HD-RH1F™

OPERATION MANUAL

ICONIX®

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Warnings/Safety Precautions

The following must be read and followed before using the HD-RH1.

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

- 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 near any appliance which generates strong magnetic fields may give rise to noise in the video signals.
- 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.
- Electric shock warning: Do not remove top cover. There are no user serviceable parts inside.
- Use with recommended accessories only.
- 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.
- 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.

Regulatory Compliance

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

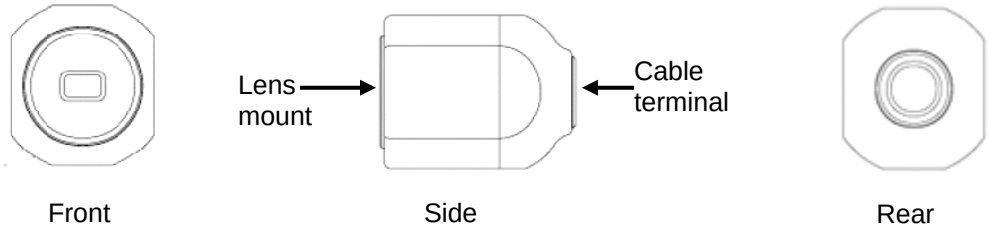

Figure 1. Camera head components

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-RH1F CCU Front Panel

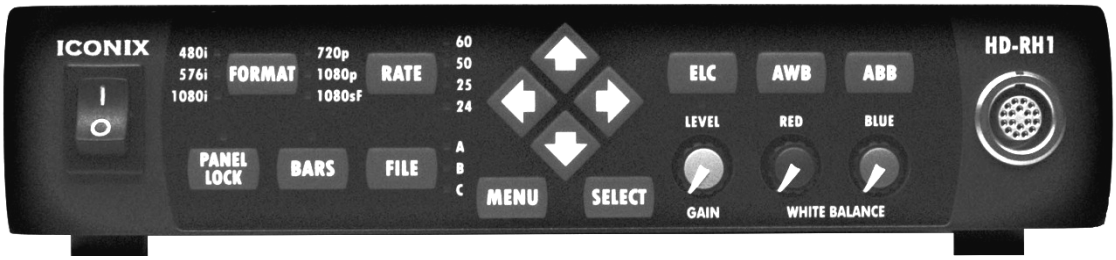

Figure 2. CCU – front panel

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.

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-RH1F CCU Rear Panel

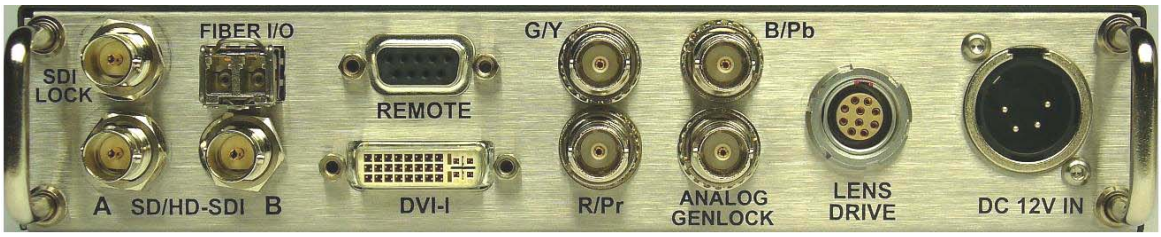

Figure 3. CCU connectors – rear panel

Part	Function
SD/HD-SDI **LINK A** **LINK B**	Single-link or Dual-Link HD-SDI (SMPTE-292) Single-Link SD-SDI (SMPTE-259)
SDI LOCK	HD-SDI and SD-SDI genlock input
FIBER I/O	Fiber optic SFP module interface
REMOTE	Remote control interface: RS-232 or RS-485
DVI-I port	Digital Video Interface – digital and analog outputs.
Y/G, Pb/B, Pr/R	Three BNC connectors for analog video output, RGB or YPbPr.
ANALOG GENLOCK	Analog Genlock input, Tri-level (HD) or Bi-level (SD) sync
LENS	Interface for motorized lens drive
DC 12V IN	DC power input (12V)

Hardware Setup

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.

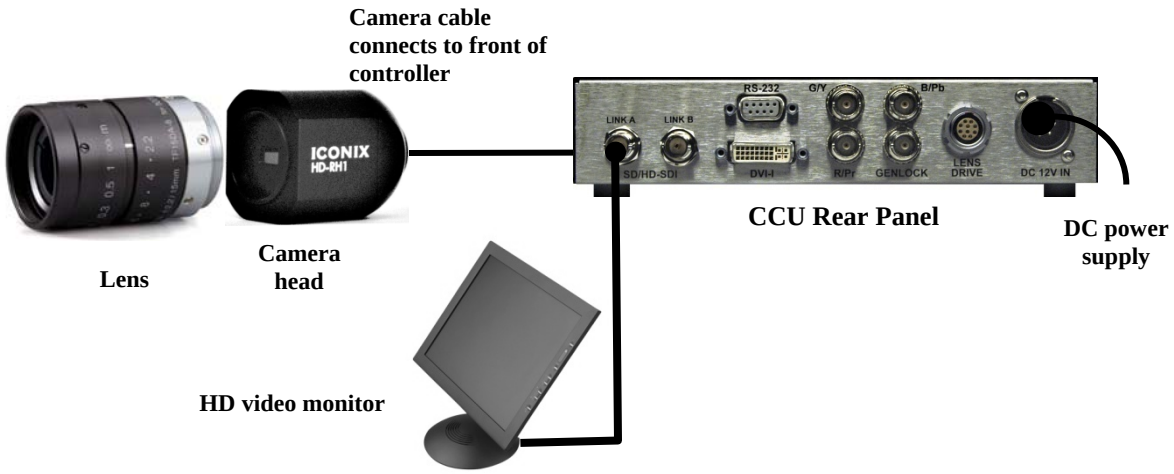

Figure 4. Standard Hardware Connection

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SFP Fiber Optic Modules

The HD-RH1F can accept Iconix SFP (Small-Form Pluggable) modules for fiber optic transmission and genlock sourcing. There are three types of modules that may be used with the HD-RH1F:

Dual Transmitter: This module will transmit via fiber the same single-link or dual link serial digital signal as the SDI outputs.

Transceiver: This module will output a single-link serial digital signal on the transmit side, while accepting a genlock source on the receive side. The transmitter will always mirror the signal on Channel A of the SDI output.

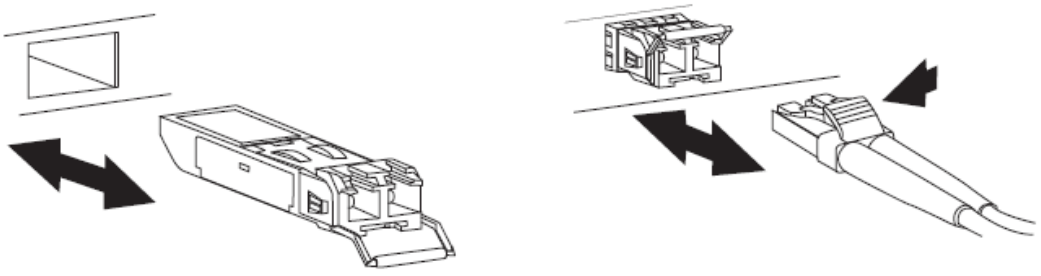
Dual Receiver: This module with accept a genlock source signal via Channel B of the SFP module (same side as if it were a transceiver module). By nature of the design of the HD-RH1F, the receiver on Channel A is always ignored.

These modules should be used with single-mode fiber. These SFPs will accept either simplex or duplex LC fiber optic connectors.

Installing SFP Fiber Optic Modules

Installation procedure:

1. The HD-RH1F will come from the factory with a dummy EMI plug installed in the SFP cage. Remove it by pressing on the release tab, and pulling out gently.
2. The new modules should be prepared by ensuring that the locking bail is in the unlocked (down) position.
3. Gently insert the SFP module into the cage opening. Check for proper and smooth insertion, and avoid any "snagging" of the metal leaf springs on the SFP body.
4. DO NOT TWIST OR FORCE the SFP module.
5. Once fully installed, put the bail in the upright, locked position.
6. Check for full, secured installation.
7. Connect an LC-terminated fiber optic cable to the module.



SFP Module Insertion
(Bail shown in unlocked position)

LC Cable Insertion

Figure 5. SFP Fiber Optic Module Installation

Removal procedure:

1. Disconnect the LC fiber optic cable, if connected.
2. Unlatch the bail on the SFP module, and move the bail to its downward position. This will unlock the module from the cage.
3. Gently pull the module out from the cage.
4. Replace the dummy EMI plug when fiber optic modules are not in use.

Remote Control

This camera is compatible with the Iconix RCP-160 Remote Control Panel, and may be remotely controlled via RS-232 or RS-485 interface.

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.

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 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 Rate

- 59.94

576i Rate

- 50

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).

1080p and Dual Link

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 (SMPTE-352) embedded in the digital stream can be used to differentiate between 1080p and 1080i when in this mode.

HD-SDI and SD-SDI

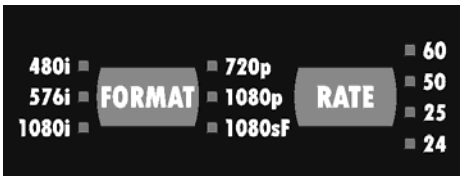
The HD-RH1 automatically switches to SD-SDI (SMPTE-259) when in **480i** and **576i**. The only colorspace mode available for SD-SDI is **SINGLE 4:2:2.**

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.

Doubled 720p Frames
To accommodate certain recording deck, 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.

See Appendix D for more information on Doubled 720p frames.

Selecting a Format and Rate: Front Panel



Press and Hold buttons to cycle through options

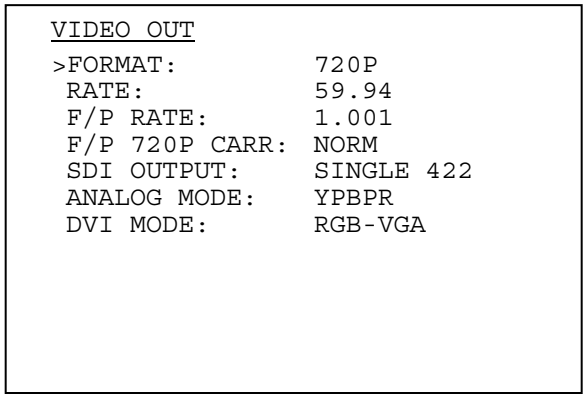
1. Press and hold the **FORMAT** key on the front panel to cycle through the format options.
2. When the desired Format LED is lit, release the button. The Format is not selected until the button is released. If the button is released on the format or rate that was already active, nothing changes.
3.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

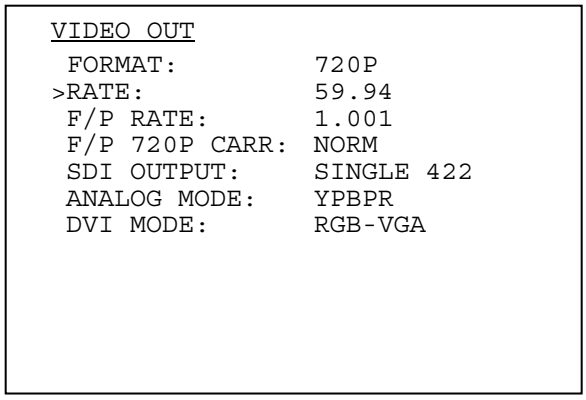
Selecting a Format and Rate: Menus

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



- Use up and down arrows to select **FORMAT**
- 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.

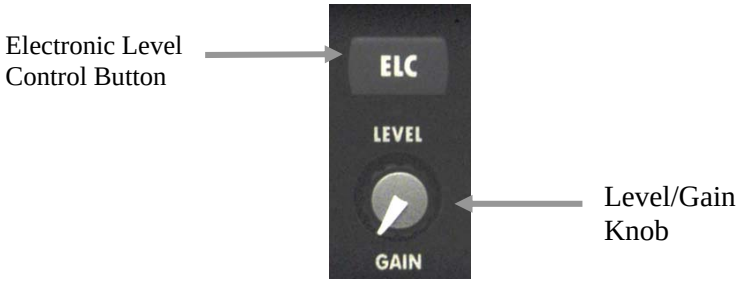
To select a scene file using the front panel

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.



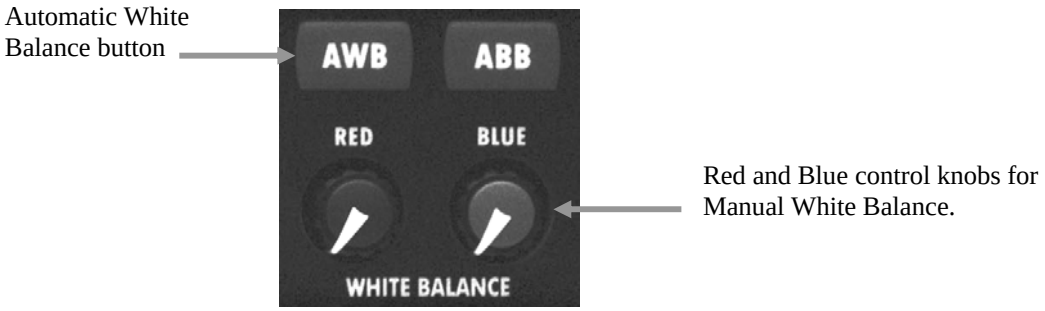
Electronic shutter and gain can be adjusted by either the menu or by the use of the ELC button and Level/Gain knob on the front panel. See *Gain Menu* and *Shutter Menu* sections for more information on menu parameter adjustments.

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 color rendition. There are two modes, selected from the "PAINT" menu (see *Using Menus* and *White Balance Menu*.):

- NORM (Automatic White Balance, AWB offset, White paint controls)
- MANUAL (Front Panel White adjust only)



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:

- Select the appropriate **COLOR TEMP** in the **PAINT** menu before white balancing
- The default preset area for AWB is **A**. The area preset may be changed via the **PAINT** menu. (See *Using Menus* and *PAINT 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 Paint Menu and select **MANUAL** mode.

```
PAINT
                  R    G    B    M
WHITE:            0    0    0
BLACK:            0    0    0    0
MAN SHADING:      0    0    0

 COLOR TEMP:        D5600
>WHT BAL MODE:      MANUAL
 AWB AREA:          A
  -USER AREA:       EDIT
 SHADING MODE:      OFF
  -AUTO SHD:        EXEC
```

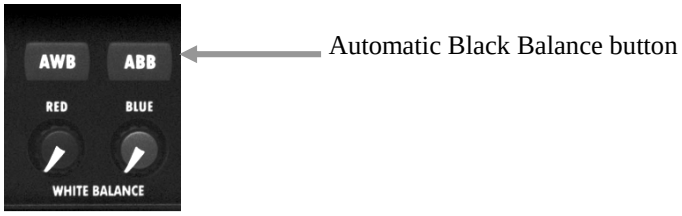
- Use up and down arrows to select **MODE**
- Press **SELECT BUTTON**.
- Use right arrow to display **MANUAL** option.
- Press **SELECT** button.
- Press **MENU** button to exit menu.

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.



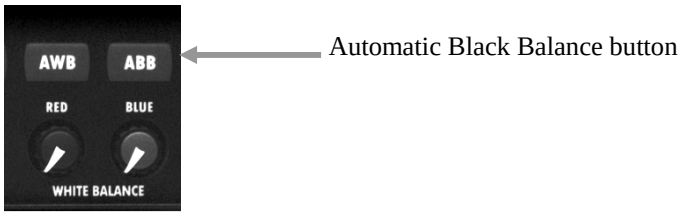
1. Close the iris or cap the lens to eliminate all light into the camera.
2. Press and hold the **ABB** button on the front panel to execute black balance.
3. During the process, the following messages display:

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 Paint 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 Paint menu.
3. Select “SHD AUTO: EXEC” in the Paint 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).

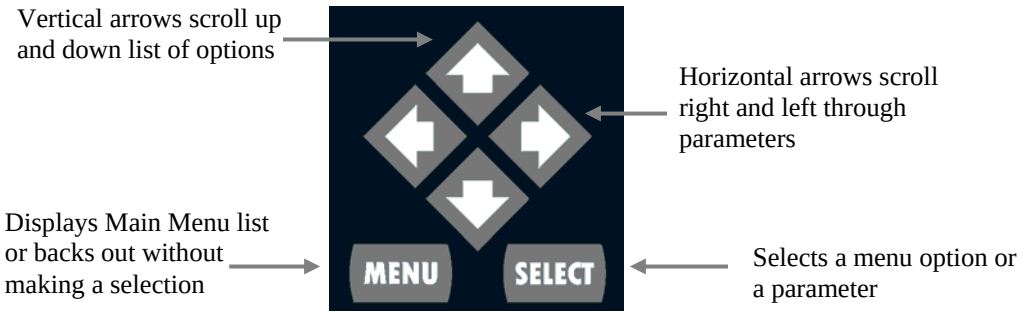
Menus

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

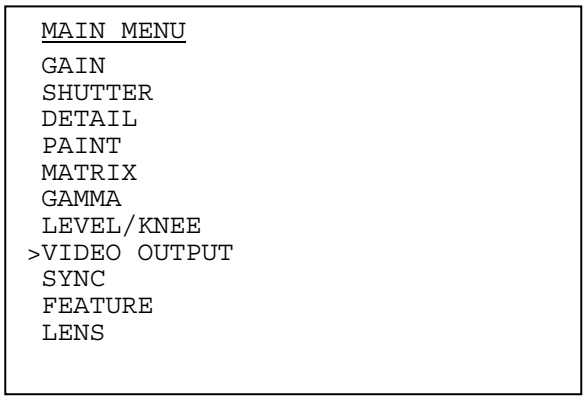
Menus may be navigated using the front panel keys as shown below.



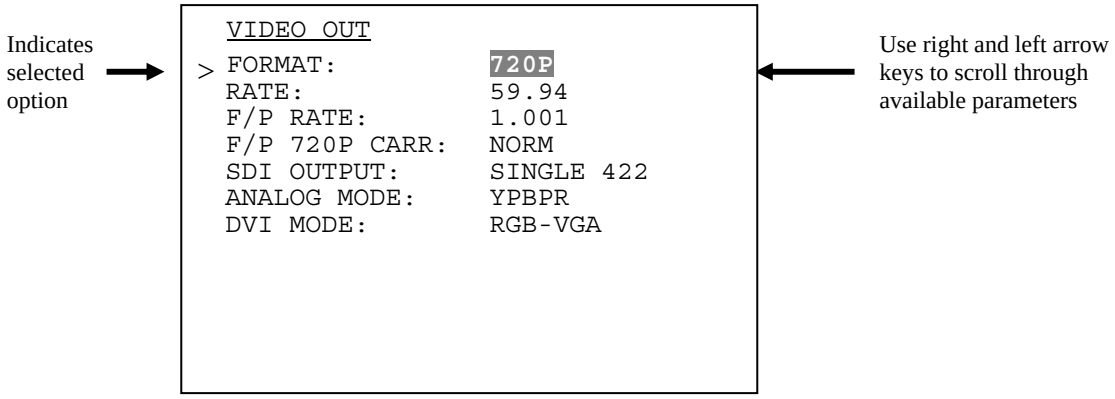
Selecting a Menu Option and Parameter

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

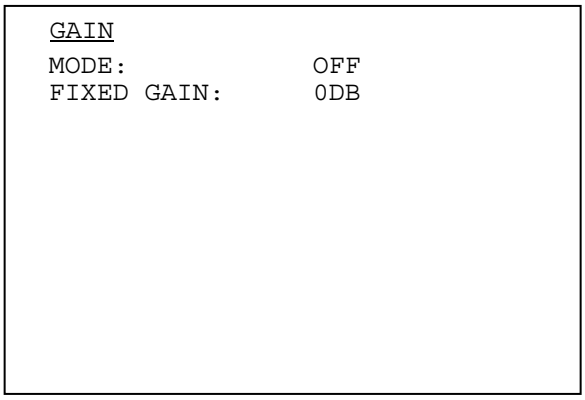
The user area contains 49 light measurement zones (7 x 7). Each zone can be set to ON or OFF.

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	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

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**.

Gain Menu



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

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

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
	SYNC-SCAN	Shutter is set to **SYNC-SCAN** position
	AUTO	Shutter is automatically adjusted
EXPOSURE	Default: OPEN	Shutter position is fully open.
	(See *Table 8* for options available per frame rate.)	
SYNC-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.

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 **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.

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								

SYNC-SCAN

When **MODE** is **SYNC-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

Area A:

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	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

Area B:

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	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

Area C:

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	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

Area D:

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	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

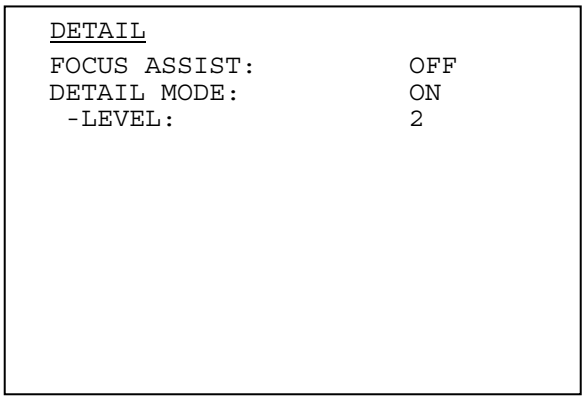
Area E:

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	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

Area F:

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	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

Detail Menu



Function	Options	Description
FOCUS ASSIST	ON	Enables Focus Assist mode.
	OFF (default)	Normal operation.
DETAIL MODE	ON (default)	Enables Detail Enhancer.
	OFF	No added enhancement processing.
DETAIL LEVEL	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.

Paint Menu

```
PAINT
                R    G    B    M
WHITE:          0    0    0
BLACK:          0    0    0    0
MAN SHADING:    0    0    0

COLOR TEMP:        D5600
WHT BAL MODE:      NORM
AWB AREA:          A
 -USER AREA:       EDIT
SHADING MODE:      OFF
 -AUTO SHD:        EXEC
```

Function	Options	Description
WHITE	Range: -99 to +99	White Paint control
BLACK	Range: -99 to +99	Black Level control
MAN SHADING	Range: -100 to +100	Manual shading calibration
COLOR TEMP	3200	Color system presets Sets white balance ranges and optimizes matrix for color correction
	D4300	
	D5600	
	D6500	
	FLAT	
WHT BAL MODE	NORM (default)	Normal white balance paint control
	MANUAL	Enables ability to manually adjust white balance using the red and blue gain knobs on the front panel. (See *Operations* .)
AWB Area	A (default)	Selects a predefined picture area to be used for AWB. Presets **A-F** are shown in Figure 8.
	B	
	C	
	D	
	E	
	F	
	USER	Selects the user defined white balance area. You must define the area first. You can define only one user area at a time.
SHADING MODE	AUTO, MAN, OFF	Sets mode for White Shading correction

COLOR TEMP

This sets the base color temperature for the camera's color system. White balance ranges will be adjusted to optimum, as well as setting the base for the 3CCD color correction function. Use the setting appropriate for the lighting in use.

It is recommended that COLOR TEMP be used whenever possible. Setting COLOR TEMP to FLAT will turn off the camera's optimal settings. When properly white balanced, this feature will yield more accurate results than color conversion filters, as the Iconix colorimetry system will represent truer color across the spectrum, with the added benefit of no light attenuation.

WHITE BALANCE MODE

When NORM, white desired white adjustment is available through AWB and White paint controls.

When MANUAL, white can only be adjusted via the front panel white balance knobs.

See the OPERATION section for more information on White Balance and Shading.

AWB Area Presets

The area presets for AWB 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
21	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

Area B:

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	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

Area C:

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	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

Area D:

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	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

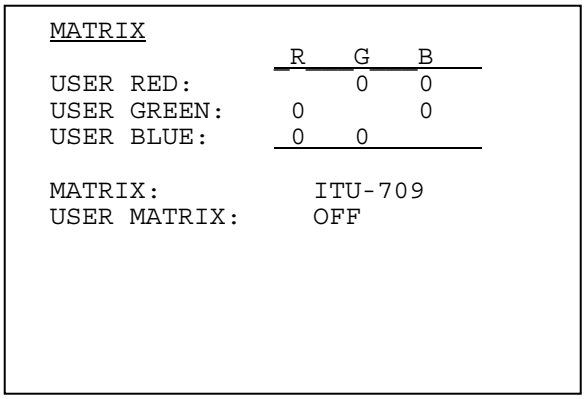
Area E:

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	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

Area F:

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	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

Matrix Menu



Function	Options	Description
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

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).

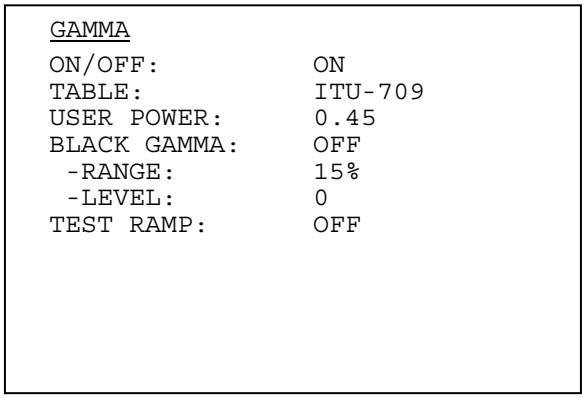
USER MATRIX

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.

Gamma Menu



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	

USER GAMMA

A specific power function can be used for Gamma transfer curve by selecting USER for TABLE, and a USER POWER. The curve can be further modified by adjustment of Black Gamma.

BLACK GAMMA

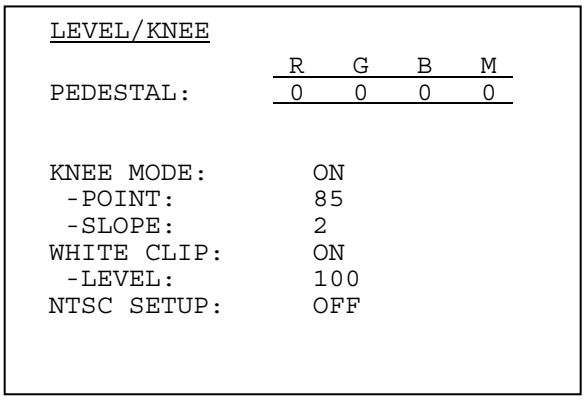
Black gamma adjustment is a stretch or crush applied to the selected table. BG RANGE sets the intercept point of the stretch/crush curve with the power function. BG LVL sets the relative amount of stretch or crush. A positive value (1 to 10) corresponds to a stretch curve. A negative value (-1 to -10)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

Level/Knee Menu



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	Disables knee functionality.
	ON (default)	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	Disables White Clip (same as 109 IRE).
	ON (default)	Enables White Clip.
WHT CLP LVL	Range: 90 ~ 109	Sets the maximum white/video level in IRE.
NTSC SETUP	ON	Adds 7.5IRE to Analog outputs.
	OFF (default)	

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.

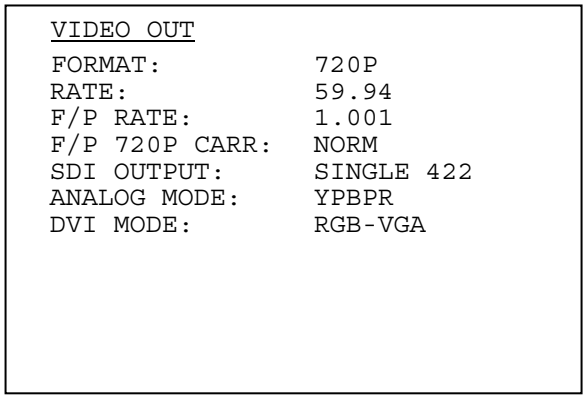
WHITE CLIP

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.

Video Out Menu



Function	Options	Description
Format	480i	Video format options.
	576i	
	720p	
	1080i	
	1080p	
	1080sF	
Rate	(Varies)	Rates available for the active format.
F/P Rate	1.001 (default)	Front Panel fractional Rate selection.
	1	Front Panel as shown
F/P 720P CARR	ON (default)	Enables Front Panel selection of doubled rates for 720p (where applicable).
	OFF	Native Rate
SDI OUTPUT	SINGLE 4:2:2	Single-Link 4:2:2 YCbCr
	DUAL RGB	Dual-Link 4:4:4 RGB
	DUAL YCBCR	Dual-Link 4:4:4 YCbCr
	DUAL 422	Dual-Link 4:2:2 YCbCr (auto mode for 1080p50, 1080p59.94, & 1080p60).
ANALOG MODE	YPBPR (default)	Selects colorspace for Analog output
	RGB	
DVI MODE	RGB-VGA (default)	Selects colorspace for DVI digital output
	RGB-VID	
	YCBCR-VID	

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
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)

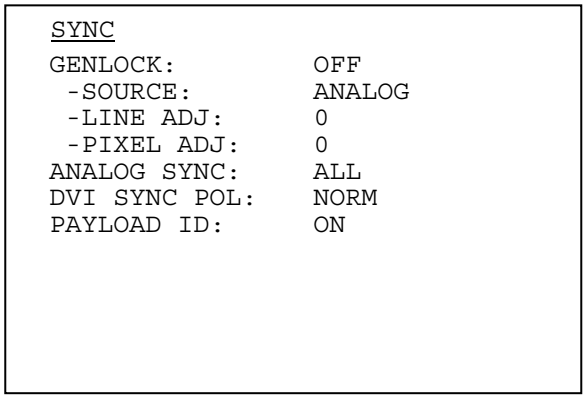
F/P 720P CARR
The front panel does not have an LED indicator for 720p frame doubling. The **F/P 720P CARR** option in the **VIDEO OUTPUT** menu is used to accommodate this. When set to **NORMAL**, no frame doubling is employed. When set to **FAST**, the frames will be doubled as shown in the table above.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

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**.

Sync Menu



Function	Options	Description
GENLOCK	OFF (default)	Camera will ignore external source.
	ON	Camera will attempt to sync to an external signal.
SOURCE	Analog, SDI, Fiber	Source signal for Lock
LINE ADJ	range varies	Lock adjustment in video lines
PIXEL ADJ	range varies	Lock adjustment in pixels
ANALOG SYNC	OFF	No Sync on analog signals.
	ALL	Sync on all channels.
	G/Y (default)	Sync on Green/Luma channel only.
DVI SYNC	NORM	Sync levels per specification
	INV	Inverted sync levels
PAYLOAD ID	ON (default)	
	OFF	

GENLOCK

The lock source may be either analog, SDI, or Fiber (if a receiver or transceiver SFP module is installed). Signal lock timing may be delayed or advanced by pixel and line increments.

ANALOG SYNC

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.

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

Feature Menu

```
FEATURE
DIGITAL NR:       OFF
4:3 ASPECT:       ANAMORPHIC
HORIZ FLIP:       OFF
NEG. IMAGE:       OFF
RCP ADDRESS:      0
RCP COMM MODE:    RS-232

LOAD STANDARD:    EXEC
LOAD FACTORY:     EXEC
```

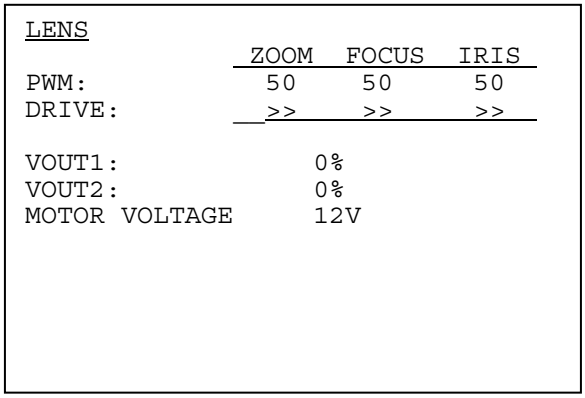
Function	Options	Description
DIGITAL NR	OFF (default)	Reduces visiblilty of some noise.
	ON	
4:3 ASPECT	ANAMORPHIC	16:9 Anamorphic in 4:3
	LETTERBOX	16:9 Letterboxed in 4:3
	CROP	Standard 4:3 center of cropped 16:9 image.
HORIZ FLIP	OFF (default)	Normal operation.
	ON	Flips output image horizontally.
NEG. IMAGE	OFF (default)	Normal operation.
	ON	Video levels and colors are inverted.
RCP ADDRESS		Unique address for RCP commands
RCP COMM MODE	RS-232 (default)	Selects communications protocol
	RS-485	
LOAD STANDARD		Loads a standard camera set-up
LOAD FACTORY		Restores original factory default settings

DIGITAL NR
Use to soften the harshness of some high-frequency noise.

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.



Function	Options	Description
PWM 1	Range = 0 ~ 100	Sets the motor drive speed of each
F/P DRIVE	FWARD >>	Use Right arrow button on front panel.
	BKWARD <<	Use Left arrow button on front panel.
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	Sets the voltage level of the motor drive channels.
	12V = default	

Motor DRIVE

Lens motor control was intended for Remote Control operation. However, motor control operations can be performed while the Lens Menu is on the screen.

Move the cursor to the desired **DRIVE** channel and press select to highlight. While selected, the left and right arrow keys can be used to drive the motor forward and reverse. The motor will be driven while the arrow is held down. Release the arrow to stop the motor.

Appendix A – Menu Screens

MAIN MENU

GAIN
SHUTTER
DETAIL
PAINT
MATRIX
GAMMA
LEVEL/KNEE
VIDEO OUT
SYNC
FEATURE
LENS

DETAIL

FOCUS ASSIST:	OFF
DETAIL MODE:	ON
-LEVEL:	3

GAIN

MODE:	OFF
FIXED GAIN:	0dB

FEATURE

DIGITAL NR:	OFF
4:3 ASPECT:	ANAMORPHIC
HORIZ FLIP:	OFF
NEG. IMAGE:	OFF
RCP ADDRESS:	0
RCP COMM MODE:	RS-232
LOAD STANDARD:	EXEC
LOAD FACTORY:	EXEC

SHUTTER

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

PAINT

	R	G	B	M
WHITE:	0	0	0	
BLACK:	0	0	0	0
MAN SHADING:	0	0	0	

COLOR TEMP:	D5600
WHT BAL MODE:	NORM
AWB AREA:	A
-USER AREA:	EDIT
SHADING MODE:	OFF
-AUTO SHD:	EXEC

MATRIX

	R	G	B
USER RED:		0	0
USER GREEN:	0		0
USER BLUE:	0	0	

MATRIX: ITU-709
USER MATRIX: OFF

VIDEO OUT

FORMAT: 720P
RATE: 59.94
F/P RATE: 1.001
F/P 720P CARR: NORM
SDI OUTPUT: SINGLE 422
ANALOG MODE: YPBPR
DVI MODE: RGB-VGA

GAMMA

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

SYNC

GENLOCK: OFF
-SOURCE: ANALOG
-LINE ADJ: 0
-PIXEL ADJ: 0
ANALOG SYNC: ALL
DVI SYNC POL: NORM
PAYLOAD ID: ON

LEVEL/KNEE

	R	G	B	M
PEDESTAL:	0	0	0	0

KNEE MODE: ON
-POINT: 85
-SLOPE: 2
WHITE CLIP: ON
-LEVEL: 100
NTSC SETUP: OFF

LENS

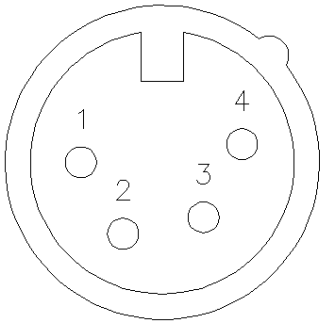
	ZOOM	FOCUS	IRIS
PWM:	50	50	50
DRIVE:	>>	>>	>>

VOUT1: 0%
VOUT2: 0%
MOTOR VOLTAGE 12V

Appendix B: Connector Pin-Outs

Power: DC 12V In

Pin Number	Description
1	GND
2	No Connect
3	No Connect
4	+12V DC



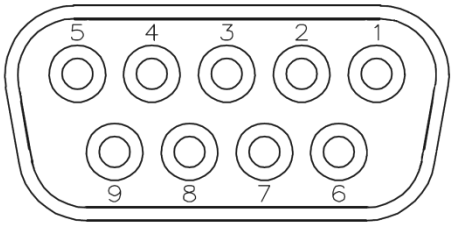
(view facing rear panel)

NOTES:
Connector is standard male XLR 4-pin.

Nominal Input Voltage: 12V DC
Minimum Input voltage: 9V DC
Absolute Maximum Input Voltage: 22V DC (peak)
3A maximum current requirement

Remote

Pin Number	RS-232 Signal	RS-485 Signal
1	DCD	
2	RXD	TXA (-)
3	TXD	RXA (-)
4	DTR	
5	GND	GND
6	DSR	
7	RTS	RXB (+)
8	CTS	TXB (+)
9	+12V DC	+12V DC



(view facing rear panel)

NOTES:
Connector is standard female DSUB-9.

When in RS-232 mode, the serial port is configured as DCE.

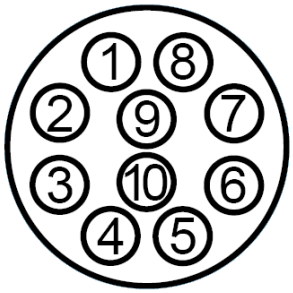
When in RS-485 mode, the serial port operates as "full-duplex" RS-485. Pin-out is Iconix "Slave" pin-out, no need for null modem style cabling when connected to equipment configured as "Master", such as Iconix RCP-160.

Pin 9 is unregulated voltage directly from main Power connector, protected by main power fuse.

Pins 7 & 8 (CTS & RTS) are tied together, and are not used
Pins 1, 4, & 6 (DCD, DTR, & DSR) are tied together, and are not used

Lens Drive

Pin Number	Signal
1	ZOOM-
2	ZOOM+
3	FOCUS-
4	FOCUS+
5	IRIS-
6	IRIS+
7	DC_V_2
8	DC_V_2
9	GND
10	GND



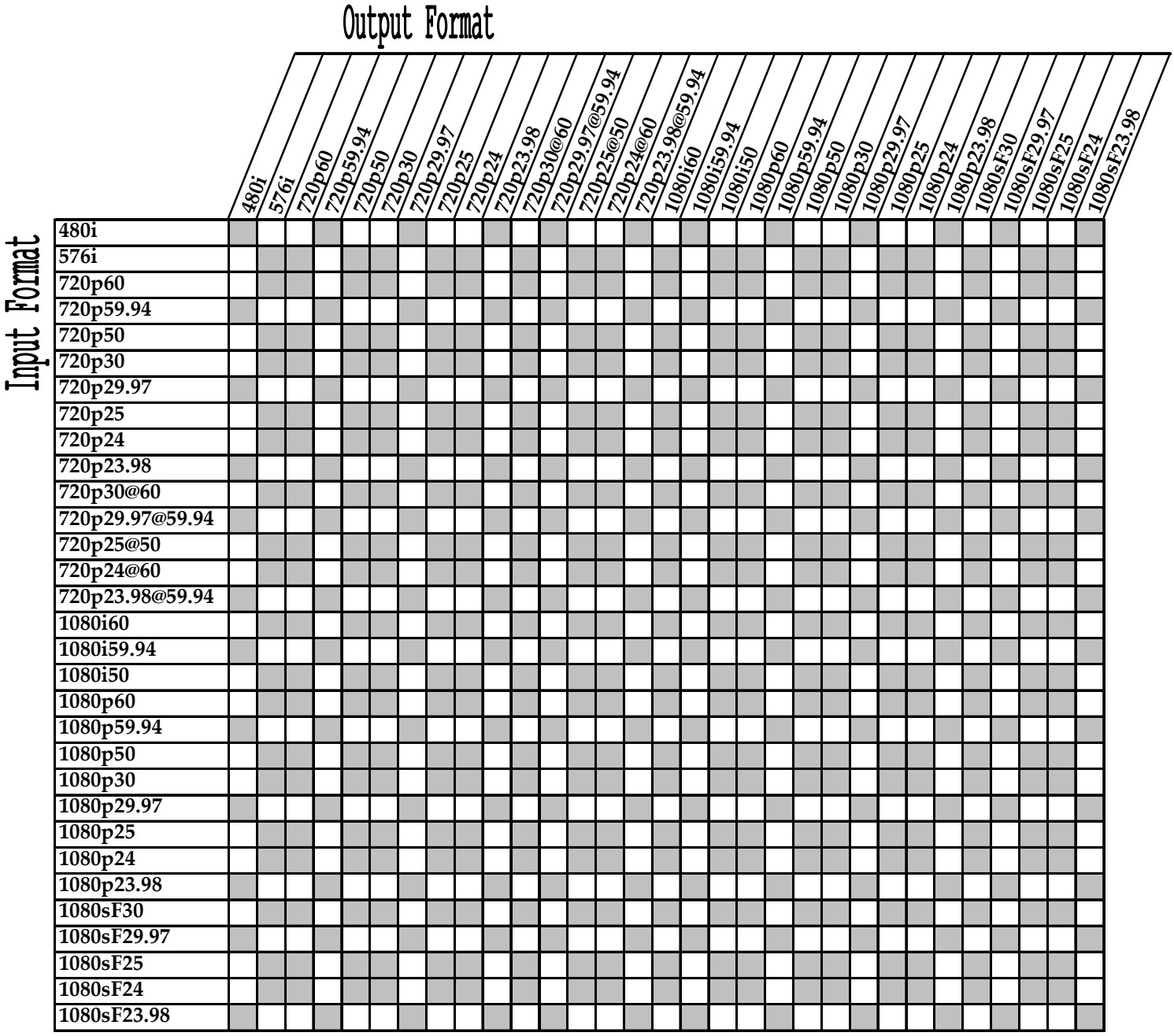
(view facing rear panel)

NOTES:
Connector is LEMO EGG.2B.310 type. Use with mating connector such as LEMO FGG.2B.310.

ZOOM, FOCUS, and IRIS are full-bridge DC motor driver outputs. Do not exceed 500mA of drive current.

DC_V_1 and DC_V_2 are programmable voltage sources, referenced to GND. These may be used to drive DC-style irises. Do not exceed 50mA of current from these outputs.

Appendix C: Genlock Compatibility

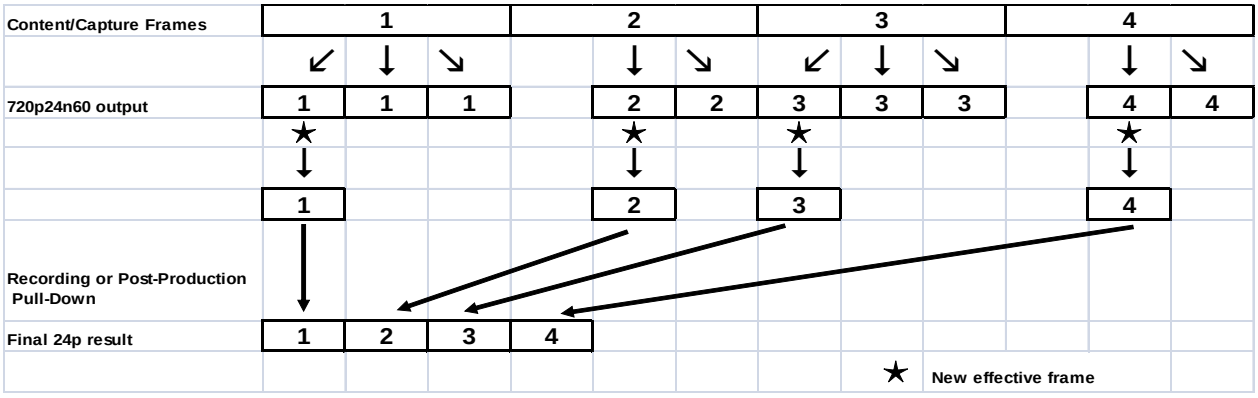


Appendix D: 720p Doubled Rates

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	
Displayed	**Actual**
23N59	720p23.98n59.94 (3:2)
24N60	720p24n60 (3:2)
25N50	720p25n50 (2:1)
29N59	720p29.97n59.94 (2:1)
30N60	720p30n60 (2:1)

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



Appendix E: 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	1080p: 23.98, 24, 25, 29.97, 30, 50, 59.94, 60 1080sf: 23.98, 24, 25, 29.97, 30
	1080i: 50, 59.94, 60
	720p: 23.98, 24, 25, 29.97, 30, 50, 59.94, 60
	576i: 50
	480i: 59.94
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
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	Analog Genlock: BNCx1, Tri-Level or Bi-level Sync
	SDI Genlock: BNCx1, SD-SDI or HD-SDI
	Fiber Optic Genlock: LCx1, SD or HD serial digital
	Remote-Control: RS-232, RS485, DSUB-9
Fiber Optic	SFP module: Dual TX, Dual RX, Transciever
Power Requirements	12VDC, 30W
Weight	Head: 2.3oz. (64g) CCU: 4.2lbs
Dimensions	Head: 1.32”W x 1.50”H x 1.92”D (34x38x49 mm)

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Part Number:

900002

Revision A1

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