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ROSEN AVIATION

Blu-ray DVD Player with SDI

Technical Manual

Model 0602-002

Document Number: 105880 Rev C

***Technical Manual, 0602-002, Blu-ray DVD Player* with SDI**

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1. INTRODUCTION

Rosen's Blu-ray DVD Player with SDI, model 0602-002, accepts content from high-definition Blu-ray™ discs, standard-definition DVDs, and audio CDs. Various video and audio output configurations are available for connecting to displays and sound systems.

This manual provides general instructions about how to install the Blu-ray DVD player with SDI and configure it with your aircraft's entertainment system.

1.1. Additional System Equipment

1.1.1. IR Remote

The Blu-ray DVD player includes a 5V @100mA output to power an external IR receiver, and an internal IR receiver. A universal remote control (sold separately) enables remote inputs with the Blu-ray DVD player and adjusts the on-screen display (OSD) settings:

- Universal color display remote control – contact Rosen Sales for P/N availability

1.1.2. Connector Kits

Rosen recommends using the following connector kits (sold separately):

- Main Interface connector kit—5W5 female, 44 HD female (P/N **0300-038**)
- SDI/CVBS/SPDIF connector kit—5W5 female (P/N **0300-040**)
- Component/RGB, digital HDMI/DVI connector kit (P/N **0300-029**)

1.1.3. System Documentation

Documentation for the Rosen Blu-ray DVD Player with SDI, including the *Outline and Installation Drawing* (P/N **0602-002-CD**), is available on the Rosen Aviation website at www.rosenaviation.com. Please contact Technical Support at 541.342.3802 if you cannot find the information you need.

2. SYSTEM DIAGRAMS

The following system diagrams show various configurations of audio and video connections. Audio line-level control is available through the OSD.

Figure 1 shows two composite analog video outputs and a DVI/HDMI output.

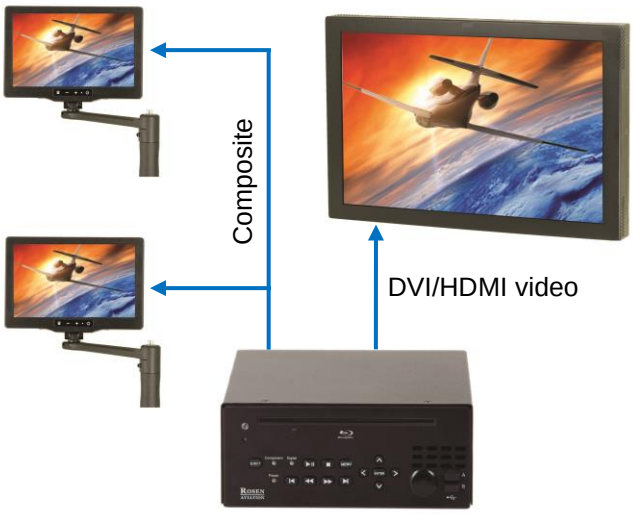


Figure 1 HDMI video system

Figure 2 shows an SDI system with two SDI outputs and SPDIF digital audio outputs configurable to 5.1 or stereo.

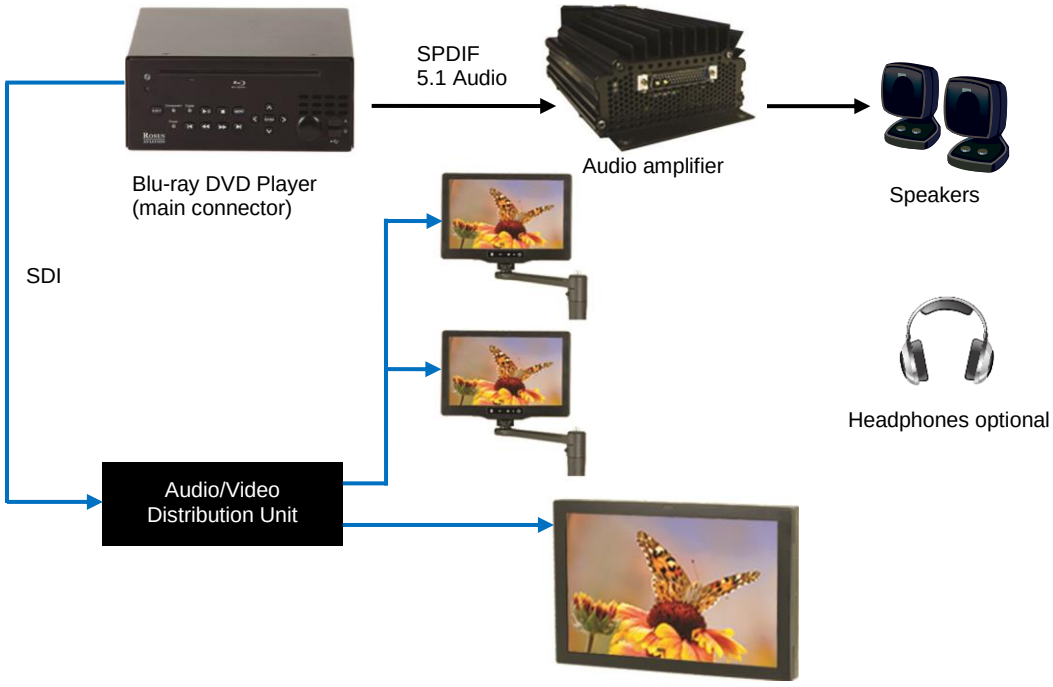


Figure 2 SDI video system

Figure 3 shows the Blu-ray DVD player for 7.1 analog audio output configurable to 5.1, 2.1 or stereo.

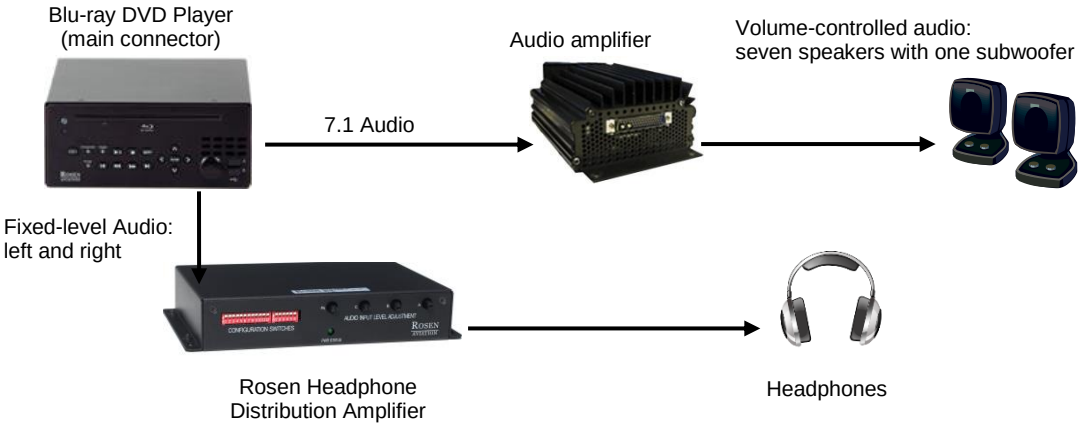


Figure 3 Audio system example for 7.1 audio

3. INSTALLATION GUIDELINES

The Blu-ray DVD player can play discs in a horizontal or vertical orientation, which allows the unit to mount in either orientation.

Outline and Installation drawings are available to assist in the installation process. Pay close attention to the dimensions when considering installation requirements.

Mount the Blu-ray DVD player with a minimum of four #8-32 screws. The following figures show the mounting option dimensions. Remove the #8-32 screws from either side, or use the threaded holes in the bottom surface as mounting points.

- Side mount–left and right (six screws; three screws per side) minimum two opposing outer holes per side is required
- Bottom-surface mount (minimum of four screws)
- Grounding port uses a #10-32 3/8” screw (not provided)
- Maximum mounting screw depth is .312”

NOTICE Do not exceed the .312” mounting screw depth for mounting orientations or damage to the player will occur!

(Dimensions are in inches)

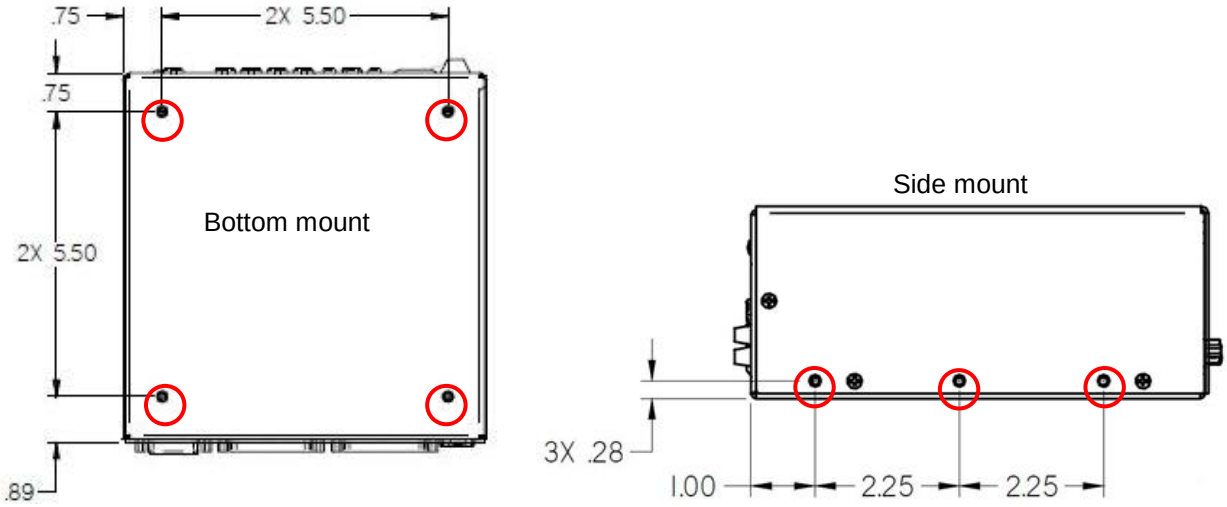


Figure 4 Dimensions for bottom and side mounting

3.1. Cooling and Ventilation

Do not block the rear vent holes. Maintain a minimum clearance of ½ inch to the front and rear of the player for ventilation, and a minimum of 6.6 square inches of venting area if you are mounting the unit in a cabinet.

4. INDICATORS, CONTROLS, AND CONNECTIONS

Figure 5 Rosen Blu-ray DVD Player front case for model 0602-002 (with SDI)

4.1. Front Case

4.1.1. Button Controls

MENU	Accesses a disc's menu.
►II	Pauses, plays, or resumes play on a disc.
I◄	Skips to the previous chapter on a disc.
◄◄	Activates the fast-reverse on a disc.
►I	Skips to the next chapter on a disc.
►►	Activates the fast-forward on a disc.
Λ, **V**, **<**, **>**	Helps navigate up, down, left, and right in the OSD and disc menus.
ENTER	Selects a menu option when navigating the OSD and disc menus.
■	Stops the movie and opens the OSD Main Menu. When the ■ button is pressed once, press the ►II button to resume the movie from where it was stopped. (Some discs do not allow the resume feature.) If you press the ■ button twice, press the ►II button to start the movie back at the beginning.
EJECT	Ejects a disc. Although it is not required, we recommend that you remove the disc before powering off the player.

Note: The Blu-ray DVD player's default setting is Auto Play.

4.1.2. LED Indicators

The front panel has three LEDs: Power, SDI, and HDMI. The Power LED indicates the general status of the Blu-ray DVD Player, and the video LEDs will light up whenever the player is on and there is an active video input connection.

The following table describes the LED functionality.

Table 1 LED indicators and conditions

Condition	Power	SDI	HDMI
Power On, no over temp	GREEN	OFF	OFF
Power On with over temp	RED	OFF	OFF
HDMI Video Connection	GREEN or RED	OFF	BLUE
No HDMI Video Connection	GREEN or RED	BLUE	OFF
No video connection	GREEN or RED	OFF	OFF
Front panel change	Three flashing GREEN	N/C	N/C

4.1.3. USB Service Inputs

Use the USB inputs A & B to update the Blu-ray disc player firmware. Firmware instructs the player how to operate. Much like a computer, Blu-ray players occasionally need an update to support the latest features.

Rosen provides firmware updates to help guarantee high-quality performance of your Blu-ray DVD player. There are several ways to view the firmware installed on the unit:

- Issue an About command from the RS-232 or RS-485
- Using the universal remote control, press the **Info** button
- Using the unit's front panel, press the following key sequence:
  Λ, **V**, **<**, **>**, **Λ**, **V**, **<**, **>**, **<**, **<**, **<**

When necessary, firmware updates and update instructions are available on the Rosen Aviation web site at www.rosenaviation.com.

4.1.4. Reset

Beneath the internal IR receiver is a recessed button used to reset the player, as shown above in Figure 5.

4.1.5. Ethernet

An Ethernet connector on the rear panel provides BD-Live functionality and requires an airborne Internet communication system.

5. INPUTS AND OUTPUTS

Inputs that control the Blu-ray DVD player can come from the unit's front panel, a universal IR remote, or via a cabin management system using RS-232 or RS-485.

5.1. Control Inputs / Outputs

- RS-485 (see Section 5.4.2, RS-485, on page 14)

- RS-232 (see Section 5.4.3, RS-232, on page 14)
- IR Remote Input (see Section 5.4.1, IR Control, on page 13)
- Cabin Brief / Pause Input

  The Cabin Brief / Pause option can be controlled by a switch or by the cabin entertainment system. The Blu-ray DVD player stays in Pause while the cabin briefing pause input is held low.
- Status Output

  Status output is normally open. The status output connects to ground when the player is in error mode, such as over-temperature.

5.2. Audio/Video Outputs

The following outputs are available on the Blu-ray DVD Play with SDI.

- Two scrambled 3G HD-SDI outputs
  To display the SDI video from the Blu-ray DVD Player, a Rosen monitor or Audio Video Distribution System capable of unscrambling the signal is required.
- Two CVBS (Composite) Out
  1 Vpp into 75 ohms. NTSC or PAL.
- One Component (YPbPr) Out
  Y: 1 Vpp into 75 ohms, YPr/Pb: 0.7 Vpp into 75 ohms.
- DVI/HDMI Out
  TMDS with HDCP. Digital video and up to 7.1 digital audio.
- Stereo analog Audio Out (fixed volume)
  2V RMS, adjustable volume. (Fixed volume adjustment may cause brief video glitch while command is set.)
- 7.1 Analog Audio Out (volume controlled)
  2V RMS, user adjustable volume. Audio delay is adjustable for lip-sync.
- SPDIF Digital Audio Out
  Coaxial

5.3. Video Output

Video output on the Dual Blu-ray depends on the disc type and the video connections. Both digital (DVI/HDMI) and Component video outputs are affected.

Analog Sunset*

As a part of Rosen's ongoing efforts to comply with all laws, regulations, and license agreements, Rosen's Blu-Ray players will no longer support Analog outputs, which include Composite and Component outputs, while playing Blu-Ray movies. The Composite and Component outputs will function, however, while playing a standard DVD.

NOTICE SDI will not output if HDMI is plugged in.

The following tables list the formats output by the different video combinations.

Table 2 Blu-ray discs output these formats with 3G HD-SDI video connected

Display Resolution Setting	3G HD-SDI	Component	Composite
480i/576i	480i/576i	Not Supported*	Not Supported*
720p	720p60/50	Not Supported*	Not Supported*
1080i	1080i30/25	Not Supported*	Not Supported*
1080p	1080p60/50	Not Supported*	Not Supported*
1080p film	1080p24/25	Not Supported*	Not Supported*
HDMI Auto	1080i30/25	Not Supported*	Not Supported*

Table3 Blu-ray discs output these formats with DVI/HDMI video connected

Display Resolution Setting	HDMI	Component	Composite
480i/576i	480i/576i	Not Supported*	Not Supported*
720p	720p60/50	Not Supported*	Not Supported*
1080i	1080i30/25	Not Supported*	Not Supported*
1080p	1080p60/50	Not Supported*	Not Supported*
1080p film	1080p24/25	Not Supported*	Not Supported*
HDMI Auto	Auto	Not Supported*	Not Supported*

Table 4 Standard DVDs output these formats with 3G HD-SDI video connected

Display Resolution Setting	3G HD-SDI	Component	Composite
480i/576i	480i/576i	480i/576i	480i/576i
720p	720p60/50	480i/576i	480i/576i
1080i	1080i30/25	480i/576i	480i/576i
1080p	1080p60/50	480i/576i	480i/576i
1080p film	1080p24/25	480i/576i	480i/576i
HDMI Auto	1080i30/25	480i/576i	480i/576i

Table 5 Standard DVDs output these formats with DVI/HDMI video connected

Display Resolution Setting	HDMI	Component	Composite
480i/576i	480i/576i	480i/576i	480i/576i
720p	720p60/50	480i/576i	480i/576i

1080i	1080i30/25	480i/576i	480i/576i
1080p	1080p60/50	480i/576i	480i/576i
1080p film	1080p24/25	480i/576i	480i/576i
HDMI Auto	1080i30/25	480i/576i	480i/576i

5.4. Blu-ray DVD Control Setup

Individual control for up to eight Rosen Blu-ray DVD players is possible. Control options include IR, RS-485, and RS-232.

5.4.1. IR Control

Rosen's Blu-ray DVD player can be controlled using one of several of Rosen Aviation's pre-programmed remote controls. Visit www.rosenaviation.com for details.

Some Rosen IR remote controls have configuration files available that allow separate control for several Blu-ray DVD players. Such controls require a unique network address for each Blu-ray DVD player.

Rosen Blu-ray DVD players have eight optional network addresses (20-27). The default network address is 20. Complete the following to change the default network address.

1. Supply power to the Blu-ray DVD player and ensure that there is no disc inserted.
2. The sequences shown below define how to establish the eight possible network addresses. Perform the sequences by pressing the front panel buttons.
   Note: Perform this sequence only when there is no disc in the player!

Table 6 Key sequences for setting RS-485 network addresses

RS-485 Address	Corresponding Remote Control Source	Required Key Sequence
20	Blu-ray 1	Λ, V, <, >, Λ, V, <, >, <, <, <
21	Blu-ray 2	Λ, V, <, >, Λ, V, <, >, <, <, ►II
22	Blu-ray 3	Λ, V, <, >, Λ, V, <, >, <, <, ■
23	Blu-ray 4	Λ, V, <, >, Λ, V, <, >, <, <, MENU
24	Blu-ray 5	Λ, V, <, >, Λ, V, <, >, <, <, I◄
25	Blu-ray 6	Λ, V, <, >, Λ, V, <, >, <, <, Λ
26	Blu-ray 7	Λ, V, <, >, Λ, V, <, >, <, <, V
27	Blu-ray 8	Λ, V, <, >, Λ, V, <, >, <, <, ►I

Note: The power status LED blinks at the end of the sequence to verify the setting. For example, if you enter the RS-485 address 22 sequence, the power status LED will blink three times at completion of sequence to verify that the setting was accepted.

NOTICE If you choose to restore defaults, the network address will automatically reset to 20. Restore defaults must be done with no disc in the player.

5.4.2. RS-485

Rosen's Blu-ray DVD players can be controlled with RS-485. For a copy of the *RS-485 Network Message Definitions* document (P/N **9002933**), please contact Rosen Aviation Technical Support at 541.342.3802.

Please note that Rosen Aviation equipment is not specifically designed to operate as part of a network with other manufacturers' equipment unless the other equipment meets the requirements defined in this document.

RS-485 Network Address Selection:

For the purposes of controlling multiple Blu-ray units from a single cabin management system or button panel, each device must be assigned a unique address on the RS-485 network.

To avoid adding switches to the back panel of the unit, we use a front panel key sequence to select a network address for each unit. This is only necessary for installations in which multiple Blu-ray units will be addressed on the same RS-485 bus. The Blu-ray mechanism must be unloaded (no disc inserted) for the device to acknowledge the key sequences. This changes both the Device ID for the IR as well as the RS-485 network address.

Key sequences for selecting RS-485 network addresses are identical to the sequences shown for IR Control, in Section 5.4.1, on page 13.

5.4.3. RS-232

Rosen's Blu-ray DVD players can also be controlled with RS-232. For a copy of the *RS-232 External Controller Message Definitions* (P/N **9002934**), please contact Rosen Aviation Technical Support at 541.342.3802.

5.4.4. Communication Protocol

- 9600 baud
- 8 data bits
- 1 stop bit
- no parity

5.4.5. Restore Factory Defaults

A Factory Reset sets all options on the unit back as it shipped from the factory. There are four ways to complete a Factory Reset to restore the defaults:

1. Using the following front panel key sequence:

   Λ, **V**, **<**, **>**, **Λ**, **V**, **<**, **>**, **V**, **V**, **V**

2. With an IR remote through the OSD Main Menu, select **Settings→System→Restore Factory Defaults**.
3. With the RS-485 Factory Reset command using serial messaging.
4. With the RS-232 Factory Reset command using serial messaging.

5.5. Changing DVD and Blu-ray Regions

The default DVD region code is set to Region 1, and the Blu-ray region is set to A. There are four alternate DVD region changes available. Whichever region you select on the fourth change, you can only play discs from the last region set. You cannot change DVD regions again.

If you insert a DVD from an invalid region into the drive, you will see the following screen.

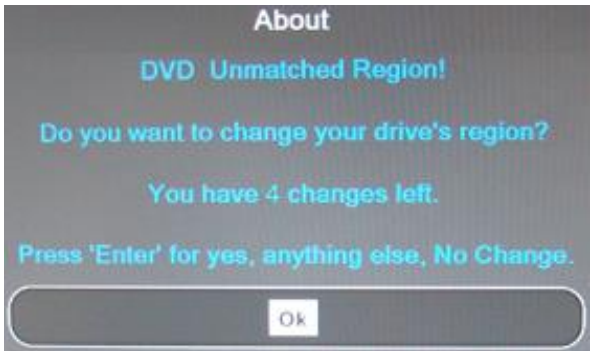


Figure 6 Invalid DVD region notification

1. To change the drive's region code, press **ENTER** for Ok and follow the onscreen instructions; otherwise, press any key to close the screen and select a different DVD.
2. Press **ENTER** when you see the next About screen, as shown below.

Figure 7 Instructions to change a DVD region

3. Re-insert the DVD to play and press **ENTER** for Ok.

The unit allows an unlimited number of Blu-ray region changes (A, B, or C) without affecting the DVD region or remaining number of region changes on the player. To change the Blu-ray region, use a universal remote control or an RS-232 or RS-485 controller. After you change Blu-ray regions with the remote, a notice screen, similar to the one below, will display.

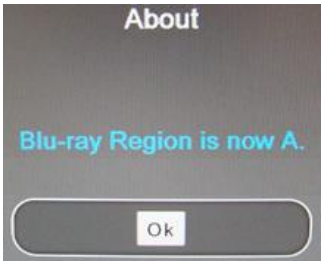


Figure 8 Message after changing a Blu-ray region

6. INITIAL POWER UP

Make sure that power is turned off and connect the following harnesses to the Blu-ray DVD player connectors:

1. Ensure a secure ground connection on the Blu-ray DVD player's grounding port (uses a #10-32 3/8" screw).
2. Connect 28VDC power to P2.
3. Attach the video to P3 and/or to P4.
4. Connect the available video inputs.
5. Adjust the fixed-level audio.
6. Apply power and wait for the LED lights to become active and the OSD main menu to display on a cabin monitor. The default settings at power-up vary by RMEB model.

NOTICE

Do not plug or unplug the display connector while power is applied.

When cycling power, leave unit off for 20 seconds before restoring power.

7. OSD MAIN MENU

The Blu-ray's OSD automatically comes on at power up if there is no disc in the drive. Use the **Λ**, **V**, **<**, **>**, and ENTER buttons from either the front panel, internal IR, external IR, RS-232 or RS-485 for navigation. The menus require a line of sight to a display in order to view the OSD options.

The menu structure is arranged like a wheel with submenus arranged in the outer rings. The main menu of the Blu-ray OSD contains the system's Settings Menu, as shown below.

The OSD Main Menu will also open if you press the ■ (Stop) button while a movie is playing

Figure 9 OSD Main Menu screen

Press the **Λ** button to navigate through the options clockwise, and press **V** to rotate counter-clockwise. Press the **>** **<** buttons to navigate between the submenus, and press ENTER to choose a selection.

7.1. Settings Menu

When you press ENTER to select Settings, the following Settings menu options display in the next ring with the System option active.

The Settings Menu contains the following selections:

Settings Menu

- System
- Network
- Info
- Display
- Audio
- Speaker
- Language

Figure 10 Settings Menu options

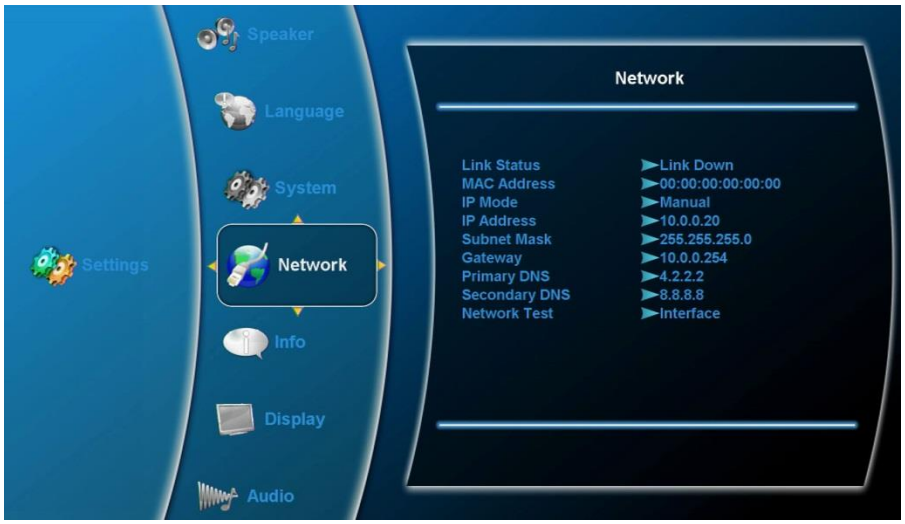
7.1.1. System Submenu

When the System option is selected, a pop-up menu contains the following options:

Option	How it Works
Optical Disc Auto Play	On/Off settings for disc play. When On, the unit automatically plays an optical disc when inserted. When Off, the user must select Play to start playing a disc.
Network Access	Determines the network access through the Ethernet port. Settings: Limit Access, Always Allow Access, or Prohibit Access. **Note:** When **Prohibit Access** is active, BD-Live content will not be accessible when playing Blu-ray discs.
BD-Live Storage	Displays the available free space for BD-Live storage. The maximum value for BD-Live Storage is 400.3 MB.
Erase BD Live Storage	Erases disc storage on the Blu-ray DVD player. Choose Ok or Cancel at the prompt. ● **Ok**: Erases the BD-Live Storage and closes the popup window. ● **Cancel**: Closes the popup window without erasing the disc storage.
CEC Support	Consumer Electronics Control (CEC) supports status messages for the device. This feature is currently not implemented.
Restore Factory Defaults	Restores the unit to the factory default settings. Choose Ok or Cancel at the prompt. ● **Ok**: Restores the factory defaults and closes the popup window. ● **Cancel**: Closes the popup window without resetting the factory defaults.
Activate Device (or De-activate Device if device is activated)	This feature is reserved for future use.

7.1.2. Network Submenu

When you select the Network option, the Blu-ray DVD player initiates a network test and displays the test results in a summary window. All fields are read-only unless you change the IP Mode options. Select **Settings→Network** and then press **ENTER** to open the window, as shown below.



Network Test Summary

- Link Status
- MAC Address
- IP Mode submenu
- IP Address
- Subnet Mask
- Gateway
- Primary DNS
- Secondary DNS
- Network Test

Figure 11 Network submenu showing the test summary

7.1.2.1. IP Mode Submenu

IP Mode enables you to set values manually for the Network options. Select **Settings→Network→IP Mode**, and use the arrow buttons and then press **ENTER** to select the following IP Mode options:

Option	How it Works
Off	Disables Ethernet communications.
Manual	Enables you to set values manually for the IP Address, Subnet Mask, Gateway, Primary DNS, and Secondary DNS fields.
Dynamic	Uses DHCP to acquire an IP Address, Subnet Mask, Gateway, Primary DNS, and Secondary DNS fields.

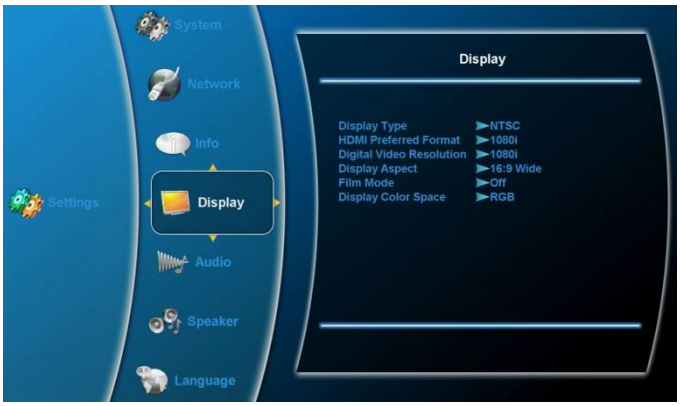
7.1.3. Info Submenu

The Info option displays a read-only window that shows the operating information about the Blu-ray DVD player. Select **Settings→Info** and then press **ENTER** to open the window, as shown below.

Figure 12 Info submenu

7.1.4. Display Submenu

Use the Display submenu options to set the attributes for the video output. Select **Settings→Display** and then press **ENTER** to open the window, as shown below.



Display Submenu

- Display Type
- HDMI Preferred Format
- Digital Video Resolution
- Display Aspect
- Film Mode
- Display Color Space

Figure 13 Display submenu with video attributes

7.1.4.1. Display Type

Use the Display Type options to set the format of the Composite video output. Select **Settings→Display→Display Type**, and use the arrow buttons and then press **ENTER** to select either option.

Figure 14 Display Type option for setting video format

Press **ENTER** to open the Display Type pop-up menu that contains the following options:

Option	How it Works
NTSC	Sets the Composite video output to NTSC format.
PAL	Sets the Composite video output to PAL format when the Digital Video Resolution is set to a value other than Auto.

Note: Display Type will default to NTSC format if the Digital Video Resolution (see Section 7.1.4.3) is set to Auto.

7.1.4.2. HDMI Preferred Format

The HDMI Preferred Format is a read-only field that displays the resolution of the monitor connected via the DVI/HDMI connector. Select **Settings→Display Type→HDMI Preferred Format**, and then press **ENTER** to view the field.

7.1.4.3. Digital Video Resolution

The Digital Video Resolution option enables you to select display video resolutions as outlined below. A pop-up submenu displays available options.

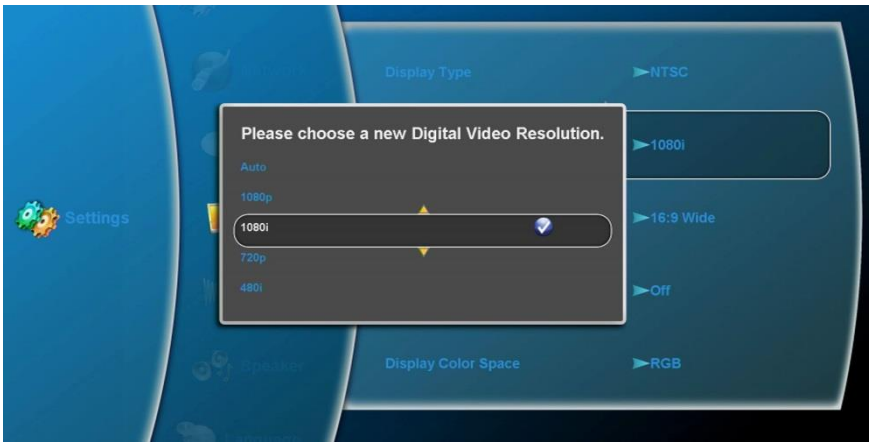


Figure 15 Digital Video Resolution options

Use arrow buttons and then press **ENTER** to select the desired Digital Video Resolution.

If the Blu-ray DVD player is connected to an HDMI monitor, the OSD will retain the Auto setting under Digital Video Resolution. If HDMI is not connected, the option will revert to 1080i.

For related information about Video Output, see Section 5.3 on page 11.

7.1.4.4. Display Aspect

This option is restricted to the capability of the disc being played. Use Display Aspect to adjust the picture's expansion ratio to match the encoding of the source image most closely. Select **Settings→Display→ Display Aspect** and then press **ENTER** to open the submenu, as shown below.

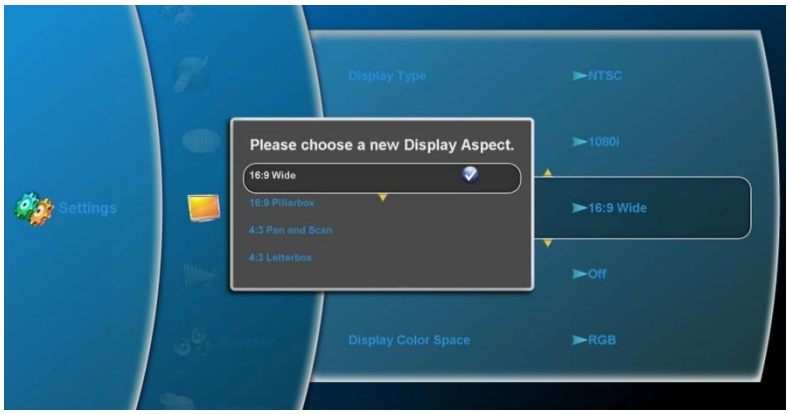


Figure 16 Display Aspect ratio options

Use the arrow buttons and then press **ENTER** to choose an aspect ratio of the digital video output.

Option	How it Works
16:9 Wide	For widescreen displays. Stretches 4:3 images horizontally to eliminate black bars on the left and right.
16:9 Pillarbox	For widescreen displays, but attempts to correctly display the 4:3 image ratio.
4:3 Pan and Scan	For non-widescreen displays, but attempts to eliminate black bars on 16:9 images by cropping left and right portions of the image. Some black bars will still be present on 2.35:1 images. Use this aspect ratio with 480i/576i or 480p/576p video.
4:3 Letterbox	For non-widescreen displays. Shows 16:9 images with black bars on top and bottom. Use this aspect ratio with 480i/576i or 480p/576p video.

7.1.4.5. Film Mode

Film Mode sets the frames-per-second rate for video output. Select **Settings→Display→Film Mode** and then press **ENTER** to open the window, as shown below.

Figure 17 Film Mode options

Option	How it Works
On	Outputs video at 24 frames per second.
Off	Outputs video at 60 frames per second.

Note: Not all discs are capable of allowing this feature.

7.1.4.6. Display Color Space

Use Display Color Space to select the color space of the DVI/HDMI digital output signal. Select **Settings→Display→Display Color Space** and then press **ENTER** to open a menu with the following options, as shown below.

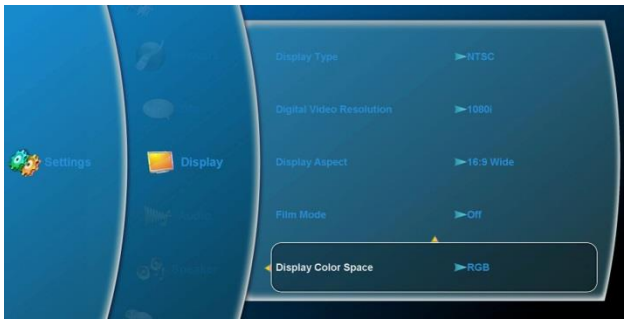


Figure 18 Display Color Space options

Use the arrow buttons and then press **ENTER** to select the different Display Color Space options from individual popup windows.

Note: Many displays cannot interpret the xvYCC and YCC settings, and display purple.

Option	How it Works
RGB	Changes the color space of the DVI/HDMI digital output to RGB.
YCC	Changes the color space of the DVI/HDMI digital output to YCC.
xvYCC	Changes the color space of the DVI/HDMI digital output to xvYCC.

Be sure to connect the Blu-ray DVD player to an HDMI source before setting the Display Color Space; otherwise, the option will revert to RGB when exiting this option.

7.1.5. Audio

Use the Audio submenu options to select the format of the digital audio output signals. Select **Settings→Audio** and then press **ENTER** to open a menu with the following options.

Figure 19 Audio options for digital output

Use the arrow buttons and then press **ENTER** to select the different Audio options from individual popup windows.

Option	How it Works
PCM Down sampling	Opens a pop-up submenu to select a PCM sampling rate: ● 48KHz

	• 96KHz • Off. Off allows various sampling rates, depending on the disc.
Digital Output	**PCM Stereo**: Sends a 2-channel audio signal via the unit's stereo audio outputs. **PCM 5.1:** Sends a PCM audio signal of up to 5.1 channels via the DVI/HDMI and SPDIF output. **PCM 7.1**: Sends a PCM audio signal of up to 7.1 channels via the DVI/HDMI and SPDIF output. **Bitstream HD:** Outputs DTS-MA bitstreams via the DVI/HDMI and SPDIF output. If the Blu-ray player is not connected to an HDMI monitor when you select this option, it will revert to the PCM Stereo option upon closing the Audio submenu. **Bitstream Legacy:** Sends DTS or Dolby Digital bitstream via the DVI/HDMI and SPDIF output. If the Blu-ray player is not connected to an HDMI monitor when you select this option, it will revert to the PCM Stereo option upon closing the Audio submenu. **Bitstream Mixed:** Sends a DTS audio stream over DVI/HDMI and SPDIF outputs. If the Blu-ray player is not connected to an HDMI monitor when you select this option, it will revert to the PCM Stereo option upon closing the Audio submenu.
Dynamic Range Control	Opens a pop-up submenu to select the Dynamic Range setting: • **On:** causes player to apply appropriate compression to make low-level content more intelligible and prevent dramatic passages from getting too loud. • **Off:** plays back the content with the standard dynamic range.

Be sure to connect the Blu-ray DVD player to an HDMI monitor before setting any of the Bitstream options; otherwise, the Digital Output option will revert to the PCM Stereo setting.

NOTICE

Using the Bitstream Mixed option overrides all other speaker settings.

7.1.6. Speaker (7.1 Multi-channel analog audio only)

Use the Speaker options to connect and configure cabin speakers to the Blu-ray DVD player. Select **Settings→Speaker** and then press **ENTER** to open a menu with the following options, as shown below.

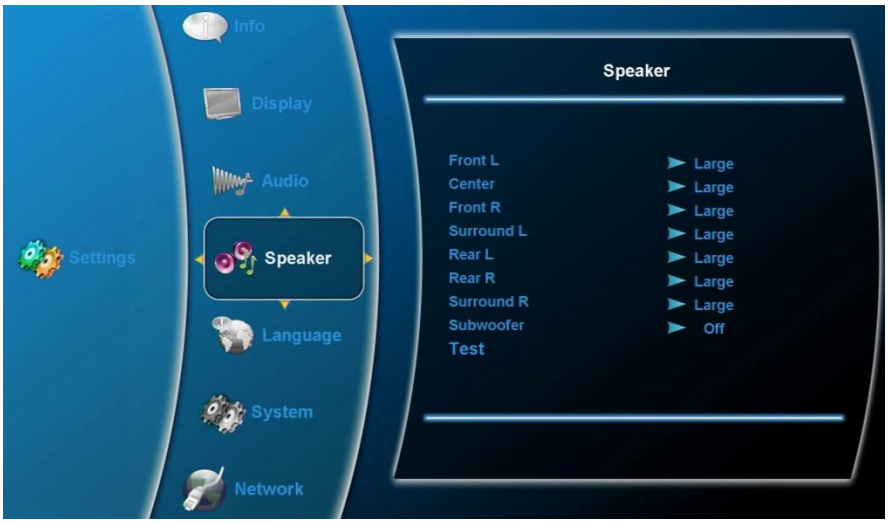


Figure 20 Speaker options for analog audio

Use the arrow buttons and then press **ENTER** to select the different Speaker options from individual popup windows.

Option	How it Works
Front L	Select the size of the front speakers: **Large** or **Small**. When either front speaker is set, the OSD will automatically set the other front speaker to the same value. ● Off: Turns off the left front speaker.
Center	Enable and select the size of the center speaker: **Large** or **Small**. Large is only available when Front L and Front R set to Large. ● Off: Turns off the center speaker.
Front R	Select the size of the front speakers: **Large** or **Small**. When either front speaker is set, the OSD will automatically set the other front speaker to the same value. ● Off: Turns off the right front speaker.
Surround L	Enable and select the size of the surround sound speakers: **Large** or **Small**. Large is only available when Front L and Front R are set to Large. When either surround speaker is set, the OSD will automatically set the other surround speaker to the same value. ● Off: Turns off the left surround speaker.
Rear L	Select the size of the rear speakers: **Large** or **Small**. When either rear speaker is set, the OSD will automatically set the other rear speaker to the same value. ● Off: Turns off the left rear speaker.

Rear R	Select the size of the rear speakers: **Large** or **Small**. When either rear speaker is set, the OSD will automatically set the other rear speaker to the same value. ● Off: Turns off the right rear speaker.
Surround R	Enable and select the size of the surround sound speakers: **Large** or **Small**. Large is only available when Front L and Front R are set to Large. When either surround speaker is set, the OSD will automatically set the other surround speaker to the same value. ● Off: Turns off the right surround speaker.
Subwoofer	Sets the bass crossover frequency for the subwoofer's output. ● Off: Disables the subwoofer output. ● 80 Hz: ● 100Hz ● 120 Hz
Test	Initiates speaker testing. Once you select the test desired, a tone signal will be sent to a single speaker, then switch to the next speaker, and so on, until all speakers have been tested.

7.1.7. Language

Use the Language options to select the preferred audio language to play and other related features, if supported by the disc. Select **Settings→Language** and then press **ENTER** to open a menu with the following options, as shown below.

Figure 21 Language options

Use the arrow buttons and then press **ENTER** to select the different Language options from individual popup windows.

Option	How it Works
OSD	Displays the Blu-ray DVD player's OSD text in the selected language.
Menu	Displays Menu text in the selected language, if the optical media played supports the selected language. **Note:** Depending on the disc, the menu text may have to be set via the BR/DVD menus.
Audio	Plays the Audio in the selected language, if the optical media played supports the selected language. **Note:** Depending on the disc, the audio may have to be set via the BR/DVD menu.
Subtitle	Displays subtitles in the selected language, if the optical media played supports the selected language. Select a language or choose **None** to turn off subtitles.

This setting's usability is disc-dependent and sometimes will not automatically function according to setup. In such cases, enter the disc's setting menu to choose the option.

- Auto/None
- English
- French
- Spanish
- Italian
- German
- Portuguese
- Chinese
- Japanese

8. TECHNICAL REFERENCES AND SUPPORT

NOTICE Check the Rosen Aviation website to ensure that you are working with the most current revision of technical documentation.

Table 7 Technical references

Product	Part Number	Location
RS-485 Network Message Definitions	**9002933**	Contact Rosen Technical Support
Outline & Installation Drawing	**0602-002-CD**	www.rosenaviation.com
RS-232 External Controller Message Definitions	**9002934**	Contact Rosen Technical Support
Universal Color Remote Control	Contact Rosen Sales for part number availability	

8.1. Troubleshooting

If the Blu-ray DVD player does not function properly, refer to the following troubleshooting table for symptoms and possible solutions before contacting Rosen Technical Support.

Note: Always use an oscilloscope to verify the video signal. Always use a multimeter to verify voltages. Check actual results against the requirements described in this manual.

Table 8 Troubleshooting tips

Problem	Possible Solutions
USB drive not recognized	Verify that the USB drive is formatted for either FAT32 or NTFS.
Unable to control via RS-485	Verify that the RS-485 address of the Blu-ray player has been set correctly per Section 5.4.2 on page 14.
No SDI Video output	Verify nothing connected to the DVI/HDMI connector on the back of the Blu-ray player.
No metadata displayed for MP3/WMA files	Not all MP3/WMA files are encoded with metadata. Verify the file in question does have encoded metadata.
Analog audio too low	Adjust the volume level with a universal remote control.

8.2. RTCA DO-160F Qualifications

The table below summarizes the DO-160 test results for qualification of the Blu-ray DVD Player with SDI. Omitted categories are not applicable to this product or its expected installation.

Table 9 DO 160 Level F test criteria on the 0602-002

Description	Section	Category	Comments
Temperature and Altitude	**4**		
Ground Survival/Short-Time Operating Low Temp	4.5.1	A1	
Operating Low Temperature	4.5.2	A1	
Ground Survival/Short-Time Operating High Temp	4.5.3	A1	
Operating High Temperature	4.5.4	A1	
In-flight Loss of Cooling	4.5.5	–	Not applicable
Altitude	4.6.1	A1	
Decompression	4.6.2	A1	
Overpressure	4.6.3	A1	
Temperature Variation	**5**		
Temperature Variation	5.3.1	C	
Humidity	**6**		
Humidity	6.3.1	A	
Operational Shocks & Crash Safety	**7**		
Operational Shocks	7.2.1	B	
Crash Safety (Impulse)	7.3.2	B	
Crash Safety (Sustained)	7.3.3	B	
Vibration	**8**		
Random Vibration – Fixed Wing Aircraft	8.5.2	S (Curve B)	

Description	Section	Category	Comments
Magnetic Effect	**15**		
Magnetic Effect	15.3	Z	
Power Input	**16**		
Normal Operating Conditions (DC)	**16.6.1**		
Average Value Voltage (DC)	16.6.1.1	Z	
Ripple Voltage (DC)	16.6.1.2	Z	
Momentary Power Interruptions (DC)	16.6.1.3	Z (B)	
Normal Surge Voltage (DC)	16.6.1.4	Z	
Engine Starting Under Voltage Operation (DC)	16.6.1.5	Z	
Abnormal Operating Conditions	**16.6.2**		
Voltage Steady State (DC)	16.6.2.1	Z	
Momentary Under Voltage (DC)	16.6.2.3	Z	
Abnormal Surge Voltage (DC)	16.6.2.4	Z	
Voltage Spike	**17**		
Voltage Spike	17.4	A	
Audio Frequency Conducted Susceptibility	**18**		
AF Conducted Susceptibility- Power Inputs	18.3.1	Z	
Induced Signal Susceptibility	**19**		
Magnetic Fields Induced Into Equipment	19.3.1	AC	
Magnetic Fields Induced Into Interconnecting Cables	19.3.2	AC	
Electric Fields Induced Into Interconnecting Cables	19.3.3	AC	
Spikes Induced Into Interconnecting Cables	19.3.4	AC	
Radio Frequency Susceptibility	**20**		
Conducted Susceptibility (CS) – 10kHz to 400MHz	20.4	T	
Radiated Susceptibility (RS) – 100MHz to 18GHz	20.5	T	
Emission of Radio Frequency Energy	**21**		
Conducted RF Emission	21.4	M	
Radiated RF Emission	21.5	M	
Electrostatic Discharge (ESD)	**25**		
Electrostatic Discharge (ESD)	25.5	A	
Flammability	**26**	N/A	Flammability testing in

Description	Section	Category	Comments
			accordance with 14 CFR 25.853 Appendix F

8.3. Specifications

Table 10 Model 0602-002 specifications

Nominal Voltage/Current Draw	28VDC/0.8A
Inrush Current	44A
Op Voltage Range	18-32VDC
Maximum Current Draw	1.28A
Power Consumption	23W
Weight	2.9 lbs [1.31 kgs.] ± 10%
Operating Temperature	0ºC – 45ºC

9. DEFINITIONS

3G-SDI High-definition SDI with 3 gigabit/s data rate transfer

AAC Advanced audio coding, a standardized, “lossy” compression and encoding scheme for digital audio

CD-DA Compact Disc-Digital Audio, the original compact disc format, or the official designation for audio-only format on CD. Highly compressed music files such as MP3 and AAC that are on the computer can be converted back to CD-DA for playback in all CD players.

CFR Code of Federal Regulations

CVBS Composite Video Baseband Signal

DAC Digital to Analog Converter

DCV Direct Current Volts – voltage from an aircraft battery or generator

DTS-MA Digital Theater System High Definition Master Audio

HD High Definition

HDCP High-Bandwidth Digital Content Protection

HDMI High Definition Multimedia Interface

HD-SDI High Definition Serial Digital Interface

IP Internet Protocol

IR Infrared

LCD Liquid Crystal Display

LPCM	Linear Pulse Code Modulation
MP3	MPEG layer 3, which is a compressed audio format
NTFS	New Technology File System; a format used for large files
NTSC	National Television Standards Committee. A video standard used in the United States, Canada, Japan, Mexico, the Philippines, South Korea, Taiwan, and some other countries.
OSD	On Screen Display – the actual user/technician menu, and any informational readouts displayed on the image.
PAL	Phase Alternating Line. A video standard used in Europe, China, Malaysia, Australia, New Zealand, the Middle East, parts of Africa, and other parts of the world.
PCM	Pulse Code Modulation
P/N	Part Number
RDM	Remote Display Module
RMEB	Remote Monitor Electronics Box
RMS	Root Mean Squared
RS-232	Standard for serial binary data interchange
RS-485	Standard for allowing multiple devices to share a common set of serial data communication lines.
SDI	Serial Digital Interface
SPDIF	Sony/Philips Digital InterFace (Serial digital audio)
TMDS	Transition-minimized differential signaling
USB	Universal Serial Bus
Vpp	Volts peak-to-peak; the maximum range of a sine wave. Sometimes expressed as Vp-p.
W	Watts
xvYCC	Extended-gamut YCC
YCC	Abbreviation of YCbCr, which is a way of encoding RGB information, where Y is the Luma component, and Cb and Cr are color difference components
YPbPr	Analog video signal carried by component video cable in consumer electronics. Y carries luma (brightness) information. Pb carries the difference between blue and luma (B − Y). Pr carries the difference between red and luma (R − Y).

10. REVISION HISTORY

NOTICE Revision E is limited to draft or prototype documents. Revisions I, O, Q, S, X and Z are not to be used

Revision	Date	Revision Description	EC
A	07/31/12	Initial release	12-0447
B	09/19/13	Update RS-485 key sequence for addresses 25 and 26	13-0352
C	2/23/16	Added Analog sunset	16-0036