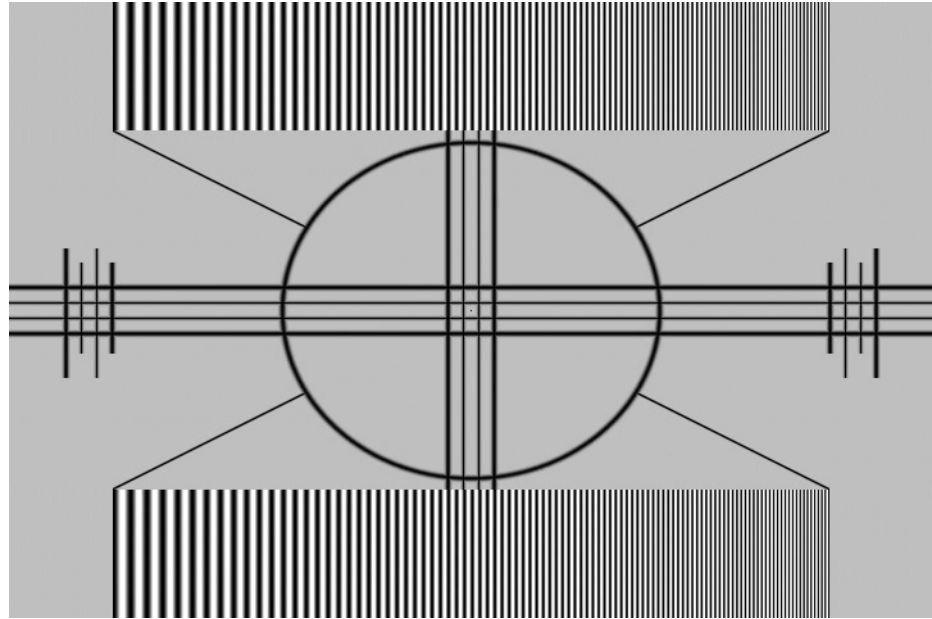


Figure 4-5. Typical Test Pattern for Adjusting Sharpness

Input Position ➤

Input Position
Left/Right
Up/Down
Width
Height
Overscan

Use the controls in the Input Position Menu to fine-tune the aspect ratio and image position for the current source.



Note

The input position settings are automatically saved for each input and resolution.

Left/Right: Select Left/Right from the Input Position menu to shift the projected image horizontally. Use the right or up cursor button to shift the image to the right; use the left or down button to shift it to the left.

Up/Down: Select Up/Down from the Input Position menu to shift the projected image vertically. Use the right or up cursor button to shift the image upward; use the left or down button to shift it downward.

Width: Select Width from the Input Position menu to change the projected image width. Use the right or up cursor button to increase the width; use the left or down button to decrease it.

Height: Select Height from the Input Position menu to change the projected image height. Use the right or up cursor button to increase the height; use the left or down button to decrease it.

Overscan: Image Overscan pushes the outside edge of the active picture area of the video signal out beyond the edge of the display area.

Some television programs are produced based on the assumption that older television sets may not display the outer edges of the broadcast picture area. Over scan effectively trims away these inactive, outer edges and enlarges the remaining portion of the image to fill the display area.

Select from 1% to 10% of Overscan, as desired.

For HDTV, DVDs and other video sources, Overscan is generally not necessary or desirable.

For each input, the CX-70DHD lets you save image quality settings as presets that you can recall at a later time. You can create up to four presets per input and resolution. Use the Memory Presets menu to recall saved image presets, or to save image settings in the “Custom 1” or “Custom 2” memory location.

The currently-selected preset is indicated by a “☒” to its left; in the example shown here, ISF Night is selected.

You should save changes to any of the following settings to a preset; otherwise they will be lost when a new input source or resolution is selected:

- Brightness
- Contrast
- Color saturation
- Tint
- Sharpness

To reset the Custom 1 and Custom 2 image presets to their factory defaults, select Factory Default and press **ENTER**.

Select Information from the Main Menu to see information that uniquely identifies your display: its serial number, the installed hardware and firmware versions and the firmware version build date. Should you ever need to contact Runco Technical Support, this information will help them answer your questions or resolve product performance issues.

◀ **Memory Presets**

Memory Presets	
<input checked="" type="checkbox"/>	ISF Night
<input type="checkbox"/>	ISF Day
<input type="checkbox"/>	Custom 1 Save
<input type="checkbox"/>	Custom 2 Save
Factory Default	

◀ **Information**

Information	
Serial Number	
Hardware	0
Firmware	0100.0A1C
Date	Jun 29 2008

Calibration ➤

Calibration
ISF Night
Display Color
Input Image
Input Color
ISF Day
Display Color
Input Image
Input Color
Save ISF Settings
Output Shift
Splash Configure
OSD Position

Use the Calibration menu to perform advanced picture quality adjustments on the **analog** inputs. **This menu should be used by ISF-certified technicians only.**



Note

To calibrate the digital (HDMI 1 and HDMI 2) inputs, use the Display Image controls in the Service menu. For more information, refer to **Display Device** on page 46.



Note

You must enter a passcode to access the Calibration menu.

To recall the ISF Night or ISF Day settings, select “ISF Night” or “ISF Day” from the ISF Presets menu (see above). Or, use the corresponding buttons on the remote control.

ISF Night - Display Color: Use the Display Color settings to adjust the color balance at the display device (as opposed to the DHD Controller) for **analog** sources (up to 1080i). These settings are saved independently for each input.

- **Gain:** Use the Gain controls to correct color imbalances in the bright areas of the image. A good way to do this is to use a test pattern consisting mostly of solid white areas, such as an 80 IRE “window” pattern. If the white areas contain traces of red, green or blue, decrease the Gain for that color.
- **Offset:** Use the Offset controls in the White Balance sub-menu to correct color imbalances in the dark areas of the image. A good way to do this is to use a test pattern consisting mostly of dark gray areas, such as a 30 IRE “window” pattern. If the gray areas contain traces of red, green or blue, decrease the Offset for that color.

ISF Night - Input Image: The Input Image controls are similar to those in the Picture menu, but are accessible only by entering the Calibration menu passcode. This makes it possible to restore the picture quality settings to what they were when the display was installed, simply by recalling the “ISF Night” preset.

ISF Night - Input Color: The Input Color controls are similar to those in the Display Color menu (see above), but adjust the color balance at the DHD Controller (as opposed to the display device). These settings are also saved independently for each input.

- **Gain/Offset:** These controls operate similarly to those in the **ISF Night - Display Color** menu (see above), but affect the Y, Pb and Pr signal components rather than the red, green and blue channels.
- **Chroma Delay:** use the Chroma Delay control to correct a mis-aligned image from a Composite, S-Video or Component video source. Chroma delay in an image causes color shifts to occur to the left of the vertical edge transitions, producing artificial shadows or a “halo” effect. If necessary, adjust this setting to eliminate them.
- **Phase:** Adjust the phase if the image (usually from an RGB source) shows shimmer or “noise.” Pixel phase adjusts the phase of the pixel sampling clock relative to the incoming signal. The effect of this control is similar to that of a tracking control on a VCR.

For best results, use a good test pattern such as a smooth gray consisting of a clear pattern of black and white pixels, or a similar “half on, half off” graphic image. (You may notice that you can stabilize the image at more than one point. Use either setting in this case.)

- **Noise Filter:** To apply noise filtering to the input signal, select Noise Filter from the Input Color menu. The Noise Filter is useful for clearing up noisy images from 480i video sources.

Use the left- or right-arrow buttons to select the desired amount of noise reduction, keeping in mind that higher settings (which reduce high frequencies) may also “soften” the image.

ISF Day - Display Color: Refer to *ISF Night - Display Color*.

ISF Day - Input Image: Refer to *ISF Night - Input Image*.

ISF Day - Input Color: Refer to *ISF Night - Input Color*.

Save ISF Settings: Whenever you make a change to the ISF settings, you should always save it. Select Save ISF Settings from the ISF Calibration menu to do this. In the event you ever have to perform a System Reset, you can restore the saved ISF settings by selecting Restore Saved Settings in the Service menu. (System Reset and Restore Saved Settings are described on page 47.)

Output Shift: The controls in the Output Shift menu are similar to those in the Input Position menu, except that they change the characteristics of the output signal. These settings are saved independently **for each aspect ratio**.

Splash Configure: Use the Splash Configure menu to customize the appearance of the start-up message that appears on the vacuum fluorescent display upon power-up.

- **Owner Name/ISF Calibrated/ISF Other:** You can have the CX-70DHD display the owner’s name, your name, the phrase “ISF Calibrated” and/or any other string, up to 20 characters in length.

Use the up or down cursor button to select a character. Use the right and left cursor buttons to change the cursor position. Press **MENU** when you have finished entering text. Then, check the “Splash Enable” box to have the CX-70DHD display the information you enter here when it is turned on.

- **Runco/ISF Logo Splash Screen Timers:** When you turn on the CX-70DHD, it projects a welcome screen with the Runco logo followed by one with the ISF logo. Select Splash Timer from the Splash Configure menu to set the amount of time that these two images appear. The range is from 2 to 60 seconds, in one-second increments.

Use the up or down cursor button to select a timer value to adjust. Use the right or left cursor button to change the timer value. Press **MENU** when you have finished configuring both timers.

OSD Position: Select OSD Position, press **ENTER** and use the arrow buttons to change the size and position of the OSD controls.

Service ➤ Use the Service menu to access advanced display configuration settings. **This menu should be used by ISF-certified technicians only.**

Service	
Test Video	
Input Names	
Remote Control	
Analog Out Mode	
Display Device	
HD Format	
Triggers	
Miscellaneous	
System Reset	
Restore Saved Settings	



Note

You must enter a passcode to access the Service menu.

Test Video: Select Test Video from the Service Menu to access the internal test patterns on the CX-70DHD. Four patterns are available, consisting of white/gray or colored bars. These are useful for calibrating other theater source components (DVD player, HD tuner etc.) that have their own picture controls.

Press **MENU** to exit test pattern mode.

Input Names	
	Restore
Composite	Composite
S-Video 1	S-Video 1
S-Video 2	S-Video 2
Component SD	Component SD
HD/RGB 1	HD/RGB 1
HD/RGB 2	HD/RGB 2
HDMI 1	HDMI 1
HDMI 2	HDMI 2
Save	

Input Names: You can give each DHD Controller input a descriptive name. For example, you may want to change the default input name to the type of source component connected to it: "VCR," "DVD," "Laptop" et cetera. Composite, S-Video and Component SD input names can be up to 12 characters long; the others can be up to eight characters long.

To edit an input name, select Input Names from the Service menu. Press ▲ or ▼ to select an input and press **ENTER**. Use the ▲ or ▼ buttons to change a character; press ◀ or ▶ to select a character to change. When you have finished editing the input name, press **MENU**.

To restore the default input name, press ▼ repeatedly to highlight that input name in the "Restore" column. Then, press **ENTER**.

To save input names so that they can be restored after a System Reset (described on page 47), press ▼ repeatedly to highlight "Save." Then, press **ENTER**.



Note

The ▼ button takes you from top to bottom in the left column, then from top to bottom in the right column. To highlight "Save," scroll through both columns.

Remote Control: The Remote Control menu shows you the primary and secondary infrared (IR) codes to which the DHD Controller will respond. By default, both are set to 17. You can change these codes if either:

- Another device in the theater (a DVD player, for example) is responding to commands from the DHD Controller remote control (Figure 2-5) in ways that are unpredictable or undesirable.
- You have multiple DHD Controllers and want to control them independently, as opposed to broadcasting commands from a single remote to all of them. In this scenario, you can use multiple remotes programmed to use different IR codes. Or, you can use a single remote and change the IR code as needed to address a specific device.



Tip

Use the DHD Controller front-panel keypad to change its IR code. Then, change the code sent by the remote to match as described below.

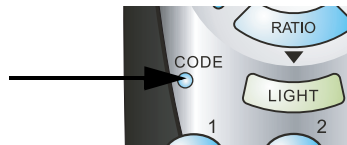


Note

Do not change the "Type" setting in this menu.

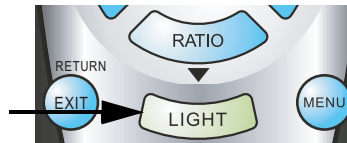
When you change a remote code on the DHD Controller, you must re-program your remote control to send that same code. To do this:

1. Using a straightened paper clip or similar object, press and hold the **CODE** button on the remote control for approximately three seconds, or until the LED on the remote lights solid red.



– OR –

If your remote control unit does not have a **CODE** button, press and hold the **LIGHT** button on the remote control for approximately three seconds, or until the LED on the remote lights solid red.



2. Enter a new two-digit code between 00 and 31 inclusive. Include a leading zero for single-digit codes; for example, enter 9 as "09."
3. The LED turns off to confirm the code change. If you enter an invalid code, the LED flashes for three or four seconds. Try again, entering a valid code.

Analog Out Mode: Select Analog Out Mode from the Service menu to change the output sync polarity from the DHD Controller. The choices are RGB-- (separate sync with negative polarity), RGB++ (separate sync with positive polarity) or RGBS (composite sync).

Display Device: The options in the Display Device menu allow you to perform the following LCD image adjustments.

- **Display Position:** Select Display Position from the Display Device menu to perform the following display device adjustments (these are global, independent of any input):
 - Select **Hpos** or **Vpos** and use the ◀ or ▶ buttons to fine-tune the displayed image position.
 - Select **H.Size.L** or **H.Size.R** and use the ◀ or ▶ buttons to fine-tune the displayed image width (horizontal zoom).
 - Select **V.Size.T** or **V.Size.B** and use the ◀ or ▶ buttons to fine-tune the displayed image height (vertical zoom).

Use the following settings to mask the edges of the display area (to eliminate “snow” or edge noise, for example). You cannot increase these values beyond 1920 pixels horizontal or 1080 pixels vertical, but you can decrease them.

- Select **H.VWPT.L** or **H.VWPT.R** and use the ◀ or ▶ buttons to apply masking to the left or right edges of the display.
- Select **V.VWPT.T** or **V.VWPT.B** and use the ◀ or ▶ buttons to apply masking to the top or bottom edges of the display.
- **Display Image:** Select Display Image from the Display Device menu to perform the following display device adjustments.
 - Brightness: refer to **Brightness** on page 37.
 - Contrast: refer to **Contrast** on page 38.
 - Sharpness: refer to **Sharpness** on page 40.
 - Back Light: The Back Light control changes the apparent brightness of the displayed image. Its effect is similar to that of a lamp intensity control on a projector. Adjust it as needed to compensate for ambient light in the viewing area.

**Note**

To extend the backlight life, use the lowest setting that makes sense for your application. This will reduce power consumption, heat output and the chances of Temporary Image Retention (TIR) from occurring, particularly at higher altitudes.

- Red/Green/Blue Gain (1080i digital and 1080p sources only): refer to **Calibration** on page 42.
- Red/Green/Blue Offset (1080i digital and 1080p sources only): refer to **Calibration** on page 42.

**Note**

The CX-70DHD stores any changes you make to these settings in the currently-selected ISF preset (ISF Day or ISF Night). After calibrating the display for one ISF preset, save your settings, select the other ISF preset and repeat the process.

HD Format: If the characteristics of the incoming signal on the HD1 or HD2 inputs are known, select HD Format from the Service menu and set them as described below. Doing so can reduce the time it takes the DHD Controller to switch from HD to 480i signals or vice versa.

This is generally not necessary unless the DHD Controller – for whatever reason – has difficulty determining the color space (RGB or YUV), bandwidth or resolution of the incoming HD signal. In most situations, the **Auto** settings work well.

- **HD/RGB 1 and HD/RGB 2 (Color Space):** Select Auto, RGB or YUV.
- **ADC Bandwidth:** Select Auto, 75 MHz, 150 MHz or 300 MHz.
- **YPbPr Input Resolution:** Select Auto or specify the input resolution, if known: 480i, 480p, 576i, 576p, 720p or 1080i.

Triggers: Select Triggers from the Service menu to configure the 12-volt trigger outputs. You can assign one or more trigger outputs to each aspect ratio. Those triggers are then activated by selecting that aspect ratio.

To save the trigger settings so that they can be restored after a System Reset (described below), press ▼ repeatedly to highlight “Save.” Then, press **ENTER**.

Miscellaneous: Select Miscellaneous from the Service menu to set the following options:

- **Menu Mode:** This is the manner in which the OSD menus appear and disappear when you press **MENU**. Choose one of the following:
 - 0 = No transition; menus abruptly appear and disappear.
 - 1 = Menus fade in and out.
 - 2 = “Checkerboard” dissolve; menus appear and disappear in sections.
 - 3 = “Window shade” effect; menus are drawn on a diagonal from top left to bottom right, and retract in the opposite direction.
- **Timeout - Short/Long:** These settings control how long the OSD menus stay on screen. Select a time-out period of from 2 to 60 seconds.
- **Side Bar Color:** This controls the color of the inactive image area. The range is from -100 (black) to 100 (white).

The inactive image area is on either side of the active image area when using the Standard 4:3 aspect ratio (or the entire screen when no incoming video signal is present).

- **Film Mode:** Enable Film Mode to smooth out moving images from interlaced, standard-definition (SD) sources. In most cases, the CX-70DHD detects the proper “pull-down” rate and vertical frequency. However, if your source is jittery and/or tearing you may wish to enable Film Mode to ensure stable processing for that source.

System Reset: To reset ALL DHD Controller settings (including image settings) back to their factory defaults, choose System Reset from the Service menu.

A confirmation message appears, reminding you to save your settings before you perform the reset, so that you can restore them afterwards. If you have done this, select Confirm to continue with the reset. Otherwise, click Back to cancel.



Caution

This action is not undoable. Proceed with caution! Before you perform a System Reset, save ALL settings, including “Custom” ISF Presets (page 41), ISF Day/Night presets (page 41), Output Shift settings (page 43), Input Names (page 44) and Trigger settings (page 47).

Restore Saved Settings: Following a System Reset, select Restore Saved Settings to apply all previously-saved settings to the CX-70DHD and DHD Controller.

Notes:

5. Maintenance and Troubleshooting

Regular cleaning will extend the life and performance of the CX-70DHD. Before cleaning, be sure to unplug the power cord from the power outlet.

Do not under any circumstances use solvents such as benzene or thinner to clean the CX-70DHD. Doing so may cause deterioration or peeling of paint from the display or remote control unit.

Wipe the display and remote control gently with a soft cloth. In the case of excessive dirt buildup, dampen a soft cloth with a diluted neutral cleaning detergent and after wringing the cloth thoroughly, wipe the component and then dry it with a dry soft cloth.

After dusting, wipe the screen gently using the supplied cleaning cloth or another soft cloth (cotton, flannel etc.). Do not use tissue or a rough cloth. The screen surface is easily scratched; do not rub it or hit it with a hard object.

If you clean the surface of the screen with a wet cloth, water droplets on the surface may enter into the product and cause a malfunction.

As a general rule, use a vacuum cleaner about once a month to clean the vents on the rear panel of the display of dust buildup (set the vacuum cleaner to its weakest setting when doing this). If not removed, accumulated dust can cause the internal temperature to increase, resulting in possible breakdown or fire.

Table 5-1 provides some general guidelines for troubleshooting problems you may encounter with the CX-70DHD. If the suggested solutions fail to resolve the problem or if you encounter an issue not described here, please contact your Runco dealer or Runco Technical Support.

Table 5-1. Troubleshooting Chart

Symptom	Possible Cause(s)	Solution
The display does not turn on after initial installation.	<ul style="list-style-type: none">The CX-70DHD is not plugged in or the AC outlet is not active.The DHD Controller is not plugged in or the AC outlet is not active.The remote control batteries have run out.The serial connection from the DHD Controller to the CX-70DHD is incorrect.	<ul style="list-style-type: none">Ensure that the CX-70DHD is plugged in and that the AC outlet is active.Ensure that the DHD Controller is plugged in and that the AC outlet is active.Replace the batteries.Ensure that the RS-232 output from the DHD Controller is properly connected to the RS-232C input on the CX-70DHD (see Figure 3-4 or Figure 3-5).

5.1 Cleaning

◀ Cleaning the Display Panel Body and Remote Control

◀ Cleaning the Screen

◀ Cleaning the Vents

5.2 Troubleshooting Tips

Table 5-1. Troubleshooting Chart (continued)

Symptom	Possible Cause(s)	Solution
The CX-70DHD and DHD Controller are both on, but there is no picture and on-screen menus do not appear.	<ul style="list-style-type: none"> Faulty or incorrect video connection between the DHD Controller and the CX-70DHD. 	<ul style="list-style-type: none"> Ensure that the HDMI output from the DHD Controller is properly connected to the DVI IN input on the CX-70DHD (see Figure 3-4).
The display is on and menus appear, but there is no picture.	<ul style="list-style-type: none"> Incorrect source selection. Source component is not turned on. Source component is connected incorrectly or not at all. 	<ul style="list-style-type: none"> Select the correct source. Turn on the source component. Check connections from source component to DHD Controller.
Image is too bright and/or lacks definition in the bright areas of the image.	<ul style="list-style-type: none"> Contrast is set too high. 	<ul style="list-style-type: none"> Lower the contrast setting.
Image appears “washed out” and/or dark areas appear too bright.	<ul style="list-style-type: none"> Brightness is set too high. 	<ul style="list-style-type: none"> Lower the brightness setting.
Colors in the image are swapped; for example, reds appear blue or vice versa.	<ul style="list-style-type: none"> The Red/Pr, Green/Y or Blue/Pb outputs from the source are connected to the wrong inputs on the DHD Controller. 	<ul style="list-style-type: none"> Ensure that the source outputs are connected to the correct DHD Controller input.
RGB-HD images appear “noisy.”	<ul style="list-style-type: none"> Clock and Phase settings need adjustment. 	<ul style="list-style-type: none"> Adjust Clock and Phase settings (refer to ISF Night - Input Color on page 42).
Computer images do not display correctly.	<ul style="list-style-type: none"> The resolution and frequency of the video card in the computer are not compatible with the CX-70DHD. 	<ul style="list-style-type: none"> Select a compatible resolution and vertical frequency (refer to Supported Timings on page 60).
The image is too large or too small.	<ul style="list-style-type: none"> Image size needs adjusting. 	<ul style="list-style-type: none"> Adjust the image size (refer to Input Position on page 40 or Display Device - Display Position on page 46).

6. Serial Communications

To interface the CX-70DHD with an automation/control system or a PC running terminal emulation software, connect it to the RS-232 output of the DHD Controller as shown in Figure 3-5. Connect your control system or PC to the RS-232 input of the DHD Controller as shown in Figure 3-10.

Configure the RS-232 controller or PC serial port as follows: no parity, eight (8) data bits, one (1) stop bit and no flow control. Set the baud rate to 19200, to match that of the DHD Controller RS-232 port.

Serial commands to the DHD Controller take the following form:

- Commands are not case-sensitive.
- For a single command that takes no parameters, type the command followed by a carriage return; for example, to set the aspect ratio to Letterbox, type `LETTERBOX <Enter>`.
- For a single command that takes a parameter, type the command, a space or a comma and the desired value followed by a carriage return; for example, to set the brightness to -10, type `BRIGHTNESS -10 <Enter>` or `BRIGHTNESS,-10 <Enter>`.
- You can also send a string of multiple commands on a single line, separated by commas. For example, `COMPOSITE,BRIGHTNESS 100,16:9<Enter>` switches to the Composite video input, sets the brightness to 100 and sets the aspect ratio to 16:9. Command strings can be up to 255 characters long.



Note

Avoid combining the `ON` or `POWER 1` commands with other commands on a single line. After sending `ON` or `POWER 1`, allow at least five (5) seconds for the DHD Controller to power up. If you have enabled the ISF splash screen (refer to **Splash Configure** on page 43), allow 15 seconds for the DHD Controller to power up.

Once it does, it will accept and properly execute multiple serial commands.

6.1 RS-232 Connection and Port Configuration

6.2 Serial Command Syntax

Table 6-1 lists the RS-232 command set. The “Parameter (min/max)” column shows the valid parameter ranges, or “NA” for commands that take no parameters.

When you enter a valid command, the DHD Controller executes it and acknowledges it with a plus sign on the command line (+ >). When you enter an invalid command – one that is misspelled or followed by values outside the valid range for that command – the DHD Controller ignores it and returns a minus sign (- >).

Table 6-1. Serial Commands

Command	Parameter (min/max)	Value Stored?	Description
Power On/Off Commands			
OFF	NA	NA	Turns system off
ON	NA	NA	Turns system on
POWER	0/1	NA	Turns system on or off (toggles on/off state)
POWER?	NA	NA	Returns power status
Input Selection Commands			
COMPONENT	NA	YES	Selects the Component input
COMPOSITE	NA	YES	Selects the Composite video input
HDMI1	NA	YES	Selects the HDMI 1 input
HDMI2	NA	YES	Selects the HDMI 2 input
HD1	NA	YES	Selects the RGB HD 1 input
HD2	NA	YES	Selects the RGB HD 2 input
INPUT?	NA	NA	Returns active input
SVIDEO1	NA	YES	Selects the S-Video 1 input
SVIDEO2	NA	YES	Selects the S-Video 2 input
Aspect Ratio Commands (not available on HDMI 1 or HDMI 2 inputs)			
16:9	NA	YES	Selects the 16:9 aspect ratio
ASPECT?	NA	NA	Returns current aspect ratio
CINEMA	NA	YES	Selects the Cinema aspect ratio
LETTERBOX	NA	YES	Selects the Letterbox aspect ratio
4:3	NA	YES	Selects the 4:3 aspect ratio
VIRTUALWIDE	NA	YES	Selects the VirtualWide aspect ratio

Table 6-1. Serial Commands (continued)

Command	Parameter (min/max)	Value Stored?	Description
Picture Adjust Commands (not available on HDMI 1 or HDMI 2 inputs)			
BRIGHTNESS	-100/100	YES	Sets a value for brightness
BRIGHTNESS?	NA	NA	Returns brightness setting value
CHROMADELAY	-12/12	YES	Sets a value for input color chroma delay
CHROMADELAY?	NA	NA	Returns input color chroma delay setting
COLOR	-100/100	YES	Sets a value for color
COLOR?	NA	NA	Returns color setting value
CONTRAST	-100/100	YES	Sets a value for contrast
CONTRAST?	NA	NA	Returns contrast setting value
FILMMODE	0/1	YES	Sets Film Mode off (0) or on (1)
FILMMODE?	NA	NA	Returns Film Mode setting (0 = off; 1 = on)
FILTER	0/15	YES	Sets a value for input color noise filter
FILTER?	NA	NA	Returns input color noise filter setting
PHASE	0/3	YES	Adjusts phase
PHASE?	NA	NA	Returns phase setting value
SHARPNESS	-6/6	YES	Sets a value for sharpness
SHARPNESS?	NA	NA	Returns sharpness setting value
TINT	-100/100	YES	Sets a value for tint
TINT?	NA	NA	Returns tint setting value
Memory Preset Commands			
CUSTOM1	NA	YES	Loads "Custom 1" image preset
CUSTOM2	NA	YES	Loads "Custom 2" image preset
PRESET?	NA	NA	Returns currently-selected preset (ISF Day, ISF Night, Custom 1 or Custom 2)
DAY	NA	YES	Loads "ISF Day" image preset
NIGHT	NA	YES	Loads "ISF Night" image preset

Table 6-1. Serial Commands (continued)

Command	Parameter (min/max)	Value Stored?	Description
Input Position Commands (not available on HDMI 1 or HDMI 2 inputs)			
IHEIGHT	-100/100	YES	Sets the value for input height
IHEIGHT?	NA	NA	Returns input height value
IHPOS	-100/100	YES	Sets a value for horizontal input position
IHPOS?	NA	NA	Returns input horizontal position value
IVPOS	-100/100	YES	Sets a value for vertical input position
IVPOS?	NA	NA	Returns input vertical position value
IWIDTH	-100/100	YES	Sets the value for input width
IWIDTH?	NA	NA	Returns input horizontal width value
OVERSCAN	0/10	YES	Sets the overscan percentage
OVERSCAN?	NA	NA	Returns overscan percentage
Output Shift Commands (not available on HDMI 1 or HDMI 2 inputs)			
OHEIGHT	-100/100	YES	Sets the value for output height
OHEIGHT?	NA	NA	Returns output height value
OHPOS	-100/100	YES	Sets the value for output horizontal position
OHPOS?	NA	NA	Returns output horizontal position value
OVPOS	-100/100	YES	Sets the value for output vertical position
OVPOS?	NA	NA	Returns output vertical position value
OWIDTH	-100/100	YES	Sets the value for output width
OWIDTH?	NA	NA	Returns output horizontal width value

Table 6-1. Serial Commands (continued)

Command	Parameter (min/max)	Value Stored?	Description
Miscellaneous Commands (not available on HDMI 1 or HDMI 2 inputs)			
BKGND	-100/100	YES	Sets the background color for 4:3 aspect ratio (-100 = black; 100 = white)
BKGND?	NA	NA	Returns background setting value
DATE?	NA	NA	Returns product manufacture date
HDINPUTRES	NA	YES	Sets YPbPr input resolution and refresh rate for HD1/HD2, as follows: 0 = 480i 1 = 480p 2 = 576i 3 = 576p 4 = 720p / 60 Hz 5 = 1080i / 60 Hz 6 = 720p / 50 Hz 7 = 1080i / 25 Hz Any other value = Auto
HWVER?	NA	NA	Returns hardware version number
INRES?	NA	NA	Returns input resolution
Miscellaneous Commands (available on all inputs)			
SWVER?	NA	NA	Returns software version number
TRIGGER	1/3	YES	Assigns trigger to currently-selected aspect ratio

Table 6-1. Serial Commands (continued)

Command	Parameter (min/max)	Value Stored?	Description
The following serial commands are meant to emulate buttons on the remote control or DHD Controller front panel. Each button has its own serial command, so effectively it is as if you were using the IR remote only you'll be doing so via serial commands. These commands provide active OSD responses just like the IR remote.			
DOWN	NA	NA	Down-Arrow (▼) key
ENTER	NA	NA	ENTER key
LEFT	NA	NA	Left-Arrow (◀) key
MENU	NA	NA	MENU
RIGHT	NA	NA	Right-Arrow (▶) key
UP	NA	NA	Up-Arrow (▲) key

7. Specifications

Table 7-1 lists the CX-70DHD specifications.

Table 7-1. CX-70DHD Specifications

Native Resolution:	1920 x 1080
Screen Size (Active Area):	61.00 in. W x 34.31 in. H (1549.4 x 871.6 mm) 70 in. (1778.0 mm) diagonal
Screen Aspect Ratio:	16:9
Available Aspect Ratios:	Refer to Table 7-2
DTV Compatibility:	480p, 720p, 1080i, 1080p
Response Time:	13 milliseconds, maximum
Contrast Ratio:	1,500:1, nominal
Data/Graphics Compatibility (DVI-D input):	VGA, SVGA, XGA, SXGA, UXGA (compressed) Horiz. scan frequency = 31.5 to 91.1 kHz Vert. scan frequency = 50 to 120 Hz Pixel clock frequency = 25 to 165 MHz
Inputs (from DHD Controller):	(1) Digital Video (DVI-D) with HDCP (1) RS-232 (8-pin, RJ-45 female)
Power Requirements:	100 to 240 VAC, 50/60Hz (auto-switching)
Current:	6.5 Amps at 115 VAC; 3.25 Amps at 230 VAC
Power Consumption:	750 watts (2559.7 BTUs/hour), maximum
Operating Environment:	32°F to 95°F (0°C to 35°C); 20% to 80% humidity (non-condensing) Altitude = up to 6,561 feet (2,000m)
Dimensions:	See Figure 7-1
Weight (panel only, without stand):	158.0 lbs. (71.7 kg)
Limited Warranty:	One (1) year parts and labor from the date of delivery to the end user.
Regulatory Approvals:	FCC 47 CFR Part 15 Class A EN55022/CISPR 22 EN55024 EN60950 UL60950 ICES-003

7.1 CX-70DHD Specifications

Specifications are subject to change without notice.

7.2 DHD Controller Specifications

Table 7-2 lists the DHD Controller specifications.

Table 7-2. DHD Controller Specifications

Aspect Ratios:	4:3, Letterbox, 16:9, VirtualWide, Cinema
Video Standards:	NTSC, PAL
Inputs:	(1) Composite (2) S-Video (1) Component (2) HD-R (Pr), G (Y), B (Pb), H, V (2) HDMI with HDCP
Outputs:	HDMI with HDCP
Control Options:	<ul style="list-style-type: none"> - Discrete infrared remote - Serial commands via RS-232 - Front-panel controls
RS-232 Communication Parameters:	19200 bps, no parity, 8 data bits, 1 stop bit, no flow control
Trigger Outputs:	(3) +12 VDC, each rated at 750 mA and thermal fuse-protected
Bandwidth:	150 Mega Samples per Second (MSPS)
Power Requirements:	100 to 240 VAC (auto-sensing), 50/60 Hz, 160 Watts
Operating Environment:	41°F to 95°F (5°C to 35°C), 0% to 90% humidity (non-condensing)
Dimensions:	Width = 17.50 inches (444.5 mm) Depth = 11.19 inches (284.1 mm) Height = 3.75 inches (95.3 mm)
Weight:	13.0 lbs. (5.90 kg)
Regulatory Approvals:	Complies with FCC, CE C-Tick
Limited Warranty:	Two (2) years parts and labor from the date of delivery to the end user.
Specifications are subject to change without notice.	

Figure 7-1 shows the CX-70DHD dimensions (all dimensions are in inches).

7.3 CX-70DHD Dimensions

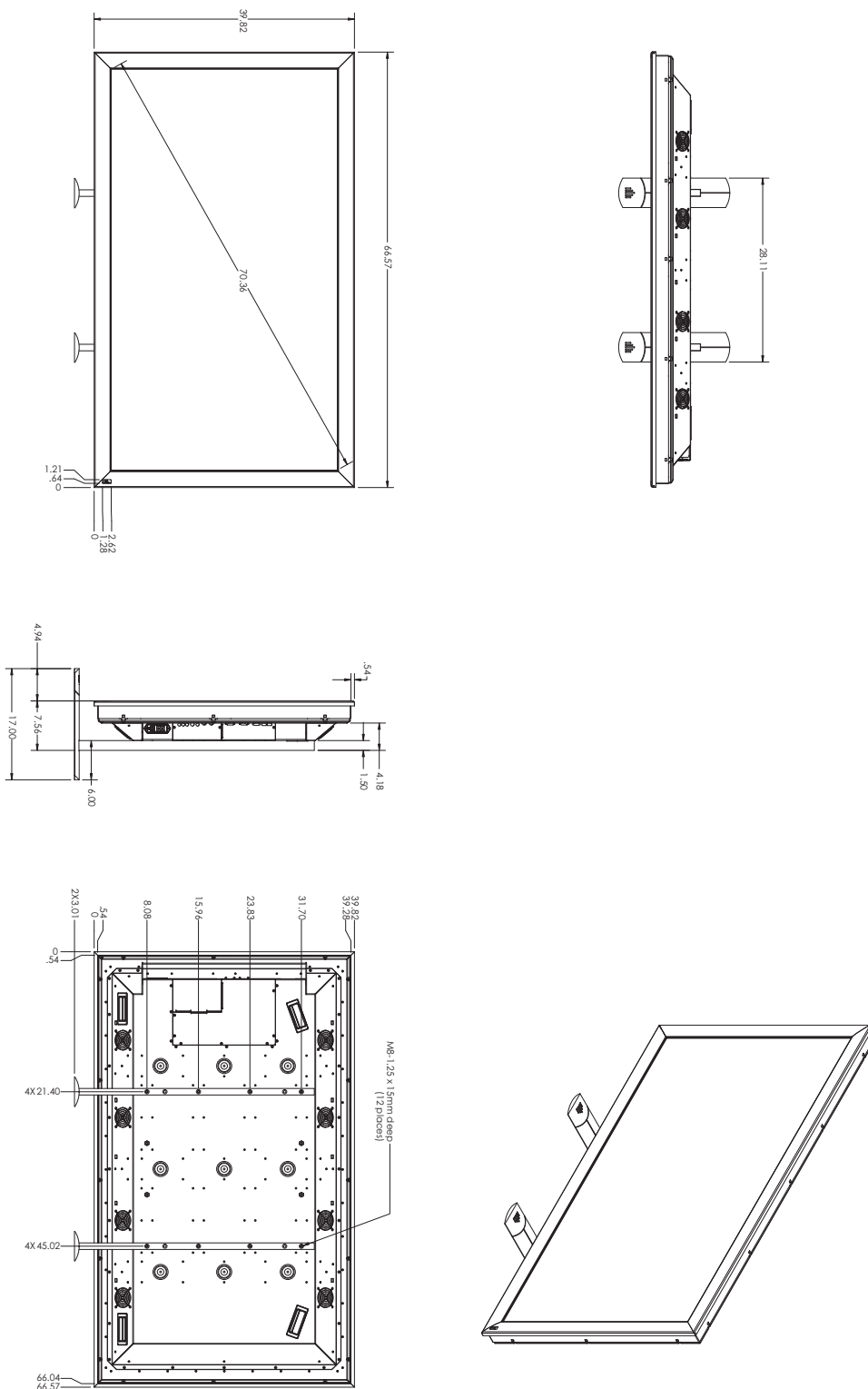


Figure 7-1. CX-70DHD Dimensions (with Table Stand)

7.4 Supported Timings

Table 7-3 lists the signal types supported by each input on the DHD Controller.

Table 7-3. Supported Signal Timings by Input

Format	Resolution	Refresh Rate (Hz)	Horizontal Frequency (kHz)	Pixel Frequency (MHz)	Supported? (√ = Yes, – = No)				
					HD/RGB 1 HD/RGB 2	HDMI 1 HDMI 2	Component	S-Video 1 S-Video 2	Video
640x480	640x480	60.00	31.469	25.175	√	–	–	–	–
		72.00	37.861	31.500	√	–	–	–	–
		75.00	37.500	31.500	√	–	–	–	–
		85.00	43.269	36.000	√	–	–	–	–
800x600	800x600	56.00	35.156	36.000	√	–	–	–	–
		60.00	37.879	40.000	√	√	–	–	–
		72.00	48.077	50.000	√	√	–	–	–
		75.00	46.875	49.500	–	√	–	–	–
		85.00	53.674	56.250	√	√	–	–	–
1024x768	1024x768	60.00	48.363	65.000	√	√	–	–	–
		70.00	56.476	75.000	√	√	–	–	–
		75.00	60.023	78.750	√	–	–	–	–
1280x1024	1280x1024	60.00	63.981	108.000	√	–	–	–	–
1920x1080	1920x1080	60.00	74.038	154.000	–	√	–	–	–
480/60i	720x487	59.94	15.734	13.500	√	–	√	√	√
480/60p	720x483	59.94	31.469	27.000	√	√	–	–	–
576/50i	720x576	50.00	15.625	14.750	√	–	√	√	√
576/50p	720x576	50.00	31.250	29.000	√	√	–	–	–
720/50p	1280x720	50.00	37.500	75.250	√	√	–	–	–
720/60p	1280x720	60.00	45.000	74.250	√	√	–	–	–
1080/50i	1920x1080	50.00	28.125/31.250	74.250/72.000	√	√	–	–	–
1080/60i	1920x1080	59.94/60.00	33.716/33.750	74.175/74.250	√	√	–	–	–
1080/24p	1920x1080	23.98/24.00	26.978/27.000	74.175/74.250	–	√	–	–	–
1080/50p	1920x1080	50.00	56.250	148.500	–	√	–	–	–
1080/60p	1920x1080	59.94/60.00	67.433/67.500	148.350/148.500	–	√	–	–	–
NTSC 3.58	–	59.94/60.00	15.734/15.750	3.580	√	–	√	√	√
NTSC 4.43	–	59.94/60.00	15.734/15.750	4.430	√	–	√	√	√
PAL-B/G	–	50.00	15.625	4.430	√	–	√	√	√
PAL-M	–	59.94/60.00	15.734/15.750	3.580	√	–	√	√	√

Table 7-3. Supported Signal Timings by Input (continued)

Format	Resolution	Refresh Rate (Hz)	Horizontal Frequency (kHz)	Pixel Frequency (MHz)	Supported? (√ = Yes, – = No)				
					HD/RGB 1 HD/RGB 2	HDMI 1 HDMI 2	Component	S-Video 1 S-Video 2	Video
PAL-N	–	50.00	15.625	3.580	√	–	√	√	√
PAL-60	–	59.94/60.00	15.734/15.750	4.430	√	–	√	√	√

Notes:



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