HD-RH1

OPERATION MANUAL

ICONIX®

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Warnings

OPERATION PRECAUTION
Operation near any appliance which generates strong magnetic fields may give rise to noise in the video signals.

CAUTION
Do not place unit into a confined space. Make sure adequate ventilation is available at all times during use. Failure to do so may cause your unit to overheat and cause a fire hazard or electric shock.

DO NOT REMOVE TOP COVER
Electric shock warning: there are no user serviceable parts inside.

CAUTION
Use with recommended accessories only.

WARNING
To reduce the risks of fire, shock and damage, do not expose this unit to rain, snow, inclement weather, moisture, or high humidity. Keep this unit away from all liquids. Do not place liquid containers on the top of the unit.

Warnings

USA:
WARNING: This equipment has been tested and found to comply with the limits for 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's manual, may cause interference to radio communications. Operation of this equipment in a residential area is likely to cause interference in which case the user will be required to correct the interference at his own expense.

The user is cautioned that changes and modifications made to the equipment without approval of the manufacturer could void the user's authority to operate this equipment.

CANADA:
This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numerique de la classe A respecte toutes les exigences du Reglement sur le materiel brouilleur du Canada.

DISPOSAL:
This product contains some components with regulated disposal due to environmental considerations.

This symbol means that used electrical and electronic products should not be mixed with general household waste.

For disposal or recycling information please contact your local authorities, or the Electronics Industries Alliance.

If you wish to discard this product, please contact your local authorities or dealer and ask for the correct method of disposal.

Product Description

The HD-RH1 is a professional 3CCD remote head camera system that offers the versatility of 720p, 1080i, 1080p, 480i (NTSC), and 576i (PAL) at all standard frame rates.

HD-RH1 Camera Head

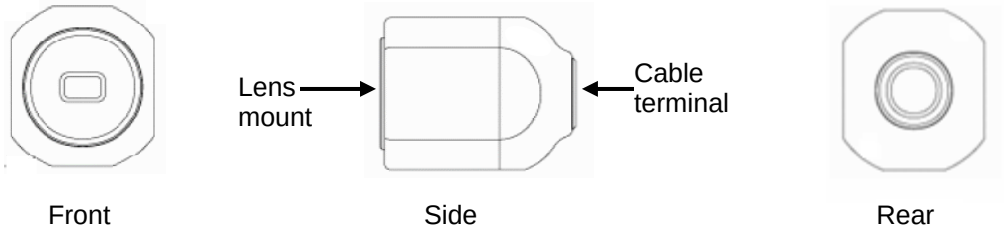

Figure 1. HD-RH1 Camera head components

Table 1. Camera Head parts and functions

Part	Description
Lens mount.	Accepts C-mount style lens.
Cable terminal	Cable connection to CCU.
Tripod mount (optional)	1/4-20 and 3/8-16 screw mounts.

HD-RH1 Camera Controller Unit (CCU)- Front

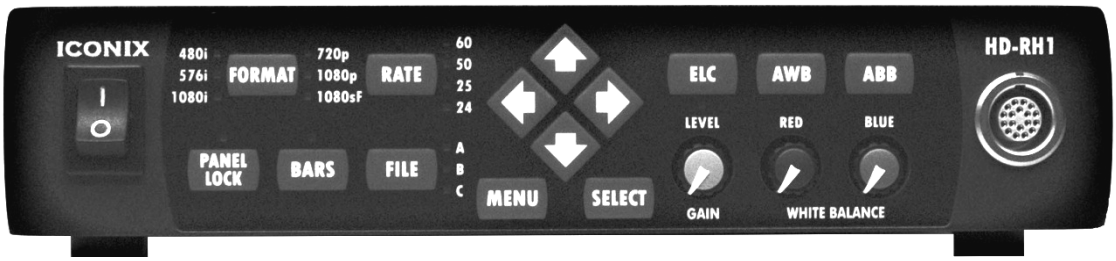

Figure 2. CCU – front panel

Table 2. CCU buttons and functions – front panel

Button	Function
On/Off switch	Powers camera on and off.
Format	Press and hold to cycle through format options: · The format does not change until you release the button. · If you release on the current format setting, nothing changes. · See *Operations* and/or *Video Output Menu* for more detail on Format options.
Rate	Press and hold to cycle through rate options: · Only rates for selected format are available. · The rate does not change until you release the button. · If you release on the current rate setting, nothing changes · See Operations and/or Video Output Menu for more detail on Rate options.
File	Press and hold to cycle through scene files and select one.
Panel Lock	Press to disable the front panel buttons and knobs. Panel is locked if LED indicator is illuminated. Press and hold to un-lock the front panel.
Bars	Toggles the display of the color bar test pattern.
Menu	Press to access the on-screen Menu, or to exit out of a menu without making a selection. (See *Using Menus*)
Arrow Keys	Press to navigate to a menu, menu option, or parameter. · Up and down scrolls through vertical list of menu options. · Right / left displays parameters for a selected menu option.
Select	Press to select/enable a menu option. **Note:** A menu selection replaces a front panel setting and vice-versa.

HD-RH1 CCU (Cont'd)

Button	Function
ELC (+Level LED)	Used to active ELC mode, or variable adjustment of the electronic shutter.
AWB	Press and hold to perform an Automatic White Balance. · Mode must be set to AWB in the White Balance Menu. · See *Operations – Video Output Setup* for more detail.
ABB	Press and hold to perform an Automatic Black Balance.
Gain/Level Knob	When Manual Gain is enabled (via menu), use this knob to adjust gain. When ELC is active, this knob is used to adjust the electronic shutter
Red knob/Blue knob	Press pop-out buttons to manually adjust red and blue gain levels for Manual White Balance. · Mode must be set to MANUAL in the White Balance Menu. · See *Operations – Video Output Setup* for more detail.

HD-RH1 CCU – Back Panel

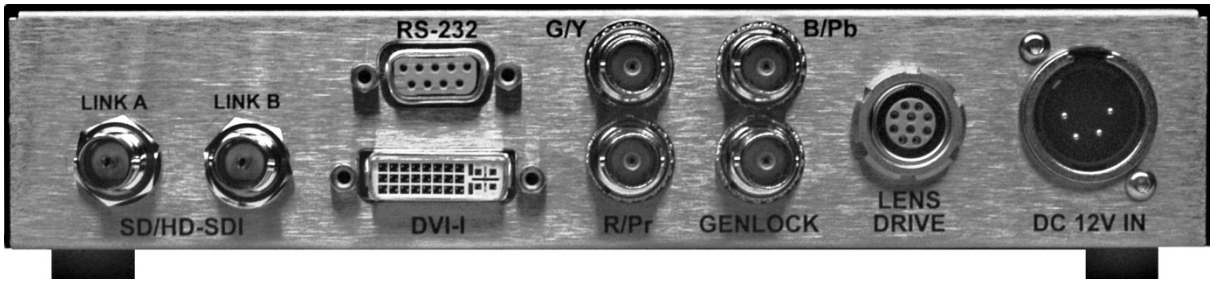

Figure 3. CCU connectors – rear panel

Table 3. CCU connectors and functions – rear panel

Part	Function
SD/HD-SDI **LINK A**	Single-link or Dual-Link HD-SDI (SMPTE-292) Single-Link SD-SDI (SMPTE-259)
LINK B	
RS-232	Remote control interface.
DVI-I port	Digital Video Interface – digital and analog outputs.
Y/G **Pb/B** **Pr/R**	Three BNC connectors for analog video output.
GENLOCK	BNC connector for reference sync source. Accepts analog input signal, with either Tri-level (HD) or Bi-level (SD) sync.
LENS	Interface for motorized lens control.
DC 12V IN	DC power input (12V)

Quick Start: Hardware Setup

Once the hardware is connected, the camera is ready to use. The default format and rate is 720p59.94. To change the format and rate, see the *Operations – Video Output Setup* section.

System Requirements

Minimum System Requirements:

- C-mount lens suitable for 1/3 inch 3-CCD camera.
- Camera head cable.
- Video output cable for SDI, DVI, or RGB/YPbPr video.
- Monitor capable of displaying desired format and rate.

Standard Hardware Connection

Figure 4 illustrates the standard hardware connection for video output.

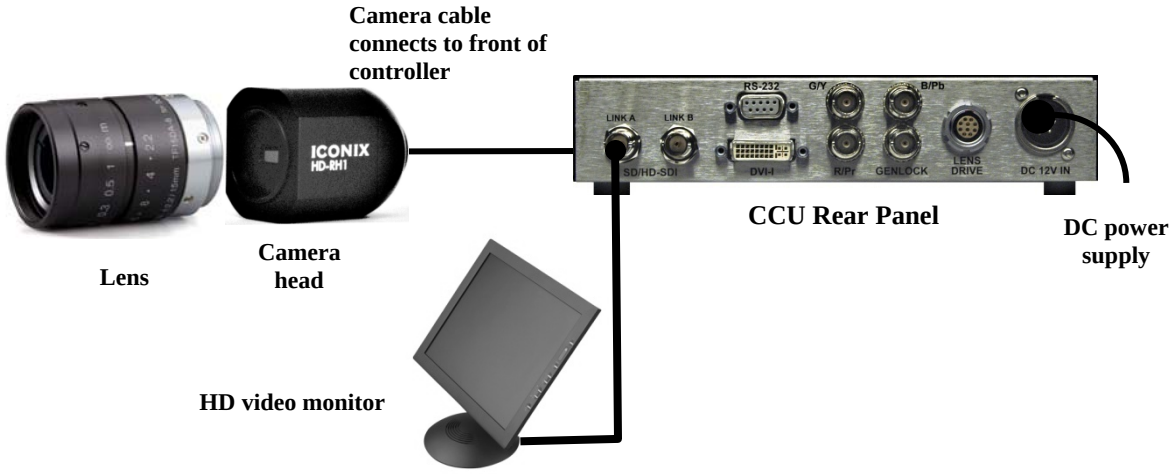

Figure 4. Standard Hardware Connection

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Standard Hardware Connection Tips

1. Verify that the CCU power switch is in the OFF position.
2. Attach the lens to the camera head.
3. Connect the camera head to the head cable. Line up the red dots on the connector with the red dots on the camera and press in.
4. Connect the head cable into the CCU connector on the front panel.
5. Connect the video output monitor to the CCU via the appropriate cable.
6. Connect the DC power supply cord into the DC 12V connector on the controller back panel.
7. Turn on the video monitor.
8. Flip the controller power switch to the ON position.
9. Press the BARS button and verify that color bars are displayed.

Remote Control / RCP

The HD-RH1 may be remotely controlled through the RS-232 remote control interface. For more information, please contact an Iconix representative.

Safety Precautions

Please read and follow the safety guidelines before using the HD-RH1.

- 12V power supply:
  - Nominal Voltage = 12V DC
  - Absolute Minimum = 9V DC
  - Absolute Maximum = 22V DC (peak)
  - 3A maximum current requirement

- Do not use the camera in a place where it could come in contact with water, moisture, steam, dust, or smoke. This could cause fire, electric shock, or camera failure.
- Use only the specified power source voltage and connection cord. The wrong source could result in fire or electric shock.
- Do not use the camera in situations that exceed the temperature specifications (0° to 40° C). This may cause malfunction and/or damage the camera.
- Do not touch the power cord or cables during a thunderstorm.

Operation

Video Formats & Rates

The HD-RH1 is capable of generating images any of 31 format/frame rate combinations. The following chart lists the available combinations:

720p Frame Rates

- 60
- 59.94
- 50
- 30
- 30n60
- 29.97
- 29.97n59.94
- 25
- 25n50
- 24
- 24n60
- 23.98
- 23.98n59.94

1080i Frame Rates

- 60
- 59.94
- 50

1080p Frame Rates

- 60
- 59.94
- 50
- 30
- 29.97
- 25
- 24
- 23.98

1080sF Frame Rates

- 30
- 29.97
- 25
- 24
- 23.98

480i Frame Rate

- 59.94

576i Frame Rate

- 50

Video Formats & Rates (Cont'd)

Standard Definition Aspects
480i and 576i modes may also be set up for use in Anamorphic 16:9, Letterboxed 16:9, or cropped 4:3 aspects.

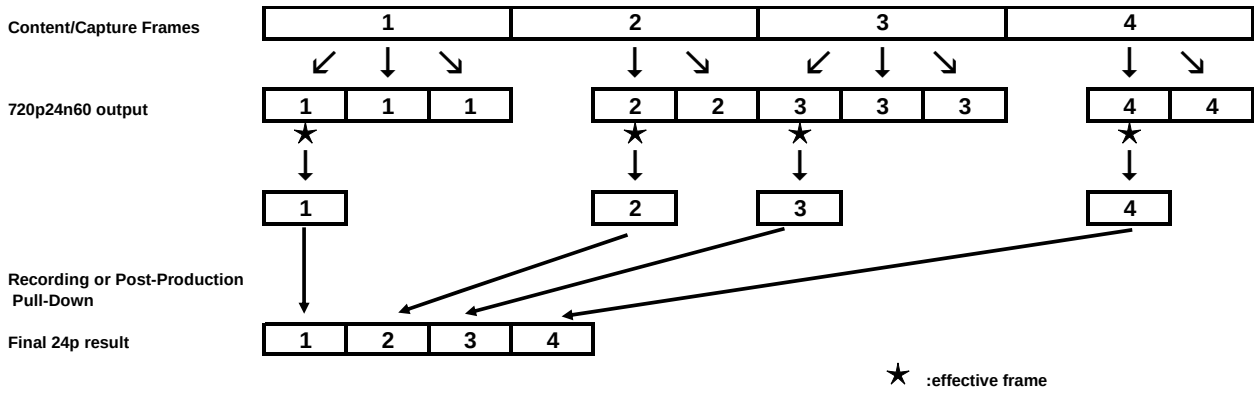
1080sF/1080PsF
For purposes of brevity and clarity, the 1080sF nomenclature is used in this manual and in the HD-RH1 operation to stand for what is also known as 1080PsF (Progressive Segmented Frame).

Doubled 720p Frames
To accommodate certain recording decks available, the slower frame rates for 720p (23.98-30Hz) have the option to be "pulled-up" to either a double (2:1 ratio) frame rate, or a 3:2 style (actually a 2:5 frame-to-carrier ratio). The nomenclature used for this device in the HD-RH1 is **720p24n60**, which means 720p resolution with 24-frame native content on a 60Hz carrier.

720p Doubled-Frame Modes

Menu Option	Resulting Mode
24N60	720p23.98n59.94 (3:2)
24N60	720p24n60 (3:2)
25N50	720p25n50 (2:1)
30N60	720p29.97n59.94 (2:1)
30N60	720p30n60 (2:1)

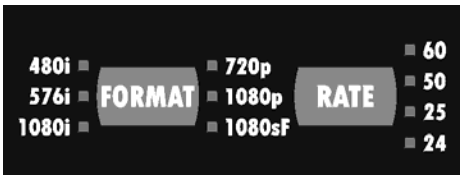
Below is a chart diagramming the flow of frames for 720p24n60 or 23.98n59.94:



OPERATIONAL NOTES:

- The Dual-Link signal for 1080p50, 1080p59.94, & 1080p60 is implemented per SMPTE-372. Either link used independent of the other will appear as a single 1080i 4:2:2 signal. The Video Payload ID embedded in the digital stream can be used to differentiate between 1080p and 1080i when in this mode.
- The HD-RH1 automatically switches to SD-SDI (SMPTE-259) when in **480i** and **576i**. The only mode available for SD-SDI is **SL 422.**

Selecting a Format and Rate: Front Panel



Press and Hold buttons to cycle through options

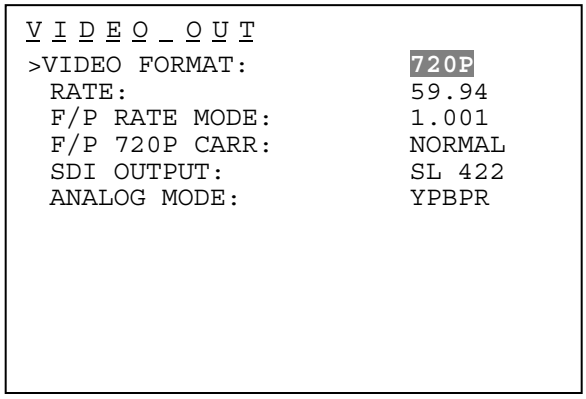
1. Press and hold the **FORMAT** key on the front panel to cycle through the format options.
2. When the desired Format LED is lit, release the button. The Format is not selected until the button is released. If the button is released on the format or rate that was already active, nothing changes.
3. Press and hold the **RATE** key on the front panel to cycle through the available rates.
4. When the desired Rate LED is lit, release the button. The Rate is not selected until the button is released.

OPERATIONAL NOTES:

- See the *Video Output Menu* section for a list of the rates available for each format.
- Only those rates valid for a format are available for selection.
- The **30** rate is only available from the Video Output menu. There is no LED indicator on the front panel. If no LED is illuminated for **RATE**, then 30/29.97 is assumed.
- If **F/P RATE** mode is **1.001** in the Video Output menu, the whole number on the front panel represents the fractional rate. For example, when **1.001** is active, and **60** is selected on the front panel, 59.94Hz is the actual result. The factory default setting for **F/P RATE** is **1.001**. To use the front panel to select a non-fractional rate, first set the **F/P RATE** to **1**. (See *Video Output Menu* section.)
- The 720p format in rates 23.98 through 30 has the option of being frame-doubled to a faster output rate. For example, 25-frame content can be output on a 50-frame signal. For quick operation from the front panel this mode is enabled or disabled by the **F/P 720P CARR** option in the **Video Output** menu.
- A format/rate setting in the menu replaces the front panel setting and vice-versa.

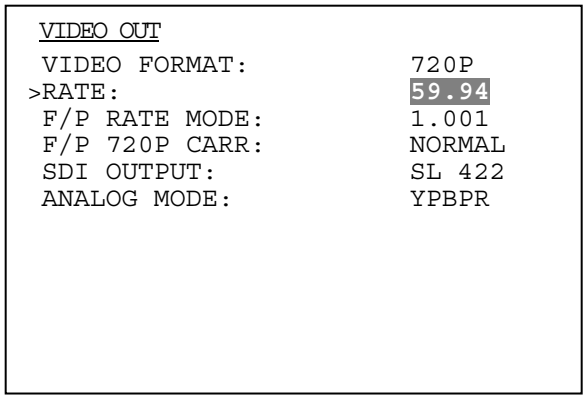
Selecting a Format and Rate: Menus

1. Access the Video Output Menu. (See *Using Menus*.)
2. Select the Format as follows:



- Use up and down arrows to select **FRAME RATE**
- Press **SELECT** button
- Use left & right arrow keys to display desired option.
- Press **SELECT** button.

3. Select the Rate as follows:



- Use up and down arrows to select **RATE.**
- Press **SELECT** button.
- Use left and right arrow keys to display desired option.
- Press **SELECT** button.
- Press **MENU** button to exit menu.

NOTES:

- See the *Video Output Menu* section for a list of the rates available for each format.
- Only those rates valid for a format are available for selection.
- A format/rate selection in the menu replaces the front panel selection and vice-versa.

Select a Scene File

There are three scene file locations – A, B, & C – for storing settings. Parameters are stored in the currently selected/active scene file.

The front panel **FILE** button can switch among the scene files as needed.

NOTES:

- If a feature setting is changed, the new setting replaces the setting stored in the scene file.
- When the scene file is switched, the settings are immediately loaded from the values stored in the newly active scene file.

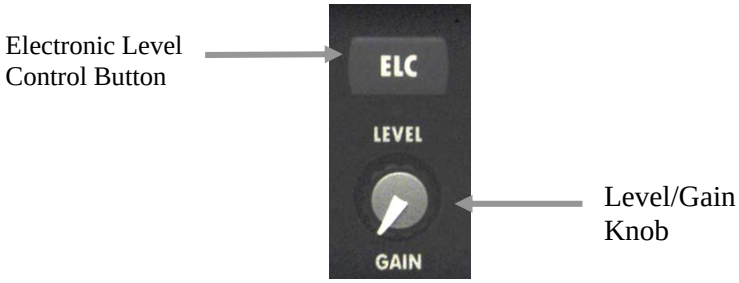
To select a scene file using the front panel

1. Press and hold the **FILE** button on the front panel to cycle through the options.
2. When the LED next to the desired letter is lit, release the button.

   NOTE: The scene file is not selected until the button is released.

Electronic Level Control (ELC)

The ELC button on the front panel can be used to manually adjust the Gain or Shutter. When the Level LED is illuminated the ELC exposure can be manually adjusted using the Level/Gain knob. When the LED is not illuminated the knob is only active if the **Gain MODE** is set to **MANUAL** in the Gain Menu.



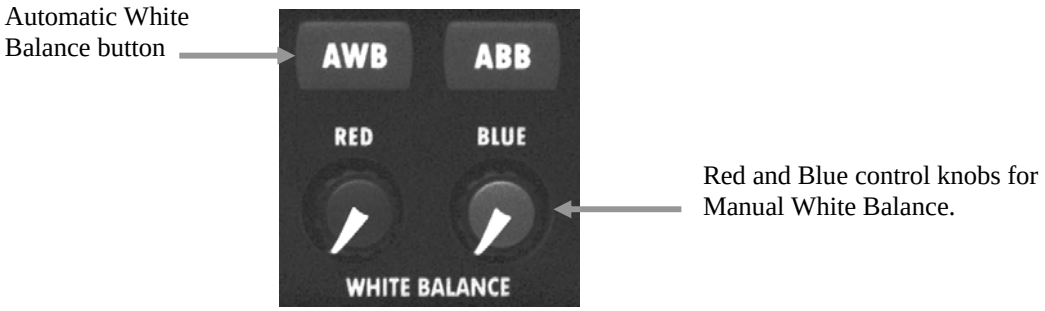
Electronic shutter and gain can be adjusted by either the menu or by the use of the ELC button and Level/Gain knob on the front panel. See *Gain Menu* and *Shutter Menu* sections for more information on menu parameter adjustments.

IMPORTANT
ELC and Manual gain cannot be used at the same time. If the user turns one of the two on, the other will automatically be deactivated.

White Balance

White Balance adjusts the camera for accurate white and color. There are two modes, selected from the "White Balance" menu (see *Using Menus* and *White Balance Menu*.):

- AWB (Automatic White Balance)
- MANUAL



How to White Balance: Automatic (AWB)

1. Focus the camera on any white object.
2. Press and hold the **AWB** button on the front panel until the **AWB IN PROGRESS** message appears. The camera automatically performs the white balance adjustment and stores the data in the active scene file.
3. During the process, the following messages display:

Message	Meaning
AWB IN PROGRESS	AWB is in progress
AWB OK	AWB has completed successfully
AWB FAIL	AWB failed to complete

OPERATIONAL NOTES:

- The default preset area for AWB is **A**. The area preset may be changed via the **White Balance** menu. (See *Using Menus* and *White Balance Menu*.)
- When the menu **MODE** is set to **AWB**, the Red and Blue knobs on the front panel are disabled

How to White Balance: Manual

1. Access the White Balance Menu and select **MANUAL** mode.

```
WHITE BALANCE
  MODE:                  AWB
  AWB R PAINT:           0
  AWB B PAINT:           0
  AWB AREA:              A
  USER AREA EDIT

  SHD MODE:              OFF
  SHD AUTO:              EXEC
  SHD MANUAL R:          0
  SHD MANUAL G:          0
  SHD MANUAL B:          0
```

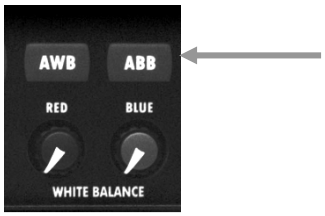
- Use up and down arrows to select **MODE**
- Press **SELECT BUTTON**.
- Use right arrow to display **MANUAL** option.
- Press **SELECT** button.
- Press **MENU** button to exit menu.

2. Focus the camera on the white object.
3. Press the red and blue pop-out knobs on the front panel. Turn to adjust while viewing on monitor.

4. When adjustment is complete, press the red and/or blue knob in.

Automatic Black Balance

Black balance adjustment is provided for accurate black coloration. Black balance is available only on the front panel.



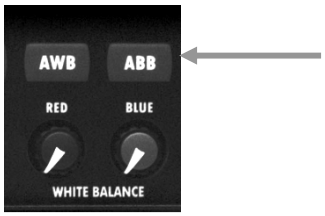
1. Close the iris or cap the lens to eliminate all light into the camera.
2. Press and hold the **ABB** button on the front panel to execute black balance.
3. During the process, the following messages display:

Message	Meaning
ABB IN PROGRESS	Calibration is in progress
ABB OK	Calibration has completed successfully
ABB FAIL	Camera cannot achieve black balance

4. The process may take several seconds to execute.

Automatic Shading Correction

Shading Correction is provided as a manual operation (see White Balance Menu), or as an automatic correction function.



To automatically correct lens shading:

1. Point camera at a completely white target (no color, black, text, or graphics) such that the screen is completely filled with white.
2. Set SHD MODE to AUTO in the White Balance menu.
3. Select “SHD AUTO: EXEC” in the White Balance menu to activate.

4. During the process, the following messages display:

Message	Meaning
SHD IN PROGRESS	Shading Correction is in progress
SHD OK	Shading Correction has completed successfully
SHD FAIL	Cannot achieve correction
SHD FAIL INVALID TARGET	Target unsuitable for automatic correction

5. The process may take several seconds to execute.

NOTE: Auto Shading Correction may only be accurate for the zoom or iris setting at which it was applied. For variable zoom and iris conditions, **SHD MODE** may be best set to **OFF,** or **MAN** for manual adjustment.

Panel Lock

To reduce the risk of accidental changes to the camera while in use, the Panel Lock feature may be used. To lock front panel menus and knobs, push the **PANEL LOCK** button, and the LED will be illuminated.

While locked, the camera can be accessed and controlled via a remote connection.

To unlock the camera, press and hold the **PANEL LOCK** button until the LED turns off (approx. one second).

Genlock

The Genlock function from the Sync Menu allows multiple devices to be genlocked to an input reference. In the chart below, a shaded box indicates that the selected output format can be genlocked to the input reference.

Table 4. Genlock Format compatibility

Input Format \ Output Format	480i	576i	720p60	720p59.94	720p50	720p30	720p29.97	720p25	720p24	720p23.98	720p30@60	720p29.97@59.94	720p25@50	720p24@60	720p23.98@59.94	1080i60	1080i59.94	1080i50	1080p60	1080p59.94	1080p50	1080p30	1080p29.97	1080p25	1080p24	1080p23.98	1080sF30	1080sF29.97	1080sF25	1080sF24	1080sF23.98
480i	■			■			■			■		■			■		■			■			■			■		■			■
576i		■	■		■	■		■	■		■		■	■		■		■	■		■	■		■	■		■		■	■	
720p60		■	■		■	■		■	■		■		■	■		■		■	■		■	■		■	■		■		■	■	
720p59.94	■			■			■			■		■			■		■			■			■			■		■			■
720p50		■	■		■	■		■	■		■		■	■		■		■	■		■	■		■	■		■		■	■	
720p30		■	■		■	■		■	■		■		■	■		■		■	■		■	■		■	■		■		■	■	
720p29.97	■			■			■			■		■			■		■			■			■			■		■			■
720p25		■	■		■	■		■	■		■		■	■		■		■	■		■	■		■	■		■		■	■	
720p24		■	■		■	■		■	■		■		■	■		■		■	■		■	■		■	■		■		■	■	
720p23.98	■			■			■			■		■			■		■			■			■			■		■			■
720p30@60		■	■		■	■		■	■		■		■	■		■		■	■		■	■		■	■		■		■	■	
720p29.97@59.94	■			■			■			■		■			■		■			■			■			■		■			■
720p25@50		■	■		■	■		■	■		■		■	■		■		■	■		■	■		■	■		■		■	■	
720p24@60		■	■		■	■		■	■		■		■	■		■		■	■		■	■		■	■		■		■	■	
720p23.98@59.94	■			■			■			■		■			■		■			■			■			■		■			■
1080i60		■	■		■	■		■	■		■		■	■		■		■	■		■	■		■	■		■		■	■	
1080i59.94	■			■			■			■		■			■		■			■			■			■		■			■
1080i50		■	■		■	■		■	■		■		■	■		■		■	■		■	■		■	■		■		■	■	
1080p60		■	■		■	■		■	■		■		■	■		■		■	■		■	■		■	■		■		■	■	
1080p59.94	■			■			■			■		■			■		■			■			■			■		■			■
1080p50		■	■		■	■		■	■		■		■	■		■		■	■		■	■		■	■		■		■	■	
1080p30		■	■		■	■		■	■		■		■	■		■		■	■		■	■		■	■		■		■	■	
1080p29.97	■			■			■			■		■			■		■			■			■			■		■			■
1080p25		■	■		■	■		■	■		■		■	■		■		■	■		■	■		■	■		■		■	■	
1080p24		■	■		■	■		■	■		■		■	■		■		■	■		■	■		■	■		■		■	■	
1080p23.98	■			■			■			■		■			■		■			■			■			■		■			■
1080sF30		■	■		■	■		■	■		■		■	■		■		■	■		■	■		■	■		■		■	■	
1080sF29.97	■			■			■			■		■			■		■			■			■			■		■			■
1080sF25		■	■		■	■		■	■		■		■	■		■		■	■		■	■		■	■		■		■	■	
1080sF24		■	■		■	■		■	■		■		■	■		■		■	■		■	■		■	■		■		■	■	
1080sF23.98	■			■			■			■		■			■		■			■			■			■		■			■

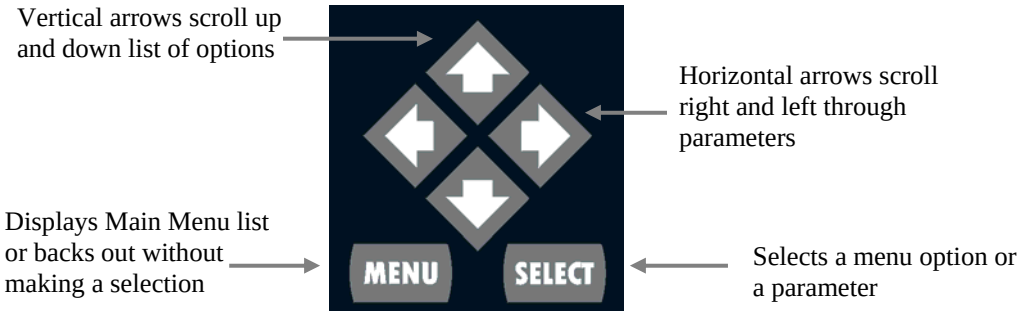
Using the Menus

The menus provide access to the camera settings. Some settings may be changed using either the front panel or menu; others may be changed only through a menu.

Changes to settings are automatically stored in the currently selected scene file. To maintain the current file contents, select a different scene file before any changes are made.

Navigating the Menus

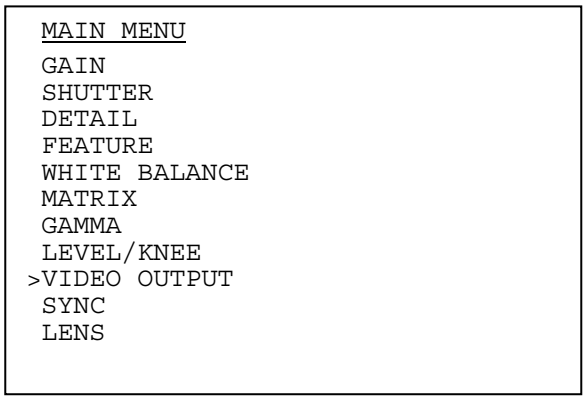
Menus may be navigated using the front panel keys as shown below.



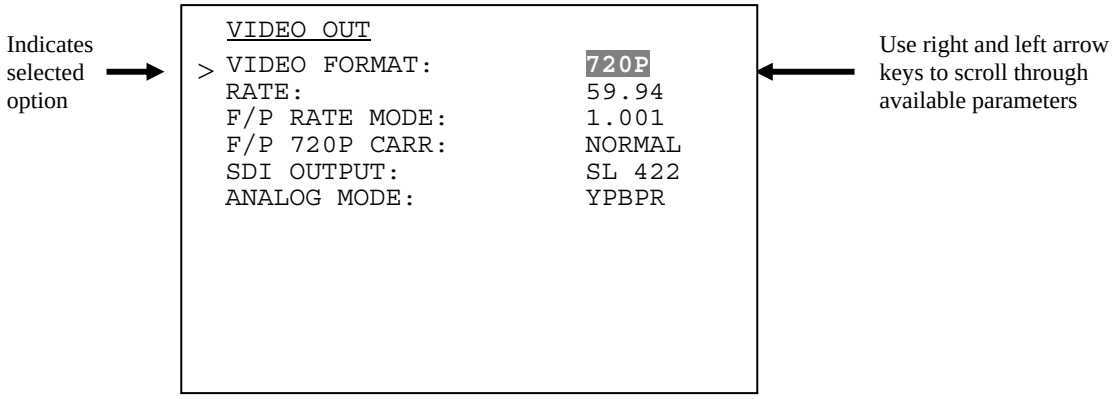
Selecting a Menu Option and Parameter

To select an option and parameter on a menu, proceed as follows:

1. Press **MENU** on the front panel to display the Main Menu.
6. Use the up and down arrow keys to scroll to the desired sub-menu. The ">" symbol appears next to the selection.



7. Press **SELECT** on the front panel to display the selected sub-menu.
8. Use the up and down arrow keys to select an option on the sub-menu.
9. Press **SELECT** button to select the menu option. The setting will be highlighted.
10. Use the right and left arrow keys to display the parameters for the selection. The available parameters display one at a time to the right.



11. When the desired setting is displayed, press the **SELECT** button again to activate.
12. Press **MENU** to return to the Main Menu.

NOTE: Pressing the **MENU** button at any time exits a menu or sub-menu.

User Area On-Screen Entry

1. In either **White Balance** menu (for **AWB)**, or **Shutter** menu (for **AUTO** shutter), scroll the cursor to **USER AREA EDIT** by using the arrow keys, and pressing **SELECT**.
2. A 7x7 grid is displayed on the screen with a blinking cursor in one of the boxes.

Blinking cursor

The user area contains 49 light measurement zones (7 x 7). Each zone can be set to ON or OFF.

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
22	23	24	25	26	27	28
29	30	31	32	33	34	35
36	37	38	39	40	41	42
43	44	45	46	47	48	49

13. To define the **USER** area, turn ON the zone (boxes) to be included in the area:
    - Use the arrow keys to move the cursor to a zone and press **SELECT**.
    - If the zone is OFF, it will turn ON.
    - If the zone is ON, it will turn OFF
14. Be sure to turn ON all zones within the area being defined.

Note: For the user area to be active, **USER** must be active for the **AWB AREA** for **White Balance**, or **AUTO AREA** option for **Shutter**. A separate **USER** area exists for both **White Balance** and **Shutter**.

Video Output Menu

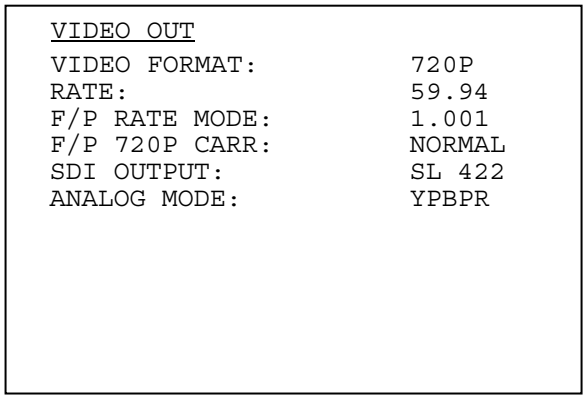


Table 5. Video Output Menu fields

Function	Options	Description
Video Format	480i	Video format options.
	576i	
	720p	
	1080i	
	1080p	
	1080sF	
Rate		Only the rates available for the active format will be displayed.
F/P Rate Mode	1.001 (default)	Enables fractional Rate selection via Front Panel.
	1	Only whole number rates may be selected from the front panel.
F/P 720P CARR	ON (default)	Enables Front Panel selection of doubled rates for 720p (where applicable).
	OFF	Native Rate
SDI Mode	SL 422	Single-Link 4:2:2 YCbCr
	DL RGB	Dual-Link 4:4:4 RGB
	DL YCC	Dual-Link 4:4:4 YCbCr
	DL 422	Dual-Link 4:2:2 YCbCr (auto mode for 1080p50, 1080p59.94, & 1080p60).
ANALOG MODE	YPBPR (default)	
	RGB	

Video Output Menu (Cont'd)

VIDEO FORMAT
Use to select the active output format. Format will not change unless the **SELECT** button is pressed.

RATE
Use to select the frame rate. Only those rates available for the active format will be displayed as options for selection. **RATE** will not change unless the **SELECT** button is pressed.

F/P RATE MODE
The front panel does not have an LED indicator for fractional rates, such as 59.94 and 23.98. The **F/P RATE MODE** is used to accommodate selection of these rates from the **RATE** button.

When the value is set to **1.001**, the front panel **RATE** button assumed to be selecting the fractional rate, where available. (e.g. the "60" LED will indicate a 59.94Hz rate)

When the value is set to **1**, the **RATE** button selects the same rate as the number on the front panel. (e.g. the "60" LED represents a true 60Hz rate)

F/P 720P CARR
The HD-RH1 has the option for lower 720p frame rates to frame-double the content onto a higher frame-rate carrier. This is indicated by an 'n' or 'N' in the format/rate call-out. For example, when 24Hz native content is placed on a 60Hz carrier, it is written **720p24n60**.

720p Doubled-Frame Modes

Displayed	Actual
24N60	720p23.98n59.94 (3:2)
24N60	720p24n60 (3:2)
25N50	720p25n50 (2:1)
30N60	720p29.97n59.94 (2:1)
30N60	720p30n60 (2:1)

The front panel does not have an LED indicator for frame doubling. The **F/P 720P CARR** option in the **VIDEO OUTPUT** menu is used to accommodate this. When set to **NORMAL**, no frame doubling is employed. When set to **FAST**, the frames will be doubled as shown in the table above. The front panel LED indicator is assumed to be the native content rate, not the carrier rate.

Video Output Menu (Cont'd)

SDI MODE

Use to select HD-SDI dual/single link mode and colorspace.

OPERATIONAL NOTES:

- 1080p50, 1080p59.94, & 1080p60 are only available in DL 422 for HD-SDI. DL 422 cannot be otherwise selected from the menu.
- The Dual-Link HD-SDI signal for 1080p50, 1080p59.94, & 1080p60 is implemented as two **1080i** links, per SMPTE-372. Either link used independently will appear as a 1080i signal. The Video Payload ID can be used to differentiate between these signals.
- The HD-RH1 automatically switches to SD-SDI (SMPTE-259) when in **480i** and **576i**. The only mode available for SD-SDI is **SL 422**.

ANALOG MODE

Use to select the output colorspace for the Analog Outputs.

Gain Menu

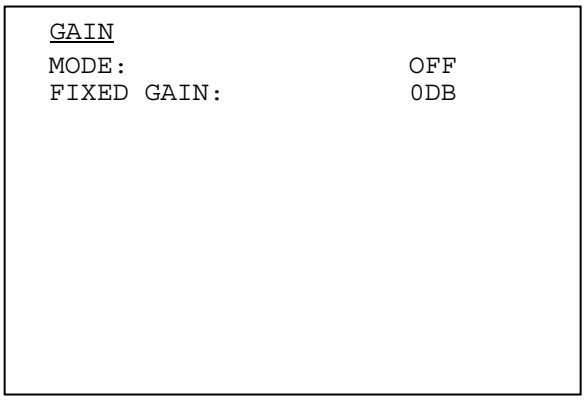


Table 6. Gain Menu fields

Function	Options	Description
MODE	OFF (default)	Disables gain adjustment. Sets Gain level to **0dB**.
	FIXED	Enables ability to set the gain value using the **FIXED GAIN** function on the menu.
	VAR	Enables ability to use the manual Gain knob on the front panel to adjust the gain
FIXED GAIN	Range: 0DB~15DB	Sets the gain value at a fixed level when the Gain **MODE** is **FIXED**.

MODE
Used to select between the gain modes. When in **VAR** mode, the gain is set via the front-panel knob. This knob is inactive in any other mode.

NOTE: Turning **VAR** on will disable Shutter **ELC**, and vice versa.

FIXED GAIN
Used to select the amount of gain when in **FIXED** mode

Shutter Menu

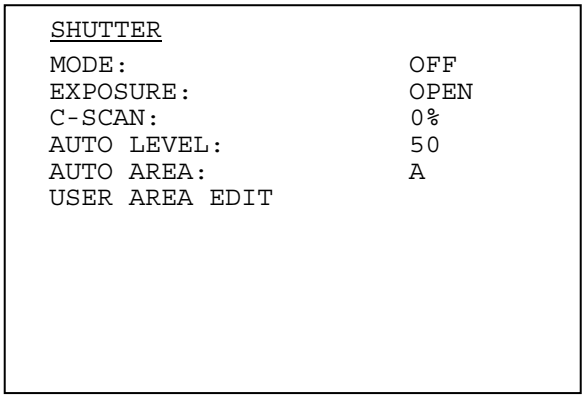


Table 7. Shutter Menu fields

Function	Options	Description
MODE	Off (default)	Disables individual shutter adjustment. Shutter position is **OPEN** (0%).
	Fixed	Shutter is set to **FIXED EXP** value
	ELC	Shutter controlled via **LEVEL** knob
	C-SCAN	Shutter is set to **C-SCAN** position
	AUTO	Shutter is automatically adjusted
EXPOSURE	Default: OPEN	Shutter position is fully open.
	(See *Table 8* for options available per frame rate.)	
C-SCAN	0% (default) Range: 0 ~ 100%	Sets variable shutter position from 0% = Open to 100% = 1/500
AUTO LEVEL	Default: 50 Range: 0 ~ 100	Sets auto shutter average picture level
AUTO AREA	A (default) B C D E F	Selects a predefined picture area to be used for AUTO exposure feedback Presets **A** through **F** shown in Figure 8.
	USER	Selects the user-defined area for auto shutter level detection.

Shutter Menu (Cont'd)

ELC
Shutter is controlled from **OPEN** to **1/10,000** via the front panel **LEVEL** knob.
NOTE: Turning **ELC** on will automatically turn off **VAR GAIN,** and vice versa.

EXPOSURE
When in **MODE** is **FIXED**, this value sets the exposure time. Values are in units of seconds (e.g. 1/100 = 1/100sec = 0.01sec). **OPEN** denotes full frame exposure. See Table 8 below for FIXED exposures available for each frame rate.

Table 8. Fixed Shutter Exposures available by frame rate

	Frame Rate							
	23.98	24	25	29.97	30	50	59.94	60
1/32	■	■						
1/33			■					
1/40				■	■			
1/48	■	■						
1/50	■	■	■	■	■			
1/60	■	■	■	■	■	■		
1/96	■	■						
1/100	■	■	■	■	■	■	■	■
1/120	■	■	■	■	■	■	■	■
1/125	■	■	■	■	■	■	■	■
1/250	■	■	■	■	■	■	■	■
1/500	■	■	■	■	■	■	■	■
1/1000	■	■	■	■	■	■	■	■
1/2000	■	■	■	■	■	■	■	■
1/4000	■	■	■	■	■	■	■	■
1/10000	■	■	■	■	■	■	■	■

C-SCAN
When **MODE** is **C-SCAN**, this value sets the shutter exposure time, from the full frame period to 1/125sec (50-60Hz) or 1/100 (23.98-30Hz) in 1% increments.

AUTO LEVEL
When **MODE** is **AUTO**, this value sets the average picture level target for the automatic shutter system. Set to desired average brightness. Note that the Auto Shutter system only uses shutter; it will not use gain increase the level of the picture.

Auto Shutter Area Presets:

The **AREA** presets for **AUTO** are as follows:

Area A:

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
22	23	24	25	26	27	28
29	30	31	32	33	34	35
36	37	38	39	40	41	42
43	44	45	46	47	48	49

Area B:

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
22	23	24	25	26	27	28
29	30	31	32	33	34	35
36	37	38	39	40	41	42
43	44	45	46	47	48	49

Area C:

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
22	23	24	25	26	27	28
29	30	31	32	33	34	35
36	37	38	39	40	41	42
43	44	45	46	47	48	49

Area D:

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
22	23	24	25	26	27	28
29	30	31	32	33	34	35
36	37	38	39	40	41	42
43	44	45	46	47	48	49

Area E:

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
22	23	24	25	26	27	28
29	30	31	32	33	34	35
36	37	38	39	40	41	42
43	44	45	46	47	48	49

Area F:

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
22	23	24	25	26	27	28
29	30	31	32	33	34	35
36	37	38	39	40	41	42
43	44	45	46	47	48	49

White Balance Menu

```
WHITE BALANCE
MODE:                   AWB
AWB R PAINT:            0
AWB B PAINT:            0
AWB AREA:               A
USER AREA EDIT

SHD MODE:               AUTO
SHD AUTO:               EXEC
SHD MANUAL R:           0
SHD MANUAL G:           0
SHD MANUAL B:           0
```

Table 9. White Balance Menu fields

Function	Options	Description
MODE	AWB (default)	Enables Automatic White Balance via the front panel button. Red and blue knobs on front panel are disabled.
	MANUAL	Enables ability to manually adjust white balance using the red and blue gain knobs on the front panel. (See *Operations* .)
AWB R PAINT	Range: -100 to +100	Red offset from white.
AWB B PAINT	Range: -100 to +100	Blue offset from white.
AWB Area	A (default) B C D E F	Selects a predefined picture area to be used for AWB. Presets **A** through **F** are shown in Figure 8.
	USER	Selects the user defined white balance area. You must define the area first. You can define only one user area at a time.
USER AREA EDIT	(See *User Area On-Screen Entry*)	Enables ability to define the **USER** AWB area.
SHD MODE	AUTO, MAN, OFF	Sets mode for White Shading correction
SHD AUTO	EXEC	Executes Auto White Shading
SHD MANUAL R	Range: -100 to +100	Manual Red shading adjust
SHD MANUAL G	Range: -100 to +100	Manual Green shading adjust
SHD MANUAL B	Range: -100 to +100	Manual Blue shading adjust

AWB Area Presets

The area presets for AWB are as follows:

AWB A:

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
22	23	24	25	26	27	28
29	30	31	32	33	34	35
36	37	38	39	40	41	42
43	44	45	46	47	48	49

AWB B:

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
22	23	24	25	26	27	28
29	30	31	32	33	34	35
36	37	38	39	40	41	42
43	44	45	46	47	48	49

AWB C:

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
22	23	24	25	26	27	28
29	30	31	32	33	34	35
36	37	38	39	40	41	42
43	44	45	46	47	48	49

AWB D:

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
22	23	24	25	26	27	28
29	30	31	32	33	34	35
36	37	38	39	40	41	42
43	44	45	46	47	48	49

AWB E:

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
22	23	24	25	26	27	28
29	30	31	32	33	34	35
36	37	38	39	40	41	42
43	44	45	46	47	48	49

AWB F:

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
22	23	24	25	26	27	28
29	30	31	32	33	34	35
36	37	38	39	40	41	42
43	44	45	46	47	48	49

Detail Menu

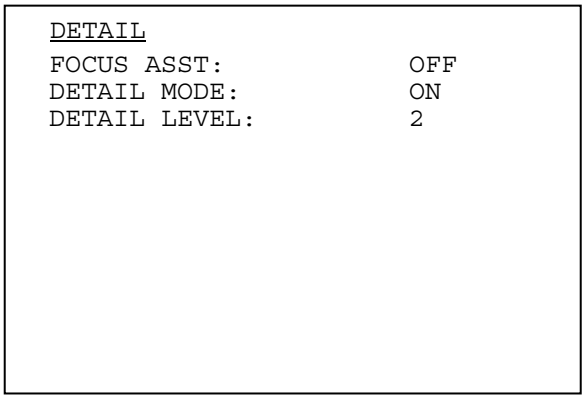


Table 10. Detail Menu fields

Function	Options	Description
FOCUS ASST	ON	Enables Focus Assist mode.
	OFF (default)	Normal operation.
DETAIL MODE	ON (default)	Enables Detail Enhancer.
	OFF	No added enhancement processing.
DETAIL LVL	Range: 0 – 10	Level of enhancement.

FOCUS ASSIST

Focus Assist displays a neutral grey background and adds only the detail information from the video image. This can be used to find the tightest focus, even when shooting in low-contrast environments.

DETAIL MODE

Used to turn on or off the detail enhancer. This enhancer is used for sharpening high frequencies and edge contrast.

DETAIL LEVEL

Used to increase or decrease amount of detail enhancement.

Level/Knee Menu

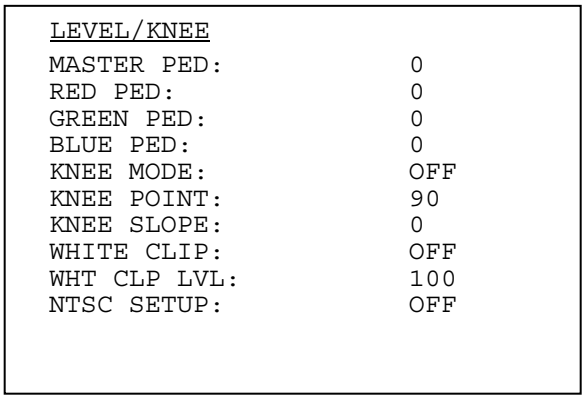


Table 11. Level / Knee Menu fields

Function	Options	Description
MASTER PED	Range: -7 ~ 0 ~ +10	IRE offset for Master Pedestal.
RED PED	Range: -10 ~ 0 ~ +10	IRE offset for red channel.
GREEN PED	Range: -10 ~ 0 ~ +10	IRE offset for green channel.
BLUE PED	Range: -10 ~ 0 ~ +10	IRE offset for blue channel.
KNEE MODE	OFF (default)	Disables knee functionality.
	ON	Enables the knee functionality.
KNEE POINT	0 ~100	Sets start level for knee.
KNEE SLOPE	0 ~ 10	Sets slope value after the knee point.
WHITE CLIP	OFF (default)	Disables White Clip (same as 109 IRE).
	ON	Enables White Clip.
WHT CLP LVL	Range: 90 ~ 109	Sets the maximum white/video level in IRE.
NTSC SETUP	ON (default)	Adds 7.5IRE to Analog outputs.
	OFF	

KNEE

For highlight control and extension of dynamic range for scenes of high contrast. Set Knee Point for desired lowest point of knee effect, and adjust Knee Slope to desired level of highlight crush.

WHITE CLIP

Sets the maximum output level of the camera in IRE.

NTSC SETUP

For adding a 7.5IRE setup level/pedestal to analog outputs. Only active when in 480i format.

Gamma Menu

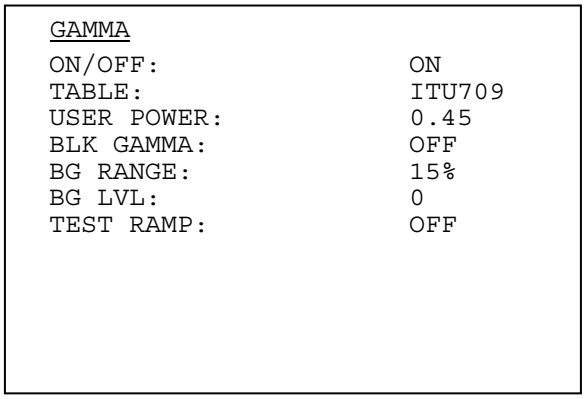


Table 12. Gamma Menu fields

Function	Options	Description
MODE	OFF	Disables gamma correction and outputs a linear response.
	ON (default)	Enables the table setting.
Table	ITU709 (default)	HDTV/NTSC/PAL standard.
	B-LAW	per BBC TV2248, toe = 5, exp. = 0.4
	CINE	
	USER	
USER POWER	0.35 ~ 0.90	0.45 (default) For USER table only.
BLK GAMMA	OFF (default)	Enables black stretch/crush.
	ON	
BG RANGE	15% (default)	Sets intercept point of stretch/crush curve.
	25%	
	35%	
	50%	
BG LVL	0 (default) -10 ~ 0 ~ +10	Negative values give a crush response. Positive values give stretch response.
TEST RAMP	OFF (default)	
	ON	

Gamma Menu (Cont'd)

BLACK GAMMA

Black gamma adjustment is a stretch or crush applied to the selected table. BG RANGE sets the intercept point of the stretch/crush curve with the power function. BG LVL sets the relative amount of stretch or crush. A positive value (1 to 10) corresponds to a stretch curve. A negative value (-1 to -10) corresponds to a crush curve.

Black Gamma settings can be applied to any of the tables, including USER.

TEST RAMP

For setup and comparison purposes, a digitally-generated test ramp can be enabled to input a unity-linear ramp from 0-109% into the gamma circuit.

Matrix Menu

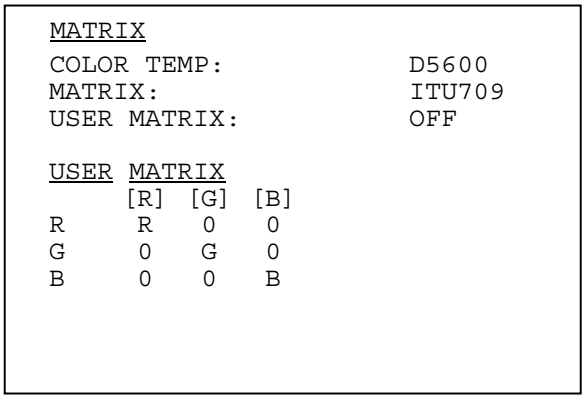


Table 13. Matrix Menu fields

Function	Options	Description
Color Temp	3200	Setting for 3200K lighting.
	D4300	Setting for 4300K lighting.
	D5600 (default)	Setting for 5600K lighting.
	D6500	Setting for 6500K lighting.
	FLAT	
Matrix	ITU709 (default)	Default matrix for all HD formats.
	NTSC	Default for 480i (NTSC).
	EBU	Default for 576i (PAL).
	OFF	
User Matrix	OFF (default)	
	ON	Activates user-defined matrix

COLOR TEMP

This sets the base color temperature for the 3CCD color matching function. FLAT is used when no color temperature correction is desired, or as a neutral base for User Matrix. Otherwise, use the setting appropriate for the lighting in use.

It is recommended that the COLOR TEMP feature be used instead of conversion filters, as the Iconix colorimetry system will represent truer color across the spectrum, with the added benefit of no light attenuation.

Matrix Menu (Cont'd)

MATRIX
Sets the camera to the color system of choice. The options are OFF, ITU-709, NTSC, and EBU. ITU-709 should be used for most HDTV applications. The NTSC option adheres to SMPTE RP 219 (SMPTE 240M), and is the default for 480i. The EBU option adheres to EBU Tech 3213, and is the default for 576i (PAL).

USER MATRIX
This is user-defined correctional/camera matching matrix. It may be used independent of, or in conjunction with the COLOR TEMP and MATRIX settings. A typical application of this is to color match among different video cameras being used on the same shoot. User Matrix can be active even when main MATRIX mode is OFF.

The User Matrix is adjusted by editing the values in the USER MATRIX section in the bottom half of the screen. These values are ignored if USER MATRIX is OFF.

The User Matrix is adjusted as follows: On the top of the user matrix are the RGB primaries that are *added into* to modify the RGB primary on the left. For example, the upper right hand parameter is the portion of Blue that will be added into Red.

Feature Menu

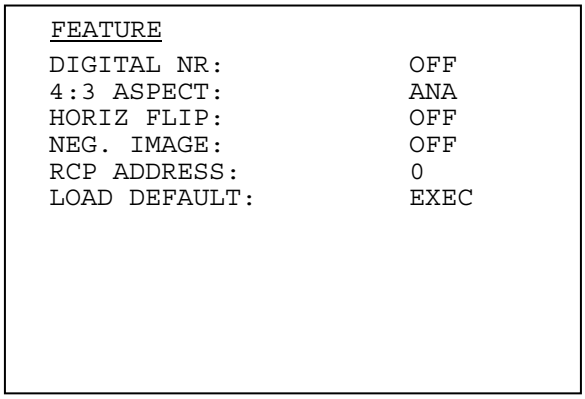


Table 14. Option Menu fields

Function	Options	Description
DIGITAL NR	OFF (default)	Reduces visiblilty of some noise.
	ON	
4:3 ASPECT	ANA	16:9 Anamorphic in 4:3
	LTRBOX	16:9 Letterboxed in 4:3
	4:3	Standard 4:3 center of cropped 16:9 image.
HORIZ FLIP	OFF (default)	Normal operation.
	ON	Flips output image horizontally.
NEG. IMAGE	OFF (default)	Normal operation.
	ON	Video levels and colors are inverted.
RCP ADDR		Unique address for RCP commands
LOAD DEFAULT		Restores original factory default settings

DIGITAL NR

Use to soften the harshness of some high-frequency noise. This may be used in conjunction with **DETAIL** to replace some lost high frequency response.

RCP ADDR

When multiple cameras are used on the same RCP data lines, use this parameter to give each camera a unique address to respond to. The camera will ignore all communication that does not match its RCP address. This parameter is NOT reset with a LOAD DEFAULT command.

Lens Menu

The Lens Menu provides a mechanism for the remote control of lenses, and other motorized devices. The lens control interface provides 3 channels of motorized control, and 2 channels of low voltage outputs.

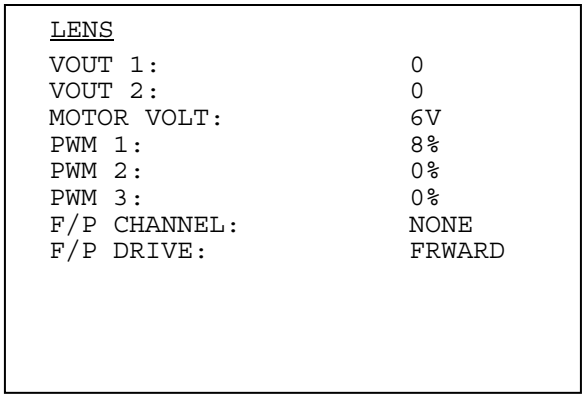


Table 15. Lens Menu fields

Function	Options	Description
VOUT 1	Range: 0V ~ 5V	Sets voltage level for channel 1 output.
VOUT 2	Range: 0V ~ 5V	Sets voltage level for channel 2 output.
MOTOR VOLT	6V ~ 12V 12V = default	Sets the voltage level of the motor drive channels.
PWM 1	Range = 0 ~ 100	Sets the motor drive speed of each individual motor control channel.
PWM 2	Range = 0 ~ 100	
PWM 3	Range = 0 ~ 100	
F/P CHANNEL	NONE	Default
	FOCUS	
	ZOOM	
	IRIS	
F/P DRIVE	FWARD	Default. Right arrow button on front panel.
	BKWARD	Left arrow button on front panel.

F/P CHANNEL and F/P DRIVE

Lens control was intended for Remote Control operation. However, lens motor control operations can be performed while the Lens Menu is on the screen. First select the channel to be moved by the motor in **FP/CHANNEL**. To drive the selected channel, select **F/P DRIVE** and hold down the left and right arrows on the front panel. The motor will stop moving when the arrow button is released. The **FRWARD**/**BKWARD** direction changes automatically with the arrow keys. Left Arrow = **BKWARD**, Right Arrow = **FRWARD.**

Sync Menu

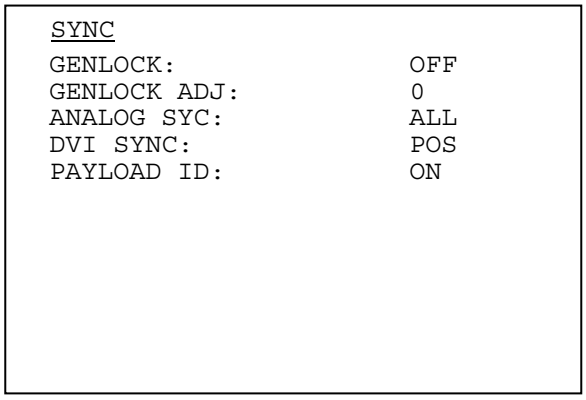


Table 16. Sync Menu fields

Function	Options	Description
GENLOCK	OFF (default)	Camera will ignore external source.
	ON	Camera will attempt to sync to an external signal.
GENLOCK ADJ	-4125 ~ 0 ~ +4125	Adjustment in pixels from VSYNC.
ANALOG SYC	OFF	No Sync on analog signals.
	ALL	Sync on all channels.
	G/Y (default)	Sync on Green/Luma channel only.
DVI SYNC	POS	Positive sync levels (HDTV-style).
	NEG	Negative sync levels (VESA-style).
PAYLOAD ID	ON (default)	
	OFF	

GENLOCK
Activates ability to synchronize to an external source, either SD, or HD. (See *Genlock* Section)

Genlock Adjust gives pixel-incremental adjustment of advance or delay of Genlock.

ANALOG SYNC
Controls TLS (Tri-Level Sync) and Bi-level sync on analog outputs.
It is recommended that Analog Sync be turned “OFF” when using the analog portion of the DVI connector for devices expecting VGA-style signals, such as a computer monitor.

Sync Menu (Cont'd)

DVI SYNC
Sets the sync level polarity such that various monitors may be used in either SMPTE-style or VESA-style timing.

PAYLOAD ID
Available on HD-SDI outputs per SMPTE-352M

Quick Reference

This section includes:

- Menu Options and Factory Defaults
- Specifications

Menu Screens (showing factory defaults)

MAIN MENU

GAIN
SHUTTER
DETAIL
FEATURE
WHITE BALANCE
MATRIX
GAMMA
LEVEL/KNEE
VIDEO OUTPUT
SYNC
LENS

DETAIL

FOCUS ASST:	OFF
DETAIL MODE:	ON
DETAIL LVL:	2

GAIN

MODE:	OFF
FIXED GAIN:	0dB

FEATURE

DIGITAL NR:	OFF
4:3 ASPECT:	ANA
HORIZ FLIP:	OFF
NEG. IMAGE:	OFF
LOAD DEFAULT:	EXEC

SHUTTER

MODE:	OFF
EXPOSURE:	OPEN
C-SCAN:	0%
AUTO LEVEL:	50
AUTO AREA:	A
USER AREA EDIT	

WHITE BALANCE

MODE:	AWB
AWB R PAINT:	0
AWB B PAINT:	0
AWB AREA:	A
USER AREA EDIT	
SHD MODE:	OFF
SHD AUTO:	EXEC
SHD MANUAL R:	0
SHD MANUAL G:	0
SHD MANUAL B:	0

Menu Screens (Cont'd)

MATRIX

COLOR TEMP:	D5600
MATRIX:	ITU-709
USER MATRIX:	OFF

USER MATRIX

	[R]	[G]	[B]
R	R	0	0
G	0	G	0
B	0	0	B

VIDEO OUT

VIDEO FORMAT:	720P
RATE:	59.94
F/P RATE MODE:	1.001
F/P 720P CARR:	NORMAL
SDI OUTPUT:	SL 422
ANALOG MODE:	YPBPR

GAMMA

ON/OFF:	ON
TABLE:	ITU-709
USER POWER:	0.45
BLK GAMMA:	OFF
BLK GAMMA RANGE:	15%
BLK GAMMA LVL:	0
TEST RAMP:	OFF

SYNC

GENLOCK:	OFF
GENLOCK ADJ:	0
ANALOG SYC:	ALL
DVI SYNC:	POS
PAYLOAD ID:	ON

LEVEL/KNEE

MASTER PED:	0
RED PED:	0
GREEN PED:	0
BLUE PED:	0
KNEE MODE:	OFF
KNEE POINT:	85
KNEE SLOPE:	5
WHITE CLIP:	OFF
WHT CLP LVL:	100
NTSC SETUP:	ON

LENS

VOUT 1:	0
VOUT 2:	0
MOTOR VOLT:	6V
PWM 1:	8%
PWM 2:	0%
PWM 3:	0%
F/P CHANNEL:	NONE
F/P DRIVE:	FRWARD

Specifications

Image sensor	1/3-inch Progressive CCD
Optical System	1/3-inch 3-CCD Prism System
Limiting Resolution	700 TVL/PH (720p) 900 TVL/PH (1080i/p/sF)
Lens Mount	C-Mount
Scanning System	720p: 23.98, 24, 25, 29.97, 30, 50, 59.94, 60 23.98n59.94, 24n60, 25n50, 29.97n59.94, 30n60 1080i: 50, 59.94, 60 1080p: 23.98, 24, 25, 29.97, 30, 50, 59.94, 60 1080sf: 23.98, 24, 25, 29.97, 30
Sensitivity	F/8 @ 2000 LUX
Signal/Noise Ratio	52dB typical, Y Channel
Quantization	14-Bit
Gamma	Parameterized with Black Gamma
White Balance	Automatic (AWB) or Manual
Black Balance	Automatic
Gain	0 dB to 15 dB, Variable or Fixed
Electronic Shutter	Variable (ELC), Fixed, Clearscan, Auto
Scene File	3 User-Programmable Profiles
Sync System	Internal or Genlock to analog sync
Output Signals	RGB/YPbPr: BNCx3, 1Vpp, 75 Ohm Sync on Y/G or YPbPr/RGB HD-SDI/SD-SDI (SMPTE-292/SMPTE-259): BNCx2 Two Single-Link 4:2:2 One Dual Link 4:4:4: RGB/YCbCr One Dual Link 4:2:2 YCbCr (1080p50-60) DVI-I
Input Signals	Genlock: BNCx1, Tri-Level or Bi-level Sync Remote-Control: RS-232, DSUB-9
Power Requirements	12VDC, 30W
Weight	Head: 2.3oz. (64g) Controller: 4.2lbs
Dimensions	Head: 1.32”W x 1.50”H x 1.92”D (33.5x38x48.8 mm) Controller: 8.4”W x 1.78”H x 12”D (213x45x305 mm)
Tripod Mount	Optional Adapter with ¼-20 and 3/8-16 Thread

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Part Number:

900001

Revision C

http://www.iconixvideo.com

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